

# APPENDIX VII

## U.S. COAST GUARD ICE OPERATIONS

### Commander Richard R. Rooth, USCG

- THE COAST GUARD'S POLAR ICEBREAKER FLEET TODAY
- THE COAST GUARD'S RESEARCH EXPERIENCE
- THE COAST GUARD'S USCGC HEALY (WAGB-20)
- THE RELIABILITY IMPROVEMENT PROJECT (RIP)
- CURRENT AND PROJECTED ICEBREAKER AVAILABILITY FOR SCIENTIFIC RESEARCH
- COSTS OF OPERATING POLAR ICEBREAKERS:

### THE OMB MANDATED REIMBURSEMENT EQUATION

#### U.S. COAST GUARD POLAR-CLASS ICEBREAKERS

#### USCGC POLAR STAR (WAGB 10) & USCGC POLAR SEA (WAGB 11)

Built: Lockheed Shipbuilding and Construction Company, Seattle, Washington Commissioned: 1976  
(Polar Star),1978 (Polar Sea)

Length:	399'	Bow crane (1):	3 ton - 10' reach
Beam:	84'	Fantail crane (2):	15 ton - 65' reach
Draft:	32'	Articulated crane (1):	2 ton, 6' reach
Displacement:	13,400	Endurance Days:	60
Ice(@ 3 kts):	6.0'	Provisioning:	60-150 days
Ice ridge:	21.0'	Fuel, Diesel:	1,359,200
Propulsion:	DE/Gas turbine	Fuel, Aviation:	46,419
Combined Shaft HP:	18,000 / 60,000	Lube oil:	13,660
Screws:	3, CP, 4 bl.17'	Water:	26,586 gal storage
Elec. System:	440v AC 3Phase	Cargo Capacity:	15,000 cubic ft
Economic Speed:	12.5	Dive capability:	full team
Range@Econ Speed:	28,000	Flight capability:	2 HH-65 dolphins
Max Speed:	17.00 / 20.00	Crew:	152
Range@Max Speed:	15,500 / 9,000	Science Party:	20/35

### U.S. COAST GUARD POLAR-CLASS ICEBREAKER SCIENCE SUPPORT CAPABILITIES

#### NEW OCEANOGRAPHIC WINCHES (2)

- 2 NEW INTEROCEAN HYDROGRAPHIC WINCHES:
- 26,000 LBF MAX. PULL
- 10,000 M 3/8 inch. WIRE, 10,000M OF .322 inch. EM,
- 1 SPARE DRUM OF 10,000 M 1/4 inch, ABILITY TO SWAP

#### NEW CORING / TRAWLING WINCH

- NEW INTEROCEAN C/T WINCH:
- 10,000 M 9/16 inch. WIRE, 40,000 LBF MAX. PULL

### **INCREASED LABORATORY SPACE**

- WET LAB: EXPANDED TO 490 SQ FT
- NEW ELECTRONICS & COMPUTER LAB: 100 SQ FT
- NEW GEOLOGY LAB: 200 SQ FT
- BIO/CHEM LAB: 264 SQ FT
- NEW STAGING AREA: 140 SQ FT

### **UPGRADED VAN CAPABILITY**

- SEVEN 20' CONEX VANS
- OR - TWO 40' & THREE 20' VANS

### **INCREASED SCIENTIST BERTHING & FACILITIES**

- NEW SENIOR SCIENTIST STATEROOM
- ABILITY TO ACCOMMODATE UP TO 35 SCIENTISTS
- UPGRADED SCIENCE LIBRARY / MEETING ROOM

### **INCREASED OCEANOGRAPHIC INSTRUMENTATION**

- ROSETTE BOTTLE ARRAY
- CONDUCTIVITY, TEMPERATURE AND SALINITY SENSOR
- UNCONTAMINATED SEAWATER SYSTEM

### **NEW CORING TRACK**

- WHOI DESIGN, PERMITS ON-DECK ASSEMBLY OF CORES

### **UPGRADED SATELLITE RECEIVERS**

- TERASCAN IMAGE RECEIVER: DOWNLINKS, PROCESSES, GEOGRAPHICALLY REFERENCES AND DISPLAYS SATELLITE DATA:
- ACCESSES NOAA TIROS-N SATELLITES: AVHRR IMAGES: VISUAL AND IR DATA 1KM

### **RESOLUTION, WEATHER PREDICTION, LOCATION OF OCEAN FEATURES AND ICE**

#### **RECONNAISSANCE, TONS DATA**

- PROVIDES ON-SITE ARGOS INFORMATION
- ACCESSES DMSP SATELLITES: OLS IMAGES: HIGHER RESOLUTION VISUAL AND IR

#### **IMAGES SSM/I IMAGES: CLOUD PENETRATING ICE IMAGES.**

### **U.S. COAST GUARD RESEARCH EXPERIENCE:**

#### **OPERATION DEEP FREEZE 1991/1992:**

- Antarctic Automatic Weather Station / Climate Program
- Physical Properties and Structural Stratigraphic Variations of Frazil, Platelet and Congelation Sea Ice,
- Ross Sea, Antarctica

- Sinking and Suspended Particulate Matter in the Antarctic Continental Margin
- The Preservation and Accumulation of Biogenic Silica and Organic Carbon in a High-Latitude Environment: the Ross Sea
- The Geodetic Control Survey of the Marie Byrd Land Coast, Antarctica
- The South Pacific Rim International Tectonic Expedition: Marie Byrd Land, Antarctica

### **ARCTIC WEST SUMMER (AWS) 92:**

Geological Framework of the Chukchi Borderland and the Tectonic Evolution of the Amerasia Basin,

#### **Arctic Ocean**

- The Oceanography of the Northwind Ridge
- Synthetic Aperture Radar Signatures of Autumn Sea Ice In The Arctic Ocean
- Paleo-climate and Paleoceanography of the Western Arctic Ocean
- Investigation of the Dropstone Content in the Surface Sediments of the Northwind Ridge Area / Water
- Samplin for Rare Element Chemistry
- Sea Ice Rafted Sediment Signal in the Arctic Basin
- Paleoclimate Record of Northwind Ridge Region, Arctic Ocean

### **U.S. COAST GUARD RESEARCH EXPERIENCE (cont.):**

#### **NORTHEAST WATER POLYNYA PROJECT: 1992/1993**

- Microbiology & Radioisotope Studies
- Phytoplankton Biology and Primary Productivity
- Benthic Biology and Benthic Studies
- Physical Oceanography and Current Studies

#### **OPERATION DEEP FREEZE 1992/1993:**

Antarctic Automatic Weather Station / Climate Program High Resolution Measurement of the Transmissivity of Sea Ice.

- Fission-Track Age Dating in the Terra Nova Bay Region: Determining the Uplift Rate and the Age of the Transantarctic Mountains
- Seal Tracking Study
- New Zealand Antarctic Programme Sub-Bottom Profiling

#### **ARCTIC WEST SUMMER 1993**

- Radionuclide Contamination in the Arctic Basin Ecosystem
- Physical Oceanography / Biological Oceanographic Studies
- Geological Framework and Tectonic History of the Amerasia Basin, Arctic Ocean
- Radionuclide Contamination in the Canada Basin Region
- Seismic Refraction Program / Climate History of the Western Arctic Basin
- Oceanography of the Canada Basin and Northwind Ridge
- Ice Physics
- Studies of Sediment in Sea Ice

### **U.S. COAST GUARD RESEARCH EXPERIENCE (cont.):**

#### **ARCTIC WEST SUMMER 1993**

Determination of Paleoclimate and Paleoceanography in the Amerasian Basin Sea Ice Mechanics Initiative (SIMI)

Evolution of Formed Ice Masses in Pack Ice / Floe-Scale Sea Ice Deformation

In-Situ Measurement of Pack Ice Stresses Strain, Tilt and Horizontal & Vertical Accelerations of Sea Ice

Simultaneous Tomographic and Acoustic Emission Imaging of Sea Ice

Technological Development of Autonomous Underwater Vehicles (AUV's)

Cadmium Distribution in the Chukchi Sea, Bering Sea and Gulf of Alaska.

### **OPERATION DEEP FREEZE 1993/1994:**

Carbon / Nitrogen Uptake Coupling, Environmental Controls of the Nitrogen Uptake in the Southern Ocean

Particulate Measurement and Sediment Rates on the Antarctic Shelf, Ocean Currents in the Ross Sea

Ocean Circulation Beneath Glacial Ice

New Zealand Antarctic Programme Mapping of the Ross Ice Shelf

## **U.S.C.G. POLAR ICEBREAKER HEALY (WAGB-20) FEATURES / CAPABILITIES**

### **MISSION CAPABILITIES**

- OPERATE IN -50 TO +95 F WEATHER
- INSTALLATION OF UP TO 8 SCIENCE VANS
- FORE AND AFT CRANE SERVICE
- TRAWLING/CORING & HYDROGRAPHY WINCHES
- DATA PROCESSING: DEDICATED SCIENCE DATA NETWORK
- LARGE, FLEXIBLE LAB SPACES
- DEDICATED SCIENCE FREEZER and CLIMATE CONTROL ROOMS
- TWO HH-65A or HH-60 SERIES HELICOPTERS

### **ICEBREAKING CAPABILITIES**

- 4.5 FEET OF LEVEL ICE AT 3 KNOTS
- 8+ FEET OF LEVEL ICE BACKING & RAMMING
- MINIMUM OF 30,000 SHP INSTALLED
- CONVENTIONAL HULL, GOOD OPEN WATER PERFORMANCE

## **U.S. COAST GUARD POLAR-CLASS ICEBREAKER**

### **RELIABILITY IMPROVEMENT PROJECT (RIP)**

Major systems to be improved:

- Sewage system
- Distilling plant
- Oily Water Separator / Lube Oil Purifier
- Compressed Air System
- Ship's Service Boilers

- Gas Turbine Logistics Support
- Controllable Pitch Propeller System
- Heeling System
- Central Hydraulic System / Boat Davit System
- HVAC system / Sea Water Cooling System
- Main Diesel Engines / Ship's Service Generators

**U.S. COAST GUARD POLAR-CLASS ICEBREAKER SCHEDULE: FY '95 - FY '97**

DATES:	MISSION:	AREA:	SPONSOR:
AUG '95 - SEP '95	AVAILABLE	(TO BE DETERMINED)	
NOV '95 - APR '96	DEEP FREEZE	ANTARCTICA	NSF
JUL '96 - SEP '96	AVAILABLE	(TO BE DETERMINED)	
NOV '96 - APR '97	DEEP FREEZE	ANTARCTICA	NSF
JUL '97 - SEP '97	AVAILABLE	(TO BE DETERMINED)	
NOV '97 - APR '98	DEEPPFREEZE	ANTARCTICA	NSF

**U.S. COAST GUARD POLAR-CLASS ICEBREAKER COSTS: FY '94**

PERSONNEL (141):	\$3,832,000
PERSONNEL OVERHEAD TRAINING:	\$742,000
OPERATIONS:	\$1,690,000
ENGINEERING SUPPORT:	\$2,975,000
FUEL:	\$1,811,000
TOTAL:	\$11,050,000

**ICEBREAKER REIMBURSEMENT SYSTEM**

1. REIMBURSEMENT COST METHODOLOGY IS AS FOLLOWS:

EXPENSE ITEM	FUNDING SOURCE	
	USCG	USER
PERSONNEL:	100%	
PERSONNEL OVERHEAD / TRAINING:	100%	
OPERATIONS:	100%	
VESSEL MAINTENANCE:	65%	35%
HELO MAINTENANCE:	40%	60%
FUEL:	41 DAYS	144 DAYS

**THE DAYS STANDARD IS BASED ON THE 1990 PRESIDENTIAL REPORT;**

THE COST DISTRIBUTION IS BASED ON THE 1985 POLAR ICEBREAKER USERS COUNCIL AGREEMENT.

2. DAILY USER FEES FOR FY95 (NOT INCLUDING FUEL)

ICEBREAKER: \$6,854

HELICOPTERS (2) \$2,732

TOTAL: \$9,586

3. BASED ON PROJECTED FUEL USE ESTIMATES FOR THE 1994/1995 DEEP FREEZE MISSION, THE DAILY USER FEE WILL APPROXIMATE \$19,137.

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