



## I. Overview

### A. Brief Summary and Project Period

Project Period: August 17 – October 6, 2014

This research area is focused on improving and reducing uncertainty in stock assessment models of important commercial fish species in the Bering Sea through the collection of fisheries oceanographic indices. Data from the survey will be used to test the hypothesis:

H<sub>0</sub>: In the eastern Bering Sea young-of-the-year (YOY) condition scaled by abundance is an accurate and precise predictor of walleye pollock recruitment and can be used for stock assessment purposes.

### B. Days at Sea (DAS)

Of the 47 DAS scheduled for this project, 47 DAS are funded by an OMAO allocation, 0 DAS are funded by a Line Office Allocation, 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 (include optional map/figure showing op area)

Eastern Bering Sea (see Appendix 1, 2).

### D. Summary of Objectives

Summary of Objectives: Fisheries (surface, midwater, and beam trawls) and oceanographic survey to:

(1) Describe the community structure, biomass, energetic status, diets, and biological composition of epi-pelagic nekton including Pacific salmon, Pacific cod, age-0 pollock, jellyfish, herring, capelin and sand lance;

(2) Conduct acoustic-midwater trawl activities including collection of echo integration and target strength data as well as directed midwater modified-Marinovitch trawl hauls to convert the acoustic data to estimates of distribution and abundance for the dominant pelagic scatterers (e.g., Pacific cod, age-0 pollock, herring, capelin).

(3) Compare and contrast pelagic and epi-pelagic fish communities and food web structure in the southeastern Bering Sea using surface and mid-water trawls;

(4) Collect electronic oceanographic data including CTD (Conductivity-temperature-depth) vertical profiles of temperature, salinity, light transmission, chlorophyll a fluorescence, dissolved oxygen, possibly pH, photosynthetic available radiation (PAR). Continuously (along-track) collect sea surface temperature, salinity, chlorophyll a fluorescence data and above surface PAR (Hobo PAR sensor and data logger);

(5) Collect biological oceanographic samples (water and plankton) at trawl stations; i.e. zoo- and ichthyoplankton data using a 20 and 60 cm bongo samplers (oblique tow with 150  $\mu$ m and 505  $\mu$ m nets, respectively to near bottom or 200 m), nutrients, chl-a, dissolved oxygen, salinity, particulate organic carbon, and possibly alkalinity samples using Niskin bottles attached to the carousel housing the CTD. These samples are

collected to yield environmental indices of the current status and trends in the Bering Sea ecosystem.

(6) Conduct beam trawls during nighttime hours for age 0 and age 1 flat- and demersal fishes. Conduct benthic sampling at each beam trawl station with a Van Veen benthic grab to characterize associated sediments and infaunal assemblages. Night operations also may include midwater trawls for target strength estimations.

(7) Conduct Jellyfish sampling and experimentation to determine the diets and feeding rates of the dominant large jellyfish, *Chrysaora melanaster*, on fish eggs and larvae and on important fish prey (copepods, ichthyoplankton, euphausiids). Experiments will run in 24 hour intervals and require dipnetting of up to 250 individuals.

(8) Collect and analyze phytoplankton samples for taxonomic information using a bench-top phytoplankton imaging system, and collect preserved phytoplankton taxa at a subset of stations.

(9) Conduct primary production experiments with stable (non-radioactive) isotopes using deck-board incubators cooled with surface seawater.

(10) PMEL and AFSC will conduct oceanographic sampling along the standard 70 m isobath transect, at Designated Biological Observation (DBO) areas, and along the Unimak Box during Leg 3 of the survey.

E. Participating Institutions

AFSC - Alaska Fisheries Science Center, Juneau, AK and Seattle, WA

PMEL - Pacific Marine Environmental Laboratory, Seattle, WA

USFWS – United States Fish and Wildlife Service, Anchorage, AK

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

	Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
<b>LEG 1</b>	Andrews, Alex	Chief Scientist	8/15	9/1	M	AFSC	USA
	Duffy-Anderson, Janet	Fish Res Biol	8/15	8/31	F	AFSC	USA
	Cooper, Dan	Fish Res Biol	8/15	8/31	M	AFSC	USA
	Proctor, Peter	Oceanographer	8/15	9/18	M	PMEL	USA
	Bell, Shaun	Oceanographer	8/15	9/1	M	PMEL	USA
	Cieciel, Kristin	Fish Res Biol	8/15	9/1	F	AFSC	USA
	McKelvey, Denise	Acoustician	8/15	9/1	F	AFSC	USA
	Spear, Adam	Fish Res Biol	8/15	9/18	M	AFSC	USA
	Auburn-Cook, Mary	Fish Res Biol	8/15	9/18	F	AFSC	USA
	Zeman, Samantha	Jellyfish Biol	8/15	8/31	F	AFSC	USA
	Reedy, Martin	Seabird Obs	8/15	8/31	M	USFWS	USA
	Boal, Natalie	Seabird Obs	8/15	8/31	F	USFWS	Foreign Nat'l
<b>LEG 2</b>	Farley, Ed	Chief Scientist	9/1	9/18	M	AFSC	USA
	Porter, Steve	Fish Res Biol	9/1	9/18	M	AFSC	USA
	Busby, Morgan	Fish Res Biol	9/1	9/18	M	AFSC	USA
	Debenham, Casey	Fish Res Biol	9/1	9/18	M	AFSC	USA
	Spear, Adam	Fish Res Biol	8/15	9/18	M	AFSC	USA
	Proctor, Peter	Oceanographer	8/15	9/18	M	PMEL	USA
	Strausz, David	Oceanographer	9/1	10/7	M	PMEL	USA

	Auburn-Cook, Mary	Fish Res Biol	8/15	9/18	F		USA
	Troy, Declan	Seabird Obs	9/1	9/18	M	USFWS	USA
<b>LEG 3</b>	Eisner, Lisa	Chief Scientist	9/18	10/7	F	AFSC	USA
	Wilson, Matt	Fish Res Biol	9/18	10/7	M	AFSC	USA
	Paquin, Melanie	Fish Res Biol	9/18	10/7	F	AFSC	USA
	Eric Wisegarver	Oceanographer	9/18	10/7	M	AFSC	USA
	Randall, Jessica	Fish Res Biol	9/18	10/7	F	AFSC	USA
	Strausz, David	Oceanographer	9/1	10/7	M	PMEL	USA
	Reedy, Martin	Seabird Obs	9/18	10/7	M	USFWS	USA
	Shimada, Alan	Fish Res Biol	9/18	10/7	M	AFSC	USA

## G. Administrative

### 1. Points of Contacts:

Alex Andrews (Chief Scientist), AFSC, 17109 Point Lena Loop Road, Juneau, AK, 99801, 907-789-6655, Alex.Andrews@noaa.gov

Ed Farley (Alternate), AFSC, 17109 Point Lena Loop Road, Juneau, AK, 99801, 907-789-6085, Ed.Farley@noaa.gov

Lisa Eisner, AFSC, 7600 Sand Point Way NE, Bldg 4, Seattle WA 98115, ph: 206-526-4060, Lisa.Eisner@noaa.gov

Janet Duffy-Anderson, AFSC, 7600 Sand Point Way NE, Bldg 4, Seattle WA 98115, ph: 206-526-6465, Janet.Duffy-Anderson@noaa.gov

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

Chris Wilson, AFSC, 7600 Sand Point Way NE, Bldg 4, Seattle, WA 98115, ph:206-526-6435, chris.wilson@noaa.gov

### 2. Diplomatic Clearances

None Required.

### 3. Licenses and Permits

This project will be conducted under a Scientific Research Permit issued by the Alaska Regional Office, National Marine Fisheries Service (Permit number 2014-B1, and a Fish Resource Permit issued by the State of Alaska (Permit number CF-14-031). The Chief Scientists will be included as an authorized participant on both permits.

## 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.

A. Project Itinerary:

**Leg 1**

Aug 15 Embark scientists in Dutch Harbor, AK  
Aug 16 Load Gear  
Aug 17 Depart Dutch Harbor, AK for SE Bering Sea  
Aug 18 - 30 Fish/Ocean survey in the E Bering Sea  
Aug 31 Arrive Dutch Harbor, AK  
Sep 1 Disembark scientific party

**Leg 2**

Sep 1 Embark scientists in Dutch Harbor, AK  
Sep 3 Depart Dutch Harbor, AK  
Sep 4 - 16 Fish/Ocean survey in the E Bering Sea  
Sep 17 Arrive Dutch Harbor, AK  
Sep 18 Disembark scientific party

**Leg 3**

Sep 18 Embark scientists in Dutch Harbor, AK  
Sep 20 Depart Dutch Harbor, AK  
Sep 21–Oct 3 Fish/Ocean survey in the E Bering Sea  
Oct 6 Arrive Kodiak, AK  
Oct 7 Disembark scientific party

B. Staging and Destaging:

Scientific gear will be loaded onto the vessel in Dutch Harbor, AK. Scientific gear is located at Offshore Systems, Inc. (OSI) in Captains Bay. **Request DY to dock near OSI (subject to dock availability) to expedite loading of scientific gear** on Aug 16-17.

Most scientific gear will be offloaded in Kodiak, AK. **Request DY carry research nets, bridles, and doors to Newport, OR for annual maintenance.** Lt. Mark Frydrych was made aware of this request. Due to winter work, all program gear and lab spaces will be offloaded and emptied in Newport, OR.

C. Operations to be Conducted:

1. Underway Operations:

1A. Primary survey operations will be conducted during hours of 06:00 to 21:00; secondary operations (FOCI Night ops) will be conducted during night time (21:00 to 06:00). Therefore, we request 24 hour operations, with sufficient deck and survey support for all operations. Stations will be sampled using a systematic grid design with stations spaced every 30 minutes of Latitude and 1 degree of Longitude. The main survey grid will cover the area from 160° W to 173° W at locations

with water depths of at least 25 meters (see Appendix 1). We have achieved stations of this depth in the past on the Oscar Dyson, but as always we can modify trawl station locations if the CO chooses.

1B. Surface trawl operations require that a Cantrawl rope trawl be loaded onto the net reel and second Cantrawl will be stored on board the vessel as backup gear. A pair of NETS five-meter alloy doors and spectra bridals will be used with the trawl. A second pair of NETS doors will be stored on board the vessel as backup gear. Acoustic trawl survey operations require that the mod-Marinovich (mod-Mar) trawl be loaded onto the second net reel. Thirty fathom bridles and the NETS doors will be used to fish the net. The mod-Marinovich will be fished with 100 lb tom weights to obtain a nominal vertical mouth opening of about 6 m. A spare mod-Mar will be aboard as a backup. We request that the Chief Boatswain keep a trawl gear logbook to record all modifications made to trawl gear during the project. Stations within the eastern Bering Sea are at depths of ~ 25 m and greater. An average of 3-4 surface trawl hauls and 1-3 midwater mod-Mar trawl hauls per 20 hrs is anticipated. It will be a balance between surface and midwater trawls. During Leg 1, we will try to achieve 4 surface trawls per day with an occasional midwater trawl. During Leg 2 and 3, we will reduce the number of surface trawls to accommodate and increased number of midwater trawls.

Surface trawl haul duration will be 30 minutes, beginning when the doors are fully deployed to ensure an adequate sample. Due to ship location of the Simrad FS-70 3<sup>rd</sup> wire net sounder, and past complications in using this sounder to successful surface trawl operations, the net sounder **will not** be used to document net dimensions (width and depth) during the 30 minute surface trawl. In place of the Simrad FS-70, SBE39 sensors will be placed on the headrope and footrope of the surface trawl to collect data on net spread (vertical) and location in the water column. Potentially, Simrad ITI sensors (i.e. trawl monitoring system) will be attached to the footrope for real-time depth information.

Midwater mod-Marinovich trawl hauls will be made to identify acoustic backscatter and to provide fish samples and other biological data. Mod-Mar trawl hauls will be conducted during daylight hours when suitable backscatter conditions are encountered. Tow duration will depend on the echosign present, but it is generally anticipated that no more than 30 minutes will be spent within the scattering layer (estimate excludes trawl deployment/recovery times). The Simrad FS-70 system **will** be used for all mod-Marinovich hauls. Additionally, an SBE39 sensor will be attached to the trawl headrope and another to the footrope to estimate net mouth vertical opening.

Biological data collected from each haul will include species composition by weight and number, sex composition, length frequencies, whole fish weight, maturities, salmon scales, and otoliths.

1C. Acoustic data will be collected during the entire survey to provide biomass estimates of age-0 and 1 pollock, Pacific cod, other forage fish, and euphausiids. Acoustic data will be collected continuously with a

Simrad ER60 echo integration system incorporating centerboard-mounted transducers at 18, 38, 70, 120, and 200 kHz. The centerboard should be left in the **intermediate** position during the entire project. It is requested that vessel not operate other echo sounders or acoustic equipment that interferes with collection of scientific acoustic data unless it is unsafe to navigate without them. The bow thrusters, Doppler speed log and bridge Furuno depth sounder should all be secured, as long as it is safe to do so as determined by the ship's OOD, as they degrade the quality of acoustic data.

1D. At each surface trawl station, small fishes and zooplankton will be sampled using fine-mesh nets: 60 cm diameter bongo nets (oblique tow) with 505 (Net 1) and 505 (Net 2) micron nets, and a 20 cm bongo array with 150 micron nets. Zooplankton net tows will occur during daylight hours but may also be requested during night time hours to assess euphausiid biomass and energetics. The bongo net will be deployed on one of the oceanographic winches with conducting wire (using real time CTD data collected with an SBE19 or SBE 49). Plankton samples will be preserved in 5% buffered formalin. 60Bon Net 1 (505 mesh) will be preserved for zoo- and ichthyoplankton and 60Bon Net 2 will be sorted at sea for special projects and then discarded. 20 Bon Net 1 will be preserved for zooplankton, 20 Bon Net 2 will be sorted for special projects (time permitting) and discarded. Zooplankton tows will be to near-bottom (5-10 m from bottom) or 300 m (if bottom depths are > 300 m).

1E. CTD casts will be conducted at each surface trawl station and *ad-hoc* casts may be necessary to document changes in oceanographic characteristics during the survey. For each cast, instruments and 5 or 10 L Niskin bottles will be added to the ship's CTD carousel. Instruments added to the ship's SBE 911+ CTD include secondary TC sensors, a PAR spherical sensor (Biospherical Instruments QSP 2300), chl-a fluorometer with turbidity sensor (Wet Labs ECO FL-NTU), beam transmissometer (Wet Labs C-star), two dissolved oxygen sensors (SBE 43), and possibly a pH meter. See fact sheets for all instruments. CTD casts will be to near-bottom (5-10 m from bottom) or 200 m (if bottom depths are > 200 m).

1F. We will collect along-track surface measurements of temperature, salinity, chlorophyll a fluorescence with the ship's thermosalinograph (TSG) system (SBE-45, Wet Labs WetStar fluorometer).

1G. Water samples collected with Niskin bottles attached to the CTD will be sampled for chlorophyll a, nutrients, salinity, oxygen, particulate organic carbon, phytoplankton taxa, primary production experiments and possibly alkalinity. Primary production experiments using stable (non-radioactive) isotopes will be conducted at a subset of stations using deck-board incubators cooled with surface seawater.

1H. Above surface PAR data will be continually recorded with a HoBo PAR sensor and data logger.

II Up to 200 samples of the target species *Chrysaora melanaster* will be collected for gut analysis. Jellyfish will be netted from the surface with a long-handled dip-net or with a 1-m “gel net” to keep sample intact and to minimize net damage. A total of 25 specimens will be collected per station to allow analysis of the relationship between the local diet and local oceanographic, zooplankton, and pelagic fish community observations. Upon collection, individual jellyfish will be weighed and measured, and all gut and appendage contents will be immediately preserved in 5% formalin in separate containers. Samples will be processed for diet analysis in the laboratory or onboard depending on vessel staffing and time.

1J Gut evacuation experiments will be conducted August 17 – 31 (Leg 1 only) to estimate digestion times of different prey types by *C. melanaster*. During the BASIS surveys aboard NOAA Ship *Oscar Dyson*, 40 jellyfish will be dip-netted from the sea surface and placed in 20 20-L containers filled with 80- $\mu$ m filtered seawater at ambient temperatures in total darkness. Individual feeding intensity will be factored into determining digestion rates. Ten jellyfish will be removed and preserved at 0, 2, 4, and 6h intervals. Individual jellyfish will be placed in separate containers in 5% buffered formalin and gut contents will be enumerated as above. Deck space for tanks with seawater access will be needed; approximately a 6 foot by 6 foot footprint.

1K. We plan to begin primary operations at 06:30 each day unless otherwise agreed upon by the CO and chief scientist. Standard station activities include:

- CTD cast with Niskin water sample collection.
- Jellyfish (when present near surface) sampled with dipnet.
- Oblique bongo net tow (FOCI set-up, 20 & 60 cm bongo).
- Surface trawl (average 3-4 tows/day; 30 minutes once doors are fully deployed.)
- Mid-water trawl (average 1-3/day; location and duration determined at sea).

We expect activities and travel between stations to take 6 to 8 hours, depending on schedule for the mid-water trawl. Thus the following would be an example of a daily schedule. The midwater and surface tows must occur during daylight hours. If short on daylight we may modify the order of operations and perform the CTD and zooplankton casts after we trawl. This schedule may be adjusted depending on time of sunrise and sunset:

Station	Time
1	06:30
2	13:00 or 15:00
3	21:00

We plan for 2 scientific teams with 12 hour shifts each. It is likely that the first shift will begin on or around 06:00 am and end at 18:00 (BASIS DAY SHIFT) and the second shift will begin around 12:00 and end around 24:00 (BASIS

NIGHT SHIFT). When time allows, we request assistance from the survey techs sorting and processing the fish catch.

#### 1L. FOCI NIGHT OPERATIONS (21:00 to 6:00)

Three types of sampling gear will be routinely used during FOCI night operations. The mod-Marinovich midwater trawl, a benthic grab, and a 3-m beam trawl (bottom trawl). This is the anticipated order of night operations: 1) At the site of the last daytime BASIS station will be a mod-Marinovich midwater trawl, followed by a benthic grab, followed by the beam trawl, 2) Transit to the BASIS station for the following morning, 3) a benthic grab followed by a beam trawl. An additional beam trawl and benthic grab between the two stations may be requested if time permits at approval of the CO.

##### Midwater trawling

The mod-Marinovich trawl will be used to make oblique tows during night operations. The trawl will be deployed to a depth of 300 meters, or 10 meters off the bottom, whichever is shallowest. Net depth will be monitored using the ship's SIMRAD FS-70 3<sup>rd</sup> wire, Simrad ITI (trawl eye) or the FURUNO system. Once equilibrium is achieved, as determined by the fishing officer or scientist, the trawl will be retrieved at a rate of about 10 meters per minute. Thus, the trawl will usually be fished over a double oblique path.

Three MOA buttons are required.

- 1) Doors out,
- 2) EQ and HB
- 3) Doors in.

Walleye pollock (all age classes), Pacific cod, capelin, eulachon, herring, and flatfishes will be sorted from the catch. It is sometimes necessary to sort walleye pollock into ca.  $\leq 120$  mm standard length (SL) and ca.  $\geq 12$  cm fork length (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. For each of these groups, all individuals or a randomly drawn subsample of all individuals will be used to determine length composition. For walleye pollock, approximately 100 age-0 pollock will be measured for body length. Standard length (SL) will be the body-length metric for age-0 pollock, and fork length (FL) will be used for age-1+ pollock. A subsample of each of the following groups will be frozen for subsequent examination in the laboratory: age-0 walleye pollock, age-0 Pacific cod, juvenile flatfish ( $< ca. 12$  cm TL). These will be flash frozen in the  $-80^{\circ}$  freezer and moved to the  $-20^{\circ}$  freezer.

##### Benthic grab

Sediment and soft-bottom benthic macroinvertebrates will be sampled using a Day grab (van Veen benthic grab inside a weighted frame). The grab is the same model grab that was used during the 2012 BASIS project during night operations.

The grab is constructed of stainless steel and has a sampling capacity of 20 liters. Total weight without lead weights is 190 lbs, and is a maximum of 431lbs with up to 14 removable lead weights attached to the grab frame. The grab typically is

allowed to “free-fall” (no more than 80 m/min) toward the seafloor, but impacts the sediment at no more than 80 m/min (1.33 m/sec or 4.4 ft/sec). Upon impact with and penetration of the seafloor, the hydrowire slacks (movement of the block is the easiest way to know the grab hit bottom), the jaws close, and the sample is collected. The grab is then retrieved at a constant speed. After the sediment and macroinvertebrate samples have been collected, the grab should be thoroughly rinsed so that the next sample is not contaminated.

The grab could snap shut and drop over one foot if the cable goes slack while the grab is suspended and cocked. For safety, while the grab is suspended in the air, it should be guided by holding the bars that hold the weights, NOT the arms of the grab. People guiding the grab while it is suspended should keep it away from their bodies and keep their feet out from under the grab.

A MOA mark should be made when the grab hits the seafloor (At depth).

### 3-m Beam Trawl

Immediately after each benthic grab, a beam trawl will be conducted. A modified plumb-staff, 3-m beam trawl will be deployed to collect juvenile flatfishes and demersal gadids from the seafloor.

We request assistance from the Bridge, Survey, and Deck Dept with deployment, fishing/monitoring, and retrieval of beam trawls. We will use the ITI (trawl eye) system to monitor depth of the trawl in real time. Assistance from the Bridge and Deck department with ITI (trawl eye) is requested for deployment, retrieval, and keeping it charged. An SBE-39 will be attached to a steel ring on the beam trawl bridle. We request assistance from the survey department to initialize the SBE-39 and download the data from each tow.

Marks should be made at Surface (in), EQ, HB, and Surface (out).

The trawl codend should be inverted and inspected after each trawl to ensure all juvenile flatfish and other small taxa are retained.

#### Processing:

Sorting: Upon retrieval of trawl to the deck, contents will be emptied into the trawl sorting conveyor and photographed (identify station/haul in photo) for associated benthic fauna and substrata. Rinsing the entire catch may be necessary if it is muddy. Fish should be sorted into the following taxonomic groups: Flatfish species [flatfish juveniles (<120 mm TL) may be sorted separately from larger fish], walleye pollock, Pacific cod, arctic cod, other expedient and logical taxonomic fish groups (ex. Poachers, snailfishes, sculpin). Invertebrates are to be sorted into the following taxonomic groups: Hermit crabs, gastropods, king crab to species, chionoecetes spp., other crabs, sea stars, brittle stars, sponge, bivalves and bivalve shell (greater than ½ of a shell), worm tubes, shrimps, and other taxonomic groups as possible.

Subsamples may be rinsed with a 2 mm sieve if muddy.

Lengths: lengths for the following taxonomic groups will be recorded:< 120 mm

TL Junveile flatfish to species (TL mm), Flatfish>12 cm TL to species (TL cm), Pacific cod (age-0 SL mm, age-1+ TL cm), walleye pollock (age-0 SL mm, age1+ FL cm), arctic cod (FL mm).

**STORAGE:**

After counting and weighing, flatfish juvenile species groups containing fish < 120 mm TL, age-0 walleye pollock, and age-0 Pacific cod will be saved and frozen (1 bag per species) in the -80 C freezer in the rough lab. Project, date, station, haul, and species should be recorded on the outside of the bag and inside on a bag label. After 24 hours, bags of frozen fish may be transferred to the (-20 F, slime lab freezer).

Chionoecetes crabs will also be preserved by freezing. Please mark station/haul/species/Ryer (inside label and outside bag).

All other species may be discarded.

On occasion, additional stations may be added requiring participation of the deck crew. These may occur between the hours of 21:00 and 06:00. These will include collection of target strength data, additional trawling (midwater trawl hauls), and other **requested special scientific projects**. Station numbers will be incremented sequentially.

1M. Multinet: A multinet will be deployed at select stations (see Appendix 2). The Multi Plankton Sampler MultiNet Type Midi will be used at select stations to determine vertical distribution of fish larvae and zooplankton (.333 or .505-mm mesh). The sampling will be focused over Bering Canyon, approximately 12 stations. The exact number and location will be determined by the scientific party at sea and may be adjusted depending on conditions and project priorities.

We request assistance from the ship's Electronics Technician in replacing two flowmeter cables and a junction box in the multinet that was damaged during deployments in spring. Parts will be provided by FOCI personnel. Installation instructions provided by Multinet provider are included below.

- Remove back lid (with battery connector) of the Motor Unit first.
- Slowly and carefully remove the back lid - small banana plugs are used to connect the battery connector to the electronics.
- Remove pressure tube
- Note wiring of BH4F to blue ribbon cable down.
- Cut wiring.
- Unscrew old BH4F
- Clean sealing surface at front lid of the Motor Unit.
- Grease O-ring of new BH4F with O-ring lubricant.
- Before mounting the new BH4F apply anti seize paste to the thread of the BH4F.

This is very important because we use Subconn connectors with titanium body which tend to seizing when not lubricated.

- Mount new BH4F.

- Re-establish wiring - do not forget to cover the soldering joint with heat shrinkable tube.
- Re-mount pressure tube and back lid.
- Use a new set of plastic bushings and screws for fixing pressure tube and back lid.

During multinet deployment, we request assistance from the ship's Electronics Technician, Survey Technician and / or Deck Department as needed to help set up the electronic and physical termination, rig the MultiNet for fishing, and help trouble shoot the MultiNet. We also request help switching between the Bongo and MultiNet on the aft Oceowinch as needed during the project.

The MultiNet has a steal frame with a square mouth opening of .5 x .5 m that can be used with up to 5 nets to sample different water depths. This net requires a conducting cable and will be deployed off the aft oceanographic winch that the Bongo array is usually attached to. Before deployment of the Multinet, the Seacat and Bongo array will be detached and the MultiNet will be electronically and physically terminated to that conducting wire. For the stations over Bering Canyon, the MultiNet will be used in place of the Bongo (after the CTD). If we have gear problems with the Multinet, the Bongo will be used as a backup. When we are done using the MultiNet, the Seacat and Bongo Array will be reconnected to continue the rest of our routine sampling. The MultiNet plankton samples will be processed in a similar manner as those from the Bongo, filtered and preserved in 1.8% Buffered Formaldehyde.

#### Winch / Fishing Rates (Multinet)

- Ship Speed: ~2.5-3 knots (may need to be adjusted based on conditions)
- Wire Payout Rate: 20 m per. min.
- Wire Retrieval Rate: no more than 10 m per min., possibly slower TDB by scientific party based on how much water is being filtered.
- Target Wire Angle 55° (acceptable range 50°-60°)
- Maximum Gear Depth: ~ 300 m or 10m off bottom

#### MOA Buttons Needed for SCS

- In the water (surface)
- At Depth
- Net 1
- Net 2
- Net 3
- Net 4
- Net 5
- Out of the water (surface)

Approximate Sampling Intervals (may change depending on bottom depth and sampling needs):

- 0-25 m
- 25-50 m
- 50-100 m
- 100-200 m
- 200-300 m

1N. The Scientific Computing System (SCS) will be configured to log data from a large array of sensors during the project including data from the thermosalinograph, CTD casts, weather data (particularly above surface PAR or other light measurements and wind speed and direction), etc.

1O. 70-m isobaths (Leg 3). This portion of the project will serve to continue a long-term time series of observations describing the physical and biological properties of the Bering Sea shelf. Information will be collected through, CTD casts and water sampling, underway shipboard measurements and plankton tows along the 70m isobath and at stations around the moorings. Activities: CTD - 70 m isobaths (chlorophyll 0,10,20,30,40,50 m; nutrients 0,10,20,30,40,50,60 m). Stations will be occupied from south to north. A CTD cast will be the first operation at each station. At every other station along the isobath, a bongo tow will occur. When at the stations around or at each mooring, both a CTD and bongo will be done and when at the mooring stations triplicate CalVET (i.e. zooplankton sampling equipment) tows will be completed as the last operation.

Bongo towing 70 m isobath: Paired, 60 cm/20 cm bongo nets will be deployed. The 60 cm diameter bongo nets (oblique tow) will be rigged with 505 (Net 1) and 333 (Net 2) micron nets and the 20 cm bongo nets will be rigged with 153 micron nets (Nets 1&2). The bongo net will be deployed on one of the oceanographic winches with conducting wire (using real time CTD data collected with an SBE19 or SBE 49). Plankton samples will be preserved in 5% buffered formalin. 60Bon Net 1 (505 mesh) and Net 2 will both be preserved for future zooplankton sorting (a between net catch comparison will be performed). 20 Bon Net 1 will be preserved in buffered formalin and 20 Bon Net 2 will be discarded.

1P. At Distributed Biological Observatory (DBO) stations (located southeast of St Lawrence island, see Appendix 1,2), CTDs and bongo tows will be conducted.

1Q. Unimak CTD Box: A CTD (with nutrient and chlorophyll samples) will be deployed at each of 18 stations in a "box" around Unimak Pass. A 20/60 cm bongo will be deployed at every station within Unimak Pass and every other station on the other sides of the box for collection of mesozooplankton. If there is not enough time to complete the entire box, the top priority is the western side of the box (UBW1, UBW2, UBW3, UBW4) and second priority is the stations in Unimak Pass (UBS1, UBS2, UBS3, UBS4).

#### 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. The ship will not have dive capabilities after July 25, 2014 due to rotation of personnel.

Dives are not planned for this project.

E. Applicable Restrictions

Conditions which preclude normal operations: None known.

**III. Equipment**

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

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 can and beam trawls

3. Oceanographic Equipment

- Both starboard oceanographic winches with conducting cable, slip rings and blocks. Forward winch terminated for CTD/rosette; aft winch terminated for SeaCat/FastCat.
- Seabird SBE 911+CTD System
- Seabird SBE19+CTD and PDIM for real time data on zooplankton tows
- SBE45 Thermosalinograph with fluorometer
- 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

4. Biological Sampling Equipment

- Fish lab conveyor system
- Catch sorting and weighing table
- Marrel M60 60kg scale (2)
- Marrel M60 6kg scale (2)
- Elect. Fish meas. Board (2)

5. Computing equipment

- Scientific Computing System
- Fisheries Scientific Computer 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,
- 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
- Bench-top space for phytoplankton imager (4ft linear) in computer lab.
- 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
- Surface seawater on aft deck for jellyfish experiments and primary production experiments.

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

1. Acoustic Equipment (500lbs)

2. Trawling Equipment (11,000lbs)

- Cantrawl mid water trawl w/accessories (e.g., 2.0cm mesh liners,) (2); 7,000lbs
- Cantrawl - Spectra bridles (60 m); 300lbs
- NETS 5.0m doors with accessories (2 sets); 3,000lbs
- Spare webbing & twine
- Spare hardware
- Mod-Marinovich (mod-Mar); The trawl mesh sizes range from 2.5 inches in the forward section to 0.75 inch in the aft section of the net. The codend is fitted with a 0.125 in. (2x3 mm oval) mesh size codend liner.
- Mod-Mar - Thirty fathom bridles (2 sets)
- Tom weights 100 lbs (4 ea 100 lb clump wts)
- 3-m beam trawls (3)
- All accessories to make trawls fishable and spare web if available

3. Oceanographic Equipment (1,500lbs)

- Biospherical !SP2300 PAR sensor
- Wet labs ECO Fluorometer and turbidity sensor (FL-NTU)
- Wet labs C-start Transmissometer
- SBE 43 dissolved oxygen sensor (2)
- pH sensor
- Secondary TC sensors for SBE 911+
- SBE 19Plus SeaCat (all Legs)
- SBE 49 FastCat (Legs 2 & 3)
- Niskin Bottles 10 L (need 10 total+ spares)
- Filter racks and pumps (3)
- Nutrient auto-analyzer and associated equipment (to be set up on center island in chem. lab for on-board nutrient analysis)
- Microscopes (compound, dissecting) (3)

- 20 & 60 cm Bongo frames, 505/335/153 mesh nets, cod ends, weights, and flowmeters
  - CalVET frame and 53  $\mu$ m mesh nets, cod ends, and flow meters
  - van Veen Benthic Grab with bucket and arm weights
  - Multinet
  - Two wire-angle indicators
  - Phytoplankton imaging system
  - Deck-board incubators for primary production experiments
  - Deck-board tanks for jellyfish experiments
  - Biological supplies (misc.) \*
4. Biological Sampling Equipment (500lbs)
- Dynamometer
  - Marel M60 60 kg scale (2)
  - Marel M60 6 kg scale (2)
  - Mechanical platform scale (2)
  - Fish baskets (30)
  - Fish catch logging system (CLAMS)
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 board and strips 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,
  - 1000 Zip-loc bags (12"),
  - Sieves, jar holder, funnels, squirt bottles,
  - 30 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
  - Cruise Operations Database (COD) software and forms

#### **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. . Documentation regarding those requirements will be provided by the Chief of Operations, Marine Operations Center, 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

See Appendix 3.

## C. Chemical safety and spill response procedures

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 bongo nets, 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.

#### **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.

#### **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.

#### Inventory of Spill Kit supplies

Product Name	Amount	Chemicals it is useful against	Amount it can clean up	Notes
VWR Spill kit	1	-aldehydes		
Formalex	2 – 1 gal.	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=10-250 ml 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 reuse
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

D. Radioactive Materials

No Radioactive Isotopes are planned for this project.

**V. Additional Projects**

A. Supplementary (“Piggyback”) Projects

1. Nutrient and dissolved oxygen sample analysis will be conducted on-board ship by scientists from P MEL.

Oxygen Measurements

The procedure is based on that of Carpenter. Winkler titrations will be conducted according to WOCE/CLIVAR protocols, and described in detail in GO\_SHIP Repeat Hydrography Manual, Report number 14, ICPO Publication Series No. 134, Version 1, 2010. On each cast, the number of samples and the depths sampled will depend on the oxygen profile from the CTD. In deep water, samples will be collected at every depth below 100 m. On the shelf, samples will usually be collected in the upper layer on one station and in the bottom layer on the next station. End point determinations of the Winkler titration will be determined by an amperometric method. Thiosulfate will be standardized for each batch of sample titrations, and blanks will be measured periodically during the project. Side by side comparison of this method with the photometric method show differences 0.06% or +/- 0.15 umol/kg. The automated amperometric titrator was designed by Chris Langdon at RSMAS in Miami.

B. NOAA Fleet Ancillary Projects

No NOAA Fleet Ancillary Projects are planned.

**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: *Under Development*

a. OMAO Data

b. Program Data

B. Responsibilities: *Under Development*

## **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 conducted a meeting no earlier than 24 hrs before or 7 days after the completion of a project to discuss the overall success and short comings 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.oma.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 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 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 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, 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](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](mailto: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 – Pacific  
2002 SE Marine Science Dr.  
Newport, OR 97365  
Telephone 541-867-8822  
Fax 541-867-8856  
Email [MOP.Health-Services@noaa.gov](mailto: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

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 email 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 and it must be arranged through the ship's Commanding Officer 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 the above 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 (FNRS) 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 Line Office Deemed Export point of contact to assist with the process.

Full compliance with NAO 207-12 is required.

Responsibilities of the Chief Scientist:

1. Provide the Commanding Officer with the email generated by the Servicing Security Office granting approval for the foreign national guest's visit. (For NMFS-sponsored guests, this email will be transmitted by FNRS.) This email 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 Security Office.
4. Export Control - Ensure that approved controls are in place for any 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 approval from the Director of the Office of Marine and Aviation Operations 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 FNRS or Servicing Security Office email 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 Security Office.

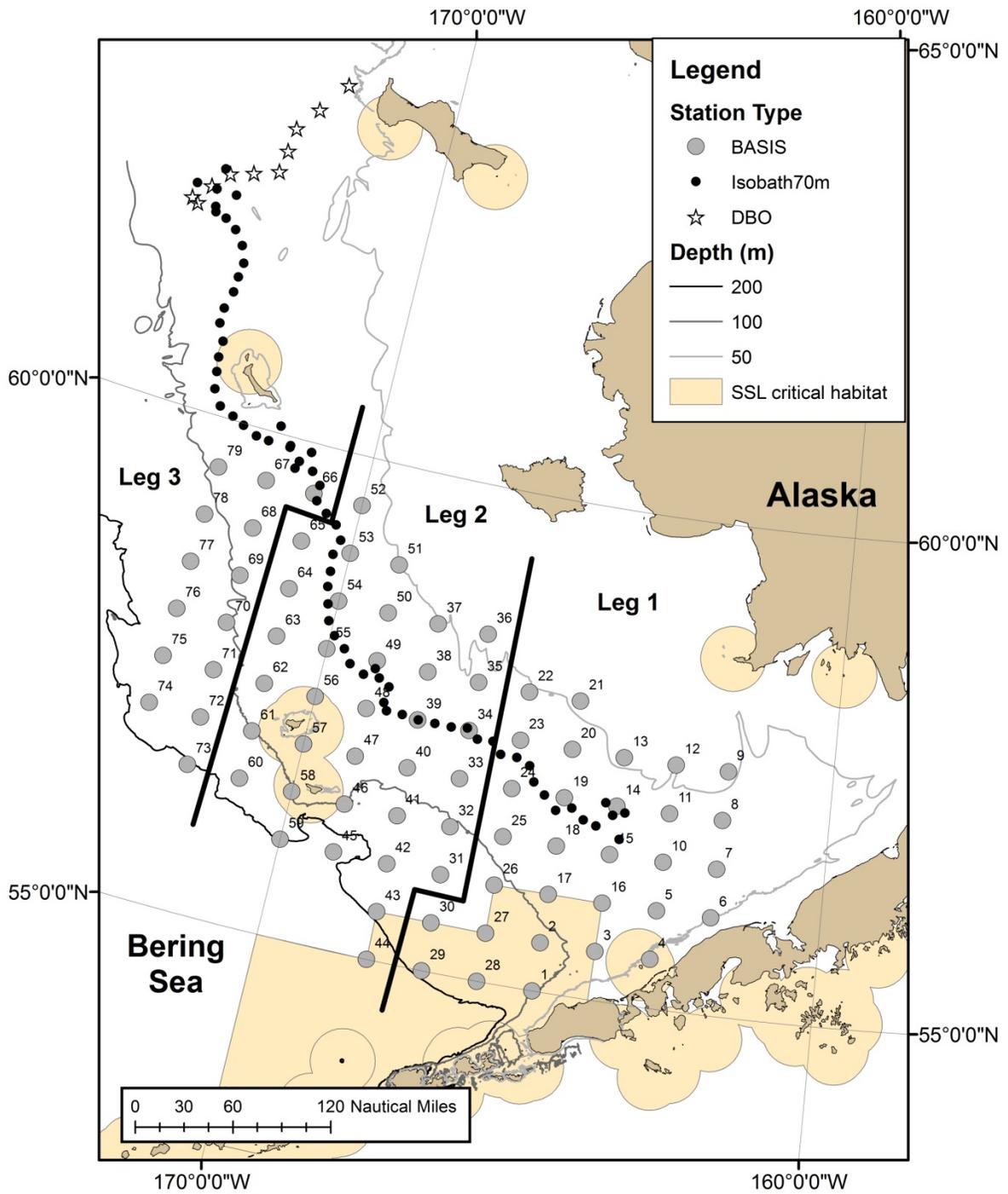
Responsibilities of the Foreign National Sponsor:

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 and a 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

## **VIII. Appendices**

1. Map of study area.
2. Station/Waypoint List (coordinates in Latitude, Longitude: degree-minutes)
3. Chemical inventory and spill response

Appendix 1. Map of survey stations in the eastern Bering Sea from August 17 to October 6, 2014. Multinet stations not shown.



Appendix 2. Station waypoint list.

Type	Leg	StnID	Lat Deg	Lat Min	Lon Deg	Lon Min	Operation
BASIS	1	1	55	0	-165	0	CTD/BON/TRAWL
BASIS	1	2	55	30	-165	0	CTD/BON/TRAWL
BASIS	1	3	55	30	-164	0	CTD/BON/TRAWL
BASIS	1	4	55	30	-163	0	CTD/BON/TRAWL
BASIS	1	5	56	0	-163	0	CTD/BON/TRAWL
BASIS	1	6	56	0	-162	0	CTD/BON/TRAWL
BASIS	1	7	56	30	-162	0	CTD/BON/TRAWL
BASIS	1	8	57	0	-162	0	CTD/BON/TRAWL
BASIS	1	9	57	30	-162	0	CTD/BON/TRAWL
BASIS	1	10	56	30	-163	0	CTD/BON/TRAWL
BASIS	1	11	57	0	-163	0	CTD/BON/TRAWL
BASIS	1	12	57	30	-163	0	CTD/BON/TRAWL
BASIS	1	13	57	30	-164	0	CTD/BON/TRAWL
BASIS	1	14	57	0	-164	0	CTD/BON/TRAWL
BASIS	1	15	56	30	-164	0	CTD/BON/TRAWL
BASIS	1	16	56	0	-164	0	CTD/BON/TRAWL
BASIS	1	17	56	0	-165	0	CTD/BON/TRAWL
BASIS	1	18	56	30	-165	0	CTD/BON/TRAWL
BASIS	1	19	57	0	-165	0	CTD/BON/TRAWL
BASIS	1	20	57	30	-165	0	CTD/BON/TRAWL
BASIS	1	21	58	0	-165	0	CTD/BON/TRAWL
BASIS	1	22	58	0	-166	0	CTD/BON/TRAWL
BASIS	1	23	57	30	-166	0	CTD/BON/TRAWL
BASIS	1	24	57	0	-166	0	CTD/BON/TRAWL
BASIS	1	25	56	30	-166	0	CTD/BON/TRAWL
BASIS	1	26	56	0	-166	0	CTD/BON/TRAWL
BASIS	1	27	55	30	-166	0	CTD/BON/TRAWL
BASIS	1	28	55	0	-166	0	CTD/BON/TRAWL
BASIS	1	29	55	0	-167	0	CTD/BON/TRAWL
BASIS	1	30	55	30	-167	0	CTD/BON/TRAWL
BASIS	2	31	56	0	-167	0	CTD/BON/TRAWL
BASIS	2	32	56	30	-167	0	CTD/BON/TRAWL
BASIS	2	33	57	0	-167	0	CTD/BON/TRAWL
BASIS	2	34	57	30	-167	0	CTD/BON/TRAWL
BASIS	2	35	58	0	-167	0	CTD/BON/TRAWL
BASIS	2	36	58	30	-167	0	CTD/BON/TRAWL
BASIS	2	37	58	30	-168	0	CTD/BON/TRAWL
BASIS	2	38	58	0	-168	0	CTD/BON/TRAWL
BASIS	2	39	57	30	-168	0	CTD/BON/TRAWL
BASIS	2	40	57	0	-168	0	CTD/BON/TRAWL

BASIS	2	41	56	30	-168	0	CTD/BON/TRAWL
BASIS	2	42	56	0	-168	0	CTD/BON/TRAWL
BASIS	2	43	55	30	-168	0	CTD/BON/TRAWL
BASIS	2	44	55	0	-168	0	CTD/BON/TRAWL
BASIS	2	45	56	0	-169	0	CTD/BON/TRAWL
BASIS	2	46	56	30	-169	0	CTD/BON/TRAWL
BASIS	2	47	57	0	-169	0	CTD/BON/TRAWL
BASIS	2	48	57	30	-169	0	CTD/BON/TRAWL
BASIS	2	49	58	0	-169	0	CTD/BON/TRAWL
BASIS	2	50	58	30	-169	0	CTD/BON/TRAWL
BASIS	2	51	59	0	-169	0	CTD/BON/TRAWL
BASIS	2	52	59	30	-170	0	CTD/BON/TRAWL
BASIS	2	53	59	0	-170	0	CTD/BON/TRAWL
BASIS	2	54	58	30	-170	0	CTD/BON/TRAWL
BASIS	2	55	58	0	-170	0	CTD/BON/TRAWL
BASIS	2	56	57	30	-170	0	CTD/BON/TRAWL
BASIS	2	57	57	0	-170	0	CTD/BON/TRAWL
BASIS	2	58	56	30	-170	0	CTD/BON/TRAWL
BASIS	2	59	56	0	-170	0	CTD/BON/TRAWL
BASIS	2	60	56	30	-171	0	CTD/BON/TRAWL
BASIS	2	61	57	0	-171	0	CTD/BON/TRAWL
BASIS	2	62	57	30	-171	0	CTD/BON/TRAWL
BASIS	2	63	58	0	-171	0	CTD/BON/TRAWL
BASIS	2	64	58	30	-171	0	CTD/BON/TRAWL
BASIS	2	65	59	0	-171	0	CTD/BON/TRAWL
BASIS	3	66	59	30	-171	0	CTD/BON/TRAWL
BASIS	3	67	59	30	-172	0	CTD/BON/TRAWL
BASIS	3	68	59	0	-172	0	CTD/BON/TRAWL
BASIS	3	69	58	30	-172	0	CTD/BON/TRAWL
BASIS	3	70	58	0	-172	0	CTD/BON/TRAWL
BASIS	3	71	57	30	-172	0	CTD/BON/TRAWL
BASIS	3	72	57	0	-172	0	CTD/BON/TRAWL
BASIS	3	73	56	30	-172	0	CTD/BON/TRAWL
BASIS	3	74	57	0	-173	0	CTD/BON/TRAWL
BASIS	3	75	57	30	-173	0	CTD/BON/TRAWL
BASIS	3	76	58	0	-173	0	CTD/BON/TRAWL
BASIS	3	77	58	30	-173	0	CTD/BON/TRAWL
BASIS	3	78	59	0	-173	0	CTD/BON/TRAWL
BASIS	3	79	59	30	-173	0	CTD/BON/TRAWL
DBO	3	DBO1.1	62	0.6	-175	3.6	ADCP/ROS/NET/MUD*5
DBO	3	DBO1.2	62	3	-175	12.6	ADCP/ROS/NET/MUD*5
DBO	3	DBO1.3	62	13.14	-174	52.62	CTD
DBO	3	DBO1.4	62	23.4	-174	34.2	ADCP/ROS/NET/MUD*5

DBO	3	DBO1.5	62	28.08	-174	4.98	CTD
DBO	3	DBO1.6	62	33.6	-173	33	ADCP/ROS/NET/MUD*5
DBO	3	DBO1.7	62	47.22	-173	30	CTD
DBO	3	DBO1.8	63	1.8	-173	27.6	ADCP/ROS/NET/MUD*5
DBO	3	DBO1.9	63	16.8	-173	4.8	CTD
DBO	3	DBO1.10	63	36.24	-172	35.46	CTD
Isobath70m	3	M2-S	56	40.0002	-163	52.0002	CTD/BON
Isobath70m	3	M2-W	56	46.0002	-164	19.9998	CTD/BON
Isobath70m	3	70M3	56	48.4998	-164	34.9998	CTD/BON
Isobath70m	3	70M5	56	51.54	-165	7.3698	CTD/BON
Isobath70m	3	70M2/M2	56	54	-164	3.1998	CTD/BON
Isobath70m	3	70M2/M2	56	54	-164	3.1998	3 CalVETs
Isobath70m	3	70M4	56	54.5598	-164	49.65	CTD
Isobath70m	3	M2-E	56	56.5002	-163	50.01	CTD/BON
Isobath70m	3	70M6	56	59.61	-165	22.65	CTD
Isobath70m	3	M2-N	57	1.0002	-164	13.0002	CTD/BON
Isobath70m	3	70M7	57	6.4002	-165	36.7998	CTD/BON
Isobath70m	3	70M8	57	15.7302	-165	44.8302	CTD
Isobath70m	3	70M9	57	19.26	-166	0.6702	CTD/BON
Isobath70m	3	70M10	57	19.3398	-166	19.5798	CTD
Isobath70m	3	70M12	57	25.7202	-166	48.72	CTD
Isobath70m	3	70M11	57	26.28	-166	30.75	CTD/BON
Isobath70m	3	70M14	57	29.9598	-167	20.6502	CTD
Isobath70m	3	70M16	57	30.0402	-167	59.1702	CTD
Isobath70m	3	70M15	57	30.0702	-167	39.9102	CTD/BON
Isobath70m	3	70M17	57	31.2102	-168	18.24	CTD/BON
Isobath70m	3	70M13	57	31.3398	-167	2.2902	CTD/BON
Isobath70m	3	70M18	57	31.44	-168	36.81	CTD
Isobath70m	3	M4-S	57	36	-168	42	CTD/BON
Isobath70m	3	M4-E	57	46.0002	-168	40.0002	CTD/BON
Isobath70m	3	70M21/M4	57	49.9998	-168	53.2008	CTD/BON
Isobath70m	3	70M21/M4	57	49.9998	-168	53.2008	3 CalVETs
Isobath70m	3	M4-W	57	49.9998	-169	12	CTD/BON
Isobath70m	3	70M23	57	54.42	-169	30	CTD
Isobath70m	3	M4-N	57	55.0002	-169	0	CTD/BON
Isobath70m	3	70M24	58	2.5302	-169	40.35	CTD/BON
Isobath70m	3	70M25	58	8.8302	-169	55.0902	CTD
Isobath70m	3	70M26	58	16.92	-170	5.6802	CTD/BON
Isobath70m	3	70M27	58	26.7702	-170	11.1402	CTD
Isobath70m	3	70M28	58	37.02	-170	16.53	CTD/BON
Isobath70m	3	70M29	58	46.4598	-170	17.6202	CTD
Isobath70m	3	70M30	58	56.8998	-170	19.6398	CTD/BON
Isobath70m	3	70M31	59	6.4098	-170	14.8098	CTD

Isobath70m	3	70M32	59	14.82	-170	24.7302	CTD/BON
Isobath70m	3	70M33	59	20.1198	-170	39.3498	CTD
Isobath70m	3	70M34	59	26.1402	-170	54.36	CTD/BON
Isobath70m	3	70M35	59	35.7	-170	55.3698	CTD
Isobath70m	3	M5-S	59	42	-171	30	CTD/BON
Isobath70m	3	70M36	59	42.93	-171	8.3898	CTD/BON
Isobath70m	3	70M37	59	46.62	-171	26.9802	CTD
Isobath70m	3	70m38/ M5	59	53.5002	-171	42.66	3 CalVETs
Isobath70m	3	M5-E	59	53.88	-171	15.4998	CTD/BON
Isobath70m	3	M5-W	59	53.88	-172	10.0002	CTD/BON
Isobath70m	3	70m38M5	59	54.5802	-171	42.4602	CTD/BON
Isobath70m	3	70M40	59	54.69	-172	26.1102	CTD
Isobath70m	3	70M41	59	58.6902	-172	44.7702	CTD/BON
Isobath70m	3	70M42	60	2.2302	-173	0.39	CTD
Isobath70m	3	M5-N	60	4.5	-172	0	CTD/BON
Isobath70m	3	70M43	60	6.03	-173	19.0002	CTD/BON
Isobath70m	3	70M44	60	15.1002	-173	31.3002	CTD
Isobath70m	3	70M45	60	25.5	-173	35.5002	CTD/BON
Isobath70m	3	70M46	60	34.3098	-173	38.37	CTD
Isobath70m	3	70M47	60	44.3298	-173	38.88	CTD/BON
Isobath70m	3	70M48	60	54.4398	-173	49.4802	CTD
Isobath70m	3	70M49	61	3.9402	-173	49.7598	CTD/BON
Isobath70m	3	70M50	61	14.9898	-173	44.4498	CTD
Isobath70m	3	70M51	61	24.6402	-173	44.1702	CTD/BON
Isobath70m	3	70M52	61	33.6102	-173	42.7302	CTD
Isobath70m	3	70M53	61	43.6398	-173	51.2802	CTD/BON
Isobath70m	3	70M54	61	51.7302	-174	5.6562	CTD
Isobath70m	3	70M55	61	56.5998	-174	21.8502	CTD/BON
Isobath70m	3	M8-S	61	58.5	-174	37.02	CTD/BON
Isobath70m	3	70M56	62	1.59	-174	39.5202	CTD
Isobath70m	3	M8-E/SL12a	62	12	-174	18	CTD/BON
Isobath70m	3	M8	62	12	-174	45	CTD/BON
Isobath70m	3	M8	62	12	-174	45	3 CalVETs
Isobath70m	3	M8-W	62	12	-175	12	CTD/BON
Isobath70m	3	M8-N	62	25.3002	-174	42	CTD/BON
Multinet	3	UT5	53	58.2	-166	58.2	MNET
Multinet	3	UT3	54	10.5	-167	9	MNET
Multinet	3	UT1	54	27.12	-167	22.8	MNET
Multinet	3	AW5	54	27.48	-166	56.28	MNET
Multinet	3	AW3	54	12.3	-166	42.6	MNET
Multinet	3	AW1	54	4.32	-166	37.2	MNET
Multinet	3	AE1	54	10.08	-166	13.98	MNET
Multinet	3	AE3	54	18.3	-166	21	MNET

Multinet	3	AE5	54	33.72	-166	35.58	MNET
Multinet	3	UBW4	54	41.28	-166	14.22	MNET
Multinet	3	UBW2	54	28.32	-166	2.34	MNET
Multinet	3	UBW0	54	18.6	-165	52.98	MNET
Unimak Box	3	UBS1	54	26.46	-164	59.11	CTD/BON
Unimak Box	3	UBS2	54	25.16	-165	8.43	CTD/BON
Unimak Box	3	UBS3	54	22.49	-165	16.63	CTD
Unimak Box	3	UBS4	54	20.51	-165	25.73	CTD/BON
Unimak Box	3	UBW1	54	21.48	-165	55.75	CTD/BON
Unimak Box	3	UBW2	54	28.31	-166	2.33	CTD/BON
Unimak Box	3	UBW3	54	34.95	-166	7.76	CTD
Unimak Box	3	UBW4	54	41.26	-166	14.21	CTD/BON
Unimak Box	3	UBN1	54	45.07	-166	3.05	CTD/BON
Unimak Box	3	UBN2	54	48.76	-165	51.49	CTD/BON
Unimak Box	3	UBN3	54	52.1	-165	40.27	CTD
Unimak Box	3	UBN4	54	55.79	-165	28.82	CTD/BON
Unimak Box	3	UBN5	54	59.19	-165	17.19	CTD
Unimak Box	3	UBN6	55	2.96	-165	6.42	CTD/BON
Unimak Box	3	UBE1	54	56.23	-164	59.73	CTD/BON
Unimak Box	3	UBE2	54	49.64	-164	53.62	CTD
Unimak Box	3	UBE3	54	42.93	-164	47.05	CTD/BON

Appendix 3. Chemical inventory

Common Name	Amount	Respondee	Spill Response	Notes
Formaldehyde 37%	2 - 20 l, 1 - 15 l	Chief Scientist	Gloves	Dyson loaded 2/4/2014, working volume for all Spring and Fall projects. MSDS, hygiene plan, and SOPs provided at time of loading.
			Eye Protection	
			Fan-Pads	
			Formalex	
			Plastic Bag	
Ethyl Alcohol 100% Genetic Grade	2 - 4 l, 1 - 0.75 l	Chief Scientist	Gloves	Loaded 2/4/2014, working volume for all Spring and Fall projects.
			3M Sorbent Pads	
			Plastic bag	
Sodium Borate Solution, Saturated 5-6%	1 - 20 l	Chief Scientist	Gloves	Loaded 2/4/2014, not a regulated chemical
			Paper towels	
			Plastic bag	
Sodium Borate Powder	1 - 500 g	Chief Scientist	Gloves	Loaded 2/4/2014, not a regulated chemical (in spill kit)
			Wet paper towels	
			Plastic Bag	
Acetone	12 - 25ml = 300ml	Peter Proctor/Eric Wisegarver	Gloves	
			Paper towels	
			Absorbant (kitty litter)	
Ammonium chloride	6 - 0.5g = 3g	Peter Proctor/Eric Wisegarver	Gloves	
			Plastic Bag	
			Wet paper towels	
Ammonium molybdate(VI) tetrahydrate	20 - 10.8g = 216g	Peter Proctor/Eric Wisegarver	Gloves	
			Plastic Bag	
			Broom/dustpan	

Ammonium molybdate(VI) tetrahydrate	6 - 27g = 162g	Peter Proctor/Eric Wisegarver	Gloves	
			Plastic Bag	
			Broom/dustpan	
Brij-35, 21% solution	2 - 125ml = 250ml	Peter Proctor/Eric Wisegarver	Gloves	
			Absorbant (kitty litter)	
			Plastic Bag	
Cadmium metal, granular	2 - 25g = 50g	Peter Proctor/Eric Wisegarver	Gloves	
			Plastic Bag	
			Broom/dustpan	
Copper (II) Sulfate Anhydrous	2 - 5g = 10g	Peter Proctor/Eric Wisegarver	Gloves	
			Plastic Bag	
			Broom/dustpan	
Dodecyl Sodium Salt solution, 15%	2 - 30ml = 60ml	Peter Proctor/Eric Wisegarver	Gloves	
			Absorbant (kitty litter)	
			Plastic Bag	
			Broom/dustpan	
Hydrazine hemisulfate salt	6 - 6.4g = 38.4g	Peter Proctor/Eric Wisegarver	Gloves	
			Plastic Bag	
			Broom/dustpan	
Hydrochloric acid 32-38% solution	1 - 500ml = 3000ml	Peter Proctor/Eric Wisegarver	Gloves	
			Plastic Bag	
			Broom/dustpan	
			Acid neutralizer	
			Absorbant (kitty litter)	
Imidazole	7 - 13.6g = 95.2g	Peter Proctor/Eric Wisegarver	Gloves	
			Plastic Bag	
			Broom/dustpan	
L(+)-Ascorbic acid	6 - 17.6g = 105.6g	Peter Proctor/Eric Wisegarver	Gloves	

			Plastic Bag	
			Broom/dustpan	
N-(1-Naphthyl)ethylenediamine dihydrochloride monomethanolate	12 - 1g = 12g	Peter Proctor/Eric Wisegarver	Gloves	
			Plastic Bag	
			Broom/dustpan	
Oxalic acid dihydrate	15 - 50g = 750g	Peter Proctor/Eric Wisegarver	Gloves	
			Plastic Bag	
			Broom/dustpan	
Phenol Liquid	2 - 25ml = 50ml	Peter Proctor/Eric Wisegarver	Gloves	
			Absorbant (kitty litter)	
			Plastic Bag	
			Broom/dustpan	
Potassium Nitrate	4 - 5g = 20g	Peter Proctor/Eric Wisegarver	Gloves	
			Plastic Bag	
			Broom/dustpan	
Potassium phosphate monobasic	4 - 0.5g = 2g	Peter Proctor/Eric Wisegarver	Gloves	
			Plastic Bag	
			Broom/dustpan	
Sodium citrate dihydrate	7 - 280g = 1960	Peter Proctor/Eric Wisegarver	Gloves	
			Plastic Bag	
			Broom/dustpan	
Sodium Hydroxide, 10N	8 - 30ml = 240ml	Peter Proctor/Eric Wisegarver	Gloves	
			Plastic Bag	
			Broom/dustpan	
			Base neutralizer	
			Absorbant (kitty litter)	
Sodium Nitrite	6 - 0.3g = 1.8g	Peter Proctor/Eric Wisegarver	Gloves	
			Plastic Bag	
			Broom/dustpan	
Sodium Nitroferricyanide	6 - 0.5g =	Peter	Gloves	

Dihydrate	3g	Proctor/Eric Wisegarver		
			Plastic Bag	
			Broom/dustpan	
Sodium hexafluorosilicate	6 - 0.5g = 3g	Peter Proctor/Eric Wisegarver	Gloves	
			Plastic Bag	
			Broom/dustpan	
Sulfanilamide	12 - 10g = 120g	Peter Proctor/Eric Wisegarver	Gloves	
			Plastic Bag	
			Broom/dustpan	
Sulfuric acid 90-98%	6 - 500ml = 3000ml	Peter Proctor/Eric Wisegarver	Gloves	
			Plastic Bag	
			Broom/dustpan	
			Acid neutralizer	
			Absorbant (kitty litter)	
3M Manganese chloride	2 - 500ml = 1000ml	Peter Proctor/Eric Wisegarver	Gloves	On board
			Plastic Bag	
			Broom/dustpan	
			Absorbant (kitty litter)	
4M Sodium iodide/8M Sodium hydroxide	2 - 500ml = 1000ml	Peter Proctor/Eric Wisegarver	Gloves	On board
			Plastic Bag	
			Broom/dustpan	
			Base neutralizer	
			Absorbant (kitty litter)	
5M Sulfuric acid	2 - 500ml = 1000ml	Peter Proctor/Eric Wisegarver	Gloves	On board
			Plastic Bag	
			Broom/dustpan	
			Acid neutralizer	
			Absorbant (kitty litter)	
0.16M Sodium thiosulfate	2 - 500ml = 1000ml	Peter Proctor/Eric Wisegarver	Gloves	On board
			Plastic Bag	

			Broom/dustpan	
			Absorbant (kitty litter)	
0.0016M Potassium iodate	2 - 500ml = 1000ml	Peter Proctor/Eric Wisegarver	Gloves	On board
			Plastic Bag	
			Broom/dustpan	
			Absorbant (kitty litter)	