THE SCIENCE BEHIND DISCOVERY: SEISMIC EXPLORATION AND THE FUTURE OF THE ATLANTIC OUTER CONTINENTAL SHELF

OVERSIGHT HEARING

BEFORE THE

SUBCOMMITTEE ON ENERGY AND MINERAL RESOURCES

OF THE

COMMITTEE ON NATURAL RESOURCES
U.S. HOUSE OF REPRESENTATIVES

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CONTENTS

OVERSIGHT HEARING ON THE SCIENCE BEHIND DISCOVERY: SEISMIC EXPLORATION AND THE FUTURE OF THE ATLANTIC OUTER CONTINENTAL SHELF

Friday, January 10, 2014
U.S. House of Representatives
Subcommittee on Energy and Mineral Resources
Committee on Natural Resources
Washington, DC

The subcommittee met, pursuant to call, at 9:30 a.m., in room 1324, Longworth House Office Building, Hon. Doug Lamborn [Chairman of the Subcommittee] presiding.

Present: Representatives Lamborn, Wittman, Thompson, Benishek, Duncan, Flores, Holt, Costa, Tsongas, Huffman, Lowenthal, Hanabusa, and Clark.

Also Present: Representative Pallone.

The CHAIRMAN. The committee will come to order. The committee notes the presence of a quorum, which under Committee Rule 3(e) is two members.

The Subcommittee on Energy and Mineral Resources is meeting today to hear testimony on an oversight hearing entitled "The Science Behind Discovery: Seismic Exploration and the Future of the Atlantic Outer Continental Shelf." Under Committee rule 4(f), opening statements are limited to the Chairman and Ranking Member of the subcommittee. However, I ask unanimous consent to include any other members' opening statements in the hearing record if submitted to the clerk by close of business today.

Hearing no objection, so ordered.

I also ask unanimous consent that Representative Pallone be allowed to participate in today's hearing at such time as he may be able to be here.

Hearing no objection, so ordered. I now recognize myself for 5 minutes.

STATEMENT OF THE HON. DOUG LAMBORN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF COLORADO

The CHAIRMAN. As we begin today's hearing, I want to make sure that everyone was clear about the focus of this hearing, particularly in light of recent discussions related to crude oil exports.

While America is in the beginning of a new energy renaissance, this committee has continued to focus on the fact that this resurgence has taken place primarily on State and private lands. Meanwhile, the potential jobs and domestic production from Federal land has been stifled by this administration. If America wants to continue to reap the economic rewards of increased oil and natural gas production, we must eliminate the red tape and other barriers that

continue to lock up the vast resources of our Federal lands and waters.

However, the topic of crude oil exports has become an important discussion point, especially in this past week. I think we all need to keep in mind that each day, while the Obama administration continues to hold hostage our domestic resources, America imports nearly 7.5 million barrels of oil from Arab sheiks and Latin dictators. This amounts to nearly one $1 billion each day flowing from the pockets of everyday Americans to petrol dictators and enemies of America who fund terrorists around the world.

We have a choice, we can stop buying their oil by producing more here at home, something I support and something unfortunately this administration has opposed at almost every step.

Let me be clear, I support free trade. I also support America energy independence, and that is a road we are on, but we are still far from our goal. As long as the administration continues to stifle our domestic development on Federal lands, our fight to create jobs and open our resources must be the focus of our efforts.

As long as American's hard-earned dollars are funding terrorists and petrol dictators, we must fight to open and develop our domestic resources, and that fight is not over. I hope the day comes soon where we can discuss oil exports. But as long as 85 percent of our Outer Continental Shelf remains closed by this administration, as long as less than 2 percent of our Federal onshore mineral estate is available for leasing, as long as the administration drives out research and development investment on new sources of energy like domestic oil shale, those discussions are premature. Our focus should remain on creating American jobs and producing American resources for American consumers.

This hearing today is a central focus of that agenda. A clear understanding of the resources in the Atlantic Ocean will help us know what areas we should develop and what resources America holds in our OCS. However, although the process of developing the Programmatic Environmental Impact Statement, or PEIS, for seismic started in 2009, the Obama administration has dragged its feet.

Now as we start 2014, we are just 1 year from the start of the development of the 2017–2022 5-year plan. We are 1 year from needing the data this PEIS is supposed to help us secure, yet the development is being stifled by the administration. If we hope to see the Atlantic included in the next 5-year plan, the administration must move forward immediately and rapidly.

In any kind of decisionmaking, I think we can all agree that decisions, especially those which will greatly impact our Nation's future, must be made with the best available data. In the case of the Atlantic OCS, the best available data cannot yet be obtained because we await a final record of decision from the Department of the Interior. Nearly 5 years ago to the day, January 21, 2009, the DOI issued the initial Notice of Intent to prepare the PEIS in order to enable the permitting of seismic activity in the Atlantic. Dr. Cruickshank will recall the issuance of this notice as he was with the Department at the time. When it takes our Canadian allies to the north only 6 months to issue a seismic permit, the obvious

question remains: 5 years and counting, when will the U.S. Atlantic finally see this activity? Five years and counting.

I fully expect that some of my colleagues on the minority side will likely decry seismic research because, much like our President, they actually do not wish to see new energy development in the U.S. Outer Continental Shelf outside of the Gulf of Mexico. But I would remind them that today's hearing is focused primarily on sound science and progress. The technology behind seismic surveying has come a long way from the technology employed in the late 1970s and early 1980s, when it was last conducted in the Atlantic.

In an increasing competitive global market, where allies like Canada and Mexico have made recent announcements about increasing their offshore oil and gas production, we need to know that the agencies that oversee our OCS operations are doing their jobs efficiently and spending taxpayer dollars wisely. We need to know that our country is maintaining its competitive edge and attracting economic development and the thousands of jobs that come with it. A recent study estimates that offshore energy development in the Atlantic alone could generate 280,000 jobs, $24 billion per year to the economy, and 1.3 million barrels of oil and natural gas production per day.

What I hope to find today is that the administration is not standing in the way of permitting advanced and safe technology, which is already employed in the Gulf of Mexico and the Canadian Atlantic to scientifically determine what kind of resources are contained in the Mid- and South Atlantic Outer Continental Shelf planning areas. These are the only areas that the PEIS covers. This information is of fundamental importance as this Congress and this administration make decisions going forward. I cannot imagine a single person who would choose ignorance over scientific discovery.

[Prepared statement of Mr. Lamborn follows:]

PREPARED STATEMENT OF THE HON. DOUG LAMBORN, CHAIRMAN, SUBCOMMITTEE ON ENERGY AND MINERAL RESOURCES

As we begin today's hearing, I wanted to make sure that everyone was clear about the focus of this hearing—particularly in light of the recent discussions related to crude oil exports.

While America is in the beginning of a new energy renaissance, this committee has continued to focus on the fact that this resurgence has taken place primarily on State and private lands. Meanwhile, the potential jobs and domestic production from Federal land has been actively stifled by this administration. If America wants to continue to reap the economic rewards of increased oil and natural gas production we must eliminate the red tape and barriers that continue to lock up the vast resources of our Federal lands and waters.

However, the topic of crude oil exports has become an important discussion point, especially this past week. I think we all need to keep in mind that each day, while the Obama administration continues to hold hostage our domestic resources, America imports nearly 7½ million barrels of oil from Arab Sheiks and Latin Dictators. This amounts to nearly $1 billion each day flowing from the pockets of everyday Americans to petrol dictators and enemies of America who fund terrorists around the world.

We have a choice, we can stop buying their oil by producing more here at home, something I support and something this administration has steadfastly opposed at every step.

Let me be clear, I support free trade. I also support American energy independence and that is a road that we are on, but we are still far from our goal. As long as the administration continues to stifle our domestic development on Federal lands our fight to create jobs and open our resources must be at the center of our efforts.

As long as American's hard earned dollars are funding terrorists and petrol dictators we must fight to open and develop our domestic resources—and that fight is not over. I hope the day will come where we can discuss oil exports, but as long as 85 percent of our OCS remains closed by the administration, as long as less than 2 percent of our Federal onshore mineral estate is available for leasing, as long as the administration drives out research and development investment in domestic oil shale, those discussions are premature. Our focus should remain on creating American jobs and producing American resources for American consumers.

This hearing today is a central focus of that agenda. A clear understanding of the resources in the Atlantic Ocean will help us know what areas we should develop and what resources America holds in our OCS. However, although the process of developing the Programmatic Environmental Impact Statement or PEIS for seismic started in 2009, the Obama administration has actively dragged their feet. Now as we start 2014, we are just 1 year from the start of the development of the 2017–2022 5-year plan. One year from needing the data this PEIS is supposed to help us secure, yet the development is being stifled by the administration. If we hope to see the Atlantic included in the next 5-year plan, the administration must move forward quickly.

In decisionmaking, I think we can all agree that decisions, especially those which will greatly impact our Nation's future, must be made with the best available data. In the case of the Atlantic OCS, the best available data cannot yet be procured because we await a final record of decision from the Department of the Interior. Nearly 5 years ago to the day, January 21, 2009, the DOI issued the initial notice of intent to prepare the PEIS in order to enable permitting seismic activity in the Atlantic. Dr. Cruickshank likely will recall the issuance of this notice as he was with the Department at the time. When it takes our allies to the North only 6 months to issue a seismic permit, the obvious question remains: 5 years AND COUNTING, when will the U.S. Atlantic finally allow this activity?

I fully expect that some of my colleagues on the minority side will likely decry seismic research because, much like our President, they do not wish to see new energy development in the U.S. OCS outside of the Gulf of Mexico. But I would remind them that today's hearing is focused primarily on sound science and progress. The technology behind seismic surveying has come a long way from the technology employed in the late '70s and early '80s—when it was last conducted in the Atlantic. In an increasingly competitive global market, where allies like Canada and Mexico have made recent announcements about increasing their offshore oil and gas production, we need to know that the agencies that oversee our OCS operations are doing their jobs efficiently and spending taxpayer dollars wisely. We need to know that our country is maintaining its competitive edge and attracting economic development and the thousands of jobs that come with it. A recent study estimates that offshore energy development in the Atlantic alone could generate 280,000 jobs, $24 billion per year to the economy, and 1.3 million barrels of oil and natural gas production per day.

What I hope to find today is that we are not spending millions of taxpayer dollars and countless years to stand in the way of permitting cutting edge, safe technology which is already employed in the Gulf of Mexico and the Canadian Atlantic to simply determine what kind of resources are contained in the Mid- and South Atlantic OCS Planning Areas—which are the only areas that the PEIS covers. This information is of fundamental importance as this Congress and this administration make decisions going forward—and I cannot imagine a single soul that would choose ignorance over scientific discovery.

The CHAIRMAN. I now yield 5 minutes to the gentleman from New Jersey.

STATEMENT OF THE HON. RUSH HOLT, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW JERSEY

Dr. HOLT. I thank the Chairman. Before I begin, I would like to welcome the committee's newest member, Representative Katherine Clark, filling the seat vacated by long time committee member and environmental champion, Ed Markey. I would like to ask unanimous consent to give Ms. Tsongas the opportunity to introduce our new member.

The CHAIRMAN. Seeing no objection, so ordered.

Ms. TSONGAS. Thank you, Mr. Chairman. It is my honor to introduce Congresswoman Katherine Clark, newly elected to represent Massachusetts' 5th Congressional District, a seat formerly held with such distinction by our former colleague and now U.S. Senator Ed Markey.

Katherine brings great experience in elective office, having previously been a school committeewoman, a State representative and a State Senator. Congresswoman Clark is a lawyer by training and as an elected official, is committed to her constituents, the issues affecting America's families and to our environment. It is great to have my colleague from Massachusetts join us on this committee.

Thank you and I yield back.

Dr. HOLT. Thank you, Representative Tsongas.

Mr. Chairman, 3 years ago this week the Presidential Commission on the BP Deepwater Horizon oil spill and offshore drilling released its final report on the causes and the lessons of the tragedy that claimed 11 lives and resulted in the release of nearly 5 million barrels of oil into the Gulf of Mexico, which some have called the greatest environmental disaster in the region ever.

That report concluded that the incident could have been prevented, that a culture of complacency had taken root with both drillers and regulators, and that significant reforms were urgently needed before we moved forward. The Commission made dozens of recommendations urging the oil and gas industry, the executive branch and Congress to take immediate action to assure that the appropriate levels of human safety and environmental protection were observed.

The Administration and the industry have, in large part, followed through. With more work needed, we still should fully enact the recommendations of the Oil Spill Commission. Congress, however, has lagged behind. In 2012, on the 2-year anniversary of the Deepwater Horizon explosion, the former commissioners assigned a grade of D, D as in Delta, to Congress, saying that "Congress did nothing about the many other critical issues the Commission identified to improve safety and environmental protection."

One year later the grade jumped to D-plus in recognition of the passage of the RESTORE Act, but the commissioners stressed that Congress had "provided neither the leadership nor the support" for efforts to make offshore drilling safer.

Today, we are seeing an example of that lack of leadership and support from the majority here. The Democrats have made improving offshore safety a priority since the tragedy. We passed the CLEAR Act that summer which would have enacted critical safety and environmental reforms. We brought forward a bill in 2011 to enact the recommendations of the Oil Spill Commission. Last year, I introduced the Big Oil Bailout Prevention Act to raise the recklessly low $75 million liability cap on offshore spills, and the Ocean Energy Safety and Technology Improvement Act to adopt recommendations from the National Academy of Sciences to promote the use of the best available and safest technology offshore. But the majority's main priority has been to open up more of our oceans to drilling. Even the one bill they passed that would have enacted any of the Commission's recommendations was mainly about forcing

lease sales in new areas, short-circuiting environmental reviews and putting up roadblocks to public protests.

Today, they turn their attention to the Atlantic and how to use seismic exploration as the first step toward opening up the entire Atlantic seaboard to drilling. I believe that would be a huge mistake. We should not be risking our fishing and tourism industries, sustainable industries that bring in over $45 billion each year and support half a million jobs in New Jersey alone because the energy companies want to get their hands on a quick oil buck, a little extra oil, that I might add the oil and gas industry has made clear they would rather export than use for the benefit of American consumers. Why should the fisheries, the tourism, the residents, the coastal businesses of the Atlantic ocean be burdened with all the risks while the reward goes to the foreign fossil fuel companies and consumers.

It is foolish to rush to open new areas to offshore drilling before we have heeded the lessons of the last disaster. Those lessons and those disasters keep coming. Just in the last 14 months, we have had two major offshore explosions in shallow water, one of which cost three offshore workers their lives. There have been a number of other losses of well control, as Dr. Boesch details in his testimony. Unfortunately, none of these have motivated the majority to hold any hearings on shallow-water drilling safety. That is unfortunate.

It is interesting that the Chairman says that production on Federal land is down. That is not true. Production on onshore Federal land is up by 35 percent. And as for offshore drilling, not only is it not surprising that it takes a while to recover from the greatest environmental disaster and safety debacle that we have seen, but we should be going slow to make sure that we do it right.

This obstinacy by the majority won't stop my efforts to draw attention to these issues, to push for adoption of serious, meaningful reforms to make offshore drilling safer, not just more prevalent.

I thank the witnesses for being here today.

[Prepared statement of Mr. Holt follows:]

PREPARED STATEMENT OF THE HON. RUSH D. HOLT, RANKING MEMBER, SUBCOMMITTEE ON ENERGY AND MINERAL RESOURCES

Mr. Chairman, 3 years ago tomorrow the Presidential Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling released its final report on the causes and lessons of the tragedy that claimed the lives of 11 offshore workers and resulted in the release of nearly 5 million barrels of oil into the Gulf of Mexico.

That report concluded that the incident could have been prevented, that a culture of complacency had taken root with both the drillers and the regulators, and that significant reforms were urgently needed. The Commission made dozens of recommendations, urging the oil and gas industry, the executive branch, and Congress to take immediate action to assure the appropriate levels of human safety and environmental protection in offshore drilling.

The Administration and the industry have, in large part, followed through. While more work needs to be done, they have enacted many of the recommendations made by the Oil Spill Commission.

Congress, however, has lagged woefully behind. In 2012, on the 2-year anniversary of the *Deepwater Horizon* explosion, the former Commissioners assigned a grade of D to Congress, saying "Congress did nothing about the many other critical issues the Commission identified to improve safety and environmental protection." One year later, the grade jumped to a D+ in recognition of the passage of the RESTORE Act, but the Commissioners stressed that Congress had "provided neither the leadership nor support" for efforts to make offshore drilling safer.

Today we are seeing an example of that lack of leadership and support from the Republican side. Committee Democrats have made improving offshore safety a priority since the tragic events of April 2010. We passed the CLEAR Act that summer, which would have enacted critical safety and environmental reforms. We brought forward a bill in 2011 to enact the recommendations of the Oil Spill Commission. Last year, I introduced the Big Oil Bailout Prevention Act to raise the recklessly low $75 million liability cap on offshore spills, and the Ocean Energy Safety and Technology Improvement Act to adopt recommendations from the National Academy of Sciences to promote the use of best available and safest technology offshore.

But the Majority's main priority is opening up more of our oceans to drilling. Even the one bill they passed that would have enacted any of the Commission's recommendations was mainly about forcing lease sales in new areas, short-circuiting environmental reviews, and putting up roadblocks to public protests.

Today, they turn their attention to the Atlantic, and how to use seismic exploration as the first step toward opening the entire Atlantic seaboard to drilling. I believe that would be a huge mistake. We should not be risking our fishing and tourism industries—sustainable industries that bring in over $45 billion each year and support over a half million jobs in *New Jersey alone*—because the energy companies want to get their hands on a little extra oil.

A little extra oil that, I might add, the oil and gas industry has made clear they would rather export than use for the benefit of American consumers, which some Republicans have said they would be more than happy to allow them to do.

It is foolish to discuss opening new areas to offshore drilling before we have heeded the lessons of the last disaster. Unfortunately, those lessons and those disasters keep coming. Just in the past 14 months there have been two major offshore explosions in shallow water, one of which cost three offshore workers their lives. There have also been a number of other losses of well control, as Dr. Boesch details in his testimony. Unfortunately, none of these have motivated the majority to hold any hearings on shallow-water drilling safety.

I believe that is unfortunate, but it will not stop my efforts to draw attention to these issues, and to push for adoption of serious, meaningful reforms to make offshore drilling safer, instead of more prevalent.

I thank the witnesses for being here today, and I yield back the balance of my time.

The CHAIRMAN. OK, I thank the gentleman. I would like to remind everyone that the subject of the hearing today is on the PEIS for the Mid- and South Atlantic areas only. These are the planning areas for the next 5-year plan.

OK. We will now hear from our witnesses. I will recognize Representative Duncan for a brief introduction of his witness from South Carolina.

Mr. DUNCAN. I want to thank the Chairman for this opportunity to introduce to the committee a fellow South Carolinian whom I have had the pleasure of meeting in Columbia, Dr. James Knapp.

Dr. Knapp is a professor of the Department of Earth and Ocean Sciences at the University of South Carolina specializing in the areas of structural geology, tectonics, geophysics and petroleum geology. He received a Bachelor of Science degree with Distinction in Geology from Stanford University and a Ph.D. in Structural Geology and Tectonics from MIT.

Before arriving at the University of South Carolina as an associate professor in 1998, Dr. Knapp spent several years working in the petroleum industry, both as a research and exploration geologist and as a member of the research faculty at Cornell University. He brings to the committee today expertise on seismic reflection and refraction data, structural analysis and geological data, as well as the application of geological and geophysical analysis for the exploration and production of hydrocarbons.

Dr. Knapp is married to Dr. Camellia Knapp, also of the Department of Earth and Ocean Sciences at USC where they are proud parents of two daughters. It is an honor to have him here today. Welcome, Dr. Knapp, and I look forward to your testimony.

The CHAIRMAN. Thank you. I would like to now welcome the remainder of the panel. Dr. Walter Cruickshank, Deputy Director of the Bureau of Ocean Energy Management; Mr. Paul Barnes, manager for Atlantic Canada and with the Canadian Association of Petroleum Producers; Mr. Richie Miller, President of Spectrum Geo, Inc.; and Dr. Donald F. Boesch, President of the University of Maryland Center For Environmental Science. Thank you all for being here.

Like all of our witnesses, your written testimony will appear in full in the hearing record, so I ask that you keep your oral statements to 5 minutes. Our microphones are not automatic so you need to turn them on when you are ready to begin.

I also want to explain how our timing lights work. When you begin to speak our clerk will start the timer and a green light will appear. After 4 minutes, a yellow light will appear and at that time you should begin to conclude your statement. At 5 minutes, the red light will come on.

Mr. Cruickshank, you may begin. Thank you again, all of you, for being here. If I could say one other thing first, we will try to conclude the hearing before votes. However, if those happen faster than we were anticipating, we may have to take a recess and come back. This is an important topic. We want to hear your testimony and we want to have adequate opportunity for all of us to be able to ask our questions. Thank you very much.

Dr. Cruickshank.

STATEMENT OF WALTER CRUICKSHANK, DEPUTY DIRECTOR, BUREAU OF OCEAN ENERGY MANAGEMENT, U.S. DEPT. OF THE INTERIOR

Mr. CRUICKSHANK. Good morning, Mr. Chairman, Ranking Member Holt and members of the subcommittee, and thank you for the invitation today to discuss the programmatic environmental impact statement for geological and geophysical activities on the Mid- and South Atlantic Outer Continental Shelf.

The Bureau of Ocean Energy Management is preparing a programmatic EIS to evaluate reasonably foreseeable environmental effects of multiple G&G surveys in the Mid- and South Atlantic. BOEM was directed to develop this programmatic EIS under the conference report for 2010 Interior appropriations. As described in the current 5-year program for offshore oil and gas leasing, the completion of this EIS is part of a region-specific strategy with respect to safe and responsible oil and gas exploration in the Mid- and South Atlantic that focuses on the need to update information in order to inform future decisions about whether, and if so, where, leasing would be appropriate in these areas.

The proposed action analyzed in the EIS is to permit G&G activities in support of potential oil and gas exploration and development, renewable energy, and marine mineral activities in the Mid- and South Atlantic planning areas.

The programmatic EIS is being prepared because BOEM currently has no NEPA coverage for permitting G&G activities in the Atlantic. BOEM has received 13 permit requests from 9 companies for seismic air gun surveys in the Mid- and South Atlantic to support oil and gas exploration. Given the scope of the proposed surveys and their potential impact, BOEM determined that a programmatic EIS is needed prior to permitting any significant new G&G surveys.

The offshore oil and gas industry is interested in acquiring modern G&G data and information because of the limitation of existing information which was acquired decades ago with now outdated technology. Modern technology allows for visualization and analysis of what lies beneath the seabed to greater depths and with greater clarity.

The surveys being analyzed in the programmatic EIS would allow for better understanding of the location and significance of potential oil and gas resources, inform engineering decisions regarding the construction of renewable energy projects, and support estimates regarding the composition and volume of marine mineral resources used for coastal restoration projects. This information would also be used to ensure the proper use and conservation of OCS energy resources and the receipt of fair value for any leases that might be offered in the future.

The main purposes of the programmatic EIS are to evaluate the potential environmental effects of multiple G&G activities in the Mid- and South Atlantic and to define mitigation and monitoring measures that would reduce or eliminate potential impacts. BOEM uses the best available science and follows the guidance of experts and other regulatory agencies such as the National Marine Fisheries Service. BOEM has also spent nearly $40 million over the last decade on research to better understand the potential for acoustic impacts on marine life from geophysical sound sources.

BOEM has also conducted programmatic consultation with NMFS and the Fish and Wildlife Service to assess impacts to endangered species in the central fish habitat. The results of these consultations will be considered in any decisions made by BOEM.

Further, if seismic surveys are allowed to go forward, operators must obtain and authorization from NMFS to assure compliance with the Marine Mammal Protection Act before BOEM issues a permit. These collective environmental compliance efforts help ensure that any activity that ultimately may be authorized do not rise to the level of jeopardizing populations or destroying important habitat.

An EIS of this scale and interest is a significant undertaking. The draft programmatic EIS was published in March of 2012 with a 90-day public comment period. We received over 55,000 comments, many with constructive and substantive suggestions. Responding to these comments involved a great deal of time, analysis and expertise.

During the development of this programmatic EIS, there has also been a significant amount of coordination with other Federal agencies with relevant expertise and authorities. BOEM completed a consultation with NMFS under the Endangered Species Act, an important consultation given the presence of the endangered North

Atlantic right whale throughout the proposed action area. The resulting biological opinion was issued in July 2013 contributing to the time taken to finalize this EIS. Both the programmatic EIS and the biological opinion will be used to support any future permit-specific environmental analyses.

Prior to the October government shutdown, BOEM was on target to release the final programmatic EIS on January 3rd. The shutdown occurred during a critical review time for finalizing the analysis and required the issuance of a stop work order to the contractor supporting our work. As a result, substantial momentum was lost and the schedule for publishing the EIS set back.

We are now on track to publish the final programmatic EIS by the end of February. Finalizing this document is a high priority for the Department and BOEM. This is a critical analysis relating to the safe and responsible acquisition of G&G data, and we expect that the collection of new seismic information will inform future decisionmaking about potential offshore leasing in the Atlantic.

Thank you, Mr. Chairman, and I would be happy to answer any questions.

The CHAIRMAN. OK, thank you.

[Prepared statement of Mr. Cruickshank follows:]

PREPARED STATEMENT OF WALTER CRUICKSHANK, DEPUTY DIRECTOR, BUREAU OF OCEAN ENERGY MANAGEMENT, U.S. DEPARTMENT OF THE INTERIOR

Chairman Lamborn, Ranking Member Holt, and members of the subcommittee, I am pleased to appear before you today to discuss the Programmatic Environmental Impact Statement (PEIS) for Geological and Geophysical (G&G) Activities in the Mid- and South Atlantic Outer Continental Shelf (OCS).

BACKGROUND

The Department of the Interior's Bureau of Ocean Energy Management (BOEM) is preparing a PEIS to evaluate reasonably foreseeable environmental effects of multiple G&G survey activities in the Mid- and South Atlantic OCS, pursuant to the National Environmental Policy Act (NEPA). BOEM was directed to develop this PEIS under the Conference Report for the Department of the Interior, Environment, and Related Agencies Appropriations Act, 2010 (Report 111–316). As described in the current Five Year Program for offshore oil and gas leasing, the completion of this PEIS is part of a region-specific strategy with respect to safe and responsible oil and gas exploration and development in the Mid- and South Atlantic that focuses on the need to update information in order to inform future decisions about whether, and if so where, leasing would be appropriate in these areas.

The proposed action analyzed in the PEIS is to permit G&G activities in support of potential responsible oil and gas exploration and development, renewable energy, and marine minerals in the Mid- and South Atlantic Planning Areas. This PEIS is being prepared because BOEM currently has no programmatic NEPA coverage for permitting G&G activities in Atlantic OCS waters. BOEM has received 13 permit requests from 9 companies for seismic airgun surveys in support of oil and gas exploration, and industry has expressed interest in expanding activities into Atlantic offshore waters. The PEIS also covers G&G activities necessary to support renewable energy projects and the identification of sand and gravel resources for coastal restoration projects, including in response to damage from Hurricane Sandy. Given the scope of the proposed surveys and their potential impacts, BOEM determined a programmatic EIS under NEPA is needed prior to permitting any new, significant G&G surveys.

The offshore oil and gas industry is interested in acquiring modern G&G data and information because of the limitations of existing information, which was acquired decades ago with now outdated technology. From 1966 to 1988, 2-dimensional (2D) seismic data were acquired in all areas of the Atlantic. The technology for acquiring and interpreting this data has been eclipsed by newer instrumentation and technology. Modern 2D and 3D data sets are acquired using better acoustic sources and longer receiving cables to better define subsea stratigraphy. In short, these advances

in G&G technology allow for visualization and analysis of what lies beneath the seabed to greater depths and with greater clarity. The surveys being analyzed in the PEIS would allow for better understanding of the location and significance of potential oil and gas resources, inform engineering decisions regarding the construction of renewable energy projects, and support estimates regarding the composition and volume of marine mineral resources. This information would also be used to ensure the proper use and conservation of OCS energy resources and the receipt of fair value to the American people for any leases that could be offered in the future.

POTENTIAL ENVIRONMENTAL EFFECTS AND MITIGATION

The main purposes of the PEIS are to evaluate the potential environmental effects of multiple G&G activities in the Mid- and South Atlantic and to define mitigation and monitoring measures that would reduce or eliminate potential impacts. BOEM uses the best available science and follows the guidance of experts and other regulatory agencies, such as the National Marine Fisheries Service (NMFS). BOEM has contributed nearly $40 million over the last decade on ground-breaking research to better understand the potential for acoustic impacts to marine life from geophysical sound sources. BOEM has also conducted numerous expert stakeholder workshops to discuss and identify further information needs on acoustic impacts.

BOEM also is pursuing programmatic consultations with NMFS and U.S. Fish and Wildlife Service to assess impacts under the Endangered Species Act (ESA) and the Magnuson-Stevens Fishery Conservation Management Act (MSFCMA). The results of these consultations will be considered in any decisions made by BOEM. Further, if seismic surveys are allowed to go forward, BOEM will confer with NMFS to assure compliance with the Marine Mammal Protection Act (MMPA) before issuing any permits. These collective environmental compliance efforts (e.g., NEPA, ESA, MMPA, MSFCMA) help ensure that any activities that may ultimately be authorized do not rise to the level of jeopardizing populations or destroying important habitat.

FINAL PEIS

A PEIS of this scale and interest is a significant undertaking. The draft PEIS was published for public comment on March 30, 2012, and the comment period closed on July 2, 2012, reflecting an extended 90-day period per commenter requests. Over 55,000 comments were received from a variety of industry, government and non-government stakeholder groups and the general public, many with constructive, substantive suggestions. Responding to these comments, therefore, involved a great deal of time, analysis and expertise.

During the development of the PEIS, there has also been a significant amount of coordination with other Federal agencies with relevant expertise and authorities in the Atlantic OCS. BOEM completed a consultation with NMFS under the ESA, an important consultation given the presence of the endangered North Atlantic right whale in the proposed action area. The resulting NMFS Biological Opinion was issued on July 19, 2013, which accounts, in part, for the time taken to finalize the PEIS. Both the PEIS and the ESA biological opinions will be used to support any future permit-specific environmental analyses.

Prior to the October government shutdown, BOEM was on target to release the final PEIS on January 3, 2014. The shutdown occurred during a critical review time for finalizing the PEIS and required the issuance of a stop work order to the contractor supporting BOEM's work on the PEIS. As a result, substantial momentum was lost and the schedule for publishing the PEIS set back. BOEM is now on track to publish the final PEIS by the end of February 2014.

CONCLUSION

Finalizing the PEIS is a high priority for the Department and BOEM. The PEIS is a critical analysis relating to the safe and responsible acquisition of G&G data, and we expect that the new collection of new seismic information will inform future decisionmaking about potential offshore leasing in the Atlantic.

Thank you again, Mr. Chairman, for inviting me to appear before your committee. I look forward to working with you as we advance these important issues.

The CHAIRMAN. Mr. Barnes.

STATEMENT OF PAUL BARNES, MANAGER, ATLANTIC CANADA, CANADIAN ASSOCIATION OF PETROLEUM PRODUCERS

Mr. BARNES. Thank you, Mr. Chairman. I would like to thank you for the invitation as well to bring a Canadian perspective to your subcommittee on this issue.

I represent the Canadian Association of Petroleum Producers, which is an association of oil and gas companies involved in exploration, development and production of oil and gas in Canada. Our members produce about 90 percent of Canada's natural gas and crude oil. Our head office is located in Calgary, Alberta, but we have a regional office based in St. John's, Newfoundland, which represents the Atlantic Canada region and primarily is involved in the offshore for Canada, and that is where I am based and represent. Our association is very similar to the American Petroleum Institute here in the United States.

Exploration for offshore oil and gas began off of Atlantic Canada in the 1960s, with the first offshore seismic program being undertaken in 1964. Since then, over 3 million kilometers, or approximately 1.9 million miles of seismic data has been acquired. This seismic data has led to a number of major discoveries of oil and gas in offshore Newfoundland and Labrador and of natural gas off of Nova Scotia, and those discoveries have brought substantial benefits to this area of Atlantic Canada.

Currently, our industry employs over 7,000 people directly and thousands more indirectly, and we have had cumulative expenditures since 1996 of over $31 billion in Newfoundland and Labrador from oil and gas activity and over $8 billion in Nova Scotia associated with that activity. And our impact on gross domestic product is huge, over 30 percent actually in Newfoundland and Labrador, which means a substantial amount of our activity is driven from oil and gas.

We have five major oil and gas production projects undergoing off of Atlantic Canada, three of which are oil and two of which are natural gas, and most of the product is actually exported here to the United States. There are also new basins as well that are opening up for exploration activity all along the Newfoundland and Nova Scotia area.

As you are aware, seismic surveys provide information on the depth, position and shape of underground geological formations that may contain oil and gas. Data is processed to improve the quality and filter out any background noise and the end result is a detailed picture of the underground structures and rock formations in the survey area.

Why are seismic surveys conducted? Well, they certainly help the oil and gas companies determine or decide whether the available information is sufficient to justify drilling an exploratory well or if additional surveys are needed to better define structures before drilling, or if the features present are not attractive enough to warrant further interest.

One of the concerns often expressed in Canada about offshore seismic acquisitions is what are the impacts of seismic surveys on marine life? While there has been substantial research that has been conducted to determine the impact on ocean life and additional research is ongoing, current research has indicated there is

minimal risk of mortality in marine mammals, fish and invertebrates, invertebrates being species such as crab, shrimp, lobster, those type of things.

Marine mammals, depending on the species and proximity, can experience temporary changes to hearing thresholds. Research has also indicated that there has been no mortality among invertebrates and that government, academia and industry continue to invest in research related to seismic impacts to further broaden the body of knowledge.

Recognizing there is concern, industry has undertaken a number of mitigation measures to reduce some of the risks associated with seismic activity. For example, air source arrays must be shut down immediately if an endangered marine mammal or sea turtle is observed within 500 meters or half a mile of a seismic vessel. Surveys must also be planned to avoid dispersion of any groups of spawning fish from known spawning areas.

Also seismic surveys in Atlantic Canada are scheduled during optimum weather conditions, which tends to be between June and September, largely because of the wave heights experienced in Atlantic Canada. Those are the very same months, of course, that there is an awful lot of offshore fishing activity, and we have put industry mitigation efforts in place to avoid conflict with the fishing industry. We have communication, direct communication with them, to allow them to understand where seismic activity is taking place. We have a single point of contact with the operator so that the fishing industry can have a specific person to speak with. We also have examiners on seismic vessels from the fishing industry so they can resolve any situations that may occur.

In conclusion, I wish to thank you for the invitation to present in front of you today. We have had seismic activity off of Canada for many, many years and have seen no impact and our activity continues.

The CHAIRMAN. Thank you for your testimony.

[Prepared statement of Mr. Barnes follows:]

PREPARED STATEMENT OF PAUL BARNES, MANAGER, ATLANTIC CANADA, CANADIAN ASSOCIATION OF PETROLEUM PRODUCERS

Marine Seismic Surveys: The Search for Oil and Gas Offshore Atlantic Canada

CANADIAN ASSOCIATION OF PETROLEUM PRODUCERS (CAPP)

- Represents Canadian upstream oil and gas sector (approximately 100 member companies)
- Members explore for, develop and produce natural gas, natural gas liquids, crude oil, and oil sands throughout Canada
- Members produce about 90 percent of Canada's natural gas and crude oil
- Key focus areas:
  - — Education
  - — Communications and outreach
  - — Policy and regulatory advocacy
  - — Industry performance
- Offices in St. John's, Ottawa, Calgary and Victoria

ATLANTIC CANADA OFFSHORE

- Bringing substantial benefits to region:
  - — Directly employs over 7,000 people (thousands more indirectly)
  - — Supports over 800 local supply/service companies
  - — Cumulative expenditures since 1996—over $31 billion in NL, over $8 billion in NS
  - — Impact of production on provincial Gross Domestic Product (GDP)
    - * Oil production accounts for 30 percent GDP in NL
    - * Mining and oil and gas production account for 2 percent of GDP in NS
- Five producing projects
- Exploration ongoing

WHAT IS A MARINE SEISMIC SURVEY?

- Uses sound energy to map geological structures under the seabed
- Vessels tow devices that use compressed air to produce pulses of high energy, low frequency sound waves
- Sound waves can penetrate more than 6,000 metres below the sea floor
- Travel through the water and into the rock layers beneath the seabed
- Bounce back to receivers ("hydrophones") that measure strength and return time
- Types of seismic surveys:
  - — Two dimensional (2D): Uses one sound source and one set of receivers
  - — Three dimensional (3D): Uses multiple synchronized sound sources and hydrophones
  - — Four dimensional (4D): Uses multiple synchronized sound sources and hydrophones with the added dimension of time (i.e., a 3D survey is conducted multiple times over the same location at different periods to compare data)
  - — Geohazard or well site survey: Uses one sound source and one set of receivers towed over a small area prior to drilling to check for possible hazards
  - — Vertical Seismic Profiles: Hydrophones are lowered into a drilled well and sound is produced at the surface to give a detailed view of the geology near the well bore

WHY ARE SEISMIC SURVEYS CONDUCTED?

- Seismic surveys provide information on the depth, position and shape of underground geological formations that may contain oil or gas
- Data is processed to improve the quality and filter out background "noise"
- End result is a detailed picture of the structures and rock formations in the survey area
- Geophysicists look for specific features that could indicate whether oil or gas might be present:
  - — Sedimentary basins
  - — Faults
  - — Ancient reefs or buried former beaches
- Seismic surveys help companies decide whether:
  - — The available information is sufficient to justify drilling an exploratory well
  - — Additional surveys are needed to better define the structures before drilling
  - — The features present are not attractive enough to warrant further interest
- Survey results do not show definitively whether oil or gas are present

WHAT ARE THE IMPACTS OF SEISMIC SURVEYS ON MARINE LIFE?

- Substantial research has been conducted to determine whether seismic surveys have an impact on ocean life and additional research is ongoing:

  - — Current research indicated there is minimal risk of mortality in marine mammals, fish and invertebrates
  - — Marine mammals, depending on species and proximity, can experience temporary changes to hearing thresholds and in some extreme cases these effects can be permanent
  - — Laboratory research conducted in NL show no mortality among invertebrates (crab, shrimp, scallop, etc.) but showed some non-life threatening physical effects
  - — Governments, academia and industry continue to invest in research to further broaden the body of knowledge
- Carefully designed mitigation measures are applied to seismic surveys to minimize risk to marine life

ENVIRONMENTAL PROTECTION

- Comprehensive Environmental Assessments (EAs) are completed prior to conducting surveys which must be approved by regulators
- Seismic vessels and their operators are guided by the *Statement of Canadian Practice with Respect to Mitigation of Seismic Sound in the Marine Environment*
  - — Outlines mitigation measures that must be considered in the planning of seismic surveys
  - — Examples:
    - * Air source arrays must be shut down immediately if an endangered marine mammal or sea turtle is observed within 500 metres
    - * Surveys must be planned to avoid dispersion of groups of spawning fish from known spawning areas

IMPACT ON FISHING AND MARINE INDUSTRIES

- Seismic surveys in the Atlantic Canada offshore must be scheduled during optimal weather conditions (June to September) because:
  - — Surveys cannot take place if waves are higher than 3 metres
  - — Rough seas affect quality of data
- June to September is also peak fishing season in Atlantic Canada
- Effective communication and coordination between petroleum and fishing industries is critical

PROACTIVE MECHANISMS IN PLACE TO MINIMIZE POTENTIAL CONFLICTS BETWEEN BOTH INDUSTRIES

- Fishing industry advised of marine seismic survey activity through direct communication and communiqués with fishing industry members, public service announcements, etc.
- In NL a single point of contact is appointed by the operator that fishers can go to for precise information about geographic location and potential impacts
- A fisheries liaison officer (FLO) may be required on board the seismic vessel—the FLO communicates directly with fishing vessels in the field to resolve situations where overlap and conflicts could occur
- Working with the fishing industry:
  - — In NL, *One Ocean* was created as a communication and liaison organization between fishing and petroleum industries
  - — Fisheries advisory committee in NS advises regulator on minimizing impact on fishing industry
- Compensation programs in place for damage to fishing vessels or gear

MORE INFORMATION AVAILABLE AT:

www.capp.ca
www.oneocean.ca

The CHAIRMAN. Dr. Knapp.

STATEMENT OF JAMES H. KNAPP, PH.D., CHAIR, USC FACULTY SENATE AND PROFESSOR, DEPT. OF EARTH & OCEAN SCIENCES, SCHOOL OF EARTH, OCEAN, & ENVIRONMENT, UNIVERSITY OF SOUTH CAROLINA

Dr. KNAPP. Good morning, Mr. Chairman, and thank you for the opportunity to be with you here today, and thank you, Congressman Duncan, for the very generous introduction. It is my great pleasure and high honor to be here this morning, and I thank you as well as the Ranking Member and the other members of the committee for this opportunity.

For the record, I am James H. Knapp, professor in the Department of Earth and Ocean Sciences in the School of the Earth, Ocean and Environment at the University of South Carolina, and I currently serve as the Chair of the Faculty Senate at the University of South Carolina Columbia campus.

At the risk of some repetition from the introduction, by way of background, I was born and raised in California, have lived in 6 and traveled to 49 States of this great country of ours, and through my profession as an Earth scientist, I have worked in or visited more than 40 countries. I hold a Bachelor of Science degree with distinction in geological sciences from Stanford University, and a Ph.D. in geology from the Massachusetts Institute of Technology.

From 1988 to 1991, I worked with Shell Oil, both in Houston, Texas, and in New Orleans, Louisiana, where I participated directly in oil and gas exploration in the Gulf of Mexico. For more than 20 years since then, my research team and I have carried out both fundamental and applied research in the design, acquisition, processing and interpretation of seismic surveys, both onshore and offshore.

Marine seismic surveys have been carried out in the United States and internationally for decades and represent the single most important tool for evaluating oil and gas potential in the subsurface. These surveys employ acoustic or sound energy to interrogate the subsurface of the Earth in much the same way that a doctor images the interior of a human body with a CAT, or a computerized axial tomography scan.

In the early days of seismic surveying, a typical success rate for wildcat wells was around 3 in 10. With the advent of 3D seismic surveys and in some cases even 4D seismic surveys, the success rate is now typically 7 out of 10, greatly changing our ability to evaluate subsurface resources.

In most cases, we now have significant confidence in not only the presence of a petroleum resource, but also the estimated volume and consequently the economic value of that resource before ever spudding a well, primarily as a result of seismic technology. In addition, scientific work within our research group in the past several years using onshore seismic and well data has called into question

more than 30 years of research on the Atlantic continental margin, suggesting that many previous interpretations of the geologic evolution were in error, and accordingly, so potentially is the estimate of the resource potential.

One of the most commonly cited criticisms of marine seismic operations is the punitive and adverse effect acoustic energy has on marine life and in particular, on marine mammals. Established in 1991, the Working Group on Marine Mammal Unusual Mortality Events under the aegis of the Office of Protected Resources with the National Oceanic and Atmospheric Administration, has formally identified a total of 60 marine mammal UMEs, unusual mortality events, in U.S. waters over the last 23 years.

In most cases, 29 of those 60, where a cause has been determined, infections and/or biotoxins were indicated. Of the 60 UMEs, not a single one has been attributed to marine seismic operations.

The incidence of UMEs is statistically the same between the Atlantic, Pacific and Gulf of Mexico regions during a period when extensive commercial seismic surveys have been conducted in the Gulf of Mexico, but not on the Atlantic and Pacific margins. The two States with the most declared UMEs are California and Florida, neither of which has been the site of commercial marine seismic acquisition during the period in which records have been compiled. These data, along with others, suggest that the contention that marine seismic surveys result in mass mortality events of marine mammals is likely a chimera.

The most recent estimates by the Bureau of Ocean Energy Management for the resource potential on the Atlantic OCS range from about 3.5 to 18 billion barrels of oil equivalent. Using seismic data from pre-1988, these estimates are undoubtedly conservative and lack the analysis which would be afforded through new state-of-the-art seismic data.

We face a truly historic opportunity to fairly evaluate the energy and mineral resource base of the Atlantic OCS through acquisition of new seismic surveys. In South Carolina, we are working to establish the Atlantic Coast Center for Energy Sustainability through Science and Engineering, or ACCESSE. Our vision is to develop a sustainable energy industry based on conventional, unconventional, renewable and alternative energy for South Carolina and the Southeastern region, helping to train a workforce and creating jobs based on locally derived energy resources.

There could be no more important first step than to initiate new seismic surveys on the Atlantic OCS, and we stand ready and able to help move that effort forward in the regional and national interest.

Thank you, Mr. Chairman. I appreciate the opportunity to be here and I will answer any questions.

The CHAIRMAN. We appreciate your testimony.

[The prepared statement of Dr. Knapp follows:]

PREPARED STATEMENT OF JAMES H. KNAPP, PH.D., PROFESSOR, SCHOOL OF EARTH, OCEAN & ENVIRONMENT, UNIVERSITY OF SOUTH CAROLINA

Good morning, Mr. Chairman and thank you both for the introduction and for the invitation to appear before this subcommittee today. It is my great pleasure and high honor to be here, and I thank you, as well as the Ranking Member and the other members of the committee for this opportunity. For the record, I am James

H. Knapp, Professor in the Department of Earth and Ocean Sciences in the School of the Earth, Ocean, and Environment at the University of South Carolina, and I currently serve as Chair of the Faculty Senate at the University of South Carolina Columbia campus.

EDUCATIONAL AND PROFESSIONAL BACKGROUND

By way of background, I was born and raised in California, have lived in 6 and traveled to 49 States, and through my profession as an Earth scientist, have worked in or visited more than 40 countries. I hold a Bachelor of Science degree with distinction in geological sciences from Stanford University, and a Ph.D. in geology from the Massachusetts Institute of Technology. From 1988 to 1991 I worked with Shell Oil, where I participated directly in oil and gas exploration in the Gulf of Mexico. For more than 20 years since then, my research team and I have carried out both fundamental and applied research in the design, acquisition, processing, and interpretation of seismic surveys, both onshore and offshore.

MARINE SEISMIC SURVEYING

Marine seismic surveys have been carried out in the United States and internationally for decades, and represent the single most important tool for evaluating oil and gas potential in the subsurface. These surveys employ acoustic, or sound, energy to interrogate the subsurface of the Earth, in much the same way that a doctor images the interior of a human body with a CAT (computerized axial tomography) scan (Figures 1 and 2). In the early days of seismic surveying, the typical success rate for wildcat wells was around 3 in 10. With the advent of 3–D seismic surveys, the success rate is now typically 7 out of 10, greatly changing our ability to evaluate subsurface resources. In most cases, we now have significant confidence in not only the presence of a petroleum resource, but also the estimated volume and consequently the economic value of that resource before ever spudding a well, primarily as a result of seismic technology.

In addition, scientific work within our research group in the past several years, using onshore seismic and well data, has called into question more than 30 years of research on the Atlantic continental margin, suggesting that many previous interpretations of the geologic evolution were in error, and accordingly, so is the estimate of the resource potential.

UME (UNUSUAL MORTALITY EVENTS)

One of the most commonly cited criticisms of marine seismic operations is the putative adverse effect acoustic energy has on marine life, and in particular on marine mammals. Established in 1991, The Working Group on Marine Mammal Unusual Mortality Events under the aegis of the Office of Protected Resources with the National Oceanic and Atmospheric Administration (NOAA) has formally identified a total of 60 marine mammal UMEs in U.S. waters over the last 23 years (Figure 3). In most cases (29) where a cause has been determined, infections and/or biotoxins were indicated (Figure 4). Of the 60 UMEs, not a single one has been attributed to marine seismic operations.

The incidence of UMEs is statistically the same between the Atlantic, Pacific, and Gulf of Mexico regions (Figure 5), during a period when extensive commercial seismic surveys have been conducted in the GOM, but not on the Atlantic and Pacific margins. The two States with the most declared UMEs are California and Florida, neither of which has been the site of commercial marine seismic acquisition during the period in which the records have been compiled. These data, along with others (Figure 6) suggest that the contention that marine seismic surveys result in mass mortality events of marine mammals is likely a chimera.

ECONOMIC POTENTIAL OF THE ATLANTIC OCS

The most recent estimates by the Bureau of Ocean Energy Management for the resource potential on the Atlantic OCS range from ~3.5–18 Bboe. Using seismic data from pre-1988, these estimates are undoubtedly conservative, and lack the analysis which would be afforded through new, state-of-the-art seismic data. We face a truly historic opportunity to fairly evaluate the energy and mineral resource base of the Atlantic OCS through acquisition of new seismic surveys. In South Carolina, we are working to establish the Atlantic Coast Center for Energy Sustainability through Science and Engineering (ACCESSE). Our vision is to develop a sustainable energy industry based on conventional, unconventional, renewable, and alternative energy for South Carolina and the southeastern region, helping to train a workforce and creating jobs based on locally derived energy resources. There could be no more im-

portant first step than to initiate new seismic surveys on the Atlantic OCS, and we stand ready and able to help move that effort forward in the regional and national interest.

ACKNOWLEDGEMENTS

Members of the Tectonics and Geophysics Lab (TGL) (Figure 8) contributed to this document, including Mr. Andrew Pollack and Ms. Susie Boote.

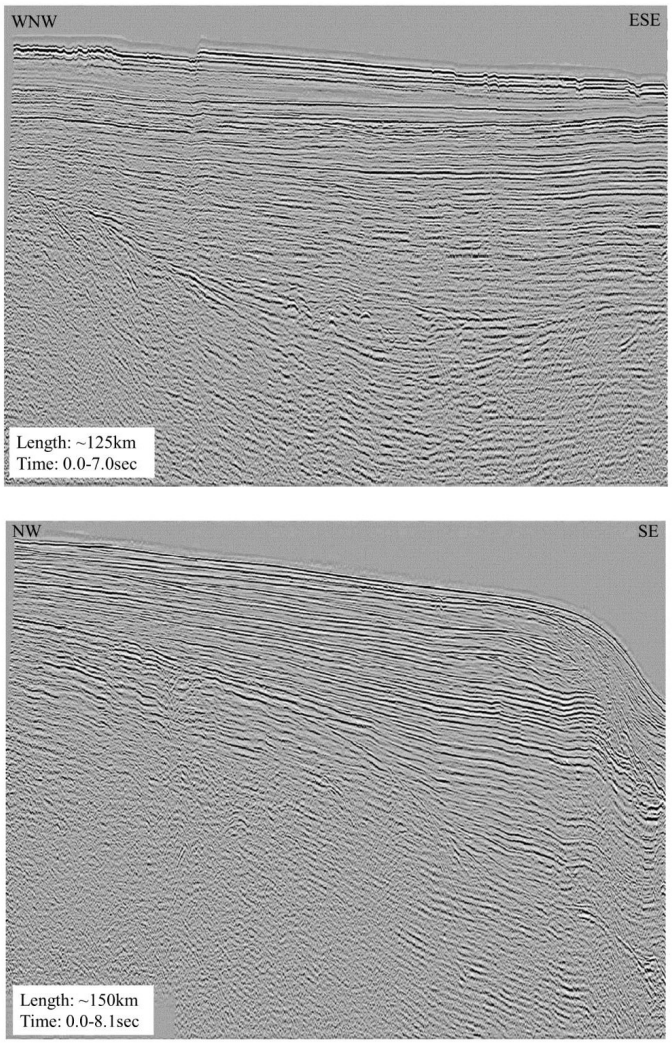

Figure 1. Examples of 2-D seismic reflection profiles showing subsurface sedimentary layers and geologic structures on the Atlantic margin, from legacy Atlantic OCS seismic surveys (courtesy of BOEM). Approximate depths imaged are 10-12 km (6-7 miles); sections are highly vertically exaggerated (note horizontal scale).

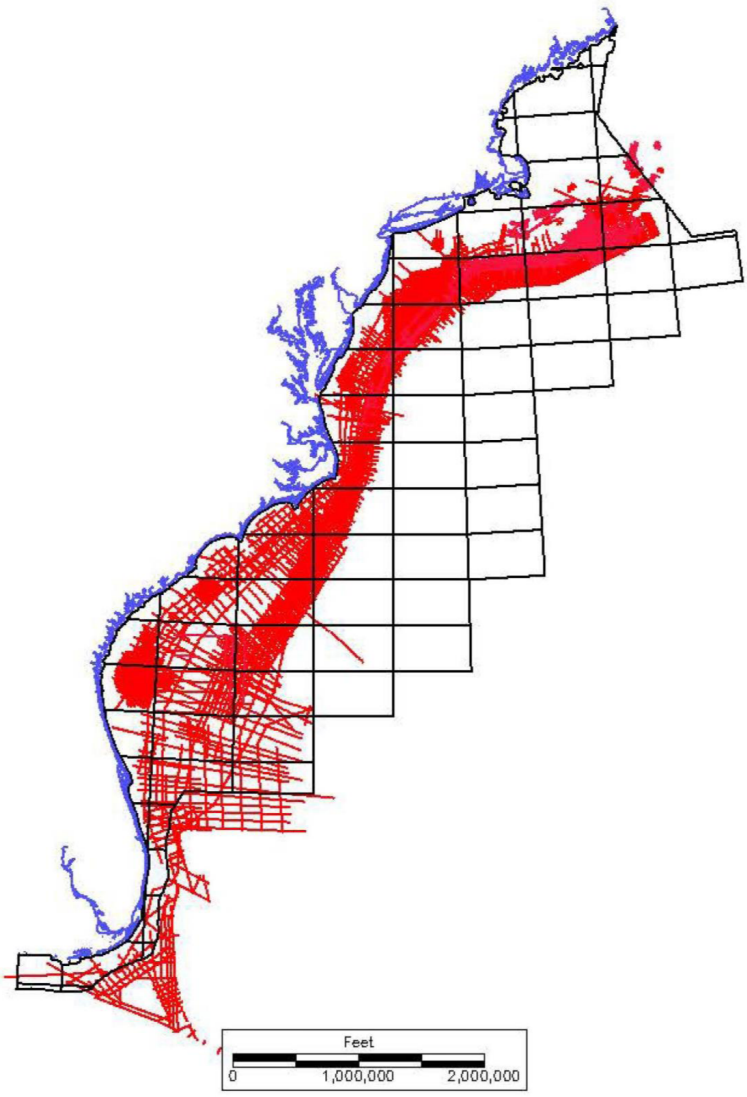

Figure 2. Map of legacy 2-D seismic data on the Atlantic OCS (courtesy of BOEM). Approximately 380,000 line km (240,000 line miles) of 2-D seismic data were collected in the Atlantic OCS between 1966 and 1988.

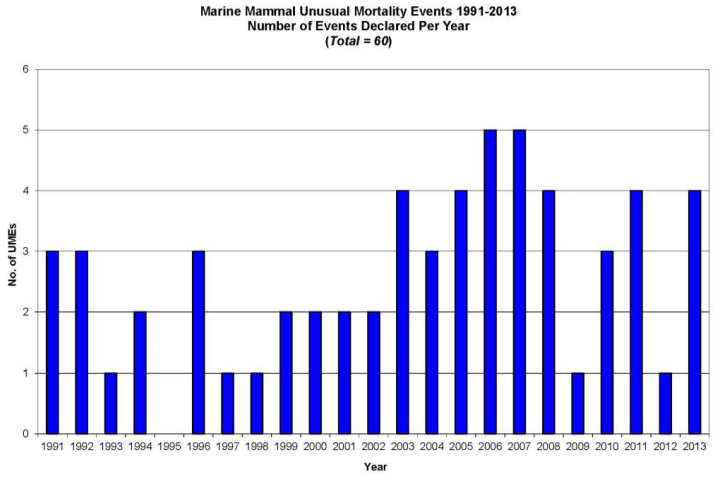

Figure 3. Number of reported Unusual Mortality Events (UME) in U.S. waters by year between 1991 and 2013 (NOAA Fisheries Office of Protected Resources; downloaded on 03 Dec 2013 from http://www.nmfs.noaa.gov/pr/health/mmume/).

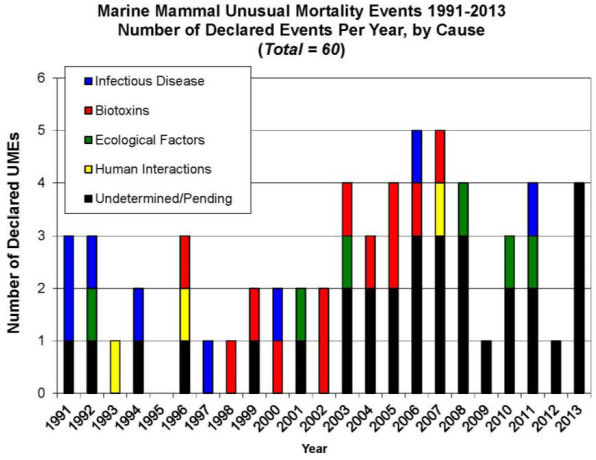

Figure 4. Cause of reported Unusual Mortality Events (UME) in U.S. waters (60 total) between 1991 and 2013 (NOAA Fisheries Office of Protected Resources; downloaded on 03 Dec 2013 from http://www.nmfs.noaa.gov/pr/health/mmume/).

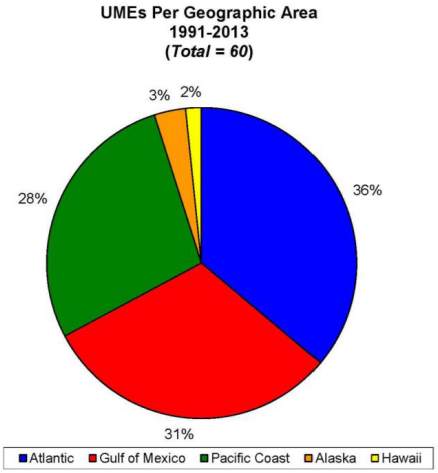

Figure 5. Percentage of reported Unusual Mortality Events (UME) in U.S. waters (60 total) by geographic area between 1991 and 2013 (NOAA Fisheries Office of Protected Resources; downloaded on 03 Dec 2013 from http://www.nmfs.noaa.gov/pr/health/mmume/).

Summary of observations of behavioural change in marine mammals in response to air guns and seismic surveys

Species	Location	Observation	Source	Received level	Range	Behaviour	Water depth	Prop.Model	Reference
Common dolphin	Irish Sea	Operating seismic	2D Seismic 2,120 cu. In.		>1 km	Reduced vocalisation rate within vocal range and/or exclusion within 1 km.	50-100 m		Goold (1996)
Bottlenose dolphin	Captivity		1 sec 20 kHz pulse	· 178 (75 kHz) dB-186 (3 kHz dB		Behavioural avoidance responses at 178 dB			Ridgeway et al. (1996)
Sperm whales	Southern Ocean	Opportunistic	Seismic 8x16l (263 dB re. 1 µPa –m)	· 112 dB	>300 km	Cessation of vocalisation in response to some instances of air gun activity	>500 m 50-100 m		Bowles et al. (1994)
Gray whales	California	Experimental playback	Seismic array	· 180 dB · 170 dB · 164 dB	1.2 km 2.5 kmc c.3.6 km	90% avoidance 50% avoidance 10 % avoidance by migrating whales			Malme et al. (1983, 1984)
Gray whales	Bering Sea	Experimental playback	Seismic array 1.64l, 226 dB	· 173 dB · 163 dB		50% avoidance 10% avoidance by summering whales			Malme et al. (1986, 1988)
Gray whales (western)	Sakhalin Island, Russia	Operating seismic		· <163db		Whales abandoned foraging site close to survey area and moved to main foraging area			Johnson (2002)
Bowhead whale	Beaufort Sea	Operating seismic	Seismic array	· 142-157	8.2 km	Behavioural changes. Changes in blow rates and dive patterns.			Various studies in Richardson et al. (1995)
Bowhead whale	Beaufort Sea	Operating seismic		· 152-178		Active avoidance. Swimming away from the guns and behaviour disrupted for 1-2 hrs.	30-60 m		"
Bowhead whale	Beaufort Sea	Operating seismic		· 125-133 dB	54-73 km	No avoidance behaviour but significantly shorter dives and surfacing periods.			"
Bowhead whale	Beaufort Sea	Operating seismic	560-1500 cu. in	· 120-130db	20-30km	Avoidance			
Humpback whale	S.E. Alaska	Experimental playback	Seismic gun 1.64L (226 dB)	· 150-169	<3.2 km	Short-term startle response. No clear avoidance at levels up to 172 dB re. 1m Pa effective pulse pressure level.			Malme et al. (1985)
Humpback whale	North West Cape, W. Australia	Operating seismic	Seismic array 44l (258 dB re. 1 µPa²-m p-p)	· 170 dB P-P · 162 dB P-P · 157 dB P-P	3- 4 km 5 km 8 km	Stand-off (General avoidance) Avoidance manoeuvres Avoidance manoeuvres	100-120 m	25 logR	McCauley et al. (1998)
Humpback whale	Exmouth Gulf, W. Australia	Experimental playback	Seismic gun 0.33L (227 dB re. 1 µPa²-m p-p)	· 168 dB P-P · 159 dB P-P	1 km 2 km	General avoidance Course alterations begin	10-20 m		McCauley et al. (1998)
Blue whale	North Pacific Ocean	Operating seismic	Seismic source 1,600 cu. in. (215 dB re. 1 µPa 1-m p-p).	· 143 dB P-P	10 km	Closest approach 10 km? Cessation of vocalisations for c.1 hr. Resumption of vocalisations and movement away from source.	2,400 m		Macdonald et al. (1995)
Grey seal	Scotland and Sweden	Experimental playback. 1 hr exposure	Single gun or small array (215-224 dB re. 1µPa-1 m)			Avoidance. Change from feeding to transiting behaviour. Haulout. Apparent recovery c 20 mins after trial.	20-100 m		Thompson et al. (1998)
Common seal	Scotland and Norway	Experimental playback 1 hr exposure	Single gun or small array (215-224 dBre. 1 µPa-1 m)			Initial fright reaction. Bradycardia. Strong avoidance behaviour Cessation of feeding	20-100 m		Thompson et al. (1998)
Ringed Seal	Prudhoe Bay, Alaska	Operating Seismic	Array, 21.6L (236 dB re. 1µ Pa-1 m p-p horizontal)	200 dB rms 190 dB rms 180 dB rms 160 dB rms	.03 km .24 km .96 km 3.6 km	Partial avoidance at <150mMore seals seen swimming away while guns firing	3-17m		Harris et al. (2001)

Figure 6. Review of seismic survey effects on marine mammals (from Gordon et al, 2004), suggesting that the most commonly observed response is avoidance.

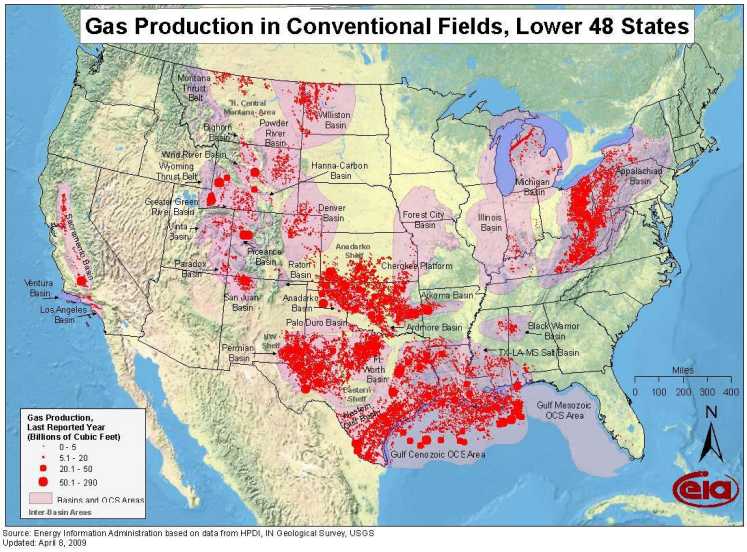

Figure 7. Distribution of producing gas fields (as of 2009) in the continental 48 states of the U.S. Based on the abundance of natural gas in onshore sedimentary basins, the lack of production in the Atlantic OCS is unlikely the result of the absence of a commercial resource base. (Downloaded from the Energy Information Administration 16 October 2013).

Figure 8. Members of the Tectonics and Geophysics Lab (TGL) and Geophysical Exploration Lab (GEL) in the Department of Earth and Ocean Sciences, Spring 2013. (Front row: Prof. C. Knapp, D. Terry, M. Akintunde, E. Derrick, C. Cunningham, Prof. J. Knapp; Back row: W. Anderson, D. Heffner, A. Simonetti, N. Robinson, K. McCormack; not pictured: A. Bayou, S. Boote, R. Kabila, A. Pollack, J. Salazar, A. Williams).

The CHAIRMAN. Mr. Miller.

STATEMENT OF RICHIE MILLER, PRESIDENT, SPECTRUM GEO, INC.

Mr. MILLER. Chairman Lamborn, Ranking Member Holt and members of the subcommittee, good morning. I appreciate the opportunity to be here today to discuss the need for America to better understand our offshore oil and gas resources, specifically those in the Atlantic.

My name is Richie Miller. I am president of Spectrum Geo, Inc., a company providing seismic data to oil and gas exploration and production companies worldwide. We are headquartered in Houston, Texas. Spectrum is a member of the International Association of Geophysical Contractors, the trade association of the global geophysical industry, and a member of the National Ocean Industries Association, which represents all segments of the offshore energy industry. We appreciate the committee's attention to this issue and we are pleased that Congress is looking into this matter for the Nation's continued progress toward energy security and economic growth.

Whether in private business or government, the best decisions are made when we have the best available data. This is true of our Nation's oil and gas resources. It only makes sense for us to understand what the resource base and resource value is as the Federal Government begins developing the next OCS 5-year leasing plan. The best tool to do this is seismic.

The benefits of modern seismic surveys are numerous. They make offshore energy production safer and more efficient by greatly reducing the drilling of unsuccessful dry holes. We no longer explore with the drill bit. Seismic surveys make this possible.

To better understand the resource potential in the Atlantic, we need to acquire modern seismic data. The last surveys of the Atlantic OCS were conducted over 30 years ago. Older, low-tech data that exists does not image medium to deep plays and does not image the basin's architecture, which is imperative to understanding the Atlantic margin play.

But before new seismic data can be acquired in the Atlantic, BOEM must complete a programmatic environmental impact statement. A record of decision, or ROD, was initially proposed to be released earlier. However, we now understand that that ROD is scheduled for March or April of this year. It will take at least a year after the EIS is issued before new seismic data is in hand. It is critical to have new seismic data to help inform future Atlantic leasing decisions. With DOI's initial work on the next 5-year plan for 2017–22 beginning later this year, time is of the essence.

Recently BOEM officials have indicated that the delay in obtaining new seismic data does not preclude them from ultimately including new areas such as the Atlantic in the next 5-year plan. We appreciate this perspective and agree that the next 5-year plan should be guided by modern survey data.

The seismic industry has demonstrated for more than 40 years its ability to operate seismic exploration activities in an environmentally safe and responsible manner. Contrary to recent statements by critics who oppose opening the Atlantic, the oil and gas

industry has demonstrated the ability to operate seismic activities in a manner that protects marine life, as recently affirmed in a statement from the National Marine Fisheries Service.

I also want to underscore what is at stake for our country and why this issue matters to your constituents. A recent study produced by Quest Offshore for NOIA and API finds that opening the Atlantic to oil and natural gas exploration and development would generate $51 billion in new Federal and State revenue, generate nearly 280,000 jobs, contribute $23 billion per year to the U.S. economy, and could produce an incremental 1.3 million barrels of oil equivalent per day, which would reduce our need for imported oil.

The Nation's energy and economic security demands that these Atlantic resources be safely explored and developed, and the process begins with acquiring new seismic data. We cannot afford to blindly make decisions regarding the future of oil and gas leasing in the Atlantic. Americans deserve public policy decisions that are made based on the best information possible. Modern seismic surveys provide that information. Let's allow science to help us understand what resources we have and work together to enhance our energy and economic security.

Thank you for the opportunity to testify before this subcommittee.

The CHAIRMAN. Thank you for your testimony.

[Prepared statement of Mr. Miller follows:]

PREPARED STATEMENT OF RICHIE MILLER, PRESIDENT, SPECTRUM GEO, INC.

Chairman Lamborn, Ranking Member Holt, members of the subcommittee: Good afternoon. I appreciate the opportunity to be here today to discuss the need for America to access offshore oil and gas resources, specifically those in the Atlantic.

My name is Richie Miller. I am President of Spectrum Geo, Inc. (Spectrum), a company providing multi-client geoscience data to oil and gas exploration and production (E&P) companies worldwide. We are headquartered in the United States. We are a member of the International Association of Geophysical Contractors, the trade association of the global geophysical industry and also a member of the National Ocean Industries Association. I would like to thank the Subcommittee on Energy and Mineral Resources for the opportunity to testify at this oversight hearing regarding "Seismic Exploration and the Future of the Atlantic OCS."

We are pleased that Congress is looking into this most important matter for the Nation's continued progress toward energy independence, economic vitality and energy security. Although the United States is set to surpass Saudi Arabia and Russia to become the world's top oil producer by 2015, in order to meet continued demand we must make new areas of the federal outer continental shelf (OCS) available for oil and gas exploration. The United States has been successful in producing its oil and gas resources because we have historically been willing to explore new areas.

Today, I would like to focus my comments on the need to better understand the resource base of the Atlantic OCS and the challenges in providing policymakers and regulators with the information they need to make informed decisions based on the best available data. Also, I think it is critical to clearly explain the relationship between acquiring new seismic data for the Mid- and South Atlantic OCS and the development of the next Five-Year OCS Leasing Plan (2017–2022).

I would first like to give a broadened description of my company, Spectrum Geo. Our company is engaged in acquiring non-exclusive seismic data, processing it and licensing these products to oil and gas companies. That means we do the work (and take the financial risks) needed to deliver oil and gas companies the ability to use modern seismic imaging to explore an area new to them (or new to the entire industry). We repeatedly license the seismic data to oil and gas companies for a fee, but retain the underlying ownership. By acquiring the data once and making it available to any oil and gas company, our industry avoids duplicating these surveys. We also provide the same products to Bureau of Ocean Energy Management (BOEM) for their use in evaluating the OCS resource base, ensuring they receive fair market

value when they lease OCS lands, and making the many conservation decisions required of them as they administer their obligations under the OCS Lands Act.

ATLANTIC PROGRAMMATIC EIS AND THE FIVE-YEAR LEASE SALE PLANNING PROCESS

Whether in private business or government, the best decisions are generally made when we have the best available data. This is true of our Nation's oil and gas resources. It only makes sense for us to understand what the resource base and resource value is.

BOEM is currently in the process of producing a Programmatic Environmental Impact Statement (PEIS) to evaluate "potential significant environmental impacts of multiple geological and geophysical activities on the Atlantic Outer Continental Shelf." It is very important to note that these G&G activities will not only be used to identify potential oil and gas resources, but also to identify suitable areas to place offshore renewable energy facilities. Seismic surveys enable our Nation to reach its full energy potential by truly using an "all-of-the-above" approach. A draft PEIS was published in the Federal Register on March 30, 2012, and underwent a 90-day comment period.

A record of decision (ROD) was initially proposed to be released in October 2013; however, we now understand that the ROD is scheduled for March or April 2014. We are concerned about potential delays in the issuance of an ROD as these delays create difficulties in scheduling for permits and vessels. Having sufficient new seismic data to inform future Atlantic leasing decisions is critical. With DOI's initial work on the next Five-Year Plan for 2017–2022 beginning later this year, time is of the essence.

It will take at least a year after the EIS is issued before new seismic data is in hand. This is because industry must first obtain permits from NOAA (under the Marine Mammal Protection Act); await BOEM's statutorily required consultations with all the impacted coastal States (under the Coastal Zone Management Act); secure an actual G&G permit from BOEM; and then go about conducting the surveys and interpreting the data. So with the EIS delayed into 2014, we are very unlikely to have any new data in hand until well after the Department has already begun scoping for the 2017–2022 Five-Year Plan. However recent public statements from BOEM officials indicate that this delay in obtaining new seismic data does not preclude them from ultimately including new areas such as the Atlantic in the 2017–2022 Five-Year Plan. We appreciate this perspective and agree that the next Five-Year Plan should be guided by modern survey data.

Because acquiring and interpreting modern seismic data provides a greater understanding of where oil and gas reserves exist and how much are likely in place, having modern seismic data prior to a lease sale will allow industry to make more informed bids. This will likely result in more bids and higher bids (and thus more revenue to the Federal Treasury) since industry is reluctant to bid on blocks where there is little or no seismic data. Modern seismic imaging consistently brings more players to bid on offshore leases, creating more competition and driving the cost of leases higher. This is a phenomenon we are seeing globally as occurred recently in Uruguay with the government receiving $1.2 billion lease bids and in Brazil where $2.0 billion in lease bids were received. Oil and gas producers have the capital to explore frontier areas and are always looking for new opportunities.

WHY NEW SEISMIC IS NEEDED FOR THE MID- AND SOUTH ATLANTIC OCS

It is very clear that seismic surveys are greatly needed in the Atlantic. It has been more than 30 years since geological & geophysical (G&G) surveys were conducted in Atlantic waters. BOEM currently estimates that the Mid- and South Atlantic OCS holds at least 3.3 billion barrels of oil and 31.3 trillion cubic feet of natural gas. While these estimates are impressive, it is widely believed that modern seismic imaging using the latest technology will show much greater resources than the 30-year-old estimates. Thus, current estimates are outdated and, in all likelihood, grossly inaccurate.

For the Atlantic OCS, we need to update our understanding of the resource, and modern seismic imaging is needed to make this evaluation. Better information enables the government's evaluation of the potential resource base as well as for prospecting for oil and natural gas reserves offshore. Older, low tech data that exists does not image medium to deep plays, and does not image the basin's architecture, which is imperative to understanding the Atlantic Margin play. The industry's array of new tools in the toolbox—reflection, gravity, magnetics, electromagnetic—can better help us understand the potential resource. By utilizing these tools and by applying increasingly accurate and effective interpretation practices, we can better locate and dissect prospective areas, identify the types of plays we are locating, and evalu-

ate the potential resource base. Seismic surveys are the only feasible technology available to accurately image the subsurface and help us better understand what lies below the surface of the Earth before a single well is drilled.

It is an amazingly useful scientific tool that allows us to accurately image the earth's crust down to depths in excess of 40,000 feet, or more than 8 miles, below the ocean floor. Today, seismic surveys that use modern data acquisition techniques and then process that data by applying the massive computing power are able to produce sub-surface images which are much clearer and more accurate than those from decades ago, or even 5 years ago.

There are reasons why geologists and geophysicists believe that the Atlantic OCS could have much more abundant oil and gas resources than we previously believed. First, the Atlantic Margin is proving to be quite productive in hydrocarbon production in areas like West Africa, Brazil and Nova Scotia.

Second, exploration and development activities generally lead to increased resource estimates. For example, in 1987 the Minerals Management Service estimated only 9.57 billion barrels of oil in the Gulf of Mexico. With more recent seismic data acquisition and additional exploratory drilling, that estimate rose in 2011 to 48.4 billion barrels of oil—a 500 percent increase.

The benefits of modern seismic surveys are numerous. They make offshore energy production safer and more efficient by greatly reducing the drilling of "dry holes" (where no oil or gas is found). We no longer explore with the drill bit. Without seismic surveys, we would again be relegated to that. Because survey activities are temporary and transitory, it is the least intrusive and also the most cost-effective way to understand where recoverable oil and gas resources likely exist in the Mid- and South Atlantic OCS. Additionally, it is expected that the early surveys will be non-exclusive or multi-client, meaning they would be shared by all E&P companies. The data gathered in a one-time process could be used again and again.

For the energy industry, modern seismic imaging reduces risk—both economic risk of exploration and production and also the associated safety and environmental risks. It also provides greater certainty by increasing the likelihood that exploratory wells will successfully tap hydrocarbons and helping us avoid drilling for oil and gas in areas where we won't likely be successful. It reduces the number of wells that need to be drilled in a given area, thus reducing the overall footprint for exploration.

In addition to modern seismic survey techniques, another key technological advancement has come with the help of the computing industry. The development of more powerful computers at diminishing prices allowed us to further leverage this new 3D acquisition tool. Ever greater computing power freed the creativity and innovation of data processing professionals to develop increasingly complex algorithms that address the vast number of challenges offered by the complex earth. And these complex algorithms are now being applied against an ever expanding number of data points.

With substantially larger amounts of data, and with more complex processing techniques that are run on increasingly powerful computers, we are now able to identify with accuracy drilling targets the size of a parking lot 3 miles deep into the earth (and sometimes through a mile of water!). This enables the drilling engineers to do what they do best—hit those targets.

Today, we are applying these new techniques in older producing areas—areas that are known to generate and trap oil and gas. We are able to use the fine scale resolution offered by today's imaging techniques to find reserves that went unseen using the older techniques. Additionally, to maximize production from existing reservoirs, another dimension in technology—4D—has been recently introduced. By acquiring 3D at the same location repeatedly, it is now possible to have a motion picture visualizing the behavior and evolution of fluids in the reservoir as it is produced.

ENVIRONMENTALLY RESPONSIBLE

The seismic industry has demonstrated for more than 40 years its ability to operate seismic exploration activities in an environmentally safe and responsible manner. Despite recent statements by critics who oppose opening up the Atlantic, the oil and gas industry has demonstrated the ability to operate seismic exploration activities in a manner that protects marine life. In the May 11, 2012, publication of the Federal Register, the National Marine Fisheries Service (NMFS), in response to a public comment associated with a recent industry seismic survey in Alaska (comment No. 9), stated the following: "To date, there is no evidence that serious injury, death or stranding by marine mammals can occur from exposure to airgun pulses, even in the case of large airgun arrays." (NOAA—National Marine Fisheries Service, Federal Register Notice May 11, 2012—Vol. 77, No. 92 Page 27723.)

The geophysical industry takes a great deal of care and consideration of potential impacts to the marine environment. Because this is a priority, we implement mitigation measures to further reduce any potential impacts to marine mammals. Examples include the avoidance of important feeding and breeding areas, demarcation of exclusion zones around seismic operations, soft starts (gradual ramping up of a seismic sound source), and visual and acoustic monitoring by professionally trained marine mammal observers. Any activity in the Atlantic would be done with at least the same care and consideration for marine life.

Additionally, the industry continues to invest millions of dollars into scientific research to fill any knowledge gaps that may exist in knowing how marine life interrelates to seismic operations. Research studies and operations monitoring programs designed to assess the potential impacts from seismic surveys have not demonstrated biologically significant adverse impacts on marine mammal populations. Industry continually monitors the effectiveness of the mitigation strategies it employs and funds research to better understand interactions between E&P operations and marine mammals.

ECONOMIC BENEFIT OF SEISMIC AND OIL AND GAS EXPLORATION

What is often understated is the economic benefit that comes from oil and gas exploration. A recent study produced by Quest Offshore for the American Petroleum Institute and National Ocean Industries Association finds that opening the Atlantic OCS to oil and natural gas exploration and development will add billions of dollars annually to the economy by 2035. Federal offshore lease sales under existing laws and regulations would be expected to result in offshore oil and natural gas exploration and production. The new exploration and production activity would require large amounts of investment and operational spending by oil and gas operators—an estimated $195 billion cumulative between 2017 and 2035, which would be primarily spent inside the United States and the Atlantic coast States.

According to the study, by 2035, new Atlantic OCS activity could produce an incremental 1.3 million barrels of oil equivalent per day, generate nearly 280,000 jobs, contribute up to $23.5 billion per year to the U.S. economy, and generate $51 billion in Federal and State revenue—with most of the accrued State benefits going to Atlantic coastal States.

The Nation's energy and economic security demands that these Atlantic resources be safely developed, and that long process begins with acquiring new seismic data.

CONCLUSION

This Nation cannot afford to blindly make decisions regarding the future of oil and gas leasing in the Atlantic. Americans deserve public policy decisions that are made based on the best information possible. Modern seismic surveys provide that information. Let's allow science to help us understand what resources we have.

I hope this information adds a new perspective to your understanding of the contributions from the innovations and applications of geophysical data. Thank you for your time and attention today. I look forward to any questions you may have, and place myself, NOIA and the IAGC at your disposal if we can be of further service. I appreciate the opportunity to testify before the subcommittee.

QUESTIONS SUBMITTED FOR THE RECORD FROM CHAIRMAN LAMBORN TO RICHIE MILLER, PRESIDENT, SPECTRUM GEO INC.

Question. The seismic data from over 30 years ago that has been collected for the Atlantic not only used old technology but also covered a distance up to 50 miles from the shoreline. Is this the area that would be of interest to industry for the next round of seismic data collection or are there additional areas that would need to be surveyed for the first time?

Answer. Interest in new data goes beyond 50 miles, outwards of 250 miles is not out of the question.

Question. At the hearing, there was a predominant focus on the Gulf of Mexico and Canada when discussing the way seismic could potentially be conducted in the Atlantic. Many other countries have robust seismic regulatory programs that have been successful in offshore seismic data acquisition for decades—as well as exploration and production. Can you provide us with additional examples we should look at as well as reiterate the programs that are used in the GOM and Canada? Do you believe the advent of seismic research in the Atlantic OCS would draw existing

seismic companies based in and around the Gulf of Mexico to expand to the Atlantic seaboard?

Answer. Seismic is acquired worldwide. Active areas currently are Brazil, Norway, UK North Sea, Ireland, Australia, many areas in the Mediterranean and Adriatic, including Israel, Lebanon, Greece, Croatia and Cyprus. Africa is active up and down the east and west coasts, with active projects in Gabon, Morocco, Mozambique, and Madagascar to name a few. Most of these countries have seismic regulatory programs, and if they do not the seismic industry abides by a standard code of principals in these areas.

Most companies operating in the GOM would be interested in working in the Atlantic.

The CHAIRMAN. Finally, Dr. Boesch.

STATEMENT OF DONALD F. BOESCH, PRESIDENT, UNIVERSITY OF MARYLAND CENTER FOR ENVIRONMENTAL SCIENCE

Dr. BOESCH. Mr. Chairman, Mr. Holt, and members of the subcommittee, my name is Donald Boesch, and I was one of the seven commissioners who comprised the National Oil Spill Commission about which Mr. Holt spoke, and I am pleased to be here to have the opportunity to testify on behalf of the former commissioners.

As the Nation considers the expansion of offshore drilling to the East Coast of the United States, it is important to heed the lessons provided by the catastrophic blowout of the Macondo well in the Gulf of Mexico almost 4 years ago now. The explosion tore through the Deepwater Horizon and began a human, economic and environmental disaster that is still being played out in terms of the costs to people and to the economy that will exceed tens of billions of dollars.

Mr. Holt basically summarized some of our findings, but let me just touch on the key issues related to the fact that this explosion, this incident in the Gulf, was completely preventable, and that it revealed through our report, as well as other reports and the testimony that has been going on in the courts in New Orleans, that as a result of systematic failures of not only BP, but the subcontractors, that really point to serious problems of risk management that affect the industry as a whole. And it was a result of the fact that as we moved into frontier areas, into deep water in the case of the Gulf, we weren't paying attention, adequate attention, to the kind of oversight and the kind of requirements that were needed. Other subsequent reports by the National Academy of Engineering, Federal agency investigators, as well as industry itself have supported the Commission's findings and reinforced our recommendations.

Since we completed our service, we have all collectively followed through and watched what has gone on, and as Mr. Holt indicated, we have issued these report cards about how well we have responded to the recommendations, and I offer this for the record, Mr. Chairman, and have copies for members here.

Overall, the response to our recommendations has been positive. The petroleum industry has established a Center for Offshore Safety and built blowout containment capabilities that didn't exist before that are now being developed and exported around the world. The Department of the Interior has implemented many of our recommendations to reduce conflicting incentives that existed within

the former Minerals Management Service and approved the efficacy of regulatory programs.

But that doesn't mean the job is done. As Mr. Holt indicated, there have been at least 17 incidences of well control since the Macondo well incident in the Gulf of Mexico, and in particular, many of these have occurred in shallow water environments which we thought we knew how to work in very well and largely related to the fact that we have an aging infrastructure that supports that previous development now operated by smaller companies which don't have the capacity that a BP does.

This experience underscores the importance of implementing our recommendations, including the initiatives that the industry and government have taken are encouraging. But, of course, as was pointed out, Congress hasn't acted on our recommendations to it.

There are several recommendations detailed in our testimony. I just want to highlight a few. Extending the period for approving exploration plans from 30 days to 60 days, this makes sense, particularly in a new area like we perceive in the Atlantic, for example; providing whistleblower protection involved for offshore drilling operations, the same kind of protection that we guarantee in other comparable settings; increasing the liability cap from the really inadequate level of $75 million that is basically off by three orders of magnitude in terms of the cost of this incident; increasing the limit of $1 billion per incident payouts from the Oil Spill Liability Fund; and to provide a mechanism to pay for the appropriate oversight of the energy industry, regulation of the industry, by the industry as opposed to the taxpayer, as many other regulated industries do.

When the Exxon Valdez spill occurred in 1989, Congress was quick to act. It passed legislation that made maritime transportation safer, provided new capabilities for dealing with oil spills. But we kind of, as a Nation, fell asleep at the wheel as we developed our oil resources in a self-reliant way in the deeper waters of the Gulf of Mexico and we should learn the lesson. So we think that Congress should follow that and take heed and act with needed legislation.

This is important as we consider the Atlantic Coast because we would like to see that we have those regulations, that they be codified by Congress and in place as we proceed in frontier areas. Second, we recommend that these frontier areas be very carefully studied. We learned by the lack of knowledge that we had on the Gulf. We thought we knew a lot about the Gulf. We were surprised.

And in particular, as a resident of the Atlantic Coast, as a resident of Maryland, I look at the interests of, say, the Commonwealth of Virginia of developing resources there from the standpoint that Ocean City is as close to some of those areas as is Virginia Beach. So the whole region, Delaware, New Jersey and so on, all have a common stake and interest and are very concerned about its ecosystems, but also its tourist industry as we go forward.

So finally, let me just say that offshore drilling has a substantial potential to contribute to the Nation's oil and gas supplies and energy security. My fellow commissioners and I continue to encourage Congress, the executive branch and the oil and gas industry to take the necessary steps to ensure that is done safely.

Thank you.

[Prepared statement of Dr. Boesch follows:]

PREPARED STATEMENT OF DONALD F. BOESCH, PRESIDENT, UNIVERSITY OF MARYLAND CENTER FOR ENVIRONMENTAL SCIENCE

I. INTRODUCTION

Chairman Lamborn, Ranking Member Holt and members of the subcommittee, my name is Donald F. Boesch, President of the University of Maryland Center for Environmental Science. I was one of seven commissioners who comprised the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling. I thank you for the opportunity to testify today.

As the Nation considers the expansion of offshore drilling to the East Coast of the United States, I believe it is important to evaluate the lessons provided by the catastrophic blowout of the Macondo well almost 4 years ago.

The explosion that tore through the *Deepwater Horizon* drilling rig on April 20, 2010, as the rig's crew completed drilling the exploratory Macondo well deep under the waters of the Gulf of Mexico, began a human, economic, and environmental disaster that is still playing out.

Eleven crew members died, and others were seriously injured, as fire engulfed and ultimately destroyed the rig. For almost 3 months more than four million barrels of oil gushed uncontrolled into the Gulf—threatening livelihoods, the health of Gulf coast residents and of those responding to the spill, precious habitats, and even a unique way of life. A treasured American coast already battered and degraded from years of neglect and mismanagement as well as natural disasters, faced yet another blow as the oil spread and washed ashore. Five years after Hurricane Katrina, the Nation was again transfixed, seemingly helpless, as this new tragedy unfolded in the Gulf. The costs from this one industrial accident are still not yet fully adjudicated and counted, but it is already clear that the impacts on the region's natural systems and people were enormous, and that economic losses will total tens of billions of dollars.

On May 22, 2010, President Barack Obama announced the creation of the National Commission on the BP *Deepwater Horizon* Oil Spill and Offshore Drilling (the Commission): an independent, nonpartisan entity, directed to provide thorough analysis and impartial judgment. The President charged the Commission to determine the causes of the disaster, and to improve the country's ability to respond to spills, and to recommend reforms to make offshore energy production safer. And we were told to follow the facts wherever they led.

After an intense 6-month effort to fulfill the charge, the Commission released its final report on January 10, 2011, 3 years ago today. As a result of our investigation, we concluded:

- The explosive loss of the Macondo well could have been prevented.
- The immediate causes of the Macondo well blowout could be traced to a series of identifiable mistakes made by BP, Halliburton, and Transocean that reveal such systematic failures in risk management that they place in doubt the safety culture of the entire industry.
- Deepwater energy exploration and production, particularly at the frontiers of experience, involve risks for which neither industry nor government has been adequately prepared, but for which they can and must be prepared in the future.
- To assure human safety and environmental protection, regulatory oversight of leasing, energy exploration, and production require substantial reforms, probably even beyond those significant reforms the Department of the Interior has already initiated since the *Deepwater Horizon* disaster.
- The technology, laws and regulations, and practices for containing, responding to, and cleaning up spills lag behind the real risks associated with deepwater drilling into large, high-pressure reservoirs of oil and gas located far offshore and thousands of feet below the ocean's surface. Government must close the existing gap and industry must support that effort.
- Scientific understanding of environmental conditions in sensitive environments in deep Gulf waters, along the region's coastal habitats, and in areas proposed for more drilling, such as the Arctic, is inadequate. The same is true of the human and natural impacts of oil spills.

We reached these conclusions and made our recommendations in a constructive spirit. Our goal was to make American offshore energy exploration and production far safer, today and in the future.

Since we released our report, several other highly qualified committees and organizations have also completed analyses of what went wrong with the Macondo well and what should be done to protect against such a catastrophe happening again. These include the Department of the Interior-Coast Guard Joint Investigation, several studies of the National Academies of Sciences and Engineering, and even some industry analyses. I wish to point out that all of these studies have supported the Commission's findings and often reinforced its recommendations.

The Commissioners, however, were not satisfied with merely issuing a report. Too many task forces and commissions, after devoting significant time and effort to their assignments, watch the value of their contribution diminish as other issues and priorities command public attention. As a group, we vowed not to let the spotlight fade from our work and elected to do what we can to advance the implementation of our recommendations so that the Nation can move forward to secure the oil and gas off our shores in a safer, more environmentally responsible manner.

To this end, we established an Oil Spill Commission *Action* (OSC*A*) project to monitor progress in making offshore drilling safer and more environmentally protective, and to continue to engage the many actors how can implement the recommendations. On the second and third anniversaries of the explosion, OSCA issued "report cards"—the most recent was released on April 17, 2013—addressing the progress that has been made in implementing the Commission's recommendations. I have brought copies of this report for committee members and would like to request that it be entered into the record.

As our report cards have indicated, we have been gratified by the positive response to many of our recommendations. The oil industry, for instance, has established a Center for Offshore Safety, implementing one of our major recommendations. Similarly the Department of the Interior has implemented many of our recommendations to reduce conflicting incentives that had existed in the Minerals Management Service, and improve the efficacy of its regulatory programs. All in all, we have made important improvements in the way the Nation manages its offshore oil and gas exploration and production.

II. CONGRESS NEEDS TO TAKE ACTION

But that does not mean that the job is done. A recent investigation by WWL-TV in New Orleans found that there have been 17 events over the last 4 years in the Gulf of Mexico where the drilling crew lost control of a well. There were 7 such events reported through the first 10 months of 2013 alone. It was a loss of well control that resulted in the *Deepwater Horizon* catastrophe. These incidents also show that risks occur closer to shore and in shallower water, where older infrastructure and smaller operating companies prevail.

This experience demonstrates the importance of implementing the Commission's recommendations. As I said, the initiatives taken by the Administration and industry have been encouraging. However, through today, coincidentally the third anniversary of the submission of the Commission's report, Congress has yet to enact any of the recommendations we made to it to improve the management and safety of offshore drilling.

With respect to improving safety and environmental protection, we continue to urge Congress to codify the organizational changes the Department of the Interior has made in its regulatory programs. Although these were not as extensive as the Commission recommended, they are a substantial improvement over the organization that existed when the Deepwater Horizon disaster occurred. Congress should make these improvements permanent.

The Commission's other recommendations for improving safety and environmental protection included making the following modifications to the Outer Continental Shelf Lands Act (OCSLA):

- The period for approving exploration plans should be extended from 30 days to 60 days. This conclusion is particularly important with respect to proposals to extend outer continental shelf exploration and production operations to the relatively unfamiliar conditions in the Arctic and along the East Coast of the United States.
- Whistleblowers involved in offshore drilling operations should be provided the same protection that workers are guaranteed in other comparable settings. Those oil companies providing leadership in the pursuit of an effective safety culture agree that any employee should have the authority to stop operations if they see conditions they think may be unsafe. Legally protecting employees working for less committed companies could be an important step in identifying problems before they become serious.

- The liability cap and financial responsibility requirements for offshore facilities should be substantially increased. Increasing the liability cap, set by law as only $75 million, is important for two reasons. First, it would increase the incentive to make sure that the operations are conducted safely. The incredibly low existing cap eliminates such incentives for companies that would take advantage of it. The Nation was very fortunate that BP did not try to take advantage of this limitation with Deepwater Horizon. The second concern is that people damaged by a spill would not be adequately compensated for damages they experienced if a company took advantage of the cap.
- The existing limit of $1 billion on per-incident payouts from the Oil Spill Liability Trust Fund should be increased. The potential costs of responding to spills have increased substantially since these limits were established. It would be extremely unfortunate if the government were unable to respond effectively to a spill because of an arbitrarily low limit on how much money can be provided by the trust fund.
- A mechanism should be established to ensure that the offshore energy industry pays the entire costs associated with its regulatory oversight, just like other regulated industries do. This includes the costs of agencies such as BSEE and BOEM primarily charged with overseeing the offshore energy operations—ensuring their safety and compliance with environmental protection requirements—and also the incremental costs of other agencies responsible for overseeing offshore operations. We recognize that Congress has agreed to budget increases for these agencies to help support improved regulatory programs, but it would benefit both the Federal budget and these oversight programs if they were funded by user fees rather than taxes

We have several other recommendations for congressional action as well. These are outlined in the attachment to my testimony and discussed in the Commission's report discussing its recommendations.

III. CONCLUSION

In the years between the *Exxon Valdez* spill and the spring of 2010, Congress, like much of the Nation, appeared to have developed a false sense of security about the risks of offshore oil and gas development. Congress showed its support for offshore drilling in a number of ways, but did not take any steps to mitigate the increased perils that accompany drilling in ever-deeper water or in new frontiers areas such as icy Arctic seas. However, despite the lessons learned since the *Deepwater Horizon* exploded, 11 rig workers lost their lives, and millions of barrels of oil spilled into the Gulf of Mexico, Congress still has not enacted any legislation to improve the safety of offshore oil exploration and production.

I recognize that the topic of today's hearing concerns seismic exploration and the future of the Atlantic OCS, but believe that the Commission's recommendations for needed legislative action are very germane. Given what has occurred, it first just makes sense to improve and codify the safety regime before moving forward into frontier areas. I have outlined some of the more important of these needs related to the safety of offshore energy development in my testimony.

Second, the Commission recommended that frontier areas should be carefully studied to determine their environmental sensitivity, guide responsible planning within the region, and define a baseline against which damages caused by offshore energy development can be accurately assessed. One of the Commission's surprising findings was that when the Macondo blowout dumped enormous volumes of oil into the Gulf waters, scientists and policymakers suddenly realized they knew relatively little about biological systems, environmental conditions, and even key aquatic and coastal species in the area affected. Leasing of vast acreage combined with weak policies and limited funding had resulted in inadequate studies of critical environmental processes and sensitive environmental features where greater caution should be exercised. The Macondo blowout also taught us that large oil spills do not recognize State boundaries as shores over five States were oiled. As a resident of Maryland I feel compelled to remind Virginia proponents of offshore development that Ocean City is as close to areas targeted for exploration as Virginia Beach. Surely, risks to tourist economies in Maryland, Delaware and New Jersey, as well as Virginia, have also to be taken into account.

Third, it is also critical that the resources needed to respond effectively to spills that may occur be located in the region where the expansion is proposed before the new areas are explored and developed. This includes both the equipment and supplies necessary to respond to any emergencies, and adequate training of the Federal, State, and local employees and volunteers who would be involved in such a response.

Offshore drilling has a substantial potential to contribute to the Nation's oil and gas supplies and energy security. For this potential to be fully realized, however, the industry and government will have to rebuild public faith in offshore energy exploration and production. The Commission proposed a series of recommendations that would assist in this effort. Our message is clear: both government and industry must make dramatic changes to establish the high level of safety in drilling operations on the outer continental shelf that the American public has the right to expect and to demand. My fellow Commissioners and I continue to encourage Congress, the executive branch, and the oil and gas industry to take the necessary steps.

Recommendations Pertaining to Congress

A. Safety and Environmental Protection

Congress and the Department of the Interior should create an independent agency within the Department with enforcement authority to oversee all aspects of offshore drilling safety, as well as the structural and operational integrity of all offshore energy production facilities, including both oil and gas production and renewable energy production. The director of the new agency should be appointed by the President for a 5- to 6-year term and be confirmed by the Senate.

Congress and the Department of the Interior should create a Leasing and Environmental Science Office within the Department charged with fostering environmentally responsible and efficient development of the Outer Continental Shelf. To ensure that environmental concerns receive full consideration, the environmental division of this office should be led by a Chief Scientist, who would conduct all environmental reviews for offshore energy development.

Congress should amend the Outer Continental Shelf Lands Act (OCSLA) to extend the 30-day deadline for approving exploration plans to 60 days.

Congress should amend OCSLA to provide the National Oceanic and Atmospheric Administration (NOAA) with a formal consultative role during the development of 5-year lease-plans and lease-sales.

Congress should amend the Outer Continental Shelf Lands Act or specific safety statutes to provide the same whistleblower protection that workers are guaranteed in other comparable settings.

Spill Response and Containment

Congress should provide mandatory funding (not subject to the annual appropriations process) for oil spill research and development.

Congress and the Administration should encourage private investment in response technology more broadly, including through public-private partnerships and a tax credit for research and development in this area.

Impacts and Restoration

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

[Congress should dedicate 80 percent of the Clean Water Act penalties to long-term restoration of the Gulf of Mexico.—Done]

[To coordinate Gulf restoration and administer restoration funds, Congress should establish a joint State-Federal Gulf Coast Ecosystem Restoration Council. The Council should be given authority to set priorities to govern the expenditure of funds and resolve any conflicts regarding eligibility of projects.—Done]

Congress should ensure that the priorities and decisions of the Council are informed by input from a Citizens Advisory Council, which represents diverse stakeholders.

[In addition, Congress should establish and fund a Gulf Coast Restoration Science and Technology Program to support the design of scientifically sound restoration projects and evaluate individual projects for technical feasibility and consistency with the region-wide strategy.—Done]

Ensuring Adequate Resources

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

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

The offshore energy industry should pay the costs associated with its regulatory oversight, just like other regulated industries do. This includes the costs of agencies such as BOEMRE primarily charged with overseeing the offshore energy operations—ensuring their safety and compliance with environmental protection requirements—and also the incremental costs of other agencies responsible for overseeing offshore operations.

Congress should increase and maintain its awareness of the risks of offshore drilling by:

- designating specific subcommittees to oversee offshore safety and environmental risks,
- requiring the Department of the Interior and its Inspector General to submit annual reports to Congress on the subject, and
- requiring appropriate congressional committees to hold annual oversight hearings on the state of technology and safety.

FRONTIER AREAS—THE ARCTIC

There should be an immediate, comprehensive Federal research effort to provide a foundation of scientific information on the Arctic.

Congress should provide resources to establish Coast Guard response capabilities in the Arctic, based on the Coast Guard's review of current and projected gaps in capacity.

The CHAIRMAN. OK. Thank you, all of you, for your testimony. We will now begin our questions. If we do have votes called in the middle of questioning, we will have to take a recess and come back. I would ask your indulgence if that is the case. Members are limited to 5 minutes for their questions but we may have additional rounds. I now recognize myself for 5 minutes.

Mr. Barnes, if I can talk to you first very quickly, Canada has been permitting seismic activity surveying in the Atlantic Ocean for some time now, and has interacted with many of the same species that our agencies have studied in the U.S. Atlantic waters. Is it your opinion that Canada is able to balance the protection of marine mammals as well as the advancement of seismic science and resource knowledge?

Mr. BARNES. Yes, it is. It is my opinion that that is the case. We have had seismic activity taking place off of Atlantic Canada as I mentioned since 1964. We do have mitigation measures in place as we undertake that activity to prevent any kind of interaction with certain marine mammals.

The CHAIRMAN. OK, thank you. I appreciate that. Additionally, Dr. Miller and Dr. Knapp, given the existing safe record of seismic exploration already conducted amongst protected species in the Gulf of Mexico, can we do the same kind of safe exploration in the Atlantic? A brief answer, please.

Mr. MILLER. Thank you for making me a doctor, by the way. Yes, we can. The mitigation factors that our industry uses are the same that we use in Canada. It is transparent between both areas.

The CHAIRMAN. Thank you.

Dr. KNAPP. Mr. Chairman, I see no reason why we couldn't conduct those surveys in a safe and effective manner.

The CHAIRMAN. Thank you both. Deputy Director Cruickshank, first as an aside, I would like to ask if you believe that offshore oil and gas operations on our Nation's Outer Continental Shelf under your oversight in the Bureau of Ocean Energy Management as well as the Bureau of Safety and Environmental Enforcement of our

Nation's offshore energy production are among some of the safest, if not the safest in the world? Do you believe that to be the case?

Mr. CRUICKSHANK. I believe we have made a lot of reforms and changes in the last few years that have greatly improved the safety of operations on the Outer Continental Shelf, but we have not and cannot eliminate all risks.

The CHAIRMAN. OK. I appreciate hearing that, given the doubts that are sometimes cast upon your agency and the Administration when it comes to protecting our offshores.

Continuing on, Deputy Director, the Department first published the Notice of Intent to prepare a programmatic environmental impact statement for the Atlantic on January 21, 2009. After seeing little progress, the 2010 Interior appropriations bill included language requiring the Department to move forward and to provide Congress with a detailed timeline, which it did several months later in February of 2010. The timeline said the record of decision would be issued on April 13, 2012, almost 2 years ago. The most recent timeline estimated that it would be issued last week, which we know did not happen. You have stated today that you expect to publish the final PEIS by the end of this February.

Now, you have made reference to the 16-day government shutdown in October, even though we have had 5 years to do this. Can you tell us why we have had these delays and is this really a hard deadline that you are going to be able to meet at the end of February?

Mr. CRUICKSHANK. This has been a very complicated and challenging programmatic EIS, and as reflected by the number of substantive comments that we received, the additional information, new science that was coming forth over this time period as well as the danger to species consultation with the National Marine and Fisheries Service, and all of these things had to be taken into account as we put together the EIS, and they all contributed to the length of time. I think we all wish we would have been able to have been more timely in moving it forward, but we are on track to publish the EIS by the end of February.

The CHAIRMAN. And, Deputy Director, you have heard comments about the Canadian experience with, I believe it is the Northern right whale. Do you have any indication that behavior of this animal is different south of the Canadian border in U.S. Atlantic waters?

Mr. CRUICKSHANK. I don't have any reason to believe it would necessarily be different. They may be doing different things at different times of the year in different places, but they are the same whales.

The CHAIRMAN. OK. And does it sound like the kind of environmental protections that are done in Canada would be appropriate and adequate for protecting U.S. waters, marine mammals found in U.S. waters?

Mr. CRUICKSHANK. We have similar practices in place and we are also looking at other potential mitigation measures as part of the EIS, to put the best set of mitigation measures we can in place to try and avoid and minimize environmental impact.

The CHAIRMAN. OK. Thank you. I now recognize the Ranking Member for 5 minutes.

Dr. HOLT. Thank you. Thanks for your testimony, all of you.

Dr. Boesch, in last year's report card you gave Congress a D-plus for the action on the Commission's recommendations. Has that changed?

Mr. BOESCH. No, it really hasn't. We upgraded it because of the RESTORE Act, but the safety provisions that we recommended that Congress act on have still not been acted on.

Dr. HOLT. Do you see things that Congress could do to promote the use of best available and safest technology for OCS drilling?

Mr. BOESCH. Yes, I do. The concept that you have embraced and picked up from the National Academy of Engineering is certainly one thing. This needs to be done, I think, in conjunction with the government and industry, because industry has a lot of investments in the development of technology and, of course, has to apply it.

Dr. HOLT. Thanks. Mr. Cruickshank, in 2011, Secretary Salazar testified before the Senate comparable committee and called on Congress to pass legislative proposals to implement offshore safety and so forth. Does the Department still support increasing penalties for safety and environmental violations and getting more flexibility to hire necessary staff? Those were two of the recommendations.

Mr. CRUICKSHANK. With respect to the flexibility to hire staff, we were given some additional flexibility in the appropriations bills for petroleum engineers and geoscientists, which we were grateful for and have put to good use. Civil penalties is really a question for the Bureau of Safety and Environmental Enforcement. I know they are taking a look at the civil penalties program and do consider that to be an important part of their toolbox for being able to enforce safe practices on the OCS.

Dr. HOLT. Thank you. Mr. Cruickshank, one offshore bill that the Republicans moved this year was the Offshore Energy and Jobs Act. It does pay attention to a couple of the Commission's recommendations, but it appears to take some steps backwards also. Does the Administration have a position on whether this bill would help or hurt the safety and environmental protection in offshore drilling?

Mr. CRUICKSHANK. The Administration was opposed to that bill. One of the main reasons for the opposition was that it really took away the Secretary's discretion to consider the balancing factors in the OCS Lands Act to determine where offshore leasing should occur.

Dr. HOLT. In fact, in the Administration statement of policy, the phrase is "strongly opposes" because there is inadequate consideration of a number of things in this legislation, and it promotes drilling, not without regard to, actually in opposition to, safety and environmental protection.

Mr. Boesch, would you, as a Commission member, go so far as to say that it is more important that we implement the recommendations congressionally from the Commission than it is to open up new territories right now?

Mr. BOESCH. I think our view is that since we have made these recommendations, they are sensible recommendations, they are really a predicate before we make these other decisions to move

into other areas. The American public, I think, should expect that we have systems in place in the long run, not just by administrative action in one Administration.

Dr. HOLT. That is a pretty strong statement, of course, but I think it is consistent with your findings that there were some pretty strong shortcomings, pretty great shortcomings in the culture and in the practice and in the details of the regulations and implementations that called for such things.

Mr. BOESCH. That is correct. But there have been, as I pointed out, and I think you did as well, there have been some considerable improvements in government oversight, in industry self-regulation and moving toward better standards. What is lacking, of course, is the law, is the legal part to put these things into place so we can reduce the risks that we have similar incidents.

Dr. HOLT. Just a quick question that we can't explore fully. Mr. Knapp, Mr. Barnes, you seem to put an emphasis on fatality in species that would result from the sonic booms in the ocean. Is fatality really the proper measure? Are there other marine biologists who use other measures of the effect of these seismic testings?

Dr. KNAPP. I will go first.

Dr. HOLT. We can't go through those.

Dr. KNAPP. I will try to keep it brief. Thank you for the question, Ranking Member Holt. First and foremost, I am an earth scientist and not a marine biologist, so I can't claim to be an authority on that. But the number of studies that I am aware of in the published scientific literature refer to behavioral changes that may result, and avoidance measures that marine mammals may take, from seismic boats. But I am not aware of any documented case of actual damage to marine mammals as a result of seismic work.

Dr. HOLT. Well, my time has expired. I am sorry, Mr. Barnes. If you can submit something later on this subject, I would be interested. Thank you.

The CHAIRMAN. OK. We will now have one more question and then we will take a recess. Fortunately, even though the votes have been called, it is only a single vote so we don't have to go over there and linger. We can just head right back. So it will be a short recess.

We will now hear from Representative Wittman, and after that we will have a recess.

Dr. WITTMAN. Thank you, Mr. Chairman, and thanks again for your leadership in holding this hearing. I want to thank our witnesses for joining us today.

As you know, Virginia has great potential to be a leader in offshore oil and gas production on the East Coast. However, we want to make sure that we understand the full picture as we go into seismic studies, and we understand seismic studies are critically important to getting that information.

For Virginia, it has been a bipartisan effort. Both of our Senators, Senator Kaine and Senator Warner, are strongly in favor of this, as well as our new Governor, Governor-elect McAuliffe, they feel very strongly about energy production there on the Atlantic Coast, and I along with all of our members of the Virginia delegation were disappointed that Virginia was not included in the 2012–2017 Outer Continental Shelf oil and gas leasing program.

We are also disappointed that it has taken 5 years for circular arguments to take place and for there not to be any forward progress on the final environmental impact statement to move things forward. There has been a lot of talk about let's explore, but talk is cheap, action is needed, and it is critically important that we get that done. A recent study highlights the importance to Virginia as well as other States on the East Coast by indicating that about 25,000 jobs would be created in Virginia and billions in economic activities for opening up the Atlantic OCS.

I want to begin questioning by going to Mr. Cruickshank and asking your perspective on, first of all, why it has taken so long for the EIS to be done and when will you make the final decision?

Mr. CRUICKSHANK. The EIS has taken longer than we had originally anticipated because of the complexity of the issues involved with seismic in the Atlantic. There has been a lot of new science developed, a lot of constructive comments that we received over the years, and the consultation for endangered species as well all added to the time it took to complete, but we are on schedule to publish the final EIS by the end of February.

Dr. WITTMAN. By the end of February, very good. I want to point recently to Secretary Jewell's comments where she stated before the Senate Energy and Natural Resources Committee that the collection of new seismic data would not be a prerequisite for developing the next 5-year plan.

And Dr. Cruickshank, I wanted to get your specific comment on whether the next 5-year plan would in any way, shape or form be affected by the seismic studies that are currently going on and the environmental impact statement.

Mr. CRUICKSHANK. What the Secretary was saying I agree with, is that we can consider whether or not to include the Mid- and South Atlantic in the next 5-year program without those seismic surveys having been completed. I think the data that those surveys would generate would be particularly important when we are planning for the individual resales under the 5-year program if those planning areas are included.

Dr. WITTMAN. OK, very good.

Thank you, Dr. Cruickshank.

Mr. Miller, I want to ask you specifically about the methodology involving seismic surveys. We know a lot of technology has improved through the years. The last seismic survey in the Atlantic was done over 30 years ago. Can you tell us a little bit about how the technology has improved and what you would expect seismic surveys today to discover more abundant resources off of Virginia. And how would those technologies help us understand the resource but also if you could explain some of the mitigation measures used by your company when conducting these surveys? And do you believe that those mitigation efforts are effective in protecting marine mammals from the potential impact of seismic operations and any other of our natural resources or fisheries or fish populations there in those coastal waters?

Mr. MILLER. Yes, sir, I will start with the mitigation measures, and as an industry, the IGC has worldwide guidelines that all of our members follow. Part of those mitigation methods is we employ what we call marine mammal observers on vessels that are moni-

toring, and if they do see a marine mammal come into the exclusion zone, which those are set by BOEM, and it is different in different areas, then we shut the operation down. We also include a passive monitor at night, acoustic monitor to listen, but all those are done, are common practice worldwide on our vessels now.

In regards to the operations, since the 1980s, the seismic industry has come a long way, just like all technology has, and what we would really see an improvement on is we would tow a longer streamer, which is collect deeper data to help understand the deep structures and the architecture of the Atlantic basin, which we are unable to see right now, and that is the activity that we are seeing in West Africa and South America, and in the Atlantic margin is where they are having massive discoveries in those deeper sections, so we would expect, just like in the Gulf of Mexico, as the 3D came in, the reserve base increased five times just on technology, on the seismic technology. We would expect the same thing just with this new technology off the East Coast.

Dr. WITTMAN. Thank you, Mr. Chairman.

I yield back.

The CHAIRMAN. OK, thank you, and we are going to take a short recess of approximately 15 to 20 minutes. The committee will be in recess.

[Recess.]

The CHAIRMAN. The subcommittee will come back to order. OK. The committee will come back to order. We will conclude our hearing. I appreciate everyone's indulgence as we took a brief recess. We will now resume members' questioning and will go to the distinguished Member from Massachusetts, Representative Tsongas.

Ms. TSONGAS. Thank you, Mr. Chairman.

As everyone is well aware and as Ranking Member Holt referenced, tomorrow is the third year anniversary of the report issued by the National Commission on the BP Deepwater Horizon Oil Spill. And as we have also heard today several times, Congress has received an abysmal D-plus on their response to the disaster from the former commissioners, as we have yet to enact many of the recommended legislative reforms to improve the safety of offshore drilling.

It is unfortunate, and that is to say it mildly, that my colleagues across the aisle have chosen to ignore the bulk of lessons learned from that appalling spill, and much of the push to explore the Atlantic Coast offshore region ignores the fact that domestic oil production is at a 20-year high, and natural gas production is at an all-time high in the United States.

We should be making sure that the current oil production boom occurs in a manner that protects its workers, coastal communities, and the environment. We cannot discuss expanding offshore drilling in the Atlantic without first passing meaningful legislation to enhance drilling safety. I am proud to be a cosponsor of Ranking Member DeFazio and Subcommittee Ranking Member Holt's legislation, the Offshore Energy Safety and Technology Improvements Act, which Mr. Holt outlined in his opening remarks.

A recent report from the American Petroleum Institute claims to lay out the economic benefits of opening up the entire Atlantic Outer Continental Shelf to oil and natural gas development. How-

ever, this report ignores the potential impact, economic impacts on tourism and fishing industries in the event of a spill.

Mr. Boesch, from your experiences in the Gulf and as a member of the Commission, how extensive was the economic impact on the local fishing and tourism industries following the BP Deepwater Horizon disaster?

Dr. BOESCH. Well, thank you. The impact was indeed extensive because it basically shut down both industries for some months during that year. Fishing has resumed, and there is at this point no indication that there are truly major long-lasting impacts, but people literally lost their livelihoods for a full year; similarly, with the tourist industry. And in both cases, there is a longer-term impact in terms of the brand. People associate the Gulf of Mexico and going there for a vacation or eating Gulf seafood with that oil spill, so those industries are very concerned about the long-term impact in terms of their attractiveness to tourists or people who consume seafood.

Ms. TSONGAS. Well, I appreciate that, because from the information we have, at the peak of the closure, over 88,000 square miles or nearly 30 percent, 37 percent of all Federal waters in the Gulf of Mexico were off limits to fishing. The National Academy of Science estimates that fishery closures decreased commercial production by 20 percent, which created, obviously, an immediate economic hardship for fishermen and also triggered, as you just mentioned, public concerns regarding the safety of Gulf seafood. It hurt the brand, which is much more difficult to quantify.

As you know, my home State of Massachusetts is also home to historic fishing and tourism industries, and like many of the Gulf States, the health of our oceans is directly tied to the economic health of our communities. While the hearing today is not focused on New England and the North Atlantic, our region is still highly relevant to today's discussion as it could well be a precursor to future efforts to drill off New England shores.

And just as a statement for the record, in Massachusetts, we depend on the ocean and coastal areas for shipping, commercial fishing, and tourism. In fact, Massachusetts is home to the most profitable port in the Nation in New Bedford, Massachusetts, which brings in over $400 million a year in commercial fishery landings. That would be a significant impact were there to be a spill that prevented that from taking place, and the New England region as a whole brings in over $1.1 billion in commercial landings annually and has a ripple effect on our entire region.

So we know the ocean is not a static ecosystem. What happens impacts many, and for the record, I thank you for your testimony today because it demonstrates that it is highly irresponsible for us to consider expanding offshore drilling and putting these important industries in jeopardy without first taking any action to improve overall drilling safety.

Thank you, and I yield back.

The CHAIRMAN. Thank you.

I would like to remind everyone, including our witnesses, that the subject of this hearing is seismic exploration off the Mid- and South Atlantic.

OK, we will now resume questioning, and I would like to recognize Representative Duncan.

Mr. DUNCAN. Well, thank you, Mr. Chairman, and I second Rob Wittman from Virginia's comments, this is very timely, and it is something that the State of South Carolina is very interested in as well, including our offshore areas in a potential lease sale and developing the resources that we may have off our coasts and benefiting from the jobs that will be created and the revenue sharing back to the State.

Mr. Cruickshank, just real quick, you don't have to answer this question, but I wish your office could provide to my office, because you are doing the environmental impact statement, a single instance where a marine mammal's death was attributed to seismic. I have researched on the Internet, we have looked in other sources, and I can't find a single instance. So if you have that information, I certainly would appreciate it because we can't find a single instance where a marine mammal was killed based on seismic work.

Mr. Miller, 300 million years ago, the tectonic plates and the continents were all together in an area call Pangaea, and those continents separated. Would you say that the geological features along the Atlantic Coast are very similar to those you would find in North Africa and West Africa because that area was connected to the eastern Continental United States 300 million years ago?

Mr. MILLER. Yes, sir, that is a play that is undertaking right now within industry, the conjugate margin between Angola, which has huge oil reserves, and Brazil, and they are looking at the same thing with the conjugate between Morocco, Mauritania up into the eastern——

Mr. DUNCAN. And there are oil and natural gas resources in that part of the world?

Mr. MILLER. That is correct, and there is a lot of activity and a lot of money being spent in those two countries right now.

Mr. DUNCAN. Just one other question. In 1987, I think MMS estimated in the Gulf of Mexico that there were about 9.57 billion barrels of oil. What did recent seismic and actual data from wells in the field show?

Mr. MILLER. Off the East Coast or in Africa?

Mr. DUNCAN. Well, no, just in the Gulf of Mexico.

Mr. MILLER. In the Gulf of Mexico——

Mr. DUNCAN. Just comparing the 1987 MMS estimate of 9.57 and what we are finding out there now.

Mr. MILLER. Yeah, I am sorry. The Gulf of Mexico, the technology that was developed there with the 3D seismic and then onwards from other types of improvements on 3D seismic, it was a fivefold increase in reserves, based on that technology, before they put the drill bit in the ground. Since then, it has increased another three. In the last 15 years, it has tripled.

Mr. DUNCAN. So the estimate was about 10 billion barrels, and fivefold of that would be almost 50 billion barrels. That is a big difference from what MMS expected to find based on old seismic data and what actually we are finding now in new seismic and well data, correct?

Mr. MILLER. That is very correct.

Mr. DUNCAN. OK, so let's fast forward or let's move over to the Atlantic Coast. Thirty years ago, we had seismic work done that estimated fairly significant reserves that are harvestable, but wouldn't you agree with me that if we use new 3D and 4D technology, new updated 21st century seismic technology, that we may expect to find significant differences between 30-year-old technology and today?

Mr. MILLER. Yes, the industry is expecting to see that improvement and increase with the new seismic.

Mr. DUNCAN. Well, thank you for that.

Professor Knapp, thanks for being here. Your valuable testimony and your experience brings a wealth of information to this committee. What geological potential do you see for the Atlantic in terms of oil and natural gas?

Dr. KNAPP. Thank you for the question, Congressman Duncan. Our group, as I alluded to in my statement, has been revisiting the tectonic and geologic evolution of the Atlantic margin, and we have come up I think with some surprising new details that play into both the evolution of the deposition of sediments, the organic richness of those sediments, as well as the presence or absence of a large volcanic province that would affect the thermal maturity of the Atlantic margin. So there is a lot of new information I think that would need to be fed into revised seismic interpretations to really come up with a new and revised estimate of the resource potential.

Mr. DUNCAN. Well, let me ask you this, what do you think the impact would be on institutions of higher education, such as the University of South Carolina, from ramping up offshore seismic exploration in future production? What do you think that would, what kind of impact would that have on an institution of higher ed?

Dr. KNAPP. I think it could have a very important effect. I think there could be a very strong partnership actually between institutions of higher education and training a workforce for the 21st century that is focused on the energy industries, especially if there is the potential for developing those resources there geographically.

Mr. DUNCAN. Real quickly, because my time is up, but you mentioned in your research, in your statement, that there was some onshore seismic well data that has been calling into question more than 30 years of research on the Atlantic continental margin, suggesting that many previous interpretations of the geologic evolution were in error. Can you explain that? What do you mean by that?

Dr. KNAPP. Real briefly, that is not uncommon in science, that is the way science works, that we are constantly testing our hypotheses and coming up with new interpretations, but in this case, it is what I just alluded to, those features about whether there was a large volcanic province that developed on the margin that would have blanketed the entire area before the Atlantic opened, we have demonstrated now that that didn't exist or if it did, it is no longer there. So there are things like that that are fundamental to our understanding of the tectonic evolution of passive margins where these deposits accumulate that have never been put into the resource estimates, so those are the kinds——

Mr. DUNCAN. Thanks so much. I appreciate it.

I yield back.

The CHAIRMAN. OK.

Now I would like to recognize Representative Pallone for 5 minutes.

Mr. PALLONE. Thank you, Mr. Chairman.

Thank you for letting me sit in on the committee.

I wanted to ask some questions of Mr. Cruickshank. I hope I am pronouncing it right. First, I wanted to impress upon the Department once again that we on the Atlantic Coast can't afford the inevitable environmental and economic costs that offshore drilling has proven to inflict on Americans. As you know, I am totally opposed to any drilling off the coast of the Atlantic.

In New Jersey, the tourism sector, which is anchored to our clean beaches and ocean, generated $34.7 billion in 2012 alone, and that is 7 percent of the entire State economy. Tourism sustained more than 5,000 jobs or 10 percent of total employment in New Jersey. And commercial fishing supports more than 43,000 jobs. And recreational fishing supports almost another 10,000. So my question is, what assurances can you offer me and my constituents that oil and gas exploration in the Atlantic will not put these jobs and my State's economy at risk?

Mr. CRUICKSHANK. Congressman, thank you for the question. We have not made any decisions at this point whether or not to allow oil and gas exploration development in the Atlantic. What we are doing in this programmatic EIS is looking at the seismic, and that sort of information will help us make decisions in the future about whether to offer areas in the Atlantic. I can say there are no guarantees that there cannot be incidents in the future, but the Department has been very aggressive in recent years in trying to make reforms and regulatory changes to improve the safety of offshore operations. And if we didn't believe that we could operate in a safe manner, then we would not be pursuing the sorts of things that we are in the leasing program.

Mr. PALLONE. Well, on December 26, NOAA released draft acoustic guidelines for assessing the effects of sound on marine mammals, obviously important when considering the impacts of seismic air gun testing. In July, when Secretary Jewell testified before the full Natural Resources Committee, I asked that she commit to waiting until these guidelines are published and finalized before issuing a final PEIS on this matter. And she said that she would consider my request after reviewing it with staff. Can you tell me whether the Department will wait until the guidelines have been finalized and fully considered before issuing the final PEIS?

Mr. CRUICKSHANK. At this point, only part of the guidelines have been put out for the draft for public comments, and to my knowledge, at this point, there is no schedule for when the remaining parts will be put out for public comment or when any of those criteria will be finalized, so we are proceeding with publishing the final PEIS, but I want to make the point that this PEIS itself does not authorize any seismic activity, that each application will be subject to a site-specific environmental review and to authorizations under the Marine Mammal Protection Act that we will be able to consider any new information including the criteria as they come out.

Mr. PALLONE. Well, would waiting for Congress to adopt the recommendations of the Deepwater Horizon Oil Spill Commission before moving forward with any offshore oil and gas exploration be prudent and make it less likely that a spill would cause catastrophic damage? As you know, I have been pushing for those recommendations to be adopted. We are not getting much help—well, any help really—from the Republicans in the majority to accomplish that. So would it make sense to simply wait to adopt those Commission recommendations before we move forward?

Mr. CRUICKSHANK. We have been implementing as many of the recommendations administratively as we are able to, but certainly that suite of recommendations and where we are in implementing them and what the residual risks are, are all factors that the Secretary will consider in deciding in the future whether or not to allow leasing activity offshore in the Atlantic.

Mr. PALLONE. Let me, because I have less than a minute. Dr. Boesch, one of the findings of that Deepwater Horizon Oil Spill Commission was that there needs to be better science and greater interagency consultation to improve decisionmaking related to management of offshore resources, and the Commission recommended that Congress give NOAA a formal consultative role during Interior's development of offshore drilling plans. Could you just tell us why the Commission made its recommendation, how you believe giving NOAA more of a formal role in statute would help lead to better decisionmaking?

Dr. BOESCH. Yes sir. Simply because it is the Federal agency which has responsibility for other important resources along our coasts, and so as we make these decisions in which we weigh the risks and benefits with respect to energy resources, renewable energy resources, living resources, we have to think about making sure that our government is working together effectively to help make those prudent decisions.

Mr. PALLONE. All right, thank you.

Thank you, Mr. Chairman, for letting me participate.

The CHAIRMAN. Thank you.

I would like to now recognize Representative Flores.

Mr. FLORES. Thank you, Mr. Chairman.

I would like to thank the panel for attending today. We have two subjects that I would like to talk about. One is somehow offshore drilling safety wound its way into a discussion about seismic activity. Just to make sure we understand the nexus between the discussion we are talking about today and some of the red herring comments that have been thrown out regarding offshore drilling safety, I think it is important to try to build how that relationship works.

So, Mr. Cruickshank, let's start with you. So let's assume the PEIS is issued in February. What is the earliest that drilling would occur in any, either of these two areas, Mid-Atlantic or South Atlantic, if we have a lease sale and if we approve drilling permits? What is the very earliest that that would happen?

Mr. CRUICKSHANK. Well, the first thing that would have to happen is that the Secretary would have to decide to include those areas in——

Mr. FLORES. Just assuming they did, right.

Mr. CRUICKSHANK. From 2017 to 2022, for a frontier area where we would need to do——

Mr. FLORES. Just a short answer, just what is the earliest, I mean, how many years?

Mr. CRUICKSHANK. It would probably be toward the latter half of the next 5-year program.

Mr. FLORES. Right. So, I mean, we are talking 4 years at the earliest, 5 years, something like that?

Mr. CRUICKSHANK. Yes.

Mr. FLORES. So we have got substantial time to address the issues related to offshore drilling that have been raised today. The next question also for Mr. Cruickshank is this: One is, your agency has made policy changes with respect to offshore drilling safety, has it not, you and BSEE? I am including you collaboratively with BSEE.

Mr. CRUICKSHANK. That is correct.

Mr. FLORES. OK. And has the industry made any improvements in offshore drilling safety?

Mr. CRUICKSHANK. Yes, the industry has upgraded a lot of its practices as well.

Mr. FLORES. OK. So, I mean, the bottom line here is safety improvements have not stopped, irrespective of what Congress has done regarding the Commission's report. Is that correct?

Mr. CRUICKSHANK. That is correct.

Mr. FLORES. OK. Just by way of comparison, Mr. Barnes, what is the earliest, I mean, your regulatory system is a lot different, in many ways, it is much more efficient than what ours is. What is the earliest, if seismic activity was approved in a particular area today, what is the earliest that drilling would occur offshore of Nova Scotia and Canada?

Mr. BARNES. Usually, if seismic is approved and seismic is acquired, there is usually about 2 years between when the seismic program is finished and when a company decides to undertake a drilling program.

Mr. FLORES. Right. And so drilling would——

Mr. BARNES. That is an industry decision, as opposed to a government decision.

Mr. FLORES. Right. So drilling would be later on, then, as well?

Mr. BARNES. That is correct.

Mr. FLORES. So, anyway, I think we can sort of dispense with the hysteria about seismic today means that we are going to have an accident tomorrow. I mean, there is plenty of time for the Congress to look at the recommendations, and now let's get on to the subject that is really important here.

Mr. Cruickshank, I would like to go back to you. We are hoping to get this PEIS in February. What will the next steps be before the next 5-year plan begins in 2017?

Mr. CRUICKSHANK. Are you referring to the next steps regarding seismic activity?

Mr. FLORES. Well, in order to get to where we can have a 5-year lease sale plan, what would happen? The next 5-year plan is due in 2017, as I understand it, so what steps do you have to make between the PEIS and the next lease sale?

Mr. CRUICKSHANK. This programmatic EIS does not feed particularly into the next 5-year program. The Outer Continental Shelf Lands Act has a very involved process for developing the 5-year program that we will be kicking off in the coming year.

Mr. FLORES. Right. This doesn't necessarily mean that we are going to have a lease sale in the next, in the Mid-Atlantic or South Atlantic area in the 2017 plan, right? That is where I am going with this.

Mr. CRUICKSHANK. That is correct. The decision has not been made yet.

Mr. FLORES. Mr. Miller, you talked about the robust environmental procedures the industry follows. Will you expand on how you work with other ocean interests to protect our economy, I mean the other parts of the economy such as fishing and shipping?

Mr. MILLER. The vessels that are working and will be working off the Atlantic have a professional group on board that communicates with the shipping industry and the fishing industry while we are out there. Besides the marine mammal observers that are on board, the vessels also employ what we call a chase vessel that is an escort vessel to help to communicate with the fishing business. Those are on all of our operations within our industry.

Mr. FLORES. OK, thank you.

And Mr. Miller, a follow up to that. Has there been, in terms of risk to marine life, is there more risk from the other activities in the ocean, such as shipping and fishing or seismic? Which one has the greater risk profile to marine life?

Mr. MILLER. I am not an expert on that, but I know that within the last 40 years, we have not seen an event, a mortality event in the seismic business.

Mr. FLORES. Exactly.

Mr. MILLER. I would assume that the shipping business may be a little bit different.

Mr. FLORES. Mr. Barnes, what is your, what are your observations in that regard in terms of other economic activities in the ocean versus seismic activity. Which has had the bigger impact on marine life?

Mr. BARNES. Oh, definitely other economic activities. The seismic industry has very little impact on marine life.

Mr. FLORES. OK. So I think we have proven today that seismic activity is an important precursor to any energy activity offshore. It doesn't mean it is necessarily going to happen. It is also safe, and it has nothing to do at this point with offshore drilling safety.

So, Mr. Chairman, with that, thank you. I yield back.

The CHAIRMAN. Thank you.

Representative Benishek.

Dr. BENISHEK. Thank you, Mr. Chairman.

I would like to thank you all as well for being here and taking the time to sit before us to answer questions. I have a couple questions.

The first one is to you, Mr. Cruickshank. I am sort of curious about the process of the environmental impact statement development. As I understand from your testimony earlier, the delay has come over new data being found, and you are trying to evaluate

more and more information to include that all in the process. Is that correct?

Mr. CRUICKSHANK. Yes, we are supposed to include the best available science as we are preparing this document. As we become aware of new information, we need to evaluate it and consider that information.

Dr. BENISHEK. Now, let me just ask you this: In my experience in developing procedures and regulations, I am a doctor, we have to do things on a timely basis, and we have to decide how to treat patients based on the best available knowledge and institute those practices, and so we have a timeline that we say we are going to try to get as much information as we can by this date, and then we are going to act on that data, you know, by studying it for a certain period of time, and then we are going to issue the regulations so that they come out in a timely fashion so that improvements can be made in a timely fashion. And I am somewhat concerned about your testimony, and it doesn't seem to me that there is a timeline. You know, it has been 5 years that they have been working on these regulations, well that hasn't improved anything in 5 years. Is there a timeline, or do you just keep adding on more information as time goes by? I mean, I want the best information, too, but a timely improvement in regulations is important as well. Can you comment on that scenario for me, please?

Mr. CRUICKSHANK. We try to be as efficient as we can in developing these documents, but there was a wealth of information that came in and needed to be evaluated. It is not that we are waiting for new information to come, but when the information is given to us, we do have to evaluate it.

Dr. BENISHEK. Well, then you would just stop what you are doing and maybe change everything you have been working on for the last 2 years if information came in tomorrow that you thought might change it or somebody in your department might change it, you just might change everything you have done for the last 5 years and start over again. Is that right?

Mr. CRUICKSHANK. If there is some significant new information that we needed to pull into our analysis, we would——

Dr. BENISHEK. Who decides that?

Mr. CRUICKSHANK. The scientists decide whether the information that is being provided is something that represents something that needs to be incorporated.

Dr. BENISHEK. Not somebody at your level then? Is it somebody higher than you or lower than you?

Mr. CRUICKSHANK. It is our scientists, our marine biologists, our oceanographers.

Dr. BENISHEK. Well, there is some concern on my part about that whole process, where there doesn't seem to be a timeline because making improvements on, like, a 5-year basis, you know, to continue to make progress doesn't happen if we delay improvement in the regulations based on last-minute information. You understand what I am saying, what I am trying to get to?

Mr. CRUICKSHANK. I do, and this EIS has taken longer than an EIS typically takes for us, but this was a particularly complicated and challenging EIS to complete.

Dr. BENISHEK. Well, 5 years seems to be a long time to me to get something done.

Mr. Barnes, the permitting process in Canada, is it different than what Mr. Cruickshank describes? I mean, do they try to take care of things as they come up time after time, or is there a timely basis involved?

Mr. BARNES. The regulatory approval process is pretty similar to what is in the United States, but we have I think shorter approval times that are actually legislated in practice. I can't be sure if you have legislative approval times, but we do in Canada, such that when a company applies for a seismic application to do seismic, they get approval within, you know, a certain number of months.

Dr. BENISHEK. Well, anyway, the point I was trying to get to, Mr. Cruickshank, is that I am very suspicious of bureaucracies that don't do their jobs, and getting this environmental impact statement done on a timely basis would seem to be the job of your agency, and the idea that I could just submit data to you today that would change everything is sort of scary to me because we are not going to make any progress. We are going to maybe wait 10 years to develop something instead of having regular improvements over a period of time.

Mr. CRUICKSHANK. Our scientists are well connected to the professional community, so it is not like we would see science come in today that would totally change the way we look at things, because they have been involved with the practitioners and other scientists around the world and understand what sorts of things are being developed. It is just a matter of trying to evaluate it and incorporate it in the context of EIS that can take some time to do.

Dr. BENISHEK. Well, OK, I understand your rationale, but there are many other industries that do this on a timely basis, and we make continuing progress.

My time is up. Thank you.

The CHAIRMAN. Representative Lowenthal.

Dr. LOWENTHAL. Thank you, Mr. Chair, and I understand we have already touched on the topic that I would like to go on already today, but I would really like to go back and understand a little bit more about the marine mammal impacts.

And so, for Mr. Cruickshank, I came today because I have been interested in the potential and understanding more about the harmful impacts or potential harmful impacts of seismic surveys on marine life and especially on the sea turtle and the endangered right whale. And what I want to ask is how you can help us understand how these animals are actually affected by seismic surveys. So, for example, how far away does the right whale need to be from an acoustic source to not be affected? What are the immediate and long-term effects? What are the resulting consequences for the animals? I know this may be difficult to answer and may be different for different animals, but could you just give me an overview of what is actually happening here?

Mr. CRUICKSHANK. Yes. I would preface by saying I am not the marine biologist, so if you have questions about specific impacts on specific species, we will be able to get that to you after the hearing, but generally what we try to do is take a look at the sorts of impacts that are possible, and you are right, they do vary by species

and location. And then a big part of the NEPA process is trying to design mitigation and monitoring measures that would reduce or eliminate those sorts of potential impacts, and so a lot of what we are trying to do in this process is to try to figure out what conditions we should place on approvals that would best protect those species.

Dr. LOWENTHAL. And in trying to figure out, based upon the research, where is the uncertainty? I know you are not a research scientist, but where is the uncertainty in our understanding of acoustic? Do we need further research? Are we really clear about what those impacts are, or really are we just kind of just assuming that we understand what those impacts are?

Mr. CRUICKSHANK. I think it is a combination of things, there is always additional research that can be done, and we continue to fund research on these very questions. I think, you know, what we try to understand through our research is how these species do react to these sound sources and how effective the mitigation measures have been, but there are a lot of species out there, a lot of ocean to cover, and we are continuing to learn new things as we conduct this research. And those things will be considered in future decisionmaking.

Dr. LOWENTHAL. And you mentioned mitigation measures. Can you be more specific? What are those measures that we use to mitigate these effects?

Mr. CRUICKSHANK. There is a suite of activities we do now for seismic, including having marine mammal observers, requiring shutdown and ramp up to make sure that if there are species in the area that they have a chance to get out of the way before they are hit by loud noises. We are looking at a number of other possible mitigation in this EIS, including time area closures, minimum separation distances between simultaneous surveys, passive acoustic monitoring, and adaptive management strategies. We are continuing to try to identify best practices and improve our mitigation.

Dr. LOWENTHAL. So you think that in the preferred alternative in the draft programmatic environmental impact statement, the PEIS, that we really are maximizing these mitigation opportunities?

Mr. CRUICKSHANK. We have been working with other scientists and with NOAA to try and understand what the best practices would be, and we are trying to develop those mitigation measures that we think would be the most effective.

Dr. LOWENTHAL. I am just wondering if anyone else on the panel has anything to add to this and help me in my understanding of just really what those impacts are.

Dr. BOESCH. Yes, Mr. Lowenthal, I am here representing the oil spill commission, and we did not investigate this issue of the effects of seismic exploration.

However, unlike Dr. Cruickshank and Dr. Knapp, I have to admit that I am a marine biologist, and I am not an expert on marine mammals, but I have obviously followed the issues. And I just want to say that part of the problem that the agency has in making these decisions is that the science isn't all lined up in the same direction in saying that there are no concerns and no risks. There are legitimate concerns, not only with respect to mortality, but more

specifically with respect to avoidance that have significant effects on the species. And I know scientists who have different views about these things, which means that it is a matter of scientific, legitimate scientific controversy, and so this is the kind of challenge the agency has of sorting through this, to kind of make the decision and then to make the decision the way that provides protection.

Dr. LOWENTHAL. Thank you, and I yield back.

The CHAIRMAN. OK, thank you.

We will have one more round of questioning. I am going to then give the gavel to Representative Miller to finish up after I ask my questions, and then we will—Duncan, excuse me, and then we will conclude. My question is for Mr. Miller; that is why that was on my mind. Sorry about that.

Mr. Miller, and I got it right this time, not Dr. Miller, in 2012, the Bureau of Ocean Energy Management and the Bureau of Safety and Environmental Enforcement put out a joint notice to lessees updating mitigation measures for marine mammals during seismic operations in the Gulf of Mexico. These regulations set up a rigorous process to minimize any possible impacts on marine mammals. Can you discuss how your company implements these specific measures, such as the use of ramping up procedures and marine observers?

Mr. MILLER. Within the industry, all of the vessels worldwide now carry marine mammal observers, and they are usually locally based. Those are on the vessel with binoculars, on the bridge looking out for marine mammals, and if there is a mammal that is within the exclusion zone, then the vessel is shut down, and there is a time period that that vessel cannot discharge the energy source to let this animal move out of the area. At that point, there is a ramp up, and you start with a low volume energy source until you get back up to your production levels. It is very common practice. The whole industry operates within those guidelines. There are industry guidelines that the IGC puts out, and we all, we follow those worldwide.

The CHAIRMAN. And Mr. Miller, I assume that you have great flexibility in terms of if some whales or other marine mammals are coming into the area, that you can wait while they depart, come and go, and still conduct the seismic exploration around their behavior?

Mr. MILLER. Yes, 100 percent correct. I mean, you may move a little bit to a different area, but we are flexible. That is the nature of our business. We work with them, and we respect it, so it is not a problem.

The CHAIRMAN. Thank you.

Dr. Knapp, there have not been new seismic surveys conducted in the Atlantic OCS in over 30 years. We have talked about this earlier. Much of the data that is currently being used by the Federal Government to make oil and gas resource assessments is from the late 1970s. Can you talk about how the science and technology has changed since that time?

And, Mr. Miller, if you want to add to this discussion, please feel free to do so.

Dr. KNAPP. Thank you, Mr. Chairman. We are in the process of and have been working with the so-called legacy data from the Atlantic OCS, and clearly, it is a useful resource, but given the technological developments that have taken place in not only the last 30 years, but in particular the last 10 years, for the acquisition of 3D seismic data, there are advancements, significant advancements that have been made both in the design and just the acquisition of the data, let alone the processing and the interpretation, so it would be the equivalent of using a, you know, a rock to draw in the sand versus having a computer to basically write something, the difference in what the technology is allowing us, and some spectacular examples in terms of that 3-dimensional imaging of very complex structures that we find in the subsurface.

Mr. MILLER. Just briefly. The technology, the big technology that has the longer offset that is going to image these deeper plays, and we have been modeling. It is very easy to take the old data that is at 3,000 meters and take the new data that is 12,000 meters that we have in other parts of the world, but you only process the three and you compare them, and they look very similar, the old data and new data if you only use part of it, but when you add the rest of the offsets then the image improves dramatically, and that is what we are going to see.

The CHAIRMAN. OK, thank you all for your testimony.

I am going to hand the gavel over to Representative Duncan and, at this point, recognize Representative Costa for 5 minutes of questions.

Mr. COSTA. Thank you.

Mr. DUNCAN [presiding]. The gentleman from California.

Mr. COSTA. Thank you, Mr. Chairman. From the snippets of the comments I have heard based upon the questions, although I didn't catch the opening statements, I am questioning after the report here that there seems to be consensus as to, one, the new science and technology; two, an acknowledgment of lessons learned; three, a need at this point for the Congress to act to provide the guidelines to demonstrate how we move forward. The tremendous resources that are there I think everyone is aware of. Members of Congress, before they get into their questioning mode, always have to get their bona fides, right, whether we have them or not, but the fact is for some of us who are avid sailors on coastal waters and who have spent time in various parts of the Atlantic and the Pacific, who are familiar with migratory patterns with whales and their pods and other sea life, I think that there is a way this can be done, and I think science has demonstrated that it can be done, so I guess I am trying to understand what the problem is here, except that, like a lot of other things, Congress has failed to take action to provide the direction. Am I missing something?

Dr. KNAPP. Thank you, Mr. Costa.

Not in my opinion. I think it should be fairly straightforward that these studies should move forward with expedition.

Mr. MILLER. We conduct these surveys all over the world safely, and there is no reason that this cannot be taken forward and completed.

Mr. COSTA. I mean, that is my sense. I mean, I was just off the Santa Barbara coast last month, and the ability to make deter-

minations as to when these migratory patterns take place is well documented, and I mean, we have greater issues with these mammals being injured as a result of them normally pursuing sea lanes and shipping taking place that accidentally has an incident where there is an injury, but where you are planning the seismology and you are doing different grid patterns and you are focused in an area, what is happening in that area. It is totally different than ships that are going on a 24–7 basis that are involved in shipping lanes. I mean, for those of us who are on a 30- or 40-foot sailboat, hell, they don't even look at us. You need to be careful and beware.

So it seems to me, Mr. Chairman, that this is one of those issues that there ought to be consensus with and that we ought to be able to move forward with, realizing that there are some other issues that are out there that we all have concerns about as it relates to safely dealing with exploration and development of these resources that I think are far more serious than this issue of seismology and the testing that goes with it.

Any other comments that either of you would like to make?

Dr. KNAPP. If I could, Congressman Costa, I agree with you, and I would also make the point that it seems that in many cases, people are viewing exploration, seismic acquisition and exploration production as an either/or proposition with a lot of the other industries that take place in the offshore: shipping, fishing, tourism, et cetera, and I really don't think that is accurate. I think that we have proven that those activities can go on simultaneously in many other parts of the world.

Mr. COSTA. I mean, there is another issue here, and of course, the technology we know has changed tremendously in the last 20, 25 years. There are some folks, and I disagree with them, who don't want to see any additional utilization of the offshore resource, whether it be oil or gas. And so they want a complete moratorium on any exploration, let alone any utilization of that resource. And so, therefore, I understand their goal is not to have any seismology testing and to question the efficacy of the seismology testing because they have a different view, and that is they don't want any of the resource to be utilized.

So let's be clear about that. If the goal is we shouldn't open up any of these areas period, for a host of reasons that they believe are valid, I understand that. I may disagree with it, but I understand that, but it is not the seismology testing that is the issue.

Anyway, I have expired my time, and thank you. I yield back.

Mr. DUNCAN. I thank the gentleman from California.

I will recognize myself for 5 minutes.

Dr. Knapp and Mr. Miller, the seismic work that we are talking about, the technology that is being used, is it currently being used all over the globe for seismic research for oil and natural gas?

Mr. MILLER. Yes, that is correct, our industry has vessels operating in every ocean right now, except Antarctic, but all over the world.

Mr. DUNCAN. So we are not talking about anything that is new and that hasn't been tried and true, tested?

Mr. MILLER. That is correct.

Mr. DUNCAN. OK.

Mr. Barnes, can you discuss further what sort of mitigation effort seismic companies operating in the Canadian Atlantic utilize to minimize the impact of marine life?

Mr. BARNES. Very similar mitigation measures as has already been mentioned. We have marine mammal observers on board seismic vessels. We do slow ramp ups of the sound source. We do constant communication with the fishing industry, so they understand. We do seismic, and we understand in the oil and gas industry, where there are any fishing industries, we avoid any conflict. And finally, we avoid areas where there are spawning grounds at certain points of the year.

Mr. DUNCAN. And I would assume that is very similar to what is being done in the Gulf of Mexico for mitigation. Are you familiar with that?

Mr. BARNES. I assume so, but I am sure others on the panel would have better information.

Mr. DUNCAN. Mr. Cruickshank?

Mr. CRUICKSHANK. That is correct, a similar source of mitigation measures around shutdown and ramp up, marine mammal observers, marine debris requirements, vessel strike avoidance. There is a whole suite of measures in place.

Mr. DUNCAN. The new environmental impact statement and study, will the recommendations of that namely mirror what is currently being done, or can you elaborate on what you are going to put in there for future mitigation because I think the oil and natural gas companies and the seismic companies, rather, need to know what is coming and whether it is going to be cost-prohibitive. Or is it going to mirror what is being done in Canada, what is being done in the GOM now?

Mr. CRUICKSHANK. The measures currently in place in the Gulf will be used in the Atlantic. We are also looking at some other mitigation measures, including time area closures where certain areas might be closed during certain seasons when there is a particular concentration of an endangered species in that area. We are looking at minimum separation distances between simultaneous surveys, passive acoustic monitoring, adaptive management, so we are looking at trying to improve our suite of mitigation measures, but the ones we have been using in the Gulf will also be in place.

Mr. DUNCAN. So what I am getting at I guess ultimately is, we have seismic being done all over the globe similar to what is going to be done in the Mid- and Southern Atlantic areas that we are talking about, we have shown that there is no definitive and proven impact where marine mammals have been killed. I haven't been able to find one, and no one has been able to provide me that. We have got mitigation that is being done in the Canadian waters that is very similar to what is currently being done in the Gulf of Mexico. That mitigation has basically protected the marine species, so why would we put any more stringent requirements in place when these are proven mitigation practices and this is technology that has been used all over the world? So why would we go beyond what is currently working?

Mr. CRUICKSHANK. The requirements under the law for endangered species are not just to avoid death or injury; it is also to try and minimize effect on behavior. And most of the impacts that you

see from this activity are behavioral effects, so we are trying to institute measures that would limit the impact on the behavior of those endangered species.

Mr. DUNCAN. All right. Well, there was an article today in the Environmental and Energy Daily by Phil Taylor. And Mr. Miller, he says that surveys which involve loud blasts from air guns towed behind ships for a day, weeks or months at a time are believed to impair hearing in whales and an array of other marine life. Are you dragging seismic out there for a month at a time?

Mr. MILLER. No, not in a single location, no. We move. The vessel is on a grid or a track, and we are in different locations. It is not in one location we sit all the time.

Mr. DUNCAN. OK. This article goes on to quote the gentleman from New Jersey who testified or asked questions earlier who has lobbied to the Obama administration to stop the seismic plan. He has called it the first step to offshore drilling, and we have to put a stop to it before we experience a Deepwater Horizon-like disaster in the Atlantic. It is an intent to put stop to seismic because they don't want to see offshore drilling. And seismic is the first step for a 5-year plan. If you look at the process, seismic, determine what is there, a lease sale to open up those areas, and then production, and so I think it is very clear. I don't want to see the mitigation efforts be so cost-prohibitive and so large and cumbersome that it doesn't allow the seismic activity to happen off of South Carolina's coast because we want to see those resources developed.

And with that, I will recognize the Ranking Member for 5 minutes.

Dr. HOLT. I thank the gentleman. My colleague spoke about our colleague Mr. Pallone from New Jersey. Yes indeed, seismic, and I will just speak on this without a question, is a first step, but as we identified in the earlier round of questioning and in the testimony, there are some very important recommendations of the Commission that should be implemented before we expand territory. It is that simple, and we can look at the question of expansion, expanding territory, but first things first.

Mr. Cruickshank, I have here a letter from the Mid-Atlantic Fishery Council, and they point out how important commercial and recreational fishing is to the economy, to jobs in the Mid-Atlantic region and say that, in light of the insufficient data and analysis about the effects the impacts of these activities on valuable marine resources, the Council cannot support the draft PEIS.

First of all, Mr. Chairman, I would like to ask unanimous consent to have this letter included in the record.

Mr. DUNCAN. Without objection, so ordered.

Dr. HOLT. And then I would like to ask, Mr. Cruickshank, if you think that the impacts, the effects on marine resources are significant enough that they should be considered in this and whether you think they are significant enough that they call for a delay in the expansion.

Mr. CRUICKSHANK. We did receive that comment, and we consider that comment along with all others in moving from the draft EIS to the final EIS, and we are using the best information we have available to us. I would note that these activities and very productive fisheries have coexisted in the Gulf of Mexico for quite

sometime, so we believe if we put the right suite of mitigation measures in place, that seismic activity can occur without having a detrimental impact on commercial fisheries.

Dr. HOLT. OK. I hope that the committee will continue to collect data, collect evidence to resolve the questions raised by those whose livelihood depends on these fish, on these marine species so that we don't just assume that everything is OK.

I would like to ask a completely separate question about wind, if I may, Mr. Cruickshank. The Atlantic Coast has been dubbed the Saudi Arabia of wind because of enormous wind potential offshore. The Department of Energy estimates that more than 4,000 gigawatts of offshore wind potential is found along the coasts, which greatly exceeds what is needed to power the entire United States. The permitting process for offshore wind in the Atlantic is farther along than oil and gas, and unlike oil and gas offshore, wind energy avoids, well, the threats of seismic air guns and oil spills and greenhouse gas emissions. There certainly are some advantages to it. Why is the Administration diverting from the expeditious development of abundant offshore wind energy and proposing to double down, in effect, on fossil fuels along the Atlantic Coast?

Mr. CRUICKSHANK. The Administration has an all-of-the-above approach to energy, and we are aggressively pursuing wind offshore the Atlantic. We have had two——

Dr. HOLT. Give some examples of this aggressive pursuit then because it doesn't look like it from my point of view.

Mr. CRUICKSHANK. We have had two successful competitive auctions last year for offshore wind leases to get them in commercial hands, there are currently five commercial leases that have been issued to companies off the North and Mid-Atlantic. We have just announced another lease sale coming up for an area offshore Maryland, and we are very close to issuing announcements for additional lease sales off New Jersey and Massachusetts to issue commercial leases for offshore wind development. Once those leases are issued, it is then in the hands of the corporations to be able to put together the projects.

Dr. HOLT. My time is expiring, but please understand that I have a great deal of interest in this, as do the people of New Jersey, and we will want aggressive action and a full report, please. Thank you.

Mr. DUNCAN. I thank the Ranking Member and I thank Chairman Lamborn for putting this hearing together and staff for their work and this panel.

I thank the panelists, excellent testimony.

I just wish there had been more members here involved, but I want to thank the members that did participate today. Members of the committee may have additional questions for the record, and I ask you all to respond to these in writing.

And if there is no further business, without objection, the committee will stand adjourned.

[Whereupon, at 11:49 a.m., the subcommittee was adjourned.]

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