FINAL CRUISE INSTRUCTIONS
FOCI

R/V *KILO MOANA*, Cruise KM0313
September 11 – 28, 2003
Chief Scientist – Nancy B. Kachel, NOAA

1.0 FINAL CRUISE INSTRUCTIONS

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

1.2 Cruise Numbers

1.2.1 Cruise Number – KM0313

1.2.2 FOCI Number – 3KM03

1.3 Cruise Dates

1.3.1 Departure – Depart Kodiak, Alaska, at 1300 ADT on Saturday, September 13, 2003.

1.3.2 Touch-and-Go – Arrive in Seward, Alaska, on Monday, September 22, 2003, to disembark four scientific personnel and embark one or two scientists via small boat operation.

1.3.3 Arrival – Arrive Kodiak, Alaska, on Sunday, September 28, 2003.

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) and the Steller Sea Lion Research Programs. 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 Stevenson and Amatuli Troughs, Portlock Bank, the area near Kennedy – Stevenson Entrances, as well as one of the large offshore eddies, that typically impact this area between spring and fall and contributes to onshore and offshore fluxes of nutrients, as well as larval fish.

Approximately six ARGOS satellite-tracked drifters will be deployed during the cruise.

1) We will begin CTD operations on the Gore Point Line then on the morning of September 14, we will recover and re-deploy three moorings on that same line. See Section 8.4.1 Cruise KM0313 Mooring Locations.

2) We will then resume occupying the box of station across Kennedy and Stevenson Entrances. From September 15-18, the work will involve nearly continuous operations at CTD stations, sampling transects across Stevenson, and Amatuli Troughs. At each station, water samples will be taken for salinity calibrations, nutrients, and chlorophyll. See Section 8.4.2 Cruise KM0313 Transect Lines for September 13-21.

3) Between September 19-21, operations will consist of recovery and re-deployment of ten moorings, which includes one 2.3-meter diameter surface fiberglass-over-foam toroid mooring. At each mooring site, we will conduct Conductivity, Temperature, and Depth (CTD) profile operations. At GB3, which is the site of the toroid mooring, we will conduct several Marine Assessment Monitoring and Prediction (MARMAP) Bongo tows.

4) After September 21, we plan to study one of the eddies that regularly impinge on the shelf in this region. 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. The locations of stations with ENW and ENE in the attached itinerary were established using this position, for the purpose of planning only. They will probably be altered, as the eddy moves.

5) After sampling the eddy, we plan to return to occupy a line of stations parallel to the Kenai Peninsula to investigate the presence of a front in chlorophyll distribution observed by satellites.

6) We will end the cruise in Kodiak, Alaska, on Sunday, September 28, 2003, where we plan to offload our equipment. See Section 8.4.3 Cruise KM0313 Transect Lines for September 22-28.

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
Nancy B. Kachel (206) 526-6780	Female	PMEL	Nancy.Kachel@noaa.gov

2.3.2 Participating Scientists

2.3.2.1 September 13-21, 2003

Name	Gender	Affiliation	E-mail Address
Dr. Nancy B. Kachel	Female	PMEL	Nancy.Kachel@noaa.gov
Dr. Calvin W. Mordy	Male	PMEL	Calvin.W.Mordy@noaa.gov
William J. Floering	Male	PMEL	William.Floering@noaa.gov
David G. Kachel	Male	PMEL	Dave.Kachel@noaa.gov
Carol L. DeWitt	Female	PMEL	Carol.Dewitt@noaa.gov
Earl Roskie	Male	PMEL	Earl.Roskie@noaa.gov
TBA	Male	PMEL	
Peter D. Proctor	Male	PMEL	Peter.Proctor@noaa.gov
Richard E. Hester	Male	PMEL	Richard.E.Hester@noaa.gov

2.3.2.2 September 21-28

Name	Gender	Affiliation	E-mail Address
Dr. Nancy B. Kachel	Female	PMEL	Nancy.Kachel@noaa.gov
Dr. Calvin W. Mordy	Male	PMEL	Calvin.W.Mordy@noaa.gov
Sigrid A. Salo	Female	PMEL	Sigrid.A.Salo@noaa.gov
David G. Kachel	Male	PMEL	Dave.Kachel@noaa.gov
Peter D. Proctor	Male	PMEL	Peter.Proctor@noaa.gov
Richard E. Hester	Male	PMEL	Richard.E.Hester@noaa.gov

2.4 Administrative

2.4.1 Ship Operations

University of Hawaii – University Marine Center (UMC)
#1 Sand Island Road
Honolulu, Hawaii 96819
Telephone: (808) 847-2661
Facsimile: (808) 848-5451
Email: snug@soest.hawaii.edu

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** – 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,
- Haul number,
- Gear type, and
- Bottom depth.

3.3 **Staging Plan** – Loading of scientific equipment is planned to occur in Dutch Harbor, Alaska, on Tuesday and Wednesday, September 9 and 10, 2003, respectively. 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.

3.4 **De-staging Plan** – Equipment will be off-loaded in Kodiak, Alaska, at the end of the cruise, on Sunday and Monday, September 28 and 29, 2003, respectively. The scientific party will be responsible for arranging vehicles for moving their equipment.

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

1) Ship transits without scientists from Dutch Harbor, Alaska, to Kodiak, Alaska, where the scientific party embarks via a small boat operation on Saturday, September 13, 2003.

2) From September 13-18, we plan nearly continuous CTD/PAR/Fluorescence casts. Chlorophyll, nutrient, and salinity samples will be taken on each cast.

3) On September 15, and again from September 19-21, we plan to recover and re-deploy 10 moorings, which include one 2.3-meter diameter surface fiberglass-over-foam toroid mooring. In addition to the mooring work, we will conduct Conductivity, Temperature, and Depth (CTD) profile operations at each mooring site and at other selected sites as time allows. Most of the moorings are in water depths between 100 and 300 meters. One surface toroid is to be recovered and redeployed at the GLOBEC OSCAR site, GBM-3 (59° 18.0' N, 148° 58.2' W).

4) Marine Assessment Monitoring and Prediction (MARMAP) Bongo tows will be taken at GB3M.

5) At the end of mooring operations on Saturday, September 21, we plan to drop off four mooring technicians plus some hand-carried equipment in Seward, Alaska, and then embark two other scientists with their personal gear. This can be accomplished by a small boat operation.

6) From September 22-28, we plan to do CTD/PAR/Fluorescence casts and to deploy several drifters.

3.5.1 CTD/PAR/Fluorescence profiler casts will be done throughout the cruise. The Uncontaminated Scientific Seawater System (USSW) with thermosalinograph, fluorometer, and a PMEL-supplied nitrate meter attached will be used throughout the entire cruise.

Salinity, nutrient, and chlorophyll samples will be taken at up to 12 depths at most CTD stations, and at 24 depths in the deep water of the eddy survey. Nutrients need to be stored in a +4° Celsius refrigerator until they are processed on board the ship. Approximately 4 cubic feet are need for this storage. 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.

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

3.5.2 See Section 8.4.1 Cruise KM0313 Mooring Locations for a chartlet of mooring sites. See Sections 8.4.2 Cruise KM0313 Transect Lines for September 13-21 and 8.4.3 Cruise KM0313 Transect Lines for September 22-28 for chartlets of the proposed cruise track and stations.

3.6 Station Operations – The following are operations to be conducted on this cruise:

3.6.1 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. A backup will be provided and maintained by Pacific Marine Environmental Laboratory (PMEL). When available, and where possible, FOCI's fluorometer and PAR light meter should 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 vessel's 9.5-liter Niskin bottles, backed up by 5-liter and 10-liter Niskin bottles provided by PMEL.

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 and VHS cassette CTD tape backup system should be 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 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.

3.6.1.1 **CTD Calibration** – Salinity samples will be taken on every other cast, or as specified by the Chief Scientist. No reversing thermometers will be required. The CTD systems will be equipped with dual temperature and conductivity sensors. Salinity samples will be returned to Seattle for analysis.

3.6.2 **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. 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 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 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.)

3.6.3 **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.

The -20° Celsius freezer is required for sample storage of the chlorophyll filters. The +4° C refrigerator is required for storage of nutrient samples before they are analyzed.

3.6.4 **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.

3.7 **Underway Operations** – Underway operations that will be performed during this cruise include thermosalinograph, fluorometer, nitrate meter, bathymetry up to 3,000 meters at all mooring sites, meteorological data, and a log of operations.

3.8 **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.

3.9 **Seachest 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 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 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, 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

3.10 Small Boat Operations – The small boat may be used to tag one surface mooring during recovery operations. Additionally, the small boat may be used for transferring scientific personnel in Kodiak and 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,
- Oceanographic winch with 0.322" electro-mechanical cable with slip rings terminated for MARMAP Bongo tows,
- Winch with minimum of 6,000 meters of 9/16" wire,
- A-Frame,
- Ability to connect a PAR and Fluorometer, provided by the project, 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,
- Sea-Bird Electronics' SBE 911*plus* CTD system without sensors, 24-bottle rosette, stand, deck unit, and weights,
- (16) 9.6-liter sampling bottles for use with rosette (11 plus 5 spares),
- 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,
- 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,
- Benthos acoustic transducer and deck box,
- EdgeTech 8011AT deck box and transducer (hull-mounted),
- Capability to transfer ship's data to CD-ROM disks,
- Barnstead NANOpure Diamond Analytical System (18MOhm) Projected use (volume/day), 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 KM0313 Equipment Inventory for weights.

- Sea-Bird Electronics' SBE 911*plus* CTD system with dual sensors (for backup),
- (2) Sea-Bird Electronics' SBE-19 SEACAT systems,
- Photosynthetically Active Radiation (PAR) and Fluorometer to be mounted on CTD,
- CTD stand modified for attachment of fluorometer,
- CTD carousel sampler,
- (12) 5-liter sample bottles,
- Lanyard material and nicropress sleeves,
- 150 salinity sample bottles,
- Fluorometer (spare) to be mounted to the Uncontaminated Scientific Seawater System (USSS),
- 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,
- Spare wire angle indicator,
- (1) Surface mooring (FOCI biophysical platforms),
- 9 Subsurface moorings,
- Benthos acoustic release deck-set and transducer,
- EdgeTech 8011-A acoustic release deck-set and transducer,
- Approximately 11 railroad wheel sets to be used as anchors,
- Chain, wire rope, rope, assorted hardware for moorings,
- 6 ARGOS satellite tracked drifter buoys,
- (2) Hand held grapple hooks,
- Dragging gear,
- 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 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,
- Electronic Navigation suite's export files on disk,
- Marine Operations Abstracts (MOA), and
- PMEL CTD Weather Observation Logs.

5.2 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 8.2 Cruise KM0313 HAZMAT Inventory.

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

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 that **R/V *KILO MOANA*** 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.

7.3 **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.

7.4 Important Telephone and Facsimile Numbers and E-mail Addresses

7.4.1 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)

7.4.2 Alaska Fisheries Science Center (AFSC)

FOCI – Resource Assessment and Conservation Engineering (RACE):

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

7.4.3 R/V *KILO MOANA*

INMARSAT C:

- 011-872-336-956-510 (voice)
- 011-872-336-956-513 (fax)

7.4.4 University of Hawaii – University Marine Center

7.4.4.1 Marine Superintendent – Stan Winslow

- (808) 847-2661 (voice)
- (808) 848-5451 (fax)
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7.4.4.2 Shipboard Support Facility Supervisor – Steve Poulos

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8.0 APPENDICES

8.1 Cruise KM0313 Equipment Inventory

ITEM	QTY	WEIGHT	TOTAL WEIGHT
ANCHORS			
1600#	4	1,600 lbs	6400 lbs
1800#	3	1,800 lbs	5400 lbs
1900#	2	1,900 lbs	3800 lbs
2200#	1	2,200 lbs	2200 lbs
RELEASE BOXES	11	110 lbs	1210 lbs
DRIFTER BOXES	3	230 lbs	690 lbs
GREY BOXES			
Mooring Wire	1	1,350 lbs	1350 lbs
MTR Cages	1	480 lbs	480 lbs
MTR Cages and Niskins	1	447 lbs	447 lbs
Mordy, Short	1	300 lbs	300 lbs
BUOY - F.2.03	1	800 lbs	800 lbs
TOWER - F.2.03	1	250 lbs	250 lbs
STEEL FLOATS			
30" Dia.	4	230 lbs	920 lbs
MOORING - ON REELS			
03GB-1A	1	340 lbs	340 lbs
03GB-2A	1	340 lbs	340 lbs
03GB-4A	1	340 lbs	340 lbs
PLASTIC FOOTLOCKERS			
Polyolefin/Release Hook	1	25 lbs	25 lbs
Grappling Hooks/Straps	1	25 lbs	25 lbs
Rubbermaid Toolbox	1	50 lbs	50 lbs
WOODEN FOOTLOCKER			
Tiedown Chain/Binders	1	500 lbs	500 lbs
MISCELLANEOUS			
Cardboard Box Tiedown Line	1	10 lbs	10 lbs
Mordy, Cardboard Box	1	5 lbs	5 lbs
NMFS-FOCI			
F15 - Miscellaneous Supplies	1	25 lbs	25 lbs
G1 - Miscellaneous Supplies	1	25 lbs	25 lbs
B2 - Floatcoats/Gloves	1	20 lbs	20 lbs
Spill Kit	1	15 lbs	15 lbs
Large, Clear Plastic Box	1	35 lbs	35 lbs
SEACAT Deck Unit	1	30 lbs	30 lbs
Buckets		5 lbs	5 lbs

ITEM	QTY	WEIGHT	TOTAL WEIGHT
SBE-39	1	10 lbs	10 lbs
Bongo Frame - 60-cm	1	40 lbs	40 lbs
Bongo Frame - 20-cm	1	15 lbs	15 lbs
Bongo Weight	1	50 lbs	50 lbs
SEACAT Box	1	40 lbs	40 lbs
		WEIGHT IN CONTAINER 1:	**26,037 lbs**

ITEM	QTY	WEIGHT	TOTAL WEIGHT
ANCHORS			
SURFACE MOORING	1	3,950 lbs	3950 lbs
DRIFTER BOXES	6	268 lbs	1608 lbs
FLOATS			
41" Dia.	3	479 lbs	1437 lbs
30" Dia.	4	230 lbs	920 lbs
28" Dia.	4	222 lbs	888 lbs
ADCP FLOAT - 36" Dia.	1	487 lbs	487 lbs
LARGE WOODEN BOX	1	795 lbs	795 lbs
CAROL DEWITT PALLET #1	1	432 lbs	432 lbs
CAROL DEWITT PALLET #2	1	548 lbs	548 lbs
GLASS BALL BASKET W/GEAR	1	450 lbs	450 lbs
CTD	1	900 lbs	900 lbs
ADCP W/ BATTERY	1	420 lbs	420 lbs
REEL STAND	1	25 lbs	25 lbs
SURFACE MOORING BOX	1	3,462 lbs	3462 lbs
PB'S	3	120 lbs	360 lbs
DRAGGING GEAR	1	1,200 lbs	1200 lbs
3/4" POLYPROPYLENE WORKING LINE	1	50 lbs	50 lbs
		WEIGHT IN CONTAINER 2:	**18,882 lbs**

ITEM	QTY	WEIGHT	TOTAL WEIGHT
WISEGARVER LARGE GREY BOX	1	735 lbs	735 lbs
PALLET AANDARAA BOXES	1	537 lbs	537 lbs
NUTRIENT METER FRAMES	2	392 lbs	784 lbs
		WEIGHT ON BARGE:	**2,056 lbs**

TOTAL WEIGHT:	**45,975 lbs**

8.2 Cruise KM0313 HAZMAT Inventory

Chemical	CAS Number	Respondee	Quantity	H	F	R	Storage Color Code	Hazard Class	Packing Group Number	UN	Reportable Quantity	Response Indices
Acetone	67-64-1	Mordy	1.0-l	1	4	2	Flammable	3	II	1090	350-lbs	1
Ammonium Chloride	12125-02-9	Mordy	544.0-g	1	0	0	General	Not regulated		9085	5,000-lbs	2
Battery, Alkaline	mix	DeWitt	7-cells	3	1	2	Corrosive	8	III	2794	None	3
Battery, Lithium, Bromine Chloride	mix	DeWitt	92-cells	2	2	3	General	9	II	3090	None	None
Battery, Lithium, Tadiran	mix	DeWitt	140-cells	2	2	3	General	9	II	3090	None	None
Brij	9002-92-0	Mordy	250.0-ml	0	1	0	General	Not regulated			None	4
Cadmium	7440-43-9	Mordy	20.0-g				Toxic	4.1	III	3178	None	5
Cupric Sulfate	7758-99-8	Mordy	40.0-g	2	0	0	Hazardous Waste	9	III	3077	400-lbs	6
Formaldehyde, 37%	mix		2-gal	3	2	2	Flammable	3 & 8	III	1198	100-lbs	1
Hydrazine Sulfate	10034-93-2	Mordy	25.0-g	3	1	0	Toxic	8	III	3260	200-lbs	7
Hydrochloric Acid, Solution	7647-01-0	Mordy	5.0-l	3	0	2	Corrosive	8	II	1789	5,000-lbs	8
Imidazole	288-32-4	Mordy	136.0-g	2	1	1	Corrosive	8	III	3263	5-kg	9
Magnesium Sulfate Heptahydrate	10034-99-8	Mordy	213.0-g	1	0	0	General	Not regulated			None	2
N-1-Napthylethylenediamine Dihydrochloride	1465-25-4	Mordy	15.0-g	2	1	1	General	Not regulated			None	10
Nitric Acid	7697-37-2	Mordy	150.0-ml	4	0	3	Corrosive	8	II	2031	150-lbs	8
Potassium Iodine (Lugols Solution)	mix	Mordy	2.0-l				General	Not regulated				None
Potassium Nitrate	7757-79-1	Mordy	21.0-g	1	0	3	Reactive	5.1	III	1486	100-kg	9
Potassium Phosphate	7778-77-0	Mordy	3.0-g	0	0	0	General	Not regulated			None	2
Sodium Bicarbonate	144-55-8	Mordy	54.0-g	0	0	1	General	Not regulated			None	11
Sodium Chloride	7647-14-5	Mordy	963.0-g	1	0	0	General	Not regulated			None	11
Sodium Fluorosilicate	16893-85-9	Mordy	2.4-g	3	0	0	Toxic	6.1	III	2674	None	12
Sodium Hydroxide, 10N	1310-73-2	Mordy	500.0-ml	3	0	2	Store Separately	8	II	1823	1,000-lbs	13
Sodium Nitrite	7632-00-0	Mordy	0.5-g	2	0	3	Reactive	5.1 & 6.1	III	1500	100-lbs	14
Stannous Chloride	7772-99-8	Mordy	100.0-g	2	0	1	General	Not regulated		1759	100-lbs	2
Sulfanilamide	63-74-1	Mordy	250.0-g	0	1	1	General	Not regulated			None	2
Sulfuric Acid	7664-93-9	Mordy	6.0-l	3	0	2	Corrosive	8	II	1830	1,000-lbs	8
Tributyltin Oxide	56-35-9	DeWitt	30-pairs				Poison	6.1	II	3020	None	15

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 sawdust. **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: Stop release, if possible. Avoid contact with any spilled material. Contain spill, isolate hazard area, and deny entry. Limit site access to emergency responders. Neutralize with sodium bicarbonate, soda ash, lime, or other neutralizing agent. Place battery in suitable container for disposal. Dispose of contaminated material in accordance with applicable local, state, and federal regulations. Sodium bicarbonate, soda ash, sand, lime, or other neutralizing agent should be kept on site for spill remediation
Spill Response 4: 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 sawdust. Do not flush to sewer!
Spill Response 5: Evacuate area. Wear Self-Contained Breathing Apparatus (SCBA), rubber boots, and heavy rubber gloves. Wear disposable coveralls and discard them after use. Sweep up, place in bag and hold for waste disposal. Ventilate area and wash spill site after material pickup is complete. Avoid raising dust.
Spill Response 6: 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 7: 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. Do not contact with acids. Do not handle with bare hands.
Spill Response 8: 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 sawdust. **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 9: 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 10: 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.
Spill Response 11: 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. Small amounts of residue may be flushed to sewer with plenty of water.
Spill Response 12: Keep unnecessary people away. Stay upwind, keep out of low areas. Isolate hazard area and deny entry. Ventilate closed spaces before entering them. Employees should be trained in safety procedures for storage and handling this product. Any personnel in area should wear a National Institute for Occupational Safety and Health (NIOSH) approved breathing apparatus and protective clothing. Isolate product spill area. Carefully shovel material and place in clean, dry container and cover. Remove container from spill site and dispose of in accordance with federal, state, and local regulations.
Spill Response 13: 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. **Do not flush caustic residues to the sewer!** Residues from spills can be diluted with water, neutralized with dilute acid such as acetic, hydrochloric, or sulfuric. Absorb neutralized caustic residue on clay, vermiculite or other inert substance and package in a suitable container for disposal. 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 14: 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. 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 15: Stop the leak, if possible. Ventilate the space involved. Absorb, sweep up, and place in container for disposal. Shut off or remove all ignition sources. Prevent waterway contamination. Construct a dike to prevent spreading. Collect run-off (water) and transfer to drums or tanks for later disposal.

8.3 Cruise KM0313 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
Dutch Harbor, Alaska		**Load**											**9/9-9/10/2003**	
Dutch Harbor, Alaska		**Depart**												**9/11/03 08:00**
Kodiak Island, Alaska		**Embark SCI**	**57° 43.720' N**	**152° 31.242' W**		**2**						**60**	**9/13/2003 15:00**	**9/13/03 16:00**
6	AP1	ctd	58° 24.960' N	151° 43.571' W	6.2	12	0.5	60	109	104	27	10	9/13/2003 16:30	9/13/03 17:07
5	AP2	ctd	58° 25.752' N	151° 31.885' W	6.2	12	0.5	52	95	90	26	10	9/13/2003 17:38	9/13/03 18:14
4	AP3	ctd	58° 26.544' N	151° 20.199' W	6.2	12	0.5	35	64	59	24	10	9/13/2003 18:45	9/13/03 19:19
3	AP4	ctd	58° 27.336' N	151° 08.513' W	6.2	12	0.5	37	67	62	24	10	9/13/2003 19:50	9/13/03 20:24
2	AP5	ctd	58° 28.128' N	150° 56.827' W	6.2	12	0.5	44	80	75	25	10	9/13/2003 20:55	9/13/03 21:30
1	GP7b/AP6	ctd	58° 28.920' N	150° 45.141' W	50.3	9	5.6	45	82	77	25	10	9/14/2003 3:05	9/14/03 03:40
	03GP-32A	ctd	59° 19.110' N	150° 40.149' W	16.4	12	1.4		60.1			180	9/14/2003 5:02	9/14/03 08:02
	03GP-32A/B	recover/deploy	59° 06.000' N	150° 59.400' W	8.9	12	0.7	153	153	148		90	9/14/2003 8:46	9/14/03 10:16
	03GP-34A	recover	58° 57.300' N	150° 55.500' W	0.6	12	0.0	0	142	137		90	9/14/2003 17:22	9/14/03 18:52
	03GP-34B	deploy	58° 57.810' N	150° 55.920' W	13.0	12	1.1	142	142	137		90	9/14/2003 19:57	9/14/03 21:27
	03GPP-36A	recover	58° 45.000' N	150° 52.000' W	0.0	12	0.0	185	185	180		90	9/14/2003 10:16	9/14/03 11:46
	03GPP-36B	deploy	58° 45.000' N	150° 52.000' W	48.6	12	4.1	185	185	180		90	9/14/2003 15:50	9/14/03 17:20
7	SE5	ctd	58° 39.500' N	152° 25.000' W	48.6	9	5.4	30	55	50	23	10	9/14/2003 22:44	9/14/03 23:17
8	SE4	ctd	58° 42.200' N	152° 23.600' W	2.8	12	0.2	78	142	137	29	10	9/14/2003 23:31	9/15/03 00:10
9	SE3	ctd	58° 44.600' N	152° 22.600' W	2.5	12	0.2	55	100	95	26	10	9/15/2003 0:22	9/15/03 00:59
10	SE2	ctd	58° 47.000' N	152° 21.800' W	2.4	12	0.2	73	133	128	29	10	9/15/2003 1:11	9/15/03 01:49
11	SE1	ctd	58° 49.700' N	152° 20.500' W	2.8	12	0.2	38	69	59	24	10	9/15/2003 2:03	9/15/03 02:37
12	KE7	ctd	58° 59.000' N	152° 18.000' W	2.3	12	0.2	48	87	77	25		9/15/2003 3:39	9/15/03 04:04
13	KE6	ctd	59° 01.200' N	152° 14.300' W	2.9	12	0.2	67	122	112	27		9/15/2003 4:19	9/15/03 04:46
14	KE5	ctd	59° 03.600' N	152° 12.200' W	2.6	12	0.2	72	131	121	28		9/15/2003 4:59	9/15/03 05:27
15	KE4	ctd	59° 06.600' N	152° 09.500' W	3.3	12	0.3	82	149	139	29		9/15/2003 5:44	9/15/03 06:13
16	KE3	ctd	59° 08.300' N	152° 07.500' W	2.0	12	0.2	77	140	130	29		9/15/2003 6:23	9/15/03 06:52
17	KE2	ctd	59° 11.600' N	152° 04.500' W	3.6	12	0.3	52	95	85	26		9/15/2003 7:10	9/15/03 07:36
18	KE1	ctd	59° 14.000' N	152° 02.000' W	2.7	12	0.2	40	73	63	24		9/15/2003 7:49	9/15/03 08:13
21	GP0	ctd	59° 09.600' N	151° 00.500' W	14.2	12	1.2	45	82	77	25		9/15/2003 11:43	9/15/03 12:08
22	GP1	ctd	59° 06.000' N	150° 59.400' W	3.6	12	0.3	45	82	77	25		9/15/2003 12:26	9/15/03 12:51
23	GP2	ctd	59° 00.600' N	150° 57.600' W	5.5	12	0.5	45	82	77	25		9/15/2003 13:19	9/15/03 13:44
24	GP3	ctd	58° 57.000' N	150° 55.800' W	3.7	12	0.3	45	82	77	25		9/15/2003 14:03	9/15/03 14:28
25	GP4	ctd	58° 52.800' N	150° 54.000' W	4.3	12	0.4	45	82	77	25		9/15/2003 14:49	9/15/03 15:14

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
26	GP5	ctd	58° 49.200' N	150° 52.800' W	3.7	12	0.3	45	82	77	25		9/15/2003 15:33	9/15/03 15:58
27	GP6	ctd	58° 45.000' N	150° 52.000' W	4.2	12	0.4	45	82	77	25		9/15/2003 16:19	9/15/03 16:44
28	GP6a	ctd	58° 40.200' N	150° 50.000' W	4.9	12	0.4	45	82	77	25		9/15/2003 17:08	9/15/03 17:34
29	GP7	ctd	58° 35.400' N	150° 48.000' W	4.9	12	0.4	45	82	77	25		9/15/2003 17:58	9/15/03 18:23
30	GP7a	ctd	58° 32.160' N	150° 46.571' W	3.3	12	0.3	45	82	77	25		9/15/2003 18:40	9/15/03 19:05
31	GP7b/AP6	ctd	58° 28.920' N	150° 45.141' W	3.3	12	0.3	45	82	77	25		9/15/2003 19:22	9/15/03 19:47
	GP8	ctd	58° 25.910' N	150° 43.440' W	3.1	12	0.3		80	75	25		9/15/2003 20:02	9/15/03 20:27
	GP8A	ctd	58° 22.600' N	150° 42.200' W	3.4	12	0.3		66	61	24		9/15/2003 20:44	9/15/03 21:08
33	STD5	ctd	58° 19.400' N	150° 41.500' W	39.1	12	3.3	33	60	50	23	0	9/15/2003 0:43	9/15/03 01:06
34	STD6	ctd	58° 15.100' N	150° 42.200' W	4.3	11	0.4	37	67	57	24	0	9/15/2003 1:30	9/15/03 01:54
35	STD7	ctd	58° 12.000' N	150° 44.300' W	3.3	11	0.3	50	91	81	25	0	9/15/2003 2:12	9/15/03 02:37
36	STD8	ctd	58° 07.600' N	150° 46.000' W	4.5	11	0.4	74	135	125	28	0	9/15/2003 3:01	9/15/03 03:30
37	STD9	ctd	58° 04.000' N	150° 47.300' W	3.7	11	0.3	93	169	159	31	0	9/15/2003 3:50	9/15/03 04:20
38	STD10	ctd	58° 00.000' N	150° 49.300' W	4.1	11	0.4	77	140	130	29	0	9/15/2003 4:43	9/15/03 05:12
39	STD11	ctd	57° 55.500' N	150° 51.000' W	4.6	11	0.4	50	91	81	25	0	9/15/2003 5:37	9/15/03 06:02
40	STD12	ctd	57° 51.500' N	150° 52.000' W	4.0	11	0.4	44	80	70	25	0	9/15/2003 6:24	9/15/03 06:49
41	STD13	ctd	57° 43.500' N	150° 55.000' W	8.2	11	0.7	44	80	70	25	0	9/15/2003 7:33	9/15/03 07:58
42	PBA14	ctd	57° 39.200' N	150° 29.000' W	14.5	11	1.3	27	49	39	23	0	9/15/2003 8:08	9/15/03 08:31
43	PBA13	ctd	57° 48.600' N	150° 30.000' W	9.4	11	0.9	50	91	81	25	0	9/15/2003 9:22	9/15/03 09:47
44	PBA12	ctd	57° 52.700' N	150° 27.500' W	4.3	11	0.4	50	91	81	25	0	9/15/2003 10:11	9/15/03 10:36
45	PBA11	ctd	57° 56.900' N	150° 25.700' W	4.3	11	0.4	54	98	88	26	0	9/15/2003 11:00	9/15/03 11:26
46	PBA10	ctd	58° 01.000' N	150° 24.000' W	4.2	11	0.4	87	158	148	30	0	9/15/2003 11:49	9/15/03 12:18
47	PBA9	ctd	58° 06.900' N	150° 22.000' W	6.0	11	0.5	100	182	172	31	0	9/15/2003 12:51	9/15/03 13:23
48	PBA8	ctd	58° 09.100' N	150° 21.300' W	2.2	11	0.2	120	218	208	31	0	9/15/2003 13:35	9/15/03 14:06
49	PBA7	ctd	58° 13.300' N	150° 20.000' W	4.3	11	0.4	50	91	81	25	0	9/15/2003 14:29	9/15/03 14:54
50	PBA6	ctd	58° 18.000' N	150° 18.000' W	4.8	11	0.4	44	80	70	25	0	9/15/2003 15:21	9/15/03 15:45
51	PBA5	ctd	58° 21.800' N	150° 16.900' W	3.8	11	0.3	27	49	39	23	0	9/15/2003 16:06	9/15/03 16:29
52	PB4	ctd	58° 24.200' N	150° 15.200' W	2.6	11	0.2	30	55	45	23	0	9/15/2003 16:43	9/15/03 17:06
55	PB3	ctd	58° 29.000' N	150° 13.200' W	4.9	11	0.4	35	64	54	24	0	9/15/2003 19:32	9/15/03 19:56
54	PB2	ctd	58° 36.200' N	150° 11.000' W	7.3	11	0.7	72	131	121	28	0	9/15/2003 18:37	9/15/03 19:05
53	PB1	ctd	58° 40.000' N	150° 09.000' W	3.9	11	0.4	62	113	103	30	0	9/15/2003 17:27	9/15/03 17:57
56	STB1	ctd	58° 13.500' N	149° 36.300' W	31.5	11	2.9	38	40	30	22	0	9/15/2003 22:48	9/15/03 23:10
57	STB2	ctd	58° 10.400' N	149° 40.000' W	3.7	11	0.3	38	50	40	23	0	9/15/2003 23:30	9/15/03 23:52
58	STB3	ctd	58° 07.200' N	149° 44.300' W	3.9	11	0.4	80	146	136	29	0	9/16/2003 0:14	9/16/03 00:43

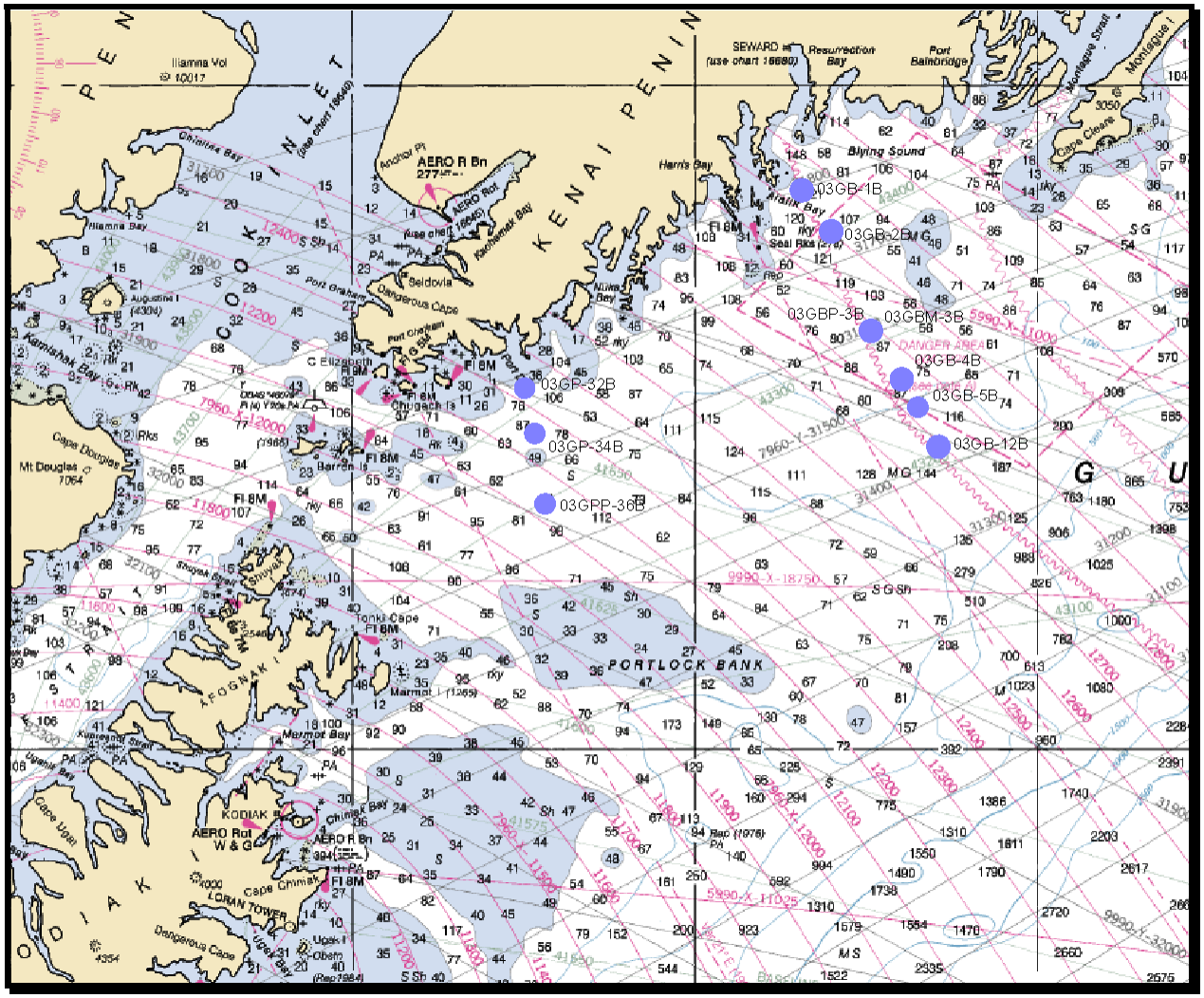
Station ID		Activity	Latitude	Longitude	Dist. (nm)	Spd (kts)	Transit (hrs)	z (fm)	Water Depth (m)	CTD Depth (m)	CTD Time (min)	Net Time (min)	Arrive Local Date/Time	Depart Local Date/Time
59	STB4	ctd	58° 03.100' N	149° 49.000' W	4.8	11	0.4	80	146	136	29	0	9/16/2003 1:09	9/16/03 01:38
60	STB5	ctd	57° 58.800' N	149° 54.400' W	5.2	11	0.5	65	118	108	27	0	9/16/2003 2:06	9/16/03 02:33
61	STB6	ctd	57° 54.200' N	150° 00.000' W	5.5	11	0.5	65	118	108	27	0	9/16/2003 3:03	9/16/03 03:30
62	STB7	ctd	57° 50.000' N	150° 05.100' W	5.0	11	0.5	65	118	108	27	0	9/16/2003 3:58	9/16/03 04:25
63	STB8	ctd	57° 46.800' N	150° 09.300' W	3.9	11	0.4	70	127	117	28	0	9/16/2003 4:46	9/16/03 05:14
64	STB9/STA1	ctd	57° 42.286' N	150° 14.340' W	5.3	11	0.5	80	146	136	29	0	9/16/2003 5:43	9/16/03 06:12
65	STA2	ctd	57° 44.200' N	150° 07.000' W	4.4	11	0.4	80	146	136	29	0	9/16/2003 6:36	9/16/03 07:05
66	STA2a	ctd	57° 46.300' N	149° 59.900' W	4.3	11	0.4	80	146	136	29	0	9/16/2003 7:28	9/16/03 07:57
67	STA3	ctd	57° 48.500' N	149° 52.800' W	4.4	11	0.4	80	146	136	29	0	9/16/2003 8:21	9/16/03 08:50
68	STA3a	ctd	57° 50.600' N	149° 46.900' W	3.8	11	0.3	80	146	136	29	0	9/16/2003 9:11	9/16/03 09:40
69	STA4	ctd	57° 52.700' N	149° 41.000' W	3.8	11	0.3	80	146	136	29	0	9/16/2003 10:00	9/16/03 10:29
70	STA5	ctd	57° 55.000' N	149° 34.700' W	4.1	11	0.4	80	146	136	29	0	9/16/2003 10:52	9/16/03 11:21
71	STA6	ctd	57° 57.000' N	149° 28.200' W	4.0	11	0.4	80	146	136	29	0	9/16/2003 11:42	9/16/03 12:11
72	STA7	ctd	57° 59.000' N	149° 25.000' W	2.6	11	0.2	80	146	136	29	0	9/16/2003 12:26	9/16/03 12:55
73	STA8	ctd	58° 01.300' N	149° 17.200' W	4.7	11	0.4	80	146	136	29	0	9/16/2003 13:21	9/16/03 13:50
74	STA9	ctd	58° 03.800' N	149° 10.200' W	4.5	11	0.4	80	146	136	29	0	9/16/2003 14:14	9/16/03 14:43
75	STA10/SAB1	ctd	58° 06.000' N	149° 04.300' W	3.8	11	0.3	80	146	136	29	0	9/16/2003 15:04	9/16/03 15:33
76	SAB2	ctd	58° 13.600' N	149° 01.500' W	7.7	11	0.7	80	146	136	29	0	9/16/2003 16:15	9/16/03 16:44
77	SAB3	ctd	58° 21.200' N	148° 58.700' W	7.7	11	0.7	80	146	136	29	0	9/16/2003 17:26	9/16/03 17:55
78	SAB4	ctd	58° 28.400' N	148° 55.900' W	7.3	11	0.7	80	146	136	29	0	9/16/2003 18:36	9/16/03 19:05
79	ATB7	ctd	58° 36.750' N	148° 53.000' W	8.5	11	0.8	80	146	136	29	0	9/16/2003 19:51	9/16/03 20:20
80	GB-12	ctd	58° 42.000' N	148° 51.000' W	5.4	11	0.5	110	200	190	33	0	9/16/2003 20:49	9/16/03 21:22
81	ATB5	ctd	58° 47.750' N	148° 49.000' W	5.8	11	0.5	130	237	227	32	0	9/16/2003 21:54	9/16/03 22:25
82	GB-11	ctd	58° 53.500' N	148° 47.000' W	5.8	11	0.5	150	273	263	33	0	9/16/2003 22:57	9/16/03 23:31
83	ATB3	ctd	58° 58.000' N	148° 44.250' W	4.7	11	0.4	130	237	227	32	0	9/16/2003 23:56	9/17/03 00:28
84	ATB2	ctd	59° 02.500' N	148° 41.500' W	4.7	11	0.4	105	191	181	32	0	9/17/2003 0:54	9/17/03 01:26
85	ATB1	ctd	59° 07.000' N	148° 38.900' W	4.7	11	0.4	75	137	127	28	0	9/17/2003 1:52	9/17/03 02:20
86	ATB0	ctd	59° 11.500' N	148° 36.200' W	4.7	11	0.4	70	127	117	28	0	9/17/2003 2:46	9/17/03 03:13
	03GB-12A	recover	58° 55.480' N	148° 34.040' W	16.1	11	1.5	0	0	0	120	0	9/18/2003 8:00	9/18/03 10:00
	03GB-12B	deploy	58° 55.480' N	148° 34.040' W	0.0	11	0.0	0	0	0	90	0	9/18/2003 10:00	9/18/03 11:30
	03GB-12B	ctd	58° 55.480' N	148° 34.040' W	0.0	11	0.0	155	282	272	34	0	9/18/2003 11:30	9/18/03 12:03
	03GB-5A	recover	59° 02.560' N	148° 41.560' W	8.1	11	0.7	0	0	0	120	0	9/18/2003 12:14	9/18/03 14:14
	03GB-5B	deploy	59° 02.560' N	148° 41.560' W	0.0	11	0.0	0	0	0	90	0	9/18/2003 14:14	9/18/03 15:44
	03GB-5B	ctd	59° 02.560' N	148° 41.560' W	0.0	11	0.0	105	191	181	32	0	9/18/2003 15:44	9/18/03 16:16

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
03GB-4A	recover	59° 07.680' N	148° 47.210' W	5.9	11	0.5	0	0	0	120	0	9/18/2003 16:16	9/18/03 18:16
03GB-4B	deploy	59° 07.680' N	148° 47.210' W	0.0	11	0.0	0	0	0	90	0	9/18/2003 18:16	9/18/03 19:46
03GB-4B	ctd	59° 07.680' N	148° 47.210' W	0.0	11	0.0	100	182	172	31	600	9/18/2003 19:46	9/19/03 06:17
03GBM-3A	ctd/bongo	59° 16.500' N	148° 57.920' W	10.4	11	0.9	70	127	117	28	0	9/19/2003 7:14	9/19/03 07:42
03GBM-3A	pickup	59° 16.400' N	148° 57.920' W	0.1	11	0.0	70	127	117	0	180	9/20/2003 8:00	9/20/03 11:00
03GBP-3A	pickup	59° 16.720' N	148° 57.520' W	0.4	11	0.0	0	0	0	0	90	9/20/2003 11:02	9/20/03 12:32
	ctds	59° 16.720' N	148° 57.520' W	0.0	11	0.0		0		0	60	9/20/2003 12:32	9/20/03 13:32
03GBM-3B	deploy	59° 16.400' N	148° 57.920' W	0.4	11	0.0	200	364	0	0	150	9/20/2003 13:34	9/20/03 16:04
03GBP-3B	deploy	59° 16.720' N	148° 57.520' W	0.4	11	0.0	0	0	0	0	120	9/20/2003 16:06	9/20/03 18:06
03GB-1A	ctd	59° 41.500' N	149° 22.260' W	27.8	11	2.5	153	278	268	34	0	9/21/2003 7:00	9/21/03 07:33
03GB-1A/B	recover/deploy	59° 41.500' N	149° 22.260' W	0.0	11	0.0	153	278	268	0	240	9/21/2003 7:33	9/21/03 11:33
03GB-2A	ctd	59° 34.200' N	149° 11.740' W	9.0	11	0.8	153	278	268	0	0	9/21/2003 12:22	9/21/03 12:22
03GB-2A/B	recover/deploy	59° 34.200' N	149° 11.740' W	0.0	11	0.0	153	278	268	0	240	9/21/2003 12:22	9/21/03 16:22
SEWARD, ALASKA	**change SCIs**	**60° 06.301' N**	**149° 25.268' W**	**32.8**	**8**	**4.1**	**80**	**146**	**136**		**120**	**9/21/2003 20:28**	**9/21/03 22:28**
ENW1	ctd	59° 10.000' N	147° 30.000' W	81.0	12	6.8	2000	3640	3630	175		9/22/2003 5:14	9/22/03 08:09
ENW2	ctd	59° 02.000' N	147° 12.000' W	12.2	12	1.0	2000	3640	3635	176		9/22/2003 9:10	9/22/03 12:06
ENW3	ctd	58° 54.000' N	146° 54.000' W	12.3	12	1.0	2000	3640	3630	175		9/22/2003 13:07	9/22/03 16:03
ENW4	ctd	58° 46.000' N	146° 36.000' W	12.3	12	1.0	2000	3640	3630	175		9/22/2003 17:04	9/22/03 19:59
ENW5	ctd	58° 38.000' N	146° 18.000' W	12.3	12	1.0	2000	3640	3630	175		9/22/2003 21:01	9/22/03 23:56
ENW6-center	ctd	58° 30.000' N	146° 00.000' W	12.3	12	1.0	2000	3640	3630	175		9/23/2003 0:58	9/23/03 03:54
ENW7	ctd	58° 22.000' N	145° 42.000' W	12.4	12	1.0	2000	3640	3630	175		9/23/2003 4:55	9/23/03 07:51
ENW8	ctd	58° 14.000' N	145° 24.000' W	12.4	12	1.0	2000	3640	3630	175		9/23/2003 8:53	9/23/03 11:48
ENW9	ctd	58° 06.000' N	145° 06.000' W	12.4	12	1.0	2000	3640	3630	175		9/23/2003 12:50	9/23/03 15:46
ENW10	ctd	57° 58.000' N	144° 48.000' W	12.4	12	1.0	2000	3640	3630	175		9/23/2003 16:48	9/23/03 19:44
ENW11	ctd	57° 50.000' N	144° 30.000' W	12.5	12	1.0	2000	3640	3630	175		9/23/2003 20:46	9/23/03 23:41
ENE1	ctd	59° 10.000' N	144° 45.000' W	80.4	12	6.7	2000	3640	3630	175		9/24/2003 6:23	9/24/03 09:19
ENE2	ctd	59° 02.727' N	144° 58.182' W	9.9	12	0.8	2000	3640	3630	175		9/24/2003 10:09	9/24/03 13:04
ENE3	ctd	58° 55.455' N	145° 11.364' W	10.0	12	0.8	2000	3640	3630	175		9/24/2003 13:54	9/24/03 16:49
ENE4	ctd	58° 48.182' N	145° 24.545' W	10.0	12	0.8	2000	3640	3630	175		9/24/2003 17:39	9/24/03 20:35
ENE5	ctd	58° 40.909' N	145° 37.727' W	10.0	12	0.8	2000	3640	3630	175		9/24/2003 21:25	9/25/03 00:20
ENE6	ctd	58° 33.636' N	145° 50.909' W	10.0	12	0.8	2000	3640	3630	175		9/25/2003 1:10	9/25/03 04:05
ENE7	ctd	58° 26.364' N	146° 04.091' W	10.0	12	0.8	2000	3640	3630	175		9/25/2003 4:56	9/25/03 07:51
ENE8	ctd	58° 19.091' N	146° 17.273' W	10.0	12	0.8	2000	3640	3630	175		9/25/2003 8:41	9/25/03 11:37
EEW9	ctd	58° 11.818' N	146° 30.455' W	10.0	12	0.8	2000	3640	3630	175		9/25/2003 12:27	9/25/03 15:22

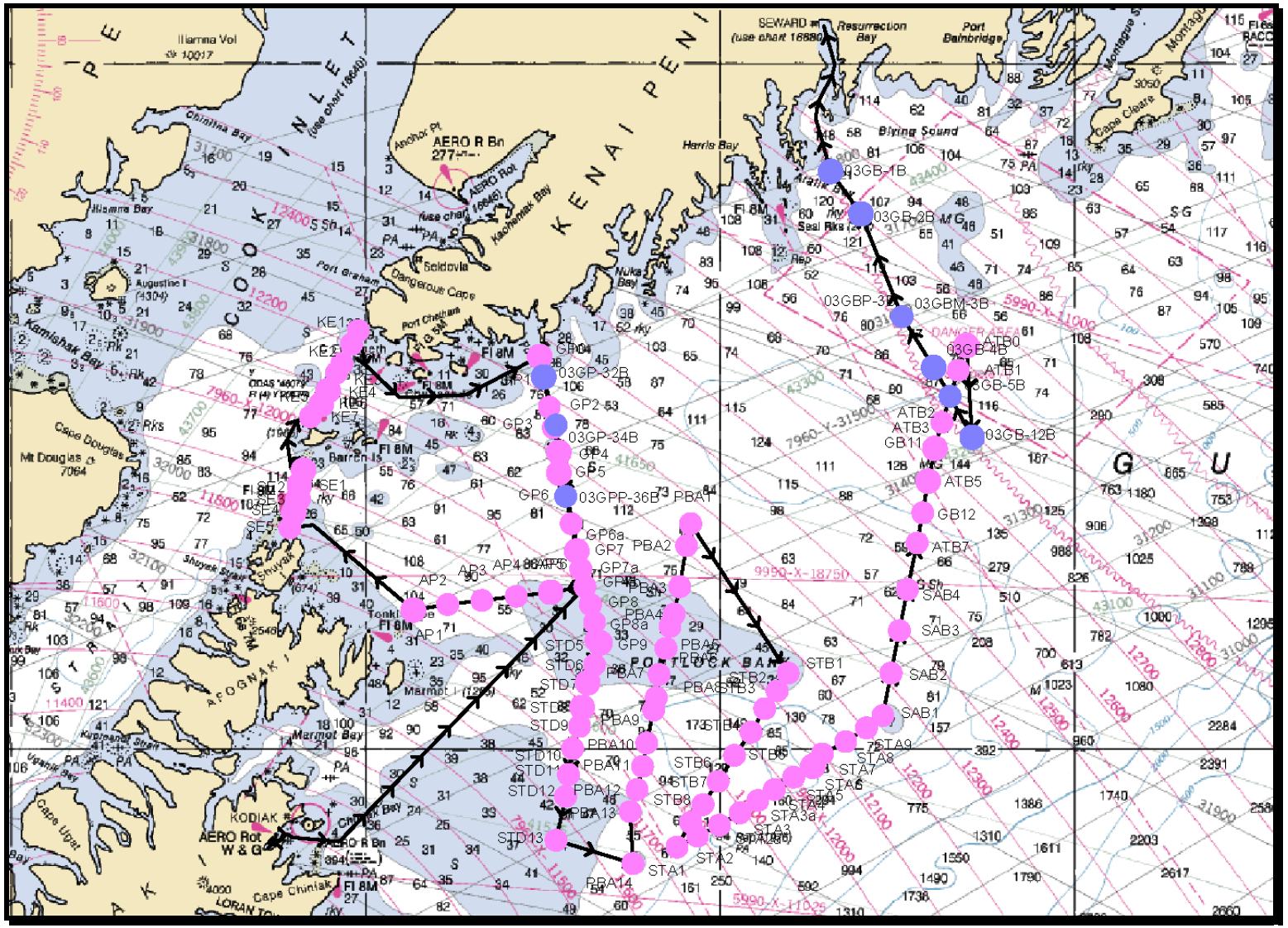
Station ID		Activity	Latitude			Longitude			Dist. (nm)	Spd (kts)	Transit (hrs)	z (fm)	Water Depth (m)	CTD Depth (m)	CTD Time (min)	Net Time (min)	Arrive Local Date/Time	Depart Local Date/Time
	ENE10	ctd	58°	04.545'	N	146°	43.636'	W	10.1	12	0.8	2000	3640	3630	175		9/25/2003 16:13	9/25/03 19:08
	ENE11	ctd	57°	57.273'	N	146°	56.818'	W	10.1	12	0.8	2000	3640	3630	175		9/25/2003 19:59	9/25/03 22:54
	ENE12	ctd	57°	50.000'	N	147°	10.000'	W	10.1	12	0.8	2000	3640	3630	175	1500	9/25/2003 23:45	9/27/03 03:40
More eddy CTDS depending on time																		
	KCW9	ctd	58°	43.200'	N	151°	25.000'	W	91.5	12	7.6	100	182	172	31		9/27/2003 11:18	9/27/03 11:49
	KCW8	ctd	58°	45.738'	N	151°	13.125'	W	6.7	12	0.6	100	182	172	31		9/27/2003 12:23	9/27/03 12:54
	KCW7	ctd	58°	48.275'	N	151°	01.250'	W	6.7	12	0.6	100	182	172	31		9/27/2003 13:27	9/27/03 13:59
	KCW6	ctd	58°	50.813'	N	150°	49.375'	W	6.7	12	0.6	100	182	172	31		9/27/2003 14:32	9/27/03 15:04
	KCW5	ctd	58°	53.350'	N	150°	37.500'	W	6.6	12	0.6	100	182	172	31		9/27/2003 15:37	9/27/03 16:08
	KCW4	ctd	58°	55.888'	N	150°	25.625'	W	6.6	12	0.6	100	182	172	31		9/27/2003 16:41	9/27/03 17:13
	KCW3	ctd	58°	58.425'	N	150°	13.750'	W	6.6	12	0.6	100	182	172	31		9/27/2003 17:46	9/27/03 18:17
	KCW2	ctd	59°	00.960'	N	150°	01.875'	W	6.6	12	0.6	100	182	172	31		9/27/2003 18:51	9/27/03 19:22
	KCW1	ctd	59°	63.500'	N	149°	50.000'	W	62.8	12	5.2	100	182	172	31		9/28/2003 0:36	9/28/03 01:08
Kodiak Island, Alaska		**Arrive**	**57°**	**43.720'**	**N**	**152°**	**31.242'**	**W**	**162.7**	**12**	**13.6**						**9/28/2003 16:00**	

8.4 Figures

8.4.1 Cruise KM0313 Mooring Locations



8.4.2 Cruise KM0313 Transect Lines for September 13-21



8.4.3 Cruise KM0313 Transect Lines for September 22-28