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Summer 2013

The Arctic

Emerging frontier, new opportunities

U.S. Coast Guard Arctic Strategy

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On Deck

Cover photo: Iceberg wall in Greenland. Photographer: Anders Peter Amsnæs. Unless otherwise indicated, all images copyrighted.

Deputy Commandant's Perspective

by Vice Admiral Peter V. Neffenger
U.S. Coast Guard
Deputy Commandant for Operations

I am honored to serve as the Flag sponsor for the Arctic edition of *Proceedings.* The past year has been historic in the region, and the Coast Guard is playing a major role in shaping the future. In May of this year, in Kiruna, Sweden, the Arctic Council shifted to four years of chairmanship in North America. Canada will chair the Arctic Council from 2013 to 2015, and the United States will chair it from 2015 to 2017. These tenures of chairmanship bring opportunities to improve maritime safety, security, and environmental sustainability across the region. Indeed, with more than one million adventure tourists visiting the region this year, we must take our responsibilities very seriously and learn from past lessons in other regions. An oil spill or sinking cruise ship would be much more challenging in the Arctic than elsewhere in the world.

This past April, I had the unique privilege to lead a U.S. delegation to the North Pole with senior leaders from every Arctic nation. Hosted by the Secretary-General of the Russian Security Council, the trip enabled me to experience firsthand how other countries and indigenous people are carrying on day-to-day activities in this harsh and unforgiving environment. Moreover, there is no denying that the Arctic landscape is changing. September 2012 marked the lowest extent of sea ice the world has observed since satellite tracking began. This opening of the Arctic, at least seasonally, is presenting new opportunities for increased use of Arctic waterways for maritime activities such as shipping, energy exploration, and tourism.

Given the scope of these challenges, it is impossible for one single agency, state, or nation to provide all solutions and resources. The United States is working with international, Native Alaskan, and other indigenous partners to leverage existing fora such as the Arctic Council and the International Maritime Organization for innovative and cost-effective solutions. Two important recent examples are the 2011 Arctic Search and Rescue Agreement and the 2013 Arctic Marine Oil Pollution Preparedness and Response Agreement. These international agreements, created under the Arctic Council, provide important response frameworks that rely on international cooperation to ensure Arctic nations have mechanisms in place to respond to potential emergency situations.

On May 21, 2013, ADM Papp promulgated the *U.S. Coast Guard Arctic Strategy.* This is the first regional strategy signed by a Commandant in the Coast Guard's long history of distinguished service in the region. The strategy outlines the Coast Guard's priorities over the next 10 years to ensure national success within the region. The strategy provides clear direction to Coast Guard members to utilize a "whole of society" approach to achieve a successful balance among commerce, environmental sustainability, and the traditional ways of living within the region.

As the Coast Guard moves forward with our implementation of the new *U.S. Coast Guard Arctic Strategy,* I can't help but think of the service's motto "*Semper Paratus,*" or "Always Ready." Successful implementation of the strategy will help ensure the Coast Guard remains true to its motto, while operating in this "emerging frontier." We are preparing today to ensure we are ready tomorrow. I hope you enjoy this historic edition of *Proceedings.*

Champion's Point of View

by CDR Karin E. Messenger
Senior Strategic Policy Supervisor
U.S. Coast Guard

"The United States is an Arctic nation." So many Arctic-related papers, briefs, and presentations contain this phase, including a few of the articles published in this very edition. What does this mean, and why do so many of us use this phrase? Well, it is because the United States *is* an Arctic nation! Acknowledging this concept is foundational to gaining the needed acceptance within the United States that it is in our best interest to actively prepare and adapt to the Arctic's changing conditions, opportunities, and challenges.

Although there are many definitions that describe the boundaries of the Arctic, the definition most frequently used within the federal government is found in the 1984 Arctic Research and Policy Act. Using this definition, which includes the waters north of the Aleutian Islands through the Bering Strait, it is clear that the United States has significant real estate within this frontier. The graphic in this edition, which transposes the great state of Alaska over the entire United States, illustrates how vast Alaska is compared to the rest of the country. Alaska is big. It is really big. It's more than twice the size of Texas. Looking at the definition and this map, it is clear that we are not just an Arctic nation—we are *really* an Arctic nation.

The Coast Guard has a long history of operating within the Arctic region, dating back to the 1800s, when we were the Revenue Cutter Service. It was the Revenue Cutter *Lincoln,* during America's initial Alaska coast survey, which transported the American flag and U.S. delegation to Sitka, Alaska, for the October 1867 transfer of Alaska from Russia to the United States. During this four-month voyage, crewmembers conducted coastal reconnaissance, charting, supported science exploration, and then reported the findings to Congress.[1] Since that time, Coast Guard operations within the Arctic region have become part of its legacy—with some of the Coast Guard's greatest heroes (such as Bertholf, Healy, and Jarvis) earning their reputations within the region.

As open water continues to replace permanent ice cover in the Arctic during the warmer months, Coast Guard responsibilities and operations have grown to address the increased risk. The Coast Guard continues to evaluate risk within the region and now, using the framework provided by the *U.S. Coast Guard Arctic Strategy,* we are prioritizing our key long-term objectives for the region.

It has been a great pleasure to champion this *Proceedings* edition, designed to provide an overview of the many pressures and competing demands facing the Arctic region. I would like to thank Dr. John Oliver, CAPT William Burns, and the *Proceedings* leadership team. But, most importantly, I thank the various authors for their time and commitment to share their thoughts and expertise. I hope you enjoy this edition and that it motivates you to further explore the Arctic's growing importance.

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Editorial Team

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Editorial Contact

Email: HQS-DG-NMCProceedings@uscg.mil

Mail: Editor, *Proceedings* Magazine
U.S. Coast Guard
2100 2nd Street SW Stop 7681
Washington, D.C. 20593-7681

Web: www.uscg.mil/proceedings

Phone: (202) 372-2316

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The Arctic Region

An emerging maritime frontier.

by CAPT Jonathan Spaner
Director
Emerging Policy
U.S. Coast Guard

The Commandant of the United States Coast Guard, Admiral Robert J. Papp Jr., spoke of the Arctic as an emerging frontier during the 2013 State of the Coast Guard Address in February. He said:

"…one example of what our future holds can be seen in the emerging frontier of the Arctic, where there is a new ocean appearing. In September we observed the lowest sea ice extent in recorded history, and there are vast areas of open water where there used to be ice…. As the receding ice increasingly gives way to commercial ventures, and human and economic presence increases, so do our responsibilities. We must continue to refine our ability to provide—and then support—a persistent operational presence during periods of increasing human activity and environmental risk."

The United States is an Arctic nation with significant equities in the future of the region. As with all U.S. waters, the Coast Guard is responsible for ensuring safe, secure, and environmentally responsible maritime activity in the Arctic. Our efforts are accomplished in close coordination with federal, state, local, tribal, and international partners to facilitate commerce, manage borders, and improve disaster resilience.

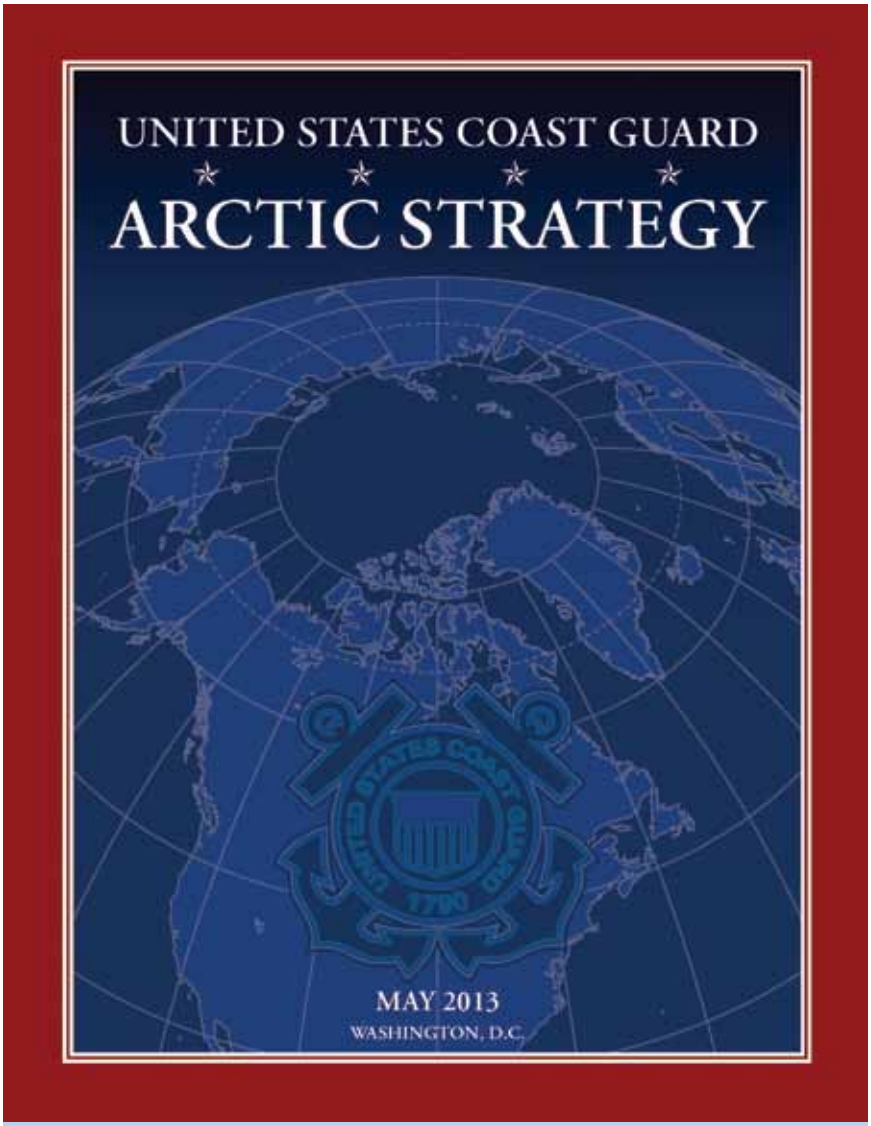
The Arctic environment is changing; satellite observations show decreasing multi-year ice and increasing open water in the summer. Coastal villages are experiencing environmental changes that make their communities more prone to storm surges, diminishing permafrost, and coastal erosion. Although winter sea travel is still limited, maritime navigation is becoming more feasible during the summer and early autumn. Economic development, in the forms of resource extraction, adventure tourism, and trans-Arctic shipping, are driving much of the current activity in the region.

The Arctic region is believed to contain an estimated 13 percent of the world's undiscovered oil and 30 percent of undiscovered gas. Decreasing sea ice and diminishing onshore oil production are creating incentives for offshore exploration. Concurrently, tourism is increasing rapidly in the Arctic. Due to undeveloped landside infrastructure, much of the increased tourism is expected to involve transportation via passenger vessel, which will further increase activity in Arctic waters. Each of these activities carries maritime risk, which must be managed through appropriate maritime governance.

The Arctic region presents numerous operational challenges including extreme weather, limited infrastructure, vast distances, and remote communities. The Coast Guard currently employs mobile command and control platforms, such as the National Security Cutter, to meet seasonal Arctic infrastructure requirements as well as seasonal air and communications capabilities. Our approach assists in providing border security, environmental protection, community resilience, and other maritime governance priorities.

Overall, economic growth and development are shaping the future of the Arctic, while the chance of military conflict remains extremely remote. Indeed, there is a new and historic maritime frontier opening right before our eyes, and modern technology and capabilities are helping to ensure deliberate and responsible development.

The emerging Arctic frontier is also driving extensive strategic thought and deliberation at several levels of government. In May 2013, the White House published a national Arctic strategy. The *National Strategy for the Arctic Region* identifies strategic priorities that will be pursued over the next 10 years and lays the foundation for future development as new challenges emerge. The strategy builds upon U.S. Arctic policy, National Security Presidential Directive 66, as well as other existing initiatives from federal, state, local, tribal authorities, the private sector, and international partners. It aims to focus efforts where opportunities exist and action is needed.



The *U.S. Coast Guard Arctic Strategy* focuses on ensuring safe, secure, and environmentally responsible maritime activity in the Arctic, in support of the *National Strategy for the Arctic Region.*

The *National Strategy for the Arctic Region*

Three overarching and complementing "lines of effort" are outlined in the strategy:

1 Advance U.S. Security Interests

The nation's highest priority is to protect the American people, our sovereign territory and rights, our natural resources, and the interests of the United States. To this end, the U.S. will identify, develop, and maintain the capacity and capabilities necessary to promote safety, security, and stability in the region.

2 Pursue Responsible Arctic Region Stewardship

Responsible stewardship requires active resource conservation, balanced management, and the application of scientific and traditional knowledge of physical and living environments. The United States will improve its ability to forecast conditions in the Arctic, while being mindful of the potential for unexpected developments.

3 Strengthen International Cooperation

Incidents or actions in one part of the Arctic region can have significant implications for the interests of other Arctic states and the international community as a whole. The remote and complex operating conditions in the Arctic environment make the region suited for collaborative efforts with nations seeking common objectives. The U.S. will seek to strengthen partnerships through existing multilateral fora and legal frameworks dedicated to common Arctic issues. It will also pursue new arrangements for cooperating on issues of mutual interest or concern and to address unique and unprecedented challenges.

In addition to the prioritized lines of effort, the strategy will apply the following principles to guide its efforts and serve as the foundation for U.S. Arctic engagement and activities: safeguarding peace and stability, making decisions using the best available information, pursuit of innovative arrangements, and consultation and coordination with Alaskan Natives.

The *U.S. Coast Guard Arctic Strategy*

Following the national strategy, Admiral Papp signed and published the *U.S. Coast Guard Arctic Strategy,* which helps to implement the national strategy. The Coast Guard document focuses on three strategic objectives for the coming decade to ensure safe,

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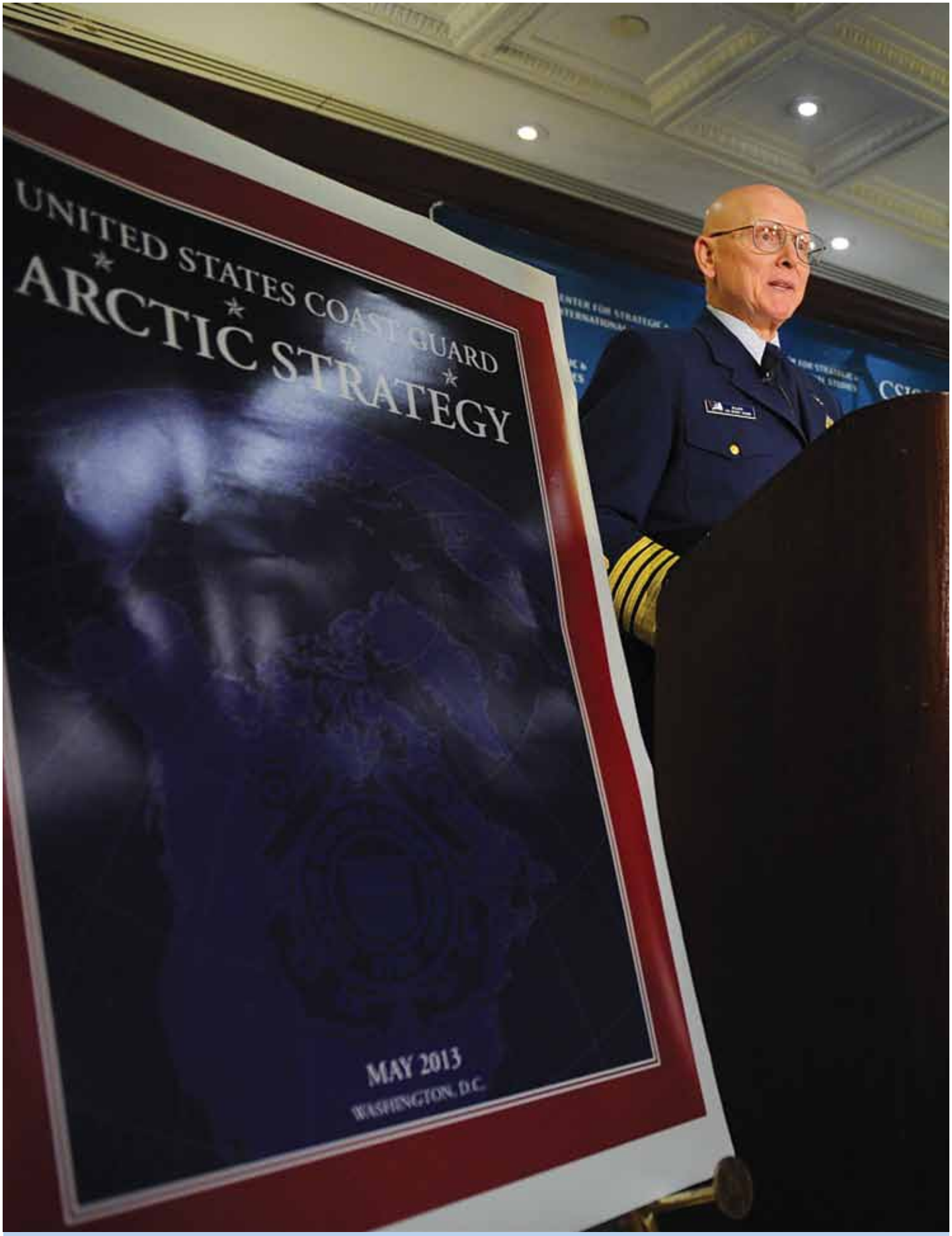

Admiral Robert J. Papp, U.S. Coast Guard Commandant, announces the new *U.S. Coast Guard Arctic Strategy.* U.S. Coast Guard photo by Petty Officer Patrick Kelley.

secure, and environmentally responsible maritime activity in the Arctic:

- improving awareness,
- modernizing governance,
- broadening partnerships.

Improving Awareness

Coast Guard operations require precise and ongoing awareness of activities in the maritime domain. Awareness enables threat identification, information sharing with front-line partners, and improved risk management. Improving awareness requires close collaboration within the Department of Homeland Security as well as with the Departments of State, Defense, Interior, Commerce, and other stakeholders including the intelligence community, to enhance integration, innovation, and field emerging technologies.

Modernizing Governance

The concept of governance involves the institutions, authority structures, and capabilities necessary to provide maritime governance. The Coast Guard will work within its authorities to foster collective efforts and improve governance. In so doing, the Coast Guard will review its own institutions and governance regimes to prepare for future missions in the region.

Broadening Partnerships

Operating in the Arctic requires a collective effort among stakeholders. This objective includes domestic regulatory regimes; international collaborative fora such as the Arctic Council, the Inuit Circumpolar Council, and the United Nations' International Maritime Organization; and local engagements in Arctic communities focusing on training and assistance. Success in Arctic partnership also depends upon close intergovernmental cooperation to support national interests as the United States prepares to assume chairmanship of the Arctic Council in 2015.

Beyond these three strategic objectives, there are a number of additional factors that will position the Coast Guard for long-term success. These factors include building national awareness of the Arctic region and its opportunities, improving public/private relationships, and identifying future requirements and resources to shape outcomes favorably.

Moving Forward

As we implement the strategy, we will consider initiatives such as an Arctic policy board, which, under the authority of the Federal Advisory Committee Act, will bring the best minds in government, academia, and industry together to discuss Arctic policy. We will also consider an Arctic fusion center, Arctic center of expertise, and we will continue advocating for aggressive recapitalization of our offshore fleet, which is essential for mobile command and control during the summer.

Operating in the Arctic is not a new venture for the Coast Guard. However, adapting to changing conditions will require foresight, focus, and clear priorities. It will also require the closest of collaboration with our partners in Alaska. Improving awareness, modernizing governance, and broadening partnerships will best position our service for long-term success.

Ultimately, the U.S. seeks an Arctic region that is stable and free of conflict, where nations act responsibly in a spirit of trust and cooperation, and where economic and energy resources are developed in a sustainable manner. Activity in the region must also respect the fragile environment and the interests and cultures of indigenous populations. The Coast Guard has a long and rich history of operating and providing national leadership in this challenging region. However, adapting to changing conditions requires the clear priorities and coordination articulated in the president's *National Strategy for the Arctic Region.*

About the author:
CAPT Jonathan Spaner is the director of the Coast Guard Office of Emerging Policy, where he develops strategy for issues including the Arctic and Western Hemisphere affairs. CAPT Spaner has completed command tours and pilot ratings in the C-130 patrol plane, HH-60, and HH-65 helicopters. He also served as strategic policy advisor to the four-star general commanding war efforts in Iraq and Afghanistan. CAPT Spaner holds an MBA from the Massachusetts Institute of Technology and is a distinguished graduate from U.S. Navy Pilot Training. He is a former fellow at the Council on Foreign Relations and is also a former White House Fellow.

For more information:

The *U.S. Coast Guard Arctic Strategy* is available online:
http://uscgproceedings.epubxp.com/i/145626

Emerging Arctic Opportunities

Dramatic increases expected in Arctic shipping, oil and gas exploration, fisheries, and tourism.

by Mr. Paul Holthus
Executive Director
World Ocean Council

Ms. Carolyn Clarkin
Project Assistant
World Ocean Council

Mr. Jonathan Lorentzen
Project Assistant
World Ocean Council

In 2004, some 6,000 vessels (approximately 60 percent of which were bulk carriers, and container or general cargo ships) transited Arctic waters either across the north Pacific and Bering Sea, along the coast of Iceland and the Norwegian Sea, or along the northern coast of Norway and then into the Barents Sea.[1]

The World Ocean Council is an alliance for private sector leadership and collaboration in ocean sustainability, stewardship, and science. Members include more than 60 leadership organizations from a wide range of ocean industries, including oil and gas, shipping, seafood, fisheries, aquaculture, mining, renewable energy, ocean technology, maritime law, and marine environmental services.

In North America, destination shipping has increased along the Beaufort Sea and Northwest Passage. In addition, vessels traveling through the Bering Strait nearly doubled from 2009 to 2010 (reaching 430 vessels per year).[2] Tugs and barges currently make dozens of resupply trips between Canada's Northwest Territory and the U.S. Beaufort Sea coastline from mid-July through the end of October,[3] and vessels carrying goods to U.S. Arctic ports sail to Point Barrow or Prudhoe Bay through the Bering Strait and along Alaska's northern coastline.

Shipping Grows Amid Challenges

Growing demand for goods; increased exploration for oil, gas, and minerals; and associated infrastructure development will increase destination shipping in the North American Arctic. These activities are constrained, however, by the limited number of deep-draft ports in the northern and northwestern Alaskan and Canadian Arctic. For example, most U.S. ports near the Bering Strait are less than 10 meters deep, far less than required for most seagoing ships.

Trans-Arctic shipping is concentrated within the Northern Sea Route (NSR), a 2,600-nautical mile route along Russian's northern border, and the Northwest Passage (NWP), which consists of multiple routes through the Canadian Arctic Islands from Baffin Bay to the Beaufort Sea.[4]

Currently trans-Arctic shipping occurs via the NSR from late summer to early autumn and requires transit fees and Russian icebreaker escort. Beginning in 2009 with two vessels, NSR traffic doubled to four vessels in 2010—transporting 110,000 tons of cargo to China—including gas condensate from Russia and iron ore from Norway.[5] In 2011, the number leaped to 34 Northern Sea Route voyages, carrying more than 820,000 tons of cargo in a five-month period.[6]

Trans-Arctic shipping via the NWP is currently not viable, as the Canadian Arctic Archipelago is one of the last parts of the region to still have significant ice congestion in the summer. In addition, warming conditions often allow icebergs from the most northern latitudes to be swept down to Northwest Passage routes. Seasonal variability, route complexity, depth restrictions, lack of adequate charts, limited infrastructure, high operating costs for icebreaker escorts, and high insurance rates also inhibit NWP use.[7]

Overall, Arctic shipping will be subject to new legal regulations such as the IMO Polar Code, with mandatory requirements for ship design, construction, equipment, operating, training, safety and response, and environmental measures.[8]

other parts of the Arctic. For example, a number of companies have licenses to explore off Greenland—although exploratory wells failed to discover hydrocarbon reserves in Greenland waters in 2011.[11]

Elsewhere, several companies have leases to drill near Tuktoyuktuk, Canada, where oil production is expected to begin by 2025.[12] Strategic cooperative agreements have been developed between Russian and Western companies to jointly develop Russia's Arctic oil fields near Siberia and in the Barents Sea,

Offshore Oil and Gas

An estimated 90 billion barrels of oil, 1,670 trillion cubic feet of natural gas, and 44 billion barrels of natural gas liquids lie north of the Arctic Circle. These reserves comprise roughly 13 percent of the world's undiscovered oil, 30 percent of undiscovered natural gas, and 20 percent of undiscovered natural gas liquids.[9]

Offshore oil and gas exploration is moving forward in the U.S. Arctic. More than one company has Arctic offshore leases in the Chukchi and Beaufort seas, with eventual production anticipated to be 500,000 barrels per day.[10] More Arctic leases are expected in U.S. waters as a national strategy to promote energy exploration, development, and conservation proposes to make further offshore areas available.

Internationally, several major oil companies are involved in offshore exploration and drilling in

The Arctic holds significant offshore oil and gas reserves. U.S. Coast Guard photo by Petty Officer Sara Francis.

Commercial fishing activity is expected to expand in the Arctic as waters warm and ice recedes.

and establish the Arctic Research and Design Center for Offshore Development.[13]

The pace and location of Arctic oil and gas exploration and development depends upon profitability, jurisdictional issues, and regulatory arrangements. For example, in the Barents Sea, offshore oil and gas development is on the rise as a result of the 2010 political boundary agreement between Norway and Russia that provides for joint development of hydrocarbon resources that straddle the boundary.[14]

Fisheries

Arctic fisheries constitute about 10 percent of the world's catch, generating billions of dollars per year in revenues, representing 90 percent of the export earnings of Greenland, 33 percent of those of Iceland, approximately six percent for Norway, and less than one percent of the export earnings of the United States and Russia.[15]

Norway's Arctic region accounts for 37 percent of the country's fishery production, with $1.8 billion of Norwegian cod exports in 2011.[16] In Alaska, $1.3 billion of fish and shellfish were harvested in 2009.[17] At the same time, individual Arctic communities are almost wholly reliant on fisheries, fish processing, and marine mammals for their economic survival.

The Arctic Ocean includes a range of ecosystems, fish stocks, and fisheries, with significant differences between the Atlantic and Pacific sides of the region. Fishing activity has recently expanded significantly in some areas. For example, the Greenlandic shrimp catch has increased significantly in the last decade.[18] In the Canadian Arctic, fishing ship voyages expanded from 30 in 2005 to 221 in 2010, making fisheries by far the largest component of vessel activity in the Canadian Arctic.[19]

Arctic fisheries are governed by national, bilateral, and multilateral management arrangements that will affect future levels and patterns of fishing activity. Where fisheries take place in exclusive economic zones such as the North Atlantic, national regulations cover most state jurisdictional capacities. As diminishing ice coverage creates new fishing opportunities where management is not in place, Arctic states will have to develop regulations to discharge international obligations. For the U.S. Arctic waters north of Alaska's Bering Strait, the United States government has decided to close the area to commercial fishing until information is available to assess ecosystem health and develop sustainable fisheries management.[20]

Tourism

With increased access to the Arctic comes the ability for cruise ships to transport large numbers of passengers to various locations throughout the area. Cruise tourism possibilities now include trips to the North Pole itself—once the most formidable challenge of Arctic exploration.

Overall, Arctic marine tourism has grown by 500 percent from 1994 to 2009.[21] The trend is accelerating, with the number of Arctic cruise ship visitors doubling from 2004 to 2007, from 1.2 million to more than 2.4 million.[22]

The majority of cruise tourism activity is along the coast of Norway, along the coast of Greenland, and through the Canadian portions of the Northwest Passage. In 2007, Norway received 1.13 million cruise ship passengers; and, in 2008, the number of cruise ship passengers visiting Greenland increased by about 30 percent.[23] The number of cruise ships visiting northern Canadian islands in 2006, such as remote

Cruise ship tourism is growing rapidly in the Arctic.

Ellsmere and Baffin Island, doubled from 11 ships in the previous season to 22 ships.[24]

Despite the popularity of Arctic cruises, northern waterways remain dangerous, and emergency response is a major challenge. In August 2010, for example, a cruise vessel carrying 128 passengers ran aground in the Northwest Passage after hitting an uncharted rock. While no one was harmed, it took the Canadian Coast Guard two days to reach the stranded vessel.[25]

From 1972 to 2007, 27 polar cruise ships ran aground; also during this period, eight polar cruise ships sank, and 28 suffered disabling incidents caused by collisions, propulsion loss, or fire. In addition, from 1992 to 2007, there were a reported 42 pollution and environmental violations.[26]

Continuing Challenges

The Arctic region will likely yield an economic bonanza in a variety of ways, from mineral extraction to living resources and adventure tourism. With the expected growth of economic development and realization of economic opportunities throughout the Arctic region, it will be essential to leverage interagency and international cooperation.

About the authors:

Mr. Paul Holthus is the founding executive director of the World Ocean Council. He held senior positions with the United Nations Environment Programme and was deputy director for the International Union for Conservation of Nature's Global Marine Programme. Since 1998, he has worked primarily with the private sector to develop practical solutions for the sustainable use of the marine environment and has travelled to more than 30 countries with companies, communities, industry associations, U.N. agencies, international nongovernmental organizations, and foundations.

Ms. Carolyn Clarkin is a project assistant for the World Ocean Council. She also serves as the social media vice chair for the Section on Environment, Energy, and Resources Marine Resources Committee, and provides research and writing support for the ABA SEER handbook Ocean and Coastal Law and Policy. She previously worked as a law clerk for the Environmental Law Institute, earned her Juris Doctor from the University of Virginia, and graduated from Bucknell University with a B.A. in environmental studies and political science.

Mr. Jonathan Lorentzen works for the Honolulu Marine Area and Coastal Zone Advocacy Council, alongside his research work with the World Ocean Council. He is a 2012 graduate from the George Washington University, and has a B.A. in international affairs.

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The Arctic

Evolution of the last frontier.

by Mr. Nils Andreassen
Executive Director
Institute of the North

A young man from Kotzebue, Alaska, did not have strong cultural connections growing up. Coming from a remote area "North of the 48," he reminisces about the days he first learned how to hunt for whales—once a traditional subsistence activity for the people of his village.

He remembers helping a captain haul his boat onto a patch of sea ice to repair a hole. The young man removed the contents of the boat and started to walk away. Suddenly, he heard the captain call out to him and ask where he was going. The man replied by saying he did not know how to patch a boat. The whaling captain brought him back and assured him it was okay not to know. "We do," he said.

That simple answer illustrated a culture of sharing, life-long learning, and teamwork.

The State of Alaska

Alaska's state motto, "North to the Future" was a source of pioneering pride for nearly a century. From gold miners to fishermen and modern-day developers, all who traveled to Alaska made the journey because of its abundance of vast riches, energy resources, and for the promise of a better future. Today, explorers look to the Arctic and recognize what was once an aspiration is now simple reality. However, nothing is simple about the Arctic.

A lasting frontier takes advantage of the great wealth and other opportunities found in the Arctic by:

- maximizing extractive and renewable energy, and addressing great energy poverty;
- providing a responsive infrastructure, supporting social and economic development as well as an increasingly busy maritime environment;
- recognizing the needs of the community;
- responding to resource development;
- encouraging local workforce development, competitive resource rents, and local and sub-national revenue sharing;
- celebrating the commonality found in Northern cultures as well as differentiation in social, political, and economic frameworks that support the Arctic indigenous peoples.

Much of the dialogue in today's Arctic deals with the concept of who is "at the table." The Arctic Council is unique in that it has formally included the voices

of permanent participants—organizations representing indigenous cultures, traditions, and ways of life. These members, four of which are represented in Alaska, bring a compelling and invaluable perspective to policy making in the North.

But they don't speak for the state of Alaska, nor do they represent local government or the public at large. This is a huge gap in regard to aligning interests, and the disconnect between state sovereignty issues and federal oversight should be an incentive to consider new approaches. The U.S. is an Arctic nation because Alaska is an Arctic state. Alaska's interests and role need to be clearly defined and incorporated into decision making. The Alaska legislature formed the Alaska Arctic Policy Commission in 2012, to articulate Alaska's priorities and goals. Alaskans recognize the future of connectivity is marine, not land-based, and the need for an Arctic policy that includes people, shipping, minerals, security, infrastructure, and research.

Two formal efforts currently underway—the newly formed Alaska Arctic Policy Commission and the Pacific Northwest Economic Region Arctic Caucus—give Alaska forums to set and act on priorities as we begin looking north. The Pacific Northwest Economic Region Arctic Caucus, a body comprised of the governments of Alaska, the Yukon and Northwest Territories, as well as the private sector, provides a platform for actively advocating for state and territorial action items. In addition, at press time, the eight Arctic nations are prepared to sign the Arctic Marine Oil Preparedness and Response instrument.

The Role of Educational Institutions and the Independent Sector

It is clear that not everyone can be at the table when deciding policies that affect sovereign nations, nor should they be. However, in a region as dynamic and changing as the Arctic, processes are in place to incorporate multiple voices.

For example, Alaska's universities collaborate with other institutions to research climate change, engineering, permafrost, oil spill response, and energy development in the Arctic. This resource includes a commitment to workforce development, science and engineering, and culturally competent learning.

In addition, the independent sector, including groups such as the Institute of the North, is the connective tissue of the Arctic. Stakeholders hold critical conversations that cannot be discussed elsewhere. This type of engagement builds relationships, facilitates soft diplomacy, and supports creative ideas.

The intentional and organized interaction among a diverse array of actors: local, tribal, federal and state government; the private sector; academia; indigenous and environmental organizations; and a broader independent sector, results in responsible decision making on a broad scale.

Mr. Jacob Adams, Arctic Slope Regional Corporation board member, receives the Robert O. Anderson Sustainable Arctic Award from the Institute of the North, for his lifetime commitment to responsible development in the Arctic. Photo courtesy of Mr. Oscar Avellaneda.

A small boat harbor in Greenland. Photo courtesy of Mr. Nils Andreassen.

Alaskan leaders listen to a presentation by the Norwegian Ministry of Petroleum and Energy during the Norway policy tour, hosted by the Institute of the North. Photo courtesy of Mr. Nils Andreassen.

Alaskans in the Forefront

The Arctic is important on all levels: locally, domestically, and internationally. Americans, for example, depend on the region because of its strategic location, energy, and natural resources. The Arctic is emerging as a hot topic because of the perceived tension in extracting resources in a way compatible with the people who live in the region. With the increasing opportunity for new access to resources, comes the opportunity to do it right.

Alaskans have the opportunity to be the drivers behind the social and economic developments within their region, by:

- taking advantage of learning opportunities;
- drawing on scientific and traditional knowledge, and moving forward in a sustainable way by managing for variability;
- representing the region they encompass—vast, abundant, and diverse ecosystems with intact and connected habitats—and the resources they support;
- valuing factual, long-term solutions.

The Arctic cannot be managed based on ideology or short-term gain. Those at the table must demonstrate a willingness to work for the common good. Finally, the Arctic is changing fast. If we take our eyes off the proverbial ball, we may miss important opportunities.

About the author:
Mr. Nils Andreassen is the executive director of the Institute of the North, a nonprofit educational organization based out of Anchorage that is charged with a mission to inform public policy and cultivate an engaged citizenry.

For more information:

The Institute of the North works on an array of critical issues with regard to Alaska's Arctic. Focus areas include: strengthening Alaska's position in the Circumpolar North; economic and resource development; and broadening awareness of Alaska's priorities.

Its legacy work has focused on Arctic infrastructure development, including energy, aviation, telecommunications, and marine shipping.

More information about the Institute of the North can be found at www.institutenorth.org.

Time Equals Money

Developing a profitable shipping system using the Northern Sea Route.

by Mr. Felix H. Tschudi
Chairman
Tschudi Shipping Co.

The Northern Sea Route (NSR) can significantly shorten the transit time between the North Atlantic and the North Pacific, and has the potential to accelerate Arctic resource development. To achieve this, information regarding the route as well as its availability and significance, must become more widespread among cargo owners, ship owners, and industries that could benefit.

Although the Northern Sea Route is still being developed as a viable commercial option, use has already started and is picking up momentum. This accelerating development is partly due to climatic changes leading to ice reduction, technological advances, and renewed interest from Arctic nations. The main driver is high commodity prices—making higher costs and investments profitable—despite the higher operating costs in the harsh Arctic environment.

International Commercial Shipping via the Northern Sea Route

In 2006, Tschudi Shipping Group focused on port development and purchased the Sydvaranger iron ore mine that was closed in 1996, and the related port areas in Kirkenes, Norway. The mine went public in 2007, and in 2009, the first vessel departed for China with 75,000 metric tons of iron ore concentrate.[1]

During 2010, all shipments were planned to go to China via the traditional routes through the Suez Canal or via Cape of Good Hope. Against this background of an increasing number of shipments to China, it became natural to think of the Northern Sea Route as an alternative with potentially significant savings. This sounds like an attractive option, but it is not that simple to realize.

For example, to establish the commercial feasibility, a large number of stakeholders would have to be involved: cargo owners, ship owners, ship brokers, commodity traders, Rosatomflot (the Russian icebreaker operator), insurance and legal experts, classification societies, public authorities, and scientific institutions. But could these parties collaborate without individual interests or commercial considerations complicating the issue?

In April 2010, the nonprofit foundation Centre for High North Logistics took the initiative to organize a workshop with a number of different stakeholders. Representatives, mostly from Russia and Norway, gathered in Kirkenes to discuss opening the Northern

Centre for High North Logistics workshop. Photo courtesy of Tschudi Shipping Co.

The Northern Sea Route

Above left: USCG Rear Admiral Christopher Colvin (right) and CAPT Craig Lloyd (center), greet Russian Lt. Gen. Raphael Alexseevich Daerbaev (left), upon his arrival to Kodiak, Alaska, in April 2011.

Above right: The Russian tanker *Renda* transits toward the Port of Nome, Jan. 13, 2012. U.S. Coast Guard photos by Petty Officer Charly Hengen.

- **The Northern Sea Route shortens the distance between the Atlantic and the Pacific by 40 to 60 percent, depending on the location of loading and discharging ports.**
- **The navigational season is from July to November.**
- **The NSR stretches from Novaya Zemlya to the Bering Strait and is under Russian jurisdiction. Permission to pass is granted by the Northern Sea Route Administration in Moscow.**
- **Rosatomflot icebreaker escort is mandatory, at a cost that is roughly equivalent to Suez Canal passage.**

The Russian icebreaker *Yamal*, Canadian icebreaker *Louis S. St. Laurent*, and the Coast Guard Cutter *Polar Sea* rendezvous near the North Pole. U.S. Coast Guard photo by LCDR Steve Wheeler.

Sea Route for regular oil, gas, and dry bulk transportation between Europe and Asia.

During the workshop, it became clear that the Russian authorities welcomed the idea of increased shipping in the NSR, which gave a clear signal that such increased traffic would be facilitated. Based on this outcome, Tschudi took the initiative, with the Danish operator Nordic Bulk Carriers and a number of other parties, to try to realize a commercial passage of the NSR.

NSR Project 2010

The stakeholders called this effort the NSR Project 2010; and in September 2010, the bulk carrier M/V *Nordic Barents* completed the voyage from Kirkenes to the port of Lianyungang, China, saving approximately 17 days, compared to transiting the Suez Canal. Transiting the Northern Sea Route shortened the voyage by nearly 5,700 nautical miles, saving about 500 metric tons of fuel, with corresponding reductions in environmental emissions. An additional bonus: No pirates.

As Russia has regularly used the route since the 1930s, the significance of the transit was not the passage itself, but that it was carried out by a non-Russian vessel carrying a non-Russian cargo between two non-Russian ports. In this way, the NSR proved itself a viable international commercial trade route.

Operational Lessons Learned

July to November is the navigational season and the NSR has been practically ice-free during the months of August and September for the past few years. The varying depths and incomplete hydrographic surveying for certain areas limit the route options, but Russian authorities are conducting ongoing surveys, which will increase navigational options.

The main challenges during these months are fog, flat coastal landscapes, remoteness, and varying ice presence. In winter, the region experiences harsh ice conditions, extremely low temperatures, and constant darkness.

Changing weather conditions with pushing-off and pushing-to winds that may cause ice ridges are possible during all seasons. Ice forecasting services, which are becoming quite accurate and reliable, work to reduce this uncertainty.

Increased Use

In 2010, four vessels transited the Northern Sea Route. In 2011, 34 vessels passed, including a 162,000 deadweight ton tanker (the largest vessel ever to pass) and a 75,000 deadweight ton bulk carrier loaded with iron ore. In 2012, a total of 46 vessels passed through the NSR.[2]

During the 2011 and 2012 seasons, several 75,000 deadweight ton tankers transited the NSR with cargo both ways—gas condensate from Russia to China, and jet fuel from Korea to the European continent. A seismic vessel saved eight days mobilizing to New Zealand from Hammerfest, Norway, via the NSR, compared to the alternative voyage through the Panama Canal.[3]

Commercial Implications

In 2012, Lloyd's of London and Chatham House reported about $100 billion of investment will take place during the next decade in the Arctic, mostly in offshore energy.[4]

With the increasing importance of Arctic mining, the opportunity for faster access via the NSR to resource-hungry markets in Asia opens up. In the future, the Arctic, a region where gas meets ore, can serve as a platform for industrial processing *in situ* before shipment directly to international markets.

As we see it, opening the Northern Sea Route may have implications for several industries.

- The shipbuilding and construction industries will benefit by using the NSR for cost-efficient vessel positioning as well as from the increased demand for specialized ice-class vessels and structures serving offshore mining.
- For cargo owners and industrial companies, the NSR offers a shorter trade route between the North Atlantic and the North Pacific regions. Additionally, new sources of industrial raw materials and energy offer closer supply sources and the opportunity to develop a new industrial frontier.
- Shipping companies utilizing the Northern Sea Route from a northern European loading port in the Baltic Sea to the Far East save about 15 days (at 13 knots), depending on the port of discharge, compared to the Suez Canal. The distance between Vancouver and Rotterdam is eight days shorter than through the Panama Canal. In addition, repositioning and demand for destinational shipping services into and out of the Arctic will offer further trading possibilities.

Tschudi Arctic Transit performs ship-to-ship gas condensate transshipment to the tanker *Vladimir Tikhonov*, near the North Cape, Norway, before it departs for Thailand via the NSR. Photo courtesy of the Tschudi Shipping Co.

Destinational Shipping

In the near term, it is likely that destinational shipping will increase via specialized shuttle tankers, bulkers, multipurpose vessels, and liquefied natural gas carriers, as well as vessels transporting oil, gas, minerals, and equipment in and out of the Arctic.

For example, in 2012 the Russian Sakhalin Shipping Company launched a new seasonal service between the port of Everett, Washington, and Pevek, Chukotka, and other ports in the northeastern region of Russia.[5]

Short Term Outlook

The main factor influencing the short-term outlook for the NSR is the inherently unpredictable freight market; this is even more difficult to assess because

of varying fluctuations within the different shipping segments.

The main driver is the economic savings achieved by transiting the NSR relative to the traditional routes. Other important factors are commodity price differences in Asian and Western markets, delivery time sensitivity for various cargoes, and vessel repositioning cost. In this context, the time required to plan and execute the passage is important. It is a function of ice conditions, waiting time, availability of suitable vessels, and the time needed to get the approval to pass the NSR.

The main limitation is the supply of ice-class tonnage. Vessel availability varies greatly among different segments and sizes, but is very limited within the larger tonnages, in particular for dry bulk and liquefied natural gas carriers. Other factors include fuel prices, the NSR transit fees (laden and in ballast), and the cost of insurance and escorts.

In my opinion, the NSR is unlikely to take a major share of the transit cargoes between the Pacific and the Atlantic as the major trade routes of the world remain too far south for the NSR to become relevant for the largest cargo flows. Additionally threatening to future NSR development are the potentially prohibitive IMO Polar Code requirements and the longer-term uncertainty of climate change effects on future ice conditions. However, this should not be taken for granted as long as Russia wants it differently.

Russian President Vladimir Putin predicted that his country's Northern Sea Route would rival the Suez Canal as a global trade route.[6] In response, a new Russian bill regulating merchant shipping on the Northern Sea Route entered into force in March 2013.[7]

Presently, Rosatomflot's fleet of icebreakers consists of six vessels, which will be gradually phased out in 20 years. The Russian government is facing up to this challenge by ordering the world's largest and most powerful icebreakers for delivery at the end of 2017.[8]

Balancing Economic and Environmental Needs

The increased activity in the Arctic, with its collateral of new shipping opportunities, also represents new environmental challenges. There is a window of opportunity now, before the development accelerates, for designing the playing field in a way that balances the desire for economic development and the needs of the environment. Considerations must be taken to integrate economic and environmental needs and take into account issues such as routing measures, speed reductions, designation of particularly sensitive

Børge Ousland's blog, www.ousland.no/blog, documents the Arctic explorer's three-month journey around the North Pole. Photos courtesy of Tschudi Shipping Co.

areas, places of refuge, and emergency response preparedness.

It is also a challenge that transportation via the NSR is in its infancy and is very cost-sensitive at this stage. If costly regulations, such as a full-scale ban on heavy fuel oil are imposed, while alternative routes can continue to use it, the NSR will be uncompetitive from the beginning and never get up to a sustainable level. Developing a balanced regulatory framework is aided by the fact that the Arctic Council (the main driver of this process) consists of nations that all have direct interests in establishing sustainable economic and environmental solutions.

Presently, the best safety measures against accidents are Russia's regulatory requirements and mandatory Rosatomflot icebreaker escort. The addition of new powerful arctic icebreakers to the national fleets of a number of stakeholders are important steps in the right direction and will add to the collective global capacity in case of Arctic emergencies.

About the author:
Mr. Felix H. Tschudi is the chairman and owner of the Tschudi Group, a shipping and logistics group focusing on cargo flows between Northwest Europe, Russia, and Central Asia.

Mr. Tschudi attended the Royal Norwegian Naval Academy and served as sub-lieutenant in the Royal Norwegian Navy. He earned a second mate's certificate from merchant navy colleges in the UK, a BSc (Econ) from the London School of Economics, and an MBA from INSEAD, France.

He is also the chairman of the Centre for High North Logistics, a member of the World Economic Forum's Global Agenda Council on the Arctic, a member of the board of Maritimt Forum Oslofjord, and former president of the Oslo Shipowners Association.

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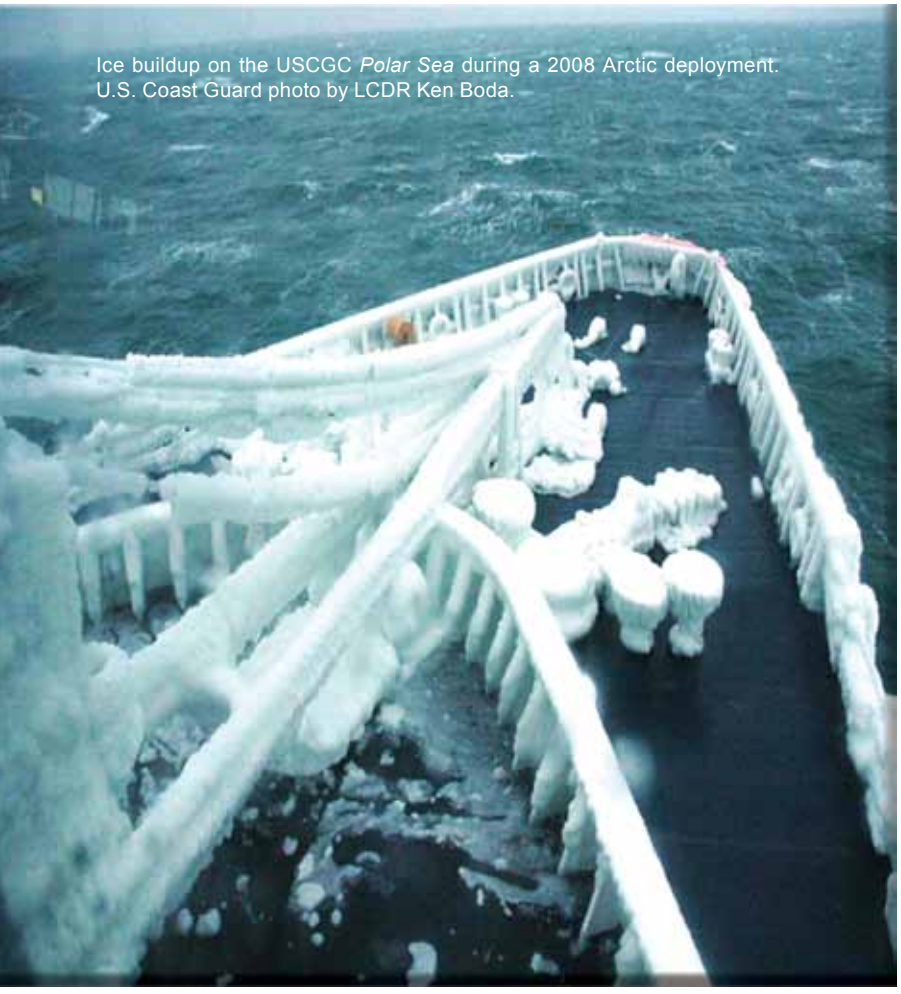
Ice Ops

Mission execution in the evolving Arctic.

by LCDR Kristen Serumgard
Polar Icebreaker Sponsor Representative
U.S. Coast Guard Office of Cutter Forces

LCDR Michael Krause
Polar Icebreaker Program Manager
U.S. Coast Guard Ice Operations and Mobility Division



Ice buildup on the USCGC *Polar Sea* during a 2008 Arctic deployment. U.S. Coast Guard photo by LCDR Ken Boda.

When the U.S. purchased Alaska, it became an Arctic nation. Since then, the U.S. Coast Guard has placed itself in the forefront of Arctic operations. Icebreakers and ice-strengthened cutters from the Revenue Cutter *Bear* to USCGC *Healy*, have conducted law enforcement, search and rescue, defense operations, community outreach, and scientific research support missions. Historically, the region's remoteness, severe climate, ice cover, and overall inaccessibility discouraged significant human activity, thereby limiting mission demand.

In recent years, reduced ice extent and increased Arctic accessibility has escalated the nation's awareness of our significant Arctic economic, environmental, and security interests. With this increased awareness will come increased activity and subsequent mission demand. In response, the president signed a national security presidential directive in January 2009,[1] providing the nation (and the Coast Guard) guidance in meeting national and homeland security needs in the Arctic region. Specifically, this directive focuses on:

- protecting the Arctic environment;
- conserving its biological resources;
- strengthening cooperation among the Arctic nations;

- involving the Arctic's indigenous communities in decisions affecting them;
- enhancing scientific monitoring and research into local, regional, and global environmental issues.

The Coast Guard, with responsibilities under most of these objectives, is proactively working to meet the demands while overcoming the challenges presented by operating in this remote and austere environment.

Arctic Operations and Challenges

The retreat of sea ice has not made the area less challenging; rather, Coast Guard crews must continue to overcome significant environmental, operational, and logistical difficulties. Even in the summer, the environment remains harsh, dynamic, and unforgiving. In July, the average temperature in Barrow, Alaska, is 47°F with the ocean remaining frigidly cold.[2] Due to the temperature differences between air and sea, thick fog is nearly a constant presence in the area—restricting visibility and hampering operations. As such, cutter-based aviation, boat assets, and their crews must be prepared to survive, should they become separated from the cutter due to fog or whiteout conditions.

While significant areas of open water exist in the summer months, the ice remaining in the Arctic may become more mobile, presenting unexpected and

A Coast Guard H-65 helicopter, outfitted with skis to facilitate landing on snow, conducts an awarthships take off. U.S. Coast Guard photo by LCDR Kristen Serumgard.

unwelcome encounters for non-ice strengthened vessels operating in the area. Further, the reduction in ice coverage, coupled with an increase in storm intensity and severity, can result in blizzard-like whiteout conditions and vessel and aircraft icing. Unfortunately, tools for situational awareness and weather forecasting—key to predicting environmental situations

The Arctic: Did you know...

National Ocean Policy

Following the 2009 National Security Presidential Directive (NSPD 66)/Homeland Security Presidential Directive (HPSD 25), in July 2010, President Obama signed an executive order that established the first comprehensive ocean policy to ensure better stewardship of our oceans, coasts, and the Great Lakes. It also established the National Ocean Council, in which the Coast Guard plays a key role.

The policy includes priority objectives focusing on coastal and marine spatial planning and how the nation should best respond to the changing conditions in the Arctic.

For more information, visit the National Ocean Council website at www.whitehouse.gov/administration/eop/oceans.

President Barak Obama signs an executive order regarding stewardship of the ocean, our coasts, and the Great Lakes. Official White House photo by Pete Souza.

Crew from Coast Guard Air Station Kodiak prepare a canister with equipment and crucial repair parts to be dropped to the 420-foot USCGC *Healy* near the North Pole. U.S. Coast Guard photo by Petty Officer Jonathan Lally.

impacting operations—are minimal or nonexistent due to limited and degraded sensing capabilities, exacerbating the hazards.

Additionally, only 11 percent of the Arctic Ocean is surveyed to modern nautical charting standards.[3] Indeed, much navigation information in these waters is developed from passing hands-on information and experience from one crew to the next. In some areas, crews are essentially conducting their own surveys.

Operationally, communications in the northern latitudes are poor and unreliable. With the majority of land-based communications equipment focused on the Gulf of Alaska and Bering Sea, communications near the North Slope mainly rely on satellites, which are often not available 24 hours a day. Installation and reliability of line-of-sight and beyond line-of-sight communications systems are hampered by the extreme weather conditions and atmospheric properties affecting radio wave propagation.

Finally, logistic infrastructure in the Arctic is severely limited or unavailable. Facilities necessary for a major response simply are not present. Little exists in the way of food, fuel, repair and maintenance facilities, or staging for assets and personnel north of the Arctic Circle. Vessels, aircraft, and personnel must either be capable of extended autonomous operations or have the ability to replenish from other forward-deployed assets. Aviation-based replenishment of stores and equipment is possible off Barrow, but must be coordinated around native subsistence activities. Nome, Alaska, is a viable port for ice-strengthened buoy tenders for pier-side replenishment and refueling; however, larger Coast Guard cutters require a port with deeper approaches. The closest such deepwater U.S. port to Barrow is Dutch Harbor on the Aleutian Island chain, located 1,200 nautical miles away.

Current Capabilities

Coast Guard cutters, aircraft, and response boats nearest to the region are fully engaged conducting other maritime missions and possess limited capacity to expand their operations to the North Slope. As a result, Arctic mission demands may require reprioritizating missions that assets are currently performing. Patrol cutters and buoy tenders provide capacity during the summer months, but only icebreakers provide safe year-round access to Arctic waters. As the nation's only governmental provider of ice-breaking services, the Coast Guard is at the forefront of emerging year-round operations.

High-endurance cutters and the new national security cutters—the Coast Guard's primary long-range offshore assets of the cutter fleet in the lower latitudes—are not designed for nor strengthened to operate in ice-covered waters. If mission execution requires assigning these assets to operate in the Arctic region, risk mitigation requires critical and continuous evaluation of ice conditions prior to and during deployment. The four 225-foot seagoing buoy tenders stationed in Alaska provide important ice-strengthened capability. However, the significant travel times to the area of responsibility and relatively limited endurance affects their ability to remain on scene and still have adequate time to complete their vital missions in southern Alaskan waters.

The Coast Guard's current aviation assets, while significant force multipliers for cutters, are not designed to operate in extreme cold temperatures. Aviation fuel gels at negative 42°F (a temperature common at sea level in the Arctic). The North Slope also lacks federal facilities for sheltering and performing maintenance for shore-based aviation assets. For cutter-based

assets, reduced visibility, inadequate communications, and sea states exceeding safe launch parameters place further limitations on operating these important assets in the Arctic.

Future Endeavors

In 2012, during *Operation Arctic Shield,* the Coast Guard deployed assets including aircraft, buoy tenders, and one of the new national security cutters in the largest seasonal deployment ever north of the Arctic Circle. The Coast Guard is meeting near-term mission demands with the current suite of Arctic-capable assets. As part of the *U.S. Coast Guard Arctic Strategy* implementation, we will examine long-term mission demands and how this will impact capabilities, including icebreakers, ice-strengthened surface vessels, communications, forward operating locations, shore-based response boats, and aviation assets.

As recession of the Arctic sea ice drives expansion of shipping, tourism, scientific research, and resource extraction, the nation will need to continue exploring how to best invest in specialized facilities and response assets to overcome the challenges of operating in this harsh environment. Shore-based support, maintenance, and operations capabilities (including buildings, boats, and aircraft toughened for extreme cold weather), remain essential to carry out the nation's goals. Communications capability akin to other U.S. waters is critical to efficient operations. While these assets are required for full Coast Guard effectiveness, icebreakers and ice-strengthened vessels remain essential to year-round access to ice-covered surface waters.

Acknowledging the need for new Arctic capabilities, the Coast Guard has begun the acquisition process for new polar icebreaking capability. However, new Arctic acquisitions must be balanced with continuing recapitalization of our current cutters, aviation assets, and boats, ensuring robust and continued operational capability, while preparing for future mission demands across the Coast Guard's entire range of missions.

Interest in the Arctic region is growing; many commercial and international players are moving ahead with their Arctic plans. As a result, the Coast Guard needs the capability to protect our nation's sovereignty, people, and resources in our territorial seas and exclusive economic zone. For the U.S. to fully ensure its Arctic interests are safeguarded, now is the time to make sure the nation has what it needs for operations in this forbidding, important, and emerging frontier.

About the authors:

LCDR Kristen Serumgard is the polar icebreaker sponsor representative in the Office of Cutter Forces at Coast Guard headquarters. Her previous afloat tours include deck watch officer aboard USCGC Polar Sea, *and executive officer for USCGC* Orcas *and* Hollyhock.

LCDR Michael Krause is the chief of the Mobility and Ice Operations Division at USCG headquarters. He served with the International Ice Patrol in polar and domestic icebreaking program management. His afloat experience includes icebreaking in the Arctic and Antarctic, law enforcement, and search and rescue operations.

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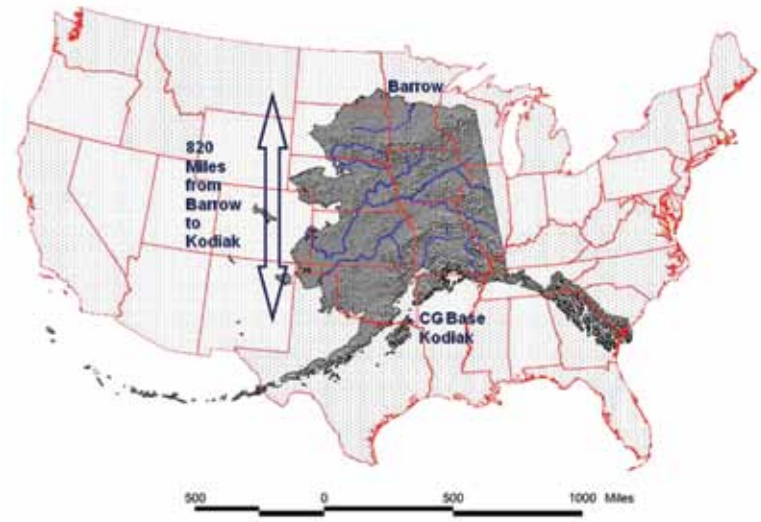
The Big Chill

Working to overcome logistical support challenges in the Arctic.

by CAPT Adam Shaw
Chief of Prevention
U.S. Coast Guard District 17

CDR David J. Godfrey
Commanding Officer
U.S. Coast Guard Electronic Systems Support Unit Juneau

In anticipation of expanding dynamic Arctic maritime activities, the U.S. Coast Guard is taking steps to boost its prevention and response posture. Along with expanding search and rescue and law enforcement duties in a region of limited maritime activity, the Coast Guard is faced with rapid growth of marine traffic, offshore exploratory drilling, and ecotourism. Simultaneously, the Coast Guard must position itself to address emergency response in harsh, unrelenting weather conditions.



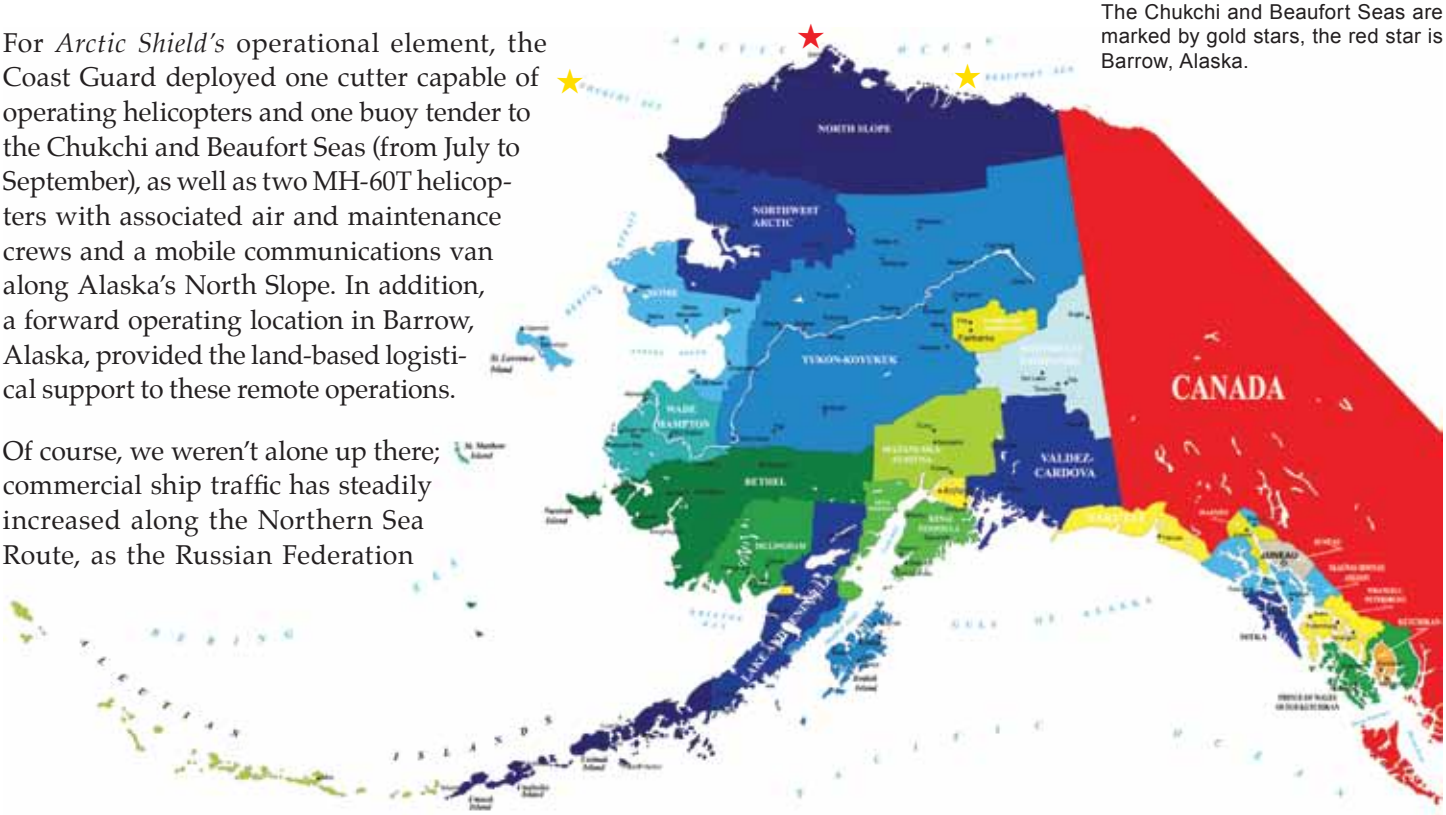
Alaska is superimposed on the continental U.S., emphasizing the distance from the Coast Guard base in Kodiak to Barrow, on Alaska's North Slope. Image courtesy of the U.S. Department of Agriculture.

In meeting these operational challenges, the Coast Guard faces significant hurdles including a lack of infrastructure, limited maritime domain awareness, and the vast distances associated with operating off Alaska's North Slope. To overcome these challenges, the U.S. Coast Guard District 17 (D17) commander has worked closely with elements of the Deputy Commandant for Mission Support (DCMS) organization to position the Coast Guard for successful operations in the emerging Arctic maritime environment.

Arctic Shield 2012

The result: *Arctic Shield 2012*, an unprecedented operational effort, held in the summer of 2012, consisting of three main elements—operations, outreach, and capability assessment. The first element focused on expanding the Coast Guard's surface and air operations to include a presence on Alaska's North Slope—a large area that did not previously require asset deployment due to historical ice coverage. The nearest Coast Guard air station is in Kodiak, Alaska, more than 800 nautical miles away, which requires four hours of flight time for a HC-130 Hercules fixed-wing aircraft and more than 10 hours for a MH-60T rotary-wing helicopter—in good weather. Coast Guard cutters routinely patrol the Bering Sea, but it can take at least three days for one of these cutters to reach the Arctic Ocean.

For *Arctic Shield's* operational element, the Coast Guard deployed one cutter capable of operating helicopters and one buoy tender to the Chukchi and Beaufort Seas (from July to September), as well as two MH-60T helicopters with associated air and maintenance crews and a mobile communications van along Alaska's North Slope. In addition, a forward operating location in Barrow, Alaska, provided the land-based logistical support to these remote operations.



The Chukchi and Beaufort Seas are marked by gold stars, the red star is Barrow, Alaska.

Of course, we weren't alone up there; commercial ship traffic has steadily increased along the Northern Sea Route, as the Russian Federation promotes the route as a safe and economical alternative for shipping goods between Asia and Europe. Moreover, Shell Oil Company contributed to the increase of maritime traffic in the summer of 2012, deploying 22 vessels, multiple aircraft, and two drill rigs to the Chukchi and Beaufort Seas. The significant number of aircraft and vessels operating in the area increased the risk for search and rescue deployment, environmental pollution incidents, and risked interference with Alaskan Native subsistence lifestyles.

To address this risk, the second element included outreach efforts, such as doctor and veterinarian visits to dozens of North Slope villages, as well as Coast Guard engagement with tribal elders and meaningful dialogue with natives and subsistence management groups. These activities provided essential medical services to remote communities; built partnerships with federal, state, local, and tribal agencies; and increased awareness of the Coast Guard's roles and missions for Arctic residents and our strategic partners.

The final element of *Arctic Shield 2012:* Assess the capability requirements to operate in remote regions with harsh weather conditions. Specific assessments included maritime domain awareness, communications, and air and surface capabilities. Exercises focused on deploying a spilled oil recovery system (SORS) from a buoy tender and delivering large-scale response berthing, mess, and essential supplies to a remote site.

Who Are You Going to Call?

Considering the monumental scope of activities conducted during *Arctic Shield 2012* in this demanding environment, long-term logistics planning was imperative for flexibility and the ability to respond to day-to-day conditions and emerging requirements. In response, D17 personnel called on the primary mission support unit at Base Kodiak to coordinate logistical support for the Barrow, Alaska, forward operating location.

The DCMS organization provides logistical support for operational units, especially for contract and procurement levels above the operational command. In this case, Base Kodiak provided a single point of contact for the operational commander to access and coordinate the wide variety of DCMS services, which included logistical support, berthing, communications, supplies, and transportation.

Why is Everything so Difficult (and Expensive)?

Determining a location for the *Arctic Shield 2012* forward operating base was a daunting task. Despite having very limited infrastructure and nominal lodging capacity, D17 personnel eventually determined

Barrow, Alaska, the northern-most city in the United States, has limited infrastructure to support large-scale operations. U.S. Coast Guard photo by LT Jason Smilie.

that Barrow, Alaska, was the preferred location, due to its centralized location along the North Slope and proximity to Wiley Post-Will Rogers Airport.

Complicating matters, Barrow has no roads and is only accessible by air for part of the year. In addition, Arctic sea ice prevents transportation by sea for most of the year; and, during the summer, the beach landings can only handle small landing craft and fuel barges. As a result, if the required resources did not already exist in Barrow, the project team had difficulty getting them there in time for the operation.

A Coast Guard C-130 completes a logistics flight to Barrow, Alaska. U.S. Coast Guard photo by LT Jason Smilie.

Furthermore, due to Barrow's size, planners needed to address the question of how to feed and house additional personnel. Managing the environmental footprint (such as sanitation) from a surge of response personnel is huge for a small community located on a permafrost foundation. To compound the logistical difficulties, basic Coast Guard telecommunications services (such as VHF and HF radio communications), which are found almost everywhere in the rest of the United States, are nonexistent in Barrow.

Another pressing issue for the Coast Guard was its desire to limit the impact on the local tourism economy. Many individuals and businesses in Barrow rely on summer tourist activity for part of their livelihood. Since Barrow only has three hotels, we did not want to compete for lodging and other services, negatively impacting tourism revenues.

Providing hangar space for the two MH-60T helicopters was another critical factor for the operational commander. Even in the summer, weather conditions in Barrow are harsh, and prolonged exposure would negatively impact the helicopters and create significant maintenance issues. Indicative of the limited infrastructure, there are only two suitable hangars at the Barrow Airport, and Shell Oil had leased one of those to support its operations. Unfortunately, there were concerns with the remaining hangar—its entrance was narrower than the desired clearance. In addition, the hangar had only a dirt floor and the attached office space was in a state of disrepair.

Finally, all these activities had to be conducted in compliance with all federal environmental regulations related to the National Environmental Policy Act, as well as conducting consultations under the Endangered Species Act and Marine Mammal Protection Act.

How Did We Do It?

Base Kodiak's project team started in mid-January 2012, and immediately focused on obtaining berthing for the 50-plus personnel who would be deployed to Barrow, communications equipment, vehicles for local transportation, and a suitable helicopter hangar.

Meeting the berthing requirements for the 16 aviation personnel provided a challenge, as the air crews needed to be close to the airport to meet their required "time to launch" for SAR response. So the project team reserved 12 rooms at the hotel closest to the airport.

In addition, due to the lack of any line-of-sight communications, D17 staffers obtained the Coast Guard's mobile communications van during the deployment, (which came with its own staffing requirements for communications and security watches), so the project team had to find berthing for 28 personnel for the duration of the operation. They would later be joined by the 17-person team assessing the SORS deployment in early August and by various VIPs and surge personnel throughout the summer and early fall. Fortunately, the remainder of the individuals did not have the aviator's berthing constraints, and the team was able to use two former Department of Defense facilities in Barrow to cover planned and contingency berthing requirements.

To resolve the hangar issues, Civil Engineering Unit Juneau personnel and the Coast Guard's real property experts at the Shore Infrastructure Logistics Center (SILC) negotiated a lease that required the hangar owners to upgrade the floor and refurbish the administrative spaces, solving two concerns. The only way to resolve the final issue—whether the hangar's entrance was large enough—was to fly an MH-60T to Barrow and see whether it would fit. After a successful "fit-test," SILC awarded a short-term lease for the hangar in time to cover the operational period.

New flooring, on the pallets to the right, was instrumental to hangar upgrading. U.S. Coast Guard photo by LT Faith Reynolds.

Obtaining vehicles for local transportation was also a significant issue. Similar to the berthing challenge, the Coast Guard did not want to monopolize the rental car market. There were minimal rental cars available in Barrow and all were cost-prohibitive. The project team opted to use government vehicles from Base Kodiak and the Government Service Agency fleet in Anchorage, via Air Station Kodiak C-130 logistical flights.

The Coast Guard mobile communications van in Barrow. U.S. Coast Guard photo by LT Jason Smilie.

Civil Engineering Unit Juneau and the SILC also partnered with the Naval Facilities Engineering Command, Northwest, for several months to complete an environmental assessment on the planned Coast Guard operations. Fortunately, the assessment showed that the Coast Guard's planned activities met federal environmental requirements and would have no significant impact on the Arctic environment.

Finally, to maintain positive relations, the Coast Guard conducted town hall meetings and held discussions with municipal and tribal leaders in Barrow to discuss Coast Guard operations. One key goal was to minimize the impact to local residents and subsistence hunters. The D17 tribal liaison officer also conducted cultural communications training for Coast Guard personnel engaged in *Arctic Shield 2012* activities.

Road Map to Success

Solving the tremendous operational and logistical issues involved long-term planning and an effective collaboration among operational and mission support units. The DCMS organization provided a single point of contact for the wide variety of services; this was key to a successful operation.

The logistical support developed for *Arctic Shield 2012* activities serve as a template for future operations, allowing the United States to maintain a real and sustainable presence in the Arctic.

About the authors:

CAPT Adam Shaw is the chief of Prevention for the 17th Coast Guard District and is on his third tour of duty in Alaska. He has served in the U.S. Coast Guard for 25 years in multiple prevention and response positions, including four afloat tours as commanding officer.

CDR David Godfrey has served in the U.S. Coast Guard for 20 years. In addition to serving six years aboard Coast Guard cutters, he served in a variety of logistical and command, control, communications, computer, and information technology billets.

Arctic Shield 2012

Logistics, statistics, and lessons learned.

by CDR Frank McConnell
U.S. Coast Guard 17th District Arctic Operations Coordinator

The Arctic Ocean is the new maritime frontier. Each year during the summer and fall, the ice recedes and exposes open water in the Arctic Ocean, Chukchi and Beaufort Seas, and the northern portions of the Bering Sea. This creates new areas of navigation and increases the need for a U.S. Coast Guard presence. In fact, the Coast Guard's 17th District (D17) operational theater roughly doubles in size during the summer and fall seasons.

Coast Guard Cutter *Bertholf* crewmembers Petty Officer Alex Luna, Chief Warrant Officer Danny Kilburger, LTJG Nicole Bredariol, and Petty Officer Jesse Kassbaum teach students at Alak School in Wainwright, Alaska, about boating safety and how to properly wear life vests. U.S. Coast Guard photo by Petty Officer Timothy Tamargo.

As a direct response to increasing maritime activity, which has also nearly doubled in these regions of the Arctic during the past 10 years, the Coast Guard began seasonal asset and personnel deployments to the Arctic in 2008, cumulating in *Arctic Shield 2012 (AS12)*, a three-pronged operation in Alaska's coastal Arctic domain that focused on community outreach, operations, and capabilities assessments.

Community Outreach

This outreach effort was very similar to a previous D17 Arctic operation called *Arctic Crossroads*. During *AS12*, community outreach included a more robust and better funded effort for education and health services than in past years. It also focused on supporting the under-served Arctic communities, specifically Barrow, Nome, Kotzebue, and its outlying native villages.

Education outreach included water, ice, and ice rescue safety awareness, and commercial fishing vessel safety training. Health services support included medical and dental screenings and veterinary support—primarily for working dog populations.

This outreach to Alaskan natives and Arctic municipal and tribal governments has strengthened partnerships in the region. Additional outreach to potential stakeholders, including Greenpeace and subsistence hunting organizations, focused on safety of life at sea. All told,

At Hogarth Kingeekuk Sr. Memorial School, LT Tom Pauser answers a student's question about cold-water safety and demonstrates the proper use of a life jacket. U.S. Coast Guard photos by Petty Officer Grant DeVuyst.

personnel conducted 55 Arctic outreach events in 26 different communities including:

- completing 79 commercial fishing vessel safety exams;
- coordinating dental, medical, and veterinary services for 18 remote villages;
- conducting boating, water, and ice safety training for more than 2,900 local residents.

Outreach Lesson Learned

District 17 personnel must continue cultural sensitivity and environmental awareness training to maintain this successful community outreach. The operations order should include cutter outreach goals as secondary missions for each of the deployed cutters in area of the North Slope of Alaska.

Operations

The aviation forward operating location in Barrow, Alaska, hosted two MH-60 Jayhawk helicopters and aircrews, maintenance personnel, and a transportable communications center and supporting personnel for aviation communications in the region.

Aviation

The MH-60 aircraft flew 289 hours, conducted 11 search and rescue missions, conducted ice reconnaissance and maritime domain awareness, and provided support for Department of Homeland Security and other government officials. In addition, C-130s from CG Air Station Kodiak provided 70 logistics sorties—delivering 1 million lbs. of cargo and fuel; and conducted 15 Arctic domain awareness sorties along with 34 hours of ice reconnaissance. The communications detachment completed more than 1,200 hours of community service to Barrow and daily communication watchstanding duties.

Vessels

AS12 deployed national security cutters, high endurance cutters, and medium endurance cutters for Arctic domain awareness, along with search and rescue, law enforcement presence, and safety zone enforcement around the drill rigs and supporting vessels at two exploratory drilling sites.

Ground crews at forward operating location Barrow, Alaska, transfer fuel from a Coast Guard C-130 to an awaiting fuel truck. U.S. Coast Guard photo by Petty Officer Elizabeth H. Bordelon.

Ground crew from Coast Guard Air Station Kodiak, Alaska, prepare an MH-60 Jayhawk helicopter for morning operations. U.S. Coast Guard photo by Petty Officer Elizabeth H. Bordelon.

Additionally, crews aboard seagoing buoy tenders and patrol craft conducted safety zone enforcement in the Port of Dutch Harbor around drill rigs and supporting vessels. Outreach and engagement with environmental organizations indicated little threat of disruptive activity, and planned safety zone resources were scaled accordingly. Ice persistence at the beginning of the summer postponed the Arctic deployment plan and drilling schedule—extending CG operational presence to late October.

Aviation Lessons and Recommendations

During *Arctic Shield 2012*, helicopter fuel was not commercially available in Barrow and had to be flown in. As a result, plans for the next deployment will include the Coast Guard establishing a defense logistics agency contract for helicopter fuel.

Cutter Lessons and Recommendations

Coast Guard personnel not normally assigned to D17 units were often not familiar with marine protected species policies and foreign-flagged research vessel permits to operate in the U.S. exclusive economic zone. To close this gap, District 17 staffers will provide additional area of responsibility-specific information and training for all non-D17 unit personnel prior to any upcoming Arctic deployment.

Also, cutter scheduling did not optimally align with operational needs (such as the drilling permit window or safety zone enforcement period). Therefore, D17 leaders will collaborate more with USCG Pacific Area to harmonize cutter schedules with operational events and timeframes.

Capabilities Assessments

Exhibiting joint operational capability and commitment among the U.S. Coast Guard, the U.S. Navy Supervisor of Salvage, and the U.S. Northern Command, *Arctic Shield 2012's* capability assessments included a spilled oil recovery system contingency exercise that employed skimming equipment off the

An MH-60 Jayhawk helicopter, one of two moved 900 miles north from Kodiak to Barrow, Alaska, sits on the runway in front of forward operating location Barrow. U.S. Coast Guard photo by Petty Officer Elizabeth H. Bordelon.

Coast Guard communication crews establish a mobile communication center in support of forward operating location Barrow, Alaska. U.S. Coast Guard photo by Petty Officer Charlie Vice.

coast of Barrow. This three-day capability assessment included deploying a U.S. Coast Guard oil skimmer, a U.S. Navy oil skimmer, and an ice capable commercial oil skimmer.

The USCG Research and Development Center's personnel conducted additional capability assessments with two experimental amphibious craft capable of traversing land, open water, and ice, and also conducted sound surveys to develop a noise baseline for USCG helicopter operations in Barrow.

Capability Lessons Learned

Opportunities to use and test equipment, refine procedures, and train people to work in the extreme North, helped shape *Arctic Shield 2012* operations. While the deployments were successful, the exercise revealed the lack of support facilities (for example, no port services), challenges of operating in and near ice, and difficulties in resupplying via small boat.

Coast Guard Cutter *Sycamore* crewmembers deploy the cutter's spilled oil recovery system equipment near Barrow, Alaska. U.S. Coast Guard photo by Petty Officer Kelly Parker.

Other Lessons Learned

While *AS 2012* was an operational success, it also provided the Coast Guard with valuable lessons learned and insight into the environmental, financial, and cultural hurdles that need to be accounted for, to conduct operations in the Arctic. Through *AS12*, the USCG also developed a baseline of operational capabilities with current technologies and assets, which will be used to plan and evaluate future operations.

Extreme Weather

One of the most difficult weather forecasting models is determining ice-free periods in the Arctic Ocean. Additionally, challenges arise with varying and quickly changing weather conditions such as extreme cold, low overcast ceilings, heavy fog, high winds, and rough seas. Also, the region experiences long periods in the summer when the sun doesn't set and in the winter when it doesn't rise.

All CG members deployed in support of *Arctic Shield 2012* received Arctic weather awareness and situational awareness training. This best practice will continue for future deployments.

Coast Guard Cutter *Bertholf* receives supplies during an airdrop from an Air Station Kodiak HC-130 Hercules airplane in the Arctic Ocean, allowing *Bertholf* to conduct operations without having to come back to port. U.S. Coast Guard photo by Petty Officer Timothy Tamargo.

Overcoming Vast Distances

The USCG District 17 area of responsibility includes more than 44,000 miles of shoreline. Generally, the existing infrastructure on the North

Slope only supports the existing remote local populations. Therefore, the Coast Guard flew all CG supplies (including fuel, spare parts, and logistics) from CG Air Station Kodiak, more than 800 miles away, or shipped them by boat from regions as far as 1,200 nautical miles away.

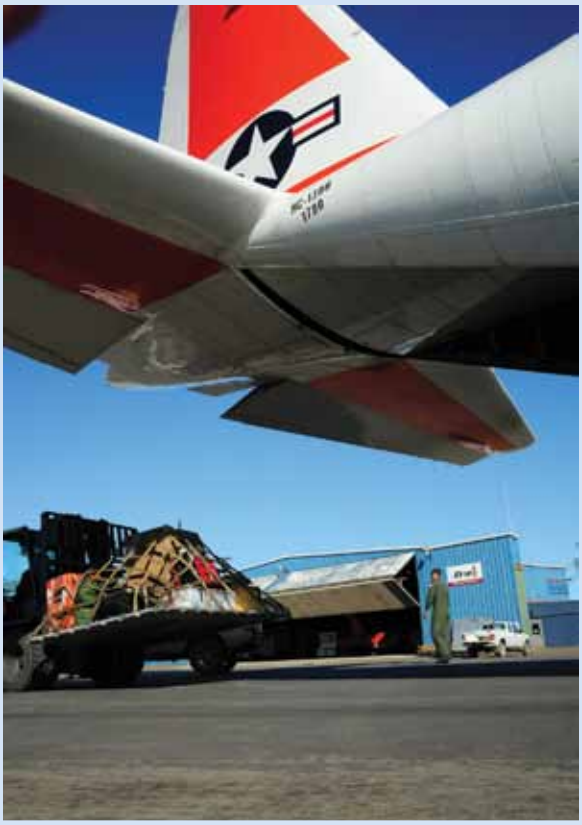
To prevent overwhelming the local infrastructure or competing for local resources, military operations in the Arctic need to be self-sufficient. Future Coast Guard operations will need to provide all of the basics for living and working in this remote region including food, shelter, water, and medical attention, along with any mechanical support for vehicles, boats, electronics, and aircraft.

Environmental Compliance

Coast Guard leaders must formally assess activities in the Arctic to ensure continued compliance with the National Environmental Policy Act, Endangered Species Act, Marine Mammal Protection Act, and the National Historic Preservation Act. In 2012, CG personnel executed an environmental assessment for *Arctic Shield* operations and received a finding of no significant impact for these operations.

Due to the increased activity anticipated for future years, we must seek formal assessments to continue to operate in the Arctic. The cost and time of such an undertaking is large and will need Coast Guard headquarters staff involvement as well as Department of Homeland Security participation.

Coast Guard communication crews load a mobile communication center onto a Coast Guard C-130 at Coast Guard Air Station Kodiak. U.S. Coast Guard photo by Petty Officer Charlie Vice.


Two helicopters with supporting air, ground, and communications crews were moved 900 miles north from Kodiak to Barrow, Alaska, to support *Arctic Shield 2012.* U.S. Coast Guard photo by Petty Officer Elizabeth H. Bordelon.

Physical Security

Physical security is not only necessary for protection from potential lawful protestors or possible terrorist threats, but also to protect against dangerous wildlife in the region.

For example, Alaska's North Slope is prime polar bear habitat. Polar bears are not only dangerous, but are also considered a threatened species under the Endangered Species Act of 1973.[1] Fortunately, polar bears did not affect operations—no injuries or close calls were reported—and few were seen near the communications detachment's trailer.

Tribal Relationships

Alaska has 229 federally recognized native Alaskan tribes, and their values, behaviors, beliefs, attitudes, and traditions may have been unfamiliar to some. However, deployed Coast Guard personnel respected and preserved these native values and cultures through daily *Arctic Shield 2012* interaction. Respectful interaction and good relationships with native villagers was not only expected by everyone, but also encouraged through training. This practice will continue indefinitely.

Needed Infrastructure

AS12 operations suggest that the USCG needs enhanced infrastructure on the North Slope of Alaska (more suitable hangar space, antenna/communications backbone, and appropriate berthing), and increased marine safety facility inspectors and investigators for the Arctic region.

As a result, D17 leadership is currently working with the Department of Defense and federal, state, and local governments to share the cost of creating dedicated infrastructure in the Arctic. These discussions are in the beginning stages and have financial and resource limitations—making the timeline for developing these partnerships unknown.

It is a tight fit just to house the two MH-60s in the Barrow, Alaska hangar, but it's the only game in town. U.S. Coast Guard photo by CDR Frank McConnell.

Looking Ahead

The Coast Guard had many successes during *Arctic Shield 2012* including: the first deployment of a national security cutter to the Arctic, the USCG *Bertholf;* the first long-term aviation detachment and communications detachment deployment to the North Slope; and completing thousands of hours of outreach to the under-served remote villages of northern coastal Alaska. Additionally, we also learned a lot as well, such as what it takes to survive and operate in the Arctic region. Today, we have a better understanding of what it will take to operate on a long-term basis and the unique environmental responsibilities that come with operating in the Arctic.


This tent is the operations center for communicating with aircrews during flights. U.S. Coast Guard photo by Chief Warrant Officer Dana Warr.

The Coast Guard has collected lessons learned from all units involved in *AS12,* which are consolidated into a comprehensive document for future USCG deployments. This will ensure that we can continue to provide a sustained and credible seasonal presence in the Arctic while meeting all national security and service goals for the foreseeable future.

About the author:
CDR Frank McConnell has served in the U.S. Coast Guard on active duty and in the reserves for 33 years in many capacities, most notably as the Arctic operations coordinator for Arctic Shield 2012 *and as a member of* Operation Deep Freeze 1980. *He has received the Meritorious Service Medal, the Coast Guard Commendation Medal, the Coast Guard Achievement Medal, and the Arctic and Antarctic Service Medals.*

Endnote:

1. Endangered Species Act of 1973. Found online at the National Oceanic and Atmospheric Administration website www.nmfs.gov/pr/species/.

Navigation North of the Arctic Circle

by LCDR Michele Schallip
Commanding Officer
U.S. Coast Guard Cutter Spar

In many parts of the world, sailors rely on information and support to navigate safely through inland and international waters. They use weather reports, shoreside data, and numerous floating and fixed aids to navigation, which mark recently sounded, well-charted traffic patterns and ports. Docks and boat harbors also line the coasts, providing fuel, food, rest stops, and emergency response.

However, these resources and modern conveniences are not available in the Arctic. Navigation north of the Arctic Circle presents challenges in that it is limited in many of the basic references sailors rely on in most other areas. Some chart information even pre-dates the U.S. purchase of Alaska in 1876 and is based on lead-line soundings from Russian and British exploration in the 1800s.

Dated Data, Other Challenges

Ice covers the Arctic for a majority of the year. Tidal and current reference points are wide-spaced and not always accurate. In addition, most of the water north of the Arctic Circle is charted in scales difficult for precise near-shore navigation.

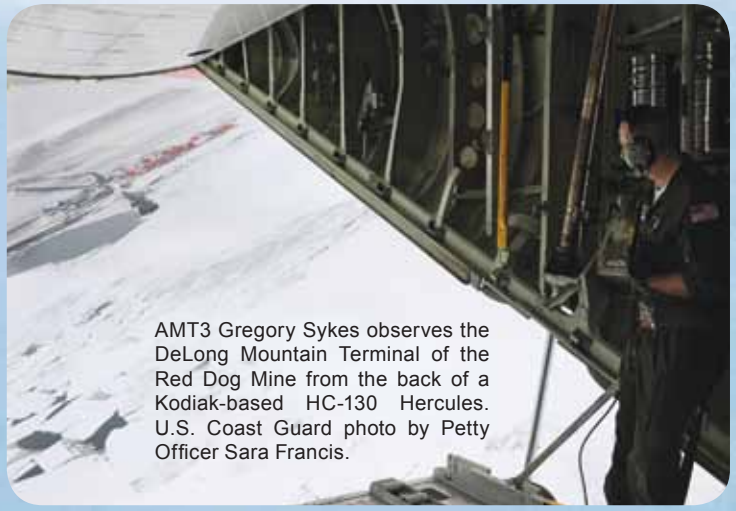
For example, the scale for the most detailed National Oceanographic and Atmospheric Administration (NOAA) chart for Point Barrow is 1:47,983. This means

The Arctic: Did you know...

Red Dog Mine

The Red Dog Mine, named after a bush pilot's dog, is the world's largest producer of zinc concentrates and a major producer of lead and other key minerals. The mine, located north of the Arctic Circle and 55 miles from the Chukchi Sea, is an open-pit truck-and-loader operation, which uses conventional drill and blast mining methods.

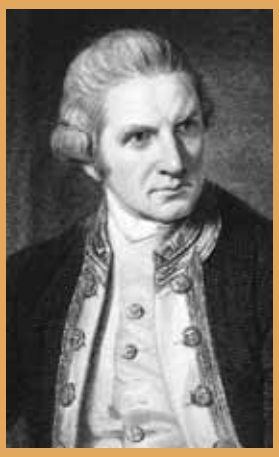
The mine trucks partially processed ore to its port facility from July to mid-October. Massive ore carriers anchor off the mine's port facility between Kotzebue and Kivilina, where barges carry the ore to the ships anchored in deeper water. These ships then transport the ore to smelting facilities in British Columbia, and to customers in Asia and Europe.



AMT3 Gregory Sykes observes the DeLong Mountain Terminal of the Red Dog Mine from the back of a Kodiak-based HC-130 Hercules. U.S. Coast Guard photo by Petty Officer Sara Francis.

The History

The earliest Arctic navigators were the indigenous people, who used shallow-draft boats to hunt whale and walrus. They also used traditional knowledge passed down through many generations to navigate during the summer months.



In 1778, Captain James Cook searched for the ice-free Northwest Passage through the Arctic for the British government. He carried with him rough charts drawn from Vitus Bering's early 1700s Arctic exploration, on behalf of the Russian Empire. These charts, while accurately charting the Russian ships' route, failed to provide the navigational information Captain Cook had hoped they would.[1]

Although solid ice prevented discovery of a northerly route during his trip, Captain Cook and his crew greatly improved Arctic bathymetry documentation.

In the mid-1800s, more non-native sailors navigated to the Arctic, transiting from the North American eastern seaboard to hunt whales. Through the years, the whaling industry waned and fewer ships transited the icy Arctic waters.

Endnote:

1. Barnett, J. *Captain Cook in Alaska and the North Pacific.* Anchorage, Alaska: Todd Communications, 2008.

every inch on the chart represents 47,893 inches or 0.7 nautical miles. In contrast, the largest scale chart available for Fort Lauderdale, Fla., is 1:10,000 or one inch equals 0.14 nautical miles. The narrowest point between the United States and Russia, the Bering Strait, has a scale of not less than 1:400,000 for an area 55 miles wide.

Few short-range aids to navigation mark Arctic waterways. Yearlong floating and coastal aids are no match for the long, harsh Arctic winters. While there are some government-maintained shore aids to navigation in Arctic communities, such as Point Hope and Kotzebue, most of these are seasonal. Floating aids to navigation north of the Bering Sea are also seasonal and maintained by private entities.

Additionally, the Arctic region has few weather stations and no weather buoys above the Arctic Circle. Two NOAA weather stations, one at Red Dog Mine and the other in Nome, provide the only immediate maritime weather information such as wind speed, direction, and barometric pressure. Therefore, real-time weather information remains an issue.

Efforts to Improve Navigation

The number of vessels sailing above the Arctic Circle is increasing. As a result, initiatives are underway to improve navigation in the Arctic and to overcome its lack of resources. For example, the National Oceanographic and Atmospheric Administration's Office of Coast Survey has identified about 325,000 square miles of navigationally significant areas.[1] In early 2012, the agency completed a new chart of the Kotzebue Bay Sound, providing important detailed navigation information to those transporting goods to and from the Red Dog Mine. In February 2013, NOAA's Office of Coast Survey, in conjunction with its Center for Operational Oceanographic Products and Services and the National Geodetic Survey, published the updated Arctic Nautical Charting Plan to lay out a strategy to improve Bering Sea and Arctic nautical charts.[2]

To increase real-time weather information, many mariners participate in the World Meteorological Organization voluntary observing ship scheme. Under this program, volunteers transmit real-time information to meteorologists by radio or satellite, which is then incorporated into weather reports and predictions.

Vessel Traffic

As transpolar and destinational traffic continues to increase and evolve, all mariners must approach the navigational challenges with caution. If we are all prudent navigators, a wide spectrum of users, including

Coast Guard Cutter *Spar* Crew Outreach

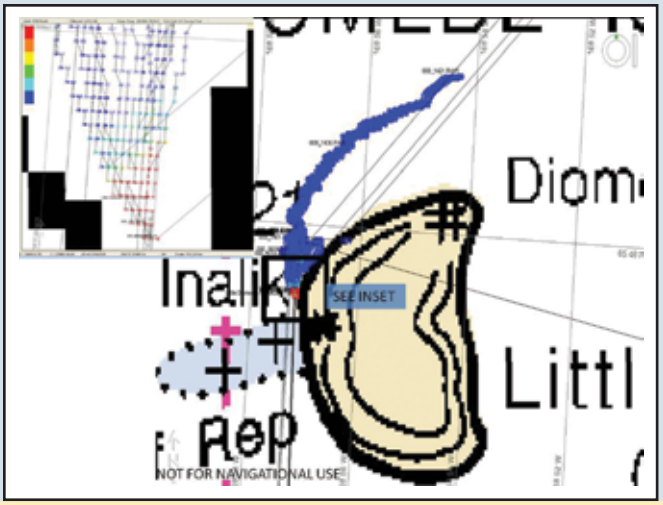


Chart information is overlaid on the NOAA chart for Little Diomede Island to determine "safe water" for the *Spar*. U.S. Coast Guard graphic by ET1 David Winters.

The U.S. Coast Guard Cutter *Spar* crew went ashore to meet with whaling captains and tribal leaders in the villages of Little Diomede, Wales, Point Hope, and Kivalina.

Crewmembers wait to be transported back to the cutter from the village of Point Hope, as the near-shore depths prevented *Spar* from anchoring close to the beach. Photo courtesy of Dr. Leslie Wood, U.S. Public Health Service.

Spar anchors near Barrow during an Arctic deployment. No docking facilities exist in this northernmost city. U.S. Coast Guard photo.

To overcome the absence of sounding information, the *Spar* crew used the hydrographic system on its small boats to conduct a simplified survey of the depths in the transit areas and transferred the data back to the cutter, where it was processed into a usable chart. The *Spar* team used the resultant chart to plan the route for the small boats and to identify an area for the ship to safely anchor.

the indigenous people, can enjoy and benefit from a productive use of this fragile environment, and we can all avoid a life-threatening emergency or environmental tragedy.

About the author:
LCDR Michele Schallip is the commanding officer of USCGC Spar, *homeported in Kodiak, Alaska. LCDR Schallip served aboard five cutters, and is on her third Alaskan assignment. She holds a master's degree in public administration, and a 1600 gross-ton merchant mariner license.*

Endnotes:

1. *Alaska Priorities*. NOAA Office of Coast Survey, 2011.
2. *Arctic Nautical Charting Plan: A Plan to Support Sustainable Marine Transportation in Alaska and the Arctic*. NOAA Office of Coast Survey, February 2013.

The Inuit Future

Food security, economic development, and U.S. Arctic policy.

by Mr. Jim Stotts
President
Inuit Circumpolar Council Alaska

Global climate change, with its resulting loss of sea ice, has opened up access to the Arctic Ocean as never before. Moreover, the rate of global warming and the pace of development are accelerating. Stakeholders have different ideas on how to handle these changes. Depending on one's perspective, the pace of development seems to be either too fast or too slow; and, like most contentious issues, the best solutions may lie somewhere in the middle.

Those who prefer a slow approach generally emphasize:

- the need to create new standards and technologies for development,
- necessary robust management and oversight capabilities for industry,
- protecting biodiversity and ecosystems,
- the needs of Arctic peoples and communities.

In contrast, those preferring a fast approach focus on:

- economic development standards and technologies that are already sufficient,
- the stifling effects of excessive environmental oversight and over-regulation,
- global needs outweighing local concerns,
- a sense of urgency to begin development to respond to the global economic crisis.

This can polarize stakeholders into different camps; and, unfortunately, the Inuit and other Arctic indigenous peoples are caught in the middle of this environmental discussion.

The Inuit Circumpolar Council

The Inuit Circumpolar Council (ICC), an international organization that advocates on behalf of 160,000 Inuit in the Arctic region, which stretches from Chukotka, Alaska, across Canada and into Greenland, has consultative status with the United Nations and consults on a broad range of Arctic issues. Moreover, the ICC is a permanent participant to the Arctic Council, the eight-nation intergovernmental organization that works to develop Arctic policy.

ICC's principal goals include:

- strengthening unity among the Inuit of the circumpolar North;
- promoting Inuit rights and interests on an international level;
- developing and encouraging long-term policies to safeguard the Arctic environment;
- seeking full and active partnership in the political, economic, and social development of the circumpolar North.

The ICC believes in sustainable development. For most of the world, this means having a balance between economic development and environmental protection. For the Inuit Circumpolar Council, it also means preserving the Inuit culture and society—this is important to remember in any discussion with Inuit about sustainable development. As the first inhabitants and stewards of the Arctic, the Inuit have the responsibility and right to ensure the protection of their environment and culture.

continued on page 41

The Inuit and U.S. Arctic Policy

In January 2009, President Bush issued National Security Directive 66 with respect to the Arctic region. Paragraph III of that directive sets out the policy objectives. Interestingly, all six policy objectives are directly related to work in which the ICC is currently engaged.

Objective 1: Meet national security and homeland security needs relevant to the Arctic region.

Comment: The ICC has long maintained that the Arctic should be a region of peace. We are hopeful that any military activity in the Arctic will be minor and any buildup there will not increase tensions or lead to another cold war.

Objective 2: Protect the Arctic environment and conserve its biological resources.

Comment: This objective is in complete harmony with Inuit perspectives, and will go a long way toward protecting and ensuring Inuit food security.

Objective 3: Ensure that natural resource management and economic development in the region are environmentally sustainable.

Comment: The only recommendation for improvement that the ICC would make to this objective is to ensure the sustainability of the Inuit culture.

Objective 4: Strengthen institutions for cooperation among the eight Arctic nations.

Comment: The ICC totally agrees with this objective, and is an active participant in the Arctic Council.

Objective 5: Involve the Arctic's indigenous communities in decisions that affect them.

Comment: There could be improvements with this objective; consultation with indigenous communities varies greatly, depending on the agency.

Objective 6: Enhance scientific monitoring and research into local, regional, and global environmental issues.

Comment: The ICC suggests that all Arctic scientific research include interaction with indigenous experts to capture traditional ecological knowledge.

On paper, it appears the government's objectives are aligned with the objectives of the Inuit people; however, the best way to ensure that everyone's interest are taken into consideration is to communicate often. The ICC is committed to keeping all lines of communication open.

Coast Guard Commandant Admiral Robert Papp, (right); Alice Hill, Senior Counselor to the Secretary of Homeland Security; and Rear Admiral Thomas Ostebo, Commander of the 17th Coast Guard District, meet with Inuit Circumpolar Council Alaska President Jim Stotts in Anchorage, Alaska. U.S. Coast Guard photo by Petty Officer Patrick Kelley.

The Inuit and Food Security

Presently, the highest priority for ICC Alaska is food security. For most of the world, food security means having enough money to purchase food and other necessities at the grocery store. In other words, food security is tied to having a permanent job and income. This is not the case for the Inuit, who measure food security from a completely different economic and cultural perspective. Well-paying jobs are at times few and far between in rural areas of Alaska, where continued access to traditional hunting and fishing areas is key to health and well-being.

Most Inuit are coastal people who rely heavily on resources from the ocean for nutritional and cultural survival. The Inuit are a hunting society and are extremely concerned about the health of the ocean ecosystem, along with the birds, fish, and animals that need a clean and healthy habitat to thrive. Despite adapting to the modern world, hunting still defines the Inuit people, who are concerned regarding food security in these times of global climate change and the rapid industrialization of the Arctic.

The ICC believes food security should be the standard against which all development should be measured. If a proposed development threatens food security, it should not be allowed to proceed until all concerns are adequately addressed. A clean ecosystem with healthy, abundant flora and fauna is the best indicator that any particular type of economic development is sustainable and wise.

The Inuit and Development

The ICC is not opposed to sustainable development, especially if cultural sustainability is incorporated into the process. It's evident to all that Arctic development will occur; the planet is warming, and the permanent sea ice and permafrost is melting. We can see it with our own eyes. Our world and that of other people in the Arctic region is on the verge of being turned upside-down, and we must calculate how to manage this development as we adapt to climate changes.

In the summer of 2010, the Inuit Circumpolar Council held its general assembly in Nuuk, Greenland. At this gathering, it was evident that there were differences of opinion among the Inuit on three issues:

- offshore oil and gas development;
- mining, particularly uranium mining;
- the environmental and social impact assessment process.

In February 2011, the ICC hosted an Arctic leaders' summit, which resulted in the *Circumpolar Inuit Declaration on Resource Development Principles in Inuit Nunaat.*

The declaration sets out basic principles that we hope will lead to responsible, sustainable development. Arctic development must bring tangible and long-lasting benefits to the indigenous people, while avoiding any degradation of the healthy ecosystems.

These are frightening yet exciting times. As we look out to sea to study the approaching prospects, we see great opportunities and great risks on the horizon. We must get things done right the first time, as we have learned from our ancestors and our own experience. In the Arctic, one doesn't get too many second chances—that is a truth we want to share with our children and grandchildren, as the Inuit continue to live and thrive in the North.

About the author:
Mr. Jim Stotts is the president of the Inuit Circumpolar Council Alaska. Stotts has extensive experience in the private sector, working for the Ukpeagvik Inupiat Corporation and the Arctic Slope Regional Corporation. For more than 30 years he has worked in executive positions at both organizations and represented Alaska on the first ICC Executive Council in 1980. His previous positions include ICC Alaska's executive director and chair. Stotts is a native of Barrow, Alaska.

For more information:

Read the *Circumpolar Inuit Declaration on Resource Development Principles in Inuit Nunaat* on the ICC Alaska website at **www.iccalaska.org.**

Arctic Regulations

Rulemaking shapes expanded activity and protects the Arctic.

by LT Daniel Velez
Judge Advocate
U.S. Coast Guard Office of Maritime and International Law

The *Overland Expedition*

On Nov. 15, 1897, Treasury Secretary Lyman J. Gage wrote to U.S. Revenue Cutter Service Captain Francis Tuttle, commanding officer of the cutter *Bear,* to inform him of a dire emergency in the Arctic. A fleet of eight whaling vessels with 265 persons aboard had become trapped—icebound in the vicinity of Point Barrow, Alaska. In response, Captain Shoemaker, Commandant of the Revenue Cutter Service, dispatched the *Bear* with a volunteer crew to attempt a rescue.

The *Overland Expedition* reaches trapped vessels at Point Barrow, Alaska. U.S. Coast Guard photo.

The *Overland Expedition* would become one of the most difficult and audacious rescue attempts in Coast Guard history.[1]

Ice conditions and the technology of the time prevented sailing to Barrow, so the plan called for sailing as far north as possible, followed by a land crossing of the Arctic, to bring relief to the trapped whaling crews. The success of this effort, in which the great majority of the trapped mariners were rescued, demonstrated the Coast Guard's commitment to excellence in Arctic operations.

The Legacy Continues

The Coast Guard continues to serve as the nation's guardian in the Arctic—more than 115 years since the *Overland Expedition*. Coast Guard operations in this remote region have continued to improve maritime safety and mobility, protect natural resources, ensure law enforcement, and prevent maritime disasters.

Harkening back to the *Overland Expedition*, in 2012, the CGC *Healy* cleared a path north for the Russian-flagged vessel *Renda* to help deliver emergency fuel to Nome, Alaska.[2] This last decade has seen incredible re-emergence of multinational maritime interest in the far northern reaches of Coast Guard District 17 and the Arctic Ocean.

As average winter ice coverage continues to decline to unprecedented levels, more people have begun to utilize now accessible waterways and economic resources. The Coast Guard has responded to these changes by:

- conducting a waterways analysis to assess the need for aids to navigation,
- serving as the nation's delegation lead to the Arctic Council Oil Spill task force in developing spill response policy and regulation in the region,
- establishing temporary forward operating locations in Alaska's Prudhoe Bay, Nome, Kotzebue and Barrow to address operational needs.[3]

Ensuring the success of our statutory missions in the region requires having assets and training in place, but it will also require the Coast Guard to carry out its role as an agency that promulgates regulations to protect the maritime environment.

How the Coast Guard Regulates the Arctic

In 2012, the U.S. Department of Interior gave Royal Dutch Shell permits for operations in the Chukchi and Beaufort seas, including preliminary drilling of casings into no-oil-bearing zones and to create mudline cellars in preparation for future exploratory drilling.[4]

Decades before Shell's endeavor, commercial operations in the Arctic provided the genesis for crucial Coast Guard regulation. For example, the grounding of the *Exxon Valdez* in 1989—the largest marine safety response that the Coast Guard had ever undertaken—led to the passage of the Oil Pollution Act of 1990 (OPA 90), with significant regulatory implementation given to the Coast Guard.[5]

Prior to the OPA 90 amendments to the Federal Water Pollution Control Act (now commonly referred to as the Clean Water Act), Coast Guard marine pollution regulation and prevention was mainly derived from a combination of environmental statutes. The Federal Water Pollution Control Act of 1972, the Act to Prevent Pollution From Ships (the 1973 U.S. implementation of the International Convention for the Prevention of Pollution from Ships 1973), and the Comprehensive Environmental Response, Compensation, and Liability Act required the Coast Guard to prepare for marine pollution incidents.

The Ports and Waterways Safety Act of 1972 and the Port and Tanker Safety Act of 1978 provided Coast Guard captains of the port the authority to control activities at waterfront facilities and on vessels in U.S. waters.[6] With this collection of statutory authorities, the Coast Guard could take some regulatory action to prevent and control marine casualties, but many key provisions that allow for contingency planning, improved vessel design, and immediate funding for response were absent.

In contrast to the pre-existing regulatory framework, OPA 90 improved the federal government's ability to provide resources to respond to oil spills through the Oil Spill Liability Trust Fund. In addition, OPA 90 provided new requirements for government and industry contingency planning through new requirements, such as the National Oil and Hazardous Substances Pollution Contingency Plan and Facility and Vessel Response Plans. Under this statutory framework, the Coast Guard also promulgated a set of pollution prevention regulations for ships and waterfront facilities including:

- inspection programs for vessels carrying oil and hazardous cargoes,
- procedural and personnel requirements for oil transfer operations,
- construction requirements (segregated ballast tanks),
- operational requirements.

OPA 90 created significant improvements to the Coast Guard oil spill response and prevention authorities including promulgation of the double hull requirement. On June 29, 1999, Rear Admiral Robert North, Assistant Commandant for Marine Safety and Envi-

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Arctic Litigation

On February 24, 2012, in a first-of-its-kind preemptive strike, Shell sued Greenpeace (and other environmental non-governmental organizations) to prevent interference with the movement and operations of Shell's vessels.[1] Shell's suit alleged violations of international and domestic law concepts of nuisance, trespass, false imprisonment, violation of a proposed safety zone, piracy, and freedom of navigation.

Shell's theory was premised on Greenpeace's interference with a Shell-contracted drillship's transit in New Zealand,[2] and that it would be highly likely that these groups attempt similar interference as Shell's mobile offshore drilling unit transited north to the Arctic. Shell asked the court to grant a temporary restraining order to protect its vessels by enjoining Greenpeace from trespassing on or interfering with Shell vessels on the territorial seas or the exclusive economic zone of the United States.

In March 2012, the Alaska Federal District Court found that Shell was likely to succeed on the merits of its action, and that irreparable harm would occur should the court not issue a temporary restraining order preventing Greenpeace et al. from engaging in certain conduct.

The Coast Guard retains significant authority outside of the U.S. territorial seas and within the exclusive economic zone to take actions in order to protect the nation's natural resources. Pursuant to the Outer Continental Shelf Lands Act, the Coast Guard promulgated regulations to create a temporary safety zone around Shell's mobile offshore drilling unit (MODU) while conducting operations on the outer continental shelf of Alaska.[3]

The District Court did not expand its preemptive order to cover the transit of the MODU outside of the U.S. territorial sea. This does not limit the Coast Guard's inherent ability to lend assistance on the high seas or to enforce certain international law concepts concerning freedom of navigation in response to (but not likely before) an incident.

The Story Continues

On July 10, 2012, the Alaska Wilderness League sued the Department of the Interior, challenging its decision to approve Shell's Beaufort and Chukchi oil spill plans, which were required pursuant to OPA 90.[4] Alaska Wilderness also, through the Administrative Procedure Act, challenged DOI's compliance with the National Environmental Policy Act, the Clean Water Act, and the Endangered Species Act. The Coast Guard was not a named defendant in this suit.

The crux of Alaska Wilderness' suit was that Shell's spill plans were created under the best possible environmental conditions (weather, sea state, ice coverage). According to the plaintiffs, a spill plan should be created for the worst-case discharge, which requires consideration of the most probably adverse weather.

Although the Coast Guard is not directly involved in this litigation, the result may have effects on Coast Guard efforts to form policy and regulation with regard to spill response, especially Coast Guard efforts to shape policy, procedure, and possible regulation to remediate oil trapped in ice.

In another litigation with a connection to the Arctic, the EPA and the Coast Guard were sued in April 2012 for alleged failure to conduct proper consultation under the Endangered Species Act with respect to rules governing the use of dispersants in oil spills and the effect dispersants may have on the Arctic marine environment. As the EPA and Coast Guard share regulatory roles governing dispersant use, the outcome of this litigation may have significant impact on how the Coast Guard may implement the National Oil and Hazardous Substances Pollution Contingency Plan in the future.

Endnotes:

1. 8. *Shell v. Greenpeace, Inc.* No. 3:12-cv-00042-SLG (D. Alaska filed Feb. 24, 2012).
2. www.greenpeace.org/international/en/multimedia/slideshows/Shell-Drill-Ship-Noble-Discoverer-Drifts-Toward-Shore-Near-Unalaska-Island-Alaska/.
3. For the MODU's in position, an OCSLA safety zone was promulgated pursuant to 33 C.F.R. 147 and the can be found at 77 FR 39164 and 77 FR 10707. An OCS safety zone may extend to a maximum distance of 500 meters around the OCS facility measured from each point on its outer edge or from its construction site, but may not interfere with the use of recognized sea lanes essential to navigation.
4. *Alaska Wilderness League et. al v. DOI.* No. 1:12-cv-00010-RRB (D. Alaska, filed July 10, 2012).

ronmental Protection, reported to Congress on Coast Guard efforts pursuant to OPA 90. He stated:

> "[o]nce the oil is spilled, the environment will be affected no matter how well the response is orchestrated. Simply put, prevention is still the best response." [7]

As maritime operations expand in the Arctic, Admiral North's statement remains a guide today.

Future Arctic Rulemaking

It is possible that future offshore oil and gas exploration and drilling in the Arctic region will require the Coast Guard to take regulatory action to establish exclusionary zones to protect the safety and security of all users of the maritime domain. Regulatory action in this context may have significant First Amendment implications.

In public forums, the government can issue content-neutral time, place, and manner restrictions that are narrowly tailored to a significant government interest.[8] If Coast Guard action is required and authorized, consideration should be given to whether the restrictions are reasonable and content neutral.[9] Assumptions of bad intent for a public assembly, without credible information, are not likely to be a reasonable basis for an exclusionary zone.[10] Restrictions are generally content neutral if they would apply equally across all viewpoints.

Regulations should also be tailored to allow the intended audience of the protest to receive the message, conceding that some zones (such as in confined waterway) may present challenges that are permissible as long as the impact is minimal in relation to overall safety concerns.

The Arctic is an extremely harsh and dynamic environment that presents many operational challenges. Despite these challenges, the Coast Guard has been a guardian of the Arctic since Alaska first became a territory of the United States and is poised to continue in this mission. Coast Guard regulatory efforts will undoubtedly feature prominently in this effort.

About the author:
LT Daniel Velez is a judge advocate serving in the Environmental and Response Law Divisions of the Office of Maritime and International Law at Coast Guard headquarters. His previous assignments include the Coast Guard Sector Miami Command Center and Coast Guard Station Golden Gate. He received his J.D. from William and Mary, an M.S. in environmental engineering from the Georgia Institute of Technology, and a B.S. in chemical engineering from the California Institute of Technology.

Endnotes:

1. Johnson, Paul H. *The Overland Expedition: A Coast Guard Triumph,* Coast Guard Academy Alumni Association Bulletin (Vol. XXXIV, 1972) No. 5, pages 63-71 (a detailed accounting of the historic Coast Guard rescue). www.uscg.mil/history/articles/johnson_overland_expedition.asp.
2. The *Healy* break-out of Nome with the T/V *Renda,* also presented a unique regulatory challenge in obtaining a waiver under the Jones Act to allow the ice class, Russian flagged *Renda* to engage in coastwise trade within the United States. *See* 46 U.S.C. § 55102. Pursuant to 46 U.S.C. § 501, the Jones Act can only be waived in the interest of national defense. No comment period was afforded this decision. Also see *What Every Member of the Trade Community Should Know About Coastwise Trade Merchandise.* U.S. Customs and Border Protection: An Informed Compliance Publication, 2009. Available at www.cbp.gov/linkhandler/cgov/trade/legal/informed_compliance_pubs/merchandise.ctt/merchandise.pdf (Customs and Border Patrol oversees the Jones Act Waiver process).
3. *U.S. Coast Guard Operations in Alaska: Hearing before the Senate Committee on Appropriations, Subcommittee on Homeland Security.* 112th Cong. (2012) (Statement of Admiral Robert Papp, Jr., Commandant of the U.S. Coast Guard.)
4. *BSEE Authorizes Shell Preparatory Activities in Chukchi Sea.* Bureau of Safety and Environmental Enforcement press release. Available at www.bsee.gov.
5. *Double Hull Requirements for Tank Vessels: Hearing before the Subcommittee on Coast Guard and Maritime Transportation and Infrastructure.* 106th Cong. (1999) (statement of Rear Admiral Robert C. North, U.S. Coast Guard).
6. Safety zones promulgated under the authority of the PWSA may be used for narrow environmental purposes generally confined to marine casualties and related discharges.
7. *Double Hull Requirements for Tank Vessels: Hearing before the Subcommittee on Coast Guard and Maritime Transportation and Infrastructure,* 106th Cong. (1999) (Statement of Rear Admiral Robert C. North, U.S. Coast Guard.)
8. *Heffron v. ISKCON,* 452 U.S. 640, 647 -50 (1981).
9. See *Wong v. Bush,* 542 F.3d 732, (9th Cir. 2008) (Affirming the Hawaii Superferry Coast Guard security zone as reasonable in time, place, and manner—and being properly analyzed for environmental compliance with a NEPA categorical exclusion.)
10. *Kunz v. New York,* 340 U.S. 290 (1951) (Stating in dicta that the past allegations of violence cannot serve as a sole basis for restrictions.)

Arctic Oil Spill Response Training

by LCDR Jennifer Hnatow
U.S. Coast Guard Office of Commercial Vessel Compliance

Mr. Mark Wagner
Supervisor
U.S. Coast Guard District 17 Response Advisory Team

The temperature is just above freezing, and it is snowing and raining sideways. For any other crew, it would be time to tuck tail, run to the nearest harbor, and wait out the squall.

However, the crew of the Coast Guard Cutter *Sycamore,* a 225-foot buoy tender, turns into the wind off the coast of Barrow, Alaska, as district response advisory team members lead the arduous task of deploying the vessel's spilled oil recovery system's outrigger, boom, skimmer, and temporary storage device.

U.S. Coast Guard photo by Petty Officer Kelly Parker.

The Oil Pollution Act of 1990 mandated that the Coast Guard form district response advisory teams (DRATs) to enhance pollution response preparedness and to provide expertise and technical assistance to the federal on-scene coordinator during oil spills. Today, DRATs have evolved and their composition now varies from Coast Guard district to district.

For example, Coast Guard District 17 (D17) in Alaska contains more than 34,000 miles of coastline. This is more than the rest of the United States put together.[1] Additionally, Alaska is estimated to have approximately only 5,000 miles of paved roads; therefore, for many locations such as the state's capitol, Juneau, there are only two ways to get in or out—by plane or boat.[2]

The D17 DRAT has adapted to Alaska's unique logistic and environmental conditions by annually training on frozen lakes and conducting spill response exercises with the Navy Supervisor of Salvage.

Ice Experts

The DRAT is always available to supplement the local responders when they are in need of advice, equipment, or even an extra worker. It also provides first responder operations and awareness-level training to all D17 operational units.

The response advisory team trains and plans for incidents all year long. To prepare for cold-weather operations, team members attend international oil and ice conferences and coordinate training with the Anchorage Navy Supervisor of Salvage unit.

During annual joint ice training, Army, Air Force, Navy, U.S. Coast Guard, and Alaska state employees conduct drills using a full decontamination station setup, oil spill response equipment designed for ice conditions, and ground-penetrating radar devices that detect oil under ice.

The D17 DRAT also maintains equipment for mechanical recovery and trains with Air Station Kodiak C-130 crews using the aerial dispersant delivery system (ADDS). Additionally, the DRAT conducts sling load operations, carrying oil spill response equipment to remote locations with helicopter crews from Air Station Sitka, and conducts oil booming operations with small boat stations from Ketchikan, Juneau, and Valdez.

The district response advisory team also inspects and maintains containers filled with oil spill response equipment on an annual basis. These containers, known as "band-aid boxes," contain items such as oil-absorbing boom, drum retention systems to retain "mystery" drums filled with unknown hazards, personal protective equipment, salvage pumps, generators, small skimmers, temporary storage devices, and cleanup kits containing brooms, shovels, and different sorbent materials. This pre-positioned equipment can help the Coast Guard or the local harbormaster during an initial response.

Mechanical Recovery

The Coast Guard also trains on using mechanical methods for oil recovery—specifically the spilled oil recovery system (SORS) and the vessel of opportunity skimming system (VOSS).

The VOSS, divided into two sets, is located in Ketchikan and Anchorage. It is a modular, portable, oil recovery skimming system secured to and operated from a vessel of opportunity at a spill site. With this system, vessels ranging from 60 to 400 feet can transform quickly into oil recovery vessels. It has an effective daily recovery rate of 2,126 barrels and a maximum sweep width of 42 feet off either side of the vessel. It is designed to skim oil effectively at up to three knots, depending on sea state, oil viscosity, and thickness.

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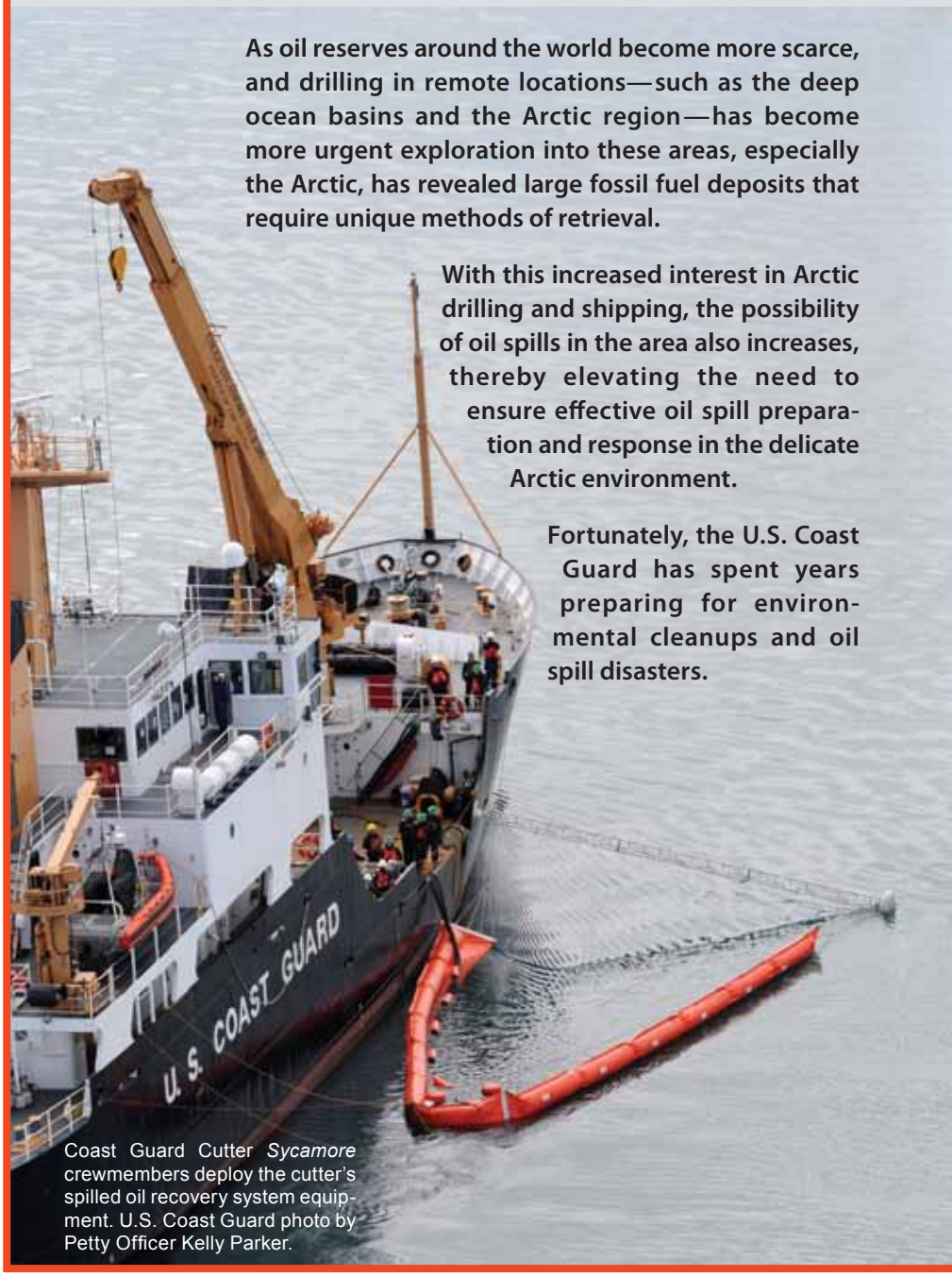
Arctic Oil Reserves Gain Attention

As oil reserves around the world become more scarce, and drilling in remote locations—such as the deep ocean basins and the Arctic region—has become more urgent exploration into these areas, especially the Arctic, has revealed large fossil fuel deposits that require unique methods of retrieval.

With this increased interest in Arctic drilling and shipping, the possibility of oil spills in the area also increases, thereby elevating the need to ensure effective oil spill preparation and response in the delicate Arctic environment.

Fortunately, the U.S. Coast Guard has spent years preparing for environmental cleanups and oil spill disasters.



Coast Guard Cutter *Sycamore* crewmembers deploy the cutter's spilled oil recovery system equipment. U.S. Coast Guard photo by Petty Officer Kelly Parker.

An over-flight photo shows the bow and stern sections of the freighter near Skan Bay. Unified command photos.

DRAT in Action

Oil spills can happen anywhere, including in remote locations. Such was the case with the large bulk freighter M/V *Selendang Ayu* in December 2004. The 738-foot bulk cargo vessel was transporting soybeans from the United States to Asia when it lost propulsion in the Bering Sea during a destructive winter storm.

The vessel eventually ran aground north of Unalaska, splitting in half, spilling approximately 336,000 gallons of oil products and a great quantity of soybeans. The D17 DRAT immediately embedded itself into the local incident command staff structure and coordinated shoreline cleanup assessment teams to monitor the targeted region, forwarding technical data on any oil that may have found its way onto the beaches.

Additionally, DRAT members supervised the cleanup of thousands of pounds of soybean "drifts" and identified oiled or injured animals.

For more information on the *Selendang Ayu*, see http://uscgproceedings.epubxp.com/i/85793.

Jennifer Henderson, a member of the shoreline cleanup assessment team, examines oil that washed ashore.

Soybean-filled waves crash along the shoreline of Unalaska Island, weeks after the *Selendang Ayu* grounded.

The partially sunken bow section of the *Selendang Ayu* takes a pounding in the Bering Sea.

The entire VOSS system fits inside a single C-130 military aircraft for transport to distant locations. The D17 DRAT deploys this system annually on the CGC *Anthony Petit* in Ketchikan, Alaska.

The SORS is similar to the VOSS, except it is designed for Coast Guard buoy tenders and stays onboard at all times. There are two sides to the system, for a port- or starboard-side deployment. D17's response advisory team exercises with the SORS on a yearly basis to maintain currency with the buoy tender crews aboard the cutters *Sycamore, Hickory, Spar,* and *Maple*.

The DRAT also exercised the SORS equipment for the first time off the coast of Nome in 2011 and in the summer of 2012 off of Barrow, Alaska, with great success.

The DRAT deploys SORS equipment five times a year; a typical deployment is a weeklong evolution involving the Pacific Strike Team, Navy Supervisor of Salvage, local CG units, the buoy tender crews, harbormasters, and other local stakeholders.

Dispersant Delivery System

The Coast Guard utilizes the aerial dispersant delivery system (ADDS) designed to install in rear-loading aircraft. The system can be installed or removed in less than 60 minutes with no need for any additional aircraft modifications, using its own auxiliary platform or standard airport equipment.

Once a year, the DRAT and Air Station Kodiak crews conduct ADDS training to exercise and recertify with the equipment.

International Engagement, Continuing Challenges

The district response advisory team conducts joint exercises with the Canadian Coast Guard biannually, and is in talks with the Russian government to conduct similar exercises. However, the DRAT can only conduct training at certain times of the year in the Arctic due to the harsh climate and extreme temperatures. Additionally, logistics to house personnel and equipment are exacerbated by limited space and road access.

Even with these challenges, D17 DRAT members are swiftly becoming elite experts in cold-weather oil spill response at a time when oil and natural resource exploration is expanding to more uncharted and isolated locations. Despite all the environmental and logistical hardships, the DRAT members continue to maintain their proficiency, expanding their knowledge to prepare in case they are called upon to respond above the Arctic Circle.

Arctic Spill Response

Because of the harsh temperatures and geographic remoteness, spill response in the Arctic is fundamentally different from responses in warmer areas. For example, in the Arctic, two-thirds of the year has limited sunlight, making spill response difficult at best. In addition, fluids become more viscous, hydraulic hoses and metals become brittle and break more easily, and freezing spray quickly covers everything.

Anyone working in these conditions must take "warm-up" breaks or face the possibility of hypothermia, frostbite, or even death. While workers are kept warm, their equipment is not—unless it is continuously covered. As such, equipment is exposed to the elements and requires more than average maintenance to ensure optimum results.

Sycamore's crew trains annually with the onboard SORS equipment. U.S. Coast Guard photo by Petty Officer Kelly Parker.

About the authors:

LCDR Jennifer Hnatow has served in the U.S. Coast Guard for 11 years, most notably as the assistant District 17 DRAT supervisor, and has received three Coast Guard Commendation medals, an Achievement medal, four Meritorious Unit commendations, and seven Meritorious Team commendations.

Mr. Mark Wagner has served in the U.S. Coast Guard as the D17 DRAT supervisor for the past 10 years, after retiring from 24 years of active duty service as a senior chief petty officer. Active duty awards include three Commendation medals and four Achievement medals. He has also been recognized as unit chief petty officer of the year and sailor of the year.

Endnotes:

1. *Statistical Abstract of the United States: 2012*. Suitland, MD: U.S. Census Bureau.
2. Alaska Department of Transportation and Public Facilities, 2009.

Arctic Dreams

Protecting and preserving the Arctic.

by Mr. Michael P. Smith
Preparedness Security Specialist
U.S. Coast Guard

Ms. Marilyn Heiman
Director
The Pew Charitable Trusts' U.S. Arctic Program

As we consider the environmental changes happening in Alaska and the Arctic, we need to look at the big picture. Today, it is so easy to become absorbed in specific details, and, in doing so, we may forget to envision what is important for those who live in these areas. For instance, we want our grandkids and their grandkids to know the awe and grandeur of an Alaska where the polar bear and walrus survive and Alaskan native culture remains vibrant.

Yes, the climate changes are affecting the local wildlife and the human communities that for centuries have depended on Alaska's natural bounty. Additionally, the retreat of year-round sea ice is making the Arctic Ocean more accessible to shipping and industrial development, like oil and gas exploration. This means there is an increased threat of environmental damage, and the marine mammals already struggling to adapt to changing conditions will soon face new threats, such as air and water pollution, noise, and ship strikes. An oil spill could also damage fragile food webs and critical habitat.

The United States faces key decisions about whether, when, where, and how development should take place to prevent harm to one of the world's last relatively untouched ecosystems. We must be willing to do what it takes to keep the ocean clean and the land unharmed; it is a matter of being responsible individually, corporately, and governmentally to remain good stewards of the Arctic region and its resources.

The Coast Guard's Role

Increased human activity in the Arctic will affect the U.S. Coast Guard's mission as well. At a minimum, there will be an increase in demand for more services. Planning is a big part of preparedness, and predicting future operations in the far North for the next 30 years will help determine specific actions that need to be taken now.

The Arctic is unforgiving; it is a remote, extreme, and challenging place to do business, and is one of the most difficult places on Earth to mount a rescue operation or spill response. A majority of the region has no major roads, ports, or airports. The nearest Coast Guard base is more than 1,000 miles away. Hurricane-force winds, subzero temperatures, high seas, shifting sea ice, and long periods of fog and darkness are normal and could shut down a response altogether.

U.S. Government Response

One of the first steps the U.S. government should undertake is to work with Alaskan state officials, industry, native communities, organizations, scientists, conservation groups, and other stakeholders to develop Arctic-specific safety and oil spill prevention and response standards. These regulatory standards should include purpose-built, Arctic-class drilling rigs and associated vessels; seasonal restrictions to ensure that drilling takes place only during the

open-water season, when ice is not present; a containment system and relief rig located in the Arctic so they can be readily deployed; and adequate trained personnel and tested equipment to respond to a spill in extreme Arctic conditions.

In addition, we need to identify and protect ecologically sensitive areas from offshore oil and gas activities, so that marine mammals and millions of migratory birds retain vital habitat and local communities are able to continue to use important subsistence areas.

Traditional and Unconventional Support

Advancements can take more time and effort than anticipated, especially when they involve something new and in such challenging conditions. By integrating research from various disciplines and educational institutions with the knowledge of the Alaskan natives and locals—who can provide insight into environmental trends and relationships that might not be available from other sources—we can develop our understanding of the ecosystem as a whole.

By maintaining awareness of Arctic situations and operations, the Coast Guard can actively participate with its domestic and international partners to support and oversee the rapid growth in oil and gas activities, shipping, and tourism. It can develop and maintain policies and strategies to protect and preserve this environment, while providing needed services such as environmental protection, oil spill response, and search and rescue. The Coast Guard can cooperate with other U.S. and international government and nongovernmental organizations dealing with Arctic issues and be an active player in all matters related to this ocean. This ensures there is a cadre of experienced personnel watching over Arctic operations.

Accountability for the Future

All stakeholders must have the courage to act responsibly, take initiative, and provide leadership. In fact, the U.S. should aspire to be the world's leader in safety, prevention, and response in the Arctic. We should start by establishing clear regulatory standards, protecting important ecological and subsistence areas, ensuring a comprehensive research and monitoring program, and listening to the native people.

About the authors:

Mr. Michael Smith is a retired U.S. Navy captain who has worked for the U.S. Coast Guard since 2002. He has served in many capacities including U.S. Coast Guard port security assessments and area maritime security training and exercise program management.

Ms. Marilyn Heiman is the director of the Pew Charitable Trusts' U.S. Arctic Program, which works to protect the U.S. Arctic Ocean and its marine life. Previously, she was campaign manager for the International Boreal Conservation Campaign, the Secretary of Interior's Alaska policy advisor, and special assistant on natural resources and oceans for Alaska Governor Tony Knowles. She also worked as an aide to the House Resources Committee in the Alaska legislature during the Exxon Valdez *oil spill response.*

Authors' note:

The views expressed in this article are those of the authors and do not necessarily reflect the official policy or position of the U.S. Department of Homeland Security, U.S. Coast Guard, or the U.S. government.

The U.N. Convention on the Law of the Sea

Now is the time to join.

by Dr. John T. Oliver
Senior Ocean Advisor
Emerging Policy Staff
U.S. Coast Guard

Mr. Steve G. Venckus
Deputy Chief
U.S. Coast Guard Office of Maritime and International Law

The Arctic region, fundamentally a maritime regime, is one of the world's last frozen frontiers. Moreover, this icy region is heating up, not just from a warming climate and melting ice, but from changing global priorities and emerging challenges and opportunities. Extending sovereignty, exploration, and exploitation resonate among nations charting new courses in and through the Arctic region.

As with any frontier, there must be a common rule of law to guide states in their pursuits. This is critical if we are to successfully exert maritime governance to ensure mariners may safely and securely approach our shores and travel in our waters. The 1982 U.N. Convention on the Law of the Sea[1] is the best compass and framework for states to determine their positions with respect to each other and the emerging opportunities and challenges in that remote part of the world. Eight nations border the Arctic. Seven of those Arctic nations are party to the convention with the exception of one—the United States.

UNCLOS: What Are We Waiting For?

Senior military and U.S. national security leaders involved in Arctic affairs agree[2] the time has come to join the convention—this move would provide a uniform governance framework to promote American interests and dramatically extend our resource-related sovereignty in that region. The convention, which codifies a broad range of international legal principles applicable to the ocean regime, represents a tremendous advance in promoting and protecting a broad range of critical interests and goals. Having such a legal regime in place is vital to the proper management of an increasingly accessible Arctic.

While the Law of the Sea Convention has now been in force for more than 160 states worldwide (plus the European Union), including virtually all of the major maritime powers and our allies and trading partners,[3] the full U.S. Senate has never taken a vote on the convention.[4]

However, with the Senate Foreign Relations Committee having held additional hearings in 2004, 2007, and 2012, there is now an opportunity for the Senate to vote for the United States to regain its natural leadership position in the development of the international law of the sea. At the same time, joining the convention would promote critical national security, global mobility, economic, scientific, and environmental interests in the Arctic region.

Additionally, our national maritime security strategy has long required worldwide mobility. Global mobility requires undisputed access through and around international straits such as the Bering Strait, the Northwest Passage, and the Northern Sea Route from Europe to Asia. The entire international community would benefit from a final resolution of any disputed points in these critical routes. Moreover, the relevant provisions of the convention guarantee these critically important transit rights to military and civilian vessels, aircraft, and submarines—no matter the purpose of the transit, the nature of the cargo, or the means of propulsion.

UNCLOS Economic Benefits

From an economic perspective, the United States emerges a clear winner under the convention's provisions on the exclusive economic zone (EEZ) and the continental shelf, due to its lengthy coastline and island possessions that border on several particularly productive ocean areas such as the Bering Sea. The United States has the largest and richest EEZ in the world. Also, our extended continental shelf has enormous potential due to oil and gas reserves, particularly in the Bering, Chukchi, and Beaufort Seas west and north of Alaska.

Discoveries by the crew aboard the USCG icebreaker *Healy* reveal that the U.S. continental shelf in the Arctic Ocean is much more extensive than originally thought. Nevertheless, only by becoming party to the convention and participating in its processes can the United States obtain secure title to these vast resources, adding an area twice the size of the Louisiana Purchase (some 290,000 square miles) for U.S. sovereign resource exploitation.[5]

Despite claims from critics of the convention that the United States could and should develop its continental shelf resources beyond 200 miles without becoming a party to UNCLOS, it stands to reason that any oil, gas, or mining company would want the legal certainty of the convention before investing billions of dollars to develop an offshore field, no matter how rich it might be.[6] In addition, the convention's deep seabed mining provisions, as amended in 1994, would permit and encourage American businesses to pursue free-market-oriented approaches to deep ocean mining, including in the Arctic Ocean.

The Convention Helps Secure Trade

Another key mission of the Coast Guard is to promote safe and secure international trade. The convention promotes freedom of navigation and overflight, by which international shipping and transportation fuel and supply the global economy. Some 90 percent of global trade tonnage, totaling more than $6 trillion in value including oil, iron ore, coal, grain, and other commodities, building materials, and manufactured goods, are transported by sea every year.[7]

Currently, little international trade travels through the Arctic, but this is changing and will continue to increase in the decades ahead as the ice cover continues to recede and marine transportation technology advances. Moreover, there is considerable destinational shipping even now, such as to bring critical supplies to the North Slope and Alaskan coastal villages, and to remove vast amounts of minerals from the treasure trove in the Brooks Range in northwestern Alaska.

By guaranteeing merchant vessels the right to navigate through international straights, archipelagic waters, and coastal waters, the provisions of the convention promote dynamic international trade. Free navigation reduces costs and eliminates delays that would occur if coastal states were able to impose various restrictions on navigational rights.

Non-Party Status Impedes International Engagement

The Coast Guard represents the United States at the International Maritime Organization (IMO), the specialized body through which international standards for ship safety, security, and environmental protection are developed and adopted. These standards are negotiated and implemented under the Law of Sea Convention's framework.

Consequently, we are becoming increasingly challenged in some of these negotiations because we are not a party to that framework. Moreover, the convention encourages international cooperation to enhance the safety and security of all ocean-going ships. The IMO is developing a mandatory Polar Code for Arctic shipping, and the Coast Guard is playing a key role in that effort.[8]

Furthermore, many states have excessive claims with respect to baselines, historic bays, territorial seas, straits, and navigational restrictions, which many believe are not permissible under the convention. However, as a nonparty, our ability to seek to roll back these excessive claims is severely inhibited. Failure to join the convention will materially interfere with our ability to engage with other states to improve maritime governance—a major part of the Coast Guard's current strategy for maritime safety, security, and stewardship.

Our non-party status is an obstacle that we must overcome in developing virtually any new multilateral maritime instrument. For example, the United States has long played a key role in the IMO to promote maritime safety and efficiency and to protect the marine environment in the Arctic, but our leadership position is undermined by our current "outsider" status.

The United States has no "seat at the table" in matters concerning the convention, nor does it have a judge on the Law of the Sea Tribunal, or a decision maker or staff expert on the Commission on the Limits of the Continental Shelf that convenes to review and approve claims to extended continental shelves. Moreover, despite the fact that the 1994 Part XI Implementation Agreement guarantees the United States a permanent seat on the International Seabed Authority and an effective veto on all key decisions of that body, as a nonparty, we simply cannot play that critical role. Without joining the convention, we have no means to formally represent our significant maritime interests as a global power, and guide the discussion interpreting and developing the law of the sea in the Arctic.

The Coast Guard performs many critical homeland security coastal missions. It needs a comprehensive legal framework to help influence the development of Arctic issues, and to put our operational activities in protecting America's interests on the strongest legal footing, whether we are taking enforcement action to ensure that U.S. sovereign rights are respected, human activity is safe and secure, rescuing those in distress, or protecting the pristine Arctic environment.

The Commandant of the Coast Guard testified before the Senate Foreign Relations Committee in June 2012 and said, "We must continue to seek out opportunities with our Arctic neighbors and the global community to address the critical issues of governance, sovereign rights, environmental protection, and security in the Arctic. While there are many challenges, the increasingly wet Arctic Ocean presents unique opportunities. The convention provides the key legal framework we need to take advantage of these opportunities. The Coast Guard needs the convention to ensure America's Arctic future."[9]

About the authors:
Dr. John T. Oliver is the senior ocean advisor of the Emerging Policy Staff at U.S. Coast Guard headquarters. He is a graduate of Stanford University and the University of Washington School of Law. He also holds a Master of Law degree and a Doctor of Juridical Science degree from the University of Virginia School of Law. He teaches a seminar, "National Security and the Law of the Sea," as an adjunct professor at the Georgetown Law Center.

Mr. Steve G. Venckus is the deputy chief of the Coast Guard's Office of Maritime and International Law. He is a 1974 graduate of the Coast Guard Academy and received his Juris Doctorate from Case Western Reserve University Law School in 1984.

Author's note:
The opinions expressed in this article are those of the authors and do not necessarily represent official Coast Guard policy.

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The Arctic: Did you know...

Camp Century

Little known fact: The U.S. Army built Camp Century early in the Cold War as a year-round snow base, tunneled into the Greenland ice cap about 150 miles west of Thule Air Force Base in Greenland. Its primary purpose was scientific research, especially deep ice core drilling and analysis. Access to the camp was solely by air; the army built a snow runway on the icecap above the camp.

The camp housed 200 people and featured 21 tunnels containing barracks, mess facilities, a small hospital, a theater, a barbershop, recreation facilities, and a chapel. Construction was complete in 1960, at a cost of $7.9 million (equivalent to more than $55 million today).

Inhabitants pumped steam into an ice well, producing more than 10,000 gallons of fresh water daily. The world's first portable nuclear generator provided electrical power to the camp. Camp Century also had a base mascot, a Siberian Husky named Mukluk.

In 1964, the Army abandoned Camp Century due to higher-than-expected ice movement, which started to collapse the tunnels.

Source: *Science Leads the Way*. Camp Century, Greenland. Available at http://gombessa.tripod.com/scienceleadstheway/id9.html.

The U.S. Coast Guard Cutter *Alder* transits past an iceberg field located above the Arctic Circle, while steaming along Greenland's coast. U.S. Coast Guard photo by Petty Officer George Degener.

Partnerships in the Arctic

A key to mission success.

by CAPT Kathleen A. Duignan
Chief, Planning and Force Readiness
U.S. Coast Guard District 17

For several years, the Coast Guard has been evaluating how to operate effectively in the Arctic. Missions that can be easily planned and executed in the "Lower 48" and in the more accessible southern reaches of Alaska, are far more difficult to execute north of established ports and refueling locations.

The challenges of harsh weather, lack of established transportation routes, and under-charted regions increase risks in planning and executing missions in the Arctic. A mechanical breakdown or other unexpected incident that might be easily overcome in more accessible regions can become critical when assistance is more than 12 hours away—in good weather.

Blizzard Ops

Weather is an ever-present challenge throughout Alaska and especially in the Arctic. The reality television show *Coast Guard Alaska* depicts the hazards of operating in a harsh, unforgiving, and remote environment. The show is featured on the Weather Channel for a reason.

In Alaska, hurricane-strength storms threaten, their might rivaling those encountered on the East and Gulf Coasts of the United States. But the storms in Alaska are much more frequent and come with lots of snow. Additionally, the unpredictable sea ice makes navigation more difficult, if not impossible for a majority of commercial vessels.

Aside from weather conditions, Arctic winters have long periods of darkness. Moreover; time, distance, and geography also work against the Coast Guard. Moving assets, equipment, and personnel successfully requires coordination, partnerships, expert planning, funding, adequate infrastructure, and luck.

Resource Challenges

For these reasons, the Coast Guard plans its Arctic missions with self-rescue capability. But planning and executing operations prudently comes at additional cost. In a time of shrinking budgets, the tradeoffs between being safe or forgoing missions are difficult to manage. To avoid this conundrum, the Coast Guard has leveraged pre-existing relationships and established new ones to ensure that resources are combined to greatest effect. It is these key partnerships that have enabled the Coast Guard to execute its missions in the dynamic Arctic frontier.

Of course, true partnership goes both ways. The Coast Guard must be a trusted ally and able partner in the Arctic and must be able to call on assistance when needed.

Key Partnerships

United States North American Aerospace Defense Command, United States Northern Command, and Joint Task Force Alaska Command

The U.S. Coast Guard maintains an excellent relationship with its Department of Defense (DOD) colleagues. The Coast Guard, as the fifth armed service,

Arctic Council oil spill task force members meet in Girdwood, Alaska. U.S. Coast Guard photo by Petty Officer David Mosley.

also shares an overlapping defense mission with the DOD services. To exercise these relationships and build teamwork, the Coast Guard participates in numerous exercises with DOD to assess asset capabilities, test how to best integrate our response, and leverage different restrictions on mission, response, and funding.

Additionally, DOD and the Coast Guard have partnered regarding long-term requirements. A jointly convened Arctic capabilities working group conducted an assessment to identify overlapping needs in the Arctic. The working group identified four areas for further work and collaboration: communications, maritime domain awareness, presence, and infrastructure.

Several exercises executed from 2011 to 2012 addressed issues concerning future operations in the Arctic. For instance, U.S. Northern Command led *Artemis Polaris*, an exercise designed to chart methods by which DOD could best assist in a mass rescue operation or a major oil spill, accounting for the differing legal and fiscal authorities that apply. Future multi-agency exercises that test Coast Guard capabilities in the Arctic, interoperability with DOD forces, and shared maritime domain awareness will most certainly include United States North American Aerospace Defense Command, United States Northern Command, and Joint Task Force Alaska.

Arctic Council and the Arctic Nations

The Arctic Council is an international body comprised of the eight Arctic nations: the United States, Canada, the Russian Federation, Iceland, Sweden, Finland, Norway, and Denmark. The council also offers permanent seats to organizations that represent indigenous peoples, such as the Inuit Circumpolar Council, and has been very active in spearheading efforts to ensure coordination is geared toward the most pressing Arctic threats.

For example, in 2011, the Arctic Council concluded a search and rescue (SAR) agreement to improve coordination in Arctic rescues. All eight Arctic nations concluded this legally binding agreement, opening the door for future international cooperation. Additionally, since the United States has not yet joined the U.N. Convention on Law of Sea, the Arctic Council is one of the few multilateral venues available for the United States to fully address Arctic issues in an international forum.

Following the success of the SAR agreement negotiations, the Arctic Council chartered a separate task force to negotiate an agreement to improve coordination among the Arctic nations regarding preparedness and response to marine oil pollution incidents. The Department of State represented the United States as one of the task force's co-chairs, and the Coast Guard led the U.S. delegation. The task force concluded an agreement under the authority and auspices of the Arctic Council, which is awaiting council ratification as of this writing.[1]

The U.S. Coast Guard also maintains bilateral agreements and arrangements with Alaska's neighbors: Canada and Russia. We have strong relations with the Canadian Coast Guard and the Russian Federation State Marine Pollution Control Salvage and Rescue Administration, and exercise our agreements and relationships regularly. As such, the U.S. Coast Guard participated in a bilateral Canadian-led Arctic logistics tabletop exercise in August 2012, as well as a bilateral Russian-led communications exercise in September 2012. The USCG plans to continue these relationships indefinitely and is planning 2013 and 2014 exercises and operations.

State, Tribal, and Local Governments

The Coast Guard's partnership with the state of Alaska on contingency planning and response is crucial to future success. Alaska boasts a wealth of expertise in oil spill response, stemming from its experience in combating oil spills like the 1989 *Exxon Valdez* spill in Prince William Sound. The state also has a unique and established relationship with the local and indigenous peoples.

To test readiness, the state of Alaska will lead *Alaska Shield 2014*, a major exercise that will focus on south-

central Alaska to prepare and test response in the event of a major earthquake and resulting tsunami. Although this particular exercise is targeted to a response in south-central Alaska, the partnerships formed and lessons learned during this exercise will be transferable to Arctic operations.

The Coast Guard is a member of many interagency groups that include state and local representatives such as the Alaska Regional Response Team, the Regional Interagency Steering Committee led by the Federal Emergency Management Agency, and other groups designed to coordinate different disaster and emergency response efforts. The commander of the 17th Coast Guard District also served as the federal liaison to the Alaska Northern Waters Task Force, established by the Alaska state legislature in 2010 to recommend ways to confront challenges and opportunities in the Arctic. In January 2012, the task force released a report recommending development of an Arctic marine strategy for federal and state entities.[2]

The Coast Guard also maintains close ties to the native and local communities—having a dedicated tribal liaison to ensure open and full communication regarding indigenous concerns. Beginning in 2007, the Coast Guard started visiting remote communities to discuss and address Alaskan native concerns and assist in delivering needed assistance, such as medical care to remote

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USCGC *Healy* Leverages Partnerships in Crucial Oil-Delivery Effort

When harsh weather prevented a scheduled fuel delivery in the fall of 2011, Nome faced a fuel shortage crisis. From December 2011 to January 2012, the Coast Guard aided the first-ever winter fuel delivery operation to the Arctic city of Nome, Alaska. The collaboration included operators from CGC *Healy* and the Russian tanker vessel *Renda* as well as those in direct support of those vessels. The team also consisted of lawyers, logisticians, meteorologists, and marine safety professionals.

The Coast Guard worked with the Russian tanker company, many federal agencies, the State of Alaska, and the mayor of Nome, as well as directly with indigenous populations to draw on networks of knowledge and assistance. Some crucial partners like the National Oceanic and Atmospheric Administration, the National Weather Service, and the Department of Defense provided ice and weather reports to *Healy's* and *Renda's* crews. Professors from the University of Alaska used specialized equipment to validate measures of ice coverage in the Port of Nome.

International Cooperation, Local Efforts

Strong partnerships ensured expert multi-agency coordination and overcame potential bureaucratic obstacles. The Coast Guard consulted with DOD and the National Guard, and routed a request through the Bureau of Customs and Border Protection to the Secretary of the Department of Homeland Security to secure a waiver of the Jones Act[1] to allow the Russian-flagged *Renda* to legally proceed directly from one U.S. port to another.

The Alaska National Guard loaned snow machines that enabled the Coast Guard to enforce a safety zone on the iced-over Nome harbor, so that *Renda* could safely pull in as close as possible to Nome. The Coast Guard worked with state officials to ensure the viability and safety of the fuel transfer and contingency plans—working together to allow sufficient time for public comment and input. Multiple local crews assisted in monitoring the fuel transfer hoses for nearly a mile over the ice from ship to shore to ensure not a drop of fuel was spilled in the pristine marine environment. Residents advised on local conditions, and all worked together to ensure operators properly limited outside time to avoid overexposure to the freezing temperatures, which dipped as low as minus 40 degrees Fahrenheit.

Success as the World Looks On

The Nome fuel-delivery operation spanned more than 45 days, and the cross-functional team coordinated all aspects of the operation, including media requests. In fact, Coast Guard's Arctic media coverage spiked from an average of 23 stories a week to 917, when coverage of the Nome fuel transfer operation was factored in.

This level of public attention dedicated to this one-time-only winter operation clearly demonstrates the increased attention the Coast Guard should expect for Arctic operations.

Endnote:

[1] 46 U.S.C. § 55102.

Arctic Shield 2012

***Arctic Shield 2012* was a multipronged USCG operation in the Alaskan Arctic during the summer of 2012, which included local outreach, oversight, and commercial shipping regulation as well as exercises designed to maximize the use of assets in forward operating locations.**

Members of an MH-60 Jayhawk helicopter crew from Coast Guard Air Station Kodiak, Alaska, give Alaska Lieutenant Governor Mead Treadwell (foreground) a tour of the helicopter hangar at Coast Guard Forward Operating Location Barrow. Coast Guard members from left: Petty Officer Zach Painter, LT Mike Groncki, and LCDR Tom Combs. U.S. Coast Guard photo by Petty Officer Elizabeth H. Bordelon.

As part of *Arctic Shield 2012,* the Coast Guard planned for a two-cutter presence in the Arctic, a seasonal air facility in Barrow operating with two MH-60 helicopters, and a parallel Coast Guard/Navy exercise to deploy a spilled oil recovery system at sea.

A Coast Guard MH-60 Jayhawk crew from Coast Guard Air Station Kodiak, Alaska, pose with a group of local high school students attending a presentation at Forward Operating Location Barrow. U.S. Coast Guard photo by Petty Officer Elizabeth H. Bordelon.

Crewmembers aboard the Coast Guard Cutter *Sycamore* prepare for a spilled oil recovery system exercise during Arctic Shield 2012 near Barrow, Alaska. U.S. Coast Guard photo by Petty Officer Kelly Parker.

Operational assets were moved to forward Arctic locations to ensure safety at the Bering Strait chokepoint and oil exploration zones in the Beaufort and Chukchi Seas, northwest of Barrow and Prudhoe Bay, Alaska.

Coast Guard personnel aboard Coast Guard Cutter *Sycamore* prepare the "Polar Bear" skimmer for an oil recovery exercise in the Arctic Ocean. U.S. Coast Guard photo by Petty Officer Kelly Parker.

From left, Rear Admiral Thomas P. Ostebo and Vice Admiral Paul F. Zukunft address the Alaska Eskimo Whaling Commission in Point Hope, Alaska, as part of *Arctic Shield 2012* outreach. U.S. Coast Guard photo by LT Sarah Morin.

regions, or supplies necessary to support subsistence hunting. In addition, the Coast Guard works with local communities to build local SAR capability.

Non-Governmental Organizations and Academic Institutions

The Coast Guard engages with outside experts and concerned groups regularly on Arctic issues to gain different perspectives and ensure that divergent viewpoints are considered. Representatives from non-governmental organizations are active participants on the task force that is negotiating a cooperative oil pollution agreement under the auspices of the Arctic Council.

The Coast Guard has also partnered with the Institute of the North, a nonprofit organization dedicated to the study and advancement of issues that affect those in the North.

Representatives from the Coast Guard participate in the Alaska Forum on the Environment, held annually for the past 14 years to bring together government agencies, businesses, organizations, tribes, and the public to discuss issues affecting Alaskans and promote a productive and efficient relationship among stakeholders. In February 2012, Coast Guard representatives spoke on topics such as Coast Guard Arctic operations, oil spill response coordination, green building, and other environmental initiatives in the Coast Guard, giving attendees the opportunity to learn about Coast Guard operations, ask questions, solidify existing relationships, and develop partnerships.[3]

The Coast Guard also partners with academic institutions. For example, the Coast Guard follows University of Alaska at Fairbanks research on various scientific issues. Presently, the university is working to establish an international Arctic research center focused on the increased risks and hazards posed by the potential for oil spills in the Arctic. Additionally, the University of Washington's Center on Canadian Studies hosted an Arctic roundtable in May 2012 to encourage continued U.S. and Canadian collaboration on Arctic issues. Both the U.S. and Canadian Coast Guards were represented on panels and in the audience.

The U.S. Coast Guard Academy sponsored an Arctic leadership symposium that discussed some of the most vexing operational and policy issues,[4] and the Navy and Coast Guard co-hosted a symposium at the Naval War College in September 2012 to address capability gaps. Collaborative efforts like these serve academic research goals, develop leaders who are Arctic literate and strategically savvy, and benefit future Arctic operations.

Industry

Partnerships among companies operating in the Arctic and the Coast Guard will continue to improve as Arctic operations increase in duration, frequency, and complexity. The Coast Guard must maintain open lines of communication with industry so that it can plan strategically.

The Coast Guard communicates regularly with industry representatives and conducts exercises to ensure Oil Pollution Act of 1990 requirements are met. Industry also relies on cooperative partnerships, such as those with oil spill removal organizations that serve as first responders, in the event of an oil spill.

Looking Ahead

Effective partnerships are not merely bilateral, they are complex and networked. In a world of increasing responsibility, dwindling resources, and ever-shrinking budgets, partnerships are key to the nation's success in the Arctic.

About the author:
CAPT Kathleen Duignan is the chief of Planning and Force Readiness for the Coast Guard's 17th District. She has served in the U.S. Coast Guard for more than 20 years in varying roles, most notably as a judge advocate, specializing in international and operational law. She also serves as a judge on the Coast Guard Court of Criminal Appeals.

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The Arctic Initiatives Matrix Team

Coordinating Coast Guard vision and operational efforts.

by CDR Karin E. Messenger
Senior Strategic Policy Supervisor
U.S. Coast Guard

The rapidly changing environmental conditions and increased level of human activity taking place in the Arctic region requires the U.S. Coast Guard to examine how we evaluate and expand our preparedness and readiness to address risk to mariners and the environment. This has required that Coast Guard headquarters, areas, districts, and operational units develop well thought-out and coordinated plans, priorities, and initiatives for this emerging region—all within the current Coast Guard resource and budget footprint.

It Takes a Team

This is the type of project that the Deputy Commandant for Operations Emerging Policy[1] staff (DCO-X) was originally created to coordinate and has been coordinating for the past four years. DCO-X was designed to examine time-sensitive, emerging-policy issues that the Coast Guard needs to strategically address and ultimately transfer to dedicated program managers. This past year, DCO-X has evolved to also serve as a strategic initiatives group, which involves building strategies, developing testimony, and representing the Coast Guard in high-profile venues. Arctic policy coordination remains an important part of DCO-X's portfolio.

The Arctic is not a new mission; rather it is a challenging, expanding operational area for the Coast Guard to execute its existing statutory responsibilities. However, advancing the Coast Guard's activities and priorities in the Arctic is not something that DCO-X can perform independently; significant engagement across Coast Guard stakeholders is needed. To address this need, DCO-X turned to a matrix organization.

The Matrix

DCO-X has hosted the Arctic Initiatives Matrix Team (AIMT) for the past four years. At its onset, the AIMT was comprised of a coalition of interested Coast Guard parties to share information and coordinate across programs and directorates. With the growing risk associated with increased summertime maritime activities, including anticipation of offshore exploratory drilling, it was clear that this workgroup needed additional structure. In October 2011, the Deputy Commandant for Operations chartered the Arctic Initiatives Matrix Team to play a definitive role in shaping the way forward for the Coast Guard and the nation. The charter outlined specific team tasks and long-term functions along with designating required Coast Guard stakeholder membership.

Today, the Arctic Initiatives Matrix Team's membership is strong and growing. The team meets regularly to share information, projects, and new initiatives. Importantly, these meetings break down programmatic stovepipes and increase internal Coast Guard collaboration to effectively coordinate Arctic initiatives. It is common for the monthly AIMT meeting to spur additional coordination meetings to further discuss a topic that was on that month's agenda, which benefits all.

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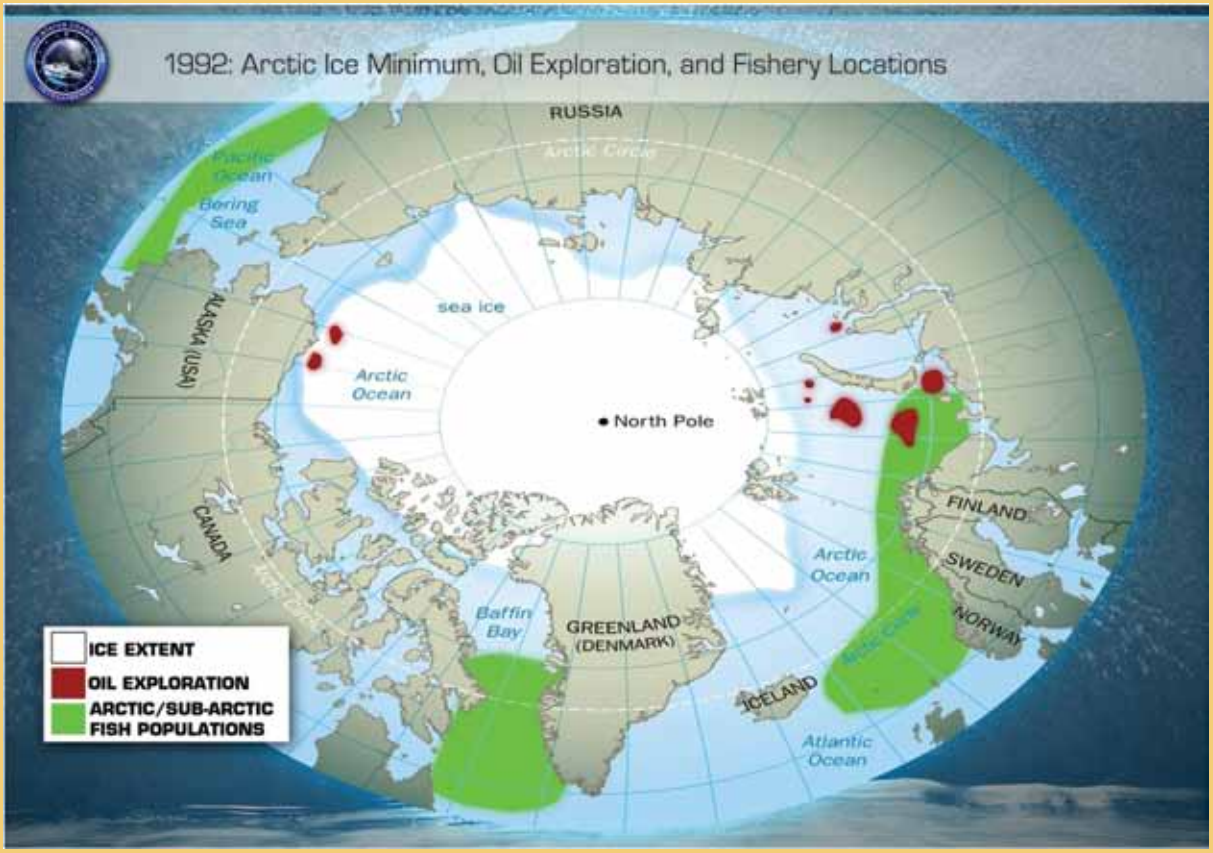
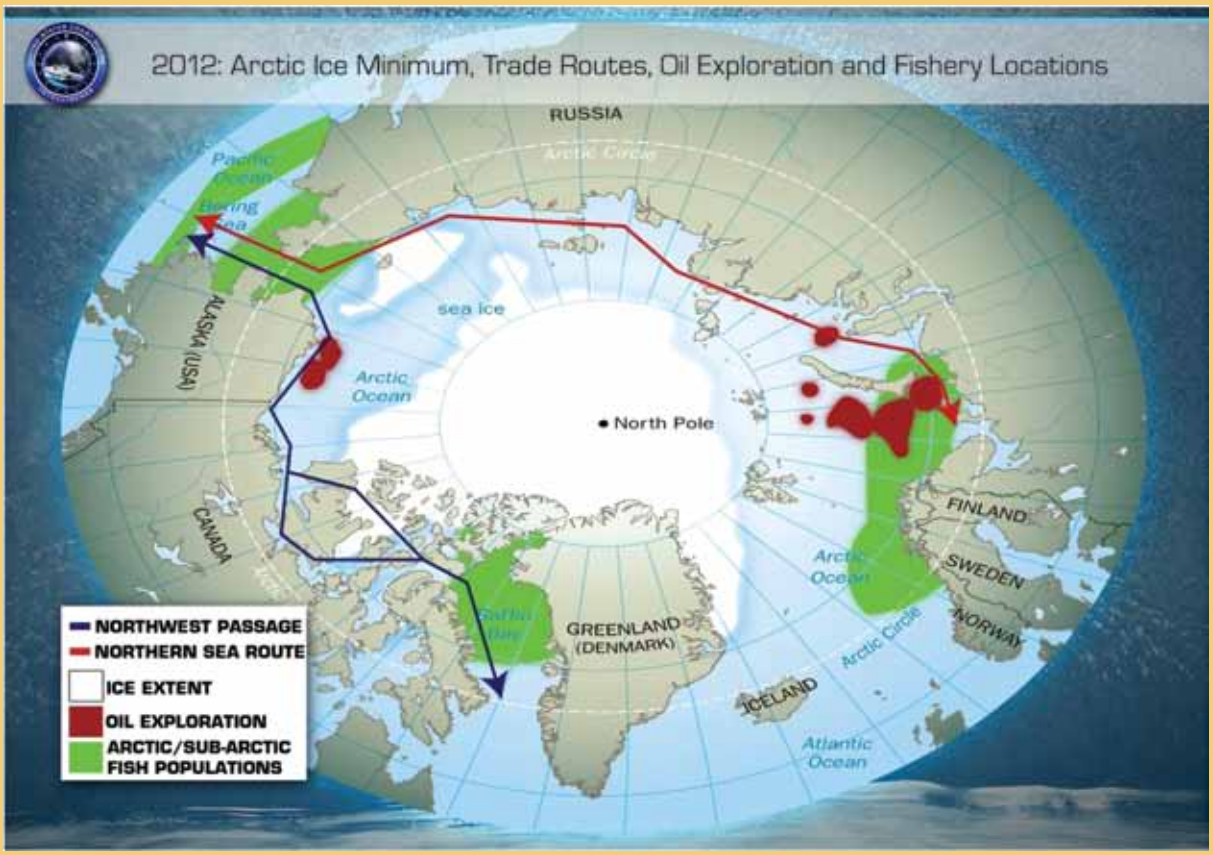


This image illustrates Arctic sea ice minimum in September 1992. The known ice extent, areas of oil exploration, and fish stocks are all represented. U.S. Coast Guard graphics.



This image illustrates Arctic sea ice minimum in September 2012. The known ice extent, areas of oil exploration, and fish stocks are all represented, in addition to newly available transportation routes, including the Northwest Passage and Northern Sea Route. Note that in comparison to the same image from September 1992, fish stocks have migrated north and oil exploration activities have increased.

The Arctic Scroll

The large number of reported Arctic activities has been eye-opening and requires 10-foot-long poster paper to print in its entirety, giving rise to the nickname the "Arctic Scroll."

"The scroll is beneficial in identifying parallel efforts and providing an overarching picture of the USCG's significant level of effort, to ensure we are prepared to execute our mission sets in this emerging frontier," says CDR Messenger, pictured. U.S. Coast Guard photo by *Proceedings* editorial staff.

Project Development

DCO-X utilizes subgroups from the AIMT as tiger teams to work on specific Arctic-related projects such as developing the *2012 Coast Guard Arctic Action Plan* and the monthly Arctic program and initiatives dashboard.

Like the AIMT, the Arctic programs and initiatives dashboard has evolved and matured during the past two years. Arctic Initiatives Matrix Team members record their Arctic projects, meetings, operations, and other initiatives to provide senior leadership with visibility on the level of effort these various program offices and CG units are performing and to support the Coast Guard's increasing role in the Arctic.

U.S. Coast Guard Arctic Strategy

When Coast Guard Commandant Admiral Robert J. Papp directed DCO-X to develop a *U.S. Coast Guard Arctic Strategy*, the staff turned to a subgroup of AIMT members to serve on the development team. The results were outstanding; the development team researched, analyzed, and refined a Coast Guard strategy draft that DCO-X then put through a rigorous Coast Guard, interagency, and academia concurrent review and refined with DHS senior leadership.

Signed on May 21, 2013, this strategy outlines the Coast Guard's Arctic priorities and defines long-term success for the next 10 years, while clearly highlighting how the Coast Guard serves as a national leader in this region. The process used to develop this important document was so successful that it is now a template for other Coast Guard strategies including the *USCG-NOAA Cooperative Maritime Strategy*, which was promulgated earlier this year.

Arctic Initiatives Matrix Team Future Plans

With increased understanding and increased cross-programmatic coordination now occurring, there may come a time in the future that the Arctic Initiatives Matrix Team is no longer needed. However, that time has not yet arrived. With the public release of the *U.S. Coast Guard Arctic Strategy*, we will need to develop comprehensive implementation plans. The AIMT will be a critical platform to not only help develop these plans, but to also ensure effective implementation across all programs areas as the Coast Guard moves forward to execute its Arctic vision.

About the author:
CDR Karin E. Messenger has been on the Emerging Policy staff since July 2011. Her responsibilities include internal and external Coast Guard Arctic engagement and policy development, leading the Arctic Initiatives Matrix Team, and cross-programmatic strategy development.

Endnote:

1. Prior to Summer 2012, the Emerging Policy staff reported to the Assistant Commandant for Marine Safety, Security and Stewardship (CG-5X) During the Summer of 2012, CG-5X was moved to the Deputy Commandant for Operations (DCO) staff as DCO-X. For simplicity, this article uses "DCO-X" when describing actions taken by the Emerging Policy staff prior to Summer 2012.

U.S. Northern Command's Role in the Arctic Region

by CDR LaDonn Allen
U.S. Coast Guard
Chief, Maritime and Arctic Exercises
NORAD and U.S. Northern Command

Lt Col Adrian L. Spain
U.S. Air Force
Chief, Joint Exercise Division
Alaskan Command and Joint Task Force Alaska

Lt Col (ret) Paul VanderWeide
SAR program manager
Alaskan Command and Joint Task Force Alaska

The U.S. Coast Guard is one of the lead federal agencies with many authorities in the Arctic. However, resources are minimal in that region and assistance for a large incident may be limited. In this scenario, the Department of Defense (DOD) may provide support, as it did during the *Exxon Valdez* oil spill.

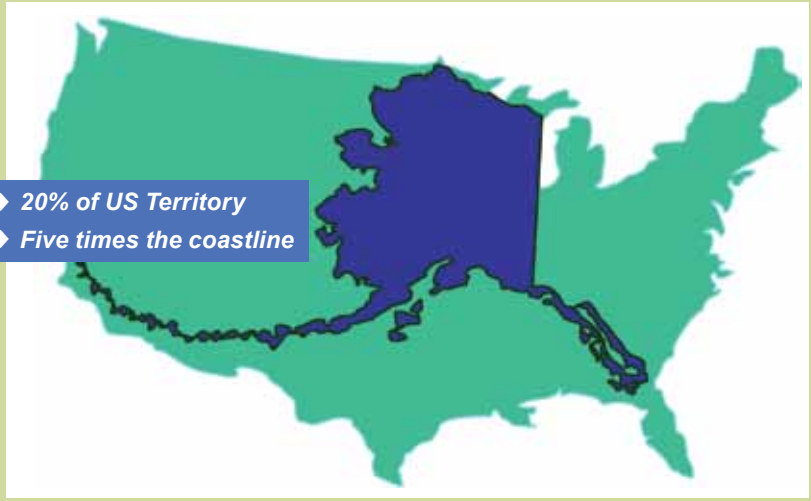
The DOD Unified Command Plan (UCP) appoints each combatant commander's missions, a description of the geographic area of responsibility, and their respective duties. The plan designates four-star commanders' responsibility for engaging across these geographical areas and provides for a line of coordination.

The UCP was revised in 2011 to reflect a shared Arctic area of responsibility for U.S. Northern Command (USNORTHCOM) and U.S. European Command. The 2011 update also designated Commander USNORTHCOM as the DOD Arctic capability advocate. In this capacity, USNORTHCOM supports the Arctic stakeholders to identify capability requirements and shortfalls across the doctrine, organization, training, materiel, leadership and education, personnel, and facilities spectrum in the areas of safety, security, and defense, and champions their resolution with trusted partners. This change strengthens relationships and streamlines responsibilities and communication as the U.S. prepares for increased levels of recreational and commercial activity in the Arctic.

Planning for Increasing Arctic Traffic

In 2012, for example, the federal Bureau of Safety and Environmental Enforcement approved Shell Alaska's oil spill response plan for Beaufort and Chukchi Sea operations. Correspondingly, there has been a significant increase in air traffic along the "polar routes." (The FAA defines the north polar area of operations as the area lying north of 78 degrees north latitude.) According to the Federal Aviation Administration's Cross Polar Work Group, the number of total flights along these

A Coast Guard HC-130 Hercules airplane flies over pack ice during a patrol of the Bering Strait. U.S. Coast Guard photo by Petty Officer Kurt Fredrickson.



This graphic illustrates how substantial the size of Alaska is when placed over a map of the lower 48 states. All graphics courtesy of Joint Task Force-Alaska, Alaskan Command, and the U.S. Air Force.

polar routes have increased from 884 in 2003 to 9,658 in 2010.

In response to this increased Arctic activity, the U.S. Northern Command executed a number of tabletop exercises including *Artemis Polaris* and *Fervent Glacier,* as well as an Arctic collaborative workshop exercise, a large Arctic command post exercise, and a field training exercise. These exercises challenged USNORTHCOM's ability to respond to emergency or catastrophic events in the Arctic, and involved inland and maritime search and rescue (SAR), oil spill response, and other support scenarios.

Via the "polar route," it would take approximately the same amount of flight time to travel from Elmendorf AFB to Asia and Europe, as it would from Elmendorf AFB to the lower United States.

They also served as the basis to advocate for future resources and capabilities. For example, DOD has a robust presence in many populated areas of the world, but it does not have an Arctic maritime or terrestrial presence at this time. Any U.S. Arctic response capability will come from DOD and Coast Guard facilities south of the Arctic Circle.

Limited Capacity for Arctic SAR Ops

Three main factors complicate Arctic SAR operations:

- severe environmental conditions,
- vast distances, and
- extremely limited resources and infrastructure.

Arctic conditions require a rapid response to survivors, yet the distances involved make that response very difficult. Search and rescue resources and infrastructure are exceptionally scarce in northern Alaska, which compounds the response issue. While the combined efforts of federal, state, local, and industry partners have done an admirable job of conducting limited SAR operations in this inhospitable region, the U.S. is not prepared or postured to respond to a mass rescue event in the Arctic.

Recognizing the U.S. Arctic SAR resource deficiency and acknowledging the eventual necessity of a mass rescue event, based on the progressive increase in Arctic activity, the U.S. must decide what level of Arctic SAR response it desires for the region. Currently, once the limited U.S. capability is exceeded, the only option to fill the need is a bilateral assistance request to Canada or Russia.

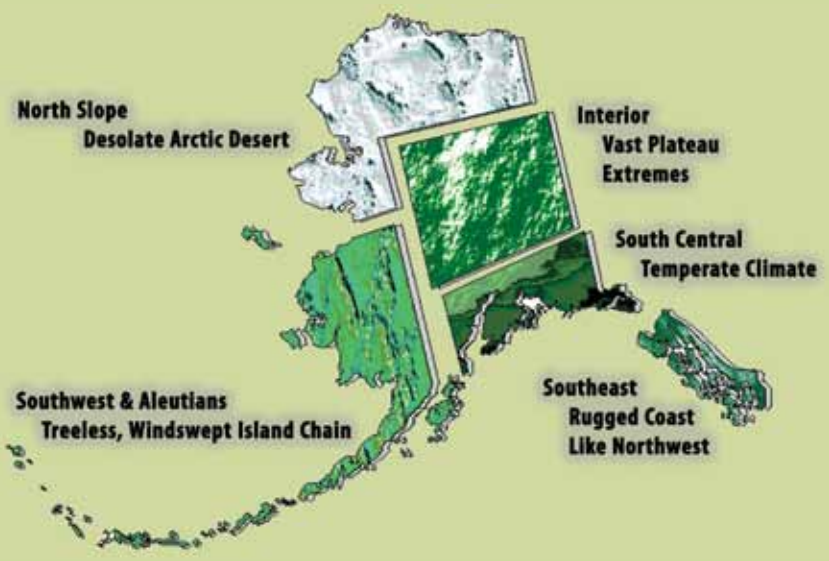
Initiatives to increase Arctic SAR capability and northern infrastructure are in development; however, maintaining momentum for these efforts is challenging in the current fiscal environment. A realistic way ahead to achieve any advancement in these initiatives is partnership among federal agencies (USNORTHCOM, USCG), the state of Alaska, and industry operating in the region.

Domain Awareness and a Common Operating Picture

There are certainly challenges for an accurate common operating picture within USNORTHCOM's area of responsibility, but the greatest challenge lies within Arctic domain awareness. The Arctic requires reliable beyond line-of-sight communications in extreme

northern latitudes for mission execution and chain of command communication. The most reliable communications source is currently the Iridium satellite, which provides coverage throughout the Arctic region. Other capabilities are effective, such as the Naval Research Laboratory's Tactical Satellite IV system, but do not provide continuous coverage.

In addition, terrestrial systems are extremely limited and are only available in a few populated areas. Furthermore, domain awareness is similarly hampered by the challenge to our intelligence, surveillance, and reconnaissance access in the Arctic.



Alaskans experience different types of climate and weather conditions depending on where they are located. This graphic illustrates the extreme differences in environment and topography across the state.

Cooperation with Other Agencies

One of USNORTHCOM's responsibilities is to look at the Arctic from the DOD perspective and advocate for necessary capabilities. Additionally, our Arctic partners must look at near-term contingencies such as expanding aerospace and maritime information requirements, responding to civil support requests, and protecting critical infrastructure in the Arctic.

The bottom line is DOD can currently provide only limited support in the Arctic region. The opening of the Arctic is occurring continually and rapidly; and, the more ship, aircraft, and drilling activity occurs, the more likely an incident is to take place.

Building capability and capacity within the Arctic region will require careful thought to policy and resourcing and cooperation among U.S. agencies as well as with our Arctic partner nations. The way forward for the U.S. Northern Command, its fellow DOD components, and the Arctic agencies it supports is to set clearly defined and achievable goals and policy. From there, it is important to continue to shape whole-of-community partnerships and capabilities to facilitate the peaceful and continuing opening of the Arctic in a manner that fosters international cooperation.

Finally, capabilities must be resourced to succeed operationally in such a harsh environment. This can be completed through coordinated efforts including creating joint policy and procedures; continued training, and multiparty exercises to identify gaps, shortfalls, and opportunities to leverage joint capabilities and requirements; and assessing Arctic policies, processes, procedures, and resources to determine future requirements.

About the authors:

U.S. Coast Guard CDR LaDonn Allen is the branch chief for Maritime and Arctic Exercises in the Training and Exercise Directorate at NORAD and U.S. Northern Command. CDR Allen is also a NIMS Incident Command System instructor.

U.S. Air Force Lt. Col. Adrian L. Spain is the chief, Joint Exercise Division for Alaskan Command and Joint Task Force Alaska. He is a command pilot and former USAF Weapons School instructor. Preceding this assignment, he was a student at the Industrial College of the Armed Forces. His most recent operational assignment was commander of the 94th Fighter Squadron.

Mr. Paul VanderWeide is the SAR program manager for Alaskan Command and Joint Task Force Alaska. He is the former director of the Alaska Rescue Coordination Center. He is a command pilot with 5,000 flight hours in the HH/MH-60G helicopter in a career that spanned special operations, USAF Combat Rescue, and Alaska Air National Guard search and rescue.

Author's note:

The views expressed in this article are those of the authors and do not necessarily reflect the official policy or position of the Department of Defense or the U.S. government.

The North American Ice Service

A decade of collaboration.

by Mr. Michael Hicks
Chief Scientist
U.S. Coast Guard International Ice Patrol

From the earliest days of the International Ice Patrol, formed after the *Titanic* tragedy in 1912, a close working relationship developed between U.S. and Canadian ice experts that continues today. The concept of the North American Ice Service (NAIS) evolved from this relationship among the Canadian Ice Service (CIS), the U.S. National Ice Center (NIC), and the International Ice Patrol (IIP), under the U.S./Canada Joint Ice Working Group.

The NAIS was formalized in 2003 through an annex to a memorandum of understanding between the U.S. National Oceanic and Atmospheric Administration and the Meteorological Service of Environment Canada, with the expectation that the integration of the ice services of both countries could further efficiencies in the provision of ice information.

As such, the mission of the North American Ice Service is to leverage the strengths of the Canadian Ice Service, the U.S. National Ice Center, and the International Ice Patrol; monitor and provide timely and accurate ice analysis; and meet the needs of the maritime interests of the United States and Canadian governments.

The respective directors from each participating service serve as co-directors for the NAIS organization. It is further organized into three committees: operations, science, and information technology. NAIS as a whole meets annually to strategize and prioritize collaborative endeavors, while its committees meet more frequently to focus individual strengths from each service to address and resolve key issues.

The NAIS supports:

- safe and efficient maritime operations,
- weather and environmental modeling,
- national and environmental security,
- research and climate understanding,
- international treaty obligations.

In 2005, NAIS completed a user needs validation study that confirmed and redefined user groups, geographic scope, and high-level information/product requirements. Another study benefit: a searchable, easy-to-maintain relational database of NAIS requirements and products.

Deliverables

Over the past decade, NAIS partners have collaborated to produce two ice charts—an ice analysis for the Great Lakes and an "iceberg limit" chart for the Atlantic—resulting from the combined efforts of each service and distributed as NAIS ice products. To more evenly divide the workflow, the National Ice Center and the Canadian Ice Service each produce the Great Lakes chart twice a week. Using the same chart template at both locations provides a common product look, regardless of the creation site.

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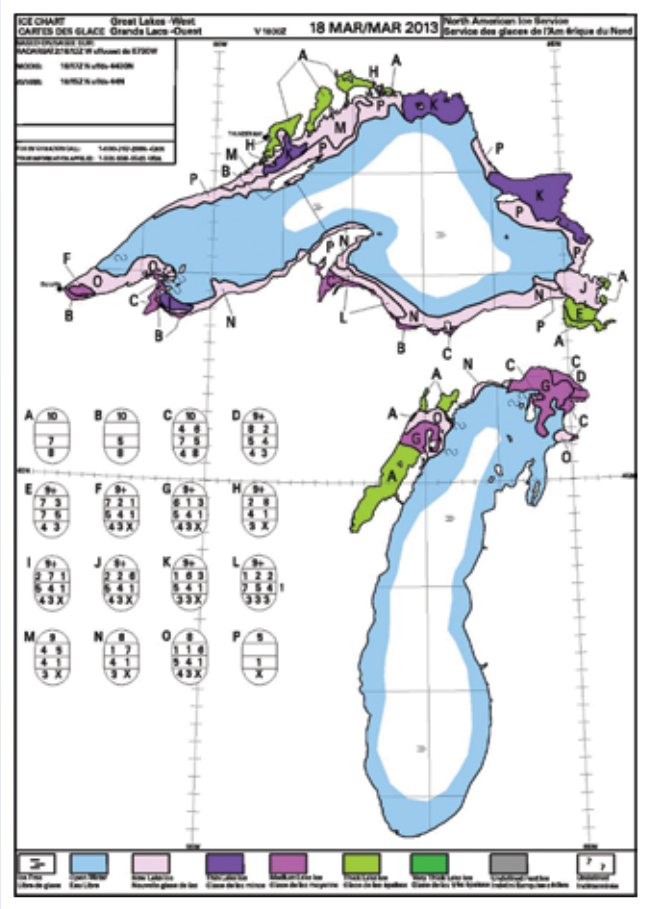
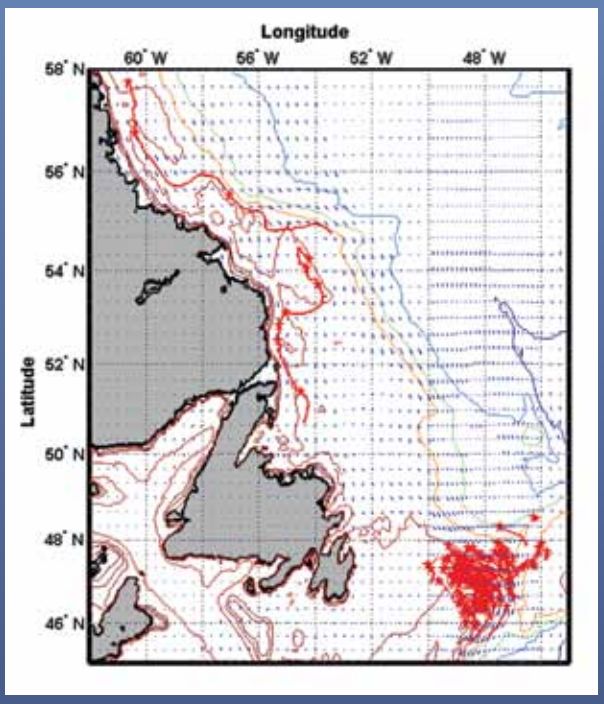
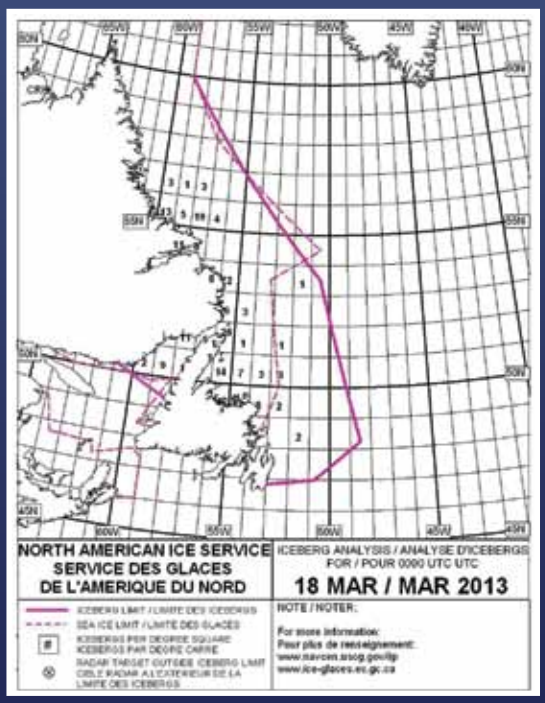


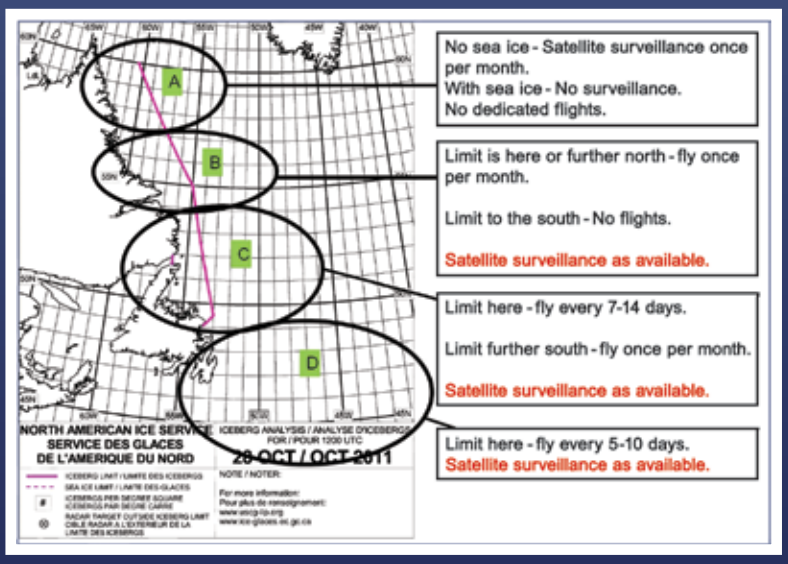
North American Ice Service Great Lakes-west ice analysis. Graphic courtesy of the Canadian Ice Service.



IIP and CIS have used the same operational iceberg drift and deterioration model since the early 1980s. Recently CIS developed a new model that takes advantage of the multi-level currents provided by the new generation of ocean circulation models. NAIS operational testing and evaluation is ongoing for eventual operational implementation. Graphic courtesy of the Canadian Ice Service.



North American Ice Service iceberg limit chart. Courtesy of the International Ice Patrol.



Collaborative North American Ice Service reconnaissance strategy using a mix of aircraft and satellite resources. Courtesy of the International Ice Patrol.

A Coast Guard C-130 fixed wing aircraft overflies an iceberg during patrol. U.S. Coast Guard photo by Petty Officer Brandon Brewer.

The International Ice Patrol and Canadian Ice Service share responsibilities to observe iceberg hazards in the North Atlantic, and report the iceberg limit to shipping. Under the NAIS partnership, IIP and CIS have agreed to divide iceberg chart creation and distribution duties. The International Ice Patrol produces the chart from February to August, and then the Canadian Ice Service does so from September to January.

Collaborative Efforts

As the iceberg limit recedes to the north in the late summer and early fall, the need to conduct costly aircraft patrols diminishes. As icebergs begin to drift south toward the transatlantic shipping lanes in February and March, the need for more frequent aerial reconnaissance increases and is focused on the southern extent of the iceberg limit.

In addition to joint products and resource-saving collaborations, the North American Ice Service has collaborated to provide extensive ice information support for annual Arctic operations including the Extended Continental Shelf (ECS) project and *Operation Nanook*, Canada's annual whole-of-government Arctic exercise.

The ECS project has been active for several years. From 2008 to 2011, the U.S. Coast Guard Cutter *Healy* and the Canadian Coast Guard Cutter *Louis St. Laurent* conducted joint bathymetric and seismic data collections efforts in the Western Arctic. The Canadian Ice Service and the National Ice Center worked together to provide cohesive, detailed, and tailored ice information support with shared imagery and ice analysts on both vessels. *Operation Nanook* has been supported in a similar manner for several years. The NAIS will continue to provide a unified source of ice information in support of annual Arctic operations.

Maritime operations in ice-encumbered waters continue to present a hazardous operating environment. Canada and the United States share a long history of cooperation to promote safe and efficient shipping. In the past decade, the NAIS organization has flourished and evolved from one of information exchange into a true collaborative environment.

About the author:
Mr. Michael Hicks is the chief scientist of the U.S. Coast Guard International Ice Patrol. Prior to this assignment, he worked for the Aviation Branch of the U.S. Coast Guard Research and Development Center. He is a prior commander of the International Ice Patrol, retiring from active duty in 2007. He earned an M.S. degree in oceanography from the Naval Postgraduate School.

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The Canadian Coast Guard Ship *Louis S. St. Laurent* makes an approach to the CGC *Healy* in the Arctic Ocean. U.S. Coast Guard photo by Petty Officer Patrick Kelley.

Russian Relationships

Existing cooperation and future opportunities.

by LCDR Iain McConnell
Regional Advisor for Russia and the Asia-Pacific Region
U.S. Coast Guard Office of International Affairs and Foreign Policy

U.S. Coast Guard (USCG) collaboration with Russian government agencies has resulted in a continuous return on investment in areas such as fisheries enforcement, maritime law enforcement, search and rescue (SAR), marine pollution response, ship safety, port security, and merchant ship port state control.

In each case, these relationships allow the Coast Guard to leverage more information and resources than would otherwise be available, which reduces excessive spending and emergency response times. In some situations like fisheries enforcement cases that straddle the maritime boundary, accomplishing missions is possible only because of long-cultivated relationships and the corresponding Russian response. Our established cooperation must continue while we look for opportunities to build new friendships.

Time-Proven Bilateral Relationships

The Russian Federal Security Service, the successor to the Soviet KGB,[1] is roughly equivalent to the U.S. Department of Homeland Security. The Border Guard, with its Russian Coast Guard component, is part of the Federal Security Service.

Primarily a law enforcement agency, the Russian Coast Guard is akin to a combination of the USCG and U.S. Customs and Border Protection. However, it

The USCGC *Bertholf* and the Russian Coast Guard vessel *Vorovsky* sail west to the Bering Sea on a joint exchange. The *Vorovsky* is a Krivak-class frigate commissioned in 1990, and the *Bertholf* is the first of the Coast Guard's National Security cutters. U.S. Coast Guard photo by Petty Officer Sara Francis.

is evolving to take responsibility for additional maritime functions.

Vice Admiral Yuriy Alekeseyev, the head of the Russian Coast Guard, is equivalent to the USCG Commandant, and represents his service at the North Pacific Coast Guard Forum and the North Atlantic Coast Guard Forum.

The Border Guard is geographically subdivided like the U.S. Coast Guard. The Kamchatka Border Guard is the regional command with ties to the USCG, covering the area of eastern Russia that shares a border with the USCG 17th District (D17) in Alaska. D17 Commander Rear Admiral Thomas Ostebo inherited a longstanding institutional relationship that predates the collapse of the Soviet Union. He meets twice a year with Rear Admiral Sergey V. Scherbakov, commander of the Kamchatka Border Guard. As a sign of friendship, USCG cutters occasionally make port calls in eastern Russia in conjunction with those meetings. This strong relationship between the two services has endured even during times when the nation-to-nation relationships have struggled in other areas.

Arguably the strongest and most visible connection between the USCG and the Russian government is the fisheries enforcement cooperation between D17 and the Kamchatka Border Guard. Strong fisheries enforcement is in the national interest of both countries.

D17 personnel share information daily relating to fishing vessels operating near the maritime boundary. District 17 staffers also cooperate regularly to curb trans-shipment of fish caught illegally in the Russian exclusive economic zone, periodically providing C-130 airborne surveillance to direct Russian Coast Guard ships to intercept suspect fishing vessels. This is a value-add for both nations.

Arctic Emergency Response

With an increase in human activity in the Arctic comes greater risk, which means that SAR and spill response are increasingly important. Building strong relationships with potential response partners is essential for the Coast Guard. Because the U.S. Coast Guard's and Russian Coast Guard's responsibilities do not completely align, the best connection is with the State Maritime Pollution Control, Salvage, and Rescue Administration (or SMPCSRA). That administration has a network of command centers throughout Russia that coordinate Russian emergency response assets. The USCG and SMPCSRA have agreements in place to facilitate SAR and pollution response. On a practical level, the D17 staff communicates directly with SMPCSRA about SAR alerts to confirm which nation will respond.

Arctic Multilateralism and Governance

For Arctic issues, the U.S. government gains consensus with the Russians in multinational organizations

Russian Ministries with Connections to the USCG

Federal Security Service

- **Border Guard** of which the Coast Guard is a component.
  - **Coast Guard**, with responsibility for operational fisheries law enforcement, some fisheries policy, maritime border patrol, other law enforcement, and some SAR when assets are available (but not SAR command and control). The two regions close to Alaska are called the Kamchatka Border Guard Directorate and the Chukotka Border Guard Directorate.

Ministry of Transport

- **Department of State Policy in the Field of Sea and River Transport**, manages merchant ship port state control, navigational safety, and international standards development at the International Maritime Organization.
- **Federal Agency for Transportation Oversight**, owns a piece of port state control of merchant ships.
- **Federal Agency for Maritime and River Transport**, and its subdivisions:
  - **Northern Sea Route Administration**, currently in its infancy, will centralize control of icebreakers, ice pilots, communications, charting, maritime domain awareness, and SAR.
  - **State Maritime Pollution Control, Salvage, and Rescue Administration**, (SMPCSRA) with command and control for SAR and marine pollution incidents.
  - **Russian Maritime Security Service**, with responsibility for port security, specifically implementing the International Ship and Port Facility Security Code.

Ministry of Emergency Situations

- **"EMERCOM"** provides SAR and pollution response assets to SMPCSRA, which controls them.

Ministry of Agriculture

- **The Federal Fishery Agency** manages fisheries science and policy.

USCGC *Healy* breaks ice for Russian-flagged *Renda* during the winter 2011 Nome, Alaska, emergency fuel delivery. The *Renda* was involved as a private commercial venture, and Russian government cooperation was not required. Future emergencies may require established relationships for government-to-government coordination. U.S. Coast Guard photo.

and conferences. The USCG works alongside its counterpart Russian agencies to engage in four venues:

- The International Maritime Organization,
- The Arctic Council,
- The Arctic Security Forces Roundtable,
- The Security and Cooperation in the Arctic Conference.

The USCG serves as the lead U.S. agency at the IMO, where the member states jointly develop design principles for ships operating at the poles, which are then incorporated into national legislation by each member state and applied to vessels under that state's jurisdiction. A forthcoming "Polar Code" will mandate safety standards for ships operating in the Arctic.[2]

The U.S. and Russia are two of eight member states in the Arctic Council. The USCG, with expertise in maritime SAR, was an instrumental collaborator on the council's 2011 Arctic SAR Agreement.[3] Building on that accomplishment, the Arctic Council approved a comparable agreement regarding marine pollution. The U.S. will chair the Arctic Council from 2015 to 2017, which will likely afford USCG officers a chance to engage Russian officials, and increase visibility for the USCG and all U.S. government agencies involved with Arctic issues.

At the Arctic Security Forces Roundtable, military general and flag officers from more than eight nations (including Russia and the U.S.) work together on Arctic issues of common interest to militaries and coast guards. The U.S. and Norway co-host this meeting, which covers topics that are expressly excluded from the Arctic Council's mandate. Finally, the Russian Security Council hosts an annual security and cooperation in the Arctic conference. It brings together diplomatic-level representatives from the eight Arctic states and is an excellent opportunity to meet Russian representatives from agencies focused on the Arctic. The next generation of relationships will likely be made in forums such as these.

The Next Promising Opportunity

As Arctic issues and Russian institutions continue to evolve, there is a specific new relationship that involves the Russian Ministry of Transport where the USCG could see an excellent return. This is the case with the Northern Sea Route Administration, which was established in the spring of 2013 to centralize control over icebreakers, search and rescue response, navigation safety, and maritime domain awareness in the Arctic. The Northern Sea Route will carry ships through the Bering Strait, and this new

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Remember, Your Neighbor May See Things Differently

Russia has the longest Arctic coastline of any nation, controls an influential fleet of icebreakers, and has much to gain from Arctic maritime development. Further, Russians have a proud history of Arctic exploration and maintain a powerful "frontier myth" about their northern border. For them, the Arctic is a deeply personal affair. In light of that, we should understand three overarching differences in the way Americans and Russians view the Arctic.

The Fishing Industry

First, fishing companies are key economic and political powers in eastern Russia (as they are in some U.S. coastal states), and their political lobby has considerable influence on the Russian federal legislature. This has a direct impact on how the Russian government cooperates with the USCG.

For example, when the U.S. and the U.S.S.R. clarified their mutual maritime boundary in a 1990 boundary treaty, Russian fishermen felt that some of their fishing area had been surrendered to the United States, and the fishing lobby blocked Russian ratification. The U.S. Senate ratified quickly, but the Duma—the Russian legislature—never has.

Both nations continue to operate under an exchange of diplomatic notes to apply the agreement provisionally, and will proceed this way until the Duma ratifies the treaty.

A solid understanding of Russian fisheries issues is important for all USCG leaders, even when trying to foster relationships with Russian officials with no connection to fisheries.

Internal vs. International Waters

The next difference relates to freedom of navigation on the Northern Sea Route, which may connect to USCG relationships with the Ministry of Transport (MINTRANS). Commercial ships of any flag may use the route, but only if they pay user fees to the MINTRANS. The fees pay for icebreaker escort, ice pilots, navigation improvements like improved charting, and a future string of SAR and salvage stations.

The Russian government justifies its mandatory user fees by claiming the straits in parts of the NSR as internal waters through which they can control passage. The U.S. views the straits as international and available for free transit passage. For now, while ice is a major factor in navigation safety, companies and their insurers understand the benefit of icebreaker escort and are willing to pay the mandatory fees.

To date, no U.S.-flagged ships have used the route, so this has not been an immediate U.S. issue. Nevertheless, when the sea ice recedes sufficiently to allow ships to transit safely without icebreakers, the conversation regarding Arctic navigation user fees will likely intensify.

The "A5" vs. the "A8"

Finally, whereas the U.S. government prefers to work almost exclusively within the Arctic Council, Russia is often interested in working with only the five Arctic coastal states. Russia considers the "A5" (Russia, U.S., Canada, Norway, and Denmark) the right-sized group for certain concerns, particularly oil-, gas-, and maritime-related issues.

The U.S. has been clear on its preference to work with all eight Arctic states (the A5 plus Iceland, Sweden, and Finland) through the Arctic Council to gain as much consensus as possible. For specific issues that are explicitly of interest to only the coastal states (such as polar bear management, extended continental shelf delimitation, and Arctic hydrographic work), the U.S. sometimes participates in A5-only meetings, but this is rare.

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A crewmember from USCGC *Bertholf* tries to defend a soccer ball from a crewmember of the Russian vessel *Vorovsky* at the Coast Guard gym at Base Kodiak, Alaska. U.S. Coast Guard photo by Petty Officer Charly Hengen.

administration will control issues of direct interest to the USCG in the Chukchi Sea adjacent to Alaska. Getting to know the leaders and responsibilities of this Russian agency would be good for both Americans and Russians.

The U.S. Coast Guard's established relationships are good, but the future demands additional effort. As Russia chooses to shift control of coast guard-related issues among and within ministries, the USCG must forge new relationships that will reap valuable operational coordination.

About the author:
LCDR Iain McConnell has served in the U.S. Coast Guard for 14 years, and has experience in the Arctic and Antarctic as a junior officer aboard icebreaker USCGC Polar Star. *Following flight school and two tours as an MH-60J helicopter pilot, LCDR McConnell earned a master's degree in international affairs and now serves as the Coast Guard's regional advisor for Russian and Asia-Pacific affairs.*

Note: The views expressed are the author's and do not necessarily represent those of the U.S. Coast Guard, the Department of Homeland Security, or represent official policy.

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Scientific Support

The U.S. Coast Guard Research and Development Center evaluates Arctic operational capabilities.

by Mr. Richard L. Hansen
Branch Chief
U.S. Coast Guard Research and Development Center

Dr. Jonathan M. Berkson
Marine Science Program Manager
U.S. Coast Guard

LCDR Kenneth J. Boda
Strategic Analyst
U.S. Coast Guard

Science operations, research, and development in the Arctic have long been significant U.S. Coast Guard mission sets. Modern research projects help the service to meet hazards and threats in this remote locale.

In support of these missions, the U.S. Coast Guard created the Research and Development Center (RDC), a facility that provides research and development, as well as testing and evaluation services. These efforts are broad and varied, support the acquisitions and regulatory processes, and improve overall Coast Guard operations and mission support.

Evaluating Arctic Capacity

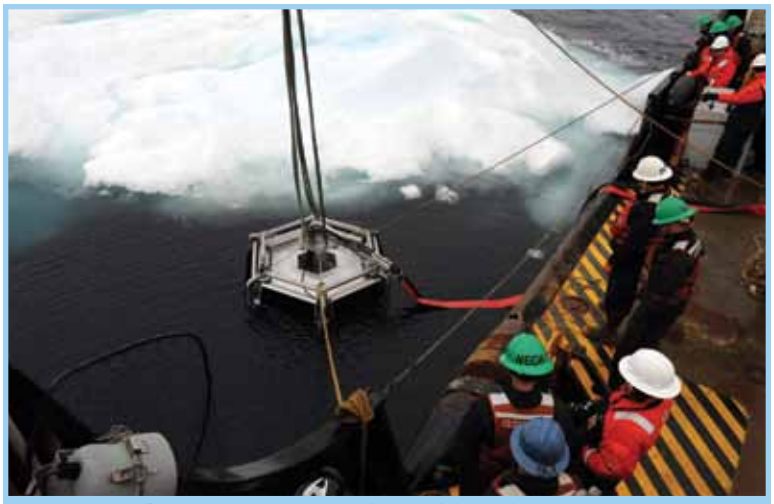
The center's efforts in the Arctic region include delivering a high latitude study in July 2010, which evaluated polar icebreaker capabilities, requirements, and Arctic and Antarctic mission needs.

To address the aging polar-class icebreakers, RDC also conducted a business case analysis that explored several options from major overhauls to icebreakers *Polar Sea* and *Polar Star,* as well as new build and lease options. The Department of Homeland Security forwarded this report to Congress in November 2011.

Arctic Oil Spill Response

An Arctic oil spill can cause major environmental damage, and the harsh weather and lack of logistical support would present huge challenges for response agencies. As such, the RDC has worked to evaluate and develop methods and equipment to respond to Arctic spills.[1] One finding: Equipment deployment exercises had not been conducted in ice, due to the lack of availability of ice-strengthened ships or icebreakers.

In 2009, the Research and Development Center initiated efforts to evaluate technologies and determine a comprehensive approach to responding in ice. Results from that investigation led to the first dockside demonstration at USCG Sector Sault Ste Marie in April 2011, where initial results highlighted the need for improved equipment. In January 2012, a second demonstration took place, consisting of a four-day sea trial, with demonstrations and observations on selected equipment, including four different skimmers, one fire boom, a remotely operated vehicle, and a vessel's fire-monitor system.



A "polar bear" skimmer is deployed from USCGC *Sycamore* during an *Arctic Shield 2012* exercise. U.S. Coast Guard photos.

Participants included crew from the Coast Guard buoy tender *Hollyhock,* three commercial tugboats, more than 50 personnel from multiple state and federal agencies, the Canadian government, and oil spill removal organizations.

Lessons learned were evaluated, and the technologies were again demonstrated as a part of the *Arctic Shield 2012* spilled oil recovery system exercise in August 2012, off of Barrow, Alaska. Another collaborative field demonstration in the Great Lakes incorporating a unified command occurred in February of 2013, along with plans for a more extensive demonstration in the Arctic in September of 2013.

Search and Rescue Challenges

At this time, the Coast Guard has no data on appropriate search swipe widths to assist search and rescue (SAR) mission controllers in developing search plans for ice-covered waters. Should a maritime mishap occur in the icy Arctic waters, search and rescue controllers have only "liquid-water" search performance data available to guide search pattern assignments for response craft.

The RDC is addressing this SAR planning data gap by conducting mission-realistic search performance tests in the Great Lakes during winter weather conditions to develop a preliminary set of search planning data for Coast Guard helicopters and airboats searching ice-covered waters.

Response Asset Assessment

The Research and Development Center continues to address Arctic capability gaps by investigating response craft and cutter boats capable of operating in the Chukchi and Beaufort Seas. The results document a search of all types of craft for potential use in the Arctic.[2] Based on these findings, the Coast Guard invited industry to propose solutions that would then be brought up to the waters off Barrow, Alaska, to demonstrate their ability to meet the Coast Guard's needs. Two craft, selected from a field of industry proposals were tested, and the RDC delivered a report on the results in 2012.

Looking Forward

Continuing Arctic challenges include safe natural resource development, protecting wildlife and fish stocks, supporting safe shipping tourism, and ensuring food security for the indigenous communities. We are witnessing environmental and ecosystem changes in this region, demonstrating its fragile nature.

Support for Arctic science has been an important part of Coast Guard missions, and the demand for

From left, the USCG Research and Development Center demonstrates the ARKTOS, a two-hulled articulated amphibious evacuation vehicle, and a Coast Guard special purpose craft air boat.

U.S. Coast Guard-Supported Scientific and Geographic Discoveries

- 1957: USCGC *Northwind* discovers the Northwind Ridge and Northwind Abyssal Plain.
- 1960s: USCG Wind-class icebreakers advance understanding of physical, chemical, and biological processes in the Bering, Chukchi, and Beaufort Seas.
- 1988, 1992: USCGC *Polar Star* collects *benthic foraminifera* census.
- 1994: USCGC *Polar Sea* is the first U.S. surface vessel to reach the North Pole.
- 2003: USCGC *Healy* discovers the Healy Seamount—a previously unmapped rise that climbs more than 3,000 meters above the surrounding seafloor.
- Scientists aboard USCGC *Healy* report a decapod from Arctic ocean vents and note first report of the species *hymenodora glacialis* near marine hydrothermal vents.
- 2003-2011: USCGC *Healy* and Canadian CGC *Louis St. Laurent* map the U.S. and Canadian extended continental shelves in the Arctic Ocean.
- 2008: NOAA conducts ice seal population survey aboard USCGC *Polar Sea.*
- 2009: *Healy* discovers a seamount (still to be named).

Dr. Larry Mayer (left) and Capt. Andy Armstrong watch as an underwater mountain, called a seamount, is discovered on the Arctic Ocean floor on Aug. 25, 2009. USCGC *Healy's* high-tech mapping system uncovered the seamount in the midst of an otherwise flat and featureless stretch of seafloor approximately 3,800 meters deep. U.S. Coast Guard photo by Petty Officer Patrick Kelley.

polar science and technology has never been greater. Whether it is oil spill response capability, improved response assets, or new anti-icing technology, the RDC is helping the Coast Guard chart an appropriate course for its expanding Arctic operations. It is clear that the Coast Guard has an enduring role in protecting the maritime Arctic by providing safety, security, and stewardship, while supporting our nation's science needs.

About the authors:

Mr. Richard L. Hansen is the branch chief of the Coast Guard Research and Development Center, New London, Conn. Previously he worked acoustics and weapons systems for the U.S. Navy, overseeing submarine construction and overhauls. He holds a B.S. from Northeastern University, and an M.S. from Worcester Polytechnic Institute.

Dr. Jonathan M. Berkson, the marine science program manager for the U.S. Coast Guard, received a Ph.D. in geophysics from the University of Wisconsin-Madison. Prior to this assignment, he worked at the NATO Undersea Research Centre in LaSpezia, Italy, and the Naval Research Laboratory in Washington, D.C.

LCDR Kenneth J. Boda is a strategic analyst at Coast Guard headquarters. He has served aboard USCGC Polar Sea, *USCGC* Eagle, *and as a marine science instructor at the Coast Guard Academy. LCDR Boda is a graduate of the Coast Guard Academy, and holds master's degrees from Columbia University, and the Naval War College.*

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Endnotes:

1. Hansen, Kurt and Marion Lewandowski. *Using Demonstrations to Advance Approaches to Response for Oil in ice Environments.* Arctic Technology Conference, OTC Paper 909318, February 2011.
2. Story, Jason, and Scot Tripp, Lou Steinbrecher, Mike Sprague, Bob McKenna. *Arctic Craft Investigation Market Research Report,* RDC UDI #1215 Part B, August 2011.

Detecting and Mitigating Oil Spills in Ice

by Ms. Marie C. Darling
Public Affairs Specialist
U.S. Army Corps of Engineers Engineer Research and Development Center
Cold Regions Research and Engineering Laboratory

The polar regions present a unique set of challenges for the U.S. Army Corps of Engineers' Cold Regions Research and Engineering Laboratory (CRREL). Ice cover can obscure the movement of spilled oil, making it visually undetectable at times, which can further extend and complicate the process of detecting and mitigating oil spills.

The CRREL works with partners from industry, government agencies, and educational institutions to develop scientific tools that can aid in effective oil spill response. These tools have many capabilities such as detecting oil spills and helping to decontaminate the affected areas above and below the water's icy surface.

Oil Spill Detection

Initial oil spill testing took place at the CRREL in 2004 to evaluate oil-detection techniques. Laboratory experts used two independent technologies, a high-frequency pulsed ground-penetrating radar (GPR) and an ethane gas sensor, to establish whether off-the-shelf technologies and sensors could detect oil under solid ice.[1]

These tests were conducted using CRREL's environmental test basin, designed primarily for large-scale study of the effects of ice forces on such structures as drilling platforms, shore protection systems, bridge piers, and for model studies of ice-breaking vessels.[2]

GPR technology has evolved since then, and these tests now take place at the U.S. Army Corps of Engineers' Cold Regions Geophysical Research Facility. Nevertheless, work has continued to verify performance and to develop 3-D mapping of oil under ice by using improved GPR and processing software. Today, using GPR technology is standard practice for oil spill responders.

Other Detection Methods

Aerial survey is another detection method, which can rapidly define the extent of, and/or track, a spill. Once

Researchers with the Boise State University profile an oil spill under ice at the Cold Regions Research and Engineering Laboratory's environmental test basin. All photos courtesy of Mr. Leonard Zabilansky at CRREL, unless stated otherwise.

Night testing for submerged oil detection systems at the Cold Regions Research and Engineering Laboratory's geophysical research facility. Photo courtesy of Mr. J. Wilkinson, Scottish Association of Marine Science.

History and Engagement

The USACE laboratory provides facilities and ice expertise to stakeholders to further the understanding of oil spill detection and mitigation and to create effective spill response techniques for ice environments.

The CRREL, located in Hanover, N.H., addresses inadequacies within the Army regarding operating in a cold theatre, with a primary focus on engineering solutions to equipment operation and capitalizing on cold environments.[1]

The laboratory staff conducts a number of experiments then shares its findings with other government partners through the Interagency Coordinating Committee on Oil Pollution Research, which is comprised of 14 members representing independent federal agencies, departments, and department components.

The purpose of the interagency committee is twofold:

- **to prepare a comprehensive, coordinated federal oil pollution research and development plan;**
- **to promote cooperation with industry, universities, research institutions, state governments, and other nations through information sharing, coordinated planning, and joint project funding.[2]**

Endnotes:

1. Available at the CRREL website at http://www.crrel.usace.army.mil/.

2. www.iccopr.uscg.gov.

the technology has completed testing, this system can be useful in profiling thick sea ice in the Arctic. Currently, the technology is in the research and development cycle, so it will require additional testing and redesign.

Submersible sensors are an innovative under-ice approach and have been used to help researchers detect and map a simulated oil spill. From 2011 to 2012, CRREL Civil Engineer Leonard Zabilansky provided facility and on-site testing assistance to researchers. The testing, sponsored by the Oil Spill Recovery Institute, explored the possibility of using a suite of sensors, cameras, sonar, and lasers attached to a submersible trolley that was then placed under the ice. This preliminary technology assessment is leading to additional in-depth testing.

Herding Agents

CRREL has also hosted tests of chemical herders to mitigate oil spills in an ice environment. Oil herders are surface-active chemicals dispensed to contain oil slicks on a water surface. Oil spreads on water below an ignitable threshold; the objective of a herder is to thicken the oil to facilitate ignition and burning *in situ*.

The most recent experiments were with new formulations of herder agents designed to be more robust in an Arctic ocean environment.[3]

"What we are trying to do in the basin is to minimize the area and maximize the oil thickness in icy waters once a spill has occurred," said Zabilansky. "Herding agents are another tool in the responder's toolbox that can be used to quickly mitigate an oil spill in ice-infested waters. By partnering with the oil companies and conducting this type of testing, we are working toward the Corps' mission of being

An early version of an airborne radar antenna to detect oil under ice.

Oil Spill Responder Training

In January 2012, the CRREL hosted a three-day advanced ice safety and response training workshop for Arctic oil spill responders. The course consisted of an interactive classroom lecture and a field practical setting.

The practical portion included hands-on proficiency checks with the oil spill responder's equipment, as if responding to an oil spill in and under ice. The exercise included spill site safety, site setup, ice profiling, and delineation using ground-penetrating radar and underwater lights.

As part of the hands-on training, oil burns in a recovery trench at CRREL's Geophysical Research Facility. *In situ* burning is considered one of the most effective means to mitigate an oil spill.

good environmental stewards," he said. "Testing in the unique Corps' facilities helps develop confidence in novel mitigation techniques."

Mechanical Skimmers

In some instances mechanical intervention is the only viable alternative, but ice impedes the oil flow to the recovery equipment or clogs the pumps and hoses used for the captured oil.

Oil spill recovery equipment currently used in warmer waters is not designed to collect the more viscous oils, or oil-ice mixtures. However, novel drum skimmer surface geometry and materials, tailored to the conditions present under cold climates, are expected to significantly increase the rate of oil recovery, reducing cost and minimizing the impact of an oil spill.

Mechanical skimmer tests were conducted using a full-scale spill recovery unit with three different oils and seven drums modified with varying surface geometries for the highest oil recovery potential in a cold environment. The goal of these tests is to evaluate the effectiveness of oil adhesion on different drums under varying conditions.

Preliminary results showed that some modifications are better than others at collecting crude. At one point, drums were recovering 40 gallons per minute of crude, as compared with a conventional drum of only five gallons. The results will help improve existing mechanical response equipment that can be more efficiently used under ice conditions.

While safety, prevention, and preparedness are high priorities for many, Arctic oil spills remain a possibility. Familiarity with response equipment will result in a more timely and efficient cleanup. This is a work in progress, as limitations are realized in existing technologies and new technologies are developed.

About the author:
Ms. Marie C. Darling is a public affairs specialist with the Army Corps' Engineer Research and Development Center. She has a bachelor's degree in business administration from Trinity College, and is a graduate of the Defense Information School, Fort George G. Meade, Md.

Endnotes:

1. Information is available at www.bsee.gov/Research-and-Training/Technology-Assessment-and-Research/Project-517.aspx.
2. Arctic Environmental Test Basin information is available at www.hydralab.eu/facilities_view.asp?id=4.
3. S.L. Ross Environmental Research Ltd. *Mid-Scale Test Tank Research On Using Oil Herding Surfactants To Thicken Oil Slicks in Broken Ice.* U.S. Department of the Interior's Bureau of Safety and Environmental Enforcement (formerly the Minerals Management Service). Available at www.bsee.gov/Research-and-Training/Technology-Assessment-and-Research/Project-554.aspx.

For more information:

Follow research activity via the CRREL innovative oil spill research website at **www.crrel.usace.army.mil/innovations/oil_spill_research/.**

DHS Center of Excellence Aids Arctic Operations

by Mr. Theophilos Gemelas
Program Manager
Science and Technology Directorate
Department of Homeland Security

Ms. Tara Spaulding
Associate
Booz Allen Hamilton

The U.S. Department of Homeland Security's centers of excellence engage the academic community to deliver tools, technologies, knowledge products, training, and talent to enhance the department's security capabilities. Among these, the Center for Maritime, Island and Remote and Extreme Environment Security (MIREES) focuses on developing research and education programs that promote maritime domain awareness in areas that present significant security challenges.

Ice Tracking via Satellite and Radar

Since 2008, MIREES researchers have worked on various efforts to facilitate operations in the Arctic; one example is using satellites to detect and track vessels and ice. While the purpose is to exploit optical and infrared remote sensing data for ship and ice tracking, satellites can also help researchers understand what times of year this information is useful and when such methods are impractical, due to environmental factors such as cloud cover, sea state, darkness, and lighting geometry.

Researchers also take into account the properties of the ocean surface, including suspended particulates, surface currents, and variations in ocean surface winds, because those properties may conspire to make reliable ship and ice tracking challenging. As such, they are learning to identify areas where the ocean environmental background is most suitable for efficient allocation of limited satellite resources. Ongoing research activities include developing optical and infrared imagery and passive microwave sea ice products, since, as shipping increases in the Arctic, detecting and tracking vessels and ice will be critical to Coast Guard operations.

Research is also underway to integrate coastal radar observations to develop an integrated ice and hazard tracking and observing system centered on semi-autonomous coastal radar. Researchers are evaluating different automated and semi-automated approaches to monitor ice movement, currents, and maritime traffic in seasonally ice-covered waters. The goal is to improve mitigation and response to hazards and emergencies, such as oil spills, by providing decision support to Coast Guard and other first responders.

Assessing hazards near coastal communities and gauging potential first responder response will likely

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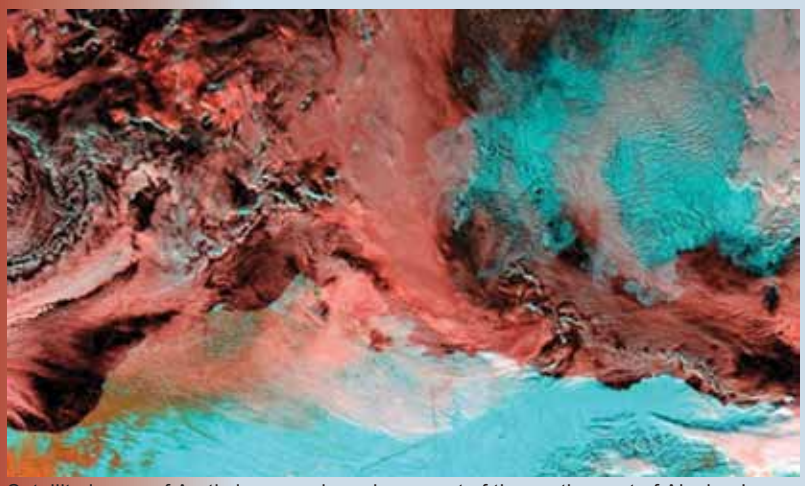

Satellite image of Arctic ice covering a large part of the north coast of Alaska. Image courtesy of Mr. Tom Heinrichs, at University of Alaska, Fairbanks.

Arctic Workshop

The U.S. Department of Homeland Security Science and Technology Directorate, Office of University Programs, in collaboration with the U.S. Arctic Research Commission, organized a workshop in September 2010, *Operating in the Arctic: Supporting U.S. Coast Guard Challenges Through Research,* to assist the Coast Guard regarding needs for Arctic infrastructure, communication, and sensors. During the workshop, participants identified key areas where scientific research and development efforts could improve Coast Guard mission capability.

Groups brainstormed research questions related to virtual aids to navigation, voice communications, and consolidated climate and environmental data.[1]

Based on these questions and on Coast Guard priorities and capability gaps, the Center for Maritime, Island and Remote and Extreme Environment Security (MIREES) invited research proposals focused on achieving greater situational awareness within the Arctic maritime domain, including the area in and around the Bering Strait. MIREES also encouraged research ideas that included approaches to minimize technological risk; communications, including fusing information into a useable common operating picture; and proposals that addressed improving oil spill detection, tracking, and recovery in the Arctic. Examples of resultant projects follow.

Enhancing Vessel Detection and Tracking in the Arctic

Led by Dr. Thomas Weingartner at the University of Alaska, Fairbanks, this collaborative project merges four separate technologies:

- an autonomous power supply;
- Automatic Identification System vessel tracking technology;
- VHF digital selective calling radio receiver technology;
- algorithms that permit high-frequency shore-based radars (commonly used to measure surface currents) to enhance the Coast Guard's ability to detect and track vessels in Arctic waters.

Greg Walker, with the University of Alaska-Fairbanks, prepares a drone for a mission to check the ice in the harbor of Nome, Alaska, on Tuesday. U.S. Coast Guard photo by Petty Officer Charly Hengen.

The goals: Assess the performance of these technologies separately and in aggregate, in an Arctic coastal setting, to provide comprehensive maritime domain awareness in remote Arctic regions. The results from the field test will help determine what additional capabilities are required to attain operational readiness.

Coast Guard Rear Adm. Tom Ostebo, District 17 commander, learns about the capabilities of an Aeryon Scout unmanned aerial vehicle at the Nome City Hall, Jan. 13, 2012. Denise Michels, the mayor of Nome, provided a tour of the ongoing fuel transfer preparations in Nome. U.S. Coast Guard photo by Petty Officer Charly Hengen.

Significant technological findings include:

- The remote power module was deployed without fossil fuels and was still able to deliver sufficient power for all instruments and communications equipment for the 121-day field season.
- All battery bank voltage and current data, run time data, environmental conditions, battery state-of-charge, and fuel usage statistics were logged at 10-second intervals during the course of the test.
- While some materials degraded in the marine environment, system performance was nearly identical between the two field seasons.
- Only nine percent of the total power generated came from the photovoltaic array.

A number of improvements were identified for optimizing system performance. These consist of a backdoor communication route into the data logger, a low EMI-emitting power supply for the data acquisition computer used on the HF radar instrumentation and incorporating liquid-tite flexible conduit for array and radar cables.

Improvement of Space-Based Sea Ice Retrievals with Low-altitude, *in-situ* Observations

Led by Dr. Greg Walker at the University of Alaska, Fairbanks, the purpose of this project was to fly a small-unmanned aircraft system (UAS), tailored to improve the satellite retrieval algorithms, with the ultimate goal of improving satellite data product accuracy.

The unmanned system can improve a cutter's situational awareness by flying ahead of the ship to scan the ice features. Its capabilities include streaming surface sea-ice observations, as either video or geographic maps, directly onto the bridge and providing information regarding leads, ridges, rubble fields, and other potentially hazardous sea ice formations to improve navigation. Other benefits may include reduced risk of ice damage, reduced maintenance costs, extended equipment life, and improved fuel consumption and speed, which could increase on-station research days.

The UAS project was helpful in assisting USCGC *Healy's* efforts to escort tanker vessel *Renda* to Nome, Alaska, in January 2012.[2] The unmanned system provided critical and timely information on ice movements offshore, and helped CGC *Healy's* crew to determine the best location to moor the tanker vessel to offload the critical heating oil.

Endnotes:

1. Information and presentations from this workshop can be found at www.hsuniversityprograms.org.
2. *Finally! Fuel tanker moored off Nome, gearing up delivery.* Anchorage, Alaska: Article by MSNBC.com staff and news service reports; The Associated Press contributed to this report, updated in January 2012.

Autonomous remote power module. Photo courtesy of Mr. Hank Statscewich at University of Alaska, Fairbanks.

involve the use of products derived from coastal radar systems and local expert knowledge, integrated with information provided by satellite imagery and on-ice sensor systems.

Autonomous Stations

The center is also developing radar systems for remote areas and extreme environments to monitor ice movement and shipping along the Northwest Passage by establishing stations that can run autonomously to report data. Designed to run as a stand-alone platform, the system will operate primarily on wind and solar power and secondarily on a liquid fuel generator to provide coastal radar data.

Its size and independence allow it to be deployed in areas where power and communication systems do not exist. Given the lack of infrastructure and communication across large coastal areas of Alaska, this effort is critical to providing information to the Coast Guard and other stakeholders.

Ongoing Efforts

Finally, MIREES is moving forward to conduct collaborative projects that merge three separate technologies:

- an autonomous power supply;
- automatic identification system digital distress calling radio receiver technology;
- algorithms that permit high-frequency shore-based radars, which are commonly used to measure surface currents.

By assessing the performance of these technologies in aggregate, MIREES hopes to give the Coast Guard the ability to track and detect vessels operating in U.S. Arctic waters.

USCG Arctic Challenges

During congressional testimony in 2011, Admiral Robert Papp, Commandant of the U.S. Coast Guard, addressed some challenges the Coast Guard faces for operating in the Arctic region.

He said, "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 shore-side infrastructure. Nor do we have a seasonal base to hangar our aircraft or sustain our crews."[1]

Endnote:

1. ***Defending U.S. Economic Interests in the Changing Arctic: Is There a Strategy?*** **Verbal testimony before the United States Senate Committee on Commerce, Science, & Transportation Subcommittee on Oceans, Atmosphere, Fisheries, and Coast Guard Hearing, July, 2011.**

About the authors:

Mr. Theophilos Gemelas is a program manager at the Department of Homeland Security's Science and Technology Directorate. He oversees four cooperative agreements with university recipients that represent two DHS Centers of Excellence: the National Center for Border Security and Immigration, and the Center for Maritime, Island, and Remote and Extreme Environment Security.

Ms. Tara Duggan is an associate at Booz Allen Hamilton. She has seven years of experience in the management consulting industry, and her project work has covered project management, process improvement, and knowledge management.

For more information:

See **www.dhs.gov/files/programs/editorial_0498.shtm** and **www.cimes.hawaii.edu/.**

Innovation in Education

Preparing cadets for a changing Arctic.

by LT Victoria Futch
Marine Science Instructor
U.S. Coast Guard Academy

Dr. Martha McConnell
Polar Programme Manager
The International Union Conservation Nature

In 2012, in response to the increased attention toward the Coast Guard's role in polar regions, the marine science section at the U.S. Coast Guard Academy has prepared a polar oceanography and policy course to educate its cadets on Arctic policy, Coast Guard history in the polar regions, current polar ocean conditions, and the linkages between polar oceans and climate.

Cadet Josie Cartaya performs an experiment to test the insulating qualities of blubber versus fur or feathers. Photos courtesy of Dr. Martha McConnell at the Polar Programme for International Union Conservation Nature.

Polar Oceanography and Policy Course

Due to the interdisciplinary nature of the polar regions, academy staff members designed this course to give cadets a foundation in polar oceanography and to integrate policy considerations, as Coast Guard missions increase in the polar regions. This allows cadets to understand the transition from scientific research to Coast Guard policy decisions.

The course consists of three subcategories:

- **Arctic and Antarctic environment:** This section includes information on the polar terrain, sea ice formation, and the dominant biology in each region.
- **Polar climate change:** This section covers the Antarctic and Arctic paleoclimate record as well as modern climate variability observations.
- **Polar policy and Coast Guard missions:** This section focuses on the main policies that govern the Antarctic and Arctic and the Coast Guard's role in each locale.

Understanding the Whole Picture

One of the most challenging aspects of teaching a science-based course is tying the theoretical science to real-world applications. To bring the class beyond information accumulation, instructors invite polar scientists as guest lecturers and assign cadets two projects that tie the course material to current world issues.

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What Can We Learn from Cadets?

The polar oceanography and policy class with instructors LT Victoria Futch, far left, and Dr. Martha McConnell, far right.

Following the course, instructors surveyed cadets to see how they would approach the Coast Guard's Arctic operations.

What do you see as the biggest concern for Coast Guard Arctic operations?

"I see the lack of funding as the biggest concern for Coast Guard operations, because without money to repair or build ice-capable ships, there's not a whole lot that can be done in the Arctic. The Coast Guard is trying to make do, but eventually it won't be possible."

"How few assets there are in the Arctic, especially with the opening of the Northwest Passage."

"I see three big issues. First, our lack of assets, in particular, our minimal icebreakers; second, we need to focus on international relations with other Arctic countries like Russia; and third, we need to ratify the United Nations Convention on the Law of the Sea."

What did you learn from this course that surprised you the most?

"How little of the Arctic we have mapped."

"I knew the ice was decreasing in the Arctic, but I didn't realize the extent of the decrease and how rapidly it was occurring."

"There is no one solution to the issues in this region."

What should all Americans know about what is happening in the Arctic?

"Remind them that we are, in fact, an Arctic nation, and that the ice is melting."

"They should know that there is still so much that is unknown, and we are not prepared to be an Arctic nation."

"That the Arctic significantly impacts the global climate and that having ice up there is important."

If you were the District 17 commander, how would you approach operations in Arctic? What would be your main focus?

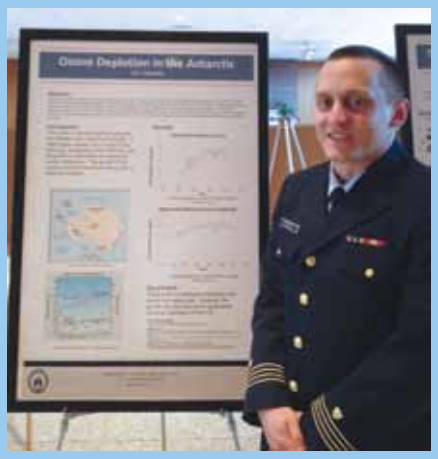
"Start with the necessities; ATON, infrastructure, new icebreakers. Get funding and operations going for these, so that when the ice retreats, we're ready for the implications."

"I would utilize all the other agencies and organizations already in place up there to aid with operations."

"Gaining more assets, working with other countries to get more cooperation for SAR, and getting more infrastructure up there."

Cadet Andrew Russo displays his poster on oil drilling at the CGA Leadership for the Arctic Conference.

As part of the Leadership for the Arctic Conference, Cadet Victoria Lacefield-Rodriguez informs attendees on polar marine seaweed adaptations.



Cadet T. Kennedy presents information regarding ozone depletion at the CGA Leadership for the Arctic Conference.

Additionally, in place of a standard final exam, cadets analyze the science behind a hypothetical marine incident scenario, explain how it occurred, plan the response, and make recommendations for policy or operational changes.

Scenario examples:

- a cruise ship grounding off Little Diomede Island;
- a major oil spill in the Chukchi Sea;
- a dramatic increase in fishing in the Arctic Ocean near the U.S. exclusive economic zone border and near disputed extended continental shelf areas;
- a completely ice-free summer, resulting in two weeks of open water for shipping traffic.

Even though scenarios vary greatly in scope, a few common themes arise during cadet presentations, such as: Asset management in the Arctic is challenging. Cadets discovered that the distance between marine incidents and the closest Coast Guard asset is often too great for the asset to be useful. To overcome this, cadets in previous classes have found the best and easiest option was to station an aircraft-capable cutter in strategic positions in Arctic waters.

Another common theme apparent in scenario findings: The Coast Guard needs a comprehensive strategy to increase infrastructure and personnel in the region to support expanding Coast Guard missions.

Leadership for the Arctic Conference

In April 2012, the U.S. Coast Guard Academy hosted an interdisciplinary academic conference on leadership for the Arctic, which addressed key issues facing global leaders tasked with shaping and implementing policy for the emerging human activities in the Arctic.

The conference offered a unique opportunity for cadets to interact with leaders in the Coast Guard, the National Oceanic Atmospheric Administration, the U.S. Department of State, and with leading polar researchers. Additionally, participating in the conference helped cadets develop an appreciation for the magnitude of issues facing the Coast Guard in the Arctic.

The Leadership for the Arctic conference solidified the connection between the material learned in the classroom and direct applicability to Coast Guard missions. Although this opportunity may not be available to students every year this course is offered, given the interdisciplinary nature of the polar regions, an effort should be made to increase polar science research opportunities for cadets and to foster professional relationships with leading experts.

About the authors:

LT Victoria Futch is a marine science instructor at the Coast Guard Academy. She previously served aboard CGC Sassafras *and* Sequoia *in Guam, and CGC* Maple *in Alaska. She holds an M.S. in physical oceanography from the University of Hawaii.*

Dr. Martha McConnell is the manager of the Polar Programme for International Union Conservation Nature. She previously served as marine science faculty at the U.S. Coast Guard Academy and study director for the National Academy of Sciences Polar Research Board. She holds a PhD in paleoclimatology/paleoceanography.

Understanding Mercury

by ENS Elizabeth Tatum
U.S. Coast Guard Academy

Chemical of the Quarter

What is it?
Mercury is the only metal that exists as a liquid at room temperature. It is heavy, and its silvery drops have a high surface tension. Mercury serves many purposes; metallic mercury is found in some household items such as thermometers, and organic mercury is used as a preservative and fungicide for seeds, wood, paper products, and latex paint.

How is it shipped?
Mercury is shipped in closed freight containers or transport vehicles. When shipped in its liquid form, mercury must have a vapor pressure of less than or equal to 110 kilo pascals at 50 degrees Celsius.

Products such as barometers, thermostats, electrical switches, and light bulbs contain the more commonly shipped form of mercury. While transporting mercury-containing material, companies are to place the products in a larger container with a tight-fitting lid, surrounded with oil-absorbing material. This container should be clearly labeled as "Mercury—Do Not Open," and placed in a cardboard box away from humans or animals.

Why should I care?
Shipping concerns
Mercury is highly volatile and vaporizes easily, which makes shipping regulation especially important, since small droplets can stick to shoes, adhere to dust, embed in carpets, go down drains, and even dissolve into jewelry. Once introduced to the environment, mercury will persist since it is non-biodegradable.

Health concerns
People are exposed to mercury through multiple means including inhalation, ingestion, and absorption through skin. Metallic mercury absorbs slowly through the skin, while liquid mercury is not highly absorbed when swallowed.

The health risks associated with exposure to mercury can range from damage to the nervous system to simple chills. Inhaling mercury vapors is highly dangerous and can cause lung damage. Neurological effects, chest tightness, bronchitis, nausea, vomiting, bleeding gums, and skin rashes may also occur after acute high-concentration contact. Chronic contact with low concentrations of mercury most commonly affects the nervous system and kidneys—this would result in symptoms such as burning sensations in legs and feet, blood in urine, and personality changes.

What is the Coast Guard doing about it?
Mercury is listed as a Class 8 hazard during transport, due to its corrosive nature. As a result, the Coast Guard requires all ocean-going vessels to transport it as a packaged hazardous material in accordance with 49 CFR 173.

Mercury Export Ban Act of 2008
The Mercury Export Ban Act, signed into law in 2008, will significantly reduce the amount of mercury on the global market, since the United States is one of the world's top exporters. The act, which takes effect on January 1, 2013, contains provisions regarding long-term storage and prohibits U.S. federal agencies from selling, distributing, or exporting elemental mercury.

About the author:
ENS Elizabeth Tatum graduated from the Coast Guard Academy in May 2012. She has a B.S. in marine environmental science with an emphasis in chemistry and biology. She is assigned to CGC Morgenthau *in Honolulu, Hawaii.*

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Nautical Engineering Queries

Questions

Prepared by NMC Engineering Examination Team

1. The steam separator, as used in conjunction with a steam whistle, normally drains to which of the following drain systems?

A. low pressure
B. high pressure
C. main turbine
D. contaminated

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2. Regarding an induction motor, what does the power developed by the rotor automatically adjust itself to?

A. power required to drive the load
B. speed required to drive the load
C. current flow in the motor stator
D. torque developed by the rotating field

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3. All shipboard personnel responsible for the maintenance and repair of air conditioning systems using refrigerants covered under the EPA Clean Air Act venting prohibition, must be certified through an approved Environmental Protection Agency (EPA) program to do which of the following?

A. before they can pump down the system in preparation for shifting over to the standby condensing unit
B. before they can set the operating controls of the system
C. before performing maintenance, service, or repair that could reasonably be expected to release Class I or Class II refrigerants into the atmosphere
D. before performing any maintenance or repair regardless of the actual procedure

1.

A. low pressure — Incorrect answer. Drains from a ship's whistle steam separator are too hot to be drained to the low pressure drains system due to the relatively high supply pressure (150 psig). Drainage to this system would cause the atmospheric drains tank contents to overheat and flashover.

B. high pressure — **Correct answer.** Drains from a ship's whistle steam separator must be drained to the high pressure drains system due to the high temperature of the drains.

C. main turbine — Incorrect answer. There is no dedicated main turbine drain system. The design and operation of the main turbine requires separate drain systems for high and low pressure drains.

D. contaminated — Incorrect answer. Drains from a ship's whistle steam separator are too hot to be drained to the contaminated drains system due to the relatively high supply pressure (150 psig). Additionally, the ship's whistle steam separator drains are not subject to oil contamination.

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2. *Note: The data nameplate on an induction motor lists the rated horsepower, which is the power it is capable of developing without overheating. In addition, the rated RPM and the rated amperage values are listed on the nameplate. The rated values of RPM and amperage are the values associated with the induction motor when developing the rated horsepower. Although torque is not generally listed on a motor's data nameplate, rated torque is torque that is produced when the motor is developing its rated horsepower. When an induction motor is developing less than its rated horsepower, the RPM will be higher than the rated RPM (but less than the synchronous RPM), the amperage draw will be lower than its rated current, and the torque will be less than its rated torque. Similarly, when an induction motor is developing more than its rated horsepower, the RPM will be lower than the rated RPM, the amperage draw will be higher than its rated current, and the torque will be higher than its rated torque.*

A. power required to drive the load — **Correct answer.** See the explanation in the note above.

B. speed required to drive the load — Incorrect answer. Although speed does change with changes in load (the greater the load, the greater the slip), the motor adjusts itself to produce exactly the amount of power required to drive the load.

C. current flow in the motor stator — Incorrect answer. Although current draw does change with changes in load (the greater the load, the greater the slip, the greater the current draw), the motor adjusts itself to produce exactly the amount of power required to drive the load.

D. torque developed by the rotating field — Incorrect answer. Although developed torque does change with changes in load (the greater the load, the greater the slip, the greater the current draw, the greater the torque), the motor adjusts itself to produce exactly the amount of power required to drive the load.

3.

A. before they can pump down the system in preparation for shifting over to the standby condensing unit — Incorrect answer: Pumping down a system in preparation for shifting over to the standby condensing unit does not require opening up the system and as such it would not reasonably be expected to release Class I or Class II substances. Therefore, the person doing the pump down is not considered a technician under the venting prohibition rules, thus no certification is required for this particular task.

B. before they can set the operating controls of the system — Incorrect answer: Setting the operating controls of the system does not require opening up the system and as such it would not reasonably be expected to release Class I or Class II substances. Therefore, the person making the adjustments to the controls is not considered a "technician" under the venting prohibition rules, thus no certification is required for this particular task.

C. before performing maintenance, service, or repair that could reasonably be expected to release Class I or Class II refrigerants into the atmosphere — **Correct answer:** Those performing such maintenance, service, or repair activities that could be expected to release Class I or Class II refrigerants are considered a technician under the venting prohibition rules, thus certification is required. Examples of maintenance, service, and repair activities that would reasonably be expected to release Class I or Class II substances are those that require opening up the system (replacing a dehydrator cartridge, charging the system with refrigerant, etc.).

D. before performing any maintenance or repair regardless of the actual procedure — Incorrect answer: Only those activities that would be reasonably expected to release Class I or Class II substances must be performed by a certified technician. See explanation for choice C.

Nautical Deck Queries

Prepared by NMC Deck Examination Team

1. Which of the following would cause an increase in the draft of the vessel?

A. Discharging 100 tons of cargo
B. Shifting 100 tons of cargo vertically 10 feet
C. Entering shallow water
D. Transiting from fresh to salt water

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2. What information can the Vessel Cargo Securing manual provide?

A. The test weight of the vessel's cranes
B. The safe working load of the vessel lashing gear
C. Operational test data for the vessel's hatch covers from the classification society
D. A list of cargo the vessel is capable of transporting

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3. When a hurricane passes over colder water or land and loses its tropical characteristics, the storm becomes _____.

A. A high-pressure area
B. An extra tropical low-pressure system
C. A tropical storm
D. An easterly wave

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4. Both International & Inland. Which statement is true concerning risk of collision?

A. The stand-on vessel must keep out of the way of the other vessel when risk of collision exists.
B. Risk of collision always exists when two vessels pass within one mile of each other.
C. Risk of collision always exists when the compass bearing of an approaching vessel is changing appreciably.
D. Risk of collision may exist when the compass bearing of an approaching vessel is changing appreciably.

1.

A. Discharging 100 tons of cargo — Incorrect Answer: Removing weight would decrease the draft of the vessel.

B. Shifting 100 tons of cargo vertically 10 feet — Incorrect Answer: Shifting weight would change the vertical center of gravity of the vessel but would not change the draft of the vessel.

C. Entering shallow water — **Correct Answer:** When entering shallow water there is a reduction in pressure on the hull, this reduced pressure causes the vessel to experience an increased draft. Reference: Derrett; "Ship Stability for Masters and Mates."

D. Transiting from fresh to salt water — Incorrect Answer: Fresh water is less dense than salt water. When transiting to salt water, the vessel displaces less water by volume; this reduces the submerged portion of the hull and decreases draft.

2.

A. The test weight of the vessel's cranes — Incorrect Answer: This information is found in the Vessel Cargo Register.

B. The safe working load of the vessel lashing gear — **Correct Answer:** SOLAS requires vessels that do not carry solid or liquid bulk cargo to be loaded in accordance with the Cargo Securing Manual. IMO MSC/Circ 745 outlines the information required in the Cargo Securing Manual, including the safe working load of fixed and portable securing devices.

C. Operational test data for the vessel's hatch covers from the classification society — Incorrect Answer: This information is not required in the Cargo Securing Manual.

D. A list of cargo the vessel is capable of transporting — Incorrect Answer: A list of cargos is found on the Certificate of Inspection issued by the U.S. Coast Guard.

3.

A. A high-pressure area — Incorrect Answer: A hurricane is a low-pressure system.

B. An extra tropical low-pressure system — **Correct Answer:** When cold air intrudes, the winds gradually abate as the concentrated storm disintegrates. The storm's warm core will survive for a few more days before completing the transformation into an extra tropical low-pressure system. Reference: Bowditch; "The American Practical Navigator."

C. A tropical storm — Incorrect Answer: As a hurricane dissipates, it is reclassified as an extra tropical low-pressure system.

D. An easterly wave — Incorrect Answer: An easterly wave is a westward moving trough of low pressure, it is the origin point of a hurricane.

4.

A. The stand-on vessel must keep out of the way of the other vessel when risk of collision exists. — Incorrect Answer: Inland and International Rule 17a(i) states "Where one of two vessels is to keep out of the way the other shall keep her course and speed."

Rule 17a(ii) states, "The latter vessel may however take action to avoid collision by her maneuver alone, as soon as it becomes apparent to her that the vessel required to keep out of the way is not taking appropriate action in compliance with these Rules."

The rule states that the obligation of the stand-on vessel is to maintain course and speed. If it is determined the other vessel is not acting appropriately the rule states the stand-on vessel may take action by its maneuver alone.

B. Risk of collision always exists when two vessels pass within one mile of each other. — Incorrect Answer: Inland and International Rule 7 defines Risk of Collision. Risk of Collision does not exist by virtue of two vessels passing within a mile of each other.

C. Risk of collision always exists when the compass bearing of an approaching vessel is changing appreciably. — Incorrect Answer: Inland and International Rule 7d(i) states, " … such risk shall be deemed to exist if the compass bearing of an approaching vessel does not appreciably change." While Risk of Collision may exist if the compass bearing is appreciable changes it does not always exist as the question states.

D. Risk of collision may exist when the compass bearing of an approaching vessel is changing appreciably. — **Correct Answer:** Inland and International Rule 7d(ii) states " … such risk may sometimes exist even when an appreciable bearing change is evident, particularly when approaching a very large vessel or a tow or when approaching a vessel at close range."

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