File. FIC

9 December 1987

UNOLS Fleet Improvement Committee
Minutes
of
Meeting 9-10 November 1987
La Jolla, California

The UNOLS Fleet Improvement Committee (FIC) met on 9 and 10 November 1987 at the Scripps Institution of Oceanography in La Jolla, CA. Present were the FIC members R. Barber, R. Dinsmore, D. Gorsline, J. Murray, W. Nowlin, B. Robison and F. Spiess, and observers W. Barbee, T. Johnson, R. Knox, E. Mortimer, E. Nelson, M. Prince, R. West, and P. Wiebe.

The agenda for the meeting, presented as Appendix 1, was discussed and approved, as were the minutes of the 13-14 August 1987 meeting.

Preliminary design of large, medium-endurance monohull. The proposal submitted by the Scripps Institution of Oceanography to NSF for a preliminary design study based on the concept design study by Glosten Associates for the UNOLS Fleet Replacement Committee was reviewed. The FIC endorsed this proposal for a follow-up study by Glosten Associates, with Fred Spiess as principal investigator. A letter of endorsement will be forwarded to the NSF. The Committee agreed that guidance for the design study should be provided by a three person subcommittee, consisting of Marcus Langseth, James Murray, and Fred Spiess (chairman).

Subcommittee for consideration of stable, deep-ocean platforms. A report on subcommittee action was presented by Fred Spiess, chairman. The report of the June 1987 subcommittee meeting is being written by Charles Bishop. Two aims of deep-ocean, stable platforms were considered:

- For multidisciplinary, long time series of observations, and
- For small-scale process-oriented measurements.

Peter Wiebe discussed potential science initiatives requiring the former capability. He noted that a November issue of Eos should contain the report of a meeting held to discuss such science initiatives.

Spiess will soon distribute a draft meeting report and plans for further studies by this subcommittee.

Status of AGOR-23. R. Dinsmore presented a written report on the status of AGOR-23 procurement (Appendix 2). The deadline for proposals from potential builders in response to the Navy RFP has been extended until January 1988. It is understood that few builder/designer groups will bid on the AGOR-23 because the process requires preparation by the bidder of a construction design, which is very costly to the bidder.

FIC operating budget. The proposal to NSF for funds to support operations of the FIC for the next 18 months was distributed to the committee. A budget summary is given as Appendix 3. It is expected that NSF soon will fund the proposal at the indicated, revised

budget level. Concern was expressed that the funding levels for new concept designs had been reduced or deferred and that the funds for subcommittee meetings, workshops, and consulting services had been severely reduced from requested levels. Nowlin indicated that he believed the budget would be adequate for ongoing FIC activities, provided that supplemental proposals for special studies/needs could be submitted with reasonable likelihood of support.

Intermediate-size SWATH research vessel. On behalf of the FIC, R. Dinsmore had solicited proposals for a concept design of an intermediate-size SWATH research ship based on science mission requirements approved at the August 1987 meeting of the FIC. Eleven proposals were received and mailed to FIC members prior to the meeting. Evaluation criteria were discussed and approved. Using those criteria the proposals were evaluated. On the first day of the meeting the top 4 were selected; these were re-evaluated and ranked on day two. Negotiations with the first ranked proposer will begin as soon as NSF funds for FIC operation as are received. Dinsmore will have program oversight for this study. Richard Barber and Charles Miller were selected as members of a subcommittee, chaired by Dinsmore, to provide scientific guidance for the design study.

Based on discussion of these proposals, it was decided that the science mission requirements for the intermediate, general purpose SWATH research vessel could be improved. Dinsmore agreed to make revisions based on FIC input and to transmit to Nowlin for distribution to the community for comment.

The U.S. Coast Guard has completed preliminary design of a 135-ft. SWATH vessel. They have offered FIC and the UNOLS community access to this design. Dinsmore provided a short handout with general characteristics, dimensions, and sketches (Appendix 4).

Status of KNORR/MELVILLE refits. Dinsmore provided a handout (Appendix 5) summarizing the status of the design study for the KNORR/MELVILLE refits. Comments from the FIC were solicited; the preliminary design phase is almost complete, so any suggested changes must be made soon. The Navy budget item containing funds to begin KNORR refit has not been approved yet. Thus, we are facing a possible deferral of this refit.

Navy AGOR (SWATH) design. The FIC and its predecessor, the Fleet Replacement Committee, have maintained a liaison with ONR during the concept and preliminary design phases for an AGOR (SWATH). Planned as a possible AGOR-24, this vessel is being designed by NavSea as part of a common hulls study aimed at designing this AGOR for academic use and an AGS for the Naval Oceanographic Office.

This design process has produced a vessel which would be unacceptable for operation as a UNOLS vessel in the view of the Fleet Improvement Committee. A memorandum to George Keller, UNOLS chairman, stating this position and documenting the reasons was approved.

Subcommittee on Scientific Requirements for UNOLS Fleet. J. Murray presented a third draft of the report from this subcommittee [Appendix 6]. Final FIC comments were solicited before December 1. It is planned to print and distribute this report as a white paper from the FIC.

USS Database. M. Langseth has prepared a paper describing the possible benefits to ship users, ship schedulers, and agency representatives of a computer based, network accessible database of information relating to research vessels and their schedules. A possible model for this system called the UNOLS Ship Schedule Database (USS Database) is presented. It was suggested that this manuscript be submitted to the UNOLS Newsletter and/or to Eos. This is timely because the UNOLS has been charged with implementing a computer based suite of ship schedule information, and because James Crease at University of Delaware has already found a searchable database containing UNOLS and some non-U.S. ship schedules. It is accessible via a number of widely used computer networks.

Costs and benefits of various modes of R/V acquisition. D. Gorsline presented a partial draft of a new white paper dealing with this issue. It was discussed, and Gorsline was encouraged to continue with this project. FIC comments on the draft were solicited.

Gorsline and Treadwell were encouraged to complete their manuscript on the history of the research vessel fleet. It should make an interesting FIC white paper.

Reserve Fleet vessels available for conversion. Nowlin presented a report [Appendix 7] from T.K. Treadwell, Dean Letzring, and Nowlin on vessels inspected on 16 September 1987 at the Maritime Administration Reserve Fleet in Beaumont, Texas. Several of these vessels were judged to be good candidates for conversion to intermediate-size (180'x40') general purpose research vessels for the UNOLS fleet. Basic conversion costs were estimated at between $2 and 3M. Monitoring of potential research vessels in the research fleet will continue. Even though no intermediate vessels are now needed by UNOLS, the possibility exists that vessels appear which would be potential conversions to other classes of UNOLS requirements.

Science mission requirements for small, general purpose research vessels. It was reported that the draft science mission requirements for small, general purpose research vessels had been distributed to the community for comment. A response date of 1 January 1988 was set. The distribution list will be sent to FIC members for possible additions.

Workshop on improvements to intermediate R/Vs. Plans were made for a workshop on mid-life refits and improvements to existing intermediate size, general purpose research vessels. R. Barber will convene the workshop in July 1988 as an adjunct to the UNOLS ship scheduling meeting in Washington, D.C. Participants will include operator representatives for the six vessels (ENDEAVOR, GYRE, ISELIN, NEW HORIZON, OCEANUS, and WECOMA), representatives of scientific advisory groups at ship operating institutions, selected users from other institutions, and the marine architects John Gilbert and Rodney Lay. Thus, there will be about 20 participants plus FIC members and observers. Scientific advisory groups from each ship operating institution will be invited to prepare a position paper in advance of the meeting. Barber will provide a draft agenda and invitation list to the FIC soon. W. Barbee will set the schedule for the July ship scheduling meeting and inform FIC soon.

Possible improvements to CAPE-class vessels. Present to discuss this item were Tom Johnson and Eric Nelson from Duke, and Mike Prince from Moss Landing. Johnson presented the potential advantages in performing a stretch on a CAPE class vessel. Some sketched are given in Appendix 8. A lengthy discussion ensued of various improvements, the pros and cons of stretching these vessels, and the distinctions between small and intermediate, general purpose vessels. Finally it was agreed that Nowlin would attempt to summarize the discussion in the form of a charge to a subcommittee, chaired by Johnson and with representatives of Moss Landing and user community, to further consider potential improvements to CAPE-class vessels, to assign priorities, and to assess associated capital and operating costs. For future construction, are the science mission requirements now under development adequate? What special science needs distinguish small, general purpose vessels?

Arctic research vessel requirements. R. Corell has requested that UNOLS consider Arctic science requirements for research vessels (see his letter to G. Keller as Appendix 9). In response the FIC has been asked to initiate such a study to be completed by 1 January 1988. Vera Alexander will chair the study group; Jerry Brown of NSF will serve as the point of contact for NSF and ONR.

Optional modes for NSF ship acquisitions. Barber presented a draft letter to Don Heinrichs from FIC stating relative merits of different ship acquisition and operation procedures. During discussion modifications were suggested. Barber will circulate a new draft to FIC at his early convenience.

Future FIC meetings. The next FIC meeting was scheduled for 28-29 March 1988 in Washington, D.C. Nowlin to arrange venue.

The following meeting will be in Seattle during the week of 11-15 or that of 18-22 July 1988. Final decision will depend on the time of UNOLS ship scheduling meeting.

APPENDIX 1

UNOLS FLEET IMPROVEMENT COMMITTEE
Meeting 9-10 November 1987
Agenda

- Consideration and adoption of agenda
- Consideration and adoption of minutes of 13-14 August meeting
- Report on proposal for large monohull preliminary design study - Spiess
- Report on Science Mission Requirements for Stable, Deep-Ocean Platforms - Spiess
- Status of AGOR-23
- Status of proposal for NSF support of FIC - Nowlin
- Review of proposals for intermediate SWATH concept design study - Dinsmore
- Status of KNORR/MELVILLE refits
- Review of Navy AGOR (SWATH) design
- Report on impact of new initiatives and projected funding increases on ship demands in the UNOLS fleet - White paper by Murray
- Report on presentation to UNOLS Annual Meeting about FIC activities - Nowlin
- Report on computer assistance to scheduling UNOLS vessels (Note input from Jim Crease, Delaware on this subject.) - Nowlin
- White paper on relative costs and benefits of various modes for R/V acquisition - Gorsline
- Report on inspection of Marad Reserve Fleet tug/supply hulls located at Beaumont, Texas - Nowlin and Treadwell
- Report on Science Mission Requirements for small, general-purpose R/V - Robison
- Progress toward workshop on improvements to intermediate-class R/Vs - Barber
- Discussion of approach to considering possible improvements to CAPE HATTERAS class R/Vs - T. Johnson
- Possible FIC study for NSF/ONR on high-latitude Arctic research ship and report on progress toward Science Mission Requirements for small, ice-capable R/V - Nowlin
- Report letter to NSF regarding options for research ship acquisition - Barber
- Schedule future meetings

UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

To: Distribution

1 August 1987

From: R. P. Dinsmore

SUBJECT: NEW NAVY SHIP CONSTRUCTION - AGOR 23, STATUS OF

CONSTRUCTION

The RFP for the construction of the new ONR research ship AGOR-23 has been issued. It is a "design & build" type RFP. This means that the bidder must submit a complete contract design package which conforms to the general requirements set by the Navy. In other words, the bidder actually designs the ship and submits the design, along with bid price for construction and outfitting. The cost for preparing a bid of this sort is about $750,000.

A summary copy of the requirements is appended (Appendix A). Previous "designs" of the AGOR-23 are in-house examples and do not necessarily resemble the final design. SWATH ships and conversions are permitted to enter but the program is aimed chiefly at a monohull type ship of about 250 feet in length.

The bid selection process is novel. Starting with a bid price having a $27.7M cap, there will be "deductions" from the actual bid price for meeting certain enhanced operating criteria. For example, the minimum acceptable cruising speed is 12 knots; but if the design makes 15 knots the bidder gets an $8.9M "credit", and so on. The lowest final adjusted price wins.

Deadline for proposal submission is 20 November 1987. Estimated delivery of the new ship is 1990. The acquisition schedule is attached as Appendix B.

OPERATION

ONR has issued the RFP for the operator of the new ship. It is intended that the operator be a UNOLS lab but a crucial issue is that a proposer must be in a position to trade in an AGOR-3 Class ship for layup. The present AGOR-3s in UNOLS are the T. WASHINGTON (Scripps), T. THOMPSON (University of Washington), and the CONRAD (Lamont). Thus, it would appear that only those labs are in a reasonable position to propose.

Deadline for the proposal is 31 August 1987 and selection will be about 30 October. It is anticipated that the operator selected may have some role in the selection of the construction design and may be able to effect some design changes (probably minor). Extract of the operations RFP is attached as Appendix C.

APPENDIX A

SUMMARY OF SPECIFICATIONS

Maximum length and draft are 275 and 17 feet, respectively. The ship may be a new construction monohull or small waterplane area twin hull (SWATH), or conversion of a newly constructed existing hull.

The following specifications are those stated in the NAVSEA Request for Proposals:

	Minimum Requirement	Enhanced Requirement
1. Sea Keeping (on Station)	o 0 kts/SWH 12'/B.H.	o 0 kts/SWH 20'/B.H.
2. Sea Keeping (Slow Speed)	o 6 kts/SWH 12'/B.H.	o 6-10 kts/SS6(SWH 20')/B.H.
3. Acoustic Characteristics and Systems	o No interference with operation of hull mounted systems at 3.5, 12 and 36, and 50-300 KHz up to 12 kts at SS4(SWH 8').	o Same
4. Station Keeping	o 300 ft Radius/B.H./wind 27 kts/current 2 kts/SS5(SWH 12').	o Same
	o No trackline capability.	o Trackline within 300' at 2.5 kts/A.H./wind 27 kts/current 2 kts/SS5(SWH 12')/heading within 45°.
5. Sea Keeping (Transit)	o 12 kts SWH/8'/A.H.	o 15 kts/SS4(SWH 8')/A.H.
6. Sustained Speed (Calm Water)	o 12 kts	o 15 kts
7. Laboratory Area	o 3,200 FT^2 total. o 2,000 FT^2 (3 labs) contiguous to work deck.	o 4,000 FT^2 total. o 3 Lab areas (2700 FT^2 total) contiguous to working decks.
8. Accommodations	o 30 scientific o 20 crew (min) o 10 single and remainder o double staterooms o 10 additional in 2 deck vans o Library/Conference Room o Science Office o Mess/Lounge Area	o Same

	Minimum Requirement	Enhanced Requirement
9. Ship Control	o Good visibility of working deck areas from bridge control station.	o Same
	o Continuously variable 0- 6 knots (electric) 5-12 knots (diesel)	o Continuously variable speec 0-15 knots. (No system swi
10. Integrated Electric Drive	o Permitted	o Required
11. Scientific Storage	o 13,000 FT^3 total in 3 locations. 35 tons total.	o 15,000 FT^3 total in 2-4 locations. 135 tons total.
12. Endurance	o 8,000 nm at 12 kts plus 29 days at 3 kts on station with 10% Reserve.	o 12,000 nm at at cruise speec plus 29 days at 3 kts with 10% reserve.
13. Working Area Deck	o Total fantail working area of 3400 ft^2 including a minimum 12' x 100' contiguous area on one side.	o 3500 FT^2 total fantail workir deck area including a minimur 12' x 100' contiguous area or one side.
	o 2 vans (see item 8 above)	o Deck area for 4 vans (8' x 20 on main upper deck with direc access to ship interior.
	o 100 tons disposable load.	o 100 tons disposable load.
	o No centerwell (SWATH)	o Centerwell 15' x 30' (SWATH only).
14. Towing Capability	o 10,000 lbs at 5 kts o 20,000 lbs at 2.5 kts	o Same
15. Marine Geology & Geophysical Mission	o None	o Electric power for 600 HP of compressors.
16. Electronic I.C. System	o None	o Serving all operating spaces labs, public spaces, working deck stations and van stations.

APPENDIX B

ACQUISITION SCHEDULE

Program Brifing to Industry	29 May 1986
NAVSEA Feasibility Designs Completed	30 May 1986
NAVSEA Acquisition Plan (AP) Approved	30 July 1986
Assistant Secretary for Shipbuilding & Logistics Endorsed AP	27 August 1986
Chief of Naval Operations Top Level Requirements (TLR) Signed and Forwarded to NAVSEA	29 September 1986
NAVSEA Circular of Requirements (COR) Approved	24 October 1986
Solicitation for AGOR 23 Released to Industry	27 May 1987
Solicitation for Operation of AGOR 23 Released to Academic Institutions by the Chief of Naval Research (OCNR)	1 June 1987
Institution Proposals Due to OCNR	31 August 1987
Industry Proposals Due to NAVSEA	20 November 1987
Operating Institution Selection	30 October 1987 (est)
Award for Ship Construction	15 April 1988 (est)
Start Construction or Conversion	October 1988 (est)
Delivery	30 September 1990 (est)

DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL RESEARCH
ARLINGTON, VIRGINIA 22217-5000

IN REPLY REFER TO

5000
Ser 1121SP/34
5 June 1987

From: Environmental Sciences Directorate
To: Distribution

Subj: AGOR-23 PROGRAM - SOLICITATION OF PROPOSALS FOR CHARTER OPERATION OF A DEEP OCEAN RESEARCH SHIP

1. Enclosed is a copy of the subject solicitation for charter operation of the AGOR-23. Your institution is invited to submit a proposal. The Office of Naval Research will negotiate a Charter Party Agreement with the selected institution for operation of the ship within the U.S. academic research ship fleet. The AGOR-23 is being procured for ONR by the Naval Sea Systems Command to replace an existing AGOR-3 class ship and is expected to be delivered by September 1990.

2. Please observe all of the conditions indicated by the solicitation. If questions arise, the ONR point of contact is Mr. Keith Kaulum, Code 1121SP. The closing date for this solicitation is 31 August 1987.

Eric O. Hartwig

ERIC O. HARTWIG
Director
Environmental Sciences

Distribution:
University of Alaska
University of Washington
Oregon State University
Moss Landing Marine Laboratories
University of Southern California
University of California, San Diego
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Skidaway Institute of Oceanography
Duke/UNC Oceanographic Consortium
The Johns Hopkins University
University of Delaware
Lamont-Doherty Geological Observatory
University of Rhode Island
Woods Hole Oceanographic Institution
University of Hawaii, Institute of Geophysics

APPENDIX C

INTRODUCTION

The Office of the Chief of Naval Research invites proposals for the operation of one deep-ocean research ship, AGOR 23. The ship will be constructed or converted as a general purpose oceanographic research ship. AGOR 23 will meet the specifications cited in Appendix A. The maximum length overall and draft are 275 and 17 feet, respectively. The ship acquisition will follow the schedule contained in Appendix B.

Title to the ship will be retained by the United States Navy. The ship will be assigned to an operator institution(s) under a renewable five (5) year charter party agreement with the Navy. This solicitation covers only the selection of the operating institution(s) for AGOR 23. It does not include consideration for funding of operations, equipment, or scientific project support.

Proposals will be evaluated by the Office of the Chief of Naval Research (OCNR) with the assistance of the National Science Foundation (NSF), the Office of the Oceanographer of the Navy (OON) and representatives from the University National Oceanographic Laboratory System (UNOLS). Major considerations for selection of the operating institution(s) will include excellence in the performance of Navy oriented oceanographic research; ability to complete final fitting out of the vessel; ability to maintain and operate such ships under sound maritime practices; and willingness to undertake a cooperative role in scheduling and operating the ship in support of the Navy research programs and the larger U. S. oceanographic research community.

<u>Proposals must be received by 5 P.M. EST, 31 August 1987</u> to be considered under this solicitation.

BACKGROUND

Approximately 25 ships operated by some 17 U. S. academic research institutions constitute the UNOLS "academic research fleet". These ships are used primarily by scientists at these and other academic institutions to carry out research projects funded by the Navy, NSF and other federal, state and local agencies. Navy has currently provides six of the seven largest research ships in the academic research fleet. The continuing need for large, multiple discipline research ships stems from Navy's need to conduct research on an all-season, worldwide basis.

Access to the academic fleet is facilitated through UNOLS, which is an independent organization of ship operating research institutions. Under UNOLS guidelines qualified, funded scientists from all U.S. institutions are assured access to shiptime on UNOLS vessels which are appropriate to their research needs.

In July 1984, the Secretary of the Navy announced fifteen initiatives to meet Navy and national requirements in Oceanography. Twc initiatives specifically address the need to replace existing Navy vessels in the UNOLS fleet. The first of these initiatives is met by the AGOR 23 program which will deliver a UNOLS Class II deep ocean research ship by 1991. The ship is being procured by the Naval Sea Systems Command (PMS-383) under a fixed-price design and construction solicitation. The Circular of Requirements and Request for Proposal for the ship will be available to respondents to this RFP.

PROGRAM GOALS

The primary goal of the AGOR 23 program is to acquire a deep ocean, multiple discipline oceanographic research ship for use by U.S. academic institutions to meet Navy and national worldwide research and data collection requirements. This ship will replace at least one existing AGOR 3 class ship in the Navy portion of the UNOLS academic fleet.

This ship will have improved sea keeping and sea kindliness, greater endurance, and larger science facilities with more accommodations than the AGOR 3 class it is replacing. It will also be ice strengthened (Class C) to help support research in high latitudes.

SCOPE OF PROPOSALS

The objective of this competitive award is to select the most appropriate institution(s) to operate AGOR 23 on behalf of the U. S. oceanographic community. Since AGOR 23 will replace at least one existing AGOR 3 Class ship in the academic fleet, a practical plan for return to the Navy of at least one AGOR 3 Class ship now chartered from ONR must be included in the proposal. ONR plans call for one ship to go out of service during FY 1988 or at a date to be negotiated between ONR and the operator.

Ships are a costly component of oceanographic research, therefore, considerations of efficiency and economy; as well as being fully utilized, and properly maintained and operated will be very important considerations. Selection of the institution(s) to operate this ship will not imply that its staff has the exclusive or biased access to its use. The selection process for the operator will result in the award of an initial 5-year charter agreement with provisions for renewal.

The operating institution will also be invited to provide technical assistance during NAVSEA builder selection, participate in oversight during design, construction, trials and outfitting of the ship. In addition, after delivery of the ship by the builder, the operating institution will have management responsibility for conduct of the post-delivery activities as detailed in Appendix B-2. ONR and/or NAVSEA will provide required funding for these specific activities. Funding for periods of restricted operations during this period would normally be the responsibility of the operator via user charges.

A Navy's decision to assign operating responsibility for the ship does not carry with it an assurance of financial support, except as discussed above. Ship operating support is provided competitively through the normal science proposal and review process within Navy and the NSF, and through contracts, grants and other arrangements between the operating institutions and other federal, state and private entities. Navy support is closely tied to the shiptime requirements of Navy-supported research programs. Accordingly, neither operational funds nor scientific research project funds are provided under this solicitation. Offerors must demonstrate the existence of, or potential for a strong scientific research program which supports the AGOR 23 program goals, fully utilizes the ship and sustains its operating costs.

The operation and maintenance of U. S. Navy-owned ships is carried out under a standardized charter party agreements which specify the terms of operations and use. (A copy of OCNR's standard charter party agreement will be provided on request.) Listed below are a few of the major conditions included in such agreements

1. Title to the ship and equipment purchased by Navy will be retained by the government.

2. The Charterer must maintain the ship in a good state of repair, readiness, efficient operating conditions, conform to all applicable regulatory requirements (including USCG and ABS certification, and Navy INSURV inspections); and assume full responsibility for the safety of the ship, its crew and scientific party personnel.

3. The initial agreement will be for five (5) years and can be extended beyond this period by the mutual consent of the institution(s) and the Navy.

4. Use of the ship is restricted to federally supported research programs, and non-federal programs of interest to the Navy under specific conditions with approval by ONR.

Offerors must be willing and able to enter into a contractual agreement of this type with the Navy, and to discharge the responsibilities and commitments prescribed.

Equipment which becomes integral to the structure or machinery of the ship, regardless of the source of funds for acquisition and installation, is considered to be part of the ship and therefore is government property. Title to privately-owned or financed portable or modular equipment or gear can be retained by the operating institution(s).

ELIGIBLE OFFERORS

Proposals will be accepted from any U. S. academic institution or consortium of U. S. institutions currently conducting graduate level research programs in oceanography and related marine geophysical sciences. Offerors must have experience in operating large world-ranging oceanographic research ships. The Institutions(s) must either be a member of UNOLS or meet the requirements for, and apply for full membership. Such offerors must be able to provide suitable docking, staging and storage facilities in addition to demonstrating their ability schedule and operate this ship.

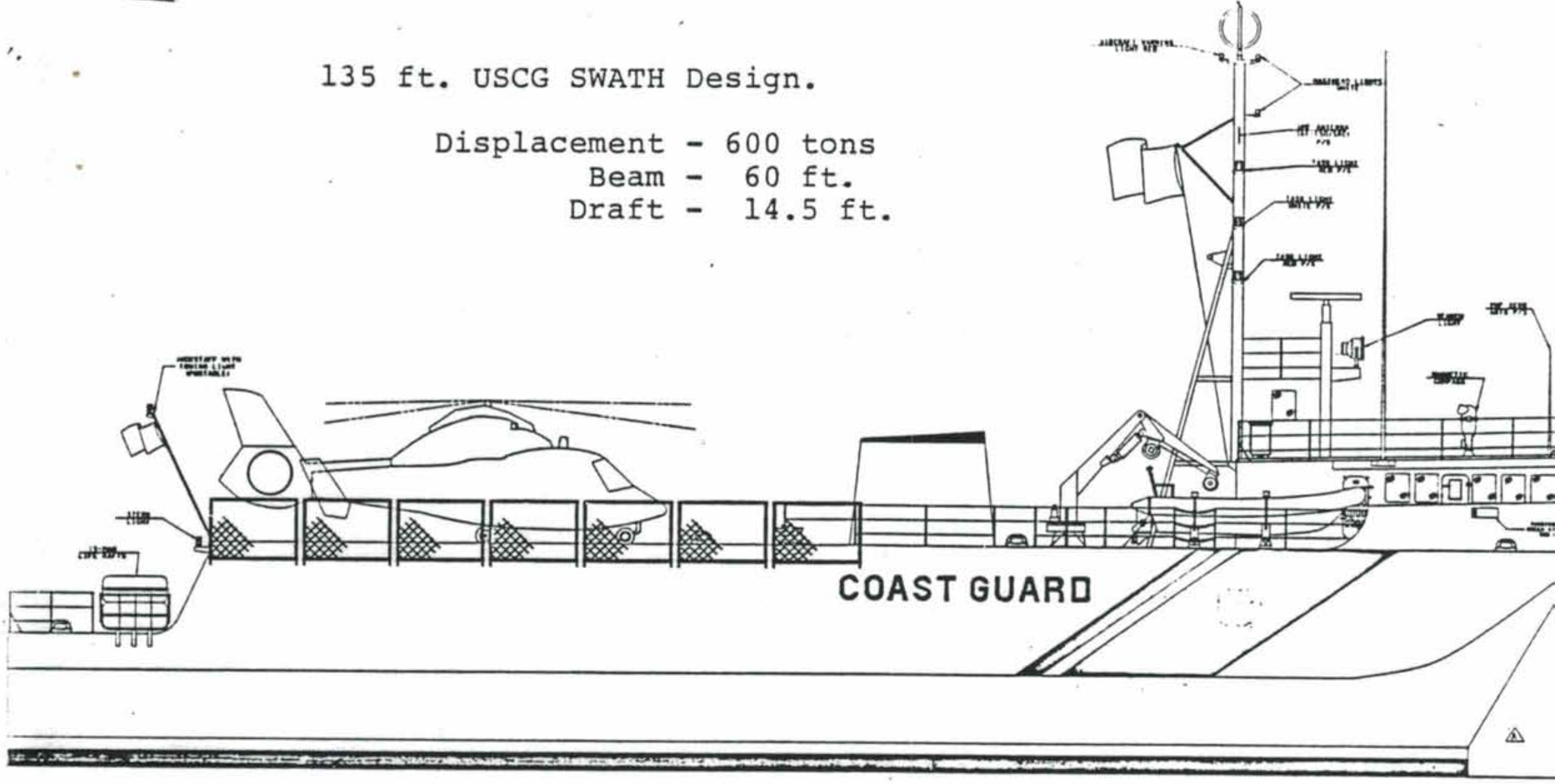
BUDGET SUMMARY

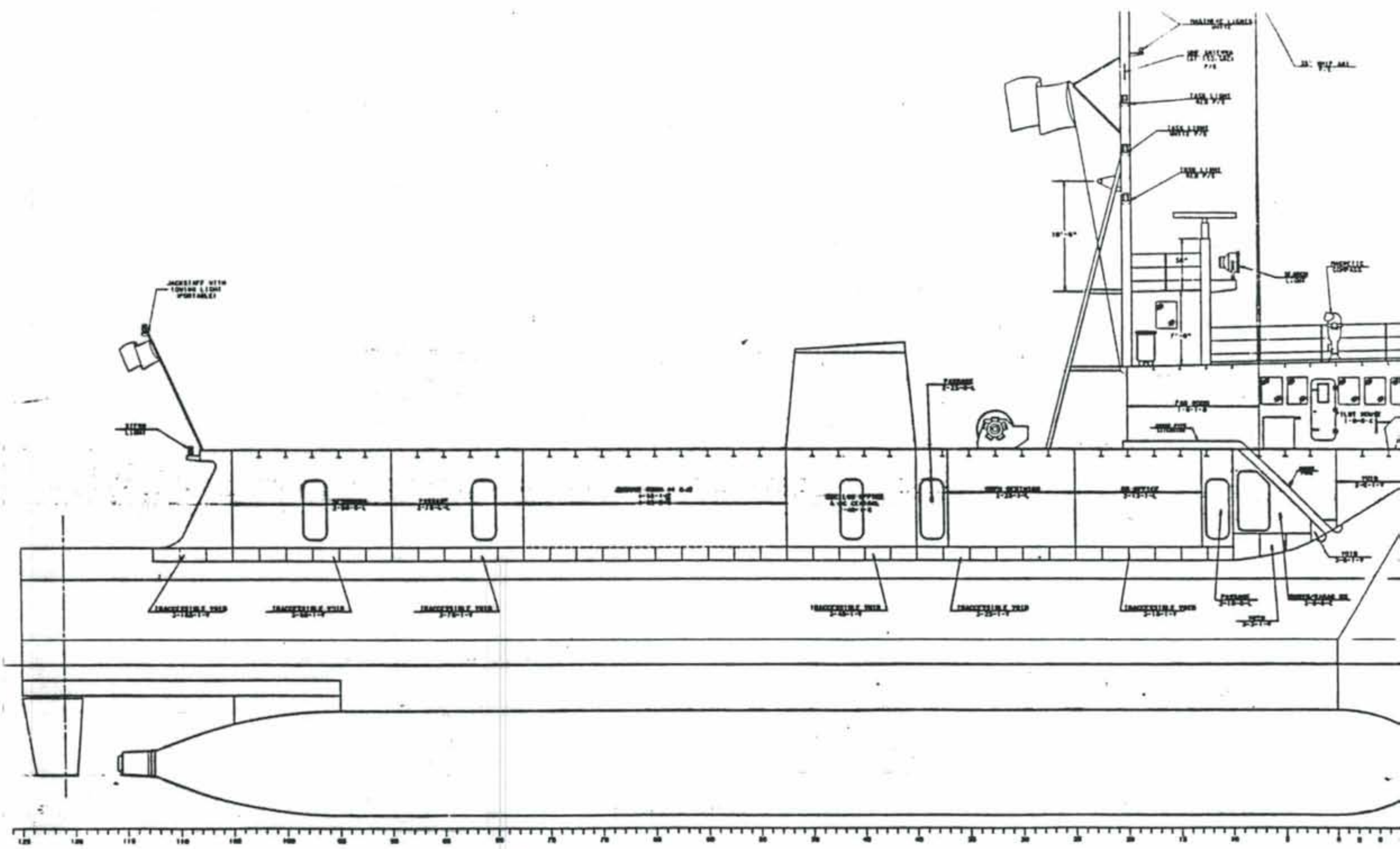
RF-88-38

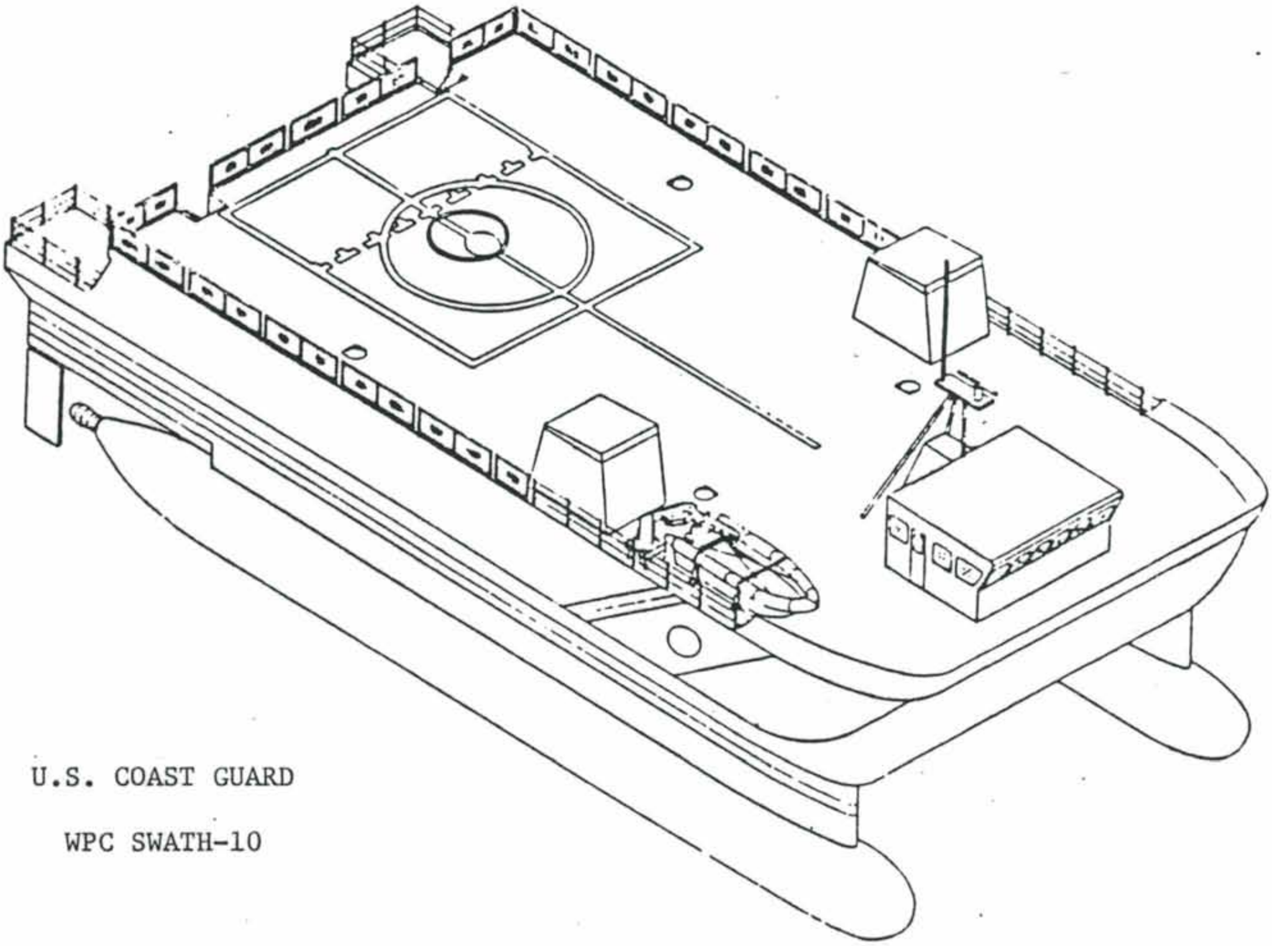
ONGOING ACTIVITIES	YEAR 1	YEAR 2
Committee Meetings	$24,900	$24,900
Subcommittee Meetings	11,200	11,200
Workshop Meetings	15,000	-0-
Consultant Fees	13,200	6,600
Support Personnel	11,357	5,937
Support Supplies	5,400	3,200
Total	81,057	51,837
Indirect Costs	31,207	19,957
Total	112,264	71,794
PROJECT ACTIVITIES		
Concept Design Studies of Small, General Purpose R/V	-0-	50,000
Studies of Mid-life Refits for Existing Intermediate Monohulls	-0-	20,000
Concept Design Study for Intermediate Size SWATH	50,000	-0-
Concept Design Study for Innovative (Stable, Deep-Ocean) Platform	-0-	-0-
Concept Design Study for Small, Ice-Capable R/V	-0-	50,000
Studies of Improvements to CAPE-class Vessels	10,000	-0-
Total	60,000	120,000
Indirect Costs	13,475	26,950
Total	73,475	146,950
Total Per Year	$185,739	$218,744

135 ft. USCG SWATH Design.

Displacement - 600 tons
Beam - 60 ft.
Draft - 14.5 ft.







U.S. COAST GUARD

WPC SWATH-10

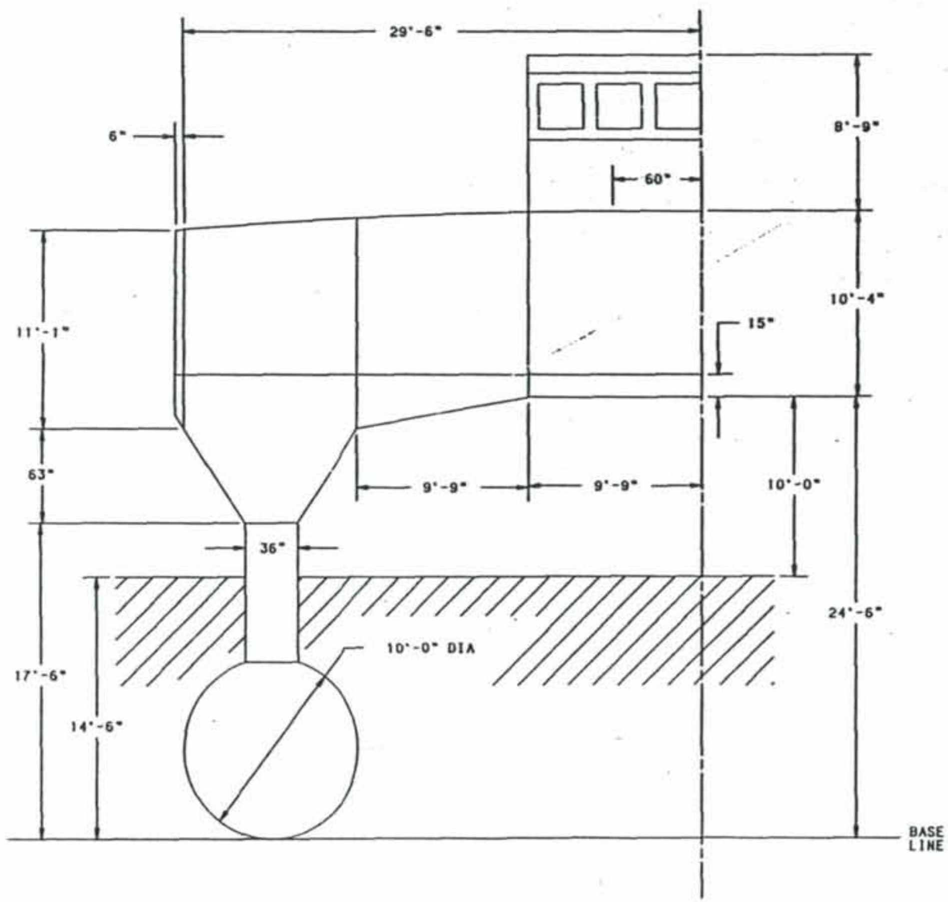
GENERAL CHARACTERISTICS

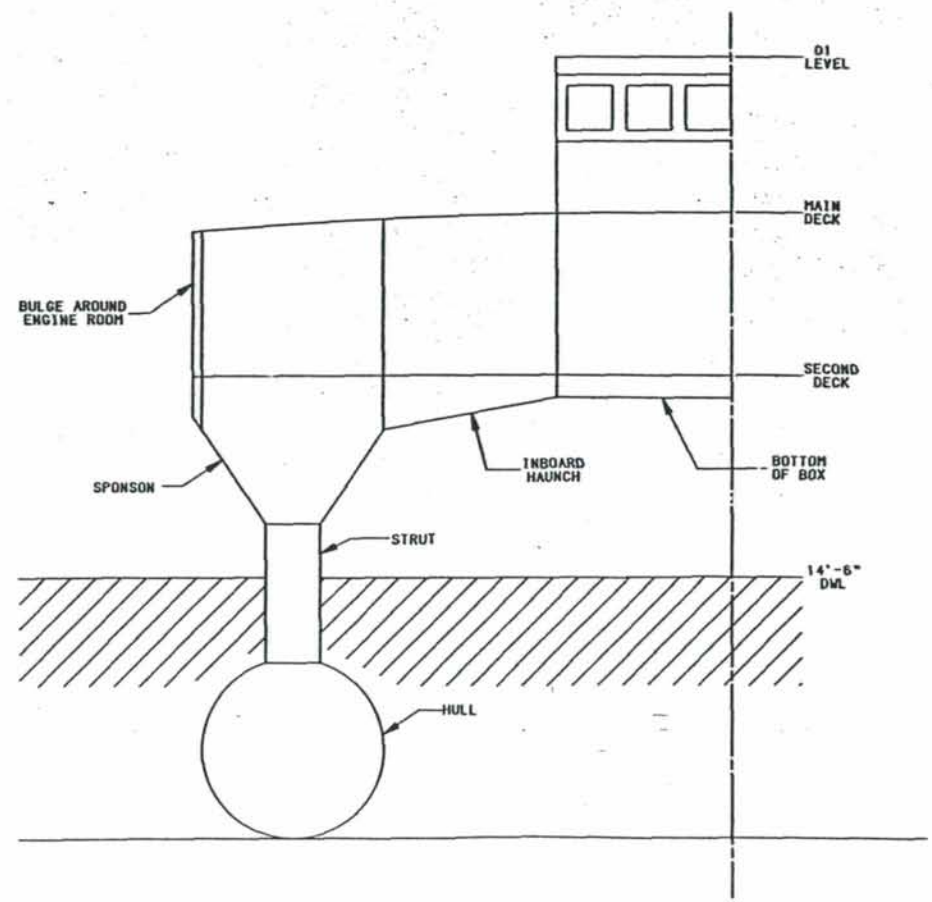
Length (Overall)	138.0 Ft.
Length (Waterline)	123.0 Ft.
Beam (Cross Structure)	59.0 Ft.
Beam (Hulls)	59.0 Ft.
Draft	14.5 Ft.
Displacement	600.0 LT.
Hull Diameter	10.0 Ft.
Strut Thickness	3.0 Ft.
Hull Centerline Separation	49.0 Ft.
Box Clearance	10.0 Ft.
Cruise Speed	14.0 Kts
Maximum Speed	20.0 Kts
Shaft Horsepower	2 x 3800 HP
Boats	6m RHI
Helicopter Capability	1 HH-65A Day/Night Ops Refueling VERTREP

135 ft USCG SWATH Design

PRINCIPAL DIMENSIONS & CHARACTERISTICS

LENGTH OVER ALL (NOT INCLUDING BULWARK)	135.58'
LENGTH BETWEEN PERPENDICULAR	125'
BEAM TO ℄ OF STRUTS	49.00'
THICKNESS OF EACH STRUT AT MAXIMUM	3.00'
HORIZONTAL DIAMETER OF LOWER HULL AT MAXIMUM	10.00'
VERTICAL DIAMETER OF LOWER HULL AT MAXIMUM	10.00'
BEAM OF BOX (EXTREME)	60.00'
BEAM TO OUTSIDE OF LOWER HULLS	59.00'
DEPTH @ SIDE, @ ⊗	33.79'
DESIGN WATERLINE	14.50'
LOWER HULL CROSS-SECTION	CIRCULAR
LOWER HULL NOSE PROFILE	ELLIPTICAL
LOWER HULL TAIL PROFILE	LENTICULAR PARABOLIC
STRUT NOSE WATERLINE	ELLIPTICAL
STRUT TAIL WATERLINES	LENTICULAR PARABOLIC





REPORT ON AGOR 14/15 OVERHAUL AND REFIT

The MELVILLE/KNORR Refit planning is approaching the completion of the Preliminary Design Phase. A copy of Draft Preliminary drawings are attached. Review, comments and suggestions are invited.

All design calculations presently meet or exceed the operational requirements and criteria which have been set.

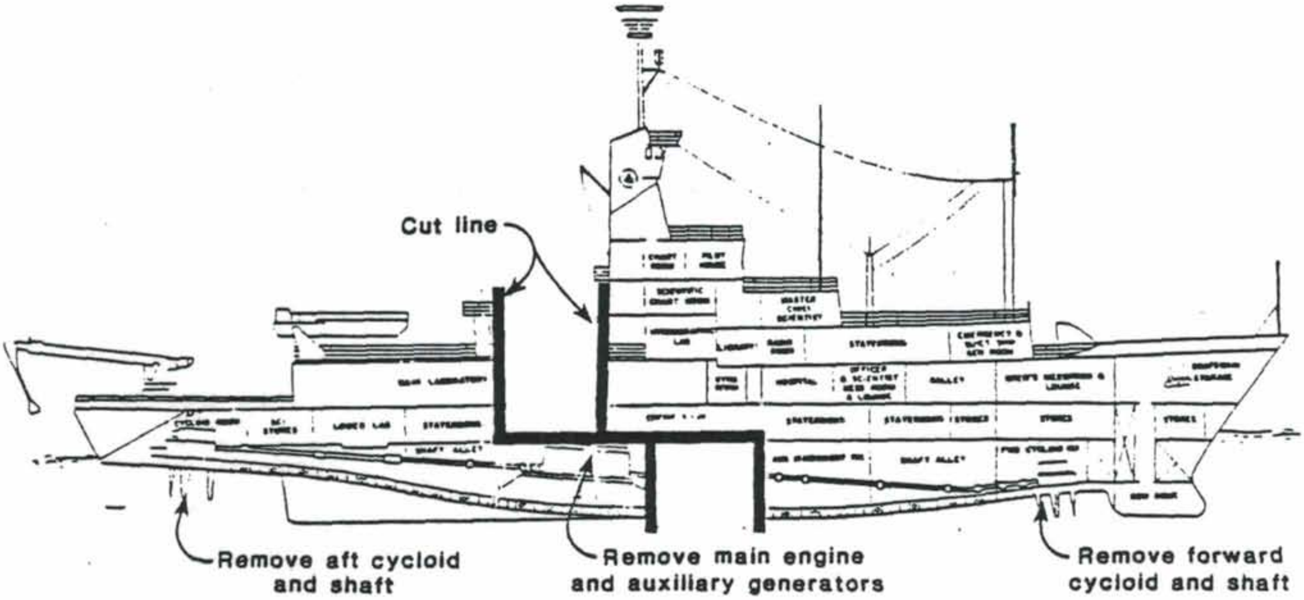
A comparison of existing to new characteristics is given by the following:

	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

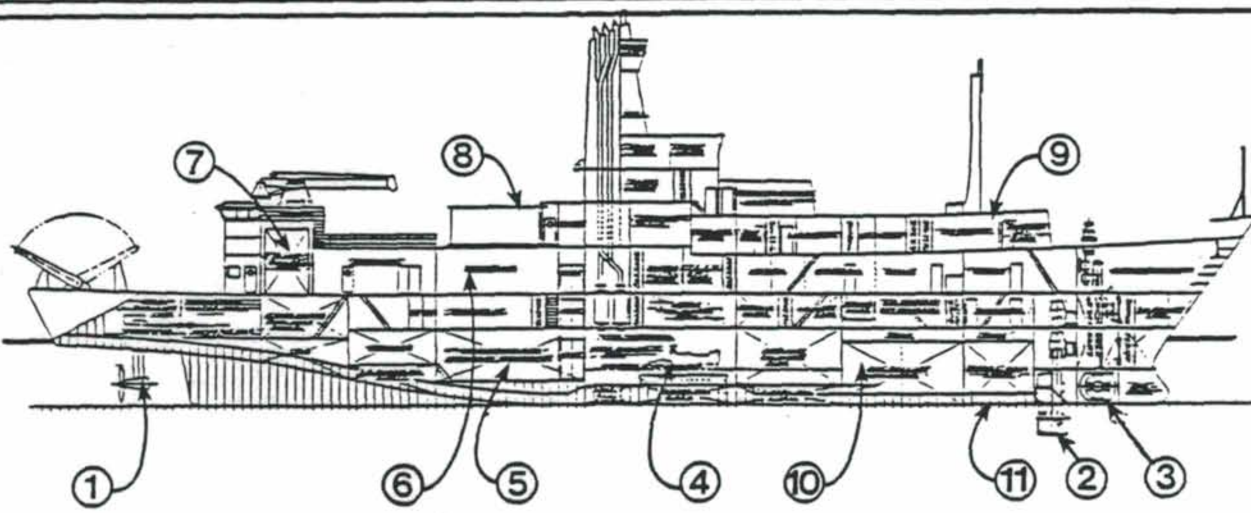
Current schedule for the project is as follows:

September 1987	Complete Preliminary Design
November 1987	Contract Design starts
February 1988	Commence long lead procurement
March 1988	Complete Contract Design
April 1988	Issue RFP for first ship
July 1988	Award contract for first ship
October 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

11/1/87
R. Dinsmore



"Cut Line" and Removals



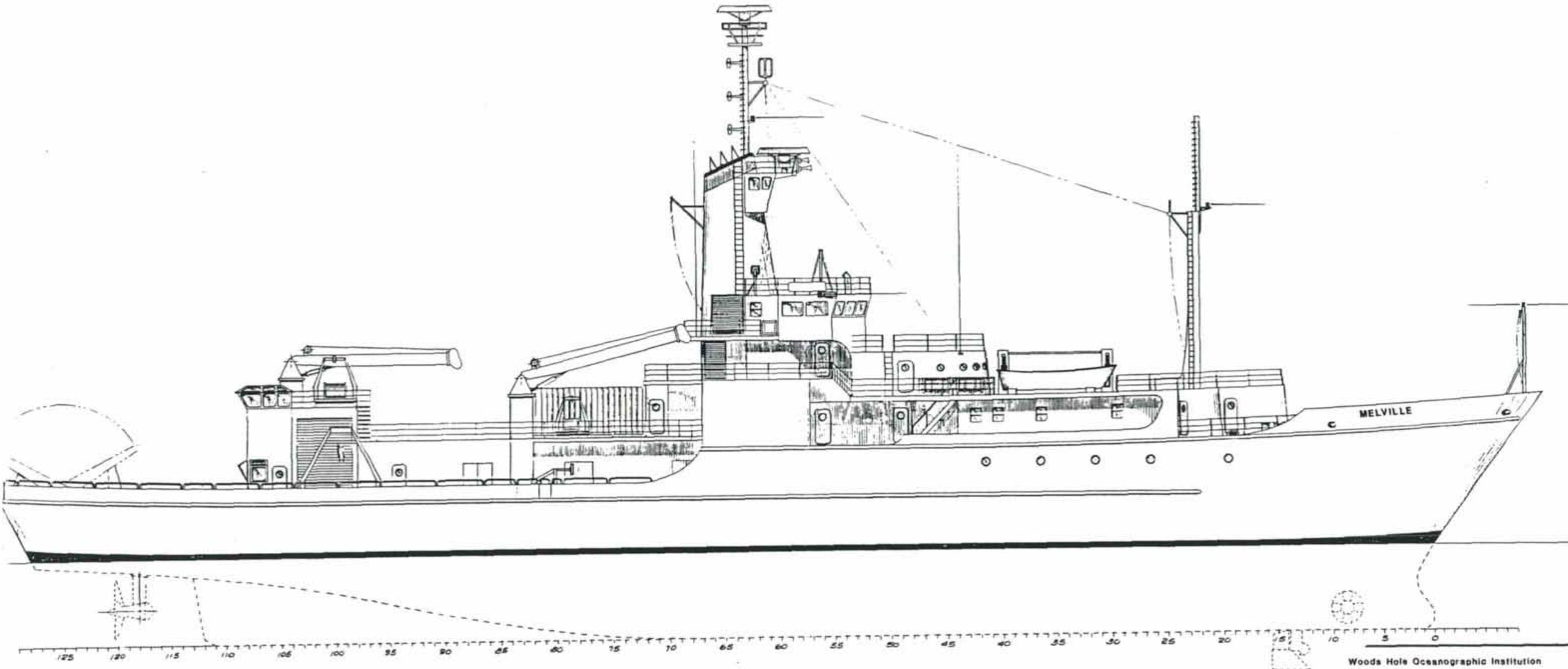
1. Twin 1500 HP 360° "Z" drive propulsors.
2. 900 HP bow thruster, retractable drive with hull fairing installed on bottom.
3. 350 HP tunnel thruster, rotatable 90° with hull closure fairing.
4. Engine room in new 34 ft. space. Integrated electric plant is three 1000 KW AC generators to a 600 volt bus.
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. Hangar/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

Table 1.5.2
Range Summary

Case	Departure Draft	F.O. Gal.	SWB L.T.	Tot. Sci. Payload L.T.	Range, N. Miles, for Various Speeds and Conditions: 14 Kts. Trial	12 Kts. Trial	12 Kts. +25%	12 Kts. SS4	12 Kts. +25% +30d	10 Kts. Trial	10 Kts. 25%	10 Kts. SS4	10 Kts. +25% + 30d
1A Max. Range Max. Payload	16'-6" Loadline	144,300	15t, fwd	342	12,910	**16,490**	**14,260**	9,590	9,590	**20,290**	**18,070**	11,270	12,150
1B Max. Range Design Payload	16'-2"	144,300	34t, aft	242	12,910	**16,490**	**14,260**	9,590	9,590	**20,290**	**18,070**	11,270	12,150
1C Long Range Design Payload	15'-10"	128,500	—	242	11,370	**14,510**	**12,550**	8,440	7,880	**17,860**	**15,900**	9,920	9,990
2A Min. Range Design Payload	15'-6"	97,050	—	242	8,290	**10,580**	9,150	6,160	4,480	13,030	11,600	7,240	5,680
2B Moderate Range Reduced Payload	15'-6"	121,420	—	170	10,670	**13,630**	**11,790**	7,930	7,120	**16,770**	14,930	9,320	9,020
Fuel Rates gph					143	96	111	165	111+60	65	73	117	73+60

Notes:
1) All fuel rates include a 415 KW of ship service load. This includes air conditioning load, but oil consumption by a boiler is not included. Operation in extreme cold temperatures is not considered.
2) 30 day mission assumes an average continuous total power usage of 875 KW. Rough conditions trackline dynamic positioning work requires approximately 1750 KW. A smooth water operating speed of 9.5 knots and the service load will also absorb the assumed 875 KW.
3) Trial conditions assume smooth water and smooth hull.
4) A 25% service allowance is applied to propulsion horsepower to account for average seastate conditions, wind, current, hull fouling, and machinery deterioration.
5) SS4 conditions assume continuous 8 foot significant height waves and 20 knot head winds.
6) Range indicated under +25% +30 days is total distance to and from the ocean work area, and does not include distance travelled during the 30 day on-site.
7) All range calculations are based on resistance at a 15'-6" draft, and hence are optimistic for cases 1A and 1B.
8) Calculations assume that 12,400 gallons of fuel is not used and held in reserve.
9) Bold type values indicate that range requirements are met: 10,000 miles at 12 kts, 15,000 miles at 10 kts.
10) Cases 1A, 1B and 1C are over the 15'-6" design draft at departure. Cases 2A and 2B are at the 15'-6" design draft.



Woods Hole Oceanographic Institution

Woods Hole, Massachusetts

AGOR 14 — OVERHAUL AND MODIFICATIONS

Preliminary Outboard Profile

APPROVED

THE GLOSTEN ASSOCIATES, inc.

CONSULTING ENGINEERS SERVING THE MARINE COMMUNITY

DRAWN — DATE —

CHECKED — DATE —

APPROVED — DATE —

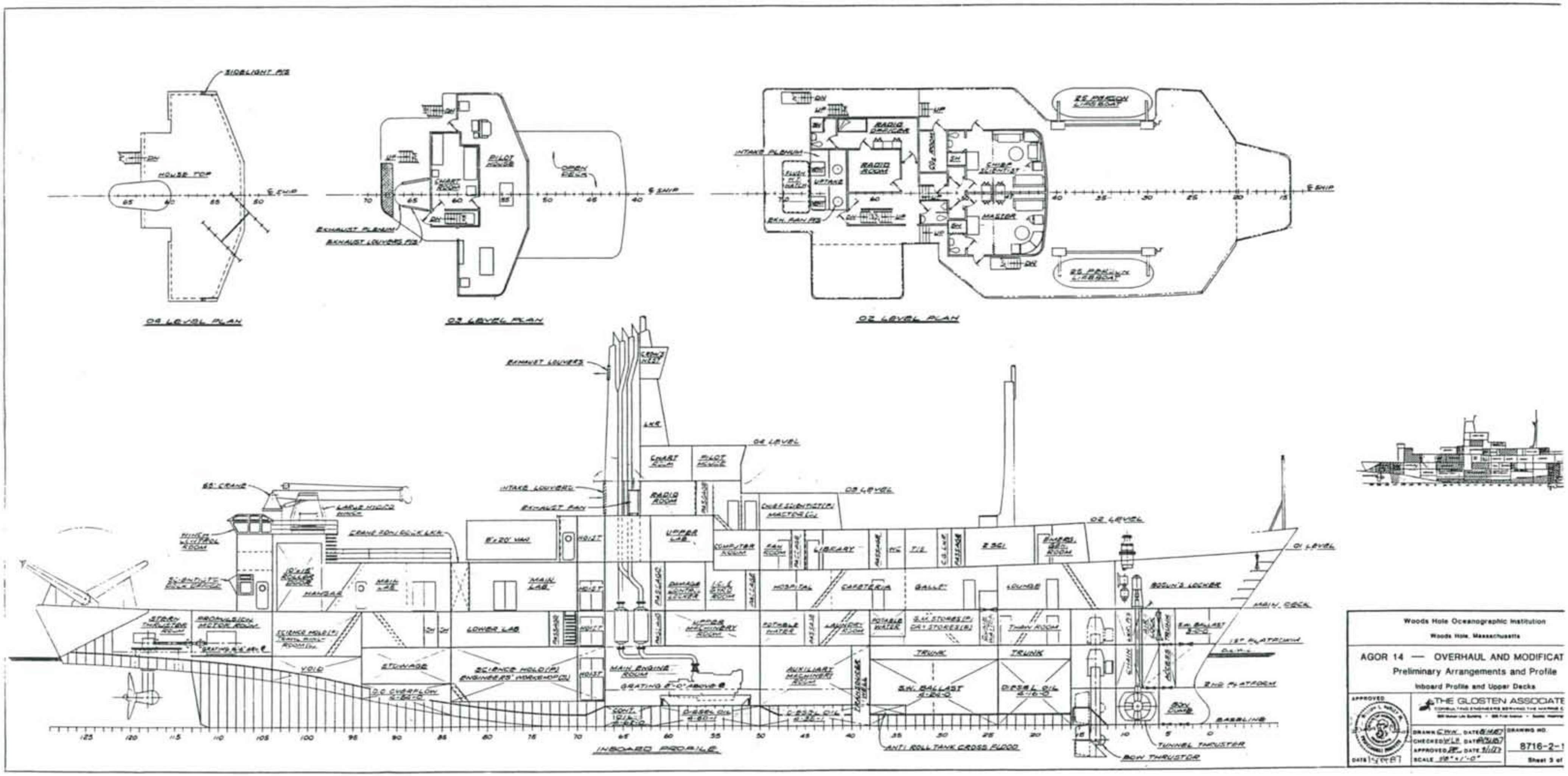
SCALE 1/8" = 1'-0"

DATE

DRAWING NO. 8716-3-14

REV.

Sheet 1 of 1


04 LEVEL PLAN
03 LEVEL PLAN
02 LEVEL PLAN
INBOARD PROFILE
SIDELIGHT P/S
HOUSE TOP
PILOT HOUSE
CHART ROOM
RADIO ROOM
RADIO OFFICER
CHIEF SCIENTIST
MASTER
25 PERSON LIFEBOAT
EXHAUST LOUVERS
INTAKE LOUVERS
EXHAUST FAN
02 LEVEL
01 LEVEL
MAIN DECK
1ST PLATFORM
2ND PLATFORM
BASELINE
MAIN LAB
LOWER LAB
UPPER LAB
HOSPITAL
CAFETERIA
GALLEY
LOUNGE
LIBRARY
HANGAR
MAIN ENGINE ROOM
AUXILIARY MACHINERY ROOM
S.W. BALLAST
DIESEL OIL
STOWAGE
VOID
BOSUN'S LOCKER
TUNNEL THRUSTER
BOW THRUSTER
ANTI ROLL TANK CROSS FLOOD
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts
AGOR 14 — OVERHAUL AND MODIFICAT
Preliminary Arrangements and Profile
Inboard Profile and Upper Decks
THE GLOSTEN ASSOCIATE
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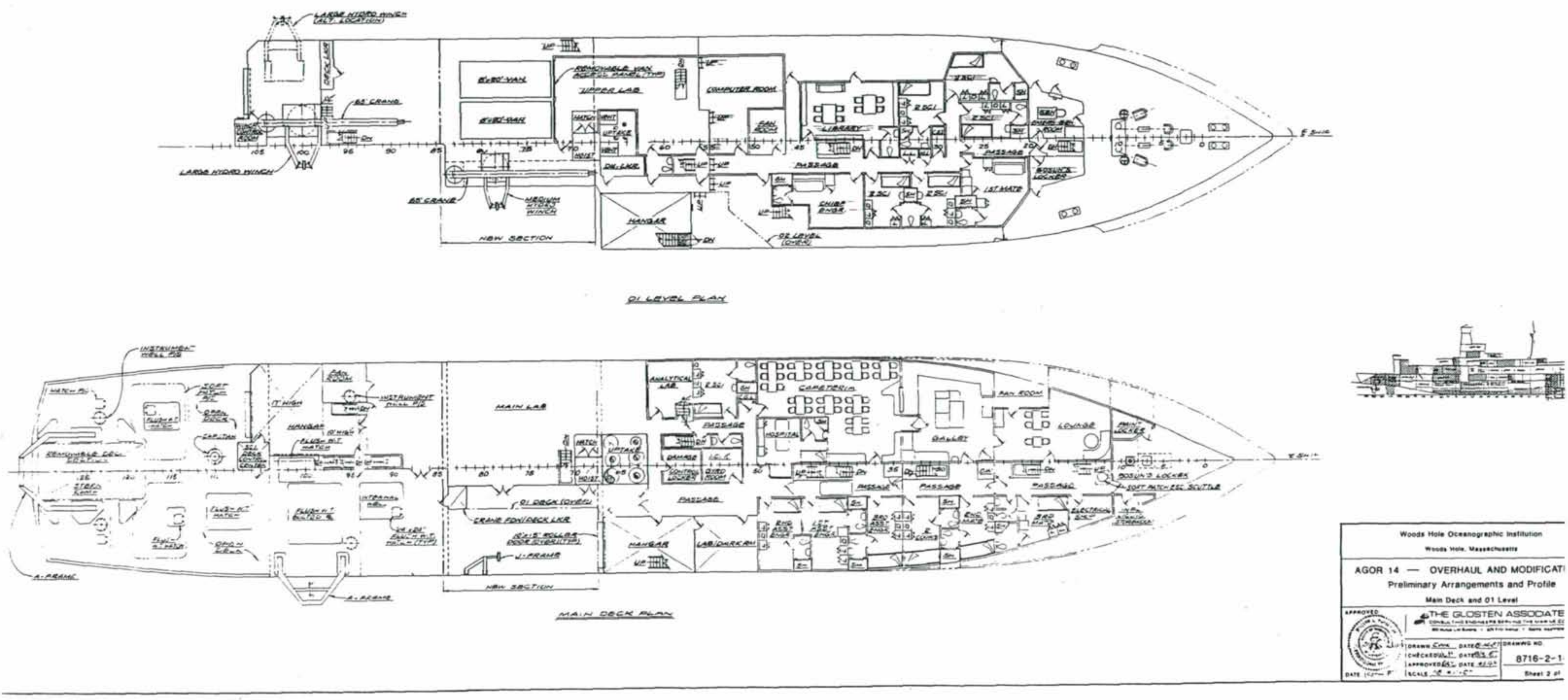
Sheet 3 of



01 LEVEL PLAN
MAIN DECK PLAN
COMPUTER ROOM
UPPER LAB
LIBRARY
PASSAGE
HANGAR
NEW SECTION
MAIN LAB
CAFETERIA
GALLEY
LOUNGE
HOSPITAL
ANALYTICAL LAB
LAB/DARKRM
A-FRAME
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts
AGOR 14 — OVERHAUL AND MODIFICAT
Preliminary Arrangements and Profile
Main Deck and 01 Level
THE GLOSTEN ASSOCIATE
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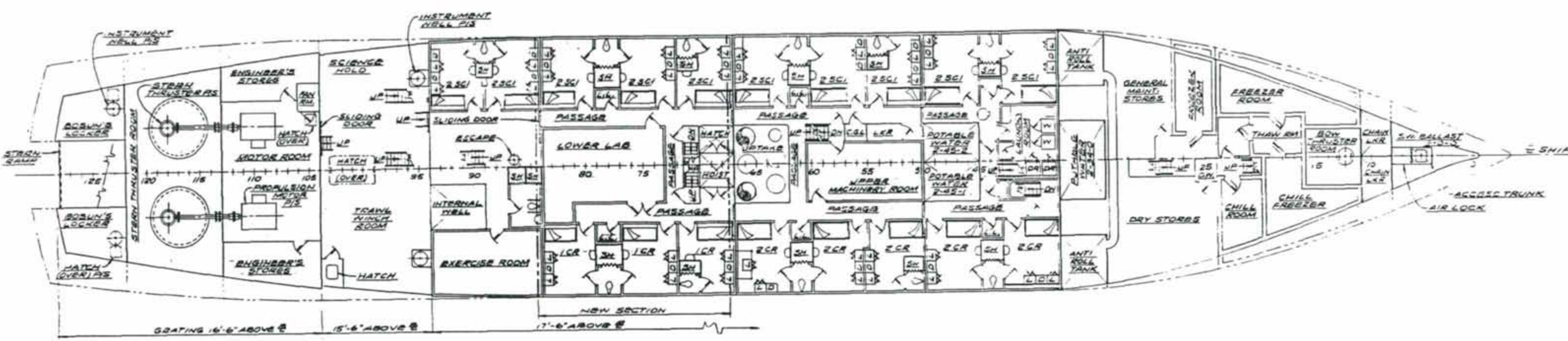
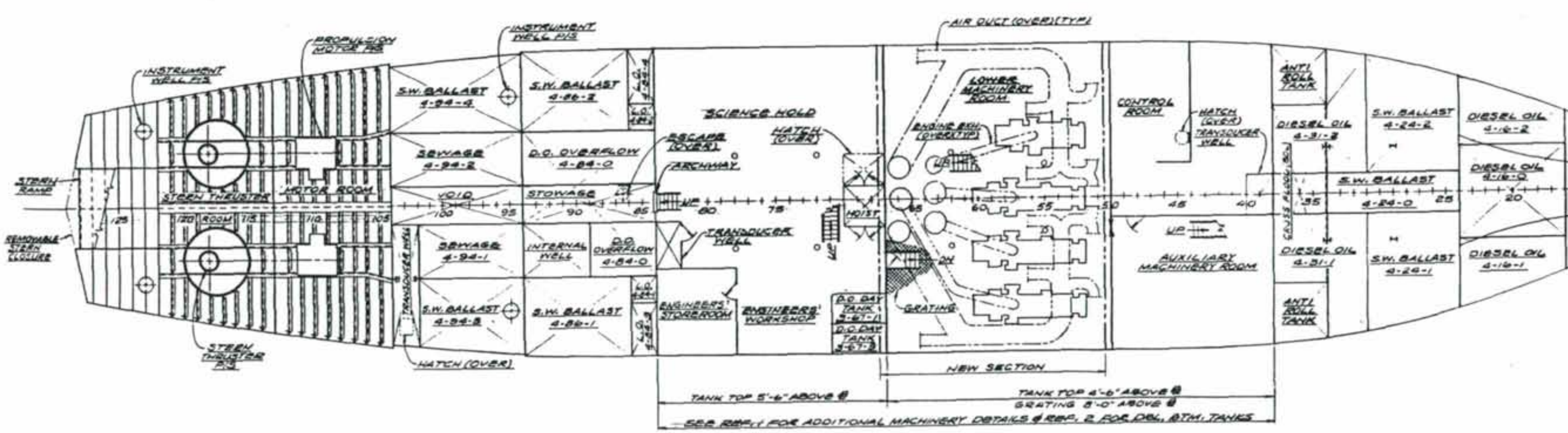


1ST PLATFORM PLAN



HOLD PLAN

Woods Hole Oceanographic Institution

Woods Hole, Massachusetts

AGOR 14 — OVERHAUL AND MODIFIC

Preliminary Arrangements and Profile

Hold and 1st Platform

APPROVED

THE GLOSTEN ASSOCIAT

DRAWN / DATE

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APPROVED / DATE

SCALE 1/8" = 1'-0"

DRAWING NO. 8716-2-

Sheet 1 o

DATE SEPT 87

THIRD DRAFT
11/4/87

Fleet Improvement Committee:
Subcommittee on Scientific Requirements
for the UNOLS Fleet.

J.W. Murray (chair)
R. Barber
M. Langseth

One of the main objectives of the UNOLS Fleet Improvement Committee (FIC) is to amplify and update the UNOLS Fleet Improvement Plan. This requires a continued reassessment of the number and mix of ships and their science mission requirements.

At present (11/87) the UNOLS fleet consists of 7 large ships (class II: 200-250 ft), 7 intermediate ships (class III: 150-199 ft) and 6 small ships (class IV:100-149 ft). UNOLS also supports 4 ships that are smaller than class IV. The only recent new construction was two general purpose class IV ships built in 1981. The number of ships in the core academic fleet from 1970 to 1985 is shown in figure 1 and the average age is shown in figure 2. These charts do not include the Fred Moore (1984 and 1985) or the Laurentian (1985) which were in the UNOLS fleet for a short time. The situation for the large ships is most crucial as 4 of these ships were built before 1965. Plans for their replacement need special attention. Two of the large (class II) ships, the R/V Knorr and R/V Melville, may be stretched and refit over a two-year period beginning in the fall of 1988. The construction of a new AGOR 23 with ONR funds is scheduled for 1990 or 1991 and will be compensated by the layup of an AGOR-3 hull (Conrad, Washington or Thompson). ONR funds

Figure 1

NUMBER of SHIPS

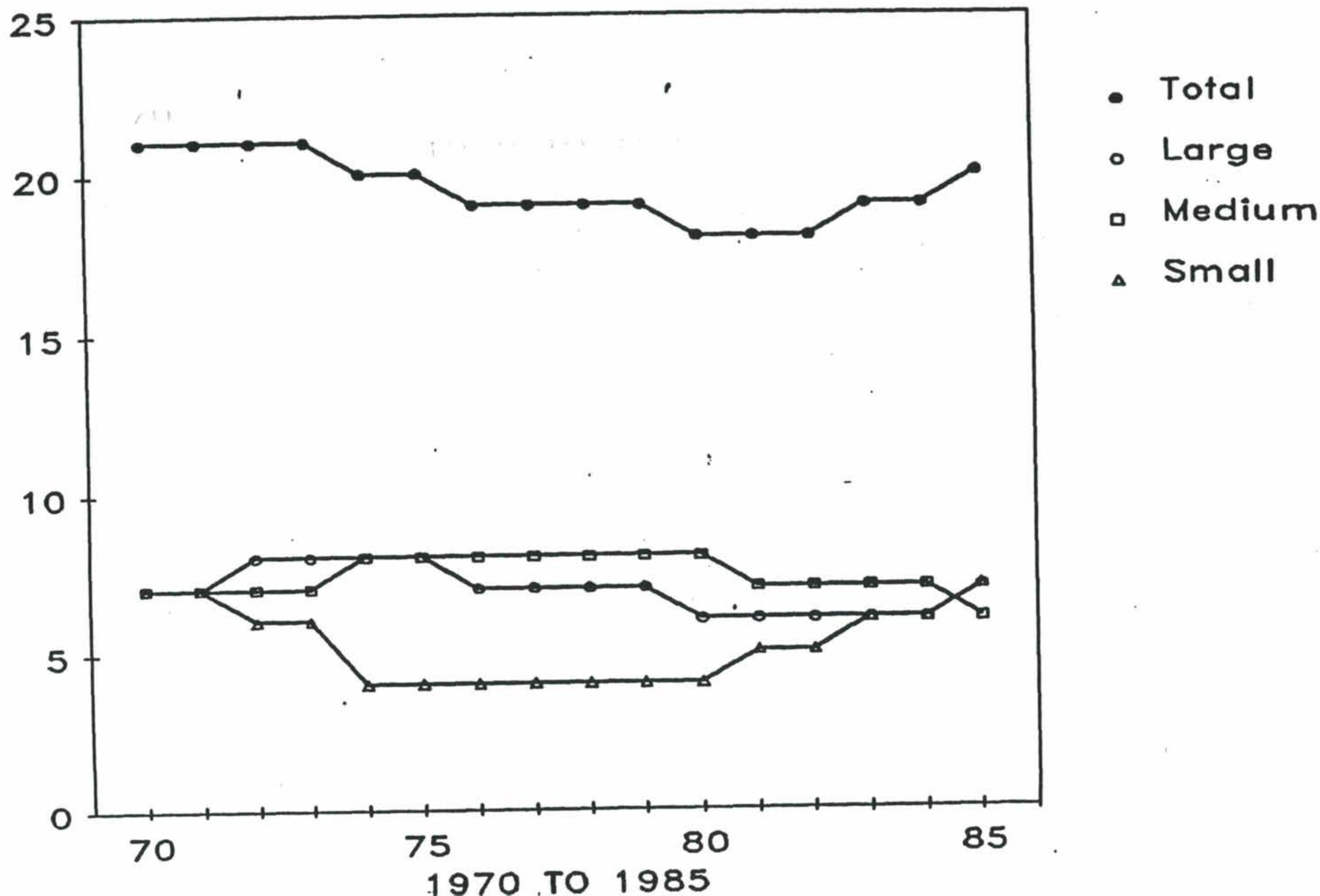
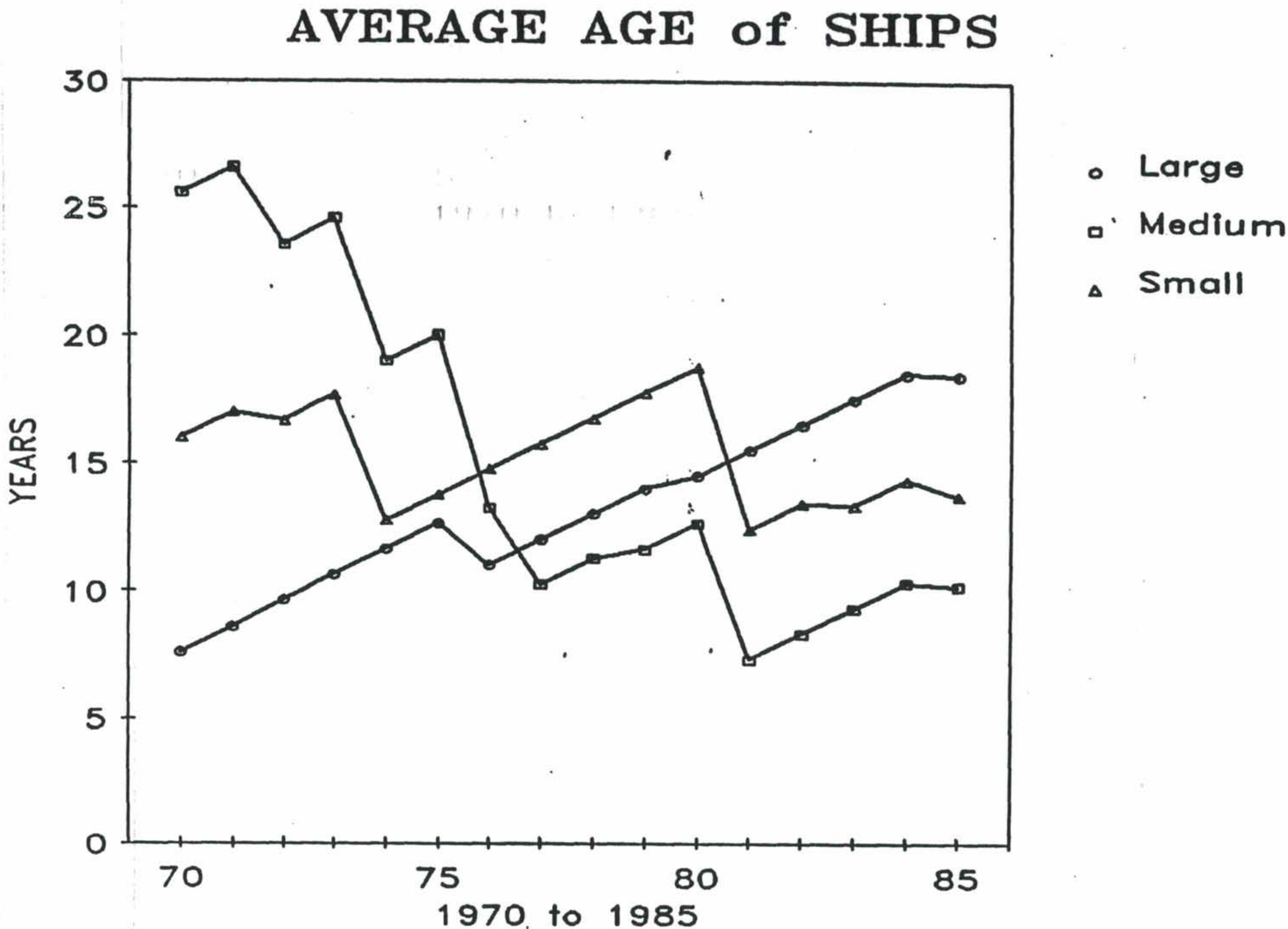


Figure 2


AVERAGE AGE of SHIPS
YEARS
30
25
20
15
10
5
0
70
75
80
85
1970 to 1985
Large
Medium
Small

are also budgeted to construct an AGX sometime after 1990; this is expected to result in the retirement of the two remaining AGOR-3 vessels. NSF has plans to acquire, over the next 5 to 6 years, a research ship with ice breaking capability by the Division of Polar Programs (DDP) and three new research vessels by the Division of Ocean Sciences (2 large general purpose and 1 smaller ice strengthened). The new DPP ship will probably not be part of the UNOLS fleet.

At the same time as new ships are coming on line and older ships are being retired a restructuring is occurring in oceanographic research. Large scale initiatives are being planned to tackle problems of global scale e.g. global climate change. These global programs call principally for larger vessels; however, we anticipate that the needs for the smaller vessels will remain strong. NSF has responded to these plans by projecting significant increases in research and ship support. The other funding agencies may follow their lead. This suggests a potential dilemma. Plans are being prepared to lay up large research vessels just as the demand for large ship time could increase dramatically.

As a result the FIC appointed a subcommittee of R.T. Barber, M.G. Langseth and J.W. Murray (chairman) to examine the demands of oceanographic science for ship use. Two approaches were used. The first was to evaluate the needs of the new large research initiatives. The second was to examine funding agency plans in terms of current and projected budgets. The objective is to determine whether the fleet capability projected in the UNOLS plan is adequately matched to the science being planned. Will our fleet meet the demands over the next two decades?

I. The Ocean Sciences: Core Research Program

The core research program in ocean sciences consists of individual projects supported primarily by NSF, ONR and to a lesser extent by DOE, NOAA, NASA and USGS. Long range projections of NSF support have been made in the NSF Long Range Plan. The new initiatives that are included in the Global Geosciences Program are the featured part of that plan. Nevertheless, the NSF long range plan recognizes that the core programs in biological, chemical and physical oceanography, and marine geology and geophysics will continue to provide traditional support to relatively small projects by individual investigators.

NSF anticipates that after 1988 the increases in support will be due largely to the new initiatives. Because these initiatives have not yet influenced UNOLS ship usage, the summary of UNOLS fleet statistics as prepared by the UNOLS office is the best estimate of the present demand by the core programs. This summary for 1982-1988 is given as Appendix I. The condensed summary below shows the number of ships involved and the total number of days supported (for class II, III and IV ships only). The UNOLS summary breaks this down further into the class sizes of ships and the funding sources.

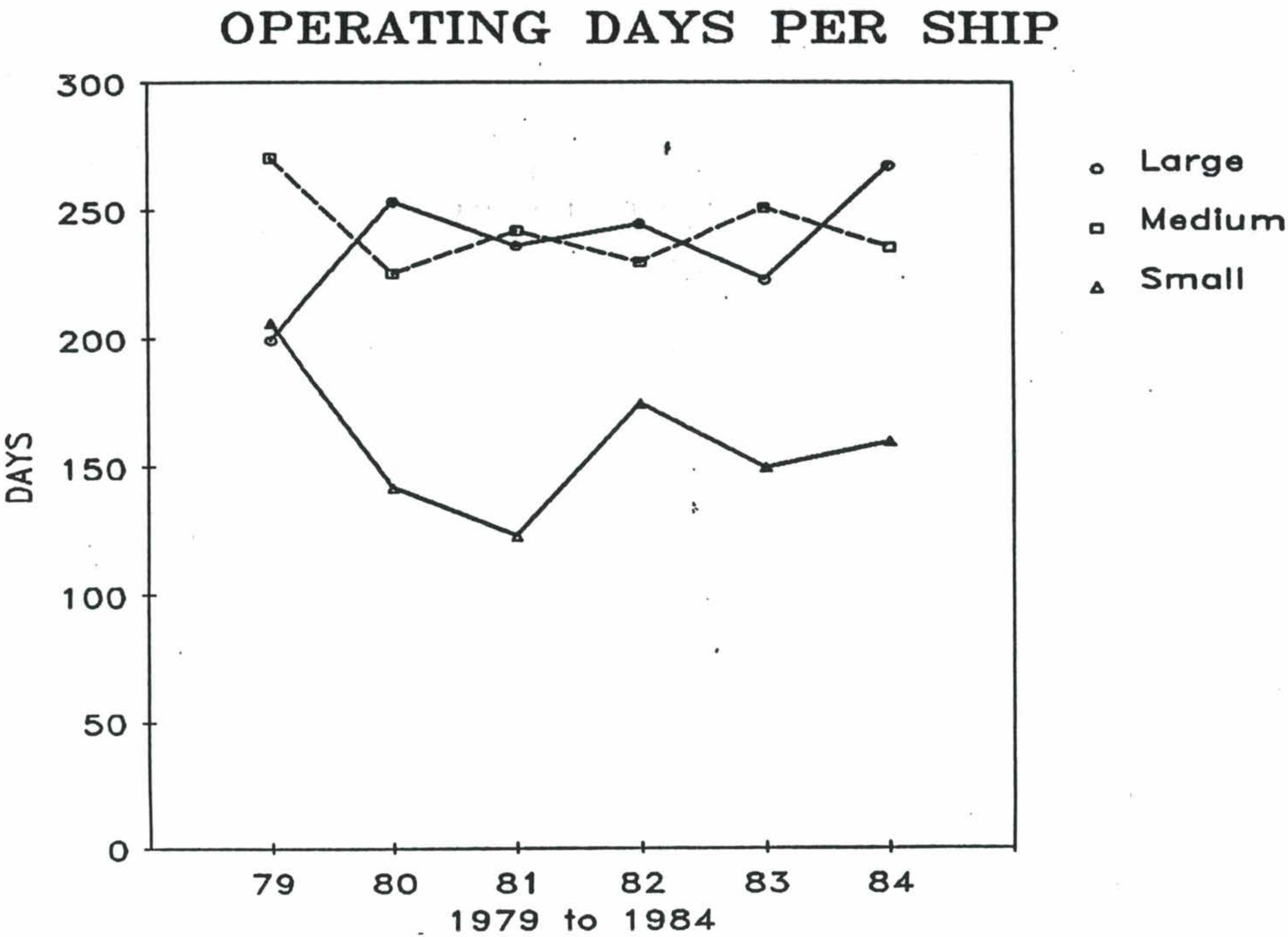
Year	Number of ships	Total days	Average days/ship
1982	17	3,643	214
1983	18	3,697	205
1984	21	4,250	202
1985	21	4,203	200
1986	19	3,766	198
1987(projected)	20	4,250	212
1988(estimated)	19	4,569	240

The average days of operation per ship has averaged about 200 days/ship when all 3 classes are considered. The average for the larger class II and class III vessels has been about 250 days/year (figure 3, Appendix I).

For the past 4 to 5 years we have had a submersible support ship (Atlantis II) in the UNOLS fleet. We can project this need into the 1990's. For our purposes this is considered part of the core program.

The biggest uncertainty in estimating future demands of the core research programs on ship time is evaluating the impact of the initiatives on the core program. The most generous prediction is that the core program demand will remain at its present level or about 4,000 days per year. The actual usage will probably be less as the initiatives siphon off the scientists and program emphasis continues to shift toward the initiatives.

Figure 3


OPERATING DAYS PER SHIP
300
250
200
150
100
50
0
DAYS
79
80
81
82
83
84
1979 to 1984
Large
Medium
Small

II. The Global Ocean Science Program (Science Initiatives)

Natural scientists have increasingly realized there are major environmental questions that need to be addressed on a global scale. Examples include the influence of the ocean on global climate and the fate and results of the increase in fossil fuel CO_2 and other radiatively important trace gases (e.g. methane, fluorocarbons) in the atmosphere. This has led to the development of several international programs endorsed by the International Council of Scientific Unions (ICSU), the Intergovernmental Oceanographic Commission (IOC), the World Meteorological Organization (WMO), and other scientific and international organizations.

The oceanographic community has responded by planning several scientific initiatives. Federal ocean funding agencies in the U.S. have, in turn, initiated programs to address these global initiatives. These initiatives have significant ship time requirements and specific needs with regard to platform type. In this section we review those needs by individual scientific program. We are at an early stage in the planning process and some of these initiatives are further along than others. Nevertheless, this is a logical point to start, because in principle, it is the science that drives the funding support that drives the ships.

This report will follow the organization of the NSF Long Range Plan for Ocean Sciences, recognizing two new broad initiatives: Global Ocean Studies and Ocean Lithosphere Studies. Each of these initiatives is composed of sub-initiatives or components. Together these initiatives have been included in the NSF FY 1987 budget as the Global Geosciences Program. This discussion follows the organizational framework of the NSF Long Range Plan.

Initiative 1: Global Ocean Studies

IA) Global Ocean Circulation, Climate and Productivity

IA-1) World Ocean Circulation Experiment (WOCE)

The fundamental rationale for WOCE is to understand the role of the ocean in climate. The primary scientific objective is to understand the general circulation of the global ocean well enough to be able to model its present state and predict its evolution in relation to long-term changes in the atmosphere. Nine specific scientific objectives are discussed in detail in U.S. WOCE Planning Report Number 3 (1986). The primary practical objective is to provide the scientific background for designing an observing system for long-term measurement of the large scale circulation of the ocean. A key element of the scientific plan is, for the first time, to survey the ocean circulation globally for a brief period with the aim of collecting a data base that will support the development of global eddy - resolving ocean circulation models. The planning for WOCE has been ongoing since 1980.

As currently envisioned there are two aspects of WOCE requiring ship time.

a) WOCE Hydrographic Program

There will be a hydrographic survey that will extend from about 1991-1997. Tracers to be measured include salinity, nutrients, tritium, helium 3 and fluorocarbons. The one time survey will require about 7 ship years. Repeated survey work may require another 2-4 ship years.

The research vessel requirements were discussed at a U.S. WOCE meeting held at Scripps in January 1987. These include: Approximately 30 berths for scientific personnel

2000-3000 sq. ft. of lab space

4 specialized 20 ft lab vans

Extensive deck space for 18 Gerard bottles and 50-60 drifters

Wet lab/rosette sampling room

CTD winch with motion compensation or cable tensioning device and coaxial cable

Articulated crane

Extended duration (92% of the legs are less than 45d but some are as long as 75d)

The nature of these requirements implies that the largest research vessels will be needed. The hydrographic legs will require a dedicated ship because of the extensive laboratory set up. The Knorr or Melville will be suitable after their stretch and refit. However, it appears at present as though only 2-3 of the 7 years needed for the basic hydrographic survey and about half of the time required for the repeated surveys (1-2 years) will be conducted on U.S. UNOLS vessels. Among the foreign research vessels which might be suitable are:

Discovery (UK, being considered for a refit)

New Hakuho Maru

Rapahela (converted Meteor I) (New Zealand)

Meteor II (FRG)

Polarstern (FRG)

Marion Dufresne (France)

Africana (R. South Africa)

Agulhas (R. South Africa)

Proposed track lines for the WOCE Hydrograpic Program are shown in Figure 1.

b) Process Studies

Special studies of processes or detailed studies of special regions will also be conducted as part of WOCE. Although the planning is in early stages these projects will probably require about 4-5 ship years over the 1990-1997 time frame. Present vessels of the UNOLS fleet will probably meet U.S. ship needs; intermediate size vessels will probably suffice for much of the work.

1A-2) <u>Tropical Ocean/Global Atmosphere (TOGA)</u>

The primary scientific objective of TOGA is to gain a description of the tropical oceans and the global atmosphere as a time dependent system in order to determine the extent to which the system is predictable on time scales of months to years.

TOGA is organized and coordinated by an International Scientific Steering Group. In the U.S. an NRC/NAS TOGA Review Panel provides oversight of the U.S. component of TOGA. The NOAA laboratories play a significant role in the U.S. component although NSF provides major funding to academic scientists. There is a strong international aspect to TOGA and much sharing of research vessels and utilization of ships of opportunity. In recent years, foreign research vessels from China, France, Australia and Peru have been utilized. TOGA ship use can be classified as either monitoring or special projects.

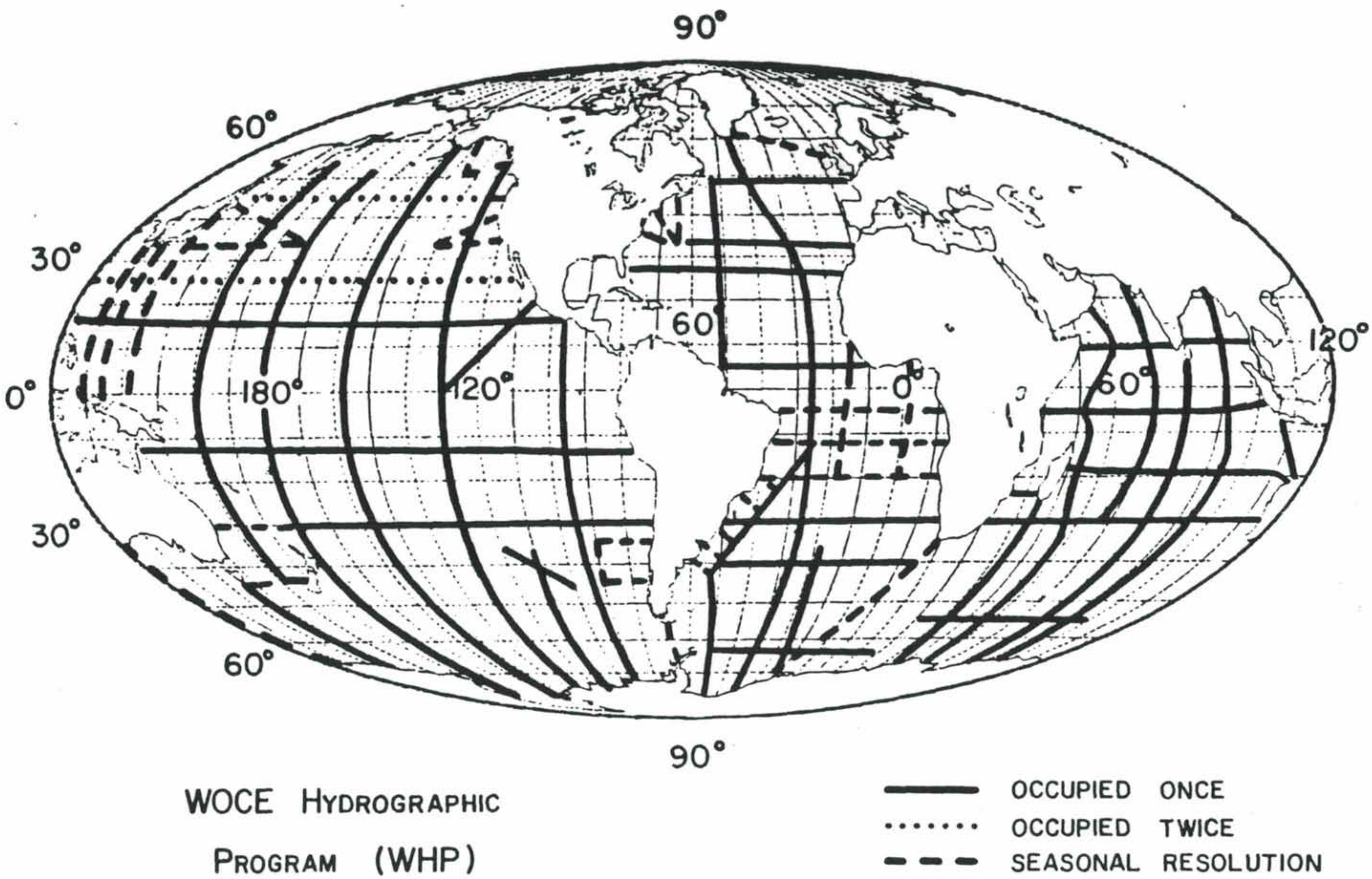


Figure 1. Location of the tentative track lines of the WOCE Hydrographic Program.

a) Monitoring

One 40- to 60-day cruise is conducted each spring and fall on NOAA Class A vessels in the eastern tropical Pacific. These NOAA cruises are projected to continue for the duration of the study (through 1995).

b) Special Projects

There are 1 or 2 process-oriented field projects per year that use between 2 to 4 months of UNOLS ship time.

1B) Global Flux Study (GOFS)

GOFS was born out of a desire to understand how to predict the fate of fossil fuel CO_2 in the ocean. Its main goal is to determine on a global scale the physical, chemical and biological processes controlling the time-varying fluxes of carbon and associated biogenic elements in the ocean and to evaluate the exchanges with the atmosphere, seafloor and continental boundaries. The aim is to understand the processes governing the production and fate of biogenic materials in the sea well enough to predict their influence on, and responses to, global scale perturbations. GOFS will be the U.S. component of an internationally coordinated decade-long Joint Global Ocean Flux Study (JGOFS). GOFS planning began with a scientific meeting in Woods Hole in September 1984.

Present plans are for three parts to the field program.

a) Global Survey

A global survey of the oceanic CO_2 system will be conducted in cooperation with WOCE. Small volume samples for total CO_2 and either pCO_2 or alkalinity will be collected during the WOCE global survey. It has been agreed that GOFS work on CO_2 parameters will utilize 2 of the 25 to 30 berths required by WOCE. A third WOCE berth has been requested by GOFS for a pigment analysis program for the purpose of satellite color calibration.

In addition, GOFS will probably require 1 to 2 additional ship years on UNOLS vessels over the time span of the global survey.

b) Time Series Stations

Data sets are needed to describe seasonal and interannual time scales which may be obtained in part by establishing time series stations at diagnostic locations. Ease of access is also an important factor for locating such stations and the preliminary plan is to establish these stations near islands e.g., plans are proceeding for the development of time-series studies off Bermuda and Hawaii. Local non-UNOLS ships could be used at each location, and it is unclear whether any of this work will be done from UNOLS vessels.

c) Process Oriented Studies

Research cruises (perhaps multiship) will be conducted in key oceanographic areas to study the numerous processes that control the dynamics of biogeochemical cycling in the ocean. There will be international cooperation in these projects through JGOFS. Planning is moving rapidly at present and it looks like the demand for the U.S. UNOLS fleet will be for 9 months of ship time per year for about 10 years. The initial plan is for a North Atlantic program that will involve 1) transect studies, 2) time series studies, and 3) process studies. A North Pacific planning meeting will be held in February 1988. Coordination with WOCE is being explored. Because most of these studies will be multi-investigator interdisciplinary projects, large research vessels will receive most of the use. The minimum suite of measurements (defined as level 1) will require approximately 13 investigators. The process studies (level 2) could easily add another 17. The only U.S. UNOLS ships, in the current fleet, adequate for this study will be the Knorr or Melville after their stretch/refit.

1-C) Coastal Ocean Dynamics and Fluxes

A major component of global ocean flux studies is a scientific understanding of coastal oceanography. However, no developments yet give an indication of its impact on the UNOLS fleet.

1-D) Global Ocean Ecosystems Dynamics and Recruitement

The objectives of this program will be to understand the climate, physical factors and variability in primary production, secondary production and predation that regulate age-cohort class success and therefore variability of biological populations. Six working groups have been set up to prepare white papers which will provide the focus for a general meeting in the spring of 1988. At present there is no formal steering committee but a proposal for planning money has been written by JOI Inc. In this sense it is 3 or more years behind GOFS.

It is anticipated that recruitment research may begin in 1989 or 1990. It will probably not have as many long or regularly spaced cruises as WOCE or GOFS, but likely will combine biological studies within a framework of good chemical and physical measurements. Ships with large scientific complements and laboratories will be needed because of the interdisciplinary nature of the projects but they will probably not require a dedicated ship. Some projects may require multi-ship cruises, perhaps in which one large (class II) ship ranges widely while one or two smaller ships (possibly class

III or IV) conduct detailed measurements on smaller spatial scales. In this way the study will link small and meso-scale processes.

1-E) Land/Sea Interface

The objectives of this program will be to study the interface between the land and ocean in terms of biological productivity, geochemical processes, origin of sedimentary rocks and the evolution of life. A workshop was held in Woods Hole in May 1987 to advise NSF about research needed in this area. The report of the workshop will be distributed by the end of 1987. Present developments of this initiative give no indication yet of its impact on the UNOLS fleet.

Initiative 2. Ocean Lithosphere Studies

2-A) Ridge Interdisciplinary Global Experiments (RIDGE)

The scientific objectives of RIDGE are to obtain a long-term data set to test hypotheses and answer scientific questions regarding ridge crest processes. These include the driving forces of plate tectonics, thermo-mechanical properties of the oceanic lithosphere and hydrothermal, volcanic and mineralization processes.

Planning for RIDGE has just begun; the initial scientific organizational meeting was held in April 1987 at Salashan, Oregon. The preliminary scientific plan is for three components that will involve UNOLS ships.

1) Global mapping of the crest of the Mid-Ocean Ridge (MOR)

The goal of this component is to map the axial zone of the MOR along much of its 40,000 km length. The axial survey will include multibeam bathymetry, SEAMARC II surveys, multichannel seismic (MCS) lines along the MOR, as well as gravity and magnetic measurements. There will be little or no station work done by ships while engaged in the axial mapping project.

It will require 2-3 ship years to carry out the MOR survey in the time period from 1990 to 1995. Class II ships that carry SEABEAM, SEAMARC II and MCS will probably be dedicated to the RIDGE survey for significant periods of time. It will be most efficient to use ships that carry both multibeam and MCS capability.

2) Regional studies of segments of the MOR

Up to five segments on the MOR system will be mapped in greater detail. Their size will be approximately 200 X 500 km. The surveys will include multibeam and side-scan mapping, and will emphasize station work such as dredging and heat flow. Deeply towed vehicles for high resolution bottom studies and submersibles will also be used for this part of the RIDGE program.

Plans are still very preliminary, but it is estimated that the detailed study of MOR segments will require 3 to 5 ship years. A mix of class II and III ships could be used for the sampling and station work. The Atlantis II is required for the submersible operations, and class II MG&G ships are required for the deep tow and bathymetric work. The time frame for this component of the program will probably be carried out in 1990 to 1995.

3) Long-term monitoring stations on the sea floor

A critical part of the RIDGE program is to install instrumented observatories on the sea floor at up to three locations on the axis of the MOR. These observatories will consist of a suite of sea-floor instruments that will monitor areas that are about 30 km along strike and 10 km across. The goal is to record data at these observatories for at least 10 years. A wide variety of instruments will be incorporated into these long-term observatories; seismometers, thermometers, flow meters, photographic monitors of biological and geothermal activity, and others.

Deployment of the RIDGE observatories will require considerable deep submersible time, and use of the larger Class II ships. A ship with a large centerwell would be preferred for many of the deployment activities. Visits to the observatories will be made periodically to retrieve data and replenish and refurbish the instrumentation. Much of this work can be done by Class III ships and ships of opportunity. Some ship time will also be required to do detailed and high resolution geological surveys of the sea floor in areas where deployments are to be made. We estimate that about 0.5 years of Class II shiptime will be required per deployment of an observatory and about 4 ship months per year for maintenance of all installations during the period from 1992 to 2002.

2-B) <u>Tectonics and structure of submerged continental margins</u>

There are two distinct types of margins: subduction margins and rifted margins. Both types will be important components of the "ocean lithosphere studies" cited in the NSF Unified Plan for Ocean Sciences.

A. The major questions that will be addressed on rifted margins are:

1) What is the geology, structure and evolution of the continental crust underlying the passive margins. What are the important hydrological, geothermal and geochemical processes occurring in this regime?

2) How does the geology vary along a passive margin and with age? What is the relation between tectonic evolution of rifted margins and onshore basins?

Studies of passive margin formation are being actively pursued as part of the core MG&G programs, and plans for a program are in the earliest stages of development. However, some estimates of the amount of shiptime and types of ships can be made. A key element in all passive margin studies will be large aperture MCS surveys using powerful acoustic sources. Some of the studies will be multiship operations. An effective passive margin program will require at least 2 months per year of MCS work using advanced techniques. A small amount of station work by Class II and III ships (2 ship month per year) and up to 2 month per year of deep submersible work. A five or ten year program will probably not get started before 1991.

B. Addressing problems at subduction or active margins will require quite different techniques. The major questions include:

1. What is the structure and composition of the accretionary complexes, the overiding wedge and volcanic zone?

2. What are the nature of the many processes active in large sedimentary wedges; deformation, diagenesis, and metamorphism?

3. What is the role of fluids in the mechanical, chemical, petrological and thermal regime of accretionary complexes?

4. What processes and parameters control the geological and tectonic diversity of subduction complexes?

Field programs addressing these questions will require:

* A combination of high resolution, 3-dimensional and deep penetrating MCS techniques. One or two months per year would be required during a ten year program. The more sophisticated studies may require leasing commercial technology.

* Submersibles will be extensively used for studies of the small-scale structure, sedimentary petrology, and fluid expulsion features.

* Deep tow studies using side-scan sonar, near bottom seismic experiments will be employed.

* Multibeam and side scan bathymetric surveys from surface ships will be a fundamental part of studies of subduction complexes, as will station work to measure heat flow, water flux and in situ pore-pressures.

* Deep sea drilling has been and will continue to be an important component of studies of subduction zones. Some of the marine geological and geophysical work may be done as surveys in support of drilling.

Many studies of subduction margins are currently in progress as part of the NSF Ocean Sciences core programs. A more structured program could require an additional 1 to 2 ship months per year, assuming that initiation of a subduction margin program would enlist some of the investigators now supported through the core program.

Multichannel seismic (MCS) technology:

MCS studies warrant further discussion because they require increasingly expensive systems and over the past decade the systems in the academic community have been hard to support financially. At present there are two vessels in the UNOLS fleet with MCS capability, R/V CONRAD and R/V MOORE. The MCS systems currently owned by the academic community are much below state of the art, but recent NSF funded improvements in the two systems have made them adequate for most projected fundamental research in marine geoscience.

The level of support for both MCS ships over the past few years has been on the order of 300-350K per year, which translates into about 3 to 4 months of ship time. The current use is a mix of individual projects supported by NSF as well as geophysical site surveys in support of the Ocean Drilling Program.

The projected use MCS can be broken down as follows:

1. Core programs are the main source of funding for MCS. The traditional support is 1-2 months per year.

2. ODP site surveys currently use 1 to 2 months per year. Although the 1988 USSAC program plan requested a doubling of funds for regional geophysics and site surveys, NSF has chosen to keep the funding at current levels. Thus, an increase in the immediate future is not likely.

3. If the new Ocean Science initiatives in "Ocean Lithosphere Studies" comes to fruition the utilization of the academic MCS systems for these programs could amount to 3 to 5 months per year. The utilization will probably build over a 4 to 5 year period.

4. ONR has supported a few MCS experiments in the past, the North Atlantic Transect and the soon to be implemented Western North Atlantic experiment. Currently ONR shows little interest in supporting extramural academic MCS research. Unless prospects change only a few special programs will be supported by ONR during the next 5 years.

In summary, if plans are realized, over the next five years, MCS usage will grow to about 6 to 8 months per years. The support would derive almost entirely from NSF.

Summary: Scientific Demands on U.S. UNOLS Fleet

Initiative 1: Global Ocean Studies

1A.1-WOCE	7 to 9 ship years over the eight year period of 1990-1997. This estimate is based on 2 years for the basic global survey (100% class II), 1-2 years for repeated sections (100% class II) and 4-5 years for process studies (100% class III).
1A-2-TOGA	0.3 ship year per year over the next 5 years (100% class III)
1B-GOFS	1 to 2 ship years for the global survey between 1990-1995 (50% class II, 50% class III) 7.5 ship years for process oriented studies between 1990-2000 (50% class II, 50% class III)
1C-Coastal Ocean Studies	no estimate
1D-Recruitment	no estimate
1E-Land/Sea Interface	no estimate

Initiative 2: Ocean Lithosphere Studies

	For the period 1990-1995:
2A-Ridge	2 to 3 years for the globial axial mapping (60% class II, 40% MCS) 3 to 5 years for the regional studies (30% class II, 40% class III, 20% MCS, 10% Atlantis II) 2.5 to 3 years for long-term stations (50% class II, 30% class III, 20% Atlantis II)
	For the period 1991-1996:
2B-Continental Margins	2 to 3 years for rifted margins (17% class III, 33% MCS, 33% Atlantis II) 2 to 3 years for subducted margins (35% class II, 15% class III, 30% MCS, 20% Atlantis II)

Core Research Programs

The most optimistic upper limit is that the current UNOLS demand represents the core demand and this will continue without increase or decrease into the next decade. There would be about 4,000 days per year or 20 ships of various sizes per year.

On this basis it would appear that the demand for the U.S. UNOLS Fleet will increase from its present 20 ships to 24 ships from 1990-1995. The demand from the present global initiatives will then decrease to 21-22 ships from 1995-2000 (Figure 2). It is reasonable to expect that the high demands for the new initiatives from 1990 to 1995 will result in some reduction in the core program demand, however this is difficult to evaluate at present.

The new Global Initiatives will almost certainly result in growth of the field of ocean sciences. The expectation is that these initiatives will either continue in some form or be replaced by new ones so that it is reasonable to predict that a UNOLS fleet of 22 to 24 ships will be needed through to the year 2000.

Figure 2. Present estimates of U.S. UNOLS ship needs by the Core Programs and new NSF Global intiatives.

```
                          YEAR

              1990             1995            2000

              I-----------------I---------------I

WOCE          I----------------------I
                   1+/yr   (50% ≥ class II,  50% class III or IV)
TOGA          I-----------------I
                 0.33/yr (class III)
GOFS          I-----------------I
                 0.33/yr (50% class II, 50% class III)
              I-------------------------------I
                       0.75/yr  (50% class II, 50% class III)
RIDGE         I-----------------I
                0.33/yr  (MCS)
              I-----------------I
                1.5/year (≥ class III)
Continental         I-----------------I
Margin               0.33/yr MCS
                    I-----------------I
                     0.66/yr (≥ class III)
CORE          I--------------------------------I
                   20/yr  (class II, III, IV)
----------------------------------------------------------------

Total         I-----I
                24.2
                    I-----------I
                        25.2
                                I-----I
                                 22.7
                                      I-----------I
                                          20.8
```

III. Scientific Support

Another approach to estimating demand for the UNOLS fleet is to look at the past, present, and projected budgets by NSF, ONR and other funding sources. These numbers are summarized in Table 1. Most ship support is provided on a calendar year basis, so this table was prepared accordingly.

The non-ONR ship support figures for the years 1981 to 1988 (projected) was obtained from NSF staff and the UNOLS office. The NSF long range plan (p77 table IV-G) shows predictions for ship operations from 1984 through 1996. The NSF plan separates the core program and the global program, which are listed separately in Table 1 together with the total. We have shown only the support projected for ship operations. Alvin support is not included, but the Atlantis II is. Also included in the ship operations budget line is some support for the Ocean Drilling Program, even though Ocean Drilling is also shown separately in the NSF budget (LRP p69). This amount was estimated to be about $1.1 million for 1988.

The actual expenditures by NSF and their LRP overlap now by 5 years and provides a test of the estimates in the NSF Long Range Plan. The actual growth of the NSF ship support is already falling behind the Long Range Plan by about 20% or $5.2 million in 1988!

The ONR ship support numbers for 1981 to 1988 (projected) were obtained from ONR and UNOLS staff. ONR has recently announced a funding enhancement of $5M per year beginning in 1988. This will be added onto $3.6 M which is considered by ONR as their projected base line level prior to this enhancement.

The total number of ship days supported by the three funding sources are shown for 1981 to 1988. These were obtained from the UNOLS fleet statistics summary which is attached as Appendix I. Ship usage is grouped according to class of ship. Only class II, III and IV ships are included.

The relation between ship support and days supported is also given in Table 1. Because large ships are more expensive than small ships, this ratio reflects the mix of ships supported by the different funding sources. It is a good index of the cost of fleet operation. From 1981 to 1988 the cost has been essentially constant in spite of inflation, averaging about $8,500 per day with a standard deviation of about 4%.

One approach for determining the number of ships required is to use the projected budgets for ship support, the projected cost per day, and the average number of days per ship. Although it is not a reasonable long range projection we have assumed, for the purposes of this exercise, that the cost per day will remain at $8.5 thousand. In projecting ship support, we assume that actual NSF support will continue to lag the long range plan by 20%. Thus, while Table 1 indicates that $61.0 million will be available for ship support in 1989, we use $51.3 million in this calculation. On this basis the budget predicts a demand for 6056 days or 24 ships in 1989, assuming 250 days/ship. It appears that a safe prediction (based on ship support projected to be available) is that requirements for the UNOLS fleet will increase from 20 (at present) to about 24 as the new Global Initiatives come on line. This is consistent with the earlier estimate of 22 to 24 based on the preliminary plans of the specific programs.

Table 1 shows the actual ocean sciences research support (OSRS) (physical, chemical, biological, MG&G) for 1981 to 1987 from the NSF Ocean Sciences Division (from NSF staff) and the predicted values from the Long Range Plan. The long range plan has separate estimates for core programs, critical needs and global programs (see p69 and p70 of the LRP). The actual

NSF research support for 1987 ($66.5 million) is in good agreement with the long range plan estimate ($68.3 million). The projected actual budget for 1988 is 10% less than the LRP indicating that the LRP may be a little optimistic.

The last row of Table 1 shows the ratio of NSF-OSRS support to NSF ship days. This ratio has been remarkably constant at about $18.5 thousand/day until 1986. The increases in 1987 and 1988 probably reflect planning and equipment items for the new initiatives. Assuming this ratio stays at 18.5 and that the actual NSF-OSRS support continues to lag the LRP by 10% (i.e. $118 million in 1989), the projected need is for 6378 days of ship time in 1989. This is significantly larger than the projection based on ship support; it seems unrealistic to envision the oceanographic community using that much more ship time.

In summary, the projected increases in the ship support and ocean science research support lead to the predictions that the demand for ship time will increase substantially. Although the predictions become less reliable with time it appears that on the basis of financial support a UNOLS fleet of 24 vessels will be required by 1989.

Table 1: Summary of ship support and UNOLS ship days according to different funding sources. Based on calendar years. Page numbers refer to NSF Long Range Plan.

	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
Ship Support ($M)																
NSF (Actual)	20.2	20.5	23.6	25.2	25.1	25.2	27.7	30.4								
(2) NSF (LRP Core Programs p77)				25.3	27.1	26.4	26.0	26.0	28.6	31.5	34.6	38.1	41.9	46.1	50.7	55.7
(LRP Global Programs p77)							3.2	9.6	19.8	28.7	37.4	45.1	49.6	53.6	56.2	59.0
(Total)							29.2	35.6	48.4	60.2	72.0	83.2	91.5	99.7	106.9	114.7
ONR	3.4	3.4	3.9	4.0	4.1	3.4	5.7	5.4	←------(3.6+5)--------------→							
Other	6.0	4.7	5.7	6.8	6.3	4.4	3.6	2.9	←------(4.0)----------------→							
TOTAL	29.6	28.6	33.2	36.0	35.5	33.0	37.1	38.7	61.0	72.8	84.6	95.8	104.1	112.3	119.5	127.3
Ship Days																
NSF	2364	2570	2690	2956	3013	3056	3151	3083								
ONR	495	394	447	426	446	351	585	1091								
Other	727	679	560	868	744	359	514	395								
TOTAL	3586	3643	3697	4250	4203	3766	4250	4569	6056							
(ships)	(19)	(17)	(18)	(21)	(21)	(19)	(20)	(19)	(24)							
Ship Support/Days ($T)																
NSF	8.54	7.98	8.77	8.52	8.33	8.25	8.66	9.41								
ONR	6.87	8.63	8.72	9.39	9.19	9.69	9.74	7.79								
Other	8.25	6.92	10.2	7.83	8.46	12.3	7.00	7.34								
TOTAL (4)	8.25	7.85	8.98	8.47	8.45	8.76	8.61	8.38	8.47----------------------→							
NSF Ocean Science Division ($M)																
Research Support																
(3) Actual	47.4	47.0	49.9	54.6	58.3	56.9	66.5	74.3								
(1) LRP (OSRS Core Programs p69)				54.7	57.4	55.5	57.8	60.5	65.1	71.6	78.8	86.7	95.3	104.9	115.4	126.9
(OSRS Critical Needs p69)								1.5	21.0	32.8	45.5	49.0	47.7	45.5	45.2	48.6
(Global Program p70)							10.5	20.7	44.9	74.9	103.1	124.9	140.0	147.0	150.5	156.3
Total Research Support							68.3	82.7	131.0	179.3	227.4	260.6	283.0	297.0	311.1	331.8
NSF Science $ ($T) / NSF Ship Days	20.0	18.3	18.5	18.5	19.3	18.6	21.1	24.1								

(1) Science Research Support only, no ship construction or OCFS support included
(2) Ship operations and facilities only, no ship equipment or construction/conversion
(3) Does not include ocean drilling program
(4) The average of this ratio for 1981-1988 is 8.47±0.34 (4%)

APPENDIX I

UNOLS FLEET STATISTICS
FIVE YEAR SUMMARY
1982-1986

	DAYS/Percent NSF	ONR	OTHER	TOTAL	AVERAGE DAYS PER SHIP
1982					
Class II (5 ships)	956/78	168/14	102/08	1226/100	245
Class III (6 ships)	875/64	180/13	324/23	1379/100	230
Class IV (6 ships)	739/71	46/05	253/24	1038/100	173
< Class IV (7 ships)	496/66	23/03	237/31	756/100	108
FLEET TOTAL (24 ships)	3066/70	417/09	916/21	4399/100	183
1983					
Class II (5 ships)	836/75	212/19	69/06	1117/100	223
Class III (7 ships)	1166/68	205/12	332/20	1703/100	243
Class IV (6 ships)	688/79	30/03	159/18	877/100	146
< Class IV (7 ships)	484/61	39/05	274/34	797/100	114
FLEET TOTAL (25 ships)	3174/71	486/11	834/18	4494/100	180
1984					
Class II (6 ships)	1225/77	237/15	137/08	1599/100	266
Class III (8 ships)	955/58	189/11	508/31	1652/100	206
Class IV (7 ships)	776/78	0/0	223/22	999/100	143
< Class IV (6 ships)	430/76	30/05	107/19	567/100	94
FLEET TOTAL (27 ships)	3386/70	456/10	975/20	4817/100	178
1985					
Class II (7 ships)	1310/68	352/18	254/13	1916/100	274
Class III (7 ships)	788/67	74/06	315/26	1177/100	168
Class IV (7 ships)	915/82	20/02	175/16	1110/100	158
< Class IV (5 ships)	394/70	33/06	139/26	566/100	113
FLEET TOTAL (26 ships)	3407/72	479/10	883/18	4769/100	183
1986					
Class II (7 ships)	1330/83	172/11	110/07	1612/100	230
Class III (6 ships)	913/77	127/11	151/12	1191/100	198
Class IV (6 ships)	813/85	52/05	98/10	963/100	160
< Class IV (4 ships)	347/70	13/03	133/27	493/100	123
FLEET TOTAL (23 ships)	3403/80	364/09	492/11	4259/100	185
1982-1986 FIVE YEAR TOTALS					
Class II	5657/76	1141/15	672/09	7470/100	249
Class III	4697/66	775/11	1630/23	7102/100	209
Class IV	3931/79	148/03	908/18	4987/100	156
< Class IV	2151/68	138/04	890/28	3179/100	109
FIVE YEAR FLEET TOTAL	16,436/72	2,202/10	4,100/18	22,738/100	182
AVERAGE/YEAR	3,287	440	820	4,548	-

UNOLS FLEET STATISTICS
SHORT TERM PROJECTION

	DAYS/Percent				AVERAGE DAYS PER SHIP
	NSF	ONR	OTHER	TOTAL	
1987					
Class II (7 ships)	1401/77	293/16	117/07	1811/100	258
Class III (7 ships)	1076/71	252/17	185/12	1513/100	216
Class IV (6 ships)	674/73	40/04	212/23	926/100	154
< Class IV (4 ships)	479/81	10/02	104/17	593/100	148
FLEET TOTAL (24 ships)	3630/75	595/12	618/13	4843/100	202
1988					
Class II (7 ships)	1543/77	418/21	37/02	1998/100	285
Class III (6 ships	690/46	624/42	185/12	1499/100	250
Class IV (6 ships)	850/79	49/05	173/16	1072/100	179
< Class IV (4 ships)	328/75	16/04	94/21	438/100	110
FLEET TOTAL (23 ships)	3411/68	1107/22	489/10	5007/100	218

UNOLS FLEET STATISTICS
FIVE YEAR FLEET HISTORY
1982-1986

1981	1982	1983	1984	1985	1986	1987
Class II (5)	**Class II (5)**	**Class II (5)**	**Class II (6)**	**Class II (7)**	**Class II (7)**	**Class II (7)**
MELVILLE	MELVILLE	MELVILLE	MELVILLE	MELVILLE	MELVILLE	MELVILLE
KNORR	KNORR	KNORR	KNORR	KNORR	KNORR	28. KNORR
ATLANTIS II	4.	10.	13. ATLANTIS II	ATLANTIS II	ATLANTIS II	ATLANTIS II
1.	CONRAD	CONRAD	CONRAD	CONRAD	CONRAD	CONRAD
THOMPSON	THOMPSON	THOMPSON	THOMPSON	THOMPSON	THOMPSON	THOMPSON
WASHINGTON	WASHINGTON	WASHINGTON	WASHINGTON	WASHINGTON	WASHINGTON	WASHINGTON
				17. MOANA WAVE	MOANA WAVE	MOANA WAVE
Class III (8)	**Class III (6)**	**Class III (7)**	**Class III (8)**	**Class III (7)**	**Class III (6)**	**Class III (7)**
VEMA	5.	ENDEAVOR	ENDEAVOR	ENDEAVOR	ENDEAVOR	ENDEAVOR
ENDEAVOR	ENDEAVOR	OCEANUS	OCEANUS	OCEANUS	OCEANUS	OCEANUS
OCEANUS	OCEANUS	WECOMA	WECOMA	WECOMA	23.	WECOMA
WECOMA	WECOMA	GYRE	GYRE	GYRE	GYRE	29. GYRE
GYRE	GYRE	11. ISELIN	ISELIN	ISELIN	ISELIN	ISELIN
ISELIN	6.	NEW HORIZON	NEW HORIZON	NEW HORIZON	NEW HORIZON	NEW HORIZON
NEW HORIZON	NEW HORIZON	KANA KEOKI	14. FRED MOORE	FRED MOORE	26. FRED MOORE	FRED MOORE
KANA KEOKI	KANA KEOKI		KANA KEOKI	18.		
Class IV (6)	**Class IV (6)**	**Class IV (6)**	**Class IV (7)**	**Class IV (7)**	**Class IV (6)**	**Class IV (6)**
2. CAPE FLORIDA	CAPE FLORIDA	CAPE FLORIDA	CAPE FLORIDA	CAPE FLORIDA	24. PT SUR	PT SUR
ALPHA HELIX	7. CAPE HATTERAS	CAPE HATTERAS	CAPE HATTERAS	CAPE HATTERAS	CAPE HATTERAS	CAPE HATTERAS
CAPE HENLOPEN	ALPHA HELIX	ALPHA HELIX	ALPHA HELIX	ALPHA HELIX	ALPHA HELIX	ALPHA HELIX
3. EASTWARD	CAPE HENLOPEN	CAPE HENLOPEN	15. R. SPROUL	R. SPROUL	R. SPROUL	R. SPROUL
VELERO IV	8.	VELERO IV	CAPE HENLOPEN	CAPE HENLOPEN	CAPE HENLOPEN	CAPE HENLOPEN
R. WARFIELD	VELERO IV	R. WARFIELD	VELERO IV	VELERO IV	25.	R. WARFIELD
	R. WARFIELD		R. WARFIELD	R. WARFIELD	R. WARFIELD	
< Class IV (7)	**< Class IV (7)**	**< Class IV (7)**	**< Class IV (6)**	**< Class IV (5)**	**< Class IV (5)**	**Class IV (4)**
SCRIPPS	SCRIPPS	SCRIPPS	SCRIPPS	19.	27.	BLUE FIN
CAYUSE	CAYUSE	CAYUSE	CAYUSE	CAYUSE	BLUE FIN	LAURENTIAN
LONGHORN	LONGHORN	LONGHORN	16.	BLUE FIN	LAURENTIAN	BARNES
BLUE FIN	BLUE FIN	BLUE FIN	BLUE FIN	20.	BARNES	CALANUS
HOH	9. HOH	ONAR	ONAR	21. LAURENTIAN	CALANUS	
ONAR	ONAR	12. BARNES	BARNES	BARNES		
CALANUS	CALANUS	CALANUS	CALANUS	CALANUS		

NOTES:

1. CONRAD out of service (midlife) 1981.
2. CAPE FLORIDA entered fleet midway 1981.
3. EASTWARD operated only 2 days 1981.
4. ATLANTIS II out of service 1982 (modification); CONRAD back.
5. VEMA retired 1982 (no sponsored use).
6. ISELIN did not operate 1982 (no schedule).
7. CAPE HATTERAS operated all of 1982.
8. EASTWARD retired from fleet.
9. HOH retired during year.
10. ATLANTIS II out of service 1983 (modifications for ALVIN).
11. ISELIN back in operation 1983.
12. BARNES entered fleet late in 1983.
13. ATLANTIS II returned to service 1984.
14. FRED MOORE entered fleet 1984.
15. ROBERT SPROUL entered fleet late in 1984.
16. LONGHORN out of fleet 1984.
17. MOANA WAVE stretched to CLASS II 1985.
18. KANA KEOKI retired 1985.
19. SCRIPPS retired 1985.
20. ONAR retired 1985.
21. LAURENTIAN added 1985.
22. ISELIN operated only 4 days in 1985.
23. WECOMA did not operate in 1986.
24. CAPE FLORIDA transferred, renamed POINT SUR in 1986 (all vessel use listed herein).
25. VELERO IV retired 1986.
26. FRED MOORE had no federally funded use in 1986.
27. CAYUSE out of service 1986.
28. KNORR out of service - 6 months.
29. GYRE out of service - 6 months.

UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

FLEET IMPROVEMENT COMMITTTEE

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MEMO FOR MEMBERS, FLEET IMPROVEMENT COMMITTEE

A visit on 16 September 1987 to the Beaumont, Texas, Reserve Fleet was arranged with the Washington office of the Maritime Administration. Worth Nowlin, T. K. Treadwell, and Dean Letzring (Marine Superintendent, Texas A&M University) participated. The principal objective was to evaluate the potential of offshore supply vessels for conversion to oceanographic research ships, and the availability of hulls for such conversion.

The offshore supply vessels stored at the facility are all of 165-180' length, designated as "tug/supply" boats. The "tug" portion of the designation refers to their capability to tow utilizing a deck-mounted towing winch just aft of the forward superstructure. Main horsepower in a twin-engine diesel configuration is somewhat in excess of 2,000 HP. The term "supply" refers to the large open deck area midships and aft, with usually 36' to 40' beam and 110' to 115' in length. While the deckhouse arrangements vary a little, they all contain a galley/mess hall, lounge area, laundry, reefer storage, quarters of varying size on the 0-1 level, and a bridge deck/wheelhouse for control. Quarters are provided for 10 to 13 persons.

The Beaumont Reserve Fleet was selected for this initial viewing due to the number of hulls available for inspection within a reasonable travel distance from the College Station/Galveston area. Other groups of ships are in the Gulf, as well as the Atlantic and Pacific Coasts and overseas.

The first group of ships inspected was previously operated by the Marsea Company, with hulls 1-6 having been built by Halter Marine, and 7, 9, and 10 by Quality Shipyard. Although shore power was not available to all the vessels, our guide was able to provide lighting to MARSEA 2 (Halter) and MARSEA 9 (Quality) to give a chance for visual inspection and comparison of builders techniques. The MARSEA 2 was powered by two

GM-16 V149T1 engines for 2,560 HP. LOA was 180', beam 40', draft 14'. The reduction gears were Philadelphia, and two Detroit Diesel/Delco generators provided auxiliary power of 90 KVA. Bow thruster was powered by Detroit Diesel, tunnel type, probably variable speed. Bridge electronics were very basic, with 2 EPSCO radars, and SSI pilot. No communications noted.

The MARSEA 9 was 184' LOA, with 40' beam, but had a larger main power plant with two EMD16-645EZ providing 3,900 HP. The type of reduction gears was not noted. Auxiliary generators were two Detroit diesels with 124 KVA capacity. Additional machinery included two aircompressors for ships service with tanks. Bridge electronics were minimal and similar to the MARSEA 2.

Both of these vessels were in reasonable condition, due in part to the dehydration system having been activated since January 1986. No inspection of tanks or voids was possible. There was no indication as to how long the vessels had been in the reserve fleet, nor were machinery logs available for assessment of engine hours, maintenance, etc. MARSEA 2 was built in 1980, and MARSEA 9 in 1981. Topside hull condition was good, considering usage, lack of maintenance and exposure in recent years.

Another group of hulls were six operated by Leam, all built by Halter Marine. This group was built in 1982, and were all 180' LOA, beam 40', draft 14'. We inspected the Leam ALABAMA which was typical. It is powered by 2 Cat D399 main engines, providing 2,250 HP. Shore power lighting was not available so detailed inspection of the interior was not possible, but it was obvious that the vessel had not seen much service before going into the reserve fleet. Condition of the bridge and hull was excellent, even in exposed areas. It is possible that this group was built and delivered just as the oil industry began to fade, and the operator suffered foreclosure. Again, engine records were not available, but it was heartening to see vessels in a rather unused condition, even though the dehydration system had not been activated.

In summary, the hulls viewed in the tug/supply category at Beaumont were all in the 180' LOA range. Nothing in larger sizes was available. Certainly this group offers a choice of hulls in good to excellent condition, in the general size range of the GYRE class (as originally built), which might be suitable starting points for intermediate-size, general-purpose R/Vs.

However, the hulls as they now exist would require major alterations to accomodate the scientific work aboard and over the side, as well as the scientific party. Obvious and most costly would be:

-- Addition of a mid-ships deck house, generally similar to the ones installed on GYRE/MOANA WAVE, to house laboratories and scientific berthing.

-- While the main power is adequate, it does not have the capability for low-thrust shaft speed needed in many oceanographic maneuvers. This could be achieved by several options, such as changing reduction gears, installation of trawling valves, or substitution of variable-pitch props for the existing fixed pitch.

-- Auxiliary power would have to be greatly increased, both for the added housekeeping load as well as scientific demands. This preferably should include provision of "clean power" for science needs.

-- Housekeeping facilities, such as berthing, messing, lounges, fresh water, sanitatation, and evaporators would all need major upgrading. Tankage as appropriate would also have to be provided.

-- Hydraulic power for A-frames and (possibly) winches would have to be provided.

-- While it was not possible to check the fuel capacity, it is suspected that it is not adequate for 30-day cruises and would have to be increased, with tank conversions and associated piping.

-- One basic possible problem is that the present engine room spaces might be overcrowded by the addition of extra power and other machinery. It might be necessary to enlarge the engine rooms, or consider a stretch of the hull, to provide needed space. This of course would give additional space not only in the engineroom spaces but for topside and superstructure as well.

-- There would of course need to be provided the usual complement of winches, A-frames, deck piping and wiring, laboratory basic equipment, and bridge navigation, communications, and control standard for the intermediate R/V. Little if any of the existing equipment could be used for these purposes.

Given the above modifications, there seems to be no reason why these hulls could not be converted into a general-purpose intermediate R/V comparable to GYRE, or comparable to MOANA WAVE if stretched, operating with a crew of about 10, and carrying a scientific complement of about 22.

Costs for carrying out such a modification can only be given in estimates of ranges, both because the original condition of the hull and machinery is variable, and because the extent of upgrading is to some extent optional. However, assuming that the hull and main machinery are basically sound, the following estimates for major conversion items have been developed, in thousands of dollars. Note that this does not include instrumentation, either over-side or in the labs.

Construction and outfitting of two-level superstructure with labs and housekeeping facilities	400 to 500
Upgrading desalination, sanitation, water, air conditioning, air compressors, etc.	200 to 400
Modifying main propulsion to achieve slower speeds and greater range	200 to 700
Install radar, radios, internal communications	100 to 300
Provide 1 large and 2 small winches with associated frames, hydraulics and wire	1,000
Provide 2 auxiliary generators	. 100
Totals	2,000 to 3,000

Maritime Administration
August 31, 1987

VESSELS AVAILABLE FOR IMMEDIATE SALE

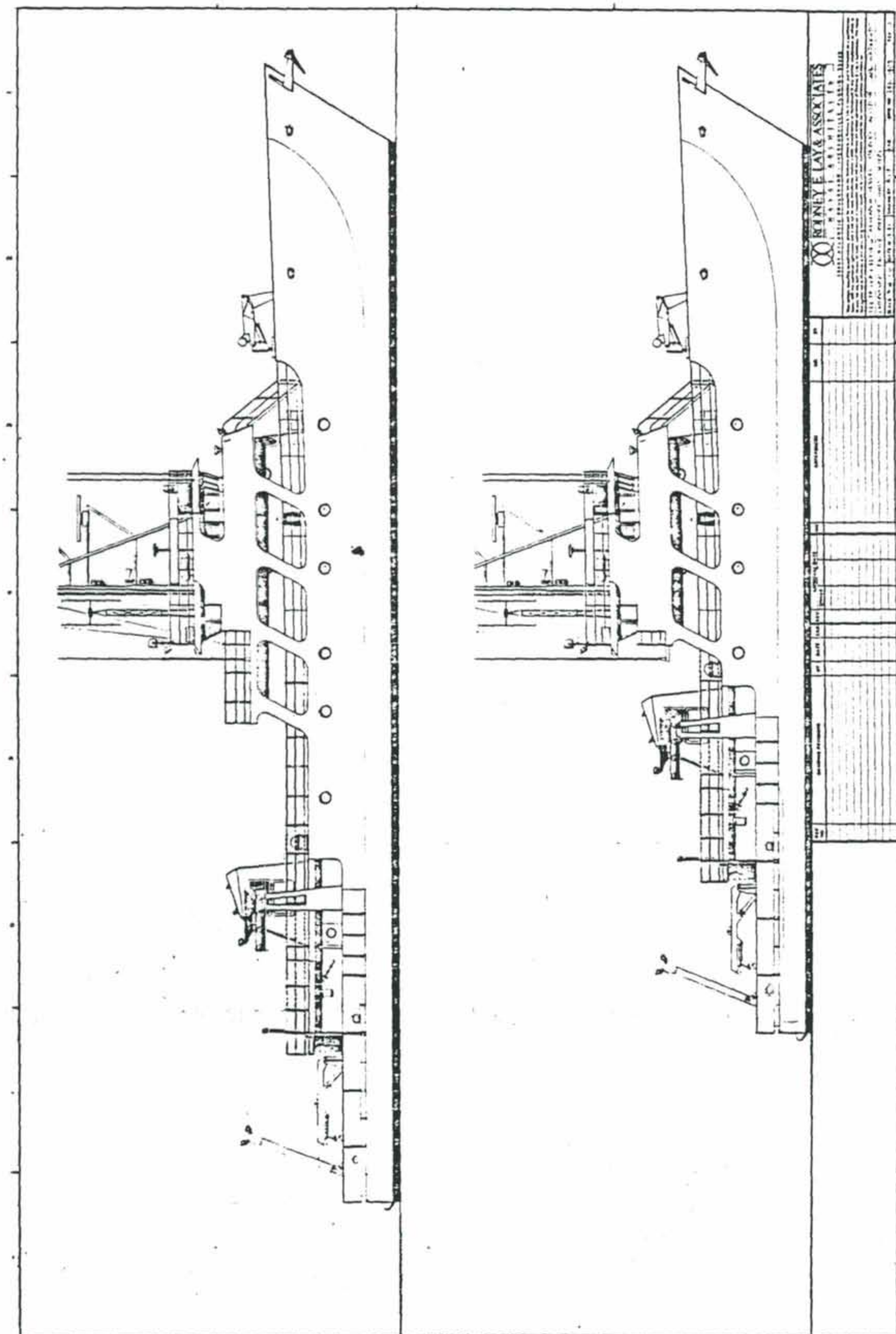
Vessel Type	Shipyard	Length	H.P./Propulsion	Delivery Date	Custodian/Location	Former Owner	MARAD Contact
Tug/Supply							
1. MARSEA 1-6	Halter	180'	2,560 H.P. 2-GM 16V 149TI	1980	Beaumont Reserve Fleet	Marsea Marine	Mr. Wakeman
MARSEA 7, 9, 10	Quality	184'	3,900 H.P. 2-EMD 16 645E #2	1981			
MARSEA 15	Halter	180'	2,250 H.P. CAT D399	1981	Galaxie		
2. INTERCEPTOR	Rysco	180'	2,520 H.P. 12-567BC	1980	Galaxie Marine Patterson, LA	Offshore Southern/ Offshore Ship Service	Mr. Wakeman
3. STATE SPIRIT	Bender	192'	2,250 H.P. 2 CAT-D399	1982	Cyprus	National Fleet	Mr. Ascienzo
STATE VIGOR	Bender	192'	3,900 H.P. 2 GM 16-645	1983	Cyprus		
STATE POWER	Bender	192'	3,900 H.P. 2 GM 16-645	1983	Cyprus		
4. MAE PELHAM	Zigler	154'	2,250 H.P. CAT D-399	1981	American Sea Venture	Linden, Inc.	Mr. Ascienzo
LOU PELHAM	Zigler	154'	2,250 H.P. CAT D-399	1981	Bourg, LA	Pelham Marine	
BEVERLY PELHAM	Zigler	154'	2,250 H.P. CAT D-399	1981			
LNG Vessels							
5. ARZEW GAMMA SOUTHERN 125,000 c/m	Newport News	948'	Steam Turbine 40,000 H.P.	1978	Middletown, RI	El Paso	Mr. Lax

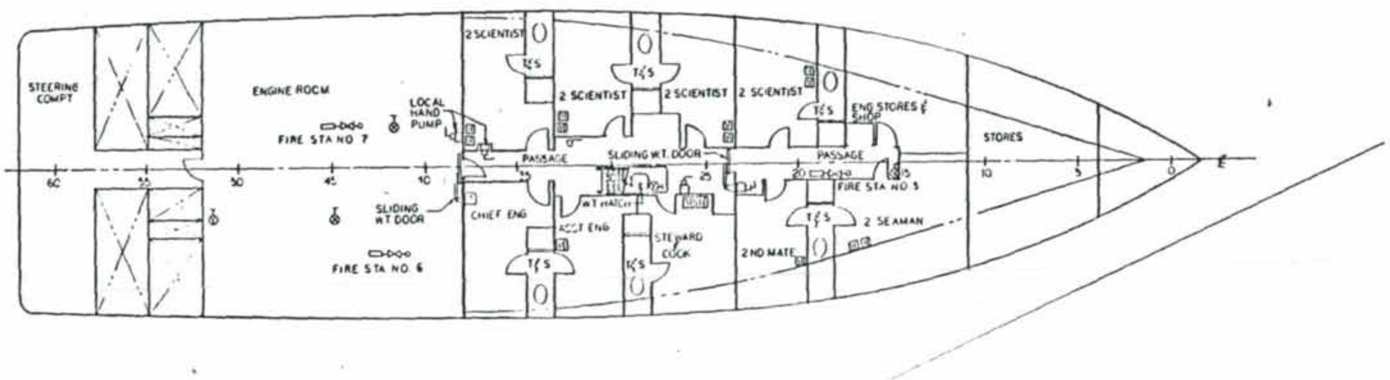
DEFAULTED VESSELS - MARAD WITHOUT TITLE

Vessel Type	Shipyard	Length	H.P./ Propulsion	Delivery Date	Custodian/Location	Former Owner	MARAD Contact
Tug/Supply							
1. MARSEA 8	Quality	180'	3,900 H.P. EMD 16-645	1981	4-Tidewater, Dubai	Marsea Marine	Mr. Wakeman
MARSEA 11	Halter	180'	2,250 H.P. CAT D399	1981	1-Galaxie Marine		
MARSEA 12	Halter	180'	2,250 H.P. CAT D399	1981			
MARSEA 17	Halter	180'	2,250 H.P. CAT D399	1981			
2. STATE BELLE	Bender	192'	2,250 H.P. 2 CAT-D399	1982	Egypt	National Fleet	Mr. Ascienzo
3. NOLA PELHAM	Quality	180'	2,250 H.P. CAT D-399	1981	Beaumont Reserve Fleet	Linden, Inc. Pelham Marine	Mr. Ascienzo
LILLIAN PELHAM	Halter	180'	2,560 H.P. 2-GM 16 Cyl	1979			
BARBARA PELHAM	Halter	166'	2,560 H.P. 2-GM 16 Cyl	1979			
SYDNEY PELHAM	Halter	166'	2,560 H.P. 2-GM 16 Cyl	1980			
EDITH PELHAM	Halter	166'	2,560 H.P. 2-GM 16 Cyl	1980			
JEANNE PELHAM	Halter	180'	2,560 H.P. 2-GM 16 Cyl	1980			
CRYSTAL PELHAM	McDermott	180'	2,250 H.P. CAT D-399	1982			
LOUISE PELHAM	McDermott	180'	2,250 H.P. CAT D-399	1982			
LYNN PELHAM	Halter	180'	2,250 H.P. CAT D-399	1983			
4. OCEAN DOLPHIN	American Marine	180'	3,200 H.P. EMD 16-567-BC	1975	OCEAN DOLPHIN Seattle, WA All others - not in MARAD custody	Ocean Marine Service	Mr. Wakeman
OCEAN MARLIN		220'	7,460 H.P. ALCO 16-251-F	1976			
OCEAN KING		220'	7,460 H.P. ALCO 16-251-F	1977			
OCEAN BONITA		220'	7,460 H.P. ALCO 16-251-F	1980			
OCEAN FIN		220'	7,460 H.P. ALCO 16-251-F	1978			
OCEAN RAY		220'	7,460 H.P. ALCO 16-251-F	1977			
OCEAN TARPON		220'	7,460 H.P. ALCO 16-251-F	1978			
5. INSIGNA	Rysco	180'	EMD 2,520 H.P. 12-567-BC	1980	Galaxie Marine	Offshore Southern	Mr. Wakeman
6. STATE COMMAND	American Marine	170'	5,750 H.P. EMD 16-645 E5	1974	Reserve Fleet	National Boat	Mr. Ascienzo
STATE EBONY	Blount	174'	2,550 H.P. CAT D 399	1976	Beaumont, TX		
STATE HAWK	Blount	137'	1,400 H.P. GM 12V 149	1978			

Vessel Type	Shipyard	Length	H.P./ Propulsion	Delivery Date	Custodian/Location	Former Owner	MARAD Contact
Tug/Supply (Cont.)							
7. LIBERATOR (ex MARK BRILEY)	McDermott	195'	2,520 H.P.	1979	Mexico	Liberty Marine	Mr. Aird
8. FIGHTING FOX	Rysco	175'	2,250 H.P./2-CAT 16 CYL	1980	Galveston, TX	Hornbeck Offshore	Mr. Ascienzo
9. TRINITY RIVER	Eastern	165'	1,860 H.P./2-GM 16 CYL	1982	Reserve Fleet Beaumont, TX	Trico	Mr. Aird
RED RIVER	Champion	171'	1,860 H.P./2-GM 16 CYL	1981			
PINE RIVER	Eastern Marine	165'	1,860 H.P./2-GM 16 CYL	1981			
CANE RIVER	Champion	171'	1,860 H.P./2-GM 16 CYL	1981			
10. LEAM MISSISSIPPI	Halter	180'	2,250 H.P./2-CAT D399	1982		LEAM	Mr. Wakeman
LEAM LOUISIANA	Halter	180'	2,250 H.P./2-CAT D399	1982			
LEAM TEXAS	Halter	180'	2,250 H.P./2-CAT D399	1982			
LEAM ALABAMA	Halter	180'	2,250 H.P./2-CAT D399	1982			
LEAM FLORIDA	Halter	180'	2,250 H.P./2-CAT D399	1982			
LEAM CALIFORNIA	Halter	180'	2,250 H.P./2-CAT D399	1982			
11. ENERGY SERVICES I	Burton	185'	4,600 F/M 10-38 D8	1978		Ocean Engery	Mr. Wakeman

Vessel Type	Shipyard	Length	H.P./ Propulsion	Delivery Date	Custodian/Location	Former Owner	MARAD Contact
Tug/Supply (Cont.)							
14. BLACK SEAL	Rysco	185'	2,250 H.P. - 2 CAT D-399	1978	Beaumont Reserve Fleet	Seal Fleet	Mr. Ascienzo
RED SEAL	Rysco	185'	2,250 H.P. - 2 CAT D-399	1978	Beaumont Reserve Fleet		
BALTIC SEAL	American Marine	185'	2,250 H.P. - 2 CAT D-399	1976	Indonesia		
BERING SEAL	Zigler	180'	2,250 H.P. - 2 CAT D-399	1976	Indonesia		
15. POINT GALION	Halter Marine	172'	3,500 2-GM 16 Cyl	1981	Beaumont Reserve Fleet	Point Marine	Mr. Ascienzo
POINT CHRISTIE	Halter Marine	172'	3,900 2-GM 16 Cyl	1981			
POINT HOPE	Halter Marine	172'	3,900 EMD	1981			
16. JAVA SEAL	Rockport Yacht & Supply Co.	185'	CAT D-399	1976	Brazil	Moody Offshore	Mr. Aird
KARA SEAL	Zigler Shipyards	185'	CAT D-399	1979	Beaumont Reserve Fleet		
Crewboats/Utility Boats							
17. TRANSPORTER (ex ALEXANDRA ROBIN)	Swiftships	100'	1,530 H.P. 3-12V71	1978	American Sea Venture Bourg, LA	SeaCo International	Mr. Ascienzo
TRAVELER (ex LORRAINE ROBIN)	Swiftships	100'	1,530 H.P. 3-12V71	1978			
18. AGILE	Rockport Yacht	112'	1,520 H.P./2-GM 16 CYL V92	1980	Galveston, TX	Hornbeck	Mr. Ascienzo
TOP FLIGHT	Rockport Yacht	125'	1,860 H.P./2-GM 16 CYL 149 T1	1981			


RODNEY E. LAY & ASSOCIATES



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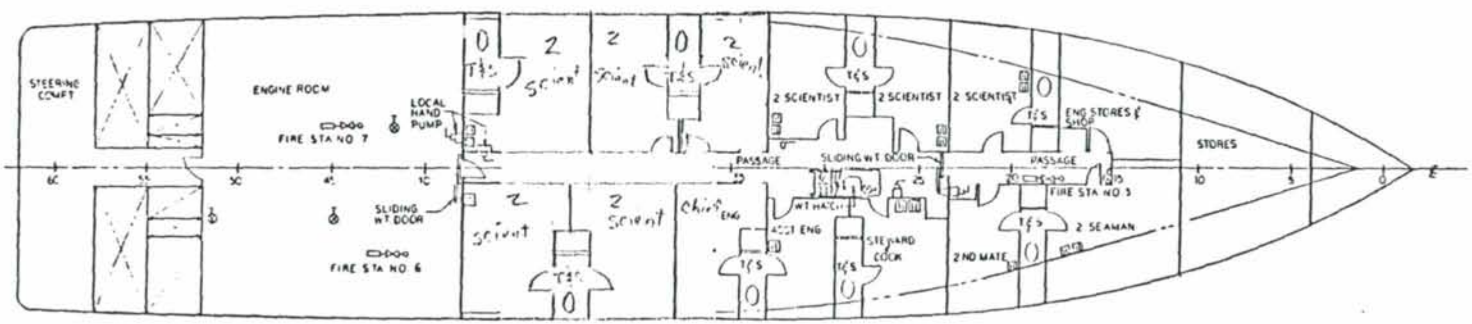

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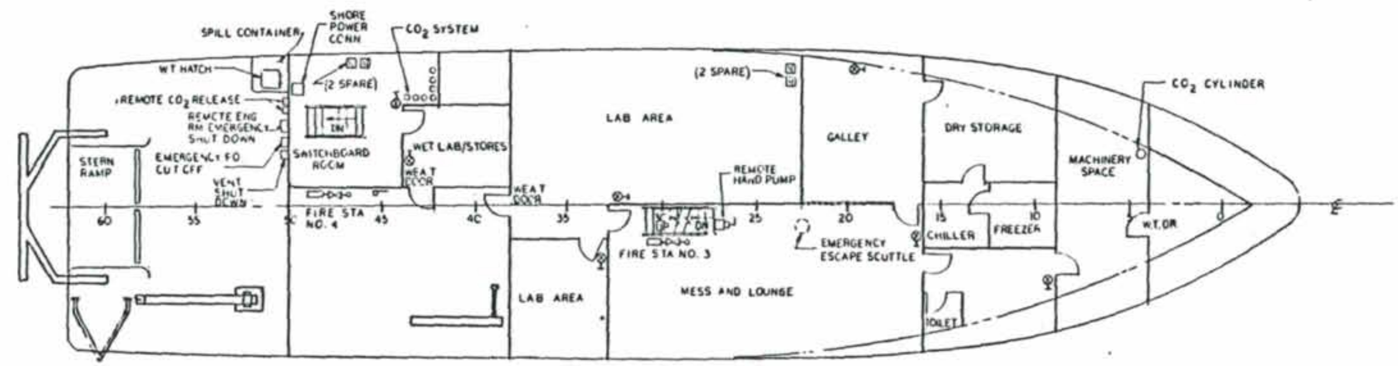

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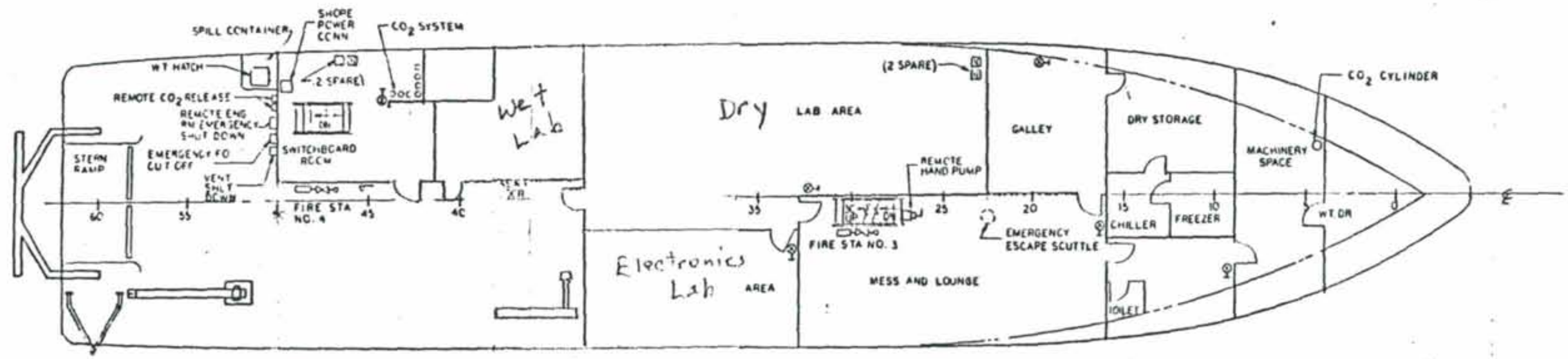

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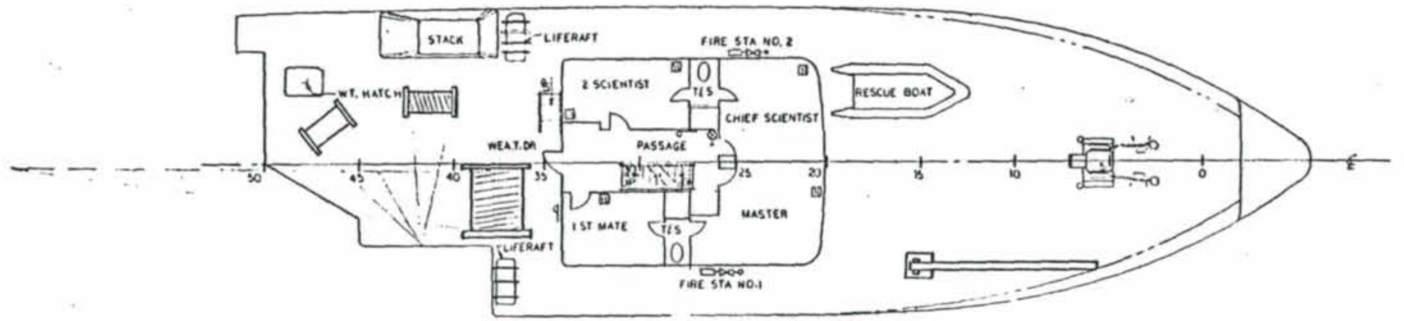

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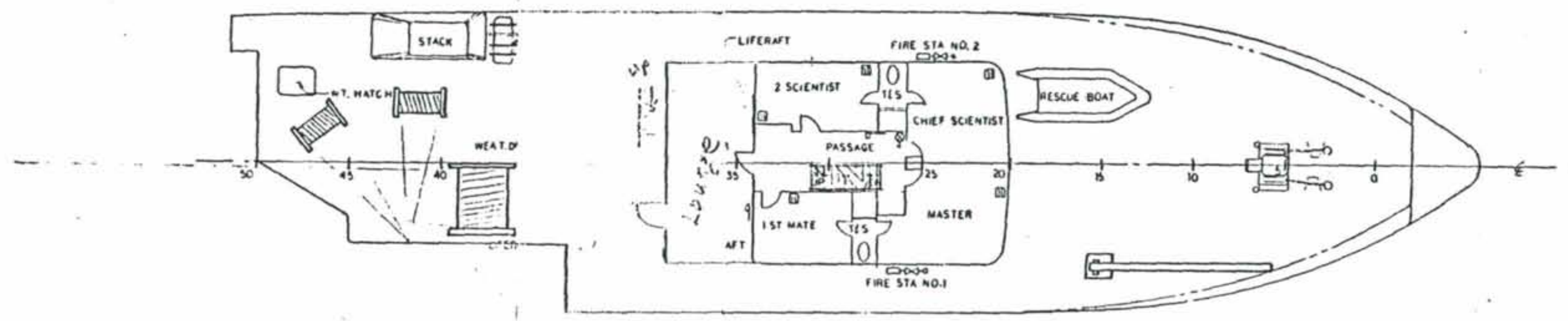

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NATIONAL SCIENCE FOUNDATION
WASHINGTON, D.C. 20550

OFFICE OF THE ASSISTANT DIRECTOR FOR GEOSCIENCES

NOV 09 1987

November 2, 1987

RECEIVED
NOV 04 1987

Dr. George H. Keller
Chairman, UNOLS
Research Office
Oregon State University
Corvallis, OR 97331

Dear George:

This letter is to follow up on our conversation at the UNOLS meeting regarding accelerating the Fleet Improvement Committee analysis of science mission requirements for ice-capable or polar research vessels.

The long-range plan for ocean sciences at NSF identifies the need for a modern, efficient and effective academic research fleet for productive programs in all ocean sciences fields. 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 research ships to meet emerging national needs for sea-going research. This includes requirements for high latitude research vessels for the Arctic.

As part of the UNOLS charge to the Fleet Improvement Committee on planning for new vessels, I would like the committee to provide a science mission/needs study for the Arctic by January 1, 1988. It should include input from a broadly based community workshop representing academic, government and industry interests.

Enclosed are two documents that strongly impact our need to aggressively review the science-driven vessel requirements for the Arctic, both western and eastern regions. The discussions on pages 19-23 and 48-49 in the Colwell report outline the basis for an Arctic - capable vessel, with a specific recommendation (Number 7) noted on page 52. Chairman Zumberge of the Arctic Commission has testified before Congress on Arctic Vessel needs and the Commission has strongly recommended action on several occasions. Recommendation for an Arctic-capable ship is noted on page xvii, Bullet 6 on page 315, and in several other places in the U.S. Arctic Research Plan. These documents form the policy basis for our review.

Scientific Research Programs

just a mention (in Executive summary)

Arctic RV need

Appendix E: National issues and Research Priorities in the Arctic Executive summary.

2 books enclosed to Steve [illegible] 11/4/87

Dr. Heinrichs and his staff are prepared to work with you and the FIC committee to meet this tight time schedule. They will also assist with coordinating progress and information with the Navy and our Polar Programs staff.

Sincerely,

Bob

Robert W. Corell
Assistant Director

Enclosures

cc: M.G. Gross, OCE
P. E. Wilkniss, DPP
D. F. Heinrichs, OCE