FINAL CRUISE INSTRUCTIONS
FOCI

R/V *MAURICE EWING*, Cruise EW0409
September 28 – October 16, 2004
Chief Scientist Leg 1 – Nancy B. Kachel, NOAA
Co-Chief Scientist Leg 2 – William J. Floering, NOAA

1.0 DRAFT CRUISE INSTRUCTIONS

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

1.2 Cruise Numbers

1.2.1 Cruise Number – EW0409

1.2.2 FOCI Number – 1EW04

1.3 Cruise Dates

1.3.1 Departure – Leg 1 – Depart Kodiak, Alaska, at 0900 ADT on Tuesday, September 28, 2004.

1.3.2 Touch-and-Go – Leg 2 – We request that the ship arrive in the vicinity of Larsen's Bay, Kodiak Island, Alaska, on Tuesday, October 5, 2004, to embark three scientific personnel via small boat operation. See Section 8.6 Cruise EW0409 – Larsen's Bay, Kodiak, Alaska (NOAA Charts 16580 and 16599) for details.

1.3.3 Touch-and-Go – Disembark scientists in Seward, Alaska, on Friday, October 10, 2004.

1.3.4 Arrival – Arrive Newport, Oregon, on Saturday, October 16, 2004.

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. The cruise will be in the Gulf of Alaska. There are

two objectives on this cruise: first, to sample (CTD, Bongos, and nutrients) two deep eddies at the slope and, second, to recover and deploy moorings in the Gulf of Alaska with CTD sampling at and near the mooring locations. This cruise is in support of the United States Global Ocean Ecosystems Dynamics (U.S. GLOBEC) and the Steller Sea Lion Research Programs, and PMEL/FOCI base.

We will focus our hydrographic efforts on the physical, chemical, and biological processes occurring in the eddies that impact this region and contribute to onshore and offshore fluxes of nutrients, as well as larval fish and zooplankton (see Section 8.2 Sea Surface Altimetry). This will involve casts with a CTD 911*plus* profiler equipped with a fluorometer and PAR sensors, and a rosette with 5-liter (or 2.5-liter) Niskin bottles, from which we will take samples for salinity calibrations, chlorophyll, and nutrient analyses. At approximately half of the CTD stations in the eddy we will also make by Marine Assessment Monitoring and Prediction (MARMAP) Bongo tows, so that we can sample for zooplankton and larval fish.

We plan to occupy hydrographic station across two eddies that are located off the shelf, one east of Kodiak Island, the other to the south of the western part of the island. The positions of these eddies shown in Section 8.2 Sea Surface Altimetry are from June 28, 2004, and will change before this cruise. Therefore, the positions of the stations shown in the figures, and in the itinerary, are for planning purposes only. We will use both altimetry and the positions of satellite-tracked drifters to ascertain the centers of these eddies at the time of the cruise.

After the hydrographic surveys the two eddies, we plan to go to Larsen's Bay, a part of Uyak Bay near the west end of the north side of Kodiak Island on Tuesday, October 5, 2004, to embark the mooring technicians. See Section 8.6 Cruise EW0409 – Larsen's Bay, Kodiak, Alaska (NOAA Charts 16580 and 16599) for details.

After that, we will recover eight or nine moorings and deploy three subsurface moorings. Three of the moorings are in Shelikof Strait, another three moorings are off Gore Point, south of the Kenai Peninsula and two or three other moorings are at GB3, south of Seward, Alaska. The first three mooring sites are those across Shelikof Strait. These are the sites of both recoveries and deployments. One of the moorings to be recovered south of Seward, Alaska, (04GBM-3A) has a surface toroid, so that recovery will involve the small boat to assist with the recovery. Another mooring has an instrument to measure iron.

Approximately two Advanced Research and Global Observation Satellite (ARGOS) satellite-tracked drifters will be deployed during the cruise.

We plan on arriving in Seward, Alaska, on Sunday, October 10, 2004, to disembark all the scientists, in a touch-and-go operation. The ship will then transit to Newport, Oregon, where we will meet the vessel to offload our gear.

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

2.3.1.1 Chief Scientist – Leg 1

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

2.3.1.2 Co-Chief Scientist – Leg 2

Name	Gender	Affiliation	E-mail Address
William J. Floering (206) 526-6480	Male	PMEL	William.Floering@noaa.gov

2.3.2 Participating Scientists

2.3.2.1 Participating Scientists – Leg 1

Name	Gender	Affiliation	E-mail Address
Dr. Nancy B. Kachel	Female	PMEL	Nancy.Kachel@noaa.gov
Sigrid A. Salo	Female	PMEL	Sigrid.A.Salo@noaa.gov
Peter Proctor	Male	PMEL	Peter.Proctor@noaa.gov
Peggy Sullivan	Female	PMEL	Peggy.Sullivan@noaa.gov
Dylan Righi	Male	PMEL	Dylan.Righi@noaa.gov

2.3.2.2 Additional Scientists – Leg 2, Joining at Larsen's Bay, Alaska

Name	Gender	Affiliation	E-mail Address
William J. Floering	Male	PMEL	William.Floering@noaa.gov
Carol L. DeWitt	Female	PMEL	Carol.Dewitt@noaa.gov
Earl Roskie	Male	PMEL	Earl.Roskie@noaa.gov

2.4 Administrative

2.4.1 Ship Operations

Lamont-Doherty Earth Observatory of Columbia University
Office of Marine Affairs
P.O. Box 1000
61 Route 9W
Palisades, New York, 10964-8000
Fax: (845) 359-6817

John Diebold
Marine Science Coordinator
Telephone: (845) 365-8367
E-mail: marscico@ldeo.columbia.edu

Paul Ljunggren
Marine Superintendent
Telephone: (845) 365-8845
E-mail: marsupt@ldeo.columbia.edu

2.4.2 Scientific Operations

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

Dr. Jeffrey M. Napp, NOAA/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** – 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 **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.

3.2.1 **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, it is requested that we receive a copy of the data at the end of the cruise. 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.

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. The ship's computer manager 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.

3.2.2 **Marine Observation Abstract (MOA)** – If the navigational data for stations are not recorded on the ship’s data logger, it is requested that the ship maintain a MOA form during the cruise. The critical information to be recorded at each station is:

- Coordinated Universal Time (UTC) date,
- UTC time,
- Position,
- Station number,
- Gear type, and
- Bottom depth.

3.3 **Staging Plan** – Loading of scientific equipment is planned to occur in Kodiak, Alaska, on Monday, September 27, 2004. A representative from NOAA will direct the loading and will be responsible for arranging vehicles and for moving their equipment from the airport and/or docks to the ship. See Section 8.1 Cruise EW0409 Equipment Inventory – Not Final for a tentative equipment list.

3.4 **De-staging Plan** – Equipment will be off-loaded in Astoria, Oregon, at the end of the cruise, on Saturday, October 16, 2004, in coordination with the ships' operations officer. The scientific party will be responsible for arranging vehicles for moving their equipment.

3.5 **Cruise Plan** — The following operations are planned:

1) We will begin CTD operations across the eddy located east of Kodiak, Alaska. The position of eddies can be tracked via satellite altimetry data. Altimetry results from Altimetry Research in Ocean Circulation (TOPEX POSEIDON) conducted jointly by the National Aeronautics and Space Administration (NASA) and the French agency Centre Nationale d'Études Spatiales (CNES) will be used to locate the position of this eddy. There is also the possibility that one of the satellite–tracked drifters we deployed in the center of the eddy studied in May will help to locate the eddy's center, since it is still broadcasting from that position. At each station, water samples will be taken for salinity calibrations, nutrients, and chlorophyll. See Section 8.2 Cruise EW0409 Itinerary for station locations and tentative itinerary and Section 8.5 Cruise EW0409 Chartlet for a chart of the cruise trackline.

2) We will then occupy CTD stations across the eddy located south of Kodiak, Alaska.

3) On Tuesday, October 5, 2004, we will transit to Larsen's Bay, a part of Uyak Bay, Kodiak Island. There we plan a small boat operation to embark three mooring technicians on Wednesday, October 6, 2004.

4) We will proceed to the line of three moorings across the southwest end of Shelikof Strait. If time permits, we will occupy a line of CTD stations across that line. Then we plan to retrieve and re-deploy three sets of moorings. See Section 8.5 Cruise EW0409 Chartlet for a chart also displaying the various mooring sites.

5) We plan to proceed to the Gore Point Line to recover three more moorings the next day. Following the mooring recoveries, we will occupy a line of CTD stations along the line at Gore Point.

6) We will then proceed to the site 04GBM-3A to pickup a surface toroid. This will involve another small boat operation. We will also pick up at least one subsurface mooring with an iron meter. We may pick up a third mooring with an Acoustic Doppler Current Profiler (ADCP).

7) We plan to then come into Seward, Alaska, for a touch-and-go operation to disembark all of the scientists.

8) Afterwards, the ship will then proceed to Astoria, Oregon, arriving Saturday, October 16, 2004, where we plan to offload our equipment.

3.6 **Sampling Strategy** – CTD/PAR/Fluorescence profiler casts will be done throughout the cruise. The Uncontaminated Scientific Seawater System (USSW) with thermosalinograph and with a fluorometer will be used throughout the entire cruise.

Salinity, nutrient, and chlorophyll samples will be taken at up to 12 depths at most CTD stations. Nutrients samples need to be frozen in a -20° Celsius chest freezer.

Chlorophyll samples will be filtered and the filters stored in a freezer at -20° Celsius. The combined space needed in the -20°C freezer is approximately 8 cubic feet.

If possible, it is best to flash freeze the nutrient samples in a -80° Celsius freezer, then move them to the -20° Celsius chest freezer. Approximately 2 cubic feet would be necessary in this freezer.

Hopefully, two ARGOS satellite-tracked drifter buoys will be deployed, primarily during the latter part of the cruise.

3.7 **Station Locations** – See Section 8.2 Cruise EW0409 Itinerary for station locations and tentative itinerary and Section 8.5 Cruise EW0409 Chartlet for a chart of the cruise trackline.

3.8 **Station Operation Procedures** – The following are the standard operation procedures at PMEL for the conduct of proposed operations on this cruise:

3.8.1 **CTD/Water Sample Operations** – A Sea-Bird Electronics' SBE 911*plus* Conductivity, Temperature, and Depth (CTD) profiler with dual temperature and conductivity sensors will be the primary system. The primary 911*plus* CTD system is requested to be provided by the vessel. If the ship is unable to provide a PAR sensor and fluorometer, then FOCI will provide the fluorometer and PAR light meter to be mounted on the CTD stand for all casts. However, these instruments cannot exceed the following depths:

- WETLabs' WETStar fluorometer cannot exceed 600 meters, and
- Biospherical Instruments' QSP-200L4S light meter cannot exceed 1,000 meters.

Samples will be collected using the PMEL's 5-liter 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 should then be started. The CTD should descend at a rate of 30 meters per minute for the first 200 meters and 45-50 meters per minute below that. The ascent rate should be 50 meters per minute. An entry in the Marine Observation Abstract (MOA) 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.

3.8.1.1 **CTD Calibration** – Salinity samples will be taken on every other cast, or as specified by the Chief Scientist. The CTD systems will be equipped with dual temperature and conductivity sensors. Salinity samples will be returned to Seattle for analysis.

3.8.2 **MARMAP Bongo Tows** – A 60-cm aluminum bongo frame with 0.505-mm mesh nets, or 0.333-mm before mid-May, 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. If a non-conducting wire is being used, a net-minder will be lowered over the side to record the depth of the bongos. The nets will be deployed at a constant wire speed of 40-45 meters per minute to a maximum depth of 100 meters, 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 to provide real-time tow data.

After the bridge gives permission, ship's personnel and one or two scientists will deploy the bongo array. A scientist will monitor the depth of the Bongo nets using SeaCat software (or net-minding 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 net-minder, 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 out, 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.) If the net minder is used, the scientists will then download the SeaCat data recorded during the cast.

3.8.3 **Chlorophyll/Nutrient Sampling Operations** – Chlorophyll samples will be collected simultaneously with Conductivity, Temperature, and Depth (CTD) profiler casts from the 10-liter Niskin bottles. The scientists will be responsible for collection, filtration, and preservation 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.

It is desirable to flash-freeze nutrient samples in a -80° Celsius freezer, if available. The -20° Celsius freezer is required for sample storage of the chlorophyll filters, and frozen nutrient samples.

3.8.4 **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.

3.9 **Underway Operations** – Underway operations that will be performed during this cruise include thermosalinograph, fluorometer, nitrate meter, bathymetry, meteorological data, and a log of operations.

3.10 **Data Logging** – The ship's data logger, shall operate throughout the cruise, acquiring, and logging data from navigation, meteorological, oceanographic, and bathymetric sensors. If a method for observing data acquisition is available, please provide project scientists with the capability of monitoring sensor acquisition via text and graphic displays. A data processing node should be made available to project scientists throughout the cruise for the above-mentioned purpose.

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 project representative at the end of the cruise. Additional recording of processed data may be requested of the ship's computer manager. The ship's computer manager 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.

3.11 **Seachest and Uncontaminated Seawater** – Sea surface temperature, conductivity, and fluorometry 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 seachest and conductivity cells. The scientists will be responsible for regularly cleaning the cuvette, inside the fluorometer, and obtaining and processing the calibration samples. Calibration samples will be taken periodically, throughout the cruise

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, checking the logger status display 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 (seachest) Temperature,
- Seawater (seachest) Salinity, and
- Laboratory Fluorometer Voltage

3.12 Small Boat Operations – The small boat is needed to tag one surface mooring during recovery operations. Additionally, the small boat will be required for transferring scientific personnel in Larsen's Bay (See Section 8.6 Cruise EW0409 – Larsen's Bay, Kodiak, Alaska (NOAA Charts 16580 and 16599) for details) and, perhaps, in Seward, Alaska.

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,
- Winch with minimum of 4,000 meters of 9/16" wire,
- A-Frame,
- Shipboard ADCP,
- Ability to connect a PAR and Fluorometer, provided by the ship, or by PMEL, to the CTD,
- 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, 12-bottle rosette, stand, deck unit, and weights,
- Refrigerator and freezer space for storage of biological and chemical samples, +4° C (4-cu ft) for nutrients and -20°C (~12-16-cu ft) for chlorophyll samples and frozen nutrients, respectively, plus a –80°C freezer, if possible,
- For meteorological observations: Anemometers, calibrated air thermometer (wet-and dry-bulb) 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 and recovered mooring equipment at CTD and Bongo stations,
- Adequate deck lighting for night-time operations,
- Navigational equipment including GPS and radar,
- Depth sounder good to at least 3,000 meters,

- Safety harnesses for working on quarterdeck and fantail,
- Ship's crane(s) used for loading and/or deploying,
- (2) Hand-held radios for scientific/winch/bridge communications,
- VHF radio with external antenna at CTD computer station,
- Thermosalinograph and fluorometer interfaced with the data logger,
- Continuous uncontaminated seawater sampling system with debubbler piped from bow into labs,
- Barnstead NANOpure Diamond Analytical System (18MOhm) Projected use (2 liters/day), or de-ionized water source, and
- Capability to transfer ship's data to Iomega Zip disks or CD-ROM.

4.2 Equipment and Capabilities Provided by Scientists – See Section 8.1 Cruise EW0409 Equipment Inventory for weights.

- (2) Sea-Bird Electronics' SBE-19 SEACAT systems,
- Photosynthetically Active Radiation (PAR) and Fluorometer to be mounted on CTD,
- CTD carousel sampler,
- (12) 5-liter sample bottles,
- Lanyard material and nicropress sleeves,
- 100 salinity sample bottles,
- Fluorometer (spare) to be mounted to the Uncontaminated Scientific Seawater System (USSS),
- Debubbler for the fluorometer,
- 60-cm MARMAP Bongo sampling arrays,
- 20-cm MARMAP Bongo arrays,
- Spare wire angle indicator,
- 3 Subsurface moorings,
- Benthos acoustic release deck-set and transducer,
- EdgeTech 8011-A acoustic release deck-set and transducer,
- Approximately 3 railroad wheel sets to be used as anchors,
- Chain, wire rope, rope, assorted hardware for moorings,
- 2 ARGOS satellite tracked drifter buoys,
- (2) Hand held grapple hooks,
- Iridium phone,
- (2) Hand-held radios for scientific/winch/bridge communications,
- Miscellaneous scientific sampling and processing equipment,
- Cruise Operations Database (COD) and forms,
- Marine Observation Abstract (MOA) log,
- PMEL CTD Weather Observation Logs, and
- CTD Cast Information/Rosette Log.

5.0 DISPOSITION OF DATA AND REPORTS

5.1 **Ship Provided Data Products** – 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,
- Files from data logger,
- Marine Operations Abstracts (MOA), and
- PMEL CTD Weather Observation Logs.

5.2 **Scientific Party Provided Data Products** – The following data products will be completed by the scientific party:

- CTD Cast Information/Rosette Log,
- 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** – See Section 8.3 Cruise EW0409 HAZMAT Inventory.

6.6 **Material Data Safety Sheets (MSDS)** – Submitted separately as electronic attachments.

7.0 MISCELLANEOUS

7.1 **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.

7.2 **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.

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

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 *MAURICE EWING*

INMARSAT

- 011-872-150-0231 (voice)
- 011-872-150-0231 (fax)

7.5.4 Lamont-Doherty Earth Observatory of Columbia University:

Office of Marine Affairs

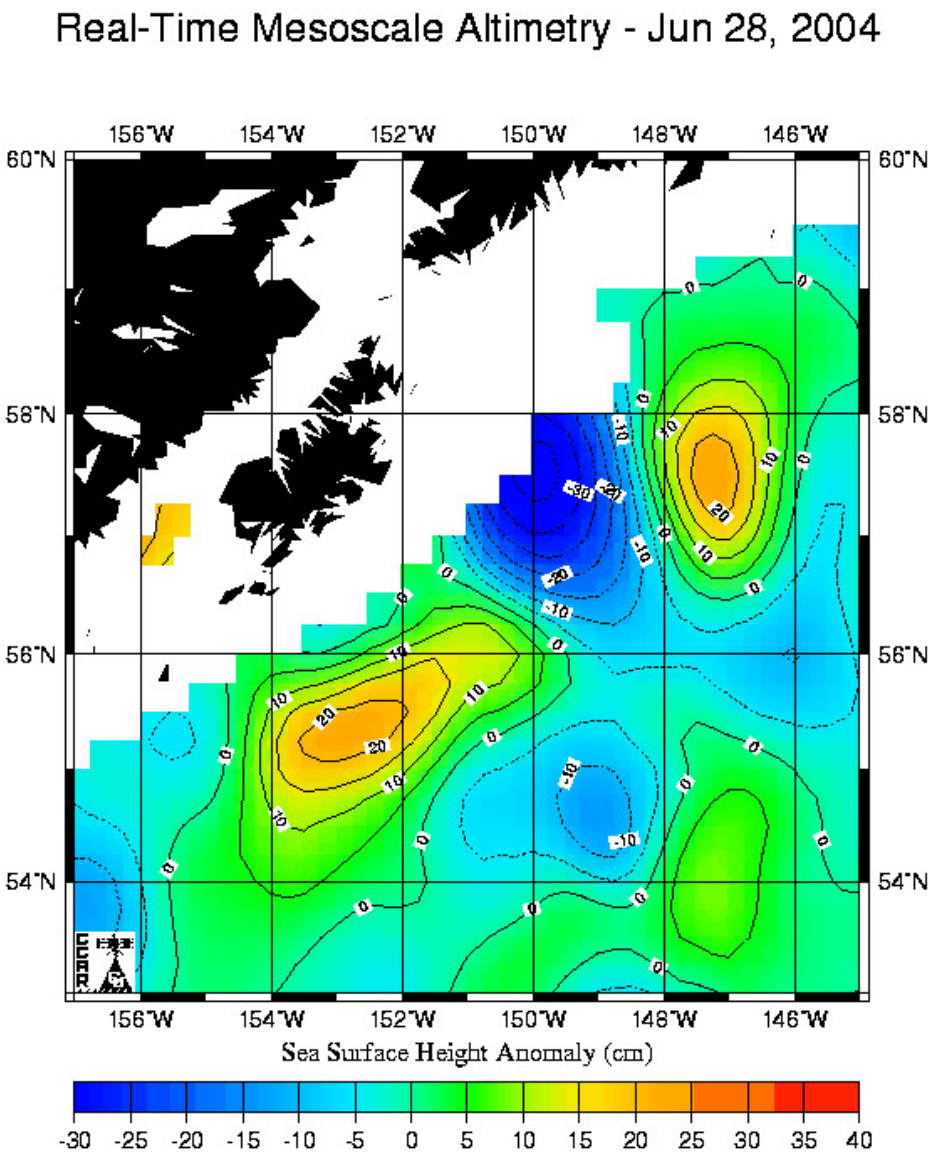
- (845) 359-6817 (facsimile)
- (845) 365-8367 – Marine Science Coordinator
- (845) 365-8845 – Marine Superintendent
- (845) 365-8824 – Administrative Aide, Marine Operations
- (845) 365-8846 – Financial Assistant/Marine Personnel

8.0 APPENDICES

8.1 Cruise EW0409 Equipment Inventory – Not Final

ITEM	QTY	WEIGHT	TOTAL WEIGHT
Mooring Supplies			
Box, Release	3	110 lbs	330 lbs
Stand, Reel	1	25 lbs	25 lbs
Anchor, Wheel, Railroad	3	1,600 lbs	4,800 lbs
Float, Steel, 30" Diameter	6	92 lbs	552 lbs
NMFS-FOCI			
Supplies, Miscellaneous, F15	1	25 lbs	25 lbs
Supplies, Miscellaneous, G1	1	25 lbs	25 lbs
Coats, Float and Gloves, B2	1	20 lbs	20 lbs
Kit, Response, Spill	1	15 lbs	15 lbs
Box, Clear Plastic, Large	1	35 lbs	35 lbs
Deck Unit, SeaCat	1	30 lbs	30 lbs
Buckets		5 lbs	5 lbs
SBE-39	1	10 lbs	10 lbs
Frame, Bongo, 60-cm	1	40 lbs	40 lbs
Frame, Bongo, 20-cm	1	15 lbs	15 lbs
Weight, Depressor, Bongo	1	50 lbs	50 lbs
Box, SeaCat	1	40 lbs	40 lbs
MISCELLANEOUS			
Box, Drifter, ARGOS	2	69 lbs	138 lbs
Box, MicroCAT	3	40 lbs	120 lbs
Cages, MicroCAT	3	48 lbs	144 lbs
Box, Wooden, Large	1	795 lbs	795 lbs
CTD	1	900 lbs	900 lbs
ADCP w/Batteries	3	420 lbs	1,260 lbs
		TOTAL WEIGHT:	**10,454 lbs**

8.2 **Sea Surface Altimetry** of June 28, 2004 showing the location of the two eddies we want to sample on this cruise, using CTDs.



8.3 Cruise EW0409 HAZMAT Inventory

Chemical	CAS Number	Respondee	Quantity	H	F	R	Storage Color Code	Hazard Class	Packing Group Number	UN	Reportable Quantity	Response Indices
Battery, Alkaline	mix	DeWitt	7-cells				General	Not regulated				
Battery, Lithium, Bromine Chloride	mix	DeWitt	92-cells	1	1	2	General	9	II	3090	None	None
Battery, Lithium, Tadiran	mix	DeWitt	140-cells				General	9	II	3090	None	None
Formaldehyde, 37%	mix		2-gal	3	2	2	Flammable	3 & 8	III	1198	100 LBS	1

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.

8.4 Cruise EW0409 Itinerary

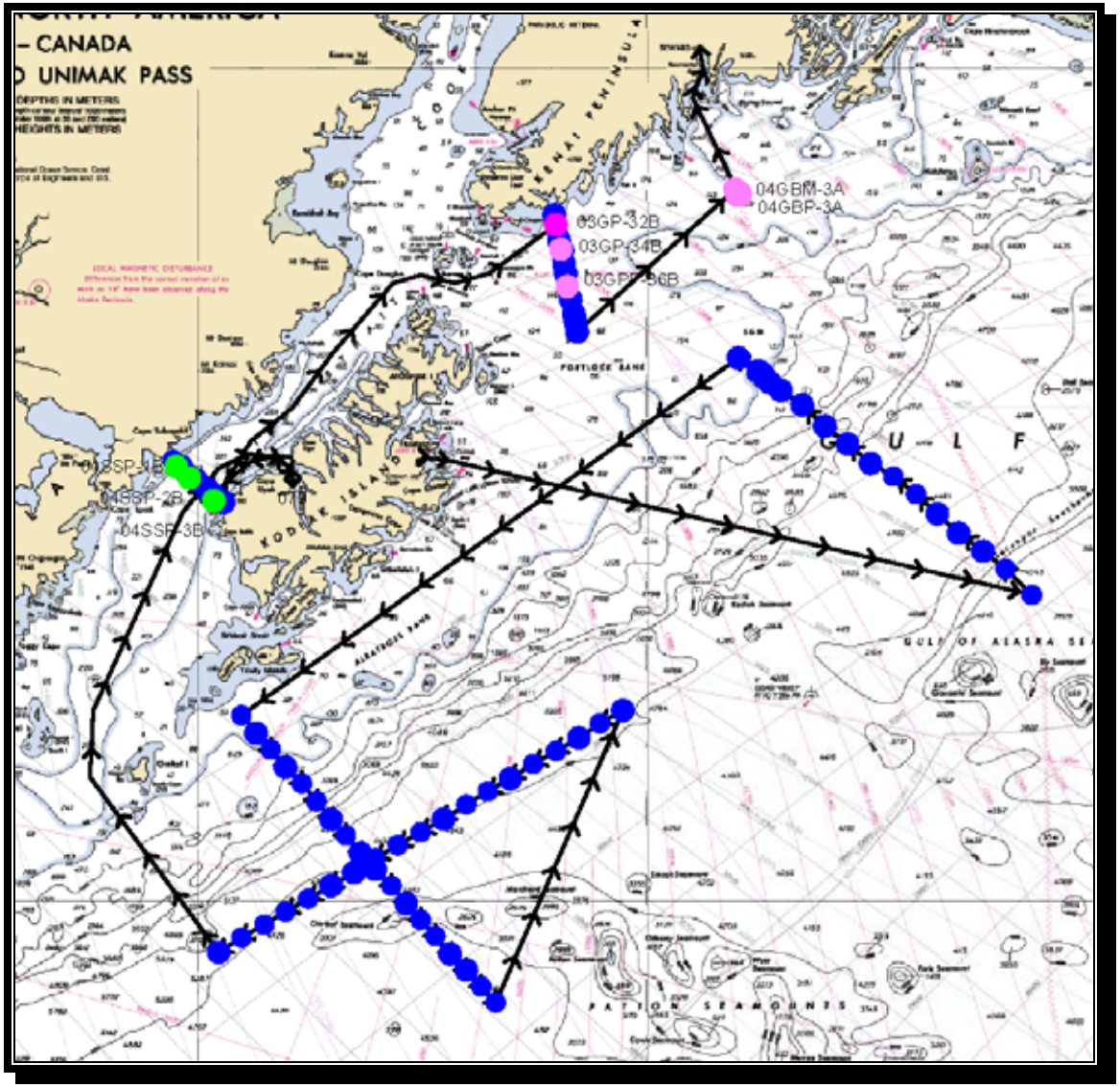
Station ID	Activity	Latitude	Longitude	Dist. (nm)	Spd (kts)	Transit (hrs)	z (fm)	Water Depth (m)	CTD Depth (m)	CTD Time (min)	Net Time (min)	Arrive Local Date/Time	Depart Local Date/Time
Kodiak, AK	**DEPART**	57° 43.430' N	152° 31.530' W			36.97	9	3.36					28-Sep-2004 08:00
ENW17	ctd/bongo	56° 54.420' N	145° 41.580' W	226.6	12	18.9		3892	1000	64	45	29-Sep-2004 02:53	29-Sep-2004 04:42
ENW16	ctd	57° 03.880' N	145° 58.990' W	13.4	10	1.3		4080	1000	64		29-Sep-2004 06:02	29-Sep-2004 07:07
ENW15	ctd	57° 10.520' N	146° 14.620' W	10.8	10	1.1		3982	1000	64		29-Sep-2004 08:12	29-Sep-2004 09:16
ENW14	ctd	57° 17.320' N	146° 31.010' W	11.2	10	1.1		4174	1000	64		29-Sep-2004 10:23	29-Sep-2004 11:28
ENW13	ctd/bongo	57° 24.140' N	146° 45.200' W	10.3	10	1.0		4420	1000	64	45	29-Sep-2004 12:29	29-Sep-2004 14:19
ENW12	ctd	57° 30.920' N	146° 59.660' W	10.3	10	1.0		4754	1000	64		29-Sep-2004 15:20	29-Sep-2004 16:25
ENW11	ctd/bongo	57° 37.340' N	147° 14.930' W	10.4	10	1.0		4843	1000	64		29-Sep-2004 17:27	29-Sep-2004 18:32
ENW10	ctd	57° 42.090' N	147° 29.950' W	9.3	10	0.9		4922	1000	64		29-Sep-2004 19:28	29-Sep-2004 20:32
ENW10	ctd/bongo	57° 42.090' N	147° 29.950' W	0.0	10	0.0		4922	1000	64	45	29-Sep-2004 20:32	29-Sep-2004 22:22
ENW09	ctd	57° 49.050' N	147° 44.780' W	10.5	10	1.1		3429	1000	64		29-Sep-2004 23:25	30-Sep-2004 00:29
ENW08	ctd	57° 55.880' N	148° 00.220' W	10.7	10	1.1		2455	1000	64		30-Sep-2004 01:33	30-Sep-2004 02:38
ENW07	ctd	58° 03.120' N	148° 15.630' W	10.9	10	1.1		1351	1000	64		30-Sep-2004 03:43	30-Sep-2004 04:48

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
ENW06	ctd/bongo	58° 08.510' N	148° 29.670' W	9.2	10	0.9		1175	1000	64	45	30-Sep-2004 05:43	30-Sep-2004 07:32
ENW05	ctd	58° 11.080' N	148° 37.290' W	4.8	10	0.5		848	838	58		30-Sep-2004 08:01	30-Sep-2004 08:58
ENW04	ctd	58° 12.700' N	148° 40.230' W	2.2	10	0.2		546	536	45		30-Sep-2004 09:12	30-Sep-2004 09:57
ENW03	ctd	58° 14.910' N	148° 42.520' W	2.5	10	0.3		351	341	37		30-Sep-2004 10:12	30-Sep-2004 10:48
ENW02	ctd/bongo	58° 15.490' N	148° 45.250' W	1.5	10	0.2		166	156	30	45	30-Sep-2004 10:58	30-Sep-2004 12:13
ENW01	ctd/bongo	58° 20.060' N	148° 57.510' W	7.9	10	0.8		126	116	28		30-Sep-2004 13:01	30-Sep-2004 13:28
E3X01	ctd/bongo	56° 10.000' N	154° 30.000' W	221.9	12	18.5		1500	1490	85	45	01-Oct-2004 07:58	01-Oct-2004 10:08
E3X02	ctd	56° 03.530' N	154° 20.000' W	8.5	10	0.9		1500	1490	85		01-Oct-2004 10:59	01-Oct-2004 12:24
E3X03	ctd	55° 57.059' N	154° 10.000' W	8.6	10	0.9		1500	1490	85		01-Oct-2004 13:15	01-Oct-2004 14:41
E3X04	ctd	55° 50.588' N	154° 00.000' W	8.6	10	0.9		1500	1490	85		01-Oct-2004 15:32	01-Oct-2004 16:57
E3X05	ctd/bongo	55° 44.118' N	153° 50.000' W	8.6	10	0.9		1500	1490	85	45	01-Oct-2004 17:48	01-Oct-2004 19:59
E3X06	ctd	55° 37.647' N	153° 40.000' W	8.6	10	0.9		1500	1490	85		01-Oct-2004 20:50	01-Oct-2004 22:15
E3X07	ctd	55° 31.176' N	153° 30.000' W	8.6	10	0.9		1500	1490	85		01-Oct-2004 23:07	02-Oct-2004 00:32
E3X08	ctd	55° 24.706' N	153° 20.000' W	8.6	10	0.9		1500	1490	85		02-Oct-2004 01:24	02-Oct-2004 02:49
E3X09	ctd/bongo	55° 18.235' N	153° 10.000' W	8.6	10	0.9		1500	1490	85	45	02-Oct-2004 03:40	02-Oct-2004 05:50
E3X10	ctd	55° 11.765' N	153° 00.000' W	8.6	10	0.9		1500	1490	85		02-Oct-2004 06:42	02-Oct-2004 08:07
E3X11	ctd	55° 05.294' N	152° 50.000' W	8.6	10	0.9		1500	1490	85		02-Oct-2004 08:59	02-Oct-2004 10:24
E3X12	ctd	54° 58.824' N	152° 40.000' W	8.6	10	0.9		1500	1490	85		02-Oct-2004 11:16	02-Oct-2004 12:41
E3X13	ctd/bongo	54° 52.353' N	152° 30.000' W	8.7	10	0.9		1500	1490	85	45	02-Oct-2004 13:33	02-Oct-2004 15:43
E3X14	ctd	54° 45.882' N	152° 20.000' W	8.7	10	0.9		1500	1490	85		02-Oct-2004 16:35	02-Oct-2004 18:00
E3X15	ctd	54° 39.412' N	152° 10.000' W	8.7	10	0.9		1500	1490	85		02-Oct-2004 18:52	02-Oct-2004 20:18
E3X16	ctd	54° 32.941' N	152° 00.000' W	8.7	10	0.9		1500	1490	85		02-Oct-2004 21:10	02-Oct-2004 22:35
E3X17	ctd/bongo	54° 26.471' N	151° 50.000' W	8.7	10	0.9		1500	1490	85	45	02-Oct-2004 23:27	03-Oct-2004 01:37
E3X18	ctd	54° 20.000' N	151° 40.000' W	8.7	10	0.9		1500	1490	85		03-Oct-2004 02:29	03-Oct-2004 03:55
E3A01	ctd	56° 12.000' N	150° 15.000' W	122.0	12	10.2		1500	1490	85		03-Oct-2004 14:05	03-Oct-2004 15:30
E3A02	ctd	56° 06.889' N	150° 30.000' W	9.8	10	1.0		1500	1490	85		03-Oct-2004 16:28	03-Oct-2004 17:54
E3A03	ctd/bongo	56° 01.778' N	150° 45.000' W	9.8	10	1.0		1500	1490	85	45	03-Oct-2004 18:52	03-Oct-2004 21:03
E3A04	ctd	55° 56.667' N	151° 00.000' W	9.8	10	1.0		1500	1490	85		03-Oct-2004 22:02	03-Oct-2004 23:27
E3A05	ctd	55° 51.556' N	151° 15.000' W	9.8	10	1.0		1500	1490	85		04-Oct-2004 00:26	04-Oct-2004 01:51
E3A06	ctd	55° 46.444' N	151° 30.000' W	9.9	10	1.0		1500	1490	85		04-Oct-2004 02:50	04-Oct-2004 04:15
E3A07	ctd/bongo	55° 41.333' N	151° 45.000' W	9.9	10	1.0		1500	1490	85	45	04-Oct-2004 05:14	04-Oct-2004 07:25
E3A08	ctd	55° 36.222' N	152° 00.000' W	9.9	10	1.0		1500	1490	85		04-Oct-2004 08:24	04-Oct-2004 09:49
E3A09	ctd	55° 31.111' N	152° 15.000' W	9.9	10	1.0		1500	1490	85		04-Oct-2004 10:48	04-Oct-2004 12:14
E3A10	ctd	55° 26.000' N	152° 30.000' W	9.9	10	1.0		1500	1490	85		04-Oct-2004 13:13	04-Oct-2004 14:38

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
E3A11	ctd/bongo	55° 20.889' N	152° 45.000' W	9.9	10	1.0		1500	1490	85	45	04-Oct-2004 15:38	04-Oct-2004 17:48
E3A12	ctd	55° 15.778' N	153° 00.000' W	10.0	10	1.0		1500	1490	85		04-Oct-2004 18:48	04-Oct-2004 20:13
E3A13	ctd	55° 10.667' N	153° 15.000' W	10.0	10	1.0		1500	1490	85		04-Oct-2004 21:13	04-Oct-2004 22:38
E3A14	ctd	55° 05.556' N	153° 30.000' W	10.0	10	1.0		1500	1490	85		04-Oct-2004 23:38	05-Oct-2004 01:03
E3A15	ctd/bongo	55° 00.444' N	153° 45.000' W	10.0	10	1.0		1500	1490	85	45	05-Oct-2004 02:03	05-Oct-2004 04:13
E3A16	ctd	54° 55.333' N	154° 00.000' W	10.0	10	1.0		1500	1490	85		05-Oct-2004 05:13	05-Oct-2004 06:38
E3A17	ctd	54° 50.222' N	154° 15.000' W	10.0	10	1.0		1500	1490	85		05-Oct-2004 07:38	05-Oct-2004 09:03
E3A18	ctd	54° 45.111' N	154° 30.000' W	10.0	10	1.0		1500	1490	85		05-Oct-2004 10:04	05-Oct-2004 11:29
E3A19	ctd/bongo	54° 40.000' N	154° 45.000' W	10.1	10	1.0		1500	1490	85	45	05-Oct-2004 12:29	05-Oct-2004 14:39
Larsen's Bay	**Pick up 3 Scientific party members**												
Line 8	ctd	57° 28.500' N	154° 42.000' W	168.5	10	16.9	60	0.4				07-Oct-2004 00:00	
04SSP-3A	ctd	57° 29.022' N	154° 48.450' W	3.5	12	0.3	191	0.5					
Line 8	ctd	57° 30.900' N	154° 47.000' W	2.0	10	0.2	205	0.5					
Line 8	ctd	57° 33.100' N	154° 52.500' W	3.7	10	0.4	228	0.5					
Line 8	ctd	57° 36.300' N	155° 00.500' W	5.4	10	0.5	238	0.5					
04SSP-2A	ctd	57° 37.120' N	155° 04.490' W	2.3	11	0.2	249	0.5					
Line 8	ctd	57° 38.500' N	155° 04.200' W	1.4	10	0.1	252	0.5					
Line 8	ctd	57° 41.000' N	155° 10.000' W	4.0	10	0.4	289	0.6					
Line 8	ctd	57° 43.200' N	155° 15.600' W	3.7	10	0.4	181	0.5					
04SSP-1A	ctd	57° 41.072' N	155° 12.196' W	2.8	10	0.3	295	0.6					
04SSP-1A	Recover	57° 41.072' N	155° 12.196' W	0.0	10	0.0	295	1					
04SSP-1B	Deploy	57° 41.072' N	155° 12.196' W	0.0	10	0.0	295	1.5					
04SSP-2A	Recover	57° 37.120' N	155° 04.490' W	5.7	10	0.6	249	1					
04SSP-2B	Deploy	57° 37.120' N	155° 04.490' W	0.0	10	0.0	249	1.5					
04SSP-2B	ctd	57° 37.120' N	155° 04.490' W	0.0	10	0.0	249	0.5					
04SSP-3A	Recover	57° 29.022' N	154° 48.450' W	11.8	10	1.2	191	1					
04SSP-3B	Deploy	57° 29.022' N	154° 48.450' W	0.0	10	0.0	191	1.5					
04SSP-3B	ctd	57° 29.022' N	154° 48.450' W	0.0	10	0.0	191	0.5					
03GP-32B	ctd	59° 06.030' N	150° 59.40' W	~180	10	0.0	165	0.5				08-Oct-2004 00:00	
03GP-32B	Recover	59° 06.030' N	150° 59.40' W	0.0	10	0.0	165	1					
03GP-34B	ctd	58° 57.780' N	150° 55.980' W	~10	11	0.8	140	0.5					
03GP-34B	Recover	58° 57.780' N	150° 55.980' W	0.0	10	0.0	140	1					
03GPP-36B	ctd	58° 45.020' N	150° 52.010' W	12.9	11	1.2	181	0.5					
03GPP-36B	Recover	58° 45.020' N	150° 52.010' W	0.0	10	0.0	181	1					

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
GP0	ctd	59° 09.600' N	151° 00.500' W	25.0	10	2.5	45					08-Oct-2004-evening time	
GP1	ctd	59° 06.000' N	150° 59.400' W	3.6	10	0.4	45						
GP2	ctd	59° 00.600' N	150° 57.600' W	5.5	10	0.5	45						
GP3	ctd	58° 57.000' N	150° 55.800' W	3.7	10	0.4	45						
GP4	ctd	58° 52.800' N	150° 54.000' W	4.3	10	0.4	45						
GP5	ctd	58° 49.200' N	150° 52.800' W	3.7	10	0.4	45						
GP6	ctd	58° 45.000' N	150° 52.000' W	4.2	10	0.4	45						
GP6a	ctd	58° 40.200' N	150° 50.000' W	4.9	10	0.5	45						
GP7	ctd	58° 35.400' N	150° 48.000' W	4.9	10	0.5	45						
GP7a	ctd	58° 32.160' N	150° 46.571' W	3.3	10	0.3	45						
GP7b/AP11	ctd	58° 28.920' N	150° 45.141' W	3.3	10	0.3	45						
04GBM-3A	ctd/bongo	59° 18.493' N	148° 59.753' W	73.6	11	6.7						09-Oct-2004 00:00	
04GBM-3A	Recover	59° 18.493' N	148° 59.753' W	0.0	11	0.0		138	128	1	240		
04GBP-3A	Recover	59° 17.027' N	148° 57.540' W	1.9	11	0.2		187	177	1	120		
Seward, AK	**Debark Scientists**											10-Oct-2004 10:00	

8.5 Cruise EW0409 Chartlet



8.6 Cruise EW0409 – Larsen's Bay, Kodiak, Alaska (NOAA Charts 16580 and 16599)