

# UNOLS NEWS

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 Vol. 4, No. 3  
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December 1987  
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## HIGHLIGHTS

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Ship Inspections	UNOLS Elections
Selection of Operator for AGOR-23	New SWATH Design Problems
Ship Scheduling	Ship Lay-ups
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New Ships in NSF's Long Range Plan	Global Initiatives & Ship Demand
Ocean Science Division Budget, 1988	MELVILLE, KNORR Refit

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## SHIP INSPECTIONS

Survey inspections of all but one of the 25 UNOLS vessels will have been completed by the end of 1987. In the case of the seven Navy-owned ships, inspections are by the U.S. Navy Bureau of Inspection and Survey (INSURV). The remaining NSF-owned or cognizant ships are inspected by the Maritime Administration through a contract with the American Bureau of Shipping and Technical Services (ABSTECH). The two inspection programs share the same goals: material condition, safety, and readiness for mission.

The most common deficiencies noted to date are watertight integrity (e.g. holes in bulkheads, missing doors, and missing bulkheads) and emergency pumps (sewage and oil pollution). While winches are being upgraded, winch installation is sometimes sloppy particularly with regard to winch and sheave alignments and motors. This endangers instruments and wires.

During 1987, one NSF vessel has been found in non-compliance with UNOLS safety standards, and one Navy vessel has been found in non-compliance with INSURV standards. These defects are expected to be speedily corrected.

Currently, and in the future, emphasis is and will be given to training, including emergency drills and safety training programs for ships personnel.



## UNOLS ELECTIONS

Elections for positions on UNOLS and the UNOLS Advisory Council were held 23 October at the UNOLS meeting in Washington, D.C. Results were as follows:

UNOLS Vice Chairman	- Jay Langfelder, Harbor Branch Oceanographic Institution
UNOLS Advisory Council	
Member Representatives	- Tom Johnson, Duke/UNC Oceanographic Consortium
	Art Maxwell, University of Texas
Associate Representatives	- Tom Malone, University of Maryland
	Jim Kennett, University of California, Santa Barbara

We congratulate you on your election, and, on behalf of UNOLS, welcome your participation in UNOLS activities. The tentative schedule for UNOLS meetings during 1988 is as follows:

Advisory Council	3, 4 March at Harbor Branch Oceanographic Institution
Advisory Council	14, 15 July at WHOI
Advisory Council	26 October in Washington, D.C.
Ship Scheduling	27 October "
UNOLS Annual Meet	28 October "

## NAVY SELECTS OPERATOR FOR THE NEW AGOR-23

Four UNOLS institutions or consortia responded to the Navy's RFP to operate the new vessel. The Navy selected a consortium of the University of Washington, Oregon State University and the University of Alaska with the University of Washington as operator. The current schedule calls for construction to begin in October, 1988 with a delivery date of October, 1990. This will not increase the current size of the fleet since, as part of the agreement, the University of Washington will retire the RV THOMAS G. THOMPSON in exchange for the new vessel. As is government policy, title to the new ship will be retained by the government, and use of the ship will be restricted to federally supported research programs and non-federal programs of interest to the Navy with approval by ONR. The initial agreement will be for five years with an opportunity for extension by the mutual consent of the Navy and the University.

## NEW SWATH UNDER FIRE

As the Navy began to determine the characteristics of the new SWATH research ship, which is tentatively intended to become a part of the research fleet in the early 1990's, the Tentative Operational Requirements (TOR) were provided to UNOLS for review. Initial reviews expressed concern over the large size of the vessel and reductions in science capability relative to the science requirements provided earlier by UNOLS. As reservations continued to increase, the Fleet Improvement Committee established a subcommittee to work with ONR and NavSea on these problems. The subcommittee recently issued a report documenting design problems and operational costs. The report asserts that the current design is not compatible with the science mission requirements and that the ship will be too large and too expensive to operate. The primary concern of UNOLS lies with the underwater hull of the baseline design which extends 30 feet astern and 8 feet outboard of the working deck. This severely limits the capability to launch and recover moorings, nets, ROV's, and precludes multi-point towing for multichannel seismic arrays.

## SHIP SCHEDULING

Annex I to the UNOLS Charter, "A Procedure for Coordinating Ship Schedules," has been modified to meet the increasing need for cost-effective coordinated scheduling of ships. Major changes involve an increase in the sharing of information among member institutions and the formal creation of the East and West Coast Scheduling Groups. Procedures for the development of schedules will include:

- collection of ship-time requests at operating institutions and the UNOLS office;
- exchange of ship-time requests and summaries among all UNOLS institutions and the UNOLS Office;
- development of tentative ship schedules by operating institutions and dissemination among all institutions and the UNOLS office;
- meetings to consolidate knowledge of science project funding status, to compile institution estimates of operating costs, to coordinate schedules, and to make recommendations concerning fleet management.

The timing of meetings is dictated by the flow of ship-time requests, by the timetable of funding decisions, and by the submission date for ship operations proposals (1 October). Tentative schedules should be compiled by March-April for the following year. A mid-summer meeting should be scheduled after most ship-time requests are in, many funding decisions have been made, and tentative schedules are becoming credible. A fall meeting is necessary to finalize operating schedules, to assure that the needs of sponsored science projects are met, and to accommodate operating costs to the total funding available.

## SHIP LAY-UPS

The RVOC has developed a position paper on ship lay-ups. The essence of this is a recommended procedure for lay-ups (which in recent years involved an equivalent of 1-2 ships) based on individual ship needs for maintenance and major overhauls (about three over the life of a research vessel). The proposed procedure is as follows:

- Year-15 months: Institutions are encouraged to establish a prioritized upgrade plan that includes at least preliminary engineering;
- Year-12 months: ABSTECH or INSURV reviews these plans and advises UNOLS on their viability;
- Year-08 months: Funding agencies advise the community as to the number of ship-days that will be funded;
- Year-06 months: Funding agencies commit funds for maintenance or upgrade; ships with light schedules in July become designated candidates for lay-ups based on the criterion that total funded days scheduled plus 1/3 of unfunded days scheduled shall equal or exceed 80% of the optimum operating days (where the optimum is 270 days, 250 days, and 220 days for Class II, Class III, and Class IV, respectively);
- Year-06 months: Operators are given an opportunity to volunteer for a lay-up; operators in the lay-up category meet to determine which vessel(s) will be layed-up;
- Year-05 months: Chairpersons of the East and West Coast scheduling groups resolve conflicts and finalize lay-up decision;
- Year-04 months: Lay-up operator circulates resumes/vitae of all marine personnel who cannot be supported under anticipated funding; active operators make every reasonable effort to place laid off personnel.

## HISTORY OF THE FLEET

Between 1970 and 1985, the fleet has shifted from one dominated by converted hulls to one dominated by ships built for oceanography. Tex Treadwell, Donn Gorsline, and Dick West have recently completed a draft of the history of the academic research fleet in the U.S. which focuses on the pros and cons of converted hulls vs new ships and provides interesting insights concerning their success in meeting science mission

requirements over the decades. After reviewing the history of research vessels from the 1800's to the present, the authors conclude with the following paragraph:

"The present fleet includes a large percentage of ships built for research....Given the present budgetary restrictions, this characteristic may be changing. At present only one new ship is actually authorized for construction by the U.S. Navy for research in the academic fleet (AGOR-23). Since 1985, three ships are from conversion or private or state funds: PELICAN, SEWARD JOHNSON, and OSPREY. Thus the trend ... (toward ships built as oceanographic vessels)...may now be reversed. Note that the apparent trend is to larger vessels with greater capacity for science party and greater range. This appears to be continuing and the suggested stretch of the CAPE class ships is an interesting indicator of this trend."

We emphasize here that this is from an early draft of the report which promises to provide a useful perspective to the current effort to improve the capabilities of the fleet.

#### ANNOUNCEMENTS

The Alvin Review Committee will hold open workshops to generate planning information on Alvin-Atlantic II deep submersible science proposed for 1990 and beyond at the AGU/ASLO meeting in New Orleans, January 17, 08:30 - 17:00 HR. Anyone with an interest in the ALVIN program is welcome. The ARC invites presentations by investigators who have submitted proposals or letters of intent for the use of ALVIN during 1990 and beyond.

#### NEW SHIPS IN NSF'S LONG RANGE PLAN

A Unified Plan for Ocean Sciences, a long range plan for the Division of Ocean Sciences of the National Science Foundation, includes a program of new ship acquisition for academic research. In a letter to the UNOLS Fleet Improvement Committee (FIC), Don Heinrichs, Head of NSF's Oceanographic Centers and Facilities Section, recognized "the need for a modern, efficient and effective academic research fleet...as an essential element for productive field programs in the ocean sciences. The NSF plan calls for a unified approach with the Navy for up-grading and modernization of existing research ships plus acquisition of new, more capable (replacement) research ships."

"We are currently in the process of trying to convert the NSF plan to acquire two large ships plus a smaller ice-strengthened ship in the period 1990-1994 from planning to budget reality."

As part of their review, NSF will examine three possible means of acquiring, operating and managing new ships: new construction by NSF, lease of new ship(s) built by private industry and lease-purchase of new ships built by private industry.

NSF has asked the FIC to assess the relative merits of planning, managing and operating under these three options.

#### **HOW WILL NEW GLOBAL INITIATIVES AFFECT SHIP DEMAND ON THE UNOLS FLEET?**

One of the main objectives of the UNOLS Fleet Improvement Committee has been to assess and project the needs for a UNOLS Fleet through the 1990's and into the twenty-first century: What number and mix of ships will be needed, with what science mission requirements, to support academic ocean research in the U.S.?

A subcommittee under Jim Murray, University of Washington, has examined projections of ship needs on the basis of Federal agency budget projections, on the basis of recent trends in research vessel use and, perhaps most interestingly, by examining the ship needs of science initiatives within the new Global Ocean Science Program. Their report will be issued early in 1988 by FIC and UNOLS as a white paper.

Although progress in planning for individual initiatives within the global ocean science program varies greatly, even early plans provide much good information on ship requirements. By assembling estimated ship requirements for the entire program and then estimating the UNOLS fleet share, the subcommittee has formed a credible appraisal of required UNOLS fleet size for the next decade and beyond. Some critical aspects:

- large global-scale initiatives such as WOCE have requirements for some ships with greater endurance and greater support capability than anything in the current fleet,
- initiatives such as WOCE, TOGA, GOFs, RIDGE and Continental Margins will often require extraordinary facilities such as extensive laboratory space, specialized laboratory vans, extensive deck space, sophisticated winches and cranes, and large scientific parties (30-40),
- when coupled with core science programs, global ocean programs create a future requirement for up to 25 UNOLS ships of Class IV or larger (an increase of 25% over the present 20 ship fleet) and the ship requirement peaks between 1990 and 1995, although the falloff in the late 1990's may just reflect limits to which planning has been extended.

The subcommittee's report will be widely distributed. Get a copy and read it. You'll find it interesting.

NATIONAL SCIENCE FOUNDATION, OCEAN SCIENCES DIVISION BUDGET FOR 1988

The Ocean Sciences Division, National Science Foundation, has released their budget for 1988. The estimates reflect appropriations resulting from budget deficit reduction actions within the Congress and between Congress and the Administration.

NSF BUDGET ESTIMATES

January 1988

	1985	1986	1987	1988
OCEAN SCIENCES DIVISION	\$ 120.7 m	119.5	133.7	135.3

Oceanographic Facilities Detail

Operations

Ship Operations	23.8	24.0	26.0 <sup>1</sup>	24.7 <sup>2</sup>
ALVIN, Aircraft, Misc.	2.9	1.6	1.8	1.8
Marine Technicians	<u>2.4</u>	<u>2.5</u>	<u>3.1</u>	<u>3.1</u>
	\$ 29.1 M	28.1	30.9	29.6

Acquisitions and Development

Science Instruments	1.8	1.6	1.8	1.6
Shipboard Equipment	1.7	1.4	1.7	1.5
Technology Development	1.6	1.7	2.4	2.6
AMS Center	-	-	-	-
UNOLS, Ship Const., Misc.	<u>0.7</u>	<u>0.9</u>	<u>0.4</u>	<u>0.8</u>
	5.8 M	5.6	6.3	6.5

<b>TOTAL</b>	<b>\$ 34.9</b>	<b>33.7</b>	<b>37.2</b>	<b>36.1</b>
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<sup>1</sup> In 1987, an additional \$1.5 million was provided by the Ocean Drilling Program.

<sup>2</sup> In 1988, an additional \$1.2 million is estimated from the Ocean Drilling Program.

Funds available for oceanographic facilities have been reduced from those estimated during UNOLS meeting in October, 1987. Estimates made in October were based on the House Appropriations Committee mark-up, and would have provided about \$28.4 million for ship operations (including

\$1.8 million from the Ocean Drilling Program). Current estimates for ship operations have been reduced to \$25.9 million, reflecting an overall reduction in Ocean Sciences from \$149.5 million to \$135.3 million (9.7%).

#### REPORT ON R/Vs MELVILLE AND KNORR PROPULSION REFIT

AGOR 14 and 15, the MELVILLE and KNORR, are being refit with new propulsion systems and stretched to provide more lab space, working area, speed and endurance. Preliminary designs, completed in September, 1987 and construction design now underway give promise of magnificent vessels. When the first ship completes refit (about August, 1989), it will be the only research vessel in the UNOLS fleet able to tackle many of the demanding, basin-scale projects in the new global ocean science programs.

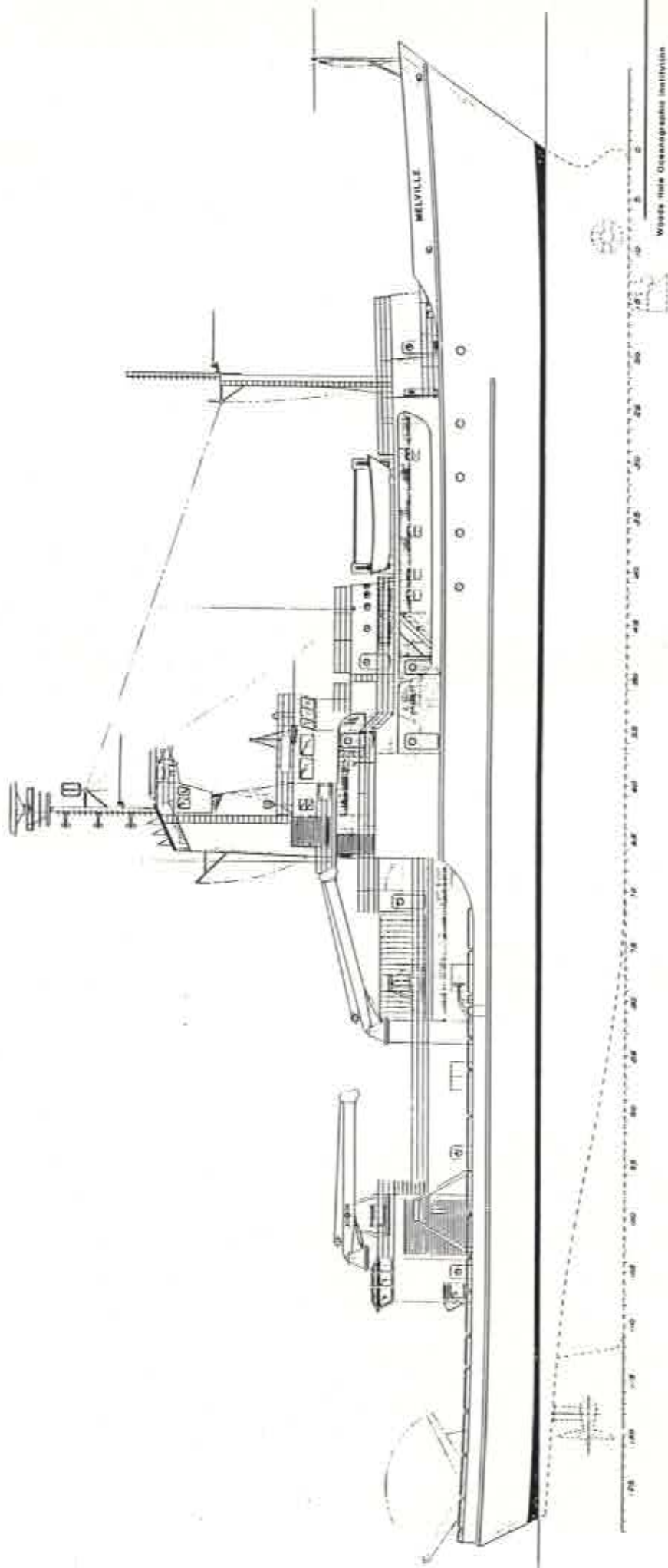
The AGOR 14 class was conceived in 1965 as a new design of research vessel over its predecessors AGORS 3 to 13. Those ships all were variations of the basic AGOR 3 design; each sub-class modified to meet new and changing requirements. Finally, the list of proposed modifications became so great that the AGOR 3 design could not be changed sufficiently to accommodate them. Accordingly, it was decided to make the AGOR 14 the lead ship of an entirely new class. The basic requirements were centered around five areas. These were:

- basic arrangements,
- maneuverability and position keeping,
- speed and endurance,
- propulsion plant and basic auxiliaries, and
- acoustic quieting.

Open deck space and flexibility for accommodating scientific outfitting were the chief forces in the basic arrangements. That this requirement has been successfully met can be attested to by the sole use of these ships in seagoing programs where they and no others can fulfill needs. Operational experience has demonstrated that the ships possess exceptional maneuverability, probably unsurpassed among all research ships. The speed and endurance requirement was set at 12 knots and 10,000 miles respectively. Under normal operating conditions, 12 knots has not been achievable. The requirements for the main propulsion plant were simplicity and to meet the maneuverability criteria. The lengthy shafting, clutches, couplings, and other novel arrangements have resulted in high casualty and maintenance costs. Quiet ship requirements have not been met in the AGOR 14 class. Scientific echo sounding from the hull is virtually impossible. The noise problem has appeared to be so related to the propulsion system that no serious effort has been mounted to identify or correct it.

MELVILLE (AGOR 14) and KNORR (AGOR 15) were completed in 1969 and 1970, respectively. They are sister ships but not twins. Their differences reflect certain preferences on the part of the operating institutions. These options were an intended feature of the individual ships' designs. In other aspects, particularly propulsion machinery, their construction





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AGOR 14 — OVERHAUL AND MODIFICATION

Preliminary Outboard Profile



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trials and subsequent operating histories have been so alike that a problem evident on one is certain to be followed by the same problem on the other.

From the outset, the ships were beset with maintenance problems chiefly associated with the drive train and propulsion system. The high maintenance costs and time lost are a matter of record. The ships are 15 years old and have demonstrated that the problems encountered are beyond the "debugging" stage. If full service life is to be expected, a major engineering refit is required.

With ONR support, engineering and acoustic studies were commenced in 1985 to define the feasibility for a propulsion and machinery refit. An additional goal was to upgrade the science capability of the ships. By early 1985 the following was recommended:

- The cycloid drives should be removed and replaced by screw propellers.
- The bow shape should be faired smooth, eliminating the existing dome and cavity.
- The existing maneuverability should be retained. In order to assure this, twin "Z"-Dive propulsors should be installed aft, with a retractable "Z"-Drive bow thruster.
- An integrated electric drive using SCR controllers (DC-DC) would be the most suitable machinery system. Due regard should be given to the suppression of electrical "noise" inherent to this type of system.
- In order to bring the ship back to its design waterline and to provide additional science laboratory, storage and berthing space, the ships should be jumboized (or stretched) about 32-ft.

The Chief of Naval Research has approved the refit program. \$16M has been included in each of the FY-88 and FY-89 budgets for this purpose.

The refit has three major goals:

- to eliminate the present mechanical and engineering problems associated with the propulsion system;
- to correct the present unsuitable acoustical characteristics for radiated noise;
- to upgrade the ships to meet ongoing and projected scientific requirements (e.g. World Ocean Circulation Experiment, WOCE, and Global Ocean Flux Study, GOFS, for which the U.W. is committed and for which no research ship is presently suited.

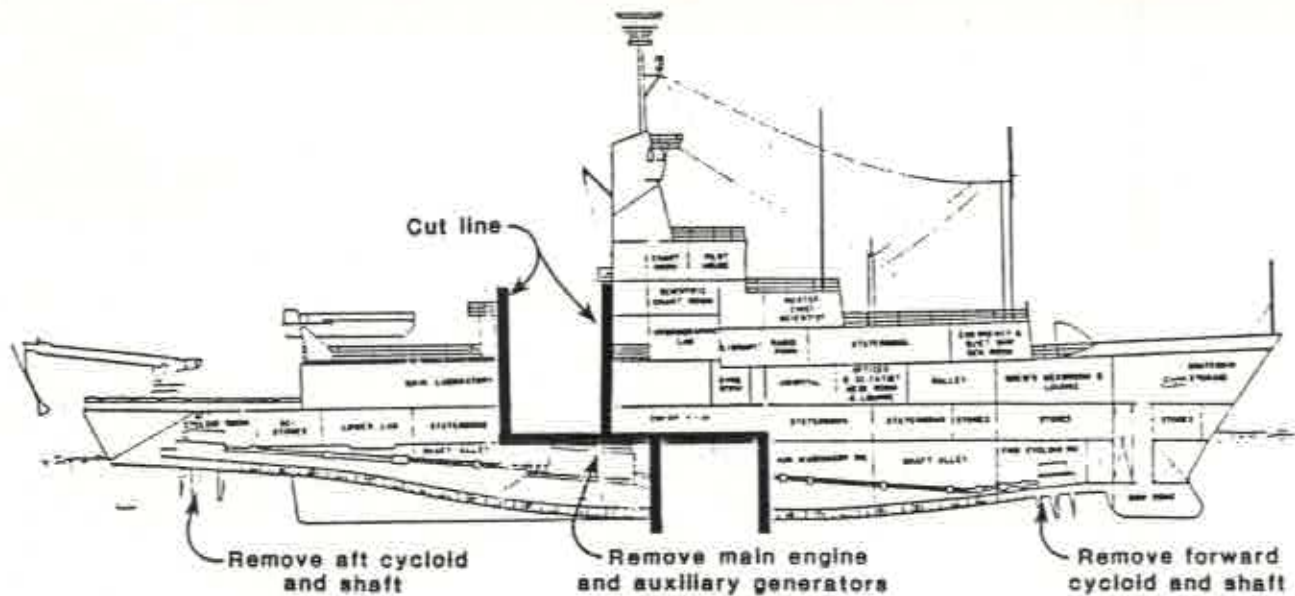
The MELVILLE/KNORR Refit planning is approaching the completion of the Preliminary Design Phase. All design calculations presently meet or exceed the operational requirements and criteria which have been set.

A comparison of existing to new characteristics is given by the following:

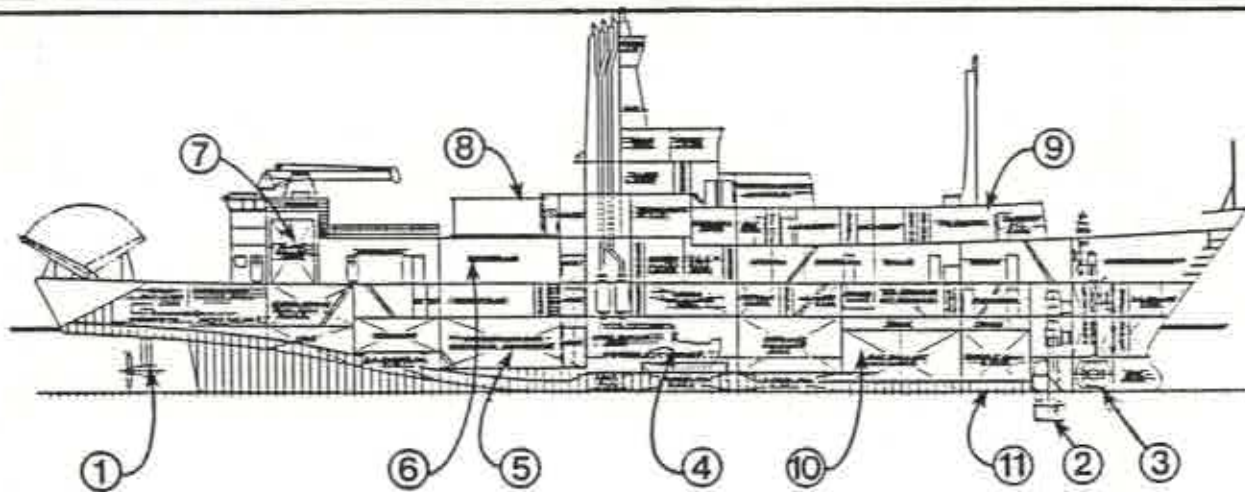
	Existing	Proposed
Length Overall	245 feet	279 feet
Beam	46 feet	46 feet
Draft	16 feet	15 feet
Full Load Displacement	2,415 tons	2,670 tons
Gross tonnage	1,806 tons	2,100 tons
Propulsion Horsepower	2,800 HP	3,000 HP
Cruising speed	10 knots	12 knots
Maximum speed	12 knots	14 knots
Cruising range	10,000 miles	12,000 miles
Fuel capacity	110,000 gals	121,000 gals
Crew	24	24
Scientists	25	34
Lab space	2,400 sq.ft.	3,860 sq.ft.
Science storage	842 sq.ft.	1,324 sq.ft.
Main Deck working area	3,424 sq.ft.	3,764 sq.ft.
clear length	96 feet	126 feet.

Current schedule for the project is as follows:

September 1987	Complete Preliminary Design
February 1988	Contract Design starts
March 1988	Commence long lead procurement
May 1988	Complete Contract Design
May 1988	Issue RFP for first ship
August 1988	Award contract for first ship
November 1988	First ship to yard
December 1988	Issue RFP on second ship
April 1989	Award contract on second ship
June 1989	Complete first ship
July 1989	Second ship to yard
August 1989	First ship in service
April 1990	Complete second ship
June 1990	Second ship in service



**"Cut Line" and Removals**



1. Twin 1500 HP 360° "Z" drive propulsors.
2. 900 HP bow thruster, retractable drive with hull fairing installed on bottom.
3. 350 HP tunnel thruster, rotatable 90° with hull closure fairing.
4. Engine room in new 34 ft. space. Integrated electric plant is three 1000 KW AC generators to a 600 volt bus.
5. Former engine room becomes new science storeroom. Hoistway access to laboratory spaces above.
6. Main laboratory area is lengthened by 34 ft. and refurbished.
7. Hanger/staging areas on port side aft and starboard side midships.
8. Provision for two laboratory vans on 01 Deck with direct access to interior of ship. New heavier crane to handle vans.
9. Former machinery space converted to staterooms.
10. New semi-active roll stabilizing tank.
11. New faired-in bow.

**Summary of Modified Vessel**