UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration

National Marine Fisheries Service
Alaska Fisheries Science Center
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FINAL Project Instructions

Date Submitted:	July 1, 2016
Platform:	NOAA Ship *Oscar Dyson*
Project Number:	DY-16-10 (OMAO)
Project Title:	Fisheries Oceanography Coordinated Investigations (FOCI) Autumn Moorings and Plankton Sampling
Project Dates:	September 24 to October 6, 2016 (DY-16-10)

Prepared by: _____ Dated: 8/12/2016
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Approved by: _____ Dated: 8/12/2016
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Approved by: _____ Digitally signed by PARKER.BRIAN.W.1076514042 Date: 2016.09.09 11:57:52 -07'00' Dated: 9/9/2016
Command Brian W. Parker, NOAA
Commanding Officer
Marine Operations Center – Pacific

I. Overview

A. Brief Summary and Project Period

Project Period: September 24 – October 6, 2016

This research area is focused on improving fisheries stock assessments and ecosystem assessments in the Bering Sea through the collection of fisheries acoustics information, zooplankton and physical oceanographic data.

B. Days at Sea (DAS)

Of the 13 DAS scheduled for this project, 0 DAS are funded by an OMAO allocation, 13 DAS are funded by a Line Office Allocation, 0 DAS are Program Funded, and 0 DAS are Other Agency funded. DY-16-10 is allocated 7 DAS in FY16 and 6 DAS in FY17. This project is estimated to exhibit a High Operational Tempo.

C. Operating Area (include optional map/figure showing op area)

Eastern Bering Sea (see Appendices 1 and 2).

D. Summary of Objectives

(1) Sampling will be along the standard 70 m isobath transect, at Designated Biological Observation (DBO) area 1, transects over the Bering Canyon and along the Unimak Box during DY-16-10 (see map, Appendix 1). An additional CTD transect NW of St. Lawrence Island may be added, time permitting.

(2) Collect electronic oceanographic data including CTD (Conductivity-temperature-depth) vertical profiles of temperature, salinity, light transmission, chlorophyll *a* fluorescence, dissolved oxygen, 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).

(3) Collect biological oceanographic samples (water and plankton); i.e. zoo- and ichthyoplankton data using a 20 and 60 cm bongo samplers (oblique tow with 150 µm and 505 µm nets, respectively to near bottom or 300 m), and nutrient, chl*a*, dissolved oxygen, and salinity 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.

(4) Conduct jellyfish sampling using dip-netting to determine the diets of the dominant large jellyfish, *Chrysaora melanaster*.

(5) Collect water from Niskin bottles and conduct primary production experiments with stable (non-radioactive) isotopes using deck-board incubators

cooled with surface seawater. Experiments will be conducted at a subset of stations during DY-16-10.

(6) Collect coccolithophore (phytoplankton) samples from Niskin bottles (0 m depth) at a subset of stations.

(7) Sort zooplankton to taxa for energetics analysis (fatty acids) and filter water samples for fatty acid analysis of phytoplankton and microzooplankton at a subset of stations.

E. Participating Institutions

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

PMEL - Pacific Marine Environmental Laboratory, Seattle, WA

JISAO - Joint Institute for the Study of the Atmosphere and Oceans, 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/duty**	**Date Aboard**	**Date Disembark**	**Gender**	**Affiliation**	**Nationality**
Eisner, Lisa	Chief Scientist	9/22	10/7	F	AFSC	USA
Harpold, Colleen	Zooplankton and ocean	9/22	10/7	F	AFSC	USA
Kimmel, David	Zooplankton and ocean	9/22	10/7	M	AFSC	USA
Gann, Jeanette	Primary production	9/22	10/7	F	AFSC	USA
Strausz, David	Oceanographer	9/22	10/7	M	PMEL/JISAO	USA
Randall, Jessica	Zooplankton and ocean	9/5	10/7	F	AFSC	USA
Johnson, Melissa	Zooplankton and ocean	9/5	10/7	F	AFSC	USA
Proctor, Peter	Oceanographer	9/5	10/7	M	PMEL/JISAO	USA
Reedy, Martin	Sea Bird Obs.	9/22	10/6	M	USFWS	USA

G. Administrative

1. Points of Contacts:

Lisa Eisner (Chief Scientist, DY-16-10), AFSC, 7600 Sand Point Way NE, Bldg 4, Seattle, WA 98115, ph: 206-526-4060, Lisa.Eisner@noaa.gov

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

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

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

LT Carl Rhodes (Operations Officer NOAA Ship *Oscar Dyson*), NOAA Corps, 2002 SE Marine Science Dr., Newport, OR 97365, ph: (541) 867-8911, (617) 283-1324, ops.oscar.dyson@noaa.gov

Oscar Dyson
CO cell: 206-271-4475
XO cell: 206-295-0775
CME cell: 206-604-4685
Iridium: 808-659-0050
Underway VIOP: 301-713-7778
INMARSAT: 011-870-336-995-920 (voice)

2. Diplomatic Clearances

None Required.

3. Licenses and Permits

This project will be conducted under the Scientific Research Permit (U.S.) issued by the Alaska Regional Office, National Marine Fisheries Service (Permit number 2016-B1). The Chief Scientist is included as an authorized participant on this permit.

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:

DY-16-10

Sep 22	Embark scientists in Dutch Harbor, AK
Sep 24	Depart Dutch Harbor, AK for eastern Bering Sea
Sep 24 - Oct 3	Oceanographic survey (planned order, weather permitting: 70m isobath S to N, DBO1, transect NE of St. Lawrence Island, Unimak Box, Bering Canyon)
Oct 3 - Oct 6	Transit from eastern Bering Sea to Kodiak, AK
Oct 6	Arrive Kodiak, AK
Oct 6 - 7	Offload gear. Disembark scientific party

B. Staging and De-staging:

The scientific gear necessary for the project will be shipped to Dutch Harbor, AK and loaded onto NOAA Ship *Oscar Dyson* prior to departure of DY-16-09 on 19-21 August 2016.

Request DY transport biological and oceanographic samples, equipment, and chemicals to Port Angeles, WA (or suitable port in WA) sometime in mid-October as in past years.

C. Operations to be conducted:

1. Acoustic data will be collected continuously with a Simrad EK60 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 those degrade the quality of acoustic data.

2. CTD casts will be conducted at every station; *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. Six of the 10-L Niskin bottles (top 6 depths) require silicon tubing and silicon O-rings for primary productivity experiments. Instruments added to the ship's SBE 911+ CTD include secondary TC sensors, a PAR spherical sensor (Biospherical Instruments QSP 2300), chlorophyll *a* fluorometer with turbidity sensor (Wet Labs ECO FL-NTU), beam transmissometer (Wet Labs C-star), and two dissolved oxygen sensors (SBE 43). CTD casts will be to near-bottom (5-10 m from the sea floor). PAR and transmissometer sensors will be removed for deep casts (bottom depths greater than tolerance of instruments; 1000 m for PAR, and 600 m for transmissometer).

3. Water samples will be collected at every station with Niskin bottles attached to the CTD. Samples will be taken for chlorophyll *a*, nutrients, salinity, oxygen, phytoplankton taxa (preserved with 1% formalin), primary production experiments and possibly microzooplankton (preserved with Lugols). Primary production experiments using stable (non-radioactive) isotopes will be conducted at a subset of stations using deck-board incubators cooled with surface seawater. Water samples for fatty acid analysis will be conducted at a subset of stations. Chlorophyll *a*, primary production, and fatty acid samples must be stored in the -80 ºC freezer.

4. Bongo nets will be deployed at ~ every other station to sample small fishes and zooplankton. A tow will be conducted using fine-mesh nets: 60 cm diameter bongo nets with 505 micron mesh nets (Nets 1& 2), and a 20 cm bongo array with 150 micron mesh nets (Nets 1& 2). Zooplankton net tows will occur during day and night time hours. 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. 60 Bon Net 1 will be preserved for zoo- and ichthyoplankton and 60 Bon Net 2 will be sorted at sea for special projects (e.g. fatty acid analysis, zooplankton rapid analysis (ZRA)) and then discarded. Samples for fatty acids must be stored in the -80 ºC freezer. 20 Bon Net 1 will be preserved for zooplankton, 20 Bon Net 2 will be sorted for special projects (time permitting, e.g. fatty acid analysis, ZRA) and discarded. . ZRA will be performed at select stations, approximately every other bongo. Zooplankton tows will be to near-bottom (5-10 m from bottom) or 300 m (if bottom depths are > 300 m).

5. Along-track surface measurements of temperature, salinity, and chlorophyll *a* fluorescence will be collected using the ship's thermosalinograph (TSG) system (SBE-45, Wet Labs WetStar fluorometer). Water samples for chl*a* will be collected once or twice daily from the TSG to calibrate the fluorometer.

6. Above surface photosynthetic active radiation (PAR) data will be continually recorded with a HoBo PAR sensor and data logger mounted on the flying bridge.

7. Samples of the target jellyfish species *Chrysaora melanaster* will be collected for gut analysis. Jellyfish will be netted from the hero deck at the surface with a long-handled dip-net or with a 1-m "gel net" to keep sample intact and to minimize net damage. If time allows on station, we may request that the hero deck platform be deployed to allow for easier netting of specimens further away from the ship's hull. 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.

8. 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 (e.g. radiometer) and wind speed and direction), etc.

9. 70-m isobath. 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 (Appendix 1, 2). Activities: CTD - 70 m isobath (chlorophyll 0, 10, 20, 30, 40, 50 m; nutrients 0, 10, 20, 30, 40, 50, near-bottom). Nutrient samples will be filtered through a 0.45 micron filter directly into acid washed and dried, 60 ml bottles. The bottles will then be frozen in the -80°C freezer and shipped to PMEL at the end of the season for analysis at PMEL. Chlorophyll *a* samples will be filtered through glass fiber filters using filter racks on board ship. Filters will be stored frozen in the -80°C freezer and then transported to AFSC for analysis. Stations will likely be occupied from south to north. A CTD cast will usually 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. vertical zooplankton sampling nets) tows will be completed as the last operation.

10. At **Distributed Biological Observatory (DBO) stations** (DBO1, located southeast of St Lawrence Island, see Appendix 1, 2), CTDs and bongo tows will be conducted.

11. An additional CTD transect northwest of St. Lawrence Island may be conducted if timing permits. This transect will start at the northernmost station of DBO1 and work northeast toward Bering Strait.

12. Unimak Box. A CTD (with nutrient and chlorophyll samples) will be deployed at each of 18 stations in a "box" around Unimak Pass (Appendix 1, 2). 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 are the stations in Unimak Pass (UBS1, UBS2, UBS3, UBS4), and the second priority is the western side of the box (UBW1, UBW2, UBW3, UBW4). At Unimak Box West stations, the multinet (see details below) may be substituted for the bongo net (time and sea state permitting).

13. Bering Canyon stations (15 stations total (5 stations/3 lines)) will be sampled in a similar fashion as the 70-m isobath with CTD casts to near bottom (every station) and zooplankton collected with oblique bongo tows (~ every other station) (Appendix 1, 2). The multinet (see details below) may be substituted for the bongo net (time and sea state permitting).

14. 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 (0.333 mm mesh). The sampling will be focused over Bering Canyon, approximately 12 stations (time permitting). The exact number and location will be determined by the scientific party at sea and may be adjusted depending on conditions and project priorities.

During multinet deployment, we request assistance from the ship's Survey Technician, and / or Deck Department as needed to rig and deploy the MultiNet, and help trouble shoot the MultiNet. We also request help switching between the Bongo and MultiNet on the aft Oceanographic winch as needed during the project.

The MultiNet has a steel frame with a square mouth opening of 0.5 x 0.5 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 connected 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. Whenwe 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 (5% buffered formalin).

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 10-15 m off bottom, depending on sea state
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

15. Standard station activities include:

CTD Stations

- CTD cast with Niskin water sample collection.
- Jellyfish (when present near surface) sampled with dip-net.

CTD/Bongo Stations

- CTD cast with Niskin water sample collection.
- Jellyfish (when present near surface) sampled with dip-net.
- Oblique bongo net tow (FOCI set-up, 20 & 60 cm bongo) or multinet (Bering Canyon or UBW stations only)

Mooring Stations (M2, M4, M5, M8)

- Oblique bongo net tow (FOCI set-up, 20 & 60 cm bongo).
- CTD cast with Niskin water sample collection (1-2 casts)
- Jellyfish (when present near surface) sampled with dip-net.
- Calvets (3 separate vertical tows)

We plan for 2 scientific teams with 12 hour shifts each. It is likely that the first shift will begin on or around 0600 and end at 1800 and the second shift will begin around 1800 and end around 0600, although some scientists may work different 12 h shifts (e.g. noon- midnight, midnight- noon, 0900-2100.

16. Mooring operations (for schematics see Appendix 3). It is not expected that the *Dyson* will need to recover moorings, and will only serve as a backup if a charter vessel (*R/V Aquilla*) is unable to retrieve the moorings. We request that the back deck of the *Dyson* be reconfigured from trawling to mooring configuration during the inport prior to the DY16-10 survey, just in case moorings need to be recovered. If we need to recover moorings, all the equipment and personnel necessary, will be awaiting the ship in Dutch Harbor when the *Dyson* returns from DY1609 Leg II. Before recovery of moorings, calibration CTD casts with nutrient and chlorophyll samples will be completed approximately 0.5 miles from the mooring sites.

D. Dive Plan

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

Dives are not planned for this project.

E. Applicable Restrictions

Conditions which preclude normal operations: None known.

F. Marine Mammal, Endangered, and Protected Species

During fishing and oceanographic operations, take all proactive steps to avoid deploying the gear in any situation where there is a high likelihood for an incidental take of protected species or marine mammals. This could mean delaying a set or moving to a suitable alternate site. Be on the look-out for marine mammals or other protected species prior to initiating a tow and also at haul back.

Within 24 hours of any incidental take of, or injuries or mortalities to, marine mammals as a result of operations, the Chief Scientist/Field Party Chief shall report incident to the vessel CO, Jon Kurland (jon.kurland@noaa.gov, 907-586-7638) or Robyn Angliss (robyn.angliss@noaa.gov, 206-526-4032), and guy.fleischer@noaa.gov and jeff.napp@noaa.gov with cc to john.c.clary@noaa.gov. This information will be entered into the Protected Species Incidental Take (PSIT) system per instructions below.

Seabirds can be sampled and retained for salvage – if take involves seabird, include Shannon Fitzgerald in notification at shannon.fitzgerald@noaa.gov. If take involves ESA-listed bird, retain specimen and we will notify FWS (to issue collection authority). Do not retain gulls – except Kittiwakes. Albatross are high priority.

KEY ACTIONS IN RESPONSE TO ALL INCIDENTAL TAKES

1. Prior to the project, communicate and coordinate with vessel crew about established protected species incidental take reporting and handling procedures whether NOAA, charter, or partner project. Ensure regional ESA biologists and pertinent staff are in the PSIT email alert notification list. The Office of Law Enforcement (OLE) will be notified of takes via PSIT email alert system for all non-marine mammal takes including seabirds within 48 hours of the event.

2. Notify the geographically appropriate Regional Stranding Response Coordinator (numbers in this document) immediately following the

incidental take of a marine mammal. Stranding Response Coordinator will contact Office of Law Enforcement (OLE). For live injured/uninjured marine mammals, priority should be to release the animal before notifying stranding response networks. NOTE: If Coordinators are unreachable, collect pertinent PSIT information and release animal and/or retain carcass if logistically feasible.

3. For a sea turtle or protected fish (injured/live/dead), follow the Terms and Conditions stated in your Fisheries Independent Monitoring Biological Opinion regarding reporting and data collection. If you do not have a current Biological Opinion, contact your designated Regional or Science Center Protected Species Point of Contact for instructions.

4. For handling, sampling and salvaging seabirds (ESA and non-ESA listed), contact regional United States Fish and Wildlife Service (USFWS) points of contact or NMFS regional seabird coordinator. If you have a permit, report seabird takes to PSIT.

PRE-PROJECT ACTIONS

1) Prior to the project, communicate and coordinate with vessel crew about established protected species incidental take reporting and handling procedures whether NOAA, charter, or partner project.

2) Ensure regional ESA biologists and pertinent protected resources staff is in the PSIT email alert notification list.

3) The NMFS Chief Scientist or Designee shall contact the appropriate Regional Stranding Network and query about additional numbers or specific contacts to reach in case of an incidental take of a marine mammal.

WHAT TO DO WITH LIVE, INJURED OR UNINJURED MARINE MAMMAL

If a live, injured or uninjured marine mammal is incidentally captured, the animal should be released immediately.

1) Considering human safety, work from the vessel as quickly and carefully as possible to free the animal from the gear. Ensure the animal can continue to breathe while freeing from the gear.

2) If it can be done immediately without further harming the animal, photograph the animal (dorsal and ventral sides including dorsal fin, flanks, head/jaw) and gear interaction at time of capture and when free from gear prior to release and collect required PSIT information.

3) If animal is NOT brought aboard the vessel and taking photos is not an option, provide a comprehensive summary of the incident following requirements described under 'PSIT narrative' in this document.

4) Notify Regional Stranding Response Coordinator about the incident.

5) Submit take information for submission to PSIT and attach any forms, photos, and narrative to the take record within a week of the event.

Note: Untrained personnel should not attempt to handle live injured/uninjured marine mammals or disentangle large whales. In the event of a large entangled whale, immediately call your regional entanglement response network.

WHAT TO DO WITH DEAD MARINE MAMMAL OR SEA TURTLE?

1) Notify Regional Stranding Network Coordinator about the take of a dead marine mammal.

2) For sea turtle takes, simply report the take/s to PSIT and follow the instructions listed in your Biological Opinion or follow Regional or Science Center Protected Species Point of Contact instructions.

3) If logistically feasible, the animal should be hauled aboard the vessel and retained for pick up by the local Stranding Network. Develop a plan with Stranding Network Coordinator or regional ESA biologist and/or relevant Center scientist for carcass pickup and subsequent necropsy.

4) If the animal cannot be hauled aboard due to human safety consideration or there is no feasible way for carcass retention onboard, release animal after necessary information is collected as described below.

5) Photos of the carcass should be taken: Dorsal fin, ventral side, and flank for marine mammals, as well as signs of entanglement, scars, and injuries. This also includes collecting required PSIT data.

6) Submit take information for submission to PSIT and attach any forms, photos, and narrative to the take record.

PSIT Reporting

Report [1] Species involved, [2] number dead, number injured and released, or number uninjured and released, [3] date and time, [4] latitude and longitude, [5] any mitigation measures taken, [6] other comments or observations germane to this take. Note if photo was taken.

In addition to the required PSIT information please complete a narrative which includes the following information.

1) Animal Condition (include photos)

Code 1 – Live Animal

Code 2 – Fresh Dead

Code 3 – Moderate Decomposition

Code 4 – Advanced Decomposition

2) Mention if animal escaped or was released.

3) Indicate if the animal or other marine mammals or sea turtles were seen in the vicinity of the vessel during fisheries operations.

4) Animal condition post-release: Describe any observed injuries, the condition and behavioral state of released or injured animal (e.g., no obvious injuries and animal swam away vigorously, did not swim away vigorously, animal surfaced to breathe, animal sank to bottom, or blood in water observed).

5) If gear was still attached to animal after release, describe how the gear was cut and approximately how much gear is left and where it is still entangled/injured.

6) Photos: Provide comprehensive photographic evidence or written description of live/dead or injured animal. Provide pictures (if possible) of how the animal was entangled in the gear, and any gear-related interactions such as wounds or constrictions.

7) Decision-making: Include rationale for any discretionary decisions taken by Chief Scientist/crew.

8) Describe possible causes for incidental capture of the animal and any additional mitigation measures that were taken, or might be taken to prevent similar captures in all subsequent operations.

ENTANGLEMENT RESPONSE NETWORK NUMBER

Alaska Region: 1-877-925-7773

III. Equipment (Hazardous materials are not to be listed here. They should be included in Hazardous Materials Section.)

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

1. Acoustic Equipment
   - GPS with NEMA 183 to Ek60 (2)
   - 50/200 kHz EK60 Bridge sounder
   - Furuno FE-700 fathometer

- Acoustic echosounders (5)

2. 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 with 10 L Niskin bottles (5 L bottles as backups)
    - 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
3. Computing equipment
    - Scientific Computing System
4. Sample storage equipment
    - Supercold freezer (-80C)
    - Walk in freezer (-10C)
    - Stand up freezer (-20C)
    - Hazmat storage cabinets
5. Laboratory and exterior working space
    - 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
    - Surface seawater on aft deck for jellyfish experiments and primary production experiments.

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

1. Oceanographic Equipment (1,500lbs)
    - Biospherical SP2300 PAR sensor
    - Wet labs ECO Fluorometer and turbidity sensor (FL-NTU)
    - Wet labs C-star Transmissometer
    - SBE 43 dissolved oxygen sensor (2)
    - Secondary TC sensors for SBE 911+

- SBE 19Plus SeaCat
- SBE 49 FastCat
- Filter racks and pumps (3)
- Microscopes (compound, dissecting, stereo) (4)
- 20 & 60 cm Bongo frames, 505/153 mesh nets, cod ends, weights, and flowmeters
- CalVET frame and 53 μm mesh nets, cod ends, and flow meters
- Multinet and associated nets and gear
- Two wire-angle indicators
- Deck-board incubators (2) for primary production experiments
- Long-handled dip-nets (2) for jellyfish sampling
- Biological supplies (misc.) *

2. Biological Sampling Equipment (500lbs)
    - Marel M60 60 kg scale (2); already on ship (MACE)
    - Marel M60 6 kg scale (2); already on ship (MACE)
    - Mechanical platform scale (2); already on ship (MACE)
3. Miscellaneous scientific sampling and processing equipment
    - Dishpans (10, MACE)
    - 5-gal buckets (5)
    - Two length board and strips for adult fish
    - Triple-beam balance for small fish weights
    - 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
    - Spare wire angle indicator
    - Winkler Oxygen Analysis rig
4. Computing equipment (50lbs)
    - IBM compatibles
    - 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 and ship's ECO 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

Dyson loaded 1/28/2016 by FOCI and MACE personnel. All chemicals listed will be used for the entire 2016 Dyson field season. Chemical volumes will be reported to the Ops Officer and the designated contact for each survey will be required to report to chemical owners. The name of the group responsible for each of the chemicals is designated after the chemical name in the

table. MSDS, chemical hygiene plan, and SOPs will be provided to the Dyson before the loading of the vessel.

Common Name	Concentration	Amount	Spill Response (all FOCI/MACE/PMEL/EMA personnel)	Notes
Dihydrogen Oxide Property of PMEL		20 liters	Spill Control: W Gloves Paper towels	Not a regulated chemical/solution. Used for oxygen titrations.
DNA Away	100%	1 – 250 ml	Gloves Paper towels Plastic bag	Not a regulated chemical.
Ethanol Property of FOCI	100%	2 -1 gal. plastic jugs	Gloves 3M Sorbent Pads Plastic bag	Store in Chem. Lab yellow flammables cabinet.
Ethylene Glycol Property of FOCI	100%	1 – 500 ml	Gloves Paper towels Plastic bag	Not a regulated chemical. Store in Spill Kit.
Formaldehyde Property of FOCI	37%	3 – 5 gal. barrels	Gloves Eye Protection Fan-Pads Formalex PolyForm-F Plastic bags	Store in Fish Lab flammable cabinets. Will need to place 2-3 in each cabinet.
Formaldehyde Property of Sandi Neidetcher	37%	5 – 1 liter plastic bottles	Gloves Eye Protection Fan-Pads Formalex PolyForm-F Plastic bag	Store in Fish Lab flammable cabinet.
Formaldehyde Property of Troy Buckley	37%	6 – 1 liter plastic bottles	Gloves Eye Protection Fan-Pads Formalex PolyForm-F Plastic bag	Store in Fish Lab flammable cabinet.
Glycerol/Thymol Solution	50 %	1 – 5 gal., 1 – 4 gal.	Gloves Paper towels	Not a regulated chemical/solutio

Property of MACE		bucket	Kitty litter	n. Store in Fish Lab under sink.
Hydrochloric Acid Property of PMEL		1 – 500 ml	Gloves 1-1 Spilfyter Acid Neutralizer	Stored in over-pack bucket.
Lithium 3v Batteries Property of FOCI		9	NA	Store in Survey Office for Fall Multi-Net use
Lithium 9v Batteries Property of PMEL		8	NA	In SeaBird and Wetlabs instruments
Lithium AA Batteries Property of PMEL		96	NA	In SeaBird instruments and MicroCats Saft LS14500
Lithium D Cell Batteries Property of PMEL		150	NA	In RCM9 & Peggy Mooring
Manganese Chloride Property of PMEL	3M	1 liter		Not a regulated chemical/solution. Used for oxygen titrations.
Potassium Iodate Property of PMEL	0.00167 M	1 liter	Spill Control: PI Gloves Plastic bag	Used for oxygen titrations.
Sodium Borate Solution Property of FOCI	5-6%	1 – 5 gal.	Gloves Paper towels Plastic bag	Not a regulated chemical. Working container will be secured on Fish Lab counter.
Sodium Borate Powder	100%	1 – 500 g	Gloves Wet paper towels Plastic bag	Not a regulated chemical. Stored in Spill Kit.

Property of FOCI				
Sodium Iodide/NaOH Solution Property of PMEL	0.11M	1 liter	Spill Control: B	Used for oxygen titrations.
Sodium Thiosulfate Property of PMEL	0.11 M	1 liter	Spill Control: ST	Used for oxygen titrations.
Sulfuric Acid Property of PMEL	5 M	1 liter	Spill Control: A	Used for oxygen titrations.
Mercuric Chloride Property of PMEL	Saturated solution of $HgCl_2$ in DIW	25 ml	Spill Control: $HgCl_2$	

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%), (2) formaldehyde (37%) and (3) Mercuric Chloride (saturated solution). Additional chemical reagents will be used for oxygen concentration analysis as noted in **Section V** below. 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. We will use Mercuric Chloride (HgCl2) (100 micro-liters per 250 ml sample) to preserve water samples for pCO2. The samples will then be shipped to UAF for analysis.

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.

Inventory of Spill Kit supplies

Product Name	Amount	Chemicals it is useful against	Amount it can clean up	Notes
Formalex	1-5 gallon 2 – 1 gal.	Formaldehyde cleanup (all concentrations)	7 gallons 1:1 control	Formalex will be used in conjunction with Fan-Pads to reduce total spill volume
Fan-Pads	2 rolls (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
PolyForm-F	1 – 5 gal. bucket	Formaldehyde cleanup (all concentrations)	1:1 control	Pour onto large spill immediately to deactivate

				formaldehyde.
3 M Pads	10 pads	Ethanol cleanup	10 pads=10-250 ml spills	Pads may be reused if dried out
Nitrile Gloves	8 pairs each S,M, L, XL	For all cleanup procedures	N/A	Gloves will be restocked by each survey group
Eye Protection	4 pairs goggles 1 face shield	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

PMEL Acid-Base Spill Kit Contents	**Amount**	**Use**	**Total Spill Volume Controllable**	**Notes**
Spilfyter Acid Neutralizer	1 box	Clean up acid spill—H_2SO_4	1.5l of 5M Sulfuric Acid 5.57l of 10% (1N) HCl	
Spilfyter Base Neutralizer	1 box	Clean up base spill--NaOH	2.0l of Sodium Hydroxide	
Vinyl Gloves	1 box	Protect hands during cleanup	N/A	

Foxtail/Dustpan	1 each	Pick up absorbed neutralizer	N/A	
Rubber apron	1 each	Protect during cleanup	N/A	
Paper Towels	1 roll	Absorb liquids	N/A	
Goggles	**2 pair**	**Protect eyes**	**N/A**	
Chemical absorbent	1 liter	Absorb liquids	0.5l	
Plastic Bags	2 each	Contain used absorbents/waste	N/A	

PMEL Mercuric Chloride Spill Kit Contents	**Amount**	**Use**	**Total Spill Volume Controllable**	**Notes**
Absorbent pads	3 sheets	Absorb $HgCl_2$ liquid	100 ml	
Poly bags	3	Contain contaminated clean up materials		
Vinyl gloves	4 pair	Protect hands while cleaning spill	N/A	

SPILL CONTROL

A: ACID

 Wear appropriate protective equipment and clothing during clean-up. Keep upwind. Keep out of low areas.

 Ventilate closed spaces before entering them.

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

B:Base
 Use proper PPE.
 Ventilate area.
 Neutralize with dilute acid such as HCl if possible.
 Absorb with cat litter or vermiculite.
 Vacuum or sweep up material and place into suitable disposal container.
 Do not breath dust.
 Do not get water on spilled substances.

M: Mercury as Saturated $HgCl_2$ Solution
Use proper PPE – protective gloves for small amounts of $HgCL_2$.
Absorb spill with absorbent material and place in a suitable container for disposal.
Wipe area with DIW soaked toweling and place used towels in a suitable container for disposal.

F: Formalin/Formaldehyde
 Ventilate area of leak or spill. Remove all sources of ignition.
 Wear appropriate personal protective equipment.
 Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible.
 Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container.
 Do not use combustible materials, such as saw dust.

PI:Potassium Iodate
 Avoid Contact with combustibles (wood, paper, clothing …).
 Keep substance damp with water spray.
 Vacuum or sweep up material and place into suitable disposable container (plastic bag).

ST: Sodium Thiosulfate
 Ventilate area of leak or spill.
 Wear protective gloves and clean body-covering
 Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

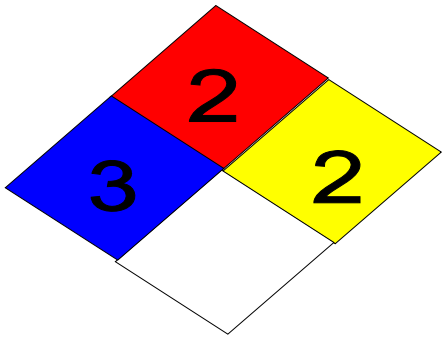
 Recover liquid or particulate in 5 gallon bucket. Absorb with a kitty litter and place in disposable bag. Do not use combustible materials, such as saw dust to absorb.

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

E: Ethanol
 Eliminate all ignition sources
 Wear PPE

Chemical Hygiene Plan and Standard Operating Procedures (SOPs)

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 vomitting.

*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

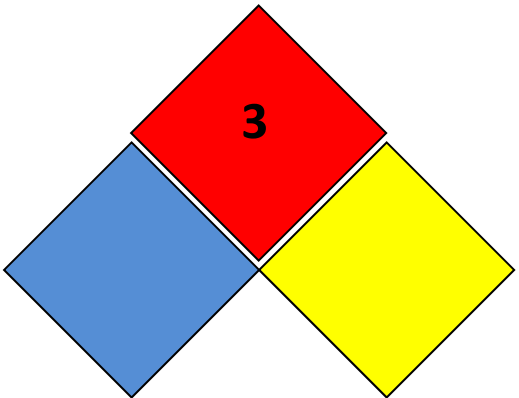
*Formalex is a greenish liquid that is to be used to insure proper chemical deactivation. Formalex should also be used in conjunction with Fan Pads. Place used Fan Pad in plastic bag, seal, and put in bottom of Spill Kit.

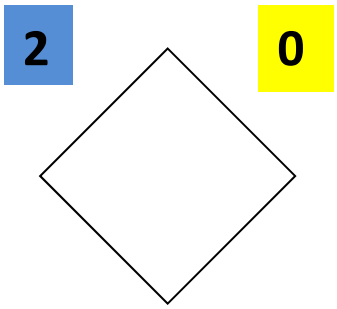
*Fan Pads may be used to absorb small spills alone but these pads work best when used with Formalex to immediately control the vapor layer.

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 vomitting.

* 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.

D. Radioactive Materials

No Radioactive Isotopes are planned for this project.

E. Inventory (itemized) of Radioactive Materials – **N/A**

V. Additional Projects

A. Supplementary ("Piggyback") Projects

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

Nutrient sampling:

Nutrients will be sampled from the Niskin bottles on the CTD rosette. Samples will be filtered through a 0.45 micron filter directly into acid washed and dried, 60 ml bottles. The bottles will then be frozen in the -80°C freezer and shipped to PMEL at the end of the season for analysis at PMEL.

Oxygen Measurements

The procedure is based on that of Carpenter (1965)[JS1]. Winkler (1888) [CGR2]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. 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 Winker titration will be determined by an amperometric method Culberson, (1991). 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.

Oxygen is the first sample to be taken from the Niskin bottles to prevent the contamination of the sample via air and oxygen entering the Niskin through the vent.

The sample is collected in glass 125 ml flasks and "pickled" with 1 ml each of 3M MgCl2 and 4M NaI/8M NaOH. After the samples have accumulated until a sufficient number have been collected the samples are analyzed.

Analysis consists of the addition 1 ml of 5M H2SO4 to dissolve the precipitate from the "pickling" and then the sample is titrated with 0.16M H10O8Na2S2 (Sodium Thiosulfate). The amount of titrant is directly related to amount of oxygen in the water.

References:

Carpenter, J. H., 1965. The Chesapeake Bay Institute technique for the Winkler dissolved oxygen method. Limnol. Oceanogr. 10, 141 -143.

Culberson, C. H., 1991. Dissolved Oxygen, in WHP Operations and Methods – July 1991

Winkler, L. W., 1888. Die Bestimmung des im Wasser gelosten Saurestoffes. Berichte der deutschen chemischen Gesellshaft. 21, 2, 2843 – 2854.

B. NOAA Fleet Ancillary Projects

No NOAA Fleet Ancillary Projects are planned.

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 hours before or 7 days after the completion of a project

to discuss the overall success and shortcomings of the project. Concerns regarding safety, efficiency, and suggestions for future improvements shall be discussed and mitigations for future projects will be documented for future use. This meeting shall be attended by the ship's officers, applicable crew, the Chief Scientist, and members of the scientific party and is normally arranged by the Operations Officer and Chief Scientist.

D. Project Evaluation Report

Within seven days of the completion of the project, a Customer Satisfaction Survey is to be completed by the Chief Scientist. The form is available at https://sites.google.com/a/noaa.gov/omao-intranet-dev/operations/marine/customer-satisfaction-survey 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).

The only secure email process approved by NOAA is Accellion Secure File Transfer which requires the sender to setup an account. Accellion's Web Users Guide is a valuable aid in using this service, however to reduce cost the DOC contract doesn't provide for automatically issuing full functioning accounts. To receive access to a "Send Tab", after your Accellion account has been established send an email from the associated email

account to accellionAlerts@doc.gov requesting access to the "Send Tab" function. They will notify you via email usually within 1 business day of your approval. The 'Send Tab" function will be accessible for 30 days.

Contact information:

Regional Director of Health Services
Marine Operations Center – 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

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.

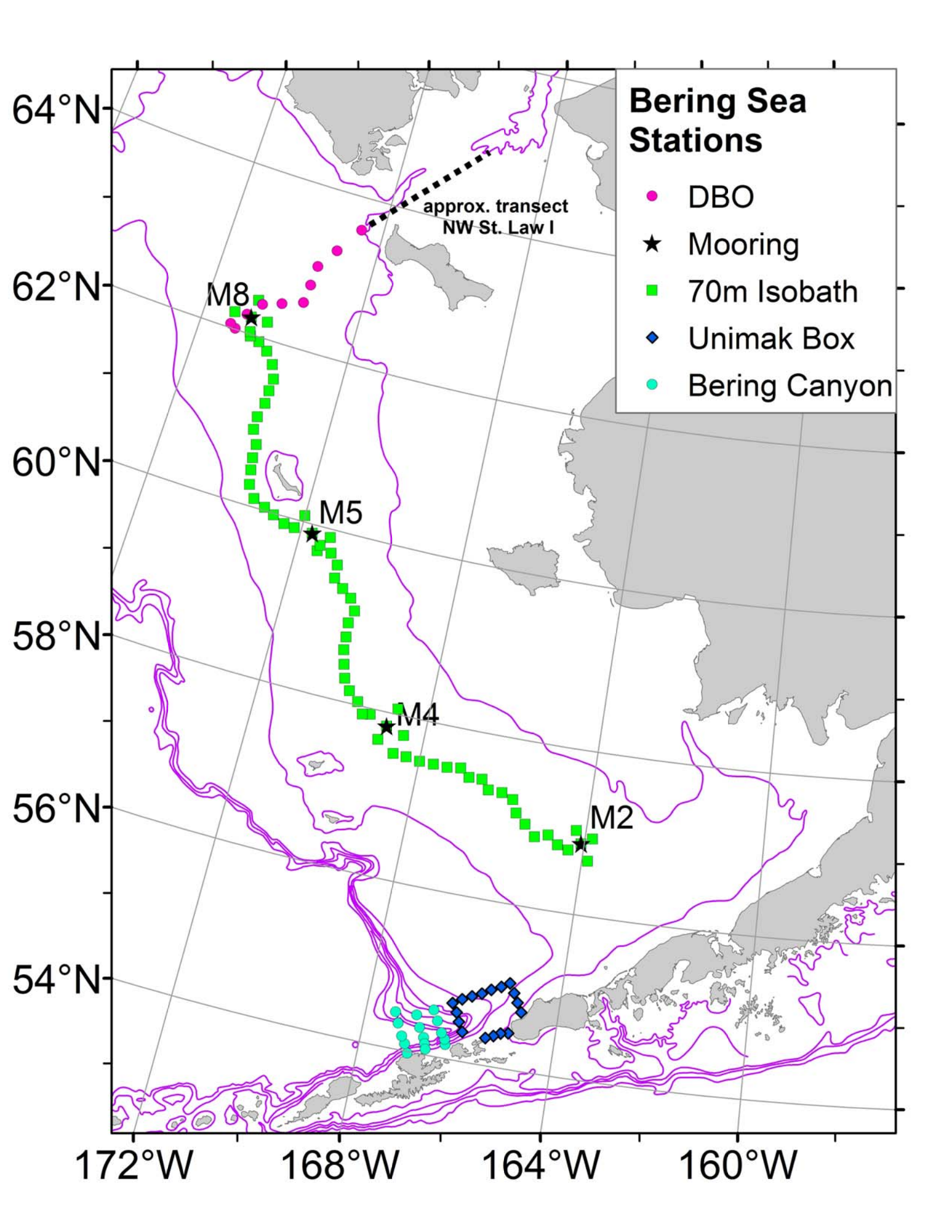
Non-NOAA personnel using the ship's computers or connecting their own computers to the ship's network must complete NOAA's IT Security Awareness Course within 3 days of embarking.

F. Foreign National Guests Access to OMAO Facilities and Platforms

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

IX. Appendices

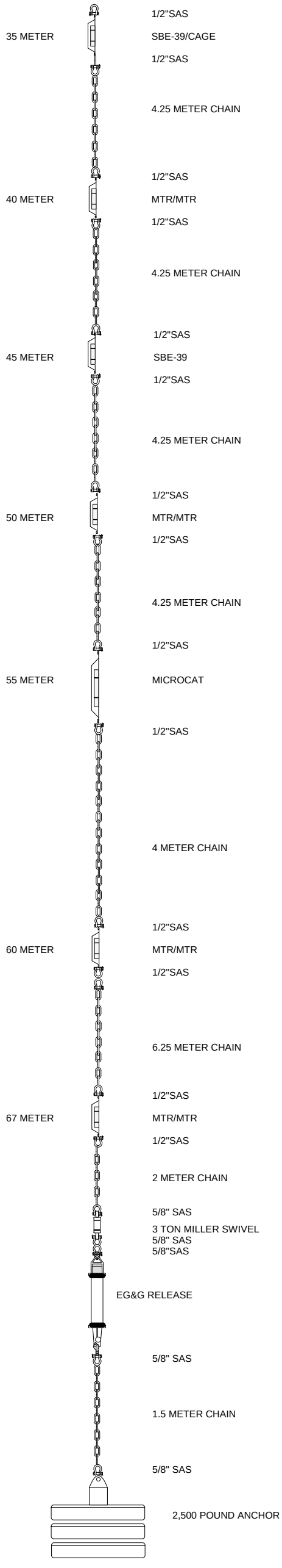
1. Map of study area
2. Station/Waypoint List (coordinates in Latitude, Longitude; degrees-minutes)
3. Mooring schematics

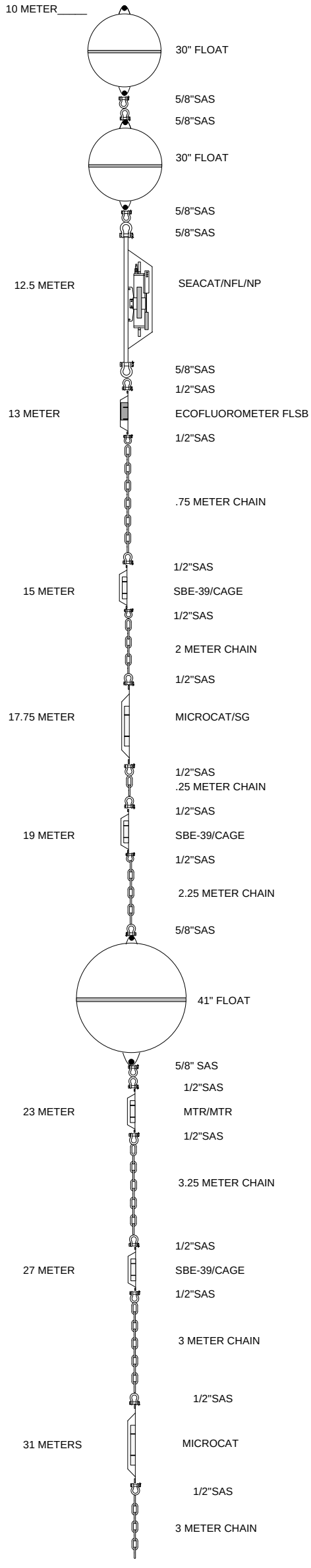

Bering Sea Stations
DBO
Mooring
70m Isobath
Unimak Box
Bering Canyon
approx. transect NW St. Law I
M8
M5
M4
M2
64°N
62°N
60°N
58°N
56°N
54°N
172°W
168°W
164°W
160°W

Type	StnID	Latdd	Londd	Lat Deg	Lat Min	Lon Deg	Lon Min	Operation	bottom depth
Bering Canyon	UT5	53.9777	-166.9758	53	58.6600	-166	58.5500	CTD/MNET	105
Bering Canyon	UT4	54.0865	-167.0648	54	5.1900	-167	3.8900	CTD	1120
Bering Canyon	UT3	54.1737	-167.1558	54	10.4200	-167	9.3500	CTD/MNET	1624
Bering Canyon	UT2	54.3175	-167.2822	54	19.0500	-167	16.9300	CTD	853
Bering Canyon	UT1	54.4480	-167.3820	54	26.8800	-167	22.9200	CTD/MNET	650
Bering Canyon	AW5	54.4618	-166.9357	54	27.7100	-166	56.1400	CTD/MNET	497
Bering Canyon	AW4	54.3178	-166.8233	54	19.0700	-166	49.4000	CTD	810
Bering Canyon	AW3	54.2058	-166.7030	54	12.3500	-166	42.1800	CTD/MNET	1367
Bering Canyon	AW2	54.1343	-166.6562	54	8.0600	-166	39.3700	CTD	1000
Bering Canyon	AW1	54.0708	-166.6217	54	4.2500	-166	37.3000	CTD/MNET	108
Bering Canyon	AE1	54.1687	-166.2325	54	10.1200	-166	13.9500	CTD/MNET	125
Bering Canyon	AE2	54.2330	-166.2630	54	13.9800	-166	15.7800	CTD	700
Bering Canyon	AE3	54.3037	-166.3528	54	18.2200	-166	21.1700	CTD/MNET	980
Bering Canyon	AE4	54.4370	-166.4800	54	26.2200	-166	28.8000	CTD	550
Bering Canyon	AE5	54.5607	-166.5985	54	33.6400	-166	35.9100	CTD/MNET	425
DBO	DBO1.1	62.0100	-175.0600	62	0.6000	-175	3.6000	CTD/BON	50-80
DBO	DBO1.2	62.0500	-175.2100	62	3.0000	-175	12.6000	CTD/BON	50-80
DBO	DBO1.3	62.2190	-174.8770	62	13.1400	-174	52.6200	CTD	50-80
DBO	DBO1.4	62.3900	-174.5700	62	23.4000	-174	34.2000	CTD/BON	50-80
DBO	DBO1.5	62.4680	-174.0830	62	28.0800	-174	4.9800	CTD	50-80
DBO	DBO1.6	62.5600	-173.5500	62	33.6000	-173	33.0000	CTD/BON	50-80
DBO	DBO1.7	62.7870	-173.5000	62	47.2200	-173	30.0000	CTD	50-80
DBO	DBO1.8	63.0300	-173.4600	63	1.8000	-173	27.6000	CTD/BON	50-80
DBO	DBO1.9	63.2800	-173.0800	63	16.8000	-173	4.8000	CTD	50-80
DBO	DBO1.10	63.6040	-172.5910	63	36.2400	-172	35.4600	CTD	50-80
Isobath70m	M2-S	56.6667	-163.8670	56	40.0002	-163	52.0200	CTD/BON	76
Isobath70m	M2-W	56.7667	-164.3338	56	46.0002	-164	20.0300	CTD/BON	74
Isobath70m	70M3	56.8087	-164.5833	56	48.5200	-164	34.9998	CTD	74
Isobath70m	70M5	56.8597	-165.1215	56	51.5800	-165	7.2900	CTD	74
Isobath70m	70M2/M2	56.8670	-164.0690	56	52.0200	-164	4.1400	CTD/BON	72
Isobath70m	70M2/M2	56.8670	-164.0690	56	52.0200	-164	4.1400	3 CalVETs	72
Isobath70m	70M4	56.9095	-164.8275	56	54.5700	-164	49.6500	CTD/BON	72
Isobath70m	M2-E	56.9452	-163.8327	56	56.7100	-163	49.9600	CTD/BON	70
Isobath70m	70M6	56.9928	-165.3775	56	59.5700	-165	22.6500	CTD/BON	72
Isobath70m	M2-N	57.0167	-164.2167	57	1.0002	-164	13.0002	CTD/BON	69
Isobath70m	70M7	57.1070	-165.6150	57	6.4200	-165	36.9000	CTD	71
Isobath70m	70M8	57.2627	-165.7465	57	15.7600	-165	44.7900	CTD/BON	70
Isobath70m	70M9	57.3217	-166.0097	57	19.3000	-166	0.5800	CTD	70
Isobath70m	70M10	57.3223	-166.3263	57	19.3398	-166	19.5798	CTD/BON	71
Isobath70m	70M12	57.4290	-166.8120	57	25.7400	-166	48.7200	CTD/BON	70
Isobath70m	70M11	57.4380	-166.5125	57	26.2800	-166	30.7500	CTD	70
Isobath70m	70M14	57.4988	-167.3442	57	29.9300	-167	20.6502	CTD/BON	71
Isobath70m	70M16	57.5007	-167.9862	57	30.0402	-167	59.1702	CTD/BON	72
Isobath70m	70M15	57.5012	-167.6653	57	30.0702	-167	39.9200	CTD	72
Isobath70m	70M17	57.5208	-168.3063	57	31.2500	-168	18.3800	CTD	72
Isobath70m	70M13	57.5223	-167.0382	57	31.3398	-167	2.2902	CTD	70
Isobath70m	70M18	57.5245	-168.6135	57	31.4700	-168	36.8100	CTD/BON	72
Isobath70m	70M19/M4	57.6000	-168.7000	57	39.1800	-169	1.2000	CTD/BON	70
Isobath70m	M4-E	57.7653	-168.6670	57	45.9200	-168	27.9100	CTD/BON	72
Isobath70m	70M21/M4	57.8330	-168.8920	57	49.9800	-168	53.5200	CTD/BON	72
Isobath70m	70M21/M4	57.8330	-168.8920	57	49.9800	-168	53.5200	3 CalVETs	72
Isobath70m	M4-W	57.7670	-169.2000	57	55.6800	-169	19.3200	CTD/BON	68
Isobath70m	70M23	57.9088	-169.5013	57	54.5300	-169	30.0800	CTD	70
Isobath70m	M4-N	57.9170	-169.0000	58	3.9700	-168	43.5700	CTD/BON	71
Isobath70m	70M24	58.0422	-169.6727	58	2.5302	-169	40.3600	CTD/BON	72

Isobath70m	70M25	58.1472	-169.9182	58	8.8302	-169	55.0902	CTD	72
Isobath70m	70M26	58.2820	-170.0928	58	16.9200	-170	5.5700	CTD/BON	72
Isobath70m	70M27	58.4455	-170.1857	58	26.7300	-170	11.1402	CTD	74
Isobath70m	70M28	58.6165	-170.2755	58	36.9900	-170	16.5300	CTD/BON	73
Isobath70m	70M29	58.7743	-170.2937	58	46.4598	-170	17.6202	CTD	72
Isobath70m	70M30	58.9483	-170.3273	58	56.8998	-170	19.6398	CTD/BON	70
Isobath70m	70M31	59.1060	-170.2492	59	6.3600	-170	14.9500	CTD	68
Isobath70m	70M32	59.2462	-170.4117	59	14.7700	-170	24.7000	CTD/BON	68
Isobath70m	70M33	59.3353	-170.6558	59	20.1198	-170	39.3498	CTD	70
Isobath70m	70M34	59.4357	-170.9060	59	26.1402	-170	54.3600	CTD/BON	73
Isobath70m	70M35	59.5953	-170.9208	59	35.7200	-170	55.2500	CTD	71
Isobath70m	M5-S	59.7023	-171.4840	59	42.1400	-171	29.0400	CTD/BON	74
Isobath70m	70M36	59.7155	-171.1398	59	42.9300	-171	8.3898	CTD/BON	72
Isobath70m	70M37	59.7743	-171.4497	59	46.4600	-171	26.9802	CTD	73
Isobath70m	M5-E	59.8980	-171.2583	59	53.8800	-171	15.4998	CTD/BON	70
Isobath70m	M5-W	59.8980	-172.1667	59	53.8800	-172	10.0002	CTD/BON	73
Isobath70m	70m38/ M5	59.8920	-171.7110	59	53.5200	-171	42.6600	3 CalVETs	70
Isobath70m	70m38M5	59.8920	-171.7110	59	53.5200	-171	42.6600	CTD/BON	70
Isobath70m	70M40	59.9115	-172.4352	59	54.6900	-172	26.1102	CTD/BON	74
Isobath70m	70M41	59.9782	-172.7462	59	58.6902	-172	44.7702	CTD	69
Isobath70m	70M42	60.0372	-173.0065	60	2.2302	-173	0.3900	CTD/BON	70
Isobath70m	M5-N	60.0750	-172.0000	60	4.5000	-172	0.0000	CTD/BON	70
Isobath70m	70M43	60.1005	-173.3167	60	6.0300	-173	19.0002	CTD	70
Isobath70m	70M44	60.2517	-173.5217	60	15.1002	-173	31.3002	CTD/BON	70
Isobath70m	70M45	60.4250	-173.5917	60	25.5000	-173	35.5002	CTD	65
Isobath70m	70M46	60.5718	-173.6395	60	34.3098	-173	38.3700	CTD/BON	68
Isobath70m	70M47	60.7388	-173.6480	60	44.3298	-173	38.8800	CTD	72
Isobath70m	70M48	60.9073	-173.8247	60	54.4398	-173	49.4802	CTD/BON	81
Isobath70m	70M49	61.0657	-173.8293	61	3.9402	-173	49.7598	CTD	79
Isobath70m	70M50	61.2498	-173.7408	61	14.9898	-173	44.4498	CTD/BON	75
Isobath70m	70M51	61.4107	-173.7362	61	24.6402	-173	44.1702	CTD/BON	75
Isobath70m	70M52	61.5602	-173.7122	61	33.6102	-173	42.7302	CTD/BON	72
Isobath70m	70M53	61.7273	-173.8547	61	43.6398	-173	51.2802	CTD	71
Isobath70m	70M54	61.8622	-174.0943	61	51.7302	-174	5.6562	CTD/BON	71
Isobath70m	70M55	61.9433	-174.3642	61	56.5998	-174	21.8502	CTD/BON	73
Isobath70m	M8-S	61.9750	-174.6170	61	58.5000	-174	37.0200	CTD/BON	70
Isobath70m	70M56	62.0265	-174.6587	62	1.5900	-174	39.5202	CTD/BON	74
Isobath70m	M8-E	62.2000	-174.3000	62	12.0000	-174	18.0000	CTD/BON	70
Isobath70m	M8	62.2000	-174.7500	62	12.0000	-174	45.0000	CTD/BON	70
Isobath70m	M8	62.2000	-174.7500	62	12.0000	-174	45.0000	3 CalVETs	70
Isobath70m	M8-W	62.2000	-175.2000	62	12.0000	-175	12.0000	CTD/BON	80
Isobath70m	M8-N	62.4210	-174.6987	62	25.2600	-174	41.9200	CTD/BON	73
Moorings	M2/16BSM	56.8695	-164.0479	56	52.1729	-164	2.8716	Surface Mc	71
Moorings	M2/16BSP-	56.8727	-164.0528	56	52.3638	-164	3.1683	Subsurface	71
Moorings	M2/16BS-F	56.8680	-164.0527	56	52.0800	-164	3.1600	Surface Mc	71
Moorings	M4/15BS-4	57.8900	-168.8718	57	53.3970	-168	52.3090	Subsurface	70
Moorings	M4/15BSP-	57.8945	-168.8778	57	53.6720	-168	52.6650	Subsurface	70
Moorings	M5/15BS-5	59.9114	-171.7354	59	54.6840	-171	44.1240	Subsurface	68
Moorings	M5/15BSP-	59.9069	-171.7335	59	54.4130	-171	44.0070	Subsurface	68
Moorings	M8/15BS-8	62.1927	-174.6879	62	11.5610	-174	41.2720	Subsurface	72
Moorings	M8/15BSP-	62.1945	-174.6842	62	11.6670	-174	41.0490	Subsurface	72
Moorings	M8/15BSIP	62.1929	-174.6831	62	11.5740	-174	40.9860	Subsurface	72
Unimak Box	UBS1	54.4395	-164.9807	54	26.3700	-164	58.8400	CTD/BON	46
Unimak Box	UBS2	54.4240	-165.1352	54	25.4400	-165	8.1100	CTD/BON	130
Unimak Box	UBS3	54.3792	-165.2783	54	22.7500	-165	16.7000	CTD	166
Unimak Box	UBS4	54.3383	-165.4348	54	20.3000	-165	26.0900	CTD/BON	156

Unimak Box	UBW1	54.3615	-165.9335	54	21.6900	-165	56.0100	CTD/BON	475
Unimak Box	UBW2	54.4742	-166.0380	54	28.4500	-166	2.2800	CTD/BON	534
Unimak Box	UBW3	54.5813	-166.1228	54	34.8800	-166	7.3700	CTD	415
Unimak Box	UBW4	54.6863	-166.2398	54	41.1800	-166	14.3900	CTD/BON	293
Unimak Box	UBN1	54.7535	-166.0563	54	45.2100	-166	3.3800	CTD/BON	219
Unimak Box	UBN2	54.8118	-165.8617	54	48.7100	-165	51.7000	CTD/BON	165
Unimak Box	UBN3	54.8653	-165.6667	54	51.9200	-165	40.0000	CTD	143
Unimak Box	UBN4	54.9307	-165.4833	54	55.8400	-165	29.0000	CTD/BON	124
Unimak Box	UBN5	54.9860	-165.2843	54	59.1600	-165	17.0600	CTD	116
Unimak Box	UBN6	55.0465	-165.1117	55	2.7900	-165	6.7000	CTD/BON	113
Unimak Box	UBE1	54.9370	-164.9928	54	56.2200	-164	59.5700	CTD/BON	93
Unimak Box	UBE2	54.8273	-164.8895	54	49.6400	-164	53.3700	CTD	76
Unimak Box	UBE3	54.7170	-164.7825	54	43.0200	-164	46.9500	CTD/BON	48





SUBSURFACE INSTRUMENTS		
DEPTH (M)	INST.	SER #
12.5	SEACAT/NFL/NP	
13	Eco-Flour FLSB	
15	SBE-39	
17.75	MicroCat/sg	
19	SBE-39	
23	MTR/MTR	
27	SBE-39	
31	MICROCAT	
35	SBE-39	
40	MTR/MTR	
45	SBE-39	
50	MTR/MTR	
55	MICROCAT	
60	MTR/MTR	
67	MTR/MTR	
72	BOTTOM	

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7600 Sandpoint Way NE
Seattle, Wa. 98115
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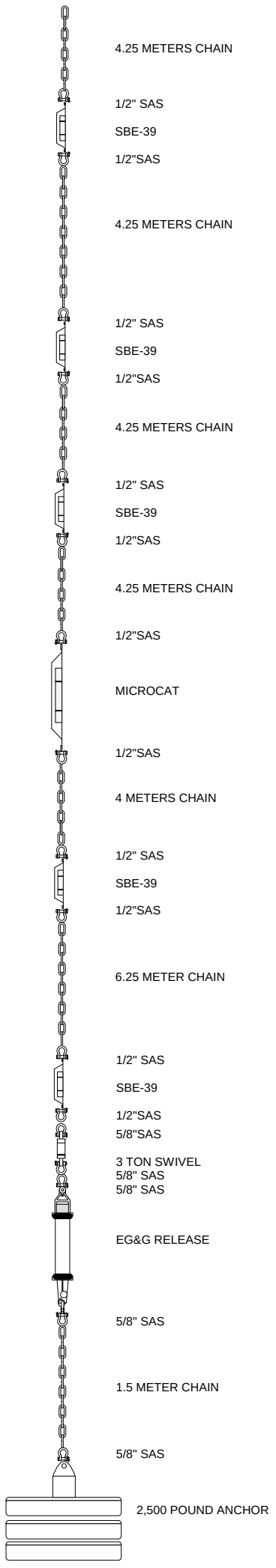
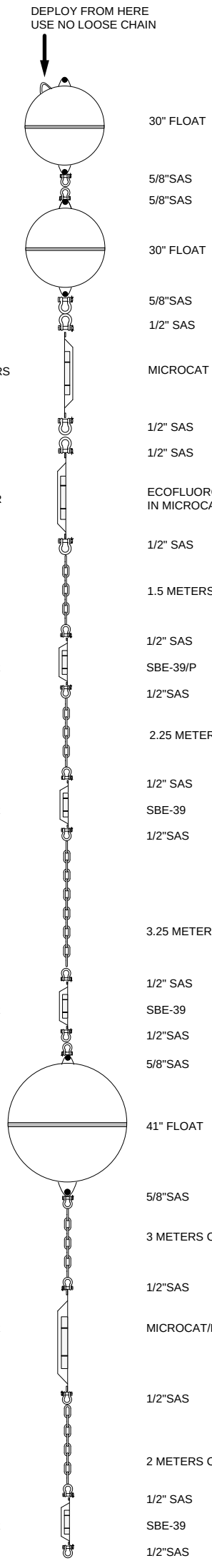
MOORING: **14BS-4B**

LOCATION: **BERING SEA, SITE 4**

DESIGN BY: **MIKE CRAIG** **DATE:** **11 JULY 2014**

DRAWN BY: **DATE:**





SUBSURFACE INSTRUMENTS		
DEPTH	INST.	SER #
17	MICROCAT	
18	EcoFluorometer	
20	SBE-39/P	
23	SBE-39	
27	SBE-39	
32	MICROCAT/P	
35	SBE-39	
40	SBE-39	
45	SBE-39	
50	SBE-39	
55	MICROCAT	
60	SBE-39	
67	SBE-39	
70	BOTTOM	

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Seattle, Wa. 98115
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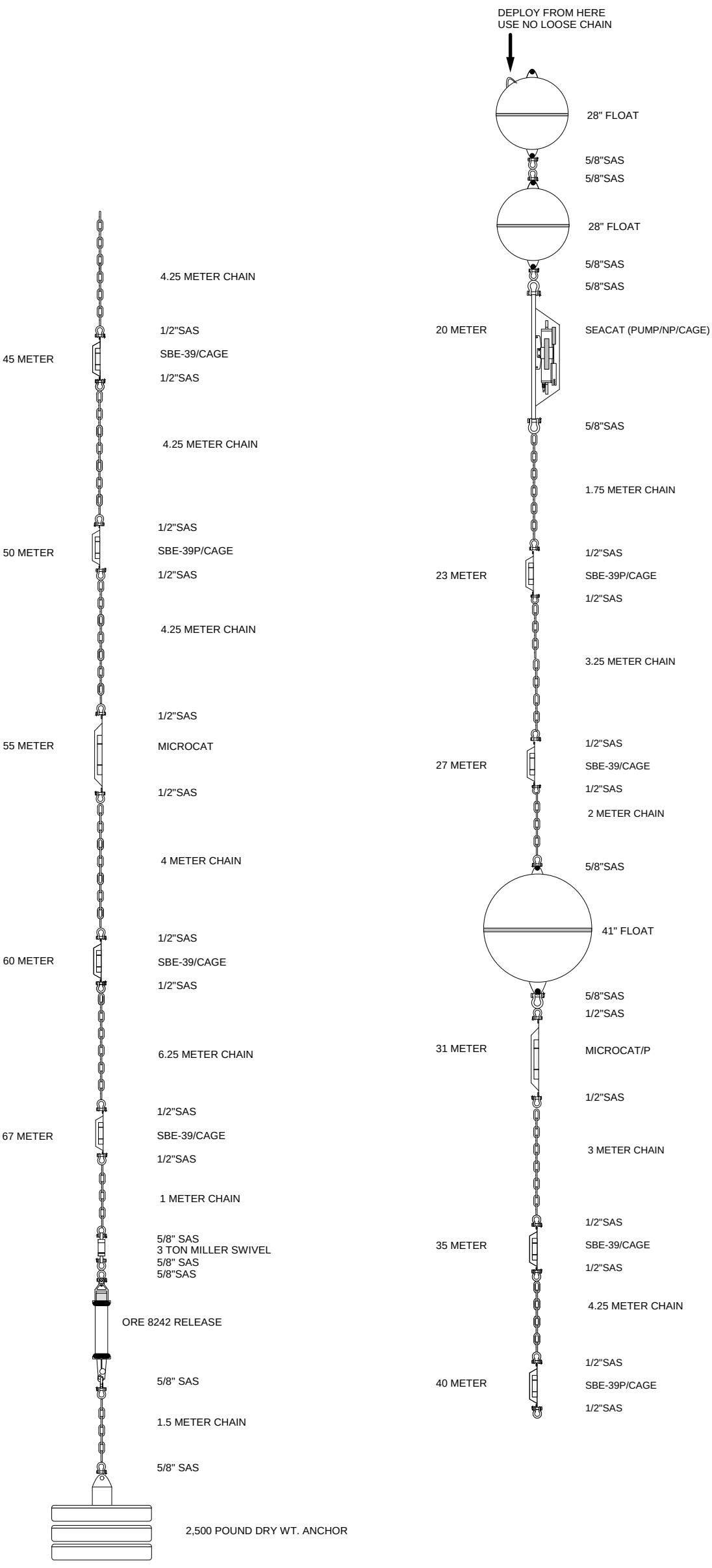
MOORING: **14BS-5A**

LOCATION: **BERING SEA, SITE 5**

DRAWN BY:	DATE:
MIKE CRAIG	**11 JULY 2014**
APPROVED BY:	**DATE:**



SUBSURFACE INSTRUMENTS		
DEPTH (M)	INST.	SER #
21	Seacat/pump/NP	
23	SBE-39/P	
27	SBE-39	
31	MICROCAT/P	
35	SBE-39	
40	SBE-39/P	
45	SBE-39	
50	SBE-39/P	
55	MICROCAT	
60	SBE-39	
67	SBE-39	
71	BOTTOM	

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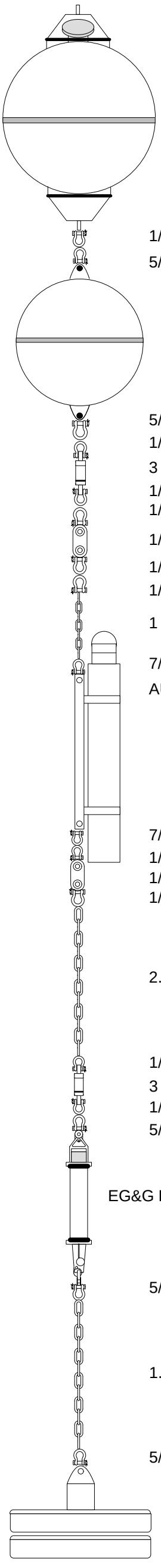
MOORING: **14BS-8A**

LOCATION: **BERING SEA, SITE 8**

DESIGN BY: **MIKE CRAIG**	**DATE:** **12 MAY 2014**
DRAWN BY:	**DATE:**



61 METERS

300 KHZ-ADCP
36" SYNTACTIC FLOAT

1/2" SAS
5/8" SAS

30" FLOAT

5/8" SAS
1/2"SAS
3 TON SWIVEL
1/2"SAS
1/2"SAS
1/2"SIP
1/2"SS SAS
1/2"SS SAS
1 METER SS CHAIN
7/16" SS SAS

65 METERS

AURAL

7/16" SS SAS
1/2" SS SAS
1/2" SIP
1/2" SAS

2.5 M 1/2" CHAIN

1/2" SAS
3 TON SW
1/2" SAS
5/8" SAS

EG&G RELEASE

5/8" SAS

1.5 METER CHAIN

5/8" SAS

1600 POUND ANCHOR

INSTRUMENT	DEPTH M	SERIAL NO.
300 kHz ADCP	61	
AURALS	65	
BOTTOM	72	

NOAA-PMEL-FOCI
7600 Sandpoint Way NE
Seattle, Wa. 98115
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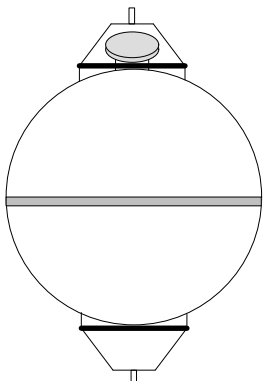
MOORING: 14BSP-4A

LOCATION: BERING SEA SITE 4

DESIGN BY: MIKE CRAIG DATE: 13 MAY 2014

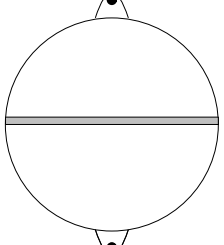
DRAWN BY: DATE:

59 METERS



300 KHZ-ADCP
36" SYNTACTIC FLOAT

1/2" SAS
5/8" SAS

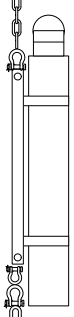


30" FLOAT

5/8" SAS
1/2"SAS
3 TON SWIVEL
1/2"SAS
1/2"SAS
1/2"SIP
1/2"SS SAS
1/2"SS SAS
1 METER STAINLESS STEEL CHAIN

63 METERS

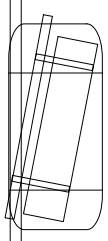
7/16" SS SAS



AURAL

7/16" SS SAS
1/2" SS SAS
.75 METER 1/2" SS CHAIN
1/2" SS SAS
3/4" SS SAS

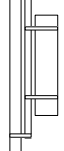
65 METERS



AWCP

3/4" SS SAS
1/2" SS SAS
1/2" SIP
1/2" SAS
5/8" SAS

67 METERS

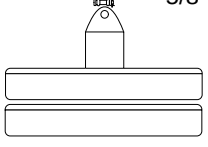


PAL

5/8" SAS
1/2"SAS
3 TON SWIVEL
1/2"SAS
5/8" SAS

EG&G 8242 RELEASE

RELEASE LINK
5/8" SAS
1.5 METER 1/2" CHAIN
5/8" SAS



1600 POUND ANCHOR

INSTRUMENT	DEPTH M	SERIAL NO.
300 KHZ ADCP	59	
AURAL	63	
AWCP	65	
PAL	67	
BOTTOM	70	

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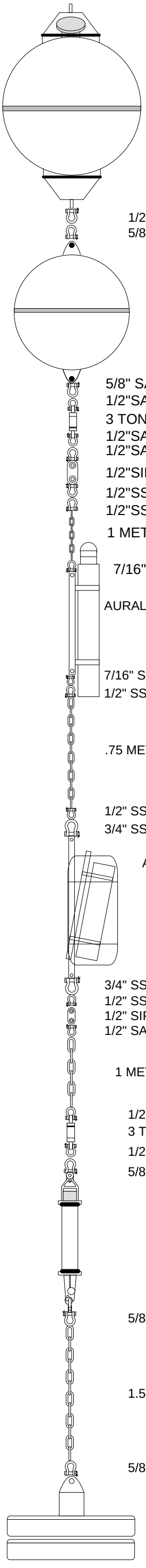
7600 Sandpoint Way NE
Seattle, Wa. 98115
(206) 526-6180

MOORING: **14BSP-5A**

LOCATION: **BERING SEA, SITE 5**

DRAWN BY: **Mike Craig** **DATE:** **12 MAY 2014**

APPROVED BY: **DATE:**



61 METERS

300 KHZ-ADCP
36" SYNTACTIC FLOAT

1/2" SAS
5/8" SAS

30" FLOAT

5/8" SAS
1/2"SAS
3 TON SWIVEL
1/2"SAS
1/2"SAS
1/2"SIP
1/2"SS SAS
1/2"SS SAS
1 METER STAINLESS STEEL CHAIN

64 METERS

7/16" SS SAS

AURAL

7/16" SS SAS
1/2" SS SAS

.75 METER 1/2" SS CHAIN

1/2" SS SAS
3/4" SS SAS

66 METERS

AWCP

3/4" SS SAS
1/2" SS SAS
1/2" SIP
1/2" SAS

1 METER CHAIN

1/2" SAS
3 TON SWIVEL
1/2" SAS
5/8" SAS

ORE 8242 RELEASE

5/8" SAS

1.5 METER CHAIN

5/8" SAS

1600 POUND ANCHOR

INSTRUMENT	DEPTH M	SERIAL NO.
300 KHZ ADCP	61	
AURAL	64	
AWCP	66	
BOTTOM	71	

NOAA-PMEL-FOCI
7600 Sandpoint Way NE
Seattle, Wa. 98115
(206) 526-6175

MOORING: **14BSP-8A**

LOCATION: **BERING SEA, SITE 8**

Mike Craig **DATE:** **12 MAY 2014**

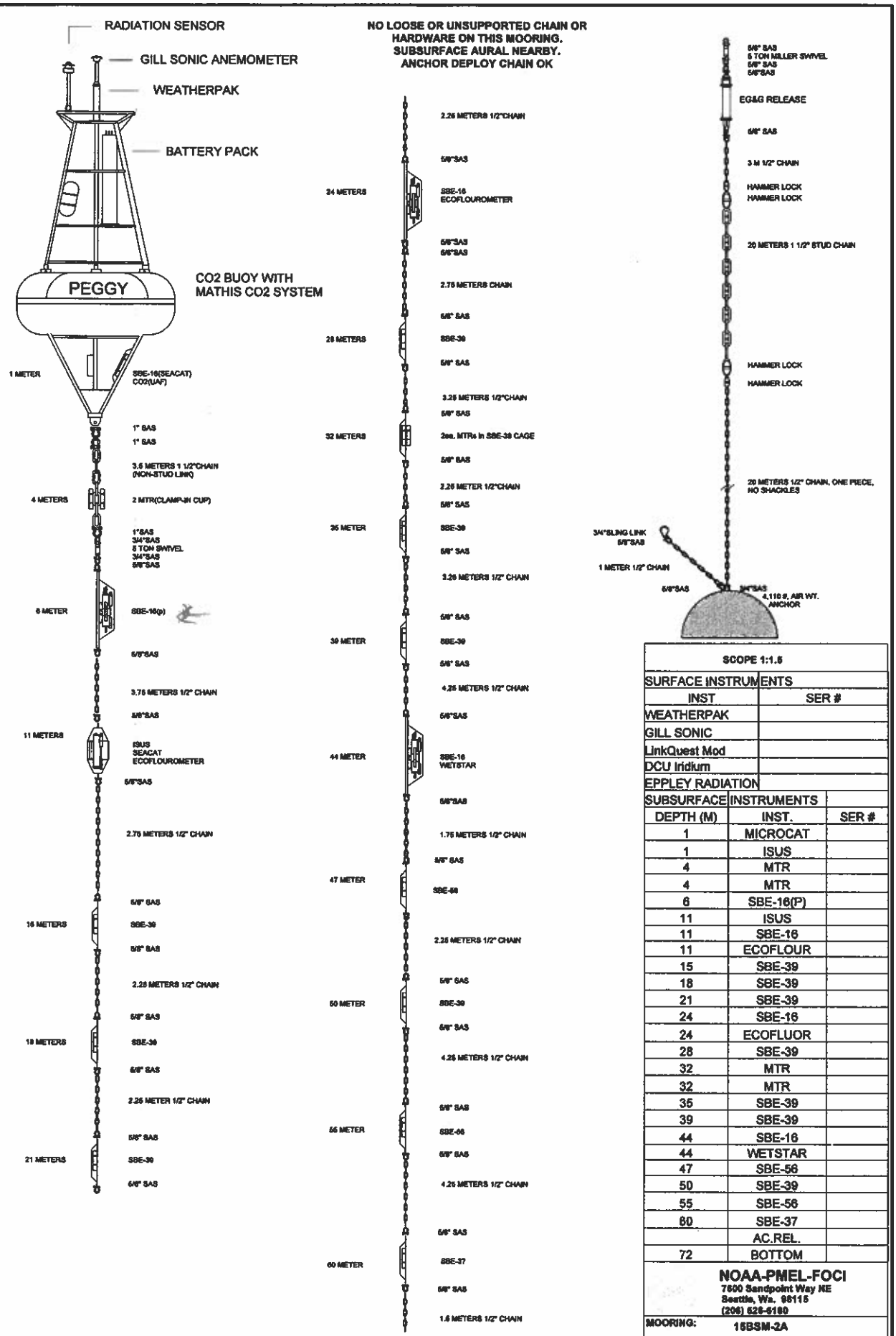
APPROVED BY: **DATE:**

Records for Mooring: 15BSM-2A

Deployment		Recovery	
Cruise Number:	**DY1504**	Cruise Number:	
Deployment Date/Time (GMT):	**2015-05-01 04:57:39**	Recovery Date/Time (GMT):	
GPS latitude:	**56 51.995 N**	GPS latitude:	
GPS longitude:	**164 2.996 W**	GPS longitude:	
CTD cast no:	**CTD022**	CTD cast no:	
Actual Deployment Depth (m):	**0**		
Timekeeper:	**Peter Proctor**	Timekeeper:	
Chief Scientist:	**Peter Proctor**	Chief Scientist:	

Pre-Deployment

Estimated latitude (N):	**56 52.0 N**
Estimated longitude (W):	**164 3.0 W**
Estimated Deployment depth:	**72**
Estimated Recovery Date:	**2015-10-01**



SCOPE 1:1.5		
SURFACE INSTRUMENTS		
INST	SER #	
WEATHERPAK		
GILL SONIC		
LinkQuest Mod		
DCU Iridium		
EPPLEY RADIATION		
SUBSURFACE	INSTRUMENTS	
DEPTH (M)	INST.	SER #
1	MICROCAT	
1	ISUS	
4	MTR	
4	MTR	
6	SBE-16(P)	
11	ISUS	
11	SBE-16	
11	ECOFLOUR	
15	SBE-39	
18	SBE-39	
21	SBE-39	
24	SBE-16	
24	ECOFLUOR	
28	SBE-39	
32	MTR	
32	MTR	
35	SBE-39	
39	SBE-39	
44	SBE-16	
44	WETSTAR	
47	SBE-56	
50	SBE-39	
55	SBE-56	
60	SBE-37	
	AC.REL.	
72	BOTTOM	

NOAA-PMEL-FOCI
7600 Sandpoint Way NE
Seattle, Wa. 98115
(206) 526-6160

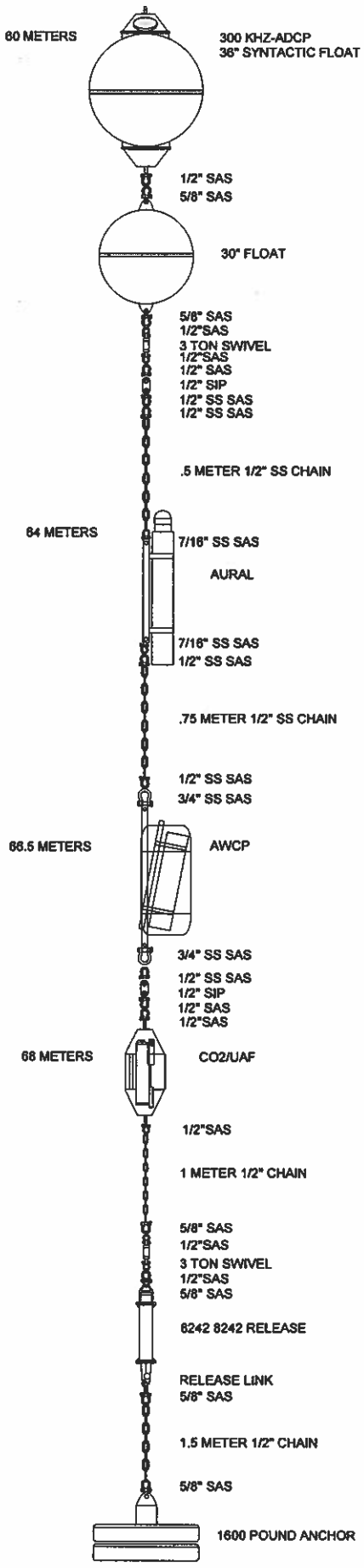
MOORING:	15BSM-2A
LOCATION:	BERING SEA
DRAWN BY: MIKE CRAIG	DATE: 9 MARCH 2014
APPROVED BY:	DATE:

Records for Mooring: 15BSP-2A

Deployment		Recovery	
Cruise Number:	**DY1504**	Cruise Number:	
Deployment Date/Time (GMT):	**2015-05-02 04:33:00**	Recovery Date/Time (GMT):	
GPS latitude:	**56 52.00 N**	GPS latitude:	
GPS longitude:	**164 04.00 W**	GPS longitude:	
CTD cast no:	**CTD027**	CTD cast no:	
Actual Deployment Depth (m):	**73**		
Timekeeper:	**Peter Proctor**	Timekeeper:	
Chief Scientist:	**Peter Proctor**	Chief Scientist:	

Pre-Deployment

Estimated latitude (N):	**56 52 N**
Estimated longitude (W):	**164 4 W**
Estimated Deployment depth:	**72**
Estimated Recovery Date:	**2015-10-01**



N

INSTRUMENT	DEPTH M	SERIAL NO.
300 KHZ ADCP	60	
AURAL	64	
AWCP	66.5	UAF
UAF/CO2	68	
BOTTOM	72	

NOAA-PMEL-FOCI
7600 Sandpoint Way NE
Seattle, Wa. 98115
(206) 526-6180

MOORING: 15BSP-2A

LOCATION:

DRAWN BY:	DATE:
MIKE CRAIG	7 APRIL 2015
APPROVED BY:	DATE: