

**Report to the UNOLS Arctic Icebreaker Coordinating Committee
From the Antarctic Research Vessel Oversight Committee**

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All is well with the Lawrence M. Gould, which is busy doing what it always does.

The same cannot be said with regard to other US icebreaker assets used in the Antarctic. The Polar Sea is laid up for an unknown number of seasons, the Polar Star may not be significantly healthier than was Polar Sea prior to the equipment failures, and the Nathaniel B. Palmer has recently been restricted to ca. 30-day legs between refueling.

Regarding RVIB Nathaniel B. Palmer, due to changing mission requirements the ship has grown heavier over twelve years of service, plus review showed that the center of gravity has moved upward. There has also been some loss of buoyancy resulting from changes in the hull associated with mission-related installations. Although these changes have not compromised the ship's Intact Stability, it was recently determined that they limit the ship's fuel burn off (require keeping 40-50% fuel load on board) in order to meet Damage Stability criteria. As a result, scientists must return for refueling if they have a cruise longer than 30 days, shorten their cruise, or potentially not do a cruise. Also, note that McMurdo as a fuel stop is precluded until the breakout in January by the Polar Star.

The operator, Edison-Chouest Offshore (ECO), intends to identify the new conditions for the ship, and to in early 2005 return the ship to the condition where the contract endurance can be met, regardless of the added weight. ECO will also examine what must be done to allow the ship to safely carry additional mission loads of about 200 tons associated with a planned drilling program to begin later this season. For example, one possible approach would be to add a dense liquid ballast material to the lower tanks and also split one tank into two, which should put the Palmer in good shape regarding damaged stability requirements. But this will take three weeks to do and the Palmer has a full schedule. It should be possible to support the funded science by shortening some work and extending other work into next season.

At the time of the ARVOC report to the AICC in March 2004, ARVOC business had been focused upon discussions and presentations regarding scientific planning for a next-generation polar research vessel (PRV), designed to meet logistical needs to support science initiatives identified in two scientific community workshops. But at that time additional ARVOC discussions of the PRV were at least temporarily tabled for possible high level review, for example by the OPP Office Advisory Committee (OAC) and/or by the National Academy/Polar Research Board. Further development of scientific planning for a PRV remains tabled.

Regarding future icebreaker support, including in the Antarctic, as the AICC is aware, during 2004 Booz Allen, a consulting firm, began a survey of future mission requirements for the Coast Guard icebreaker program. This report is expected December 2004. But in a recent development, Congress has ordered an independent icebreaker study from the National Academy of Sciences to begin in 2005. Initially the need for the study was triggered (some time ago) by

growing requirements for icebreaker support (specifically at McMurdo) plus the deterioration of the Coast Guard Polar-class icebreakers. The language of the study ordered by Congress is focused on the needs for *Coast Guard* icebreaker support. The Congressional language - different from that which might be expected by the scientific community - is under review and may be revised. Congress included examination of changes in icebreaker missions due to environmental change, such as including Northwest Passage sea route support. Also Congress included review of existing laws governing Coast Guard polar icebreaker operation, and to present recommended law changes based on potential new missions and operating regions. The study is to be joint between Academy's Marine Board (ship engineering and design) and the Polar Research Board. An interim report may be due September 2005, and may address demands, missions, stakeholder needs, and time-dependent issues. (The Academy cannot begin the study until they actually receive funds.) The final comprehensive report may be due June 2006. A very wide range of expertise will be required for the group doing this.

One study issue many scientists hope to be resolved has to do with its breadth, specifically regarding (1) looking beyond the Coast Guard and (2) a special focus on science. For example, the Coast Guard may see science support as one equal mission among many, whereas the science community and perhaps funding agencies may see science support as a highlight mission. This is among the issues now being discussed. Perhaps slightly broadened/revised terms would permit other parties (e.g., NSF, NOAA) to co-sponsor this study.

A very important issue to NSF - perhaps less directly so to ARVOC though certainly of interest - regards icebreaker support for McMurdo. For the current season, NSF scrambled to determine what support was available to back up the USCGC Polar Star. NSF talked with wide range of operators, but as yet has not secured a suitable icebreaker outside the US. Hence it may be that this year the Coast Guard will carry out the break-out mission with the Polar Star alone, with the Palmer operating in the Ross Sea and thus available (for moral/evacuation support?).

A longer term solution may not be in place for 5-7 years at least. Thus the present situation will continue and must be addressed. There are now 90 miles of ice in the channel. A one-time miss on breaking through the channel could permit an increase in multi-year ice in the channel, complicating future break-outs. And a one-time miss on refueling McMurdo could potentially shut down much US Antarctic science for as much as 4-5 years (i.e. nearly all continent research not staged out of Palmer Station). Thus the situation is critical. Currently the annual McMurdo offload is 9,000,000 lbs of ship cargo and 55,000,000 lbs of fuel. The ships which provide these must get within at least 7 miles of McMurdo (there are 7 miles of hoses to connect to tankers).

The options to carry out the McMurdo resupply are sea-only, sea plus ground traverse, air-only, and sea-plus-ground plus air (say, bring fuel in by ship and everything else via air). [Plus one imagines there is the option of moving McMurdo.] The sea-only approach requires 1 or 2 icebreakers, 1 tanker, plus 1 freighter - or 1 icebreaking resupply vessel that makes more than one trip. Or one could use numerous tractor-trailers to move items to McMurdo. (Regarding the tractors, one country has given this up due to several potentially fatal accidents.) There is an additional option of bringing ships in the open ocean to the ice shelf east of McMurdo, followed by a long tractor traverse. As far as the air options go, the largest aircraft in regular Antarctic use, the C-17, carries 100,000 lbs per flight. That comes to 7 flights per day for the entire

season, plus there is ice runway damage, and the collateral fact that an aircraft engine produces about 100x the pollution of a diesel engine per gallon of fuel burned.

Regarding the various options, NSF has made a preliminary examination of the costs to the US over twenty years, but there are many other considerations. NSF is also beginning what other steps it can to address the situation, such as looking into increasing McMurdo fuel capacity. NSF may try to lease other icebreakers on the world market, but this is uncertain. For example, Canada and Finland have not yet entered into longer-term agreements which would commit a national asset to US support outside their waters during a hypothetical time (aftermath of an exceptionally heavy winter) that they needed it to protect their national shipping interests. Additional study is being given to narrow down the most likely options. The strategies in the end depend partly on who is tasked to do this mission.

In summary, the Nathaniel B. Palmer situation appears to be well on the way to solution, though with some unknowns to this writer. The Coast Guard Antarctic icebreaker situation is, however, bleak, and present US options for maintaining sea access to McMurdo are few and expensive. As is the case with any issue of this nature, a solution awaits the application of some combination of will and funding.