S. HRG. 111–303

OFFSHORE ENERGY PRODUCTION

HEARING

BEFORE THE

COMMITTEE ON ENERGY AND NATURAL RESOURCES UNITED STATES SENATE

ONE HUNDRED ELEVENTH CONGRESS

FIRST SESSION

TO

RECEIVE TESTIMONY ON ENVIRONMENTAL STEWARDSHIP POLICIES RELATED TO OFFSHORE ENERGY PRODUCTION

NOVEMBER 19, 2009

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OFFSHORE ENERGY PRODUCTION

THURSDAY, NOVEMBER 19, 2009

U.S. SENATE,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,
Washington, DC.

The committee met, pursuant to notice, at 10:35 a.m. in room SD–366, Dirksen Senate Office Building, Hon. Jeff Bingaman, chairman, presiding.

OPENING STATEMENT OF HON. JEFF BINGAMAN, U.S. SENATOR FROM NEW MEXICO

The CHAIRMAN. All right, thank you all for coming. This is a hearing on environmental stewardship and offshore oil and gas development. These are vitally important issues to the long-term sustainability of our ocean resources and, obviously, to our national energy policy.

It's my hope that as part of this hearing we can focus on the facts surrounding offshore oil and gas production and its impact on the environment. At the end of the hearing, I hope we'll have a better understanding of these issues that will help us in the upcoming debate on these subjects on the Senate floor. In the hearing, we're following up on issues that were raised during the markup of our energy bill.

Policy suggestions were made by Senator Dorgan and others about ways of addressing environmental concerns in this area. These ideas included limitations on structures within the line-of-sight of the coastline and the creation of "no development" buffer zones of various sizes between the coast, and actual production activities offshore. I think we all agreed that such discussion would benefit from a better understanding of the facts involved and that a hearing that would focus on these issues would be useful.

The witnesses bring a wide variety of expertise to the subject. We have representatives from the Department of the Interior's Minerals Management Service, the oil and gas industry, experts on ocean resources conservation. Each of these witnesses has significant technical and scientific experience with oceans and energy development.

We look forward to a productive discussion. Let me call on Senator Murkowski for any comments she has.

[The prepared statement of Senator Bingaman follows:]

PREPARED STATEMENT OF HON. JEFF BINGAMAN, U.S. SENATOR FROM NEW MEXICO

Welcome, everyone, to this Full Committee hearing on environmental stewardship and offshore oil and gas development. The issues we will discuss today are vitally important both to the long term sustainability of our ocean resources and to our na-

tional energy policy. They are much debated, but unfortunately often with more heat than light on all sides.

It is our hope in this hearing to move away from rhetoric and to focus on the facts surrounding offshore oil and gas production and its impact on the environment. At the end of this hearing I hope that we will have a better understanding of these issues that will guide our work on the Committee and in the Senate going forward.

In this hearing we are following up on some issues raised during the markup of our energy bill earlier this year. Policy suggestions were made by Senator Dorgan and others about ways of addressing environmental concerns in this area. These ideas included limitations on structures within the line of sight of the coastline and the creation of no-development "buffer zones" of various sizes between the coast and production activities. I think we all agreed that such a discussion could benefit from a better understanding of the facts involved, and that a hearing focused specifically in this area would be useful.

I look forward to hearing more about the environmental concerns presented by offshore development, the technologies and procedures available to address those concerns, and policy ideas to further environmental protection in the context of this development. It is my hope that we can use our time today to focus on these issues in particular, given the need for additional factual information in this area.

The panel of witnesses here today brings a wide variety of expertise to these issues. We have representatives from the Department of the Interior's Minerals Management Service; the oil and gas industry; and experts on ocean resources conservation. Each of these witnesses has significant technical or scientific experience with oceans and energy development, and we look forward to a productive discussion.

STATEMENT OF HON. LISA MURKOWSKI, U.S. SENATOR FROM ALASKA

Senator MURKOWSKI. Thank you, Mr. Chairman. Again, appreciate you convening this very important and timely hearing.

I wasn't sure that we were actually going to be returning to the OCS development this year after completing our energy bill, but I'm glad that we're continuing the conversation.

To start, I want to again congratulate you and Senator Dorgan for working with Republicans to advance an offshore production title in the energy bill. I think we recognize that there's a need for balance in resource production with our responsibility to protect the environment. I do hope that we can improve on that production title and get the energy bill that we worked so hard on signed into law.

We have got a duty to prevent and ameliorate environmental harm, and certainly buffer zones are one of the many ideas that can help protect our coastal areas. But, as we consider our options, I think we need to recognize that some of these ideas make more sense than others. I'm glad that we have the panel here to explore some of those in greater detail.

Our committee has also debated revenue sharing. I believe it's critical to environmental stewardship. Revenue sharing should be thought of as a collaboration between the Federal Government and coastal producing States necessary to secure meaningful production and to ensure that States and communities can study and adjust for any environmental impacts they might face.

I'm proud of the bill that Senator Landrieu and I introduced, and I would remind my colleagues that there is a real and continuing need to reach agreement on this issue, because it's not going away. In the meantime, I am compelled to voice my growing concern over this administration's approach to OCS. It's now been over a year since the offshore moratoria were lifted. This committee has voted for greater offshore production to boost our economy and our en-

ergy security. But, there have been many executive actions, and perhaps a few that have not been taken, that appear to be taking us in an opposite direction.

As we speak, the President's Ocean Policy Task Force is developing recommendations that could effectively zone the oceans, in much the same way a local government could plan and zone a city.

In September, the NOAA Administrator signed a letter to MMS criticizing most of the 5-year plan and suggesting its own set of deferrals, removals, and buffer zones. Then there's the EPA, which has taken its authority for the permitting of OCS development outside of the Gulf of Mexico, and run with it. The agency has taken nearly 4 years now to consider an air permit for exploratory ships in our extremely remote Arctic areas.

Some 200,000 miles, mostly offshore in resource-rich area of Alaska, had been proposed as critical habitat for polar bear. The Interior Department has committed to viewing all of its actions through the lens of climate change. Then hanging over all of this is Interior's coming release of the revised 5-year plan, which will rank the sensitivity of coastal areas as a result of litigation by environmental groups.

So, Senator Dorgan's proposal for line-of-sight restrictions and a 25-mile buffer zone is really just one of the many pending limitations. But, at least it's originating here in the Energy Committee, where it can be properly vetted and debated. As we do, I think that we need to keep in mind just how many others are seeking authority that could be used to make the development process more complex than perhaps it should be. Instead of allowing many different agencies to control pieces of the offshore development process, we should be consolidating management, preferably to just one agency under this committee's jurisdiction.

We'll have to work hard to restore our authority over the OCS, but it would be better for both resource development and environmental stewardship if we did. I don't think that these goals are mutually exclusive, although perhaps some policies might tip that balance too far in one direction.

I'm glad we're having the opportunity to explore this here today, Mr. Chairman. Thank you.

Mr. CHAIRMAN. Let me—since we don't have many members, let me just see if Senator Dorgan would like to make a statement—and Senator Menendez, as well—before we hear from the witnesses.

STATEMENT OF HON. BYRON L. DORGAN, U.S. SENATOR FROM NORTH DAKOTA

Senator DORGAN. Mr. Chairman, thank you. I asked for this hearing because I think, in the midst of discussion about climate change and energy policy, the issue of energy security will almost certainly require us to pursue the production of new energy from virtually every source. The question is, How do we produce additional energy, American-produced energy, in a manner that is in harmony with our responsibilities for environmental stewardship?

During the debate earlier this year, I withheld an amendment that would have established in a requirement—a requirement that would set new standards on how oil and gas would have been pro-

duced on the Outer Continental Shelf, based on various types of technologies, in terms of projects—a project's distance to shore. I withheld that amendment, and yet you indicated you would hold this hearing.

I requested this hearing really to focus on the technical issues of environmental stewardship, rather than to rehash the tired questions and old questions, but ones that won't go away in other hearings, I assume, on State revenue sharing, royalty reform, the 5-year planning process, and so on.

I think this question of environmental stewardship, and the technical questions that relate to that, vis-a-vis, line-of-sight and 25 miles verses 45 miles, et cetera, are very, very important.

I do want to mention that, during the 2005 hurricane season, when Katrina and Rita tore through the Gulf of Mexico, we had some damage to facilities in the Gulf—168 platforms had some damage, 55 rigs, 560 pipeline segments—and yet there were no major oil spills. The total amount of petroleum that was spilled as a result of the two most vigorous storms in many, many, many decades was 15,000 barrels. That's about the size of an Olympic-size swimming pool. So, it suggests—and, I think, clearly suggests—that the technology has advanced in a very significant way. As a result of that, I offer the amendment that would open up the eastern Gulf. That had a 45-mile buffer zone, in the amendment that I offered. That eastern Gulf amendment, as you know, passed this committee.

The question with respect to the Outer Continental Shelf, all of which is now open, and the production in the Outer Continental Shelf, is, What would be done with respect to a buffer zone there? The amendment that I had offered would have restricted surface presence, have "no surface presence" on line-of-sight. It would have had a 25-mile-plus "no surface" restriction. But, I think it is important for us to have a discussion in a committee hearing like this. What about these buffer zones? What are the consequences of them? How do we do the things that are necessary to unlock the opportunities so that we can produce more American energy?

Mr. Chairman, you and I and Senator Domenici and Senator Talent were the first to offer legislation to open up Lease 181. A portion of that is now open as a result. In my judgment, more of those areas will become open on the Outer—well, more of those areas in the eastern Gulf will become open—all of it will become open as a result of our amendment if we get our bill to the floor at some point. Then the rest of the Outer Continental Shelf is open. So, the question is, How do we produce? With what environmental stewardship requirements do we begin this venture to produce more American energy?

So, I thank you very much for calling this hearing, and look forward to the witnesses' testimony.

Mr. CHAIRMAN. Thank you.

Senator Menendez, did you wish to make a statement before the witnesses——

STATEMENT OF HON. ROBERT MENENDEZ, U.S. SENATOR FROM NEW JERSEY

Senator MENENDEZ. Very briefly, Mr. Chairman. Thank you for the opportunity.

You know, for those of us who look at States, like New Jersey, with a coastal line that is a national treasure and incredibly important to our economy and tourism, and the fishing industries that are economic engines of our State, we have concerns for any threat or risk to our shore. That is taken as seriously as the desire to produce energy. We don't think it's an unfettered concern or an unreasonable concern.

You know, there's natural disasters. Hurricane Katrina and Rita alone spilled some 9 million gallons of oil and—offshore and onshore operations. We see that, in fact, this is—recently, the National Academy of Sciences study showed us that current cleanup methods are still incapable of removing more than a small fraction of the oil spilled in marine waters.

We look at the testimony this committee just most recently had, once again, where we had the Energy Information Administration say that the total unfettered drilling that some would seek on the Outer Continental Shelf would have no significant impact on domestic oil and natural gas production or prices. Or prices.

Finally, I look at just what happened in Australia, with an entity that is state-of-the-art and is operating here in the United States, and I see millions and millions of oil spilling and weeks before, in fact, they cap it off.

So, I know everybody says that can't happen here. But, the fact is that it has happened. MMS has over 40 documented spills of 47,000 gallons or more in the last decade or two—couple of decades, I should say.

So, you know, when I look at Rita, Katrina, I look at just what happened in Australia, it's a real cause for concern.

So, I appreciate the balance that you've brought to the panel, Mr. Chairman, in today's hearing, and look forward to the witnesses.

Mr. CHAIRMAN. Very good.

Let me introduce our witnesses, and then we'll hear from them. Dr. Walter D. Cruickshank is here. He is deputy director of the Minerals Management Service in the Department of Interior.

Thank you for being here.

Mr. Marvin Odum, who's not a regular witness, but a welcome witness here. He has been here before. He's president of Shell Oil Company in Houston.

Thank you for coming.

Mr. John Amos is president of SkyTruth in Shepherdstown, West Virginia.

Thank you for being here.

Mr. David Rainey is vice president of Gulf of Mexico Exploration with BP America.

Thank you for coming.

Mr. Jeffery Short is Pacific Science Director for Oceana, which is located in Juno, Alaska.

Thank you very much for being here.

If each of you could take 5 or 6 minutes and give us the main points you think we need to understand about these issues, that

would be greatly appreciated. Your full statements will be included in the record, so you don't need to go through it all with us. But, what are the main things we need to understand when we consider this set of issues.

Mr. Cruickshank, you wish to go ahead?

STATEMENT OF WALTER CRUICKSHANK, DEPUTY DIRECTOR, MINERALS MANAGEMENT SERVICE, DEPARTMENT OF THE INTERIOR

Mr. CRUICKSHANK. Thank you, Mr. Chairman, Senator Murkowski, and members of the committee. Appreciate the opportunity to discuss the Minerals Management Service's stewardship in promoting environmentally responsible energy and mineral development of the Outer Continental Shelf.

MMS's responsibilities extend over about 1.7 billion acres of the Outer Continental Shelf, or OCS. These responsibilities range from the initial resource assessments through the exploration, development, production, and, ultimately, the decommissioning of offshore facilities. We are charged with managing access to, and development of, oil and gas, renewable energy, and marine minerals in a manner that is operationally safe, environmentally sound, prevents waste, and provides a fair return to the public for its resources.

For over 50 years, the Department of the Interior and MMS have overseen the OCS program by enforcing regulations, developing standards, and conducting environmental and technological research. The committee asked me to highlight MMS's stewardship role with respect to oil and gas resources. I will provide a brief overview of three areas: how we determine which areas to lease, our environmental protections and standards over energy development, and our research programs. More detail on these topics can be found in my written statement, which I have submitted for the record.

The OCS accounts for about 27 percent of the oil and 14 percent of the natural gas produced in the United States. We manage access to this oil and gas through our 5-year OCS Oil and Gas Leasing Program. In developing this program, we evaluate the economic, social, and environmental values of all the resources of the ocean and the OCS, and we look at the potential impact of oil and gas exploration on these resources and on the marine, coastal, and human environments. After a 5-year program is finalized, there is further environmental review and consultation with other Federal agencies, State, local, and tribal governments, and other stakeholders before holding any individual lease sale. As a result of this process, additional areas may be excluded from leasing and mitigating measures may be required to address any potential impacts from exploration and development.

MMS's responsibilities do not end when the leases are executed. We oversee a regulatory program that mixes prescriptive requirements and performance-based goals: failsafe mechanisms, including emergency shutoff valves and other safety equipment that are tested regularly; a robust inspection and enforcement program, which conducts over 25,000 inspections per year; conservation requirements to ensure the greatest ultimate recovery of oil and gas from developed fields and to limit the flaring and venting of natural gas;

oil-spill planning and response, including plans for responding to worst-case scenarios, and we conduct over 30 unannounced spill drills every year to test the capabilities of implementing those plans. All of this is done in coordination with other Federal agencies and State governments.

We also administer a comprehensive environmental studies program that has invested about $840 million in research to support our stewardship role. We conduct studies in a variety of subject areas, including marine mammals, benthic biology, physical oceanography, fates and effects of discharges, and socioeconomics. Our research has added significantly to the scientific knowledge of the marine environment. For example, nearly 300 new marine species have been discovered as a result of the MMS studies.

Our goal is to provide the information necessary for decision-making and in an adaptive management framework, and to develop workable solutions, such as mitigation measures, for activities that could impact the environment.

MMS also funds research into operational safety, pollution prevention, and oil-spill response and cleanup through its technology, assessment, and research program. As part of this program, MMS manages the Ohmsett wave and test tank facility in New Jersey, which provides oil-spill response testing, training, and research opportunities to all comers.

One of the best examples of MMS's environmental stewardship is the Flower Garden Banks in the Gulf of Mexico, the northernmost coral reef in North America's continental shelf. Starting in the 1970s, the Department of Interior began extensive studies and monitoring of these coral reefs, leading to the development of "no activity zones" and buffer zones of up to 4 miles where drilling discharges are handled in a manner to prevent contact with the coral reefs. In 1988, MMS established a monitoring program that now represents the longest continuously operating coral reef monitoring program in the world. After the Flower Garden Banks became a national marine sanctuary in 1992, MMS partnered with NOAA to ensure continued protection of these reefs, which now have a higher cover of living coral than other reefs off Florida and most areas of the Caribbean. They're considered among the healthiest coral reefs in the world, while coexisting with oil and gas activity.

In conclusion, the Department of the Interior and MMS are poised to continue our commitment to environmental protection and safe operations. We look forward to working with the committee as we move forward with our OCS oil and gas renewable energy and minerals programs.

Mr. Chairman, this concludes my remarks and I would be happy to answer questions.

[The prepared statement of Mr. Cruickshank follows:]

PREPARED STATEMENT OF WALTER CRUICKSHANK, DEPUTY DIRECTOR, MINERALS MANAGEMENT SERVICE, DEPARTMENT OF THE INTERIOR

Thank you, Chairman Bingaman, Senator Murkowski, and members of the Committee, for the opportunity to discuss the Minerals Management Service's (MMS) stewardship in promoting environmentally responsible energy and mineral development on the Outer Continental Shelf (OCS).

The Department of the Interior (Department) and its agencies, including the MMS, are public stewards for much of our nation's natural resources. The Department manages 500 million acres of land, one-fifth of the land mass of the U.S., and

over 1.7 billion acres of the OCS. About 1/3 of the nation's domestic oil and gas production comes from Federal resources managed by the Department.

This land base includes areas that boast some of the best renewable energy resources available for development today. On the OCS, the Department of Energy's National Renewable Energy Lab has identified more than 1,000 gigawatts of wind potential off the Atlantic coast, and more than 900 gigawatts of wind potential off the Pacific coast. Secretary Salazar is committed to taking the initiative in these areas by contributing to a clean energy-based economy that promotes investment and innovation here at home and in an environmentally responsible manner. Collectively, the Administration's efforts to develop a clean energy economy will generate jobs, improve our energy security by reducing our dependence on oil, and reduce greenhouse gas emissions.

We recognize that we will likely be dependent on conventional sources of energy—oil, gas and coal—for a significant portion of our energy for some time to come. Therefore, it is important that the Department continue careful stewardship of energy resources on public lands, both onshore and on the OCS. With these objectives in mind, the Department has been actively engaged in the Interagency Ocean Policy Task Force. The Task Force, established by President Obama is led by the White House Council on Environmental Quality and charged with developing a recommendation for a national policy that ensures protection, maintenance, and restoration of the ocean, our coasts and the Great Lakes. It will also recommend a framework for improved stewardship, and effective coastal and marine spatial planning designed to facilitate better management of multiple uses of the oceans, coasts, and Great Lakes, including oil and gas operations and emerging renewable energy resources well into the future. We strongly support this coordinated approach to sustainable management of our ocean, coastal, and Great Lakes resources.

The MMS is charged with managing access to and development of the Nation's energy and mineral resources on the Federal OCS in a manner that is operationally safe and environmentally sound, prevents waste, and provides a fair return for public resources. MMS is also responsible for the management of the mineral revenues generated from Federal and American Indian lands onshore and the Federal OCS.

For 50 years, the Department of the Interior and MMS have overseen the OCS oil and gas program by enforcing regulations, developing standards, and conducting technology and environmental research. The Committee has asked me to highlight MMS'sstewardship role in managing OCS oil and gas resources. I will focus on three areas (1) how MMS determines which areas to lease to meet the Nation's energy needs; (2) the environmental protections and standards for developing OCS energy and mineral resources; and (3) MMS research programs.

DETERMINING AREAS TO LEASE

The MMS has cradle-to-grave management and oversight responsibility for oil and gas leasing, exploration, and development on the OCS. Section 18 of the OCS Lands Act requires the Secretary of the Interior to prepare a 5-Year oil and gas leasing program (5-Year Program) that consists of a 5-year schedule of proposed lease sales that shows size, timing, and location of leasing activity as precisely as possible. The OCS Lands Act mandates that the 5-Year Program must balance the priorities of meeting national energy needs, ensuring environmentally sound and safe operations, and assuring receipt of fair market value to the taxpayer. Before any particular lease sale is considered, it must be included in an approved 5-Year Program.

The process to develop a 5-Year program includes three separate comment periods, two draft proposals, a final proposal, and the development of an environmental impact statement that informs the Secretary's decision making. During this process MMS evaluates the economic, social, and environmental values of the renewable and nonrenewable resources in the OCS and the potential impact of oil and gas exploration on other resource values of the OCS and the marine, coastal, and human environments. Throughout the stages of developing the plan, MMS analysis is based on science and research obtained through the MMS Environmental Studies Program, Technology Assessment and Research Program, and studies from other sources such as other Federal and State agencies, the National Academy of Science, and universities.

In order to balance the priorities of national energy needs, environmental protection and receipt of fair market value, the OCS Lands Act requires the Secretary to consider information on the geographical, geological, and ecological characteristics of each region; equitable sharing of development benefits and environmental risks; regional and national energy markets; other uses of the OCS; interest of potential oil and gas producers; the laws, goals and policies of the affected states; the relative environmental sensitivity and marine productivity of different areas of the OCS; and

the relevant environmental and predictive information for different areas of the OCS.

The 5-Year Program initiates the process of deciding how, when and where it is appropriate to offer oil and gas leases on the OCS. As the leasing process moves forward, the potential areas to be offered for lease cannot be expanded from those available in the previous step without re-initiating the development of a new 5-Year Program. Thus, the entire leasing process proceeds from broad-based planning to a narrower focus as actual development is proposed. For example, it was at the final proposal stage of the current 2007-2012 5-Year Program, that the area 25-miles seaward of the coastline of the Chukchi Sea Planning Area was deferred from leasing activity to reduce potential environmental impact to the resources. For the Beaufort Sea Planning Area, the Barrow and Kaktovik bowhead whale hunt areas were also excluded from leasing. In the Central Gulf of Mexico Planning Area, the proposed final program included the commitment reached with the Governor of Alabama to avoid surface occupancy in a 15-mile area offshore Baldwin County, Alabama in order to mitigate visual impacts; this stipulation has been consistently included at the lease sale stage for all sales in this area since 1999.

After a new 5-Year Program is finalized, there is further environmental review and consultation with other Federal agencies and state, local and Tribal governments before holding any individual lease sale. As with the 5-Year Program development, the individual sale process is conducted in an open, transparent, predictable manner. From the Call for Information/Nominations to the Final Notice of Sale, the individual lease sale process, described in section 19 of the OCSLA, includes many opportunities for public input, in addition to the opportunities offered by necessary procedures under the National Environmental Policy Act and Coastal Zone Management Act. In all, there are eight opportunities for public comment before a final decision is made to hold any OCS sale. As a result of environmental review and consultations in this pre-lease sale process, additional areas may be excluded from leasing and mitigating measures may be required to address any potential impacts from oil and gas exploration and development. For example, MMS has for decades ensured protection of the Flower Garden Banks in the northwest Gulf of Mexico, by prohibiting leasing in the immediate area and restricting activities in a surrounding buffer zone.

OVERSIGHT OF OCS LEASES

MMS's stewardship responsibilities do not end once leases are executed; they have only begun. The Department of the Interior's OCS regulatory program has been in existence for 50 years. The program continues to evolve with the goals of improving effectiveness and efficiency and ensuring preparedness for new technological challenges such as deep water or Arctic operations.

Our regulatory framework encompasses a variety of components which address environmental, safety, and conservation issues. This framework includes a three-tiered approach to regulation, relying upon prescriptive requirements, performance-based goals, and consensus-based technical standards incorporated into MMS regulations. (A consensus-based technical standard is an industry standard where all concerned parties are given a voice in its development. While this process seeks agreement with most participants, it also resolves or mitigates the objections of the minority. MMS has incorporated 97 such standards into our regulations. The MMS continually reviews these regulations to update and revise them to ensure that they include the most effective requirements for promoting safety and environmental protection on the OCS.)

Plan Submissions

Once a lease has been issued, a lessee/operator must submit plans for MMS approval before beginning any activity. The lessee/operator must meet certain criteria documented in a site-specific Exploration Plan (EP) before beginning exploratory drilling on a lease. If exploration results are favorable, the lessee/operator moves to the production and development phase of its operations. The lessee/operator must submit a Development and Production Plan (DPP) or a Development Operations Coordination Document (DOCD).

In water depths greater than 400 feet, the lessee/operator must also submit a Deepwater Operations Plan (DWOP) and a Conservation Information Document (CID). The purpose of the DWOP is to ensure that MMS has sufficient information to review any development project that uses non-conventional production or completion technology (in most cases, floating or subsea production systems) from a total system approach. MMS evaluates the system to determine whether the project will be properly developed, particularly from the standpoint of operational safety and en-

vironmental protection issues. The purpose of the CID is to ensure that all economically producible reservoirs are developed.

Each EP, DPP or DOCD must demonstrate that the proposed activities are conducted in a manner that—

- Conforms to Federal laws and regulations
- Is safe
- Prevents waste, conserves natural resources, and protects Federal interests
- Does not unreasonably interfere with other uses of the OCS
- Does not cause undue or serious harm or damage to the human, marine, or coastal environment.

An Application for Permit to Drill (APD) must be submitted to MMS for each and every well drilled on the OCS. Written approval is required before an operator may begin to drill any well, sidetrack, bypass or to deepen a well. The MMS requires each lessee/operator to take necessary precautions to keep wells under control at all times. The oil spill financial responsibility requirements must also be met.

Fail-Safe Mechanisms

Drilling and production safety equipment used on the OCS must be designed, installed, used, maintained, and tested in a manner to assure the safety and protection of the human, marine, and coastal environments. All wells open to hydrocarbon-bearing zones below the surface must be equipped with safety devices that will shut off the flow from the well in the event of an emergency, unless the well is incapable of flowing. All surface production facilities, including separators, treaters, compressors, headers, and flowlines, must be designed, installed, and maintained in a manner that provides for efficiency, safety of operations, and protection of the environment. Surface-and subsurface-controlled safety valves and locks must conform to the requirements of MMS regulations. Production facilities also have stringent requirements concerning electrical systems, flowlines, engines, and firefighting systems. The safety-system devices are tested by the lessee at specified intervals.

Inspections

MMS conducts announced and unannounced inspections of OCS facilities and any vessels engaged in drilling or downhole operations to determine whether an operator's performance is acceptableyear-round. Surprise unannounced inspections foster a climate of safe operations, maintain an MMS presence, and focus on operators with a poor performance record. Noncompliance with requirements for specific installations or procedures is followed by prescribed enforcement actions consisting of written warnings or shut-ins of platforms, zones (wells), equipment, or pipelines. In the event noncompliance is detected, the inspector takes the appropriate enforcement action. If an operator is found in violation of a safety or environmental requirement, a citation is issued requiring that it be fixed within 7 days. The violation may call for the particular well component, production component, or the entire complex to be shut in.

The Secretary also has other remedies, including the assessment of civil penalties for failure to comply with responsibilities under the law, a license, a permit, or any regulation or order issued.

Coordination

Throughout the 5-Year Program, individual sale, and regulatory processes, MMS consults with various Federal, state, and local agencies that share a stewardship role in managing the OCS. MMS consults with the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Fish and Wildlife Service to meet the requirements of the Endangered Species Act. MMS meets with tribal leaders in accordance with government-to-government consultation requirements and to incorporate their views in decisions. MMS and other agencies routinely collaborate to develop Memoranda of Agreement on various areas of overlapping responsibility.

Exploration and production activities proposed to MMS for approval must undergo environmental reviews by other federal agencies in compliance with more than ten statutes, executive orders and international agreements, in addition to the extensive environmental analysis required under NEPA. For example, proposed activities are examined for potential impacts to endangered and threatened species and habitat under the Endangered Species Act, to fish and habitat under the Magnuson-Stevens Fishery Conservation and Management Act, and to cultural resources under the National Historic Preservation Act. Evaluations of potential effects on marine mammals, birds, coral reefs, water quality, air quality, Indian sacred sites, and environmental justice also take place under separate consultation processes. Further, MMS coordinates with affected states under the Coastal Zone Management Act to ensure

any MMS-approved activities are consistent with a state's federally-approved coastal management program. All of these environmental reviews are considered by MMS, along with the NEPA analysis, to make decisions on whether to approve an activity, and if so, what mitigation and monitoring measures must be put in place to eliminate or minimize any potential for adverse affects to these valuable marine resources.

In addition, in 2004, MMS entered into a Memorandum of Understanding with the U.S. Coast Guard (USCG). MMS interacts with the USCG on a multitude of mission areas at all levels from Headquarters down to the field units. For example, MMS has been authorized to oversee the Fixed Platform Self-Inspection Program on behalf of the USCG, and frequently exchanges information with the USCG to clarify policy issues and provide compliance statistics. MMS also interacts with the USCG at the Region and District levels to coordinate overlapping areas of offshore inspection and accident investigation field activities.

The MMS has been consulting with the military for more than 25 years at both the planning and operational stages to ensure that each agency meets the requirements of its mission while not unduly interfering with the other. Coordination under a 1983 MOA between the Department and the Department of Defense has yielded no serious conflict. For example, seven military communication towers installed by the U.S. Air Force offshore Mobile, Alabama support Air Combat Maneuvering Instrumentation; MMS coordinates with the Air Force to ensure non-interference with military operations in that area. Oil and gas activities are restricted so that no activity can take place within 500 feet of a tower site, and unobstructed lines of sight must be maintained between towers. The MOA is in the process of being updated to more accurately reflect the current status of the OCS and the new offshore renewable energy program.

Conservation of Resources

Part of the MMS mission is to manage ocean energy and mineral resources on the OCS to enhance public benefits, promote responsible use, and realize fair value. In order to accomplish this, MMS emphasizes the importance of conservation principles, which maximize the ultimate recovery of oil and natural gas from currently producing reservoirs. Sound conservation practices also ensure that the Nation reaps the full benefits of OCS development, including royalty revenues to the U.S. Treasury as well as domestic energy.

Through regulation and oversight, MMS requires a lessee/operator to conform to sound conservation practices that ensure all recoverable oil and gas reserves are produced and enhanced recovery is used whenever possible. Enhanced recovery operations include a variety of methods that alter the natural forces in a reservoir to increase the ultimate recovery of oil and gas. To this end, in water depths greater than 400 feet, operators must submit conservation information documents (CID). The CID's submitted by the operator undergo a detailed review by a multidisciplinary team composed of a petroleum engineer, a geologist and a geophysicist. This team reviews the CID to ensure that all economically producible hydrocarbon-bearing zones are developed in an efficient manner. Waste of hydrocarbons could occur if producible hydrocarbon reservoirs are bypassed.

In addition, all requests to revise or abandon projects in deepwater are reviewed to ensure that wells are not prematurely abandoned before all economically producible reserves are recovered as outlined in the CID.

In addition, MMS is revising its regulations on flaring and venting of natural gas. Flaring and venting are only allowed after receiving prior approval from MMS (MMS may deny a request to flare or vent). The new regulations will set clearer limits on natural gas flaring and venting and require operators to report the amount of natural gas they flare separately from the amount of natural gas they vent. In addition, we will require operators to install natural gas flare/vent meters on any facility that processes more than 2,000 barrels of oil per day. These changes will give MMS better data on natural gas flaring and venting operations on the OCS.

Oil Spill Planning and Preparedness

The Oil Pollution Act of 1990 and Executive Order 12777 gives DOI/MMS authority over oil spill planning and preparedness for facilities in state and Federal offshore waters that handle, store, or transport oil (excluding deepwater ports). The MMS Oil Spill Program was established to oversee planning and preparedness activities of operators of regulated facilities in offshore waters. The goal of the program is to ensure that, during a response, those who will operate oil spill response equipment or serve on management teams are prepared to do so in a manner that prevents or minimizes safety hazards to responders and the public, and negative impacts to the environment.

Affected offshore operators must prepare an oil spill response plan for MMS approval that includes details on how they will respond to a worst-case discharge scenario from both near-shore and far-shore locations. Contents of oil spill response plans include spill management team members, certification of contracts with oil spill removal organizations, notification requirements, sensitive resources, dispersant use plans, platform and pipeline information, and specific emergency management procedures. On an annual basis, MMS conducts over 30 unannounced oil spill drills to verify that operators are prepared to quickly and efficiently respond to a spill from one of their facilities.

MMS RESEARCH PROGRAMS

The MMS is a leading participant in and supporter of scientific research relating to the ocean environment. Environmental stewardship is emphasized in all phases of OCS activity from the development of the 5-Year Program through platform decommissioning and removals. A fundamental goal of MMS's Environmental Studies Program is to develop workable solutions for those activities in the OCS that could adversely affect environmental resources. Since the program'sinception in 1973, more than $867 million has been spent on environmental research to manage development of offshore energy and mineral resources. This allows MMS to determine how to maintain safety and environmental protection while approved exploration and development continue. In fiscal year 2008 alone, 29 environmental studies were contracted at nearly $16 million, and MMS completed 320 environmental assessments and two full, detailed environmental impact statements.

In many areas, MMS research has added significantly to scientific knowledge of the marine environment. Nearly 300 new marine species have been discovered as a result of the MMS studies. One of these discoveries is the fascinating "iceworm," that lives on the surface of frozen methane hydrate in deep waters of the Gulf of Mexico.

One of the most important focuses for scientific study in the Alaskan offshore area has been the bowhead whale. Distinctive for its huge, comb-like baleen and thick blubber, the bowhead migrates annually between the Canadian Beaufort Sea and the Bering Sea. This large whale is vitally important to Alaska Native subsistence hunters and coastal villages in Alaska that are located along the migration route. The whale is protected by U.S. laws and has been designated as an endangered species. Since 1979, the MMS has funded and for many years conducted the "Bowhead Whale Aerial Survey Project"to survey the bowhead whales'fall migration through the Western Beaufort Sea. During many summers between 1979 and 1991, the MMS funded aerial surveys in the Chukchi Sea for marine mammals. Since 2008, MMS has funded the "Chukchi Offshore Monitoring in Development Area"to provide aerial surveys of the migration in the Chukchi Sea Planning Area. This project is coordinated through NOAA's National Marine Mammal Laboratory. The MMS uses the aerial survey information from the Beaufort and Chukchi Seas in the environmental review of OCS activities. Further, the information is available for any other entity to use and is posted on MMS website and the NOAA Fisheries Alaska Fisheries Science Center website.

The MMS also funds research into operational safety, pollution prevention, and oil spill response and cleanup capabilities through its Technology Assessment and Research (TAR) Program. In fiscal year 2008, the MMS funded 29 TAR studies at nearly $3 million. The components of the TAR Program include the Operational Safety and Engineering Research program that addresses technological issues associated with the complete spectrum of oil and gas operations ranging from the drilling of exploratory wells to the removal and decommissioning of facilities on the OCS; the Oil Spill Response Research (OSRR) program that covers a wide spectrum of oil spill response issues to improve the knowledge and technologies used for the detection, containment and cleanup of oil spills that may occur on the OCS; and the Renewable Energy Research program that addresses technology and engineering issues associated with renewable energy projects on the OCS.

This research enables MMS managers to make better decisions in evaluating operational proposals and enables regulators to consider the latest technological advancements in enacting new regulations. As a result, the MMS has a robust regulatory system designed to prevent accidents and oil spills from occurring. This includes redundant well control equipment, emergency plans, and production safety systems as well as a host of other requirements. This has proven effective both in the wake of hurricanes in the Gulf of Mexico and in the Arctic conditions on the Alaska OCS.

Through the OSRR program, MMS also manages the Ohmsett wave and test tank facility at the Naval Weapons Station Earle Waterfront in Leonardo, New Jersey.

Ohmsett provides oil spill response testing, training, and research opportunities to government, industry, academia, and private organizations on a reimbursable basis. Standard test protocols are used at Ohmsett to evaluate oil spill containment booms and skimmers. Ohmsett provides the intermediate step between small-scale and open water testing of equipment. An estimated 95% of the performance data on mechanical equipment used today was obtained at Ohmsett. Ohmsett is also developing the capability to test renewable energy wave and current systems.

EXAMPLES OF MMS STEWARDSHIP OF LEASED AREAS ON THE OCS

One of the best examples of MMS environmental stewardship is at the Flower Garden Banks in the Northwest Gulf of Mexico. These two banks are the northernmost coral reefs on the continental shelf of North America and have a higher cover of living coral than other reefs off Florida or most areas of the Caribbean. They are considered among the healthiest coral reefs in the world. They also lie in an area of the Gulf of Mexico with extensive hydrocarbon reserves.

Beginning in the early 1970s, MMS initially required extensive monitoring studies of the reefs related to each energy development activity, typically many miles away. This requirement was later dropped and buffer zones were developed to prevent any possible impacts to the coral habitats from energy development activities including physical contact as well as discharges from drilling activities. Required protection measures range from specific areas where no activity of any kind is allowed, up to a four-mile radius where all drilling discharges are required to be transported or shunted to near the sea bed in deeper water preventing any transport onto the coral reefs.

Even though surrounded by numerous active oil and gas platforms, these coral reefs remain extremely healthy, while the majority of coral reefs all over the world suffer from extensive mortality due to heat stress and land-based sources of impacts. One existing platform structure is located just one mile from the coral reef at the East Flower Garden Bank. This platform predates, and is located inside the boundaries of the Flower Garden Banks National Marine Sanctuary. It has served as a research station in the past through cooperative arrangements with industry. Although MMS began research and monitoring at the Flower Gardens in the 1970s, both NOAA and MMS began sharing the expense of annual monitoring of the reefs beginning shortly after their designation as a sanctuary in 1992.

The MMS has also been a leader in the protection of deep-sea biological communities, particularly chemosynthetic communities and cold water corals. Chemosynthetic communities (animals living independent of photosynthesis required by most all other life on earth) were first discovered in the Central Gulf of Mexico during an MMS-funded study of the deep continental slope in 1984. MMS recognized the importance of these unusual habitats and this particular project was extended specifically to study these new communities for the first time. Through MMS studies, chemosynthetic communities in the Gulf of Mexico are the best understood ecosystems of their kind anywhere in the world. Avoidance regulations were established beginning in 1988 and adapted over time as we learned more about these communities, leading to increased buffer distances from both energy production discharge locations and physical impacts such as anchors.

MMS has also been at the forefront of the study of cold water corals beginning in the 1990s. The most extensive deep coral habitat in the Gulf of Mexico was discovered in 1,500 feet of water southeast of Louisiana in 1993, during a standard visual survey required by MMS prior to operations. Through an adaptive management approach, regulatory policies are being revised to incorporate recent MMS scientific findings. Two recent studies have determined that very sensitive deepwater coral habitats occur as shallow as 300 meters. Amending MMS's regulatory policies to require review for these coral habitats beginning at 300 meters rather than 400 meters, will result in extended avoidance and buffer distances from all potential deep water coral habitats and protect these corals.

Historic preservation is another aspect of MMS's protection of theoffshore environment. The MMS considers the effect of all its actions, including lease sales, studies and permits, on the cultural heritage of the Nation. To meet this responsibility, it requires the oil and gas industry to conduct marine remote-sensing surveys that may identify shipwrecks. As a result, a highly sought-after World War II German submarine, the U-166, was discovered 45 miles from the mouth of the Mississippi River through the joint efforts of MMS and the oil industry charged with conducting the surveys. The U-166, the only German submarine sunk in the Gulf of Mexico, rests in the crater it created when it was sent to the bottom by a depth charge in the summer of 1942, shortly after the U-166 torpedoed and sank the passenger freighter S.S. Robert E. Lee. The wreckage of the submarine was found in 5,000 feet

of water. The U-boat's whereabouts had long been disputed and it was thought to lie far from its actual resting-place. MMS archaeologists were part of the scientific team that was instrumental in locating and identifying the World War II U-boat. The discovery solved a 59-year old mystery and ended decades of fruitless searching.

In addition, we have just finished the third year of a four-year project jointly sponsored by MMS and NOAA's Office of Ocean Exploration and Research, to better understand ocean ecosystems, corals and submerged historic and cultural resources in the Gulf of Mexico. By working together, we combine our talent, funding and physical resources to meet important objectives for both agencies with better results and lower costs than either agency could realize alone.

CONCLUSION

The Department and MMS are poised to continue their vital roles in managing OCS conventional and renewable energy resources. The magnitude and complexity of being a responsible steward requires a continued commitment to environmental protection and safe operations on the OCS. The MMS takes OCS stewardship responsibilities seriously and is committed to regulating the development of the Nation's energy and mineral resources through measures to ensure environmental protection and safe operations, continued research, and requiring fair returns and accurate accounting of revenue generated from the Federal resources.

We welcome your input on our Nation's energy initiatives and look forward to working with the Committee as we move forward with our OCS energy and minerals programs. Mr. Chairman, this concludes my remarks. I would be happy to answer any questions.

Mr. CHAIRMAN. Thank you very much.

Mr. Odum, please go right ahead.

STATEMENT OF MARVIN E. ODUM, PRESIDENT, SHELL OIL COMPANY, HOUSTON, TX

Mr. ODUM. Thank you, Chairman Bingaman, Ranking Member Murkowski, members of the committee. Thank you for the opportunity to testify today on environmental stewardship as it relates to offshore oil and gas production.

I'd like to begin by sharing a couple of relevant statistics. Global energy demand is projected to increase by 50 percent over the next 20 years, and could double by the year 2050. The world faces a daunting challenge, how to meet this escalating demand in ways that protect the environment.

Now, it's very clear that we will need a wide range of energies, particularly over the next several decades, including alternatives, renewables, nuclear, and more oil and gas from the Outer Continental Shelf. Now, fortunately, we're not forced to choose between OCS development or the environment. We can have both.

Today, I would like to address questions that often come with discussions of OCS exploration and production, and explain some of the technologies and safeguards that Shell and the industry have in place to protect the environment.

As a frame of reference, more than 30,000 wells have been drilled in the Gulf of Mexico, and thousands of scientific studies have been conducted by government, academia, and industry, and have shown that we can, and do, manage and mitigate environmental impacts responsibly. Our record continues to improve.

We recognize, in the context of a comprehensive energy policy, that we need to address the challenges of climate change. Shell agrees that we must reduce CO_2 emissions by developing a full range of low-carbon energies, along with effective mitigation technologies for fossil fuels like carbon capture and sequestration, all

preferably within a phased-in cap-and-trade program to protect American jobs and our economy.

Now, we should take action on these issues now, but not at the expense of further development of the OCS. Access to the vast resources in the OCS is critical. We need it and it's good for this country. Developing more of our own resources will reduce imports, create jobs, provide energy security, and help our balance of trade. It will allow these resources to be developed in a manner that fits our environmental goals and avoid the hypocrisy of being willing to buy from other countries rather than produce our own resources.

Our industry can develop offshore resources with a footprint that is smaller than ever before. As an example, Shell's Perdido project, in the ultradeep Gulf of Mexico—an example is that project. Three different offshore fields, covering about 90 square miles, will be tied into a single facility located in 8,000 feet of water, 200 miles offshore. Now, technically, this single surface point could reach oil and gas volumes within a 30-mile radius.

Offshore oil and gas facilities are complex and highly sophisticated. It's critical that they be designed, installed and operated for safety and environmental protection. Control practices are built on the principle of redundant barriers. For example, exploration and production wells entail multiple layers of protection, such as proper engineering, materials design, and training of staff, realtime monitoring of multiple data points, both at the surface and deep in well bores, and that's used to detect variations in performance and mitigate those items before they become problems. Multiple mechanical barriers, such as pressure-sealed well casing, blowout preventers, and subsurface safety valves, are utilized.

Now, despite these safeguards, it is necessary to be prepared to react and mitigate if an oil spill occurs. Now, we are prepared to respond quickly with the right skills and equipment. In Alaska, that means a response time of 1 hour or less.

Now, discharges in the ocean are often cited as a concern. Now, this is a highly and effectively regulated activity. Any discharge or emission must meet Clean Water Act and Clean Air Act requirements. The EPA and the MMS impose tight controls on allowable discharges and emissions based upon sound science.

Now, regulations require drilling fluids, for example, to be tested for composition and pass a battery of tests for toxicity to marine life and biodegradation rate in the environment before they can be discharged.

Noise is also cited as a concern with respect to marine mammals. In Alaska, Shell has a monitoring program that includes marine mammal observers, both on board vessels and in aircraft, as well as an unprecedented network of seafloor acoustic recording devices to capture the sounds of whales, other animals, and human activity, helping us understand their distribution, their abundance, and the migration routes, as well as document any subtle behavioral changes that they might make in response to our activity.

Shell and the industry take very seriously our responsibility to develop offshore resources with careful regard for the environment. If the government chooses to develop parts of the OCS, which is essential to meeting America's energy needs, then the OCS leasing program should be truly supported. When a lease sale is held, the

government should be prepared to do the required permitting and environmental work in a timely manner by ensuring the necessary financial and human resource support. The regulatory system has worked well in the Gulf of Mexico for 50 years. The Federal system for the Alaska OCS, by contrast, is in need of attention.

In addition, the government should provide revenue sharing for impacted coastal communities, not just the Gulf Coast States. Some argue that revenue sharing takes money out of the Federal treasury. I believe revenue sharing is essential to enable offshore development and will bring additional revenues into the Federal treasury.

In summary, we must stop ignoring the fact that oil and gas will play a major part in meeting America's energy demands for several decades as we transition to a more sustainable energy future. Our economy's health and our Nation's security demand and deserve nothing less.

Thank you, and I look forward to your questions.

[The prepared statement of Mr. Odum follows:]

PREPARED STATEMENT OF MARVIN E. ODUM, PRESIDENT, SHELL OIL COMPANY, HOUSTON, TX

Mr. Chairman and members of the Committee, I appreciate the opportunity to testify today about environmental stewardship and offshore oil and gas development.

This hearing is timely and some might say urgent. World energy demand will double in the next 40 years. This demand can only be met if all sources of energy and efficiency are accessed. We cannot ignore the fact that oil and gas will play a major part in meeting America's energy needs for decades to come. The United States has vast oil and gas resources on the Outer Continental Shelf (OCS).

There is some hypocrisy in locking these resources away while relying on resources produced in other countries. Instead, we should embrace policies that provide access to our own oil and gas resources.

Let's be clear. As a responsible integrated energy company, Shell recognizes that access alone will not solve our energy challenges. We also need alternatives and renewables and effective mitigation technologies, such as carbon capture and storage (CCS), operating within a workable, phased-in cap-and-trade program that best addresses CO_2 emissions and protects our economy.

Access to our natural resources will also contribute to U.S. energy security and contribute to economic health by creating U.S. jobs and improving our balance of trade.

The record clearly shows that offshore development can occur in an environmentally responsible way. We should demand no less.

There are those who promote a "do nothing" approach to OCS development. Perhaps they have an outdated view of how the oil and gas industry operates today. I appreciate the opportunity to provide the facts because the facts show that environmental stewardship and oil and gas activity are not mutually exclusive. We do not have to choose between OCS development or the environment. We can access OCS resources and be good environmental stewards.

I am hopeful that this hearing will advance discussion so that we can come together around the facts, reject the myths and move forward on solutions that will fuel economic growth.

Today I will discuss three major points.

- First, the vast U.S. oil and gas resources that can and must play a critical role in meeting that future energy demand and in fueling the economy
- Second, the oil and gas industry's environmental record on the Outer Continental Shelf and the role of technology and science in environmental stewardship
- Third, the steps that industry and governments can take to ensure environmentally sound development of the OCS.

ABOUT SHELL

Before addressing these points, let me provide background about Shell. We are an integrated oil and gas company, dedicated to meeting ever-growing energy needs efficiently and responsibly. Shell puts safety, sustainability, the global search for viable new energy sources and innovative technologies at the heart of how we do business.

We have a robust portfolio in the Americas that consists of offshore and onshore exploration and production, unconventional resource development, oil products manufacturing and distribution, chemicals, LNG, hydrogen and renewables, including wind and biofuels. In 2009, we expect to invest about $31 billion worldwide to develop a broad portfolio of energies.

THE OCS: MEETING ENERGY DEMAND AND DRIVING ECONOMIC GROWTH

In summary:

- Global demand for energy will continue to grow, and existing and developing energy sources may well struggle to keep up with demand. Consistent with the desire to transition to a low carbon energy mix as soon as possible, oil and gas resources will be needed for decades to come.
- The U.S. has vast oil and gas resources on the Outer Continental Shelf, and it is within government's ability to reduce imported energy with more domestic supplies.
- Domestic oil and gas production provides energy security, improves the balance of trade figures, creates jobs, generates federal revenue and drives economic stability.

Global Energy Demand

The world must grapple with the reality that global energy demand is projected to increase by roughly 50 percent over the next 20 years and could double by 2050. As the global recession fades and economies recover, demand will accelerate. A key driver will be the strong economic growth and a vast, emerging middle-class in the developing nations.

Just last week, the International Energy Agency warned that rising crude prices could hamper economic recovery. In raising its daily oil-demand forecast by 140,000 barrels, the agency projected that demand for oil will increase to 86.2 million barrels a day next year because of emerging markets.

U.S. OCS Resources

The U.S. imports approximately 60 percent of its petroleum needs. This is not necessary and can be turned from a problem into an opportunity. The U.S. has vast oil and gas resources. According to the U.S. Minerals Management Service (MMS), there are 420 trillion cubic feet of natural gas and more than 86 billion barrels of oil yet to be discovered on the Outer Continental Shelf, including Alaska. To put that into perspective, that is enough natural gas to heat 100 million homes for 60 years and enough oil to fuel 85 million cars for 35 years. My belief is that these resource estimates will continue to increase as we develop the technology to discover and produce them.

Summarized here is the resource potential in four key offshore areas of the United States: the Gulf of Mexico, Alaska, the Atlantic Coast and the Pacific Coast.

Gulf of Mexico.—This is the heartland of the U.S. offshore activity. The industry has been exploring for and producing in the Gulf for more than 50 years. Although records from the early days of near-shore production are incomplete or unavailable, we know from MMS and Energy Information Administration (EIA) records dating back to 1980 that the Gulf of Mexico has produced more than 10 billion barrels of oil and more than 73 trillion cubic feet of natural gas. The Gulf of Mexico remains a significant petroleum province. The MMS estimates that there are 45 billion barrels of oil and more than 233 trillion cubic feet of gas. Combined, this is the equivalent of more than 86 billion barrels of oil remaining. With new technology enabling development of deepwater and ultra-deep water, I believe these estimates could be low.

Shell has been a leader in Gulf of Mexico production. More than 80 percent of our OCS leases are in deep and ultra-deep water. In the coming months, the Shell Perdido project will initiate production with a nameplate capacity of 130,000 barrels equivalent per day. It will be the world's deepest drilling and production facility and include the deepest subsea well.

Shell-operated production in the Gulf of Mexico averages more than 400,000 barrels of oil equivalent per day. In fact, our Mars Platform produces about 3

percent of all U.S. crude production and nearly 1 percent of the nation's total daily crude oil usage.

Alaska OCS.—Alaska's OCS has world-class oil and gas potential, holding an estimated 27 billion barrels of oil and 132 trillion cubic feet of natural gas. Exploring for oil and gas offshore Alaska is not new. A total of 30 wells have been drilled in the Beaufort Sea and five wells drilled in the Chukchi Sea. In the 1980s, Shell acquired federal leases in the Beaufort Sea and drilled seven exploration wells. Although we found oil and gas, developing these wells was not economically viable at that time.

Now let's fast forward some 25 years. Since 2005, the federal government has held several OCS lease sales in Alaska. Shell participated in making these sales a success and paying the federal treasury nearly $3 billion for ten-year leases in the Beaufort and Chukchi Seas. We have the most environmentally sensitive and thoroughly responsible exploration plan in history, involving hundreds of millions of dollars of investment in equipment, support vessels, baseline studies and workforce training. Yet, we have not drilled a single exploration well, due in large part to permitting delays and litigation. I will share more on this later in my testimony.

Atlantic and Pacific Coasts.—The oil and gas resource potential off the Atlantic and Pacific Coasts is also substantial. The MMS estimates that there are 4 billion barrels of oil and 37 trillion cubic feet of gas off the Atlantic Coast, and 10 billion barrels of oil and 18 trillion cubic feet of gas off the Pacific Coast. However, assessments of resources have not been updated in decades, and, therefore, it is likely that even greater volumes of oil and gas exist. Although the moratorium on offshore leasing in these coastal areas has been lifted, the government has not yet determined whether and where to allow oil and gas lease sales.

Benefits of Domestic Oil and Gas Development

We should not be satisfied with having other nations produce their energy for our use. The cost is enormous. According to the EIA, the U.S. imports nearly 12 million barrels per day or approximately 60 percent of our consumption. These imports cost the U.S. nearly $600 billion last year.

The choice is clear. We can continue to bear the costs of importing ever-increasing volumes of oil and gas or we can develop our own domestic resources. Producing more oil and gas in the U.S. is a "no lose" proposition. It will provide energy security, improve the balance of trade figures, create jobs and generate federal revenue. In sum, domestic oil and gas development is an economic engine.

An estimated 9.2 million people are directly or indirectly employed in the domestic oil and gas industry. This makes the industry one of the largest employers in the nation. The industry has some of the highest paying jobs in the U.S., about two times the national average. A growing oil and gas sector has a positive impact on many other sectors of the economy, such as iron and steel, aviation, electronics, agriculture, construction, chemicals, plastics, marine vessels, telecommunications, manufacturing, trucking and transportation. Most of these industries have expressed their support for expanded access to the OCS.

Revenues to federal and state governments also increase as a result of domestic oil and gas activity. According to the MMS, the OCS leasing program is the second largest source of federal revenue. In 2008, a record $23.4 billion was collected from energy production on federal lands (onshore and offshore). In total, OCS oil and gas development has generated more than $190 billion in federal revenue from lease bonuses and royalty payments since 1953, in addition to federal, state and local income and property taxes. Future OCS activities would produce more federal revenues. A study by ICF International looked at oil and natural gas resources (both offshore and onshore) that until recently were off limits and concluded that development could generate more than $1.7 trillion in government revenue, create many thousands of new jobs and enhance our nation's energy security.

The Land & Water Conservation Fund (LWCF) is almost entirely funded from OCS revenues. Washington, D.C. has received $14 million in 85 grants, Virginia has received $81 million in 377 grants impacting 46,000 acres of parkland and Maryland received $76 million in 327 grants impacting 43,000 acres of parkland. Nationally, this program has funded more than $7.2 billion (leveraged with a 50-percent match) in more than 40,000 projects impacting more than 2.6 million acres of parkland across the U.S. Of importance, the LWCF program is at risk if additional OCS production is not pursued.

ENVIRONMENTAL STEWARDSHIP

Finding environmentally and socially responsible ways to meet the nation's energy needs is critical to our business success. We are acutely aware of the passion around the potential adverse impacts of offshore oil and gas activities. These include:

- GHG emissions from the combustion of oil and natural gas,
- environmental footprint and visual impact,
- risks of a major oil spill on marine wildlife and sensitive environments and whether spilled oil can be cleaned up (especially in Arctic conditions),
- discharges into the ocean and air emissions from offshore platforms,
- noise impacts on marine mammals, and
- operating in sensitive areas.

The industry has an excellent record of exploring for and developing OCS resources. Advances in technology and science have enabled this in ways that were unimaginable even a few years ago. We can drill safely and efficiently with an ever-smaller environmental footprint in ever-greater water depths farther and farther from shore with minimal stress on the oceans.

We can operate as good stewards of the environment and, at the same time, address many of our nation's pressing needs, as the U.S. Commission on Ocean Policy said:

> *America can protect the marine environment while creating jobs, increasing revenues, enhancing security, protecting cultural heritage, expanding trade, and ensuring ample supplies of energy, minerals, healthy foods, and life-saving drugs.*

Shell is very familiar with the work of the Interagency Ocean Policy Task Force to develop a national framework for eco-system-based management of our nation's oceans. We believe this is an excellent opportunity to recognize the importance of offshore energy to our country's economy and security, and we acknowledge the vast body of existing science that guides us, as I will discuss later in these remarks. Shell is hopeful that the Task Force will provide recommendations that properly balance the environmental, economic and social priorities that ought to guide our national ocean policy.

Let me address some of those key concerns here.

Climate Change

There is concern or outright opposition to offshore oil and gas development from those who oppose the use of fossil fuels. This reflects a concern about the consequences of CO_2 emissions and global climate change, including concerns about the impacts of the changing climate on sea levels, polar ice and ocean acidification.

Shell agrees that CO_2 emissions must be reduced and that climate solutions must be embraced. Shell advocates strongly for cap-and-trade-based legislation to ensure that greenhouse gas reduction goals are met, but any program must make a fair allocation of credits.

Shell also recognizes the "hard truth" that the world must rely on oil and gas for several decades to come as we transition the U.S. energy mix to a lower carbon energy mix. It is simply not reasonable to think that we can turn off oil and gas use. And we cannot afford to. We need the energy from oil and gas to fuel economic growth and stability. Only if we are economically healthy can the transition to new technologies, new energy sources and new energy-efficient ways of living be achieved. It is important to recognize that this is not an "either/or" situation—either fossil fuels or alternatives, renewables and other energy sources. We will need all sources to meet demand.

In addition to advocating for government cap-and-trade frameworks, Shell is working to address the climate challenge by

- increasing the efficiency of our own operations;
- establishing a substantial capability in Carbon Capture and Storage;
- continuing research and development on technologies that will increase efficiency and reduce emissions;
- helping our millions of retail and business customers use less energy and emit less CO_2; and
- aggressively developing low CO_2 sources of energy, including natural gas, biofuels and other low-CO_2 fuel options.

Let me say a word about the potential for natural gas because the development of our nation's domestic gas resources is a major success story for our country. By

combining new advanced technologies involving horizontal drilling with proven technologies such as hydraulic fracturing, we have increased onshore natural gas production by more than 20 percent over the past three years—an accomplishment that most energy experts thought impossible a few years ago.

According to some experts, America's known natural gas resources now exceed 100 years of supply at current U.S. consumption levels—and we are finding more every day. The fact that we have such enormous resources gives our country increased energy security and flexibility to address issues, such as climate change, since natural gas is a clean-burning fuel that can help to reduce carbon emissions. It serves as an important bridge as we develop new renewable energy sources. Therefore, it is important that policymakers recognize the critical role of natural gas as climate and energy legislation is developed. In particular, legislation should not inadvertently disadvantage natural gas.

Footprint on the OCS

The oil and gas industry can develop offshore resources with a footprint smaller than ever before. This is an important aspect of our environmental stewardship. It is possible to develop very large sub-surface areas with a very small surface expression. The technologies that enable this can be applied both near shore and in deepwater. Let me describe some of the technologies.

Our Deepwater technology program focuses on equipment and integrated systems required to produce hydrocarbons with fewer and smaller surface facilities and reduced environmental impacts. This involves the optimal use of subsea production systems and new floating drilling and production systems. New technologies include subsea separation and boosting, subsea re-injection of produced water and long-distance pumping with flow assurance. All of our deepwater projects go through an internal carbon footprint and environment impact assessment as part of the tollgates to final investment decisions.

Perdido is an ultra-deep water project in the Gulf of Mexico that illustrates the industry's ingenuity and smaller footprint. Three different offshore fields covering about 90 square miles in the OCS will be tied into a single facility at Perdido. Technically, the project provides the infrastructure that could enable future oil and gas volumes from a 30-mile radius. That means that about a 3,000-square-mile area can be developed sharing one facility.

Even more astounding is the fact that Perdido is in 8,000 feet of water 200 miles south of Houston. When the leases were acquired in 1996, the deepest projects in the Gulf were in 3,000 feet of water. We did not have the technology at that time, but we were confident that it could be developed.

There were significant challenges to the project due to water depth, water pressure and reservoir characteristics. What mooring systems should be used in ultra-deep water? How should we address harsh wave loading conditions? How should we overcome the massive hydrostatic pressure in order to produce 8,000 feet below the surface of the water?

Over a period of more than a decade and at a cost of several billion dollars, the technology was developed to make the project work. For the first time, the oil and gas produced will be separated on the seafloor and "boosted" to the surface using machines purposely built for this project and installed and maintained using robotics. Perdido is the first application of wet tree direct vertical access (DVA) wells from a spar—a configuration that allows a larger number of subsea wells to be accessed from a smaller surface host facility. By utilizing a single well slot to access the wells beneath the surface facility, the size and cost of project are reduced. At the same time, the number of wells that can be accommodated by the surface facility is not limited.

When Perdido begins producing in the next few months, it will be the world's deepest offshore oil development, the deepest drilling and production facility and the deepest subsea well. It will have a nameplate capacity of 130,000 barrels equivalent per day.

The Ormen Lange project in Norway also demonstrates how technology enables offshore development with a small footprint. In fact, there is no surface facility on the offshore at all. Despite being in 3,600 feet of water with uneven seafloor terrain, strong seafloor currents, subzero temperatures and extreme wind and wave conditions, our engineers designed a "Subsea-to-Beach" production system in which the natural gas is produced from subsea wells and transported some 75 miles through subsea flowlines to the shore. This complex project producing from one of the largest gas wells in the world in the deepest water depths in Europe will provide up to 20 percent of the natural gas needs of the UK for up to 40 years.

Operational Integrity and Incident Prevention

Offshore oil and gas facilities are complex and highly sophisticated. It is critical that they be designed, installed and operated with rigorous attention to preventing incidents of any kind. Safety is a core operating principle essential to protecting people and the environment. So too is operational excellence. Let me describe some of the control practices that are in place when we drill a well and during producing operations.

Well control.—When drilling a well, the pressure in the wellbore must be monitored and maintained in a way that gas and fluids in the geologic formation do not escape. There are four layers of prevention and containment (barriers) that maintain well control. This means that if one barrier fails due to operational error or equipment failure, there is no loss of well control.

- Layer I includes proper planning and design of the wells to minimize any technical or environmental risks. This way, before we start to "Drill the Well Right," we first decide on "The Right Well to Drill" from a technical and environmental perspective. This layer also includes training of our on-site staff on crucial well control procedures.
- Layer II includes early detection of, and timely response to, events where gas or fluids begin to enter the wellbore. When such a "kick" is detected, the general response is to immediately shut down the pumps, perform a flow check, shut in the well and kill the well. To help carry out this task, Shell employs its Real Time Operations Centers (RTOCs) in New Orleans and Houston to monitor the wells 24 hours a day, 7 days a week. Through advanced information technology and satellite communications, the experts in the RTOCs monitor in real time what is happening at the drill site offshore. The RTOCs see the same drilling data at the same time as the drillers onsite, such as data from downhole sensors, rig gauges and sub-surface visualization. With those additional "sets of eyes" trained to monitor and detect any anomalies in the drilling process, operational concerns of any kind, in particular those associated with well control, can be stopped and mitigated immediately.
- Layer III involves the use of mechanical barriers. Well casing, cemented in the hole, allows for safe deepening of the well and provides long-term protection against formation fluids coming to surface. Blowout preventers (BOPs) are mechanical devices that can shut off a well completely and prevent formation fluids from reaching the surface when the well is drilled. Weekly testing and inspections are performed to ensure their competency and integrity.
- Layer IV represents relief well drilling. If, despite the first three layers of protection, there is the unlikely event of a blowout at an exploration well, site-specific, detailed contingency plans are in place for drilling a relief well. Contingency plans include dynamic surface control measures and the methods of drilling a relief well.

Production Control.—MMS regulations and industry standards require all offshore producing platforms to have safety shutdown equipment. Fail-safe sub-surface safety valves must be installed in all wells at least 100 feet below the sea floor. These safety valves can be manually closed. They are also designed to shut tight whenever there is a loss of pressure from the surface facility. For example, if a surface platform is pushed over by a hurricane or ocean-going vessel, the safety valves will activate and shut in the well. This prevents the wells from blowing out.

At the "Bridge," located in New Orleans, we monitor all of our deepwater production systems in the Gulf of Mexico and Brazil (and ultimately Alaska). The centralized surveillance center is designed to optimize deepwater production rates, equipment reliability and system integrity. Specifically, production and equipment data streams are continuously scanned to identify any irregularities in performance and, if detected, are immediately addressed with technical and operational experts. The Bridge enables us to squeeze the most out of the reservoirs and maintain our systems and equipment to their best operating performance. This identifies potential problems before they occur and minimizes downtime.

During the 2005 hurricanes that devastated the Gulf of Mexico, about 115 platforms were destroyed and more than 50 others were damaged. There was no loss of life due to the industry's safety and evacuation practices. There were no well blowouts because the safety valves worked. There were some relatively small oil spills from storage tanks located on the platforms, but none that caused oiling of the coastline.

Oil Spills: Impacts and Response

Petroleum poses a range of environmental risks when released into the environment, whether as spills or discharges. U.S. federal agencies have turned to the Na-

tional Research Council (NRC) on several instances to look at the issue. One of the most widely quoted studies of this type, titled Oil in the Sea: Inputs, Fates, and Effects, was completed in 1985. This study has been updated twice since then, the most recent update occurring in 2003.

In North American marine waters, most petroleum comes from natural seeps (62.5%) rather than from anthropogenic (man-made) discharges associated with petroleum-extraction (1.2%), transportation (3.6%) and consumption (32.8%) of crude oil and refined products. (Table 1) (NRC, 2003)

Table 1: Relative contribution of average, annual releases (1990-1999) of petroleum hydrocarbons in North American Marine Waters

	bbls	Percent of Total (%)
Natural Seeps	1,264,000	62.5
Petroleum Extraction	23,700	1.2
Petroleum Transportation	71,890	3.6
Petroleum Consumption	663,600	32.8

(from NRC 2003)

Offshore seeps of hydrocarbons are known to occur around the United States in the Gulf of Mexico and southern California, and released oil can be delivered long distances by oceanic currents. Of the anthropogenic sources of oil in the sea, consumption is by far the largest contributor (32.8% of total and 87.4% of anthropogenic sources). As defined in the NRC 2003 report, "consumption" contributions are storm-and surface-water runoff, use of 2-stroke engines, non-tank vessel spills, operational discharges, atmospheric deposition and aircraft dumping. These releases due to consumption of petroleum products tend to occur in coastal areas.

Oil and gas extraction activities are often concentrated in regions where natural seeps form. Historically, slicks of oil from seeps have been incorrectly attributed to releases from oil and gas platforms and vice versa. In North America, the largest and best-known natural seeps appear to be restricted to the Gulf of Mexico and the waters off of southern California, regions that also have extensive oil and gas production. In fact, geologists use aerial imagery of oil slicks in the ocean to identify likely areas to explore for oil and gas.

The toxicity of petroleum hydrocarbons to marine organisms is dependent on the persistence and bioavailability of specific hydrocarbons. A quick and effective response to an oil spill is therefore critical in avoiding or minimizing any shoreline impacts. In other words, in the unlikely event of a spill we want to respond and remove the oil before it can impact sensitive environments.

Each offshore oil and gas project must have such a plan in place before it is permitted to go forward. Given Shell's investment in exploring in Alaska's OCS, there are concerns that oil spills in arctic conditions or in ice conditions cannot be cleaned up. I would like to focus on and hopefully dispel that claim.

Arctic exploration and production is building on a huge experience base in temperate conditions. The experience in the Gulf of Mexico is instructive. We know that with proper well design, well controls, improved technology and effective training, the likelihood of a significant spill incident has been reduced substantially. In fact, the MMS calculates that since 1980 less than 0.001% of the oil produced in the OCS has spilled. In the unlikely event that a spill does occur, we have a dedicated and proven oil spill response capability, including equipment, methods and competencies.

During any spill that occurs in water (warm waters, cold waters or ice-covered waters), it is impossible to clean up 100 percent of the oil spilled. Depending on air temperature and oil gravity, as much as 40 percent of the oil can evaporate in the first 24 hours. However, in Arctic conditions, the evaporation rate will be lower and depend on water temperature and wind conditions. Waves and current can also impact the recovery rate since mechanical equipment is typically limited to operating in waves up to 2-3 meters. Daylight, access to the site, travel time, needed approvals from government agencies and other factors can also impact a spill operation.

Shell accepts the fact that, in some cases, oil spill response in ice conditions can be more difficult than in open water. Ice conditions will demand more flexibility and planning in tactics, special response equipment and strong coordination and competence of staff and contractors. It will also require additional planning in areas such as forecasting ice conditions, monitoring ice and ice deflection to help trap oil. In some cases, the presence of cold water and ice can enhance response effectiveness

by limiting oil spreading (which in open water cannot be controlled) and slowing the weathering process.

By working with the natural environment, responders can increase the response window of opportunity and improve the effectiveness of mechanical recovery and in-situ burn techniques. For example, if a spill occurred during the winter season under the ice, the oil would be trapped, allowing the responders more time to evaluate options for recovery or in-situ burning because the oil is semi-stationary under the ice.

Shell believes that it is very important to have the capability to include multiple response methods in the planning, have approval to use them and to respond with as many tools as needed. The response strategy and planning should allow the use of dispersants, in-situ burning and other methods that may be applicable. The method(s) selected during a response will depend on items such as the weather conditions, type of spill and other factors that are decided on a case-by-case basis in collaboration with the federal and state on-scene coordinators. Additionally, during a spill event the responders may change from one tactic to another as the conditions change. Dispersants have been proven to be effective in cold waters and can be applied with ice present and be effective for spills that cover a large area. In-situ burning (which has been used for 30 years around the world) can play an important role in the unlikely case of a blowout and can burn up to 95 percent of the oil spilled.

Shell has created an unprecedented oil spill response capability to support its drilling plans in the Beaufort and Chukchi Seas. We have a dedicated fleet of vessels and specialized oil containment equipment, which will be on-site 24/7. Spill recovery equipment is state of the art and widely acknowledged as proven systems under cold-climate conditions and designed to remove the worst-case discharge. The Nanuq is an ice-class purpose-built vessel, which can begin recovery within an hour of any incident large or small.

Arctic Oil Spill Response Research and Development

International scientists and operational personnel, under management of SINTEF Norwegian Research Institute, spent two weeks in May of 2009 in the pack ice in the Norwegian Barents Sea to study the behavior of oil spills in Arctic waters and to test various response options in realistic oil-in-ice conditions.

The tests proved that ice acts as a natural boom or protective barrier to confine and reduce the spread of an oil spill and to provide a longer window of opportunity in which clean-up technologies can be used effectively. These tests are the most wide-ranging research and development programs ever undertaken to evaluate Arctic oil spills.

The Joint Industry Project (JIP), under the management of SINTEF, was sponsored by six international oil companies, including Shell. The MMS was also a project participant. The project's major objectives are to further develop knowledge, tools and technologies for oil spill response in ice-covered waters. The program has consisted of project areas being carried out over a four-year period, ending in 2009. The JIP was designed to address key oil spill response issues and scenarios that program participants might have to deal with:

1. The fate and behavior of oil spilled in Arctic conditions
2. The in-situ burning of oil in Arctic and ice-covered waters
3. The mechanical recovery of oil in Arctic and ice-covered waters
4. The use of chemical dispersants in Arctic and ice-covered waters
5. Monitoring and remote sensing of oil in and under ice
6. The preparation of a generic oil spill contingency plan
7. Field experiments at Svalbard, Norway, in offshore ice-covered waters

These real-world offshore tests marked the final stage in the largest and most wide-ranging international research and development program ever undertaken to enhance understanding, to further improve and develop spill-response technologies and to increase the ability to react rapidly in the event of an accidental oil spill in ice-covered conditions.

Discharges and Emissions

"Dumping" does not occur offshore. In fact, many materials cannot be discharged at all, including oily mud and trash and debris. Allowable discharges from offshore platforms can include produced waters, drilling discharges and air emissions. We understand public concern about their potential effect on the environment. Let's be clear, however, that any discharge or emission must meet Clean Water Act or Clean Air Act requirements. The Environmental Protection Agency (EPA) and the MMS permit the allowable discharges and emissions under tight controls based upon sound science. Sensitive habitats on the seafloor, like corals or chemosynthetic com-

munities in the Gulf of Mexico, must be avoided. These permits require drilling mud, for example, to be tested for composition before their use, to pass a battery of tests for toxicity to marine animals and biodegradation rate in the environment before they can be discharged.

An example of how our industry has developed technology to address the challenges of deepwater and environmental performance at the same time is new synthetic drilling fluid. This fluid can be recycled and reused, and, as a result, discharges are minimized. They increase drilling penetration rates, resulting in less time on location and reduced air emissions. The EPA has classified this as a "pollution prevention technology."

More than 35,000 wells have been drilled in the Gulf of Mexico. For more than 20 years, the petroleum industry, the regulatory agencies and academic researchers have conducted ocean monitoring around well sites to study effects on water quality, sediment quality, and the local biological communities. We have found that small areas of the seafloor can be temporarily disturbed by the deposition of drill cuttings. However, there are no long-lasting effects and no bioaccumulation of contaminants that would either jeopardize benthic animals or affect human consumption of seafood. In fact, our offshore platforms are some of the most prolific areas for recreational fisherman, and our industry has successfully coexisted with the commercial fishing industry for decades.

Marine Animals and Noise

In the Gulf of Mexico and offshore Alaska, our operations have to coexist with populations of marine mammals that are important to protect. Seismic exploration is one operation that is carefully regulated by the federal government and managed by the company so that, for example, the sounds created don't cause whales to change their behavior in ways that might be harmful. Regulations require us to:

- Have trained marine mammal observers onboard to watch for mammals
- When starting, use a ramp-up procedure to gradually increase the sound level being produced, which allows animals to leave the area if the sound is uncomfortable
- Stop any operations if a marine mammal is likely to enter a "safety zone" around the operation and wait to restart operations until the zone is all-clear for at least 30 minutes

In Alaska, Shell goes further. We use observers on aircraft to monitor an even larger area around our operations in the Beaufort Sea. Since 2006, we have also deployed a network of seafloor acoustic recorders across the Chukchi Sea and Beaufort Sea that record the sounds of whales, seals, walrus and other animals, along with natural sounds like storms and earthquakes and man-made sounds, such as our seismic programs and vessels. This information helps us understand the distribution, abundance and migration routes of the animals, as well as document any subtle behavioral changes that they might make in response to our presence.

Through these programs, we have seen and heard thousands of whales, seals, walruses and polar bears, and our monitoring has not detected a single one that has been injured by our activities. Our seafloor recorders have documented that migrating bowhead whales will swim around seismic activities at a distance of a few kilometers. We are now studying to determine if this response is biologically significant or less significant—like you or I might cross the street to avoid noise from a construction site.

Operating in Sensitive Areas

We have found that multiple uses of our oceans can be accommodated—we can conserve special places and have economic development. For example, the Flower Garden Banks National Marine Sanctuary in the Gulf of Mexico is a national treasure of manta rays, whale sharks, coral heads that are bigger than cars and hundreds of species of fish and invertebrates. Within a four-mile radius of the Flower Garden Banks, hundreds of exploratory wells have been drilled, and there are currently 10 production platforms and approximately 160 km. of pipelines. Twenty-five years of stringent environmental monitoring by the National Oceanic and Atmospheric Administration (NOAA), the MMS and industry have found no contamination or degradation of corals due to oil and gas activity. In fact, our marine biologists participate in an annual government/industry dive on the Flower Garden Banks, and we have observed firsthand the pristine coral formations and wildlife.

Role of Technology

Technology is not static. What we know and how we operate today will evolve. We must continue to find better ways of working through technology improvements

and breakthroughs that make our operations more efficient and environmentally safe. Let me give some examples of what Shell is doing.

Shell has initiated a Future Wells Project involving a range of technical experts. Their goal is to identify new technologies and processes that will, for example, reduce the volume of well cuttings and fluids, increase production rates by reaching the drilling target with larger casing, unlock reserves that are currently uneconomic or unreachable and reduce our own fuel consumption.

Shell's interest in the Arctic, in Alaska and Russia, has accelerated the development of specific projects that will better equip us to work in this arena. Again, we are looking for alternative approaches that reduce our environmental footprint in an area that has unique characteristics very different from the Gulf of Mexico. We do so in order to advance our understanding of the region, to inform our design technologies to achieve smaller impact and to respond to concerns expressed by many, including the indigenous peoples with strong dependence on and cultural ties to the environment.

- Unmanned Aircraft Systems (UAS).—One example of our work involves integrating unmanned aircraft into our existing manned aircraft monitoring programs. The monitoring is essential because it tracks the habits and movements of marine mammals, the movement of sea ice and the operations of offshore operations. The goal of the UAS research program is to reduce the risk and environmental footprint of monitoring. Unlike manned aircraft, the unmanned aircraft can carry compact payloads, which allows standard sensors like electro-optical video, electro-optical stills and infrared to be flown with very little airborne noise or disruption to natural surroundings. In Alaska, the industry and government agencies have collaborated in testing an A-20 ScanEagle system to track walrus, seals and endangered bowhead whales. We expect to be able to detect sea-surface contaminants, track sea ice and find stranded personnel and vessels in broken ice scenarios.
- Marine Sound Reduction Program and Marine Mammal Impacts.—Another example involves developing ways to reduce the sound of our operations in the Arctic. Shell's program is intended to better understand sound in Arctic waters and then to develop ways to mitigate man-made sound. This research is part of our marine mammal monitoring initiative in the Beaufort and Chukchi Seas. Together, these two programs seek to understand the sources and characteristics of man-made marine sound and its effect on marine animals so that appropriate sound management plans can be developed. We are analyzing sound data from drilling activities in Alaska waters done during the 1980s and 1990s. We are taking acoustic measurements on vessels and drilling rigs to understand the magnitude of sound generated. We are developing sound mitigation designs for new-build vessels and underwater acoustic barriers that could be deployed around existing rigs.

Role of Science

Scientific knowledge will also evolve. This expanded knowledge is critical because it informs government regulators who must issue permits, it informs policymakers who must develop sound energy and environmental policy and it informs our operational decisions.

The government plays a leading role in performing scientific studies. Since 1973, federal agencies have performed more than 5,000 scientific studies on the environmental effects of offshore oil and gas activities. For example, the National Academy of Sciences has produced three reports focused directly on environmental science for offshore oil and gas, two with particular focus on Alaska. The Minerals Management Service's OCS Environmental Studies Program has spent more than $600 million (more than $1 billion in inflation adjusted dollars) on scientific studies of offshore oil and gas—about half of that directed specifically to Alaska. Money is not a perfect measure for the applicability or credibility of the information, but it provides a metric of effort and breadth that many people will understand.

The industry also has a role to play. Oil and gas companies have worked on major scientific programs that supplement the research by government agencies. In the last 10 years, the industry has published studies on the environmental effects of and best management practices for pollution prevention technology, emissions from offshore platforms that include produced waters, drilling discharges, air emissions, the effects of sound on marine life that includes whales and fish, weather and oceanographic studies, improved design standards for severe weather and even the causes of hypoxia in the Gulf of Mexico.

WHERE DO WE GO FROM HERE?

I have discussed the need for and benefits of developing the vast offshore oil and gas resources off the U.S. coast. I have discussed the industry environmental record and how technology and science are key enablers for our environmental stewardship. Now I would like to look forward—where do we go from here and what should policymakers do?

RECOMMENDATIONS

The federal government has a critical role to play as a steward of our oceans. It also has a role to play in supporting the OCS leasing program and the sustainable development of its natural resources. Let me provide some policy recommendations for your consideration.

First and foremost, the government must support the OCS leasing program

In areas where OCS leasing has occurred, the government has done literally years of environmental analysis in advance of the lease sale. It has invited companies to buy the leases, and it has accepted bonus bids from companies. In return, the government bears some responsibility to the leaseholder. Companies bid on leases with the tacit understanding that the government is prepared to do the work that allows exploration and development.

Shell's experience in Alaska is a case in point. We participated in the government's Alaska lease sales and paid the U.S. Treasury billions of dollars for the leases. We invested hundreds of millions of dollars more to prepare for exploration drilling. In order to drill, we must have some 30 state and federal permits. We have not yet drilled a single exploration well. Permitting delays, coupled with litigation delays, have blocked the work for several years. We are hopeful that we will be able to drill in 2010, but this will only happen if the federal government finally delivers all the permits and if litigation challenges do not occur.

I fully support the permitting work and the regulatory requirements that Congress has put in place. Many of those requirements are intended to protect the environment. I do not believe the process should be "rubber stamped." Quite the opposite. I believe that the government should have a robust and thorough process that leads to timely decisions. Endless delays and inefficiencies should not be tolerated because it is a waste of effort and money for all concerned—Shell, the government and the taxpayer.

Specifically, I urge Congress to:

- Fully fund and resource the various federal agencies that handle OCS oil and gas permitting. Inadequate funding and insufficient staff should not be the cause of permitting delays. If the government is going to hold a lease sale, it must be prepared to do the environmental studies and other analyses that underpin OCS permits.
- Impose clear timelines on federal agencies, and hold the agencies to those deadlines so that the private sector has some assurance of action and can plan its investment decisions accordingly. If properly staffed and resourced, the deadline should not be a problem.
- Defend its permits when there is a legal challenge and seek expeditious decisions by the courts. As a result of a court decision last spring, the Department of Interior (DOI) is remedying flaws in its current Five-Year OCS Plan. The DOI needs to move expeditiously to complete this work and in the process, remove the legal "cloud" that hangs over the 2008 Chukchi lease sale.
- Consider whether the EPA is the appropriate agency to handle OCS permits. In the FY 2010 appropriations report for the EPA, Congress directed the EPA to put adequate staff and resources to permitting OCS facilities and further directed that the EPA "set clear, reasonable national guidelines for issuing OCS air permits." Shell has applied to the EPA for our Alaska exploration work. The 40-month process is still not complete. This should not be replicated or tolerated.
- Increase funding for the MMS Environmental Studies Program. The government should invest now in key studies, ecological characterization and additional baseline science, all of which will be critical to permitting any oil and gas work in OCS areas outside the Gulf of Mexico.
- Establish regional, inter-agency permitting offices to support OCS leasing and permitting. I commend this Committee for including an Alaska-based permitting office in the energy bill that was approved last summer. Such an office will enable agencies to coordinate their regulatory work, share resources and hopefully move expeditiously to approve permits.

Second, the government should support opening new OCS areas to oil and gas development

As I discussed earlier, the U.S. is blessed with resources. Development has multiple energy and economic benefits.

Third, the government should provide revenue sharing for all coastal communities

States and communities adjacent to offshore development have infrastructure needs, such as roads, housing and schools for workers and their families, enhanced seaport and air terminal facilities, greater demands for basic public services and other expenses common to economic growth. Congress recognized this when it provided that the four Gulf states could share in federal OCS revenue from Gulf leases. Revenue sharing should not be denied to other states that have OCS leasing. Today, Alaska is the only other state with OCS leasing by the federal government. It is unfair and unreasonable to deny revenue sharing to the State of Alaska. Some argue that revenue sharing takes money out of the federal treasury. On the contrary, revenue sharing will enable offshore development and would bring revenues into the federal treasury.

Fourth, the government should ensure that any National Ocean Policy recognizes the importance of offshore energy to the nation's economy and energy security

The President's Interagency Ocean Policy Task Force is developing a national oceans policy. We will see this report by the end of the year. I hope the Task Force will provide recommendations that balance the nation's environmental, economic and social goals without adding new bureaucracies that undermine the existing OCS oil and gas leasing program. The Task Force was directed by the President to develop a framework for marine spatial planning. This framework should inform government decision makers by providing access to environmental and ocean user information. It should be used in a way that allows for continued multiple uses of the oceans and not as a process to "zone off" important economic and recreational uses.

Finally, Congress must have the will to support OCS oil and gas development, to embrace a domestic energy policy that works with domestic environmental goals

The energy future of our country will be determined to a great extent by the legislation enacted by Congress.

In closing, thank you for the opportunity to speak on behalf of Shell about issues of paramount importance, ones that cannot be overstated or overemphasized.

The world faces a daunting challenge that demands aggressive, collaborative and realistic action to meet escalating energy demand in ways that are good for the environment. Shell challenges our elected officials to exercise political courage and leadership to make tough—often unpopular—decisions that are in the best interest of our citizens, economy and environment.

Driving those decisions must be the reality that it will take all possible energy sources to meet demand—and that oil and gas will remain our primary energy sources for decades to come as we transition to a more sustainable energy future.

Access to vast, untapped natural resources onshore and on the Outer Continental Shelf is critical—we need it now. Access is good for America. Developing more of our own resources will create jobs, provide energy security and help our balance of trade. We must stop sending hundreds of billions of dollars out of the country and start developing more of our own energy and bolstering our own economy.

History shows that we can—and do—develop oil and gas resources in responsible ways. Our record at Shell is impressive.

Shell is a leader in environmentally superior operations. We advocate globally for carbon dioxide reduction through a phased-in cap-and-trade program. We see great promise for carbon capture and storage as a mitigation technology and are collaborating on numerous CCS research and demonstration projects in the U.S., Canada and other parts of the world.

Shell supports continued development of alternatives and renewables, with our focus on wind and biofuels. In addition, we are increasing production of natural gas, the cleanest-burning fossil fuel. New technology has opened up abundant gas resources contained in dense rock formations, which will increase supplies dramatically.

Shell continues to deliver energy to Americans in responsible ways. That's our job, day in and day out. Our elected officials have the role to move beyond discussion and enact sound, realistic legislation and to establish the regulatory framework necessary to bring more energy to America. Our economy and our nation's security demand and deserve nothing less. Likewise, we should expect nothing less from our government.

The CHAIRMAN. Thank you very much.

Mr. Amos, go right ahead.

STATEMENT OF JOHN F. AMOS, PRESIDENT, SKYTRUTH, SHEPHERDSTOWN, WV

Mr. AMOS. Mr. Chairman, members of the committee, thank you for this opportunity to present some of the ongoing risks posted by offshore oil and gas drilling. I've submitted written testimony for the record and will summarize my comments here.

After more than a decade analyzing satellite imagery in the commercial sector for oil and gas exploration, I founded SkyTruth, a nonprofit corporation dedicated to investigating environmental issues, using satellite images and other remote sensing technologies. We work to inform decisionmakers and the public about the risks posed by resource extraction so we can make better decisions about developing our resources, understand the worst-case scenarios implied by those risks, and ensure that we can effectively respond to those scenarios.

Our work investigating drilling mishaps, severe storm damage, and leaking pipelines demonstrates that major oil spills still occur today, including in U.S. waters, despite significant advances in technology. This testimony addresses several incidences of oil spills observed by SkyTruth that are directly related to current offshore oil and gas drilling and production and the utility and effectiveness of mitigation efforts, such as creating buffer zones.

Most recently, on August 21, 2009, a production well at the new Montara oil platform, off the northwest coast of Australia, experienced a blowout, ejecting its cement plug and spraying oil and gas into the air and water. The platform and attached West Atlas drill rig, seen in this photo, were evacuated. For the next 10 weeks, oil and gas flowed unabated from the well. To plug the leak, authorities decided to bring in a second rig from Singapore and drill a relief well. On November 1, the spill was finally stopped by pumping heavy mud into the well. Concurrently, the platform and attached rig were engulfed in flames and burned for 2 days. The $250-million rig is reported to be a total loss, and engineers are assessing the integrity of the platform. Difficult work remains to install a permanent cement plug in the well.

Estimates of the amount of oil spilled range from 1.2 million gallons to more than 9 million gallons. SkyTruth's analysis of NASA's satellite images, like the one here, showed that oil slicks and sheen moved as far as 225 miles from the leaking well and cumulatively impacted more than 24,000 square miles of ocean, an area the size of my State of West Virginia. Researchers documented impacts from the spill on seabirds and marine mammals. Indonesian and Australian fishermen cited fish kills and significant declines in catch, and news accounts report that fishermen are going bankrupt.

The Australian government has launched an investigation into the causes of the blowout, effectiveness of the response, and environmental impacts. The investigation is expected to take 6 months.

Severe storms present another risk. In 2005, as Senator Dorgan noted, Hurricanes Katrina and Rita moved through oil fields in the Gulf as powerful category-5 storms. SkyTruth's analysis of satellite images, including this image taken a few days after Katrina made

landfall, revealed extensive slicks covering more than 700 square miles in the Gulf of Mexico. The Minerals Management Service reported that Katrina and Rita destroyed more than 100 platforms and damaged 450 offshore pipelines.

These storms caused major spills from the onshore facilities that support offshore production. The Coast Guard reported that onshore infrastructure spilled 8 million gallons of oil into coastal wetlands, streams, and communities. A single spill from a ruptured storage tank inundated 1700 homes in Louisiana with crude oil.

Infrastructure can fail even in the absence of storms. In calm weather, in July 2009, a major pipeline operated by Shell sprang a leak about 30 miles off the Louisiana coast. Divers located a crack in the pipe, but 63,000 gallons of oil spilled into the Gulf. The resulting slick covered 80 square miles. The failed pipeline was installed more than 30 years ago. In 2009, it began carrying oil from a new platform almost 200 miles south of New Orleans. In a common industry practice, the new platform was connected to the old pipeline network.

Offshore production in the Gulf began in the late 1940s. Today, as you can see on this map, the seafloor is crisscrossed by 25,000 miles of active pipeline, connecting 3600 platforms to coastal facilities. As the pipeline network ages, structural failures and spills become increasingly likely.

In summary, offshore drilling is an inherently risky venture. Accidents happen despite the most technologically advanced systems. Nature can create insurmountable situations. Infrastructure ages and becomes vulnerable. Recent history shows that when things go wrong, consequences can be severe. As the Senate debates the merits of opening new offshore areas to energy development, it is important to understand and carefully evaluate the risks posed by offshore drilling. The critical first step is acknowledging these risks to the environment and to communities that depend on healthy marine and coastal ecosystems for their economic wellbeing.

I thank you for your attention today, and I would be happy to answer questions.

[The prepared statement of Mr. Amos follows:]

PREPARED STATEMENT OF JOHN F. AMOS, PRESIDENT, SKYTRUTH, SHEPHERDSTOWN, WV

Good morning, Mr. Chairman and members of the committee. Thank you for this opportunity to present information about some of the ongoing risks posed by offshor important issue for our nation as we face increasing political, strategic, environmental and economic consequences resulting from our dependence on fossil fuels as the primary energy source driving our economy. As the nation embarks on a new marine spatial planning process to help us make better informed management decisions governing our nation's coastal and marine resources, and as the merits of opening new offshore areas to energy development carefully evaluate the risks of offshore drilling when considering the benefits acknowledging the potential risks of offshore oil and gas development to the environment, and communities that depend on healthy marine and coastal ecosystems for their economic well

I received degrees in geology from Cornell University (B.S.) and the University of Wyoming (M.S.), and spent nearly a decade working as an exploration geol firms, Earth Satellite Corporation (now MDA Federal Inc.) and Advanced Resources International. During that time I developed expertise in remote sensing and digital mapping: processing and analyzing satellite images as a tool to explore for oil and gas, minerals, and ground water. I conducted dozens of onshore and offshore exploration studies for clients that included British Petroleum, Shell Oil Co., Exxon, and the U.S. Department of Energy, among many othe NASA-funded study to develop re-

mote sensing techniques for detecting and mapping both natural and human-caused oil slicks at sea. I have analyzed hundreds of satellite and aerial images of the world's oceans, collected by a variety of radar, visible and infrared sensors.

In 2001 I founded SkyTruth, a non-profit organization dedicated to investigating and illustrating environmental issues using satellite imagery, digital mapping, and other remote sensing technologies. This testimony addresses several instances of oil spills observed by SkyTruth that are directly related to current offshore oil and gas drilling and production. These incidents are notable for their magnitude and/or the potential risk they expose, and include a broad range of causes including:

- Drilling accidents (Western Australia, August-November 2009)
- Severe storm damage (Katrina and Rita, 2005; Ike, 2008)
- Aging pipeline infrastructure (Eugene Island Pipeline, July 2009)

I. DRILLING ACCIDENTS: THE MONTARA / WEST ATLAS BLOWOUT AND SPILL

On August 21, 2009, Seadrill, a Norwegian offshore drilling services company[1], was working from their West Atlas portable jackup drilling rig at the new Montara oil production platform in the Timor Sea, about 150 miles off the coast of Western Australia, at a water depth of 260 feet[2]. The West Atlas rig was drilling a new production well[3] when one of the previously completed and temporarily plugged wells on the platform experienced a "blowout," ejecting its cement plug and spewing oil, natural gas, and vaporized natural gas condensate[4] into the air and water. The rig and platform were immediately evacuated, with no injury to the 69 workers involved. Due to the extreme fire and explosion hazard posed by the situation, all personnel were excluded from the immediate vicinity of the platform and rig[5].

For the next ten weeks, oil and gas flowed from the damaged well unabated[6], despite repeated attempts to plug the well (Figure 1).* Australian authorities and the platform operator, PTTEP-Australasia[7], responded primarily by aerial spraying of chemical dispersants on the oil slick, with limited boom-and-skimmer operations to mechanically recover the spilled oil. PTTEP determined that the best way to stop the flow from the damaged well was to drill a relief well that would intercept the damaged well at a point approximately 8,600 feet below the seafloor[8]. Because the West Atlas drill rig was deemed too hazardous for personnel, a second jackup drill rig, the West Triton, was transported from Singapore[9]. The West Triton rig did not arrive on-scene until September 10, nearly three weeks after the spill began[10]. It was stationed about 6,500 feet from the West Atlas drill rig[11], and began to drill the relief well.

Nearly one month later, on October 6 the relief well had finally reached the target depth and the first attempt was made to intercept the damaged well, a target about ten inches in diameter. This attempt missed the well[12], requiring the crew on the West Triton to pull the drillstring back and drill forward again on a slightly different trajectory, a process that takes several days to accomplish. This process was repeated three more times without success. Finally, on November 1, the fifth attempt to intercept the damaged well succeeded[13]. The West Triton crew began pumping heavy drilling mud into the damaged well to squelch the flow of oil and gas. Concurrently, the damaged well ignited (Figure 2), engulfing the Montara platform and attached West Atlas drill rig in flames[14]. The fire continued for two days[15] before finally burning out all the residual oil and gas in the well and other combustible materials on the structures (Figure 3).

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[1] http://www.seadrill.com/
[2] http://www.worleyparsons.com/Projects/Pages/MontaraPlatform.aspx
[3] http://www.offshore-mag.com/index/article-display/6066428130/articles/offshore/company-news/australianew-zealand/2009/08/seadrill-issues__update.html
[4] http://www.ens-newswire.com/ens/aug2009/2009-08-24-02.asp
[5] http://www.abc.net.au/news/stories/2009/08/25/2666754.htm
[6] http://www.watoday.com.au/photogallery/wa-news/the-west-atlas-oil-spill/20090829-f34l.html
* All figures have been retained in committee files.
[7] http://www.au.pttep.com/
[8] http://www.news.com.au/perthnow/story/0,21598,26172761-5017962,00.html
[9] http://www.theaustralian.com.au/news/breaking-news/oil-gas-leak-to-continue-for-seven-weeks/story-fn3dxity-1225765343929
[10] http://www.watoday.com.au/wa-news/mobile-rig-to-clean-up-oil-arrives-today-20090910-fj8p.html
[11] http://www.bloomberg.com/apps/news?pid=newsarchive&sid=aUYFMY8a.T6U
[12] http://www.news.com.au/perthnow/story/0,21598,26172761-5017962,00.html
[13] http://www.google.com/hostednews/afp/article/ALeqM5gwLtvodwRVStfa7BCRLFsX6WbqPg
[14] http://www.google.com/hostednews/afp/article/ALeqM5jBnSKYWjVXfddqxWb00p8eb6SqXQ
[15] http://www.google.com/hostednews/afp/article/ALeqM5gwLtvodwRVStfa7BCRLFsX6WbqPg

At this time, leakage from the damaged well has been stopped. Engineers are assessing the structural integrity of the Montara platform, heavily damaged by the fire. The $250M West Atlas drill rig is reported to be a total loss[16]. Difficult and complex work remains to re-enter the damaged well so a permanent cement plug can be installed[17]. The ultimate disposition of the other previously drilled production wells has not been announced.

Oil and gas flowed uncontrollably from the damaged Montara well for 73 days. No estimate has been made of the amount of methane—a potent greenhouse gas—released during this event. Estimates of the amount of oil spilled vary widely. Based on visual approximation only, PTTEP estimated 400 barrels (16,800 gallons) per day[18]. The Australian government's Department of Resources, Energy and Tourism estimated the spill rate at "up to 2,000" barrels per day[19]. The Australian Greens party collected data on the measured flow rates from other oil wells in the vicinity and came up with an estimate of 3,000 barrels per day[20]. These spill rates translate into total spill volumes of 1.2 million gallons, 6.1 million gallons, and 9.2 million gallons respectively. For comparison, the Exxon Valdez tanker spill in Alaska in 1989 released an estimated 10.8 million gallons[21].

Even at the lowest estimate of 400 barrels per day, the Montara event ranks as the worst productionrelated spill in Australia's 40-year history of offshore energy development[22]. SkyTruth obtained daily NASA satellite imagery throughout the course of the spill to track and measure the locations of oil slicks and sheen in the Timor Sea[23]. MODIS[24] satellites capture light reflected from the Earth's surface in visible and infrared wavelengths. MODIS imagery on August 30[25] showed slicks and sheen spread across an area of 2,500 square miles[26] (Figure 4). On September 3 patches of slicks and sheen ranged across 5,800 square miles[27] (Figure 5). On September 24, MODIS images showed slicks and sheen spanning nearly 10,000 square miles of the Timor Sea[28], an area larger than the state of Maryland[29].

Before the spill was stopped on November 1, satellite images obtained and analyzed by SkyTruth showed that oil slicks and sheen had cumulatively ranged across more than 24,000 square miles of ocean[30], an area the size of West Virginia. Slicks had moved far into Indonesian territorial waters[31], coming within 40 miles of the Timor coast and within 20 miles of islands along Western Australia's biologically rich Kimberley coast. Slicks and sheen were observed at times as far as 225 miles away from the leaking Montara well.

Preliminary investigations of the spill's environmental impacts by World Wildlife Fund[32] and by Australian government-funded researchers[33] have documented impacts on seabirds and marine mammals. Timorese and Australian fishermen have cited fish kills and significant declines in catch in the region affected by the spill and the application of dispersants[34]. News accounts report that fishermen are going bankrupt as a result of the steep decline in catch[35]. A multi-year study of the spill's impacts and lingering toxicity is being launched[36]; recent studies of the Exxon Valdez spill aftermath suggest that measurable impacts on ecosystem health and fisheries can be anticipated for decades[37].

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[16] http://www.bloomberg.com/apps/news?pid=newsarchive&sid=aFa6kCclA1Yg
[17] http://www.google.com/hostednews/afp/article/ALeqM5gwLtvodwRVStfa7BCRLFsX6WbqPg
[18] http://www.watoday.com.au/wa-news/oil-spill-is-now-one-of-australias-worst-20091022-hagd.html
[19] http://www.theaustralian.com.au/news/nation/timor-oil-leak-larger-than-claimed/story-e6frg6pf-1225790241987
[20] http://www.news.com.au/perthnow/story/0,21498,25996354-2761,00.html?from=public__rss
[21] http://www.sciencentral.com/video/2009/03/24/exxon-valdez-anniversary/
[22] http://www.bloomberg.com/apps/news?pid=20601130&sid=asC4plvYuEuE
[23] http://blog.skytruth.org/search?q=timor
[24] http://modis.gsfc.nasa.gov/
[25] http://earthobservatory.nasa.gov/NaturalHazards/view.php?id=40029
[26] http://blog.skytruth.org/2009/09/timor-sea-drilling-spill-covers-2500.html
[27] http://blog.skytruth.org/2009/09/timor-sea-drilling-spill-covers-5800.html
[28] http://blog.skytruth.org/2009/09/timor-sea-drilling-spill-september-24.html
[29] http://www.ipl.org/div/stateknow/popchart.html#statesbysize
[30] http://www.flickr.com/photos/skytruth/sets/72157622226354812/
[31] http://www.flickr.com/photos/skytruth/3951854968/sizes/l/in/set-72157622226354812/
[32] http://www.wwf.org.au/publications/montaraoilspillreport/
[33] http://www.environment.gov.au/coasts/publications/pubs/montara-rapid-survey.pdf
[34] http://www.news.com.au/perthnow/story/0,21598,26286663-5017007,00.html
[35] http://www.abc.net.au/news/stories/2009/11/07/2736012.htm
[36] http://thegovmonitor.com/energy__and__environment/australia-looks-at-long-term-environmental-plan-formontara-oil-spill-13389.html
[37] http://www.time.com/time/health/article/0,8599,1902333,00.html

The Australian government has launched an investigation into the causes of the Montara blowout, effectiveness of the response, and environmental impacts[38]. This investigation is expected to take at least six months to come to completion[39]. Ideally, it will include an analysis of regulatory gaps or weaknesses that may have contributed to or allowed the occurrence of this accident. As with most major spills, it is unlikely that the exact causal chain of events will be repeated anywhere, including in U.S. waters. Yet the Montara blowout and spill offers cautionary lessons about modern offshore drilling, regardless of its cause:

1. The West Atlas drill rig is new, technologically advanced equipment, built in 2007[40]. It is a jackup rig[41], a style commonly used for drilling in relatively shallow water (<400 feet), including much of the Gulf of Mexico continental shelf. The Montara production platform is also new equipment. Construction was completed in 2008[42], and the platform was installed in 2009 by an Australian engineering firm[43].

2. The West Atlas rig is owned and operated by Seadrill, a major international offshore drilling contractor that operates a global fleet of 41 drilling units, including nine that are under construction[44]. They have an office in Houston, identify the Gulf of Mexico as an important business target[45], and are currently under contract with Devon Energy to drill deepwater wells in the U.S. Gulf of Mexico using their new West Sirius semisubmersible rig[46]. All of the personnel present when the Montara blowout occurred were working on the West Atlas rig[47].

3. The U.S. Minerals Management Service has investigated 18 blowouts and 13 losses of well control in the U.S. Gulf of Mexico since 1983, with three such incidents occurring since 2007[48].

4. The Montara platform is located in relatively shallow water (260 feet), and the Montara well suffered a failure 8,600 feet below the seafloor. Despite generally calm tropical seas and favorable weather for offshore operations, more than ten weeks elapsed before the Montara blowout could effectively be killed by one of the world's leading well-control contractors (Alert Well Control)[49]. In contrast, drilling in the U.S. Gulf of Mexico has moved into ultradeep waters, approaching 10,000 feet for some recently targeted plays on the continental slope[50], and wells in the Gulf are now being drilled to depths exceeding 30,000 feet below the seafloor[51]. The Gulf of Mexico and Atlantic coasts are regularly hit by tropical storms[52]. Portions of the Arctic, where offshore energy development is being considered, feature adverse winter conditions characterized by sea ice, subzero temperatures, tropical storm-force winds, and low visibility. Effective response to a comparable accident in the deepwater Gulf, or mid-winter Arctic, could be significantly more difficult, prolonged, and costly.

II. STORM DAMAGE: HURRICANES KATRINA, RITA AND IKE

In late August of 2005, Hurricane Katrina moved through oil fields in the central Gulf of Mexico as a Category 5 storm[53]. Just three weeks later another Category 5 storm, Hurricane Rita[54], drove through the offshore infrastructure in the western Gulf. SkyTruth acquired radar satellite images taken a few days after Katrina made landfall[55]. Our analysis of these images revealed extensive oil slicks covering more than 700 square miles in the Gulf of Mexico (Figure 6). Close examination revealed

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[38] http://www.watoday.com.au/environment/inquiry-announced-into-timor-sea-oil-spill-20091105-hz7x.html
[39] http://www.cbsnews.com/stories/2009/11/05/ap/business/main5530677.shtml
[40] http://www.seadrill.com/stream__file.asp?iEntityId=935
[41] http://oilgasglossary.com/jackup-drilling-rig.html
[42] http://www.rigzone.com/news/article.asp?a—id=64979
[43] http://www.upstreamonline.com/live/article172586.ece
[44] http://www.seadrill.com/modules/module__123/proxy.asp?D=2&C=19&I=1772&mid=18
[45] http://www.drillingcontractor.org/dcpi/dc-julyaug08/DC__July08__Seadrill.pdf
[46] http://www.rigzone.com/news/article.asp?a__id=69946
[47] http://drillingclub.proboards.com/index.cgi?board=wellcontrol&action=display&thread=4315&page=1
[48] http://www.gomr.mms.gov/homepg/offshore/safety/acc__repo/accindex.html
[49] http://www.upstreamonline.com/live/article197622.ece
[50] http://www.gomr.mms.gov/PDFs/2009/2009-016.pdf
[51] http://blog.nola.com/tpmoney/2008/05/mcmoran__says__highprofile__black.html
[52] http://commons.wikimedia.org/wiki/File:Atlantic__hurricane__tracks__1980-2005.jpg
[53] http://www.katrina.noaa.gov/
[54] http://earthobservatory.nasa.gov/NaturalHazards/view.php?id=15546
[55] http://blog.skytruth.org/2007/12/hurricane-katrina-gulf-of-mexico-oil.html

multiple sources for the slicks, including known platform locations[56] (Figure 7). Months later, the Minerals Management Service reported that Katrina and Rita had destroyed more than 100 platforms (Figure 8) and severely damaged more than 50 others; damaged more than 450 pipelines; and caused at least 124 separate spills in the Gulf totaling 750,000 gallons of oil and other liquid hydrocarbons (primarily based on self-reporting by industry)[57]. Five drilling rigs were destroyed, and 19 others were severely damaged[58]. Nineteen mobile drilling units were broken loose from their moorings and set adrift by the storms, dragging their heavy anchor chains on the seafloor and causing much of the pipeline damage[59]. We conclude that many of the oil slicks SkyTruth identified on satellite images of the Gulf resulted from pipelines damaged in this manner.

Aside from the direct damage to, and spills from, offshore facilities, these storms exposed a significant and previously unrecognized risk posed by offshore production: catastrophic spills resulted from the onshore oil and gas infrastructure that supports offshore production in the Gulf—the refineries, pipelines, and tanks required to receive, process, store and distribute oil and gas from offshore fields. In a May, 2006 report to the U.S. Department of Homeland Security, the U.S. Coast Guard reported that Katrina and Rita released over 9 million gallons of oil, not including more than 5,000 minor spills[60]. Storm-damaged onshore infrastructure spilled 7 to 8 million gallons of oil into coastal wetlands, streams, and communities. A single spill from a ruptured storage tank at the Murphy Oil Refinery inundated more than 1,700 homes in the towns of Chalmette and Meraux, Louisiana, with more than one million gallons of crude oil[61] (Figures 9 and 10).

On September 13, 2008, this coastal vulnerability was exposed again when Hurricane Ike made landfall near Galveston, Texas, with Category 2 winds but a storm surge more typical of a Category 5 event. Coastal oil facilities were flooded. SkyTruth obtained NOAA aerial survey photographs[62] that showed extensive oil slicks emanating from coastal wells[63] and damaged storage facilities[64] (Figure 11). Onshore facilities related to offshore production continue to pose risks that should be acknowledged and effectively managed.

III. PIPELINE SPILLS: AGING INFRASTRUCTURE

Oil and gas infrastructure can become damaged and cause oil spills even in the absence of major storms. On July 25, 2009, Shell Oil Co. reported to the U.S. Coast Guard's National Response Center that they had detected a loss of pressure in the Eugene Island Pipeline off Louisiana. Divers found a crack in the 20" diameter pipe at a point about 30 miles offshore, in water about 60 feet deep[65]. 63,000 gallons of oil leaked into the Gulf[66], a "medium" spill by Coast Guard definition. Radar satellite imagery from NOAA showed the resulting oil slick[67], which eventually stretched over 15 miles and reached a size of 80 square miles[68] before it was effectively dispersed (Figure 12). Had this break occurred from a point closer to shore, beaches and coastal resources could have been directly impacted (Figure 13), as they were with the 1997 Torch spill from a pipeline just off the California coast[69].

The Eugene Island Pipeline was installed in 1976[70]. In 2009[71] it began carrying oil produced from Chevron's new deepwater "Tahiti" platform[72], situated approximately 190 miles south of New Orleans[73].

In a common industry practice, Tahiti was "tied back" to the existing infrastructure: new pipeline was only extended 55 miles from Tahiti to Shell's Boxer platform,

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[56] http://skytruth.mediatools.org/node/12846
[57] http://www.mms.gov/ooc/press/2006/press0501.htm
[58] http://meetingorganizer.copernicus.org/EGU2009/EGU2009-13707.pdf
[59] http://www.mms.gov/tarprojects/581/44814183__MMS__Katrina__Rita__PL__Final%20Report%20Rev1.pdf
[60] http://www.uscg.mil/ccs/npfc/docs/PDFs/Reports/osltf__report__hurricanes.pdf
[61] http://www.epa.gov/katrina/testresults/murphy/
[62] http://ngs.woc.noaa.gov/ike/IKE0000.HTM
[63] http://www.flickr.com/photos/47684393@N00/2861763336/sizes/l/
[64] http://www.flickr.com/photos/skytruth/2924786274/sizes/l/
[65] http://www.incidentnews.gov/attachments/8061/524175/EugeneIslandNewsRelease090729.pdf
[66] http://www.incidentnews.gov/incident/8061
[67] http://www.incidentnews.gov/attachments/8061/524191/NESDIS—Analysis.jpg
[68] http://www.incidentnews.gov/entry/524230
[69] http://www.dfg.ca.gov/ospr/spill/nrda/nrda__irene.html
[70] http://www.reuters.com/article/environmentNews/idUSTRE56R46E20090729
[71] http://www.chevron.com/news/Press/release/?id=2009-05-06
[72] http://www.gasandoil.com/goc/company/cnn71530.htm
[73] http://www.offshore-technology.com/projects/tahiti/

where it was connected to the existing pipeline network[74]. From Boxer, Tahiti oil flowed to shore through older pipelines including the Eugene Island Pipeline.

The cause of the Eugene Island Pipeline failure has not yet been publicly reported, but as the existing nearshore pipeline network ages, structural failures become increasingly likely due to accumulated strain and corrosion. Offshore production of oil in the U.S. Gulf of Mexico began in the late 1940s[75]. In 2006, federal waters in the Gulf of Mexico produced 5.5 trillion cubic feet of natural gas and 400 million barrels of crude oil[76]. Today, the seafloor in the western and central Gulf is crisscrossed by a complex network of over 25,000 miles of active pipeline, connecting 3,600 platforms and thousands of oil and gas wells to coastal processing, storage and distribution facilities[77] (Figure 14). A recent SkyTruth analysis of pipeline data from the Minerals Management Service showed that 60 miles of still-active pipeline exceed 30 years in age. But most of the active pipeline segments in the MMS online dataset—totaling over 18,000 miles, or 72% of the active pipeline network—lack information pertaining to their installation date[78], so the real extent of the age problem is elusive.

Rigorous inspection and maintenance, routine monitoring, and aggressive programs to decommission aging pipeline can help manage the risk. But effective design and implementation of such programs may be complicated by the existing regulatory regime for offshore pipelines, with jurisdiction split between two separate agencies, the Department of Transportation and the Department of the Interior. This is a classic example of gaps and overlaps in ocean governance of the kind discussed in a widely quoted 2006 paper[79] in the journal *Science.*

IV. KEY OBSERVATIONS

Based on SkyTruth's experience over the past five years investigating significant oil spill incidents caused by drilling mishaps, severe storm damage, and leaking pipelines, we offer the following thoughts:

1. Offshore oil and gas production is a complex, technically challenging industrial activity. Relatively small spills occur regularly and, although accidents that lead to major spills are not common, they do still occur and pose a continuing threat to other marine and coastal resources, and to the communities and economic systems that depend on the integrity and sustainability of those other resources.
2. While continual improvements to comprehensive regulation and enforcement, coupled with advances in technology and technique, can significantly reduce the likelihood of accidents that lead to major spills, offshore production still poses risks.
3. When things go wrong offshore, the results can be disastrous, difficult to remediate, and extremely costly[80] to both industry and society[81]. The risk becomes much higher in deeper water, in stormy locations, or where other difficult conditions (such as ice cover) slow and complicate oil spill response.
4. Prepare for the worst. Determine the worst-case scenario wherever drilling is allowed, and integrate that scenario into the processes that will guide the decisionmaking and management of our nation's marine and coastal resources.

Other impacts, not addressed in this testimony, can also occur. This testimony does not provide a comprehensive analysis of the pollution that inevitably accompanies an intensive industrial resource extraction operation such as oil and gas production. Other important topics that should be thoroughly investigated and carefully considered when weighing the merits of offshore drilling include:

- The routine, expected pollution from drilling and production activities (air, water).

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[74] http://www.subseaiq.com/data/Project.aspx?project__id=127&AspxAutoDetectCookieSupport=1

[75] http://www.gomr.mms.gov/homepg/regulate/environ/history__louisiana.html 76

[76] http://tonto.eia.doe.gov/dnav/pet/pet__crd__gom__s1__a.htm

[77] http://www.gomr.mms.gov/homepg/pubinfo/repcat/arcinfo/index.html

[78] http://www.gomr.mms.gov/homepg/pubinfo/repcat/arcinfo/zipped/8321.zip

[79] Crowder, L.B., G. Osherenko, O.R. Young, S. Airamé, E.A. Norse, N. Baron, J.C. Day, F. Douvere, C.N. Ehler, B.S. Halpern, S.J. Langdon, K.L. McLeod, J.C. Ogden, R.E. Peach, A.A. Rosenberg, and J.A. Wilson (2006). Resolving mismatches in U.S. ocean governance. Science, v. 313, pp. 617-618

[80] http://www.watoday.com.au/environment/cause-of-wa-oil-spill-revealed-20091109-i59k.html

[81] http://www.watoday.com.au/wa-news/oil-spill-cleanup-cost-tops-5-million-20091020-h6qx.html

- The occurrence of minor accidental spills and discharges. See Table 1,* for example, showing the frequency of spills >2100 gallons. Data addressing the frequency and cumulative impact of smaller spills are difficult to come by[82].

—Fugitive emissions of methane, a potent greenhouse gas, from oil and gas development activities and facilities.
—The short- and long-term environmental, economic, and sociological impacts of spills and pollution.

The CHAIRMAN. Thank you for being here.
Mr. Rainey, go right ahead.

STATEMENT OF DAVID RAINEY, VICE PRESIDENT, GULF OF MEXICO EXPLORATION, BP AMERICA, INC., HOUSTON, TX

Mr. RAINEY. Thank you, Chairman Bingaman, Ranking Member Murkowski, and members of the committee. I am honored to appear before you today to share BP's perspective on environmental stewardship and offshore energy production.

Throughout the 20th century, an abundant supply of low cost energy has been the driving force behind America's development, prosperity, and security. BP supports the view that energy security is inseparable from economic security and national security. BP is the largest producer of oil and natural gas in the U.S. and one of the largest investors in biofuels, wind, and solar. We recognize the need to transition to a lower-carbon economy, but that's—that transition will take time. The U.S. will continue to rely on hydrocarbons for many years to come. Like any industrial activity, the production and transportation of oil and gas have environmental implications. The public is highly concerned about this, and we share their concerns.

Releases from oil and gas operations are rare, and the application of technology has enabled a dramatic reduction of releases from our industry over the last 30 years. To be clear, any release from our operations is unacceptable, and we will continue to invest in research and technology to drive us to our ultimate goal of zero discharge.

Contrary to popular perception, ours is a high-tech industry. To demonstrate this point, I would like to highlight three technologies which enable the safe and reliable production of offshore oil and gas. These are seismic imaging, drilling, and production systems.

Seismic imaging allows us to predict the possibility of hydrocarbon reservoirs below the seabed. Drilling allows us to test for the presence of hydrocarbons in the reservoir, and, if hydrocarbons are present, the well bore connects the reservoir to the surface, where production systems enable us to produce the hydrocarbons and deliver them safely to market.

Our industry has a remarkable track record of moving forward the limits of each of these technologies. I would like to highlight a few examples of how we have applied these technologies in the Gulf of Mexico, in Alaska, and in the United Kingdom.

In the Gulf of Mexico, much of the seabed is underlain by shallow salt canopies. These salt canopies obscure the image below the seabed in the same way that a pane of frosted glass obscures the

*Table has been retained in committee files.
[82] Fraser, G.S., J. Ellis, and L. Hussain, 2007. An international comparison of governmental disclosure of hydrocarbon spills from offshore oil and gas installations. *Marine Pollution Bulletin*, v. 56, pp. 9-13.

image on the other side of a window. Early exploration focused on areas that had no shallow salt canopy. As the fields in these areas were discovered, industry began to explore under the thin edges of the canopies and eventually under thicker and more complex bodies of salt. Each phase of exploration was enabled by advances in seismic imaging technology.

Recently, BP has pioneered a technology known as Wide-Azimuth Towed Streamer, or WATS. WATS is a 3-dimensional acquisition technology which has allowed us to get a better view of what lies on the other side of the frosted glass. As a result of the application of this technology, we recently announced a significant extension to our Mad Dog field, which is now firmly established as the third giant field in our Gulf of Mexico portfolio.

Also in the Gulf, we have been progressing the limits of drilling and production systems. As drilling technology has moved forward enabling discoveries in deeper and deeper water, so production technology has followed. A variety of production systems has been developed to account for different metocean, seabed, and reservoir conditions.

BP currently operates eight production hubs in the deepwater Gulf of Mexico using these technologies. One of these, our Marlin hub, has just celebrated its 10th anniversary of first production. As the original field has declined, five satellite fields up to 18 miles distant have been tied back to the Marlin host. This has been enabled by combination of directional and extended-reach drilling and subsea production technologies. The useful life of the facility has been extended and the environmental footprint has been reduced by requiring only one surface facility, where six would otherwise have been needed. In addition, Marlin has, this year, achieved a second peak of production, a very rare occurrence in our industry.

In Alaska, BP is the only company producing oil and gas from the Beaufort Sea. Production began from our Endicott field in 1986. Drilling and production take place from an artificial gravel island located about 1 mile from the shore. The island is connected to shore via a gravel causeway along which oil and gas flows through aboveground pipelines. In 2000, production began at our Northstar project. The Northstar Island, from which drilling and production takes place, is further offshore than Endicott. At Northstar, however, there is no causeway and production is through a pipeline which is buried below the sea bed.

Our third offshore development in Alaska is the Liberty Project, which is currently under development. The reservoir at Liberty is located in Beaufort Sea Federal waters, some 6 to 8 miles from the shoreline. Despite being much further offshore than either Endicott or Northstar, at Liberty there will be no new island and no new pipeline. Advances in extended-reach drilling will allow us to reach the Liberty reservoir from the existing facilities at Endicott.

Finally, I would like to talk about our Wytch Farm development in the U.K. Wytch Farm is the largest onshore oil and gas development in Western Europe. It is located on the south coast of England in one of the most environmentally sensitive areas in the U.K. The application of extended-reach drilling has allowed the offshore parts of the reservoir to be drilled and produced from onshore facilities behind the shoreline. By working closely with government,

as well as surrounding communities and other stake holders, we have been able to design and locate the facilities to have minimal environmental and visual impacts. This project has been a resounding success, it is championed by local communities, by government leaders, and industry. In the 1995, it won the Queen's Award for Environmental Achievement.

In summary, I would like to return to the Gulf of Mexico, where technology has been a key driver of our success. In September, we announced a Tiber discovery, where we set a new drilling depth record for the industry at 35,055 feet. There are many challenges to overcome to bring Tiber to production, but they are exciting challenges and we look forward to addressing them. As we do so, we will be ever mindful and respectful of the communities and the environments in which we operate.

We look forward to continuing to work with you to secure the energy supplies that our Nation will need. Thank you, and I will be happy to take your questions.

[The prepared statement of Mr. Rainey follows:]

PREPARED STATEMENT OF DAVID RAINEY, VICE PRESIDENT, GULF OF MEXICO EXPLORATION, BP AMERICA, INC., HOUSTON, TX

Chairman Bingaman, Ranking Member Murkowski, and Members of the Committee:

My name is David Rainey, and I am BP's Vice President of Exploration for the Gulf of Mexico. I am pleased to appear before you today to share BP's perspectives on environmental stewardship and offshore energy production.

BP IN THE UNITED STATES

BP is the largest oil and gas producer in the US, where we directly employ 29,000 people. We have long been a proponent of comprehensive energy policies that promote energy security through the development of both traditional and non-traditional sources of energy, as well as conservation and efficiency. We have also been an advocate of taking a precautionary approach to CO_2 emissions, and are committed to reducing the environmental impacts of both energy production and consumption.

ENERGY TRENDS

Throughout the 20th century, an abundant supply of low-cost energy was the driving force behind America's development, prosperity, and security. Globally, the world uses roughly 80 million barrels of oil a day. The US consumes a quarter of this—about 20 million barrels, of which we import 60 percent—or 12 million barrels. The Energy Information Administration (EIA) projects that US energy demand will grow by 11 percent from 2007 to 2030. Satisfying that demand in a sustainable way is one of our nation's most significant challenges. If anticipated US needs are combined with those of the rest of the world, EIA projects that a 35 percent expansion in global oil production will be needed. That equates to an additional 30 million barrels of oil every day.

Finding that oil and natural gas will be neither simple nor cheap. The era of "easy oil" may be over. New supplies are harder to find, more difficult and more expensive to extract, and are often located in politically unstable parts of the world. Wherever they come from, bringing new supplies to fuel our homes, businesses and transportation needs will require the investment of hundreds of billions of dollars.

BP supports the need to transition to a lower-carbon economy—but this transition will take time—probably many decades. We believe that the nation's and the world's short- to medium-term energy mix will continue to be dominated by hydrocarbons, and finding and developing oil and gas remains a huge challenge.

BP'S ENERGY PORTFOLIO

BP is not only the largest oil and gas producer in the United States, but also the largest investor in energy of all sorts. In the last five years, we have invested ap-

proximately $35 billion in the US to ensure Americans have the energy and fuels they need to live their lives. These include:

Oil and natural gas: Offshore and onshore, from the Alaskan North Slope to the deep waters of the US Gulf of Mexico, we are a leader in providing America's traditional energy needs.

Wind: We are major investors in wind generation and have 1,000 megawatts (MW) of wind generation on-line. We expect to have an installed capacity of 2,000 MW by the end of 2010. And we also have a land position capable of potentially supporting 20,000 MW in the future—one of the largest portfolios in the country.

Biofuels: We are one of the largest blenders and marketers of biofuels in the nation. BP has committed more than $1.5 billion to biofuels research, development, and production in response to increasing energy demand and the need to reduce overall greenhouse gas emissions. Our cutting-edge research looks to use dedicated non-food crops that will contain more energy and have less impact on the environment and human food supplies than past generations of biofuels. They will also be more compatible with existing engines and transport infrastructure, making them less costly to deploy at scale.

Carbon Capture and Storage (CCS): BP is involved in three major CCS projects: active operations in Algeria, a planned project in Abu Dhabi, and a potential hydrogen energy project in California.

Solar: BP's solar business has been operating for over 30 years and last year had sales of 162 MW globally. This represents an increase of 29% over 2007 and further growth is expected.

By investing heavily in a diverse portfolio of energy sources and the technologies to support them, BP is helping meet America's energy needs while ensuring a more sustainable economy and energy future.

TRACK RECORD OF ENVIRONMENTAL STEWARDSHIP

Like any industrial activity, production and transportation of oil and natural gas carries environmental implications. The public is rightly concerned about potential impacts and we share these concerns.

Releases from oil and gas operations are rare, and the application of technology has enabled a dramatic reduction in releases from our industry over the last 30 years. The National Academy of Sciences published its "Oil in the Sea III" report in 2002. This report states that oil released to the sea from the global oil and natural gas declined by 80 percent from 1975 to 2002.

To be clear, any release of hydrocarbons from our operations into the environment is unacceptable, and we continue to invest in research and technology to drive us to our ultimate goal of zero discharge.

Examples of the technologies which have helped to reduce accidental releases include:

- Down hole flow control valves that shut down the well automatically if damage to the surface equipment is detected;
- Blowout preventer technology which includes redundant systems and controls;
- New and improved well control techniques which maintain constant control of the fluids in the wellbore;
- Sensors which continually monitor the subsurface and seabed conditions for sudden changes in well pressures; and
- BP's fiber optic network in the US Gulf of Mexico which allows us to monitor well pressures in real time, both at the facility and in our offices in Houston.

While our intent is to prevent all accidental discharges, we conduct regular emergency drills with local, state, and federal agencies. All of our production facilities have contingency plans that identify the procedures, response equipment, and key personnel needed for responding to incidents.

OFFSHORE TECHNOLOGIES ENABLING ENVIRONMENTAL STEWARDSHIP

Three key technologies which enable the safe and reliable production of offshore oil and gas resources:

- Seismic imaging;
- Offshore drilling; and
- Offshore production systems.

Seismic imaging allows us to predict the presence of hydrocarbon reservoirs below the sea bed. Drilling allows us to test for the presence of hydrocarbons in the res-

ervoirs. When hydrocarbons are present, the well bore connects the reservoir to the surface, where production systems enable us to produce the hydrocarbons, and deliver them safely to the refinery.

Our industry has a remarkable track record of moving forward the limits of each of these technologies. In BP, we have been at the forefront of both the development of the technologies, and their application. I would like to talk about three specific areas where we have employed these technologies: the US Gulf of Mexico, the Beaufort Sea offshore Alaska, and our Wytch Farm development in the UK.

US DEEPWATER GULF OF MEXICO

Industry began to explore in the US Gulf of Mexico during the early 1930's. The first discovery out of site of land was made by Kerr McGee in 1947. The MMS classifies water depths greater than 1,000 feet as deepwater, and depths beyond 5,000 feet as ultra-deepwater. The first deepwater exploration well was drilled in 1975. The first ultra-deepwater exploration well was drilled in 1987. So, while it took more than 40 years for industry to develop the technology to move from the shoreline to 1,000 feet water depth, it took just 12 years to move from 1,000 feet to 5,000 feet. Wells in water depths up to 10,000 feet are now routine.

In the US Gulf of Mexico, shallow salt canopies underlie about 65 percent of the seabed in the deepwater areas. These salt canopies make seismic imaging of the subsurface very challenging. [See Figures 1A and 1B]* They present the same barrier to our seismic imaging capability that a pane of frosted glass presents to our eyes and our ability to see through it. The salt canopies bend the seismic waves and obscure the image of the underlying geology.

Early exploration in the US Deepwater Gulf of Mexico was focused on the 35 percent of the area which has no salt canopy. Without the salt, conventional seismic imaging worked and fields were discovered as the advances in drilling technology enabled industry to move rapidly into the deepwater. Much of the success in this period was enabled by widely-spaced two dimensional seismic data. The technology challenge was about developing the systems to safely produce the oil and gas in these water depths. Our colleagues in Shell were at the forefront of this phase of Gulf of Mexico development.

By the mid-1990's, the large fields had been found in the areas of the deepwater free of shallow salt canopies. This led industry to turn its attention to the challenge of exploring below the salt. To do this, we matured a technology known as seismic depth imaging. This technology combines geological modeling and computer algorithms to restore the seismic wave paths to their correct positions-allowing the image to emerge.

By the late 1990's, depth imaging allowed the industry to begin to explore beneath the salt. These early forays were restricted to areas where the top and base of the salt were geometrically simple and the imaging problem was, from where we stand today, relatively easy to solve. BP's Mad Dog, Atlantis, and Thunder Horse discoveries were delivered on the back of this technology in 1998 and 1999. Since then, we have continued to refine the technology and have been able to announce a steady stream of discoveries—most recently Kaskida in 2006, Isabela in 2007, Kodiak and Freedom in 2008, and this year Mad Dog South and Tiber.

In 2003, BP began to address the problem of how we would explore under more complex salt geometries. We predicted that continuing incremental improvements to what was then considered conventional; depth imaging methods would soon reach a point of diminishing returns. So we set out to create a step change by developing a completely new seismic imaging technology.

Conventional depth imaging is a data processing technology which involves some of the most sophisticated computer algorithms ever created. These algorithms require powerful super-computers to run them. However, the underlying data were acquired using a technology which had not changed significantly for 25 years. The data were acquired using a single seismic vessel towing both the seismic source and the receivers. Effectively, therefore, the data were acquired in two dimensions, but at sufficiently close spacing to allow processing in three dimensions.

BP's Wide Azimuth Towed Streamer (WATS) and Ocean Bottom Node technologies involve truly three-dimensional seismic acquisition. They were conceptualized, modeled, and piloted at scale in the US Deepwater Gulf of Mexico. The WATS pilot was on our Mad Dog Field, and the Nodes pilot was on Atlantis. At Mad Dog, the WATS data have contributed significantly to our ability to continue to develop the field. The successful Mad Dog South appraisal well which we announced in July of this year was enabled by these data. At Atlantis, development of the North Flank

*Figures have been retained in committee files.

of the field has been enabled through the application of nodes technology and production has begun.

We have worked hard to drive our WATS technology into the market, and to refine it to make it cost effective in the exploration arena. Today, much of the US Deepwater Gulf of Mexico is covered by what we call XWATS—for Exploration WATS—seismic surveys. [See Figure 2] The data from these surveys will allow us to continue to move forward the limits of where we explore. As a result, we will be more efficient, drill fewer wells, and have less impact on the environment as we become better at predicting the presence of oil and gas in the subsurface.

I have mentioned above how drilling technology advanced to allow us to drill in deep and ultra-deep waters. As discoveries were made, production technology followed. A variety of production systems have been developed to account for the different metocean, seabed, and reservoir conditions. [See Figure 3]

BP has been at the forefront of this recent phase of deepwater development. Today, we operate eight major producing facilities in the US Deepwater Gulf of Mexico. [See Figure 4] They range from the Pompano fixed platform, installed in 1994 in 1,300 feet of water, to the Atlantis semi-submersible platform, which started production in 2007 and sits in 7,100 feet of water. In between lie:

- The Marlin tension leg platform in 3,234 feet of water;
- The Holstein, Mad Dog, and Horn Mountain spar facilities in 4,344, 4500 and 5,422 feet of water, respectively; and
- The Thunder Horse and Nakika semi-submersible platforms in 6,050 feet and 6,340 feet of water, respectively;

Today Atlantis is the world's deepest oil production facility, an honor previously held by both Horn Mountain and Nakika, when they began production.

In addition to enabling the industry to move into ever deeper waters, the drilling envelope has been extended by advances in directional and extended reach drilling. The Nakika development is an example of where these technologies have been combined with subsea production technology to bring six otherwise uneconomic discoveries to production. These independent, medium-sized fields are tied back to the centrally-located semi-submersible production host facility. Distance from the central host varies from five to 26 miles. By combining directional and extended reach drilling with subsea production systems, the environmental footprint has been reduced by requiring only one surface facility, where previously six would have been needed. [See Figure 5]

This month marks the tenth anniversary of our Marlin oil and gas hub. As the Marlin Field has declined, a series of satellite fields have been tied back using subsea production technology. In total, five satellite fields have been tied back, with distance from the host ranging from two miles to 18 miles. This year, the Dorado and King South satellite fields have been brought on line. These tiebacks have returned the facility to a second peak of production—a very rare occurrence in our industry. Again, the combination of directional and extended reach drilling and subsea production technology has enabled multiple fields to be developed from a single host platform. The environmental footprint has been reduced and the useful life of the facility has been extended.

In addition to directional and extended reach drilling, today's drilling technology allows us to drill to total depths which were unimaginable just 15 years ago. In the mid-1990s, drilling was restricted to roughly 20,000 feet total depth. Today we routinely drill to 30,000 feet and below. [See Figure 6] This means that we encounter ever greater temperatures and pressures. Our Thunder Horse development currently defines the limits for what we call high-pressure/high-temperature production technology. That said, we are already moving beyond these limits. Our Kaskida discovery, with reservoir depths ranging from 30,000 feet to 32,500 feet, has reservoir pressures above 20,000 pounds per square inch. We are currently designing the systems which will be required to bring Kaskida to production.

Finally, we have recently announced our Tiber discovery—which was at the time of rig release the deepest well in the history of the oil and gas industry at 35,055 feet. Tiber is an exciting discovery, and we are working hard to understand the technologies which will be required to bring it to production.

LIBERTY PROJECT, BEAUFORT SEA, ALASKA

In Alaska, as elsewhere, much of the easy-to-reach oil and natural gas has been found and has been, or is being, produced. The new opportunities which have emerged are harder to reach and more technically challenging. They have become accessible, in large part, due to the technological advances we are discussing here

today. Presently, BP is the only company producing oil and natural gas from the Outer Continental Shelf in the Beaufort Sea.

In 1986, the Endicott field became the first offshore producing field in the Beaufort Sea. The Endicott facility lies about a mile offshore and produces from an artificial gravel island which is connected to the coast by a gravel causeway. Oil and gas produced at Endicott come to shore via above-ground pipe lines.

The next step of Arctic offshore developments in the Beaufort Sea was Northstar—also operated by BP. The artificial Northstar Island sits in state of Alaska waters, significantly further offshore than the Endicott Island. It is accessible by water and air only. There is no causeway, and production is through a pipeline which is buried below the seabed. The Northstar Island was designed to withstand Beaufort Sea ice conditions, and the pipeline was constructed to protect against leakage and is buried deep enough to protect against ice scouring on the sea bed.

The latest evolution of the application of offshore Arctic technology is BP's Liberty Project which is currently under development. The Liberty reservoir is located in Beaufort Sea Federal waters, roughly six to eight miles from the North Slope shoreline. The project will use existing, expanded facilities associated with Endicott and require no additional, roads, causeways or subsea pipelines. The key technology which will enable success is directional and ultra-extended reach drilling.

During the last three decades, the limits of extended reach drilling have moved forward continuously. During the 1980's, three to four miles was the maximum horizontal distance which a well could be drilled from its surface location. During the 1990's, five to six miles became the norm. At Liberty, the wells will reach out six to eight miles from the Endicott Island to access the reservoir under the Beaufort Sea. [See Figure 7] One of the world's most powerful and most sophisticated onshore drilling rigs was constructed (in Washington state) to make this possible. For perspective, if the Washington Monument were the Liberty drill rig, it could extend out to the Capital Beltway and reach a target nearly two miles deep. These will be among the most challenging wells ever drilled in the industry.

Drilling from the expanded Endicott surface facilities is expected to start in 2010, and first production is expected in 2011. Through the advance of drilling technology we will access a new, 100-million barrel field that will produce directly into existing facilities without the need for a drilling island, offshore production facility, or subsea pipeline.

Another key to success in the Beaufort Sea has been our relationships with our neighbors on the North Slope. These relationships have spanned decades and are based on long-term trust and commitments to the community. We have staffed an office in Barrow, Alaska since 1979 and regularly interact with stakeholders, including the North Slope Borough, the Alaska Eskimo Whaling Commission, residents of Native Alaskan villages, and others. Things that concern our neighbors the most are those that pose a risk to their subsistence way of life. Understanding this has allowed a trusting relationship to prosper.

THE WYTCH FARM FIELD

Located on the south coast of England, Wytch Farm is Western Europe's largest onshore oil field. It is located in one of the most environmentally sensitive areas of the UK and it is operated by BP. [See Figure 8] In 1995, it won The Queen's Award for Environmental Achievement. The area has also been designated as an Area of Outstanding Natural Beauty, a Site of Special Scientific Interest (SSSI), and a World Heritage Coastline. Wytch Farm achieved first oil in 1979. Since then, the project has been developed in three phases and over 100 wells have been drilled to date. [See Figure 9]

The Wytch Farm reservoir extends underneath Poole Harbor, which is an area similar to Cape Cod here in the US. The reservoir is accessed by extended reach drilling from behind the shoreline. Development here has been achieved through close co-operation and engagement with governments, as well as the surrounding communities. Considerable input on the design of facilities was sought from local community and environmental stakeholders, including the siting of the operating equipment, with various above-ground permanent facilities designed to blend into the existing landscape.

As a result of the area's ecological importance, BP and other stakeholders applied strict environmental protection policies and established monitoring programs and surveys related to air quality, archaeology, seabed ecology, bird and reptile populations. All of these surveys were vital in determining how to develop the oilfield and in providing baseline data against which BP could monitor its performance.

In recent years, BP applied extended reach drilling techniques, which brought environmental and commercial benefits to the development by enabling the furthest

parts of the offshore reservoir to be drilled from an onshore site. Well M16 set a new world record when it broke the six mile barrier in June 1999, reaching a total length of seven miles and a depth in excess one mile. In addition, the drilling rig and equipment also had noise-abatement controls installed to meet the requirements set by local officials.

Wytch Farm continues to be a resounding success, championed by the local community, government leaders, and industry. The application of technology has enabled the development of this oil field in the midst of one of the most environmentally sensitive coastal environments in Europe.

SUMMARY

In my testimony today, I have described the evolution of three key technologies which have enabled BP and our industry to explore for and produce oil and natural gas in some of the most challenging environments in the world.

Seismic imaging is the key technology which enables us to see below the seabed and better predict the presence of oil and gas reservoirs. Finding oil and gas for the future requires exploring in areas that are ever deeper and more complex. To do this, we must continue to apply and enhance our seismic imaging technologies.

Advances in drilling technologies and production systems have been significant. They include extended reach drilling, drilling in deeper waters, and to greater depths. These advances enable more production while reducing environmental impacts and allowing for efficient use of existing facilities and infrastructure.

Floating production systems allow oil and gas to be produced from locations that are far removed from onshore oil refineries or pipelines. Sub-sea tiebacks allow multiple wells and fields to connect to one surface platform from many miles away. This means that fewer platforms are required which increases efficiency, and reduces the environmental footprint, and the visual profile. Many of the technology examples discussed herein have enabled a robust track record of environmental stewardship and can reduce or even eliminate the visual "footprint" of offshore energy operations.

As we continue to move forward the limits of drilling and production technology, we are constantly mindful of our aspiration of "zero discharge". The technology to contain oil and gas is constantly moving forward as well.

Technology has been, and will continue to be, the key to our energy future. We must continue to invest in exploration and production capability and in technology to meet demand. We must also continue to develop technologies to increase recovery of oil and gas from established hydrocarbon positions here in the US and around the world. Finally, to encourage and ensure continued success, we must have stable fiscal, regulatory, and leasing policies so that the oil and gas industry can continue to maintain investments which create jobs, generate revenues and enhance US energy security.

Thank you for the opportunity to share BP's perspectives on environmental stewardship and offshore energy production.

The CHAIRMAN. Thank you very much.

Mr. Short, go right ahead.

STATEMENT OF JEFFREY SHORT, PACIFIC SCIENCE DIRECTOR, OCEANA, JUNEAU, AK

Mr. SHORT. Thank you, Mr. Chairman, Senator Murkowski, other members of the committee. Good morning.

I'm the Pacific science director for Oceana, an international marine conservation organization dedicated to using science, law, and policy to protecting the world's oceans. While I understand we're here today to talk about environmental stewardship as it relates to offshore oil and gas production, I must state for the record that Oceana opposes expanded oil development in the OCS because we and many other conservation organizations believe the environmental risks are poorly understood and are not justified by the economic benefits.

Simply put, the current state of the science is just not capable of identifying all of the risks involved, let alone assess them with much confidence. We typically approach these projects by assuming

that we know all we need to know about how exploration and production affect the environment, which we use to justify doing an inadequate job of characterizing the environment before development starts, and then, when impacts occur, find we can't really tell what caused them, because we didn't document what was there to begin with carefully enough.

Environmental scientists have made stunning discoveries on how oil affects marine life over the last 20 years, making it clear that there is a lot more that we need to know. The prudent management response is not to pretend that these impacts don't exist, but to set the stage for their discovery, and to embrace truly precautionary science-based regulation of development.

Along these lines, I commend to you the following principles:

No. 1, decisions about development should be guided by a plan that prioritizes marine ecosystems and the services they provide and to ensure the integrity of the most important ecological areas is adequately protected.

No. 2, we need to know what is in the ocean and how a marine ecosystem functions to have a reasonable chance of detecting impacts that really did occur. For example, claims that oil and gas development have had little effect on marine life in the Gulf of Mexico ring rather hollow, because, although we know these ecosystems have changed considerably, we do not know exactly how, because we did not establish, quantitatively, what was there beforehand.

No. 3, the status of key ecosystem components should be monitored over the course of development and production so that natural trends and variability can be accounted for when assessing impacts.

No. 4, the best available technology should be used and proposed incident response and recovery methods should be fully developed, proven effective, and readily available.

No. 5, we should insist on adequate predevelopment social and economic research to evaluate subsistence and local use of the ocean in respective ecosystems.

No. 6, we recommend increased dedicated funding to the National Oceanic and Atmospheric Administration to provide them with expanded agency capacity to evaluate the effects of—and impacts—of oil on marine ecosystems.

This needn't be prohibitively expensive. Per barrel produced, Norway currently spends over three times as much just on response and mitigation technologies as we do on our entire oil research program, and just 1 percent of the value of new oil produced would represent a tremendous expansion of our program.

Finally, we believe that oil and gas development should only occur as part of a plan to move toward an alternative renewable energy.

In closing, I cannot overemphasize the fact that marine ecology is still a developing science and that the science of oil pollution effects, in particular, is still in its infancy. The record of new toxicity mechanisms that continue to be discovered virtually guarantees that impacts occur in the environment that we still don't even know how to detect. Responsible stewardship, therefore, compels us to embrace a much higher standard of precaution as we consider the risks associated with oil and gas development.

Thank you for this opportunity to comment, and I look forward to answering the committee's questions.

[The prepared statement of Mr. Short follows:]

PREPARED STATEMENT OF JEFFREY SHORT, PACIFIC SCIENCE DIRECTOR, OCEANA, JUNEAU, AK

Good morning. I am the Pacific Science Director for Oceana, an international marine conservation organization dedicated to using science, law, and policy to protect the world's oceans. Oceana's headquarters are in Washington, DC, and we have offices in five states as well as Belgium, Belize, Spain, and Chile. Oceana has 300,000 members and supporters from all 50 states and from 150 countries around the globe.

Prior to joining Oceana, I spent more than 30 years as an environmental chemist studying oil pollution fate and effects as an employee of the National Oceanic and Atmospheric Administration (NOAA). In that role, I led numerous studies on the *Exxon Valdez* oil spill beginning a week after the incident through my retirement from NOAA in November 2008. I have a Master of Science degree in chemistry, and I wrote the doctoral dissertation for my PhD in fisheries on data generated by the spill. With more than 50 professional papers on the *Exxon Valdez* oil spill and related topics, I have advised governments in Canada, China, Korea, Norway and Russia on oil pollution issues.

Our oceans are places of wonder and beauty, and they provide important services that we want and need. Oceans are our largest public domain and house biological riches that surpass those of our national forests and wilderness areas. Oceans provide oxygen we breathe, food we eat, medicines we need, and aesthetic and spiritual nourishment. Healthy oceans and coastal ecosystems are also economic engines that provide valuable jobs, energy resources, and recreation and tourism opportunities. Simply put, oceans are essential to our lives and livelihoods.

While I understand that the purpose of this hearing is to discuss environmental stewardship as it relates to offshore oil and gas production, I must state for the record that Oceana opposes expanded offshore oil and gas development. We and so many other environmental organizations take this position because we believe the environmental risks poorly are understood and are not justified by the potential economic benefits. The current lack of baseline information combined with the broad suite of toxicological risks, both known and emerging, requires responsible stewards to embrace a much higher standard of precaution in considering the risks associated with oil and gas development. We, therefore, believe that the potentially irreversible effects of oil pollution on marine ecosystems and their dependent economies do not warrant the questionable, and in any case short-term, economic benefits that might be gained from offshore oil and gas development.

That said, Oceana and other conservation groups do support better stewardship for our oceans, and we appreciate the fact that the Committee has framed this hearing in those terms. As we consider any industrial activities in the ocean—oil and gas, shipping, fishing, alternative energy development—our first step should be to understand and protect the marine environment and those dependent on it. Once we understand the functioning of the ecosystem, we can better predict how activities might affect it and, therefore, undertake a true stewardship and planning effort.

Too often, this is not the case. Large oil development proposals in the marine environment are presented and discussed as engineering challenges, without sufficient regard for the complexity of the environment in which they would occur, or the often dubious assumptions implicit in assessments of environmental risks and mitigation technologies. Oil spill contingency plans are presented as exercises in damage control, taking for granted that not all damage can be controlled, and based on the faulty assumption that the important variables and their interactions are adequately understood, predictable, and manageable. Similarly, the methods used to evaluate mitigation technologies in the field usually do not meet basic scientific principles, so that the results, and hence risk assessments based on them, are inherently questionable. In truth, our understanding of how oil behaves in the environment, the ways it affects organisms, and how well response and mitigation measures actually work in the field is still in its infancy. That fact alone argues for an especially precautionary approach to offshore oil and gas development.

For example, following the 1989 *Exxon Valdez* oil spill, scientists and spill response managers assumed that oil would be most persistent in the uppermost parts of the intertidal zone because oil from the spill would be more likely to adhere to

the sediments there.[1] Four years after the incident, beach cleanup and monitoring were terminated, because hardly any oil was still evident in the upper portion of the intertidal zones, either on beach surfaces or beneath.[2] Subsequently, however, residents of the area repeatedly reported finding oil lower down in the intertidal zone and just below the beach surface. Sometimes enough oil was found to support combustion. Finally in 2001, I led a rigorous, quantitative study that involved no assumptions about where on a beach oil might be found. That study showed that most of the remaining oil was in the more biologically productive mid-tide portion of the beach.[3]

As it turned out, the policy decision to end cleanup and beach monitoring was largely based on unverified assumptions that went unquestioned for 9 years. Over the last 20 years, scientists have definitively proved false similarly naive assumptions regarding the ways in which oil components exert their toxic effects,[4] the identities of many of the compounds that are known to be toxic,[5] the processes that affect the persistence of oil in the environment once released,[6] the efficacy of response and mitigation technologies,[7] and the ecological impacts from disturbances associated with offshore oil and gas development.[8] Each time one of these assumptions is proven incorrect, it reinforces the fact that there is a great deal that we do not know about these issues.

This information is important because the risk assessments we undertake for oil and gas activities are, by definition, based on what we do know and what we assume. Given the fact that we have been wrong so many times before, we can rest assured that such assessments understate the actual likelihood of serious environmental impacts.

Given the fundamental nature of the scientific uncertainties that remain, we should expect more unwelcome surprises regarding the environmental impacts of offshore oil and gas development in the future. While we have a better idea of what questions to ask scientifically, we have also learned that there are likely to be im-

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[1] Owens, E. H., In *Proceedings, 14th Arctic and Marine Oil Spill Program (AMOP) Technical Seminar*, Environment Canada, Ottawa, ON, 1991, pp. 579-606.

[2] Neff, J. M.; Owens, E. H.; Stoker, S. W. In *Exxon Valdez Oil Spill: Fate and Effects in Alaskan Waters*; Wells, P.G., Butler, J. N., Hughes, J. S., Eds.; American Society for Testing and Materials Pub. 1219: Philadelphia, Pennsylvania, 1995; pp 312-346.

[3] Short, J. W., Lindeberg, M. R., Harris, P. M., Maselko, J. M., Pella, J. J., and Rice, S. D. 2004. An estimate of oil persisting on beaches of Prince William Sound, 12 years after the *Exxon Valdez* oil spill. Environmental Science and Technology, 38:19-26.

[4] Carls, M.C., Rice, S.D., and Hose, J.E. 1999. Sensitivity of fish embryos to weathered crude oil: Part I. Low-level exposure during incubation causes malformations, genetic damage and mortality in larval Pacific herring (Clupea pallasi). Environ. Toxicol Chem 18: 481-493.

Heintz, R.A., J.W. Short, and Rice, S.D. 1999. Sensitivity of fish embryos to weathered crude oil: Part II. Incubating downstream from weathered *Exxon Valdez* crude oil caused increased mortality of pink salmon (Oncorhynchus gorbuscha) embryos. Environ. Toxicol Chem 18: 494-503.

Incardona, J.P., Collier, T.K., and Scholtz, N.L. 2004. Defects in cardiac function precede morphological abnormalities in fish embryos exposed to polycyclic aromatic hydrocarbons. Toxicol. Appl. Pharmacol. 204:191-205.

Barron, M.G., and Ka'aihue, L. 2001. Potential for photoenhanced toxicity of spilled oil in Prince William Sound and Gulf of Alaska waters. Mar. Pollut. Bull. 43:86-92.

Cleveland, L., Little, E.E., Calfee, R.D., and Barron, M.G. 2000. Photoenhanced toxicity of weathered oil to Mysidopsis bahia. Aquat. Toxicol. 49:63-76.

[5] Barron, M.G., Carls, M.C., Heintz, R., and Rice, S.D. 2004. Evaluation of fish early life stage toxicity models of chronic embryonic exposures to polycyclic aromatic hydrocarbon mixtures. Toxicol. Sci. 78:60-67.

Barron, M.G., Podrabsky, T., Ogle, S., and Ricker, R.W. 1999. Are aromatic hydrocarbons the primary determinant of petroleum toxicity to aquatic organisms? Aquat. Toxicol. 46:253-268.

Rowland, S., Donkin, P., Smith, E., and Wriage, E. 2001. Aromatic hydrocarbon "humps" in the marine environment: unrecognized toxins? Environ. Sci. Technol. 35:2640-2644.

[6] Burns, K. A., Garrity, S. D., Jorissen, D., MacPherson, J., Stoelting, M.; Tierney, J., and Yelle-Simmons, L. 1994. The Galeta oil spill. II. Unexpected persistence of oil trapped in mangrove sediments. Estuarine Coast. Shelf Sci. 38:349-364.

Reddy, C. M., Eglinton, T. I., Hounshell, A., White, H. K., Xu, L., Gaines, R. B., and Frysinger, G. S. 2002. The West Falmouth oil spill after thirty years: the persistence of petroleum hydrocarbons in marsh sediments. Environ. Sci. Technol. 36:4754-4760.

Short, J.W., Irvine, G.V., Mann, D.H., Maselko, J.M., Pella, J.J., Lindeberg, M.R., Payne, J.R., Driskell, W.B., and Rice, S.D. 2007. Slightly weathered *Exxon Valdez* oil persists in Gulf of Alaska beach sediments after 16 years. Environ. Sci. Technol. 41:1245-1250.

[7] Fingas, M. 2004. Dispersants, salinity and Prince William Sound. Prince William Sound Regional Citizens' Advisory Council Report No. 955.431.041201. Prince William Sound Regional Citizens' Advisory Council, Anchorage, Alaska.

[8] Petersen, C. H., Rice, S. D., Short, J. W., Esler, D., Bodkin, J. L., Ballachey, B. E., and Irons, D. B. 2003. Emergence of ecosystem based toxicology: Long term consequences of the *Exxon Valdez* oil spill. Science, 302:2082-2086.

pacts that we do not know how to detect, let alone mitigate, because we do not even know what they might be. The prudent management response is not to pretend that such impacts do not exist, but to conduct the necessary research, account for uncertainty, and embrace truly precautionary, science-based regulation. Along these lines, I recommend to you the following principles:

First, decisions about development, such as oil and gas activities should be made in the context of a plan that prioritizes protecting marine ecosystems and the services they provide. Decisions about industrial activities must be based on sound science, planning, and precaution. Critical habitats and processes, including important ecological areas should be identified and appropriate protective measures adopted for them as a predicate to development.

Second, to make effective decisions about whether industrial activities should occur and, if so, when, where, and how, we need to know what is in the ocean as well as how the marine ecosystem is structured and functions. In the aftermath of the *Exxon Valdez* spill, consequences for populations of impacted species were often obscured because we did not have a sufficient picture of the pre-impact population sizes. Similarly, the massive development in the Gulf of Mexico occurred with scant attention to the status of the ecosystem beforehand. As a result, claims that oil and gas development has had little effect on marine life in the Gulf of Mexico ring hollow. Although we know that these marine ecosystems have changed considerably, we cannot demonstrate exactly how because we did not establish quantitatively what was there before the development occurred. Without such baseline knowledge about what is in the ocean and how it interrelates, we cannot legitimately evaluate risks prior to industrial activities, and we risk being in the position of wondering what was lost following development or an industrial accident because we did not evaluate what was there to begin with. Yet, that is the current situation in most of the areas where expanded oil and gas drilling has been proposed—there simply is not sufficient ecological baseline information to adequately evaluate or mitigate risks. In the Arctic Ocean, for example, a massive expansion of oil and gas leasing has been authorized despite a paucity of scientific data about the marine ecosystem.

To better understand the risks and to provide a baseline for decision makers, quantitative assessments of the major ecosystem components as well as ecological studies to provide a basic understanding of the food-web interactions that support them or are affected by them should be conducted prior to authorizing oil and gas activities. These studies should include baseline surveys of pollutants, pre-development population assessments of species at greatest risk, such as seabirds and marine mammals, and studies on their seasonal and spatial variability.

For large-scale projects, the adequacy of these pre-development surveys should be evaluated by an independent panel of experts. Although the Minerals Management Service has expended considerable sums on studies, they were not guided by an integrated ecosystem research plan. As a result, population and distribution data for several vulnerable species that play important roles in the marine ecosystem are either outdated or missing. In contrast, careful formulation of integrated ecosystem research and monitoring plans, such as the Gulf Ecosystem Monitoring plan in Alaska formulated in the aftermath of the *Exxon Valdez* oil spill,[9] may furnish more useful information at a fraction of the cost.

Third, the status of key and vulnerable ecosystem components should be monitored over the course of development and subsequent production, so that natural trends and variability can be given due consideration when evaluating oil and gas impacts. Any important but poorly-understood ecological processes identified during the pre-development surveys and subsequent review should be studied in sufficient detail to elucidate and remedy the defects in our understanding. These on-going research and monitoring programs should be tailored to the respective regions where new development is proposed and overseen by an independent body comprising concerned local interests, such as the Regional Citizens' Advisory Councils envisioned in the Oil Pollution Act of 1990. The results of these efforts should be made publicly available not only through websites and publications, but also periodic science symposia in respective ecosystem regions. Funding for these endeavors should be provided largely by those seeking to develop oil and gas leases. An oil spill risk assessment as outlined in S. 1564 introduced by Senator Begich should be a first step to determining if spill clean up is possible and under what conditions.

[9] See: http://wwww.evostc.state.ak.us/gem/gemdocs.cfm

Fourth, best available technology must be used, and proposed incident response and recovery methods be fully developed and readily available. These mechanisms must be demonstrated to be effective in the region where new oil and gas development is proceeding, not in some warehouse thousands of miles away, and under realistic environmental conditions in field tests. Oil spill response and recovery plans often rely on dispersants, for example. At this time, however, we have not developed a reliable and scientifically rigorous method for measuring the proportion of oil actually dispersed that did not, and would not, have temporarily disappeared because of wave action only to re-aggregate unmeasured elsewhere.[7] Once a reliable method for performance evaluation is in hand, it should be applied in field tests to determine dispersant efficacy under a realistic range of temperatures, sea surface salinities and agitation, and oil types, viscosities and slick thicknesses. Similar concerns apply for in situ burning. For mechanical recovery, we need to know how well the proposed techniques can be expected to work in various states of the seas and winds, and for what fraction of the time they can even be deployed successfully. In the Arctic, it has been widely recognized that mechanical recovery is impossible in icy conditions, and it would be useful to know whether such response measures could even be deployed during the long Arctic night.

A necessary component of these response and recovery methods is adequate infrastructure. We must ensure that all vessels are subject to tracking and that response and recovery equipment is stationed in accessible locations.

We also must insist that impacts from the exploration process, production wastes, and other pollution are minimized. Exploration for oil, which involves seismic testing, can be harmful to many species of endangered and threatened species including marine mammals, sea turtles and fish.[10] While we believe these impacts are unjustified in any areas that were previously set aside or protected, as well as in highly sensitive areas such as the Arctic, responsible environmental stewardship requires that these impacts at least be minimized by careful timing and choosing locations where these species are not present. Production wastes, such as drilling muds and produced waters also harm marine ecosystems.[11] Methods should be developed to treat these wastes prior to releasing them into the environment, or they should not be released at all. Similarly, emissions of air and water pollutants must be minimized by requiring new and better technology, and the introduction of invasive species must be strictly prohibited.

Fifth, we should insist on adequate pre-development social and economic research to evaluate subsistence and local use of the ocean in respective ecosystems. As we have seen with beach communities and fishery economies following oil spills and other ocean pollution events, just the perception that seafood could be tainted can lead to devastating market losses for commercial fishers and tourism providers and even more profound disruptions of communities that rely on subsistence for the main supply of food, as is often the case with Alaska Natives. Research before development is the only way to accurately account for these risks in the decision making process.

Sixth, increased dedicated funding should be provided to the National Oceanic and Atmospheric Administration and through the National Science Foundation to support research on the toxicology of petroleum and petroleum products and their interactions with other contaminants. NOAA in particular has done pioneering work discovering heretofore unanticipated biochemical mechanisms through which petroleum can poison marine biota, such as the embryotoxic effects of certain polycyclic aromatic hydrocarbons (PAH) on fish eggs and the interaction of PAH with sunlight to dramatically increase toxicity.[4] Funding for

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[10] Engos, A., S. Lokkeborg, E. Ona, and Soldal, A.V. 1996. Effects of seismic shooting on local abundance and catch rates of cod (Gadus morhua) and haddock (Melanogrammus aeglefinus). Canadian J. Fish. Aquatic Sci. 53: pp. 2238-49.

Mate, B.R., K.M. Stafford, and Ljungblad, D.K. 1994. A change in sperm whale (Physeter macrocephalus) distribution correlated to seismic surveys in the Gulf of Mexico. J. Acoustical Soc. Am. 96:3268-69.

Richardson, W.J. ed., "Marine Mammal and Acoustical Monitoring of Western Geophysical's Open-Water Seismic Program in the Alaskan Beaufort Sea, 1998" (1999) (LGL Rep. TA2230-3).

[11] Cranford, P.J., Gordon, D.C. Jr., Lee, K., Armsworthy, S.L., and Tremblay, G.—H. 1999. Chronic toxicity and physical disturbance effects of water-and oil-based drilling fluids and some major constituents on adult sea scallops (Placopecten magellanicus). Mar. Environ. Res. 48:225-256.

Ray, J.P., and Engelhardt, F.R. (eds). 1992. Produced water: technological/environmental issues and solutions. Proceedings of the 1992 International Produced Water Symposium, February 4-7, San Diego, California. Plenum Press, New York.

this work should be broadened to include research aimed at identifying toxic compounds in petroleum that now remain obscure, as well as the biochemical mechanisms causing their toxic effects. The research methods developed at NOAA in these fields over the last decade hold great promise for producing more discoveries of fundamental value regarding responsible environmental stewardship.

The funds needed to address all of the concerns listed above amount to a small fraction of likely revenues generated by new oil production. In fact, allocating just 1% of the revenues resulting from expanded offshore oil and gas production would amount to an enormous increase over current funding levels. Currently, the national oil-spill research plan is more than 10 years old, and of the $28 million annually authorized to fund it, only about a fourth is actually spent.[12] In contrast, Norway has spent the equivalent of $10 million on new oil-spill technologies alone since 2006,[12] and it produces less than a third of the petroleum that the United States does.[13] Truly responsible environmental stewardship would include substantial funding increases to better support research in all aspects of the environmental impacts of offshore oil and gas development.

Moreover, the provision of adequate funding would address a chronic asymmetry in the scientific standards used to evaluate the environmental impacts of offshore oil and gas development. Paying inadequate attention to pre-development surveys, ecosystem process and monitoring studies, and ecotoxicological research, has crippled our ability to detect impacts. This failure exacerbates the likelihood of ill-advised policy recommendations. By contrast, there are rigorous standards typically applied to demonstrations of impacts from development. By acquiescing to defective standards prior to impacts but insisting on rigorous standards to demonstrate them afterward, we create a substantial bias that works to promote environmental harm. This bias could be considerably reduced simply by insisting on rigorous and adequately comprehensive pre-development surveys, as well as monitoring over the economic life of approved projects. There should be enough science to have a reasonable chance of detecting population-level effects that might result from plausible impacts associated with development within the associated region.

Finally, new oil and gas activities should occur only as part of a plan to move toward alternative, renewable energy. We can all recognize that the country must undergo a shift to renewable energy. New oil and gas activities must only be undertaken as a bridge to that future. We must ensure that decisions are made and revenues allocated in such a way to move us closer to renewable energy and sustainable living.

In closing, I cannot overemphasize the fact that marine ecology is still a developing science, with new, fundamental discoveries coming on a regular basis, and that the science of oil pollution effects is still in its infancy. We are never quite sure how oil will behave once released, where it will eventually find its way, how it may interact with other pollutants, or even all the ways it can harm marine life. When we make the effort to look closely, such as happened after the *Exxon Valdez* spill, fundamental surprises typically come to light. These discoveries overturn predictions of impacts often stated with unfounded confidence beforehand that in retrospect turn out to have been based on little more than conjecture. The record of new toxicity mechanisms that continue to be discovered, along with longstanding evidence of toxic effects that are clearly related to oil exposure but that cannot be explained on the basis of what we currently know about the toxicity of oil components, virtually guarantees that toxic impacts occur in the environment that we do not even know how to detect. Recognition of this requires us to embrace a much higher standard of precaution as we consider the risks associated with oil and gas development. It is largely on the basis of this recognition that we at Oceana, along with most of the marine conservation community, believe that the potentially irreversible effects of oil pollution on marine ecosystems and their dependent economies do not justify the potential short-term economic gains that might accrue from offshore oil and gas development.

The CHAIRMAN. Thank you all very much for your testimony. Let me start with a few questions.

Dr. Cruickshank, let me ask you, first of all—one of the suggestions we've heard and discussed is the idea of establishing "no de-

[12] Torrice, M. 2009. Science lags on saving the Arctic from oil spills. Science 325:1335.

[13] Central Intelligence Agency. 2008. The world factbook. Central Intelligence Agency, Washington, DC.

velopment buffer zones" for a certain number of miles offshore or in particular sensitive areas. I notice, in your testimony, about the—which is it?—the Flower Garden Banks—you talk about how MMS established—as I understand your testimony—MMS established buffer zones to prevent possible impacts on the coral habitats in that area. That raises the obvious question, Is this something we should have MMS doing instead of having the Congress do it? I mean, we—once Congress legislates a buffer zone or a "no development" zone, whatever you want to call it, we're then sort of locked into that until we get the votes to change that or until it becomes a big enough priority to change. I'm just wondering if it—is this really something that needs to be left to the agency with responsibility so that new information can be taken into account? What's you're—does the administration have a position on that question?

Mr. CRUICKSHANK. We don't have a position on that particular question. We certainly have authority, under current law, to establish buffer zones, and we have done so, not only in the Flower Garden Banks, but in certain sail areas where we've created buffer zones from the coast. We try and do that based on what we know about the specifics in an area—the specific environmental resources, the other uses of the sea and seabed, the particular social values of an area—and, as appropriate, we create zones to protect those resources and values that are appropriate to protect in a given area. That's not to say that everybody would always agree with the decisions we make as to where we put buffer zones, and their size, but we certainly have the authority to do so.

The CHAIRMAN. Do you also consider establishing buffer zones in order to protect the view? I mean, if there's a community located there and they're concerned about the possibility of rigs in the line-of-sight offshore, do you take that into account and perhaps establish buffer zones to deal with that, or is that not part of your authority, as you see it?

Mr. CRUICKSHANK. We can, and we have done so in one place. We negotiated a lease stipulation with the State of Alabama for areas offshore Baldwin County, Alabama. There were some visual concerns for the tourism industry in Baldwin County, Alabama, and we've negotiated a requirement, on all leases, that they take steps to minimize the visual impact in that area. That stipulation applies to any lease within 15 miles of the coast of that county.

The CHAIRMAN. OK. Why—if you did it there, have you considered doing it more broadly as part of a leasing plan, to just provide assurance to folks on—who—living on the coast, that—so they're—they need not worry about any development occurring in a larger area?

Mr. CRUICKSHANK. It's certainly an option. To date, we have not applied that as a general rule across the OCS. We have—did so, in that case, because of particular concerns of the State and the ability to negotiate with them on an acceptable solution. Other buffer zones we have used have been to protect subsistence-hunting resources, marine mammal migration paths, and the like. So, it really depends on the particular circumstances.

The CHAIRMAN. OK. Why don't I stop and defer to Senator Murkowski.

Senator MURKOWSKI. Thank you, Mr. Chairman, and thank you all for your testimony this morning.

Mr. Rainey, I appreciate you stating for the record that the oil and gas industry is high-tech. For people who don't know about Perdido and about what is occurring at Liberty, it is nothing short of phenomenal to think that we can be exploring and producing in the depths that you're talking about, 35,000 feet is the record, but what's going on at Perdido at 8,000 feet, 200 miles offshore, tapping into things in a 30-mile radius. I had an opportunity to see what Shell is doing with the 4-D seismic technology, and it's better than Disneyland, in terms of how you can take technologies and go after a resource that is thousands of years old, and do so in an environmentally sound way. So, I commend you for the efforts that have been made to really play out the technologies so that you're able to gain the resource while at the same time working to care for the environment.

Mr. Odum, I thought that you were more than just a little bit of a gentleman in your criticism. I wouldn't even call it criticism, you just said that when, "We here at the Federal level commit to OCS, the government needs to be prepared to do the necessary permitting." I think we recognize that up north that is not the case, and you have been very gentle in saying that the Federal system in Alaska needs attention. It needs more than attention, and I think we're failing on that commitment when we can't get these permits to you after years of waiting. You need to know that we're working to that issue.

I wanted to ask you, Mr. Odum and, Mr. Rainey, you were also involved, and Dr. Cruickshank there was a test that went on up in the Barents Sea, off of the coast of Norway, to determine how capable we are in responding to a spill in Arctic icy conditions. For us in Alaska, as we look to expanded offshore, this is something that is of keen interest. This was just reported in yesterday's Anchorage Daily News, and the conclusion, as I understand it was pretty encouraging, the ice can actually act as more of a natural blockade that can trap the oil and give responders a greater time period to clean it up. Can you speak to this test that was conducted, and I understand that it was paid for by the industry, so of course that makes it suspect from the get-go. But, MMS was also involved, and I would like to explore what we've learned from this.

Mr. ODUM. Thank you, Senator. I think the—so, SINTEF is the group that organized this. It's a Norwegian research institute. As you say, there were a number of industry participants, plus also a number of other government-related participants, as well.

The idea behind this study—this was a 3-year study to answer these questions about what happens—what's the behavior of oil in water that is either partially or all the way up to fully ice-covered? So, this was a—an opportunity to do this in a real-world situation in the Barents Sea.

I think it actually—if I could just link it very quickly to a statement made earlier—we do a certain amount of research—you know, the MMS does, here in this country, but we benefit from research that's done all around the world. I think this is a great, great example of that.

It tested the behavior of oil in the water, various recovery methods, which would include mechanical-type recovery methods, boom and scooping oil out of the water, as well as dispersants in ice, as well as in situ burning. What it found was that—I think, two major conclusions. One is that each of those methods is successful to a degree—and I think "better than expectations" would be the way to say it—but ten, in a mitigating sense, in a preparatory sense as we work in a area, we should be prepared to apply all three of those methods. So, it was good news, from that perspective, and we're happy to see the report out on that.

Senator MURKOWSKI. Dr. Cruickshank, would you care to comment on that?

Mr. CRUICKSHANK. Yes. So, I'm aware of this report. We're—SINTEF is coming in to brief us next week on the results, so I won't comment on that. But, I would like to note that that's only one of a lot of research that's gone on in the ability to clean up spills in Arctic waters. Earlier this year, we published a report highlighting the research results of about 10 years of research on this topic, and we can certainly make that available to the committee, if it's interested.

Senator MURKOWSKI. Great, I appreciate it.

Thank you, Mr. Chairman.

The CHAIRMAN. Senator Dorgan.

Senator DORGAN. Mr. Chairman, thank you.

Because there's no longer a restriction on drilling on the Outer Continental Shelf, and, I think, because there's a generally different view about the eastern Gulf—I mean, reflected by the vote in this committee—it seems to me that it probably is useful now for your agency, Dr. Cruickshank, to be thinking about what kind of buffer zones would be advisable. I know you've said you described it in one State because of concerns about the State, but do you think it's probably advisable for the agency to be thinking about that more generally?

Mr. CRUICKSHANK. It's certainly an option that we have on table. We are currently going through over a half million comments that we received on a draft proposed program for the OCS, and one of the specific questions asked in that program was about the applicability of buffer zones and how they might be used. So, we're going through and analyzing those comments, and it will be among the information that's available to the Secretary as he considers his decisions for the OCS.

Senator DORGAN. I mean, the issue of environmental stewardship is about a lot of things. It's about visual line-of-sight issues with respect to drilling. It's about ecosystems and other things. So, I mean, I think all of us are interested in trying to determine, What does this mean as we prepare to produce more energy here in our country and drill where we perhaps have not drilled before? What is our responsibilities and requirements for environmental stewardship?

One of the witnesses raised the question—I think Mr. Amos—of the blowout of the new rig in Australia. My understanding is that an official from MMS indicated that that agency would never have approved the engineering design of the well that is leaking off of Australia. Are you familiar with that at all?

Mr. CRUICKSHANK. A bit. Until the Australian government completes its investigation, we won't know for sure what caused the incident. But, there are some differences between here and there that I think are significant.

The well design is not one that we would have approved. They had a single barrier to control the well, we require redundant barriers. We also require that the barriers be tested at pressures at least as great as those expected to be found in the reservoir. It's our understanding there was no such requirement to test the barrier offshore Australia.

We also have what we believe is the most aggressive oil spill contingency planning and oil spill drill program in the world, where we are constantly making sure people are able to respond quickly and muster the equipment quickly to respond to spills. Whether any of these would have had any bearing on the spill in the Timor Sea, we won't know until Australia completes its investigation. But, I do believe that these factors would help reduce the likelihood of such a spill, and mitigate impacts of any such spill.

Senator DORGAN. Mr. Amos, you talked about the 9 million gallons of oil, Katrina/Rita—and it's—I'm just—I think—I'm trying to read this—the storm damage onshore infrastructure spill, 7 to 8 million gallons. So, the bulk of that was not spilled from offshore drilling, the bulk of that was onshore storage. Is that correct?

Mr. AMOS. That's correct.

Senator DORGAN. OK. The reason I mention that is, my colleague from New Jersey used the 9-million-gallon gross number, without a description of it. I didn't have the same number. But—so, the bulk of that was onshore.

Mr. AMOS. Correct.

Senator DORGAN. All right. Let me ask, if I can—the sources of hydrocarbons in the marine ecosystem from oil drilling verses natural seeps and discharges from shipping—does anybody on the panel have some notion about what kind of percentages we're talking about there?

Mr. Short.

Mr. SHORT. Yes, there are much greater inputs of hydrocarbons to the marine environment from natural oil seeps than there are from exploration activities and development activities. The key difference is that when hydrocarbons are released into the environment from seeps, the ecosystem has adapted to that over centuries, if not millennia. So, birds, marine mammals, other biota in the region are—know to avoid the area if they're impacted toxicologically.

Senator DORGAN. So——

Mr. SHORT. But, a marine spill or catastrophic release, the animals aren't adapted to, so they get clobbered.

Senator DORGAN. So, there's a difference between seeps and discharges and spills and so on—

Mr. SHORT. Yes.

Senator DORGAN [continuing]. Just based on the ecosystem's response to it. My understanding is that about 2 percent of the volume of oil released into U.S. waters comes from spills. About 98 percent comes from seeps and discharges from shipping and so on, so forth. I'm not—by that, I'm not suggesting that there is not a concern or an interest here. You—Mr. Short, you've talked about

the need to understand the ecosystem better, and the fact that drilling occurred without a baseline study. Of course, a baseline study at this point would simply describe today's baseline.

Mr. SHORT. Exactly.

Senator DORGAN. I'd—but—and there's a great deal of drilling going on in the Gulf, and many of us feel there will be more drilling. One of the things that we will rely on very substantially is Dr. Cruickshank's agency to make sure that the rules, the regulations, the conditions, the restrictions, including environmental stewardship, reflect the kind of safety that our country will expect and demand with respect to offshore drilling. I personally believe that, from the standpoint of energy security for this country, which is a very important issue for America right now and going forward, we are going to produce more American energy. A portion of that is going to be offshore oil and gas. The question isn't "whether," the question is, "How do we do that in a way that accomplishes two goals, greater energy security for our country and, at the same time, protecting our environment and our ecosystem?"

So, I really appreciate, Mr. Chairman, your holding this hearing, because it relates to the amendment that I withdrew, and I think that this will attend, I think, a much longer discussion over a longer period of time. But, I thought the witnesses gave us a good blend of virtually all of the interests and discussion that need to be a part of this.

The CHAIRMAN. Thank you very much.

Senator RISCH.

Senator RISCH. I'll pass.

The CHAIRMAN. All right.

I think Senator Shaheen was—no. Is that—oh, that's right. Senator Shaheen came before Senator Landrieu.

Senator Shaheen.

Senator SHAHEEN. Thank you, Mr. Chairman. You know, we women all look alike——

[Laughter.]

Senator SHAHEEN. I'm sorry, but—I didn't mean that. That was a shot.

[Laughter.]

The CHAIRMAN. I didn't suggest you looked the same.

[Laughter.]

Senator SHAHEEN. Thank you all very much for being here.

I want to follow up on your comment, Dr. Cruickshank, about the decision to ask, in Alabama, that the company minimize their sight impacts. What exactly does that mean?

Mr. CRUICKSHANK. What the stipulation calls for is to look at opportunities to—instead of building a new platform in those waters, to perhaps have subsea completion and tie it back to an existing platform, to drill from existing facilities. If you're not able to do that, to try and place and design a facility so that it will have a minimal visual impact on the shoreline.

Senator SHAHEEN. Dr. Short, in his testimony, talks about the national oil spill research plan being more than 10 years old and that only about a fourth of the 28 million authorized to fund it has been actually spent. Is that—would you agree with that assessment? Should we—what more should we be doing in that area?

Mr. CRUICKSHANK. I can't speak specifically to those numbers, though we can get them for you.

At MMS, we have a budget of about $6 million a year that we put into oil spill response research and training programs. We've funded that regularly every year to look into improved technologies and to operate the National Oil Spill Response Test Tank in New Jersey. I know that there are a lot of other agencies involved in oil spill research, as well, but I can't speak to their levels of funding.

Senator SHAHEEN. Dr. Short, would you like to comment on your—put that in a context for us. You talked about how much Norway has spent on new oil spill technologies. Do you have recommendations for what we ought to be doing to address cleanup?

Mr. SHORT. Addressing much greater emphasis on how well these technologies actually work in the field would be the—my single greatest recommendation, so that we do field tests that are—employ methods of known recovery so we can make quantitative comparisons between different approaches, and do them in a realistic field setting rather than in the artificial settings that are so often employed.

I don't know what the conditions were in the Barents test. I'm very encouraged, and I congratulate Shell and SINTEF for pursuing that research. But, typically, these sorts of experiments are limited, don't have much replication, and they're very expensive to conduct. So, doing them in a rigorous way that will give us robust results, I would encourage that that further continue.

Senator SHAHEEN. Dr. Cruickshank, is it MMS that has the responsibility to do that kind of comparative analysis of technologies that are available?

Mr. CRUICKSHANK. I think that the responsibility is shared among agencies, and we are certainly one of them.

I do want to say a little bit more about the test tank we have in New Jersey. It's one of a kind in the world, and it's about 660 yards long, 75 yards wide, and can create oceanlike conditions and test response technologies in real-world conditions, a variety of temperatures and sea conditions. It is used to try and compare the results of different cleanup technologies under different conditions. These—responsible for probably about 95 percent of the data that's out there on mechanical response information. So, we think this is a very valuable resource that we make available to anybody who wants to use it to try and improve understanding.

Senator SHAHEEN. Is there a lead agency that is charged with being the decisionmaker on those kinds of analyses?

Mr. CRUICKSHANK. I've——

Senator SHAHEEN. If there's a discrepancy between what agencies come up with?

Mr. CRUICKSHANK. I'm not sure there's a discrepancy between agencies that—we all sit down together. We're involved, NOAA's involved, and the Coast Guard is involved, and others, as well. We do compare notes on the sorts of research we're conducting, and the results that we get.

Senator SHAHEEN. Thank you. Just very quickly, for both Shell and BP, what—you pointed out the technological advancements that have been made by both of those companies in the industry in drilling processes. Are you also working on those same kinds of

research and development efforts when it comes to cleanup and how to deal with spills and challenges like the ones Mr. Amos showed us?

Mr. RAINEY. I'm not familiar with the details of the studies, but I do know that BP participates in research studies all over the world on these issues. So, I can get you the details if you would like me to.

Mr. ODUM. Senator, my answer——

Senator SHAHEEN. Thank you, I'd appreciate that.

Mr. ODUM [continuing]. My answer is really the same. The answer is clearly, yes, we do. The studies that we did in Norway, which were multimillion-dollar, multiyear studies, were to answer exactly this type of question. We recognize that is not only important to being able to mitigate a spill if it happens, but it's an important enabler to helping convince stakeholders that we can actually do this the right way.

I'll make the point again, too, I think the idea that research needs to be one place or the other, we—I think we should look at it and say, "This is research that's shared openly all over the world. It's not protected and kept to any particular area." So, the fact that it is done globally is important, I believe.

Senator SHAHEEN. Thank you.

The CHAIRMAN. Senator Landrieu.

Senator LANDRIEU. Thank you.

Let me begin, quickly, Mr. Chairman, by just thanking you for holding this very important hearing, because, like several of my colleagues have said, I think it's important for us to really examine the facts and to try to seek the truth, relative to the benefits and the risk associated with energy production.

I particularly like the term "stewardship," and I believe that stewardship actually begins with presenting facts in a way that tell the truth about what's really happening in offshore and onshore oil and gas.

So, knowing, Mr. Amos, that you would bring your charts, I brought some of my own. I'd like to start with a picture first.

I think my colleagues need to see a satellite image from NASA in the Gulf of Mexico, because most of the offshore oil and gas drilling in the Nation, of course, has gone on, as Mr. Amos said, for 40 years off of the State that I represent. So, we would know a lot about this. So, I brought a picture of what the Gulf looks like.

These are oil spills in the Gulf. This was taken, Tom, when? 2007. But, Mr. Amos, as you know, none of these spills are spills, they're leakages, natural seepage in the Gulf of Mexico. On any day, you could take a shot from NASA, in any ocean, in any place in the world, and you will see the oil like this, because of this chart. I'm going to ask Mr. Amos to read this chart. Go ahead, please.

Mr. AMOS. I'm sorry, I can't see it very well from where I sit.

Senator LANDRIEU. OK. Let me try to read it for you. It says petroleum transportation tankering, it's petroleum in American waters, 4 percent, which is the blue, from tankering. Those are spills caused by tankers that run aground because organizations like yours don't encourage safe domestic drilling, but we have to

bring in oil from other countries, which is a lot more hazardous. I'll get to that in a minute.

So, these tankers run aground and spill oil in lots of places, including New Jersey and California and all places. Then cars and boats and other sources that Americans drive put 32 percent of the oil into the oceans. Then natural seepage puts 63 percent. Then, you see that little green? It's very small, so it's hard for a lot of people to see it, even though you don't—some people even have glasses—it's hard to see, so I'm going to point it out. It's 1 percent of the oil in the oceans—1 percent is from drilling. We could, if we work together and be truthful about what's happening, perhaps even eliminate that 1 percent, which is a very small portion. That's hopefully what this hearing will be about.

In addition, the other point I would like to make is that this 1 percent, which is a risk, and there are impacts, but, to put this into perspective, the spill that you cited in Australia which causes some people to back up—I want to give you these details here. You said it was the largest spill in Australia's history. It's true. It leaked 823,000 gallons of oil. As Mr. Cruickshank testified, it wouldn't even be allowed in this country, because it doesn't stand up to our strict environmental rules. But, let's say we had messed up and allowed it to produce oil off of our shores. The spill equals one-third of the amount necessary to fill the Reflecting Pool outside of this Capitol. It's largest spill in the history of Australia. It's a pretty long history. The rig that blew didn't meet our standards, but if we—it had slipped through and we had allowed it to drill, the oil it spilled would fill up a third of the Capitol Reflecting Pool.

So, Mr. Chairman, I think one of the ways forward is for people to start telling the truth about what actually happens, onshore and off. The risk associated with offshore oil and gas drilling domestically are far outweighed by the benefits. I'm going to go about 30 seconds over my time. Those benefits would be victory in World War II, would be the Industrial Revolution, would be the automobile or the airline industry. You do a great disservice, you and your organizations, in not telling the American people the truth about what happens in domestic drilling, onshore and off, and putting it in the perspective that it deserves.

So, my second point—and I'll be very, very brief here—is that stewardship also, I think, starts with understanding that the more we push this industry off of our own shores and off domestically, it goes to countries that we have absolutely no control over, that don't even have democracies, that don't have lawyers, that don't have courts, that, when things go wrong, it can't be fixed easily, countries like Cuba or Venezuela, or places like Saudi Arabia or other places.

So, I would strongly suggest that we have more hearings like this. The people that I represent—and I'm going to show one more chart, which talks about this, and I'll give back my time, Mr. Chairman—we brought this chart. We use it a lot, because this is what the Gulf looks like. That doesn't look like a bad picture to us, that looks like a jobs picture to us, because thousands of people are employed, laying those pipelines, working on those rigs, producing tremendous wealth for this Nation. We intend to pursue this in other places in the country, as well.

Thank you.

The CHAIRMAN. Dr. Cruickshank, let me ask you, just to be clear—Mr. Amos has made the point, which I don't think anyone has contradicted, that most of the spill that occurred as a result of Katrina and Rita was onshore—I mean, that wound up in the Gulf, was onshore, spillage from storage facilities and pipelines that were onshore. That's—is that a correct description of what you testified to, Mr. Amos?

Mr. AMOS. Senator, that's correct, although I do want to point out that you can't have offshore production without building those onshore facilities.

The CHAIRMAN. No, I agree with that, and I'm just trying to get clear in my mind, Dr. Cruickshank. What is MMS's responsibility for preventing spills and leakage from onshore facilities such as these?

Mr. CRUICKSHANK. We have no authority over onshore facilities. Those are typically permitted by the States.

The CHAIRMAN. So, that's strictly a State problem, the way the law now stands, as you see it.

Mr. CRUICKSHANK. Yes.

The CHAIRMAN. EPA does not get involved, and the Department of Energy does not get involved—

Mr. CRUICKSHANK. I'm sure there are a number of Federal agencies that have rules in permitting, such as EPA, for clean air, clean water; Army Corps of Engineers, if wetlands are affected. But, in terms of the decisions to build a facility and a lot of the specifics about where it's going and how it's operating——

The CHAIRMAN. So, the Department of Interior's position under the law is that your responsibility for this kind of issue commences at the water's edge, essentially. Is that accurate, or not?

Mr. CRUICKSHANK. That's what we have authority to permit. What we do require, as part of the environmental review, is that a company needs to explain how they're going to get the product to shore, where it's going to go, the facilities they may use, so that can all be considered and the environmental impact statement and any information used in the Coastal Zone Management Act reviews.

The CHAIRMAN. But, in these—in the pipelines and the storage that is constructed, once that is constructed, the question of how hardened that is to resist damage from hurricanes, for example, that's not a subject that you address through MMS.

Mr. CRUICKSHANK. That's correct.

The CHAIRMAN. OK.

Senator Murkowski, do you have any other questions?

Senator MURKOWSKI. I do, just a couple, Mr. Chairman.

Senator Landrieu, the last poster that you showed, you said, "This is jobs." I think we can go further, it's not only jobs, it's energy security for this Nation.

Senator LANDRIEU. For America.

Senator MURKOWSKI [continuing]. It's environmental protection.

I would like to ask you both, Mr. Rainey and Mr. Odum—both of your companies work all over the world, not just here in the United States. I believe that the environmental standards that we put in place, the requirements that we put on you as an industry,

are pretty tough. I know, certainly in Alaska, they're extra tough. It's because we have an environment up there that is different, it is unique, and it is harsh, but it's also very fragile.

Can you rank for me, if you will, where the United States is in terms of environmental protections and regulations as compared to the other places in the world that you operate? Where are we?

Mr. ODUM. Certainly, I think the—it's taking a very broad perspective. I would say that the U.S. programs are the most comprehensive and—"strict" would probably be appropriate word to use, as well—in the world. That's taking into account the specific regulations around areas like Alaska, but also the comprehensive nature of that entire program across the U.S. OCS. I would put it at the top.

Senator MURKOWSKI. Mr. Rainey.

Mr. RAINEY. Yes, Senator, I would agree with Mr. Odum, that, in my view, environmental regulations in the U.S. are amongst the most stringent that we see anywhere in the world, and they provide the highest level of environmental protection that we see anywhere in the world.

Senator MURKOWSKI. I know there were announcements made this past week, in terms of some changes with the U.S. program where we are shortening the lease terms, there are additional, I would call them "regulatory burdens," but perhaps others would describe them otherwise. When we put in place in policies that say, "OK, we're going to shorten your lease terms," what does that do for you, from a business perspective, and where you choose to operate in the globe?

Mr. RAINEY. Thank you, Senator. I can speak to that from an explorer's perspective. In BP, we rank our exploration opportunities on a global basis. The nature of the leasing and the regulatory and the fiscal regime is an important aspect of that ranking.

At the present time, the U.S. receives a very large proportion of our global exploration spend. You all know that, without successful exploration, there is no development and there is no production. So, if we choose to send our exploration dollars elsewhere, then the follow-on benefits of development and production will go elsewhere, as well.

Senator MURKOWSKI. "Go elsewhere" to nations to where the environmental regulations are not near as stringent.

Mr. RAINEY. Exactly.

Senator MURKOWSKI. We need to think globally about this.

Mr. Amos, let me ask you—because you made the statement that SkyTruth essentially focuses on the risks that are posed by resource extraction. Does your organization also focus on other energy resources that might have impact to the environment? A lot of discussion has taken place in this committee about offshore wind. There are some environmental challenges with that, and also environmental challenges with the onshore wind. Do you do environmental assessments in other energy areas as well, or is it just resource extraction?

Mr. AMOS. I would like to correct a misperception, that Senator Landrieu suggested that our agency actually takes a position on whether more offshore oil or gas drilling should or should not be done. We do not take such a position. Our work is focused on en-

suring, in fact, that drilling for resources can and will be done in a more sustainable and environmentally friendly manner, wherever it's done, including here in U.S. waters. So, I just wanted to correct that.

I will say that our organization does look at other forms of energy production and extraction. As you suggest, no form of energy production is without its impacts and risks.

I would also suggest that the very same technology that we've shown you today that can be used to demonstrate what happens when things go wrong, even with the best technology—and they do still go wrong—can also be used to show where things are not going wrong. So, we would welcome the opportunity to work with you, and to work with representatives of industry and government, to use this monitoring technology in a publically transparent way so that, hopefully, we can show where it's being done right instead of just where it's being done wrong.

Senator MURKOWSKI. I think industry would welcome the opportunity to demonstrate where it's being done right.

Senator LANDRIEU. I do have a followup.

The CHAIRMAN. I think maybe the others do, too. Let me——

Senator LANDRIEU. I'm sorry.

Senator Shaheen.

The CHAIRMAN. Senator Menendez, I think, would be next, and then Senator Shaheen, and then Senator Landrieu.

Senator MENENDEZ. Thank you, Mr. Chairman. Mr. Chairman, I appreciate the hearing.

Mr. Odum, in your testimony, you painted what I think is a pretty absurdly rosy picture of the oil reserves contained in the Outer Continental Shelf. Listening to your testimony, one might think that we had several Saudi Arabias beyond our shores ready to be, you know, drilled and wash over us in low gas prices and rainbows. Of course, I have a different picture of that, because the Energy Information Administration's 2007 report on what effects opening the entire OCS to drilling would have on energy production and prices states that such a policy, quote, "would not have a significant impact on domestic crude oil and natural gas production or prices." Then, the EIA testified before this committee last month, and they reaffirmed, basically, that statement again.

But, I'm concerned, when, you know, witnesses like yourself come before the committee and make these, you know, incredibly rosy pictures, because it affects our policy—you know, I'm concerned when, in 2004, your parent company was caught falsifying its oil reserves, was fined $150 million, faced criminal charges, and only recently settled shareholder lawsuits. Why would, based upon that experience, the committee necessarily believe what you are saying about oil reserves versus, you know, predictions?

Mr. ODUM. Thank you, Senator. I think we—the good news is, we have the ability to go back to the facts. I think the easiest place for me to point to is the Gulf of Mexico. Gulf of Mexico right now makes probably on the order of 1.4 million barrels a day. We have a project out there,—we call it the Mars development—that itself makes a few hundred thousand barrels a day. We have the Perdido project, which will come on in the next couple of months, which

itself will make—has the capacity to make 130,000 barrels a day. There are other examples from other industry players out there.

My point is, you know, 1.4 million barrels, in its entirety, right now from the Gulf of Mexico, in these discrete projects, which are the development opportunities we have out there, are adding significant pieces. So, I would disagree, fundamentally, that this area, where—you know, the other characteristic we've seen in the Gulf of Mexico is, the resource estimates have continued to grow as we've been there, done additional research, improved technology—throughout the history of us being there, those resource estimates have grown. I would anticipate the exact same thing would happen at other areas of the OCS in the U.S. So, we can make a significant difference in——

Senator MENENDEZ. But, there is a difference between a guess and what actually is a reserve, is it not?

Mr. ODUM. There are very clear parameters on which the U.S. uses to define what a "reserve" is verses what "resources" are.

Senator MENENDEZ. Let me ask you this. You, in your testimony, state that you believe that those who believe that there are serious environmental risks to offshore drilling have a, quote, "outdated view of how the oil and gas industry operates today." Is it really so outdated, in view of what just happened off the coast of Australia, that it spewed oil into the ocean—do you have a picture of that?—for over 10 weeks, and then caught fire before finally being plugged, just 2 week ago? Is it really just an outdated view to believe that environmental effects of drilling, when it's estimated that 9 million gallons of oil spilled during that spill? Am I just being old-fashioned, when that same drilling entity is working in U.S. waters today? I find it difficult to—you know, maybe you can say that things are safer, but to suggest that there are no risks. I want to end there, with that question.

Then, Mr. Amos, I want to ask you a question. I know that—earlier, I talked about what happened in Katrina and Rita. I was talking about both offshore and onshore spills. When the Coast Guard reported to Congress—not me, but the Coast Guard—that 8 million gallons of oil spilled onshore, and MMS reported that over 700,000 gallons spilled offshore, aren't the labyrinth of onshore pipelines and refineries directly linked to offshore production? If we didn't have the offshore production, would we necessarily have all of that additional risk? Shouldn't we count that as part of the overall risk factor?

So, if you would both answer those questions, I'd appreciate it.

Mr. ODUM. If I go back to the question of, "Do we have an outdated view?" my point is this, that the technology has dramatically changed over the decades, and many people do have a view of how they saw the industry 20, 30 years ago. I'm telling you, yes, it's very different today.

As we think about opening new areas of the OCS to exploration production, I believe the way to look at it is to look at latest developments by the industry in the current areas that are open, translate that to the new areas, because that's where you see the new technology, and, in addition, all the mitigation techniques and other things that we've learned over these decades. So, that's where my view, an outdated view, comes from.

Mr. AMOS. Thank you, Senator. You're absolutely correct in your statement that the onshore and offshore infrastructure is essentially one interconnected facility. It should be considered as such. The 1700 homes in Louisiana that were inundated by crude oil from the spilled storage tank, those homeowners probably would not differentiate between where the oil came from and who owned it. So, as we consider offshore drilling in new areas, it's not just the risk from what happens on multibillion-dollar high-tech platforms that are operated by the biggest energy companies in the world; it's also the risk posed by the network of pipelines and onshore processing and storage facilities that are a requirement of supporting that offshore development.

I'd also like to point out that—I think you mentioned that the Norwegian company that was drilling off Australia when this blowout occurred is a well-respected global operator. They have a fleet of 41 drilling platforms around the world. They've targeted the Gulf of Mexico as an important area of business operations, and have an office in Houston. I think you mentioned, they're currently under contract to drill in the Gulf of Mexico through 2012. So, it's imperative that we understand exactly what caused that blowout and spill in Australia. But, as we've seen in our investigations in recent years, every individual accident is a unique—a culmination of a unique chain of circumstances.

Senator MENENDEZ. I appreciate it. I've asked Secretary Salazar to look into exactly that.

Thank you very much, Mr. Chairman.

The CHAIRMAN. Senator Shaheen.

Senator SHAHEEN. Thank you, Mr. Chairman.

The Interagency Ocean Policy Task Force that was established by President Obama in June released their interim report in September. The priorities that the task force laid out included ecosystem-based management, comprehensive coastal and marine spatial planning, increased scientific knowledge of the oceans that we can apply to policy decisions, and improved coordination between Federal, State, local, and regional ocean management entities.

Now, we haven't yet seen the final report. But, if we were going to incorporate that framework into current policies around our oceans and coasts, how would that affect what we're currently doing with respect to development, drilling? How would existing environmental standards change, or not, based on that kind of a framework?

Dr. Short, I'm going to ask you to, if you would, go first, because I think what's being talked about in those recommendations is consistent with the kinds of things you were talking about in your testimony.

Mr. SHORT. Thank you, Senator.

We would like to see the—those recommendations integrated into policies for offshore oil and gas leasing—in particular, marine spatial planning and ecosystem-based management aspects of them—because too often these—as I mentioned earlier, too often these things focus on a zoning approach rather than identifying which parts of the marine ecosystem are disproportionately productive and vulnerable and need protection. We feel that those should be first identified and then appropriate protections conferred on

them—not necessarily to exclude industrial development, but to make sure that we preserve the integrity of the function of what they do—and that that should be number-one priority of any marine spatial planning exercise.

Along with that, ecosystem-based management could usefully be applied to the way that we go about assessing the background and then monitoring of ecosystems as these industrial projects are—unfold, because we see that, although there is a great deal of money often spent on environmental studies, it's not spent as intelligently as it could be if you were to take an ecosystem approach at the outset to figure out, in a fundamental way, what's there and how it works together, what it depends on. This doesn't have to cost a fortune. There are several examples in Alaska of highly respected ecosystem-based management plans—study plans, in effect, primarily now directed toward fishery issues—that could be usefully adopted toward oil and gas issues, as well.

Senator SHAHEEN. Thank you.

Mr. Rainey and Mr. Odum, how would you see, if those priorities were adopted, that changing or affecting the way you currently do business?

Mr. ODUM. The—Senator, I think the—the first thing that I think is important here is that we recognize what currently happens within the purview of the agencies that exist. So, for example, the idea of looking out at long-term impacts, at multiple uses, that is actually already within the purview of the MMS that's done. I may get the terminology wrong, but I think it's the OCS Lands Act that, you know, provides for that type of analysis. So, first of all, I think it's important to recognize what's already done.

Second of all, if I could be very frank, I mean, one of the things that—if I went to the worry side, one of the things that worries me is, it creates a very big bureaucracy, potentially. It could be done right. If it wasn't done right, it could create a large bureaucracy that could potentially put us into a mode of slowing things down and just studying forever rather than truly moving forward on things. So, I do worry about that, to be perfectly open.

I think the—you know, my personal take on it is that I think we need to understand what we mean when we say an "adaptive approach." I'll use Alaska as an example. There's—across the Arctic, there, through the Canadian Beaufort, as well as the coast off Alaska in the Beaufort and the Chukchi, there's been about 112 exploration wells drilled. There's been an enormous amount of data collected associated with that activity, which has taken great steps forward, in terms of the understanding of everything from migration of mammals all the way to the impact of noise and so forth. So, that activity actually, to a degree, enables the collection of that information. We adapt as we learn from that and how we move forward.

So, I think we'd have to be cautious about a program that says, "Are we going to learn and adapt and move forward, or are we just going to study until we've answered every possible question?" That's my concern.

Senator SHAHEEN. I don't—other than the increased scientific knowledge, I don't think it said anything about studying. Do you not think increased scientific knowledge is appropriate?

Mr. ODUM. No, I certainly do. I mean, I absolutely, fully support having the right information.

Senator SHAHEEN. Thank you.

I'm actually out of time, Mr. Rainey.

The CHAIRMAN. Go ahead, if you want to respond.

Mr. RAINEY. I was just going to add, Senator, that I think we should remember that scientific knowledge is always moving forward. Actually, using the best available and most up-to-date scientific information is part of the current regulatory system, and it supports the OCS leasing and exploration and development programs.

I think we also need to remember that OCS development has been going on for the last 50 years, and it has been going on in a way that is both safe and protective of the environment.

The CHAIRMAN. Senator Landrieu.

Senator LANDRIEU. Thank you very much.

Following up, I'd like to use Senator Menendez's picture, which is a very disturbing picture, but it's part of the truth that I'm going to continue to try to tell. The fact is, these things happen.

On this day, when this picture was taken, however, on this rig off the coast of Australia—I'm going rough it; maybe, Mr. Rainey, you, or Mr. Odum know better. But, since we have 4,000 structures like this in the Gulf, I'm going to rough that there are 20,000 in the world. So, 19,999 were not on fire. I want to repeat, 9,999 were not on fire. This one was. The oil spilled from this would fill up, as I said, one-third of the Reflecting Pool outside of the Capitol.

So, let us agree that there are risks associated, but it has already been determined, and testified to at this hearing by Mr. Cruickshank, who is the expert for the government, does not work for oil companies and does not work for SkyTruth, has said that this rig would not be allowed to operate in the United States of America.

No. 2. The spill that occurred in my State, in St. Bernard Parish, that went—the oil went into 1700 homes—I'm very familiar with, because I walked through many of them myself—was leaked from a holding tank, Mr. Chairman. Murphy Oil, this is public record, had 5 or 6 of these large holding tanks that are very familiar to places in Louisiana, Texas, New Jersey, Alaska—all over the country, actually. They're refined products, and sometimes unrefined products, that are held until they can be refined in the Nation. There is a regulation that says that, when a storm comes—because we have them all the time, and have for hundreds of years in the United States—the companies have to fill them up so that they're heavy and the winds that blow against them won't overtop them. That was not done. They are liable, and they paid a significant amount of money to people. Now, four or five of the tanks were filled, and one was not. Now, that is public record. You all can go look at it.

Mistakes are made every day, even though there are regulations and there are enforcements. We've learned from that. Mr. Amos, you would be happy to know that I think we've adopted new regulations so that maybe inspectors now go out and check, before storms come, to see how much these tanks are filled up. We did some good things.

But, those things happen. But, the fact is, people were compensated, it was terrible, there was a lot of cleanup. But, the same people that had the oil in their homes also worked for the company, so they didn't want them to go out of business because they would lose their jobs. So, we all rolled up our sleeves, we cleaned up, learned, passed new regulations, and moved on.

The third and final point I want to make are the reserves. My colleagues continue to say that this whole effort is for naught, because there's no oil anywhere anyway, so why drill? I'm going to ask you, Mr. Amos, where you support drilling, because you said you did, and I want to know specifically in what area.

These are the estimates—not from the oil companies, not from the environmental groups; this is from the Minerals Management Service—that is proving what Mr. Odum has said is true, that the estimates are going up, and they're going up because technology's getting better, we're learning how to find oil in places we didn't know it was before, and gas. We used to have to drill lots of wells before we'd find the oil and gas; now, with the new imaging technology, we're finding it more quickly. As we continue to produce more, we're finding more. So, based on our own data—this is the U.S. Government, this isn't Louisiana, this isn't Texas, this isn't Alaska trying to tell everybody there's oil out there when there's not—this is the U.S. Government saying, "If you look for it, you'll find it." There are lots of resources. These resources belong to the people of the United States, and they have a right to earn a living and to create wealth for them. They actually own these resources.

My final point is this. Mr. Amos, we have found something we agree on. You said that we need more environmental support, and I agree. If the States of Louisiana, Texas, and Mississippi and Alabama, who have—are bearing the burden of this production—proudly—we know their risk, their advantages—had gotten a portion of the funding that all the other States in this country have gotten, based on a 37-and-a-half-percent share, which Harry Truman offered to us in 1920, which we did not get, it would have generated $23 billion for us just in the last 7 years. That would have supported a lot of environmental support, rules, and regulations, coastal restoration, flood protection, navigation control. But, we have this great industry that we're proud of and virtually no help from the Federal Government to regulate it in the way that we would wish and would want to—although there are great regulations out there—for the protection of our coast.

So, I'm going to conclude with: good stewardship, again, starts with telling the truth, painting a clearer picture of the hazards and benefits, and sharing the revenues in a way that promotes good stewardship of the environment and good economic opportunity for the people of our Nation.

Thank you.

The CHAIRMAN. Let me just ask one additional question, then I think we're ready to terminate the hearing.

Mr. Amos, your satellite imagery and digital mapping and remote sensing technologies that you made reference to and have in your exhibits here, those are available to our agencies at this time? I mean, the information that you collect through those. Is that right, or not?

Mr. AMOS. The satellites we collect information from are operated by a variety of sources, including the U.S. Government. In the case of Australia, the images we showed were produced by NASA from NASA taxpayer-funded satellites. But, in some cases, we have to buy satellite imagery from commercial providers. For oil pollution, in particular, the best tool is radar satellite imagery, and the U.S. Government does not operate any civilian radar satellites. But, NOAA Satellite Services Division does have agreements with other countries to purchase those kinds of images, when necessary.

The CHAIRMAN. OK. All right.

I think there's been useful testimony. I appreciate all of you coming. We will try to learn from your written reports and see if any action can be taken here in Congress.

Thank you very much.

[Whereupon, at 12:15 p.m., the hearing was adjourned.]

[The following statement was received for the record.]

STATEMENT OF JON HROBSKY, DIRECTOR, POLICY & GOVERNMENT AFFAIRS, NATIONAL OCEAN INDUSTRIES ASSOCIATION

Thank you for the opportunity to submit written testimony for the record regarding the Committee's November 19, 2009 hearing to receive testimony on environmental stewardship policies related to offshore energy production.

NOIA is the only national trade association that represents all companies engaged in the exploration for, and production of, traditional and alternative energy on the nation's Outer Continental Shelf. The NOIA membership comprises more than 300 companies engaged in activities ranging from producing to drilling, engineering to marine and air transport, offshore construction to equipment manufacture and supply, shipyards to communications, and geophysical surveying to diving operations. As such, this hearing is of particular importance to our members.

While some of your witnesses may be testifying on particular environmental stewardship proposals related to offshore energy production, we would like to concentrate our testimony on general technological advancements and improved safety practices in the offshore oil and gas industry which may help guide the committee in your decision making.

A SOURCE OF CONSTANT TECHNOLOGICAL INNOVATION

Today's offshore technology allows us to produce more energy by reaching places that would never before have been possible. New world records are always being set.

Industry recently set one of these records by drilling a well in water depths exceeding 10,000 feet. That's the equivalent of successfully navigating nearly two miles down from the surface of the ocean before even beginning to drill, sometimes another 30.000 feet into the earth below the sea floor. The technology required to drill, complete and produce this type of well must overcome an environment of high pressure (in excess of 20,000 pounds per square inch) and high temperature (exceeding 350°F). Deep wells such as this are expensive, costing as much as $100 million apiece.

After coming from the ground, the oil or natural gas then travels through a pipeline where the temperature is just above freezing and the formation of ice crystals threatens to block the flow unless constantly supervised and adjusted. At depths far beyond where humans can travel, sometimes as much as 5,000 feet or more below the ocean surface, Remotely-Operated Vehicles (ROVs) are used to perform maintenance and repairs.

All this is possible with fewer facilities and less impact—even visual—than ever before. For example, multiple subsea wells can be connected by tiebacks to a single platform over great distances. Such an installation is capable of reaching wells on the ocean floor dozens of miles away in all directions while connecting to an ocean surface platform one mile above.

Directional drilling also allows for extraction of resources which are miles away from the point where the actual well is drilled.

This cutting edge technology doesn't come cheap, however. The total cost of this type of project, including wells drilled and the subsea connection system, can exceed $5 billion.

AN EXEMPLARY RECORD OF ENVIRONMENTAL PROTECTION AND STEWARDSHIP

The outstanding environmental record of U.S. companies operating offshore around the world is well recognized as . . .*technologies are allowing the offshore industry to venture into deeper waters than ever before, while protecting marine life and subsea habitats.* . . .[1]—even in the most challenging areas such as the Arctic and North Sea and in otherwise catastrophic weather.

Off the part of our coast in which exploration and production has historically been allowed, the safety of our operations was demonstrated in the most severe hurricane situations in 2005 and 2008. Though many of the exploration and production facilities in the Gulf of Mexico were severely damaged or destroyed, the high-tech safety and environmental protection equipment and processes worked.

Careful scientific environmental study and operational planning always precede OCS activity. For example, our offshore geophysical companies, which conduct seismic work that allows us to "see" geologic structures beneath the seabed—have worked with the National Marine Fisheries Service and MMS to implement many procedures and practices designed to avoid harm to marine mammals, including:

- Monitoring for the presence of animals of concern
- Shutdown or no start-up when they are too close
- Slow, gradual ramp-up of operations just in case

During exploration, jack-up or semi-submersible rigs and drill ships have multiple systems and physical barriers to ensure that no spill occurs. Most important, along with multiple, redundant remote control systems. are "blowout preventers" which in deepwater are installed on the well at the seabed and are capable of immediate closure in event of any emergency.

Also, a "downhole safety valve" in the well itself below the seabed provides an added protection barrier in the event of some catastrophic event.

As a result of these safeguards, the offshore oil and gas industry has a laudable environmental record, as noted in the "Oil in the Seas III" National Academy of Sciences study, which finds that although the amount of oil produced and transported on the sea continues to rise, improved production technology and safety training of personnel have significantly reduced both blowouts and daily operational spills.

The industry remains under intense scrutiny by its two primary regulators—the MMS and the U.S. Coast Guard—as well as a host of other governmental agencies with oversight responsibilities such as the Environmental Protection Agency and the National Oceanic and Atmospheric Administration.

However, it is the MMS that regulates all exploration, development, and production activities on about 8,000 active leases to ensure that these activities are conducted safely and in an environmentally sound manner. The MMS reviews and approves industry exploration and development plans before allowing any operations to commence, monitors all lease operations to ensure that industry is in compliance with relevant requirements, and conducts scheduled and unscheduled inspections. In 2008, MMS conducted over 25,000 inspections of OCS facilities.

To summarize, the latest technology and sound management practices not only allow for the continued production of domestic energy resources, but they have also made the U.S. offshore industry the envy of the world. Its environmental record is superb:

- Since 1985, more than 8 billion barrels of oil were produced in federal offshore waters with less than 0.001 percent spilled—a 99.999 percent record for clean operations.
- There has not been an incident involving a significant oil spill from a U.S. exploration and production platform in nearly 30 years (since 1980).
- Government statistics show that the injury and illness rate for offshore workers is about 70 percent lower than for all of private industry.
- Today's modern technology includes such environmental protections as automatic subsea well shut-in devices, including sub-seabed safety valves.

The industry's performance during the 2005 hurricane season (Hurricanes Katrina and Rita), which moved through a core area of offshore operations, is instructive. While it is true that 115 platforms were destroyed, the storm threatened over 3,000 facilities, the vast majority of which survived. Despite sustained winds reaching 170 miles per hour and towering waves and the resulting destruction of numerous platforms and rigs, there was no significant spill from production wells

[1] Clinton Administration DOE report: *Environmental Benefits of Advanced Oil and Gas Exploration and Production Technology*, 1999.

and no injury or loss of life among the 25,000—30,000 workers who are offshore at any given time.

We thank you again for this opportunity to submit written testimony, and remain available for any further questions.

APPENDIX

RESPONSES TO ADDITIONAL QUESTIONS

RESPONSE OF JOHN F. AMOS TO QUESTION FROM SENATOR BINGAMAN

Question 1. Your testimony expressed concern about the impact of the offshore and onshore infrastructure necessary to support offshore production. The Minerals Management Service (MMS) testified that their jurisdiction generally ends at the state-federal offshore boundary. Please discuss your understanding of the governmental entities with jurisdiction over this infrastructure, and any view you may have about the adequacy of the regulatory oversight for this infrastructure.

Answer. MMS decisions about outer continental shelf (OCS) leasing will generate demand for onshore facilities to support new, or additional, offshore exploration and production. Current regulatory roles are now provided to impacted coastal states under the federal consistency provision of the Coastal Zone Management Act (CZMA), for those impacted coastal states that have a federally-approved Coastal Zone Management Plan. If OCS leasing expands into previously protected federal waters, onshore industrialization in shoreline areas—where coastal states have set aside important habitats, parklands, and coastal-dependent tourism infrastructure—will likely require continued reliance on a strong state role under the CZMA consistency process.

An additional complicating factor in regulatory oversight is the division of offshore pipeline oversight between MMS and the Department of Transportation (DOT). It is our understanding that, in general, MMS is responsible for "gathering" lines that typically collect oil and gas from offshore wells and deliver it to platforms, while DOT is responsible for "market" lines that then bring the product to shore. We are not sure how, specifically, a given segment of pipeline is assigned to MMS or DOT jurisdiction.

I would like to take this opportunity to expand on my response to a question you asked during the hearing: whether the data and information that SkyTruth uses are available to government agencies as well. I interpreted your question to refer to the satellite images that we use in our work, and answered that government agencies certainly have access to those same satellite systems and the images and data they produce. I also want to make clear that we routinely make SkyTruth-processed images and analyses available to the public, including government agencies, for non-commercial purposes. For example, we have provided images to the Surface Water Quality Bureau of the State of New Mexico Environment Department, and to scientists in Wyoming conducting studies funded by industry and the Bureau of Land Management. In the immediate aftermath of Hurricane Katrina, we worked around the clock to produce and publish precision image-maps showing platform and pipeline locations and sources of oil leaks in the Gulf of Mexico, and informally provided those maps to staff at MMS and NOAA as fast as we could generate them. It was our hope that these image-maps would be helpful for the response and repair effort so we produced and published them as a public service. For an example of one of these image maps, see http://skytruth.mediatools.org/sites/default/files/photo__import/1904/935/11980.jpg.

RESPONSES OF JOHN F. AMOS TO QUESTIONS FROM SENATOR MURKOWSKI

Question 1. You stated in your testimony that "effective design and implementation of safe pipeline systems may be complicated by the existing regulatory regime for offshore pipelines, with jurisdiction split between two separate agencies, the Department of Transportation and the Department of the Interior. This is a classic example of gaps and overlaps in ocean governance of the kind discussed in a widely quoted 2006 paper in the journal Science." Would you agree that it makes sense to consolidate as much management as possible of the OCS oil and gas resources within one department, with other agencies serving in advisory roles?

Answer. Our observation is that gaps raise the possibility that existing or potential problems are not being recognized or effectively addressed. However, SkyTruth has no expertise in developing government policy and regulation, so we can make no specific recommendations in those areas.

Question 2. From your testimony, it appears that SkyTruth focuses much of its efforts on oil and natural gas operations.

a. Does your organization track or project the impacts that offshore wind installations could have on the marine environment?

Answer. We're not aware of any large offshore wind projects in U.S. waters. We have, however, produced images illustrating the landscape footprint of utility-scale onshore wind and solar projects (see our renewable energy gallery at http://www.flickr.com/photos/skytruth/sets/72157616622223819/).

b. Does your organization track or project the impacts that solar energy, biofuels, and any other onshore alternative energy projects could have?

Answer. See above.

c. Would you agree that the development of offshore wind energy, solar energy, biofuels, and other alternative energy resources will impact the environment?

Answer. We're not experts in understanding the impacts posed by all potential sources of energy, particularly offshore in the complex and relatively poorly understood marine environment. We know what we see, and that's generally limited by the primary technologies we use—satellite and aerial imagery—to impacts that are directly observable on land, or on the ocean's surface. But in general it seems likely that any industrial-scale activity to produce and transport energy will have impacts on the environment.

Question 3. As I understand your organization, you obtain, create, and supply pictures of resource extraction impacts and potential resource extraction impacts to environmental groups and other entities interested in documenting and communicating such impacts. Is this accurate?

Answer. SkyTruth produces images that illustrate a range of environmental issues, including resource extraction activities such as drilling, mining, and logging. We routinely make these images available to the public, including interested individuals, conservation organizations and government agencies, for noncommercial, educational and scientific purposes.

a. Would you provide a comprehensive list of all of the organizations to whom you have supplied SkyTruth's materials?

Answer. SkyTruth generally distributes images publicly through our website and online image galleries, so it's not possible for us to compile a comprehensive list. However, we do know that users of our images have included the Bureau of Land Management, the New Mexico state government, Trout Unlimited, Rocky Mountain Elk Foundation, World Wildlife Fund-Australia, The Wilderness Society, Sierra Club, Earthworks, Appalachian Voices, PBS, NBC Nightly News, and CBS Evening News, among others.

b. Of these groups, how many have taken positions generally or specifically opposing the projects of which you've provided photographs?

Answer. I have no way of knowing this (see above). Certainly many of the conservation groups that have used our images advocate for changes in the way public lands and resources are managed.

c. If all or an overwhelming percentage of the groups to whom you supply your pictures oppose offshore and onshore drilling projects, how is it true to state, as you did in testimony before this committee, that your group takes no position on the issue?

Answer. We don't know what percentage of citizens groups, organizations, or other public entities using our work are opposing drilling projects (see above). SkyTruth believes that the relative risks, benefits, and impacts of all industrial uses of public lands and waters should be acknowledged, fully presented to the public, and carefully weighed as part of the decisionmaking process about how to best manage those public resources. Our role is to help provide information about these risks, benefits and impacts, using remote sensing technologies, to those engaged in policy debates.

Question 4. Several of the images on your website and in your testimony aren't actual photos of development but they're photos of an area with your own drawings of what your organization believes some possible future development might look

like. Do you ever run these images by the proposed developer of the area to verify whether they happen to agree or disagree with your sketches?

Answer. SkyTruth simulations are based on satellite and aerial imagery of actual pollution incidents, and on existing, comparable, developments. To the extent possible we use published plans or applications from the proposed developers, and government rules and management practices that would likely apply.

Question 5. Your testimony cites what you label catastrophic oil spills resulting from hurricanes Katrina and Rita, but these larger spills seem to have occurred onshore from the refineries, the pipelines, and other infrastructure associated with delivering the products to customers. I'm not sure how this is specifically relevant to the debate about offshore development. Wouldn't similar risks apply to the same types of facilities much further inland, supporting on-shore development, if they were hit by other disasters like tornadoes or earthquakes?

Answer. Hurricane Katrina caused damage to OCS facilities that spilled more than 700,000 gallons of oil and condensate offshore, cumulatively a "major" spill by Coast Guard definition. Among other spills, Hurricane Rita caused 1.9 million gallons of heavy fuel oil to spill into the Gulf from a damaged barge; most of this product sank into the water and could not be recovered (http://www.darrp.noaa.gov/southeast/dbl152/).

SkyTruth's work with severe storms highlights the interconnectedness between offshore development and onshore infrastructure. In the case of Hurricanes Katrina, Rita, and Ike, these facilities caused significant spills. Communities that are being asked to consider drilling off their shores should be aware that coastal infrastructure is also implied by that development, and can be a source of damaging spills. For this reason, the information I presented on coastal spills is directly relevant to offshore development.

Although I have no knowledge of major spills caused by earthquakes or tornadoes, large earthquakes certainly have the potential to damage pipelines and storage facilities. Seismic and volcanic activity present hazards somewhat unique to Alaska: Cook Inlet risked a major spill early this year from an oil storage tank facility located in the well-documented path of dangerous mudflows from the latest eruption of Redoubt Volcano, and the facility has since been closed (http://www.rigzone.com/news/article.asp?a_id=82587). All such risks should be acknowledged and incorporated into the decisionmaking processes that inform resource management and emergency preparedness.

Question 6. I'm trying to get a better sense of your organization SkyTruth's philosophy. What I'm getting from your testimony is that the risks of offshore development outweigh the benefits. My question is where and how you may suggest Americans obtain our 20 million barrels of oil each day in the immediate to short term. Do you think tankers from abroad, presumably increasing traffic in the Houston ship channel to make up for a slowdown in domestic production, would be a safer measure until our Nation ceases to consume oil?

Answer. The risks and benefits of offshore development should be honestly and publicly debated as part of an ongoing national decisionmaking process. Industry spends millions of dollars each year reiterating the benefits of drilling to the public and to influential decisionmakers. However, the impacts of development and the continued risk of accidental spills often are not apparent to the public and decisionmakers. These impacts would need to be considered in comprehensive cost-benefit analyses to address the question of benefit vs. risk. SkyTruth doesn't engage in comprehensive cost-benefit analysis; that is well beyond the scope of our mission and current resources. Rather, we provide information on impacts and risks to be included in such public policy debates.

a. Where, specifically, have your pictures revealed that oil development can be or is being conducted in a safe manner?

Answer. With a publicly transparent, systematic program of regular monitoring, we could demonstrate over time that development is avoiding some observable impacts (such as moderate to large oil spills, or excessive landscape fragmentation). Such a program would require substantial resources to buy and process the stream of imagery required to do this kind of systematic monitoring. To date, these resources have not been dedicated to implement such a monitoring effort here in the US.

To help evaluate the safety of offshore energy development, we recommend forming a partnership among government agencies, industry, researchers, citizens groups and other stakeholders to design and conduct routine OCS monitoring. SkyTruth has worked with two satellite data receiving, processing and analysis facilities that could house such a monitoring program: the Center for Southeastern Tropical Advanced Remote Sensing (CSTARS) at the University of Miami (http://

cstars.rsmas.miami.edu/), and the Alaska Satellite Facility (ASF) at the University of Alaska-Fairbanks (http://www.asf.alaska.edu/).

Question 7. Concentrated oil spills always have some environmental impact—that's why we agree that oil and gas should always be produced as safely as possible, under stringent conditions. However, according to a report issued in 2003 by the National Academy of Sciences (Oil in the Sea III), extraction activities release far less oil each year than consumption activities, which in turn release far less than natural seepages. In fact, the NAS report found that extraction activities—which your organization so closely tracks—accounts for just 1 percent of the oil entering North American waters each year. Taking this a step further, multiple peer-reviewed studies [see http://www.ia.ucsb.edu/pa/display.aspx?pkey=412] have found that the offshore production of oil could actually help reduce the amount that naturally seeps from the ocean floor.

Answer. I understand from SkyTruth's scientific advisors that there is a substantial difference in toxicological impact between slow, steady-state, widely distributed seepage of weathered and biodegraded oil, vs. the sudden concentrated release of raw crude oil into an environment that has not evolved mechanisms to accommodate it. The deaths of marine mammals, birds, fishes and shellfish that result from major oil spills attests to that difference.

In fact, entirely unique and potentially valuable ecosystems of hydrocarbon-metabolizing organisms have developed on the seafloor around many of the natural seeps in the Gulf of Mexico. I personally observed these organisms on two deep research dives in the Gulf, at water depths over 1,000 feet (http://tinyurl.com/y9edj5l). These organisms survive by "eating" the oil and gas that emerges from the seeps. In this case, if oil production actually reduced the flow of oil from these natural seeps, it could extinguish rare communities of organisms that are not yet well-studied. This would not necessarily be a net positive outcome, since these seeps and communities are an integral part of the marine environment in this area.

In addition, natural seeps are not ubiquitous. Background research for a NASA-funded study I participated in determined that in US waters, most natural oil seeps occur on the continental slope in the deepwater Gulf of Mexico, and in the Santa Barbara Channel off southern California (http://www.nasa.gov/home/hqnews/1999/99-001.txt).

Question 8. Although accidental spills or blowouts involve a much more concentrated release of oil than natural seeps, much of the testimony discusses toxicity of oil in the sea and the idea that its continued buildup and dispersal may have toxic effects. Is this any less true of a constant seepage of oil from the seabed than from the 1 percent of the ocean's oil from production related releases?

Answer. See above. The acute toxicity of a major oil spill can have effects on the environment and on economically valuable fisheries that can last for decades (http://tinyurl.com/cfekru). Natural seepage, as a long-term natural phenomenon, is part of the evolved landscape where it occurs; therefore the local ecosystem is adapted to that local flux of hydrocarbons.

Question 9. Have you ever considered that oil production could actually have a positive environmental impact, insofar that it could be reducing the rate of natural seepages?

Answer. See above. The arbitrary destruction of unique and potentially important seep ecosystems, that have evolved over a long period of time, would not necessarily be a positive environmental or economic outcome.

Question 10. Would policies not be more efficient in terms of reducing oil in the sea to focus on reducing the amount of oil that is spilled during consumption activities, rather than narrowly focusing on a part of the process that is believed to account for nearly 30 times less spillage each year?

Answer. As the personal opinion of a seafood lover and a body-surfing fanatic, I think our nation should diligently work to reduce all human-caused sources of oil pollution in the sea.

Question 11. I understand your organization also tracks and projects the effects of domestic mining operations. While you certainly have every right to do that, have you considered mining's importance to the development of clean energy technologies? Some of the largest wind turbines can contain 335 tons of steel (forged with iron ore), nearly 5 tons of copper, 3 tons of aluminum, and up to 2 tons of rare earths. If we refuse to produce our own mineral resources, we will simply cede the front end of the clean energy supply chain, fall further behind in the development of these technologies, and trade our dependence on foreign oil for an equally devastating dependence on foreign minerals. So, do you believe the environmental impacts that can be associated with hardrock mining outweigh the beneficial effects of the raw minerals and metals that it yields?

Answer. Again, SkyTruth's mission is to help the public and decisionmakers become aware of the impacts of mining so that these impacts can be honestly acknowledged, debated, and incorporated into the planning process for mine approval, bonding, permitting and closure. SkyTruth does not have the expertise or resources to engage in comprehensive cost-benefit analyses.

Question 12. Since your career as a geologist began, have you observed any meaningful improvements in the development of offshore or onshore oil and gas development in the U.S.?

Answer. Most of the technical advances I'm aware of come in the area of seismic data processing and analysis, and drilling and completion technology. These advances improve industry's ability to profitably locate and produce resources from unconventional reservoirs, complex geologic settings, and logistically challenging environments.

Question 13. Since SkyTruth's inception, can you illustrate any success stories in terms of influencing policy and regulation, or providing pictures to groups that do so influence, that has resulted in meaningfully safer offshore oil and gas development?

Answer. I'm not aware of any such examples with certainty but I consider it possible that our post-Katrina oil spill imagery helped spur MMS and industry to rapidly develop new, stricter requirements for the mooring systems of mobile drilling units; and spurred NOAA to acquire satellite imagery after severe storms, enhancing our nation's ability to evaluate and respond to storm-damaged infrastructure.

Question 14. On November 5th of this year, you headlined a briefing in the Capitol, presented by the Sierra Club, on the "risks associated with including offshore drilling in the upcoming climate legislation." Was a member of Congress a sponsor of this briefing, and was a member of Congress present at this briefing?

Answer. My understanding is that Senator Bill Nelson sponsored this briefing, which was attended by one of his staff. No members of Congress attended. SkyTruth was invited to provide information on recent offshore oil spills, similar to our testimony on November 19. We clearly stated that we do not promote any particular legislative or policy prescriptions related to offshore drilling.

RESPONSE OF JOHN F. AMOS TO QUESTION FROM SENATOR MENENDEZ

Question 1. The Australian oil spill in the Timor Sea is the latest and best known mishap, but isn't it true that in the just the last six months there have been other oil spills, in the U.S. and around the world? Please describe what you know of these incidents and comment on how they illustrate our current risk for spills despite the existence of advanced technology and regulatory laws.

Answer. There have been other oil spills since June 2009, including the following:

- Prudhoe Bay pipeline spill, December 2009—an above-ground, onshore pipeline operated by British Petroleum in the Lisburne field ruptured and spilled 46,000 gallons of mixed oil and water onto the tundra (http://dec.alaska.gov/spar/perp/response/sum__fy10/091129301/091129301__index.ht m), one of the biggest spills to occur on the North Slope (http://www.adn.com/money/industries/oil/prudhoe/story/1046914.html). A 200,000 gallon spill from a poorly maintained BP pipeline in March 2006 still ranks as the largest North Slope spill (http://www.adn.com/money/industries/oil/story/876063.html). Lack of inspections and regular maintenance resulted in corrosion that caused the 2006 spill; the cause of the 2009 spill is under investigation.
- Dubai Star tanker spill, December 2009—a 2007-built tanker carrying jet fuel was at anchor in San Francisco Bay and loading bunker fuel from a barge when a mechanical failure occurred, spilling fuel onto the deck and into the Bay. Responders were immediately activated but the resulting oil slick reached 2 miles in length and 200 yards in width, and was not contained for four hours (http://www.mercurynews.com/topstories/ ci__13677172).
- Eugene Island Pipeline, July 2009—a large-diameter pipeline operated by Shell Oil Co. sprang a leak about 30 miles off the Louisiana coast and spilled 63,000 gallons into the Gulf of Mexico (http://www.incidentnews.gov/incident/8061), creating an 80-square-mile oil slick before the spill could be contained. The pipeline was installed in 1976 and recently began carrying oil produced from a new platform located in deep water 190 miles south of New Orleans. It is common for new producing fields to be tied back in to the existing pipeline network closer to shore. To the best of our knowledge, no cause has yet been determined for this failure.
- Mystery spill, July 2009—tar balls began washing ashore on the beaches of South Padre Island, Texas. The source of the oil is unknown (http://www.mysanantonio.com/news/51521182.html).

- Norway tanker spill, July 2009—One of Norway's worst oil spills ever occurred when a tanker ran aground and spilled part of its cargo of diesel fuel (http://www.independent.co.uk/news/world/europe/norway-cleans-up-after-oil-spill-1769714.html). The captain of the vessel failed to call for assistance when his engine failed in stormy conditions.

These spills result from a mix of old and new technology, but what they share (for those where a cause has been established) is the element of human error: neglected maintenance, and failing to follow the law and best practices. Technology advances can provide a measure of protection from spills, but we observe that accidents due to equipment failure, bad practices, and bad decisions continue to have serious consequences.

RESPONSES OF MARVIN E. ODUM TO QUESTIONS FROM SENATOR BINGAMAN

Question 1. The Committee heard testimony about the infrastructure necessary to support offshore oil and gas production and to bring the product onshore. Please state the extent to which your company typically is involved in the development, construction or maintenance of this infrastructure. If you do not typically handle this directly, please indicate the extent to which you are involved with the entities who are responsible for this infrastructure.

Answer. Shell is an integrated energy company with exploration, development, and producing capability. We also own and operate pipeline transportation infrastructure, which transports crude oil and natural gas from offshore platforms to shore for refining and marketing. While we do have design engineering capability in-house, we typically manage development projects in-house and contract with engineering firms to design the facilities. Construction and installation of offshore infrastructure is performed by contactors and managed by our project engineers and construction staff. Shell operates its own platforms and pipelines with the help of contactors that Shell requires be trained to Shell and Industry standards.

In some cases, we determine that facilities (including pipelines and platforms) owned and operated by other companies can be used in lieu of constructing new infrastructure. Doing so generates efficiency and reduces the infrastructure footprint. For example, our Perdido facility in the Gulf of Mexico utilized new technology to make a world record water depth subsea tie-in to an existing pipeline.

Question 2. The Committee also heard testimony to the effect that the Minerals Management Service's authority ends "at the water's edge." Please state your understanding of the various government entities—federal, state, or local—responsible for permitting, oversight, or spill response related to the infrastructure necessary to support offshore production or to bring the product onshore.

Answer. The Mineral Management Service's (MMS) authority for leasing and regulatory enforcement for oil and gas facilities begins at the dividing line between the state territorial seas and the Outer Continental Shelf (OCS). The territorial seas typically extend from the shoreline out to three nautical miles but can extend further out in the case of Texas and Florida. The MMS is also required to consult with any Federal agency that has regulatory jurisdiction. There are, however, some exceptions to the MMS's jurisdiction and a myriad of other federal statutes and agencies that impact offshore development and peripheral activities. These include:

- For oil spill prevention and response preparedness under the Oil Pollution Act requirements, the President delegated authority over oil and gas facilities—including pipelines—to MMS from the shoreline out to and including the offshore platforms. This includes the state territorial seas.
- The U.S. Coast Guard (USCG) has jurisdiction for actual response to an oil spill from oil and gas facilities and for workplace safety on offshore platforms.
- The Department of Transportation has jurisdiction for the design, construction, and maintenance of offshore pipelines downstream of the oil and gas sales point.
- The Environmental Protection Agency (EPA) has authority to regulate water discharges in the OCS and air emissions in the OCS, except for the central and western Gulf of Mexico.
- The Fish and Wildlife Service and the National Marine Fisheries Service have authority to regulate activities for the protection of marine mammals that could be impacted by offshore projects.

Offshore facilities are subject to the Federal consistency requirements of the Coastal Zone Management Act (CZMA), whereby a coastal state can determine whether any project receiving a Federal permit is consistent with its coastal management program. If an offshore project requires on onshore pipeline or onshore

processing facilities, that portion of the project is subject to the permitting requirements of the coastal state and the local jurisdictions, such as zoning requirements of a county.

Question 3. The Committee heard testimony regarding oil spills that occurred during severe storms in the Gulf of Mexico from onshore oil and gas infrastructure that supports offshore production—refineries, pipelines, and tanks required to receive, process, store and distribute oil and gas from offshore fields. Please describe your company's involvement in developing and maintaining this onshore infrastructure, and your understanding of the governmental entities responsible for permitting, oversight and spill response for this infrastructure.

Answer. Coastal states and local jurisdictions (county, parish, or town) will have jurisdiction for onshore pipelines and other infrastructure. Shell has constructed and does maintain onshore oil and gas infrastructure that support offshore production. This is primarily pipelines and pumping and storage facilities along the coast where offshore pipelines come ashore. In addition, Shell owns and operates refineries, pipelines, and tanks required to receive, process, store and distribute oil and gas from offshore fields. These facilities are designed to withstand operational and environmental loading, such as internal pressures and wind and wave loads as prescribed by Industry standards and required by both Federal and state regulations. We perform regular inspections of and maintenance on these facilities as required by Shell policies and state and Federal regulations.

A spill or discharge from a facility onshore or offshore that causes the release of a pollutant or results in a sheen on the water is reported to the National Response Center (NRC), which is the national point of contact and operations center for the release of any hazardous substances that occurs in the U.S. The NRC will relay information to the appropriate federal on-scene coordinators (USCG or EPA, depending on the spill's location), which in turn will contact and mobilize other federal and state incident teams. The first and most immediate response; however, is that of the facility, and the facility's response plan is immediately activated in the event of a spill. For this reason, the facility's response equipment and the quantity, operation, and location of this equipment and supplies are all critical to effective spill recovery and clean-up.

Responses of Marvin E. Odum to Questions From Senator Murkowski

Question 1. Can you amplify for me your concerns about domestic energy production and, if regulatory uncertainty and overly burdensome litigation continues to stall development, what we can expect to see in terms of driving energy jobs and production overseas? Feel free to answer in numbers of actual jobs and numbers of barrels of oil, or percentages, whichever is available.

Answer. When considering an investment in a multi-year, multi-million or billion dollar exploration and development project, a company looks at many factors including the applicable fiscal terms, regulatory requirements and legal or political risks. The project's attractiveness is impacted if there is a high potential for legal challenge or political interference; or if the fiscal terms or the regulations are uncertain or unstable.

It is difficult for me to say how many US oil and gas projects and associated jobs have been left "on the table" due to a company's analysis of these criteria. I can say, first, that oil and gas development in the central and western Gulf of Mexico over the last 50 years has been successful in large part due to clear and equitable "rules of the road;" and second, we are seeing that the "rules of the road" are not as clear in other areas of the OCS that are opening up. This should be a concern to policymakers. Let me provide two examples.

In the OCS off the coast of Alaska, we have experienced a delay of three years in acquiring permits necessary to drill exploratory wells in the Beaufort Sea and incurred hundreds of million dollars in costs for preparation and equipment and personnel mobilization. Limited term leases were acquired from MMS in 2005, and we have not been able to drill a well. A recent study by the Institute of Social and Economic Research of the University of Alaska[1] quantifies OCS development could generate an annual average of 35,000 jobs over the next 50 years for the state of Alaska alone. These jobs represent a total payroll of $72 billion (2007$) over the 50-year period. OCS-related employment growth could more than offset losses from the de-

[1] Economic Analysis of Future Offshore Oil & Gas Development: Beaufort Sea, Chukchi Sea, and North Aleutian Basin, Northern Economics and the Institute of Social and Economic Research of the University of Alaska, March 2009.

cline of petroleum production on state lands and could help sustain the Alaska economy for several decades.

In the Eastern Gulf of Mexico, we have received approval from MMS for an exploration plan in ultra-deep water, but issuance of an air permit from EPA will take an additional 18-24 months. The Gulf of Mexico Energy Security Act of 2006 opened several million acres of the Eastern Gulf to leasing but failed to adequately provide for streamlined air permitting, such as that applied in the central and western Gulf of Mexico. To help illustrate the significance of the oil and gas industry relative to job creation, a recent study entitled, "The Energy Sector: Still a Giant Economic Engine for the Louisiana Economy" by Dr. Loren C. Scott, Ph.D found that in 2005 alone the oil and gas industry supported $70.2 billion in sales in Louisiana firms, generated over $12.7 billon in household earnings for Louisianans, and supported 320,280 jobs in the state.

Question 2. When evaluating offshore oil and gas development opportunities in nations outside the U.S., what are some of the main factors a company might take into account when assessing the attractiveness of the investment climate?

Answer. Oil and gas exploration and development opportunities both in the U.S. and around the world are evaluated on a number of criteria. The internal screening process is designed to ensure that investments are made in projects that will successfully grow the business and return value to our shareholders. Among the criteria applied to a proposed exploration or development project are:

- The recoverable oil and gas volume and price forecast
- The cost to bring the resource to market, including applicable fiscal terms, and any uncertainty about the applicable legal and regulatory regime that might increase project costs
- The ability to meet a schedule, which is affected by litigation and regulatory delays
- The predictability and certainty of gaining a license to operate and the security of that license
- The technology required to develop the resource—does it exist?
- The potential environmental and social factors associated with the project The political stability of the resource holding country
- Access to skilled workers

Question 3. When we talk about environmental stewardship on a global level, knowing what we know about the U.S. program, is it better or worse for the world's environment when the U.S. adds to its environmental restrictions things like shorter lease terms and heightened regulatory burdens?

Answer. Like any policy that impacts the factors listed above (in Murkowski Response No. 2), shorter lease terms and heightened regulatory burdens reduce the attractiveness and global competitiveness of U.S. energy prospects. Failure to provide for adequate timeframes to explore and properly evaluate offshore leaseholds before having to make a multi-million dollar decision would impact the viability and prospective value of domestic lease rights and could influence the energy industry to pursue more attractive foreign alternatives. Unnecessary regulatory burdens have a similar economic impact. Because U.S. demand will need to be met, the effect of overly burdensome regulation is to force the importation of foreign energy sources that may have greater environmental impacts or risks.

The U.S. has very high safety standards and environmental controls. The environmental record over the past 40 years, as documented by the Department of Interior and the National Academy of Sciences, attests that such a regulatory framework is effective and is continuously improving. We know this because other countries copy what we have here in the U.S. On the other side of the equation, for every barrel of oil or TCF of natural gas that the U.S. imports rather than produces domestically, the U.S. effectively increases environmental risks while exporting the environmental effects of production and transport.

Any policies that unnecessarily favor less stringent environmental alternatives are obviously contrary to U.S. goals regarding global environmental stewardship.

When you add the tremendous economic and national security benefits from domestic production compared to imports, the net benefits weigh greatly in favor of domestic development of our energy resources.

Question 4. While EIA has said that increased domestic offshore oil and gas production would not result in meaningful energy price differences for Americans, do you think that a major ramp up of development in the Atlantic, Pacific, Eastern Gulf, and Alaska OCS would send a market signal that could, in fact, affect world price of oil?

Answer. It is very difficult to predict oil prices with any degree of certainty—given the multitude of factors, anticipated and unanticipated—which can come into play

over time. Any price impact would also depend on whether more investment in productive capacity for oil in the U.S. OCS adds to, or substitutes for, investment in capacity in other regions of the world. In the first case, this could result in a more moderate price environment. It the second case, it may not, depending on the relative cost and volume profiles of competing developments. Increased access to development options in the lower 48 OCS and Alaska OCS would clearly improve the set of investment choices available to the oil and gas industry and allow growth of additional producing capacity and supply where economic parameters and market needs are most favorable.

a. Is the analysis the same for natural gas prices as oil, even though natural gas is not based on a world price?

Answer. Although gas prices in the U.S. tend to be more closely related to supply and demand developments in North America, rather than global trends, similar considerations to oil apply.

Question 5. Senator Menendez indicated that not only would price be unaffected by increased domestic offshore drilling, but that "production" would be unaffected by increased domestic offshore drilling. Is it accurate to imply that increasing production would have no effect on energy security?

Answer. As indicated in my response to question #4, we do not agree with the Senator's basic assumption. If we assume, however, that "energy security" means a stable energy supply that promotes and fuels a healthy economy, then there can be no doubt that increasing domestic production will contribute to domestic energy security.

- Each barrel of oil produced in the U.S. will displace a barrel of oil imported from abroad and is a more secure supply source.
- Nearly $1 billion is exported from the U.S. to other nations in order to import oil. This export of U.S. dollars has an adverse effect on our balance of trade and therefore, an adverse impact on the overall economic health of the U.S. economy.
- Exploration and production in the U.S. will create jobs. Over 9 million people are employed directly and indirectly by the domestic oil and gas industry. A study by the University of Alaska concluded that developing the vast resources off the coast of Alaska will create 35,000 annual jobs in Alaska and the lower 48 states.
- Exploration and production on U.S. land creates revenue for the federal government in the form of bonus bids, rentals and royalties. The industry is the largest revenue source for the federal government after the Internal Revenue Service.
- Increasing oil and gas production in the U.S. will generate tax revenues for federal, state and local governments in the form of income taxes, sales taxes, property taxes and the like.

In sum, by creating more jobs, more government revenue, and more energy, increasing domestic production will substantially enhance the health of the economy and make us less dependent on foreign sources. A healthy economy will be essential as we move to invest in a lower carbon future.

Question 6. Environmental stewardship has improved through directional drilling and subsea tiebacks, among other improvements, as I understand it. Can you describe your environmental record in terms of exploration, development, and production for both Alaska and the Gulf of Mexico?

Answer. I refer you to my written testimony submitted to the Committee where I covered our environmental record, which I was not able to go into detail during my oral testimony. Let me provide a condensed response for you here. The oil and gas industry can develop offshore (and onshore) resources with a footprint smaller than ever before. This is an important aspect of our environmental stewardship. It is possible to develop very large sub-surface areas with a very small surface expression. The technologies that enable this can be applied both near shore and in deepwater. Let me describe some of the technologies.

Our deepwater technology program focuses on equipment and integrated systems required to produce hydrocarbons with fewer and smaller surface facilities and reduced environmental impacts. This involves the optimal use of subsea production systems and new floating drilling and production systems. New technologies include subsea separation and boosting, subsea re-injection of produced water and long-distance pumping with flow assurance. All of our deepwater projects go through an internal carbon footprint and environment impact assessment as part of the tollgates to final investment decisions.

Gulf of Mexico. Perdido is an ultra-deep water project in the Gulf of Mexico that illustrates the industry's ingenuity and smaller footprint. Three different offshore fields covering about 90 square miles in the OCS will be tied into a single floating surface facility at Perdido. Technically, the project provides the infrastructure that could enable future oil and gas volumes from a 30-mile radius. That means that about a 3,000-square-mile area can be developed sharing one floating facility.

Alaska. Shell hopes to drill two exploratory wells in the Alaska OCS in 2010. Shell has created an unprecedented oil spill response capability to support its drilling plans in the Beaufort and Chukchi Seas. We have a dedicated fleet of vessels and specialized oil containment equipment, which will be on-site 24/7. Spill recovery equipment is state of the art and widely acknowledged as proven systems under cold-climate conditions and designed to remove the worst-case discharge. The Nanuq is an ice-class purpose-built vessel, which can begin recovery within an hour of any incident large or small.

Question 7. Seismic data acquisition has also improved over the years. Please describe any environmental benefit that may be conferred as a result, and feel free to discuss any additional benefits to the OCS program through this technology.

Answer. Environmental performance of all aspects of our business continues to improve as we understand and incorporate the latest information into the way we work. These improvements, such as passive acoustic monitoring and air gun technology, go a long way in mitigating the environmental effects of seismic exploration. Operational commitment is also a factor. In the Alaska OCS, for instance, Shell seismic vessels followed a gradual sound ramp up profile at commencement of any seismic survey, to give marine mammals time to clear the area. We also maintained constant vigilance for marine mammals with trained native observers on board the seismic ships and with airborne monitors flying ahead on its planned course. Seismic operations ceased with any sighting and did not restart until the area was clear.

Still, the oil and gas industry, geophysical contractors, and governmental regulatory agencies continue to further scientific understanding of the effects of sound on marine life, to investigate if additional improvements can be made. For example, a joint industry program (JIP) organized by the International Association of Oil and Gas Producers has provided approximately $24 million USD to advance scientific understanding of the effects of sound generated by offshore oil and gas exploration and production operations on marine mammals, fish, and reptiles through independent research by some of the leading scientists and institutions in the field. This work is available to all—the public, the scientific community, and international regulators at: http://www.soundandmarinelife.org/

In addition to mitigating the environmental impacts of seismic exploration, improvements in seismic data acquisition include 3-D seismic, wide azimuth seismic, and enhanced processing and visualization. These improvements allow us to see below salt formations, which typically "whiteout" or blur seismic data and better pinpoint oil and gas reservoirs. This results in a smaller environmental footprint (i.e., fewer exploratory and appraisal wells, fewer platforms, and more productive wells). It also better enables us to locate potential hazards to drilling, such as shallow gas formations.

Question 8. How are competing uses in the offshore areas dealt with currently under existing laws and regulations—does this work and are changes needed?

Answer. We don't believe that significant changes are needed to balance multiple-uses of offshore areas. There is a robust, effective system already in place to balance environmental stewardship and responsible energy development of the OCS that takes into consideration multiple-uses of the ocean. The leasing process established by the Outer Continental Shelf Lands Act requires the Secretary of Interior to consult with other agencies to obtain information pertinent to responsible OCS oil and gas leasing, exploration, and development decisions as well as to monitor the human, marine, and coastal environments. The MMS puts stipulations on operations in place during the planning process to minimize and mitigate potential conflicts between different user groups. The MMS is also obligated to incorporate public concern and potential conflicts between different user groups through the public participation process and response.

The system works in the Gulf of Mexico. For example, the oil and gas industry has co-existed with the sport and commercial fishing industry in the Gulf for decades and also co-exists within the protected boundaries of the Flower Garden Banks National Marine Sanctuary (FGBNMS). In the Gulf, it's common for fishermen to target areas around platforms because they serve as artificial habitat for so many important species. A 2002 study from the MMS reported that the total economic output to Gulf coastal counties associated with sport fishing and diving activities near

oil and gas structures is more than $300 million per year[2]. At the Flower Garden Banks National Marine Sanctuary, 25 years of stringent environmental monitoring by NOAA, MMS, and industry has found no contamination or degradation of corals due to oil and gas activity, even though hundreds of exploratory wells have been drilled, and there are currently 10 production platforms and approx. 160 km of pipelines within 4 miles of the sanctuary boundary.

RESPONSE OF MARVIN E. ODUM TO QUESTION FROM SENATOR DORGAN

Question 1. Earlier this year in this committee, I proposed an amendment which is one of the primary reasons for the oversight hearing. Through my approach, the MMS would be authorized to go through a rulemaking process to issue regulations and would consider a range of local and other conditions during that process. In federal waters, the Secretary would establish zones which would determine what kind of restrictions would be placed on surface activities. The onus is then placed on individual companies to develop innovative technology solutions in those zones. Renewable development (i.e. wind turbines offshore) and previously existing oil and gas projects would be exempt. I believe that if we could pursue this approach, it is possible to deploy innovative technology applications to limit the environmental footprint and significantly reduce the visual impact while increasing access to resources.

Given your company's experience with projects in other regions and the testimony that you have presented, do you believe that this is a concept that you could support?

Answer. The footprint and visual impact of offshore oil and gas activities could be addressed through the process you describe. As new areas of the Outer Continental Shelf (OCS) are opened to oil and gas leasing, perhaps such a proposal merits consideration. I will note that the federal agencies currently have tools to protect sensitive areas offshore. For example, MMS requires buffer zones around corals and chemosynthetic communities on the seafloor and around marine protected areas. Currently, States control activities in their Territorial Seas (generally three miles from the coast) and require that offshore projects do not conflict with coastal management plans, which can include view shed criteria.

RESPONSES OF MARVIN E. ODUM TO QUESTIONS FROM SENATOR MENENDEZ

Question 1. Much of your testimony has focused on the spill prevention capacity of your company. But realistically, an accident is an accident, and by its very nature cannot be fully anticipated or prevented. Yet, some preliminary reports have shown that the recent Australian oil spill in the Timor Sea happened as a result of negligence on the part of its operator. On this issue, how can your company ensure that human error is not a factor in drilling operations? If we cannot prevent human error, are we not then to assume that further accidents could happen?

Answer. I invite you and your staff to tour Shell's facilities to meet the men and women involved with our operations and the technology they employ to ensure the safety and integrity of our operations. In my testimony, I described some of the technology, such as the multiple redundant barriers in place when drilling exploration wells. I described the exploration and production control rooms that are manned 24/7 and see in real time the operations that occur offshore. Should there be any anomaly in those operations, experts both on-site and onshore work to understand the anomaly and resolve it before it becomes an incident. Shell takes extreme measures to avoid incidents that will pose a danger to our employees, to the residents of the communities in which we operate, or to the environment.

Question 2. One of the troubling aspects of the Australian spill is that it took three weeks before any efforts to plug the leak were even attempted. This was the case despite the fact that the rig is in relatively shallow water and mild weather conditions were present. How would Shell be able to respond to a well blow-out if it happened in the wake of a disaster similar to Hurricane Katrina? Or, if it happened in the frigid conditions of the Beaufort Sea, or far offshore in the Chukchi Sea, in the winter? How long do you think it would take to stop a spill and clean it up under those conditions?

Answer. Further to my response to the question above, Shell has a robust contingency plan in place to deal with a loss of well control. In the Gulf of Mexico, all drilling operations are shutdown prior to a hurricane entering the Gulf. If a well blow-out occurred as a result of a hurricane, the same relief well drilling plan is

[2] Hiett, R.L. and J.W. Milon. 2001. Economic Impact of Recreational Fishing and Diving Associated with Offshore Oil and Gas Structures in the Gulf of Mexico: Final Report. OCS Study MMS 2002-010. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. 98 pp.

put in place—there is no difference. Access to a suitable drilling rig would not be a problem.

In Alaska, the drillship is equipped with special devices that allow it to disconnect from the well quickly (within minutes) and move away from the site to avoid damage by the blowout. This allows the same drillship to drill the relief well for the blowout. In the Timor Sea incident the original rig was a jackup rig could not escape quickly, so it was evacuated at the beginning of the leak. A second jackup rig had to be activated, equipped for service, manned, mobilized to the well site, jacked to the proper height, a relief well planned and drilling operations initiated all while the leak was still in progress.

The MMS requires all offshore operators to have a relief well drilling plan with a blowout kill plan before initiating well drilling operations. Adequate casing, wellheads, the guide base, cement, drilling fluids, a second Blow Out Preventor (BOP) and all other components of the relief well must be aboard the drillship or its supporting fleet or within "easy reach". Unlike the Timor Sea incident, in its offshore U.S. operations, Shell will be ready to initiate the relief well drilling process almost immediately.

It is difficult to say how long it would take to stop a spill and clean it up since there are a variety of factors and conditions that will affect this. We have designed our systems to minimize this time as much as reasonably possible.

RESPONSES OF MARVIN E. ODUM TO QUESTIONS FROM SENATOR SESSIONS

Question 1. In your opinion, do shorter lease terms, an increase in royalties, and an increase in taxes play a part in determining which country your company with produce?

Answer. Yes. Although there are other intangible factors that play a role in our investment decisions, economic reality dictates that such costs and lease terms are a critical determinant. We have a serious responsibility to our shareholders to thoughtfully and analytically select the most favorable economic alternative.

Question 2. The oil and gas industry directly and indirectly employ 9.2 million people, so could someone explain to me why with double digit unemployment numbers are we not moving forward with increasing domestic production and employing individuals here at home?

Answer. Shell supports government policies that will enable the growth of domestic production and believes that increasing domestic oil and gas production is a "win-win-win." Such policies will generate jobs, contribute to government revenues and improve the overall US economy. As noted, over 9 million people are employed directly and indirectly by the domestic oil and gas industry. A study by the University of Alaska concluded that developing the vast resources off the coast of Alaska would create 35,000 annual jobs in Alaska and the lower 48 states.

Question 3. In total, the OCS development has generated $190 billion in federal revenue from bonus bids and royalty payments. Its puzzles me with record breaking deficit numbers, why the 5 year plan for OCS is getting delayed when it could produce federal revenues. Does anyone have an opinion on this?

Answer. With all due respect, the US Department of the Interior is in the best position to explain the reason for delay in issuing the 5-year OCS leasing plan. It is true that the oil and gas industry makes a substantial contribution to federal revenues each year in the form of bonus bids, rentals and royalties, as well as in tax revenues generated by associated jobs.

Question 4. What is the role of the National Oceanic and Atmospheric Administration (NOAA) in OCS development? NOAA Administrator Lubchenco sent a letter to MMS dated September 21, 2009, which also appeared the LA Times commenting on the OCS proposed 5-year plan—2010-2015. However, NOAA later claimed it was an unofficial letter. How is MMS bound or inclined to react to this letter's contents?

Answer. With all due respect, the MMS is better positioned to comment on whether or not it will react to or be bound by the Sept. 21, 2009 letter that NOAA submitted and withdrew. I read the letter and believe that it contained serious factual inaccuracies, unfounded allegations and important omissions. Therefore, I sent a response to the NOAA Administrator in an attempt to set the record straight. I attach that letter here for your review.

Question 5. How many agencies does an oil and natural gas company have to deal with to produce from a federal offshore lease? Does this number of different and competing bureaucracies make operations in the OCS more efficient or less efficient?

Answer. I have attempted to answer the question of regulatory jurisdiction in my response to Senator Bingaman's question #2. The number of agencies varies by the nature of the specific activity, location of the offshore lease and whether the state and local jurisdictions are involved. Suffice it to say, there are many agencies. How-

ever, the number of agencies and regulations is not as problematic as agencies not working together effectively and agencies whose policy and objectives are at odds with the responsible development of federal OCS resources.

For example, if an agency's mission is primarily conservation related, it may not diligently and objectively review and process regulatory approvals unless a national federal policy provides such guidance.

I call your attention, though, to the effectiveness of the regulatory framework (and the corresponding environmental record) of the central and western Gulf of Mexico. The regulatory agencies work cooperatively to review and process regulatory approvals and maintain the highest standard of environmental and safety standards of anywhere in the world. I question why this model can't be replicated in other areas of the OCS. We strongly support the provision in the Senate Energy bill for an Alaska OCS permitting office with direction to major federal agencies to work cooperatively to process permits.

Question 6. We've heard the U.S. ranks very high in environmental stewardship. How high does the U.S. rank in terms of applying its stewardship policies in such a way as to provide certainty to the process of leasing and developing the OCS?

Answer. The environmental statutes and regulatory regimes that implement those statutes are among the most protective in the world. That is why many say that the US ranks very high in environmental stewardship. In the same vein, the US offshore leasing program in the Gulf of Mexico has been among the most transparent and certain in the world. As federal leasing of other offshore areas occurs, there appears to be valid reason to be concerned that the "rules of the road" are less clear and less certain.

The example is the OCS off Alaska. The federal government has held lease sales there, awarded leases and collected billions of dollars in bonus bids and rentals. Shell paid about $2.2 billion for leases; we invested about another $1 billion; and have been "shovel ready" to explore since 2007. Due to legal and regulatory roadblocks, we have not yet been able to drill a single exploration well. We have urged policymakers to address this dilemma.

RESPONSE OF JEFFREY SHORT TO QUESTION FROM SENATOR BINGAMAN

Question 1. You testified that current scientific knowledge related to the impacts of offshore oil and gas production on the marine environment is inadequate. You recommended that additional research be conducted. Please be more specific about the highest priority areas of research that you believe are necessary. Also state which research entities or agencies you believe to be best suited to conduct this priority research.

Answer. My written statement details, at a broad level, the scientific research that must be undertaken before we can make informed decisions about whether oil and gas production should occur offshore and, if so, when, where, and how. We cannot fully evaluate the potential impacts of production without understanding the marine ecosystem, and the necessary steps to beginning that understanding are outlined in my written statement.

The three priority areas for research are in the toxicology of oil pollution, in oil spill cleanup and mitigation technology, and in gathering basic scientific information in Arctic coastal and marine environments. In toxicology, research on the biochemical mechanisms of toxic impacts of polycyclic aromatic hydrocarbons (PAH) on developing embryos is likely to be immediately rewarding, and the toxicity of other oil components such as the alkylbenzenes (Rowland et al. 2001) that have been identified as toxic as a class but have not been examined in detail are also likely to be fruitful. In cleanup and mitigation, quantitative methods for assessing the efficacy of existing and new methods are urgently needed. Cleanup and mitigation methods are typically "evaluated" with little or no regard for routine scientific practices elsewhere such as use of positive and negative controls, comparison with reference standards, determination of precision through replication, etc. In general, much higher standards of scientific evaluation should be mandated for qualifying performance claims for these technologies.

As I highlighted in my testimony and below, we should have sufficient understanding of ecosystems to conduct a quantitative risk assessment of impacts. Our understanding of Arctic marine ecosystems is especially deficient. With few exceptions we do not know even basic information such as the abundance and distribution of marine species. A large expansion of oil and gas activities is occurring in the U.S. portion of the Arctic Ocean. An investment in research to at least attain a basic understanding of Arctic ecosystems is necessary to inform the public and decision makers of the risks and trade-offs to developing this region.

The agency most qualified to perform research in these areas is the National Oceanic and Atmospheric Administration (NOAA). Scientists at NOAA discovered the embryotoxic effects of PAH and have done subsequent pioneering studies on the biochemical mechanisms responsible. Modest but sustained support for continuing these studies is almost certain to lead to practically useful insights regarding the ways that oil affects wildlife, and possibly humans as well. NOAA's Office of Response and Restoration has the most direct experience with using practical methods for mitigating oil spills when they occur, and hence is best equipped to evaluate technological improvements. NOAA is also well suited to conduct much of the research necessary to gain a better understanding of Arctic marine ecosystems.

RESPONSES OF JEFFREY SHORT TO QUESTIONS FROM SENATOR MURKOWSKI

Question 1. I agree with your testimony that there should be a plan that balances ecosystems with resource management. I also certainly agree with best available technology and continuing research on how to better prevent and mitigate risks for offshore development. My question is, since there is always room for improvement, does that mean that the science may never quite be good enough for some to accept offshore development?

Answer. Thank you, Senator Murkowski, for your support of balanced and comprehensive planning. Please do not hesitate to ask if there is anything I or my colleagues can do to further your efforts in that regard.

With regard to your specific question, while it may be true that some people are never satisfied with anything, the more relevant issue here is how much science is adequate. Just because scientific enquiry is boundless should not be used as an excuse to forego investment in enough science to achieve a basic understanding of ecosystem functioning. In my view, adequate science here means sufficient understanding of the ecosystem to conduct a quantitative risk assessment of impacts that may occur because of offshore development. Ability to couch impacts in terms of a known distribution of likely outcomes is key here, as distinct from unsupported opinions of agency staff, contractors and others, all having varying degrees of credentials, which has typically been the case to the present.

By definition, "risk" is uncertainty that is quantifiable. This implies that the most important sources of risk are known, as well as the uncertainties associated with each source. Applied to a risk assessment of ecosystem impacts from defined events such as an oil spill or well blowout, a quantitative assessment of ecosystem risks would require a basic understanding of how the ecosystem works. This means knowledge of the major ecosystem components (i.e. species) and their food web dependencies, including their seasonal variability. Once a basic food-web is constructed, comprising the dominant species, the energy flows connecting them and the natural variability of these species or functional equivalents, it is possible to run Monte Carlo simulations of effects from impact scenarios. These simulations allow estimation of the probability of specified responses, and hence a quantitative specification of risk.

Question 2. Your testimony indicates that 4 years after the Valdez spill, "monitoring was terminated." I want to give you a chance to clarify this; has there really been no monitoring of the coastal areas around the Valdez spill since 1993?

Answer. Thank you for the opportunity to clarify this statement. I was referring to the monitoring done by Shoreline Cleanup Assessment Teams (SCAT) to evaluate the persistence of oil remaining on beaches oiled by the 1989 *Exxon Valdez* oil spill. This monitoring was terminated after the summer of 1993, when it was determined that natural dispersion and degradation processes would remove any remaining oil. Subsequently, research that I led in 2001 demonstrated that the assumptions underlying this determination were substantially incorrect (see Short et al. 2004, 2006).

In particular, the 1993 decision assumed that (1) observation and persistence of oil on the surface of beaches was closely correlated with the location of oil beneath the surface (2) that the subsurface oil was located in the upper intertidal; (3) that clay-oil flocculation processes, recently discovered to be an apparently effective natural dispersion process (Bragg and Yang 1993) would rapidly disperse remaining subsurface oil, and (4) microbial degradation would effectively degrade any remaining oil within beaches. All four of these assumptions turned out to be incorrect. Subsequent studies carried out after 2000 showed that the location of visually-evident surface oil and obscured subsurface oil were poorly correlated, so that monitoring oil persistence at locations where surface oil was present (and where most monitoring effort was directed) gave little information on the persistence of subsurface oil. Surface oil was located mainly in the upper intertidal, whereas subsurface oil was concentrated near the mid-tide level on beaches. These two factors led to mis-

allocations of monitoring effort for subsurface oil from 1990 to 1993, so that efforts were put toward the wrong beaches and the wrong places on beaches.

The unanticipated persistence of oil in some locations shows that natural dispersion processes including clay-oil flocculation and microbial degradation were less effective than expected. Indeed, in some places the composition of the oil remaining today is similar to that of oil present near the end of 1989 (Short et al. 2007a). The reasons for this persistence are currently under investigation.

The surprising persistence of oil on beaches of Prince William Sound following the *Exxon Valdez* oil spill serves as an excellent example of my primary point: that management decisions regarding the environmental impacts of oil are far too often based on unwarranted assumptions that usually go unchallenged. Tragic though it was, the *Exxon Valdez* oil spill provided a rare opportunity to evaluate some of these assumptions, because the remote setting was conducive to evaluating impacts with scant interference from other sources of pollution, and because the settlement funds provided a relatively ample source of funding for the scientific studies. These studies led to realization that oil was not only much more persistent than expected, it was also much more toxic to fish embryos (Carls et al. 1999, Heintz et al. 1999), and the toxic components were not those thought to be primarily responsible for toxicity prior to 1989 (Incardona et al. 2004). These discoveries clearly indicate that much more needs to be learned about how oil affects marine ecosystems to support sound management decisions, and the agency best positioned to investigate these issues is the National Oceanic and Atmospheric Administration.

Question 3. Are you or your organization familiar with the population of sperm whales in the Gulf of Mexico?

Answer. Oceana is not familiar with the population of sperm whales in the Gulf of Mexico.

a. Has the population increased or decreased as the Gulf continues to be developed?

Answer. Oceana is not familiar with the status of the sperm whale population in the Gulf of Mexico.

b. Would you agree that we continue to learn new information about marine mammals through monitoring programs associated directly with, and dependent upon, deepwater oil and natural gas programs?

Answer. The collection of new information about marine life in general helps us better understand how marine ecosystems are structured and function. We should, however, strive to understand ecosystems before industrial activities proceed in order to better assess the risk of activities to the health of the ecosystem and provide critical baseline information. Monitoring that is conducted during operations can then be compared to baseline conditions to help determine if impacts have occurred. Such monitoring should be independently verified.

c. Is there any conclusive or empirical evidence that these marine mammals have been harmed by seismic activity in the Gulf of Mexico?

Answer. I am not familiar with research that has been done on the impacts of seismic activity in the Gulf of Mexico, but it is my understanding that MMS did commission a study that showed some effects of seismic on sperm whales. Without adequate baseline information, it is extremely difficult to demonstrate harm to a population of marine mammals. Furthermore, marine mammals can be especially difficult to study. If there is a lack of sufficient science to determine effects, that is not necessarily an indicator of a lack of effects.

Question 4. Concentrated oil spills always have some environmental impact—that's why we agree that oil and gas should always be produced as safely as possible, under stringent conditions. However, according to a report issued in 2003 by the National Academy of Sciences (Oil in the Sea III), extraction activities release far less oil each year than consumption activities, which in turn release far less than natural seepages. In fact, the NAS report found that extraction activities—which your organization so closely tracks—accounts for just 1 percent of the oil entering North American waters each year. Taking this a step further, multiple peerreviewed studies [see http://www.ia.ucsb.edu/pa/display.aspx?pkey=412] have found that the offshore production of oil could actually help reduce the amount that naturally seeps from the ocean floor.

a. Although accidental spills or blowouts involve a much more concentrated release of oil than natural seeps, much of your testimony discusses toxicity of oil in the sea and the idea that its continued buildup and dispersal may have toxic or poisoning effects. Is this risk any less for a constant seepage of oil from

the seabed than from the 1 percent of the ocean's oil from production related releases?

Answer. Thank you for the opportunity to elaborate on this issue. Comparing the total amount of oil released by seeps and development is diverting Congress and the public from the real issue here. The fact that natural seeps release oil into the environment has little bearing on the risks posed by catastrophic spills and blowouts, or even on chronic, intermittent releases of oil related to development activities.

Natural seeps provide a reliable source of reduced carbon for microbial communities that detoxify the oil by assimilating and decomposing the toxic components. More complex and mobile organisms are able to avoid areas impacted by the toxic components of oil seeps, thus avoiding the toxic effects of oil. Many sessile organisms have adapted over long time periods to such seeps, which is not possible in an accidental spill. Furthermore, pollution from oil seeps is largely unavoidable. In contrast, pollution from oil spills, blowouts and even urban runoff are more variable in both time and space, and hence enter environments where populations of microbes capable of decomposing the toxic components of oil are low, more complex organisms are not habituated to inputs.

b. Have you ever considered that oil production could actually have a positive environmental impact, insofar that it could be reducing the rate of natural seepages?

Answer. I am not aware of any scientific data supporting this contention. In my studies of natural oil seeps in Alaska (Short et al. 2007b), my petroleum geologist colleagues have remarked that while oil seeps reliably indicate the regional presence of oil, they are typically poor indicators of specific, economically attractive deposits because the seepage usually means that most of the oil associated with the deposit from which it arises has already seeped away. To the extent that this is true, tapping unconnected oil deposits nearby would have little or no effect on oil seepage rates.

c. Would policies not be more efficient in terms of reducing oil in the sea to focus on reducing the amount of oil that is spilled during consumption activities, rather than narrowly focusing on a part of the process that is believed to account for nearly 30 times less spillage each year? In other words, should more taxpayer dollars be directed towards dealing with production or consumption spills?

Answer. Careful assessment of the impacts of oil released into the environment from consumption activities deserves far more scientific scrutiny than has so far been devoted to it. At present, too little is known about these impacts to provide a reasonably sound basis for resolving this question.

Question 5. Your testimony states "When we make the effort to look closely. . .fundamental surprises typically come to light. These discoveries overturn predictions of impacts often stated with unfounded confidence beforehand that in retrospect turnout to have been based on little more than conjecture." Does this principle ever apply to predictions of both environmental organizations as well as offshore drilling proponents in terms of what an impact might or might not turn out to be?

Answer. Again, thank you for the opportunity to clarify this important point. I want to be clear that my answer is emphatically in the affirmative. If, on the basis of rigorously conducted science, a practice or activity can be shown to have negligible or otherwise environmentally acceptable impacts, then we should not waste time or resources to oppose them, and I am personally committed to this principle.

For example, in 2001 I participated in a study of toxic hydrocarbons in the discharge from the ballast water treatment facility at the Alyeska marine oil terminal into Port Valdez, Alaska (Salazar et al. 2002). Our study clearly showed that the most contaminated site located just above the discharge diffuser was cleaner than the supposedly clean, un-impacted reference site in similar studies of the Sullom Voe marine oil terminal in the United Kingdom. I was subsequently quite vocal in my defense of the outstanding job done by Alyeska to treat their discharges, and our study effectively laid to rest concerns regarding suspected effects of these discharges on the biological resources of Port Valdez. So as a matter of principle as well as practice, I strongly believe that when industry can be clearly shown to be doing an environmentally responsible job, they deserve the support and applause of the environmental community.

Question 6. Presume a major increase in efficiencies, biofuels, electric cars, and other efforts to reduce American consumption of oil, but that millions of barrels a day will still be consumed for many decades to come. What is Oceana's position on

where, specifically, such oil should come from, and if there is no such position, why not?

Answer. Careful review of America's oil production and consumption figures show that a major national initiative to reduce dependence on oil could eliminate our dependence on foreign oil, especially oil from countries other than Canada and Mexico, our closest trading partners. Based on data for 2008 from the Energy Information Agency, the United States consumed 19.5 million barrels per day (MBD), of which 11.1 MBD was imported (EIA 2009). Of this, 9.0 MBD was used for gasoline for transportation, 4.6 MBD for diesel fuel and home heating oil (not including jet fuel), and 1.9 MBD for liquid petroleum gas. Reducing our consumption through conservation, alternative energy sources and increased efficiencies of these three components of consumption by 72%, an achievable goal, would eliminate our need for imported oil entirely. Assuming the 2.5 MBD we import from Canada remains a reliable additional source reduces our conservation requirement to 55% and our imports from Mexico reduce it even further.[1]

Such a conservation program would have multiple benefits for the United States. It would dramatically reduce our balance of payments, increase our latitude in foreign policy with respect to countries from whom we import oil and who are less friendly toward the United States than are Canada and Mexico, dramatically lower our emissions of carbon dioxide thus helping to mitigate global warming, and substantially lower the cost of all petroleum products that are still used, thus enhancing the efficiency of our economy. For as is well known the price of petroleum is very sensitive to supply, and were the United States to effectively increase supply by ~10 MBD through conservation, increased energy efficiency and alternative energy, the price of petroleum would plummet.

Question 7. Since Oceana's inception, can you illustrate any success stories in terms of influencing policy and regulation that has resulted in meaningfully safer offshore oil and gas development?

Answer. In the nearly ten years of Oceana's existence, decisions about offshore oil and gas activities have focused on opening new areas to leasing and increasing seismic and other activities. Those decisions have been made without a comparable increase in available science or clean-up technology.

RESPONSES OF WALTER CRUICKSHANK TO QUESTIONS FROM SENATOR BINGAMAN

Question 1. Offshore oil and gas production involves not only production wells, but also considerable infrastructure to support those wells, to bring the product onshore, and to process or transport the product once it is onshore. This includes onshore refineries, pipelines and tanks required to receive, process, store and distribute oil and gas from offshore fields. Please describe MMS' authority and responsibility regarding permitting, oversight, and spill response for the offshore and onshore infrastructure necessary to support offshore oil and gas production. Include in your response a discussion of the extent to which MMS' analysis of offshore activity under the National Environmental Policy Act (NEPA) includes impacts caused by this infrastructure.

Answer. MMS has no authority under OCSLA or any other law to regulate OCS-related activities in State waters and onshore. While MMS's permitting authority ends at the Federal/State boundary, impacts of any new OCS-related infrastructure in State waters and onshore which will be installed in order to serve the OCS production activities are considered indirect impacts and must be analyzed in MMS's NEPA documents. At the lease sale stage, NEPA documents analyze programmatically the impacts of coastal infrastructure including existing oil refineries and pipelines, and this analysis typically extends to the first onshore processing point. While the States, Army Corps of Engineers, Federal Energy Regulatory Commission and/or Department of Transportation have permitting authority for OCS-related activities in State waters and onshore, the MMS prepares NEPA documents to address the general impacts from hypothetical new OCS-related facilities that could extend into State water or onshore areas. Actual permitting for construction or expansion of any OCS-related coastal facility, such as a pipeline or gas processing plant, would not be within MMS purview. Detailed impact analyses and any mitigation requirements for OCS-related infrastructure in State waters and onshore fall under the purview of permitting agencies such as those listed above.

The MMS's responsibilities under the Oil Pollution Act of 1990 (OPA 90) include spill prevention, review, and approval of oil-spill response plans (OSRP); inspection

[1] Note that these scenarios assume no reductions in jet fuel consumption through conservation or increased energy efficiency.

of oil-spill containment and cleanup equipment; and ensuring oil-spill financial responsibility for all offshore facilities seaward of the coast line.

Question 2. Please describe your understanding of the authority and responsibility of other government entities or agencies, including federal, state, or local authorities, regarding the permitting, oversight or spill response for this infrastructure both offshore and onshore. Also describe any ways in which MMS coordinates with any of these entities in carrying out its responsibilities.

Answer. The OCSLA directs the Secretary to conserve the Nation's natural resources; develop natural gas and oil reserves in an orderly and timely manner; meet the energy needs of the country; protect the human, marine, and coastal environments; and receive a fair and equitable return on the resources of the OCS. The Department uses marine spatial planning (MSP) as a collaborative process of working with other Federal agencies, along with its diverse stakeholders, to meet its stewardship and ocean resource management responsibilities using an adaptive and ecosystem-based approach to management. To that end, MMS presently leads the development of a Web-based Multipurpose Marine Cadastre, in a partnership with NOAA. The Cadastre is intended to evolve toward meeting the needs of the entire U.S. ocean community for the purpose of planning ocean uses, avoiding conflicts, and determining the necessary participants for individual project assessments.

The following agencies are those with whom the MMS shares jurisdiction of the OCS and works collaboratively either as lead or in a participating capacity:

Coast Guard
- Maritime safety and security
- Cranes on mobile facilities
- Facilitate spill clean-up in Federal and state waters
- Aids to navigation, fairways and anchorage areas
- Offshore workplace health and safety
- Hazardous materials storage

Army Corps of Engineers
- Offshore structures locations
- Evaluates permit applications for essentially all construction activities that occur in the Nation's waters

Air Force and Navy
- Designated military warning and water test areas
- Decommissioning and site clearance

States
- Permitting and oversight of oil and gas operations in state waters
- Coastal Zone Management—Coastal area protection, preservation.

Environmental Protection Agency
- Water quality in state and federal waters,
- Air quality in all OCS areas except the Gulf of Mexico west of 87°30'W longitude[1]

National Oceanic and Atmospheric Administration
- Coastal Zone Management—Coastal area protection, preservation
- Marine sanctuaries
- Marine mammal protection
- Endangered species
- Essential fish habitat
- Commercial fisheries
- Consultation for Decommissioning
- Fishermen's Contingency Fund
- Provide oil spill response scientific support

Fish and Wildlife Service
- Marine mammal protection
- Endangered species

Department of Transportation
- Oversight of transportation pipelines offshore and onshore (Pipeline and Hazardous Materials Safety Administration (PHMSA))

[1] Under provisions of the Clean Air Act Amendments (CAAA) of 1990, the Environmental Protection Agency's (EPA) Administrator, in consultation with the Department of the Interior's Secretary and the U.S. Coast Guard's Commandant, established requirements to control air pollution in Outer Continental Shelf (OCS) areas of the Arctic, Atlantic, Pacific, and eastward of 87°30'W longitude in the Gulf of Mexico

Federal Aviation Administration
- Oceanic air traffic (helicopters), towers

Occupational Safety and Health Administration
- Safe and healthful working conditions

As described above, onshore regulation rests with the States, Army Corps of Engineers, Federal Energy Regulatory Commission and/or Department of Transportation

Question 3. The Committee heard testimony that existing research efforts related to the marine ecosystem and the impact of industrial activities in particular areas is inadequate. Specifically, concern was expressed about the lack of baseline data, an integrated ecosystem research plan, monitoring of vulnerable ecosystem components, and information on best available technology. What is MMS' view of the adequacy of its research capacity in this area? Are there other federal entities that currently complement MMS' research? What if any additional resources for research does MMS need to ensure that these issues are adequately addressed?

Answer. The MMS is committed to maintaining the capability to conduct the research needed to ensure safe and environmentally sound offshore energy development. The MMS does not operate research facilities and therefore seeks the most highly qualified scientists through a selective and competitive process to meet mission requirements.

This approach has been successfully followed since the 1970s when the OCS Environmental Studies Program (ESP) began. The ESP research strategy has evolved over the years. Initially the focus was on the development of statistically significant baseline information. Following recommendations from a National Academy of Sciences review, the program strategy evolved to gathering focused, scientific information that could inform management decisions, such as the development of protective measures and identifying vulnerable ecosystem components. This approach has served the program and the scientific community well. Over the decades, the offshore energy program created the stimulus for pioneering research that otherwise would not have occurred. This research has led to discovery of new habitats and new species, description and modeling of physical processes, and an improved body of scientific knowledge regarding the ecosystem components that could possibly be impacted by offshore energy development.

MMS has a strong record of gathering baseline data and monitoring information in areas that actively experience offshore energy development. Notably, our early studies of the Flower Gardens Banks (now part of the Flower Garden Banks National Marine Sanctuary) in the 1970's evolved to a continuous monitoring program that, decades later, attests to the successful management of, and coexistence of, oil and gas activities in proximity to one of the healthiest coral reefs in the world. Another example of MMS development of baseline data with subsequent long-term monitoring is the establishment of the Multi-agency Rocky Intertidal Network (MARINe) which started along the Pacific coast in the area of offshore oil development. That program has gathered several decades of observations and has grown over the years to include more than a dozen partners. Through the addition of numerous new partners, the MARINe program has expanded to include the entire west coast from Alaska to Mexico and is currently adding new sites on the east coast. The use of MARINe monitoring results and processes have been instrumental for a number of notable events including the M/V Cosco Bussan oil spill in San Francisco Bay in 2007 and the closure of the black abalone fishery in Southern California.

MMS has the responsibility for environmental assessment and environmental research to support offshore energy activities. To carry out these responsibilities, MMS works with other science agencies including the National Oceanic and Atmospheric Administration (NOAA), U.S. Fish and Wildlife Service, U.S. Geological Survey (USGS), Environmental Protection Agency, and many other agencies that have complementary interests. Frequently, MMS will use the research capabilities within another federal agency to meet mission requirements. For example, NOAA performs much of the marine mammal research in offshore Alaska to meet MMS scientific information needs. Similarly, the MMS utilizes the scientific capabilities of the USGS to carry out mission research in Louisiana and California. Our federal partners in turn utilize the body of scientific knowledge that includes MMS funded research to accomplish their mission. For example, much of the MMS marine mammal research will be used by MMS and the NOAA National Marine Fisheries Service for biological consultations under the Endangered Species Act. On several occasions, MMS-managed research has received awards for excellence in partnering from the National Oceanographic Partnership Program (NOPP) and the Department of the Interior.

RESPONSES OF WALTER CRUICKSHANK TO QUESTIONS FROM SENATOR MURKOWSKI

Question 1. Are you able to speak to Mr. Amos' account of the Eugene Island pipeline spill this past summer insofar as whether it resulted in any environmental degradation such as oiled birds or mammals or fisheries impacts? Did it reach shore?

Answer. The Eugene Island Pipeline oil spill, which occurred on July 25, 2009, was from a Shell pipeline that is regulated by the Department of Transportation (DOT). DOT is conducting the investigation of the incident. The Unified Command for the Eugene Island Pipeline oil spill announced that clean-up operations were completed on August 3, 2009.

The July 25, 2009 spill from the 20" Eugene Island Pipeline released approximately 1,500 barrels (63,000 gallons) of crude oil before it was secured on July 27, 2009. The actual break was approximately 33 miles offshore and 60 miles southwest of Houma, LA. There were no reports of contacts to mammals, birds, fish, other wildlife species, or coastal habitats. There were no reported contacts to shore. The Marine Spill Response Corporation (MSRC) responded to the spill by applying dispersants and skimming surface oil.

Question 2. Can you talk about the Rigs to Reef program and how it figures into the agency's environmental stewardship priorities? On this point, would you characterize your experience with the impact of oil rigs on fishing to be a positive or negative one?

Answer. MMS is proud of the Rigs to Reefs program and its place in our environmental stewardship priorities. Natural hard substrate is limited in the Gulf of Mexico OCS region. Oil and gas platforms contribute substantially to local and regional abundance of reef habitat and the abundance of reef associated fishes. In many areas, platforms also allow the development of numerous species of coral. All offshore platforms, including those in the Rigs to Reefs program, provide protected areas from trawling and associated impacts such as bycatch (living creatures captured unintentionally). Coastal states with approved, State specific, artificial reef plans can identify offshore areas and sites suitable for artificial reef developments. The total number of platforms that have been used in all states' Rigs to Reefs programs over its entire history is 323 as of 2009 (Alabama 4; Florida 3; Louisiana 215; Mississippi 8 and Texas 93). These substantial additional areas of hard bottom habitat result in an overall positive impact to the Gulf of Mexico. MMS works very closely with the states' artificial reef coordinators to ensure the program is run efficiently and provides a benefit to fishermen and the environment without unreasonable impediments to other users or to oil and gas infrastructure and future exploration and development.

Question 3. Can you describe the process at Interior for ranking the environmental sensitivity of coastal areas under the Outer Continental Shelf Lands Act? Do you have all the information you need to have completed this exercise in environmental stewardship? Can you provide a status update on this as relates to the 5-year plan.

Answer. It would be premature to describe the process for ranking the environmental sensitivity of coastal areas for the 5-year OCS program, as the Department has not yet finalized the analysis required by the D.C. Circuit in last year's Center for Biological Diversity case. As required by the Court, the Department's consideration goes beyond NOAA's Environmental Sensitivity Index (ESI) data to analyze the sensitivity of (shoreline) coastal habitats as well as the sensitivity of offshore (marine) resources.

Question 4. You mentioned your engagement with the President's Ocean Policy Task Force. To what extent has MMS ceded any of its authority over managing the OCS energy resources to this interagency commission? Do you think that energy priorities will be lower or higher upon completion of the recommendations?

Answer. The OCS Lands Act and the Energy Policy Act of 2005 vest the Department with authority and responsibility for mineral and energy development on the OCS, in conjunction with other relevant statutes such as the National Environmental Policy Act (NEPA), Marine Mammal Protection Act (MMPA), Coastal Zone Management Act (CZMA), etc. The Ocean Policy Task Force intends to provide policy guidance, encourage efficiencies among governmental entities, and provide a better framework for application of existing laws and agency authorities, but it does not supersede these laws and authorities.

Question 5. In soliciting comments for the Chukchi POE application from Shell, did any DOI office issue a direct or specific solicitation, apart from the Federal Register, to the North Slope Borough or any other specific entity?

Answer. The MMS Alaska OCS Region formally solicited comments on the Chukchi Exploration Plan (EP) from multiple stakeholders. The MMS made direct distribution of the EP to the North Slope Borough, Alaska Eskimo Whaling Commis-

sion, Alaska Beluga Whale Committee, Alaska Eskimo Walrus Commission, Ice Seal Commission, Nanuk Commission, Federally recognized tribes, local community leaders and Federal and State agencies. The MMS also posted the EP on the MMS Alaska OCS Region webpage and provided copies of the EP to local libraries in Anchorage and Fairbanks for direct access to the public. MMS also formally notified several environmental organizations that the EP was available for review. The MMS offered to conduct government-to-government consultations with Federally recognized tribes and to meet with any interested party. The Native Village of Point Hope, the North West Arctic Borough and the Village of Wainwright each requested a meeting, which MMS staff attended in person or by teleconference.

Question 6. Are you aware of any coordination between any DOI office and outside environmental organizations in the formulation of official comments or rulemakings?

Answer. MMS does collaborate with other federal, state, tribal and non-governmental organizations (e.g., environmental groups) on many topics, such as developing studies, soliciting input on environmental analyses during public comment periods, and formulating mitigation and monitoring measures. While we would review any input from various parties, we independently develop and transmit official MMS comments for various governmental actions and do not assist outside environmental organizations in the formulation of their official comments. For an action where MMS is the main Federal agency, we review any comments from environmental organizations received during the public comment process and consider them during the rulemaking process, as we do with any other entity.

Question 7. What is the average length of time, from application receipt to approval, for MMS to issue an air permit for the Western and Central Gulf of Mexico?

Answer. MMS does not "issue a permit," but does require operations to limit air pollutant emissions. Air emissions are evaluated and approved as part of an Exploration Plan (EP) or Development Operations Coordination Document (DOCD) submitted to MMS by an offshore operator.

The legal foundation for the air reporting required in EPs and DOCDs is set forth in the Outer Continental Shelf Lands Act (43 U.S.C. 1334(a)(8)).[2] "The regulations prescribed by the Secretary under this subsection shall include, but not be limited to, provisions—for compliance with the national ambient air quality standards pursuant to the Clean Air Act (42 U.S.C. 7401 et seq.) to the extent that activities authorized under this subchapter significantly affect the air quality of any State."

The Clean Air Act Amendments of 1990 provide that the Secretary of the Interior will work with the U.S. Environmental Protection Agency's (USEPA) Administrator to establish requirements to control air pollution in OCS areas of the Gulf of Mexico westward of 87o30' longitude. For sources located in areas under MMS jurisdiction, regulations are promulgated by 30 CFR 250 Subpart C.

The purpose of the EP and DOCD is to determine if proposed activities will comply with applicable United States federal laws and regulations including the Clean Air Act; unreasonably interfere with other uses of the area; interfere with or endanger operations on other leases; result in pollution; create hazardous or unsafe conditions; and to determine if proposed activities will cause serious or undue harm or damage to life, property, any other mineral deposits (in leased or unleased areas), the national security or defense, the marine, coastal, or human environment.

The contents of an EP and DOCD include, but are not limited to, a description of the proposed activities; a description of the drilling unit, if applicable, with brief discussion of safety and pollution prevention features; and, for DOCDs, proposed or existing structure locations and a description of each proposed piece of infrastructure (including any production equipment to be installed), and a brief discussion of safety and pollution prevention features of each item.

EP and DOCD reporting requirements are promulgated at 30 CFR 250 Subpart B and further clarified in *Minerals Management Service Notice to Lessees No. 2008-G04, Information Requirements for Exploration Plans and Development Operations Coordination Documents.*

If an EP or DOCD is accurate and complete when submitted, including air emissions information, the document must be approved or conditionally approved (approved with modifications) within 30 days for an EP (30CFR 250.233) or within 120 days for a DOCD (30CFR 250.270). The clock does not start until the plan is deemed complete by MMS. EPs or DOCDs that are deemed incomplete are sent back for corrections, which usually take 2 to 4 additional weeks. Submission of inadequate or inaccurate information in any of the multiple plan reviews within the EP or DOCD

[2] Air emissions information requirements for EPs and DOCDs are specified at 30 CFR 250.218 and 250.249.

can require modification of a plan, which slows down the review and approval process.

For the period 1991 through 2009, the average time from application receipt to approval (including the time to deem plans complete) was 43 days for an EP and 60 days for a DOCD. The DOCD typically has more information submitted related to oil and gas production and transportation facilities and equipment.

Question 8. Are shorter lease terms, such as the proposed reduction from 10-to-7 years and 8-to-5 years, projected to confer any benefit in terms of environmental stewardship?

Answer. The policy proposal for Lease Sale 213 is to shorten primary lease terms from 10 to 7 years in 800-1600 meters of water depth in the Gulf of Mexico, with extension from 7 to 10 years in the primary term granted in return for commencing an exploration well within the new initial 7-year primary term. A similar policy is being proposed for leases in 400-800 meters, where 8-year term leases will be shortened to 5 years with extension to 8 years for commencing an exploration well within the first 5 years of the lease. However, that second proposed policy change reflects a similar existing policy in which 8-year primary term leases are cancelled at the end of 5 years if an exploratory well is not commenced within the first 5 years of the lease.

MMS's internal analysis indicates that industry is already capable of operating on these timeframes (see response to next question). One effect of the proposal as it relates to 7-year term leases will be to accelerate drilling on some leases that would otherwise have been drilled closer to the end of the 10-year primary term. Another effect will be to speed up the relinquishment and reoffering of leases that otherwise would be held to the end of the 10-year primary term. Because this would only affect a narrow band of leases, a reduction or increase of overall production is not anticipated. Therefore, MMS does not anticipate negative or positive environmental impacts from this policy proposal.

Question 9. What evidence is there to prove or strongly indicate that the length of existing lease terms is resulting in the U.S. taxpayer failing to derive the maximum benefit from OCS oil and gas development?

Answer. As proposed in the Proposed Notice of Sale for Central Gulf of Mexico OCS Sale 213, the existing lease term of 10 years would be shortened to 7 years for leases in water depths from 800 to 1600 meters deep in the Gulf of Mexico, but they would receive an automatic 3-year extension provided drilling has started by the end of the seventh year after lease issuance. Evidence derived from detailed data MMS routinely collects on OCS activity strongly indicates that the evolution of capabilities in these water depths have decreased time necessary for exploration. In contrast to earlier periods, deepwater leases that have completed their primary term in the last 5 years show that nearly all producing leases in 800 to 1600 meters of water commenced drilling by year 7. In 800 to 1200 meters of water, 92% of leases issued from 1995 to 1999 that have achieved production were found to have started drilling by the 7th year of their lease term, up from 33% of those issued from 1985 to 1989. The data are similar in 1200 to 1600 meters, where 85% of producing leases issued from 1995 to 1999 were drilled by year 7, up from 25% for those issued from 1985 to 1989. Almost all prospective leases that were not drilled by year 7 either were extended through unitization or encountered unusual circumstances that led to authorized extensions beyond the 10-year primary term through suspensions. Because the unitization and suspension programs handle such unusual cases, the primary term does not need to be set to accommodate the exceptional cases.

The shortened drilling periods will improve taxpayer benefit largely by expediting re-leasing and exploration on non-producing leases. In some cases lessees that otherwise would have postponed drilling until near year 10 will find ways to drill earlier. Those who do not accelerate drilling will relinquish their blocks sooner so those tracts can be reoffered to others who may have different ideas about their oil and gas potential. Earlier reoffering will accelerate the receipt of new bids for the relinquished acreage and its evaluation by new lessees.

Question 10. How are competing uses in the offshore areas dealt with currently under existing laws and regulations—does this work and are changes needed?

Answer. Under existing laws and regulations, MMS is the lead for all energy and mineral resources activities on the OCS. Several other federal agencies also have jurisdiction over certain aspects of OCS activities. At the lease sale stage, MMS coordinates with those federal agencies along with a number of affected State agencies. This coordination includes, but is not limited to, consultations required under the Endangered Species Act with the National Marine Fisheries Service and Fish and Wildlife Service; Essential Fish Habitat consultation with the National Marine Fisheries Service; and Coastal Zone Management Act consistency determination

with affected States. In addition, MMS and the United States Coast Guard have several Memoranda of Understanding and Memoranda of Agreement regarding our respective responsibilities in such areas as oil discharge planning, preparedness, and response; incident investigations, floating offshore facilities, civil penalties and general jurisdictional concerns.

For post-lease activity, the number of federal agencies an oil and gas company must deal with directly depends on the lease location and type of activity proposed. A list of those pertinent federal agencies was previously provided above in reply to Chairman Bingaman's second question. Not every federal agency listed above is involved in the review and approval of every OCS oil and gas proposal, but every proposal does involve consultations with at least a few of these agencies. The MMS strives to ensure that its NEPA and other analyses contain all the information needed for decision-making, including information related to compliance with laws and regulations outside MMS' direct purview. Our collaborative processes continue to work successfully as they are currently structured under existing laws and regulations.

RESPONSES OF WALTER CRUICKSHANK TO QUESTIONS FROM SENATOR DORGAN

Question 1. Earlier this year in this committee, I proposed an amendment which is one of the primary reasons for the oversight hearing. Through my approach, the MMS would be authorized to go through a rulemaking process to issue regulations and would consider a range of local and other conditions during that process. In federal waters, the Secretary would establish zones which would determine what kind of restrictions would be placed on surface activities. The onus is then placed on individual companies to develop innovative technology solutions in those zones. Renewable projects (i.e. wind turbines offshore) and previously existing oil and gas projects would be exempt. I believe that if we could pursue this approach, it is possible to deploy innovative technology applications to limit the environmental footprint and significantly reduce the visual impact while increasing access to resources.

Is this the type of approach that could have environmental merits and also allow for increased access to hydrocarbon resources near shore in the federal waters?

Answer. A similar approach is already in use off of Baldwin County, Alabama to limit visual impacts per the State's request. Since 1999, MMS has adopted in each annual Central Gulf of Mexico lease sale a lease stipulation that requires consultation when developing plans for fixed structures within 15 miles of the coast of Baldwin County. MMS's NEPA documents also analyze deferring this area, but have found that the stipulation adequately addresses adverse visual impacts.

The stipulation states that in order to minimize visual impacts from development operations on this area, lessees must contact other lessees and operators of leases in the vicinity to determine if existing or planned surface production structures can be shared. If the lessee cannot formulate a feasible development scenario that does not call for new surface structure(s), the operator should ensure that new structures are the minimum necessary for the proper development of the block and that they will be constructed and placed, using orientation, camouflage, or other design measures in such a manner as to limit their visibility from shore.

Likewise, the use of newer technological innovations in the Gulf of Mexico now allows the use of subsea development projects to 'tie-back' to existing structures. It is possible to forego surface structures in near-shore environments by connecting subsea production to structures as far away as 45 miles away for oil and 77 miles away for natural gas. The use of this technology also allows for the minimization of the number of offshore facilities, reducing multiple use conflicts, and aesthetics. This technique also provides policymakers with an option to allow coastal buffer zones with no permanent surface structures without putting the oil and gas resources out of reach.

In the Pacific Region, some leases, particularly those close to shore, contain a stipulation "all platforms will be an acceptable design, properly camouflaged and subject to other conditions to protect aesthetic values." In other cases, mitigation attached to the development plan and environmental documents addressed aesthetic concerns. In both cases, these measures result in the use of a paint color anticipated to reduce visual impacts. In the latter case, these mitigation measures were coordinated with the U.S. Coast Guard, State of California Coastal Commission, California State Lands Commission, adjacent counties, industry and MMS.

Question 2. If buffer zones on structures within certain distances from shore are implemented, do you have a view on the environmental issues intended to be addressed, and what are the appropriate distances to be identified for such limitations? How would the MMS take this into consideration?

Answer. Alternatives, including buffer zones, are identified during the public scoping process for the 5-Year Program and individual lease sales. All reasonable alternatives would then be analyzed in MMS's NEPA documents. Buffer zones are usually proposed with the intention of limiting visual impacts or risk of an oil spill contacting shore. In addition, buffer zones are used to protect sensitive areas such as critical habitat for endangered and threatened species. The appropriate buffer distance to address visual impacts would depend on such things as the type of structures, coastal elevation, and presence of historic properties, while risk of oil spill contact with sensitive archaeological and biological resources would depend on prevailing winds and currents, and the presence of any such resources.

Question 3. Another witness, Dr. Jeffrey Short, Pacific Science Director of Oceana, made strong assertions that much more needed to be done in terms of better understanding of the marine ecosystem in order to protect it from serious environmental damage. He stated that the U.S. does not have a good baseline record of the original state of the environment in the Gulf of Mexico before we started oil and gas operations, so we cannot assess the impact of these activities on the environment in the Gulf of Mexico. He indicated that we need to study and monitor ecosystems and technologies before projects were able to proceed and that funding needed to be provided for that.

Answer. The MMS places a high priority on conducting an integrated scientific program that develops information on living marine resources and their interaction with, and influence by physical and other environmental processes. MMS's environmental research strategy is developed around an understanding of the energy technologies and the potential nature of impacts they might produce. This focus provides the greatest opportunity to successfully develop the scientific information needed to mitigate environmental impacts. It is true that many areas of the marine environment have been exposed to impacts from fishing, shipping, naval operations, and in some cases, offshore oil and gas development. Baseline environmental conditions are constantly changing, but that does not preclude the conduct of scientifically valid studies to assess impacts. In the Gulf of Mexico, highly regarded studies published in peer-reviewed scientific journals describe the localized impacts that can be measured around drill sites and/or production platforms. MMS sponsored pioneering research of biologic communities on the continental slope in the 1980's, long before the oil industry had moved into these water depths. MMS research led to important discoveries of chemosynthetic communities of biological organisms that were subsequently protected through operational regulations. MMS environmental research moved into still deeper Gulf of Mexico waters, and many of these studies, in collaboration with federal partners in NOAA and USGS, identified new chemosynthetic and deepwater coral communities. This research has informed resource managers and has led to additional protections for these deepwater biological communities.

Follow-on research and monitoring then assesses the effectiveness of the mitigation. As a research strategy, MMS will continue to conduct studies of marine ecosystems in areas that are being considered for development, and it will continue to conduct studies throughout the life of the offshore energy development activity.

Question 4. Is this the type of work that the MMS has authority to do? If so, what kinds of research and analysis are underway at the MMS that would respond to the concerns of Dr. Short? Do you know of any areas in the world where we do have adequate baseline data and where we have been able to measure the impact of oil and gas activities? What do these studies show as the impact of oil and gas activities and how concerned should we be about their environmental impact when compared to other activities in the marine environment in other regions of the world?

Answer. The OCS Lands Act provides MMS with the authority to conduct the research needed to manage offshore energy development in a safe and environmentally sound manner. MMS conducts a broad array of environmental research designed to meet the needs in a particular OCS area. While a general research strategy can be described, the scientific knowledge base and state of OCS activity varies from the Gulf of Mexico to the Pacific and from the Atlantic to offshore Alaska. The research programs in each of these areas will vary depending on these and other factors. The MMS conducts public workshops to give the scientific community and stakeholders the opportunity to work with MMS scientists as we develop our research plans. In addition, the MMS has established an independent Scientific Advisory Committee (chartered under the Federal Advisory Committee Act) that provides advice on the Environmental Studies Program research direction and focus. This input, numerous reviews by the National Academy of Sciences over the years, and publication of scientific findings in peer-reviewed scientific journals, all combine to validate the kinds of research and analyses that are undertaken.

Considerable resources have been allocated towards gathering baseline data in each of the OCS areas over the decades. However, MMS data gathering does not

continue when the prospect of offshore energy development no longer exists. The Gulf of Mexico is probably the most studied and well described area in the world. In the 1970's, baseline studies evolved into focused ecosystem studies and monitoring studies. These studies provide a solid basis for the management of potential impacts from offshore oil and gas activities. Notably, our early studies of the Flower Gardens Banks (now part of the Flower Gardens National Marine Sanctuary) in the 1970's evolved to a continuous monitoring program that, decades later, attests to the successful management of, and coexistence of, oil and gas activities in proximity to one of the healthiest coral reefs in the world.

While other regions around the world undergo oil and gas development, few have been developed under the broad safety and environmental safeguards afforded through U.S. regulations. MMS has invested more than $800 million in environmental research since the beginning of the program studying marine life and ecosystem processes. No other program in the world can match the investment and regulatory protections of the United States. Notwithstanding that fact, we do engage with colleagues from around the world to learn from their experiences and to share our knowledge. For example, we have collaborated on many scientific projects related to offshore oil and gas activities offshore Canada, Norway, Mexico, and Australia.

RESPONSES OF WALTER CRUICKSHANK TO QUESTIONS FROM SENATOR MENENDEZ

Question 1. Dr. Cruickshank, I am concerned about the offshore activities of Seadrill—the operator of the failed rig in the Australia disaster. They operate here in the United States and have at least one rig in the Gulf of Mexico. In a recent letter to Secretary Salazar, I requested that the Department of the Interior conduct a full investigation of Seadrill and its activities in American waters to ensure that a similar accident is not repeated here at home. Has MMS independently done anything to examine Seadrill, its activities in US waters or its compliance with US law? How is Seadrill's safety record, and what exactly about the Australian spill makes you convinced it couldn't happen here?

Answer. The MMS is conducting the requested analysis of Seadrill's compliance and safety record. As mentioned in a response to your letter, we anticipate completing this analysis by the end of February 2010.

Regulations governing U.S. OCS drilling operations provide that on the U.S OCS—

- The drilling program would have to be submitted to MMS as required in the regulations. The program would have to satisfy MMS engineers before it was approved by the MMS District Supervisor.
- The casing would have to be cemented in accordance with the requirements in the drilling regulations.
- The casing would have to be pressure tested to 70% of the minimum internal yield for 30 minutes with less than a 10% pressure drop. This test would have likely identified the problem with the primary cement job on the Timor Sea well.
- For suspended wells, the operator would have to set a secondary plug in the casing as described in the decommissioning regulations .
- The operation would be inspected by MMS personnel at least once during the course of the drilling operations, and all casing, cementing, and testing information would be closely reviewed.

Each of these requirements separately, and certainly all of them together, should have prevented the drilling operations that occurred in the West Timor Sea, as we understand them. The Australian Government's final review of the causes of the West Timor spill, however, has yet to be completed.

Question 2. Dr. Cruickshank, according to statistics compiled by the MMS, there have been over 40 spills greater than 42,000 gallons (1,000 barrels) since 1964. During Hurricanes Katrina and Rita alone, some 9 million gallons of oil were spilled from offshore and onshore operations.5 Oil is extremely toxic to a wide variety of marine species, and as noted by a recent National Academy of Sciences study, current cleanup methods are, "incapable of removing more than a small fraction of the oil spilled in marine waters." Why is it so difficult to clean up oil once it is spilled into coastal ecosystems?

Answer. A primary focus of the MMS regulatory program is spill prevention. MMS is also a leader in spill preparedness, response research, and studies to address the potential effects of spills on marine and coastal resources. The ability to clean up oil varies with each circumstance depending on the product released, location, weather conditions and more. MMS requires offshore operators to have the nec-

essary equipment on standby, usually through contracts with oil spill response companies, to respond to a worst case scenario spill. Booms, skimmers, and other response equipment frequently recover substantial volumes of oil given the right circumstances. In the open ocean, any remaining oil will weather and become entrained in the water column and will be diluted by the far greater volume of ocean water so as not to raise the oil concentration above natural conditions.

An oil spill that comes in contact with shore can become entrained in sensitive habitats where attempts to remove the oil may cause more damage than the oil. Since 1964, only 10 OCS spills have contacted shore; all originated 19 miles or less from shore, and only one caused substantial harm to wildlife and habitats (1969). Deepwater tracts generate much of the current offshore oil production and are expected to generate more each year. Deepwater tracts are generally 50 or more miles offshore, from where it is highly unlikely a spill would contact shore.

There have been 36 petroleum spills of 42,000 gallons (1,000 barrels) or greater from Federal OCS oil and gas activities since 1964. Most of these spills had no recorded contacts to marine species or coastal habitats. Only six of these spills contacted shore, the last of which was in 1998. Most of the contacts were minor, with no wildlife contacts recorded and minimal beach cleanup required. The exception was the 80,000 barrel Santa Barbara spill in 1969, which had substantial contacts to birds and to coastal habitats. Current OCS regulations have far more stringent requirements for well casing, which would have prevented the Santa Barbara well failure.

The OCS petroleum spill record has improved greatly over time from the first 15-year record of approximately 10,300 barrels produced per barrel spilled (1964-1978), to more than 88,400 barrels produced per barrel spilled (1979-1993), to more than 140,000 barrels produced per barrel spilled (1994-2008)

The article referenced in the question supporting the Hurricane Katrina and Rita spill statistics was published by the Houston Chronicle in November 2005 and was written prior to any comprehensive spill statistics being available for Hurricanes Katrina and Rita and should be considered preliminary.

Over 250,000 barrels of oil spilled onshore and in Louisiana State waters during Hurricane Katrina. This included nine crude oil spills of 1,000 barrels and greater from onshore oil refinery tank farms totaling more than 193,000 barrels. Most of the remaining spillage was reported as dispersed during Hurricane Katrina. Over 22,000 barrels of oil spilled onshore and in Louisiana State waters during Hurricane Rita. This included three crude oil spills of 1,000 barrels and greater totaling 10,783 barrels of which 7,500 barrels were reported recovered. Most of the remaining spillage was reported as dispersed during Hurricane Rita. (Source: Louisiana Department of Environmental Quality, December 2007).

By far the greatest amount of oil spilled as a result of the hurricanes came from facilities not regulated by MMS. An estimated 8 million gallons of oil were spilled from coastal oil storage facilities and approximately 50 percent of this was recovered. An additional 1.46 million gallons were spilled onshore or in State waters as a result of Hurricane Katrina and none of the oil was recovered. An estimated 0.49 million gallons of crude oil from eleven onshore or coastal facilities in State waters released during Hurricane Rita and approximately 70 percent of this was recovered. An additional 45 spills resulting in 0.43 million gallons occurred onshore or in coastal waters as a result of Hurricane Katrina with none of the oil recovered. Finally, approximately 3.3 million gallons were spilled from a tank barge, when it struck a submerged oil platform that had been damaged during the storms and only 4.8 percent was recovered.

MMS reported the following petroleum losses from offshore structures during: Hurricane Ivan, 4,645 barrels; Hurricane Katrina, 4,729 barrels; Hurricane Rita, 8,734 barrels; and Hurricanes Gustav/Ike, 5,858 barrels for a total of 23,966 barrels (811,482 gallons). Over 1 million gallons were spilled from federal offshore oil platforms and associated pipelines during these storms. The loss of hydrocarbons from wells and pipelines was minimized by the successful operation of the safety valves that MMS requires to be installed. All OCS facilities in areas threatened by the storms' approach were shut in before the hurricanes so that oil losses were mostly limited to the oil stored on the damaged platforms and rigs or contained in damaged pipeline sections between the check valves. The hydrocarbons lost during the hurricanes were thoroughly dispersed offshore by the hostile sea conditions, which eliminated the potential for oiling the shores. However, some of the platforms and pipelines damaged during the 2004, 2005, and 2008 hurricane seasons continue to release small volumes of oil, some with short duration releases, and repairs have not been fully completed for all facilities and pipelines. These small volumes amounted to an additional 1,767 barrels (about 74,000 gallons) through the end of 2009.

There were no accounts of environmental consequences resulting from spills from OCS facilities that occurred during major hurricanes from 2002 through 2008:

- no spill contacts to the shoreline
- no oiling of marine mammals, birds, or other wildlife
- no large volumes of oil on the ocean surface to be collected or cleaned up
- no identified environmental impacts from any OCS spills from these hurricanes

RESPONSES OF WALTER CRUICKSHANK TO QUESTIONS FROM SENATOR SESSIONS

Question 1. Has the Minerals Management Service (MMS) taken a stance on revenue sharing?

Answer. The Administration has not taken a position on establishing additional revenue sharing programs.

Question 2. MMS announced yesterday that it disbursed $10.68 billion in Fiscal Year 2009 for mineral development (oil, gas and coal), but in FY 08 the Department of Interior's MMS distributed $23.4 billion. Could you please explain why there has been a significant decline?

Answer. In the last five years, the Department has disbursed an average of more than $13 billion annually. It is important to note that the FY 2008 disbursement of over $23 billion was an anomaly due in part to the high prices of oil and gas boosting royalties and causing record bonus bids for Outer Continental Shelf leases. In FY 2008, MMS disbursed approximately $23.4 billion in total revenues with $10.1 billion in bonus bids, $.3 billion in rents and $13 billion in royalties and other revenues. In FY 2009, MMS disbursed approximately $10.7 billion in total revenues with $1.3 billion in bonus bids, $.3 billion in rents, and $9.1 billion in royalties and other revenue.

Question 3. My state of Alabama received revenues through Fiscal Year 2009 in amount of $ 17.2 million, but I noticed that several onshore states specifically New Mexico received $388.5 million. In your opinion, wouldn't allowing revenue sharing and additional production off coastal states help with state budget issues?

Answer. The Gulf of Mexico Energy Security Act established a revenue sharing program with four Gulf of Mexico coastal producing states. The MMS allocates and distributes the funds annually, based on a formula established under the Act. Congress authorized the States' use of the funds for mitigation of damage to fish, wildlife, or natural resources; implementation of a federally-approved marine, coastal, or comprehensive conservation management plan; mitigation of the impact of OCS activities through the funding of onshore infrastructure projects; and the planning and administrative costs of such projects.

Question 4. How can MMS justify its recent announcement to shorten lease terms in deepwater Gulf of Mexico, when the Department of Interior Inspector General has testified that this could be counterproductive by reducing interest in leases? Was there any analysis completed beforehand by MMS to study the impacts this decision could have?

Answer. As set forth in the Proposed Notice of Sale for Central Gulf of Mexico OCS Sale 213, the existing lease term of 10 years would be shortened to 7 years for leases in water depths from 800 to 1600 meters deep in the Gulf of Mexico, but those leases would receive an automatic 3-year extension provided drilling has started by the end of the seventh year after lease issuance. The shortened period to start drilling recognizes the evolution of capabilities in the deeper water depths and the decreased time necessary for exploration and infrastructure development. Over the last 25 years, industry has become more experienced with deepwater drilling, offshore development technology has improved and infrastructure has spread into the deeper waters of the Gulf of Mexico. The number of possible host facilities emerging from existing prospects has increased, so more fields will likely be produced by less costly tie-back arrangements. Consequently, parts of the deepwater Gulf basin can reasonably be explored and developed in less than a decade.

Analysis of data accumulated by MMS as part of its duties to manage the OCS confirm that industry has become able to identify and drill the prospective leases in up to 1600 meters of water depth in the Gulf in less than 10 years. In contrast to earlier periods, deepwater leases that have completed their primary term in the last 5 years show that nearly all producing leases in 800 to 1600 meters of water commenced drilling by year 7. In 800 to 1200 meters of water, 92% of leases issued from 1995 to 1999 that have achieved production were found to have started drilling by the 7th year of their lease term, up from 33% of those issued from 1985 to 1989. The data are similar in 1200 to 1600 meters, where 85% of producing leases issued from 1995 to 1999 were drilled by year 7, up from 25% for those issued from 1985 to 1989.

These data show that most leases not drilled by year 7 were eventually relinquished undrilled, while the relatively few leases drilled after the 7th year were almost invariably relinquished, presumably because those wells did not result in the discovery resources worth developing. Almost all prospective leases that were not drilled by year 7 either were extended through unitization or confronted unusual circumstances that led to authorized extensions beyond the 10-year primary term suspensions. Because the unitization and suspension programs handle such unusual cases, the primary term need not deal with those kinds of productive leases.

Question 5. Secretary Salazar has made several decisions that has made it increasingly difficult for producers to supply domestic oil and natural gas and increase energy security. Secretary Salazar has repeatedly stated that the Obama Administration is not "anti-oil and gas," yet when it comes to Interior's onshore and offshore natural gas and oil program, the record suggests otherwise. The 2010-2015 5-year plan, as of today, is still stuck at Interior and Secretary Salazar is indicating that whatever revised plan comes out will have to go through additional public comment time as well as resubmission to DC Circuit. You have been with the agency for at least 4 other 5 year plans. Why is this particular plan taking so long to become final?

Answer. The 2007-12 program is being revised to meet the mandate of the U.S. Court of Appeals for the D.C. Circuit, which found fault with the program developed by the prior Secretary June 2007. The Court found that in using the NOAA Environmental Sensitivity Index that addresses shoreline/coastal habitats only, the Department had failed to consider the relative environmental sensitivity of the entirety of " the outer Continental Shelf" of the different areas, as required by section 18 of the OCS Lands Act. The Department formed a team of well-qualified scientists and other subject matter experts that conducted a more complete environmental sensitivity analysis. The Secretary is considering the new information along with the existing information and analysis that was either upheld by the court or not challenged, including the Final EIS, to make the necessary decisions under the Act to balance the potentials for environmental damage, discovery of oil and gas, and adverse impact on the coastal zone. In accordance with the Government's petition to the Court, the Preliminary Final Program will be announced for public comment and submitted to the President and Congress, before being finally approved. It should be noted that, in response to a petition for reconsideration filed by Secretary Salazar, the Court limited its order to three areas of the Alaska OCS, so that other sales included in the 2007-2012 program are proceeding without awaiting the curative work.. The last sale was Western Gulf of Mexico Sale 210 held in August of 2009. The next proposed sale is Central Gulf of Mexico Sale 213 scheduled for March 2010.

In mid-2008, the previous Administration began preparation of a 5-Year Program and issued a Draft Proposed Program for 2010-2015 on January 16, 2009 with a 60-day comment period. The Secretary extended the comment period an additional 180 days and held four regional meetings to allow for greater public input. Over 530,000 comments were received and are being summarized and considered for the next decisions, beginning with the announcement of public meetings for scoping issues for preparation of a draft EIS. The current program does not expire until June 30, 2012. Accordingly, the preparation process of a new program does not affect sales in the current program for 2007-2012.

Question 6. Has Carol Browner, Energy Czar, been briefed in regards to the 5 year plan and has she had any input in deciding to move forward?

Answer. MMS has not briefed Ms. Browner.

Question 7. The oil and gas industry directly and indirectly employ 9.2 million people, so could someone explain to me why with double digit unemployment numbers are we not moving forward with increasing domestic production and employ individuals here at home?

Answer. President Obama expects the Department of the Interior to make significant progress toward a new energy future, with attention to responsible domestic production of conventional energy resources as well as a strong new emphasis on renewable energy production and transmission. We are delivering on this task. Since January 20, 2009, we have offered tens of millions of acres of onshore and offshore lands for oil and gas leasing, adopted a new framework for renewable energy development in the OCS, and expedited the review of solar, wind, and geothermal energy projects on public lands. These actions will create more supplies of conventional and renewable domestic energy, leading to more jobs.

Question 8. In total, the OCS development has generated $190 billion in federal revenue from bonus bids and royalty payments. Its puzzles me with record breaking deficit numbers, why the 5 year plan for OCS is getting delayed when it could produce federal revenues. Does anyone have an opinion on this?

Answer. The Department is currently operating under the existing OCS Leasing Program, 2007-2012. While Secretary Salazar did extend the comment period last February for an out-of-cycle Draft Proposed Program, which the previous Administration released on January 16, 2009, the Department expects to issue an approved Final Program and Final EIS, with a schedule of offshore lease sales to allow for activities to be conducted in an environmentally safe and operationally sound manner, prior to the scheduled expiration of the current program.

Question 9. What is the role of the National Oceanic and Atmospheric Administration (NOAA) in OCS development? NOAA Administrator Lubchenco sent a letter to MMS dated September 21, 2009, which also appeared the LA Times commenting on the OCS proposed 5 year plan-2010-2015. However, NOAA later claimed it was an unofficial letter. How is MMS bound or inclined to react to this letter's contents?

Answer. During the 5-Year Program preparation process, comments are solicited three separate times, the initial Request for Information, the Draft Proposed Program and the Proposed Program. In addition to public comment, pursuant to statutory requirements, MMS specifically solicits review and comment from Governors and other Federal agencies, including NOAA. On September 30, 2009, NOAA sent a follow-up letter clarifying that their earlier letter was intended to provide informal comments to start a dialogue between the agencies on a variety of issues. The Department has had a long-standing relationship with NOAA and their highly-respected scientists and other experts. The Department looks forward to continuing this relationship and pursuing this dialogue with NOAA throughout the entire OCS process. MMS is not bound by NOAA's comments, except to the extent that NOAA is providing an official position on a mandate under NOAA's authority that requires certain actions or responses from MMS, but will give careful consideration to its recommendations as well as those of other commenters.

Question 10. How many agencies does an oil and natural gas company have to deal with to produce from a federal offshore lease? Does this number of different and competing bureaucracies make operations in the OCS more efficient or less efficient?

Answer. While MMS is the lead for all energy and mineral resources activities on the OCS, several other Federal agencies also have jurisdiction over certain aspects of OCS activities. At the lease sale stage, MMS coordinates with several federal and state agencies. This coordination includes, but is not limited to, consultations required under the Endangered Species Act with the National Marine Fisheries Service and Fish and Wildlife Service; Essential Fish Habitat consultation with the National Marine Fisheries Service; and Coastal Zone Management Act consistency determination with affected States.

For post-lease activity, the number of Federal agencies an oil and gas company must deal with directly depends on the lease location and type of activity proposed. In addition to MMS, the following Federal agencies may also have jurisdiction over an individual proposal:

- Department of Defense (including the U.S. Army Corps of Engineers)
- Department of Transportation (including U.S. Maritime Administration)
- Environmental Protection Agency
- Federal Aviation Administration
- Federal Energy Regulatory Commission
- National Aeronautics and Space Administration
- National Marine Fisheries Service
- National Park Service
- Fish and Wildlife Service
- U.S. Coast Guard

While not every Federal agency listed above is involved in the review and approval of every OCS oil and gas proposal, every proposal does involve at least a few of these agencies. The magnitude of this involvement ranges from receipt of notifications to issuing permits.

Because MMS is the lead for OCS oil and gas activities, MMS considers the overall proposal, while other Federal agencies may look at one aspect of the proposal. These agencies have various specialties that in many cases can bring forth pertinent information more efficiently than one or two agencies could. It is not the number of agencies, but rather, how they coordinate and cooperate that makes the difference in efficiency. MMS strives to ensure that its NEPA and other analyses contain the information needed for decision-making, including information related to compliance with laws and regulation outside MMS' direct purview. MMS and other Federal agencies have worked together and will continue to work together to promote the efficiency of the permitting process for OCS oil and gas activities.

RESPONSES OF DAVID RAINEY TO QUESTIONS FROM SENATOR BINGAMAN

Question 1. The Committee heard testimony about the offshore infrastructure necessary to support offshore oil and gas production and to bring the product onshore. Please state the extent to which your company typically is involved in the development, construction or maintenance of this infrastructure. If you do not typically handle this directly, please indicate the extent to which you are involved with the entities who are responsible for this infrastructure.

Answer. BP currently operates eight deepwater projects in the Gulf of Mexico. In some cases, BP owns pipeline capacity to bring oil and gas production to shore and in others, we utilize existing capacity owned by other producers or pipeline operators. The development, construction and maintenance of the infrastructure required to support offshore oil and gas production is an integral part of BP's business. BP recently completed the delivery of a series of five new developments in the deepwater Gulf of Mexico, they included: Mad Dog, Holstein, Nakika, Atlantis and Thunderhorse. As we proceeded with the development of these projects, we were also engaged in the installation of the critical pipeline infrastructure to bring the oil and gas produced from these facilities to shore. BP undertook these investments because there was no existing capacity to bring these volumes to shore. These collective investments are called the Mardi Gras Pipeline Transportation System. The project transports production from the five major deepwater Gulf of Mexico projects previously mentioned and also transports 50 percent of all current deepwater Gulf production at depths of more than 7,000 feet. This transportation system consists of five main lines which total 490 miles—Okeanos (100 miles), Proteus (70 miles), Endymion (90 miles), Caesar (115 miles) and Cleopatra (115 miles)—and is the highest capacity deepwater pipeline system ever built. The Mardi Gras system is able to move more than one million barrels of crude and 1.5 billion cubic feet of natural gas per day. This project is but one example of the investment BP has made and continues to make in the safe and environmentally responsible exploration, development, production and transportation of offshore oil and gas resources to consumers and businesses in the United States.

Question 2. The Committee also heard testimony to the effect that the Minerals Management Service's authority ends "at the water's edge." Please state your understanding of the various government entities—federal, state, or local—responsible for permitting, oversight, or spill response related to the offshore infrastructure necessary to support offshore production or to bring the product onshore.

Answer. The Department of Interior, through the Minerals Management Service, is charged with implementation of the OCS Lands Act. Many other agencies regulate activity on the OCS, including a number of federal and state agencies responsible for implementing laws and regulations relating to the protection of the environment and marine life. These laws, and the agencies charged with their oversight, are able to assure adequate oversight and rigor with respect to safety and the environment on the OCS.

Among the laws designed to address those concerns are: Coastal Zone Management Act, National Environmental Policy Act, Rivers and Harbors Act, Clean Water Act, Oil Pollution Act, Clean Air Act, Noise Pollution Control Act, Comprehensive Environmental Response, Compensation, and Liability Act, Resource Conservation and Recovery Act, Endangered Species Act, Marine Mammal Protection Act, Migratory Bird Treaty Act, Magnuson-Stevens Fishery Conservation and Management Act, National Fishing Enhancement Act, as well as acts designed to protect historical and ecologically important resources, including the National Marine Sanctuaries Act, Antiquities Act, Abandoned Shipwrecks Act, Archeological Resources Protection Act, and National Historic Preservation Act.

In addition to the MMS, other federal agencies and departments having influence on operations on the OCS are: Department of Transportation, Department of Homeland Security (Customs and Border Patrol, U.S. Coast Guard), Department of Commerce (National Oceanic and Atmospheric Administration, National Marine Fisheries Service), Department of Interior (Fish & Wildlife Service), Army Corps of Engineers, Federal Energy Regulatory Commission, Environmental Protection Agency, Department of Labor, Occupational Safety and Health Administration.

State agencies involved in OCS operations include: Departments of Natural Resources, Offices of Conservation, Departments of Environmental Quality, State Mineral Boards, State Land Offices, Railroad Commissions, and various local government entities.

Question 3. The Committee heard testimony regarding oil spills that occurred during severe storms in the Gulf of Mexico from onshore oil and gas infrastructure that supports offshore production—refineries, pipelines, and tanks required to receive process, store and distribute oil and gas from offshore fields. Please describe your

company's involvement in developing and maintaining this onshore infrastructure, and your understanding of the governmental entities responsible for permitting, oversight and spill response for this infrastructure.

Answer. BP is involved in the production and transportation of oil and gas from onshore facilities to onshore refineries and natural gas processing facilities. Where we have owner and operator positions, we are accountable for the maintenance of these facilities. All onshore facilities are regulated by state and federal pipeline transportation authorities, as well as environmental agencies.

All pipelines operated by BP which deliver oil and natural gas from offshore facilities to onshore locations are equipped with high and low-pressure sensors. In the event of a change in pipeline pressure beyond a specified set point, the pressure sensors will trigger an alarm to the facility operator and/or shut down the pipeline. When alerted of a potential pipeline emergency BP will first shut down the operation and investigate the cause including ensuring that the pressure sensing equipment is not malfunctioning, and then will visually observe the pipeline, if possible, to determine the source. If the source is not within observable range, BP will contact the sending and receiving facilities to determine the abnormality. In the event a release is discovered, the BP Pipeline Response Plan with its predetermined response capabilities will be activated.

Question 4. BP has recently reported a spill from a pipeline that serves Prudhoe Bay in Alaska. Please describe the cause of this spill and state which governmental entities are involved in regulating that pipeline and in assisting in the spill response. Please indicate whether there is any difference between the pipeline infrastructure involved in that spill and the onshore infrastructure that is utilized to transport oil produced offshore.

Answer. On November 29 while performing routine rounds, a BP operator discovered an oil leak on an 18 inch oil production line to its Lisburne Production Center (LPC). Workers have identified the specific point of the leak. It is a rupture, roughly 24-inches long, running lengthwise on the bottom of the 18-inch diameter pipe. The rupture, by visual inspection, appears to have been caused by overpressure in the pipeline, linked to ice forming inside the pipe. Large ice plugs have been identified on both sides of the leak. The investigation into the incident continues, and is expected to conclusively determine the cause.

The pipeline in question is regulated by the State of Alaska through the Department of Natural Resources, the Department of Environmental Conservation and the Alaska Oil and Gas Conservation Commission. The response to the incident is being managed through a Unified Command structure. The Unified Command is comprised of BP, the Alaska Department of Environmental Conservation, the North Slope Borough and the US Environmental Protection Agency. The US Coast Guard has also participated.

The design of every pipeline system is unique to its specific circumstances and needs. Each design takes into consideration items such as the type of service (full or partially processed oil, multi-phase production, water, gas, etc), the properties of the oil produced (e.g. SPE specific gravity, paraffin content, etc.), operating pressures, fluid temperatures, and external temperatures. In addition, pipeline construction, control and monitoring technology continues to evolve and is applied as applicable to each project.

RESPONSES OF DAVID RAINEY TO QUESTIONS FROM SENATOR MURKOWSKI

Question 1. Can you amplify for me your concerns about domestic energy production and, if regulatory uncertainty and overly burdensome litigation continues to stall development, what we can expect to see in terms of driving energy jobs and production overseas? Feel free to answer in numbers of actual jobs and numbers of barrels of oil, or percentages, whichever is available.

Answer. As a company involved in many aspects of energy development—wind, solar, biofuels, oil, natural gas, and shale gas—we remain very concerned about the impact that litigation is having on US energy development. No form of energy is immune; wind is now seeing significant development challenges just like oil and natural gas. Recently, the industry has seen challenges to seismic acquisition programs, the MMS Five-year leasing program and other project specific matters. BP is intimately familiar with "public challenges" (i.e. protests, challenges or litigation) involving BP America Production Company. These challenges have the potential to affect oil and gas leasing and development decisions made by the United Stats Department of the Interior, Bureau of Land Management: San Juan Citizens Alliance v. Norton (United States Court of Appeals for the Tenth Judicial Circuit); San Juan Citizens Alliance v. Stiles (United States District Court for the District of Colorado);

and Biodiversity Conservation Alliance v. Bureau of Land Management (United States District Court for the District of Wyoming).

In additional to litigation, BP is also concerned about the cumulative effects of others policy proposals, including higher taxation, legislative initiatives, and proposed regulatory changes on the oil and gas industry. It is true that increased level of uncertainty brought about by these multiple policy initiatives does not enhance the attractiveness of the US. We believe the result of increased uncertainty could lead to reduced investment, which will mean less energy production, fewer jobs, lower revenues to state and federal treasuries, etc.

Question 2. When evaluating offshore oil and gas development opportunities in nations outside the U.S., what are some of the main factors a company might take into account when assessing the attractiveness of the investment climate?

Answer. Key factors that companies look for when assessing the attractiveness of an area for long term investment include: economic attractiveness and the ability to make a return on the investment for shareholders, historical fiscal stability, and stable regulatory regimes. Other factors that also are assessed include:

- Level of technical risk—the ability to find and develop the resource
- Technical challenges such as water and reservoir deeper, pressures, temperatures.
- The attractiveness of the opportunity (size of the opportunity, ease of developing, will new technologies be required, etc.)
- Fiscal arrangements—for example in some Production Sharing Agreements, which are popular outside the US, countries allow companies to recover capital investment before applying royalties, taxes, etc.
- Upfront capital investment required by BP before starting to receive money back.
- Amount of capital required
- Type of fiscal regime and the level of complexity (federal vs. state, a 3 x 3 mile block, or a 30 x 30 miles block
- Progressive or regressive tax structures

Question 3. When we talk about environmental stewardship on a global level, knowing what we know about the U.S. program, is it better or worse for the world's environment when the U.S. adds to its environmental restrictions things like shorter lease terms and heightened regulatory burdens?

Answer. The OCS has been safely and reliably producing oil and natural gas for the nation for over 50 years. The current regulatory structures and lease terms have served the US Government and industry well. Stable fiscal, regulatory and leasing policies are important to sustainable oil and natural gas development which help the nation meet its goals for energy and economic security.

We would be concerned about the creation of additional regulation that duplicates current practices of Federal and State governments and would not add value or enhance the consultation that already takes place between the various government agencies, oil and gas companies and other stakeholders. Onerous regulation and bureaucracy would discourage companies from investing in the United States versus elsewhere, reduce government revenues and opportunities for jobs related to our industry's activities, and also have potential overall negative impacts on the environment because we would likely import more oil from other countries that may have less stringent environmental standards.

Stringent regulatory oversight in the US helps maintain environmental performance. Offshore operators operate under 17 major permits and must follow 90 sets of federal regulations.

In accordance with National Environmental Policy Act (NEPA), the Minerals Management Service prepares environmental documents on lease sales and other major exploration and production related activities to be informed on environmental consequences of their decisions. For example, environmental impacts of seismic acquisition in the OCS are addressed in Environmental Impact Statements. Mitigation and monitoring requirements are determined during consultation processes with US Fish and Wildlife, National Marine Fisheries Service and state Coastal Zone Management agencies.

The MMS strictly governs well drilling programs. The policies followed by the industry and MMS regulations ensure that wells on the US OCS are cased, cemented, protected with internal plugs and monitored to prevent problems during drilling of wells. The United States has the most effective oil spill prevention and response regime in the world. The OCS leases produce about 1.4 million barrels of oil per day. MMS calculates that since 1980 less than 0.001% of the oil produced in the OCS has spilled. Natural seepage of oil from the ocean floor is much greater.

Industry's performance during Hurricanes Katrina and Rita demonstrated the success of the environmental protection built into offshore operations. MMS estimates 3,050 of 4,000 Gulf platforms and 22,000 of 33,000 miles of pipelines were in direct paths of the storms. About 115 platforms were destroyed and over 50 others damaged. There was no loss of life and there were no significant oil spills from OCS facilities.

In addition, Federal lease sales include a 5 Year plan with both draft and final environmental impact statements and solicitation of public comment no fewer than three times. The Federal Lease Sale planning process is public lengthy and elaborate.

We are very concerned about reducing lease terms and in a letter to Mr. Marshal Rose, Chief, Economics Division, Minerals Management Service, on November 24, 2009, BP urged the Minerals Management Service to reconsider its proposal to reduce lease terms in oil and gas Lease Sale 213 for the Central Gulf of Mexico Planning Area to be held March 17, 2010 (letter is attached herein). Stable and predictable leasing structures have encouraged significant investments which have led to a dramatic increase in production in the past decade. Today the GoM accounts for almost one quarter of the oil produced in the United States. Key to the success has been a stable leasing program, including lease terms that do not change from one sale to another.

We believe that the proposed reduction of lease terms could produce serious unintended consequences. The proposal will likely impact the overall attractiveness of the GoM in comparison with other areas around the world. If the region becomes less attractive for investment, this will result in reduced revenues to the US. Furthermore, limiting the terms of leases in water depths of up to 1600 meters likely will result in the drilling of fewer exploration wells. We also believe that the proposed changes could result in production of less oil from fewer deepwater projects, not more. This will cause the US to import more oil from other locations where environmental laws are less stringent. The US balance of trade would also be negatively impacted with fewer jobs created and US energy and national security could be undermined.

Policies that drive companies to drill additional wells merely to retain leases or extend shortened lease terms will result in a waste of resources simply for the purpose of extending the term of the lease. This is inconsistent with the Congressional declaration of policy found in the Outer Continental Shelf Lands Act, particularly Congress' stated policy of ". . .expeditious and orderly development, subject to environmental safeguards, in a manner which is consistent with the maintenance of competition and other national needs. . ." This could lead to inefficiencies in the GoM drilling sector and unnecessary environmental risks.

Due in large part to advances in seismic imaging, deepwater drilling technology and production systems technology, the industry is able to explore previously inaccessible areas of the Outer Continental Shelf. New supplies are harder to find, more difficult and more expensive to extract and take much more time and resources of all kinds to bring online, not less. As a result, we need a more flexible leasing program to support safe and reliable oil and gas development in the US OCS, not one which is more restrictive.

Question 4. While EIA has said that increased domestic offshore oil and gas production would not result in meaningful energy price differences for Americans, do you think that a major ramp up of development in the Atlantic, Pacific, Eastern Gulf, and Alaska OCS would send a market signal that could, in fact, affect world price of oil?

a. Is the analysis the same for natural gas prices as oil, even though natural gas is not based on a world price?

Answer. The market impact of developing areas of the OCS currently closed to development would ultimately depend on the volumes of oil (and natural gas) discovered and produced. Based on official data, the National Petroleum Council estimated in 2007 that undiscovered, technically recoverable resources in Federal OCS moratoria areas amounted to 17.8 billion barrels of oil and 76.5 Tcf of natural gas, which the NPC estimated could support production by 2025 of 1 Mb/d and 3.8 bcf/d, respectively. (NPC Hard Truths, tables 2-12 and 2-13)

New discoveries could begin to impact prices even before production started if they contributed to changing market expectations of short-and long-term future supply availability. Moreover, the market impact could be amplified if opening OCS acreage to development were part of a larger energy policy package aiming to increase domestic production, slow demand growth, and increase the flexibility of the US and global economic systems to deal with changing market circumstances. The

market impact would also be affected by the reactions of consumers and producers alike to the changing supply prospects signaled by such an opening.

While there is not an integrated global natural gas market, regional markets have become increasingly linked in recent years. And US natural gas prices would be likely to efficiently reflect the market impact of any new supplies that resulted from a lifting of OCS moratoria.

Question 5. Senator Menendez indicated that not only would price be unaffected by increased domestic offshore drilling, but that "production" would be unaffected by increased domestic offshore drilling. Is it accurate to say that increasing production would have no effect on energy security?

Answer. The market impact of increased domestic offshore drilling would ultimately depend on the volumes of oil (and natural gas) discovered and produced. It is true that oil is a global market—and the US natural gas market has become more linked to other regional gas markets—so developments here must be assessed in a global context. That said, an increase in domestic oil and natural gas production that resulted from an increase in offshore drilling would be likely to have an impact. The extent of that impact would depend on the additional volume of oil and natural gas produced; the impact on market perceptions about short-and long-term supply availability; and the reactions of other market participants to these changes.

Given the global nature of the oil market—and the increasingly linked nature of natural gas markets—import independence would not totally isolate the US from energy supply disruptions abroad. However, increased domestic production would benefit the economy by creating domestic jobs and by reducing the trade deficit. The National Petroleum Council estimated in 2007 that opening Federal OCS moratoria areas to development could attract a cumulative total of $98 billion in new investment by 2025; create more than 130,000 (direct) jobs; raise $41 billion in federal royalties and $28 billion in federal income taxes; and reduce the trade deficit by $145 billion. (NPC Hard Truths, table 2-13)

Question 6. Environmental stewardship has improved through directional drilling and subsea tiebacks, among other improvements, as I understand it. Can you describe your environmental record in terms of exploration, development, and production for both Alaska and the Gulf of Mexico?

Answer. The record of BP and the industry when viewed through a historical perspective is one of extraordinary success both in the Gulf of Mexico and Alaska. While we have had incidents, our objective and aspiration is to have none. Any release of oil from our facilities is unacceptable. Operations today include regulatory requirements for blow-out preventers and also include multiple technological and mechanical redundancies to ensure that releases do not occur and the environment is protected. In addition, inspection and maintenance programs ensure that facilities are regularly monitored to prevent incidents and releases from occurring.

Question 7. Seismic data acquisition has also improved over the years. Please describe any environmental benefit that may be conferred as a result, and feel free to discuss any additional benefits to the OCS program through this technology.

Answer. Seismic imaging allows us to predict the presence of hydrocarbon reservoirs below the sea bed. BP's Wide Azimuth Towed Streamer (WATS) and Ocean Bottom Node technologies involve truly three-dimensional seismic acquisition and help in improvement of imaging below salt and other complicated geology. These acquisition technologies have been adopted industry-wide in the Gulf of Mexico. Additionally, improvement in seismic imaging in a producing field over time helps in monitoring fluid movement. As a result, we as an industry will be more efficient, drill fewer wells, and have less impact on the environment as we become better at predicting the presence of oil and gas in the subsurface.

This ability to more clearly see the reservoir increases drilling success. Fewer wells drilled to find and develop a reservoir lead to incrementally less emissions per barrel of oil produced from drilling and its logistical support operations. That means less discharges to air and water and fewer solid wastes. And energy efficiency per barrel of oil produced is improved.

Increased seismic success in the OCS results in more barrels of oil and gas produced domestically which can have environmental benefits. This provides energy closer to the end user reducing air emissions and fuel consumption from transporting imported oil. This lessens the carbon footprint for the same barrel of oil and risks from transporting oil via tankers.

Furthermore, BP has developed the attached OCS resources assessment document which we feel will assist policy makers in trying to understand the issues government and industry should consider as it contemplates opening new areas.

Question 8. How are competing uses in the offshore areas dealt with currently under existing laws and regulations—does this work and are changes needed?

Answer. The Minerals Management Service process has proven to be an effective, deliberate public process that provides area residents and other users of the OCS with extensive opportunities for comment and consultation.

- Draft and final environmental impact statements are prepared, soliciting public comment.
- MMS holds scoping sessions and public hearings in local communities during the stages in the lease sale planning process.
- These are supplemented with numerous formal and informal contacts and consultations with various stakeholders.
- Effective multiple-use planning continues when leases are awarded as companies seek approval for exploration plans, consulting with potential affected communities.

Policy needs to allow for true multiple uses, encourage cooperative efforts that engage all stakeholders, including industry and commercial users, and consider all benefits that the United States and its communities derive from oceans, lakes and coasts.

National policy should be built on extensive region and local stakeholder investment already in place. For example, BP already participates in a number of voluntary efforts with stakeholders in areas it operates including (but not limited to):

- Numerous consultation and coordinated research efforts with communities and sustenance resource users in Alaska;
- Participation in the Gulf of Mexico Foundation, founded to help protect the health and productivity of the Gulf;
- And the SERPENT Project which facilitates scientific research with academia using industry resources.

All oil and gas development projects in the OCS go through a permitting process that involves multiple agencies at the local, state, and federal levels. Nearly every state and federal permit process requires, at a minimum, public notice. Direct consultation with communities and stakeholders is an agency requirement for more complex projects, including those requiring an environmental impact statement.

For example, in Alaska, BP's development projects require approvals from the Borough's Planning Department, Planning Commission and Assembly and this also includes consultation with key communities and subsistence hunters. BP Alaska's Liberty project provides a recent example of the extensive nature of these consultation requirements. In order to develop the Liberty field, the company was required to obtain over 25 major permits. These include: federal permits (e.g., U.S. Army Corps of Engineers wetlands fill, U.S. Fish and Wildlife Service marine mammal authorization, and U.S Environmental Protection Agency camp wastewater permit), state permits (e.g. Alaska Department of Natural Resources land use and water use permits, Alaska Department of Environmental Conservation air quality permit) and Borough permits (rezoning and master plan approval). For each of these there was a formal public consultation requirement as part of the permit approval process. This included public notice, public meetings, and federal and state government consultations.

BP takes a proactive role in this consultation. In the case of the Northstar EIS process, we recognized the critical role the Borough would have in overall project review, and we insisted the Borough be involved in the planning and preparation of the EIS for Northstar by making them a cooperating agency. In designing our environmental marine mammal monitoring, BP works closely with the Borough with an extensive peer-review process lasting several days. Along with federal agencies such as the Minerals Management Service and the National Marine Fisheries Service, the Alaska Eskimo Whaling Commission, individual hunters and Borough staff are very involved in these meetings and offer very detailed comments.

Borough officials have ongoing access to our facilities and periodically meet with BP on matters relating to Borough jurisdiction and concern. Planning Commission members are invited to visit the field and are regularly updated on activities and issues. BP also goes beyond the required legal or regulatory requirements for consultation and pursues a healthy, ongoing working relationship with the North Slope community. Some examples are:

- Since the mid 1980s when BP has had a need to conduct any activities in offshore waters during later summer and fall, BP has negotiated annual Conflict Avoidance Agreements with the Alaska Eskimo Whaling Commission and key whaling captains associations of villages closest to our activities. The CAA is an agreement to minimize the potential for conflicts and negative impacts be-

tween subsistence hunters and industry operators and includes mutually agreed upon mitigation measures.
- BP shares scientific data with the Borough and participates in scientific working groups.
- A company policy ("The Good Neighbor Policy") designed to mitigate the potential effects in the event of a large offshore oil spill related to the Northstar facility

RESPONSES OF DAVID RAINEY TO QUESTIONS FROM SENATOR DORGAN

Question 1. Earlier this year in this committee, I proposed an amendment which is one of the primary reasons for the oversight hearing. Through my approach, the MMS would be authorized to go through a rulemaking process to issue regulations and would consider a range of local and other conditions during that process. In federal waters, the Secretary would establish zones which would determine what kind of restrictions would be placed on surface activities. The onus is then placed on individual companies to develop innovative technology solutions in those zones. Renewable development (i.e. wind turbines offshore) and previously existing oil and gas projects would be exempt. I believe that if we could pursue this approach, it is possible to deploy innovative technology applications to limit the environmental footprint and significantly reduce the visual impact while increasing access to resources.

Given your company's experience with projects in other regions and the testimony that you have presented, do you believe that this is a concept that you could support?

Answer. BP fundamentally believes that it is possible to deploy innovative technology applications to limit environmental footprints and reduce visual impacts while increasing access to resources. BP supports a pragmatic approach to offshore energy development. Our experience—at Wytch Farm, in the environmentally sensitive Poole Harbor area of southern England and the Liberty Project in Alaska—clearly demonstrates that these objectives can be achieved through innovative technology solutions.

Question 2. The extended reach drilling from onshore as a part of the Poole Harbor/Wytch Farm Field in the U.K. seems particularly interesting to me. You have effectively been able to use technology to drill 11 kilometers offshore in a very ecological sensitive location. As you explain, over 100 wells have been drilled so far.

Answer. Wytch Farm has been developed by BP to be Western Europe's largest known onshore oil field in one of the most environmentally sensitive areas of the UK. It is an Area of Outstanding Natural Beauty, featuring: Sites of Special Scientific Interest (SSSI), Special Protection Areas, World Heritage Coastline, Ramsar Sites (designated wetlands of international importance), National Trust land, National Nature Reserves.

Development has been achieved through close co-operation and openness with the surrounding communities. Local liaison committees were formed to consult fully with all statutory and non-regulatory bodies and local residents are kept informed of relevant activities. Careful consideration was given to the levels, shape and general arrangement of the developed area and the siting of the operating equipment, with the various above-ground permanent facilities designed to blend into the existing landscape.

As a result of the area's ecological importance, BP vigorously applied its environmental protection policy, establishing a monitoring program covering 23 studies, from archaeology and seabed ecology, to surveys of the wintering bird population, reptile communities and the red squirrel colony on Furzey Island, to the health of heathland, reed beds and saltmarshes. The results of these surveys were vital in determining both how to develop the oilfield and in providing baseline data against which BP could monitor its performance.

Regular atmospheric monitoring around the oilfield facilities, together with observation of lichens on nearby trees, indicate that the air quality around existing well sites and the gathering station generally suffers no adverse impacts from BP's activities in the area.

In recent years, BP has pioneered significant advances in extended reach drilling techniques, which has brought considerable environmental benefits to the development by enabling the furthest parts of the offshore Sherwood reservoir to be drilled from an onshore site. Well M16 set a new world record when it broke the 10km barrier in June 1999, reaching a displacement distance of 10,728m, a total length of 11,278m and a depth of 1638m. The drilling rig and ancillary equipment had a comprehensive noise-control package installed to meet the strict noise criteria imposed by Dorset County Council.

In 1995, the Wytch Farm Development won The Queen's Award for Environmental Achievement in acknowledgement of the innovative, technologically challenging and environmentally beneficial manner in which the offshore section of the Sherwood reservoir was being developed.

BP continues to manage an area of land around the site in order to integrate Wytch Farm into the Purbeck countryside and to ensure that due consideration is given to the ecology of the area for the life of the oilfield.

DEVELOPMENT/FACILITIES

There have been three phases of development at Wytch Farm, which has a total of 98 wells, 63 producers and 35 injectors, operating from 10 sites.

EXPORT

The heart of the project is at Wytch Heath, the site of the gathering station, where the crude oil and liquid petroleum gases (LPGs) from the reservoirs are separated.

LPG is stored in 12 large steel vessels and is loaded into road tankers and transported to the local market. A 16-inch diameter pipeline exports up to 110,000 barrels of crude oil a day, 91km via the Fawley Refinery across Southampton Water to Hamble Oil Terminal. Here it is stored in five tanks before being exported by tanker.

At the gathering station there is a parallel 48km, 8-inch diameter pipeline that was laid by BP on behalf of British Gas. It exports two million cubic feet a day of methane/ethane to Sopley, north of Christchurch, for feeding into the main domestic gas network.

FAST FACTS

Field description	Wytch Farm oil field comprises three separate reservoirs that lie under Poole Harbour and Poole Bay, in Dorset, South-west England.
Location	17 miles from Poole, Dorset
Block number	PL089 (main onshore fields); PI259 (small onshore area under sandbanks); 98/6 and 98/7 (Sherwood offshore)
Participants	BP (Operator—67.5%), Premier (12.5%), Maersk (7.5%), ONEPM (7.5%), Talisman (5%)
Discovered	1959-1978
Start-up	1979 (Stage I); 1990 (Stage II), 1994 (Stage III)
Average daily production (2007)	23,000 bpd oil; 6 mmscfd gas; 50 tonnes LPGs
Peak production	1997—110,000 bpd

Question 3. Can you tell me more about how this project came about? How were local communities and governments engaged? What kind of consultative process was undertaken before the project began? What kinds of policies were put in place to meet the strict environmental conditions? Do you think that this approach is something that could be employed in the U.S. federal OCS?

Answer. See response to previous question. Yes, the approaches that were taken at Wytch Farm and which are being take at our Liberty project in Alaska could certainly be employed in the US federal OCS.

RESPONSE OF DAVID RAINEY TO QUESTION FROM SENATOR MENENDEZ

Question 1. I think that the environmental integrity of offshore oil operations should not be limited to what happens on platforms. Pipelines, tankers/barges and onshore facilities—all necessary for oil production—are also at risk for spills. In March 2006 the largest crude oil spill in the history of North Slope operations

brought national attention to the chronic problem of spills. BP was fined $20 million including criminal penalties and probation for knowingly neglecting corroded pipelines. As a result, the federal government and the State of Alaska have filed separate lawsuits against BP. In 2007 BP shut down Northstar oil field, which lies six miles offshore of the Prudhoe Bay field in the Beaufort Sea, after a worker noticed a leak in some pipe. What has BP learned from these experiences and how can you assure us this problem will not happen again?

Answer. In 2006 BPXA set up the Technical Directorate to provide in addition to other roles integrity management capability and oversight of North Slope operations with respect to engineering standards, operating systems development and corrosion management. Over the past 3 years, this team has successfully introduced a new corrosion control strategy, doubled the size of the corrosion, inspection and chemicals group, and implemented a new BP Operating Management System. These actions have made a significant improvement to the integrity of our facilities and operating systems.

RESPONSES OF DAVID RAINEY TO QUESTIONS FROM SENATOR SESSIONS

Question 1. In your opinion, do shorter lease terms, an increase in royalties, and an increase in taxes play a part in determining which country your company with produce?

Answer. Lease terms, royalty rates and taxes all play a critical role in determining how BP approaches investment decisions around the world.

BP is especially concerned about what we see as a trend toward higher levels of government take. This includes recent increases in royalty rates on leases across the GoM, new taxes on GoM production being contemplated by Congress and the administration, and escalating rental rates. These actions, when combined with a reduction in lease terms, have the undesired effect of decreasing the competitiveness of the GoM.

We believe that a reduction of lease terms as recently proposed by MMS could produce serious unintended detrimental consequences. The proposal will likely impact the overall attractiveness of the GoM in comparison with other areas around the world. If the region becomes less attractive for investment, this will result in a reduction in revenues to the US Treasury from lower bonus bids on leases, reduced rental payments and lower royalties. Furthermore, limiting the terms of leases in water depths up to 1600 meters will likely result in the drilling of fewer exploration wells. We also believe that the proposed changes could result in production of less oil from fewer deepwater projects, not more. This will cause the US to import more oil from other locations where environmental laws are less stringent. The US balance of trade would also be negatively impacted, fewer jobs will be created, and US energy and national security could be undermined.

To encourage continued success with domestic energy development, we must have stable leasing, fiscal, and regulatory policies. They are critical to continuing investments which create jobs, generate revenues and enhance US energy and national security.

Also please see attached comments submitted by BP on the Notice of Lease Sale 213 proposal to reduce lease terms for leases in the Gulf of Mexico:

Question 2. The oil and gas industry directly and indirectly employ 9.2 million people, so could someone explain to me why with double digit unemployment numbers are we not moving forward with increasing domestic production and employing individuals here at home?

Answer. The oil and gas industry does directly and indirectly employ over nine million people in the US. We believe that increasing access to new areas would have a significant stimulative impact on the domestic employment situation. In the energy industry, the best way to increase investment and create new jobs is to promote policies which open new areas to exploration and development. The US government can play an important role in this respect. The impact of such policy proposals would be to create jobs in a multitude of areas, including oil and gas exploration, development and production, pipeline manufacturing and construction, equipment manufacturing, offshore service sector expansion, natural gas plant construction and installation, as well as the service sectors which support these activities. While many of the jobs would be construction related, a significant number would sustained by an expanding industry.

Question 3. In total, the OCS development has generated $190 billion in federal revenue from bonus bids and royalty payments. Its puzzles me with record breaking deficit numbers, why the 5 year plan for OCS is getting delayed when it could produce federal revenues. Does anyone have an opinion on this?

Answer. BP believes that the current MMS Five-year leasing program is robust and should continue as originally outlined. Furthermore, we support the proposed 2010-2015 Five-year plan and would like to see it move forward expeditiously so that the US can begin to enjoy the economic and energy benefits that come from opening new areas.

Question 4. What is the role of the National Oceanic and Atmospheric Administration (NOAA) in OCS development? NOAA Administrator Lubchenco sent a letter to MMS dated September 21, 2009, which also appeared the LA Times commenting on the OCS proposed 5 year plan—2010-2015. However, NOAA later claimed it was an unofficial letter. How is MMS bound or inclined to react to this letter's contents?

Question 5. How many agencies does an oil and natural gas company have to deal with to produce from a federal offshore lease? Does this number of different and competing bureaucracies make operations in the OCS more efficient or less efficient?

Answer. The Department of Interior, through the MMS, is charged with implementation of the OCS Lands Act. Many other agencies regulate activity on the OCS, including a number of federal and state agencies responsible for implementing laws and regulations relating to the protection of the environment and marine life. These laws, and the agencies charged with their oversight, are able to assure adequate oversight and rigor with respect to safety and the environment on the OCS.

Among the laws designed to address those concerns are Coastal Zone Management Act, National Environmental Policy Act, Rivers and Harbors Act, Clean Water Act, Oil Pollution Act, Clean Air Act, Noise Pollution Control Act, Comprehensive Environmental Response, Compensation, and Liability Act, Resource Conservation and Recovery Act, Endangered Species Act, Marine Mammal Protection Act, Migratory Bird Treaty Act, Magnuson-Stevens Fishery Conservation and Management Act, National Fishing Enhancement Act, as well as acts designed to protect historical and ecologically important resources, including the National Marine Sanctuaries Act, Antiquities Act, Abandoned Shipwrecks Act, Archeological Resources Protection Act, and National Historic Preservation Act.

In addition to the MMS, other federal agencies and departments having influence on operations on the OCS are: Department of Transportation, Department of Homeland Security (Customs and Border Patrol, U.S. Coast Guard), Department of Commerce (National Oceanic and Atmospheric Administration, National Marine Fisheries Service), Department of Interior (Fish & Wildlife Service), Department of the Army (Corps of Engineers), Federal Energy Regulatory Commission (FERC), Environmental Protection Agency (EPA), Department of Labor, Occupational Safety and Health Administration.

State agencies involved in OCS operations include: Departments of Natural Resources, Offices of Conservation, Departments of Environmental Quality, State Mineral Boards, State Land Offices, Railroad Commission, and various local government entities.

Question 6. We've heard the U.S. ranks very high in environmental stewardship. How high does the U.S. rank in terms of applying its stewardship policies in such a way as to provide certainty to the process of leasing and developing the OCS?

Answer. The United States has well developed and understood environmental laws and regulations which have directed leasing and development in the OCS for many decades. US OCS environmental regulatory programs are looked at as models by some countries new to offshore energy development.

The National Environmental Policy Act (NEPA) has provided the framework for environmental policymaking since 1969. Minerals Management Service (MMS) produces NEPA documents for each of the major stages of energy development planning—from the overarching 5 Year Leasing Program EIS, through each of the NEPA documents for the energy lease sales, exploration, development and production plans. The MMS Environmental Studies Program has conducted environmental research in support of the NEPA process for over 35 years. Federal and state agencies participate in the NEPA process as cooperating or consulting agencies. And public comment is an important part of the process.

Stewardship is recognized as high in part because of the comprehensive nature of the NEPA analysis. Environmental, biological, archaeological, socioeconomic, and geological conditions or potential conflicts, or other information that might bear upon the potential leasing, exploration, and development of the program area and vicinity are considered and addressed. The NEPA process used for leasing and development aides in delivering certainty by providing a balanced forum for early identification, avoidance, and resolution of potential conflicts.

ATTACHMENT I.—OUTER CONTINENTAL SHELF (OCS) RESOURCE ASSESSMENT PROPOSAL

MAY 1ST, 2009

Congressional and Administration officials have called for an updated resource assessment of the US Outer Continental Shelf (OCS). By far, the most powerful tool in assessing oil and gas potential on the OCS is marine seismic data. Current resource assessments are based on data which were acquired 20 to 30 years ago. Seismic technology has improved dramatically in the intervening period, as has the understanding of deepwater exploration potential. New data will provide valuable insights into the crustal structure and geology of the OCS, and help to ″refresh″ existing geophysical and well log databases.

- New seismic data is the enabling technology to help both government and industry deliver timely and more accurate resource assessments on which to base a new MMS Five-year Leasing Plan.
- Seismic acquisition programs should be scaled appropriately for the different phases of evaluation in order to minimize costs and environmental impacts. For example:

  —A logical first step is to acquire low-density, two-dimensional (2D) regional seismic data via an Environmental Assessment (Note: An EA determines if significant impact may occur requiring an Environmental Impact Statement)
  —Areas with greatest exploration potential would be high-graded, and subsequently, high density 2D or three dimensional (3D) seismic would be acquired in focused areas where prospectivity is demonstrated. Such activities would be part of a Programmatic Environmental Impact Statement (PEIS), which could take up to two years to complete and cover multiple Geophysical & Geological (G&G) activities. PEIS should be undertaken in a timely manner along the East and West Coasts in support of future exploration activity.

- If required, a Steering Board of government and industry experts could be formed to guide the design and development of the seismic acquisition. This would ensure government access to, and input from subject matter experts.

Regional framework and 2D seismic

To the best of our knowledge, no significant industry seismic data has been acquired off the US East Coast in 30 years, West Coast and south Alaska in over 20 years. A regional 2D, long record length (to enable deep imaging) sparsely spaced seismic grid will provide much-needed and timely data to enable an improved and updated resource assessment. This data will serve to "refresh" and tie existing vintage seismic data, provide insights into deep crustal structure and will enable us to better tie existing seismic datasets into a common framework.

Figure 1* is an example of a "vintage" 2D seismic section compared with a modern (2006) 2D section. These sections are a cross section, or vertical slice, through an offshore basin. Please note the detailed geology revealed in the modern 2006 section, where the deeper geology reveals both insights into the crustal structure as well as a new play type.

Timing: This type of survey can be obtained under an Environmental Assessment. This would enable the acquisition of new data within 6-12 months, beginning as early as 3Q 2009.

Funding model: Industry could fund the low-density 2D program as a speculative seismic shoot and data would be provided at no cost to MMS by the seismic contractor.

Survey Design: Wide spacing (a seismic line every 50-100 miles).

Potential Environmental Impacts: Wide seismic line spacing minimizes environmental impacts. Impacts will be addressed in the Environmental Assessment and Incidental Harassment Authorization (IHA). Mitigation and monitoring requirements will be identified during consultation processes with US Fish and Wildlife, National Marine Fisheries Service and state Coastal Zone Management agencies. Typical mitigation during seismic acquisition includes marine mammal observers, ramp up procedures and exclusion zones.

Resource assessment

Regional evaluation enables geoscientists and engineers to generate an updated resource assessment of the oil and gas potential of the OCS. This will help focus further exploration activity in the most prospective areas and down-grade/eliminate

*All figures have been retained in committee files.

other areas, thus reducing overall cost and environmental impacts of an offshore leasing program. New seismic data, combined with global exploration insights gained over the past 3 decades, will certainly reveal new exploration concepts. A Steering Board of subject matter experts, as mentioned previously, could be utilized to ensure robust seismic acquisition.

Forward timeline, data requirements and links to a 5 year plan

In the MMS draft 2010-2015 5 year plan, East and West Coast area-wide sales will begin in 2012. Area-wide Programmatic Environmental Impact assessments for the East and West OCS (including S. Alaska) could be initiated as early as mid-2009, and would require at 18-24 months for completion. While a PEIS could not be in place for a timely regional assessment of offshore oil and gas resources, this would provide a robust environmental assessment in support of future focused 2D or 3D seismic.

New regional seismic, coupled with existing seismic, will not be sufficient to define prospects in all areas of the OCS. However, process of high-grading on sparse, widely spaced data, then focusing dense 2D or 3D seismic over the most prospective areas is a typical practice of the petroleum industry. This process is efficient in terms of time, cost and environmental impact, because it focuses activity into only those areas that are deemed as prospective. This could be funded as a ″speculative″ seismic project, where a number of companies share the costs. The data is owned by the acquiring geophysical company, shared with the MMS and can be purchased by any interested party.

ATTACHMENT II.—BP COMMENTS

BP AMERICA INC.,
GULF OF MEXICO EXPLORATION,
Houston, TX, November 24, 2009.

Mr. MARSHAL ROSE,
Chief, Economics Division, Minerals Management Service (MS-4050), 381 Elden Street, Herndon, VA.

Subject: Comments on the Proposed Changes in Lease Terms, Proposed Notice of Sale 213, Central Planning Area, Gulf of Mexico

DEAR MR. ROSE: The Minerals Management Service (MMS) has proposed that oil and gas Lease Sale 213 for the Central Gulf of Mexico (GoM) Planning Area be held March 17, 2010. The Proposed Notice of Sale 213 published in the Federal Register on November 16, 2009 includes a revision of lease terms for the blocks in water depths of 400 meters to less than 1600 meters. Under the proposal, blocks in 400 to 800 meters are proposed to change from an 8-year lease term to a five-year initial lease term, where commencement of an exploratory well would extend the lease term to eight years. Furthermore, blocks in 800 to less than 1600 meters are proposed to change from a ten-year initial lease term to a seven-year initial lease term, where commencement of an exploratory well would extend the lease term to ten years.

Retain current lease terms

BP America strongly supports a continuation of the regular leasing program in the central and western GoM—the region has been safely and reliably producing oil and natural gas for the nation for over 50 years. However, we are very concerned about reducing lease terms. We urge MMS to reconsider this proposal. We believe the appropriate approach is to retain the current lease term structures for these waters because they have served the US Government and industry well. Stable and predictable leasing structures have encouraged significant investments which have led to a dramatic increase in production in the GoM over the past decade. Today, the GoM accounts for almost one quarter of the oil produced in the US. Key to the success has been a stable leasing program, including lease terms that do not change from one sale to another.

Potential for significant unintended consequences

We believe that the proposed reduction of lease terms could produce serious unintended detrimental consequences. The proposal will likely impactthe overall attractiveness ofthe GoM in comparison with other areas around the world. If the region becomes less attractive for investment, this will result in a reduction in revenues to the US Treasury from lower bonus bids on leases, reduced lease rental payments, and lower royalty payments. Furthermore, limiting the terms of leases in water depths up to 1600 meters will likely result in the drilling of fewer exploration wells. Fewer exploration wells will result in fewer discoveries, fewer development

projects, and less production. This will cause the US to import more oil from other locations where environmental laws are less stringent. The US balance of trade would also be negatively impacted, fewer jobs will be created, and US energy and national security could be undermined.

Policies that drive companies to drill additional wells merely to retain or extend shortened lease terms will result in a waste of resources simply for the purpose of extending the term ofthe lease. This is inconsistent with the Congressional declaration of policy found in §1332 of the Outer Continental Shelf Lands Act, particularly Congress' stated policy of ". . .expeditious and orderly development, subject to environmental safeguards, in a manner which is consistent with the maintenance of competition and other national needs. . ." This could also lead to inefficiencies in the GoM drilling sector and unnecessary environmental risks.

GoM complexity demands regulatory flexibility

The GoM is one of the most complex oil and gas basins in the world. This complexity is demonstrated by very deep, subsalt, high pressure and high temperature reservoirs that are currently being explored and appraised. It was not until earlier in this decade that the industry was able to position exploration wells and appraise discoveries in complex subsalt and high pressure strata. The complexity of the subsurface requires long periods of time to acquire and process seismicim ages before being able to safely design and execute wells which today take at least a year to plan. Therefore, past experiences regarding the timeframes from lease acquisition to the first exploration well are not appropriate analogues for the present and the future.

Water depth should not be the only driver

We believe that water depth should not be the primary driver of lease terms. More often than not, it is the subsurface difficulties associated with imaging and drilling designs that require industry to need more time to image, plan, and execute the drilling of deep water wells. We believe this fact is recognized by MMS, and especially so in the deep water and ultra deep gas plays on the shelf. MMS has issued Notices to Lessees and Suspensions of Operations regarding the evaluation, planning and drilling of ultra deep gas wells on the shelf. In doing so, MMS has acknowledged that these operations are as challenging as those in the deep water even though the leases are in less than 200 meters of water.

Technology challenges require time to overcome

Industry has always operated on the cutting edge of technology. This is more the case today than ever before. Due in large part to advances in seismicim aging, deep water drilling technology and production systems technology, the industry is able to explore previously inaccessible areas of the GoM. The chalenges of operating in deeper water, subsalt, and at higher temperatures and pressures are extraordinary. The fact remains, new supplies are harder to find, more difficult and more expensive to extract and take much more time and resources of all kinds to bring online, not less. These facts call for a more flexible leasing program , not one which is more restrictive.

Drilling costs are increasing

Today, exploration wells cost between $100 and $250 million each and take several years to plan and execute. On average, only one in three exploration wells will find sufficient commercial quantities of oil and gas to develop. When discoveries are made, the projects that bring them to production often require the development of new technology. These projects are hugely expensive and require many years to deliver. This said, the projects are being delivered with a safety and environmental record that would be the envy of any industry.

Next generation of discoveries will require more time

The next generation of discoveries in the GoM will require more time and more investment to move from discovery to production. Today, exploration wells in the GoM target reservoirs lying as much as 6 to 7 miles below sea level. Water depth is just one element of increased complexity. Subsurface challenges associated with seismic imaging and drilling designs have an even more significant impact on the time and investment required. As the remaining resources become increasingly difficult to discover, and more challenging and expensive to develop, stable and predictable leasing, regulatory, and fiscal regimes will continue to be important to successful oil and gas resource development.

Ten year lease terms are critical

Today, the significant amount of uncertainty involved, and the technology and investment required justify the full 10-year lease term. As we move to deeper and more chalenging environments, whether they be on the shelf or in deepwaters, there is no reasonable logic for shorter lease terms.

Kaskida example

With more difficult to image and deeper prospects our recent successes like Kaskida clearly demonstrate that it may take a full ten years from the initial lead identification and lease acquisition to drill the exploration well . It took ten years for us to produce a seismic image of sufficient quality to safely plan and execute the exploration well at Kaskida (see timeline below).* We believe this will be a typical timeline for many future GoM prospects.

New play concepts will be discouraged

The current ten-year lease term for deepwater areas of the GoM enables industry to adequately evaluate new play concepts. Examples include recent success in assessing the Paleogene/Lower Tertiary plays where industry has discovered billions of barrels of oil and gas in-place. New play concepts require sufficient time, investment and technology to be properly assessed and tested. Often, one well is selected to test a play concept; however, there is a group of related prospects on other leases which are dependent upon the outcome of the play test. If lease terms are reduced, the incentive to pursue new play concepts will be severely diminished as industry will be less likely to test a single prospect in a new play if they do not hold a portfolio of leases with "follow-on" prospectivity.

Hub developments

While conventional plays in the GoM mature, field sizes are decreasing. As a result, in order to make a discovery economically viable it is often required that multiple discoveries are tied together into a single hub, or production facility. Such circumstances require that industry has the time and flexibility to mature each of these opportunities individually. This concept is demonstrated by BP's Nakika development, which includes six separate fields tied together into a common host/hub facility. None of these fields was economic on its own. However, the hub concept enabled collective development. Under the proposal, industry will be discouraged from pursuing such opportunities because ofthe lack of time available to fully explore and appraise multiple fields.

Escalating rental rates

The Notice also includes new, escalating rental rates for leases in the GoM. BP is concerned about what we see as a trend toward higher levels of government take. This includes recent increases in royalty rates on leases across the GoM, new taxes on GoM production being contemplated by Congress and the administration, and escalating rental rates. These actions, when combined with a reduction in lease terms, have the undesired effect of decreasing the competitiveness of the GoM. We urge MMS to retain the existing rental rate structure.

Conclusion

Technology has been, and will continue to be, the key to our energy future. We must continue to invest in exploration and production capability, and in technology to meet demand. We must also continue to develop technologies to increase recovery of oil and gas from established hydrocarbon positions in the US. To encourage and ensure continued success, we must have stable leasing, fiscal, and regulatory policies so that the oil and gas industry can continue to maintain investments which create jobs, generate revenues and enhance US energy and national security.

BP appreciates the opportunity to comment on the Proposed Notice of Sale 213. In order to enhance the nation's economic, energy, and national security, the U.S. clearly needs to aggressively expand offshore access and open all available areas to oil and gas leasing, exploration and development, rather than limiting the opportunities by reducing lease terms. A dramatic change in policy with regard to lease terms, as proposed in the Notice, sends the wrong signal to industry and undermines the confidence built in the leasing program overdecades. Again, BP urges the

*Graphic has been retained in committee files.

MMS to reconsider this proposal and retain the current lease term structure. We would welcome the opportunity to further discuss our comments.

Sincerely,

DAVID I. RAINEY,
Vice President.

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