

SECTION III-A

Technical Requirements

Introduction

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INTRODUCTION

1. Purpose

These requirements are a basis for the charter and operation of a general-purpose, multidisciplinary antarctic research and supply vessel with icebreaking capabilities. It is the intent that the Owners shall deliver and operate this ship complete in all respects for the service intended. The ship shall be fully equipped, fitted out, and operated in accordance with the best commercial practices and applicable laws. Vessels proposed can be an existing vessel, modified, converted or new build. Examples of existing vessels similar in mission requirements can be found at the following sites:

- The proposed Alaska Region Research Vessel (<http://www.sfos.uaf.edu/arrv/>);
- The Finnish vessel R/V ARANDA (<http://www.fimr.fi/en/aranda.html>);
- The RRS ERNEST SHACKLETON (http://www.antarctica.ac.uk/living_and_working/research_ships/index.php); and
- The vessel currently supporting the USAP, the R/V LAURENCE M. GOULD (<http://www.usap.gov/vesselScienceAndOperations/>).

2. Area of Operation

The primary mission area is the Antarctic Peninsula and adjacent areas such as the southern sectors of the Atlantic and Pacific coasts of South America, but operations throughout the Southern Ocean and adjacent seas may be expected. Although the vessel will be employed primarily in the southern latitudes for the charter's duration, the vessel will also make regular (approximately bi-annual) cruises to the U.S. at the Charterers' discretion. The vessel may also be employed for occasional Arctic science cruises. The ship will operate from Punta Arenas, Chile or Ushuaia, Argentina, for operation in the Antarctic Peninsula area including Palmer Station, the Weddell Sea, and in support of remote island field stations throughout the operating area. Occasionally, the ship may be required to operate out of other ports, such as Hobart, Australia or Lyttelton, New Zealand, for trips to the Ross Sea, Antarctica.

3. Concept of Operation

The primary mission of this vessel is to resupply Palmer Station, in the Antarctic Peninsula, and support marine science research wherever science missions are proposed in Antarctic waters. The base of operation is in the southern latitudes to minimize transit time to the primary mission areas. Because shore support is remote for a ship operating in these areas, reliability, on-board maintainability, and redundancy of systems is of prime importance.

4. Relationship Between the NSF and Charterers

The Charterers have a contract with the National Science Foundation (NSF) for the operation and maintenance of the United States’ facilities in Antarctica. One of the tasks the Charterers perform is management of the research vessels operated by subcontractors.

5. Vessel Mission Summary

A representative annual operations summary for the ship is shown below. This summary is shown only to provide the bidder with an overview of the types of operations in which the vessel may be employed. This summary is not intended to indicate, in any way, vessel operational limits within the context of this requirement, as the actual ship operation may vary significantly over the life of the charter, and any such variation will in no way imply or permit a change to any other portion of the charter agreement, including the day rate.

Table 1: Representative annual operations summary.

Activity	Speed (knots)	Duration (days)
Ice Docked	0	24
Stationkeeping	0	66
Dredging & Trawling	1-3	43
Towing Instruments	2-6	27
Icebreaking	3	12
Operating in Pack Ice	2	57
Open Water Transit (including about 12 trips per year to Palmer Station)	8-12	86
Total Days Away From Port		315

6. Ship-Size Estimate

The vessel dimensions should be appropriate for maneuvering, docking and cargo operations at Palmer Station, Antarctica. A drawing of the planned pier design for Palmer Station is attached to this RFP.

7. Technical Evaluation of Responses

- A. The technical requirements contained in this document are the criteria for the research vessel performance, equipment, safety, and operation sought through this request for proposal. The technical evaluation of responses to this RFP will be based upon the extent to which each response meets each of the technical requirements. For a proposal to be considered for evaluation the requirements of the sections listed in Table 2 are minimum and must be met in full:

Table 2: List of the minimum criteria a proposal must meet.

Criterion	RFP Section	Paragraph(s)
Air Temperature	III-B	5
Icebreaking Capability	III-C	1
Stability, Compartmentation	III-C	8
Endurance and Range	III-C	9
Science Requirements	III-D	1-7, 10, 12
General Ship Requirements	III-E	1
Main Propulsion Machinery	III-E	2.A
Cold Weather Starting	III-E	2.B
Fuel	III-E	2.D

- B. Proposals should include calculations and/or text to demonstrate compliance and understanding with requirements. As an example, calculations and/or data should be included with the proposal regarding endurance, hull strength, intact and damage stability, and other subjects as appropriate.
- C. Calculations, simulations, model tests or full-scale tests for existing vessels in open water must be provided to demonstrate the vessel performance. This includes low noise propagation (low propeller cavitation) during slow-speed towing conditions.
- D. Operational capability in ice should be shown in the proposal. This can be achieved by comparing the calculated resistance of the vessel, as a function of speed in 1 foot of level ice, to the propeller thrust to overcome that resistance.

- E. Solely repeating the technical requirements as stated in this RFP will be considered non-responsive. All requirements as stated in this RFP must be addressed. If a bidder is proposing an existing vessel that does not meet the specification in a particular area, the bidder must identify and quantify how close they are to the requirement in that area. Should conflicts between requirements be discovered, the bidder should identify them. If the bidder identifies a better solution than what is specified, the bidder should present the solution in the proposal.
- F. The use of standard U.S. units or metric units (Systeme International d'Unites [SI]) is acceptable. Units of measure shall be consistent and clearly stated throughout all proposals.
- G. The ship shall be subject to dock and underway trials to show that the ship can meet the technical requirements. All test and trial requirements, including procedures and data to be collected, are provided below. The trials will be performed by the bidder under the supervision of, and subject to acceptance by, Charterers' personnel and their representatives.

8. Vessel Trials Criteria

A rather standard set of powering and maneuvering trials shall be performed. These trials are in addition to any and all required machinery trials. The proposed trials agenda for powering and maneuvering trials is presented in Table 3. The only trials included in this agenda which are not part of a standard agenda are 8 knot pull-out and the 4 knot turn with thruster(s) operating at full power in the direction which reduces turning diameter, advance and transfer.

A. Required Data and Documentation

- i. The Owners shall provide to Charterers a Trials Report describing, as a minimum, the following:
 - a. Location of the trials and water depth over the range (to be measured if depth is anywhere less than 100 feet and to be estimated from charts if everywhere greater than 100 feet);
 - b. Environmental conditions (wind speed and direction, measured, observed, or hind-cast wave height and direction, and measured or estimated current velocity during the entire period of the trials);
 - c. Vessel operating condition (ship speed, propeller RPM, rudder angle(s), thruster power level or RPM and vessel heading) at the beginning of each trial run;
 - d. Method used to ensure steady-state conditions at the initiation of the trial run;

- e. Method of position measurement (Raydist, Decca gyrocompass, etc. and method of measuring other trial variables (propeller or thruster RPM, heading, etc.) ;
- f. Discussion of unusual results.
- ii. The Owner must provide the following data in this Trials Report:
 - a. Measured propeller shaft torque, RPM and resulting SP as a function of vessel speed for sufficient vessel speeds to adequately define variation of SHP and RPM with speed;
 - b. Measured vessel tracks for all trial runs, including powering trials, to show time, at appropriate time increments, on the track plots;
 - c. Time histories of propeller RPM(s), thruster RPM(s) and rudder angle(s) for all runs, where appropriate;
 - d. Standard measures needed to characterize results of each trials maneuver. These include, but are not limited to: head reach, time to stop, etc., for a crash stopping maneuver; advance, transfer and overshoot angles, times to execute and swept path widths for a zig-zag maneuver; and station and track keeping characteristics including divergence from designated heading, position, and navigation track line.
- iii. All results will be presented in suitable graphical and/or tabular form.

Figure 1: Palmer Station Pier Design Drawing

