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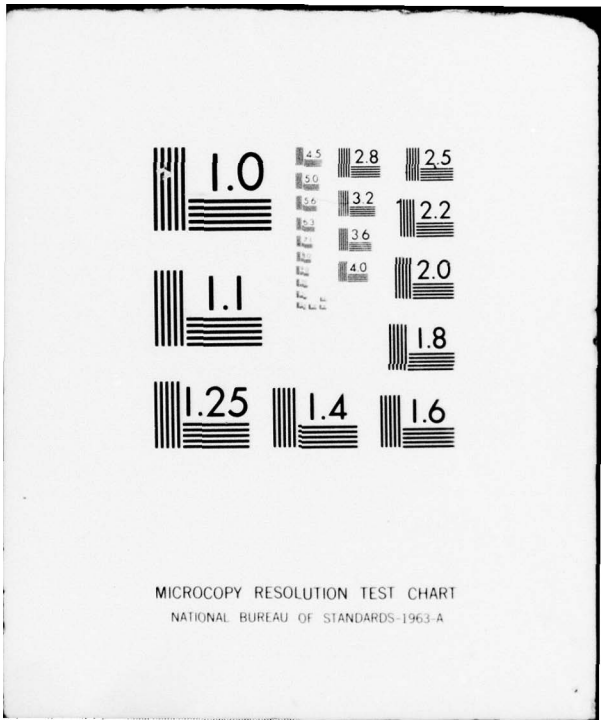
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NAVAL POSTGRADUATE SCHOOL
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THESIS

THE AGOR-21 CLASS OCEANOGRAPHIC RESEARCH SHIPS: AN ACQUISITION ANALYSIS

by

Cary G. Van Haaren
Lieutenant Commander, Supply Corps, U.S. Navy

March 1978

Thesis Advisor: J. W. Creighton

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The AGOR-21 Class Oceanographic Research Ships: An Acquisition Analysis

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Cary G. Van Haaren
Lieutenant Commander, Supply Corps, United States Navy
B.S., United States Naval Academy, 1965

Submitted in partial fulfillment of the
requirements for the degree of

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ABSTRACT

The use of commercial "off the shelf" products, commercial standards and business practices to meet Defense material needs is receiving increasing attention. Defense acquisition policy-makers believe that using commercial products and standards is one way to reduce acquisition costs while still meeting mission needs.

This thesis is a history and analysis of a successful ship acquisition program which utilized commercial standards and practices. Two current ship acquisition programs using the same concept are briefly described. The intent is to illustrate the development of the acquisition concept and the project manager's strategy as well as describe the planning and execution of the program. Significant management problems were encountered due to use of commercial standards and practices. Emphasis is given to their solution. Contractor and ship operator evaluations of the program are provided. Several recommendations are made concerning use of commercial standards and practices for future acquisition programs.

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LIST OF EXHIBITS

ABBREVIATIONS

ABS	American Bureau of Shipping
ACO	Administrative Contracting Officer
AGOR	Auxiliary Vessel, Oceanographic Research
APP	Advance Procurement Plan
ASPR	Armed Services Procurement Regulation
AT	Acceptance Trial
ATF	Auxiliary, Fleet Tug
CCAP	Commercial Commodity Acquisition Plan
CNO	Chief of Naval Operations
COR	Circular of Requirements
CY	Calendar Year
DCAS	Defense Contract Administration Service
DoD	Department of Defense
EEO	Equal Employment Opportunity
FCC	Federal Communications Commission
FFP	Firm-Fixed Price
FY	Fiscal Year
GFI	Government Furnished Information
GFM	Government Furnished Material
GFP	Government Furnished Property
IFB	Invitation for Bids
ILS	Integrated Logistic Support
INSURV	U.S. Navy Board of Inspection and Survey
MARAD	Maritime Administration
MILSPEC	Military Specification

MSC	Military Sealift Command
NASCO	National Academy of Sciences Committee on Oceanography
NAVMAT	Naval Material Command
NAVOCEANO	Naval Oceanographic Office
NAVSEA	Naval Sea Systems Command
NAVSEC	Naval Ship Engineering Center, a field activity of NAVSEA
NAVSHIPS	Naval Ship Systems Command (now NAVSEA)
NPD	Navy Procurement Directives
NSF	National Science Foundation
OCC	Office of Contracts Compliance, Department of Labor
OCEANAV	Office of the Oceanographer of the Navy
OPNAV	Office of the Chief of Naval Operations
OSB	Offshore Oil Supply Boat
PCO	Procuring Contracting Officer
PHS	Public Health Service
PMS	Project Manager, Sea Systems Command
QA	Quality Assurance
RESUPSHIP	Resident Supervisor of Shipbuilding, Conversion and Repair, USN
RFP	Request for Proposal
RPO	Resident Project Officer
R/V	Research Vessel
SAP	Ship Acquisition Plan
SCB	Ship Characteristics Board, OPNAV
SECNAV	Secretary of the Navy

SUPSHIP	Supervisor of Shipbuilding, Conversion and Repair, USN
SURTASS	Towed Array Sensor
T-AGOS	Ocean Surveillance Vessel operated by MSC
T-ATF	Auxiliary, Fleet Tug operated by MSC
TENOC	Ten Year Program in Oceanography
USCG	U.S. Coast Guard

I. INTRODUCTION

A. PURPOSE

In recent years there has been an increasing level of interest in greater use of commercial products and practices to meet Defense material needs. Such programs as CCAP, Commercial Commodity Acquisition Program, have been initiated to increase the amount of defense requirements met by "off the shelf" commercial products. There have been other initiatives to reduce the level of military "uniqueness" in material procurements. There now exist DoD directives requiring that military specifications and standards be "scrubbed and tailored" before being contractually invoked. Not only specifications and standards are receiving attention, however; Defense Department business practices are also being scrutinized for there is little doubt that they are often a barrier to commercial product acquisition.

The purpose of this thesis is to illustrate the development and management of a defense acquisition program using commercial standards and practices. All phases of the acquisition are analyzed in order to demonstrate the types of problems likely to be encountered in managing such a program.

The program was unique in that commercial standards and practices were used to acquire relatively complex products; two oceanographic research ships. The ships were part of the FY 1971 Navy shipbuilding program and were bailed, or loaned,

to two private academic institutions in furtherance of the Navy's oceanographic research programs after delivery.

The program had a relatively low priority within the total Navy shipbuilding program, therefore, funding was constrained. As a result, the program sponsor and the project manager found it necessary to develop a ship acquisition concept new to the Navy; they chose to buy a modified commercial design vessel and to adapt their usual business practices to the commercial environment in which these ships were being produced.

Two separate programs using the same acquisition concept are now proceeding under the same project office. These two programs are briefly described to further illustrate use of the concept.

B. RESEARCH METHOD

In conducting research for this study all pertinent records available in the Naval Sea Systems Command Auxiliary, Amphibious and Special Mission Ship Project Office (NAVSEA PMS-383) and the Defense Contract Administration Services Office, Houston, Texas, were utilized. Interviews were conducted with PMS-383, NAVSEA Contracts Branch, Navy Office of General Counsel and Office of the Oceanographer of the Navy personnel. Outside of the Government; Texas A&M University, University of Hawaii and contractor personnel were contacted.

C. ORGANIZATION OF THESIS

Section II describes the background and evolution of oceanographic research vessels with emphasis on the U.S. Navy's

involvement. The significance of the offshore oil supply boat is also discussed. The process through which the AGOR-21 Class vessels were acquired is presented in Section III. Section IV is included so that the reader may acquire a perspective on the success of the program. Section V provides a brief look at current and future programs utilizing the same acquisition concepts. In section VI conclusions are presented regarding the key management problems faced when using commercial standards and practices in defense programs.

D. ACKNOWLEDGMENTS

The author wishes to express his appreciation to the many people whose gracious allocation of many hours from their schedules made this study possible. Special thanks are owed to the staff at NAVSEA PMS-383, in particular Mr. Don Robertson, who supported this effort.

Interviews were conducted with the following people:

Mr. Gary Jayne, Deputy Project Manager, NAVSEA PMS-383.

Mr. Don Robertson, Project Engineer for AGORs, PMS-383.

Mr. Carl Becker, Project Engineer for T-ATF, PMS-383.

Mr. Roy Weber, Project Engineer for T-AGOS, PMS-383.

Mr. Paul Dabson, Contract Negotiator, NAVSEA Contracts Branch.

Mr. Samuel Groner, Associate Chief Trial Attorney, Contract Appeals Division, Office of the General Counsel of the Navy.

Mr. Stewart Nelson, Staff,
Office of the Oceanographer of the Navy.

Commander W. C. Knodle, USN, Staff,
Office of the Oceanographer of the Navy.

Mr. Salvadore Guarino, Vice President of Engineering, Halter Marine Services, Inc.

Mr. William Imbert, Treasurer, Halter Marine Services, Inc.

Captain Henry Rowe, USN (Ret) formerly with Texas A&M Univ.

Mr. Dean Letzring, Marine Operations Director, Texas A&M University.

Mr. William Clark, Marine Operations, University of Hawaii.

E. SPECIAL ACKNOWLEDGMENT

Special gratitude is due to the late Mr. Maxwell Silverman. It was Mr. Silverman, more than any other individual, to whom the inception and successful completion of the AGOR-21 Class program can be attributed. It was Mr. Silverman's intent to one day document the program. It is the author's hope that this thesis fulfills his wish.

II. OCEANOGRAPHIC RESEARCH VESSELS: BACKGROUND

A. HISTORICAL PERSPECTIVE

Benjamin Franklin is credited with being the first American oceanographer, although the word "oceanographer" did not appear in the English language until 1883. He was responsible for the charting of the Gulf Stream while serving as Postmaster General of the Colonies. It seems that it took the mail from England too long to reach the Colonies because the mail packets were stemming the current instead of crossing it. [1]

This anecdote demonstrates that the United States has a long history of involvement in oceanography and hydrography, or undersea mapping. A long line of vessels have served in the oceanographic research role, most part-time, and relatively few built specifically for oceanographic work.

During World War II the U.S. Navy was in great need of oceanographic research for defense needs. Lacking internal resources, the Navy turned to private and academic institutions for needed expertise. Various and sundry vessels were acquired and converted for use as platforms by the institutions. [1]

After the war the Government continued to support oceanographic research at universities and other private insitutions through the Navy and other agencies. The Navy expanded its own internal research program at the same time. The "fleet" supporting all the research activity during the decade after the war consisted almost entirely of conversions; no ship

having been designed and built specifically for oceanographic research since 1931. [1]

In 1952 the Office of Naval Research established a ship panel within the oceanographic community. This panel produced a study that was the impetus for further conferences and studies which eventually resulted in the design of the AGOR-3 class oceanographic research ship by the Navy Bureau of Ships.

In 1957 the third National Academy of Sciences Committee on Oceanography (NASCO) was established. The NASCO report, published in 1959, highlighted a growing concern with oceanographic research and the need for larger and more capable ships. [1]

The Navy followed the NASCO effort with its Ten Year program in Oceanography (TENOC). The TENOC report recommended a ten year construction program for forty ships. TENOC actually engendered the construction of the previously designed AGOR-3 class ships. [1] Eleven of the Class were built between 1960 and 1969.

Further conversions and some new construction were completed during the 1960's. The Navy funded the construction of twenty new vessels, half the TENOC goal, while other agencies and private institutions provided sufficient numbers to exceed the forty ship goal. [2]

Entering the Seventies, some institutions supporting the Navy's oceanographic program were still using old, ill-suited and uneconomical converted ships. With funding constrained by

the Vietnam war, the Navy found itself unable to continue building large, multi-discipline research ships which cost in the neighborhood of $6 million at the end of the 1960's. For example, the cost of an AGOR-3 Class ship increased from $2.638 million to $5.038 million between 1962 and 1969 due to inflation. [3]

As a result of continually shrinking Navy Oceanographic research budgets and rising costs, it became increasingly evident that the Navy and its institutional supporters had to find or design a low cost and flexible platform if support of Navy programs was to be maintained. For example, operating costs (crew salaries, maintenance, fuel and consumables) began to escalate dramatically, as much as twenty-four percent between FY 1974 and FY 1975, so that it was imperative that smaller, simpler ships be built. [3] Operating funds for ships operated by other institutions, whether Government owned or not, are now largely provided by the National Science Foundation (NSF). Formerly, that is in the 1960's, most funding was provided by the Office of Naval Research.

B. THE OFFSHORE OIL SUPPLY BOAT

In the mid-1960's several farsighted individuals in the oceanographic community noted that the U.S. oil industry was using an inexpensive, but very capable class of ships for offshore supply and seismic research work. This hull type, popularly known as the offshore oil supply boat (OSB), was being produced in large numbers as a standard design in a very

competitive environment by a nucleus of about eight small shipyards centered on the Gulf Coast. The OSB design was a natural commercial development of the World War II LCI and related types of landing craft.

In the mid-1960's OSBs were sized in the 125 to 165 foot range lengthwise, with a 30 to 38 foot beam and a 9 to 11 foot hull depth. They possessed good deck space, range, endurance, speed and stability, but lacked certain seakeeping abilities. [4] At the time OSBs were being built at a cost of between $650,000 and $1 million. They were operated with a nine man crew, thereby minimizing operating costs. They were all built at under 300 gross tons thus avoiding U.S. Coast Guard regulation as it applies to machinery, materials, habitability and manning levels. [5] Since crew costs are nearly forty percent of operating costs, it was crucial that these ships be sized below the 300 gross ton threshold.[1]

In 1964 Texas Instruments, Inc. performed a study on research ship characteristics preparatory to acquiring ships for seismic survey charter business. The design that came closest to fulfilling their needs was the OSB. In 1965 Texas Instruments contracted for two ships of modified OSB design. The two ships were built in a small Texas yard at a cost of less than $750,000 each less payload costs. [4]

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[1] Gross tonnage is a volumetric measure to which personnel manning standards are keyed by U.S. law. The key threshold is at 300 gross tons since any U.S. flag vessel over that size must carry the same numbers of qualified crew members as a merchant ship of 4,000 tons.

Other studies by private institutions confirmed the feasibility of the OSB as a research platform. The continuing evolution of the OSB and their increasing numbers on the oceans helped to foster the dialogue within the oceanographic community. The OSB's low construction and operating costs, plus its large, open main deck aft, where oceanographic research payloads could be carried, made it the most attractive platform to replace the small conversions in the oceanographic fleet.

III. AGOR-21 CLASS OCEANOGRAPHIC RESEARCH VESSELS: ACQUISITION HISTORY

A. PROGRAM INITIATION

1. Organizational Responsibilities

The Oceanographer of the Navy (OCEANAV) is assigned as the Director, Naval Oceanographic Program for the CNO by authority of SECNAVINST 5430.79. As such, the Oceanographer is the mission sponsor representing the users, the Naval Oceanographic Office (NAVOCEANO), Navy laboratories and the private institutions that support Navy programs.

The Naval Ship Systems Command (NAVSHIPS), now the Naval Sea Systems Command (NAVSEA), has always been responsible for building ships for the Navy. The Oceanographer, in order to establish responsibilities and working relationships regarding oceanographic ships, negotiated a written agreement with NAVSHIPS in September 1970. This agreement established direct contact between OCEANAV and the NAVSHIPS Project Manager responsible for oceanographic ships. Establishment of the communication channel, provision for User Representatives and creation of a OCEANAV Liaison Officer billet on the Project Manager's staff were the most significant elements of the agreement.

The User Representative was a concept borrowed from the private institutions and commercial shipowners who routinely station an Owner's Representative in the shipbuilder's yard to represent their interests. In this case the User Representatives were to represent the interests of the particular

institution to which the Navy would provide the ship even though the Navy would retain ownership. A very important function performed by the User Representative was that of liaison with the Navy's contract administration office responsible for the contract. This concept later proved to be one of the keys to the success of the AGOR-21 and 22 acquisition.

2. Mission

The mission of the AGOR-21 class vessels, generally, is to conduct oceanographic research in support of the Naval Oceanographic Program. Specifically, the ships are intended to support various multi-discipline programs both in basic and applied oceanography and in education. The ships are intended to operate worldwide from fringe ice to the tropics and be capable of limited handling and service of small deep research vehicles and towing of deep sea buoys. [6] The mission is obviously all-encompassing and accomodates the desires of many people within the oceanographic community. A design of considerable flexibility was needed to meet this mission requirement.

3. Design Characteristics

Input from the oceanographic institutions, both Government and private, led to the development of a set of ship characteristics based on the 300 gross ton OSB design. The objective of OCEANAV and NAVSHIPS was to formulate characteristics that (1) were acceptable to the CNO Ship Characteristics

Board (SCB), (2) would provide flexibility enough to meet the mission, (3) would provide for a platform economical to build and operate and (4) be close enough to the basic OSB design to attract that segment of the shipbuilding industry.

The SCB issued the approved Characteristics for the class on 20 April 1970. The document stated bluntly that, "the design shall be based on the basic commercial offshore oil exploration ship." The use of commercial standards was specifically called out. In this case the standards were those in general use in commercial shipbuilding. There are four regulatory bodies that impose commercial shipbuilding standards; (1) the American Bureau of Shipping (ABS), (2) the U.S. Coast Guard (USCG), (3) the U.S. Public Health Service (PHS) and (4) the Federal Communications Commission (FCC).

The ABS is a private organization that provides inspection and certification services to ship owners. They publish construction standards for various classes of ships and inspect and certify based on those standards. Their service is used almost universally in the U.S. commercial ship construction and repair industry. Payment for ABS services is made by the shipyard and is included as part of the contract price.

The USCG is primarily interested in safety. They enforce Federal regulations in such areas as damage control features, lifesaving equipment and manning levels. They approve plans, inspect and certify just as does ABS.

The PHS is concerned with the sanitation, food service and habitability aspects of the vessel. They also inspect and issue a certificate.

The FCC sets minimum standards for communication facilities and provides a certificate indicating their standards have been met.

Most of the above standards are required by law and the commercial shipowner cannot operate without them. They are the baseline standards which all builders meet as a matter of course. They are, however, not as stringent as the Navy's standards for military vessels that are built for the combat environment. In addition, the Navy's inspection or quality assurance procedures are much more onerous, generate more paperwork and require more manpower for both the Navy and the builder.

Since the AGOR-21 Class mission involved non-combatant work with a civilian crew, the commercial standards were considered adequate and more cost-effective. In addition to requiring use of commercial standards, the SCB Characteristics specifically stated that compliance with the General Specifications for Ships of the U.S. Navy, NAVSHIPS Technical Manuals and other military requirements were <u>not</u> required. Other major requirements of the SCB were the 300 gross ton limitation and use of a civilian crew whether the ships were operated by the Navy or private institutuions. [6]

The concern of the Project Manager that the design be as close as possible to the OSB was demonstrated in an April

1970 letter in response to a Naval Ship Engineering Center (NAVSEC) letter questioning the watertight integrity standard of the proposed hull design. The Project Manager stated in part, "This procurement is intended to utilize the expertise of the segment of the shipbuilding industry which builds such vessels for the oil industry." The changes proposed by NAVSEC were of a nature that would have altered the design to such a degree that there would have been no advantage left in a commercial vessel acquisition. In the end, NAVSEC's institutional design review role was abrogated by the Project Manager for the AGOR program and the basic OSB design concept remained intact.

In order to provide the flexibility required for missions the concept of "portability" was utilized for all payload equipment. The SCB Characteristics required large, free working areas and the capability to changeover oceanographic equipment while in port, but without shipyard facilities. The portability concept for the highly specialized, largely one-of-a-kind payload machinery established the basis for the following:

a. Payload changes

The operational capability to change payload oceanographic equipment between mission voyages with a minimum of physical installation effort aboard ship, consequently with minimum turnaround time between voyages, was provided. Different oceanographic missions, while all under the general umbrella of oceanography, require different equipment to be

aboard the ship. For example, a voyage devoted to geological oceanography requires equipment for taking bottom samples and bottom coring for soils analysis. A mission devoted to biology requires nets, net handling gear and aquaria. Building into the ship the equipment for all these functions would result in an oversized ship with equipment going to sea that would not be used much of the time.

b. New Equipment Installation

The state of the art in oceanographic equipment is constantly evolving and changing, driven by the basic nature of research. New and experimental equipment is often developed to meet these needs and can be installed aboard ship readily when the ship is equipped in accordance with the portability concept.

c. Shoreside Equipment Maintenance

Preventative and repair maintenance can be done between voyages while the unused equipment is shoreside thus maximizing operational availability when aboard ship.

d. Separate Procurement of Specialized Equipment

Since the specialized equipment must be portable and the ship built to accomodate and facilitate portability, procurement of the equipment separate from the ship is allowed. Thus the shipbuilder is insulated from this equipment, which is unfamiliar to him, and he is allowed to concentrate on building ships unencumbered by the unique requirements for design, construction and testing of strange equipment.

The Government contracts directly to the segment of industry that are specialists thus avoiding the learning, middle-man and cost problems the shipbuilder would experience. The equipment is installed after ship delivery thus avoiding the problems of cost and timing in providing large quantitites of unique GFE.

All payload components, which were procured separately by the Project Manager through the NAVOCEANO contracts office, were provided with fittings to make them portable, i.e., easily removable from the ship's decks. These components did not require any systems integration as do combatant ship weapons and electronics equipments. In addition to winches and gear handling equipment; vans for stowage, laboratories, dormitories, mini-computers and other scientific electronics were procured. The special feature on the ships permitting this capability was bolt-down fittings on exterior decks and in interior laboratory and stowage areas.

The characteristics that emerged from the SCB were largely those of the OSB unencumbered by extraneous military requirements. The user-producer dialogue established between the private institutions and NAVSHIPS, via OCEANAV and the Navy-NSF coordinating committee on oceanography, was very productive in evolving a viable set of design goals.

4. Programming

OCEANAV, with the backing of the Navy-NSF coordinating committee, proposed a twelve ship AGOR (300 GT) class starting

with the FY 1970 budget. The ships were to be built at the rate of two per year for six years. The request was deleted from the FY 1970 budget; however, two ships were programmed in the FY 1971 budget. These two ships were redesignated AGOR UTILITY, or AGOR (U), and were eventually assigned hull numbers AGOR-21 and AGOR-22. The first two ships became the only two ships as the remaining ten ships of the proposed class were never programmed. In the opinion of the OCEANAV people involved the two ships that were programmed were authorized and left intact simply because they were small and inexpensive. Figure 1 shows the funding established in May 1972.

Figure 1.
Initial Program Funding

	AGOR-21	AGOR-22
Construction	$2,247,000	$2,087,000
Payload	830,000	830.000
Other	816,000	483,000
End Cost	$3,893,000	$3,400,000

B. ACQUISITION STRATEGY

With the approval of a commercial design, the Project Manager was then faced with the more difficult problems of (1) finding a suitable procurement procedure, (2) adapting to commercial business practices within the limitations of law and regulations and (3) convincing at least one of the OSB builders to accept a Government contract.

PMS-391 early on had studied various Government procurement procedures in search of a method successfully used to acquire a boat or ship of commercial design. The Army Corps of Engineers procurement of sixty-five foot towboats and the Maritime Administration's procurement of the hydrographic ship FERREL served as examples. The FERREL, which is operated by the Environmental Sciences Service Administration, was based on a small size OSB design.

The New Orleans District, Corps of Engineers, recommended the two-step formal advertising procedure as a suitable method of procurement.[7] MARAD successfully used the same method in acquiring the FERREL. After studying the details of the Army and MARAD acquisitions, PMS-391 prepared an Advance Procurement Plan (APP) setting forth two-step formal advertising per ASPR 2-502 as the procurement method. It was proposed that the procurement be firm-fixed price and a total set-aside for small business. The set-aside was a device to help restrict the bidding to competent OSB builders, most of whom were small business (less than 1,000 employees). Adequate design and

price competition was anticipated from these builders. The APP was approved without comment by NAVMAT on 15 July 1970.

Step one of the ASPR two-step procedure calls for the bidders to submit an unpriced technical proposal based on a general statement of mission and technical requirements. PMS-391 prepared a document called the Circular of Requirements (COR) based on their knowledge of OSBs and input gathered in meetings with all the proposed vessel users and OCEANAV. The COR, which is included herein as Appendix A, was general in nature; cited the regulatory standards, particulars of design, features required to modify the standard OSB for oceanographic research and software, trials and spares requirements. A vessel patterned after the standard 165 foot OSB was desired. The COR was jointly approved by PMS-391 and OCEANAV on 9 March 1971. It was then used as an integral part of the Request for Unpriced Technical Proposals in step one of the procurement procedure.

After approval of the APP and COR, PMS-391 developed an all-encompassing Ship Acquisition Plan (SAP). The SAP incorporated the APP and also contained general management, financial, ILS, scheduling and risk control plans.

In consonance with the basic concept of tailoring the project to a commercial acquisition, the SAP delineated the following requirements:

1. Commercial regulatory body standards, inspection and certification.
2. Milestone payments.

3. An abbreviated ILS effort calling for initial spares with user responsibility for further support.

4. Use of the builder's own specification developed as part of step one of the procurement procedure.

Just as importantly, the SAP prohibited the following:

1. Government furnished property, equipment or information.

2. Military specifications or standards.

3. Government plan or technical data approval.

4. Formal inspection or quality assurance programs.

Use of a competitively awarded FFP contract in conjunction with the above mentioned requirements and prohibitions was considered a low risk approach, therefore, the SAP was approved by the Commander, NAVSHIPS on 23 June 1971.

The initial problem was to eliminate where possible those practices and requirements known to be offensive to the prospective bidders. This meant deviation from standard operating procedures and conflict with elements within NAVSHIPS and some resultant compromises. To duplicate the business practices of the OSB industry was of course impossible for the Navy. Normally, private customers negotiate with the OSB builders based on one of the builder's standard designs with modifications to suit the customer's particular needs. The builders often proceed based on a handshake with formal contract signatures coming later. Customers put between ten and twenty-five percent of contract price down at the time of contract execution with other payments coming at specified milestones during construction. Exhibit 1 is a summary of the business practice issues facing the Project Manager.

EXHIBIT 1

Summary of Business Practice Issues

Category	Normal Navy Practice	Commercial Practice
Specifications	Military (MILSPEC, NAVSHIPS Technical Manual) requirements invoked.	Regulatory body (ABS, USCG, PHS, FCC, etc.) requirements invoked.
Financing	Progress Payments based on percentage of physical progress. Payment processing slow. Bonds required.	10-25% down payment with payments at specific construction milesontes. Payments usually rapid. No bonds.
Inspection, QA	Contractually imposed Inspection or QA systems (MIL-I-45208 or MIL-Q-9858) enforced by large Navy QA force.	Inspection by regulatory bodies and owner's representative. Builder's QA procedures relied upon.
Audits and Systems Reviews	Required by law/ASPR for Progress Payments, change orders over $100,000 gross and labor/overhead rate verification.	None
Progressing	Formal Quarterly Production Progress conferences. Navy and contractor personnel compute percentage of progress. Extensive manhours and paperwork involved.	Progress reviewed informally by Owner's Representative.
GFP	Provide some major equipment for installation by contractor. Provide spare parts. Require contractor warehousing and record-keeping. Government Property Administrator required.	None. All equipment is contractor furnished or installed after delivery by owner.

EXHIBIT 1

Summary of Business Practice Issues (Continued)

Category	Normal Navy Practice	Commercial Practice
Profit Limitations	Renegotiation Board recoupment possible. Vinson-Trammell Act limits profit to 10% of contract price.	Competitive Market relied upon.

An example of a commercial practice which PMS-391 proposed using was the milestone payment method. PMS-391 proposed the milestone schedule shown in figure 2 to replace the standard NAVSHIPS progress payments procedure. The standard procedure was considered too complicated, would impose an unnecessarily heavy administrative burden on the builder and require Navy inspection far beyond the scope desired for this acquisition:

Figure 2.
Proposed AGOR(U) Milestone Payment Schedule

1. 10% of contract price at time of contract execution.
2. 5% at time of keel laying.
3. 10% at time of completion of hull plating.
4. 10% at time of bolting down of main machinery.
5. 10% at completion of the electrical installation
6. 10% at completion of all tank testing.
7. 10% at completion of all joiner work.
8. 10% at completion of dock trials.
9. 10% at completion of sea trials.
10. 10% at delivery of ship to the Government.
11. 5% at completion of the guarantee period.

The milestones were also an important part of the Navy's limited inspection program, i.e., inspections were made for payment purposes, but included correction of deficiencies up to that point. The deficiencies were judged with the contractor's own specification as the standard. The milestone procedure, along with regulatory body inspections, negated the need for the Quarterly Production Progress Conferences normally

held on Navy shipbuilding programs. PMS-391 viewed this "carrot and stick" approach as simpler and more appropriate in dealing with the OSB builders. NAVSHIPS Legal Counsel and Contracts personnel considered the proposed clause to be too risky since the normal physical progress review by Navy personnel would not be conducted. After much dialogue it was agreed that milestones could be used, but only to define the percentage of physical progress within the context of the standard NAVSHIPS payments clause. Moreover, the milestones were altered somewhat; the initial 10% milestone was considered to be an unauthorized advance payment and the final milestone was unnecessary because the standard clause provided for a guaranty period witholding, so both were deleted.

One element of the PMS-391 strategy not reflected in the formal planning documents was the external marketing of the program. The Project Manager and his principal assistant for oceanographic ships visited several of the OSB builders. This was done to generate interest in the project and to explain the modified business practices PMS-391 intended to use. Preliminary inquiries soliciting interest in the program were sent to twelve builders. The inquiry consisted of a letter of explanation, directions to proposers, the COR and a pro-forma contract. Issues highlighted in the letter were (1) use of the builder's own commercial specification, (2) the lack of military requirements, (3) no Government furnished property, (4) little government inspection, (5) milestone payments and (6) a promise

to hold paperwork to a minimum. The thrust of the letter was to quiet the fears of the small, relatively unsophisticated builders that they would be overrun by Government inspectors and enmeshed in technicalities and red-tape. The effort was considered successful at the time because several yards expressed interest in bidding.

C. PROCUREMENT ACTIONS

1. Development of the Pro-Forma Contract

Piecing together the procurement package was a time consuming effort as it was necessary to convince the Contracts Directorate and Legal Counsel of the necessity to delete or modify many standard contract clauses and add some special features. Exhibit 2 is a summary of the alterations.

The aforementioned conflict regarding the milestone payments procedure was one in which a satisfactory compromise was reached with Contracts and the Production Progressing division.

Controversy also arose over the User Representative concept. The Contracts people felt that having such a person in the builder's yard would lead to constructive changes.[2] It must be remembered that during this period, 1969-1971, many large shipbuilding claims were being submitted to NAVSHIPS,

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[2]Constructive changes are changes to the scope of a contract initiated by the action or inaction of a Government representative, either verbally or in writing, which are not authorized by the Contracting Officer in writing. The majority of actions which lead to constructive changes involve interpretations of specifications and drawings.

and they were understandably very sensitive to the constructive change issue. By this time it had been decided that the individual serving as OCEANAV Liaison Officer on the PMS-391 staff would become the User Representative in the builder's yard with the title of Resident Project Officer, USN (RPO). In view of the fact that this individual was instrumental in developing the entire project, being one of the "farsighted individuals" mentioned in Chapter II, the Contracts people felt that the Navy policy of separation of "requisitioning" and "administrative" powers would be compromised if the RPO were given any authority to direct the contractor. It had been proposed informally that the RPO be given a limited contracting officer warrant since it was anticipated that the contractor would be a small yard not then covered by or close to a USN Supervisor of Shipbuilding Office (SUPSHIP). Contracts strongly opposed a warrant, but PMS-391 insisted on its own RPO. Legal Counsel eventually facilitated a compromise of sorts by proposing insertion of a changes clause used in construction contracts. This clause, found in the Navy Procurement Directives, carefully circumscribes and limits the conditions under which a contractor may claim a constructive change order. Additionally, the last paragraph of the clause provides for contracting officer designation of a representative empowered to direct the contractor's efforts within a specified, limited scope. Contract's concern about constructive changes was thus mollified and PMS-391 felt they had language that could be used

EXHIBIT 2

Summary of Pro-Forma Contract Alterations

Clause/Provision	Change/Rationale
Changes	NPD 7-103.2/NPC No. 18 (10/27/70 used in lieu of usual clause for constructive change avoidance and Contracting Officer Representative coverage.
Payments	Milestone method of computing progress substituted for normal method within NAVSHIPS Payment clause. Milestones based on commercial practice.
Specifications Article	Established contractor responsibility. Disputes in regard to equipment/material settled by having contractor provide that which was installed on ship named in article previously built by contractor.
Government Property	Special Provisions stated no GFP provided.
Inspection/QA Systems	3 standard NAVSHIPS clauses deleted. Modified Standard Form 32 clause included to give Navy right to inspect. Reliance on Regulatory Bodies for most inspection..
Liquidated Damages	Included to enforce 300 gross ton limit and delivery schedule.
Buy American Act	Clause modified to treat Controllable Pitch Propellor System as a separate end product.
Value Engineering Incentive	Clauses (ASPR 1-1707.1a, 1-1707.21c, 1-1707.3b) deleted. Design and costs controlled by commercial market.
Other	Following clauses deleted as inapplicable or because coverage provided in specification: Military Security (ASPR 7-104-12), Qualified Products-Components (ASPR 1-1107.2b), Logistic Support Requirements (NAVSHIPS), Subcontracts (ASPR 7-104.23a), Equal Opportunity Pre-Award Clearance of Subcontracts (ASPR 7-104.22), Change Order

EXHIBIT 2

Summary of Pro-Forma Contract Alterations (Continued)

Clause/Provision	Change/Rationale
Other	Estimates (NPD 26-208.1c), Limitation of Price and Contractor Obligation (ASPR 7-104.47a), Cancellation of Items (ASPR 1-322.5b) and Required Source for Aluminum Ingot (ASPR 7-104.59).

to give the RPO more authority if needed, although, as it turned out Contracting Officer Representative designation was never requested.

Unique among Navy shipbuilding contracts was the Specifications article of the Special Provisions. The article provided for incorporation of the contractor prepared specification, from step one of the two-step procedure, as the contract specification. The article holds the contractor responsible for the completeness, thoroughness and adequacy of the specification. The article also provided for settlement of disputes regarding the type of equipment or material provided by having the contractor provide that which was installed on a like type of ship previously built by the contractor and named in the article. The intent of these provisions was to resolve problems quickly at a low level, and in retrospect, that goal was met.

Although not controversial, the Liquidated Damages article of the contract is worthy of mention. The greatest worry of PMS-391 was that, through builder error, the vessels would admeasure over 300 gross tons. Therefore, a provision was inserted allowing assessment of $250,000 liquidated damages if the ships exceeded that threshold. The amount was actually small compared with the excess life-cycle costs in the form of increased manning and added safety equipment that would be incurred if the limit was exceeded. The delivery schedule was not as critical as it is for most combatant ship contracts, but the article did provide for a $500 per day per vessel

assessment after a one month grace period with a top limit of $30,000. Deliveries were to be fourteen and fifteen months after date of award, respectively. PMS-391 had confidence in OSB builder's ability to meet the delivery schedule, however, some leverage was desired should the contractor decide to divert his efforts toward keeping his steady commercial customers happy.

PMS-391 was successful in a generalized effort to reduce boilerplate in the contract. The idea was to present a simpler, less imposing document that would not frighten the OSB builders, all neophytes in Government contracting. In particular, all clauses regarding inspection systems, military security and qualified products were deleted. Other clauses such as Government Property, weight control, spare parts provisioning and value engineering were made inapplicable by the acquisition plan and were also deleted.

2. Solicitation, Evaluation and Award.

Upon settlement of all issues concerning the pro-forma contract, a Request for Unpriced Technical Proposals was prepared in order to proceed with step one of the procedure prescribed in ASPR Section II, Part 5. Only those builders submitting acceptable technical proposals in part one are requested to submit priced proposals in response to a formal IFB in part two of the procedure. As previously mentioned, the procurement was then restricted to small business.

The step one RFP was issued to fourteen yards on 22 June 1971 with proposals due on 24 August 1971. Unfortunately, only three proposals were received. Two of them were deemed clearly unacceptable and the third was considered amenable to being made acceptable. ASPR 3-210.3 places a restriction on negotiating with the only successful technical proposer in a two-step Small Business Restricted Advertising procurement. It was therefore necessary to cancel the RFP and reissue it without the small business set-aside.

The initial lack of response to the RFP was disappointing, and added response was considered unlikely by opening the procurement to large business. PMS-391 had requested that the bidders list be restricted to those yards that were experienced OSB builders, however, a few other yards requested that they be added to the list. The two unsuccessful proposers were Northeast U.S. yards that had not built OSBs before. PMS-391 attributed the lack of response to a combination of backlogs, steady customer considerations, unwillingness to spend money for proposal preparation and last-minute decisions not to get involved with the Navy.

The evaluation of the unpriced technical proposals was performed by a team composed of several engineers from PMS-391, NAVSEC and a few select engineer/oceanographers from the oceanographic community. A scoring system was developed based on degree of conformance with the COR and past experience in building supply or exploration vessesls. Exhibit 3 shows the scoring system used.

EXHIBIT 3

Technical Proposal Evaluation Scoring System

					Maximum
I	Construction of Supply or Exploration Vessel (Show evidence of)			____	30%
II	Hull and Structure				
	A. Less than 300 gross tons	2 1/2%	___		
	B. Conformance to ABS standards	2 1/2%	___		
	C. Firefighting/Life Saving	5 %	___		
	D. Access and arrangements	10 %	___	____	20%
III	Machinery				
	A. Controls/Alarms	5 %	___		
	B. Arrangements/Maintainability	12 1/2%	___		
	C. Pilothouse/Unmanned Engine Room	3 1/2%	___		
	D. Spares	2 %	___		
	E. Tests and Trials	2 %	___	____	25%
IV	Payload/Mission				
	A. Bolt Downs/Deck weight capacity	2 1/2%	___		
	B. Service Interfaces	2 1/2%	___		
	C. Seakeeping	10 %	___	____	15%
V	Habitability				
	A. Equipage/Quarters arrangements	3 %	___		
	B. Stores capacity	2 %	___	____	5%
VI	Materials and Components				
	A. Common components	2 1/2%	___		
	B. Corrosion resistance	2 1/2%	___	____	5%
				____	100%

The two unsuccessful proposers received ratings of 67.5 and 62.5, while the one successful proposer received a 96. The two losers scored low because they did not in fact modify an OSB design according to the guidelines in the COR. Their proposals were essentially a regurgitation of the COR and could not be used as a specification for step two. The fact that neither of the two had experience in building OSBs showed in their proposals. All three proposers were notified of the results of the evaluation and the cancellation and projected reissuance of the RFP. All three were given detailed statements of the deficiencies in their proposals.

PMS-391 next issued a modification to its procurement request adding several large builders to the bidders list. The RFP was then reissued on 4 November 1971. Only two proposals were received on 4 January 1972; one from Halter Marine Services, New Orleans, the previous successful proposer, and one from General Ship and Engine Works of East Boston, Mass., a previous unsuccessful proposer. The other unsuccessful proposer dropped out. Proposal evaluation was completed on 4 February 1972 with Halter Marine again receiving a 96 and General Ship a 79 this time due to the correction of many of the deficiencies cited to them. Both proposals were considered amenable to being made acceptable, and both proposers were advised of desired changes to their proposals. Both proposers agreed to the changes proposed by NAVSHIPS and on 29 March 1972 the IFB was issued; each builder bidding on his own specification.

Halter Marine and General Ship submitted bids for two ships as follows:

Halter Marine	General Ship
$3,788,000	$4,903,042

The Halter Marine bid was well within the budget ($4,334,000 for two ships) and PMS-391's internal cost estimates. The NAVSHIPS cost-estimating branch did not make an estimate because of the commercial nature of the vessels. The IFB called for delivery of the ships fourteen and fifteen months after date of award.

Since Halter Marine's bid was low and their technical score high, PMS-391 had little reservation about the award. The required pre-award survey was conducted in May 1972. Halter Marine was deemed responsible without reservation as a result of the survey, and after a review by a NAVSHIPS Contract Evaluation Panel, award of contract N00024-72-C-0288 was made on 23 June 1972. OCEANAV assigned the first ship to Texas A&M University and the second to the University of Hawaii. The Government was to accept the vessels at the contractor's yard and then move them to the Texas A&M Marine Facility at Galveston, Texas for outfitting and installation of payload.

Exhibit 4 is a schedule of the major events in the acquisition process up to the time of contract award. Obviously, there are several significant delays. Some of the delay can be attributed to the unique nature of the program, but most is due the low priority of the program and characteristic slowness of a large organization such as NAVSHIPS.

EXHIBIT 4

Schedule of Major Events

1.	Characteristics approved by SCB	20 April 1970
2.	APP approved	15 July 1970
3.	Procurement Request submitted	31 July 1970
4.	Funds Approved*	2 November 1970
5.	COR/RFP Package Submitted for Review	26 February 1971
6.	RFP(unpriced technical) issued-step one (small business set-aside required)	22 June 1971
7.	Revised RFP(unpriced technical) issued	4 November 1971
8.	Proposals opened	4 January 1972
9.	Proposal Evaluation Completed	4 February 1972
10.	IFB issued-step two	29 March 1972
11.	Bids opened	4 May 1972
12.	Pre-award Survey completed	12 May 1972
13.	Contract Awarded	23 June 1972

*The delay between events 3 and 4 was due largely to a temporary funding deferral imposed on the program by higher authority.

D. CONTRACT MANAGEMENT

The term Contract Management as used herein includes contract administration as performed by DoD field contract administration activities as well as the management efforts of the project office staff and user institutions.

PMS-391 discovered sometime before contract award that the Navy's Supervisor of Shipbuilding Office for the Eighth Naval District in New Orleans did not have plant cognizance over Halter Marine Services. Rather, Halter Marine was covered by the Defense Contract Administration Service (DCAS) as are all plants not otherwise assigned to one of the Services. This presented a problem in the DCAS, in particular the DCAS office in Houston, Texas, was an unknown quantity. PMS-391 learned that DCASO Houston provided Quality Assurance services on numerous boat contracts in Louisiana and Texas, but that ACO functions were usually handled by the procuring office. PMS-391 in fact wanted ACO services, but not QA services. It had always been their intent to have most of the field administration functions performed by their RPO. The problem was one of shielding the contractor from the red-tape and close supervision associated with both DCAS and SUPSHIP administration. Many "normal" Government contract administration practices were seen as potentially harmful to the relationship PMS-391 intended to build with the contractor based on commercial practices.

SUPSHIP procedures were well understood by PMS-391 and prior to DCAS entering the picture, in fact as early as 1970, they had been negotiating within NAVSHIPS for a modified contract administration structure that would compliment the commercial acquisition concept. In a 22 July 1970 memo to NAVSHIPS 07, then the organizational element responsible for field inspection procedures, PMS-391 proposed that the RPO be responsible directly to NAVSHIPS, have Contracting Officer Representative designation and not be organizationally linked to the cognizant SUPSHIP. The RPO was to have an assistant from one of the user institutions and technical representative assistance as needed. PMS-391's memo was quite detailed in its description of the commercial standards and practices to be employed and the probable ramifications should normal Navy procedures be followed. Specifically, PMS-391 forewarned of (1) some builders electing not to bid, (2) higher bids due to projected administrative expenses and uncertainty, and (3) prolonged construction periods caused by builders having to become acclimated to Navy procedures. Additionally, it was pointed out that MARAD did not even station personnel in the builder's yard during the FERREL acquisition, and that ship was delivered early at the original contract price. PMS-391 also pointed out that OCEANAV had agreed to fund the entire RPO function. NAVSHIPS 07 maintained in their reply that the AGOR (U) contract could easily be administered by a SUPSHIP without significant deviation from existing NAVSHIPS regulations.

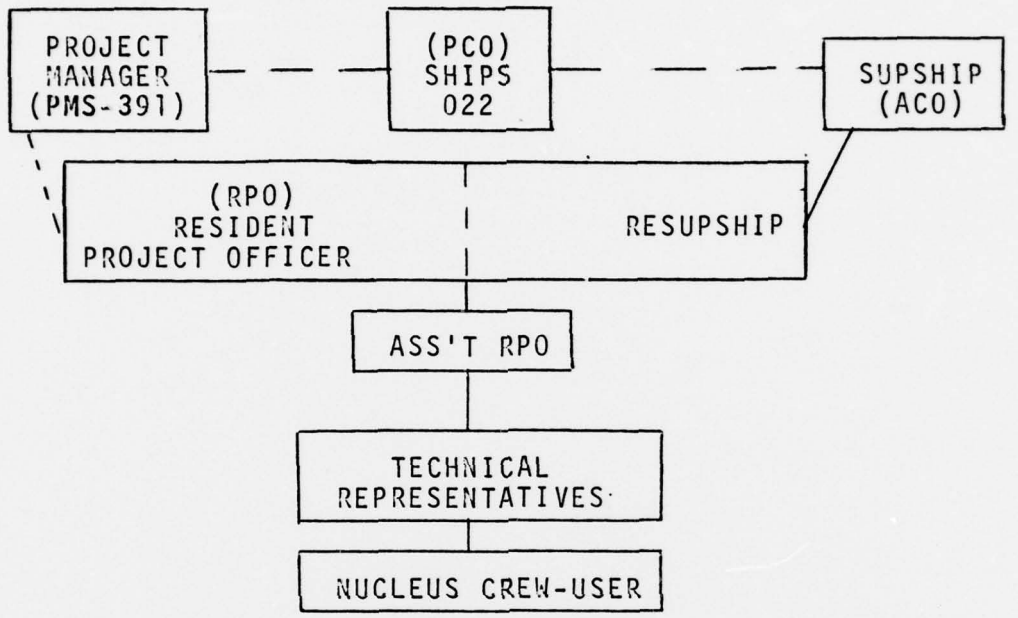
The did, however, propose an alternative wherein the RPO would be designated a Resident SUPSHIP (RESUPSHIP) under SUPSHIP administrative control, but would report directly to PMS-391 on project matters. PMS-391 considered this alternative acceptable and a proposed organization chart and list of duties, EXHIBIT 5, were drawn up for formal concurrence within NAVSHIPS.

When it was learned that DCAS had cognizance over Halter Marine Services, PMS-391 was presented with new alternatives. They could (1) initiate action to have plant cognizance transferred to SUPSHIP New Orleans, (2) accept DCAS administration or (3), as proposed earlier by NAVSHIPS 07, request DCAS to allow SUPSHIP personnel to assume most contract administration functions because of their expertise in the shipbuilding field. Alternative (3) had been used previously in yards holding Navy Master Ship Repair contracts and not engaged in work under DCAS cognizance at the time.

PMS-391 was in contact with DCASO Houston during this time. A post-award conference was arranged and carried out and DCAS personnel were acquainted with the project and PMS-391's desire to work primarily through the RPO. In the interim PMS-391 became satisfied that administration with DCAS assistance would be acceptable. They therefore elected not to request SUPSHIP involvement. DCASO Houston agreed to provide only those services requested by PMS-391 and to avoid unneeded surveillance visits to the contractor's facility. NAVSHIPS' delegation of contract administration functions, which formalized

EXHIBIT 5

ORGANIZATION CHART FOR AGOR(U) CONTRACT ADMINISTRATION



Duties of Resident Project Officer (RPO)

1. Report completion of milestones for PMS-391 verification.

2. Review plans, other documents and work performance for conformance to Contractor perpared specifications.

3. Refer need for contract changes to PMS-391/Contracting Officer.

4. Maintain liaison with PMS-391 and provide periodic progress reports.

5. Phase-in nucleus crew.

6. Monitor participation by Regulatory Bodies.

7. Control User payload acquisition and interfacing.

the practices agreed to in a DCASO/PMS-391 meeting, stated that DCASO would provide an Administrative Contracting Officer (ACO) to assist PMS-391 and the RPO in processing milestone payments and reduced cost/no cost/administrative changes to the contract. Increase cost changes could be delegated to the ACO on a case basis, which in fact they were.

DCASO Houston had considerable experience with limited delegations of authority and the principal elements of DCASO and its regional command, DCASR Dallas, adapted readily to the situation. PMS-391 and DCASO Houston signed a Memorandum of Agreement in October 1972 which defined the interface between the RPO and the DCAS organization. The RPO was established as the single point of contact between the Government and the contractor and the sole representative on technical and inspection matters. DCASO was to handle strictly contractual and financial matters. In retrospect this arrangement worked very well, but it was necessary for the ACO to fend off attempts from lower management levels within the DCAS organization to restrict his flexibility. DCASR and DCASO top management viewed their participation in the program with pride since they had never before administered a Navy shipbuilding contract. But at the same time there was some suspicion of the soundness of the procedures being used by PMS-391 among lower level DCAS management. The fact that DCASO Houston was being asked to insulate Halter Marine from some of the standard reviews was seen as coddling the

contractor at the expense of sound contract administration practice. Most of the suspicion was due to lack of understanding or acceptance of the commercial acquisition concept being used.

The fact that the ACO assigned by DCASO Houston was a Naval Officer with previous SUPSHIP experience, and that another Naval Officer assumed the DCASO Chief job, minimized problems from within DCAS. The RPO and the ACO established a sound working relationship, communicated frequently and made no attempt to interfere with the other's areas of responsibility. The DCASO Chief contributed by authorizing sufficient travel funds to permit the ACO to visit Halter Marine frequently, by providing frequent status reports to the DCASR Dallas Region Commander and publicizing the project nationally within DCAS. DCAS was represented by Flag Officers at the christening ceremonies for the ships as a result of these efforts. The RPO and PMS-391 staff also excelled at publicizing the project and undoubtedly maintained support through this type of effort. PMS-391 considered this aspect to be an important part of their management effort.

PMS-391 had several goals for the contract management team. One of the highly important goals that was exceeded was that of paying the contractor as quickly as his commercial customers. The RPO/ACO/PMS-391 team assembled for each milestone; technical approval was made, and the invoices were approved and immediately forwarded for payment by the ACO. The payment was

usually received in less than ten days. This promptness drew considerable praise from the contractor since he had expected the Government to be very slow in this respect.

Processing of contract modifications was handled in a similar manner. Some modifications were issued on-site and those not priced before issuance were definitized promptly. Procurement regulations made it impossible to duplicate the informal, often verbal, change order procedure used by commercial owner's representatives, but the promptness realized was a great improvement over that normally found on Navy ship-building contracts, large or small.

The above mentioned three member team managed most aspects of the contract. Each member mobilized the resources of his parent organization as needed. The RPO, in addition to reporting status to his formal superior, OCEANAV, also frequently briefed the user institutions. This particular team structure was not planned in advance, but evolved as dictated by circumstances and organizational politics. The number of personnel involved on a daily basis was kept to a minimum in order to avoid overwhelming the contractor or generating commensurate administrative expense on his part. It should also be noted that all three of the people involved were assigned other duties in addition to the AGOR project. The RPO responded to tasks from OCEANAV and traveled frequently to assess the progress on payload equipment contracts. The ACO carried a full workload responding to 75 contractors other than Halter Marine. The PMS-391 Assistant Project Manager for Oceanographic Ships

managed the payload procurement for these ships as well as several other ship acquisition programs plus advance design projects for additional ship programs. The intent was to run a barebones, cost-effective effort in keeping with commercial practice.

E. ACCEPTANCE TRIALS

One of the steps that must be accomplished in any Navy shipbuilding program is an Acceptance Trial (AT) under the supervision of the Navy's Board of Inspection and Survey (INSURV). Even though AGOR-21 and 22 were being built to commercial standards, PMS-391 made no attempt to challenge the imposition of a full scale INSURV trial.

AGOR-21 and 22, as previously mentioned, were to be built to American Bureau of Shipping and U.S. Coast Guard standards. ABS, USCG and the other regulatory bodies normally witness tests throughout the ship construction process and do not base their approval on one underway trial. INSURV, on the other hand, conducts a two trial procedure during which they inspect for conformance to Navy regulations, specifications, instructions and the SCB Characteristics. The President of the INSURV Board is responsible to the Secretary of the Navy and recommends whether or not a ship should be accepted for service use.

PMS-391 correctly surmised that the INSURV Board would have difficulty adapting to commercial standards. Although AGOR-21 had received ABS classification and certification by the other regulatory bodies, INSURV could not be expected to automatically

approve the ship. PMS-391 staff members briefed the INSURV Board in advance of the trial regarding the commercial standards, the mission of the ship and its characteristics. The unique provision of the contract which required correction of all deficiencies incident to each payment milestone completion was emphasized, also. INSURV, however, found sufficient fault with AGOR-21 to require a limited retrial. Much of the problem resulted from the contractor's lack of understanding of the very structured, formal nature of an INSURV trial. INSURV expects all the finishing touches to be put on a ship whereas commercial customers check only functional type items at time of acceptance trials. INSURV's inspection was generally much more thorough than that of a commercial owner and, despite warnings to that effect from PMS-391, Halter Marine was not thoroughly prepared. Once these differences in practice were ironed-out, the AGOR-21 retrial went smoothly. A modified trial procedure was used for AGOR-22 with a greatly reduced scope and level of effort. INSURV reported less than one third the number of trial deficiencies for AGOR-22 as they did for AGOR-21. Considering the large gap in methods and standards between INSURV and Halter Marine, the ordeal, a "first" for both parties, was probably unavoidable.

F. THE CONTRACTOR'S VIEWPOINT

Halter Marine personnel were involved in some earlier oceanographic ship design work for the Scripps Institution of Oceanography. They were, and are today, interested in further adaptation of the OSB design. They were, however, leery of Government contracts despite their enthusiasm for the Navy's interest in using the OSB for an oceanographic research platform.

Their concerns regarding Government contracts centered on two areas: (1) "red-tape" and (2) financing. "Red-tape" to them means excessive paperwork, overinspection, audits, EEO reviews and the general slow response characteristic of a Government agency. Financially, they felt that the lack of a down payment, anticipated payment lag, the uncertainty of renegotiation and possible unallowable costs all drove up their risk. They also cited the problems involved in the highly publicized Litton claim against the Navy as another deterrent to doing business with the Government.

Halter Marine's sales in 1972 were about $18 million with a net before taxes of about $2 million. Sales now approach $70 million with a net before taxes of about $10 million. This indicates the growing nature of their business and in a way explains their involvement with the AGOR project. During a lull in their business in 1972 they bid on the AGOR contract to fill some of their expanded capacity that was then unused. Their previous involvement in oceanographic ship design variations was also a factor.

Their bid breakdown showed a profit margin of six percent. Their usual expected margin is in the fifteen to twenty percent range. Part of the reason for the low profit bid figure was a mistaken belief by their management that any profit above the level they bid would be declared "excessive" and recouped by the Renegotiation Board.[3] The view was firmly held despite repeated assurance to the contrary by the ACO and PMS-391. They used an inordinately low profit percentage on all change order proposals throughout the contract life. This, fortunately, offset an unallowable portion of their G&A rate which they refused to delete.

Due to the lack of a down payment they committed $500,000 of their own capital to purchase materials needed early in the construction process. They were also required to obtain a performance bond and found it difficult to establish a line of credit with a bonding company, since this is not a requirement of their commercial customers, and no bonding company was familiar with their finances.

There was considerable tension over the subject of audits. They were unaware of the extent to which they could be audited, even under a competitively awarded FFP contract. Initially, an accounting system review for progress (milestone) payments was required. Later an audit to verify their proposed labor

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[3]Profit is in fact limited to 10% of contract price for all shipbuilding contracts by the Vinson-Trammell Act(10 USC 2382 and 7300) which was invoked in the contract general provisions.

and overhead rates for change order pricing was performed. Finally, a P.L. 87-653 cost/pricing data audit was accomplished for one large change order over $100,000 gross value. All of these audits were agreed to grudgingly and only after lengthy explanation of the contractual provisions authorizing them.

Other contractual provisions were also of some concern to them. The Liquidated Damages provision was considered abnormal and they feared a strict Government interpretation regarding "Acts of God" causing delays in construction. As it turned out, the effects of two hurricanes were felt in the area and their yard was flooded causing some delay, which, although settled favorably, required a great deal of effort to justify to NAVSHIPS Legal Counsel. They were assessed damages ($25,500) for late deliveries.

They considered the EEO clause enforcement by the Federal Office of Contracts Compliance (OCC) to be more onerous than State requirements and a duplication thereof. The INSURV trials problems were unanticipated, as previously mentioned, but the extra cost experienced was covered by an overly high bid element for inspection costs. This extra inspection cost in their bid reflected their concern about the local DCAS QA specialist and the SUPSHIP New Orleans QA department. Asked to rate the AGOR 21 and 22 contract level of inspection, they stated that it was about five on a one to ten scale. Their one previous Government contract experience was on a Corps of Engineers workboat over which DCAS exercised inspection

responsibility. This was ten on their scale with zero being their least obtrusive commercial customer.

On balance they were pleased with the AGOR contract and, except for the audit and INSURV problems, experienced fewer problems than anticipated. They claimed to have made over seven percent profit on the contract, but this figure doesn't take into account the opportunity cost of using their own capital for the large, initial material purchases necessiated by the lack of a down payment customary in commercial business.

They have since bid on other procurements for Navy ships based on the OSB design. Discussion of their bids will be included in a later chapter.

G. CONTRACT PERFORMANCE SUMMARY

Appendix B is the contract performance summary prepared by the NAVSHIPS PCO after final settlement of the AGOR-21/22 contract. Several items are noteworthy, the most obvious being the assessment of liquidated damages totaling $25,500.00. AGOR-21 was three days late and AGOR-22 was forty-eight days late. Nothing was assessed with regard to the 300 gross ton limitation since it was not exceeded. The 1100 ton figure in part 3c of the report refers to displacement tonnage, not gross tonnage. Item 4e (Mod A00032), a $20,944.11 reduction, refers to costs incurred by the Navy in correcting deficiences found during acceptance trials or the year long guaranty period. Final acceptance of ships is not made until the end of the

guaranty period. Items 4g and 4h refer to consumables and spare parts commercially procured by the contractor. It was decided during the course of the contract to use the contractor as a central purchasing office to buy the many line items needed instead of having each user institution purchase them separately with Navy funds.

The only really unsatisfactory aspect in the report is the lateness of AGOR-22, but, as stated earlier, the Navy was not greatly concerned about the delivery schedule. The trial item deficiency figure (4e) is well within acceptable limts.

IV. VESSEL OPERATIONAL PERFORMANCE

A. OPERATING COSTS

Considerable subjective information regarding AGOR 21 and 22 operational performance was obtained from Texas A&M University and the University of Hawaii. As for an objective comparison with similar size ships, it was informative to refer to a study done by Commander W. C. Knodle, USN, who is presently assigned to the OCEANAV staff.

Knodle classified oceanographic and hydrographic ships into four size categories and compared their operating costs' in an effort to identify cost reduction possibilities. R/V GYRE (AGOR-21) operated by Texas A&M, and R/V MOANA (AGOR-22) operated by Hawaii, were classified in the "intermediate" size category, which ranges from 652 to 950 tons displacement. GYRE and MOANA WAVE both displace 950 tons. Seven other ships were in the intermediate category. Knodle used the following eight comparison factors in his evaluation:

1. Total costs (of operation)
2. Total costs less maintenance costs
3. Total cost per day at sea
4. Total cost less maintenance cost per day at sea
5. Crew costs
6. Maintenance costs
7. Fuel cost per day at sea
8. Fuel consumption at cruising speed

Knodle concluded that GYRE and MOANA WAVE appeared to have some

advantage in operating costs. One factor contributing to this advantage was the smaller crew size needed, due to admeasuring under 300 gross tons and automation, despite being the largest vessels in the intermediate category. He did note that maintenance costs for GYRE and MOANA WAVE were less because they were newer than the other seven ships. Once maintenance costs were removed, GYRE and MOANA WAVE had a reduced but measurable advantage.

In his final recommendations, Knodle stated that potential savings exist through replacement of AGOR-3 Class ships, which displace over 1,300 tons, with AGOR-21 Class ships. He concluded that due to the inherent flexibility of the AGOR-21 Class design, they could undertake missions normally performed by the larger AGOR-3 Class ships at a forty to fifty percent savings in operating costs.

B. SEAKINDLINESS

There are subjective factors that weigh as heavily as operating costs, especially in the minds of the people who go to sea on AGORs. Seakindliness is one of these factors. How well the ship rides is very important in evaluating its efficiency. A ship may be rugged and reliable, but ride so poorly that the people who sail on it find it very difficult to operate their equipment. If the ship cannot handle heavy weather, they may be forced to abandon their operating area when a more stable ship could remain on station.

Texas A&M and Hawaii rated GYRE and MOANA WAVE very highly in seakindliness. Texas A&M has been operating GYRE at a rate of about 300 days per year and has found the hull design to be sound in all types of weather. Hawaii operated MOANA WAVE slightly more than half as much as GYRE was operated in CY 1977. Their opinion as regards seakindliness is essentially the same as Texas A&M's. Based on subjective evidence, it appears that the current, all-oceans OSB design has fulfilled expectations as an oceanographic research platform.

C. RELIABILITY AND MAINTENANCE

The AGOR 21/22 contract contained no specific reliability requirements. Rather, PMS-391 relied upon commercial standards and the proven reputation of the OSB industry to provide a reliable vessel. In this respect one vessel operator has been disappointed. Texas A&M reported significant problems in several areas; the major one being the propulsion system. AGOR 21 and 22 are twin screw vessels equipped with Caterpillar diesel engines and a controllable pitch propulsion system manufactured in Norway. AGOR 21 and 22 were two of the first OSB type vessels to have a controllable pitch propulsion system. Texas A&M's ship, R/V GYRE, had a bad shaft alignment and other problems with the propulsion system that persisted after the one year guaranty period expired. These problems cost Texas A&M over $250,000 to correct over a period of several years. Additionally, Texas A&M reported that the ship's air-conditioning system is of poor design and requires

too much maintenance. They have replaced valves, piping wiring and almost all hydraulic tubing because of failures which they attribute to installation of inferior quality materials by the builder. They feel these problems have driven their maintenance costs up disproportionately. Their CY 1977 maintenance cost was $175,000 which includes $60,000 for propulsion system repairs.

The University of Hawaii on the other hand, reported no disproportionate maintenance expenses and did not experience propulsion system or air-conditioning problems. Nor did they mention any wiring, or hydraulic problems; only a problem with the durability of some plastic air control piping in the engine room was indicated. Some minor construction/installation defects were reported, but their number and seriousness was not considered to be inordinate for a new ship. Overall, Hawaii considers MOANA WAVE to be a reliable and well-built vessel. Their CY 1977 maintenance cost was $116,000 of which $60,000 was for a periodic overhaul.

Some of the variance in Texas A&M's and Hawaii's maintenance/reliability experiences can be attributed to the difference in tempo of operations. Certainly, the degree of preventative maintenance is also a factor. Undoubtedly though, there were some problems, such as the bad shaft alignment, which were caused by the builder and were overcome on the second vessel, the MOANA WAVE. Texas A&M was perhaps less fortunate than Hawaii in receiving the first of the two ships, as well as being less experienced in shaking down a new ship.

D. FLEXIBILITY

Texas A&M reported that the bolt-down fitting feature provided less flexibility than expected. They are now installing some vans/equipment on a more permanent basis in lieu of bolting them down. The primary problem is that of service (electric power, water and air lines) to the vans/equipments. The service lines are exposed on the open, working decks, and, as a result, take considerable abuse often resulting in a safety hazard. Texas A&M is protecting these lines with permanent housings which might have to be torn out if the van/equipment configuration were changed greatly.

Hawaii has not experienced the same problem, possibly due to a difference in operational tasks. MOANA WAVE has been used recently on a Navy project which required significant equipment installation in a shipyard. This fact explains some of the difference in opinion.

V. OTHER PROGRAMS

A. BACKGROUND

In 1975 PMS-391 was disestablished and its functions were absorbed by PMS-383, the project office for all auxiliary, amphibious and special mission ships. PMS-383 has several projects under its cognizance which use or envision using a modified OSB or other stock commercial hull as the basic platform. PMS-383, like PMS-391, is attempting to use commercial standards and attract OSB builders to their procurements. Two of the PMS-383 projects will be described and contrasted with the AGOR-21/22 acquisition in the following paragraphs.

B. FLEET TUG, T-ATF-166, CLASS PROGRAM

1. Mission need

The T-ATF is intended to replace the Navy's fleet of 22 World War II class fleet tugs, all of which are over 28 years old. The T-ATF 166 Class will be multi-mission vessels capable of performing the following functions:

Towing at sea
Rescue and limited salvage at sea with protable equipment
Limited Diving with portable equipment
Extinguishing fires on ships in distress at sea
Limited Self-defense
Open sea oil-spill pollution abatement

The primary missions of towing, dewatering and firefighting will be accomplished by the Military Sealift Command (MSC) civilian crew embarked full time. Other missions will be accomplished with the assistance of transient military

diving and salvage personnel specially trained and equipped with portable equipment for the particular mission.

2. Programming

A preliminary design for a Navy manned, Navy specification ATF was approved by CNO in 1973. This ATF was included in the FY 1975 Navy shipbuilding program budget request, but was deleted by DoD. In a successful reclama to that decision, the Navy proposed a commercial standard vessel as an alternative. The commercial version was designated T-ATF after the OPNAV sponsor decided to have MSC operate the ships with civilian crews. The Deputy Secretary of Defense authorized one ship in the FY 1975 program and three in FY 1976.

In preparing its position for the aforementioned reclama, the Navy evaluated four different ATF profiles. Exhibit 6 outlines the results of that evaluation. NAVSEA strongly endorsed alternative 4. Their position was that for a commercially built, Navy-manned ship program to be successful, it was essential that a clear definition of the technical aspects of the program be established and held inviolable. In the absence of this, a commercially built ship for Navy manning would be subject to "creeping militarization" as the acquisition process proceeded. [9] Because of the plethora of potential problems in areas such as habitability and training, and the cost estimates, OPNAV opted for a commercial ship with a MSC civilian crew.

EXHIBIT 6

ATF COST PROFILES

Cost Standards	(1)Navy	(2)Navy with relaxation	(3)Commercial ABS/USCG	(4)Commercial ABS/USCG
Equipment	MILSPEC	MILSPEC	Commercial	Commercial
Manning	Navy or MSC	Navy or MSC	Navy or MSC	MSC
Cost(program)$M	16.1	14.3	12.9	9.7

3. Technical characteristics

PMS-383 developed a T-ATF-166 Class COR similar to the AGOR-21 Class COR, but less specific in nature. The COR describes a basic offshore tug/supply vessel design built to commercial standards as was AGOR-21/22. In many respects the OSB was even more suitable to be a T-ATF than it was to be an AGOR, since in the 1970's OSB designers and builders were world leaders in development of large all-oceans tug, rescue and supply vessels. The COR encompasses all of the CNO characteristics which were approved on 28 August 1973. The T-ATFs will be considerably larger than AGOR-21/22 reflecting their mission requirement. In the commercial environment OSBs have evolved into increasingly larger sizes, so the Navy was not asking for a blown-up AGOR-21, but rather a vessel similar to commercially available tug/supply boats.

The ship will be configured for a sixteen man civilian crew and a four-man Navy communications team. The habitability requirements represent MSC standards, which are somewhat more luxurious than non-union commercial supply boat standards. There will be troop type accomodations for twenty transients. The Navy communications equipment will be installed after delivery of the ships.

4. Acquisition strategy

The T-ATF-166 Class program follows basically the same acquisition strategy employed for the AGOR-21 Class program. The two-step formal advertising procedure was used for the

initial four-ship buy. The builders were sent preliminary inquiries, but only three acceptable technical proposals were received, and only one of the three submitted a responsive bid in step two. A small business set-aside was not used on order to avoid the problem encountered on the AGOR-21/22 procurement.

A contract was awarded to the sole responsive bidder, Marinette Marine Corp., Marinette, Wisc. The contract price for each of the four vessels is $7.6 million. The first vessel is approximately forty percent complete at the time of this writing.

A second lot of three ships is now in the bidding stage. This second lot was solicited on the basis of the specification developed by Marinette Marine in step one of the initial procurement, therefore, the two-step procedure was not used. There were four responsive bidders for lot two with Marinette Marine as low and Halter Marine high. Halter Marine was the only one of the traditional OSB builders to bid. The Navy is fortunate to have attracted the small builders on the Great Lakes to these acquisitions; they did not bid on the AGOR-21/22 procurement.

An effort was made to visit several OSB builders, as was done for the AGOR program, to stir interest in the T-ATF-166 program, however, none of the yards visited except Halter Marine bid. It appears that OSB builders will remain reluctant to forsake their commercial customers for Navy work despite the use of commercial standards and practices. As long

as the search for oil remains intense, these builders will have a backlog of work. Halter Marine, now the largest OSB builder with six separate yards, apparently still has the capacity to entertain Navy work. It was noted, however, that Halter Marine's labor rates have escalated and are considerably higher than Great Lakes shipyard rates. The labor rate differential accounts for much of the difference in bids for T-ATF-166. How well Halter Marine's rates reflect the Gulf Coast shipyard labor market is unknown, but Halter has historically paid top wages in the area, though not a union yard. They consider this a necessity to attract and maintain a competent, stable labor force.

5. Contract provision changes

Differences between the AGOR-21/22 and the T-ATF contracts were slight. The NPD changes clause was dropped and replaced with the standard ASPR 7-103.2 Changes clause. The ASPR 7-104.86 Notification of Changes clause was added providing coverage with regard to Contracting Officer Representatives and constructive change orders. A new milestone payments clause was used which contains the language of the standard NAVSEA progress payments clause and incorporates the milestones. The milestones themselves were changed for T-ATF and are now as shown in figure 3.

Figure 3. T-ATF Milestone Payment Schedule

MILESTONE (Per Vessel)	CONTRACT PERCENTAGE OF PHYSICAL PROGRESS
(1) Placement of purchase order for 30% of dollar value of material	1.7%
(2) Placement of purchase orders for a total of 70% of dollar value of material	2.6
(3) Keel laying	3.5
(4) Receipt of 30% of dollar value of material	5.6
(5) Receipt of a total of 60% of dollar value of material	7.5
(6) Completion of hull structure up to and including the main deck, framing, plating, stiffening and welding	3.3
(7) All hull structure including superstructure and stacks completion	2.0
(8) Electrical installation completion	1.2
(9) All joiner work completion	1.0
(10) Dock trials	1.0
(11) Successful completion of Acceptance Trials	1.0
(12) Delivery of ship to government	1.5
(13) Completion of delivery of all data for the ship to the Government	0.5

It should be noted that milestones (1), (2) and (4) provide payment based on material orders/receipts unlike the AGOR-21/22 clause. This change provides more money earlier thus alleviating financing problem for the small builders.

A Liquidated Damages provision, mechanically the same as for AGOR-21/22, was used with the monetary amounts increased by fifty percent. No other significant changes in contract content were noted indicating that the Contracts/Legal people have made a permanent adjustment to PMS-383's methodology.

6. Contract Management

PMS-383 was unable to replicate the contract management arrangement used for AGOR-21/22. MSC, the vessel operator, was requested to assign an on-site representative, as they do when

one of their ships undergoes a shipyard overhaul. The negotiation with MSC was not successful, however, and PMS-383 fell back on the cognizant SUPSHIP at Sturgeon Bay, Wisconsin to provide a representative in the yard. DCAS was not involved in this program since Marinette Marine has been a builder of small Naval vessels for many years and the Navy, therefore, has always had plant cognizance. A comprehensive Memorandum of Agreement was developed by PMS-383 and SUPSHIP Sturgeon Bay delineating the responsibilities of each party and setting out in detail the functions to be performed by the on-site representative at Marinette Marine. The SUPSHIP assigned their Quality Assurance man at Marinette to act as the on-site representative, the focal point for the Navy in its relations with the contractor. This arrangement resembles the RESUPSHIP alternative proposed by NAVSHIPS 07 for the AGOR-21 project. The on-site representative is an employee of the contract administration office instead of the project office or user organization in this case. The degree of engineering surveillance will not be the same, but Marinette Marine is an experienced Navy contractor. PMS-383 is relying more heavily on the contractor and regulatory bodies for T-ATF than for AGOR-21/22.

7. Acceptance Trials

INSURV participation will be patterned after the AGOR-22 AT. Relatively few INSURV board members are expected to witness the builder's own underway trial and the actual AT. PMS-383

has planned on the basis of INSURV having adapted to commercial standards and practices. The risk in this assumption is lessened because Marinette Marine is familiar with INSURV procedures, which Halter Marine was not.

C. OCEAN SURVEILLANCE SHIP, T-AGOS-1 CLASS, PROGRAM

1. Mission Need

The T-AGOS-1 Class mission is to collect, process and transmit accoustic data. The ships will provide a platform for deployment of a towed array sensor (SURTASS) being developed by the Naval Electronics Systems Command. [10]

2. Programming

The ship part of the program is tied to the SURTASS which is in the R&D phase. An interesting sidelight is that the prototype SURTASS system is deployed on MOANA WAVE (AGOR-22) for tests. The first three ships are in the President's FY 79 budget. The first ship will be delivered in the fourth quarter of FY 1981. A class of twelve ships is planned.

3. Technical Characteristics

T-AGOS-1 is to be slightly smaller than T-ATF-166, but larger than AGOR-21/22. Propulsion will be diesel-electric vice geared diesel as in the other two classes and most standard OSBs.

4. Acquisition Strategy

The T-AGOS sponsor in OPNAV, independent of PMS-383, became convinced that a T-AGOS platform based on a modified

OSB was a cost-effective alternative and sold the SURTASS project manager on that basis. The same emphasis on commercial standards and practices used for T-ATF-166 and AGOR-21/22 was given by the OPNAV sponsor to T-AGOS. On this program PMS-383 placed itself in the unenviable position of devil's advocate to the OPNAV sponsor on many T-AGOS issues because PMS-383 has experience with adapting the commercial OSB and has recognized that certain requirements such as ship noise restriction and mission length result in much larger deviations from standard OSB design than did either T-ATF-166 or AGOR-21/22. PMS-383 continues to stay with a modified OSB strategy and has been aided by recent OSB evolutions such as introduction of diesel-electric proplusion systems for OSB commercial customers. Therefore, PMS-383 has been able to retain the emphasis on commercial standards and practices for T-AGOS though interest in building these ships by much of the OSB industry is problematical considering the scope of the deviations from standard design. In all significant respects the planning for T-AGOS-1 is the same as for T-ATF-166. Requirements from the SURTASS project office that result in further deviation from standard OSB design are a potential problem that PMS-383 will have to contend with.

D. IDEAS FROM OUTSIDE

Halter Marine's Vice-President of Engineering, Mr. Salvadore Guarino, presented a paper in which he proposed a large OSB

design variant for general Navy use. He labeled this design ATUS, for Auxiliary Tug, Utility and Salvage vessel. Its capabilities would include towing and salvage; research and survey; buoy tending; mine sweeping, submersible support; coastal patrol; USCG cutter duties; intelligence gathering; and fisheries protection. It is noted that one OPNAV sponsor has authorized concept design studies by PMS-383 for a submarine fleet support ship based on the OSB. This fact demonstrates that PMS-383 is, to a limited extent, already doing what Guarino proposes. PMS-383, chartered as the project office for all auxiliary vessels, is in a position to propose the OSB or other standard commercial hull designs for adaptation to various Navy support ship requirements.

Whether Halter Marine's entire management group is as commited to Navy programs remains to be seen. Halter Marine submitted an acceptable technical proposal on the T-ATF-166 Class procurement, but was not a responsive bidder in step two. For their part, Halter Marine claimed that the T-ATF-166 package regressed away from AGOR-21/22 toward a "MILSPEC" ship and they bid high due to the perceived uncertainty. Price notwithstanding, they were non-responsive because they did not submit bids for the second, third and fourth ships of the four ship package. In the opinion of PMS-383 staff members, Halter Marine's objections to the T-ATF-166 COR are fallacious. PMS-383 correctly pointed out that no MILSPECs are cited and the COR is in fact less specific than the AGOR-21/22 COR was.

The regression toward a MILSPEC ship that Halter Marine perceived was not readily understandable.

VI. CONCLUSIONS

A. GENERAL

The oceanographic community's interest in OSB variants was driven primarily by cost considerations. The bureaucratic directives now requiring consideration of commercial products, specification tailoring and commercial business practices were largely promulgated subsequent to the AGOR-21/22 acquisition. Whether they will produce similar results remains to be seen, but it is undeniable fact that the Navy would not have AGORs 21 and 22 nor a replacement fleet tug program without a commercial acquisition strategy.

It is encouraging that DoD acquisition policymakers are concerned; for example Mr. Jacques Gansler, former Deputy Assistant Secretary of Defense (Material Acquisition) wrote recently in the Harvard Business Review that material acquisition efficiency could be improved by revising military specifications and procurement practices to make defense business less unique and by motivating industry executives to combine their defense and commercial product lines. He feels that defense business practices differ too much from commercial business practices and discourage commercially oriented companies from entering the defense market. Mr. Dale W. Church, the current Deputy Director of Defense Research and Engineering (Acquisition Policy), also wrote of the need to reduce or eliminate the specialized nature of military specifications

and standards, and to accept commercial practices and products, where feasible.

With the high-level support of executives like Mr. Church, project managers and sponsors should be encouraged to search for commercial equipments to meet their mission needs. These new policies will take time to percolate down through the bureaucracy. In the interim, project managers and others responsible for material acquisition will find it necessary to counter ingrained standard operating procedures and fend-off criticism from those who have had bad experiences with unsupportable commercial equipment, for example in Vietnam.

Changing business practices often requires new legislation such as the proposed Federal Acquisition Act of 1978 now before the Congress. As can be seen from the experiences of PMS-391 and 383, radical changes in practices will have to be made before many segments of industry, particularly small firms, will take defense contracts. These companies correctly perceive that project managers, however well-intentioned, are limited in the degree to which they can ameliorate practices required by law or regulation.

Within the limits of flexibility allowed a project manager, PMS-391 and 383 did demonstrate what can be done. What follows is a summary of the key factors to be considered in a commercial type acquisition of a major piece of equipment based on the AGOR-21/22 acquisition.

B. ACQUISITION STRATEGY

The project manager must have the power to sell an acquisition strategy based on commercial standards and practices and also to keep it from being progressively diluted. PMS-391/383 clearly and forcefully stated their intentions in this regard in all their planning documents. They obtained the approval of their superiors in each case.

The project manager must use his high-level approvals to gain concessions in order to simplify contractual packages, waive design reviews, delete excessive data requirements and inspections, etc. All of the various power centers within the command or service will want to pass judgment on the program. Care must be taken in deciding which threats can be ignored safely and which must be addressed in order to maintain the acquisition concept.

The commercial market to be entered should be fully understood. Financing procedures, engineering practices, inspection procedures and the like must be known. The milestone payments provision and the User Representative/RPO arrangement were successful adaptations to the OSB commercial environment.

The program may have to be sold to the segment of industry involved. Success is this endeavor is difficult to measure, but without the PMS-391/383 efforts even the few participants that were attracted might not have responded.

The procurement procedure should be carefully considered. For the two-step formal advertising procedure to be successful,

two fundamental prerequisites are required: (1) There must already be established a commercial marketplace with products available, and (2) the mission need of the procuring agency must be capable of being satisfied by the commercially available products with little change to those products. When significant "tailoring" or "militarization" of the commercial product is necessary, then successful use of the procedure is jeopardized.

C. TECHNICAL FACTORS

A statement of requirements must be developed by the user or mission sponsor. The project manager should insure that terminology appropriate to the industry is used. The standards used in the industry must be adequate and fully understood by all concerned. A mechanism, perferably contractual, should be provided to settle technical disputes at a low level. For the initial buy, contractor development of the specification is recommended.

Supportability should be carefully considered. Parts and service availability to the user are critical factors. Some components were specified by brand name on AGOR-21/22 for supportability reasons. Use of Government Furnished Equipment defeats the purpose of commercial product acquisition and should be installed after delivery of the system to the Government.

Government approval of plans should not be required nor should Government standard technical manuals be orderd.

Production progress and other types of technical reporting requirements should be avoided unless they are standard in the industry.

D. CONTRACT MANAGEMENT

A project manager needs control in this area to avoid having his commercial atmosphere militarized by well-meaning field contract administration personnel. It should be his objective to have his own man or a user organization representative in the contractor's plant. A written agreement should be developed between the project manager and the contract administration office which assigns responsibilities in detail. The agreement should clearly establish the role of the on-site or user representative whether he be the sole Government contact point or a project officer reporting administratively to the contract administration office.

Given that it is very difficult to arrange a contracting officer warrant for the user/on-site representative, emphasis should be given to arranging responsive ACO services. Reliance on the PCO involves long delays in most large organizations.

All field personnel involved, particularly the ACO, must be indoctrinated in the commercial standards and practices to be used. Auditors, QCC and other program specialists should be required to arrange their visits to the contractor through the project-site representative or ACO. They should thoroughly

understand the commercial acquisition concept before making their review. All such reviews not required by law or regulation should be avoided. Some reviews required by the contract administration organization's regulations can usually be canceled if the project manager insists. Overall, the number of people involved should be minimized.

Special arrangements with the cognizant disbursing office may be needed. The DCASR Dallas disbursing office had to be thoroughly briefed in order to properly handle the AGOR-21/22 payments. A special, off-line procedure was created for that contract with a specific individual assigned to handle all Halter Marine invoices. The promptness of the payments to Halter Marine attests to the worth of that effort.

E. TEST AND EVALUATION

Whatever form this function takes, every attempt should be made to limit its scope to pertinent, mission-related factors. Operational test and evaluation personnel can be expected to have difficulty adjusting to commercial equipment and practices. They should be briefed in advance on commercial standards and practices, and the contractor should be acquainted with the military evaluator's normal procedures and requirements.

APPENDIX A

CIRCULAR OF REQUIREMENTS

OCEANOGRAPHIC RESEARCH SHIPS
AGOR UTILITY CLASS

Office of the
Oceanographer of the Navy
Alexandria, Virginia

and

U. S. Naval Ship Systems Command
Oceanographic, Mine, Patrol and
Special Purpose Ship Acquisition
Project (PMS 391)
Washington, D. C.

9 March 1971

CIRCULAR OF REQUIREMENTS

General

It is the intention of this circular of requirements to provide for the construction of twin screw, steel oceanographic research ships, patterned after offshore oil supply or exploration vessels of approximately 165 ft. length overall. The design departs from the standard supply vessel in the following general areas:

1. Stability and fire protection: One compartment sub-division, at about 10 ft. draft, Rahola Criteria; enclosed interior stairs.
2. Hull form and scantlings: i.e., finer entrance, additional flare, longer forebody, and ABS scantlings including class C ice strengthening.
3. Support for scientific equipment through provision of bolt down fittings and service interfaces.
4. Machinery: large generator capacity, support for at sea periods up to 45 days, bow thruster

Specific requirements are listed and shown in this Circular and attached drawings.

These ships will perform as oceanographic vessels in all waters of the world, except Arctic and Antarctic ice, during all climatic seasons.

Scientific operations will be mostly conducted from portable vans and readily removable winches, gear handling equipment and electronics which will be attached to the ship by means of bolt-down fittings with interfaces to services from the ship.

Procurement and installation of this oceanographic equipment termed "payload" except as specifically mentioned, will be the responsibility of the Government and will be accomplished after delivery of the ships to the Government. The contractor shall understand that he has no responsibility for any items of scientific payload with the exception of providing bolt-down fittings and service interfaces to the ships and except that the ship is capable of supporting the total weight of payload and providing the services listed herein. The bolt-down fittings and service interfaces are shown in the attached drawings and tables.

The contractor shall produce ships generally in accordance with his own standard vessels and standard practices, within the limitations of specific materials, features and practices

enumerated and illustrated in the attached tables and drawings, which are intended to produce ships suitable for oceanographic research.

Specification Requirements

The listing of specific terms, systems, features, components, and categories of the design or indicating them on the attached drawings requires that the contractor shall:

1. Check the design and/or item, system, components, feature for adequacy and appropriate regulatory body requirements.
2. Procure and provide.
3. Install.
4. Test for satisfactory operation and conformity to regulatory requirements.
5. Guarantee in accordance with the contract.

Where items, systems, features, components, or categories are not specifically mentioned or are not shown on the drawings, yet are necessary for:

1. Proper functioning of the vessel.
2. Meeting good commercial marine practice.
3. Meeting the requirements of the regulatory bodies as appropriate.

It is to be clearly understood that the contractor shall:

1. Check the design and/or item, system, component, feature for conformity to the above criteria.
2. Procure and provide.
3. Install.
4. Test for satisfactory operation and conformity to regulatory requirements as appropriate.
5. Guarantee in accordance with the contract.

In general, equivalents proposed by the contractor for vendors' items may be considered by the Government, and may be substituted on a specific item basis. In order for the proposed substitute to be considered by the Government, it must meet the following criteria:

1. Possess appropriate regulatory body approval where required.
2. Possess similar dimensions, weights, power, service, material and maintenance features to the item named

except where lesser dimensions and weights and superior power, service, material and maintenance characteristics

are not only demonstrable but are to the advantage of the vessel's mission.

Final approval of proposed equivalents shall be by the Government, subject to the provisions of the contract.

DEFINITIONS

Regulatory Body-	U.S. Coast Guard (USCG), American Bureau of Shipping (ABS), U.S. Public Health Service, Federal Communications Commission and agencies and organizations authorized by the above to act in their behalf or codes cited as authority by the above. The term "regulatory body" or any of the agencies or organizations so named are not synonymous with the term "Government."
Vessel or Ship-	The end products to be developed by the Contractor from this Circular of Requirements.
Purchase Order-	An order and accompanying descriptive specification furnished by the Contractor to a vendor or subcontractor for material and services to be rendered in construction of these ships.
Vendors Drawing-	Drawing, plan or data developed by vendor or subcontractor illustrating features of material and/or services for use in construction of these ships.
Mission of an Oceanographic Research Vessel-	To provide a vehicle for facilitating acquisition of scientific data and samples from and in any navigable waters of the world. To accomplish this mission, such a vessel must possess adequate stability, life-saving and fire protection, adequate structural efficiency, competent crew and attendant facilities to make competence possible, recognition of scientific demands on ships services and inherently dangerous operations to be performed. Also, to perform this mission, the vessel must possess appropriate documents for unhampered entry and departure from the ports of the world.

Commercial-	Vendor product of commercial grade or contractor manufactured product of commercial grade suitable for service under this Circular of Requirements.
Payload-	Oceanographic equipment, either portable or readily removable, such as vans, winches and gear handling equipment, scientific electronics. This equipment is attached to the ship by means of bolt-down fittings (exterior and interior) and is interfaced with the ship by means of service connections. The contractor is not responsible for the acquisition or installation of payload except as specifically provided in this Circular of Requirements.
Test Memo-	Written procedure for testing by contractor of a system in or component of the ship.
Contractor-	Shipyard or shipbuilder party to the contract under which these ships are constructed.

Table 1

CERTIFICATION & OTHER REQUIREMENTS*

A. Materials and Certification

1. All materials and articles installed in the ships shall be new and of the best commercial marine quality.
2. Construction of the ships under special survey of the American Bureau of Shipping to the classification A1 E✠AMS with Class C Ice Strengthening.

U. S. Coast Guard Rules and Regulations for Uninspected Vessels (Subchapter C)

U. S. Public Health Service certificate of sanitary ship construction for vessels on foreign voyages--installation of water, plumbing, food preparation systems and ratproofing in accordance with USPHS handbook on Sanitation of Vessel Construction.

Institute of Electrical and Electronics Engineers (IEEE) Standards No. 45 for electfical components and installations.

Federal Communications Commission Requirements.

Panama and Suez Canal Regulations.

International Load Line Regulations 1966.

Motorboat registration numbers for the specific state of each ship user, under the Federal Boating Act of 1958. (States of Texas and Hawaii apply.)

3. Under the terms of Public Law 89-99 (1965) an oceanographic research vessel is not engaged in trade or commerce; therefore the ships defined in this circular of requirements will not be registered, enrolled or licensed with the U.S. Bureau of Customs and are thus undocumented, numbered ships. Accordingly, these ships are exempt from the provision of the 1960 International Convention for Safety of Life at Sea (SOLAS 60).

4. It is the intent of this Circular of Requirements that the ships as produced by the contractor at and upon delivery to the Government shall each admeasure less

*The contractor shall provide, frame, and mount all certificates in required locations

than 300 gross tons. Failure to meet this requirement will be handled under the contract. The contractor shall provide the necessary certificates and documentation from the Admeasurement Branch of the U. S. Coast Guard to attest to this condition.

In the event tonnage openings are utilized, their locations shall be subject to the approval of the Government and shall not compromise the utility of the space in which located.

Water ballast shall be provided to maintain proper conditions of stability, trim, immersion, seakeeping and strength under varying requirements of the vessels operation. Water ballast installations shall comply with U. S. Coast Guard Navigation and Vessel Inspection Circular 11-69 of 2 December 1969. Installation of deep floors shall comply with U. S. Coast Guard letter (OCMI New Orleans Ser 5949 of 10 December 1969) entitled Deep Floors in Small Vessels.

B. Care during construction and fire protection

All components and materials used in construction of the ship shall be properly stored, preserved, installed and protected. A fire protection and fire fighting system shall be established which provides 24-hour, 7 day protection. Combustible material such as used in staging shall be kept to a minimum and shall be fire retardant. Waste material shall be removed daily.

Table 2

PARTICULARS OF DESIGN

A. General Characteristics

Construction	Steel
Length between perpendiculars	About 158'
Length overall	About 165'
Beam molded	About 36'
Depth	At least 14 1/2'
Design Draft	No less than 10' (at approx. 950 tons displ.)
Gross tonnage	Less than 300
Propulsion (main)	Twin screw geared diesels, no less 1700 hp continuous (max, rpm 1225). Propellers, 3-blade controllable pitch, approx. 77" dia., stainless steel.
Propulsion (auxiliary)	One rotatable, retractable, electro-hydraulic, no less than 150 hp (bow).
Ship Service Generators	Two, diesel driven (max. rpm 1225), 250kw, 460 vac, 3 phase, each (diesels with power take offs)
Accomodations	21
Hull form	Single Chine
Flare	About 15° (intersection fwd perp & design waterline)
Entrance Angle	About 23°
Deadrise midships	About 8° - 10°
Run at midbuttock	About 10°
Block coefficient	Between 0.60 to 0.70
Transverse prisimatic	Between 0.68 to 0.75
Waterplane coefficient	Between 0.85 to 0.87
Limitations	Propeller tunnels not acceptable
Speed (Main propulsion only)	12 knots free route (calm water, clean hull)
Bollard Pull	28000 lbs. at 8 kts (calm water, clean hull)
Stability (all conditions, including payload range from zero to 100 tons)	Rahola applied with 6" ice accumulation.
Sub-division standard	One compartment at 10' draft. Bulkhead spacing per USCG Subchapter U. Penetrations per COR and drawings.

Range	8000 miles (taken with departure from payload and tankage for 950 ton displacement and consumed to a 15% burn out condition.
Total payload weight reservation	100 tons at 4' above main deck
Minimum clear deck area on main deck aft of superstructure	3000 square feet
Scantlings	American Bureau of Shipping A1 E with Class C ice strengthening
Framing	Longitudinal, except in fore and aft body
Lifesaving	4 - 20 man rafts, 16' alum. rescue boat, preservers, buoys, flares as specified
Firefighting	Fixed CO_2 in machinery spaces, 3 hydrant stations, portable CO_2 in excess of USCG Subchapter C as specified

B. Environmental Conditions

1. Weather air	95°F to minus 20°F
2. Seawater	28°F to 90°F

C. Limiting Operational Conditions

1. Trim by bow or stern	5° from horizontal
2. List	15° from vertical
3. Pitch	15° up or down from horizontal
4. Roll	35° from vertical each side

The ship and all mechanical, electrical and electronic components shall be capable of performance through the ranges of environmental and limiting operational conditions.

At delivery the ships shall have no more than 1/4 degree port or starboard list and no more than 18 inch trim.

D. Modes of Operation

1. Cruising; either or both propulsion engines, one s. s. generator carrying hotel load, no propulsion thruster.

    a. either or both propulsion engines, both s. s. generators in parallel

2. Open Ocean On Station, Maneuvering in a Channel or to Dock.

    a. one propulsion engine, one propulsion thruster, one s. s. generator

    b. no propulsion engine, one propulsion thruster, one s. s. generator

3. At anchor or hove to; one s. s. generator carrying hotel load.

4. Emergency take home; bow propulsion thruster, both s. s. generators.

5. Engine room unmanned except for starting engines and generators, paralleling generators and starting vital auxiliaries.

The ship and all mechanical, electrical and electronic components shall be capable of operating in any mode above.

Table 3

FEATURES REQUIRED ON STANDARD OFFSHORE SUPPLY OR EXPLORATION VESSELS TO PRODUCE OCEANOGRAPHIC RESEARCH SHIPS

NOTE: Specifications and drawings prepared by proposers shall reflect these features and those shown on the drawings (sheets one through ten), which may be in addition to the proposer's standard.

A. Hull

1. ABS Scantlings
2. ABS Class C Ice Strengthening
3. Scantlings on superstructure front one category higher than ABS
4. Forebody with fine entrance, flare, high chine, no tumble-home
5. Main deck/sheer strake intersection radiused (use split pipe)
6. High bulwarks forward and midships
7. Freeing ports continuous-bulwarks set off above main deck
8. Raised uptakes
9. Pilot house bridge wings extended to ship sides; long aft windows
10. Mast and yardarm with 1000 lb. load capability
11. Increased rudder area; rudders with 45°-45° capability
12. Welding and fairing in accordance with ABS, including inspection and radiography requirements.

    a. Radiograph every main hull butt-seam intersection.

    Continuous welding on both sides of member in:

    a. peripheries of oil tight and watertight bulkheads.

AD-A053 872 NAVAL POSTGRADUATE SCHOOL MONTEREY CALIF F/G 13/10
THE AGOR-21 CLASS OCEANOGRAPHIC RESEARCH SHIPS: AN ACQUISITION --ETC(U)
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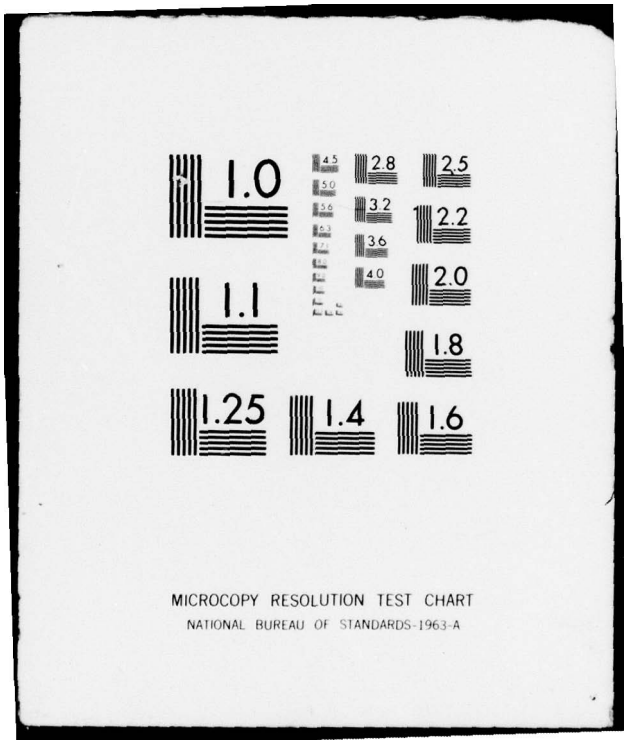
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b. within ballast and water tanks.

Continuous welding all areas exposed to the weather including superstructure
Slugged welds and tack welds on finished areas not permitted.

13. Lines and surfaces shall be smooth and fair. Plating shall be free of unevenness, waviness and wrinkling and welding.

14. Major machinery foundations continuously welded; with long tapers incorporated in foundation design.

15. Zincs in Sea Chests and thruster.

16. Floors to have limber and drainage holes.

17. Bridge wing bulwarks of solid plate.

18. Fresh water tank isolated from hull and other tanks per USPHS.

19. Exterior pipe rails of 3 courses.

B. Machinery

1. Acoustic isolation of engine room and machinery components.

2. One electro-hydraulic rotatable (through 360°), retractable thruster, with controls in pilot house and on both bridge wings.

3. Duplicate fire and bilge pumps.

4. Duplicate sea suctions for above (sea chests with air or steam connections and ice exclusion).

5. All overboard discharges on port side below 1. w.l

6. Sewage disposal plant (macerator-chlorinator).

7. Pilot house control in center console of propulsion engines, thruster; pilot house alarms for machinery and generators (see drawings, page 8).

8. Spare parts and special tools (Table 4, item 5).

9. Piping stencilled and valves labelled (name and flow direction).
   Piping and valves color coded.

10. Manual remote controls for inaccessible valves.

11. Air conditioning plants separate for ship and central laboratory and pilot house; located inside vice in weather.

12. Refrigeration plant capable of 0°F freeze.

13. Piping runs from engine room via central tunnel only.

14. Deck shore d. o. and f. w. connections, int'l fire connection.

15. Deck machinery (payload) fill connections with hose.

16. Tanks to shell with drydock plugs.

17. Lab uncontaminated s. w. system.

18. Takedown joints in pipe runs over 20 feet.

19. "Tate-type" valves and screens in vents and overflows.

20. Sounding caps in tops of vents elbows where terminating on weather deck.

21. Vents and overflows to terminate adjacent bulkwarks inside bulkwark brackets.

22. Stack exhaust piping to terminate at least 32 feet above main deck.

23. Exhaust piping to be hung by shock absorbent hangers with flexible sections.

24. Padeyes located over as req'd major machinery for lifting and servicing.

25. Hydraulic piping with bleeders at high points and with vents, and takedown joints.

26. Machinery space floor plates to have recessed handles for easy removal for access to critical items.

C. Electrical

1. Two 250kw diesel generators with front end diesel power take offs.

2. Ship service switchboard set up for parallel and independent simultaneous operation of generators.

3. Pilot house control of propulsion and thruster machinery; pilot house alarms for critical machinery and generators.

4. Incandescent exterior deck lighting.

5. Fluorescent interior lighting.

6. Space parts and special tools (Table 4, item 5)

7. Circuit breakers with overload protection.

8. All wiring labelled, all circuits labelled.

9. Not-under-command and task lights per Rules of the Road (CG-169) Rule 4

10. Emergency lighting, battery op., line floating type.

11. Wire runs neatly banded and firmly secured in wire ways.

12. Quick opening means for switchboards and controllers.

13. Penetration tubes for deck and bulkhead cable penetrations.

14. Space lighting switches located next to door.

15. Pilot house with red night lights.

16. Exterior deck house lighting which face forward with glare screens.

17. Shore power connection and cable w/stowage.

D. Outfit

1. Berthing for 21 scientists and crew.

2. Marlite bulkheads and ceilings (formica clad marine plywood).

3. Enclosed stair towers for fire protection.

4. Flashing of inaccessible corners in quarters, galley, mess, navigating, public and wash spaces.

5. Stores shelving.

6. Concealed piping and wiring in quarters, mess and galley, public spaces, and navigating spaces.

7. Two non-skid pads applied to deck at head and foot of ladders and stairs (exterior and interior).

8. Maximum ladder slope of 50°.

9. Minimum ladder headroom throughout ship, 6'2".

10. Minimum space headroom 6'4".

11. Minimum ladder width 30".

12. Galvanized sheet metal lining with insulation in refrigerated space.

13. Temperature insulation lined with marlite or formica clad plywood.

14. Uninsulated shell bulkheads require anti-sweat protection (vermiculite).

15. Ventilation ducts in quarters, galley, mess, public and navigation spaces with servicing or access panels. Accesses labelled.

16. Bulkhead and ceiling panel seams with mahogany stripping.

17. Joiner work smooth and finished; scratches on painted or finished surfaces touched up.

18. Interior stairways with metal fire screen doors top and bottom (except pilot house).

19. Locker doors louvered. Joiner doors at stateroom entrances louvered.

20. Lower berths with two built-in drawers.

21. Drawers with catches.

22. Upper berths with ladders and grabs.

23. All berths with fluorescent berth lights.

24. Grabs in way of water closets, showers and at heads of stairs and hatches.

25. Staterooms with bookshelves and coat hooks.

26. Messroom with coat hooks.

27. Chart stowage and flag stowage in navigation space.

28. Pilot house chart table at least 30" x 48" with drawers under.

29. Notice frames in mess and navigation spaces.

30. Labelling to be embossed and attached with screws.

31. Exterior storm rails in superstructure.

32. Interior storm rails in machinery access tunnels and passageways.

33. Rescue boat with built-in flotation tanks.

34. Tow cable and reel (ABS).

E. W. T. Requirements

1. One compartment subdivision.

2. W. T. bulkheads and QAWT doors.

3. W. T. bulkhead penetrations limited to distance 1/5 of beam either side of C. L.

4. W. T. bulkhead and deck penetrations welded on both sides or with spool pieces-ABS standards.

5. W. T. doors on inboard sides of stacks.

6. W. T. bulkheads labelled both sides with frame number and deck.

7. W. T. doors labelled both sides starting with No. 1 forward.

8. W. T. boundaries and drains all wet spaces with continuous welding in showers, toilet spaces, laundry, laboratory.

9. W. T. door open/close indicating system.

F. Special Features

1. Bolt-down fittings for scientific payload (CRES attachments) - see drawings.

2. Transducer dome at forefoot - see drawings.

3. Transducer void in hull.

4. Payload service interfaces - see drawings.

Table 4

SOFTWARE, TRAILS, AND SPARES REQUIREMENTS

1. Distribution of Data

	To Gov't* for record	To reg. body for approval	Final Distribution
Purchase orders	2		
Vendors equipment drawings**	3	as required	in Tech. Man.
Agendas & Schedules (plan, purchase, erection, trials)	2		
Technical Manuals	3		
Spare Parts List	3		in Tech. Man.
Working Drawings	3	as required	6+reproducible**
Test memos	3	as required	
Photos***	1		5
As completed photos: (color 8"x10")			
Broadsides			
Bow (45°off ℄)			
Stern (135° off ℄)			
Head on			
Directly astern			
Regulatory Certificates	-		2 (+2 copies)****

Working drawings must show reference to and interface with vendors drawings or technical manuals.

*As work progresses, per Article 3 of Contract Special Provisions

**One set of final, as-constructed, placed on each ship included in the above.

***Progress photos at bi-monthly intervals and photos of major events and features.

****Originals aboard ship, 1 copy to Texas A&M, 1 copy to University of Hawaii.

2. Required Manuals

Commercial standard instruction manuals for all machinery, electrical and electronic equipment (excluding fittings and fixtures).
Laminated operating instructions posted adjacent to main and auxiliary machinery and electronics.

3. Tests and Trials

1. Prepare test memos for tanks, piping, structure and hull fittings, main and auxiliary machinery, electrical and electronic equipment for dock and underway trials.

2. Tests of all above in accordance with regulatory body requirements and to demonstrate satisfactory performance including overloads. Include the following:

   a. Dynamometer bollard pull test and main and thruster propulsion at dock and underway. (only for first ship)

   b. Verify alignment of shaft bearings.

4. Dock and at sea trials by contractor. Licensed master and chief engineer provided in contractor's trial crew for underway trials. At sea trials to consist of proof of operation of all installed components by means of at least:

   a. Four hour full power run

   b. Crash stops, starts, reversals

   c. Maneuvering tests with main propulsion and with thruster

   d. Demonstration of safety and emergency systems

   e. Four speed runs over measured course to develop speed power curve*

   f. Windlass and deck gear operation

   g. Verify operating conditions in Table 2C

   *a run consists of three passes (up, down, up)

   Contractor will conduct two underway trials. The first will be informal. The second will be witnessed by representatives of the U.S. Navy Board of Inspection and Survey. Government representatives will witness all tests and trials. Contractor will provide an agenda of trials three months in advance. The Government may conduct its own trial at or near the expiration of the guaranty period. The contractor may attend if he desires.

5. Spare Parts and Special Tools:

   Spares shall be provided for all machinery, electrical and electronic components.

   1. Spares according to ABS and for one year continuous service on extended voyages away from the continental U.S. Contractor shall inform every vendor of this

requirement, for purposes of obtaining list of recommended spares. Spares shall be purchases and provided based on these lists and additionally as follows:

2. Supplimentary spares in following categories and amounts:

   a. Hardware - 10% of items installed each, all door, port and miscellaneous fittings (i.e., hinges, handles, etc.) but no less than one of each kind.

   b. Paint - 5 gallons each color and type and sufficient dimetcote or inorganic zinc to recoat 500 square feet.

   c. Light bulbs and receptacle fittings - 100% replacement bulbs, 10 receptacle plugs and fittings each type, 5 spare 115V exterior and interior receptacles each, 2 spare 460V receptacles.

   d. Deck covering - sufficient material and underlay to re-do largest space in each type.

   e. Refrigerant - one spare complete charge each unit in addition to operating charge.

   f. Fuel filters - 200% each type.

   g. Injectors - main and auxiliary diesels - 1 set each size.

   h. The following spare parts shall be furnished with each main and auxiliary diesel engine. Where the quantity "one set" is referred to. 100% spares for only one diesel engine shall be furnished. In cases where left and right hand parts are involved, sufficient items shall be provided to service both engines.

      1 set, main bearing shells
      1 set, connecting rod bearing shells
      1 cylinder head assembly complete with valves and springs
      1 set cylinder valves complete with springs, locks, etc.
      1/2 set cylinder liners
      4 sets elements for lubricating and diesel oil filters
      1 diesel oil supply pump (attached)
      10 connecting rod bolts and nuts
      1/2 set wrist pins and bushings

1 set turbo-charger
1 set injector assemblies
1 set injector assemblies
1 set injection pumps (if applicable)
1 lubricating oil pump of each type (attached)
1 fresh water pump (attached)
1 saltwater pump (attached)
1 piston assembly complete with rings, pins and connecting rod
2 pistons
2 connecting rods
1 set piston rings
1 set valve springs and keepers
1 set oil seals and packing
2 sets V belts
1 set cylinder head studs and nuts
1 complete overhaul set gaskets, seals and packing at least 2 of each kind and size of special pipe, tubing or fittings used for starting air, lubricating oil, cooling water, diesel oil and any other special lines used.

3. All special tools, including torque wrench for setting engine bolts, required for maintenance of hull fittings, machinery, electrical and electronic units.

4. Spares and repair parts shall be furnished in domestic wooden shipping containers or sheet steel boxes. Outside of container stenciled with equipment name. Provide typed list of components inside container. Provide stowage and spare parts location plan. In general stow spare parts adjacent to components located in machinery space. Locate other spare parts in machinery access tunnels (in shelving located along passageway bulkheads.)

6. Stability, Inclining and Measurement

1. Weight and stability reports submitted to Government at three equal time periods during construction to indicate compliance with stability requirements.

2. Inclining test in accordance with Coast Guard requirements (first ship only).

3. Prepare stability booklet and loading instruction.

4. Gross tonnage reports submitted to Government at three equal time periods during construction to indicate gross tonnage maintenance under 300 gross tons.

7. Contractor's Working Drawings, Plans and Data

1. Contractor developed data not limited to following list but shall include all drawings necessary to produce vessel in accordance with these requirements:

   a. Inboard and outboard profiles.*

   b. General arrangements (showing location of fire fighting, lifesaving, equipment).*

   c. Lines, offsets.

   d. Plating framing, bulkheads, house, rudder, appendages, other structural and foundation drawings.

   e. Tank capacity table.*

   f. Curves of form, cross curves, bonjean curves.

   g. Tonnage diagram.

   h. Docking plan.

   i. HVAC arrangement and fan list.

   j. Machinery arrangement.

   k. Pilot house and engine room controls, diagrams and arrangements.

   l. Shafting, propellers, steering septem.

   m. Thruster.

   n. Piping systems, diagrams and arrangements.

   o. One line power analysis; power and lighting distribution.

   p. Motor and controller list.

   q. Navigation lights, antennas and superstructure appendages.

   r. Mast and cableways.

   s. Interior communications, electronics, communications systems.

   t. Scientific payload interfaces.

u. Stability booklet and loading instructions.

b. Stowage and spareparts location plan, list or key.

*Additional copy shall be framed and placed on ship, mounted in main deck passage.

Contractor may combine data illustrating the above according to his standard commercial practice. The above are not necessarily required to be provided on separate drawings. Contractor will use NAVSHIPS numbers, provided by the Government, for drawings and manuals. Within 30 days of delivery a set of "as built" original or reproducible drawings shall be provided the Government. (RESSUPSHIP)

8. Delivery:

After completion of the following events the Government will accept delivery of the vessel at the contractor's dock:

1. Completion of at sea trials.
2. Correction of known deficiencies.
3. Provide all required certicicates.
4. Stowage of all contractor furnished spare parts.
5. Removal of all waste, debris and items used in the construction of the vessel. Clean up of the vessel and touch up where required.
6. Fill ballast tanks with fresh water. Clean and disinfect pot. water tanks and reefers.
7. Vessels shall be drydocked prior to delivery at contractors expense if there is evidence of grounding, straining, collision or launching damage. Contractor shall be liable for correction of defects from such causes.
8. Fuel and lube oil on board at time of delivery shall be negotiated between contractor and user.

APPENDIX B

CONTPACT PERFORMANCE SUMMARY

N00024-72-C-0288

A. CONTRACTUAL DATA

1. Contract number - N00024-72-C-0288
2. Date of Contract - 23 June 1972
3. Quantity and description of vessels

   a. AGOR-21 R/V Gyre
   b. AGOR-22 R/V Moana Wave
   c. Characteristics:

Length overall	174 ft.
Beam	36 ft.
Displacement (full load)	1100 ton
Draft	10 ft.

4. Contract price

	AGOR-21	AGOR-22	TOTAL
a. Original contract price for two ships	$1,894,000.00	$1,894,000.00	$3,788.000.00
b. Adjustments in price resulting from supplemental agreements negotiated by DCASO	4,106.50	4,106.50	9,213.00
c. Adjustments in price resulting from negotiating by NAVSEA	9,360.00	6,123.00	15,483.00
d. Other adjustments: Liquidated damages Mod P00003	(1,500.00)	(24,000.00)	(25,500.00)
e. Claims settlement Mod A00032	(4,143.70)	(16,800.41)	(20,944.11)
f. Final Price for Ships	$1,901,822.80	$1,863.429.09	$3,765,251.89
g. Initial Outfitting Material	87,250.00	91,998.00	179,248.00
h. Spare Parts	-----	-----	38,178.00
	$1,989,073.50	$1,955,427.09	$3,982,677.89

5. Delivery schedule per original contract

   AGOR-21 - 23 August 1973
   AGOR-22 - 23 September 1973

6. Delivery schedule per contract as revised.

a. Modification P00002 dated 28 September 1973 changes the delivery dates to:

AGOR-21 - 12 October 1973
AGOR-22 - 16 November 1973, and changes the dates for start of the one month grace periods to:

AGOR-21 - 7 September 1973
AGOR-22 - 5 October 1973

b. Modification P00003 dated October 1974 changes the delivery dates to:

AGOR-21 - 14 November 1973
AGOR-22 - 16 January 1974, and changes the dates for start of the one month grace period to:

AGOR-21 - 11 October 1973
AGOR-22 - 29 October 1973

7. Actual delivery schedule.

AGOR-21 - 14 November1973
AGOR-22 - 16 January 1974

8. Major subcontractors:

Catapillar, Lieaen, Con-Select, Carrier, etc.

9. Conditions requiring administrative action during performance of the contract.

a. None - No Government property.

b. Laxness in Contractor's security measures.

There were no classified documents on this contract for which performance can be measured.

c. Failure of the Contractor to maintain good safety and fire protection measures.

All adequate as far as records or memory shows.

B. Contractor Comments

C. NRPO Rating and Comments

1. Work ratings:

All work appeared to be above average.

2. Number and dollar magnitude of INSURV work list the general rating by INSURV work list the general rating by INSURV. Identify all items.

AGOR-21	188 items
AGOR-22	59 items

Most of the above items were completed immediately after preliminary acceptance trials and prior to delivery. The remainder were included with the final acceptance trial items and the defects and deficiencies. A dollar magnitude was not determined.

3. Number of remaining PAT items and deficiencies uncovered during the guarantee period and documented during FCT.

AGOR-21	43 items
AGOR-22	65 items

The INSURV ratings were generally satisfactory, indicating that the ships were constructed in accordance with contract specification and would be acceptable at such time as deficiencies were corrected.

4. Comments on

a. Scope and effectiveness of Contractor's inspection force.

(1) Hull Area - Generally satisfactory
(2) Electrical Area - Generally satisfactory
(3) Electronic Area - Generally satisfactory
(4) Mechanical Area - Generally satisfactory

b. Management including supervision and effectiveness.

c. Design performance.

(1) Design performance was satisfactory.

d. Planning, scheduling and coordination between engineering and production.

e. Technical competence.

(1) The Contractor was technically competent. It is believed that the Contractor's supervision and labor was above average.

f. Handling of escalation.

(1) The contract did not provide for escalation.

g. Choice of subcontractors and inspection of subcontractors' work.

(1) The Contractor's choice of subcontractors was satisfactory.

h. Purchase, storage, segregation of material and material handling.

(1) The Contractor performed these functions satisfactorily and in accordance with accepted commercial practices.

i. Performance difficulties and steps taken to overcome these difficulties.

(1) The Contractor was quick to comply with any and all new requirements in the administration and execution of the contract.

(2) The Contractor accepted change orders and accomplished the work in a timely manner.

j. Contractor's compliance with requests for estimates in connection with proposed changes.

(1) Change order administration was handled by DCASO, Houston. Estimates were usually handled satisfactorily.

k. Promptness in submitting scope, proposals and/or claims for changes.

(1) The Contractor readily submitted meaningful scopes of work required under changes. Generally the Contractor's proposals were submitted in a timely and satisfactory manner.

l. Reasonableness of such proposals and claims.

(1) The DCASO feels that the Contractor's proposals on change orders were generally factual and reasonable.

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