PRV Review Meeting
(NSF, RPSC, MARAD, STC)

Agenda

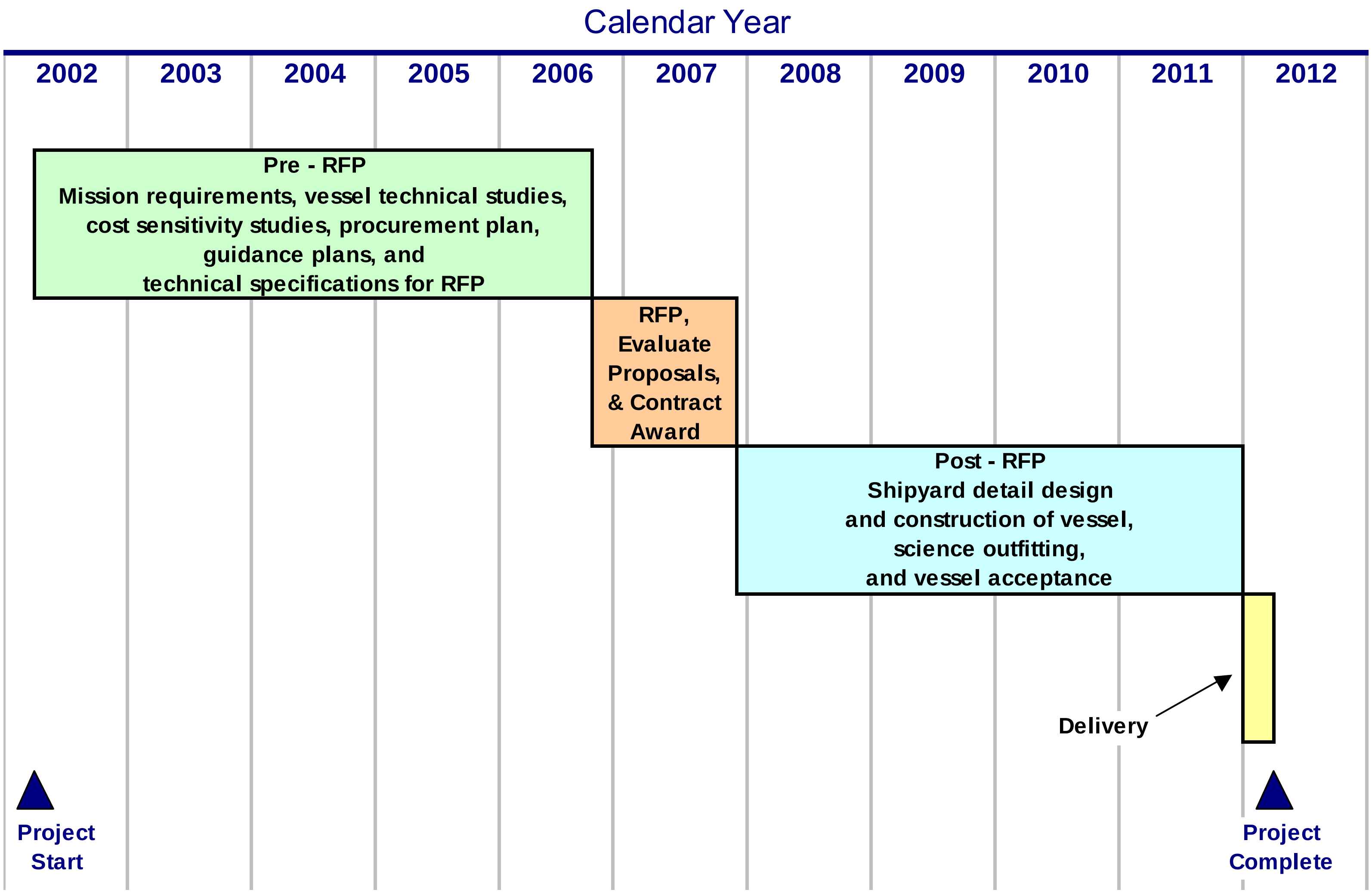
Project Overview
Project Schedule
Current Science Requirements
Initial Results of Sensitivity Study
(mission versus construction cost)
Procurement Approaches
Summary of Meeting

Date: April 9, 2004
Location:
Maritime Administration
Room 8101
400 Seventh Street, SW
Washington, DC 20590

Project Overview

Project Schedule

Timeline of Major Activities for PRV Project



Procurement Milestones
(RFP to Vessel Charter)

CALENDAR

2006	2007	2008	2009	2010	2011	2012

▲ Compile RFP documents and evaluation criteria (September 2006)

▲ Issue RFP (November 2006)

▲ Start evaluation of proposals (March 2007)

▲ Contract award and Shipyard detail design (December 2007)

▲ Start vessel construction (December 2008)

Vessel acceptance, charter start, transit south (December 2011) ▲

First science cruise (March 2012) ▲

Pre - RFP Activities

Subject	Project Activities	2002										2003												2004												2005												2006											
		M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Procurement	Initial procurement plan including milestones																																																								
	Lease versus buy alternative																																																								
	Type of charter and duration																																																								
	Strategy to generate competition in procurement																																																								
	Guidelines for technical section of RFP																																																								
	Lease cost estimate for vessel																																																								
	Publish request for letters of interest from industry																																																								
	Conduct meeting with industry on procurement																																																								
	Revise procurement plan and RFP																																																								
	Develop contractual sections of RFP																																																								
	Develop Source Selection Plan																																																								
	Prepare Plan for Scoring of Cost Proposals																																																								
Science	Scientific and operational requirements	▨		▨											▨	▨	▨	▨								▨	▨																																
	ARVOC-SSC-PRV review meetings															■		■																																									
	NAS/PRB study on national science needs in polar regions																												X	~	~	~	~	~	~	~	~	~	~	X	~	~	~	~	~	~	~	~	~	~	~	X							
	Science plan for project including manpower & instr. cost																																																								
	Laboratory deck arrangement and space layout																▨	▨																																									
	Cost estimate for science outfitting including manpower																																																								
	Scientific guidance plans and specs for RFP																																																								
	Criteria and scoring for science suite in RFP																																																								
	Report on history of science and operational requirements																																																								
Vessel	Vessel characteristics defined from science requirements													▨	▨	▨	▨	▨							▨	▨	▨	▨								X																							
	Generic hull form that meets requirements																																																								
	Special technical studies															▨	▨	▨																		X																							
	Presentations and review meeting with NSF, ARVOC															■		■		■								■																															
	Technical project plan for vessel													○																																											
	Math model for sensitivity study																									■	■																																
	Sensitivity analysis: mission versus construction cost																											▨	▨																														
	Model tests to verify vessel performance																																																								
	Vessel guidance plans and specifications for RFP																																																								
	Report on project technical history																																																								

■ = completed ▨ = in process X = planned

Schedule - Issues

- Seeking concurrence on milestones so that schedules and interrelationships between project activities can be formulated and critical path determined as well as estimates of manpower and costs for each fiscal year
- Current effort ends in May 2004 and may restarting January 2005

Science Requirements

Initial Science and Operational Requirements Provided to Design Team

- Acoustic profiling including bottom mapping during icebreaking
- Towing of nets and instruments from the stern during icebreaking
- Conduct of Autonomous Underwater Vehicle (AUV) / Remotely Operated Vehicle (ROV) operations from a moon pool
- Geotechnical drilling through a moon pool
- Acoustically quiet
- Comply with International Maritime Organization (IMO) guidelines for Arctic vessels
- Accommodations for 50 scientists
- 80-day endurance
- Reduced air emissions from diesels and incinerator
- Enhanced icebreaking capability
- Helicopter hangar

Sources of Refinements to Requirements

- Input from series of ARVOC/SSC meetings in May 2003; June/July 2003; November 2003
- Poster sessions at Town Meetings held at AGU, December 2003; Ocean Sciences, January 2003
- Community Memo from ARVOC Chair
- Last input from ARVOC/SSC was November 2003

Refined Science and Operational Requirements

- Moon pool size reduced to 10’ by 15’ and relocated because drill rig and AUV/ROV should not be built in
- 80 day endurance defined as 20,000 NM @ 12 Knots in open water
- Accommodation for 50 scientists; minimum 3 single PI cabins
- Jumbo piston core capability for 50 meter core, using design under development by WHOI
- Endorsed concept of podded propulsors for station-keeping, towing in ice and maneuverability but further investigation necessary – EMI and reliability

Refined Science and Operational Requirements (Cont)

- ABS A3 (PC3) Classification: 4.5 feet level icebreaking at 3 knots; operations in Central Arctic Basin in Summer
- Box Keel for transducer placement gives superior ability to survey in ice
- Helicopter Hangar
- Reduced emissions (‘green’ vessel)
- Portable lab containers (2 on 01 deck and 3-4 on Main deck)

Refined Science and Operational Requirements (Cont)

- 8 ft wide passageway on main deck for palletized cargo handing; intra-deck elevator
- 2 microscope rooms; 2 environmental rooms
- Investigate gyro-stabilized platform/lab for microscopy, micro-balances and ultra-centrifuge
- Walk in freezer, 200 sq ft
- Improved container handing in holds
- Two point winch system for large otter trawls
- No ‘water-wings’

Science and Operational Requirements - Issues

- Vessel delivery in 2012 could be adversely impacted with delays in defining scientific and operational requirements
- An initial set of “baseline” requirements should be established to assess one or more viable vessel options
- Activities of ARVOC in formulating and defining requirements unclear with pending NAS/PRB study

Initial Results of Sensitivity Study

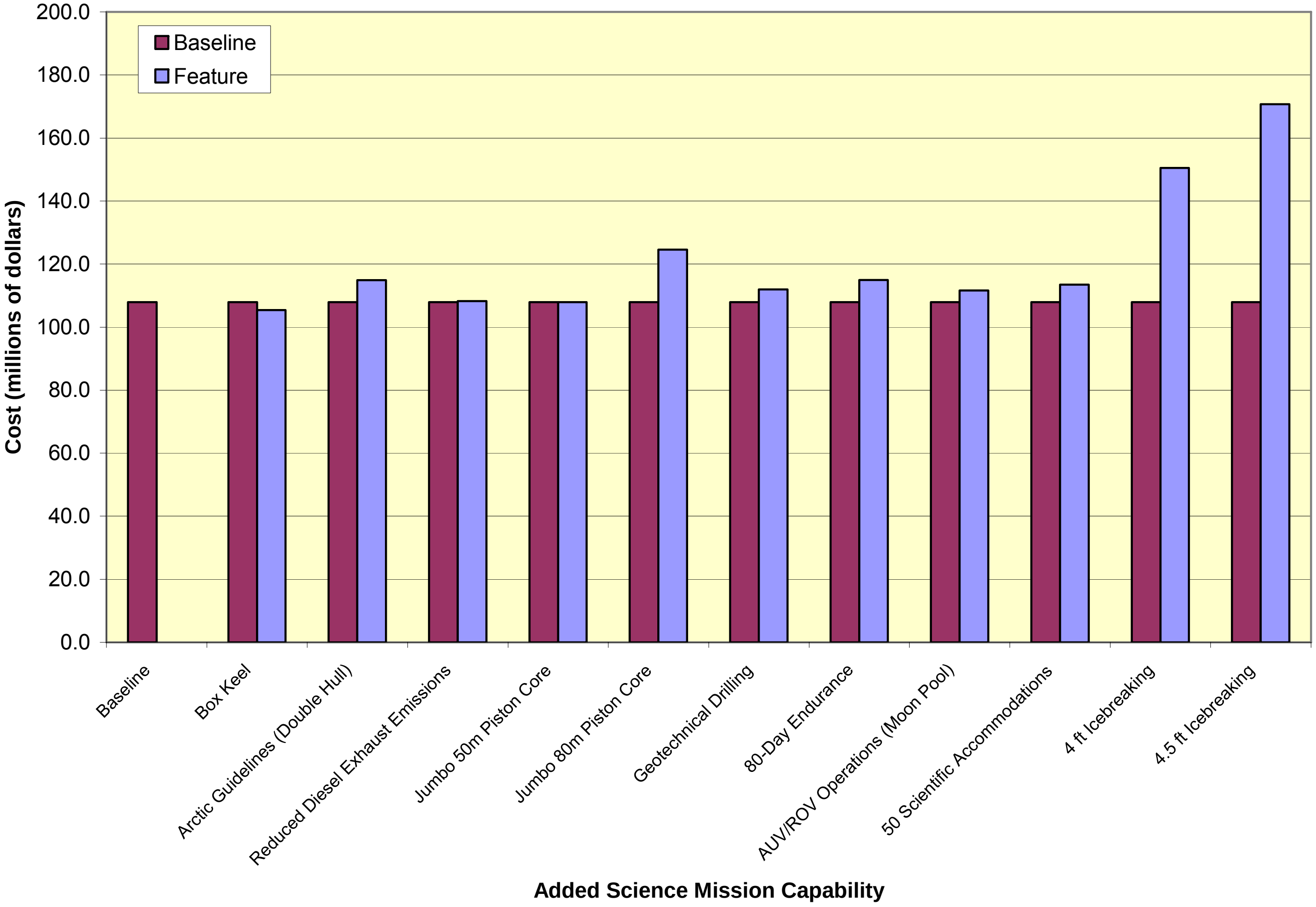
Construction Cost Sensitivity of Added PRV Mission Capabilities

BASELINE CAPABILITY
(NATHANIEL B. PALMER CAPABILITIES PLUS ELECTRIC PODDED PROPULSION)

- AFT WORKING DECK
- 3 FT ICEBREAKING
- SCIENCE WORKSHOP
- WINCHES
- CRANES
- 37 SCENCTIFIC ACCOMMODATIONS
- 60-DAY ENDURANCE
- LABORATORIES
- WORKBOAT
- SONARS & ACOUSTICAL SYSTEMS
- VAN STORAGE
- HELICOPTER DECK AND STORAGE

	→	= 100.0%
+	ARCTIC GUIDELINES (Double Hull) & IMPROVED HULL FORM	= 106.4%
+	SUPERIOR ACOUSTICAL FEATURES	= baseline
+	BOTTOM MAPPING DURING ICEBREAKING WITH BOX KEEL	= 97.7%
+	GEOTECHNICAL DRILLING	= 103.7%
+	ICEBREAKING 4/4.5 FT	= 139.5% / 158.2%
+	80-DAY ENDURANCE	= 106.5%
+	AUV/ROV OPERATIONS THROUGH MOON POOL	= 103.4%
+	REDUCED DIESEL EXHAUST EMISSIONS	= 100.3%
+	GREATER LENGTH FOR 80 M JUMBO PISTON CORING	= 115.5%
+	50 SCIENTIFIC ACCOMMODATIONS	= 105.1%
+	IMPROVED TOWING OF NETS AND INSTRUMENTATION	= baseline

Construction Cost Sensitivity of Added PRV Mission Capabilities



Selected Mission Options with 3 ft Icebreaking

	Level icebreaking	Box keel	Reduced diesel emissions	Length for 50 m jumbo piston core	50 science accommodations	80 days endurance	SHALDRIL capable	Expanded moon pool	Double hull	Length for 80 m jumbo piston core	Cost ($M)	% of baseline cost	% of 3 ft baseline cost
baseline	3 ft	○	○	○	○	○	○	○	○	○	107.9	100%	100%
	3 ft	●	●	●	○	○	○	○	○	○	105.7	98%	98%
	3 ft	●	●	●	●	○	○	○	○	○	111.4	103%	103%
	3 ft	●	●	●	○	●	○	○	○	○	113.0	105%	105%
	3 ft	●	●	●	○	○	●	○	○	○	109.8	102%	102%
	3 ft	●	●	●	○	○	○	●	○	○	109.8	102%	102%
	3 ft	●	●	●	○	○	○	○	●	○	112.5	104%	104%
	3 ft	●	●	●	●	●	○	○	○	○	118.8	110%	110%
	3 ft	●	●	●	●	●	●	○	○	○	122.6	114%	114%
	3 ft	●	●	●	●	●	●	●	○	○	126.8	117%	117%
	3 ft	●	●	●	●	●	●	●	●	○	135.0	125%	125%
	3 ft	●	●	●	●	●	●	●	●	●	136.9	127%	127%

○ = feature not selected

● = feature selected

Selected Mission Options with 4 ft Icebreaking

	Level icebreaking	Box keel	Reduced diesel emissions	Length for 50 m jumbo piston core	50 science accommodations	80 days endurance	SHALDRIL capable	Expanded moon pool	Double hull	Length for 80 m jumbo piston core	Cost ($M)	% of baseline cost	% of 3 ft baseline cost
baseline	4 ft	○	○	○	○	○	○	○	○	○	150.6	100%	140%
	4 ft	●	●	●	○	○	○	○	○	○	147.0	98%	136%
	4 ft	●	●	●	●	○	○	○	○	○	152.5	101%	141%
	4 ft	●	●	●	○	●	○	○	○	○	155.7	103%	144%
	4 ft	●	●	●	○	○	●	○	○	○	150.4	100%	139%
	4 ft	●	●	●	○	○	○	●	○	○	152.5	101%	141%
	4 ft	●	●	●	○	○	○	○	●	○	154.5	103%	143%
	4 ft	●	●	●	●	●	○	○	○	○	161.3	107%	149%
	4 ft	●	●	●	●	●	●	○	○	○	164.8	109%	153%
	4 ft	●	●	●	●	●	●	●	○	○	170.1	113%	158%
	4 ft	●	●	●	●	●	●	●	●	○	178.9	119%	166%
	4 ft	●	●	●	●	●	●	●	●	●	178.9	119%	166%

○ = feature not selected

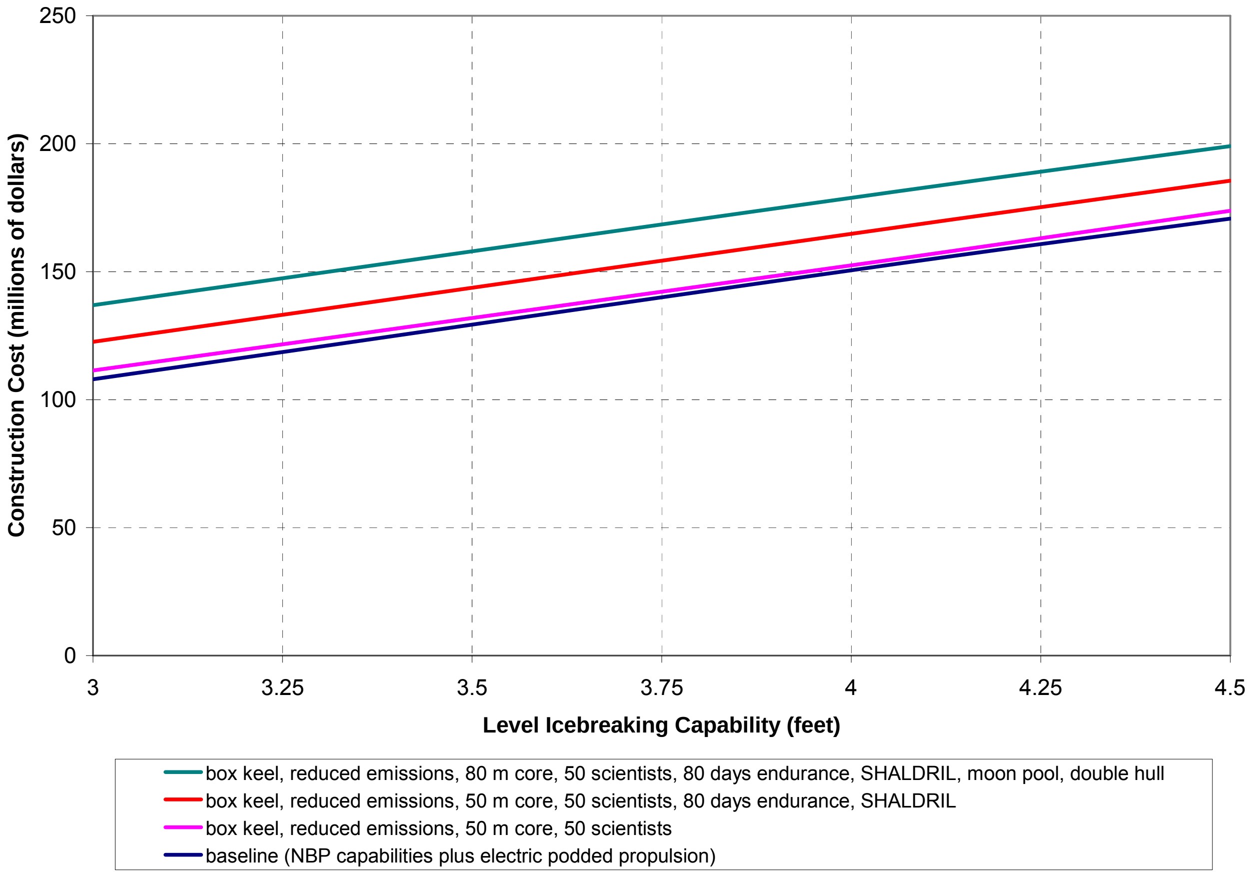
● = feature selected

Selected Mission Options with 4.5 ft Icebreaking

	Level icebreaking	Box keel	Reduced diesel emissions	Length for 50 m jumbo piston core	50 science accommodations	80 days endurance	SHALDRIL capable	Expanded moon pool	Double hull	Length for 80 m jumbo piston core	Cost ($M)	% of baseline cost	% of 3 ft baseline cost
baseline	4.5 ft	○	○	○	○	○	○	○	○	○	170.8	100%	158%
	4.5 ft	●	●	●	○	○	○	○	○	○	168.3	99%	156%
	4.5 ft	●	●	●	●	○	○	○	○	○	173.8	102%	161%
	4.5 ft	●	●	●	○	●	○	○	○	○	176.6	103%	164%
	4.5 ft	●	●	●	○	○	●	○	○	○	171.6	100%	159%
	4.5 ft	●	●	●	○	○	○	●	○	○	173.1	101%	160%
	4.5 ft	●	●	●	○	○	○	○	●	○	176.0	103%	163%
	4.5 ft	●	●	●	●	●	○	○	○	○	182.2	107%	169%
	4.5 ft	●	●	●	●	●	●	○	○	○	185.5	109%	172%
	4.5 ft	●	●	●	●	●	●	●	○	○	190.2	111%	176%
	4.5 ft	●	●	●	●	●	●	●	●	○	199.1	117%	184%
	4.5 ft	●	●	●	●	●	●	●	●	●	199.1	117%	184%

○ = feature not selected ● = feature selected

Construction Cost for Selected Mission Capabilities



Sensitivity Analysis - Issues

- Can an acceptable set of baseline mission requirements be ascertained as a result of the sensitivity study?
- Is there a desire for a presentation to NSF or ARVOC and, if so, when?

Procurement Approaches

Procurement Approach Alternatives

- Procurement solicits a charter based on vessel performance specifications
- Procurement selects the best three proposals from designer/shipyard/operator teams to be funded to develop a design and cost. A second stage evaluates the design and cost and picks a winner
- Procurement solicits a charter based on vessel performance specifications and a conceptual design for guidance

Performance Specifications Only

Used in 1989 lease of existing vessel

- All conceptual design costs borne by bidders
- Vessel had traditional set of missions
- Procurement generated competing bids and was successful

Procurement Funds 3 Teams to Develop Design and Cost

- Most suitable for high-value, multiple-ship procurements (USCG, USN)
- Procurement pays for 3 designs tripling the design cost
- Designs incorporate a build strategy
- Longer procurement time because of a final design cycle to incorporate the best ideas of all designs into the winning design
- Evaluation process is much more involved than other procurement alternatives

Performance Specification and Conceptual Design as Guidance

This approach considered for PRV
because
the vessel has a more complex and
expanded set of mission requirements
compared to the 1989 vessel
and

Rationale

1. Greater industry competition can be realized with a reduction in bidder's financial risk and uncertainty

    - Up-front costs to develop a conceptual design with construction cost estimate can discourage potential bidders – costs may exceed $250,000

    - A more timely response by bidders is possible having advance knowledge of approximate vessel size and arrangements that satisfy scientific and performance requirements

Rationale (Cont)

2. NOAA* and USCG* have used and prefer performance specifications with concept designs in recent vessel procurements. Demonstrated advantages include greater industry competition and lower vessel cost.

3. An element of this acquisition approach was to have public meetings with industry to learn of their interest and concerns with the vessel design and acquisition process.

* NOAA – National Oceanic and Atmospheric Administration
USCG – United States Coast Guard

Rationale (Cont)

4. Validates that the complex set of scientific and performance requirements result in a workable design for the vessel

5. Produces a vessel cost estimate needed by Government for budgeting purposes **before** the RFP is issued

Rationale (Cont)

6. Results in specific rather than general requirements by scientists

- Allows scientific community to rethink some of the requirements based on evolving design
- Provides knowledge to technical evaluation team for evaluation of proposals

Rationale Summarized

Benefits of performance specification and conceptual design in the RFP accrue to Scientists, Government, and Industry

Procurement - Issues

- Desire for a Mini-Workshop at NSF Offices with several Government agencies that have conducted recent vessel procurements
- PRV project team currently consists of :
    - NSF Project Manager
    - RPSC Science Manager – liaison with ARVOC
    - MARAD Technical Manager
    - A Procurement Manager is lacking

Procurement – Issues (Cont)

- Seeking understanding that procurement should guide and direct the activities associated with science and operational requirements and technical studies
  - Establishes procurement approach
  - Establish schedule and milestones to satisfy vessel delivery date
- Desire clarification to foster competition in the procurement

Summary of Meeting

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Summary of Meeting (continued)

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