FINAL CRUISE INSTRUCTIONS

ECO-FOCI

NOAA Ship *MILLER FREEMAN*, Cruise MF-0904L2
22 Sept. – 15 Oct.
Chief Scientist – Wm. Floering NOAA/PMEL/AFSC

1.0 FINAL CRUISE INSTRUCTIONS

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

1.2 Cruise Numbers:

1.2.1 Cruise Number – MF-0904L2

1.2.2 Eco-FOCI Number – 2-MF-09

1.3 Cruise Dates: 22 Sept. – 11 Oct., 2009

1.3.1 Departure – Dutch Harbor, AK; 22 Sept, 1500 Local Time

1.3.2 Arrival – Dutch Harbor, AK; 13 Oct, 0800 Local Time

1.3.3 Departure -Dutch Harbor, AK; 13 Oct, 0900 Local Time

1.3.4 Arrival – Kodiak, AK ; 15 Oct, 0800 Local Time

1.4 Operating Area – Bering Sea Shelf North to near St. Lawrence Island.

2.0 CRUISE OVERVIEW

2.1 Cruise Objectives – The continuation of a long term time series of observations describing the physical and biological properties of the Bering Sea shelf. Information will be collected through surface and subsurface mooring instrumentation, CTD casts and water sampling, underway shipboard measurements and plankton tows.

2.2 Applicability - These instructions, with ***FOCI Standard Operating Instructions for NOAA Ship MILLER FREEMAN***, dated March 1, 2005, present complete information for this cruise.

2.3 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

NOAA – National Marine Mammal Laboratory
7600 Snd Point Way N.E., Seattle, WA 98115
Univ. of Alaska Fairbanks (UAF)
Penn. State University

2.4 Personnel

2.4.1 Chief Scientist

Name	Gender	Nationality	Affiliation	E-mail Address
Wm. Floering	M	U.S.A.	PMEL	William.floering@noaa.gov

2.4.2 Other Participating Scientists

Name	Gender	Nationality	Affiliation	Email Address
Carol Dewitt	F	USA	PMEL	Carol.dewitt@noaa.gov
Jay.Clark	M	USA	AFSC	Jay.clark@noaa.gov
Sam Denes	M	USA	Penn.State	
Steve Porter	M	USA	AFSC	Steve.proter@noaa.gov
HYUN-Choel Kim	M	Korea	UAF	
Peter Proctor	M	USA	PMEL	Peter.proctor@noaa.gov
Chrissy Jump	F	USA	AFSC	Chrissy.jump@noaa.gov
Lisa Deforest	F	USA	AFSC	Lisa.deforest@noaa.gov
Jessica Cross	F	USA	UAF	jcross@alaska.edu
Dan Naber	M	USA	UAF	dnaber@alaska.edu
Aaron Lang	M	USA	USFWS	

2.5 Administration

2.5.1 Ship Operations

Marine Operations Center, Pacific
1801 Fairview Avenue East, Seattle, Washington 98102-3767
Telephone: (206) 553-4548
Fax: (206) 553-1109

LCDR Demian Bailey, NOAA
Chief, Operations Division, Pacific (MOP1)
Telephone: (206) 553-8705
Cellular: (206) 390-7527
E-mail: ChiefOps.MOP@noaa.gov

2.5.2 Scientific Operations

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

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

3.0 OPERATIONS

3.1 Data To Be Collected - The standard set of SCS sensors will be monitored and recorded. TSG, weather, GPS, and depth soundings are some of the instruments required for this cruise. The CTD should be equipped with duel Temperature and conductivity sensors. PMEL will provide oxygen sensors, a PAR and flourometer to be installed on the CTD for this cruise. Oxygen, salinity, chlorophyll and nutrient samples will be collected from the rosette so a full rosette of 5 and 10 liter Niskin bottles will be needed. Bongo and Cal Vet tows will be completed along the 70 meter lines and at the mooring sites. Data from the mooring instruments will be downloaded as we recover them.

3.1.1 Scientific Computer System (SCS) - The ship's SCS shall operate throughout the cruise, acquiring and logging data from navigation, meteorological, oceanographic, and fisheries sensors. See ***FOCI Standard Operating Instructions for NOAA Ship MILLER FREEMAN*** (SOI 5.2) for specific requirements.

3.2 Staging Plan – It is our hope that prior to the ship's departure from Seattle early Sept., we will be able to load all the necessary steel floats needed for this cruise. There are a number of additional mooring related items that could also be loaded aboard the vessel prior to their departure from Seattle if space is available. Most if not all of the plankton gear needed for this cruise will be on board in support of the AFSC plankton cruise just prior to ours. The bulk of the equipment will be shipped to Dutch Harbor via Horizon Lines in a 40 foot container. The equipment will be trucked to the pier for loading onto the vessel in Dutch Harbor. Final logistics will depend upon the facilities available at the chosen pier.

3.3 De-staging Plan – Since this is the final cruise of the field season for the Miller Freeman it is our intent to leave the recovered mooring equipment, scientific equipment and samples (frozen or preserved) aboard the vessel for transport to Seattle. PMEL will offload the vessel upon arrival in Seattle.

3.4 Cruise Plan-Operations will consist of many CTD and Bongo stations along with mooring deployments at several historical sites in the Bering Sea and Gulf of Alaska. The Bering Sea operations will center around the 70m line. This is a line of CTD and Bongo stations that has several mooring sites strategically placed along it. It extends from just west of Bristol Bay at mooring site BS-2 to just southwest of St Laurence Island at mooring site BS-8. In addition to the 70m line, several CTD/Bongo lines perpendicular to it (which cross at mooring sites) will be completed. These lines are (from S to N) the CN, MN, and SL lines. A general timeline of operations for the Bering Sea section of the cruise is listed below:

- Head from DH to site BS-2. At BS-2 Recover 2 subsurface and 1 surface mooring. Deploy 2 subsurface. Complete CTD/Bongo "box" around BS-2 and begin 70m line.

- Complete 70m line to site BS-4. Recover one subsurface mooring, deploy 3 subsurface moorings including special "ice" mooring. Complete site 4 "box."
- Complete 70m line to site BS-5. Recover 2 subsurface and deploy 2 subsurface moorings. Complete site 5 "box."
- Complete 70m line to site BS-8. Recover 3 subsurface and deploy 2 subsurface moorings. Complete site 8 "box."
- Complete SL line of CTD/Bongo stations.
- Head to MN line (crosses E-W with site BS-5) and complete CTD/Bongo stations.
- Head to CN line (crosses E-W with site BS-2) and complete CTD/Bongo stations.
- Search for lost mooring at site BS-2.
- Drag for CRAB mooring on slime bank.
- Recover Site 9 mooring on way back to Dutch.

Upon completion of the Bering Sea operations, the majority of the scientific party will depart the ship in Dutch Harbor. Chief Scientist William Floering will remain on the ship as she heads towards Kodiak to recover and deploy two more moorings. One mooring is located in Pavlof Bay. The other is just offshore of Kodiak in Chiniak Bay. Bering Sea operations will be halted with enough time remaining to complete these final two mooring recoveries without impacting the ship's arrival date in Seattle. The Chief Scientist will be dropped off in Kodiak prior to the ship's transit back to Seattle.

3.5 **Station Locations** - See appendix 9.4.

3.6 **Station Operations** - The following are operations to be conducted on this cruise. The procedures for these operations are listed in the ***FOCI Standard Operating Instructions for NOAA Ship MILLER FREEMAN*** (SOI). Operations not addressed in the SOI and changes to standard procedures are addressed below.

- CTD/Water Sample Operations (SOI 3.2.1)
- MARMAP Bongo Tows (SOI 3.2.2)
- CalVET Net Tows (SOI 3.2.6)
- Chlorophyll and Nutrient Sampling Operations (SOI 3.2.10)
- Dissolved Oxygen sampling
- Mooring recovery and mooring deployment operations

3.7 **Underway Operations** - The following are underway operations to be conducted on this cruise. The procedures for these operations are listed in the ***FOCI Standard Operating Instructions for NOAA Ship MILLER FREEMAN*** (SOI). Operations not addressed in the SOI and changes to standard procedures are addressed below.

- Acoustic Doppler Current Profiler (ADCP) Operations (SOI 3.2.13),
- Scientific Computer System (SCS) data acquisition (SOI 5.2),
- Fluorometer monitoring (SOI 5.3),
- Thermosalinograph monitoring (SOI 5.3).

3.8 **Applicable Restrictions** - None

3.9 **Small Boat Operations** – To assist in the recovery on the BS-2 surface mooring.

4.0 FACILITIES

4.1 Equipment and Capabilities Provided by Ship

- Oceanographic winch with slip rings and 3-conductor cable terminated for CTD,
- 12 Khz hull mounted Edgetech Acoustic release transducer,
- Manual wire-angle indicator,
- Oceanographic winch with slip rings and 3-conductor cable terminated for the SBE SEACAT, for net tow operations,
- Sea-Bird Electronics' SBE 911*plus* CTD system with stand, each CTD system should include underwater CTD, weights, and pinger. There should be a deck unit for the system,
- 10-liter Niskin sampling bottles for use with rosette (10 plus 4 spares),
- Conductivity and temperature sensor package to provide dual sensors on the CTD (primary),
- Sea-Bird Electronics' SBE-19 SEACAT system for plankton tows,
- Meter block for plankton tows,
- Wire speed indicators and readout for quarterdeck, Rowe, and Marco winches,
- For meteorological observations: 2 anemometers (one R. M. Young system interfaced to the SCS), calibrated air thermometer (wet-and dry-bulb) and a calibrated barometer and/or barograph,
- Freezer space for storage of biological and chemical samples (blast and storage freezers, indicate desired temperatures),
- RD Instruments' ADCP written to disk,
- Use of PC in DataPlot for data analysis,
- Scientific Computer System (SCS),
- Minimum of 2 computers with internet and e-mail access,
- Removable stern platform (in place),
- Laboratory space with exhaust hood, sink, lab tables and storage space,
- Sea-water hoses and nozzles to wash nets (quarterdeck and aft deck),
- Adequate deck lighting for night-time operations,
- Navigational equipment including GPS and radar,
- Safety harnesses for working on quarterdeck and fantail,
- Ship's crane(s) used for loading and/or deploying.
- Space on bridge for bird observer to conduct seabird survey.

4.2 Equipment and Capabilities Provided by Scientists

- Sea-Bird Electronics' SBE 911*plus* CTD system,
- Sea-Bird Electronics' SBE-19 SEACAT system,
- PMEL PC with SEASOFT software for CTD data collection and processing,
- Fluorometer, light meter and dual oxygen sensors to be mounted on CTD,
- CTD stand modified for attachment of fluorometer,
- Conductivity and temperature sensor package to provide dual sensors on the CTD (backup),
- CTD rosette sampler,

- IAPSO standard water,
- 60-cm bongo sampling arrays,
- 20 cm bongo arrays,
- Spare wire angle indicator,
- CalVET net array,
- Surface moorings (FOCI biophysical platforms),
- Subsurface moorings,
- Miscellaneous scientific sampling and processing equipment,
- Scientific ultra-cold freezer.
- Cruise Operations Database (COD)

5.0 DISPOSITION OF DATA AND REPORTS

5.1 The following data products will be included in the cruise data package:

- **NOAA Form 77-13d - *Deck Log - Weather Observation Sheets***,
- Electronic Marine Operations Abstracts,
- SCS backup,
- Calibration Sheets for all ship's instruments used,
- PMEL CTD Weather Observation Logs,
- CTD Cast Information/Rosette Log,
- ADCP Log Sheets,
- ADCP CD (CD-RW),
- Ultra-cold Freezer Temperature Daily Log (SOI 5.4).

5.2 **Pre- and Post-cruise Meetings** - Cruise meetings may be held in accordance with ***FOCI Standard Operating Instructions for NOAA Ship MILLER FREEMAN*** (SOI 5.5).

6.0 ADDITIONAL PROJECTS

6.1 **Definition** - Ancillary and piggyback projects are secondary to the objectives of the cruise and should be treated as additional investigations. The difference between the two types of secondary projects is that an ancillary project does not have representation aboard and is accomplished by the ship's force.

6.2 **Ancillary Projects** - Any ancillary work done during this project will be accomplished with the concurrence of the Chief Scientist and on a not-to-interfere basis with the programs described in these instructions and in accordance with the ***NOAA Fleet Standing Ancillary Instructions***.

6.3 **Piggyback Projects**

6.3.1 **North Pacific Pelagic Seabird Observer Program:** The U.S. Fish and Wildlife Service has a cooperative agreement with NOAA to conduct seabird and marine mammal surveys from ships of opportunity. This project will provide data for the North Pacific Pelagic Seabird Database. The data will eventually be used to examine seabird and marine mammal distribution relative to oceanographic and biological features. A single observer will operate from the inside bridge, port side, and will require space for a laptop computer. The observer will conduct surveys

opportunistically during daylight hours when the vessel is underway. The observer will be following standard FWS protocol to record all birds and mammals within a 300-m are, extending 90° from bow to beam.

6.3.2 **Equipment and Capabilities Provided by the Scientists:** The observer will bring their own equipment for conducting surveys, including laptop computer, binoculars, rangefinder, and backup hand-held GPS. The observer will require a cable feed to the ship's GPS (serial port). While conducting seabird/marine mammal surveys, the observer will require access to the console providing data on ship's speed, wind speed, SST, SSS, and air temperature.

7.0 HAZARDOUS MATERIALS The field party chief shall be responsible for complying with MOCDOC 15, Fleet Environmental Compliance #07, Hazardous Material and Hazardous Waste Management Requirements of Visiting Scientists. July 2002

7.1 Inventory
See appendix 9.2.

7.2 Material Safety Data Sheet (MSDS)

MSDS will be available from the Chief Scientist.

8.0 MISCELLANEOUS

8.1 Communications - Specific information on how to contact the **NOAA Ship *MILLER FREEMAN*** and all other fleet vessels can be found at:

http://www.moc.noaa.gov/phone.htm

8.2 Important Telephone and Facsimile Numbers and E-mail Addresses

8.2.1 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)

E-Mail: PMEL.Dir.Ops@noaa.gov

8.2.2 Alaska Fisheries Science Center (AFSC):

FOCI - Resource Assessment and Conservation Engineering (RACE):
- (206) 526-4171 (voice)
- (206) 526-6723 (fax)

E-Mail: Janet Duffy Anderson: Janet.Duffy-Anderson@noaa.gov
Jeff Napp: Jeff.Napp@noaa.gov

8.2.3 NOAA Ship *MILLER FREEMAN* - Telephone methods listed in order of increasing expense:

United States Coast Guard - Kodiak, Alaska
- (907) 487-9752
- (907) 487-9753
- (907) 487-4397
- (907) 487-4398

Cellular:
- (206) 790-7594

Iridium:
- (808) 659-5684

INMARSAT Mini-M
- 011-872-761-267-346 (voice/PBX)
- 011-872-761-267-347 (voice)
- 011-872-761-267-348 (fax)

INMARSAT B
- 011-872-330-394-120 (voice)
- 011-872-330-394-121 (fax)

E-Mail:
- OPS.Miller.Freeman@noaa.gov

8.2.4 Marine Operations Center, Pacific (MOP):

Operations Division (MOP1)
- (206) 553-4548 (voice)
- (206) 553-1109 (facsimile)
- E-Mail: ChiefOps.MOP@noaa.gov

8.3 Foreign National Access and Deemed Export Controls on NMAO Vessels

All foreign national access to the vessel shall be in accordance with NAO 207-12 and RADM De Bow's March 16, 2006 memo (http://deemedexports.noaa.gov). The foreign national's sponsor is responsible for obtaining clearances and export licenses required and for providing for required escorts by the NAO. Programs sponsoring foreign nationals should consult with their designated line office personnel to assist with the process (http://deemedexports.noaa.gov/contacts.html).

The following are basic requirements. Full compliance with NAO 207-12 is required.

Responsibilities of the Chief Scientist:

Ensure the following is provided to the Commanding Officer before any foreign national will be allowed on board for any reason:

1. Written notification identifying the NOAA Program individual who is responsible for ensuring compliance with NOAA and export regulations for the foreign national (see Foreign National Sponsor responsibilities below).

2. A copy of the DOC/OSY clearance authorization for access by the foreign national.

3. A copy of Appendix B of NAO 207-12 with NOAA Chief Administrative Officer concurrence endorsement.

4. Written notification that the foreign national has been cleared against the State, Commerce and Treasury departments' Lists to Check.
http://www.bis.doc.gov/ComplianceAndEnforcement/ListsToCheck.htm

5. Provide the NOAA Foreign National List spreadsheet for each foreign national in the scientific party.

Escorts – The Chief Scientist is responsible to provide escorts to comply with NAO 207-12 Section 5.10, or as required by the vessel's DOC/OSY Regional Security Officer.

Ensure all non-foreign national members of the scientific party receive the briefing on Espionage Indicators (NAO 207-12 Appendix A) at least annually or as required by the servicing Regional Security Officer.

Export Control - The Chief Scientist is responsible for complying with NAO 207-12 and the development of Technology Access Control Plans for items they bring aboard. The Chief Scientist must notify the Commanding Officer of any export controlled items they bring aboard and any access restrictions associated with these items.

The Commanding Officer and the Chief Scientist will work together to implement any access controls necessary to ensure no unlicensed export occurs of any controlled technology onboard regardless of ownership.

Responsibilities of the Commanding Officer:

Ensure only those foreign nationals with DOC/OSY clearance are granted access..

Deny access to OMAO platforms and facilities by foreign nationals from countries controlled for anti-terrorism (AT) reasons and individuals from Cuba or Iran without written NMAO approval and compliance with export and sanction regulations.

Ensure foreign national access is permitted only if unlicensed deemed export is not likely to occur.

Ensure receipt from the Chief Scientist of the NOAA Foreign National List spreadsheet for each foreign national in the scientific party.

Ensure Foreign Port Officials, e.g., Pilots, immigration officials, receive escorted access in accordance with maritime custom to facilitate the vessel's visit to foreign ports.

Export Control - 8 weeks in advance of the cruise, provide the Chief Scientist with a current inventory of OMAO controlled technology onboard the vessel and a copy of the vessel Technology Access Control Plan (TACP). Also notify the Chief Scientist of any OMAO-sponsored foreign nationals that will be onboard while program equipment is aboard so that the Chief Scientist can take steps to prevent unlicensed export of Program controlled technology.

The Commanding Officer and the Chief Scientist will work together to implement any access controls necessary to ensure no unlicensed export occurs of any controlled technology onboard regardless of ownership.

Ensure all OMAO personnel onboard receive the briefing on Espionage Indicators (NAO 207-12 Appendix A) at least annually or as required by the servicing Regional Security Officer.

Responsibilities of the Foreign National Sponsor

Export Control - The foreign national's sponsor is responsible for obtaining any required export licenses and complying with any conditions of those licenses prior to the foreign national being provided access to the controlled technology onboard regardless of the technology's ownership.

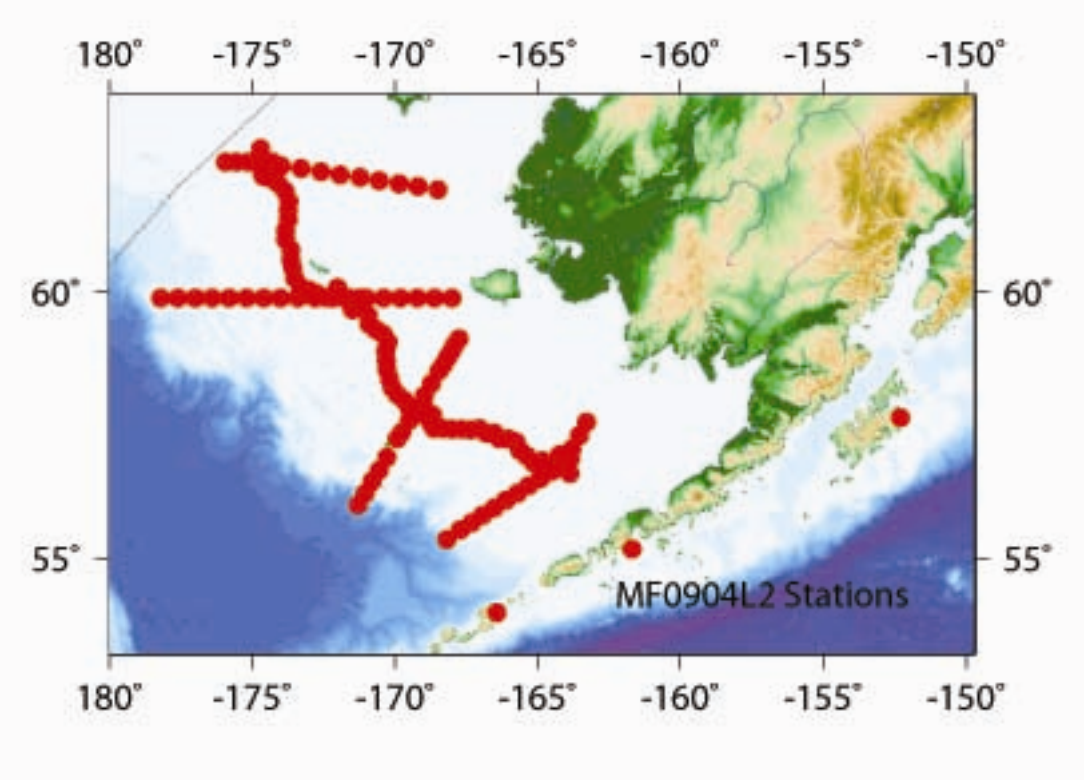
The Departmental Sponsor/NOAA of the foreign national shall assign an on-board Program individual, who will be responsible for the foreign national while on board. The identified individual must be a U.S. citizen, NOAA employee or be approved by the vessel's DOC Regional Security Officer homeport.

Ensure completion and submission of Appendix C (Certification of Conditions and Responsibilities for a Foreign National Guest) as required by NAO 207-12 Section 5.03.h

9.0 APPENDICES

9.1 Figures

9.1.1 Chartlet of work area:



9.2 Hazmat Inventory:

Item	Weight or Volume per vial		Number of vials	Total Amount		Safety Ratings				Spill Response
						H	F	R	C	
Ammonium Molybdate	10.8	g	50	540	g	2	0	1	2	Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust.
Ammonium Molybdate	7.1	g	20	142	g	2	0	1	2	Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust.
Battery, Lithium (general)						2	2	3		Remove personnel from area until fumes dissipate. Do not breathe vapours or touch liquid with barehands. If the skin has come into contact with the electrolyte, it should be washed thoroughly with water. Sand or earth should be used to absorb any exuded material. Seal leaking battery and contaminated absorbent material in plastic bag and dispose of as Special Waste in accordance with local regulations.
Brij (Surfactant)	100	ml	3	300	ml	1	0	0	0	Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust.
Cadmium	26	g	5	130	g	3	3	1	1	Use non-sparking equipment and collect in ziplock
Copper Sulfate	20	g	5	100	g	2	0	0	2	Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust.
Dowfax	100	ml	3	300	ml	2	0	1	1	Absorb material with dri-zorb or kitty litter

Hydrazine Sulfate	10	g	20	200	ml	3	1	2	3	Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust.
Hydrochloric Acid (Conc)		10 x 1 liter				3	0	2	4	Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer
Imidazole	13.6	g	15	204	g	3	1	0	3	Remove all sources of ignition. Use non-sparking equipment. Reduce airborne dust and prevent scattering by moistening with water. Pick up spill for recovery or disposal and place in a closed container.
Manganese Chloride	600	g	3	1800	g	1	0	1	1	Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal.
N-1-Naphthylethylenediamine Dihydrochloride	1	g	20	20	g	2	1	1	2	Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust.

Phenol	100	g	2	200	g	3	2	1	4	Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. 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, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! Dry lime or soda ash may be used on spill for neutralization.
Potassium Iodate	0.4	g	3	1.2	g	2	0	3	1	Remove all sources of ignition. Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: 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.
Potassium Nitrate	3.8	g	5	19	g	2	0	3	2	Use non-sparking equipment. Reduce airborne dust and prevent scattering by moistening with water. Pick up spill for recovery or disposal and place in a closed container.
Potassium Phosphate	0.32	g	5	1.6	g	1	0	0	1	Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust.

Sodium Citrate, Dihydrate	140	g	24	3360	g	1	1	0	1	Remove all sources of ignition. Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: 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.
Sodium Fluorosilicate	0.5	g	8	4	g	3	1	1	1	Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust.
Sodium Hydroxide 10N		1 liter				3	0	2	4	Contain and recover liquid when possible. 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.
Sodium Hydroxide, 10N	500	g	3	1500	g	3	0	2	4	Ventilate area of leak or spill. Keep unnecessary and unprotected people away from area of spill. Wear appropriate personal protective equipment as specified in Section 8. Contain and recover liquid when possible. 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.

Sodium Iodide	600	g	3	1800	g	2	0	1	2	Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust. Small amounts of residue may be flushed to sewer with plenty of water.
Sodium Nitrite	0.05	g	15	0.75	g	1	0	3	1	Use non-sparking equipment. Reduce airborne dust and prevent scattering by moistening with water. Pick up spill for recovery or disposal and place in a closed container.
Sodium Nitroprusside	0.5	g	12	6	g	3	0	1	3	Ventilate area of leak or spill. Keep unnecessary and unprotected people away from area of spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust.
Sodium Thiosulfate	40	g	3	120	g	1	0	1	1	Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal.
Stannous Chloride	50	g	15	750	g	2	0	2	2	Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust.
Sulfanilamide	10	g	20	200	g	0	1	1	1	Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust.

Sulfuric Acid		4 x 500 ml				2	0	1	3	Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer
Tartaric Acid	150	g	20	3000	g	0	1	0	1	Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust.

9.4 Station Table

Sta Name	Activity	Lat.	lat-min	H	Long	lon-min	H	Dist. (nm)	Dist. (km)	Spd (kts)	Transit (hrs)	Water Depth (m)	CTD Depth (m)
Depart Dutch Harbor	DEPART	53	52.833	N	166	25.93	W						
CN16	CTD/BON	55	22.320	N	168	10.740	W	108.12	197.3	10.5	10.3	456	451
CN14	CTD/BON	55	33.250	N	167	42.400	W	19.44	35.5	10.5	1.9	139	134
CN13	ctd	55	42.000	N	167	18.240	W	16.22	29.6	10.5	1.5	137	132
CN12	CTD/BON	55	51.060	N	166	54.420	W	16.18	29.5	10.5	1.5	133	128
CN11	ctd	55	59.220	N	166	30.600	W	15.65	28.6	10.5	1.5	125	120
CN10	CTD/BON	56	8.220	N	166	6.240	W	16.32	29.8	10.5	1.6	107	102
CN9	ctd	56	16.680	N	165	42.060	W	15.90	29.0	10.5	1.5	91	86
CN8	CTD/BON	56	25.320	N	165	18.180	W	15.81	28.9	10.5	1.5	80	75
CN7	ctd	56	33.840	N	164	54.300	W	15.71	28.7	10.5	1.5	80	75
CN6	CTD/BON	56	42.300	N	164	30.540	W	15.58	28.4	10.5	1.5	73	68
CN5/ M2	ctd	56	53.922	N	164	2.292	W	19.36	35.3	10.5	1.8	71	66
CN4	CTD/BON	57	7.830	N	163	47.820	W	15.99	29.2	10.5	1.5	60	55
CN3	ctd	57	22.992	N	163	31.680	W	17.51	31.9	10.5	1.7	47	42
CN2??	CTD/BON	57	38.220	N	163	16.560	W	17.27	31.5	10.5	1.6	46	41
CTD - M2E	CTD/BON	56	56.50	N	163	50.01	W	45.48	83.0	10.5	4.3	70	65
CTD -M2N	CTD/BON	57	1.00	N	164	13.00	W	13.32	24.3	10.5	1.3	73	68
CTD - M2W	CTD/BON	56	46.00	N	164	20.00	W	15.49	28.3	10.5	1.5	75	70
CTD -M2S	CTD/BON	56	40.00	N	163	52.00	W	16.51	30.1	10.5	1.6	73	68
70M2/M2	mooring site-in2008	56	52.600	N	164	3.400	W	14.07	25.7	10.5	1.3	74	69
70M2/M2	3 CalVETs	56	54.000	N	164	3.200	W	1.41	2.6	10.5	0.1	73	68
70M2/M2	CTD/BON	56	54.000	N	164	3.200	W	0.01	0.0	10.5	0.0	73	68

70M3	CTD/BON	56	48.5	N	164	35	W	18.25	33.3	10.5	1.7	73	68
70M4	ctd	56	54.560	N	164	49.650	W	10.05	18.3	10.5	1.0	72	67
70M5	CTD/BON	56	51.540	N	165	7.370	W	10.15	18.5	10.5	1.0	73	68
70M6	ctd	56	59.610	N	165	22.650	W	11.61	21.2	10.5	1.1	72	67
70M7	CTD/BON	57	6.400	N	165	36.800	W	10.27	18.7	10.5	1.0	70	65
70M8	ctd	57	15.730	N	165	44.830	W	10.30	18.8	10.5	1.0	70	65
70M9	CTD/BON	57	19.260	N	166	0.670	W	9.27	16.9	10.5	0.9	70	65
70M10	ctd	57	19.340	N	166	19.580	W	10.22	18.7	10.5	1.0	70	65
70M11	CTD/BON	57	26.280	N	166	30.750	W	9.20	16.8	10.5	0.9	70	65
70M12	ctd	57	25.720	N	166	48.720	W	9.70	17.7	10.5	0.9	70	65
70M13	CTD/BON	57	31.340	N	167	2.290	W	9.22	16.8	10.5	0.9	70	65
70M14	ctd	57	29.960	N	167	20.650	W	9.97	18.2	10.5	0.9	71	66
70M15	CTD/BON	57	30.070	N	167	39.910	W	10.36	18.9	10.5	1.0	72	67
70M16	ctd	57	30.040	N	167	59.170	W	10.36	18.9	10.5	1.0	71	66
70M17	CTD/BON	57	31.210	N	168	18.240	W	10.32	18.8	10.5	1.0	79	74
70M18	ctd	57	31.440	N	168	36.810	W	9.98	18.2	10.5	1.0	78	73
70m19-M4S	CTD/BON	57	36.00	N	168	42.00	W	5.35	9.8	10.5	0.5	75	70
CTD - M4E	CTD/BON	57	46.00	N	168	40.00	W	10.07	18.4	10.5	1.0	74	69
70M21/M4	3 CalVETs	57	50.000	N	168	53.201	W	8.10	14.8	10.5	0.8	73	68
70M21/M4	CTD/BON	57	50.000	N	168	53.201	W	0.01	0.0	10.5	0.0	73	68
70M21 M4-go1 mi away	Mooring	57	51.120	N	168	53.201	W	1.13	2.1	10.5	0.1	73	68
70m22 - M4W	CTD/BON	57	46.00	N	169	12.00	W	11.26	20.5	10.5	1.1	71	66
CTD - M4N	CTD/BON	57	55.00	N	169	0.00	W	11.05	20.2	10.5	1.1	71	66
70M23	ctd	57	54.420	N	169	30.000	W	15.96	29.1	10.5	1.5	70	65
70M24	CTD/BON	58	2.530	N	169	40.350	W	9.80	17.9	10.5	0.9	69	64
70M25	ctd	58	8.830	N	169	55.090	W	10.03	18.3	10.5	1.0	71	66
70M26	CTD/BON	58	16.920	N	170	5.680	W	9.84	18.0	10.5	0.9	72	67
70M27	ctd	58	26.770	N	170	11.140	W	10.27	18.7	10.5	1.0	73	68
70M28	CTD/BON	58	37.020	N	170	16.530	W	10.64	19.4	10.5	1.0	72	67

70M29	ctd	58	46.460	N	170	17.620	W	9.47	17.3	10.5	0.9	71	66
70M30	CTD/BON	58	56.900	N	170	19.640	W	10.50	19.2	10.5	1.0	72	67
70M31	ctd	59	6.410	N	170	14.810	W	9.84	18.0	10.5	0.9	69	64
70M32	CTD/BON	59	14.820	N	170	24.730	W	9.84	18.0	10.5	0.9	68	63
70M33	ctd	59	20.120	N	170	39.350	W	9.17	16.7	10.5	0.9	70	65
70M34	CTD/BON	59	26.140	N	170	54.360	W	9.74	17.8	10.5	0.9	86	81
70M35	ctd	59	35.700	N	170	55.370	W	9.58	17.5	10.5	0.9	85	80
70M36	CTD/BON	59	42.930	N	171	8.390	W	9.78	17.9	10.5	0.9	84	79
70M37	ctd	59	46.620	N	171	26.980	W	10.08	18.4	10.5	1.0	83	78
M5E	CTD/BON	59	53.88	N	171	15.50	W	9.28	16.9	10.5	0.9	81	76
CTD - M5S	CTD/BON	59	42.00	N	171	30.00	W	13.95	25.5	10.5	1.3	80	75
70m38/ M5	3 CalVETs	59	53.5	N	171	42.660	W	13.16	24.0	10.5	1.3	79	74
70m38/ M5	CTD/BON	59	53.5	N	171	42.660	W	0.01	0.0	10.5	0.0	79	74
70m38M5	mooring site 2008	59	54.578	N	171	42.472	W	1.09	2.0	10.5	0.1	79	74
70M38 - M5N	CTD/BON	60	4.50	N	172	0.00	W	13.25	24.2	10.5	1.3	77	72
70M39 M5W	CTD/BON	59	53.88	N	172	10.00	W	11.75	21.4	10.5	1.1	76	71
70M40	ctd	59	54.690	N	172	26.110	W	8.13	14.8	10.5	0.8	74	69
70M41	CTD/BON	59	58.690	N	172	44.770	W	10.18	18.6	10.5	1.0	68	63
70M42	ctd	60	2.230	N	173	0.390	W	8.58	15.7	10.5	0.8	70	65
70M43	CTD/BON	60	6.030	N	173	19.000	W	10.04	18.3	10.5	1.0	70	65
70M44	ctd	60	15.100	N	173	31.300	W	10.95	20.0	10.5	1.0	70	65
70M45	CTD/BON	60	25.500	N	173	35.500	W	10.62	19.4	10.5	1.0	60	55
70M46	ctd	60	34.310	N	173	38.370	W	8.93	16.3	10.5	0.9	68	63
70M47	CTD/BON	60	44.330	N	173	38.880	W	10.03	18.3	10.5	1.0	72	67
70M48	ctd	60	54.440	N	173	49.480	W	11.36	20.7	10.5	1.1	83	78
70M49	CTD/BON	61	3.940	N	173	49.760	W	9.51	17.4	10.5	0.9	79	74
70M50	ctd	61	14.990	N	173	44.450	W	11.35	20.7	10.5	1.1	75	70
70M51	CTD/BON	61	24.640	N	173	44.170	W	9.66	17.6	10.5	0.9	75	70
70M52	ctd	61	33.610	N	173	42.730	W	9.01	16.4	10.5	0.9	72	67
70M53	CTD/BON	61	43.640	N	173	51.280	W	10.83	19.8	10.5	1.0	71	66

70M54	ctd	61	51.730	N	174	5.656	W	10.57	19.3	10.5	1.0	71	66
70M55	CTD/BON	61	56.600	N	174	21.850	W	9.06	16.5	10.5	0.9	73	68
m8-S	Mooring 2008	61	58.5	N	174	37.02	W	7.39	13.5	10.5	0.7	70	65
70M56	ctd	62	1.590	N	174	39.520	W	3.32	6.1	10.5	0.3	74	69
M8	moorings- 3 pickups & 2 deployed	62	11.64	N	174	44	W	10.28	18.8	10.5	1.0	71	66
SL1bb	CTD/BON	61	44.940	N	168	29.148	W	178.10	325.0	10.5	17.0	25	20
SL1aa	ctd	61	47.940	N	169	10.308	W	19.71	36.0	10.5	1.9	25	20
SL1	CTD/BON	61	50.880	N	169	51.468	W	19.67	35.9	10.5	1.9	30	25
SL2a	ctd	61	53.880	N	170	32.628	W	19.64	35.9	10.5	1.9	35	30
SL4a	CTD/BON	61	56.880	N	171	13.788	W	19.61	35.8	10.5	1.9	43	38
SL6a	ctd	61	59.820	N	171	54.948	W	19.57	35.7	10.5	1.9	45	40
SL8a	CTD/BON	62	2.802	N	172	36.108	W	19.55	35.7	10.5	1.9	50	45
SL9a	ctd	62	5.778	N	173	17.268	W	19.52	35.6	10.5	1.9	60	55
SL11a	CTD/BON	62	8.760	N	173	58.428	W	19.49	35.6	10.5	1.9	70	65
M8E/SL12a	CTD/BON	62	12	N	174	18	W	9.70	17.7	10.5	0.9	70	65
M8-N	CTD/BON	62	25.3	N	174	42	W	17.37	31.7	10.5	1.7	80	75
M8	CTD	62	12	N	174	45	W	13.38	24.4	10.5	1.3	70	65
M8	mooring site	62	11.64	N	174	44	W	0.60	1.1	10.5	0.1	71	66
SL14/M8W	ctd	62	12.000	N	175	9.090	W	11.72	21.4	10.5	1.1	80	75
SL12	CTD	62	12	N	174	37.5	W	14.74	26.9	10.5	1.4	70	65
SL15	CTD/BON	62	12.000	N	175	32.950	W	25.87	47.2	10.5	2.5	85	80
SL16	ctd	62	12.000	N	175	56.340	W	10.92	19.9	10.5	1.0	90	85
MN18	ctd	59	54.000	N	178	12.000	W	152.81	278.9	10.5	14.6	173	168
MN17	CTD/BON	59	54.000	N	177	36.000	W	18.06	33.0	10.5	1.7	135	130
MN16	ctd	59	54.000	N	177	0.000	W	18.06	33.0	10.5	1.7	100	95
MN15	CTD/BON	59	54.000	N	176	24.000	W	18.06	33.0	10.5	1.7	100	95
MN14	ctd	59	54.000	N	175	48.500	W	17.81	32.5	10.5	1.7	132	127
MN13	CTD/BON	59	54.000	N	175	12.000	W	18.32	33.4	10.5	1.7	100	95
MN12	ctd	59	54.000	N	174	36.000	W	18.06	33.0	10.5	1.7	90	85
MN11	CTD/BON	59	54.000	N	174	0.000	W	18.06	33.0	10.5	1.7	80	75

MN10	ctd	59	54.000	N	173	24.000	W	18.06	33.0	10.5	1.7	76	71
MN9	CTD/BON	59	54.000	N	172	48.000	W	18.06	33.0	10.5	1.7	70	65
MN8	ctd	59	54.000	N	172	12.100	W	18.01	32.9	10.5	1.7	66	61
70m20~site5	Moorng site-NOT a Station	59	53.88	N	171	42.660	W	14.78	27.0	10.5	1.4	67	62
MN7	CTD/BON	59	54.000	N	171	36.000	W	3.35	6.1	10.5	0.3	70	65
MN6	CTD/BON	59	54.000	N	171	0.100	W	18.01	32.9	10.5	1.7	66	61
MN5	ctd	59	54.000	N	170	24.000	W	18.11	33.1	10.5	1.7	64	59
MN4	CTD/BON	59	54.000	N	169	48.000	W	18.06	33.0	10.5	1.7	50	45
MN3	ctd	59	54.000	N	169	12.000	W	18.06	33.0	10.5	1.7	48	43
MN2	CTD/BON	59	54.000	N	168	36.000	W	18.06	33.0	10.5	1.7	42	37
MN1	ctd	59	54.000	N	168	0.000	W	18.06	33.0	10.5	1.7	38	33
NP01	CTD/BON	59°	10.300'	N	167°	45.000'	W	44.37	81.0	10.5	4.2	38	33
NP02	ctd	59	3.030	N	167	53.610	W	8.52	15.5	10.5	0.8	41	36
NP2a	CTD/BON	58°	56.438'	N	168°	01.288'	W	7.70	14.0	10.5	0.7	43	38
NP03	ctd	58	49.810	N	168	9.510	W	7.88	14.4	10.5	0.8	45	40
NP3a	CTD/BON	58°	42.575'	N	168°	17.575'	W	8.37	15.3	10.5	0.8	51	46
NP04	ctd	58	35.720	N	168	26.110	W	8.18	14.9	10.5	0.8	74	69
NP05	CTD/BON	58	21.560	N	168	42.020	W	16.43	30.0	10.5	1.6	72	67
NP06	ctd	58	8.010	N	168	58.040	W	15.97	29.1	10.5	1.5	70	65
NP07	ctd	57	54.110	N	169	14.550	W	16.43	30.0	10.5	1.6	68	63
NP08	CTD/BON	57	40.820	N	169	30.420	W	15.76	28.8	10.5	1.5	69	64
NP09	ctd	57	26.810	N	169	46.400	W	16.43	30.0	10.5	1.6	67	62
NP10	CTD/BON	57	19.380	N	169	55.320	W	8.86	16.2	10.5	0.8	75	70
NP11	ctd	56	58.300	N	170	16.840	W	24.11	44.0	10.5	2.3	74	69
NP12	CTD105	56	43.4	N	170	32.4	W	17.17	31.3	10.5	1.6	123	30
NP13	CTD/BON	56	30.720	N	170	48.480	W	15.47	28.2	10.5	1.5	123	30
NP14	ctd	56	17.030	N	171	3.230	W	15.95	29.1	10.5	1.5	136	30
NP15	CTD/BON	56	3.235	N	171	18.048	W	16.08	29.4	10.5	1.5	2752	150
Depart Dutch Harbor	DEPART	53	52.833	n	166	25.93	W	212.35	387.5	10.5	20.2		
Pavlof Bay	Mooring	55	10.86	N	161	41.163	W	182.70	333.4	10.5	17.4		
Chiniak Bay	Mooring	57	43.2	N	152	17.49	W	346.39	632.2	10.5	33.0		