

**DEFENDING U.S. ECONOMIC INTERESTS IN THE  
CHANGING ARCTIC: IS THERE A STRATEGY?**

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**HEARING**

BEFORE THE

SUBCOMMITTEE ON OCEANS, ATMOSPHERE,  
FISHERIES, AND COAST GUARD

OF THE

COMMITTEE ON COMMERCE,  
SCIENCE, AND TRANSPORTATION

UNITED STATES SENATE

ONE HUNDRED TWELFTH CONGRESS

FIRST SESSION

—————  
JULY 27, 2011  
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ONE HUNDRED TWELFTH CONGRESS

FIRST SESSION

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IN THE CHANGING ARCTIC:  
IS THERE A STRATEGY?**

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**WEDNESDAY, JULY 27, 2011**

U.S. SENATE,  
SUBCOMMITTEE ON OCEANS, ATMOSPHERE, FISHERIES,  
AND COAST GUARD,  
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,  
*Washington, DC.*

The Subcommittee met, pursuant to notice, at 10:30 a.m. in room SR-253, Russell Senate Office Building, Hon. Mark Begich, Chairman of the Subcommittee, presiding.

**OPENING STATEMENT OF HON. MARK BEGICH,  
U.S. SENATOR FROM ALASKA**

Senator BEGICH. Thank you all very much. Thanks for being here. The Ranking Member is on her way, but we may go ahead and start in just a second here. I appreciate you being patient while I came from a Veterans Committee meeting, in which we were talking about long-term care for our veterans. So I appreciate your patience.

Today our topic is "Defending U.S. Economic Interests in the Changing Arctic: Is There a Strategy?" So today is the discussion of hopefully there is and, if not, we hope to have a long-term discussion and start to move forward.

Again, good morning. I'd like to welcome our witnesses and thank them for taking the time to testify before the Committee today.

Any Alaskan can tell you our State is ground zero for the changes apparent in the Arctic today. Sea ice disappearing faster than scientific models have predicted; open seas eroding the coastline and thawing permafrost, undercutting our many villages along the coast. And warm water temperatures are changing the migration patterns of our fish and marine mammals.

The opening of this fifth ocean has broad implications for our nation. It's been said there's suddenly a lot more water up there, and it's our responsibility. We need to make sure our nation is prepared to fulfill that responsibility and address the implications for national security, energy development, and increased marine shipping and tourism.

The responsibilities and opportunities of the changing Arctic are the subject of today's hearing on our nation's economic interests in the Arctic and whether we have a strategy to address these. Con-

sider energy. The Beaufort and Chukchi Seas contain an estimated 28 billion barrels of oil, almost twice as much as has already been produced from Prudhoe Bay, and 38 trillion cubic feet of natural gas.

I'm pleased that President Obama supported my push to start utilizing Alaska resources to support America's energy needs. As we look to future energy development, we need to proceed carefully, safely, and make sure communities are fully prepared and engaged. I welcome the testimony of Shell Oil's Pete Slaiby on the second panel today.

The diminishing ice pack is also opening new routes for marine shipping, which can cut distances for transcontinental shipping in half. This year is expected to see a record number of sailings of cargo vessels through the northern sea route on top of Russia, including tankers.

With increased energy development and maritime activity, our nation must ensure that the Coast Guard has the capabilities to operate in the Arctic waters, to guard our borders, protect life, safety, and the environment, and ensure safe commerce. That includes icebreakers, which we are sorely lacking. It also includes other cutters and aircraft hangars, crew quarters, communication capabilities, and other infrastructure needed to do the job. I look forward to exploring those needs in more detail today.

We also need a strategy toward addressing the international issues that exist in the opening Arctic. On that front, the most important single step our nation needs to take for the future Arctic governance is the ratification of United Nations Convention on the Law of the Sea. Even while we have abided by its terms, the United States is among a handful of nations which have not ratified the Law of the Sea. And the company we keep by not ratifying this law, this convention, includes the likes of Libya, Iran, and North Korea, a list, honestly, we don't need to belong to.

As the world's leading maritime power, the only way the United States can make sure that the rules are followed and to protect the freedom of navigation, to advance our commercial and national security interests, is by being party to the convention. And, only as a party to the convention can we protect our rights as a coastal state and secure international recognition of the outer limits of the continental shelf. The extended continental shelf in the Arctic is estimated at almost twice the size of California.

It's huge, even by Alaska standards.

There are other strategic needs in the Arctic as well, such as addressing border disputes, fisheries in international waters, and more, which we will talk about today.

The coming years bring great challenge and opportunities to the Arctic and the United States has a major role to play. To fulfill that role and responsibility, we must address the broader policy and implications of an ice-diminishing Arctic on the diplomatic, scientific, and national security fronts. We must make the needed investments to maintain leadership at the top of our globe.

Before I introduce the first panel, I will ask the ranking member, Senator Snowe, if she'd like to make a few statements. Senator Snowe.

**STATEMENT OF HON. OLYMPIA J. SNOWE,  
U.S. SENATOR FROM MAINE**

Senator SNOWE. Thank you very much, Mr. Chairman, for calling this hearing to explore our economic opportunities in the Arctic.

With the release of the Coast Guard's High Latitude Study on July 20 of this year, it's certainly timely that we understand the infrastructure, research, and legislative priorities necessary to promote economic growth in the region. In June this subcommittee reviewed the Coast Guard budget and discussed the lack of icebreaking capacity and its implications for the Coast Guard, and I'm certain as well we'll hear from the Navy today about its reliance on the icebreaker fleet.

At the same time, indisputably our hearing today stems from the fact that climate change has dramatically changed the Arctic environment and receding sea ice will require new patrol and response capacities as shipping routes open, vessel traffic increases, and competing claims to resources are made in areas previously inaccessible due to year-round ice.

Scientists predict that the Arctic may shift from an ice-covered environment to a recurrent ice-free ocean in the summer in as few as 20 years. In fact, scientists at the National Snow and Ice Data Center are seeing record ice melt this summer, and the ice extent is currently lower than it was in 2007, the year there was a shocking record low. As of July 17, Arctic sea ice extended only 2.9 million square miles, 865,000 square miles below the 1979 to 2000 average.

New open waters will increase the potential for shippers to save several days and thousands of miles of travel between Asia and Europe or North America. While significant increases in vessel traffic remain impeded by operational costs in the northern latitudes, we cannot stand idly by and wait to address the capability of our Coast Guard and Navy to protect American safety and security interests.

The Coast Guard has actively pursued an Arctic mission analysis and I'm pleased that the High Latitude Study is now available to guide Congressional decisionmaking. This study identifies significant capacity gaps in four key mission areas: defense readiness, ice operations, marine environmental protection, and port security.

The Coast Guard takes seriously its statutory obligations to protect our sovereignty, human lives, infrastructure, and the unique Arctic environment and the root cause of its inability to perform at the level we expect is a stark lack of polar icebreaking capacity. The current status of our icebreaker fleet, with only one medium active vessel in operation, poses an unacceptable risk to our nation. Icebreaker construction would take 8 to 10 years after we make a decision to grow the fleet, of course, so it is imperative that we begin to identify concrete steps to address our nation's long-term requirements.

Admiral Papp, you've commented on the Coast Guard budget hearing in April that one thing that keeps you up at night is the Coast Guard's inability to respond to any sort of disaster in the Arctic. It therefore comes as no surprise to you, I assume, that the High Latitude Study found that we were constrained currently by inadequate communications system capabilities, limited forward

operating bases, and shortfalls in our environmental response and mitigation capabilities in ice-covered water.

With small communities' cold climate transportation challenges, the most basic provisions will prove difficult to meet in the Arctic should we have to locate people to a remote site. We even lack adequate places to house people or vehicles.

Unfortunately, in this difficult budget climate and due to the realities of acquisition and construction processes, meeting those infrastructure requirements is a goal that is years away. As a positive step, in 2009 the U.S. led the successful development of an international search and rescue initiative in the Arctic, negotiated under the auspices of the Arctic Council. Yet, given the security issues that may be posed by growing open water and the discovery of new sea routes, the United States must be at the table and have all the tools at the ready to address emerging threats to our nation's sovereignty, whether through competing resource claims or maritime passage along our shores and international straits.

The United States as a maritime nation should continue to be a strong leader in the development of international ocean policy. A cornerstone of this will be how we address the significant changes occurring in Arctic waters and how we use the lessons we are learning there to inform mitigation and prevention efforts to address climate changes along our Atlantic and Pacific coasts. The effects of climate change are being felt already around this country, and the Arctic is the canary in the coal mine.

I look forward to an illuminating discussion today and I welcome all of you here.

Thank you, Mr. Chairman.

Senator BEGICH. Thank you very much, Senator Snowe.

Again, we want to thank the first panel here today and look forward to your testimony. We have on the panel today: Ambassador David Balton, Deputy Assistant Secretary for Oceans, Fisheries, Bureau of Oceans and International Environment and Scientific Affairs, U.S. Department of State. That's a long title.

Admiral Papp, again it's always good to see you, Commandant of the United States Coast Guard; and Rear Admiral Titley, Oceanographer and Navigator of the Navy, United States Navy.

Again, thank you all three for being here. We'll start with Ambassador Balton, if you could go ahead, and then we'll kind of just go down the list here. Ambassador, thank you.

**STATEMENT OF AMBASSADOR DAVID A. BALTON, DEPUTY ASSISTANT SECRETARY FOR OCEANS AND FISHERIES, BUREAU OF OCEANS AND INTERNATIONAL ENVIRONMENTAL AND SCIENTIFIC AFFAIRS, U.S. DEPARTMENT OF STATE**

Ambassador BALTON. Thank you very much, Chairman Begich, Ranking Member Snowe. I'm pleased to be here today. I have a written statement and ask that it be included in the record.

Senator BEGICH. Without objection.

Ambassador BALTON. Mr. Chairman, as you noted, the Arctic is changing in fundamental ways. Much, though not all, of this change is resulting from the warming Arctic climate. As you noted, Arctic sea ice is retreating, Arctic land glaciers are receding, coasts are eroding, Arctic permafrost is thawing.

Much of this change presents serious challenges for Arctic residents and for governments. But with these challenges come certain opportunities, particularly economic opportunities. Over the next few minutes I will try to outline some of the steps we are taking at the international level to facilitate and manage economic activity in the Arctic. I will close with some remarks about why the United States must accede to the Law of the Sea Convention if we are to advance our economic interests in the Arctic most effectively.

Mr. Chairman, in early 2009 the U.S. Government released an updated U.S. Arctic region policy. That policy remains in effect. The impetus to update this policy arose from the many changes that had taken place in the Arctic in the previous 15 years, including the region's emerging economic opportunities.

The other Arctic nations are also moving ahead with policies to take advantage of these same economic opportunities. Part of our mission and our challenge is to manage economic development across the Arctic so that it proceeds in an orderly and responsible fashion. Here are just a few of things we are doing, the tip of the iceberg, no pun intended.

Using our policy, we are working closely with Russia, which holds vast hydrocarbon and other mineral deposits in the Arctic, to share our experience in managing the development of such resources. The Russian government, the Geological Survey of Canada, and the United States Geological Survey have also jointly mapped mineral potential across the Arctic. The United States and Canada are conducting research to develop technologies to locate Arctic methane hydrate deposits for potential production. The United States and Canada also plan to cooperate on the regulatory process of the proposed Alaska Natural Gas Pipeline.

Now, the main forum in which we work with other Arctic nations is the one that Senator Snowe mentioned, the Arctic Council. The Council is valuable on a lot of fronts, not least of which is because it serves as a venue in which the Arctic indigenous peoples can collaborate with governments there on many issues of concern.

This council, the Arctic Council, is evolving in a number of very useful ways. In May, for example, Secretary Clinton signed the search and rescue agreement that Senator Snowe referred to. This is the first-ever legally binding agreement adopted under the auspices of the Arctic Council. This agreement will support economic activity in the Arctic where infrastructure and support services are sparse.

While she was at the meeting, Secretary Clinton also joined with other colleagues at the Arctic Council in launching a new set of negotiations on oil spill preparedness and response, which the United States will co-chair.

Let me say a word about Arctic fisheries. Outside the Arctic Council, we are advancing our interests in the management of the potential for increased Arctic fisheries as they may expand into the Arctic region with the warming of the waters.

I note that the United States has taken an unprecedented step at home. We have closed the portion of the U.S. exclusive economic zone north of Alaska to new commercial fisheries. Why? Well, essentially because we don't yet have sufficient knowledge of those waters to manage fisheries in that area properly.

We at the State Department have encouraged our immediate Arctic neighbors—Russia and Canada—to consider taking comparable action in waters under their jurisdiction in the Arctic. And we are seeking a broader agreement that nations should not authorize their vessels to fish in the high seas portion of the central Arctic Ocean until we have an international mechanism for managing fisheries in that area.

Finally, Mr. Chairman, I must say that the most significant step we can take as a nation to advance our economic interests in the Arctic would be to accede to the Law of the Sea Convention. As you noted, the Convention provides the basic legal framework applicable to economic activities in all oceans, including the Arctic Ocean. The Convention contains highly favorable rules that benefit the U.S. oil and gas industry, the shipping industry, the telecommunications industry, and the fishing industry, among others. Only as a party, though, could the United States fully secure those benefits, and that is why these industries support U.S. accession to the Convention.

While those benefits would apply in all regions, the Arctic region presents a particularly compelling case for why the United States must be party to the Convention. We are the only Arctic nation not party. We are the odd one out. We are the only nation bordering the Arctic Ocean that is not in a position to fully secure rights to our continental shelf, which may extend 600 miles north of Alaska.

From a geostrategic perspective, we need to be a party to the Convention to take complete advantage of our stature as a major maritime power and as an Arctic nation.

Thank you for this opportunity to testify. I would be pleased to answer any questions.

[The prepared statement of Ambassador Balton follows:]

PREPARED STATEMENT OF AMBASSADOR DAVID A. BALTON, DEPUTY ASSISTANT SECRETARY FOR OCEANS AND FISHERIES, BUREAU OF OCEANS AND INTERNATIONAL ENVIRONMENTAL AND SCIENTIFIC AFFAIRS, U.S. DEPARTMENT OF STATE

Chairman Begich, Ranking Member Snowe, members of the Subcommittee, I am David A. Balton, the Deputy Assistant Secretary of State for Oceans and Fisheries. I am pleased to be here today to discuss with you how we work with our fellow Arctic nations to promote and advance our economic interests in the Arctic region.

As you know, the frozen areas of the Arctic are melting and thawing, and this phenomenon is triggering ever-increasing public interest in this little-known and mysterious area of the world. We have all heard much lately about the oil and gas deposits in the off-shore areas of the Arctic, including Alaska, and though we hear less about other kinds of human activity in the Arctic such as increases in shipping and tourism. These things are happening now. We must be prepared to manage Arctic economic activity in ways that both secure our economic interests and also protect the environment. It is in part for these reasons that we reviewed and updated our Arctic policy in 2009.

#### **United States Arctic Region Policy**

On January 9, 2009, the past Administration released an updated and revised U.S. Arctic Region Policy for the first time since 1994. Shortly after the current Administration came to office, it reaffirmed that this policy remains in effect.

The impetus to update the Arctic Region Policy arose from the many changes that have taken place in the Arctic over the previous 15 years, including growing interest in the region's economic assets. The policy sets forth seven areas of policy:

- National Security and Homeland Security Interests
- International Governance
- Extended Continental Shelf and Boundary Issues

- International Scientific Cooperation
- Maritime Transport
- Economic Issues, Including Energy
- Environmental Protection and Conservation of Natural Resources

#### **Arctic Resource Potential**

The Arctic regions of Russia, the United States, and Norway contain the largest amounts of discovered Arctic oil and gas resources. Russia has 75 percent of known oil reserves and 90 percent of known gas reserves, and likely contains the vast majority of undiscovered resources of oil and gas. Russia ships up to 140 million barrels of oil per year along the Arctic Russian and Norwegian coasts. Norway transports up to 180 million barrels of oil and gas condensate per year from Norwegian Sea platforms. The potential for oil and gas in the areas of possible U.S. extended continental shelf is still largely unknown, but has the potential to be significant. Russia also holds vast non-energy mineral deposits and engages in significant mining activity in the Arctic.

U.S. Government agencies are actively involved in sharing our experiences in the area of oil and gas management with Russia, which continues to express interest in cooperation in Chukchi Sea oil and gas activities. Russia also holds vast non-energy mineral deposits and engages in significant mining activity in the Arctic. The Russian Government, the Geological Survey of Canada and the United States Geological Survey have jointly mapped pan-Arctic mineral potential. The United States and Canada are conducting research to develop technologies to characterize Arctic methane hydrate deposits with a long-term goal of potential production of methane. Research is also underway in the United States, Canada, Norway, Germany and other EU countries on the methane hydrate role in terms of seafloor hazards and global climate change. The United States and Canada also plan to cooperate on the regulatory process of the proposed Alaska natural gas pipeline.

The National Ocean Policy for the stewardship of the ocean, our coasts, and Great Lakes established by President Obama in 2010 recognizes the Arctic as a national priority. Implementation of this policy will address environmental stewardship needs in the Arctic Ocean and adjacent coastal areas through the identification of better ways to conserve, protect, and sustainably manage Arctic coastal and ocean resources, effectively respond to the risk of increased pollution and other environmental degradation on humans and marine species, and adequately safeguard living marine resources. The policy stresses collaborations and partnerships and communicates to other Arctic Nations the commitment of the United States to support science based decision-making and an ecosystem-based approach to managing human activities at sea, including using tools, consistent with international law, such as coastal and marine spatial planning.

#### **The Arctic Council**

The Arctic Council is the main forum we use to advance our economic, environmental and other Arctic interests with the Arctic nations. The Arctic Council also gives us a forum in which the indigenous peoples living in the Arctic collaborate on many issues of concern. The Council has been very successful for the United States in that we have led or co-led many of its important projects including the 2004 Arctic Climate Impact Assessment, the 2008 Arctic Oil and Gas Assessment, and the 2009 Arctic Marine Shipping Assessment. In May 2011, Secretary Clinton signed an agreement on Aeronautical and Maritime Search and Rescue Cooperation in the Arctic, the first-ever legally binding agreement negotiated under the auspices of the Arctic Council. This agreement is key to supporting economic development activity in the Arctic, where infrastructure and support services for search and rescue are sparse.

Secretary Clinton also joined with her colleagues in creating a Task Force on oil spill preparedness and response, which the United States will co-chair with Russia. This Task Force is an excellent opportunity to join with our fellow Arctic nations to prepare for offshore oil exploration and development so that if a spill does happen, we will be better-positioned to address it. We will include the lessons learned from the *Deepwater Horizon* spill as we develop an international instrument on oil spill cooperation in the Arctic, where coordination of international efforts would likely be critical to mounting an effective response. The United States has recently proposed a new Arctic Maritime and Aviation Infrastructure Initiative which, if agreed by the other seven Arctic Council members, would examine the current state of Arctic infrastructure, how it measures up to current and future economic development needs, and recommend to governments what infrastructure investments they should consider in order to support sustainable economic development in the region such as oil and gas development, shipping, and tourism.

### **Arctic Fisheries**

The Department of State and other agencies are also working to advance our interests in the proper management of fisheries that may expand into the Arctic region. Over the past few years, two significant developments in the United States have encouraged us to take action on this matter. First, in 2008, Congress passed a Joint Resolution calling on the United States to work with other Arctic nations to develop one or more agreements for managing fisheries that may expand into new areas of the Arctic Ocean. Second, the United States took the unprecedented step of closing the portion of the U.S. Exclusive Economic Zone north of Alaska to new commercial fisheries—essentially because we do not yet have sufficient science and understanding of these Arctic ecosystems to manage new fisheries there appropriately.

We have regularly engaged the other Arctic nations on this subject, both bilaterally and multilaterally. Last month, thanks primarily to the National Oceanic and Atmospheric Administration, the United States hosted a meeting of scientists to consider steps to improve our collective understanding of the marine environment in the Arctic so as to better predict when and where new fisheries may be possible. On a broader note, we are seeking agreement that nations should not authorize their vessels to fish in the high seas portion of the central Arctic Ocean until there is an adequate international mechanism in place for managing fisheries in that area.

### **International Science Cooperation**

We are benefiting from the increased investment in science during the International Polar Year (2007–2009). The intensified IPY science and education activities, coordinated by the U.S. National Science Foundation on behalf of many U.S. agencies, invigorated international science cooperation in polar regions. These enduring international science partnerships, that are fostered under science and technology agreements coordinated by the State Department as well as memoranda of understanding between research entities in the U.S. and foreign partners, advance diplomacy in the Arctic region. Moreover, joint international science activities leverage the U.S. ability to achieve understanding of the environment that underpins our economic activities in the Arctic.

### **Law of the Sea Convention**

Finally, we could significantly advance our economic interests in the Arctic by joining the Law of the Sea Convention.

The Law of the Sea Convention provides the basic legal framework applicable to such activities, including the rules applicable to navigation, the determination of the outer limits of the continental shelf, fishing, environmental protection (including in ice-covered areas), and marine scientific research.

Unfortunately, the Convention remains a key piece of unfinished treaty business for the United States.

Of course the Convention's provisions are highly favorable to U.S. national security interests, because navigational rights and freedoms across the globe for our ships and aircraft are vital to the projection of sea power.

In addition, the Convention's provisions are highly favorable to U.S. economic interests, in the Arctic and elsewhere.

First, the Convention provides the legal certainty and predictability that businesses depend upon.

Second, it sets forth rules that promote and protect their interests.

- The Convention gives coastal States an exclusive economic zone (EEZ) extending 200 nautical miles offshore, encompassing diverse ecosystems and vast natural resources such as fisheries, energy, and other minerals. The U.S. EEZ is the largest in the world, spanning over 13,000 miles of coastline and containing 3.4 million square nautical miles of ocean—larger than the combined land area of all fifty states.
- The Convention also gives coastal States sovereign rights for the purpose of exploiting and managing resources of the continental shelf, which can extend beyond 200 nautical miles if certain criteria are met. The United States is likely to have one of the world's largest continental shelves, potentially extending beyond 600 nautical miles off Alaska. Only as a Party could we take advantage of the treaty procedure that provides legal certainty and international recognition of the U.S. continental shelf beyond 200 nautical miles.
- The Convention provides a mechanism for U.S. companies to obtain access to minerals of the deep seabed in areas beyond national jurisdiction.

- The Convention guarantees the ability to lay and maintain submarine cables and pipelines in the EEZs and on the continental shelves of other States and on the high seas.
- The Convention secures the rights we need for commercial ships to export U.S. commodities and protects the tanker routes through which half of the world's oil moves.
- The Convention is the foundation upon which rules for sustainable international fisheries are based.

More broadly, U.S. accession is a matter of geostrategic importance in the Arctic, in terms of both symbolism and substance. We are the only member of the Arctic Council that is not a Party. We are the only State bordering the Arctic Ocean that is not in a position to fully secure our continental shelf rights. We need to be a Party to the treaty to have the level of influence in the interpretation, application, and development of law of the sea rules that reflects our maritime status. We need to be a Party to the treaty to fully claim our rightful place as an Arctic nation.

The United States has been an Arctic nation since the Alaska purchase in 1867. Although many Americans do not think about our country in connection with the Arctic, those of us in Alaska and in Washington, D.C. think about it a lot, and we are working hard to preserve this beautiful, pristine place, increase its resilience, and protect our important interests there.

Senator BEGICH. Thank you very much, Ambassador.  
What I'd like to do now is, Admiral Papp.

**STATEMENT OF ADMIRAL ROBERT J. PAPP, JR.,  
COMMANDANT, U.S. COAST GUARD**

Admiral PAPP. Good morning, Chairman Begich and Senator Snowe. It's good to see you both again and thank you for having me up here for this hearing, and for your continuing support of our Coast Guard, especially our hardworking Coast Guard men and women. As I previously stated, it's my highest honor to lead and represent them.

America is a maritime nation. Most of our citizens are keenly aware of the importance of our oceans. But America is also an Arctic nation. However, few Americans outside of Alaska are aware that we are also an Arctic nation, largely because the northern Arctic waters have been frozen and inaccessible.

But rapid change is occurring, as has been noted here. Arctic ice is diminishing and in summer months an entire new ocean is emerging. These waters are spurring an increase in human activities, such as natural resource exploration, shipping, and ecotourism.

For more than 221 years, our nation has relied upon the U.S. Coast Guard to protect those on the sea, to protect against threats delivered by the sea, and even protect the sea itself. Our challenge today is to ensure we have a Coast Guard capable of meeting these same responsibilities in this new area.

However, posturing our forces to do so presents us with many challenges. Operations in the Arctic's extreme cold, darkness, and ice-infested waters require specialized equipment, infrastructure, and training. Our current Arctic capabilities are very limited. We have only one operational icebreaker. We do not have any coastal or shoreside infrastructure. We do not have a seasonal base to even hangar our aircraft or to sustain our crews.

By way of example, after assuming my watch as Commandant last May one of the first things I did was to travel to the Arctic. One of the places I visited, along with you, Mr. Chairman, was

Barrow, but we did not stay overnight. Next week I'm headed back up to the Arctic and I will return to Barrow. This time I'm planning to remain overnight. But it's also been a real challenge to find enough lodging even for our small travel party. Imagine if we had to mount a major pollution response. We'd have to create our own infrastructure.

Last spring, a Russian ice camp unexpectedly broke up 630 miles north of Point Barrow, within the U.S. search and rescue area of responsibility. Russia sent one of their icebreakers to respond. If we'd been asked to respond within our SAR area of responsibility, we could not have done so. Indeed, had it been a U.S. team we would likely have had to request a foreign icebreaker to conduct the rescue.

This case highlights the need for sufficient Arctic surface capabilities. When weather prevents planes from flying, you need ice-capable ships to perform search and rescue. Ice-capable ships will also be required to conduct any Arctic pollution response.

The threat posed by the increase in Arctic shipping traffic is also very real and expanding. The use of Russia's northern sea route is increasing and in 2009 Russian icebreakers escorted the first several ships through the passage. Last year, in 2010, for the first time in modern history the northern sea route was completely ice-free and at least eight vessels transited through the passage. This year Russia is planning to do at least 15 escorts, including six convoys with oil tankers, as well as cargo vessels and bulk tankers.

While this represents a moderate increase in traffic, all vessels sailing the northern route will have to exit into the Bering Sea. Therefore we have undertaken a Bering Strait port access route study to determine the navigational, vessel traffic, and other safety requirements.

The bottom line is that shipping traffic through the waters containing our richest fisheries is on the rise. The Arctic is also rich in natural gas and oil. Oil companies continue to bid on leases in the Beaufort and Chukchi Sea. Royal Dutch Shell is seeking permits to drill five exploratory wells in the Chukchi and Beaufort Seas and other oil companies plan to submit exploration plans.

Although private industry may assert they're adequately prepared to respond to a spill, we must also determine what response capability our Coast Guard and nation needs so we can mount an adequate response as exploration advances toward production.

Arctic governance is also a challenge. The Law of the Sea Convention has emerged as the governing legal framework. However, the United States is the only Arctic nation that has yet to accede to the Law of the Sea Treaty. In order to exercise leadership and make claims to the extended continental shelf and effectively interact with other Arctic nations, we urgently need the Senate to accede to the treaty.

Arctic waters are not limited to north of the Bering Sea, but also encompass the Bering Sea north of the Aleutian Islands. Our ability to provide persistent presence and operate in the harsh Bering Sea is essential to the protection of our fish stocks, our fishermen, and our fishing industry. This is a \$4.6 billion industry that is responsible for thousands of jobs.

Completion of our National Security Cutter is vital to our ability to continue this high seas mission. National Security Cutter Number 1, the Cutter BERTHOLF, just finished her first Alaska patrol, exhibiting remarkable seakeeping ability that enabled her to launch and recover her boats, boarding teams, and helicopters in sea states that would have challenged our existing legacy cutters.

National Security Cutter Number 2, the *Waesche*, is completed and operating. Number 3, the *Stratton*, which was christened by the First Lady in July of 2010, is complete and undergoing builder's trials, and steel is being cut on Number 4, and I'm going down to Pascagoula on Friday to see Numbers 3 and 4. And I'm pleased to announce that we're completing our purchase negotiations on Number 5.

But a stable, predictable funding strategy for the three remaining National Security Cutters will provide incentive for the shipbuilder for advantages in pricing, and we definitely need at least eight National Security Cutters to preserve our future ability to patrol the high seas, not just in the Bering Sea, but also to confront threats in other high seas approaches, such as illicit drug trafficking in the Eastern Pacific Ocean.

You now have in hand our recently completed High Latitude Study. This is an outstanding first-time broad-based look at all our missions in the high latitude regions. This will serve as a building block to help look strategically at our requirements and risks in what is becoming one of the most important new regions of the world.

The Department of Homeland Security Science and Technology Directorate, in cooperation with the U.S. Arctic Research Commission, is also assisting in studying our future needs for the Arctic infrastructure, communication and sensors.

In the 1600s the British writer Thomas Fuller declared, "He that will not sail 'til all the dangers are over must never put to sea." Senators, I'm a sailor. The dangers, risks, and challenges of the Arctic exist. It's time to address them and we must put to sea.

So thank you for this opportunity to testify today and I look forward to your questions.

[The prepared statement of Admiral Papp follows:]

PREPARED STATEMENT OF ADMIRAL ROBERT J. PAPP, JR.,  
COMMANDANT, U.S. COAST GUARD

Good morning, Chairman Rockefeller, Ranking Member Hutchison and distinguished members of the Committee. I am pleased to be here today to discuss the Coast Guard's operational presence in the Arctic. I thank you for the opportunity to testify before you today.

**An Evolving Arctic**

The United States is an Arctic Nation, and the Coast Guard has been operating in the Arctic Ocean since Alaska was a territory to assist scientific exploration, chart the waters, provide humanitarian assistance to native tribes, conduct search and rescue, and law enforcement. Today our mission remains remarkably similar to what it was in 1867; however, as open water continues to replace ice, human activity is increasing. With increasingly navigable waters, comes increased Coast Guard responsibility.

Along with our statutory responsibilities, U.S. Arctic policy is set forth in the 2009 National Security Presidential Directive (NSPD) 66/Homeland Security Presidential Directive (HSPD) 25. The Arctic Region Policy directive identifies objectives for the Arctic while acknowledging the effects of climate change and increased human activity. Importantly for Coast Guard, NSPD 66 specifically directs relevant agencies, in-

cluding the Department of Homeland Security to work with other nations and through the IMO to provide for safe and secure Maritime Transportation in the Arctic. NSPD-66 also directs the Secretaries of State, Defense, and Homeland Security, in coordination with heads of other relevant executive departments and agencies to carry out the policy as it relates to national security and homeland security interests in the Arctic. Executive Order 13547 (National Policy for the Stewardship of the Ocean, Our Coasts, and the Great Lakes) adopts and directs Federal agencies to implement the recommendations of the Interagency Ocean Policy Task Force. These recommendations include, as one priority objective, identifying and implementing actions to address changing conditions in the Arctic through better stewardship. Coast Guard is moving forward to execute its responsibilities under these directives.

The Coast Guard is the Nation's principal maritime safety, security, environmental protection and law enforcement entity. We have the lead role in ensuring Arctic maritime safety, security and stewardship. To meet NSPD 66's and EO 13547's direction, the Coast Guard is working closely with its many inter-agency partners, and Alaska State, local and tribal governments. For the past 4 years, we have been conducting limited Arctic operations during open water periods. However, we face many challenges. Some Arctic operations demand specialized vessels, aircraft, and crews trained to operate in extreme climate.

Operationally, in order to meet the NSPD 66's and EO 13547's requirements, we need to determine our Nation's vessel requirements for transiting in ice-laden waters, consider establishing seasonal bases for air and boat operations, and develop a force structure that can operate in extreme cold and ice. As a matter of policy and stewardship, we encourage the Senate to ratify the Law of the Sea Treaty. Law of the Sea has become the framework for governance in the Arctic. Every Arctic Nation except the United States is a party. As our responsibilities continue to increase in direct proportion to the Arctic's emerging waters, it is more vital than ever that the U.S. ratify to Law of the Sea.

#### **Arctic Trends**

The Arctic domain has been gaining national attention. Gradually increasing accessibility to waters previously covered by ice has increased the significance of maritime issues including freedom of navigation, offshore resource exploration and exploitation, and environmental preservation. Observations and trends relevant to USCG operations include:

- *Dynamic changes in ice conditions:* The recession of the ice edge continues to open new water in the summer months. While there is less ice and more water, the unpredictable movement of existing ice flows and uncharted waters beneath a previously frozen sea could present risks to ships that venture into these waters.
- *Offshore Resource Development:* Oil companies such as Shell are in the process of taking advantage of drilling and exploratory opportunities in the Arctic. In May 2011, Shell submitted a plan of exploration to the Bureau of Ocean Energy Management Regulation and Enforcement (BOEMRE) that details company plans to drill exploratory wells in the Chukchi Sea beginning in 2012. Other companies, including ConocoPhillips and Statoil, own leases on the Arctic outer continental shelf and may submit exploration plans as well. Shell is currently in the process of retrofitting a mobile offshore drilling unit (MODU), the *Kulluk*, designed for drilling in the offshore Arctic environment and plans to have the drilling platform operational in the spring of 2012.
- *Fish Stock Migration:* As the ice edge recedes and water temperatures change, there have been anecdotal reports that fish stocks are moving northwest. The North Pacific Fishery Management Council is currently conducting a study to gather more reliable data on fish stock migrations. The Bering Sea remains one of the world's richest biomasses, and if fish stocks are in fact migrating north, fisherman will follow, which could lead to increased foreign incursions into the U.S. EEZ.
- *Extended Continental Shelf:* This summer marks the fourth year the U.S. Coast Guard Cutter (CGC) HEALY and the Canadian icebreaker LOUIS S. ST. LAURENT will work together to collect seismic and bathymetric data in the Arctic Ocean. This data is necessary to delineate the outer limits of the continental shelf beyond 200 nautical miles according to the criteria set forth in the Law of the Sea Convention.]

### **Supporting Execution of the National Arctic Policy Objectives**

The vast Arctic is primarily a maritime environment and the U.S. Coast Guard has the same responsibilities in the Arctic Ocean as it does in all other waters it patrols. The Arctic, more so than any other ocean, is environmentally fragile, lacks infrastructure, and remains a very harsh operating environment. At the same time, within the risk reduction framework that drives our allocation of assets and resources, we recognize that the Arctic poses greater long-term planning challenges that overshadow the immediate tactical challenges we face today.

Given the scope of these challenges, we have adopted a “whole of government” approach and are leveraging international partnerships to pursue our interests. The Coast Guard’s strategic approach is to ensure we pursue the capability to perform our statutory missions so we can ensure the Arctic is safe, secure, and environmentally sustainable. This strategy is consistent with our Service’s approach to performing its *Maritime Safety, Security and Stewardship* functions. In accordance with our risk reduction framework, we will do our part to build legal regimes, domain awareness, and a force structure that can operate in extreme cold and ice.

Our approach also accounts for seasonal changes and conditions in the environment. While the Arctic is increasingly open in warmer months, its waters remain mostly ice-covered.

#### *Meeting Homeland Security Needs in the Arctic*

As part of a multi-agency effort to implement the Arctic Region Policy, we continue to push forward and assess our Arctic operational limits. In 2008, 2009 and 2010 we set up small, temporary Forward Operating Locations on the North Slope in Prudhoe Bay, Nome, Barrow and Kotzebue, AK to conduct pulse operations with Coast Guard boats, helicopters, and Maritime Safety and Security Teams. We also deployed our light-ice capable 225-foot ocean-going buoy tenders to test our equipment, train our crews and increase our awareness of activity. Additionally, from April to November we fly two aircraft sorties a month to evaluate private, commercial, and governmental activities. These initial missions have provided valuable information that we are applying to future operations, infrastructure requirements and force structure development.

#### *Protecting the Maritime Environment*

To protect the Arctic environment, we engage industry and the private sector to address their significant responsibilities for pollution prevention, preparedness, and response capability. Recognizing that pollution response is significantly more difficult in cold, ice and darkness, enhancing preventative measures is critical. Those engaging in offshore commercial activity in the Arctic must also plan and prepare for emergency response in the face of a harsh environment, long transit distances for air and surface assets and limited response resources. We continue to work to facilitate awareness, contingency planning, and communications.

While prevention is critical, USCG must be able to respond to pollution incidents where responsible parties are not known or fail to adequately respond. We have exercised the Vessel of Opportunity Skimming System (VOSS) and the Spilled Oil Recovery System (SORS) in Alaskan waters, but we have yet to conduct exercises north of the Arctic Circle. Both of these systems enable vessels to collect oil in the event of a discharge. The VOSS is deployable and capable of being used on a variety of ships and the SORS is permanently stored and deployed from the Coast Guard’s 225-foot ocean-going buoy tenders. However, these systems have limited capacity and are only effective in ice-free conditions.

The Coast Guard needs to test and evaluate these systems in icy waters. Notably, the President’s Fiscal Year 2012 Budget supports research and development work, including research on oil detection and recovery in icy water conditions.

Fisheries are also a major concern. The National Marine Fisheries Service, based on a recommendation from the North Pacific Fisheries Management Council, has imposed a moratorium on fishing within the U.S. EEZ north of the Bering Strait until an assessment of the practicality of sustained commercial fishing is completed. Regardless of the outcome of this assessment the Coast Guard will continue to carry out its mission to enforce and protect living marine resources in this region.

#### *Facilitating Safe, Secure, and Reliable Navigation*

We continue to update our Waterways Analysis and Management System to determine navigational requirements, vessel traffic density and appropriate ship routing measures. We are also moving forward with a Bering Strait Port Access Routing Study, which is a preliminary analysis to determine navigational and vessel traffic and other safety requirements. This study is in the initial phase and, because the Bering Strait is an international Strait, we require coordination with the Russian

Federation before we can forward it to the International Maritime Organization (IMO) for consideration.

*Supporting Multi-Agency Arctic Region Policy Implementation*

The Coast Guard continues to support international and multilateral organizations, studies, projects and initiatives. We are actively working with the Arctic Council, IMO and their respective working groups. We are also conducting joint contingency response exercises with Canada and we maintain communications and working relationships with Canadian and Russian agencies responsible for regional operations including Search and Rescue (SAR) and law enforcement. Additionally, Secretary of State Hillary Clinton recently signed an Arctic SAR agreement, which memorialized the intent of all Arctic nations to cooperate in SAR operations. We will continue to engage Arctic nations, international organizations, industry and Alaskan state, local and tribal governments to strengthen our partnerships and inter-operability.

In particular, our engagement with Alaska Native Tribes continues to be highly beneficial. Our efforts to learn from their centuries of traditional knowledge—and their willingness to share it with us—have made our operations safer and more successful. This year, we are again conducting small-scale visits to tribes in remote villages on the North Slope and along northwestern Alaska to conduct boating safety exchanges and provide medical, dental, and veterinary care. We are working hard to ensure tribal equities are recognized, considered and indigenous peoples and their way of life are protected to the greatest extent possible. We look forward to continuing to strengthen our partnerships with our Native Alaskan friends.

CGC HEALY is presently supporting Arctic research efforts throughout the summer and into early fall. These operations are supporting research by the National Aeronautics and Space Administration (NASA), Naval Research Lab, National Science Foundation, Office of Naval Research, and the Department of State. Presently, NASA scientists are aboard CGC HEALY conducting their ICESCAPE mission—“Impacts of Climate on Ecosystems and Chemistry of the Arctic Pacific Environment” to study the impacts of climate change in the Chukchi and Beaufort seas. NASA does part of this mission from space—but also needs “boots on the ice” to better understand their satellite data in this complex and emerging region.

**Law of the Sea Treaty**

All other Arctic nations and most other nations worldwide have acceded to the Law of the Sea Treaty. Arctic nations are using the treaty’s provisions in Article 76 to file extended continental shelf claims with the U.N. Commission on the Limits of the Continental Shelf (CLCS) in order to expand the territory over which they have exclusive rights to resources on and beneath the Arctic seabed. If the U.S. made an extended continental shelf claim, we could potentially assert sovereignty over 240 miles of additional seabed territory out to 440 miles from our land base line, far beyond the existing 200 nautical mile Exclusive Economic Zone. This area reportedly contains some of the richest, undiscovered deposits of oil and natural gas in the Arctic. However, until the U.S. accedes to the Law of the Sea Treaty, it is unlikely CLCS will entertain any U.S. submission of an extended continental shelf claim. Acceding to the Law of the Sea Treaty also provides us with standing to work within the Law of the Sea Convention framework with other Arctic Nations on issues such as environmental stewardship. As such, I join with a number of other senior Administration, military, industry, and academic leaders in supporting favorable action on the part of the U.S. Senate to accede to the Law of the Sea Treaty.

**Current Arctic Capacities and Limitations**

The U.S. Coast Guard’s extensive history of Arctic service provides both experience and an expansive network of governmental, non-governmental, and private partnerships to draw upon. However, while our summer operations continue to provide valuable lessons and help us gain insights regarding the Arctic, we must acknowledge the seasonal limitation of these efforts and the fact that we still have much to learn about Arctic operations.

There are few national assets capable of operating in the harsh Arctic maritime environment. As new capabilities are developed, the Coast Guard will work to ensure its force structure is appropriately sized, trained, equipped, and postured to meet its Arctic mission requirements. Currently, the Coast Guard has one operational ice breaker, the 11-year-old HEALY, a medium icebreaker or PC3, specifically adapted for scientific research. Our two heavy polar ice breakers are not operational. The 34-year-old POLAR SEA has been out of commission due to a major engineering casualty, and is now in the process of being decommissioned. The 35-year-old POLAR STAR, which has been in a caretaker status since 2006, is currently undergoing a major reactivation project, funded by 2009 and 2010 appropria-

tions, and is expected to be ready for operations in 2013. Surface capability is vital to meet our responsibilities in the region. Although the risk of an incident in ice-covered U.S. waters is currently low, our Nation must plan for ice capable assets in the future that can effectively carry out search and rescue and environmental response in ice-laden waters. In the near term, the Coast Guard can utilize the HEALY to manage the response or rely on our foreign arctic partners that have icebreakers operating in the area.

The Coast Guard's most immediate operational requirement, however, is infrastructure. Energy exploration is underway on the North Slope of Alaska, but the existing infrastructure is extremely limited. We need a seasonal facility to base our crews, hangar our aircraft and protect our vessels in order to mount a response.

#### **Conclusion**

With an emerging Arctic Ocean come increased national operational responsibilities. National Security Presidential Directive (NSPD) 66/Homeland Security Presidential Directive (HSPD) 25 and Executive Order 13547 direct Coast Guard developing mission objectives. We also must meet our persistent statutory responsibilities. To meet these objectives and responsibilities, we have much work to do.

We must build toward a level of mission performance and preparedness commensurate with the relative risks posed by Arctic activity; we must continue working amongst the interagency to refine future mission requirements, identify the precise mix of national assets, capabilities and infrastructure needed to meet these requirements, and look for collocation opportunities. We must continue to seek out opportunities with our Arctic neighbors and the global community to address the critical issues of governance, sovereignty, environmental protection, and international security.

While there are many challenges, the increasingly wet Arctic Ocean also presents unique opportunities. The relatively undeveloped infrastructure, current low commercial maritime activity levels, and developing governance structure provide an opening to engage in proactive, integrated, coordinated, and sustainable U.S. and international initiatives. We look forward to working with the Congress on how we can support our national objectives and responsibilities in the emerging Arctic Ocean.

Thank you for the opportunity to testify today. I look forward to your questions.

Senator BEGICH. Thank you very much, Admiral.  
The next person is Rear Admiral Titley, please.

#### **STATEMENT OF REAR ADMIRAL DAVID TITLEY, OCEANOGRAPHER OF THE NAVY AND DIRECTOR, TASK FORCE CLIMATE CHANGE**

Admiral TITLEY. Thank you, sir. Senator Begich, Senator Snowe, Senator Klobuchar, colleagues: I wish to thank you for the opportunity to address you today regarding the Navy's interests, capabilities, responsibilities with respect to the changing Arctic.

My name is Rear Admiral David Titley. I'm the Oceanographer of the Navy and the Director of the Navy's Task Force on Climate Change. I've submitted a written statement and request, sir, to include that in the record.

Senator BEGICH. Without objection.

Admiral TITLEY. Task Force Climate Change—the Chief of Naval Operations in 2009 in May established Task Force Climate Change to address the implications of climate change for national security and naval operations, with a near-term focus on the Arctic. Today I'm speaking about the Navy's strategic Arctic vision and Arctic road map.

As both the Chairman and Ranking Member noted, the U.S. is a maritime nation and the Arctic is a maritime environment. The Navy is watching with great interest the changing environment in this region. Despite a consistent downward trend in Arctic sea ice extent and volume, the Arctic will remain ice-covered in the winter

throughout this century and remains a very challenging operating environment at any time of year.

The changing Arctic has important national security implications for the Navy. As you mentioned, Mr. Chairman, it is the opening of the fifth ocean, and what I like to say sometimes is this is for the first time in 500 years that the West has had a new ocean. The last time this happened was due to the actions of a gentleman named Columbus.

Strategic guidance on the Arctic is articulated in National Security Presidential Directive 66, the Arctic region policy. The 2010 national security strategy and the 2010 Quadrennial Defense Review and the National Maritime Strategy provide additional strategic guidance on the Arctic.

The Office of the Secretary of Defense recently released a report to Congress on Arctic operations and the Northwest Passage. This report states: "The overarching strategic national security objective is a stable and secure region where U.S. national interests are safeguarded and the U.S. homeland is protected."

Potential impacts of a changing Arctic require adaptation efforts that are informed by the best possible science and initiated at the right time and cost. The Arctic report to Congress also states: "Existing Department of Defense posture in the region is adequate to meet near to mid-term U.S. defense needs."

The report recognizes that assured Arctic access to support national interests could be provided by a variety of proven capabilities, including submarines and aircraft. The challenge is to balance the risk of being late to need with the opportunity cost of making premature Arctic investments.

Navy action in the Arctic is guided by its Arctic roadmap, which was released in November 2009. Navy Arctic strategic objectives, released in May 2010, specify the objectives required to ensure the Arctic remains a stable and secure region. These objectives are aligned with Department of Defense priorities.

The Navy is actively leveraging interagency, international, and academic partnerships to ensure it has access to the best science and information and to avoid duplication of effort. The Navy engages regularly and has friendly relations with all Arctic nations.

To echo the comments of both Ambassador Balton and Admiral Papp, international relations are enhanced immeasurably by the rule of law. The United Nations Convention on the Law of the Sea provides that rule of law, which would help our forces best to protect United States interests in the Arctic. The Chief of Naval Operations iterated his support before the Congress several months ago in his Fiscal Year 2012 posture statement, recognizing that it is essential that the United States become a full party to the treaty.

The Arctic is an ocean in the midst of rapid change, which is likely to change the nature of human maritime activity in that region. The Navy's job is to maintain readiness to operate in every ocean as required. The Navy understands the challenges and opportunities that a changing Arctic environment presents to its missions. We are conducting the assessments necessary to inform future investments and are initiating adaptation activities in areas where we have enough certainty with which to proceed.

Thank you, Mr. Chairman, and I look forward to answering any questions the Subcommittee might have.  
[The prepared statement of Admiral Titley follows:]

PREPARED STATEMENT OF REAR ADMIRAL DAVID TITLEY, OCEANOGRAPHER OF THE  
NAVY, DIRECTOR, TASK FORCE CLIMATE CHANGE

Mr. Chairman, members of the Subcommittee and distinguished colleagues, I want to thank you for the opportunity to address you today regarding the Navy's interests, capabilities, and responsibilities with respect to the changing Arctic. My name is Rear Admiral David Titley and I am the Director of Navy's Oceanography, Space, and Maritime Domain Awareness programs, Oceanographer of the Navy and the Director of Navy's Task Force Climate Change. The Chief of Naval Operations, Admiral Gary Roughead, established Task Force Climate Change in May of 2009 to address implications of climate change for national security and naval operations with a near-term focus on the Arctic. Today I am speaking about the Navy's strategic Arctic vision and Arctic Roadmap.

The U.S. is a maritime nation, and the Arctic is a maritime environment. The Navy is watching with great interest the changing environment in the Arctic. September 2007 saw a record low in sea ice extent and the declining trend has continued—September 2010 was the third lowest extent on record and the overall trend has shown an 11.2 percent decline per decade in seasonal ice coverage since satellites were first used to measure the Arctic sea ice in 1979. Perhaps more significantly, estimates from the University of Washington's Applied Physics Lab show that the volume of sea ice continues to decrease dramatically. In September 2010, the ice volume was the lowest recorded at 78 percent below its 1979 maximum and 70 percent below the mean for the 1979–2009 period. Despite these changes to sea ice, the Arctic will remain ice covered in the winter through this century and will remain a very challenging operating environment. The changing Arctic has important national security implications for the Navy.

Strategic guidance on the Arctic is articulated in National Security Presidential Directive (NSPD) 66/Homeland Security Presidential Directive (HSPD) 25, Arctic Region Policy.<sup>1</sup> NSPD-66 requires that naval forces be prepared to execute missions in the Arctic, including missile defense, strategic sealift, maritime presence and security, and freedom of navigation and overflight. The 2010 National Security Strategy (NSS) and the 2010 Quadrennial Defense Review (QDR) provide additional strategic guidance on the Arctic. The QDR identifies the Arctic as the region where the influence of climate change is most evident in shaping the operating environment and directs DoD to work with the Coast Guard and Department of Homeland Security to address gaps in Arctic communications, domain awareness, search and rescue, and environmental observation and forecasting capabilities.

The Navy's Maritime Strategy identifies that new shipping routes within the Arctic have the potential to reshape the global transportation system. For example, the Bering Strait has the potential to increase in strategic significance over the next few decades as the ice melts and the shipping season lengthens, and the private sector begins to ship goods across the Arctic rather than through the Panama Canal. The Office of the Secretary of Defense recently released an "Arctic Report to Congress" on Arctic operations that addresses strategic national security objectives, needed mission capabilities, an assessment of changing the Unified Command Plan (UCP), needed basing infrastructure, and the status of and need for icebreakers. This report states "the overarching strategic national security objective is a stable and secure region where U.S. national interests are safeguarded and the U.S. homeland is protected." This objective is consistent with a regional policy that reflects the relatively low level of threat in a region bounded by nation states that have not only publicly committed to working within a common framework of international law and diplomatic engagement, but also demonstrated ability and commitment to doing so over the last fifty years."

The potential impacts of a changing Arctic require adaptation efforts that are informed by the best possible science, and initiated at the right time and cost. The Arctic Report to Congress also states:

"Existing DOD posture in the region is adequate to meet near- to mid-term U.S. defense needs. DOD does not currently anticipate a need for the construction of a deep-draft port in Alaska between now and 2020. Given the long lead times

<sup>1</sup>Department of Defense, Office of the Undersecretary of Defense Policy. "Report to Congress on Arctic Operations and the Northwest Passage." 19 May 2011.

for construction of major infrastructure in the region, DoD will periodically re-evaluate this assessment as the Combatant Commanders update their regional plans on a regular basis.

The United States needs assured Arctic access to support national interests in the Arctic. This access can be provided by a variety of proven capabilities, including submarines and aircraft, but only U.S.-flagged ice-capable ships provide visible U.S. sovereign maritime presence throughout the Arctic region. Significant uncertainty remains about the rate and extent of climate change in the Arctic and the pace at which human activity will increase. The challenge is to balance the risk of being late-to-need with the opportunity cost of making premature Arctic investments. Not only does early investment take resources from other pressing needs, but the capabilities would be later in their lifecycle when finally employed. Given the many competing demands on DOD's resources in the current fiscal environment, the Department believes that further evaluation of the future operating environment is required before entertaining significant investments in infrastructure or capabilities."

The Navy is already conducting further evaluation, guided by its "Arctic Roadmap" that was released in November 2009. This Roadmap is a five-year plan that details specific action items related to assessing current readiness for Arctic operations, increasing operational experience through Arctic and sub-Arctic training exercises, increasing collaborative efforts with joint, interagency, and international stakeholders for operations and training, and improved environmental understanding. The Navy Arctic Strategic Objectives, released in May 2010, specify the objectives required to ensure the Arctic remains a stable and secure region where U.S. national and maritime interests are safeguarded and the homeland is protected.

In the summer of 2010, the Navy participated in the national security portion of Canada's largest annual Arctic exercise, Operation NANOOK/NATSIQ, which provided our sailors valuable operating experience in the region. In March 2011 the Navy conducted its biennial ice exercise ICEX organized by the Navy's Arctic Submarine Lab, which allows the collection of valuable scientific data used by the Navy, Federal Government, and academic researchers to understand and better predict changing conditions in the region. The Navy has gathered experts at the Naval War College and other institutions to think through future scenarios, specifically focused on the Arctic region. The Navy is currently conducting a Capabilities Based Assessment for the Arctic to identify capabilities required for future operations in the region and possible capability gaps, shortfalls, and redundancies. Assessments such as these will inform Navy strategy, policy, and plans to guide future investments.

Furthermore, the Navy is actively leveraging interagency, international, and academic partnerships to ensure it has access to the best science and information and to avoid duplication of efforts. We are participating, in coordination with appropriate DoD offices and the Coast Guard, in many of the interagency efforts focused on the Arctic, including the Interagency Arctic Research Policy Committee chaired by the National Science Foundation, the National Ocean Council's Arctic Strategic Action Plan, and the Arctic Policy Group coordinated by the State Department. As an example, the Office of Naval Research has developed initiatives that will improve monitoring and prediction of critical environmental changes in the Arctic, including the marginal ice zone in which the Navy and Coast Guard may be required to operate. The President requested funding for these initiatives in his FY12 budgets. Finally, the Navy engages regularly with and has friendly relations with all Arctic nations.

International relations are enhanced immeasurably by the rule of law. This is especially true in an austere environment like the Arctic, where access by U.S. forces in times of need is more challenging. The Law of the Sea Convention provides that rule of law which would help our forces best protect U.S. interests in the Arctic. However, our Nation has still not acceded to this important treaty. As stated by the Chief of Naval Operations before Congress several months ago in his FY12 posture statement:

"The Law of the Sea Convention provides a regime with robust global mobility rules. I believe it essential that the United States become a full Party to the treaty. The Convention promotes our strategic goal of free access to and public order on the oceans under the rule of law. It also has strategic effects for global maritime partnerships and American maritime leadership and influence. Creating partnerships that are in the strategic interests of our Nation must be based on relationships of mutual respect, understanding, and trust. For the 160 nations who are parties to the Law of the Sea Convention, a basis for trust and mutual understanding is codified in that document. The treaty provides a solid

foundation for the U.S. to assert its sovereign rights to the natural resources of the sea floor out to 200 nautical miles and on the extended continental shelf beyond 200 nautical miles, which in the Arctic Ocean is likely to extend at least 600 nautical miles north of Alaska. As a non-Party to the treaty, the U.S. undermines its ability to influence the future direction of the law of the sea. As the only permanent member of the U.N. Security Council outside the Convention, and one of the few nations still remaining outside one of the most widely subscribed international agreements, our non-Party status hinders our ability to lead in this important area and could, over time, reduce the United States' influence in shaping global maritime law and policy. The Law of the Sea Convention provides the norms our Sailors need to do their jobs around the world every day. It is in the best interest of our Nation and our Navy to ratify the Law of the Sea Convention. We must demonstrate leadership and provide to the men and women who serve in our Navy the most solid legal footing possible to carry out the missions that our Nation requires of them."

In conclusion, I will borrow a quote from Dr. John Holdren, Assistant to the President for Science and Technology, who says, "We must avoid the unmanageable, and manage the unavoidable." The Arctic is an ocean in the midst of rapid change, which is likely to change the nature of human maritime activity in that region. The Navy's job is to maintain readiness to operate in every ocean as required. The Navy understands the challenges and opportunities that a changing Arctic environment presents to its missions. We are conducting the assessments necessary to inform future investments and are initiating adaptation activities in areas where we have enough certainty with which to proceed. Thank you Mr. Chairman and I look forward to answering any questions the Subcommittee may have.

Senator BEGICH. Thank you all very much, and thank you for your opening statements. It's an impressive panel, and what we'll do is we'll probably have two rounds of 5 minutes each of questions. I'll start with the Ranking Member and then again we'll do 5 minutes each, and then do probably a second round, depending on where the discussion goes.

Senator SNOWE.

Senator SNOWE. Thank you, Mr. Chairman.

Admiral Papp, I mentioned earlier in my statement your response to a question that was posed by Chairman Begich in the last hearing about what keeps you up at night—and this was obviously a serious concern about what could happen up in the Arctic. How does the Arctic Council's search and rescue initiative support the Coast Guard's mission requirements in the Arctic?

Admiral PAPP. The search and rescue agreement sets us up with the boundaries for each country, the area that they're responsible for, sets up regimes for communication and cooperation between the countries in the Arctic, and then there are still some responsibilities, though, that have to be fulfilled by the nation itself.

So the challenge that I find is, while we have the regimes in place now by signing the treaty, I need the resources to be able to carry out those responsibilities in the Arctic. We were confronted by this just 2 weeks ago when there was a report of about 2 dozen fishermen from Barrow that were stuck out on the ice. The ice broke away. We had to send a helicopter from down in Kodiak, which is about a 1,000-mile trip over three mountain ranges, to get up there to perform a rescue.

Fortunately, they have a small helicopter that's up on the North Slope, that was able to go out there very precariously and get the people off. But if we had had to respond, it would have been very difficult and put their lives at risk.

Senator SNOWE. Not to mention weather conditions, if they had been vastly different as well.

So how long did that helicopter ride take from Kodiak?

Admiral PAPP. Actually, it takes them hours, and I don't have the exact number of hours. We were able to turn around before getting there because the other helicopter that's up there was able to recover the people off the ice. But we essentially have to fly up there and then have to refuel and then prosecute the case and, as I've stated before, there's very few facilities for us up on the North Slope once you get there.

Senator SNOWE. How many search and rescue cases have the Coast Guard been able to respond to?

Admiral PAPP. We—ma'am, I don't have any data or statistics on that. I would have to get back to you on that. There are cases that we've been unable to respond; other people have carried it out.

The other challenge we find up there is we just don't know what we don't know. We've worked with the people in the villages and in the towns up there and in fact as we've studied the culture many times they have a belief that if they fall into the water it is preordained that they were supposed to fall in. We have tried to convince them to do things like wearing life jackets, which we've been somewhat successful at doing. But it's an entire change of culture.

So we don't know how many have been lost up there over the years, and we have no way of communicating up there. So it's very difficult to find out in a timely fashion when something happens and how we would get up there.

Senator SNOWE. I think it would be helpful for the Committee to know exactly how many you were not able to respond to and where the Coast Guard had to rely on others to prosecute those rescues. Because I think it is critical.

Admiral PAPP. We'll be glad to provide that.

[The information requested follows:]

For FY 2008–2010, there were 296 Alaskan Search and Rescue (SAR) cases that required assistance from other government agencies, industry, and/or good Samaritans. Of these 296 Alaskan SAR cases that required assistance from other government agencies, industry, and/or good Samaritans, 46 were in the Arctic.

Senator SNOWE. On the High Latitude Study, do you agree with—and I'd like to also hear from you, Admiral Titley, as well—on the findings of requirements for Coast Guard vessels? As I understand it, the recommendation included three medium icebreakers. Am I correct in saying that, three medium icebreakers?

Admiral PAPP. I agree with the mission analysis. As you look at the requirements for the things that we might do up there if it's in the nation's interests, it identifies a minimum requirement for three heavy icebreakers and three medium icebreakers. Then if you want a persistent presence up there, it would require—and also doing things such as breaking out McMurdo and other responsibilities—then it would take up to a maximum of six, six heavy, and four medium.

Senator SNOWE. Right. Do you agree with that?

Admiral PAPP. If we were to be charged with carrying out those full responsibilities, yes, ma'am, those are the numbers that you would need to do it.

Senator SNOWE. Admiral Titley, how do you respond to the High Latitude Study? Has the Navy conducted its own assessment of its capabilities?

Admiral PAPP. Ma'am, we are in the process right now of conducting what we call a capabilities-based assessment, that will be out in the summer of this year. We're getting ready to finish that up.

The Coast Guard has been a key component of the Navy's task force on climate change literally since day one, when the Chief of Naval Operations set this up. That morning, we had the Coast Guard invited as a member of our executive steering committee. So we've been working very closely with the Coast Guard, with the Department of Homeland Security.

I think Admiral Papp said it best as far as the specific comments on the High Latitude Study, but we have been working very closely with the Coast Guard.

Senator SNOWE. Would the Navy and the Coast Guard be able to share capabilities and resources?

Admiral PAPP. Well, in a small way this is a "Back to the Future" type question. After World War II, we had eight icebreakers shared between the Navy and the Coast Guard. We had a requirement for it during the Cold War years because we had a national imperative. We had the Distant Early Warning system or the DEW line that was across the North Slope, and each summer the Navy led a task force to do the resupply of the DEW line.

The Coast Guard always took part as a part of the task force in providing icebreakers. Over the years, though, we diminished. We went from—when the Navy finally transferred all the icebreakers to the Coast Guard, we had six WIND-class icebreakers. Progressively we gave up one after another, another. Then we built POLAR SEA and POLAR STAR in the early 70s and decommissioned all the rest of them. So now we're left with two. Both of them are inoperable.

Senator SNOWE. What was the high water mark for the number of icebreakers that the Coast Guard had?

Admiral PAPP. Eight, ma'am.

Senator SNOWE. Eight was the high water mark?

Admiral PAPP. It's a very interesting story. We did a little research on this. It was—acquisition processes must have been easier in those days, because we went into our history books and there was actually a note from President Roosevelt in 1940 to Secretary of the Treasury Morgenthau saying: "Henry: Build me the world's best icebreakers." And we launched on that and ultimately built six of the WIND-class and two others, for a total of eight after World War II.

Senator SNOWE. Those were the days.

Senator BEGICH. Those were the days.

[Laughter.]

Senator BEGICH. Thank you very much.

How easy it was.

Thank you, Senator Snowe.

Senator Klobuchar.

**STATEMENT OF HON. AMY KLOBUCHAR,  
U.S. SENATOR FROM MINNESOTA**

Senator KLOBUCHAR. Thank you very much to both the Chairman and Ranking Member. I was telling them how interested I am in this issue, I guess for a few reasons. One, I think it is really incredibly important, diplomatic and military and economic challenges. Second, I chair the Canadian-U.S. interparliamentarian group along with Senator Crapo and so we've been working with the Canadians on the issues.

The third is that Minnesotans always have a fondness to the Arctic because we figure it's the only place colder than our state. But I will note the Arctic has not been the one where the cars have tested and said, if this car can go in a colder place maybe you should live somewhere else. It's testing in Embarrass, Minnesota, and Baudette, Minnesota. So we're just glad the Arctic's out there as a colder place.

My first question really for you, Ambassador Balton, is—and then maybe other panelists can chime in—is the U.N. Convention on the Law of the Sea Treaty. I share your view, as I know some of the other panelists, that we need to ratify that treaty. I continue to be concerned by the arguments by some who claim that ratifying the treaty somehow weakens our national security.

Can you take a moment—I know you talked about the value of it—to address some of the concerns raised by opponents, such as fears that the international bodies administering the treaty will be hostile to U.S. interests or other things?

Ambassador BALTON. Thank you very much for this opportunity, Senator. I think any sober assessment of U.S. interests in the oceans leads to the conclusion that we should have been party to this Convention long ago. The rules built into the Convention are highly favorable on a number of grounds, including for national security. The rules allow U.S. military and, I would say, commercial vessels as well, to go wherever they need to go in the oceans. While most countries follow those rules most of the time, our status as a non-party does not give us the standing and stature we would have as a party to ensure respect for those rules all the time.

We say those rules reflect customary international law, but that is a shaky basis on which to put such important rights. Customary international law, depending as it does on the practice of states, is subject to erosion over time. Only as a party to the Convention can we lock in these rights.

Senator KLOBUCHAR. How would it help us with the Arctic and some of the issues that we're dealing with?

Ambassador BALTON. The Arctic presents a particularly compelling reason for why we should be party. Here's just one example, perhaps the most interesting. Under the Convention, a nation such as the U.S. gets the first 200 miles of sea floor off its coast as its continental shelf outright. Then, if the area beyond 200 miles from shore meets certain criteria, the nation can claim that area as well.

Why is that important? It gives the Nation exclusive rights to explore and exploit all of the resources of that sea floor—oil, gas, minerals, sedentary species. All the other countries of the Arctic are party to the Convention and they're using a mechanism in the Convention to perfect their claim to areas of sea floor in the Arctic

and elsewhere. For the United States, although we are investigating and collecting data on different areas that we may be able to claim, as a non-party we can't go through this process to secure title and international recognition for our extended continental shelf in the Arctic or elsewhere.

Senator KLOBUCHAR. Did you want to add anything to that, Admiral Papp or Rear Admiral Titley?

Admiral PAPP. Yes, ma'am. Maybe I can answer it more from the view of an operator. I've never really understood the resistance to this. We have an Antarctic Treaty. For sailors we have rules of the road that are agreed to through international organizations, such as the International Maritime Organization, which the Coast Guard leads the delegation to. And we all understand the predictability, the guidance that these rules give us on how we operate at sea.

The sea is not like operating on the land, where you have streets and traffic signs and everything else. You have no markers out there, but you have rules and understandings on how you operate within the rules and predictability on how other people will operate in those rules as well.

This treaty seems to me to give us great understanding and predictability on how we deal with freedom of the seas and how we operate on the seas. As a law enforcement agency that's responsible for operating within the laws, this is just vital for us to carry out our responsibilities in the Coast Guard and for the nation.

Senator KLOBUCHAR. Rear Admiral?

Admiral TITLEY. Yes, ma'am. Thank you very much for the opportunity to comment on this. It's something the Navy—accession to the U.N. Convention on the Law of the Sea—is something the Navy believes in very, very strongly. I'm sure many of you have heard in the media, especially a year or 2 ago, people talk about the Arctic as the Wild West and it's the race for resources and it's like Oklahoma in the 19th century all over again. That really is not true, but the reason it is not true is because of the U.N. Convention of the Law of the Sea, which, as my colleagues have mentioned, has been ratified by every other Arctic nation except the U.S.

That really does provide the governance structure. We are not looking for—the Arctic Council said, we don't need a treaty like the Antarctic Treaty, because we have the U.N. Convention on the Law of the Sea. But the Law of the Sea is not frozen in time. It's not immutable to change. And if we are not on the inside, then that change may take place in ways that is not advantageous to the United States.

Senator KLOBUCHAR. Because we're not on the treaty dealing with the other people on some of the economic issues.

Admiral TITLEY. So the leadership is—other countries are, frankly, looking for the U.S. to be able to show leadership, and it's hard to show leadership in this treaty when we are not a party to it.

Senator KLOBUCHAR. Thank you very much.

Senator BEGICH. Thank you very much.

I have a couple quick questions. Let me follow up, Admiral Papp, with regards to the cutters, the icebreakers, the kind of infrastructure needs of the Coast Guard, not only for the Arctic, but overall. Obviously, we're focused on the Arctic today.

Can you—you now have the High Latitude Study. You have knowledge of kind of the general range of things you might need based on the level of mission you need. What is the next step to be aggressive about fulfilling these needs if we're serious about what we want to do in the Arctic, no matter what we want to do? Maybe fisheries or management of the transportation routes, oil and gas development. What's the next step to be aggressive in ensuring that we do the job we need to do to make sure your missions have the infrastructure you need, so you don't have to have a helicopter from Kodiak coming 1,000 miles or having to borrow—probably it was the North Slope Borough's helicopter, I'm guessing, Mayor Itta's—in order to satisfy the need there?

What's the next step? Funding I know is a critical piece, but is that the only piece, or what do we need to do here?

Admiral PAPP. As Commandant I've got three responsibilities. First is to carry out the real-time now operations. The next is to start preparing for the future; and then the third is looking out probably a couple of decades and trying to determine what our needs are. That's part of the leadership responsibilities, to look forward and determine what we're going to need, not just focus on year to year.

So the High Latitude Study does that. That's part of the process, doing the mission analysis based upon the responsibilities that we have under statutes. That has given us a guideline to go by, and the next step for us in the Coast Guard is to work out a concept of operations. We're in the process in a number of areas, going back and taking our strategy and working out our concept of operations, whether it's terrorism, how do we provide layered security for the United States. We also have to begin work on our Arctic strategy.

Another part that will play in there, as you saw last year, is our experimentation over the last three summers on what resources work up there, getting a better idea for what infrastructure that does exist, and then apply that along with our concept of operations, and then start putting resource proposals forward. And not just for the Coast Guard, but we need to look across the inter-agency at the other services and the other departments to determine who has resources out there that we might be able to leverage against, that we might be able to apply, and then our resource proposals should fill in those gaps.

Senator BEGICH. Is there—is part of that looking at the other agencies, but also looking at, as we assume development will occur at some levels up there, maximizing some of the use of their capacity? I know, for example, that on the Aleutian Chain, when we had I can't remember what vessel it was that had run loose, and it was actually—I think it was an oil company vessel that assisted in moving that from potentially a hazardous situation, because the Coast Guard could not move fast enough or they didn't have equipment in the region.

Is that part of it, not only agency, but to look at what other company and government resources, local government resources, might be available to maximize the whole plan?

Admiral PAPP. Yes, Mr. Chairman. If we focus on offshore drilling, that will be part of the permitting process. The Department of the Interior will review plans and, most importantly, whatever re-

sponse plans are required for the potential discharges, spills, other disasters that might happen up there. The Coast Guard will get a review of those as well to look and use our judgment to see whether the companies are providing sufficient resources.

But just as they did, clearly the Coast Guard didn't respond all by itself in *Deepwater Horizon*, we depended heavily upon the resources provided by the oil companies. The Oil Pollution Act of 1990 put that process in motion. We've learned some lessons and some shortfalls of OPA 1990. We probably will take those lessons and apply them in some way, shape, or form to response plans up on the North Slope.

But if the company fails, if the response plan fails, the Federal Government must in some way be able to back it up with some level of resources. We had plenty of resources, starting from bases to communications systems to helicopters, air stations, etcetera, in the Gulf of Mexico. If this were to happen off the North Slope of Alaska, we would have nothing. We're starting from ground zero today.

Senator BEGICH. Very good.

If I can ask, Ambassador, to kind of follow up on that. I know the Arctic Council's passage of the search and rescue was one. Can you tell me the kind of status of similar agreements around oil and gas cleanup that may be being discussed or moving forward?

Ambassador BALTON. Yes, thank you, Senator. At the Arctic Council meeting in May, the ministers, including Secretary Clinton, agreed to launch a new round of negotiations. This would be to create some kind of instrument to cooperate on oil spill preparedness and response in the Arctic, just what Admiral Papp was talking about.

The United States is not the only nation that is not well prepared for this. So through such an agreement we can at a minimum improve coordination and cooperation among the Arctic nations in the event of a spill. Then the agreement itself could provide the impetus for all Arctic nations, including the U.S., to actually secure increased resources to handle the spill.

We are all very aware of what Admiral Papp just said, that if the *Deepwater Horizon* spill had happened north of Alaska the ability to clean it up would have been sorely lacking and the disaster would have been even worse.

Senator BEGICH. Very good.

Let me stop there and go to our second round. Senator Snowe.

Senator SNOWE. Thank you, Mr. Chairman.

Let me follow up on that, Ambassador Balton. So are there assets or a plan in place on the part of the United States or in conjunction or concert with other countries in the event of an oil spill?

Ambassador Balton: Yes, Senator, we do have agreements with a number of other nations on oil spill cleanup. We have a bilateral understanding with Russia. We have something else in place with Canada. What is lacking, however, is something that is pan-Arctic that would allow assets to be shared and communication to be enhanced across all Arctic nations. That is the advantage we see in producing an Arctic-wide oil spill preparedness response agreement much like the Arctic search and rescue agreement is intended to link or knit together the eight Arctic nations.

Senator SNOWE. I see. It is comprehensive; it does include all eight nations.

Ambassador BALTON. Yes, ma'am.

Senator SNOWE. Now this is very limited.

Ambassador BALTON. Yes.

Senator SNOWE. How long would it take to expand? Does that require another agreement?

Ambassador BALTON. Probably. We will—the first round of talks on an oil spill preparedness and response system will take place in October in Oslo. I will actually be co-chairing those talks. Our aim is to have a product for nations to consider by May 2013 when the Arctic Council next meets at the ministerial level.

Senator SNOWE. That's quite a ways away.

Ambassador BALTON. It is. That's about as much time as it took to do the Arctic search and rescue agreement. Maybe we can do this one a little faster. But that is actually the time when the ministers will next meet and would be able to sign such an agreement if we produce one by then.

In the meantime, there is work we can do to improve on the status quo and I hope that goes forward on an operational—

Senator SNOWE. So you depend on industry's capacity? Would you depend on the shipping companies to do the cleanup at this point?

Ambassador BALTON. It depends on the nature of the spill. If it comes from a tanker, yes, shipping companies would have a responsibility, shared with the government, I would say. If it came from a drilling installation, it would be the drilling company, it would be the responsible party. But, as Admiral Papp says, if they do not have the resources in place it would be incumbent upon the government to do what we could to help in a disaster of that sort.

Senator SNOWE. Do we have any assets in place that could do that, Admiral Papp, currently?

Admiral PAPP. No, ma'am.

Senator SNOWE. No. So there are no assets. But if we had the assets, would having an adequate response capability require additional training, as well?

Admiral PAPP. Well, the response plans that the companies put in will have a requirement for response capability, and I'm sure that the oil spill response organizations, the OSROs, will respond to the economic incentive, the business that will be created by that.

One of the things, though, that we learned from *Deepwater Horizon* was if you don't think through what is the worst possible case, it's difficult for you to plan on how much equipment is needed. We had to turn on oil boom manufacturers around the world to supply us. We had to employ thousands of fishing boats to go out there and do skimming operations. None of that exists up on the North Slope. We have zero to operate with at present. So now's the time to start thinking that through and determining what we'll need up there.

Senator SNOWE. Well, that is true of the *Deepwater Horizon*. It was the worst case scenario and there was no preparation, especially at that depth, and with that type of an explosion. But we had no preparation, no contingency plans, in place.

I realize that Arctic drilling would not be comparable in depth, but it has other serious problems, with no infrastructure in place at all, and we are starting without response assets. So that is highly problematic.

How long would it take to meet minimum requirements? Just to activate the POLAR STAR, which is obviously being repaired—will take until 2013, is that correct?

Admiral PAPP. Yes, ma'am.

Senator SNOWE. So to build a new icebreaker—takes 8 years?

Admiral PAPP. Oh, years, yes, ma'am.

Senator SNOWE. So this is really a long-term planning that we're talking about.

Admiral PAPP. It is, and there are other demand signals that come in. We right now, as you well know, we only have the HEALY that's available and that's operating in the Arctic. Just this week we've gotten inquiries at the staff level about the possibility of breaking out McMURDO. The National Science Foundation has been contracting with a Swedish company to provide an icebreaker down there for the last couple of years and Sweden has decided that their national interests need that icebreaker, so that the ship is not available. We've gotten an inquiry to look at the feasibility of sending HEALY down to the Antarctic, which would leave us with nothing up in the Arctic, and we just can't turn around POLAR STAR quickly enough to start doing that business.

So we're really in what we call a stern chase right now, we're in a bad position trying to catch up.

Senator SNOWE. Thank you.

Senator BEGICH. Senator Klobuchar.

Senator KLOBUCHAR. Thank you very much.

We've heard a lot of discussion today about expanding the options for travel and trade through Arctic waters. A lot of people, as you've acknowledged, have been talking about that. Yet, Admiral Papp, as you rightly point out, the dynamic changes in ice conditions appear at present to make it difficult with these ice cutters in the region.

So in your opinion is it premature to start laying out ground rules for navigation in the seas, while we still can't navigate, or should we be drafting regulations so that we're ready when a northern sea route has opened?

Admiral PAPP. Ma'am, we're in the process of that right now. We're putting together our side and how we think we might operate and how we might control the traffic in the Bering Sea. That of course is going to require cooperation across the inter-agency, with the State Department, with the Navy and others, and then take it to Russia as well and start negotiating with them.

Fortunately, we've got a number of venues to be able to do that, the Arctic Council being one of them. This fall I'll be traveling to Japan to take part in what we call the North Pacific Coast Guard Forum, in which we've got great relationships with the Russian border guards, our equivalent on the Russian side, and other countries over there, but most importantly Russia.

We are continuously exchanging people between our Coast Guard's 17th Coast Guard District in the Russians to gain familiarity with procedures and cooperation up there.

Senator KLOBUCHAR. Thank you.

Rear Admiral, Ambassador Balton and Admiral Papp have been talking about these diplomatic relations that we have with these other countries up in the Arctic. Do we have similar relations on the military side?

Admiral TITLEY. Yes, ma'am. Thanks for the question. In fact, we were in Oslo not 3 weeks ago conducting the first ever Arctic military roundtable. It was a conference sponsored by the Office of the Secretary of Defense and the U.S. European Command. Navy was one of the players. We were able to have all eight Arctic militaries except for Sweden, and that was just a technical issue on their part. The Russians were represented by the border guard. As Admiral Papp mentioned, we have good relations with them.

Really, it was not in any way to supplement or supplant the Arctic Council, but it was a way to start establishing relationships at the senior level in the militaries, to be able to work through issues of common concern. I believe we decided to hold another meeting here in about a year and we're starting working groups sort of at the captain level to start working specific agendas. So that's just one example, ma'am, of how the Navy and the Department of Defense are pushing to ensure that that type of relationship, in addition to the diplomatic and Coast Guard relationships, exist.

Senator KLOBUCHAR. I just want to end up back on Law of the Sea. I was asking our staff member here, Marian, about when, what the status, because I remember when it passed through the Foreign Relations Committee and I think she said that was in 2007, I think. And it just seems to me when you have the military, the Coast Guard, diplomatic people, I know Shell, the oil company, people seeing the value of this treaty, why we're not moving forward. And I just wondered if you knew any, without getting into any of the politics of it, what the status is? Is there any movement right now to move this ahead when the Senate has to do its job and ratify this treaty?

Ambassador BALTON. Perhaps I can answer that. You're right, twice actually the Senate Foreign Relations Committee favorably voted on the Convention, once in 2003 and again in 2007. My understanding is that Senator Kerry as Chair of the Committee is interested in trying again this year.

As far as the Administration is concerned, we very much support that. We see the Convention as nonpartisan. This Administration certainly supports it. So did the last one.

Senator KLOBUCHAR. Right. President Bush supported it.

Ambassador BALTON. So did the one before that. A wide range of U.S. businesses, companies that do business in the oceans, all support accession, as of course our national security and diplomatic teams, and many other stakeholders out there.

So we are hoping that the Convention will be considered on the merits. It's not, it should not, be a political or partisan issue, and we think that any sober assessment of those merits would lead to the conclusion that we should join.

Senator KLOBUCHAR. Admiral Papp?

Admiral PAPP. From a very practical point of view, it ties our hands. We go to the International Maritime Organization and I don't think we ever enter into a conversation without them remind-

ing us that we are not signatories to this, that we have not acceded to it. On an even down in the weeds practical matter, the Coast Guard deals with many bilateral agreements to allow us to conduct law enforcement operations with the countries of South and Central America, and just trying to get agreement on baselines, territorial seas, etcetera, which are governed by this, we run into difficulties in these bilateral negotiations because we are not signatories to the treaty, and we are reminded of it.

The Coast Guard forums that I go to, almost all my bilateral meetings with the members who attend those meetings start off with a reminder to us that the United States is the one major power that has not acceded to the treaty. So I could probably get much more productive business done if we acceded to it and we took that off the table in terms of something that has to be worked through.

Senator KLOBUCHAR. Very good. Anything more?

Admiral TITLEY. Yes, ma'am. Really, a very similar experience in the Navy to what Admiral Papp experiences in the Coast Guard. In fact, I have a running bet with the one person who travels with me whenever I speak internationally that either the first or second, no later than the second, question will be: Why isn't the United States—

Senator KLOBUCHAR. See, I try to make you at home here.

[Laughter.]

Admiral TITLEY. And that's every single time, every forum, we get that. Admiral Roughead tells me that at his level, at the Chief of Naval Operations, Navy staff, chief of Navy staff level internationally, he gets the exact same question.

But more substantively, other nations are looking to the United States for leadership in this area and our allies, our partners, fervently wish we were a member of this treaty.

Senator KLOBUCHAR. Thank you. I just want to end by thanking you, Admiral Papp, for the work the Coast Guard is continuing to do at Lake Superior, and also the work where you helped with this fishing guide issue. I want to report I was up in International Falls on the Canadian border and everything appeared fine with the fishing guides. We had a tug of war over the Canadian border. I will not say which country lost, but in any case I want to thank you for the help that you've given us.

Admiral PAPP. Thank you very much, ma'am.

Senator BEGICH. Let me ask just a couple quick questions. First, to close out this round, Admiral Papp, let me follow up a little bit on Senator Snowe's comments regarding the capabilities and what's available. There's a couple things. For example, we have control when there's oil and gas development in the Arctic by permitting process to ensure that capabilities would be in place, to a level that all Federal agencies at some point, if they agree, are capable; is that a fair statement? In other words, they're not going to get a permit if they're not capable of cleaning it up.

Admiral PAPP. Oh, absolutely. And we are working hand in glove with the Department of Interior's Bureau of Ocean Energy Management Regulation and Enforcement, or OEMRE or BOEMRE or whatever we want to call it nowadays. But as you know, we've worked together with them on the investigation process of *Deep-*

*water Horizon*, and we will be joined at the hip as we approach these new drilling options up in the Arctic.

Senator BEGICH. My biggest concern is at the end of the day—and we'll see on the next panel, but I believe that the oil and gas industry will do the necessary precautionary measures. My biggest concern is those vessels that are coming from one country to the next. As mentioned, I think you mentioned 15 escorted vessels, up from 8 or 7 or so. Those are the ones that make me nervous because I have no clue where they're flagged from, what their safety standards are, even though we do have international rules to some extent.

That is what concerns me most. As we know, I think it was last year, if I remember right—maybe it was the year before; time flies around here, but I think it was last year—when one ship ran aground with I think it was 1,500 gallons if I remember right. That's what concerns me most, not necessarily the industry of oil and gas, because they're going to be required by our regulatory process.

Is that an issue that also as the Coast Guard looks at oil and gas, they look at this other piece, which is the shipping and what's going to happen there, and how we manage that? Because it's both life, rescue, as well as if they run around and they're carrying a full load of diesel fuel to operate? Is that a fair statement?

Admiral PAPP. Yes, Mr. Chairman, and that's probably what gives me the most concern, is because the increase of shipping through the Bering Straits. I mean, my goodness, just with the last 2 years we've had people trying to cross the Bering Strait with parasails and with jet skis. So the activity is picking up. At some point in time, you will have an oil tanker or a freighter or something up there that breaks down, goes adrift, and in all likelihood would drift toward our shores, and it's a narrow strait.

Right now, we're generally only able to maintain one high-endurance cutter in the Bering Sea. The ability to get up there, I'm sure we could probably get up there in time to provide some sort of response.

Senator BEGICH. But it would be tight.

Admiral PAPP. It's tight, and plus they're becoming increasingly unreliable in terms of being 40-plus-year-old ships. So getting the National Security Cutters up there is important. But also having an ability to get aircraft there on short notice is important as well, some way of basing aircraft up on the North Slope and having the facilities to sustain them, at least seasonally, when the ship traffic is going through there.

Cruise ships. One of the things that keeps the Coast Guard in business in the Caribbean is going out and picking injured or ill passengers off cruise ships. We have the helicopters and the air stations to do it. We don't have that up in the Arctic and cruise ships are going through there as well.

Senator BEGICH. That's right. Those will increase. We know that.

Let me ask, to both Admiral Papp and Admiral Titley: deepwater port and infrastructure. I know in Alaska we're debating, can we do a port, some sort of infrastructure, and I think the High Latitude Study tells us a lot, as well as other studies, that the water is so shallow you can't really do it on shore. You've got to probably

end up in federal waters, doing a deepwater port of some concoction.

Do either one of you have comments on that? I just visualize that if industry progresses, the tourism industry progresses, shipping progresses, the needs of infrastructure, a deepwater port is going to be critical up there. And I'm not a scientist, I'm not in your guys' business, but I just think, based on the dimensions and the depths, it's going to be in Federal waters in order to accomplish the deepwater capacity.

Admiral PAPP. Well, as you remember, Mr. Chairman, that was one of the first things I was looking for up there.

Senator BEGICH. Right.

Admiral PAPP. The real nearest deepwater port is Dutch Harbor, which is about 1,400 miles away from the North Slope, Barrow for instance. So any ship that goes up there really has to be self-sustainable. It has to have enough fuel, supplies, food, water, to be able to sustain itself at present.

Icebreakers are able to do that. They can go up there for months at a time. They have a hangar, they have a helicopter or two helicopters. They are almost like a floating city. That's one of the reasons why I feel very strongly about the ability for us to carry out operations requires us to have a ship that can sustain itself up there, because there are no deepwater ports to pull into.

Nome comes about the closest right now, and I was impressed to see that pier, because the first time I went to Nome there was no pier. But even with that—

Senator BEGICH. They really want a port. That's why they're building that.

Admiral PAPP. But I think the maximum depth there was 24 feet, and to extend that pier out there I think it would only be carried away by the ice. So a deepwater port is going to be a severe challenge, and there won't be places for the ships that travel through there to pull into, at least in the foreseeable future.

Senator BEGICH. Rear Admiral?

Admiral TITLEY. Yes, sir, thank you. I would really echo Admiral Papp's comments on the challenges of a deepwater port. It was one of my takeaways when I was up in Barrow, and I did stay overnight. But it's really just this sandy, shoaly spit, and Prudhoe Bay really isn't much better as far as getting ships anywhere near the shore. So you either have to do either small boat or helicopter type transfer.

When we've looked at Nome, we came up with very similar conclusions to what Admiral Papp did. If I understand my scientists right, it's a granite bottom, so you can't just bring in a dredge and say, well, let's make that 24 feet 30 feet or 32 feet. So there are real, real challenges, and I believe there are some locations that might potentially be suitable, but then there's no land-based infrastructure. And with the permafrost changing, that is a non-trivial issue.

So in the Navy, ships like our oilers, like our amphibious ships that have long legs, are the kinds of—we have to think about how do you self-deploy, how do you sustain yourself in this very, very austere environment. Right now, sir, the Department of Defense,

we believe we can meet today's missions with today's capabilities, but we're constantly reassessing that, sir.

Senator BEGICH. Very good.

Well, again, thank you all very much. Thank the panel for being here. There is additional questions I know people have that they will submit for the record. Again, thanks to the first panel. We'll line up the next panel. Thank you all very much. Next panel.

[Pause.]

Senator BEGICH. Our third panelist may have stepped out. He may not have realized. Maybe he's out lobbying the admirals.

[Pause.]

Senator BEGICH. Let me go ahead and we'll start this next panel, and they'll search and rescue. We'll send the Coast Guard out for Dr. Metzger.

But we wanted to thank you for being here, thank you for being patient in our first panel. We wanted to get some additional items on the record. We are joined by Pete Slaiby, Vice President of Alaska Ventures, Shell Oil Company; Dr. Scott Borgerson, Senior Fellow, Institute for Global Maritime Studies; and hopefully Dr. Andrew Metzger, Assistant Professor at the University of Alaska-Fairbanks.

Let me again thank you all for being here. Your testimony will also be entered into the record, your written testimony. But please, we'll start with Mr. Slaiby. We'll give it a second as they close the door.

Go ahead.

**STATEMENT OF PETER E. SLAIBY,  
VICE PRESIDENT, SHELL ALASKA**

Mr. SLAIBY. Well, thank you very much, Mr. Chairman and members of the Subcommittee. I appreciate your invitation to speak to you today on the economic opportunities in the Arctic. My remarks focus on the vast and long-term economic benefits of developing Alaska's extraordinary offshore oil and gas resources, resources potentially large enough to create generations of jobs and vitalize entire economies.

Our government estimates Alaska offshore holds world-class resources in the realm of 27 billion barrels of oil and over 120 trillion cubic feet of natural gas. It could be much more. With Alaska's offshore production, we can reduce foreign imports, improve our balance of trade, and keep U.S. dollars at home to fuel our own economy. With Alaska offshore production, nearly 55,000 jobs per year will be created for generations. These are long-term, well-paying jobs, both in Alaska and the Lower 48.

Alaska OCS production will generate, conservatively, \$197 billion in government revenue from royalties at a modest oil price, at today's oil price probably closer to \$300 billion.

Finally, it will continue to contribute to the long-term viability of an asset of national importance, the Trans-Alaska Pipeline System, or TAPS. For the last 30 years, TAPS has been a major supply line to the U.S., delivering more than 17 billion barrels of oil. Because of the declining oil production in Alaska, TAPS is running at one-third capacity and is at the risk of shutting down unless more oil, Alaskan oil, is produced.

We firmly believe the estimated reserves in the offshore provide Alaska the best chance to fill that pipeline once again. We believe these potential resources may become a national—excuse me—an asset of national significance as well, and, most importantly, Senator, we believe that these assets can be safely produced. We remain ready to prove it.

Shell has been prepared to explore in Alaska's offshore since 2007. After years of regulatory wrangling, I'm hopeful that our exploration program will go forward in 2012. Unlocking the economic opportunity in the Alaskan offshore has been delayed too long.

At the government's invitation, Shell participated in offshore lease sales in Alaska beginning in 2006. Since then, we have paid the government more than \$2 billion for those offshore leases in the Beaufort and Chukchi Seas and invested more than \$1.5 billion to prepare for an exploration program that meets and exceeds regulatory requirements. Despite our most intense efforts, we have yet to drill a single well, and this is highly unusual.

When the Federal Government holds a lease sale, it is in fact saying offshore exploration and development is desired. If a company presents a plan that meets these regulatory requirements, that plan should be permitted.

It's important to keep in mind that exploration is a temporary, short-term operation. Our initial Alaska wells will take approximately 30 days to drill and evaluate. Data will be gathered and the well will be permanently plugged and abandoned. These are not complex wells.

There is no question the bar should be high in the Arctic. We support high standards and a robust permitting process. But the process must work and currently the government's permitting and regulatory process is not equipped to deliver. Delays are frustrating and disappointing, you might even say irresponsible. The delays undermine the confidence of those who would seek to invest in the U.S. and create economic value here.

To fully unlock economic opportunities in Alaska, policymakers should support a regulatory process that is clear and efficient, one that ensures development is done in a responsible and sustainable way. Specifically, statutes and regulations must be clear, with firm time lines for delivery of permitting, and funding must be provided to regulatory agency staff and analysts for the required permits. Current budgeting constraints should not be allowed to undermine the long-term value of the Alaskan offshore development.

In addition, we believe the U.S. should ratify the Law of the Sea Treaty and evaluate what additional resources should be deployed in Alaska.

Thank you and I look forward to answering your questions.  
[The prepared statement of Mr. Slaiby follows:]

PREPARED STATEMENT OF PETER E. SLAIBY, VICE PRESIDENT, SHELL ALASKA

#### **Introduction**

Mr. Chairman and members of the Subcommittee, I appreciate the opportunity to testify today. I would like to thank you for this hearing to examine the economic opportunities in the Arctic areas of the United States.

My name is Pete Slaiby. I am the Vice President of Shell Alaska and I lead a team of professionals who since 2007 have been ready to begin exploring for domestic oil and gas reserves off the coast of Alaska. It has long been Shell's belief that

Alaska's offshore holds world-class hydrocarbon volumes. Shell has invested more than \$3.5 billion for the opportunity to validate that optimism.

Alaska should continue to play a major role in meeting the energy needs of American consumers and American businesses, but achieving this requires action and political will. Developing these Arctic resources will extend the life of the Trans-Alaska Pipeline System (TAPS) and also create thousands of jobs; amass hundreds of billions in revenue for local, state and Federal coffers; reduce imports; and improve the balance of trade.

Although regulatory and legal challenges have blocked the drilling of even a single well, I am hopeful that in 2012 we will be able to move forward with exploration wells in the Beaufort and Chukchi Seas. Since returning to Alaska to purchase leases in 2005, Shell has drilled more than 400 exploration wells around the world. I remain hopeful that the barriers to exploring in Alaska's Outer Continental Shelf will be addressed so that Shell can begin its exploration drilling in 2012.

*Today I will focus on the economic benefits of developing our Nation's Arctic oil and gas resources. Specifically:*

- Global energy demand forecasts, and the critical role that oil and gas will play in meeting future energy needs and in fueling the economy.
- Alaska's offshore resource potential, and the benefits to the Nation of developing those resources.
- Shell's proposed exploration program in Alaska and the challenges that have blocked the program.
- And finally, recommendations for moving forward.

#### **Global Energy Demand**

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

To address this demand, we will need all sources of energy—hydrocarbons, alternatives, renewables and significant progress in energy efficiency. Oil and gas will be the dominant energy source for decades. Renewables and energy efficiency will play an ever-increasing role. Shell is actively pursuing research and development into next-generation biofuels. We also have a wind business in North America and Europe.

Future growth for alternative energy forms will be paced by the speed of technological development, public and private investment capacity, government policies, and the affordability of energy supply. Still, it takes several decades to replace even one percent of conventional energy with a renewable source. The effort to tip the scale toward more renewable sources of energy is worthwhile but even unprecedented growth in renewables would leave an enormous energy gap that must be filled with oil and gas.

As we move to meet the world's energy needs, environmental challenges must be met and policies kept in place to ensure responsible energy development that allows our economy to grow.

Governments have a role to play in defining policies to foster a viable, efficient and workable marketplace that allows technology and innovation to move forward. Industry—and most particularly the energy industry—has an important role to play as well.

#### **U.S. Oil and Gas Resource Potential**

The President recently acknowledged that reducing dependence on imports was a national policy imperative. We agree. The U.S. is resource-rich in many ways, especially in oil and gas. Yet, in recent years our country has imported more than 60 percent of its petroleum.

This comes at a significant cost. According to the EIA:

- Petroleum net imports will average 9.7 million barrels per day in 2011 and 10 million barrels per day in 2012, comprising 50 percent and 52 percent of total consumption, respectively.
- Imports cost the U.S. more than \$350 billion last year.

Producing more oil and gas in our own country is a "win-win" proposition. It provides real economic and security benefits. With increased domestic production, less money is exported from the U.S., more money is invested here and federal revenues increase through royalties and taxes. Resources can be developed with appropriate

environmental protections based on solid science and an understanding of ecosystems and the impact of oil and gas activities on them.

I offer an example from the OCS:

According to the U.S. Government, 420 trillion cubic feet of natural gas and more than 86 billion barrels of oil are yet to be discovered on the OCS, including Alaska.

The greatest offshore resource potential lies in four key areas: the Gulf of Mexico, Alaska and the Atlantic and Pacific Coasts.

- *Gulf of Mexico*—This has been the heartland of U.S. offshore activity. The industry has been in the Gulf for more than 60 years, producing more than 10 billion barrels of oil and more than 73 trillion cubic feet of natural gas. Estimates state there are at least 45 billion barrels of oil and more than 233 trillion cubic feet of gas remaining.
- *Alaska OCS—World Class Potential*—The Alaska offshore likely holds some of the most prolific, undeveloped conventional hydrocarbon basins in the world. Conservative estimates from the Bureau of Ocean and Energy Management Regulation and Enforcement (BOEMRE) place roughly 27 billion barrels of oil and more than 120 trillion cubic feet of gas in the Alaska OCS.
- *Atlantic and Pacific Coasts*—Assessments of these areas have not been updated in decades, but the estimate is that the Atlantic Coast holds 4 billion barrels of oil and 37 trillion cubic feet of gas and the Pacific Coast holds 10 billion barrels of oil and 18 trillion cubic feet of gas.

#### **History of Alaska OCS**

The world has long been aware of the Arctic's vast resources. In total, more than 500 exploratory, production, and disposal wells have been drilled in the Arctic waters of Alaska, Canada, Norway and Russia. As a result of Federal OCS lease sales in the 1980s and 1990s, more than 35 wells have been safely drilled in the U.S. Beaufort and Chukchi Seas.

Shell is proud of its offshore legacy in Alaska, having produced in the state waters of Cook Inlet in Alaska for more than 30 years beginning in 1964. In the late 1970s and mid 1980s, Shell drilled exploration wells offshore in the Gulf of Alaska, St. George Basin and the Bering Sea. In the late 1980s and early 1990s, Shell drilled exploration wells in the Beaufort Sea and later drilled four of the five exploration wells ever drilled in the Chukchi Sea.

Although oil and gas were found, Shell chose not to proceed to development. We plugged and abandoned those exploratory wells for economic reasons—including the fact that, at that time, TAPS was already running near capacity.

Since 2005, the Federal Government has held several more OCS lease sales in Alaska. Shell participated in these lease sales and, in fact, is now the majority leaseholder in the Alaska offshore. Shell has paid the Federal treasury nearly \$2.2 billion for ten-year leases in the Beaufort and Chukchi Seas. Additionally, Shell has invested more than \$1.5 billion and 6 years preparing for an exploration drilling program with unparalleled mitigation and safety measures. Shell's work includes multiple years of 3D seismic data collection, first-of-its-kind baseline science, shallow hazard surveys, geotechnical programs, numerous social investment initiatives and hundreds of meetings with North Slope residents.

#### **The Benefits of Developing the Alaska Offshore**

The benefits of developing Alaska's offshore oil and gas resources are many—not only to Alaska, but also to the Lower 48. Development would fuel U.S. economic growth for decades to come.

A study conducted in 2010 by Northern Economics and the Institute for Social and Economic Research (ISER) at the University of Alaska (using USGS resource data) details the potential national benefits of developing the oil and gas resources of the Alaska OCS:

- An annual average of 54,700 new jobs would be created and sustained through the year 2057, with 68,600 jobs created throughout decades of production and 91,500 at peak employment;
- A total of \$145 billion in new payroll would be paid to employees through the year 2057, including \$63 billion to employees in Alaska and \$82 billion to employees in the rest of the U.S.; and
- A total of \$193 billion in government revenue would be generated through the year 2057, with \$167 billion to the Federal Government, \$15 billion to the state of Alaska, \$4 billion to local Alaska governments, and \$6.5 billion to other state governments at a modest oil price.

Several important implications for national policy and domestic supply are raised in the study including:

- Alaska OCS development maximizes the value of Alaska's and the Nation's oil and gas resources by enhancing both value and volume. Using TAPS' existing infrastructure, which is currently operating far below capacity, would enhance value by lowering transportation costs. Further, the new expanded infrastructure needed to connect to TAPS would enable potential development of satellite fields such as the National Petroleum Reserve-Alaska (NPRA).
- Alaska OCS development would extend the operating life of TAPS and increase the viability of an Alaska gas pipeline, due to greater certainty of the available gas resource base to fill it.

To elaborate, Alaska's OCS likely has at least one-third more oil than has been produced in Prudhoe Bay, moved through TAPS and used to fuel the U.S. for the past 30 years. It is two-and-a-half times what has been produced in the Gulf of Mexico since 1990.

An independent assessment of industry-wide development of Alaska's Beaufort and Chukchi Sea OCS concluded that an average of about 700,000 barrels of oil per day would be produced for 40 years. This is equivalent to our 2010 oil imports from Iraq (506,000 bbl/day) and Russia (137,000 bbl/day) combined. This same study found that Alaska OCS production would peak at 1.45 million barrels of oil per day in 2030 (and 2.1 billion cubic feet of gas per day in 2050). This is more than our 2010 oil imports from some of our major importing nations, *e.g.* Mexico (1.03 million bbl/day), Saudi Arabia (958,000 bbl/day), Nigeria (996,000 bbl/day), or Venezuela (827,000 bbl/day).

Such production numbers, which could potentially eliminate the need for imports from one of our largest foreign suppliers, is significant, and even more so in a world of increasing geopolitical instability.

A major benefit from Beaufort and Chukchi development would be the long-term viability of TAPS. Since 1977, Alaska has supplied the U.S. and its refineries with vast quantities of domestic oil via TAPS, totaling roughly 17 billion barrels through 2010. The construction and operation of the pipeline has also provided hundreds of thousands of high paying jobs in Alaska and the nation, helping lift America out of one of its worst economic downturns. A generation of Americans worked to build TAPS; and it remains not only an economic engine, but a symbol of American know-how and ingenuity. Unfortunately, without a reliable new resource base, TAPS' future is uncertain.

Production in Prudhoe Bay has fallen significantly in recent decades. At its height, TAPS supplied the Nation with 2.1 million barrels of oil per day or about one-third of the Nation's oil production.

Today, TAPS supplies only 600,000 barrels per day; still 11 percent of our domestic supply but far from its peak throughput of more than 2-million barrels a day in the early 1990s. If the throughput in the pipeline continues to decline and no new supplies are developed, TAPS will eventually be shut down, cutting access to one of the largest sources of domestically produced oil in the country. A recent low-flow impact study sponsored by TAPS operator, Alyeska Pipeline Service, concluded that corrosion, wax build-up and potential freezing of the pipeline could occur at 350,000 barrels per day. At the current rate of decline, that number could be reached in less than 15 years. In a shutdown scenario, our already increasing dependence on imported oil will accelerate and the U.S. balance of payments and Federal revenues will both get worse.

Unfortunately, we have already witnessed a preview of life without TAPS. A temporary shutdown of TAPS earlier in 2011 had an immediate impact on crude prices, jeopardized the continuity of the U.S. West Coast refinery infrastructure, and resulted in a spike in U.S. reliance on Russian crude supplies. This could be a harbinger of things to come unless we develop new resources in Alaska.

Fortunately, the U.S. has an opportunity to prevent this scenario from reoccurring. According to Northern Economics and ISER at the University of Alaska in the report previously discussed, if OCS oil is transported through TAPS, the higher volume of throughput would reduce the TAPS tariff and extend the life of TAPS for decades. Doing so would require new pipelines that connect offshore fields in Camden Bay and the Chukchi Sea to TAPS. These projects would certainly rank among the largest private sector construction projects in U.S. history.

It is clear that resource development, such as OCS oil and gas production, is the first step in wealth creation. It has an enormous economic multiplier effect. Jobs and revenues created by oil and gas development reverberate throughout our economy, producing long-term, high paying jobs. It creates a need for domestic manufacturing capabilities, steel production, transportation, infrastructure development,

electronics and high-tech components. Alaska OCS development is a genuine long-term economic stimulus plan.

In addition, by exploring and developing our Alaska OCS resources, the U.S. has an opportunity to reaffirm its global role as an Arctic nation. It is no secret the Arctic is becoming a critical location from a geopolitical and strategic perspective. Arctic nations are increasingly interested in international boundaries and opportunities for resources and economic development.

Recently, Norway and Russia signed a maritime border delimitation agreement that settled a long-standing seaward boundary dispute in the Barents Sea. The motivation for the agreement was mutual cooperation that would allow the development of offshore Arctic oil and gas resources. Elsewhere, Arctic nations are asserting their claims to continental shelf borders in accordance with the United Nations Convention on the Law of the Sea. For instance, reports indicate Denmark is considering claiming the North Pole as an extension of Greenland territorial waters. Even nations outside the Arctic are positioning themselves for Arctic resource development.

Without action, our country risks falling even further behind the rest of the world in developing its Arctic resources. In Norway, Russia, Greenland and Canada, Arctic resources are highly valued and new exploration is already underway. We have an opportunity to develop our own Arctic resources and the infrastructure appropriate to facilitate our presence in this valuable region, especially during tough economic times.

#### **Offshore Safety Standards**

Before moving to a discussion of Shell's Alaska OCS exploration program, it remains appropriate to acknowledge the *Deepwater Horizon* incident in the Gulf of Mexico. The incident forced a re-examination of offshore operations and led to new regulatory requirements that have raised the bar on safety and led to substantial changes in the way the industry operates. There is no question that the industry must be held to the highest standards for protecting the environment and the health and well-being of our workers and the communities in which we operate.

The following are just a few of the new regulatory requirements systems recently adopted by the Federal Government and industry:

- The Interim Final Drilling Safety Rule is focused on minimizing the likelihood of an incident and addresses barriers that should be in place to prevent a hazard. Preventing an incident is a top priority.
- Responding to an incident is now substantially enhanced with new requirements for containment capability. The Marine Well Containment Company (MWCC), which Shell initially formed in partnership with three other oil and gas companies, is designed to do just that. The MWCC is a stand-alone organization committed to improving capability for containing a potential underwater well control incident in the Gulf of Mexico.
- A new Center for Offshore Safety will be created to promote the safety of offshore operations and enhance the government's regulatory role. The Center will provide an effective means for sharing best practices. Members will be subject to independent, third-party auditing and verification to ensure integrity. The Center will operate around an existing safety framework known as RP75, or "Recommended Practice for Development of a Safety and Environmental Management Program for Offshore Operations and Facilities."
- Industry has also greatly increased its resources to respond to a major oil spill by adding vessels, equipment and personnel. Significant research and development is ongoing for oil spills in ice.
- Shell has taken the lead as operator of the Subsea Well Response Project (SWRP) to be based in Stavanger, Norway. Nine major oil and gas companies will work pro-actively and collaboratively progress development of subsea well intervention and oil spill response equipment that can be deployed swiftly to different regions in the world.

In addition to regulatory requirements, a company must foster and promote safety relentlessly each day. At Shell we call this Goal Zero. Everyone who works for us—both employee and contractor—is expected to comply with the rules; intervene when anything looks unsafe; and respect people, the environment and our neighbors. Compliance is not optional.

We have personal safety systems and procedures with clear, firm rules; simple "do's and don'ts" covering activities with the highest potential safety risk, such as getting proper authorization before disabling safety-critical equipment and protecting against falls when working at heights.

We have process safety systems to ensure the safety and integrity of our operations and assets. Process safety is also managed through a variety of tools, such as well and facility design standards; established “operating envelopes” not to be exceeded; maintenance and inspection intervals for safety critical equipment; and an effective Management of Change process.

Our approach also requires that all our drilling contractors develop a Safety Case to demonstrate major risks are properly managed. A Safety Case shows how we identify and assess the hazards on the rig; how we establish barriers to prevent and control the hazards; and how we assign the critical activities needed to maintain the integrity of these barriers. Further, it guides the rig and crews in risk management; and ensures staff competency, especially for those new to the rig.

#### **Shell’s Alaska Exploration Program**

Shell is planning an offshore oil and gas exploration program in Alaska’s OCS in 2012 during the four-month open water season. This program could include drilling multiple wells in both the Beaufort and Chukchi Seas, site clearance surveys and baseline science studies. It is important to note that an exploration program, unlike a development and production program, is a temporary, short-term operation. In the Alaska OCS, an exploration well is anticipated to take approximately 30 days to complete, at which time the well will be permanently plugged and abandoned and the site cleared. Shell’s exploration program will meet or exceed all applicable regulatory requirements for the protection of health, safety and the environment.

Shell has been committed to employing world-class technology and experience to ensure a safe, environmentally responsible Arctic exploration program—one that has the smallest possible footprint and no negative impact on North Slope stakeholders or traditional subsistence hunting activities. Aspects of the 2012 program have been under evaluation by Federal agencies since 2006. At every step, Shell has worked with Federal agencies, the State of Alaska, and local communities to develop a program that achieves the highest technical, operational and environmental standards.

My discussion here focuses on the following points:

- 1.The currently available science regarding the Arctic is extensive and more than adequate for an exploration program;
- 2.The shallow water, low pressure Alaska OCS wells differ significantly from Gulf of Mexico deepwater exploratory wells; and
- 3.The oil spill prevention, containment, mitigation and response plans included in Shell’s 2012 Arctic exploration plan are robust and comprehensive and were largely in place even before the BP Macondo incident.

#### **Arctic Baseline Science**

Some argue that there is insufficient scientific data regarding the Arctic and, therefore, exploration in the Chukchi and Beaufort Seas should not go forward. This is not accurate. In fact, the available scientific data is more than adequate to identify and evaluate the impacts of an exploration program that is, by definition, a short-term, temporary operation.

The recent release of the United States Geologic Survey (USGS) scientific gap analysis commissioned by Secretary Salazar does not differentiate between exploration and development, nor does it satisfy the original mission of accurately cataloguing existing scientific data specific to the Arctic. The cursory review that was done is merely a compilation of selected reports done over the years but does not analyze the present landscape.

The report also fails to acknowledge the data available from years of Arctic oil spill response research, technology development, as well as the tested tools, techniques and assets capable of Arctic oil spill recovery and response. Regional Alaska Native Corporations, North Slope and Northwest Arctic communities, Federal agencies, marine mammal commissions and industry have volumes of current scientific data that were not considered as part of this analysis.

The categories of scientific data available include: tides and ocean currents, weather (*e.g.*, wind and its effect on currents, precipitation), ice conditions, baseline environmental data related to species found in the arctic (*e.g.*, benthic, fish, birds, marine mammals, etc.), assessments regarding the impacts of oil and gas exploration activities on those species, and, specifically, information assessing the impacts of an oil spill on those resources, in the highly unlikely event of an incident during exploration drilling.

Since 1973, Federal agencies have performed more than 5,000 environmental studies to better understand the Alaska OCS and coastal environment, and document or predict the effects of offshore oil and gas activities. The former Minerals

Management Service Environmental Studies Program spent more than \$600 million dollars (more than \$1 billion in inflation adjusted dollars) for studies under the guidance of the OCS Scientific Committee, which advises the Secretary of Interior. About half of these funds have been directed to Alaska.

The advancement of scientific knowledge will continue. This expanded knowledge is critical because it informs government regulators who must issue permits, it informs policymakers who must develop sound energy and environmental policy and it informs our operational decisions. In fact, Shell is contributing to advancing Arctic science in several ways. Since returning to Alaska in 2005, Shell has spent \$60 million engaging in an aggressive environmental studies program in the Arctic offshore. Shell has worked in a collaborative manner with a wide range of stakeholders, including industry partners, local, state, and Federal Governments, universities, and non-government organizations to share resources and facilitate the further development of our understanding of the Arctic marine ecosystem.

Shell has also taken the lead in the development and implementation of new technologies, including unmanned aerial systems, acoustic recorders, and integrated ecosystem studies to advance capacities to work in this challenging offshore environment. Shell fosters and funds such diverse research as computer assisted identification of marine mammal calls, greatly enhancing the capacity to utilize acoustic sampling technologies, satellite tagging of whales and seals, ice and weather forecasting and physical oceanography.

Recently, the North Slope Borough (NSB) and Shell entered into a multi-year collaborative science agreement that will enable impacted North Slope communities to build capacity for scientific research and independent review of studies, exploration and development plans and regulatory documents. The research program established under this agreement will be guided by an Advisory Committee of representatives from each of the coastal communities (Point Hope, Point Lay, Wainwright, Barrow, Nuiqsut and Kaktovik), scientists from the NSB and Shell, and independent scientists. This committee will be responsible for identifying critical issues, setting investigative priorities, and integrating traditional knowledge with science. The current agreement is between the NSB and Shell, but it anticipates expansion of the studies program through additional funds from third parties, which may include private or public sources.

If exploration leads to a commercial discovery, even more science will be needed. Consistent with the Outer Continental Shelf Lands Act's (OCSLA) multi-stage process, development and production activities will build on the information gathered through the exploration stage. The first development in the Arctic OCS will require the preparation of an additional environmental impact statement. The issues to be addressed in that document will be determined during a public scoping process. Since 2006, Shell has spent almost \$90 million pre-investing in data acquisition, studies, and research and development that will support environmentally sound offshore development. Information gathered during these earlier OCSLA stages (including exploration) will form the basis for that scoping process, as well as the identification of any issues that may require additional research or study before informed decisionmaking.

This approach was recently validated in the final version of the President's Oil Spill Commission report, which states: "The need for additional research should not be used as a *de facto* moratorium on activity in the Arctic, but instead should be carried out with specific time frames in mind in order to inform the decisionmaking process."

### **Exploration in Alaska's OCS Compared to Exploration in Deepwater Gulf of Mexico**

The drilling conditions for Shell's proposed 2012 Alaska OCS exploration program are typical of wells that have been safely drilled for decades in shallow water around the world. The Alaska OCS wells are in shallow waters and have much lower reservoir pressure, which is vastly different from the conditions found in the deep waters of the Gulf of Mexico. This increases the safety margin.

The *Deepwater Horizon* was drilling the Macondo well in 5,000 feet of water and down to a depth of 18,000 feet. The pressure encountered in the Macondo well was about 15,000 psi based on mud weight at total depth. The water depth, well depth and pressure make the Macondo well and other deepwater Gulf of Mexico wells far more technically complex than the shallow wells that will be drilled off the coast of Alaska.

In Alaska's Beaufort Sea, the wells will be in 150 feet of water or less. The wells will be between 7,000 to 10,000 feet deep. We have reservoir pressure models based on previously drilled wells in the Chukchi and Beaufort Seas that show the pressure at total depth in our initial exploration wells will be no more than 6,000 psi.

With lower anticipated bottomhole pressure in the Alaska wells, all of the mechanical barriers in Shell's well design have higher overall safety margins between operating pressure and mechanical barrier design pressures. Even if the riser from the drill rig to the blow-out preventer on the seafloor was breached, as it was in Macondo, the weight of the drill mud in the downhole pipe would maintain well control and prevent a blowout. To reiterate, Shell's 2012 Arctic well program is exploratory. The well will not be converted to a production well. It will be permanently plugged and abandoned per Federal regulations.

#### **Oil Spill Prevention and Response**

Oil spill prevention and response planning remains a top priority. Shell's Oil Discharge Prevention and Contingency Plan is robust. We have invested in an unprecedented oil spill response capability to support our drilling plans in the Beaufort and Chukchi Seas. Our spill recovery equipment is state-of-the-art, widely acknowledged by experts as proven and effective under cold-climate conditions and designed to remove the worst-case discharge.

Shell developed a three-tier or layer system for use in the Alaska OCS in 2007.

1. The first tier is located onsite, always less than an hour from the drilling rig. It is a dedicated fleet of purpose-built vessels and specialized oil containment equipment, which will be on-site 24/7 before a drill bit ever touches the sea floor.
2. The second tier is located to capture oil that might move away from the drill rig; termed near-shore recovery.
3. The third layer involves pre-staged shoreline protection. This, along with the first two tiers involves extensive use of both local residents and traditional knowledge.

Shell's oil spill response personnel routinely practice and conduct spill response drills. The response system consists of dedicated oil spill response assets including:

- Offshore recovery vessels with skimmers and boom,
- Near-shore barges with skimmer and boom,
- Shallow water vessels with skimmers and boom,
- Pre-identified protection strategies and equipment for environmentally and culturally sensitive sites, and
- Onshore oil spill response teams to deploy and support the above.

These assets are staffed during operation around the clock with trained crews provided by Alaska Clean Seas, Arctic Slope Regional Corporation, and Ukpavik Inupiat Corporation.

#### **Design Prevention, Containment and Spill Response**

Shell has design standards and practices that have enabled us to safely drill many deepwater and shallow water wells worldwide in a variety of conditions, including the Arctic. Shell will rigorously apply these standards in all well operations on the Alaska OCS. As described above, the conditions of the well mean that prevention through the mechanical barriers built into the design have a high margin of safety.

The blow out preventers (BOPs) that Shell will use have been extensively maintained, inspected and tested by third party specialists. The BOPs have been validated to comply with the original equipment manufacturer specifications, in accordance with API Recommend Practice No. 53. Shell's BOPs will have two sets of shear rams and comply with all regulatory requirements and NTLs (Notice to Leaseholders).

We will also maintain the ability to mechanically cap the well in the unlikely event of a BOP breach. In fact, all existing Shell wells in deep water around the globe can be capped. The design and construction of these wells allows them to withstand the pressure build-up that results when the well is capped. If the blow-out maintains mechanical integrity in the borehole and wellhead, a "capping and containment" operation would be employed. Mechanically capping the well, for example with an additional pre-engineered BOP, has the ability to reduce or even stop the flow, but may require a surface collection system. The benefit of this response methodology is that it reduces or completely halts the flow of oil entering the water column. This capping method was eventually proven successful in terminating the well bore flow even at Macondo, and has been an integral part of well control descriptions in industry's recently approved permits in the deepwater Gulf of Mexico return to drilling.

In the extremely unlikely event that the wellhead integrity is compromised and an uncontrolled flow occurs, we would employ a pre-fabricated “subsea collection” system. This would consist of a capping stack that would be located on top of the blowout preventer, collecting fluids to a surface barge where gas, oil and water can be separated prior to storage and disposal. Separated gas would be flared; separated oil and water would be stored in tanks for subsequent disposal offsite or flared.

Collecting the flowing fluids close to their source of origin prevents or limits the flow of oil into ocean waters, and optimizes the suite of surface oil spill response capabilities by engaging the problem at its source. This is a key part of the strategy that Shell has employed in Alaska, even pre-dating the Macondo blowout. Surface oil spill response equipment would remain on station in the immediate area. Given we will have two functional drilling vessels in our 2012 exploration operations, each drilling rig will act as the relief backup well drilling unit for the other. Each can immediately stop operations and respond to drill any ultimate relief well.

#### **Oil in Ice**

A significant amount of oil-in-ice research has been completed over the last 30 years and more is underway. A four-year program known as the Joint Industry Project (JIP), under the management of SINTEF Norwegian Research Institute, was sponsored by six international oil companies, including Shell, and involved a host of international scientists including those from the Department of the Interior.

The purpose was to advance knowledge, tools and technologies for oil spill response in ice-covered waters. The program examined:

- The fate and behavior of oil spilled in Arctic conditions;
- In-situ burning of oil in Arctic and ice-covered waters;
- Mechanical recovery of oil in Arctic and ice-covered waters;
- Use of chemical dispersants in Arctic and ice-covered waters;
- Monitoring and remote sensing of oil in and under ice;
- Preparation of a generic oil spill contingency plan; and
- Field experiments at Svalbard, Norway, in offshore ice-covered waters.

In May 2009, the group spent two weeks in the pack ice in the Norwegian Barents Sea to study the behavior of oil spills in Arctic waters and to test various response options in realistic oil-in-ice conditions. The tests proved that ice can act as a natural boom or protective barrier to confine and reduce the spread of an oil spill and to provide a longer window of opportunity in which clean-up technologies can be used effectively. These tests are the most wide-ranging research and development programs ever undertaken to evaluate Arctic oil spills.

These real-world offshore tests marked the final stage in the largest and most wide-ranging international research and development program ever undertaken to enhance detailed understanding, to further improve and develop spill-response technologies and to increase the ability to react rapidly in the event of an accidental oil spill in ice-covered conditions. The summary of that research showed that by using a suite of available tools (all of which are part of Shell’s Alaska tool kit), including Arctic-tested booms and skimmers, and in-situ burning and dispersants, the majority of oil could be cleaned up in a variety of Arctic conditions; including broken ice and slush.

Shell has already committed to several more years of oil-in-ice research in Norway. Beyond those large-scale field trials, we are also pursuing test projects in Alaska that will better inform our approach to oil spill response. In Situ Burning is well-proven in open water conditions and in an effort to expand our ability to ignite a large pool of oil using a fixed-wing aircraft, Shell recently conducted a “Proof-of-Concept” test program at the Beacon Training Center in Kenai, Alaska in 2010. The tests were successful in showing that safe and effective ignition was possible from a fixed wing aircraft. That’s key as we consider the long distances our aircraft may have to travel if an in situ burn is necessary offshore.

Shell is also a leading sponsor of a Joint Industry Project that will help determine the sensitivity of key Arctic species to chemically and physically dispersed petroleum under Arctic conditions. Partners in the project include the University of Alaska Fairbanks and Barrow Arctic Science Consortium, with all dispersant testing being done at the Barrow Arctic Research Center in Barrow, Alaska.

#### **Regulatory Challenges in the Arctic OCS**

Shell participated in several Alaska OCS lease sales at the invitation of the Federal Government. Although the leases were issued to Shell, the government’s permitting and regulatory process has not been equipped to deliver. As a result, Shell has been blocked from drilling even a single exploration well.

Let me stress that this is *highly* unusual. The Federal Government's decision to hold a sale is, in effect, a decision that OCS exploration and development is desired. The Federal Government performs years of in-depth analyses before holding an OCS lease sale. Therefore, an exploration or development plan that meets regulatory requirements is approved. In the case of Shell in Alaska, we have met and exceeded the regulatory requirements and still have not been able to drill a well.

Each of our 414 leases in the Beaufort Sea and the Chukchi Sea has a ten-year term. A lease will expire and return to the Federal Government at the end of its term, if substantial steps to develop it are not taken.

So, Shell is in a "Catch-22." We have invested more than \$3.5 billion in leases and in supporting infrastructure—equipment, support vessels, baseline studies, and workforce training—in order to take the first step to explore for oil and natural gas. We have assembled what is arguably the most environmentally sensitive and thoroughly responsible exploration plan in history. Yet, for reasons largely beyond our control, permits have not been issued. Since our leases are only valid for a limited time, we are ready to move forward.

#### **A Robust Regulatory Process Is Critical**

Let me be clear, Shell fully supports a robust permitting process. Shell does not seek lower environmental standards for Arctic OCS activities or a less exhaustive public permitting process. Such a process protects people and the environment and ensures safe and responsible operations. The bar is high in the Arctic, and it should be. Shell fully understands and supports this. We are ready to proceed with an exploration program that does precisely that.

But the regulatory framework should be clear and consistent; and the regulatory process should be properly funded, efficient and robust. The process should lead to timely decisions. Regardless of one's views on oil and gas development, we can all agree that endless delays by our government are wasteful to the taxpayer and should not be tolerated. Permitting for oil and gas activity must be done thoroughly and to the letter of the law. Without that, legal challenges are likely and can also act to block a program.

The recent formal creation of Federal working group dedicated to pursuing domestic energy solutions in Alaska is welcome news to Shell and builds on conversations we have had with this administration related to responsible offshore exploration in the Arctic. We're hopeful this effort to coordinate various regulatory workstreams will lead to more data, a more efficient permitting process and ultimately, a stronger permit.

#### **Recommendations: How Do We Move Forward?**

Now I would like to look forward—to where we go from here and what policy-makers should do.

Developing the oil and gas in our Nation's Arctic OCS will require governments at all levels—Federal, state and local—to work together to develop a workable regulatory framework and to provide focused funding and staff for the work.

Specifically:

- Federal permitting agencies must have adequate, trained staff with appropriate expertise and direction to execute the program. Alternatively, the agencies must be given the authority and the direction to do the permitting work through outside experts. This can be accomplished through arms-length funding from pre-approved third-party contractors. Lack of staff should be no excuse for delaying permitting work.
- The Federal Government must pursue data collection and analysis necessary for environmental studies, ecological characterization and baseline science required for potential development activities. I stress that existing data is available for exploration. This critical work is required by various statutes and underpins permitting of work in the Arctic OCS. Again, if funding is an issue, the government should be allowed to do the work through arms-length funding from third parties.
- Federal and state regulatory agencies must work through a coordinated permitting process. Multiple agencies are now involved in issuing multiple permits for a single offshore project. Duplication and inefficiency lead to delay and waste.
- Statutes and regulations should be clear and the permitting process transparent. Agencies should be forced to set and meet milestones for reviewing and processing permit applications. They should have firm timelines for permit delivery. These activities should be coordinated through one office that works with all needed agency participants and contractors to ensure timelines are followed.

In short, the government must respond to permit applications in a timely and competent manner.

Second, looking more broadly to Arctic economic opportunities for our country, the U.S. should ratify the Law of the Sea Treaty. While Shell's Alaska OCS program is not dependent upon this action, U.S. ratification of the Treaty is in the best interest of both national and economic security. The Treaty provides a clear and well-accepted framework for resolving maritime border questions and for ensuring that the U.S. controls the OCS off its coast.

Ratification could lead to international cooperation (such as the maritime border delimitation agreement recently signed between Norway and Russia). Ratification could also provide future protection for the import and export of petroleum and production and improved capabilities for search and rescue and environmental protection.

Third, policymakers should consider what physical presence the Federal Government should have along Alaska's Arctic coastline. At a time when nations both in and out of the Arctic are mapping the Arctic surface and seafloor, it seems appropriate to develop a strategic plan for how and when U.S. manpower will be deployed in the U.S. Arctic and what the U.S. government's contribution will be to that deployment.

Even though the lack of a U.S. Government presence and infrastructure in the Arctic does not inhibit or hinder Shell's proposed exploration program, we support funding for the U.S. Coast Guard and other Federal agencies to identify and pursue resources needed to ensure responsible development of economic opportunities in the Arctic.

#### **Conclusion**

Oil and gas will remain critical sources of energy for decades to come. There are broad and sustained benefits in developing our own resources in the Arctic OCS. The U.S. Arctic is resource-rich and tapping those resources will create jobs, power the economy, put billions into dwindling government coffers, provide energy security, reduce imports and reduce our trade deficit. We can ill afford not to embrace this momentous economic opportunity.

Thank you. I am happy to answer any questions.

Senator BEGICH. Thank you very much.

Dr. Borgerson.

#### **STATEMENT OF SCOTT BORGERSON, PH.D., SENIOR FELLOW, INSTITUTE FOR GLOBAL MARINE STUDIES**

Dr. BORGERSON. Good morning, Mr. Chairman, Senator Snowe. Thank you very much for the opportunity to be here today.

My short answer to the title of today's hearing, "Is There a Strategy?," is no. I'll elaborate why and what we might do to fix it in my testimony. So as to not repeat what we heard on the first panel about the realities of climate change, the facts of the Arctic's opening, I'll skip over that part of my testimony, but would like it to be noted that it's submitted for the record.

Senator BEGICH. It is.

Dr. BORGERSON. Creative local, state, and federal initiatives can ensure that we seize this historic economic opportunity presented by the Arctic's radical transformation and do so in a way that I think is sustainable, both for the environment and for local populations, and this is important, as well as in the Nation's clear-eyed national security interests. I'm advocating that the U.S. embrace and embrace in a big way, as I did in an op-ed in the *Wall Street Journal* last Friday along this theme, what might be the world's last and potentially most attractive emerging market.

It's a mistake to leave Alaska in the proverbial icebox. In addition to the oil and gas resources we just heard about, the Arctic is home to some of the world's largest precious metals deposits, as well as fresh water, which is increasingly important in a warming

world. Another resource is the Arctic sea routes, which if realized would be many thousands of miles shorter than traditional sea ways around the two capes or through the two canals. With massive tidal, wind, and geothermal capacity, the Arctic also has renewable energy potential.

While the U.S. sits on the sidelines, other Arctic nations are moving forward with ambitious development programs. Russia is actively working to open the Barents region. Canada is doing the same in the Yukon. Norway and Iceland each of multi-billion dollar energy projects under way. And Greenland, for now still under Danish rule, is exploring 31 billion barrels of oil estimated to be off its coast.

Before detailing what kinds of strategic investments should be given priority in the American Arctic, let me say generally first that I think the overall approach needs to be balanced. In my view, neither extreme of the “Drill, Baby, Drill” crowd and the idea that Alaska can somehow build a bright future on oil and gas extraction alone, versus the equally unrealistic position that the entire State is to be set aside as a nature preserve with zero development, is acceptable or realistic.

Rather, I believe a comprehensive approach should be undertaken that is predicated upon environmental best practices to ensure we meet our responsibilities as stewards of this pristine frontier, is sensitive to the economic and human rights of indigenous communities, is supportive of increasing domestic oil and gas production, while simultaneously and aggressively accelerating renewable energy projects, is appreciative of the central importance of resource owners, and is forward-looking in positioning the State 1 day that it will ultimately transform from primarily an exporter of natural resources to a vibrant, innovative, and dynamic economy further up the value chain.

Some other comments and thoughts are in my testimony, but let me skip ahead, submit it for the record—but let me skip ahead to some policy suggestions for your consideration that might help the U.S. have a twofold strategy, one of both mitigating the risks, which you heard a lot about in the first panel, as well as, importantly, embracing the opportunities in the new Arctic.

First—and I put it first for a reason—let me add my voice to the chorus. It’s long overdue that the U.S. accedes to the U.N. Convention on the Law of the Sea. I wrote a study at the Council on Foreign Relations articulating all the reasons why it’s in our national security interest to do so. It has broad bipartisan support. I think there is not a serious voice in the national security establishment that would not endorse our acceding to the treaty, and it’s embarrassing, frankly, as a Nation that we’ve not yet. I’d be happy to speak to that during the question-answer session if there are questions tied to the treaty.

Second, one creative idea that came out of a recent conference I attended in Anchorage, I know you spoke at, Senator Begich, The Arctic Imperative, is the idea of somehow using Alaska’s really incredible budget reserves and the permanent fund, which is especially unique in this current budgetary environment, in a sovereign wealth fund-type model, and there are established models abroad, and I can speak to that a little bit, to facilitate private investment.

Three, tied to that, craft ambitious federal-state strategies for attracting foreign capital. I think that's consistent with the President's recent statement along these lines. We're open for business and should welcome foreign capital to help develop the American Arctic.

Four, unshackle local commerce. Frankly, Washington, D.C., needs to get out of the way of Alaskan development and I think can strike an important balance between environmental sustainability and development with some overarching legislation.

Fifth, work with Canada on the Beaufort maritime boundary line and Northwest Passage disputes.

Sixth, recapitalize the nation's icebreaker fleet, as we've heard about today.

Seventh, amend the U.S.-build provision of the Jones Act. That's sometimes controversial, but I think important.

A deepwater port, studying other emerging markets, and then supporting science, which is an important foundation for these policy decisions.

I look forward to speaking to any of those ideas or answering any questions you might have in the question-answer period. Thank you.

[The prepared statement of Dr. Borgerson follows:]

PREPARED STATEMENT OF SCOTT BORGERSON, PH.D., SENIOR FELLOW,  
INSTITUTE FOR GLOBAL MARITIME STUDIES<sup>1</sup>

Mr. Chairman:

Thank you for the opportunity to participate in today's hearing "Defending U.S. Economic Interests in the Changing Arctic: Is There a Strategy?" My short answer is NO. While I have seen some interesting proposed legislation in Juneau and Washington, from my perspective I have not yet heard a strategic vision articulated for America's future in the new Arctic.

The radical climate change underway in the high latitudes is well chronicled and an accepted fact among the scientific community. It is happening and undeniable no matter what one's political stripes. My testimony, however, is not concerned with the causes of the warming or potential mitigation remedies that are indeed important, but rather with what practical steps should be taken because of this new reality.

Creative local, state and Federal initiatives can ensure that we seize this historic economic opportunity presented by the Arctic's radical transformation and do so in a way that is sustainable both for the environment and for local populations as well as being in the country's clear-eyed national security interests.

I am advocating that the U.S. embrace, and embrace in a big way, what might be the world's last and potentially most attractive emerging market as opposed to leaving Alaska in the proverbial icebox.

Long literally and figuratively frozen to outside investors, the Arctic now has melting sea ice and thawing tundra that are yielding huge resource opportunities. According to the U.S. Geological Survey and Alaskan state studies, 22 percent of the world's undiscovered oil and gas reserves are to be found in the Arctic. On the North Slope alone, there are an estimated 40 billion barrels of oil and 236 trillion cubic feet of gas.

The Arctic is also home to some of the world's largest precious metals deposits, as well as fresh water, which is increasingly important in a warming world. Another resource is the Arctic's sea routes, which, if realized, would be many thousands of miles shorter than traditional seaways around the two capes or through the two canals. With massive tidal, wind and geothermal capacity, the Arctic also has renewable energy potential.

<sup>1</sup>The Institute for Global Maritime Studies is a publicly supported, non-profit educational organization, dedicated to exploring a wide range of policy issues relating to the sea. The Institute's purpose is to foster greater public awareness of the importance to humankind of the oceanic world, and it is committed to advancing the national welfare and the public good.

While the U.S. sits on the sidelines, other Arctic nations are moving forward with ambitious development programs. Russia is actively working to open the Barents region. Canada is doing the same in the Yukon. Norway and Iceland each have multi-billion-dollar energy projects underway. And Greenland, for now still under Danish rule, is exploring 31 billion barrels of oil estimated to be off its coast.

Before detailing what kinds of strategic investments should be given priority in the American Arctic, let me say generally first that I think the overall U.S. approach needs to be balanced. In my view, neither extreme of the “drill baby drill” crowd and the idea that Alaska can somehow build a bright future on oil and gas extraction alone, versus the equally unrealistic position that the entire state is to be set aside as a nature preserve with zero development is acceptable.

Rather, I believe a comprehensive approach should be undertaken that is predicated upon environmental best practices to ensure we meet our responsibilities as stewards of this pristine frontier, is sensitive to the human and economic rights of indigenous communities, is supportive of increasing domestic oil and gas production while simultaneously and aggressively accelerating renewable energy projects, is appreciative of the central importance of resource owners, and is forward looking in positioning the state one day to transform from primarily an exporter of natural resources into a vibrant, innovative and dynamic economy farther up the value chain.

For example, why aren't Anchorage, Fairbanks and other Alaskan cities already mostly powered from green sources and world leaders in the development of alternative energy technologies? Why isn't Alaska more centrally part of the explosive growth in Asian economies that are in relative close geographic proximity? Why isn't Alaska aggressively pursuing a host of exciting investment opportunities including infrastructure expansion and rare earth mineral projects? Why isn't Alaska with its vast Arctic resources at the forefront of leading the Nation out of its current economic funk? Why shouldn't the American Arctic be the future financial, intellectual, and logistics epicenter for this increasingly important region?

Here are some policy proposals for your Committee's consideration that might better position Alaska and the United States to mitigate the risks and embrace the opportunities of the new Arctic:

1. *Formally accede to the U.N. Convention on the Law of the Sea (UNCLOS).*

There are numerous global strategic imperatives for why this is long overdue and urgently needed. In the Arctic, more specifically, the convention includes provisions for extending U.S. sovereignty over its extended continental shelf; allows for stricter environmental standards over Arctic shipping; establishes protocols for managing the Bering Strait which will become a key maritime choke point; and protects the mobility of U.S. flagged vessels and those of our allies in new Arctic transit routes, to name but a few.<sup>2</sup>

2. *Consider enabling Alaska's \$13 billion constitutional budget reserve and its \$40 billion Triple-A rated permanent fund to function like an Alaskan Sovereign Wealth Fund.* Deploying this capital reserve smartly alongside private monies would allow Alaska to accelerate Arctic development projects that are shovel-ready. If the money were steered toward increasing oil production and financing renewable energy projects—both administration priorities—it would have the added benefit of helping the country reduce its dependence on Middle East oil. The Alaska Industrial Development and Export Authority and an envisioned State Infrastructure Bank might be useful vehicles for promoting these investments.

3. *Craft ambitious Federal and state strategies for attracting foreign capital.* This would be consistent with the President's formal commitment last month to an open national investment policy. As our recent deficit challenges underscore, welcoming any investor interested in the American Arctic would create meaningful new jobs and contribute to economic recovery. Of course, any foreign investment will need to navigate the interagency Committee on Foreign Investment in the United States designed to safeguard national security interests.

4. *Unshackle local commerce.* This might be aided by a congressional “Arctic Preservation and Development Act” that could lay out the rules of the game, balancing environmental protection and the state's economic interests. This legislation should be pursued irrespective of ANWR, and focus more on creative ideas of how environmentalists and industrialists can sit around the same table

<sup>2</sup>For a summary of the arguments for and against acceding to the Convention see “The National Interest and the Law of the Sea,” Council on Foreign Relations Special Report by Dr. Scott Borgerson, May 2009.

working in common cause to open Alaska up to development while doing so with the highest conservation standards.

5. *Resolve our differences with Canada over our Beaufort Sea maritime boundary line and the Northwest Passage.* The U.S. and Canada enjoy a special relationship and I believe conditions in Ottawa are ripe to strike a deal. We should come to agreement on a compromise maritime boundary line in the Beaufort Sea so that offshore energy production can proceed there. We should also deepen and widen our collaboration over the Northwest Passage, creating a joint-Arctic Navigation Commission to promote and safeguard commerce through both nations' waters using the St. Lawrence Seaway as a model. In general, the U.S. should approach the Arctic in a spirit of enthusiastic diplomacy and champion other collaborative diplomatic initiatives such as strengthening the Arctic Council, formalizing an Arctic Ambassadorship, and establishing a North Pole marine preserve.

6. *Recapitalize the nation's icebreaker fleet.* The country finds itself in a dire predicament of being an Arctic nation with one dying heaving icebreaker. Icebreakers are needed for the same Coast Guard missions that exist on America's other four coasts such as supporting commercial shipping, research and science, search and rescue, oil spill response, and projecting sovereignty. Given the precipitous decline in this nation's shipbuilding capacity, even if Congress appropriates monies for new ships today, given the long lead time to build these complex vessels they likely wouldn't be operational until after the Arctic is already seasonally ice free. An interim fix might be to lease foreign icebreakers until new ships can be built, but by doing this we are in effect outsourcing our sovereignty, which is unthinkable for the world's greatest naval power but probably necessary as an interim fix.

7. *Amend the U.S. "build" provision of the Jones Act.* The Jones Act—a protectionist policy that requires all domestic maritime cargo be carried on vessels that are owned, flagged, crewed, and built in America—has killed the U.S. merchant marine and hurts Alaska and other noncontiguous states and territories more than it does the rest of the country. Because of the market distortions created by the U.S. build provision, constructing a commercial tanker in the U.S. costs 2–3 times more than building the equivalent ship abroad, even in countries with higher labor and environmental costs. Relaxing this restriction to allow foreign built vessels into domestic trade routes would decrease the cost of Alaska's seaborne imports and make its exports more competitive. Commercial shipping is also a less carbon intensive form of transportation for freight intensive cargo. Waving the domestic build requirement would have the added benefit of helping rejuvenate America's shipyards with the likely effect of reducing the cost of building new icebreakers.

8. *Develop a deep-water port for both private shipping and as a regional Coast Guard base.* This port should be built with the vision of 1 day becoming a high latitude equivalent of Singapore which profits handsomely from its geostrategic location on the Malacca Straits. Careful study should be given to the optimal port among existing candidates, and then a public-private partnership pursued to build out new Coast Guard facilities alongside commercial piers. In addition to Coast Guard and other military traffic, this port should be designed to support fishing boats, dry bulk tankers, offshore support vessels and cruise ships.

9. *Study other emerging markets.* What are the best practices to emulate and pitfalls to avoid from previous emerging market examples that are more or less analogous to Alaska's position today such as Mongolia, Peru and Brazil? What are optimal investment models in the American Arctic? How can creative public policies in the form of tax incentives jumpstart innovation and entrepreneurship?

10. *Support science.* Looking to the Arctic Research Commission for direction, how can strategic investments in scientific research help jump-start economic development? Some examples include bathymetric surveys, climate studies, fish stock accounting, and seismic research. Sound science leads to better public policy and therefore solid foundations for spurring economic growth.

America and Alaskans have a rare multigenerational opportunity of facing a relative blank canvas for greenfield investments. It would be a mistake to press ahead hastily and exploit the American Arctic with reckless abandon. At the same time, it's neither fair to Alaskans nor good for the country to use litigation and legislation to stonewall progress. No other state would settle for being made into a theme park. The uncertainty created by the absence of a comprehensive U.S. Arctic development strategy is an investment killer.

If the U.S. can wake up to the Arctic potential it possesses, Secretary of State William Seward's 1867 purchase of Alaska for \$7.2 million could turn out to be the single greatest investment in American history.

Thank you and I look forward to answering your questions and expanding on any of these points during the follow on question and answer period.

Senator BEGICH. Thank you very much.  
Dr. Metzger.

**STATEMENT OF ANDREW T. METZGER, PH.D., P.E., ASSISTANT PROFESSOR, DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING, COLLEGE OF ENGINEERING AND MINES, UNIVERSITY OF ALASKA, FAIRBANKS**

Dr. METZGER. Thank you, Mr. Chairman, and thank you for the opportunity to provide the testimony on the challenges of infrastructure in the Arctic. As an engineering professor at University of Alaska-Fairbanks, I've been studying the topic of Arctic marine civil infrastructure for the past 2 years as a researcher. During this time I've traveled in the region and conversed with many Arctic stakeholders from government, industry, and local communities.

On the topic of infrastructure challenges for stakeholders, early in the study I was immediately struck by the overall lack of infrastructure. Existing roadways are generally undeveloped and not connected to the contiguous highway system. There is no rail system. Transportation typically consists of annual barge service along with air service that is more frequent. Any materials missing from the barges have to be either flown in or barged in the following year.

As far as existing port and harbor facilities, there is a port in Nome. This facility has a draft of approximately 24, 25 feet, and has limited dockage. There's a pier servicing the Red Dog zinc mine, but this facility is specialized for loading ore. There's a number of shallow-draft barge facilities in the region as well.

There's an extensive network of air strips. The majority of these are intended for small aircraft, although jet service is available in a few locations. Presently, the norm in the Arctic coastal communities is that existing housing, water, wastewater, and power utilities only marginally meet the demands of the community. Communities would likely be overwhelmed with an influx of people.

Rigors of the Arctic cannot be overstated. People and facilities in this environment must contend with extreme cold, permanently frozen soil, or what we call permafrost, and lack of daylight in the winter. In addition, coastal areas must endure intensive wind and wave conditions, subsea permafrost, accelerating erosion, and potential catastrophic hazards from sea ice.

Due to severe winter temperatures, many activities are hindered or cease altogether. Because of this, construction is often confined to 3 or 4 favorable months of the summer. Permanently frozen soil extending out into the sea is known to exist, but is not well documented or studied. This so-called subsea permafrost will affect dredging and requires extraordinary care when building on it.

Delays caused by adverse wind, waves, and ice movement are commonplace and delivery schedules are routinely altered by days or longer. Coastal erosion will significantly impact marine infrastructure in the Arctic. The soil that is washed away from shore

eventually settles on the sea floor. This action can fill dredged navigation channels and the erosion itself can consume shoreside infrastructure. The latter has and is occurring in Arctic coastal communities.

The presence of sea ice is cause for concern and must be handled with care. Massive ice flows pushed by wind move along and in to the shore. These ice flows can be thought of, if you will, as enormous bulldozers. This mass of ice will impact marine structures with extraordinary force. It's not uncommon for these bulldozers to ride up on shore some distance, and a spectacular example of this occurred at Barrow this spring.

Ice flows gouge the sea floor and can destroy subsea pipelines, as well as dredged navigation channels. It must be noted that each year there's thousands of these bulldozers at work along the coast.

These facts must be addressed in locating and designing infrastructure along the Arctic coast. In a broader context, we design civil infrastructure for the extreme, not the mean. Quantitative information about extremes of waves, winds, currents, and sea ice conditions is not readily available for the Arctic, and there are few engineers and construction contractors that have considerable experience in the region.

I'd like to be clear that none of these comments are meant to indicate Arctic marine infrastructure is impractical. Rather, they are meant to briefly outline some of the challenges we face and information we need to be successful.

On the topic of investments in infrastructure, based on the information I've gathered from Arctic stakeholders, I'll summarize the sentiments concerning Arctic infrastructure as follows: Build it and we'll use it.

The ability to refuel and resupply at higher latitudes appears to be a limiting factor for maritime operations. An adequate refuel and resupply point much farther north than Dutch Harbor would greatly benefit a number of stakeholders.

Such a facility could be a port. It could also be a lightering facility, an offshore fuel mooring, and there are other possibilities. While the port option may be most desirable to some stakeholders, latter options are potential near-term goals that would enhance our ability to operate in the Arctic, possibly serving as interim measures until a port can be built.

The presence of a port in the Arctic will likely promote diverse economic development. However, a port facility is just that, a port, a portal or a doorway, a transition between modes of transportation. One side of the door is, of course, marine transportation. A port driven by economic opportunity will require a companion project on the other side of the door. The companion project would likely be rail, roadway, or even aviation infrastructure.

A key area of need is basic shoreside civil infrastructure. Facilities with adequate lodging, water, wastewater, and storage facilities are not generally available, but will be needed to support any significant operations or developments. In my opinion, development of shoreside civil infrastructure is necessary before any other infrastructure development.

Thank you. That concludes my statement.

[The prepared statement of Dr. Metzger follows:]

PREPARED STATEMENT OF ANDREW T. METZGER, PH.D., P.E., ASSISTANT PROFESSOR,  
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING, COLLEGE OF  
ENGINEERING AND MINES, UNIVERSITY OF ALASKA, FAIRBANKS

Thank you for the opportunity to provide testimony on the challenges of infrastructure in the Arctic. As an engineering professor at the University of Alaska Fairbanks that specializes in marine civil infrastructure, I have been studying the topic of Arctic Marine Civil Infrastructure, in the context of engineering design and construction, for the past 2 years. During this time, I've visited communities on the North and Northwestern Alaska coastlines and conversed with many Arctic stakeholders including Federal and State Agencies, oil-and-gas and mining interests as well as residents of communities in the region.

Before I continue, I would like to clarify that by *marine civil infrastructure*, I am referring to civil engineering infrastructure that supports maritime operations.

### **Infrastructure Challenges for Stakeholders**

When I began my work on this topic, I was immediately struck by the overall lack of infrastructure. Existing roadways are generally undeveloped and not connected to the contiguous highway system. There is no rail system. Transportation consists of annual barge service along with air service that is more frequent. Since barge traffic is sporadic during the one or two months of ice free seas, all materials must be carefully scheduled as much as a year in advance. Any missing materials must be either flown in or sent via barge the following year.

I've also come to understand that the lack of infrastructure has precluded development of significant mineral resources in Arctic regions of Alaska.

As far as existing port and harbor facilities: There is a port in Nome, Alaska. This facility has a draft of 25 feet and limited dockage. There is a pier servicing the Red Dog zinc mine, but this facility is specialized for loading ore onto vessels that lighter to larger vessels offshore. An assortment of other facilities servicing barges also exist in the Arctic; along the coasts and in some of the major river systems. These barge facilities are characterized by shallow depth; approximately 10 feet or less.

Presently, the norm for Arctic coastal communities is that existing housing, water, wastewater and power utilities only marginally meet community needs. Consequently, shore side support for escalating maritime activities, as well as development of any new marine infrastructure, will likely overwhelm these communities.

The rigors of the Arctic cannot be overstated. People and facilities in this environment must contend with extreme cold, permanently frozen soil (permafrost) and lack of daylight in winter. In addition, coastal communities and marine infrastructure must contend with intense wind and wave conditions, subsea permafrost, accelerating erosion and potentially catastrophic hazards from sea ice. These harsh conditions will significantly shape development of marine infrastructure in the Arctic as well as stakeholder activities.

Extreme cold impedes the ability of humans to do tasks and can cause equipment to operate at a diminished rate or not at all. There is a point at which productivity is essentially zero and activities must be stopped; primarily due to the inability of emergency responders to operate. During the winter months it should be anticipated that operational and construction activities will be hindered or halted altogether. Because of this, most construction activities will be confined to three or four favorable months in the summer.

Permanently frozen soil extending out into the sea is known to exist but is not well documented or understood. This *subsea permafrost* presents two challenges. First, it may make dredging impractical since frozen soil tends to be more like rock. Second, if exposed by dredging, and as climatic warming continues, the permafrost will melt. This will require carefully designed foundation structures which can either keep the permafrost frozen or perform well should the permafrost melt. The presence of subsea permafrost will also affect navigation channel design and construction.

Those who routinely transport freight in the Arctic are keenly aware of intense winds and waves that can occur. Delays caused by adverse winds, waves or ice movement are commonplace. Committee members may be familiar with the popular television show, *Deadliest Catch*, and can imagine these challenges, and understand how delivery schedules are routinely altered by days or even weeks. Another way to think of this is to contemplate a long route crossing intense weather and rough seas, to a remote location, with no supplies or safe haven along the way. It is easy to see the challenge of planning and logistics for operations or construction in the Arctic.

Eroding coastlines, exacerbated by longer periods of exposure to wave action (a result of diminishing sea ice) will impact marine civil infrastructure in the Arctic.

The soil that is washed away from the shore could be described as flowing mud. Water transports this mud which eventually settles on the seafloor. This action can fill dredged navigation channels and the erosion itself can consume shore side infrastructure. The latter has and is occurring in some Arctic coastal communities.

The presence of sea ice is cause for concern and must be handled with care in the design and construction of coastal infrastructure. “Ice out,” when the ice finally breaks away from the shores in late spring and summer, is an exciting time for every community along Alaska’s northern coastline because it allows fishing and the delivery of supplies. However, just as the ice is moved offshore by the wind, it can be blown back to shore in a matter of hours. When this happens, an ice floe can act like a bulldozer as it is blown toward shore. The ice-mass will impact marine structures with extraordinary force. And, it is not uncommon for these “bulldozers” to ride up on shore for some distance. These facts must be addressed in siting and designing infrastructure along the Arctic coast. The portion of the ice floe beneath the water will gouge the seafloor, excavating soil and forming trenches. This action can destroy subsea pipelines as well as dredged navigation channels. And it must be noted that each year there are thousands of these bulldozers in the shallow waters along the Arctic coast of Alaska. Virtually no portion of the U.S. Arctic coast is unaffected by sea ice.

Creating new infrastructure in the Arctic will be constrained by the fact that researchers know so little about it—from an engineering perspective. Arctic infrastructure challenges are unique and there are few engineers and construction contractors that have considerable experience with them.

In a broader context, *reliably* engineered systems—systems with an acceptably low probability of failure—require adequate knowledge of demands placed on the system. Simply stated, we design engineered systems for the extreme, not the mean. Quantitative information about the extremes of environmental conditions in the Arctic, including waves, wind, currents and, sea-ice conditions, is not readily available. Therefore, information needed to design reliable infrastructure in this region is generally not available.

I would like to be clear, none of these comments are meant to indicate Arctic Marine Infrastructure is impractical. Rather, they are meant to briefly outline some of the challenges we face and information we need to be successful.

### **Investments in Infrastructure**

In the venues I’ve attended on the Arctic and its challenges, and comments from the various stakeholders, I will summarize sentiments concerning arctic marine infrastructure as follows: “Build it and we’ll use it.”

In the context of maritime operations, the most limiting factor appears to be the ability to refuel and resupply in the higher latitudes of the Arctic. In light of this, an adequate refuel and resupply point, much further north than Dutch Harbor, would greatly benefit arctic maritime operations for a range of stakeholders. Such a facility could be: a port; a lightering facility—in which fuel and supplies are stored on land and transported to vessels offshore via smaller craft; offshore fuel moorings—a vessel mooring connected to a subsea pipeline conveying fuel from storage tanks onshore (this option could be coupled with lightering for supplies). There are other possibilities beyond what I have stated.

While the port option may be most desirable to some stakeholders, the latter options are potential near term goals that would enhance our ability to operate in the Arctic. Concepts like the lightering facility or the fuel mooring may also be approached as interim measures that will provide some level of service until a port can be built.

In consideration of new economic opportunities in the Arctic, the presence of a port will likely promote diverse economic development. However, a port facility is just that, a “port,” a “portal” or “doorway”; a transition between modes of transportation. On one side of the “door” is, of course, marine transportation. An economically driven port will require a companion project on the other side of the door. This is the case for all other economically orientated ports in the Nation. The companion project would likely be rail, roadway or even airport infrastructure.

Another key area of need is basic shore side civil infrastructure. Facilities with adequate lodging, water, wastewater and storage facilities necessary to support significant seasonal or sustained operations by private or government entities are not generally available. In my view, development of shore side civil infrastructure is necessary before any other infrastructure development.

Thinking long term, and in consideration of all stakeholders’ needs, it may be beneficial to pursue the question of marine infrastructure needs in terms of an Arctic Marine Transportation System. While a single infrastructure asset will benefit one or more stakeholders, a well-planned system of civil infrastructure assets could po-

tentially be even more beneficial to a wider set of stakeholders. Defining such a system beforehand will surely result in more efficient use of resources than a system pieced together in a discretionary manner.

Thank you.

This concludes my written testimony.

Senator BEGICH. Thank you very much. Thank you all for giving your testimony. We'll open for questions. I'll start with Senator Snowe in a 5-minute round.

Senator SNOWE. Thank you, Mr. Chairman.

Mr. Slaiby, last week I understand that your colleagues briefed the Committee staff regarding prevention and oil spill response strategy that Shell has developed for the Arctic leases. I know that we're in the exploratory phase and there's a difference in terms of depth between the wells your company is exploring as opposed to what occurred in the Gulf with the *Deepwater Horizon* explosion.

Your contingency plan is predicated on a multi-tiered vessel strategy, as I understand, one for the skimming vessel and then of course having containment vessels to come to the scene before the skimming vessels would be filled. The Pew Environment Group disputes your company's claim that the oil response vessel, the NANUQ, would be able to deploy fast enough to respond to a spill in the Chukchi Sea, that your response vessels are not actually on the scene and would take longer than you claim to arrive there. What is your response to that assertion?

Mr. SLAIBY. Senator Snowe, thank you for the question. We are required to have vessels deployed within 60 minutes of a spill. This is something that we have done in full recognition that we are in a remote area and have to design our operating practices along that line. It's actually more than one vessel, Senator. It's a number of vessels that would be responsible for deploying a boom.

Senator SNOWE. So you could meet that requirement of response within 60 minutes?

Mr. SLAIBY. We will beat that requirement of 60 minutes.

Senator SNOWE. So you're saying that what the Pew Environment Group indicates is wrong?

Mr. SLAIBY. I won't comment specifically on what's in the report. I did read the report and we take exceptions to certain areas that they report.

Senator SNOWE. On this one specifically?

Mr. SLAIBY. This one specifically.

Senator SNOWE. We thought, as you know, and we talked about it earlier, that BP was prepared for the worst case scenario, having been approved by our agency, the MMS, and ultimately we discovered otherwise. Now, the Interior Department estimated recently that a hypothetical blowup in an oil well on the Chukchi Sea could release 1.4 million barrels within 39 days. Has your contingency planning been based on that scenario?

Mr. SLAIBY. Senator, the study that was done by the DOE involved a worst case discharge of a particular sand. We will not be drilling those type of sands. We will be using the required notice to lessees to calculate the worst case discharge for the reservoirs that we will drill, and BOEM will agree—we will come to an agreement on our ability to recover that worst case discharge.

Senator SNOWE. So they're saying—you're saying that it's in different types of sand than they were using for estimates?

Mr. SLAIBY. The worst case discharge that was presented as part of this supplemental EIS, Senator, was to inform the decision-maker, Secretary Salazar, of what could be the possibly worst worst case if, hypothetically, all were to go wrong.

Senator SNOWE. So what would be your worst case scenario? What have you designed your contingency plans for?

Mr. SLAIBY. We have designed our contingency plans to recover 25,000 barrels a day mechanical recovery. We would have additional recovery available beyond that, in other words, in situ burning, dispersants, capping and containment, that actually fit above and beyond the mechanical skimming.

Senator SNOWE. Does the Interior Department agree with that?

Mr. SLAIBY. The Interior Department agrees with that, but wants to see the mechanical efficient—the mechanical skimming agree with the worst case discharge number.

Senator SNOWE. Speaking of dispersants, that was the other dimension to the *Deepwater Horizon*. There, the use of dispersants was unprecedented in terms of amount, and obviously we're still learning about the effects and the impact on sea life. We know that, ironically, the dispersants that were used in the Gulf became more toxic to some sea life after they had been mixed with oil.

I understand that you completed a \$2.5 million 2-year study in collaboration with the University of Alaska at Fairbanks to look at the impact of dispersant use on marine life and living sources. You've tested those in cold water, both in the ocean and the Ohmsett test facility, in collaboration with the Bureau of Ocean Energy Management Regulation and Enforcement.

What differences do you see in the impact of dispersants in the cold waters where you tested and the Gulf of Mexico?

Mr. SLAIBY. Well, Senator, I'm not familiar with all the details on exactly what the differences are. I know that the study that we are doing right now in Barrow, Alaska, actually, has not been completed, but the results have been encouraging with respect to the preservation of biota and the ability to actually make an impact over there. There are bacteria that will eat the oil.

Senator SNOWE. Will there be further reports on the results of this study?

Mr. SLAIBY. The study will have to be peer reviewed and then it will be released, I suspect by the end of the year.

Senator SNOWE. Thank you.

Thank you, Mr. Chairman.

Senator BEGICH. Thank you very much. We'll probably have a couple more back and forths here, but, Mr. Slaiby, let me ask you a couple for the record so we understand the differences. The depths that you'll be exploring in will be what? How deep of water will you be in?

Mr. SLAIBY. Senator, it will be in about 140 feet to about 120 feet of water.

Senator BEGICH. What is the pressure per square inch compared to the Gulf? I know in the Gulf it was a couple thousand, if I remember. I can't remember it exactly. The depths were 5,000.

What's the pressure that you'll be dealing with or you think you'll be dealing with?

Mr. SLAIBY. We actually have a pretty good idea because we have drilled wells here.

Senator BEGICH. Right, in the early 80s, right?

Mr. SLAIBY. In the 80s and 90s.

Senator BEGICH. Right.

Mr. SLAIBY. So we believe we've got a very good handle on the pressures. They'll be about a third of the pressure that we saw on the BP *Deepwater Horizon*, anywhere from 5 to 7,000 pounds.

Senator BEGICH. You had noted, and I knew you had done this, that you had done drilling in the 80s and 90s, exploratory wells. Would it be fair to say when you did those wells to where we are today the scientific knowledge for cleanup and other activity and just the technology has advanced somewhat?

Mr. SLAIBY. Senator, I would say more than somewhat. I mean, clearly the drilling technology is vastly improved. I think cleanup technology and actually well control technology were able to be—were improved last year in the *Deepwater Horizon* incident. We will be deploying a capping system that will be in the theater when we start. We're also deploying and started contracting for a containment system. So these are huge advances and really work to our benefit of keeping the oil on the scene.

Senator BEGICH. And blowout preventers, how does that work in your business?

Mr. SLAIBY. We have very simple wells, so we are able to put—and I know that everybody became a drilling engineer last summer.

Senator BEGICH. 308 million engineers now.

Mr. SLAIBY. It's quite impressive.

But we have gone to using a weekly inspection—weekly testing, excuse me, of the BOPs, functional testing. We're also putting in two of the shearing rams in our BOP. Because these are very simple wells, we're able to do that.

The one other thing I might add is, even if the BOP were to become inoperable, there will be, because of the lower pressures of these wells, enough drilling fluid in that well to control the outflow. A very different situation than in deepwater Gulf of Mexico.

Senator BEGICH. And access to the well, because it's obviously a lot more shallow, is—robotics were used in the deep water. What is used here if you have to get to the well? Is it a combination?

Mr. SLAIBY. We could use divers, we could use remote-operated vehicles.

Senator BEGICH. So people could actually be down there?

Mr. SLAIBY. People would be. This would be within the range. We will probably use—we'll have divers, but we would—our first recourse would be the remote-operated vehicles.

Senator BEGICH. Remote operation.

Again, thank you for that. You heard my question to Admiral Papp. I will say this as an Alaskan. Any time we think of oil and gas, we get sued. You don't have to do anything. But the standards I think are much higher because of that in a lot of ways, because of the process you go through. The review is much higher.

Is the statement that I made—I know Admiral Papp responded to it, and that is, you're not going to be able to drill there unless

you have a plan that's going to take the worst case scenario, as well as other conditions that are around your efforts, as well as other efforts; is that fair to say?

Mr. SLAIBY. It's clear to say from a number of different fronts. Shell would not be working in the Arctic had we believed that there was something, an event that we could not control. We simply would not be there. I believe we have the best oil spill response plan anywhere in the world.

Senator BEGICH. Very good.

Dr. Borgerson, let me go to the broader sense. And I appreciate you had kind of a shopping list of things that could be done. We've taken a little time here on oil and gas, but there are other opportunities in the Arctic. You had made the note, how do you balance this between kind of both extremes, lockup or let anything happen everywhere.

How do you get to that balance when you're talking about oil and gas or you're talking about potential mineral, fisheries, tourism, shipping opportunities? It's a wide range. Can you give me kind of a sense, how you think there's an ability to get to a balance here? I believe there is because it is a unique frontier of development, but we have to protect the unique environment up there. Give me a little bit more thought, if you could? I know you have some in your written testimony, but if you could.

Dr. BORGERSON. Of course, the devil is in the details there, and this town is great at compromise and balance, this week in particular.

Senator BEGICH. I'm not sure if you were going to say there are a lot more devils around for a second there.

Dr. BORGERSON. Maybe true.

I think the key is getting all the stakeholders in at the beginning and not just sort of paying lip service or rhetoric to one side or the other, but trying to get sort of reasonable Alaskans and non-Alaskans around the table buying into the process, buying into the effort. Some of the environmentalists that I know are at Anchorage and have Alaska in their portfolio. I sort of approached them informally with this sort of concept before coming down here, and they were sort of: Wow. The notion of being brought to the table to help shape the guidelines in a very collaborative way I think was very appealing to them.

I think it should be more than, of course, just the environmental side versus industry. I think in particular local indigenous communities have a huge voice to play here, and I know they want to be heard. So whether it's a commission—I've heard some ideas in Juneau about infrastructure banks or other kinds of ways to facilitate both the investment and the dialogue around those things. My sense is to sort of get the various stakeholders around the same table, rolling up their sleeves, try and strike the right balance, and then getting out of the way and letting progress proceed.

Senator BEGICH. Very good. Let me stop there and see if Senator Snowe has some additional questions. Then I have one and I'm going to talk about deepwater ports in my next questions.

Senator SNOWE. Dr. Borgerson, you heard earlier this morning and obviously are very familiar with the fact that other than one medium icebreaker, that we virtually have no capacity in that re-

gard, and it's going to take quite some time before we can obtain additional capacity. There was some discussion actually yesterday in the House Committee on Transportation and Infrastructure about the whole idea of leasing icebreakers.

You wrote an article in the *Huffington Post* in 2008 saying that leasing icebreakers outsources our sovereignty. What are your concerns with leasing?

Dr. BORGERSON. I think that op-ed in the *Huffington Post* was reprinted from the *New York Times*. But if we want to be an Arctic power, just like in the world's other oceans off our other coasts, we can't essentially lease foreign icebreakers and put our flag on the back and pretend somehow we're the world's naval power, which we are. If you look at how much we spend on our Navy and the size of the Navy vis-à-vis the other countries, we dwarf them in naval capacity.

The Coast Guard is not blameless here, by the way. In some ways, the Coast Guard sold icebreakers out for the deepwater program to recapitalize its other assets. There's a lot of blame to go around for why the country finds itself in this position.

The reality is we've got sort of one and a half, however you count, of tired icebreakers, and you've heard, even if the Senate or the Congress were to allocate dollars today, they likely wouldn't be launched until years after the Arctic is seasonally ice free and, depending what scientists you talk to, maybe even longer than that.

So we're stuck. There has to be a bandaid solution, I suppose, in trying to bridge the gap here. But I think it's just unacceptable for a number of reasons beyond oil spill response, but search and rescue, projecting sovereignty, regulating shipping, and the other sort of things that the Coast Guard and Navy do on all of our coasts and around the world's oceans are true in the Arctic Ocean as they are elsewhere.

Senator SNOWE. I don't disagree with the concerns that you raise. Obviously, we want to have our own icebreakers. But how do you envision that the Coast Guard fills this gap in the meantime? It's going to be a long-standing gap, obviously, and based on the High Latitude Study it would indicate that the capacity needs to be six heavy and four medium basically. That's a dramatic gap, considering where we stand today.

I understand about the *Deepwater* acquisition issue. I lived the whole saga, unfortunately, having many concerns about that--how it came about and what happened. But we were starting basically from a very difficult position in terms of what needs to be done, and then of course all the contractual problems that emerged as a result. So that set back the program, not to mention the appropriations process, all in combination. So I understand what you're saying.

So how do you think the Coast Guard should respond, and-or the Navy, for that matter?

Dr. BORGERSON. Well, the Navy is in even worse shape than the Coast Guard. Its surface vessels are not, as I understand it, capable of sailing in water that's filled with ice. So submarines are a whole other bag. So take those off the table.

It depends on who you ask on time. I'm a bit of a skeptic here and I'll hedge and say I think 10 years is optimistic. I think you're

talking 15 to 20 maybe, in between. Some of the climate scientists I talk to, just as a footnote to that, think we could be ice-free in summer in the next 5 years, maybe 10. All the models have been overly conservative.

So the proposals I've heard are you have to look to foreign-built ships—this speaks to the Jones Act a bit—or beginning to build U.S. vessels for this purpose, have them essentially be civilian-crewed, maybe put a Coast Guard officer as a shipwrighter on board, where he could exercise sort of classic boarding officer authorities and that kind of thing. But they would not be taxpayer-built or operated vessels. They would have to be built in foreign yards, or built here—and I've seen some proposals of what those ships might look like, but they couldn't be sort of a full Coast Guard contingent. It would just be sort of an outsourced type thing, as an interim fix.

The danger of those interim fixes is they can become permanent. So in this fiscal environment it can be easy to say, oh, that's working, etcetera, and not build the icebreakers and just sort of prolong what I think is a non-optimal situation.

Senator SNOWE. So at the very least, we ought to be pursuing aggressively the icebreaking capacity.

Dr. BORGERSON. We should have been building icebreakers—

Senator SNOWE. Your concern is that the last thing we ought to do is turn to other countries for building ships. We ought to be able to do that here.

Dr. BORGERSON. 5 years ago we should have started building, laying steel for these replacement ships.

Senator SNOWE. Absolutely. And there's a host of problems as to why in terms of what happened here in the appropriations process, given the lead time and how much money you give in which years above and beyond everything else. There was a lack of capitalization for this project.

And you had a Coast Guard dealing with 50-year-old ships, in some cases 60. It was horrific, given the environment they're generally working under. Not exactly a calm environment. They're generally in stressful situations and that's why they do what they do.

In any event, it's remarkable. Think about Hurricane Katrina. That's a good example. They were doing, with some very aged aircraft and ships, remarkable things. So you could say, well, we ought to put Members of Congress in that equipment, and maybe they would think very quickly and very differently.

Dr. BORGERSON. Just a footnote to that. I was a Coast Guard patrol boat captain in 2001. Driving ships in hurricanes that were built for Vietnam rivers is sobering.

Senator BEGICH. Good to see you here.

Senator SNOWE. Yes, right.

[Laughter.]

Senator BEGICH. Thank you.

Senator SNOWE. Well, thank you.

Senator BEGICH. Thank you very much.

Let me ask, Dr. Metzger or whoever might feel comfortable answering this, in regards to—again, in the last panel I asked about a deepwater port and the capacity, and there was some discussion of Nome, but distance and so forth. Some have approached me and

talked about an idea of a freestanding deepwater port in federal waters. I'm not an engineer. I don't claim to be one. I don't want to be one, no disrespect. It's a lot of work in figuring out how that all will work in the Arctic.

But is there any credibility to that kind of thinking, that there is—we're going to need a deepwater port, because these ships—correct me if I'm wrong—the ships you're building, they're 300-plus feet long. These are deep. I don't know what the draft is, probably 40 feet or more. So these are huge ships and will be bigger, is my bet, based on what's going to happen up there.

Does that make sense, to do a deepwater port in those federal waters, and maybe it's a freestanding? When I say freestanding, an anchored port.

Dr. METZGER. Yes, yes, it does. That is a model that would keep you away from having to dredge so far out to sea because it's so shallow. A fixed structure, fixed permanently, permanently built structure, that's one option.

There are also ideas that some people on my side have been kicking around, seasonally deployed facilities, a floating facility that can be taken out and moved away, stored, so to speak, for when the ice is in. So yes, there are definitely possibilities for having—moving the facility, mooring facility, port facility, further offshore to avoid dredging.

Senator BEGICH. Very good.

Mr. Slaiby, I'm not going to get into the coastal zone management issue of the state of Alaska and the lack that they have one there, but I will put that on the record. Without that, it creates some problems for a deepwater port development in Federal waters, but that's another battle, not for you to take on, but one that I need to deal with with the Governor and the state.

But I'm assuming as you see the future, if we can step, and actually for Dr. Borgerson, too, as you see the future of development, yours specifically in oil and gas and maybe yours in kind of a broader sense, the need for that deepwater port, at least from my perspective—and I'm asking if this makes sense, again—is multifaceted. It is oil spill servicing, it is oil and gas servicing, it is servicing for those in rescue potential, Coast Guard capacity, and dependent on defense needs, because I think that is becoming—NORAD I know is now reexamining their role, as we heard briefly here—that if there is a port, it could be multi-functional, as long as we think long term.

Whoever wants to answer that first.

Mr. SLAIBY. I can start maybe on the first part. I do believe that a port offshore can be designed to withstand ice conditions. Senator, you grew up looking at it in the Cook Inlet. Those platforms have been out there for over 40, 45 years.

Senator BEGICH. Yes.

Mr. SLAIBY. The second point I would make is that there does need to be a solution that incorporates the stakeholders. I've—we've spent about 400 trips into the North Slope Borough talking with different stakeholders. Huge issues about how that port is located, where it sits, who it sits with. It's one that really needs to incorporate the federal government, state government, local governments, and industry, which bridges to the third point.

I'm very, very content that we can do what we need to do in our exploration plan, including servicing oil spill response, with the assets we have in place. For longer term, yes, I do think it would be very helpful for servicing platforms on prolonged periods of time and the other industries and infrastructure needed to support that.

Senator BEGICH. Very good.

Dr. Borgerson.

Dr. BORGERSON. I always think of Singapore when this issue comes up. It also sits on an important strategic choke point linking oceans. Once a sleepy town with not much infrastructure, now the world's largest seaport. Could Alaska 1 day host a future Arctic Singapore? It's sort of interesting to think about.

Should the—I'm not sure what the exact candidate or port should be. I've heard different ports mentioned. Adak has got a lot of facilities there. I know there's a number of candidates in the running for who might get that port. To me, though, maybe more importantly is the model. I think a public-private model makes perfect sense up there, to share the cost, to be force multipliers on the resources there, and that there should be—there are models in the Lower 48 for how that might work with various port authorities, of how you might sort of leverage private capital, industry, along with the need for, we've heard, a regional Coast Guard base, not just regional traffic, but also some of the inter-ocean traffic that Admiral Papp spoke to you about as well.

Senator BEGICH. I think you got to my next question, which was can it be a public-private partnership. My sense is yes, because you're starting really from scratch. So you don't have necessarily port jurisdictional issues. You have interested communities right now, but none of them have ports of this potential magnitude if you design it—you can design a quick port, maybe service a few industry folks.

But I guess my vision is that this goes to where you just talked about, that it has a much larger capacity, if we do this right and think about not just the next 10 or 15 years, but the next 50 years, of how do we service what could be going on up there as long as we can engineer it right. There is probably something that will be needed, no matter who's transporting what.

Dr. BORGERSON. I couldn't agree more. It's really, from sort of a planning point of view, an exciting opportunity to have a greenfield in which to do it right from scratch. If you look at L.A.-Long Beach, which has a lot of urban issues around it, or Port Authority of New York-New Jersey, obviously, interesting geography. The Bayonne Bridge has essentially limited how much the Port of New York can grow, and there were parochial interests that dictated the height of that bridge and now New York is not built to be the port of the future with that sort of limitation.

I think definitely, as far as I understand it, the private-public model and sort of doing it with the strategic long view in mind is the way to go in the Arctic.

Senator BEGICH. Let me thank the panel very much for being here today. Your written testimony is all part of the record. We'll keep the record open for 2 weeks. I know there are some other questions that I have that I'll just submit for your response.

But again, thank you. This is very enlightening, both of the panels. The Arctic is an incredible last frontier for all of us and the question is how do we manage it for all the economic opportunities and make sure it works for the environment that it's in.

Thank you all very much. This hearing is adjourned.

[Whereupon, at 12:31 p.m., the hearing was adjourned.]

## A P P E N D I X

PREPARED STATEMENT OF JANE LUBCHENCO, PH.D., UNDER SECRETARY OF COMMERCE FOR OCEANS AND ATMOSPHERE, AND ADMINISTRATOR, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, U.S. DEPARTMENT OF COMMERCE

Chairman Begich, Ranking Member Snowe, and distinguished members of the Subcommittee, thank you for the opportunity to submit testimony on U.S. strategies to address Arctic issues and to highlight some of the actions NOAA is taking to address Arctic issues. My name is Jane Lubchenco, Under Secretary of Commerce for Oceans and Atmosphere and the Administrator of the National Oceanic and Atmospheric Administration (NOAA). On behalf of NOAA, I would like to thank the Committee for its continued attention to the issues associated with a changing Arctic and the myriad impacts to its people and the ecosystems on which they depend. I would also like to recognize Chairman Begich and the other Members of this committee for their leadership and support on Arctic issues, including the Arctic-related legislation that you are working to advance in this Congress.

I will now describe some of the actions NOAA is taking to address Arctic issues. This hearing puts a well-deserved spotlight on emerging Arctic opportunities and challenges, and the Federal Government's role in helping the United States to take advantage of those opportunities. The Administration is currently working to implement the January 2009 Directive (*National Security Presidential Directive 66/Homeland Security Presidential Directive 25*) on Arctic Policy, the July 2010 Presidential Memorandum on arctic research policy, which reinvigorates interagency research coordination in the Arctic, and the July 2010 National Ocean Policy's recognition of the Arctic as an area of special emphasis. Adopted by the President via Executive Order 13547 on July 19, 2010, the National Ocean Policy calls for "better ways to conserve, protect, and sustainably manage Arctic coastal and ocean resources . . . new collaborations and partnerships to better monitor and assess environmental conditions . . . [and] improvement of the scientific understanding of the Arctic system and how it is changing in response to climate-induced and other changes." On July 12, 2011, the President issued Executive Order 13580 to establish an Interagency Working Group on Coordination of Domestic Energy Development and Permitting in Alaska. The purpose of this working group is to coordinate the efforts of Federal agencies responsible for overseeing the safe and responsible development of onshore and offshore energy resources and associated infrastructure in Alaska and the U.S. Arctic Outer Continental Shelf (OCS).

As you know, there is now widespread evidence of climate change in the Arctic region, most dramatically observed in loss of sea ice. In four of the last 5 years, we have witnessed the lowest sea ice extents on record, as well as a 35 percent decrease in thicker multi-year sea ice. Shifts are evident in ocean ecosystems from the Aleutian Islands to Barrow, and across the Arctic Ocean, due to a combination of Arctic warming, natural variability, and sensitivity to changing sea ice conditions.

As sea ice retreats and the Arctic becomes more accessible, cascading needs for information, readiness, response, and assistance are created. NOAA is receiving increasing requests for timely weather forecasts and disaster warnings, improved seasonal and long-range forecasts of sea ice and other conditions, more comprehensive and current navigation charts, tide tables, and elevation data, improved oceanographic information, and more baseline data on protected species and ecosystems. The maritime community is anticipating a future open Arctic trade route and is concerned about accurate navigation charts, weather and disaster forecasts and emergency response capacity. The fossil fuel industry is seeking permitting approvals for oil and gas exploration in the Chukchi and Beaufort Seas for 2012, with increasing information needs concerning potential impacts, behavior of oil in frigid waters, and appropriate response capacity.

Economic drivers can also threaten marine and coastal ecosystems as well as Arctic inhabitants already affected by the rapidly changing climate. Native coastal communities are requesting assistance in relocating entire villages or burial grounds, information about likely changes in whales, seals and fish, and more accurate

weather and oceanographic conditions. They are faced with changing precipitation patterns, later freezing and earlier thawing of snow and ice, damaging storm surge with loss of the sea ice barrier protecting homes and businesses on the coast, and changing sea level. Furthermore, changes in the Arctic may affect climate and the functioning of ecosystems around the globe, so changes in the region affect us all. Climate changes already apparent in the Arctic may portend future changes in global climatic conditions.

As the United States begins to confront these Arctic challenges, it is evident that understanding and effectively managing the changing ecosystems, expectations, and opportunities in the Arctic requires a solid foundation of ecological and socio-economic information. Yet despite the wealth of traditional ecological knowledge, exploration, and research to date, even the most basic data are lacking. Interagency and stakeholder dialogues, such as the ongoing interactions in conjunction with developing the National Ocean Policy's Arctic Strategic Action Plan, continually underscore this point: Federal agencies need accurate information about human and environmental conditions in the region in order to comprehensively manage the various U.S. Arctic interests and support effective stewardship and investment decisions.

NOAA recognizes that a strategic approach leveraging our strengths and those of our sister agencies with Arctic-relevant missions is essential if the United States is to take advantage of emerging economic opportunities there without causing irreparable harm to this fragile region. As the uses of the Arctic environment evolve, NOAA believes it is important that decisions and actions related to conservation, management, and use are based on sound science and support healthy, productive, and resilient communities and ecosystems. We seek to better understand and predict changes there. We recognize that because the region has been relatively inaccessible, and without widespread need for such information, the Arctic is deficient in many of the science, service and stewardship capabilities that NOAA provides to the rest of the Nation.

To facilitate internal and external coordination on Arctic requirements, NOAA has developed a comprehensive Arctic strategy that integrates and aligns our numerous and diverse capabilities within the broader context of our Nation's Arctic policies and research goals, and supports the efforts of our international, Federal, state and local partners and stakeholders. NOAA's Arctic Vision and Strategy (available at [http://www.arctic.noaa.gov/docs/arctic\\_strat\\_2010.pdf](http://www.arctic.noaa.gov/docs/arctic_strat_2010.pdf)) has six priority goals, derived directly from stakeholder requirements:

- (1) Forecast Changes in Sea Ice
- (2) Strengthen Foundational Science to Understand and Detect Arctic Climate and Ecosystem Changes
- (3) Improve Weather and Water Forecasts and Warnings
- (4) Enhance International and National Partnerships
- (5) Improve Stewardship and Management of Arctic Ocean and Coastal Resources
- (6) Advance Resilient and Healthy Arctic Communities and Economies

These goals were selected because they represent areas where NOAA has the expertise to address emergent Arctic issues that meet two key criteria: providing the information, knowledge, and policies to meet NOAA mandates and stewardship responsibilities; and providing the information, knowledge, and services to enable others to live and operate safely in the Arctic. We also believe that these are the highest priority areas where NOAA can have an impact on environmental and economic sustainability in the Arctic.

Within NOAA's existing capacity for Arctic action, we have had some modest successes in implementing our strategic goals. On sea ice, for example, NOAA and its partners, including the U.S. Army Corps of Engineers Cold Regions Research and Engineering Laboratory, issued the 2010 and 2011 Arctic Report Cards, showing summer sea ice extent well below 1990s levels with sea ice thinning, older sea ice disappearing, and ocean temperatures warming. The loss of sea ice affects marine access, regional weather, ecosystem changes, and coastal communities. As ice cover diminishes, marine food webs are expected to dramatically shift from seafloor-dominant systems that favor species such as crabs to water column-dominant systems that favor commercial fish species such as pollock. The understanding of ice as a habitat also has implications for oil spill response and damage assessment. As the Arctic Ocean becomes seasonally passable and tourism, oil and gas exploration, and shipping increase, floating sea ice and changing marine weather will present a major threat to maritime safety and increase the potential for oil spills from vessel traffic in the region. Sea ice also has significant implications for effective oil spill response and assessment.

NOAA currently conducts operational sea ice analysis and forecasts, evaluating sea ice projections through Intergovernmental Panel on Climate Change climate models, conducting and analyzing along with NASA, satellite and airborne observations of sea ice freeboard or thickness, improving satellite image analyses, and contributing to the international Arctic buoy program. NOAA's National Weather Service has a sea ice desk at the Anchorage Weather Forecast Office, which provides operational sea ice forecasting in Alaska. NOAA's National Environmental, Satellite, Data, and Information Service partners with the Navy and Coast Guard to maintain the National Ice Center in Suitland, Maryland, which provides operational analyses and forecasts of sea ice conditions and hazards in the Arctic and collaborates with the National Weather Service sea ice desk to provide Alaska products 5 days a week. NOAA also supports the National Snow and Ice Data Center, along with NASA and NSF, within the Cooperative Institute for Research in Environmental Sciences at the University of Colorado, where a vast array of Arctic data are stewarded and made available to both academic and public users.

NOAA's National Weather Service delivers marine weather forecast services to protect life and property, enhance the economy and fulfill U.S. obligations under international treaties for the safety and security of marine transportation, energy (oil and gas) exploration, and tourism activities, and to protect northern and western Alaska coastal communities from storm surge and other inundation hazards. Major stakeholders and partners, including the U.S. Coast Guard and the State of Alaska Division of Homeland Security and Emergency Management, require more useful weather and water information for planning and decisionmaking to protect lives, property, and manage the region's many resources. Arctic populations rely heavily on aviation and marine weather for safe transportation and access to goods and services.

The Arctic region has very little of the information infrastructure needed to provide weather forecast and warning services of a caliber comparable to mid-latitudes. A primary reason for this discrepancy is the relative coarseness of observation fields to support meteorological and oceanographic modeling and environmental observations and studies supporting weather and ice forecasts highly limited in both geographic scope and frequency. The Arctic region also presents unique numerical modeling challenges with respect to the dynamic coupled interaction of the ocean, sea ice and atmospheric processes both in near-term and long-term prediction scales. For example, there is inadequate real-time meteorological data in U.S. Arctic waters to support accurate forecasting of ocean storms, which have the potential to threaten marine transportation, offshore oil and gas operations, and the Arctic coastal communities. The November 2009 failure of NASA's QuikSCAT satellite scatterometer to continue providing ocean surface wind speed and direction and sea ice thickness estimates after more than a decade of operation, the need for continued access to synthetic aperture radar (SAR) data, and the potential for a gap in satellite coverage in 2016–2017 due to the impacts of reduced funding in Fiscal Year (FY) 2011 for our next polar-orbiting satellite, the Joint Polar Satellite System (JPSS), pose challenges to Arctic weather and sea ice services capability. JPSS will contain the replacement for the NASA MODIS instrument, which is a critical tool for mapping sea ice and studying other Arctic features, currently in operation on NASA's Terra and Aqua satellites, which have already exceeded their expected lifetime.

In data-sparse areas like Alaska, polar-satellite data is critical to weather forecasting. Light aircraft aviation is a \$400 million a year industry in Alaska and since many Alaskan communities are not accessible by roads, residents often rely on aircraft as a primary mode of transportation. Furthermore, since geostationary satellite coverage is not available in large areas of the Arctic, NOAA's Search and Rescue beacon program (SARSAT) relies heavily on polar-orbiting satellites to receive signals from distressed mariners and aircraft personnel. NOAA did not receive the full \$1.060 billion requested in the President's FY 2011 budget, which was needed to meet the planned launch date for JPSS to maintain continuity of observations. As a result, NOAA could face a data gap in the U.S. civilian polar orbit, on which both civilian and military users rely, beginning in 2016. This information is critical in real-time forecasting and warning of events such as rapid sea ice formation, river ice jams, and storms carrying hurricane force winds that are major hazards for life, property, and economic activities in the Arctic. Losing this critical piece of national infrastructure at the time when Arctic development is expected to ramp up could significantly hamper our Nation's ability to protect U.S. assets in this region.

Improved sea ice and marine weather forecasting would assist the energy, maritime shipping and transportation industries, which use operational and seasonal forecasts for safety and resource exploration. Improvements in the sea ice and weather services that NOAA is currently able to provide, particularly model resolu-

tion and forecast frequency, and the integration of different types of observations (including sea ice characteristics and indigenous knowledge) into the forecasts would enhance our understanding of the Arctic environment. Accurate forecasts and models depend on the ability of NOAA and its partners to deploy a variety of sensing devices—from buoys to airborne and satellite sensors. NOAA's goal is to provide accurate, quantitative, daily-to-decadal sea ice projections to support infrastructure planning, economic development and ecosystem stewardship.

These changes in climate and sea ice are also driving changes in marine ecosystems (including species abundance and composition) in ways not yet fully understood. Biophysical and chemical changes in the ocean, combined with increasing human uses will impact the Bering, Chukchi, and Beaufort Seas. Currently, commercial harvest of groundfish, shellfish, salmon and other resources, primarily in the Bering Sea, constitute almost 50 percent of marine fish landings in the United States. Further, these same resources, plus various species of marine mammals, seabirds, and other marine life are critical to the maintenance of the subsistence lifestyle of over 40,000 indigenous people who inhabit small towns and villages on Alaska's Arctic coastline. Broad-scale biological observations are needed to understand how a changing climate and environment will impact the food web and other aspects of the ocean ecosystem, and help NOAA evaluate the impacts of man-made changes to the equation, such as permitting new drilling activity. However, NOAA's current climate modeling capacity is too gross to meet user needs for regional and local scales, and the uncertainties are large. Similarly, it is beyond the scope of existing ecosystem models to provide reliable indications of how loss of sea ice and increasing ocean temperatures will impact key species such as pollock, cod, salmon, and crab, as well as ice seal species and Arctic cetaceans (*e.g.*, bowhead, gray, humpback, and beluga whales). NOAA has also worked closely with its international partners for decades to monitor changes in atmospheric composition, for which the changing arctic is anticipated to have significant influence in the future.

To support these foundational science needs, NOAA is striving on many fronts to improve baseline observations and understanding of Arctic climate and ecosystems in order to reduce the uncertainty in assessing and predicting impacts caused by a changing Arctic. For example, NOAA is conducting ocean acidification experiments on pollock and king crab, process studies on Steller sea lions and fur seals, and cooperative studies with Department of Interior's Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) on bowhead whales. NOAA also continues monitoring of atmospheric levels at coastal Arctic observatories in partnership with other agencies and nations. All of this work is heavily dependent on in situ and remote sensing observations of the ocean and atmosphere, shipboard sampling, and long-term, community-based research on marine species. Due to the interconnected nature of Arctic ecosystems, the United States will need to continue to improve collaboration and engagement with other Arctic nations through international mechanisms, such as the Arctic Council and our bilateral relationships, to better understand, observe, research, and manage Arctic resources. This includes joint efforts such as working with Russia for elements of a distributed biological observatory. The 2011 cruise for the Russian-American Long-term Census of the Arctic (RUSALCA) to sample and deploy instruments in U.S. and Russian territorial waters has just ended. Stemming from a 2003 Memorandum of Understanding for World Ocean and Polar Regions Studies between NOAA and the Russian Academy of Sciences, this annual three-week RUSALCA cruise collects biological, geological, chemical and physical oceanographic samples to benchmark Arctic conditions and contribute to foundational Arctic science.

NOAA also provides leadership and resources to support Arctic governance and science organizations. Specifically, NOAA continues to support the Arctic Council and its working groups, which monitor and assess biodiversity, climate, and the health of humans and ecosystems, and contribute to international approaches to oil spill response, ecosystem and protected area management, as well as management of shipping. Coordination across Federal entities, such as that provided by the Inter-agency Arctic Research Policy Committee and the Committee on the Marine Transportation System's Arctic Integrated Action Team, are also essential to implement overarching U.S. Arctic Policy goals, particularly those identified by the U.S. Arctic Region Policy (NSPD 66/HSPD 25) and the National Ocean Policy. NOAA's partnerships with Alaska Native Organizations to co-manage marine mammals continue as important collaborations for stewardship of protected species.

In May 2011, I signed a Memorandum of Understanding between NOAA and BOEMRE to ensure effective scientific and regulatory cooperation on OCS energy exploration and development. This agreement is intended to facilitate development of baseline observations and environmental studies needed to assess Arctic drilling. Leveraging relationships such as this to build sustained observations will enable re-

searchers to study the effects of oil and gas exploration, sea ice loss, ocean acidification, and sea surface temperature warming on Arctic ecosystems over time. This information will also inform NOAA's ecosystem stewardship, private sector economic development, and Coast Guard and Navy missions.

Currently, Alaska has limited geospatial infrastructure; sparse tide, current, and water-level prediction coverage; obsolete shoreline and hydrographic data; poor nautical charts; and inadequate oil-spill response capacity. Most Arctic waters that are charted were surveyed with obsolete technology, some dating back to the 1800s, before the region was part of the United States. Most of the shoreline along Alaska's northern and western coasts has not been mapped since 1960, if ever, and confidence in the region's nautical charts is low. NOAA's navigation services provide baseline scientific data, such as hydrography, shoreline mapping, oceanography, tides, currents, positioning and geodesy, that benefits not only navigation, but also supports more informed decisions for other economic development and resource management processes. The establishment of an adequate geospatial infrastructure would help inform Arctic management and policy decisions that seek to balance economic development with ecosystem protection and cultural heritage. The National Ocean Policy includes an emphasis on the Arctic among its priority objectives and a Strategic Action Plan on *Changing Conditions in the Arctic*, which addresses these topics, is under development.

NOAA has made some progress in support of safe marine transportation, coastal resilience and oil spill response readiness, including finalizing an Arctic Nautical Charting Plan after consideration of stakeholder input. This plan provides a detailed scheme for additional nautical chart coverage in U.S. Arctic waters and describes the activities necessary to produce and maintain the charts for safe navigation. NOAA continues its Arctic hydrographic survey effort in FY 2011 with the Survey Vessel *Fairweather* currently up near Kotzebue, to update nautical charts for navigation and support the safe installation of an offshore lightering facility for fuel oil. Since 2007, we have acquired approximately 2,100 square nautical miles of hydrographic data with modern survey methods (multibeam sonar) in the Arctic as defined by the Arctic Research and Policy Act of 1984. This includes about 726 square nautical miles for survey work done in 2009 to survey the Pribilof Canyon. The U.S. EEZ in the Arctic encompasses 568,000 square nautical miles, about a third of which is considered navigationally significant, and most of which was surveyed with obsolete technology dating back to the 1800s. Thirty eight thousand square nautical miles of navigationally significant area have been identified as highest priority for survey. Building on this need for modern survey data, NOAA worked in its role as U.S. representative to the International Hydrographic Organization to establish an Arctic Regional Hydrographic Commission with other Arctic member states in 2010 for international collaboration on hydrographic surveying, nautical charting, and other mapping activities.

In addition, NOAA is building on existing partnerships to acquire gravity data in Alaska so that by the end of FY 2012 most of the state will be covered. This project, Gravity for the Redefinition of the American Vertical Datum, will vastly improve elevation measurements by correcting meters-level positioning errors to two-centimeter accuracy, which will help coastal communities and the private sector to develop climate change adaptation strategies and make decisions on infrastructure hardening, erosion and flood controls. Based on State of Alaska Immediate Action Working Group identified priority areas, NOAA also deployed seven short term tide stations to support surveying and update tide predictions, as well as for NOAA's Vertical Datum Transformation Tool, which links bathymetry to topography to enable the development of inundation and erosion models. NOAA is now evaluating the technology and strategies needed for long-term monitoring of tides, water levels, and currents under harsh Arctic conditions. Finally, collaboration with Canada continues on joint seafloor mapping missions to help define the limits of the extended continental shelf in the Arctic per criteria set forth in Article 76 of the Law of the Sea Convention. An expedition is occurring now to map the seafloor using multibeam sonar, image the underlying sediment layers, collect dredge samples and gravity data, and conduct under-ice Autonomous Underwater Vehicle operations. The U.S. could significantly advance our economic interests in the Arctic with respect to extended continental shelf and other activities by joining the Convention.

NOAA can also support the spill response capacity of industry and Coast Guard first responders and other Arctic stakeholders, including coastal communities, Alaska Native villages, and the State of Alaska by building the same interactive online mapping tool for the Arctic as was used during the Gulf spill response. More commonly known in the responder world as the Environmental Response Management Application, or ERMA, this powerful tool is a web-based Geographic Information System tool designed to assist both emergency responders and environmental re-

source managers who deal with incidents that may adversely impact the environment. The data within ERMA also assist in resource management decisions regarding hazardous waste site evaluations and restoration planning. ERMA also includes human use and human dimension data components and, for the Arctic, would include sea-ice conditions. Federal, state and tribal governments will be able to use this information and the ERMA interface not only to address oil spill planning and response, but also to assess sea-ice and shoreline erosion information. It is NOAA's hope to bring this technology online sometime next year. We also know that ERMA is only as good as the information within it, so the sharing of new datasets among agencies, the state, academia and the private sector to improve the platform is essential.

In conclusion, NOAA is striving to bring its diverse capabilities to bear on the cultural, environmental, economic, and national security issues emerging as a result of changes in the Arctic. The breadth and complexity of these impacts require a concerted, systematic and rapid effort with partners from international to local levels. NOAA's scientific capabilities are being deployed to increase understanding of climate and other key environmental trends, to predict the ecosystem response to those trends, and to offer the technical expertise needed to develop policy options and management strategies for mitigation and adaptation to the environmental challenges in the Arctic region. NOAA's service capabilities are supporting safety and security needs for fishing, marine mammal protection, marine and other modes of transportation, energy, infrastructure, and mineral exploration in the unique Arctic environment. The choices we make today will have pivotal impacts on the future state of the Arctic. There is a great deal of work to be done, and NOAA, in collaboration with our partners, is committed to strengthening Arctic science and stewardship, and providing the information, products, and services needed by our Arctic stakeholders. Key to enhancing these efforts will be the coordinated implementation of the National Ocean Policy's Arctic Strategic Action Plan.

Thank you again for the opportunity to present NOAA's role in the Arctic. We appreciate your leadership and the time and attention the Subcommittee is devoting to this important issue, and look forward to working with you in future.

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PREPARED STATEMENT OF FRAN ULMER, CHAIR,  
U.S. ARCTIC RESEARCH COMMISSION (USARC)

Mr. Chairman and members of the Subcommittee, thank you for the opportunity to offer comments on this important topic. As you know, Federal, state and local governments, as well as private industry and non-profit organizations, are in the process of creating strategies to economically and sustainably develop the Arctic. It is important to support scientific research in the Arctic in order to implement informed policy that capitalizes on economic opportunities as well as implements environmental protections to ensure social and economic viability for future generations in the Arctic.

My name is Fran Ulmer, and I was recently appointed Chair of the U.S. Arctic Research Commission (USARC).<sup>1</sup> My testimony represents the view of USARC, an advisory body to the President and to Congress. The Commission formulates its positions independently in public meetings and publishes these in reports, referred to below.

The Arctic Ocean is increasingly accessible, and transformational economic opportunities are emerging. Opportunities include oil and gas exploration and development, tourism, and commercial shipping. Ice coverage is shrinking in the Arctic, and shipping lanes are relatively ice-free during the summer for longer periods than in the past.

Climate change is easily observable in the Arctic: consistently warmer temperatures, thawing permafrost (permanently frozen ground), melting glaciers, earlier spring thaws and later winter freeze ups, less predictable ice cover on interior rivers, more powerful storms and dramatic coastal erosion imperiling dozens of coastal villages, and a slow but consistent march northward of flora and fauna seeking cooler temperatures. The impacts on communities and infrastructure are expensive. A few examples follow. Ice cover on the Arctic Ocean serves as a blanket, reducing the

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<sup>1</sup>Under the Arctic Research and Policy Act of 1984, the seven Commissioners of the USARC are appointed by the President and report to the President and the Congress on goals and priorities of the U.S. Arctic Research Program. The program is coordinated by the Interagency Arctic Research Policy Committee, (IARPC), a National Science and Technology Council subcommittee, that is chaired by National Science Foundation Director Dr. Subra Suresh, who is also an *ex-officio* member of the Commission. See [www.arctic.gov](http://www.arctic.gov) for Commission publications, including the Commission's Goals Report.

power of winter storms and wave action. The retreat of sea ice means that the storm surges and waves are more powerful and more damaging to the coast. As a result of that, and higher sea levels, communities are losing private and public infrastructure and several dozen villages are seeking funds to reinforce coastlines in hopes of protecting people and buildings. Other villages are in the process of moving or planning to move. Some areas are increasingly inaccessible because permafrost is thawing, making the ground “soft” for many of the warmer months. Soft, boggy ground jeopardizes the limited roads, airports, pipelines, and buildings that exist in the Arctic, and reduces the months that both residents and oil companies can use ice roads for access.

Climate change, tourism development, and international investment in the Arctic are moving faster than our limited understanding of arctic ecosystem functions. The pace of change in both natural systems and human use patterns demands increased focus on and attention to arctic research. Scientific research must inform policy decisions to maximize economic opportunities while ensuring long-term sustainability and environmental protection. Timely examples are marine transportation, adventure cruises, and oil and gas exploration, all of which need shore-based infrastructure to be safe and reliable. Research can better inform decisions about where to develop ports that will be safe from dramatic coastal erosion or how to address oil spills more effectively in an ice-filled environment.

Baseline mapping of Arctic lands, both on- and offshore is essential to improve safety and inform decisions. Arctic observations, with an emphasis on weather, climate and environment, and how they are evolving, are needed to accurately plan for development in the Arctic.

There are many Arctic research efforts worth noting and I highlight a few. The Alaska Ocean Observing System addresses regional and national needs for ocean information—including Arctic regional data. This system, primarily funded by the National Oceanic and Atmospheric Administration, is a network of air-, land-, and sea-based instruments that collects a host of valuable oceanographic, atmospheric, and biological data, which are then turned into information and tools for the use of the nation.

The Sea Ice Zone Observing Network (SIZONET) is an interdisciplinary project, supported by the National Science Foundation, and led by the University of Alaska Fairbanks. SIZONET has implemented an integrated program to observe seasonal ice in the context of the sweeping environmental, geopolitical, and socio-economic change in the North. By assessing the nature and extent of sea ice system services, SIZONET is building an integrated observation network that will lead to prediction of key trends that provides maximum benefit for the broadest range of affected parties.

Internationally, Sustaining Arctic Observing Networks (SAON), a group important in the coordination of Arctic observing data on an international scale, has entered a second phase of its work. The continuing process consists of representatives from the eight Arctic countries, permanent participants in the Arctic Council, and Arctic Council working groups. With the inclusion of representatives from the International Arctic Science Committee and the World Meteorological Organization, SAON is also connected to the Arctic science, observing, data management activities and interests of the non-Arctic countries, as well as to global observing systems.

I attach the U.S. Arctic Research Commission’s *Report on Goals and Objectives* to provide a more comprehensive overview of Arctic research priorities for the nation.

[To view this report, go to [http://www.arctic.gov/publications/usarc\\_2009-10\\_goals.pdf](http://www.arctic.gov/publications/usarc_2009-10_goals.pdf).]

Research also provides the data necessary to advance responsible development plans and to help protect against potential impacts related to development of the Arctic’s vast natural resources. The Commission is encouraging research in oil spill prevention and containment, response and fate/effects. I attach a white paper from the Commission on oil spill research priorities that makes specific recommendations on these issues.

[To view the white paper from the Commission on Oil Spill Research Priorities go to [http://www.arctic.gov/publications/usarc\\_oilspill\\_5-26-10.pdf](http://www.arctic.gov/publications/usarc_oilspill_5-26-10.pdf)]

The Commission appreciates this Subcommittee’s interest in research to maximize Arctic economic opportunities in the Arctic. Timely Arctic scientific research is key to inform pivotal strategic decisions at this time in our history.

RESPONSE TO WRITTEN QUESTION SUBMITTED BY HON. JOHN D. ROCKEFELLER IV TO  
 AMASSADOR DAVID A. BALTON

*Question.* Several Arctic powers that are parties to UNCLOS, namely Russia, Denmark, Norway, and Canada, are exploring ways to exert sovereign control over the increasingly accessible oil and gas reserves of the region. To this end, they have submitted or are in the process of submitting expanded continental shelf claims to the Commission on the Limits of the Continental Shelf. The U.S., as a non-party to the Convention, cannot participate as a member of the Commission and as a result cannot submit a claim under Article 76. Ambassador Balton, it's my understanding that other Arctic powers, like Russia, are actively in the process of submitting claims for expanded continental shelf limits claims.

- How might an accepted claim of a foreign power affect our sovereignty?
- Can we, if it has sound scientific backing, legitimize a claim to an expanded continental shelf when we remain a non-party to UNCLOS?
- Is it true that even if we were to accede to the Convention tomorrow and submitted an OCS limit claim, we would be stuck at the back of the line?
- Are we already too late to the party?

*Answer.* As Parties to the Convention, Russia, Norway, and Denmark have each made at least partial submissions to the Commission on the Limits of the Continental Shelf, an expert body established by the Convention that makes recommendations to coastal States relating to the outer limits of their continental shelf beyond 200 nautical miles (extended continental shelf or ECS). Canada intends to make its submission in 2013 and Denmark intends to make another partial submission in 2014. As a non-Party, the United States is the only Arctic coastal State that is unable to avail itself of this treaty procedure.

The Commission only advises on what is continental shelf and what is not. Where two States both claim or could claim a particular area of continental shelf, the Commission does not have the authority to make recommendations concerning the delimitation of the continental shelf between such States. Further, any recommendations of the Commission on the outer limits of an Arctic coastal State's continental shelf cannot prejudice boundary questions, including subsequent boundary agreements that may be negotiated between Arctic coastal States.

With respect to our own ECS, the United States has established an interagency task force to gather and analyze the data necessary for the United States to establish the outer limits of its continental shelf, including in the Arctic. A State does not need to be a party to the Law of the Sea Convention to be entitled to continental shelf beyond 200 nautical miles. However, joining the Convention would put our customary law rights with respect to the shelf beyond 200 nautical miles (nm) on the firmest legal footing, that is, treaty law, and it would give us access to the procedure set forth in the Convention that provides legal certainty and international recognition of such rights. Joining the Convention would also allow us to nominate a U.S. national to the Commission.

We are not too late. We should join the Convention as soon as possible in order to secure our rights with respect to the shelf, secure our navigational rights and freedoms, maximize U.S. influence in law of the sea-related institutions, and otherwise take advantage of the range of benefits that would accrue to the United States as a party.

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RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. MARK BEGICH TO  
 AMBASSADOR DAVID A. BALTON

*Question 1.* While the U.S. is a non-party to the Convention, past and present administrations, and the Armed Forces, operate under the premise that UNCLOS is a codification of "customary international law."

- Can you explain what this means?
- So can customary international law change over time?
- Shouldn't we be concerned that without ratifying UNCLOS, we may be left in the lurch by the changing practices of other states, particularly ones that continually flout international norms or at the very least ones that go against our interests?

*Answer.* While we have been relatively successful to date in relying on customary international law to protect our interests, that law can change based on the practice of countries and is ultimately something we cannot control. As a party, the United

States would “lock in” the Convention’s favorable set of rules as treaty rights. Moreover, joining the Convention would enable the United States to take advantage of treaty procedures to nominate/designate experts to treaty institutions and to sponsor U.S. companies to secure deep seabed mining rights—none of which is the case under customary international law.

*Question 2.* The Law of the Sea is recognized by the international community as the “Constitution” for the world’s oceans. Like our own nation’s Constitution, the Law of the Sea can be amended and changed as new situations arise—but only by member nations and the U.S. cannot participate in this process because of its failure to ratify the treaty.

- Which member countries are currently offering amendments?
- What types of amendments are these countries offering?
- How will these proposed amendments affect U.S. interests in the Arctic, both in the present and the future?

Answer. To our knowledge, the Parties to the Law of the Sea Convention have not yet made any formal proposals to amend the Convention. If such a proposal came forward, though, the United States would have limited ability as a non-party to influence the consideration of that proposal.

In addition, the United States would be in a much stronger position as a party to the Convention to defend its highly favorable provisions from being misinterpreted or misapplied—even in the absence of a proposal for amendment.

The Convention provides the basic legal framework applicable to the Arctic Ocean. All other Arctic nations are party to the Convention. The United States, which has vital interests in this region, is the odd one out.

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RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. JOHN D. ROCKEFELLER IV  
TO ADMIRAL ROBERT J. PAPP, JR.

*Question 1.* With no heavy icebreaker and only one medium icebreaker, U.S. capabilities in the polar regions stand in stark contrast to the icebreaking capabilities of other nations in the Northern Hemisphere. Most notably, Russia has twenty-five icebreakers—eight of which are heavy icebreakers—and is using them to assert sovereign control over the Arctic region and its many valuable resources. Other Arctic countries with significant icebreaking capability include Finland, with seven icebreakers; Sweden, with seven; and Canada, with six. In this regard, it is worth noting that a May 21, 2008, letter to the Chairman of the Joint Chiefs of Staff, the Commander of U.S. Northern Command, Commander U.S. Transportation Command, and the Commander of the U.S. Pacific Command emphatically stated, “To assert our interests in these regions, the United States needs assured access with reliable icebreaking ships”. This letter also stated that the icebreakers were essential instruments of the United States policy in the Polar Regions and included recommendations for the construction of new polar icebreakers for the Coast Guard and adequate funding to keep existing icebreakers ready and viable.

Admiral Papp, I understand that operating in the Arctic extends well beyond just icebreakers. But everyone agrees, including the Joint Chiefs, that icebreakers are crucial to assert U.S. interests in the Arctic region. Is it only a lack of funding that is preventing you from going ahead and building a replacement icebreaker?

Answer. Obtaining funding for replacement icebreakers is only one critical element to a major acquisition project. Funding is required to complete acquisition documentation, survey and design work, and construction. Per the Coast Guard’s Major Systems Acquisition Manual, a sequence of analyses and reports must be completed prior to moving forward on an acquisition project. Specifically, a Mission Analysis Report, Mission Needs Statement, Concept of Operations and an Operational Requirements Document must be completed before moving into design and build phases. Additionally, coordination with other Federal partners will be necessary to ensure that an icebreaker incorporates technical requirements to support the missions of multiple agencies. All of the documentation and analysis is critical when considered a major acquisition to understand the needs, how it will operate, and what alternatives are available, so as to make best use of funding, if appropriated.

*Question 2.* You have noted in your written testimony that the Coast Guard has adopted the “whole of government” approach to dealing with the Arctic. That presumably means a “whole of government” approach to your icebreaking needs. Is that correct? Have you used this “whole of government” approach with any other Coast Guard asset?

Answer. While the Coast Guard is responsible for operating and maintaining the national fleet of polar icebreakers, they are just one part of a “whole of government” approach to implement national Arctic policy. The United States is an Arctic Nation and as such there is a need for a whole of government solution to meet U.S. policy objectives in the Arctic which are articulated in the National Ocean Policy (Ex. Order 13547), 2010 National Security Strategy and National Security Presidential Directives 66 and/Homeland Security Presidential Directive 25.

As with other Coast Guard missions, a “whole of government” approach involves partnering with International, Federal, State, and local stakeholders to meet mission demands. Depending on the specific mission, a “whole of government” approach is routinely taken, as Coast Guard missions often require close coordination with key stakeholders. This approach is especially critical in the Arctic based on the limited infrastructure and facilities available. For example, we have a longstanding agreement with the National Science Foundation to co-support an Arctic Icebreaker Coordinating Committee that advises on science outfitting and scheduling of USCG Icebreakers for Arctic research. This approach has enabled over a decade of research missions primarily on the CGC HEALY by the National Science Foundation but also including the polar class icebreakers and other research agencies. Additional “whole of government” approaches include the recently signed International Arctic SAR agreement, coordination with the Alaska Air National Guard and the North Slope Borough for SAR cases in the Arctic.

Expected increases in vessel traffic in the Bering Straits and north can be expected to increase the risk of collision with marine mammals, fuel spills, and displacement of wildlife although there are no assessments at this time of the extent of such impacts. The capability of the U.S. Coast Guard to perform its vessel safety and oil spill response functions has substantial bearing on natural resource protection.

*Question 3.* With only one functional icebreaker, how will USCG maintain crew proficiency in icebreaking operations?

Answer. The Coast Guard is maintaining crew proficiency in icebreaking operations through: icebreaking simulations, temporary duty assignments to CGC HEALY and other domestic icebreaking assets. Additionally, the Coast Guard is looking at potential international professional engagements on foreign icebreaking assets. In fact, a Coast Guard Icebreaker Captain is sailing on the Russian vessel that NSF is chartering for the McMurdo break-in mission in January 2012.

*Question 4.* CMSP has been used in New England to successfully reduce conflicts between shipping activities and marine mammal migrations. In the Arctic, melting ice has resulted in increased shipping access to the Bering Strait, leading to a greater likelihood of ship collisions with protected marine mammals. Do you think that it is necessary to implement a CMSP process for the Arctic in the near term to avoid whale ship-strikes and other user conflicts?

Answer. The Coast Guard is committed to supporting the implementation of Coastal and Marine Spatial Planning (CMSP) in all regions of the United States under the auspices of the National Ocean Council, consistent with Ex. Order 13547, July 19, 2010, “Stewardship of the Ocean, our Coasts, and the Great Lakes.” The rationale for CMSP is contained in the Final Recommendations of the Interagency Ocean Policy Task Force and other materials the Council has prepared and is developing. One of the examples of successful interagency cooperation to balance the interests of maritime trade, offshore energy, and environmental protection as contained in the Final Recommendations was that of the Stellwagen Bank National Marine Sanctuary, located just off of the always busy Boston, Massachusetts, harbor. Major benefits of interagency planning and working closely with all stakeholders were to reduce the potential of ship strikes with little adverse impact on shipping. The Coast Guard played an active role in that planning and review process.

Alaska/Arctic is one of the nine regions of the country where the National Ocean Council is working to implement CMSP. Regional planning bodies (RPBs) composed of Federal, State, and tribal partners (including Alaska Native entities) will form to develop coastal and marine spatial (CMS) plans for each region or, in some cases, sub-regions. Each RPB will be informed by its members, scientists, industry, other concerned stakeholders, and the general public in developing their regional CMS plans. Avoidance of collisions between ships and marine mammals is one of the many issues that the RPBs will consider. The RPB, in implementing key principles and elements of the CMSP process, will consider how to mitigate and plan for conflicts among human uses as well as conflicts between human uses and the environment. The expected increase in commercial vessel traffic in Arctic and Alaskan waters will likely pose significant conflict use challenges that the RPB will seek to

resolve. The Coast Guard is committed to being part of this process in all nine regions.

In the meantime, the Coast Guard is undertaking studies to analyze the nature and effects of ship traffic passing through the Bering Strait and into the Chukchi Sea to promote vessel safety and the needs of all concerned. On November 8, 2010, the Coast Guard published a Notice of Study and request for comments for a "Port Access Route Study: In the Bering Strait" in the Federal Register (75 FR 68568). The Coast Guard recently extended the public comment period until September 6, 2011. What is learned during this process, as well as the routing measures and best practices that are developed, will be implemented under existing statutory authority and then incorporated into the CMSP process.

The Coast Guard agrees with the other Federal agencies about the importance of ensuring CMSP serves as a tool to promote a more integrated and proactive approach to planning and managing the existing and emerging uses of our oceans and coasts. Although there is currently a low volume of shipping and other opportunities to plan waterway safety and environmental stewardship exist, near-term implementation of CMSP is the preferred integrated approach to reducing ship strikes and resolving other anticipated conflicts. Ship traffic through the Arctic and Bering Sea will increase in the future as a result of diminishing sea ice; accordingly, it is imperative that an early, proactive approach be taken to mitigate the resulting greatly increased noise and other potential environmental impacts on marine mammal populations, as well as on the native communities which depend upon them through traditional subsistence hunting.

*Question 5.* How would the implementation of CMSP in the Arctic affect Coast Guard operations there?

Answer. The Coast Guard anticipates no adverse operational impacts from implementing Coastal Marine Spatial Planning (CMSP) in the Arctic. Implementing CMSP will promote and leverage a broad range of existing Coast Guard priorities and equities, including safety, security, and stewardship, in the region.

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RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. MARK BEGICH TO  
ADMIRAL ROBERT J. PAPP, JR.

*Question 1.* Given the \$4 to \$7 billion the High Latitude Study identifies in icebreaker needs, there is a lot of discussion about the wisdom of outsourcing our homeland security activities by leasing or chartering icebreakers. Can you comment on the wisdom of leasing icebreakers instead of having government-owned assets?

Answer. In general, executing Homeland Security activities can be accomplished from a leased vessel only if primarily operated by a Coast Guard crew and flagged as a U.S. Coast Guard vessel. To fully evaluate the applicability of a capital lease, its utility and operational flexibility must be considered against the initial acquisition costs. Additionally, based on current fiscal policy, scoring of the initial, full budget authority for the length of a capital lease must be considered when evaluating the benefits of leasing over a capital acquisition.

*Question 2.* Are there Coast Guard missions that cannot be performed on leased or chartered vessels? Are those missions critical capabilities or just "nice to have" on icebreakers?

Answer. The ability to conduct inherently governmental missions from a leased asset is a critical factor when operating in the arctic. All Coast Guard missions could be conducted on a leased vessel operated under a demise charter to the Coast Guard, properly marked as a Coast Guard Cutter, obtained in accordance with applicable laws and regulations, and crewed by all active duty Coast Guard.

*Question 3.* In 2010, the cruise ship Clipper Adventurer ran aground in the Canadian Arctic, on a shoal which was charted at 60 feet, but was actually about 9 ft. and it took the Canadian Coast Guard days to reach the vessel. What is the state of our nautical charts in the Arctic? Could a similar thing happen in U.S. waters? How long would it take the Coast Guard to respond?

Answer. The National Oceanic and Atmospheric Administration's (NOAA) Office of Coast Survey has responsibility for charting waters under U.S. jurisdiction to the limits of the Exclusive Economic Zone. NOAA considers the nautical charting data in much of the U.S. Arctic to be inadequate or nonexistent. According to NOAA's U.S. Coast Pilot, much of the Bering Sea area is "only partially surveyed, and the charts must not be relied upon too closely, especially near shore."

A nautical chart shows water depths (soundings obtained from hydrographic surveys), shoreline, prominent topographic features, aids to navigation, and other information pertinent to marine transportation. Nautical charts serve multiple purposes.

Not only do they aid navigation and promote vessel safety, but they also have scientific value. Models describing storm influence on coastal erosion, for instance, require information on nearshore bathymetry. Acquiring adequate bathymetric data for the nearshore zone of the Beaufort and Chukchi seas would improve our ability to forecast the condition of the rapidly changing arctic coastal zone. Forecasts of coastal zone change are important to infrastructure planning, natural resource management, and for local communities.

The water depth information in U.S. Arctic waters is a major concern. The soundings along the northern Alaska coast and south to the Bering Strait were obtained between 1940 and 1969 from hydrographic surveys capable of only partial bottom coverage, some using lead lines. The discrete point soundings obtained using lead lines can be more than 500 meters apart. Widely spaced soundings do not contain enough data to detect pinnacles, rocks, shoals, and other obstructions that protrude above the sea bottom and may not reflect actual water depths in the surrounding area.

Along the northern Alaska coast, the 10-fathom (60 feet) curve lies 2 to 20 miles offshore. Soundings inside the 10-fathom curve are charted anywhere from one-half to three-quarters of a nautical mile apart. However, in some areas, the charted soundings are spaced as much as four nautical miles apart. Historical sounding positions were obtained using less accurate positioning technology than what is available to modern vessels using the Global Positioning System (GPS), Differential GPS, Electronic Chart Display, and Information Systems).

Modern hydrographic surveying technology includes the use of single beam and multibeam echosounders, along with side scan sonar. Multibeam technology obtains millions more soundings than single beam systems and covers a wide swath of the ocean floor, depending on the depth (deeper water equates to wider swath, shallower water equates to narrower swath). Side scan sonar is towed behind the survey vessel and the data obtained assists in detecting objects (wrecks, rocks, or other obstructions) that project from the sea floor. Until full coverage bottom surveys obtained using multibeam echosounders and/or side scan sonar are completed, the extent of potential hazards will not be known. Side scan sonar and multibeam systems provide nearly 100 percent bottom coverage of the sea floor, greatly enhancing the ability to detect hazards undiscovered by earlier, less modern surveys.

During the 2010 field season, the Office of Coast Survey's Hydrographic Surveys Division undertook hydrographic survey projects in the Bering Strait, Port Clarence, and Kuskokwim River—collecting over 300 square nautical miles of hydrographic data. However, this is only a small portion of the estimated 40,000 square nautical mile U.S. Arctic hydrographic survey requirement. Much of the data needed for improving charts in the U.S. Arctic still needs to be obtained through modern hydrographic surveys, water level information, geodetic control, and shoreline/channel delineation.

A similar incident could take place in U.S. Arctic waters. The time of the year, the location of the incident, and weather conditions would determine the length of time it would take the Coast Guard to respond. If a Coast Guard icebreaker is not in the area and a Coast Guard High Endurance cutter is patrolling the Bering Strait, the High Endurance cutter could arrive on scene within 24–48 hours. It would take about 5 days for a Coast Guard buoy tender to transit from Kodiak to Point Barrow, depending on weather conditions.

The Coast Guard would also likely deploy a C-130 aircraft and an H-60 helicopter from Coast Guard Air Station Kodiak. Both would have to travel approximately 900 nautical miles across the Alaskan mainland. The transit time for a C-130 would be approximately 4 hours and it would be limited to dropping survival gear at the site. The H-60s transit time would be approximately 9 hours and would require two air crews and one refueling stop.

The Coast Guard would also likely engage rescue squadrons of the Alaska Air National Guard out of Ellison Air Force Base near Fairbanks and Joint Base Elmendorf-Richardson near Anchorage for assistance.

Additionally, the Coast Guard would request assistance from other partners, such as the North Slope Borough search and rescue helicopters and fixed wing aircraft.

Search and rescue operations in the U.S. Arctic are extremely difficult due to weather, distances, and lack of infrastructure. In 2011, two exercises focused on U.S. Arctic rescue response were conducted. In May, a table top exercise was conducted in Barrow to discuss the rescue of a large number of passengers from a cruise ship. In July, a joint operations field exercise was conducted with the U.S. Air Force and the North Slope emergency response organizations to search for people in the water in the Beaufort Sea. Both exercises were successful as they worked to build interagency partnerships and familiarity with asset capabilities and limita-

tions, while seeking to fully understand the challenges that that would be encountered during an actual incident.

*Question 4.* The Coast Guard has been studying the full range of capabilities needed for the Service to meet its statutory mission requirements and the requirements of the U.S. Navy in the polar regions, identifying gaps in mission capabilities in the regions and the number and types of assets—including polar icebreakers—needed to close the gaps. I understand the Coast Guard is now taking the results of this High Latitude Study and conducting a Mission Analysis Report to look at the mission requirements in greater detail. When this is complete, a Mission Needs Study will look at various options how the Coast Guard will accomplish the missions. How many more studies need to occur to take action? And where does the DHS Arctic Study fit into this picture?

*Answer.* The Coast Guard is using the results of the High Latitude Study to inform its planning processes moving forward as maritime activity evolves in the region. The Coast Guard will continue to monitor and assess activity in the region with its current operations and assets and proceed with a risk-based, phased resourcing approach designed to address the highest operational needs, including the establishment of infrastructure and communications systems to support operations as the level of activity requires it. The study will also be used to inform a whole of government solution to address U.S. national requirements in the Polar Regions.

*Question 5.* In your opinion, what is the most important piece of information that you learned from the High Latitude Study?

*Answer.* Based on the current and projected level of activity in the Arctic, the Coast Guard is challenged to meet its statutory mission responsibilities now and likely will not be able to meet requirements in the future without investment in infrastructure or capabilities required for the polar regions.

*Question 6.* What is the Coast Guard doing with the results of the High Latitude Study?

*Answer.* The Coast Guard is using the results of the High Latitude Study to inform its planning processes moving forward as maritime activity evolves in the region. The Coast Guard will continue to monitor and assess activity in the region with its current operations and assets and proceed with a risk-based, phased resourcing approach designed to address the highest operational needs, including the establishment of infrastructure and communications systems to support operations as required. The study will also be used to inform a whole of government solution to address U.S. national requirements in the Polar Regions.

*Question 7.* Most of the Chukchi and Beaufort Seas are shallow near shore. Arctic coastlines of Alaska lack shore-side infrastructure needed to support escalating maritime operations. Ideas such as designing an offshore vessel mooring or a deepwater port to support operations are being recommended for consideration. Last Congress I proposed legislation that would require a study on the feasibility and potential of establishing a deep water sea port in the Arctic to protect and advance U.S. strategic interests within the Arctic region. Do you think there should be a deepwater port in the Arctic?

*Answer.* The Coast Guard expects that greater infrastructure will be required in Alaska's Arctic region to support the expanding oil and gas production, mining activities, shipping, fishing, and other human activities of increasing importance there, while protecting the marine environment and promoting the interests and equities of the indigenous populations. However, given the lack of a natural deepwater port, the tremendous challenges to dredging, building, and maintaining such a facility, including the huge initial and ongoing capital costs, the very small resident population, and significant resource obstacles that lie ahead, it will be extremely challenging to invest in the infrastructure needed to address the issues previously described. One might expect that commercial interests, who also have infrastructure needs, could provide leveraging opportunities for Federal agencies as the future needs become clearer.

Note that, the State of Alaska and the U.S. Army Corps of Engineers (USACE) completed a joint three-year study to look at the issue of whether there should be additional ports and harbors in Alaska. The State of Alaska, with matching funds from USACE, is funding the project. The Coast Guard, along with National Oceanic and Atmospheric Administration and Department of Defense, have actively participated. More information is available at <http://www.poa.usace.army.mil/en/cw/AKPportsStudy.htm>.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. MARK BEGICH TO  
REAR ADMIRAL DAVID W. TITLEY

*Question 1.* The Task Force Climate Change was created by the Chief of Naval Operations in May 2009 to ensure the Navy is ready to meet any potential challenges to mission requirements, force structure and infrastructure created by a changing climate. Of any region on earth, the Arctic is experiencing climate change effects the most rapidly. As the sea ice melts, it is estimated that the Arctic will become seasonally navigable by mid-century. What is driving the U.S. Navy's interest in climate change?

Answer. The policy guidance for the U.S. Navy with respect to climate change includes "A Cooperative Strategy for 21st Century Seapower," known as The Maritime Strategy or CS-21 and the Quadrennial Defense Review 2010. CS-21 and QDR 2010 identify climate change as a national security priority. Executive Order 13514 "Federal Leadership in Environmental, Energy, and Economic Performance" also requires Federal agencies to set goals for climate change mitigation and energy efficiency.

*Question 2.* How do climate changes in the Arctic rank as compared to other challenges the Navy sees around the world?

Answer. Nowhere is the Earth's climate changing more dramatically than in the Arctic. Decreasing sea ice is making the Arctic Ocean more accessible to human activity including oil and gas exploration, maritime shipping, commercial fishing, and adventure tourism. The Navy views the Arctic as a challenge, not a crisis; the risk of conflict in the region is low. In support of U.S. national security interests as an Arctic nation, the U.S. Navy is taking a deliberate approach in order to be prepared and ready to respond to future tasking in the region to ensure the Arctic remains a stable and secure environment.

*Question 3.* What are the other climate-related issues around the world that the Navy foresees?

Answer. Climate change has numerous implications for naval force structure and operations outside of the Arctic including:

- Sea level rise, and increased storm surge may adversely affect Navy coastal installations.
- Sea level rise may impact availability of foreign ports and strategic assets.
- Changes in the distribution and availability of water, agriculture, fisheries, coastal lands, and other natural resources may increase demand for naval peace-keeping, humanitarian response, and disaster relief missions

*Question 4.* How will the increased access to the Arctic through the Northwest Passage and Northern Sea Route caused by melting sea ice impact the Navy?

Answer. The Navy must be prepared to operate in the Arctic Ocean just as it does in every other ocean. The harsh environment of the Arctic, however, will present the Navy with challenges associated with the cold weather environment that go beyond those of other oceans. The Navy is in the process of assessing the impacts of Arctic operations through execution of the Arctic Roadmap.

*Question 5.* What are the greatest challenges to Naval operations from a changing Arctic environment, and how is the Navy planning for these changes?

Answer. The Navy is currently executing its Arctic Roadmap, which is a 5 year plan to identify the challenges posed by a changing Arctic and to assess the impact of these changes on naval operations and readiness. Phase 1 of the Arctic Roadmap is the study and assessment phase which includes an Arctic Mission Analysis and an Arctic Capabilities Based Assessment (CBA). Together these studies articulate the primary missions of the U.S. Navy in the Arctic and the describe the gaps in the Navy's ability to conduct these missions. The Arctic Mission Analysis, signed on 15 August 2011, describes the primary missions for the Navy in the region and how they will change over the next 30 years. The two mission areas that have been identified to increase through 2040 are Theater Security Cooperation and Maritime Security, which includes search and rescue and Maritime Domain Awareness. The Arctic CBA is scheduled to be completed by mid-September 2011 and will articulate the principle gaps in the capabilities necessary for the Navy to operate in the Arctic and form the basis for U.S. Navy future year's investments.

*Question 6.* After the DOD-NOAA "divorce" on polar-orbiting satellites, it was agreed that DOD satellites would have a morning orbit and NOAA satellites would cover the afternoon orbit. Both provide data for numerical weather models, which are a primary forecasting tool, for both DOD and civil users. As you know, NOAA now forecasts a "gap" in their polar-orbiting satellite coverage in 2016.—How impor-

tant are accurate weather forecasts to Naval operations, and military operations generally?

Answer. Accurate and timely atmospheric and oceanographic forecasts are key components of Battlespace Awareness and Intelligence Preparation of the Environment and are critical for safe and efficient Naval and military operations.

*Question 7.* Does this mean you will be relying on NOAA's Joint Polar Satellite Systems for data from the afternoon orbit?

Answer. The President's decision to restructure the National Polar-orbiting Operational Environmental Satellite System (NPOESS) assigned responsibility for the afternoon orbit to NOAA and the early morning orbit to DOD. NOAA and DoD will share data with each other from their respective orbits.

*Question 8.* Since a gap in JPSS coverage is projected, will not having that data degrade weather model output and thus forecast quality?

Answer. Navy uses data from all available U.S. and international satellite sources for its global atmospheric and oceanographic models, to include all three polar satellite orbits and several geostationary satellites. The loss of data from any one orbit or satellite will affect the numerical model forecast quality. Quantitative impacts of a loss of data from a particular orbit or satellite type will be assessed in the context of all available data.

*Question 9.* Would this impact affect military weather forecasts just for the U.S. or will affect overseas operations as well?

Answer. Satellite-based data is assimilated into the Navy's global atmospheric and oceanographic models which are subsequently scaled and tailored to deliver localized environmental (weather and oceanographic) forecasts for Naval operations around the globe. Overseas operations, particularly over water, around the globe will be more affected by the loss of weather satellite data than in the United States.

*Question 10.* Icebreaking needs for our Nation were once predominately conducted by the Navy but in 1965, the Navy permanently transferred responsibility for icebreaking and mission requirements in the Polar Regions to the Coast Guard. The Navy has stated that the Arctic is critical to national defense and maintaining a continued presence in the region on the surface, subsurface, and in the air is required.—How critical is the Coast Guard's icebreaking capability to the U.S. Navy?

Answer. The Coast Guard's icebreaking capability supports the U.S. Navy's desired end state of maintaining the Arctic as a safe, stable and secure region where U.S. national and maritime interests are safeguarded and the homeland is protected. Additionally, the Office of the Secretary of Defense's 2011 Report to Congress on Arctic Operations and the Northwest Passage states "there is a current and continued future imperative to provide a sovereign maritime presence in the region." This aligns with Annex E to the Memorandum of Agreement between the Department of Defense and the Department of Homeland Security on the use of Coast Guard Capabilities and Resources in Support of the National Military Strategy which states that "Coast Guard icebreakers are the only means of providing assured surface access in support of Department of Defense missions." As the U.S. Navy does not possess any ice-capable surface combatants, the Coast Guard has the only icebreaking vessels capable of supporting the six core Navy missions in the Arctic.

*Question 11.* How concerned is the Navy with the Coast Guard's lack of icebreaking capability and is this considered a national defense vulnerability?

Answer. The U.S. Navy is very concerned about the U.S. Coast Guard's degraded icebreaking capabilities. Having sovereign icebreaking vessels capable of supporting the six core Navy missions and supporting the a broad range of Department of Defense and Department of Homeland Security missions is important for protecting U.S. national interests. With no service icebreaking requirements currently identified, the Coast Guard provides the only means for access to much of the Arctic. Lacking this enabler, and with the Office of the Secretary of Defense's statement of requirement in the 2011 Report to Congress on Arctic Operations and the Northwest Passage to be able to persist in the Arctic to protect sovereign interests, the Navy may not have the means to meet that requirement.

*Question 12.* How limited is the Navy in the Arctic without Coast Guard icebreakers?

Answer. The lack of Coast Guard icebreakers currently does not impact the Navy's ability to perform its core mission of preventing conflict. However, lacking any ice-capable surface combatants, the U.S. Navy is limited in the near term to operating only in the ice-free waters of the Arctic during those times of year when the sea ice is minimal. Coast Guard icebreakers would represent the only military vessels capable of conducting Arctic operations year round. The recent Navy Arctic Mission Analysis states that the potential for armed conflict in the Arctic in the

near-term (through 2020) is low. However, the Navy is conducting several analyses, including the potential need for ice-capable surface combatants, to ensure it can capably perform all six core Navy missions to meet expected mid and long term Arctic operating needs.

*Question 13.* One of the major challenges in the Arctic is the lack of infrastructure needed to support escalating maritime operations. The vast areas of the Arctic have insufficient infrastructure to support safe marine shipping and respond to marine incidents and emergencies in the Arctic. This area lacks critical infrastructure components to support communications, safe navigation, search and rescue assets, pollution response assets, and port facilities where ships may need to take refuge, refuel, resupply or discharge waste.—What kind of investments in infrastructure is needed to meet Navy strategic objectives in the Arctic?

Answer. The U.S. Navy is continually re-evaluating its Arctic infrastructure needs. As such, the Navy is currently participating in a number of ongoing studies and assessments related to these infrastructure needs. Although military infrastructure in the region is limited, the low threat of military conflict between Arctic nations currently does not necessitate substantial near-term investments in military bases and infrastructure. However, as ice coverage recedes and human activity in the Arctic begins to increase, the Navy may need to accelerate its need to field capabilities and build infrastructure in order to provide a persistent presence in this harsh environment.

*Question 14.* Do you think the Navy should be making investments in the Arctic in a fiscally-constrained environment?

Answer. Substantial U.S. Navy near term investment (next 5–10 years) in the Arctic, especially given the current U.S. Fiscal situation, is not currently planned or anticipated. However, it will be important to periodically re-evaluate our investment needs to ensure our Arctic capabilities investments are sufficient to meet any emerging threats to U.S. national security.

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RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. JOHN D. ROCKEFELLER IV  
TO PETER E. SLAIBY

*Question 1.* On Wednesday, August 10, 2011, an oil leak began and was detected by Shell UK, stemming from the flow line of its shallow water Gannet Alpha platform, located 112 miles east of Aberdeen, Scotland in the North Sea. Though the initial leak was stopped, it has now emerged that a smaller flow from the same source is ongoing. It is estimated that as of Monday, August 15, approximately 54,600 gallons (1300 barrels) have spilled into the sea in what has become the worst spill in UK waters in the past decade. Though the leak began on August 10th, why was the British public not informed of its existence until August 12th? Is this how Shell would respond if a spill were to occur in U.S. Arctic waters as a result of its activities?

Answer. In this particular instance we wanted to get a full assessment of the situation prior to engaging the press. You will note, however, that we engaged immediately with the regulatory bodies as quickly as the leak was detected. We have provided updated information as appropriate while dealing with the situation.

*Question 2.* The regulatory regime of the United Kingdom and the safety of North Sea production operations are regularly touted as industry “gold standards.” Yet Shell has admitted that the ongoing Gannet Alpha incident constitutes “a significant spill in the context of annual amounts of oil spilled in the North Sea.” Additionally, Shell technical director Glen Cayley has acknowledged that the ongoing leak has been difficult to stem because it “is in an awkward position to get to\* and really getting into it amongst quite dense marine growth is proving a challenge.” Mr. Slaiby, at the hearing on July 27, you indicated Shell would not be working in places like the Arctic if the company believed something might happen that you couldn’t control. If you’re having difficulties responding to an incident in an area with a well-established history of oil production, shouldn’t Americans be concerned with Shell’s ability to prepare for and respond to a spill in an inherently more challenging and remote environment, such as U.S. Arctic waters, one where capabilities have yet to be truly tested?

Answer. While the Gannet Alpha incident is regrettable, the leak is not related to a well control incident nor does it correspond with the exploration plans we have planned for Alaska. The exploration program planned in the Alaskan Arctic is not comparable to a leak in a flowline. We continue to have confidence in our ability to operate in the North Sea and will learn from this incident as the investigation is completed. This learning will improve our operations around the world.

*Question 3.* In early August, the United Nations Environment Programme (UNEP) released a major report titled, "Environmental Assessment of Ogoniland." The report details the findings of an independent scientific assessment and demonstrates that the impacts of oil pollution from over 50 years of operations in south-east Nigeria are far more significant than once thought, potentially warranting "the most wide-ranging and long term oil clean-up exercise ever undertaken if contaminated drinking water, land, creeks and important ecosystems such as mangroves are to be brought back to full, productive health," one that may take 25 to 30 years. Beyond its disastrous scientific findings, the report implicates Shell Petroleum Development Company as a key contributor to this disaster, accusing the company of chronically failing to live up to its own safety procedures and environmental standards and colluding with government officials to cover up oil spill sites. Shell faces hundreds of millions of dollars in damages for two massive oil spills that occurred in the region as a result of the rupture of the 2008 Bodo-Bonny trans-Niger pipeline; originally claiming that less than 40,000 gallons were spilled in Bodo, Ogoni, Nigeria, your company now accepts liability for a spill experts estimate could rival that of *Exxon-Valdez*. Mr. Slaiby, Shell has spent billions upon billions of dollars on spill preparedness in the Arctic, and has made considerable efforts to brand itself as a responsible and proactive industry leader when it comes to the safety of its oil exploration and production activities. Even with everything Shell has done in this regard, what kind of credible assurances can you really make in the wake of these developments that Shell is and will be, to use your words, "committed to employing world-class technology and experience to ensure a safe, environmentally responsible Arctic exploration program?"

*Answer.* Oil spills in the Niger Delta are a tragedy, and the Shell Petroleum Development Company of Nigeria (SPDC) takes them very seriously. That is why we have always accepted responsibility for paying compensation when they occur as a result of operational failure. SPDC has always acknowledged that the two spills in the Bodo area in 2008, which are the focus of extensive media reports today, were caused by such operational failure. Even when, as is true in the great majority of cases, spills are caused by illegal activity such as sabotage or theft, we are also committed to cleaning up spilled oil and restoring the surrounding land.

It is unfortunate that inaccurate reporting has created the impression that SPDC in particular and oil companies in general are responsible for all oil spills in Nigeria. The two spills at issue here resulted in around 168,000 gallons of spilled oil. It is regrettable that any oil is spilled anywhere, but it is wildly inaccurate to suggest that those two spills represent anything like the scale which some reports refer to, such as a comparison to the *Exxon Valdez* spill (10.8 million gallons). Concerted effort is needed on the part of the Nigerian government (which itself owns a majority interest in the assets operated by SPDC under a joint operating agreement with the Nigerian state oil company, NNPC), working with oil companies and others, to end the blight of illegal refining and oil theft in the Niger Delta, both of which perpetuate poverty. This is the major cause of the environmental damage which media reports have so graphically illustrated.

It is inappropriate to compare the situation in Nigeria with exploration in Alaska. Domestic exploration does not experience sabotage and civil unrest which are the root causes of most of the environmental damage in Nigeria.

In Alaska, as elsewhere in the world, we are committed to operational standards that meet or exceed regulations. We are also committed to ensuring the communities that we work in participate fully in the economic benefits that oil and gas development will bring. This is perhaps at the root of many of the issues in Nigeria.

*Question 4.* The Alaska Eskimo Whaling Commission, the organization of native communities living in the Arctic which depend on a subsistence hunt of bowhead whales for their cultural and nutritional health, does not support the expansion of offshore oil and gas activities in the Arctic because of the unknowns associated with such projects and concerns about oil spills. Local communities are not convinced that industry or the government is currently capable of remediating an oil spill, and want to make sure that oil and gas development does not endanger the communities' resources. How does Shell take the indigenous concerns about offshore oil and gas development into account in their development plans for the Arctic?

*Answer.* Shell takes indigenous concerns very seriously and has been working closely with the Alaska Eskimo Whaling Commission (AEWC) to address their concerns associated with the potential impacts of oil and gas activities on subsistence hunting. In addition, Shell has voluntarily committed to a "zero discharge" policy for certain waste streams in the Beaufort Sea (federal law permits such discharges) in response to requests from the AEWC.

Shell has entered into an agreement with the North Slope Borough (NSB) to fund a science program for an initial term of 5 years, which is administered by the NSB

Mayor's Office. The Steering Committee, which governs the direction of scientific studies, is dominated by local residents to ensure the incorporation of indigenous concerns.

Shell also conducts annual Plan of Cooperation meetings with every impacted coastal community to share results of science data collection efforts, plans for the upcoming season and to solicit questions and concerns about Shell's program. The solicitation of input is not just a paper exercise; stakeholder input has resulted in a substantial mitigation program including:

1. Communications Plan to avoid conflict with subsistence hunters
2. Commitment to hire subsistence advisors and marine mammal observers
3. Development of a robust marine mammal monitoring protocol
4. Real time ice and weather forecasting
5. Collaboration with coastal communities on transit routes

*Question 5.* In the event of a catastrophic oil spill, how would Shell compensate these communities whose nutritional needs and way of life depend completely on Arctic natural resources?

*Answer.* As in other parts of the world where it operates, Shell is committed to being a good neighbor. One example of this is Shell's commitment to fund mitigation measures in the unlikely event of an oil spill that has a significant potential to affect subsistence species or a spill that is followed by a reduction in availability of species for subsistence. The Inupiat Community of the Arctic Slope (ICAS), AEWG and the NSB could request funds from a third party that would make funds immediately available for distribution. Shell's commitment is backed by a substantial financial instrument. The purpose of the mitigation funds includes transportation of hunters and equipment to alternate hunting sites and acquisition and transportation of alternate subsistence food supplies.

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RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. MARK BEGICH TO  
PETER E. SLAIBY

*Question 1.* As part of larger efforts to improve oil spill response, oil companies such as Shell conduct intentional spills of limited amounts of oil to better understand the properties of oil in the environment. Some Arctic countries, such as Norway, allow this kind of testing in their waters. While the EPA has the authority to provide Clean Water Act waivers for such testing, our staff is unaware of any waivers that have been issued. It's my understanding that your company conducts limited controlled spills in foreign waters to better understand the properties of spilled oil in the environment. Can you share with us how these activities have improved oil spill response capabilities?

*Answer.* As part of Joint Industry Projects (JIPs) and other R&D work, Shell participates in cooperative efforts with industry, regulatory agencies, academia, and research institutions that perform experimental spills. These experimental spills provide an excellent opportunity to further advance knowledge in a laboratory or small test basin which can be extrapolated to a larger scale. During an experimental spill, testing can take the place of new technology dealing with mechanical skimmers, booming, dispersants, in-situ burning, detection and monitoring of oil, environmental fate and effects, oil behavior in cold environments, and other data gathering. While industry keeps as a top priority the prevention of any spill, opportunities to test new or advanced technology are limited and difficult to perform during an actual spill in which the priority is to properly respond and clean up the spill. The last experimental spill conducted was in 2009 as part of the SINTEF Oil in Ice JIP which resulted in many learnings and significant advancements regarding spill response in Arctic conditions. We utilized the information gathered from the in-situ burn and the use of dispersants during the experimental spill at Svalbard to further enhance the use of these response tools in our contingency plan. The results of the SINTEF JIP have been reported and the summary can be found at the following link: [http://www.sintef.no/project/JIP\\_Oil\\_In\\_Ice/Dokumenter/publications/JIP-rep-no-32-Summary-report.pdf](http://www.sintef.no/project/JIP_Oil_In_Ice/Dokumenter/publications/JIP-rep-no-32-Summary-report.pdf).

*Question 2.* Would testing in U.S. waters improve our understanding of how spilled oil behaves in the environments of places we'd actually be drilling in?

*Answer.* Yes, the information gathered during experimental spills is very valuable in learning how oil behaves in the environment although we don't believe the work done in Norway is less relevant. It also would be of great benefit for testing new and advanced technology, developing strategies and tactics for response, improving modeling of oil movement and dispersion, and other areas. When a JIP performs an

experimental spill, detailed planning goes into effect to maximize the knowledge and data gathering that occurs during the test.

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RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. JOHN D. ROCKEFELLER IV  
TO ANDREW T. METZGER, PH.D., P.E.

*Question 1.* One of the major challenges in the Arctic is the lack of infrastructure needed to support escalating maritime operations. The vast areas of the Arctic have insufficient infrastructure to support safe marine shipping and respond to marine incidents and emergencies in the Arctic. This area lacks critical infrastructure components to support communications, safe navigation, search and rescue assets, pollution response assets, and port facilities where ships may need to take refuge, refuel, resupply or discharge waste. Dr. Metzger, what are the greatest challenges for building marine infrastructure in the Arctic?

Answer. From the perspective of civil engineering and construction, I believe the four greatest challenges for building marine infrastructure in the U.S. Arctic are as follows:

*Permitting*—The permitting process for construction of marine infrastructure, both coastal and offshore, will be difficult for anyone to gauge in advance. However, one should expect considerable lead time before ground is broken on any new construction project in the Arctic marine environment. I would anticipate one to several years of permitting lead time, depending on the scope of the project.

*Logistics*—It would be difficult to overstate the logistical challenges of construction in an Arctic maritime environment. This is due primarily to remoteness and the fact the region is relatively undeveloped. Almost every component of a constructed facility will be shipped to the site from considerable distance; probably by barge from the west coast of the contiguous United States. The Barrow Replacement Hospital, presently being constructed in Barrow, Alaska, is a good example of this situation. Every beam, window, door knob, screw, and all other construction materials needed for a modern hospital was shipped via barge from Seattle, Washington. Shipments also included vehicles, equipment, construction worker housing, fuel and most other supplies required for the 2-year project. The planning for such a project must be comprehensive and precise. A forgotten or damaged item must be flown in, often from outside Alaska, or barged in the following summer. One should anticipate mobilization and material costs to be in excess of what could be expected along the East, Gulf, West or Great Lakes coasts. It should be anticipated that the project will take longer (than analogous facilities in the contiguous US) to construct due to these complications; coupled with the very short construction season in the Arctic.

*Existing Civil Infrastructure*—As stated in both my written and oral testimony: the lack of basic shore side civil infrastructure, including lodging, water, wastewater and electrical power facilities, will obstruct marine infrastructure development in the Arctic. The civil works at most communities in this region cannot support more than minimal influx of additional people. New civil works (lodging, water, wastewater, power) will likely be required to accommodate any significant workforce as well as operators of a finished facility.

*Incomplete Knowledge Base*—The Arctic is a severe environment. Marine civil infrastructure built in this environment must withstand extreme environmental conditions. Numerical quantities describing the extremes of environmental are needed to build facilities with reliable performance. While the scientific community has studied the Arctic for quite some time, and in considerable detail, we have very little information available about actual numerical values of extremes (e.g., wind, waves, sea-ice conditions) over time. Extreme values are needed to build civil infrastructure with reliable performance.

*Question 2.* How robust is the research on building in the Arctic?

Answer. I would describe research on building terrestrial infrastructure in the Arctic as “robust.” A substantial amount of scientific literature and experience-based expertise for on-land projects exists. Notable examples of successful land-based projects include: the Trans-Alaska Pipeline (TAPS), facilities at Prudhoe Bay, the Dalton Highway adjacent to the TAPS route, as well as a host of other constructed facilities.

Specific areas in which I would refer to our knowledge base as “robust” include: construction in/on terrestrial permafrost, material performance in cold temperatures, Arctic utilities (water, wastewater and housing).

Research and experience designing and constructing marine civil infrastructure is not as developed as the storehouse of knowledge for land-based Arctic infrastructure. However, examples of successful projects do exist. A port has been constructed in Nome, Alaska; artificial islands, like the Northstar project, have been constructed at the Prudhoe Bay facility.

Topics in which further study, from an engineering perspective, is warranted include sub-sea permafrost, the coastal transition zone, and sea-ice. Sea-ice represents a major challenge for designing, constructing and maintaining coastal and offshore marine infrastructure. A considerable amount of information was gained during the first “push” to develop oil resources in the Arctic, circa 1980s. However, much of this information warrants updating given recent knowledge of geophysical processes in the Arctic.

*Question 3.* You mentioned in your testimony that environmental conditions in the Arctic are not conducive to currently building reliable Arctic infrastructure. What do engineering societies and academia need to develop Arctic design standards?

*Answer.* To develop Arctic design standards, the engineering community and academia will need a robust understanding of the magnitude of environmental metrics and their probability of occurring over time. This understanding must also account for changes in environmental parameters occurring as a result of climate change. As stated in my testimony, we do not design for the mean; we must design for the extreme. Rationally derived quantities for extreme values of environmental demands including wind, wave and ice conditions are necessary to conclude, with certainty, that a facility is “reliable.”

