UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NOAA Marine and Aviation Operations
Marine Operations Center
439 W. York Street
Norfolk, VA 23510-1114

MEMORANDUM FOR: Captain Robert Kamphaus, NOAA
Commanding Officer, NOAA Ship *Ronald H. Brown*

Anne K Lynch CAPT/NOAA

JUL 31 2015

FROM: Captain Anne K. Lynch, NOAA
Commanding Officer, NOAA Marine Operations Center-Atlantic

SUBJECT: Project Instruction for RB-15-05/06
Eco-FOCI and NOS Arctic Cruise

Attached is the final Project Instruction for RB-15-05/06, Eco-FOCI and NOS Arctic Cruise, which is scheduled aboard NOAA Ship *Ronald H. Brown* during the period of August 6 – September 4, 2015. Of the 30 DAS scheduled for this project, 30 DAS are funded by a Line Office Allocation (16 DAS are funded by OAR and 14 DAS are funded by NOS).

This project is estimated to exhibit a High Operational Tempo. Acknowledge receipt of these instructions via e-mail to **OpsMgr.MOA@noaa.gov** at Marine Operations Center-Atlantic.

cc:
Nancy B. Kachel
S. Ian Hartwell
Phyllis Stabeno
Mary Erickson
Christopher L. Sabine

NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

UNITED STATES DEPARTMENT OF COMMERCE

PMEL Pacific Marine Environmental Laboratory

NCCOS Center for Coastal Monitoring and Assessment

Final Project Instructions

Date Submitted: July 6, 2015

Platform: NOAA Ship *Ronald H. Brown*

Project Number: RB-15-05/06

Project Title: *Eco-FOCI and NOS Arctic Cruise*

Project Dates: **6 August – 4 September, 2015**

Prepared by: Dr. Nancy B. Kachel, Nancy B. Kachel Dated: 7/27/15
Chief Scientist, Research Scientist
NOAA/OAR/PMEL and University of Washington, JISAO

Prepared by: Dr. S. Ian Hartwell, HARTWELL.STUART.IAN.1365860730 Digitally signed by HARTWELL.STUART.IAN.1365860730 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=HARTWELL.STUART.IAN.1365860730 Date: 2015.07.27 14:18:56 -04'00' Dated: _____
Co-Chief Scientist, Co-PI
NOAA/NOS/NCCOS/ Center for Coastal Monitoring Assessment

Approved by: Dr. Phyllis Stabeno, Phyllis J. Stabeno Dated: 7/27/15
Program Lead
EcoFOCI, NOAA-PMEL

Approved by: Mary Erickson, Mary C Erickson Digitally signed by ERICKSON.MARY.C.1365826923 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=ERICKSON.MARY.C.1365826923 Date: 2015.07.27 [illegible] Dated: _____
Director, NOAA-NCCOS

Approved by: Dr. Christopher L. Sabine, _____ Dated: 7-28-15
Director, NOAA-PMEL

Approved by: Captain Anne K. Lynch, _____ CAPT/NOAA Dated: 7/30/2015
NOAA, Commanding Officer
Marine Operations Center - Atlantic

JUL 31 2015

I. Overview

A. Brief Summary and Project Period

This is a joint project between OAR/PMEL/Eco-FOCI and NOS to survey the Chukchi and Beaufort Seas.

PMEL/ Eco-FOCI RB-15-05

The Eco-FOCI project goal is to sample the series of transects shown in Figure 1 using CTD casts, Tucker sled trawls and MARMAP (bongo) tows. This is part of the multi-institutional effort to obtain a baseline characterization of the biological, chemical and physical oceanography of ice-free portions of the U.S. Chukchi and Beaufort Seas and to understand the changing ecosystems NOAA/PMEL/Eco-FOCI has occupied several transects across their shelves during four of the last five years. In addition, we have deployed multiple moorings at sites on the Chukchi shelf. Several of these transects are part of the "Distributed Biological Observatory (DBO)". DBO sampling is focused on transects centered on locations of high productivity, biodiversity and rates of biological change. The DBO effort has expanded into the Beaufort as of 2015, and comprises part of our effort there.

NOS RB-15-06

The goal of the NOS project is to assess habitat conditions that influence biodiversity and distribution of benthic infaunal communities, contaminants, and chemical body burdens of resident organisms as measures of environmental health in the bays and lagoons in the Chukchi and Beaufort Seas in the vicinity of proposed oil transport pipelines. Baseline data will be essential for monitoring pollution control effectiveness and NRDA activities in the event of a spill. Offshore sampling in the region was carried out from 2010-2012 in collaboration with the State of Alaska Dept. of Environmental Conservation (DEC) and the University of Alaska Fairbanks (UAF). The assessment will be augmented by further collaboration with the DEC Aquatic Resources Survey to address information gaps relevant to Ocean Discharge Criteria Evaluation (ODCE) of lease sale areas relating to oil and gas development in rivers entering the Chukchi and Beaufort Seas. Information gaps identified by a DEC/UAF working group are determination of baseline concentrations for hydrocarbons and trace metals in key prey of anadromous and marine fishes inhabiting Chukchi and Beaufort Sea estuaries. The Office of Response and Restoration (ORR) is also collaborating and has several objectives to address pre-spill baseline data needs.

B. Days at Sea (DAS)

Of the 30 DAS scheduled for this project, 0 DAS are funded by an OMAO allocation, 30 DAS are funded by Line Office Allocations (16 DAS for OAR and 14 DAS for

NOS), 0 DAS are Program Funded, and 0 DAS are Other Agency funded. This project is estimated to exhibit a High Operational Tempo.

C. Operating Area

Chukchi and Beaufort Sea and their coastal bays and inlets: For maps see Appendix I Figures 1 and 2 and for stations see Appendix IIA (PMEL/Eco-FOCI) and Appendix IIB (NOS inshore stations).

D. Summary of Objectives

The Eco-FOCI part of the project plans to perform hydrographic and zooplankton studies in the Chukchi and Beaufort Seas; to serve as first backup to recover 2 wave-gliders; and to serve as second backup to recover one mooring, yet to be deployed, but to be located somewhere along the Chukchi grid on the map above. Whether *Brown* will serve as these backups will be unknown until after the cruise has begun. The NOS portion of this project seeks to survey a series of inlets and bays using the small boat *Peggy D*. NOS plans to collect sediment and fish tissue samples for chemical analyses, benthic and epi-benthic community assessment samples, and water column quality measurements.

The ship is scheduled to depart Kodiak on 6 August 2015 with all scientists aboard and transit through Unimak Pass to the Bering Sea. As the ship transits the Bering Sea shelf, we plan to do a test CTD cast that will collect samples for an experiment involving analysis techniques.

The ship will then proceed to Bering Strait, where, if time permits, we will occupy 2 CTD/Bongo stations. If time permits once more, we will then transit to the outside station of the Pt. Hope Line and occupy its stations before continuing to Kasegulak Bay, on the east side of Icy Cape. During the days of (Aug. 12-13) NOS and ORR will take *Peggy D* to conduct inshore and beach surveys.

The 4 ARGOS-tracked drifters will be deployed early in the cruise at positions to be determined partially by the progress of the cruise.

On days when *Peggy D* is inshore, *Brown* will move offshore, in consultation with *Brown's* officers, to seek the location of a coastal oceanographic front. If the front is positioned sufficiently close to shore, we plan to occupy a pattern of stations zigzagging across the front. If there is insufficient time during the day, or if the distance is too far from *Peggy D's* location, these operations will be conducted at night, after *Peggy D* is aboard *Brown*. This operation will be repeated other days and nights, as possible, offshore other NOS/ORR sampling sites in the Chukchi Sea.

NOS plan to sample Kasagulak bay on 12 August, Wainwright on 13 August, nearshore between there and Peard Bay on 14 August.

The nearshore ops on 14 Aug consist of 2 lines of stations. The deep stratum runs along shore north of Wainwright for about 10 mi and extends from the 3 mile State waters limit in to the 6 fathom isobath. The shallow stratum covers the same length of shoreline from the 6 fathom isobath to the shoreline. There are 5 primary sites (e.g. 1-1P) and 10 alternates (1-1A) in each stratum. The deep sites will be sampled off the RV Brown and the shallow sites off the Peggy D. The latter are of secondary priority and will be sampled only if weather permits and sufficient crew are available.

From 15-17 August NOS will occupy inshore stations in Peard Bay. With *Peggy D* aboard we will then occupy a grid of CTD/Bongo stations (WT-HS-BX-BC), ending in Barrow, AK on August 17-19.

At Elson Lagoon/Dease/Admiralty Inlet NOS plans 2 days of inshore work on 20-21 August. On the evening/morning of 21-22 August we will occupy the B154 line of CTD/Bongo stations, before returning to the coast at Smith Bay on the morning of 22 August. NOS will work inshore at Smith Bay on Aug. 22. On the evening/morning of 22-23 August we will occupy the B152 line of hydro/net stations, before returning to the coast. On August 23-24, NOS will take *Peggy D* inshore to Harrison Bay. Overnight Aug 24 – August 25 *Brown* will occupy the B150 lines of hydro/net stations, and then return to Smith Bay August 26 for a second day of NOS small boat ops there.

Brown will then return to Barrow on the morning of 27 August to potentially drop off the NOS scientists either on the Chukchi side at the beach in Browerville, or in Elson Lagoon, whichever is more feasible. If weather/sea conditions are infeasible for this operation, we will depart no later than an agreed-upon hour (to be decided).

After Barrow we will occupy a grid of 6 lines in the Chuckchi Sea with CTDs and Bongo net tows: Icy Cape (IC), Chukchi ABC (CKA, CKB, CKC) and Cape Lisbourne (LB).

During the occupation of this grid, we might be called upon as second backup, to recover a surface mooring near the IC line. In addition, we might be called upon as first backup to recover 2 Waveglider drones (http://liquidr.com/) or (http://liquidr.com/technology/waveglider/sv2.html). Hydrographic stations will be cut to make time for these operations, if they become necessary.

At the end of the last of these lines, we will proceed to Dutch Harbor for a planned arrival on September 4.

Two ARGO drifters (not ARGOS-tracked drifters will be deployed near the last waypoint (in Bering Canyon) on the itinerary spreadsheet. For their deployment is required that the bottom depth exceed 2000m.

If the transit proves to be quicker than estimated we plan to occupy 2 legs of a box of stations at Unimak Pass (UPS and UPW) before coming into port.

Bird observers and whale watchers (up to 2 total) will conduct surveys from the bridge whenever conditions are favorable during transits. One of the observers may accompany the NOS team on an inshore trip(s) on *Peggy D.*

E. Participating Institutions

NOAA/NOS/NCCOS
National Status and Trends Program
1305 East West Hwy. (SSMC4, N/SCI-1)
Silver Spring, MD 20910

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

Joint Institute for the Study of the Atmosphere and Oceans (JISAO)
University of Washington
3737 Brooklyn Ave. NE
Seattle, WA 98105-6715

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

University of Alaska (UAF)
505 South Chandalar Drive
Fairbanks, AK 99775

College of Earth, Ocean, and Atmospheric Sciences
Oregon State University
104 CEOAS Administration Building
Corvallis, OR 97331-5503

USFWS Migratory Bird Management
1011 E Tudor Rd, MS 341
Anchorage AK 99503

Alaska Dept. of Environmental Conservation
555 Cordova St.
Anchorage, AK, 99501

F. Personnel/Science Party: name, title, gender, affiliation, and nationality

Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
Kachel, Nancy	PhD, Chief Scientist	8/4/15	9/5/15	F	NOAA/PMEL	USA
Hartwell, Ian	PhD, Co-Chief Scientist	8/5/15	8/27/15	M	NOS	USA
Bell, Shaun		8/5/15	9/5/15	M	NOAA/PMEL	USA
Buktenica, Maggie	grad student	8/5/15	9/5/15	F	OSU	USA
Hoberg, Max		8/5/15	8/27/15	M	UAF	USA
Lomax, Terri		8/5/15	9/5/15	F	AK DEC	USA
Kachel, Dave		8/4/15	9/5/15	M	PMEL	USA
Pryor, Rachel		8/4/15	8/27/15	F	NOAA/ORR	USA
Randall, Jessica		8/5/15	9/5/15	F	FOCI /AFSC	USA
Stillie, Brian		8/5/15	8/27/15	M	AK DEC	USA
Reedy,Marty		8/5/15	9/5/15	M	F&WS	USA
Wisegarver, Eric		8/4/15	9/5/15	M	NOAA/PMEL	USA
Spear, Adam		8/5/15	9/5/15	M	FOCI /AFSC	USA
Williams, Nancy		8/4/15	9/5/15	F	PMEL	USA
Wojahn, John Michael	student	8/4/15	9/5/15	M	OSU	USA
Wright, Charlie		8/6/15	9/5/15	M	F&WS	USA
For Kodiak Load						
Juranek, Laurie	PhD	8/5/15	8/5/15	F	OSU	USA
Strausz, David		8/5/15	8/5/15	M	NOAA/PMEL	USA

G. Administrative

1. Points of Contacts:

Nancy B. Kachel (Chief Scientist), JISAO/PMEL, 7600 Sand Point Way NE, Bldg 3, Seattle WA 98115-0070, ph: (206) 526-6217; Nancy.Kachel@NOAA.GOV

Ian Hartwell, (Co- Chief-Scientist) Senior Scientist- Aquatic Toxicology
NOAA/National Status and Trends Program
1305 East West Hwy. (SSMC4, N/SCI-1)
Silver Spring, MD 20910
P(301) 713-3028; ian.hartwell@noaa.gov

Phyllis Stabeno, PMEL, 7600 Sand Point Way NE, Bldg 3, Seattle, WA 98115-0070; ph: (206) 526-6453; Phyllis.Stabeno@NOAA.GOV

Gary Shigenaka - NOAA Office of Response and Restoration (NOS/ORR/ERD/TSB), 7600 Sand Point Way NE, Bldg 3, Seattle, WA 98115-0070, ph 206-526-6402, Gary.Shigenaka@noaa.gov

Adrienne Hopper, ops.ronald.brown@noaa.gov

2. Diplomatic Clearances

None Required.

3. Licenses and Permits

Permit CF-15-108 has been issued to NOS by the Alaska Dept. of Fish & Game for collection of fish and invertebrates.

A Bureau of Land Management permit for working in the upper reaches of the estuaries has been applied for by ADEC (Terri Lomax).

NOS scientists are also working with the North Slope Borough, Olgoonik Corporation in the Wainwright area, and with the Wainwright Trilateral Council (the Council includes reps from the City of Wainwright, the Tribal Council, and Olgoonik Corporation) to fully inform them of the nature of our work.

II. Operations

The Chief Scientist is responsible for ensuring the scientific staff are trained in planned operations and are knowledgeable of project objectives and priorities. The Commanding Officer is responsible for ensuring all operations conform to the ship's accepted practices and procedures.

The science party requests that the ship use the time zone GMT-11 instead of GMT+8 (the time zone used both in Kodiak and Dutch Harbor), if at all possible. This would more closely align the ship's clocks with solar time. Since morning fog is anticipated as a major problem for small boat operations, setting *Brown's* time to a later time zone could seriously improve the chances for conducting those operations.

A. Project Itinerary:

See Appendix I, Figure 1 for a schematic map and Appendix IIA for a detailed listing NOAA/PMEL/Eco-FOCI stations, and the Excel spreadsheet of the itinerary sent with this cruise plan. See Appendix I, figure 2 for a map of NOS inshore stations and Appendix IIB for a detailed listing of the inshore stations to be sampled by NOS. An Excel spreadsheet with a detailed itinerary for the cruise is submitted as a separate document. It will be necessary to reorder operations before the final project

instructions or during the cruise itself to accommodate restrictions in nearshore whaling areas of the Beaufort Sea. The restrictions are: that large ships need to vacate the nearshore areas east of 148°40'W before August 24th. As a matter of courtesy, it is customary for a ship to update someone in the North Slope Borough of operations planned and areas of operation on a daily basis. The chief scientist will provide contact information to the bridge staff, and a customary protocol for this.

Departure: August 6, 2015, Kodiak, AK

August 28, 2015, Debark scientists via small boat operations, Barrow, AK

Arrive: September 4, 2015, Dutch Harbor, AK

B. Loading and Unloading:

Loading most of the gear aboard *Brown* will occur during the ship's in-port in Seattle on 7-8 July 2015. A limited amount of NOS equipment will be shipped directly to Kodiak, to be loaded there. The scientific party will arrive at two days early to assist with loading and preparations in Kodiak. The scientific party will be responsible for arranging vehicles for transporting themselves and equipment to the ship. All Eco-FOCI and OSU equipment will remain aboard the ship to be off-loaded at a Puget Sound location after *Brown's* return after the end of the project. To facilitate pre-project equipment assembly and set up, a crane operator may be needed for short periods during normal day work hours on August 5, as well as during the Seattle in-port, on 7 July and possibly 8 July.

C. Operations to be conducted:

Eco-FOCI scientists from PMEL/AFSC will conduct CTD casts and MARMAP bongo tows with 2 frames each with 20cm and 60 cm nets, and Tucker trawls with 3 nets. Eco-FOCI will also deploy 4 ARGOS-tracked drifters, possibly on the IC (Icy Cape) line. It is possible that *Brown* will need to pickup a surface mooring or 2 wave gliders. This possibility was discussed above, and is not known at the time the final instructions are due.

NOS inshore sampling consists of 5 different sampling techniques from *Peggy D* and will be conducted as follows: *Peggy D* will proceed to the nearest sediment sampling station to begin collections. (1) A CTD cast or YSI measurements will be taken at each station. (2) Water column samples will be collected from a Niskin bottle for nutrient analyses aboard *Brown*, and chlorophyll samples to be frozen on *Brown* until the end of the cruise. (3) A PONAR (a type of grab) sampler will be deployed approximately four times at each station. The surficial sediment material will be removed with scoops and placed into a polyethylene lined bucket. Once sufficient material has been collected, the sample will be homogenized by stirring and apportioned to jars and bottles for biological and chemical testing at laboratories ashore. In addition, (4) a grab will be deployed at each of the stations for the collection of benthic community samples. The contents of these samples will be

placed into plastic containers and sieved on *Brown*, followed by preservation in formalin. Chemical samples will be held in coolers packed in ice and later transferred to freezers on *Brown* until the end of the cruise. Following sediment sampling, (5) a small beam trawl will be deployed to collect epibenthic fish and invertebrates. Animals will be identified, weighed and measured. Selected animals will be retained for chemical analyses. They will be frozen on *Brown* until the end of the cruise. The NOS crew will consist of 4 people, plus a bird observer from US F&WS will accompany them on selected locations. Estimated weight of gear is $\leq$ 200lb.

Decisions on which operations will be conducted will be made on a daily basis in consultation with the ship's command, Chief Scientist and Co-Chief scientist, and based upon conditions and priorities. A full list the planned cruise itinerary with Station IDs, locations and projected speeds is provided as Appendix I with estimates of transit and operation times.

The order of operations may change due to weather or ice conditions.

Eco-FOCI Standard Operating Instructions are in Appendix III.

D. Dive Plan

All dives are to be conducted in accordance with the requirements and regulations of the NOAA Diving Program (http://www.ndc.noaa.gov/dr.html) and require the approval of the ship's Commanding Officer

Dives are not planned for this project.

E. Applicable Restrictions

Conditions that would preclude normal operations include: poor weather, equipment failure, unforeseen conditions and ice coverage greater that ~20% (to be determined by the captain in consultation with the scientists). Poor weather would have to be waited out and/or the project's station list would need to be modified to ensure that most of the projects' goals will be met. A frame or winch failures would need to be addressed immediately for the projects to continue.

III. Equipment

A. Equipment and Capabilities provided by the ship (itemized)

- Hydrographic winch with slip rings and 3-conductor cable terminated for CTD,
- Capability of re-terminating the wires on the winches.
- Wire speed indicators and read-out for oceanographic winches,
- Seawater hoses and nozzles to wash nets on the starboard deck,
- 12- 5-liter Niskin sampling bottles for use with rosette;

- A CTD frame, SBE9, and SBE32An altimeter / pinger has was also requested but in not available on *Brown*.
- For meteorological observations: 2 anemometers (one R. M. Young system interfaced to the SCS), calibrated air thermometer (wet-and dry-bulb, if possible) and a calibrated barometer and/or barograph,
- Freezer space for storage of biological and chemical samples,-20° C turned on and operating,
- Shallow navigation echo sounder with readout in the electronics lab,
- RD Instruments' ADCP written with data written to a storage device or disk,
- Scientific Computer System (SCS),
- Use of PCs for data analysis,
- Minimum of 2 computer workstations with Internet, printer and e-mail access,
- Laboratory space with storage space,
- Underway flow-through seawater system with temperature, salinity sensor and fluorometer,
- Adequate deck lighting for nighttime 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.

B. Equipment and Capabilities provided by the scientists (itemized)

- A Sea-Bird Electronics' SBE 911plus CTD system with stand and dual temperature and conductivity sensors, a including underwater CTD, a SBE32, weights, and a deck unit for this system.
- SeaBird 911+ CTD with rosette (12 or 24 positions yet to be determined)
- Fluorometer, light meter (PAR) and dual oxygen sensors and altimeter to be mounted on the *Brown's* CTD,
- Sea-Bird Electronics' SBE-19plus SEACAT system for MARMAP and Tucker tows,
- -80° C freezer
- -40° C freezer
- 60-cm bongo sampling arrays,
- 20 cm bongo sampling arrays,
- 1 Tucker trawl sled
- Nets and backup nets for Bongo frame.
- Nets and backup nets for Tucker frame.
- 2 SeaCat for the net tows
- 2 deck units for the SeaCat to be put on the Tucker and bongo tows
- Manual wire angle indicator,
- Zooplankton processing equipment
- 2 crates of jars for zooplankton sampling
- 4 Ocean Drifters-Argos-tracked drogued at 30m
- 2 ARGO floats
- Chlorophyll and nutrient sampling equipment,
- 2 chlorophyll filtration rigs,
- Nutrient auto-analyzer system,
- Miscellaneous scientific sampling and processing equipment,
- Winkler Oxygen Analysis rig,
- pCO2 and MIMS, and nitrate sampling systems installed in flow-through system,

- Dissolved oxygen sensor and fluorometer installed in flow-through system
- Miscellaneous computers for processing and analysis,
- Miscellaneous office supplies

IV. Hazardous Materials

A. Policy and Compliance

The Chief Scientist is responsible for complying with FEC 07 Hazardous Materials and Hazardous Waste Management Requirements for Visiting Scientific Parties (or the OMAO procedure that supersedes it). By Federal regulations and NOAA Marine and Aviation Operations policy, the ship may not sail without a complete inventory of all hazardous materials by name and quantity, MSDS, appropriate spill cleanup materials (neutralizing agents, buffers, or absorbents) in amounts adequate to address spills of a size equal to the amount of chemical brought aboard, and chemical safety and spill response procedures. The Chief of Operations, Marine Operations Center, will provide documentation regarding those requirements upon request.

Per OMAO procedure, the scientific party will include with their project instructions and provide to the CO of the respective ship 30 days before departure:

- List of chemicals by name with anticipated quantity
- List of spill response materials, including neutralizing agents, buffers, and absorbents
- Chemical safety and spill response procedures, such as excerpts of the program's Chemical Hygiene Plan or SOPs relevant for shipboard laboratories
- For bulk quantities of chemicals in excess of 50 gallons total or in containers larger than 10 gallons each, notify ship's Operations Officer regarding quantity, packaging and chemical to verify safe stowage is available as soon as chemical quantities are known.

Upon embarkation and prior to loading hazardous materials aboard the vessel, the scientific party will provide to the CO or their designee:

- An inventory list showing actual amount of hazardous material brought aboard,
- An MSDS for each material,
- Confirmation that neutralizing agents and spill equipment were brought aboard sufficient to contain and cleanup all of the hazardous material brought aboard by the program,
- Confirmation that chemical safety and spill response procedures were brought aboard.

Upon departure from the ship, scientific parties will provide the CO or their designee an inventory showing that all chemicals were removed from the vessel. The CO's designee will maintain a log to track scientific party hazardous materials. MSDS will be made available to the ship's complement, in compliance with Hazard Communication Laws.

Scientific parties are expected to manage and respond to spills of scientific hazardous materials. Overboard discharge of hazardous materials is not permitted aboard NOAA ships.

B. Inventory

Please see Appendix IV for the inventory of chemicals.

C. Chemical safety and spill response procedures

Please see Appendix V for Spill Control Response Codes and Procedures, Appendix VI for Spill Response Kit Inventory and Appendix VII for Chemical Hygiene Plan and Standard Operating Procedures (SOPs).

D. Radioactive Materials

No radioactive isotopes are planned for this project.

V. Additional Projects

This cruise has 3 ancillary projects planned.

A. Whale/sea-bird observers plan to make observations from the bridge, without diversions, and if space permits, from *Peggy D* on occasion.

B. Scientists from Oregon State University will operate a MIMS (Membrane Inlet Mass Spectrometer) on the flowthrough science seawater line for determination of O2/Ar -based net community metabolism. OSU would also like to do automated surface POC (Particulate Organic carbon) sampling and optical measurements from the underway line, and perhaps some isotopic (d13C, d15N) determinations on a subset of those. They will continue to operate and monitor the pCO2 system installed for the previous cruise and have the permission of those scientists. Finally, OSU is interested in some Niskin-based sampling for O2 isotopes and O2/Ar.

C. NMML will be conducting an aerial survey project near Barrow and Wainwright, Alaska (Figure 3), from mid- to late August 2015. They will be conducting marine mammal surveys using three methodologies: 1) human observers aboard a manned aircraft; 2) cameras mounted to the belly of the manned aircraft; and 3) cameras mounted to an unmanned aerial vehicle (UAV). The UAV will be launched and retrieved from the Naval Arctic Research Laboratory, located at Pt. Barrow (Figure3). *NOAA Ship Fairweather* is expected to be in the aerial survey study area from approximately 19-30 August to support NMML's project. *Fairweather*'s primary purpose will be to serve as an offshore ground control station for the UAV, recover the UAV in the event of a water landing, and launch weather balloons in coordination with our project.

Prior to *Fairweather*'s arrival in the study area, the co-sponsors of the project have agreed to have *NOAA Ship Ronald H. Brown* serve as a backup to help recover the UAV if NMML is unable to acquire small boat support from Barrow, as long as

such a request does not interfere with *Brown*'s science missions. In addition, NMML would appreciate weather updates from *Brown* in the morning, mid-day, and late afternoon.

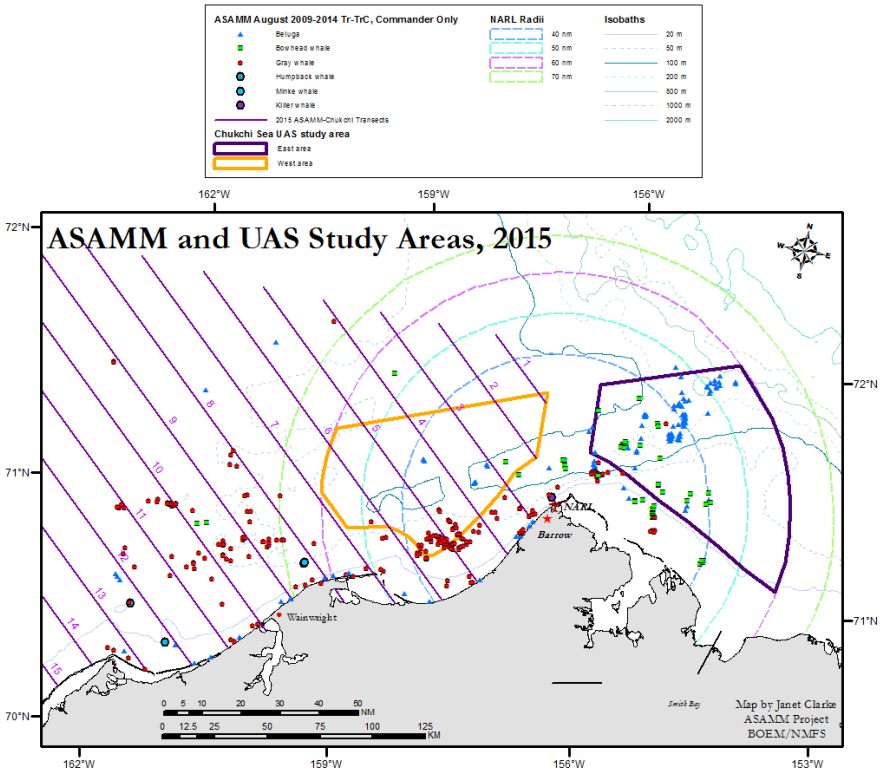


Figure 3. NMML's UAS study areas in Peard Bay (west area) and Barrow Canyon (east area).

D. *Brown* is currently listed as the second backup ship to recover a surface mooring to be deployed this spring somewhere on the Chukchi grid (Figure 1). If it becomes necessary for the Brown to recover them, hydrographic stations will be deleted from the cruise plan.

E. In addition, *Brown* might be called upon as first backup to recover 2 Waveglider drones (http://liquidr.com/technology/waveglider/sv2.html) that will be operating in the area of the Chukchi grid.). If it becomes necessary for the Brown to recover them, hydrographic stations will be deleted from the cruise plan.

F. PMEL scientists have received a request to follow a particular cruise track north, the PARS corridor, through the Bering, and to collect multibeam data as the ship goes. Waypoints along this corridor have been placed in the accompanying itinerary spreadsheet.

VI. Disposition of Data and Reports

Disposition of data gathered aboard NOAA ships will conform to NAO 216-101 *Ocean Data Acquisitions* and NAO 212-15 *Management of Environmental Data and Information.* To guide the implementation of these NAOs, NOAA's Environmental Data Management Committee (EDMC) provides the *NOAA Data Documentation Procedural Directive* (data documentation) and *NOAA Data Management Planning Procedural Directive* (preparation of Data Management Plans). OMAO is developing procedures and allocating resources to manage OMAO data and Programs are encouraged to do the same for their Project data.

A. Data Classifications:

a. OMAO Data

b. Program Data - At the end of the project, the Senior Survey Technician will provide the Chief Scientist with copies of data from the ship's SCS system, barometer measurements, log sheets, TSG data, rain sensor data, wind speed and direction data, ship's navigation log data, speed logs, winch system, ADCP, Fluorometer data, ADCP data, and any other logged scientific data. The number of copies of each data set will be worked out between the Chief Scientist and Senior Survey Technician.

B. Responsibilities: Chief Scientist will distribute data to Program Principle Investigators as appropriate.

VII. Meetings, Vessel Familiarization, and Project Evaluations

A. Pre-Project Meeting: The Chief Scientist and Commanding Officer will conduct a meeting of pertinent members of the scientific party and ship's crew to discuss required equipment, planned operations, concerns, and establish mitigation strategies for all concerns. This meeting shall be conducted before the beginning of the project with sufficient time to allow for preparation of the ship and project personnel. The ship's Operations Officer usually is delegated to assist the Chief Scientist in arranging this meeting.

B. Vessel Familiarization Meeting: The Commanding Officer is responsible for ensuring scientific personnel are familiarized with applicable sections of the standing orders and vessel protocols, e.g., meals, watches, etiquette, drills, etc. A vessel familiarization meeting shall be conducted in the first 24 hours of the project's start and is normally presented by the ship's Operations Officer.

C. Post-Project Meeting: The Commanding Officer is responsible for conducting a meeting no earlier than 24 hrs before or 7 days after the completion of a project to discuss the overall success and shortcomings of the project. Concerns regarding safety, efficiency, and suggestions for future improvements shall be discussed and mitigations for future projects will be documented for future use. This meeting shall be attended by the ship's officers, applicable crew, the Chief Scientist, and members of the scientific party and is normally arranged by the Operations Officer and Chief Scientist.

D. Project Evaluation Report: Within seven days of the completion of the project, a Customer Satisfaction Survey is to be completed by the Chief Scientist. The form is available at http://www.omao.noaa.gov/fleeteval.html and provides a "Submit" button at the end of the form. Submitted form data is deposited into a spreadsheet used by OMAO management to analyze the information. Though the complete form is not shared with the ships, specific concerns and praises are followed up on while not divulging the identity of the evaluator.

VIII. Miscellaneous

A. Meals and Berthing

The ship will provide meals for the scientists listed above. Meals will be served three times daily beginning one hour before scheduled departure, extending throughout the project, and ending two hours after the termination of the project. Since the watch schedule is split between day and night, the night watch may often miss daytime meals and will require adequate food and beverages (for example a variety of sandwich items, cheeses, fruit, milk, juices) during what are not typically meal hours. Special dietary requirements for scientific participants will be made available to the ship's command at least seven days prior to the project.

Berthing requirements, including number and gender of the scientific party, will be provided to the ship by the Chief Scientist. The Chief Scientist and Commanding Officer will work together on a detailed berthing plan to accommodate the gender mix of the scientific party taking into consideration the current make-up of the ship's complement. The Chief Scientist is responsible for ensuring the scientific berthing spaces are left in the condition in which they were received; for stripping bedding and linen return; and for the return of any room keys that were issued. The Chief Scientist is also responsible for the cleanliness of the laboratory spaces and the storage areas utilized by the scientific party, both during the project and at its conclusion prior to departing the ship.

All NOAA scientists will have proper travel orders when assigned to any NOAA ship. The Chief Scientist will ensure that all non-NOAA or non-Federal scientists aboard also have proper orders. It is the responsibility of the Chief Scientist to ensure that the entire scientific party has a mechanism in place to provide lodging and food and to be reimbursed for these costs in the event that the ship becomes uninhabitable and/or the galley is closed during any part of the scheduled project.

All persons boarding NOAA vessels give implied consent to comply with all safety and security policies and regulations which are administered by the Commanding Officer. All spaces and equipment on the vessel are subject to inspection or search at any time. All personnel must comply with OMAO's Drug and Alcohol Policy dated May 17, 2000, which forbids the possession and/or use of illegal drugs and alcohol aboard NOAA Vessels.

B. Medical Forms and Emergency Contacts

The NOAA Health Services Questionnaire (NHSQ, NF 57-10-01 (3-14)) must be completed in advance by each participating scientist. The NHSQ can be obtained from the Chief Scientist or the NOAA website http://www.corporateservices.noaa.gov/noaaforms/eforms/nf57-10-01.pdf.

All NHSQs submitted after March 1, 2014 must be accompanied by NOAA Form (NF) 57-10-02 - Tuberculosis Screening Document in compliance with OMAO Policy 1008 (Tuberculosis Protection Program).

The completed forms should be sent to the Regional Director of Health Services at the applicable Marine Operations Center. The NHSQ and Tuberculosis Screening Document should reach the Health Services Office no later than 4 weeks prior to the start of the project to allow time for the participant to obtain and submit additional information should health services require it, before clearance to sail can be granted. Please contact MOC Health Services with any questions regarding eligibility or completion of either form. Ensure to fully complete each form and indicate the ship or ships the participant will be sailing on. The participant will receive an email notice when medically cleared to sail if a legible email address is provided on the NHSQ.

The participant can mail, fax, or email the forms to the contact information below. Participants should take precautions to protect their Personally Identifiable Information (PII) and medical information and ensure all correspondence adheres to DOC guidance (http://ocio.os.doc.gov/ITPolicyandPrograms/IT_Privacy/PROD01_008240).

The only secure email process approved by NOAA is Accellion Secure File Transfer which requires the sender to setup an account. Accellion's Web Users Guide is a valuable aid in using this service, however to reduce cost the DOC contract doesn't provide for automatically issuing full functioning accounts. To receive access to a "Send Tab", after your Accellion account has been established send an email from the associated email account to accellionAlerts@doc.gov requesting access to the "Send Tab" function. They will notify you via email usually within 1 business day of your approval. The 'Send Tab" function will be accessible for 30 days.

Contact information:

Regional Director of Health Services
Marine Operations Center – Atlantic
439 W. York Street
Norfolk, VA 23510
Telephone 757-441-6320
Fax 757-441-3760
Email MOA.Health.Services@noaa.gov

Prior to departure, the Chief Scientist must provide an electronic listing of emergency contacts to the Executive Officer for all members of the scientific party, with the

following information: contact name, address, relationship to member, and telephone number.

C. Shipboard Safety

Hard hats are required when working with suspended loads. Work vests are required when working near open railings and during small boat launch and recovery operations. Hard hats and work vests will be provided by the ship when required.

Wearing open-toed footwear or shoes that do not completely enclose the foot (such as sandals or clogs) outside of private berthing areas is not permitted. At the discretion of the ship CO, safety shoes (i.e. steel or composite toe protection) may be required to participate in any work dealing with suspended loads, including CTD deployment and recovery. The ship does not provide safety-toed shoes/boots. The ship's Operations Officer should be consulted by the Chief Scientist to ensure members of the scientific party report aboard with the proper attire.

D. Communications

A progress report on operations prepared by the Chief Scientist may be relayed to the program office. Sometimes it is necessary for the Chief Scientist to communicate with another vessel, aircraft, or shore facility. Through various means of communications, the ship can usually accommodate the Chief Scientist. Special radio voice communications requirements should be listed in the project instructions. The ship's primary means of communication with the Marine Operations Center is via e-mail and the Very Small Aperture Terminal (VSAT) link. Standard VSAT bandwidth at 128kbs is shared by all vessel's staff and the science team at no charge. Increased bandwidth in 30-day increments is available on the VSAT systems at increased cost to the scientific party. If increased bandwidth is being considered, program accounting is required, and it must be arranged at least 30 days in advance.

E. IT Security

Any computer that will be hooked into the ship's network must comply with the *OMAO Fleet IT Security Policy* 1.1 (November 4, 2005) prior to establishing a direct connection to the NOAA WAN. Requirements include, but are not limited to:

(1) Installation of the latest virus definition (.DAT) file on all systems and performance of a virus scan on each system.
(2) Installation of the latest critical operating system security patches.
(3) No external public Internet Service Provider (ISP) connections.

Completion of these requirements prior to boarding the ship is required.
Non-NOAA personnel using the ship's computers or connecting their own computers to the ship's network must complete NOAA's IT Security Awareness Course within three days of embarking.

F. Foreign National Guests Access to OMAO Facilities and Platforms

Foreign National access to the NOAA Ship or Federal Facilities is not required for this project.

Appendix I: Maps and Figures

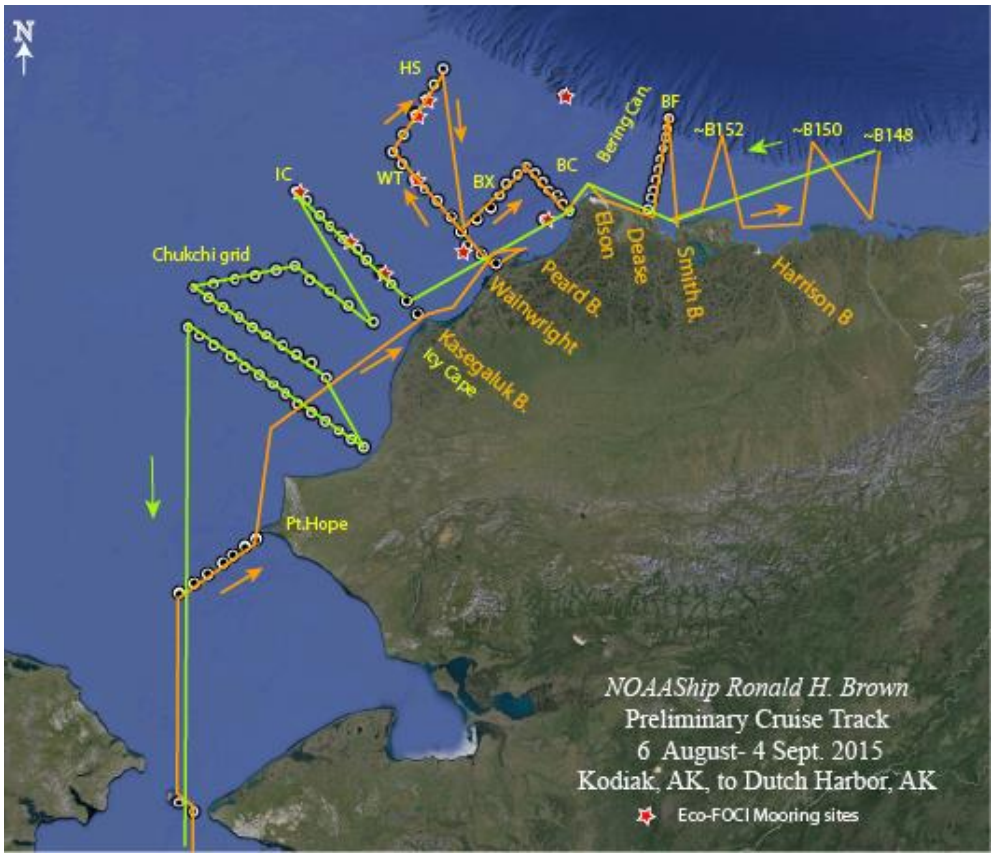


Figure 1. Preliminary cruise itinerary for *NOAA Ship Ronald H. Brown*

Figure 2. Map showing NOS primary sediment sampling sites in 6 estuaries/lagoons in the Chukchi and Beaufort Seas.

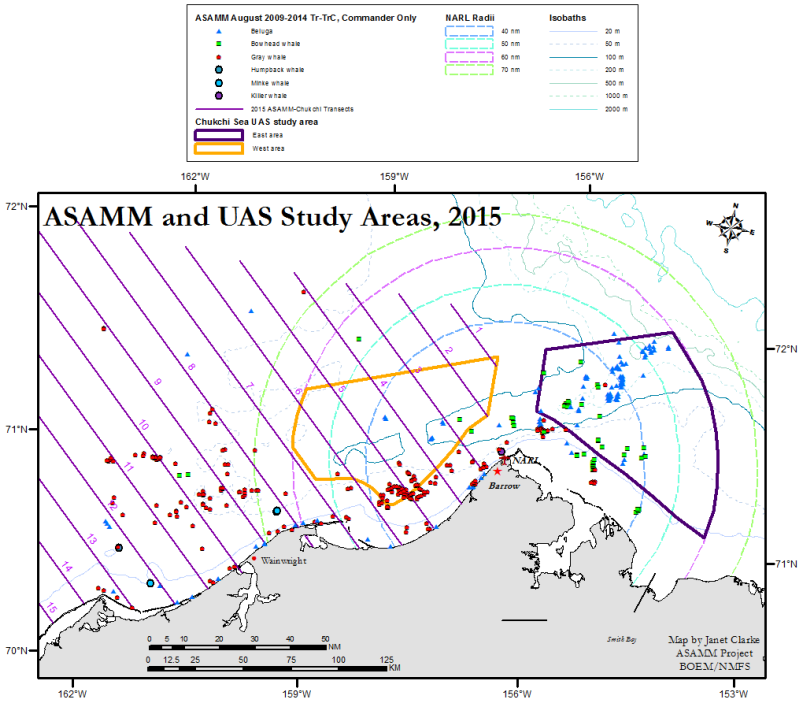


Figure 3. NMML's UAS study areas in Peard Bay (west area) and Barrow Canyon (east area).

Appendix IIA: Station list for RB15-05 PMEL CTD/net stations
NOTE: An Excel spreadsheet with positions, times, distances, and estimated operation times is being sent separately

Site ID	OPS	Lat Deg	Lat min	H	lon deg	long min	H
Kodiak	DEPART	57	43.4297	N	152	31.53	W
Unimak Pass	on Transit	54	16.000	N	165	0.00	W
CTD exper	**ctd**	54	36.000	N	165	40.00	w
w. of nunivak I	wpt-transit	60	0.000	N	168	0.00	W
Nome	Pickup	64	24.000	n	166	30.00	w
w of Nome	wpt	64	20.000	N	168	30.00	W
BS1-wpt	**ctd**	65	40.000	N	168	10.00	W
BS2	**ctd**	65	40.000	N	168	20.00	W
PH1	ctd	67	41.3901	N	168	56.3699	W
PH2	ctd	67	47.1698	N	168	35.6104	W
PH3	ctd	67	54.0102	N	168	13.7997	W
PH4	ctd	68	0.68985	N	167	51.7703	W
PH5	ctd	68	7.66983	N	167	30.65	W
PH6	ctd	68	11.64	N	167	18.1998	W
PH7	ctd	68	14.5898	N	167	6.97998	W
PH8	ctd	68	18.4799	N	166	55.6503	W
wpt-off C. Lisburne	wpt	69	0.000	N	166	20.00	W
wpt-off Icy Cape	wpt	70	30.000	N	162	0.00	W
Kasegaluk Bay (east of Icy Pt)	baywork	70	26.010	N	161	20.00	W
Wainwright/ Kuk R	baywork	70	42.000	N	160	0.00	W
Wainwright to Peard Bay	nearshore Peggy D work						
Peard Bay	baywork	70	58.000	N	158	45.00	W
Peard Bay	wait	70	58.000	N	158	45.00	W
Peard Bay	baywork	70	58.000	N	158	45.00	W
Peard Bay	wait	70	58.000	N	158	45.00	W
Peard Bay	baywork	70	58.000	N	158	45.00	W
WT01	ctd/Tucker	70	51.4101	N	159	40.08	W
WT02	ctd	70	58.9801	N	159	54.4803	W
WT03	ctd/Tucker	71	7.3201	N	160	16.4896	W
WT04	ctd	71	13.4898	N	160	32.6596	W
WT5	ctd/Tucker	71	20.9999	N	160	50.8401	W
WT6	ctd	71	31.49	N	161	10.5698	W
WT7	ctd/Tucker	71	38.1798	N	161	32.8098	W
WT8	ctd	71	45.6898	N	161	49.27	W
WT9	ctd/Tucker	71	55.6	N	162	11.0999	W
WT10	ctd	72	2.87979	N	162	26.1099	W
HS01	ctd	72	13.8698	N	162	3.53027	W
HS02	ctd	72	24.9701	N	161	30.9998	W

HS03	ctd	72	35.1201	N	161	9.10034	W
HS04	ctd	72	44.1499	N	160	43.1799	W
HS05	ctd	72	51.8701	N	160	27.9602	W
BX01	ctd	71	17.7402	N	160	7.81036	W
BX02	ctd	71	24.6002	N	159	45.2097	W
BX03	ctd	71	29.5898	N	159	21.9498	W
BX04	ctd	71	37.0399	N	159	0.26001	W
BX05	ctd	71	42.8101	N	158	38.02	W
BC11	ctd/Tucker	71	45.3598	N	158	11.6803	W
BC10	ctd/Tucker	71	40.0699	N	158	3.94043	W
BC09	ctd/Tucker	71	34.5502	N	157	51.0599	W
BC07	ctd/Tucker	71	29.9501	N	157	42.1902	W
BC05	ctd/Tucker	71	24.8099	N	157	30.4102	W
BC03	ctd/Tucker	71	20.3499	N	157	21.0004	W
BC01	ctd/Tucker	71	14.7899	N	157	9.92981	W
Barrow or Elson Lagoon	transit/	71	23.500	N	157	37.00	W
Elson/Dease west	bay	71	30.950	N	156	10.00	W
Admiralty Bay/Dease Inlet east	baywork	71	18.500	N	155	10.00	W
B154-10	ctd/bon	71	59.81	N	153	17.48	W
B154-09	ctd/bon	71	53.91	N	153	27.11	W
B154-08	ctd	71	49.15	N	153	34.79	W
B154-07	ctd/bon	71	42.52	N	153	45.68	W
B154-06	ctd	71	36.09	N	153	57.52	W
B154-05	ctd/bon	71	30.45	N	154	5.91	W
ctd/bon	ctd/bon	71	24.83	N	154	15.74	W
B154-03	ctd/bon	71	18.98	N	154	25.37	W
B154-02	ctd	71	13.97	N	154	33.23	W
Smith Bay	bay	71	19.0	N	154	20.0	W
B152-7.5	ctd/bon	71	38.050	N	151	59.16	W
B152-6	ctd/bon	71	32.220	N	151	56.88	W
B152-5	ctd/bon	71	28.320	N	152	0.12	W
B152-4	ctd/bon ctd	71	24.360	N	152	3.36	W
B152-3	ctd	71	20.460	N	152	6.60	W
B152-2	ctd/bon	71	16.560	N	152	9.84	W
B152-1	ctd/bon	71	12.660	N	152	13.02	W
Harrison Bay	transit to east end offshore	70	55.000	N	150	10.0	W
B150 -7	ctd	71	24.7	N	149	58.0	W
B150 -6	ctd/bon	71	19.50	N	150	0.4	W
B150 -5	ctd	71	17.400	N	150	2.8	W
B150 -4	ctd/bon	71	11.800	N	150	5.2	W
B150 -3	ctd	71	6.200	N	150	7.6	W
B150 -2	ctd/bon	70	0.600	N	150	10.0	W
B150 -1	ctd/bon	70	55.000	N	150	12.4	W

Harrison Bay	transit to east end offshore	70	55.000		151	48	W
Smith Bay	bay	71	7	N	154	8	W
Barrow/ Elson Lagoon	DEBARK-NOS	71	25	N	156	10	W
Pt Barrow	wpt	71	32.000	N	156	25.00	W
IC02	ctd/Tucker	70	43.27	N	162	50.93	W
IC03	ctd/Tucker	70	51.12	N	163	10.87	W
IC04	ctd/Tucker	70	58.54	N	163	33.62	W
IC05	ctd/Tucker	71	5.3	N	163	47.8	W
IC06	ctd/Tucker	71	11.95	N	164	11.96	W
C2-MOORING	ctd	71	14.5	N	164	16.74	W
IC07	ctd/Tucker	71	20.39	N	164	36.44	W
IC08	ctd/Tucker	71	27.09	N	164	54.91	W
IC09	ctd/Tucker	71	36.25	N	165	18.08	W
IC10	ctd/Tucker	71	42.46	N	165	36.16	W
CKC01	ctd	70	21.7	N	163	29.71	W
CKC02	ctd	70	31.93	N	164	10.09	W
CKC03	ctd	70	41.25	N	164	43.16	W
CKC04	ctd	70	48.78	N	165	17.01	W
CKC05	ctd	70	57.04	N	165	42.12	W
CKB05	ctd	70	54.84	N	166	18.2	W
CKB04	ctd	70	52	N	166	56.13	W
CKB03	ctd	70	49.99	N	167	32.27	W
CKB02	ctd	70	47.26	N	168	10.39	W
CKB01	ctd	70	44.32	N	168	45.18	W
CKA09	ctd	70	38.43	N	168	18.09	W
CKA08	ctd	70	32.67	N	167	53.09	W
CKA07	ctd	70	27.08	N	167	23.82	W
CKA06	ctd	70	21.09	N	166	59.83	W
CKA05	ctd	70	16.04	N	166	36.71	W
CKA04	ctd	70	9.4	N	166	9.09	W
CKA03	ctd	70	3.96	N	165	44.08	W
CKA02	ctd	69	59.08	N	165	19.46	W
CKA01	ctd	69	50.14	N	164	56.03	W
LB01	ctd/Tucker	69	7.94	N	163	59.17	W
LB02	ctd/Tucker	69	12.67	N	164	17.65	W
LB03	ctd/Tucker	69	18.27	N	164	37.03	W
LB04	ctd/Tucker	69	24.52	N	165	0.42	W
LB05	ctd/Tucker	69	29.89	N	165	22.17	W
LB06	ctd/Tucker	69	34.9	N	165	44.31	W
LB07	ctd/Tucker	69	40.99	N	166	4.99	W
LB08	ctd/Tucker	69	46.87	N	166	26.36	W
LB09	ctd/Tucker	69	52.89	N	166	48.88	W

LB10	ctd/Tucker	69	57.43	N	167	12.93	W
LB11	ctd/Tucker	70	3.46	N	167	38.92	W
LB12	ctd/Tucker	70	9.83	N	168	7.6	W
LB13	ctd/Tucker	70	15.54	N	168	31.81	W
LB14	ctd/Tucker	70	20.97	N	168	53.89	W
Bering Strait	**transit**	65	50.000	N	168	31.00	W
Dutch Harbor	return to port	53	52.833	n	166	25.93	W

To be done if there is time available as we approach Dutch Harbor

Unimak box S1	CTD/BON	54	26.460	N	164	59.110	W
Unimak box S2	CTD/BON	54	25.160	N	165	8.430	W
Unimak box S3	CTD/BON	54	22.490	N	165	16.630	W
Unimak box S4	CTD/BON	54	20.510	N	165	25.730	W
Unimak box W4	CTD/BON	54	21.480	N	165	55.750	W
Unimak box W3	CTD/BON	54	28.310	N	166	2.330	W
Unimak box W2	CTD/BON	54	34.950	N	166	7.760	W
Unimak box W1	CTD/BON	54	41.260	N	166	14.210	W

Appendix IIB: Station list for RB15-06 NOS Inshore Sampling

SiteID	Loc	Stratum	Name	LatDD	LongDD	Lat Deg	Lat Min	Long Deg	Long Min
NPRA2015-004	Kasegaluk	Chukchi	Kasegaluk Lagoon	70.37480	-160.75040	70	22.488	-160	45.024
NPRA2015-008	Kasegaluk	Chukchi	Kasegaluk Lagoon	70.40747	-160.66603	70	24.448	-160	39.962
NPRA2015-012	Kasegaluk	Chukchi	Kasegaluk Lagoon	70.27848	-161.76559	70	16.709	-161	45.935
NPRA2015-016	Kasegaluk	Chukchi	Kasegaluk Lagoon	70.29292	-161.65028	70	17.575	-161	39.017
NPRA2015-020	Kasegaluk	Chukchi	Kasegaluk Lagoon	70.30159	-161.66497	70	18.096	-161	39.898
NPRA2015-003	Kuk	Chukchi	Wainwright Inlet	70.36858	-159.97228	70	22.115	-159	58.337
NPRA2015-007	Kuk	Chukchi	Wainwright Inlet	70.34818	-160.04029	70	20.891	-160	2.417
NPRA2015-011	Kuk	Chukchi	Wainwright Inlet	70.51060	-159.77668	70	30.636	-159	46.601
NPRA2015-015	Kuk	Chukchi	Wainwright Inlet	70.60025	-159.98684	70	36.015	-159	59.211
NPRA2015-019	Kuk	Chukchi	Wainwright Inlet	70.46691	-160.08720	70	28.015	-160	5.232
NPRA2015-001	Peard	Chukchi	Peard Bay & Kugra Bay	70.71267	-159.22701	70	42.760	-159	13.621
NPRA2015-002	Peard	Chukchi	Peard Bay & Kugra Bay	70.86120	-159.19334	70	51.672	-159	11.601
NPRA2015-005	Peard	Chukchi	Peard Bay & Kugra Bay	70.79686	-158.81770	70	47.811	-158	49.062
NPRA2015-006	Peard	Chukchi	Peard Bay & Kugra Bay	70.89156	-158.80687	70	53.493	-158	48.412
NPRA2015-009	Peard	Chukchi	Peard Bay & Kugra Bay	70.77631	-159.15972	70	46.579	-159	9.583
NPRA2015-010	Peard	Chukchi	Peard Bay & Kugra Bay	70.83797	-158.76354	70	50.278	-158	45.812
NPRA2015-013	Peard	Chukchi	Peard Bay & Kugra Bay	70.82707	-158.56424	70	49.624	-158	33.855
NPRA2015-014	Peard	Chukchi	Peard Bay & Kugra Bay	70.76367	-159.34956	70	45.820	-159	20.974
NPRA2015-017	Peard	Chukchi	Peard Bay & Kugra Bay	70.77201	-159.02874	70	46.321	-159	1.724
NPRA2015-018	Peard	Chukchi	Peard Bay & Kugra Bay	70.85303	-158.94975	70	51.182	-158	536.985
NPRA2015-063	Elson	Beaufort	Elson Lagoon/ Admiralty Bay	70.90970	-155.60872	70	54.582	-155	36.523
NPRA2015-065	Elson	Beaufort	Elson Lagoon/ Admiralty Bay	71.36737	-156.46608	71	22.042	-156	27.965
NPRA2015-067	Elson	Beaufort	Elson Lagoon/ Admiralty Bay	71.20460	-155.81260	71	12.276	-155	48.756
NPRA2015-069	Elson	Beaufort	Elson Lagoon/ Admiralty Bay	71.12656	-155.53670	71	7.594	-155	32.202
NPRA2015-070	Elson	Beaufort	Elson Lagoon/ Admiralty Bay	70.97270	-155.56381	70	58.362	-155	33.829
NPRA2015-074	Elson	Beaufort	Elson Lagoon/ Admiralty Bay	70.96877	-155.75988	70	58.126	-155	45.593
NPRA2015-077	Elson	Beaufort	Elson Lagoon/ Admiralty Bay	71.12519	-155.22963	71	7.511	-155	13.778
NPRA2015-079	Elson	Beaufort	Elson Lagoon/ Admiralty Bay	71.27743	-156.01835	71	16.646	-156	1.101
NPRA2015-064	Smith	Beaufort	Harrison Bay	70.52738	-151.71650	70	31.643	-151	42.990
NPRA2015-068	Smith	Beaufort	Harrison Bay	70.61881	-151.83437	70	37.128	-151	50.062
NPRA2015-072	Smith	Beaufort	Harrison Bay	70.60148	-152.06391	70	36.089	-152	3.835
NPRA2015-075	Smith	Beaufort	Harrison Bay	70.41250	-151.29364	70	24.750	-151	17.618
NPRA2015-076	Smith	Beaufort	Harrison Bay	70.68240	-152.09978	70	40.944	-152	5.987
NPRA2015-080	Smith	Beaufort	Harrison Bay	70.72519	-152.34663	70	43.511	-152	20.798
NPRA2015-061	Harrison	Beaufort	Smith Bay	70.82817	-154.48801	70	49.690	-154	29.280
NPRA2015-062	Harrison	Beaufort	Smith Bay	70.85073	-154.41632	70	51.044	-154	24.979
NPRA2015-066	Harrison	Beaufort	Smith Bay	70.90549	-154.52536	70	54.329	-154	31.521
NPRA2015-071	Harrison	Beaufort	Smith Bay	70.88876	-153.98992	70	53.326	-153	59.395
NPRA2015-073	Harrison	Beaufort	Smith Bay	70.86544	-154.25193	70	51.926	-154	15.116
NPRA2015-078	Harrison	Beaufort	Smith Bay	70.90193	-154.59856	70	54.116	-154	35.914

Appendix III: PMEL/Eco-Foci Standard Operating Instructions

Procedures for Operations – The following is a comprehensive list of FOCI operations including gear and procedures for collecting data. A listing of specific operations to be conducted on each cruise is listed in the FOCI Cruise Instructions. Changes or alterations to these standard procedures will be noted in the Cruise Instructions.

1. CTD/Water Sample Operations – A Sea-Bird Electronics' SBE 911plus Conductivity, Temperature, and Depth (CTD) profiler with dual thermistors and conductivity cells will be the primary system. The primary system will be provided and maintained by Pacific Marine Environmental Laboratory (PMEL). A backup SBE 911plus CTD is required and will be provided by the vessel. When available, and where possible,

   FOCI's fluorometer and light meter should be mounted on the CTD stand for all casts; however, these instruments cannot exceed the following depths:

   Biospherical Instruments' QSP-200L4S light meter cannot exceed 1,000 meters,

   FOCI's Sea-Bird Electronics SBE 911plus CTD cannot exceed 3,000 meters

   Once the CTD has been deployed, it should be lowered to 10 meters, and then the deck unit should be turned on. After one minute when the pumps have turned on, the CTD can be returned to just below the surface. If the bottom of the CTD breaks the surface of the water, then we will need the CTD to be lowered to 10 meters again for approximately one minute. Then the data acquisition program should be started. The CTD should descend at a rate of
   30 meters per minute for the first 200 meters and 40-45 meters per minute below that. The ascent rate should be 40-45 meters per minute, or at ta rate decided by the FOCI CTD operator.

   Water samples will be collected form the Niskin bottles on the rosette.
   The CTD computer operator and other scientists will keep the CTD Cast Information / Rosette Log.

   Water samples will be collected on each cast from the 5-10-liter Niskin bottles for oxygen, nutrient and or chlorophyll water samples are required. Salinity calibration samples will be taken once every 2-3 casts.

   1.1 CTD Calibration – Salinity samples will be taken on every cast, or as specified by the Chief Scientist. The CTD systems will be equipped with dual temperature, conductivity and oxygen sensors.

2 MARMAP Bongo Tows – A 60-cm aluminum Bongo frame with 505-µm mesh nets, or 333-µm, flow meters, 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.

Upon arrival at station, the Bridge will report that they are ready for operations. The Bridge will need to maintain the ship's speed between 1.0 to 2.5 knots – depending on weather conditions – so that the wire angle of the gear during the descent and retrieval is as close to 45 degrees as possible to maximize the fishing capacity of the gear. A scientist will relay wire angles to the Bridge as the tow proceeds via radio or other means of communication. 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

Wire retrieval rate will be 20 meters per minute. The winch should be one of the ship's Markey oceanographic winches equipped with slip rings and at least 2,000 meters of 0.322", 2-layer, 3-conductor oceanographic wire. A Sea-Bird Electronics SBE 19 SEACAT Profiler or SBE 39 Temperature and Pressure Recorder will be attached to the wire above the Bongo frame(s) to provide real-time tow data. A scientist is stationed in at the CTD computer to monitor the SEACAT and to inform the Survey Technician and Winch Operator when the desired gear depth is reached.
The winch operator will then be instructed by the computer operator to retrieve the nets at a wire speed of 20 meters per minute.

When the nets reach the surface, they are brought aboard and hosed with saltwater to wash the sample into the cod-end. The sample is preserved as specified in the FOCI Field Manual or sample collection request forms. The scientists on watch are responsible for recording station information, tow times, maximum depth, wire-out, and flow meter counts on the Cruise Operations Database (COD) forms. Tows not meeting specifications (i.e., hit bottom, poor wire angles, nets tangled, etc.) will be repeated at the discretion of the scientific watch.

The Pacific Marine Environmental Laboratory (PMEL) will provide the primary SEACAT or SBE 39 and a backup.. Personnel from PMEL will provide the acquisition computer .

3. Chlorophyll Sampling Operations – Chlorophyll samples will be collected from the 10-liter Niskin bottles filled during Conductivity, Temperature, and Depth (CTD) profiler casts. The scientists are 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 or chlorophyll maximum. If the maximum is deeper than 60 meters, sampling should be moved deeper with fewer samples in the mixed layer.
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.

5. Tucker Trawls – The Tucker trawl may be used as the primary gear for late-larval surveys, as a backup for the Multiple Opening/Closing Net & Environmental Sensing System (MOCNESS), or for dedicated predator studies. When used for late-larval surveys, the Tucker will be equipped with 0.505-mm mesh netting and be towed in a smooth oblique fashion with one net open. If the Tucker is to be used as a backup MOCNESS sampler, it will have 0.333-mm mesh netting. However, four Tucker tows are required to substitute for one oblique MOCNESS tow. When used for predator studies, it will have 0.505-mm mesh with a 1-mm cod-end bucket. When used for discrete depth sampling, a Sea-Bird Electronics SBE 19 SEACAT or a SBE 39 Temperature and Pressure Recorder will be attached on the main cable above the bridle. The messenger release is positioned on the cable above the SEACAT.

   The winch should be one of the ship's Markey oceanographic winches equipped with slip rings and at least 2,000 meters of 0.322", 2-layer, 3-conductor oceanographic wire. A Sea-Bird Electronics SBE 19 SEACAT Profiler or SBE 39 Temperature and Pressure Recorder will be attached to the wire above the Tucker frame(s) to provide real-time tow data. The Pacific Marine Environmental Laboratory (PMEL) will provide the primary SEACAT or SBE 39. Before the SEACAT is terminated on the wire by the ship's electronic technician and the survey technician, a PMEL scientist will note the identification number of the unit and provide the proper calibration file for the computer when the SEACAT from PMEL is used; however, if the ship's equipment is used, current calibrations should be available. Personnel from PMEL will provide the acquisition computer and monitor. There is no requirement for the SEACAT data to be displayed on the Scientific Computer System (SCS).

   After the bridge gives permission, the Survey Technician and one or two scientists will deploy the Tucker trawl. A scientist will be stationed in the ship's dry lab to monitor the SEACAT and to inform the ship's Survey Technician and Winch Operator when each desired gear depth is reached. While holding at depth, the first messenger is sent, usually by a scientist, closing the drogue net and opening the first net. Then at the next desired depth, a second messenger is sent, closing the first net and opening the second. It is important the bridge attempt to maintain proper speed while messengers are being deployed to maintain net target depth.

   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 the Survey Technician relaying wire angles to the bridge by radio. When the nets reach the surface, they are brought aboard and hosed with saltwater to wash the sample into the cod-end. The sample is preserved as specified in the FOCI Field Manual or sample collection request forms. Flow meters in the nets record the amount of water filtered, and the SBE 19 SEACAT, or SBE 39, 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 (i.e., hit bottom, poor wire angles, nets tangled, etc.) may be repeated at the discretion of the scientific watch.

Appendix IV: Chemical Inventory

1) **Chemical inventory for zooplankton preparation, responsibility of Adam Spear and Jessica Randall (AFSC/NOAA)**. All FOCI/ PMEL personnel are trained to use and in the appropriate spill response for chemicals listed below. For definitions of abbreviations used in spill responses, please see refer to Appendix V, section 1.

CHEMICAL INVENTORY

Common Name of Material	Concentration	Amount	Spill Control	Spill Response	Notes
Dihydrogen Monoxide		20 liters	W	Gloves Paper towels	Not a regulated chemical/solution. Used for oxygen titrations.
Ethanol	100%	1 x4L Plastic jug		Gloves 3M Sorbent Pads Plastic bag	Store in Chem. Lab flammables cabinet.
Ethylene Glycol	100%	1 x 500 ml		Gloves Paper towels Plastic bag	Not a regulated chemical. Store in Spill Kit.
Formaldehyde	37%	1 5gallon plastic bottle		Gloves Eye Protection Fan-Pads Formalex PolyForm-F Plastic bag	Store in flammable cabinet.
Glycerol/Thy-mol Solution	50 %	1 250ml		Gloves Paper towels Kitty litter	Not a regulated chemical/solution.

2) **Chemical inventory for Oxygen Analysis, responsibility of Eric Wisegarver (PMEL/NOAA)**. For definitions of abbreviations used in spill responses, please see refer to Appendix V, section 1.

CHEMICAL INVENTORY

Common Name	Concentration	Amount	Spill Control	Spill Response	Notes
Manganese Chloride	3M	1 liter			Not a regulated chemical/solution. Used for oxygen titrations. Store in acid locker
Potassium Iodate	0.0016 7 M	1 liter	PI	Gloves Plastic bag	Used for oxygen titrations. Store in Chem Lab acid locker
Sodium Borate Solution	5-6%	1 – 5 gal.		Gloves Paper towels Plastic bag	Not a regulated chemical. Working container will be secured on counter.
Sodium Borate Powder	100%	1 – 500 g		Gloves Wet paper towels Plastic bag	Not a regulated chemical. Stored in Spill Kit.
Sodium Iodide/NaOH Solution	0.11M	1 liter	B		Used for oxygen titrations. Store in flammable cabinet.
Sodium Thiosulfate	0.11 M	1 liter	ST		Used for oxygen titrations. Store in acid locker
Sulfuric Acid	5 M	1 liter	A		Used for oxygen titrations. Store in acid locker.

Nutrient Analyzer Chemicals

Common Name	Weigh/ volume	Number	Spill Response (all FOCI/MACE/PMEL/EMA personnel)	Notes
Acetone	50 ml	10		Store in flame locker
Ammonium molybdate tetrahydrate	27g	10		Store in Chem lab lockers
Ammonium molybdate tetrahydrate	10.8g	20		Store in Chem lab lockers
Brij-35, 21% soln	125ml	2	Clean up with paper towels and water	Store in Chem lab lockers
Cadmium metal, granular	25gm	2		Store in Chem lab lockers
Copper(II) sulfate pentahydrate	20g	3		Store in Chem lab lockers
Dodecyl Sodium Salt soln 25%	250ml	2	Clean up with paper towels and water	Store in Chem lab lockers
Hydrazine hemisulfate	6.4g	10		Store in Chem lab lockers
Hydrocloric Acid 32-38% soln	500ml	6	Spill Control A:	Store in Acid lockers
Imidazole	13.6g	10		Store in Chem lab lockers
L(+) Ascorbic Acid	17.6g	10		Store in Chem lab lockers
N-(1-Naphthyl)ethylene diamine dihydrochloride monomethanolate	1g	10		Store in Chem lab lockers
Oxalic Acid dihydrate	50g	10		Store in Chem lab lockers

Potassium Nitrate	4g	4		Store in Chem lab lockers
Potassium phosphate monobasic	0.5g	4		Store in Chem lab lockers
Sodium hexafluorosilicate	0.3g	8		Store in Chem lab lockers
Sodium Hydroxide, 10N	30ml	10	Spill control B:	Store in Base lockers
Sodium nitrite	0.3g	10		Store in Chem lab lockers
Sulfanilamide	10g	10		
Sulfuric Acid 90-98%	500ml	6	Spill Control A:	
Sodium Citrate dihydrate	280g	10		Store in Chem lab lockers
Phenol	50ml	2		Store in Chem lab lockers
Sodium Nitroferricyanide dihydrate	0.5g	10		Store in Chem lab lockers

3) **Chemical inventory for fish samples. Responsibility of Max Hoberg.** Max Hoberg and Ian Hartwell are trained to use and in the appropriate spill response for chemicals listed below.

CHEMICAL INVENTORY

Common Name	**Concentration**	**Amount**	**Spill Control**	**Spill Response**	**Notes**
Alcohol		5x 4 liter	AL	Gloves 3M Sorbent Pads Plastic bag	Store in Chem. Lab flammables cabinet.
Formaldehyde		1 x 2 gallons	F	Gloves Eye Protection Fan-Pads	Store in flammable cabinet.

				Formalex PolyForm-F Plastic bag	
Hexamine (Hexamethylenetetraamine)		2 kg		Gloves 3M Sorbent Pads Plastic bag	Store in Chem. Lab flammables cabinet.
Rose Bengal		25g		Gloves 3M Sorbent Pads Plastic bag	Store in flammables cabinet.

Appendix V: Spill Control Response Codes and Procedures

A: Acid

 Wear appropriate protective equipment and clothing during clean-up. Keep upwind. Keep out of low areas.
 Ventilate closed spaces before entering them.
 Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible.
 Large Spills: Dike far ahead of spill for later disposal. Use a non-combustible material like vermiculite,
sand, or earth to soak up the product and place into a container for later disposal.
 Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination.
 Never return spills in original containers for re-use.
 Neutralize spill area and washings with soda ash or lime. Collect in a non-combustible container for prompt disposal.
 J. T. Baker NEUTRASORB® acid neutralizers are recommended for spills of this product.

A: Alcohol

Small Spill:

 Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

Large Spill:

 Flammable liquid. Keep away from heat. Keep away from sources of ignition.
 Stop leak if without risk.
 Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material.
 Prevent entry into sewers, basements or confined areas; dike if needed.
 Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS

B: Base

 Wear appropriate protective equipment and clothing during clean-up. Keep upwind. Keep out of low areas.
 Ventilate closed spaces before entering them.
 Neutralize with dilute acid such as HCl if possible.
 Absorb with cat litter or vermiculite.
 Vacuum or sweep up material and place into suitable disposal container.
 Do not breath dust.
 Do not get water on spilled substances.

F: Formalin/Formaldehyde

 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, earth), and place in a chemical waste container.
 Do not use combustible materials, such as saw dust.

PI: Potassium Iodate
 Wear appropriate protective equipment and clothing during clean-up.
 Avoid Contact with combustibles (wood, paper, clothing, etc).
 Absorb with cat litter or vermiculite.
 Keep substance damp with water spray.
 Vacuum or sweep up material and place into suitable disposable container (plastic bag).

RB: Rose Bengal Chloramphenicol Agar
 Wear appropriate protective equipment and clothing during clean-up.
 Wipe up with damp sponge or mop.
 Absorb material, ventilate area, and wash spill site after material has been cleaned up.

ST: Sodium Thiosulfate
 Ventilate area of leak or spill.
 Wear protective gloves and clean body-covering
 Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.
 Recover liquid or particulate in 5 gallon bucket. Absorb with a kitty litter and place in disposable bag. Do
not use combustible materials, such as saw dust to absorb.

W: Water
 Absorb the liquid and wash with water
 Wear PPE

E: Ethanol
 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, earth), and place in a chemical waste container.
 Do not use combustible materials, such as saw dust.

Appendix VI: Spill Response Kit Inventory

1) **Spill kit inventory for zooplankton preparation, responsibility of Adam Spear and Jessica Randall (AFSC/NOAA)**. All NOAA/NMFS/AFSC personnel are trained in the appropriate spill response for the chemicals listed below:

ACID-BASE SPILL KIT INVENTORY

Contents	Amount	Use	Total Spill Volume Controllable	Notes
Spilfyter Acid Neutralizer	1 box	Clean up acid spill—H_2SO_4	1.5l of 5M Sulfuric Acid 5.57l of 10% (1N) HCl	
Spilfyter Base Neutralizer	1 box	Clean up base spill--NaOH	2.0l of Sodium Hydroxide	
Vinyl Gloves	1 box	Protect hands during cleanup	N/A	
Foxtail/Dustpan	1 each	Pick up absorbed neutralizer	N/A	
Rubber apron	1 each	Protect during cleanup	N/A	
Paper Towels	1 roll	Absorb liquids	N/A	
Goggles	2 pair	Protect eyes	N/A	
Chemical absorbent	1 liter	Absorb liquids	0.5l	
Plastic Bags	2 each	Contain used absorbents/waste	N/A	

2) **Spill response and spill kit contents for Nutrient Analysis, responsibility of Eric Wisegarver (NOAA/PMEL/EcoFOCI).** Eric Wisegarver is trained in the appropriate spill response for the chemicals listed below:

SOLID SPILL RESPONSE

Chemical	Spill Response
Ammonium molybdate(VI) tetrahydrate Ammonium molybdate(VI) tetrahydrate Copper (II) sulfate pentahydrate Hydrazine hemisulfate L(+)-Ascorbic acid N-(1-Naphthyl)ethylenediamine dihydrochloride monomethanolate Oxalic acid dihydrate Potassium phosphate monobasic Sulfanilamide Sodium citrate dihydrate Sodium Nitroferricyanide Dihydrate Sodium hexafluorosilicate	Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust
Imidazole Cadmium metal, granular Potassium Nitrate Sodium nitrite	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.

LIQUID SPILL RESPONSE

Chemical	Spill Response
Brij-35, 21% solution Dodecyl Sodium Salt solution, 15%	Absorb material with dri-zorb, kitty litter, or paper towels
Acetone	Warn all persons nearby. Turn off any ignition sources such as burners, motors, and other spark-producing equipment. Absorb with paper towels or other absorbents. However, these materials can increase the surface area and evaporation rate, increasing the potential fire hazard if the material is flammable and airborne concentration reaches the flammability level.
Sodium hydroxide, 10N	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.
Hydrochloric acid 32-38% solution Sulfuric acid 90-98%	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
Phenol	In case of insufficient ventilation, evacuate the area. Wearing suitable respiratory equipment and neoprene/natural rubber gloves or Viton/butyl gloves plus splash goggles and lab coat, use absorbent material to absorb spilled material. After spill has been completely absorbed, wipe down contaminated area with soap and water solution. Lab personnel should take great care to avoid skin contact with phenol.

i) Spill kit inventory for fish samples, responsibility of Max Hoberg. Max is trained in the appropriate spill response for the chemicals listed below:

Contents	Amount	Use	Total Spill Volume Controllable	Notes
Spilfyter	1-LB in plastic tub	Formaldehyde cleanup -all concentrations	1:1 control	Pour onto spill to deactivate formaldehyde
UPF-MP Pads	50 pads	Formaldehyde cleanup-all concentrations	50 pads 50X150ml spills	Spilfyter will be used in conjunction with UPF-MP pads to reduce spill volume
Yellow Pads	2 pads	Alcohol cleanup	2 pads 2X250ml spills	
Nitrile gloves	1 box-M-100 and 1 bag-L- 20 pairs	For all cleanup procedures	N/A	
Eye protection	1-goggles 1-safety glasses 1-face shield	Formaldehyde and alcohol cleanup	N/A	Eye protection will be cleaned before reuse
Tyvex Lab Overall	1-overall	Formaldehyde and alcohol cleanup	N/A	
Cotton Lab Coat	1-coat	Formaldehyde and alcohol cleanup	N/A	
Plastic Bags	2	Formaldehyde and alcohol cleanup/UPF-MP	N/A	Bags are packed full and sealed with duct tape

Note: UPF-MP pads: Universal, fine fiber perforated pads

Appendix VII: Chemical Hygiene Plan and Standard Operating Procedures (SOPs)

Previous sections of the Project Instructions include a list of hazardous materials by name and anticipated quantity. Chemicals will be transported, stored and used in a manner that will avoid any spills and adequate containment, absorbents and cleanup materials will be available in the event of a chemical spill.

The scientific chemicals to be used for this project are: (1) ethyl alcohol (100%) and (2) formaldehyde (37%). Other chemicals brought aboard are consumer products in consumer quantities. Dilutions of the scientific chemicals will be used to preserve in faunal organisms collected with benthic grab samplers, as described in the Operations section of these Project Instructions. Use of these chemicals and the specified dilutions will only occur in exterior locations on the ship away from air intakes. Scientific chemicals shall not be disposed over the side.

Standard Operating Procedures and Information Sheets are provided here for the scientific chemicals. Included are details concerning personal protective equipment, work area precautions, special handling and storage requirements, spill and accident procedures/first aid, waste disposal and other pertinent information. Both small and large spills are of particular concern. In both cases, the spill response is intended to first contain the spill and then neutralize it. This may be easily accomplished for small spills depending on the degree of vessel motion and the prevailing environmental conditions. In all cases, the first responder should quickly evaluate the risks of personal exposure versus the potential impacts of a delayed response to the spill and act accordingly. For example, if the spill is small and it is safe to do so, a neutralizing agent should be rapidly applied to encircle/contain the spill and then cover it. However, a large formaldehyde spill (> 1 L) is extremely hazardous and individuals at risk of exposure should immediately leave the area. The CO or OOD should be notified immediately so that a response team with self-contained breathing apparatus (SCBA) can be deployed to complete the cleanup operation or dispense the hazard with a fire hose directed overboard. The vessel's course should be adjusted to minimize exposure of personnel to wind-driven vapors and to limit spread of the spill due to vessel motion. The reportable quantity (RQ) of formaldehyde is 1,000 pounds and the RQ for ethyl alcohol is 5,000 pounds which greatly exceed the quantities brought aboard for this project.

Standard Operating Procedures – Formaldehyde
At-Sea

Chemical Name: 37% Formaldehyde

UN Number: 1198

<u>Hazard Ratings: (on a scale of 0 to 4)</u>

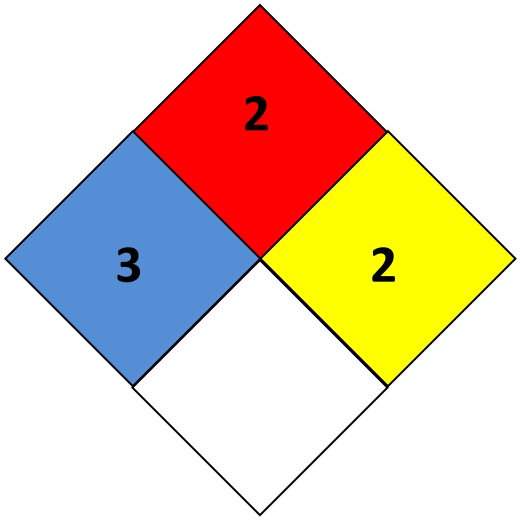
Health (blue): 3 Flammability (red): 2

Reactivity (yellow): 2 Special (white):

<u>Personal Protection Gear Needed</u>

*gloves

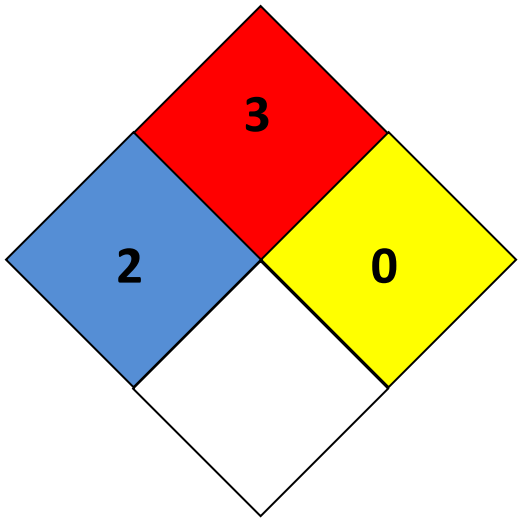
*goggles or face shield



Special Handling Instructions

* If a ventilation hood is not available, then pouring of chemical must be done outside. At least two people should be involved with large chemical transfers in case of an emergency.

* Chemical must be stored at temperatures above 15^{o} c to prevent polymerization of paraformaldehyde.



First Aid

* If swallowed, give large amounts of drinking water and induce vomiting.

*If vapors inhaled, get out into fresh air immediately. Give oxygen if breathing is difficult.

* If spilled on skin or splashed in eyes, flush with water for at least 15 minutes.

Spill Cleanup Procedures

For small spills (500-1000 mls):

Cover spill quickly with a Fan Pad and spray on Formalex to deactivate and absorb chemical. Let material sit for 10 - 15 minutes. Dispose of materials in plastic bag.

For large spills (1000 mls - ?):

Use a combination of Fan Pads and Formalex as quickly as possible to contain spill and deactivate it. Vacate area and try to ventilate room, if possible. Call Bridge immediately.

Deactivation/Disposal Procedures At Sea

*Formalex is a greenish liquid that is to be used to insure proper chemical deactivation. Formalex should also be used in conjunction with Fan Pads. Place used Fan Pad in plastic bag, seal, and put in bottom of Spill Kit.

*Fan Pads may be used to absorb small spills alone but these pads work best when used with Formalex to immediately control the vapor layer.

Shipping Procedures and Restrictions

37% formaldehyde cannot be ship by air due to its flammability rating.

All quantities should be over-packed with absorbency material in case the original container is damaged. When shipping by barge or land, labels are not required for quantities under 110 gallons by D.O.T. but the container should have MSDSs and the UN number readily available.

Standard Operating Procedures – Ethanol At-Sea

Chemical Name: 100% Alcohol

UN Number: 1170

Hazard Ratings: (on a scale of 0 to 4)

Health (blue): 2 Flammability (red): 3

Reactivity (yellow): 1 Special (white):

Personal Protection Gear Needed

*gloves

*goggles or face shield when pouring

Special Handling Instructions

* Keep away from heat, flame, and other potential ignition sources.

* Store in a well ventilated area or in a flammable cabinet.

First Aid

* If swallowed, give large amounts of drinking water and induce vomiting.

* If vapors inhaled, get out into fresh air immediately. Give oxygen if breathing is difficult.

* If spilled on skin or splashed in eyes, flush with water for at least 15 minutes.

Spill Cleanup Procedures

Absorb ethanol with 3M Sorbent Pads and allow to dry in a well ventilated area away from ignition source.

Deactivation/Disposal Procedures At Sea

Use 3M Sorbent Pads to absorb the ethanol. Put used pads outside to dry (secure from blowing overboard and exposure to flame). Once dry, the pads may be reused or burned.

Shipping Procedures and Restrictions

Due to the flammability rating of 95% ethanol, this chemical cannot be shipped by air. Transportation by barge or land vehicle will require the ethanol container to be over-packed with absorbent materials such as clumping kitty litter or shredded paper. Include MSDSs and the UN number with the shipment for reference in the event of a spill.