MINUTES OF UNOLS ADVISORY COUNCIL MEETING

July 31 - 1 August 1974
Annapolis, Maryland

1. A regular meeting of the UNOLS Advisory Council was convened at 0915 - Wednesday, 31 July 1974 at the Naval Ship Research and Development Laboratory, Annapolis, Md.

Present were:

MEMBERS

Dr. J. V. Byrne, Chairman
Dr. P. L. Parker
Dr. Adrian Richards
Dr. W. S. Richardson
Dr. R. J. Wold

EXECUTIVE COMMITTEE

Dr. G. C. Shor
R. P. Dinsmore, Secretary

GUESTS

Ms. Mary Johrde, NSF
Dr. Ned Ostenso, ONR
Mr. Robert Hale, CNA

2. The minutes of the previous meeting of May 15th, 1974 were reviewed and approved.

3. The 1975 Ship Support situation was discussed at some length centered around the effects of inflation. The first estimates for 1975 show projected operating costs up 13.2% over 1974 for the same number of ships. This is about the same rate as from 1973 to 1974. Dr. Ostenso expressed concern that the actual costs in 1975 may become even worse than currently projected. Against this is a funding outlook about level with 1974. The means to cope with this will be the continued paring of costs and a reduction in ship days. Dr. Byrne proposed that the Advisory Council's position be that no ships be eliminated in 1975 but that needed economies be effected by reduced operations and temporary layups.

Dr. Knauss reported that additional funds may become available by increased Congressional authorizations to the NSF budget. Mary Johrde advised that she had no reliable figures on this but that a similar pattern to the 1974 appropriation could emerge where both ship construction and operations funding were directed to be made higher by a reapportionment of the total budget.

4. The Center for Naval Analyses Study on capital resources was reported by Mr. Robert Hale of the CNA who is directing the study. He discussed the background of the Study stemming from NACOAS concern over oceanographic facilities support, and that the principal role of the study was matching approved agency requirements against available resources. The data collection phase was now completed - and the study results should be available by November. Preliminary indications show modest increases in requirements over facilities especially in the longer term - 3-5 years.

There followed a discussion on how extra needs could, and should, be met. Alternatives included (1) getting more use out of ships, (2) eliminating non-Federal use from Federally owned ships, and (3) adding more ships. It was agreed that (2) was not a desireable course and (3) should be approached with caution. Dr. Ostenso remarked that the present Federal attitude is highly uncertain and that any plans should be flexible enough to cope with further Federal uncertainties.

Dr. Knauss considered the CNA outlook welcome because it conveys needed facts when there are many who state without facts that the oceanographic fleet is over capitalized. He suggested that an annual process ought to update the CNA effort. This might be a function of the UNOLS report.

5. The Executive Secretary reported on the status of efforts to improve the foreign clearance situation. He said that a plan is in development for approval

by ICMSE which will set up a definitive procedure for cruise clearances and reports. A current problem needing definition is the total scope of cruises to which the "cruise prospectus", which is part of the plan, would apply. The Navy wants it to apply to <u>all</u> high seas cruises based on its need for operational information. Others desire it limited to the clearance process only. It was the general opinion of the group that attempt to make the effort meet <u>all</u> information needs might lose its effectiveness for any single purpose and that the plan confine itself, if possible, to the foreign clearance situation only.

Dr. Knauss discussed a plan he hopes to have ready for the next Annual Meeting. This involves centralizing all university ship requests as "UNOLS" to present a more common and effective appearance. Such a system often might be able to deal privately abroad with better success than seems to occur through cumbersome State Department procedures.

6. Following lunch the group was given a brief talk on the mission and programs of the NSR&D Annapolis Lab. which together with the Carderrock Lab. (David Taylor) comprise the Naval Ship Research and Development Center. Following the talk a short tour was taken including visits to the large deep ocean-hyperbaric simulation chamber and the marine sanitation device testing facility. The group was advised that often the use of the Lab. facilities are available on an opportunity basis to university investigators.

7. Dr. Byrne reported on the visit to the Staff of the Senate Ocean Policy Study on July 30th by him, Dr. Knauss and Capt. Dinsmore. The principal contact was John Hussey with whom areas of UNOLS concern was discussed. Mr. Hussey made the novel suggestion of a UNOLS representative testifying at appropriation hearings but otherwise the visit seemed to have little significance.

8. The visit to the OMB, now scheduled for August 2nd, was carefully discussed inasmuch as it was to deal with current OMB directives dealing with the layup of 3 ships for 2 new ones. A "white paper" setting forth the UNOLS case was reviewed and approved. The points included and to be made to Mr. Hugh Loweth at OMB were (1) the overall cost effectiveness of university ships, (2) the net reduction in total costs of the newer ships, (3) meeting reduced funding through reduced operations without layups, and (4) the international implications of deep oceangoing research ships.

9. The Executive Secretary reported on the status of the Insurance Study. The revised proposal meeting the recommendations of the Annual Meeting and RVOC was reviewed and approved. The Study will be a five month analysis of various institution insurance programs and recommendations for their improvement both at the individual and group level. The study will be conducted by Risk Engineering Services at a cost of $19,866. The UNOLS Office will seek the necessary funding by a supplementary proposal to NSF.

10. The Executive Secretary reported on the status of ongoing projects including: (a) The Arctic Research Vessel Conference will be held August 14th & 15th at Seattle. A copy of the Agenda was distributed. (b) The Ship Inspection Program is proceeding on an orderly schedule, a new inspection format is under development. (c) A Marine Technicians Meeting is being planned at the University of Rhode Island in the late Fall. Guidelines for the meeting were discussed and it was agreed that the meeting be limited generally to UNOLS Members to define areas of common problems, mutual interests and recommendations leading to an improved situation surrounding marine technicians.

11. The subject of dedicated G&G ship was taken up. The controversy surrounding the proposals for a dedicated ship to handle multi-channel arrays has reached

the proportion where a forum needs to be convened to best represent the views of the community. Although UNOLS has been proposed as one to sponsor such a meeting, it was the opinion of the group that the Ocean Science Committee was more appropriate to represent the scientific merits. Dr. Byrne as Chairman of OSC agreed to convene such a meeting.

12. The meeting recessed for the day at 1730 hours and reconvened at 0830 - Thursday, 1 August 1974.

13. The Long Range Plan for research ships was taken up. First discussed were the Draft Projections for future marine science for which the Second Draft was carefully and critically reviewed. Various changes and rewrites of sections were suggested to produce a third draft which will be sent to the 40 major university laboratories for comment.

The further development of the Long Range Plan dealt with setting up the special planning meeting 24-26 October at Catalina Island and in particular the makeup of the group. It was decided that the group should comprise three or four practicing scientists from each discipline with a representation from as many major laboratories. Dr. Craven was nominated as Chairman and a steering group for the further development of the Long Range Plan will be Drs. Dugdale, Richards, Parker and Craven.

Nominations for participants at the Catalina Meeting were as follows and included the recommendations of the Ocean Science Committee:

Physical Oceanography - Cox, Davis, Nowlin, Sturgis

Biology - Benson, Cohen, Colwell, Dugdale, Frankenberg, McGowan, Menzel

Chemistry - Goldberg, Hood, Parker, Spencer

Engineering - Anderson, Dyer, Richards, Savage

Geology - Drake, Gorsline, Ewing, Fisher, Van Andel

14. Recommendations for the Annual Report were reviewed from a listing of eight areas compiled by the Executive Secretary. These were along with guidelines discussed:

(1) Makeup & Distribution - UNOLS Fleet -

- Policy should be specific and made clear
- numbers should be compatible with Long Range Plan

(2) Ship Construction & Replacement -

- Urgent to retain in Federal Budget
- Stress Coastal vessel construction
- Assign equal priority to replacement of 150-ft to 200-ft ships

(3) Ship Scheduling -

- Stronger coordination needed but Dr. Byrne opposed guaranteed "blocks" of time (such as in Bering Sea).

(4) Coastal Regional Schemes -

- Every effort should be made to further and strengthen regional arrangements

(5) Other Facilities - Aircraft - Submersibles

- Continue standing recommendations

(6) Other Facilities - Technicians - Equipment

- Further define and develop problems.
- Meeting on Marine Technicians will help
- Equipment support becoming critical, needs efforts such as facts, policies etc. to help justify improved support

(7) Federal Support

- Aim recommendations at OMB and congressional levels - further develop "White Paper" into document usable by all members.

(8) Cost Accounting -

- Should further standardized arrangements where and if possible; especially true in data which are intercompared.
- Ask RVOC to review

The foregoing were approved in principle and the following added:

(9) Foreign Clearances -

- Stress importance and need for effective plan; show plans available.

(10) Long Range Plan -

- Should be included in Annual Report if possible.

15. Nominations for a new Chairman were requested by Dr. Byrne who advised that he did not wish to be re-elected. Dr. Richardson and Dr. Parker were nominated and seconded. It was proposed that written ballots be collected from members absent as well as those present. This was approved and the nominations were closed and the Executive Secretary so directedi

16. The next meeting was scheduled to on or about 5-6 December 1974 at the University of Texas Institute of Marine Science at Port Aransas.

17. The meeting was adjourned at 1230 hours 1 August 1974.

Respectfully submitted,

J. V. Byrne, Chairman

R. P. Dinsmore, Ex. Sec'y

Background Information

(Items sent out prior to the upcoming meeting)

UNOLS FUNDING
1975

	ORIG. BUDGET	CURRENT BUDGET	CURRENT FUNDING Navy	Other	NSF	Tot.	Def.	Current NSF Req.
ALASKA	255	336	0	176	122	298	38	89
SCRIPPS	3812	4018	599	531	2400	3530	488	488
LAMONT	2041	2096	893	63	900	1856	240	240
DUKE	486	486	48	0	438	486	0	0
SKIDAWAY	131	131	0	26	85	111	20	0
HAWAII	1462	1438	469	98	500	1067	371	371
JOHNS HOPKINS	463	463	0	78	385*	463	0	0
RSMAS	1914	1914	107	47	1697	1851	63	0
NOVA	56	-	-	-	-		-	?
OSU	1044	1044	144	225	500	869	175	176
URI	899	925	30	0	800	830	95	94
USC	392	382	0	74	300	374	8	0
TAMU	668	669	35	178	185*	398	271	272
WASH	1319	1423	199	175	735	1109	314	361
WHOI	4022	4268	1031	768	2400	4199**	69	69
tot	18954	19640	3553	2439	11442	17434	2206	2110

* Includes carryover from 1974
** WHOI has requested addn'l $328 for 1974 overrun & ALVIN Escort

SUMMARY OF 1974 FUNDING

	NSF	Navy	NSF Navy Fuel	Other	tot	Costs	Deficit
ALASKA	229	-		20	249	249	0
SCRIPPS	2385	526	200	636	3747	3789	42
LAMONT	1207	600	50	-	1857	1932	75
DUKE	428			-	428	475	47
SKIDAWAY	100			21	121	121	0
HAWAII	692	447	200	68	1407	1407	0
JOHNS HOPKINS	281			70	351	301	+50
RSMAS	1790 1/	58	50	-	1898 1/	1898 1/	0
NOVA	41	20		-	61	61	0
OSU	628	150	25	150	953	953	0
URI	699	28	25	0	752	794	42
USC	227	-	25	53	305	305	0
TAMU	257	353	50	57	717	525	+1[illegible]
WASH	700	303	25	88	1116	1116	0
WHOI	2479	1282	50	23	3834	4092	168
total	12143	3767	700	1186	17,796	18018	-

1/ 13 mos funding

ONR: 200
NSF 500

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HISTORY

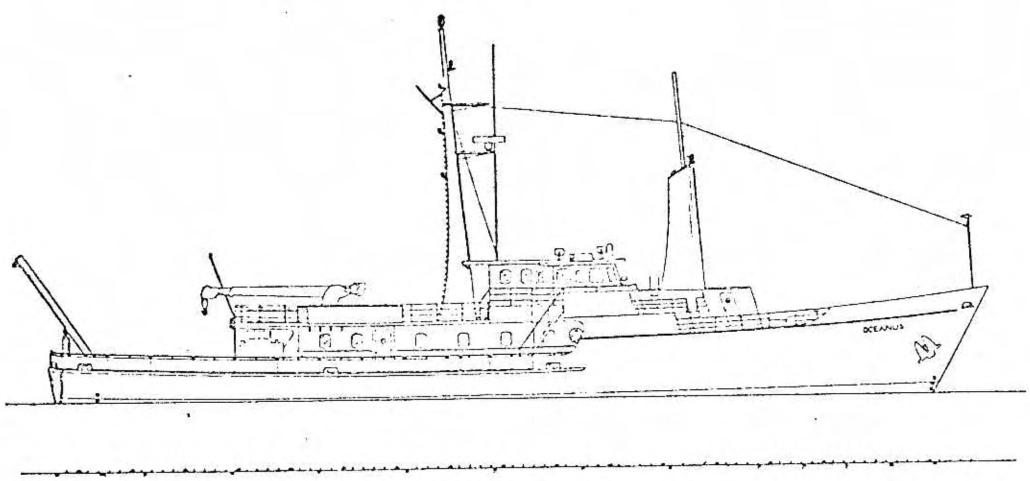
AND

DESIGN CRITERIA

RESEARCH VESSEL OCEANUS

AND

RESEARCH VESSEL WECOMA



OCEANUS - One of the Titans or Elder Gods, the river that encircled the earth.

WECOMA - The Clatsop Indian name for the sea.

J. Leiby
Woods Hole Oceanographic Institution

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PRESENT SITUATION

Two ships, the OCEANUS and the WECOMA, are under construction at Peterson Builders, Inc., Sturgeon Bay, Wisconsin, funded by the National Science Foundation and will be operated respectively by the Woods Hole Oceanographic Institution and Oregon State University when delivered in the fall of 1975. The design was conceived at Woods Hole as a replacement for the CRAWFORD. Work started as far back as 1963 and proceeded intermittently with strong inputs from our experience in the conversion, design and operation of the various ships such as the CRAWFORD, CHAIN, GOSNOLD, ATLANTIS II and KNORR. The resulting configuration put the living and working spaces in the most comfortable part of the ship, allowed the operators on the bridge to see what was happening on deck, and put major emphasis on good seakeeping qualities with the ability to maintain a fairly high sea speed and with the overriding consideration to keep the vessel, all its equipment, and its operation as simple as possible. Because it was to be an intermediate unit of the fleet a target of 300 gross register tons was used as the upper limit of size.

The hull design and engineering was accomplished by John W. Gilbert Associates of Boston, who have to their credit many vessels which successfully earn their living in the North Atlantic Fisheries in year-round service.

DESIGN OBJECTIVES

In general order of priority the primary design objectives were to produce an intermediate sized seagoing ship of less than 300 gross register tons with the following characteristics:

SEAKEEPING	To have the ability to operate safely in deep-sea service, including the North Atlantic in winter, through an optimum balance of freeboard, weight distribution, range of stability and survival of damage.
SHIP MOTION	Hull design, weight, trim and stability to be developed for minimum ship motion in a seaway under all conditions of loading.
COMFORT	Living, working and command spaces to be located in areas of least motion amidships and low in the vessel, and to be removed as far as possible from machinery spaces to reduce effects of noise and vibration
SPEED	Fairly high sustained sea speed with a minimum loss in heavy weather.
SIMPLICITY	Arrangements and equipment to be simple and functional as possible with grouping for direct access between command and working areas; permanent spaces located below deck, laboratories with transient equipment on the main deck, and bridge located to oversee working deck aft.
CONTROL	Maneuvering and speed control to zero speed, with sustained periods at idle or slow speed.

The basic justification for research ships is understood. It is also understood that both in initial cost and operation they are the most expensive instruments used in the science of oceanography. Since operating cost equals construction cost in approximately five years, it is imperative that operational cost be reduced to the minimum consistent with efficiency and safety. Since crew costs approach fifty percent of total operating costs, the major area for cost reduction is in reducing crew requirements. An examination of vessel characteristics, operating pracrices and maritime laws indicates that there are several plateaus in ship size where significant changes in crew size take place.

Few new ship designs developed in the past decade have had previous design studies to build upon. In capability and/or size many have been at an uneconomical position on an operating plateau. Often they have been overcomplicated by attempts to make them all-purpose research platforms with too many scientific accessories. Furthermore, many of the smaller ships have been ill configured or too small to do much high seas work in very rough weather.

The requirements for the design of an intermediate size ship presented here evolved over many years. They had their origin in the design study of a series of research ship sizes presented in 1959 by Minot and were further influenced both by operational experience with the CRAWFORD and design, construction and operational experience with the larger more complex ships of the Woods Hole fleet. Since these requirements have been under discussion and given serious thought for such a long period they have probably been distilled to a greater extent than has been customary in the past design projects.

The requirements can be divided into two sections. We purposely made secondary in importance the very specific requirements for details of design, construction and equipage which have been developed from experience with past operations, quality and function of equipment, etc. Such specific detail requirements were the basis for the construction specifications which were developed after the basic design objectives were settled upon and met.

The design objectives dictate the requirements for the basic functions of the vessel. These determine the basic characteristics, capabilities and operational efficiencies to be achieved in the design. In essence these objectives were relatively simple and few:

1. <u>To design an intermediate size seagoing ship of less than 300 gross tons to operate as economically and as efficiently as possible.</u>

The intermediate size was an inherent requirement. The limitation of gross tonnage will be a major factor in keeping the operating costs low since this is one of the major boundaries of an operating plateau. Within this limit there is also the advantage that it is possible to use personnel with small ship experience which is more appropriate to our work rather than that gained on more complicated larger ships.

2. <u>The ship is to have comfortable seakeeping characteristics for year-round, rough sea operation such as the North Atlantic and is to have a fairly high sea speed.</u>

Both the seakeeping and speed requirements favor a longer, larger design but a reasonable response to gross tonnage requirements sets a maximum limit on size. This interaction tended to place the design at the optimum end of the economical plateau for this general size of ship while primary attention to seakeeping characteristics helped assure that the hull was properly configured for the service rather than an inappropriate adaption from some unrelated service. Unfortunately, primary attention to seakeeping has not been a major factor in the design of many existing research vessels. Too often past designs have placed more stress on a high packing factor and 'unique' oceanographic features to the detriment of the basic seakeeping ability and comfort of the vessel. The word comfort is important in that we determined to place personnel living and working spaces in areas of minimum motion and maximum comfort. This was an effort to reverse the trend carried from other classes of ships that place inanimate and less densely populated areas - such as storerooms and machinery spaces - in those areas. Furthermore, under the heading of comfort we intended to locate high noise spaces as remotely as possible from the major living and working areas rather than right in the center of such spaces as is too often the practice.[1]

1. See App. 3, Critique of Previous Woods Hole Vessels.

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Related to the requirement for a fairly high sea speed we attempted to provide a sufficient and conservative margin of power so that the ship can operate at an economical cruising speed which analyses indicate is considerably higher (14.5 knots) than obtainable in existing ships.

3. To have a minimum of complication in all aspects of design and operation.

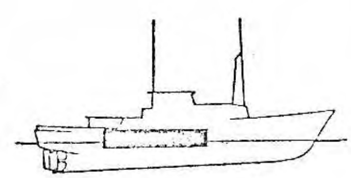
The aim of this requirement is to reduce both construction and operating costs and if realized it would also go far in reducing operating complications and confusion. This requirement implies the minimum number of components consistent with the safety and efficiency. For example, we have attempted to eliminate every point at which operating alternatives require decisions on the premise that the greater the number of decisions required, the greater are the number of personnel necessary to make and debate those decisions.

In addition, reduction of components and unnecessary appurtenances will materially reduce maintenance loads on both the crew and during overhaul periods. Further, the arrangement of the ship has been kept simple and compact; spaces are grouped by function, living quarters and other relatively stable areas of the ship are below the main deck, and laboratories with their transient equipment are on the main deck with good access. The bridge is located near the center of scientific work spaces to centralize work and communications.

MEANS OF MEETING OBJECTIVES

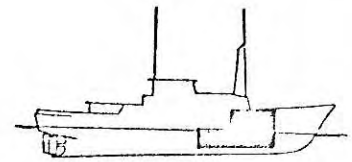
1. General configuration.

The living accommodations are placed amidships and low within the vessel for minimum motion. In addition, they are remote from machinery areas to reduce noise transmission.



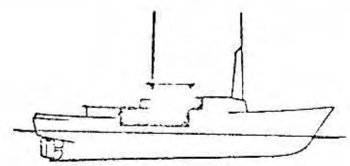
2. Machinery location.

Machinery spaces are located forward of amidships. This permits the amidships area of least motion and greatest space to be used for the more densely populated accommodation, library and control spaces and eliminates interference from machinery uptakes. The engine room incorporates a simplified, straightforward arrangement using standard commercial equipment and is arranged for unmanned operation with complete control from the bridge over all of the main machinery operations involving vessel maneuvering, positioning and winch operations.



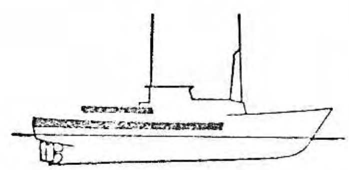
3. Navigation and laboratory areas.

The navigation and laboratory areas are located amidships for reduced sea motion and direct access to the main and upper deck working areas. The centrally located bridge provides maximum visibility of all over-the-side scientific operations as well as around-the-horizon visibility for navigation.



4. Working decks.

The main working deck areas are located amidships and aft for greater flexibility in working over the side and stern, and protection from the weather when going ahead.

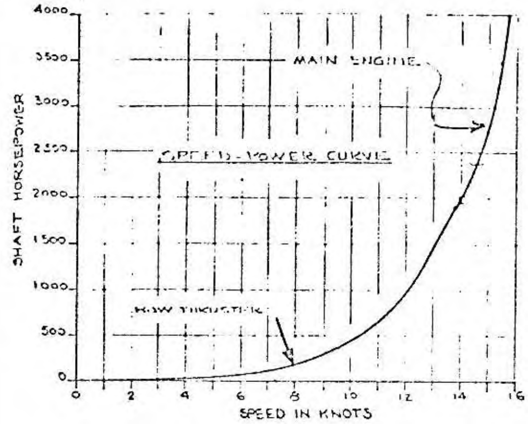


5. Seakeeping and seakindliness.

The vessel will be capable of operating throughout the world with special emphasis on the conditions encountered in the North Atlantic. Basic seakeeping and seakindliness characteristics have been developed from those of large American and European fishing trawlers operating in such areas throughout the year.

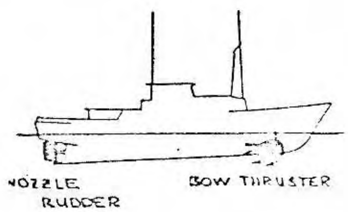
6. Speed and power.

Previous research vessels expended considerable time traveling to stations and from station to station. To reduce time, this vessel has a reasonably high speed of advance which will provide a greater percentage of on-station time. This higher speed will not adversely effect the seakindliness of the vessel because of the hull form and the placement of living and working areas in the central part of the vessel.

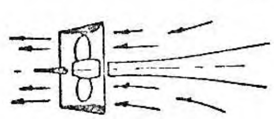


7. Maneuvering.

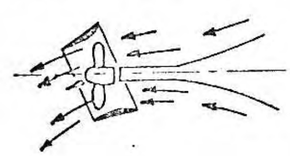
At low speeds the vessel is maneuvered by its steering nozzle rudder aft and the large bow thruster controlled from the bridge. The propeller is controllable pitch permitting a full range of speed control with increased steering torque from the nozzle rudder. The bow thruster provides 360° of thrust and could also act as a come-home standby propulsion unit.



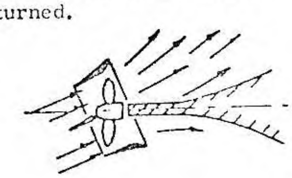
Flow Diagram in straight ahead course showing shrouding of propeller tips which reduces waterborne noise.



Flow Diagram in Turning Mode. The flow of water is directed by the turning nozzle rather than deflected as in ordinary rudders.



Flow Diagram in Reversing Mode. The flow of water is directed forward in whatever direction the nozzle is turned.



FACTORS THAT INFLUENCED THE DESIGN

Basic arrangement and machinery location - The living and working spaces are located amidships and as low as possible in the area of minimum motion to provide maximum comfort and convenience in the most heavily populated parts of the ship. The bridge is located amidships at the point of maximum observation of working areas both overside and on the main deck aft and the arrangement allows for direct communication and access between the bridge, laboratories and working deck areas.

The arrangement with living and working space amidships dictates that the machinery space be forward since there is not enough depth in the ship to place such a power plant aft without complicated gearing arrangements and the addition of engine room uptakes through the main working deck. The architects have no fear of the length of shaft involved in a forward location due to experience with similar arrangements in fishing vessels, tuna clippers and other commercial vessels.

Prof. F. M. Lewis, who consulted with us on the solution to the shaft vibration problems on the KNORR, has reviewed the machinery, shafting and propeller arrangements of this design.

Engine and propeller arrangement - A single screw-single engine geared medium speed Diesel installation with a controllable pitch propeller leads to greater simplicity in operation, is more economical in space and weighs less than other possible configurations. A single screw arrangement with a Kort nozzle steering rudder and a controllable pitch propeller can give adequate maneuverability especially in association with a trainable 360° steerable bow thruster. The planned thruster unit could bring the ship home at 5-6 knots in the event of failure of the main propeller or shafting.

With the addition of a rectifier the shaft driven generator could also be used as an auxiliary propulsion motor powered from the ship's service generators in the event of failure of the main propulsion engine. In this mode it could drive the main propeller to give an estimated speed of 8 knots.

Type of power plant - During the design there was question of the 15 to 16 knot speed requirement in view of the steepness of the speed/power curve. It was felt this requirement dictated an uneconomically large power plant with attendant high fuel costs and high maintenance costs. The following points were made relative to this question:

> Part of the reason for the large power is the need for a higher average speed than exists in the present Woods Hole ships. This would save transit time and since use charges to the scientific department are based on a daily cost it would result in lower ship costs. Such a saving in time, of course, must be weighed against higher fuel cost for higher speeds but it was noted that fuel oil costs average approximately 15% of Woods Hole ship operation costs and therefore a substantial increase would not effect total costs a great deal. A calculation was made of the power requirements for the most economic speed for a series of typical voyages. This is summarized in Appendix 4 attached.
>
> Another reason for the selection of a large engine is psychological in that the operating engineers tend to run machinery below full rating while manufacturers tend to over-rate machinery in their advertising. Therefore, a large engine with a high rating is expected in actual practice to run at a more reasonable setting

which hopefully would correspond to the economical cruising speed of the vessel but still allow a substantial margin of power for rough weather operation and high speed transit on short cruises.

The need to reduce crew costs - in the Woods Hole fleet they amount to approximately 45% of total operating cost - dictates reduced manning requirements which can be the result of a simple power plant designed so a minimum of operating decisions are required.

To accomplish this the power plant was developed around the most simple arrangement possible; a single screw/single engine propulsion system with the capability of also operating auxiliary loads such as a generator for bow thruster drive from the main engine reduction gear box.

The ability to utilize such drives directly through clutch control from the bridge should reduce full-time manning requirements in the engineering spaces. This is in contrast to some present ships where auxiliary power engines must be started and warmed up by the engineers before load can be applied to a bow thruster or winch.

It should be noted that the auxiliary load through a clutch-driven output from the main gear box has been arranged within a standard Lufkin reduction gear box and does not require specialized components.

It should also be noted that we would prefer to compromise or reduce the speed requirement in honor of greater simplicity in the power plant in order to reduce manning requirements. For instance, several of the preliminary design arrangements utilized multiple engines to achieve a 16-knot speed with a margin of power but the complication of such multiple engine arrangements was not felt to be worth the compromises with simplicity which would result. As an example of the opposite approach, the diesel electric power plant of the Research Vessel CHAIN was cited where four 8-cylinder diesel driven electric generators provide power to four propulsion motors which drive twin screws through reduction gears. Thus 32 cylinders, four generators, four propulsion motors and two gear sets provide comparable power to the single 16 cylinder engine, reduction gear and controllable pitch propeller arrangement proposed for the new ship.

Experience has taught us that multiple engines, especially on a single shaft, provide so much "flexibility" that the ship would end up with watch standing engineers to start and stop the flexible plant. We prefer to have one engine and thereby eliminate the possibility of a debate on whether the engines should be run, idled or stopped and whether they can be safely started from the bridge.

An electro-motive (GM) engine of approximately 2800 hp at 900 rpm was selected as a reasonable power plant for this ship because it is the type and manufacture of engine most readily available with good maintenance and operational experience. Its large production for the railroad industy (approximately 500 units per year) makes it one of the lowest cost engines in this power range and gives assurance of good parts supplies. Figure 2 gives the estimated speed and power for the design.

Kort nozzle steering rudder - A Kort nozzle steering rudder also provides a method of shrouding the propeller to protect it from fouling with overboard wires, lines and other equipment and improves maneuvering characteristics. The nozzle rudder is not only more effective in steering in the forward direction but it permits the ship to be steered when going astern or backing. Mr. Gilbert's office has had favorable experience with nozzle installations in a number of their designs for the fishing industry.

Vibration and noise - A Diesel plant cannot be as quiet as a steam vessel such as the ATLANTIS II but the location of the machinery forward, remote from the living quarters and working areas, should tend to reduce noise levels. The auxiliary generators are on acoustic mounts and sound dampening material has been applied to the engineering spaces. Additionally, attention has been paid to the acoustics of the ship's ventilation systems in an effort to reduce noise levels in living and working areas. The Kort nozzle will also give a considerable reduction in propeller noise.

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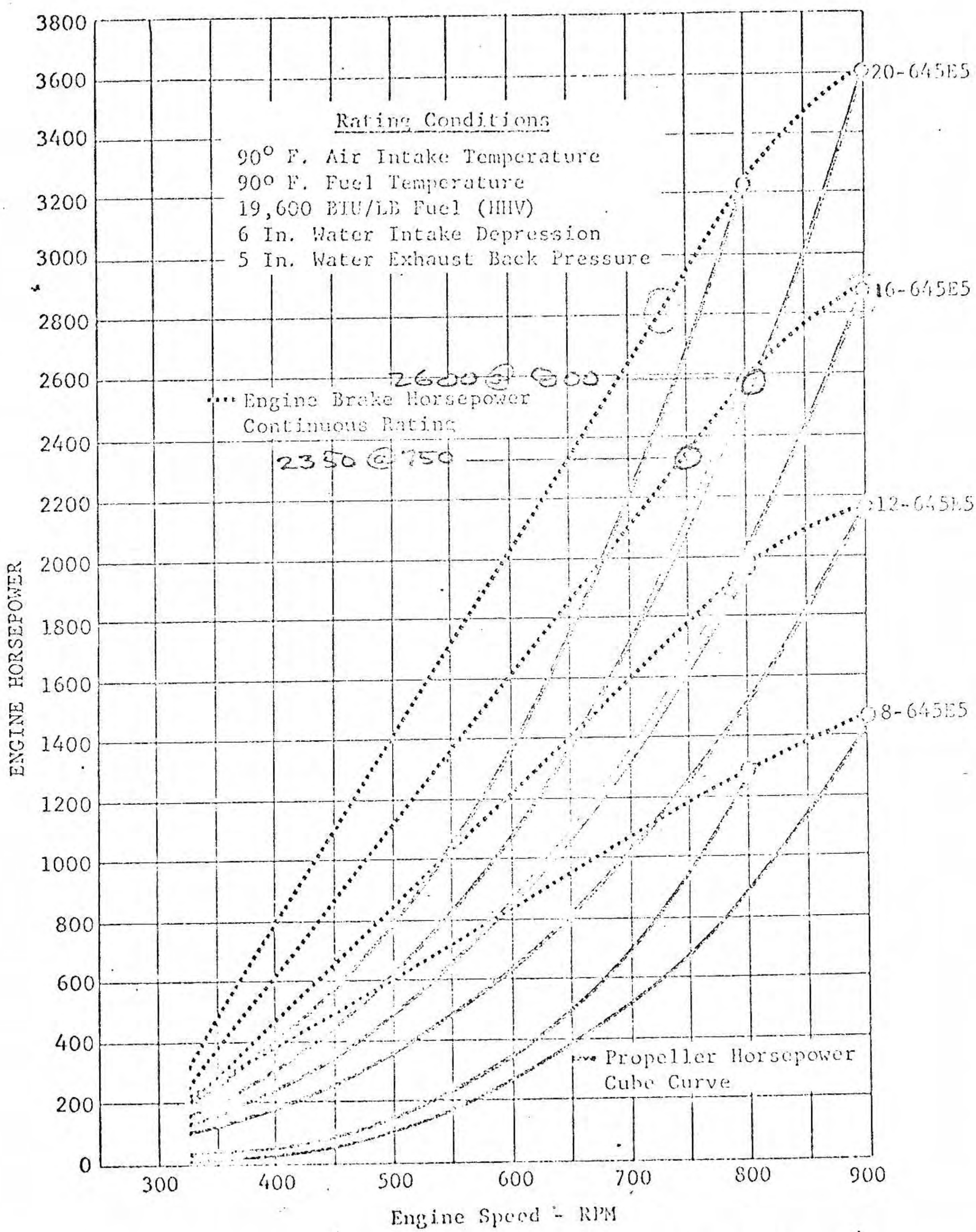
HORSEPOWER vs ENGINE SPEED CURVES

TURBOCHARGED ENGINES



OVERLOAD RATING DEFINITION - The standard overload rating of the engine permits an output of 10% in excess of full load rating for two continuous hours, but not to exceed a total of two hours out of any 24 consecutive hours of operation.

Growth potential - The vessel contains sufficient margin in hull characteristics, power and the electrical system for added operational development. The main deck, the aft part of the boat deck, and the laboratories are arranged with a sufficient number of boltdowns to permit the installation of portable vans, various winches, and scientific equipment to allow complete flexibility in preparation for each cruise.

CONTRACTING PROCEDURE

A survey by the Research Vessel Operator's Council in 1967 showed that there was a general need for intermediate size ships at many laboratories which was not reflected in the construction programs of the major funding agencies. The Navy was concentrating on large ships and the National Science Foundation, because of budget limitations, had brought it's construction program to a standstill. As a consequence of this report the Navy instituted an intermediate size class, again for serial production, but unfortunately a hull type was picked which was considered to be unsuitable for year-round North Atlantic operation. This precluded participation in the program by Woods Hole and other high latitude laboratories. In addition, further budget setbacks curtailed the program to the point where construction has only been completed on the first vessels as of this writing (1974).

Because of lack of encouragement and restrictive budgets in the late 1960's no proposals were submitted for construction funding for an intermediate size ship at Woods Hole but the requirements were worked

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on and further distilled and design outline work was continued. The need for the replacement ship was emphasized when operating budget restrictions forced the 41-year old CRAWFORD to be laid up in 1968 after 12 years of service to the Institution.

In 1971 a design grant was received from the Fleischmann Foundation and a preliminary design was undertaken by the office of John W. Gilbert Associates, Inc. of Boston.

1971 (November)
Preliminary design completed.

1972 (January)
Construction proposal submitted to NSF.

1972 (June)
NSF contract signed for 2.8m, title of ship to be retained by Government (NSF).

1972 (August)
Model testing underway at MIT tank.

1972 (December)
Bidding and contracting procedure developed in conjunction with NSF and reviewed by Trustees Advisory Committee. Proposals were to be solicited only from qualified shipbuilders; qualification to result from site visits, evaluation of reputation, financial condition, etc., by Woods Hole team.

Twelve builders originally evidenced interest in the project. Five of these later declined due to other commitments or relatively small size of ship. Two of the twelve were considered not qualified, leaving five potential bidders.

1973 (March)
Proposals received from only two of the five that had taken out plans and specifications:
Peterson Builders, Inc., Sturgeon Bay, Wisconsin (3.8m)
Campbell Industries, San Diego, California (4.7m)

1973 (April)

Woods Hole representatives negotiated with Peterson and through deletion or reduction in size of certain equipment and consequent reduction in man-hours arrived at a reduction of the P.B.I. bid by approximately $600,000.

The negotiated price was still in excess of the funds provided by NSF. NSF rejected an offer by Woods Hole to supplement the construction and directed that the proposals be cancelled, the design revised, and new proposals solicited.

1973 (May-August)

Plans and specifications revised. Readvertisement in the Commerce Business Daily resulted in deposits from eleven yards for plans and specifications, five of which received plans in the first round. NSF had requested bids be obtained for one or two ships with the operator of the second ship unspecified.

CHANGES IN REVISED DESIGN

The basic hull and arrangement remained the same. Major changes made during the revision of plans and specifications were:

Smaller main engine - from 20 cylinder 3500 hp to 16 cylinder 2800 hp with consequent change in size of shafting, propeller and nozzle rudder.

Speed - will be reduced about one knot (from 16 to 15) which is acceptable.

Smaller bow thruster - reduction from 500 hp to 300 hp unit.

Elimination of gas turbine auxiliary propulsion and emergency power system.

A small 120 volt battery bank is substituted for emergency generator.

Great simplification in electrical switchboards and distribution system.

Simplification in monitoring system.

Standard "drop-in" prefabricated refrigerator boxes rather than built-in equipment.

Elimination of communication and navigation electronics from yard purchase and installation. The Operator will install essential equipment from laid-up ships or future purchase after delivery of the vessels.

Elimination of spare parts purchase by shipbuilder, required parts will be purchased by Operators after delivery.

Standard furniture versus custom built-in wooden units.

Reduction in upper deckhouse size by lowering of bridge and elimination of gas turbine room, wet lab and upper deck library location.

Extensive simplification or reduction of detailed equipment such as doors, windows, furnishings, galley equipment, machinery, steering gear, etc.

Reduction or elimination of ambiguous specification requirements.

1973 (October)
Proposals received from two of the eleven potantial builders:
Peterson Builders, Inc. (3.46m one ship - 3.13m two ships)
Campbell Industries (3.9m one ship - 3.83m two ships)
Each proposal contained optional prices for certain equipment.

1973 (December)
Contract was approved by NSF and signed between Peterson Builders, Inc. and Woods Hole Oceanographic Institution for two ships at 3.093 per ship by reducing some of the options.

The proposal procedure called for (1) a firm fixed price for each ship as specified; (2) separate prices for optional items; (3) alternate proposals wherein the shipbuilders could propose alternative construction methods, equipment, a longer construction time, or even a complete alternate design. Evaluation criteria were given in the request for proposal to insure that basic requirements were met.

None of the proposers chose to offer an alternate design.

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APPENDIX 1

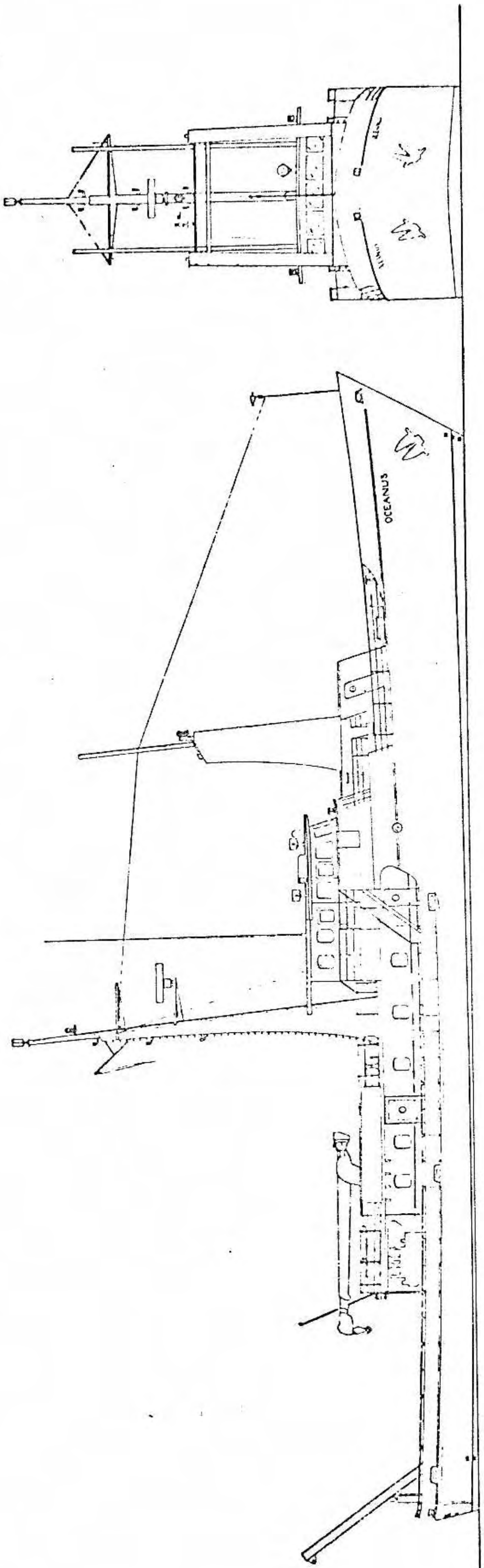
(a) Characteristics

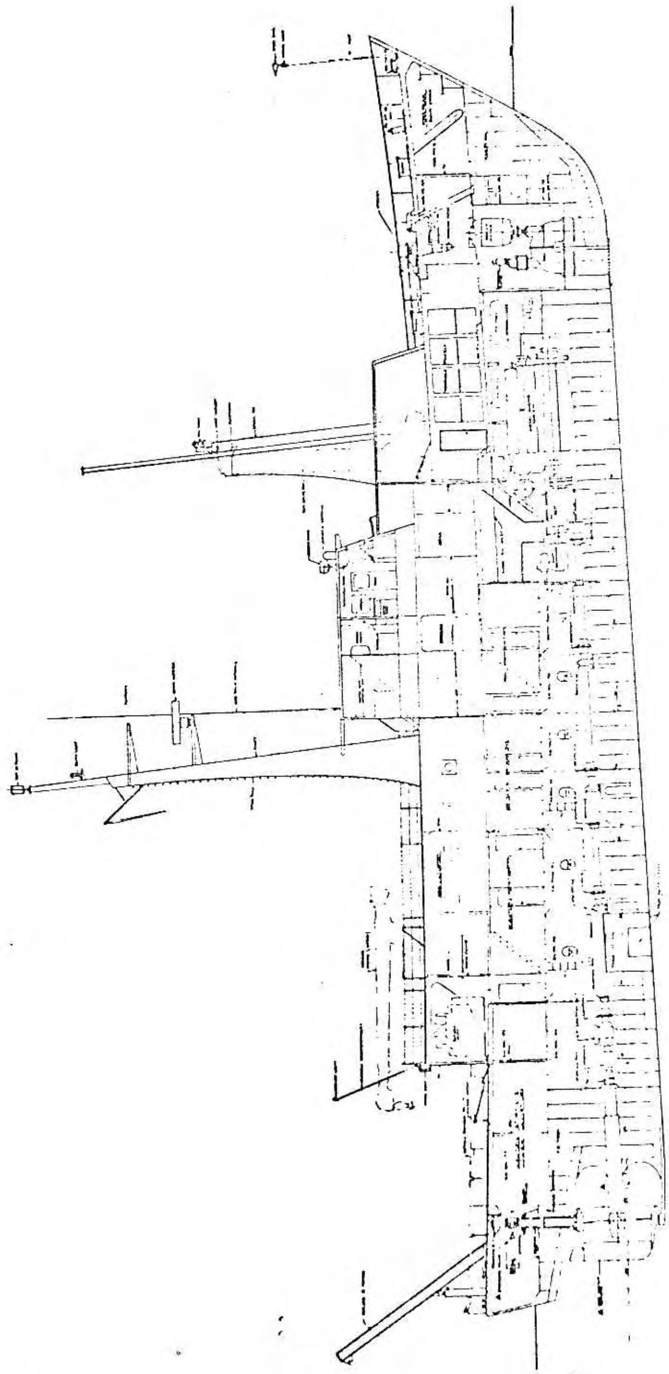
Length overall	177'-0"	
Length on waterline	165'-0"	
Length between perpendiculars	157'-8"	
Breadth molded	33'-0"	
Depth molded to main deck	17'-6"	
Design draft in salt water	12'-6"	
Scantling draft	14'-6"	
Draft, max., with 6'-3" drag	17'-6"	
Displacement molded at design draft .	962	tons
Gross tonnage, under	300	
Power, total max. continuous SHP . . .	2,800	
Speed, full power	15.0	knots
Speed, maximum cruising	14.5	knots
Range at 14.5 knots	8,000	naut. mi.
Endurance	30	days
Complement - officers and crew	13	
- scientists	12	
Total	25	

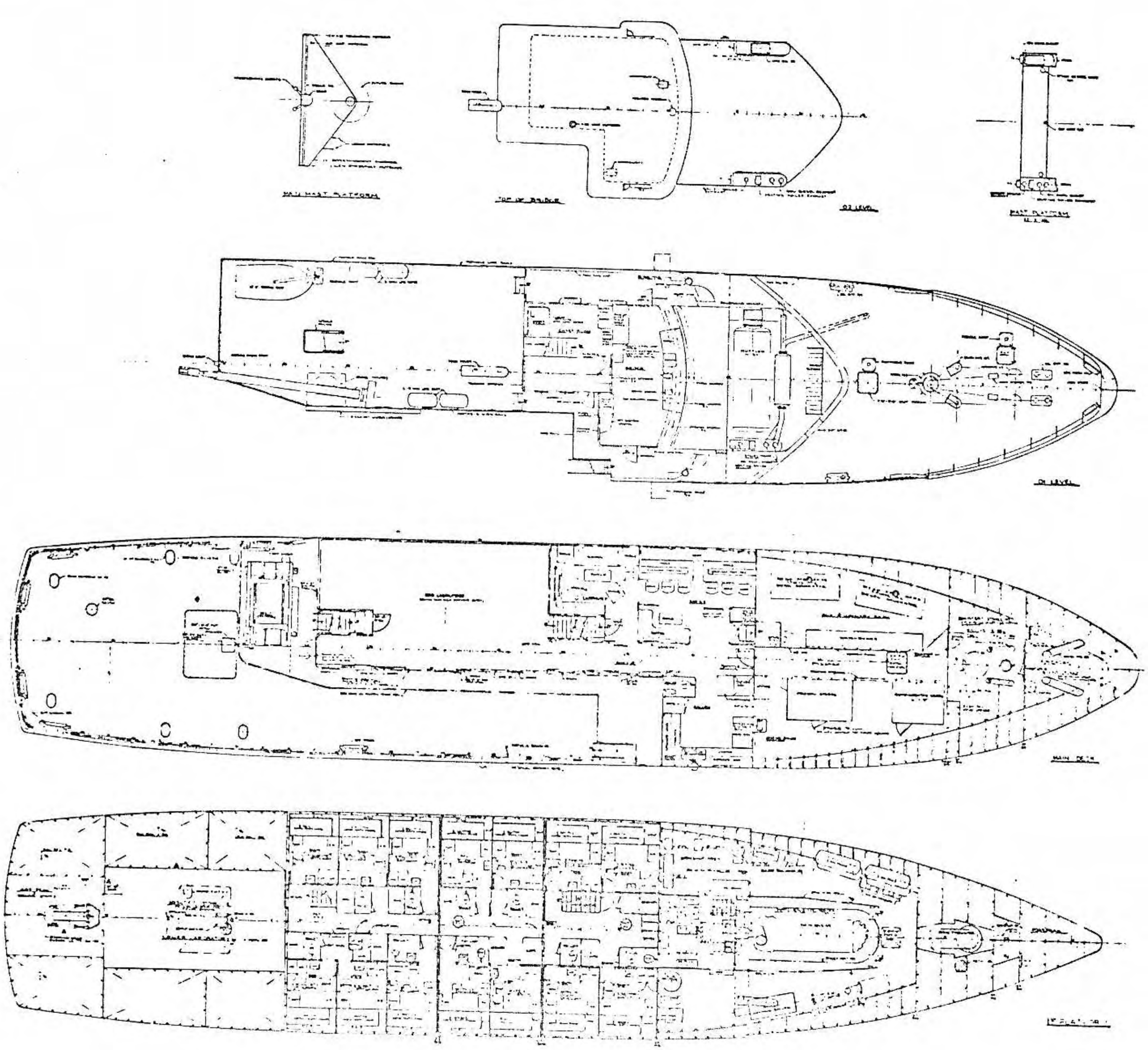
(b) Weights and Capacities (approx.)

Diesel oil	188	tons
Lubricating oil	4	tons
Fresh water	31	tons
Dry stores (approximate)	917	ft^3 molded
Refrigerated stores, chill (approx.) .	306	ft^3
frozen (approx.).	360	ft^3
Scientific stores (approx.)	4,000	ft^3 molded
Scientific outfit (including cranes, winches, stores, etc.) centered four feet above the main deck . .	100	tons

APPENDIX 2







TOP OF BRIDGE
02 LEVEL
MAST PLATFORM

APPENDIX 3

A Critique of Several Recent Woods Hole Vessels

CRAWFORD

The main deficiency of the CRAWFORD was that she was designed for service as a Coast Guard Cutter which led to a poor arrangement for a research vessel and the inability to carry heavy equipment such as a trawl or coring winch or any other relatively large weights or volumes. This latter deficiency prevented use of the ship by several groups which required heavy weight capacity of coring and trawling operations. The CRAWFORD's deck and lab space arrangement were unsuitable and limited relative to a ship of her size because a large forward deck had been provided for the installation of a gun during Coast Guard service leaving only a small afterdeck where most of our work takes place; the large foredeck had relatively little use for research since it was on the windward side of the deckhouse and was wet at sea. The small afterdeck was taken up by the hydrographic winch and allowed little space for even light but bulky equipment. The center part of the ship, especially the central section of the deckhouse, was taken up by machinery space which relagated the scientific living quarters to the forward end of the ship below deck where the motion was accentuated. The machinery space was surrounded by living and laboratory spaces which led to a relatively noisy situation, especially since the only passage between living and messing and laboratory spaces was through the upper engine room. The machinery space was given so much prominence that the class must have been designed by a marine engineer. The wheelhouse was located quite far forward compared to the working end of the ship (laboratories and hydrographic platform, stern working area, etc.) which made it difficult for those maneuvering the ship to observe and coordinate the operations.

On the positive side the CRAWFORD was a fine sea boat which could sustain a fairly high sea speed. She was one of the first air-conditioned ships.

GOSNOLD

The GOSNOLD's main deficiencies were poor arrangement for a research ship and slow speed, the latter primarily due to low power and hull form. The hull form is such that even increased power will not change the speed appreciably.

The major problem with her arrangement was the high poop deck which severely restricted access to the stern of the vessel for scientific equipment handling and winch installations, towing gear, etc. Also, the living space and galley area surround the machinery and are therefore vulnerable to noise, vibration and heat.

On the positive side the GOSNOLD does have a very sea kindly hull which was never known to roll.

CHAIN

The CHAIN has a good hull form and good seakeeping record, but suffers somewhat from the complication in arrangement and overly complicated power plant by modern standards and lack of good visibility from the bridge of the after working deck.

ATLANTIS II

The ATLANTIS II was designed from the inside; essentially, the design tried to encompass too many requirements for an all-purpose ship and the relatively tight budget dictated too compact a package.

The hull form was wrapped around these requirements almost as an afterthought resulting in a ship which was too full and too wide for it's length and one that is also underpowered so that it has but a 10-11 knot average sea speed, too low for a modern ocean-going research ship.The design orientation was that of a large merchant ship with all the traditions and complications in the way of arrangements, layout, and machinery operation.

On the positive side the ship has proven to be extremely reliable, very quiet and conveniently laid out.

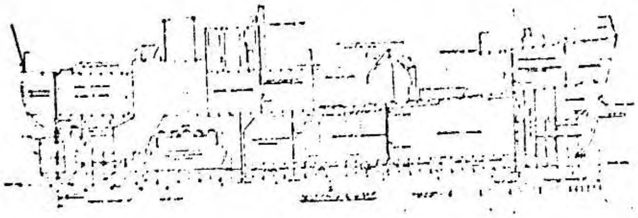
KNORR

The KNORR was an attempt to improve on the ATLANTIS II design with the same displacement but longer ship and by making improvements in arrangement such as moving the bridge where it could view the working area of the ship's main deck aft. These points were accomplished and in addition, a novel propulsion system gives the ship greater maneuverability.

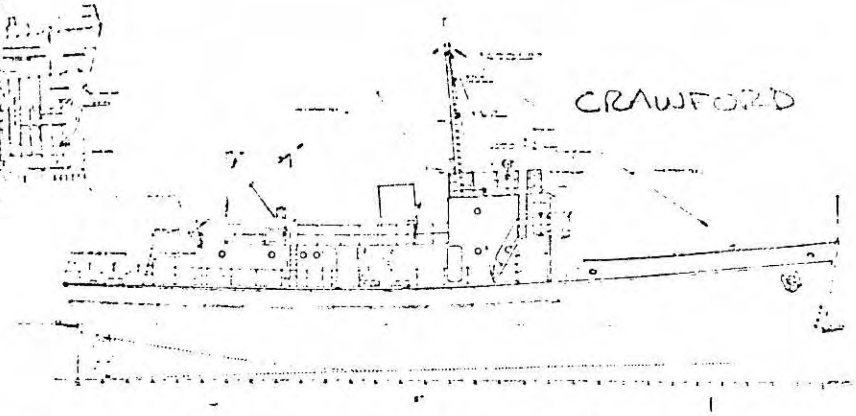
The basic deficiency of the KNORR results from the fact that too much of the design and construction was by an enormous (Navy) organization which sometimes lost control of the overall objectives and details so that some features of the ship resulted in a compilation of bits and pieces with the result that the total vessel does not easily accomplish all its intended purposes. Partially because of the above and because of the KNORR's propulsion system, the hull configured in a way that has proven detrimental to seakeeping qualities. The ship pounds aft because of the flat underbody of the transom stern and the motions are quick and violent due to the summation of the Navy and Coast Guard damaged stability requirements.

GENERAL

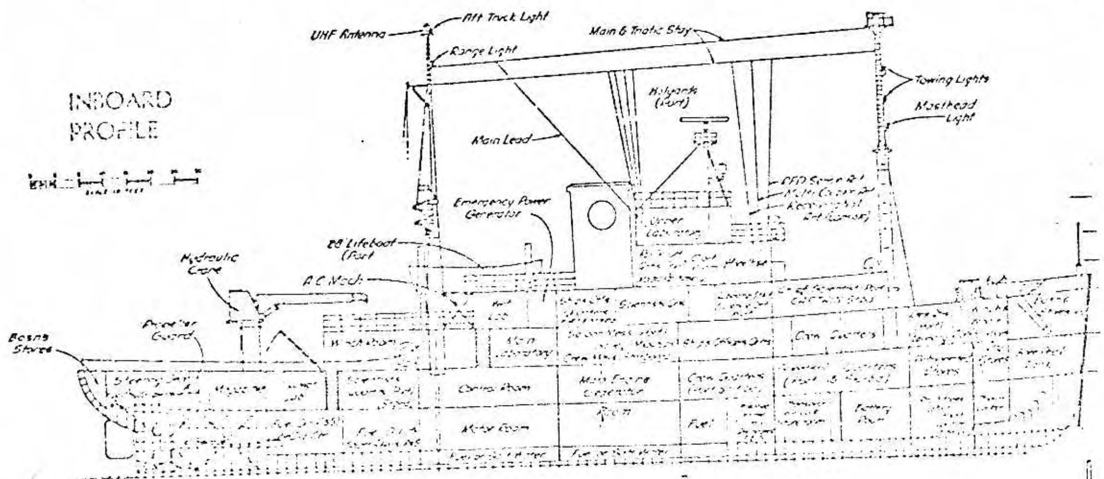
The CHAIN, ATLANTIS II AND KNORR are, of course, larger ships than was envisioned for the CRAWFORD replacement. Still, in many ways, each of the three larger ones are overcomplicated to an extent that is disproportionate to their size. Their interiors are arranged as a number of small spaces scattered throughout the ship with complicated access routes. Generally, their machinery takes up the most valuable part of the hull at the point of minimum motion and they suffer from our attempts to design all-purpose ships to do all things at once, rather than keeping them open and free with the space generally available for use by investigators for specific tasks on a particular cruise basis.



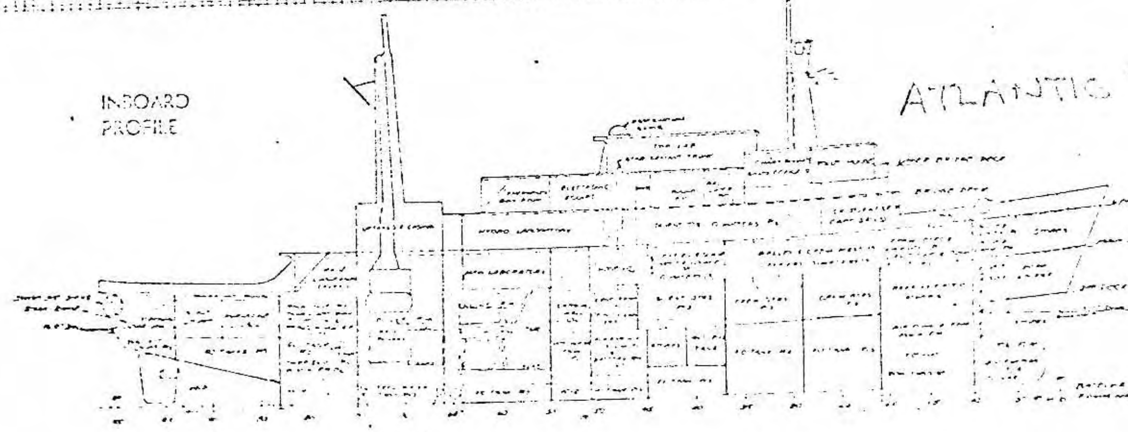
GOSNOLD



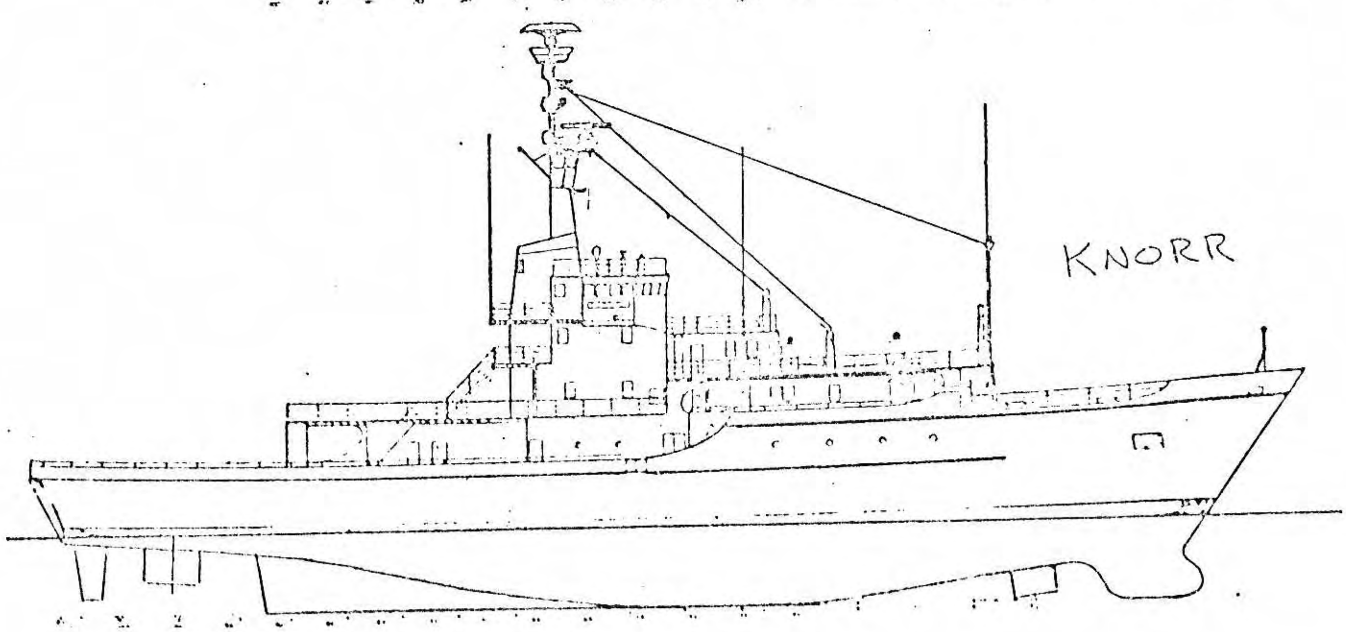
CRAWFORD



— CHAIN

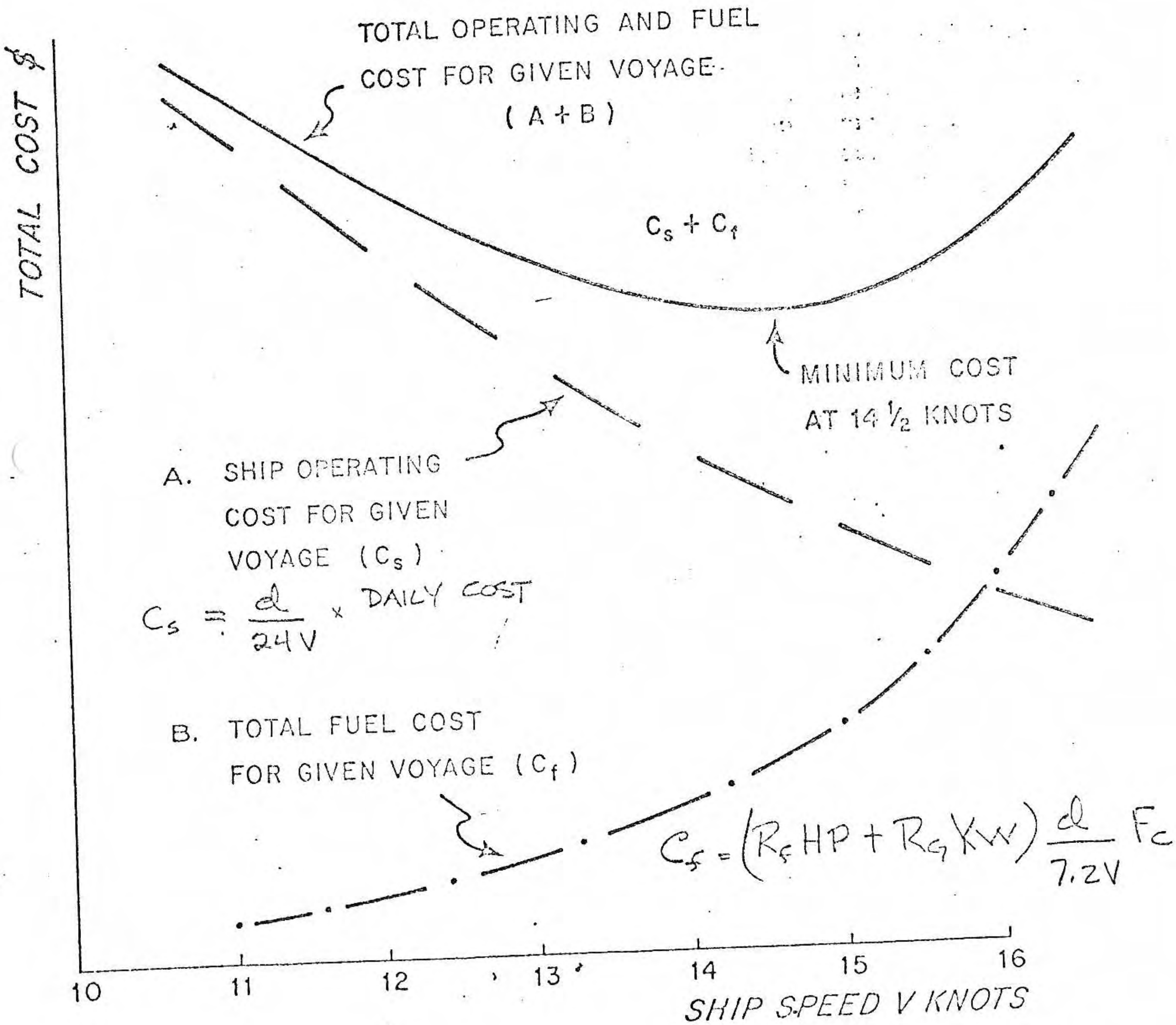


ATLANTIS II

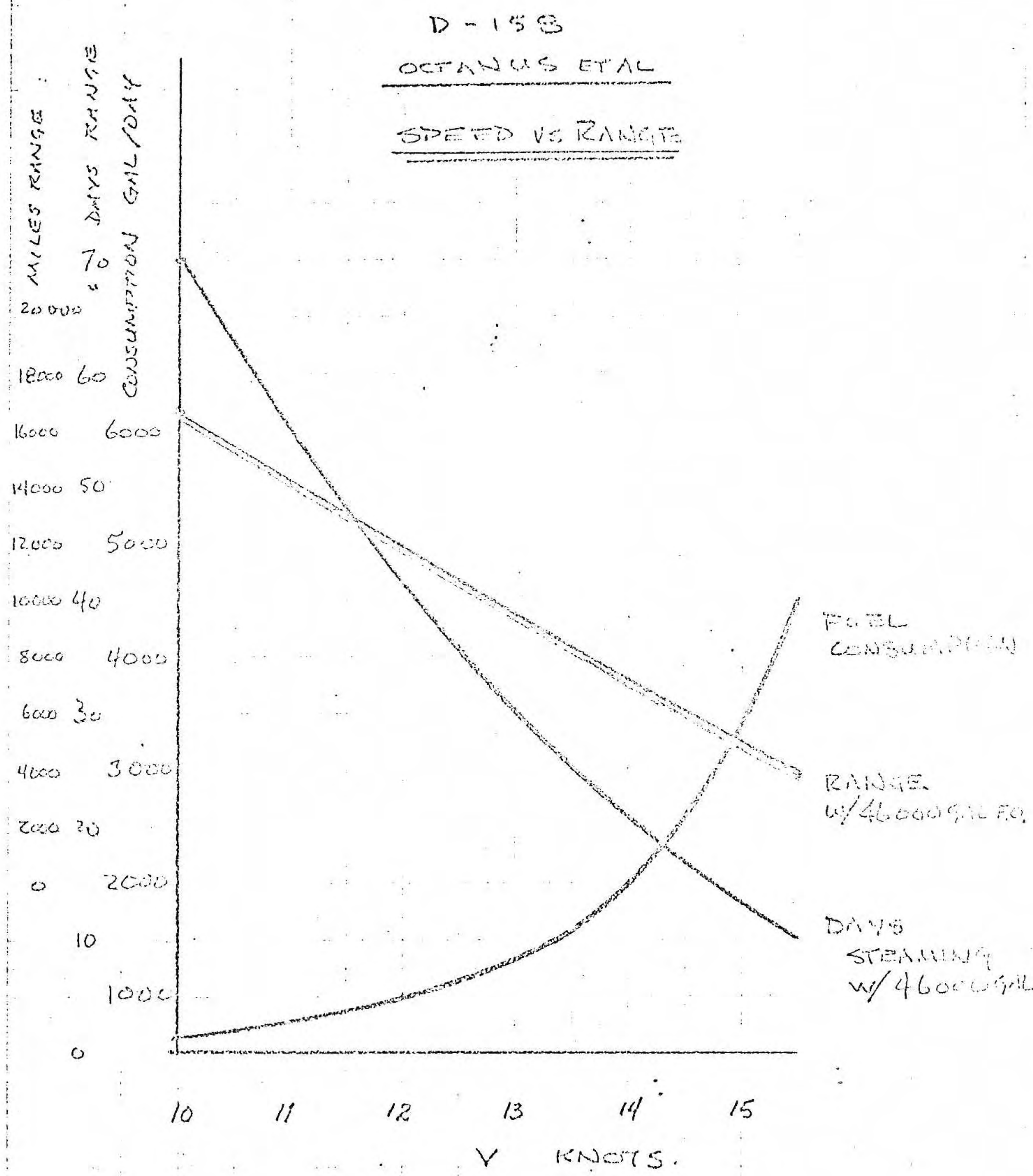


KNORR

TOTAL SHIP OPERATING COSTS RELATED TO SEASPEED



d = VOYAGE DISTANCE
V = SPEED
R_f = FUEL RATE MN ENG
R_G = " " GENERATOR
F_c = FUEL COST #/GAL.


D - 158
OCTANUS ETAL
SPEED VS RANGE
MILES RANGE
" DAYS RANGE
CONSUMPTION GAL/DAY
20000 70
18000 60
16000 6000
14000 50
12000 5000
10000 40
8000 4000
6000 30
4000 3000
2000 20
0 2000
10
1000
0
10 11 12 13 14 15
V KNOTS.
FUEL CONSUMPTION
RANGE w/46000 GAL FO.
DAYS STEAMING w/46000 GAL

11-12-74 JL

UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

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

UNOLS Office
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts 02543

January 24, 1975

RESEARCH SHIP SCHEDULES - 1976

Institutions of the University-National Oceanographic Laboratory System (UNOLS) will be developing research operating schedules for 1976 during the early months of 1975. UNOLS members will make every effort possible to accommodate investigators from other institutions. Toward that end ship operators will receive requests for ship time and several will hold open meetings for the presentation and discussion of ship use proposals. The following schedule gives the dates when various ship operators desire requests to be submitted and the dates of open meetings which are now scheduled.

INSTITUTION	WRITTEN REQUEST DATE	OPEN MEETING DATE
University of Rhode Island	March 1	early March
University of Southern California	March 1	-
Texas A & M University	March 1	-
University of Washington	March 1	-
Woods Hole Oceanographic Institution	March 1	-
Duke University	Feb. 15	*
(*selected competitively)		

INSTITUTION	WRITTEN REQUEST DATE	OPEN MEETING DATE
University of Alaska	May 1	-
Scripps Institution of Oceanography	March 1	-
Lamont Doherty Geological Observatory	March 1	-
University of Hawaii	May 1	-
Johns Hopkins University	March 1	-
University of Miami	Jan. 12	Feb. 13
Oregon State University	Feb. 15	Feb. 18

The dates shown above are deadlines for initial consideration and especially for principal ship use. Requests may be submitted for ancillary ("piggy-back") time throughout the year although timeliness is important.

UNOLS members have agreed to receive and honor the UNOLS Ship Time Request Form, a copy of which is enclosed. This may be submitted to the UNOLS contacts listed on the attached sheet or to the UNOLS Office. A specific institution may require subsequent additional information.

Investigators seeking ship time for Federally funded programs should make ship needs clearly known to their agency sponsors. The National Science Foundation requires that Form NSF-831 (copy attached) be included iwth every proposal within the marine sciences area. Similar information should be included with proposals to other agencies.

In addition to the Federally funded UNOLS vessels other academic research ships are often available for which daily rate charges are usually required.

For further information contact R. P. Dinsmore, UNOLS Office, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts 02543, telephone (617) 548-1400, Extension 352 or any of the contacts listed.

Encls.

UNOLS OFFICE
1/1/75

The University-National Oceanographic Laboratory System

LIST OF FEDERALLY FUNDED ACADEMIC RESEARCH SHIPS

OPERATOR	NAME	LOA (FT)	BUILT/ CONVERTED	NO. SCIENTS	OWNER 1/	SHIP SCHEDULING CONTACT
University of Alaska Institute of Marine Science Fairbanks, Alaska 99701	ACONA	85	1961	9	NAVY	Dr. Donald Hood, Director (907) 479-7531
Scripps institution of Oceanography P. O. Box 1529 La Jolla, California 92037	AGASSIZ MELVILLE DOLPHIN SCRIPPS T. WASHINGTON ALPHA HELIX	180 245 96 95 209 133	1944/1961 1969 1968/1974 1965 1965 1966	13 25 8 8 17 12	-- NAVY -- -- NAVY --	Capt. Robert B. Haines, Ship Scheduler, Code A-010 (714) 452-2840
University of Hawaii Hawaii Institute of Geophysics 2525 Correa Road Honolulu, Hawaii 96822	KANA KEOKI MOANA WAVE	156 174	1967 1973	15 13	-- NAVY	Mr. J. Frisbee Campbell, Scientific Coordinator for Marine Operations (808) 948-7654
Oregon State University School of Oceanography Corvallis, Oregon 97331	CAYUSE YAQUINA *(WECOMA)* 2/	80 180 *177*	1968 1944/1964 *1975*	8 17 *14*	-- -- *NSF*	Dr. Larry D. Kulm (503) 754-2296
University of Southern California Allan Hancock Foundation University Park Los Angeles, California 90007	VELERO IV	110	1948	9	--	Dr. Jay Savage, Associate Director (213) 746-2073
University of Washington Department of Oceanography Seattle, Washington 98105	T.G. THOMPSON HOH ONAR	209 65 65	1965 1943/1962 1954/1963	20 6 6	NAVY NAVY NAVY	Dr. Alyn C. Duxbury, Director of Operations (206) 543-0444
Lamont-Doherty Geological Observatory Columbia University Palisades, New York 10964	CONRAD VEMA	209 197	1962 1923/1953	15 14	NAVY --	Dr. Dennis Hayes (914) 359-2900 Ext. 470
Duke University Duke Univ. Marine Laboratory Beaufort, North Carolina 28516	EASTWARD	118	1964	15	--	Dr. Richard T. Barber, Director, Cooperative Oceanographic Program (919) 728-2111
Skidaway Institute of Georgia University System of Georgia P. O. Box 13687 Savannah, Georgia 31406	KIT JONES	65	1938/1958	4	--	Dr. David W. Menzel, Director (912) 352-1631
Johns Hopkins University Chesapeake Bay Institute Baltimore, Maryland 21218	R. WARFIELD	106	1967	10	--	Mr. Harold W. Screen, Jr., Director of Operations (301) 366-3300 Ext. 762
Rosenstiel School of Marine & Atmospheric Sciences University of Miami 10 Rickenbacker Causeway Miami, Florida 33149	GILLISS ISELIN CALANUS	209 170 64	1962 1972 1970	19 13 6	NAVY -- --	Mr. James Gibbons, Operations Manager (305) 350-7223
University of Rhode Island Graduate School of Oceanography Kingston, Rhode Island 02881	TRIDENT *(unnamed)* 2/	180 *177*	1944/1962 *1976*	13 *14*	-- *NSF*	Mr. Robert Sexton, Coordinator of Scientific Services, (401) 792-6197
Texas A&M University Department of Oceanography College of Geosciences College Station, Texas 77843	GYRE	174	1973	19	NAVY	Capt. T. K. Treadwell, Assistant Department Head (713) 845-7211
Woods Hole Oceanographic Institution Woods Hole, Massachusetts 02543	ATLANTIS II KNORR CHAIN *(OCEANUS)* 2/	210 245 213 *177*	1963 1970 1944/1958 *1975*	25 25 25 *12*	-- NAVY NAVY *NSF*	Dr. Arthur E. Maxwell, Provost (617) 548-1400 Ext. 250

1/ unless otherwise indicated the vessel is owned by operator

2/ New construction; will replace ship listed immediately above

UNOLS
5/9/73

UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

SHIP TIME REQUEST

TO	and/or UNOLS OFFICE ☐ (check)

SHIP REQUESTED (if no specific ship, leave blank)	PRINCIPAL SHIP USE ☐ (where project will be chief use of ship) ANCILLARY SHIP USE ☐ (on a shared or not-to-interfere basis)

PURPOSE (project title and brief outline of scientific objective)

CHIEF INVESTIGATOR (name, title, address, tele.no:)	OTHER SCIENTISTS INVOLVED
	TOTAL NUMBER OF SHIPBOARD PARTY

PROJECT REQUIREMENTS

SHIP REQUIREMENT (large, small & why)		MINIMUM NUMBER OF SHIP DAYS NEEDED
SHIPBOARD EQUIPMENT NEEDED		OPTIMUM INCLUSIVE DATES
SPECIALIZED FACILITIES OR INSTRUMENTS REQUIRED		ACCEPTABLE ALTERNATIVES
SUPPORTING PERSONNEL NEEDED (technicians)		AREA OF OPERATIONS (attach page size track chart)
EXPLOSIVES CARRIED	RADIOACTIVE MATERIAL	UNDERWAY and/or STATION REQUIREMENTS (attach sampling plan if available)

FUNDING STATUS

FUNDED			NOT-FUNDED	
FUNDING AGENCY			PROPOSAL SUBMITTED ☐ WILL BE SUBMITTED ☐	TO:
GRANT NO:			DATE:	AMOUNT REQUESTED:
AMOUNT OR ANNUAL RATE	BEGIN. DATE	DURATION	NEW PROPOSAL ☐	or RENEWAL OF GRANT NO:

OTHER SHIPS, LABS, AGENCIES TO WHOM REQUESTS HAVE BEEN SUBMITTED	SUBMITTED BY (name, title, address, tele.no if different from chief investigator) SIGNATURE
DATE OF REQUEST	APPROVED BY (department chairman or lab.director)

UNOLS
5/9/73

UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

SHIP TIME REQUEST

TO and/or UNOLS OFFICE ☐ (check)

SHIP REQUESTED (if no specific ship, leave blank)

PRINCIPAL SHIP USE ☐ (where project will be chief use of ship)
ANCILLARY SHIP USE ☐ (on a shared or not-to-interfere basis)

PURPOSE (project title and brief outline of scientific objective)

CHIEF INVESTIGATOR (name, title, address, tele.no:)

OTHER SCIENTISTS INVOLVED

TOTAL NUMBER OF SHIPBOARD PARTY

PROJECT REQUIREMENTS

SHIP REQUIREMENT (large, small & why)

SHIPBOARD EQUIPMENT NEEDED

SPECIALIZED FACILITIES OR INSTRUMENTS REQUIRED

SUPPORTING PERSONNEL NEEDED (technicians)

EXPLOSIVES CARRIED | RADIOACTIVE MATERIAL

MINIMUM NUMBER OF SHIP DAYS NEEDED

OPTIMUM INCLUSIVE DATES

ACCEPTABLE ALTERNATIVES

AREA OF OPERATIONS (attach page size track chart)

UNDERWAY and/or STATION REQUIREMENTS (attach sampling plan if available)

FUNDING STATUS

FUNDED

FUNDING AGENCY

GRANT NO:

AMOUNT OR ANNUAL RATE | BEGIN. DATE | DURATION

NOT-FUNDED

PROPOSAL SUBMITTED ☐
WILL BE SUBMITTED ☐ TO:

DATE: | AMOUNT REQUESTED:

NEW PROPOSAL ☐ or RENEWAL OF GRANT NO:

OTHER SHIPS, LABS, AGENCIES TO WHOM REQUESTS HAVE BEEN SUBMITTED

DATE OF REQUEST

SUBMITTED BY (name, title, address, tele.no if different from chief investigator)

SIGNATURE

APPROVED BY (department chairman or lab.director)

OTHER ACADEMIC INSTITUTIONS

Research Vessels 60-ft and larger

Listing of additional academic research vessels which make regular and frequent cruises in local waters for which schedules have not been received or are not regularly published. Unless otherwise indicated the nature of work is general oceanography, coastal research and student training. Most of these vessels are willing to accommodate cooperative projects within the capability of the vessel either on a not to interfere or reimbursable basis. Further information can be obtained from the listed contact. Corrections and additions should be submitted to the UNOLS Office.

INSTITUTION	SHIP NAME	LOA (ft)	AREA OF OPERATION	CONTACT
Southern Maine Vocational Technical Institute Dept. of Marine Science & Technology Fort Road South Portland, Maine 04106	AQUALAB III	144	New England Coast	Tapan Banerjee (207) 799-7303 Ext. 67
Southeastern Massachusetts University North Dartmouth, Mass. 02747	CORSAIR	65	New England Coast	Gilbert Fain (617) 997-9321 Ext. 357
Marine Biological Laboratory Woods Hole, Mass. 02543	A. E. VERRILL	65	New England Coast	John Valois (617) 548-3705 Ext. 325
University of Connecticut Marine Sciences Institute SE Branch, Avery Point Groton, Connecticut 06340	UCONN T-441	65 65	Southern New England Coast Long Island Sound	Peter Dehlinger (203) 446-1020 Ext. 211
New York Ocean Science Laboratory Drawer EE Montauk, New York 11954	KYMA	65	Southern New England Coast-Long Island Sound	Rudolph Hollman (516) 668-5800
University of Delaware College of Marine Studies Newark, Delaware 19711	(unnamed- in service mid-1975)	120	Mid-Atlantic Coast	Anton Inderbitzen (302) 645-6676
Marine Science Consortium P. O. Box 43 Millersville, Penn. 17551	ANNANDALE	90	Atlantic Coast	B. L. Oostam (717) 872-5411
Johns-Hopkins University Chesapeake Bay Institute Baltimore, Maryland 21218	RIDGELY WARFIELD MAURY	106 65	Chesapeake Bay	Harold W. Screen (301) 366-3300 Ext. 762
University of Maryland Chesapeake Biological Laboratory Box 38 Solomons, Maryland 20688	AQUARIUS ORION	65 65	Chesapeake Bay	L. Eugene Cronin (301) 326-4281

OTHER ACADEMIC INSTITUTIONS (Cont.)

INSTITUTION	SHIP NAME	LOA (ft)	AREA OF OPERATION	CONTACT
Old Dominion University Institute of Oceanography Box 6173 Norfolk, Virginia 23508	LINWOOD HOLTON	65	Chesapeake Bay Mid-Atlantic Coast	J. C. Ludwick (703) 489-8000
Virginia Institute of Marine Science Gloucester Point, VA 23062	RETRIEVER LANGLEY PATHFINDER	115 80 57	Mid-Atlantic Coast Chesapeake Bay	James E. McCauley (804) 642-2111
Bermuda Biological Station St. George's West Bermuda	PANULIRUS II	65	Bermuda	Wolfgang Sterrer Bermuda 3-2060
Cape Fear Technical Institute 411 North Front Street Wilmington, North Carolina 28401	ADVANCE II HERRING	185 110	Atlantic Coast	A. W. Jordan (919) 763-9876 Ext. 48
Skidaway Institute of Oceanography of the University System of Georgia P. O. Box 13687 Savannah, Georgia 31406	KIT JONES GOLDEN ISLE	65 67	Southern Mid-Atlantic Coast	David Menzel (912) 352-1631
Florida Institute of Technology Melbourne, Florida 32901	SEA HUNTER	72	East Florida Coast	O. D. Waters, Jr. (305) 723-3701
Harbor Branch Foundation Laboratory RFD #1, Box 196 Fort Pierce, Florida 33450	SEWARD JOHNSON	125	Florida Coast Bahamas	E. A. Link (305) 465-2400
Nova University Physical Oceanographic Laboratory 800 North Ocean Drive Dania, Florida 33004	GULF STREAM	55	Florida Coast	W. S. Richardson (305) 927-1621
University of Puerto Rico Department of Marine Sciences Mayaguez, Puerto Rico 00708	CRAWFORD MEDUSA	125 55	Caribbean Sea	D. K. Atwood (809) 832-4040
State University System Institute of Oceanography 830 First Street, South St. Petersburg, Florida 33701	BELLOWS	65	Florida Coast	R. E. Smith (813) 896-5197

OTHER ACADEMIC INSTITUTIONS (Cont.)

INSTITUTION	SHIP NAME	LOA (ft)	AREA OF OPERATION	CONTACT
University of Alabama Sea Laboratory Dauphin Island, Alabama 36528	AQUARIUS	65	Gulf of Mexico	G. F. Crozier (205) 861-3702
Gulf Coast Research Laboratory P. O. Drawer AG Ocean Springs, Mississippi 39564	GULF RESEARCHER	65	Gulf of Mexico	H. D. Howse (601) 875-2244
University of Texas Marine Biomedical Institute Earth & Planetary Sciences Division 200 University Blvd. Galveston, Texas 77550	IDA GREEN	135	Gulf of Mexico	J. L. Worzel (713) 765-2181
University of Texas Marine Science Institute Port Aransas, Texas 78373	LONGHORN	80	Gulf of Mexico	P. L. Parker (512) 749-6711
Occidental College Department of Biology 1600 Campus Road Los Angeles, Calif. 90041	VANTUNA	85	California Coast	J. S. Stephens, Jr. (213) 259-2675
U.S. Naval Post Graduate School Monterey, Calif. 93940	ACANIA	126	California Coast	D. F. Leipper
California State University Humbolt Arcata, California 95521	PACIFIC RAIDER	125	California Coast	Richard Reinert (707) 826-3011
State University College at Buffalo Great Lakes Laboratory 1300 Elmwood Avenue Buffalo, NY 14222	ROGER SIMONS CHARLES A. DANBACH	166 66	Great Lakes	R. A. Sweeney (716) 862-5422
University of Michigan Institute of Science & Technology Ann Arbor, Michigan 48106	LAURENTIAN MYSIS	80 50	Great Lakes	Clifford Tetzloff (313) 763-3183
University of Wisconsin-Milwaukee Center for Great Lakes Study Milwaukee, Wisconsin 53201	NEESKAY	65	Great Lakes	D. F. Mraz (414) 963-4196

Department of Oceanography
The Florida State University
Tallahassee, Florida 32306

January 8, 1975

UNOLS Advisory Committee

Dear Sir:

On Nov. 4, 1974 a meeting was held in New Orleans of representatives of Gulf Coast universities actively engaged in marine related research. The following organizations were represented:

The University of Texas
Texas A & M University
Louisiana State University
Gulf Coast Research Laboratory, Mississippi
University of Alabama
University of West Florida
Florida State University
University of South Florida
State University System Institute of Oceanography (Florida)
Florida Governors Office

The primary purpose behind the meeting was to assess the current state of availability of oceanographic ship and support facilities and to determine future needs for the Gulf coast institutions. The general consensus was that the current level of support is inadequate and inequitably distributed and that future needs could best be met by a regional ship program. Everyone in attendance expressed willingness to participate in a regional ship operation that was responsive directly to the research scientists. It was also felt that the regional operation should include deep ocean and coastal vessels as well as maintenance and support facilities. The regional program might well be supported by a mix of federal, state and private money. However, to provide continuity and facilitate long-term planning heavy reliance on applied programs should be avoided. Therefore, we envisage that the principal support for the regional ship operation will be the NSF. We intend to fully develop an operational plan and to request funding from NSF for ship and facilities acquisition and operation.

The advent of regional ship operations is timely considering the current resource restrictions imposed by the economy. The future for oceanographic research may require shared ship facilities not only in the Gulf of Mexico region, but throughout the U.S. oceanographic community. The UNOLS working group on coastal zone research vessels recognized this in their report of April 12, 1972. To properly plan and ultimately implement a regional program will require considerable man-hours of work. Accordingly we plan to submit to NSF a proposal for planning money to provide salary support for a coordinator (who will probably be on temporary leave from other duties). The coordinator will be an active liason between the concerned institutions and, with the help of advisors, will develop the operational plan and the proposal(s) to fund them. We hope that UNOLS will give its official endorsement to these actions.

Sincerely,

John A. Calder

John A. Calder
Assistant Professor

JC/pb

UNIVERSITY OF DELAWARE

LEWES, DELAWARE

19958

COLLEGE OF MARINE STUDIES
MARINE STUDIES CENTER
PHONE: 302-645-6674

Fiscal 76 is almost upon us, so the time is ripe for formally organizing our mid-Atlantic regional group for coastal zone research. Our goal remains to also obtain UNOLS sponsorship for the group. We must begin now so we are ready to utilize the new vessel when it arrives in Lewes, Delaware.

The vessel construction is progressing on schedule. On January 16, 1975, the keel was laid. The vessel will be "floatable" by March 1, 1975. Anticipated delivery is early- to mid-August of this year. There does appear to be one possible delay as the manufacturer of the generators cannot guarantee delivery before November or December. Hopefully, he will deliver much earlier, as he is trying to do.

Although it is still impossible to give a firm date as to when the vessel can be used for research cruises, we must soon make firm commitments on membership in the group and anticipated use of the vessel. Requests for vessel time are already being received from agencies, and we must be able to preserve adequate blocks of time for our institutional user group.

As discussed last September, the users group will operate on a fiscal-year basis, each member contributing $5400 for five days per year or up to $10,800 for 10 days per year at the beginning of FY 76. It appears now that we will not have a full operating year in FY 76, but at the most, three seasons of operation, and possibly only two seasons. We will plan our scheduling activities on this basis and should still be able to meet all users needs in FY 76.

Attached is another copy of our plan for the organization of the institutional users group in case you need it to interest others in your institution.

May I please have a firm commitment from your institution by March 15, 1975, so that we can formally organize and begin scheduling our ship time for FY 76? I would appreciate a reply as soon as possible so that I can schedule a meeting of all members to begin our activities. Also, I will be pleased to come to your institution to discuss this further.

We hope that your institution will join us in this regional research vessel program. I await your reply.

Sincerely,

A. L. Inderbitzen, Ph.D.
Director of Marine Operations

ALI:llb
Attachment

A DRAFT PROPOSAL

OF

A PLAN FOR INSTITUTIONAL SUPPORT

OF THE

COASTAL ZONE RESEARCH VESSEL

Prepared By
College Of Marine Studies
University of Delaware
September 12, 1974

SUMMARY

The University of Delaware, a private, state-assisted institution, has been active in estuarine and shelf research since 1950 operating at both Lewes, and Newark, Delaware. The University is now constructing a 120 ft. research vessel for coastal zone studies, which will be delivered during the summer of 1975. This vessel has been designed to meet the coastal and continental shelf research needs of many users within the mid-Atlantic region.

The design of the vessel is based on the requirements of scientists from many universities as determined by a survey conducted by the College of Marine Studies in 1972. Eighty scientists and marine engineers representing thirty-two institutions within the mid-Atlantic region responded to that questionnaire. The present ship design reflects their needs and wishes so that this vessel will be useful to, and utilized by, as many different researchers and institutions as possible.

Institutional support for this new coastal zone research vessel will guarantee ship time for any member. This will allow institutions without an oceanographic vessel to obtain guaranteed days at sea for educational and/or research programs and allow those institutions who already have an ocean-going capability to increase their fleet size.

In brief, the specifications of this vessel are:

120 ft. LOA
23 ft. beam
10 ft. 7 5/8 in. molded depth to main deck
2880 continuous shaft horsepower
19 kt. cruising speed
21 kt. full speed
600 mile range at 19 kts.
4000 mile range at 12 kts.
6 crew
12 scientists (bunking capacity)

Services provided to institutions contributing to the support of this vessel will include guaranteed use of the ship, the availability of a portable laboratory van for lease, use of the van trailer and scientific assembly areas of the College of Marine Studies Operations Center if leasing a van, participation in the allocation of time and scheduling of the vessel within the guaranteed periods and preferential treatment in leasing additional vessel time at the beginning of each scheduling year. Each of these services will be explained in more detail.

Besides the vessel itself, four 8 x 8 x 16 ft. portable laboratory vans are being purchased by the University of Delaware and will be available to member institutions. These vans will be equipped with modular furniture, which can include a sink, work benches, desk, cabinets and electronic instrument racks. Each van contains its own heating and air conditioning unit. These vans mate to the exterior bulkhead of the dry laboratory of the vessel and become part of that laboratory. On shore, at Lewes, Delaware, they can be mated to the scientific assembly rooms of the Operations Center or the laboratories of the Marine Studies Center. The ability to mate these vans to shoreside facilities as well as the dry laboratory of the ship maximizes their utility and continual use in research projects. These vans are completely portable and can be towed on their own trailers by a station wagon or pick-up truck. They can be on or off loaded with the ship's crane at any port where the vessel can dock. Based upon anticipated costs of these vans, they will be leased to member institutions for $50 per day. The scientific assembly rooms of the College of Marine Studies Operations Center in Lewes, Delaware, are available to van users during their lease period. Frequent users of the vessel may want to purchase and outfit their own van or vans so that they can be used at their institution as well as at the marine facility in Lewes, Delaware, or on the research vessel.

A management committee will be formed to coordinate the scheduling of vessel time subscribed for by participating institutions. Each member of the group will have a voice in the allocation of ship days and scheduling of the vessel within the predetermined blocks of time for member use. Four blocks of time throughout the year will be set aside for members' use of the vessel. These blocks will consist of about two weeks in January, three weeks in April - May, two weeks in July - August and three weeks in October - November. The management committee will allocate and prioritize members' time within these blocks.

Member institutions will be provided vessel time at 90% of the fixed costs (See Table 1) plus their expendables. Member institutions will pay a minimum amount for a guaranteed 5 days at sea. Additional days, up to 5 more, may be subscribed to on an annual basis to be guaranteed within the predetermined blocks of time. Charges for the expendables will be made at the conclusion of the member's use of the vessel. Member institutions can gain even more time at sea for the same amount of money by combining operations and "piggybacking" on each other's cruises. Arrangements of this kind can be worked out within the management committee. Actual charges are explained in detail at the end of this document.

If member institutions want additional ship time beyond the maximum of 10 guaranteed days within the predetermined blocks of time, they will receive preferential treatment in leasing remaining time at the beginning of the scheduling year. This additional time must be leased at the full rate.

The option to lease vans and piggyback on other members' time is only offered to institutions which enter the group during the first year of this program. The University of Delaware offers this member support program for a period of three years. The University reserves the right to review the costs annually and adjust accordingly the rates for fixed and expendable costs at the beginning of each schedule year within the three year period. After three years of operation, this entire membership program will be reviewed by the University of Delaware in order to decide upon its continuance.

Support funds for membership can be provided by: (1) direct contribution from the member institution, (2) funds for ship-time provided by outside funding for a research grant held by a member institution, or (3) any combination of (1) and (2).

By forming a multi-institutional group to aid in the support of this new coastal zone research vessel, it is hoped to allow more people a chance to "go to sea" for educational and research purposes than have been able to because of cost restrictions. Another goal, equally important, is to form the nucleus of institutions which can work together on large multi-institutional research programs which will involve this vessel as well as many other facilities.

SERVICES AVAILABLE TO MEMBER INSTITUTIONS

1. Guaranteed use of the new 120 ft. coastal zone research vessel for educational and/or research cruises during specific annual periods.

2. Lease of a portable laboratory van and the scientific assembly areas and other facilities of the College of Marine Studies Operations Center for $50 / day.

3. Participation in the allocation of time and scheduling of the vessel within predetermined time periods.

4. The opportunity to participate in multi-institutional research programs.

5. Preferential treatment in leasing additional vessel time at the beginning of scheduling year.

6. The opportunity to gain more sea time without additional expense by combining sea operations with other member institutions.

Services 2 and 6 only pertain to members that join during the first year of the program.

SAMPLE AGREEMENT

We, the undersigned institution, agree to participate in the operational support of the University of Delaware's coastal zone research vessel. We agree to provide ____________________ per annum for the operation of this vessel paid at the beginning of the scheduling year. Charges for expendables (fuel & food) will be made to our institution when computed at the end of our trip or trips aboard the vessel. A review of the annual support figures will be made annually and adjusted, if necessary, to reflect the latest operational costs.

In return for our annual operational support, we shall receive:

1. __________ days of sea time per annum aboard the coastal zone research vessel to serve the at-sea needs of the educational and/or research programs of our institution.

2. The opportunity to lease one of the portable laboratory vans which accompany this vessel and the scientific make-up areas for $50 / day.

3. Primary opportunity to lease any available vessel time beyond its annual commitments to the University of Delaware programs and guaranteed days to other member institutions.

4. Membership in the Regional Scheduling Board to coordinate the use of members' blocks of time.

____

For The University Of ____________

COSTS AND PLANS

Based upon preliminary estimates of labor rates, fuel costs and other economic factors, Table 1 represents our best estimate, at this time, of the daily costs for the operation of this vessel.

An initial contribution will guarantee the member institution 5 days minimum of ship time within the first year of participation. Up to 5 additional days may be guaranteed at the same rate if included in the annual membership contribution. Expendables will be billed to the member institution upon completion of each of their trips to sea during the year. The cost for expendables will vary by distance the vessel traveled and its speed plus number of people on board for the cruise (food costs).

Funds for a member institution's participation in this program may come from one of two possible sources or any combination thereof. The first source is a direct contribution from the institution's own budget for educational or research programs.

The second source is from an outside funding agency, such as NSF or ONR, which is funding a research program at that institution which involves work at sea. In this case, the funds could come directly from the funding agency to the University of Delaware or indirectly through the member institution. These outside funds would have to be at the full 100% lease rate for the vessel and not at the member's reduced rate.

Table 1

COSTS PER ANNUM - FIRST YEAR OF OPERATION

Fixed Costs	
Salaries & Wages	$108,625
Overhead (20% of Sal.)	21,725
Insurance	45,000
Depreciation	97,307
Maintenance	26,643
Stores & Minor Equipment	6,500
Utilities	6,200
Total Fixed Cost	$312,000
Divided By 260 Days	
Fixed Cost Per Day	$ 1,200
Expendables - Approximate Daily Values	
Fuel & Food	$ 360
Food	90
	$ 450[1]
Fixed Cost To Member Institution At 90%:	$ 1,080/day
Minimum Contribution (5 Guaranteed Days):	$ 5,400

[1] Expendables will vary from trip to trip depending upon how far and how fast the vessel goes and how many people are on board. Food costs are computed at $5/man/day. Fuel costs are based upon $.40/gal. and .45 lbs fuel burned/ship hr. Ten hours running at top speed would cost $604. Fuel rates per day can vary from $200 to $800 depending on mileage and speed. Food will vary from about $40/day (crew plus 2 scientists) to $90/day (crew plus 12 scientists).

UNOLS[1], NECCRF[2] AND
A PROPOSED REGIONAL SHIP

PREPARED FOR THE NEERS[3] MEETING, WOODS HOLE, MAY 1974

[1]University National Oceanographic Laboratory System

[2]New England Cooperative Coastal Research Facility

[3]New England Estuarine Research Society

1. <u>BACKGROUND:</u> UNOLS Recommendations

The need for coastal zone research vessels to meet the needs of academic research institutions was raised at the first UNOLS Meeting in November 1971 at La Jolla, California. Such vessels, it was envisioned, should be more capable than those presently used in the growing efforts of institutions responding to the existing and documented needs of coastal zone research. At subsequent meetings the UNOLS Advisory Council directed that a working group be formed to examine the needs for coastal zone research facilities, and ships in particular, and to develop a plan to implement those needs.

The working group thus formed considered that the recommendations should be directed principally to academic research needs, both basic and applied, including the role played by graduate research. Emphasis was placed on multi-institutional operational arrangements. The group compiled and reviewed a series of federal, regional and industry reports on the problems and needs for coastal zone research disciplines. A synopsis of requirements was included in its report along with a comprehensive bibliography. There were five major conclusions:

a. That capable multi-purpose ships are a fundamental need for coastal research.

b. That interest of the scientific and regional community, within given geographical regions, can best be served by a multi-institutional, cooperative ship facility.

c. That a Coastal Facility should include more than ships and dockside facilities. There must be an inventory of basic instruments and facilities for calibration and repair, as well as data processing. Furthermore there is a need to consider specialized coastal facilities such as coastal drilling rigs, habitats, submersibles, and even large, low-cost mobile barges.

d. That the acquisition of, and support for, regional cooperative coastal research vessel systems should be assigned a singularly high priority; and that funding for the support and operation of Cooperative Regional Research Facilities be developed taking into consideration the obligations Federal, State and Regional Agencies which have responsibilities and needs to support Coastal Zone Research.

e. That the scheduling and use of a Cooperative Coastal Research Facility be controlled by a regional organization. Facility use should be awarded on the basis of regional needs and scientific merit.

It was felt that in each geographic region the community of research users should be represented by a regional organization which would seek to identify the regional research requirements and develop a plan for the acquisition and operation of regional facilities. A regional policy group should determine overall scheduling policies based on regional needs and/or scientific merit. Direct operations and maintenance would be assigned to a participating institution or institutions within the region. Suggested regions were New England (Maine to Block Island), Mid-Atlantic (Block Island to Cape Hatteras), Southeast (Cape Hatteras to Florida), Gulf of Mexico, Great Lakes, Pacific Southwest and the Pacific Northwest.

2. NECCRF

The NECCRF Advisory Group was formed in June 1972 for the purpose of responding to the UNOLS recommendation. New England educational and non-commercial laboratories engaged in marine research as well as several regional government agencies were invited to participate. Twenty institutions expressed an interest in NECCRF. Twelve of this number appointed representatives to the NECCRF Advisory Group. They are listed in Table 1. Figure 1 shows the region.

We emphasize that NECCRF is open to any additional members who may wish to join in the future, and use of the ship would be open to anyone interested in research in the New England Coastal Zone. The Advisory Group submitted a proposal to the National Science Foundation in 1973 calling for construction of a 125-foot oceanographic research ship with associated shore facilities to be used on a cooperative basis to help meet the coastal seagoing research needs of all scientists and ocean engineers interested in the region. Cost of the ship is estimated at $1,136,000.

The objective is to develop a complete facility for research in coastal waters so that a scientist need provide only his own specialized equipment. The ship would be equipped with the fundamental navigation and data-gathering instruments that are in general demand. Deck and laboratory space would be provided for portable vans with more sophisticated gear. Technicians would be available to keep the gear operative and to oversee its use at sea; they would also be responsible for routine data processing and keeping cruise records. Shore facilities would include a home port with docking facilities, adequate utilities, convenient access to fuel and supplies, space for storage and maintenance of equipment and an office for the operation manager.

Operation would normally be in the Gulf of Maine and on the Continental Shelf and Slope between Montauk Point and Cape Sable, but no fixed geographical limits would be imposed. Users would be chosen, on the basis of scientific merit and regional coastal zone needs, by an advisory panel elected by NECCRF members.

Ship design and construction costs would be funded by the National Science Foundation. The design would be undertaken by a capable naval architectural firm in consultation with NECCRF and NSF representatives. Operating costs would be divided between the individual projects of the users and a form of multi-agency block funding. Under this arrangement, at least half of the total cost would be

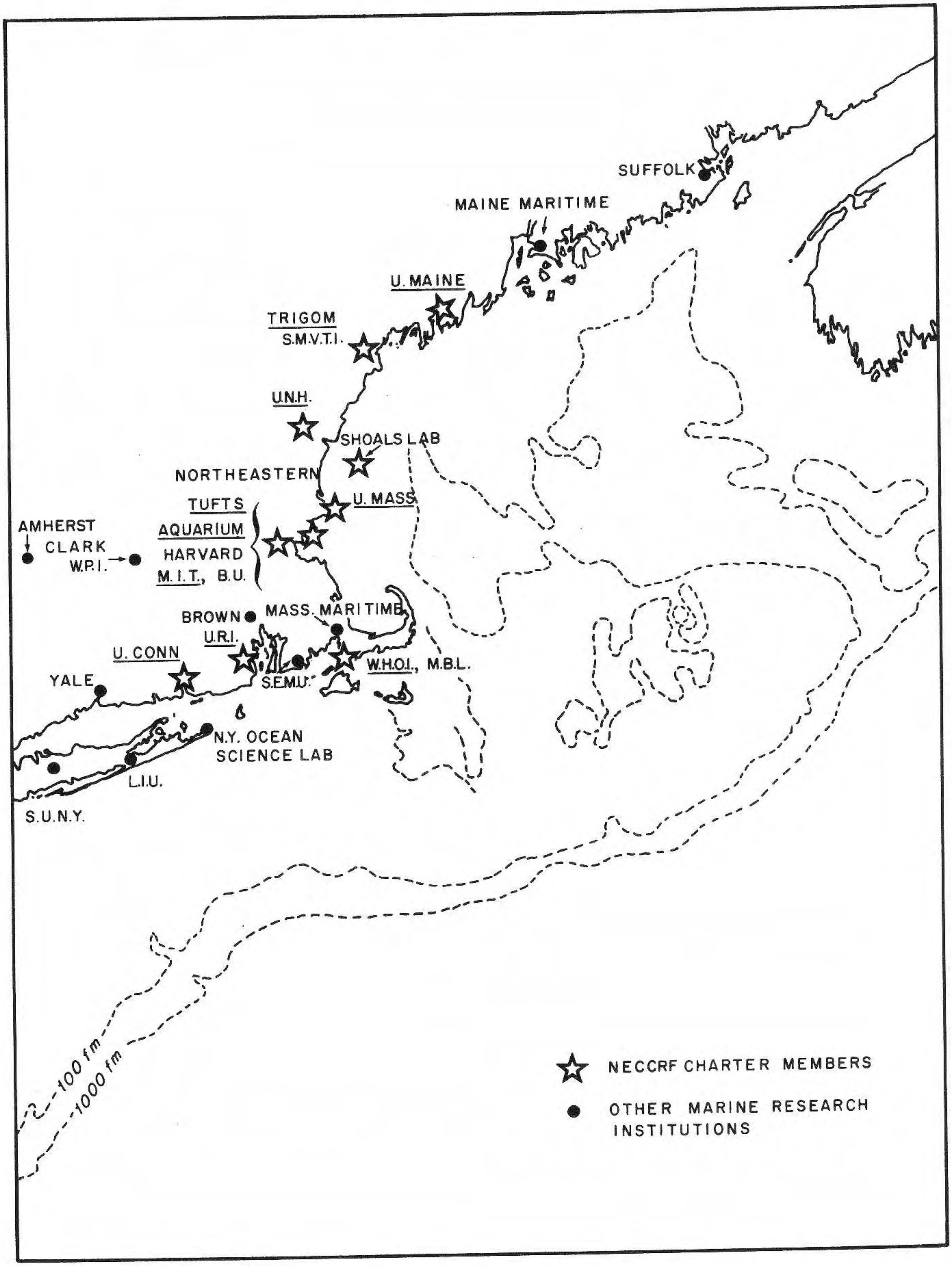


FIGURE 1. New England Coastal Region

TABLE 1

NECCRF CHARTER MEMBERS

INSTITUTION	REPRESENTATIVE
Massachusetts Institute of Technology	Dr. Erik Mollo-Christensen
New England Acquarium	Dr. Guy McLeod
Northeastern University	Dr. Nathan W. Riser
TRIGOM	Dr. Donald Horton
Tufts University	Dr. Chester Roys
University of Connecticut	Dr. Peter Dehlinger
University of Maine	Dr. Bernard J. McAlice
University of Massachusetts	Dr. Edward S. Gilfillan III
University of New Hampshire	Prof. E. Eugene Allmendinger
University of Rhode Island	Dr. Scott Nixon
Woods Hole Oceanographic Institution	Dr. W. R. Wright
Shoals Marine Laboratory	Dr. John M. Kingsbury

block funded by NSF and other federal, regional and state agencies with an interest in New England coastal waters. This would reduce the daily cost to users and would also provide a capability to investigate special situations such as an oil spill or to accommodate occasional unfunded proposals of special merit.

The Advisory Group feels that NECCRF could fulfill a number of roles in addition to managing a much needed coastal research facility. It could serve to coordinate the research needs of academic institutions with these of government agencies. It could provide a forum in which all interested parties could address matters of concern about the marine environment of the region. Perhaps more important, it could function as a kind of "mini-UNOLS" to help make more efficient use of existing coastal research vessels in New England. The accompanying directory is a step in that direction.

3. PROPOSED SHIP

The general specifications for the proposed ship were based on consideration of the special characteristics of the New England region itself, the research needs of marine scientists in the region as expressed in a widely-circulated questionnaire, and the existing academic research fleet.

The New England coastal region is a large area, comprising two distinct physiographic regimes - the Gulf of Maine and a portion of the Middle Atlantic Bight - with strong seasonal contrasts in the marine environment. It is also a region plagued by hazards such as winter gales, summer fog, autumn hurricanes and year-round heavy traffic. Finally, it is an area of critical importance in the development of marine resources, both biological and mineral.

Research needs of the region can be categorized as "inshore" and "offshore" needs. Inshore needs involve the problems of the shoreline itself and the estuaries and sounds along the coast, while offshore needs concern more remote waters, out to the edge of the continental shelf and occasionally beyond. Most of the research activities associated with inshore needs of New England can be adequately served by the existing fleet of small vessels, except for weather limitations. However, most offshore coastal research requires the capabilities of a vessel which, at present, is not available in New England.

New England has a long standing tradition of research into all aspects of the ocean, and many of the pioneering oceanographic expeditions set out from New England ports. Coupled with this is a reputation of even longer duration as one of the world's great centers of advanced learning. Increasingly in recent years, even these institutions that are located inland, miles from the sea, have been turning their attention to the sea and its problems, and have been developing laboratory facilities for marine studies.

Under the circumstances it is paradoxical that a relatively small fraction of the marine research in New England has been directed at the waters of the Gulf of Maine and the Continental Shelf south of Cape Cod. Most of the research at sea has been done in local near-shore waters - estuaries, harbors, and beaches - or in the deep ocean beyond the edge of the shelf. To find a comprehensive discussion of the hydrography of the Gulf of Maine or the Middle Atlantic Bight, for example, one has to go back to the works of Bigelow and his associates early in this century.

This situation is reflected in the existing fleet at academic institutions in New England, which can be divided into three categories:

1. Universities with ample laboratory facilities ashore but no seagoing capability. Marine Scientists at these institutions have used EASTWARD or PANULIRUS or various "piggy-back" arrangements, so that much of their research is remote from New England.

2. Universities, marine laboratories and state agencies with vessels less that 65-feet long and severely handicapped for regional purposes because of limitations in range, seakeeping ability and scientific payload.

3. Two major marine laboratories - U.R.I. and W.H.O.I. - with large and capable deepsea ships. These ships are scheduled up to two years in advance and are usually committed to the deep ocean, often being away from home for months at a time. Neither of the big laboratories has a suitable vessel which can be committed to coastal research. Even if the bigger ships were available, their use in local waters could not be justified economically.

In short, the existing research fleet in New England consists of vessels which are either too small or too large for regional coastal investigations. Nevertheless it appears that a substantial demand exists for a vessel of intermediate size. Questionnaires returned by individual scientists at the 12 NECCRF charter member institutions along showed requirements adding up to more than 100 weeks of use per year.

The characteristics of such a ship, again based on the questionnaires, are:

1. The ship should be sufficiently versatile to serve as a platform for a wide variety of scientific and engineering coastal research activities.

2. Its design should be conventional and based on propulsion and sea-keeping characteristics which have been proven by operation in New England coastal waters during all seasons of the year.

3. The sustained speed and range should be sufficient to permit working at the edge of the continental shelf for several days at a time, without sacrificing efficient fuel consumption.

4. The arrangements should provide adequate deck space for at least one portable van without unduly cramping the open working area, and enclosed space for "fixed" laboratories, galley, and accommodations for scientific party and crew.

5. All aspects of the design should feature simplicity in the interests of a) promoting adaptability and b) minimizing both construction cost and operating costs associated with crew size, maintenance and repair. More specific characteristics are given in Table 2. Figure 2 is a conceptual sketch of the proposed vessel.

It has been estimated that the annual operating cost would be about $350,000, figuring about 240 days at sea. Cost to the user should be about $700 per day.

The ship would be operated and proposals for use would be evaluated by an elected council representing the participating research institutions. The home port would be selected, with the aid of NSF, on the basis of location and cost.

Such an arrangement would spread the cost among those who stand to gain most from the results, make the vessel available to any investigator with interest in New England waters, and at the same time guarantee high quality research.

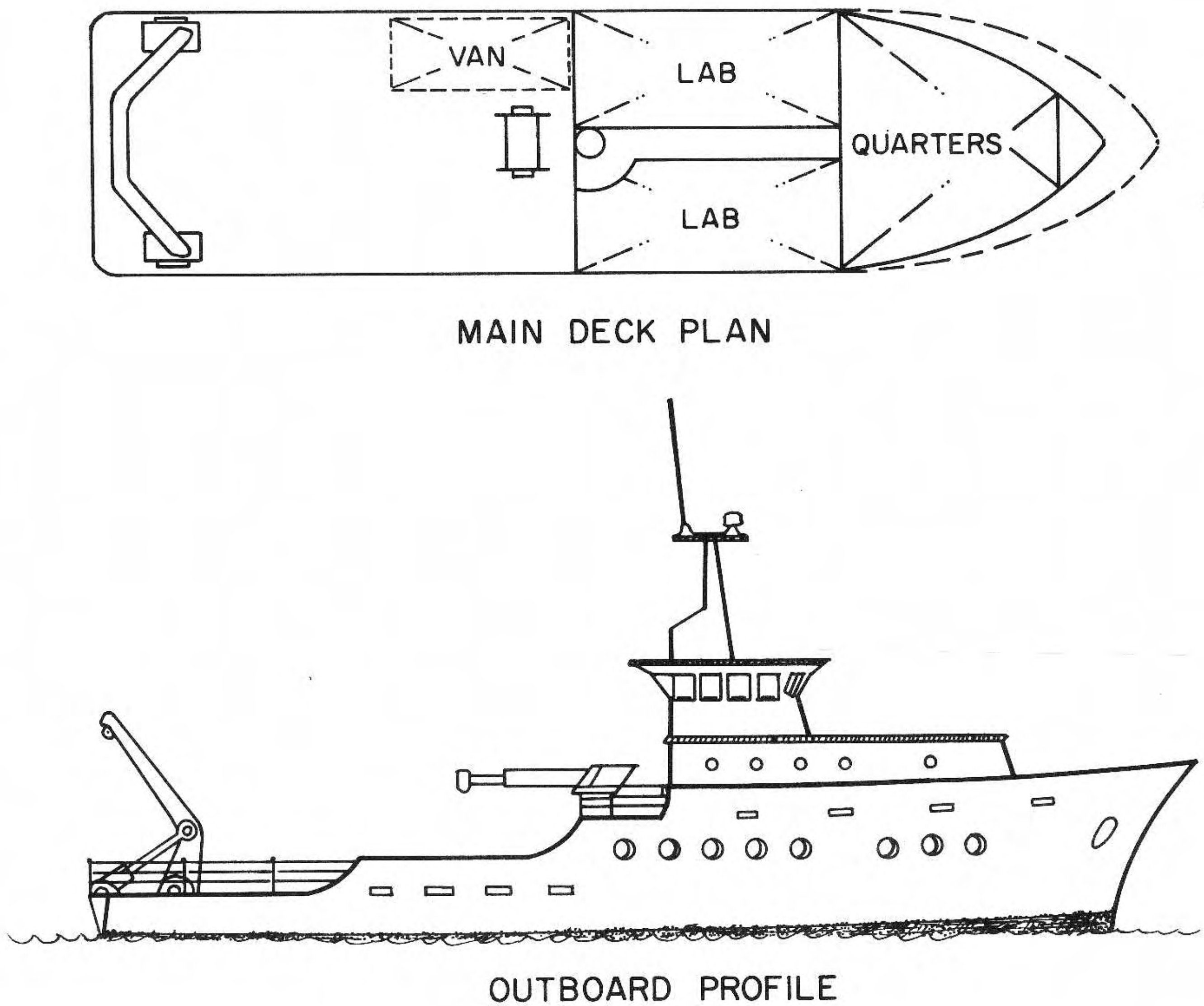


FIGURE 2 - CONCEPTUAL SKETCH OF NECCRF SHIP

TABLE 2

NECCRF SHIP - PRINCIPAL CHARACTERISTICS

Length Overall (LOA)	125 ft.
Beam (B)	30 ft.
Draft (H)	10 ft.
Depth to working deck (D)	14 ft.
Displacement - full load (Δ_F)	425 L. tons
Registered Gross Tonnage (RGT)	$<$ 300
Speed - max. cruising (Vm)	12 knots
slow (Vs)	0 to 5 knots
Shaft Horespower - normal @ Vm (SHP_N)	1200
Open deck area (Ao)	1650 ft^2
Research Personnel (R)	10
Crew (C)	8
R/C ratio	1.25

BERMUDA BIOLOGICAL STATION FOR RESEARCH
Incorporated in the State of New York, U.S.A., 1926

29th November, 1974.

Capt. R. P. Dinsmore,
Secretary, UNOLS,
Woods Hole Oceanographic Inst.,
Woods Hole,
Mass. 02543, USA.

Dear Bob:

Please find enclosed a list of those persons and projects who have used the "Panulirus II" under GD-38933. As I pointed out to Ms. Johrde in previous letters (copies enclosed), response to the grant is slow in coming, but has been picking up during recent months. I was especially pleased to find Dr. Bé very enthusiastic about the potential for a long-term project on culturing of planktonic organisms, as his project would take best advantage of the close association between a shore-based lab. and an open ocean facility which BBS and the "P.II" represent.

I am very hopeful that NSF will continue to support the "Panulirus II", and thank you for all the support you are giving us.

Sincerely yours,

W. E. Sterrer, Ph.D.
Director.

Enc.

St. George's West, Bermuda
Telephone — Bermuda 7-1880 • Cable Address — "Biostation, Bermuda"

BERMUDA BIOLOGICAL STATION FOR RESEARCH

Incorporated in the State of New York, U.S.A., 1926

"PANULIRUS II" USE UNDER UNOLS
TO NOVEMBER 27, 1974

1.	Georges Merinfeld, Institute of Oceanography, Dalhousie University, Halifax, Nova Scotia. Study of vertical migration of Acantharia. (No NSF Grant)	4½ days September 18, 21, 24, 27, 28, 30, 1973.
2.	H. T. Rossby and D. R. Watts, Yale University, New Haven, Connecticut. Testing of Inverted Echo Sounder. (NSF Grant GX-30416)	2 days April 22, 29, 1974.
3.	Robert Summers, Department of Zoology, University of Maine, Orono, Maine. Collection of Leptocephalus larvae of American eel. (NSF Grant GB-34211)	2 days July 31, Aug. 1, 1974.
4.	R. Tucker Abbott, Delaware Museum of Natural History, Greenville, Delaware. Trapping of deep-sea Mollusca (No NSF Grant)	3 days Sept. 22, 24, 26, 28, 29, 1974.
5.	Allan Bé, Lamont-Doherty Geological Observatory, Columbia Univ., Palisades, New York. Collection of pelagic foraminifera for laboratory culturing. (Exploratory for proposal to be submitted to NSF)	2 days November 27, 28, 1974.
	TOTAL	13½ days

16th July, 1974.

Dr. M. K. Johrde,
National & International Programs,
Office for Oceanographic Facilities & Support,
National Science Foundation,
Washington, D.C. 20550,
U.S.A.

Dear Dr. Johrde:

ref: GD-38933 and GD-38934

Thank you for your prompt attention to our new proposal for ship operations support. I hope the following will answer the questions you have raised in your letter of July 2nd, 1974.

1) On the question of starting dates for the new grant, we chose January 1, 1975 simply to synchronize the grant with our fiscal year, as we found this advantageous while compiling the recent proposal. We did not anticipate any inconvenience resulting from this short overlap; however, the starting date could, of course, be postponed to March 1, 1975, without any problem.

2) As stated in previous correspondence, we anticipate increased use of ship time by projects qualifying under the terms of the grant starting this fall. Preliminary requests have been received from Dr. P. Wiebe, WHOI (sedimentation), Dr. R. Tucker Abbott, Delaware Museum (deep-sea mollusks), Dr. R. R. Colwell, University of Maryland (deep-sea microbiology), and further information has been sent out on several more enquiries.

The present balance of the grant is $17,186.38; although we anticipate spending the balance before February 28, 1975, it is difficult to make definite statements given such imponderables as changes in cruise plans, inclement weather, etc., and we may very well have to revise our optimistic predictions later in the year.

/cont'd...

Dr. M. K. Johrde. 15th July, 1974.

As stated previously, we have been frankly disappointed in the apparent lack of interest in this unique opportunity. Perhaps one drawback in the use of the "P.II" is the lack of a ready source of support for related expenditures such as air-fare to and from Bermuda, and the use of shore facilities, including room and board which, im the case of most oceanographic ships - are included in the ship operations cost. It seems likely that the advantage of short-term availability and scheduling of the "P.II" is offset by the time necessary to secure additional funds for these expenditures.

3) With regard to Mr. Merenfeld's "student cruise", I am not quite clear whether the policy against such use of ship time under the grant was in effect as such when this ship-time was assigned, and expenditure would therefore not be alloweable, or whether you wanted to point out to me that this was a more recent decision that will have to be observed as of now.

4) With regard to grant GD-38934 for shipboard equipment, I wish to apologize for any mistake I may have made in interpreting the regulations regarding administration of the grant, especially of what is considered "significant departures" from the budget. In comparing the approved budget with our actual expenditures to date, I find that the following minor items have not been specifically approved: binoculars ($39.00; a standard shipboard item); bilge pumps ($102.92; hand-operated, as a safety measure in case of electrical failure); volt-ohmmeter ($43.50; to maintain the cathodic protection set-up for the hull); new cables for meter wheel ($247.20; to ensure adequate control over engine performance); and a dry-ice machine ($160.00; to provide quick refrigeration of mostly biological samples). Even if the fiberglass dinghy ($400; used during cruises, e.g. for work in conjunction with moored buoys) which is stored on the deck and could come under II/4 of the budget (deck equipment) is added to this list, the total is no more than $992.62 or about 5% of the total grant. May I herewith request permission for the expenditures as outlined and justified above.

5) The current balance of GD-38933 is $8,523.85; it will be spent in the following way:

Dredging and hydrowire	$1,500
Freight of above, approx.	$ 500
Modifications to winch and cherry picker	$3,000

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Dr. M. K. Johrde. 15th July, 1974.

Sample refrigerators	$ 900
Collecting equipment	$2,300
Freight and minor items	$ 323.85
	$8,523.85

The items under "collecting equipment" are being implemented slowly as we are awaiting feed-back from users, and also wish to retain a cushion for replacement of equipment (and possibly wire) lost during operation. We anticipate spending the balance of this grant concurrently with that of the operations grant, i.e. by the end of February, 1975. May I herewith request an extension of the original grant expiration (October 31, 1974) to that date.

Again, the overlap in GD-38934 and our renewal proposal (requested starting date: September 1, 1974) is explained by the fact that some of the equipment requested is urgently needed and should, in the case the grant is made, not have to await closing out of the previous balance.

It is my hope that the above information answers your queries and will meet with your approval. Please do not hesitate to contact me again should I have left one or more points insufficiently clarified.

Sincerely yours,

W. E. Sterrer, Ph.D.,
Director.