FINAL CRUISE INSTRUCTIONS
FOCI

R/V *ALPHA HELIX*, FOCI Cruise 2HX04
July 8, 2004 – July 19, 2004
Chief Scientist – Dr. Nancy B. Kachel, NOAA/PMEL

1.0 FINAL CRUISE INSTRUCTIONS

1.1 Cruise Title – Fisheries-Oceanography Coordinated Investigations (FOCI).

1.2 Cruise Numbers

1.2.1 Cruise Number – HX287

1.2.2 FOCI Number – 2HX04

1.3 Cruise Dates

1.3.1 Departure – Depart Seward, Alaska, Thursday July 8, 2004, at 08:00.

1.3.2 Arrival – Arrive Seward, Alaska, Monday July 19, 2004, at 08:00.

1.4 Operating Area – Gulf of Alaska

2.0 CRUISE OVERVIEW

2.1 Cruise Objectives – Fisheries-Oceanography Coordinated Investigations (FOCI) is an effort by National Oceanic and Atmospheric Administration (NOAA) and associated academic scientists. FOCI's goal is to understand the effects of abiotic and biotic variability on ecosystems of the North Pacific Ocean and Bering Sea in order to discern the physical and biological processes that determine recruitment variability of commercially valuable finfish and shellfish stocks in Alaskan waters. This cruise is in support of the United States Global Ocean Ecosystems Dynamics (U.S. GLOBEC). This cruise is being undertaken by FOCI in support of research into the physical, chemical, and biological mechanisms acting in the coastal Gulf of Alaska that make it one of the most productive ecosystems on earth.

We will focus our efforts on the physical, chemical, and biological processes occurring in particular areas of this region. These include Portlock Bank, Stevenson Trough, and one of the large offshore eddies, that typically impact this area between April and September and contribute to on and offshore fluxes.

We plan to use the University of Alaska's towed vehicle to make hydrographic surveys, alternating with lines of Conductivity, Temperature, and Depth (CTD) surveys, both across the eddy and over Portlock Bank. At many of the CTD stations, we will be making Marine Assessment Monitoring and Prediction (MARMAP) Bongo net tows. The location of this eddy as of April 19, 2004, is shown in Section 8.1 TOPEX POSEIDON Altimetry Data from April 19, 2004. Two or three Advance Research and Global Observation Satellite (ARGOS) satellite-tracked drifters will be deployed during the course of the cruise.

2.2 Participating Organizations

NOAA – Pacific Marine Environmental Laboratory (PMEL)
7600 Sand Point Way N.E.
Seattle, Washington 98115-6439

NOAA – Alaska Fisheries Science Center (AFSC)
7600 Sand Point Way N.E.
Seattle, Washington 98115-0070

2.3 Personnel

2.3.1 Chief Scientist

Name	Gender	Affiliation	E-mail Address
Dr. Nancy B. Kachel (206) 526-6780	Female	PMEL	Nancy.Kachel@noaa.gov

2.3.2 Participating Scientists

Name	Gender	Affiliation	E-mail Address
Dr. Nancy B. Kachel	Female	PMEL	Nancy.Kachel@noaa.gov
Dr. Carol A. Ladd	Female	PMEL	Carol.Ladd@noaa.gov
David G. Kachel	Male	PMEL	Dave.Kachel@noaa.gov
Colleen E. Harpold	Female	AFSC	Colleen.Harpold@noaa.gov
Jay B. Clark	Male	AFSC	Jay.Clark@noaa.gov
Zachary Chen	Male	PMEL	
Christina M. Deliyanides	Female	AFSC	Christina.Deliyanides@noaa.gov
Morgan S. Busby	Male	AFSC	Morgan.Busby@noaa.gov

2.4 Administrative

2.4.1 Ship Operations

Mr. Thomas Smith, Assistant Director Coastal/Marine Operations
University of Alaska
Seward Marine Center
201 Railway Avenue
P.O. Box 730
Seward, Alaska 99664

Telephone: (907) 224-5261
Fax: (907) 224-3392
E-mail: fnts@uaf.edu
Homepage: http://www.ims.uaf.edu/helix/

2.4.2 Scientific Operations

Dr. Phyllis J. Stabeno, PMEL
Telephone: (206) 526-6453
E-mail: Phyllis.Stabeno@noaa.gov

Dr. Jeffrey M. Napp, AFSC
Telephone: (206) 526-4148
E-mail: Jeff.Napp@noaa.gov

3.0 OPERATIONS

3.1 Responsibilities

3.1.1 Master – The ship's Master shall be in sole command of the vessel and shall be responsible for the welfare of all personnel on board. The Master shall be the final authority in matters relating to the safety, proper navigation, stability, and sailing condition of the vessel and shall execute each voyage with the utmost dispatch.

The Master shall inform the Chief Scientist as soon as possible of any changes in the program necessitated by events. In the case of emergency, nothing in these instructions shall be construed as preventing the Master from taking the most effective action, which in the Master's judgment, will rectify the situation causing the emergency, and; thereby, safeguard life, property, and the ship.

The Master will have the authority to abort operations temporarily on the basis of clear and present danger to life and property at sea, and will inform the Chief Scientist as soon as safe conditions permit. Full details of the action taken, rationale, and recommendations will be provided at the earliest opportunity. Under normal operating conditions, the Master shall not take any mission-aborting action without consultation with the Chief Scientist.

3.1.2 Chief Scientist – The Chief Scientist is responsible for executing the technical portion of the scientific mission specified by these instructions. Responsibilities also include:

1. Comportment of visiting scientists and technicians,
2. Disposition of data, feedback on data quality, and archiving of data and specimens collected,

3. Administration and physical handling of all scientific party hazardous materials,
4. Assignment of berthing for the scientific party,
5. Cleanliness of all berthing, laboratory, and storage spaces used by the scientific party,
6. Delivery of medical and emergency contact forms for the scientific party, and
7. With the Master, safe, efficient, and economical use of shipboard resources to support the embarked mission.

The Chief Scientist has the authority to revise or alter the technical portion of the instructions as work progresses provided that, after consultation with the Master, it is ascertained that the proposed changes will not:

1. Jeopardize the safety of personnel or the ship,
2. Exceed the overall time allotted for the project,
3. Result in undue additional expenses, or
4. Alter the general intent of these project instructions.

3.1.3 **Scheduling of operations** – Scheduling of individual activities will depend upon weather conditions and progress of scientific work. Therefore, firm advance scheduling of events will not be possible, and a continual dialogue between scientific and ship's personnel will be important.

3.2 **Staging Plan** – Loading of scientific equipment is planned to occur in Seward, Alaska, on Wednesday, July 7, 2004. It will include the Triaxus, Marine Assessment Monitoring and Prediction (MARMAP) Bongo nets, sample jars, preservatives, Bongo SEACAT and SEACAT deck unit, auto-analyzer equipment for the next cruise, and flow-through nitrate meter. These are currently being stored at the Seward Marine Center, where **R/V *ALPHA HELIX*** is docked, for the cruise. Drifters, some chemicals, and miscellaneous lab equipment will be shipped to the Seward Marine Center before the cruise date. The scientists will bring some equipment with them from Seattle, Washington. On the afternoon of Tuesday, July 6, 2004, three members of the scientific party will need assistance moving equipment out of storage in Seward, Alaska, and loading it onto the ship. No large or heavy items, other than any needed for the Triaxus, are to be loaded onto the ship. One of the scientists will be available to set up and install a nitrate meter in the flow-through system on July 6, 2004. Arrangements are currently being made between Dr. Calvin W. Mordy of PMEL and Steve Hartz of Seward Marine Center to have Terry Whitledge's MBARI-ISUS nitrate meter outfitted and installed on the Triaxus.

3.3 **De-staging Plan** – Equipment will be off-loaded in Seward, Alaska, at the end of the cruise on Monday, July 19, 2004. After the cruise, the scientific party will arrange to have their equipment picked up from the Seward Marine Center to be transported back to Seattle, Washington. Dr. Calvin W. Mordy will meet the ship, to assist with this operation, and to begin the set-up of his equipment for the next cruise for which George Hunt is chief scientist. The scientific party will be responsible for arranging vehicles and shipping for moving their equipment. Frozen nutrient samples will remain aboard the ship for analysis during the next cruise.

3.4 **Cruise Plan** – The following operations are planned: We will begin by crossing the deep eddy off the shelf, which will gain us some familiarity with the operation of the towed vehicle before we attempt to operate it over the more complex bathymetry around Portlock Bank.

1. Make hydrographic survey out over the deep eddy, located approximately 100-200 nautical miles south of Seward, Alaska, using the University of Alaska's Triaxus towed vehicle, equipped with sensors to measure temperature, conductivity, fluorescence, nitrate, and the optical plankton counter. This will be followed by a return trip back across the eddy doing CTD/Bongo station to 1,500 meters. CTD/PAR/Fluorescence profiler casts will be used for hydrographic surveys. Samples will be taken for chlorophyll and nutrients. Salinity calibrations samples will be taken approximately ever second station.
2. Marine Assessment Monitoring and Prediction (MARMAP) Bongo tows will be taken at many of the CTD stations.
3. The Uncontaminated Scientific Seawater System (USSW) with thermosalinograph, fluorometer, with a PMEL-supplied nitrate meter attached will be used throughout the entire cruise. Calibration samples will be taken twice each day.
4. Approximately two or three ARGOS satellite-tracked drifter buoys will be deployed during the cruise.
5. Chlorophyll analysis will be made aboard ship. Nutrient samples will be frozen for analysis during the following cruise.

See Section 8.3 Cruise 2HX04 Chartlet for the proposed cruise track. We plan to depart from Seward, Alaska, at 08:00 on Thursday, July 8, 2004. We plan first to deploy the iron-monitor mooring at GAK2

1. **Triaxus** – Tow the Triaxus vehicle in undulating mode across the offshore warm-core eddy to as great a depth as possible. See Section 8.1 TOPEX POSEIDON Altimetry Data from April 19, 2004 for April location.
2. **CTD/Bongos** –Begin conducting CTD/bongo station back across the eddy. CTD will be taken to a maximum depth of 1,500 meters, where the bottom depths exceed 1,500 meters.
3. **Triaxus** – If, in the opinion of the Master, the Marine Technicians, and the Chief Scientist, the Triaxus can be successfully flown where the bottom topography is steep, we want to use the Triaxus vehicle in undulating mode to make a detailed hydrographic survey across Portlock Bank. Optimally, we would be capable of operating the Triaxus to within 10 meters of the bottom. If that seems too risky, we propose to undulate the Triaxus to a depth of 50 meters on a zigzagging path over Portlock Bank
4. **CTD/Bongos** – Repeat the survey of Portlock Bank and Stevenson Trough, this time occupying CTD/Bongo stations.

3.5 **Station Locations** – See Section 8.4 Cruise 2HX04 Station Locations for a full listing of station locations. Chartlet of the proposed cruise track can be found in Section 8.3 Cruise 2HX04 Chartlet.

3.6 **Data To Be Collected** – The Chief Scientist is responsible for the disposition, feedback on data quality, and archiving of data and specimens collected on board the ship for the primary project. The Chief Scientist will be considered the representative of the Directors of PMEL and AFSC for purpose of data disposition. A single copy of all data gathered by the vessel shall be delivered to the Chief Scientist for forwarding to the Center and Laboratory Directors, who in turn will be responsible for distribution of data to other investigators desiring copies.

3.6.1 **Ship's Data Logging** – If the ship has a computer system that operates throughout the cruise acquiring and logging data from navigation, meteorological, and flow-through oceanographic sensors and ADCP. It is requested that we receive a copy of the data at the end of the cruise.

It is requested that at regular intervals, not to exceed every five days, the ship's computer manager will archive data from disk files to recordable compact diskettes (CD-R) for delivery to the Chief Scientist at the end of the cruise. Additional recording of processed data may be requested of the ship's computer manager, who will ensure data quality. During the cruise, the scientific party may require the assistance of the ship's computer manager to determine if all sensors are functioning properly and to monitor some of the collected data in real time to make sampling strategy decisions.

3.6.2 **Marine Observation Abstract (MOA)** – If the navigational data for stations are not recorded on such a system, it is requested that the ship maintain a Marine Observation Abstract (MOA) log provided by the scientists of times, positions, and meteorological conditions for each station. The critical information to be recorded at each station is:

- Coordinated Universal Time (UTC) date,
- UTC time,
- Position,
- Station number,
- Haul number,
- Gear type, and
- Bottom depth.
- Air Temperature
- Wind speed and direction
- Cloud type
- Cloud Amount
- Bottom depth

3.6.3 **Underway Operations** – Underway operations that will be performed during this cruise include thermosalinograph, fluorometer, nitrate meter (provided and set up by PMEL), ADCP, bathymetry up to 4,000 meters (if possible), meteorological data, and a log of operations.

3.6.4 **Acoustic Doppler Current Profiler (ADCP) Operations** – The 38-kHz RD Instrument (RDI) Ocean Surveyor Acoustic Doppler Current Profiler (ADCP) will be used to measure ocean currents below the moving ship. ADCP data should be logged on the operating computer's hard disk or supplementary drive and transferred to CD at cruise end.

3.6.5 **Sea Chest and Uncontaminated Seawater** – Sea surface temperature and conductivity will be continuously monitored. Uncontaminated seawater from the Uncontaminated Scientific Seawater System (USSS) will be continuously pumped through the thermosalinograph, fluorometer, and nitrate monitor. Data from these instruments should be sent to the data logger, if possible. Approximately 2 square feet of bench space will be required near a sink with uncontaminated seawater to install the underway nitrate monitor.

The ship's complement will be responsible for inspecting, and when required, cleaning the sea chest and conductivity cells. The scientists will be responsible for regularly cleaning the cuvette, inside the fluorometer, and obtaining and processing the calibration samples for chlorophyll and nitrate. Calibration samples will be taken after each MARMAP Bongo station.

Data logger files will be included in the periodic backup of collected data for distribution at the end of the cruise. During the cruise, the ship's personnel will be responsible for ensuring that data streams from the instruments are correctly logged by the data logger. It is hoped that they check the logger status display at least once per watch to determine that the instruments are functioning.

The scientists also request that the fluorometer be interfaced to the ship's data logger, if possible, and the data logger should be configured to log one-minute data throughout each FOCI cruise, including:

- GPS Time,
- GPS Latitude,
- GPS Longitude,
- Water Depth, in meters,
- Seawater (sea chest) Temperature,
- Seawater (sea chest) Salinity, and
- Laboratory Fluorometer Voltage
- Nitrate concentration

3.6.6 **Towed Vehicle Operations** – The MacArtney Underwater Technology Group's Triaxus should be equipped with temperature and conductivity sensors, a fluorometer and the Optical Plankton Counter. If possible, a nitrate meter should be installed. Operations should follow standard procedures established by the Seward Marine Center for operating their Triaxus vehicle.

3.6.7 **CTD/Water Sample Operations** – The **R/V *ALPHA HELIX***'s Sea-Bird Electronics' SBE 911*plus* Conductivity, Temperature and Depth (CTD) profiler with dual temperature and conductivity sensors, is requested. It should be equipped with a ship-supplied fluorometer and PAR sensor, as well as a pinger (altimeter).

Samples will be collected using the vessel's 5-liter (or 2.5-l) Niskin bottles. Once the CTD has been deployed, it should be lowered to 10 meters, and then the deck unit should be turned on. After 45 seconds, the CTD can be returned to just below the surface. Then the data acquisition program is started. The CTD should descend at a rate of 30 meters per minute for the first 200 meters and 45 meters per minute below that. The ascent rate may be 50 meters per minute. An entry in the Marine Observation Abstract (or bridge log) should be made for each CTD cast at the maximum cast depth.

Scientists will keep the ***CTD Cast Information/Rosette Log***. Pressure, primary salinity, secondary salinity, primary temperature, secondary temperature, fluorescence, and light levels will be recorded on the ***CTD Cast Information/Rosette Log*** for all water bottle samples.

3.6.7.1 **CTD Calibration** – Salinity samples will be taken approximately on every other cast, or as specified by the Chief Scientist. The CTD systems will be equipped with dual temperature and conductivity sensors. It is requested that the ship's salinity bottles be used, and that the samples will be analyzed by a UAF marine technician in Seward, and the data sent to the chief scientist.

3.6.8 **MARMAP Bongo Tows** – A 60-cm aluminum bongo frame with 0.505-mm mesh nets, hard plastic cod-ends, and a 40-kg lead weight for a depressor will be used in standard Marine Assessment Monitoring and Prediction (MARMAP) Bongo tows. The nets will be deployed at a constant wire speed of 40-45 meters per minute to a maximum depth of 100 meters, or 200 meters before mid-May, or 5-10 meters off bottom in shallower waters.

A Sea-Bird Electronics SBE 19 SEACAT Profiler will be attached to the wire above the bongo frame(s) to provide real-time tow data.

After the bridge gives permission, ship's personnel and one or two scientists will deploy and recover the bongo array. A scientist will monitor the depth of the Bongo nets using SeaCat software and inform the ship's winch operator when the desired gear depth is reached. The bridge will then be instructed by the scientist to enter the position in the Marine Observation Abstract (MOA). Afterwards, the winch operator will be instructed by the scientist to retrieve the nets at a wire speed of 20 meters per minute. The ship's speed should be adjusted to maintain a wire angle of 45° during the entire tow, which is accomplished by relaying wire angles to the bridge by radio, so that the bridge personnel can speed up or slow down the vessel's speed to increase or reduce the towing angle. When the nets reach the surface, the SeaCat and nets will be recovered. After the nets are brought aboard, they are hosed down with saltwater to wash the sample into the cod-end. In some cases, larvae are sorted and preserved separately. Flow meters in the nets record the amount of water filtered, and the SBE 19 SEACAT records the depth history of the tow. The scientists on watch are responsible for recording times, maximum depth, wire outs, and flow meter counts on the Cruise Operations Database (COD) forms. Tows not meeting specifications may be repeated at the discretion of the scientific watch (i.e. hit bottom, poor wire angles, nets tangled, etc.)

3.6.9 **Chlorophyll/Nutrient Sampling Operations** – Chlorophyll samples will be collected simultaneously with Conductivity, Temperature, and Depth (CTD) profiler casts from the 5-liter Niskin bottles. The scientists will be responsible for collection, filtration, and preservation or analysis of samples. Sampling depths depend on the fluorescence profile. A typical strategy would be samples at 0, 10, 20, 30, 40, and 50 or 60 meters, depending upon which of the latter two depths is closest to the fluorescence maximum. If the maximum is deeper than 60 meters, sampling should be moved deeper with fewer samples in the mixed layer. Nutrient samples will be collected from all Niskin bottles, both near surface and from depth. Nutrient samples will be taken from bottles fired throughout the water column.

Nutrients need to be flash frozen (if possible) in a –80° Celsius Freezer and then moved to a –20°C freezer for storage until after the cruise. This has been discussed with the ship's marine technician. Chlorophyll samples will be filtered and analyzed aboard ship. Some filters will need to be fast-frozen before being moved to a -20°C freezer.

The freezer space needed for these samples is approximately 4 cubic feet at -80°C (if available). The combined space needed in the -20°C freezer is 12-16 cubic feet.

The +4°C refrigerator is required for temporary storage of chlorophyll samples before they are analyzed.

3.6.10 **ARGOS Satellite-Tracked Drifter Buoy Deployments** – Two to three working days before deployment, the Chief Scientist, or designee, will secure the drifter on the back deck. The drifter buoy is then turned on, usually by removing the magnet, and an e-mail message will be sent by the Chief Scientist, or designee, to Dr. Phyllis Stabeno at Phyllis.Stabeno@noaa.gov, stating the serial number that is stamped on the drifter and the time that it was turned on. This lead-time is necessary to ensure that telemetry from the buoy is being received and transmitted by the Advanced Research and Global Observation Satellite (ARGOS). The method of deployment of the drifter is dependent upon the particular make of drifter and is to be directed by the Chief Scientist, or designee.

3.7 **Small Boat Operations** – No small boat operations are planned.

4.0 FACILITIES

4.1 Equipment and Capabilities Provided by Ship

- Oceanographic winch with 0.322" electro-mechanical cable with slip rings terminated for CTD operations,
- Oceanographic winch with 0.322" electro-mechanical cable with slip rings terminated for MARMAP Bongo tows,
- A-Frame,
- Provide termination kits and ship support personnel to do the terminations,
- Wire speed indicators and readout for winches,
- Meter block for plankton tows,
- Electrical connection between winch and Deck computer system,
- Sea-Bird Electronics' SBE 911*plus* CTD system with dual sensors, PAR and Fluorometer sensors, 12-bottle rosette, stand, deck unit, and weights,
- 5-liter sampling bottles for use with rosette (12 plus spares),
- Refrigerator and freezer space for storage of biological and chemical samples, +4°C (4-cu ft), -20° C (~12-16-cu ft) and -80°C, (if possible) for freezing nutrient samples and for their storage,
- RD Instruments' ADCP with data written to disk,
- For meteorological observations: Anemometers, calibrated air thermometer (wet-and dry-bulb, if possible) and a calibrated barometer and/or barograph, interfaced to the data logger if possible,
- Bench space for PCs, monitor, and printer,

- Laboratory space with exhaust hood, sink, lab tables, and storage space,
- Sea-water hoses and nozzles to wash nets at CTD/Bongo stations,
- Adequate deck lighting for night-time operations,
- Navigational equipment including GPS and radar,
- Ship's crane(s) used for loading and/or deploying,
- Depth sounder good to at least 3,000 meters,
- Safety harnesses for working on quarterdeck and fantail in bad weather,
- (2) Hand-held radios or other method for scientific/winch/bridge communications,
- VHF radio with external antenna at CTD computer station or other communication link to bridge and to winch operators,
- Thermosalinograph and fluorometer, and nitrate meter (PMEL supplied) interfaced with the data logger,
- Continuous uncontaminated seawater sampling system with debubbler piped from bow into labs,
- Deionized water system [Projected use 5 gal/day],
- Capability to transfer ship's data to Iomega Zip disks or CD-ROM, and
- (4) Cases of salinity sample bottles with new caps to replace existing ones.

4.2 Equipment and Capabilities Provided by Scientists

- (2) Sea-Bird Electronics' SBE-19 SEACAT systems for use on Bongo tows,
- Debubbler for the fluorometer,
- Nitrate meter to be mounted to the Uncontaminated Scientific Seawater System (USSS),
- 60-cm MARMAP Bongo sampling arrays,
- 20-cm MARMAP Bongo arrays,
- Wire angle indicator,
- Sea-Bird Electronics' SBE-19 SEACAT systems for mooring,
- 2 ARGOS satellite tracked drifter buoys,
- Iridium phone,
- (2) Hand-held radios for scientific/winch/bridge communications,
- Cruise Operations Database (COD) and forms,
- Marine Observation Abstract (MOA) log,
- PMEL CTD Weather Observation Logs,
- CTD Cast Information/Rosette Log,
- Filtering rig for filtering chlorophyll samples,
- Laboratory equipment for analysis of chlorophyll samples,
- Sample bottles for nutrient samples, and
- Miscellaneous scientific sampling and processing equipment.

5.0 DISPOSITION OF DATA AND REPORTS

5.1 The following data products will be provided by the ship and included in the data package at the end of the cruise:

- Calibration Sheets for all ship's instruments used,
- Data logger files of weather, position, depth, and sea chest variables,
- Electronic Navigation suite's export files on disk,
- Marine Operations Abstracts (MOA),
- ADCP Iomega Zip and/or recordable compact diskette (CD-RW), and
- ADCP Log Sheets.

5.2 The following data products will be completed by the scientific party:

- CTD Cast Information/Rosette Log,
- CTD Weather Observation Logs,
- Cruise Operations Database (COD) log sheets, and
- Mooring logs.

5.3 **Pre-cruise Meeting** – A pre-cruise meeting between the ship's representative and the Chief Scientist will be held before the start of the cruise. Its purpose is to identify the day-to-day requirements of the project in order to best utilize shipboard personnel resources and to identify overtime requirements. A brief meeting of all scientific personnel, the ship's officers, deck and marine tech departments, and other relevant ship's personnel should be held before the vessel reaches the operations area for the purposes of:

1. Introducing scientific personnel to ship's procedures, proper channels, etc.,
2. Discuss operating procedures for deploying various pieces of sampling equipment, and
3. Coordinating scientific watch assignments.

6.0 HAZARDOUS MATERIALS

6.1 **Definition** – Hazardous scientific materials are any substance, which because of its chemical properties can cause the deterioration of the materials or injury to living organisms. Rules for the stowage, labeling, and protection of flammables and other hazardous scientific stores on inspected vessels are given in ***Subchapter U, Title 46 CFR, Part 194***.

6.2 **Standards**

6.2.1 **Storage Containers** – Storage containers should be marked, labeled, and stored in a ventilated and protected area under the supervision of the Chief Scientist with the knowledge and approval of the Master. Consideration should be given to transporting and storing hazardous materials, normally shipped in glass containers, in special, non-breakable containers.

6.2.2 **Working Quantities** – Working quantities only should be stored in the laboratory. A reasonable working quantity would be a one-day supply, considering the hazard posed by the material. Containers should be marked with the material's chemical and common names, type, and classification.

6.2.3 **Storerooms** – Storerooms for chemicals and flammables, where practicable, should be protected by fixed CO_2 or Halon systems, and used for no other purpose. Where it is not practical to provide such a storeroom, consideration should be given to a hazardous material locker appropriate for the type and quantity of material being stored.

6.2.4 **Incompatible Materials** – Because of the limited shipboard storage for hazardous materials, particular attention must be made to avoid storing incompatible materials together. A close review of the Material Safety Data Sheets (MSDS) will show if two chemicals are incompatible.

6.3 **Transportation and Disposal** – The Chief Scientist is responsible for the proper transportation, shipping, and disposal of hazardous materials, including empty containers, associated with their project. Transportation and disposal must be carried out in accordance with Federal, State, and Local regulations. In no case will this responsibility be passed to the ship's crew or operating institution unless specifically arranged in advance.

6.4 **Chemical Spill Response** – The scientific party is responsible for supplying neutralizing agents, buffers, and/or absorbents in the amounts adequate to address spills of a size equal to the amount of any chemicals brought aboard. This spill response material must accompany the chemicals when they come aboard.

6.5 **HAZMAT Inventory List** – See Section 8.2 Cruise 2HX04 HAZMAT Inventory.

6.6 **Material Data Safety Sheets (MSDS)** – Electronic MSDSs attached separately.

7.0 **COMMUNICATIONS** – For scientific projects, the Chief Scientist, or their designated representative, may have access to the ship's communications systems on a cost reimbursable basis.

7.1 **Satellite Communications** – INMARSAT (voice and facsimile) communications are available aboard ship and may be used for personal or business related calls. Arrangements to pay for the calls must be made before calling. Credit card calls are the preferred method of payment. INMARSAT calls can be extremely expensive and the exact cost may not be known until you receive your bill.

7.2 **Electronic Mail (E-mail)** – FOCI requests **R/V *ALPHA HELIX*** transmit e-mail at least once a day. Each embarked personnel will have an e-mail account and address established in their name by the ship.

7.3 **Receiving Scientific Status Reports** – The Chief Scientist may anticipate the need for daily reports on the position of satellite drifters in the study area and on the status of biophysical mooring(s). These will be sent either by facsimile from PMEL over INMARSAT, IRIDIUM phone (PMEL provided), or over the Internet via e-mail from PMEL.

7.4 Use of Radio Transceivers – Because it is sometimes necessary for the scientific staff to communicate with other research vessels, commercial vessels, and shore based NOAA facilities, the Chief Scientist or designee may request the use of radio transceivers aboard the vessel.

7.5 Important Telephone and Facsimile Numbers and E-mail Addresses

7.5.1 Pacific Marine Environmental Laboratory (PMEL)

FOCI – Ocean Environmental Research Division (OERD2):

- (206) 526-4700 (voice)
- (206) 526-6485 (fax)

Administration:

- (206) 526-6810 (voice)
- (206) 526-6815 (fax)

7.5.2 Alaska Fisheries Science Center (AFSC)

FOCI – Resource Assessment and Conservation Engineering (RACE):

- (206) 526-4171 (voice)
- (206) 526-6723 (fax)

7.5.3 R/V *ALPHA HELIX*

INMARSAT B

- 011-872-336-862-510 (voice)
- 011-872-336-862-512 (fax)

IRIDIUM Telephone

- 011-881-631-461-96

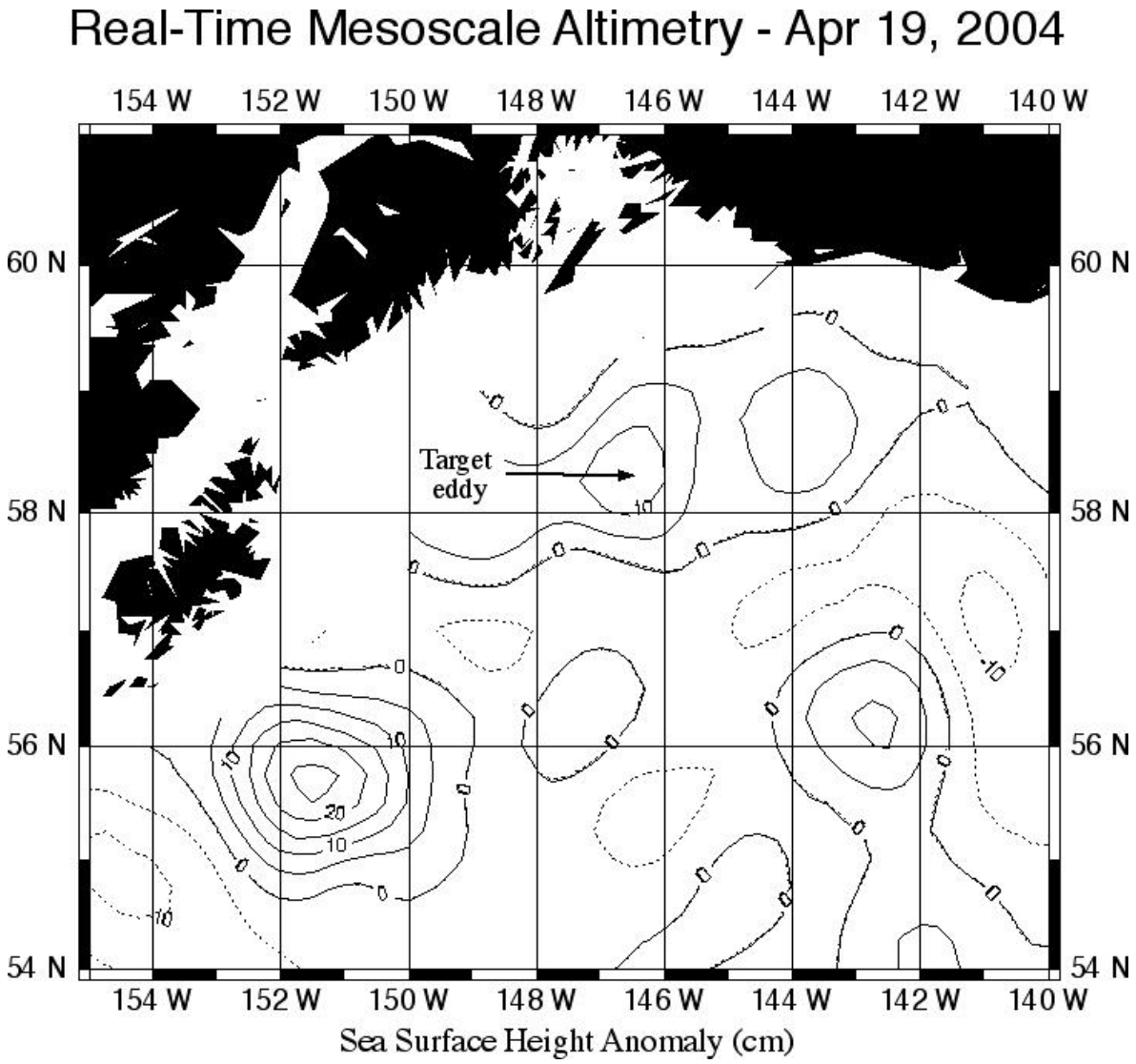
7.5.4 University of Alaska – Seaward Marine Center

7.5.4.1 Assistant Director Coastal/Marine Operations – Mr. Thomas Smith,

- (907) 224-5261 (voice)
- (907) 224-3392 (fax)
- fnts@uaf.edu

8.0 APPENDICES

8.1 **TOPEX POSEIDON Altimetry Data from April 19, 2004** – Showing the position of a Gulf of Alaska eddy impinging on the study area. It is expected that the eddy will move 70-80 nautical miles to the southwest by mid-July, when the cruise begins



8.2 **Cruise 2HX04 HAZMAT Inventory** – The HAZMAT inventory will be submitted at the time of the final instructions. It will include chemicals for preserving zooplankton, and chemicals needed for measuring chlorophyll. In addition, the Iron-meter with its chemical solutions will be sealed and ready to deploy

Chemical	CAS Number	Resp.	Org	Qty	H	F	R	Storage Color Code	Hazard Class	Packing Group Number	UN	Reportable Quantity	Response Indices
Acetone	67-64-1	Harpold	AFSC	8-l	1	4	2	Flammable	3	II	1090	350 LB	1
Ammonium Chloride	12125-02-9	Mordy	PMEL	98-g	1	0	0	General	Not regulated		9085	5,000 LB	2
Brij	9002-92-0	Mordy	PMEL	100-ml	0	1	0	General	Not regulated			None	3
Cupric Sulfate, Pentahydrate	7758-99-8	Mordy	PMEL	40-g	2	0	0	Hazardous Waste	9	III	3077	400 LB	4
Formaldehyde	mix	Harpold	AFSC	20-l	3	2	2	Flammable	3 & 8	III	1198	100 LB	1
Hydrochloric Acid, Solution	7647-01-0	Harpold	AFSC	1-l	3	0	2	Corrosive	8	II	1789	5,000 LB	5
Imidazole	288-32-4	Mordy	PMEL	204-g	2	1	1	Corrosive	8	III	3263	5 KG	6
N-1-Napthylethylenediamine Dihydrochloride	1465-25-4	Mordy	PMEL	7-g	2	1	1	General	Not regulated			None	7
Potassium Nitrate	7757-79-1	Mordy	PMEL	6-g	1	0	3	Reactive	5.1	III	1486	100 KG	6
Sulfanilamide	63-74-1	Mordy	PMEL	70-g	0	1	1	General	Not regulated			None	2

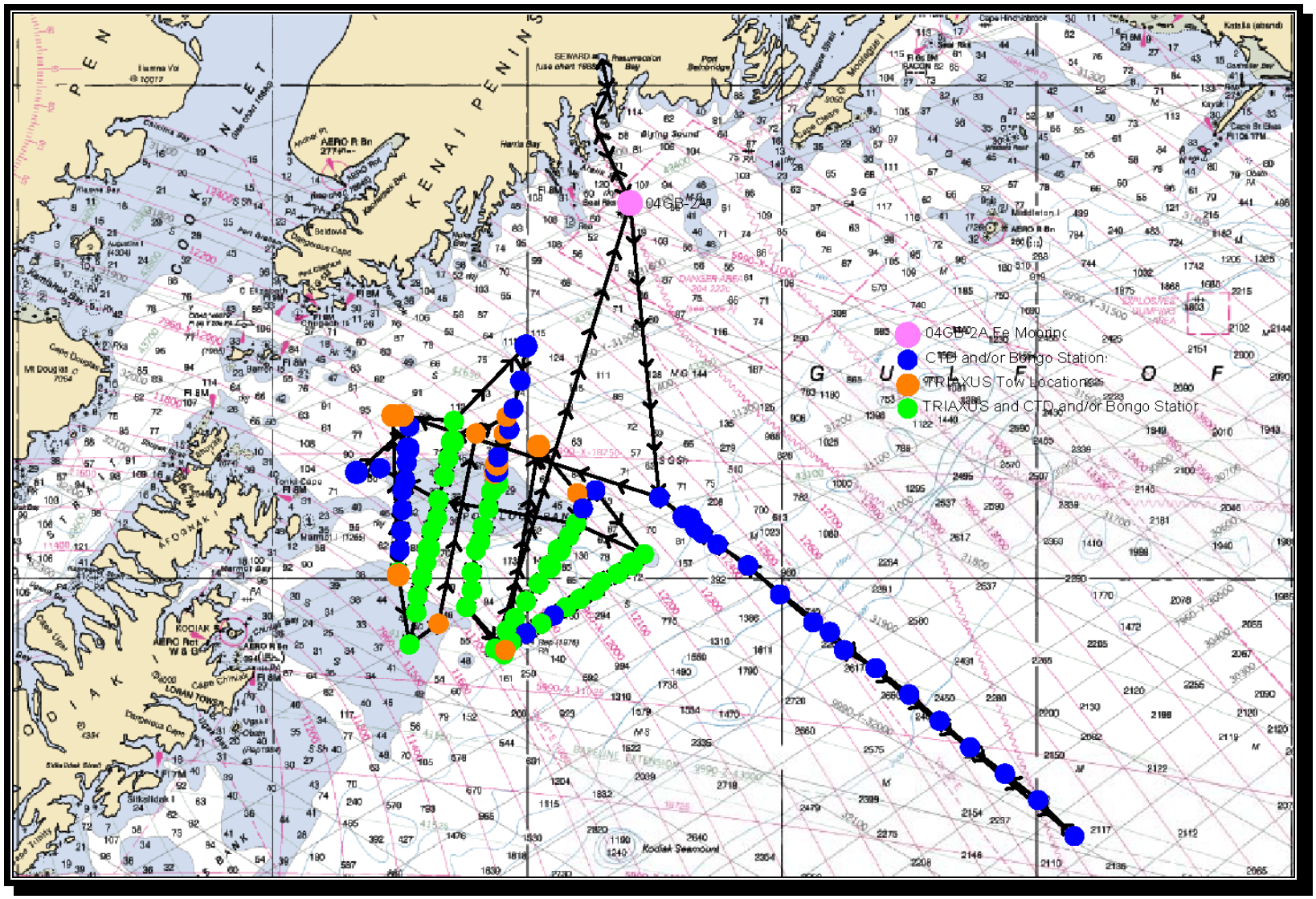
Spill Response 1: Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, or earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. **Do not flush to sewer!** If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. U.S. Regulations (CERCLA) requires reporting spills and releases to soil, water, and air in excess of reportable quantities. The toll free number for the U.S. Coast Guard National Response Center is (800) 424-8802.

Spill Response 2: Ventilate area of leak or spill. Wear appropriate personal protective equipment. Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal. Place material in closed container.

Spill Response 3: Ventilate area of leak or spill. Wear appropriate personal protective equipment. Contain and recover liquid when possible. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer!

Spill Response 4: Ventilate area of leak or spill. Keep unnecessary and unprotected people away from area of spill. Wear appropriate personal protective equipment. Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust. U.S. Regulations (CERCLA) requires reporting spills and releases to soil, water, and air in excess of reportable quantities. The toll free number for the U.S. Coast Guard National Response Center is (800) 424-8802.
Spill Response 5: Ventilate area of leak or spill. Wear appropriate personal protective equipment. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. **Do not flush to sewer!** U.S. Regulations (CERCLA) requires reporting spills and releases to soil, water, and air in excess of reportable quantities. The toll free number for the U.S. Coast Guard National Response Center is (800) 424-8802.
Spill Response 6: Remove all sources of ignition. Ventilate area of leak or spill. Wear appropriate personal protective equipment. Clean up spills in a manner that does not disperse dust into the air. Use non-sparking tools and equipment. Reduce airborne dust and prevent scattering by moistening with water. Pick up spill for recovery or disposal and place in a closed container.
Spill Response 7: Ventilate area of leak or spill. Wear appropriate personal protective equipment. Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust.

8.3 Cruise 2HX04 Chartlet



8.4 Cruise 2HX04 Station Locations

	Station ID	Activity	Latitude	Longitude	Dist. (nm)	Spd (kts)	Transit (hrs)	z (fm)	Water Depth (m)	CTD Depth (m)	CTD Time (min)	Net Time (min)	Arrive Local Date/Time	Depart Local Date/Time
	SEWARD		60° 06.30' N	149° 25.27' W		9	0	80	146	136				07/08/2004 08:00
	04GB-2A Fe-mooring	deploy	59° 32.00' N	149° 10.95' W	35	9	3.9	153	278	268	0	120	07/08/2004 11:53	07/08/2004 13:53
1	04GB-2A	ctd	59° 32.00' N	149° 10.95' W	0	9	0	153	278	268	34		07/08/2004 13:53	07/08/2004 14:27
	ENW1-Last years' eddy position		58° 20.06' N	148° 57.51' W	72.3	9	8		126	116			07/08/2004 22:29	07/08/2004 22:29
	ENW9-Last year's eddy position		57° 49.05' N	147° 44.78' W	49.4	6	8.2		3,429	1,500			07/09/2004 06:43	07/09/2004 06:43
2	ENW17	ctd/ bongo	56° 54.42' N	145° 41.58' W	86	9	9.6		3,892	1,500	86	45	07/09/2004 16:16	07/09/2004 18:27
3	ENW16	ctd	57° 03.88' N	145° 58.99' W	13.4	9	1.5		4,080	1,500	86		07/09/2004 19:56	07/09/2004 21:21
4	ENW15	ctd/ bongo	57° 10.52' N	146° 14.62' W	10.8	9	1.2		3,982	1,500	86	45	07/09/2004 22:33	07/10/2004 00:44
5	ENW14	ctd	57° 17.32' N	146° 31.01' W	11.2	9	1.2		4,174	1,500	86		07/10/2004 01:58	07/10/2004 03:24
6	ENW13	ctd/ bongo	57° 24.14' N	146° 45.20' W	10.3	9	1.1		4,420	1,500	86	45	07/10/2004 04:32	07/10/2004 06:43
7	ENW12	ctd	57° 30.92' N	146° 59.66' W	10.3	9	1.1		4,754	1,500	86		07/10/2004 07:52	07/10/2004 09:17
8	ENW11	ctd/ bongo	57° 37.34' N	147° 14.93' W	10.4	9	1.2		4,843	1,500	86	45	07/10/2004 10:26	07/10/2004 12:37
9	ENW10	ctd	57° 42.09' N	147° 29.95' W	9.3	9	1		4,922	1,500	86		07/10/2004 13:39	07/10/2004 15:05
10	ENW10	ctd/ bongo	57° 42.09' N	147° 29.95' W	0	9	0		4,922	1,500	86	45	07/10/2004 15:05	07/10/2004 17:15
11	ENW9	ctd	57° 49.05' N	147° 44.78' W	10.5	9	1.2		3,429	1,500	86		07/10/2004 18:26	07/10/2004 19:51
12	ENW8	ctd/ bongo	57° 55.88' N	148° 00.22' W	10.7	9	1.2		2,455	1,500	86	45	07/10/2004 21:02	07/10/2004 23:13
13	ENW7	ctd	58° 03.12' N	148° 15.63' W	10.9	9	1.2		1,351	1,341	79		07/11/2004 00:26	07/11/2004 01:45
14	ENW6	ctd/ bongo	58° 08.51' N	148° 29.67' W	9.2	9	1		1,175	1,165	71	45	07/11/2004 02:46	07/11/2004 04:42
15	ENW5	ctd	58° 11.08' N	148° 37.29' W	4.8	9	0.5		848	838	58		07/11/2004 05:14	07/11/2004 06:12
16	ENW4	ctd/ bongo	58° 12.70' N	148° 40.23' W	2.2	9	0.2		546	536	45	45	07/11/2004 06:26	07/11/2004 07:56
17	ENW3	ctd	58° 14.91' N	148° 42.52' W	2.5	9	0.3		351	341	37		07/11/2004 08:13	07/11/2004 08:50
18	ENW2	ctd/ bongo	58° 15.49' N	148° 45.25' W	1.5	9	0.2		166	156	30	45	07/11/2004 09:00	07/11/2004 10:15
19	ENW1	ctd/ bongo	58° 20.06' N	148° 57.51' W	7.9	9	0.9		126	116			07/11/2004 11:08	07/11/2004 11:08
	PBC (west line-n end)	Triaxus	58° 40.50' N	150° 58.00' W	66.2	9	7.4						07/11/2004 18:29	07/11/2004 18:29
	PBC (west line-s end)		58° 01.00' N	151° 00.00' W	39.5	6	6.6						07/12/2004 01:04	07/12/2004 01:04
	to PBBC		58° 40.50' N	151° 03.00' W	39.5	6	6.6						07/12/2004 07:40	07/12/2004 07:40
	PBB12/PBST1	Triaxus	58° 39.00' N	150° 33.80' W	15.3	6	2.5	119	217	207			07/12/2004 10:12	07/12/2004 10:12
	STD2		58° 34.00' N	150° 34.50' W	5	6	0.8	100	182	172			07/12/2004 11:02	07/12/2004 11:02
	STD3		58° 29.70' N	150° 37.00' W	4.5	6	0.7	50	91	81			07/12/2004 11:47	07/12/2004 11:47
	STD4		58° 25.20' N	150° 39.00' W	4.6	6	0.8	38	69	59			07/12/2004 12:34	07/12/2004 12:34
	STD5		58° 19.40' N	150° 41.50' W	5.9	6	1	33	60	50			07/12/2004 13:33	07/12/2004 13:33
	STD6		58° 15.10' N	150° 42.20' W	4.3	6	0.7	37	67	57			07/12/2004 14:16	07/12/2004 14:16

	Station ID	Activity	Latitude	Longitude	Dist. (nm)	Spd (kts)	Transit (hrs)	z (fm)	Water Depth (m)	CTD Depth (m)	CTD Time (min)	Net Time (min)	Arrive Local Date/Time	Depart Local Date/Time
	STD7		58° 12.00' N	150° 44.30' W	3.3	6	0.5	50	91	81			07/12/2004 14:49	07/12/2004 14:49
	STD8		58° 07.60' N	150° 46.00' W	4.5	6	0.7	74	135	125			07/12/2004 15:34	07/12/2004 15:34
	STD9		58° 04.00' N	150° 47.30' W	3.7	6	0.6	93	169	159			07/12/2004 16:11	07/12/2004 16:11
	STD10		58° 00.00' N	150° 49.30' W	4.1	6	0.7	77	140	130			07/12/2004 16:52	07/12/2004 16:52
	STD11		57° 55.50' N	150° 51.00' W	4.6	6	0.8	50	91	81			07/12/2004 17:38	07/12/2004 17:38
	STD12		57° 51.50' N	150° 52.00' W	4	6	0.7	44	80	70			07/12/2004 18:18	07/12/2004 18:18
	STD13		43.50' N	150° 55.00' W	8.2	6	1.4	44	80	70				07/12/2004 19:40
	PBBA(n)		57° 48.50' N	150° 41.20' W	8.9	6	1.5						07/12/2004 21:09	07/12/2004 21:09
	PBBA(s)		58° 36.00' N	150° 23.40' W	48.4	6	8.1						07/13/2004 05:13	07/13/2004 05:13
	PBA1		58° 39.91' N	150° 09.34' W	8.3	6	1.4		133	123			07/13/2004 06:36	07/13/2004 06:36
	PBA2		58° 36.03' N	150° 10.58' W	3.9	6	0.7		112	102			07/13/2004 07:15	07/13/2004 07:15
	PBA3		58° 28.58' N	150° 13.81' W	7.6	6	1.3		87	77			07/13/2004 08:32	07/13/2004 08:32
	PBA3.5		58° 25.91' N	150° 15.26' W	2.8	6	0.5		75	65			07/13/2004 09:00	07/13/2004 09:00
	PBA4		58° 23.76' N	150° 14.07' W	2.2	6	0.4		66	56			07/13/2004 09:22	07/13/2004 09:22
	PBA5		58° 21.52' N	150° 16.40' W	2.6	6	0.4		52	42			07/13/2004 09:47	07/13/2004 09:47
	PBA6		58° 17.43' N	150° 17.95' W	4.2	6	0.7		57	47			07/13/2004 10:29	07/13/2004 10:29
	PBA7		58° 12.98' N	150° 20.12' W	4.6	6	0.8		86	76			07/13/2004 11:15	07/13/2004 11:15
	PBA8		58° 09.22' N	150° 21.80' W	3.9	6	0.6		154	144			07/13/2004 11:54	07/13/2004 11:54
	PBA9		58° 07.01' N	150° 23.46' W	2.4	6	0.4		193	183			07/13/2004 12:17	07/13/2004 12:17
	PBA10		58° 01.44' N	150° 25.78' W	5.7	6	1		176	166			07/13/2004 13:14	07/13/2004 13:14
	PBA11		57° 56.87' N	150° 25.83' W	4.6	6	0.8		157	147			07/13/2004 14:00	07/13/2004 14:00
	PBA12		57° 52.75' N	150° 27.96' W	4.3	6	0.7		112	102			07/13/2004 14:43	07/13/2004 14:43
	PBAE(s)		57° 42.00' N	150° 10.00' W	14.4	6	2.4						07/13/2004 17:07	07/13/2004 17:07
	PBAE(n)		58° 33.00' N	149° 54.00' W	51.7	6	8.6						07/14/2004 01:44	07/14/2004 01:44
	STB0		58° 21.30' N	149° 36.00' W	15	6	2.5						07/14/2004 04:14	07/14/2004 04:14
	STB1		58° 13.50' N	149° 36.30' W	7.8	6	1.3		38	40			07/14/2004 05:32	07/14/2004 05:32
	STB2		58° 10.40' N	149° 40.00' W	3.7	6	0.6		38	50			07/14/2004 06:09	07/14/2004 06:09
	STB3		58° 07.20' N	149° 44.30' W	3.9	6	0.7		80	100			07/14/2004 06:48	07/14/2004 06:48
	STB4		58° 03.10' N	149° 49.00' W	4.8	6	0.8		80	1,220			07/14/2004 07:36	07/14/2004 07:36
	STB5		57° 58.80' N	149° 54.40' W	5.2	6	0.9		65	130			07/14/2004 08:28	07/14/2004 08:28
	STB6		57° 54.20' N	150° 00.00' W	5.5	6	0.9		65	130			07/14/2004 09:22	07/14/2004 09:22
	STB7		57° 50.00' N	150° 05.10' W	5	6	0.8		65	118			07/14/2004 10:12	07/14/2004 10:12
	STB8		57° 46.80' N	150° 09.30' W	3.9	6	0.7		70	100			07/14/2004 10:51	07/14/2004 10:51
	STB9/STA1		57° 41.10' N	150° 10.60' W	5.7	6	1		80	70			07/14/2004 11:49	07/14/2004 11:49
	STA2		57° 44.20' N	150° 07.00' W	3.6	6	0.6			100			07/14/2004 12:25	07/14/2004 12:25
			57° 48.50' N	149° 52.80' W	8.7	6	1.5			145			07/14/2004 13:52	07/14/2004 13:52

	Station ID	Activity	Latitude	Longitude	Dist. (nm)	Spd (kts)	Transit (hrs)	z (fm)	Water Depth (m)	Depth (m)	CTD Time (min)	Net Time (min)	Arrive Local Date/Time	Depart Local Date/Time
	STA4		57° 52.70' N	149° 41.00' W	7.6	6	1.3			100			07/14/2004 15:08	07/14/2004 15:08
	STA5		57° 55.00' N	149° 34.70' W	4.1	6	0.7			65			07/14/2004 15:48	07/14/2004 15:48
	STA6		57° 57.00' N	149° 28.20' W	4	6	0.7			200			07/14/2004 16:28	07/14/2004 16:28
	STA7		57° 59.00' N	149° 25.00' W	2.6	6	0.4			300			07/14/2004 16:55	07/14/2004 16:55
	STA8		58° 01.30' N	149° 17.20' W	4.7	6	0.8			100			07/14/2004 17:42	07/14/2004 17:42
			03.80' N	149° 10.20' W	4.5	6	0.7							07/14/2004 18:27
20	STA10/SAB1	ctd	58° 06.00' N	149° 04.30' W	3.8	6	0.6	75	137	132	29	26	07/14/2004 19:05	07/14/2004 20:00
21	STB1	ctd	58° 13.50' N	149° 36.30' W	18.5	6	3.1	40	73	68	25	26	07/14/2004 23:04	07/14/2004 23:55
22	PBA6	ctd	58° 17.43' N	150° 17.95' W	22.3	6	3.7		57	47	23	26	07/15/2004 03:37	07/15/2004 04:26
23	STD5	ctd/bongo	58° 19.40' N	150° 41.50' W	12.5	6	2.09	33	60	50	23.3	26	07/15/2004 06:32	07/15/2004 07:21
24	AP4	ctd	58° 27.34' N	151° 08.51' W	16.2	6	2.7	37	67	62	24	26	07/15/2004 10:03	07/15/2004 10:54
25	AP3	ctd	58° 26.54' N	151° 20.20' W	6.2	6	1	35	64	59	24	26	07/15/2004 11:55	07/15/2004 12:45
26	PBC1	ctd	58° 37.60' N	150° 55.00' W	17.2	9	1.9	100	182		20	26	07/15/2004 14:40	07/15/2004 15:26
27	PBC2	ctd	58° 32.30' N	150° 56.00' W	5.3	9	0.6	78	142	137	29	26	07/15/2004 16:01	07/15/2004 16:56
28	PBC3	ctd	58° 28.70' N	150° 56.50' W	3.6	9	0.4	42	76	71	25	26	07/15/2004 17:20	07/15/2004 18:11
29	PBC4	ctd	58° 24.40' N	150° 57.20' W	4.3	9	0.5	36	66	61	24	26	07/15/2004 18:40	07/15/2004 19:30
30	PBC5	ctd	58° 21.80' N	150° 58.00' W	2.6	9	0.3	30	55	50	23	26	07/15/2004 19:48	07/15/2004 20:37
31	PBC6	ctd	58° 17.10' N	150° 58.20' W	4.7	9	0.5	50	91	86	26	26	07/15/2004 21:08	07/15/2004 22:00
32	PBC7	ctd	58° 12.00' N	150° 59.00' W	5.1	9	0.6	83	151	146	30	26	07/15/2004 22:34	07/15/2004 23:30
33	PBC8	ctd	58° 07.00' N	150° 59.80' W	5	9	0.6	54	98	93	26	26	07/16/2004 00:03	07/16/2004 00:55
34	PBC9	ctd	58° 01.50' N	151° 00.00' W	5.5	9	0.6	45	82		25	26	07/16/2004 01:32	07/16/2004 02:23
35	STD13	ctd/bongo	57° 43.50' N	150° 55.00' W	18.2	9	2.02	44	80	70	24.7	26	07/16/2004 04:25	07/16/2004 05:15
36	STD12	ctd	57° 51.50' N	150° 52.00' W	8.2	9	0.91	44	80	70	24.7		07/16/2004 06:10	07/16/2004 06:34
37	STD11	ctd/bongo	57° 55.50' N	150° 51.00' W	4	9	0.45	50	91	81	25.4	26	07/16/2004 07:01	07/16/2004 07:53
38	STD10	ctd	58° 00.00' N	150° 49.30' W	4.6	9	0.51	77	140	130	28.7		07/16/2004 08:23	07/16/2004 08:52
39	STD9	ctd/bongo	58° 04.00' N	150° 47.30' W	4.1	9	0.46	93	169	159	30.6	26	07/16/2004 09:19	07/16/2004 10:16
40	STD8	ctd	58° 07.60' N	150° 46.00' W	3.7	9	0.41	74	135	125	28.3		07/16/2004 10:40	07/16/2004 11:09
41	STD7	ctd/bongo	58° 12.00' N	150° 44.30' W	4.5	9	0.5	50	91	81	25.4	26	07/16/2004 11:39	07/16/2004 12:30
42	STD6	ctd	58° 15.10' N	150° 42.20' W	3.3	9	0.37	37	67	57	23.8		07/16/2004 12:52	07/16/2004 13:16
43	STD5	ctd/bongo	58° 19.40' N	150° 41.50' W	4.3	9	0.48	33	60	50	23.3	26	07/16/2004 13:45	07/16/2004 14:34
44	STD4	ctd	58° 25.20' N	150° 39.00' W	5.9	9	0.66	38	69	59	23.9		07/16/2004 15:14	07/16/2004 15:38
45	STD3	ctd/bongo	58° 29.70' N	150° 37.00' W	4.6	9	0.51	50	91	81	25.4	26	07/16/2004 16:08	07/16/2004 17:00
46	STD2	ctd	58° 34.00' N	150° 34.50' W	4.5	9	0.5	100	182	172	31.5		07/16/2004 17:30	07/16/2004 18:01
47	PBB12/PBST1	ctd/bongo	58° 39.00' N	150° 33.80' W	5	9	0.6	119	217	207	31	20	07/16/2004 18:35	07/16/2004 19:26
48	PBA00	ctd/bongo	58° 57.50' N	150° 00.00' W	25.5	9	2.83	115	209	199	33.3		07/16/2004 22:15	07/16/2004 22:49
49	PBA0	ctd	58° 48.89' N	150° 03.00' W	8.7	9	0.97	90	164	154	30.3		07/16/2004 23:47	07/17/2004 00:17

	Station ID	Activity	Latitude	Longitude	Dist. (nm)	Spd (kts)	Transit (hrs)	z (fm)	Water Depth (m)	CTD Depth (m)	CTD Time (min)	Net Time (min)	Arrive Local Date/Time	Depart Local Date/Time
50	PBA1	ctd/bongo	58° 42.00' N	150° 06.00' W	7.1	9	0.78		133	123	28	26	07/17/2004 01:04	07/17/2004 01:59
51	PBA2	ctd	58° 37.00' N	150° 08.00' W	5.1	9	0.6		112	102	27		07/17/2004 02:33	07/17/2004 02:59
52	PBA3	ctd/bongo	58° 30.00' N	150° 13.00' W	7.5	9	0.8		87	77	25	26	07/17/2004 03:49	07/17/2004 04:40
53	PBA3.5	ctd	58° 26.88' N	150° 13.50' W	3.1	9	0.3		75	65	24		07/17/2004 05:01	07/17/2004 05:26
54	PBA4	ctd/bongo	58° 23.75' N	150° 14.00' W	3.1	9	0.3		66	56	24	26	07/17/2004 05:46	07/17/2004 06:36
55	PBA5	ctd	58° 21.52' N	150° 16.40' W	2.6	9	0.3		52	42	23		07/17/2004 06:53	07/17/2004 07:16
56	PBA6	ctd/bongo	58° 17.43' N	150° 17.95' W	4.2	9	0.5		57	47	23	26	07/17/2004 07:44	07/17/2004 08:33
57	PBA7	ctd	58° 12.98' N	150° 20.12' W	4.6	9	0.5		86	76	25		07/17/2004 09:04	07/17/2004 09:29
58	PBA8	ctd/bongo	58° 09.22' N	150° 21.80' W	3.9	9	0.4		154	144	30	26	07/17/2004 09:54	07/17/2004 10:50
59	PBA9	ctd	58° 07.01' N	150° 23.46' W	2.4	9	0.3		193	183	32		07/17/2004 11:06	07/17/2004 11:38
60	PBA10	ctd/bongo	58° 01.44' N	150° 25.78' W	5.7	9	0.6		176	166	31	26	07/17/2004 12:16	07/17/2004 13:13
61	PBA11	ctd	57° 56.87' N	150° 25.83' W	4.6	9	0.5		157	147	30		07/17/2004 13:44	07/17/2004 14:13
62	PBA12	ctd/bongo	57° 52.75' N	150° 27.96' W	4.3	9	0.5		112	102	27	26	07/17/2004 14:42	07/17/2004 15:35
63	STB9/STA1	ctd/bongo	57° 41.10' N	150° 10.60' W	14.9	9	1.7		80	70	24.7	26	07/17/2004 17:14	07/17/2004 18:04
64	STB8	ctd	57° 46.80' N	150° 09.30' W	5.7	9	0.6		70	60	24		07/17/2004 18:43	07/17/2004 19:07
65	STB7	ctd/bongo	57° 50.00' N	150° 05.10' W	3.9	9	0.4		65	55	23.7	26	07/17/2004 19:33	07/17/2004 20:22
66	STB6	ctd	57° 54.20' N	150° 00.00' W	5	9	0.6		65	55	23.7		07/17/2004 20:56	07/17/2004 21:19
67	STB5	ctd/bongo	57° 58.80' N	149° 54.40' W	5.5	9	0.6		65	55	23.7	26	07/17/2004 21:56	07/17/2004 22:46
68	STB4	ctd	58° 03.10' N	149° 49.00' W	5.2	9	0.6		80	70	24.7		07/17/2004 23:20	07/17/2004 23:45
69	STB3	ctd/bongo	58° 07.20' N	149° 44.30' W	4.8	9	0.5		80	70	24.7	26	07/18/2004 00:17	07/18/2004 01:07
70	STB2	ctd	58° 10.40' N	149° 40.00' W	3.9	9	0.4		38	28	21.9		07/18/2004 01:34	07/18/2004 01:55
71	STB1	ctd/bongo	58° 13.50' N	149° 36.30' W	3.7	9	0.4		38	28	21.9	26	07/18/2004 02:20	07/18/2004 03:08
72	STB0	ctd	58° 17.50' N	149° 33.00' W	4.4	9	0.5	50	91	81	25.4		07/18/2004 03:37	07/18/2004 04:02
73	STB00	ctd/bongo	58° 22.00' N	149° 27.50' W	5.3	9	0.6	75	137	127	28.4	26	07/18/2004 04:38	07/18/2004 05:32
74	STA10/SAB1	ctd	58° 06.00' N	149° 04.30' W	20.1	9	2.2	80	146	136	29	0	07/18/2004 07:46	07/18/2004 08:15
75	STA9	ctd	58° 03.80' N	149° 10.20' W	3.8	9	0.4	80	146	136	29	0	07/18/2004 08:41	07/18/2004 09:10
76	STA8	ctd	58° 01.30' N	149° 17.20' W	4.5	9	0.5	80	146	136	29	0	07/18/2004 09:40	07/18/2004 10:09
77	STA7	ctd	57° 59.00' N	149° 25.00' W	4.7	9	0.5	80	146	136	29	0	07/18/2004 10:40	07/18/2004 11:09
78	STA6	ctd	57° 57.00' N	149° 28.20' W	2.6	9	0.3	80	146	136	29	0	07/18/2004 11:27	07/18/2004 11:56
79	STA5	ctd	57° 55.00' N	149° 34.70' W	4	9	0.4	80	146	136	29	0	07/18/2004 12:22	07/18/2004 12:52
80	STA4	ctd	57° 52.70' N	149° 41.00' W	4.1	9	0.5	80	146	136	29	0	07/18/2004 13:19	07/18/2004 13:48
81	STA3a	ctd	57° 50.60' N	149° 46.90' W	3.8	9	0.4	80	146	136	29	0	07/18/2004 14:13	07/18/2004 14:42
82	STA3	ctd	57° 48.50' N	149° 52.80' W	3.8	9	0.4	80	146	136	29	0	07/18/2004 15:07	07/18/2004 15:36
83	STA2a	ctd	57° 46.30' N	149° 59.90' W	4.4	9	0.5	80	146	136	29	0	07/18/2004 16:05	07/18/2004 16:34
84	STA2	ctd	57° 44.20' N	150° 07.00' W	4.3	9	0.5	80	146	136	29	0	07/18/2004 17:03	07/18/2004 17:32
85	STB9/STA1	ctd	57° 42.29' N	150° 14.34' W	4.4	9	0.5	80	146	136	29	0	07/18/2004 18:01	07/18/2004 18:30

	Station ID	Activity	Latitude			Longitude			Dist. (nm)	Spd (kts)	Transit (hrs)	z (fm)	Water Depth (m)	CTD Depth (m)	CTD Time (min)	Net Time (min)	Arrive Local Date/Time	Depart Local Date/Time
	04GB-2A Fe-mooring	recover	59°	32.00'	N	149°	10.95'	W	114.6	9	12.7	153	278	268	0	120	07/19/2004 07:14	07/19/2004 09:14
	04GB-2A	ctd	59°	32.00'	N	149°	10.95'	W	0	9	0	153	278	268	34		07/19/2004 09:14	07/19/2004 09:48
	SEWARD		60°	06.30'	N	149°	25.27'	W	35	9	3.9	80	146	136			07/19/2004 13:41	