UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Alaska Fisheries Science Center
Resource Assessment and Conservation Engineering
7600 Sand Point Way NE
Seattle, WA 98115

FINAL Project Instructions

Date Submitted: June 13, 2013
Platform: NOAA Ship *Oscar Dyson*
Project Number: DY-13-08 (AFSC)
Project Title: EMA-EcoFOCI Juvenile Walleye Pollock and Forage Fish Survey

Project Dates: August 14, 2013 to August 30, 2013 (Leg 1)
September 4, 2013 to September 19, 2013 (Leg 2)

Prepared by: _____ Dated: 6-13-13.
Matt Wilson/Janet Duffy-Anderson
Chief Scientists
AFSC/RACE

Approved by: _____ Dated: 13 JUNE 2013
Guy Fleischer
Acting Division Director
AFSC/RACE

Approved by: _____ Dated: 6/17/13
Doug DeMaster
Center Director
AFSC

Approved by: Wade J Blake Digitally signed by BLAKE.WADE.JAMES.1025936538 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=NOAA, cn=BLAKE.WADE.JAMES.1025936538 Date: 2013.08.09 15:00:23 -07'00' Dated: _____
Captain Wade J. Blake, NOAA
Commanding Officer
Marine Operations Center – Pacific

I. Overview

A. EMA-EcoFOCI Juvenile Walleye Pollock and Forage Fish Survey

August 14 – September 19, 2013

B. Service Level Agreements: Of the 33 DAS scheduled for this project, 0 DAS are funded by the program and 33 days are funded by OMAO. This project is estimated to exhibit a High Operational Tempo.

C. Operating Area: Gulf of Alaska

D. Summary of Objectives

Summary of Objectives: Fisheries (midwater trawl) and oceanographic survey to:

1) Extend time series of age-0 walleye pollock abundance off east Kodiak Island and in the Semidi Bank vicinity;
2) Describe the community structure, biomass, energetic status of pelagic nekton (capelin, eulachon, Pacific cod, walleye pollock, arrowtooth flounder, sablefish, and rockfishes);
3) Collect age-0 pollock-associated prey and measure environmental variables that potentially affect pollock ecology;
4) Conduct a series of gear comparison tests to examine catch differences in size composition & abundance for each species between the anchovy trawl (aka Stauffer trawl) and the CanTrawl;
5) Occupy a series of cross-shelf transects of CTD stations to examine cross-shelf physical and chemical oceanography.

E. Participating Institutions

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

NOAA – Pacific Marine Environmental Laboratory (PMEL)
7600 Sand Point Way N.E., Seattle, Washington 98115-0070

NOAA – Alaska Fisheries Science Center (AFSC)
TSMRI
17109 Point Lena Loop Road, Juneau, AK, 99801

F. Personnel/Science Party:

Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
LEG 1						
Wilson, Matt	Chief Sci.	Aug 12	Aug 30	M	AFSC	USA
Benjamin, Dennis	Sci.	Aug 12	Aug 30	M	AFSC	USA
Overdick, Ashlee	Sci.	Aug 12	Aug 30	F	AFSC	USA
Cooper, Dan	Sci.	Aug 12	Aug 30	M	AFSC	USA
Busby, Morgan	Sci.	Aug 12	Aug 30	M	AFSC	USA
Dougherty, Annette	Sci.	Aug 12	Aug 30	F	AFSC	USA
DeWitt, Carol	Sci.	Aug 12	Aug 30	F	PMEL	USA
LEG 2						
Duffy-Anderson, Janet	Chief Sci.	Sept 2	Sept 19	F	AFSC	USA
Proctor, Peter	Sci.	Sept 2	Sept 19	M	PMEL	USA
Harpold, Colleen	Sci.	Sept 2	Sept 19	F	AFSC	USA
Shavey, Christie	Sci.	Sept 2	Sept 19	F	AFSC	USA
Paquin, Melanie	Sci.	Sept 2	Sept 19	F	AFSC	USA
McKeever, Scott	Sci.	Sept 2	Sept 19	M	PMEL	USA
Canino, Michael	Sci.	Sept 2	Sept 19	M	AFSC	USA
Eiler, John	Sci.	Sept 2	Sept 19	M	AFSC	USA
Culbertson, Britta	TAS	Sept 2	Sept 19	F	The Center School	USA

G. Administrative

1. Points of Contact:

Matt Wilson (Chief Scientist, Leg 1)
NOAA – Fisheries, Alaska Fisheries Science Center
7600 Sand Point Way NE
Seattle, WA 98115
Ph: 206-526-6522, Matt.Wilson@noaa.gov

Janet Duffy-Anderson (Chief Scientist, Leg 2)
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Seattle, WA 98115
Ph: (206) 526-6465, Janet.Duffy-Anderson@noaa.gov

Jeff Napp, AFSC, FOCI Supervisor
7600 Sand Point Way NE, Bldg 4
Seattle WA 98115

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Phyllis Stabeno, PMEL, FOCI Supervisor
7600 Sand Point Way NE, Bldg 3
Seattle WA 98115
Ph: 206-526-6453, Phyllis.Stabeno@noaa.gov

Ed Farley, EMA Supervisor
TSMRI / 17109 Point Lena Loop Road
Juneau, AK, 99801
Ph: 907-789-6085, Ed.Farley@noaa.gov

NOAA Ship *O*scar *Dyson*
CO cell: 206-403-8433
XO cell: 206-295-0775
CME cell: 206-295-0670
Iridium: 808-659-0050
Underway VIOP: 301-713-7778
INMARSAT: 011-870-336-995-920 (voice)

Field Operations Officer, Lt. Mark Frydrych
ops.oscar.dyson@noaa.gov

2. Diplomatic Clearances - N/A

3. Licenses and Permits
This project will be conducted under the Blanket Scientific Research Permit #2013-B issued by the U.S. on January 14, 2013 effective January 31 – October 14, 2013 to AFSC research personnel and the *Oscar Dyson.* In addition, the State of Alaska Fish Resource Permit CF-13-002 has been granted and is effective February 5, 2013 to December 31, 2015.

II. Operations

A. Project Itinerary
Departure: August 14, 2013 Kodiak, AK 0900 hours
Arrival: August 30, 2013 Kodiak, AK 0900 hours
Departure: September 4, 2013 Kodiak, AK 0900 hours

Arrival: September 19, 2013 Kodiak, AK 0900 hours

B. Staging and Destaging

The equipment necessary for the project will be shipped to Kodiak and loaded onto NOAA Ship *O*scar *Dyson* prior to departure from Kodiak on 14 (Wednesday) August 2013. We request ship's assistance with loading on August 13, 2013. We will require dedicated use of the chemistry, hydrographic, wet, dry, and fish processing labs for sample and equipment preparation and request as much counter and cabinet space as possible. We will use the Dry lab for SEACAT operations. Gear will remain on board until the NOAA Ship *O*scar *Dyson* arrives in Seattle in October 2013. Samples will be shipped from Kodiak, AK.

C. 1. **Underway Operations** –

The ship's Scientific Computer System (SCS) shall operate throughout the project, acquiring and logging data from navigation, meteorological, and oceanographic sensors. See FOCI Standard Operating Instructions (**SOI 5.2** and **SOI 5.3**) for specific requirements. We request that the centerboard be DOWN for the duration of the project.

2. **Station Operations** – Operations will occur 24/7. *Please advise the science party if 2 survey technicians will not be available for one or both legs of the project.*

Gear Comparison #1: The project will begin upon departure from Kodiak, Alaska at 09:00 ADT on 14 August, 2013. Prior to the time of departure the net reels will have been loaded with 1 CanTrawl and 1 anchovy trawl, and the 5m alloy doors will have been prepared for trawling activities. We will proceed to Kalsin Bay to conduct a gear comparison of the CanTrawl and anchovy trawl catch efficiencies. First, two replicate tows will be conducted using the CanTrawl (use and assistance with 3rd wire is requested). Either depth-integrated tows or tows targeted on sign will be conducted. The tow will be a targeted town on midwater sign. Upon completion and remaining in the calm waters of Kalsin Bay the 5m alloy doors will be swapped out for the 5x7 doors. We will return to the same coordinates as were sampled using the CanTrawl and 2 replicate tows using the anchovy net will occur. For this tow, vertical sampling will be conducted in a sawtooth pattern between the surface at 30 m depth over the same towed path as the CanTrawl. Sawtooth sampling will ensure that the sample vertical extent of the water column is sampled with the anchovy trawl as was with the CanTrawl (CanTrawl vertical opening – 30 m, anchovy trawl vertical opening 15 m). The anchovy trawl will be retrieved at 10 m/min. All jellyfish and nektonic animals collected, or a subsample of each species, will be enumerated, weighed, and measured for body size. All, or a

subsample, of any miscellaneous other small zooplankton (MOSP) will be frozen. Subsamples of MOSP will amount to about 0.5 l of material and will be selected haphazardly.

YOY Survey: Upon completion of Gear Trial Comparison #1, we will begin sampling ~250 pre-determined stations (Figure 1, Table 1). Enroute to the first pre-determined station, the CanTrawl will be removed from the net reel and a backup anchovy trawl will be loaded. At each grid location, a bongo tow will be conducted first to collect zoo- and ichthyoplankton followed by a small-mesh anchovy trawl (Stauffer/anchovy trawl) to sample age-0 walleye pollock and other forage fishes.

The standard gear for plankton sampling will be a 60-cm bongo (SOI 3.2.2) with 0.505-mm mesh netting paired with a 20-cm bongo with 0.153-mm mesh. A FastCat will be mounted above the bongo to provide depth, temperature, and salinity data. Tows will be to 200 meters or 10 meters off the bottom where water depth is shallower.

Two buttons are required:

1) Surface (in/out),
2) EQ

Marks to the MOA will be made in the Survey Office (Dry Lab) by a scientist on-watch who will be monitoring the FastCat operation throughout the station occupation. The processing of FastCat files and CTD files will be the responsibility of the scientific personnel on watch.

The samples collected from the 20-cm and 60-cm bongos will be processed in the following manner. For each, Net 1 will be preserved in 1.8% formaldehyde, buffered with sodium borate, and boxed. Net 2 (60BON only) samples will be sorted for all fish larvae and preserved in 100% ethanol and/or frozen in the -80 °C freezer, dependent on special requests. Net 2 20BON will be discarded.

<u>Midwater (anchovy) trawl</u>

The anchovy trawl will be deployed to a depth of 200 meters, or 10 meters, off the bottom, whichever is shallowest. An SBE-39 will be deployed on the headrope as a backup depth sensor. Net depth will be monitored using the ship's Simrad ITI (trawl eye) or FURUNO system. Standard trawl operations will be used for deployment. Once equilibrium is achieved, as determined by the fishing officer or scientist, ***the trawl will be retrieved at a wire rate of about 10 meters per minute***. Thus, the trawl will be fished over a double-oblique path.

Three buttons are required

1) Doors (in/out),
2) EQ,
3) HB

The SBE will be removed and downloaded. Walleye pollock (all age classes), Pacific cod, rockfishes, sablefish, capelin, eulachon, and flatfishes will be sorted from the catch. It is sometimes necessary to sort walleye pollock into ca. ≤120 mm SL and ca. ≥12 cm FL to ensure adequate representation of age-0 and age-1+ components, respectively, in the catch and length data. Flatfishes will be sorted to species if possible. Those individuals <100 mm TL that cannot be ID'ed to species will be bagged and frozen for return to the laboratory. For each of these groups named above, all individuals or a randomly drawn subsample of all individuals will be used to determine length composition. For walleye pollock, approximately 100 age-0 and 100 age-1+ walleye pollock will be measured for body length. Standard length (SL) will be the body-length metric for age-0 walleye pollock. Fork length (FL) will be the body-length metric for age-1+ walleye pollock. Subsampling may be necessary prior to enumerating and measuring individuals. A sample (~25 individuals) of each of the following groups will be frozen for subsequent examination in the laboratory: age-0 walleye pollock, age-0 Pacific cod, and each of the other flatfish species (flatfish <100 mm TL). These will be flash frozen in the –80 ^{o}C freezer and then moved to the –20 ^{o}C freezer. Excluding gelatinous zooplankton, which will be quantified, all zooplankton will be collectively weighed as MOSP and discarded. Note, the MOSP often includes fishes that appear to be larvae; these fishes can be highly abundant and vary in size (e.g., *Lumpenus* spp., ≤7 cm TL).

CTD transects: Selected transects will also be occupied for CTD cross-shelf analysis (Figure 2). At each transect location a CTD (with bottles) will be conducted. All hydrographic casts include high-resolution vertical profiling of water properties (including temperature, salinity, chlorophyll fluorescence, PAR, dissolved O_2) to within 10 m of the bottom using a Seabird 911Plus CTD. Discrete oxygen samples will be collected, preserved with 1 ml solutions of $MnCl_2$ and sodium hydroxide (8 M) / sodium iodide (4 M), and stored on board for titration during the fall survey. This data will be used to calibrated the CTD oxygen sensors. Nutrient and chlorophyll samples will be collected and filtered onboard and frozen for analysis at a later date at the NOAA laboratories in Seattle. CTD transects will be occupied weather and time permitting.

Gear Comparison #2:

Upon completion of the YOY Survey, we will proceed to Kalsin Bay and conduct another gear comparison of the anchovy trawl and Can Trawl catch efficiencies. En route to Kalsin Bay, 1 anchovy trawl will be removed from the net reel, and the CanTrawl with spectra bridles will be re-loaded. First, two replicate tows will be conducted using the anchovy trawl (use and assistance with 3rd wire is requested). Targeted tows will be made on acoustic sign and will be conducted in a sawtooth pattern between the surface and 30 m depth. Upon completion of tows, and remaining in the calm waters of Kalsin Bay, the 5x7 doors will be swapped out for the 5m alloy doors. We will return to the same coordinates as were sampled using the anchovy trawl and 2 replicate tows using the CanTrawl will occur. If time permits, additional tows might be undertaken for the gear comparison project, weather and CO approval permitting.

D. Dive Plan N/A

E. Applicable Restrictions

Conditions that could preclude normal operations would be poor weather and equipment failure. Poor weather would be waited out in a sheltered area until operations could be resumed and modifications would be made to the sampling grid. Sheltered areas are of scientific interest; therefore, while waiting out poor weather, the Chief Scientist may request sampling operations to assess local physical conditions, zooplankton, and fish populations. Equipment failure would have to be addressed immediately for the project to continue.

III. Equipment

1. Acoustic Equipment
    - GPS with NEMA 183 to ER60 (2)
    - 50/200 kHz ES60 Bridge sounder
    - Furuno FE-700 fathometer
    - Acoustic echosounders (5)
2. Trawling Equipment
    - 3rd wire FS-70 net sonar with winch and accessories (2)
    - Simrad ITI net mensuration system (2)
    - Furuno CN24-40 headrope transducer
    - Stern trawl capabilities for trawling
3. Oceanographic Equipment

- Both starboard oceanographic winches with conducting cable, slip rings and blocks. Forward winch terminated for CTD/rosette; aft winch terminated for FastCat.
- Seabird SBE 911+CTD System
- Seabird SBE19+CTD and PDIM for real time data on zooplankton tows
- SBE45 Thermosalinograph with fluorometer
- Power source for ISUS
- Wire speed indicators and readout for both hydrographic winches visible in Dry Lab or where SEACAT operations occur
- Weather instr. for above surface PAR, wind speed/direction
- Ship's crane and A-frame for recovering moorings

4. Biological Sampling Equipment
    - Fish lab conveyor system
    - Catch sorting and weighing table
    - Calibrated Marel M60 60kg scale (2)
    - Calibrated Marel M60 6kg scale (2)
    - Large gray tubs for dumping catch into (2)
5. Computing equipment
    - Scientific Computing System
6. Sample storage equipment
    - Supercold freezer (-80C)
    - Walk in freezer (-10C)
    - Stand up freezer (-20C)
    - Hazmat storage cabinets
7. Laboratory and exterior working space
    - Use of Pentium PC in Dry and/or Computer Lab for data analysis,
    - Remote access in the computer lab to fastcat data stored in the survey lab.
    - Scientific Computer System (SCS)
    - Video monitors in Dry, Chemistry, and Wet labs for viewing SCS and Electronic MOA output
    - Laboratory space with exhaust hood, sink, lab tables, and storage space
    - Sea-water hoses and spray 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 starboard sampling station/hero platform and fantail
- Ship's crane(s) used for loading and/or deploying gear and supplies

B. Equipment and Capabilities Provided by the Scientists (itemized)

1. Acoustic Equipment (500lbs)
2. Trawling Equipment
    - Cantrawl mid water trawl w/accessories (e.g., 2.0cm mesh liners,) (2); 7,000lbs
    - Spectra bridles (60 m); 300lbs
    - NETS 5.0m doors with accessories (2 sets); 3,000lbs
    - Small-mesh midwater trawls (Stauffer, a.k.a. anchovy) equipped with 3-mm (1/8") mesh codend liner,
    - Bridles for anchovy trawl
    - Bottom trawl (high-opening shrimp) with 3-mm (1/8") mesh codend liner (trawl without tickler chain),
    - Two pair steel-v trawl doors (each door: 5'x7', 1250 lbs),
    - Spare webbing & twine
    - Spare hardware
    - All accessories to make trawls fishable and spare web if available
3. Oceanographic Equipment (1,500lbs)
    - Biospherical QSP2300 PAR sensor
    - SBE 43 dissolved oxygen sensor (2)
    - pH sensor
    - Secondary TC sensors for SBE 911+
    - SBE 19Plus SeaCat
    - SBE 49 FastCat
    - Niskin Bottles 10 L (need 10 total+ spares)
    - Filter racks and pumps (3)
    - 20 & 60 cm Bongo frames, 505, 153 mesh nets, cod ends, weights, and flowmeters
    - Two wire-angle indicators

- Biological supplies (misc.) *

4. Biological Sampling Equipment (500lbs)
    - Dynamometer
    - Mechanical platform scale (2)
    - Fish baskets (30)
5. Miscellaneous scientific sampling and processing equipment
    - Fish baskets (12, MACE),
    - Dishpans (10, MACE),
    - 5-gal buckets (5),
    - Wading pools (small and large),
    - Two length boards for adult fish,
    - Three length boards for small fish,
    - SBE-39 temperature and depth sensor (MACE) for beam trawl
    - Triple-beam balance for small fish weights,
    - 2000 Zip-loc bags (12”),
    - Sieves, jar holder, funnels, squirt bottles,
    - 70 cases of 32-oz jars, closures, and labels,
    - 10 flowmeters, calibration data, hardware for attaching and maintaining them,
    - Preservative-dispenser equipment,
    - Hazardous materials spill kit, and
    - Spare wire angle indicator
6. Computing equipment (50lbs)
    - IBM compatibles w/XP Op.System*
    - Printers*
    - Laptops
    - Project Operations Database (COD) software
    - Electronic (MS Excel) and paper forms: Haul, Catch, and Length

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’s Office of MArine and Aviation Operations policy, the ship may not sail without a complete inventory of all hazardous materials by name and the anticipated quantity brought aboard, MSDS and appropriate neutralizing agents, buffers, or absorbents in amounts adequate to address spills

of a size equal to the amount of chemical brought aboard, and a chemical hygiene plan (see Appendix 2 for Chemical Hygiene Plan and SOPs. All FOCI personnel on this survey are trained to manage and respond to spills for the chemicals listed below in the Inventory). Documentation regarding those requirements will be provided by the Chief of Operations, Marine Operations Center, upon request.

Upon departure from the ship, scientific parties will provide the CO or their designee an inventory of hazardous material indicating all materials have been used or 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.

Overboard discharge of scientific chemicals is not permitted during projects aboard NOAA ships.

B. Radioactive Isotopes N/A

C. Inventory (itemized)

Common Name	**Concentration**	**Amount**	**Spill Response (all FOCI personnel)**	**Notes**
$MnCl_2$	3 molar	2 – 450 ml	Gloves Paper towels Plastic bag	Loaded 1/23/2013, not a regulated chemical.
Solution of sodium hydroxide sodium iodide	 8 M 4M	2 – 450 ml	Gloves 3M Sorbent Pads Plastic bag	Loaded 1/23/2013, working volume for all Spring and Fall FOCI projects.
$MnCl_2$	3 molar	2 – 450 ml	Gloves Paper towels Plastic bag	Loaded 1/23/2013, not a regulated chemical.
Formaldehyde	37%	6 – 5 gal.	Gloves Eye Protection Fan-Pads Formalex Plastic bag	Dyson loaded 1/23/2013, working volume for all Spring FOCI projects. MSDS, hygiene plan, and SOPs provided at time of loading.
Ethanol	100%	4 – 1 gal.	Gloves	Loaded

			3M Sorbent Pads Plastic bag	1/23/2013, working volume for all Spring and Fall FOCI projects.
Sodium Borate Solution	5-6%	1 – 5 gal.	Gloves Paper towels Plastic bag	Loaded 1/23/2013, not a regulated chemical.
Sodium Borate Powder	100%	1 – 500 g	Gloves Wet paper towels Plastic bag	Loaded 1/23/2013, not a regulated chemical.
Ethylene Glycol	100%	1 – 500 ml	Gloves Paper towels Plastic bag	Loaded 1/23/2013, not a regulated chemical.
Formalex	100%	1.5 gal.	Gloves Paper towels	Loaded 1/23/2013, not a regulated solution. Used for spill cleanup.

Spill Kit Contents	**Amount**	**Use**	**Total Spill Volume Controllable**	**Notes**
Formalex	1.5 gallons	Formaldehyde cleanup (all concentrations)	1.5 gallons 1:1 control	Formalex will be used in conjunction with Fan-Pads to reduce total spill volume.
Fan-Pads	1 roll (50 sheets)	Formaldehyde cleanup (all concentrations)	50 sheets=50-150 ml spills	Formalex will be used in conjunction with Fan-Pads to reduce total spill volume.
3 M Pads	10 pads	Ethanol cleanup	10 pads=10-250ml spills	Pads may be reused if dried out.
Nitrile Gloves	4 pairs each S,M,L,XL	For all cleanup procedures	N/A	Gloves will be restocked by each survey group.
Eye Protection	4 pairs	Formaldehyde cleanup	N/A	Eye protection will be cleaned before re-use.
Tyvex Lab Coats	2 coats	Formaldehyde cleanup	N/A	Coats will be cleaned with Fan-Pads and Formalex before reuse.
Plastic Bags	2	Formaldehyde cleanup/Fan Pads	N/A	Bags may be packed full and sealed.

V. Additional Projects

A. Supplementary ("Piggyback") Projects N/A

B. NOAA Fleet Ancillary Projects

VI. Disposition of Data and Reports

A. Data Responsibilities

B. Pre and Post Project Meeting

Prior to departure, the Chief Scientist will conduct a meeting of the scientific party to train them in sample collection and inform them of project objectives. Some vessel protocols, e.g., meals, watches, etiquette, etc. will be presented by the ship's Operations Officer.

Post-Project Meeting: Upon completion of the project, a meeting will normally be held at 0830 (unless prior alternate arrangements are made) and attended by the ship's officers, the Chief Scientist and members of the scientific party to review the project. Concerns regarding safety, efficiency, and suggestions for improvements for future projects should be discussed. Minutes of the post-project meeting will be distributed to all participants by email,.

C. Ship Operation Evaluation Report

Within seven days of the completion of the project, a Ship Operation Evaluation form is to be completed by the Chief Scientist. The preferred method of transmittal of this form is via email to omao.customer.satisfaction@noaa.gov. If email is not an option, a hard copy may be forwarded to:

Director, NOAA's Office of MArine and Aviation Operations
NOAA Office of Marine and Aviation Operations
8403 Colesville Road, Suite 500
Silver Spring, MD 20910

VII. Miscellaneous

A. Meals and Berthing

Meals and berthing are required for up to _8_ scientists per leg. Meals will be served 3 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 survey.

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 which 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, Revised: 02 JAN 2012) 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. The completed form should be sent to the Regional Director of Health Services at Marine Operations Center. The participant can mail, fax, or scan the form into an email using the contact information below. The NHSQ should reach the Health Services Office no later than 4 weeks prior to the project to allow time for the participant to obtain and submit additional information that health services might require before clearance to sail can be granted. Please contact MOC Health Services with any questions regarding eligibility or completion of the NHSQ. Be sure to include proof of tuberculosis (TB) testing, sign and date the 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

Contact information:

Regional Director of Health Services
Marine Operations Center - Pacific
2002 SE Marine Science Dr.
Newport, OR 97365
Telephone 541-867-8822
Fax 541-867-8856
Email MOP.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

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. Steel-toed shoes are required to participate in any work dealing with suspended loads, including CTD deployments and recovery. The ship does not provide steel-toed boots. Hard hats are also 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.

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 vessels 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 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 *NMAO 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 3 days of embarking.

F. Foreign National Guests Access to OMAO Facilities and Platforms

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). National Marine Fisheries Service personnel will use the Foreign National Registration System (FRNS) to submit requests for access to NOAA facilities and ships. The Departmental Sponsor/NOAA (DSN) is responsible for obtaining clearances and export licenses and for providing escorts required by the NAO. DSNs should consult with their designated NMFS Deemed Exports point of contact to assist with the process.

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

Responsibilities of the Chief Scientist:

1. Provide the Commanding Officer with the e-mail generated by the FRNS granting approval for the foreign national guest's visit. This e-mail will identify the guest's DSN and will serve as evidence that the requirements of NAO 207-12 have been complied with.
2. 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.
3. 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.
4. Export Control - *The NEFSC currently neither possesses nor utilizes technologies that are subject to Export Administration Regulations (EAR).*

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:

1. Ensure only those foreign nationals with DOC/OSY clearance are granted access.
2. 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.

3. Ensure foreign national access is permitted only if unlicensed deemed export is not likely to occur.
4. Ensure receipt from the Chief Scientist or the DSN of the FRNS e-mail granting approval for the foreign national guest's visit.
5. 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.
6. Export Control - 8 weeks in advance of the project, 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.
7. 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:

1. 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.
2. The DSN 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 (or DOC) employee. According to DOC/OSY, this requirement cannot be altered.
3. Ensure completion and submission of Appendix C (Certification of Conditions and Responsibilities for a Foreign National

Appendices

Station List (station order and number of stations occupied may vary)

ACTIVITY	LAT DEG	LAT MIN	HEMI	LONG DEG	LONG MIN	HEMI
Project start	**57**	**47.33**	**N**	**152**	**24.11**	**W**
Gear comparison	57	38.4	N	152	24.45	W
Tcha0 survey	54	16.9	N	164	42.63	W
Tcha0 survey	54	2.8	N	164	39.64	W
Tcha0 survey	54	3.1	N	164	13.19	W
Tcha0 survey	54	17.3	N	164	16.10	W
Tcha0 survey	54	31.8	N	163	52.44	W
Tcha0 survey	54	17.6	N	163	49.66	W
Tcha0 survey	54	3.5	N	163	46.84	W
Tcha0 survey	54	3.9	N	163	20.56	W
Tcha0 survey	54	18.0	N	163	23.30	W
Tcha0 survey	54	32.2	N	163	25.99	W
Tcha0 survey	54	32.5	N	162	59.63	W
Tcha0 survey	54	18.4	N	162	57.02	W
Tcha0 survey	54	4.2	N	162	54.37	W
Tcha0 survey	54	18.8	N	162	30.82	W
Tcha0 survey	54	32.9	N	162	33.35	W
Tcha0 survey	54	47.0	N	162	35.81	W
Tcha0 survey	54	33.3	N	162	7.14	W
Tcha0 survey	54	18.2	N	162	5.92	W
Tcha0 survey	54	5.0	N	162	2.21	W
Tcha0 survey	54	19.5	N	161	38.66	W
Tcha0 survey	54	34.1	N	161	42.52	W
Tcha0 survey	54	47.8	N	161	43.32	W
Tcha0 survey	55	1.9	N	161	45.56	W
Tcha0 survey	55	16.4	N	161	21.46	W
Tcha0 survey	55	2.3	N	161	19.36	W
Tcha0 survey	54	48.2	N	161	17.19	W
Tcha0 survey	54	34.0	N	161	14.98	W
Tcha0 survey	54	19.9	N	161	12.70	W
Tcha0 survey	54	20.2	N	160	46.82	W
Tcha0 survey	54	34.4	N	160	49.01	W
Tcha0 survey	54	48.5	N	160	51.14	W
Tcha0 survey	55	2.7	N	160	53.22	W
Tcha0 survey	55	16.8	N	160	55.24	W

Tcha0 survey	55	3.0	N	160	27.17	W
Tcha0 survey	54	48.9	N	160	25.18	W
Tcha0 survey	54	49.3	N	159	59.29	W
Tcha0 survey	54	35.1	N	159	57.31	W
Tcha0 survey	54	34.8	N	160	23.12	W
Tcha0 survey	54	20.6	N	160	21.01	W
Tcha0 survey	54	35.5	N	159	31.58	W
Tcha0 survey	54	35.9	N	159	6.08	W
Tcha0 survey	54	50.0	N	159	7.73	W
Tcha0 survey	55	4.2	N	159	9.49	W
Tcha0 survey	55	18.3	N	159	11.18	W
Tcha0 survey	55	17.9	N	159	37.08	W
Tcha0 survey	55	31.7	N	160	4.85	W
Tcha0 survey	55	32.4	N	159	12.81	W
Tcha0 survey	55	46.6	N	159	14.37	W
Tcha0 survey	55	32.8	N	158	46.91	W
Tcha0 survey	55	18.7	N	158	45.36	W
Tcha0 survey	55	4.5	N	158	43.75	W
Tcha0 survey	54	50.4	N	158	42.07	W
Tcha0 survey	54	36.0	N	158	41.09	W
Tcha0 survey	54	50.6	N	158	17.20	W
Tcha0 survey	55	4.9	N	158	18.08	W
Tcha0 survey	55	19.0	N	158	19.61	W
Tcha0 survey	55	33.2	N	158	21.08	W
Tcha0 survey	55	47.3	N	158	22.48	W
Tcha0 survey	55	56.7	N	158	37.11	W
Tcha0 survey	56	16.0	N	157	59.09	W
Tcha0 survey	56	25.7	N	158	6.07	W
Tcha0 survey	56	1.8	N	157	57.91	W
Tcha0 survey	55	47.7	N	157	56.65	W
Tcha0 survey	55	33.6	N	157	55.33	W
Tcha0 survey	55	19.4	N	157	53.95	W
Tcha0 survey	55	5.0	N	157	53.32	W
Tcha0 survey	54	50.7	N	157	52.21	W
Tcha0 survey	55	5.6	N	157	26.98	W
Tcha0 survey	55	19.8	N	157	28.36	W
Tcha0 survey	55	33.9	N	157	29.66	W
Tcha0 survey	55	48.1	N	157	30.90	W
Tcha0 survey	56	2.2	N	157	32.08	W
Tcha0 survey	56	16.4	N	157	33.18	W
Tcha0 survey	56	30.5	N	157	34.21	W
Tcha0 survey	56	35.3	N	157	47.64	W
Tcha0 survey	56	40.0	N	157	13.00	W

Tcha0 survey	56	16.7	N	157	7.34	W
Tcha0 survey	56	2.6	N	157	6.32	W
Tcha0 survey	55	48.4	N	157	5.23	W
Tcha0 survey	55	34.3	N	157	4.07	W
Tcha0 survey	55	20.1	N	157	2.84	W
Tcha0 survey	55	6.0	N	157	1.54	W
Tcha0 survey	55	20.5	N	156	37.39	W
Tcha0 survey	55	34.7	N	156	38.54	W
Tcha0 survey	55	48.8	N	156	39.63	W
Tcha0 survey	56	17.1	N	156	41.58	W
Tcha0 survey	56	31.2	N	156	42.45	W
Tcha0 survey	56	45.4	N	156	43.25	W
Tcha0 survey	56	51.0	N	156	45.00	W
Tcha0 survey	56	59.9	N	156	18.04	W
Tcha0 survey	56	45.8	N	156	17.40	W
Tcha0 survey	56	31.6	N	156	16.69	W
Tcha0 survey	56	17.5	N	156	15.90	W
Tcha0 survey	56	3.3	N	156	15.04	W
Tcha0 survey	55	49.2	N	156	14.10	W
Tcha0 survey	55	35.0	N	156	13.10	W
Tcha0 survey	55	20.9	N	156	12.02	W
Tcha0 survey	55	35.4	N	155	47.72	W
Tcha0 survey	55	49.5	N	155	48.65	W
Tcha0 survey	56	3.7	N	155	49.51	W
Tcha0 survey	56	17.8	N	155	50.29	W
Tcha0 survey	56	32.0	N	155	51.00	W
Tcha0 survey	56	46.1	N	155	51.64	W
Tcha0 survey	57	0.3	N	155	52.19	W
Tcha0 survey	57	14.4	N	155	52.67	W
Tcha0 survey	57	27.0	N	155	46.00	W
Tcha0 survey	57	28.9	N	155	27.13	W
Tcha0 survey	57	14.8	N	155	26.81	W
Tcha0 survey	57	0.6	N	155	26.42	W
Tcha0 survey	56	46.5	N	155	25.94	W
Tcha0 survey	56	32.4	N	155	25.39	W
Tcha0 survey	56	18.2	N	155	24.76	W
Tcha0 survey	56	4.1	N	155	24.05	W
Tcha0 survey	55	49.9	N	155	23.27	W
Tcha0 survey	55	35.6	N	155	22.54	W
Tcha0 survey	55	50.1	N	154	58.16	W
Tcha0 survey	56	4.4	N	154	58.67	W
Tcha0 survey	56	4.8	N	154	33.37	W
Tcha0 survey	56	5.2	N	154	7.71	W

Tcha0 survey	56	5.7	N	153	42.11	W
Tcha0 survey	56	19.7	N	153	43.37	W
Tcha0 survey	56	19.3	N	154	8.60	W
Tcha0 survey	56	18.9	N	154	33.92	W
Tcha0 survey	56	18.6	N	154	59.30	W
Tcha0 survey	56	32.7	N	154	59.85	W
Tcha0 survey	56	46.9	N	155	0.32	W
Tcha0 survey	56	47.2	N	154	34.79	W
Tcha0 survey	56	47.6	N	154	9.32	W
Tcha0 survey	57	1.4	N	154	35.11	W
Tcha0 survey	57	1.0	N	155	0.72	W
Tcha0 survey	57	15.2	N	155	1.04	W
Tcha0 survey	57	29.3	N	155	1.27	W
Tcha0 survey	57	43.4	N	155	1.42	W
Tcha0 survey	57	43.8	N	154	35.56	W
Tcha0 survey	57	44.2	N	154	9.77	W
Tcha0 survey	57	58.3	N	154	9.67	W
Tcha0 survey	57	58.7	N	153	43.88	W
Leg I -> II transition	**57**	**47.3**	**N**	**152**	**24.11**	**W**
Tcha0 survey	58	12.8	N	153	43.61	W
Tcha0 survey	58	13.2	N	153	17.82	W
Tcha0 survey	58	27.0	N	153	43.25	W
Tcha0 survey	58	27.4	N	153	17.37	W
Tcha0 survey	58	27.7	N	152	51.58	W
Tcha0 survey	58	41.5	N	153	16.83	W
Tcha0 survey	58	41.9	N	152	50.95	W
Tcha0 survey	58	56.0	N	152	50.23	W
Tcha0 survey	59	10.2	N	152	49.41	W
Tcha0 survey	59	10.5	N	152	23.45	W
Tcha0 survey	59	24.7	N	152	22.44	W
Tcha0 survey	59	39.2	N	151	55.27	W
Tcha0 survey	59	25.0	N	151	56.47	W
Tcha0 survey	59	10.9	N	151	57.56	W
Tcha0 survey	58	56.4	N	152	24.35	W
Tcha0 survey	58	42.2	N	152	25.15	W
Tcha0 survey	58	42.6	N	151	59.42	W
Tcha0 survey	58	28.5	N	152	0.20	W
Tcha0 survey	58	28.8	N	151	34.63	W
Tcha0 survey	58	14.7	N	151	35.40	W
Tcha0 survey	58	0.6	N	151	36.07	W
Tcha0 survey	58	0.2	N	152	1.48	W
Tcha0 survey	57	59.8	N	152	26.97	W

Tcha0 survey	57	46.0	N	152	1.98	W
Tcha0 survey	57	46.4	N	151	36.65	W
Tcha0 survey	57	32.3	N	151	37.13	W
Tcha0 survey	57	31.9	N	152	2.39	W
Tcha0 survey	57	17.7	N	152	2.71	W
Tcha0 survey	57	17.4	N	152	27.96	W
Tcha0 survey	57	3.2	N	152	28.12	W
Tcha0 survey	57	2.9	N	152	53.37	W
Tcha0 survey	56	48.7	N	152	53.36	W
Tcha0 survey	56	48.3	N	153	18.61	W
Tcha0 survey	56	34.2	N	153	18.45	W
Tcha0 survey	56	33.8	N	153	43.69	W
Tcha0 survey	56	19.9	N	153	17.81	W
Tcha0 survey	56	19.9	N	152	52.94	W
Tcha0 survey	56	34.4	N	152	53.00	W
Tcha0 survey	56	34.6	N	152	27.85	W
Tcha0 survey	56	49.0	N	152	27.77	W
Tcha0 survey	56	49.4	N	152	2.25	W
Tcha0 survey	57	3.6	N	152	2.23	W
Tcha0 survey	57	4.1	N	151	36.66	W
Tcha0 survey	57	18.2	N	151	36.68	W
Tcha0 survey	57	18.7	N	151	11.06	W
Tcha0 survey	57	32.7	N	151	11.14	W
Tcha0 survey	57	46.8	N	151	11.38	W
Tcha0 survey	58	0.9	N	151	10.73	W
Tcha0 survey	58	15.1	N	151	9.98	W
Tcha0 survey	58	29.2	N	151	9.14	W
Tcha0 survey	58	43.4	N	151	8.20	W
Tcha0 survey	58	43.0	N	151	33.77	W
Tcha0 survey	58	57.1	N	151	32.81	W
Tcha0 survey	58	57.5	N	151	7.15	W
Tcha0 survey	59	11.8	N	150	40.69	W
Tcha0 survey	58	57.9	N	150	41.57	W
Tcha0 survey	58	43.7	N	150	42.69	W
Tcha0 survey	58	29.6	N	150	43.72	W
Tcha0 survey	58	15.4	N	150	44.63	W
Tcha0 survey	58	1.3	N	150	45.46	W
Tcha0 survey	57	47.1	N	150	45.60	W
Tcha0 survey	57	33.2	N	150	45.47	W
Tcha0 survey	57	47.6	N	150	19.87	W
Tcha0 survey	58	1.5	N	150	19.84	W
Tcha0 survey	58	15.8	N	150	19.37	W
Tcha0 survey	58	29.9	N	150	18.37	W

Tcha0 survey	58	44.1	N	150	17.27	W
Tcha0 survey	58	58.2	N	150	16.06	W
Tcha0 survey	59	12.4	N	150	14.76	W
Tcha0 survey	59	25.9	N	150	14.52	W
Tcha0 survey	59	39.8	N	149	48.34	W
Tcha0 survey	59	26.9	N	149	47.76	W
Tcha0 survey	59	12.8	N	149	49.12	W
Tcha0 survey	58	58.6	N	149	50.63	W
Tcha0 survey	58	44.5	N	149	51.91	W
Tcha0 survey	58	30.3	N	149	53.09	W
Tcha0 survey	58	16.0	N	149	53.84	W
Tcha0 survey	58	2.0	N	149	54.28	W
Tcha0 survey	58	16.2	N	149	28.68	W
Tcha0 survey	58	30.3	N	149	27.92	W
Tcha0 survey	58	44.8	N	149	26.63	W
Tcha0 survey	58	59.0	N	149	25.27	W
Tcha0 survey	59	13.2	N	149	23.55	W
Tcha0 survey	59	27.2	N	149	22.26	W
Tcha0 survey	59	41.1	N	149	21.01	W
Tcha0 survey	59	53.7	N	149	22.17	W
Tcha0 survey	59	55.4	N	148	54.15	W
Tcha0 survey	59	41.6	N	148	55.41	W
Tcha0 survey	59	27.7	N	148	56.69	W
Tcha0 survey	59	13.7	N	148	57.99	W
Tcha0 survey	58	59.9	N	148	58.78	W
Tcha0 survey	58	45.7	N	148	59.93	W
Tcha0 survey	58	30.9	N	149	2.12	W
Tcha0 survey	58	46.5	N	148	33.59	W
Tcha0 survey	59	0.5	N	148	32.66	W
Tcha0 survey	59	1.5	N	148	6.04	W
Tcha0 survey	59	15.2	N	148	5.38	W
Tcha0 survey	59	14.6	N	148	31.63	W
Tcha0 survey	59	28.1	N	148	31.13	W
Tcha0 survey	59	29.1	N	148	4.47	W
Tcha0 survey	59	42.4	N	148	4.26	W
Tcha0 survey	59	42.0	N	148	29.83	W
Tcha0 survey	59	55.8	N	148	28.56	W
Tcha0 survey	59	56.2	N	148	2.98	W
Tcha0 survey	59	43.6	N	147	37.32	W
Tcha0 survey	59	29.9	N	147	38.11	W
Tcha0 survey	59	16.3	N	147	38.49	W
Tcha0 survey	59	16.4	N	147	13.46	W
Tcha0 survey	59	17.5	N	146	46.64	W

Tcha0 survey	59	31.2	N	146	45.92	W
Tcha0 survey	59	31.1	N	147	10.95	W
Tcha0 survey	59	44.4	N	147	10.84	W
Tcha0 survey	59	45.8	N	146	43.40	W
Tcha0 survey	59	58.8	N	146	43.57	W
Tcha0 survey	59	57.9	N	147	10.16	W
Tcha0 survey	60	10.3	N	147	36.12	W
Tcha0 survey	60	23.9	N	147	34.85	W
Tcha0 survey	60	34.7	N	148	3.66	W
Tcha0 survey	60	37.4	N	147	33.59	W
Tcha0 survey	60	48.2	N	147	37.49	W
Tcha0 survey	60	51.3	N	147	6.73	W
Tcha0 survey	60	37.8	N	147	7.99	W
Tcha0 survey	60	24.3	N	147	9.26	W
Tcha0 survey	60	24.7	N	146	43.66	W
Tcha0 survey	60	38.2	N	146	42.40	W
Tcha0 survey	60	38.6	N	146	16.80	W
Tcha0 survey	60	26.3	N	146	15.85	W
Tcha0 survey	60	12.2	N	146	43.01	W
Tcha0 survey	60	13.1	N	146	16.30	W
Tcha0 survey	60	0.3	N	146	15.85	W
Tcha0 survey	59	45.9	N	146	18.37	W
Tcha0 survey	59	32.3	N	146	19.09	W
Tcha0 survey	59	32.9	N	145	53.17	W
Tcha0 survey	59	46.9	N	145	51.55	W
Tcha0 survey	60	0.4	N	145	50.82	W
Tcha0 survey	60	14.8	N	145	48.31	W
Tcha0 survey	60	14.9	N	145	23.28	W
Tcha0 survey	60	1.5	N	145	24.00	W
Tcha0 survey	60	2.1	N	144	58.07	W
Tcha0 survey	59	48.1	N	144	59.69	W
Tcha0 survey	59	47.5	N	145	25.62	W
Tcha0 survey	59	33.5	N	145	27.24	W
Gear Comparison	57	38.4	N	152	24.45	W
Project End	**57**	**47.33**	**N**	**152**	**24.11**	**W**

2. Chemical Hygiene Plan and Standard Operating Procedures (SOPs)

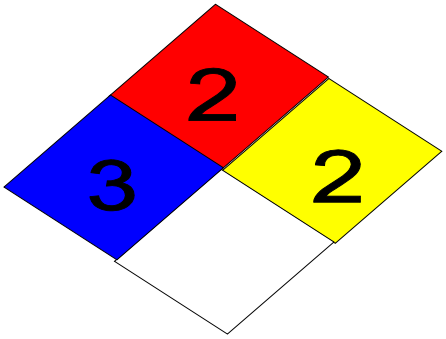
Appendix 2 – Chemical Hygiene Plan

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%), (2) formaldehyde (37%), (3) manganese (II) chloride (3M), (4) sodium iodide (4M), and sodium hydroxide (8M). Other chemicals brought aboard are consumer products in consumer quantities. Dilutions of the scientific chemicals will be used to preserve oxygen samples, and 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

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

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

Reactivity (yellow): 2 Special (white):

Personal Protection Gear Needed

*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.

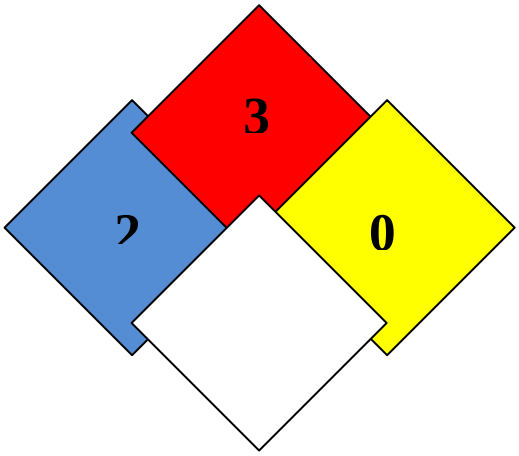
*Fan Pads may be used to absorb small spills alone but these pads work best when used with Formalex to immediately control the vapor layer.

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.

Figure 1. Station Map – YOY survey

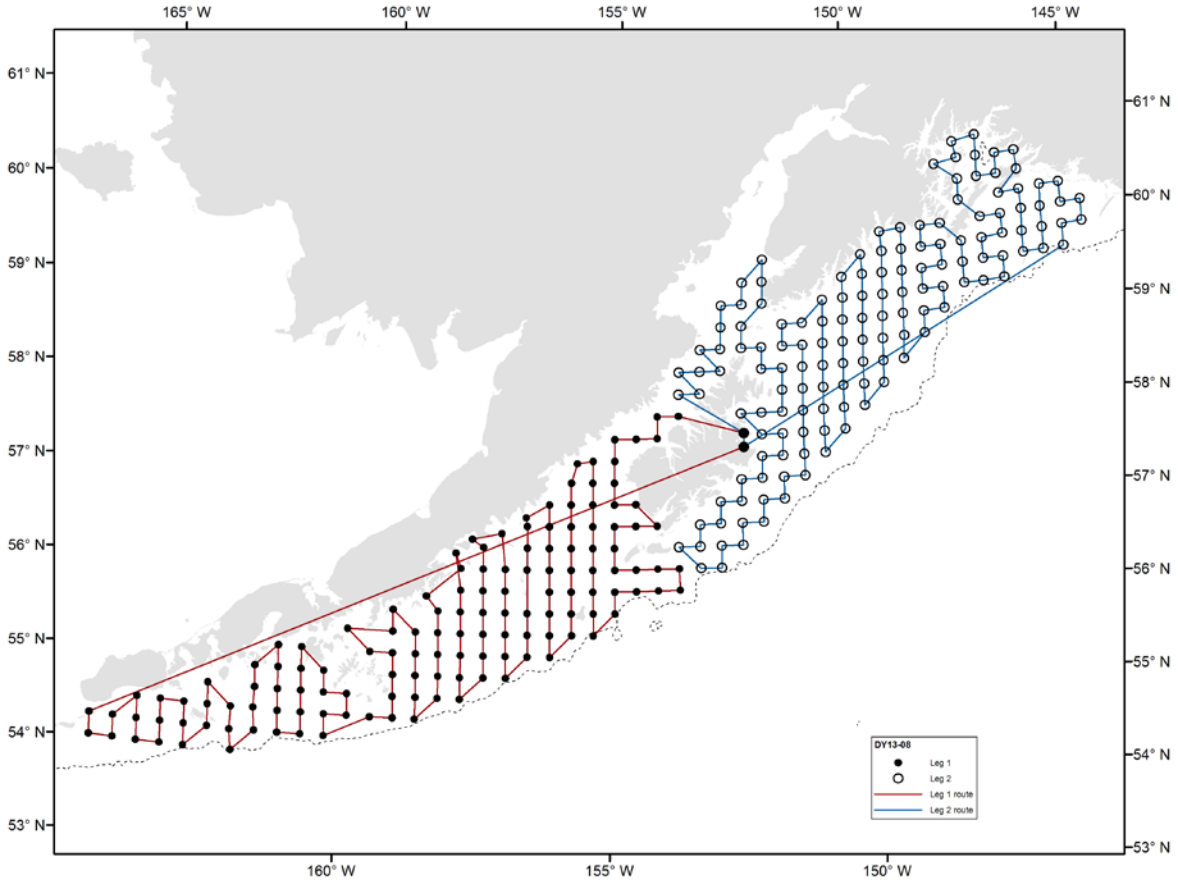


Figure 2. CTD Stations