U.S. Coast Guard rescue swimmer deploys from MH-65C Dolphin during mass rescue exercise Icy Resolve 2013 (U.S. Coast Guard)

Improving Safety in the U.S. Arctic

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On Friday, August 27, 2010, the MV Clipper *Adventurer*, a cruise ship carrying 128 passengers, ran aground on an uncharted rock off the Nunavut Coast while making its way from Port Epworth to Kugluktuk in the Northwest Passage. None of the passengers were injured, but they were forced to stay on the ship until Sunday, when a Canadian coast guard icebreaker arrived to ferry them to Kugluktuk.[1] It took 3 days for the icebreaker to arrive. If the *Adventurer* began to sink in frigid waters, could the Canadian government have responded in time? If the same event occurred off the coast of Alaska, could the United States respond in time?

Currently, the United States is not postured to handle the increase in human activity that is occurring in the Arctic. The Arctic capabilities of the United States are inadequate and action is required in the near term—the next 5 to 7 years—to operate in this more accessible yet still challenging region. In the immediate future, the area of gravest concern is safety. In coming years, Arctic sovereignty claims, commercial shipping, resource exploration, tourism, and increased military operations could drive multiple scenarios causing the region to become an arena of international cooperation, competition, or conflict.[2] As greater accessibility and commercial development expand, national interest and an urgency to ensure that the United States possesses the capacity to preserve freedom of navigation, provide safety of life at sea, protect its natural resources, and preserve the natural environment will increase as well.[3] For these reasons, the United States should immediately invest in search and rescue (SAR) infrastructure and icebreakers to support future regional safety needs.

Arctic sea ice melted to its lowest recorded level in 2012 and resulted in the opening both of previously inaccessible parts of the Arctic Ocean and of economic exclusion zones (EEZs). The biggest driver for opening the Arctic is simple economics: trillions of dollars worth of resources could lie below newly accessible areas. According to the U.S. Geological Survey, nearly 13 percent of

the world's undiscovered oil reserves and 30 percent of its undiscovered gas reserves are north of the Arctic Circle, a staggering 90 billion barrels of oil and 1,670 trillion cubic feet of natural gas.[4] Countries and corporations are posturing themselves to tap into this enormous potential wealth of oil, gas, and minerals. Melting Arctic ice during the summer months and shoulder seasons will increase human activity because of:

- increased tourism—primarily cruise ship traffic
- increased oil/gas/mineral/fish exploration and exploitation—economic drivers
- increased shipping—an increase in traffic to and from resource extraction sites and potentially cheaper trans-Arctic shipping routes.

Cruise Ships and Tourism

Maritime traffic in the Arctic is increasing. From 2008 to 2012, U.S. Coast Guard Arctic Maritime Activity data show a 100 percent increase of traffic in the region from 123 vessels to 247.[5] Though not a large numerical increase, it does demonstrate an upward trend. The increase in vessel traffic has heightened the probability of incidents and potential casualties that would require Coast Guard medical response/evacuation or SAR support. Of significant concern, cruise ship traffic in the Arctic exponentially increases the aspect of safety and potential undesired consequences. In 2007 more than half of Alaska's 1.7 million visitors were cruise ship passengers, and the economic impact of the tourist industry cannot be overstated. It provides a $1.07 billion economic benefit annually for the state and $767 million in direct industry spending. Despite the total cruise capacity in Alaska declining by 10 percent from 2009 to 2010, the industry experienced overall growth over the last 10 years. This trend is expected to continue.[6]

As passenger and cruise vessels increase in number and routes stretch further into the Arctic, SAR infrastructure and passenger safety requirements are likely to increase proportionally. Even today's relatively meager number of summer tourists cruising Arctic waters exceeds the limited emergency response capabilities of the local communities. Of most concern is the spatial compression of opportunity to successfully respond and conduct lifesaving operations. The Arctic's cold air and water temperatures, shifting pack ice, and unpredictable weather require the quick and efficient rescue of tourists aboard lifeboats or distressed vessels. Even limited exposure to cold weather and Arctic seawater reduce human endurance to minutes and the likelihood of long-term survival to nearly zero. These hazardous environmental conditions prevail in a region with scarce emergency resources and vast distances that result in lengthy response times.[7]

To address these stressors, the Arctic Council, an international body of Arctic nations, penned an Arctic SAR agreement that was signed by the U.S. Secretary of State in May 2011. The agreement is the first legally binding instrument negotiated under the auspices of the Arctic Council and the first legal accord on any topic among all eight Arctic states. The signing of the *Nuuk Declaration* demonstrates the commitment and cooperation to address emerging safety issues in the Arctic region. The agreement commits parties to provide appropriate assistance when incidents arise and to take other steps to address growing SAR requirements in the Arctic region.[8]

Economic Drivers

The Shell Oil Company has already invested 6 years and $4.5 billion in an effort to tap into the oil reserves off the North Slope of Alaska.[9] The U.S. Geological Survey projects that a good portion of this undiscovered oil lies off the coast of Alaska, within the U.S. EEZ. Heather Conley, a senior fellow for the Center for Strategic and International Studies, believes significant mineral deposits such as nickel, iron ore, tin, uranium, copper, and rare earth minerals are already mapped or postulated to be located throughout the Arctic. She argues that even though the full extent of these resources is not fully known, each of the Arctic nations is expending great effort to assess, access, and extract these resources.[10] For example Alaska, by way of the Red Dog mine, produces 10 percent of the world's zinc output. This accounted for 55 percent of the mineral value produced in Alaska in 2008.[11] In addition, the Alaskan mining industry produces zinc, lead, gold, silver, and coal as well as construction minerals such as sand, gravel, and rock. Alaska's five operational mines (Fort Knox, Greens Creek, Red Dog, Usibelli, and Pogo) provided more than 1,500 full-time jobs of the nearly 3,500 mineral industry jobs in Alaska last year.[12]

The Bering Sea is world renowned for its enormously productive, profitable, and sustainable fisheries. The Alaska Marine Conservation Council estimates the net worth of these fisheries to be $2.5 billion annually.[13] Seven of the top 30 ports for fishery landings, by both weight and value, are located in Alaska. Dutch Harbor-Unalaska is the busiest fishing port in the country, harvesting 612.7 million pounds of fish in 2008 (the last year for which statistics are available). Furthermore, Naknek-King Salmon, another major Arctic fishing port, processed 105.2 million pounds of fish in 2008. The combined catch exported through both harbors was valued at over $260 million.[14]

Shorter Shipping Routes

Many journalists, economists, and academics have been looking at the utility of Arctic Sea routes (Northern Sea Route along Russia's coast and the North West Passage along the Canadian and U.S. coastlines) as a cost saving measure for transshipments. The Northern Sea Route along the Russian northern coast could reduce a maritime journey between East Asia and Western Europe from 21,000 kilometers (km) utilizing the Suez Canal to 12,800 km, cutting transit time by 10 to 15 days.[15] The summer of 2011 saw a record 33 ships carrying 850,000 tons of cargo navigating the Northern Sea Route off Russia's northern coast. This year's shipping season may see up to 1.5 million

tons of cargo. The development of Arctic offshore hydrocarbon resources and related economic activities will also improve the integration of the Arctic economy into global trade patterns.[16]

However, Stephen M. Carmel, senior vice president of Maersk Line, Limited, has questioned the viability of global Arctic transshipping. Carmel argues that Arctic shipping routes do not offer an attractive alternative to the more traditional routes and are highly unlikely to be advantageous in the future. He believes the variability in transit time due to shifting ice and unpredictable weather is unacceptable in a world of "just in time" supply. He further notes that variability eliminates network efficiencies. Arctic routes are useful for only a small part of the year and are more expensive due to poor economies of scale.[17] Therefore, Carmel would not expect to see a large increase in commercial transit shipping.

Regardless of whether trans-Arctic shipment is slow to develop for reasons outlined by Carmel, the traffic supporting the worldwide delivery of extracted resources *from* the Arctic is increasing dramatically.[18] Oil and gas developments in northern Russia have resulted in a higher demand for shipping to and from that area. A similar trend was seen in 2012 off the coast of Alaska as Shell had a small armada supporting its oil-drilling mission. The Coast Guard reported a steady increase in Bering Strait transit from 247 vessels in 2008 to 484 in 2012.[19]

Risk

Given the safety concerns cited, the authors developed a list of probable incidents/events from Coast Guard SAR historical documents the may require a U.S. safety response in the future. Although not all-encompassing, the 10 potential scenarios are listed most to least likely. The wide array demonstrates the fragility of the Arctic and the scenarios serve as driving factors as the United States considers future capacities and capabilities:

- Medical Evacuation/nonmaritime medical transports (currently 3 percent of all SAR cases)
- SAR operation small maritime vessel (fishing/recreational)
- small oil spill/discharge in the Chukchi or Beaufort seas
- downed aircraft (small passenger) SAR mission
- vessel runs aground, caught in ice, or sinks
- emergency barge resupply for North Slope community
- large oil spill from drilling operation
- large oil spill from tanker operating in Arctic
- mass rescue operation (MRO) downed jetliner
- MRO cruise ships/ferries.

Despite assuming a lower position on the list due to probability of occurrence, MROs would be nearly impossible to carry out given currently assessed response shortfalls. For example, if an MRO or large oil spill incident occurred on the North Slope of Alaska, the closest Federal SAR and oil spill response is 820 miles away in Kodiak. Current oil spill response capabilities include four Spilled Oil Recover Systems equipped on 225-foot buoy tenders home ported in Alaska at Kodiak, Sitka, Cordova, and Homer; an aerial dispersant delivery system staged in Anchorage as a backup to commercial venders; and Federal on-scene coordinators located in Juneau, Anchorage, and Valdez with incident management expertise and limited prepositioned oil response equipment.[20] Given these sparse and widely dispersed assets, the long-term environmental impacts of a spill in the Arctic Ocean could prove cataclysmic.

U.S. Safety Response

The primary Federal agency responsible for operational safety in the Arctic is the Department of Homeland Security (DHS) with the Coast Guard as its operational arm. When directed, U.S. Northern Command provides defense support to DHS in order to support the safeguarding of human life, the environment, critical infrastructure, and property. The District 17 (D17) commander, headquartered in Juneau, is the North Pacific SAR coordinator and has the task for maritime and aeronautical SAR responsibilities in the maritime region of Alaska, including the North Pacific Ocean and the U.S. slice of the Arctic. Because Alaska is vast and remote, D17 relies on other government and civilian agencies for SAR missions. For example, the National Guard, U.S. Air Force, Alaska State Troopers, dozens of small fire departments and volunteer rescue organizations such as SAR Dogs, Civil Air Patrol, and Sitka Search and Rescue are important augmentation resources that ensure timely SAR coverage. Furthermore, in the far north, D17 relies on local North Slope Borough Bell 412SP helicopters and fixed-wing aircraft for SAR requirements.[21]

The nearest Coast Guard air station to the Arctic is in Kodiak and requires a 4-hour fixed-wing or 10-hour rotary-wing flight to support the most northern Alaskan population of Barrow, a distance of 820 miles. By sea, Coast Guard cutters routinely patrol the Bering Sea, but it requires at least 3 days once embarked to reach the Arctic Ocean.[22] In 2012, the Coast Guard in its *Seventeenth Coast Guard District Area of Responsibility Analysis Fiscal Year 2012* identified the two primary challenges to successful Arctic SAR operations as distance (the time it takes to arrive on the scene to effectively respond to distress) and infrastructure (the lack of equipment, personnel, and locations to effectively respond to distress).[23]

Requirement for the North Slope

Strategically positioning SAR infrastructure in key locations in the U.S. Arctic would decrease response times by significantly reducing transit distances. There is an urgent need to respond quickly in the Arctic, as the prevention of injury and loss of life depends on timely SAR response, prompt evacuation, and the application of medical and other emergency services. Effective responses can only be accomplished by the design and implementation of appropriate SAR management policies and programs, supported by appropriate physical infrastructure and well-trained personnel.[24] The Coast Guard is postured for effective response with the

exception of not having an Arctic SAR stepoff location to launch SAR missions. During an interview in December 2012, Rear Admiral Thomas Ostebo commented that Barrow would be the ideal location for SAR: "Barrow is Alaska's most northern and largest town [on the North Slope] and is centrally located in the U.S. Arctic. It is also the center of power for corporate, tribal, and economics of the North Shore Borough making it the best location for investment of SAR infrastructure."[25]

Despite its advantages as a key location for SAR support assets, Barrow's central North Slope position creates significant logistical challenges due to a limited road network and port access. No roads link Barrow to the rest of Alaska, which prevents ground shipment of supplies, and the lack of a deep-water port requires extensive use of small landing craft and fuel barges to deliver supplies to the mainland. Given weather impacts, Barrow's primary line of communication is by aviation from either Anchorage or Fairbanks. Today, supplies and equipment required to execute SAR missions are flown into Wiley Post–Will Rogers Airport, the newest airport on the North Slope, serviced by Alaska Airlines. Lack of port facilities means that marine cargo bound for Barrow is transferred from barges offshore to landing craft. U.S. cutters can anchor 1,200 yards off Barrow in 30 feet of water to receive supplies and transfer personnel by small boat, but the anchorage is exposed to weather from all directions. Barrow is also a destination for small cruise ships carrying as many as 400 passengers, who must also be ferried on small boats.[26]

D17's 2012 Arctic Shield exercise demonstrated Coast Guard ability to execute a seasonal SAR capability from the airport in Barrow. D17 staged two HH60 helicopters along with aviation and communication detachments from June through September during Shell's drilling season. The operation was deemed a success because of the SAR proof of concept but also due to the robust and positive engagement plan and the partnership D17 fostered with the North Slope Borough communities. Nevertheless, there were logistical challenges with even this small footprint. For example, fuel for the HH60s had to be flown in using C-130s, but hanger and berthing facilities, while manageable, were subpar for the requirements.[27]

Another SAR location to consider is Prudhoe Bay. While half the size of Barrow with approximately 2,000 people, many of whom are transient workers supporting oil facilities, Prudhoe Bay has an interconnected road network and limited port infrastructure. However, it is disadvantaged by being 200 miles east of Barrow, closer to the Canadian border, and farther from potential SAR events along the western Alaskan Arctic. Prudhoe Bay is the unofficial northern terminus of the Pan-American Highway, which was used during Arctic Shield 2012 to transport the Navy Supervisor of Salvage (SUPSALV) tactical oil spill response equipment. Its limited port facilities allowed the SUPSALV equipment to be loaded onto a commercial barge and shipped to the exercise training site near Barrow. The limited port infrastructure can only support small ships and barges with 6 to 8 feet of draft. Resupply of a Coast Guard cutter would require a helicopter from the public Deadhorse Airport or barge out to approximately 12 nautical miles (nm) where the vessels could safely anchor, much further than the 1,200 yards at Barrow.

Neither location is ideal to satisfy requirements without major investment, but the United States must be able to operate in this area to support tourism, shipping, and oil exploration and drilling. Barrow offers a central location that is critical to reducing the time-distance factor. Any enhancement of Barrow's infrastructure will require coordination with the North Slope Borough. A seasonal SAR capability could be established—when the ice retreats in the summer—to cover oil exploration and drilling along with recreational and cruise vessels. It is possible the Coast Guard could lease facilities in Barrow to support aircraft maintenance, fuel storage, lodging, and command and control. However, even a small footprint places a significant burden on the local community, where resources are expensive and supply is limited. If it is not possible to lease facilities because of the strain it places on the community, the United States should invest in commercial off-the-shelf expeditionary-type structures/facilities similar to what the Department of Defense (DOD) used during Operations *Enduring Freedom* and *Iraqi Freedom*. Washington is not in a position to invest in major construction without further study, so temporary facilities make sense as a stopgap measure.

Another import consideration is refueling operations. Once on scene, maritime assets are limited both by fuel capacity and the distance to a refueling station. With the closest fueling point to Barrow nearly 1,000 nm away in Dutch Harbor in the Aleutian Chain, on-station times are dramatically reduced. Even under ideal water conditions, the Coast Guard does not have the surface capacity to support sustained presence in the Arctic.[28] Ostebo identified one possible solution. Shell obtained a refueling barge that supported 22 maritime vessels during its oil exploration in the Chukchi Sea, and he believes a similar contract to support cutters and other ships is possible for future missions. On-station refueling would allow for sustained maritime presence in the Arctic Sea before returning to Dutch Harbor for resupply is required. Regarding air platforms, once an adequate supply of aviation fuel is housed at Barrow, the Coast Guard can use the location to sustain air presence in the region.

Emerging Need for Additional Icebreakers

When issues begin to arise in the Arctic, the United States will need a maritime surface presence sufficient to support safety and response. Presence enables the Coast Guard to respond to vessels in distress, thus saving lives and protecting against potential pollution. Presence also ensures adequate enforcement of vessel routing regimes and compliance with safety, environmental laws, and treaties.[29] To maintain a presence in the Arctic, the United States needs an adequate number of icebreakers or ice-capable ships. Presently, there is only one operational surface ship capable of

operating in ice. That ship, the USCGC *Healy*, is considered a medium icebreaker capable of cutting through 4.5 feet of ice at 3 knots, and it has less than 20 years of service life remaining. The *Polar Star*, a heavy icebreaker commissioned in the 1970s, is capable of breaking through 6 feet of ice. It recently finished a major refit and is undergoing sea trials. The *Polar Star* was expected to return to service in early 2013 with 6 to 7 years of remaining service life.[30] The Coast Guard placed the *Polar Sea*, the sister ship of the *Polar Star*, in "commissioned but inactive" status October 14, 2011, because of a blown engine.[31] For comparison, Russia has up to 25 icebreakers, and several nuclear-powered icebreakers can cut through ice 6 to 9 feet thick. China is building an icebreaker for launch in 2014. This will be China's second—it purchased its first from Ukraine in 1993.[32]

Since September 2010, at least three reports have identified the Coast Guard's challenges in meeting its current and future icebreaking mission requirements in the Arctic, as well as the hurdles it faces in acquiring new icebreakers.[33] A January 2011 report from the DHS Office of the Inspector General noted that the Coast Guard and other U.S. agencies are unable to meet their current Arctic mission requirements with existing icebreaking resources. The report highlighted that Coast Guard resources are unlikely to meet future demands as well, in part because the agency has not followed its life-cycle replacement plan, which requires replacement of icebreaking ships after 30 years of service. The report concluded that without funding for new icebreakers or major service-life extensions of existing vessels, the United States would lose all of its polar icebreaking capabilities by 2029.[34]

Sent to Congress in October 2011, the *U.S. Polar Icebreaker Recapitalization Report* addressed recapitalization of U.S. polar icebreakers. The report addressed ways to meet mission requirements by assessing options for rehabilitating the icebreaker fleet including new icebreaker construction, refurbishment of *Polar Sea* or *Polar Star*, and leasing. The report found that the most cost-effective option would be to build two heavy icebreakers while performing minimal maintenance to keep the existing icebreakers operational. Given the timeframe associated with building new ships, the report concluded that the Coast Guard must begin planning and budgeting immediately.[35]

A third report, *The High Latitude Study*, included a broader analysis of the Coast Guard's icebreaker needs. Presented to Congress in July 2011, the report found that the common, dominant contributor to the significant mission effects in the Arctic is a gap in polar icebreaking capability, and that the existing icebreaker fleet is insufficient to meet the Coast Guard's statutory mission requirements in both the Arctic and the Antarctic. To fulfill these mission requirements, the study found that the Service needs a minimum of six icebreakers (three heavy and three medium). If the requirements for a U.S. Navy presence are taken into account, the Coast Guard would require three additional heavy icebreakers and one additional medium icebreaker, for a total of 10 icebreakers.[36]

The Coast Guard estimates it will take 8 to 10 years to design and build a new icebreaker. It is projected that it will cost $859 million to construct a new *Polar*-class heavy icebreaker and $1.2 billion to reconstruct the *Polar Sea* or *Polar Star* from scratch to the current standard for heavy icebreakers.[37] Other options include leasing icebreakers or jointly funding icebreakers through the National Science Foundation (NSF) or DOD. Currently, these options do not appear viable. DOD is working through its own budget constraints. Using the NSF is possible, but it might pull the icebreaker away from its primary missions to support scientific research. Lastly, there have been bad experiences with leased icebreakers that could not fulfill their mission requirements. Sweden called the *Oden* home, breaking its commitment by ending its resupply and science mission support of the U.S. Antarctic McMurdo Research Station and putting the entire 2011–2012 research season in jeopardy. The NSF was eventually able to commission a Russian vessel.[38]

The good news is that the Coast Guard budget includes $8 million in acquisition funding to initiate survey and design activities for a new polar icebreaker. The Coast Guard's Five Year Capital Investment Plan includes an additional $852 million in fiscal years (FY) 2014–2017 for acquiring the ship. The Coast Guard anticipates awarding a construction contract within the next 5 years and taking delivery within a decade, just as *Polar Sea* retires. The project to design and build a polar icebreaker is a new acquisition project initiated in the FY13 budget.[39] The next step is for Congress to act on the Coast Guard's budget to modernize its icebreaker fleet so it has the capability to perform its polar missions. Construction of this new icebreaker will still only give the Coast Guard two operational icebreakers after 2020, when the *Polar Star* meets the end of its service-life extension.

The *High Latitude Report* listed a requirement of up to six icebreakers to meet statutory requirements into the future. That number may be what is required in the far term, but near-term requirements suggest that the United States needs a minimum of three icebreakers to support the following missions:

- Antarctica Presence—scientific research and McMurdo resupply
- Arctic Presence—enforcement of vessel routing regimes, compliance with safety, security, and environmental laws/treaties, freedom of navigation, response to vessels in distress, SAR, protecting against potential pollution
- Arctic Research/Thule Air Force Base resupply/Flex—support to the NSF, resupply of Thule, and an option to flex to any location in case a crisis or emergency arises.

Deciding to keep the U.S. icebreaker fleet "status quo" in the near term would risk response capability for incidents in the Arctic and place the United States at a strategic disadvantage vis-à-vis other countries that are committed to increasing their role in the Arctic. Washington needs to start building two icebreakers to fill this need immediately because the *Polar Star* service life is extended to 2020 and the *Healy* to 2030.

The United States needs to take steps now to invest in Arctic safety capabilities to operate in a more accessible region as human activity in that region increases. The Coast Guard is currently not funded to handle statutory missions to support this increase in activity. To boost national Arctic capabilities to protect and promote U.S. interests, Congress must ensure that the Coast Guard is funded appropriately. Investing in a seasonal search-and-rescue location in Barrow, Alaska, and building two additional icebreakers would allow the Nation to have a near-term Arctic presence and protect its safety interests. Not investing in these Arctic safety capabilities in the near term would risk the ability of the United States to respond to incidents and possibly save lives or prevent environmental catastrophe. **JFQ**

Notes

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