



Statement to the
National Research Council Study Committee
For the

Assessment of U.S. Coast Guard Polar Icebreaker Roles
and Future Needs

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Duane Laible, Member of the U.S. Arctic Research Commission (USARC), is making the presentation to the Committee. Commission Chair, George B. Newton, sends his regrets that he is unable to make this presentation due to prior commitments.

I am one of the two members of the Commission who come from industry. I am currently a Senior Principal and Chairman of The Glosten Associates, Inc., a firm of consulting naval architects located in Seattle. For the past 35 years, I have been engaged in serving a wide range of clients, most from the Pacific Northwest, but also from other parts of the nation and the world. My interest in the Arctic stems from the interests of our clients who include the many tug and barge operators with whom we have worked to support the economy of Alaska, particularly the Bering Sea and North Slope activities. Our firm has been involved with re-supplying Arctic communities since the days of the DEW Line and the Bureau of Indian Affairs ships: North Star II and North Star III. We designed the barges that delivered the pipe for the Trans Alaska Pipeline and provided engineering support for every sea lift to Prudhoe Bay for over 25 years. A special area of personal practice has been research ships. My firm and I have served a significant number of operators of University National Oceanographic Laboratory Ships (UNOLS) for over 40 years. I have been supporting Alpha Helix since she first went to the University of Alaska in 1980, and was responsible for modifications to convert this vessel from dedicated biology focus to multi-purpose oceanography. In the early 90s, I led the Glosten team in preparing the ice capable Arctic Research Vessel design that NSF sponsored through the University of Alaska. The Alaska Region Research Vessel, also an ice capable design, was prepared by our firm for a research community steering committee led by the University of Alaska. As an aside, I should note there is some hope that this vessel will be built sometime soon. As a consequence of my many years of exposure to activities in the Arctic, and in particular the connection with research ships, the question you are addressing is of particular interest to me, both as a naval architect and as a member of the Commission.

I understand your challenge in undertaking this difficult question, especially given the short time you have to consider the matter. I served on a National Academies committee several years ago that also had to answer a complex question in a relatively short time. Your eminently qualified membership with its broad perspective will accomplish the task, and the Commission appreciates the opportunity to provide you with some elements to consider in your deliberations.

The Arctic Ocean is now a highly demanding place. It is also a remote and expensive area in which to operate. Yet, as we conservatively look to the future, it is a region of great opportunity.

Access to the Arctic Ocean is improving—some would say dramatically improving—and is projected to continue to improve as this century progresses. Since the ocean essentially provides great circle routes between the continents of the Northern Hemisphere, and because 9 out of 10 people in the world live on these continents, all

of which border on the Arctic Ocean, the north is where the action will be in the 21st century. As you can see, the importance of the Arctic Ocean in global strategic affairs is going to grow significantly. In the summer 2005 issue of *Surveyor*, the journal of the American Bureau of Shipping, it was noted that in 2004 Arctic nations (other than the U.S.) committed (ordered) over \$4.5 billion to the construction of ice class ships to meet the growing demand for maritime transport of Russian crude oil from northwest Siberia.

Why is the Arctic Research Commission addressing you? The United States is a polar country and we have been since 1867. Right now, we are the leading Arctic research nation. During the last decade, no other nation has committed the funds and research talent than we have to the broad range of challenging questions the Arctic poses. The Arctic is vitally important to our national interest, and its economic impact is increasingly significant.

USARC has, as its primary objective, to advocate Arctic research policies and priorities for the country to the President and Congress. Icebreakers play a vital role in the nation's strategic presence in the polar regions. In a recent letter to President Bush regarding the national importance of icebreakers, we made some points that we would like to share with you today, along with some additional comments that we hope will assist you in your deliberations.

Following are some of the key elements of USARC positions that we want to articulate:

1. Icebreakers are national assets and are an important element of broad national interest. We recommend that the Committee carefully consider the national needs for icebreakers first, and then consider the U.S. Coast Guard's role in meeting those national needs.

2. These national needs include:

- Research
- National security
- Homeland security (i.e., Alaska's Arctic Ocean coastline is 1,000 miles long)
- Resource exploitation of the ocean
 - Fishing activity and regulation enforcement
 - Offshore development of fossil fuels
- Maritime activity
 - Search and rescue
 - Environmental protection (e.g., oil spill response)
 - Transportation (i.e., ship R&D, escort, vessel assistance)
- US responsibilities under UNCLOS
 - Article 76 (extending our claim to ocean-bottom resources beyond our 200 nautical mile EEZ)
 - Freedom of navigation
 - Marine scientific research (enforcing our authority in U.S. waters)

You may hear strong views expressed that the icebreaker fleet could be provided entirely by private enterprise, but the interplay of critical national interests and the breadth and complexity those interests embrace, in our opinion, speak to a federal fleet of ships.

The opportunities afforded our nation when we do accede to UNCLOS can be fully realized only if we have a viable polar icebreaker capability as the list of national needs above attests. The surveys and other activity needed to defend our claims cannot be done without proper icebreakers.

3. These are some of the USARC concerns for the Arctic Ocean from a research perspective.

- Arctic Climate Impact Assessment says that the Arctic is changing, and it is changing FAST.
- It is clear there will be greater marine access due to climate change.
- The Arctic Ocean will play a greater role in the nation's existence in the years ahead.
- The Arctic Ocean is currently the least understood ocean in the world and we need to study it to define its future importance. For example, researchers are not in agreement as to how the Arctic Ocean was formed. More directly, the world knows more about the topography of Venus and Mars than it does of the bathymetry of the Arctic Ocean.
- Icebreaking ships as research platforms are integral to Arctic research and serve to protect national interests in remote areas. Polar icebreakers are necessary to enable maintenance of a broadly capable research fleet comprising polar class icebreakers and lower capability vessels. Lower ice class ships cannot operate effectively without support of fully capable icebreakers in the Arctic Ocean.
- There are at present very sophisticated research endeavors underway in the open ocean. Every one of these activities must be done in the Arctic Ocean in order to fully understand it. These activities include bottom-founded sensing systems, drilling and coring, mapping, biogeochemistry, marine geology, paleo-oceanography, and hydrography-- plus cryogenics and other fields unique to the area.
- Future icebreakers must be capable of supporting broad, interdisciplinary research.
- To conduct research in the Arctic, with its challenges of access and mobility, we need large capable ships that can get there, remain there safely, and are capable of supporting diverse research activity. At the same time, they must be effective for the mission. There are no small polar icebreakers. By definition they are all large, complex, powerful machines.
- The unique demands of the Arctic require a suite of ships of different ice transit capabilities. However, a key factor is that we must have fully capable polar class ships or the less capable ships will be unable to operate safely and effectively.

The ARRV should be a member of the U.S. suite of ice capable ships. It can operate alone in the Bering Sea, but will have utility in the Arctic Ocean in the company of an appropriate polar icebreaker. This will extend its safe operating research season. Furthermore, somewhat more capable ships should exist to bridge the gap in capability between an ARRV and the USCG research icebreaker, USCGC Healy (WAGB-20). Our entreaty is: DO NOT eliminate the most capable polar class icebreakers from the U.S. Fleet.

4. The polar icebreaker fleet has multiple missions, but one of the most important is research. To achieve the greatest value for research in the Arctic Ocean, a higher operating tempo (optempo) is desirable. This is, of course, true for all icebreaker missions. The Committee should examine ways of increasing optempo such as:

- Multiple crews
- Higher sustainability
- Advanced basing

5. There has been considerable discussion about reconstitution of our Nation's polar icebreaker fleet either through new design or refurbishment. The Commission would like to offer some considerations:

One of the major issues the Committee will address is whether the USCG ships, WAGB(10) Polar Star and WAGB(11) Polar Sea, should be fully refurbished and modernized to meet current and future national needs. An alternative to refurbishment is complete replacement with a new design-and-build program.

In the refurbishment of the Polar Sea and Polar Star, one must consider:

- Asbestos removal—The ships (may still) contain significant amounts of asbestos-containing materials that complicate and make modernization much more expensive.
- Propulsion system change—The propulsion system is antiquated and must be completely replaced to provide reliable, cost-effective service for the next 30 years.
- Habitability standards—These standards have changed since Polar Star and Polar Sea were designed and constructed. All accommodation spaces would have to be rearranged and replaced.
- Scientific outfit and science party size—The current vessels are inadequate for contemporary, advanced research capability and personnel capacity. These aspects must be improved significantly.

Alternatively, when one considers new construction (i.e., if one starts with a clean sheet of paper), there have been significant advances in ship design and construction techniques, ship technology and outfitting. Modular construction is now the standard shipbuilding industry approach, and the use of this method has made construction of large complex vessels much more cost-effective. In our experience, it is generally not economical to refurbish complex, large ships such as icebreakers.

The only component that will not change significantly is a portion of the hull, i.e., steelwork, which is usually the least expensive component. Ultimately, the outfitting of an older "fixed-up" vessel with all the new, expensive equipment has to be carried out in an inefficient, piecemeal manner. One ends up with a compromise in what should have been a state-of-the-art design at a cost nearly equal to new construction.

New ships may be the best answer—new technology, new icebreaking techniques, and advanced hull forms have evolved over the nearly 40 years since the Polar Star class ships were designed, with several significant improvements post-dating the Healy design.

6. There is currently no single responsible icebreaker user agency for the many parties who participate, pay for and need the capability of polar icebreakers. There is a challenge to provide multi-agency support to enable a comprehensive Arctic research program while still meeting all the developing national interests the Arctic demands.

7. With the advent of more access to the Arctic, and the implication that more commercial activity will develop, there may be a greater need for search and rescue than exists today. To whom does a commercial operator look for help if a ship gets in trouble? Can the USCG respond? Search and rescue will become more important in the Arctic of the future. It is a point of concern that the USCG recapitalization plan, DEEP WATER, does not mention the polar icebreakers.

If the Arctic experiences developing commercial activity, we must address and research the possibilities and capabilities needed to support that activity. For example, substantial Arctic marine transport and resource exploitation could occur and must be supported by a suitable infrastructure. That infrastructure will only be put in place in the field with the assistance of polar icebreakers.

We understand that this whole issue is complex. The Committee must consider Antarctic support requirements also, which may feed into your decision making. However, the USARC's position is that Arctic research and its connected needs must be addressed head-on.

The United States must maintain its global maritime capability. If the US decides not to exercise its visible maritime presence in the Arctic Ocean, we cede the ocean to whomever wants it.

Notwithstanding the fact that this question of Arctic presence must also include submarines, and that the issues are large, complex and difficult to quantify, USARC firmly believes that new, large, powerful, federally-operated icebreakers--with state-of-the-art research capability--are an absolute necessity in the Arctic of tomorrow.

The Arctic Research Commission thanks you for the opportunity to express our views.