CGC Polar Star
WAGB-10
DeepFreeze 1986

U.S. Department of Transportation
United States Coast Guard

Commanding Officer
USCGC POLAR STAR
(WAGB-10)

FPO Seattle, WA
98799-3920
PH: 206-442-7360
FTS: 399-7360

3120
APR. 05 1986

From: Commanding Officer, USCGC POLAR STAR (WAGB-10)
To: Commander, Naval Support Force Antarctica

Subj: REPORT OF DEEP FREEZE 1986 OPERATIONS

Ref: (a) CNSFA OPORD NO. 1-86
(b) COMDTINST 16155.2A

1. In accordance with references (a) and (b), this report of Deep Freeze 1986 operations is hereby submitted. The report covers the entire operation, commencing with POLAR STAR's departure from Seattle on 26 October 1985, to arrival back in homeport on 5 April 1986.

2. Deep Freeze 1986 was characterized by poor weather in the Antarctic Peninsula area and by severe pack and fast ice conditions in the Ross Sea/McMurdo Sound area. Palmer Station resupply was completed without incident in high winds. While operating in the McMurdo area POLAR STAR was plagued by an unusual number of engineering difficulties. Despite all of the obstacles in our path the channel break-in and the resupply ship escorts were successfully accomplished. Regrettably, science support was somewhat less than planned because of equipment availability. Also, while at McMurdo the POLAR STAR AVDET rescued all hands from the Southern Quest when it was holed by ice and sank off Beaufort Island. Deep Freeze 1986 will be long remembered for all of the difficulties encountered, but also because of successful mission accomplishment under trying conditions.

3. The cooperation and support you and your staff provided during Deep Freeze 1986 was appreciated, and greatly contributed to the success of the mission. We look forward to working with you again for Deep Freeze 1988.

W. M. MONCRIEF JR

Distribution:
COMPACAREA (Po) (2)
COMDT (G-OIO) (2)
COMDT (G-ENE)
CCGDTHIRTEEN (ene)/(eee)/(f)/(o)
NSF POLAR
Center for Polar and Scientific Archives
WDC-A for Glaciology
USCGC POLAR SEA
USCGC GLACIER
USCGC NORTHWIND
USCGC WESTWIND
ATC MOBILE
USCG ACADEMY
ISF SEATTLE

TABLE OF CONTENTS

CONTENTS PAGE

LIST OF PLATES

CHRONOLOGICAL LIST OF MAJOR EVENTS

Date	Event
26 October 1985	Departed Seattle en route San Diego, CA. FTG riders aboard. CHOP COMPACAREA.
30 October 1985	Investigated red flare sighting 4 miles east of Anacapa Island, CA.
31 October 1985	Moored San Diego, CA. CHOP CTG 11.1.
04 November 1985	Commenced training exercises with FTG.
08 November 1985	U/W en route Port Hueneme, CA. CHOP COMPACAREA.
09 November 1985	Moored Port Hueneme, CA. Commenced on loading cargo for Palmer Station.
15 November 1985	Embarked AVDET 109, CG Helos 1413 and 1385. U/W en route Puerto San Martin (Pisco), Peru.
24 November 1985	Crossed the equator at longitude 88-42.1' W.
28 November 1985	Moored Puerto San Martin (Pisco), Peru.
01 December 1985	U/W en route Valparaiso, Chile.
05 December 1985	Moored Valparaiso, Chile.
10 December 1985	U/W en route Punta Arenas, Chile. Two Chilean pilots embarked for transit thru the Patagonian Passage and the Straits of Magellan.

12 December 1985	Launched TOGA Buoy in position 40-00.2'S, 74-44.1'W.
14 December 1985	Entered the Patagonian Passage.
15 December 1985	Anchored Punta Arenas, Chile.
17 December 1985	Embarked scientists for Palmer Station. U/W en route Palmer Station.
18 December 1985	Disembarked Chilean pilots. Entered Drake's Passage.
19 December 1985	Launched TOGA buoy in position 59-59.8'S, 64-58.8'W. Crossed 60 S at longitude 64-58.8'W; CHOP to COMNAVSUPPFORANTARCTICA.
21 December 1985	Anchored Palmer Station. Commenced cargo and fuel offload. Transferred GLACIER 1 and crew to Palmer Station. Disembarked scientists.
22 December 1985	U/W outside of Arthur Harbor. Anchored Palmer Station, resumed cargo ops. U/W outside of Arthur Harbor.
23 December 1985	Anchored Palmer Station, resumed cargo ops.
24 December 1985	Completed resupply of Palmer Station. Embarked scientists for McMurdo Station. U/W en route McMurdo Station.
26 December 1985	Crossed Antarctic Circle at longitude 83-51.3'W.

03 January 1986	Crossed International Dateline at latitude 68-41.8'S.
06 January 1986	Arrived at fast ice edge 33 NM from Hut Point. Transferred AVDET 109 to McMurdo Station. Disembarked scientists.
07 January 1986	Embarked ARCTEC personnel. Commenced channel break-in.
08 January 1986	RADM ROBBINS, Chief, Office of Operations; RADM THORSEN, Chief, Office of R&D; RADM RALPH, Royal Australian Navy; Mr. SERIG, DOT; Mr. GOULD, PAO, U.S. Embassy, Wellington; CAPT SRITE, CNSFA; and Dr. WILKNISS, NSF came aboard for official visit.
09 January 1986	RADM ROBBINS, RADM THORSEN, RADM RALPH, and other dignitaries departed.
12 January 1986	Responded to distress call from M/V SOUTHERN QUEST. Visited by 14 members of the House Armed Services Committee.
16-20 January 1986	Hove-to in McMurdo Sound awaiting fuel.
21 January 1986	Rendezvoused with the M/V PAUL BUCK. Commenced refueling operations.
30 January 1986	Escorted PAUL BUCK into Winter Quarters Bay.
31 January 1986	Departed McMurdo Sound on Science Cruise I/II.

02 February 1986	Arrived in the vicinity of Cape Hallett. Transported scientists to Hallett Station via helo.
03 February 1986	Arrived in the vicinity of Coulman Island. Transported two geologists to the island via helo. U/W enroute Terra Nova Bay.
05 February 1986	U/W en route McMurdo Station.
07 February 1986	Returned to McMurdo Station. Moored alongside PAUL BUCK to offload fuel.
08 February 1986	Towed PAUL BUCK away from the ice pier and escorted her to the fast ice edge. Moored, McMurdo Station.
09 February 1986	U/W in McMurdo Sound.
10 February 1986	Escorted M/V GREENWAVE into Winter Quarters Bay. Departed on Science Cruise III.
12 February 1986	Picked up scientists on Coulman Island.
13 February 1986	Picked up Hallett Station crew.
14-16 February 1986	Conducted oceanographic work.
17 February 1986	Arrived in McMurdo.
20 February 1986	Escorted GREENWAVE to the fast ice edge. Moored at the ice pier and loaded supplies. U/W en route Sydney.
23 February 1986	Launched TOGA Buoy in position 65 S, 166-54 E.

24 February 1986	Crossed 60 S; CHOP to COMPACAREA. Launched TOGA buoy in position 60 S, 163-42 E.
26 February 1986	Launched TOGA buoy in position 50 S, 158-11 E.
03 March 1986	Moored Sydney, Australia.
09 March 1986	U/W en route Seattle.
19 March 1986	Crossed the Equator at the International Date Line.
25 March 1986	Off Barber's Point, Hawaii for flight ops.
26 March 1986	U/W en route Seattle.
05 April 1986	Moored Seattle, WA.

CHAPTER 1

SHIP OPERATIONS

1. Narrative Summary of Operations

a. Pre-deployment Preparations

(1) After returning from DEEP FREEZE '85, POLAR STAR spent five months in a dockside availability status. All departments made extensive preparations for the upcoming deployment. A planned eight day shakedown cruise was aborted due to problems with pitch control on the starboard shaft. Consequently, POLAR STAR spent three weeks in emergency drydock at Todd Pacific Shipyards, Seattle from 24 September until 15 October 1985.

(2) After completion of the drydock period, POLAR STAR spent three days underway in the vicinity of Elliott Bay conducting various sea trials, calibrating equipment, and refueling. The following week was spent loading stores and completing all preparations for getting underway.

b. Specific Tasking for DEEP FREEZE '86 included:

(1) Resupply of Palmer Station.

(2) Break-in of McMurdo Channel and escort of supply ships to Winter Quarters Bay.

(3) Conduct assigned scientific operations as directed.

(4) In-transit law enforcement patrol to include sighting reports and investigation of suspicious activity.

c. Deployment Operations

(1) Seattle, WA to San Diego, CA

(a) POLAR STAR departed Seattle on 26 October 1985 en route San Diego, CA. A group of "riders" from FTG were on board to conduct a training assist with emphasis on engineering STRs and DC scenarios. In addition, the Engineering Department conducted equipment trials. On the evening of 30 October, the lookout spotted a red flare approximately four miles east of Anacapa Island, CA. POLAR STAR diverted from her base track to investigate. Nothing was discovered, however, and further information suggested that the flares marked a naval operation. POLAR STAR arrived in San Diego on the following Thursday and moored at the Naval Supply Annex Pier for the weekend. The following week was spent conducting training with FTG. POLAR

STAR anchored each evening in San Diego Harbor. Late in the afternoon of 08 November, POLAR STAR departed San Diego en route Port Hueneme, CA.

(2) San Diego, CA to Port Hueneme, CA

(a) The transit to Port Hueneme was uneventful. POLAR STAR arrived at the sea buoy early the following morning, and moored shortly thereafter. On account of the Veteran's Day weekend, the stevedores did not commence loading operations until 12 November. AVDET 109 joined us during this week. All cargo operations were completed on the morning of 14 November. We departed Port Hueneme the next day en route Puerto San Martin (Pisco), Peru. Both helos landed on board shortly after we cleared the traffic lanes.

(3) Port Hueneme, CA to Puerto San Martin (Pisco), Peru

(a) The transit to Puerto San Martin was uneventful. POLAR STAR crossed the Equator at longitude 88-42.1'W. King Neptune and his Royal Court came aboard, and the appropriate ceremonies were held. POLAR STAR moored at Puerto San Martin on 28 November.

(b) A NOAA weather buoy and associated equipment were turned over to the Peruvian Navy while inport.

(4) Puerto San Martin (Pisco), Peru to Valparaiso, Chile

(a) Future port calls in Pisco are not recommended. Lima/Callao appears to be only suitable port in Peru.

(b) We departed Puerto San Martin on 01 December and arrived in Valparaiso on 05 December. The transit was uneventful.

(5) Valparaiso, Chile to Punta Arenas, Chile

(a) On the day of departure, 10 December, two merchant pilots, Atilio Opazo and Raul Cancino, came on board for the transit through the Patagonian Passage, the Straits of Magellan, and Canal Beagle.

(b) Immediately after clearing Valparaiso Harbor, SS3 Paul J. Hubbard showed symptoms of appendicitis. He disembarked and was returned to Valparaiso via the pilot boat.

(c) A TOGA Drift Buoy was deployed at latitude 40 S, 75 W.

(d) We entered the Patagonian Passage through the Golfo de Penas on 14 December. In all, the transit went smoothly and the crew enjoyed the magnificent scenery.

(e) POLAR STAR anchored off Punta Arenas on the evening of 15 December. On 17 December, 12 scientists came on board. We departed that afternoon bound for Palmer Station.

(6) Punta Arenas, Chile to Palmer Station, Antarctica

(a) After transiting Canal Beagle, our two Chilean pilots disembarked. That evening we entered Drake's Passage.

(b) A TOGA Drift Buoy was deployed at latitude 60 S, 65 W.

(c) On 19 December, we crossed 60 S and CHOPPED to COMNAVSUPPFORANTARCTICA.

(d) POLAR STAR entered Arthur Harbor on the morning of 21 December. Refueling and cargo operations commenced shortly thereafter. GLACIER 1 and her crew were transferred to Palmer Station. The refueling portion of the resupply operation was completed that evening. On account of high winds and poor holding ground, the anchor began dragging. Early in the morning of 22 December, we were forced to get underway and remain outside of Arthur Harbor. Later in the morning, we again anchored and cargo operations resumed. Still however, the anchor would not hold, and again we were underway through the night. Finally, early in the morning of 24 December, all cargo operations were completed, including the onloading of retrograde cargo. Four scientists came on board for the transit to McMurdo. We then departed for McMurdo Station.

(7) Palmer Station, Antarctica to McMurdo Station, Antarctica

(a) On December 26 we crossed the Antarctic Circle, and on 03 January 1986, we crossed the Dateline; the appropriate, somewhat chilly, ceremonies were held.

(b) POLAR STAR arrived at the fast ice edge on 06 January. AVDET 109 departed for McMurdo. The break-in commenced the following day.

(c) RADM ROBBINS, USCG, Chief, Office of Operations; RADM THORSEN, USCG, Chief, Office of Research and Development; RADM RALPH, Royal Australian Navy; Mr. SERIG, Department of Transportation; Mr. GOULD, PAO, U.S. Embassy, Wellington, N.Z.; CAPT SRITE, Commander, Naval Support Force

Antarctica; Dr. WILKNISS, National Science Foundation; and Dr. Rita COLWELL, Presidential Appointee to the National Science Board, came aboard, for an official visit on 08 January.

(d) Early in the morning of 12 January, POLAR STAR and AVDET 109 responded to a distress call from the Icelandic trawler, SOUTHERN QUEST. The vessel was the support ship for the "Footsteps of Scott" expedition to the South Pole. The SOUTHERN QUEST was trapped between two ice floes off of Beaufort Island, holed, and sunk. POLAR STAR was hove to approximately 70 miles southwest of the QUEST's last position. Upon hearing of the disaster, POLAR STAR began monitoring all distress frequencies, energized the TACAN, and got underway. POLAR STAR's helos were dispatched from McMurdo and picked up the survivors from an ice floe. They were transported to the temporary safety of Beaufort Island. Then, with the support of CNSFA's helos, all were taken to McMurdo Station. Throughout this operation, POLAR STAR served as a secondary rescue platform. That afternoon, 14 members of the House Armed Services Committee visited POLAR STAR.

(e) From 16-20 January, POLAR STAR was hove-to in the channel awaiting the arrival of the tanker, PAUL BUCK. We rendezvoused with her on the morning of 21 January at the pack ice edge off Beaufort Island. We escorted her through the pack ice, and moored alongside in a position 20 miles southeast of Beaufort Island. Refueling operations commenced that day and were completed early in the evening. We got underway and continued working the channel, the turning basin, and Winter Quarters Bay. On 30 January, we escorted the PAUL BUCK to the ice pier.

(f) On 31 January, we departed McMurdo Sound on Science Cruise I/II. Personnel were dropped off at Hallett Station and on Coulman Island. High katabatic winds in the vicinity of Terra Nova Bay prevented us from conducting science operations there. We returned to McMurdo Sound on 7 February.

(g) The following day at PAUL BUCK's request, we moored alongside her at the ice pier and transferred fuel to her for her return journey. In the early morning of 8 February, we began towing her away from the ice pier. We then escorted her to the edge of the fast ice. POLAR STAR returned and moored. The crew was granted liberty until the following afternoon. During the next day and a half, retrograde cargo from Palmer Station was offloaded. Additional personnel and their equipment came aboard for Science Cruise III.

(h) On 9 February we were underway again, working the channel. The next day we met the containership GREENWAVE at the fast ice edge and escorted her, without incident, to Winter Quarters Bay. Once that task was completed, POLAR STAR was underway on Science Cruise III.

(i) On 12 February we picked up the personnel on Coulman Island. The following morning, we picked up the Hallett Station crew. From Cape Hallett, we headed northeast and conducted various types of oceanographic work, including surface tows, bottom grabs, and bottom dredges. POLAR STAR then turned south and headed for Franklin and Beaufort Islands. Further oceanographic work was conducted while en route.

(j) No science work was accomplished on Franklin Island because of adverse weather. Upon arrival in the vicinity of Beaufort, we transported a group of scientists ashore via helo. They spent two hours on the island and then were returned to the ship. We got underway again and proceeded to McMurdo.

(k) On 17 February we were back in McMurdo Sound conducting channel work. The GREENWAVE had some engineering difficulties; consequently the escort, scheduled for the 19th, was delayed. On the 20th, however, we towed her clear of the ice wharf and escorted her to the fast ice edge. After completing the escort, we moored at the ice pier and onloaded lube oil and some frozen goods. We unmoored that same evening and departed en route Sydney, Australia.

(l) Recommend that the supply ships, if they are to be continued each year, be fitted with stainless steel propellers. Both have standard propellers. M/V PAUL BUCK sustained damage to hers. M/V GREENWAVE was light on departure and was also susceptable to damage. The turning basin was clogged with thick ice during the entire DF-86.

(m) Some confusion arose regarding our Coast Guard contact point for operations. Orders were received from both COMPACAREA and COMDT (G-OIO), and in one case without the other apparently aware of the order. I finally directed all operational requests to COMPACAREA for coordination.

(8) McMurdo Station, Antarctica to Sydney, Australia

(a) On 24 February, we crossed 60 S and CHOPPED to COMPACAREA.

(b) Three TOGA drift buoys were deployed as follows:

(1)#6702 deployed on 23 Feb at 65 S, 166-54 E.
(2)#6703 deployed on 24 Feb at 60 S, 163-42 E.
(3)#6703 deployed on 26 Feb at 50 S, 158-11 E.

(c) We arrived in Sydney, Australia on 3 March and departed on 9 March.

(9) Sydney, Australia to Seattle, WA

(a) On 19 March, POLAR STAR crossed the Equator at the International Date Line. King Neptune and his Royal Court arrived for the rather prestigious ceremony.

(b) On the afternoon of 25 March, POLAR STAR arrived off Barber's Point, Hawaii. Flight ops were conducted for the transfer of personnel and outgoing mail. Mechanical difficulties with copter 1385 delayed our departure until early in the afternoon of the following day. Gear box replacement was required, and could not be effected immediately. COMPACAREA directed us to leave it behind at Barber's Point, to be flown back to Mobile via military A/C.

2. Deck Operations

a. Cargo

(1) Port Hueneme Cargo. Palmer Station cargo was loaded smoothly by professional stevedores. Two unusual items, a N.O.A.A. weather buoy and a cargo van, were loaded forward of the superstructure on the 01 deck. The buoy was bound for Peru and the van was bound for the research vessel POLAR DUKE. Total cargo loaded at Port Hueneme was 384 tons.

(2) The N.D.B.O. weather bouy was offloaded onto a Peruvian Navy patrol boat in Pisco, Peru, minus some of it's working parts. This was due to the fact that these parts had been scattered throughout the ship by the stevedores, and that it had not been brought to the attention of ship's personnel that any parts were to be offloaded with the buoy, with the exception of several small items given to the MST's. Parts were later found in the science vans and in two separate places in the upper cargo hold. The mooring tripod was buried under a stack of loose lumber. The missing parts were shipped as they were located.

(3) During the transit from Punta Arenas, Chile to Palmer Station Antarctica, a problem was brought up by Mr. B. Betzel of N.S.F. Because some lumber destined for Palmer aboard POLAR STAR was left behind in Port Hueneme, an important item scheduled to go aboard the GLACIER was bumped to carry the lumber. This resulted in great expense to N.S.F to ship this item down to Punta Arenas. It was pointed out to Mr. Betzel that the CO had offered to carry the lumber in question on the 02 deck, or anywhere else it would fit, but that the offer was declined by Mr. L. Degalen, who was in charge of loading POLAR STAR in Port Hueneme. Time was not a factor since the ship did not sail until the next day.

(4) POLAR STAR anchored in Arthur Harbor at 0940, 21 December 1985. Cargo operations commenced at 1209. The last load of supplies went ashore at 2026 on the 23rd. At this time,

retrograde material began to come aboard. At 0005, 24 December, the last load of retrograde was stowed and POLAR STAR made ready to depart for McMurdo station. A total of 384 tons of cargo was handled using a total of 36 hours available for cargo handling.

(5) During the 3 day offload operation, a considerable amount of cargo handling time was lost due to the numerous bergy bits that had to be pushed out of the area by POLAR STAR's small boats.

b. Boat Operations

(1) San Diego, CA. A LCVP boat operation was conducted to transfer a heavy fire pump motor ashore for repairs. The LCVP was used because of the weight and awkwardness of the item. The LCVP made a beach type landing at San Diego Air Station's abandoned seaplane ramp.

(2) Palmer Station. Once anchored, preparations were made to offload cargo to Palmer Station. A five man shore party was transported to Palmer Station in GLA I. Once this was accomplished, GLA I returned and picked up the 12" towing hawser. The towing hawser was transported to Gamage Point and at 1048 it was attached to the installed mooring chain. A pelican hook from POLAR STAR was provided for this operation. The pelican hook was left attached in order to facilitate the mooring of other ships in the future. At 1300, a strain was taken on the hawser and the fuel line was floated out from Palmer Station. Fueling commenced at 1333.

(3) While stowing the LCVP's, slight damage was sustained by STAR 4 when it swung into the portside of the hangar. Contributing to the cause was the high lift point on the crane and the presence of a slight swell in the harbor.

(4) During science party put-in and extractions at Coulman Island and Cape Hallett, when one of the helos was not available, the zodiac was inflated and maintained on standby as a rescue vehicle in case any problems developed with the single helo. When limited to single helo operations POLAR STAR then becomes the rescue vehicle.

(5) During science cruise III the scientists involved with project K-014 requested boat operations at various locations within the Ross Sea for shoreline sample collection. This is not practical with only an MSB and zodiac especially under existing weather conditions. Where boat operations are required for science support the ASB should be available. We did not have an ASB as we had transported the GLACIER's ASB from Seattle to Palmer Station. We were also unaware of the need for boat support for K-014.

c. Towing of M/V PAUL BUCK

(1) The 12" towing hawser was layed out as per the diagram found on page 1-12. 500 feet of hawser was made up to run out from the towing winch. The remainder was led clear and faked down.

(2) A stern to stern approach was made which allowed for an overlap of approximately 50 ft. Two unsuccessful attempts to pass the messenger by bolo were made. The third attempt was made with the line throwing gun. It was successful. The 12" towing hawser was passed through the PAUL BUCK's stern chock. A series of figure eights were led around their stern bitts. This was done because the hawser eye was too small to fit around the bitts.

(3) Several times during the towing operation the hawser came under very heavy strain. At one point the line slipped off PAUL BUCK's bitts and traveled through their chock. The runaway line carried away their stern light and one lifeline stanchion. The line was recovered and repassed to the PAUL BUCK. The hawser was then led to their stern capstan and secured. A heavy strain on the hawser caused the towing winch to be overpowered. This made it extremely hard to slack the line. The line was eased by the two ships closing each other.

(4) Once the PAUL BUCK was in position to make her turn into the ice channel the towline was cast off.

d. Towing of the M/V GREENWAVE

(1) The towing hawser was set up the same as for the PAUL BUCK except that a 600' vice 500' messenger was used. Also, a wire pendant was shackled on the end of the towing hawser for ease and quickness in attaching to their stern bitts.

(2) The entire operation went very smoothly. As with the PAUL BUCK, once the GREENWAVE was in the turning basin the towline was cast off.

3. Diving

a. Pre-deployment Preparations

(1) Although billeted for six divers, POLAR STAR had an operational dive team for Deep Freeze '86 consisting of five divers: 1-SSDO, 1-DV1, 2-DV2 and 1 Scuba. All divers had previous ice diving experience with the exception of 1-DV2.

(2) Annual dive physicals were completed at Support Center, Seattle prior to departure for all divers whose physicals were due to lapse during the deployment.

b. Training

(1) Due to the extended and isolated nature of this deployment, quotas were procured through COMDT (G-WER-2) for two divers to attend the Poseidon Regulator and Unisuit Repair School in Amboy, N.J.

(2) Underwater hull inspection familiarization was conducted by the Engineering Department for the dive team during the ship's October drydocking in Seattle.

(3) Unisuits were utilized during an operational dive in October to reacquaint the divers with proper operation and buoyancy control.

(4) Written PQS was implemented for new divers reporting on board.

c. Equipment

(1) All gauges were tested and calibrated.

(2) All regulators were completely overhauled.

(3) Spare parts inventories were restocked as necessary.

(4) Air quality tests were completed on both Bauer dive compressors and found to be within the required U.S. Navy specifications.

d. Individual Transit Sections

(1) Seattle, WA through Punta Arenas, CI

(a) Training lectures were held on the following topics: use of the Bauer K-14-E3 dive compressor; revision 1 to the U.S. Navy Dive Manual (Vol. 1); log keeping procedures; ice diving procedures and techniques; ice tending procedures; and line pull and hand signals.

(b) Shipwide solicitation was made for dive tender candidates. Training lectures were held specifically for these non-diving personnel with emphasis on Navy PQS requirements. Topics included diving operations, ice tending procedures and line pull signals.

(c) Equipment PMS was on-going with emphasis on annual cylinder VIP requirements and reserve actuation testing for all tank manifolds.

(2) Punta Arenas, CI to First Arrival McMurdo

(a) Training lectures were held on the following topics:

1. Hypothermia and cold environment related illnesses and injuries
2. Ice diving operations
3. McMurdo diving requirements as per CNSFAINST 3900.1G
4. Emergency first aid procedures
5. Ice diving equipment operation

(b) Tender training lectures included diving safety and emergency procedures, ice diving equipment operation, and line pull signals.

(c) Equipment PMS was on-going with emphasis on ice diving equipment preparations. All unisuits were overhauled, anti-freeze caps attached to the regulators and tending lines and diving harnesses inspected.

(3) McMurdo Through Last Science Cruise

(a) Training lectures included recognition and treatment of pressure related injuries, diving safety and emergency procedures, and repetitive dive tables.

(b) Three non-diving personnel qualified as dive tenders, and two divers requalified.

(c) Nine operational dives were conducted in the ice channel and turning basin of McMurdo Sound between 15 and 28 January. Six of these were to inspect the rudder, shafts and screws for ice breaking damage, while the other three were to temporarily patch the starboard shaft in support of internal engineering repairs.

(d) The patch was fabricated by the First Lieutenant and consisted of a 40"X25' length of herculite and four ratchet type tie down straps. It was placed around the void of the missing rope guard, after wrapping this space with 450' of 3" double braided nylon line. For further details refer to the engineering chapter.

(e) Dive parameters for all dives remained fairly constant: current - 0.0 to 0.5 kts, ice - 9 to 10/10s coverage

of broken fast ice, air temp - 22 to 34°F, water temp - 29°F, dive depth(s) - 25 to 50 ft, and visibility 40 to 100 ft.

(f) Both killer and minke whales were observed in the immediate area but posed no threat to the divers.

(g) US Divers Conshelf XIV (with Arctic modification kits) and Poseidon regulators were utilized. Free flows were encountered intermittently with each, even though a rigorous PMS was followed.

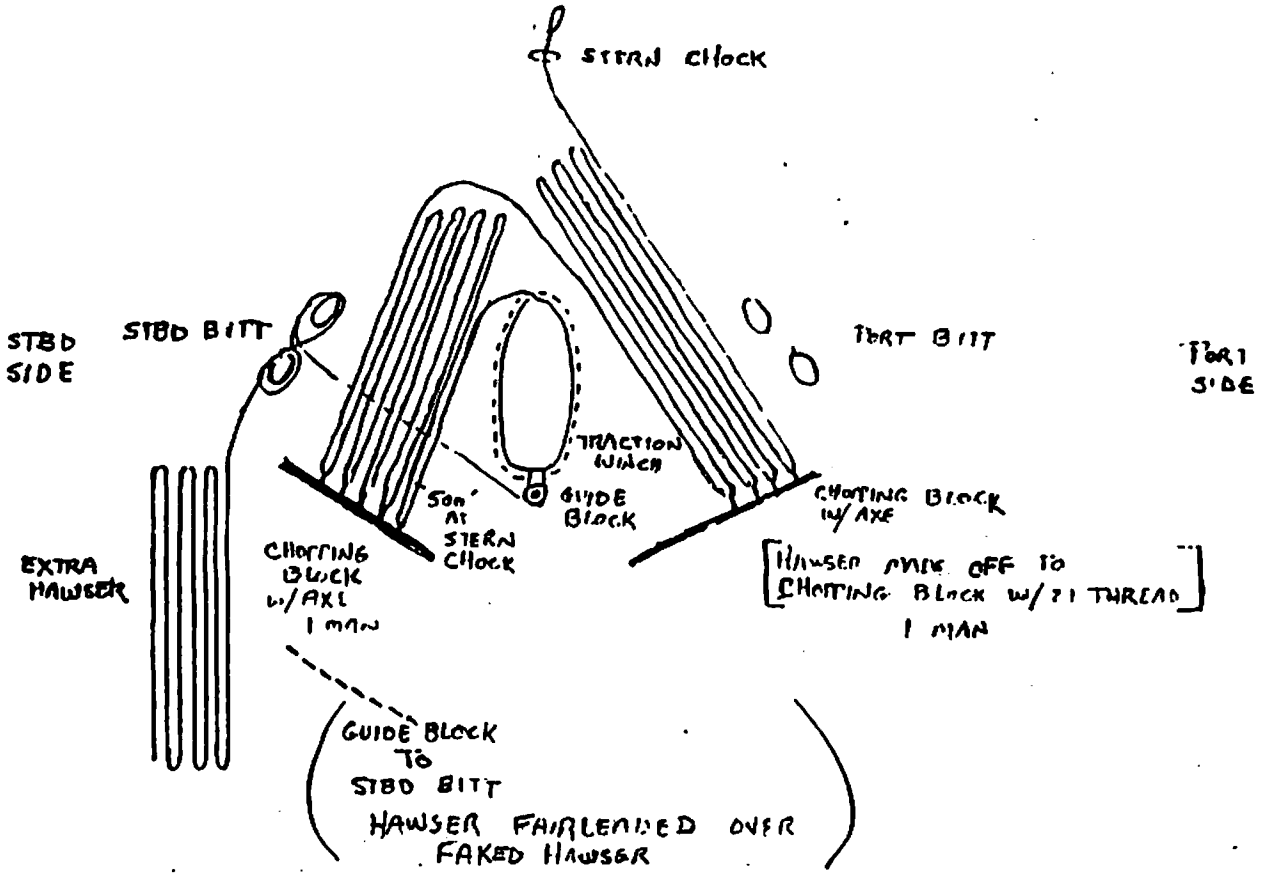
(h) The recompression chamber at McMurdo was operational for all dives, with Mac Center and the CNSFA Diving Admin Officer notified before and after each dive. Although the current chamber does not remain assembled for the entire year, future plans are to construct a permanent chamber with both 60 ft/O_2 and 165 ft/air capabilities which will be operational by DF '87. There are no permanently assigned medical personnel at McMurdo who have specialized training in the recognition and treatment of diving injuries.

(i) Following suspected ice damage to her propeller during departure from McMurdo, the M/V PAUL BUCK requested a dive to inspect her shaft and propeller. Because of the non-availability of the decompression chamber, the dive was not conducted and the PAUL BUCK using her small boat inspected the propeller from the surface after ballasting.

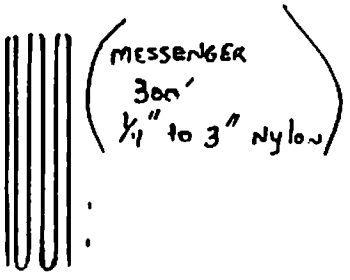
(4) Last Science Cruise to Seattle, WA

(a) Training lectures included decompression and treatment tables, hull inspections, search and recovery procedures, and regulator and buoyancy compensator maintenance.

(b) Equipment PMS continued with emphasis on overhauling all regulators, buoyancy compensators and cylinder manifolds.



STERN OVERVIEW



AFTER NETS LOWERED

BUI

FAKED ON FLIGHT DECK

PASSED TO TANKER VIA BOLO FM FLIGHT DECK

Plate 2
Tanker Towing Rig

CHAPTER 2

AIR OPERATIONS

Plate 3

1. Pre-deployment Preparations

a. Aviation Detachment 109 (four pilots and ten enlisted maintenance personnel) was designated on 30 September 1985. HH52A CGNR 1385 and 1413 were assigned to the AVDET. During the five

week pre-deployment period Hurricane Juan interrupted aircrew training and aircraft maintenance for an eight day period (23-30 Oct). However, 68.1 flight hours of pilot and flight crew training, 5.4 maintenanee flight hours and 1639 man-hours of maintenance (994 scheduled - 645 unscheduled) were completed during the remainder of the period.

b. The helicopters and cross country crews departed ATC Mobile on 7 November en route to Naval Air Station PT. Mugu, CA. This is normally a four day trip with no weather or mechanical delays. On 10 November the helicopters deviated from the planned flight route in order to conduct precautionary maintenance at Coast Guard Air Station Los Angeles. AVDET 109 completed the cross country flight to PT. Mugu on 11 November.

c. On 15 November both helicopters were flown aboard POLAR STAR once the ship was at sea. AVDET 109 chopped to POLAR STAR at 1045 PST.

2. Summary of Flight Operations

a. Port Hueneme, CA through Punta Arenas, Chile

(1) Four flights were flown during the transit between Port Hueneme, CA and Punta Arenas, Chile to train pilots, LSO's and flight deck crews. These flights fully qualified the port and starboard flight deck sections for day and night operations. Additionally, all pilots completed their semi-annual day and night shipboard landing requirements. One other mission was scheduled but was cancelled due to adverse weather conditions.

b. Punta Arenas, Chile to McMurdo Station, Antarctica

(1) Flight operations were conducted once for pilot training during the transit between Punta Arenas and McMurdo Station. Ice recon flights were not required.

(2) On 6 January 1986, both helicopters launched 50 nautical miles north of McMurdo Station to commence the transfer of AVDET 109 personnel and equipment. Scientific personnel and their equipment that had accompanied POLAR STAR from Punta Arenas and Palmer Station were also transferred to McMurdo during these logistic flights.

(3) During the period 6-28 January 1986, AVDET 109 conducted operations from the helicopter pads at McMurdo Station. During this time POLAR STAR was engaged in creating a channel through the fast ice extending 33 miles northward from McMurdo Station.

(a) Helicopter operations at McMurdo were scheduled in part by the National Science Foundation. The two HH52A helicopters of AVDET 109 supplemented the UH-1N helos of VXE-6 in

support of NSF missions. The HH52A helos were assigned to fly all the over water flights, as the Navy UH-1N's are prohibited to fly over open water.

(b) On a daily basis, POLAR STAR required helicopter support for resupply and personnel transfer. These missions were given highest priority and only after completion of POLAR STAR's requirements were both helicopters released to support NSF missions.

(c) AVDET 109's helicopters operated from the lower helo pads at McMurdo Station. The location and surrounding terrain of these pads does not permit takeoff in all directions. Because of the predominant winds, it was sometimes necessary to accept a tailwind component upon takeoff or landing. During these periods, lighter than normal loads were carried, resulting in more sorties to complete the mission.

(d) Pilot weather briefings were available from the weather office of the COMNAVSUPPFORANTARCTICA. Because of the continuously changing weather patterns common to this area, this facility was used frequently.

(e) Fueling operations were conducted at the helopads at McMurdo. Additionally, the fuel cache at Marble Point was used as an en route fueling point for missions to the dry valleys and the west side of McMurdo Sound.

(f) Radio Communications with McMurdo Station (MAC CENTER) were satisfactory on UHF (360.2) and HF (8.997), with the exception that UHF was unavailable at low altitudes at some locations north of McMurdo because of obstruction by Hut Point. Williams Field Tacan was available on channel 90X and was used for missions to Black and White Islands. It was unusable at low altitudes over Winter Quarters Bay because of obstruction by Observation Hill.

(g) Compass headings in this area were considered unreliable. Pilots adhered to the navigation standard operating procedures of VXE-6: VFR flights only.

(h) Upon AVDET 109's arrival, VXE-6 provided pilot briefings as well as a locally experienced helicopter pilot to conduct area familiarizations for our crew. Local operations, course rules, communications, landmarks, refueling procedures, and navigation were covered in great detail. This information was of extreme importance. It is considered a necessity, and should be continued by all Coast Guard aviation detachments that operate in McMurdo Sound.

(4) While operating out of McMurdo, Aviation Detachment 109 flew a total of 179.5 hours while conducting 164 sorties. 515 passengers and 41,700 pounds of cargo were transported during this

23 day period. Of international interest during this period was the SAR case involving the rescue of 21 survivors from the M/V SOUTHERN QUEST. This independently sanctioned vessel was providing logistical support for the "Footsteps of Scott" expedition. The vessel was caught and crushed between two ice floes while operating four NM southeast of Beaufort Island. After a mayday broadcast, all hands abandoned ship to an adjacent ice floe. The vessel sank shortly after midnight 12 January 1986. Both HH52A helicopters from AVDET 109 launched to effect the rescue. Because of their dangerous location, deteriorating weather conditions and the helicopters' fuel state, all persons were initially flown to Beaufort Island. After refueling, all 21 survivors were flown to McMurdo Station.

c. Science Cruise I and II

(1) During the period 31 Jan - 06 Feb 1986, five flights were flown in support of S-073, S-263, K-051, and K-078 missions (see listing at end of statistical summary). S-073 and K-078 missions were accomplished as requested. The Terra Nova Bay portion of S-263 was cancelled due to high katabatic winds and severe turbulence conditions encountered in the Bay. The Coulman Island portion of K-051 was cancelled midway through the cruise because helicopter CGNR 1413 had been grounded (transmission). This problem limited the maximum range of single helicopter operations to a distance of eight NM from POLAR STAR (POPDIV Manual).

d. Science Cruise III through OUTCHOP 60° South

(1) During the period 11-17 Feb 1986, four flights were flown in support of S-073, K-014, and K-078 missions. All of these missions were completed as requested.

(2) Project S-263, construction of a weather station on Reeves Glacier (Approx. 15 NM inland), was cancelled because of the single helicopter limitation.

(3) Upon arrival McMurdo and prior to escorting M/V GREEN-WAVE to open water, flight operations were conducted to offload 10 scientists and their support equipment and onload 40 barrels of lube oil.

e. OUTCHOP 60° South To Seattle, WA

(1) During the period 20 February - 4 April 1986, seven flights were flown for pilot, LSO, and flight deck crew recurrent training. These flights fully qualified the port and starboard flight deck sections for day flight operations and one section for night flight operations. The pilots also completed their semi-annual day and night shipboard landing requirements.

(2) On 25 March 1986, both helicopters were launched to transport personnel and mail to Coast Guard Air Station Barbers PT. Helicopter CGNR 1385 encountered transmission problems which required a main gearbox change and it had to be left behind at CGAS Barbers PT. Helicopter CGNR 1413 returned to POLAR STAR on 26 March 1986.

(3) On 04 April 1986, Helicopter CGNR 1413 departed POLAR STAR en route ATC Mobile, AL. AVDET 109 chopped to ATC Mobile at 0829 PST on 04 April 1986.

3. Maintenance Summary

a. Cross Country Flight (Mobile, AL to Port Hueneme, CA) (07 November - 15 November 1985)

(1) Due to precautionary maintenance requirements, Aviation Detachment 109 diverted to Coast Guard Air Station Los Angeles to facilitate repairs on 10 November 1985. Precautionary maintenance completed:

AIRCRAFT	MAINTENANCE	REASON
CGNR 1385	Garlock Seal Replacement	Leakage
CGNR 1413	Rotating Scissors Bearing Replacement	Excessive Play
CGNR 1413	Tail Gearbox Sight Guage Replacement	Leakage

b. Port Hueneme, CA to Punta Arenas, Chile (15 November - 17 December 1985)

(1) During the USCGC POLAR STAR's transit south, Aviation Detachment 109 was tasked with minimal flight requirements. In an effort to exercise aircraft systems, engine washes and on-deck engine/rotor engagements were conducted on four occasions (20 November, 27 November, 03 December, and 14 December).

(2) A Helicopter Support Kit inventory was completed on 20 November 1985. Significant maintenance completed:

AIRCRAFT	MAINTENANCE	REASON
CGNR 1413	Rotor Overspeed Switch Replacement	Erratic Behavior

c. Punta Arenas, Chile to McMurdo Station

(1) Computerized maintenance system quarterly requirements were completed early on both helicopters in anticipation of maximum flight requirements at McMurdo Station,

Antarctica. In addition, a 100 hour inspection was also completed prior to schedule on HH52A CGNR 1413. Significant maintenance completed:

AIRCRAFT	MAINTENANCE	REASON
CGNR 1413	Tail Strut Pre-Load Inspection	Damaged Shim

d. Antarctica (McMurdo Station to Outchop 60° South) (06 January 1986 - 24 February 1986)

(1) Aviation Detachment 109 completed a total of 203.7 flight hours during this period. The majority of these flight hours were conducted while POLAR STAR operated in McMurdo Sound. During POLAR STAR's operations in McMurdo Sound, Aviation Detachment 109 conducted flight operations from the helicopter landing pads at McMurdo Station. McMurdo Station has minimal hangar space, thus requiring maintenance and storage of Aviation Detachment 109's helicopters to be completely unprotected from the Antarctic environment.

(2) To facilitate detailed and efficient maintenance requirements, along with aircraft engine and airframe washes, Aviation Detachment 109's helicopters were flown aboard POLAR STAR on 17 January 1986. At the completion of these maintenance requirements, the helicopters returned to McMurdo Station.

(3) On 23 January 1986, the chip detection caution light illuminated on CGNR 1413 prior to the initial rotor engagement of the day. Inspection of the magnetic chip detector of the main gear box revealed nine metallic particles. Photographs of the metallic particles were forwarded to Aviation Training Center Mobile and AR&SC Elizabeth City. A main gear box serviceability was completed in accordance with the HH52A Computerized Maintenance System. Re-inspection of the magnetic chip detector noted a decrease in contamination. CGNR 1413 was then flown aboard POLAR STAR (approximately one mile) to facilitate additional maintenance. Serviceability of the main gear box was again completed on 24 January. Inspection of the magnetic chip detector again revealed a decrease in contaminants (fuzz). Following a five hour flight close to POLAR STAR, a main gear box serviceability was performed a third time. In light of the minimal amount of contaminants (fuzz) found on the magnetic chip detector, and in accordance with the HH52A Computerized Maintenance System, CGNR 1413 returned to a Bravo status.

(4) On 02 February 1986, CGNR 1413 experienced an inoperative AC current transformer on the #2 generator. No available spares are carried in the Helicopter Support Kit. Therefore, CGNR 1413 was grounded due to supply.

(5) On 05 January 1986, Aviation Detachment 109 received instructions from Aviation Training Center Mobile requiring a main gear box change prior to further flight on CGNR 1413. ATC Mobile's decision was based on the photograph of contaminants found in the main gear box of CGNR 1413 on 23 January. The main gear box contaminants were positively identified as pieces of the planetary gears. Removal of the main gear box, engine, and accessory components were completed aboard POLAR STAR, while underway, near Hallett Station, Antarctica (14-16 February 1986). Due to delays in the aviation supply system, the main gear box replacement for CGNR 1413 did not arrive in McMurdo Station, Antarctica, prior to the departure of POLAR STAR on 20 February. The replacement main gear box was rerouted to Sydney, Australia, POLAR STAR's first port of call.

Significant maintenance completed:

AIRCRAFT	MAINTENANCE	REASON
CGNR 1385	Garlock Seal Replacement - #2 Generator (Repeat Discrepancy)	Leakage
CGNR 1413	Main Gear Box Serviceability	Contaminants
CGNR 1385	Yaw Channel Repacking (Repeat Discrepancy)	Leakage
CGNR 1385	Rotor Blade Replacement - Yellow Blade	FOD Puncture
CGNR 1385	AC Current Transformer Replacement	Inoperative

e. Transit North (Outchop 60° South to Sydney, Australia) (24 February 1986 - 03 March 1986)

(1) During POLAR STAR's transit north, Aviation Detachment 109 was not tasked with any flight requirements. In an effort to exercise aircraft systems, engine washes and on-deck engine/rotor engagements were conducted on 01 March 1986.

No significant maintenance was completed during this period.

f. Transit North (Sydney, Australia to Seattle, WA) (03 March 1986 - 05 April 1986)

(1) On 05 March 1986, a replacement main gear box for CGNR 1413 was received. Replacement cotter pins, unavailable in the Helicopter Support Kit, were acquired from the U.S. Air Force detachment at RAAF Richmond, Australia. On 11 March, on-deck engine/rotor engagements and testing of CGNR 1413 were completed. CGNR 1413's test flight was delayed three days due to sea conditions. On 14 March, CGNR 1413's test flight was completed. CGNR 1413 returned to Bravo status.

(2) During POLAR STAR's transit north, Aviation Detachment 109 was tasked with minimal flight requirements. In an effort to exercise aircraft systems, engine washes and on-deck engine/rotor engagements were conducted on four occasions (11 March, 15 March, 19 March, and 24 March).

(3) On 19 March 1986, CGNR 1385 experienced a fuel leak in the fuel control unit during an on-deck engine/rotor engagement. An engine change was required and completed on 20 March. CGNR 1385's test flight was delayed four days due to sea conditions. On 25 March, CGNR 1385's test flight was completed. CGNR 1385 returned to Bravo status.

(4) A Helicopter Support Kit inventory was completed on 21 March 1986.

(5) On 25 March 1986, CGNR 1385 experienced an illumination of the chip detected caution light during personnel transfer flights between POLAR STAR and USCG Air Station Barbers Point. CGNR 1385 began an immediate descent and landed on the approach end of runway 4R of NAS Barbers Point. The aircraft was secured and subsequently towed to USCG Air Station Barbers Point. Inspection of the magnetic chip detector of the main gear box revealed metal particle contamination. Additional inspections of the main gear box strainers and oil also revealed contamination. A main gear box serviceability was completed in accordance with the HH52A Computerized Maintenance System. Following a thirty minute hover, re-inspection of the magnetic chip detector noted a continuance of contamination. Phone conversations concerning the maintenance status of CGNR 1385 were conducted between members of Aviation Detachment 109 and CDR McLaughlin (ATC Mobile, Polar Operations), CDR Belz (ATC Mobile, Engineering Officer), and CDR Williams (CGAS Barbers Point, Engineering Officer). In response to message traffic notifying appropriate authorities, the decision was made to leave CGNR 1385 at USCG Air Station Barbers Point for further transport to ATC Mobile via air transport. On 26 March, POLAR STAR departed Hawaiian waters en route Seattle, Washington, with CGNR 1413 aboard.

Significant maintenance completed:

AIRCRAFT	MAINTENANCE	REASON
CGNR 1413	Main Gear Box Replacement	Contamination
CGNR 1413	Main Rotor Head Replacement	High Time
CGNR 1413	Tail Rotor Assembly Inspection	CMS Requirements
CGNR 1413	Tail Rotor Drive Shaft Inspection	CMS Requirements
CGNR 1385	Engine Change	Fuel Leakage
CGNR 1413	Tail Rotor Drive Shaft Sealed Bearings Inspection	TCTO HH-52A-587
CGNR 1413	Stator Vane Actuator Piston Inspection	TCTO 2J-T58-8B-518

CHAPTER 3

NAVIGATION

1. Pre-deployment Preparations

a. Training

(1) The OODs and QMs attended training conducted by STD-5 during the period 16-20 September 85. Topics included: rapid radar plotting, rules of the road, aircraft ditching procedures, piloting (using a radar mock-up), and tactical signaling (including a consolidation drill).

(2) Departmental training was conducted while inport Seattle and while en route San Diego, with emphasis on piloting and signaling.

(3) The QMs and the Assistant Navigator attended an ice brief given by a representative from NAVPOLAROCEANCEN Suitland, MD, concerning the forecasted ice conditions in Antarctica.

b. Equipment and Supplies

(1) The magnetic compass was calibrated off Manchester, WA on 17 October 85.

(2) Both DFs were calibrated off Alki Point, WA on 17 October 85.

(3) DMA assisted in the update of POLAR STAR'S foreign chart portfolio by providing charts from England, Argentina, Chile, the Soviet Union, and France, POC: LT Eric Baylor, 202/227-3701. In addition, COMDT (G-NSR-3) amended POLAR STAR'S chart allowance list, POC: Mr. Frank Parker, FTS 426-9566.

(4) Foreign flags were ordered as needed.

(5) The Raytheon Collision Avoidance System (RAYCAS) was installed during the dockside availability, and training in its use was conducted at an introductory level.

2. Individual Transit Sections

a. Seattle, WA through Port Hueneme, CA.

(1) Piloting, SATNAV, LORAN C, Omega and celestial were used for navigation.

(2) Transit through the Straits of Juan de Fuca was made at night, with navigation done by visual bearings and radar ranges.

(3) While en route from Buoy "J" to San Diego, the POLAR STAR remained approximately 70 miles off of the coast. LORAN C and Omega were used as the primary means of navigation; fixes were generally within one mile of each other. The SATNAV was inoperative due to error cards in both units resulting from improper power input.

(4) The RAYCAS was used extensively with excellent results. Contact information was accurate and verified by maneuvering board and rapid radar plot.

(5) TACAN was checked by a CG aircraft overflight off Point Conception on 30 October 85.

(6) The fleet guide provided helpful information for San Diego and Port Hueneme.

(7) A pilot and two tugs were used during mooring evolutions at the Naval Supply Depot pier, San Diego, (adjacent to Broadway pier). POLAR STAR anchored each night at anchorage #216 during the training assist with COMFLETRAGRU.

(8) A pilot and two tugs were also used during mooring evolutions at Port Hueneme. POLAR STAR moored starboard side to at Wharf 4, center berth. The dredged depth of the channel was 37 feet at datum. Port Hueneme Control (channel 16, VHF-FM) is to be contacted two hours prior to arrival at the approach point, two miles southwest of the sea buoy. The pilots desire the ship to be trimmed slightly by the stern upon departure at extremely low tides.

b. Port Hueneme, CA through Punta Arenas, CI

(1) The open ocean passage was made via rhumb line.

(2) Piloting, LORAN C, SATNAV, Omega and celestial were used for navigation.

(3) LORAN C became unreliable at approximately 26-51N 115-26W, about 60 NM southwest of Punta Eugenia, Baja, MX.

(4) Pilot Charts proved fairly reliable with regards to surface currents with the exception of:

(a) 11-30N to 10-00N - Easterly set at 0.7 kts

(b) 10-00N to 09-00N - Westerly set at 0.8 kts.

(5) The sailing directions offered some information on Puerto San Martin, with a local time zone of +5 Romeo.

(6) A Pilot who spoke poor English and one tug was used during mooring evolutions. The pilot did not have a good concept of shiphandling a three shaft vessel. Pilots can be contacted via channel 16 VHF-FM using "Pisco Pilots". When we departed, the tug refused to come alongside the ship once our shafts were turning.

(7) POLAR STAR moored starboard side to Berth B with a least depth of 38 feet at a +1.0 tide.

(8) Chart 22181 was utilized for navigation into Puerto San Martin. Radar ranges cut well. The following fixed aids were used for bearings:

(a) Light on Isla Blanca
(b) Light on Isla Centro
(c) Monumento San Martin
(d) Pier dolphins
(e) Pier light structures

Many other charted aids were obscured due to haze with reduced visibility of 03 NM, and could not be verified.

(9) The 9_7 meter shoaling area 180 yards east of Berth A was reported by the pilot to be sand and not rock. Likewise, the pilot stated that the charted depths south and east of Berth A were actually 10 meters at datum.

(10) Winds were light and variable, no surge or set and drift were experienced.

(11) Departure was made between Isla Ballestas and Isla Chincha on a 270°T track to the north of Isla Blanca.

(12) Surface currents were generally in a north to northwest direction at 1.0 kts.

(13) The sailing directions and U. S. Navy's Port Directory provided excellent information on Valparaiso, with a local time zone of +3 Papa, Daylight Saving Time. The time change occurs on the second Sunday of March and October.

(14) A pilot who spoke fair English and two tugs were used during mooring evolutions. All arrangements were made through Agunsa (Agencias Universales), via message and radio contact on channel 16 VHF-FM prior to arrival.

(15) POLAR STAR moored port side to the furthest berth at the inside end of the Navy's breakwater using the starboard anchor to maneuver. During the stay, six shots were left paid

out. A slight surge was experienced, with southerly winds increasing throughout the afternoon. A least depth of 50 feet at a +1.0 tide was found.

(16) Radar ranges and the breakwater lights cut well as navigation aids.

(17) Two Chilean merchant pilots were embarked in Valparaiso for the transit through the Patagonian Passage. They remained on board through the entire passage, spoke good English, and did an excellent job. Pilotage is mandatory for transit through the Patagonian Passage and the Straits of Magellan, and can be arranged through Agunsa.

(18) Transit to the Golf De Penas was made via rhumb line maintaining 20 to 50 NM off the coast. Trackline distances were: from Valparaiso to Bahia Tarn - 970 NM; from Bahia Tarn to English Narrows - 80 NM; from English Narrows to Canal Gray - 230 NM; and from Canal Gray to Punta Arenas - 200 NM.

(19) English Narrows was transited during the slack (referred to as "estoa" in the Chilean current tables) current after the ebb during daylight hours and Canal Gray was transited during daylight hours. These times were recommended by the pilots who assumed the conn at these points. The remainder of the transit was conducted with an OOD as Conning Officer and JOOD assisting the QMOW with the navigation plot. The four hour OOD and JOOD watches were off-set by two hours to provide continuity during reliefs. The pilots stood port and starboard watches on the bridge during the entire transit.

(20) Transit speed was 12.1 kts from English Narrows to Canal Gray and 12.5 kts from Canal Gray to Punta Arenas. The special sea detail was set only during the transit of these two areas.

(21) A southerly current of approximately 1.0 kt was experienced while transiting the Chilean Inside Passage regardless of the tide state.

(22) Radar ranges and visual bearings were used for navigation inside the Patagonian channels. Chilean charts were utilized for the entire inside transit, and proved to be extremely accurate.

(23) Anchorage in Punta Arenas was in 53°10.65'S 070° 53.3'W in 14 FM, mud bottom, with 5 shots on deck to the starboard anchor, at the pilot's recommendation.

c. Punta Arenas, CI through First Arrival McMurdo

(1) Radar ranges and visual bearings were again used for piloting through the Patagonian channels and Straits of Magellan. Chilean chart inconsistencies were found on number 1251 with the shoals mischarted in Canal Ballenger around Isla Guillermo (55-56S 070-37W), and number 1201 with the land mischarted between 54-16S 070-55W and 54-21S 071-20W. The resulting inaccurances severly limited the use of radar navigation. In addition, latitude and longitude inconsistencies existed when transferring tracklines from Chilean charts 1207 to 1251.

(2) Transit from Punta Arenas to Drake's Passage was made via Canal Beagle, north of Isla Nueva. Trackline distances were: Punta Arenas to Paso Agguire - 140 NM; Paso Agguire to Grupo Timbales - 70 NM; Grupo Timbales to Puerto Williams - 95 NM; and Puerto Williams to Isla Nueva - 45 NM.

(3) The pilots took the conn at Paso Agguire, through portions of Grupo Timbales and at Puerto Williams. State of currents and tides were not a factor and the special sea detail was not set. Paso Agguire was transited during twilight prior to sunrise.

(4) The pilots were disembarked to a Chilean naval patrol boat north of Isla Picton. High winds precluded flying them back to Puerto Williams.

(5) Due to current directions inside the Patagonian Passage, it is best to follow the tracklines that are printed on the Chilean charts.

(6) Local time was +3 Papa for both Punta Arenas and Palmer Station.

(7) The transit across Drake's Passage was made via rhumb line with SATNAV being the primary means of navigation. Omega dead reckoned the entire transit as signal strength of all stations was too weak for fixing.

(8) Tracklines were altered at the scientists' request to pass to the north, east and south of Smith Island at a distance of no closer than 05 NM. Requested flight operations to Smith Island were canceled due to heavy weather. Charted depths were confirmed to be accurate.

(9) The approach to Arthur Harbor is correctly described in Pub 200, Sailing Directions for Antarctica. The approach and departure from Palmer Station were made without difficulty. Radar ranges and charted NAVAIDS cut well. The daybeacon on Spume Island is missing.

(10) Many difficulties were experienced while anchored in Arthur Harbor due to the strong shifting winds off the glacier and poor holding quality of the bottom. POLAR STAR dragged anchor four times during the sixty hours of offloading and had to steam at night along the coast twice until the winds subsided. During this sixty hour period the winds varied from calm to a steady 25 kts with gusts to 35 kts, from 200°T to 090°T. The following anchorages were utilized:

(a) 65°46'18"S 064°04'24"W in 19 FM
Problem - Anchor would not fetch-up.

(b) 64°46'16"S 064°04'18"W in 15 FM
Problem - Anchor DRAGGED in 20 kts of wind

(c) 64°46'23"S 064°04'30"W in 11 FM
Problem - Anchor DRAGGED in 17 kts of wind

(d) 64°46'14"S 064°04'24"W in 18 FM
Problem - Anchor DRAGGED in 26 kts of wind

(e) 64°46'12"S 064°04'19"W in 18 FM
Problem - Anchor suspected of DRAGGING in 23 kts of wind

Anchorage (e) provided the best holding ground for the longest duration and was used until anchor was weighed en route McMurdo. However, a southerly wind would have caused the ship to swing uncomfortably close to the glacier's face. Our operations in Arthur Harbor were further complicated by two grounded icebergs just off the Station. An unsuccessful attempt was made to break them loose with the ship.

(11) From Palmer Station, POLAR STAR's track was southwest until the Antarctic circle was crossed, then due west until sea ice was encountered at 66-40S 117-48W. Because of the uncertainity of ice conditions within the pack and its unusual northern extent, the entire transit was made in open water along the ice edge. Though this transit was generally in a westerly direction, it deviated to the north and south at times, depending upon the actual location of the ice edge. This ice edge was changing daily, sometimes as much as 20 NM, depending upon the prevailing wind conditions. Total transit distance from Palmer Station to Hut Point was 3693 nm.

(12) At 66-38S 175-34W, approximately 110 NM northeast of Scott Island, POLAR STAR's track turned southwest towards McMurdo Station. The beginning of this transit was through 2-4/10s ice coverage with one 20 NM section of 7-10/10s coverage being encountered at 70-00S 178-00E. After passage through this increased coverage, open water transit was made until entering

the pack ice at 76-56S 168-26E, approximately 20 NM east of Beaufort Island.

(13) From this pack ice to arrival at the fast ice edge, at 77-25S 165-07E, a southwest track was followed between Beaufort Island and Cape Bird.

(14) Primary means of navigation was SATNAV during ocean transit and radar during coastal transit. Celestial and visual bearings were used as secondary means respectively. Omega was unreliable and dead reckoned continuously.

(15) Magnetic deviations varied from 34°W to 22°E with the larger deviations occurring south of Scott Island in the Ross Sea and McMurdo Sound areas.

(16) Sailing Directions for Antarctica, Pub 200, is must reading for all Navigators, especially Chapter 3 on Navigation.

d. 7 Jan - 20 Feb McMurdo Through Last Science Cruise

(1) Piloting was used in the vicinity of Ross, Beaufort, Franklin and Coulman Islands; and Capes Adare and Hallett. SATNAV was utilized during open water transits between these areas.

(2) Due to the large amounts of pack ice north of McMurdo Sound and west of Beaufort and Franklin Islands, transit within the Ross Sea during the science cruises were made between Cape Bird and Beaufort Island, then to the east of both Beaufort and Franklin Islands. Charted depths in these areas were accurate with deep water found as close as 2.0 NM to the west and north of Cape Bird.

(3) Franklin Island was found to be 2.9 NM on a bearing of 145°T from its charted position on US charts 29321 and 29012.

(4) Beaufort Island was found to be charted correctly on US charts 29321, 29281 and 29012.

(5) Coulman Island was verified to be charted accurately, with deep water found 3.0 NM from its south side in the vicinity of Cape Anne.

(6) Cape Hallett was approached to within 5.0 NM due north with deep water all about.

(7) Due to the small scale of available U.S. and British Admiralty charts of Terra Nova Bay (Inexpressible Island), Coulman Island and Cape Hallett, US Geological survey maps were helpful in providing additional large scale information of these areas. However, they were not utilized for navigation purposes.

(8) Gyro errors on the MK 19 gyro fluctuated from 1°W to 1°E and on the MK 23 gyro from 0° to 2°W. Weather conditions permitting, gyro errors were calculated from sun azimuths at least once per watch.

e. Last Science Cruise through Seattle, WA

(1) SATNAV and celestial were used for navigation to Sydney, Australia.

(2) This transit was made via rhumb line passing 50 NM to the east of Macquarie Island.

(3) Trackline distance from Hut Point to Sydney was 2770 NM.

(4) The sailing directions and U.S. Navy's Port Directory provided excellent information on Sydney with a local time zone of -11 Lima, daylight savings time.

(5) The pilot, a RAN (Royal Australian Navy) navigation officer, and two tugs were used during mooring evolutions.

(6) POLAR STAR moored port side to the Fitting Out Pier at the RAN base on Garden Island. A least depth of 48 feet at a +2.0 tide was noted.

(7) Upon departure from Sydney, rhumb line passage was made to the Equator and International Dateline. The following route was taken: east northeast between Elizabeth Reef and Lord Howe Island to the southeast of New Caledonia; then northeast, passing to the southeast of the New Hebrides Islands and the west of Penguin Bank; through the Tuvalu (Ellice) Islands; and then to the southeast of the Gilbert Islands.

(8) Due to the small scale of US charts, the following British Admiralty charts were provided by the RAN and utilized during this transit:

(a) BA 3033 New Hebrides Islands to New Caledonia
(b) BA 2901 Solomon Islands to Tuvalu
(c) BA 1830 Ellice Islands to Phoenix Islands

(9) SATNAV, Omega and celestial were used for navigation to the Equator and International Dateline, with Loran C also utilized within approximately 700 NM from Hawaii.

(10) Great circle passage was made from the Equator, passing 30 NM south of Wilder Shoal, between Oahu and Kauai Islands of the Hawaiian Archipelago to Puget Sound.

(11) Piloting was used from Cape Flattery to Seattle.

(12) The MK 23 gyro was used for the entire transit between Sydney and Seattle with gyro error of $1^{o}E$ to $2^{o}E$ observed.

(13) Total distance transited during Deep Freeze '86 was 25,748.4 NM.

3. Ice Operations

a. Palmer Station to McMurdo Station

(1) The Anvers Island area was free of sea ice. Arthur Harbor itself contained brash ice and several grounded growlers from off of the glacier face, all pretty much concentrated on the southern portion of the harbor. During refueling operations, Palmer's zodiacs and the ship's LCVP's had to tend the fuel hose constantly, pushing the ice away from the hose to ease the hose tension. POLAR DUKE also pushed a few of the large growlers away from the ship during the fueling operation. Later the growlers caused the ship difficulties because they were within the ship's swing circle, and required the rolling of shafts on several occasions to maneuver away from them to prevent possible propeller or rudder damage. An attempt by the ship to nudge one growler into deeper water and clear of the harbor was unsuccessful. It was hard as steel and wouldn't budge.

(2) Ice edge information from Palmer to McMurdo was requested and received every other day from NAVPOLAROCEANCEN. This information proved to be very accurate, though concentration information was sometimes off. When the ship tried to cut corners at several locations, it encountered the ice right where they said it was. Numerous thin fingers of ice jutting northward were encountered north of the ice edge. Ship's APT reception was very poor during the transit, and really did not come in well until the ship had reached the McMurdo area, primarily because of almost constant fog or cloud cover during the transit.

(3) The ice surrounding Antarctica this year was the most extensive on record. The ice edge and the ship's track from Palmer to McMurdo are shown on page 3-21. Several days out of Palmer it was decided to enter the pack to evaluate the possibility of transiting through the pack to cut corners. The ice encountered was on the average 5/10's concentration, mostly deteriorating first year with some blue glacial ice mixed in. Floes pushed aside easily, but speed was limited to 9 knots. The further inside the ship pushed, the higher the concentrations encountered, and it was finally decided to skirt the ice edge and make best possible speed vice getting bogged down in the ice with a necessarily slower speed.

(4) In last year's cruise report the ship recommended that two additional days be added to the scheduled transit time from Palmer to McMurdo. These two additional days were added to the schedule this year by CNSFA, and were much needed. In fact the ship still arrived a day late at the fast ice edge due to the ice extent during the transit. Total distance travelled was 3,693 miles. This was 555 miles further than last year's Palmer to McMurdo transit.

(5) Numerous icebergs were encountered during the transit to McMurdo, some at least 10 miles in diameter. At any one time the ship could be surrounded by as many as 30 icebergs. They showed up very well on radar, which was comforting since low visibility was encountered during a good portion of the transit. In pack ice or sea return they show up more as shadows on the radar. Guidelines to OOD's were to pass when possible no closer than 3000 yards to an iceberg. When large concentrations were encountered, this minimum distance was necessarily lowered to 1000 yards or less dependent on size and overall concentration.

(6) At 66-38S 175-34W, approximately 110 NM northeast of Scott Island, POLAR STAR's track turned southwest towards McMurdo Station. The beginning of this transit was through 2-4/10's ice coverage, with one 20 NM section of 7-10/10's coverage being encountered at 70S 178E. South of this area, open water was present all the way to the Ross Ice Shelf, east of Ross Island. Both Franklin and Beaufort Islands, however, were surrounded by heavy pack. The decision was made to stay in open water as long as possible and then cut between Beaufort Island and Cape Bird on Ross Island. Ice was encountered approximately 20 miles east of Beaufort all the way to the fast ice edge north of McMurdo. The ice was predominantly 8-9/10's, with some vast floes, and some areas of 10/10's coverage. Backing and ramming with five available diesels was required in the 10/10's coverage.

b. McMurdo Break-in

(1) The fast ice was located 33 miles NW of McMurdo. The plan was to commence breaking in on a course of 143T to the right tangent of Observation Hill, which was visible from that distance. Then, about halfway in, to come right to 145T so as to arrive abeam Hut Pt at 1500 yards. This would be the eastern edge of the channel. Then to come about to starboard and parallel the track back out, offsetting it by approximately a ship length. This would be continued until a long, straight, well-tended channel approximately 200 yards wide was achieved. The straightness of the channel was deemed important for the ship escorts, and also in case favorable winds occurred to allow a free flow of ice out the channel. Due to the extent of the fast ice, and the amount of ice located to the north of the fast ice, no attempt to cut a V-shape was made.

(2) Ice thickness at the fast ice edge was 74", with no deterioration noted, 20 miles NW of Hut Pt 81", and abeam Hut Pt at 1/2 mile 95". There was an average of approximately 4" of snow cover on the ice.

(3) Backing and ramming with five available diesels was required once inside 100 yards of the fast ice edge. With a three turbine or with a centerline (CL) and starboard turbine and port diesel combination, continuous progress (2 knots or less) was accomplished until an E/W running ridge was encountered approximately four miles north of Hut Pt. From this point south, the ice was substantially thicker. With three turbines OTL backing and ramming, approximately 40 yards a ram were made. Upon arrival abeam Hut Pt, a turn to starboard was accomplished, and the ship commenced an outbound run west of and parallel to the inbound track offset approximately one shipwidth.

(4) It was decided to concentrate on widening the channel north of the E/W running ridge four miles north of Hut Pt until refueling could be accomplished. Following refueling the ship would complete the channel south of the four mile ridge and carve out the turning basin. At this point it had become obvious that refueling would have to take place outside the fast ice edge, due to the ship's low fuel state, the extent and thickness of the ice, and the number of engineering casualties experienced during the break-in process. Channel widening progress continued until the fuel state dropped below 200K gallons, at which point the ship hove to, to await the tanker's arrival. This fuel was needed to allow for enough fuel to make the transit to New Zealand in case anything happened to the tanker, or if it was required to escort the tanker through the pack ice present to the NE of Cape Adare.

(5) A C-130 ice recon flight to the area NE of Cape Adare was requested from CNSFA. Two Navy ice observers, CNSFA Ship OPS, and POLAR STAR OPS and MST1 were observers on the flight. All the observers concurred that the ice to the NE of Cape Adare had deteriorated to the point that it was passable by the tanker without escort.

(6) En route to the rendezvous position with the tanker, the port shaft suffered a casualty which prevented its use for the remainder of the deployment. Speed in the ice from this point on was limited to four knots. In addition, extra care was taken for any turns of the ship in ice to limit the amount of damage to the unturning prop.

(7) Rendezvous with the tanker was made at the ice edge 20 miles SE of Beaufort Island. From there the ship escorted the tanker four miles inside the ice edge into ice of 8/10's concentration. There the tanker hove to. POLAR STAR maneuvered

around and moored port side to the tanker's starboard side with approximately 20 feet of loose ice inbetween. The mooring was accomplished without incident from the aloft conn with the starboard and CL turbines, and the port shaft OOC. A swell was present, and the movements of the ships caused the ice inbetween to work itself out such that by the time the refueling was completed only open water was present between the ship and the tanker. Multiple fenders had been rigged prior to the mooring, but the ships never came together. Unmooring was accomplished by casting off all lines. The bow moved away, the stern in. At that point the CL shaft was rolled, and the ship came ahead and away from the tanker, using left rudder as necessary to kick the stern out. The conning for the unmooring was done from the bridge level.

(8) Following refueling the ship transited back to the ice channel to continue work on the channel and to begin carving out the turning basin.

(9) The turning basin was carved out by ever increasing the size of the original turn made abeam Hut Pt. All turns were made to port, because of the ease in turning that direction with two right-hand turning screws, and to protect the unturning port shaft. Turbines were used throughout the long process. Charts showing the boundaries of the turning basin are shown on page 3-22.

(10) The break-in to Winter Quarters Bay and the scarfing of the ice wharf were accomplished without problem following the completion of the turning basin. A shallow angle and minimal power was used during the scarfing evolution to prevent damage to the wharf and its shoreside moorings. Winter Quarters Bay was not broken out until just prior to the tanker escort.

(11) Following preparations of the ice channel prior to the escort of the tanker PAUL BUCK into McMurdo, POLAR STAR hove to in the channel just inside the fast ice edge facing northward for oil purification of the starboard shaft (see Engineering Chapter). About an hour later ship movement along the port side was detected, with no movement along the starboard side whatsoever. It was suspected that the fast ice to the east had broken loose from shore and was moving northward taking the ship with it. An ice recon conducted shortly thereafter by the ship's helo verified that this had in fact happened. The escort was delayed, not wanting to chance the tanker getting pinched in the ice channel. Another ice recon was flown 12 hours later. This recon showed major changes in the ice, with a large portion of the ice channel no longer discernable, the former fast ice to the east of the channel broken up into large floes, and the actual new fast ice edge at seven miles north of Hut Pt. The ice north

of the ice channel was deemed navigable following a several mile venture into it by POLAR STAR, and the escort of the PAUL BUCK commenced shortly thereafter.

(12) In last year's cruise report it was recommended that four additional days be added to the McMurdo break-in schedule this year to account for severe ice years and ship casualties. These four days were added this year by CNSFA, and would have been much needed, even with the ship operating without engineering problems.

(13) The following are several shiphandling and general observations made during the break-in evolution:

(a) With the port shaft OOC, the ship turned very sluggishly to starboard. This made channel scarfing operations to port easy, to starboard nearly impossible. With the starboard turbine and CL on diesels, turning to starboard was even more difficult, with 10 to 15 degrees of rudder required to maintain a straight track.

(b) Milling and ship vibrations were often worse when transiting in the broken up channel than when breaking in the fast ice.

(c) Ballasting down to 27 feet seemed to ease the milling somewhat.

(d) As stated in the Shiphandling Guide, when using non-follow-up steering mode, constant alertness is required. (As a note, the follow-up knob in the aloft conn worked itself loose several times during the break-in, resulting in a rudder response less than ordered on the knob. When this happened, a steering casualty was at first suspected. All that was needed to correct the problem was a small screwdriver to tighten the screws on the knob itself.)

(e) Seals are very dumb critters, who despite whistle blowing, rattling cans off the bow, etc., are very slow at moving out of harm's way. Somehow we missed them all, however.

(f) When attempting to back out of an ice-free Winter Quarters Bay on two separate occasions, with starboard and CL turbines and a southerly wind, the ship backed to port towards the Hut Pt shoal, vice to starboard. The seldom talked about northerly current in that vicinity was suspected.

(g) Prior to loss of the port shaft, with a CL turbine and wing diesel combination, 0% pitch was available on the port shaft, up to 15% at times on the starboard shaft, and up

to 60% was available on the CL. The port shaft even at 0% pitch was in an overload status a good portion of the time. Very little additional pitch was available on the port shaft in turbine mode.

c. Ship Escort Operations

(1) Prior to escorting either ship in or out of the ice channel, extensive running of the channel, turning basin and Winter Quarters Bay was accomplished to break up any refreeze.

(2) The following information was passed to each ship prior to the escort:

(a) A description of the channel, turning basin, and Winter Quarters Bay.

(b) That transit would be down the center of the channel.

(c) Transit speed would be no more than 4 knots.

(d) The other ship was to maintain as constant a speed as possible. Distance between ships would be adjusted by POLAR STAR, dependent upon ice conditions.

(e) That if problems occurred during the escort, POLAR STAR would veer to port, the other ship would back and veer to starboard, staying inside the ice channel, however, and not impacting the fast ice edge.

(3) All escorts were accomplished with the CL and starboard turbines, and with the conning from the aloft conn. The recently installed aloft conn radar was convenient for distance information between ships. A stadimeter was used as a backup.

(4) Escort distance between ships was generally between 100 and 400 yards; the more congested the ice, the closer the distance. It was desired to keep the escorted ship's bow in the open water left by POLAR STAR.

(5) Both escorted ships bogged down at lower engine power. Their power had to be steadily increased such that by the end of the escort each was near full power. A constant adjustment of speed by POLAR STAR was required to keep the desired distance away from the other ship, due to the changing ice conditions in the channel, and the other ship steadily increasing its number of turns.

(6) At the southern end of the ice channel, two channels were cut leading into the turning basin, a western channel for inbound escorts, and an eastern channel for outbound escorts. A

large floe existed between the two channels. The separate channels were used to ease the turn required from/to the ice channel and worked out very well for both supply ships.

(7) Ice conditions stopped GREENWAVE during her outbound escort. Two attempts by POLAR STAR at backing down to within 10 yards of GREENWAVE's bow and then applying full power to ease the ice around her bow with the resultant prop wash, while GREENWAVE applied full power, were not successful in freeing her. It was decided to transit out to the fast ice edge, come about and transit back in, passing close aboard the GREENWAVE. A turn around would be accomplished in the turning basin, then a transit back out, with the GREENWAVE applying full power once POLAR STAR had passed close aboard her again. Then the escort would proceed. As it turned out, once POLAR STAR made her first pass by GREENWAVE after transiting to the fast ice edge, the ice loosened sufficiently for GREENWAVE to proceed out the channel without further escort by POLAR STAR. Once moving, she did not want to stop. (Note: At this point the fast ice edge was approximately 4.5 miles north of Hut Pt, which demonstrates the ever-changing ice conditions about the McMurdo Sound area. Also, open water existed all the way from the ice edge to Beaufort Island.

d. Ship Towing Operations

(1) Both the towing of the PAUL BUCK and the GREENWAVE clear of the ice wharf were accomplished from the stern of POLAR STAR to the stern of the towed ship using 500 feet of 12 inch nylon towline. Once the towline was secured to the stern bitts of the ship, the slack was taken up, gradual tension applied, and the ship was pulled free of the ice wharf. The stern to stern tow allowed much better ship control for POLAR STAR, both when maneuvering to establish the tow and while towing (over the usual bow to stern tow), especially due to the fact that the port shaft was OOC and because of the heavy ice concentration.

(2) Due to PAUL BUCK's size and the heavier ice conditions present during her towing, a heavy tension on the towline was constant throughout. At one point the towline slipped off of her bitts. She attempted to back the remaining distance into the turning basin on her own, but was unsuccessful. The towline was re-attached as before, and the tow completed when the SW corner of the turning basin was reached. (Note: Damage to one blade of PAUL BUCK's propeller occurred at some point during her operations in the McMurdo area ice.)

(3) GREENWAVE attempted to unmoor herself from the ice wharf by backing and filling to starboard around the outboard end of the ice wharf. An on-the-dock wind prevented the success of this maneuver. She was towed out by the stern to the beginning

of the turning basin, where the tow was released upon her request. She backed on her own far enough into the turning basin to make the turn into the ice channel unassisted.

e. Miscellaneous

(1) During break-in operations salt water intrusion to the starboard CPP system was discovered. See Engineering section for further details. This necessitated purification of the starboard CPP system for four of every 12 hours for the remainder of operations in Antarctica. This requirement cut down on time available for channel tending and proved very inconvenient when trying to schedule ship escorts, channel tending, science work, etc. Whenever in ice the ship would have to stop for this purification period, while in open water only the starboard shaft was secured.

(2) Minor forecastle icing occurred in an attempt to enter Terra Nova Bay for science operations with up to 60 knots of wind dead ahead. Speed was reduced to 5-6 knots to minimize the icing. Build-up was approximately 2 inches thick. Wooden mallets were used to knock the ice free of moving parts, and the sun quickly did the rest.

(3) The majority of shiphandling evolutions in ice were accomplished from the aloft conn. These evolutions included all of the break-in work, the mooring next to PAUL BUCK to refuel, the scarfing of the ice wharf, the towing of the two ships, the escorts, and all moorings alongside the ice wharf. This was done for several reasons, including better visibility (especially of the stern), quicker response by the conning officer to the ever changing ice conditions that tend to veer you to one side or the other or slow you down, etc., and to lessen the confusion factor. During intricate maneuvering situations, with the special sea detail set, only the conning officer, a JOOD, the CO and a 1-JV phone talker would be in the aloft conn. The one disadvantage noted to the use of the aloft conn for moorings was in the handling of mooring lines. It was felt that better control of lines was available from the bridge level.

(4) The majority of in-ice watches were stood with a qualified ice OOD (4) and a break-in (5). Prior to arrival in the ice, detailed training had been held on ice features identification, shiphandling in ice, and rules in ice to keep from damaging the ship. The majority of information for the training was taken from the Shiphandling Guide. Once in the ice the break-ins were quick learners, and after a couple of observation watches got their share of hands-on experience.

(5) CNSFA Ship Operations installed two ranges within Winter Quarters Bay for use of the resupply ships. One of the ranges marked the edge of the ice wharf (approximately 051T) and

the other marked a parallel track approximately 70 feet off the ice wharf. These ranges were helpful to both resupply ships in setting up their entry track from the turning basin and approaching the ice wharf.

(6) Upon our final departure from McMurdo on 20 February, the fast ice edge was at approximately 4.2 miles on the east side of the channel and 6 miles on the west side of the channel. The channel was completely ice clogged from about the three mile point into and including the turning basin. Within this area ice chunks ranged from 4-8 feet thick. Winter Quarters Bay inside of Hut Pt was essentially ice free. There was also an open water band around the tip of Hut Pt. An ice recon flight on 19 February indicated that the fast ice to the west of the channel was essentially intact, whereas the fast ice to the east had numerous cracks, including a large crack (not continuous) along the shore, up the peninsula and then across towards the Erebus Ice Tongue. A strong blow out of the south could break this loose and clear out the ice all the way in to Winter Quarters Bay. If not, POLAR SEA should expect some pretty thick and hard ice the last four miles next year. There is also a large scrap metal heap of junk on the ice in approximate position 77-51.7S 166-35.9E that should be avoided, if it doesn't break up before next year and should become snow covered.

(7) Considerable pack ice was encountered in the vicinity of Coulman Island on both science cruises. During science put-in and pick-up evolutions at Coulman only one helo was operational, restricting flight operations to an eight mile radius from the ship, and requiring ship capability as a rescue vehicle. During the second science cruise we were required to operate two turbines to reach a satisfactory helo launch position for the recovery operation.

Plate 4

Escort of GREENWAVE

Plate 5
Winter Quarters Bay Ice Wharf

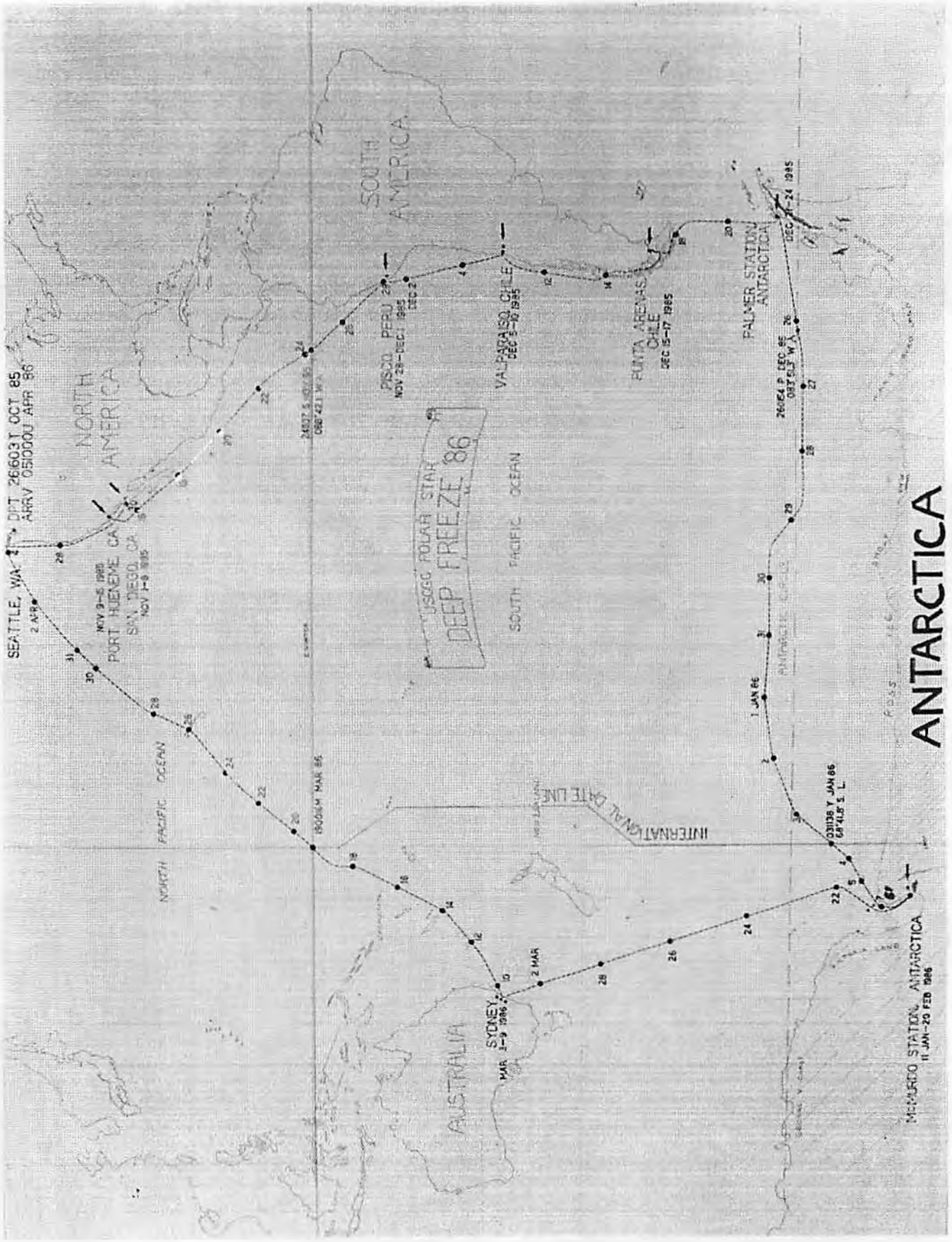


Plate 6
Deep Freeze '86 Tracklines

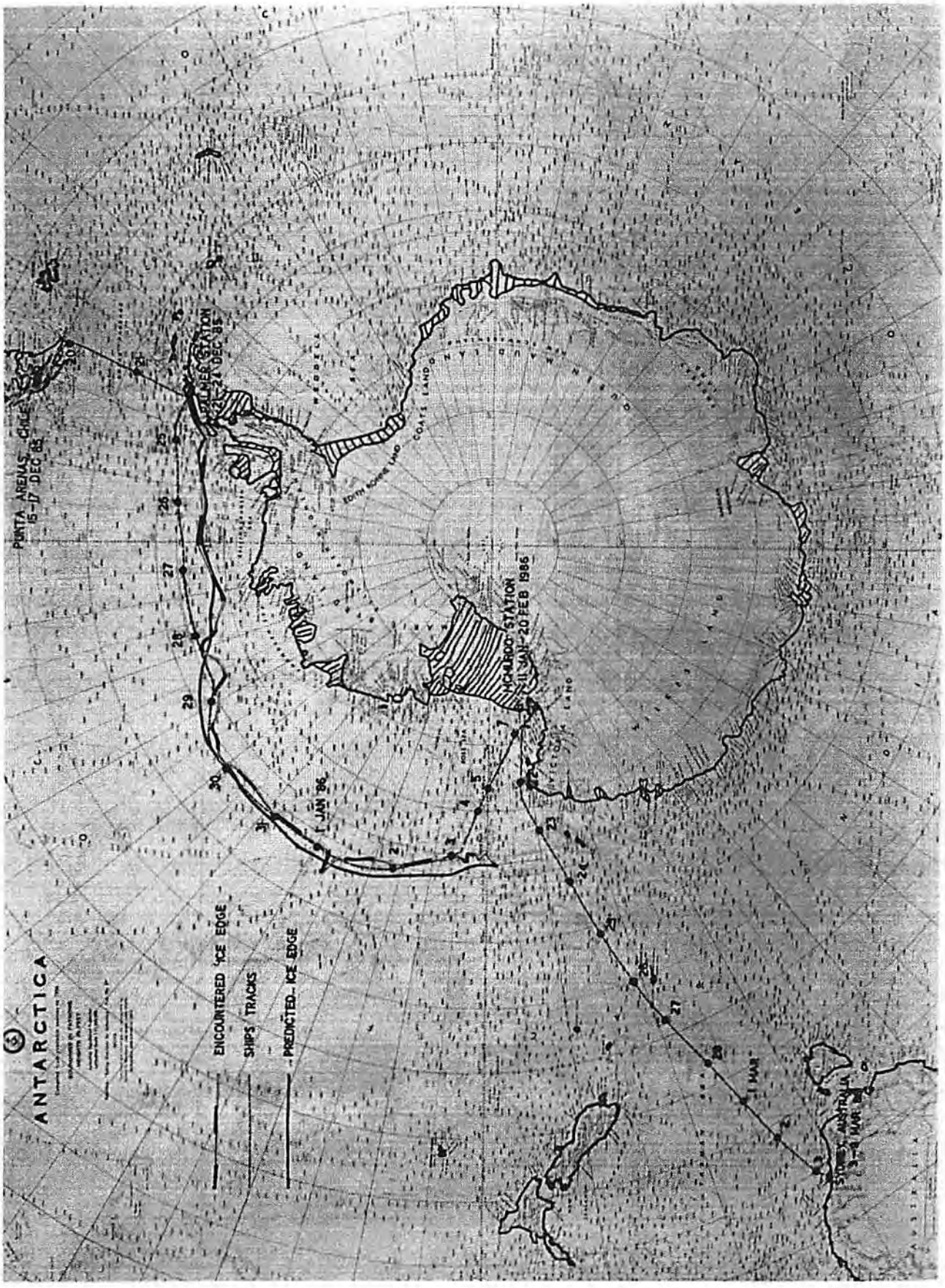


Plate 7
Antarctic Tracklines

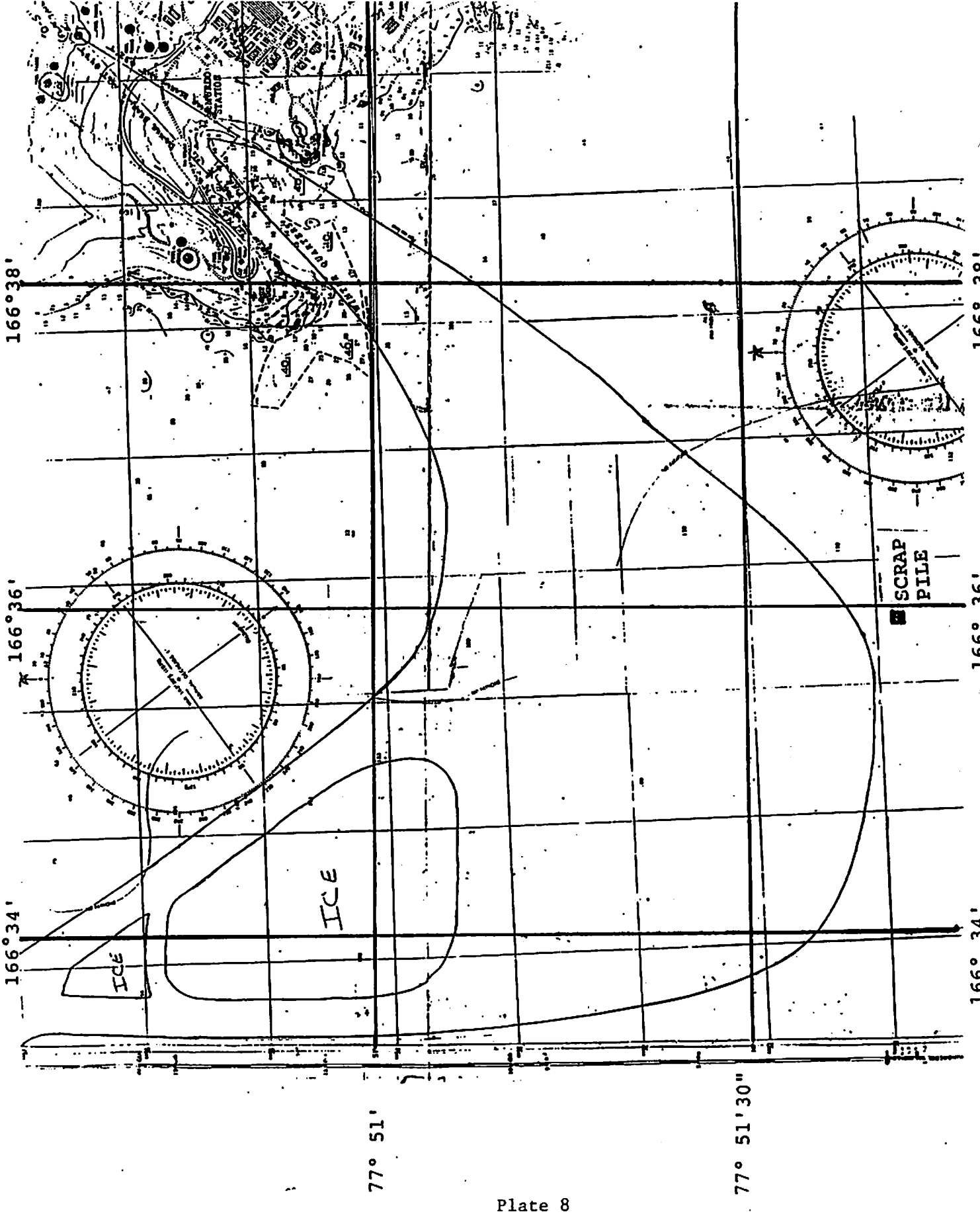


Plate 8
Winter Quarters Bay Turning Basin

CHAPTER 4

COMMUNICATIONS

1. Radio Central

a. Pre-deployment Preparations

(1) Classified Material Removal

(a) CMS: IAW CMS 32 and CSP 1, monthly Reserve on Board Key material shipments were suspended several months prior to departure allowing for complete reduction by normal monthly destruction. CMS equipment was transferred to CRF Bremerton for temporary storage and publications were transferred to CCGDTHIRTEEN (dttm) for temporary storage.

(b) CMC and COMTAC: Ship's holdings were reviewed and all classified publications and material not vital to ship's operations were removed and transferred to CCGDTHIRTEEN (dttm) for temporary storage.

b. Individual Transit Sections

(1) A full period termination was maintained with Cogard Commsta San Francisco/NMC. While inport Pisco, Valparaiso, and Punta Arenas, comms skeds were held every four hours between 0700 and 2400 local. Upon arrival at the fast ice edge, comms were shifted to McMurdo Station, Antarctica/NGD.

(2) While on Science Cruise III, McMurdo experienced a comms blackout on the McMurdo-Christchurch circuit. As a result, only traffic originated in Antarctica was received. Message tapes were occasionally flown down from Christchurch on log flights. Outgoing traffic encountered the same delays. Both voice and radioteletype comms were good. Most communications were conducted on frequencies between 3 and 6 MHZ. Voice comms with McMurdo were conducted on the ship/ship conference frequency 3320.4KHZ vice 4770KHZ (Antarctic common). The other Antarctic common frequencies, 7995KHZ and 11553KHZ were too high for use due to POLAR STAR's close operating distance to McMurdo.

(3) POLAR STAR received several Telex messages relayed by the Third Coast Guard District Commcenter. Our responses to these messages were sent to the Third District for commercial refile. They should have been refiled through the Twelfth District Commcenter.

(4) The Australian Navy sent a classified response to our unclassified Sydney LOGREQ. The response was never received aboard due to our lack of secure comms capability. Confusion could have been prevented had we advised them of this fact in the LOGREQ.

2. Amateur Radio/Mars

a. Pre-deployment Preparations

(1) The ship's qualified ham operator made contact with two ham operators in Seattle, one in Long Beach, CA, one in Los Angeles, CA, one in Petaluma, CA, and one in Citra, FL. A list of approximately 224 phone numbers was prepared and mailed out to each of the ham operators.

b. Individual Transit Sections

(1) Seattle, WA to Punta Arenas, CI

(a) Contact was made with one of the ham operators in Seattle on 15 meters (21404KHZ). The signal was not good, so 20 meters was tried (14300KHZ). This frequency was better, but it didn't last long. The time was 2300Z. A new schedule was made starting at 1900Z on 20 meters. 15 meters was assigned as an alternate band starting at 2200Z.

(b) A message was received from DIRNAVMARCORMARS REGION FIVE SAN DIEGO, CA stating that MARS phone patches would be free to all military personnel deployed out of CONUS during Thanksgiving. The POLAR STAR's ham operator sent a message to Coast Guard Station Alexandria, VA, the MARS station (NNNONCG), to set up a schedule for the Thanksgiving phone patches. On 27 November, contact was made with NNNONCG on 14441.5KHZ. Communications was shifted to a working frequency and 60 phone patches were made.

(c) Attempts were made to meet phone patch schedules with NNNONCG with no further success. As POLAR STAR continued South, operating times ran later in the evening. Amateur Radio proved once again to be more reliable than MARS. POLAR STAR's Ham Operator made contact with several stateside contacts and ran 38 phone patches, with a total thus far of 108 phone patches.

(2) Punta Arenas to First arrival McMurdo

(a) Conducted 220 phone patches.

(3) McMurdo through Science Cruise III

(a) Conducted 33 phone patches.

(b) Received 2 Mars Grams.

3. Postal Operations

a. Pre-deployment Preparations

(1) On board stamp/cash credit was increased from $2,500.00 to $5,000.00. The increase was approved by the Accountable Paper Depository, G.P.O. New York, NY.

(2) CDR JT MIL POSTAL ACTY PAC SAN FRANCISCO, CA and CH JMPA PAC FLD OFC SEATTLE, WA were consulted for mail routing information for DF-86.

(3) Sent mail routing instructions to all concerned commands for delivery information on POLAR STAR's port calls.

b. Individual Transit Sections

(1) San Diego, CA. The original LOGREQ for San Diego stated that POLAR STAR's mail would be held at 32nd St. Navy Base. Upon arrival at San Diego, we found the mail to be located at the E. St. Post Office, approximately 10 blocks from the pier where POLAR STAR was moored.

(2) Port Hueneme, CA. Mail was to be delivered to CBC PORT HUENEME, CA mail depository, for further pick up by POLAR STAR. Little 3rd/4th class mail and no 1st class mail was received. POLAR STAR's postal clerk contacted CDR JT MIL POSTAL ACTY PAC SAN FRANCISCO and CH JMPA PAC FLD OFC SEATTLE to discuss the problem. Both commands and POLAR STAR's postal clerk contacted all commands concerned with the handling of POLAR STAR's mail. The problem was discovered to be at AMF LAX (Airmail Facility Los Angeles International Airport), where despite all mail bags destined for POLAR STAR being clearly tagged "Do not open in transit, ship's mail", and overlabled to Port Hueneme, CA, all sacks were opened by AMF LAX staff, and POLAR STAR's mail was sent for delivery to Seattle, WA. FPO Seattle and POLAR STAR's postal clerk arranged to have all available 1st class mail delivered to LAX via express mail. RM2 BROWNLOW and ENS RAINEY (Postal Officer) drove to LAX, received 1,041lbs of 1st class mail, and returned to POLAR STAR the night prior to scheduled departure from CONUS.

(3) Port San Martin (Pisco) Peru. Registered mail was received upon arrival from DAO Lima, Peru. No mail deliveries were made by AMEMBASSY/USDAO Lima to Pisco, due to the distance from Lima (4 hours by car). POLAR STAR's mail clerk drove to AMEMBASSY Lima and picked up 30 bags of mail. This was the only delivery of mail made to POLAR STAR while in Peru. Incoming flights were cancelled. Outgoing mail was dispatched upon arrival and on the day of departure. Outgoing mail consisted of two bags of letters and two bags of parcels.

(4) Valparaiso, Chile. No registered mail was received/sent from Valparaiso. Personnel from AMEMBASSY Santiago were not available as couriers. POLAR STAR decided not to dispatch via ship's courier because personnel acting as courier would have to fly to Punta Arenas and await POLAR STAR's arrival. All regular mail was handled by AGUNSA (see chapter 8) of Valparaiso. Service was excellent, considerably better than that provided by AMEMBASSY Santiago in the past. Total mail dispatched: 2 bags of letters, 9 bags of parcels. Total received: 34 bags.

(5) Punta Arenas Chile. Total incoming: 18 bags. Outgoing: 9 bags. Service again was provided by AGUNSA, and was excellent.

(6) McMurdo Station Antarctica. Upon arrival McMurdo Station mail was received on board POLAR STAR on a regular basis depending on the availability of space on incoming flights from New Zealand. Outgoing mail was delivered to McMurdo Post Office when conditions permitted.

c. Money order sales totalled $59,300.

CHAPTER 5

MARINE SCIENCE

1. Pre-deployment Preparations

a. General

(1) Two new MSTs reported aboard in August 1985. This filled the billet requirements for MSTs onboard.

(2) A thorough review of all National Science Foundation, COMNAVSUPPFORANTARCTICA and Coast Guard Deep Freeze 1986 materials was made prior to deployment and was of great benefit for planning purposes.

b. Training

(1) Much of the pre-deployment period was spent familiarizing the new MSTs with onboard Oceanographic / Meteorological equipment and watchstanding duties. Both MSTs began qualification under the new Marine Science Watchstander's Qualification Program.

(2) In addition to shipboard training, the following training was conducted:

(a) NAS Whidbey Island, WA conducted several lectures on Satellite Weather Interpretation and Nephanalysis.

(b) NOAA/NMFS Seattle, WA conducted several Marine Mammal Identification lectures for MSTs, QMs and bridge lookouts.

(c) NOAA/NWS Seattle, WA conducted several pre-cruise weather briefs and several lectures on Satellite Weather Interpretation.

(d) The Senior representative from the NAVY/NOAA Joint Ice center conducted a brief lecture on board covering ice conditions in Antarctica and services available to USCG vessels during Arctic/Antarctic deployments.

c. Equipment

(1) All required consumables were stocked sufficiently prior to departure.

(2) Two scientific vans were requested by NSF again this year. ISF was advised via letter three months prior to deployment to have the vans ready, and they were loaded on board prior to departure from Seattle. #1 van was loaded to starboard and #2 van loaded to port, with the doors facing forward.

(3) All major Marine Science systems were tested and the following discrepancies noted:

(a) The APT printer (Honeywell VGR 4000) failed to operate when energized.

(b) The oceanographic winches were weight tested during the May-June dockside availability period. The aft winch failed to hold the static load. Nansen cable (1/4 inch oceanographic cable) was used instead of the CTD cable (3/16 inch oceanographic cable). In addition it was discovered that several bolts had backed out of the drum assembly. These two items were corrected. The aft winch passed a second weight test prior to departure.

(c) A new motor was procured and installed in the Precision Depth Recorder (PDR) take up reel assembly, which failed during DF85.

(d) CTD and salinometer equipment were surveyed in accordance with instructions received from COMDT (G-OIO). The equipment was packaged and shipped to the International Ice Patrol, Avery Point, CT for further disposition.

(4) A pinger and dynamometer were requested via telcon with LCDR Jackson of the NOAA ship DISCOVERER. The equipment was picked up from the vessel several days before departure from Seattle. The pinger and dynamometer were required to be on board for use in project S-073 (see project description below).

2. Operations by Transit Sections

a. Seattle to Port Hueneme

(1) Two test casts were conducted at anchor in San Diego and pierside in Port Hueneme. MSTs were familiarized with proper winch operation procedures as well as with bottle cast procedures using the Nansen bottle.

(2) All Coast Guard cooperative Marine Science projects were conducted IAW COMDTINST 3140.2 and COMDTINST 3161(series). There were no non-Coast Guard programs assigned to the POLAR STAR.

(3) While in Port Hueneme, five TOGA Buoys were loaded onto the fantail with two buoys to be deployed en route Antarctica and three to be deployed on the track to New Zealand. Mr. Ray Partridge of the NOAA National Data Buoy Center, NSTL Bay St Louis, MS conducted a pre-deployment brief on board POLAR STAR covering assembly of the buoys, deployment procedures and environmental ground truthing of the buoys.

b. Port Hueneme to Punta Arenas

(1) One TOGA buoy was deployed at 40.0S 075.2W and ground truthed IAW instructions received at Port Hueneme brief.

(2) All Coast Guard cooperative Marine Science projects were conducted.

(3) Facsimile products of good quality were received from Buenos Aires, Argentina on 5185 KHz and 10720 KHz and from Brasilia, Brasil on 10225 KHz between Pisco, Peru and Punta Arenas, Chile.

(4) The following equipment problems were experienced:

(a) The APT receiver experienced minor problems. An adjustment was made to the sensitivity settings on the circuit boards.

(b) The APT hard disk experienced frequent crashes probably due to overheating or power flux.

(5) A request via msg to NAVPOLAROCEANCEN Suitland MD was made prior to arrival Punta Arenas requesting daily ice edge/concentration information between Palmer and McMurdo ice edge.

c. Punta Arenas to McMurdo Ice Edge

(1) Some facsimile products were received from Buenos Aires, Argentina on 5185 KHz. These products did not cover POLAR STAR'S operating area however.

(2) One TOGA buoy was deployed at 59-59.8 S 64-58.8W.

(3) All Coast Guard cooperative Marine Science projects were conducted.

(4) Facsimile products are not available covering the area between Punta Arenas and the East Amundsen Sea.

(5) Annex C to CNSFA OPORD 1-86 lists dedicated facsimile frequencies (8090/11004 Khz) and a transmission schedule. During the transit from Palmer to McMurdo however, no products were received on these frequencies. Upon arrival in the southern Ross Sea, POLAR STAR established voice communications with McMurdo. We were informed that facsimile products were being broadcast on US 18. This frequency band, established for use between McMurdo and Christchurch, is referenced in Appendix IX to Tab A of the OPORD. Annex C should have stated that this band would be used for facsimile transmissions.

(6) Ice edge/concentration information was received via message from NAVPOLAROCEANCEN and COMNAVSUPPFORANTARCTICA every other day between Palmer Station and the McMurdo ice edge.

(7) APT coverage from Palmer to McMurdo was good, but limited. Specific information on the ice edge was limited due to cloud coverage.

(8) While in the McMurdo area, six ice reconnaissance flights were flown by POLAR STAR's HH52As with one MST and OPS, XO or CO as ice observers. In addition there was one LC-130 ice reconnaissance flight with two NAVPOLAROCEANCEN and two POLAR STAR ice observers aboard. The mission of this flight was to observe the ice conditions to the NE of Cape Adare.

(9) The following equipment problem was noted:

(a) ETs replaced the APT hard disk on 20 Jan 1986 due to problems with frequent system crashes. They also did a color alignment to remove distortion caused by environmental factors. This remedied many of the problems experienced earlier in the cruise. A change in the ventilation scheme is still necessary, however, due to high temperatures in the space when POLAR STAR is operating in tropical regions.

(10) Project S-209: MSTs conducted three (03) ten-meter Niskin bottle casts and two ice casts by hand using a metal pail attached to a nylon line, between Punta Arenas and the McMurdo ice edge. MSTs provided Expendable Bathythermograph (XBT) information to the S-209 scientist four times daily. Two water samples per day were obtained by the S-209 scientist from the sea chest using the salt-water hookup in the wet lab.

(11) ARCTEC Inc. - Three ARCTEC engineers were embarked on 06 Jan 1986 for ice maneuvering tests and sea ice thickness and hull resistance tests. ARCTEC engineers monitored thrust bearing vibrations and pitch from the Scientist Library (2-164-3-Q), deployed two transponders on the ice for ice maneuvering tests, conducted augering operations at 13 sites and analyzed 20 ice cores taken at several of the augering sites for salinity and thickness measurements. Two ice reconnaissance flights were flown to determine areas of lesser ice thickness. ARCTEC departed on 19 January 1986 having been unable to complete ice maneuvering tests due in part to the extreme ice conditions experienced and time constraints because of POLAR STAR engineering casualties and fuel status.

d. Science Cruises I-II

(1) All Coast Guard cooperative Marine Science projects were conducted.

(2) Mechanical problems with one of the helicopters resulted in modifications to the science support.

(3) The following NSF projects were supported during Science Cruise I-II:

(a) Project S-209: Three samples per day were obtained by S-209 scientist from the sea chest using the salt-water hookup in the wet lab. MSTs provided XBT information to the S-209 scientist, four times daily. Penguin droppings were collected on Franklin Island in order to correlate diatom measurements with the food chain.

(b) Project S-263/283 - One Automatic Weather Station (AWS) was serviced on Franklin Island. The scientist had planned to service one additional AWS on Inexpressible Island and establish a new AWS on Reeves Glacier in Terra Nova Bay. Poor weather conditions and constraints on single helo use forced the cancellation of both.

(c) Project S-073 - Several rock samples were obtained on Franklin Island and at Hallett Station. Two S-209 scientists were transported to Coulman Island and remained there until Science Cruise III to study geologic processes on the island.

(d) Project K-051 - Two scientists conducted bird observations daily between the hours of 0600 and 0100. They were transported to Franklin Island and Cape Hallett Station to study Penguin rookeries there. MSTs provided sea surface temperatures and navigation information.

(e) Project K-078 - Four support people were transported via helo to Hallett Station to disassemble the station and conduct meteorological observations. They remained there until picked up by the POLAR STAR during Science Cruise III. It appears that there may be future requirements for hauling gear from Hallett Station (and possibly from Palmer Station). If this is the case, then sufficient days should be added to the schedule. See the Recommendations Chapter for more specific details.

(4) No written descriptions of the "K" (New Zealand) projects were available. We were not aware of each project's requirements until we were already underway on the cruise.

e. Science Cruise III

(1) All Coast Guard cooperative Marine Science projects were conducted.

(2) Due to engineering problems and changes to the schedule, Science Cruise III was delayed until 10 Feb 1986.

(3) The following NSF projects were supported during Science Cruise III:

(a) Project S-209: The same project support was provided on this science cruise. Teaching commitments resulted in the scientist's departure in McMurdo vice Sydney as was scheduled. An MST was assigned the remainder of the project which is described in the next section.

(b) Project S-263/283: Constraints on helo use caused the cancellation of repairs to the AWS on Inexpressible Island which was planned to be completed by ship's personnel. The equipment was returned to McMurdo.

(c) Project S-043 - Two scientists with the aid of two MSTs took bottom samples at six stations in the Ross Sea, at bottom depths ranging from 200-1100 fathoms, using either an Eckman Bottom Grab or a dredge net to collect sediment samples.

(d) Project S-073 - The two geologists dropped off at Coulman Island during Science Cruise I-II were picked up, having successfully completed their project. They retrieved approx 300 lbs of volcanic rock and other specimens. The two scientists were transported via helo to Beaufort Island for several hours to retrieve rock samples.

(e) Project K-014 - Two scientists with the aid of two MSTs conducted 10 Neuston Net tows using the hydrographic winch. With the ship moving at 2 knots the nets were deployed (and retrieved at same speed) on the surface of the water. When the nets were fully deployed, the ship's speed was increased to 5 knots. Later in the cruise, the two scientists were transported via helo to Beaufort Island for several hours. A trip to Franklin Island was cancelled due to high winds and seas. The K-014 scientists had planned on conducting sea bottom searches along selected shorelines using an ASB, which was not on board. We had been unaware of any such requirements for small boat use. The MSB was deemed inappropriate for such use.

(f) Project K-078 - The four support personnel dropped off during Science Cruise I-II were picked up via helo from Hallett Station having completed the partial disassembly of the NZ station there.

(4) Prior to POLAR STAR'S deployment on each science cruise, a plan was developed based upon discussions between NSF and CNSFA. Once underway, however, the Senior Scientist, after meeting with the science parties, requested major modifications to the established plan. See Recommendations.

f. McMurdo Station to Seattle, WA

(1) An Aerographer's Mate came on board in McMurdo, just prior to Polar Star's departure. He remained on board for the remainder of the trip as a member of the Marine Science Division.

(2) Three TOGA buoys were deployed between McMurdo Station and Sydney, Australia as follows:

a. Buoy 6702 was deployed at 65-00S 166-54E
b. Buoy 6703 was deployed at 60-00S 163-42E
c. Buoy 6704 was deployed at 50-00S 158-11E

(3) All Coast Guard cooperative Marine Science projects were conducted.

(4) OTSR support was requested via MOVREP message from NAVOCEANCOMCEN and NAVWESTOCEANCEN Pearl Harbor, HI between Sydney, AS and Seattle, WA. OTSR weather observations were taken daily at 0800 local time and transmitted via message.

(5) Facsimile products of good quality were received from McMurdo Station, Antarctica on 5140 KHz; Melbourne, Australia on 5101 KHz and 11031 KHz; Wellington, NZ on 9460 KHz and 13551 KHz; and NAVWESTOCEANCEN Pearl Harbor, HI on 4855 KHz (LSB), 9396 KHz (USB) and 14826 KHz (USB) between McMurdo and Seattle, WA.

(6) APT reception was good between Antarctica and Seattle, WA.

(7) Dr. Steven Warren, an astrophysicist from the University of Washington, was embarked between McMurdo and Sydney, Australia. While on board he conducted cloud observations and monitored synoptic weather and XBT observations. The purpose of these observations was to monitor the accuracy of marine weather observations and to collect data for use in preparing a climatology atlas.

3. Deep Freeze 86' Projects

S-043 PROJECT: The Trophic Positions of Benthic Rhizopoda in Antarctic Communities
INSTITUTION: Scripps Institute of Oceanography
PROJECT LEADER: Dr. Ted E. DeLaca
DATES: 10 February 1986 - 17 February 1986
WHERE: Ross Sea
SUPPORT: (1) Hydrographic winch support for Bottom (Net) Dredge and Eckman Grab.
(2) MST assistance with casts
SUMMARY: Two scientists with the aid of two MSTs took bottom samples at 6 stations using an Eckman (Box) Grab and Bottom (#250 mesh Net) Dredge. The original project description found in the USARP Plan stated that the sampling would be done in McMurdo Sound. The scientist, however, once aboard stated their desire to conduct the majority of the sampling at a 1150 fathom spot approximately 75NM NE of Cape Hallet. Fortunately, time was available in the cruise, and this was accomplished. No sampling was done in McMurdo Sound itself. Samples were obtained at bottom depths ranging from 200-1150 fathoms. The first two samples containing coral and other benthic specimens were retrieved at depths of 200 fathoms and 500 fathoms respectively, using the bottom dredge. The box grab did not retrieve any samples; because of the angle of the wire, the box did not contact the bottom squarely. The samples obtained indicated that the bottom was rocky. The next two samples were obtained using the bottom dredge only. Sizeable quantities of soft sediment containing formanifera were obtained at depths 1150 and 500 fathoms respectively. The final two samples were obtained using the box grab. Deployment and retrieval speeds were modified so that sizeable quantities of soft sediment containing formanifera and other benthic specimens were obtained. The samples obtained will be used in a continuing study of the evolutionary and ecological processes of the Antarctic environment.

S-073 PROJECT: Volcanic Geology of Marie Byrd Land - West Antarctica
INSTITUTION: University of Colorado at Denver
PROJECT LEADER: Dr. Wesley E. LeMasurier
DATES: 29 January 1986 - 17 February 1986
WHERE: Ross Sea
SUPPORT: Helo transport to Beaufort Island, Franklin Island, Cape Hallett and Coulman Islands
SUMMARY: Originally four scientists were to deploy with the POLAR STAR. Schedule delays and other

commitments caused two scientists to depart prior to Science Cruise I-II. The two remaining scientists were transported via helo to Franklin Island and Cape Hallett in order to obtain rock samples. They were then transported via helo to Coulman Island where they remained for one week. The purpose of their visit was to study the volcanic geology of Coulman Island. From the study of a dormant volcano and the rocks obtained there (these rocks are being compared with those obtained elsewhere in Antarctica), they hope to learn more about the evolutionary processes which resulted in the formation of the Antarctic continent and the ice sheet which covers it. They were picked up from Coulman Island via helo on Science Cruise III. En route McMurdo they were transported via helo to Beaufort Island where they collected the last of their rock samples.

S-209 PROJECT: Sediments Deposited by Marine-Based Ice Sheets in the Ross, Weddell, Amundsen and Barents Seas During the Last Glacial Maximum
INSTITUTION: University of Maine at Orono
PROJECT LEADER: Dr. Lloyd C. Burckle
DATES: 20 December 1985 - 28 February 1986
WHERE: (1) Southbound: Punta Arenas, Chile - McMurdo Station, Antarctica
(2) Northbound: McMurdo Station, Antarctica to 48S
SUPPORT: (1) Hydrographic winch support
(2) 10M Niskin casts
(3) XBT data
(4) Helo transport to shoreside sampling locations
SUMMARY: Initially, three 10 meter Niskin bottle casts were conducted between Punta Arenas and McMurdo. The casts were abandoned in favor of sea chest samples. The sea chest method proved to be less cumbersome and produced samples of sufficient quality and quantity. Samples were obtained from the sea chest via a salt water hookup on a deep sink located in the Oceanographic Winch Room. The sample passed through a filter assembly and then into a Niskin bottle. The purpose of this project was to study diatom distribution in the surface waters of the Southern Ocean. The data would then be compared to diatom distribution since the last glacial maximum. Penguin emissions were collected from Franklin Island in order to establish a control group. The emissions give information on

diatom distributions over the past 18,000 yrs. This informaiton will be compared to the diatom levels found today in the water column.

S-263/ 283
PROJECT: Boundary Layer Studies in Terra Nova Bay/ Antarctic Automatic Weather Station (AWS)
INSTITUTION: Ohio State University
PROJECT LEADER: Ed Elorenta
DATES: 29 January 1986 - 08 February 1986
WHERE: Terra Nova Bay
SUPPORT: Helo transport to Automatic Weather Stations (AWS)
SUMMARY: Project S263 involved the installation of a new AWS on the Reeves Glacier. The availability of only one helo forced the cancellation of this project. Project S283 involved the repair of an AWS on Inexpressible Island and one on Franklin Island. The AWS on Franklin was repaired, but the repair of the AWS on Inexpressible was delayed due to poor weather. Plans were made through NSF to have shipboard personnel repair the station during Science Cruise III or IV. Eventually, this was cancelled due to helo availability and the station parts were offloaded in McMurdo. The purpose of this project was to make weather observations in those regions. The data will be used to create a model that will predict the occurence of regional winds and the subsequent effects on the surrounding sea ice

K-014
PROJECT: Enviromental Studies in the Western Ross Sea and McMurdo Sound
INSTITUTION: NZARP cooperative project
PROJECT LEADER: Dr. Murray Gregory
DATES: 10 February 1986 - 17 February 1986
WHERE: Western Ross Sea and McMurdo Sound
SUPPORT: (1) Hydrographic winch support for Neuston Net Tows.
(2) MST assistance
(3) Helo transport to shoreside sampling locations.
SUMMARY: K-014 scientists with the aid of MSTs conducted 10 Neuston Net tows and a shoreline survey of Beaufort Island in the Western Ross Sea. The purpose of this project was to study man's effect on the Antarctic environment. They had hoped to retrieve plastics, wood pumices and tarball samples. The sampling did not yield any of these items.

K-051 PROJECT: Penguin Surveys in the Western Ross Sea and McMurdo Sound
INSTITUTION: NZARP cooperative project
PROJECT LEADER: Dr. Graham J. Wilson
DATES: 29 January 1986 - 08 February 1986
WHERE: Western Ross Sea and McMurdo Sound
SUPPORT: (1) MSTS to provide hourly sea surface temperatures.
(2) Helo transport to survey penguin rookeries ashore.
SUMMARY: Each hour, K-051 scientists conducted 10-20 minute surveys of Penguins and other pelagic birds in the Ross Sea between 0600 and 0100. In addition, they were transported ashore on Cape Hallett and Franklin Island to conduct a shoreside survey of penguin rookeries on each island. This project was part of a continuing study by the NZ scientists in an effort to learn about the behavior patterns of several species of Antarctic and Sub-Antarctic penguins and to correlate these studies of penguin behavior with environmental information which are both analyzed in the 10-20 minute transects and rookery surveys. They were unable to study the rookery on Coulman Island due to helo availability

K-078 PROJECT: Reclamation of Cape Hallett Station
INSTITUTION: NZARP cooperative project
PROJECT LEADER: Mr. John Alexander
DATES: 29 January 1986 - 12 February 1986
WHERE: Cape Hallett Station
SUPPORT: Helo transport to Cape Hallett Station.
SUMMARY: K-078 support personnel were flown ashore during Science Cruise I-II to continue the disassembly of the abandoned research station there. All personnel were retrieved the following week. They had been scheduled to be picked up approximately a week later when POLAR STAR was en route Sydney. Concerns with helo availability prompted their early retrieval, however.

APPENDIX I

OPERATIONAL TOTALS

1. The following Coast Guard cooperative marine science projects were conducted during DEEP FREEZE 1986:

(a) 570 Synoptic weather observations were conducted at 0000Z, 0600Z, 1200Z and 1800Z daily.

(b) 260 Expendable bathythermograph (XBT) observations were conducted IAW instructions received from U. S. Navy Fleet Numerical Oceanographic Center, Monterey, CA.

(c) The PDR was annotated hourly IAW Ocean Sounding Program requirements (COMDTINST 3161.2D).

(d) The following marine mammal species sightings were made:

30	Crabeater Seals
10	California Sea Lions
30	Elephant Seals
08	Harbor Seals
40	Leopard Seals
08	South American Sea Lions
150	Weddell Seals
06	Common Dolphin
30	Dalls Porpoise
30	Pacific White-sided Dolphin
02	Fin whales
30	Killer whales
04	Humpback whales
50	Minke whales
02	Pilot whales

(e) 320 Command Weather Briefs and Aviation weather briefs were conducted at 0900 and 1900 daily and whenever flight quarters were held throughout DEEP FREEZE 1986.

CHAPTER 6

ENGINEERING

1. Pre-deployment Preparations

a. Returning from DF-85, POLAR STAR immediately entered into a dockside availability in mid-May to correct some major problems and to conduct required periodic maintenance.

b. The following major items were accomplished in Engineering:

(1) The starboard oil distribution box was opened and inspected. Three new seal bands were fabricated and the bearing surfaces of the box were re-babbitted.

(2) The turbocharger foundations on 1A, 2B and 3B MDE's were repaired. 2B and 3B turbochargers were overhauled. The exhaust bellows on 1A and 3A MDE's were renewed.

(3) The deteriorated vent lines on the starboard seachests in Diesel 1, Diesel 2, and the Turbine Room were renewed.

(4) CPP pumps 1A, 1B, and 2A were overhauled.

(5) The exhaust leak on the centerline turbine was repaired and the insulation blankets were renewed.

(6) A hot section inspection and repairs were made to the port turbine.

(7) Thrust clearances were taken on all three shaft thrust bearings. All three shafts were found to be over max. allowed. Repairs scheduled for the April 86 yard.

(8) The tube bundles on 2A, 2B MDE and 1 S/S Gen. J/W coolers were renewed.

(9) All jacket water expansion tank fill valves were renewed.

(10) Sections of corroded piping in the CPP and M/M L/O systems were renewed.

(11) All pumps and motors on both evaporators were overhauled.

(12) Both boilers were overhauled. Forty-two (42) tubes were renewed on #1 Boiler along with repair of the firewall. Two tubes were renewed on #2 Boiler and all tubes were rolled.

(13) The SCAMPS system was installed.

(14) The AN/SPS-64(V) RAYCAS V INDICATOR was installed.

(15) A number of heat exchangers were cleaned and hydro tested on the MDE'S, SSG'S and on CHS.

(16) A number of cyclical maintenance jobs such as vent duct cleaning, S/W valve overhaul and weight handling gear tests were performed.

c. Despite satisfactory static tests of the starboard CPP system using ship's divers to verify blade position on 30 August, the shakedown scheduled for 01 to 06 Sept. was aborted after only nine hours due to two major failures in the starboard CPP system; namely, (1) pitch control was lost as soon as the shaft started to rotate and (2) the forward seal of the OD box failed while trying to troubleshoot the pitch problem.

d. The investigation following return to port showed the OD box bearing surfaces were wiped. The equalizing line between the forward and aft bearing was found to be plugged with babbitt material (left over from the rebabbitting). This was believed to be the cause of the seal and bearing failure. No apparent cause for the pitch control failure could be found and it was assumed to be a problem in the feedback piston or the hub. The OD box was sent out for rebabbitting and the ship was scheduled for an emergency drydocking.

e. POLAR STAR went into emergency drydock from 23 Sept to 15 Oct 1985. While in drydock the following major work was accomplished:

(1) Renewed the starboard propeller.

(2) Removed and inspected the starboard tailshaft.

(3) Flushed the starboard CPP system.

(4) Repaired the outer oil tube support feet.

(5) Removed and inspected the OD box feedback piston.

(6) Measured the starboard stern tube bearing staves and rebored the aft bearing.

(7) Renewed all three rope guards.

(8) Renewed stern tube circular zincs.

(9) Touched up the Inerta 160 coating on the rudder and skeg.

f. Upon departing from drydock on 15 Oct. POLAR STAR conducted a 2 1/2 day shakedown cruise in the Puget Sound area. The plant was exercised to the maximum extent possible within the time frame allotted. POLAR STAR returned to pier 37 on the evening of 17 Oct. after successfully completing the engineering shakedown.

2. Electrical and Electronics

a. Electrical Group

(1) The #1 fire pump motor developed shorted windings during a General Emergency drill imposed by REFTRA personnel. The motor was sent out for rewind in San Diego, reinstalled, tested satisfactorily and placed back in commission while in Port Hueneme.

(2) No. 2 M/M S/W Air Cooling Pump motor became grounded. The motor was replaced with CALMS spare.

(3) No. 3 A/C Chill Water pump motor overheated and became grounded. Motor was replaced from CALMS spares.

(4) No. 1 S/S generator after bearing seal felt failed and sprayed 9250 L/O into generator windings. Seal was replaced and generator was cleaned and megged. An inspection window was made from Plexiglas and installed in place of the top air filter position.

(5) 3A MDE developed a 10 volt positive ground in the generator field. The sliprings and brush riggings were cleaned and the ground was eliminated.

(6) 1A M/M blower fan grounded. The EM's disconnected it and No. 1 M/M was operated using 1B blower for the remainder of the trip.

(7) 3A and B M/M Blower fan motors quit operating. All three windings of both motors and both speeds were completely open. Ambient temperature in the enclosure was 155 deg. F. The filter doors were replaced with plywood covers that had holes to accommodate red devil blower hoses. These hoses were run directly to the main port exhaust vent (01-150-2) and mounted on plywood covers. The rear and side access covers were removed and replaced with a sandwich of expanded metal and filter material bolted in place. A supply vent was redirected to cool the outer casing of the main motor. Although the Cubic Feet per

Minute(CFM) is about half that generated by the motor fans, by blocking off the filters in the M/M, efficient air flow keeps the windings cool, below 130 deg. F. A replacement motor for 3A was received and installed in McMurdo. 3B will be repaired by ISF upon return to Seattle.

(8) No.1 LOP heater is overheating and shutting down due to overtemp. trip. EM's have not been able to adjust controller to correct the problem. Troubleshooting continued throughout the trip.

b. Control Group

(1) The ST12 transformer windings shorted during electrical STR's imposed by REFTRA personnel. An interim substitute was installed and a replacement was ordered.

(2) The Barber-Colman Power Supply failed when the +/-15 VDC rectifier transformer opened. The unit was replaced with a spare from ISF and the faulty power supply was sent to ISF for repair because the power supply modules are hermetically sealed.

(3) Tack-packs and speed transducers were replaced on #3B and #2A MDE'S.

(4) The modulator valve controller for No. 3 gas turbine began to oscillate, creating high frequency noise in ECC. The unit was cleaned and the noise disappeared.

(5) The relay solenoid coil for No. 1 Set-Up Switch interlocks in the M/G Room opened. The system can only be manually operated until ordered parts arrive.

(6) The F/O snubber on No. 3 S/S generator failed and was replaced.

(7) A loose F/T cannon plug caused a loss of the MOD valve control on No. 2 Gas Turbine.

(8) The starboard anemometer tail assembly fell off. A new bird will be ordered, or the existing unit will be sent for repair.

(9) Circuit Card 17 vibrated loose during icebreaking, causing Incomplete Sequence on No. 1 Gas Turbine Sequencer.

(10) Icebreak Mode on No. 2 Shaft was lost. The centerline turbine would not come above Idle Trip and the Shaft would not go above 105 RPM. Found a ground in the console wiring for the pitch schedule +24VDC. A wiring harness was rubbing on the casing and chafed through the plastic jacket, using relay IR2 as a fuse.

(11) The +5 VDC Alarm Power Supply in Propulsion Control Console began operating intermittently. Found output voltage low, but could find no blueprints or instructions showing Hewlett-Packard, (HP), supply in the system. The HP power supply was replaced with the spare Llambda power supply and installed as originally shown on manufacturers' drawings.

c. Electronics Group

(1) A solid C-phase ground was noted in Electronics panel 02-67-1. Investigation showed that the GSB-900DX fan was faulty. Improper radio power isolator washers were installed and the secondary of the Video Room isolation network controls were grounded. The fan failure was particularly significant in that it was the third such failure in eight months.

(2) Severe maintenance problems continue with the AN/URT-23V HF transmitters. Several Translator/Synthesizers and RF Amplifiers have been replaced.

(3) The MX-1107 Satellite Navigator experienced Error 1. When it was replaced with the spare unit, the error recurred. All inputs were verified correct. Both sets were removed for repair upon arrival in San Diego. Both speed circuit boards had weak 5 MHz clock signals and faulty interconnecting cables.

(4) An intermittent failure of ship's heading flash on RAYCAS indicator was experienced. The cause was a failed part # 5A2A6 which has no ERPAL allowance.

(5) All AN/SRC-21 UHF are experiencing low output power. The CAQI-410C meter probe has failed and repairs have been thus far unsuccessful. Spare SRC has failed and RF/PA has been placed on order.

(6) The Thrust Bearing Vibration Monitor failed due to short in +5 volt regulated power supply at bar graph meter. A full system alignment was conducted.

(7) Three (3) earth plate assemblies have been replaced in the CRP-1200 thus far due to improper cleaning and/or adjustment. Spare plates were ordered.

(8) AS-3194/SPS-64V pedestal No. 1 display bow-tied. Found Resolver B2 gear assembly faulty. The bearings were destroyed and the gear became misaligned and subsequently damaged. ET's replaced the bearings, removed burrs from the gear, repositioned the gear and reed switch assembly and reinstalled the unit. A replacement gear was placed on order.

(9) AN/URT-23V No. 5 2A2P2 was destroyed due to power surge. 2A1CR2 and -3 were shorted, 2A1CR1 was shorted, AM-6909 1A1CR3-11 were shorted, 1A1A7R1-3 were opened and numerous foil runs had to be repaired or replaced taking 80 manhours and costing $1,500.00.

(10) The DC Power Supply voltages were lost to No. 3 Gas Turbine Sequencer. The cause was determined to be the crowbar of the +/- 5VDC regulated supply.

(11) AN/URT-23V No. 5 was rewired and repaired after extensive damage done by improper tuning procedures and previous repairs.

(12) Thrust Bearing Vibration Monitor System was not reading properly on the Port shaft. ET group found a lower resistance value and changed it to match the other two shaft amplifiers. Recalibrated the system for .18 inches alarm.

(13) The AN/SRD-22 and starboard VHF/FM antennas fell from their respective locations as noted:

(a) AN/SRD-22 fell when the stand-off insulator broke after loosing a mounting bolt. Further investigation showed that the lip of the ALOFTCON had two vertical tears inside the welds attaching the platform to the ALOFTCON. There is also a longitudinal crack along the deck where the lip is attached; commencing about 1/2 in. on either side of center of the platform and extending port and starboard about 2 in. beyond the sides of the platform.

(b) The VHF/FM mounting bolts backed out along with the connector fasteners, the antenna fell tearing loose the center conductor of the antenna from the connector. Both antennas are repairable, however, heavy vibration incurred in the mast during ice-breaking maneuvers seem to be creating problems in both the mounting of fixtures on the mast and in connection to the fixtures.

(14) The magnetron failed twice in No. 2 MTR for the AN/SPS-64V9 radar system.

(15) Rectifier 2B door interlock switches vibrated loose, dumping the centerline shaft. Two days later the power supply failed dumping the same shaft and had to be replaced with a CALMS spare.

(16) Clutch air switches continue to be a problem when switching from DE mode to GT and back. The plungers are severely worn, the springs have weakened due to age and the contacts have been severely bent. Recommend replacement during D/D 86 on those clutches which are not being removed.

(17) Due to the heavy seas and port shaft leaks, sloshing bilges deluged the No. 2 CPP leak-off pump motor twice. Because this motor is not in continuous operation, it is recommended that all three motors be encapsulated.

(18) The port anemometer directional shaft broke in the same manner as the starboard. This also appears to be vibration-related.

(19) AN/URT-23V No. 6 failed and parts were not ordered because they are scheduled for replacement this summer. Parts were removed from No. 7 to complete necessary repairs.

d. General

(1) All three groups have experienced multiple failures that could have been major catastrophies had not the personnel been constantly making rounds of their spaces and equipment; e.g., brass light cage falling off inside the setup switch, KD relay falling apart inside setup switchboard, lighting fixtures hanging by their cables in cargo spaces, etc.

3. Main Propulsion

a. Diesel Group

(1) Approximately 1/2 hour after departing Seattle 3B MDE was placed O.O.C. due to high temperatures on all cylinders. The high cylinder temperature problem was narrowed down to the turbocharger and a replacement was requested from ISF to be shipped to San Diego.

(2) While in San Diego, the Navy SIMA team pulled the bad turbocharger from #3B MDE and installed the new one. During this job it was noticed that the exhaust blade shroud was missing from the bad turbocharger. This explained why the turbocharger was not working properly.

(3) A few days out of Port Hueneme 3B MDE was secured and placed O.O.C. when the bridge reported flames coming out of the stack and the Diesel 2 watchstander reported an explosion. Later investigation revealed a broken camshaft between 3R and 4R. Messages were sent requesting ISF to procure and ship a new camshaft and repair parts to Valparaiso, Chile.

(4) The next day 2A MDE was secured and placed O.O.C. when the watchstander reported unusual noises. The investigation showed that the turbocharger had destroyed itself. Messages were sent requesting a new turbocharger also be shipped to Valparaiso.

(5) The turbocharger on 2A was removed and placed in the hangar. The turbocharger on 3B was then removed and installed on 2A MDE. 2A MDE was placed back in commission six days after initial failure.

(6) The jacket water cooler on # 2 S/S gen. developed salt water leaks, and 16 of the 96 tubes had to be plugged.

(7) The new turbocharger requested from ISF was received in Valparaiso and installed on the way to Puenta Arenas. However, the camshaft parts were delayed in Miami. Delivery in Punta Arenas was arranged but did not occur.

(8) Diesel Group found the MDE racks set at 32.5 mm. All racks were reset to 31 mm.

(9) Continual problems with water in the starting air proves that air driers for the new starting air compressors are a definite must.

(10) Diesel group replaced 25 MDE fuel pumps. five on 1A, four on 1B, seven on 2A, and nine on 3A. All were frozen tight. One pump was opened for inspection and a large quantity of rust was found. A check of the service tanks showed water contamination. Fuel group commenced purifying the service tanks constantly with the larger capacity No. 1 Diesel Oil Purifier (DOP) vice constant purification with the No. 2 DOP. Diesel group had to strip 3B MDE of all 16 fuel pumps as only nine pumps were found in stock. An emergency shipment of 50 pumps and hardware was requested from ISF.

(11) A fuel door had to be replaced on # 2B MDE using a spare from # 3B MDE.

(12) During our transit from Hawaii to Seattle, low L/O pressure was experienced on 1B MDE. The first indications were 1B MDE tripping off the line for no apparent reason. When the engine was placed back into the propulsion loop, and was on the line for about 20 minutes, the engine tripped off the line again, shutting down on a low L/O vital alarm. After preliminary investigation, no leaks were found. The engine was restarted and placed into the propulsion loop with 65 PSI L/O pressure. As the L/O temperature reached 175 deg. F the L/O pressure started dropping rapidly. At 40 PSI L/O pressure, the engine was removed from the propulsion loop and secured. The secondary investigation revealed brass, steel, and aluminum filings in the L/O filters, strainers and sump. Diesel group crew continued to investigate for an apparent cause. The engine will require a complete overhaul to check all bearings for wear and/or failure due to filings found in the L/O system.

(13) 2A MDE was running at 1100 engine RPM'S, with a 1.1 megawatt load during our transit from Hawaii when the following situation developed. The highest cylinder temperature at the time was eight right (8R) at approximately 1050 degrees F. Suddenly, the engine room watch stander called ECC with a high cylinder temperature of over 1250 deg. F. The load on the engine was reduced to lower the cylinder temperature to a safe level. When the cylinder temperature returned to a safe level, the load on the engine was brought back up, but the cylinder temperature increased to above 1100 deg. F. The engine was shut down and the nozzle was replaced on cylinder 8R. After the engine was started a load was put on the engine and the cylinder temperature was still high. After testing the engine at 500, 900 and 1100 engine RPM'S, the cylinder temperature went down and stayed below 250 deg. F. The cylinder was firing intermittently. It was determined that the fuel pump was bad and had to be replaced. Upon removal of the fuel pump, the piston and plunger fell out of the pump. It was discovered that the pump housing was broken at the retainer ring groove. The fuel pump was replaced, but the pump could not be timed properly. When Diesel group removed the fuel pump support to find out why the pump could not be timed, they found that the roller on the fuel pump cam lifter had shattered, was gone and the lifter itself was riding on the cam lobe. Most of the pieces of the roller were fished out of the sump with a high powered magnet. The friction of the lifter and cam lobe rubbing together wore down the cam and lifter. The cam lobe was filed to remove burrs and high spots. A fuel pump support from 3B MDE was then installed on 2A MDE. The fuel pump was timed and the engine started for tests. All tests were satisfactory, so the engine was placed back in commission and run at reduced load. Upon arrival in Seattle the cam segment will be removed and rebuilt or replaced as necessary.

(14) All the MDE'S and S/S GEN'S, L/O and J/W temperatures were significantly higher while crossing the equator due to the increased sea water temperature of this area. 1A MDE'S temperatures increased higher than normal, and engine loads had to be decreased to compensate. All sea water suction, discharge, and overboard valves were open, and the sea water pressure was higher than normal, but the temperatures became unacceptably high on that engine only. An investigation revealed that the threaded area on the S/W discharge valve disk had deteriorated, separated from the valve stem and plugged the discharge piping to the overboard line. The valve disk was removed from the pipe, and the valve reassembled without the disk. The engine was test run and operated normally. Upon arrival in Seattle, the valve will be repaired or renewed.

(15) 2B MDE experienced occasional low vacuum alarms, with reports from watch standers that there was noise coming from the crankcase exhauster fan. When the exhauster fan was removed, it was found that the fan blade was no longer connected to the

motor shaft. The fan blade was reconnected and reinstalled on the engine. The engine operated normally with no futher vacuum problems.

(16) #2 LOP started dumping to the bilge. Every attempt to restart it failed. An inspection revealed that the seal ring had leaked into the L/O sump, and the lower spindle bearing had failed. After rebuilding the LOP it was started and placed on the line with no further problems. The same problem turned up on #1 LOP later on in the trip. The same solution was used with similar successful results.

b. Turbine Group

(1) Approximately 2-1/2 hours after departing Seattle, #1B CPP servo pump was placed on line and # 1A was placed O.O.C. due to unusual noises and loss of pitch control.

(2) The third day out a cracked weld was discovered on the centerline CPP piping. A soft patch was applied until permanent repairs were made in San Diego.

(3) New CPP cooling system temperature regulating valves were installed to replace faulty valves on the starboard system in San Diego and on the centerline system in Pisco, Peru.

(4) While in Port Hueneme, 1A CPP servo pump was overhauled. The small steel shot found in this system on previous overhauls was again found in the main pump and the pilot pump. Damaged rollers and stuck ball check valves were also found. The cage was dressed up and new rollers and check valves were installed. After reassembly and the installation of a new pitchsetter, a satisfactory test was performed and the system was placed back in commission.

(5) The port OD box return hose developed a pin hole leak and the shaft was dumped while a soft patch was installed. Again ISF was informed and requested to ship repair parts to Punta Arenas.

(6) The OD box hose was received in Punta Arenas; however, it was decided to hold off on replacing the old hose when the fittings on the new hose were found to be the wrong type.

(7) The forward oil seal blew on the starboard clutch on #3 reduction gear. A canvas shield was installed to deflect oil spray down into the bilge.

(8) The starboard OD box return line drain cracked a weld on two separate occasions in different spots. Each time the affected section was removed to the DC shop, rewelded, and reinstalled.

(9) Syntron seal blew on the port shaft and was renewed. The old one failed at the glued joint.

(10) #1 and #3 gas turbines failed to start. Both units were taking too long to establish a fireball (13 seconds compared to nine seconds on the centerline) which caused them to time-out before reaching 3400 rpm N2. An investigation showed that the spring in the P&D valve was weak. Turbine group readjusted the P&D valves and the turbines operated normally. The P&D valves will have to be replaced as they are at maximum adjustment now. The only spare valve was used by a Tech Rep during last hot section and not replaced in stock.

(11) The port shaft stern tube bearing wore down to the point that it was rubbing on the syntron seal gland ring. Lowered the syntron seal assembly about .130".

(12) The pitch setter on 1A CPP servo pump failed driving the propeller to full astern and jamming the feedback piston in that position. It took a few hours of exercising the pitch and about 1/2 hour of cycling both pumps to warm up the oil. The piston was eventually freed by rolling and dumping the shaft while cycling the pumps after the oil was warmed up.

(13) The TLI on the port reduction gear is OOC. It became necessary to constantly monitor the L/O pressure as an indication of L/O level in the sump. The TLI cannot be repaired without draining the sump and crawling inside. These sumps need some type of mechanical indicator. At the minimum, the TLI's must be calibrated/repaired as necessary.

(14) The pilot pump for 1A CPP servo pump cracked a weld. The pipe was removed to the DC shop, rewelded and reinstalled.

(15) The port shaft syntron seal assembly was lowered another .070". This was as far as it would go. Three days later the shaft again came into contact with the syntron seal assy. The port shaft was placed out of commission for the rest of the trip. On advice from district, the port shaft was secured with it coupled in, clutched in, shaft and turbine brakes on, CPP pump and hub pumps running, and full pitch on the propeller. The shaft turns as much as 1/2 revolution when heavy hits are taken. The syntron seal is leaking about 1 gpm.

(16) Despite the fact that the port shaft was coupled-in, clutched-in, turning gear engaged, turbine break on, and shaft break on, the shaft continued to jerk roll with heavy ice impacts. As a result, the syntron seal leak on the port shaft increased to about 15-20 gpm. necessitating almost constant bilge pumping. Attempts to reduce flow by stuffing packing in between

shaft and seal gland ring and by fabricating and mounting another ring on existing ring with packing in between reduced flow somewhat but due to ice impacts, seal could not be maintained for very long. Likewise, the boot could not be inflated due to the rotation of the shaft when hit by ice.

(17) The starboard reduction gear cracked a weld on the L/O supply line to the high speed mesh spray tube, starboard branch. Due to the inaccessible location (between fwd bulkhead and reduction gear, under N3 shaft) was unable to weld. Repaired with VELODUR liquid metal.

(18) The starboard CPP has developed a salt water leak. Since the CPP S/W cooler passed hydro on both sides, the suspected source of the leak is in the hub although no oil has been seen in the water around the propeller. A schedule of running the shaft for eight hours then shutting down and purifying the hub for four hours was established. This schedule was maintained from the time that the casualty was discovered until completion of McMurdo Operations on 20 February. See also paragraph (28).

(19) While maneuvering in the ice, especially during turns to port, heavy ice milling on the starboard prop resulted in moderately severe vibration of the starboard OD box. As a result, at least fifteen lower clevis bearing pins on the anti-rotation bar sheared and had to be renewed. The pins are made of mild steel round stock which is relatively inexpensive in order to protect the more expensive clevis bearing. The average down time to remove and renew one of these pins was about 20 minutes. However, considerable time and effort was expended when a failure of the upper clevis bearing pin occurred during the channel break-in. The pin sheared on the forward end between the forward clevis ear and the forward bearing end. The forward portion of the broken pin simply fell out. However, the remainder of the pin refused to budge despite coaxing attempts using a drift punch and a heavy sledge. The next step was to cut the pin between the after end of the bearing and the forward end of the after clevis ear. This would allow us to just pull the entire anti-rotation bar straight out from the ears of the clevis. The main problem with this idea was that the original shear zone on the pin had left a high spot in the center of the cross section of the break. This high spot was wedging itself against the after end of the forward clevis ear. Since the upper clevis on the underside of the OD box has a smaller clearance between the clevis ears there is a tighter fit between bearing and clevis. To make matters worse, we discovered that this upper pin was made of a higher strength steel which further frustrated our efforts to free the mechanism by cutting and grinding. Perseverance and pencil grinding on the forward face of the after ear eventually gave us sufficient clearance to pull the entire anti-rotation bar free from the clevis ears. Since the remaining center section of the

pin was frozen in the bearing, a new bearing assembly had to be installed on the anti-rotation bar. This was done and a new mild steel pin was inserted. After over six hours worth of work, the shaft was finally back in commission. One final note concerning anti-rotation bars was made by the Escher-Wyss Tech. Rep. That is: the mounting of the anti-rotation bar should be such that it is at a right angle to the surface of the OD Box as opposed to our present mounting position.

(20) 1B CPP pump cracked a weld where the atmospheric vent line enters the pump replenishment line. The line was cut off and DC plugs and straps were installed until permanent repairs can be made.

(21) The starboard stern tube cooling vent line cracked where it enters the stern tube housing. BM's fabricated a canvas wrap to seal the stern tube. The divers wrapped approximately 500 feet of line into the rope guard cavity to effect a better seal and then installed the canvas wrap around the shaft. DC's then removed the broken pipe nipple and plugged with a new nipple and cap. Divers removed the canvas and the line. Permanent repairs (with flexible hose) will be done during upcoming drydocking.

(22) The port CPP system is losing about 65 gal of 797 a day through the leak on the OD box (leaking at the split face). The DC's fabricated and installed a drip pan under the OD box with a drain line to the leak-off tank.

(23) The starboard shaft coupling would not disengage. The initial investigation, when the problem was first discovered, revealed that the self-aligning rod coupler (item 112) had become disconnected. The actuating cylinder (item 110) was cycled several times before being reconnected and appeared to operate normally. All attempts to disengage, after reconnecting the coupler, resulted in a movement in the disengage direction of about one inch. Attempts to disengage by putting 170 PSI air directly to the actuator with the pressure vented off the other side and assisting the coupling itself with crowbars produced the same results.

(24) Attempts to disengage the starboard shaft coupling by bumping then securing the shaft with the jacking gear (and with the turbine) were also unsuccessful. At this time, the shaft thrust bearing condition is thought to be a possible cause of the problem. It is thought that a worn thrust bearing would allow excessive movement to be transmitted through the coupling causing internal damage to the actuating shaft assembly or possibly the coupling itself. Dynamic thrust readings have been taken using the turbine and full ahead to full astern pitch readings were taken at the forward face of the centrex seal using a wood spacer block and a razor blade (method suggested by Gus during the last inport). Total movement was 0.078 inches.

(25) The starboard shaft was used in turbine mode only until icebreaking ops were completed. Finally, the starboard shaft coupling was disengaged by cycling between clockwise and counterclockwise rotation of the turning gear with the coupling controls in the disengaged position. An inspection revealed an extreme amount of galling and pitting on the center of the teeth, load side, of both the sleeve and the the shaft. However, Turbine Group was unable to determine the condition of the teeth at the reduction gear hub end without complete disassembly of the coupling. Except in an emergency, diesel mode will be maintained on the starboard shaft.

(26) The nipple where the charge pump connects to 1A servo pump on the suction side broke twice on separate occasions. The section was removed to the DC shop, a new nipple welded onto the pipe and then it was reinstalled.

(27) A weld cracked on the centerline reduction gear electric L/O pump discharge piping flange. The flange was removed to the DC shop, rewelded and reinstalled.

(28) The salt water intrusion on the starboard CPP system appears to have stopped since leaving the ice. This supports the EW tech rep's theory that one or more of the blade seal "O" rings are weak and leak only when the blade is hit by ice such that the "O" ring cannot respond quickly enough to maintain a proper seal.

(29) During our return from Australia, the port shaft rotated and ripped the shaft boot while running the #2 MGT on the centerline shaft with two diesels on the starboard shaft. The port propeller blades were pitched ahead full, the shaft coupling was engaged, and the shaft brake was energized. The turning gear would not go into the locked position. The shaft stopped when ship's speed was reduced. The leakage rate was about 10 GPM.

c. Cumulative Parts Used Summary

(1) Heads---------5
(2) Nozzles------77
(3) Pumps--------48
(4) Pitchsetters--9

4. Auxiliary

a. Upon reaching tropical waters, microorganisms (bugs) in the fuel became a problem. Stripping F/O tanks, purifying, and adding biobor kept the problem in check.

b. Salinity indicating systems failed on both evaps and chemical tests became necessary once per watch. The system was repaired with onboard spares and additional parts were placed on order. Although the system has been restored marginally, the overall reliability is such that the chemical tests are still being taken.

c. The #2 S/S air compressor developed another leak in the cooler. Repairs were made and a new cooler was placed on order.

d. An alternative to super chlorinating F/W tanks in ports where water quality is doubtful was identified while in Pisco, Peru. This method is outlined in the recommendations section of this report.

e. Upon arrival at Palmer Station, station personnel used zodiac boats to bring the hose out to the ship. They provided a 4" hose with a female camlock style fitting. POLAR STAR provided a 6" flange with an attached 4" male camlock fitting. Once the hose was aboard, connections were made within 30 minutes. Fuel suction was from seven 6th level tanks using the #1 diesel oil transfer pump and discharging to the port quarterdeck connection. Palmer Station requested 500-600 gpm at 60 psi. This was achieved by maintaining 85-95 psi at the quarterdeck gauge using the system relief valve at the pump to adjust the pressure. Upon completion of fueling, the hose was blown down by closing the valve at the quarterdeck and attaching S/S air to the sample port and air flushing until a zero gauge reading was obtained. Palmer Station supply valve was then closed. Communications were considered good using comcos. Total pumping time was eight (8) hours with 150,000 gallons of DFM transferred.

f. Due to the unusually tough ice, increased turbine operations resulted in rapid depletion of fuel and significantly reduced displacement. It therefore became necessary to S/W ballast six fuel tanks to obtain the desired drafts for icebreaking. Tanks ballasted were 3-57-1-F, 3-57-2-F, 6-113-1-F, 6-113-2-F, 6-113-3-F, and 6-113-4-F. A total amount of 233,855 gallons of S/W was brought aboard. This was done with one fire pump filling 3-57-1-F and 3-57-2-F via fill valves 2-72-1 and 2-72-2. The 6-113 tanks were filled by opening the seachest gravity fill valves to the ballast manifolds located in the Turbine Room. Prior to ballasting, the tanks were taken down until suction was lost on the remaining fuel. This fuel was transferred to the 2-182-0-F tank. After the F/O transfer was completed the ballasting operation took about 1-1/2 to 2 hours.

g. Prior to departing McMurdo, POLAR STAR onloaded 120, 55 gallon drums (6600 gallons) of 9250 lube oil to replenish the depleted storage tank. The barrels were struck down using a 2" AOP with 1-1/2" suction and discharge hoses. By placing a "Y" gate on the suction side of the pump, one barrel could be pumped

while another was set up for pumping. It was found that it takes about one hour and forty-five minutes to pump a barrel of 20 degree oil. The oil was therefore stored in the hanger for 24 hours with the heat turned up as high as possible. This reduced the time required to strike down to ten or twenty minutes a barrel.

h. The #2 steering pump cooler developed a leak while operating in the McMurdo area. Because there are no isolation valves to the cooler, it became necessary to plug the oil lines to remove the cooler. Since the cooler is located on the drain line from the pump, operating the pump when the cooler is not in the system will result in pump failure. A second leak developed enroute Sydney. As a result of the leaks, a total of two tubes had to be plugged to place the cooler back in operation.

i. During towing operations, the "C" CHS pump blew a gasket in the pump housing. Since there are no pump isolation valves, the whole central hydaulic system must be secured so that the inlet and outlet lines of the pump can be blank flanged. Before the "A" and "B" systems could be energized, the "C" pump drain had to be plugged. While the cause of the casualty is yet to be determined, system overload has been hypothesized to be the cause. It is recommended that when the vessel is to tow, the hawser be made up to the towing winch, then be secured to a bitt. The towing winch should then only be operated to feed out slack. Otherwise, higher than normal system pressures and hammering will result.

j. It is recommended that the ventilation system be set up prior to arrival at Palmer Station. With the preheaters set up to 55-60 degrees, humidity set at about 55-60% and the reheaters on, the air temperature in the living spaces can be adjusted from 55 to 80 degrees. Use of the humidity control system necessitates the use of air conditioning units. The air conditioning system should be used with only two compressors, (mainly for electronics spaces).

5. Damage Control

a. En route to San Diego, the helo foam tank was found to be contaminated with S/W. Inspection revealed leakage by the check valve. The check valve disk was lapped and reseated. The diaphragm control valve was initially suspected and was consequently rebuilt. The system test was satisfactory after repairs. No further contamination has been detected.

b. The sewage smell problem of previous trips surfaced again. Retaining a 1/2 to 1 degree port list and ensuring balanced ventilation seemed to reduce the intensity of the problem. However, we need to proceed with correcting the actual

problems as outlined in POLAR STAR'S 1983 SHIPALT Request. One small segment of this problem was rectified when the source of odor in the CO's pantry was traced to an idle drain behind the reefer which had lost it's water trap. Since this drain was no longer being used by the present reefer, a DC plug was installed and that odor problem disappeared.

c. A review of the DC book revealed that the loading conditions are not being strictly adhered to particularly with regard to the heeling tanks. Page II(a)4 of the DC book states that the heeling tanks are to be at 95 percent capacity for the departure condition. Based on precedent, POLAR STAR filled these tanks to their ice area operation levels of 50 percent. However, the concept of filling the heeling tanks to 95 percent in open water is to effect an increase in roll period to ensure a more comfortable ride. The roll tank also plays a part in this interaction by serving to reduce the roll amplitude in open water when it is filled to 40 percent. Also, two different full load conditions are shown; i.e., 1 and 2. A determination needs to be made as to which full load condition should be used upon sailing for Deep Freeze.

d. Because of fueling to the lower 95 percent capacity condition, conducting REFTRA prior to departure, higher than anticipated fuel consumption during transit and the necessity to skirt the outer pack ice further than normal, POLAR STAR arrived at the fast ice edge with a lower than planned fuel level. The approximate drafts immediately prior to arrival at the ice edge were 26' 3" forward and 27' 5" aft. In order to bring POLAR STAR closer to design draft for ice breaking according to the ship's DC book, the fore peak tank (3-V-0-W) and the clean ballast tank (4-D-0-W) were ballasted with salt water and approximately 34,000 gallons of fuel was transferred from 6-23-0-F, 6-57-1,2,3&4-F and 3-57-1&2-F to 4-243-0-F to even the ship's trim. After this operation, ship's drafts were 27' 6" forward and aft.

e. Drafts prior to ballasting the F/O tanks (para VI.4.f) were 28' 4" fwd and 26' 4" aft with a mean draft of 27' 4". After the ballasting operations were complete, drafts were 30' 0" fwd and 27' 0" aft with a mean draft of 28' 6", exactly halfway between the recommended limits for icebreaking as specified in the DC book. Subsequent F/O transfers brought the ship back to an even trim for the most efficient icebreaking and to maximize propeller protection.

f. The 6-113-1,2,3 & 4-F tanks were deballasted en route Seattle from Hawaii. The whole process took about fourteen hours. The small size of the holes in the strainer baskets for the Bilge and Deballast pumps may have imposed undue restrictions thereby reducing pumping capacity. This situation is being investigated.

g. Back-ups in the sewage drain line from the first class head were a recurring problem. One unclogging evolution on the return transit from Hawaii consumed over fifty manhours of effort. Part of the problem in this case is another troublesome tie between the gray water and black water systems aboard POLAR STAR. A shipalt request has been submitted to correct this and other similar problems in the drainage systems.

CHAPTER 7

ADMINISTRATION

1. Personnel General

a. Pre-deployment Preparations

(1) The following items were carried out to prepare for the Deep Freeze '86 deployment:

(a) Reviewed previous cruise reports.

(b) Conferred with 13th District personnel and Support Center Seattle to discuss possible administrative incidents.

(c) One month prior to deployment, a cut-off date was established for all Non-Central Assignment Control (NCAC) rated personnel for Class "A" school orders. This aided us in stabilizing our NCAC personnel allowance. COMDT (G-PTE) was requested to hold in abeyance all Class "A" school orders until 5 April 1986.

(d) All Central Assignment Control (CAC) rated personnel were ordered in well in advance. This required close liaison with HQ rating managers.

(e) All military personnel service obligations were reviewed to ensure service was extended through the duration of the deployment.

(f) Orders to duty involving flying as a technical observer for the CO, XO, and OPS were requested two months prior to the deployment. At that time the names, and social security numbers were given to COMDT (G-PO-2) to ensure proper issuance.

(g) Received 100 Antarctic Service Medals and 15 Good Conduct Medals from D13 (p).

(h) Completed the SGLI Election Form (VA 26-8286) for all personnel.

(i) Distributed sailing list to D13(p), ISF, and Support Center Seattle. Attached with the sailing list to D13 (p) were copies of the Record of Emergency Data, CG-4113, for all personnel. This alleviated all doubt of record management required by PMIS (Section 2.6.6 PMIS Manual).

(j) Ensured TONO's were acquired from D13 (p) for emergency leave purposes for both officer (5) and enlisted (10).

(k) Ensured TONO's were acquired from D13 (pk) for medical purposes for both officer (6) and enlisted (12).

(l) Ensured sufficient amount of identification cards were on board (100).

b. Deployment Operations

(1) AVDET 109 did not bring service records or complete personnel data records (PDR). The PDR does not give a complete history of the member's service. Suggest for future deployments that an entire copy of the right hand side of the service record be made and placed in the PDR. All PMIS entries for the AVDET were done by ATC Mobile via message.

(2) During the deployment, five Captain's Masts were held. Results were forwarded to the Personnel Reporting Unit, Seattle for appropriate service record entries.

2. Servicewide Exams

a. Informed Coast Guard Institute of deployment dates.

b. Collected all special requests from the crew prior to deployment, and gave the tentative list to Support Center. The ship's office ensured that all applicants were qualified.

c. Service wide exams were not received on board until 05 March. Difficulty with some of our registered mail had caused them to be delayed. A special trip was made the day before the exam to pick them up.

3. Education

a. End of Course Tests - A library of 160 course tests was ordered from the Coast Guard Institute. Aviation EOCT's were included for the benefit of the AVDET. All necessary rates were covered in the library, and the most commonly taken tests were ordered in larger numbers: FN-10, SN-15, MRN-E3-15, MRN-E4-15, MRN-E5-5, MRN-E6-5, BM3-5. One problem that developed was that the Institute only sent us 3-FN, 3-SN and 3-MRN-E3 library exams. With the exception of this, the Institute was very cooperative, but must be informed of the deployment schedule so that EOCT results can be sent by message. Library EOCT's were returned to the Institute upon return to Seattle.

b. Fort Steilacoom Community College - Arrangements were made with this college to conduct classes during Deep Freeze. The crew applied for tuition assistance but unfortunately D13(pmr) was unable to allocate any to POLAR STAR. The only course made

available was Management 194. YNC MASON instructed the class, which counts as college credit for the students. Polar Operations in Mobile must be notified in advance so that interested aviators may also register.

c. ASVABs: One ASVAB was ordered prior to deployment. Several people were administered these exams during the trip. Several copies of the test should be on board for ease in administering.

d. OCS Exam: One OCS exam was ordered upon request by one of the crew.

e. DANTES Exams: Several DANTES exams were ordered early in the deployment. These include several SATS, CLEP exams, and a GMAT.

4. Morale

a. Prior to departure several new stereos were purchased and placed in all the lounges. Three new televisions were purchased and placed in all but the crews lounge. A new VHS format VCR was purchased to be used in the entertainment center

b. Filming for the POLAR STAR Deep Freeze 1986 video commenced on the day of departure.

c. Approximately $1,100 was spent upgrading the morale locker. This included $200 spent on new books for the library. Additional fishing, camping, and golf equipment were also purchased.

d. In Peru, the crew donated money to the "Children of Peru" fund.

e. A Christmas video was produced by dependents during a POLAR STAR morale fund sponsored Christmas Party in Seattle. The video was received by POLAR STAR upon arrival McMurdo.

f. Christmas activities on board POLAR STAR included a gift exchange and special holiday meal. A video of the day's activities was made to be sent to dependents. In addition married personnel were encouraged to have a 2-3 minute segment taped on this video.

g. A message was sent on 28 December 1985 to CNSFA requesting information concerning the Scott Hut Race. The race was scheduled for 12 January 1986. Due to operational commitments POLAR STAR crew members were unable to participate. Approximately 1/3 of the crew had expressed an interest in

running in the race. Plans for a second race at a later date were initialized. The race was never run, however, due to operational commitments.

h. On 15 and 17 January Hump Day activities were held. Activities included were a crazy hat contest, weird T-shirt contest, pie eating contest, arm-wrestling contest, and dart throwing contest. Other activities included were ice liberty, ice football, golf-ball driving, and a volleyball tournament. The highlight of Hump Day Activities was Reno Night. Reno Night was organized and run by the Chief's mess. The morale fund purchased $700 in prizes to be auctioned prior to leaving Seattle. Prizes were auctioned the following day. Approximately $1,875 was raised during Reno Night. The money earned was used to offset the price of the cruise book.

i. Overnight liberty in McMurdo was offered to four crewmen each evening. Names were drawn at random. This proved to be a tremendous morale builder during our channel break-in. Close coordination with the Coast Guard Liaison Officer is necessary to ensure that adequate berthing is available.

j. Prior to our arrival in Sydney, a beard-growing contest was held. The winners in the various categories received gift certificates from the Exchange.

k. Money collected from the sale of haircut insurance for the Golden Shellback Initiation was given to the Morale Fund.

l. Crossing certificates (Straits of Magellan, Antarctic Circle, International Date Line, Equator/International Date Line) were ordered immediately following our arrival in Seattle. The Morale Fund picked up 1/2 of the total cost.

m. Throughout the deployment, on Saturdays, Pizza Nights were held. Responsibility for cooking rotated among all Departments, the Chiefs, First Class, and Officers. Morale purchased 10 cases of soda each time.

CHAPTER 8

SUPPLY/LOGISTICS

1. Pre-deployment Preparations

a. Agent Cashier and Authorized Certifying Officer Functions

(1) On 26 October the Agent Cashier deployed on D/F 86 with $649,133.59 dollars. Of this total, $82,400 was in U.S. Treasury checks in various denominations to be utilized in exchange for cash derived from postal and exchange sales. A pre-deployment pay conference was held between POLAR STAR's Supply Department and Personnel Reporting Unit Seattle on 3 October to discuss pay action and procedures for the deployment. POLAR STAR departed Seattle with seventy percent of onboard personnel live on the jumps pay system. Pay periods would be handled by message throughout the deployment. PSC Topeka would continue to send a Deployed Money List Message, and PERSRU Seattle would also send a message authorizing payment for all personnel still on the manual pay system. All allotment action requests were completed prior to departure for dependency, loans, and other types of allotments associated with individual pay accounts. Arrangements were made to have W-2 forms mailed to dependents from the PERSRU for those personnel desiring to do so. Anticipated total payroll for the deployment was $550,000, estimated port services was $50,000 and miscellaneous disbursements and back-up cash for unplanned disbursements at approximately $50,000.00. A breakdown of each payroll and disbursements for each port is summarized at the end of this report.

b. Clothing and Small Stores

(1) An inventory of $4,260.09 of various C&SS items was requested from PSC Seattle in July for operation of the satellite clothing locker during Deep Freeze '86. All items requested were received two weeks prior to deployment.

c. General Mess

(1) Bulk orders for dry provisions were ordered from NSC Puget Sound and frozen provisions from DPSC Alameda on 30 July, 1985, requesting a delivery date 10 days prior to deployment. All items ordered were received during our last week in port, with back ordered items being filled from commercial orders. Onboard inventory at time of departure was $134,703.72, which is adequate for six months with a crew of 165 persons. Two provision orders were scheduled for delivery while in McMurdo. Naval Support Forces Antarctica requires at least a 30 day notice for all provision orders in order to give them enough time to schedule delivery and logistics. Approximately 900 cu.ft. of space was allocated in the freezer for Palmer Station freezer

goods to be loaded in Port Hueneme. A summary of expenditures in each port is listed at the end of this report for reference purposes.

d. Supply Department/Logistics

(1) A pre-deployment logistics conference was held on 9 October with ISF to discuss any unforeseen problems and solutions prior to our departure. Two logistic shipments were scheduled during the deployment with the first to arrive in McMurdo mid January, the other to arrive in New Zealand if and when directed by the POLAR STAR. With one week of REFTRA in San Diego and another five days in Port Hueneme for loadout, last minute purchases and servmart runs were taken advantage of. One shipment of supplies was received in Port Hueneme from ISF, which amounted to mostly routine supplies which were received in Seattle after our departure. A break-down of port services and charges is summarized at the end of this report for each port of call.

e. Fuel-POL Products

(1) POL products were ordered and received from Manchester Fuel Depot on 16 October 1985. A supplemental order of 9250 Lube Oil was ordered from COMNAVSUPPFORANTARCTICA for delivery in McMurdo and another in New Zealand. POL products taken on prior to deployment were as follows.

DFM	708,414 Gals	.82 Per Gal	$580,899.48
JP5	36,708 Gals	.87 Per Gal	31,985.96
9250	2,947 Gals	1.90 Per Gal	5,599.30

2. Deployment Operations

a. Agent Cashier and ACO Functions

(1) For each port a local banker was requested to board the vessel upon our arrival and exchange U.S. dollars for the local currency. In Peru, $12,000 U.S. dollars were exchanged to the local currency of Soles at an official rate of exchange of 17,250 Soles to $1.00 U.S. In Valparaiso, Chile $10,000 U.S. dollars were exchanged to the local currency of Pesos at an official rate of exchange of 202 Pesos to $1.00 U.S. In Australia, $40,000 U.S. dollars were exchanged to the local currency of Australian dollars at an official rate of exchange of $1.40 Australian dollars to $1.00 U.S.

b. Clothing and Small Stores

(1) Sales during the first month of operations were high as expected; totaling $782.49. By the end of February total C&SS sales amounted to $2,283.60.

(2) The Satellite Clothing Locker closed on the 19th of March with total sales for the deployment amounting to $2,794.00. Items most in demand were working trousers and shirts.

c. General Mess

(1) For our first port of call Pisco, Peru no provisions were ordered or received. Upon arrival in Valparaiso, Chile orders for fresh fruits, vegetables, bakery goods, frozen products and dry provisions were placed with several vendors. More fresh provisions were ordered than in the past to ensure we had enough to carry us to the next resupply in McMurdo in January. Fruits and vegetables are a good buy in Chile and are recommended purchases. Our next port of call was Punta Arenas, Chile where we took advantage of the price of fresh king crab. While in McMurdo we had two logistic shipments of fresh provisions. Our first shipment was brought on board via VERTREP on the 15th of January. Fresh fruits and vegetables and a small amount of dairy products were received. Our second shipment of provisions was received on the 10th of February which included fresh vegetables and ice cream.

d. Supply Department/Logistics

(1) Our first port of call after leaving the United States was Pisco, Peru. No cargo or supplies other than routine mail were received in Peru. The quality and amount of service provided in Pisco was very limited. No fresh water was taken. Dockside power and phones were not available. Sewage and waste was retained onboard in our holding tanks. The cost of services provided were rather expensive considering the location and quality of service. The official rate of currency exchange was 17,250 Soles to $1.00 U.S. All transactions were completed in U.S. currency after the official ROE was computed.

(2) Our second port of call, Valparaiso, Chile, had much to offer as far as services and vessel requirements. By an agreement/contract between the USDAO Santiago and a shipping agent AGUNSA (Agencias Universales) of Valparaiso, the embassy transferred all support and services to the agent in support of all Coast Guard vessel requirements while in Valparaiso. The services provided by AGUNSA were very prompt and reliable. The cost of port services, however, were much higher than in the past, when the embassy was involved. All services provided were required to be paid by the vessel before departure. In the future, all cashiers should plan on these additional expenses and expenditures when determining the amount of cash to carry for the deployment. Two logistics shipments were received from ISF and a small amount of parts and supplies through the mail while in Valparaiso. The official rate of exchange was 202 Pesos to $1.00 U.S. All transactions were conducted in U.S. dollars after the conversion was made.

(3) Our next port of call was Punta Arenas, Chile. AGUNSA and a sub-agent COMAPA, provided all services required. The POLAR STAR was at anchorage during our stay in Punta Arenas, therefore no port services were required. However, water taxi, freight shipments, customs charges and miscellaneous agency expenses were incurred and paid to the agency before our departure. While in Punta Arenas, one logistics shipment was received from ISF, in addition to a few parts received through the mail.

(4) The next shipment of parts and supplies received was in McMurdo on the 7th of January 1986. Most of these supplies were received through our FPO mail. During the next several weeks parts and supplies were received on board as they arrived in McMurdo. One big shipment of parts and supplies was received on the 19th of January from ISF totaling over 7,000 pounds. On the 7th of February another shipment of parts totaling over 1,200 pounds was received from ISF.

e. Fuel-POL Products

(1) PALMER STATION: On 22 December 1985 POLAR STAR transferred 150,000 gallons of DFM NSN 9140-00-273-2377 at a unit cost of .82 per gallon to Palmer Station. Total cost of the fuel transferred was $123,000.00.

(2) M/V PAUL BUCK: On 21 January 1986 POLAR STAR received 799,561 gallons of DFW NSN 9140-00-079-5805 at a unit cost of .82 per gallon from M/V PAUL BUCK.

(3) M/V PAUL BUCK: On 07 February 1986 the POLAR STAR sold 30,000 gallons of DFW NSN 9140-00-079-5805 at a unit cost of .82 per gallon to the M/V PAUL BUCK. This transfer of fuel was done at the request of COMNAVSUPPFORANTARCTICA.

(4) On the 20th of February 1986 POLAR STAR brought on board our final shipment of 9250 lube oil NSN 9150-00-181-8097 which had been previously ordered and shipped to McMurdo via M/V GREENWAVE. Total quantity received was 120 drums (55 GL) at a unit cost of $131.09, totalling $15,730.80.

(5) NEW ZEALAND: In October of 1985 POLAR STAR ordered 3,300 gallons of 9250 Lube Oil for bulk delivery dockside in Auckland, NZ on our return trip to Seattle. The order was placed by NAVSUPPFORANTARCTICA DET CHRISTCHURCH NZ with Shell Oil of NZ LTD., under contract number N55418-86-M-A038. POLAR STAR's port visit to New Zealand was cancelled which lead to the cancellation of the contract with Shell Oil. However, Shell oil does not have any demand for the 9250 with our Milspec requirements. POLAR STAR had no choice but to purchase the 9250 at a cost of $13,018.00. An additional charge of approximately $2,000.00 was

assessed to drum the bulk 9250 for shipment to Christchurch, NZ. NAVSUPPFORANTARCTICA DET CHRISTCHURCH NZ was directed to hold the drums in storage and ship to McMurdo via M/V GREENWAVE marked for USCG Polar Icebreaker D/F 87.

(6) SYDNEY, AUSTRALIA: In February of 1986 POLAR STAR ordered 1,000 gallons of Mobil DTE-797 Hydraulic Oil for delivery during our inport period in Sydney. CG District Thirteen (ENE) funded and coordinated the arrangements for delivery and contract specifications of the Mobil DTE 797 with Mobil Oil Australia LTD of Melbourne under contract number MDTCG33-86-P-62914. Arrangements were also made by D13(ENE) for delivery of 400,000 gallons of diesel fuel via barge while in Sydney. While inport Sydney, 1,469,430 liters of diesel fuel were received at a total cost in U.S. dollars of $320,203.14. Mobil DTE 797 was also delivered; total amount received was 3,690 liters at a cost of $3,926.16 U.S. dollars.

3. Exchange

a. Pre-deployment Preparations

(1) Two months prior to departure, a deployment loan in the amount of $22,500 was requested and approved by Commandant (G-FNM); POC: Ms. Marilyn Brewer, FTS 755-9490.

(2) A special DEEP FREEZE '86 T-shirt was designed. Approximately 22 dozen shirts were ordered. Other souvenir items, such as ball caps, hat pins, and lighters were well-stocked knowing that they would later be used as trading items.

(3) Previous inventories were consulted and rough rates of consumption were calculated to aid in stocking up for the trip. Nearly $20,000 worth of supplies were delivered during the week prior to getting underway. All deliveries were coordinated well in advance with the Supply Officer and the 1st Lieutenant.

(4) A total of 1,400 cases of soda were ordered for the deployment. The magazine was clean and empty prior to delivery. The soda was stacked 11 cases high in a 12-case tie (pictured below) with sheets of 1/4" plywood inserted at the 6th case level.

(5) A small number of stereos were stocked; these were very popular. Cassette tapes were ordered through Eurpac West, Inc. (100 tapes per month during the deployment).

(6) An informal survey was conducted among the crew to determine if there was an interest in model-building. A number of the crew seemed interested and $700 worth of models and model supplies were purchased from American Eagles, Inc. of Seattle.

(7) All ordering was completed in Seattle. POLAR STAR departed Seattle with a $61,000 Exchange inventory.

(8) Credit sales commenced after departing Seattle with a maximum of $100 per person per pay period. Debts were collected on paydays.

b. Individual Transit Sections

(1) Port Hueneme through Punta Arenas

(a) Several essential items, including laundry bags and envelopes, were purchased at the Port Hueneme Exchange.

(b) The Exchange's normal U/W business hours ran from 1800-30 and from 2000-30. These hours varied occasionally depending on the operator's watch schedule. On paydays the Exchange opened from 1600-30 and from 2000-30 for the collection of credit only, and was open for normal business from 1800-30.

(c) Upon arrival in Peru, a small quantity of alpaca products were purchased. These items sold immediately. Due to logistical constraints however, a larger quantity could not be purchased.

(d) Upon arrival in Valparaiso, approximately $1,270.00 worth of assorted chocolate and candy was purchased from Jose Vargas Guzman (J.V.G.), Ship chandler. These items were extremely popular, and were used by many as Christmas gifts.

(2) Punta Arenas through first arrival McMurdo

(a) Christmas cards were sold from the messdeck while en route Punta Arenas. Sales went moderately well. I recommend that, in the future, the Exchange purchase only boxed cards. They satisfy the needs of the crew, and are easily inventoried.

(b) No items were purchased in Punta Arenas.

(c) Prior to our arrival in Palmer Station, the models were put on sale. The "hobby locker" was set up on the after crew's messdeck. The models were well received by the crew; nearly two-thirds of the original inventory sold out during the first opening.

(d) The Exchange Officer went ashore upon arrival at Palmer Station and met with the Station's store operator. $474.45 worth of POLAR STAR souvenir items were traded for $827.50 worth of Palmer souvenirs. A cash payment made up the difference. Unfortunately, the Station was out of adult clothing items. These items were listed on POLAR STAR's cargo manifest,

but were not found. Items received from Palmer Station included: children's t-shirts, USARP pins, towels and lighters.

(e) During the first three months of deployment the exchange was not receiving the 100 cassette tapes per month. A letter was sent to Eurpac West, Inc explaining the problem. Tapes were received on a regular basis once in McMurdo.

(3) McMurdo through arrival Sydney Australia

(a) In early February Valentines Cards were sold. The cards were a very popular item.

(b) Approximately $100.00 worth of souvenir items were purchased at the McMurdo exchange.

(4) Sydney Australia through arrival Seattle

(a) $3,381 worth of consumable goods were purchased from Allen's Sweets Company of Sydney Australia. The more popular goods such as Poppers, chips and Cadbury bars were sold out within two weeks. Approximately 40 stuffed Koala bears were also purchased. The bears sold out within two days out of Sydney. This was surprising because a dealer was selling these exact same bears on the mess deck for a cheaper price than what the exchange was selling them for.

(b) Beginning at 2000, on the last evening of the deployment, the exchange sponsored a Channel Fever sale. It featured a 50% price reduction on the first $1,000 of merchandise sold.

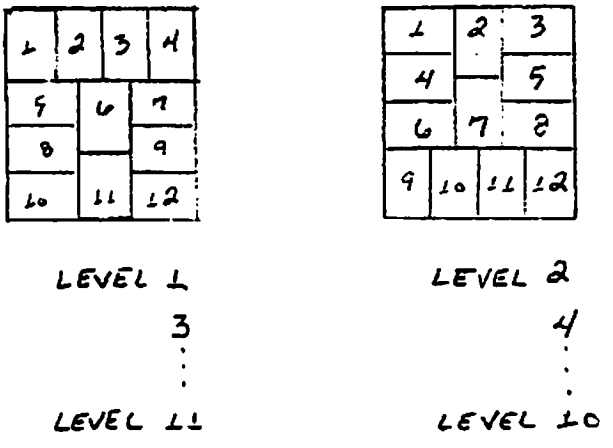


Plate 9
12-Case Soda Tie

Port Visit Expenses

I. PORT HUENEME, CALIF.

a.	Water/Sewage	$250.00
b.	Garbage Removal	250.00
c.	Telephone	300.00
d.	Vehicles	350.00
	Total	$1,150.00

II. PISCO, PERU

a.	Berthing	7,764.00
b.	Misc. Port Services	1,382.00
c.	Tugs and Pilots	5,441.90
d.	Transportation	1,039.49
e.	Phones	Not Available
	Total	$15,627.39

III. VALPARAISO, CHILE (Includes expenses for Patagonian Channel passage)

a.	Pilot: Docking/Undocking	900.00
b.	Boat service for above	600.00
c.	Tugs, In/Out	1,800.00
d.	Transportation for parts and mail	250.00
e.	Documentation, Customs	120.00
f.	Channel Pilots	300.00
g.	Pilots to Punta Arenas	9,500.00
h.	Wharfage	12,800.00
i.	Lighthouse dues	13,000.00
j.	Miscellaneous	300.00
k.	Agency fee	480.00
l.	Sewage	3,450.00
m.	Garbage removal	325.00
n.	Transportation, Bus & driver and Van	2,290.00
o.	Fresh Water, Shoretie	1,100.00
	Total	$47,215.00

IV. PUNTA ARENAS, CHILE

a.	Captain of Port Fee	9.61
b.	Comapa agency fee	360.00
c.	Water Taxi	1,898.10
d.	Airline tickets for pilots	326.86

e.	Freight & Transportation charges for parts and customs charges	222.80
f.	Telephone calls	6.92
g.	Mail delivery to Santiago and Misc. agency fees	400.00
	Total	$ 3,224.29

V. SYDNEY, AUSTRALIA

a.	Water & Electricity	$ 52.81
b.	Tugs - Inbound/Outbound	2,479.00
c.	Vehicles	521.40
	Total	$3,053.21

General Mess Transactions

	LOCATION	AMOUNT
1.	Port Hueneme, Calif.	$7,401.33
2.	Pisco, Peru	No Purchases Made
3.	Valparaiso, Chile	3,779.85
4.	Punta Arenas, Chile	2,127.95
5.	McMurdo, Antarctic	10,684.71
6.	Sydney, Australia	7,160.00

Pay Roll Figures

OCTOBER	30	$43,115.00
NOVEMBER	15	40,333.00
NOVEMBER	30	40,207.00
DECEMBER	13	49,716.00
DECEMBER	30	45,538.98
JANUARY	15	38,989.00
JANUARY	30	45,168.00
FEBRUARY	14	42,404.00
FEBRUARY	28	42,957.00
MARCH	14	43,495.00
MARCH	28	43,842.00

CHAPTER 9

MEDICAL

1. Pre-deployment Preparations

a. The medical department consisted of one permanently assigned HSC and one CWO3(PYA) who was permanently assigned six weeks prior to deployment.

b. All medical and dental records were reviewed. The screening revealed that all personnel, with a few minor exceptions, were medically and dentally qualified for deployment.

c. Most supplies, with the exception of a few non-essential items, were received prior to deployment.

d. All personnel desiring prescription safety and sunglasses were given the opportunity to obtain these prior to deployment.

e. A deratting inspection was conducted by the Naval Environmental Health Services, Bremerton, Washington. The ship was subsequently certified to be rodent free.

2. Medical/Dental by Individual Transit Sections

a. San Diego, CA. Two crew members experienced dental pain and were referred to the local Naval Medical Facility, where dental care was provided. One member was experiencing low back pain with other symptoms indicating possible kidney involvement. He was evaluated at the Naval Hospital with the resulting recommendations of FFD, with follow-up in 3 to 6 months. Two patients who were recovering from routine surgery performed prior to deployment in Seattle returned to POLAR STAR FFLD.

b. Port Hueneme, CA. Several crew members sustained minor injuries while on liberty. They were subsequently treated and released fit for duty by the Port Hueneme Naval Dispensary. One crewmember was transferred to Seattle pending evaluation of a possible navicular fracture. In an unrelated incident, a crewmember was referred to Long Beach Naval Hospital, Long Beach, CA for evaluation of vertigo, etiology unknown. Care and follow up of referred cases to Port Hueneme Naval Dispensary were excellent.

c. Port Hueneme, CA to Pisco, Peru

(1) On 18 November 1985 due to temperature exceeding 100 degrees fahrenheit in various compartments, the heat stress program as outlined in COMDTINST M6260.17 was implemented and successfully carried out.

(2) On December 1 in accordance with COMDTINST 1020.8, all personnel were weighed and the appropriate entries placed in their Service Records. Counseling and dietary measures were initiated.

(3) Shore tie water for consumption was not available while tied up at Pisco.

(4) No produce or other food items were purchased while in Pisco.

(5) One crew member developed a dental abscess just prior to arrival in Pisco. Arrangements were made and he was successfully treated at a local Peruvian Naval Base.

(6) After departing Pisco, approximately 20% of the crew developed traveler's diarrhea. That diagnosis was based on the food and drink they consumed while ashore and the symptoms they presented. All cases were treated with mild success.

d. Pisco to Valparaiso, Chile

(1) One crew member was referred to a civilian out patient facility in Valparaiso with a provisional diagnosis of melanocytic nevus verses melanoma. Minor surgery was performed and the resulting pathology report stated there were no elements of malignant characteristics.

(2) Another crew member was medically evacuated via civilian pilot boat and admitted with a provisional diagnosis of acute appendicitis verses pancreatitis. An appendectomy was performed the same day. Arrangements were made via the Embassy to transport the patient to Seattle for recovery and follow-up.

(3) Fresh produce and a few dry goods were purchased while in Valparaiso. All items were inspected and considered safe for consumption and free of pests.

(4) Shore tie water was available and was chlorinated to 2.0 mg/ml prior to consumption, as per Water Supply and Waste Water Disposal Manual CG-379.

e. Valparaiso to Punta Arenas, Chile was uneventful.

f. Punta Arenas, Chile to first arrival McMurdo

(1) Frozen crab meat, bread and tomatoes were purchased and brought aboard while in Punta Arenas. All items were inspected and considered safe for consumption and free of pests.

(2) Scientific personnel who reported aboard in Punta Arenas did not have their medical or dental records with them as per Annex F of CNSFA OPORD NO. 1-YR. In lieu of said records, an SF-93 was completed on each member for the purpose of medical history.

(3) A crew member sustained a suspected stress fracture to his left forearm while off loading supplies at Palmer Station. The forearm was casted pending re-evaluation by the Medical Officer at McMurdo.

g. Arrival McMurdo - Departure

(1) While at McMurdo Station Antarctica the medical and dental support provided by the Dispensary staff was outstanding. Approximately 30 medical/dental patients were seen, and at times on very short notice. All were well received and treated in a very timely and professional manner.

(2) One patient who dislocated his finger while jogging on deck was evaluated by McMurdo who referred the patient to Christchurch, N.Z., for further evaluation and treatment by an Orthopedic Surgeon. The patient was under evaluation and physical therapy for 19 days in New Zealand. It was recommended that he be re-evaluated upon arrival in Seattle.

(3) The problem as mentioned previously in this report concerning civilian science personnel reporting aboard POLAR STAR without medical records was discussed with the FORCE MEDICAL OFFICER of McMurdo Station. He concurred with our position and stated that all civilian personnel would comply in future deployments.

(4) Fresh produce and other food items were received while at McMurdo. All items were inspected and considered safe for consumption and free of pests.

h. McMurdo to Sydney, Australia

(1) Underway from McMurdo to Sydney, Australia was uneventful.

(2) Upon entering Sydney harbor, POLAR STAR was boarded by a member of the Australian Health Department via small boat. A request was made as to the locations and dates of our two previous South American ports. A valid deratting certificate was also requested. We were in compliance and all was acknowledged to be in order.

(3) Shore facilities were utilized and considered safe (ref. U.S. Navy's Port Directory). Special attention was paid to the proper installation of rat guards, as sightings of rodents were made.

(4) While inport Sydney, five patients were seen by the Australian Naval Dispensary. As per our request for consultation, four of these patients were referred to various specialty clinics, one patient being admitted to the local naval hospital for three days of observation. Two patients were subsequently returned to the U.S. for further evaluation and treatment. Cooperation from the Australian Naval medical personnel was outstanding.

(5) Fresh produce, dairy products and dry goods were received, inspected and considered free of pests and safe for consumption.

(6) Underway from Sydney to Seattle, due to temperatures in excess of 100 degrees fahrenheit in various engineering spaces, the heat stress program as outlined in COMDTINST M6260.17 was implemented and successfully carried out.

(7) En route Seattle, the HSC developed severe right ear pain diagnosed as otitis externa (diffuse). SNP failed to respond to conventional therapy, due possibly to a history of eustachian tube dysfunction. Tripler Army Hospital was contacted for an otolarynogolgy consult and therapy was initiated accordingly. SNP was medevacked by helo to COGARD AIRSTA BARBERS PT for transport and subsequent care at Tripler Army Hospital. Patient's condition continued to improve in response to therapy, and remained ambulatory.

(8) Medical equipment and supplies were inventoried in preparation for the upcoming refresher training and AWS. Orders were submitted as budgetary constraints permitted.

(9) Medical/dental records were reviewed and verified. Personnel requiring periodic referrals e.g. eye exams, dive and flight physicals, etc. were identified.

3. Miscellaneous

a. Operational demands prompted POLAR STAR's being directed for a port visit to Honiara in the Solomon Islands. In preparation for said deployment, investigation as to current immunization requirements in COMDTINST 6230.4C dated June 1977 gave no indiction of any risk of vector borne disease in the form of chloroquine-resistant plasmodium falciparum, malaria. The fact that this risk did exist, however, was noted by several sources on board in the form of current medical periodicals as well as various medical texts.

b. In addition to the malaria threat the sources also warned of possible serious adverse effects of chemosuppressive drugs in individuals with glucose-6-phosphate dehydrogenase (G-6-PD) deficiency. These sources strongly suggested that all patients be tested to check for this deficiency, by appropriate laboratory means. Naval medical sources at McMurdo, Antarctica concurred with this information.

c. Additionally NAVMEDCOM NOTICE 6230 dated 5 June 1985 emphatically stated the necessity that "all medical personnel be thoroughly familiar with known malaria risks in areas of deployment and with the prevention, diagnosis and treatment of the various types of malaria".

d. Information received from COMDT, while acknowledging the "significant risk" of (CRPF) malaria, did not address the lack of pre-deployment preparations of POLAR STAR specifically in the areas of availability of G-6-PD testing, development of a well defined education program and the lack of all related equipment and supplies on board, particularly all medications for treatment of pre and post malaria cases, the use of which, would be contingent on individual sensitivity and possible G-6-PD deficinecy.

e. The Honiara port call was eventually cancelled not due to the medical considerations but because of POLAR STAR's commitment date to a shipyard availability.

4. Statistical information for this deployment is as follows October 26, 1985 through April 5 1986:

1233	Total outpatient visits
82	Medical referrals
35	Dental cases/referrals

5. Summary

a. There is never an uneventful passage to the polar regions. The trip proved interesting and challenging in hardships endured and overcome. Traditional medical skills have a definite place but they must be tempered with the understanding of how humans function under mental as well as environmental stress. Survival being nearly 100 percent psychological challenge, a thorough understanding of how individuals deal with these mental and physical challenges is necessary prior to polar deployments.

CHAPTER 10

PUBLIC RELATIONS

1. Pre-deployment Preparations

a. Welcome Aboard pamphlets in English and Spanish were inventoried prior to departure. Approximately 2000 English pamphlets and 1000 Spanish pamphlets were on board.

b. A representative from CCGD13 (dpa) inventoried the photo lab, and made suggestions for replenishment. This inventory needs to be done early to allow time for procurement of needed materials. The following items were stocked in the dark lab:

(1)	Color Print film (100 ASA)	10 rolls
(2)	Color Slide film (Extrachrome)	10 rolls
(3)	B/W print film (125 ASA)	50 rolls
(4)	B/W print film (400 ASA)	50 rolls
(5)	Bulbs for enlarger	05
(6)	Paper (8 X 10) 250 per box	03 boxes
(7)	Paper (5 X 7) 100 per box	20 boxes

c. POLAR STAR was adopted by a Second Grade Class from Coe Elementary School. The Class planned to correspond with the crew and follow our trip.

d. Since the Commanding Officer is expected to sponsor various social functions, he should be provided with an expense account. See the Recommendations chapter for specific details.

2. Puerto de San Martin, Peru (28 November - 01 December)

a. A Peruvian Coast Guard patrol boat, the RIO HUARMEY, was assigned to Puerto San Martin during our stay. She rendezvoused with us upon our arrival at the harbor entrance. Honors were passed. During our stay she got underway several times to run tours for ship's personnel around the islands NW of Puerto San Martin.

b. 12 Foreign and U.S. dignitaries attended an official luncheon on board, and were given a tour of the ship. The visit was considered an official call made and an official call received.

c. The USDAO, Captain Jack Clay, and his representative, Mr. Jim Cruz provided a great deal of assistance and made our stay very enjoyable.

d. No ship tours were scheduled for our stay. Several small groups, including a group from the Peruvian Coast Guard, did come on board however.

e. The Welcome Aboard pamphlets printed in Spanish were very well received.

3. Valparaiso, Chile (03-09 December)

a. La Estrella, a local newspaper, interviewed the Commanding Officer and ran several articles on our visit.

b. There were no official functions held on board. A message covering our Port call stated that official calls by the Commanding Officer were not required.

c. No tours of the ship were given. The pier we moored to granted access to military personnel only.

4. Punta Arenas, Chile (15-17 December)

a. No tours were conducted since the ship was anchored.

5. Palmer Station through OUTCHOP CNSFA (20 December 85 - 23 February 86)

a. Several groups visited POLAR STAR while we conducted channel break-in operations. RADM Robbins and RADM Thorsen (USCG), RADM Ralph (Royal Australian Navy), Mr. Gould (PAO, US Embassy, Wellington), and Mr. Serig (DOT), were on board from 08-09 January. They toured the ship, observed the break-in, and met with various groups on board. CAPT Srite (CNSFA), Dr. Wilkniss (NSF), and Dr. Rita Colwell (NSB Presidential Appointee), accompanied this group on 08 January.

b. On 12 January, twenty-one Congressmen were flown out to the ship, spent several hours on board, and were given short tours.

c. McMurdo Station's Chaplain and Priest came aboard for overnight stays, and conducted religious services and counseling.

d. POLAR STAR spent the period from 08-09 February at the ice pier. Approximately 55 people from McMurdo and Scott Base toured the ship.

6. Sydney, Australia (3-9 March 86)

a. Prior to arrival, a press release concerning the dimensions and operations of POLAR STAR as well as biographical information on the CO was prepared and sent via message to the USDAO in Canberra. Upon arrival, a media tour of the ship was conducted and attended by about a dozen media representatives. The CO and the Senior Aviator held a brief press conference. The next day, the CO was interviewed twice by ABC (Australian Broadcasting Company) radio.

b. On the day of arrival, the Commanding Officer made a courtesy call on the Australian Consul-General of the United States, Mr. John C. Dorrance. On the following day, he made a call on Rear Admiral H. M. Knox, Flag Officer Commanding HM Australian Fleet. On 4 March, he made a call on Rear Admiral D. J. Martin, Flag Officer Australian Support Command.

c. The "Dial-a-Sailor" program was used and was a success. Many members of the crew enjoyed the hospitality provided by the people of Sydney.

d. On the evening of 4 March, the officers attended a cocktail party given in honor of the POLAR STAR by the Australian-American Friendship Association.

e. Since POLAR STAR was berthed at an Australian Naval Facility, an Open House was not possible. The U.S. Consul set up several tour groups during our stay. These included a group of 16 Marine Engineering Students from the University of New South Wales.

7. Hometown Support

a. Throughout the deployment, POLAR STAR sent five "Familygrams" to dependents and friends of the crew. These letters, signed by the CO, kept them up to date on the ship's progress. In addition, 20 updates of the tape-recorded message heard when dialing POLAR STAR'S home telephone number were sent.

b. A cruise book was put together as a permanent record of the deployment.

CHAPTER 12

RECOMMENDATIONS

DECK

a. Any cargo destined for a place other than the primary destination (i.e. Palmer Station) must be marked as such, extra care must be taken to load it all in one location and it must be brought to the attention of ship's personnel. (Ref I.2.a.(2) ACTION: CNSFA)

b. That the responsibility for prioritizing cargo loaded at Port Hueneme remain with ANS (and not with ship's personnel). (Ref I.2.a.(3) ACTION: CNSFA)

c. A strong wire pendant should be used on the end of the towing hawser for ease in attachment to the stern bitts of the supply ships. (Ref I.2.c. and d. ACTION: Ship)

ENGINEERING

a. All F/O tanks should be treated with Biobor at a 270 PPM dosage as per COMDTINST M9000.6, 541.2.10 to prevent bug. growth in warmer waters. (Ref VI.4.a. ACTION: Ship)

b. The following procedure may be used in foreign ports where water quality is doubtful:

(1) Connect the F/W to firemain at the international shore connection to provide check valve protection to the shore tie.

(2) Connect the firemain in turbine room to the evaporator by removing the piping elbow on the evap. feed pump and hooking up a flange for fire hose connection.

(3) Operate the evap. in normal mode. (Ref VI.4.d. ACTION: Ship)

c. A conscious decision needs to be made as to what loading condition to use enroute to the ice area and what deviations (if any) are to be allowed. For example, according to page II(a)14 of the DC Book, Condition 1 shows all F/O tanks to be at 95% which includes the heeling tanks. Historically, the heeling tanks have only been filled to the ice operating levels of 50% while enroute to the ice area. If the decision is made to depart under a full load condition, then a further determination must be made as to what full load condition, i.e., 1 or 2 is to be used. (Ref VI.5.c. ACTION: Ship)

d. Refueling to top off tanks prior to DF should be programmed into the operational schedule when REFTRA precedes a DF deployment or when a particularly heavy ice year is

forecasted. Recommend consideration be given to fueling in either Port Hueneme, San Diego or Punta Arenas as the operational schedule demands. (Ref VI.4.f. and VI.5.d. ACTION: CCGD 13)

e. S/S air compressor coolers which develop leaks should be promptly replaced prior to deployments as opposed to effecting temporary repairs. (Ref VI.4.e. ACTION: Ship)

f. Isolation valves should be installed on the steering pump cooling system to aid in cooler changeout and repairs. A spare steering cooler should also be carried onboard. (Ref VI.4.h. ACTION: Ship/ISF)

g. The ventilation system should be set up prior to arrival at Palmer Station to obtain optimum temperature/humidity range for comfortable living. (Ref VI.4.j. ACTION: Ship)

h. When towing, the towing winch should only be used to feed out or take in slack only when there is a catenary in the towline to avoid potential system damage. (Ref VI.4.i. ACTION: Ship)

i. Air driers should be installed on the starting air compressors. (Ref VI.3.a.(9) ACTION: ISF)

j. TLI's should be calibrated/repaired on all Red Gear L/O sumps. (Ref VI.3.b.(13) ACTION: ISF/DISTRICT CSMP 85-161 has been submitted by Ship for this purpose) Some mechanical type of indicator should also be installed. (Ref VI.3.b.(13) ACTION: Ship to submit CSMP)

ADMINISTRATION

a. That COMDT (G-PTE) be contacted two months prior to departure, to determine who will be departing for class "A" schools prior to departure. (Ref VII.1.a.(1)(c) ACTION: Ship)

b. That one month prior to deployment, a message be sent to COMDT (G-PTE) and (G-PE) asking them to hold all orders in abeyance until the ship's return from Deep Freeze. (Ref VII.1.a.(1)(c) ACTION: Ship)

c. That all ordered library EOCT exams be supplied as requested. (Ref VII.3.a ACTION: Institute)

OPERATIONS

a. That both supply ships be fitted with stainless steel ice propellers. (Ref I.1.c.(7)(l) ACTION: CNSFA)

* b. That COMDT (G-OIO) deal through COMPACAREA regarding all operational matters during deployment. (Ref I.1.c.(7)(m) ACTION: COMDT)

c. That the two additional transit days Palmer to McMurdo and the four additional break-in days added to this year's schedule remain a permanent part of the DF schedule. (Ref III.3.a.(4) and III.3.b.(12) ACTION: CNSFA)

d. That pipeline training for all assigned Physician Assistant's and Chief Health Service Technicians be initiated with regards to the recognition and treatment of "diving specific" injuries. (Ref I.3.d.(3)(h) ACTION: COMDT)

PUBLIC AFFAIRS

a. The CO is required to entertain both Foreign and U. S. dignitaries throughout the deployment. He is expected to sponsor luncheons and other functions, yet the CO has nothing other than personal funds for these functions. Since these activities are in the name of the Coast Guard and the United States, the CO should be provided with an extraordinary expense fund for this purpose. Propose $500 for DF deployments. (Ref X.1.d. ACTION: G-OIO, G-F)

MARINE SCIENCE

a. Due to technical inexperience with the APT system hardware, a maintenance support program using a technical representative from P & P Industries should be established. This issue was addressed in COMDT (G-OIO) message 072206Z SEP84 to CCGD13. To date, however, no program has been developed. (Ref V.2.b.(4)(a) ACTION: D13/ISF)

b. Due to overheating of electronic components in the APT and other systems in the Meteorological Lab (01-119-3-Q) it is recommended that modifications to existing ventilation be made. Modifications have been successfully made to the ventilation in the ship's C3 room and Radio room by tapping into the chill water system (Ref V.2.b.(4)(b) ACTION: Heating, Ventilation, and Cooling (HVAC) study funded by ISF/D13 to be followed by submission of a CSMP)

c. Make the following changes to Annex C of CNSFA OPORD 1-YR (Ref V.2.c.(5) ACTION: CNSFA)

(1) Make reference to additional frequencies used for facsimile transmission.

(2) Include the following, "USCG or MSC ships operating under CNSFA operational control (OPCON) may submit requests for current facsimile broadcast information via message to COMNAVSUPPFORANTARCTICA upon INCHOP CNSFA."

d. "K" (NZARP) projects were not described in the 1985-86 USARP Science Program Plan. In the future, a detailed description of each project needs to be included in the Plan. (Ref V.2.d.(4) ACTION: NSF)

e. Once underway on both science cruises, the Senior Scientist, after working with the science parties, requested major modifications to the projects that had been described in the USARP Science Program Plan and the schedule that had been worked out by NSF and CNSFA. If major changes in the sequence of the science cruise or changes to a specific science project are anticipated, then the icebreaker needs to be informed of such changes ASAP; at least prior to deploying on the cruise. Better communications between NSF and the Senior Scientist involved with each project should solve this problem. (Ref V.2.e.(5) ACTION: NSF)

f. There appears to be a future requirement for hauling junk/old equipment from Palmer and Cape Hallett; either hauling to another site or offshore for dumping. Sufficient additional days should be scheduled for these requirements. Because of the amount at Cape Hallett, it may be necessary to accomplish this task over a number of years. This topic should be addressed in future DF planning conferences. (Ref V.2.d.(3)(e) ACTION: COMDT (OIO), CNSFA, NSF)

AIR OPERATIONS

a. Main gear boxes have not been available as spares in the past due to a shortage throughout the HH52A supply system. As the HH65A replaces the HH52A as the Coast Guard's SRR helicopter, more transmissions should become available. Recommend that future aviation detachments include a spare main transmission gear box in the Helicopter Support Kit (HSK). (Ref II.3.d.(3) ACTION: ATC)

MEDICAL

a. Request that scientific personnel attached to Coast Guard icebreakers for more than 16 hours carry their medical/dental records with them, as per CNSFA OPORD No. 1-YR - ANNEX F. (Ref IX.2.g.(3) ACTION: NSF)

b. Training should be provided to medical personnel in all aspects of medicine applicable to polar regions, with special emphasis on diving medicine and emergency dental procedures. (Ref IX ACTION: COMDT)

CHAPTER XIII

STATISTICAL SUMMARY

DAILY FUEL USE

DFM	JP-5	DTG OF SOUNDING	REMARKS
15404	0	271600Z OCT 85	DEPART SEATTLE 262300Z OCT 85
12100	0	281600Z OCT 85	
10900	0	291600Z OCT 85	
13987	0	301600Z OCT 85	
9000	0	311600Z OCT 85	ARRIVE SAN DIEGO 010100Z NOV 85
11200	0	011600Z NOV 85	INPORT
			NO SOUNDING TAKEN
		021600Z NOV 85	INPORT
			NO SOUNDING TAKEN
		031600Z NOV 85	INPORT
			NO SOUNDING TAKEN
4479	0	041600Z NOV 85	UNDERWAY, REFTRA
			SOUNDING REPRESENTS TOTAL USAGE INPORT
3628	0	051600Z NOV 85	UNDERWAY, REFTRA
2000	0	061600Z NOV 85	UNDERWAY, REFTRA
5000	0	071600Z NOV 85	UNDERWAY, REFTRA
7232	0	081600Z NOV 85	DEPART SAN DIEGO 082358Z NOV 85
11700	0	091600Z NOV 85	ARRIVE PORT HUENEME 151611Z NOV 85
		101600Z NOV 85	INPORT
			NO SOUNDING TAKEN
		111600Z NOV 85	INPORT
			NO SOUNDING TAKEN
		121600Z NOV 85	INPORT
			NO SOUNDING TAKEN
		131600Z NOV 85	INPORT
			NO SOUNDING TAKEN
7900	0	141600Z NOV 85	INPORT
			SOUNDING REPRESENTS TOTAL USAGE INPORT
1200	0	151600Z NOV 85	DEPART PORT HUENEME 151611Z NOV 85
13900	0	161600Z NOV 85	
10000	0	171600Z NOV 85	
11500	0	181500Z NOV 85	
13300	0	191500Z NOV 85	
10700	0	201500Z NOV 85	
11500	0	211500Z NOV 85	
10500	0	221500Z NOV 85	
11000	0	231400Z NOV 85	
11000	0	241400Z NOV 85	
11500	0	251400Z NOV 85	
15600	0	261400Z NOV 85	
11500	0	271400Z NOV 85	
11000	0	281300Z NOV 85	ARRIVE PUERTO SAN MARTIN 281430Z NOV 85
		291300Z NOV 85	INPORT
			NO SOUNDING TAKEN
		301300Z NOV 85	INPORT
			NO SOUNDING TAKEN
3600	0	011300Z DEC 85	DEPART PUERTO SAN MARTIN 011330Z DEC 85
			SOUNDING REPRESENTS TOTAL USAGE INPORT
10500	0	021300Z DEC 85	
10500	0	031300Z DEC 85	

DAILY FUEL USE

DFM	JP-5	DTG OF SOUNDING	REMARKS
10500	0	041300Z DEC 85	
11500	0	051100Z DEC 85	ARRIVE VALPARAISO 051613Z DEC 85
		061101Z DEC 85	INPORT
			NO SOUNDING TAKEN
		071100Z DEC 85	INPORT
			NO SOUNDING TAKEN
		081100Z DEC 85	INPORT
			NO SOUNDING TAKEN
		091100Z DEC 85	INPORT
			NO SOUNDING TAKEN
6500	0	101100Z DEC 85	DEPART VALPARAISO 101129Z DEC 85
			SOUNDING REPRESENTS TOTAL USAGE INPORT
12000	0	111100Z DEC 85	
13200	0	121100Z DEC 85	
12500	0	131100Z DEC 85	
12000	0	141100Z DEC 85	
10700	0	151100Z DEC 85	ARRIVE PUNTA ARENAS 160023Z DEC 85
6600	0	161100Z DEC 85	INPORT
		171100Z DEC 85	DEPART PUNTA ARENAS 171858Z DEC 85
			NO SOUNDING TAKEN
11500	0	181100Z DEC 85	SOUNDING REPRESENTS TOTAL USAGE INPORT
12500	0	191100Z DEC 85	CROSSED 60 SOUTH 200015Z DEC 85
13800	0	201100Z DEC 85	
11400	0	211100Z DEC 85	ARRIVE PALMER STATION 211135Z DEC 85
			OFFLOADED 150000 GAL DFM
2800	0	221100Z DEC 85	
6500	0	231100Z DEC 85	
6000	0	241100Z DEC 85	DEPART PALMER STATION 240530Z DEC 85
11000	0	251100Z DEC 85	
11800	0	261100Z DEC 85	
11000	0	271100Z DEC 85	
10700	0	281100Z DEC 85	
11600	0	291500Z DEC 85	
10700	0	301600Z DEC 85	
11500	0	311600Z DEC 85	
11000	0	012000Z JAN 86	
11600	0	022000Z JAN 86	
11000	0	032000Z JAN 86	
10800	0	042000Z JAN 86	
12700	0	052000Z JAN 86	
6800	0	062000Z JAN 86	
11350	0	072000Z JAN 86	
35000	0	082000Z JAN 86	
43000	0	092000Z JAN 86	S/W BALLASTED 6 FUEL TANKS
23979	0	102000Z JAN 86	
11805	0	112000Z JAN 86	
13104	20000	122000Z JAN 86	TRANSFERRED 20000 GAL JP-5 TO FUEL TANK
6359	0	132000Z JAN 86	
21856	0	142000Z JAN 86	
31006	0	152000Z JAN 86	
2390	0	162000Z JAN 86	
2954	10000	172000Z JAN 86	TRANSFERRED 10000 GAL JP-5 TO FUEL T
2423	0	182000Z JAN 86	
7359	0	192000Z JAN 86	

DAILY FUEL USE

DFM	JP-5	DTG OF SOUNDING	REMARKS
17111	0	202000Z JAN 86	
5977	0	212000Z JAN 86	RECEIVED 799561 GAL DFM FROM PAUL BUCK
9870	0	222000Z JAN 86	
26927	0	232000Z JAN 86	
17013	0	242000Z JAN 86	
16445	0	252000Z JAN 86	
25561	0	262000Z JAN 86	
3827	0	272000Z JAN 86	
26529	0	282000Z JAN 86	
9273	0	292000Z JAN 86	
12239	0	302000Z JAN 86	
15306	0	312000Z JAN 86	
15008	0	012000Z FEB 86	
15907	0	022000Z FEB 86	
10602	0	032000Z FEB 86	
11358	0	042000Z FEB 86	
7871	0	052000Z FEB 86	
12781	0	062000Z FEB 86	
25426	0	072000Z FEB 86	TRANSFERRED 35102 GAL DFM TO PAUL BUCK
4800	0	082000Z FEB 86	
13252	0	092000Z FEB 86	
10293	0	102000Z FEB 86	
12981	0	112000Z FEB 86	
14566	0	122000Z FEB 86	
12227	0	132000Z FEB 86	
11530	0	142000Z FEB 86	
7593	0	152000Z FEB 86	
10733	0	162000Z FEB 86	
8352	0	172000Z FEB 86	
7339	0	182000Z FEB 86	
22563	0	192000Z FEB 86	RECEIVED 6600 GALS 9250 LUBE OIL (120 DRUMS) FROM McMURDO STATION
15158	0	202000Z FEB 86	
8199	0	212000Z FEB 86	
18577	0	222000Z FEB 86	
11817	0	232000Z FEB 86	
10832	0	242000Z FEB 86	CROSSED 60 SOUTH 240730Z FEB 86
12721	0	252000Z FEB 86	
9321	0	262000Z FEB 86	
10407	0	272000Z FEB 86	
8212	0	282000Z FEB 86	
13529	0	012000Z MAR 86	
15216	0	022100Z MAR 86	ARRIVE SYDNEY 022316Z MAR 86
		032100Z MAR 86	INPORT NO SOUNDING TAKEN
		042100Z MAR 86	RECEIVED 391250 GALS DFM INPORT, NO SOUNDING TAKEN
		052100Z MAR 86	RECEIVED 990 GALS OF 797 HYDR. OIL INPORT, NO SOUNDING TAKEN
		062100Z MAR 86	INPORT NO SOUNDING TAKEN
		072100Z MAR 86	INPORT NO SOUNDING TAKEN

DAILY FUEL USE

DFM	JP-5	DTG OF SOUNDING	REMARKS
2863	0	082100Z MAR 86	INPORT
			SOUNDING REPRESENTS TOTAL USAGE INF
13424	0	092100Z MAR 86	DEPART SYDNEY 090100Z MAR 86
16125	0	102100Z MAR 86	
14948	0	112100Z MAR 86	
10600	0	122100Z MAR 86	
9962	0	132100Z MAR 86	
9083	0	142100Z MAR 86	
14998	0	152000Z MAR 86	
10054	0	162000Z MAR 86	
12971	0	172000Z MAR 86	
35041	0	182000Z MAR 86	
13472	0	192000Z MAR 86	
22493	0	202000Z MAR 86	
10842	0	212000Z MAR 86	
13695	0	222000Z MAR 86	
13634	0	231900Z MAR 86	
17454	0	241900Z MAR 86	
18650	5015	251800Z MAR 86	TRANSFERRED 5015 GALS JP-5 TO FUEL TANK
22344	0	261800Z MAR 86	
15281	0	271800Z MAR 86	
19133	5000	281800Z MAR 86	TRANSFERRED 5000 GALS JP-5 TO FUEL TANK
6963	0	291800Z MAR 86	
12400	0	301800Z MAR 86	
10700	0	311700Z MAR 86	
18580	0	011700Z APR 86	
13398	0	021700Z APR 86	
7950	0	031700Z APR 86	
9800	0	041700Z APR 86	
6100	0	051700Z APR 86	ARRIVE SEATTLE 051748Z APR 86

SUMMARY OF MAJOR TRANSACTIONS

DATE	TRANSACTION	AMOUNT	TYPE	LOCATION
20 DEC	Offloaded	150,000	DFM	Palmer Station
20 JAN	Received	799,561	DFM	McMurdo Station
07 FEB	Offloaded	35,102	DFM	McMurdo Station
19 FEB	Received	6,600	9250 L/O	McMurdo Station
04 MAR	Received	391250	DFM	Sydney, Australia
05 MAR	Received	990	797	Sydney, Australia

USAGE

DATE	797	JP-5	9250	FUEL OIL
28-31 OCT	323	0	803	61391
01-30 NOV	1176	0	1683	210939
01-31 DEC	564	0	2527	259300
01-31 JAN	1570	30000	3558	462563
01-28 FEB	1824	0	2364	340426
01-31 MAR	644	10015	2707	375875
01-05 APR	60	0	650	55828
TOTAL	6161	40015	14292	1766322

HELICOPTER USE STATISTICS

DATE	MISC	TRAIN	ICE RECON	USER SUPPORT	FUEL (GALS)	REMARKS
851115		2.3			152	Ship Landings - Pilot
851119		1.8			120	Ship Training - LSO/Tie down
851126		4.9			325	Ship Training - LSO/Tie down
851226		1.2			94	Pilot Training - Warmup Flt.
860105	0.5			NSF/8.0	600	AVDET Deployment - McMurdo
860107	9.8			ARCTEC/ 1.0	750	Personnel, Cargo Transfer
860108	10.4			NSF/1.3	800	N-20 Project
860109	6.1			NSF/0.5	450	S-005
860110	3.5			NSF/3.7	500	S-043(3.2), K-041(0.5)
860111	2.7				185	Transport Congressional Party
860112	15.3				1060	SAR - SOUTHERN QUEST
860113	5.2				360	VIP Transport & Logistics
860114	3.5			NSF/2.7	430	K-041
860115	9.5			NSF/3.3 ARCTEC/ 1.0	955	S-004(2.6), N-20(0.7) Personnel Transfer
860116	3.9			NSF/6.0	685	K-041(4.0), S-004(1.0) N-20(1.0)
860117	6.2			NSF/3.4	665	K-041(1.2), S-004(2.2)
860118	1.1.2	0.3			785	Pilot Training
860119	5.7		5.9	ARCTEC/ 0.6	800	CNSFA, ARCTEC Personnel Transfer
860120	0.5			NSF/4.6	350	S-073
860121	2.7			NSF/2.8	380	S-048
860122			5.2	NSF/4.6	680	CNSFA,S-038(2.7),S-283(1.9)
860123	2.6			NSF/1.5	285	S-283(1.5)
860124	3.9	2.5		NSF/2.7	360	Pilot Training, S-073(1.7) K-021(1.0)
860125	0.1		3.0		215	CNSFA
860127	9.5				650	Logistics - POLAR STAR
860128	0.4				30	Personnel Transport
860129			1.0		70	CNSFA
860130	0.6		1.5		145	CNSFA
860131			1.1		75	CNSFA
860201				NSF/4.8	330	S-263(2.4), S-073(1.2) K-051(1.2)
860202				NSF/4.5	310	S-073(0.9), K-051(0.9) K-078(2.7)
860203				NSF/0.8	55	S-073(0.8)
860207	1.6				105	Personnel, Cargo Transfer
860210	0.3				20	Personnel, Mail Transfer

HELICOPTER USE STATISTICS

DATE	MISC	TRAIN	ICE RECON	USER SUPPORT	FUEL (GALS)	REMARKS
860212				NSF/0.8	50	S-073
860213				NSF/1.3	85	K-078
860216				NSF/1.9	125	S-073(1.0),K-014(0.9)
860217	3.8				250	Offload Science Equipment Transport oil on POLAR STAR
860218	0.3				20	Personnel Transport
860219			0.6		40	Ice Recon for POLAR STAR
860314	1.8				120	Maint. Test Flt.
860314		1.8			120	Pilot Training
860325	3.6				240	Personnel Transfer - Barbers Pt
860325	1.3				100	Maint. Test Flt.
860326	0.9				70	Personnel Transport
860328		0.9			70	Night Quals - Pilots, LSO's & Flt. Deck Crew.

UNITED STATES ANTARCTIC RESEARCH PROGRAM - PROJECT STUDIES

N-20	Black Island Project
S-004	Behavior and Ecology of Weddell Seals
S-005	Role of Glycopeptide Antifreezes in Freezing Avoidance of Antarctic Fishes
S-038	Growth, Photosynthesis and Carbon Metabolism of Phytoplankton in the Southern Ocean
S-043	Tropic Positions of Benthic Rhizopoda in Antarctic Communities
S-073	Volcanic Geology of Marie Byrd Land - West Antarctica
S-263	Boundary Layer Studies in Terra Nova Bay, Antarctica
S-283	Antarctic Automatic Weather Station: Operation and Data Analysis
K-014	Ecology Studies
K-021	Marshall Valley Project
K-041	Butter Point Project
K-051	Penguin Survey
K-078	Cape Hallett Station Replenishment