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EXECUTIVE SUMMARY

This report responds to House Report 111-491, page 337, to accompany H.R. 5136, the National Defense Authorization Act for Fiscal Year 2011, which requested the Department of Defense (DoD) provide a report on Arctic operations addressing strategic national security objectives, needed mission capabilities, an assessment of changing the Unified Command Plan (UCP), needed basing infrastructure, and the status of and need for icebreakers.

- *Section One* provides the overarching context for the rest of the report and assesses the national security objectives in the region.

- *Section Two* assesses the capabilities needed to support the identified strategic objectives and, where gaps are identified, describes mitigation approaches to address them.

- *Section Three* assesses the advantages and disadvantages of amending the Unified Command Plan to designate a single Combatant Commander for the Arctic region.

- *Section Four* assesses the basing infrastructure needed to support the identified strategic objectives, including the need for a U.S. deep-water port in the Arctic.

- *Section Five* assesses the status of and need for icebreakers in the context of the capabilities to support national security objectives.

The Arctic[1] is warming on average twice as fast as the rest of the planet, resulting in increased human activity in the region. Although some perceive that competition for resources and boundary disputes may result in conflict in the Arctic, the opening of the Arctic also presents opportunities to work collaboratively in multilateral forums to promote a balanced approach to improving human and environmental security in the region.

Strategic guidance on the Arctic is articulated in National Security Presidential Directive (NSPD) 66 / Homeland Security Presidential Directive (HSPD) 25[2], *Arctic Region Policy*. Additional guidance is found in the *2010 National Security Strategy* (NSS) and the *2010 Quadrennial Defense Review (QDR)*. The overarching strategic national security objective is a *stable and secure region where U.S. national interests are safeguarded and the U.S. homeland is protected*. This objective is consistent with a regional policy that reflects the relatively low level of threat in a region bounded by nation states that have not only publicly committed to working within a common framework of international law and diplomatic engagement, but also demonstrated ability and commitment to doing so over the last fifty years.

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[1]For this report, the Arctic is defined as that region which encompasses all U.S. and foreign territory north of the Arctic Circle and all U.S. territory north and west of the boundary formed by the Porcupine, Yukon, and Kuskokwim Rivers, and all contiguous seas and straits north of and adjacent to the Arctic Circle. This definition is consistent with the Arctic Research and Policy Act of 1984 (15 U.S.C. 4111) and Arctic Council usage.
[2]The January 2009 National Security Presidential Directive (NSPD)-66, dual titled as Homeland Security Presidential Directive (HSPD)-25, or NSPD-66/HSPD-25, establishes the policy of the United States with respect to the Arctic region and outlines national security and homeland security interests in the region.

DoD will take responsible steps to anticipate and prepare for the Arctic operations of the near- (2010-2020), mid- (2020-2030), and far-term (beyond 2030). Capabilities will need to be re-evaluated as conditions change, and gaps must be addressed in order to be prepared to operate in a more accessible Arctic. Key challenges include: shortfalls in ice and weather reporting and forecasting; limitations in command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) due to lack of assets and harsh environmental conditions; limited inventory of ice-capable vessels; and limited shore-based infrastructure. The key will be to address needs in step with the rate at which activity in the Arctic increases, and balance potential investments in these capabilities with other national priorities. The United States has a vital Arctic neighbor and partner in Canada, with its shared values and interests in the region. DoD will work with the Canadian Department of National Defence (DND) to ensure common Arctic interests are addressed in a complementary manner.

Although having multiple Combatant Commanders (CCDRs) in the Arctic Ocean makes coordination more challenging, having too few would leave out key stakeholders, diminish long-standing relationships, and potentially alienate important partners. There are now two CCDRs with Arctic responsibilities: Commander, U.S. European Command (USEUCOM), and Commander, U.S. Northern Command (USNORTHCOM), each responsible for a portion of the Arctic Ocean aligned with adjacent land boundaries, an arrangement judged best suited to achieve continuity of effort with key regional partners.

Existing DoD posture[3] in the region is adequate to meet near- to mid-term U.S. defense needs. DoD does not currently anticipate a need for the construction of a deep-draft port in Alaska between now and 2020. Given the long lead times for construction of major infrastructure in the region, DoD will periodically re-evaluate this assessment as the Combatant Commanders update their regional plans on a regular basis.

The United States needs assured Arctic access to support national interests in the Arctic. This access can be provided by a variety of proven capabilities, including submarines and aircraft, but only U.S.-flagged ice-capable ships provide visible U.S. sovereign maritime presence throughout the Arctic region. This need could potentially be met by either icebreakers or ice-strengthened surface vessels, none of which are in the U.S. Navy current surface combatant inventory, but which do exist in U.S. Coast Guard's inventory in limited numbers.

Finally, significant uncertainty remains about the rate and extent of climate change in the Arctic and the pace at which human activity will increase. The challenge is to balance the risk of being late-to-need with the opportunity cost of making premature Arctic investments. Not only does early investment take resources from other pressing needs, but the capabilities would be later in their lifecycle when finally employed. Given the many competing demands on DoD's resources in the current fiscal environment, the Department believes that further evaluation of the future

[3] This report assesses major defense infrastructure, such as bases, airfields, and ports. Minor modifications to existing bases, such as the addition of a new hangar, will be made as part of the maintenance and modernization process.

operating environment is required before entertaining significant investments in infrastructure or capabilities.

CIA World Factbook

Section 1:

An Assessment of Strategic National Security Objectives and Restrictions In the Arctic Region

Purpose

The harsh Arctic environment and polar icecap have long enhanced U.S. security by acting as a significant physical barrier to access to the U.S. homeland from the north, but the changing climate is allowing greater access to the region. Human activity in the Arctic, driven primarily by economic opportunity—ranging from oil and gas exploration to shipping and tourism—is increasing. Media coverage of these changes has contributed to a perception that boundary disputes and competition for resources may result in regional conflict. These changes shape the context in which this assessment was done.

Key documents for this assessment of national security objectives are the 2010 *National Security Strategy* and National Security Presidential Directive (NSPD) 66 / Homeland Security Presidential Directive (HSPD) 25, *Arctic Region Policy*. The 2010 *Quadrennial Defense Review* (QDR) report provides top-level DoD guidance on the Arctic. Executive Order 13547, *Stewardship of the Ocean, Our Coasts, and the Great Lakes,* also applies. This document also relies on material and conclusions derived from meetings of the Arctic Policy Interagency Policy Committee.

A review of national-level policy guidance on the Arctic leads to the conclusion that, broadly stated, the desired strategic end state for the Arctic is a *stable and secure region where U.S. national interests are safeguarded and the U.S. homeland is protected*. The policy guidance that leads to this assessment is explored in more detail in this section, which lays the foundation for the rest of the Report.

Policy Guidance

The *2010 National Security Strategy* identifies four enduring national interests, all of which are relevant to the Arctic:

- The security of the United States, its citizens, and U.S. Allies and partners;
- A strong, innovative, and growing U.S. economy in an open international economic system that promotes opportunity and prosperity;
- Respect for universal values at home and around the world;
- An international order advanced by U.S. leadership that promotes peace, security, and opportunity through stronger cooperation to meet global challenges.

The *National Security Strategy* succinctly articulates U.S. interests in the Arctic: "The United States is an Arctic nation with broad and fundamental interests in the Arctic region, where we seek to meet our national security needs, protect the environment, responsibly manage resources, account for indigenous communities, support scientific research, and strengthen international cooperation on a wide range of issues."

Thus, according to the *National Security Strategy*, the United States has an enduring interest in working collaboratively with other nations to address the emerging challenges arising from the impacts of climate change and globalization on the Arctic. More specific guidance is set forth in NSPD-66/HSPD-25. The United States' Arctic policy is to:

- Meet national security and homeland security needs relevant to the Arctic region;
- Protect the Arctic environment and conserve its biological resources;
- Ensure that natural resource management and economic development in the region are environmentally sustainable;
- Strengthen institutions for cooperation among the eight Arctic nations (the United States, Canada, Denmark, Finland, Iceland, Norway, Russian Federation, and Sweden);
- Involve the Arctic's indigenous communities in decisions that affect them;
- Enhance scientific monitoring and research into local, regional, and global environmental issues.

NSPD-66/HSPD-25 specifically identifies freedom of the seas as a top national priority. Preserving the rights and duties relating to navigation and overflight in the Arctic region supports the United States' ability to exercise these rights throughout the world, including through strategic straits. It characterizes U.S. national security interests in the Arctic as "broad and fundamental" and states that the United States is "prepared to operate either independently or in conjunction with other states to safeguard these interests." These interests explicitly include such matters as missile defense and early warning; deployment of sea and air systems for strategic sealift, strategic deterrence, maritime presence, and maritime security operations; and ensuring freedom of navigation and overflight.

NSPD-66/HSPD-25 also outlines fundamental homeland security interests in preventing terrorist attacks and mitigating those criminal or hostile acts that could increase the United States' vulnerability to terrorism in the Arctic region. In light of this guidance, this report broadly considers not only traditional (military) threats, but also a range of other potential national security challenges, including smuggling, criminal trafficking, and terrorism.[4]

[4] This report was informed by classified threat assessments by the National Intelligence Council, the Central Intelligence Agency, the Defense Intelligence Agency, and the Office of Naval Intelligence.

Additional national-level policy guidance is found in Executive Order 13547: *Stewardship of the Ocean, Our Coasts, and the Great Lakes*, signed July 19, 2010. The Executive Order highlights the fact that "[t]he ocean, our coasts, and the Great Lakes provide jobs, food, energy resources, ecological services, recreation, and tourism opportunities, and play critical roles in our Nation's transportation, economy, and trade, as well as the global mobility of our Armed Forces and the maintenance of international peace and security."

Department of Defense strategic guidance was provided in the *2010 Quadrennial Defense Review (QDR),* which established four priority objectives for the Department: prevail in today's wars; prevent and deter conflict; prepare to defeat adversaries and succeed in a wide range of contingencies; and preserve and enhance the All-Volunteer Force. The QDR identified the opening of the Arctic waters for seasonal commerce in the decades ahead as "a unique opportunity to work collaboratively in multilateral forums to promote a balanced approach to improving human and environmental security in the region."

The QDR highlighted the need for DoD to work collaboratively with interagency partners to address gaps in Arctic communications, domain awareness, search and rescue, and environmental observation and forecasting capabilities to support both current and future planning and operations. It also reiterated DoD's strong support for accession to the United Nations Convention on the Law of the Sea (LOS Convention) to protect U.S. interests worldwide and to support cooperative engagement in the Arctic.

Key Objectives

As an Arctic nation, the United States has a range of enduring interests in the Arctic region. These can be summarized as the desired strategic end-state for the Arctic: *a stable and secure region where U.S. national interests are safeguarded and the U.S. homeland is protected*.

U.S. national security interests for the Arctic region reflect the relatively low level of threat in a region bounded by nation states that have not only publicly committed to working within a common framework of international law and diplomatic engagement,[5] but have also demonstrated the ability and commitment to doing so over the last fifty years.

DoD's strategic objectives describe what is to be accomplished to achieve the desired end-state. They are bounded by policy guidance, the nature of the strategic and physical environment, and the capabilities and limitations of the instruments of power (military power, for the purposes of this report) available. The Department's strategic objectives applied to the Arctic are to:

- *Prevent and deter* conflict in the Arctic;

[5] In the Ilulissat Declaration (May 28, 2008), all five Arctic coastal states (United States, Russian Federation, Canada, Norway, and Denmark on behalf of Greenland) committed themselves to the orderly settlement of overlapping territorial claims through the established framework of the law of the sea.

- *Prepare to respond* to a wide range of challenges and contingencies—operating in conjunction with other states when possible, and independently if necessary.[6]

All of the implementation tasks outlined for DoD in NSPD-66/HSPD-25 fall under one or both of these objectives. For example, increasing all domain awareness and preserving the global mobility of U.S. vessels and aircraft (freedom of navigation and overflight) will help prevent and deter conflict. Developing greater capabilities and capacity to defend U.S. air, land, and sea borders in the Arctic will ensure that DoD is prepared to respond to a wide range of challenges. The capability to project a sovereign maritime presence also supports the ability to respond to challenges, operating independently if necessary. Future challenges in the Arctic may span the full range of security interests, as outlined in the assumptions in the following section.

Assumptions and Constraints

A comprehensive assessment of U.S. strategic national security objectives must identify and examine assumptions, constraints, and restraints, which together can be considered as restrictions.[7]

- *The changing Arctic climate is highly likely to alter conditions sufficiently to affect U.S. national security interests and objectives in the region over time.* Increased access allowed by the melting sea ice will lead to a corresponding increase in human activity in the decades ahead. Although there is no current military threat in the region, competing economic and political interests resulting from changed conditions and increased human activity may result in disagreements between parties with competing interests. These issues will need to be managed bilaterally, or in some cooperative international forum. An increase in maritime traffic between Asia and Europe, or Russia, could also raise the prominence of the Bering Strait as a strategic chokepoint and heighten the geostrategic importance of the Arctic region. The U.S. national security community will need to monitor the region closely, and be prepared to revisit assessments as conditions change.

    - These assessments will be informed by awareness of the national interests of the other Arctic states. Russia, for example, has nearly 4,350 miles of Arctic coastline.[8] Many of its great rivers belong to the Arctic drainage basin, and many of them are an integral part of its internal transportation system. Twelve percent of its Gross Domestic Product (GDP) comes from the Arctic, primarily from resource extraction activities. About half of all Arctic inhabitants are Russian. Russia's investments in Arctic infrastructure, and in its fleet of icebreakers, reflect

[6] The 2010 QDR Report states: "America's Armed Forces will retain the ability to act unilaterally and decisively when appropriate, maintaining joint, all-domain military capabilities that can prevail across a wide range of contingencies." This is consistent with NSPD-66/HSPD-25, which states: "The United States has broad and fundamental national security interests in the Arctic region and is prepared to operate either independently or in conjunction with other states to safeguard these interests."
[7] The HASC report language requests an assessment that includes "[a]n assessment of the strategic national security objectives and restrictions in the Arctic Region."
[8] The United States, in comparison, has about 1,060 miles of Arctic coastline.

the region's centrality to its economy, and to the interests of its Arctic citizens. The United States will continue to bear in mind the significant importance of the Arctic to Russia and other Arctic countries as it develops its strategy in the region.

- *The extent, impact, and rate of climate change in the Arctic are uncertain, and may not unfold in a linear fashion*. This will make it challenging to plan for possible future conditions in the region and to mobilize public or political support for investments in U.S. Arctic capabilities or infrastructure absent a clear and immediate need for them. The general assumption that climate change will occur gradually, allowing plenty of time to adapt, may be overturned by periods of rapid change punctuated by episodes of climatic stability, or by unexpectedly severe impacts from the change. Part of the challenge will be the variable pace of climate change: several relatively ice-free summers may be followed by a number of unusually cold years during which the sea ice remains throughout the year.

- *Relationships among the Arctic nations will remain generally stable and cooperative*. All five littoral nations (United States, Russian Federation, Canada, Norway, and Denmark on behalf of Greenland) have already established the groundwork of common approaches to managing the region within the framework of the UN Convention on the Law of the Sea, the International Maritime Organization (IMO), the Arctic Council, and other international forums. All of the Arctic states (the five littoral nations plus Iceland, Sweden, and Finland) have shown through their participation in the Arctic Council, the Barents Euro-Arctic Council, the IMO, and other international organizations a willingness and ability to manage and resolve disputes through established international diplomatic mechanisms. This provides a sound basis to anticipate that the security environment in the Arctic will be defined by cooperation rather than conflict in the future. Should military security issues arise, they will be addressed with the appropriate stakeholders through the network of relevant bilateral and multilateral relationships.

- *Human activity in the region will increase over the coming decades.* Commercial entities will seek to take advantage of increasing Arctic access to exploit resources and transit routes. This will strain current management regimes, as well as associated monitoring and enforcement capabilities. Additionally, growing traffic for scientific, commercial, and military purposes will increase, rather than reduce, the challenges associated with monitoring and responding to incidents in what is, and will remain, an inherently risky operating environment. Safety and security concerns stemming from this increased activity will need to be addressed by appropriate U.S. agencies and departments.

- *DoD and the Department of Homeland Security (DHS) have different authorities, missions, and responsibilities, and face different requirements and timelines in the Arctic.*[9] The current level of human activity in the Arctic is already of concern to DHS,

[9] The Coast Guard, as the nation's leading maritime law enforcement agency, has broad, multifaceted jurisdictional authority. The statutory basis for all law enforcement missions is contained in 14 U.S.C. 2, which provides: "The Coast Guard shall enforce or assist in the enforcement of all applicable Federal laws on, under, and over the high

in particular the U.S. Coast Guard, which in addition to its freedom of navigation responsibilities is also responsible for icebreaking, search and rescue, marine environmental protection, living marine resources/law enforcement, marine safety, and waterways management in its title 14 capacity. The Coast Guard's 2011 High Latitude Study further details Coast Guard missions in the Arctic. The U.S. Navy's vision is presented in the October 2009 Arctic Road Map. The differing missions and timeframe of the challenges faced by the different agencies can account, in part, for the difference in their perspective on the urgency of the challenges presented by the changing conditions in the Arctic.

- *Applicable customary international law, as reflected in the LOS Convention, will guide development of the legal framework as the Arctic Ocean further opens to human activity.* Given the Arctic region's maritime characteristics, the U.S. Government will continue to hold the position that there is no need to create an overarching comprehensive international treaty or convention for the region analogous to the Antarctic Treaty, since the law of the sea already addresses Arctic Ocean issues. The U.S. Government will remain open to considering the need for new or enhanced international agreements or other mechanisms to address issues likely to arise from the changing climate, and will seek to strengthen as appropriate existing institutions designed to ensure that Arctic nations take a cooperative approach to emerging issues regarding the Arctic. The United States will abide by international law and U.S. legal and regulatory mandates, including fulfilling its treaty obligations. Even though the United States is not a Party to the LOS Convention, the United States will continue to adhere to the core principles of customary international law articulated in the LOS Convention, including the principles of freedom of navigation and overflight.[10]

- *Applicable environmental law and regulations will continue to evolve.* Environmental laws and regulations will evolve, and changes will tend to increase restrictions on human activity to protect against damage to the environment. IMO's efforts to develop a mandatory Polar Code for vessels operating in the Arctic is one example of the kinds of changes that may occur over the near- to mid-term. The United States will remain actively engaged in the Arctic Council and other international forums in order to shape the development of applicable laws and regulations.

- *Arctic operations will continue to be challenging and inherently risky even as the warming climate increases accessibility of the region.* The Arctic will continue to experience months of darkness each winter, during which the ice will re-freeze. Even in summer, however, the weather poses dangerous risks. Ships face the possibility of being

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seas and waters subject to the jurisdiction of the United States." In addition, 14 U.S.C. 89 authorizes the Coast Guard to board any vessel, subject to the jurisdiction or operation of any law of the United States, in order to make inquiries, examinations, inspections, searches, seizures, and arrests for the enforcement of U.S. law.

[10] NSPD-66/HSPD-25 explicitly states: "The United States exercises authority in accordance with lawful claims of United States sovereignty, sovereign rights, and jurisdiction in the Arctic region, including sovereignty within the territorial sea, sovereign rights and jurisdiction within the United States exclusive economic zone and on the continental shelf, and appropriate control in the United States contiguous zone."

trapped by wind-blown ice, as well as the threat of superstructure icing, which can impair stability and may lead to capsizing. In addition, sudden storms and fog often limit visibility. The melting permafrost also poses a growing challenge to land operations. Demand for supporting infrastructure (e.g., ship repair and refueling facilities) will likely outpace availability. Those who operate in the Arctic will do so at significant risk not only to themselves, but also to the Arctic environment and its inhabitants.

- *The near-term fiscal and political environment will make it difficult to support significant new U.S. Government investments*. This is an assumption, but also serves as a constraint on action. Agencies will only operate in the Arctic to the level to which they are resourced, meaning that new efforts will likely have to be funded through reallocation of existing resources. The Arctic is currently seen as a peripheral interest by much of the national security community, a situation not likely to change significantly in the next decade or more, absent some external forcing event, such as a major environmental or human disaster or activity in the Arctic viewed as threatening U.S. interests in the region.

- *Intergovernmental and non-state actors, including the media, and State actors external to the region will seek to play a significant role in shaping the future of the Arctic region.* The Arctic States will have to consider other stakeholders in framing their regional strategies. Intergovernmental actors such as the Arctic Council and the International Maritime Organization will play a prominent role in informing, developing, and implementing Arctic policy on a range of issues. Non-state actors such as oil, gas, shipping, and tourism companies; indigenous tribes and organizations; and environmental groups will also influence the nature of human activity and its effects on the region as a whole.

Many of these assumptions can create restraints or provide opportunities to advance U.S. policy goals in the Arctic, depending on what actions are taken to respond to the changing conditions in the Arctic.

Section 2:

An Assessment of Missions and Capabilities Needed to Support the Strategic National Security Objectives

Overview

This section assesses the capabilities needed to support U.S. strategic objectives and identifies potential gaps over the near-, mid-, and far-term. DoD's six core mission areas, as articulated in the 2009 Quadrennial Roles and Missions review, are: homeland defense and civilian support; deterrence operations; major combat operations; irregular warfare; military support to stabilization, security, transition, and reconstruction operations; and military contribution to cooperative security.[11] DoD may be required to perform any or all of those missions in any region of the world. However, scientists currently project transpolar routes will not be reliably open until around 2040, and then only for a limited period during the summer and early fall.[12] Therefore, during the timeframe assessed for this report, performance of most national security missions that entail military presence in the Arctic Ocean will likely be limited to those months when the sea ice is near its minimum, and regional activity is at a peak.

Exceptions to the seasonal variation in mission requirements are the strategic deterrence and ballistic missile defense missions. These missions require persistent domain awareness and episodic presence to deter adversaries and protect the United States from a range of threats that may not even originate from the Arctic region. Despite occasional political rhetoric and episodic press reportage, actual potential for armed conflict in the Arctic is low. However, the Arctic may be vulnerable to strategic spillover; although conflicts are not likely to originate in the Arctic, the region may reflect contention of Arctic nations over other issues.

Missions and Capabilities to Support National Security Objectives

Assessment of the priorities set out in NSPD-66/HSPD-25 in light of the national security objective described in Section One led to identification of nine missions broadly applicable to all DoD Components, as outlined in the table at Appendix One, along with key defense objectives and relevant Arctic capabilities. Although DoD has few niche capabilities specifically tailored for Arctic Operations (e.g., the ski-equipped HC-130 Hercules aircraft and the "688i" LOS ANGELES-class submarines designed for under-ice operations with diving planes on the bow rather than on the sail, and reinforced sails), it has a wide range of capabilities such as P-3 Maritime Patrol Aircraft, F-22 Raptors, and Stryker vehicles, among others, that can be employed in a wide range of operating environments, including the Arctic. This approach is in keeping with DoD's policy of preparing for a wide range of contingencies.

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[11] 2009 *Quadrennial Roles and Missions Review* Report.

[12] Arctic Council 2009. *Arctic Marine Shipping Assessment 2009 Report*. Arctic Council, Norwegian Chairmanship, Oslo, Norway, p 25. Also, I. Eisenman and J. S. Wettlaufer, "Nonlinear threshold behavior during the loss of Arctic sea ice," *Proceedings of the National Academy of Sciences* 106, no. 1 (January 6, 2009): 28-32; Dirk Notz, "The Future of Ice Sheets and Sea Ice: Between Reversible Retreat and Unstoppable Loss," *Proceedings of the National Academy of Sciences* 106, no. 49 (December 8, 2009): 20590-20595.

Capability Assessment Approach

This qualitative assessment looks at the near- (2010-2020), mid- (2020-2030), and far-term (beyond 2030), and factors in non-material capabilities, such as having a cadre of trained and qualified personnel capable of safely operating in the arduous conditions of the Arctic. The U.S. Navy's participation for the last two years in Canada's annual Operation NANOOK, U.S. Marine Corps participation in the Norwegian invitational exercise COLD RESPONSE, and Air National Guard and Army Reserve participation in ARCTIC CARE are examples of some of the Arctic-related training events that help maintain the U.S. military's cold weather operational capability. Some, such as ARCTIC CARE, are annual events, others, like ARCTIC EDGE, an exercise focusing on Defense Support of Civil Authorities, are held less frequently.

Capability Gap Assessment in Relation to Arctic Mission Areas

- *Maritime Domain Awareness (MDA).* MDA is the effective understanding of anything associated with the maritime domain that could affect the security, safety, economy, or environment of the United States. This 24-hours-per-day / 7-days-per-week / 365-days-per-year mission exists now, but demand for domain awareness in the Arctic is projected to increase in pace with regional activity, placing heavier demands on Intelligence, Surveillance, and Reconnaissance (ISR) assets such as underwater sensors, shore-based sensors, unmanned aerial systems (UAS), national reconnaissance satellites, patrol aircraft, and the surface and subsurface vessels that contribute to the picture. The ability to locate, identify, and track surface vessels in the Arctic today is limited, and depends in part on collaboration with partner nations and use of commercial assets. This gap will likely remain significant through the time period of this analysis, based on projected investments over the Future Years Defense Plan (FYDP). MDA must be integrated with awareness of the other operational domains to provide commanders, decision makers, and responders with all-domain awareness.

- *Search and Rescue (SAR).* The extreme distances, limited infrastructure, and paucity of assets will make a timely SAR response challenging in the best of conditions. As human activity increases in the region, this gap is expected to increase. SAR, however, is not a force sizing or shaping mission for DoD; the Department contributes assets when needed and as available.

- *Regional Security Cooperation.* Existing and programmed assets suffice for joint exercises and routine training in the near-term.

- *Humanitarian Assistance/Disaster Response/Defense Support of Civil Authorities.* This mission may require the movement of resources through the air or on the surface across great distances by forces trained and equipped for the Arctic environment; the small population and lack of dense urban infrastructure limits the need for these missions in the near-term. As the region becomes more accessible to human activity, more assets from multiple Arctic states will likely be available to respond to requests for aid.

- *Maritime Security.* The Arctic nations are aligned in their support for enhanced safety and security in the Arctic region, but the vast distances, harsh environment, and resource limitations necessitate a coordinated approach to the region as human activity increases. Logistical support such as supplies, fuel, maintenance, transportation, and facilities will be required not just for DoD activities, but also for other government entities, such as the U.S. Coast Guard, and for commercial endeavors.

- *Power Projection.* DoD is currently able to execute this mission in the Arctic region, given the low threat level and the complementary capabilities of allied and partner nations. Robust air and subsurface capabilities also mitigate the lack of ice-strengthened surface combatants.

- *Sea Control.* Sea control operations in the Arctic are expected to be minimal in the near-term, but may increase along with the rate of sea ice decline and the increase in human activity. DoD's lack of surface capabilities able to operate in the marginal ice zone [13] and pack ice will increasingly affect accomplishment of this mission area over the mid- to far-term.

- *Strategic Deterrence.* DoD's current aviation, submarine, and intercontinental ballistic missile capabilities are able to deter both existing and developing state threats to the national security of the United States.

- *Air and Missile Defense (AMD).*[14] Air and missile defense, supported by an extensive network of early warning radars and communications stations, will remain an important mission in all timeframes of the assessment. DoD currently has missile defense facilities located at Fort Greely and Eareckson Air Station, Alaska. The U.S. Air Force Base in Thule, Greenland, is part of the U.S. network of early warning radars being upgraded as part of the Global Ballistic Missile Defense System (BMDS). Missile defense capability assessment is a function of threats analysis. Increasing Arctic access is not projected to affect existing AMD capabilities.

The North American Aerospace Defense Command (NORAD) is a bi-national U.S. and Canadian command established in 1958. NORAD's missions include aerospace warning and control and maritime warning for threats against the United States and Canada. By virtue of the command's forward presence and operational posture in Alaska and Canada, NORAD will continue to play a significant role in DoD's ability to meet national security challenges in the Arctic. NORAD also embodies the unique and enduring partnership between the United States and Canada in defense cooperation—a partnership that will prove vital in the Arctic.

Today, DoD can accomplish its missions against existing threats in current Arctic conditions with its current capabilities. However, these capabilities will need to be re-evaluated as

[13] For the purpose of this report, the "marginal ice zone" refers to the area between the pack ice and the open ocean that contains broken ice and is affected by wave action.
[14] AMD includes Ballistic Missile Defense (BMD).

conditions change and gaps addressed in order to be prepared to operate in a more accessible Arctic. Key challenges include: shortfalls in ice and weather reporting and forecasting; limitations in C4ISR due to lack of assets and harsh environmental conditions; limited inventory of ice-capable vessels; and limited shore-based infrastructure. The key will be to address needs in step with the rate at which activity in the Arctic increases and balance potential investments in these capabilities with other national priorities.

The capabilities likely to be most affected by the extreme Arctic environment include: navigation equipment; sensor employment; weapons employment capability; personnel safety; communications; logistics and resupply; equipment and facilities maintenance; infrastructure; and command and control. Three capability gaps in particular have the potential to hamper Arctic operations across all time frames covered in this assessment.

First, communications are extremely limited in latitudes above 70°N due to magnetic and solar phenomena that degrade High-Frequency (HF) radio signals, limited surface-based relays outside of Alaska, and geostationary satellite geometry. High-data-rate satellite communications are sparse, but commercial low-rate service is available. Although adequate for single ships, the communications architecture is insufficient to support normal operational practices of a surface action group or any large-scale Joint Force operations.

Second, Global Positioning System (GPS) performance in the Arctic is degraded due to poor satellite geometry, ionospheric effects, and multipath interference. Although its performance is adequate for surface navigation, the degradations could affect missions that require precision navigation, such as weapons targeting or search and rescue. Furthermore, navigation charts in Arctic areas are not up to modern standards. Reported depths can be particularly unreliable in areas subject to shoaling and ice scour, increasing the risk for all littoral operations.[15]

Additionally, although accurate ice coverage charts are available for surface navigation, reliable real-time ice characterization (e.g., depth or thickness) is not. These issues, taken together, could affect the safety of all maritime operations.

Third, awareness across all domains in the Arctic is extremely limited due to distances, limited presence, and the harsh environment. DoD requires the capability to monitor and assess human activity in the Arctic persistently in order to support evolving defense, safety, and security efforts adequately.

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[15] *National Security Implications of Climate Change for U.S. Naval Forces: Letter Report*, 2010, Committee on National Security Implications of Climate Change for U.S. Naval Forces, National Academies Press, ISBN: 0-309-15308-5. Alaska is the only State without digital shoreline imagery and elevation maps that meet nationally accepted standards. Also, the State's reference system has neither the density of control points to support submeter-level accuracies for surveying and positioning activities, nor vertical data coverage for the western half of the State to support the accurate determination of elevation heights.

Service-Specific Arctic Capabilities

U.S. Navy. U.S. Navy surface ships are not ice-strengthened and, therefore, are not available for employment in first year ice, or even in the marginal ice zone. The Navy submarine force has been operating in the Arctic since the trans-Arctic voyage of USS NAUTILIS in 1958. The Arctic Submarine Laboratory (ASL) is the Navy's center of excellence for Arctic matters and is responsible for developing and maintaining expertise in the Arctic. A periodic Ice Exercise (ICEX) is conducted by Commander, U.S. Submarine Forces, in order to validate submerged operations and tactics in the Arctic environment. Test and evaluation objectives are coordinated with the ASL and the priorities are established based on operational and submarine platform/system development requirements.

The Naval Ice Center in Suitland, Maryland, provides sea ice analysis and forecasting for the polar regions primarily in support of the submarine fleet but also in support of other national missions. The Naval Ice Center, which is part of the tri-agency National Ice Center, is a model for interagency cooperation with NOAA and the U.S. Coast Guard, and a vital supporting capability for any current and future Arctic operations.

The U.S. Navy is conducting an assessment of the missions that it needs to be able to perform in the Arctic in the future. The Navy Arctic Mission Analysis, being performed under the auspices of the Navy's Arctic Roadmap, is assessing these requirements for the near- (2010-2020), mid- (2020-2030), and far-term (beyond 2030). Potential capability gaps in these missions are being analyzed in detail, and results will be contained in the Navy's Arctic Capabilities Based Assessment (CBA), which will be completed by summer 2011 in order to support decisions about investing in potential solutions in the Navy's budget submission for Fiscal Year 2014.

U.S. Army. The relevant capabilities of the U.S. Army in the Arctic include executing training and readiness in support of USPACOM's Theater Campaign Plan (TCP) and missile defense. Principal Army components based in Alaska include two active Brigade Combat Teams and a National Guard Infantry Brigade and aviation unit, located primarily at Fort Wainwright (Fairbanks) and Joint Base Elmendorf-Richardson (Anchorage), and a Cold Weather Training and Test Center at Fort Greely (Fairbanks). Additionally, the U.S. Army Corps of Engineers' Cold Regions Research and Engineering Lab (CRREL), located in Hanover, New Hampshire, develops solutions to military challenges in the Earth's cold regions.

The Army recently completed a Final Programmatic Environmental Impact Statement (FEIS) and Record of Decision (ROD) for the realignment, growth, and stationing of aviation units. The ROD, published March 30, 2011, explains the Army's decision to activate and station a new Combat Aviation Brigade (CAB) at Fort Carson, Colorado, and build and consolidate existing aviation units to form a CAB split-based at Joint Base Lewis-McChord, Washington, and Fort Wainwright, Alaska. The Army recognizes Alaska as a strategic location and is continuing to maintain a significant aviation presence there and will increase medical evacuation (MEDEVAC) strength in Alaska by three additional aircraft in fiscal year 2013.

U.S. Air Force. U.S. Air Force capabilities in the Arctic are primarily located in the Alaska region with bases near Anderson, Alaska, and in Thule, Greenland. Capabilities at Thule Air Base include the Ballistic Missile Early Warning System (BMEWS), which is a multi-mission radar providing missile warning, missile defense, and space situational awareness. Additionally, Thule hosts an Air Force Satellite Control Network facility that provides the capability to control numerous U.S. satellites. Thule AB has a robust basing support infrastructure that includes the world's northernmost deep-water port, a 10,000-foot runway with radar approach control, and a 20-million gallon fuel farm. Clear Air Force Station, located near Anderson, Alaska, provides the Western U.S. counterpart to Thule Air Base. Capabilities at Clear include a BMEWS similar to the one at Thule. Clear Air Force Station will undergo a three-year upgrade to add the missile defense mission starting in early 2012.

The Air Force also maintains an Arctic aviation capability based at two Air National Guard (ANG) facilities. The first is Joint Base Elmendorf-Richardson. This facility operates HC-130 and HH-60 aircraft (144th and 249th Airlift Squadrons, 210th/211th/212th Rescue Squadrons, 176th Air Control Squadron, and the 11th Rescue Coordination Center), which are capable of operating in Arctic conditions. These aircraft maintain a 24-hour alert and annually participate in Arctic search and rescue exercises (SAREX) with joint and international partners.

The second facility under the ANG is Stratton ANGB, Scotia, New York. This facility is the home of the 109th Air Wing, which has a unique mission, combining both scientific and military objectives. The 109th Air Wing operates LC-130 Hercules (ski-equipped) aircraft, which are used to support the National Science Foundation (NSF). NSF directly reimburses DoD for support based on the NSF-DoD Memorandum of Understanding (MOU). The LC-130s can operate from prepared and unprepared snow fields, floating ice sheets, glaciers, and traditional paved runways. Up to seven LC-130s deploy from October to February to McMurdo Station, Antarctica, as part of Joint Task Force (JTF) Support Forces Antarctica under Operation DEEP FREEZE. Additionally, three LC-130s operate from Kangerlussuaq, Greenland, from April to August each year to support U.S. and European science camps on the Greenland Ice Cap. Kangerlussuaq, which has a 10,000-foot runway, was formerly USAF Sondrestrom Air Base. It was returned to Danish/Greenlandic control but by agreement remains available for scheduled U.S. military flights and contingency operations.

The Air Force is responsible for the Joint Pacific Alaska Range Complex (JPARC), home to Red Flag Alaska. JPARC constitutes the world's largest instrumented range airspace. When the Gulf of Alaska is included, the airspace is measured at 127,000 square miles, which is one thousand percent larger than the Nevada Test and Training Range (NTTR) that supports operations at Nellis Air Force Base. JPARC enables full tactical weapons employment without undue deconfliction constraints. It is the only training environment in the DoD enterprise that offers contiguous all-domain (air, land, maritime, cyber, and space) capacity needed to host full-spectrum joint training.

A critical Arctic capability maintained by the U.S. Air Force is the Enhanced Polar System (EPS). EPS provides Extremely High-Frequency, protected military satellite communications

above 65°N. EPS consists of a communications payload hosted on two satellites with highly elliptical orbits, providing 24-hour/day coverage.

U.S. Marine Corps. The Marine Corps, as an expeditionary force, is prepared to operate in every climate and place. This includes providing Marine Air Ground Task Forces (MAGTFs) to serve with the Navy for the full range of operations in the Arctic region. The Marines routinely conduct cold weather training in the continental United States (CONUS) (Marine Corps Mountain Warfare Training Center, Bridgeport, California) and overseas in cooperation with partner nations (e.g., exercise COLD RESPONSE with Norway). Additionally, Marines preparing to deploy to Afghanistan during the winter months receive specialized cold weather training.

Summary

The long lead time associated with capability development, particularly the procurement of space-based assets and ships, requires a deliberate risk-based investment strategy. Additional capability analysis will be required; the U.S. Army and U.S. Navy are already taking steps to reassess their Arctic capabilities and posture in light of the changing conditions in the region. Three significant areas of uncertainty may increase or help close potential capability gaps identified in this report:

- First, the physical characteristics (e.g., sea ice coverage) of the Arctic are changing, but there is little scientific consensus on the long-term projections.

- Second, economic viability of commercial ventures in the Arctic (e.g., oil and gas exploration, mineral extraction, tourism, and fishing) will be the dominant driver of the pace at which human activity increases in the region. Changes are expected to occur gradually and unevenly, driven by existing infrastructure, individual national policy decisions, and the self-interest of commercial entities, among other factors.

- Finally, Department of Defense operations in the Arctic have been reduced since the Cold War with the exception of submarine operations and, to a lesser extent, aviation operations. Consequently, the safety and effectiveness of some newer systems and platforms are relatively untested in an Arctic environment.

Section 3:

An Assessment of the Impact of Aligning the Arctic Ocean Under a Single Combatant Commander

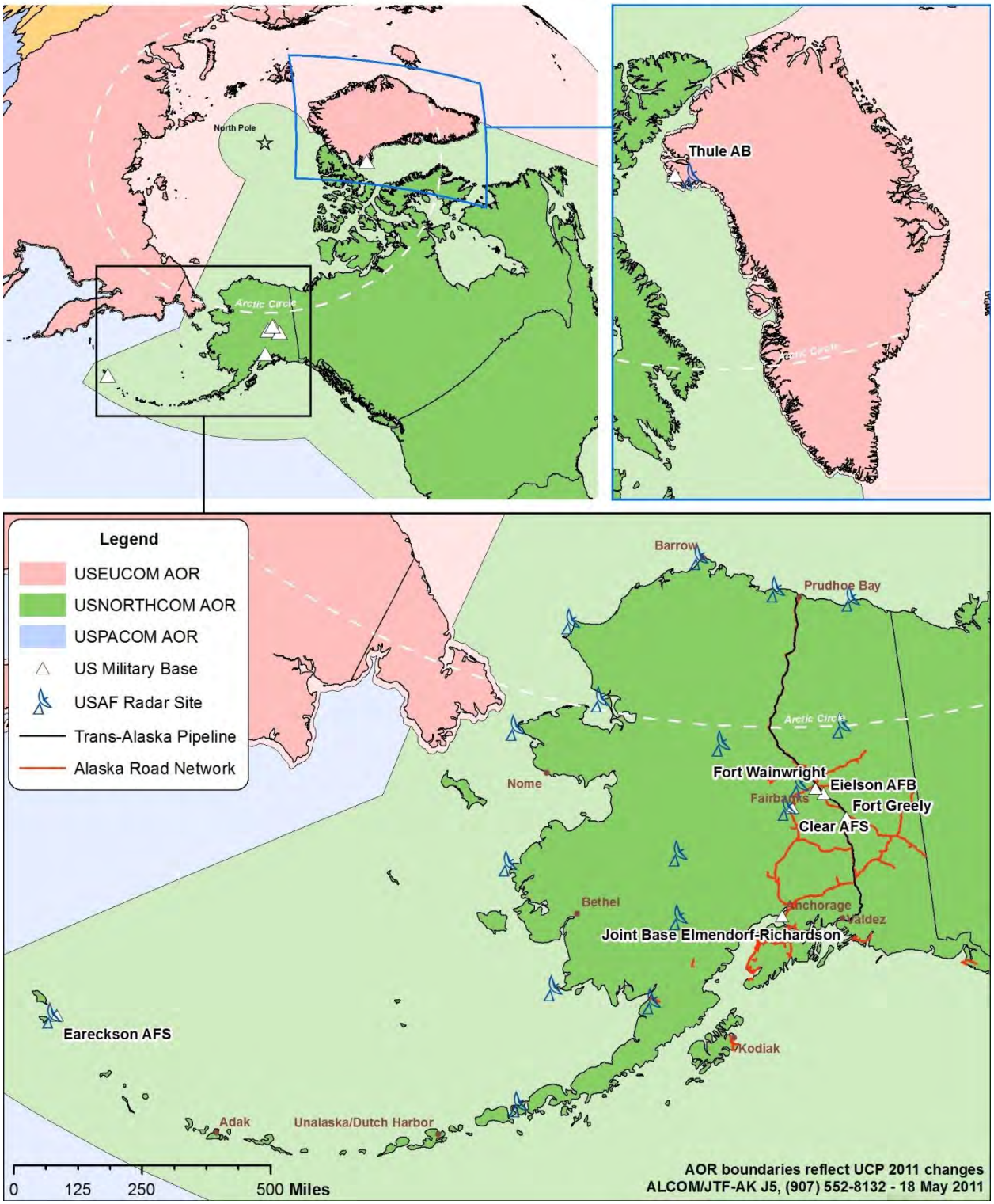
The recently signed 2011 UCP realigned Arctic water space with associated CCDRs. It maximizes and leverages current relationships and sets the stage for improved future planning in the region, while improving command and control in the vicinity of the Bering Strait. The Chairman of the Joint Chiefs of Staff and the Secretary of Defense recommended this adjustment to the AOR boundaries, which was approved by the President on April 6, 2011.

There are now two CCDRs with distinct areas of responsibility in the Arctic Ocean: Commander, U.S. European Command (USEUCOM), and Commander, U.S. Northern Command (USNORTHCOM). Additionally, UCP 2011 assigned Commander, USNORTHCOM, singular advocacy responsibility for Arctic capabilities primarily due to USNORTHCOM having the only U.S. Arctic territory within its AOR. As such, Commander, USNORTHCOM, will be responsible for Arctic planning, identification of future capabilities, and requirements or engagement with other relevant national or international agencies and governing bodies.

For the Arctic area, an approach based on coordination and cooperation toward a common objective is more effective in achieving the strategic end state of a stable and secure Arctic region. CCDRs build long-term relationships with counterparts in their AORs based on a history of frequent interaction that includes high-level personal contacts, international training exercises, conferences, and personnel exchanges to facilitate dialogue and understanding between stakeholders on regional issues. These relationships are the foundation of the CCDRs' ability to work effectively with other nations in their AORs to address emerging regional challenges and opportunities. Regarding the advocacy responsibility, USNORTHCOM is best suited for this effort due to its historic relationships with Canada and NORAD, as well as its habitual relationship with the DHS and the U.S. Coast Guard. These relationships are key to human and environmental safety and security concerns, which are relevant in the near term in order to regulate, monitor, and conduct safety missions in the Arctic (such as search and rescue, maritime safety, law enforcement, and disaster response). Aligning the entire Arctic Ocean under a single CCDR would disrupt progress in theater security cooperation achieved over decades of dialogue and confidence-building by USEUCOM and USNORTHCOM with regional interlocutors. Although having multiple CCDRs with responsibility in the Arctic Ocean makes coordination more challenging, having too few would leave out key stakeholders, diminish long-standing relationships, and potentially alienate important partners.

The Chairman of the Joint Chiefs of Staff (CJCS) will continue to assess command relationships in the Arctic, and will recommend updates to the UCP as appropriate.

Existing DoD Bases and Facilities in Alaska and the Arctic



Section 4:

Assessment of Basing Infrastructure Needed to Support Strategic Objectives in the Arctic

This section looks at the major defense infrastructure such as bases, ports, and airfields needed to support DoD's strategic objectives for the Arctic. Minor modifications to existing bases, such as addition of a new hangar or construction of new barracks, are made by the Services as part of the ongoing maintenance and modernization process, and beyond the scope of this report.

DoD's infrastructure in the Arctic, never large in comparison with its posture in other areas, was reduced after the end of the Cold War, reflecting the regional threat assessment and reorientation of Departmental priorities. DoD reviews its global posture regularly in light of the fluid global security environment and adjusts it to reflect the defense strategy and needs articulated by the CCDRs in their theater campaign, contingency, and posture plans. Global defense posture encompasses more than bases and infrastructure; it involves the forces, infrastructure, and agreements designed to sustain U.S. capacity for global reach and power projection in support of national security objectives. The existing Arctic infrastructure is reflective of this process and meets current DoD needs for both operational and contingency plans as well as steady-state defense and security cooperation activities. Any future facilities or bases in the Arctic must be viewed in the context of the larger picture of U.S. global defense posture.

NSPD-66/HSPD-25 includes deployment of sea and air systems for strategic sealift and airlift among the U.S. national interests in the Arctic. With the establishment of five new flight routes across Russia in 2001, the number of cross-polar commercial flights increased from 402 in 2000 to 8,527 in 2009.[16] Overflight of the Arctic region will continue to increase as demand grows for efficient connections between North America and Asia. Continued improvements in the air traffic management system over Russia and the slot allocation process across the entire Arctic region will permit greater usage by commercial passenger and air freight carriers. However, for DoD strategic airlift, the cross-polar routes have limited utility due to range limitations and refueling requirements for military aircraft, and due to challenges in obtaining diplomatic clearances for overflight of Russia.

Commander, U.S. Transportation Command (USTRANSCOM), is the functional CCDR responsible for strategic sealift and airlift. The sealift requirement to support Thule Air Base, Greenland, is limited to one mission per year (July/August) with one ice-class general cargo ship and an ice-class tanker. The mission has been accomplished in recent years by commercial charter vessels. Icebreaker support for this mission is provided through cooperation with the Canadian government. USTRANSCOM assesses that until navigational charts, aids to navigation, ice breaking support, and port infrastructure (including refueling capabilities) are more developed in the region and the United States procures strategic sealift vessels rated for operations in the Arctic, it is unlikely that DoD strategic sealift will be able to operate in the Arctic.

[16] United Airlines: "Polar Operations, 1996-2010," briefing to Cross-Polar Working Group, November 2010.

Existing DoD Bases and Facilities

U.S. infrastructure capable of supporting current military operations is sparse, particularly in northern Alaska and the Aleutian Islands, with the exception of Dutch Harbor. In the eastern Arctic (Baffin Bay plus the Greenland, Norwegian, and Barents Seas), U.S. forces can receive support from Thule Air Base, Greenland, or rely on Allied nations for necessary basing and infrastructure support.

- In the Anchorage area, Joint Base Elmendorf-Richardson contains a combined military population of more than 12,000 and serves as home to a U.S. Air Force fighter wing, a C-17-equipped air transport unit, an Army Brigade Combat Team, and support units. Additionally, an active duty C-130 squadron will be established in Fiscal Year 2011, with expected initial operational capability in August 2011. The base provides significant capacity such as runways, ramp space, air space command and control, and fuel infrastructure to support throughput for aircraft, mid-air refueling operations, aerial command and control, ISR operations, and weather forecasting. The move of the 176th Wing (Alaska Air National Guard), with its C-130s and helicopters, from Kulis Air National Guard Base in 2011 added significant search and rescue capabilities as well. The resident Air Force and Army support units provide extensive capabilities in communications, logistics, engineering, ground transportation, and medical support, including a 60-bed hospital.

- In the Fairbanks area, Eielson Air Force Base serves as home to a fighter wing and an Air National Guard air refueling wing. The base provides significant aerial throughput capacity and can support SAR missions that extend north of the Alaska Range. Fort Wainwright is home to an Army Brigade Combat Team and aviation task force, and can provide services such as air support operations and emergency medical care. Together with Fort Greely, Fort Wainwright also serves as a cold weather test and training center.

- Fort Greely is the site of the 49th Missile Defense Battalion (ARNG), which operates the BMDS ground-based interceptors at both Fort Greely and Vandenberg AFB, California. The 49th Missile Defense Battalion is an integral part of the missile defense of the United States. Fort Greely also houses the support for the contractor logistics that sustains the missile system.

- In the vicinity of Baffin Bay, Thule Air Base, Greenland, is home to a BMEWS radar and Air Force satellite control network ground site. The base provides significant basing capacity such as a deep water port, a 10,000-foot runway, ramp space, radar approach control, and 20-million gallon fuel infrastructure to support throughput for aircraft, mid-air refueling operations, aerial command and control, SAR operations, and weather forecasting. The resident Air Force support units provide capabilities in communications, logistics, engineering, ground transportation, and medical support, including an 8-bed hospital. Thule Air Base supports military, government, and Allied missions in the eastern Arctic.

Other Facilities

Dutch Harbor, in the Aleutian Island chain, is strategically located on the North Pacific shipping lanes between North America, East Asia, and the Bering Sea. With its 40-foot deep harbor, the Unalaska Marine Center, and U.S. Coast Guard dock, Dutch Harbor provides vessel berthing, containerized cargo loading, warehousing, and passenger and port services. The seaport is primarily oriented toward supporting the fishing industry, but is ice-free year round and can provide limited berthing and support for larger, deep draft vessels. However, with a runway less than 4,000 feet in length and harsh weather conditions, the Unalaska airport provides only limited multimodal port capabilities.

Adak lies near the southern tip of the Aleutian Islands, about 450 miles west of Dutch Harbor. Although Adak was an important operations and supply location for the U.S. military during the Cold War, it was closed in 2000 as a result of the Base Realignment and Closure (BRAC) Act of 1995.

Challenges Associated with Arctic Infrastructure

Because of the range and severity of Arctic conditions, climatic, hydrologic, topographic, and geographic factors must all be considered in site selection for any infrastructure in this region. The environment desired inside buildings is usually drastically different from ambient conditions, placing additional stresses on building components. Some important considerations for infrastructure in the Arctic include: condensation control, structural design ventilation, snow load, snow accumulation and drifting potential, and roof drainage, among others detailed in the Unified Facilities Criteria manuals.[17] When infrastructure is sited along the coast, erosion, silting, sea ice variability, and coastal dynamics must also be considered. The ice movement means that conventional pier construction is rarely feasible. An additional consideration is the months of almost continuous daylight in summer, followed by winter months of almost complete darkness, a variation that becomes more extreme as one goes further north.

Construction in the Arctic is seasonal and skilled labor is usually in short supply; therefore, costs for both construction and maintenance are high. The need to provide room and board at remote locations, decreased efficiency of workers and machinery in extreme environmental conditions, and the difficulties, costs, and risks in shipping materials and equipment add to the challenge. Because of the short construction season, outside work must be accomplished quickly, dictating a high degree of expensive prefabricated construction. During ice-free periods, the most economical means of transportation is by barge. During the winter, transportation over frozen rivers and lakes may be more economical than air transportation. But delays in shipping equipment due to weather can result in prolonged construction times and expensive emergency air freight costs. Construction in the Arctic costs, as a rule of thumb, three to five times more

[17] Unified Facilities Guide Specifications (UFGS) were developed by the U.S. Army Corps of Engineers (USACE), the Naval Facilities Engineering Command (NAVFAC), the Office of the Air Force Civil Engineer, and the National Aeronautics and Space Administration (NASA). UFGS specify construction criteria for the DoD Components.

than comparable infrastructure in lower latitudes. Another challenge to bear in mind is the risk to existing infrastructure posed by thawing permafrost. As the permafrost thaws, it loses strength and volume, leading to failure of foundations and piling. The warming climate will also accelerate the erosion of shorelines and riverbanks, threatening infrastructure located on eroding shorelines.

Future DoD Infrastructure Needs

Significant uncertainty remains about the rate and extent of climate change in the Arctic and the pace at which human activity will increase. The challenge is to balance the risk of being late-to-need with the opportunity cost of making investments in the Arctic before they are needed, especially given the many competing demands on DoD resources in the current fiscal environment.

The first step is to adapt existing facilities to the changing climate. Melting permafrost and coastal erosion will present structural challenges that will need to be addressed to maintain full mission readiness of the existing early warning radar sites and communications infrastructure in Alaska and Greenland.

Since 2007, the U.S. Coast Guard has deployed cutters, aircraft, boats, and special detachments to northern Alaska during the summer season to increase competencies and develop Arctic partnerships. One area for future assessment might be the need for a co-located airport and port facility suitable for deployment of undersea search and rescue assets. Given the paucity of suitable sites and existing infrastructure, it is likely that any future infrastructure, at least initially, will consist of dual-use military-civilian facilities.

In summary, with the low potential for armed conflict in the region in the foreseeable future, the existing defense infrastructure (e.g., bases, ports, and airfields) is adequate to meet near- to mid-term U.S. national security needs. Therefore, DoD does not currently anticipate a need for the construction of additional bases or a deep draft port in Alaska between now and 2020. Given the long lead times for basing infrastructure in the region, DoD will periodically re-evaluate this assessment as activity in the region gradually increases and the CCDRs review and update their regional plans as the security environment evolves.

Section 5:

An Assessment of the Status of and Need for Icebreakers to Support Strategic National Security Objectives

Overview

This section assesses the status of and need for polar icebreakers in order to determine whether icebreakers provide important or required mission capabilities to support Arctic strategic national security objectives.

Status of U.S. Polar Icebreakers

Although there is not an internationally agreed-upon standard for classification of icebreakers or ice-strengthened ships, the following descriptions allow for discussions of these types of vessels:[18]

- *Icebreakers.* The International Maritime Organization (IMO) defines an icebreaker as "any ship whose operational profile may include escort or ice management functions, whose powering and dimensions allow it to undertake aggressive operations in ice-covered waters." The USCG defines three comparative icebreaker categories based on displacement, power, and ability to break varying thicknesses of ice at a continuous speed of 3 knots: Heavy Icebreakers (6 feet at 3 knots, 21 feet backing and ramming; examples: USCGC POLAR SEA, USCGC POLAR STAR); Medium Icebreakers (4 feet at 3 knots, 8 feet backing and ramming; example: USCGC HEALY); and Light Icebreakers.

- *Ice-strengthened vessels.* These vessels are built and maintained in accordance with the class standards set by individual classification societies. The vast majority of these vessels require icebreaker support when operating in ice-covered waters; however, some vessels may be constructed to class standards that allow for independent Arctic operations. Ice-strengthening increases the cost of construction and affects the operation of such vessels compared with non-ice-strengthened counterparts.

    - Ice-strengthening for naval surface combatants would entail not only hull protection but also strengthened and upgraded propellers, rudders, seawater intakes, and hull-mounted sonars and other sensors. These changes could potentially affect other characteristics, such as speed, energy efficiency, and noise signature.

There are frequent comparisons between the number of U.S. icebreakers (two heavy, one medium) and the 34 vessels in the Russian fleet, including eight nuclear-powered heavy

[18] This report is informed by a USCG Intelligence Report on icebreaker classifications.

icebreakers (of which two are currently not operational), and two conventionally powered heavy icebreakers, all of which are capable of independent Arctic operations. However, numbers alone do not tell the whole story.[19] About half of the Arctic's four million inhabitants live along Russia's sprawling northern coastline. The Northern Sea Route is an integral part of Russia's transportation infrastructure and is used for deliveries of food, fuel, building materials, and other necessities. It is also an important export route for timber, ores, oil, and other natural resources. The shipment of ores and processed metals from the Norilsk industrial complex via the Yenisey River to Murmansk is just one example of the vital role the Northern Sea Route plays.

U.S. Arctic polar icebreaking needs are more modest in comparison, as most of Alaska's 700,000 inhabitants live south of the Arctic Circle. DoD's needs are currently met by foreign-flagged commercial contract vessels or through cooperation with Canada, a close Ally and reliable partner on a range of shared security interests, but these needs will need to be reevaluated periodically in light of the changing conditions in the Arctic and evolving U.S. requirements. There are no U.S.-flagged heavy icebreakers in the U.S. commercial fleet. The U.S. Government inventory of polar icebreakers resides entirely within the U.S. Coast Guard. Although the U.S. Coast Guard intends to decommission USCGC POLAR SEA in Fiscal Year 2011, it is working to return USCGC POLAR STAR to full operational capability in 2013, giving the vessel an additional 7-10 years of service life. USCGC HEALY has an estimated 18 years of service life remaining; as a medium-duty icebreaker, it has limited independent operating capability in heavy ice.

Although it does not possess icebreakers, the U.S. Navy owns one ice-strengthened tanker that is used, along with chartered supply ships and foreign icebreaker support, to resupply bases at Thule and Antarctica. Three additional tankers have been removed from service and are being retained by the Maritime Administration in the National Defense Reserve Fleet in an inactive status.

Need for U.S. Polar Icebreakers

The U.S. Government has enduring national interests in the Arctic, including security, economic, and scientific interests. When considering national security interests, associated objectives identified in Section One of this report, and the mission areas described in Section Two, it is clear there is a current and continued future imperative to provide a sovereign maritime presence in the region. As expressed by Commander, USPACOM, Commander, USTRANSCOM, and Commander, USNORTHCOM, in a May 2008 memo, the United States needs assured access to support U.S. national interests in the Arctic.[20] Although this imperative could be met by regular

[19] This report highlights Russia, which has the largest icebreaking fleet in the world, and the longest Arctic coastline. Other Arctic nations also maintain large fleets. Canada operates one medium icebreaker and 15 light icebreakers. Sweden operates four medium and six light icebreakers. Finland operates two medium and six light icebreakers. China has one light icebreaker. All of the medium icebreakers are capable of independent Arctic operations.

[20] Memo from Commander, USPACOM, Commander, USTRANSCOM, and Commander, USNORTHCOM, to the Chairman of the Joint Chiefs of Staff on Icebreaker Support. Note: The memo, which includes consideration of security, economic, and scientific interests, identifies a need for icebreakers and expresses support for the USCG in operating and maintaining those icebreakers. This report, however, focuses specifically on defense interests and associated needs.

U.S. Government ships in open water up to the marginal ice zone, only ice-capable ships provide assured sovereign presence throughout the region and throughout the year. Assured access in areas of pack ice could also be met by other means, including submarines and aircraft.

As environmental and geo-political conditions (and associated human activity) continue to evolve in the Arctic, the U.S. Government will need to continue to assess its national interests and associated requirements. The need for ice-capable ships to provide visible and assured sovereign maritime presence in the Arctic region could potentially be met by either icebreakers or ice-strengthened vessels. These vessels are likely to become increasingly important as the changing environment results in increased emphasis for mission areas such as maritime security, power projection, and sea control in the mid- (2020-2030) and far-term (beyond 2030). In today's environment, ice-strengthened vessels may provide an affordable option to meet this need.

As noted in Section 2, the Department of the Navy is currently developing an Arctic Capabilities Based Assessment (CBA), scheduled for release in summer 2011. This assessment should provide additional insight on DoD-specific maritime needs in the Arctic. Additionally, the DHS plans to lead an effort in Fiscal Year 2012 to study icebreaking options to inform future U.S. icebreaking needs. Such detailed assessments are especially important given the long lead time from identification of requirements through design and procurement to operational availability of new ships.

Appendix 1

Table 1: DoD Missions in the Arctic[21]

Mission	Objectives	Relevant Arctic Capabilities

Maritime Domain Awareness (MDA)[22]	• Persistently monitor in the global maritime domain:
	  o Vessels and craft;
	  o Cargo;
	  o Vessel crews and passengers; and
	  o All identified areas of interest.
	• Access and maintain data on vessels, facilities, and infrastructure.
	• Collect, fuse, analyze, and disseminate information to decision makers to facilitate effective understanding. This includes a range of activities and capabilities referred to as Intelligence, Surveillance, and Reconnaissance (ISR).
		• National/Naval Ice Center
		• USN Maritime Patrol Aircraft (P-3 Orion, P-8 Poseidon)
		• USAF aviation assets
		• USAF supports maritime patrol aircraft (e.g., USN P3) operations out of Thule Air Base (AB)
		• Enhanced Polar System (EPS) satellites
		• Space and aerial reconnaissance
		• USCG HC-130 and HH-60 aircraft out of Air Station Kodiak, Alaska
		• USCG polar-capable icebreakers

Search and Rescue (SAR)	• SAR is a primary mission for the USCG on the high seas and waters subject to the jurisdiction of the United States and for the USAF in terrestrial Alaska. • SAR is a secondary mission for the USN. USN SAR consists primarily of self-rescue, SAR of opportunity, and SAR in support of the USCG.	• USAF aviation assets • USAF LC-130 Hercules (ski-equipped) aircraft from the 109th Air Wing Stratton ANGB, Scotia, New York • USAF can support search and rescue basing, staging, and operations from Thule AB • EPS satellites • USCG HC-130 and HH-60 aircraft from Air Station Kodiak, Alaska • USCG polar-capable icebreakers
Regional Security Cooperation	• Strengthen U.S. security posture in the region. • Advance constructive security initiatives and build transnational and partner nation capacity and capabilities in the region. • Thwart the emergence of specific security threats (national or transnational) in the region.	• USA ground and aviation units from Fort Wainwright and Joint Base Elmendorf-Richardson, Alaska • USA Cold Weather Training and Test Center, Fort Greely, Alaska • U.S. Army Corps of Engineers' Cold Regions Research and Engineering Lab (CRREL), Hanover, New Hampshire

[21] Analysis of the USCG's missions in the Arctic will be contained in its 2011 High Latitude Study and therefore is not included in this table; however, key USCG capability contributions to DoD missions are included above.

[22] MDA is one component of the Department's all-domain awareness, which involves the integration of maritime, air, and land domain surveillance, intelligence, and all-source information. This table focused on the maritime component as the most-stressing case for the Arctic Ocean; many of the same assets are also used to build awareness in other domains, and contribute to all-domain awareness.

Mission	Objectives	Relevant Arctic Capabilities
	• Enable and improve cooperative security arrangements for improved multinational operating performance.	• USN surface vessels (primarily Second, Third, and Sixth Fleet assets)[23] • USAF aviation assets • USAF McKinley Climatic Laboratory, Eglin AFB, Florida • USAF supports basing operations for Canadian and Danish forces from Thule AB • USMC Special Purpose Marine Air Ground Task Force (SPMAGTF)[24] • USCG surface vessels (primarily homeported in Alaska, California, Hawaii, New England, and Washington) • USCG Polar capable icebreakers
Humanitarian Assistance / Disaster Response (HA/DR) & Defense Support of Civil Authorities (DSCA)	HA/DR: Respond to foreign disasters and catastrophes: • Establish and maintain a safe, secure environment; • Deliver humanitarian assistance; • Reconstruct critical infrastructure and restore essential services; • Support economic development; and • Establish representative, effective governance and the rule of law. DSCA: Maintain the ability to provide Defense Support of Civil Authorities during domestic events, incidents, emergencies, and disasters, regardless of the cause.	• U.S. Army Corps of Engineers' Cold Regions Research and Engineering Lab (CRREL), Hanover, New Hampshire • USA ground and aviation units from Fort Wainwright and Joint Base Elmendorf-Richardson, Alaska • USN surface vessels • USAF aviation assets • USAF LC-130 Hercules (ski-equipped) aircraft from the 109th Air Wing Stratton ANGB, Scotia, New York • USAF can support basing, staging, and operations from Thule AB • USMC Special Purpose Marine Air Ground Task Force (SPMAGTF) and /or USMC Marine Air Ground Task Force (MAGTF)[25] • Marine Corps Prepositioned Program, Norway (MCPPN) • USCG aircraft and surface vessels • USCG polar-capable icebreakers

[23] The U.S. Navy has no ice-strengthened surface combatants, so operating areas are limited for other than submarines, to ice-free waters (less than 10 percent ice). This caveat applies throughout.
[24] SPMAGTF - A Special Purpose MAGTF is task organized to accomplish a specific mission, operation, or regionally focused exercise. As such, SPMAGTFs can be organized, trained, and equipped to conduct a wide variety of expeditionary operations, ranging from crisis response to training exercises and peacetime missions.
[25] MAGTF - The Marine Air Ground Task Force is the Marine Corps' principal organization for conducting missions across the range of military operations. MAGTFs provide combatant commanders with scalable, versatile expeditionary forces able to respond to a broad range of crisis and conflict situations. They are balanced combined-arms force packages containing organic command, ground, aviation, and sustainment elements.

Mission	Objectives	Relevant Arctic Capabilities
Maritime Security	• Protect sovereignty and maritime resources. Support free and open seaborne commerce. Counter maritime related terrorism, weapons proliferation, transnational crime, piracy, environmental destruction, and illegal seaborne immigration. • Freedom of navigation and access support maritime security, power projection, sea control, and, if required, strategic deterrence.	• USN surface vessels • USN submarine assets • USAF aviation assets • USAF air assets from Kulis Air National Guard Base (ANGB), Anchorage, Alaska • USAF can support basing, staging, and operations from Thule AB • EPS satellites • USCG aircraft and surface vessels • USCG polar-capable icebreakers
Power Projection	• Deploy and sustain forces in and from multiple dispersed locations to respond to crises, contribute to deterrence, and enhance regional stability.	• USA ground and aviation units from Fort Wainwright and Joint Base Elmendorf-Richardson, Alaska • USN submarine assets • USN surface vessels • USAF and USN aviation assets • USAF can support basing, staging, and operations out of Thule • EPS satellites • USMC MAGTF • MCPPN • USCG aircraft and surface vessels • USCG polar-capable icebreakers
Sea Control[26]	• Protection of vital sea lanes. • Destruction of enemy naval forces. • Suppression of enemy sea commerce. • Establishment of military superiority in areas of naval operations.	• USN submarine assets • USN surface vessels • USAF and USN aviation assets • USAF can support basing, staging, and operations from Thule • EPS satellites
Strategic Deterrence	• Decisively influence an adversary's decision-making calculus in order to prevent hostile actions against U.S. vital interests.	• Nuclear triad assets • USN submarine (SSN) assets • USN surface vessels • USAF and USN aviation assets • EPS satellites • USAF Ballistic Missile Early Warning System (BMEWS)
Air and Missile Defense (AMD)	• Protect U.S. deployed and multinational forces as well as critical assets and areas of vital interest or political importance from attack by air and missile threats.	• 49th Missile Defense Battalion (ARNG), Fort Greely, Alaska • Cobra Dane, Shemya Island, Alaska • UEW Radar, Thule, Greenland

[26] In the event of hostilities, currently assessed as unlikely due to low threat, but included for sake of comprehensiveness.

Mission	Objectives	Relevant Arctic Capabilities
	• Detect and target aircraft, unmanned aerial systems (UAS), and missiles; detect, warn, and report an aircraft, UAS, or missile launch; and coordinate a multifaceted response to such an attack while integrating that response with other combat operations. • Detect, target, and warn of aircraft, UAS, and missile overflights or transits of the AOR. • Reduce the probability of and / or minimize the effects or damage caused by aircraft, UAS, or missile attack.	• BMEWS • Ground-Based Midcourse Defense (GMD) units based in Alaska and California for defense against Intercontinental Ballistic Missiles (ICBMs) attack directed at North America • USAF intercept, surveillance, and tanker aircraft at ground based inceptors out of Joint Base Elmendorf-Richardson and Eielson AFB • USN surface vessels