

# Antarctic Research Vessel Oversight Committee (ARVOC)

## October 18 & 19, 2005

Polar icebreaker status, needs and requirements -

- (1) AICC report, presentation of the OPP Advisory Committee's USAP re-supply report, and informal discussion of the ongoing work of the National Research Council Icebreaker panel
- (2) Polar Research Vessel status, review and discussion

SHALDRIL Report

RPSC Report - budgeting environment, last year's major procurements, FY 06 proposed projects

ASRV Re-bid Project

RPSC Report - Action Items, IT report, Lab Report

# Advancing U.S. Polar Research through the acquisition of a New Polar Research Icebreaker

[Science and Technology Corporation, polar technology group (STC) & MARAD]

A report by  
ARVOC:  
Antarctic  
Research  
Vessel  
Oversight  
Committee



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# *ARVOC report – A New Generation Polar Research Icebreaker*

ARVOC is advisory to the U.S. Antarctic Program (USAP)

ARVOC has engaged in planning the future vessel needs for USAP since 2002:

- Thematic workshops to define the science 20 years out
- Established a special committee of experts to work with MARAD and STC on a feasibility level design study, e.g. converting science needs into design
- Commissioned specialty science groups to comment on specific requirements
- Conducted “Town Hall Meetings”
- Solicited and recorded a substantial body of science user input

ARVOC presents a report establishing the science needs and operational requirements for a new Polar Research Icebreaker. We recommend a vessel with increased icebreaking capability, endurance, and with special design features to allow for new instrument and technology deployment.

The U.S. scientific polar vessel user community is now large and well-versed in ship design and icebreaker technology. ARVOC recommends strong scientific involvement in all future steps in the design and procurement process.

The most important factor driving the need for a larger, heavier vessel is the increase in icebreaking capability. A major limitation for current U.S. research in Antarctica is the inability of the *NBP* to access large areas of high scientific importance. A new vessel should be capable of working farther into the ice and be reliable to support year-round science operations in most of the Southern Ocean.

Areas in red are likely to consist of 2nd year or older ice.

The *NBP* has had little success penetrating even short distances into areas of multiyear ice.

The red region represents the minimum area within which the *NBP* cannot operate. Additional areas that are problematic include the blue region during winter and spring, particularly in areas of sea ice convergence, even if only first year sea ice is present.

Hatched areas show where *NBP* operations have been problematic during multiple cruises.

QuickTime™ and a  
TIFF (Uncompressed) decompressor  
are needed to see this picture.

# PRV Science Features



- Bottom mapping during icebreaking
- Geotechnical drilling capability
- Moon pool (completely enclosed)
  - AUV/ROV
  - Diving
  - CTD rosette
  - Ocean-Bottom Seismograph (OBS)
- Advanced A-frames, winches, cranes
- Enhanced towing in ice
- Accommodation for 50 scientists
- Helicopter complex (deck, hangar, elevator)
- Clear view aft from starboard pilot house control station
- Inter-deck science/cargo elevator
- Box keel with size suitable for growth in sensors

# Vessel Design



Polar Technology Office

D. Karnes

## Principal Characteristics

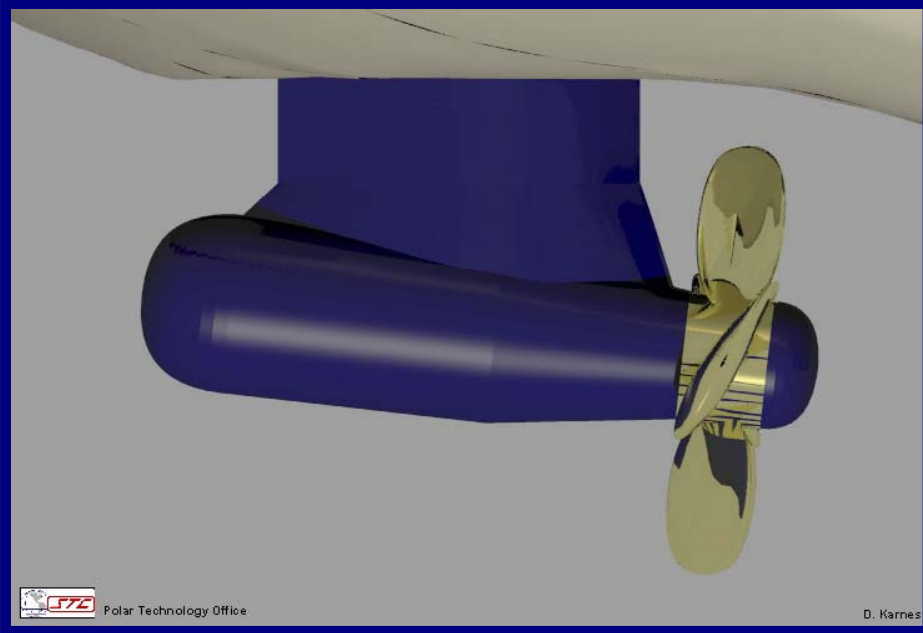
<b>LOA</b>	<b>378.4 ft</b>	<b>Draft</b>	<b>29.6</b>
<b>LWL</b>	<b>340.9 ft</b>	<b>Displacement</b>	<b>11,000</b>
<b>Beam</b>	<b>74.5 ft</b>	<b>Shaft horsepower</b>	<b>22,400</b>

# Summary - Operational Capability

- Level Icebreaking @ 3 kts -- 4.5 ft
- Endurance at 12 kts -- 80 days/20,000 miles
- Crew -- 22
- Total Complement -- 80
- Independent operation in multiyear ice including central Arctic basin in the summer
- Podded propulsion provides added maneuverability without rudders
- Diesel exhaust emissions reduced by 90 percent compared to existing research vessels



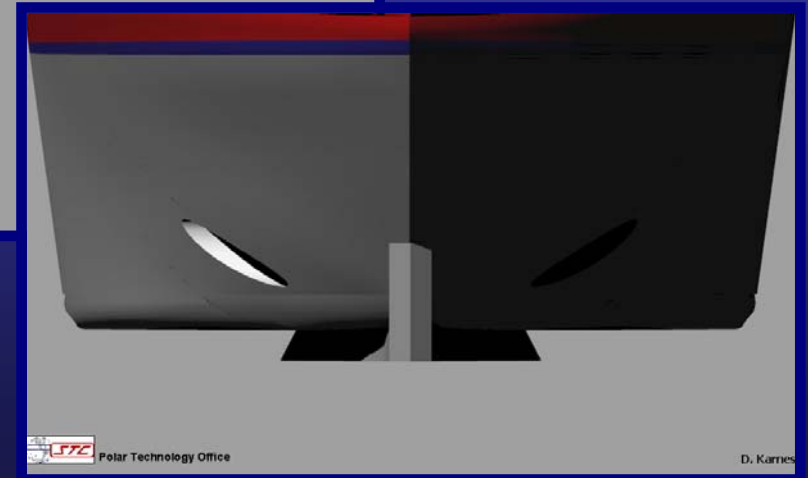
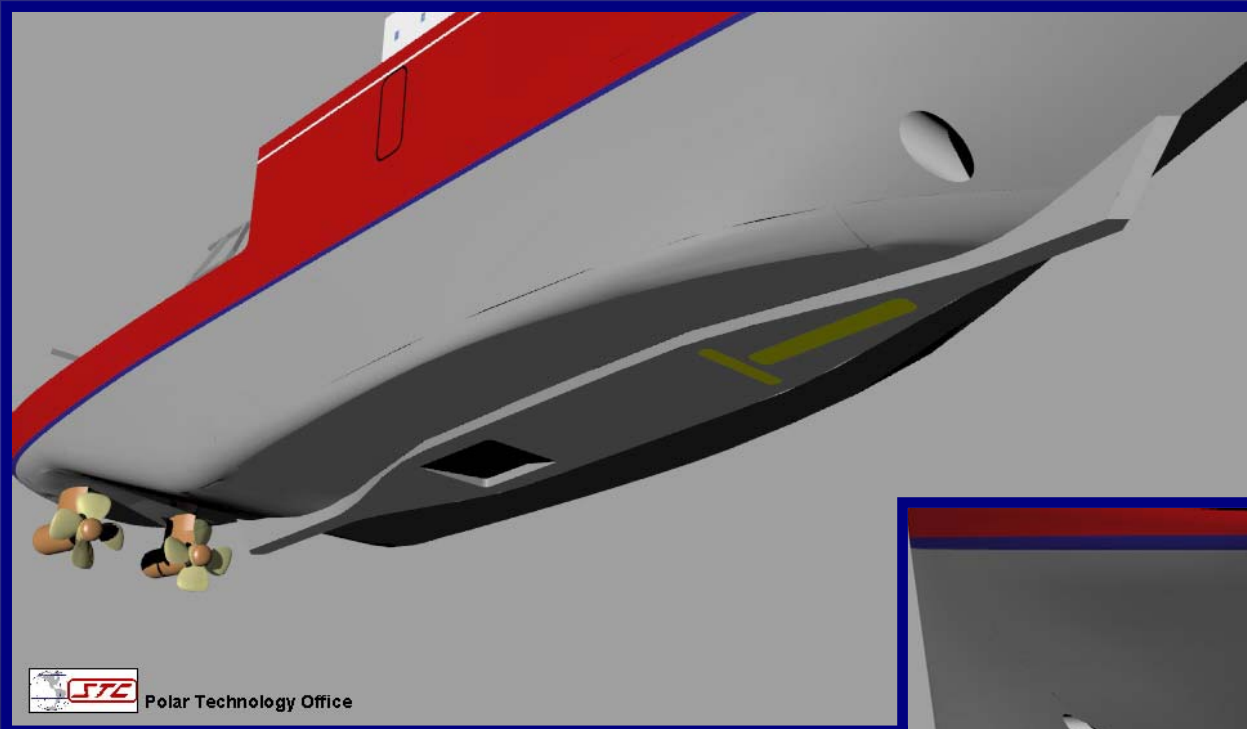
# Podded Propulsion System



- Podded propulsors pull rather than push - electric plant provides flexibility
- Diesel-generators can be “floated” on isolation mounts for low noise/vibration
- Twin azimuthal propulsors give greater maneuverability in ice and open water station keeping and can also be use to keep stern area clear of floating ice while underway.



# Box Keel



# Enhanced Capability and Features of New Generation Polar Research Icebreaker

- 62% increase in displacement
- 79% increase in shaft power
- 50% increase in icebreaking capability
- 128% increase in space available for laboratories
- 32% increase in accommodations for scientists
- 33% increase in endurance
- 69% increase in construction cost
- 50% increase in design service life of vessel

