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United States Coast Guard

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From: Commanding Officer, USCGC HEALY (WAGB-20)
To: Commander, Coast Guard Pacific Area (Po)

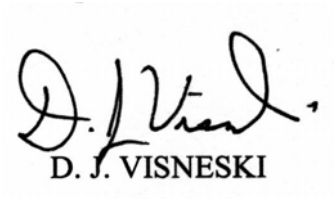
Subj: ARCTIC EAST SUMMER 2001 CRUISE REPORT

Ref: (a) Polar Icebreaker Cruise Reports, COMDTINST 16155.2B

1. This report is submitted in accordance with reference (a) and covers the period from 12 June to 20 December 2001.

2. HEALY completed two challenging science missions during AES '01. The first was the Arctic Mid-Ocean Ridge Exploration (AMORE) during which a comprehensive program of dredging, rock cores, water sampling and bottom mapping was completed along the Gakkel Ridge. The German R/V POLARSTERN worked in concert with HEALY during this phase. The second mission focused testing and evaluation of an Autonomous Underwater Vehicle (AUV) in first year and multi-year ice conditions. The AUV is the cornerstone for the Atlantic Layer Tracking Experiment (ALTEX). A significant amount of water sampling was conducted as an important element of the ALTEX program. Science of Opportunity support was also provided to NASA Jet Propulsion Lab, Naval Research Laboratory and the National Ice Center personnel so that ground truthing could be conducted of both existing and future ice imagery technologies . HEALY also completed Limited Team Training during the return transit working with training personnel from ATG PACNORWEST.

3. During Arctic East Summer, all science mission objectives were met or exceeded as HEALY firmly established its position as America's premier Arctic research vessel during this maiden scientific mission.



D. J. VISNESKI

Encl: (a) Arctic East Summer 2001 Cruise Report

Dist:

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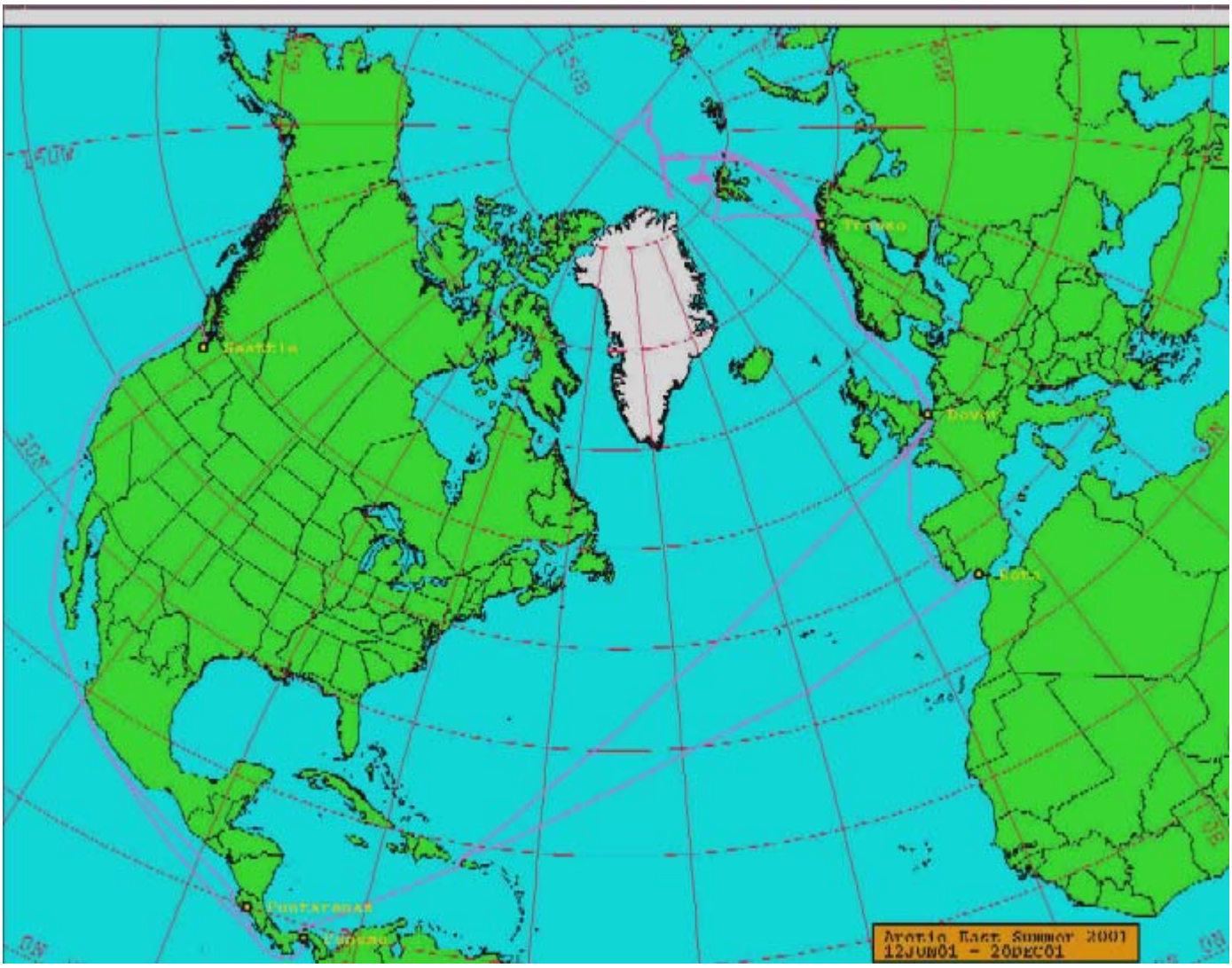
Commandant (G-OPN, G-OCU, G-OCA, G-SEN)	1 ea	National Science Foundation	1
Commander, Pacific Area (Po, Pof, Poo)	2 ea	Center for Polar and Scientific Archives	
Commander, Atlantic Area (Ao)	1	National Archives of the United States	1
MLCP (v, t)	1 ea	U.S. Army cold Regions Research and	
USCG Academy	1	Engineering Lab	2
Aviation Training Center (POPDIV)	1	Engineering Logistics Center (01, 02)	1 ea
USCGC POLAR STAR	2	NESU Seattle	1
USCGC POLAR SEA	2	ESU Seattle	1
Arctic Icebreaker Coordination Committee	10		

ARCTIC EAST SUMMER 2001



12 June 2001	Depart Seattle, WA
25 – 29 June 2001	Puntarenas, Costa Rica
1 July 2001	Panama Canal
16 – 22 July 2001	Dover, England
27-31 July 2001	Tromso, Norway
2 – 7 October 2001	Tromso, Norway
6-7 November 2001	Tromso, Norway
12 – 16 November 2001	Dover, England
20 – 24 November 2001	Rota, Spain
6 December 2001	Panama Canal
20 December 2001	Seattle, WA

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CHAPTER I - SHIP OPERATIONS

Summary

Pre-Deployment Preparations

Preparation for HEALY's first paid science missions began almost immediately upon return from the maiden voyage. After officially commissioning on 21 August 2001, HEALY entered 7 months of drydock and dockside availability's to correct warranty discrepancies and enhance habitability and functionality for the upcoming Arctic East Summer 2001 (AES 01) deployment. The most significant change related to science was the simplification of the science winch controls.

During the extended inport period we had several meetings with the primary investigators for each phase of AES 01. Phase one was to be 2 months of high latitude dredging and mapping on the Arctic Mid-Ocean Ridge (a.k.a. the Gakkel Ridge) while operating in company with the German research vessel/icebreaker POLARSTERN. Phase two was to be 1 month of testing of an Autonomous Underwater Vehicle (AUV) along the ice edge, as well as providing Science of Opportunity for ground truthing of some ice satellites. These meetings were invaluable to ensuring that we were ready to provide the service the PI's needed to make their projects successful.

In March 2001 we began a series of shakedown cruises to prepare for AES 01. During two and a half weeks in late-March and early-April we conducted engineering trials, all hands drills, helicopter operations, TACAN calibration and three days of intense training with ATG Everett. On 23 April we sailed from Seattle with members of the AICC along with Dr Peter Michael, Chief Scientist for the Gakkel Ridge mission, and Greg Kurras, who would use SeaBeam data to make the maps of the Gakkel Ridge. We conducted several days of surveying and dredging on the Gorda Ridge off the Oregon/California coast as "practice" for the Gakkel Ridge work. We initially had more problems with the winches, but after extensive troubleshooting we were able to certify the controls as ready for operations, which had been one of Dr. Michael's main concerns with Coast Guard deployment preparations. The prospective CO, XO and OPS were all able to sail with HEALY on these two trips, which ensured continuity at the senior level where potentially there could have been none for such a significant mission as AES 01. Upon completion of dredging operations, HEALY made her first ever stop in San Francisco to participate in several Coast Guard Foundation events.

Upon arrival back to Seattle on 8 May 2001 we focused primarily on preparation for the change of command on 5 June 2001 and our subsequent departure one week later. During this time we completed a massive on-load of supplies, stores and science gear necessary for the deployment.

Seattle, WA - Puntarenas, Costa Rica

HEALY departed ISC Seattle at 0700 on 12 June 2001 marking the beginning of AES 01. Our first stop was Manchester fuel pier. After bunkering approximately 900,000 gallons of fuel we departed Manchester at 0800 on 13 June 2001 en route to Puntarenas, Costa Rica. We experienced extremely good weather for the duration of the trip. We took advantage of the transit time to conduct drills, all hands general military training, and took a few opportunities to stop and exercise the trawl/core winch. After considerable discussion with our Puntarenas agent, the Embassy and a local pilot we decided to anchor vice mooring at the

newly constructed cruise ship pier. Apparently the pier was built perpendicular to the tidal currents and other ship's mooring there have reported significant problems with strong beam currents. As we were approaching the anchorage we launched one of our RHIB's to pickup a pilot and tour guides.

Costa Rica

We anchored approximately 3NM northwest of La Punta in approximately 80 feet of water. This area provided excellent holding ground. During the four day stay we swung back and forth on the incoming and outgoing tides. Tidal currents of up to 2.5 knots were common but the ship rode well. We rigged the accommodation ladder and used the new LCVP to conduct liberty runs to Puntarenas. The LCVP completed the round trip in about 30 minutes. We ran several runs per day and the whole operation worked well. However, if given the chance to do it again, we would recommend anchoring a little closer to La Punta to cut down of the length of the boat runs.

USCGC HEALY anchored off Puntarenas, Costa Rica

Costa Rica - Panama Canal

We weighed anchor mid-morning on 29 Jun en route to the Panama Canal. Once again weather was very good and we arrived at the Pacific side of the Canal at 0600, 01 July. We were directed to anchor and did so in the anchorage SE of the entrance. After a visit from the Panama Canal Commission, we took a pilot aboard at 1500 and commenced HEALY's first ever transit of the Panama Canal. Our pilot was very professional and took control of the conn shortly after we raised the anchor. The transit was fairly uneventful with the exception of minor damage to the hero platform when the starboard quarter made contact with a lock wall. We finished the transit around midnight and began our transit across the Atlantic.

Panama Canal - Dover, England

After departing the canal we headed straight for the Mona Passage to rendezvous with AVDET 151. We experienced some unusually rough weather in the southern Caribbean, with winds in excess of 40 knots and seas on the bow up to 15-18 feet. We arrived in the Mona Passage on the morning of 5 July and conducted 8 landings to get all the gear and

AVDET aboard. After securing the helicopters we began a 3500 NM great circle route to the English Channel. Again, we experienced nice weather for most of the trip and took several opportunities to stop and conduct winch operations. We also completed several day and night helicopter landings. Upon entering the English Channel traffic increased significantly. It was not uncommon to be tracking over 20 contacts at a time. As we approached Dover it was necessary to cross the oncoming traffic lane. Heavy traffic was encountered, complicated by the large number of ferries that transit in and out of Dover. We made our way to the pilot pickup point, embarked the pilot and proceeded into the Eastern entrance. We moored portside to the eastern end of cruise ship terminal number 2. The range of tide was more significant than we had ever experienced on HEALY so we had to rig a 50ft brow, provide by the Port of Dover to the flight deck. It was not possible to rig our accommodation ladder because at low tide the 01 deck was several feet below the pier deck.

Dover, England - Tromso, Norway
The trip from Dover to Tromso was uneventful.

Phase 1 - Science (AMORE)
In Tromso, we embarked the scientists for the AMORE mission (HLY-01-02) and conducted our in brief. We also met with R/V POLARSTERN ship's officers to establish procedures for operations of the two ships in company. It was agreed that HEALY would lead POLARSTERN from the ice edge up to the Gakkel Ridge so that POLARSTERN could tow its seismic array. Beyond that, it was agreed that whenever the ships were transiting together they would take turns leading in order to share the wear and tear on crewmembers and equipment from continuous icebreaking. Since we were departing Tromso via different fjords (POLARSTERN to the north and HEALY to the west due to being too high to go under Tromso's bridge) we obtained from POLARSTERN a chart printout showing their intended track to the ice edge. When we showed them our intended route, they insisted that the two ships should travel east of Kvitoya Island not west of it as we were intending. As they had more experience in the area, we agreed to travel with them up the east side (more on this later). At Dr Michael's request, we delayed sailing by one day so that the science party and ship's crew could attend a traditional pre-mission reception aboard POLARSTERN.

We encountered 20-25 ft head seas when we departed Tromso into the Norwegian Sea, however HEALY rode quite well through it. The seas abated after two days and we rendezvoused with POLARSTERN southeast of Svalbard. We then successfully tested our ship-to-ship wireless data link and conducted helo ops so scientists from both ships could further discuss their MOU. Shortly after these first meetings, we heard from our scientists that the POLARSTERN scientists wanted to change the game plan. We soon experienced that firsthand. POLARSTERN split off from us about 90 NM south of Kvitoya Island saying they wanted to do some equipment testing. They said they would remain close by. HEALY stayed on the track POLARSTERN had provided, heading around the east side of Kvitoya Island. To our surprise, POLARSTERN took the west side. When we asked why they had changed their mind, they said they had not. We knew by then that it was going to be interesting operating with them.

We reached the ice edge at 81-50N 030-00E. During the first 7-10 days, we continuously revised our procedures for conducting science operations with the science party as we worked to settle into a rhythm for escorting POLARSTERN through the ice for seismic work, conducting our own bottom mapping, plus identifying, setting up and completing dredge operations. We quickly adapted to the situation. A Senior Scientist of the Watch was established who had a direct link to the Conning Officer for identifying and setting up

dredge, core and CTD sights. Carrying out the objectives of the Science Party was however complicated by our Chief Scientist having to coordinate all efforts with the Chief Scientist on POLARSTERN. Fortunately, ice conditions early on usually permitted us to transit to and conduct science operations where our scientists wanted to go. The weather was good and the ice conditions required some set up work without having to resort to heavy icebreaking. To our surprise, we were asked to escort POLARSTERN much of the time that she was in transit with us. Even when we were in light ice, this often forced us to run two MDGs for safety when one would have been sufficient if we didn't have to worry about another ship coming up behind us while we occasionally backed and rammed. We freed POLARSTERN several times after she was beset while operating on her own or while following us at too slow of speed. We escorted POLARSTERN from the Gakkel Ridge to the Lomanosov Ridge while she towed her air guns, and then to the North Pole, where we arrived on 6 September and stopped briefly to stand on the ice and enjoy our achievement. We then took separate paths back to the Gakkel Ridge, and rejoined a few days later. Our AVDET deployed a new ARGOS data buoy in an ice floe to replace the dying JCAD-3 buoy for the University of Washington.

After the first 40 days of the cruise, ice conditions had become significantly tougher, and began to dictate our track line and dredge tracks. Drift of the ice pack also began to significantly affect dredges as we saw drift rates up to 0.75 knots. We had to navigate around a number of giant and vast floes. In addition, we had to transit more quickly to the west on several occasions than had been planned due to ice imagery showing a rapid closing in of the ice. RadarSat imagery obtained from the Naval Ice Center was a great help in getting from the Gakkel Ridge to the North Pole and back, and then out to the ice edge.

When we exited the ice edge on 28 September at 82-41N 027-59E, 50 NM north of where we had entered in August, we knew that the next mission, the ALTEX AUV testing, was going to be very challenging as daylight hours were waning rapidly at this latitude.

We had remained in the ice for 55 days, conducted detailed SeaBeam mapping of the undersea Gakkel Ridge which identified twelve new volcanoes, carried out 99 successful dredges and numerous wax cores that recovered over 8 tons of rock samples, and deployed the CTD to successfully locate four thermal vents.

Phase II – Science (Primary – ALTEX, S.O.O. - JPL/NIC)

After disembarking our AMORE scientists in Tromso, we embarked the science party for the funded ALTEX mission, headed by Dr Jim Bellingham, as well as personnel from NASA's Jet Propulsion Lab (JPL) and the Naval Ice Center (NIC) who would be aboard for science of opportunity ice imagery ground truthing. With permission from Norway, we then conducted a day of AUV testing in the protected waters of a fjord north of Tromso to verify that the onboard inertial navigation system would work at this high latitude. Then we proceeded to the ice edge above Svalbard, again proceeding up the east side of Svalbard, although this time we transited west of Kvitoya Island. Further testing of the AUV was conducted near the ice edge, although it was readily apparent that conditions would be difficult at best. Unlike the AMORE mission, we were never really able to establish a day to day routine on this mission. This was mainly due to the time of year this mission was conducted and the unusually high latitude of the ice edge this year. By the end of the first week, we no longer had any sunlight. After the first week, Dr Bellingham gave the JPL/NIC group two days of dedicated time to transit into the ice about 40 NM, where the JPL/NIC group took various physical samples and electronic measurements. The ALTEX group then took over again, conducting further AUV testing as weather permitted, and conducting CTD operations during

other times. In fact, we were quite surprised at the number of CTDs that ALTEX wanted to do.

Weather began to increasingly hamper operations. Useable twilight went from less than 8 hours daily at the beginning of the mission to 3 hours by the end. We had over a week in which the wind chill was from –30F to –60F, which precluded any use of boat crews in the RHIB. So while we made plans each evening for the next day's activities, most of those plans were "if weather allows", and for that one week weather didn't allow any AUV ops. Due to time constraints, the ALTEX team had consciously not brought with them a device that would allow recovery of the AUV without putting a small boat in the water to assist. This was unfortunate, as there could have been quite a few more days in which to conduct AUV operations. HEALY wanted to test a recovery method we thought would work (2 personnel properly outfitted in working basket hung from crane with AUV lifting bracket also attached to crane and dangling below basket). However, the AUV team decided to take a chance and wait on the weather instead. Weather did not improve, as expected, and thus no further AUV testing was conducted in the Arctic after 26 Oct. A final series of CTDs was conducted down the west side of Svalbard, and then HEALY returned to Tromso to disembark the Phase II participants. In the end, the ALTEX group completed most of their testing with the exception of the ice melting buoy launcher, which would not function properly. The JPL/NIC group received 3 dedicated days of support as well as close to 100 hours of support during the evening hours when ALTEX wasn't utilizing the ship.

Personnel Training

Several Officers of the Deck and Junior Officers of the Deck were broken in and qualified on this mission. For the OODs there was considerable experience gained in icebreaking in different ice conditions, finding leads in the fog (sometimes while escorting Polarstern at only 700 meters), finding or making leads for dredging operations, keeping ice away from the wire during dredging operations, working in close company with another ship (addressing navigation, coordination and comms issues), utilizing the Dynamic Positioning (DP) system, and, of course, working closely with scientists to get that perfect dredge, CTD or wax core completed.

Navigation

Nicoya Bay, Puntarenas, Costa Rica
Harbor Pilot Dieudonne Sibaja Alvarado embarked for entering Nicoya Bay early evening 24 Jun 01; no tug(s) were utilized. Anchorage approach on outgoing tide was approximately one hour after high tide. No tidal current data available other than general information from Sailing Directions. A 0.5 knot ebb current was observed in an ESE direction during transit. Approach to anchorage was relatively easy with narrowest part of channel 1.8 NM wide. Shifted to DP for final approach and anchored 3.3 NM west of La Punta at sunset in position 9-58.90N 084-54.49W in 91 feet of water to a gray sand bottom with 4 shots of chain on deck. Charted aids to navigation position checked by RASCAR radar and appeared to be on station and watching properly. P-Code GPS was used as primary sensor. Electronic chart BA 1931 and paper chart NOAA 21544 were used for the approach and anchorage. Predicted tides during period of port visit were accurate. Maximum currents observed during period of port visit were approximately 3 knots, flooding NW and ebbing ESE. Winds were generally variable, freshening in the late morning/early afternoon.

Departed Nicoya Bay late morning 29 Jun 01 en route Panama Canal. No pilot embarked/no tug(s) utilized for departure. Weighed anchor on outgoing tide mid-way between high and low tides. A 1.0 knot ebb current was observed during transit of the bay.

Panama Canal Transit - July

Arrived at Pacific Ocean entrance to Panama Canal early morning 01 Jul 01 and anchored 6 NM southwest of Balboa for vessel inspection. Embarked pilot Captain Pastor de Sedas and weighed anchor mid-afternoon to commence transit; no tugs utilized. Approach to entrance was made on out-going tide at mid-tide. A 1.0 knot ebb was observed at the entrance. Embarked second pilot Captain J. A. Ibarra prior to entering first lock. Transit of Miraflores Locks and Pedro Miguel Locks completed without incident. While entering Gatun Locks, stern of HEALY made contact on starboard side causing structural damage to "hero platform" used for A-frame. Pilots disembarked shortly after Gatun Locks in Cristobal Harbor. HEALY completed transit of Colon Harbor and stood into Atlantic Ocean en route Puerto Rico. Transit of canal was completed in approximately 8 hours.

HEALY enters the first lock of the Panama Canal

Dover, England - July

Transited Dover Strait and contacted Dover Pilots 6 hours and 2 hours prior to arrival. At pilot station 3 nautical miles east of breakwater on 17 July at 0700 local and embarked Pilot Captain Peter Weston from pilot boat. Dover Harbor was very busy with both commercial, private and ferry traffic. Dover Pilot assumed the conn prior to entering harbor and conned HEALY through the eastern entrance of breakwater and harbor to pier. Operations Officer assumed conn vicinity of Cruise Ship Terminal 2, and moored HEALY in DP Mode with assistance of tractor tug. A strong northerly set was experienced throughout the evolution due to wind and current. The transit and mooring were conducted on the incoming tide, approximately one hour before high tide.

Departed Dover late morning 22 July. Embarked Pilot Captain Nick Shearman who advised delaying getting underway due to strong currents in the harbor. A tractor tug was available and standing by throughout the evolution. HEALY was underway in DP mode on incoming

tide, approximately 1.5 hrs prior to high tide, and exited Dover Harbor via the eastern entrance of breakwater.

HEALY moored in Dover Harbor, England

Tromso, Norway (Olavsvern Naval Base) - July

On approach to Hekkingen checked in on channel 16 VHF-FM 12 hours prior to arrival at pilot station. Embarked Pilot Captain Vidar Olsen vicinity of Hekkingen. An early morning transit of approximately 34 NM was conducted through Malangen, Straumsfjorden and Ballsfjorden on the incoming tide with southwesterly winds 12 knots. The narrowest part of the transit was through Ryoystraumen (narrows) with a width of 400 yards and Ryoya Island to the south. The pilot directed HEALY to maintain track on southern side of channel on eastbound approach to narrows. Skallen Rock, with a charted depth of 8 meters, was left close aboard to starboard at the west entrance to Ryoystraumen. P-Code GPS was used as primary means of navigation, on British Admiralty electronic chart 3763 and NIMA paper charts 43124 and 43106.

Upon approach to pier at Olavsvern, shifted to DP and moored portside to. A tug was standing by but not utilized during the evolution. The uncharted Navy Base is approximately 1000 yards into Ramsfjorden on the north bank There are overhead cables spanning Ramsfjorden east of the pier that do not affect moorings. Predicted tides were accurate throughout the port visit.

The uncharted pier was determined to be at position 69-31.921N 019-01.274E. Depth along the pier at charted datum was 130 feet. The pier is 95.0 meters long (311 ft) with an orientation of 003 degrees True. The southern half of the pier is actually a concrete gangway pier. HEALY moored with stern flush at southern end of pier. HEALY projected forward of north end of pier approximately100 feet from bridge to bow. Remote bollards on shore were available for bow and stern lines. The forward remote bollard was approximately 140 feet forward of pier on shore, next to the entrance to the tunnel inside the mountain. The aft bollard was inset 110 feet perpendicular to southern end of pier on shore. The north end of the pier has 5 10-inch bollards. The finger pier has 4 12-inch bollards with a 16-inch bollard

at the southern end. There are three large, flat rubber fenders with flush alignment attached to the pier at north and south ends and in middle of pier. There are tire fenders running the length of the northern section of the pier, but they are slightly inset of fixed rubber fenders at end and middle. Vessels with a length of at least 175 ft should breast comfortably against the two attached rubber fenders on forward half of pier without utilizing gangway pier, other than for mooring lines. (See diagram)

HEALY departed Olavsvern en route the Arctic Ocean on 31 July at 2325 local at high tide with steady southwest winds of 30-35 knots (off the port quarter). Pilot Captain Vidar Olsen was embarked and a tug was standing by. Upon energizing HEALY's bowthruster, a 14 ft recreational boat moored inside the pier was capsized by the turbulence. HEALY secured the bowthruster and got underway from pier in DP Mode with the tug made fast forward. During the transit outbound on the outgoing tide, winds veered to the WNW, increased to 40-45 knots, and visibility reduced to 1-2 miles. The pilot disembarked via pilot boat in Malangen Strait and HEALY completed the remaining 17 NM transit to open water, standing into the Malangsdjupet around 0230 local.

Tromso, Norway (Olavsvern Naval Base) - October
Embarked Pilot Captain R. J. Sorensen vicinity of Hekkingen. An afternoon transit was conducted through Malangen, Straumsfjorden and Ballsfjorden on the incoming tide with easterly winds 10-12 knots. Again, the narrowest part of the transit was through Ryoystraumen (narrows) with a width of 400 yards and Ryoya Island to the south. The voyage was planned in order to transit the narrows at high tide/slack water. P-Code GPS was used as primary means of navigation, on British Admiralty electronic chart 3763 and NIMA paper charts 43124 and 43106.

Upon approach to pier at Olavsvern, shifted to DP and moored portside to. A tug was standing by but not utilized during the evolution. Final approach to the pier and mooring was conducted in Joystick Manual Heading Mode. The Joystick Auto Heading Mode was not used due to discrepancies between the DPS heading and gyrocompass heading.

HEALY departed Olavsvern en route the Arctic Ocean on 07 October at 1630 local. The transit was timed for high tide and available daylight. Winds were ENE at 10-15 knots. Pilot Captain Vidar Olsen was embarked and a tug was standing by. HEALY departed the pier in Joystick Manual Heading Mode, then shifted to Joystick Auto Mode once all lines were brought in and HEALY was away from the pier. The pilot disembarked via pilot boat in Malangen Strait and HEALY completed the remaining 15 NM transit to open water, standing into the Malangsdjupet around 1930. The majority of the transit was conducted during arctic twilight.

Tromso, Norway (Olavsvern Naval Base) - November
Embarked Pilot Captain I. Gabrielsen vicinity of Hekkingen. As on earlier transits to Tromso in July and October, attempted to contact pilot (as per Sailing Directions) twelve hours prior to arrival and regularly thereafter. No radiotelephone response was ever received and pilot simply appeared on time. A morning transit was conducted through Malangen, Straumsfjorden and Ballsfjorden on the outgoing tide with southeasterly wind 15-20 knots. Once again, the narrowest part of the transit was through Ryoystraumen (narrows) with a width of 400 yards and Ryoya Island to the south. The voyage was planned in order to transit the narrows at low tide/slack water with twilight/sunlight available. P-Code GPS was used as primary means of navigation, on British Admiralty electronic chart 3763 and NIMA paper charts 43124 and 43106.

The approach to pier at Olavsvern was made in DP using Joystick Manual Heading Mode. The Conning Officer shifted to Joystick Auto Heading Mode when alongside pier and moored portside to. A tug was standing by but not utilized during the evolution. HEALY had been prepared to moor further north in the fjord at the NATO "ammunition pier" due to supposed lack of pier space at regular pier, with a transit under overhead power cables with a reported height of 145 meters (information received from Naval Base). This proved unnecessary, as pier space was available upon arrival.

HEALY departed Olavsvern en route Dover, England, on 07 November at 1044 local. The transit was timed for low tide and available daylight. Winds were variable at 10-12 knots and visibility less than 01 nautical mile at times due to fog and snow. Pilot Captain T.C. Vevik was embarked and a tug was standing by. HEALY departed the pier with helmsman and lee helmsman, as per Conning Officer's preference. Upon clearing Ramfjorden and standing into Ballsfjorden, the Conning Officer shifted to Autopilot Mode. The pilot disembarked via pilot boat in Malangen Strait and HEALY completed the remaining 14 NM transit to open water, standing into the Malangsdjupet approximately 1340.

Dover, England - November

Transited Dover Strait early morning 12 November and contacted Dover Coast Guard on channel 11 VHF-FM as per Sailing Directions upon crossing northeast limit of CALDOVREP system. HEALY also contacted Dover Pilots channel 74 VHF-FM 6 hours and 2 hours prior to arrival. Embarked Pilot Captain N. Shearman from pilot boat approximately 01 NM west of pilot station (2 NM east of east breakwater entrance) at 0743. The Dover Pilot assumed the conn prior to entering harbor and conned HEALY through the eastern entrance of breakwater and harbor to the pier. HEALY's Conning Officer assumed the conn alongside of Cruise Ship Terminal 2, shifted to DP, and moored portside to using Joystick Auto Heading Mode. Two tugs were available but not utilized during the evolution. A strong northerly set was experienced throughout the evolution due to current. The transit and mooring were conducted on the incoming tide, during the hour prior to high tide, with mooring at high tide. Winds were westerly at 12 knots. As during HEALY's visit in July, the benefit of having of pilot with local knowledge of currents and harbor was very evident upon entering narrow breakwater entrance and transiting the harbor.

Embarked Pilot Captain N. Stokes and departed Dover late morning on the incoming tide approximately 30 minutes before high tide/slack water. Winds were northerly at 15 to 20 knots. The Conning Officer got underway from pier using helmsman and lee helmsman as recommended by the pilot. Due to our previous difficulty in July with getting HEALY away from the pier, this time a tug was made fast to starboard quarter and assisted in pulling the stern away from pier. Once underway, HEALY utilized the turning basin west of the pier to come about and departed the harbor via the Southern Breakwater entrance (recommended by the pilot to avoid ferry traffic crossing the Channel, since we were going to head south in the Channel). An additional tug was standing by forward of HEALY but was not utilized.

Having transited Dover Harbor on four different occasions, it is highly recommended to time mooring evolutions with the slack tide (approx. 30 minutes prior to slack for actual mooring and unmooring). The harbor buoy marking shoal water just north of the Southern Breakwater is a good indicator for speed and direction of current.

Rota, Spain (Rota Naval Station) - November
Set the Navigation and Anchor Details early morning 20 November for entering Rota, Spain. The approach through Bahia de Cadiz was easily conducted in darkness. All charted navigational aids appeared to be on station and watching properly. Fishing gear was present in the harbor and clearly marked by strobe lights. Winds were northeasterly at 20-25 knots and the transit was made approximately one hour before high tide. Contacted Rota Harbor Control channels 13/16 VHF-FM and embarked Pilot Captain Bill O'Neal vicinity of the sea buoy (at last turn prior to entering breakwater). No tugs were utilized. Entrance to the harbor is a 400 yard wide breakwater entrance (260 yards is navigable due to shoaling at east and west ends of breakwater entrance). There is an entrance range that was very visible throughout the approach with an occulting 3 second light over a quick flashing light watching properly. Once through the breakwater the harbor itself was unobstructed. The pilot had us keep good distance from the southern breakwater due to 9-meter depths which he said could cause bank suction effect if approached too closely.

The Conning Officer moored HEALY portside to Pier No. 1 with no difficulty, using DP in Joystick Auto Heading Mode. A set onto the pier was initially experienced due to wind, then somewhat counteracted by currents deflecting off the pier as final approach was made. The pilot mentioned that a tug was available for assistance at any time during the port visit while moored at Pier No. 1, and that the tug should be called whenever winds greater than 30 kts from the west are experienced (this did not occur during our stay).

Embarked Pilot Captain Palmer and departed Rota late morning 24 November at high tide with winds northeast 15-20 kts. HEALY used DP Joystick Auto Heading Mode to get underway from pier; no tugs were utilized. Upon backing into harbor basin, the Conning Officer shifted to helmsman and lee helmsman for remainder of transit through the harbor and breakwater entrance. Disembarked pilot via pilot vessel south of breakwater entrance and commenced transit to Panama Canal via Puerto Rico.

Panama Canal Transit - December
Arrived at Atlantic Ocean entrance to Panama Canal early morning 06 December for scheduled 1600R transit of canal. Directed by Cristobal Signal Station to anchor in west Limon Bay early afternoon for vessel and paperwork inspection prior to canal transit. HEALY entered the harbor through breakwater entrance on the outgoing high tide with winds NNE at 18 knots. The harbor was very crowded with vessels anchored and underway.

HEALY remained anchored for two hours. Embarked pilot Captain Jimmy Young and weighed anchor mid-afternoon en route Gatun Locks. No tugs were utilized throughout transit although one was standing by at all times if needed. A second pilot, Captain M.A. Santamsais, embarked prior to entering the first locks. The majority of the canal transit was made in darkness. Transit of Gatun Locks, Gaillard Cut, Pedro Miguel and Miraflores Locks were all made without incident. Eleven line handlers were embarked before entering and disembarked upon exiting each set of locks.

Pilot J.A. Young disembarked, along with the line handlers, shortly after Miraflores Locks. HEALY completed canal transit and stood into the Pacific Ocean at approximately 0200 local 07 December. After giving us information on inbound traffic that we might encounter, Pilot M.A. Santamsais disembarked upon reaching the entrance channel from the Pacific. The entire transit of the canal was completed in approximately 10 hours.

Seattle, Washington - December
Arrived Elliott Bay late morning 20 December on outgoing tide approximately 2 hours after high tide. Winds were northerly 10-15 knot. Embarked Pilot Captain Verne K. Justice at entrance to Elliott Bay. A tractor tug was standing by throughout the mooring evolution but was not utilized. Moored portside to Pier 37, Berth Delta utilizing DP.

DECK OPERATIONS

Pre-Deployment Preparations
Prior to departure from Seattle, Deck Force assisted the MST's with science cargo onload and preparation of the three cargo holds. All gear for the first two month phase was stowed in #2 hold, all cargo for the second phase was stowed in #3 hold, and most of the ship's extra science gear was located in #1 hold. Deck Force also assisted other divisions as needed with crane operations.

Seattle, WA - Puntarenas, Costa Rica
During the transit to Costa Rica, Deck Division worked with the DC's to get the H-Frame for the accommodation ladder modified. The original design was not correct and therefore would not fit on the accommodation ladder. The DC's corrected those mistakes. Further preparations for the Costa Rica port call were conducted including. setting up the lower platform, getting a sling that would lift the accommodation ladder with the lower platform and the H-Frame.

During the Costa Rica port call, the ship anchored out and the LCVP was used for liberty runs. Upon arrival to Costa Rica, the ship was anchored just before sunset at which time Deck Force commenced rigging the accommodation ladder with the H-Frame. This procedure started around 1800. First the accommodation ladder J-Bar Davit was moved from the starboard side to the port side where the accommodation ladder was to be rigged. The accommodation ladder with the lower platform attached was than lowered to the 02 and set on foam blocks. The H-Frame was than lowered to the 02 deck. The H-Frame was attached to the lower platform by being lifted with the 04 crane. Once attached, the platform was raised to the position that would be needed for when lowered to the water. Once everything was set up, the accommodation ladder was than lowered to its mounting position on the 01 deck using the 04 crane. When bolted to the deck, the J-Bar davit was attached and the 04 crane released. The accommodation ladder was lowered to about 4 feet above the water in approximate position for the LCVP. The H-Frame was too much weight for the accommodation ladder so a sling was attached to the outboard forward arm of the H-Frame and the 04 crane to provide requisite stability. This was the first time the H-Frame had been used with the accommodation ladder. This evolution was completed around 0030.

The LCVP was then lowered to the water the following morning. The duty BM was duty Coxswain each of the four days. A schedule was set up throughout the day for the runs with additional runs as needed. All four days went smooth and safely and the LCVP provided an excellent form of transportation to and from the ship for the crews liberty.

The morning of departure, a final liberty run was made and than the accommodation ladder and LCVP were secured. This tearing down of the accommodation ladder took about one hour to complete. Once done, than Deck Force raised the anchor.

Costa Rica - Portsmouth, England
During the day and a half transit to the Panama canal, Deck Force brought the canal bits and chock from the #1 cargo hold to the fantail and secured in place. There were two sets of bits that were bolted on deck fore and aft just to the port and starboard of centerline and one chock that was bolted aft centerline between the A-Frame. The cargo lift, electric pallet jack, 04 crane, and port fantail crane were used to accomplish this. The bolt holes in the deck had not been used since the shipyard at Avondale and required work to clean them out for the bolts to work. With the help of the MST's and DC's this was completed in half a day.

Six mooring lines were required on both the fantail and focsle. During the transit through the Panama Canal, all line handling work was done by the Canal authorities and Deck Force stood by in case mooring lines were needed or the anchor needed to be dropped. Once through the canal, all mooring lines were stowed and the canal bits and chock were placed in the #1 cargo hold until needed on the return trip home.

Bitts & Chocks Being Moved Into Place

Location of Bitts & Chocks for Canal

Portsmouth, England - Tromso, Norway
During the Tromso inport, Deck Force assisted the MST's to bring science gear on board and stowed in the cargo holds.

Phase 1 Science (AMORE)
During the Phase 1 Science mission, Deck Force occasionally assisted the MST's on the fantail with CTD casts.

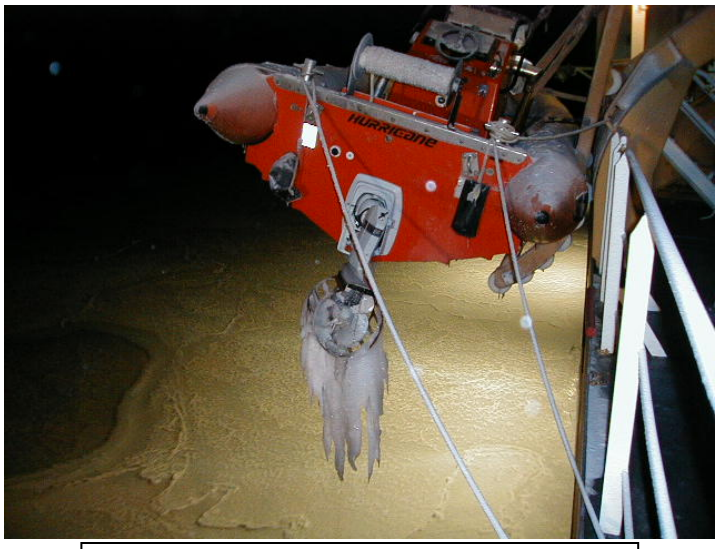
Phase 2 Science (Primary – ALTEX, S.O.O. - JPL/NIC)
During the Phase 2 Science Mission, Deck Force handled all crane ops on the fantail that consisted of placing and recovering the AUV and ROV into the water and putting personnel on the ice to collect ice core samples. A bear watch was also supported by Deck Force whenever personnel were on the ice. HEALY 2 was the primary small boat that was used to assist in the launch, station keeping, and recovery of the AUV. As it got later in the month of Oct, temperatures that were consistently below zero with a wind chill factor of more that -40 deg. F caused the RHI to not run well. Warm water and heat blowers were hooked up to the engine and engine compartment to try to keep the engine running but the RHI would not run well and was no longer available. This restricted the ability to be able to deploy the AUV any further.

AUV Recovery Operations

Tromso, Norway - Seattle

During the port call in Dover, the spare cyclo converter was craned on board. Due to the distance from the pier the crane could just barely get the cyclo on the fantail. With the assistance of Engineering personnel, both the port and starboard cranes were used to maneuver the cyclo into the aft staging area for the transit back to Seattle.

The Panama Canal chock and bits were also placed back on deck and bolted down in preparation for the Canal transit. This was done during the Dover port call so that there would not be any delays due to weather. During this transit of the Panama Canal the line handlers opted to use the chocks installed on the stern quarters rather than the centerline stern chock.



RHI in Extreme Wind Chill Conditions

1200 POSITIONS

DATE/TIME	1200 POSITION	DAILY NM	CUMULATIVE
120720T JUN 01	DPT SEATTLE, WA	0.0	0.0
120924T JUN 01	ARR MANCHESTER, WA	9.4	9.4
130817T JUN 01	DPT MANCHESTER, WA	0.0	9.4
131200T JUN 01	48-05.9N 122-38.6W	207.7	217.1
141200T JUN 01	44-37.1N 125-10.2W	332.6	549.7
151200T JUN 01	39-17.4N 124-23.1W	335.1	884.8
161200T JUN 01	34-41.2N 121-25.7W	312.0	1196.8
171200T JUN 01	30-09.0N 117-32.9W	342.5	1539.3
181200T JUN 01	25-35.2N 113-49.7W	340.5	1879.8
191200T JUN 01	21-40.3N 109-29.1W	341.7	2221.5
201200T JUN 01	19-08.6N 105-26.3W	251.4	2472.9
211200S JUN 01	16-32.3N 100-44.4W	340.5	2813.4
221200S JUN 01	14-29.6N 096-08.7W	301.0	3114.4
231200S JUN 01	12-06.1N 090-50.0W	335.1	3449.5
241200S JUN 01	09-46.9N 085-43.1W	0.0	3449.5
241813S JUN 01	ARR PUNTARENAS, CR	244.8	3694.3
291005S JUN 01	DPT PUNTARENAS, CR	0.0	3694.3
291200S JUN 01	09-43.7N 084-45.3W	178.5	3872.8
301200S JUN 01	07-00.0N 080-40.6W	259.3	4132.1
011200R JUL 01	08-51.9N 079-29.0W	103.8	4235.9
021200R JUL 01	11-07.0N 077-38.1W	312.5	4548.4
031200R JUL 01	13-47.8N 073-50.1W	266.2	4814.6
041200Q JUL 01	16-34.6N 069-50.8W	289.6	5104.2
051200Q JUL 01	18-30.8N 067-18.2W	224.6	5328.8
061200Q JUL 01	22-40.9N 063-10.8W	377.4	5706.2
071200Q JUL 01	27-05.4N 058-20.7W	378.7	6084.9
081200Q JUL 01	31-18.8N 053-08.0W	384.1	6469.0
091200Q JUL 01	35-24.9N 047-16.0W	325.5	6794.5
101200P JUL 01	38-24.8N 042-15.6W	312.1	7106.6
111200O JUL 01	41-06.0N 036-59.7W	292.4	7399.0
121200O JUL 01	43-33.9N 031-13.1W	326.4	7725.4
131200N JUL 01	45-54.2N 024-20.1W	328.2	8053.6
141200Z JUL 01	47-39.9N 017-39.7W	287.0	8340.6
151200Z JUL 01	49-01.7N 010-02.1W	329.4	8670.0
161200Z JUL 01	49-49.7N 002-56.3W	255.9	8925.9
170820A JUL 01	ARR DOVER, ENGLAND	68.8	8994.7
221140A JUL 01	DPT DOVER, ENGLAND	171.0	9165.7
231200A JUL 01	55-57.8N 003-54.8E	336.4	9502.1
241200A JUL 01	61-40.3N 004-05.2E	344.8	9846.9
251200A JUL 01	66-13.5N 009-20.3E	261.8	10108.7
261200B JUL 01	69-35.3N 015-21.5W	199.2	10307.9
270756B JUL 01	ARR TROMSO, NORWAY	80.0	10387.9
312325B JUL 01	DPT TROMSO, NORWAY	4.7	10392.6

011200B AUG 01	70-58.8N 019-32.7E	243.5	10636.1
021200A AUG 01	74-35.3N 027-19.1E	262.6	10898.7
031200Z AUG 01	78-57.7N 032-51.8E	277.1	11175.8
041200Z AUG 01	82-07.0N 028-40.6E	168.5	11344.3
051200Z AUG 01	84-09.6N 023-32.2E	130.4	11474.7
061200Z AUG 01	85-37.5N 016-26.3E	110.4	11585.1
071200Z AUG 01	85-21.5N 013-32.2E	68.1	11653.2
081200Z AUG 01	84-52.4N 006-54.7E	54.8	11708.0
091200Z AUG 01	84-25.7N 002-04.2E	82.8	11790.8
101200Z AUG 01	84-09.4N 000-30.8E	48.9	11839.7
111200Z AUG 01	83-31.7N 003-51.4W	105.4	11945.1
121200Z AUG 01	82-55.1N 006-19.9W	70.9	12016.0
131200Z AUG 01	82-54.5N 006-13.4W	47.7	12063.7
141200Z AUG 01	83-21.1N 005-13.0W	66.9	12130.6
151200Z AUG 01	83-30.4N 004-05.1W	48.8	12179.5
161200Z AUG 01	83-40.5N 002-50.2W	41.2	12220.7
171200Z AUG 01	83-52.8N 001-48.0W	35.9	12256.6
181200Z AUG 01	83-52.7N 001-54.9W	69.0	12325.6
191200Z AUG 01	84-12.6N 000-02.5W	70.1	12395.6
201200Z AUG 01	84-31.3N 002-34.3E	40.0	12435.6
211200Z AUG 01	84-47.4N 004-18.2E	52.0	12487.6
221200Z AUG 01	85-02.8N 008-09.2E	53.9	12541.5
231200Z AUG 01	85-30.8N 014-46.5E	50.2	12591.7
241200Z AUG 01	85-16.2N 012-33.8E	58.2	12649.9
251200Z AUG 01	85-25.1N 013-31.1E	55.7	12705.6
261200Z AUG 01	85-48.6N 021-15.3E	60.9	12766.5
271200Z AUG 01	86-00.6N 025-33.9E	49.0	12815.5
281200Z AUG 01	86-02.6N 031-31.3E	42.4	12857.9
291200Z AUG 01	86-17.9N 037-15.1E	69.6	12927.5
301200Z AUG 01	86-17.9N 07-15.1E	54.6	12982.1
311200Z AUG 01	86-40.7N 049-07.6E	54.9	13037.0
011200Z SEP 01	87-02.8N 058-55.8E	60.6	13097.6
021200Z SEP 01	86-33.1N 067-36.1E	79.7	13177.3
031200Z SEP 01	86-16.0N 071-50.1E	62.2	13239.7
041200Z SEP 01	87-36.5N 081-59.0E	113.3	13353.9
051200Z SEP 01	88-54.2N 114-59.9E	101.7	13455.6
061200Z SEP 01	90-00.0N	77.3	13532.9
071200Z SEP 01	88-47.3N 087-19.1E	111.0	13643.9
081200Z SEP 01	87-21.9N 088-21.8E	89.1	13733.0
091200Z SEP 01	85-58.1N 086-27.8E	81.2	13814.2
101200Z SEP 01	85-38.8N 084-15.9E	28.6	13842.8
111200Z SEP 01	85-31.8N 084-40.7E	50.5	13893.3
121200Z SEP 01	86-14.8N 076-11.9E	89.6	13982.9
131200Z SEP 01	86-40.7N 067-34.5E	48.1	14031.0
141200Z SEP 01	86-48.4N 064-25.4E	50.6	14081.6
151200Z SEP 01	86-57.6N 057-23.8E	59.0	14140.6

161200Z SEP 01	86-53.7N 054-08.7E	43.4	14184.0
171200Z SEP 01	86-48.9N 049-45.1E	40.5	14224.5
181200Z SEP 01	86-36.8N 044-49.4E	40.5	14265.0
191200Z SEP 01	86-26.7N 039-51.0E	35.3	14300.3
201200Z SEP 01	86-18.6N 038-42.2E	35.6	14335.6
211200Z SEP 01	86-17.5N 035-32.2E	32.2	14367.8
221200Z SEP 01	86-06.4N 033-29.7E	48.6	14416.4
231200Z SEP 01	86-08.7N 031-50.9E	39.8	14456.2
241200Z SEP 01	86-01.9N 026-35.9E	30.6	14486.8
251200Z SEP 01	85-54.2N 023-17.8E	60.2	14547.0
261200Z SEP 01	85-05.0N 020-44.4E	106.1	14653.1
271200Z SEP 01	83-51.1N 028-05.8E	93.7	14746.8
281200Z SEP 01	81-50.9N 028-39.2E	220.4	14967.2
291200A SEP 01	78-10.4N 031-09.9E	229.7	15196.9
301200B SEP 01	74-42.5N 024-38.7E	252.5	15449.4
011200B OCT 01	71-35.8N 019-55.8E	143.2	15592.6
021200B OCT 01	69-44.3N 017-48.0E	62.4	15655.0
021602B OCT 01	ARR TROMSO, NORWAY	41.8	15696.8
071630B OCT 01	DPT TROMSO, NORWAY	86.2	15783.0
081200B OCT 01	70-00.7N 020-18.6E	153.6	15936.6
091200B OCT 01	73-45.5N 024-33.4E	354.0	16290.6
101200B OCT 01	79-08.7N 032-07.9E	255.5	16546.1
111200B OCT 01	81-32.7N 030-40.9E	109.8	16655.9
121200B OCT 01	81-51.4N 025-30.9E	94.8	16750.7
131200B OCT 01	81-50.0N 021-43.2E	32.7	16783.4
141200B OCT 01	82-12.9N 015-06.9E	92.4	16875.8
151200B OCT 01	82-41.0N 012-11.3E	28.1	16903.9
161200B OCT 01	82-36.6N 011-16.8E	18.0	16921.9
171200B OCT 01	82-36.0N 012-05.0E	12.6	16959.6
181200B OCT 01	82-24.2N 011-55.9E	48.3	17007.9
191200B OCT 01	81-39.4N 012-36.7E	58.4	17066.3
201200B OCT 01	81-52.4N 013-43.1E	79.4	17145.7
211200B OCT 01	81-48.8N 014-38.9E	70.6	17216.3
221200B OCT 01	81-31.0N 015-24.8E	68.4	17284.7
231200B OCT 01	80-50.3N 016-24.7E	52.8	17337.5
241200B OCT 01	81-01.2N 016-03.3E	86.7	17424.2
251200B OCT 01	81-14.2N 015-39.2E	44.2	17468.4
261200B OCT 01	81-07.1N 015-34.2E	24.7	17493.1
271200B OCT 01	81-29.7N 018-23.3E	62.3	17555.4
281200B OCT 01	81-03.8N 019-46.9E	54.0	17609.4
291200B OCT 01	80-57.3N 017-38.8E	98.1	17707.5
301200B OCT 01	80-28.5N 011-52.9E	74.3	17781.8
311200B OCT 01	79-09.8N 009-15.4E	106.7	17888.5
011200B NOV 01	78-51.6N 004-47.7E	61.2	17949.7
021200B NOV 01	78-47.4N 000-17.5E	76.6	18026.3
031200B NOV 01	77-17.1N 006-20.8E	233.0	18259.3

041200A NOV 01	73-17.2N 015-53.7E	278.3	18537.6
051200A NOV 01	70-26.0N 020-42.7E	174.3	18711.9
061211A NOV 01	ARV TROMSO, NORWAY	118.1	18830.0
071044A NOV 01	DPT TROMSO, NORWAY	0.0	18830.0
071200A NOV 01	69-32.0N 018-32.4E	181.4	19011.4
081200A NOV 01	65-36.6N 008-37.1E	381.3	19392.7
091200A NOV 01	60-11.3N 004-03.0E	321.7	19714.4
101200A NOV 01	56-00.5N 003-55.1E	209.2	19923.6
111200Z NOV 01	53-03.0N 002-37.7E	176.7	20100.3
120822Z NOV 01	ARV DOVER, ENGLAND	52.8	20153.1
161109Z NOV 01	DPT DOVER, ENGLAND	0.0	20153.1
161200Z NOV 01	51-00.2N 001-18.3E	196.0	20349.1
171200Z NOV 01	47-41.2N 006-22.5W	387.0	20736.1
181200Z NOV 01	41-57.3N 009-55.7W	365.3	21101.4
191200Z NOV 01	37-00.3N 009-14.5W	226.6	21328.0
200828A NOV 01	ARV ROTA, SPAIN	55.2	21383.2
241105A NOV 01	DPT ROTA, SPAIN	0.0	21383.2
241200A NOV 01	36-34.1N 006-26.7W	209.5	21592.7
251200Z NOV 01	36-09.9N 014-32.9W	410.8	22003.5
261200N NOV 01	35-11.0N 022-42.1W	387.7	22391.2
271200N NOV 01	33-44.8N 030-16.5W	402.9	22794.1
281200O NOV 01	31-47.5N 037-48.1W	397.5	23191.6
291200P NOV 01	29-27.0N 044-50.0W	372.2	23563.8
301200P NOV 01	26-57.1N 051-08.4W	394.2	23958.0
011200Q DEC 01	23-59.1N 057-31.7W	390.1	24348.1
021200Q DEC 01	20-46.2N 063-6.5W	375.9	24724.0
031200Q DEC 01	18-17.9N 067-28.3W	326.7	25050.7
041200R DEC 01	14-18.2N 073-06.6W	390.0	25440.7
051200R DEC 01	10-24.3N 078-38.3W	284.7	25725.4
061200R DEC 01	09-29.5N 080-00.2W	121.8	25847.2
071200R DEC 01	06-59.9N 080-48.6W	362.5	26209.7
081200R DEC 01	09-26.4N 086-46.4W	419.9	26629.6
091200S DEC 01	12-21.9N 092-45.8W	312.6	26942.2
101200S DEC 01	14-46.0N 097-19.7W	365.6	27307.8
111200S DEC 01	17-41.0N 102-59.8W	389.1	27696.9
121200T DEC 01	21-13.2N 108-44.5W	368.4	28065.3
131200T DEC 01	25-20.3N 113-37.9W	360.8	28426.1
141200U DEC 01	26-17.0N 114-24.0W	279.1	28705.2
151200U DEC 01	32-51.1N 119-50.0W	224.8	28930.0
161200U DEC 01	36-25.4N 122-46.9W	279.3	29209.3
171200U DEC 01	40-23.5N 125-01.0W	231.6	29440.9
181200U DEC 01	44-21.1N 125-04.0W	248.9	29689.8
191200U DEC 01	48-27.7N 124-42.8W	220.6	29910.4
201216U DEC 01	ARV SEATTLE, WA	96.6	30007.0

CHRONOLOGY OF MAJOR EVENTS

DATE	TIME	EVENT
12Jun01	0720T	Underway from Seattle, WA enroute Manchester, WA
	0924T	Moored Manchester, WA. Took on fuel.
13Jun01	0817T	Underway from Manchester, WA, en route Puntarenas, Costa Rica.
18Jun01	2310T	Stood into Tropic of Cancer southbound in position 23-26.3N 112-09.1W.
20Jun01	1500T	Advanced ship's clocks one hour to conform with +6S ZD.
24Jun01	1814S	Anchored Nicoya Bay, Puntarenas, Costa Rica
29Jun01	1005S	Weighed anchor Nicoya Bay, enroute Panama Canal
30Jun01	1500S	Advanced ship's clocks one hour to conform with +5R ZD.
01Jul01	0623R	Anchored 6 NM Southwest of Balboa, Panama, awaiting Panama Canal transit. Vessel inspection of HEALY was conducted by Panamanian officials.
	1510R	Weighed anchor and commenced Panama Canal transit - Balboa, Panama.
	2326R	Completed Panama Canal transit - Colon Harbour, Panama. Stood into Caribbean Sea, Atlantic Ocean, en route Puerto Rico.
03Jul01	1500R	Advanced ship's clocks one hour to conform with +4Q ZD.
05Jul01	1118Q	Conducted helo ops off Point Borinquen, Puerto Rico. Embarked AVDET 151 (CG 6559 and CG 6515).
09Jul01	1500R	Advanced ship's clocks one hour to conform with +3P ZD.
10Jul01	1500P	Advanced ship's clocks one hour to conform with +2O ZD.
12Jul01	1500O	Advanced ship's clocks one hour to conform with +1N ZD.
13Jul01	1500N	Advanced ship's clocks one hour to conform with 0Z ZD.
16Jul01	1500Z	Advanced ship's clocks one hour to conform with -1A ZD.
	2154A	Stood into Eastern Hemisphere eastbound at latitude

		50-20.8N.
17Jul01	0820A	Moored Dover, England.
22Jul01	1140A	Underway en route Tromso, Norway.
25Jul01	1430A	Crossed Arctic Circle northbound in position 66-33.7N 009-54.7E
	1500A	Advanced ship's clocks one hour to conform with -2B ZD.
27Jul01	0756B	Moored Olavsvern Naval Base, Tromso, Norway.
29Jul01	1330B	CG technicians installed LOS comms equipment aboard Polarstern enabling scientists to pass data back and forth to each other.
30Jul01	1000B	Held inbrief for Gakkel Ridge science party onboard HEALY.
	1300B	Officers and CPOs met with Polarstern counterparts to develop joint ship and helicopter operating procedures for Gakkel Ridge project.
31Jul01	1600B	Officers, CPOs and scientists attended pre-departure reception aboard Polarstern.
31Jul01	2325B	Underway for Gakkel Ridge mission (AMORE)
01Aug01	2300B	Retarded ship's clocks one hour to conform with -1A ZD.
02Aug01	1200B	Rendevous with Polarstern in position 74-35.3N 027-19.1E.
	2300A	Retarded ship's clocks one hour to conform with +0Z ZD.
03Aug01	0705Z	First ice (bergy bit) sighted in position 78-09.8N 031-42.5E.
04Aug01	0135Z	Stood into Arctic Ocean in position 81-00.0N 031-32.7E.
	0600Z	Entered ice edge, 7/10 brash/pancake floe, in position 81-34.2N 029-52.0E.
	1000Z	Commenced icebreaking escort in position 81-55.7N 029-04.2E, for R/V POLAR STERN conducting underwater seismic and bathymetric survey.
06Aug01		Arrived Gakkel Ridge.
23Aug01	1415Z	Hove to in ice in position 85-33.5N 015-22.1E for Ice Party with German R/V POLARSTERN and Swedish R/V ODEN.

04Sep01		Departed Gakkel Ridge en route Lomanosov Ridge.
06Sep01	1012Z	HEALY reached Geographic North Pole. Hove to for Ice Party with German R/V POLARSTERN.
	1525Z	Departed North Pole en route Gakkel Ridge.
09Sep01		Returned to Gakkel Ridge.
14Sep01	1400Z	Hump Day Celebration.
25Sep01		Completed Gakkel Ridge operations. Broke POLARSTERN free from ice and commenced ice escort southbound.
26Sep01	0800Z	Commenced Initiation Rites for Realm of the Arctic in position 85-13.1N 020-46.5E.
27Sep01	0800Z	Concluded Initiation Rites for Realm of the Arctic.
27Sep01	1200Z	Hove to in ice in position 83-51.0N 028-02.7E for Ice party with German R/V POLARSTERN.
	2306Z	Completed escort of R/V POLARSTERN in position 83-31.0N 027-28.3E.
28Sep01	0724Z	Departed ice edge in position 82-41.4N 027-59.3E.
	1500Z	Advanced ship's clocks one hour to conform with –1A ZD.
29Sep01	1500A	Advanced ship's clocks one hour to conform with -2B ZD.
02Oct01	1602B	Moored Olavsvern Naval Base, Tromso, Norway. Completed mission HY-01-02.
02-06Oct 01		Disembarked AMORE science party and equipment.
		Embarked science personnel for Mission HY-01-03 (AES 01 Phase 2), to conduct testing of autonomous underwater vehicle (AUV) from Monterey Bay Aquarium Research Institute (MBARI) and, as AUV ops permit, to conduct ground truthing of ice imagery satellites for NASA's Jet Propulsion Lab (JPL) and the Naval Ice Center (NIC). Conducted science party inbrief.
		Embarked CNN correspondent documenting USCG support of Arctic science operations.
07Oct01	1630B	Underway from Tromso en route AUV operations.
08Oct01:		Transited 100 NM up Norwegian coast, then down into Ullsfjorden fjord. Conducted sheltered water tests of AUV,

ROV and tracking equipment with approval of Norwegian govt. Scientists experienced problems with AUV ballasting and with tracking equipment.

09Oct01: Enroute ice edge above Svalbard.

10Oct01: Conducted AUV inertial nav. sys tests and shipboard DF calibrations.

11Oct01: Conducted 05 CTD casts. Conducted helo ops for ice recon.

12Oct01: Arrived at ice edge and transited 10 NM into it. Conducted tests of ROV under the ice. JPL/NIC group also collected ice samples. Conducted 03 CTD casts.

13Oct01: ALTEX group: conducted night ROV testing under ice, and day AUV testing in open water. Conducted 01 CTD cast for comparison of water column data to that gathered by AUV.

JPL/NIC group: collected pancake ice sample and then remained w/in ice edge for evening to permit data gathering.

14Oct01: ALTEX group: worked on AUV since sea conditions unfavorable. Dr Bellingham traded this day to JPL/NIC team.

JPL/NIC group: transited 10 NM in and back out of ice edge last night to enable collection of data and ice samples, then transited along ice edge until morning logging visual observations. Transited 40 NM into ice to locate large multi-year floe for further data and sample collection.

15Oct01: JPL/NIC group: collected various measurements and ice samples from 2 multiyear giant floes.

1200B Sun below horizon entire day at 82-40N 012-10E. Meridian passage 1258B.

16Oct01: JPL/NIC group: took measurements and collected ice samples from another giant multi-year floe (18 by 12 NM) and a first-year floe. This giant floe was of great interest to the team as it was not readily distinguishable on RadarSat imagery.

ALTEX group: conducted AUV testing, including first under ice run. AUV went 1 km into (under) a 2 meter thick multi-year floe, then back out, surfacing as planned less than 50 meters off port quarter of ship. Visibility 1nm and 25 kt winds made it challenging working with AUV and RHIB, but also helped keep sufficient area next to the floe clear of ice for AUV to get up to speed prior to commencing its run.

17Oct01:	Completed more AUV testing under multiyear floe, followed by comparative CTD cast. This marked successful completion of AUV tests required under multiyear ice.
18Oct01:	JPL/NIC group: collected more ice samples and measurements from Multiyear flow during evening.
	ALTEX group: conducted ballasting of full-length AUV (with buoy section). Transited back out to ice edge, then conducted first tests of full-length AUV. Problems encountered getting it to dive.
19Oct01:	JPL/NIC group: collected more ice samples and measurements from pancake ice during evening.
	ALTEX group: conducted further ballasting of full-length AUV, then more test runs. Vehicle was able to dive this time. Chief Scientist predicted 5-6 more days testing along ice edge, then move to open water CTDs to collect Atlantic Layer inflow data.
20Oct01:	ALTEX group: conducted 1 CTD last night after AUV ops and 1 CTD today. No AUV ops today due to wind chill of -34 F.
	JPL/NIC group: conducted ice sampling/measurements along close pack edge last night.
21Oct01:	High winds from due north and low temps combined for wind chill of 60 below zero. Besides no AUV ops, JPL/NIC group brought most of their instruments inside to protect them from the 60 kt gusts.
	JPL/NIC group: conducted ice sampling/measurements during evening.
	ALTEX group: conducted 03 CTD casts along Lermak plateau. Made decision to stop the operation after dark due to wind chill, drifting ice, and inability of DP system to keep wind (at 35-50kts) 10 degrees off stbd.
22Oct01:	ALTEX group: wind chill still unsafe, again preventing AUV ops. Tried to commence another CTD on Lermak plateau in morning, however winch control could not be passed from Winch Room to Science Conn. Troubleshot all day, finally locating a card with bent connector pins. Then completed 01 CTD.
	JPL/NIC group: transited through ice during the evening so they could take visual observations. Their equipment

	remained inside due to their concerns about the high winds.
23Oct01:	ALTEX group: conducted 07 CTD casts, thus completing all those which ALTEX group wanted to obtain across Lermak plateau. Conducted test of AUV and deployable data buoy. Buoy failed to launch due to comms failure between AUV and science equip on ship. Troubleshooting in progress.
	JPL/NIC: no ops as we were in open water entire period.
23Oct01	Other: while conducting CTD in approx posit 80-45N 016-37E (36 NM nw of nearest land on Svalbard coast), we were over flown by a Norwegian maritime patrol aircraft
24Oct01:	ALTEX group: conducted AUV testing all day. AUV still not communicating w/buoy launcher.
	JPL/NIC group: no ops as we were in open water again today.
	Other: with wind chills exceeding -20 F last several days, have experienced great difficulty operating RHIB, with s/w system sometimes freezing up soon after RHIB is unplugged from pre-heat and lowered into water for ops. Since AUV group did not come with a system for a shipboard only pickup of AUV, we can not support AUV ops when the wind chill goes out of safe parameters for deploying a boat crew (thus delaying completion of mission objectives despite being in relatively calm sea state). Then even when the wind chill is within safe parameters for deploying the boat crew, we are having to operate the RHIB in conditions beyond which it is rated while we try to recover the AUV.
25Oct01:	AUV group: conducted extensive AUV testing w/short body most of the day. Troubleshooting on mid-section (buoy launcher) comms problem continues. Conducted 1 CTD cast to verify accuracy of AUV CTD data.
25Oct01:	Other: attempted helo ops for test flight to certify radar altimeter OK for operation. Had to scrub when, during start procedure, sparks were observed coming from panel above pilot. Investigation revealed chafed wiring.

26Oct01: ALTEX: conducted underwater test of deployable data bouy using ROV. Tests sat except that saltwater induced chemical reaction to enable burn thru of ice did not happen. Buoy retrieved and inspected. Conducted further underwater tests of AUV mid-section which seem to have resolved onboard (vehicle) comms probs.

JPL/NIC: collected measurements and samples from 2 sections of first year ice.

Other: Conducted flight of CG-6515 to verify radar altimeter problem corrected. Upon completion, conducted 100 NM flight w/member of JPL/NIC group to observe ice conditions in marginal zone, and w/cameraman from AUV group for documentation footage. Not using RHIB to recover AUV when wind chill is in marginal zone per SAR manual. RHIB fully operational but we are pushing the design envelope with extreme low temps/wind chill we are encountering regularly. Block heater working fine but we've also had to run warm water through cooling system constantly and are using hot air guns to keep engine compartment warm enough so engine will start and operate properly.

27Oct01: ALTEX AUV group: air temps and wind chill still too cold for boat ops so no AUV ops this period. The group conducted 1 CTD for AUV mission, and assisted JPL/NIC group in carrying out 3 CTDs for their ice formation eval work.

JPL/NIC group: transited 35 nm last night and today through areas of new ice formation observed during helo flight yesterday. Conducted 3 CTDs along the way, finding relatively warm water in one location 20 m below the surface, which may be slowing ice formation.

28Oct01: ALTEX AUV group: completed 6 CTDs to gather more Atlantic Layer Arctic Basin inflow data. Since temps and wind chill again prevented use of RHIB to recover AUV, we hove to in ice and used ROV to deploy and test another ice penetrating data transfer buoy. Buoy's heat generating chemical reaction occurred this time, however the buoy failed to penetrate more than a couple inches into the ice.

JPL/NIC group: conducted ice observations during station to station transits for ALTEX group's CTDs. Conducted 1 CTD after that.

29Oct01: ALTEX AUV group: recovered AUV data buoy deployed night before, then commenced transit to another series of CTDs.

JPL/NIC group: conducted multiyear ice measurements while healy moored alongside floe containing AUV data buoy.

30Oct01: ALTEX AUV group: conducted 3 CTDs, and placed another AUV data buoy in the ice to test transmission to ARGOS satellite.

JPL/NIC group: collected measurements and sample of more first year ice.

Other: AUV group requested we obtain permission to operate AUV again within fjords north of Tromso from 4-5 Nov. Passed request on to PacArea.

31Oct01: ALTEX AUV group: transited SSW to 78-52N and commenced another series of CTDs in westerly direction across Fram Strait starting at a point 15 nm west of Svalbard coast. Completed 2 CTD casts.

01Nov01: ALTEX AUV group: conducted 6 CTD casts.

02Nov01: ALTEX group: conducted AUV data buoy testing under ice using ROV. Buoys still failed to melt through ice. Completed 2 CTD casts. With no word yet on request for clearance to operate AUV in fjord north of Tromso, Chief Scientist decided to take a chance and head for the fjord. Commenced transit toward Fugloysundet Fjord

03Nov01: Continued transit enroute Norway. Encountered 15-20 ft seas due to gale force low pressure system moving east from Greenland.

04Nov01: Continued transit enroute Norway. Swell height decreasing.

0000B Retarded ship's clocks one hour to conform with -1A ZD.

0956A Sun rose after 20 days below horizon in position 73-41N 015-01E.

05Nov01: Called AmEmbassy Oslo at 1030 local time and received word that verbal approval had been obtained for AUV work in Ullsfjorden Fjord. Commenced transit into Norwegian territorial waters enroute the fjord. At 1300, when almost to the AUV test area, received radio call from outbound British frigate to contact Norwegian Navy Northern Sector on cell phone. Did so and they advised that there had been mix-up, and that we were not to conduct AUV ops in the fjord due to naval exercises in the area. Departed the fjord enroute southern entrance to Tromso.

06Nov01	1211A	Moored Olavsvern Naval Base, Tromso, Norway. Disembarked ALTEX, JPL and NIC scientists.
07Nov01	1044A	Underway from Tromso, Norway, en route Dover, England.
11Nov01	0000A	Retarded ship's clocks one hour to conform with +0Z ZD.
12Nov01	0822Z	Moored Cruise Terminal 2, Dover, England, for four day portcall. Took on fuel and provisions.
16Nov01	1109Z	Underway from Dover, England, en route Rota, Spain.
	1550Z	Stood into Western Hemisphere at latitude 50-30.6N.
19Nov01	1500Z	Advanced ship's clocks one hour to conform with -1A ZD.
20Nov01	0828A	Moored Naval Station Rota, Spain.
24Nov01	1105A	Underway from Rota, Spain, en route Panama Canal. ATG Pacnorwest embarked for LTT en route Puerto Rico.
25Nov01	0000A	Retarded ship's clocks one hour to conform with +0Z ZD.
26Nov01	0000Z	Retarded ship's clocks one hour to conform with +1N ZD.
28Nov01	0000N	Retarded ship's clocks one hour to conform with +2O ZD.
29Nov01	0000O	Retarded ship's clocks one hour to conform with +3P ZD.
01Dec01	0000P	Retarded ship's clocks one hour to conform with +4Q ZD.
	1611Q	Stood into Tropic of Cancer in position 23-26.3N 058-31.2W.
	1935Q	Moonbow sighted position 23-00.3N 059-27.5W.
03Dec01	1005Q	Disembarked CG Helicopters 6515 and 6559, AVDET and LTT to Airsta Borinquen, Puerto Rico.
04Dec01	0000Q	Retarded ship's clocks one hour to conform with +5R ZD.
06Dec01	1416R	Anchored Limon Bay at Atlantic entrance to the Panama Canal.
	1619R	Weighed anchor and commenced Panama Canal transit.
07Dec01	0200R	Completed Panama Canal transit and stood into the Pacific Ocean.
08Dec01	2359R	Retarded ship's clocks one hour to conform with +6S ZD.

11Dec01	2359S	Retarded ship's clocks one hour to conform with +7T ZD.
13Dec01	2359T	Retarded ship's clocks one hour to conform with +8U ZD.
20Dec01	1216U	Moored port side to Pier 37 ISC Seattle, WA.

CHAPTER II - AVIATION

SUMMARY

ATC Mobile Polar Operations Division (POPDIV) assigned Aviation Detachment (AVDET) 151 for this Arctic East Summer deployment. In April 2001, AVDET 150 transferred the Helicopter Support Kit (HSK) from POLAR STAR following their St. Lawrence Island Polyna Project (SLIPP) 2001 deployment. A follow-up HSK shipment to deliver additional equipment arrived on HEALY at the beginning of June 2001. Two representatives from POPDIV visited HEALY during the first week in June to inventory and finalize stowage of the HSK. AVDET 151 "formed up" on 14 May 2001 with four (4) pilots and eight (8) flight mechanics.

AVDET 151 completed the deployment with four (4) pilots and four (4) mechanics versus the traditional larger crews of up to ten (10) mechanics. This prototype combination proved to be effective during the first HEALY deployment in 2000. PACAREA (Po) letter 3501 (undated) to Commandant governed HEALY's AVDET staffing and operations. General operating guidelines included: (1) the ship's crew performed some of the typical functions of a larger POPDIV AVDET, such as the daily JP-5 fueling system operations, providing at least 4 personnel for helo traversing and maintenance of the flight deck surface (de-icing, etc), (2) flight operations were restricted to a maximum of approx. three 1.5 hour flights per day based on no more than 10 man hours per individual mechanic or eight flight hours per aircrewman per day, and (3) two aircraft operations (flying at the same time) were not normally scheduled or recommended. A complete Enlisted Labor Hour Analysis was completed during the course of the deployment tracking each enlisted members daily labor hours expended according to several different categories. Because the aviation support mission was limited in scope, one pilot returned to ATC Mobile at the start of phase two. After the operational missions were completed with HEALY's return to port on November 6, the AVDET was further reduced to only 2 pilots and 3 mechanics for the return transit.

Table II-1 lists a breakdown of the hours flown, fuel used, identifying sortie as dual or single pilot, and passengers and cargo flown on each flight. The main categories of flights flown during the deployment were ice reconnaissance, logistics, passenger transport, and training flights.

Date	Hrs	Sorties	D/S	Helo	Pax	Cargo	Fuel	Mission	Remarks - Cargo
5-Jul-01	1.7	1	D	6559	3	800 lbs.		Inchop	Pax - Healy Crewmen
5-Jul-01	1.6	2	D	6515	2	800 lbs.		Inchop	Pax - Healy Crewmen
10-Jul-01	1.8	1	D	6559	0	0 lbs.	139.0 gals	DLQs/Training	Pilots, HCOs, LSOs, Tie-down
25-Jul-01	4.1	2	D	6559	0	0 lbs.	300.0 gals	Pilot Proficiency	
End of Transit Phase									

Date	Hrs	Sorties	D/S	Helo	Pax	Cargo	Fuel	Mission	Remarks - Cargo
6-Aug-01	1.2	1	D	6515	3	0 lbs.	190.0 gals	Ice Recon	
10-Aug-01	1.0	1	D	6559	3	0 lbs.	98.0 gals	Pax Transfer	Healy Scientists
10-Aug-01	1.6	1	D	6559	5	70 lbs.	213.0 gals	Pax Transfer	Healy Scientists - Bow Thruster Part
15-Aug-01	1.5	1	D	6559	2	0 lbs.	122.0 gals	Ice Recon	
16-Aug-01	0.8	1	D	6559	4	0 lbs.		Pax Transfer	Polarstern Scientists
22-Aug-01	1.1	1	D	6515	1	0 lbs.	93.0 gals	Pilot Proficiency	

25-Aug-01	1.5	1	D	6515	1	0 lbs.	121.0 gals	Pilot Proficiency	
29-Aug-01	1.7	2	D	6559	3	175 lbs.	179.0 gals	Ice Recon/Logistic	w/Polarstern - Bouy, Rice, Soda
31-Aug-01	1.1	1	D	6515	3	0 lbs.		Ice Recon	
2-Sep-01	1.7	1	D	6559	4	0 lbs.	144.0 gals	Ice Recon	Polarstern Scientists (SP/ .4)
2-Sep-01	1.0	1	D	6559	4	0 lbs.		Pax Transfer	Pilot Proficiency (SP/ .5)
5-Sep-01	1.6	1	D	6559	1	0 lbs.	111.0 gals	Ice Recon	North Pole
7-Sep-01	0.9	1	D	6515	1	0 lbs.	126.0 gals	Ice Recon	Pilot/Crew Day Hoist Complete
8-Sep-01	1.8	1	D	6515	1	0 lbs.	133.0 gals	Ice Recon	Pilot Proficiency (EP's)
13-Sep-01	1.4	1	D	6559	3	50 lbs.	143.0 gals	Pax Transfer	Crew Proficiency - luggage
14-Sep-01	0.1	1	D	6515	2	0 lbs.	118.0 gals	Ice Recon	Abort - wx
15-Sep-01	2.1	2	D	6515	8	0 lbs.	98.0 gals	Ice Rec / Pax xfer	
15-Sep-01	1.3	1	D	6515	1	200 lbs.	163.0 gals	Bouy Deploy	Cargo - Bouy
16-Sep-01	1.3	1	D	6559	2	0 lbs.	102.0 gals	Ice Recon	
17-Sep-01	2.2	2	D	6515	8	850 lbs.	198.0 gals	Ice Rec / Pax xfer	Cargo - Rocks
21-Sep-01	0.3	1	D	6559	2	0 lbs.	112.0 gals	Ice Rec	Abort - Eng chip light
21-Sep-01	2.9	2	D	6559	5	970 lbs.	181.0 gals	Ice Rec/Pax xfer	Cargo - Rocks
22-Sep-01	2.1	2	D	6559	7	1,200 lbs.	152.0 gals	Pax Transfer	Cargo - Rocks
24-Sep-01	3.5	2	D	6559	1	3,500 lbs.	180.0 gals	Ice Recon/Logistic	Cargo - Rocks
26-Sep-01	3.2	2	D	6559	3	800 lbs.	269.4 gals	Ice Recon/Logistic	Cargo - Rocks
1-Oct-01	0.7	1	D	6515	0	0 lbs.	113.3 gals	Pilot Proficiency	Abort - Radalt failure
						End of Science Phase One			
11-Oct-01	2.4	1	S	6515	2	0 lbs.	69.5 gals	Ice Recon	
26-Oct-01	2.1	1	D	6515	2	0 lbs.	189.6 gals	Ice Recon	
						End of Science Phase Two			
11-Nov-01	2.2	1	D	6559	0	0 lbs.	144.0 gals	Pilot Proficiency	
19-Nov-01	1.2	1	D	6559	2	0 lbs.	152.0 gals	Pilot Proficiency	2 pax -morale riders
20-Nov-01	0.3	1	D	6559	0	0 lbs.	81.0 gals	Shore Base Helo	Flight into Rota, Spain
20-Nov-01	2.5	1	D	6559	0	0 lbs.	73.0 gals	Day/Land Trainer	Rota
21-Nov-01	4.0	2	D	6559	1	0 lbs.	164.0 gals	Night Trainer	Rota
24-Nov-01	0.4	1	D	6559	0	0 lbs.	209.0 gals	End shore base	Return from Rota
3-Dec-01	1.6	1	S	6515	6	400 lbs.	146.2 gals	Logistics	Off-load to Puerto Rico
3-Dec-01	1.2	1	S	6559	3	600 lbs.	81.0 gals	Logistics	Off-load to Puerto Rico
Total:	66.7	52			99	10,415 lbs.	5107.0 gals		

Table II-1

PRE-DEPLOYMENT PREPARATIONS

Maintenance. AVDET 151 began pre-deployment maintenance on CG6515 and CG6559 on 14 May 2001. Having just returned from the SLIPP ’01 deployment, 6515 and 6559 still had the modified main landing gear strut scissors and fuel dump tube installed for ski use, saving a potential 10 man hours. Both aircraft received standard pre-deployment maintenance to include all calendar maintenance to 6 months and hourly maintenance to 150 hours. Some of the maintenance included 500-hour cycles. The #2 engine fuel pump, #2 alternator and four main rotor head attachment beams were replaced on 6515. The #1 alternator, aft main gearbox suspension bar and four main rotor head spherical thrust bearings were replaced on 6559. This minimized extensive component changes underway. Additionally, the hoist on 6515 was replaced as well as the #2 starter

generator and right main landing gear strut on 6559. Maintenance crews did not replace any major components (engines, main gearbox, etc.) during pre-deployment maintenance.

Operations. Pre-deployment operations concentrated on pilot proficiency minimums for the Jan – Jun 2001 semi-annual period. Upon departure to HEALY, two pilots still needed some day and night shipboard landings to achieve flight currency. All AVDET members attended a rifle range session for familiarization with the .375 magnum rifle for crew protection when away from the ship on the ice operations.

Administration. All twelve (12) AVDET members completed training, medical, and administrative requirements through 31 December 2001. Arrangements were made for one AVDET member to participate in the November Service Wide Exam (SWE) competition for advancement to E-6.

DEPLOYMENT OPERATIONS

Cross-Country: 6515 and 6559 departed on 29 JUN 01 and flew with six (6) crew cross-country. The aircraft made refueling stops in Panama City, FL, and Brooksville (Hernando County), FL to arrive at Air Station Miami, FL for the night. On 30 JUN 01 the aircraft departed Miami and made refueling stops on Andros Island (AUTEC), Bahamas, then at Exuma International Airport on Great Exuma Island, Bahamas to a final destination of Provodentiales in Turks and Caicos. On 01 JUL 01, the crew continued on to Air Station Borinquen, Puerto Rico via Porta Plata, Dominican Republic. A total of 16 sorties totaling 27.8 hours were flown. The two remaining AVDET crew arrived in Puerto Rico on 02 JUL 01 via commercial air.

Borinquen, Puerto Rico.

(a) AVDET 151 planned the cross-country flights to account for possible maintenance breakdowns while enroute. Arriving in Borinquen on 01 JUL 01 allowed ample time to prepare for any outstanding maintenance issues and embarkation on the revised date of 05 JUL 01 vs. 04 JUL 01.
(b) In anticipation of the lack of a rescue swimmer on the deployment, the AVDET flew on 03 JUL 01 with Air Station Borinquen rescue swimmers to complete both pilot and flight mechanic night rescue swimmer hoisting proficiency minimums.
(c) Maintenance. AVDET 151 performed seven (7) day inspection cycles on both 6515 and 6559 while in Borinquen.

Embarkation. A rendezvous with HEALY was arranged just offshore Air Station Borinquen on 05 JUL 01. Each helicopter made three trips back and forth to HEALY to deliver the AVDET, 5 HEALY personnel, and 1600 lbs. of cargo. 6559 flew on the evening of 10 JUL to complete ship/helo proficiency minimums for the semi-annual period for the pilots as well as qualify flight deck personnel.

Science Phase I (AMORE)

Operations. Flight operations were very limited during Phase I of the trip due to weather and limited aviation support requirements. AVDET 151 flew a total of 48.8 hours, 39 sorties, transported 83 passengers and 9,415 lbs. of cargo. (See summary in table 2-1). Scheduled flights on 12, 14, 16, 21, 30 AUG, and 16 and 20 SEP, were cancelled due to poor weather. Operationally beneficial ice reconnaissance flights were "non-starters" on at least 10 occasions due to poor weather conditions. The most operationally significant flights included: an ice reconnaissance flight on 05 SEP 01 to aid HEALY and POLARSTERN in reaching the North Pole and the deployment of a arctic weather station to replace the JCAD-3 station in position 87-27.5 N, 053-31.0 E on 14 SEP 01. Flights were flown dual pilot almost exclusively in order to provide adequate flight proficiency opportunities for all four pilots. If more operations were conducted, single pilot flights could have been flown which would avail an additional 20 minutes of flight time to a sortie. Flying dual pilot did not have any adverse affects on the operations. In addition, R/V POLARSTERN shared some of the logistical needs by flying two BO-105 helicopters for transferring personnel and cargo. The BO-105 landed 19 times on board HEALY and transferred over 30 passengers and 2000 lbs. of science material. POLARSTERN flew the BO-105 with one pilot and no crew, greatly enhancing its abilities for logistics missions.

Helicopter launch planning. In order to maximize mission efficiency, whenever possible flight operations were conducted during science dredges. When HEALY stopped to lower the dredge, the helicopter could be traversed, blades unfolded and fueled. This would normally allow about a 3-hour window (depending upon the dredge depth) to fly and return to HEALY. From the time the helicopter traversing started, the helicopter was airborne in 45 minutes. This time included the traverse time, blade unfolding time, fueling, flight briefing and all other pre-flight activities. In a SAR scenario, the helicopter could have been airborne in 30 minutes from the start of traversing, although at no time was this tested. Flight deck icing became a major limiting factor to launch ability. If flight operations were scheduled in advance, the flight deck could be readied. Last minute or late notice flights were cancelled on several occasions because the flight deck could not be readied in a reasonable amount of time. If the deck iced up excessively, de-icing could take up to 2 hours. The random nature of flight operations coinciding with science dredges and the unpredictable Arctic weather made flight planning and execution challenging.

Maintenance. Scheduled maintenance was limited. A slow operational pace enabled great aircraft care with highly focused anti-corrosion efforts. Further work was done to complete a thorough HSK inventory, and for aircrew training. The most significant maintenance included the in-flight failure of 6559's right-hand main landing gear (RH MLG) ski when the strut damper pulled free from the ski. Following an uneventful landing and aircraft inspection, maintenance personnel designed and fabricated parts for a unique repair that was accepted by ATC and ARSC engineering to affect temporary repairs to 6559's RH MLG ski for the deployment's duration. Further inspection on all aircraft skis found similar indications of impending failure on 6515's RH MLG ski. Repairs were completed on this ski as well. An Unsatisfactory Report (UR) with detailed instructions for the accepted temporary repair was forwarded to ATC for

submittal. An aircraft mishap message was sent with a recommendation for a TCTO to all old style skis. AR&SC Elizabeth City considered the repair only temporary and directed the replacement of the old skis after the mission. 6559 experienced a #2 engine chip light on 21 SEP and a slightly unusual flight control response troubleshooting that took place on 22 and 23 SEP. The engine chip light caused only a 30-minute launch delay after the chip detectors revealed no problem. A trim/feel unit was replaced and all flight control mechanisms were lubricated and inspected and on 24 SEP, 6559 was returned to service. Finally, on 01 OCT, 6515 experienced a radar altimeter problem which prompted an abort. The SIU in 6515 was replaced and the aircraft was returned to service. Both aircraft exhibited typical cold weather main landing gear strut problems and were serviced with nitrogen routinely, especially in the later half of this science phase. Maintenance labor hour (MLH) tracking continued. At the completion of phase one after 69 days deployed, daily MLHs averaged 24.0: 15.8 hours dedicated to maintenance, 3.1 hours to operational work, and 5.1 hours to shipboard work. Twelve days (13%) exceeded the established 40.0 MLH baseline, only three (4.3%) occurred on days with flight operations. The average MLHs required for fly days was 32.4 with a maximum recorded 47.6 hours. Average maintenance per flight hour was 1.7.

Training. The AVDET provided training to the ship's crew on helicopter salvage operations and procedures. The AVDET conducted weekly pilot and aircrew training and completed hoisting and instrument approach proficiency minimums within the scope of flight missions. An AVDET specific DCPQS syllabus was completed by all AVDET.

Science Phase II (Primary – ALTEX, S.O.O. - JPL/NIC)

Operations. AVDET 151 flew a total of 4.5 hours, 2 sorties, and transported two passengers. Both sorties were ice reconnaissance flights in support of the science operations. On the second sortie, a photographer flew and took video and still photos of the flight and HEALY.

Maintenance. 6515 continued to have a troublesome radar altimeter that showed up again during the first flight of this phase on 11 OCT. After some trouble-shooting and repairing some potential suspect wiring, 6515 was returned to service. On the final flight of the phase on 26 OCT the radar altimeter initially failed but after resetting the circuit breaker, it worked fine throughout the remainder of the 2.1 hour flight. Maintenance labor hour (MLH) tracking continued. One day (3%) exceeded the established 40.0 MLH baseline. The average MLHs required for fly days was 31.6 with a maximum recorded 46.1 hours (none flying day).

Training. The AVDET continued work on aviation training sessions. The AVDET Chief provided aircraft salvage training to HEALY crewmembers during an evening damage control personal qualification standard (DCPQS) training session.

Transit back to US and Shore-based helicopter flights in Rota, Spain.

Operations and Training. The AVDET flew 6559 from HEALY while moored at the pier at Naval Station Rota, Spain into the military airport at Rota (LERT) on the morning of 20 Nov 01. The purpose was to shore-base one helicopter in order to complete the pilot's semi-annual proficiency minimums. The aircraft was parked at the transient line adjacent to the U. S. Navy P-3 squadron, FAIRECONRON TWO (VQ-2). The U. S. Navy and Spanish Navy operate the air base together. This location was very secure, especially in light of the recent increased threat levels. The AVDET flew a day/land training flight on 20 Nov and two night training flights on 21 Nov. On 24 Nov, 6559 flew back aboard before HEALY's departure.

The flights were highly effective for the AVDET because the pilots were able to complete all semi-annual minimums before return to ATC in December. This location was superb for several reasons:

(1) the climate and weather is typically very favorable,
(2) it allowed for minimal cost because the AVDET remained billeted on HEALY throughout the port call, and
(3) transportation to and from the airport was easily accomplished through the use of HEALY's liberty van system. In addition, the U.S. Navy P-3 squadron, VQ-2 was helpful in providing some logistics support to the AVDET.

Maintenance. Only routine maintenance was performed on the helicopters from the last Tromso port call to the fly off in Puerto Rico. Maintenance labor hour (MLH) tracking continued. The AVDET size was reduced to only 3 mechanics for this phase, so the labor hour baseline was adjusted to 30 hours per day. Four days (14.8%) exceeded this revised 30.0 MLH baseline, with only one of the four days a fly day. The average MLHs required for fly days was 28.7 with a maximum recorded 42.9 hours (non flying day).

AVDET Departure.

The AVDET departed HEALY on the morning of 03 Dec 01 requiring an hour and a half of flying time for each helo and six sorties, to transfer 09 passengers and 1000 lbs of cargo into Borinquen, Puerto Rico.

OBSERVATIONS, RECOMMENDATIONS, AND NOTES

A waiver was requested from COMDT (G-OCA) to use the Athwartship Landing Wind Limitations of the Polar Class Icebreakers to expand the hove-to wind envelope for athwartship operations. This waiver was approved and a test envelope was used during the deployment. Because inadequate data was collected during the deployment, a message requesting an extension of the waiver was requested from G-OCA to cover the period through the next deployment.

A waiver for the German BO-105 helicopter to operate on HEALY was requested and approved by G-OCA. Operations were limited to hove to in the ice landings and take-

offs with the generic wind limits from COMDTINST 3710.2(series), Shipboard Helicopter Operations Manual for BO-105 on HEALY and HH-65A on POLARSTERN.

HEALY had a problematic flight deck icing problem. After several de-icing "parties" consisting of salting the deck, beating the ice off and sweeping the excess away, another less destructive method was attempted. The ship's fire main system is heated to 55 to 60 degrees Fahrenheit when operating in the Arctic regions thanks to the sea bay salt water system configuration. The fire hoses were used in conjunction with several sweepers using long rough bristle brooms to sweep the water into the drains before it was able to freeze to the deck. This worked well for the flight operations conducted on 26 OCT. This technique was tested only once and seemed to work well and provided the best method for ice removal. Drawbacks include: (1) the science and 01 decks below the flight deck iced from the water used above, and (2) this technique may not work in weather colder than that experienced during the “test”.

The marginal arctic weather combined with science that had little to no specific helicopter support needs kept the AVDET under employed. Unfortunately, from the aviation perspective, a lack of flying leads to a lack of proficiency, increased risk for all but the most routine of missions and underutilized aviation assets. The policy of sending only pilots that are experienced aircraft commanders must be continued on these Arctic East deployments, especially when flying opportunities are few. The competence and experience of the pilots (and mechanics, see 5. below) kept the operations safe. The reduction of a two aircraft AVDET to just 3 pilots instead of 4 for these minimal aviation support deployments provides reasonable redundancy yet more realistic and safe flying proficiency opportunities.

The AVDET was manned with very experienced and competent mechanics. This was also very critical to the optimal manning of HEALY. The mechanic crew was very senior consisting of an AMTC, AMT1, AVT1 and AVT2. HEALY must continue to be manned with experienced (or talented) maintenance personnel to assure success and safety, especially if operations are maximized.

For future AVDETs considering flights into Rota, Spain, make sure that the submission time guidelines in the Foreign Clearance Guide (FCG) are closely followed. The successes of the flights were in great part due to the large lead-time to allow the processing of the requests. A flight plan was faxed to the air operations number listed in the FCG before launch. The original plan involved flying from HEALY into the airport just before entering port. This plan was aborted due to winds in excess of HEALY operating limits. An area that should be considered closely is determining where the ship is in relation to many off shore warning areas around Rota. The warning areas are greater than 10 miles off shore, so a launch inside of territorial seas would be the best approach. A pier launch is a good option also as long as winds are favorable with respect to the mooring alignment of the ship. Port operations at Navsta Rota must be notified as well as the airport to prior to take-off.

CHAPTER III – COMMUNICATIONS AND ELECTRONICS

Summary

Pre-Deployment Preparations

1. **Communications**. The bulk of pre-deployment preparations were spent identifying high latitude communications solutions. Normal steaming communications use Inmarsat high-speed data to connect directly with the CGDN (Coast Guard Data Network) in Seattle. But the Inmarsat satellite footprint only reaches as high as 74 degrees North latitude. After sifting through many options, two possible solutions were identified, TDRSS (Terminal Data Relay Satellite System) and Iridium.

   TDRSS is a NASA satellite system. The satellite TDRSS-1 is a little used satellite positioned at 49 degrees West longitude with a wandering orbit that allows it to be seen at the North and South pole for up to five hours a day. NASA built a portable ground terminal known as TILT (TDRSS Internet Link Terminal) that potentially would allow HEALY to connect to the Internet at 512 kbps for up to 4 hours a day. With NSF assistance, we gained approval for use of this terminal, and NASA arranged to have the terminal shipped to arrive with the Avdet on 04 July.

   Iridium is a commercial constellation of 66 cross-linked LEO (Low Earth Orbit) satellites that previously were available only for voice communications. Starting 01 June, Iridium was to offer 2.4 kbps data to a dedicated network or 9.6 kbps to their own network. Requests were made to ESU Seattle regarding the feasibility of connecting Iridium to either the CGDN or SDN Science Data Network. TCC Cashen of Pacific Area (PT) was superb in assisting HEALY in obtaining Iridium phones and contracts as well as making arrangements for Inmarsat leased channel communications during the transit to and from the Eastern Arctic operations area.

   The tertiary communications option was HF Messenger. HF Messenger is the replacement for HFDL (High Frequency Data Link) and like HFDL is a packet based data link system. HF Messenger promises higher data rates than HFDL, 2400 versus 300 baud, and a simpler user interface. HF Messenger was installed 3 days prior to departing Seattle and initial testing was very successful. The system seems to be a vast improvement over HFDL. However, success and reliability in high latitudes was still untested.

2. **Electronics**. Prior to the deployment the ships TACAN, IFF, Integrated Bridge System and various communications systems were all groomed as specified by various contracts. ESU Seattle and HEALY personnel replaced two Shakespeare Model 229 transmit whip antennas with two Shakespeare Model 222 antennas. The model 229 antennas had low resistance readings, which was believed to be the cause of two antenna coupler failures. The new antenna is lighter, easier to maintain and should not cause antenna coupler failures due to salt film buildup the way the earlier model did.

   Another High Frequency system that was replaced was the HFDL (high frequency data link) system for sending message traffic. This was replaced with the HF messenger system. High Frequency communication could potentially become the only means of ship to shore communications in the Arctic when the ship goes above the Inmarsat footprint. Another communications system that had promise above the Inmarsat footprint is the revived Iridium system. Pacific Area purchased two data

capable Iridium sets, which were delivered on 12 June, which we hoped could be connected to the CGDN (Coast Guard Data Network) if needed. Pacific Area also arranged to borrow wireless Ethernet equipment to be used to exchange data between HEALY and the German research vessel POLARSTERN. One set was installed and tested on HEALY and the other set would be installed on POLARSTERN when HEALY arrived in Norway. Ship's force also worked on a ship to ship voice system that should enable the two ships telephone systems to connect together for ordinary telephone calls.

Inmarsat communications were also improved when ESU Seattle collocated the Main Control Units of the ship's two Inmarsat B terminals to radio. Normally the aft Inmarsat B antenna would be connected to the CTES (Continuous Testing and Evaluation System), but it is now possible to patch to this antenna from the other Inmarsat B system, which is used for connectivity to the CGDN ashore. This allowed the ship to continue on its same course and connect to CGDN when the forward antenna is not in line of sight to the satellite.

Seattle, WA - Puntarenas, Costa Rica

1. **Communications**. Inmarsat communications proved to be unreliable. During transit to Costa Rica, HEALY had three outages of over 12 hours on the Inmarsat system. Both outages appear to have been network router problems at ESU Seattle. While Inmarsat is our primary communications circuit while in transit it appeared to not be treated as such by shore side support. The network was taken down for configuration changes for long periods in mid-day and over night interruption of service was not corrected until the following morning. Tertiary systems exist on HEALY to send and receive record message traffic but the nature of our mission and our partnership with civilian scientists and the NSF has made message traffic a secondary consideration and e-mail our primary means of contact to our customers and suppliers. In the communications world, the loss of ability to send and receive message traffic is considered a dire emergency with all involved on land and ships working to ensure outages are kept to absolute minimums. Yet, our loss of ability to send and receive e-mail seemed taken as a low priority for repair by shore side support and we had been down for periods up to 48 hours when a network outage occurred over a weekend. Otherwise when the service was up, the Inmarsat leased channel performed well. The addition of longer connect times on the leased channel and the ability for long periods of Internet access was a benefit to all hands; especially storekeepers with underway access to LUF-NT. ESU has promised Voice over IP telephone communications over the Inmarsat leased line data connection, but it was unsuccessful. The switch from the Pacific Ocean Region (POR) satellite to the Atlantic Ocean Region West (AOR-W) satellite brought a much lower signal to noise ratio which may have contributed to the problem.

2. **Electronics**. Ship's force installed the two Iridium telephones. One was installed in Radio and the second in the HAM shack. The set was tested for voice connectivity. The ship Integrated Bridge System had problems with its autopilot function. The autopilot worked fine in auto mode. However, in NAV mode, VMS appeared to give appropriate orders to autopilot, and autopilot was no longer able to hold ordered course. The heading would vary 5 degrees either side, sometimes more. This condition was demonstrated to the Sperry rep on 8 May. When we returned to port he made adjustments to the values that control how the VMS interacts with the Autopilot. After leaving port we attempted to use NAV mode and found the

adjustments had made VMS control worse. We reloaded old code and returned the system to its original settings. The system was CASREP'd and we received a response from Sperry to change some settings and test. Ship's force completed installing the Sub-Bottom profiling equipment in the IC room using fiber optic converter equipment to operate the equipment in the Science Conning Station and the Computer Lab. The Knudsen system would be used for pinger operation and the Bathy 2000 system would be used for sub-bottom profiling. There were numerous trouble calls concerning GPS receiver problems from a number of independent systems, so we suspected the problem was associated with the bottom topography or possibly an electromagnetic noise source on the ship.

Costa Rica - Dover, England

1. **Communications**. **TDRSS**: After taking it on board near Puerto Rico, the TILT (TDRSS Internet Link Terminal) was assembled and ready to use with a minimal amount of cabling to perform before initial testing. The placement of the antenna was a small problem. The unit has the Power Amplifier and the antenna separated by a RF cable run that can be a maximum of 50ft before experiencing signal loss. This limited locations where we could mount the antenna, and specifically prevented us from mounting it where it would have 360 degrees of coverage. We finally decided to place the antenna on the 05 deck aft of the bridge, with a removable mounting bracket that would allow us to move the antenna from port to starboard to overcome antenna blockage from the pilothouse and stack. We had initial EMI problems, which were solved by Electronics division as described below. At the time, we had still not received a response from ESU Seattle on possible solution for connecting TDRSS data to Coast Guard Data Network (CGDN) and Science Data Network (SDN). A message was drafted and sent to Pacific Area (Po) stating we had successfully tested high latitude communications alternatives and requesting assistance in connecting data to shore based networks.
   Inmarsat: Inmarsat outages continued to plague us. We had 2 more days of complete loss of communications-- both message traffic and e-mail. Three distinct problems were being experienced. (1) Timeserver malfunctions on CGC MUNRO caused them to overrun their time slot and use up our time as well. (2) We were able to connect to the server in Seattle but no data would pass. This always turned out to be a networking/router error and was fixed once someone from network staff at ESU Seattle returned to the shop and corrected the problem. (3) We connected to the server and would have Internet access but no e-mail would pass. This was a problem with the Microsoft Exchange server at ESU. All three problems were beyond the ship's ability to correct, and required a call to ESU Seattle for problem resolution. If the problem occurred after normal work hours or on a weekend, it usually was not fixed until the next work day.

2. **Electronics**: **TeraScan**: TeraScan's software upgrade included a "bug" that randomly deleted the "sys.config" file. As a result, the system would no longer recognize it's GPS input, disabling the ability of the antenna to track satellites. SeaSpace emailed a software patch that would continually check for the "sys.config" file and replace it whenever it was deleted. System was operational once the patch was installed.
   HF Antenna coupler 2-2 wouldn't tune. Technicians discovered bad circuit card and replaced. Coupler operational.
   Knudsen sub-bottom profiler. Set it up to operate in pinger mode in Science Conning Station.

Radio Frequency Interference. A primary source was revealed to be caused by the Naval Electronics TV antenna which receives 15V. For much of the deployment the Electronics division thought that there was atmospheric interference relating to Solar Maximum. The Electronics Technicians had checked for radio frequency interference near the GPS receive frequencies. This interference was affecting the 3D GPS set and the Northstar GPS set.

DPS: DPS monitors failed while arriving in Dover. Technicians discovered a bad distribution amplifier power adapter and replaced it. System operational.

Dover, England - Tromso, Norway

1. **Communications**: **TDRSS**. TILT system mounted and ready for operational use. DC shop fabricated a stand and removable mounting bracket that attaches to handrails on 05 deck. We began hearing numerous responses to high latitude connectivity message. Pacific Area directed ESU Seattle to explore solutions to connecting from NASA ground station in White Sands New Mexico and to enter into CGDN at OSC Martinsburg via a VPN (virtual private network). A similar solution would be provided for the Science Data Network to connect to a server in Seattle so scientists could send and receive e-mail. Mr. Bob Winters of ESU began heading up the effort. In Tromso we received additional cables, connectors and modems to establish network connection.

   Inmarsat: We had 2 more days of no Inmarsat during the 5 day transit to Tromso. We were able to connect to ESU server on both days but no data would pass. ESU said problem was due to poor signal strength with ship in North Sea, but signal strength readings on our end showed acceptable levels. Problem was once again resolved upon the return to work of key ESU network personnel.

   Iridium: Unable to connect transmit/receive data on installed Iridium Sailor brand phones. We received an additional handheld Motorola Iridium phone from Pacific Area PT and conducted successful 2400-baud data test using Motorola handheld. We also received low-cost Department of Defense contract SIM cards for Iridium phones. DOD SIM cards are $120.00 for 500 minutes and Iridium is promising full coverage for our operations area.

2. **Electronics**: **VMS**. Technicians modified IBS "config.ini" file with new steering parameters. System was continually tested until optimal performance was achieved by VMS system. Ship steering via auto pilot in NAV mode now satisfactory.

Phase 1 Science (AMORE)

1. **Communications**: **TDRSS**: On 07 August the TDRSS/TILT system was on line and operational. We were able to send and receive message traffic; crew e-mail and have Internet access for most of the 5-hour window. There were some bugs to work around and a lot of trial and error and coordination with ESU Seattle involved. The first major difficulty was when we went over 80N. The TILT system uses a magnetic compass on the antenna pedestal to provide heading information to the software that points the antenna. Once the compass ceased to function at the higher latitudes, the movements of the antenna in relation to changes in the ship's heading had to be completed manually. In the next two weeks the IT division became quite skilled at manually *driving* the antenna and running out on deck to shift the antenna to either side of the 05 deck when it was blocked. Bob Winters spent many long hours assisting us in programming the routers to establish the VPN's for both CGDN and SDN. The Science Data Network had numerous troubles the first 2 weeks of science

phase one after initial successful connection to Seattle server. When SDN was connected to TDRSS large amounts of data would begin transmitting, bringing all other communication to a standstill. Troubleshooting continued for a week with no luck until finally it was discovered that SDN was infected with a computer virus known as Red Alert. Once the patch was installed SDN began to work again for a week until it once again went down. This time the problem was traced to a bad router. SDN was transferred to the TILT system router and then functioned normally. Both SDN and CGDN, including e-mail and Internet access, worked perfectly via TILT for 5 hours at the North Pole on 6 September. After that, we began to move out of coverage of the F1 satellite positioned at 49W. We were able to get some coverage on the F3 satellite at 85E for 30 minutes each day and experienced a few days with no connection. Adding it all up, we had a TDRSS link to the CGDN on 47 of the 53 days north of Inmarsat coverage, and a link to SDN for 35 days out of the 53. Overall the TDRSS/TILT system was an outstanding success and a true revolution in polar communications.

Inmarsat: We were able to connect to Inmarsat all the way up to 79N for first 5 days of science phase. We coordinated with Atlantic Area for Inmarsat time for the transit back to Tromso at the end of the phase.

Iridium: The Iridium telephone system was also a tremendous success. There were dead spots in the westernmost part of operations area from 8-20 August while between longitudes 7W and 15E. Once east of 15E we had uninterrupted coverage. Iridium data was also successfully utilized to send message traffic and download news and satellite ice imagery, although at much slower rates.

HF Messenger: HF messenger was successfully tested. A link was established with CommSta Kodiak and message traffic and test messages were sent. While it is not immune to all the old HF propagation problems, we were very impressed with the speed and quality once a link was established

2. **Electronics**: **IBS Starboard VMS** computer crashed. Continual problem from shakedown voyage. Litton was to replace the computer, but it never happened. Computer crashed 2 more times, and was rebooted twice. Did not have problem again. Will request computer be replaced upon return to Seattle.

   Ship to Ship communications link installed on POLARSTERN tested satisfactory and was used continually throughout Phase 1 with great success.

   TDGPS inoperable. Due to heavy seas and unsecured objects, TDGPS power source knocked loose. Power source was re-installed, unit operational.

   CCTV camera on Aft A-frame tilt function inoperable. Technicians lashed camera stationary w/ line in a position usable for science ops. Will order replacement to install upon return to Seattle, as camera's tilt functions not mission critical for Phase 2.

   Ice build-up. A constant problem at the higher latitudes. Technicians would "knock" ice off antennas w/ broom handles. Starboard CA-1139-4 antenna's housing cracked due to vigorous ice removal. As this is just a covering for the four elements inside, antenna still operational.

   High latitude GPS/Gyro problems. Above 85 degrees North, TDGPS and Gyro heading separation resulted in significant problems in associated equipment. TeraScan and Seabeam would not track without manual heading input. TDGPS position never a problem. Above 88 degrees North, TDGPS heading was sporadic. Swings in heading information were up to 180 degrees off.

   Port windbird (anemometer) failure. Due to plastic construction and ice collection

on its propeller, propeller blades broke off. Replaced with spare. Will research a stronger material more susceptible to arctic climate.

Phase 2 Science (Primary – ALTEX, S.O.O. - JPL/NIC)

1. **Communications**: **TDRSS**: TDRSS/TILT system was inoperable this phase. During last part of AMORE phase, the signal began to get weaker, and on the last 2 days we were able to lock on but not transfer data. During Phase 2 we were unable to lock modem on signal at all. Continued to try and repair and troubleshoot system throughout the phase with no luck. Problem remains unknown. After consulting with NASA and ESU Seattle, decision was made to ship TILT back to ESU for further testing and a feasibility study for future polar operations. Suspect problem is due to NASA reducing the strength of the signal in order to prolong the life of the satellite.
   Iridium: Iridium was used as primary communications on this phase for both crew and scientists, covering both data and voice. Pacific Area PT developed a solution using a freeware encryption software known as PGP which allowed us to send and receive message traffic via e-mail using a laptop and a 2400 baud Iridium data connection. A separate Iridium phone and separate accounts were established for both science parties, which allowed them to use Iridium for data and voice without conflicting with ship's business. Coverage was 100 percent over the operations area with no outages. However, slow baud rate hindered the ability to send and receive large data files.
   Inmarsat: Most of this phase was above the 80N limit of the Inmarsat footprint. We were able to test the northern most limits of Inmarsat coverage and connected twice when operations allowed us to dip down into footprint. Highest Inmarsat coverage achieved and which allowed for connection to CGDN was 80-32N.

2. **Electronics**: **Ice build-up**. This problem only intensified from previous mission due to less sun and colder temperatures. **IBS**: Intermittent and minor problems arose. System had to be rebooted, which fixed most problems. Also experienced problem of blown fuses. Once fuses replaced, system worked fine. **Fantail Communications**: Established a temporary VHF communication system so that scientists working on the fantail were able to communicate with colleagues working in Science Conn and the Bridge. **Autonomous Vehicle Transducer**: Installed transducer in ship's transducer well for communications between vessel and autonomous unmanned vehicle. **ADCP Measurements**: Took measurements and conducted preliminary survey of ADCP system in preparation for upcoming 300-to-75 kHz ADCP replacement. **GPS**: HEALY lost GPS antenna for TeraScan. Crewmembers had to manually enter data to point antenna. Connector shorted due to being open to weather. Will replace upon return to Seattle.

Tromso, Norway - Panama Canal

1. **Communications: Inmarsat**: Inmarsat was primary communications for transit home. Problems encountered during transit across Atlantic in June were eliminated, and the only significant outage of Inmarsat was a CG wide CGDN+ virus infection. HEALY was put on its own router in ESU Seattle which allowed us to connect to Inmarsat on a on demand basis and not be limited to leased satellite time slots. Problems connecting to LUFS and AOPS software programs via Inmarsat still remained, troubleshooting continues.
   HF Messenger: Classified message traffic guard was shifted to CAMSLANT Chesapeake for transmission via HF messenger. A lot of coordination between HEALY and CAMSLANT was required at first but once frequency range and

schedule was established, the system worked well.

2. **Electronics**: **.680 Cable**: Questions arose as to the health of HEALY's .680 CTD cable after it was used for a number of deep dredges. Checks by crew ultimately deemed cable sat. Additional testing to be pursued inport Seattle. **ADCP 150 kHz**: Problems arose on this system. Working with ESU Seattle and the manufacturer, software was reloaded and ADCP 150 kHz tested SAT. **ADCP Antifreeze**: Questions arose regarding the Glycol to Water ratio used in head tanks. Final resolution was for manufacturer to provide HEALY with proper proportions. **WIFCOM**: problems were highlighted during LTT visit with WIFCOM usage during Damage Control drills. Problem being researched. **GMDSS Handheld Radios**: These radios were inventoried and found to be lacking replacement parts. Parts ordered.

Panama Canal - Seattle, WA

1. **Communications**: **Inmarsat**: Inmarsat continued to be primary communications for transit home. Shift from Atlantic area to Pacific area satellites resulted in an increase to 10 hours a day of leased Inmarsat time.
   HF Messenger: Classified message traffic guard was secured pending return to Seattle.

2. **Electronics**: **Training and Grooms**: Time focussed on scheduling training and grooms and developing PMS. **CCTV**: New inport duty section requires CCTV cameras to be modulated on Ship's Entertainment System for OOD monitoring. Developed short- and long-term plans and made possible modifications.

Recommendations

1. **Communications**: While TDRSS/TILT and Iridium were acceptable high latitude systems, they may not be the definitive solution for high latitude communications. The failure of TDRSS/TILT in the second phase of the science mission and the age of the TDRSS-1 satellite make it unlikely for a long-term solution. Iridium shows promise if baud rate can be increased and integration to CGDN+ and SDN can be accomplished. HF Messenger should be more useful during our Arctic West Summer 2002 deployment since we will be much closer to CG communication assets—but it is still a message traffic only system and can not be used for science party data or e-mail. There is still no broadband data capability system identified for the latitudes above 80N. Due to the nature of our mission and extended periods away from homeport, e-mail has become as critical a capability as message traffic. During this deployment HEALY Communications sent over 45,000 business and personal e-mail messages and received over 150,000. Science party members require ability to transmit and receive large volumes of data. HEALY will continue to research alternatives
2. **Electronics:**
   a. **Gyro**: Science instruments as well as TeraScan weather imagery system require accurate gyro heading feed. This proved to be problematic above 80N. Researching gyro alternatives will be useful in meeting the needs of the scientists as well as the ice navigation needs of the ship (receiving routine ice imagery)
   b. **.680 Cable**: Cable should be tested by professionals used to working with this cable to verify it is still usable.
   c. **PMS**: A PM schedule needs to be fully defined and integrated for the ET Shop. Already being developed by ship's personnel

d. **Spares**: Many spare parts are not aboard. Work by ETCM Passalacqua (NESU) during transit from Rota, Spain to Seattle, WA helped identify a series of discrepancies with MICA.

Message Traffic Statistics

	Sent	Received
Inmarsat	487	7202
TILT/TDRSS	260	2310
Iridium	111	574
HF Messenger	12	109
Total	**870**	**10195**

CHAPTER IV - SCIENCE

Summary

Pre-Deployment Preparations

The Marine Science Division attended training conducted by Seabeam, Seaspace, NOAA (SCS) and Microsoft (Windows 2000) prior to departure. During the two Science shakedown cruises AICC members were brought onboard to further evaluate and make recommendations on various science systems. The list of desired improvements was tackled through the Electronics Support Unit, Seattle.

Science party equipment for the cruise was scheduled for onload during the two weeks prior to departure. The Marine Science and Deck divisions onloaded over 23,000 lbs of science equipment. This included loading a 20-foot container onto the fantail for the first time by ship's force. The ISC Seattle crane was used to position the container on the port side of the fantail, where the 5-Ton crane was able to pick it up and position it in van slot number three (third from port side). Most deck equipment (dredges and corers) were secured on the fantail. All other equipment was secured in the Science Cargo Holds.

Seattle, WA - Puntarenas, Costa Rica

Upon exiting the Strait of Juan de Fuca, all science sensors and systems were energized (except ADCP) and began collecting data. SDN user accounts for Phase 1 science party members were established and tested by the system administrator. Recent repairs to the science refrigerator and freezer were effective, and both systems operated as designed. The Seabeam system operated error free during the entire transit to Costa Rica, and provided a wonderful bottom map along HEALY's track.

Three winch casts were conducted enroute Puntarenas. The first T/C cast to 700M was executed flawlessly and provided valuable refresher training for the MSTs. The second T/C cast to 1000M was used to train newly reported MSTs and members of the deck force. During this cast, the isolator switch in the Trawl Core cabinet failed, and a work around fix was required to bring the package back on deck. Trouble-shooting by the Electronics Systems Division provided a temporary solution to the problem until a replacement part could be located. Repair to the winch was made using onboard spares.

Costa Rica - Portsmouth, England

During transit of the Panama Canal, contact with the canal lock damaged the coring “hero” platform mounted outboard of the starboard A-frame. Assessment of the platform determined it was irreparable; after counsel with the scheduled science party the decision was made to wait until return to Seattle to have another one fabricated.

The Knudsen and Bathy 2000 computers were moved to the IC Room to minimize the cable run to the transmitter units. This fix appeared to remedy a pinger continuity issue on the Knudsen sub-bottom profiler. Prior to the move, the pinger trace would break periodically when the system was in "pinger mode". The Bathy 2000 computer was moved to troubleshoot a failure of the Bathy 2000W system.

An Oceanographic winch #2 cast using 3/8" wire and test weights was conducted using the aft A-frame to a depth of 461 meters. This evolution was useful in testing the performance of the Knudsen "pinger mode" and used for crew training. Numerous water to deck evolutions were conducted to train members of the MST and Deck divisions on

the proper use of the winch control system. During a work-up to this cast, the FIP network continued to fail when the O/W #1 was energized.

Portsmouth, England - Tromso, Norway

Continued to troubleshoot problems with the FIP during this leg. Conducted tests as changes to the network were made. Upon completion of troubleshooting, all winches operated satisfactorily in normal and emergency manual mode. Conducted T/C dredge to 4500m prior to mooring in Tromso, Norway.

Relocated Bathy 2000W in an attempt to resolve casualty issues. Replaced compressor unit on Climate Control Chamber #1, unit operated satisfactorily. All other science related systems operated properly during this leg of the transit.

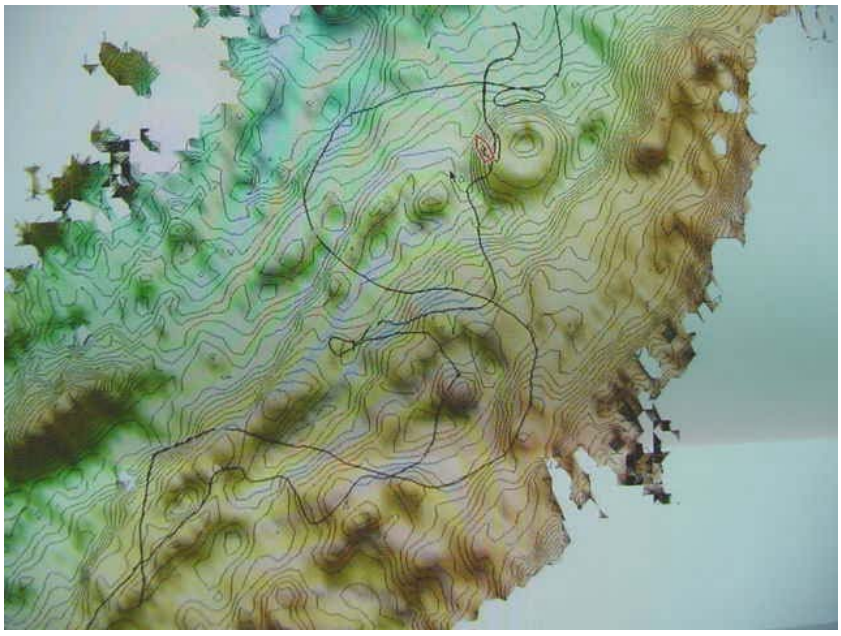
HEALY MSTs and members of science party deploy a dredge

Phase 1 - Science (AMORE)

During inport period Tromso, Norway; embarked science party members and onloaded 5 pallets of equipment and 30 K-bottles of Argon gas. ESU Seattle assisted with the installation of the wireless ship-to-ship communications network and resolution of science data network e-mail issues.

Transited in tandem with R/V Polarstern to the ice edge. HEALY lead icebreaking efforts at all times when Polarstern conducted seismic survey work. Experienced wire failure on first scientific winch cast when T/C wire experienced 15,000 lbs of tension. Wire parted resulting in the loss of 4300m of wire, one pinger, one MAPR, and the attached dredge. Upon investigation found that the balanced sheave in the winch room remained pinned up during the entire cast, causing the wire to jump the track and chafe against the sheave housing.

Both ships conducted seismic and bathymetric surveys along the initial southwest leg of the ridge transit. HEALY conducted a number of dredges and wax cores during this initial leg. Experience showed that DP was an effective means of dredging at slow speeds (.5-1 knots). In areas of heavy ice coverage (greater than 7/10), HEALY ran dredge trackline in both directions prior to putting wire in the water. Ice drift was determined and applied before dredges/cores requiring precision placement of sampling equipment. During dredge of 30 degree slope, sampling equipment snagged on a bottom feature. Winch operator attempted to free the dredge by applying and releasing tension on the wire, however the dredge remained anchored. OOD attempted to aid in positioning the ship over the dredge by backing slightly while twisting to maintain heading. During this effort the wire contacted a significant floe while under 12000 lbs of tension. The wire parted at the waters edge, resulting in the loss of one dredge, one MAPR, one pinger and approximately 3500 meters of 9/16" wire.



Bottom maps produced with SEABEAM proved invaluable for site selection

During the second leg of the transit, HEALY dredged up a portion of a thermal vent. While attempting to deploy the CTD/Rosette to determine the presence of the thermal plume, a signal error occurred. Nearly three days of troubleshooting led to the determination that the O/W Winch #1 motor was emitting an EM field large enough to disturb the data flow through the .322 wire drum. Ship's personnel resolved this issue by shielding cables on the winch motor. Multiple successful CTD casts were conducted without the recurrence of errors.

While at the North Pole, HEALY conducted one gravity core to recover a mud sample from the sea floor. The return legs of the transit included several dredge stations with depths beyond the scope of the remaining 9/16" wire. After consulting with Interocean, Inc. and members of RVTEC, the decision was made to use the .680 wire for deeper dredges. The wire was prepared by sealing the conductivity element with marine grade sealant and vulcanizing rubber. A poured metal fitting was used to terminate the wire. After several casts were conducted with the .680 wire, it appeared the internal lubricant was being forced out of the wire while under heavy tension, apparently not an item of

major concern. Continued to use the .680 wire for dredging, .322 wire for CTDs, and 3/8" wire for wax cores during the remainder of the voyage.

Scientists analyze rock samples in Main Lab

The final leg of the transit included several dredge and wax core stations. Since no SEABEAM data was available for this area, much of the sampling involved selecting sites as multi-beam data became available. This type of station selection required close coordination between the Science Watch Commanders and the Ship's OODs. The ability to monitor the SEABEAM data using the ship's entertainment system was critical for the success of this leg. Earlier in the cruise, a television was placed in the Aloft Conn, and a monitor was placed on the bridge to enable the conning officer to view the SEABEAM bottom map. During the final CTD cast of the trip, #1 O/W tripped offline continually. Extensive troubleshooting found that the cooling water to the power cabinet had been inadvertently secured and caused it to overheat. Upon restoring cooling to the power cabinet, the winch operated as designed. During this phase 101 dredges, 19 was cores, and 6 CTD casts were completed casts.

Phase 2 - Science (Primary – ALTEX, S.O.O. - JPL/NIC)

Embarked phase 2 science party during our second port visit to Tromso, Norway. Previous science party remained onboard until the second inport day, and loading of upcoming science equipment and personnel was scheduled to begin on the third day. Due to increased security concerns, all cargo and personal baggage was inspected pier side before being loaded on HEALY. Approximately 4 tons of equipment on 23 pallets were loaded over two days. Most equipment was unpacked and organized in lab spaces, with only storage containers and spare parts placed in the cargo holds. The MSTs and ETs assisted in the installation of tracking antennas for the ALTEX equipment, as well as computer networking and other concerns.

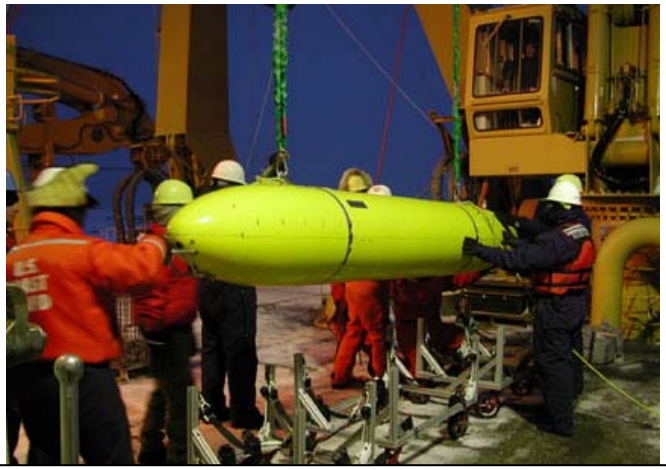
Prior to departing Tromso, the AUV was launched from the fantail using the port crane. MBARI personnel conducted ballast adjustments on the vehicle and tested the ability to launch and recover the vehicle from HEALY. JPL and NIC personnel conducted installation of their test equipment, including the mounting of both a radiometer and a scatterometer, on the port side of the Fantail, forward end at the hand railes. They calibrated their equipment using "targets" placed on the pier.

Upon departure from Tromso, a day of AUV testing was conducted in the fjords of Northern Norway. Diplomatic approval was required to operate within this area. The approval was coordinated through PACAREA and arrived several days before the operation. The AUV was launched using the port articulating crane for ballast adjustment alongside, and run on several short missions. Recovery required use of

HEALY's small boat and the articulating crane. Aside from communication issues between the lab party and the AUV, all tests were completed without any problems.

During the transit to the ice edge, a CTD transect was conducted in the area north of Svalbard. A total of 4 CTDs were conducted over the course of 2 days with data collection completed by NOAA PMEL personnel. Upon arrival at the ice edge, daylight hours, which were really just twilight hours, were occupied with AUV testing while hours of darkness were used to conduct ice analysis by JPL while AUV technical issues were resolved. For the first three days near the Ice, HEALY spent daylight hours in the open water area just south of the ice edge, and hove to in desirable marginal ice zone areas at night. The focus of the ALTEX teams tests during this time frame were to communications were good between the AUV and the control / tracking systems located on HEALY. A hydrophone was deployed on the end of HEALY's coring system for tracking and communicating with the AUV.

Normal AUV operations consisted of launching the AUV by lowering it into the water off the port side of the fantail using a spreader bar and two lift straps. The AUV would be let go using quick release fittings controlled by personnel on the fantail. The hydrophone would then be lowered using the block and tackle in conjunction with the after windlass. The AUV was usually kept on the port side of HEALY as the ADF could also be used to track the vehicle on the surface. ADF bearings were more accurate on the port side due to the location of the antenna. When the vehicle was ready for recovery, two MBARI personnel would deploy in the RHI with the boat crew. The "recovery team" would bring the AUV into a side tow along the RHI for the return to the cutter. The MBARI personnel would attach the lifting straps to fittings on the vehicle and it would then be hoisted to its cradle on the fantail. Normally not a difficult evolution if in calm waters. However, in the harsh Arctic climate of October with ice pancakes prevalent this was a challenging evolution. Some testing was completed in the open water and it became a challenge to hook up the lifting straps while riding the swells.



AUV Recovery on the Fantail in the Arctic Night

During the first week of the mission, two days were dedicated to JPL ice analysis because weather conditions precluded the testing of the AUV (due to heavy swell/chop). After the MBARI personnel were satisfied that the AUV was performing as designed and could be communicated with, HEALY headed further into the ice to an area with various types of ice coverage. During this phase of the mission, the AUV continued to be tested primarily during daylight hours, while JPL /NIC analysis was conducted during darkness. AUV technical issues continued to be worked during the evening hours. The AUV was

launched using the aft port articulating crane for this entire segment of the cruise, and HEALY maneuvered to open leads to launch the port RHI for vehicle recovery. The AUV tests proved successful as the vehicle was deployed for various runs under the ice and back to open leads. During these tests the installed ice sonar and CTD subsystems appeared to work properly.

As ice/weather conditions complicated operations HEALY utilized time for three main mission areas; AUV Operations, CTD Operations, and Ice Observation/ Analysis. For the final weeks of this science phase, temperatures averaged -4 F with wind chills nearing -50 F. Small boat performance was unreliable at the low end temperatures, and crew stay time limitations made performing extended operations difficult. During times when personnel safety was at risk due to extreme temperatures, ice observations and CTD operations became the primary areas of concentration.

Ice observations for the JPL/NIC ground truthing mission usually consisted of looking for various types of ice (multi-year, first year, frazzle, pancake, etc) that was flat and undisturbed. The OOD would maneuver the ship along side the optimal ice found so as to locate the forward, port side of the fantail adjacent to the desired ice. Scatterometer readings would then be taken for about 45 minutes followed by Radiometer readings for the same duration. Afterwards, other science party members would deploy to the ice via a personnel platform supported by the port articulating crane in order to record ice readings and to recover ice cores. On several occasions pieces of pancake ice were recovered for the science party. Once by the RHI crew other times by using a wire basket hoisted by the articulating crane.

Upon completion of AUV testing in ice conditions, HEALY transited to the west side of Svalbard to conduct CTD transects of the Atlantic current layer. Four days of CTD operations were conducted in support of this mission. All equipment performed well during this portion of the cruise. A total of 51 CTD casts were completed during this phase. The ALTEX team was able to meet all objectives with the exception of successful deployment of the communications buoys. The buoys could not melt through the ice as designed due to a problem with the pellets they used for the heat generating process. The ALTEX team also was not able to complete a final test with the buoy launcher installed on the AUV and a deployment of the communications buoy from the launcher under the ice.

With the CTD transects completed, HEALY transited to the fjords of Northern Norway once again for further AUV testing. Unfortunately, Norwegian naval activity prevented the testing and the fjord was used as shelter while the science party packed up their gear.

Tromso, Norway - Panama Canal

During a quick one-day stop in Tromso, the science party disembarked. As with the first science party, much equipment was left onboard for further transport to Seattle where members of the respective science parties planned to take possession of their equipment.

Technicians from Alstom made the transit from Tromso to Dover to continue troubleshooting several continuing winch control issues. They were able to correct all problems. All that pends is a full test of the T/C Winch to fully verify the repairs were complete.

Recommendations

Dredging – OODs need to clear a track in preparation for the dredge whenever possible. Take time to determine set and drift prior to selecting a lead or breaking a dredge track. When the dredge becomes anchored and wire is under load, do not allow it to contact any ice. If open water is available astern, use the wire tension to pull the ship back towards the dredge. Utilize a proper weak link to break in cases where the dredge cannot be freed by "yo-yoing" the wire and the ship is unable to navigate directly above the dredge.

Small-boat operations- Science missions needing extended small-boat support need to be scheduled for different time of year. Such operations need to be completed during warmer months when crew stay time is not limited.

TABLE IV-1: OVER THE SIDE SCIENCE OPERATIONS

DATE	EVOLUTION	EQUIPMENT	REMARKS
16-Jun-01	T/C CAST	DREDGE	SUCCESFUL CAST TO 700M
19-Jun-01	T/C CAST	DREDGE	SUCCESFUL CAST TO 1000M
9-Jul-01	O/W CAST	WEIGHTS / 3/8" WIRE	SUCCESSFUL CAST TO 461 M
11-Jul-01	T/C CAST	DREDGE	SUCCESSFUL CAST TO 1028M
14-Jul-01	T/C CAST	DREDGE	SUCCESSFUL CAST TO 4500M
25-Jul-01	T/C CAST	DREDGE	WINCH TEST TO 1200M
6-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	PARTED WIRE. LOST 3439M OF WIRE AND ALL EQUIPMENT
6-Aug-01	#2 O/W CAST	WAX CORE	SUCCESSFUL CAST TO 3718M
7-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4632M
8-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4500M
8-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4258M
9-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4200M
10-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4000M
10-Aug-01	#2 O/W CAST	WAX CORE	SUCCESSFUL CAST TO 3700M
10-Aug-01	#2 O/W CAST	WAX CORE	SUCCESSFUL CAST TO 3500M
11-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 2800M
12-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4300M
12-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 3290M
13-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	PARTED WIRE. LOST 3738M OF WIRE AND ALL EQUIPMENT
14-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 3200M
14-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 3144M
14-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 3400M
15-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 3300M
15-Aug-01	#2 O/W CAST	WAX CORE	SUCCESSFUL CAST TO 3224M
15-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 3400M
16-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4003M
16-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 2600M
16-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 3600M
17-Aug-01	#2 O/W CAST	WAX CORE	SUCCESSFUL CAST TO 3098M
17-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 3000M
17-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 3200M
17-Aug-01	#2 O/W CAST	WAX CORE	SUCCESSFUL CAST TO 2864M
17-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 3300M
17-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 3600M
18-Aug-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 3300M
19-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 3090M
19-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 3800M
19-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4350M
20-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4350M
20-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4292M
20-Aug-01	#2 O/W CAST	WAX CORE/MAPR	SUCCESSFUL CAST TO 3745M

20-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4550M
21-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4500M
21-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4300M
21-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4700M
22-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 3500M
22-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4500M
22-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4100M
23-Aug-01	#2 O/W CAST	WAX CORE/MAPR	SUCCESSFUL CAST TO 4675M
23-Aug-01	#2 O/W CAST	WAX CORE/MAPR	SUCCESSFUL CAST TO 4169M
24-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4500M
24-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4600M
24-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4800M
25-Aug-01	#2 O/W CAST	WAX CORE/MAPR	SUCCESSFUL CAST TO 4673M
25-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4100M
25-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4550M
26-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4050M
26-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 3800M
26-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4400M
27-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4300M
27-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4800M
27-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4600M
28-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4100M
28-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4100M
28-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4200M
28-Aug-01	#2 O/W CAST	WAX CORE/MAPR	SUCCESSFUL CAST TO 4092M
29-Aug-01	#2 O/W CAST	WAX CORE/MAPR	SUCCESSFUL CAST TO 4380M
29-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4000M
29-Aug-01	#2 O/W CAST	WAX CORE/MAPR	SUCCESSFUL CAST TO 3807M
30-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 3800M
30-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4100M
31-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4700M
31-Aug-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4100M
1-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4400M
1-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 3500M
2-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 3000M
2-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 3300M
3-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 3600M
3-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 3550M
9-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4000M
10-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4200M
10-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4100M
10-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4100M
10-Sep-01	#2 O/W CAST	WAX CORE/MAPR	SUCCESSFUL CAST TO 3940M
10-Sep-01	#2 O/W CAST	WAX CORE/MAPR	SUCCESSFUL CAST TO 3781M
11-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4000M
11-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 3500M
11-Sep-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 3929M
12-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4000M

13-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4100M
13-Sep-01	#2 O/W CAST	WAX CORE/MAPR	SUCCESSFUL CAST TO 4126M
13-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4200M
14-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4400M
14-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4800M
14-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 1200M
15-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4200M
15-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4000M
15-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4200M
16-Sep-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 4020M
16-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4800M
17-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 5100M
17-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 5100M
17-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4900M
17-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 5000M
18-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 5000M
18-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4900M
18-Sep-01	#2 O/W CAST	WAX CORE/MAPR	SUCCESSFUL CAST TO 2853M
18-Sep-01	#2 O/W CAST	WAX CORE/MAPR	SUCCESSFUL CAST TO 3320M
19-Sep-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 2812M
19-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 3550M
19-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 5200M
19-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4400M
20-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 5100M
20-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4700M
20-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 5000M
20-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4800M
21-Sep-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 3665M
21-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 5150M
21-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4900M
21-Sep-01	#2 O/W CAST	WAX CORE/MAPR	SUCCESSFUL CAST TO 5134M
22-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4900M
22-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4400M
22-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4450M
23-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4600M
23-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4300M
23-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 2300M
23-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4800M
24-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4550M
24-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 4800M
24-Sep-01	T/C CAST	DREDGE/PINGER/MAPR	SUCCESSFUL CAST TO 5000M
24-Sep-01	#1 O/W CAST	CTD/ROSETTE	WINCH OVERHEAT - CAST TO 4719M
11-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 500M
11-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 900M
11-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 750M
11-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 1000M
11-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 2350M

12-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 300M
12-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 400M
12-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 1000M
13-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 350M
16-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 300M
16-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 300M
17-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 900M
18-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 1000M
19-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 1200M
20-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 1050M
20-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 600M
21-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 2150M
21-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 2000M
22-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 2500M
22-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 2100M
23-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 2200M
23-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 1900M
23-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 1500M
23-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 1000M
23-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 500M
23-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 200M
25-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 1850M
26-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 550M
27-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 800M
27-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 1100M
27-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 1800M
27-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 900M
27-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 500M
28-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 400M
28-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 150M
28-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 100M
28-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 300M
30-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 150M
30-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 500M
30-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 800M
31-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 100M
31-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 150M
31-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 200M
31-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 750M
31-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 900M
31-Oct-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 2150M
01-Nov-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 1850M
01-Nov-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 2350M
01-Nov-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 2400M
01-Nov-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 2100M
01-Nov-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 2100M
01-Nov-01	#1 O/W CAST	CTD/ROSETTE	SUCCESSFUL CAST TO 2200M

TABLE IV-2:
SUPPLIES EXPENDED IN SUPPORT OF SCIENCE OPERATIONS

Item Name	Quantity Used	Used For
Rewritable CDs	50 ea	Data Archiving/ Both Science Parties
8mm Tapes for Seabeam	15 plus	Data Archiving/Chief Scientists
HP 1200c Color Printer Cartridges	15 ea	Seabeam
Paper for 1005cm Plotters(Seabeam)	10 rolls	Seabeam
Printer paper	5 bxs/10 Reams per Bx	AMORE/ALTEX
Terascan Printer Paper	5 Boxes/100 per Box	Additional Pics for Science
Electrical Tape	15 Rolls/ Various Sizes	Dredges/ALTEX
Duct Tape	10 rolls	Dredges
Plastic Wire Ties	5 Bags/100+ bag	AMORE/ALTEX
Paper Towels	30 Rolls	GSK Item
Cleaning Supplies	Various Items	GSK Item
Clipboards	5 ea	Dredge Logs
Disposable Hand Cleaners	5 rolls	AMORE
Site Saver Lens Cleaners	2 Cases/ 10box	AMORE/ALTEX
Gojo Hand Cleaner	2 Bottles	AMORE/ALTEX
Coffee	2-3 Cases	AMORE/ALTEX
Coffee Filters	2 Boxes	AMORE/ALTEX
Cotter Pins(Various Sizes)	5 Boxes	AMORE/ALTEX
Batteries(Various Sizes)	10 boxes	AMORE
Floppy Disks	2 boxes	AMORE/ALTEX

CHAPTER V - ENGINEERING

Summary

Pre-Deployment Preparations

Extensive repairs and modifications were completed during PSAII (Sep 00-Mar 01, value $7M), Mini-Dockside Availability (Jan- Mar 01, value $320k), construction Warranty repairs (Aug 00-Jun 01, value $5.2M). Highlights of these projects include the following.

a) Significant improvements were realized in the Integrated Power Plant's (IPP) performance and reliability.
b) The Science Winch Control System was completely redesigned for simplified man-machine interface.
c) Sweeping habitability improvements were completed, including installation of three additional staterooms, and the complete remodeling of all the crew's lounges and the Science Conference Room.
d) Expanded automation and monitoring of ship's systems (fueling, boiler feedwater treatment, distilling plant, etc.) to improve the optimally sized crew's ability to safely operate the ship.
e) New, more capable, reliable and serviceable LCVPs (4 each) and an ASB were acquired for the whole Polar Icebreaking fleet.

HEALY sailed with the following open CASREPS.

a) 00070 and 00071, #1 and #3 A/C Unit Condensers, Cat 2. Condensers ruptured during inport period, inspection found over 10% of tubes eroded and near failure. Suspect tubes were plugged, existing design not serviceable. A complete new condenser system is being designed for installation upon return to homeport.
b) 01008 Boiler Feedwater Treatment System, Cat 2. Dosing pump burned up when steam system was secured for repairs. System manufactured in England, planned on having service rep visit ship during England port call to install new pump and software upgrade.
c) 01005 #2 Start Air Compressor, Cat 3. Compressor self destructed due to loss of cooling water during ASW system modifications. Long lead time parts delayed repair until just prior to sailing, test run damaged head gasket when inter-stage valves were installed backwards. Repair parts were forwarded to Puerto Rico for fly on with AvDet.
d) 01011 Science Electronic Systems, Cat 3. Numerous problems with the ship's science electronic systems were uncovered during science shakedown cruise in April 01. ESU worked with ship's crew to rectify.
e) 01013 Sea Bay Piping, Cat 3. Sea bay feed piping sprung numerous leaks just prior to departure. Temporary repairs were completed by crew, more extensive temporary repairs were planned for England port call. Piping is wrong material choice for sea water service (304L SS) and has to be renewed in the near future.

Seattle, WA - Puntarenas, Costa Rica

HEALY encountered its first extensive high ambient temperature operations, sea and air temperatures ranging 80-90 °F, and relative humidity at 80-85% for weeks at a time. Ship's systems performed as designed, though close monitoring of A/C boundaries was required to maintain comfortable temperatures in all the normally manned spaces.
The IPP performed admirably in these conditions and we purposely pushed the plant hard (3 MDGs online at 100%) to find the limiting factor for warm weather operations. After

many hours of adjusting water flows to the MDGs, full power was easily sustainable with sea temperatures of 87 °F. The limiting factor we found was the winding and Midel fluid temperatures in the Cyclo Converter Transformers. After several hours of full power operation, the temperatures exceeded the break-down temperature of the Midel insulating fluid, so that the throttles had to be brought back to approximately 80%. This result is somewhat expected due to the installation of flow regulators in the MSW cooling lines to the transformer heat exchangers. High flow rates had prematurely eroded several of the coolers during the Maiden Voyage, and as part of the warranty replacement, 18 GPM regulators were installed to extend the life of the new coolers.

The following CASREPs were generated during this transit.

a) 01014 Sperry VMS, Cat 2. Autopilot did not communicate properly with the VMS in NAV mode. Troubleshooting conducted by ship's force with guidance from Sperry.
b) 01015 #1 Climate Control Chamber Compressor, Cat 2. MSTs noted rise in temperature in the #1 Climate Control Chamber, further investigation found a dead winding on the compressor motor. Compressor is a hermetically sealed unit, so total replacement was required. New compressor requested for delivery during England port call.

Costa Rica - Dover, England

The transit from Costa Rica to Dover was routine and uneventful.

The following CASREPs were generated during this transit.

a) 01016 Terascan, Cat 2. Terascan would not track GPS satellites and kept returning a configuration file error. SeaSpace emailed a temporary software patch that corrected the problem.
b) 01017 Purifier Pneumatic Pump System, Cat 2. LOP/FOP sludge tank Air Operated Pump failed, no spare onboard. Both Seattle based SKs and ELC were able to identify and deliver a replacement in Tromso, Norway.
c) 01018 #1 Oceano Winch, Cat 2. #1 Oceano Winch FIP problems returned during testing of winches causing momentary loss of plant control. Problem was eventually isolated to FIP B on the Science Winch Hub which was disconnected for the remainder of the trip.
d) 01019 CTES, Cat 2. CTES failed to bind logs properly and trending is spotty. Investigation by Alstom continues.

Upon arrival in Dover, HEALY sponsored three days of events for Alstom, including a Ship's Bell Presentation and press day with over 75 journalists touring the ship. The next day saw nearly 125 Alstom employees visit and tour the ship. During the stay in Dover the following casualty repairs were effected:

a) The aft waste oil tank was pumped down and cleaned by a commercial contractor. The entire MSW pipe that transits the tank was then wrapped in Synthoglass to halt the salt water leaks plaguing our stainless steel piping systems.
b) A technical representative from Hamworthy KSE visited the ship to inspect the #2 Start Air Compressor for high interstage discharge temperatures. It was given a clean bill of health and placed back in service.
c) Mr. Bruce Majer of Vibration Specialty Corp. visited the ship to install a Dynamic Vibration Absorber (DVA) and balance the flywheel on the #3 Start Air

Compressor. These actions successfully reduced vibrations on the machine by 30%.

Dover, England - Tromso, Norway

HEALY departed Dover with the following additional personnel.

a) Seven personnel from Alstom customer service, contract management and field service rode the ship during this transit. The customer service and contract management folks were onboard for ship familiarization and for discussions on support contract methods and remote technical support. The field service folks were working on the FIP problems in the Science Winch hub.
b) Mr. Kevin Logan of MACSEA was onboard to do follow-up monitoring and crew training on the DEXTER system installed prior to departure.
c) Mr. Bruce Majer remained onboard to complete the DVA install on #3 Start Air Compressor and conduct crew training on vibration monitoring.
d) Technical representatives from Wartsila and Woodward Governor were scheduled to ride with the ship, but missed the departure time.

3. The following CASREPs were generated during this transit.

a) 01020 Incinerator, Cat 2. The incinerator experienced numerous intermittent flame failures from large amounts of water in the sludge tank. This damaged the combustion chamber temperature probes, no spares onboard. Spares were procured direct from OEM and installed in Dover with negative results. Technical representative from A-S Vesta in Denmark met the ship in Tromso and found the fuel filters clogged, the sludge pump coupling improperly sized and numerous other mis-adjustments. System was returned to full capability.
b) 01021 MSW Piping, Cat 3. While consolidating fuel to prepare for onload in Tromso, the 5-84-3-F was filled to 95% capacity. Shortly afterward, an oil sheen was observed on the starboard side of the ship, further investigation found that the MSW pipe transiting the tank had ruptured and was sucking small amounts of fuel out of the tank. The tank was pumped down and found to have a 3/8 inch hole in it, the pipe material is 304L SS. Ship's force utilized remaining synthoglass to repair leak.

Phase 1 - Science (AMORE)

Departed Tromso with a 95% fuel load to maximize endurance for projected 65 day mission to the Gakkel Ridge.

On 09 August the 2CC1 Cyclo Converter started to trip off line when placed under load. The plant was shifted to six pulse power on the port shaft and twelve pulse power on the starboard shaft. Trip histories were forwarded to Alstom via email for analysis and within four days the culprit was identified as faulty gate cards. These were changed out with onboard spares and the drive placed back in commission. This was the first true validation of remote technical support, and was considered a resounding success.

The following CASREPs were generated during this phase of the mission.

a) 01021 MSW Piping Update 01, Cat. 3. The MSW piping in the 5-84-3-F ruptured again in five additional places, fuel and water remaining in the tank was transferred to the 5-84-4-F which contaminated an additional 35,000 gallons of fuel. Leaks in the 5-84-3-F were not repairable due to their location in the overhead of the tank, so the tank was left to fill with salt water. The overflow

check valve was wedged closed to prevent cross contamination of the fuel overflow system. Water that settled out of the 5-84-4-F was transferred back into the 5-84-3-F before it filled up.

b) 01022 Bow Thruster Moment Arm, Cat. 2. While operating the bow thruster in DP mode, a loud bang was heard throughout the ship and the bow thruster shut down. Further investigation revealed that the starboard diverter vane moment arm that connects the hydraulic ram to the vane stem had broken. Cause of failure was determined to be low cycle fatigue at the keyway cut. Material for a new arm was cannibalized from the propulsion shaft handling tools and a replacement arm was fabricated by the engineers on Polarstern. Bow thruster was returned to full capability.

c) 01023 #1 ASW Pump, Cat 2. The #1 ASW pump lost pressure and went into alarm. Further investigation found the impeller dropped into the volute and the retainer bolt broken and seized into the shaft. No spare parts onboard.

d) 01024 Bridge Window, Cat 2. The center heated bridge window overheated and broke when the thermostatic controller failed. These windows have not proven to be very reliable, older style thermostatic controllers are the main culprit and we are upgrading to the new style as the older ones fail.

e) 01025 #4 MDE Fuel Leak Off System, Cat 2. During adjustments on #4 MDE, the bolt that holds the leak off piping to the high pressure fuel pump twisted and broke when tightened. Further inspection of other bolts on the other engines showed similar over tightening distortion. Neither the leak off piping, bolt or torque specification were found in the tech manual, Northrop Grumman investigating. In the mean time to return the engine to service, the sheared bolt head was reinstalled using a compression bracket to hold it in place. Engine was return to service and awaiting parts. Replacement parts were received from HEALY shoreside support during the Tromso II port call.

f) 01026 Port Wind Indicator, Cat 2. The port wind direction and speed indicator was found broken and hanging by its wires. Topside icing was the suspected culprit. The indicator was replaced by a spare that was eventually found under a different part number in the spare parts inventory.

g) 01027 #2 MDG, Cat 3. #2 MDG HV circuit breaker commanded to open randomly when generator was under load. Extensive onboard troubleshooting by crew was unable to identify the culprit. Alstom RTS efforts were also unable to locate source of problem. Alstom tech rep was ordered to meet ship in Tromso to conduct plant testing during transit to Phase II science.

Phase 2 - Science (Primary – ALTEX, S.O.O. - JPL/NIC)

While inport Tromso we received the large diameter Jubilee patches we had ordered during the previous port stop. With these 18 inch diameter patches we were able to temporarily repair the leaks in the MSW overboard line that transits the 5-84-3-F. These repairs ended the free communication with the sea in this tank.

Two pipe fitters from Todd Pacific Shipyards visited the ship in Tromso to scope the sea water piping renewal for our Emergency Dry Dock. Mr. Barry Ford of Alstom joined the ship to help troubleshoot the #2 MDG HV Circuit Breaker problem.

Departed Tromso with 66% fuel for a projected 30 day mission in the ice.

HEALY experienced its first prolonged exposure to extreme low temperatures during this phase. Temperatures remained at –20 deg C for more than two weeks, with the wind

chill reaching down to –41 deg C for several days. The following problems were encountered:

a) A total of seven steam pre-heaters ruptured, the exact cause of failure is still to be determined as access to the coils is impossible underway. Even with these pre-heater coils isolated, we were still able to keep the interior of the ship comfortable using re-heaters and recirculating air.
b) We experienced problems with ejecting oil out of the rear seal of the MDGs if they were placed online without first being properly warmed up. Several fixes were tried, including keeping the enginerooms heated to over 100 deg F, but none were totally successful. The only way to prevent the problem was to warm the engine up off line for at least 10 minutes prior to placing on the HV bus. This had minimal effect on operations, but required the bridge to anticipate the need for additional generating power ahead of time.
c) The recovery of the AUV required the use of the RHI, but the RHIs are not intended for use in extreme cold weather. Though they have a jacket water heater that keeps the engine sufficiently warm, there is no way to effectively heat or drain the salt water cooling lines. These eventually froze solid and it took an extensive effort to thaw them out. Once we had the salt water lines clear, we had to keep them clear by constantly running 56 degree F ASW water through them while the boat was in the cradle. The ASW water instantly froze once it exited the lower drive unit, which required the removal of a very large icicle every few hours so that we did not damage the boat's propeller.

We experienced a leak detection alarm on the port main motor cooling air-to-main sea water heat exchanger. The water was bled off the detector and alarmed again within the hour, which confirmed that we did indeed have a leak. The heat exchanger is a tube-within-a-tube design that collects and channels any leaking water to the detector. Finding the leak would prove a challenge, but a stroke of genius by our AC&R technician pinpointed the leak in no time. By charging the leak-off gallery with refrigerant we were then able to sniff each tube (122 total) with our halide detector to locate the failed tube. One definite and two probables were identified in this manner and the tubes were sealed with micarta plugs, and the main motor placed back in service. Eddy current tests of both main motor heat exchangers will be required upon return to homeport to identify any additional suspect tubes.

The following CASREPs were generated during this phase of the mission.

a) 01027 #2 MDG Update 01, Cat 3. Extensive troubleshooting efforts by ship's force and Alstom rep finally uncovered cause of the #2 MDG uncommanded HV circuit breaker openings. Fault was isolated in a poorly wired pressure differential switch across the the #2 MDG's duplex fuel oil strainer that resulted in an intermittent short circuit when the engine was vibrating under load. The resulting voltage droop in the alarm I/O card in RTU 4 commanded breaker to open and tripped numerous alarms simultaneously. Switch has been bypassed, engine fully functional with local monitoring of fuel oil strainer differential pressure. Replacement switch ordered for deliver upon return to home port.
b) 01028 SDN Connectivity, Cat 3. SDN has no ability to connect via INMARSAT to the internet or to send and receive e-mail. SDN Cisco 2500 series router inoperative and there is no spare onboard. Spare router shipped to Tromso, but still did not correct the problem. Suspect problem is actually in TILT/TDRSS

system (see CASREP 01037). TILT system turned over to ESU upon return to homeport to continue troubleshooting.

c) 01029 #3 Eductor Limitorque Valve, Cat 2. #3 Eductor Limitorque Valve drive nut seized and broke due to saltwater corrosion. Replacement nut received in Tromso.
d) 01030 #1 Science Reefer Compressor. Compressor sucked liquid when the defrost switch failed to operate properly. Replacement parts received in Dover.
e) 01031 #1 6250 HF Coupler Interface, Cat 2. Capacitor failed in coupler interface requiring renewal of entire unit. Awaiting delivery of parts upon return to homeport.
f) 01032 Radio Direction Finder, Cat 2. Antenna elements broke off during topside icing conditions. Awaiting delivery of parts upon return to homeport.
g) 01033 #3 MSW Pump, Cat 2. Pump bearings failed, awaiting delivery of parts upon return to homeport.
h) 01034 Science Winch System, Cat 2. Accumulated problems with science winches that developed during science missions identified for resolution by Alstom. Alstom provided three tech reps for transit from Tromso to Dover, all problems corrected.
i) 01035 Oily Water Separator, Cat 2. Several automatically controlled solenoid valves failed, system still functions, but requires additional operator intervention. Awaiting delivery of parts upon return to homeport.
j) 01036 #1 O-Winch Cooling Fan, Cat 2. #1 O-Winch cooling fan bearings failed, and were renewed in Tromso.

Tromso, Norway - Seattle

Mr. Mickey Donner, John Craig and Peter Watt of Alstom rode the ship from Tromso to Dover to work on correcting the Science Winch problems noted in CASREPs 01034 and 01036. Final winch repairs were completed plus testing and planning meetings with Alstom were conducted in Dover.

The following CASREPs were generated during this phase of the mission.

a) 01037 Tilt/TDRSS, Cat 2. Tilt/TDRSS comms system on loan from NASA failed to operate reliably, unable to correct problems after extensive troubleshooting efforts by ship's force. Unit will be turned over to ESU upon return to homeport for further troubleshooting.
b) 01038 Steam Heater Coils, Cat 2. Seven total pre-heater steam coils ruptured during this mission, root cause of failure is unknown and will be investigated upon return to homeport. Repairs will be added to the DS02 work package.
c) 01039 150 kHz ADCP, Cat 2. 150 kHz ADCP fails to boot up properly, troubleshooting efforts directed by OEM identified a software problem that was corrected.
d) 01040 TACAN, Cat 2. Failed board in TACAN prevents azimuth information from the gyro to be transmitted. New board on order for delivery upon return to homeport.
e) 01041 Auxiliary Seawater Piping, Cat. 2. ASW piping failed in numerous places in AMR No. 5. Ship's force installed several soft patches to enable the systems to remain operational. The piping is Copper Nickel, however replacement of a three foot section and various fittings will be replaced during the inport period.
f) 01042 Science Seawater Pump, Cat. 2. The discharge hose from the science seawater pump came loose spilling seawater on to the pump's electric motor. Replacement to be procured upon return to homeport.

g) 01043 #2 MDE Exhaust Expansion, Cat 2. Exhaust leaks found coming from No. 2 MDE cracks in the bellows type expansion joint on the exhaust manifold. Heat stress and/or vibration believed to be the cause of the failure. Inspection found numerous connection bolts loose and two were found snapped in two. Similar conditions were found with the bolts on No. 1 and 4 MDEs. Problem to be repaired upon return to home port.
h) 01044 1CC2 Cycloconverter, Cat 3. Gate card power supply unit failed. Unit in spare cycloconverter not the same model and incompatible with installed cyclo. Requested MLCPAC procure spare.

Main Propulsion Summary

Pre-Deployment Preparations

Pre-deployment preparations were focused on the on-load and storage of spare parts, the final checking of work completed during the extensive 10-month, Aug 00 to June 01 availability, and the detailed check of machinery readiness.

Confidence was high the main propulsion machinery was as ready to meet the demands of the mission ahead, and that only a few small problems would be encountered on the voyage to Tromso, Norway.

Seattle, WA - Puntarenas, Costa Rica

As expected, the main propulsion machinery performed well, and the small problems that arose were taken care rapidly and without significant disruption to the plant

Main Propulsion personnel busied themselves with the fine tuning of the main engines fuel system and the replacement of the engine's high pressure fuel lines with an upgraded and improved fuel pipe. As of the HEALY's arrival in Costa Rica, all four main engines were running well and the new fuel pipes had been installed on MDG #4.

Costa Rica - Dover, England

Main Propulsion personnel continued work on adjusting the main engine fuel systems and installing the new fuel pipes. Work on the fuel pipe replacement project was severely hampered by troublesome main engine overheat causalities, which required lowering the main engine J/W temp control settings from 192 degree F to 187 degree F. Resetting the temp controls was deemed necessary after finding the turbochargers were overheating in the hot, humid air of the tropics. As of our arrival in Dover, England, new fuel pipes have been installed on MDGs #4 and #3; MDGs #1 and #2 still need fuel system adjustments.

Dover, England - Tromso, Norway

Visit to Dover, England was marked with the arrival of numerous tech-reps and the onload of several shipments of parts and supplies. Received the balance of parts necessary to complete the main engine fuel pipe replacement upgrade, and various back-ordered main engine spares. Bruce Major from Vibration Specialty Corporation arrived and installed a prototype vibration dampner system on the number 3 start air compressor. Kingsley White from Hamworthy KSE arrived to verify the recently rebuilt number 2 start air compressor was operating properly – he found that it was. A representative from Aquanet International arrived to deliver replacement parts for the CASREPed boiler water monitoring system and make a programming change to shut down the unit completely if sample water became too hot.

Sailed from Dover with main propulsion plant in good working order. After docking in Tromso, a representative from Wartsila, under contract for Northrop Grumman, arrived to troubleshoot and repair the malfunctioning fuel regulator on MDG #3, which was thought to be responsible for low engine fuel pressure during starts. The regulator was quickly cleaned and readjusted, and the fuel pressure problem resolved. A Woodward Governor representative, also under contract for Northrop Grumman, arrived to readjust the sensitivity setting of the charge-air waste activation signal in an attempt to prevent cycling of the waste gates during normal engine operation. The setting was changed from 400 kW/sec to 750 kW/sec. Sailed from Tromso with main propulsion plant in excellent working condition. Confidence was high the plant was ready to meet the mission ahead.

Phase 1 - Science (AMORE)

The ship's electricians made numerous sensitivity adjustments to achieve optimum performance of the main engine charge air waste gates. Optimum performance was finally achieved with a setting of 550 kW/sec. But even with the waste gates opening as intended during engine unloading the turbocharger surging continued - all hopes of reducing the turbocharger surges with the "smart" waste gates were abandoned.

While operating in DP mode during a bottom dredge, the moment arm controlling the bow thruster's starboard vane broke at the keyway. Machinist aboard the German R/V Polarstern fabricated a new arm from steel plate we proved them. The new, "beefier" moment arm was installed and tested satisfactory. The Germans were paid with a case of beer, and the bow thruster placed back in full operation.

With hopes this year's showing would be better than last's, the bow wash system was run for an operational test – the results were disappointing. After only a few minutes of operation in heavy ice, water discharge from the bow wash all but stopped. Suspecting a choke point in the water distribution piping, the forward most ballast tank was accessed for a look. As suspected, the forward sections of the distribution pipes on both the port and starboard side were found to contain obvious obstructions to the discharge of accumulated ice in the piping system. A camera was rigged from the bow to observe the effect of the clogging on the distribution of water from the bow wash system. What the camera revealed was far worse than clogging in the distribution piping. Ice under the hull was blocking water flow into the bow thruster's sea chest and completely cutting off water to the jet pump. The blockage would not readily clear itself in open water. Concluding there was nothing that could be done to solve the problem short of relocating or significantly altering the bow thruster's sea chest, all bow wash testing and use was suspended.

While tuning up the #4 MDG, the bolt that holds the fuel leak off line to the high pressure fuel pump broke when tightening, no spare onboard. Subsequent investigation of the other bolts found most to be over tightened and torsionally distorted. Parts and torque specs were not identified in any tech pubs, Northrop Grumman researching. Subsequently received replacement parts in Tromso.

While transiting to exit the ice, #3 MDE Jacket Water temperature regulating valve (Amot) began to malfunction causing the engine to run too cool. The valve controller was rebuilt to eliminate binding and the engine returned to service.

Phase 2 Science (Primary – ALTEX, S.O.O. - JPL/NIC)

The main propulsion plant continued to run well throughout the second phase. However, as the ambient air temperature in the AMRs and engine rooms fell, the main engines repeatedly blew four to eight gallons of lube oil (and small amounts of crankcase vapor) from the rear engine seal during startups, especially auto-starts. Sometimes theses incidences were preceded by Vital Alarm System (VAS) oil mist detection shutdowns. After inspecting, testing and consultation with Northrop Grumman we determined the problem was a result of excessive lube oil pressure during engine run up, caused when cold oil from the coolers and piping located in the AMRs returned to the engine during the first few minutes of engine operation. To prevent this occurrence we suspended use of the minimum generator manipulation auto start option, left the oil keep warm unit on continuously reduce the likelihood they would be left off and required engine to be prelubed for a full five minutes before starting. We also required the EOW to ensure the engine main bearing temperatures were at least 140 degrees before running the engines up to rated speed. The engine room and AMR heaters were placed in at the highest setting possible. And last, but certainly not least, the engine room fans were set to maintain a slight pressure in the engine room during startups.

MDGs 1 and 4 developed significant exhaust header leaks. Dozens of exhaust bolts were found loose, missing nuts, or broke on both engines. Technicians tighten what they could but without spare bolts, the broken ones could not be replaced. The engines were placed back in service. The remaining exhaust header leaks, mostly in the inaccessible (while underway) area around the turbochargers, will be addressed during the next inport.

Tromso, Norway - Seattle

Technicians installed the new fuel pipes on and tuned both MDGs #1 and #2.

Auxiliary Summary

Pre-Deployment Preparations

Pre-deployment preparations were focused on the detailed checking of machinery readiness, and the completion of work remaining from the extensive 10-month, Aug 00 to June 01, availability. Particular attention was given to the adjustment and preparation of the ship's HVAC system which was expected to be pushed to it's performance limits during the upcoming deployment

Confidence was high the auxiliary machinery was ready to meet the demands of the mission ahead and that only a few adjustments would be necessary once the cutter was underway to achieve optimum performance on the trip to Tromso, Norway

Seattle, WA - Puntarenas, Costa Rica

As expected, the auxiliary machinery performed well despite the demands placed on in oppressive heat of the lower latitudes. And when problems did arise they were handled very quickly with no impact on the ship's operation.

Auxiliary personnel made numerous adjustments necessary to achieve optimum performance of their machinery with outstanding results. As of the HEALY's arrival in Costa Rica, nearly all of the auxiliary machinery was performing exceptionally well. Most notable was the performance of the ship's distillers, refrigeration, HVAC, and waste disposal systems. HEALY arrived in Costa Rica with no appreciable

waste oil or oily water onboard; all had been processed on voyage from Seattle.

Costa Rica - Dover, England

The auxiliary machinery performed well. The air conditioning system was able to maintain comfortably cool temperatures throughout the ship with only two of the three installed chiller units on line. The ventilation system in the AMRs, however, seemed woefully inadequate in the heat of the tropics, thus allowing the AMRs to reach miserably high temperatures. The ship's incinerator, after performing flawlessly from Seattle to Costa Rica, failed after the sludge tank was filled with an oil mixture containing a large quantity of water. As of our arrival in Dover, England, the incinerator was still OOC.

Dover, England - Tromso, Norway

Our visit to Dover was marked with the arrival of a technical representative from Scandinavia Boiler Service, sent to troubleshoot and repair our CASREPed incinerator. The tech rep found and replaced a damaged fuel pump coupling and readjusted the incinerator. Incinerator was placed back in full operation. In Tromso, the Auxiliary Division conducted a fuel onload of 750,000 gallons of fuel oil. Sailed from Tromso with auxiliary machinery in good working order.

Phase 1 - Science (AMORE)

During the first thirty days of the science mission the incinerator and evaporators became very problematic; both required constant attention and numerous readjustments before reliable and consistent performance could be achieved. The HVAC and refrigeration system, on the other hand, performed exceptionally well, as did the ship's hydraulic systems and various other auxiliary machinery. The only exception being the number #1 ASW pump which dropped an impeller, destroyed the pump shaft and had to be CASREPed because there was no spare shaft on hand.

Phase 2 – Science (Primary – ALTEX, S.O.O. - JPL/NIC)

Phase 2 was rather uneventful for the Auxiliary Division with the exception of recurring incinerator failures and the constant battle to keep the RHI warm enough to operate in support of AUV recovery operations. During the troubleshooting of the incinerator failures, the following lessons were learned: 1) keep the incinerator sludge tank hot and keep it full; 2) avoid shutting down the incinerator once it's up an running; 3) frequent cooling air flow adjustment are necessary to compensate for changes in the temperature and density of outside ambient air; 3) run the incinerator for at least 24 hours to heat the exhaust piping before attempting to put it in operation burning trash; and 3) high outside wind conditions can prevent the incinerator from running reliably.

Tromso, Norway - Seattle

Auxiliary Division personnel caught up on overdue preventive maintenance and making the necessary adjustments to keep the HVAC systems running at peak performance during the ship's transit through the lower latitudes.

Electrical Summary

Pre-Deployment Preparations

Having completed dry docking and a mini dockside availability, Electrical Division completed extensive modifications to the switch gear equipment, main diesel generators, trawl winches, oceanic winches, and the steering system. We were engaged in cycloconverter tuning, MPCMS reconfiguring, installation of new staterooms, and lighting project upgrades.

All efforts resulted in the satisfactory operation of the plant by passing a full power test via a bollard pull and satisfactory operation of the winches and habitability modifications proven during the shake down transit to and from San Francisco in early spring.

Seattle, WA - Puntarenas, Costa Rica

The transit to Costa Rica has proven to be very successful. There were only two Cycloconverter over current trips while in DP mode. Cycloconverter transformers overheated a couple of times due to the newly installed saltwater regulating valves being clogged with paint chips and krill. The Electrical Division worked many hours calibrating resistance temperature devices (RTD) in order to keep the plant running optimally.

A few loose wires reeked havoc in RTU-7 for a couple of days. The loose wires resulted in 32 low confidence alarms and the reduction of ship's power to one-engine operations in spite of steaming on two engines.

The calm seas and the reliable plant allowed us time to complete some of our PMS. One small but significant casualty was with the trawl winch isolator switch, which rendered the winch inoperable. Having replaced the switch with a used, but good switch, the winch was soon back in operation.

Costa Rica - Dover, England

During the transit to Dover, we assisted onboard Alstom engineers in modifications to the drill training software on MPCMS. Mr. Alan Walton of ALSTOM was also onboard for various changes and modifications to the MPCMS software. We continued to have high readings on the cycloconverter cooling water systems due to high seawater temperatures.

We also experienced several casualties in the ship's incinerator. Parts were ordered and the problems were corrected on arrival to the next port of call.

Dover, England - Tromso, Norway

During this brief transit, the modification to the MDE lube oil filtration system was completed making the system fully automated, meaning that during normal operation a watchstander no longer needs to cycle power on the control unit.
Several final tests to the science winches were conducted to confirm satisfactory operation before the first science mission. However, FIP communication problems were unable to be fully solved. An interim solution was devised and a casualty control procedure was developed in order to respond properly to a future FIP communications problem, should one occur.

Phase 1 - Science (AMORE)

During the first science mission, we experienced multiple cycloconverter drive trips. Working with Alstom engineers we were able to keep the drives running. We experienced voltage spikes on the power system that wrecked havoc on the cycloconverters. The cause is not yet known. These trips seem to be growing in frequency and randomness (i.e. varied plant configurations and modes of operation).

Heavy seas caused several faults on the fire alarm system due to water intrusion to remote boxes located on the foc'sle.

Experienced varied problems with the Science Winches. Drives tripped, control panel lighting was inaccurate, and other equipment, such as the meter that measures tension in Aft Conn, failed. The overall wiring appeared to be problematic and not having proper schematics further impeded our ability to adequately troubleshoot the problems.

After entering the ice, witnessed an uncommanded shaft reversal phenomenon. When the engines (regardless of number) were under full load (such as when breaking ice), maximum current is being applied to the main motors, and the ship is making little to no headway, a sudden change in lever position (ex. from position 10 to position 2 and then back to 10) caused the shaft to momentarily turn in the astern direction. Multiple e-mails have been sent to Alstom, but communication has been intermittent and joint troubleshooting thus fruitless.

While transiting to exit the ice the #2 MDG High Voltage circuit breaker started to randomly open under load. The breaker was not being tripped so there were no indications of fault. Further investigation found the MPCMS was sending a signal to the breaker to open, but the cause has yet to be determined.

Phase 2 – Science (Primary – ALTEX, S.O.O. - JPL/NIC)

Excessive noise on the CTD system was investigated and numerous grounds were found to be missing or incomplete. Electricians corrected these deficiencies as well as the slip-ring connection between the drum and the cable that carries the data to the logger. This made a noticeable improvement.

Problems with the incinerator continued as one of the contactors blew, and later a power supply. Replacement parts were not available, but thanks to inventive part substitutions, the incinerator was able to be brought back on line while correct parts were ordered.

Alstom technical representative Barry Ford cured various miscellaneous problems. These included fixing the lack of information from the number one evaporator and making some progress on the Science Winch lighting control problems.

During this phase continued problems with the Bridge window controllers were experienced. In addition to the first controller that burned out (and subsequently one of the bridge windows), four additional controllers were found to be faulty.

Tromso, Norway - Seattle

Alstom representatives came aboard to resolve CASREP items. In addition, meetings were held to assess where things were with the IPP Fault Log. Work was made towards repairing CTES binding issues, but the problem remains. A cosmetic change to how the

low voltage busses appear on MPCMS was instituted.

Two additional window controllers went bad. Coordination between MLC, ESU, and HEALY yielded additional information, alerting us to the fact all controllers installed are MOD E. It was also concluded, after proper investigation, that only control cards are required and not entire units for replacing burned controller cards.

While in Dover, onloaded a spare cycloconverter for shipment back to Seattle where it will be stored as a deep insurance spare. During the transit the 1CC2 cycloconverter gate card power supply unit burned up. We attempted to use the one installed in the spare cycloconverter but found that it was a different type. As a result, we were left with 6 pulse power on the starboard shaft for the transit up the west coast of the U.S.

Damage Control Summary

Pre-Deployment Preparations

1. Onloaded a large quantity of supplies (metal, pipe, gas (oxygen and acetylene), repair parts (sink and showers) to support various projects and repairs for a six month deployment.
2. Completed CASREP repairs to crack in re-circulation piping on black water tank. Rigid bracketing added to piping.
3. Made temporary repairs to main salt water piping in AMR #3 and AMR #2.

Seattle, WA - Puntarenas, Costa Rica

1. Made corrective modifications to accommodation ladder H-frame.
2. Removed and replaced sewage venting and main drain piping for flushing/cleaning.
3. Fabricated portable vise stand for scientist use.
4. Repaired firemain leaks.
5. Improved temporary repairs made to main salt water piping in AMR #3 and AMR #2.

Costa Rica - Portsmouth, England

1. Transit through Panama Canal – damaged science frame platform on STBD side.
2. Made repairs to HERO science frame platform.
3. Conducted AFFF flow test.

Portsmouth, England - Tromso, Norway

1. Welded flat bar to aft A-frame pin to hold in place.
2. Syntho-glas repair made to starboard sea bay overboard discharge piping running through 5-84-3-F.
3. Took measurements for no. 3 eductor overboard valve repairs

Phase 1 - Science (AMORE)

1. Fabricated workbench and shelving in science spaces.
2. Made weld repairs to leaky exhaust covers on MDG.
3. Fabricated satellite dish foundation.
4. Installed hold open devices to stores handling elevator.
5. Syntho-glass & steel repair made to AFFF re-entry station piping for ADG at MICA and AMR5 bulkhead penetration.
6. Installed wood baffling to prevent water for entering ventilation system on starboard forecastle.

7. Made silver braze repairs to start air compressor no. 1 salt water cooling pipe.

Phase 2 - Science (Primary – ALTEX, S.O.O. - JPL/NIC)

1. Installed workbench on STBD fantail for Scatterometer.
2. Turned down drill bit and drills holes in science lifting bar.
3. Fabricated and installed MDE fuel injector test stand in STBD passageway (Generator Rm. No. 1).
4. Fabricated MDE fuel injector storage bracket in STBD passageway (Generator Rm. No. 1).
5. Installed jubilee patches on leaky MSW piping running through 5-84-3-F.
6. Fabricated soda CO_2 racks (2) and installed in chase just aft of Reefer Box and in Drystores.
7. Conducted CHT system maintenance on injectors.
8. Relocated shelving from Port Davit Hydaulic Pump Room to Science Reefer Equipment Room.

Tromso, Norway – Seattle

1. Patched leaks (2) on ASW piping in AMR #5.
2. Patched leak (1) in MSW piping in AMR #3.
3. Installed holder devices for hatch dogging wrenches.
4. Removed workbenches in Aft Staging Area to make room for spare cycloconvertor.
5. Repaired #3 eductor overboard valve; CASCORed.
6. Also, for whole trip, conducted nightly DCPQS training. At the end of the deployment 100% of the crew (those who had been onboard more than 2 months) had completed their Basic DCPQS. In addition, 75% of the crew completed the advanced DCPQS required for their assigned billets.

Fueling Summary

Seattle, WA

On 11 June 2001, onloaded fuel in Manchester (F-76: 845,570 GAL; JP-5: 22,280 GAL; Expended 120 GAL BIOBOR)

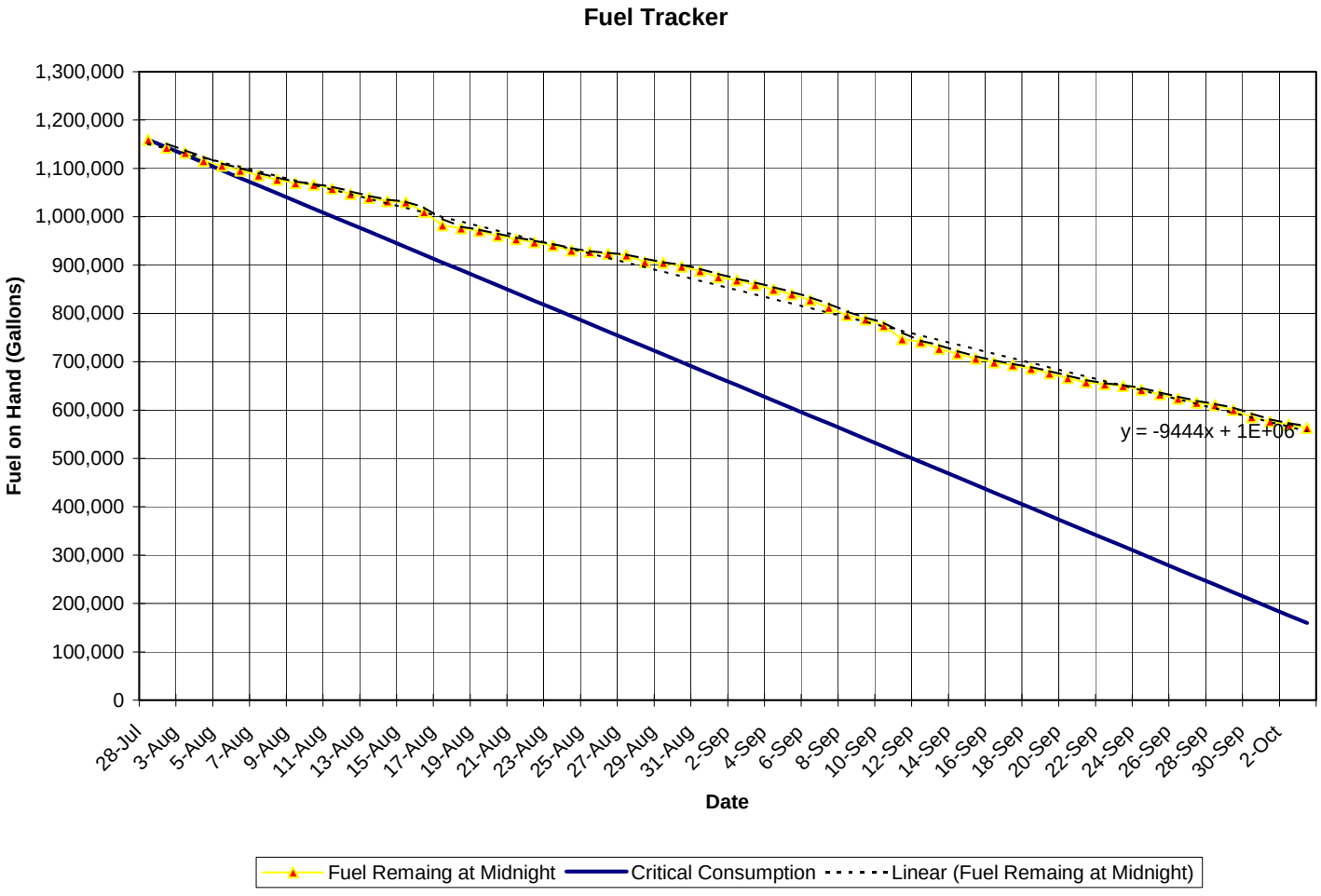
Tromso, Norway

Onloaded fuel in Tromso, Norway on 27 July (No. 1 & 2 diesel: 712,900 GAL; Expended 1 barrel of BIOBOR)

Phase 1 - Science (AMORE)

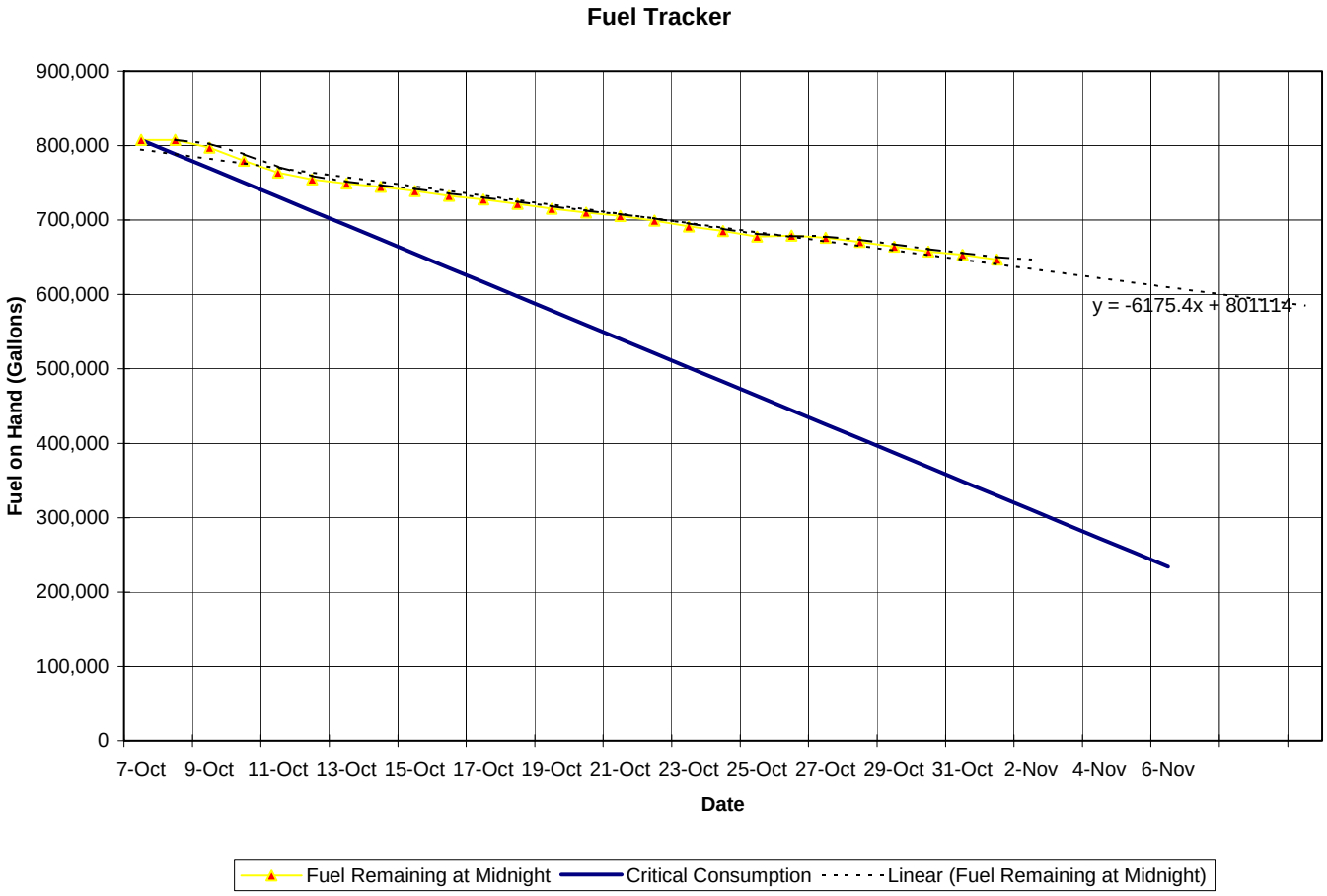
The MSW line transiting the 5-84-3-F ruptured once again upon entering the ice. The fuel in the 5-84-4-F was moved and water and fuel mixture from the 5-84-3-F was transferred in. The leaks were too extensive in the 5-84-3-F to repair, so the tank was left to fill on its own with seawater. The fuel and water in the 5-84-4-F was left to separate, but was too emulsified to safely use, approximately 35,000 gallons of contaminated fuel requires removal upon return to homeport.

Fuel consumption was much better than expected for such a long mission. The mission profile was such that long periods were spent at low power while dredging, leading us to burn much less fuel than projected. See the Fuel Tracking graph below.



Phase 2 – Science (Primary – ALTEX, S.O.O. - JPL/NIC)

Fuel consumption continued to be satisfactory and we were never concerned about burning too much for our month long mission. We hove to for most evenings in order to permit study of the ice by the Satellite Ground Truthing party thus minimizing our consumpton. Onloaded fuel in Tromso, Norway on 5 October (MGO: 292,450 GAL; Expended 1 barrel of BIOBOR)



Dover, England

Onloaded fuel in Dover, England on 12 November (MGO: 400,950 GAL) to ensure we had a sufficient quantity for our transit home.

TABLE V-1: FUEL CONSUMPTION

Date	Percent Remaining	Daily F/O Consumption	Fuel Remaining at Midnight	MDE Configuration	Daily JP-5 Consumption	JP-5 Remaining Consumption
12-Jun	93.2%	5,000	1,138,374	2, 3, ADG	0	53,164
13-Jun	92.7%	6,606	1,132,017	2, 3, ADG	0	53,165
14-Jun	91.1%	19,773	1,112,244	2, 3	0	53,067
15-Jun	89.4%	21,250	1,090,994	2, 3	0	53,024
16-Jun	87.5%	22,311	1,068,683	2, 3	0	52,856
17-Jun	85.9%	20,497	1,048,186	2, 3	0	52,839
18-Jun	84.1%	21,748	1,026,438	2, 3	0	52,681
19-Jun	82.4%	20,163	1,006,275	2, 3	0	52,540
20-Jun	81.3%	14,113	992,162	2, 3	0	52,222
21-Jun	79.4%	22,867	969,295	2, 3	0	51,955
22-Jun	77.6%	21,284	948,011	2, 3	0	51,968
23-Jun	75.9%	21,673	926,338	1, 4	0	52,311
24-Jun	73.8%	25,406	900,932	1, 4	0	51,420
25-Jun	73.7%	1,000	899,932	ADG	0	51,420
26-Jun	73.4%	3,928	896,004	ADG	0	51,420
27-Jun	73.2%	2,726	893,278	ADG	0	51,420
28-Jun	72.8%	4,153	889,125	ADG	0	51,420
29-Jun	72.3%	6,395	882,730	2, 3, ADG	0	51,420
30-Jun	70.4%	23,170	859,560	2, 3	0	51,420
1-Jul	69.8%	6,821	852,739	4	0	51,076
2-Jul	68.4%	17,025	835,714	2, 3	0	51,500
3-Jul	67.1%	17,025	818,689	1, 4	0	51,500
4-Jul	65.5%	18,940	799,749	2, 4	0	51,060
5-Jul	64.9%	7,110	792,639	1, 2	0	51,060
6-Jul	62.8%	26,200	766,439	2, 4	0	51,129
7-Jul	60.0%	33,628	732,811	1, 2, 4	0	51,908
8-Jul	57.2%	34,540	698,271	2, 3, 4	0	51,908
9-Jul	54.9%	27,772	670,499	2, 3, 4	0	51,908
10-Jul	53.3%	19,300	651,199	1, 2	0	51,908
11-Jul	51.8%	19,288	631,911	1, 4	139	51,709
12-Jul	50.2%	18,750	613,161	1, 4	0	51,709
13-Jul	48.8%	17,500	595,661	1, 4	150	51,591
14-Jul	47.7%	13,100	582,561	1, 4	0	51,591
15-Jul	46.0%	21,500	561,061	1, 4	0	51,591
16-Jul	45.0%	11,600	549,461	4	0	51,785
17-Jul	44.8%	2,773	546,688	4, ADG	0	51,785
18-Jul	44.6%	2,120	544,568	ADG	0	51,785
19-Jul	44.4%	2,065	542,503	ADG	0	51,785
20-Jul	44.2%	2,820	539,683	ADG	0	51,785
21-Jul	43.9%	4,140	535,543	ADG	0	51,785
22-Jul	43.4%	6,184	529,359	1, 4, ADG	0	51,676
23-Jul	41.3%	25,700	503,659	1, 4	150	51,487
24-Jul	40.2%	12,938	490,721	1, 4	0	51,487
25-Jul	38.9%	16,196	474,525	1, 4	0	51,487

26-Jul	37.5%	16,549	457,976	1, 4	0	52,704
27-Jul	95.0%	11,415	1,159,461	4, ADG	0	51,487
28-Jul	94.9%	1,110	1,158,351	ADG	0	52,704
29-Jul	94.6%	3,406	1,154,945	ADG	0	52,704
30-Jul	94.4%	2,212	1,152,733	ADG	0	52,704
31-Jul	94.2%	3,239	1,149,494	ADG	0	52,704
1-Aug	93.6%	6,625	1,142,869	2, 3	0	52,916
2-Aug	92.7%	10,662	1,132,207	1,4	0	52,440
3-Aug	91.4%	16,690	1,115,517	3,4	0	52,440
4-Aug	90.5%	10,376	1,105,141	3	0	52,853
5-Aug	89.7%	9,987	1,095,154	3,4	0	52,975
6-Aug	88.9%	9,789	1,085,365	3,4	94	53,460
7-Aug	88.2%	8,417	1,076,948	3,4	94	53,422
8-Aug	87.6%	7,622	1,069,326	3,4	94	53,491
9-Aug	87.3%	3,515	1,065,811	2,4	97	52,951
10-Aug	86.7%	7,782	1,058,029	1,2,4	89	52,860
11-Aug	85.8%	10,937	1,047,092	3,4	92	53,235
12-Aug	85.1%	8,043	1,039,049	3,4	0	52,717
13-Aug	84.5%	7,089	1,031,960	3	0	52,839
14-Aug	84.4%	2,013	1,029,947	3,4	0	52,747
15-Aug	82.7%	6,930	1,009,600	3,4	105	52,500
16-Aug	80.4%	6,230	981,989	3,2	102	52,703
17-Aug	80.0%	7,100	976,206	3	0	52,637
18-Aug	79.5%	6,069	970,137	3	0	52,511
19-Aug	78.6%	9,896	960,241	3,4	0	52,640
20-Aug	78.1%	6,616	953,625	3	0	52,526
21-Aug	77.6%	6,680	946,945	3,4	0	52,167
22-Aug	77.0%	6,879	940,066	4	94	52,282
23-Aug	76.2%	9,990	930,076	4,1	0	52,193
24-Aug	75.9%	2,985	927,091	4,1	0	52,204
25-Aug	75.6%	3,752	923,339	4	120	52,273
26-Aug	75.4%	2,943	920,396	4	0	52,265
27-Aug	74.2%	13,982	906,414	4	0	52,193
28-Aug	74.1%	1,578	904,836	4	0	52,166
29-Aug	73.4%	8,202	896,634	3,4	98	52,082
30-Aug	72.7%	8,818	887,816	3,4	75	51,718
31-Aug	71.7%	12,426	875,390	3,4	0	51,627
1-Sep	71.1%	6,902	868,488	3,4	0	51,682
2-Sep	70.4%	8,954	859,534	3,4	144	51,348
3-Sep	69.6%	9,950	849,584	4	0	51,523
4-Sep	68.8%	10,127	839,457	3,4	111	51,493
5-Sep	67.8%	12,033	827,424	3,4	0	51,295
6-Sep	66.5%	15,324	812,100	1,4	0	51,449
7-Sep	65.2%	15,994	796,106	3,4	122	51,015
8-Sep	64.5%	8,838	787,268	3,4	133	51,061
9-Sep	63.4%	12,614	774,654	3,4	0	51,018
10-Sep	61.1%	28,306	746,348	3,4	0	51,431
11-Sep	60.7%	5,475	740,873	3	131	50,998

12-Sep	59.6%	13,532	727,341	4,3,2	0	51,340
13-Sep	58.7%	10,833	716,508	3,4	0	50,899
14-Sep	57.9%	9,900	706,608	3,4	178	51,236
15-Sep	57.2%	8,039	698,569	3,4	189	51,162
16-Sep	56.8%	5,630	692,939	3	0	51,143
17-Sep	56.2%	7,381	685,558	3	196	51,227
18-Sep	55.3%	9,847	675,711	2,3	0	51,244
19-Sep	54.6%	9,445	666,266	2,3	0	51,225
20-Sep	53.9%	8,341	657,925	3	123	51,026
21-Sep	53.5%	4,494	653,431	2,3	0	51,216
22-Sep	53.2%	3,617	649,814	2,3	193	50,898
23-Sep	52.5%	8,286	641,528	2,3	155	50,728
24-Sep	51.8%	9,269	632,259	2,3	178	50,616
25-Sep	51.1%	8,656	623,603	2	0	50,498
26-Sep	50.4%	8,380	615,223	1,3	267	50,388
27-Sep	50.0%	4,917	610,306	1,4	0	50,310
28-Sep	49.2%	10,015	600,291	4	0	50,217
29-Sep	47.9%	14,917	585,374	4	0	50,311
30-Sep	47.2%	9,163	576,211	4	0	50,187
1-Oct	46.7%	6,027	570,184	4	0	50,111
2-Oct	46.1%	7,132	563,052	4	0	49,960
3-Oct	45.6%	6,393	556,659	ADG	0	49,960
4-Oct	45.4%	2,714	553,945	ADG	0	49,960
5-Oct	69.1%	2,477	843,918	ADG	0	49,960
6-Oct	68.7%	4,946	838,972	ADG	0	49,960
7-Oct	66.2%	31,121	807,851	ADG	0	49,727
8-Oct	65.3%	10,566	797,285	1	0	49,646
9-Oct	63.9%	17,538	779,747	1,2,3	0	49,455
10-Oct	62.6%	15,786	763,961	3,4	0	49,243
11-Oct	61.8%	9,220	754,741	3	65	49,441
12-Oct	61.4%	5,552	749,189	3	0	49,468
13-Oct	61.0%	4,620	744,569	ADG	0	49,543
14-Oct	60.6%	5,285	739,284	3	0	49,301
15-Oct	60.0%	6,602	732,682	ADG	0	49,732
16-Oct	59.6%	4,977	727,705	4	0	49,809
17-Oct	59.1%	5,910	721,795	ADG	0	49,697
18-Oct	58.6%	6,273	715,522	3	0	49,711
19-Oct	58.2%	5,233	710,289	3	0	49,870
20-Oct	57.8%	4,671	705,618	3	0	49,709
21-Oct	57.3%	6,306	699,312	3	0	49,651
22-Oct	56.7%	7,615	691,697	3	0	49,824
23-Oct	56.1%	6,397	685,300	3	0	49,785
24-Oct	55.5%	7,377	677,923	3	0	49,886
25-Oct	55.6%	-1,429	679,352	3	189	49,772
26-Oct	55.4%	3,120	676,232	3	0	49,604
27-Oct	55.0%	5,313	670,919	3	0	49,513
28-Oct	54.4%	6,730	664,189	3	0	49,618
29-Oct	53.9%	6,322	657,867	3	0	49,668

30-Oct	53.5%	4,442	653,425	2,3	0	49,541
31-Oct	53.0%	6,336	647,089	3	0	49,385
1-Nov	52.4%	7,816	639,273	2,3	0	49,573
2-Nov	51.7%	8,125	631,148	3	0	49,823
3-Nov	51.1%	7,328	623,820	3	0	49,479
4-Nov	50.0%	12,764	611,056	3,2	0	49,761
5-Nov	49.4%	8,009	603,047	3	0	49,580
6-Nov	49.0%	5,195	597,852	2, 3, ADG	0	49,580
7-Nov	48.3%	7,603	590,249	ADG	0	49,289
8-Nov	46.7%	20,590	569,659	2,3	0	49,276
9-Nov	45.2%	18,316	551,343	2,3	0	49,126
10-Nov	44.2%	11,394	539,949	3	0	49,385
11-Nov	43.7%	6,955	532,994	3	144	49,398
12-Nov	74.6%	22,732	911,212	3	0	49,137
13-Nov	74.4%	3,048	908,164	ADG	0	49,137
14-Nov	74.1%	3,352	904,812	ADG	0	49,137
15-Nov	73.9%	2,388	902,424	ADG	0	49,137
16-Nov	73.4%	6,031	896,393	ADG	0	49,246
17-Nov	71.6%	22,052	874,341	2,3	0	49,066
18-Nov	69.8%	22,657	851,684	2,3	0	48,996
19-Nov	69.2%	7,084	844,600	3	152	48,630
20-Nov	68.4%	9,597	835,003	2, 3, ADG	0	48,630
21-Nov	68.2%	1,881	833,122	ADG	0	48,630
22-Nov	68.0%	2,956	830,166	ADG	0	48,630
23-Nov	67.8%	2,013	828,153	ADG	0	48,630
24-Nov	66.5%	15,971	812,182	ADG	0	48,795
25-Nov	64.4%	25,492	786,690	2,3	0	48,399
26-Nov	62.9%	18,275	768,415	2,3	0	48,357
27-Nov	61.7%	15,006	753,409	3,4	0	48,372
28-Nov	59.9%	21,647	731,762	1,3	0	48,307
29-Nov	58.2%	21,538	710,224	3,4	0	48,274
30-Nov	56.4%	22,014	688,210	2,3	0	48,160
1-Dec	54.7%	20,767	667,443	2,3	0	47,928
2-Dec	52.9%	21,587	645,856	3,4	0	47,948
3-Dec	51.7%	14,924	630,932	3,4	227	47,649
4-Dec	49.9%	21,255	609,677	2,3,4	1,242	46,549
5-Dec	51.1%	-13,973	623,650	3,4	36,171	10,293
6-Dec	50.6%	5,601	618,049	4	0	10,381
7-Dec	49.4%	15,033	603,016	3,4	0	10,209
8-Dec	47.6%	21,770	581,246	1,4	0	10,255
9-Dec	46.1%	18,432	562,814	1,4	0	10,280
10-Dec	44.6%	18,830	543,984	4	0	10,596
11-Dec	42.8%	20,861	523,123	1,2,3	0	10,155
12-Dec	41.1%	21,129	501,994	3,4	0	10,295
13-Dec	39.4%	21,087	480,907	1,4	0	10,620
14-Dec	38.3%	13,476	467,431	1,4	0	10,841
15-Dec	37.7%	7,101	460,330	4	0	10,662
16-Dec	36.8%	11,039	449,291	3	0	11,006

17-Dec	36.0%	9,442	439,849	3,4	0	11,058
18-Dec	35.3%	8,721	431,128	3	0	11,207
19-Dec	0.0%	0		3	0	
20-Dec	0.0%	0			0	
	TOTALS	2,085,314			4,490	

CHAPTER VI – ADMINISTRATION

Summary

Pre-Deployment Preparations
Preparations for deployment began when August 2000, immediately upon return from HEALY's maiden voyage. An AMDAHL connection was established with HRSIC allowing the Yeoman to access HEALY crew pay files directly from PPC. With our INMARSAT capabilities, we are able to access these files underway thus making it possible to explain and resolve pay issues more easily. Extension/reenlistment paperwork was completed for all those crewmembers who's enlistment would expire during the deployment.on these people prior to June 12th. Thirteen District Legal Assistance also provided counsel who prepared wills and powers of attorney for the crew and their families. All PCS departing worksheets (for personnel departing while deployed) were completed and at the PERSRU prior to our departure. In the last two months prior to the deployment 20 people departed and 23 reported. Four non-rates departed for "A" School.

Seattle, WA – Puntarenas, Costa Rica
Departed June 12, 2001 with 74 permanent party on board (14 officers 60 enlisted). Two Storekeepers remained at HEALY Shore Support Office for shore side support. Two other personnel remained ashore for medical issues and one crewmember was TAD for training.

Two TAD personnel met the ship in Costa Rica. One crewmember was sent back to Seattle for medical evaluation. Another crewmember was detailed as an escort. ISC Seattle admin provided outstanding support in obtaining medical travel orders from MLCPAC (pp) and making flight and hotel arrangements for last minute travel.

Costa Rica – Dover, England
Our EM3 was advanced to EM2 1 July 2001. On July 5 two crewmembers, one TAD and one new SA, arrived with the AVDET on 5 July.

The new XO, OPS and AEO reported in Dover along with a new FS.

Dover, England – Tromso, Norway
XO, OPS and AEO departed on PCS Orders. The Supply Officer returned to the Shore Support Office along with an SK3. The new SKC reported and the SK2 reported in from the Shore Support Office.

Phase I (AMORE)
An MK2 was advanced to MK1 on 1 August. One crewmember was sent back to Seattle for medical evaluation. The ETCM escorted the member back and then departed on terminal leave. An EM1 who was TAD from NESU Seattle was advanced to EMC on 1 October 2001. One FN was advanced to MK3 on 1 October 2001. Upon our return to Tromso, one pilot returned to ATC Mobile. Two members were sent TAD for C schools. An FS2 reported TAD from ISC New Orleans. The new Supply Officer reported aboard along with our new ETCM. A TAD diver reported from Group Portland relieving another TAD diver, also from Group Portland.

Completed and sent Assignment Data Worksheets to the PERSRU via overnight mail for entry into CG HRMS for all personnel due for rotation in 2002. Copies were also sent to CGPC-opm and CGPC-epm.

Phase 2 Science (Primary – ALTEX, S.O.O. - JPL/NIC)
Upon our return to Tromso, one pilot and two air crewmen returned to ATC Mobile and one replacement AMT3 reported aboard. Our TAD diver also departed.

Tromso Norway to Dover England
A new SNFS reported in and an MK3 returned from training in Dover. One crewmember departed on Emergency Leave.

Dover England to Rota
Two new crewmembers reported aboard (ET2 & SA) in Rota while two others departed TAD. Advanced one Ensign to LTJG on 17 November.

Rota to Seattle
The AVDET departed on 4 December along with 4 crew members for leave. Another departed for TAD. An MK2 returned from AC&R school and a new SA reported aboard. Advanced an SA to SN on 18 December and an Ensign to LTJG on 19 December.

Embarked Personnel

See Table VI-1.

Morale

Seattle to Tromso
We took advantage of the great weather and sea conditions during our trans-Atlantic crossing to hold a cook-out and movies under the stars. The hangar door was used as the big screen and the DVD player was connected into the ship's portable PA system to provide a great movie going experience.

Phase 1 Science (AMORE)
Bingo was run almost every Saturday throughout the trip. Three to Four small prizes were given away and then a blackout game was played, with an increasing number of balls each week. The winner of the blackout game received a DVD player, and we finally had a winner at 65 balls

Spades was played for a two week period culminating in a tournament for teams of two.

Hump Day was celebrated on September 15. There was a Pudding Eating Contest, the final judging on a two week goatee-growing contest, and civilian clothes were authorized for crew members.

Hangar movies were played in the Hangar on Saturday nights when the aircraft could be rolled outside.

A Digital Photo Contest was held for a three week period while underway. Winners were picked out of six categories, and by voting on their favorite photos crewmembers entered a raffle in which two gift certificates to the Ship's Store were given away.

Phase 2 Science (Primary – ALTEX, S.O.O. - JPL/NIC)
Bingo was played on two occasions, Oct 13, and Oct 20. Four prizes were given away during each Bingo game and the blackout prize was a 19 inch TV-VCR combination.

Casino Night was held on October 27 and was a great success. Over 40 people participated and $118 was generated for the ship's morale fund. 17 prizes were given away at the end of the evening in an auction.

Hot action at the Craps Table on Casino Night

Tromso – Seattle
Rota, Spain was a port call where many on the HEALY enjoyed themselves on one of two tours. One tour went to Jerez for wine tasting and a horse show. The other tour went to Gibraltar for the day. Rota MWR was very helpful and should be contacted well in advance by any units visiting Rota in the future for planning such events.

A Skeet shoot was a major success, with twenty crewmembers shooting five clay pigeons each, some taking two turns.

Bingo continued on Saturday nights during our return transit including two evening sessions on the flight deck taking advantage again of great weather conditions. We were also able to enjoy another flight deck movie under the stars.

TABLE VI-1: PERSONNEL EMBARKED

A. OFFICER PERSONNEL ONBOARD

CAPT DAVID J. VISNESKI	010612 - 011221
CDR DANIEL OLIVER	010612 - 010730
CDR DOUGLAS RUSSELL	010717 - 011221
LCDR DAVID VAUGHN	010612 - 010730
LCDR NEIL E. MEISTER	010612 - 011206
LCDR JOSEPH SEGALLA	010717 - 011221
LT TROY KUNAS	010612 - 010730
LT ROBERT CLARKE	010717 - 011221
LT TODD ADRIAN	010612 - 011221
LTJG MICHAEL WOODRUM	010612 - 011124
LTJG KEVIN L. PLYLAR	010612 - 010716
LTJG SARAH CORTEVILLE	010612 - 011221
LTJG BRETT HUBRIG	010612 - 011221
ENS DANIEL EVERETTE	010612 - 011221
ENS JOSEPH BENIN	010705 - 011221
ENS JOSEPH CASTANEDA	010705 - 011221
ENS DAVID KOWALCYZK	010705 - 011221
CWO3 TIMOTHY D. MALCOLM	010612 - 011221
CWO2 JAMES B. ROBERTS	010612 - 011221
CWO2 BRADFORD SMITH	010612 - 010730
CWO2 WILLIAM LEVITCH	011006 - 011221

B. TAD OFFICER PERSONNEL ONBOARD

CDR BARBARA SCHOEN (ISC SEATTLE)	010612 - 011221
LCDR KYLE ANDERSON (POPDIV)	010705 - 011203
LT ROB TAYLOR (POPDIV)	010706 - 011106
LT MICHAEL PLATT (POPDIV)	010705 - 011203
LT KELLY LARSON (POPDIV)	010705 - 011004
LTJG LARRY SIEGLE (GRP PORTLAND)	011006 - 011106
CWO2 MARK W. RUBLE (NESU SEATTLE)	010612 - 010716
CADET STACEY ROSICK (CG ACADEMY)	010612 - 010719
CADET MEGHAN STARK (CG ACADEMY)	010612 - 010719
CADET PAIGE SWITZER (CG ACADEMY)	010612 - 010719

C. ENLISTED PERSONNEL ABOARD

EMCM DAVID R. MUNIZ	010612 - 011221
ETCM PETER CHURCHILL	010612 - 010823
ETCM JAMES L. O'BRIEN	011006 - 011221
QMCM GEORGE J. SCHWARZ	010612 - 011221
FSCS KARL KANISS	010612 - 011221
MKCS GEORGE A. WENZINGER	010612 - 011221
MSTCS GLEN T. HENDRICKSON	010612 - 011124
HSCS KIRK T. WATSON	010612 - 011221
BMC GLENN WOODBURY	010612 - 011221
DCC PETER A. SCHAFFNER	010612 - 011221
ETC JAMES FLYNN	010612 - 011121
MKC BRYAN P. MINER	010612 - 011221

SKC TODD MEEKINS	010719 - 011007	
TCC JOHN F. DILOUIE	010612 - 011221	
YNC SELINDE A. BROCK	010612 - 011203	
BM1 PATRICK W. MORKIS	010612 - 011221	
DC1 TIMOTHY J. BINDER	010612 - 011203	
EM1 MARK C. HULEN	010612 - 011221	
EM1 THOMAS B. STONE	010612 - 011221	
EM1 BART BIXLER	010612 - 011221	
ET1 ROGER J. RETZLAFF	010612 - 011221	
FS1 ERIC F. GRANTHAM	010612 - 011221	
MK1 DONALD G. ENSMINGER	010612 - 011221	
MK1 JENNIFER A. LOWDEN	010612 - 011221	
MK1 JEFFREY P. PIERCE	010612 - 011221	
MST1 DAVID A. HUTCHINSON	010612 - 011206	
MST1 SEAN M. KUHN	010612 - 011221	
SK1 LOVETT SPENCER	010612 - 011117	
TC1 BARBARA A. BENJAMIN	010612 - 010629	010705 - 011221
TT1 STEPHEN A. CHIPMAN	010612 - 011221	
QM1 IVAN SMITH	010612 - 011221	
QM1 DAVID J. GROB	010612 - 011221	
MK1 MICHAEL A. WILLIAMS	010612 - 011221	
BM2 JEFFERY M. RIVETT	010612 - 011221	
BM2 ELSA E.A. SANDOVAL	010612 - 011221	
DC2 BIANCA P. WITKOWSKI	010612 - 011221	
EM2 BRADLEY WOOLEVER	010612 - 010718	
ET2 TIMOTHY MARVIN	010612 - 011221	
ET2 BRIAN D. MILLINGTON	010612 - 011221	
ET2 EDWARD B. DUNLAP	010612 - 010823	
ET2 CHRIS MARTIN	010612 - 011221	
ET2 JOSHUA RASMUSSEN	011121 - 011221	
FS2 JOSEPH J. STODDARD	010612 - 011221	
MK2 JOSHUA A. LIGHTCAP	010612 - 011221	
MK2 JOHN TEBO	010612 - 011007	011203 - 011221
MST2 BRIDGET A. CULLERS	010612 - 011221	
SK2 DANIEL L. BITZER	010728 - 011221	
BM3 PATRICK M. LOGAN	010612 - 011203	
DC3 CHRISTOPHER R. KLINE	010612 - 011117	
EM3 BENJAMIN GARRETT	010612 - 011221	
FS3 JOHNNY M HANIKA	010612 - 011221	
MK3 EUGENE A. MAES	010612 - 011221	
MK3 TIMOTHY B. GOGOLLA	010612 - 011221	
MST3 SUZANNE K. SCRIVEN	010612 - 011221	
SK3 CANDICE HYLTON	010612 - 011221	
SK3 AMANDA MCVEIGH	010612 - 010730	
QM3 EDMUND J. FOSTER	010612 - 011221	
MK3 MICHELE LAEGER	010612 - 011006	011121 - 011221
MK3 MATTHEW J. LORCH	010612 - 011221	
SNFS JONATHAN SCOTT	011121 - 011221	
SNFS KEVIN MENRAD	010717 - 010823	
FN BRANDON S. SCHRECK	010612 - 011221	
FN CRYSTAL KEELER	010612 - 011221	

SN MICHAEL J. THAYER	010612 - 011221
SN FRANK FISHER	010612 - 011221
SN WILLIAM J. SIMPSON	010612 - 011221
SN BRADLEY GLOVER	010612 - 011221
FN JEREMY MURPHY	010612 - 010629
FA CALEB TRAWICK	010612 - 011221
FA BRET COBB	011121 - 011221
SA AUSTIN F. HUNT	010612 - 011221
SA JAMES E. MENARD	010612 - 011221
SA BRETT KIME	010612 - 011221
SA ISAAC NATHANIEL	011203 - 011221

D. ENLISTED PERSONNEL TAD

ETCM JOE PASSALACQUA(NESU SEATTLE)	011115 - 011221	
EMCM SCOTT KREHMEIER(NESU SEATTLE)	011115 - 011221	
MKCM ROBERT MAHONEY (NESU SEATTLE)	010612 - 010719	
AMTC RUSS HOOVER (POPDIV)	010705 - 011221	
ETC MICHAEL MCGUIRE (NESU SEATTLE)	010612 - 011221	
QMC JOHN LITZENBERGER (GRP PORTLAND)	010718 - 011004	
AVT1 JOHN GORDON (POPDIV)	010705 - 011203	
AMT1 LYN DUPREE (POPDIV)	010705 - 011106	
EMC FRANK DONZE (NESU SEATTLE)	010612 - 011221	
AVT2 RICH LYMAN (POPDIV)	010705 - 011106	
FS3 LEE PECUE (CGC MIDGETT)	010612 - 011221	
FS2 CHAPPELL DODSON (GRP NOLA)	011008 - 011221	
AMT3 RANDELL HALL (POPDIV)	011106 - 011203	
MK2 MICHAEL WEAVER (NESU SEATTLE)	011115 - 011221	
MK3 ROBERT MYERS (NESU SEATTLE)	011115 - 011221	
MK3 JEFFERY REYNOLDS (NESU SEATTLE)	011115 - 011221	
EM3 JAMES FRATTO (NESU SEATTLE)	011115 - 011221	
DC1 PHILLIP SMELSER (NESU SEATTLE)	010612 - 010716	011115 - 011221
DC2 JAMES PENTECOST (NESU SEATTLE)	011115 - 011221	011115 - 011221
TT1 MARK SPEAKER (ESU SEATTLE)	010612 - 010716	
FS1 RYAN C. OBERMEYER (ISC SEATTLE)	010612 - 010718	

E. CIVILIANS

Seattle to Dover

GERRY YATES	Alstom	010612 - 010716
RUTH JOHNSON	Alstom	010612 - 010716

Dover to Tromso

DON CHAMBERS	Sherikon	010716 - 010728
ROGER DAVIS	U. of Hawaii	010716 - 010726
GREGORY KURRAS	U. of Hawaii	010716 - 010730
GERRY YATES	Alstom	010716 - 010726
ALAN WALTON	Alstom	010716 - 010726
PHIL PROCTOR	Alstom	010716 - 010726
BRUCE MAJOR	VSC	010716 - 010726
KEVIN LOGAN	MACSEA	010716 - 010726
ANDY COPELAND	Alstom	010716 - 010726

ANDREW PARKER	Alstom	010716 - 010726	
TONY LOVE	Alstom	010716 - 010726	
AILEEN MCCONNELL	Alstom	010716 - 010726	
LISA MASTANDREA	Alstom	010716 - 010726	
JIM WILSON	ESU Seattle	010716 - 010730	
GRANT MASSEY	ESU Seattle	010716 - 010730	

Phase I Science

PETER MICHAEL	Univ. of Tulsa	010730 – 011003	Chief Scientist
STEVEN GOLDSTEIN	Columbia Univ.	010730 – 011003	Principal Investigator
CHARLES LANGMUIR	Columbia Univ.	010730 – 011003	Principal Investigator
HENRY DICK	WHOI	010730 – 011003	Principal Investigator
DAVID GRAHAM	Oregon State	010730 - 011003	
JOEL DONOHUE	Univ. of Tulsa	010730 - 011003	
GREGORY KURRAS	Univ. of Hawaii	010730 - 011003	
JIM BRODA	WHOI	010730 - 011003	
JEFFREY STANDISH	WHOI	010730 - 011003	
PAUL SCHMIEDER	Univ. of Tulsa	010730 - 011003	
GAD SOFFER	Columbia Univ.	010730 - 011003	
KEVIN WHEELER	Columbia Univ.	010730 - 011003	
LINA KUHNZ	MBARI	010730 - 011003	
MOLLY LANGMUIR	Columbia Univ.	010730 - 011003	
HEIDI HANSEN	Univ. of Bergen	010730 - 011003	
KYLA SIMONS	Columbia Univ.	010730 - 011003	
KERSTIN LEHNERT	Columbia Univ.	010730 - 011003	
HENRIETTA EDMONDS	Texas A & M	010730 - 011003	
MICHELE ADAMS	TEA	010730 - 011003	
DEBORAH HASSLER	WHOI	010730 - 011003	

Phase II Science

JAMES BELLINGHAM	MBARI	011006 – 011106	Chief Scientist
TODD WALSH	MBARI	011006 - 011106	
DREW GASHLER	MBARI	011006 - 011106	
MARK SIBENAC	MBARI	011006 - 011106	
RICH HENTHORN	MBARI	011006 - 011106	
ROB MCEWEN	MBARI	011006 - 011106	
BILL KIRKWOOD	MBARI	011006 - 011106	
FARLEY SHANE	MBARI	011006 - 011106	
DJ OSBORNE	MBARI	011006 - 011106	
MARK TALKOVIC	MBARI	011006 - 011106	
HANS THOMAS	MBARI	011006 - 011106	
MIKE PINTO	MBARI	011006 – 011106	
AMY WEST	MBARI	011006 - 011106	
NED COKELET	NOAA PMEL	011006 - 011106	
ARMEN BAHLAVOUNI	SSI Inc.	011006 - 011106	
DOUGLAS ANDERSEN	SSI Inc.	011006 - 011106	
SON NGHIEM	NASA JPL	011006 – 011106	Principal Investigator
MARC SIMARD	National Ice Ctr	011006 - 011106	
MICHAEL VAN WOERT	National Ice Ctr	011006 - 011106	
TED MAKSYM	National Ice Ctr	011006 - 011106	
WOLFGANG DIERKING	U. of Denmark	011006 - 011106	

KAREN ST. GERMAIN	NRL	011006 - 011106
AG1 EUGENIA GARCIA	National Ice Ctr	011006 - 011106
ALVO MARTIN	CNN	011006 - 011106
BARRY FORD	Alstom	011006 – 011106

Tromso to Dover

PETE CAPP	Alstom	011006 - 011116
JOHN CRAIG	Alstom	011006 - 011116
MICKEY BONNAR	Alstom	011006 - 011116

CHAPTER VII - SUPPLY/LOGISTICS

SUPPLY

Pre-deployment Preparations - Onload

Engineering Logistics Center (ELC) Baltimore reviewed spare parts shortages for our ten most critical systems for provisioning and allowance adjustment. $37K of spare parts were ordered and loaded onto HEALY before deployment. NAVSEA PMS373 purchased an additional $50K of main diesel engine parts, which were load just before departure. The ship purchased required general use consumables and spare parts required for a six-month deployment. Removed over 30 pallets of excess, storage, or disposable material.

TYPE	*Number of Orders*	*Amount*
Commercial (General Use Consumables)	**42**	**$51,699.00**
MILSTRIP	**12 Batches**	**$83,211.00**
	Total	**$134,910.00**

During the inport we also completed organization and set up of our Shore Support Office. Two of the Storekeepers stayed behind to coordinate the procurement and shipping of repair parts plus other supplies required by the ship while deployed. The staff also completed all LUFS entries for the unit and maintained the unit financial files permitting us to keep a much more up to date accounting of the unit budget plus an orderly close out of the files at the end of the fiscal year. This arrangement was very successful as numerous issues were resolved quickly through our dedicated support staff rather than depending on other units to coordinate. Several of the support staff switched between the Support Office and the ship during the trip.

Fuel

Obtained 838,295 gallons of F-76 fuel at $1.03 a gallon and 22,857 gallons of JP-5 fuel at $.98 a gallon from DESC Manchester Fuel Department, PO Box 8, Manchester, WA 98353. Unit was charged $292.00 for 9.75 hours fueling overtime. DD-1149 was used as the payment document.

Seattle Departure

Crowley Marine Services, 2401 Fourth Ave, Seattle, WA (206) 443-8100 provided tug for undocking. Puget Sound Pilots, 101 Stewart St., Suite 900, Seattle, WA (206) 728-6400 provided the pilot for departure.

Portcalls

Costa Rica

Port service obtained through ARMADA DE NAVEGACION, S.A.,Apdo, Postal 2703-1000, Edif Don Bosco 3er piso, Calle 36 Ave 6, San Jose, Costa Rica, Tel ph:+506-257-8844, faxes:

+506-221-2258, email: armada@racsa.co.cr, POC: Juan Carlos Orozco/Operations Manager, mobile ph: +506-382-7144. Service was very friendly and professional. No moorage fees were incurred due to our anchoring off of Puntarenas; however, the use of a fishing dock for our LCVP cost $10.00 a day. Cellular telephones were obtained at $5.00 per phone and $2.25 per minute for long distance. A van and driver was well worth the $250.00 for 12hrs per day. The big surprise was mail delivery from the U.S. Embassy costing $325.00 per trip, because it was mandatory that a security vehicle be used for all mail deliveries. In addition, the ship was charged $10.00 for any members entering or departing Costa Rica.

The Imprest Fund was used to make payment. While credit cards are accepted, a seven percent charge is added when using the credit card.

The agents were surprisingly friendly, professional, and extremely helpful. Everything we required was quickly attended to. The agents spoke English fluently, which resulted in no communication difficulties

Panama Canal

Canal crossing services were handled by; Inchcape Shipping services, S.A., Panama City, Panama, phone no. # (507)236-8411, fax no. # (507)236-7832, email panama@iss-shipping.com.

The crossing was very confusing and expensive. Panama Canal authorities stated we had to be classified as a commercial cargo ship, which is charged almost double of what a warship is charged. Information and paperwork received before arriving to Panama Canal was incorrect. New measurements of the ship and additional paperwork had to be done once we arrived. The only acceptable method of payment was credit card which the numbers had to be given advance in order to cross. The agent would only communicate via radio or INMARSAT and was extremely reluctant about coming out to the ship.

Dover, England

Port services were handled by; Inchcape Shipping Services, U.K., Prince Charles Port, Southampton SO9 4TD, telephone number +44 (0) 1703-789122, fax +44 (0) 1703-701064, email manish.khanna@iss-shipping.com.

Service by Mr. Robert Van derVoort was timely and courteous. HEALY moored at Cruise Terminal II, Western Dock, Dover England. Ship's husbandry fees were $1,872.00. Ship's pilots, tugs, line handlers, forklifts, and crane service, harbor berthing fees, car and van rental, landlines, and cellular telephones were all arranged by Inchcape.

Because of the difference in high and low tides (approx. 20 ft), and the location of HEALY's gangway, a cruise terminal brow was used to the flight deck. This option worked well, though a close eye had to be kept on the retaining chains to keep them from getting too tight.

The Imprest Fund was used to make payment. While credit cards are accepted, a high percentage rate surcharge would have been incurred.

Tromso, Norway

Healy made three portcalls in Tromso. Port services were handled by; Scandinavian Marine Services (SMS), Akershusstranda 35, N-0150 Oslo, telephone number + 47 22 41 40 95 , Fax

+47 22 41 40 96, email sms-gnas@online.no . Service by Mr. Baard Mahle and Mr. Arne Furulund was timely and courteous. HEALY moored portside Tromso Navy Base Olavsvern Orlogsstasjon Tromsdalen 9020. While there, HEALY used pilots, tugs, water, water, sewage disposal, trash, two vans and a sedan. All were arranged and billed by SMS. They were also able to arrange emergency purchases for a winch fan, materials to repair the RHI, charts, and other needed goods.

The staff of the Norwegian Navy base were very helpful, especially their receiving staff. They had all paperwork and cargo segregated and ready to go in their warehouse, and were more than willing to provide forklift services to move the materials to the pier. On the last visit, SMS and the Norwegian Navy Base graciously hosted a party for the crew of the ship.

One problem encountered with receiving cargo in Tromso is that Scandinavian Air Service, the sole provider, has limitations on the size of cargo they will accept. This required that large cargo be diverted in Oslo, and trucked to Tromso. It is highly recommended that if you are shipping to Tromso, restrict the size of the shipment so that it can be transported via air the entire way.

The Imprest Fund was used to make payment for the first visit. Subsequent investigation into the issue of surcharges revealed that the rate was only 3%, and authorized under the terms of the Husbanding Contract. This seems to be a fairly normal rate, and the convenience outweighed the nominal increase to the payment total.

Fuel was received twice. The first time was for 715,873 gallons of F-76 @ $0.81 a gallon was brought aboard by barge. Fueling was arranged through a U. S. Navy Port Services Contract, NRCC Detachment, London, England, PSC 821 Box 45, FPO AE 09421-0045, telephone +44(0)208-385-5567. MLCPAC(fp) paid for this delivery with a purchase order to the NRCC Detachment. MLCPAC(fp) POC : SK1 Fennell at (510) 437-3539. The second delivery was arranged in the same manner. The only problem encountered was the fact that there is only one barge in the area that can carry enough fuel to meet HEALY's needs. The first refueling was done with a smaller barge, which required multiple refueling trips, and a fueling evolution that took over 12 hours. The second refueling was done with the larger barge and completed in 4 hours. Because of a schedule change for HEALY's third port call, the large barge was not going to be available, so we chose not to refuel on its last stop prior to heading south.

Dover, England

All port services were the same as the first port call. In addition, Mr. Ray Tiltman from the Dover Cruise Welcome Group (C/O Victory Cars Building, Worthington St., Dover, Kent CT17 9AD, Phone: 07050 207393, Email raytiltman@tinyworld.co.uk) came to the ship and provided information on local points of interest, train schedules, and other MWR type information.

Mr. Van der Voort was very proactive in regards to the changing security requirements. Of his own volition he researched prices for a security guard at the pier gate and provided the info to the ship. In addition, he had two handheld metal detectors that he made available for our use, at a nominal fee. The total cost for round the clock security on the pier was only $2,145.60

1,292.953 metric tons of fuel were arranged through Inchcape at a cost of $298,602.84. Fuel was delivered by a lighter, which was standing by upon arrival of the HEALY.

Payment for port services was made by Credit card. Once again, the surcharge was only 3%, as authorized by the Husbanding Contract. Mr. Van der Voort also noted that he would only charge

us the amount charged by the bank. So the actual surcharge ended up being less than the 3% authorized.

Rota, Spain

All port services were handled by NAVSTA Rota Supply, Fleet Support Officer. The POC was SKCM (SW) Jim Simpson at 34-956-82-1195. The support was outstanding. MCPO Simpson and his staff were waiting on the pier upon arrival. Garbage removal, potable water, vehicles, and cell phones were all available upon arrival. All costs were very reasonable. In addition, the NAVSTA Supply personnel were able to assist us in the procurement of some pipe plugs and thermometers through the local Prime Vendor contractor. All port service costs were paid for with a DD-1149.

Panama Canal

The Panama Canal was again a challenge, but not so much so as the first transit. The transit request is not submitted to the canal authority by the Navy until 48 hours prior to arrival, due to frequent changes by transiting ships. We contacted the agent, Jimmy Hidalgo of Inchcape, 36 hours before arriving to ensure all arrangements had been made. He informed us that the transit was arranged, but that the scheduled transit time would not be posted by the Panama Canal Authority (PCA) until 24 hours prior. Calling back the next day we learned that our scheduled transit was 1600, vs the 0800 requested. Inquiring if there was anything we could do to get the 0800 time slot, we were informed that it was all based on the size of the ship, and that the HEALY was too small for a daytime transit. Arriving in the area of the canal at approximately 1300, HEALY was informed by the PCA that since we had not called in at 0800, the noted time of arrival, that we might not be able to get through. We were informed that we should have called as soon as we arrived in the area. A call to the agent resolved the matter, and the inspectors were onboard by 1530.

Again, the agent requested our credit card in advance of the transit, and prior to receiving an invoice. We declined to pass the information via radio or cell phone, and made arrangements for shoreside personnel to contact him via landline. The final invoice for the transit was not available until more than a week after the fact.

Date	Port	Steam	Water	Trash	Elect.	Oily Waste
12-Jun-01	MANCHESTER, WA	$0.00	$0.00	$0.00	$0.00	$0.00
24-29 JUNE 01	COSTA RICA	$0.00	$0.00	$0.00	$0.00	$0.00
01-Jul-01	PANAMA CANAL	$0.00	$0.00	$0.00	$0.00	$0.00
17-21 JULY 01	DOVER ENGLAND	$0.00	$374.40	$1,080.00	$0.00	$0.00
27-30 JULY 01	TROMSO NORWAY #1	$0.00	$0.00	$2,217.22	$0.00	$0.00
02-06 Oct 01	TROMSO NORWAY #2	$0.00	$0.00	$3,921.85	$0.00	$0.00
06-07 Nov 01	TROMSO NORWAY #3	$0.00	$0.00	$1,307.28	$0.00	$0.00
12-16 Nov 01	DOVER, ENGLAND	$0.00	$447.00	$931.25	$0.00	$0.00
20-24 Nov 01	ROTA, SPAIN	$0.00	$75.00	$200.26	$0.00	$0.00
06-Dec-01	PANAMA CANAL	$0.00	$0.00	$0.00	$0.00	$0.00
	Totals	$0.00	$896.40	$9,657.86	$0.00	$0.00

Date	Port	Emerg. Services	Vehicles	Cranes	Phones	Pilot	Tugs
12-Jun-01	MANCHESTER, WA	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
24-29 JUNE 01	COSTA RICA	$0.00	$800.00	$0.00	$141.00	$0.00	$0.00
01-Jul-01	PANAMA CANAL	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
17-21 JULY 01	DOVER UK	$0.00	$3,389.86	$720.00	$2,822.40	$1,584.00	$2,520.00
27-30 JULY 01	TROMSO #1	$0.00	$2,918.34	$0.00	$488.89	$1,293.34	$2,463.78
02-06 Oct 01	TROMSO #2	$0.00	$3,651.33	$0.00	$164.71	$2,012.25	$3,845.09
06-07 Nov 01	TROMSO #3	$0.00	$1,564.42	$0.00	$23.64	$2,012.25	$3,845.08
12-16 Nov 01	DOVER, UK	$0.00	$2,845.97	$1,273.95	$2,406.35	$1,639.00	$2,607.50
20-24 Nov 01	ROTA, SPAIN	$0.00	$791.00	$0.00	$2,625.00	$0.00	$0.00
06-Dec-01	PANAMA CANAL	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Totals	$0.00	$15,960.92	$1,993.95	$8,671.99	$8,540.84	$15,281.45

Port	Husbandary Fee	Berth. Fee	Harbour Fee	Cable TV	Sewage	Line Handlers	Other Svcs	Total Port Services Cost
MANCHESTER, WA	$0.00	$0.00	$0.00	$0.00	$0.00	$987.00	$0.00	$987.00
COSTA RICA	$2,250.00	$50.00	$0.00	$0.00	$0.00	$0.00	$810.00	$4,051.00
PANAMA CANAL	$0.00	$0.00	$36,101.15	$0.00	$0.00	$0.00	$0.00	$36,101.15
DOVER UK	$1,872.00	$0.00	$7,004.16	$0.00	$6,134.49	$676.80	$10,376.92	$38,555.00
TROMSO #1	$2,525.33	$0.00	$0.00	$0.00	$8,103.33	$0.00	$6,344.10	$26,354.33
TROMSO #2	$3,780.58	$0.00	$0.00	$0.00	$20,995.15	$0.00	$3,972.60	$42,343.56
TROMSO #3	$1,730.17	$0.00	$0.00	$0.00	$6,998.38	$0.00	$1,795.60	$19,276.82
DOVER, UK	$1,788.00	$0.00	$6,103.04	$0.00	$6,347.49	$700.30	$5,852.12	$32,941.97
ROTA, SPAIN	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$639.43	$4,330.69
PANAMA CANAL	$0.00	$0.00	$36,101.15	$0.00	$0.00	$0.00	$0.00	$36,101.15
Totals	$13,946.08	$50.00	$85,309.50	$0.00	$48,578.84	$2,364.10	$29,790.77	$241,042.67

DATE	PORT	WASTE OIL	SHIP FUEL	AVIATION FUEL	LUBE OIL	ENGINEERING SVCS. TOTAL
12-Jun-01	MANCHESTER, WA	$0.00	$828,100.00	$25,750.00	$0.00	$853,850.00
24-29 JUNE 01	COSTA RICA	$0.00	$0.00	$0.00	$0.00	$0.00
01-Jul-01	PANAMA CANAL	$0.00	$0.00	$0.00	$0.00	$0.00
17-21 JULY 01	DOVER ENGLAND	$0.00	$0.00	$0.00	$0.00	$0.00
27-30 JULY 01	TROMSO NORWAY #1	$0.00	$579,857.13	$0.00	$0.00	$579,857.13
02-06 Oct 01	TROMSO NORWAY #2	$0.00	$235,425.72	$0.00	$0.00	$235,425.72
06-07 Nov 01	TROMSO NORWAY #3	$0.00	$0.00	$0.00	$0.00	$0.00
12-16 Nov 01	DOVER, ENGLAND	$0.00	$298,602.84	$0.00	$0.00	$298,602.84
20-24 Nov 01	ROTA, SPAIN	$0.00	$0.00	$0.00	$0.00	$0.00
06-Dec-01	PANAMA CANAL	$0.00	$0.00	$0.00	$0.00	$0.00
	Totals	$0.00	$1,941,985.69	$25,750.00	$0.00	$1,967,735.69

General Mess

Pre-Deployment Preparations

Two months prior to the deployment the Food Service Division started a gradual on load of subsistence items. Frozen items were loaded first, followed by dry stores, and lastly chilled items. Total cost of the subsistence inventory on board prior to deployment was $225,000.00. Total cost of all non-food items (paper products, foil, galley equipment, cleaning agents, etc) was $8,250.00.

The Food Service Division deployed under our PAL by two cooks. ISC Seattle provided outstanding support by being able to send one TAD FS1 for the first month of the deployment.

Transit

Seattle, WA - Puntarenas, Costa Rica

Adjusted menus due to hot weather.

Costa Rica - Dover, England

Placed food order consisting of fresh fruit, fresh vegetables and dairy products through Prime Vender Europe (DPSCE) via E-mail. Ordered bakery products through husbanding agent via E-mail and telephone. All items to be delivered upon arrival in Dover.

Dover, England - Tromso, Norway

Placed dry stores and freezer items order with Prime Vender Europe (DPSCE) for delivery in Tromso on the 28th of July. An order of additional items of dairy, fruit, and vegetables was placed with the husbanding agent.

Science Operations

Placed dry stores and freezer items order twice with Prime Vender Europe (DPSCE) for delivery in Tromso during the first two port calls. Placed a separate dairy and bread order with husbanding agent. On the third Tromso port call, HEALY placed a small order for fresh fruit and vegetables with the husbanding agent. This was enough to get us to Dover where we performed our last resupply before RTP.

Tromso, Norway - Panama Canal

Placed dry stores, fresh fruit, dairy, and freezer items order with DPSC for delivery in Dover. Also placed a bread order with husbanding agent for delivery at the same time. As HEALY proceeded south, we adjusted the menus and menu items due to hot weather.

Panama Canal - Seattle, WA

Placed fresh fruit, bread, and dairy order for delivery upon return to Seattle with home port Prime Vender (SYSCO). Taking of advantage of the available time during the transit, we prepared all galley storage spaces for return to homeport, cleaned, reorganized, and re-stowed. We also made preparations for Healy's in-port, reviewing submitted CSMPs, galley work orders. In addition, scheduled "C" schools for staff, as well as periods of leave.

Started initial load list for next deployment.

Recommendations

We ran into delays in payment for meals consumed by the science parties. Arrangements had to be made with sponsoring institutions to issue purchase orders to cover meals. All science parties payments should be handled using the following method: FSO document all meals on a DD-1149 for reimbursable issue to unit AFC-30 Fund. Commandant (G-OPN) will then bill NSF and initiate reimbursement to the unit upon receipt of payment.

Due to the work load, long hours, and the increase in personnel from in-port levels (75), to an underway level of 120 to 130, consideration should be given to requesting one additional FS billet to be assigned during long deployments.

When HEALY deploys on Arctic East trips, the FSO should use DCSPE as the primary source for ordering food. The only issue to be aware of is that DCSPE requires orders large enough to justify the shipping costs to points farther afield.

Ship's Exchange

Pre-Deployment Preparations

During preparations for deployment the store purchased $15,000 worth of merchandise and expendable supplies. From Cloud Trading, tobacco products were purchased and delivered 8 June 2001. An order of 300 pounds of Expresso coffee beans and other coffee stand items was purchased from Tully's Coffee and delivered on 11 June 2001. Additional coffee stand necessities were purchased from Cash and Carry in Seattle. One hundred and seventy cases of soda were purchased in three trips to Costco over the week of 4 June 2001 as well as various candy and toiletry items. Uniform articles were purchased through the Uniform Distribution Center and delivered at the beginning of June. Orders for t-shirts, sweatshirts, mugs, and hats were placed early in May. The clothing items were delivered prior to departure from homeport.

Seattle, WA - Puntarenas, Costa Rica

The Java Hut (coffee shop) was in full operation, averaging approximately $50 a day in business. Java Hut started selling cold drinks. Iced latte's were the hottest selling items while we were heading south. Three boxes of mugs arrived in Puntarenas. These helped reduce the amount of paper cups used for the coffee.

Costa Rica - Dover, England
The Java Hut continued operation with sales of cold drinks declining as we crossed the Atlantic Ocean. In England, we sold numerous HEALY souvenirs to ALSTOM when a group from the company came down for a tour. The store accepted British pounds as currency for this event. At the end of the inport, money was exchanged with the money changer when he came aboard to change crewmembers' money. The last box of the original pre-deployment order arrived this inport.

Dover, England - Tromso, Norway
Completed a relief of the Exchange Officer during this transit.

Phase 1 - Science (AMORE)
Coffee drinks and HEALY hats, shirts and mugs were big sellers with the AMORE science party. Many of the scientists made regular stops in the Java Hut as part of their daily routine. The Exchange arranged to sell AMORE Sweat and T-shirts for the science party.

During the Ice Rendezvous with Polarstern and Oden, the exchange did a large volume of business as over 100 people visited HEALY.

Due to under estimating amount of tobacco products that would be used, another order was placed through a Seattle vendor. The logistics of transporting the cigarettes and smokeless tobacco was coordinated through HEALY's shore-side support team.

The Fleet Post Office system proved unreliable for purchases made towards the beginning of the deployment. Only one box arrived out of 4 that were shipped same day. This reduced sales considerably of deployment shirts, and unit ball caps.

A total of 50 cases of soda were sold to the R/V Polarstern during this phase as they were experiencing a much higher than normal consumption rate with their embarked science party.

Phase 2 - Science (Primary – ALTEX, S.O.O. - JPL/NIC)
Sales continued to be brisk with the new science party. As before, the Java Hut was key stop on the scientists' daily rounds of the ship Additional UHT Milk was purchased for the coffee stand, as well as soda through the husbanding agent.

A Typical Night at the Java Hut

Tromso, Norway - Panama Canal
The audit of the Exchange operation was completed. Sales in the Java Hut began to transition back to cold coffee drinks as the temperatures climbed.

Recommendations

Delivery of items should take place at least a week before departure. A soda distributor would alleviate most of the outside purchases the Exchange Officer needs to perform.

Recommend purchasing entire inventory prior to deployment. This will alleviate the necessity of relying on the Fleet Post Office system for delivery of inventory while underway.

CHAPTER IX - MEDICAL

Pre-Deployment Preparations

Pre-deployment preparations included completion of medical appointments for ongoing medical issues, dental cleanings, and ensuring a full supply of pharmaceuticals and supplies were onboard. Research was also conducted with the Center for Disease Control to check for current conditions in anticipated port calls. Otherwise, the focus was on collecting all medical questionnaires for the science party members, reviewing them, and ensuring the medical staff was fully prepared to support the needs of the science parties.

Deployment Summary

Overall, the deployment went smoothly and no unusual medical situations arose. Two members were returned to Seattle for psychological screening. A dental x-ray was completed for a POLARSTERN crewmember using HEALY's x-ray apparatus during Phase I of science operations. The Dive Team conducted Hyperlite hyperbaric dive training under the supervision of the medical staff. NAVSTA Rota Medical provided outstanding support for HEALY during our port call. Two crew members had wisdom teeth removed and four dive physicals were completed. Finally, in preparing for our return transit through the Panama Canal we found that our Deratting Certificate was due to expire the day of our transit. A one month extension was obtained from MLCPAC(kse) so the transit would not be delayed. Finally, arrangements were completed with ISC Seattle to complete all necessary medical and dental appointments during our first month back in homeport so issues could be resolved during our short inport period prior to our Arctic West Summer 2002 deployment. The medical staff saw 250 (239 crew, 11 science party) patients during the AES 2001 mission.

CHAPTER X – PUBLIC RELATIONS

Summary

Pre-Deployment Preparations

Pre-deployment preparations consisted of ensuring the ship had sufficient brochures onboard for anticipated tours during proposed port calls.

Seattle, WA - Puntarenas, Costa Rica

Ship was not open to public tours during the Puntarenas port call due to being anchored offshore.

Costa Rica - Dover, England

Public tours were scheduled for 2 of the 5 days in Dover. One day a group of 70 ALSTOM employees came for a tour of the ship they have been working on for 3 years. In all a total of 150 people came to the ship in Dover, mostly in small groups at the request of various crew members.

Dover, England - Tromso, Norway

Due to being moored at the Submarine Base, public tours were limited to base members, and associates of the science party.

Phase 1 - Science (AMORE)

23 AUG 01: Rendezvoused with R/V POLARSTERN and Swedish Icebreaker ODEN in the ice, resulting in meeting in which 17 various countries were represented. HEALY hosted an American Style barbeque onboard for 250 scientists and crew.

Swedish R/V Oden & German R/V Polarstern

06 SEP 01: At 1012 GMT, HEALY became the second U.S. Surface Ship to reach the North Pole, and first ship to do so, unassisted. Shortly after arrival, the German R/V POLARSTERN joined HEALY at the pole. Through high quality satellite connectivity via the TILT/TDRSS system, we were able to send a press release and photograph of the ship and crew at the pole to Pacific Area and 13th District Public Relations staffs. This enabled the news to be published the day following the event.

HEALY at the North Pole

HEALY's website was updated weekly while we had good satellite connectivity via the TILT/TDRSS system. During this time Coast Guard Magazine highlighted the Website in its "Web Hot" column. Other regular website updates were completed by several members of the science party. Ms. Michele Adams from Musselman Middle School in West Virginia maintained a journal of her daily activities on the web including discussions of various aspects of shipboard life. Ms. Adams was fortunate to benefit from the Teachers Exploring the Arctic (TEA) program sponsored by NSF. (See: http://tea.rice.edu/tea_adamsfrontpage.html#calendar)

Due to the increase in Threatcon level and also because of our moorage at the submarine base at the conclusion of Phase I, no personnel visited HEALY other than associates of the science party, personnel assigned to the Norwegian Naval Base, and several crew members from a USNS ship that was also moored at the base.

Phase 2 Science (Primary – ALTEX, S.O.O. - JPL/NIC)

Due to lack of substantial bandwidth throughout phase, updates to HEALY's website were not made until the ship was back within INMARSAT range.

Mr. Alvo Martin, a free lance correspondent for CNN, rode the ship for the entire Phase. His focus was on the Coast Guard's support of the scientific parties. He interviewed the Commanding Officer and numerous members of the crew in addition to several members

of the embarked science parties. We await the resultant article from his time onboard.

During this phase Mr. Mike Pinto from MBARI maintained a daily log of ongoing scientific operations. In addition, Mr. Todd Walsh, also from MBARI, took numerous photos and video clips. The log and an excellent assortment of photos were later placed on the MBARI Website which has a direct link from HEALY's Website. This information can be seen at:

http://www.mbari.org/education/cruises/Altex/logbbook.htm

Tromso, Norway - Panama Canal

Tromso: No visitors.

Dover: No visitors other than two guests of the Commanding Officer.

Rota: No visitors other than one U.S. Navy officer and his daughter who is interested in attending the Coast Guard Academy.

On 28 November, a press conference was held by the National Science Foundation in Washington, D.C. to address the significant scientific discoveries made during the AMORE portion of AES. The Chief Scientist and the Principal Investigators were present. The press conference, and the preceding press release, were covered by the major new services with articles showing up at numerous websites. See the following article from the National Geographic News that was typical of articles appearing in various media in conjunction with the press conference.

Panama Canal - Seattle, WA

Provided a press release to the 13th District Public Affairs staff for release in conjunction with HEALY's return to port.

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Visitor Totals by Port

Port Call	Dates	Number of Visitors
Puntarenas, Costa Rica	25 – 28 June, 2001	5
Dover, England	17 – 22 July, 2001	150
Tromso, Norway	27 – 31 July, 2001	20
Tromso, Norway	3 – 6 October, 2001	10
Tromso, Norway	8 – 9 November, 2001	0
Dover, England	14 –16 November, 2001	2
Rota, Spain	21 – 23 November, 2001	2

Coast Guard News
COMMANDING OFFICER
USCGC HEALY (WAGB 20)
FPO AP, 96667-3918

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U.S. Icebreaker reaches North Pole

The United States Coast Guard Cutter Healy, the nation's largest and most technologically advanced icebreaker, commanded by Captain Dave Visneski, became the second U.S. surface ship to reach the North Pole, and the first to reach the pole unassisted. Thursday, September 6, 2001 at 1012 Greenwich Mean Time, Healy arrived at position 90º00.0' North Latitude.

Currently Healy is deployed on Arctic East Summer (AES) 2001. The ship arrived at the North Pole as part of a joint international scientific endeavor to explore the Gakkel Ridge Basin and Lomonosov Ridge. As part of this scientific mission, Healy has been escorting the German R/V Polarstern, as detailed seismic surveys of the mid-oceanic ridge are conducted. During the escort operations, Healy breaks open channels in the ice so that the Polarstern can follow, towing their seismic array. Scientists on Healy have been recovering volcanic rocks from the Gakkel Ridge while also developing a detailed map of the ridge's topographical features. Thermal vents have been discovered while various organisms have also been recovered.

The Coast Guard icebreaker Polar Sea arrived at the North Pole in the summer of 1994 as part of a joint mission involving icebreakers from three separate countries. Healy's arrival at the North Pole comes during the ship's maiden scientific voyage, and begins to establish its reputation as the nation's premier polar research vessel.

"It's been great working with the crew of Healy. This cruise marks the beginning of a new era in Arctic marine research for U.S. Scientists" said Dr. Peter Michael of The University of Tulsa. Dr. Michael is the chief scientist aboard Healy for the Arctic Mid-Ocean Ridge Expedition (AMORE).

Healy's next port of call will be Tromso, Norway from October 3rd to October 7th. While in Tromso, Healy will embark a new science team, and return to the Arctic for an additional 30-day science mission. The ship will return to its homeport of Seattle, Washington on December 21st, where it will begin preparations for a 6-month deployment in the western Arctic Ocean during the spring and summer of 2002.

Further information about Healy can be found on the world wide web at http://www.uscg.mil/pacarea/healy

-USCG-

Scientists Excited by Arctic Ocean Ridge Finds

Hillary Mayell
for National Geographic News
November 29, 2001

The floor of the Arctic Ocean is one of the last frontiers on Earth, and mapping it was thought to be an impossible task—too much ice, too remote, too difficult.

But on its inaugural research expedition, the U.S. Coast Guard Cutter *Healy,* a specially designed icebreaker equipped for science, has returned with highly detailed maps, exotic life forms, and new discoveries of volcanic activity below the ice cap.

"This was an epic journey in search of geological knowledge from a remote corner of the Earth," said Peter Michael, chief scientist for the Arctic Mid-Ocean Ridge Expedition (AMORE). The AMORE expedition was a joint project with Germany. The *Healy* and Germany's icebreaker *Polarstern* traveled to the Arctic from July 31 to October 3.

The co-chief scientist on the journey, Charles Langmuir of the Lamont-Doherty Earth Observatory at Columbia University, compared the Arctic expedition to the major discoveries of early U.S. explorers. The icebreakers' findings will provide fertile ground for new exploration over the next decade, he said.
"We have completely unexpected results," said Langmuir. "The ocean ridge below the Arctic is completely unique. We found 12 new volcanoes where we expected to find none, and we found unexpected and abundant hydrothermal activity."

The Gakkel Ridge

The Arctic expedition, funded by the National Science Foundation, focused on the northern end of the mid-ocean ridge. The ridge is a volcanically active mountain range, 52,000 miles (84,000 kilometers) long, that runs beneath the North and South Atlantic Oceans, the Arctic Ocean, the Indian Ocean, and the South Pacific.

"Ocean ridges are like great gashes in the Earth, where hot rock from the Earth's core is forced up," said Henry Dick, a marine geologist at Woods Hole Oceanographic Institution and also a co-chief scientist of the expedition.

The Gakkel Ridge is the deepest and most remote portion of the global mid-ocean ridge system. It extends 1,100 miles (1,800 kilometers) from north of Greenland to Siberia, lying about three miles (five kilometers) beneath the Arctic ice cap.

Scientists study the mid-ocean ridge to better understand how the Earth's mantle was formed. The theory is that volcanic eruptions beneath the ocean create new oceanic crust, which then moves away from the ridge. This process, known as seafloor spreading, is thought to underlie the movement of continents.

"Unlike volcanoes on land, which are tall and conical in shape, undersea volcanoes are long, linear, and oozing," said Langmuir. Volcanoes on land don't spread.

The Gakkel Ridge is the slowest spreading ridge in the world, spreading at a rate of one centimeter (less than half an inch) a year. Ridges in other parts of the mid-ocean range spread up to 18 centimeters (7 inches) a year. Because it is so slow-spreading, scientists expected there would be very little volcanic activity along the Gakkel Ridge.

"Most of what we know about mid-ocean ridges is from the mid-latitudes," said Langmuir. Many theories about seafloor spreading can be tested only on a slow-spreading ridge like the Gakkel.

Unexpectedly, the AMORE expedition found an abundance of both volcanism and hydrothermal activity.
"What we found on this expedition changes fundamentally the way we see the flow of the mantle and the generation of magmas beneath ocean ridges," said Dick.

Origins of Life

The researchers tentatively named the field of undersea hydrothermal vents they found the "Aurora." Hydrothermal vents, sometimes called "black smokers" or chimneys, eject plumes of superheated water that look almost like an underwater cloud of smoke. Exotic forms of life have been found at vents in other locations, and some scientists think that life on Earth may have originated in these plumes.

The energy that supports these organisms comes from chemical reactions rather than photosynthesis, as on the surface of the planet.

"The abundance and taxonomic breadth of the animals we found was quite a surprise," said Linda Kuhnz, a biologist from Moss Landing Marine Labs in California who participated in the expedition.
The isolation of the Arctic Ocean has long intrigued biologists. They hope that some of the samples recovered will help answer the question of whether the life forms and ecosystems in the Arctic resemble those from the Atlantic Ocean or Pacific Ocean, or whether they have evolved separately.

"We took samples of mud, water, rocks, and animals—everthing we could think of, and now we're getting ready to go into the lab and see what we've got," said Kuhnz.

CHAPTER XI - DIVE

Summary

Pre-Deployment Preparations

Approximately two months before departure, a diver solicitation message was sent to MLCPAC requesting 2 SCUBA divers. At the time of departure, several candidates had been identified, but no orders had been issued. HEALY's Dive Officer conducted interviews with several of these candidates and forwarded recommendations on to MLCPAC and CGHQ (G-OCU).

Two weeks prior to departure, members of all three Icebreaker Dive Teams conducted a weeklong training program with personnel from CGLO Panama City and Coast Guard Headquarters. Training topics included the Hyperlite Hyperbaric Stretcher, Amron surface supplied diving console, Surface supplied diving operations, EXO-26 full-face mask, and changes to the Coast Guard and Navy dive manuals.

Eight new Poseidon regulators, 6 White's drysuits, and two 260-foot surface supplied umbilicals were purchased for the ship by Commandant (G-OCU) just prior to departure. Nine Poseidon Unisuits, two chamber gauges, and underwater welding equipment were transferred to NOAA by direction of Commandant. All other dive equipment was on schedule for required PMS and calibration.

A training dive at Mukilteo, WA was conducted the week prior to departure to determine proper weight requirements and develop proficiency in using the new White's drysuits.

Seattle, WA - Puntarenas, Costa Rica

HEALY's Dive Officer continued to work with MLCPAC to identify TAD divers for the upcoming science mission. Initial indications that divers would be made available from the U.S. Navy Dive Locker in Everett, WA did not seem as solid, and efforts focused on identifying alternatives.

Dive team members began a routine physical training program, and weekly diver training during this phase of the transit. Training priorities were determined using a general dive exam, and the schedule of topics was developed from the results.

Costa Rica - Portsmouth, England

Conducted weekly PMS and training during this transit leg.

Portsmouth, England - Tromso, Norway

Embarked 1 TAD diver from Gru Portland while inport Dover, UK. This brought dive team strength to 4 members (Dive Officer + 3 SCUBA divers)

Continued training program during transit leg.

Phase 1 Science (AMORE)

Dive team members conducted weekly training during this leg of operations. Conducted quarterly Hyperlite training, including several chamber dives for dive team familiarization and training.

6 Sep: Conducted four open water dives while hove to at the North Pole. Dives were conducted for training using drysuits, BCs, and AGA full-face masks. Divers entered and exited the water from the ice floe behind the ship. Each diver was tended from the Ice. These dives proved especially useful for dive team proficiency and planning.

HEALY dive team member prepares to leave the surface while diving at the North Pole.

Phase 2 Science (Primary – ALTEX, S.O.O. - JPL/NIC)

Arranged for Air Test kit delivery prior to second port call in Tromso, Norway. Air test was conducted during the port visit and sent FEDEX to laboratory for analysis.

Dive team continued weekly training sessions, brought required annual and semi-annual training requirements up to date.

Tromso, Norway - Panama Canal

Dive Officer conducted the PT test for 4 diver candidates while inport Rota, Spain. This base offered all facilities required to properly complete both the medical and physical exams. Packages for qualified candidates were faxed to Headquarters (G-OCU) for billeting in an upcoming dive school class.

Dive Operations (Hours/Personnel)

Date	Location	Purpose	# of Divers	Total Dive Time
2 Jun 01	Seattle, WA	Drysuit Training	3	1:40
16 Aug 01	HEALY	Hyperlite Trng	3	:35
06 Sep 01	North Pole	Training / Proficiency	4	:30

CHAPTER XII – OVERALL RECOMMENDATIONS

The successful completion of AES 01 confirmed that HEALY is an outstanding Polar research platform that will be a key element of significant scientific discovery in the Arctic for many years. The experience gained though also brought to light a number of issues that need to be addressed in the future for optimal employment of HEALY.

Communications: A high bandwidth Internet connection is essential for future operations above 80 degrees where Inmarsat connectivity is lost. The science community has an expectation that they will be able to transmit large data streams, to update websites, and to maintain nearly continuous e-mail capability with their support organizations while deployed. The successful results of our TILT/TDRSS test during the AMORE phase demonstrated the capability is achievable in the near future while also illustrating how critical such a connectivity capability is to operational success during a prolonged science mission. Fortunately, the lack of capability didn't limit us significantly during the shorter ALTEX cruise.

Mission Timeframe: Science missions in the Arctic must start earlier than 30 July if we are to maximize the operational effectiveness of HEALY and the embarked science parties. The weather and ice conditions really began to effect our ability to conduct dredges and CTD casts in the later stages of September. Additionally, weather had significant impact on AUV operations during October. HEALY was delayed in starting AES until POLARSTERN was available to conduct simultaneous petrology experiments. In retrospect, HEALY could have accomplished more dredges, rock cores and CTD casts if the mission had started earlier and if HEALY had operated independently. If significant AUV sampling is to be conducted high into the Arctic Basin then operations will have to be conducted earlier in the season when ice conditions include sizable polynyas for deploying and recovering the AUV. In addition, weather conditions will be much more conducive to deck and small boat operations then they were during October.

Dredge Wire Size: For missions when aggressive dredging is planned consideration should be given to outfitting HEALY with the capability for ¾-inch wire. A conservative dredge approach was necessary to ensure dredges weren't hung up or excessive recoveries (heavy weight) weren't made so that the 9/16-inch wire wasn't in danger of breaking. This approach included ensuring that dredges weren't attempted on steep slopes (limited to slopes less than 30 degrees) and stopping dredges after four good "hits" were obtained. As a result, HEALY didn't recover as much material as could have been brought onboard. Adding the ¾-inch capability will not require the procurement of appropriate Lebus shells as these are already on hand.

High Latitude Gyro: Our MK-37 gyro behaved quite erratically above 85 North. At times we could not connect CGDN and SDN for more than a few minutes to TDRSS F1 satellite due to inability to input a valid heading from the gyro. It also sometimes prevented us from linking up with the SeaSpace satellite to download TeraScan ice images for our daily transit planning. The gyro problem also made it difficult to determine a heading to provide to the helo so it could set its heading bug prior to flying away from the ship. The MK-37 gyro on Healy does not have a high latitude switch similar to some gyros that were available in the past, yet Healy was built specifically to operate in a polar environment. Polarstern has a laser gyro compass that they use instead of a conventional gyro that they say works quite well. It would be a good idea for MLCPAC (v/t) to investigate the use of similar technology on HEALY prior to future deployments.

Dredge Operations: We found several keys to our success in completing an extensive dredge program while deployed in the Arctic. First, providing Seabeam output information to the Aloft Conn via the CCTV system made it easy for the Conning Officer to see what the scientists' goals were for each dredge (ex. location, direction, length) while also showing how successful the OOD was in meeting the objective. This saved a lot of time that had been spent previously on the phone with the Principal Investigators trying to describe what they were looking for in each dredge. Second, prior to setting up for a dredge, OODs would stop and evaluate ship and ice drift for 10 to 15 minutes. This was essential to identifying whether existing leads would work for a dredge over the 3-4 hour evolution or it would give an OOD a better idea of where they would have to cut a lead in preparation for a dredge. HEALY's Dynamic Positioning System and squared off stern provided a great combination for completing dredges. Even in tough wind conditions the ship's head could be maintained even while maintaining a dredge speed of one-half to one knot. The flat stern allowed the dredge wire to remain clear of the ice while conducting the dredge as well as during dredge deployment and recovery.

Staging from Olavsvern Naval Base: When operating in the Eastern Arctic, especially above Svalbard and to the east, recommend staging out of Olavsvern Naval Base. Although the base is located outside of Tromso, the drive in to town is only a few minutes longer then it is to Breivika which is where HEALY would have moored otherwise. The Naval Base provides a very safe location, safe receiving capability for supplies, a small club on base with flexible operating hours to meet ship and crew's needs, and great hospitality. The staff at Olavsvern is used to supporting forward deployed U.S. and other NATO naval vessels so it is not unexpected that they can provide first class support for an icebreaker.

Panama Canal Requirements: Even though HEALY had been through the canal five months previously, we had to undergo a full compliance inspection again for our return transit. During this second inspection the Panama Canal Commission inspector identified a discrepancy in HEALY's design that requires correction prior to future transit. Because the embarked pilot cannot see directly down the side of HEALY from inside the Pilothouse, he must be able to stand outside just aft of the bridge wing doors **under cover** if necessary to conn the ship. Covers must be provided above this open area to protect the pilot when it rains. We offered to provide a crew member with an umbrella to protect the pilot if necessary during our transit which was an acceptable temporary solution. We will pursue minor modifications that permit the rigging of covers above the locations in the future.

AUV Recovery System: We were able to deploy the AUV directly to the water using quick release hooks and lanyards that were manned on the fantail. However, recoveries required the deployment of the small boat with the boat crew connecting the lifting straps to the vehicle. The connection of the recovery system came about after the AUV was first towed back to HEALY as it was usually located between 500 – 2000 yards away from the ship. In calm water with reasonable weather conditions this evolution can be completed with relative ease. However, in a seaway and/or in extreme weather conditions this becomes a challenging, if not high risk, evolution. A recovery system that is much less dependent on human interaction needs to be developed so that safety is not an issue and the AUV deployment is less dependent on weather. Apparently, the MBARI's AUV team is developing such a system. They just couldn't complete it in time for testing during AES '01.

Aviation Detachment Staffing: AES ’01 had minimal requirements for aviation support. During the AMORE phase of this deployment we were staffed with four pilots and four crewman/mechanics. We reduced this down to three pilots during the ALTEX phase. In retrospect, we could have completed the AMORE phase with three pilots as well given the level of aviation support that was necessary. In the future we need to carefully review aviation support requirements for each science mission so that AVDETs are properly sized rather than being staffed at the same level regardless of mission.