Final Project Instructions DY1805

Date Submitted: March 29, 2018

Platform: NOAA Ship *Oscar Dyson* R 224

Project Number: DY-18-05 (OMAO)

Project Title: EcoFOCI Spring Mooring Cruise and Hydrographic Survey

Project Dates: April 29, 2018 to May 10, 2018

Prepared by: _____ Dated: 04-03-2018
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NOAA-PMEL/EcoFOCI/UW/JISAO

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NOAA-PMEL

Approved by: _____ Dated: 4/4/2018
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Director (Acting)
NOAA-PMEL

Approved by: _____ Dated: _____
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Date: 2018.04.19 13:37:23 -07'00'
Captain Keith W. Roberts, NOAA
Commanding Officer
Marine Operations Center – Pacific

I. Overview

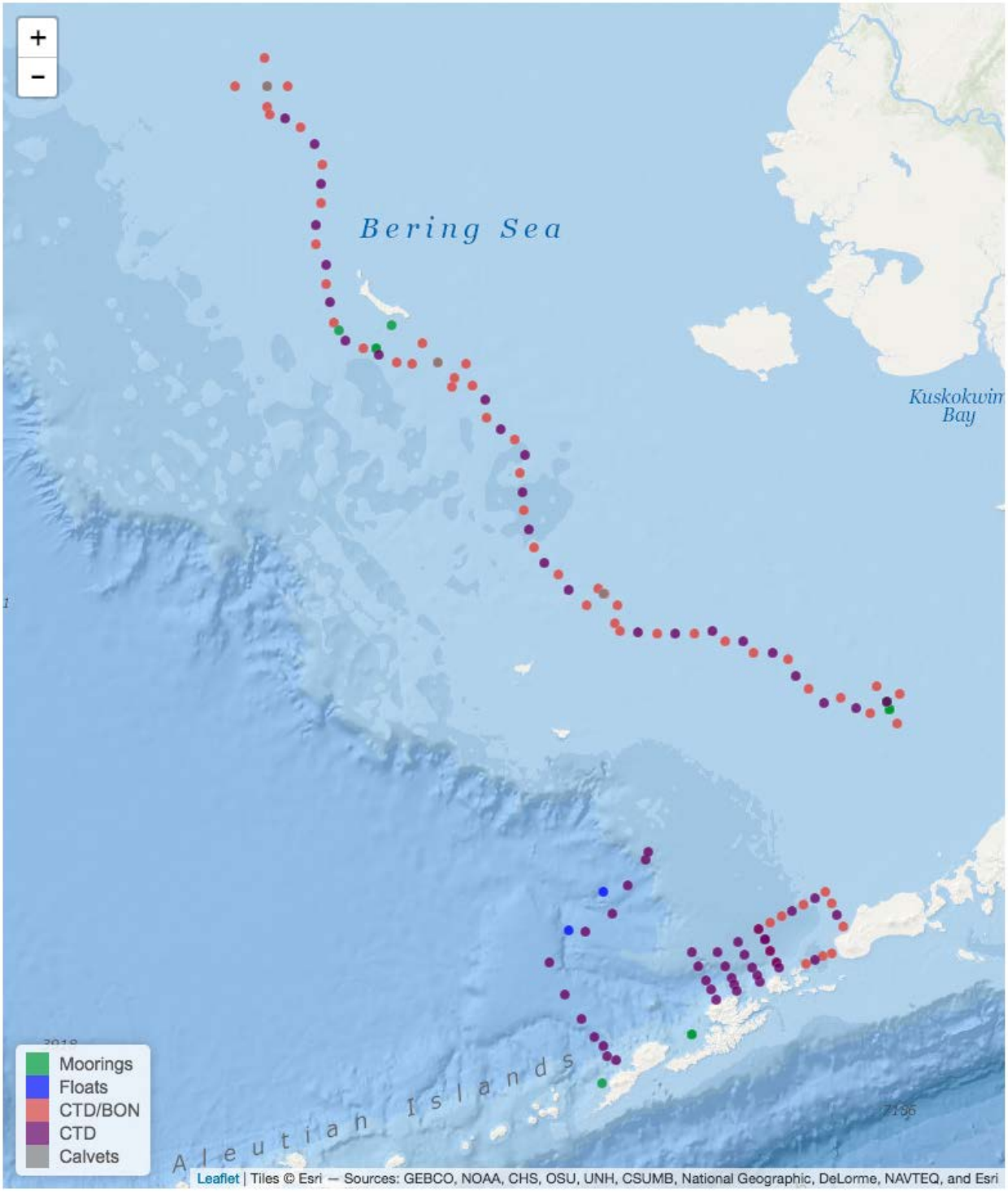
A. Brief Summary and Project Period

EcoFOCI Spring Mooring cruise and hydrographic/biological survey; April 29, 2018 to May 10, 2018

B. Days at Sea (DAS)

Of the 12 DAS scheduled for this project, 0 DAS are funded by an OMAO allocation, 12 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)



Area of operations in the Bering Sea including mooring sites, the Unimak Box, L-Line, Bering Canyon, and 70-meter isobath.

D. Summary of Objectives

This project is intended to recover two (2) subsurface moorings in the Bering Sea at Site M2 and deploy two (2) surface moorings and one (1) subsurface mooring; deploy one (1) surface mooring and three (3) subsurface moorings in the vicinity of St. Matthew Island; and recover a Marine Mammal subsurface mooring and deploy two (2) west of Unalaska Island. Additionally, a hydrographic/biological survey consisting of **C**onductivity/Temperature/**D**epth (**CTD**) casts, 20/60 cm bongo tows and **C**alifornia **V**ertical **E**gg **T**ows (**C**al**VET**s) in the Unimak Pass and along the 70-meter isobath and in a box around the 4 mooring sites along the 70-meter isobath, and such other areas as time permits. Additionally, we will deploy and recover an Oculus glider, deploy 3 satellite tracked drifters in the vicinity of St. Matthew Island and deploy 2 ARGO drifters.

E. Participating Institutions

NOAA – Pacific Marine Environmental Laboratory (PMEL)

7600 Sand Point Way NE,

Seattle WA 98115

NOAA – Alaska Fisheries Science Center (AFSC)

7600 Sand Point Way NE,

Seattle, WA 98115

Joint Institute for the Study of the Atmosphere and Oceans (JISAO)

University of Washington

3737 Brooklyn Ave. NE

Seattle, WA 98105-6715

University of Alaska, Fairbanks (UAF)

505 South Chandalar Drive

Fairbanks, AK 99775

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

Name (Last, First)	**Title**	**Date Aboard**	**Date Disembark**	**Gender**	**Affiliation**	**Nationality**
Proctor, Peter, Dr.	Chief Scientist	April 28, 2018	May 11, 2018	Male	NOAA/JISAO	US
Duffy-Anderson, Janet, Dr.	Scientist	April 28, 2018	May 10, 2018	Female	NOAA	US
Lebon, Geoffrey	Scientist	April 28, 2018	May 11, 2018	Male	NOAA/JISAO	US
Harpold, Colleen	Scientist	April 28, 2018	May 10, 2018	Female	NOAA	US
Grassia, Stephanie	Scientist	April 28, 2018	May 11, 2018	Female	NOAA	US
Monacci, Natalie	Scientist	April 28, 2018	May 11, 2018	Female	UAF	US
Langis, Daniel	Scientist	April 28, 2018	May 10, 2018	Male	NOAA	US
Qiong Yang	Scientist	April 28, 2018	May 10, 2018	Female	JISAO	China (Permanent Resident of US

G. Administrative

1. Points of Contact:

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

Dr. Janet Duffy-Anderson, AFSC; 7600 Sand Point Way, NE, Bldg. 4, Seattle, WA, 98115. Ph: (206) 526-6465. Janet.Duffy-Anderson@NOAA.GOV

Zygas, Aras, LT, (Operations Officer, NOAAS *Oscar Dyson*); NOAA Corps, 2002 SE Marine Science Drive, Newport, OR 97365. Ph: (541) 867-8911 (Ship's VOIP), OPS.Oscar.Dyson@NOAA.GOV

2. Diplomatic Clearances

None Required.

3. Licenses and Permits

This project will be conducted under the Scientific Research Permit (U.S.) (SRP) #2018-B1 (U.S.); effective: February 1, 2018 to October 1, 2018. Issued to Douglas P. DeMaster, Science and Research Director – AFSC.

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:
Departure: Dutch Harbor, Sunday, April 29, 2018
Arrival: Dutch Harbor, Thursday, May 10, 2018

B. Staging and Destaging:
Two 40 foot containers will be shipped from Seattle and will be staged on the pier. Unloading of the containers and the transfer of equipment to the ship will occur as appropriate prior to departure. Members of the science party will arrive at least two days prior to departure to assist in the loading of equipment on the ship, preparation of the moorings and setting up the sampling gear on deck and in the labs. The science party will arrange their own vehicles for transporting personnel and equipment. At the end of the project, most equipment will remain on board the ship until the end of the follow on project – DY1806 – when it will be offloaded for shipment back to Seattle. Some equipment will be offloaded for shipment to the University of Alaska, Fairbanks. To

assist in the unloading of the containers and setting up the moorings, a crane operator will be needed during normal working hours on Friday, April 27 and Saturday, April 28. Additionally, a crane operator will be needed on May 10 to off-load equipment for shipment to Fairbanks, AK

Additional equipment will be shipped from the University of Alaska, Fairbanks to Dutch Harbor for loading on the ship.

C. Operations to be Conducted:

a. **Unimak Box CTDs:** CTDs will be taken at each of 18 stations in the "box" in and around Unimak Pass. At each station within the pass and at every other station along the sides and across the northern line, a 20/60 cm bongo net will be towed for the collection of zooplankton.

b. **FOCI Bering Site 2:** Depending upon arrival time, the project will commence mooring operations or the CTD "box" will be conducted. The CTD box will consist of a CTD and 20/60 cm bongo at each of 4 corner stations and a CTD, bongo and three (3) CalVET tows at the location of the mooring in the center of the box. Depending upon water sampling requirements, the CTD at the mooring location may have to be done twice to get adequate water samples. Subsequent to the deployment of the moorings, another CTD will be conducted at the mooring site for calibration of the moored instruments.

c. **Oculus Coastal Glider:** The Oculus will be deployed in the vicinity of Mooring Site 2 and will be recovered later in the cruise. It is necessary that the glider be deployed and recovered using small boat operations.

d. **70-meter Isobath Survey Line:** A CTD cast with sampling for salinity, chlorophyll, nutrients and oxygen will be conducted at each station along the 70-meter isobath. Stations will commence at Mooring Site 2 and continue as far north as time, weather and ice conditions permit. CTDs will be conducted to within 5 meters of the bottom unless it is deemed prudent to only go to 10 meters, such as when the ship's motion is such that the CTD may hit the bottom. Winch speeds should be 30 meters/minute on the down and up cast.

e. **FOCI Bering Sea Moorings, Sites 4, 5 and 8:** If weather and ice conditions permit access to these sites, using a sampling scenario similar to the box around Mooring Site 2, CTDs, bongos and CalVETs will be conducted at each mooring.

f. **Satellite tracked drifter deployments:** Three (3) satellite-tracked drifters will be deployed in the vicinity of St Matthew Island. These drifters can be deployed over the stern of the ship and require no lifting equipment.

g. **L-line:** Up to 11 CTD stations may be sampled along the "L-Line" if time permits; locations for these stations are in Appendix I. CTD casts will be to within 5 meters of the bottom or to 1500 meters. At depths greater than 200 meters, the speed of the

winch may be increased to a speed commensurate with safe operations.

h. **Argo Float Deployments:** Two Argo floats may be deployed when the ship is in water whose depth is over 2000 meters. These floats may be deployed over the side of the ship and do not require any lifting operations by ship's equipment.

i. **Marine Mammal Moorings:** Two (2) marine mammal moorings will be deployed in the vicinity of Umnak Island and Samalga Pass, and one (1) mooring will be recovered from the Umnak Island site.

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. (This statement must remain in all project instructions)

Dives are not planned for this project.

E. Applicable Restrictions

Conditions which preclude normal operations: poor weather, equipment failure, unforeseen conditions, and ice coverage would all preclude normal operations. Poor weather would have to be waited out or the project track would have to be modified to provide the best prospects for completing the project. A-frame and winch failures would have to be addressed immediately for the project to continue. Ice coverage would negate the ability to conduct mooring operations, these would have to be postponed for later in the project, or conducted during subsequent projects or from another vessel. Additionally, surface floats will not be deployed if there is a possibility of ice in their location.

III. Equipment

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

Hydrographic winch with slip rings and 3-conductor cable terminated for the CTD,

Sea-Bird Electronics' SBE 911 plus CTD system with stand and dual Temperature and Conductivity sensors, each CTD system should include underwater CTD, weights, and altimeter, there should be a deck unit for the system,

10 liter Niskin sampling bottles for use with the CTD rosette (11 plus 4 spares); it is not necessary for these bottles to have silicon tubing vice metal springs for this project,

Hydrographic winch with slip rings and 3-conductor cable terminated for the SBE 19plus for net tow operations – bongos and CalVETs.

12 KHz hull mounted EdgeTech Acoustic release transducer,

Scientific Computer System (SCS),

For meteorological observations: 2 anemometers (one R. M. Young system interfaced with the SCS), calibrated air thermometer (wet- and dry-bulb) and a calibrated barometer and/or barograph,

Freezer space for storage of biological and chemical samples (-20° and -80°C), turned on and operating,

SIMRAD ES-60 and EK-60 echo sounders,

A minimum of two (2) computer workstations in the acoustic lab with Internet, printer and email access,

Removable stern platform in place,

Laboratory space with storage space,

Underway flow-through seawater system with TSG,

Seawater hoses and nozzles to wash nets,

Adequate deck lighting for nighttime operations,

Navigational equipment including GPS and radar,

Safety harnesses and floatation equipment for working on the side sample platform and fantail,

Ship's cranes used for loading and/or recovering and deploying moorings,

Work boat for deployment of gliders

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

Sea-Bird Electronics SBE 19 Plus SEACAT system,

Fluorometer, light meter (PAR), and dual oxygen systems to be mounted on the CTD (backup),

20/60 cm bongo net systems,

Manual wire angle indicator,

CalVET net sampling system,

Surface moorings with doughnuts/flotation, instruments and anchors,

Subsurface moorings, floats, anchors, instruments,

Equipment to deploy moorings,

Dragging gear as need to drag for moorings that fail to release,

Scientific sampling supplies and storage/preservation supplies,

Satellite-tracked drifters, three (3)

Oceanic profiling floats – Argo, two (2)

Oculus glider and related launch and recovery equipment,

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

Fish/Zooplankton sampling chemicals:

Common Name /Responsibility	**Responsibility**	**Concentration**	**Amount**	**Spill Response**	**Notes**
DNA Away/FOCI	Chief Scientist	100%	1 – 250 ml	Gloves, paper towels, plastic bags	Not a regulated chemical
Ethanol/FOCI	Chief Scientist	100%	4 – 1-gallon plastic jugs	Spill Response E, Gloves, 3M absorbent Pads, Plastic bags	Store in Chem Lab, yellow flammable locker

Common Name /Responsibility	Responsibility	Concentration	Amount	Spill Response	Notes
Ethanol/FOCI	Chief Scientist	100%	12 – 1-liter plastic bottles	Spill Response E, Gloves, 3M absorbent Pads, Plastic bags	Store in Chem Lab, yellow flammable locker
Ethylene Glycol /FOCI	Chief Scientist	100%	1 – 500 ml	Gloves, paper towels, plastic bags	Not a regulated chemical, Store in Spill kit
Formaldehyde /FOCI	Chief Scientist	37%	8 – 2.5 gallon barrels	Spill Control F, Gloves, eye protection, Fan-Pads, Foramalex, PolyForm-F, plastic bags	Store in Fish Lab Flammable cabinets. Will need to place 4 in each cabinet.
Sodium Borate Solution/FOCI	Chief Scientist	5-6%	1 – 5-gallon carboy	Gloves, Paper towels, plastic bags	Not a regulated chemical. Working container will be secured on Fish Lab bench
Sodium Borate Powder/FOCI	Chief Scientist	100%	1 – 500 g	Gloves, wet paper towels, plastic bags	Not a regulated chemical, stored in Spill kit

Common Name /Responsibility	Responsibility	Concentration	Amount	Spill Response	Notes
Glycerol/Thymol Solution/MACE	Chief Scientist	50%	2 – 5 gallon buckets	Gloves, paper towels, Kitty litter, plastic bags	Not a regulated chemical/solution Store in Fish Lab, Under sink

Oxygen Analysis Chemicals, property of PMEL

Common Name	Responsibility	Concentration	Amount	Spill Response	Notes
Manganese Chloride	Chief Scientist	3 M	1 liter	Gloves, Paper Towels, Kitty litter, Plastic bags	Not a regulated chemical /solution.
Potassium Iodate	Chief Scientist	0.00167 M	1 liter	Spill Control PI, Gloves, Kitty litter, Plastic bags	Store in Acid Locker in Chem. Lab.
Sodium Iodide/NaOH Solution	Chief Scientist	4 M NaI, 8 M NaOH	1 liter	Spill Control B	Store in Acid Locker in Chem. Lab.
Sodium Thiosulfate	Chief Scientist	0.11 M	1 liter	Spill Control ST	Store in Acid Locker in Chem. Lab.
Sulfuric Acid	Chief Scientist	5 M	1 liter	Spill Control A	Store in Acid Locker in Chem. Lab.

Lithium Batteries, property of PMEL:

Size	Responsibility	Number	Spill Response	Notes
9V	Chief Scientist	48	NA	In SeaBird and WET Labs instruments
AA	Chief Scientist	77	NA	In SeaBird instruments and MicroCATs Saft LS14500
D	Chief Scientist	6	NA	In RCM9 & Peggy Mooring
DD	Chief Scientist	2 x 12 each	NA	In Argo Floats, stored on after deck, outside
Battery Packs	Chief Scientist	2 x 3 2x1	NA	In Oculus Gliders, 3 packs per glider, store in the gliders on the after deck. Second group in WBATT's
BCX85D	Chief Scientist	3 packs containing 8 cells each for a total of 24 BCX85D cells	NA	In Prowler moored instrument package

UAF Chemicals and Lithium batteries:

Common Name	Responsibility	Concentration	Amount	Spill Response	Notes
Compressed Air	Chief Scientist	Calibration gas used in the CO_2 system on Peggy Buoy	2 tanks (roughly the size of dive tanks)	NA	
Mercuric Chloride	Chief Scientist	Saturated Solution	0.25 liter	Spill Control M	
Lithium D Cell Batteries	Chief Scientist		18	NA	In SEACAT instruments for Peggy Buoy

FOCI Spill Kit Contents:

Common Name	Amount	Use	Total Spill Volume Controllable	Notes
Formalex	1 – 5 gallons 2 – 1 gallon	Formaldehyde cleanup, (all concentrations)	1:1 control	Formalex will be used in conjunction with Fan-Pads to reduce spill volumes.
Fan-Pads	2 rolls (50 sheets per roll)	Formaldehyde cleanup, (all concentrations)	50 sheets = 50 – 150 ml spills	Formalex will be used in conjunction with Fan-Pads to reduce spill volumes.
PolyForm-F	1 – 5-gallon bucket	Formaldehyde cleanup, (all concentrations)	1:1 control	Pour onto large spill immediately to deactivate formaldehyde.

Common Name	Amount	Use	Total Spill Volume Controllable	Notes
3 M Pads	10 pads	Ethanol cleanup	10 pads = 10 – 250 ml spills	Pads may be reused if dried out under fume hood.
Nitrile Gloves	8 pairs each: S,M,L,XL	For all cleanup procedures	NA	Gloves will be restocked by each survey group.
Eye protection	4 pairs goggles,1 face shield	Formaldehyde cleanup	NA	Eye protection will be cleaned before reuse
Tyvex Lab Coats	2 coats	Formaldehyde cleanup	NA	Coats will be cleaned with Fan-Pads and Formalex before reuse.
Plastic Bags	2	Formaldehyde cleanup/Fan-Pads	NA	Bags may be packed full and sealed.

PMEL Acid-Base Spill Kit Contents:

Common Name	Amount	Use	Total Spill Volume Controllable	Notes
Spilfyter Acid Neutralizer	1 Box	Clean up acid spill – H_2SO_4	1.5 liters of 5M Sulfuric Acid	
Spilfyter Base Neutralizer	1 Box	Clean up base spill – NaOH	2.0 liters of NaOH	
Vinyl Gloves	1 box each M, L and XL	Protect hands during all cleanups	NA	
Foxtail/Dust pan	1 each	Pick up absorbed neutralizer	NA	

Common Name	Amount	Use	Total Spill Volume Controllable	Notes
Rubber Apron	1 each	Protect personnel during cleanup	NA	
Paper Towels	1 roll	Absorb small amounts of liquids	NA	
Goggles	2 pair	Protect eyes during cleanups	NA	
Chemical Absorbent (kitty litter)	1 liter	Absorb liquids	0.5 liters	
Plastic Bags	2 each	Contain used absorbents/waste	NA	

C. Chemical safety and spill response procedures

A: ACID

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

B: BASE

- 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 dilute acid such as 10% HCl if possible. Collect in a non-combustible container for prompt disposal.

E: Ethanol

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

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.

M: Mercury

- Spills: Pick up and place in a suitable container for reclamation or disposal in a method that does not generate dust. Sprinkle area with sulfur or calcium polysulfide to suppress mercury. Use Mercury Spill Kit if need be.

PI: Potassium Iodate

- Wear appropriate personal protective equipment.

- Avoid contact with combustibles (wood, paper, clothing, etc.)
- Absorb with kitty litter or vermiculite.
- Do not use combustible materials, such as saw dust.
- Keep substance damp with water spray.
- Vacuum or sweep up material and place into suitable disposable container (plastic bags).

ST: Sodium Thiosulfate

- Ventilate area of leak or spill.
- Wear appropriate personal protective equipment.
- Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.
- Avoid contact with combustibles (wood, paper, clothing, etc.)
- Absorb with kitty litter or vermiculite.
- Do not use combustible materials, such as saw dust.
- Recover liquid or particulate in 5-gallon bucket.

D. Radioactive Materials

No Radioactive Isotopes are planned for this project.

V. Additional Projects

A. Supplementary ("Piggyback") Projects

No Supplementary Projects are planned.

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:

a. OMAO Data

b. Program Data

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

C.

D. 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 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 or Principal Investigator, as appropriate. 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. It is also located at https://docs.google.com/a/noaa.gov/forms/d/1a5hCCkgIwaSII4DmrHPudAehQ9HqhRqY3J_FXqbJp9g/viewform. 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 makeup 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. Unless prior arrangements are made, the science party may move aboard the night before scheduled departure and must move off the ship the day after scheduled arrival (at the end of project). The Chief Scientist/Principal Investigator 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 or Principal Investigator 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.

NHSQs must be submitted every 2 years for individuals under the age of 50 and every 1 year for ages 50 and above. NHSQs must be accompanied by NOAA Form (NF) 57-10-02 - Tuberculosis Screening Document in compliance with OMAO Policy 1008 (Tuberculosis Protection Program, which requires a yearly PPD or TB exam).

The completed forms should be sent to the Marine 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 submission process approved by NOAA is Accellion Secure File Transfer which requires the sender to set up an account using a valid NOAA email address and password. Accellion's Web Users Guide is a valuable aid in using this service. As a cost-reduction measure under the DOC contract with Accellion, user accounts expire after 30 days of inactivity. Simply re-register to send and receive files.

Persons without a NOAA email account must fax or mail their forms.

Contact information:

Marine 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 has increased, on average per ship, to 768 kbs and is shared by all vessel's staff and the science team at no charge to sailing personnel. Increased bandwidth in 7 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.

Computer Operating Systems that the support vendor has identified as reaching "End of Life" for support will not be allowed on the shipboard network. Examples include Microsoft Windows XP and Vista as well as Windows Server 2003.

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.

G. Incidental Take

Summary of mitigation measures for compliance of MMPA and NEPA

These mitigation measures shall include but are not limited to:

- AFSC shall take all necessary measures to coordinate and communicate in advance of each specific survey with the National Oceanic and Atmospheric Administration's (NOAA) Office of Marine and Aviation Operations (OMAO) or other relevant parties on non-NOAA platforms to ensure that all mitigation measures and monitoring requirements described herein, as well as the specific manner of implementation and relevant event-contingent decision-making processes, are clearly understood and agreed upon.
- AFSC shall coordinate and conduct briefings at the outset of each survey and as necessary between ship's crew (Commanding Officer/master or designee(s), as appropriate) and scientific party in order to explain responsibilities, communication procedures, marine mammal monitoring protocol, and operational procedures.
- AFSC shall coordinate as necessary on a daily basis during survey cruises with OMAO personnel or other relevant personnel on non-NOAA platforms to ensure that requirements, procedures, and decision-making processes are understood and properly implemented.
- When deploying any type of sampling gear at sea, AFSC shall at all times monitor for any unusual circumstances that may arise at a sampling site and use best professional judgment to avoid any potential risks to marine mammals during use of all research equipment. AFSC shall convey this requirement to IPHC.
- AFSC shall implement handling and/or disentanglement protocols as specified in the guidance that shall be provided to AFSC survey personnel.
- AFSC shall adhere to a final Communication Plan. In summary and in accordance with the Plan, AFSC shall: (i) notify and provide potentially affected Alaska

Native subsistence communities with the Communication Plan through a series of mailings, direct contacts, and planned meetings throughout the regions where AFSC fisheries research is expected to occur;

- meet with potentially affected subsistence communities to discuss planned activities and to resolve potential conflicts regarding any aspects of either the fisheries research operations or the Communication Plan;
- develop field operations plans as necessary, which shall address how researchers will consult and maintain communication with contacts in the potentially affected subsistence communities when in the field, including a list of local contacts and contact mechanisms, and which shall describe operational procedures and actions planned to avoid or minimize the risk of interactions between AFSC fisheries research and local subsistence activities;
- schedule post-season informational sessions with subsistence contacts from the study areas to brief them on the outcome of the AFSC fisheries research and to assess performance of the Communication Plan and individual field operations or cruise plans in working to minimize effects to subsistence activities

Trawl survey protocols:

- AFSC shall conduct trawl operations as soon as is practicable upon arrival at the sampling station.
- AFSC shall initiate marine mammal watches (visual observation) at least 15 minutes prior to beginning of net deployment, but shall also conduct monitoring during any pre-set activities including trackline reconnaissance, CTD casts, and plankton or bongo net hauls. Marine mammal watches shall be conducted by scanning the surrounding waters with the naked eye and range-finding binoculars (or monocular). During nighttime operations, visual observation shall be conducted using the naked eye and available vessel lighting.
- AFSC shall implement the move-on rule mitigation protocol, as described in this paragraph. If one or more marine mammals are observed and are considered at risk of interacting with the vessel or research gear, or appear to be approaching the vessel and are considered at risk of interaction, AFSC shall either remain onsite or move on to another sampling location. If remaining onsite, the set shall be delayed. If the animals depart or appear to no longer be at risk of interacting with the vessel or gear, a further observation period shall be conducted. If no further observations are made or the animals still do not appear to be at risk of interaction, then the set may be made. If the vessel is moved to a different section of the sampling area, the move-on rule mitigation protocol would begin anew. If, after moving on, marine mammals remain at risk of interaction, the AFSC shall move again or skip the station. Marine mammals that are sighted shall be monitored to determine their position and movement in relation to the vessel to determine whether the move-on rule mitigation protocol should be implemented. AFSC may use best professional judgment in making these decisions.

- AFSC shall maintain visual monitoring effort during the entire period of time that trawl gear is in the water (i.e., throughout gear deployment, fishing, and retrieval). If marine mammals are sighted before the gear is fully removed from the water, AFSC shall take the most appropriate action to avoid marine mammal interaction. AFSC may use best professional judgment in making this decision.
- If trawling operations have been suspended because of the presence of marine mammals, AFSC may resume trawl operations when practicable only when the animals are believed to have departed the area. AFSC may use best professional judgment in making this determination.
- AFSC shall implement standard survey protocols to minimize potential for marine mammal interactions, including maximum tow durations at target depth and maximum tow distance, and shall carefully empty the trawl as quickly as possible upon retrieval.

IX. Appendices

Appendix I – Station List

Appendix II – Mooring Diagrams

Appendix III – The Oculus Coastal Glider

Appendix IV- Argo Floats

Appendix V – Chemical Hygiene Plan

Appendix I: Station List

Note: the locations for the CalVETs and CTD/BON at the locations of the moorings are the actual locations of the moorings; CalVETs and CTDs should be approximately 0.25 nm from the location of the moorings, Bongos adjusted accordingly.

CTD casts will be to 5 meters from the bottom or 1500 meters max.

	Sta. Name	Activity	Water Depth (m)	Lat.dd	Lon.dd
Dutch Harbor	Depart Dutch Harbor	DEPART		53.900	166.545
Unimak Box					
	UBS1	CTD/BON	42	54.441	164.985
	UBS2	CTD/BON	110	54.419	165.141
	UBS3	CTD	203	54.375	165.277
	UBS4	CTD/BON	91	54.342	165.429
	UBW1	CTD/BON	91	54.358	165.929
	UBW2	CTD/BON	511	54.472	166.039
	UBW3	CTD	402	54.583	166.129
	UBW4	CTD/BON	329	54.688	166.237
	UBN1	CTD/BON	183	54.751	166.051
	UBN2	CTD/BON	168	54.813	165.858
	UBN3	CTD	153	54.868	165.671
	UBN4	CTD/BON	139	54.930	165.480
	UBN5	CTD	124	54.987	165.287
	UBN6	CTD/BON	110	55.049	165.107
	UBE1	CTD/BON	88	54.937	164.996
	UBE2	CTD	67	54.827	164.894
	UBE3	CTD/BON	46	54.716	164.784
BS Site 2					

	17BS-2	CTD	70	56.87	164.05
	17BS-2C	Recover Subsurface Mooring	70	56.868	164.055
	17BSP-2B	Recover Subsurface Mooring	70	56.878	164.054
	17BSM-2A	Deploy Surface Mooring	70	56.8	164.0
	17BS-ITAE	Deploy Surface Mooring	70	56.8	164.0
	17BSP-2A	Deploy Subsurface Mooring	70	56.8	164.0
Mooring Site 2 Sampling					
	70M2/M2	3 CalVETs	72	56.87	164.055
	70M2/M2	CTD/BON	72	56.87	164.055
	CTD -M2N	CTD/BON	69	57.017	164.217
	CTD - M2E	CTD/BON	69	56.942	163.834
	CTD -M2S	CTD/BON	72	56.667	163.867
	CTD - M2W	CTD/BON	75	56.767	164.333
70 m isobath					
	70M3	CTD	73	56.808	164.583
	70M4	CTD/BON	72	56.909	164.828
	70M5	CTD	73	56.859	165.123

	70M6	CTD/BON	72	56.994	165.378
	70M7	CTD	70	57.107	165.613
	70M8	CTD/BON	70	57.262	165.747
	70M9	CTD	70	57.321	166.011
	70M10	CTD/BON	70	57.322	166.326
	70M11	CTD	70	57.438	166.513
	70M12	CTD/BON	70	57.429	166.812
	70M13	CTD	70	57.522	167.038
	70M14	CTD/BON	71	57.499	167.344
	70M15	CTD	72	57.501	167.665
	70M16	CTD/BON	71	57.501	167.986
	70M17	CTD	79	57.520	168.304
	70M18	CTD/BON	78	57.524	168.614
Mooring Site 4 Sampling					
	70m19-M4S	CTD/BON	75	57.600	168.700
	CTD - M4E	CTD/BON	74	57.767	168.667
	70M21/M4	3 CalVETs	73	57.87	168.89
	70M21/M4	CTD/BON	73	57.87	168.89
	70M22 - M4W	CTD/BON	71	57.767	169.200
	CTD - M4N	CTD/BON	71	57.917	169.000
	70M23	CTD	70	57.907	169.500
	70M24	CTD/BON	69	58.042	169.673

	70M25	CTD	71	58.147	169.918
	70M26	CTD/BON	72	58.282	170.095
	70M27	CTD	73	58.446	170.186
	70M28	CTD/BON	72	58.617	170.276
	70M29	CTD	71	58.774	170.294
	70M30	CTD/BON	72	58.948	170.327
	70M31	CTD	69	59.107	170.247
	70M32	CTD/BON	68	59.247	170.412
	70M33	CTD	70	59.335	170.656
	70M34	CTD/BON	81	59.436	170.906
	70M35	CTD	80	59.595	170.923
	70M36	CTD/BON	79	59.716	171.140
	70M37	CTD/BON	78	59.777	171.450
Mooring Site 5 Sampling					
	M5E	CTD/BON	81	59.898	171.258
	CTD - M5S	CTD/BON	80	59.700	171.500
	70m38/ M5	3 CalVETs	79	59.91	171.73
	70m38/ M5	CTD/BON	79	59.91	171.73
	70M38 - M5N	CTD/BON	77	60.075	172.000
	70M39 M5W	CTD/BON	76	59.898	172.167
	70M40	CTD/BON	74	59.912	172.435
	70M41	CTD	68	59.978	172.746

St Matthew Island moorings					
	18SM-ITAE	**Deploy mooring**	**70**	**60.03**	**172.79**
	18SM-1A	**Deploy subsurface mooring**	**72**	**60.03**	**172.79**
	18SM-2A	**Deploy Subsurface Mooring**	**72**	**60.18**	**173.42**
	18SM-3A	**Deploy Subsurface Mooring**	**76**	**60.23**	**172.52**
	70M42	**CTD/BON**	**70**	**60.037**	**173.007**
	70M43	**CTD**	**70**	**60.101**	**173.317**
	70M44	**CTD/BON**	**70**	**60.252**	**173.522**
	70M45	**CTD**	**60**	**60.425**	**173.592**
	70M46	**CTD/BON**	**68**	**60.572**	**173.640**
	70M47	**CTD**	**72**	**60.739**	**173.648**
	70M48	**CTD/BON**	**83**	**60.907**	**173.825**
	70M49	**CTD**	**79**	**61.066**	**173.829**
	70M50	**CTD/BON**	**75**	**61.250**	**173.741**
	70M51	**CTD**	**75**	**61.411**	**173.736**
	70M52	**CTD/BON**	**72**	**61.560**	**173.712**
	70M53	**CTD**	**71**	**61.727**	**173.855**
	70M54	**CTD/BON**	**71**	**61.862**	**174.094**

	70M55	CTD	73	61.943	174.364
	70M56	CTD/BON	74	62.027	174.659
	CTD-M8S	CTD/BON	70	61.975	174.617
	M8	CTD/BON	70	62.195	174.666
	M8	CALVETS	70	62.195	174.666
	CTD-M8N	CTD/BON	80	62.422	174.700
	CTD-M8W	CTD/BON	80	62.200	175.200
	CTD-M8E	CTD/BON	70	62.200	174.300
L-Line					
L-Line	LL3	CTD	500	55.372	168.187
L-Line	LL4	CTD	200	55.441	168.141
L-Line	LL5	CTD	1500	55.115	168.483
L-Line	LL6	CTD	1500	54.837	168.745
L-Line	LL7	CTD	1500	54.667	169.203
L-Line	DL7/LL8	CTD	1500	54.350	169.833
L-Line	DL6/LL9	CTD	1500	54.037	169.560
L-Line	DL5/LL10	CTD	1575	53.783	169.267
L-Line	DL4/LL11	CTD	1500	53.603	169.062
L-Line	DL3/LL12	CTD	1500	53.520	168.903
L-Line	DL2/LL13	CTD	1000	53.410	168.835
L-Line	DL1/LL15	CTD	1500	53.368	168.692
Argo Floats					

A-Float	**A1**	**Deploy Float**	**2366**	**55.047**	**168.913**
A-Float	**A2**	**Deploy Float**	**2895**	**54.668**	**169.506**
Umnak Island					
	17M^3-1	**Recover Marine Mammal Mooring**	**100**	**53.632**	**167.393**
	18M^3-1	**Deploy Marine Mammal Mooring**	**100**	**53.632**	**167.393**
Samalga Pass					
	17M^3-2	**Deploy Marine Mammal Mooring**	**130**	**53.14**	**168.93**
Bering Canyon Transects					
Bering Canyon Transects	**UT5**	**CTD**	**100**	**53.978**	**166.976**
	UT4	**CTD**	**1300**	**54.085**	**167.067**
	UT3	**CTD**	**1700**	**54.175**	**167.150**
	UT2	**CTD**	**1100**	**54.322**	**167.267**
	UT1	**CTD**	**650**	**54.452**	**167.380**
	AW5	**CTD**	**550**	**54.458**	**166.938**

	AW4	**CTD**	**750**	**54.320**	**166.818**
	AW3	**CTD**	**1350**	**54.205**	**166.710**
	AW2	**CTD**	**900**	**54.140**	**166.652**
	AW1	**CTD**	**100**	**54.072**	**166.620**
	AE1	**CTD**	**90**	**54.168**	**166.233**
	AE2	**CTD**	**700**	**54.233**	**166.263**
	AE3	**CTD**	**900**	**54.305**	**166.350**
	AE4	**CTD**	**550**	**54.437**	**166.480**
	AE5	**CTD**	**450**	**54.562**	**166.593**
	UBW4	**CTD**	**300**	**54.688**	**166.237**
	UBW3	**CTD**	**400**	**54.583**	**166.129**
	UBW2	**CTD**	**500**	**54.472**	**166.039**
	UBW1	**CTD**	**460**	**54.358**	**165.929**
	UBW0	**CTD**	**110**	**54.310**	**165.883**
	Arrive Dutch Harbor	**ARRIVE!**	**650**	**53.900**	**166.545**

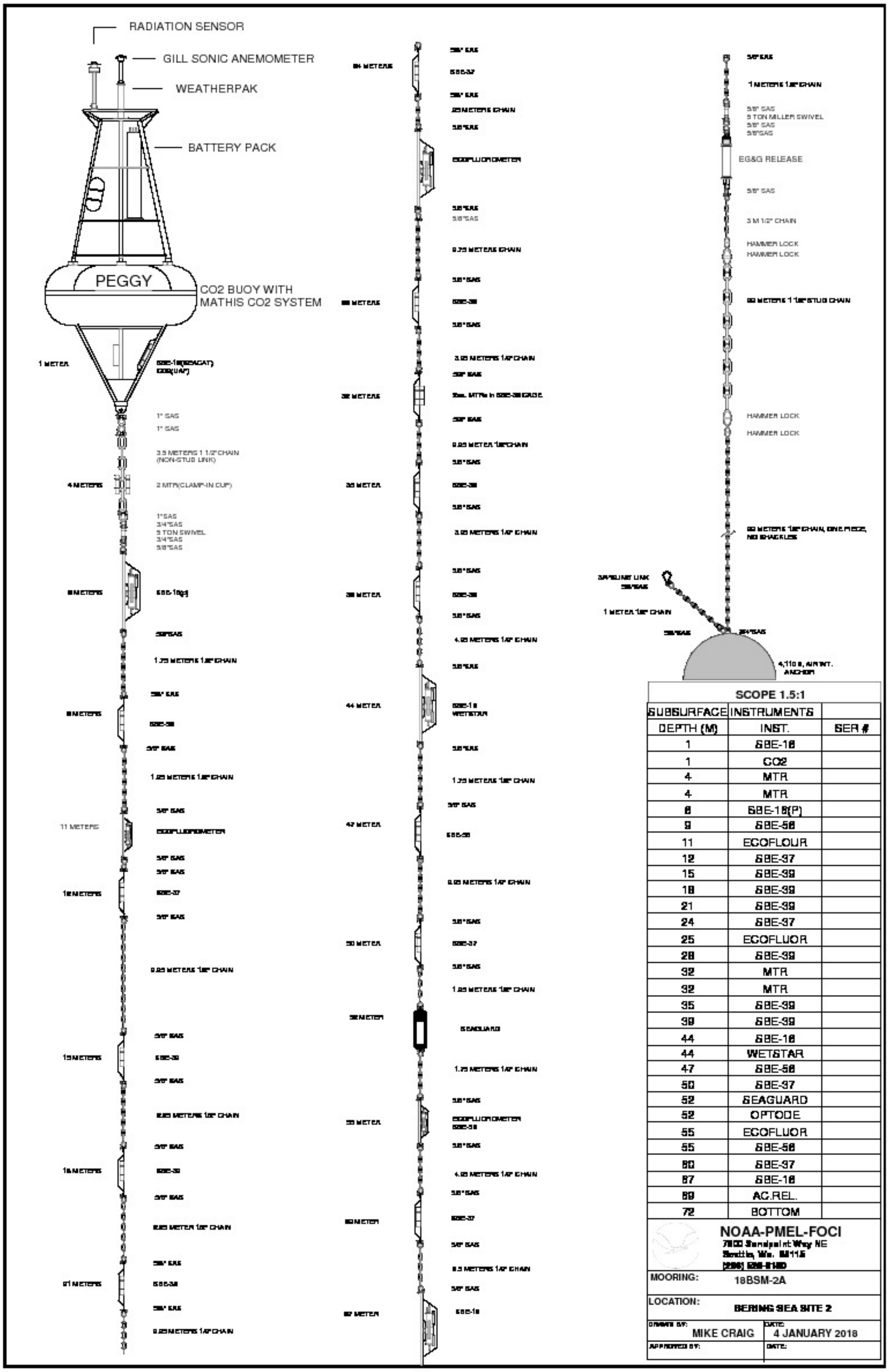
70m Line	0-100m	0-200m	0-500m	0-1000m	0-1500m
Surface	Surface	Surface	Surface	Surface	Surface
10	10	10	10	10	10
20	20	20	20	20	20
30	30	30	30	30	30
40	40	40	40	40	40
50	50	50	50	50	50
70	75	75	75	75	75

	Bottom	100	100	100	100
		125	150	300	500
		150	200	500	1000
		Bottom	Bottom	Bottom	Bottom

Conduct all CTDs to within 5 meters of the bottom, or 1500 meters if depth is greater than 1500 meters. If sea conditions are rough, the maximum depth may be adjusted to only go to 10 meters above the bottom.

Winch speeds should be 30 meters/minute on the down cast and up cast when below 200 meters. At depths below 200 meters the winch speed may be increased to a higher rate, usually what the ship deems a safe operating speed. When operating at higher speeds, it is prudent to have the winch operator slow the speed of the winch to 30 meters/minute about 50 meters before the required stop depth. This should be done on both the down cast when approaching maximum depth, and on the up cast when approaching Niskin trip depth.

Appendix II: Mooring Diagrams



SCOPE 1.5:1

SUBSURFACE	INSTRUMENTS	
DEPTH (M)	INST.	SER #
1	SBE-16	
1	CO2	
4	MTR	
4	MTR	
6	SBE-16(P)	
9	SBE-56	
11	ECOFLOUR	
12	SBE-37	
15	SBE-39	
18	SBE-39	
21	SBE-39	
24	SBE-37	
25	ECOFLUOR	
28	SBE-39	
32	MTR	
32	MTR	
35	SBE-39	
39	SBE-39	
44	SBE-16	
44	WETSTAR	
47	SBE-56	
50	SBE-37	
52	SEAGUARD	
52	OPTODE	
55	ECOFLUOR	
55	SBE-56	
60	SBE-37	
67	SBE-16	
69	AC.REL.	
72	BOTTOM	

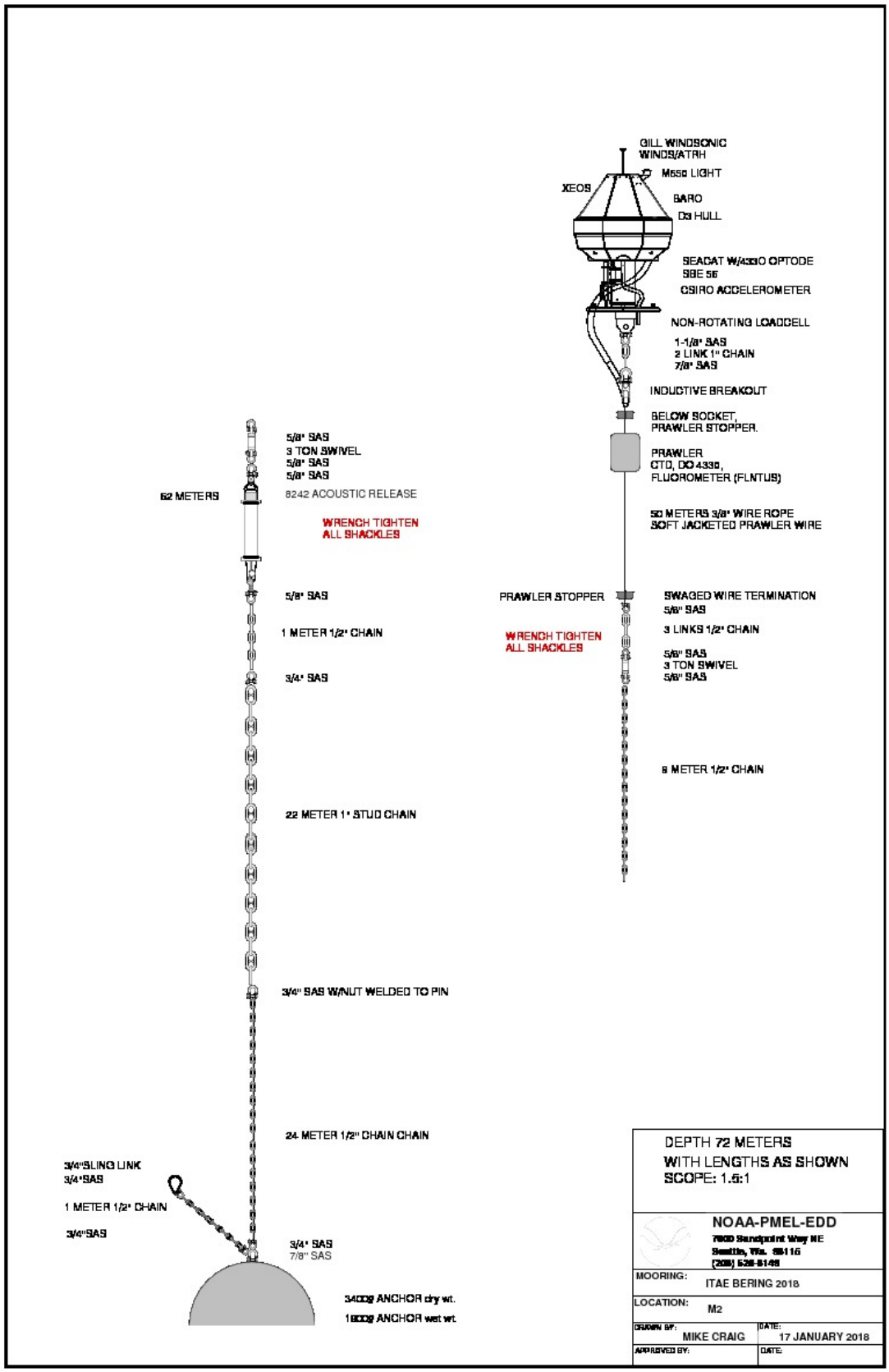
NOAA-PMEL-FOCI
7600 Sandpoint Way NE
Seattle, Wa. 98115
(206) 526-6180

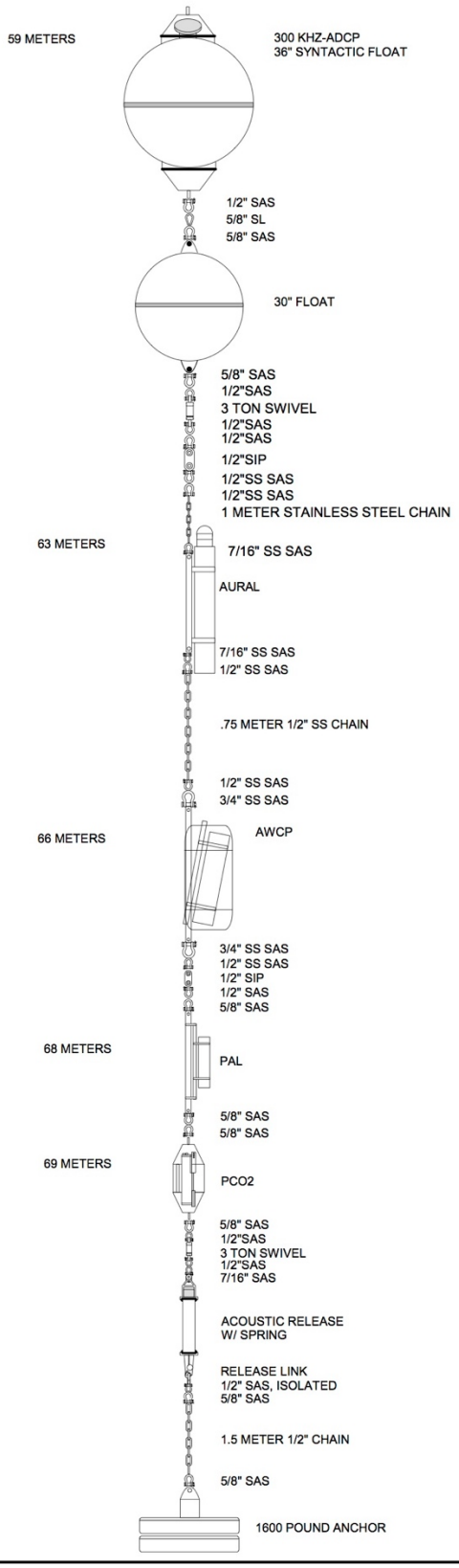
MOORING: 18BSM-2A

LOCATION: BERING SEA SITE 2

DRAWN BY: MIKE CRAIG | DATE: 4 JANUARY 2018

APPROVED BY: | DATE:


GILL WINDSONIC
WINDS/ATRH
M650 LIGHT
XEOS
BARO
D3 HULL
SEACAT W/4330 OPTODE
SBE 56
CSIRO ACCELEROMETER
NON-ROTATING LOADCELL
1-1/8" SAS
2 LINK 1" CHAIN
7/8" SAS
INDUCTIVE BREAKOUT
BELOW SOCKET,
PRAWLER STOPPER.
PRAWLER
CTD, DO 4330,
FLUOROMETER (FLNTUS)
50 METERS 3/8" WIRE ROPE
SOFT JACKETED PRAWLER WIRE
PRAWLER STOPPER
SWAGED WIRE TERMINATION
5/8" SAS
3 LINKS 1/2" CHAIN
5/8" SAS
3 TON SWIVEL
5/8" SAS
WRENCH TIGHTEN
ALL SHACKLES
8 METER 1/2" CHAIN
5/8" SAS
3 TON SWIVEL
5/8" SAS
5/8" SAS
62 METERS
8242 ACOUSTIC RELEASE
WRENCH TIGHTEN
ALL SHACKLES
5/8" SAS
1 METER 1/2" CHAIN
3/4" SAS
22 METER 1" STUD CHAIN
3/4" SAS W/NUT WELDED TO PIN
24 METER 1/2" CHAIN CHAIN
3/4"SLING LINK
3/4"SAS
1 METER 1/2" CHAIN
3/4"SAS
3/4" SAS
7/8" SAS
3400g ANCHOR dry wt.
1800g ANCHOR wet wt.
DEPTH 72 METERS
WITH LENGTHS AS SHOWN
SCOPE: 1.5:1
NOAA-PMEL-EDD
7600 Sandpoint Way NE
Seattle, Wa. 98115
(206) 526-6148
MOORING: ITAE BERING 2018
LOCATION: M2
DRAWN BY: MIKE CRAIG
DATE: 17 JANUARY 2018
APPROVED BY:
DATE:



INSTRUMENT	DEPTH M	SERIAL NO.
300 KHZ ADCP	59	
AURAL	63	
AWCP	66	
PAL	68	
PCO2	69	
BOTTOM	72	

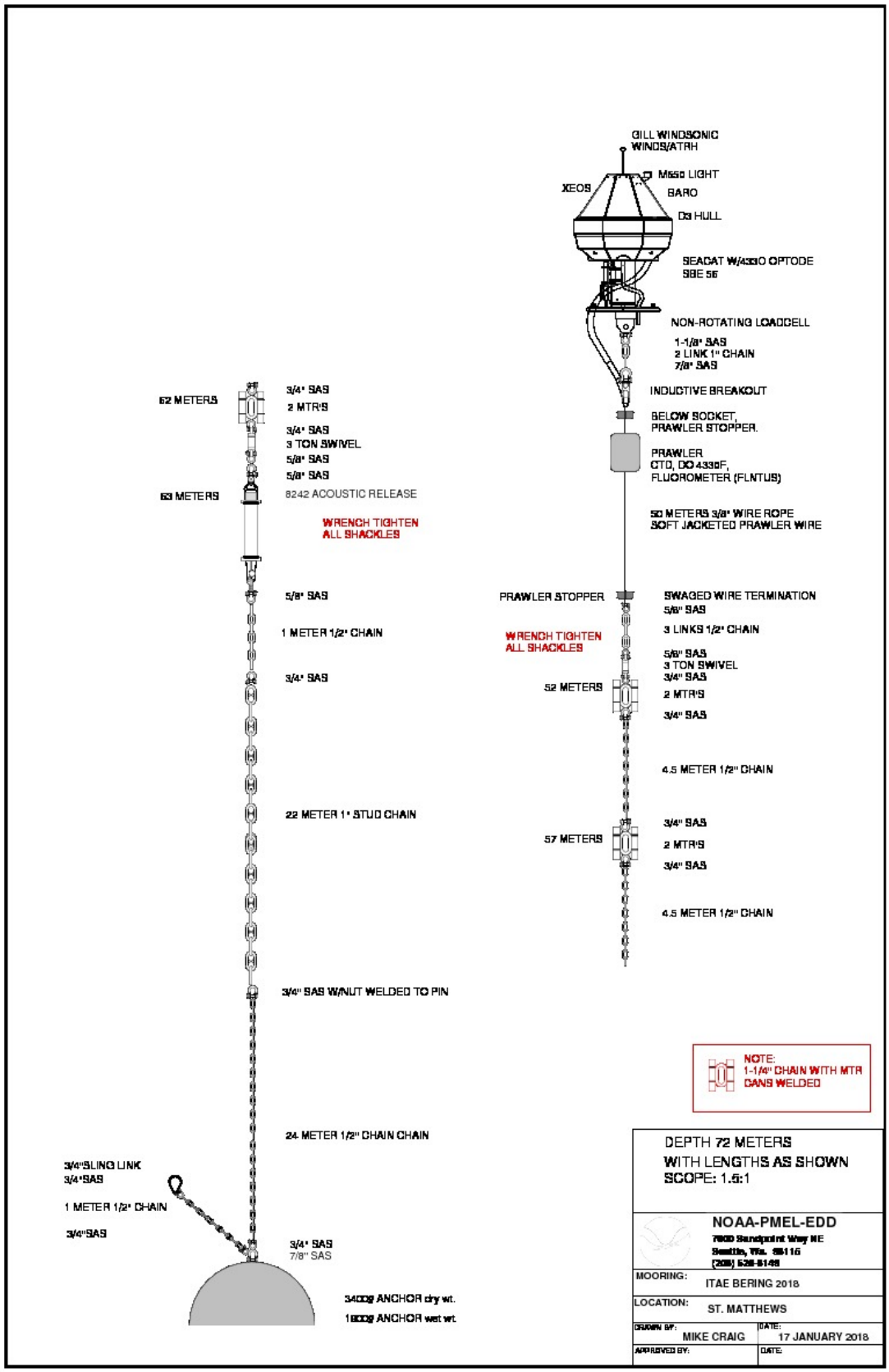
NOAA-PMEL-FOCI
7600 Sandpoint Way NE
Seattle, Wa. 98115
(206) 526-6180

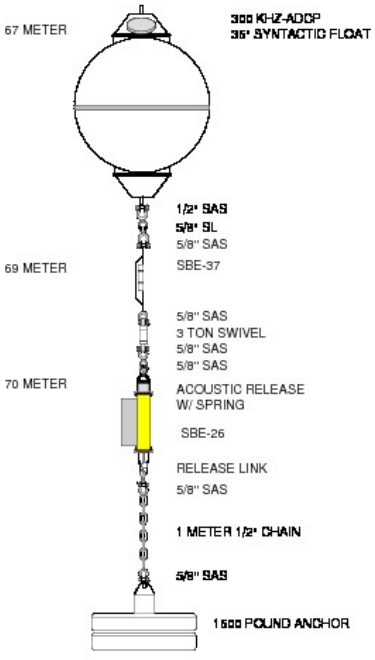
MOORING: 18BSP-2A

LOCATION: BERING SEA, SITE 2

DRAWN BY: Mike Craig — DATE: 11 DECEMBER 2017

APPROVED BY: — DATE:


GILL WINDSONIC
WINDS/ATRH
XEOS
Mass LIGHT
BARO
Dss HULL
SEACAT W/4330 OPTODE
SBE 56
NON-ROTATING LOADCELL
1-1/8" SAS
2 LINK 1" CHAIN
7/8" SAS
INDUCTIVE BREAKOUT
BELOW SOCKET,
PRAWLER STOPPER.
PRAWLER
CTD, DO 4330F,
FLUOROMETER (FLNTUS)
50 METERS 3/8" WIRE ROPE
SOFT JACKETED PRAWLER WIRE
PRAWLER STOPPER
SWAGED WIRE TERMINATION
5/8" SAS
3 LINKS 1/2" CHAIN
WRENCH TIGHTEN
ALL SHACKLES
5/8" SAS
3 TON SWIVEL
3/4" SAS
52 METERS
2 MTR'S
3/4" SAS
4.5 METER 1/2" CHAIN
3/4" SAS
57 METERS
2 MTR'S
3/4" SAS
4.5 METER 1/2" CHAIN
62 METERS
3/4" SAS
2 MTR'S
3/4" SAS
3 TON SWIVEL
5/8" SAS
5/8" SAS
63 METERS
8242 ACOUSTIC RELEASE
WRENCH TIGHTEN
ALL SHACKLES
5/8" SAS
1 METER 1/2" CHAIN
3/4" SAS
22 METER 1" STUD CHAIN
3/4" SAS W/NUT WELDED TO PIN
24 METER 1/2" CHAIN CHAIN
3/4"SLING LINK
3/4"SAS
1 METER 1/2" CHAIN
3/4"SAS
3/4" SAS
7/8" SAS
3400g ANCHOR dry wt.
1800g ANCHOR wet wt.
NOTE:
1-1/4" CHAIN WITH MTR
CANS WELDED
DEPTH 72 METERS
WITH LENGTHS AS SHOWN
SCOPE: 1.5:1
NOAA-PMEL-EDD
7600 Sandpoint Way NE
Seattle, Wa. 98115
(206) 526-6148
MOORING: ITAE BERING 2018
LOCATION: ST. MATTHEWS
DRAWN BY: MIKE CRAIG
DATE: 17 JANUARY 2018
APPROVED BY:
DATE:



INSTRUMENT	DEPTH M	SERIAL NO.
300 KHZ ADCP	67	
SBE-37	69	
SBE-26	70	
RELEASE	70	
BOTTOM	72	

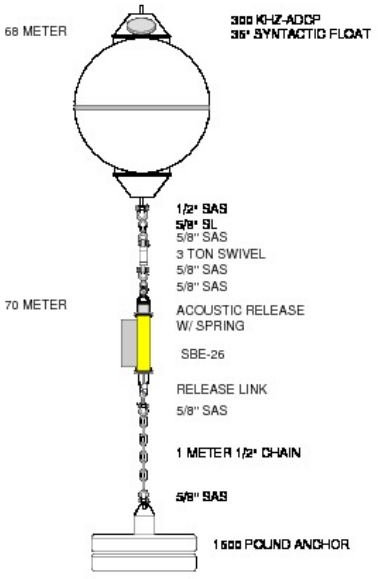
NOAA-PMEL-FOCI
7600 Sandpoint Way NE
Seattle, Wa. 98115
(206) 526-6150

MOORING: 16MTP-1A

LOCATION: ST. MATTHEWS

DRAWN BY: Mike Craig | DATE: 11 JANUARY 2016

APPROVED BY: | DATE:



INSTRUMENT	DEPTH M	SERIAL NO.
300 KHZ ADCP	66	
SBE-26	70	
RELEASE	70	
BOTTOM	72	

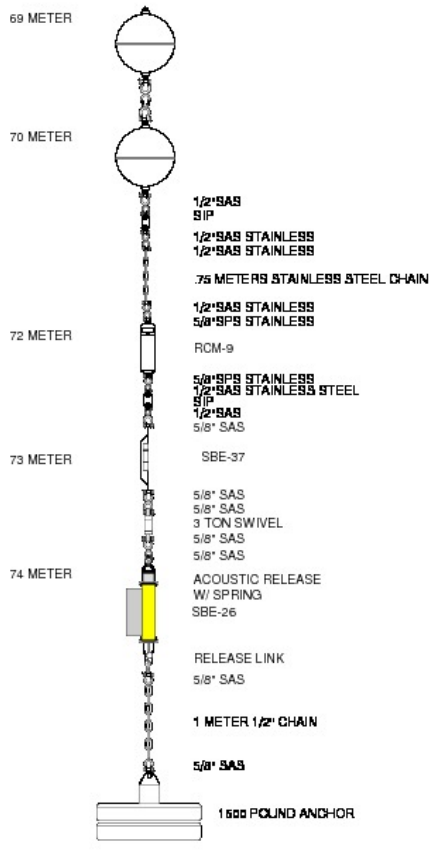
NOAA-PMEL-FOCI
7600 Sandpoint Way NE
Seattle, Wa. 98115
(206) 526-6150

MOORING: 16MTP-2A

LOCATION: ST. MATTHEWS

DRAWN BY: Mike Craig | DATE: 11 JANUARY 2016

APPROVED BY: | DATE:



INSTRUMENT	DEPTH M	SERIAL NO.
RCM-9	72	
OPTODE	72	
NEPHYLOMETER	72	
SBE-37	73	
SBE-26	74	
RELEASE	74	
BOTTOM	75	

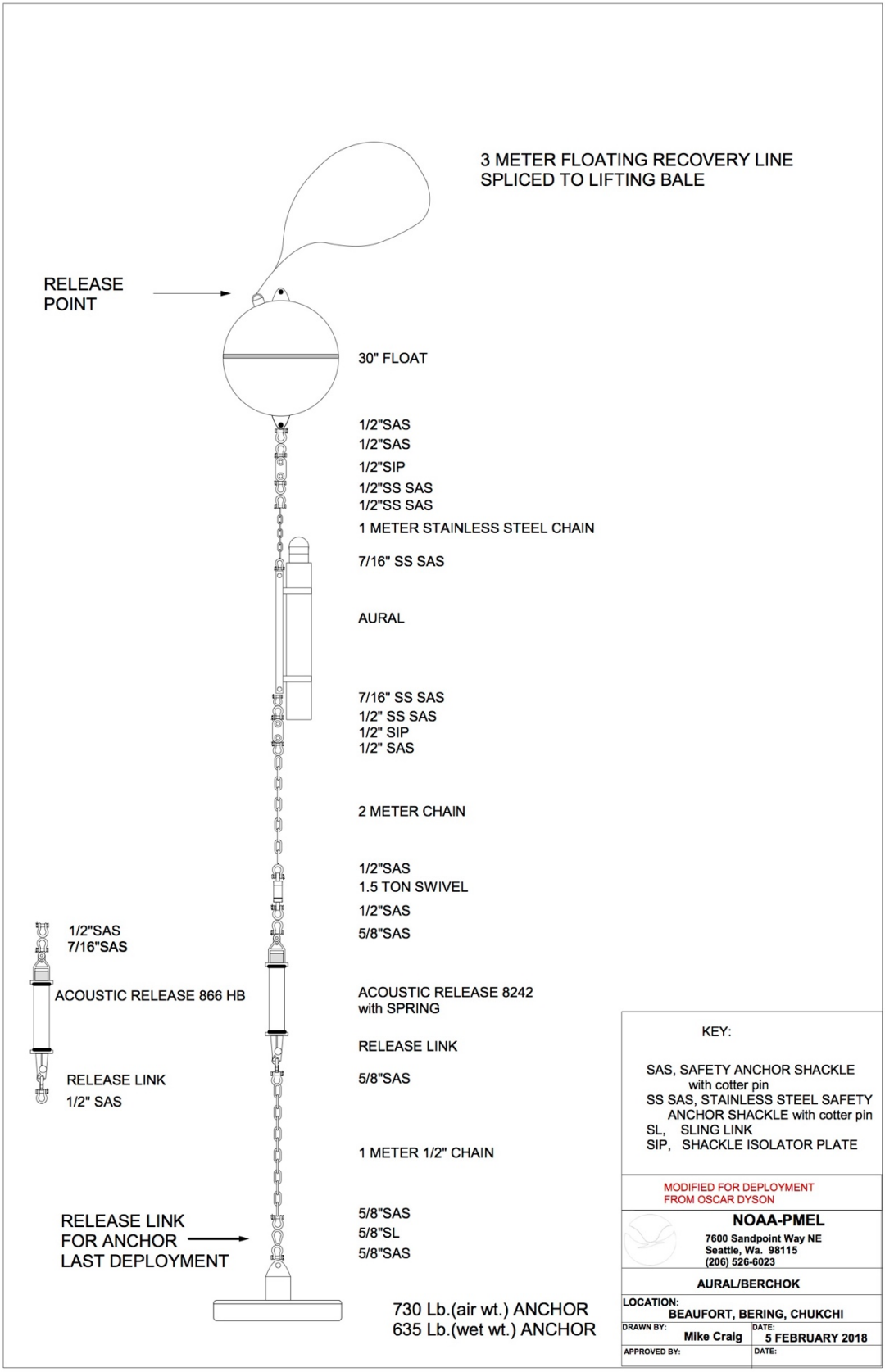
NOAA-PMEL-FOCI
7600 Sandpoint Way NE
Seattle, Wa. 98115
(206) 526-6150

MOORING: 18MT-3A

LOCATION: ST. MATTHEWS

DRAWN BY: Mike Craig | DATE: 11 JANUARY 2018

APPROVED BY: | DATE:


3 METER FLOATING RECOVERY LINE
SPLICED TO LIFTING BALE
RELEASE
POINT
30" FLOAT
1/2"SAS
1/2"SAS
1/2"SIP
1/2"SS SAS
1/2"SS SAS
1 METER STAINLESS STEEL CHAIN
7/16" SS SAS
AURAL
7/16" SS SAS
1/2" SS SAS
1/2" SIP
1/2" SAS
2 METER CHAIN
1/2"SAS
1.5 TON SWIVEL
1/2"SAS
5/8"SAS
1/2"SAS
7/16"SAS
ACOUSTIC RELEASE 866 HB
ACOUSTIC RELEASE 8242
with SPRING
RELEASE LINK
5/8"SAS
RELEASE LINK
1/2" SAS
1 METER 1/2" CHAIN
5/8"SAS
5/8"SL
5/8"SAS
RELEASE LINK
FOR ANCHOR
LAST DEPLOYMENT
730 Lb.(air wt.) ANCHOR
635 Lb.(wet wt.) ANCHOR
KEY:
SAS, SAFETY ANCHOR SHACKLE
with cotter pin
SS SAS, STAINLESS STEEL SAFETY
ANCHOR SHACKLE with cotter pin
SL, SLING LINK
SIP, SHACKLE ISOLATOR PLATE
MODIFIED FOR DEPLOYMENT
FROM OSCAR DYSON
NOAA-PMEL
7600 Sandpoint Way NE
Seattle, Wa. 98115
(206) 526-6023
AURAL/BERCHOK
LOCATION:
BEAUFORT, BERING, CHUKCHI
DRAWN BY:
Mike Craig
DATE:
5 FEBRUARY 2018
APPROVED BY:
DATE:

Appendix III: Oculus Coastal Glider

The Oculus Coastal Glider in its cradle

The Oculus coastal glider is an autonomous underwater vehicle (AUV) catered to the shallow depths of the Arctic. By using a rapid buoyancy system this glider can change buoyancy states 20 times faster and achieve speeds 3 times faster than legacy gliders - allowing for a more efficient and adaptive Arctic survey, but transferable to a variety of markets. We anticipate the Oculus to be field tested in the spring of 2017 on NOAA Ship Oscar Dyson.

The vehicle moves through the water in a saw-tooth like pattern and surfaces often to determine its position. Navigation is accomplished using a combination of GPS fixes while on the surface and internal

sensors that monitor the vehicle heading, depth and attitude during dives. External sensors are constantly scanning the ocean to determine environmental properties.

Technical Specifications:

Weight and Dimensions

- Length: 2.1 meters
- Diameter: 11.675 inches
- Weight: 70 kg

Shipping and Storage

- 2-4 boxes of 92x24x24
- Weight: ~200 lbs

Battery

- **1** - 4.4 MJ
- **2** - 'science batteries' at 3.9 MJ each
- **1** - main 24-volt battery at 12.2 MJ

Deployment:

The Oculus coastal glider will be deployed similarly to legacy gliders. Small boat operations are the preferred method by which to do this, not only for vehicle but personnel safety. Each glider will be packaged in a stretcher/cradle for ease of deployment, mobility to and from deployment/recovery point, and safety. Though not preferred, the Oculus glider, like legacy gliders, can be deployed and recovered from the R/V using standard lifting procedures and an additional 'lasso' to ensure safety of the glider and crew. The lifting point is under two black 'wings' in the tail section. Please see photos below as an example from a test mission in Lake Washington.

Appendix IV: Argo Floats

SEA-BIRD SCIENTIFIC

sea-birdscientific.com
info@sea-birdscientific.com

Navis
Autonomous Profiling Float

The Navis float has a traditional layout, with the sensor head at the top, and the buoyancy bladders at the bottom. The Navis buoyancy engine uses a positive displacement piston pump to transfer silicon oil from internal to external reservoirs to increase the float volume and cause it to rise. This system provides improved energy efficiency, better parking stability, and increased depth range over existing floats.

The Navis buoyancy engine is augmented at the sea surface by inflation of an air reservoir. This surface-following function provides excess buoyancy to improve surface communications. The open-loop air buoyancy system uses a seamless, natural-rubber, external bladder and oil-augmented bladder crush prevention.

At the surface, Navis uses a Garmin 15xL-W GPS to acquire positional information. It then transmits the acquired data via an Iridium Transceiver 9523. The Iridium antenna is mounted on the CTD end cap, and is supported by the CTD cell guard.

The Navis aluminum hull has a smaller diameter and length than existing floats, providing a lightweight and cost-effective package that requires less energy to operate. The float is powered by twelve lithium DD batteries in a Sea-Bird battery pack. The battery pack provides sufficient power for 300 CTD profile cycles to 2000 dbars.

Features

- Sufficient power for 300 CTD profile cycles to 2000 dbars.
- SBE 41CP CTD; Argo standard
  - Pump-controlled, T-C ducted flow minimizes salinity spiking
  - Anti-foulant devices provide effective bio-fouling protection
- Iridium continuous circuit switched, 2-way communications for low-cost download of large amounts of data
- Self-ballasting, 1 day to equilibrate; ballasting and setup done at Sea-Bird prior to shipment
- Easy-to-use interface for mission programming, and for reprogramming while deployed
- Firmware based on field-proven Argo firmware
- Lightweight and easy to deploy (< 18.5 kg)
- Expandable and scalable design for future missions, such as biogeochemical floats, deep floats
- Warranty — 100 profiles at 100% of purchase price, pro-rated thereafter

www.seabird.com sales@seabird.com 425-643-9866

SBE Sea-Bird Electronics

CTD Operation

The SBE 41CP CTD measures temperature, conductivity, and pressure continuously at 1 Hz through ascent and provides high accuracy, resolution, and stability. The pump-controlled, T-C ducted flow configuration minimizes salinity spiking caused by mismatch of temperature and conductivity measurements. The carefully engineered anti-foul protection includes anti-foulant devices, a U-shaped flow path, and an integral pump. On the float's ascent, as it approaches 10 to 5 dbars beneath the ocean surface, the pump turns off. The U-shaped flow path prevents sea surface oils and contaminants from being ingested while proceeding through the ocean surface skin and sitting at the surface during data transmittal. Between profiles, the pump is off. The U-shaped flow path prevents water flow through the system caused by waves or currents; minute amounts of anti-foulant concentrate inside the conductivity cell to minimize bio-fouling.

Science Data (SBE 41CP CTD)

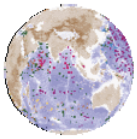
Temperature	Initial accuracy ± 0.002 °C; Stability 0.0002 °C/year
Salinity	Initial accuracy ± 0.002 PSS-78; Stability 0.001 PSS-78/year
Pressure	Initial accuracy ± 2 decibars; Stability 0.8 decibars/year

Float Operation

Depth Rating	2000 decibars
Communications	Iridium Transceiver 9523 — RUDICS, circuit switched
Position	GPS, Garmin 15xL-W
Park Interval	1 - 15 days
Materials	Aluminum hull, seamless natural-rubber external bladders
Ballasting	Self-ballasting, 1 day to equilibrate
Weight in air	Less than 18.5 kg
Self-Activation	Starts operating automatically on deployment, when pressure reaches user-programmable setpoint
Internal batteries	4 packs of 3 DD lithium sulfuryl chloride cells (cannot ship in passenger aircraft; Class 9 Dangerous Goods).
Power Endurance	10 years or 300 2000-dbar cycles
Memory	CTD stores one 2000-dbar CTD profile; Navis stores 64 2000-dbar CTD profiles
Dimensions	Hull diameter 14 cm, Ring diameter 24 cm, Total length 159 cm

SEA-BIRD SCIENTIFIC

Sea-Bird Electronics
+1 425-643-9866
sales@seabird.com

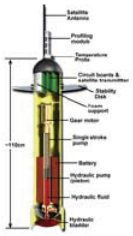


Argo

How Argo floats work

part of the integrated global observation strategy

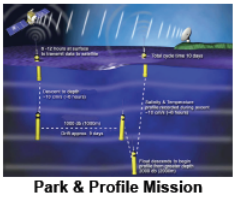
Home
About Argo
Argo data
Uses of Argo data
Media Center
Documents
Argo Steering Team
Meetings
Links
Google Earth layer
FAQ
Data FAQ
Contact
Site Map



Float Design

Argo Floats

Argo is an international collaboration that collects high-quality temperature and salinity profiles from the upper 2000m of the ice-free global ocean and currents from intermediate depths. The data come from battery-powered autonomous **floats** that spend most of their life drifting at depth where they are stabilised by being neutrally buoyant at the "parking depth" pressure by having a density equal to the ambient pressure and a compressibility that is less than that of sea water. At present there are several models of profiling float used in Argo. All work in a similar fashion but differ somewhat in their design characteristics. At typically 10-day intervals, the floats pump fluid into an external bladder and rise to the surface over about 6 hours while measuring temperature and salinity. Satellites or GPS determine the position of the floats when they surface, and the floats transmit their data to the satellites. The bladder then deflates and the float returns to its original density and sinks to drift until the cycle is repeated. Floats are designed to make about 150 such cycles.



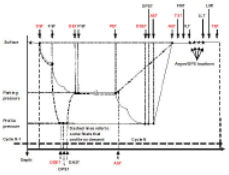
Park & Profile Mission Operation

Argo Mission

The standard Argo mission is a **park and profile mission** where the float descends to a target depth of 1000m to drift and then descends again to 2000m to start the temperature and salinity profile. In 2015, 80% of floats profile to depths greater than 1500m. Another 12% profile to between 1000 and 1500m.

Argo Cycle Timing Variables

Each Argo float cycle is composed of programmed events. Depending on float type, some of these events can be dated and sent back by the float to aid in the calculation of velocities. The Argo Program has highlighted several cycle timing variables that it would prefer that floats send back timing information. This **cycle timing document** explains the variables and how they fit into the trajectory file.



Argo Cycle Timing Variables

Argo Float Models

The Argo array is currently comprised of several float models:

- the **PROVOR** and the new generation PROVOR, the **ARVOR** built by NKE-INSTRUMENTATION in France in close collaboration with IFREMER
- the **APEX** float produced by Teledyne Webb Research
- the **SOLO** and the new generation SOLO, the **SOLO-II** float designed and built by Scripps Institution of Oceanography
- the **S2A** float is produced by MRV Systems in the USA who bought the rights to the SOLO-II and manufactures it under the rebranded name of the S2A float
- the **NAVIS** built by Sea-Bird in the USA

The **SBE** temperature/salinity sensor suites is now used almost exclusively. In the beginning, the **FSI** sensor was also used. The temperature data are accurate to a few millidegrees over the float lifetime. For discussion of salinity data accuracy please see the **Data FAQ**.

Argo Data Transmission

As the float ascends, a series of about 200 pressure, temperature, salinity measurements are made and stored on board the float. These are transmitted to satellites when the float reaches the surface. For floats using high speed communications with more bandwidth capabilities, measurements are taken more frequently, often up to every 2db, resulting in several hundred measurements per profile.

For 60% of floats in the Argo array the data are transmitted from the ocean surface via the **Système Argos** location and data transmission system. The data transmission rates are such that to guarantee error free data reception and location in all weather conditions the float must spend between 6 and 12 hrs at the surface. Positions are accurate to ~100m depending on the number of satellites within range and the geometry of their distribution.

An alternative system to Argos using positions from the Global Positioning System (GPS) and data communication using the **Iridium** satellites now comprises 40% of the Argo array. Iridium is becoming a more attractive option as it allows more detailed profiles to be transmitted with a shorter period at the surface and two-way communication with the float. In 2014, 55% of floats were been deployed with Iridium antennas and 45% with Argos antennas.

As noted above, an Argo float weighs less than 40 pounds in air. Launching is relatively straight forward with two persons handling a line fed through a hole in the collar of the float. Once the ship has come to about 1-2 knots the float is lowered over the side and the line retrieved. Position of the release is marked on the ships SCS system, usually via a button on the CTD computer. The float will self-actuate when it reaches its programmed depth.

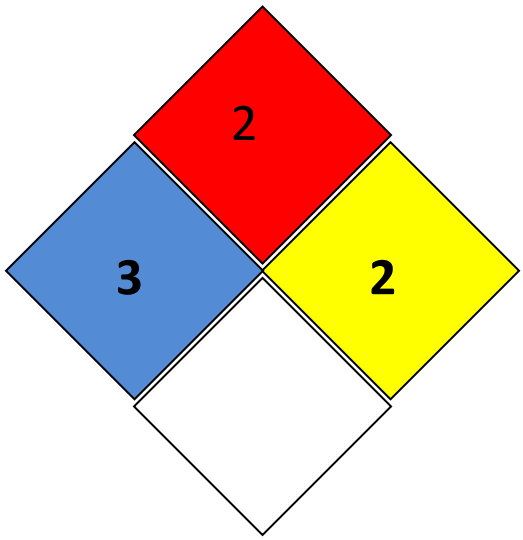
Appendix V – Chemical Hygiene Plan

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

The scientific chemicals to be used for this project are: (1) ethyl alcohol (100%) and (2) formaldehyde (37%) and reagent chemicals for the preservation and analysis of oxygen samples. 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 towed zooplankton nets (bongos and CalVETs) as described in the Operations section of these Project Instructions and for the pickling and analysis of oxygen samples for calibration of the oxygen sensors on the CTD. Use of these chemicals and the specified dilutions will only occur in exterior locations on the ship away from air intakes. Scientific chemicals shall not be disposed over the side.

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

Standard Operating Procedures – Formaldehyde At-Sea



Chemical Name: 37% Formaldehyde

UN Number: 1198

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

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

Reactivity (yellow): 2 Special (white):

Personal Protection Gear Needed

*gloves

*goggles or face shield

Special Handling Instructions

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

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

First Aid

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

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

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

Spill Cleanup Procedures

For small spills (500-1000 ml):

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 ml):

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 (x101).

Deactivation/Disposal Procedures at Sea

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

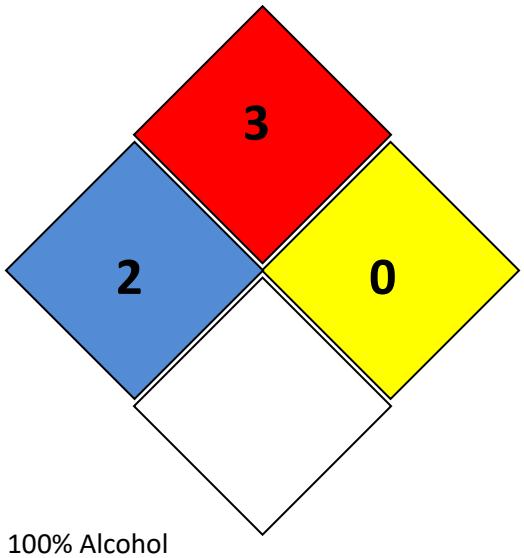
*Fan Pads may be used to absorb small spills alone but these pads work best when used with Formalex to immediately control the vapor layer.

Shipping Procedures and Restrictions

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

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

Standard Operating Procedures – Ethanol At-Sea



Chemical Name: 100% Alcohol

UN Number: 1170

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

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

Reactivity (yellow): 1 Special (white):

Personal Protection Gear Needed

*gloves

*goggles or face shield when pouring

Special Handling Instructions

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

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

First Aid

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

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

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

Spill Cleanup Procedures

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

Deactivation/Disposal Procedures at Sea

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

Shipping Procedures and Restrictions

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