Advisory Council Meeting
March 3, 4, 1988
Harbor Branch Oceanographic Institution
Ft. Pierce, Florida

Advisory Council members, together with representatives from the National Science Foundation, the National Oceanic and Atmospheric Administration, the Office of Naval Research and several UNOLS institutions met at the Harbor Branch Oceanographic Institution. The meeting was called at 8:30 a.m. by Chairman John Martin. Items were addressed as reported herein, somewhat modified from the order in the advanced Agenda (Appendix I).

Attendees:

Advisory Council

John Martin, Chairman
Robertson Dinsmore
Tom Johnson
James Kennett
Robert Knox
Arthur Maxwell
George Keller, UNOLS Chair
Jay Langfelder, UNOLS V-Chair

Observers

Tom Forhan, NSF
Don Heinrichs, NSF
John McMillan, NSF
Keith Kaulum, ONR
Gregory Segur, NOAA
E.R. Dieter, U Alaska
Brian Lewis, U Washington
Gil Rowe, TAMU

UNOLS Office

William D. Barbee

Dr. Jay Langfelder welcomed the Advisory Council to Harbor Branch and advised of a tour of the Institution's engineering facilities and of the R/V SEWARD JOHNSON which was alongside.

The Advisory Council accepted the minutes for the October 21, 1987 Council meeting, and directed that they be distributed to UNOLS members and funding agencies.

The Council agreed that John Martin should chair the current meeting, since he had been closely involved in preliminaries to all critical issues. **The selections of Advisory Council chair and Vice Chair were deferred to the end of the meeting.**

An application for Associate Membership had been received from the Monterey Bay Aquarium Research Institute (Appendix I). John Martin provided supplemental information to the Council on MBARI staff, plans for acquiring and operating a ship and research program plans. **The Advisory Council recommended to UNOLS that Monterey Bay Aquarium Research Institute be elected an Associate Member.**

UNOLS and Advisory Council Activities

Ship Scheduling. The Advisory Council was alerted to several significant changes that had been made in individual ship schedules since the October, 1987 Ship Scheduling meeting. These changes included: significant schedule changes on the CONRAD, ENDEAVOR, ISELIN, CAPE HATTERAS, CALANUS, MELVILLE, and MOANA WAVE. The GYRE was not operating in 1988, the OSPREY had only a brief scientific shakedown and the THOMPSON would suspend operations in early September. The effect of all these changes has been to reduce fleet operating days to 5,015 (from the 5,406 projected last October) and to reduce costs as follows:

1987	NSF	ONR	OTHER	TOTAL
October 1987 projection	$32.29M	$5.15M	$4.47M	$41.91M
March 1988 projection	$21.11M	$4.72M	$4.04M	$37.87M

This reduction would have almost exactly matched the available funding as forecast in October 1987. (See p. 5, Report of the Joint Meeting of UNOLS East Coast and West Coast Ship Scheduling Groups.) However, in the meantime deficit-reduction measures have led to adjustments in 1988 budgets, especially in NSF, so that **there still remains a projected shortfall of about $2.1 Million for NSF operations.** (Details on NSF's final budget for 1988 together with estimates for 1989 are given later in this report.) Don Heinrichs, NSF, remarked that the deficit was

real and that NSF was concerned. Other aspects of budgets and ship operations, management and scheduling are discussed below under **Fleet Management** and **Funding Agency Reports.**

The informal estimates of **1988 Cost Projections** (Appendix III) included a major ambiguity: funding from ONR in the UNOLS costs projections totaled $4.7 million, while ONR estimates were for a total of about 6.2 Million in 1988. The discrepancy will be resolved.

The Advisory Council and Chairman, UNOLS again pressed the Executive Secretary for progress on **computer/electronic mail Ship Schedule and ship time request data bases.** Bill Barbee noted that a ship scheduling data base is operational at the University of Delaware (accessible by "goto SONIC"). UNOLS ship schedules are provided to the University's Ocean Network Information Center, as are the schedules of many other research vessels and fleets. The searchable data base available on SONIC seems to satisfy most potential users. Mr. Barbee recommended that UNOLS not duplicate the SONIC effort, but instead refine the interface between UNOLS Ship.SchedXX bulletin boards and SONIC. Users in the UNOLS have been discussing with OMNET a proposal for a searchable data base for ship time requests. **The Executive Secretary was directed promptly to develop the proposal and submit it for UNOLS approval.**

ALVIN Review Committee activities were reported by Bill Barbee. The ARC had sponsored two ALVIN Planning Workshops, in San Francisco, in December just preceding the AGU Winter Meeting and in New Orleans before the Ocean Sciences meeting in January. Although several Notices of Intent were submitted, only a small number of submersible users attended or made presentations at either of the meetings. The very limited opportunity for interaction between ARC and prospective ALVIN users led Committee members to conclude that the present format for planning workshops is no longer effective. The ARC discussed holding a scientific symposium based on the results of twenty-five years of ALVIN operation. One aspect of such a meeting would address ALVIN program planning. The ARC is developing the concept.

The ALVIN Flyer, inviting ALVIN time requests for 1989 will be distributed in early April. This flyer includes a very general projection of expected areas of ALVIN/ATLANTIS II operation for the entire period from availability after the 1989 overhaul until the next scheduled ALVIN overhaul in 1991/92.

The Study of Submersible Science in the 1990's, chaired by Bruce Robison, is in progress but no status report has been submitted.

James Kennett asked if the ALVIN Review Committee of the Advisory Council was promoting the use by academic researchers of SEA CLIFF and TURTLE. He noted that SEA CLIFF was the only 6000 meter depth capability in the U.S., and with the soon-to-be-available any-ocean support ship, is a highly capable facility. In response, both ARC and ONR have worked to increase SEA CLIFF/TURTLE availability to university oceanographers, to coordinate dive requests and to review requests as is done with ALVIN. So far, however, an open process for requesting dives or getting time on SEA CLIFF has not been achieved. **Both the ARC ad ONR recognize the importance of an open, objective process wherein university oceanographers can request and be granted time on SEA CLIFF/TURTLE.** They will continue to work the problem.

Recent Fleet Improvement Committee activities were reported by Bob Dinsmore. The FIC had last met in November 1987, and has meetings scheduled for late March, and July, 1988. They are in the second year of their effort to update the plan to improve the UNOLS fleet. Several elements of the improvement plan will soon be issued as white papers: **Scientific Requirements for the UNOLS Fleet,** James Murray, an assessment of the need for a research vessel capable of operating in ice in the Arctic, Vera Alexander, assessment of the merits of a submarine for general purpose research, Bruce Robison, a history of research vessels in the U.S., and a study of modes of acquiring R/Vs, Donn Gorsline.

The FIC is also pursuing projects charged to them by UNOLS. **One of the UNOLS monohull concept designs (the Scripps-sponsored Glosten design) is being advanced at least to the preliminary design stage.** The work phase has already been funded, and is underway.

The FIC was also directed to advance a large-ship SWATH concept to the preliminary design stage. The Committee modified this task to investigate SWATH applicability in the intermediate range (because of Navy design work in large SWATHS). Proposals were submitted, a company selected and **a conceptual study is underway for an intermediate SWATH.**

Several additional studies are being pursued by FIC. They include: **science mission requirements for small vessels, Bruce Robison, concept of a small (165 ft - 180 ft) ice strengthened research vessel for the Arctic, Tom Royer, on renovating or extending intermediate ships in the fleet, Dick Barber, and on coastal (Cape class) vessel renovation and improvement (Tom Johnson).**

On the subject of fleet improvements and ship acquisition, George Keller and Keith Kaulum reported on UNOLS-Navy exchanges on Tentative Operational Requirements (TOR) and other design decisions taken on the second ship to be provided to UNOLS by the Navy, **the T-AGS (OCEAN) SWATH.** All

eighteen UNOLS Member Institutions were polled for their reaction to the UNOLS Chairman letter of November 20, 1987 wherein UNOLS recommended that the community should refuse to operate and employ a ship to the T-AGS (OCEAN) design. **The heads of all eighteen UNOLS Member institutions concurred with the Chairman's recommendation.**

Keith Kaulum reported that Admiral Wilson, ONR had indefinitely postponed acquisition of the research vessel, in part, in consideration of the UNOLS advice.

The bid evaluation process for AGOR-23 was discussed by Keith Kaulum, ONR, and by Brian Lewis, University of Washington.

ONR had announced in November, 1987 that the University of Washington had been selected to operate AGOR-23 in behalf of the NORCOR Consortium (University of Alaska, Oregon State University and University of Washington). Negotiations are active between ONR and the University of Washington/NORCOR concerning ship acquisition and terms for operation.

Proposals for AGOR-23 design and construction were in by February 29; NAVSEA was preparing to evaluate proposals and proceed with the selection process. Indications are that several credible proposals were received. Review and evaluation was to start during the week of March 8. The process is expected to take about three months. ONR was trying to arrange for the University of Washington to participate in the process, but NAVSEA procedures are tightly controlled and closed.

Brian Lewis reported that NORCOR had formed a committee of scientists to examine in detail the Circular of Requirements for AGOR-23 and to provide a basis for advice during the ship acquisition process. The Committee includes Tom Royer and Dolly Dieter (UA), Vern Kulm and Charlie Miller (OSU), and Mary Jane Perry and Jim Murray (UW). NORCOR and the UW feel strongly that they can provide valuable insight and perspective to the bid evaluation and construction process. This scientist's perspective is essential, but the operators are, so far, frozen out. He asked for UNOLS help in achieving a role in the bid evaluation process.

After discussion and further consideration, the Advisory Council adopted a resolution:

The UNOLS Advisory Council commends the Navy for its plans to construct an oceanographic research vessel which is scheduled to be operated by the University of Washington on behalf of the Northwest Oceanographic Research Consortium (the Universities of Alaska and Washington and Oregon State University). The ensure user and operator input into the process for evaluating contractor proposals for design and

construction, the Advisory Council strongly believes that a representative from the University of Washington should be allowed to participate in the evaluation process. It is felt that by bringing this user/operator interest to the evaluation process the resulting ship will be a much more effective research platform. Future communications during the construction process among the shipyard, Navy and user community should also be greatly improved by this early interaction.

UNOLS Chairman George Keller agreed to convey the resolution to ONR and to the Navy.

Vessel Inspection Programs. Bob Dinsmore, in describing the NSF and Navy inspection programs that cover the UNOLS fleet, reported that in the last two years 24 ships had been inspected under one of the two programs. As reported in a recent UNOLS News, in two instances ships had been found to not be in compliance with applicable standards. (In both instances conditions were fixed, and the ships cleared for sea.)

ABSTECH, the inspecting agency under the contract for the NSF program, is developing a schedule for 1988-89 to begin in April and emphasize ships not owned by NSF (e.g., Robert GORDON SPROUL, MYSIS).

UNOLS News. Bill Barbee will substitute for Tom Malone as editor for the next issue which will be published about April, 1988.

Shipboard Scientific Instrumentation and Marine Technicians. The Advisory Council again considered issues of shipboard scientific instrumentation and marine technicians, and reiterated their position that there are serious problems that must be addressed. Problems seem to be centered around two main themes:

Costs. The various UNOLS institutions have widely differing policies and cost structures for both scientific equipment and marine technicians. What is free on one ship has a substantial daily or use rate on another. Technicians are free or available as required or mandatory when certain equipment is used at a high cost per day. While information on policies and costs are available the trick is to know when to ask. Inexperienced P.I.'s or P.I.'s from non-UNOLS institutions often get surprised, and even knowledgeable investigators, if they are shifted from one ship to another can be faced with large, unexpected costs.

Availability of appropriate equipment or technicians. Too often, based on their experience, investigators count on using particular equipment or on having some level of technical support only to find that equipment or technical

support isn't available on this year's ship. (Sometimes things are available but not affordable.) While there is always a strong rationale for individual institution policies (and so their differences), it remains true that the P.I. or his science project budget assumes an unfair burden.

The Council agreed that although they and other parts of UNOLS have looked at these problems for several years no progress has been made.

Fleet Management. Council deliberations on fleet management centered around a letter (Appendix IV) from Don Heinrichs to the Advisory Council Chairman suggesting a review of the present status of the UNOLS fleet. Related correspondence (Appendix V) among NSF, ONR, the Advisory Council and UNOLS institutions Texas A&M University, the University of Texas, Lamont-Doherty Geological Observatory and the University of Washington raise issues similar to those in the Heinrichs letter.

Briefly, the Advisory Council heard the following:

1. NSF budget estimate for ship operations in 1989 are about equal to funds available in 1988 (and 1987).

2. The UNOLS fleet will undergo a number of significant changes during the next few years; some ships will not be available for service for extended periods, some ships will be retired from service and new ships acquired. **With tight budgets and strong science program demand, neither NSF nor ONR can afford to use scarce ship operations funds to support under utilized facilities.**

In preliminary discussion the Council was alerted to several individual ship-availability situations that would affect the total ship days available from the UNOLS fleet sometime during the next several years:

- five Navy ships versus the seven now,
- AGOR-23 construction
- deferral of acquisition of a second Navy ship,
- GYRE status and U. Texas-TAMU plans (see later discussion),
- 1988 lay-up of THOMPSON and U. Washington reaction,
- KNORR, MELVILLE renovation and limited availability,
- availability of the OSPREY,
- proposals to acquire the M/V BERNIER.

Although the Advisory Council did not discuss all of these ship issues in detail, some information is contained on each in Appendix IV or V.

The funding agencies, led by NSF, asked the Advisory Council to examine UNOLS fleet status and expected changes over the next few years (1989, 1990 and 1991), to take particular account of the changes above, to compare fleet status and projection with projections of ship operations funding as furnished by NSF, ONR and others, and to make recommendations for effective UNOLS fleet management. To be most useful, the study, report and recommendations should be available in three to four months.

After a period of discussion and reflection **the Advisory Council accepted the agency charge for a study of UNOLS fleet status and management, 1989-1990, with the general terms as outlined above. A subcommittee, Bob Knox, chairman, members Bob Dinsmore and Tom Johnson agreed to begin the study and draft the report.** It was agreed that more definitive terms for the study, would be developed among the subcommittee, Don Heinrichs and Keith Kaulum.

Art Maxwell, University of Texas and Gil Rowe, TAMU briefed the Council on University of Texas, Texas A&M University ship operation status and plans.

With both the GYRE and the MOORE presently laid up the situation is critical for Gulf ship operators. The University of Texas and TAMU are working closely together with other members of SECOR and with the funding agencies to reach a situation wherein there is a vessel in the Gulf capable of filling Gulf-institution and other UNOLS ship needs. **University of Texas and Texas A&M both feel strongly that there should be a ship in the Gulf to support University of Texas and Texas A&M programs.**

The Texas approach is to combine to develop and support an effective ship operations. At present all ships crew and most ship operations personnel are being laid off to minimize expenses. At the same time University of Texas and Texas A&M are acquiring a new ship base which will be operated jointly as the only Texas research ship operations base. Efforts are directed at developing an excellent one-ship program that will serve institution and community research vessel needs (e.g. general purpose capability as well as Moore's MCS capability). A preliminary proposal has been made to NSF for a new ship to replace the MOORE capability, perhaps with a stretched GYRE or ISELIN. The proposal is for institution financing but NSF amortization.

The M/V BERNIER has also been examined as a potential MCS solution; inquiries have been made of L-DGO concerning co-coordinate acquisition and MCS program management.

Gil Rowe provided additional information focused sharply on GYRE status and efforts to return the ship to operational status. TAMU sees itself in a crisis mode concerning ship

operations, but also in a very responsive mode. They are taking direct aim on those factors that they see as leading to two weak schedule years and the current lay up. Through aggressive cost sharing measures and other efficiencies they hope to reduce day rates to about $6K/day. With GYRE's 20 science bunks that would be the cheapest stay rate per scientist in the UNOLS fleet. They would increase state funding for training and education cruises. More industry money will be sought, especially with reduced day rates. There is potential for funding from MMS. Altogether on the order of half a ship year could be funded aside from traditional NSF and ONR sources. Furthermore, seagoing scientists are being recruited both at College Station and Galveston to strengthen regional need for a ship.

TAMU, would like to keep the GYRE alongside at Galveston for lay up rather than mothballing at MARAD's facility in Beaumont. Once the GYRE is mothballed, costs to restore to operation would be severe, if not prohibitive. The Advisory Council was asked to make recommendation on this point.

Keith Kaulum reiterated the ONR consideration that led to their decision to end their charter party agreement and obligations to support the GYRE. ONR has determined that they need only five ships in the academic fleet to support their programs. The GYRE has had, recently, an ineffective schedule and little use in support of Navy programs. **While he did not reject outright the idea of maintaining the GYRE at the TAMU dock in Galveston he did note that ONR would be very reluctant to spend their funds in support of an inactive ship.**

The Advisory Council adopted a resolution that the Office of Naval Research move as quickly as possible to achieve transfer of title to the GYRE to Texas A&M University. They recommended and urged that ONR defer for a reasonable time any move of GYRE away from TAMU facilities in Galveston so that if title can be transferred, significant mothballing costs can be avoided.

Science and Government Trends; Agency and Community Contact. Several oceanographic community issues were noted by the Council. A controversy had arisen concerning two competing electronic mail services. UNOLS, and most UNOLS institutions, regularly employ one of these services. A UNOLS institution had urged the UNOLS Office to go on record in support of one of the competing services. The Advisory Council suggested that UNOLS and the Office should continue to employ their current mail service but it was not appropriate for the organization to comment publicly on the controversy.

The Council was informed that **Joint Oceanographic Institutions, Inc. had contacted the UNOLS Office for**

information on UNOLS Member and Associate Member institutions not represented in JOIDES. Evidently, JOI is considering some expansion. The Advisory Council urged cooperation, noting that JOI was not likely to intrude into core UNOLS activities.

The Advisory Council asked for a status report on NSF and ONR efforts to achieve effective joint-agency management of the UNOLS fleet. (The Council and UNOLS had been briefed on this effort at various meetings during 1987.) NSF and ONR staff reported that the effort has continued, centered around discussion and correspondence between Don Heinrichs, NSF and Eugene Silva, ONR. **All issues have been resolved except that of sharing lay up costs between the two agencies.** A policy for dividing lay up costs is a sticking point. The issue will be addressed again at a higher level.

The Council discussed **proposed Minerals Management Service rules on Scientific Activities on the Outer Continental Shelf.** These proposed rules have been recognized for some time as a potential constraint on oceanographic research by U.S. scientists on the OCS. Recent Texas A&M University experience wherein they were pressured to seek a permit and submit reports for OCS work give evidence that MMS is proceeding. **The Advisory Council noted that the issue is being addressed through at least one other advisory mechanism. There seemed little that UNOLS or the Advisory Committee could do beyond following the issues.**

Funding Agency Reports. Don Heinrichs gave a comprehensive report on NSF's current budget plan for 1988, the 1989 requests and implications for ship and facilities funding. Details of the presentation were shown in a series of slides reproduced in Appendix VI. Summary points in the presentation:

1. Comparison of Ocean Sciences Division budgets for 1985-1988 and the budget request for 1989 illustrate that facilities funding is essentially flat 1987-1989. Effects on fleet operations in 1988 have already been felt, and continuing funding at the same level means additional problems.

2. The reduction from the request for 1988 and the 1988 appropriation (Current Plan), $14.07M or 9.4% for Ocean Sciences, is not fully regained in the 1989 request. Global Geosciences remains the highest priority, but implementation of programs dependent on incremental funds must be delayed at least a year.

3. Five large or intermediate ships will be out of service for some part of 1988. Establishment of a center for Accelerator Mass Spectrometry will be deferred until 1989.

4. Although Oceanographic Centers and Facilities would receive a $4.05M or 10.9% increase under the 1989 request, Operations would receive only about $1.4M, or 4.6%. Ship Operations, although not yet broken out, should anticipate 4.6% or less.

The final series of slides summarize changes between 1988 and the 1989 request for all of NSF and describe strategic themes for 1989.

Tom Forhan, NSF/DPP noted progress in the acquisition of a research vessel with ice breaking capability for the Antarctic program. Twelve responses had been received, and although some did not meet specifications more than half are good bids and these include some for U.S. construction. Contractor evaluation was underway. DPP hopes for UNOLS/ocean community involvement in evaluation and assessment of the contracted report on contractor evaluation.

DPP has money in 1988 and in the 1989 budget request to proceed with the program for a six-year lease arrangement with a two year extension. They can proceed as long as they receive level funding.

Keith Kaulum, ONR discussed Navy activities to acquire new research vessels in support of academic oceanographers and renovation of the KNORR and MELVILLE. The AGOR-23 acquisition had already been discussed.

Refit program for AGOR-14 and AGOR-15 is on track. Details and schedules of the program are in R.P. Dinsmore's report (Appendix VII). This refit program will result in two ships "meeting most ongoing requirements" (e.g., for WOCE, GOFS, RIDGE). Details of ship characteristics, propulsion and arrangement are in the report. Woods Hole Oceanographic Institution is the prime contractor. The current schedule would have long lead time procurement beginning in April 1988, contract design completed and RFP issued in August, contract award for KNORR in October and KNORR entering shipyard in November. The MELVILLE would enter shipyard in July, 1989 and KNORR would return to service in September. MELVILLE would resume operations in June 1990.

Contrary to earlier comments (from outside ONR) virtually all funds for the refit have been retained in the budget. ONR has about $15.5 million in 1988 and $14.7 million in 1989 for construction and procurement of equipment. **ONR expresses a sense of urgency on the program because they need a concrete start (i.e., construction contract award) before October 1.**

The status of a second vessel constructed by the Navy for the academic fleet was reviewed. Keith Kaulum again noted the Admiral Wilson, CNR letter "indefinitely postponing acquisition of the (second) research vessel. Money for this vessel is, however, still in Navy/ONR budget **plans** for 1990. It is unlikely that NAVSEA can or would develop new and suitable preliminary plans for a SWATH in time to initiate acquisition in 1990. Very tentative discussions have been held, however, on perhaps building a second ship based on bids for AGOR-23.

(At the time of the Advisory Council meeting, the Oceanographer was proceeding toward construction of a TAGOS-Ocean SWATH based on the design which UNOLS had deemed unsuitable for the academic fleet. By early April, however, informal word was that the Oceanographer was not going to build a TAGOS-Ocean SWATH.)

ONR is planning for a downward adjustment of 3 1/2 % in their 1989 budget.

Lieutenant Commander Gregory Segur, NOAA reported that NOAA's Office of Marine Operations faces an increasingly difficult funding picture in 1988 and 1989. It is widely known that OMO's budget, on the order of $50 million to operate 23 ships, has been drastically cut in the President's request of every recent year. Through 1987 the NOAA fleet has maintained, largely through Congressional budget restoration and in part through interagency fund transfer (e.g., for survey work done for NavOceo). NOAA/OMO are concerned, however, that Congress may not agree to restore all funds in 1989. The significant work agreement with NavOceo ended in early 1988.

The classification issue for well controlled multibeam surveys on the EEZ is unchanged. (NOAA's work is currently classified.)

NOAA is advancing technology within their fleet by installing multibeam systems on the MT. MITCHELL in 1988 and on the FAIRWEATHER and PIERCE in 1989. A total of six ships will be equipped with multibeam systems by 1989. All ships are being equipped with mini Vaxes for processing, etc., and helicopter platforms are being added.

The Marine Board, National Academy of Engineering/National Research Council in 1987 made a study of the NOAA fleet and fleet management. They noted that the fleet was in good overall condition, although condition varied widely among ships. The quality of original construction was cited. It recommended that to maintain a modern, effective fleet NOAA should rehabilitate 18 of the present ships (at about $4.5 million each), scrap 5 of the existing ships and build 6 new ones.

Problems widespread among existing ships:

- asbestos used in original construction, now an environmental hazard,
- boat davits obsolete,
- winches outdated,
- engines outdated, (in some ports no longer available),
- fire detection inadequate,
- plumbing systems deteriorating.

Dolly Dieter gave the Council an interim report on her NSF-sponsored study of insurance costs and risk management for the UNOLS fleet. A primary aim is to investigate the feasibility of a group insurance plan for the UNOLS fleet. The study takes account of **Risk Management and Insurance for Members of University-National Oceanographic Laboratory System, July 7, 1975** by Charles H. Martin.

Member institutions/operating institutions have been polled to provide copies of their existing insurance policies, costs and five-year claims histories. Responses from institutions have been prompt and accurate.

Preliminary thoughts are: that costs have risen about five-fold, from $250,000 to $1,250,000 since 1975, and that it may be necessary to insure hulls in order to get favorable rates for P. and I. The study will examine the issue of insurance for over-the-side equipment. It may be necessary to exclude certain activities (e.g., diving, deploying ROVs, use of radio-active substances, use of explosives).

UNOLS Research Vessel Safety Standards will be an issue. As has been alluded to in recent UNOLS, Advisory Council and RVOC meetings, rates for insurance coverage, especially group plans, are dependent on the quality of and adherence to safety standards. Insurance and risk management are among factors that must be considered in formulating UNOLS policy concerning safety standards.

Bob Dinsmore gave a preliminary 1987 annual report on Cruise Assessments. Returns of Cruise Assessment Forms were much higher than had earlier been estimated. A total of 242 Assessments were returned, covering about 80% of all scheduled cruises. Of these, 26 (10.7%) reported less than fully successful operations. Reasons limiting success were:

weather:	6
shipboard equipment or instrumentation failure (e.g., winches, monitors, navigation):	7
inherent ship design problems (e.g., noisiness):	10
lack of cooperation or confrontation between science party and ship operating force:	3

An informal poll suggests that P.I.'s have no complaints with the design of forms or with how they are submitted. (It should be noted that there have been such complaints in the past.) Operators would prefer to get copies of assessments directly from the users.

Keith Kaulum requested that he be sent copies of Cruise Assessments for all Navy ships. **The Advisory Council agreed that this was reasonable and directed the Executive Secretary to provide copies to ONR.**

UNOLS Charter Revision. The UNOLS membership had, at its October 23, 1987 meeting resolved to revise the UNOLS Charter. The principal concern expressed then was to remove ambiguities in the organizational and functional structure as described in the Charter. At issue were the relationships among the UNOLS membership, the Executive Committee, the Advisory Council and other UNOLS committees, and the autonomy enjoyed by such bodies, especially the Advisory Council.

UNOLS Chairman George Keller directed Brian Lewis, University of Washington and Bill Barbee, Executive Secretary to develop a draft Charter revision for evaluation by the Advisory Council and submission to UNOLS members.

In fact, both Lewis and Barbee produced draft revisions. These revisions were similar in many respects, but included at least one fundamental difference. (See Appendix VIII, letter.)

There was no agreement on the Advisory Council concerning proposed changes to the Charter or on a model UNOLS organizational structure. The Council did express its opposition to an expanded membership on the Executive Committee. Opinions were expressed both for and against maintaining a significant level of autonomy for the Advisory Council.

Don Heinrichs, NSF suggested that the essential form of the Charter was flawed and that a successful revision should include restructuring of the total Charter. He also noted that he and NSF valued existing Advisory Council roles and functions and would want to preserve the ability "to go directly to the Advisory Council". The Advisory Council agreed that these funding agency perceptions should receive consideration.

The UNOLS Chairman determined that additional work was needed to develop a satisfactory revision of the Charter. Subsequent to the meeting he formed a working group of Brian Lewis and the UNOLS Executive Committee to meet and develop a draft revised Charter for submission to UNOLS members.

Selection of Advisory Council Chairman, Vice Chairman. John Martin had earlier advised the Council that he would not continue as Chairman (but would remain as a member). **The Council selected Art Maxwell as Chairman for 1988 and again selected Tom Malone as Vice Chairman.**

George Keller reminded the Council of recent RVOC efforts to develop a policy regarding temporary ship lay ups. (These RVOC ideas were included in a letter introduced at October, 1987 UNOLS meetings.) Comments on the RVOC suggestions had been received from both ONR and NSF and from within UNOLS (see correspondence in Appendix IX). Most comments see merit in the process outlined by RVOC but also recognized problems in making the system work.

The Advisory Council agreed that the RVOC process was of value but that it could not be fully implemented without resolving some of the problems raised by commentors.

The UNOLS Chairman will form a working group to address the issues raised in an attempt to develop a policy on lay ups that can be implemented.

Issues relating to the use of radioactive substances aboard ships were not considered because Tom Malone was unable to attend the meeting.

The Committee thanked Jay Langfelder for graciously hosting the meeting. The tours of Harbor Branch facilities and of the R/V SEWARD JOHNSON were informative and well received.

The meeting was adjourned at 12 noon on March 4.

UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

ADVISORY COUNCIL MEETING
AGENDA
8:30 a.m.
March 3, 4, 1988
Harbor Branch Oceanographic Institution
Ft. Pierce, Florida

Call the Meeting - John Martin

Accept minutes of the October 21, 1987 Advisory Council Meeting - Minutes distributed to Advisory Council with Agenda for March 3, 4.

UNOLS and Advisory Council Business

Choose Council Chairman, Vice Chairman for 1988 - A/C Members should politic early (i.e. before the meeting).

Application for Associate Membership - The Monterey Bay Aquarium Research Institute (MBARI) has applied for Associate Membership (in package). John Martin will present material in addition to the application A/C make recommendation to UNOLS.

UNOLS Charter Revision - As directed at UNOLS meeting October 23, Brian Lewis and Bill Barbee have drafted a revised UNOLS Charter (in package). Council should consider, modify if desired, and provide a recommended revision to UNOLS Membership.

UNOLS, and Advisory Council Activities

Ship Scheduling - 1. Summary of changes (since Oct., 1987) to 1988 UNOLS ship schedules. 2. James Crease's efforts at a dynamic ship schedule on e-mail. The SONIC link. 3. UNOLS office efforts toward an accessible Ship Time Request data base. (Barbee)

ALVIN Review Committee Report - Workshops in San Francisco and New Orleans. Planned ALVIN Symposium and published transactions. Progress report on Robison's submersible science study. (Barbee)

Fleet Improvement Committee - Report on recent FIC activities (Dinsmore). FIC and UNOLS actions on AGOR-24 (Keller, Kaulum).

Cruise Assessments - Dinsmore.

Vessel Inspection Program - Dinsmore

Fleet Management - 1. Don Heinrichs letter to John Martin (in package). Council discussion; formulate action plan involvement of Scheduling Groups. UNOLS statistics as partial basis for assessments. 2. Responses to RVOC lay-up letter; Maxwell, Heinrichs, Kaulum (in package). Council discussion. Council action?

Shipboard Scientific Instrumentation, Technician Program - Martin, report as needed.

UNOLS News - Vol. 4, No. 3 distributed in February; Vol. 5, No. 1 target date March 31. (Barbee will edit Malone on cruise.)

Science and Government Trends; Agency and Community contact - 1. The OMNET-KOSMOS controversy. George Shor's letter and AGU.Forum file (in package). UNOLS action? Letters to Spilhaus? 2. JOI inquiry concerning medium sized ocean institutions. JOI plan to expand? UNOLS posture? 3. Action on joint ONR-NSF fleet management. Status report. Sticking points. Council discussion. 4. Proposed MMS regulations (see OSN package).

Funding agency reports - 1. Agency representatives will provide information and request UNOLS action as appropriate (NSF, ONR, others?). 2. Status of AGOR-23 acquisition program and ONR-operating institution agreement.

UNOLS Fleet Insurance - Dolly Dieter will report on her NSF sponsored study of fleet insurance. (This will be Friday morning.)

Radioactive substances aboard ships - Tom Malone has summarized UNOLS institution procedures for controlling the use of radioactive substances aboard UNOLS ships, identified problems and recommends a course to achieve satisfactory, consistent UNOLS policies, procedures. (Document available at the meeting.)

UNOLS Meeting October 28, 1988 - 1. Discussion with UNOLS Chairman on input to meeting agenda. 2. Suggestions for principal speaker. Mel Peterson, NOAA? Baker, JOI? Dave Ross (re: MMS regs)? RADM Wilson, ONR?

General - Jay Langfelder has offered a tour of Harbor Branch facilities. Best time to be arranged, but afternoon Thursday is likely.

The aim is to adjourn at about noon Friday, because of travel schedules/connections.

UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

An association of Institutions
for the coordination and support
of university oceanographic facilities

UNOLS Office, WB-15
School of Oceanography
University of Washington
Seattle, WA 98195

UNOLS

APPLICATION FOR ASSOCIATE MEMBERSHIP

Pursuant to the UNOLS Charter the below named organization hereby submits application for associate membership in the University-National Oceanographic Laboratory System. In doing so the applicant understands and agrees to work for the objectives set forth in the UNOLS Charter.

Name of Institution: Monterey Bay Aquarium Research Institute

Name of person delegated to act as representative to UNOLS

Name: Richard T. Barber

Title: Director

Address: 160 Central Avenue; P.O. Box 20
Pacific Grove, CA 93950

Telephone Number: (408) 649-4616

General Information on oceanographic, Sea Grant and other marine science programs:

No. Professional Personnel 30 No. Graduate Students _____

Approximate Annual Budget $3,000,000

List of research vessels owned or operated:

NAME	SIZE
Lolita	110' x 26'

NOTE: Please attach copies of brochures, bulletins, photos, etc. which describe the institution and its facilities.

Please attach a brief list of the names and addresses of key individuals to whom the following information sent out by UNOLS would apply (Note: The Institution UNOLS Representative receives all):

Ship user information - research ship schedules, ship availabilities, etc. (intended for scientists and ship users);

Research ship operations and maintenance - for marine superintendents and port captains.

SEND TO:

William D. Barbee
Executive Secretary
UNOLS Office, WB-15
School of Oceanography
University of Washington
Seattle, Washington 98195

SUBMITTED: (for)
Signature RICHARD T. BARBER

Name: _____
Title: DIRECTOR
Date: 18 DECEMBER 1987

Revised 7/82

Informal Estimates DATE Feb. 25, 1988

1988 COST PROJECTIONS

	1987 COSTS NSF	1987 COSTS	1987 OP DAYS	1988 OP DAYS	PROJECTED 1988 COSTS NSF	ONR	OTHER	TOTAL
ATLANTIS II				311	3,045	319	307	3,671
KNORR				305	2,900	10	151	3,061
CONRAD				297	2,350	620	690	3,660
OCEANUS				258	1,174	650	0	1,824
ENDEAVOR				226	1,073	200	EPA& DOE 400	1,673
GYRE				58	0	199	213	412
ISELIN				239	1,597	240	0	1,837
CAPE HENLOPEN				151	755			755
CAPE HATTERAS				201	875	311	73 73	1,332
WARFIELD				130	548	9	0	557
BLUE FIN				184	106	0	DOE 102	208
LAURENTIAN				70	196	0	33	229
CALANUS				166	270	27	0	297
MOORE				0	0	0	120	120
WEATHERBIRD				250	370	0	0	370
TOTAL				**2,846**	**15,259**	**2,585**	**2,162**	**20,006**

DATE February 25, 1988

1988 COST PROJECTIONS

	1987 COSTS NSF	1987 COSTS	1987 OP DAYS	PROJECTED 1988 COSTS 1988 OP DAYS	NSF	ONR	OTHER	TOTAL
MELVILLE				186	1,547	847	66	2,460
WASHINGTON				328	3,041	667	0	3,708
NEW HORIZON				219	825	109	770	1,704
ROBERT G. SPROUL				189	573	85	69	727
OSPREY				30	300	0	0	300
POINT SUR				183	383	94	56 483	1,016
WECOMA				251	1,300	332	0	1,632
THOMPSON				122	1,679	0	0	1,679
BARNES				140	225	0	20	245
ALPHA HELIX				219	1,686	0	8	1,694
MOANA WAVE				302	2,288	0	410	2,698
TOTAL				**2,169**	**13,847**	**2,134**	**1,882**	**17,863**
East Coast				2,846	15,259	2,585	2,162	20,006
FLEET TOTAL				**5,015***	**29,106**	**4,719**	**4,044**	**37,869**
Anticipated (3/1/88)				-	25.9	4.7	4.0	34.6M
3/1/88 Shortfall				-	3.2M	-	-	3.3M

NATIONAL SCIENCE FOUNDATION
WASHINGTON, D.C. 20550

DIVISION OF OCEAN SCIENCES
OCEANOGRAPHIC CENTERS AND FACILITIES SECTION

1 FEBRUARY 1988

Dr. John H. Martin, Chairman
UNOLS Advisory Council
Moss Landing Marine Laboratory
P.O. Box 450
Moss Landing, CA 95039

Dear John:

I would like to have you include on the agenda for the March UNOLS Advisory Council meeting consideration of a review of the present status of the academic research fleet. It should provide for recommendations for improved procedures to establish priorities for identified short-term needs. Longer term planning is already underway with the Fleet Improvement Committee addressing critical issues for UNOLS.

A number of items are coming together at this time that require an examination of the structure and composition of the academic research fleet as a whole. These include:

- New ONR Fleet Policy (Enclosure 1)
  - 5 ship fleet instead of 7 ships
  - Schedule of retirements/transfers
  - U of Washington selection as AGOR-23 operator
  - Cancellation of SWATH AGOR-X construction
  - Impact of R/V operations cost sharing programs

- NSF Budget estimates (Enclosure 2)
  - Reduced operations and equipment funds in FY 1988
  - FY 1989 projections level or below FY 1987
  - Delays to new ship acquisition plans
  - Impact of Navy goal to transfer ships to other agencies
  - Refit/refurbishment of NSF-owned ships. Timing.

- Research fleet changes
  - Thompson retired
  - Knorr/Melville refits
  - Osprey conversion completed in 1988
  - Cayuse transfer
  - Pt. Sur operations (west vs. east coast base)
  - Gyre status?
  - Fred Moore status?

The "bullets" above are not all inclusive but illustrate the scope of recent and near-future changes and impacts. Various components of the items are being examined in different forums and committees but a comprehensive overview is needed.

I have deliberately not suggested a specific charge for this "status review" since I believe ONR should be included in the discussion. An immediate issue facing NSF is a request by Texas A&M University to ONR that the U.S. Navy transfer title of the R/V Gyre to NSF. We have agreed to discuss the issues with Texas A&M and informed them NSF will not make a unilateral decision on the R/V Gyre future. Community advice from UNOLS, other federal agency view, and a more comprehensive understanding of the Texas response to the Navy proposals will be used to assist in making final decisions.

This letter and enclosures are longer than I intended but provide a context for the requested reviews.

Sincerely,

Donald F. Heinrichs
Head

Enclosures

cc: K. W. Kaulum, ONR
G. Keller, UNOLS
W. D. Barbee, UNOLS
W. D. Nowlin, TA&M

ENCLOSURE 1

OCEANOGRAPHIC RESEARCH FACILITIES PROGRAM

CODE 1121SP

KEITH W. KAULUM

Presentation to external oversight committee

5 JANUARY 1987
CODE 1121

OCEAN ENGINEERING DIVISION OVERVIEW 6.1 PROGRAM

PLANS:

- LIKELY THAT THE OCEAN ENGINEERING DIVISION WILL BE ABOLISHED
  - PROGRAMS WILL REMAIN
- NEW PROGRAM MANAGER: DR. STEVEN E. RAMBERG WILL BRING CHANGE TO 11210T
- OCEAN ENGINEERING PROGRAMS WILL CHANGE DIRECTION IN THE GENTLE ONR MANNER
- ATTEMPTS WILL BE MADE TO GET A REPLACEMENT FOR THE T-AGS (0)
- NAVY-OWNED RESEARCH FLEET WILL BE BROUGHT TO MORE APPROPRIATE SIZE

5 JANUARY 1988
CODE 1121SP

OCEANOGRAPHIC RESEARCH FACILITIES PROGRAM

- o BACKGROUND OF PROGRAM
  - ARI FOR R/VS AND SHIP MANAGEMENT OFFICE(FY-81)
  - SECNAV INITIATIVES
    - AGOR-23 (FY-87)
    - AGOR 14/15 OVERHAULS (FY-88 & 89)
    - SWATH AGOR (FY-90)

- o NEW ONR FLEET POLICY (FY-88)
  - 5 SHIP FLEET
  - R/V OPERATIONS SUPPORT VIA SUPPLEMENTAL FUNDING PROGRAM

- o RESEARCH SUBMERSIBLES
  - DSV ALVIN
  - NR-1
  - NAVY DSVs

5 JANUARY 1988
CODE 1121SP

SECNAV R/V INITIATIVES

o CNO (OP-006)/ONR PLAN FOR NAVY R/V FLEET

- AGOR-23, NAVSEA FY-87 PROCUREMENT VIA COR, $33M (SCN)

- AGOR 14 & 15 (R/V MELVILLE & KNORR) OVERHAUL/REFIT, ONR VIA GRANT, $16M EACH FY-88 AND FY-89 (6.5 R AND D)

- SWATH TAGS(OCEAN)/AGOR(X), NAVSEA PROCUREMENT AND DESIGN, FY-89 AND 90, $74M AND $60M (SCN)

5 JANUARY 1988
CODE 1121SP

AGOR-23 OPERATOR

- PROPOSALS FROM:
  - LAMONT DOHERTY
  - SCRIPPS
  - UNIVERSITY OF TEXAS CONSORTIUM
  - UNIVERSITY OF WASHINGTON

- UNIVERSITY OF WASHINGTON SELECTED
  - GENERAL PURPOSE OPERATION
  - STRONG TECHNICAL PROGRAM
  - UW WILL FUND 45 DAYS OF OPERATIONS/YEAR
  - APL (UW) AFFILIATION

- UW INVOLVEMENT IN PROPOSAL EVALUATION, CONSTRUCTION AND TRAILS
  - NAVSEA FUNDS $2.5M (FY88-91)

5 JANUARY 1988
CODE 1121SP

SWATH TAGS(O)/AGOR(X) ISSUES

- OCEANOGRAPHIC COMMUNITY AGAINST CONSTRUCTION BECAUSE:
  - EXTENDED HULL CONFIGURATION
  - SIZE AND COST OF OPERATION

- CNO (OP-006) EXPECTED TO PROCEED WITH TAGS(O)

- POSSIBLE REPROGRAMMING OF AGOR(X) FY-90 FUNDS ($60M)

5 JANUARY 1988
CODE 1121SP

ONR FLEET STATUS PROJECTION

YEAR	GYRE	THOMPSON	AGOR-3 CLASS	AGOR-3 CLASS	MOANA WAVE	AGOR-14 CLASS (KNORR)	AGOR-14 CLASS (MELVILLE)	AGOR-23	AGOR(X)	# SHIPS OPERATING	TOTAL OPERATING COST
87	PL	0	0	0	0	PL	0	DP	-	5	14.6M
88	R/T	R	0	0	0	0/DP	0	C	DP	5	15.3M
89	-	-	0	0	0	C	0/DP	C	DP	4	11.7M
90	-	-	0	0	0	0	C	0	C	5	15.3M
91	-	-	R/T	0	0	0	0	0	C	5	16.8M
92	-	-	-	R/T	0	0	0	0	0	5	17.1M
93	-	-	-	-	0	0	0	0	0	5	17.1M

PL = Partial Year Lay-up
O = Operate
R = Retire or Reserve Status
T = Transfer to another agency
C = Construction or Overhaul
DP = Design & Planning

5 JANUARY 1988
CODE 1121SP

R/V OPERATIONS COST SHARING PROGRAM (FY-88)

	UNOLS SHIPS	OTHER SHIPS
PR'd TO DATE	1,826	1,097
PENDING ACTIONS	1,760*	317**
SUBTOTALS	3,586 (71%)	1,414 (29%)
GRAND TOTAL $5,000K		

* INCLUDES NRL PROGRAM $406K

** C.G. ICE BREAKER

5 JANUARY 1988
CODE 1121SP

R/V OPERATIONS COST SHARING PROGRAM ISSUES

- LARGER FRACTION OF FUNDING ON UNOLS SHIPS
- ESTABLISHING A CONSISTENT TRANSIT COST POLICY
- STABLE SUPPORT FOR ONR SHIPS
- NSF/ONR POLICY AGREEMENT ON LAY-UP COSTS

NSF BUDGET ESTIMATES
January 1988

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

Oceanographic Facilities Detail

Operations

Ship Operations	23.8	24.0	26.0[1]	24.7[2]
ALVIN, Aircraft, Misc.	2.9	1.6	1.8	1.8
Marine Technicians	2.4	2.5	3.1	3.1
	$ 29.1 M	28.1	30.9	29.6

Acquisitions and Development

Science Instruments	1.8	1.6	1.8	1.6
Shipboard Equipment	1.7	1.4	1.7	1.5
Technology Development	1.6	1.7	2.4	2.6
AMS Center	-	-	-	0
UNOLS, Ship Const., Misc.	0.7	0.9	0.4	0.8
	$ 5.8 M	5.6	6.3	6.5

TOTAL	$ 34.9	33.7	37.2	36.1

[1]In 1987, an additional $1.5 million was provided by the Ocean Drilling Program.

[2]In 1988, an additional $1.2 million is estimated from the Ocean Drilling Program.

Appendix V
(A)

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

IN REPLY REFER TO

5000
Ser 1121SP/02
11 January 1988

RECEIVED
JAN 19 1988

For your info
George

Dr. Gilbert T. Rowe
Head, Department of Oceanography
Texas A&M University
College Station, TX 77843

Dear Dr. Rowe:

We have received your proposal RF-88-456 for Operations Support of the R/V GYRE during the anticipated 1988 lay-up period. I regret to inform you that ONR does not intend to fund your proposal. This decision is based on programmatic plans to reduce the number of Navy owned ships in the UNOLS fleet. The R/V GYRE has been selected for elimination due to very low utilization by ONR investigators, and persistent weak schedules requiring supplemental lay-up funds.

I understand that your institution may be interested in operating the GYRE within the UNOLS fleet as an institutionally owned vessel. This would require transfer of the title of the ship to Texas A&M from the Navy, and may be possible via MARAD since TAMU operates an approved maritime training program and legislation allows such transfers of title. Transfer of the ship to TAMU via MARAD is outside the normal surplus procedures for Navy ships and thus would require prior concurrence of other Navy organizations which may have use for the ship and GSA, thus we cannot guarantee success. However, before we pursue this course of action, it is necessary for you to decide whether TAMU desires to accept transfer of the title for independent operation, and express your interest to ONR with a letter.

If your institution is not interested in independent operation of the GYRE, we will proceed with the normal surplus procedures. Since this process is often quite lengthy, it may be most cost effective to move the ship to the nearest MARAD lay-up facility which is at Beaumont, Texas when scheduled operations are completed. In any case, we will need a prompt expression of your interest or non-interest in continuing to operate the GYRE independently. Please write me with your decision as soon as possible, but no later than 29 January 1988 as we plan to initiate action by this date.

Sincerely,

Keith W. Kaulum

K. W. KAULUM
Manager, Special Project Program
Ocean Engineering Division

Copy to:
TAMU Research Foundation (Mr. A. D. Rychlik)
NSF (Dr. D. Heinrichs)
UNOLS Chairman (Dr. G. Keller)
CNO OP-006 (Mr. R. Winokur)

COPY Appendix V (B)

RECEIVED
FEB 2 1988
RESEARCH OFFICE

NATIONAL SCIENCE FOUNDATION
WASHINGTON, D.C. 20550

DIVISION OF OCEAN SCIENCES
OCEANOGRAPHIC CENTERS AND FACILITIES SECTION

26 JANUARY 1988

File: Chairman's Corresp 1988

Dr. Gilbert T. Rowe, Chairman
Department of Oceanography
Texas A&M University
College Station, TX 77043

Dear Gil:

I received my copy of the ONR letter declining to provide support for the R/V Gyre during the 1988 lay-up period and providing details on their programmatic plans to eliminate the R/V Gyre from the Navy-owned ships in the UNOLS scheduled fleet. If Texas A&M University accepts title for independent operation of the R/V Gyre, NSF will continue to view the ship as an academic research vessel within the guidelines of the UNOLS charter. The R/V Gyre would be treated equivalent to the other institutionally-owned ships.

In your letter to me, you raise the question of the longer-term prospects for the R/V Gyre at the national level. There is no simple answer to your question. In the short run, 1988 and 1989, research ship operations in support of NSF projects will remain close to 1987 levels and may decrease slightly. ONR projects a modest increase in support for UNOLS ships but believes use of the R/V Gyre by ONR investigators will remain very low. I expect the academic research fleet will continue to have more ship time available than funded research projects require at least through 1989. Longer term projections for overall NSF support of research ship operations are more optimistic. The Administration remains committed to doubling the NSF budget in the next few years. This should lead to an expansion of oceanographic field programs related to our Global Geosciences research initiatives in the early 1990's. If fully implemented as outlined in the Ocean Sciences Division long range plan, the existing academic research fleet will need to be augmented by additional research ships.

The stringency of the FY 1988 NSF appropriation for research and related activities -- a 3.3% increase over FY 1987 levels -- required that resources be allocated with particular care. Significant increases in grant size and increased numbers of individual investigator awards will not be possible this year, nor will any new starts in facilities projects. We will undertake the task of examining all our facilities with the

objective of phasing out or down those of lessor priority or productivity. As part of this process I am asking the UNOLS Advisory Council to review the present status of the academic research fleet and provide recommendations for improved procedures to establish priorities for identified short-term needs. Longer term planning is already underway with the Fleet Improvement Committee addressing critical issues for UNOLS.

The NSF will not make a unilateral decision on whether or not the R/V Gyre has a future in the UNOLS fleet. Community advice from UNOLS, other federal agency views and the Texas A&M response to the Navy proposal for independent operation will be used to make a final decision.

Sincerely,

Donald F. Heinrichs
Head

cc: K. W. Kaulum, ONR
G. Keller, UNOLS

MOSS LANDING MARINE LABORATORIES

CALIFORNIA STATE UNIVERSITY FRESNO. HAYWARD. SACRAMENTO. SAN FRANCISCO. SAN JOSE. STANISLAUS

P. O. BOX 150
MOSS LANDING, CA USA
95039-0450
(408) 633-3304

RECEIVED
FEB 23 1988
UNOLS OFFICE

17 February 1988

Gilbert T. Rowe
Head
Department of Oceanography
Texas A & M University
College Station, Texas 77843-3146

Arthur E. Maxwell
Director
Institute for Geophysics
University of Texas

Dear Gil and Art:

I look forward to your presentation concerning the combined UT/A&M ship operations.

Sincerely,

John H. Martin
Director

cc: G. Keller (w/ attachment)
W. Barbee (w/ attachment)

TEXAS A&M UNIVERSITY
COLLEGE OF GEOSCIENCES
COLLEGE STATION, TEXAS 77843-3146

Reply to
Department of
OCEANOGRAPHY

February 11, 1988

FEB 16 1988

Dr. John H. Martin
Chairman
UNOLS Advisory Council
Moss Landing Marine Laboratories
Moss Landing, California 95039

Dear John:

This letter is to advise you that the University of Texas and Texas A&M University are planning to merge their ship operations into a single group. The purpose of this merger is to achieve a more effective and efficient ship operations group that will be responsive to both institutions. As part of this plan, we are considering the possibility of accommodating A&M and UT's research on a single UNOLS ship. A single ship should provide an economy of operation for the State of Texas, as well as the UNOLS fleet.

Since this plan affects the UNOLS fleet, we would like to present our plan to the Advisory Council at its March 3 and 4 meeting. Art Maxwell will be prepared to make the presentation. Please advise us if it is possible to schedule the presentation.

Sincerely,

Gilbert T. Rowe
Head, Department of Oceanography
Texas A&M University

(for) Arthur E. Maxwell
Director, Institute for Geophysics
University of Texas

GTR:AEM:ct

xc: Dr. M. Friedman
Dr. A. Maxwell
Dr. W. Merrell
Dr. W. Nowlin

Lamont-Doherty Geological Observatory | *Palisades, N.Y. 10964*
of Columbia University

Cable: LAMONTGEO
Palisades New York State
TWX-710-576-2653

Telephone: Code 914, 359-2900

February 29, 1988

Dr. M. Grant Gross, Director
Division of Ocean Sciences
National Science Foundation
Washington, D. C., 20550

Dear Grant:

I want to follow-up my informal conversations with you and your staff on the subject of a replacement vessel for the R/V ROBERT D. CONRAD. In particular, we want to stimulate an early, informal response from NSF, ONR, and UNOLS regarding a specific plan to acquire an existing research vessel. The particular vessel we have in mind is the M/V BERNIER, a Canadian-flag geophysical exploration ship. This ship can 1) help solve the general long-term fleet replacement problem and 2) simultaneously address the problem of the inadequate marine geological and geophysical capabilities that would follow any near-term demise of the R/V CONRAD. I request, therefore, that this matter be considered by you and brought by NSF before the UNOLS Advisory Council Committee at their meeting of 3-4 March.

By way of background, we have examined the M/V BERNIER (using various professionals from ABS, ex-USCG, and from our own ranks) and we are persuaded that the likely availability of this vessel represents a unique opportunity. The relatively modest cost of this approach is equally important.

To assess the likely response of the UNOLS community, we have compared the characteristics (existing or easily acquired) of the M/V BERNIER to the generic characteristics of the medium-endurance and high-endurance vessels as defined in the UNOLS Fleet Replacement Committee Report of April, 1986. The M/V BERNIER can satisfy all of the scientific mission requirements of the medium-endurance "class" and most of the mission requirements of the high-endurance "class." The basic specifications of the M/V BERNIER are given in Table 1 and Tables 2A-C.

We believe this particular ship could be acquired and modified for enhanced MG&G capability, general purpose use, reflagging and classification requirements for a cost in the range of $10M. Although the idea of replacing the fleet in part by acquiring existing hulls for conversion

is not new, the suitability of existing ships varies widely regarding availability, cost, capability, and conversion requirements. Furthermore, the volatility of this used-ship market is well known and it is currently a buyer's market. We are convinced that the near-term availability of the M/V BERNIER presents an unusually attractive opportunity---but one that is likely to be lost if we don't collectively act expediently and boldly.

We are currently prepared to pledge up to $1M in institutional funds to help secure this vessel and to put it into operation. Additionally, we are actively soliciting major gifts/support from the private sector and elsewhere that would increase "our" financial commitment and decrease the proposed NSF role commensurately.

In order to move ahead we need to lay a specific offer on the table soon. I would like an informal reaction to the following scenario that would underpin a bid of ~$10M to acquire the ship and to affect the needed modifications, equipment, installations, etc.

FY 89	NSF	$6M	($3M new, $3M reprogrammed from operations)
	LDGO	$1M	(institutional)
FY90	NSF	$3M	(new)

(all NSF new monies requirements would be reduced accordingly to reflect private gifts and other agency support)

We would plan for CY89 to be primarily a low-to-no operations year (for both R/V CONRAD and M/V BERNIER). The funds typically provided for R/V CONRAD operations (~$3M) could be reprogrammed to partially meet the estimated $6M, NSF component needed in FY89. The R/V CONRAD would be retired and the M/V BERNIER brought into service; in late 89-early 90 we would expect to resume full operations and would compete for NSF CY90 operational funds in the normal manner.

In summary, we are looking for: ~ $6M in FY89 of which $3M could be reprogrammed because of curtailed operations and $+3M would have to be new. In FY90, an additional $3M of new money would be required, plus operations monies commensurate with the level of NSF-supported science projects to be implemented on this vessel. Naturally, we are prepared to consider any plausible plan of creative financing and look to NSF to help identify ways in which the needed funds could be committed.

We would want the BERNIER to be considered a bonafide component of the UNOLS fleet and in particular a part of the NECOR mini-fleet. It would be operated by Columbia University/L-DGO, assuming the same level

of cooperation from the other NECOR institutions that has supported the R/V CONRAD operations for the last several years. Because the ship is less than five years old, and in excellent condition, it would provide an important component of the UNOLS large ship needs (including enhanced MG&G) for the next 25+ years.

We are convinced that the opportunity to acquire the BERNIER will evaporate if we do not take some positive action with the next 2-3 months. This strawman proposal simply illustrates our thinking and alerts NSF to the elements of an intended proposal; we urge NSF to be prepared to evaluate and respond quickly. It is my intention to submit a formal specific proposal shortly, within the next few weeks.

I trust this letter of intent will stimulate some discussion among NSF, UNOLS, ONR, and other interested parties and will demonstrate that we are prepared to make institutional commitments. The community cannot allow itself to get paralyzed by the enormous scope and complexity of the long-term capitalization problems facing the ocean and earth sciences. I trust you will discuss at NSF a position that could accomodate a quick response to solutions of component parts of this problem as opportunities are identified.

We would appreciate some guidance from both NSF and UNOLS regarding how to proceed. Naturally, we recognize the importance of a general endorsement from UNOLS and the broader scientific community as well as from NSF and ONR. Our proposal to acquire the M/V BERNIER is well in line with actions proposed in recent studies regarding the fleet replacement problems. Therefore, we presume that broadly based enthusiasm for our plan will be forthcoming once the appropriate groups have had an opportunity to review and confirm the suitability of the M/V BERNIER as a component of the future UNOLS fleet.

Sincerely,

Dennis E. Hayes

Associate Director

cc: R. Corell, NSF
D. Heinrichs, NSF
J. Martin, UNOLS ✓
G. Keller, UNOLS
K. Kaulum, ONR
C. B. Raleigh, L-DGO

Table 1

GEOPHYSICAL SURVEY VESSEL M/V BERNIER

DIMENSIONS AND RIGGING

Length OA	72.75 m (239')
Length BP	66.30 m (218')
Beam Mld. Amidships at C Deck	14.00 m (46')
Draught Mld. Design	7.00 m (23')
Displacement Light	1748.78 t
Displacement Loaded @ 5.3 m	2665.90 t
Fuel Capacity	702.90 cu m
Cruising Range	12000.00 n mi @ 14 kts
Total Ballast	265.92 t
Feed & Fresh Water Tanks	50.36 t
Shaft Horsepower	2350.00 kW
Official Number	370452
Port of Registry	Sorel, Canada
Gross Tonnage	1965.73 t
Net Tonnage	582.64 t
Number of Berth	40 (Presently 16 Officers/Crew)

MAIN ENGINE

Main Ship Power	4 Diesel generator sets, each rated at 1000 kW at 600 V, 3 phase, 60 hz.
Main Generating Engines	4 Burmeister and Wain Holeby Diesel generating sets, type 6S28LH-4.
Propulsion Motor	4 CGE type 1571AT DC motors rated at 600 kW each.
Gear Box	Lohmann Stolterforth 4 input, single output ratio = 6.06:1 Model GVA 1120.B/SO.
Bow Thruster	CGE DC motor, 750 V, 540 A, horsepower:378 kW.

PROPELLOR CHARACTERISTICS

L.R.S. Ice Class: 1
Material: NI AL Bronze
Number of Blades: 5
Diameter: 3.000 m
Mean Pitch: 3.480 m

CLASSIFICATION

Lloyds Register of Shipping: Class +100-A-1, with descriptive notation hull ice class Baltic 1A.

BRIDGE ELECTRONICS

Radar Sets	Furuno FR-126RS and RMS 1630C. 230 mm display units, 1.2 and 1.8 m scanners. Maximum range 48 n mi with optimum conditions, 30 n mi with seas of Beaufort force 5.
VHF Radios (Air Band)	2 Genave Alpha/720 40 channel transceivers. 4 watt RF carrier, frequency range 118.000 to 135.975 MHz in 25 KHz increments.
VHF Radios (Marine Band)	2 Sailor Channelized transceiver 25 watt frequency range 156.000 to 157.775 MHz.

Table 1 (Con't.)

HF-SSB Radio	Harris RF-2330 Channelized ARQ System. SSB channelized transceiver. 125 watt PEP transmitter. 0.5 uV sensitivity receiver with 4 watt output to internal speaker; 32 through 96 field programmable channels. Operable in all standard modes including continuous duty RTTY.
Weather Facsimilie	Alden Marinefax III. Digital leverwheel switches to 1 KHz resolution, frequency coverage from 100 KHz to 29.999 MHz continuous.
Echo Sounder	Honeywell Elac Echograph LAZ51. 6 measuring ranges, provides coverage to a maximum of 0 to 1500 m. Frequency 50 KHz.
Auto Pilot	Wagner Mark VI Steering Control System. Maximum hard over to hard over range: 90 degrees. Dual switchable hydraulic pumps, failure alarm, off course alarm, gyro compass repeater, rudder angle and order meters, compass selector (magnetic or gyro).
Loran C	Decca 1024 Receiver/Plotter. Two time delay displays, notch filters, plotter with Lat/Long LED display.
Radar Responder Beacon	Displays the Morse letter P (pappa) on all operational radar sets within appropriate range. Used to identify M/V Bernier from other vessels.
Aircraft Homing Beacon	267 KHz SG 3 1020 Hz Modulation.
Marisat	Magnavox 211 Satellite Communications Terminal. Enables 24 hour worldwide telex and voice communications. Telex # 1560322 PCNA X.
Water Distillation	2 evaporator type and 1 reverse osmosis water makers. Can make up to 18 tons of potable fresh water daily.
Helideck	For sizes up to Bell 212.

Table 2A

Reference between the 'Scientific Mission Requirements for New Oceanographic Ships' published by the UNOLS Fleet Replacement Committee dated June 86, comparing the modified M/V Bernier to the requirements for both the class 1 & 2 vessels as per the above mentioned document.

SUMMARY COMPARISON OF SCIENCE REQUIREMENTS FOR LARGE SHIPS

	M/V Bernier	Medium Endurance	High Endurance
Size	240 ft.	200-250	250-300
Endurance	60 days 12000 nm @ 14 knots	50 days 12000 nm @ 14 knots	60 days 15000 nm @ 15 knots
Cruise Speed	14 knots	14 knots	15 knots
Seakeeping	No Data (They tow a 3 Km. streamer @ 5 kts. in B6 seas)	14 knots B4 12 " B5 8 " B6	15 knots B4 13 " B5 8 " B6
Station Keeping	No Data available, 750 kw bow thruster		
Trackline	No Data available.		
Towing	18000 lbs. normal ops at 5 knots.		
Science Accomm.	30 cabins *?? vans	20-25 cabins 30 w/ vans	30-35 cabins 40 w/ vans
Deck work area	3500 sq.ft. 15 x 100 waist dk. disposable load ??	2000 sq.ft. 12 x 40 waist dk. 90 tons disp. load	3000 sq.ft. 12 x 50 waist dk. 100 tons disp. load
Lab area	4500 sq. ft. **2 vans to inside 4 deck load	3000 sq.ft. 2 vans	4000 sq. ft. 4 vans
Science storage	approx. 19000 cu.ft. 15000 climate ctrl.	15000 cu.ft.	20000 cu.ft.
Ice rating	Ice sheathed to Canadian Class B	ABS Class 1C	ABS 1B / 1AA
Acoustical systems	Sea Beam, 3.5 Khz., 12 Khz., current profiling.	Sea Beam, 3.5 Khz ---------12 Khz., current-------- profiling.	
MCS	3000 scfm 2500 psi. 8000 + cu. in. 240 ch. digital streamer	3000 scfm 2000 psi. large array none spec.	4000 scfm 2500 psi. large array

Table 2A cont.

* Upper limit would have to be set by Coast Guard and the additional safety equipment would have to be acquired, life rafts etc.. This would also adversely effect the endurance based on food storage requirements.

**This would be predicated on the removal of the Solas status, by removing the two 52 man life boats(see *), this would not be directly into main lab but into the main ladder well accessing the main lab areas.

Table 2B

The following is a comparison of the available space and equipment aboard the R/V Conrad and the M/V Bernier as she would be reconfigured to suit the community needs:

Description	Conrad	Bernier w/mod
Instrument Lab	610 sq.ft.	1282 sq.ft.
Wet Lab	270 sq.ft.	2660 sq.ft.
Hydro Lab	0	to
Bio/Chem. Lab	88 sq.ft.	be
Dark Room	0	assigned
Working deck @ 6 ft.	1235 sq.ft.	1720 sq.ft.
Open deck @ 14+ ft.	450 sq.ft.	1790 sq.ft.
Winch Area	730 sq.ft.	1640 sq.ft.
Sci. storage aft.	3000 cu.ft.	8700 cu.ft.
Tape/Sci. storage	2500 cu.ft.	3200 cu.ft.
Air gun shop	96 sq.ft.	250 sq.ft.
MCS/SCS storage	0	800 cu.ft.
Scientific Equipment		
MCS/SCS Logging	DSS240 240ch.	DSS240 240ch.
Gravity	BGM-3	BGM-3 KSS-30
Magnetics	Varion V75	2 Varion V75
Nav. Logging	Masscomp	?
Q.C./reduction	Masscomp	Masscomp
Sound sources		
Airguns	5835 c.i./10	8300 c.i./16
Waterguns	160 c.i./2	160 c.i./2
Compressors	1030 csfm/5	3000 csfm/3
Bathymetry		
3.5 Khz.	EDO	EDO/ORE
12 Khz.	EDO	EDO
Bottom mapping	Sea Beam	Sea Beam
Speed log	Furuno	Furuno
Core/Trawl winch	Lebus	Lebus
CTD winch	Lebus	Lebus
Hydro winch	Lebus	Lebus
Accommodations		
W/ Head and shower	10	12
W/ Heads	0	18
W/O Heads	16	0
Total Bunks (+ 2 medical)	44	50
Sci. Bunks	21	34
Crew Bunks	23	16

Table 2C

The following is a list of the items currently in operation aboard the M/V Bernier, which could be part of the package:

3 ea. LMF 1000 csfm D.C. drive compressors

40 ea. Bolt 1500C airguns

46 ea. Geco 100 m x 12.5 m group sections

2 ea. Armored lead-in sections

1 ea. Bodenzeeworks KSS-30 gravity meter

1 ea. Varion V-75 maggie

1 ea. Magnavox 3-D integrated nav. system

1 ea. Texas Instruments DFS-V 6250 bpi sys.

1 ea. I.O. Inst. Gun controller

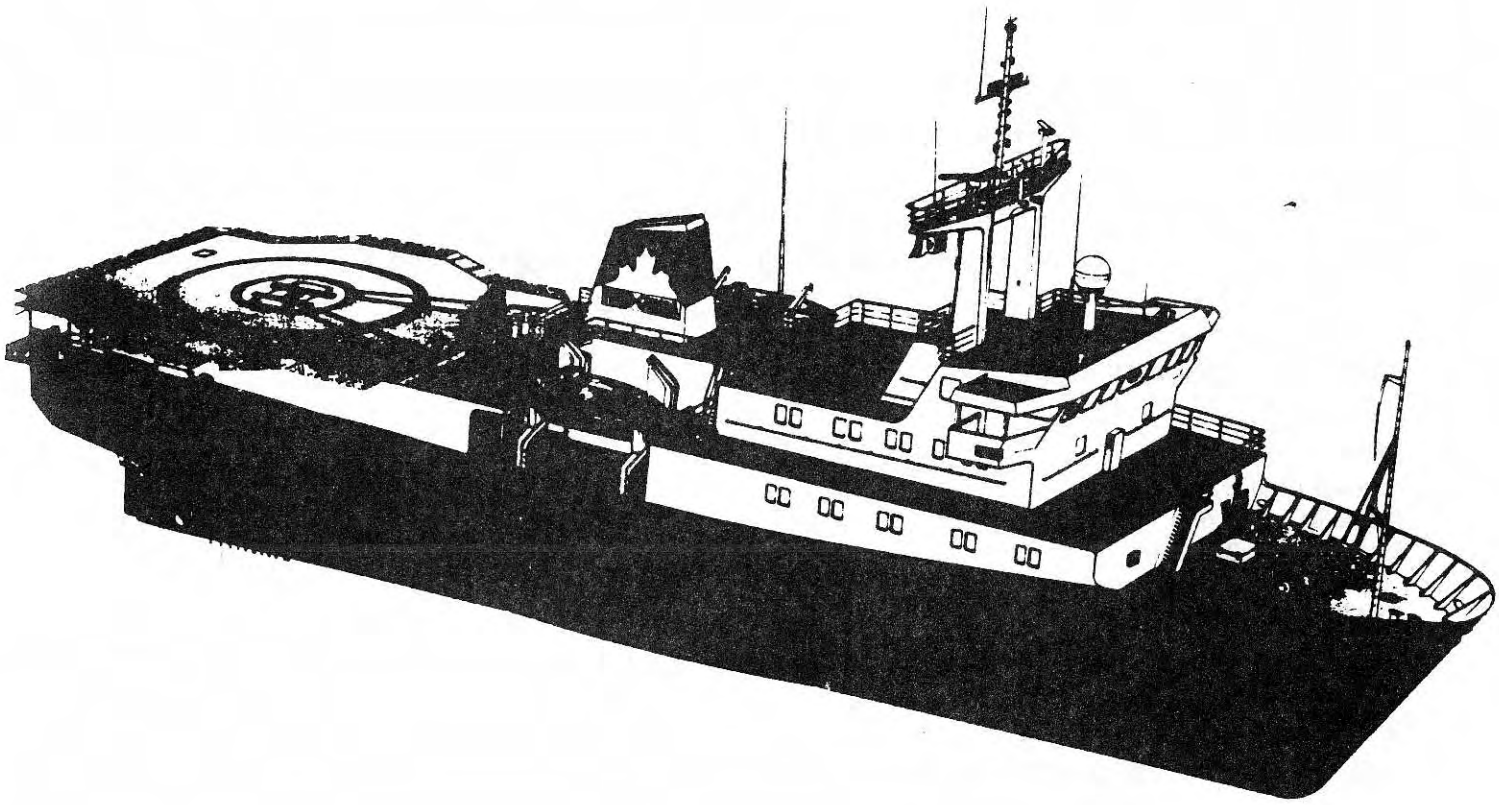
1 ea. Seismic Eng. DSS5 Streamer system

4 ea. Gun array handlers

This list only covers the larger items, which doesn't include the current spares inventory.

M./V. BERNIER

UNDER CONSIDERATION BY LDGO AS A REPLACEMENT
FOR R/V CONRAD



GEOPHYSICAL SURVEY VESSEL M/V BERNIER

DIMENSIONS AND RIGGING

Length OA	72.75 m
Length BP	66.30 m
Beam Mld. Amidships at C Deck	14.00 m
Draught Mld. Design	7.00 m
Displacement Light	1748.78 t
Displacement Loaded @ 5.3 m	2665.90 t
Fuel Capacity	702.90 cu m
Cruising Range	12000.00 n mi @ 14 kts
Total Ballast	265.92 t
Feed & Fresh Water Tanks	50.36 t
Shaft Horsepower	2350.00 kW
Official Number	370452
Port of Registry	Sorel, Canada
Gross Tonnage	1965.73 t
Net Tonnage	582.64 t
Number of Berth	40

MAIN ENGINE

Main Ship Power	4 Diesel generator sets, each rated at 1000 kW at 600 V, 3 phase, 60 hz.
Main Generating Engines	4 Burmeister and Wain Holeby Diesel generating sets, type 6S28LH(4).
Propulsion Motor	4 CGE type 1571AT DC motors rated at 600 kW each.
Gear Box	Lohmann Stolterforth 4 input, single output ratio = 6.06:1 Model GVA 1120.B/SO.
Bow Thruster	CGE DC motor, 750 V, 540 A, horsepower:378 kW.

PROPELLOR CHARACTERISTICS

L.R.S. Ice Class: 1
Material: NI AL Bronze
Number of Blades: 5
Diameter: 3.000 m
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Water Distillation	2 evaporator type and 1 reverse osmosis water makers. Can make up to 18 tons of potable fresh water daily.
Helideck	For sizes up to Bell 212.

M/V BERNIER

The M/V Bernier is a unique seismic vessel. Its Canadian design fullfills the demands of a state-of-the-art geophysical data collection operation using the latest in proven marine technology. Designed solely for geophysical data collection, the vessel does not suffer the constraints common to seismic vessels which are conversions of vessels that have been originally designed and built for other functions. While configured for the seismic operations of today, the M/V Bernier was designed with the requirements of future technological developments in mind and has built into it the flexibility and resources to accommodate the demands of a larger and more complex seismic operation.

Since its delivery in 1983, the M/V Bernier has successfully shot thousands of km of high quality data off the Canadian Eastcoast in both summer and winter conditions Internationally, the Bernier operated throughout 1984 in the Caribbean, Philippines, Sri Lankan and West African areas, including 4,500 km of 3D data recorded in Thailand. All projects to date have been completed on schedule and on budget with no compromises in data quality. Any inquiries regarding this brochure or on the M/V Bernier, should be directed to Petro Canada, Geophysical Services:

PROPULSION AND POWER MANAGEMENT

The M/V Bernier is equipped with AC/DC diesel electric propulsion. Its power management system is simple to operate, efficient and enables a flexibility and economy of operations unparalleled by vessels with conventional diesel drive systems.

The four 1000 kW B&W diesel generators provide 600 volt D.C. electrical power via a Ross Hill S.C.R. system.

The main propulsion, bow thruster and seismic compressor are all driven by D.C. motors with infinite speed control. All electrical controls are simple to operate and proven reliable.

Only as many diesel generators as the electric load requires need be used at any one time. This enables the diesels to operate in their optimum power ranges, increases overall fuel efficiency and decreases wear and resultant maintenance. Any combination of the four diesel generators may be used. As a result there is no need for vessel downtime due to routine maintenance or repairs on one, or even two of the diesels at any time. Figure I, 'Power Flow Diagram', indicates different operating configurations.

OPERATIONAL CONSIDERATION

The M/V Bernier has been designed for operation worldwide, from Arctic to Tropical conditions, some features of the design are listed below:

a. Ice Strengthening

For optimal safety and operability in the Arctic and Canadian Atlantic regions, the M/V Bernier is ice strengthened and meets the requirements of a Canadian Ice Type B. Additional reinforcing, beyond the Lloyds Ice Type I, has been added to the hull below the waterline. The ice knife and nozzle provide protection from ice for the propellor and rudder.

Water tight bulkheads extending to "C" deck divide the hull into (6) six watertight compartments. This compartmentalization enables the vessel to maintain stability should flooding due to ice or collision damage occur within a compartment.

b. Hull

Ice strengthening has not been at the expense of hull performance. Developed using the expertise of the Netherlands Ship Model Basin, the hull is shaped to minimize both resistance through the water and hull generated noise. The specially designed 5-bladed propellor coupled with the vessel's superior hull performance characteristics give optimal towing performance, line keeping capability and minimal generated noise.

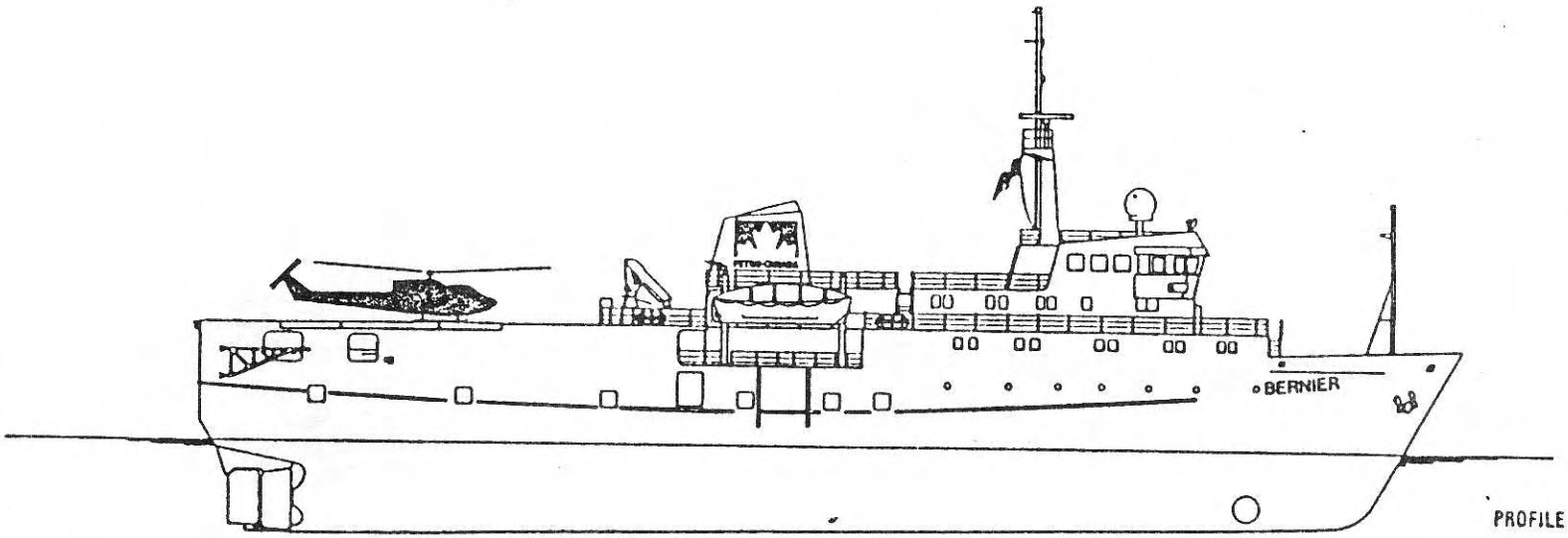
c. Range

With 540 Tonne fuel capacity, the vessel can operate for 45 or more 'shooting' days depending on operational practises. Ample freezer and refrigerator space enables a 60 day food supply for 40 persons to be carried.

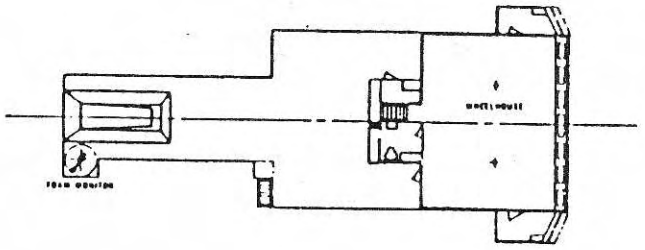
The ample helideck can handle helicopters up to a Bell 212 size for resupply or crew changes while at sea.

d. Tropical Operation

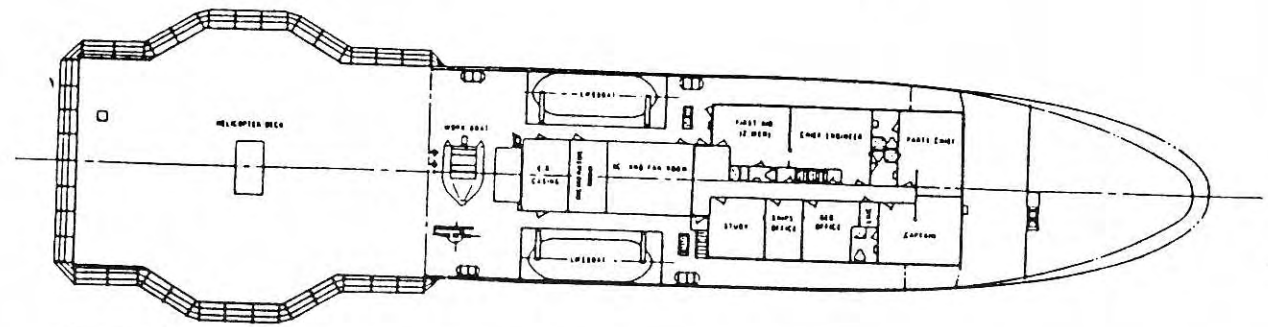
All living areas of the "Bernier" are fully air conditioned. The instrument room has two independent air conditioning systems, each of which is able to fully air condition the room.



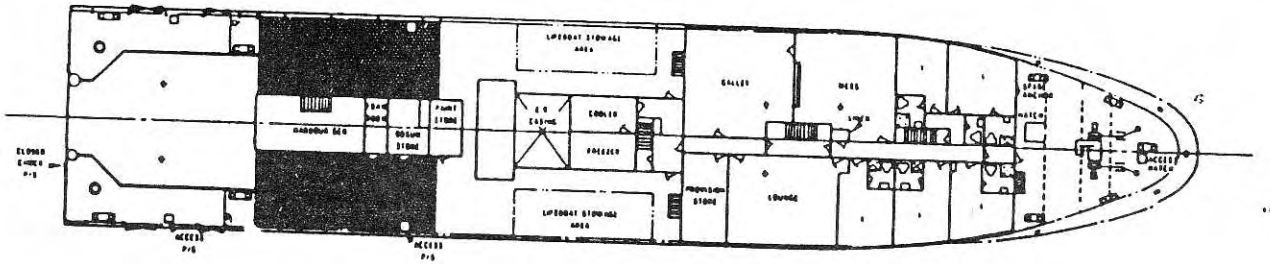
PROFILE



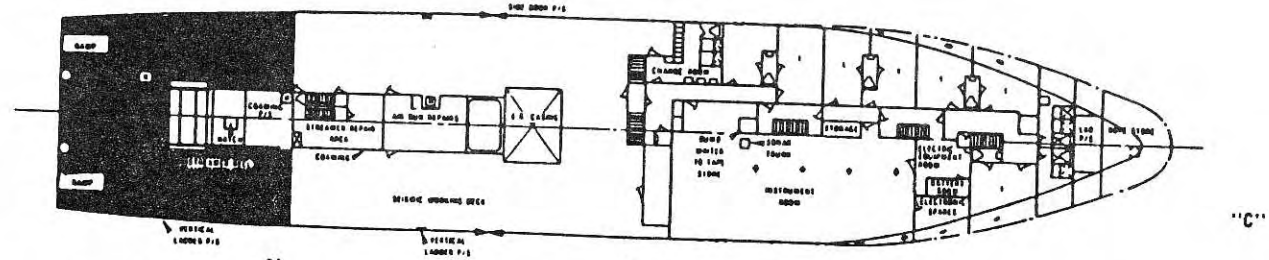
BRIDGE DECK



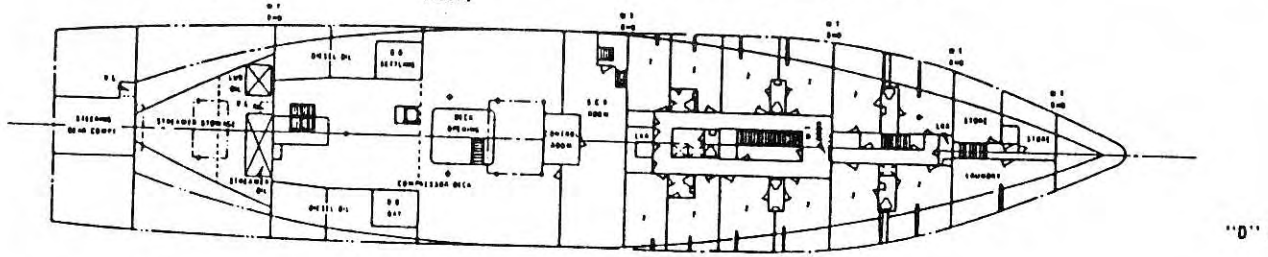
"A" DECK



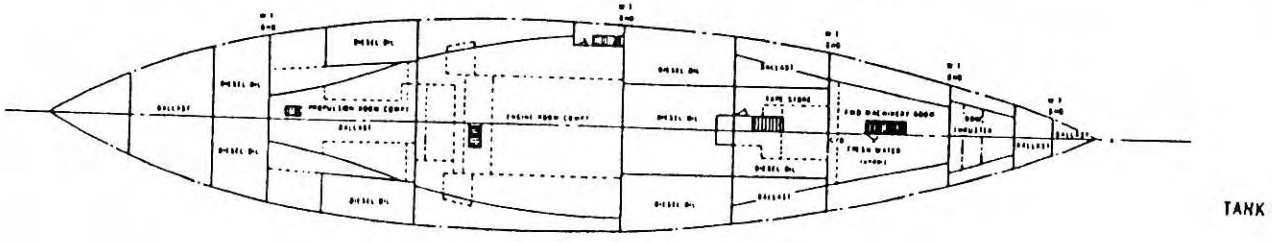
"B" DECK



"C" DECK



"D" DECK



TANK TOP

SUMMARY COMPARISON OF SCIENCE REQUIREMENTS FOR LARGE SHIPS

	M/V Bernier	Class 2	Class 1
Size	240 ft.	200-250	250-300
Endurance	60 days 12000 nm @ 14 knots	50 days 12000 nm @ 14 knots	60 days 15000 nm @ 15 knots
Cruise Speed	14 knots	14 knots	15 knots
Seakeeping	They tow a 3 km. streamer @ 5 knots B6	14 knots B4 12 " B5 8 " B6	15 knots B4 13 " B5 8 " B6
Station Keeping	No Data available, 750 kw bow thruster		
Trackline	No Data available.		
Towing	18000 lbs. normal ops at 5 knots.		
Science Accomm.	30 cabins *?? vans	20-25 cabins 30 w/ vans	30-35 cabins 40 w/ vans
Deck work area	3500 sq.ft. 15 x 100 waist dk. disposable load ??	2000 sq.ft. 12 x 40 waist dk. 90 tons disp. load	3000 sq.ft. 12 x 50 waist dk. 100 tons disp. load
Lab area	4500 sq. ft. **2 vans to inside 4 deck load	3000 sq.ft. 2 vans	4000 sq. ft. 4 vans
Science storage	approx. 19000 cu.ft. 15000 climate ctrl.	15000 cu.ft.	20000 cu.ft.
Ice rating	Ice sheathed to an unknown ABS cls.	ABS Class 1C	ABS 1B / 1AA
Acoustical systems	Sea Beam, 3.5 Khz., 12 Khz., current profiling.		Sea Beam, 3.5 Khz 12 Khz., current profiling.

MCS	3000 scfm 2500 psi. 8000 + cu. in. 240 ch. digital streamer	3000 scfm 2000 psi. large array none spec.	4000 scfm 2500 psi. large array

DETAILED SUMMARY OF SPECIFIC EQUIPMENT

Cranes	Alaska crane 2900 lbs. @ 50 ft. Hiab knuckle boom 4000 lbs. @ 20 ft.	5000 lbs. @ 30 ft. 20000 lbs. max.
Winches	Lebus Trawl winch capable of 40000 ft. 9/16" 6 x 19 wire (currently 35500 ft. 9/16") capable of 30000 ft. .680 EM. wire	Trawl winch capable of 40K ft. 9/16" and 30K ft. .680" EM. cable.
	Lebus CTD winch Capable of 40000 ft. .303 3 cond. EM wire (currently 38500 ft.)	Two winches capable of carrying wire rope or EM cable from 1/4" to 3/8"
	Lebus Hyd. winch capable of 40000 ft. 1/4" 3 x 19 wire. (currently 36000 ft.)	
A-Frames	Side frame 18 ft. horiz. X 20+ ft. vert. Stern frame ***12 ft. horz. X 16 ft. vert Heli-deck for Deep tow Hi-Ho's	Stern A-frame 20 ft. horiz. X 30 ft. vert., SWL 120000 lbs.
Workboats	2 ea. 18 ft. Avon rigid hull inflatables w/ 60 hp. & 25 hp. outboards. 1 ea. 13 ft. Dory(Boston Whaler) w/ 15 hp. outboard Sci. work boat could be supported.	1-2 ea. inflatable 16 ft. boats. Poss. deck loading of a 25-30 ft. sci. work boat.
Nav./Pos.	2 ea. GPS receivers integrated w/ transit, loran C, etc. D.P. and acoustic nav. could be implemented.	GPS, short baseline acoustic nav. sys. and Dynamic positioning.
Internal Comms.	Pabx telephone service through out, as well as a general/selec- tive P.A. System. Full deck camera coverage of all operations. Status monitors video muxed through out	Meets or exceeds all specs.

UNIVERSITY OF WASHINGTON
SEATTLE, WASHINGTON 98195

School of Oceanography, WB-10
Office of the Director

March 1, 1988

Dr. John Martin
Chairman
UNOLS Advisory Council

Dear John:

I am concerned that in the rush to award the AGOR-23 to UW while simultaneously reducing the fleet, there has been insufficient attention paid to the effects of a premature decision to lay up the R/V THOMPSON. In the absence of a published plan for the fleet, and in the absence of a schedule for the next three years for large ship use especially in the Pacific, (and I use three years as it is unlikely the new AGOR will be in service before 1991), I am unaware of how decisions to lay up ships have been reached. From my discussions with ONR, it is clear that the lay-up of the THOMPSON must occur before the new ship comes on line, but the date is unspecified and in their view is determined by the community's need for ships. I would be most appreciative if your committee can address the issues of ship plans for at least FY'89 and FY'90 prior to an irrevocable decision on the future of the THOMPSON.

Sincerely,

Arthur R.M. Nowell
Acting Director

ARMN:aw

Telephone: (206) 543-6487

NSF BUDGET ESTIMATES
March 1988

	1985	1986	1987	1988	Request 1989
OCEAN SCIENCES DIVISION	$ 120.7 M	119.5	133.7	135.3	146.5

Oceanographic Facilities Detail

Operations

Ship Operations	23.8	24.0	26.01	25.82	
ALVIN Aircraft, Misc.	2.9	1.6	1.8	1.8	
Marine Technicians	2.4	2.5	3.1	3.1	
	$29.1 M	28.1	30.9	30.7	32.1

Acquisitions and Development

Science Instruments	1.8	1.6	1.8	1.6	
Shipboard Equipment	1.7	1.4	1.7	1.5	6.7
Technology Develop.	1.6	1.7	2.4	2.6	
AMS Center	-	-	-	0	1.8
UNOLS, Ship Const., Misc.	0.7	0.9	0.4	0.8	0.7
	$ 5.8 M	5.6	6.3	6.5	9.2

TOTAL	$34.9	33.7	37.2	37.2	41.3

[1] In 1987, an additional $1.5 million was provided by the Ocean Drilling Program

[2] In 1988, an additional $1.2 million is estimated from the Ocean Drilling Program.

GEOSCIENCES.....$320,876,000

SUMMARY OF REQUEST

The FY 1989 Budget Request for Geosciences (GEO) is $320.88 million, an increase of $29.54 million or 10.1 percent over the FY 1988 Current Plan of $291.34 million.

(Millions of Dollars)

Subactivity	FY 1987 Actual	FY 1988 Request	FY 1988 Current Plan	FY 1989 Request
Atmospheric Sciences.....	$ 93.46	$106.70	$ 96.33	$104.25
Earth Sciences.....	49.92	63.35	51.29	59.27
Ocean Sciences.....	133.74	149.45	135.38	146.52
Arctic Research Program.....	8.09	10.50	8.34	10.84
Total, Activity.....	**$285.21**	**$330.00**	**$291.34**	**$320.88**

CHANGES BETWEEN THE FY 1988 REQUEST AND FY 1988 CURRENT PLAN

(Millions of Dollars)

Subactivity	FY 1987 Actual	FY 1988 Request	FY 1988 Current Plan	Change Amount	Change Percent
Atmospheric Sciences....	$ 93.46	$106.70	$ 96.33	$ -10.37	- 9.7%
Earth Sciences.....	49.92	63.35	51.29	-12.06	-19.0
Ocean Sciences.....	133.74	149.45	135.38	-14.07	- 9.4
Arctic Research Program..	8.09	10.50	8.34	- 2.16	-20.6
Total, Activity.....	**$285.21**	**$330.00**	**$291.34**	**$ -38.66**	**-11.7%**

The FY 1988 Current Plan is $38.66 million, or 11.7 percent, less than the Budget Request, but $6.13 million (2.1 percent) more than FY 1987. This change is due to unspecified Congressional reductions.

The Global Geosciences initiative remains the highest priority of this Activity. Although incremental funds have been reduced from $24.60 million to $1.95 million, existing Global Geoscience components will be maintained close to the FY 1987 level and a new component, CEDAR, will start, though at a reduced level of activity.

Five ships in the academic fleet will be removed from service for all or part of FY 1988. This will reduce the science capacity of the fleet and result in the deferral of some field project activities in the Ocean Sciences Subactivity.

In the Earth Sciences Subactivity, the Continental Lithosphere Program will be funded at the FY 1987 level.

The number of grants for individual investigators in all Subactivities will remain approximately at the FY 1987 level.

OCEAN SCIENCES.....$146,520,000

SUMMARY OF REQUEST

The FY 1989 Budget Request for Ocean Sciences (OCE) is an increase of $11.14 million or 8.2 percent over the FY 1988 Current Plan of $135.38 million.

(Millions of Dollars)

Program Element	FY 1987 Actual	FY 1988 Request	FY 1988 Current Plan	FY 1989 Request
Ocean Sciences Research Support	$ 66.56	$ 74.29	$ 67.42	$ 73.11
Oceanographic Centers and Facilities..	37.18	43.86	37.26	41.31
Ocean Drilling Program.....	30.00	31.30	30.70	32.10
Total, Subactivity.....	**$133.74**	**$149.45**	**$135.38**	**$146.52**

CHANGES BETWEEN THE FY 1988 REQUEST AND FY 1988 CURRENT PLAN

(Millions of Dollars)

Program Element	FY 1987 Actual	FY 1988 Request	FY 1988 Current Plan	Change Amount	Change Percent
Ocean Sciences Research Support.....	$ 66.56	$ 74.29	$ 67.42	$- 6.87	- 9.2%
Oceanographic Centers and Facilities.....	37.18	43.86	37.26	- 6.60	-15.0
Ocean Drilling Program..	30.00	31.30	30.70	- 0.60	- 1.9
Total, Subactivity.....	**$133.74**	**$149.45**	**$135.38**	**$-14.07**	**- 9.4%**

The FY 1988 Current Plan for Ocean Sciences is $14.07 million, or 9.4 percent, less than the Budget Request, and represents an increase of $1.6 million, or 1.2 percent, over FY 1987. These changes result from unspecified Congressional reductions.

The reduction in the level of effort for Oceanographic Centers and Facilities, 15.0 percent, will require that five ships, or one-third of the large research vessels in the academic fleet, be out of service for all or part of FY 1988. This action will reduce NSF's ability to support shipboard oceanographic research and will cause some field research projects funded by OCE to be deferred.

A reduction in the U.S. science program for Ocean Drilling will be necessary in order for the Ocean Drilling program to meet its international obligations. Operationally, some engineering and technology programs will be deferred, and support for publications and technicians will be reduced.

No new programs in Ocean Sciences will be started under the Global Geosciences initiative. Planning activities will continue for the Tropical Ocean/Global Atmosphere (TOGA), World Ocean Circulation Experiment (WOCE), and Global Ocean Flux Studies (GOFS) programs. TOGA field experiments will be funded at the FY 1987 level. The WOCE hydrographic program and GOFS pilot programs will be deferred until FY 1989, as will the establishment of a center for Accelerator Mass Spectrometry for oceanographic applications and an initiative in marine biotechnology.

FY 1989 BUDGET REQUEST

(Millions of Dollars)

Program Element	FY 1988 Current Plan	FY 1989 Request	Change Amount	Change Percent
Ocean Sciences Research Support	$ 67.42	$ 73.11	$ 5.69	8.4%
Oceanographic Centers... and Facilities	37.26	41.31	4.05	10.9
Ocean Drilling Program..	30.70	32.10	1.40	4.6
Total, Subactivity....	**$135.38**	**$146.52**	**$11.14**	**8.2%**

The FY 1989 Budget Request is $146.52 million, an increase of $11.14 million, or 8.2 percent above the FY 1988 Current Plan level of $135.38 million. Global Geosciences will receive an increment of $6.50 million for the TOGA, WOCE, GOFS, and Ridge Crest Processes programs. The base program will be increased by $3.14 million in order to maintain essential components upon which new thrusts are built. OCE will participate in the ARCSS initiative ($0.5 million) and in a new start in biotechnology ($1.0 million).

OCEANOGRAPHIC CENTERS AND FACILITIES

This program element supports research at sea by providing ships and other shared-use facilities required by NSF grantees. Included are: operating and maintaining research ships and the deep submergence research vehicle Alvin, supporting technicians to maintain and operate shipboard scientific systems, and supporting the University-National Oceanographic Laboratory System Office to schedule ship use. Support of surface ships is the largest component. In FY 1988, NSF provided about 75 percent of the funds required for academic fleet operations. Support also comes from the Office of Naval Research, state governments, and private sources.

This program element also provides support for acquiring and developing shared use instruments and equipment. Adaptation of existing technologies to ocean sciences and development of new instruments is included. Ship design studies and conversion and upgrading of ships and other platforms are supported as required to meet research needs.

At the requested level, the program will fund approximately 75 percent of academic research fleet operations and the NSF share of operational costs for Alvin. Support will be focused on facilities, field operations, and technological requirements of the Global Geosciences initiative, including:

- seagoing projects in the TOGA, WOCE, and GOFS research thrusts;
- establishing an Accelerator Mass Spectrometry facility for oceanographic applications in WOCE, GOFS and marine geology programs; and
- developing new instruments required to implement ocean components of the Global Geosciences initiative.

NSF BUDGET SUMMARY
FY 1988–1989
(DOLLARS IN MILLIONS)

	FY 88 APPROP	FY 89 REQST	CHANGE AMOUNT	FY89/88 CHANGE
RESEARCH AND RELATED ACTIVITIES	1,453	1,603	150	10%
SCIENCE AND ENGINEERING EDUCATION	139	156	17	12%
U.S. ANTARCTIC PROGRAM	125	141	16	13%
SCIENCE AND TECHNOLOGY CENTERS	0	150	150	N/A
TOTAL, NSF	$1,717	$2,050	$333	19%

NSF BUDGET SUMMARY
FOR
RESEARCH AND RELATED ACTIVITIES
FY 1988–1989
(DOLLARS IN MILLIONS)

	FY 88 APPROP	FY 89 REQST	FY89/88 CHANGE
MATHEMATICAL AND PHYSICAL SCIENCES	$ 473	$ 503	6%
GEOSCIENCES	291	321	10%
BIOLOGICAL, BEHAVIORAL AND SOCIAL SCIENCES	266	289	9%
ENGINEERING	171	195	14%
COMPUTER AND INFORMATION SCIENCE AND ENGINEERING	124	149	20%
SCIENTIFIC, TECHNOLOGICAL AND INTERNATIONAL AFFAIRS	44	51	16%
PROGRAM DEVELOPMENT AND MANAGEMENT	84	95	13%
RESEARCH & RELATED ACTIVITIES	$1,453	$1603	10%

U.S. ANTARCTIC PROGRAM
FY 1989

- Increases from $125 M in FY88 to $141 M
- Research program strengthened
- Continue with acquisition of ice-breaking research ship
- LC-130 refurbishment program continues
- Science enhancement at McMurdo

SCIENCE AND ENGINEERING EDUCATION

(FY 1989)

- Increases from $139 million to $156 million
- Summary by level:

Precollege	$108 M
Undergraduate	24 M
Graduate	24 M

- 100 Additional New Graduate Fellows
  (Increased from 760 to 860)
- Double support for Comprehensive Regional Centers for Minorities
- Instructional Materials for Middle School Mathematics

FY 1989 STRATEGIC THEMES

- Education and Human Resources
- Disciplinary Research and Facilities
- Centers and Groups

EDUCATION AND HUMAN RESOURCES

- Two Main Aspects:
  - Increasing supply of scientists and engineers for future
  - Broadening participation
    - Women, minorities, disabled
    - Institutions
    - Geographic regions
- Crosses all Foundation organizations
- Examples: Graduate Fellowships
  Presidential Young Investigators
  Minority Research Initiation
  Research Opportunities for Women
  Minority Scholars
  Special Postdoc Programs
  Research Improvement in Minority Institutions
  EPSCoR

DISCIPLINARY RESEARCH & FACILITIES

- Increase Grant Size and Number:
  - Support of students and postdocs
  - Instrumentation

- New or Expanded Research Areas:
  - Superconductivity
  - Materials chemistry
  - Biological communication
  - Manufacturing systems
  - Parallel computing
  - Cosmology

- National Facilities
  - National Supercomputer Centers and NSFNET strengthened
  - VLBA construction continues
  - Physics facility upgrades at Michigan State, Cornell and Indiana come online
  - Antarctic -- research ship, laboratory space, aircraft refurbishment

CENTERS AND GROUPS
FY 1989

- Continuing Centers
  - Materials Research Laboratories
  - Engineering Research Centers
  - Interagency Plant Science Centers

- Groups
  - Materials, mathematics
  - Global geosciences
  - Biotechnology, ecology
  - Emerging engineering technologies

- Separate S&T Centers Initiative

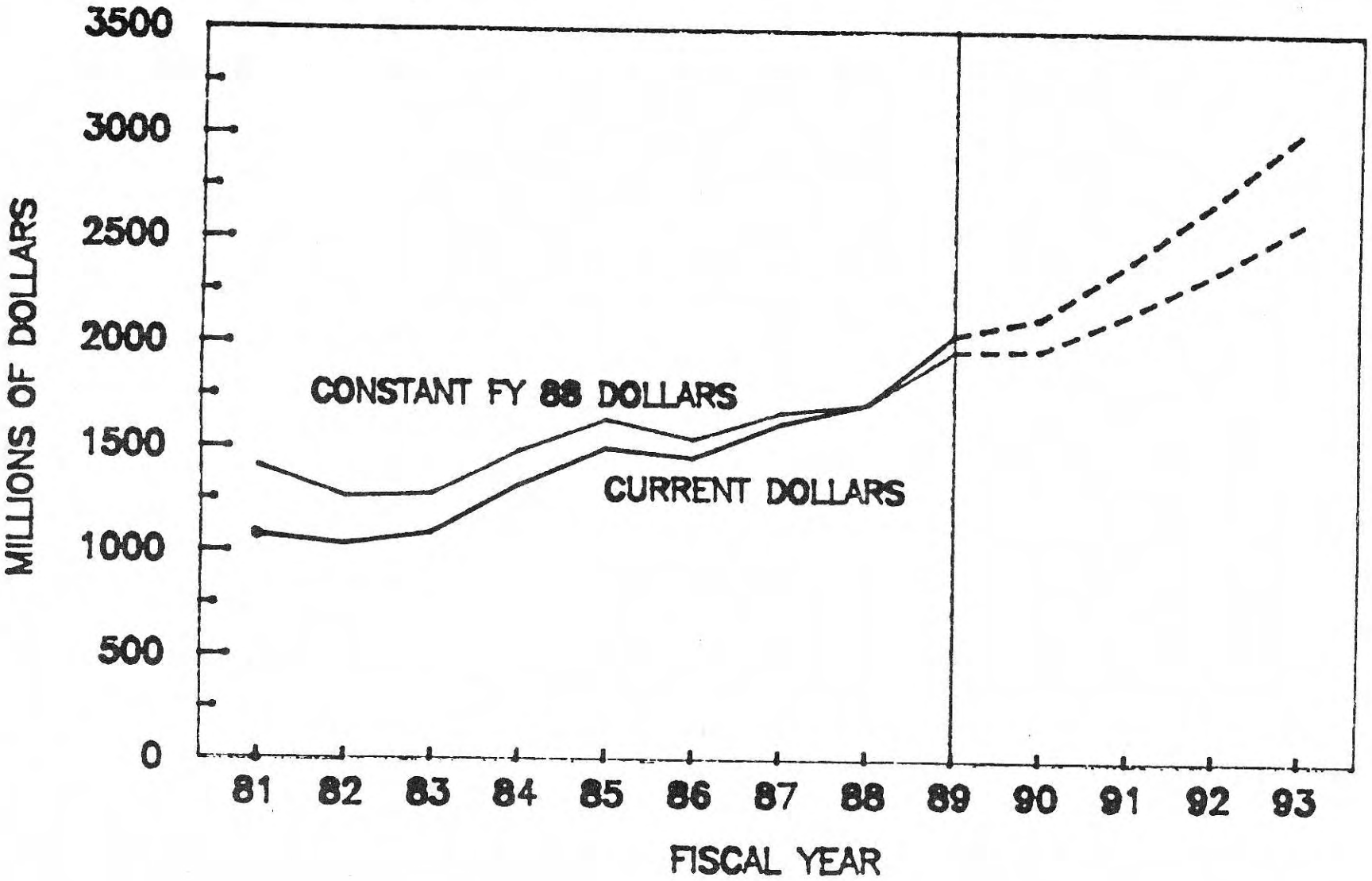
S&T CENTERS
FY 1989

- New $150 Million Appropriation in FY 1989
- Up—front, fully funded Centers
- Slow outlay pattern
- Initiate 12 to 15 centers in FY 1989
- Projected award size: $1—5M per year for up to 5 years
- Merit review
- Topics not targeted by NSF in advance

S & T CENTER PROPOSAL STATISTICS

Receipt Date: January 15, 1988
Proposals Received: 325
Number of Institutions: 122
Number of States: 42
Total Requested: $4.1 Billion (for 5 years)
Average Total Request: $12.6 Million
First Year Average Request: $2.4 Million

NSF BUDGET ESTIMATES
FY 1981 – FY 1993



STATUS OF R/Vs KNORR & MELVILLE REFIT PROGRAM

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

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

Open deck space and flexibility for accommodating scientific outfitting were the chief forces in the basic arrangements. That this requirement has been successfully met can be attested to by the sole use of these ships in seagoing programs where they and no others can fulfill the needs.

Maneuverability and position keeping were defined as maintaining position against a 40 knot beam wind and a one knot beam current (35,000 lb. force). Almost alone this requirement drove the selection of the propulsion system resulting in the use of two Voith-Schneider cycloidal propellers, one aft-2,000 HP and one forward-1,000 HP. Operational experience has demonstrated that the ships do possess exceptional maneuverability, probably unsurpassed among all research ships; however, high casualty rates and accompanying maintenance costs have led to ambivalence by the operators and users.

The speed and endurance requirement was set at 12 knots and 10,000 miles respectively. Under normal operating conditions, 12 knots has not been fully achievable as a regular cruising (or even full) speed.

Other than to meet the maneuverability criteria, the requirement for the main propulsion plant was simplicity. This resulted in a single, large, low speed diesel engine to drive both aft and forward cycloids. The machinery arrangement is shown in Figure 1. The lengthy shafting, clutches, couplings, and other novel arrangements make questionable whether simplicity actually has been achieved.

Quiet ship requirements have not been met in the AGOR 14 class. Quite the contrary, these ships have a reputation for noisiness. Scientific echo sounding from the hull is virtually impossible. The noise problem has appeared to be so related to the propulsion system that no serious effort has been mounted to identify or correct it.

MELVILLE (AGOR 14) and KNORR (AGOR 15) were completed in 1969 and 1970 respectively. They were built under the direction of the Supervisor of Shipbuilding, Naval Ship Systems Command by the Defoe Shipbuilding Corporation of Bay City, Michigan. A description of R/V KNORR follows (MELVILLE is similar but not identical).

Description of AGOR-15 (AGOR-14 similar but not identical)

The Research Vessel KNORR was designed and built under the direction of the Supervisor of Shipbuilding, Naval Ship Systems Command by the Defoe Shipbuilding Corporation of Bay City, Michigan. The vessel was launched in 1968 and delivered to Woods Hole Oceanographic Institution on April 15, 1970. The ship was designed as a general purpose oceanographic research vessel. A summary of current data is:

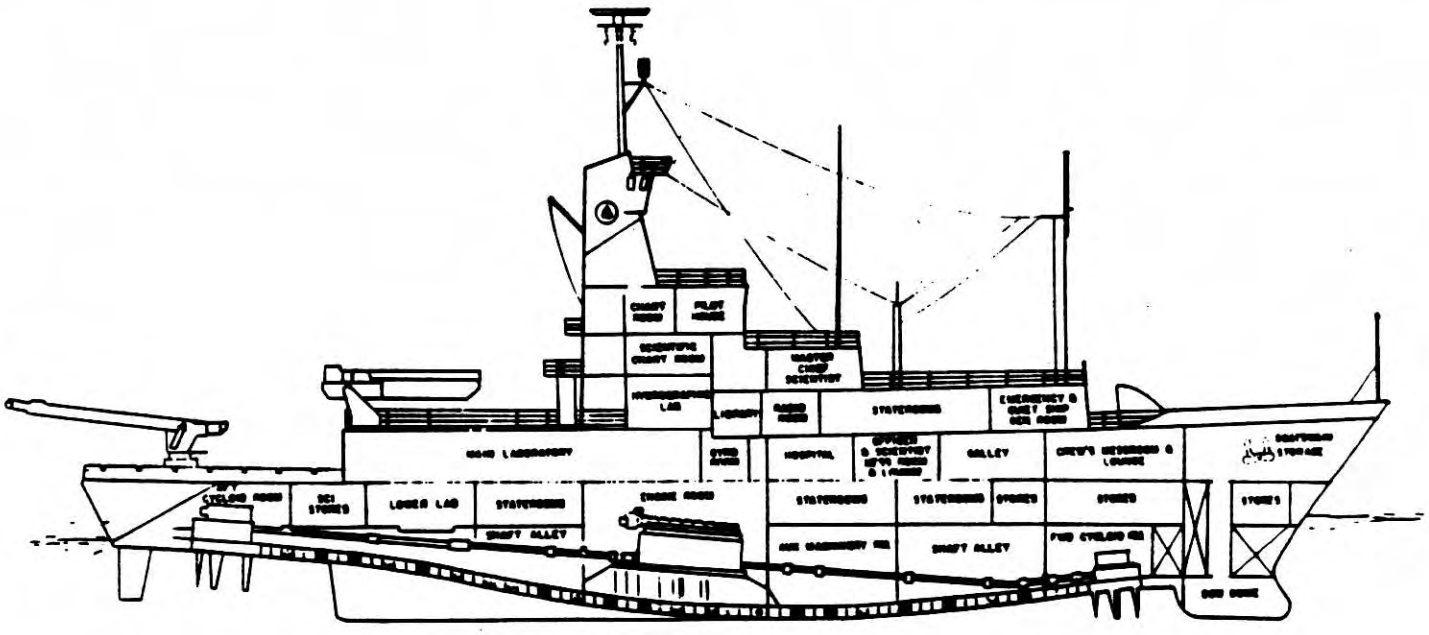
Built:	1969
Length:	245' LOA (75 m)
Beam:	46' (14 m)
Draft:	16' (4.8 m)
Gross Tonnage:	1,806 tons
Displacement:	1,915 L tons
Crew:	24
Scientific Personnel:	24
Main Engine:	One Enterprise DMR diesel engine; 2,500 HP
Propulsion:	Cycloidal propellers forward and aft (J. M. Voith Model 32G and 24E)

Ownership:
Title held by U S Navy; operated under contract with ONR by WHOI

Speed:
- Cruising - 10.0 knots
- Full - 12.0 knots
- Minimum - Dead Slow

Endurance: 45 Days
Range: 10,000 miles
Fuel Capacity: 110,100 gals.
Laboratories:
- Wet - 400 sq. ft.
- Dry (3) - 3,000 sq. ft.

Ships Service Generators:
Two 300 KVA, Enterprise diesel DSM-36 generators



KNORR - Inboard Profile

From the outset, the ships were beset with maintenance problems chiefly associated with the drive train and propulsion system. These ranged from vibrations, alignments, gears, seals, and more recently, a massive failure in the aft cycloid itself. A failure in one ship would be soon followed by a duplicate failure in the other. The high maintenance costs and time lost are a matter of record. The ships are now 18 years old and have demonstrated that the problems are beyond the "debugging" stage. If full service life is to be expected, a major engineering refit is required.

In 1985, with support from ONR, an engineering feasibility study was commenced. Its purpose was to examine the problems with the existing propulsion system, to redefine the mission requirements, and to investigate the alternatives for modifying and/or replacing the propulsion system. The engineering phase of the study was accomplished under contract to the J.J.Henry Co., Inc. Guidance and oversight was by a Steering Committee made up with representatives from Woods Hole, Scripps Institution, and ONR. Results of the study showed (1) that the average mean time between failures is 10 months and shows no indication of lessening; (2) underwater radiated noise is from cycloid cavitation and the mechanical shafting, and precludes any reasonable attempt to meet scientific acoustical requirements; and (3) refits to correct the deficiencies are possible.

The study examined three alternative propulsion systems: refitted cycloids, azumuthing thrusters (Z-Drive), and conventional screw propellers; and two alternative power systems: geared diesel drive, and electric drive. The study recommended:

1. Use of an integrated electric power system (AC-DC) to replace the existing direct diesel drive.

2. Use of azimuthing Z-Drive Thrusters over cycloid or conventional screw propellers.

3. Fairing the existing hull shape to remove the bow dome and cycloid cavity in order to alleviate flow turbulence and bubble sweepdown.

Scientific upgrading as a part of a possible refit emerged early during the feasibility stage. The need to plan for new, more capable research ships to carry out scientific programs at sea has become virtually self evident. Numerous studies have amply demonstrated that our ships, mostly constructed in the 1960's are becoming obsolete in their capability to support oceanography for the 1990's and beyond. A 1985 Study by the University-National Oceanographic Laboratory System (UNOLS) and supported by ONR and NSF found that "Much scientific equipment ... has increased in weight, bulk, and complexity, therefore requiring deployment from large, stable ships. Increasing complexity of electronic sensors and shipboard computers often result in an increase in the

number of technicians who must go to sea, rather than a reduction in their number. The nature of new interdisciplinary ocean science research projects requires that several scientists from different discliplines be able to work on the same ship at the same time. This increases the demand for laboratory, storage, and other working spaces aboard ship. Large high performance overside handling arrangements and midern state-of-the-art shipboard laboratories will be needed to support major ongoing ocean programs. In addition, a high quality working and living environment is essential in order to attract competent seagoing personnel."

The AGOR-14 Class, unlike its predecessors the AGOR-3 Class, has many excellent attractions for work at sea. It was, and still is, a ship for the future. It is argued that by including science upgrading as part of a class refit a modern ship meeting most ongoing requirements will result. Scientific upgrading was defined as acoustic quieting, improved laboratory space, increased accommodations and storage, greater range, and improved roll suppression. Examples of major ship requirements to which the U.S. is committed and for which no suitable ship presently exists are the World Ocean Circulation Experiment (WOCE) and the Global Ocean Flux Studies (GOFS)

In 1986 the engineering studies were expanded to include the feasibility for jumboizing (stretching) the hull. Until then only a cursory look had deemed it as a feasible or desireable measure. The chief attraction is to return the ship to its design draft and reduce drag resistance and transom immersion. Additional benefits include increased laboratory and accommodation space, greater payload capacity, and increased speed and range. The results of that study indicated, that in order to meet any repropulsion design along with science requirements for laboratory space, personnel, cruising endurance, and storage, hull lengthening of between 30-36 ft. was necessary.

Additional studies included acoustic evaluations of alternative installations in order to make an impact assessment on sonar systems, and a dynamic positioning study to assess maneuvering.

In late 1986 under ONR support, a survey team visited operating and maintenance facilities in the North Sea area where most of the modern propulsion systems under consideration were in use. A total of six ships and five maintenance activities were visited to gather information on the performance and reliability of candidate propulsion systems. In addition four manufacturing facilities were inspected. Findings from this tour indicated that either cycloid or Z-Drive propulsors would provide highly suitable performance from the standpoint of maneuverability and reliability. Integrated electric drive emerged as a near solitary choice thereby making controllable pitch propellers an unnecessary consideration.

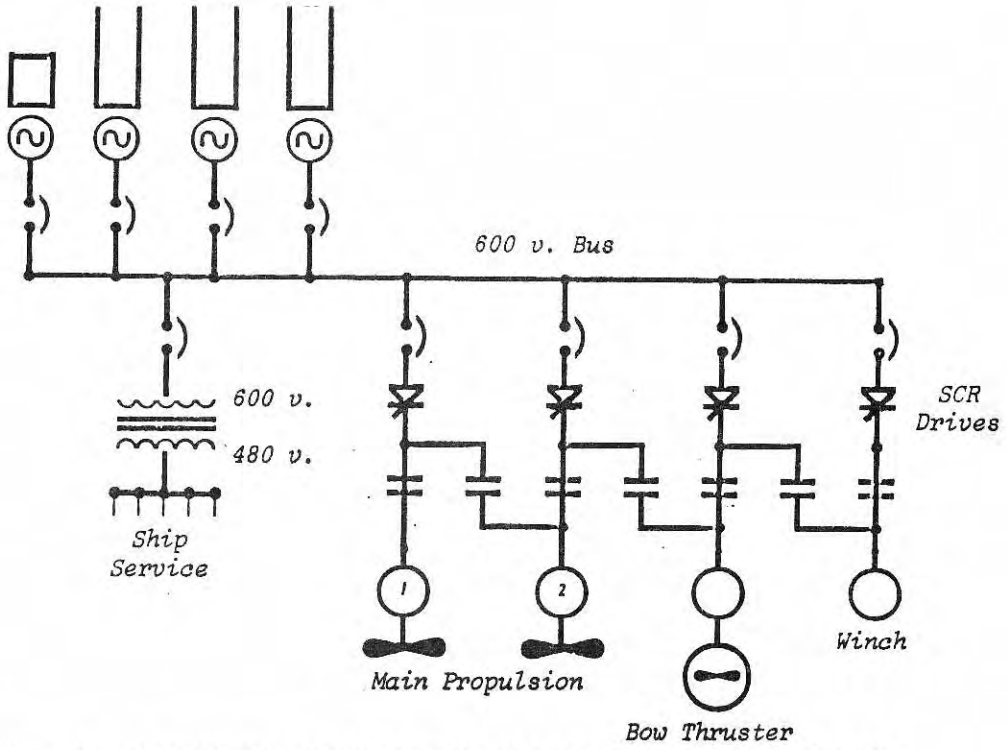


Fig. 2 - INTEGRATED ELECTRIC POWER SYSTEM (AC-DC) USING SILICON CONTROLLED RECTIFIER DRIVES (SCR)

In early 1987, results from the acoustic studies by BBN Labs, Inc., and information from the Naval Sea Systems Command showed that cycloid propulsors, even modern designs, would exceed the design target for underwater radiated noise. Further, the lesser relative thrust per horsepower by cycloids indicated a marginal weight and size consideration. A meeting of the Steering Committee on 2-3 March 1987 examined all available reports and alternatives under consideration. It directed that future planning be based on an integrated AC-DC power system with twin azimuthing Z-drive main propulsors and a retractable Z-drive bow thruster. Arrangements would be on a jumboized hull lengthened amidships by 34 feet.

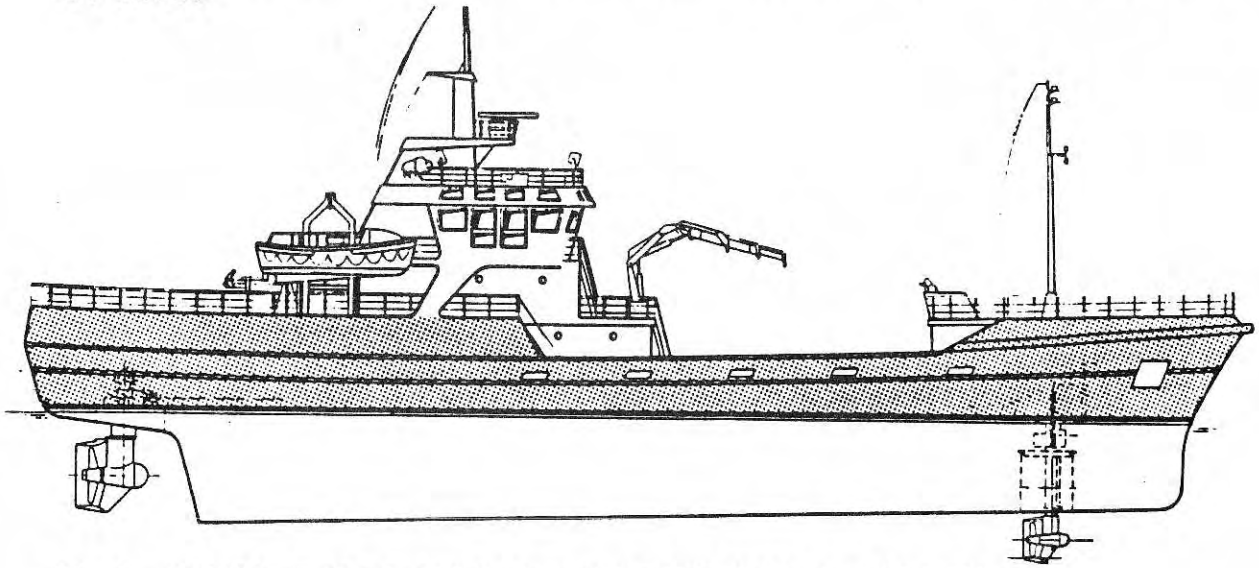


Fig.3 - TYPICAL Z-DRIVE INSTALLATION WITH RETRACTABLE BOW THRUSTER

From March-October 1987, a Preliminary Design Study was carried out as the next step in planning for the overhaul and refit program. The design was supported by ONR and the naval architecture and marine engineering contractor was The Glosten Associates, Inc. Preliminary design was in accordance with preliminary operational requirements approved March 1987 and included the following tasks:

- Deadweight Survey
- Modified Hull Lines
- Tank Testing
- Resistance & Powering Analysis
- Power & Load Analysis
- Stability Calculations
- Structural Modifications
- General Arrangements Plans
- Machinery Arrangements
- Radiated Noise Analysis
- Airborne Noise Analysis
- Weight Analysis
- Science Upgrading Definition
- Seakeeping Analysis
- HVAC Analysis
- Cost Estimates
- Preliminary Specifications

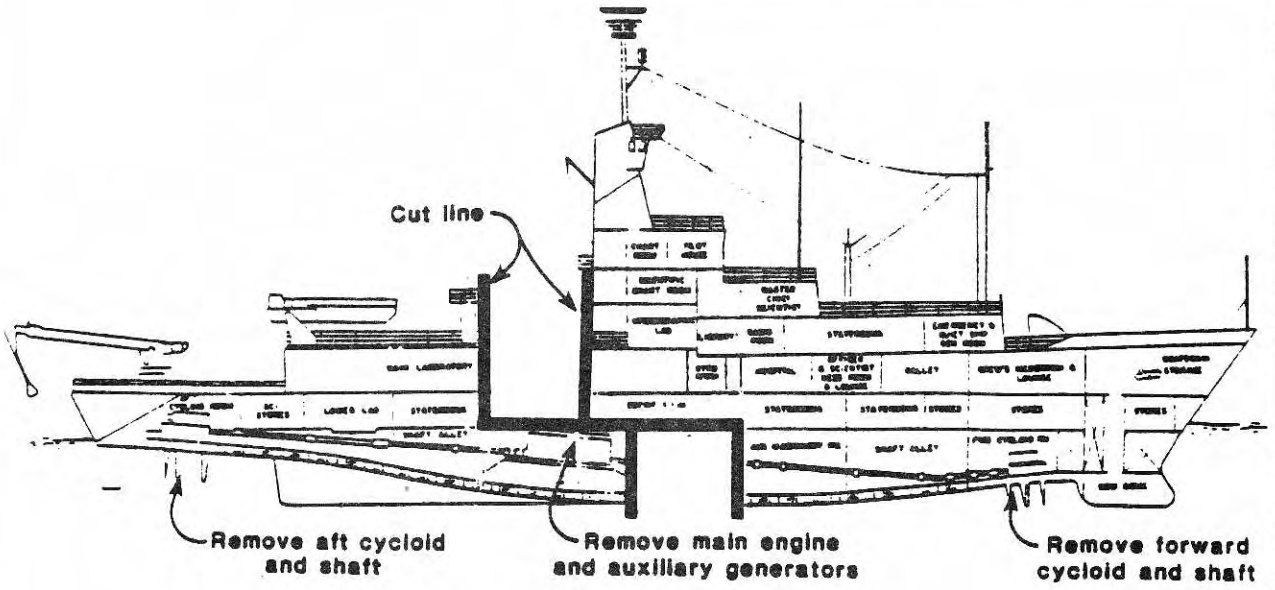
Results of the preliminary design are summarized in Figs. 4 & 5, and a comparison of the modified design with the original is shown by the following table of characteristics:

	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

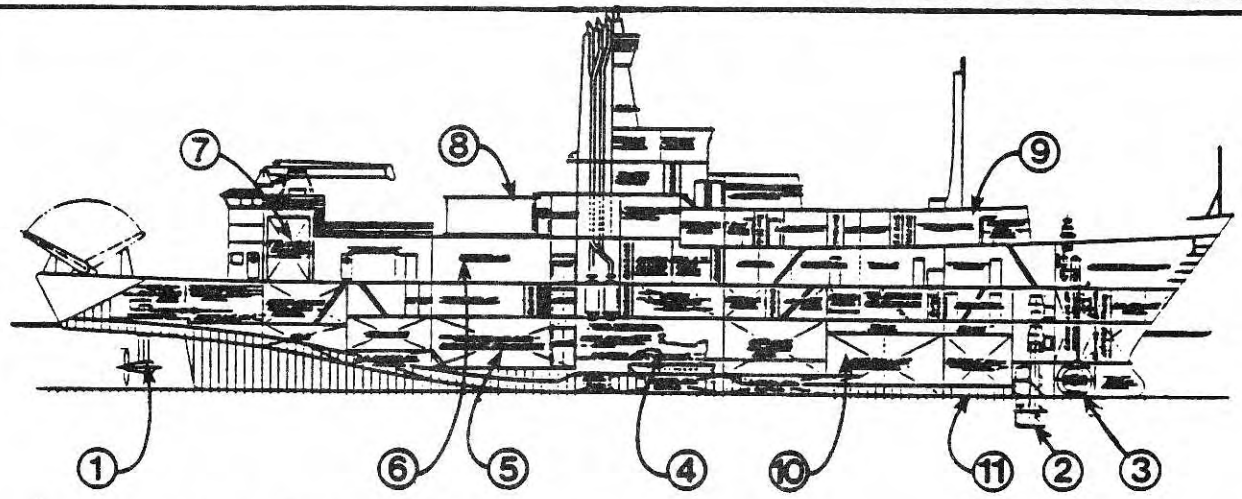
Copies of the arrangement plans are shown by Figs. 6-8.

The Steering Committee approved the Preliminary Design and the Final Operational Requirements on 25 October 1987. A copy of the Operational Requirements is attached.

Funding for the first ship (R/V KNORR) was approved in the FY-1988 Budget. The second ship (R/V MELVILLE) has been included in the proposed FY-89 Budget.



"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.

Fig. 4
Summary of Modified Vessel

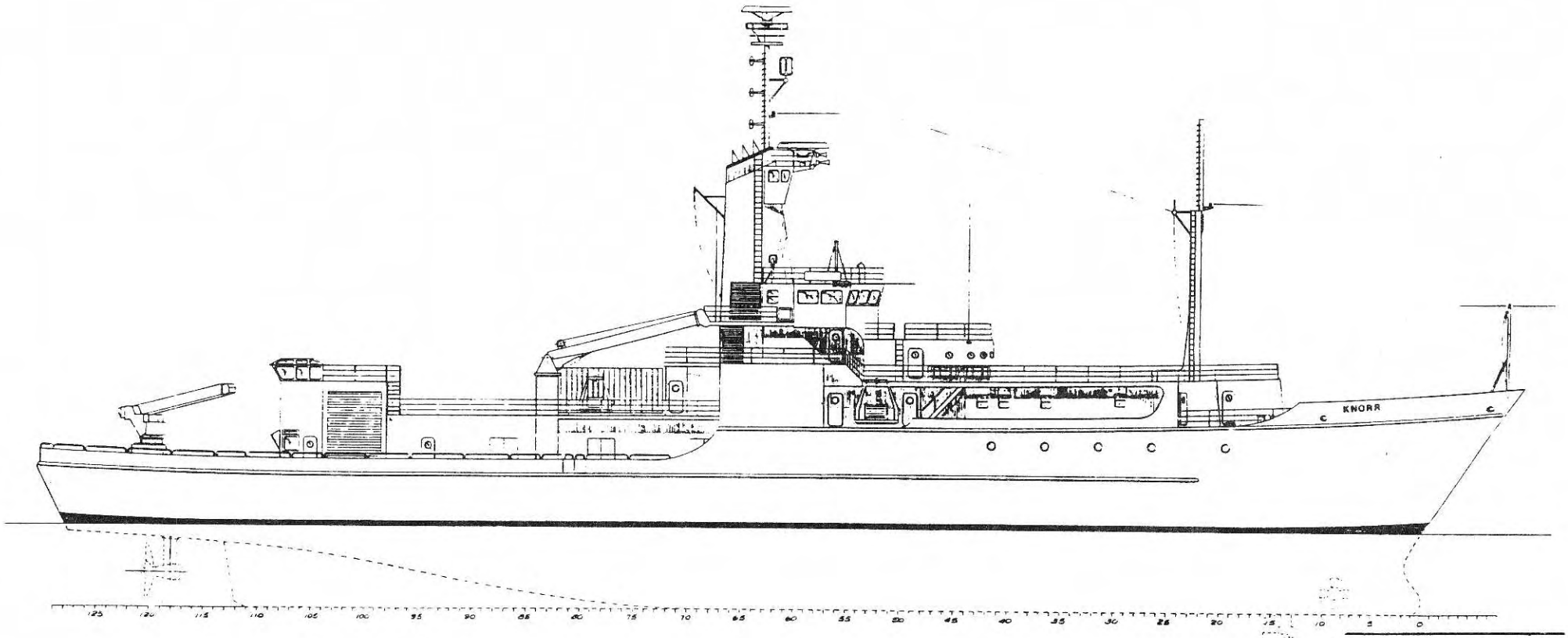
The contract design phase started on 1 February 1988 and will be a seven month effort to produce the Contract Plans, Specifications and other documents leading to a contract award for the refit of the two vessels. The Glosten Associates will continue as project naval architects.

During the course of the Contract Design phase, products will include updated engineering and acoustic reports and plans, contract plans and drawings, and technical and administrative specifications for purchases and for shipyard conversion. It will include machinery selection, and the preparation and issuance of RFPs of long lead time equipment and the Shipyard Conversion phase for the lead ship.

The design efforts will continue to be in cooperation with the Scripps Institution of Oceanography. Guidance and oversight will be by a committee made up from representatives of Woods Hole, Scripps Institution and the Office of Naval Research.

Current schedule for the project is as follows:

February 1988	-	Contract Design starts.
April 1988	-	Commence Long Lead Time procurement
August 1988	-	Complete Contract Design; issue RFP
October 1988	-	Contract Award for KNORR
November 1988	-	KNORR enters shipyard
May 1989	-	Contract Award for MELVILLE
July 1989	-	MELVILLE enters shipyard
August 1989	-	KNORR completes shipyard; trials & shakedown.
September 1989	-	KNORR resumes operating schedule.
April 1990	-	MELVILLE completes shipyard
June 1990	-	MELVILLE resumes operating schedule.



Woods Hole Oceanographic Institution

Woods Hole, Massachusetts

AGOR 15 — OVERHAUL AND MODIFICATIONS

Preliminary Outboard Profile

APPROVED

THE GLOSTEN ASSOCIATES, INC.

DRAWN CWK DATE 8/14/87 | DRAWING NO. 8716-3-15

CHECKED WH DATE 8/24/87

APPROVED DATE 9-4-87

SCALE 1/8"=1'-0" | Sheet 1 of 1

DATE 15 SEP 87

Fig. 5

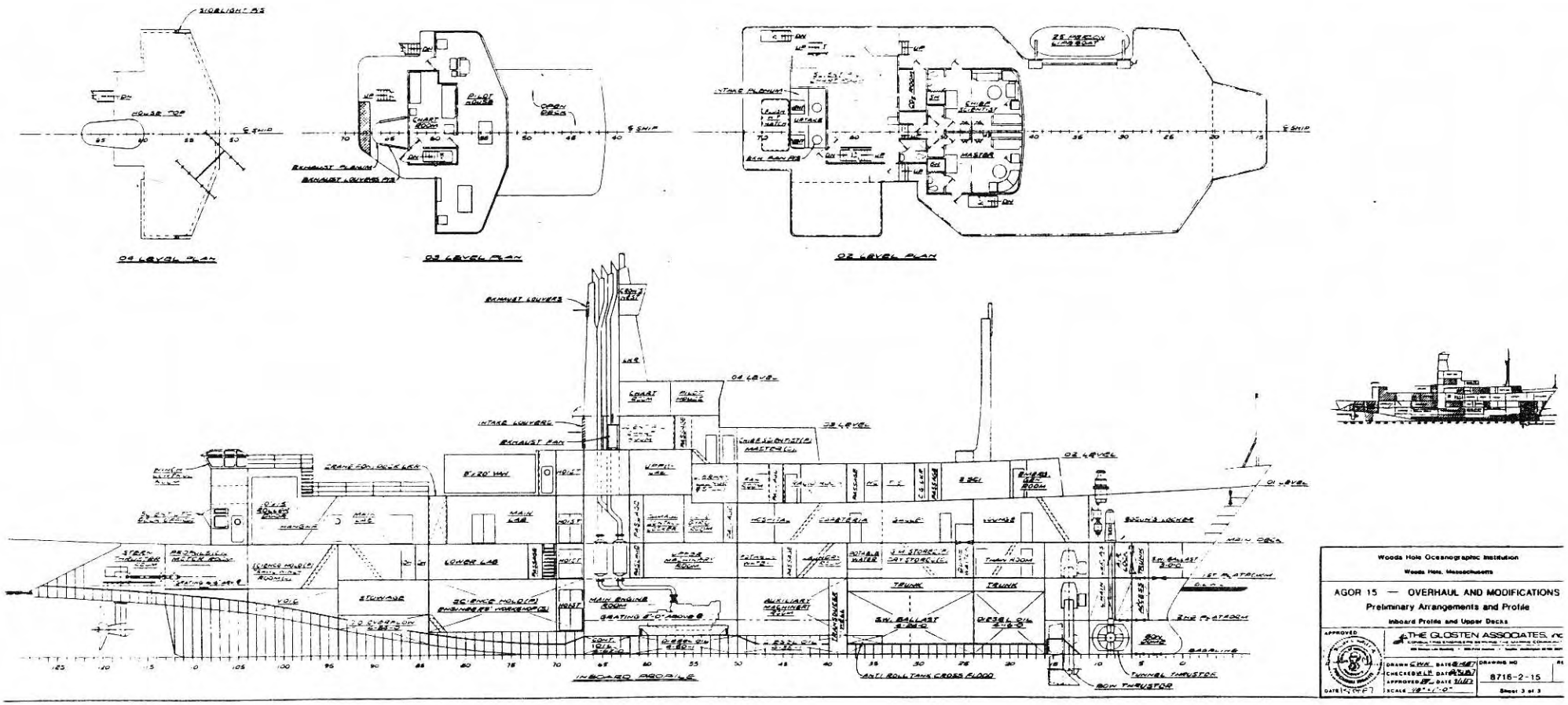
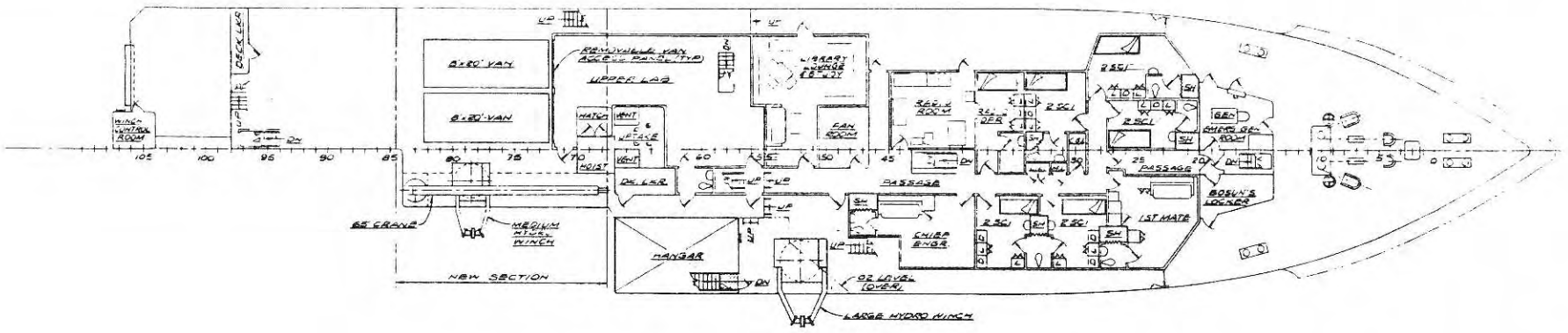
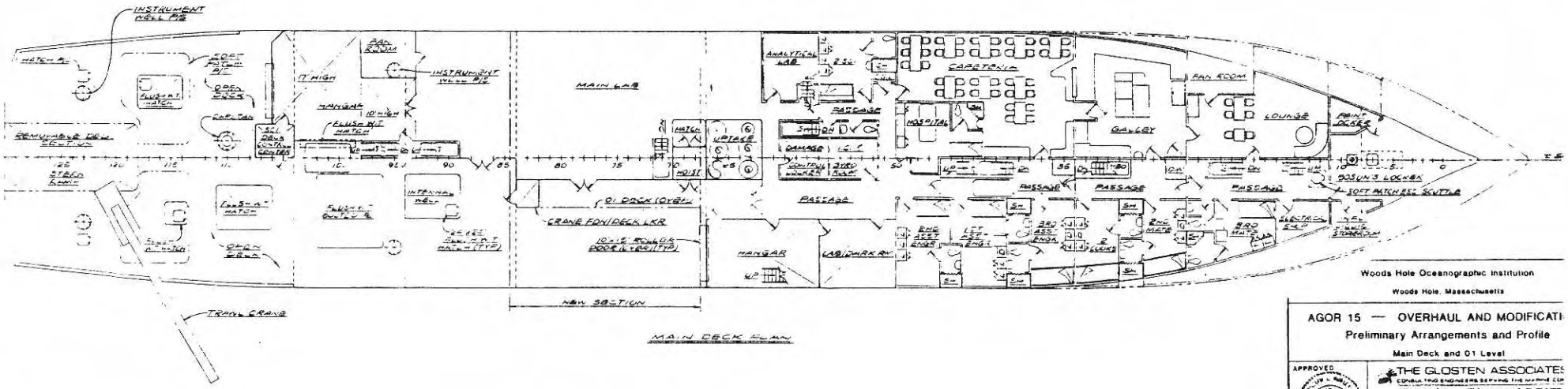

04 LEVEL PLAN
03 LEVEL PLAN
02 LEVEL PLAN
INBOARD PROFILE
AGOR 15 — OVERHAUL AND MODIFICATIONS
Preliminary Arrangements and Profile
Inboard Profile and Upper Decks
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts
THE GLOSTEN ASSOCIATES, INC
8716-2-15
Sheet 3 of 3

Fig 6



01 LEVEL PLAN



MAIN DECK PLAN

Woods Hole Oceanographic Institution

Woods Hole, Massachusetts

AGOR 15 — OVERHAUL AND MODIFICATI

Preliminary Arrangements and Profile

Main Deck and 01 Level

APPROVED

DATE

THE GLOSTEN ASSOCIATES

CONSULTING ENGINEERS SERVING THE MARINE COM

DRAWN CMK DATE 8/4/87

CHECKED DJL H DATE 8/5/87

APPROVED DWL DATE 8/6/87

SCALE 1/8" = 1'-0"

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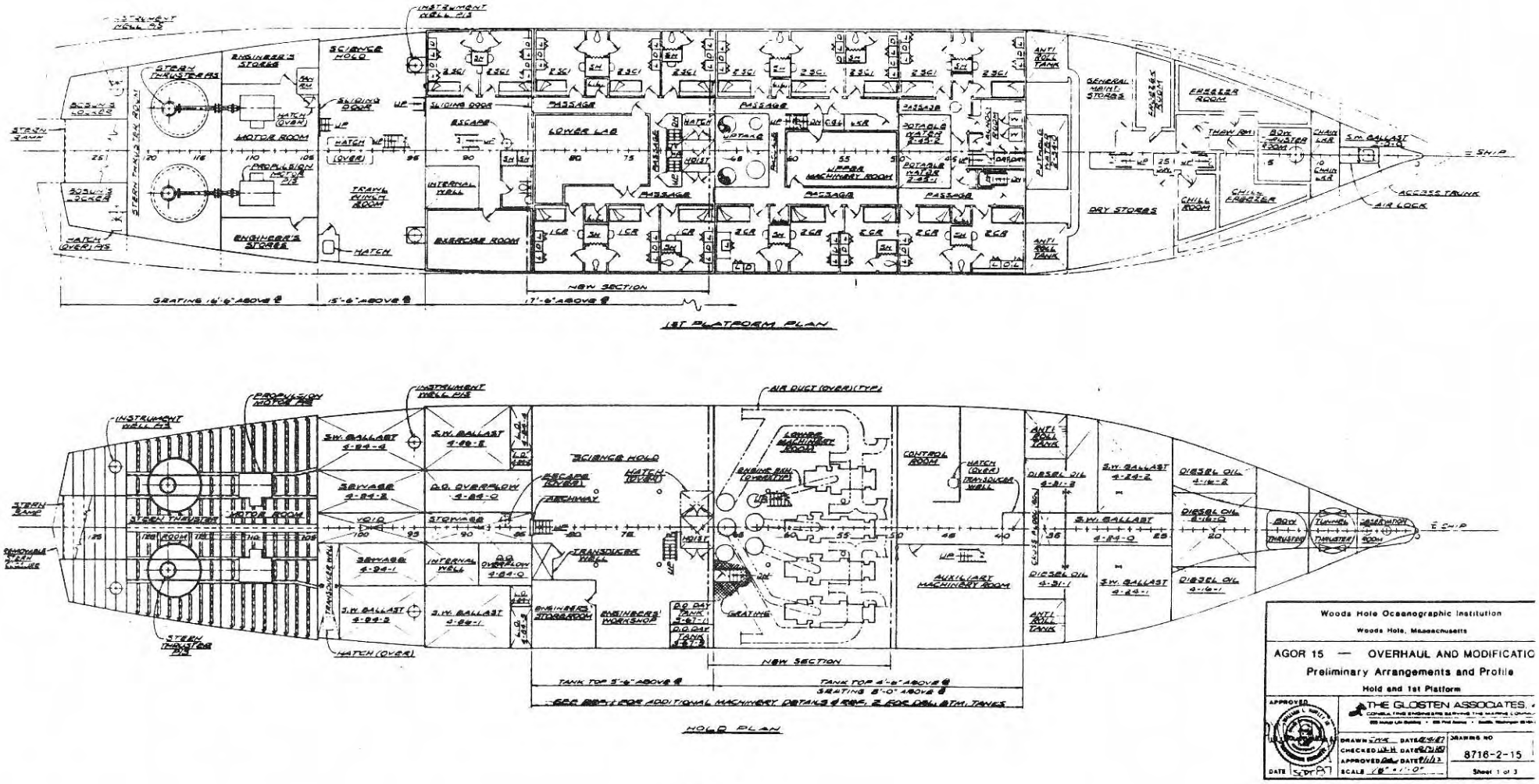
Sheet 2 of 3

Fig 7


1ST PLATFORM PLAN
HOLD PLAN
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts
AGOR 15 — OVERHAUL AND MODIFICATIO
Preliminary Arrangements and Profile
Hold and 1st Platform
THE GLOSTEN ASSOCIATES,
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8716-2-15
Sheet 1 of 3

Fig 8

Orig. July 1985
Rev. June 1986
Rev. Jan. 1987
Rev. Nov. 1987

AGOR 14/15 Overhaul and Refit Program
OPERATIONAL REQUIREMENTS

For purposes of Contract Design, the following requirements apply:

1. SPEED AND ENDURANCE

a. Maximum speed - 14 knots (no defined range)
b. At 12 knots cruising speed - minimum 10,000 miles range
c. At 10 knots cruising speed - minimum 15,000 miles range
d. Speed control - continuous speed control or increments not greater than 0.1 knot (0-6 knots) and 0.2 knot (6-14 knots).
e. Fifty day endurance based on stores and supplies

2. STATIONKEEPING AND MANEUVERING

a. Maneuverability - the maneuverability of the existing vessels shall be retained
b. Dynamic Positioning - Depths to 6000 m in wind speed 35 knots, sea state 5 and 3 knot current, at best heading, using GPS and/or bottom transponders. Maximum excursion of 150 ft.
c. Precision Trackline - Maintain low speed (2 knots mean speed) track under controlled conditions (GPS and/or bottom transponders in depths to 6000 m) in wind speed 35 knots, sea state 5 and 3 knot current, and ships heading within 45 degrees of intended track with a 10,000 lb. horizontal pull ± 0.1 knot speed control along track. Maximum lateral excursion 150 ft.
d. Tow Pull - 10,000 lbs. at 6 knots; 25,000 lbs at 2.5 knots

3. ACOUSTICS

a. Acoustics - Ship should be as quiet as possible for hull mounted echo sounding and towed multichannel seismic arrays. Design target is precision echo sounding at 3.5 and 12 kHz and SEABEAM to depths of 6000 m and acoustic doppler profiling at frequencies between 50-300 kHz; up to 10 knots sustained speed at sea state 4 (8 ft. wave height). Underwater radiated noise limit is 50 db relative to 01 micropascal 2/Hz at one meter for 12 kHz frequency at the sonar installation.

b. Bow Fairing - In order to minimize bubble sweepdown, the bow shall be faired from the bow dome aft with no protuberances or openings. The existing bow dome shall be retained unless tests indicate a significant contribution to bubble sweepdown.

4. POWER AND PROPULSION

a. Integrated Electric Plant - Design scheme to use AC/DC with SCR controllers. Target goal is four generator sets, 3 of unit size and one of 1/2 unit size; sized so that one unit may be off line and still meet cruising demand.
b. Main Propulsors - Two 360 degree azimuthing units with fixed pitch propellers.
c. Bow Thruster - Retractable 360 degree azimuthing, fixed pitch ducted propeller with a faired bottom housing.
d. Ships Service Electric Load - to be based on projected load analysis but should provide for auxiliary electric power about 50% more than now available.
e. Electrical Noise Suppression - Electrical components should be designed to minimize and otherwise suppress electrical noise interference with ships control and science systems
f. Unattended Engine Room - Design to meet regulatory and classification rules for unattended engine room operation.
g. Provide space and power for docking tunnel thruster.
h. Provide 600 hp for itinerant science deck equipment.

5. ACCOMMODATIONS AND HABITABILITY

a. Science Complement - 34 scientific personnel in two-person staterooms.
b. Officers and Crew - 12 single staterooms for officers and 6 double staterooms for officers and crew.
c. Mess - Convert existing officers and scientists mess room to consolidated cafeteria style mess.
d. Lounge - Convert existing crews mess to general lounge.
e. Effect reduction in ambient noise levels in living and lab spaces near machinery areas.
f. Exercise Room

6. SCIENTIFIC ARRANGEMENTS

a. Laboratories - upgrade, enlarge and/or improve science laboratories in accordance with science requirements provided separately.
b. Science Storage - available science storage shall not be reduced from existing design. Increased storage to be provided.
c. Transducer Wells and Voids - Bow dome and other existing spaces for transducer and instrument mounts are to be retained and/or relocated as necessary.

d. Center Well; Stern Ramp - to be retained. Centerwell to have portable cover.
e. Cranes; Winches and Overside Handling - to be replaced and/or refurbished in accordance with recommendations provided separately.
f. Payload - Provide for deck and hold loading of not less than 100 tons total in addition to regular scientific outfit.

7. SHIP STRUCTURE AND SYSTEMS

a. Lengthening - Jumboize hull by inserting a new 34-ft. section at or near Fr. 50. Target full load waterline is 15'6".
b. Roll Suppression - Install a semi-active anti-roll system similar or equal to the "Intering Stabilizer" installed in modern research ships (R/Vs POLARSTERN and FRANKLIN).
c. Ice Strengthening - To meet ABS Ice Class C.

This should be marked Appendix 2? Kate 2/2009

UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

An association of institutions
for the coordination and support
of university oceanographic facilities

UNOLS Office, WB-15
School of Oceanography
University of Washington
Seattle, Washington 98195
(206) 543-2203

February 19, 1988

To: Advisory Council

From: Executive Secretary

Subject: Draft revisions, UNOLS Charter

I've attached two draft revisions of the UNOLS Charter, along with a copy of the existing Charter. The reason for the re-draft is general concern among UNOLS members (expressed in October, 1987 meeting) that the line of authority in the current Charter is ambiguous, especially among the assembled UNOLS Members, the Executive Committee and the Advisory Council. In addition, there has been some feeling that UNOLS has no mechanism for addressing "strategic" issues. (I don't know if the re-draft helps on this.) Finally, a few mistakes or ambiguities are cleared up (e.g. lapsed membership on Advisory Council, selection of UNOLS Office and Executive Secretary, other standing sub-bodies.)

The two drafts are one, by Brian Lewis, and one by me. We discussed the two versions and found that we were in agreement on most points. On one issue, though, we did not agree. Brian would expand the Executive Committee, and give it many more functions. I leave the Executive Committee at its present size and make-up, but still give it some precedence over the Advisory Council.

The Council and UNOLS Membership should know that both revisions clip the AC's wings some and enhance the Executive Committee (Brian's more than mine).

New material or changes are in bold on both drafts. Most of Brian's changes are contained in paragraphs 4. and 5. He reverses them, to show precedence of the Executive Committee over the Advisory Council. His intent is that the Executive Committee would oversee and control UNOLS activity; delegate studies and charges to A/C and other sub-bodies, etc.

Brian did not address the issues of selection of Executive Secretary and host institution, expelling A/C members or change in voting rules (my paragraphs 4(b), 6(a)-(d) and 10(a). He agrees with their intent, though, and would incorporate similar sentiments in his draft.

My main changes (labeled Barbee draft):

2.(c) Additions made to establish the hierarchy of authority and functions among UNOLS membership, Executive Committee, Advisory Council and other sub-bodies.

4.(a) Establishes, with changes, functions of the Advisory Council.

(b) Changes by addition that allow the Advisory Council some discretion on removing AC members with 3 consecutive absences.

5.(b) Sets out and expands the purposes of the Executive Committee.

6.(a) Includes a rotation-among-institutions policy for UNOLS Office. Reviews every three years.

(c) Says where Executive Secretary gets direction.

(d) Sets procedures for selecting UNOLS Office host institution and executive secretary. Couples the two processes.

7.(a-d) Expands on establishment, purpose of other sub-bodies.

10.(a) Gives Associate Members a vote for Vice-Chairman.

UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

An association of institutions
for the coordination and support
of university oceanographic facilities

Oregon State University
Research Office
Corvallis, OR 97331-2136
(503) 754-3437

File: Clarwin Correspondence 1987

December 14, 1987

Dr. Arthur Maxwell, Director
Institute of Geophysics
The University of Texas at Austin
Austin, TX 78713-7456

Dear Art:

Excuse my tardy acknowledgment of your comments on the RVOC position paper on ship lay-ups, but I have been out of the country for a couple of weeks.

I agree, the RVOC did a pretty good job of tackling a sticky issue. Your points are well taken, and I am optimistic that we can put a plan together assuming two things, (1) that the institutions will agree to it, and (2) if ONR and NSF will work with us to work out something they can live with. Don Heinrichs raised some valid concerns, but not something that is out of the realm of reality to work out. ONR has not yet responded.

I feel that it is worth some more effort and will have it on the agenda of the next Advisory Council meeting.

Thank you, Art, for taking the time to share your comments.

Regards,

George

George H. Keller
Chairman

ms

xc: W. Barbee
J. Bash

INSTITUTE FOR GEOPHYSICS
THE UNIVERSITY OF TEXAS AT AUSTIN

Director • Austin, Texas 78713-7456 • (512) 471-4860

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November 17, 1987

Dr. George Keller
Chairman UNOLS
Oregon State University
Research Office
Corvallis, OR 97331-2135

Dear George:

This letter is in response to the request for comments on the RVOC position paper on research ship lay-ups. First, I would like to comment on the overall policy. I think RVOC has done a first rate job in attacking a perennially tough problem. I like the basic assumptions they have made e.g., an optimun number of operating days for each class of ship, definition of "warm" lay-up, need for advance notice of lay-up, taking advantage of this time for overhaul, refit, etc., making the lay-up more attractive to operator and the development of logical criteria and a schedule for lay-ups. Consequently, my comments will only refer to some of the details rather than the overall concept.

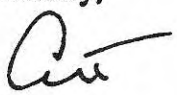
The most important comment that I have is, that to make the plan work and to have it supported by the funding agencies, the plan really must save money when a ship is laid-up. I don't feel that it is reasonable to expect about half of the full operating cost for a ship in lay-up. Somewhere between a quarter and a third is more logical. This means, of course, that more drastic savings need to be taken in the insurance, shore-side support, security and crew costs. This should be the situation for a ship requiring only limited work. If the ship requires major overhaul, the cost of that needs to be added to the above amount.

Next comment is that all UNOLS ships should be considered in such a plan. There should be developed a long-term overall schedule that includes all ships, so that it is clear well in advance which ships will be laid-up. Not only would this keep some ships from being laid-up an abnormally high percentage of the time, but it would be viewed as a fair procedure that equally affects all. If this were done, then items 5 and 6 of the procedures would need to be revised to reflect there is a natural schedule that needs to be given consideration along with a calculated formula and volunteers.

If the above considerations could be worked into the plan, I feel it would receive more support from both the community and funding agencies.

Lastly, I would like to compliment RVOC on what they have come up with and I hope the community can pull together to get something like this into operation.

Sincerely,



cc W. Mitchell

UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

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Oregon State University
Research Office
Corvallis, OR 97331-2136
(503) 754-3437

File: Chairman's Correspondence 1987

December 14, 1987

Dr. Donald F. Heinrichs, Head
Oceanographic Centers and Facilities Section
Division of Ocean Sciences
National Science Foundation
Washington, DC 20550

Dear Don:

Thank you for your comments on the RVOC plan for vessel lay-ups. You have pointed out some rather real and practical issues that are not easily overcome but I feel could be resolved. Perhaps the community would have to find itself in truly dire straights before it could bite some of the bullets, but this issue is important enough to warrant additional effort, in my opinion.

We will keep after it and seek your help at a time when your further input would be of most help. Thank you again for taking the time to critically review the RVOC plan.

Regards,

George

George H. Keller
Chairman

ms

xc: W. Barbee
J. Bash

NATIONAL SCIENCE FOUNDATION
WASHINGTON, D.C. 20550

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DIVISION OF OCEAN SCIENCES
OCEANOGRAPHIC CENTERS AND FACILITIES SECTION

25 NOVEMBER 1987

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

Dear George:

The following is my synopsis of the RVOC position paper:

- Research ship lay-ups will continue.
- Optimum operations are 270 days (Class I & II), 250 days (Class III), and 220 days (Class IV).
- Any ship with 80% or less of optimum schedule is candidate for lay-up.
- Lay-ups effective only if funds are saved.
- Lay-ups defined as 3-14 months out-of-service (warm lay-up).
- Life cycle of research vessel requires periods of major overhaul or refit.
- At least three major vessel and/or science equipment upgrade periods should be incorporated into lay-up planning.
- Lay-ups traumatic because of short notice for crew and maintenance planning.
- Advance plans should be required for major overhaul or refit of all ships.
- Lay-up decisions should be in open forum discussion using logical criteria.
- Principal candidates for lay-up should have first opportunity to resolve issues.
- Final solution by UNOLS ship schedule chairmen and funding agencies.
- Ships Layed-up!

The "procedures" section of the report outlines a rigorous time schedule for commitments and decisions by federal agencies and UNOLS institutions. Overall the RVOC position paper builds on the existing UNOLS system by adding a "maintenance/upgrade" component during lay-ups.

I see a number of difficulties in making the RVOC model work with the present UNOLS committee structure and federal agency constraints. My thoughts and concerns include the following.

Annual maintenance/upgrade proposals

If I understand the report correctly, each institution would assemble in December/January a general maintenance and upgrade work package including ship and/or science outfitting. These would be reviewed and priorities established for each ship in the fleet every year. Funding agencies would pledge maintenance or upgrade funds for whatever ships are to be out of service. Funds flow later in response to scheduling decisions.

Major problems include:

- Annual proposal and review for all ships excessive work for lay-up problem.
- Ships are owned by different agencies and institutions. Unclear uniform policies can be established.
- "Pledge of support" may fall all on one sponsor.
- Maintenance and upgrades driven by scheduling not by long range fleet planning.
- Federal agencies do not have approved budgets by July.

I believe the basic concept behind much of this section of the report is sound, however. We need to develop procedures (and commitments) for long range planning of major overhauls, upgrades and refits related to the life cycles of the research ships. An integrated analysis of the overall fleet profile, required timing, etc. is needed to prioritize individual ships. With needs and priorities known, the candidate ships for refits can be identified before detailed scheduling is done. These ships should be scheduled for operation last.

Support Level Estimates

Funding agencies are to advise operators by April to June of number of ship days that will be funded. Ship days per se is the wrong measure -- too diverse mixture of possible ships, transits, non-UNOLS vessels, etc. to estimate specific number. The anticipated resources to support field operations i.e. the budget is the best predictor. NSF has provided UNOLS with budget estimates (updated as the budget cycle proceeds) for years. The UNOLS scheduling committees have routinely calculated "shortfalls" and then waited for them to go away. If the RVOC procedures are to work, reasonable estimates of support from all sources are needed and the shortfall calculation has to be believed. This is the time sound recommendations on lay-up procedures are needed using logical criteria.

Schedule Resolution

I do not believe that "lay-up candidates" without outside assistance can resolve ship day shortfalls. This implies a closed system involving only those operations. The solutions must include options from the entire fleet.

Final Decisions

RVOC recommends UNOLS Ship Schedule Chairmen and funding agencies provide final resolutions. Two things are mixed here -- advice and management. The key issue is how is UNOLS as an organization is going to provide its final recommended set of actions -- actions, that will result in funds being saved by putting ships and personnel out-of-service.

This is a weak point in the present system. The Schedule Committee chairmen make recommendations now but they are not empowered to speak as the final voice of UNOLS. I doubt that many UNOLS institutions will be willing to delegate the final "lay-up authority" to the chairmen. Advisory Council role? UNOLS Executive Committee?

I am encouraged by the renewed effort to address the lay-up problem. The system at present retains too much emphasis on the mechanics of the scheduling process and not enough emphasis on overall resource allocations.

Sincerely,

Donald F. Heinrichs

Donald F. Heinrichs
Head

cc: E. Silva, ONR

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File: Chairmans Corresp. 1988

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

IN REPLY REFER TO

5000
Ser 1121SP/10
9 February 1988

Dr. George Keller
Chairman, UNOLS
Oregon State University
Research Office
Corvallis, OR 97331-2135

Dear George:

As per your request, I offer the following comments regarding the RVOC Position Paper on ship lay-ups dated 19 October 1987.

Page ?, Paragraph 6:

Using refit periods as convenient lay-up periods sounds great, but we should remember that this is a period during which ONR is presently either replacing or doing major refits. When they are completed, it will be ten plus years before any of the large expensive ships require refits. Also, these refit periods are long shipyard programs when crew are of no value and must be layed off.

Page 3, Paragraph 1:

Funding agencies don't like "welcome respites from extended operations" because this most likely means paying expensive crew members including masters and chief engineers to do repair or refurbishment which could be more quickly accomplished by a shipyard. More importantly, in most cases the ship is being layed-up because the federal agencies don't have funds to operate the ship and are trying to save funds. Therefore, in most situations they don't have funds for repairs and refits. ONR has been an exception to this because we have had separate funds for refit programs.

Page 3, Paragraph 2:

The problem of not deciding on lay-up until late in the year is tough to solve. Obviously lay-ups could be more efficient and less traumatic if planned well in advance, but this is difficult to achieve for the following reasons:

- As discussed, the operators with thin schedules hang on past the July and even October scheduling meetings in hopes for the appearance of a miracle 100 day user. A good example is TAMU this year. They had a very weak schedule for GYRE in July and it had not improved in October. The scheduling committee said that it was weak, but no recommendation for a lay-up was considered, probably because Tex Treadwell made a big fuss last year when the committee did make a recommendation regarding the GYRE. I think the proposed test for a viable schedule on page four may be a practical means for the UNOLS scheduling committee to make lay-up recommendations since it becomes impersonal and quantitative.

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- The other problem regarding early lay-up is that the funding agencies, particularly NSF, don't know their budgets in July, and now it's more likely to be January as a result of the slow congressional budget process. Even at this late date ONR doesn't have a firm budget and we are limited to 85% of the last adjusted value. This situation is now probably a way of life for federal agencies, including NSF, and any scheme to deal with lay-up should be able to accommodate budget uncertainty.

Page 3, Paragraph 3:

The general idea here is reasonable and I would support advance planning for major upgrades, however, the concept presumes that funds will be available which is unlikely to be true as I have discussed above.

Page 3, Paragraph 4:

I agree with the idea that lay-up decision should be based on "open discussion using logical criteria". I have yet to see this approach work well in the UNOLS scheduling process. It may be just too hard for the oceanographic facilities community to deal with such a threatening situation. As it is now, NSF usually waits until January, then makes a decision not to fund any time on the victim institutions ship, and spreads any residual time on to other ships schedules. This arrangement presents problems when NSF selects ONR owned ships and maintains a policy that the owner agency pays the lay-up costs. As you know, ONR and NSF have been negotiating this issue for some time, but as yet have not reached an acceptable resolution.

Pages 4 and 5, The Proposed Procedure:

Generally, the procedure appears to be OK except for two steps which I will comment on. In step 4 the funding agencies are asked to pledge maintenance funds for an unknown ship or ships in July. I don't know about NSF, but as the ONR Program Manager for Oceanographic Facilities, I am not prepared to make such a commitment. First, I don't know my budget at that point, and second my policy is to fund maintenance only on ONR owned ships. The eventual ship to be layed-up and receive funding could well be an institutionally owned ship. With a large portion of the fleet and a small budget ONR just can't afford to act as a patron for the entire UNOLS fleet.

Regarding step 7, I think this step would be improved if the lay-up candidates met together with the Scheduling Committee Chairmen and the results were then included in the report on the general scheduling meeting. If there is no progress, we would all know it very soon. Then when the follow up meeting (step 8) takes place a month later with the agencies, we would have good solid information available to all so we could potentially reach a funding arrangement for the necessary lay-ups.

I hope these comments will be of value to you in structuring a new process to schedule the UNOLS ships which effectively deals with the lay-up problem. You should note that lay-up of larger ships should not be a problem

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for the next several years since KNORR and MELVILLE will be undergoing overhaul/refit programs and THOMPSON is expected to be retired in late FY-88. I am sure we will be discussing the whole issue, plus a few other items, at the next Advisory Council Meeting.

Best Regards,

Keith W. Kaulum

KEITH W. KAULUM
Program Manager
Special Projects

Copy to:
Code 112
Code 10P
UNOLS Office