UNIVERSITY - NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

UNOLS FLEET IMPROVEMENT COMMITTEE

Meeting Summary Report

12-13 November 1998

Renaissance Hotel
Baltimore, Maryland

Meeting Report
UNOLS
FLEET IMPROVEMENT COMMITTEE
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Appendices

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V. AGOR 26 Design Status

12 November 1998

Opening Remarks - The UNOLS Fleet Improvement Committee (FIC) met in the Renaissance Hotel in Baltimore, MD on 12-13 November 1998. FIC Chair, Larry Atkinson, opened the meeting at 9:00 am with introductions and a review of the agenda. The agenda is included as ***Appendix I*** and the meeting participant list is provided in ***Appendix II.***

Accept Minutes -The FIC minutes from the November 1997 meeting were accepted as written.

UNOLS Report — Bob Knox, UNOLS Chair, provided a summary of the activities of UNOLS. This has been a year of change that included elections for a new UNOLS Chair, with Ken Johnson's term ending. Ken Johnson had made great progress in building new UNOLS partnerships in response to funding shortfall predictions. Partnerships with NAVO and NOAA have matured and now represent a substantial part of the UNOLS activity. The UNOLS Office will move in the year 2000 as dictated by the Charter. The solicitation process to find a new office is in progress.

NSF is participating in a Fleet Review that is examining the very structure of the UNOLS concept and the way NSF arranges for ship time. The review is in progress and difficult to gauge at this time, however, it is not likely to lead to major perturbations of the system. Its recommendations could well have a positive affect on Fleet operations.

Ship scheduling has continued to be a problem as funding restraints have increased the need for more schedule scrutiny. There is always an effort to balance the scientist's needs and desires with efficient schedules. A revised scheduling procedure will be tried next year that will delay the posting of schedules until more funding information is available. Conflicts are inevitable as schedulers juggle multiple agency ship needs

with competing science programs. EWING took on commercial work in 1998 to fill in a weak schedule. The question continues to be asked as to whether or not UNOLS should maintain the current size fleet or reduce the size to only accommodate the traditional customers of NSF and ONR. It is believed that the larger fleet provides more flexibility and ultimately more cost-effective ships for the academic community. This is an issue that can be addressed by the FIC.

This is an exciting time for oceanography. The oceans are receiving a lot of interest at the highest levels of the Government. The National Oceans Conference was held in Monterey and was attended by the President. The Year of the Ocean has been active in publicizing ocean research. This year the Navy's 6.1 funding support is high. A "Stratton II" study has been recommended.

On the down side, NSF proposal success rates are declining. The question of whether cubicle science is on the rise is being asked. Major assets of the fleet are operating at less than full utilization as demonstrated by the lay-up of KNORR in 1999.

Bob concluded by emphasizing the importance of continuing to nurture and build partnerships and planning for the Fleet of tomorrow.

Agency Reports

National Science Foundation — Don Heinrichs provided the report for NSF. Dick West retired in October. His work will be divided between Dolly Dieter and Sandy Shor until a new person is hired. The office will be restructured and responsibilities realigned. NSF has concluded that the ship inspection program must be contracted directly by NSF and therefore the current contract will be re-competed. NSF science program managers will be involved in future inspections.

The last meeting for the NSF Academic Fleet Review is scheduled for 2-3 December at the University of Rhode Island. Consultant Bill Humphries will make a presentation on a financial analysis of the Fleet operations. The second day will be spent organizing key points and beginning the report. At the second Fleet Review meeting, the committee examined other fleets including those of NOAA, NAVO, Canada, NERC (UK) and commercial operations to provide a comparison. Recommendations will likely be made on the overall size of the fleet and re-competition of the present ships.

The NSF research budget is up approximately 9% for 1999. There is $22M in the budget for Arctic logistics. Ocean science is anticipating an increase of about 6%. Decisions on the distribution of this increase have not yet been made.

Don provided viewgraphs, ***Appendix III***, which give the results to a survey of the oceanographic community on the UNOLS Fleet and operations. Four concern areas were of identified: 1. Instrument improvements, 2. Technical support, 3. Scheduling

(too many scenarios) and 4. Institutional oversight of ship operations. The responses indicated the need for more consistent quality of technical support as well as the need for more technicians. The community is concerned with next generation submersibles, replacements for the intermediate ships and ship requirements for the Great Lakes and estuaries. On the whole, Don noted that everyone is quite pleased with the UNOLS system.

The Division of Ocean Sciences held a "Futures" workshop to look into science for the next ten years. These were Physical Oceanography (APROPOS), Chemical Oceanography (FOCUS), Marine G&G (FOMAGES) and Biological Oceanography (OEUVRE). A small committee headed by Peter Brewer and Ted Moore will be synthesizing these reports. The results of this committee are expected in late 1999 and will include funding priorities. These workshops have been identifying facility needs and UNOLS will need to keep abreast of their results.

Office of Naval Research/Oceanographer of the Navy — Pat Dennis provided the ONR/OON report. The Navy endorses the concept of competition and re-competition of ships. The process has been effective in reducing costs and increasing efficiency. Pat gave examples of the contributions made by institutions in return for being selected as ship operator. The Navy's research survey fleet is completing its current replacement plan. There had been 12 ships in their fleet and at the end of their modernization program their fleet will consist of eight ships. The final ship, TAG 65 is in the budget. TAG 64, BRUCE HEEZEN, is completing construction and TAG 63, HENSON, has joined the fleet.

In the past ONR provided 55% of the cost of ship time from Facilities while the science programs paid 45%. This has now been changed to 80% Facilities funding. SEA CLIFF has been transferred to WHOI. A study will be funded to see if ALVIN and SEA CLIFF can be married in some way that would enhance the capabilities of deep submergence science. Pat reported that the SCICEX program, where scientists have been taken to the Arctic Ocean in a nuclear submarine, has been very successful. The last cruise in this 5-year program will be conducted in 1999.

The National Oceanographic Partnership Program (NOPP) provided $7.5M in 1998 for NAVO's use of the UNOLS Fleet and data processing. The Navy is very pleased with results of this program. It will continue in 1999 at the same level, however, future funding is unclear. CDR Jim Trees of NAVO will be retiring in the spring.

RADM Jerry Ellis is now the new Oceanographer of the Navy. Rick Spinrad will relieve Ed Whitman, as OON Technical Director. At ONR, Tim Pfeiffer will replace Andy Silver.

National Oceanic and Atmospheric Administration (NOAA) - Jim Meehan of NOAA/NMFS provided the NOAA report. NOAA's National Ocean Service (NOS) has set up a new office named the Office of Science and Coastal Ocean Survey headed

by Don Scavia. This program has identified a need for highly capable coastal vessels with shallow draft. There is a new emphasis on fisheries and fish habitat. There is also an effort to identify what equipment is needed to enhance fishery studies. Jim commented on R/V BROWN's capabilities and reported that a doppler radar that profiles the upper winds.

RADMs Stubblefield and Albright will be retiring in the spring. A selection process is in progress to select their replacements.

United States Coast Guard (USCG) — Jon Berkson provided the report for the USCG. HEALY is scheduled for delivery on 30 June 1999. The ship will undergo four testing phases and will be ready for unrestricted science use in January 2001. POLAR SEA will make an Arctic cruise in 1999 and will be available for Science of Opportunity (SOO). Jon expressed a need for expeditionary planning in the science community.

FIC Issues:

NOAA/National Marine Fisheries Service (NMFS) Update — Jim Meehan provided the update on NMFS. An increased effort is needed for fish stock assessment, fish recruitment and fish habitat. More contracted ship time is expected to accomplish these tasks. Congress has allocated funds for the acquisition of new ships. The acquisition program will include four ships over a four-year period. The class will be designated FRV-40. Jim's viewgraphs are included as ***Appendix IV***. The ships will be required to meet ICES noise specifications. They must be mission capable for hydro-acoustic fish surveys, deep-water trawling, deep-water hydrography, oceanography, fish stock assessment and marine mammal observation. A centerboard with a transducer will be used to reduce ship's motion and reduce ship's noise. Deck gear will include trawl winches, a net reel, winches, deck cranes, fish sorting and measurement systems, long-lining gear, winch instrumentation, and a stern gantry. Laboratory spaces will include a catch processing area, wet and dry labs, a clean lab, hydrography lab, acoustic processing lab, computer lab, and bait and specimen freezers. The sonar systems suite will include a scientific sounder, doppler profiler, trawl net monitor, fish finder, bottom profiler, and doppler speed log. DPS is required to hold station for water column work.

The ships will likely require two years of side by side work with the older ships to properly calibrate the systems for fish assessment purposes. Ship models have been constructed and will be tested at David Taylor Facility.

The Requirements Document, which provides the ship's principal characteristics, has been completed. A statement of requirements is in progress. The ships will have 3000 hp engines and are expected to be 2500 GT. There will be 38 bunks. The ships will be government owned, however, the operator and homeport is yet to be determined. NOAA is planning a 270 Days at Sea (DAS) operating year, roughly equivalent to 300

UNOLS operating days. The first ship is to be funded in the 2000 budget with three years for construction.

Comments from Dr. Craig Dorman (ONR) on NOAA Fleet Requirements - Dr. Craig Dorman, Sr. Scientist at Penn State and currently an IPA at ONR, provided his thoughts on NOAA's fleet requirements. Dr. Dorman had been asked to study NOAA's FRV construction plans and comment to OMB. Dr. Dorman began by stating that NOAA will need new state of the art Fisheries Research Vessels (FRVs) to fulfill their mission. The FRVs that NOAA has designed are superb, acoustically quiet platforms. Dr. Dorman reported that he feels the academic oceanographic community and the fisheries research community need to work more closely together. He noted that the GLOBEC and FOFCI programs combine oceanography and fisheries very successfully. However, it requires energy and effort for the two communities to successfully interact and develop a strong partnership.

Dr. Dorman reported that he disagrees with NOAA's requirement for six new FRVs. In his opinion four vessels are sufficient at this time. For example, mammal watching does not require a sophisticated FRV platform and can be supported by other vessels.

Dr. Dorman continued by reporting on NOAA's non-fishery vessel fleet. He has recommended that as NOAA retires their ships, they should consider chartering to meet their survey needs. Small boats (30 - 60-ft) could accomplish much of their bottom mapping work. NOAA has a sufficient deep-water capability with BROWN and KA'IMIMOANA. They also have two vessels for swallow water work, FERREL and McARTHUR; however, both of these vessels are slated for retirement in 2003. They will need to consider coastal replacements ships. There is a direction towards long term observatory research and facilities with insitu and remote capabilities. NOAA/PMEL is doing more and more atmospheric type work. What will be the role of the fleet to meet these future requirements? An initial report is expected out in the early part of 1999. Dr. Dorman said that any suggestions would be accepted.

There was continued discussion on the coastal oceanography facility needs. NOAA's mission requirements for coastal vessel replacement have not been defined; however, a sophisticated capability with the ability to accommodate science parties of 10-15 people is envisioned. Dr. Dorman recommends that NOAA work with the academic community in developing these SMRs. A NOAA hydrographic capability is needed, but this can be adopted by an institution. In his opinion, NOAA has the potential to be a much larger partner with the academic community, on the level of NSF and ONR.

Dr. Dorman ended by noting that it is essential that NOAA and UNOLS work together. His fisheries report and hydrographic survey vessel report are both completed. OMB has not released the findings at the time of the FIC meeting.

Bob Knox also emphasized the importance of working with NOAA in their plans to replace their coastal vessel. A meeting is planned with Don Scavia and Dave Evans of NOAA on 30 November and these issues will be discussed.

Dr. Dorman recommended that UNOLS aggressively pursue the FRVs. He feels that that NOAA's new Alaska and New England FRVs will be fully utilized for fish counting. However, a Gulf FRV could have an oceanographic element.

AGOR —26 Status Report — Robert Hinton provided the status report for AGOR-26. His viewgraphs are included as ***Appendix V.*** Congress appropriated $45M for the construction of a SWATH research vessel. The University of Hawaii won the competition to be the operator of this ship. An award was made in May 1998 for a Lockheed Martin/Ingalls team to design and build the ship. The effort includes the active participation of NAVSEA, ONR, University of Hawaii and UNOLS. The $45M appropriation includes approximately $5M for ship equipment. Ingalls construction estimates for the Lockheed Martin design were well in excess of the funds available. Three other shipyards have since indicated an interest in building the ship. These yards will be given a specification package for pricing. By January, we should know if the project would be able to stay within budget and proceed.

The ship design has been evaluated for ways to cut costs. Reducing its size is not considered an option. A ship of less size will not be able to accommodate the operating rigors of the central Pacific. Additionally, there are not much savings in reducing the ship size since the steel costs are not a large portion of the construction budget.

Robert's viewgraphs (***Appendix V***) include an organization chart, the design operational capabilities, mission description, equipment list, layout drawings, vessel comparison chart, and milestone chart.

Alaska Science Mission Requirements (ASMR) Committee Report — Tom Weingartner provided the report for the Alaska Science Mission Requirements (ASMR) committee. The ASMR committee includes Vera Alexandra (Co-chair), Tom Weingartner (Co-chair), Larry Atkinson, Jon Christensen, George Hunt, Ken Johnson, and Jim Meehan (NOAA). Other contributors to the SMR development include Bob Dinsmore, Joe Coburn, and R. Ellsner.

The requirements call for the vessel to be capable of conducting oceanographic research as well as fisheries oceanography in the North Pacific Ocean including the Gulf of Alaska, the Bering Sea, the Chukchi Sea and the Beaufort Sea. The ship should be capable of operating year-round in open water and in seasonally ice-covered seas. Open water operations require a stable platform. The environmental conditions for the operating area will require that the ship operate in temperatures of 90°F to - 25°F. The vessel should be able to operate in seasonal sea ice of up to three feet thick. A Class III vessel is called for with a size of approximately 180-ft LOA, 1600 gross tons, and a 13-foot draft. The ship should be able to accommodate a science party of 18 to 20

people. The endurance requirements are 45 days (75 days hotel service). The total lab area requirements indicate 2000 square feet; with a main lab of 1000 sq. ft; analytical lab, 200 sq. ft; wet lab, 500 sq. ft; and the electronics/computer lab, 300 sq. ft.

The science features of the SMRs include a general oceanographic capability, a fisheries capability, and ice strengthening. The fisheries capability will require a quiet hullform, acoustically quiet to ICES specifications, and a trawling capability. Crabbing and long-lining from the vessel is not planned. It was noted that the fisheries capability would be useful to the academic community.

The final draft of the Alaska SMRs is near completion. Comments from the FIC have been incorporated.

East Coast Science Mission Requirements (ECSMR) Committee Report — Larry Atkinson provided the status of the ECSMR committee efforts. He began by reporting that there was a big response to the call for volunteers to participate in the East Coast SMR development. The ECSMR Committee includes Larry Atkinson, Chair; Charlie Flagg; Al Hines; Gus Paffenhofer; Clare Reimers; and Mary Scranton. The committee is made up of sea-going scientists, not shipbuilders. As a result, the committee recognized that some of the requirements that they were specifying may not be feasible and would have to be reviewed by someone with naval architecture experience. Joe Coburn was asked to comment on the SMRs and his input is being incorporated.

The committee was asked to review the UNOLS Coastal Workshop report of 1994 as well as other existing SMR documents in developing the new requirements. The committee recognized the need for the smaller estuary, shallow water vessels; however, they also see the need for a larger platform for work on the shelf and slope. The committee focused its attention on establishing requirements for a vessel to work on the east coast shelf and slope. There are a number of factors driving the ship size. The interdisciplinary nature of the research to be conducted will require larger science parties. The rough sea conditions that are often experienced on the east coast shelf also will dictate a larger, stable platform. Since most of the work will be restricted to no further than the slope, the requirements for the ship's range are somewhat reduced from the range of the current intermediate ships. The committee saw the need for an ROV handling capability. An expert in ROV handling was consulting to define the requirements.

FIC — Directions for the Future:

Review FIC Terms of Reference - Larry Atkinson reviewed Annex IV to the UNOLS Charter, which serves as the Terms of Reference for FIC. It was recognized that an update to the Annex would be needed to more accurately define today's role of FIC. The committee reviewed, Section 2 of Annex IV, which defines the purpose of the committee. It states that the Committee should maintain the currency of a dynamic UNOLS Fleet Improvement Plan. This has proven to be a difficult task. Annex IV

requires that the plan include an assessment of the number and mix of ship capabilities needed in the UNOLS fleet. The FIC has found that it can assess the current mix, but trying to accurately predict future facility needs has been not fruitful. Another purpose of FIC stated in Annex IV is for the committee to consider means for acquiring needed vessels, including new construction, modification to existing ships, conversions, private acquisition and leasing. The FIC felt that this should not be the role of the committee and that it might more appropriately fall under the role of the Council. The committee agreed that some of the items in Annex IV are still realistic terms for FIC. These included development of SMRs, conceptual plans, and preliminary ship plans, and development of a schedule for improvement and replacement of vessels so as to assure continuing fleet excellence.

After considerable discussion, it was recommended that a UNOLS Fleet Assessment Report be generated. This report would replace the traditional Fleet Improvement Plan. It could help to determine what facility needs are not being met and what may be needed to meet future oceanographic research needs. It was recommended that a matrix of ships vs. capabilities and geography be compiled to help determine needs. The results of NSF's "*Futures*" report could be applied to the assessment. The implementation plan for the *Futures* study will address facilities (not just ships). It was suggested that a member of the *Futures* committee or Mike Purdy be asked to provide a summary to FIC at a future meeting. Bob Knox will send a letter to Mike Purdy at the appropriate time. The FIC assessment report could address the status of the fleet, what facilities are aging or becoming obsolete, regulatory changes and their impact, changes to SMRs that are needed, technical support needs, and any identifiable shortfalls. The committee agreed to think about the assessment report overnight and readdress the topic later in the meeting.

Wednesday, 13 November, 1998

Ship Construction Project Updates:

R/V SAVANNAH — Contracting for construction of Skidaway's vessel SAVANNAH (BLUE FIN replacement) has been a challenging process. One shipyard bid on the construction package for the ship. The bid was significantly higher than the amount the state of Georgia had planned to fund the project. As a result, the project is in negotiation to resolve the funding shortfall situation.

CALANUS Replacement — Model tests for the CALANUS replacement design have been conducted. The design calls for a 78-foot catamaran. The project will be funded with the proceeds from the sale of ISELIN as well as private donations. Miami is now looking for a shipyard for construction of the vessel.

R/V CONNECTICUT — The University of Connecticut will soon take delivery of their new vessel, CONNECTICUT. They are considering making this ship a UNOLS

vessel. The FIC noted that there are quite a few small, local, near-shore type vessels entering or about to enter the picture; BLUE HERON (U.Minn, Duluth), GULF CHALLENGER (UNH), ODU vessel, SAVANNAH (Skidaway), CALANUS replacement (U.Miami), and SUNCOASTER replacement (FIO). The impact of potential additions to the Fleet will need to be evaluated.

WHOI SWATH — Joe Coburn reported on the status of WHOI's plans to build a SWATH vessel. WHOI hired a naval architecture firm to develop a SWATH design. The vessel design specifications call for:

LOA:	105-ft
Beam:	51-ft
Shallow Draft:	~9.5-ft
Max. Speed:	13 knots
Cruise Speed:	12 knots
Work deck:	2,000 sq. ft
Endurance:	15 days
Range:	1,000 nm

The final design of the WHOI SWATH is being completed and model tests have been conducted in Norway. Joe showed the test results and noted that the model performed well and exceeded it goals in the sea states indicated for its intended mission. In fact, it is predicted that the SWATH may provide a more stable platform for winter work on Georges Bank than an intermediate ship. This was a driver in the design of this vessel.

The daily operating cost of the ship is expected to be in the range of $2K to $4K with a four-person crew. A variable draft is planned. The design appears to present wet deck slamming in rough seas, but with a variable draft capability, the air gap between the deck and water can be increased to reduce the problem. The final design of the vessel is near completion and construction can begin as soon as funds become available. However, it was noted that shipyards are quite busy at this time and finding an available yard may not be an easy task.

Joe noted that there is a lot of interest for this vessel in New England from Navy labs, Gulf of Maine institutions, USGS, WHOI, etc. There was discussion on the management issues of the SWATH. The FIC discussed whether or not they should encourage WHOI to make this a UNOLS vessel. FIC recognized that the vessel could be a useful asset to the community. **The FIC recommended that Larry draft a letter to WHOI indicating that they make the SWATH a UNOLS vessel.**

The UNOLS Biennial Review of Seagoing Oceanographic Research Facilities — Larry Atkinson shared his thoughts on FIC's task to develop an assessment report of oceangoing facilities. He suggested that the assessment report be titled, "The UNOLS Biennial Review of Seagoing Oceanographic Research Facilities." The goal of the report is to inform the research community, funding agencies and operators on the state

of sea going research facilities and how these facilities may meet future research needs. The report will:

- Assess the capability of seagoing facilities now and for the coming decade.
- Assess trends in research requirements and how the facilities will meet those requirements.
  - ➢ Inform researchers on upcoming changes in facilities and new technologies being included in ship design.
- Advise funding agencies on future requirements and areas needing R&D.
- Inform operators on future trends and global and regional scenarios so they may better plan their future.

Possible topics for the report were identified:
1. Trends in facility use: what we have, how we use them, and how long they will be around, and what is coming.
2. Future Research Requirements: from four reviews: technology, platform, regional focuses, new modes (returning to vents).

Possible sub topics and chapters for the report might include:

- Ship replacement and refit schedule noting the Intermediate Class ship Issue.
- New regulations and their impact (IMO).
- Fisheries oceanography and NOAA Fleet
- NOAA hydrosurvey
- Technical support — RVTEC science side
- ROV/AUV's
- LEO's
- Dynamic positioning
- PI supported technology (i.e. ADCP, SeaBeam). More shipboard technicians? Dedicated groups?
- New assets — HEALY, AGOR-26 (FIC involved in design phase as appropriate)
- Coastal and Estuarine vessels — new opportunities
- Coring
- Navigation/GPS
- Agency needs
- Conclusions, recommendations and findings/summary

General Business:

Recap of FIC Action Items:

Long Range FIC Agenda Items - The FIC determined that many of their long-range agenda items have been taken over by events. The FIC will devote their attention to drafting the facilities assessment report. This could become a living document.

They discussed the time schedule for developing the assessment report. The results of the NSF Fleet Review should be ready in early 1999 and the *Futures* report should be ready in the next couple of months. The results of both of these studies would be useful in developing the assessment report. In January, Larry will post the assessment topics with a sentence explaining each on the OMNET, Sciencenet bulletin board. The FIC will then have an opportunity to comment on the outline and sign-up for topics that they would like to address. An announcement will be sent to the community asking for volunteers to contribute to the writing of the report.

Science Mission Requirements (SMR) - The final draft of the Alaska SMRs will be sent electronically to the FIC and then to the Council for endorsement. The East Coast SMRs will go through the same process when ready.

FIC Membership Terms - There are two vacancies on the FIC. It was decided to wait until the outline of the assessment report was available before filling these positions. We will then send a letter to the list of past volunteers to let them know what the committee is involved with. We can also ask for additional volunteers through the UNOLS Newsletter.

Schedule of Next Meeting - It was suggested that the next meeting of the FIC should be held at the shipyard selected for construction of the AGOR 26 SWATH. Another possibility would be to visit the MBARI SWATH. If possible a short cruise to fully experience the SWATH capabilities would be useful.

Appendix I

Revised 11/4/98

Fleet Improvement Committee
Mt. Washington Conference Center
Baltimore, Maryland 21209
November 12-13, 1998

THURSDAY, 12 November

9:00 am **FIC Welcome and Introduction** - Larry Atkinson will welcome the Committee and review the meeting's agenda.

9:05 am **Accept Minutes** - Accept the minutes of the November, 1997 FIC Meeting.

9:15 am **UNOLS Report** - Bob Knox, UNOLS Chair, will report on UNOLS activities over the past year and plans for the future.

9:30 am **Agency Reports** - NSF, ONR, NOAA, and USCG representatives will provide agency reports.

10:15 am **Break**

10:30 am **FIC - Directions for the Future** - Bob Knox and Larry Atkinson will discuss the role and future directions of FIC. The long-term agenda items identified in the last meeting will be reviewed.

11:30 am **NOAA/National Marine Fisheries Service Update** - Jim Meehan from the NMFS will comment on NOAA's Fishery Needs and report on the status of their vessel construction efforts.

12:00 pm **Lunch**

1:00 pm **Comments from Dr. Craig Dorman (ONR) on NOAA Fleet Requirements**

1:30 pm **AGOR 26 Status Report** - Robert Hinton will report on the status of design and construction efforts of AGOR 26. His report from the September UNOLS Annual Meeting is attached, ***see enclosure 1***.

2:00 pm **Alaska Science Mission Requirements (ASMR) Committee Report** - Tom Weingartner will review the draft ASMR and open it for committee discussion/endorsement. Follow-up actions will be discussed.

2:30 pm **Break**

2:45 pm **Alaska Science Mission Requirements (ASMR) Committee Report continued.**

3:15 pm **East Coast Science Mission Requirements (ECSMR) Committee Report** - Larry Atkinson will provide the status of the ECSMR Committee efforts and will review the draft SMRs. There will be a discussion on follow-up activities.

4:30 pm **FIC Response to the Day's Discussion**

Friday, 13 November

9:00 am **Ship Construction Project Updates**

- **R/V SAVANNAH** - Report on the construction status of Skidaway's vessel SAVANNAH.
- **CALANUS Replacement** - Report on Miami's plans for replacement of CALANUS.
- **WHOI SWATH** - Joe Coburn will report of the status of WHOI's plans for construction of a regional SWATH vessel.

9:30 am **Review of Ship Use Trends** - As part of the on-going NSF Academic Fleet Review the UNOLS Office compiled a series of statistics on use of UNOLS ships. These figures will be reviewed.

10:00 am **Break**

10:15 am **Near and Long-Term FIC Agenda** - The committee will discuss FIC agenda items and assign tasks.

- **Fleet Improvement Plan Update** - Discussions will focus on how to proceed with the update and how to address the following areas:
  - Ship use trends
  - UNOLS Fleet Characteristics
  - Cycles for ship replacements and refits
  - The present fleet situation
  - Political Implications
  - Specialized facilities and technologies
- **SMR Development** - Are additional SMRs required to meet future oceanographic research requirements?

12:00 pm **Lunch**

1:00 pm **Review FIC Terms of Reference** - The FIC Terms of Reference (UNOLS Charter, Annex IV) will be reviewed to determine if they are still current (***see Enclosure 2***).

1:30 pm **General Business**

- Review of FIC Member Terms - A replacement is needed for Suzanne Strom
- Scheduling of Next Meeting
- Recap of FIC Action Items

Adjourn

Appendix II

FIC - Nov. 12-13, 1998

NAME	INSTITUTION/ORGANIZATION	PHONE/FAX/E-MAIL
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Appendix III

Fleet Review Meeting

Scientist Survey: Progress Report

- **31 Responses to Date**
- **17 Institutions Represented**

  SIO (6), WHOI (3), Skidaway (3), HBOI (2), Texas (2), Brown (2), and 1 each from Delaware, OSU, URI, LUMCON, LSU, Maryland, Minnesota, New Hampshire, OGI, NOAA, NAVOCEANO

- **Additional Responses Expected**

Fleet Review Meeting

Scientist Survey - General Themes

UNOLS System:

- **Effective System, Capable Ships**
- **Projects Completed Successfully**
- **Responsive, Capable Ship Crew and Technical Support**
- **Institution Involvement Positive Factor**
  - **Responsibility of Users Key to Success**

Fleet Review Meeting

Scientist Survey - Negative Comments

UNOLS

- Contract crew inexperienced, Gyre
- Poor for estuarine research, Sproul
- Some ops take "life of their own" (caution)
- Poor ops quality of early '90s has now improved, Wecoma

Non-UNOLS

- Contract crew problems, 3 examples
- Separation of crew, techs, science and "remote" captain, Palmer
- "Stiffness" - Palmer, commercial
- Coast Guard icebreaker "tales"

Fleet Review Meeting

Scientist Survey - Support Issues

Instrument Improvement

- Shipboard sensors, including ADCP, GPS
- Multibeam systems
  - Deep and shallow
- Multichannel seismic reflection
  - High and low res
- Equipment upgrades

Technical Support

- More consistent quality of personnel
- More technicians needed for basic support
- Preserve stability and capability of support to technician groups

Fleet Review Meeting
Scientist Survey - Other Issues

UNOLS Scheduling

- Too many scenarios
- Eliminate preliminary scheduling process

Institution Ship Committee Oversight

- Need to strengthen
- Expand to include users from outside operator institution

Fleet Review Meeting
Scientist Survey - Capability Issues

- **Improve Deep Submergence**
  - **Both Deep & Shallow (New Capabilities)**
- **Replacement of Intermediate Ships**
  - **Next Generation Requirements**
- **Estuarine/Lake Ships Lacking**
  - **Don't Overlook**

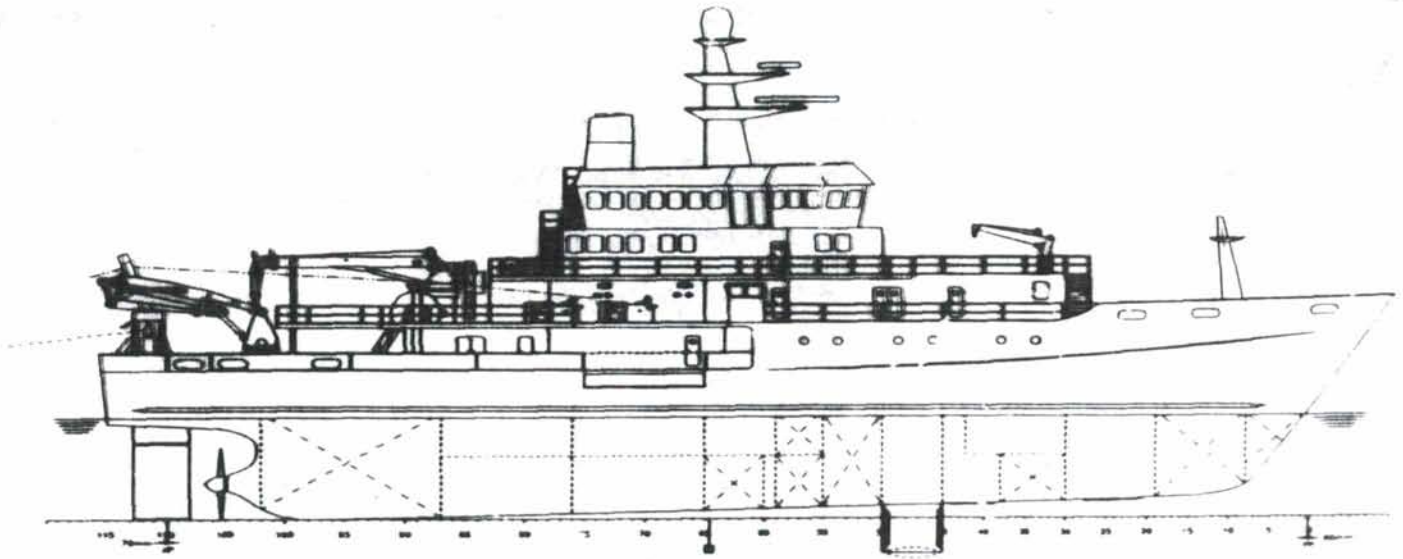
Fleet Review Meeting

Scientist Survey - Neutral Comments

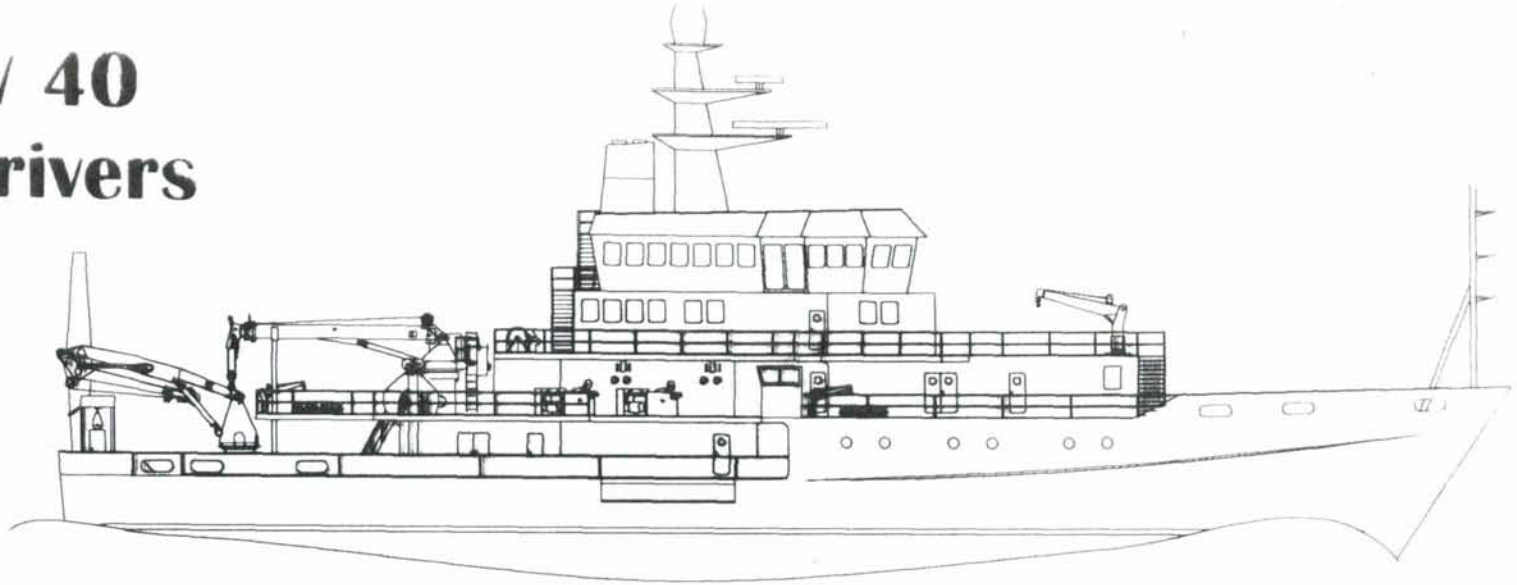
- **Several said they had acceptable experiences on research vessels operated by France, Canada, Germany, commercial operators and UNOLS.**

Appendix IV

Fisheries Research Vessel Acquisition Program



NOAA FRV 40
Design Drivers



Ship Design Standards
- SOLAS
- IMO
- MARPOL
- USCG

Flooding Prevention
Rescue Equipment
Stability Features
Communications Gear
Pollution Control Systems

Acoustic Requirements
- ICES Underwater Noise
- IMO/USCG Airborne Noise
- Sonar Self Noise

Quiet Hullform
Highly Skewed Propeller
Electric Drive Propulsion
Piping System Isolation
Acoustic Insulation
Centerboard for Sonars

Mission Capabilities
- Hydroacoustic Fish Surveys
- Deep Water Trawling
- Deep Water Hydrography
- Deep Water Oceanography
- EEZ Fish Stock Assessment
- Marine Mammal Observation
- Range & Speed

Commercial Size Trawling Gear
Oceanographic & Hydrographic Winches
Scientific Laboratory Spaces
Crew & Scientist Accommodations
Fuel Tankage, Storage Volumes

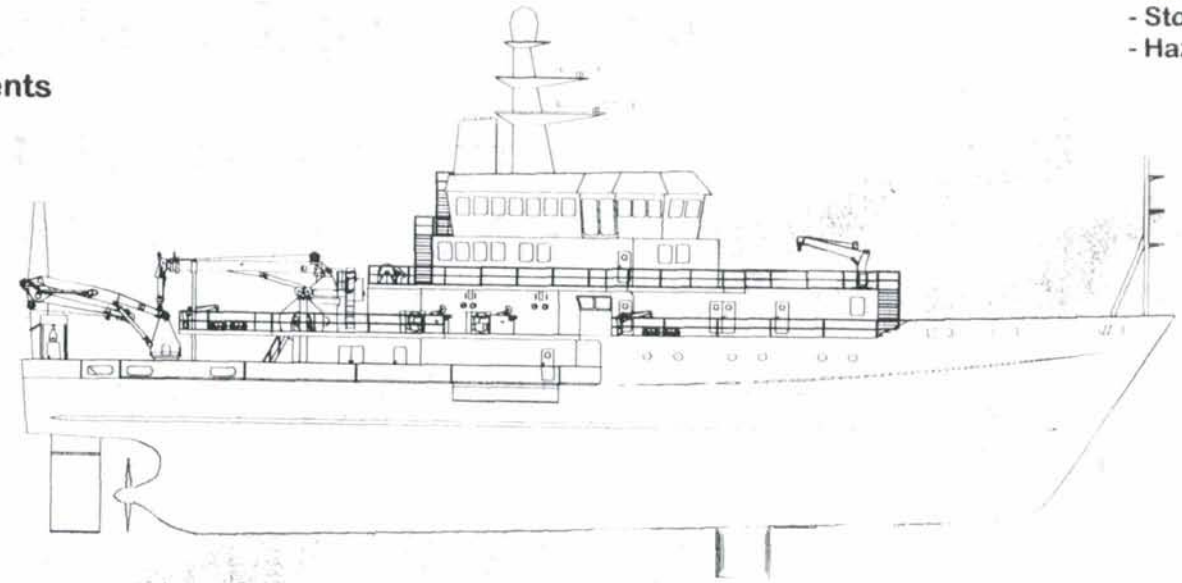
NOAA
FRV 40

NOAA FRV 40
Elements of Ship Construction

Group 400 - Electronic Systems
Includes:
- Ship's navigation systems
- Ship's communication systems
- Ship's alarm systems
- Scientific sonars
- Scientific positioning systems
- Scientific nav/com systems
- Laboratory electronics

Group 600 - Outfitting
Includes:
- Painting
- Insulation
- Berthing & messing space
- Storerooms
- Hazmat storage

Group 000 - General Administrative Requirements
Includes:
- Contract management
- Warranty
- Design control
- Logistics support
- Test & trials
- Weight control
- Noise control



Group 100 - Hull
Includes:
- Steel structure and plating
- Machinery foundat

Group 500 - Auxiliary Systems
Includes:
- Piping systems
- Fuel & lube systems
- Steering
- Refrigeration
- Ventilation
- Scientific winches
- Cranes & booms
- Mooring systems
- Rescue boat
- Pollution control

Group 200 - Propulsion Plant
Includes:
- Diesel engines
- Propulsion motor
- Propeller & shafting
- Machinery control system
- Propulsion support systems

Group 300 - Electrical Systems
Includes:
- Generators
- Switchboards
- Lighting systems
- Power distribution systems

FRV NOISE REQUIREMENTS

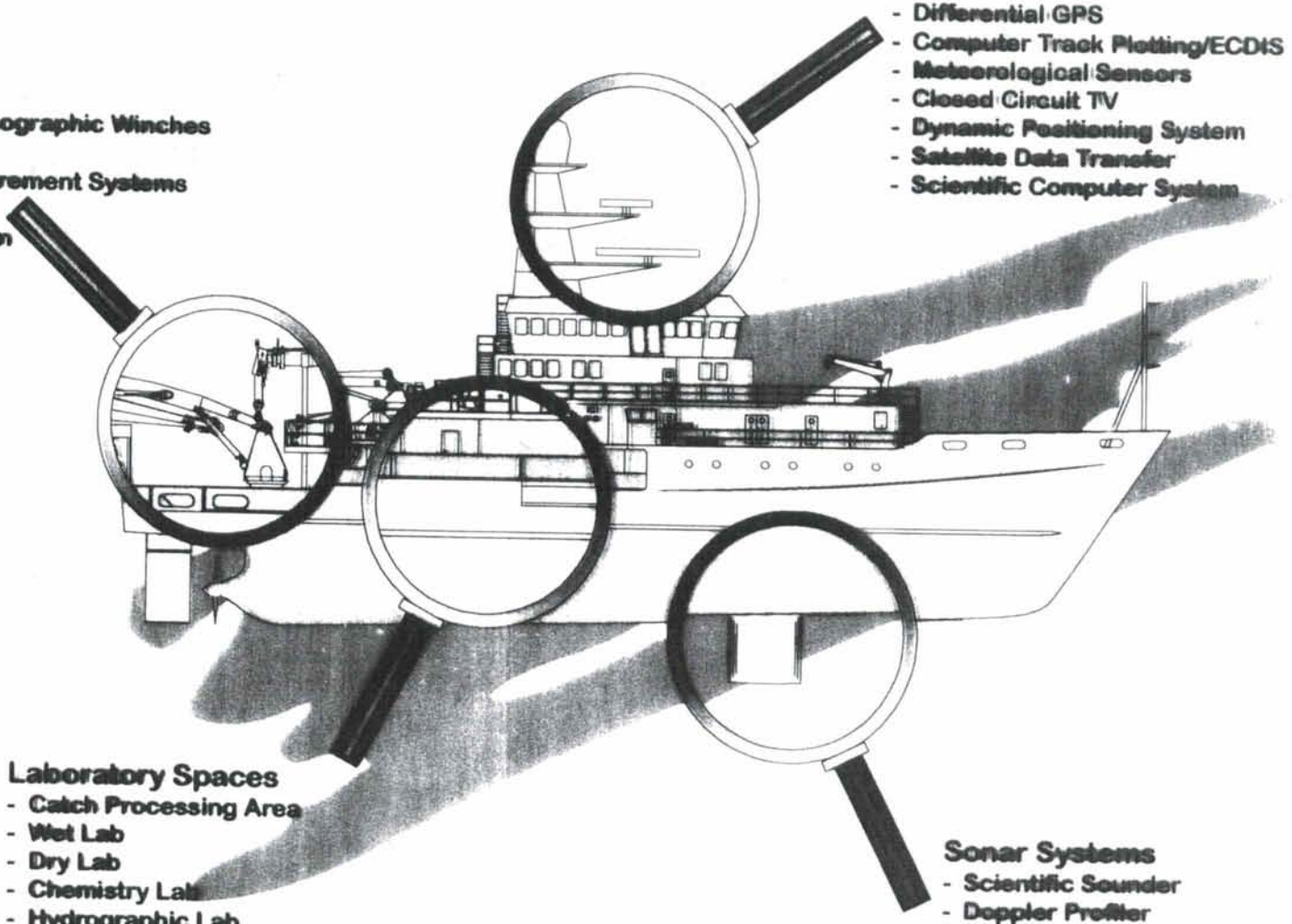
ICES Noise Specification

- Low Frequency Requirements
  - Fish show an avoidance reaction when threshold of hearing exceeded by 30 dB or more
  - Commercial fish species, i.e. cod, herring, hear between .1 Hz and 1.2 kHz, with maximum sensitivity between 20 Hz and 1.2 kHz
- High Frequency Requirements
  - Acoustic instrumentation operates at high frequencies, greater than 10 kHz
  - High frequency noise can degrade sonar performance

NOAA FRV 40
Scientific Systems

Deck Gear
- Trawl Winches
- Net Reel
- Auxiliary Winches
- Hydrographic, Oceanographic Winches
- Deck Cranes
- Fish Sorting & Measurement Systems
- Longlining Gear
- Winch Instrumentation
- Stern Gantry

Navigation/Communication Systems
- Gyrocompasses
- Heave/Roll/Pitch Sensor
- Differential GPS
- Computer Track Plotting/ECDIS
- Meteorological Sensors
- Closed Circuit TV
- Dynamic Positioning System
- Satellite Data Transfer
- Scientific Computer System

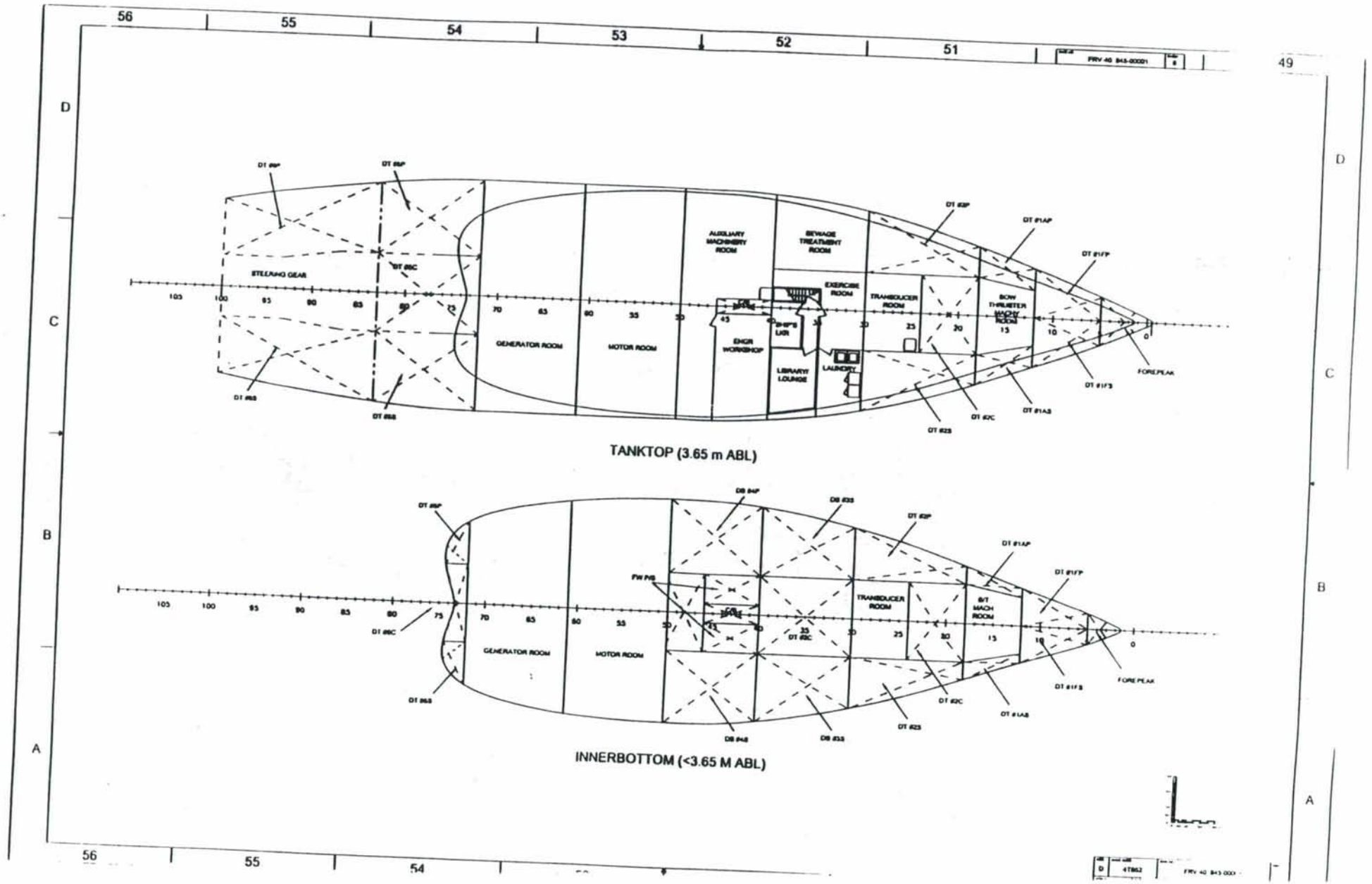


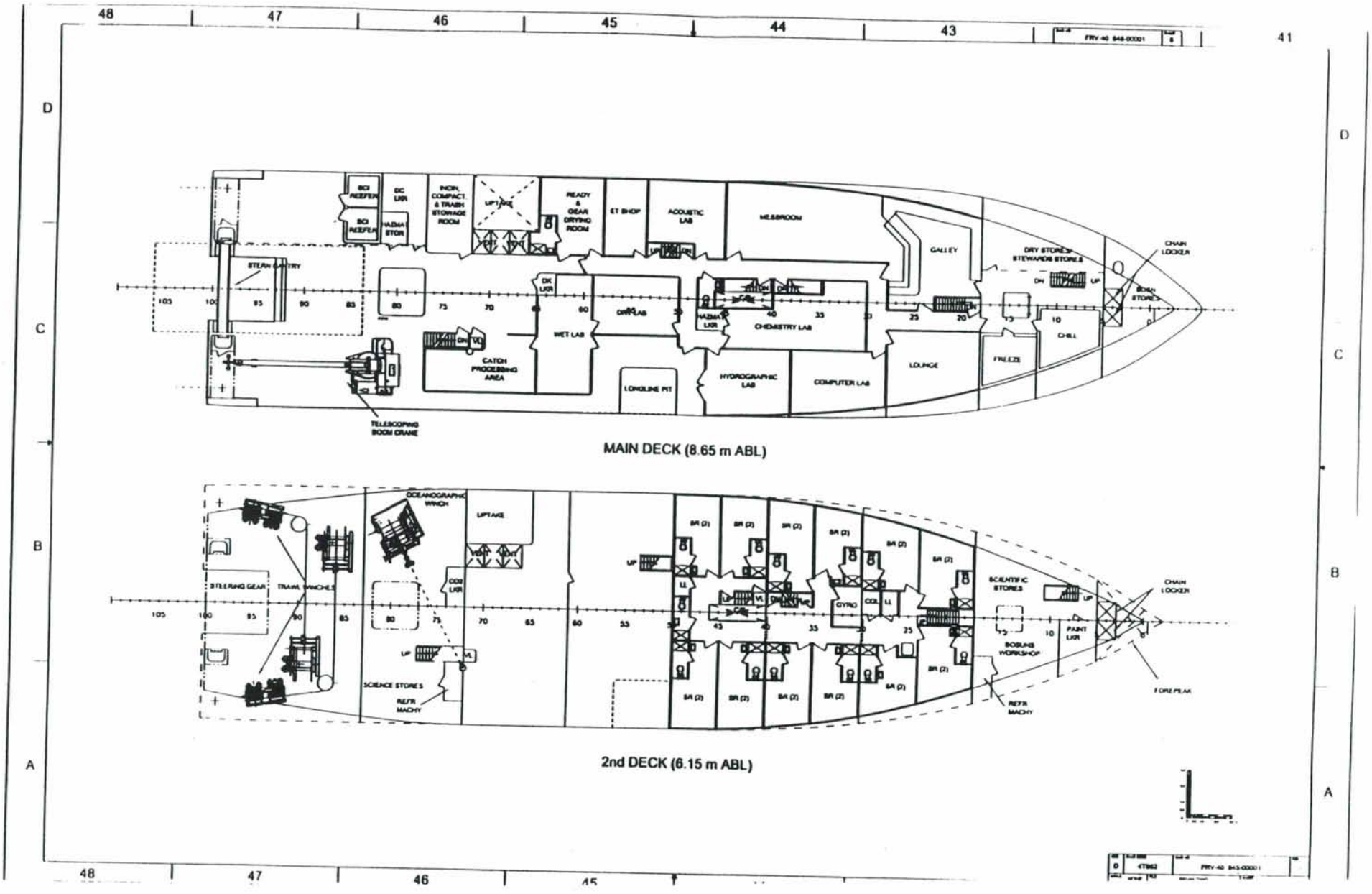
Laboratory Spaces
- Catch Processing Area
- Wet Lab
- Dry Lab
- Chemistry Lab
- Hydrographic Lab
- Acoustic Processing Lab
- Computer Lab
- Bait & Specimen Freezers

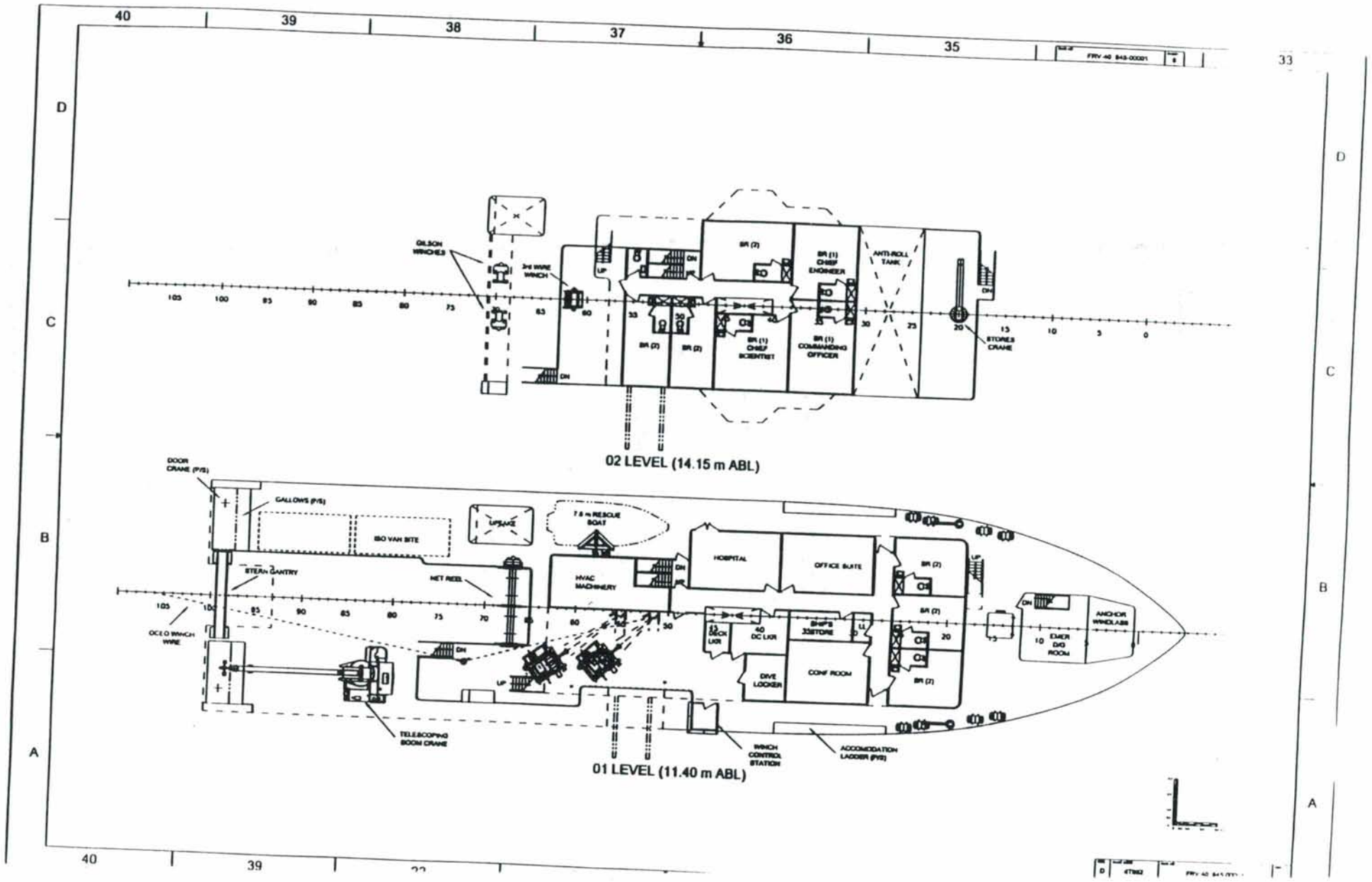
Sonar Systems
- Scientific Sounder
- Doppler Profiler
- Trawl Net Monitor
- Fish Finders
- Bottom Profiler
- Doppler Speed Log
- Acoustic Mooring Release

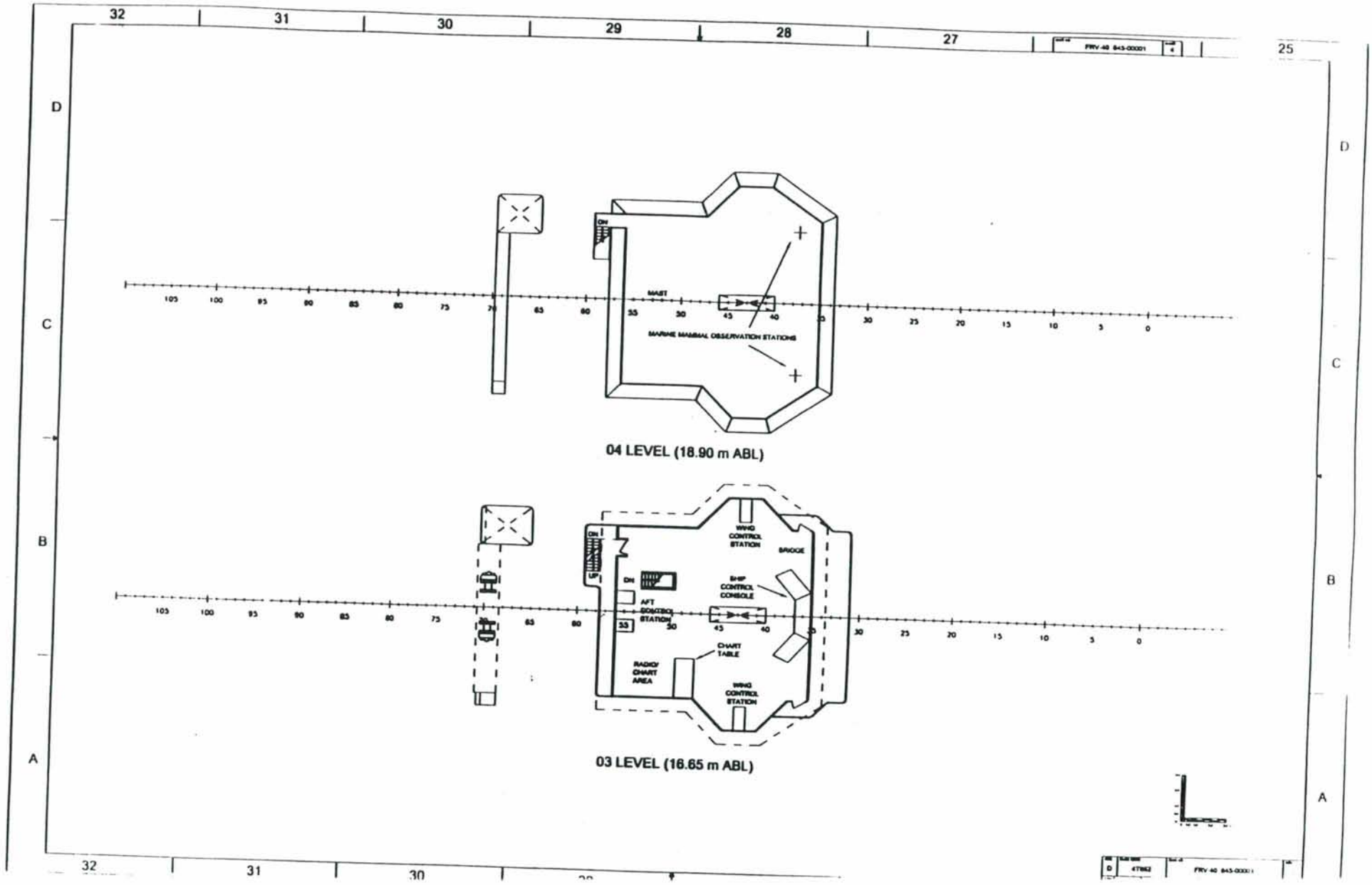
REQUIREMENTS DOCUMENT
FRV PRINCIPAL CHARACTERISTICS

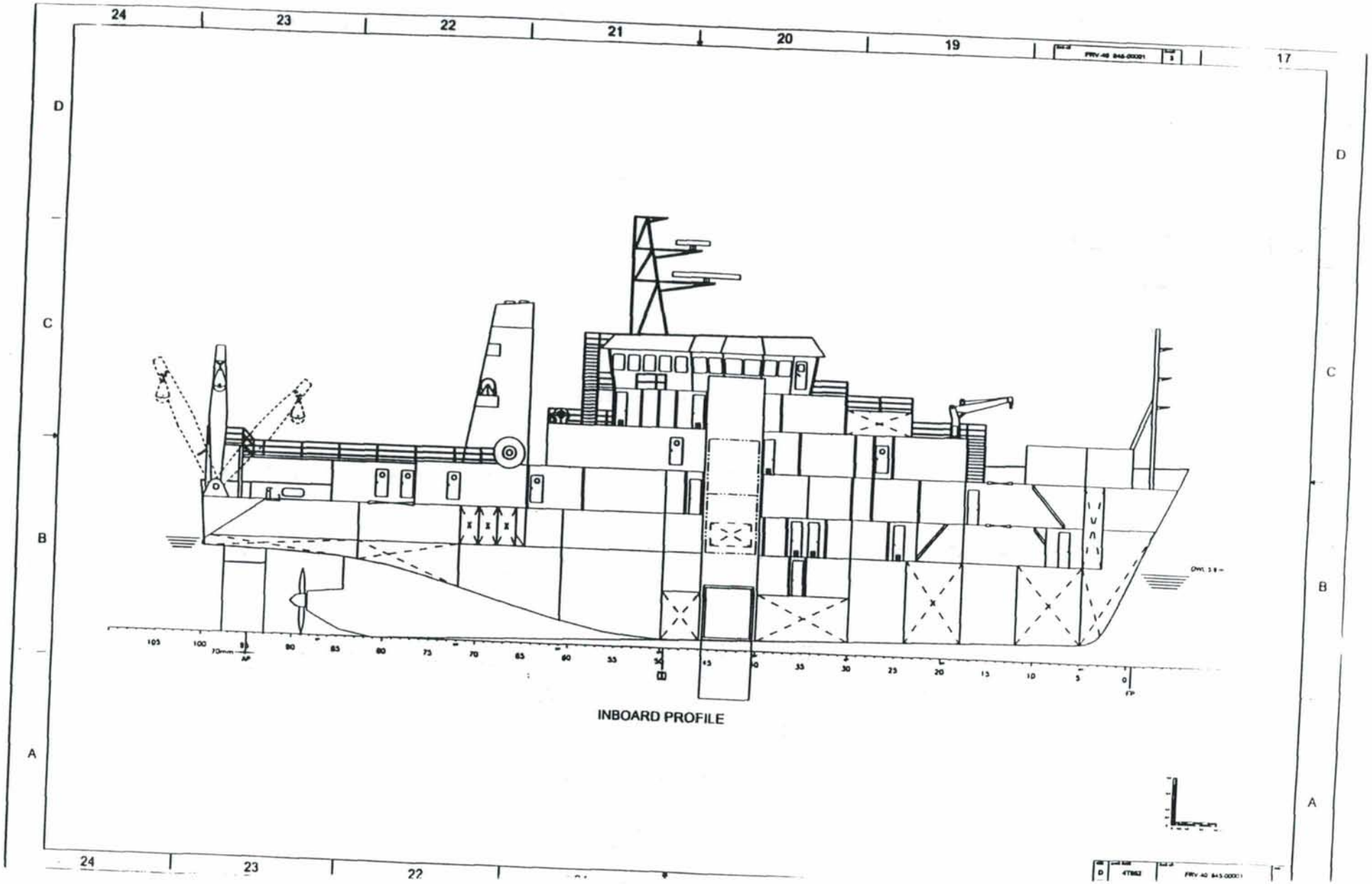
Characteristic	FRV40
Length	65.0m
Draft	5.9m
Endurance	40 days
Speed	14 kt
Range	12,000 nmi
Fuel Capacity	485 mt
Complement (crew/scientist)	19+19=38
Trawl Depth	1,000 fm
Scientific Depth	5,000 m


56
55
54
53
52
51
49
D
C
B
A
STEERING GEAR
GENERATOR ROOM
MOTOR ROOM
AUXILIARY MACHINERY ROOM
SEWAGE TREATMENT ROOM
EXERCISE ROOM
TRANSDUCER ROOM
BOW THRUSTER MACHINERY ROOM
ENGR WORKSHOP
LIBRARY/ LOUNGE
LAUNDRY
FOREPEAK
TANKTOP (3.65 m ABL)
INNERBOTTOM (<3.65 M ABL)

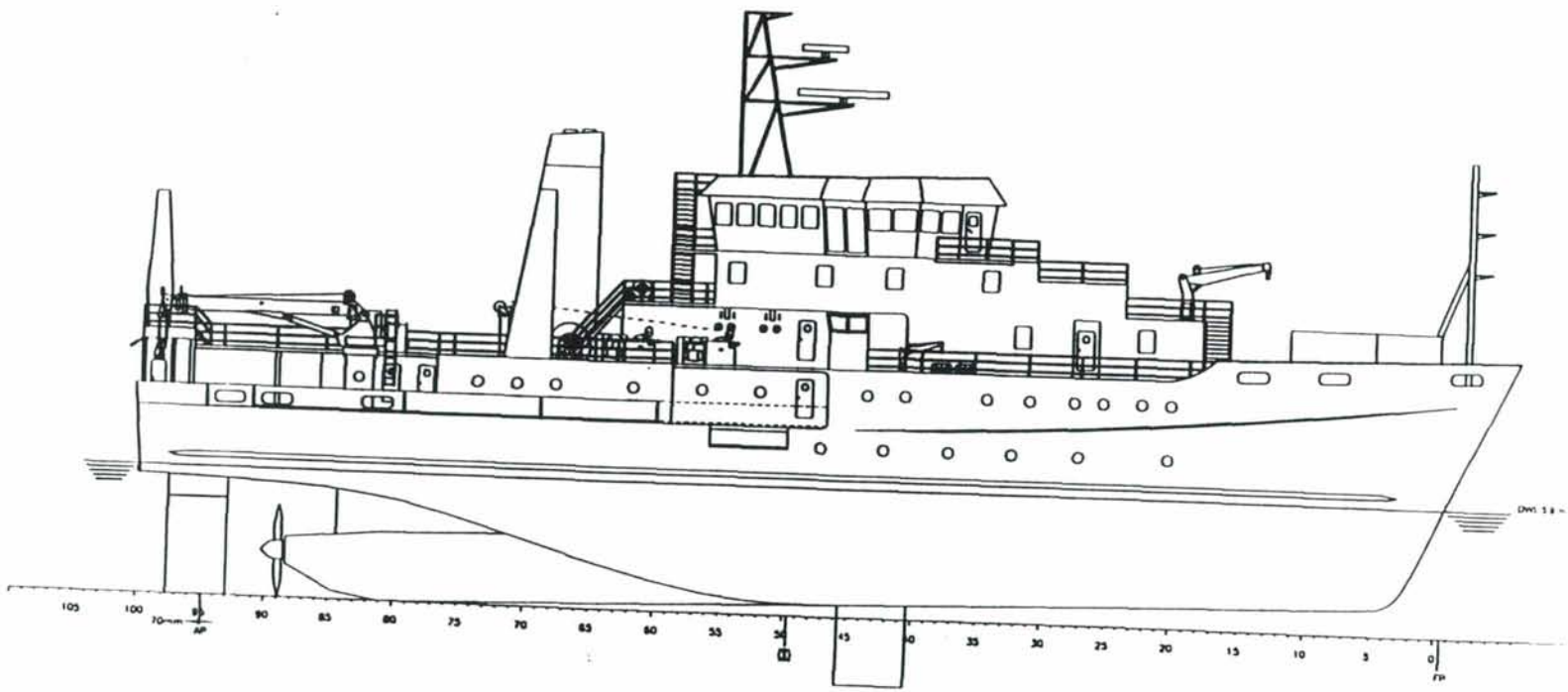

48
47
46
45
44
43
41
D
C
B
A
BCI REEFER
BCI REEFER
DC LKR
HAZMAT STOR
INCIN, COMPACT. & TRASH STORAGE ROOM
LIFT AXE
READY & GEAR DRYING ROOM
ET SHOP
ACOUSTIC LAB
MESSROOM
GALLEY
DRY STORES STEWARDS STORES
CHAIN LOCKER
BOWN STORES
STEAM GANTRY
DK LKR
DRY LAB
WET LAB
CATCH PROCESSING AREA
TELESCOPING BOOM CRANE
LONGLINE PIT
HAZMAT LKR
CHEMISTRY LAB
HYDROGRAPHIC LAB
COMPUTER LAB
LOUNGE
FREEZE
CHILL
MAIN DECK (8.65 m ABL)
OCEANOGRAPHIC WINCH
LIFT AXE
STEERING GEAR
TRAWL WINCHES
CO2 LKR
SCIENCE STORES
REFR MACHY
BR (2)
SCIENTIFIC STORES
GYRO
COIL
PAINT LKR
BOSUNS WORKSHOP
CHAIN LOCKER
FORE PEAK
2nd DECK (6.15 m ABL)


40
39
38
37
36
35
33
D
C
B
A
GILSON WINCHES
3rd WIRE WINCH
BR (2)
BR (1) CHIEF ENGINEER
ANTI-ROLL TANK
BR (2)
BR (2)
BR (1) CHIEF SCIENTIST
BR (1) COMMANDING OFFICER
STORES CRANE
02 LEVEL (14.15 m ABL)
DOOR CRANE (P/S)
GALLOWS (P/S)
ISO VAN BITE
UPSAVE
7.6 m RESCUE BOAT
STERN GANTRY
NET REEL
HVAC MACHINERY
HOSPITAL
OFFICE SUITE
BR (2)
BR (2)
BR (2)
ANCHOR WINDLASS
OCEO WINCH WIRE
40 DC LAB
SHIP'S STORE
DIVE LOCKER
CONF ROOM
EMER D/O ROOM
TELESCOPING BOOM CRANE
WINCH CONTROL STATION
ACCOMMODATION LADDER (P/S)
01 LEVEL (11.40 m ABL)


32
31
30
29
28
27
25
D
C
B
A
MAST
MARINE MAMMAL OBSERVATION STATIONS
04 LEVEL (18.90 m ABL)
WING CONTROL STATION
BRIDGE
SHIP CONTROL CONSOLE
AFT STEERING STATION
CHART TABLE
RADIO/ CHART AREA
WING CONTROL STATION
03 LEVEL (16.65 m ABL)

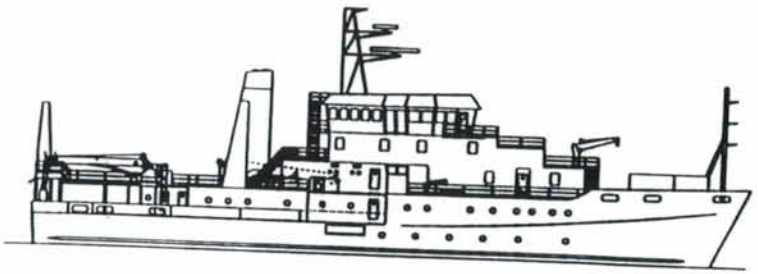


INBOARD PROFILE



OUTBOARD PROFILE

FISHERIES RESEARCH VESSEL
40 DAY ENDURANCE



GENERAL NOTES

1. THIS DRAWING IS FOR GUIDANCE ONLY
2. REFER TO THE STATEMENT OF REQUIREMENT FOR ALL REQUIREMENTS PERTAINING TO THIS DESIGN
3. ALL MEASUREMENTS ARE METRIC

PRINCIPAL CHARACTERISTICS

LOA	69.0 m
LBP	57.3 m
BEAM	13.0 m
DRAFT	5.9 m (oft)
	6.6 m (oft)
DEPTH	8.7 m
AIR DRAFT	28.6 m
COMPLEMENT	36 PERSONS

TANKAGE/CARGO CAPACITY

FO	484.5 m³ (95 %)
LO	18.3 m³ (95 %)
FW	482.7 m³ (100%)
PW	37.7 m³ (100%)
SEWAGE	21.8 m³ (72 hr)
CARGO	3 ISO VANS

POWERING CHARACTERISTICS

2 x 1,300 KW DIESEL GENERATORS
2 x 816 KW DIESEL GENERATORS
1 x 175 KW EMERGENCY DIESEL GENERATOR
1 x 2,384 KW PROPULSION MOTOR
1 x 685 KW BOW THRUSTER
1 x 5 BLADED, 4.1 m FIXED PITCH PROPELLER
INTEGRATED POWER DISTRIBUTION SYSTEM
HIGH LIFT RUDDER

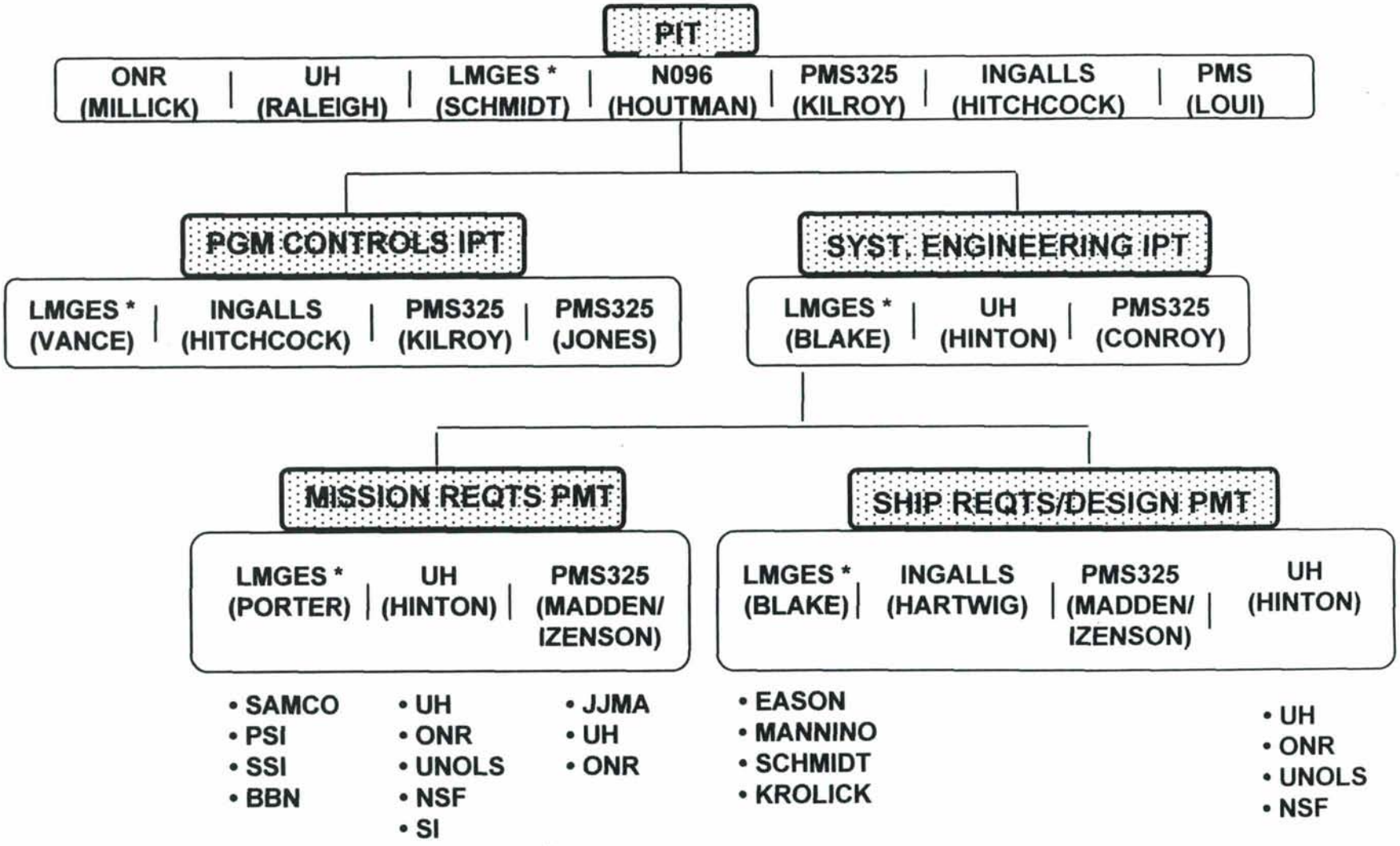
DESIGN SPEED - 14.0 knots
DESIGN RANGE - 13,000 nm

ELECTRONIC INNOVATORS	NOAA	1315 EAST WEST HIGHWAY Silver Spring, MD 20910
	FRV-40 General Arrangements	
	D	FRV-40 845-00001

Appendix V

SWATH AGOR 26

PRESENTATION TO FIC
STATUS AS OF 11/12/98


PIT
ONR (MILLICK)
UH (RALEIGH)
LMGES * (SCHMIDT)
N096 (HOUTMAN)
PMS325 (KILROY)
INGALLS (HITCHCOCK)
PMS (LOUI)
PGM CONTROLS IPT
LMGES * (VANCE)
INGALLS (HITCHCOCK)
PMS325 (KILROY)
PMS325 (JONES)
SYST. ENGINEERING IPT
LMGES * (BLAKE)
UH (HINTON)
PMS325 (CONROY)
MISSION REQTS PMT
LMGES * (PORTER)
UH (HINTON)
PMS325 (MADDEN/ IZENSON)
• SAMCO
• PSI
• SSI
• BBN
• UH
• ONR
• UNOLS
• NSF
• SI
• JJMA
• UH
• ONR
SHIP REQTS/DESIGN PMT
LMGES * (BLAKE)
INGALLS (HARTWIG)
PMS325 (MADDEN/ IZENSON)
UH (HINTON)
• EASON
• MANNINO
• SCHMIDT
• KROLICK
• UH
• ONR
• UNOLS
• NSF

OPERATIONAL CAPABILITIES

- **OVERVIEW**
- SWATH AGOR is to be a fully-equipped, small waterplane area, twin hull (SWATH) oceanographic research ship. This document provides a brief description of the desired capabilities of the ship. The primary goal of the SWATH AGOR is to extend the limited capability of monohulls for performing oceanographic operations in high sea states. It should be emphasized that these capabilities are not firm requirements and should be treated as goals. As the project progresses, required capabilities will be adjusted if it becomes apparent that some capabilities are not affordable. The Government will work with the industry team to determine acceptable requirement values. This document is not intended to convey all the information required to complete the design of the ship.
  - **GENERAL CAPABILITIES**
- The mission of the SWATH AGOR will be to conduct general purpose oceanographic research in coastal and deep ocean areas. The ship should be capable of performing the following tasks:
  - a. Sampling and data collection of surface, midwater and sea floor parameters using modern scientific instrumentation
  - b. Launch, towing, and recovery of scientific packages, both tethered and autonomous, including the handling, monitoring and servicing of remotely operated vehicles (ROVs), autonomous underwater vehicles (AUVs), and boats
  - 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 operations
  - e. Long periods of operation at low speeds.

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.

a. Performance in a Seaway: Fully operational in sea state 6 (4 to 6 meter wave height; 28 to 47 knot wind) at all headings
b. Exterior Working Deck Area: 2,000 square feet of contiguous, exterior working deck area
c. Station Keeping Capability: +/- 50 meters in sea state 6
d. Science Payload: Capacity for 100 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: 25 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

	Mission: Air-sea Atmospheric Geochemistry			
	Air and near-surface water sampling (only restriction on speed is ADCP and auxiliary swath bathymetry)			
	Example ops areas: cross-Pacific transect			
	Ports: Seattle to Honolulu to Hobart			
	Track length: 2400 nm then 6600 nm	6.7 days direct Seattle-Honolulu then 18.3 days indirect Honolulu-Hobart		
	On site time: 1 day	one station per day of one hour duration		
	science party: 28	(one variant would include occasionally landing people to make obs from small islands)		
	Op. State	1	4	
	PARAMETER	Transit	Vertical Sampling	
	TIME (days):	25 d @ 15 kt	1 day	
	MILES (nm):	9,000 nm	0	
	OPS:	continuous meteorology, sea & air sampling; daily balloon launches (UAVs in future)		
		(swath bathy desirable during transits)		
1	Speed, Max, kt	20 kts	0	
2	Speed, nom, kt	15 kts	0	
3	speed, min, kt	12 kts	0	
4	drag extra at nominal speed	nothing towed or deployed in water		
5	(science) payload, lb	40,000 lbs plus workboat		
6	payload dist, itimized	4 vans @ 7,000 lbs each (2 on foredeck near met tower); workboat for island landings		
		misc. 12,000 lbs besides installed systems (cranes etc)		
7	pitch, °	-	3°	
8	roll, °	-	6°	
9	heave, ft	-	4 ft	
10	vert. accel, g	-	0.1g	minimize bow accel
11	horiz. accel, g	-	0.1g	
12	max sea state, deploy	-		
13	max sea state, recovery	-		
14	dp at best heading in 35 kt wind, 2 kt current, max as: ± ft	-		
15	precision trackline at min speed, ±°, ±ft	-		
16	propulsion package interference an issue?	no	no	
17	Low acoustic waterborne radiated noise at towed array for depth <1000 m issue yes/no?	no	no	
18	Low acoustic waterborne radiated noise at towed array for depth >1000 m issue? yes/no	no	no	
19	Low acoustic self-noise at hull-mounted array at nom speed for water depth >1000 m yes/no?	yes	yes	
20	Low acoustic self-noise at hull-mounted array at max speed for water depth >1000 m yes/no?	yes	yes	
21	Low acoustic self-noise at hull-mounted array at nom speed for water depth <1000 m yes/no?	yes	yes	
22	Low acoustic self-noise at hull-mounted array at max speed for water depth <1000 m yes/no?	yes	yes	
23	Acoustic airborne noise in labs, working deck areas, control stations,	minimize	minimize	
24	Acoustic airborne noise in manned machinery spaces, passageways, &	no	no	
25	Acoustic airborne noise in other spaces	quiet deck for acoustic atmospheric sounders		
26	Clean air?	yes	yes	
27	Uncontaminated water?	yes	yes	reversable plastic pump & fittings on uncontaminated water supply
28	Clean power?	yes	yes	
29	Transducer well for sensors, observation?	yes - sensors	yes - sensors	
30	Sensor/lab proximity?	need lab and container space forward as close as possible to the uncontaminated air intake		
31	Auxiliary platform	Boom that can be positioned well in front of the bow just above the wave tops for sampling and eddy		
32	Auxiliary structures	correlation measurements at low elevation in undisturbed air; Bow air intake, met tower		
33	Deck support services: elec. water, air, hydraulics, communications	air, water, elec, comms., especially forward		
34	Crew for deployment/recovery, #	0	(1 or 2 for UAVs in future)	

						Ship equipment used																				
Ship/yr	Days/ Trans.	Av. Spd.	Cruise type	Sci. Party	DP	#1ctd w inch	#2ctd w inch	SEA BEAM	3.5 Khz	12 Khz	Hydro- Boom	A-Frame	9/16 w ire	Deck Crane	0.68 Cable	ADCP	IMET	ADF	Refrig/ Freez.	Seismic Comp.	UPS Pow er	Sea Water	SIS	Inst. Well	Grav. Meter	deck Serv.
K 97	28	12+	Weather	23		x			x		x			x		x	x				x	x	x			x
K 97	49	8+	PhysO	30		x		x	x		x	x	x	x		x			x		x	x	x			x
K 97	10	<8	Mooring	20	x			x	x	x		x	x	x		x		x			x					x
K 97	21	<8	Net Tow			x			x			x			x	x			x		x	x	x			x
K 97	9	>12	Transit	0				x	x	x						x										
K 97	38	<10	WOCE line	30		x	x	x	x		x	x	x	x	x	x	x	x	x		x	x	x			x
K 97	29	<10	WOCE line	30		x	x	x	x		x	x	x	x	x	x	x	x	x		x	x	x			x
K 97	22	<10	WOCE line	30		x	x	x	x		x	x	x	x	x	x	x	x	x		x	x	x			x
K 97	9	>12	Transit	0				x	x	x						x										
K 97	38	<10	WOCE line	30		x	x	x	x		x	x	x	x	x	x	x	x	x		x	x	x			x
K 97	3	<8	Mooring	3	x			x	x	x		x	x	x		x					x					x
K 97	26	>12	Sea map	20				x	x	x						x					x	x				
K98	31/8	<10	Mooring	20	x	x		x		x	x	x	x	x		x	x	x			x	x	x			x
K98	6	>12	Transit	0				x	x	x						x										
K98	14	>10	survey	15		x		x	x		x	x	x	x		x			x		x		x			x
K98	6	>12	Transit	0				x	x	x						x										
K98	16	<8	RMV sup.	15	x									x												
K98	29	<8	Coring	25	x	x		x	x	x	x	x	x	x		x			x		x	x	x			x
K98	15	<8	Mooring &F	25	x	x		x	x	x	x	x		x		x		x				x				x
K98	9	>12	Transit	0				x	x	x						x										
K98	26	<8	Gnt.coring	30	x	x		x	x	x	x	x	x	x		x			x		x	x	x			x
K98	25	>12	Transit	0				x	x	x						x										
K98	35	<8	Gnt.coring	30	x	x		x	x	x	x	x	x	x		x			x		x	x	x			x
K98	6	>12	Transit	0				x	x	x						x										
K98	33	<10	Chemistry	30		x	x	x	x		x	x	x	x	x	x	x	x	x		x	x	x			x
K98	11	>12	Transit	0				x	x	x						x										
T96	17	<10	Sedim.traps	10		x			x		x	x		x	x	x						x	x			
T96	9	>12	Transit	2				x	x							x										
T96	44	<10	CTD,SCS	28	x	x	x	x	x	x	x	x	x	x	x	x			x	x		x	x			x
T96	20	>12	Trqnsit	2				x	x							x										
T96	9	>12	Transit	2				x	x							x										
T96	35	<10	CTD,Recov.	29	x	x		x	x	x	x	x	x	x	x	x	x	x	x		x	x	x			x
T96	49	<10	OBS recov.	24	x	x		x	x	x	x	x	x			x		x			x	x	x			x
T96	15	<10	CTD,Stud.	34	x	x		x	x	x	x					x						x	x			
T96	21	<8	ROV	35	x	x		x	x	x	x			x		x	x				x	x	x			x

Mission Description

Mission Description	Low Spd Kts	Low Spd Days	Med Spd Kts	Med Spd Days	High Spd Kts	High Spd Days	Total Mission Days	Total Range NM	No. of Crew	No. of Pass	Portable Payload Required LT	Reserve Payload Available LT	Total Portable Payload LT
• HOT quarterly cruise with mooring	1	5	8	8	13	1	14	1968	16	25	17	83	100
• Bottom Observatory Service w/ ROV	0	4	6	1.3	13	6.7	12	2278	16	25	10	90	100
• Sidescan, seismics & sampling	1.5	3	8.2	21.3	13	3.7	28	5454	16	30	36	64	100
• Ocean bottom seismics	2	9	6	7	13	10	26	4560	16	25	28	72	100
• Biogeochemistry Flux Studies	0	14	8	11	13	7	32	4296	16	32	25	75	100
• Physical Oceanography	1	16	0	0	13	14	30	4752	16	24	25	75	100
• CTD, nets, moorings	1	10	10	12	13	8	30	5616	16	28	31	69	100
• Survey & Dredge	2	15	0	0	13	15	30	5400	16	25	25	75	100
• Air-sea Atmospheric Geochemistry	0	1	0	0	13	25	26	7800	16	28	10	90	100
• Trace Element Geochemistry	0	9	0	0	13	25	34	7800	16	28	31	69	100
• Marine Geophysics Survey	0	0	0	0	13	30	30	9360	16	25	24	76	100

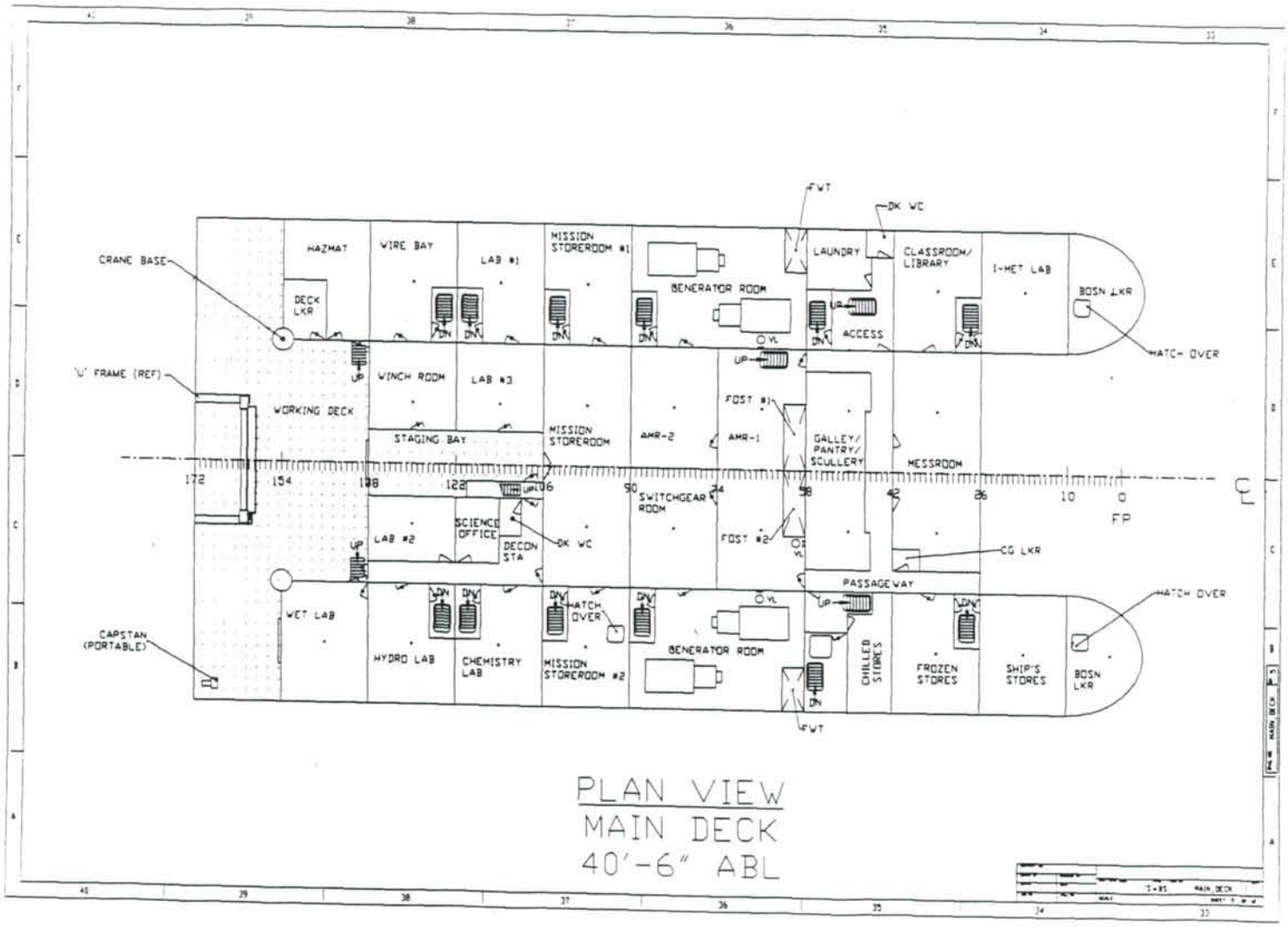
Assumes a 100 LT portable payload for all missions per DOC. Portable payload consists of identified mission unique equipment that are not permanently built into the ship. Balance of 100 LT payload is held in reserve.

Item	Space ft.	Weight #	Removable	Installed	Provided	Power req.	ROM (k$)	Location~	% used	
CTD										
Winch DESH5	8x8	15000		yes	LM	75hp		aft deck		
2nd winch	8x8	15000	yes		UoH	50hp		aft deck		foundtion and serv. Connection
.322 em cable		2821	yes		UNOLS			aft deck		10000m
Handing sys.		15800		yes	LM	50hp		aft deck		Hydro Boom
Rosett	7h x4d	2500	yes		UoH			aft deck		
.25 wire		3609	yes		UNOLS			aft deck		10000m
Sonars										
Multib. Found.	~15x20			yes	LM					Foundation/cable way/space
Multib. Sys				yes	LM					
3.5Khz	2x2			yes	LM					
12Khz	2x2			yes	LM					
ADCP	2x2			yes	LM					
Vert. Ref. Sys.	1x1			yes	LM					
Dop. Sp. Log	1x1			yes	LM					
Instri. Well	30"D			yes	LM					
Main winch										for coring/dredge/nets
DESH9/11	10x15x8h	58000		yes	LM	150hp		winch rm		9/16wire &.680 cable
9/19 wire		32900	yes		UNOLS					
.680 cable		32800	yes		UNOLS					
A-frame	20x10x22h	32000		yes	LM			aft deck		
A-frame power	3x6	2150		yes	LM	75hp		winch rm		hydro power pack
Side A-frame	12x8x12h	15000		yes	LM			aft side		
Imet tower	8x8			yes	LM			Forward deck		Foundation/services
Traction winch	~5x8	~25900		yes	LM	50HP		winch rm		replace DESH9/11
Uncont.sea W	2" serv.			yes	LM	1hp		Labs/aft deck		
Sci Fef/Frez	10x10		yes		UoH			aft deck		Power service for 8x20 iso van
Seismic sys	10x20	25000		yes	LM	2x150HP		below decks		LM provide fn/power
Tie downs				yes	LM			deck/labs		Working deck 1"&labs3/8"
Unistrut				yes	LM			Labs		2' centers
Sci wireway				yes	LM					Labs/for&aft deck/bridge&mast
SIS				yes	LM			rm's/labs/decks/br/sonar space		
SATCOM M	2x2	200		yes	LM					
P-code GPS		5	yes		UoH					
Gravimeter	3x3	300	yes		UoH					
Magnetometer	3x3	300	yes		UoH					

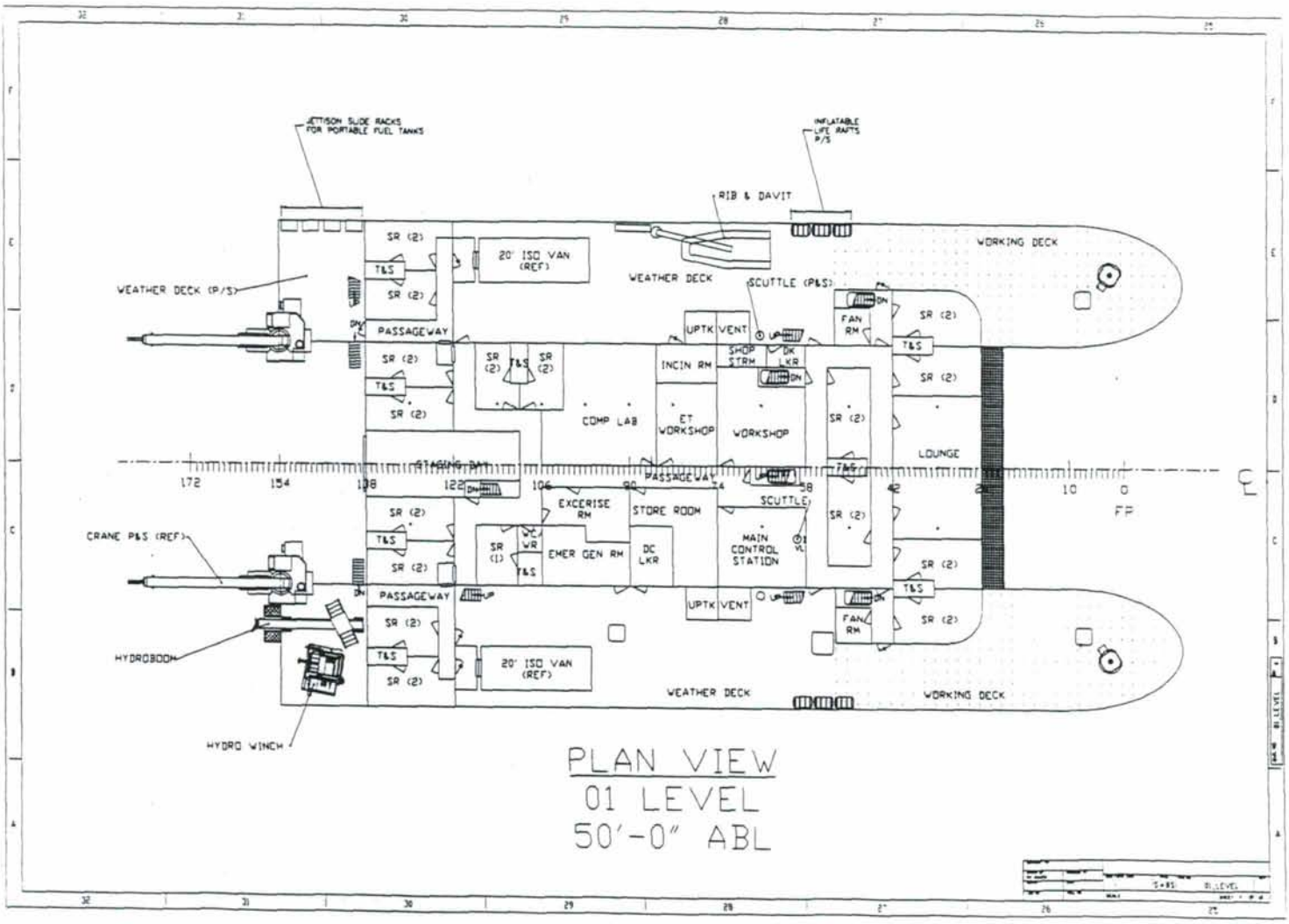
COST

PHASE TWO 36,000K

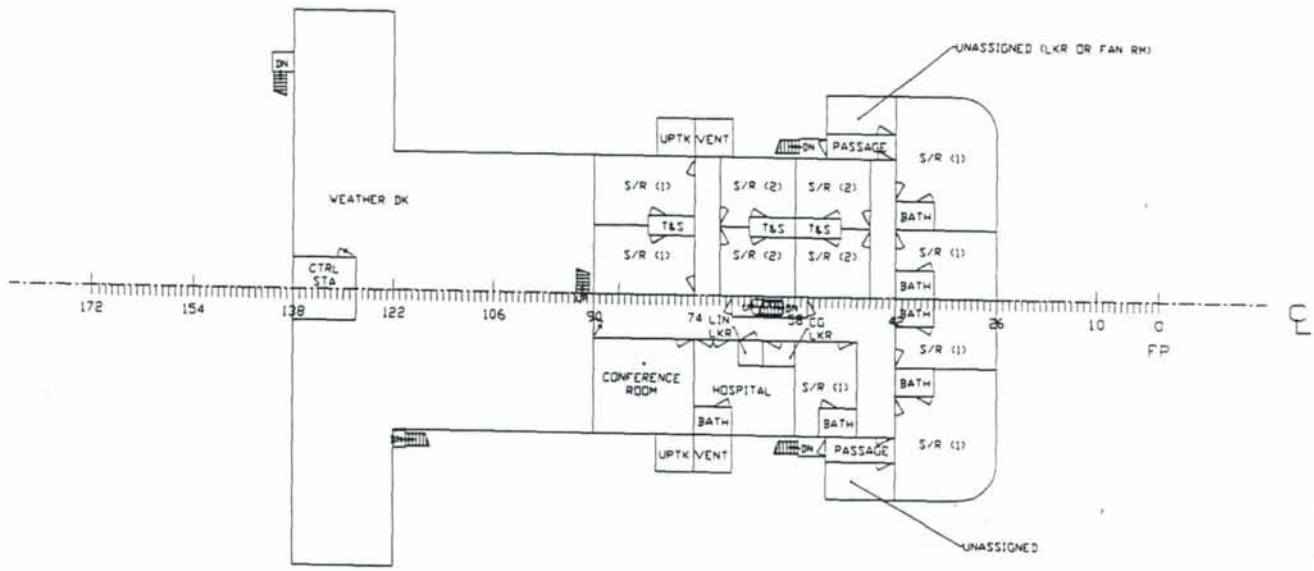
INGALLS 52,000K



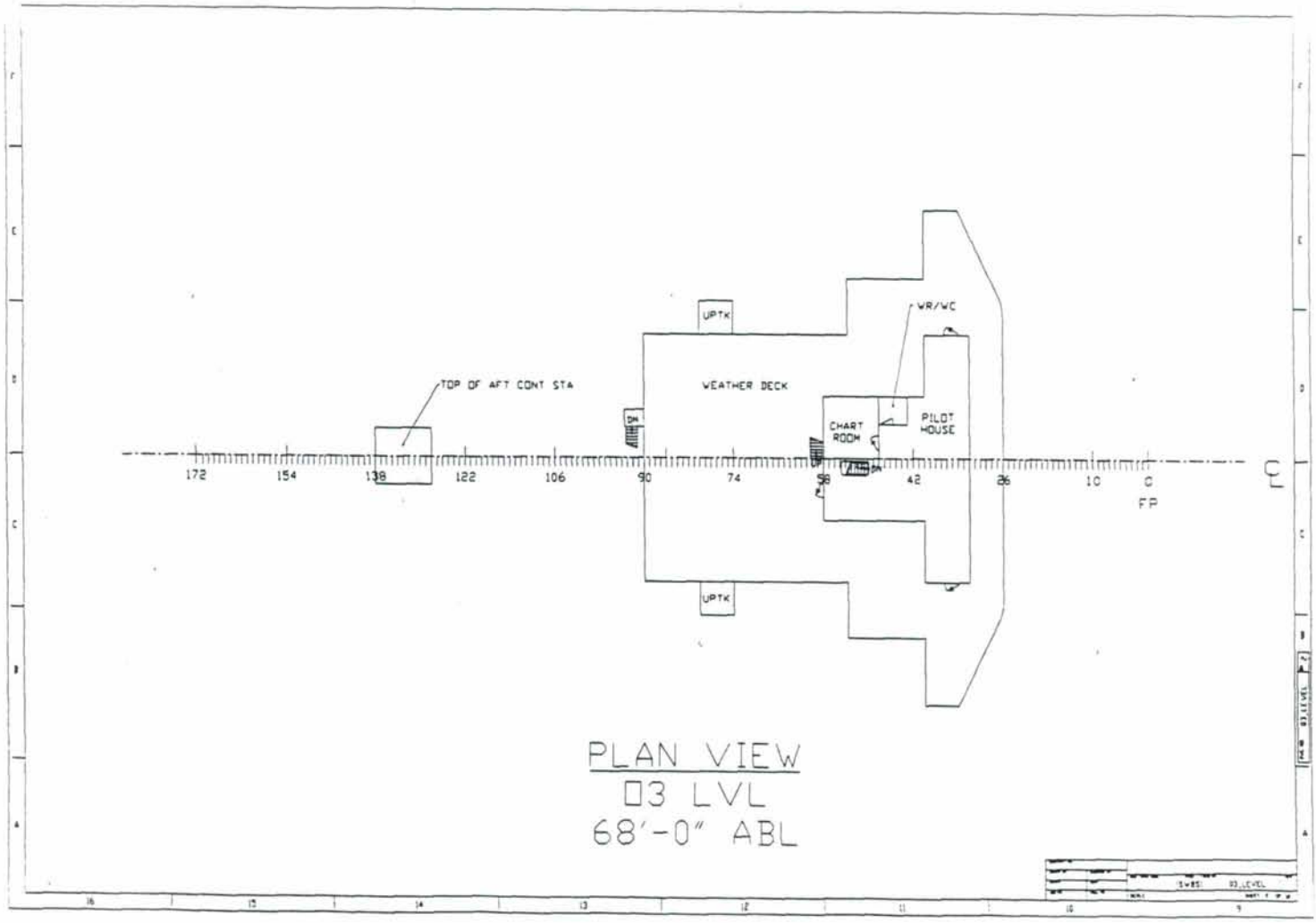
PLAN VIEW
MAIN DECK
40'-6" ABL



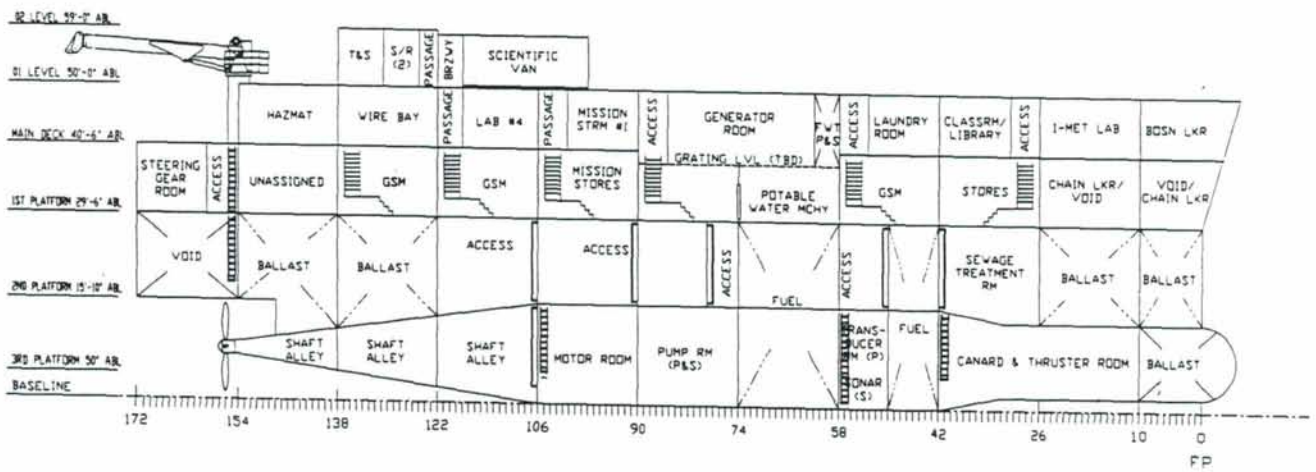
PLAN VIEW
01 LEVEL
50'-0" ABL



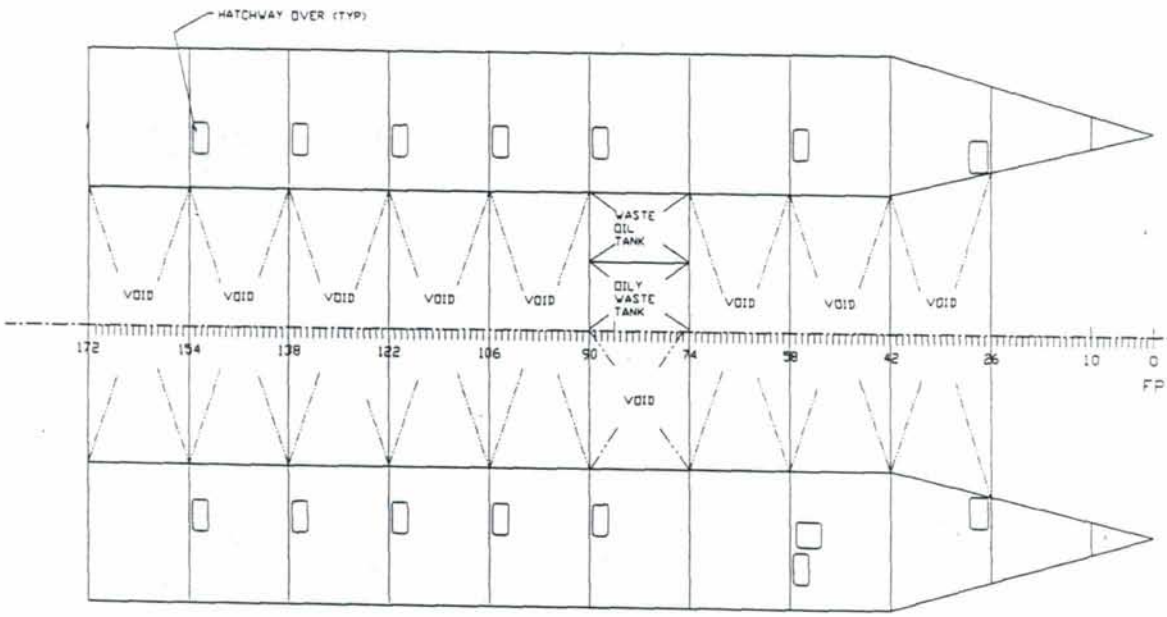
PLAN VIEW
02 LEVEL
59'-0" ABL



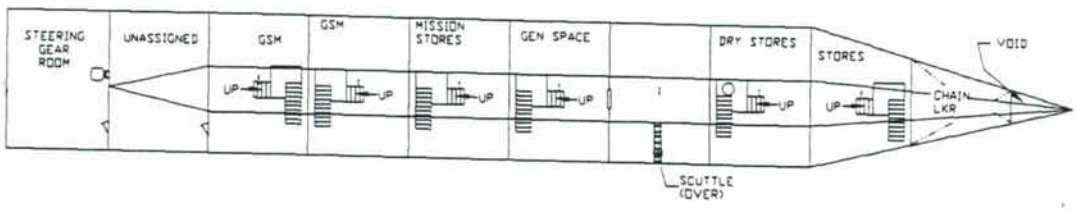
PLAN VIEW
03 LVL
68'-0" ABL

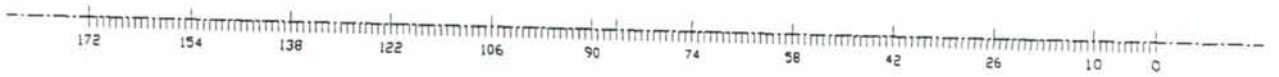


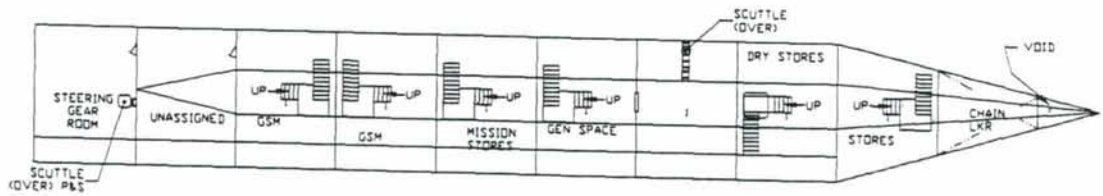
ELEVATION
32' OFF CENTERLINE
PORT LOOKING OUTBOARD



PLAN VIEW
WET DECK
36'-6" ABL





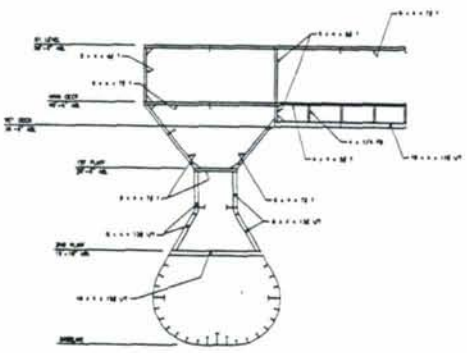


PLAN VIEW
1ST PLATFORM
29'-6" ABL

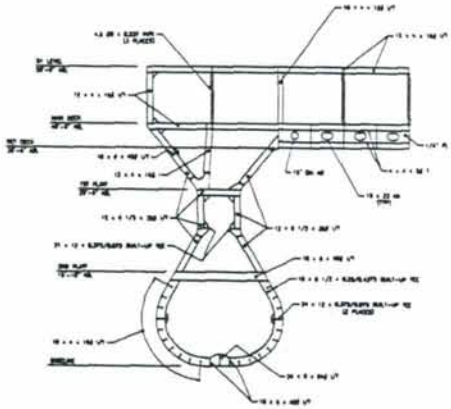
REVISIONS

GENERAL NOTES

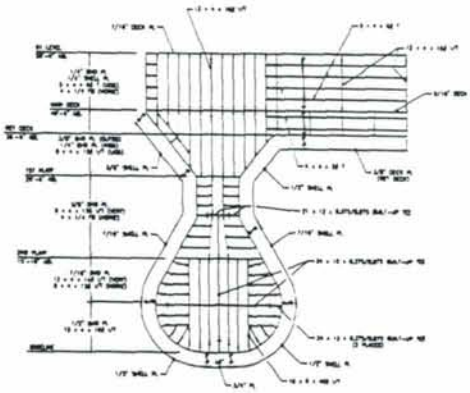
1. THIS DRAWING WAS DEVELOPED IN ACCORDANCE WITH NSRL USCG AND XXX STD 10 REQUIREMENTS.
2. IDENTIFICATIONS ARE IN ACCORDANCE WITH MIL-STD-130 AND COMMERCIAL MARINE PRACTICE.



EVERY 24"
PORT SHOWN
STBD SIM OPP HAND



8'-0" AFT OF BHD
PORT SHOWN
STBD SIM OPP HAND



BHD EVERY 16'-0"
PORT SHOWN
STBD SIM OPP HAND

SHEET NUMBER
REVISION STATUS OF SHEETS

SWATH
MIDSHIP SECTION

TITLE
REFERENCES

SHIPS

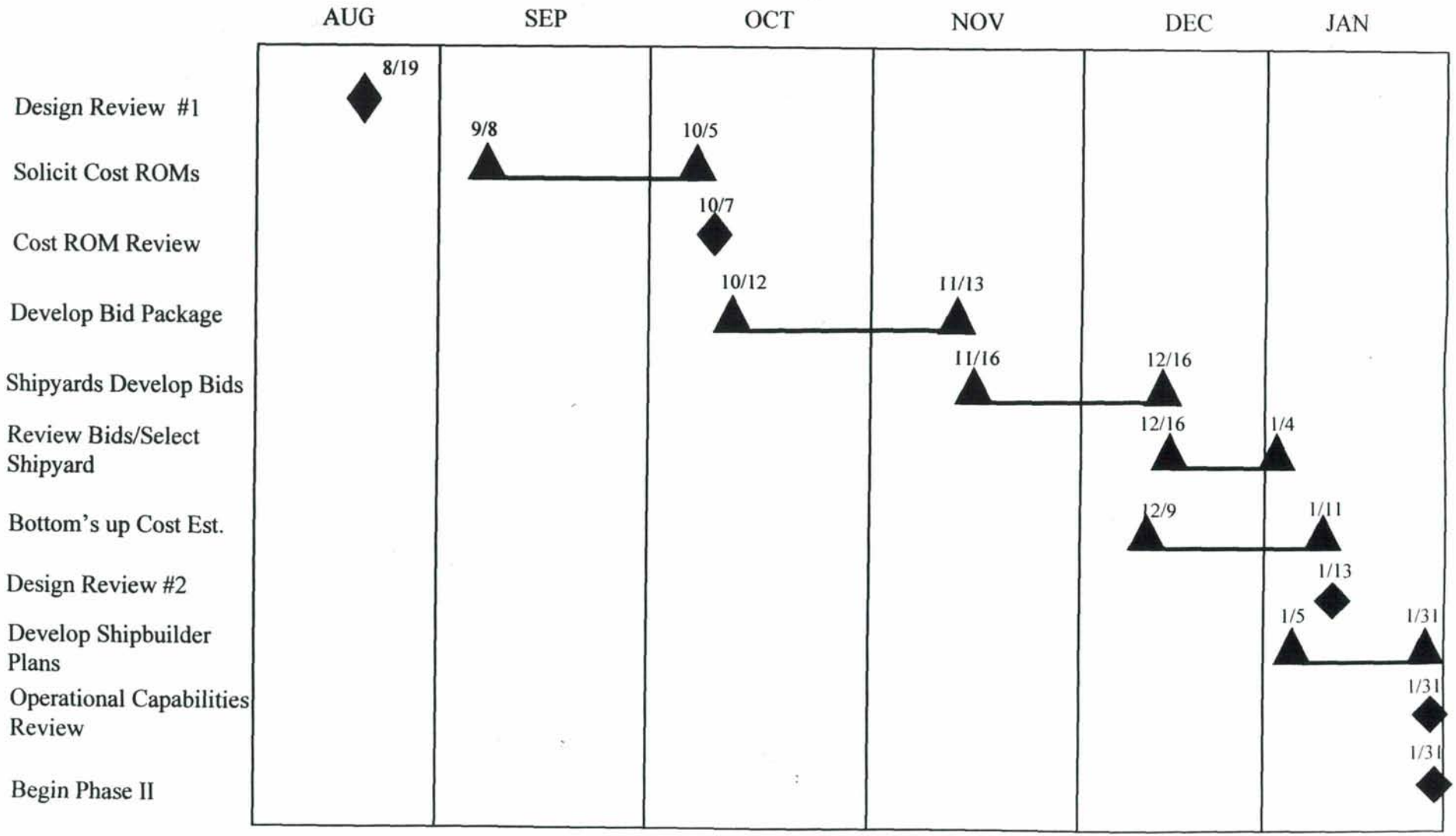
REQUIREMENT	AGOR24	UNOLS Minimum	SWATH 97 Desirable	Maximum	RFP Desired Capabilities "treated as GOALS"	Lockheed/Ingalls Design as of 7/10/98	KAIYO
Station Keeping	S.S. 6	S.S. 6	S.S. 7	NA	S.S.6 +/- 50m		S.S.6
Pitch		4 degrees	3 degrees	NA			
Roll		8 degrees	6 degrees	NA			
Heave		6 ft.	4 ft.	NA			
Vertical Accel.		0.4g	0.09g	NA			
Horizantal Accel.		0.2g	0.11g	NA			
Deck Space	2800	2000 sq ft			2000 sq ft	3800 sq ft	10500 sq ft
Science Payload	240LT	60LT	100LT	120LT	100LT	100LT	490LT
Draft	17 ft			17 ft	17 ft	25.5	21 ft
Beam	52			104 ft		88 ft	92 ft
Laboratory Space	4800 sq ft	2500 sq ft	3000 sq ft		3000 sq ft	3025 sq ft	630 sq ft
Science Staff	38	20	25	30	25	30-32	53
Speed Cruising	15 kts	10kts@ss6	15kts@ss6		15 kts	14 kts	13.3 kts
Endurance	60 days	40 days	50 days	50 days	50 days		100
Range	10000 nm	9000nm	10000nm	10000nm	10000nm	9360 nm	5100 nm
Science Gear	21000 cu ft	10000 cu ft	15000 cu ft		15000 cu ft	16384 cu ft	30000 cu ft
Displacement	3200LT					2370LT	3500LT
Mission Equip.							
Multibeam sys.	Yes					Yes	
3khz echosounder	Yes					Yes	
12khz echosounder	Yes					Yes	
Sea water probe	Yes					Yes	
Vertical ref. Sys.	Yes					Yes	
Instriment well	Yes					Yes	
A-frame	Yes					Yes	
a-frame power pack	Yes					Yes	
2- cranes	Yes					Yes	
CTD DESH-5	Yes					Yes	
CTD handling sys	Yes					Yes	
Traction winch	Yes					Yes	
SARCOM M	Yes					Yes	
SIS	Yes					Yes	
DP system	Yes					Yes	

Yard Package

- Weight Report
- General Arrangement Drawings
- Mid-ship section
- Hull lines
- EPLA
- One line electrical Schematic
- Information system block diagram
- Drive and thruster sizing
- Stability, powering, fuel comp/endurance, seakeeping
- Machinery arrangement
- Master equipment list
- Auxiliary system calculation
- Ballast calculation
- Model test plan
- Ship specification

Oceanographic Research Vessel

PHASE I MILESTONE SCHEDULE - REMAINING



EPLA SUMMARY

ELECTRICAL LOAD ANALYSIS

SWAGOR 26

Vessel Name: TBD

ELECTRICAL POWER LOAD SUMMARY		Connected Load		winter Cruising		summer		winter On Station at 0 Speed		summer		Anchor	
		HP	kW	Avg LF*	kW	Avg LF*	kW	Avg LF*	kW	Avg LF*	kW	Avg LF*	kW
Propulsion		3,656.00	4,445.55	*0.28*	2,909.85	*0.28*	2,909.85	*0.49*	1,454.13	*0.46*	1,069.13	-	-
Propulsion Aux. & Steering		107.00	200.20	*0.09*	39.49	*0.06*	38.99	*0.24*	85.68	*0.18*	56.68	*0.04*	1.90
Aux. Machinery		397.00	580.91	*0.20*	61.60	*0.23*	182.10	*0.18*	61.50	*0.21*	182.00	*0.20*	182.05
Deck Machinery		247.50	311.55	-	-	-	-	*0.05*	20.90	-	-	*0.08*	26.33
Shops		2.00	21.16	-	-	-	-	-	-	-	-	-	-
IC & Ships Electronics		-	138.07	*0.62*	79.92	*0.63*	87.42	*0.68*	83.25	*0.67*	90.75	*0.57*	83.79
Hotel		3.25	202.23	*0.18*	53.94	*0.17*	54.29	*0.19*	54.08	*0.19*	55.54	*0.18*	53.94
AC & Vents		71.62	953.09	*0.66*	237.36	*0.72*	101.56	*0.77*	250.07	*0.72*	101.56	*0.81*	242.19
	Propulsion Total	3,656.00	4,445.55		2,909.85		2,909.85		1,454.13		1,069.13		-
	Ship Servive Total	**828.37**	**2,407.22**		**472.31**		**464.36**		**555.47**		**486.53**		**590.19**
	Vessel Total	**4484.37**	**6,852.77**		**3,382.16**		**3,374.21**		**2,009.61**		**1,555.66**		**590.19**
Propulsion Gen	(4 @ 910kW)		**3,640.00**		**Propulsion Load Max=**		**2,909.85**						
			-		**Ship Sevice Load (Max) =**		**741.33**						
Emer Generator	(1 @ 250kW)		**250.00**		**Emer Generator Load =**		**206.31**						

*Note: Average LF numbers shown are for information only

Weight Summary

SWBS NO.	DESCRIPTION	WEIGHT UNIT	NUMBER UNITS	WEIGHT LT	C A	VCG FT	MOMENT FT-LT	LCG FT	MOMENT FT-LT	TCG FT	MOMENT FT-LT
A	LIGHTSHIP W/OUT MARGIN			1826.25		34.89	63718	83.21	151964	0.24	443
	WEIGHT MARGIN 13%	13.0%		237.41		34.89	8283	83.21	19755	0.24	58
	KG MARGIN 5%	5.0%				1.74	3600				
	LIGHTSHIP WITH MARGIN			2063.67		36.63	75601.64	83.21	171719.73	0.24	500.93
D00	ENDURANCE - FULL LOADS										
D11	SHIP'S CREW	0.15	16	2.36		40.00	94	80.00	189	0.00	0
D12	SCIENTISTS	0.15	32	4.80		40.00	192	80.00	384	0.00	0
D21	SHIP AMMUNITION			0.07		43.00	3	82.00	6	33.50	2
D29	SP. MISSION SYS & EXPENDABLES			100.00		43.00	4300	118.00	11800	0.00	0
D31	PROVISIONS	0.11	48	5.08		34.00	173	45.00	229	-0.83	-4
D32	GENERAL STORES	8.59		8.59		34.00	292	38.00	326	-0.83	-7
D41	DIESEL FUEL			383.00		12.00	4596	70.00	26810	0.00	0
D46	LUBRICATING OIL			2.68		12.00	32	70.00	187	0.00	0
D49	SPECIAL FUELS & LUBRICANTS			1.37		12.00	16	70.00	96	0.00	0
D51	SEA WATER			11.45		25.00	286	74.50	853	0.00	0
D52	FRESH WATER	0.28	48	13.41		36.27	486	62.38	837	0.00	0
D54	HYDRAULIC FLUID			1.56		30.50	48	57.50	90	0.00	0
D55	SANITARY TANK LIQUID			3.94		12.00	47	70.00	276	0.00	0
D	ENDURANCE-CONDITION 1 LOADS			538.31		19.63	10566	78.17	42082	-0.02	-9
	FULL LOAD, CONDITION 1			2601.97		33.12	86168	82.17	213801	0.19	492