UNOLS Fleet Improvement Committee Meeting
November 9-10, 1999
Monterey Bay Aquarium Research Institute

Appendices

November 9, 1999

WESTERN FLYER Tour - The Fleet Improvement Committee (FIC) meeting participants convened at 8:30 am at the Monterey Bay Aquarium Research Institute (MBARI), 7700 Sandholdt Rd. Steve Etchmendy led the group on a tour of WESTERN FLYER.

Welcome and Introduction - Following the ship tour, the FIC met at the Moss Landing Chamber of Commerce to hold their business meeting. Larry Atkinson welcomed the Committee and reviewed the meeting agenda, ***Appendix I***. The agenda order was adjusted and the biennial review discussion was moved to the first meeting day. The agenda was followed in the order reported below. Participants of the meeting introduced themselves, see ***Appendix II***.

Accept minutes - The minutes of the November 1998 FIC meeting were accepted as written.

UNOLS Report - Jack Bash provided the UNOLS Report. UNOLS Office will transfer on May 1, 2000 to Moss Landing Marine Lab. Mike Prince will be the new Executive Secretary and Annette DeSilva will remain with the office as Assistant Executive Secretary. Over the past year and a half an external committee selected by NSF reviewed the academic fleet. One of their primary recommendations was to strive for excellence. The committee would like to see increased response for post cruise assessment reporting. This process is now voluntary. We are investigating ways in which to make the form easier to submit as well as more effective.

Jack reported that a UNOLS workshop titled, Developing Submergence Science for the Next Decade, "DESCEND" was held in October. It brought together 120 scientists, engineers, and agency representatives with an interest in submergence science. The focus of the meeting was to define future submergence science directions and identify the vehicles required to meet the future needs.

Jack reported on plans for a UNOLS Winch and Wire Symposium to be held on 30 November to 1 December. There has been a good response to the symposium from industry and technical personnel. Heroes have been selected for six different categories: the four basic science disciplines, one operator and one ocean engineer. A winch and wire questionnaire was distributed to the community. The results of the questionnaires will be used by each hero to compile a two-page issues paper. The symposium speakers will be asked to address these issues. The agenda for the symposium is posted on the UNOLS website. Jack encouraged members of the science community to participate.

Agency Reports:

National Science Foundation (NSF) - Dolly Dieter reported that 1999 was a good year for NSF facilities in terms of the budget. In addition to supporting their ship time requirements they were also able to support training, the Winch and Wire Symposium and the DESCEND Workshop. It appears that 2000 will strain the facilities budget. Presently there is approximately a $5M dollar differential between the projected costs and the budget. In personnel changes, Holly Smith has been hired as a science program assistant in the facilities section. Don Heinrichs will retire in the end of the year. A program assistant for Dolly has not yet been hired.

There was a question on the status of the NSF Ship Inspection process. Dolly reported that they are still defining the specifications for the contract.

Office of Naval Research (ONR) - Sujata Millick reported that ONR is also facing budgetary challenges. Navy ship time support is approximately $15M. The Navy will accept DURIP proposals for technical support. ONR is encouraging the community to apply for this support.

The question was asked how ONR plans to inspect the AGORs. Sujata reported that they are looking at this issue. They are considering a combination of the INSURV and science inspection.

Sujata reported that the Navy has approval to transfer MOANA WAVE to an organization in Alaska. The ship will be run primarily for training.

National Oceanic and Atmospheric Administration (NOAA) - A representative from NOAA was not present. Jack reported that UNOLS and NOAA have readopted the UNOLS/NOAA-OAR Memorandum of Understanding (MOU). A similar MOU has been drafted for the National Marine Fisheries Service (NMFS) and UNOLS. It is being circulated through NMFS and is expected to be reviewed favorably. Jack reported on the AMLR program. The original NOAA solicitation for an AMLR support vessel was awarded to a Russian ship. UNOLS had little time to respond to the solicitation. The first award has expired and a second solicitation is in progress. UNOLS was given sufficient notification and a joint proposal was submitted by Scripps Institution of Oceanography (SIO) and Woods Hole Oceanographic Institution (WHOI). The proposal cost exceeded NOAA's budget and NOAA opened the solicitation commercially. WHOI and SIO again responded, but were disqualified because the commercial solicitation indicated that the proposal must include a liquidated damages clause. WHOI and the University of California cannot legally comply with this requirement. One of the reasons that the original proposal costs were high was because transit costs to the Antarctic were included. FIC suggested that if the community were aware of these transits well in advance, the legs would have a high potential of being used to support science. UNOLS could assist in this type of regional planning. It was also noted that by adding a fisheries capability to KNORR/MELVILLE the ship would likely attract additional users.

John Freitag reported that the UNOLS/NOAA-OAR MOU has had a very positive affect in collaborations. At the 1998 RVTEC meeting, Dennis Shields of NOAA offered information on their system for data collection. RVTEC was very interested in this and there has been continued sharing of information.

United States Coast Guard (USCG) - Phil McGilliavary gave the report for the USCG. A written report from CDR Wheeler is provided as ***Appendix III***. HEALY builder's trials were conducted in August and pre-acceptance trials were performed in October. The final delivery is planned for 9 November. Science trials are scheduled to begin in January and continue through June 2000. The ship is expected to be ready for science operations in spring 2001. The ship will do ice trials near Baffin Island and in the eastern Arctic. Transit to it to the ship's homeport in Seattle will be via the Northwest Passage.

Phil continued with a report on the science of opportunities and operations planned for POLAR SEA and POLAR STAR. Improvements to the POLARs include upgrading the e-mail system and other improvements to communication systems. They are also experimenting with a whale avoidance system.

Academic Fleet Review Recommendations and FIC's Directions for the Future - Dolly Dieter provided the report on the Academic Fleet Review recommendations. Her viewgraphs are included as ***Appendix IV***. The overall finding and recommendation of the report is that the UNOLS system is good

and science access to the sea is being provided. The system should be maintained, but we should strive for excellence. Emphasis needs to focus on technical support improvements. The findings and recommendations of the review are outlined below:

Principal Findings:

- **Current practices provide excellent access to the sea for U.S. researchers**
- **UNOLS services are meeting community needs and costs are comparable to other government and commercial operators.**

Recommendations:

- **The UNOLS system should be retained.**

Programmatic findings:

- **Potential for a near-term period of reduced use of UNOLS fleet by NSF grantees.**
- **Need for a strong continuing program for technology introduction, improvement of existing capabilities, and a more systematic approach to maintenance and upgrades.**
- **Need to enhance quality control, training and safety procedures, and to develop even higher standards for shared use facilities.**

Recommendation:

- **Launch a significant campaign to upgrade and strengthen the fleet to prepare for increasing technological sophistication and improve future productivity and quality of fleet operations.**

Operational findings:

- **Continue practice of competing the management of the UNOLS Office.**
- **Needs for specialized capabilities are met in special circumstances from outside the UNOLS system.**

Recommendations:

- **Use a cooperative agreement for support of the UNOLS Office to ensure necessary management oversight.**
- **Consider a trial including some commercial ship operators as UNOLS non-member operators to provide unique fleet capabilities.**

Planning findings:

- **Ocean scientists must assess the future needs and opportunities of the field to establish priorities. A broad vision is essential to anticipate future fleet requirements.**
- **Federal agencies must improve long range planning for facilities with twenty to thirty year life spans, that is beyond the scope of NSF and UNOLS alone.**

Recommendation:

- **NSF must accelerate and expand efforts to articulate a broadly based vision for the future of ocean science and technology.**
- **Federal agencies sponsoring research in oceanography should develop a long-range plan for modernization and composition of the oceanographic research fleet that reaches well into the 21st century.**

Dolly reported on the NSF actions underway in response to the review. Initial actions include:

- **Developing new cooperative agreements for ship operators, with increased emphasis on quality control and standards.**
- **Revising guidelines for management of shared use instrumentation to improve technology.**
- **Sponsoring workshops focussed on emerging technology and specialized capabilities.**

In response to the recommendation to develop a long-range plan for the oceanographic fleet, NSF, ONR and NOAA plan to develop a cooperative plan in partnership. This is beyond the scope of NSF and UNOLS acting independently. NSF will take the lead in this effort with strong support from the Navy and NOAA.

Dolly reviewed the framework of the Long-Range Plan. The report should provide an overview of the fleet through 2030. They will focus on the next ten years with integrated assessments of science trends, ship capabilities and capital requirements. They expect that the document will be of modest length, 10 to15 pages. They would like to have the plan in place within the next eight months.

Larry Atkinson asked Dolly what the role of FIC would be in this activity. Dolly indicated that it would be useful for FIC to look at the future of the Fleet and try to determine the science capabilities that will be needed. They should try to identify the types of ships that will be needed for observations, ROV and AUV support, etc. However, Dolly indicated that the agencies need to take the lead in development of the long-range plan.

AGOR 26 Status Report - Sujata Millick began the AGOR 26 status report by announcing that the contract for construction of the ship has been signed. Lockheed Martin representatives gave a brief history of the program. A summary report titled "AGOR 26 SWATH Oceanographic Research Ship - Final Phase I Concept Design" was provided to meeting participants prior to the meeting and is enclosed as ***Appendix V***.

In January, Atlantic Marine Industries (AMI) was selected as the shipyard. The construction process will be an integrated process with Lockheed/Martin and AMI working together. The SWATH AGOR program master schedule was reviewed. As a first step they will be working with ABS to determine the approach for classing the vessel along with its approval process. They hope to establish an MOU with ABS. There will be an integrated master schedule between the shipyard and the naval architect. There will also be model testing to look at resistances. The load analysis for the ship will rely on previous model testing.

Tests and trials are planned after ship construction. Delivery is planned 23 months from the start of construction. AMI offered the shortest construction time since they work double shifts. The Navy is using a new process (A45) for procuring the ship. There will be no INSURV and no SUPSHIP activities during construction. The yard will be paid based on milestones and performance. Design modifications will need to be integrated into the design. On-site representatives from the Navy will have a dollar limit that they can authorize for design changes. No major changes are planned at this time. In the first two months there may be latitude for changes.

The report continued with a technical update. Originally, the AGOR 26 construction portion of the program was budgeted at $36M. It was soon learned that it would not be feasible to build a ship to meet the mission requirements and stay within the budgeted $36M. They were faced with the choice of either downsizing the ship or eliminating the equipment. Instead, additional funds for construction were requested and are likely to be awarded. All construction costs in excess of the $36M will be included as options to the contract. The ship was designed in consideration of adding these options. If the additional funds become available, the options will be exercised.

The design operational capabilities were reviewed, see ***Appendix V*** for details. The ship includes 68 tons of fixed equipment and 100 tons of variable load. The ship can accommodate a science party of 31. Crew size will be either 16 or 17.

Robert Hinton continued the report with a description of the ship's deck arrangements. These figures are included in ***Appendix V***. He noted that they are still examining ladder locations in an effort to add space to the labs. Passageway locations are not as optimal as desired, but are necessary to maintain the

bulkheads. On the 01 level a working deck has been added. The standard shipload includes one drum of wire for the winch. If a scientist wishes to carry another wire, the weight will be applied to the science payload.

At the last FIC meeting there was concern over the ADCP selection. There was discussion on whether to install a newly introduced ADCP requiring a large space aboard the ship. A decision has been made to install a traditional system, but hold space available for the new ADCP. Overall, the ship's arrangements have not changed much since the last meeting, but some of the requested improvements have been incorporated.

Joe Coburn noted that in the AGOR 23, 24and 25 project there were funds for correction of deficiencies after delivery. This is not the case for the SWATH. It is hoped that deficiencies can be identified and corrected during the construction with throughout the process between the builder, the naval architect and the U.Hawaii on-site rep. If any one wishes to comment on the AGOR 26 design, they should send the information to Robert. Larry noted that this process will likely be the way of the future, we need to determine how to most effectively interact during the process in the future. Pete Kilroy (NAVSEA) noted that Robert is the on-site rep and he is there to provide continuous review and input. Robert writes weekly reports that are in the vault and can be commented on.

The ship's maneuvering system. The goal was to design the vessel to maintain station in 47 knots of wind. They wanted the ship to be able to turn through the winds. The ship was designed for a towing capability of 10,000 lbs. at 3 knots. The design includes a fixed pitch propulsion with forward azimuthing thruster and aft rudders. Various propulsion systems were examined and a tradeoff study was performed. The selected propulsion drive is electric with a 3-Megawatt capacity. The propellers are 11-ft diameter with 5 highly skewed blades. The rudders are located aft of the propellers.

The SWATH AGOR seakeeping performance was one of the most important design parameters. The goal was for the ship to be fully operational in upper Sea State 6 in best heading. The MIT WAMIT computer code was used to analyze seakeeping. At high SS6, pitch exceeded the goal which means that it would require large stabilizers. At low SS6, it was within the goal. At the completion of phase I, the ship meets all motion criteria with the exception of the 3 degree pitch requirement at zero speed. Additional review will be performed in Phase II to determine if more improvement can be achieved.

The ship characteristics were reviewed. The length overall is 182 feet and draft is 25 feet. Four endurance cases were analyzed with varying drafts, fuel loads and hotel loads. The desired range of 10,000 could be met if needed with the ship configured appropriately. Weights are critical for this vessel and they were still being studied. Large cargoes cannot be easily accommodated on SWATHS. Equipment for follow-on cruises will need to be shipped to port calls rather than carried aboard ship from cruise to cruise.

The Role of FIC in development of New Ships and Refits - There was a discussion continued on the role of FIC in development of new ships and refits. In many cases it will be the responsibility of the individual institution to initiate and carry out replacement plans and refits. These institutions should interact with UNOLS throughout the effort and seek community input. It was suggested that FIC issue guidelines for institutions on the proper path to follow in replacement planning. FIC should continue in their role of defining the science needs of the ships. RVOC deals with operations and RVTEC deals with technical issues. The FIC is the body that should be looking at science facility needs. Institutions are encouraged to interact with FIC. FIC is the link with the science community and should be a reference source. There was a discussion on how to approach fleet planning: There appears to be a few overlapping and conflicting roles. These roles include a pro-active role (e.g. Intermediate/regional ship planning), a gatekeeper to filter information to the community, and the role of collaborator. FIC should continue in their efforts of SMR development. It was suggested that a plan outlining FIC's role be developed. Larry, Jack, and Annette will draft a plan.

The UNOLS Biennial Review of Sea Going Oceanographic Facilities - Larry reviewed the topics of the Review document, see *Appendix VI*. Authors and suggestions for authors were identified for the various sections. The document is posted on the UNOLS website. The first section addresses future research and systems. The Brewer/Moore report, which will synthesize the NSF Futures

workshops, can be used to define future research requirements. "Future observing system needs and possibilities" is another topic in this section and John Delaney and Keir Becker were suggested as authors. The section on "General Information on the UNOLS Fleet" is subdivided into the following topics:

- **State of the fleet and trends in fleet Use - Atkinson, DeSilva, Bash, Prince, Pittenger**
- **Historical perspective of fleet replacement and expansion - UNOLS Office and past Chairs**
- **New Assets - Chris Measures**
- **Trends in support of Research Vessels**

The next section, "Specific Topics - new Types of Vessels" included the following topics and authors:

- **Icebreakers – Jim Swift**
- **Seismic Vessels - Paul Ljunggren and John Diebold**
- **SWATH Vessels - Joe Coburn**

Another section titled, "Impact Mission" includes the following topics and suggested authors:

- ROV's - Dana Yoerger
- AUVs - Jim Bellingham
- Ocean Observatories - Larry Clark, Dunneuber, Alan Chave
- Arrays (TOGA)

The Fisheries and Hydrographic Surveying section included the following topics:

- Fisheries surveys - Ned Cokelet, Caillet (MLML), Love (UCSB)
- Design Aspects - Tom Althouse
- Hydrographic Surveys - Sam DeBow

The final section of the report addresses "Technical Issues" and includes the following topics:

- New Regulations - Joe Coburn
- Shore Side Technical Support - John Freitag
- Ship supported technology - John Freitag

There was discussion on the goals of the report. The Goals are outlined at the beginning of the document, see ***Appendix VI***. The report can help to compare today's fleet with the capabilities needed in future facilities. The report will also stimulate the community to identify other tools that are not currently available.

East Coast Science Mission Requirements (ECSMR)- There was a discussion on how to proceed with the ECSMRs. The ECSMRs were drafted but need additional information. Larry requested that Annette attempt to update the SMRs and pass them to Mark Brzezinski and Dave Hebert for review.

Ship Design/Construction Project Updates:

CALANUS Replacement - The CALANUS replacement vessel is well into the construction phase. Delivery is anticipated in early 2000. The ship is a catamaran design.

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CAPE HENLOPEN Replacement Plans- Matt Hawkins (U.Delaware) reported on Delaware's plans for replacement of CAPE HENLOPEN. His viewgraphs are included as ***Appendix VII.*** Matt began by showing a map of the East Coast of the U.S. with the routine CAPE HENLOPEN operating area

highlighted. Next he reviewed the preliminary time line for replacement planning and construction. The University of Delaware will provide financial support to begin the process. In 2000, the SMRs will be developed and conceptual design will begin. Preliminary design is planned for 2001with spec/bid/verify in 2002. Final design development is scheduled to begin in 2003. Construction is scheduled to begin in 2004 with delivery at the end of 2005.

The University of Delaware's Ship Advisory Committee (SAC) will establish a Delaware Research Vessel Review Committee (DRVRC). The DRVRC will be composed of sea-going scientists from the mid-Atlantic which represent CAPE HENLOPEN's normal user base. The Committee will be selected such that multiple disciplines in oceanography are represented. It will include users, another ship operator, and representatives from principle funding agencies. The committee will include approximately ten persons. Documents and plans proposed by the DRVRC will be presented to FIC for review. Matt showed a flowchart of the R/V design process. The process includes design and review iterations by DRVRC, FIC, and naval architect. He reviewed a table of the project tasks along with the responsibilities of the DRVRC, FIC, Marine Ops Naval Architect, and shipyard during each task. The tasks include SMR, concept design, preliminary design, spec/bid and verification, final design, and construction. There was some discussion on the role of FIC in this process. The FIC agreed with the process and their role as defined by the Delaware committee. They recommended that a fisheries capability for the ship be considered. It was also suggested to include ROV users in their planning stage. U.Delaware would like to have the SMRs in place by July 1st with a draft to FIC by May. This is a tentative plan.

WHOI SWATH - Joe Coburn reported on the status of WHOI SWATH design effort. His viewgraphs are included as ***Appendix VIII***. At the last meeting, FIC recommended that this vessel be designated as a UNOLS Vessel. Joe reviewed the characteristics of the ship and the design process. A group of likely users were brought together on a number of occasions for input and design review. The design concept applies the SemiSWATH^{TM} Concept with a variable draft and tandem strut. The design process includes conceptual and preliminary design development with user input, an independent review, model tests, finite element modeling, dynamic load analysis and ABS review. Model tests will examine resistance, speed and power, structural prying and squeezing loads, slamming structural loads, and seakeeping. Joe provided an illustration of the SWATH. He showed charts comparing the expected roll in a seaway for OCEANUS and the SWATH as well as the expected pitch in seaway. The SWATH performs better than OCEANUS and meets the SS4 design limit.

The ship's design calls for a length overall of 105 ft, which is similar in size to WESTERN FLYER. The beam is 51.5 ft. The operating draft is 13.6 ft and the transit draft is 9' 6". Joe showed the outboard profile and the main deck arrangements. The lab is almost the same size as OCEANUS and the main deck is a bit larger. It appears that this ship may be more comparable to OCEANUS in its capabilities than originally planned. The main limitations of the SWATH is the variable payload and the fewer bunks (Oceanus has 18 berths and the SWATH has 12). WHOI has drafted deck layout options for buoy deployment. One of the major differences between OCEANUS and the SWATH is that OCEANUS can take four buoys while the SWATH can only carry one. WHOI also studied aft deck layouts for varying operations. WHOI is considering a transducer sword.

In assessing the design, WHOI feels their goals have been met. They are still looking at the manning requirements. They would like to operate with a crew of four and possibly six for longer offshore cruises. WHOI is working with the USCG on this issue. They are also looking into ABS and SOLAS requirements. Some of these requirements may have weight and cost implications.

WHOI is raising funds to support the ship's construction. Their goal is to raise $10M. Construction is estimated at about $7M. Model tests and model building have already been paid for. WHOI also paid Glosten to develop the model tests and oversee them. The question was asked about the comparison of the cost between a monohull and the SWATH. It seems that the construction cost of the SWATH is a bit higher for the same size monohull, but the capability of the SWATH is better in the intended application. It is a difficult comparison to make. There was a general discussion on whether FIC should be encouraging more SWATHS. The limitations of the design need to be recognized, such as, flexibility.

NOAA Fisheries Vessel Update - The status of the NOAA Fisheries RV which was presented at the

RVOC meeting earlier in the month was reviewed. Hull and propeller model testing have been completed. NOAA issued an RFI to industry in July. NOAA is waiting for an appropriation for construction. They hoped to issue an RFP this month once the appropriation is received. They would like to make an award for construction by May 2000. The first ship is slated for Alaska and is scheduled to come on-line in 2003. The current plan calls for FRV-2 to be assigned to the Northeast coast and will come on line in 2004/5. Plans call for FR-3 to be assigned to the west coast and is scheduled to come on-line 2005. FRV-4 would be assigned to the Gulf of Mexico and come into service in 2006.

ALPHA HELIX Replacement - There were questions about replacement plans for ALPHA HELIX and GYRE. Plans are unclear at this time and no report was provided.

Near and Long-Term FIC Agenda - Various FIC activities were reviewed:

1. The role of FIC in new ship and overhaul design needs definition.

2. Membership - Larry reviewed the current FIC membership. It was suggested that a representative from the Gulf of Mexico be added to the Committee. We also need to review participation by Alaska on FIC.

3. Next Meeting - It was suggested that FIC's next meeting be aboard HEALY, perhaps during it's transit from Norfolk to Baltimore in March. Annette will contact the Coast Guard to request permission.

The meeting adjourned at 10:30.

Immediately following the meeting, FIC was invited to ride MBARI's SWATH vessel, WESTERN FLYER, in Monterey Bay.