UNIVERSITY - NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

UNOLS

FLEET IMPROVEMENT COMMITTEE

MEETING SUMMARY REPORT

November 6-7, 1997

NOAA Pacific Marine Center, 2nd Floor
1801 Fairview Drive, E
Seattle, Washington 98109

Meeting Report
UNOLS
FLEET IMPROVEMENT COMMITTEE

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November 6, 1997

Opening Remarks The UNOLS Fleet Improvement Committee (FIC) met in the conference room of NOAA's Pacific Marine Center (PMC), Seattle, WA on 6-7 November 1997. The committee was welcomed to PMC by Captain Taguchi. LCMD John Herring, also of PMC, followed with meeting logistics of the facility and a report on NOAA ship activities.

Larry Atkinson, FIC Chair, opened the meeting by reviewing the Agenda, ***Appendix I***. These minutes reflect the order in which agenda items were addressed. Meeting participants are listed in ***Appendix II***.

Accept Minutes - The FIC minutes from the December 1996 meeting were accepted as written.

UNOLS Report - Ken Johnson, UNOLS Chair, provided the UNOLS Report. Ken presented a table and graph, ***Appendix III***, reflecting the NSF Ocean Science's funding in 1987 and 1996. Science funding increased by 81% while ship operations increased by only 11%. During this period the ship operating days have remained constant.

Ken reviewed the 1998 ship use and cost figures. The 1998 total ship time is down significantly from past years. Ken noted that these totals include the NAVO ship time. In 1998 the large and intermediate ships are under-utilized while the smaller, Class IV vessel ship day totals are remaining constant and the Class < IV are at record capacity. He encouraged the FIC to look at platform characteristics needed for fisheries research vessels. By incorporating these additional features into the intermediate general-purpose class, we may be able to increase our future user base.

Ken questioned if there are any large field programs on the horizon and suggested a need to examine future facility needs. He suggested that today we are running a bigger, better fleet for less money. NSF has been budgeting approximately $32M annually for facilities. This is the first year that they will not be using the entire budget for fleet operations.

Ken continued his discussion by talking about the perception of UNOLS and FIC in the community. Attendance at the UNOLS Annual Meeting was low this year. Ken is in the process of polling members to see why they did not attend. It was recommended that increased outreach is needed between UNOLS and the community. Many people in the community don't know the role and purpose of UNOLS. There are many misconceptions about UNOLS. A town meeting is planned for UNOLS at the 1998 Ocean Sciences meeting in San Diego.

Long-Term FIC Agenda - Larry began this discussion by reading the "purpose of FIC" from the UNOLS Charter. He stated that before the end of the meeting he would like to have a written list of the items that the FIC needs to address in the upcoming years. Some of the items that will need to be addressed include: an updated Fleet Improvement Plan, fisheries Vessel issues, Central Pacific SWATH planning, coastal research vessel design; and an analysis of trends. Considerable discussion revolved around these topics. In particular, the committee discussed fishery vessel plans. Jim CEO, NMFS, stated that NOAA needs to meet their fishery mandates. FIC will need to determine if it is feasible to design a general-purpose oceanographic vessel with a fisheries capability. Additionally, they will need to determine if ship can be economical to both operate and build. A fisheries vessel should be acoustically quiet. It will need to be determined if fisheries work can be conducted from a deck 20-feet above the water surface and if equipment will need to be modified to accommodate fishery programs.

The FIC discussed the fleet planning process. The first step in planning for fleet additions is the development of science mission requirements (SMR) by FIC and/or a subcommittee of the group. Next a concept design is developed based on the SMRs. This is normally tasked to Naval Architecture firm. Following acceptance of the concept design, a preliminary design for the planned vessel is developed by the naval architect. FIC interacts with the architect through both of these phases. These reports have proven to be a valuable reference tool for agencies and the community.

The first item in the long range FIC plan is updating the Fleet Improvement Plan. Ken Johnson explained that this has historically been an influential document. There was

discussion on how to approach the real political realities when developing the new plan. It was suggested to acknowledge the political realities and yet look at the trends in use and cost effectiveness of fleet utilization. The FIC needs to identify new proactive and responsive issues.

Presentation by The Glosten Associates, Inc. - Bill Hurley and Duane Laible of Glosten provided a presentation on "Planning Considerations for a New Research Vessel." A sequence of view graphs were presented and are included as ***Appendix IV***. Glosten studied the impact of new regulations on new ship construction. They also looked into the present information on current shipbuilding technology. They studied the pros and cons of various ship procurement methods.

Bill Hurley explained that the regulatory changes studies include the new admeasurement rules, International Maritime Organization (IMO) rules and International Safety Management Code (ISM) requirements. These changes were primarily in response to recent marine disasters involving passenger ships. Implementation of the new rules is rather confusing as a result of two different tonnage measurement systems (domestic and international) and the involvement of multiple rulemakers (IMO, USCG and ABS). First you need to determine which tonnage measurement system applies to your vessel and then determine the which regulations will be associated with these measurements. Bill explained the different measurement systems and provided tables showing the applicable rules associated with the measurements.

These new requirements will most likely require new ships of the intermediate size to be subject to all international regulations. Bill provided a listing of some of the specific regulatory impacts required by SOLAS, ISM, GMDSS MARPOL, STCW and ABS along with their associated costs. Bill pointed out that the new regulations do not require increased manning. In fact, crew on the new vessels could be fewer than on current vessels due to automation and training. Operators would need to negotiate with the USCG on manning requirements.

In total, approximately $800K will be added to the construction cost of a new intermediate vessel to comply with the new regulations. Glosten estimates that replacement costs for a new intermediate research vessel to be approximately $18M. The relative cost impact of the regulations on a new vessel is minor at about 4% of the entire construction cost. Bill provided a breakdown of the new construction cost allocation.

In Glosten's closing remarks they recommended FIC to embrace SOLAS and re-assess manning requirements. The new regulations will foster greater safety at sea. Currently, the medium sized shipyards dominate shipbuilding activity. Many of these yards are implementing new technology in building. Glosten recommended that it is best to purchase an existing stock design when constructing a new vessel, then define the ship needed.

Lastly, it was noted that it will be very difficult, if not impossible to modify existing ships to meet the new regulations. The changes would be extremely costly. A final report from Glosten should be available soon.

NOAA Fisheries Oceanography/Stock Assessment Needs -

FIC Tasking Summary - Ken Johnson opened the discussion on fisheries oceanography needs. NOAA/OAR and UNOLS have recently signed a Memorandum of Understanding (MOU) for increased cooperation. As part of this MOU, NOAA's newest vessel will be included in the UNOLS ship scheduling process. Over the past year, UNOLS has been communicating with NOAA's NMFS to learn more about their fishery research needs. At the summer Council meeting, Jim Meehan and Jim Coe of NMFS presented NOAA's fishery plans and needs. Ken tasked FIC to determine if it is feasible to integrate a fisheries capability into a general-purpose oceanographic research ship. Also, we should try to determine what NOAA's fisheries research needs for chartering will be in the future.

NOAA/National Marine Fisheries Service Update - Jim Coe from NOAA/NMFS explained their requirements for ship time. NMFS by mandate under the Magnson/Stevens Act has a need for approximately 5000 days at sea of ship time per year with approximately 2,655 for charter. Fishing boats have been used to fulfill some of their charter work which includes stock assessment and gear development. NMFS will be looking for platforms for marine mammal ice surveys and studying ecosystems.

Jim described some of the ship requirements they will be looking for in a fisheries vessel. NMFS is looking for ships that are acoustically quiet. They must be able to pull trawls and be capable of low speed accurate positioning. The ships used for observations should be stable and fast. New ships brought into the process for fish stock assessment should be properly calibrated.

NOAA's fleet is aging and rapidly becoming technically obsolete. The rationale for quiet ships is that noisy ships tend to herd fish and bias the collected data. NOAA requires modern Fisheries Research Vessels (FRVs) to meet their needs. There are no modern FRVs in the U.S. either private, academic, or within NOAA. In assessing ships currently available, including UNOLS vessels, they have found them inadequate in quietness, hydroacoustics, trawling and other gear, marine mammal observation capabilities, and in some cases endurance and dynamic positioning. For new ship design, stability is only second to acoustic quietness as design criteria. If there was a new, acoustically quiet, UNOLS ship available, NOAA would most likely be interested in a long-term charter arrangement. However, it was noted that NMFS' chartering budget is limited.

The 1998 budget presently includes $2.1M for design work on a new class of fisheries research vessels. NOAA is hopeful that the FY99 budget will include construction funds. If built, three FRVs will be assigned to the Atlantic and three to the Pacific. These six FRVs will be fully subscribed by NOAA. The new ships planned will be about 65 meters and are expected to cost $46-50M each.

General discussion followed on the appropriateness of UNOLS to become involved in fisheries research. It was questioned whether a fisheries vessel is a tool that academic scientists need. Can a general-purpose capability be maintained and include a fisheries capability? It was noted that the acoustic characteristics associated with a fisheries vessel will also be of benefit to other disciplinary research.

ALPHA HELIX Replacement - Tom Weingartner reported on the University of Alaska's plans for a replacement of their vessel ALPHA HELIX which is 30 years old. U. Alaska is focusing on a replacement vessel that would have both oceanographic and fisheries research capabilities. The ship is expected to be intermediate in size and be ice capable for work in the marginal ice zone. University of Alaska has been in communications with NOAA regarding their platform needs. Alaska's ship would be available for both academic and NOAA fisheries research but would not be considered a replacement for a fish assessment vessel for NOAA. By adding a fisheries capability, the vessel will be more capable for a larger user base.

It was recommended that FIC establish an ad hoc committee to develop SMRs for an ALPHA HELIX replacement. Membership to the committee should include representatives with a strong fisheries background, oceanographers, a regional perspective and FIC. The specific tasking statement to the subcommittee is to develop Science Mission Requirements for a fisheries capable, general-purpose oceanographic research vessel for replacement of ALPHA HELIX. The vessel will require ice strengthening for work in the Alaska region. The vessel should be constrained to Class II/III size and should be economically operational. Larry Atkinson and Tom Weingartner will suggest nominations for the ad hoc committee. The meeting participants suggested names of possible candidates. Tom Weingartner agreed to chair the subcommittee. The subcommittee will correspond by e-mail initially. The SMR development effort was estimated to take approximately six months. The group should identify what the trade-off will be in incorporating a fisheries capability into a general-purpose oceanographic vessel. Joe Coburn agreed to assist the subcommittee by providing iterative reviews of their SMR development. He also offered to provide Tom with the current definitions of ice strengthening.

Long Term Agenda Items - The FIC revisited the discussion on long-term agenda items for FIC. It was suggested a that a spreadsheet providing the fleet characteristics would be a useful reference tool for the FIC. It was requested that the UNOLS Office compile this spreadsheet.

The FIC then reviewed a list of potential long-term agenda items:

- Updating the Fleet Improvement Plan (FIP)
- Coastal Research Vessel planning
- Analysis of fleet trends - and distribution of this information to the community through various outreach methods (town meeting)
- SMR development for an ALPHA HELIX replacement.

- Identification of critical fleet issues
- Investigation of fishery vessel needs
- Central Pacific R/V planning
- Identify new proactive and responsive issues
- Planning, analysis and communication

Annette DeSilva provided an example of ship utilization information that can be provided by the UNOLS Office for use in working on the long term items, see ***Appendix V***. The charts show the ship days by year for each Class III and IV vessel for 1993 through 1998. A full operating year for Class III ships is considered 250 days. It was noted that for most Class III vessels operations have been at less than full levels for the past five years. The FIC indicated that this type of information was useful and would be helpful as they address their long-term tasks.

The FIC briefly discussed some of the components that would be important in the update of the FIP. These included cycles for replacement and renovation, a narrative of the present fleet situation and a description of specialized facilities and technologies available.

The FIC identified a schedule in which they would like to complete the various long-term agenda items:

In the next one to two years, they would like to address the following items:

- Alaska vessel planning
- Central Pacific research vessel planning
- Fisheries R/V planning
- Coastal R/V
- Considerations for MELVILLE/KNORR replacement
- Fleet Improvement Plan update - 1999 distribution.

November 7, 1997

Replacement Plans for the OCEANUS Class - Ken Johnson set the stage for a discussion on the replacement of the OCEANUS class intermediate ships by presenting a viewgraph showing the estimated useful life projections of the UNOLS vessels, see ***Appendix VI***. The OCEANUS Class ships are over twenty years old suggesting their replacement should be within the next eight to ten years. Science Mission Requirements will need to be developed. As we look towards replacement, we should consider enhancement to make the vessels more capable while maintaining the general-purpose capability. Some of the enhancements might include fisheries capabilities and or coastal research features. Acoustic issues should be considered. Added features have the benefit of increasing the potential user base for the vessels. Intermediate ships fill a niche of being less expensive than the world ranging Class I and II vessels, yet have significant capabilities for large science parties and multiple disciplines.

In planning for the replacement of the Class III ships, it was recommended to use the existing SMRs for this vessel as a baseline for developing a new one. It was discussed whether there may be interest from "other" agencies for use and construction support of these vessel. Other agencies might include MMS, USGS and EPA.

The FIC needs to look at the future research needs for intermediates. Coastal zones are becoming increasingly more important. Other features which may be attractive for an intermediate vessel (depending on where the vessel will operate) might include: seakindliness, ice strengthening, and acoustic quieting. A comparison chart of the trade-offs of these features along with cost impact would be useful. Arrangement of the afterdeck can be challenging when trying to accommodate fisheries requirements. Acoustic quieting will also be challenging.

It was decided to postpone development of SMRs for the intermediate vessels until the SMR for the ALPHA HELIX replacement is completed. The Alaska vessel will most likely address many of the components identified; such as, general-purpose capability, fisheries capabilities, acoustically quiet, coastal capability and ice strengthening. The Alaska vessel SMRs may serve as a useful tool in planning for the replacement of the intermediate ships.

Coastal Research Vessel Planning - FIC discussed the need for a subcommittee to develop SMRs for coastal research vessels. Initially it was thought that regional consortia would organize working groups and develop SMRs for their specific needs. For a variety of reasons this is not happening. It was the consensus of the meeting participants that FIC should take the responsibility. Attractive features of a coastal vessel would be the ability to work in the coastal zone in rough seas and carry twenty people. It was decided that a subcommittee be established to develop SMRs for a coastal vessel. Various names were suggested as possible members of the subcommittee. Larry Atkinson agreed to serve as chair and will contact the potential candidates for the subcommittee.

Replacement Plans for Skidaway's Vessel, BLUE FIN - The FIC took some time to look over plans for replacement of Skidaway's vessel, BLUE FIN. Skidaway will soon let a contract for a new research vessel to be named R/V SAVANNAH that will replace BLUE FIN. Construction should start late this year (1997). The ship will be a conventional design mono-hull with a length of 91 feet. The design was driven by it planned mission as a "coastal ship" for waters off Georgia. A range of 350-miles is planned. The construction phase should take nine to 11 months with an additional three to four months for outfitting. Construction costs are estimated at $3M. The BLUE FIN will be put up for sale as SAVANNAH comes on-line. No action is needed by FIC on this activity.

AGOR 26 Report - Pat Dennis provided a report on the progress with institution selection, yard selection, design and construction of AGOR 26. Over the past year, the Navy has been determining the appropriate procurement process for the vessel. The funds for this ship were included in the Navy's 1997 budget. The appropriation of $45M was

designated as Ship Construction Navy (SCN) funds which did not allow funding for design efforts. The funds are being moved from SCN funds into Research and Development (R &D) which will allow for design expenditures.

NAVSEA has published, through the Commerce Business Daily, an Announcement for Operator Selection of AGOR 26 (***Appendix VII***). This announcement asks for institutions interested in operating this ship to request an RFP by 17 October 1997. RFPs are to be submitted by interested operators by mid December. A selection panel will be convened in January 1998 for selecting the operating institution. The institution will be required to bring contributions and support for the new vessel. In particular they must give up a Class I or II vessel; they must provide cost sharing; they must provide full time technical assistance to Navy during the design and construction phase of this ship; and they must complete the final outfitting of the vessel.

In another Commerce Business Daily Notice, NAVSEA has published a solicitation for design and construction of a developmental SWATH oceanographic research vessel (***Appendix VIII***). The Navy is implementing a new innovative acquisition process which should provide a more streamlined procedure for yard selection, design and construction. The Oceanographer of the Navy will be the ship's sponsor. The Chief of Naval Research will be the mission sponsor. Pat explained that the Congressional language calls for AGOR 26 to be a SWATH design ship. The mission requirements support this design by having sea keeping as the #1 priority.

There was general discussion on how to keep UNOLS involved in the design and construction process for this new vessel. Pat provided a draft document "SWATH AGOR Desired Operational Capabilities," see ***Appendix IX***. FIC expressed their concern that science input is needed throughout the design and construction phase. It was recommended that the FIC be added to the Navy's e-mail correspondence list for the vessel.

Ken Johnson expressed concern over the acquisition process and technical risk involved in construction of the AGOR SWATH. The Navy is proposing a new design, and new process and a short time line for completion. Each of these element carries an associated risk which has the potential to be compounded when all linked together.

Planning, Analysis and Communications - Larry Atkinson revisited long-term planning for FIC. In particular, "Planning, Analysis and Communications" was addressed. The committee need to focus on the future. It was recommended that an article be submitted to EOS explaining trends research vessel use and capabilities. The UNOLS Office can assist in compiling statistics for this article.

Ken Johnson explained that there were a variety of issues that need to be explained and discussed with the community at large. UNOLS is setting up a "Town Meeting" at the 1998 Ocean Sciences Meeting in San Diego February for this purpose. Issues to be discussed will include defining what UNOLS is and what it does, post cruise assessments,

the ship scheduling process, funding issues with respect to UNOLS capacity, and future fleet planning. FIC suggested that UNOLS needs to encourage people to attend their meetings and become more involved in the fleet planning activities. It was suggested that the FIC activities and long-range plans be presented at the Town Meeting. It was also recommended to include a viewgraph providing the points of contacts for the UNOLS Council and committees.

Fleet Improvement Plan - The Fleet Improvement Plan is to intended to document the dynamic currency of the fleet. The FIC has been involved in updating the 1995 Fleet Improvement Plan (FIP) and the updated draft text can be viewed by FIC on the UNOLS home page. It was recommended that the draft be available to the entire community for review and comment. An e-mail notice can be sent to the community informing them about the FIP draft. Additionally, it was suggested to poll the community for their feedback on fleet issues at the Ocean Sciences town meeting. The FIP should address big ship use trends. Tom Crowley offered to investigate the Global Ocean Observing System. A target date of November 1998 has been set for a draft FIP. The final FIP report is planned for November 1999.

Interim Fleet Improvement Plan - The draft Interim FIP prepared by Chris Mooers will be streamlined and finalized by Ken Johnson.

General Business:

Nominations for a New FIC Member - Suzanne Strom was reappointed to the committee for a second term. It was recommended to place a call for volunteers in the next UNOLS Newsletter. The FIC can call upon these volunteers to serve as committee members and sub-committee members when needed.

Scheduling of Next FIC Meeting - The committee agreed that the next meeting should be held in May 1998 at Woods Hole. Joe Coburn will look into meeting room availability. Potential speakers were discussed. Suggestions included representatives from the SWATH industry, a fisheries oceanographer, and a representative from the AGOR 26 shipyard.

Recap of FIC Action Items regarding SMRs and new ship construction:

- Alaska SMR - Tom Weingartner, chair, will establish a subcommittee of six to seven members for development of SMRs for an ALPHA HELIX replacement. This is a high FIC priority. A draft is planned for summer 1998 and the final SMRs are expected in fall 1998.
- East Coast SMR - Larry Atkinson will chair a subcommittee for development of a coastal research vessel SMR for East Coast work. The schedule for this effort is the same as for the Alaska SMR.
- Fisheries SMR - This item is deferred until after the Alaskan SMRs are complete.
- Intermediate SMR - On hold until completion of the other SMRs.

- Central Pacific R/V - FIC will participate in the planning process with the Navy via e-mail. It was noted that the FIC ad-hoc group needs to be more closely involved in the process.

The meeting adjourned at 3:00 p.m.

APPENDIX I

Fleet Improvement Committee
NOAA Pacific Marine Center, 2nd Floor
1801 Fairview Ave, E
Seattle, Washington 98109
November 6-7, 1997

THURSDAY, 6 November

Morning Session:

8:30 am **FIC Welcome and Introduction** - Larry Atkinson will welcome the Committee and review the meeting's agenda.

8:35 am **NOAA Welcomes the Fleet Improvement Committee to the Pacific Marine Center**

8:40 am **Accept Minutes** - Accept the minutes of the December, 1996 FIC Meeting.

8:45 am **UNOLS Report** - Ken Johnson will report on UNOLS activities over the past year and plans for the future.

9:00 am **Agency Reports** - Written reports provided by the agency representatives will be reviewed by Ken Johnson. A question/answer period will follow.

9:30 am **Development of a Long-Term FIC Agenda** - Before the meeting, a proposed long-term agenda was distributed via e-mail for review. Additionally, Chris Mooers provided a paper titled, "Reflections on UNOLS/FIC and Council, and on UNOLS Overall" which was distributed via e-mail to FIC. Larry Atkinson will lead a discussion to finalize long-term FIC plans.

10:15 am **Break**

10:30 am **Long-Term FIC Agenda** - Discussion wrap-up and agreement on FIC long-term agenda.

11:00 am **Presentation by The Glosten Associates, Inc.** - A representative from the naval architecture firm, The Glosten Associates, will report on the impact of new US Coast Guard regulations on construction of future intermediate research vessels. (The new regulations call for twice as much crew and considerable structural changes.) These new regulations may place strong constraints on replacement and refit schedules FIC is to develop.

11:30 am **FIC Discussion and Question/Answer Period on Impact of New USCG Regulations**

12:00 pm **Lunch**

1:00 pm **NOAA Fisheries Oceanography/Stock Assessment Needs** - NOAA has drafted a paper titled "*Talking Points: Fisheries Research Vessels*," see ***enclosure (1).*** The paper outlines NOAA's long-term research vessel requirements and plans. They are proposing to build six new vessels to help meet their projected stock assessment needs. Even with six new ships, NOAA projections indicate that there could be additional fisheries oceanography work for outsourcing. The FIC has been tasked to examine the feasibility of building a general purpose fisheries vessel.

- **FIC Tasking Summary** - Ken Johnson will provide a brief history of the UNOLS activities to date on this topic and review the tasking to the committee.
- **NOAA/ National Marine Fisheries Service Update** - A representative from the NMFS will comment on NOAA's Fishery Needs and report on the status of their vessel construction efforts.

- **University of Alaska Replacement Plans for ALPHA HELIX** - A representative from the University of Alaska will discuss their considerations for replacement of ALPHA HELIX. The University has been increasing its emphasis on fisheries research. In a discussion at the June UNOLS Council Meeting, it was recommended that the FIC develop SMRs for a research vessel that is: 1) ice capable; 2) capable for fisheries research; and 3) operationally economic. A 1989 UNOLS/FIC report titled, "*Science Mission for an Intermediate Ice-Capable Research Vessel*" is provided as ***enclosure (2)*** and "*Scientific Mission Requirements for Intermediate Ice-Capable, General-purpose Oceanographic Research Ship,*" dated February 1989 is provided as ***enclosure (3).***

2:30 pm **Break**

2:45 pm **Fisheries Discussion - Continued**

- **Research Fishery Needs** - Representatives from the research community will discuss their fishery research facility needs and plans for the future.
- **FIC Discussion** - FIC will outline their plans to study/develop conceptual designs for a general purpose fisheries-capable research vessel.

FRIDAY, 7 November

8:30 am **Replacement Plans for the OCEANUS Class** - Planning for the replacement of the OCEANUS Class vessels needs to begin soon. Larry Atkinson will lead a discussion on the initiation of these plans. "*Scientific Mission Requirements for an Intermediate General-Purpose Oceanographic Research Ship*" dated March 1989 are included as ***enclosure (4).*** FIC should be prepared to discuss these SMRs.

10:15 am **Break**

10:30 am **Coastal Research Vessel Planning** - Discussion on FIC's role in development of a conceptual design for a coastal vessel.

11:00 am **AGOR-26 Report** - The Navy will be selecting an operator for the new Central Pacific swath, AGOR 26. FIC has been asked to represent the academic user community during the Science Mission Requirement development and construction phase in cooperation with the operator. Discussion on a proposed way for FIC to do this.

12:00 pm **Lunch and Tour of NOAA Pacific Marine Center**

1:15 pm **Replacement Plans for Skidaway's vessel, BLUE FIN** - Skidaway has provided a set of plans and drawings for their new research vessel, SAVANNAH, for FIC review. See ***enclosure (5).***

1:45 pm **1998 Fleet Improvement Plan (FIP98)** - Larry Atkinson will discuss plans for completing the FIP98.

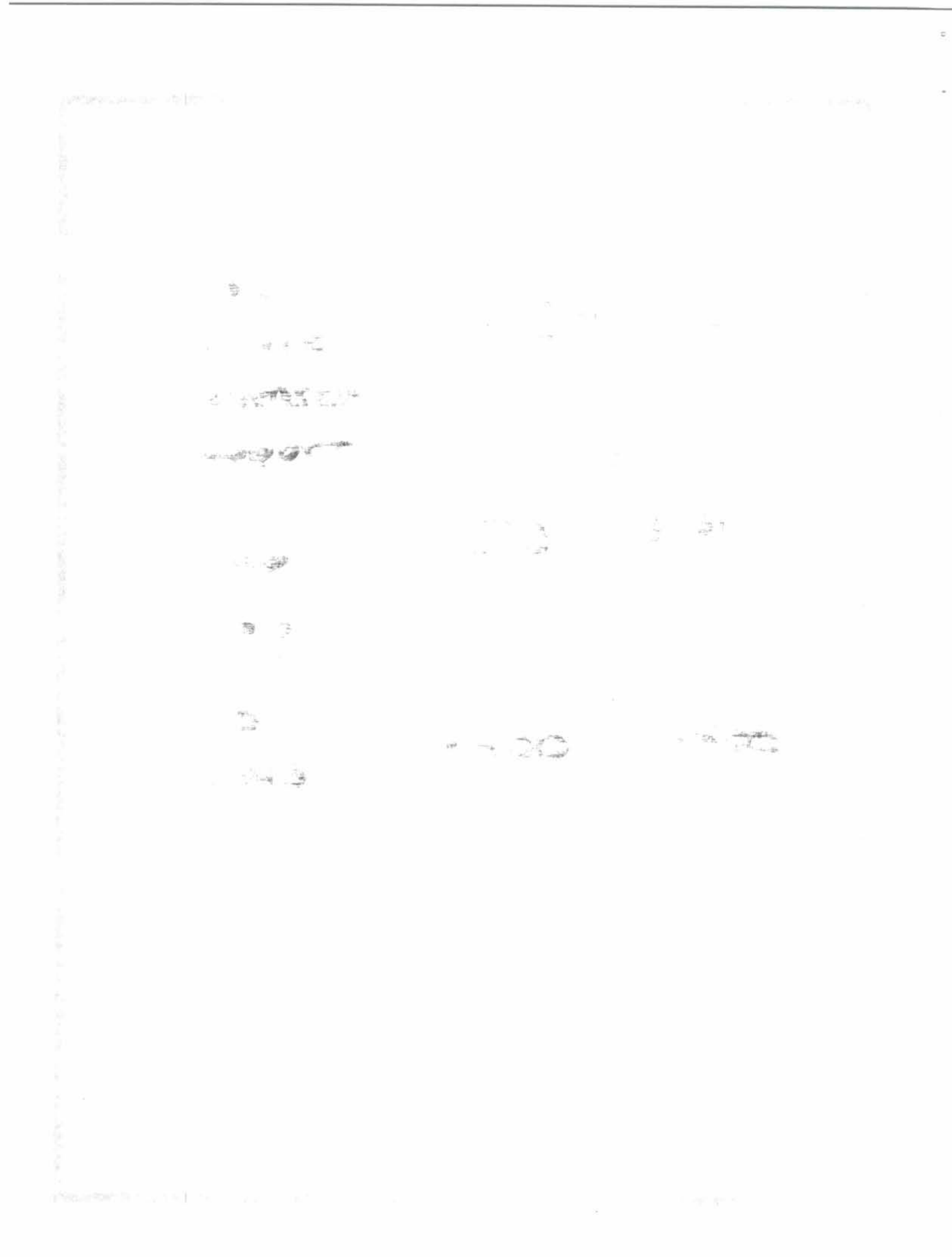
2:15 pm **Interim Fleet Improvement Plan (IFIP)** - Ken Johnson will provide an update on the status of the IFIP.

2:45 pm **General Business**

- Nominations for a New FIC Member
- Scheduling of Next Meeting
- Recap of FIC Action Items

Adjourn

APPENDIX II



FIC - Nov. 6-7, 1997

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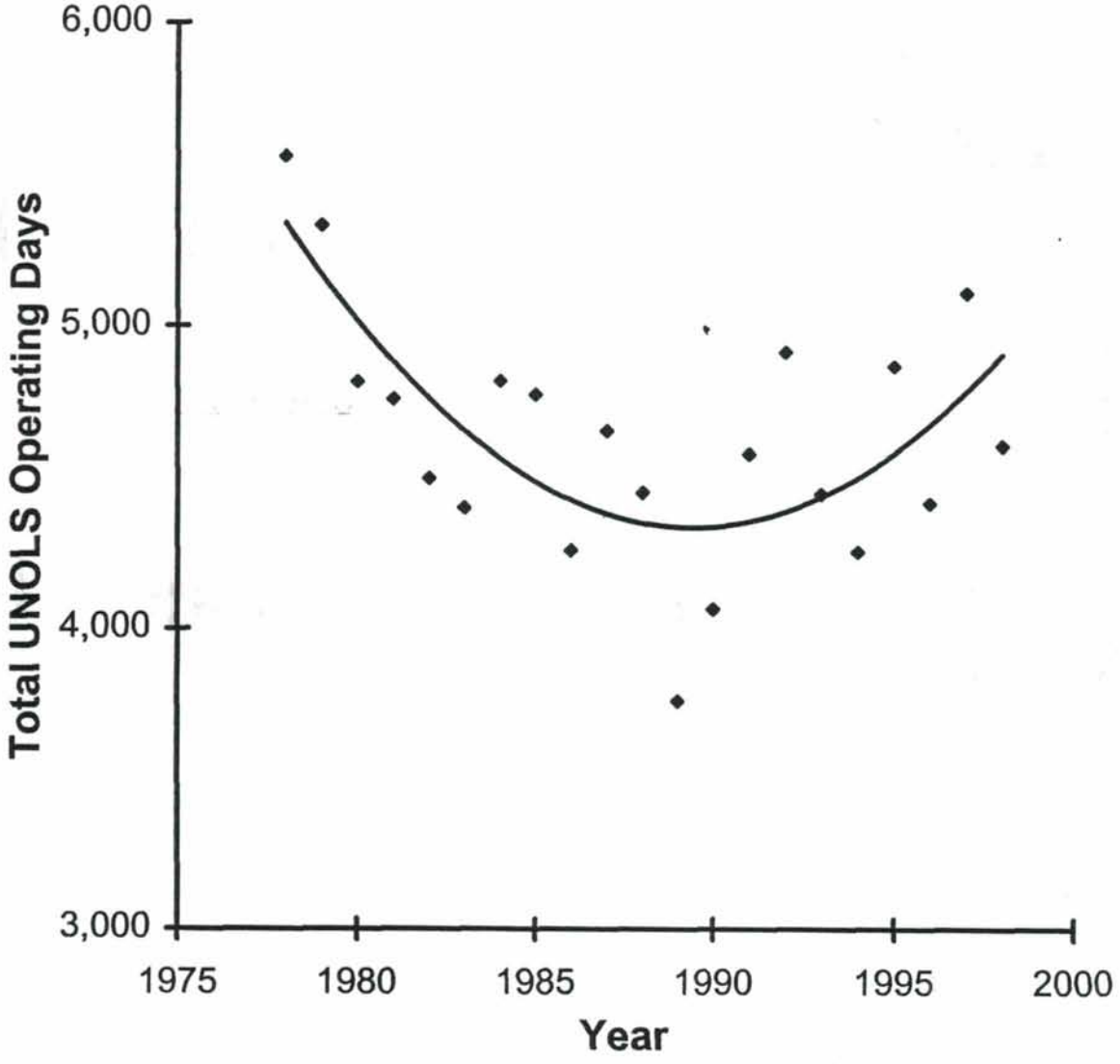
APPENDIX III

	1987	1996	96/8
Ocean Science Research Support	$57.8M	$104.9	1.81
Ship Ops	$28.0	$31.1	1.11
Op. Days	~4500	~4500	1.0


6,000
5,000
4,000
3,000
Total UNOLS Operating Days
1975
1980
1985
1990
1995
2000
Year

SUMMARY OF SHIP USE AND COSTS

YEAR1,998

As of: 9/12/97

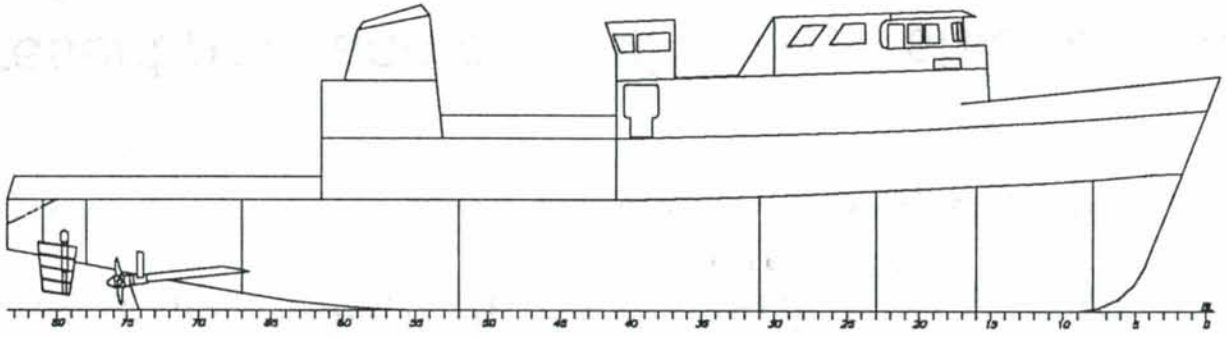
SHIP/CLASS	NSF DAY	NSF $	NAVY DAY	NAVY $	OTHER DAY	OTHER $	TOTAL DAY	TOTAL $	DAILY RATE
R. REVELLE	127	2,121	135	2,255	18	301	280	4,677	16,704
MELVILLE	172	3,044	0	0	7	124	179	3,168	17,698
KNORR	185	3,034	53	869	19	312	257	4,215	16,400
ATLANTIS	223	3,524	11	174	38	600	272	4,298	15,801
EWING	73	1,278	48	840	18	315	139	2,432	17,496
T.G. THOMPSON	112	1,773	76	1,203	1,615	4,591	290	4,591	15,831
MOANA WAVE	104	1,452	16	224	65	907	185	2,583	13,962
CLASS I/II	996	16,226	339	5,565	1,780	7,150	1,602	25,964	- -
AVE: (7)	142	2,318	48	795	254	1,021	229	3,709	- -
EDWIN LINK	29	261	0	0.0	209	1,881.0	238	2,142	9,000
ENDEAVOR	0		0		0		0	0	0
OCEANUS	152	1,611	40	424	7	74	199	2,109	10,600
GYRE							0	0	0
NEW HORIZON	77	754	97	950	37	362	211	2,066	9,791
SEWARD JOHNSON	173	1,678	34	330	26	252	233	2,260	9,700
WECOMA	71	703	58	574	86	851	215	2,128	9,898
CLASS III	502	5,007	229	2,278	365	3,420	1,096	10,705	- -
AVE: (8)	63	626	29	285	46	428	137	1,338	- -
PELICAN	62	233	25	94	105	394	192	721	3,755
LONGHORN	54	216	0	0	30	120	84	336	4,000
POINI SUR	121	762	28	176	46	290	195	1,228	6,297
CAPE HATTERAS	104	724	81	564	57	397	242	1685	6,963
ALPHA HELIX	132	1,417	0	0	12	129	144	1546	10,736
R. SPROUL	81	482	44	262	20	119	145	863	5,952
CAPE HENLOPEN	104	593	68	388	16	91	188	1,072	5,702
WEATHERBIRD II	139	1,043	0	0	0	0	139	1,043	7,504
SEA DIVER	18	86	22	105	45	214	85	405	4,761
CLASS IV - TOTAL	815	5,556	268	1,589	331	1,754	1,414	8,899	- -
AVE: (9)	91	617	30	177	37	195	157	989	- -
BLUE FIN (b)							0	0	1,816
LAURENTIAN	140	630	0	0	6	27	146	657	4,500
BARNES	65	99	17	26	18	27	100	152	1,520
CALANUS	80	248	0	0	60	186	140	434	0
URRACA							0	0	0
< CLASS IV TOTAL	285	977	17	26	84	240	386	1,243	- -
AVE: (5)	57	195	3	5	17	48	77	249	- -
Fleet Total	2,598	27,766	853	9,458	2,560	12,564	4,498	46,811	- -
AVE: (29)	90	957	29	326	88	433	155	1,614	- -

SHIP/CLASS	1995	1996	1997	1998
ATLANTIS	319	93	185	272
EWING	310	315	273	91
KNORR	350	279	293	257
MELVILLE	297	297	308	179
R. REVELLE		80	287	280
T.G. THOMPSON	333	246	260	290
CLASS I/II	1609	1310	1606	1369
AVERAGE	322	218	268	228
		(284w/o Atl or Rev)		
EDWIN LINK	175	186	212	238
ENDEAVOR	228	147	201	0
GYRE	122	219	148	18
MOANA WAVE	195	144	203	185
NEW HORIZON	240	174	262	180
OCEANUS	187	168	201	199
SEWARD JOHNSON	271	304	290	233
WECOMA	145	198	200	217
CLASS III	1563	1540	1717	1270
AVERAGE	195	193	215	159
ALPHA HELIX	144	73	120	180
CAPE HATTERAS	175	0	230	242
CAPE HENLOPEN	198	185	206	188
LONGHORN	72	130	53	40
PELICAN	182	201	211	192
POINT SUR	164	118	197	195
R. SPROUL	180	132	88	75
SEA DIVER	145	155	185	168
WEATHERBIRD II	154	167	150	154
CLASS IV	1414	1161	1440	1434
AVERAGE	157	129	160	159
BARNES	77	86	133	100
BLUE FIN (b)	75	96	105	146
CALANUS	48	50	115	140
LAURENTIAN	91	72	44	146
URRACA				173
< CLASS IV	291	304	397	705
AVERAGE	73	76	99	141
Fleet Total	4877	4315	5160	4778
Fleet Total without <Class IV	4586	4011	4763	4073

APPENDIX IV

PLANNING CONSIDERATIONS FOR A NEW RESEARCH VESSEL

UNIVERSITY - NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM



Prepared by The Glosten Associates, Inc.
for UNOLS
Fleet Improvement Committee
6 November 1997

The Glosten Study for UNOLS
Our Workscope

- Define how regulations impact new construction
- Present information on current shipbuilding technology
- Present pros and cons of various ship procurement methods
- Discuss Conceptual Design Issues
  - » Monohull versus Swath
  - » Thruster Arrangements

Today's Presentation

- New Regulations Impact New Construction
  - » Background and Introduction
  - » Application of Tonnage Systems and Regulations
  - » Regulations and their Cost Impact
  - » Manning Considerations
- New Vessel Cost
- Current Shipbuilding Technology
- Ship Procurement Methods

New Regulations Stem from Safety and Environmental Protection Concerns

- Worldwide emphasis because of recent serious marine accidents
  - » *Herald of Free Enterprise* (capsizing)
  - » *Scandinavian Star* (fire)
  - » *Estonia* (capsizing and sinking)
- Passenger Vessel / RoRo Regulations trickle down to other vessels
- USCG, saddled with budget cuts, deferring rule making to IMO and inspection to Classification Agencies (ABS)

Implementation of New Regulations is Creating Extensive Confusion

- USCG is subjected to political process
  - » Notice of Proposed Rules
  - » Interim Rules
  - » Final Rules
  - » Suspension of Final Rules
- Two separate tonnage measurement systems - Domestic and International Tonnage
- Various regulations from various rulemakers - IMO, USCG, ABS

Assess the Application of the Regulations

- 1st - Determine which **tonnage measurement system** applies -
  - » Regulatory (Domestic) Tonnage or
  - » International Tonnage

- 2nd - Determine which **regulations** apply
  - » Application is based on tonnage

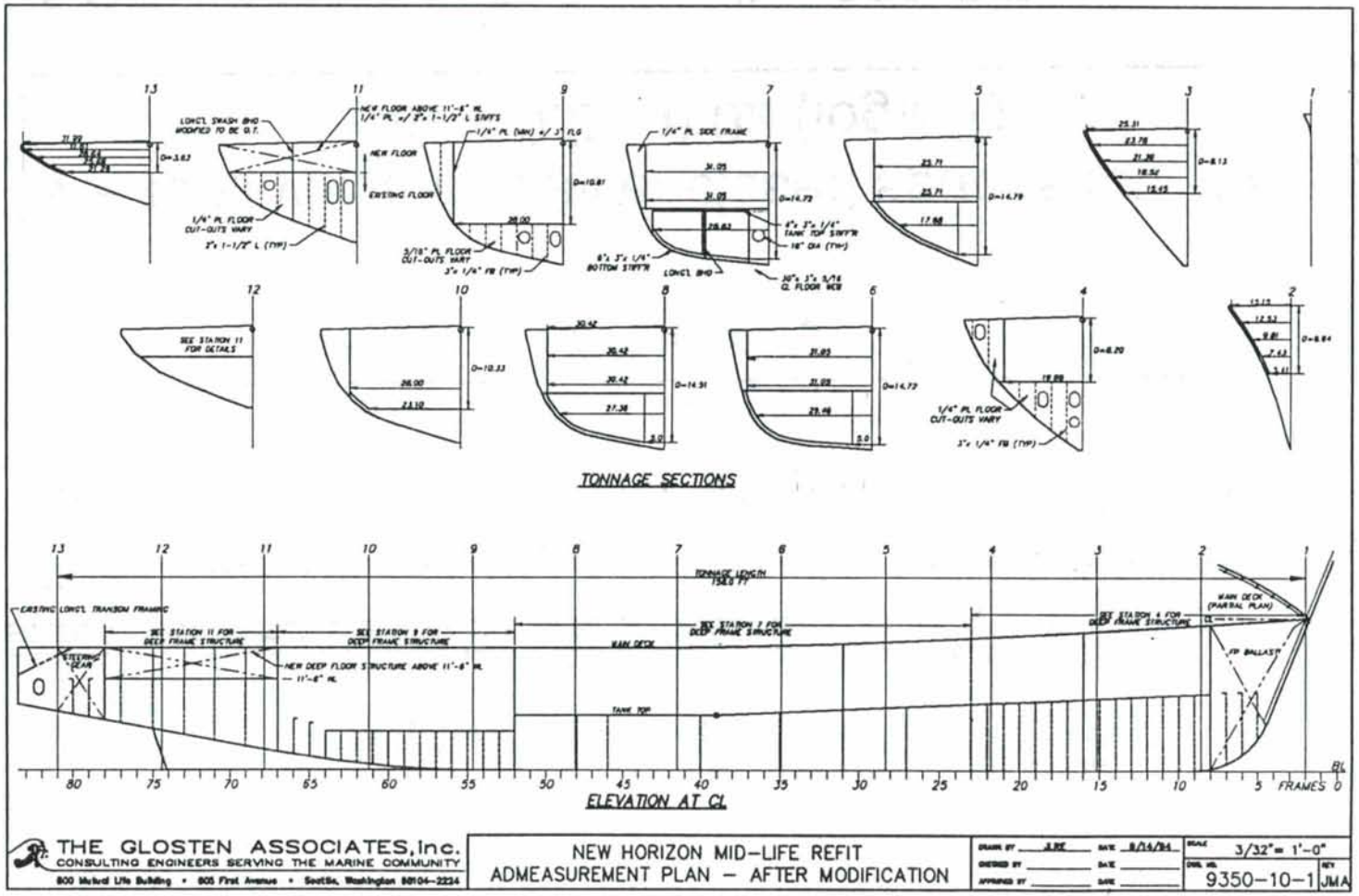
The Tonnage Measurement Systems: GRT and GT

- Origins in assessing the earning capability of ships
- **GRT** (Gross Register Tonnage) is the **Regulatory Measurement System** (Domestic Tonnage System)
- **GT** (Gross Tonnage) is the **International Measurement System**

Domestic Tonnage - GRT

- Traditional measurement process
- Arcane rules that allow for exemption of spaces:
  - » filled with special tonnage floors,
  - » ballast tanks, and
  - » "open" spaces in superstructures fitted with tonnage openings
- 1 GRT = 100 Cu. Ft.

Domestic Tonnage - GRT
Tonnage Plan for *New Horizon*



International Tonnage - GT

- Rule was constructed so that for large ships GT~GRT (measurement by two methods had same number)

$$\mathbf{GT = K_1 V}$$

V = total volume of all enclosed spaces (cu. meter)

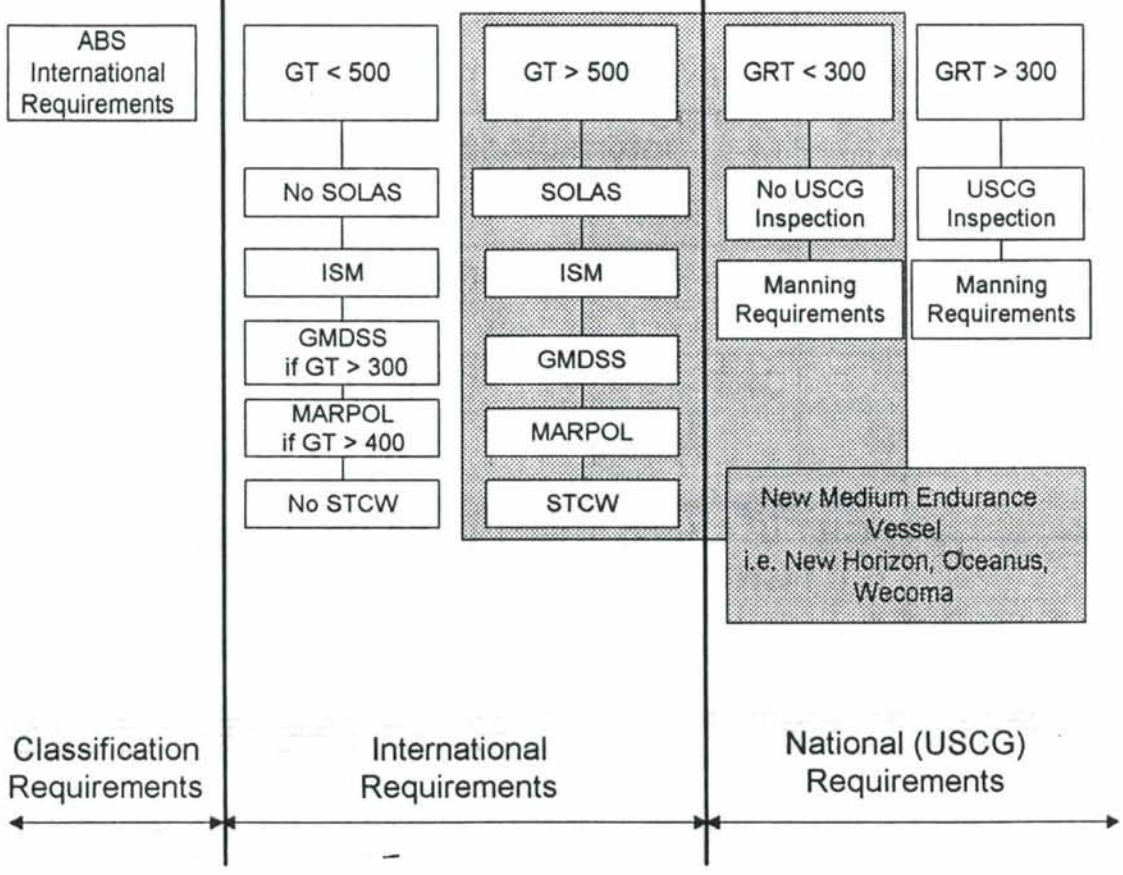
$$K_1 = 0.2 + 0.02 (\log_{10} V)$$

- 1 GT = 131 cu.ft. for a smaller 800 GT ship
- 1 GT = 118 cu.ft. for a large 30,000 GT ship

Which System Applies to Which Regulation For Vessels Certified for International Voyages

When Built or Altered	International Regulations			US Regs.
	SOLAS / ISM	STCW	MARPOL	
Before July 82 (Table 5, Ref. 1)	GRT	GRT	GRT	GRT
July 82 - Dec 85 (Table 6, Ref 1) Interim Scheme	GRT	GRT	GRT if <400	GRT
Jan 86 - July 94 (Table 7, Ref. 1) Interim Scheme	GRT IF < 1600 GT if GRT>1600	GRT IF < 1,600 GT if GRT>1600	GRT IF <400 GT if GRT>400	GRT
After July 94 (Table 8, Ref. 1)	GT	GT	GT	GRT

Application of Regulations to a New Research Vessel Certified for International Voyages



Regulations and their Impacts
Various Types of Impacts

- Design (i.e. arrangements, access/egress) (DES)
- Construction Cost (CC)
- Maintenance and Repair Effort and Cost (M&R)
- Operations and Management Effort and Cost (O&M)
- Manning Cost (MAN)
- Seafarer (i.e. training, certification, cost) (SEAF)

Regulations and their Impacts
a) SOLAS - New Vessels

- Research Vessel with less than 50 scientists is Cargo Vessel
- Structural Fire Protection — Impacts
  - » Incombustible Materials (no wood) — CC ($50k)
  - » Fire Boundaries (A class bhds) — CC ($75k)
  - » Fire Dampers in Vent Systems — CC/M&R($25k)
  - » Access / Egress — DES
  - » Fixed Fire Ext. Sys. — CC/M&R($100k)

Regulations and their Impacts
a) SOLAS, cont.

	Impacts
• Subdivision and Stability	All
» Sliding WT Doors	All ($150k)
» Double Bottoms (trade vs dp floors)	DES
• Lifesaving Appliances	All ($50)
• Emergency Generator	All ($100k)

Plus new items:

• Min. Bridge Visibility (L>45m) (Jul 98)	DES
• Electrical Grounding (Jul 98)	DES
• Rapid Evacuation (Jul 98)	All ($50k)
• Cargo Securing per CSM (Dec 97)	O&M

Regulations and their Impacts
b) ISM - New and Existing Vessels

- ISM (International Ship Mgmt.) is part of SOLAS
- RV's will be considered "Other Cargo Vessels"
- Safety and environmental protection policy
- Procedures to support this policy
- Defined levels of authority
  - » vessel and shoreside

Impact is all O&M

- Procedures for emergency situations
- Training
- Periodic audits and senior management review
  - » operator and certification agency

Regulations and their Impacts
c) GMDSS - New and Existing Vessels

GMDSS is part of SOLAS, but applies at 300 GT

	Impact
• Install Radio Equipment	DES/CC ($100k)
• Licensing Equipment Maintainers	M&R / O&M
• Train Crew (STCW)	SEAF

Regulations and their Impacts
d) MARPOL - New and Existing vessels

Vessel is required by USCG to meet these rules in any event - so no real impact

- Marine Pollution Regs, incl.
  - » Sewage Holding or Treatment
  - » Oil Holding or Separation
  - » Plastics Disposal

Plus a new item:

- Garbage Management Plan

Regulations and their Impacts
e) STCW - New and Existing Vessels (2002)

- STCW is "Standards for Training, Certification and Watchkeeping"
- Applies to all "Seagoing Ships"
- Applies to domestic vessels greater than 200 GRT
- Starting Aug. 1998 - New crew meet certification req.
- Starting Oct. 2002 - All crew meet certification req.
- Built into ISM - If you get ISM you will meet STCW
- Most of cost to seafarer
- Many company (management) obligations

Impact is on O&M/SEAF

Regulations and their Impacts
f) New ABS Rules for Small Vessels (<90m)

- Double Bottoms
- Subdivision / WT Doors
- Structural Fire Protection
- Fixed Fire Fighting in Engine Room
- Emergency Generator

Impact is in all areas

Duplicates SOLAS

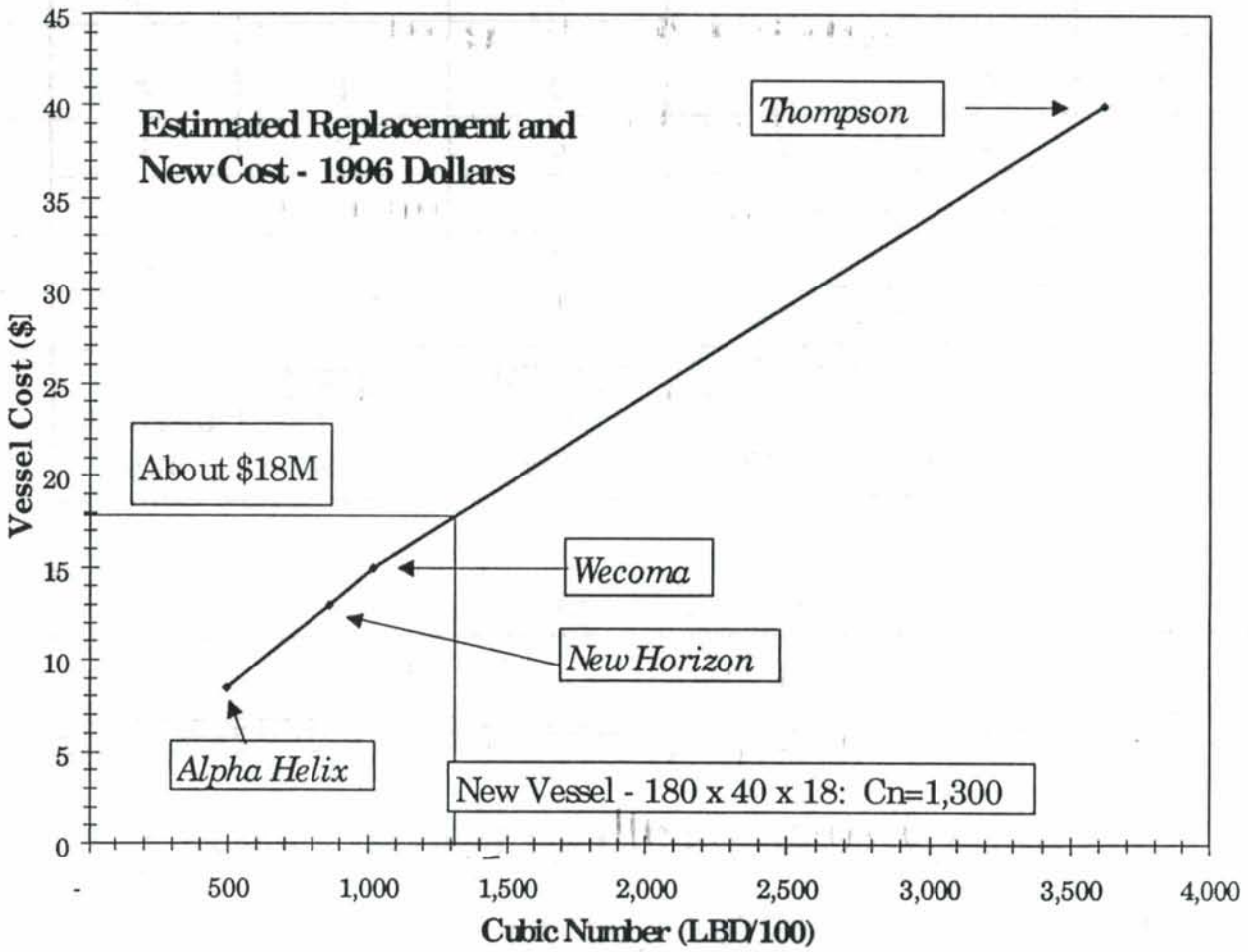
What is the Cost of These New Regulations?

	DES	CC	M&R	O&M	Manning	Seafarer
a) SOLAS	X	$600k	X	X		
b) ISM		$100k		XX		X
c) GMDSS	X	$100k	X	X		X
d) MARPOL	X		X			X
e) STCW	2			X		X
f) ABS		included already				
TOTAL		$800,000				

The Regulations do not Require Increased Manning

	GT Greater than 500					GT less than 500	
	New Horizon	***Wecoma***	***Oceanus***	***Western Flyer***	**NEW VESSEL**	***Alpha Helix***	***Point Sur***
Length	170'	177'	177'	117'	180'	135'	135'
Beam	36'	33'	33'	53'	36'	31'	32'
HP	1,700	2,875	2,875	2,500	3,000 est.	825	
GRT	295	297	297	495	not applicable	289	294
GT	797	769	~769	~800	~900	~460	~480
Officers	5	4	4	4	4	2	5
Total Crew	12	12	12	9	10	9	9
Scientists	17	15	15	15	24	15	12
Year Built/Mod	1978/94	1994	1994	1996	2000	1966	1981

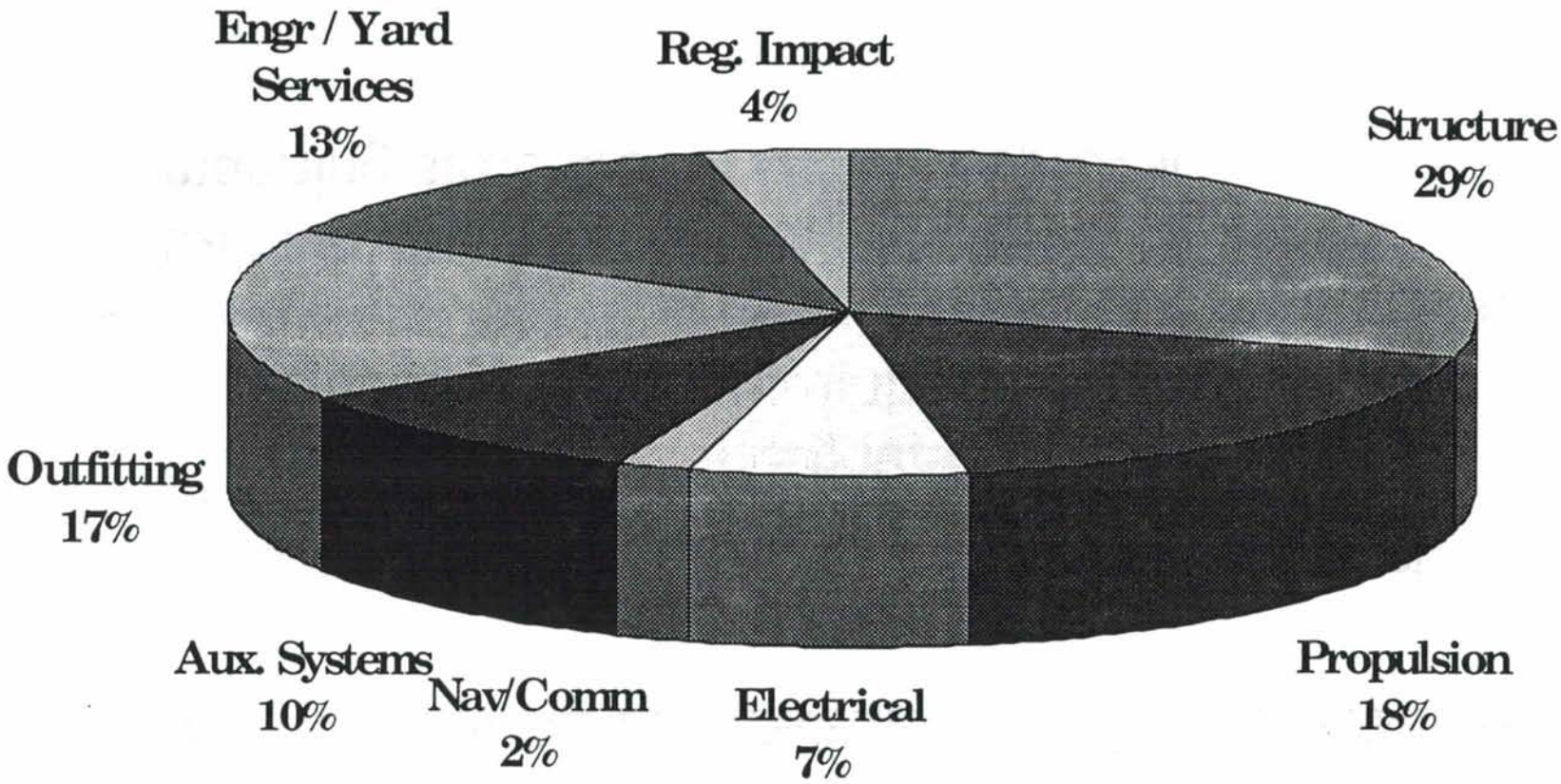
A New Research Vessel will Cost $15 to $18 M



Crew on the New Vessel could be Fewer than on Current Vessels

	GT Greater than 500							GT less than 500
	New Horizon	*New Horizon* (possible)	*Wecoma* (Un-inspected)	*Wecoma* (Inspected)	*Western Flyer*	NEW VESSEL		*Alpha Helix*
Master	1	1	1	1	1	1		1
Mates	2	2	2	2	2	2		1
Ch. Eng.	1	1	1	1	1	1		0
Asst. Engineer	1	0	2	2	1	1		0
Unlicensed Engineers	2	1	0	5	0	0		2
AB's	3	3	4		3	3		4
Cooks/Messmen	2	1	2		1	2		1
Total Crew	12	9	12	12	9	10		9
Scientists	17	17	15	15	15	24		12

The Relative Cost Impact of the Regulations on a New Vessel is Minor (about 4%)



New Construction Cost Allocation

Closing Ideas on Regulatory Impacts

- Embrace SOLAS - but work to integrate impacts effectively and at minimum cost.

- Re-assess manning requirements and organization / training structure to establish research vessel manning structure for USCG approval.

Current Shipbuilding Technology Supports New Research Vessel Construction

- Medium sized shipyards dominate shipbuilding activity
- Many yards make for good competitive environment, although work load high so no "deals"
- Active, skilled work force in place
- Many yards implementing new technology

Ship Procurement Methods

A. Purchase Existing Stock Design

- Save on Engineering and Planning
- Increase probability of user acceptance
- Decrease technical risk

B. Define the Ship You Want

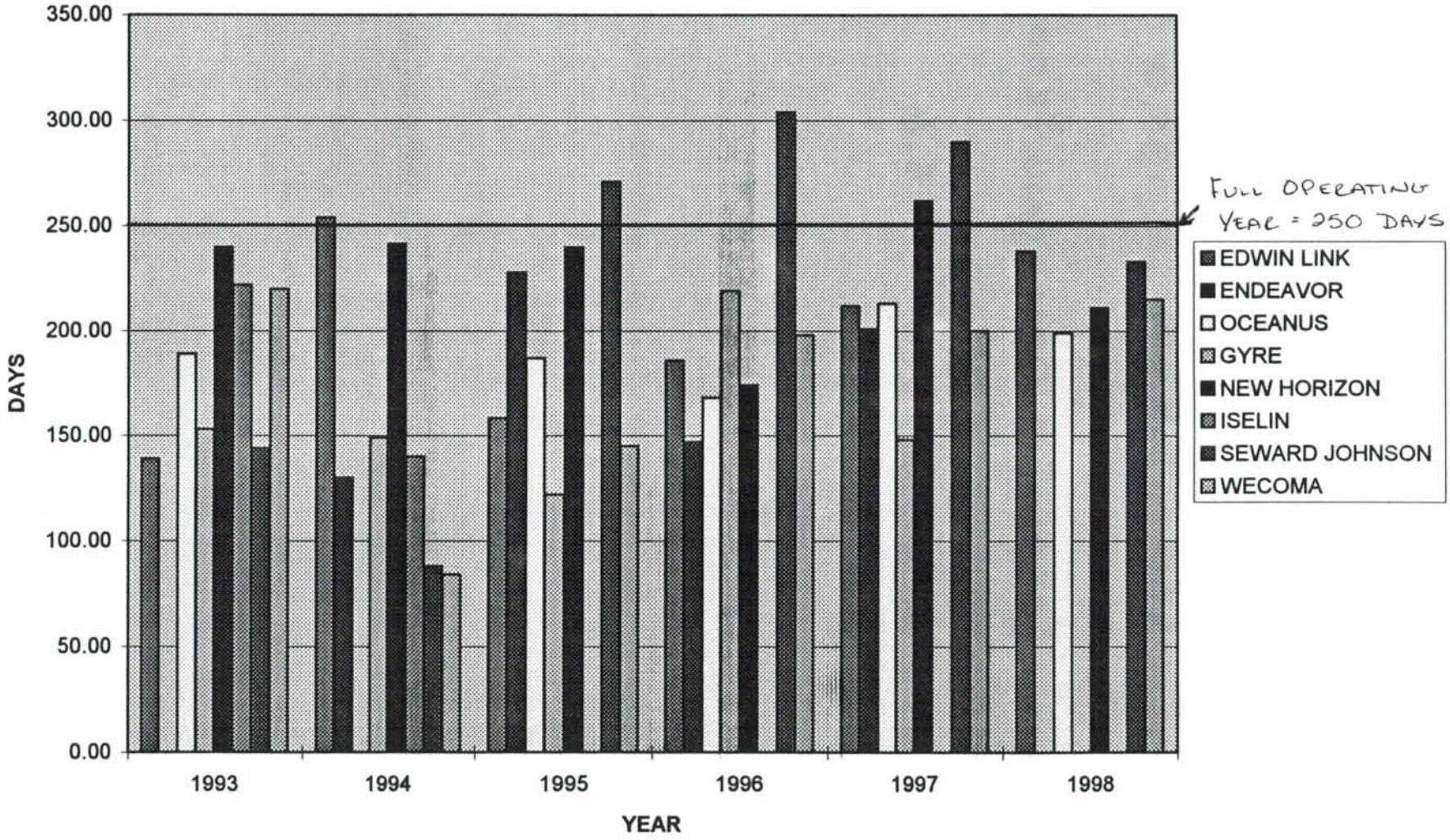
- Plans and specs - define what is important
  - » Variant of existing vessel type
  - » Define everything that is important- produce complete contract design package
- Pre-qualify yards - Quality Control
- Manage expectations to control cost

APPENDIX V

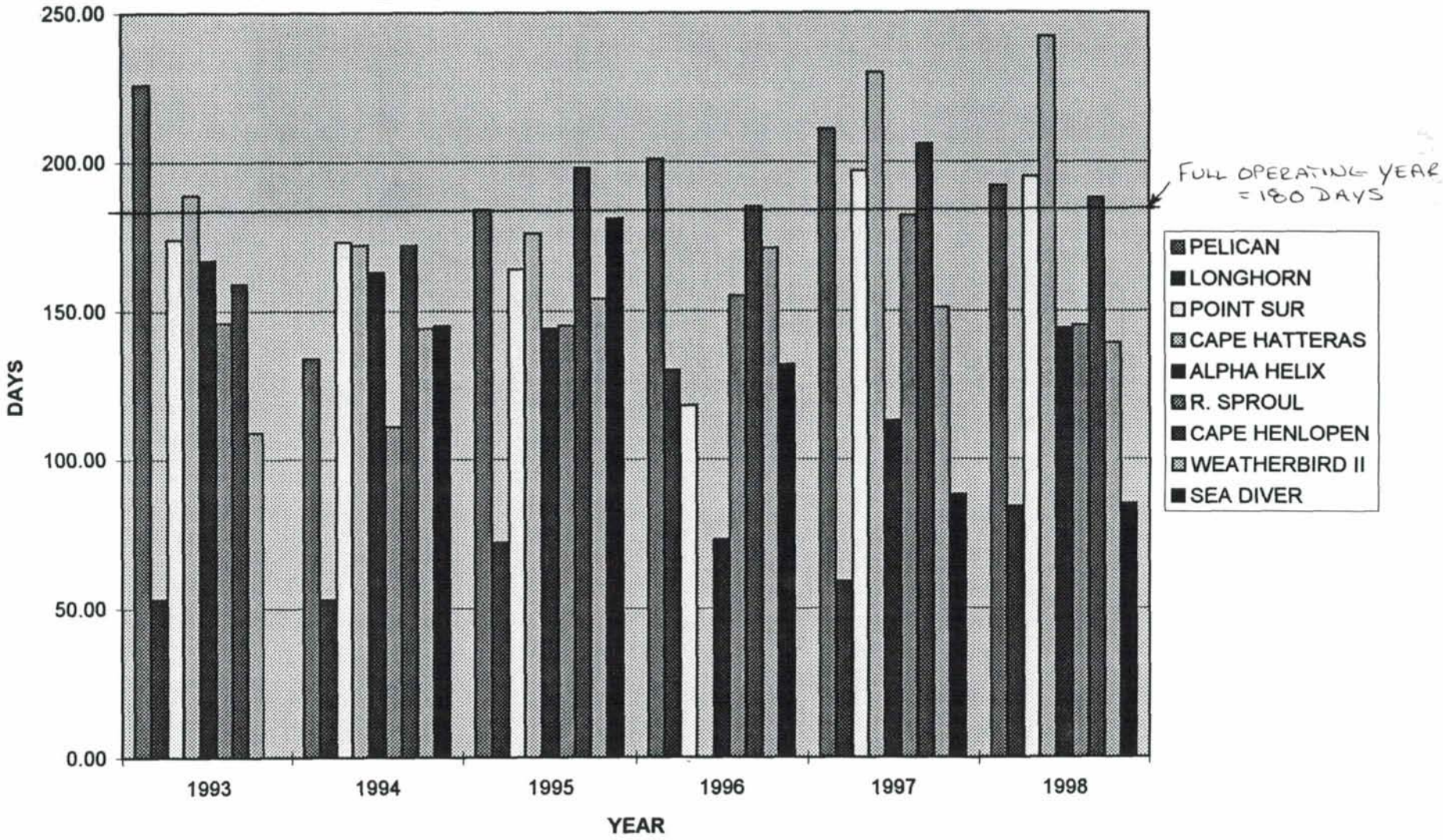
CLASS III Ship Use

1993	1994	1995	1996	1997
TOTAL SHIP DAYS:				
1093	985	1353	1396	1526
SHIP YEARS (250 FULL OPERATING YEAR):				
4.4	3.94	5.4	5.6	6.1

CLASS III SHIP USE: 1993-1998

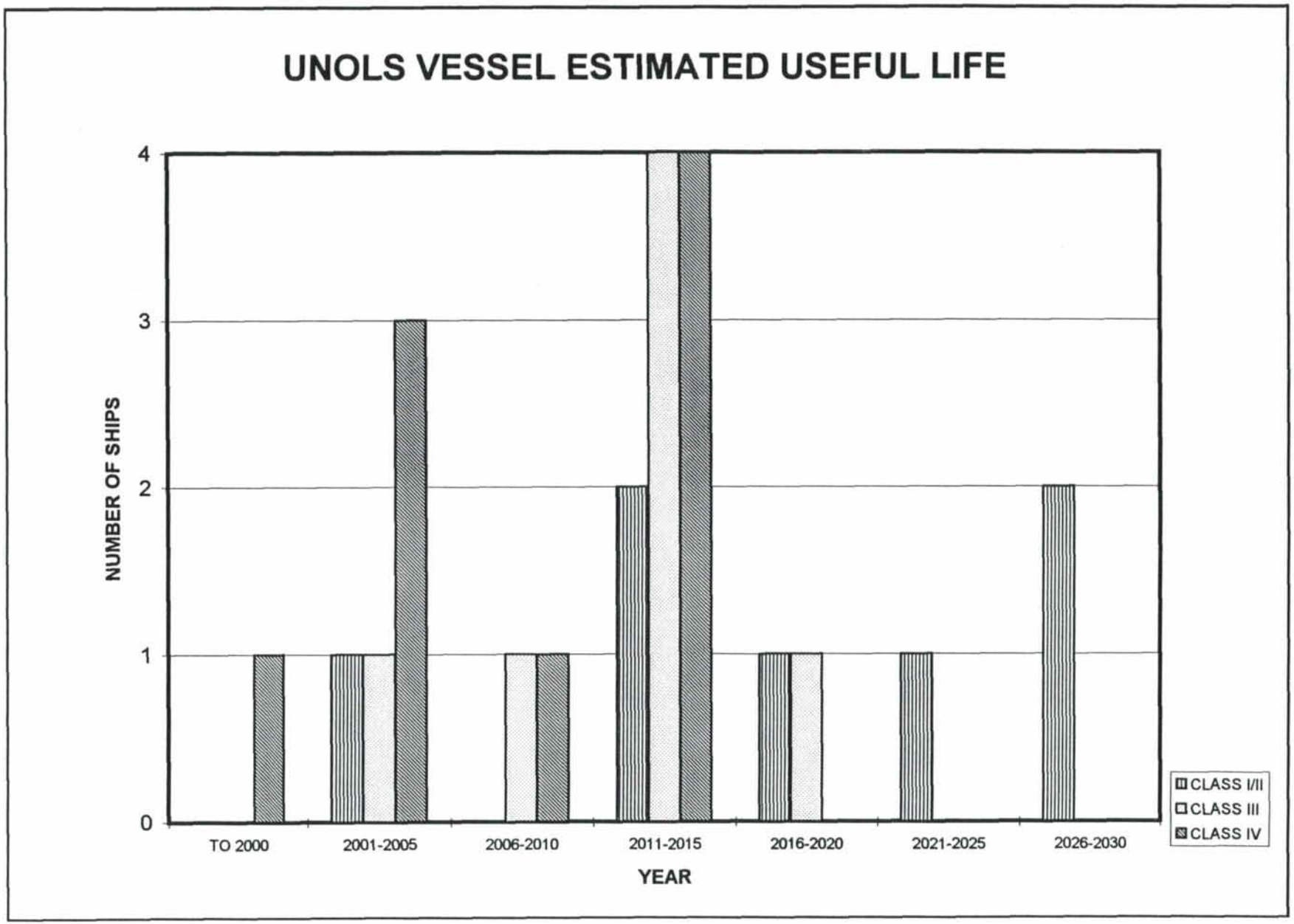


CLASS IV SHIP USE: 1993-1998



APPENDIX VI

UNOLS VESSEL ESTIMATED USEFUL LIFE



APPENDIX VII

CBD ANNOUNCEMENT FOR OPERATOR SELECTION

Office of Naval Research, 800 N. Quincy St., Arlington, VA 22217-5660

OPERATION OF ONE OCEANOGRAPHIC RESEARCH VESSEL:

The ship will be constructed as a general purpose oceanographic research vessel, the AGOR 26. To be eligible to operate the vessel, the offeror must be a member of the University National Oceanographic Laboratory System (UNOLS) or meet the requirements and agree to apply for full membership if selected. In order to maintain the nation's oceanographic fleet at the optimum size, a current CLASS I or CLASS II UNOLS vessel must be retired or otherwise removed from service by the date the AGOR 26 commences operations. Thus, to be eligible for award, the offeror must be able to exchange or retire a CLASS I or CLASS II UNOLS oceanographic research vessel. In addition, the successful offeror is expected to (1) provide cost-sharing annually to defray part of the cost of ship operations; (2) provide technical assistance during the period covering design development through builder selection and vessel delivery; (3) enter into a renewable charter party agreement with the Navy; (4) maintain and operate the ship under sound maritime practices; (5) complete final outfitting of the vessel; (6) undertake a cooperative role in scheduling and operating the ship in the support of Navy programs and the larger U.S. oceanographic community. Interested parties should request the RFP by 17 October 1997 to be considered further. Send written requests for the RFP to the above address, to the attention of Code 321RF.

APPENDIX VIII

CBDNet

Notice Accepted

Submission No. 136734

October 23, 1997 – 14:20

[Commerce Business Daily: Posted October 23, 1997]
From the Commerce Business Daily Online via GPO Access
[cbdnet.access.gpo.gov]

PART: U.S. GOVERNMENT PROCUREMENTS
SUBPART: SUPPLIES, EQUIPMENT AND MATERIAL
CLASSCOD: 19--Ships, Small Craft, Pontoons, and Floating Docks
OFFADD: Department of the Navy, Naval Sea Systems Command, 2531 Jefferson Davis Highway, Arlington, VA 22242-5160
SUBJECT: 19--SMALL WATERPLANE AREA TWIN HULL (SWATH) OCEANOGRAPHIC RESEARCH VESSEL
SOL N00024-98-R-2304
POC Contracting Officer, Melvin Jones, 703/602-7518/Negotiator, Dea Merchant, 703/602-7518
DESC: The Naval Sea Systems Command (NAVSEA) plans to release a solicitation for design and construction of a developmental Small Waterplane Area Twin Hull (SWATH) oceanographic research vessel. This solicitation will not be posted to the NAVSEA homepage; it will only be distributed to sources who express an interest in the effort. This solicitation will lead to an agreement with the successful offeror using the provisions of 10 U.S.C. 2371 and Public law 103-160, Section 845, Other Transactions Authority, as amended by Section 804 of Public Law 104-201. This authority allows for non-traditional contract approaches, outside the purview of the Federal Acquisition Regulations, that more closely parallel industry practice. The purpose for using this authority is to encourage industry participation and maximize the efficient use of limited funds. One industry team will be selected to complete a two phase effort. Phase I will be awarded at a firm fixed price and Phase II is planned as a contract option with a not to exceed price. After Government approval of Phase I, the Phase II option will be negotiated at a firm fixed price. Award is anticipated in the second quarter FY 98 and approximately $45M has been appropriated for the total effort. The Navy will use Integrated Product Teams (IPT's) for this program. The teams will consist of Government representatives and the industry team we are seeking. This ship is expected to replace the aging and technically obsolete Navy owned, university operated, research vessel, R/V MOANA WAVE (AGOR 22). It is anticipated that this ship will operate in coastal and deep ocean areas and conduct general purpose oceanographic research. Program phases for development of the

SWATH AGOR include: Phase I - Ship Definitization Phase: During this phase the IPTs will work together to optimize desired ship capabilities within a specific cost cap. Work required during Phase I will include, but may not be limited to the following: budget breakdown, integrated management plan, ILS cost/performance trade-off studies, finalize ship requirements, point design, some design development beyond the point design stage, performance specification development, and life cycle cost estimates. Phase II - Design and Construction Phase. Work required during Phase II will include, but may not be limited to the following: perform model testing, complete any detail design necessary to construct the vessel, purchase all necessary material, and develop pre and post delivery trial plans. In addition, this phase will include lofting or other production design, fabrication, erection and outfitting of the ship, and system testing including all pre and post delivery trials to determine all ship performance and mission capabilities. Industry teams interested in this solicitation must respond in writing to the Contracting Officer. Responses shall be addressed to Commander, Naval Sea Systems Command, Attn: LCDR Mel Jones, SEA 02232, RM 5S18, 2531 Jefferson Davis Highway, Arlington, VA 22242-5160, or send via e-mail to Jones_Melvin_G_LCDR@HQ.NAVSEA.NAVY.MIL.

CITE: (W-296 SN136734)

URL: http://cbdnet.gpo.gov/ACCEPT.template
LAST MODIFIED: February 18, 1997 by JER

APPENDIX IX

Mon 2-4pm

SWATH AGOR
Desired Operational Capabilities Document

1.0 OVERVIEW

This document provides definition of the desired capabilities of the SWATH AGOR that have evolved from ongoing study efforts and discussions with ship users. All of the desired capabilities may not be attainable within the cost constraint and should be treated as goals when conducting the tradeoff studies during Phase I. Study efforts completed to date indicate that the expected ship will be in excess of 1,500 tons in displacement. The primary goal of the SWATH AGOR is to extend the capability for performing oceanographic operations as far as possible into sea state 6 and beyond. The outstanding seakeeping performance of a SWATH will enable research to be performed in areas where a conventional oceanographic ship is unable to operate effectively.

2.0 DESIGN PHILOSOPHY

The SWATH AGOR is to be a fully equipped oceanographic research ship designed and constructed to commercial standards and practice. The mission of the ship will be to conduct general purpose oceanographic research world wide in coastal and deep ocean areas. In general, the SWATH AGOR should achieve commonality with current University-National Oceanographic Laboratory System (UNOLS) fleet practice. However, in recognition of the prototypical nature of this ship, innovative approaches using advanced technologies, such as the following, are encouraged whenever cost effective:

- ~~"Golf club" shaped~~ hull sections to improve overside handling
- High performance propulsion motors and generators
- Fuel efficient fuel cells
- Advanced solid state power control components
- Aluminum and composite materials for ship structure
- Contra-rotating propellers
- Composite shafting
- Active motion control

3.0 OPERATIONAL CAPABILITIES

3.1 GENERAL CAPABILITIES

The SWATH AGOR should be capable of performing the following tasks:

a. Oceanographic sampling and data collection of surface, midwater and sea floor parameters using state-of-the-art scientific instrumentation

b. Launch, recovery and towing of scientific packages, both tethered and autonomous, including the handling, monitoring and servicing of remotely operated vehicles (ROVs) and autonomous underwater vehicles (AUVs).
c. Shipboard data processing and sample analyses in modern well-equipped scientific laboratories
d. Precise navigation and station keeping and track-line maneuvering to support deep sea and coastal surveys

3.2 SPECIFIC CAPABILITIES

The following specific capabilities are desired and are presented in order of priority. Although highly desired, these capabilities are not firm requirements and should be treated as goals for the Phase I tradeoff studies.

a. Performance in a Seaway: Fully operational in sea state 6 at all headings
b. Exterior Working Deck Area: 2,000 square feet of contiguous, exterior working deck area
c. Station Keeping Capability: Commensurate with oceanographic operations and performance in a seaway
d. Science Payload: Capacity for 120 tons of temporary science equipment brought on board for specific missions and stored on deck and in storerooms.
e. Length/Beam/Draft Limitations: Ability to reduce draft to less than 17 feet for pier access in a light load condition. Ability to transit through the Panama Canal.
f. Laboratory Area: Total of 3,000 square feet divided among multiple labs and located adjacent to the working deck
g. Science Staff: 30 scientists and technicians in addition to the crew required to operate the ship.
h. Speed: 15 knots.
i. Endurance: 50 days at sea.
j. Range: 10,000 nautical miles
k. Scientific Gear Storage Space :15,000 cubic feet in below deck storerooms

4.0 OTHER DESIGN CONSIDERATIONS

a. **Flexibility of Arrangement:** The paramount design consideration for general purpose research ships is flexibility of arrangement and configuration. Oceanographic research is constantly changing and evolving to confront new environmental concerns and challenges. In order to meet these challenges, oceanographers are continually devising new research projects which the SWATH AGOR will be called upon to support. The ship must be capable of quickly altering arrangements of deck and laboratory equipment. Often, complete changeovers are accomplished during three or four day port calls in remote locations. To support this flexibility, design features include deck bolt grids in laboratories, storerooms,

and exterior working deck areas. In addition, labs and storerooms have bulkhead and overhead mounted fittings and wireways for running temporary power and signal cables. An absolute minimum of equipment is permanently installed in these areas. Even mooring bits and bulwarks are bolted down to permit removal and rearrangement. Bolt down grids may also be used to secure cranes, winches, cargo vans, and overboard handling gear. Laboratories are usually arranged with no permanently installed equipment other than ventilation, plumbing, and electrical services. It is imperative that these essential services be located to minimize impact on lab flexibility. Bolted down portable equipment in labs includes work benches, shelving, cabinetry, fume hoods, freezers, and electronic gear. Even sinks are arranged for portability.

b. **Commercial Standards for Construction and Operation:** The SWATH AGOR is to be designed and constructed to commercial standards. The ship will be classed by ABS as a SWATH vessel for unrestricted ocean service and operation with machinery spaces periodically unattended. The ship will be certified in accordance with the Code of Federal Regulations, Title 46, Subchapter U, for international voyages and should comply with all applicable federal regulations. The ship will be manned by a civilian crew and scientists and technicians. Since the overall purpose of the ship is to put to sea as many scientists as possible, the crew size should be limited through use of automation.

c. **Maintenance and Reliability:** The ship will operate independently without fleet support often in remote areas and will be away from maintenance facilities for long periods of time. The ship is expected to average 300 or more days per year at sea with typical missions lasting up to 50 days. Low maintenance and high reliability are essential to achieve these goals.

d. **Deck Space and Equipment:** Oceanographic operations typically involve handling instrumentation packages over the side, over the stern, and/or through centerwells. The types of overboard handling gear typically used on oceanographic research vessels are A-frames, articulated davits, and telescopic hydrobooms. In addition, cranes are required to support these operations as well as handling instrumentation and stores on the working deck. Open and uncluttered deck space is needed to handle the numerous pieces of oceanographic equipment. Some of these systems are very heavy, while others are long and awkward.

e. **Environment:** The ship is intended to operate world wide on any ocean and should be designed to operate in the full range of winter and summer conditions. The ship is not intended to navigate in ice.

f. **Propulsion Plant:** The propulsion plant should be designed to allow precise speed control and operate efficiently over the full range of speed.

g. **Overboard Handling**: One of the primary tasks of an oceanographic research ship is to launch and retrieve boats and oceanographic packages either over the stern, over the side, over the bow, and/or through centerwells. The hull form, appendages, and propulsors should be designed to facilitate these operations.

h. **Economy of Operation**: The hull, propeller and machinery should be designed for low fuel consumption to minimize operating costs.

i. **Hull Mounted Sonars**: The hull, appendages, and propulsors should be configured to permit installation of hull mounted scientific sonars which may be installed during construction or in the future. The hull, propulsion, and machinery installation should be designed to meet acoustic requirements of sonars. Design features may include physical separation between machinery and sonars, single or double stage machinery isolation mounts, and structural damping treatments.

5.0 TYPICAL OCEANOGRAPHIC OPERATIONS

The SWATH AGOR will be called upon to support a variety of oceanographic research operations. A typical mission may concentrate on one particular area of study or may include a number of different disciplines. The following areas of investigation are typical:

a. **Physical oceanography** - Physical oceanography, the study of the physical properties of seawater, is probably the largest and most diversified of the basic divisions. It includes measurements of tides, currents, sea swell, temperatures, water densities, origin and circulation of water masses, sound propagation, transparency , and sea ice. Of major importance is knowledge concerning surface and subsurface currents, including point of origin, speed and direction. Long and short range wave forecasting are of utmost value for many marine operations, including military, commercial and scientific. Internal waves are similar to the commonly observed surface waves but occur beneath the ocean surface at the interface of layers of water of different densities at the sea-air boundary. Development of pressure operated wave indicators will provide new types of data for analyses. Water transparency, light penetration, light scattering and water color observations are aided by the use of photoelectric cells lowered to various depths. Such studies will assist in the determination of currents and provide clues to biological influences. Equipment used in support of these studies include conductivity, temperature, and depth (CTD) instruments which are lowered nearly to the ocean bottom and send data back to the surface via cable data conductor. In addition, an acoustic doppler current profiler (ADCP) which uses a hull-mounted transducer, may be used to determine current speed and direction as it varies with depth. Sea surface temperature indicators may be installed on the hull bottom.

b. **Chemical oceanography** - Chemical oceanography is concerned with the determination of the various constituents of sea water and their distribution. Analyses to determine nutrient concentration (phosphate, nitrate, silicate, etc.), pH, and concentration of dissolved gases (oxygen and carbon dioxide) provide information which aids in determining age, origin, and movement of water masses and their influences upon marine life. Equipment used in support of these studies include water samplers which are lowered independently, or as part of a group called a rosette, and are designed to retrieve samples at particular depths. In addition, an uncontaminated seawater system may be installed to provide a continuous flow of seawater unaffected by ship emissions.

c. **Biological oceanography** - Biological oceanography is concerned with both plant and animal life in the sea. Equipment used in support of this study include a variety of nets, sonar packages, and video systems which are typically towed behind the ship.

d. **Marine geology and geophysics** - This science is concerned with the shape, character, and history of the ocean bottom. Equipment used in support of this study include hull mounted single and multibeam echosounders which use sound waves to determine the shape of the bottom. Single beam units concentrate on a small area while multibeam units are capable of mapping very wide swath angles of up to 150 degrees. In addition, subbottom profilers can be used and consist of hull mounted low frequency transducers to penetrate the bottom and provide indication of layer thickness and composition. In addition, bottom core samplers can be used to determine composition and thickness of bottom layers. A variety of towed equipment can be used including seismic gear, magnetometers, and bottom dredges..

e. **Meteorology** - This science is concerned with the interaction of sea and air and the influence of each medium upon the other. Prevailing winds affect ocean waves and currents and sea water modifies air temperature. Solar radiation affects temperature and influences the biological environment. Meteorological information generally accompanies all oceanographic observations and includes air temperature, wind direction and speed, atmospheric pressure, cloud types, and visibility. The equipment used in support of this study consists of a multisensor instrument package installed high on a mast in the forward part of the ship.