



UNITED STATES DEPARTMENT OF COMMERCE

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

September 23, 2016

MEMORANDUM FOR: Commander William Mowitt, NOAA
Commanding Officer, NOAA Ship *Pisces*

FROM: Captain Scott M. Sirois, NOAA
Commanding Officer, NOAA Marine Operations Center-Atlantic

SUBJECT: Project Instruction for PC-16-08
UMOOS/NERACOOS Gulf of Maine Buoy Array Service, Survey
and Glider Deployment

Attached is the final Project Instruction for PC-16-08, Gulf of Maine Buoy Array Service, Survey and Glider Deployment, which is scheduled aboard NOAA Ship *Pisces* during the period of October 4- October 14, 2016. Of the 11 DAS scheduled for this project, 11 days are funded by a Line Office Allocation. This project is estimated to exhibit a Medium Operational Tempo. Acknowledge receipt of these instructions via e-mail to OpsMgr.MOA@noaa.gov at Marine Operations Center-Atlantic.





UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northeast Fisheries Science Center
166 Water Street
Woods Hole, MA 02543-1026

Final Project Instructions

Date Submitted: September 22, 2016

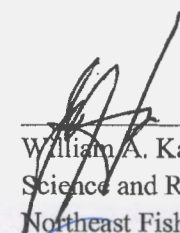
Platform: NOAA Ship *Pisces*

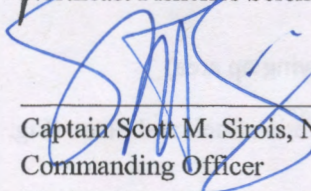
Project Number: PC 16-08

Project Title: UMOOS/NERACOOS Gulf of Maine buoy array service, survey, and glider deployment.

Project Dates: October 4 – 14, 2016

Prepared by: Neal R Pettigrew Dated: __September 2, 2016
Chief Scientist
Affiliation (Physical Oceanography Group, University of Maine)

Approved by:  for Bill Karp Dated: 22 Sept 2016
William A. Karp, Ph.D.
Science and Research Director
Northeast Fisheries Science Center

Approved by:  Dated: 9/23/16
Captain Scott M. Sirois, NOAA
Commanding Officer
Marine Operations Center - Atlantic

I. Overview

A. Brief Summary and Project Period

The UMOOS/NERACOOS project has three sections:

1) Service of the UMOOS/NERACOOS Real-time data buoy arrays (F, I, M). The currently deployed buoys I and M will be recovered and replaced with 2 buoys that will have been prepared at the University of Maine. Buoy F will be serviced only - not replaced. (See Appendix A Fig. 1 for buoy locations). We may need the use of a boat to connect a winch to the buoys if hooking the buoys from the ship is difficult. (See Appendix B for buoy mooring schematics and images)

2) Shipboard surveys using the 911 CTD system to which 12 UMaine water bottles will be attached to the CTD carousel, as will a turbidity sensor, a fluorescence sensor, and a UMaine SUNA nitrate sensor. (See Appendix A Fig. 1 for survey transects). Before the cruise the University of Maine staff may attempt to attach an ADCP to the CTD to use as a LADCP. The ADCP would run on its own battery power, with no real-time data transfer. This would only be attempted if it could be done safely without interfering with the normal operation of the CTD carousel and with the approval of the ship.

3) Near the beginning of the cruise a UMaine autonomous Slocum glider will be deployed in the Wilkinson Basin. In addition another Slocum glider will be launched on the Nova Scotian Shelf to survey the shelf, the Northeast Channel, Georges Basin, and Jordon Basin. These gliders will not be recovered on this cruise, unless we have problems. See Appendix C for deployment protocols, locations and pictures.

4) At the end of the cruise, the last activity, en-route back to port will be to recover the UMaine LIDAR buoy, south of Monhegan Island. Another buoy will not be deployed at this location. (See Appendix B for buoy mooring schematics and images) .

B. Days at Sea (DAS)

Of the 11 DAS scheduled for this project, 0 DAS are funded by an OMAO allocation, 11 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 medium Operational Tempo.

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

The Gulf of Maine (US and CA) and the Nova Scotian Shelf and Slope (Fig. 1)

D. Summary of Objectives: The primary objectives for this cruise are to service buoys in the UMOOS/NERACOOS Gulf of Maine Array provide a hydrographic survey and water

sampling in the GoM and the Scotian Shelf/Slope regions, deploy 12 drogued drifters and to deploy two autonomous Slocum gliders (see figure 1 and appendix A).

E. Participating Institutions

University of Maine

NERACOOS

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

Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
Neal Pettigrew	Chief Scientist	Oct 2	Oct 14	M	UMaine	US
John Wallinga	Buoy Chief	Oct 2	Oct 14	M	UMaine	US
Neil Fisher	Buoy Ops	Oct 2	Oct 14	M	UMaine	UK/Green Card
C. Patrick Fikes	Elect. Engineer	Oct 2	Oct 14	M	UMaine	US
Mark Neary	Ocean Scientist	Oct 2	Oct 14	M	UMaine	IE/ Green Card
Maura Thomas	Research Associate	Oct 2	Oct 14	F	UMaine	CA/Green Card
Nina Whitney	Grad. Student	Oct 2	Oct 14	F	IOWA	US
Megan Switzer	Grad. Student	Oct 2	Oct 14	F	UMaine	US
Jordon Snyder	Grad. Student	Oct 2	Oct 14	F	UMaine	US
Constantin	Scherelis	Oct 2	Oct 14	M	UMaine	US

The Chief Scientist will be the foreign national sponsor for this cruise.

G. Administrative

1. nealp@maine.edu {Chief Scientist, University of Maine}

wallinga@maine.edu {Buoy Operations Manager, University of Maine}

Nathan.Keith@noaa.gov {NEFSC Vessel Coordinator}

Jon.Hare@noaa.gov {Oceanography Branch Chief}

CO.Pisces@noaa.gov {Commanding Officer }

Michael.S.Abbott@noaa.gov {NEFSC Port Captain}

2. Diplomatic Clearances

This project involves Marine Scientific Research in waters under the jurisdiction of Canada. Diplomatic clearance has been requested and a foreign fishing vessel License from Canada will be on board the vessel prior to departure.

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: Planned Itinerary:

- October 2: Science personnel and flatbed truck arrive with buoys and equipment and loading of the ship will begin at Newport Naval Station, Newport RI.
- October 3: Staging of heavy equipment will begin at noon in collaboration with the ships crew at Newport Naval Station, Newport RI.
- October 4: Sail to begin cruise activities from Newport Naval Station, Newport RI.
- October 14: Return to Newport Naval Station, Newport RI, and begin off-loading the scientific equipment and data, disembark scientific personnel.

Operational Plans:

The primary objectives for this cruise are to service buoys in the UMOOS/NERACOOS Gulf of Maine Array provide a hydrographic survey and water sampling in the GoM and the Scotian Shelf/Slope regions, deploy 12 drogued drifters and to deploy two autonomous Slocum gliders (see figure 1 and appendix A).

B. Staging and Destaging:

Staging will start at noon October 3 at Newport Naval Station, Newport RI, loading buoys, mooring equipment, and sensors etc... The set up on the decks will done in collaboration with the ship's crew.

De-staging will begin early on October 14 Newport Naval Station, Newport RI, with trucking to transport the buoys and equipment unloaded from the ship.

Scientific and personnel items will be off loaded and put in University of Maine vans for travel back to Orono, ME.

C. Operations to be Conducted:

1. Buoy operations: The mooring operations will include complete recovery (anchor included) and redeployment of buoy/mooring gear. If necessary we request a launched boat to connect

the buoy to the line via the A-Frame and winch for recovery. A schematic of buoy/mooring will be provided to the command. Each buoy will be re-deployed with as much new equipment and sensors as deemed necessary by the Chief Scientist to insure the integrity of the mooring system. Before deploying a mooring, shipboard and shore side communications between the science party and University of Maine personnel will confirm that the replacement mooring is transmitting all data buffers reliably. Once confirmation is obtained, deployment operations can begin. After the mooring is established, the ship will steam by the surface buoy for a final position fix and await confirmation of the buoy's hourly data transmission before proceeding to the next scientific objective.

2. Hydrographic survey will operate on schedule prior to arriving at the next buoy location. University of Maine personnel Mark Neary (mark.g.neary@maine.edu) and Bob Fleming (bfleming@umeoce.maine.edu) can be contacted regarding mapping.
3. At each mooring location, bridge watch personnel will be asked to record certain information on a bridge log sheet that is provided by the scientific party prior to sailing. The science party will provide the logs and guidance on how they should be completed. At the completion of a mooring deployment, these bridge logs will be turned over to the scientific buoy deck chief.
4. Underway sampling: Along the entire cruise track, surface seawater temperature, salinity, and fluorescence will be measured with the ship's flow-through thermo-salinograph and fluorometer. Since the RV Pisces's ADCP system is not working, UMaine will attempt a 150 or 75 kHz ADCP that will run independent of the CTD data and power systems. University of Maine technicians will be responsible for attaching the ADCP prior to departure with the help of the ship's ET. The ship's acoustic depth sounder data will be completed and saved for the entire survey and connected to GPS location data. The UMaine Science team will bring 25TB of portable data storage to back up and store cruise data.
5. University of Maine will install a portable voice and data communications system prior to sailing. We will use this system to communicate with shore side personnel during the cruise.
6. CTD casts will be conducted on a 24 hour basis at station locations and times mutually agreed upon by the Chief Scientist and Commanding Officer. UMaine will operate 3 CTD watches on rotation. See Appendix E for cast locations and watch details.
7. The Commanding Officer and Chief Scientist will jointly review the various route options prior and during operations, and make the final decisions to ensure the most efficient use of ship time whilst completing the scientific objectives. This objective may be altered at any time during the cruise as conditions warrant. Highest cruising speeds reasonable should be employed to improve the potential to complete the cruise missions.

D. Dive Plan

Dives are not planned for this project.

E. Applicable Restrictions

Conditions which preclude normal operations: The Chief Scientist and CO will be in regular communications to discuss conditions that may interfere with research objectives.

Protected Resources:

North Atlantic right whale protection: The vessel is requested to adhere to right whale protection regulations. Information on Seasonal Management Area (SMA) and Dynamic Management Area (DMA) regulations and information for protecting right whales from collisions with vessels are provided through the NOAA Protected Resources website (<http://www.nmfs.noaa.gov/pr/shipstrike/>), Right Whale Sighting Advisory System (SAS) website (<http://www.nefsc.noaa.gov/psb/surveys/>), the U.S. Coast Guard's "Notices To Mariners" and NOAA weather radio. Mariners are urged to use caution and proceed at safe speeds in areas where right whales occur. U.S. Law (50 CFR 224.105) prohibits operating vessels 65 feet (19.8 meters) or greater in excess of 10 knots in Seasonal Management Areas (SMAs) along the U.S. east coast. Mariners are also requested to route around voluntary speed restriction zones, Dynamic Management Areas (DMAs) or transit through them at 10 knots or less. Approaching within 500 yards of right whales is prohibited, unless the Chief Scientist is in possession of an ESA/MMPA permit allowing such approaches.

Whale sightings: Sightings of right whales, or dead or entangled whales of any species, are extremely valuable and reports are urgently requested. Please report all right whale sightings north of the Virginia-North Carolina border to 866-755-6622; right whale sightings south of that border should be reported to 877-WHALE HELP. Right whale sightings in any location may be reported to the U.S. Coast Guard via VHF channel 16. Protocols for reporting sightings are described in the Guide to Reporting Whale Sightings placard. The placard is available online (http://www.nefsc.noaa.gov/psb/surveys/documents/20120919_Report_a_Right_Whale.pdf) and laminated copies will be provided by the Protected Species Branch upon request. It is requested that this placard be kept on the bridge for quick reference and to facilitate rapid reporting (via satellite phone if necessary). Opportunistic sightings of other marine mammal species that are live and well may be reported using the Platforms of Opportunity (POP) forms and protocols. To information regarding the WhaleALERT application <http://stellwagen.noaa.gov/protect/whalealert.html>. For information on reporting a dead whale http://www.nefsc.noaa.gov/psb/surveys/documents/20120919_Report_a_Dead_Whale.pdf

Mitigation for Protected Resources:

Plankton Nets, Small-mesh Towed Nets, Oceanographic Sampling Devices, Video Cameras, and Remotely Operated Vessel (ROV) Deployments

The NEFSC deploys a wide variety of gear to sample the marine environment during many of their research cruises, such as plankton nets, oceanographic sampling devices, video cameras, and ROVs. These types of gear are not considered to pose any risk to protected species because of their small size, slow deployment speeds, and/or structural details of the gear and are therefore not subject to specific mitigation measures. However, the officer on watch and crew monitor for any unusual circumstances that may arise at a sampling site and use their professional judgment and discretion to avoid any potential risks to protected species during deployment of all research equipment.

“Take” of Protected Resources: Under the Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA) it is unlawful to take a protected species. The MMPA defines take as “harass, hunt, capture, kill, or collect, or attempt to harass, hunt, capture, or collect”. The ESA defines take as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct.” An incidental take is one that is incidental to, but not the purpose of, otherwise lawful activities.

In the event of an incidental take of a marine mammal or federally listed threatened or endangered species during the cruise, the chief scientist will take the following actions:

Marine turtle, Sturgeon and Atlantic salmon bycatch: Please refer to the Permits & Incidental Take Manual for handling and sampling procedures. Information should be collected on the Sturgeon & Salmon and Turtle Data Collection Sheets and required information should be submitted within 24 hours of the take to Incidental.Take@noaa.gov, Elizabeth.Josephson@noaa.gov, Nathan.Keith@noaa.gov, Sarah.Pike@noaa.gov for PSIT entry. **Dead turtles, sturgeon, and Atlantic salmon shall, if feasible, be frozen and returned to the Woods Hole Laboratory.**

Marine mammal bycatch: Please refer to the Permits & Incidental Take Manual for handling and sampling procedures. Information should be collected on the Marine Mammal Incidental Take & Data Collection Sheet. **Animals determined to be dead, shall if feasible be frozen and return to the Woods Hole laboratory.** Required PSIT information should be submitted within 24 hours of the take to Incidental.Take@noaa.gov, Elizabeth.Josephson@noaa.gov, Nathan.Keith@noaa.gov, Sarah.Pike@noaa.gov.

Migratory bird salvage: Please refer to the Federal Fish and Wildlife “Special Purpose – Salvage” Permit located in the Permits & Incidental Take Manual for the salvage of dead migratory birds (except species listed as threatened or endangered under the Endangered Species Act; see 50 CFR 17.11).

Stellwagen Bank National Marine Sanctuary:

Please see the permit and requirements located in the Permits and Incidental Take Manual.

III. Equipment

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

Ship Requirements for Acoustics

Simrad EK60 Scientific Sounder: EK60 data are logged to the EK60 data server, which is on the ships and scientific networks. RS232 connections are used for navigational (Differential GPS) input. The SCS Event Logger will be used to record all operational events (e.g., begin and end points of transects, stations, gear deployments, and other events that affect the track cruise and vessel speed) during the cruise.

It is understood by UMaine that the ships ADCP will not be operational for this cruise.

Both acoustics running during cruise at all frequencies and logging data

NOTE: Extraneous echo sounders should be turned off to eliminate or at least minimize acoustic interference with the EK60

Scientific Computer System (SCS) and Fisheries Scientific Computer System (FSCS): The *Pisces*' SCS system is a PC-based server, which continuously collects and distributes scientific data from various navigational, oceanographic, meteorological, and sampling sensors throughout the cruise. The SCS EventLog program has also been configured for NEFSC Fisheries Acoustic Survey operations, and will be used by the scientists to document all operational events (e.g., begin and end of transects and deployments). The University of Maine does not have a previous or current SCS Event template and would be happy to go with the ships preferred / default template. Date and time for data collections from computers, instrumentation, and logsheets recording will be synchronized using the vessel's GPS master clock and Dimension IV software. The FSCS system (version 1.6) will be used for on-board data logging of the biological and catch data. The NEFSC is responsible for setting up FSCS hardware and software, and the NEFSC and *Pisces*' ST and ET are responsible for ensuring data collection and logging.

Ship Requirements for Side Sampling Station and Oceanographic Operations

- SBE911 connected to conducting cable on forward winch.
- Terminations be redone prior to cruise and redone if necessary.
- Slip rings be checked prior to cruise and redone if necessary.
- SBE19 connected to conducting cable on aft winch for bongo deployments.
- NEMA Data String for CTD Computer.
- Disposal of waste water cannot happen before, during, or right after CTD rosette operations.
- Smoking is not allowed on Oceanography deck owing to nutrient collections and carbonate chemistry collections.
- NEMA Data String to Computer Lab.
- Ultra-cold (-80°C) freezer (tested prior to embarkation) for storage of samples.

Ship Requirements for Continuous Underway Sampling

SCS - Navigational, meteorological, and environmental data will be archived throughout the cruise using the *Pisces*' Scientific Computer System (SCS).

SCS system should be running for duration of cruise.

ADCP - (Not available)

Flow-through system - TSG - salinity, temperature, density.

Fluorometer – chlorophyll a concentration.

Discrete samples – drawn from flow-through by scientists.

DIC – dissolved inorganic carbon.

chlorophyll a – measured directly.

salt – for salinity calibrations.

Flowthrough system cleaned prior to cruise (freshwater flush).

Flowthrough system running during cruise and logging data.

Ability to draw water samples from system.

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

QUANTITY	FURNISHED BY	ITEM
		<hr/>
1.		Weather/Oceanographic buoys (2000# each) 2 University of Maine
2.		Mooring anchors (2800# each) 2 University of Maine
3.		Mooring wire (various lengths) 2 University of Maine
4.		Mooring Chain (900# each in steel drums) 2 University of Maine
5.		Tools (in tool boxes) 1 set University of Maine
6.		Air winch with hose will be bolted to the deck and attached to the ship's air pressure systme. 1 University of Maine
7.		Various mooring hardware 3 University of Maine
8.		Mooring handling gear (lines, straps, etc.) 1 set University of Maine
9.		Computers 10 University of Maine
10.		Electronic equipment and parts 1 set University of Maine
11.		Cellular phone and Iridium Phone with wireless router 1 each University of Maine
12.		CTD Niskin bottles 12 University of Maine
13.		Teledyne-Webb Slocum G2 Gliders 2 University of Maine
14.		Portable dock-server field laptop for glider operations 1 University of Maine
16.		Freezer (normal temperature) 1 University of Maine

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

Common Name of Material	Qty	Notes	Trained Individual	Spill control
Acetone	10L	See Appendix F	Maura Thomas	See Appendix F
Lugols Iodide solution	1L	See Appendix F	Maura Thomas	See Appendix F

See attached appendix F for specific chemical MSDS/SDS, specific storage, handling and spill control procedures.

C. Chemical safety and spill response procedures:

See appendix F.

D. Radioactive Materials

No Radioactive Isotopes are planned for this project.

The Chief Scientist is responsible for complying with OMAO 0701-10 Radioactive Material aboard NOAA Ships. Documentation regarding those requirements will be provided by the Chief of Operations, Marine Operations Center, upon request.

At least three months in advance of a domestic project and eight months in advance of a foreign project start date the shall submit required documentation to MOC-CO, including:

1. NOAA Form 57-07-02, Request to Use Radioactive Material aboard a NOAA Ship
2. Draft Project Instructions
3. Nuclear Regulatory Commission (NRC) Materials License (NRC Form 374) or a state license for each state the ship will operate in with RAM on board the ship.
4. Report of Proposed Activities in Non-Agreement States, Areas of Exclusive Federal Jurisdiction, or Offshore Waters (NRC Form 241), if only state license(s) are submitted).
5. MSDS
6. Experiment or usage protocols, including spill cleanup procedures.

Scientific parties will follow responsibilities as outlined in the procedure, including requirements for storage and use, routine wipe tests, signage, and material disposal as outline in OMAO 0701-10.

All radioisotope work will be conducted by NRC or State licensed investigators only, and copies of these licenses shall be provided per OMAO 0701-10 at least three months prior to the start date of domestic projects and eight months in advance of foreign project start dates.

E. Inventory (itemized) of Radioactive Materials

None.

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: *Under Development*

a. OMAO Data

b. Program Data

B. Responsibilities: *Under Development*

VII. Meetings, Vessel Familiarization, and Project Evaluations

- A. Pre-Project Meeting: The Chief Scientist and Commanding Officer will conduct a meeting of pertinent members of the scientific party and ship's crew to discuss required equipment, planned operations, concerns, and establish mitigation strategies for all concerns. This meeting shall be conducted before the beginning of the project with sufficient time to allow for preparation of the ship and project personnel. The ship's Operations Officer usually is delegated to assist the Chief Scientist in arranging this meeting.
- B. Vessel Familiarization Meeting: The Commanding Officer is responsible for ensuring scientific personnel are familiarized with applicable sections of the standing orders and vessel protocols, e.g., meals, watches, etiquette, drills, etc. A vessel familiarization meeting shall be conducted in the first 24 hours of the project's start and is normally presented by the ship's Operations Officer.
- C. Post-Project Meeting: The Commanding Officer is responsible for conducted a meeting no earlier than 24 hrs before or 7 days after the completion of a project to discuss the overall success and short comings of the project. Concerns regarding safety, efficiency, and suggestions for future improvements shall be discussed and mitigations for future projects will be documented for future use. This meeting shall be attended by the ship's officers, applicable crew, the Chief Scientist, and members of the scientific party and is normally arranged by the Operations Officer and Chief Scientist.
- D. Project Evaluation Report

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

VIII. Miscellaneous

A. Meals and Berthing

The ship will provide meals for the scientists listed above. Meals will be served 3 times daily beginning one hour before scheduled departure, extending throughout the project, and ending two hours after the termination of the project. Since the watch schedule is split between day and night, the night watch may often miss daytime meals and will require adequate food and beverages (for example a variety of sandwich items, cheeses, fruit, milk, juices) during what are not typically meal hours. Special dietary requirements for scientific participants will be made available to the ship's command at least seven days prior to the project.

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

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

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

B. Medical Forms and Emergency Contacts

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

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

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

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

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

Contact information:

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

Prior to departure, the Chief Scientist must provide an electronic listing of emergency contacts to the Executive Officer for all members of the scientific party, with the following information: contact name, address, relationship to member, and telephone number.

C. Shipboard Safety

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

Wearing open-toed footwear or shoes that do not completely enclose the foot (such as sandals or clogs) outside of private berthing areas is not permitted. At the discretion of the ship CO, safety shoes (i.e. steel or composite toe protection) may be required to participate in any work dealing with suspended loads, including CTD deployment and recovery. The ship does not

provide safety-toed shoes/boots. The ship's Operations Officer should be consulted by the Chief Scientist to ensure members of the scientific party report aboard with the proper attire.

D. Communications

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

E. IT Security

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

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

Completion of the above requirements prior to boarding the ship is required.

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

F. Foreign National Guests Access to OMAO Facilities and Platforms

All foreign national access to the vessel shall be in accordance with NAO 207-12 and RADM De Bow's March 16, 2006 memo (<http://deemedexports.noaa.gov>). National Marine Fisheries Service personnel will use the Foreign National Registration System (FNRS) to submit requests for access to NOAA facilities and ships. The Departmental Sponsor/NOAA (DSN) is responsible for obtaining clearances and export licenses and for providing escorts required by the NAO. DSNs should consult with their designated Line Office Deemed Export point of contact to assist with the process.

Full compliance with NAO 207-12 is required.

Responsibilities of the Chief Scientist:

1. Provide the Commanding Officer with the email generated by the Servicing Security Office granting approval for the foreign national guest's visit. (For NMFS-sponsored guests, this email will be transmitted by FNRS.) This email will identify the guest's DSN and will serve as evidence that the requirements of NAO 207-12 have been complied with.
2. Escorts – The Chief Scientist is responsible to provide escorts to comply with NAO 207-12 Section 5.10, or as required by the vessel's DOC/OSY Regional Security Officer.
3. Ensure all non-foreign national members of the scientific party receive the briefing on Espionage Indicators (NAO 207-12 Appendix A) at least annually or as required by the Servicing Security Office.
4. Export Control - Ensure that approved controls are in place for any technologies that are subject to Export Administration Regulations (EAR).

The Commanding Officer and the Chief Scientist will work together to implement any access controls necessary to ensure no unlicensed export occurs of any controlled technology onboard regardless of ownership.

Responsibilities of the Commanding Officer:

1. Ensure only those foreign nationals with DOC/OSY clearance are granted access.
2. Deny access to OMAO platforms and facilities by foreign nationals from countries controlled for anti-terrorism (AT) reasons and individuals from Cuba or Iran without written approval from the Director of the Office of Marine and Aviation Operations and compliance with export and sanction regulations.
3. Ensure foreign national access is permitted only if unlicensed deemed export is not likely to occur.
4. Ensure receipt from the Chief Scientist or the DSN of the FNRS or Servicing Security Office email granting approval for the foreign national guest's visit.
5. Ensure Foreign Port Officials, e.g., Pilots, immigration officials, receive escorted access in accordance with maritime custom to facilitate the vessel's visit to foreign ports.
6. Export Control - 8 weeks in advance of the project, provide the Chief Scientist with a current inventory of OMAO controlled technology onboard the vessel and a copy of the vessel Technology Access Control Plan (TACP). Also notify the Chief Scientist of any OMAO-sponsored foreign nationals that will be onboard while program equipment is aboard so that the Chief Scientist can take steps to prevent unlicensed export of Program controlled technology. The Commanding Officer and the Chief Scientist will work together to implement any access controls necessary to ensure no unlicensed export occurs of any controlled technology onboard regardless of ownership.
7. Ensure all OMAO personnel onboard receive the briefing on Espionage Indicators (NAO 207-12 Appendix A) at least annually or as required by the Servicing Security Office.

Responsibilities of the Foreign National Sponsor:

1. Export Control - The foreign national's sponsor is responsible for obtaining any required export licenses and complying with any conditions of those licenses prior to the foreign national being provided access to the controlled technology onboard regardless of the technology's ownership.

2. The DSN of the foreign national shall assign an on-board Program individual, who will be responsible for the foreign national while on board. The identified individual must be a U.S. citizen and a NOAA or DOC employee. According to DOC/OSY, this requirement cannot be altered.
3. Ensure completion and submission of Appendix C (Certification of Conditions and Responsibilities for a Foreign National)

IX. Appendices

Appendix A - Cruise Track

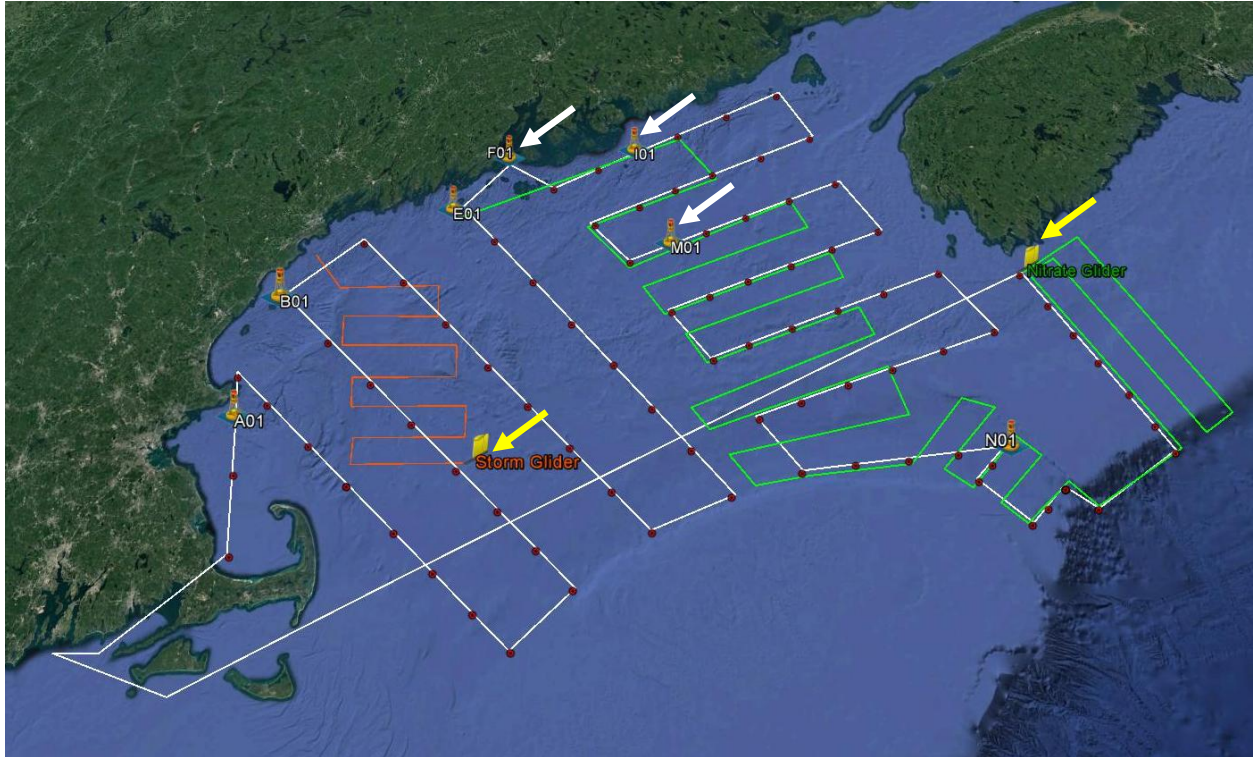


Figure 1. Pisces Cruise (Oct 2nd to Oct 14th). Buoy servicing / deployments (White Arrows), CTD Stations (Red Dots), Cruise Track (White), Glider Tracks (Orange and Green), Glider deployment points (Yellow Arrows), Drogue deployments (To be decided).

Appendix B - Buoy Deployments

Buoy M, Jordan Basin

Latitude: 43° 29.45'N

Longitude: 67° 52.76'W

Location Description: Jordan Basin

Deployed: Nov 05 2015

Coast Guard Light List Letter: M

Coast Guard Light List Number: 6

Water Depth: 285 meters (935 feet)

Watch Circle Radius: 55 meters (180 feet)



Figure 1. UMOOS Buoy - similar to buoys M and I

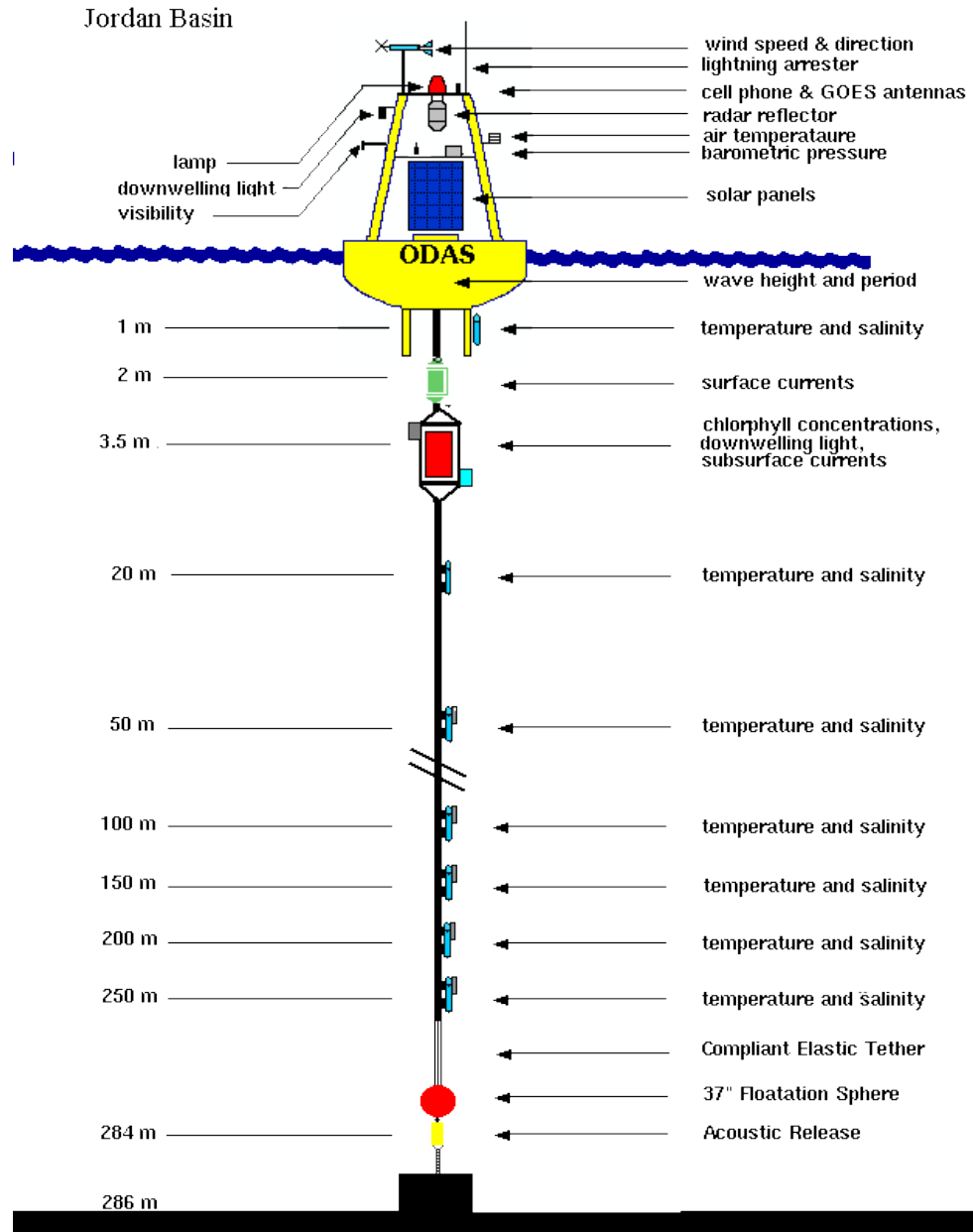


Figure 2. Buoy M's mooring configuration

Coastal Buoy - Buoy I

Latitude: 44° 6.37'N

Longitude: 68° 6.57'W

Location Description: Acadia

Deployed: Jun 05 2015

Coast Guard Light List Letter: I

Coast Guard Light List Number 2296

Water Depth: 100 meters (328 feet)

Watch Circle Radius: 50 meters (164 feet)

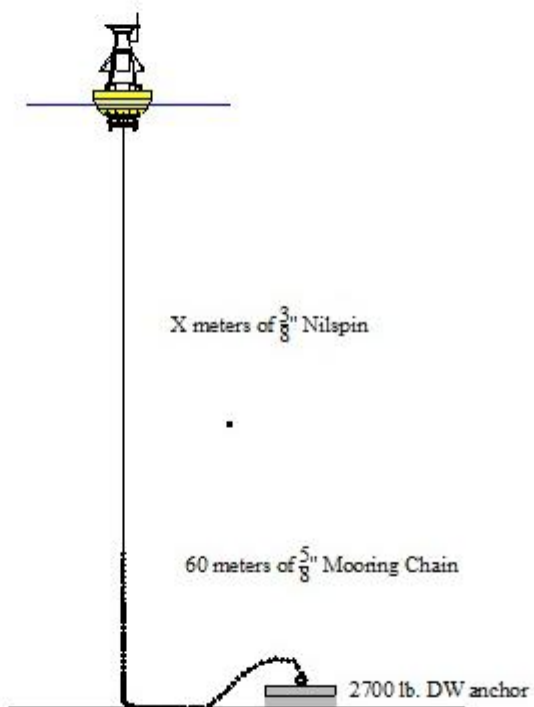


Figure 3. Buoy I mooring configuration

LIDAR Buoy

Latitude: 43° 45.38'N

Longitude: 69° 20.35'W

Location Description: South of Monhegan Island

Deployed: Dec 13 2015

Coast Guard Light List Letter: -

Coast Guard Light List Number: -

Water Depth: 95 meters (312 feet)

Watch Circle Radius: 50 meters (164 feet)

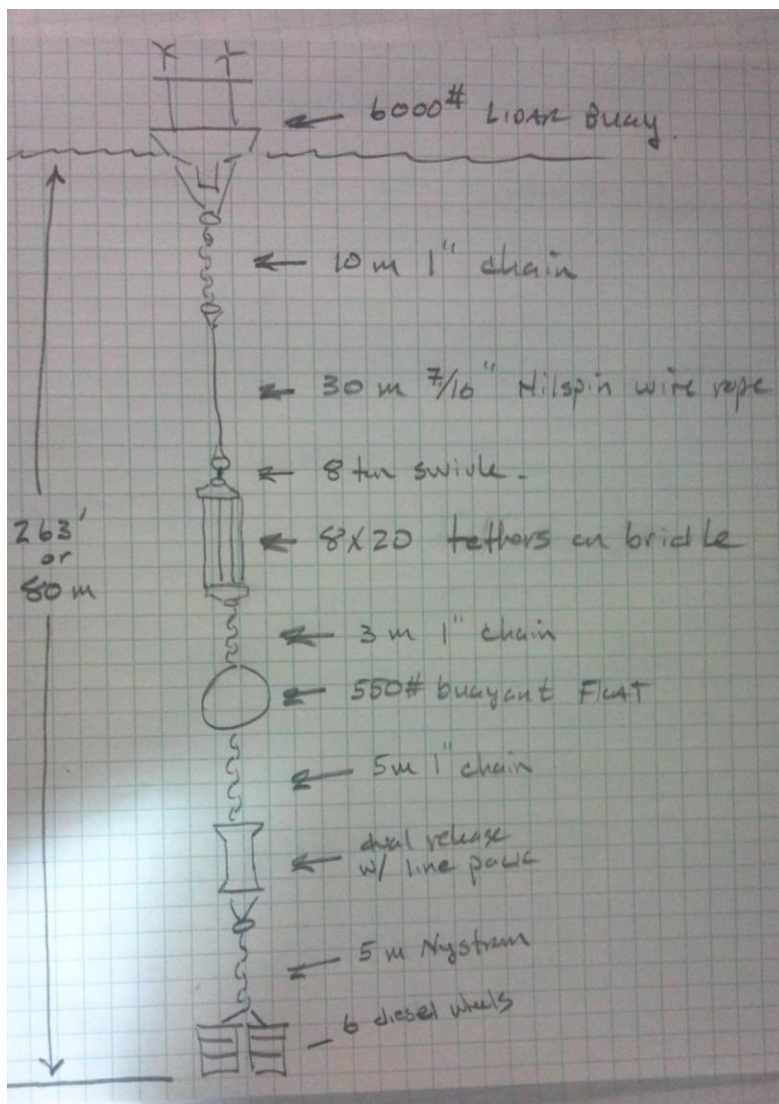


Figure 4. Mooring diagram of LiDAR buoy

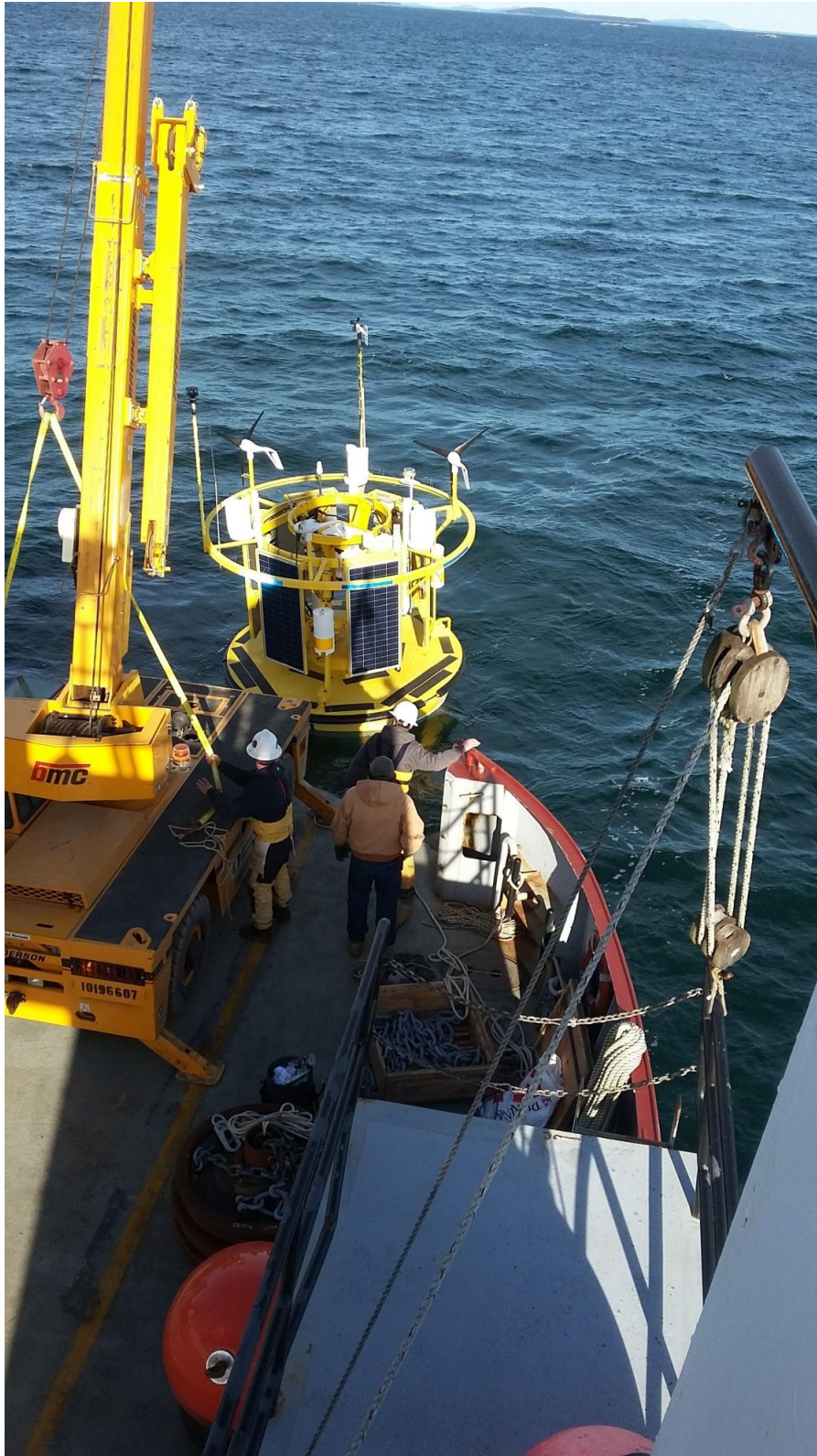


Figure 5. LiDAR buoy after deployment



Figure 6. Tether assembly

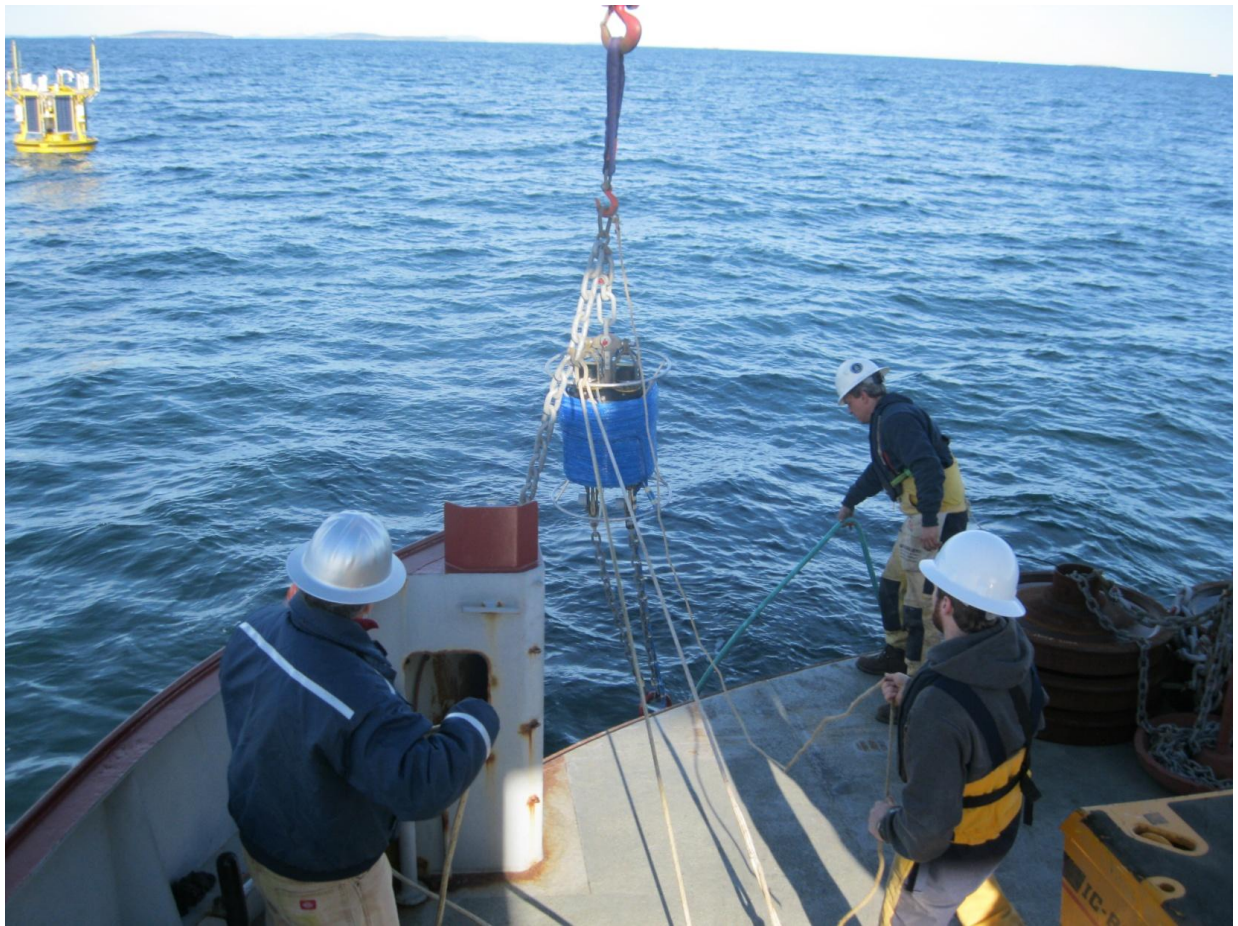


Figure 7. Line pack with dual acoustic releases



Figure 8. Anchor assembly

Appendix C - Slocum Glider Deployments



Figure 1: Glider Deployment Sites. **Orange Glider:** Storm glider deployment in South Wilkinson Basin. **Green Glider:** Nitrate glider deployment on the Scotian Shelf.

Approximate Storm Glider deployment location

42°18'40.00"N
69° 4'58.00"W

Approximate Nitrate Glider deployment location

42°19'49.20"N
65°54'25.20"W

Note: Exact deployment location is not crucial. The gliders will make way at about 20km/day towards their desired track.

Deployment Protocol

Before arriving at deployment site

1. The glider will be staged on deck several hours previous to deployment to confirm iridium communications and communications with the shore side systems at UMaine.
2. The UMaine mobile dockserver will be set up inside the ship with a small freewave antenna mounted externally.
3. A small boat is requested to deploy the glider from and if necessary recover it. 2 personnel will be in the boat for physical handling. A ship board operator will handle telemetry.
4. Radio communications will be established between the team going on the small boat and the ship board operator.
5. The glider can only be deployed in calm conditions with good visibility and minimal wind (Max wave height 2 feet)

At deployment site

6. The small boat with glider and personnel will be lowered into the water.
7. Once a safe distance from the ship, the shipboard operator will complete glider communications checks, initiate a test mission and give the go-ahead to the deployment crew.
8. The deployment crew will release the glider, letting it slide slowly into the water as in Figure 2.
9. The glider test mission will run, taking approximately 5 minutes. Once the test mission has completed, and parameters confirmed a longer 15 minute mission will be initiated testing sensors.
10. Once completed, good instrument and glider behavior will be confirmed and communications with UMaine will be confirmed. The glider will now begin its primary mission.
11. Once the glider has dived, the small boat will return to the ship and the ship can proceed.
12. The glider will communicate with shore side systems in UMaine from here on.
13. If there is an issue with the glider during the test missions, the deployment crew will recover the glider and the small boat and glider will return to the ship. A further deployment attempt may be made later in the mission if possible.

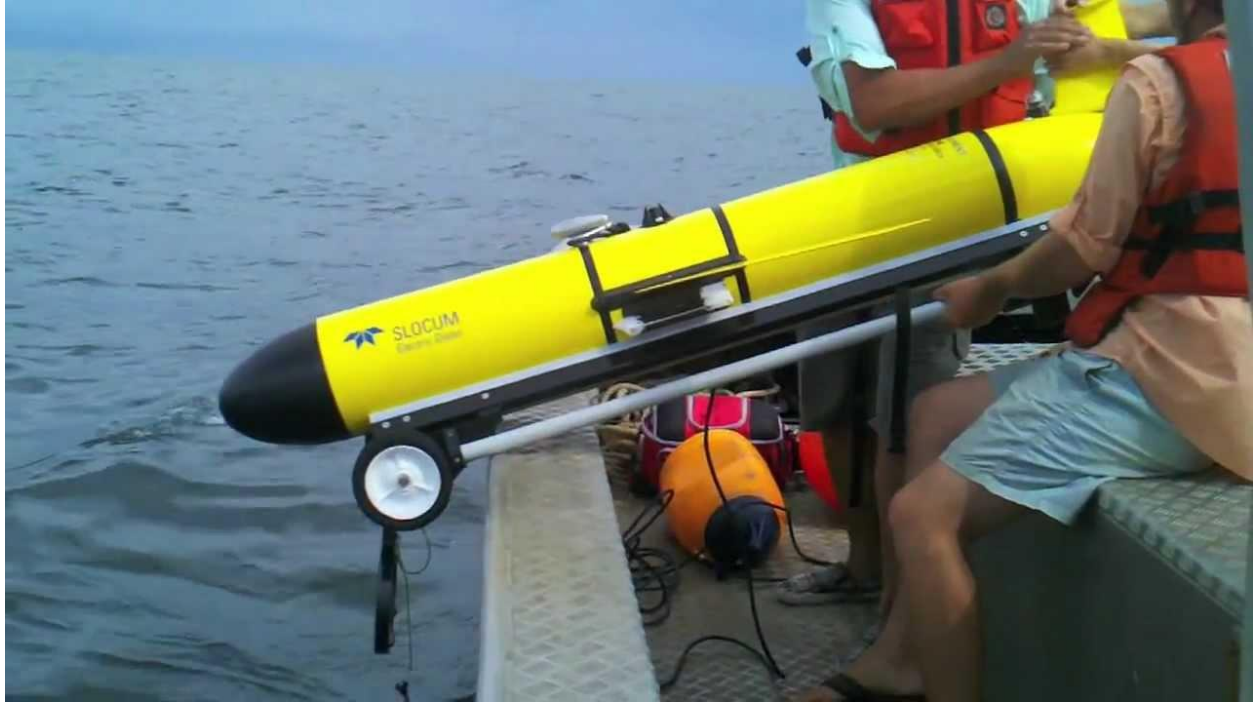


Figure 2: Glider deployment procedure

Appendix E - Cast Schedule and Watches

The University of Maine would like to operate on the standard Merchant watch system.

Each watch will include 2 people in addition to deck crew for deploying and recovering the CTD Rosette.

The watches will run:

Watch 1 group: 4:00-8:00 (AM & PM)

CTD Operator:

Water sampling:

Watch 2 group : 08:00- 12:00 (Am & PM)

CTD Operator:

Water sampling:

Watch 3 group: 12:00-4:00 (AM & PM)

CTD Operator:

Water sampling:

.

Appendix F - Hazardous Materials - Notes and Spill Control

See accompanying documents

'MSDS-lugols-iodine.pdf'

'MSDS_acetone-certified-acs-fisher-chemical.pdf'



Fisher Scientific

Part of Thermo Fisher Scientific

SAFETY DATA SHEET

Creation Date 28-Apr-2009

Revision Date 12-Mar-2014

Revision Number 1

1. Identification

Product Name

Acetone

Cat No. :

A9-4; A9-20; A9-200; A11-1; A11-4; A11-20; A11-200; A11S-4;
A16F-1GAL; A16P-1GAL; A16P-4; A16S-4; A16S-20; A18-1; A18-4;
A18-20; A18-20LC; A18-200; A18-200LC; A18-500; A18CU1300;
A18FB-19; A18FB-50; A18FB-115; A18FB-200; A18P-4; A18POP-19;
A18POPB-50; A18RB-19; A18RB-50; A18RB-115; A18RB-200;
A18RS-28; A18RS-50; A18RS-115; A18RS-200; A18S-4; A18SK-4;
A18SS-19; A18SS-28; A18SS-50; A18SS-115; A18SS-200; A19-1;
A19-4; A19RS-115; A19RS-200; A40-4; A928-4; A929-1; A929-4;
A929RS-19; A929RS-50; A929RS-200; A929SK-4; A929SS-28;
A929SS-50; A929SS-115; A929SS-200; A946-4; A946-4LC;
A946FB-200; A946RB-19; A946RB-50; A946RB-115; A946RB-200;
A949-1; A949-4; A949-4LC; A949CU-50; A949N-119; A949N-219;
A949POP-19; A949RS-28; A949RS-50; A949RS-115; A949SK-1;
A949SK-4; A949SS-19; A949SS-28; A949SS-50; A949SS-115;
A949SS-200; BP2403-1; BP2403-4; BP2403-20; BP2404-1; BP2404-4;
BP2404SK-1; BP2404SK-4; HC-300-1GAL; S70091; 22050131;
22050295

Synonyms

2-Propanone; Dimethyl ketone; (Certified ACS, HPLC, OPTIMA, Histological, Spectranalyzed, NF/FCC/EP, Pesticide, Electronic, GC Resolv, SAFE-COTE)

Recommended Use

Laboratory chemicals.

Uses advised against

No Information available

Details of the supplier of the safety data sheet

Company

Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number

CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 001-703-527-3887

2. Hazard(s) identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids

Category 2

Serious Eye Damage/Eye Irritation	Category 2
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Central nervous system (CNS).	
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Kidney, Liver, spleen, Blood.	

Label Elements**Signal Word**

Danger

Hazard Statements

Highly flammable liquid and vapor

Causes serious eye irritation

May cause drowsiness or dizziness

May cause damage to organs through prolonged or repeated exposure

**Precautionary Statements****Prevention**

Wash face, hands and any exposed skin thoroughly after handling

Do not breathe dust/fume/gas/mist/vapors/spray

Use only outdoors or in a well-ventilated area

Keep away from heat/sparks/open flames/hot surfaces. - No smoking

Keep container tightly closed

Ground/bond container and receiving equipment

Use explosion-proof electrical/ventilating/lighting/equipment

Use only non-sparking tools

Take precautionary measures against static discharge

Wear protective gloves/protective clothing/eye protection/face protection

Keep cool

Response

Get medical attention/advice if you feel unwell

Inhalation

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing

Call a POISON CENTER or doctor/physician if you feel unwell

Skin

IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower

Eyes

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing

If eye irritation persists: Get medical advice/attention

Fire

In case of fire: Use CO2, dry chemical, or foam for extinction

Storage

Store in a well-ventilated place. Keep container tightly closed

Store locked up

Disposal

Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)

Repeated exposure may cause skin dryness or cracking

3. Composition / information on ingredients

Component	CAS-No	Weight %
Acetone	67-64-1	>95

4. First-aid measures

Eye Contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.
Skin Contact	Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.
Inhalation	Move to fresh air. If breathing is difficult, give oxygen. Get medical attention immediately if symptoms occur.
Ingestion	Do not induce vomiting. Obtain medical attention.
Most important symptoms/effects	Breathing difficulties. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting: May cause pulmonary edema: Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	CO ₂ , dry chemical, dry sand, alcohol-resistant foam. Water spray. Cool closed containers exposed to fire with water spray.
Unsuitable Extinguishing Media	Water may be ineffective
Flash Point	-20 °C / -4 °F
Method -	Closed cup
Autoignition Temperature	465 °C / 869 °F
Explosion Limits	
Upper	12.8 vol %
Lower	2.5 vol %
Oxidizing Properties	Not oxidising
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical

Flammable. Risk of ignition. Containers may explode when heated. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back.

Hazardous Combustion Products

Carbon monoxide (CO) Carbon dioxide (CO₂) Formaldehyde Methanol

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
1	3	0	N/A

6. Accidental release measures

Personal Precautions	Use personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition. Take precautionary measures against static discharges. Keep people away from and upwind of spill/leak. Avoid contact with skin, eyes and inhalation of vapors.
Environmental Precautions	Should not be released into the environment.

Methods for Containment and Clean Up Remove all sources of ignition. Take precautionary measures against static discharges. Soak up with inert absorbent material. Keep in suitable, closed containers for disposal. Use spark-proof tools and explosion-proof equipment.

7. Handling and storage

Handling Wear personal protective equipment. Ensure adequate ventilation. Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharges. Use only non-sparking tools. Use explosion-proof equipment. Do not breathe vapors or spray mist. Do not get in eyes, on skin, or on clothing. To avoid ignition of vapors by static electricity discharge, all metal parts of the equipment must be grounded.

Storage Flammables area. Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat and sources of ignition. Keep container tightly closed in a dry and well-ventilated place.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Acetone	TWA: 500 ppm STEL: 750 ppm	(Vacated) TWA: 750 ppm (Vacated) TWA: 1800 mg/m ³ (Vacated) STEL: 2400 mg/m ³ (Vacated) STEL: 1000 ppm TWA: 1000 ppm TWA: 2400 mg/m ³	IDLH: 2500 ppm TWA: 250 ppm TWA: 590 mg/m ³

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Acetone	TWA: 500 ppm TWA: 1190 mg/m ³ STEL: 1000 ppm STEL: 2380 mg/m ³	TWA: 1000 ppm TWA: 2400 mg/m ³ STEL: 1260 ppm STEL: 3000 mg/m ³	TWA: 500 ppm STEL: 750 ppm

Legend

ACGIH - American Conference of Governmental Industrial Hygienists

OSHA - Occupational Safety and Health Administration

NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location. Use explosion-proof electrical/ventilating/lighting/equipment.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	sweet

Odor Threshold	19.8 ppm
pH	7
Melting Point/Range	-95 °C / -139 °F
Boiling Point/Range	56 °C / 132.8 °F
Flash Point	-20 °C / -4 °F
Method -	Closed cup
Evaporation Rate	5.6 (Butyl Acetate = 1.0)
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	12.8 vol %
Lower	2.5 vol %
Vapor Pressure	247 mbar @ 20 °C
Vapor Density	2.0
Relative Density	0.790
Solubility	Soluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	465 °C / 869 °F
Decomposition Temperature	> 4°C
Viscosity	0.32 mPa.s @ 20 °C
Molecular Formula	C3 H6 O
Molecular Weight	58.08
Refractive index	1.358 - 1.359

10. Stability and reactivity

Reactive Hazard	None known, based on information available
Stability	Stable under normal conditions.
Conditions to Avoid	Heat, flames and sparks. Incompatible products. Keep away from open flames, hot surfaces and sources of ignition.
Incompatible Materials	Strong oxidizing agents, Strong reducing agents, Strong bases, Peroxides, Halogenated compounds, Alkali metals, Amines
Hazardous Decomposition Products	Carbon monoxide (CO), Carbon dioxide (CO ₂), Formaldehyde, Methanol
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions	None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Acetone	5800 mg/kg (Rat)	> 15800 mg/kg (rabbit) > 7400 mg/kg (rat)	76 mg/l, 4 h, (rat)

Toxicologically Synergistic Products Carbon tetrachloride; Chloroform; Trichloroethylene; Bromodichloromethane; Dibromochloromethane; N-nitrosodimethylamine; 1,1,2-Trichloroethane; Styrene; Acetonitrile, 2,5-Hexanedione; Ethanol; 1,2-Dichlorobenzene

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation	Irritating to eyes and skin
Sensitization	No information available
Carcinogenicity	The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Acetone	67-64-1	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Central nervous system (CNS)

STOT - repeated exposure Kidney Liver spleen Blood

Aspiration hazard No information available

Symptoms / effects, both acute and delayed Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting: May cause pulmonary edema: Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting

Endocrine Disruptor Information No information available

Other Adverse Effects Neurotoxic effects have occurred in experimental animals.

12. Ecological information

Ecotoxicity

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Acetone	NOEC = 430 mg/l (algae; 96 h)	Oncorhynchus mykiss: LC50 = 5540 mg/l 96h Alburnus alburnus: LC50 = 11000 mg/l 96h Leuciscus idus: LC50 = 11300 mg/L/48h Salmo gairdneri: LC50 = 6100 mg/L/24h	EC50 = 14500 mg/L/15 min	EC50 = 8800 mg/L/48h EC50 = 12700 mg/L/48h EC50 = 12600 mg/L/48h

Persistence and Degradability Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility Will likely be mobile in the environment due to its volatility.

Component	log Pow
Acetone	-0.24

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Acetone - 67-64-1	U002	-

14. Transport information

DOT

UN-No UN1090
 Proper Shipping Name ACETONE
 Hazard Class 3
 Packing Group II

TDG

UN-No UN1090
 Proper Shipping Name ACETONE

Hazard Class	3
Packing Group	II
IATA	
UN-No	UN1090
Proper Shipping Name	ACETONE
Hazard Class	3
Packing Group	II
IMDG/IMO	
UN-No	UN1090
Proper Shipping Name	ACETONE
Hazard Class	3
Packing Group	II

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Acetone	X	X	-	200-662-2	-		X	X	X	X	X

Legend:

X - Listed

E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.

F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.

N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.

P - Indicates a commenced PMN substance

R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.

S - Indicates a substance that is identified in a proposed or final Significant New Use Rule

T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.

XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B)).

Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.

Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313 Not applicable

SARA 311/312 Hazardous Categorization

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	Yes
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act Not applicable

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Acetone	5000 lb	-

California Proposition 65 This product does not contain any Proposition 65 chemicals

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Acetone	X	X	X	-	X

U.S. Department of Transportation

Reportable Quantity (RQ): Y
 DOT Marine Pollutant N
 DOT Severe Marine Pollutant N

U.S. Department of Homeland Security

This product contains the following DHS chemicals:

Component	DHS Chemical Facility Anti-Terrorism Standard
Acetone	2000 lb STQ

Other International Regulations

Mexico - Grade Serious risk, Grade 3

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class B2 Flammable liquid
 D2B Toxic materials

**16. Other information**

Prepared By Regulatory Affairs
 Thermo Fisher Scientific
 Email: EMSDS.RA@thermofisher.com

Creation Date 28-Apr-2009

Revision Date 12-Mar-2014

Print Date 12-Mar-2014

Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer

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End of SDS

Material Safety Data Sheet

Revision Date 30-Jun-2010

Revision Number 1

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name Lugol's Iodine

Synonyms No information available.

Recommended Use Laboratory chemicals

Company Remel
12076 Santa Fe Drive
Lenexa, KS 66215 United States
Telephone: 1-800-255-6730
Fax:1-800-621-8251

Emergency Telephone Number INFOTRAC 1-352-323-3500
(International)
1-800-535-5053 (North America)

2. HAZARDS IDENTIFICATION

Emergency Overview

Toxic to aquatic organisms.

Appearance Yellow-orange

Physical State Liquid

odor No information available

Target Organs Central Vascular System (CVS), Central nervous system (CNS), Eyes, Respiratory system, Skin

Potential Health Effects

Acute Effects

Principle Routes of Exposure

Eyes May cause irritation
Skin May cause irritation
Inhalation May cause irritation of respiratory tract
Ingestion Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea

Chronic Effects None known

See Section 11 for additional Toxicological information.

Aggravated Medical Conditions Central nervous system disorders. Preexisting eye disorders. Skin disorders.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Haz/Non-haz

Component	CAS-No	Weight %
Iodine	7553-56-2	4
Potassium iodide	7681-11-0	9

4. FIRST AID MEASURES

Eye Contact	Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician
Skin Contact	Wash off immediately with soap and plenty of water removing all contaminated clothes and shoes
Inhalation	Move to fresh air
Ingestion	Clean mouth with water and afterwards drink plenty of water
Notes to Physician	Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Flash Point	No information available.
Method	No information available.
Autoignition Temperature	No information available.
Explosion Limits	
Upper	No data available
Lower	No data available
Unsuitable Extinguishing Media	No information available.
Hazardous Combustion Products	No information available.
Sensitivity to mechanical impact	No information available.
Sensitivity to static discharge	No information available.

Specific Hazards Arising from the Chemical

Keep product and empty container away from heat and sources of ignition

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear

NFPA **Health** 1 **Flammability** 0 **Instability** 0 **Physical hazards** N/A

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions	Ensure adequate ventilation
Environmental Precautions	Should not be released into the environment
Methods for Containment and Clean Up	No information available

7. HANDLING AND STORAGE

Handling	Ensure adequate ventilation
Storage	Keep containers tightly closed in a dry, cool and well-ventilated place

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Measures

Ensure adequate ventilation, especially in confined areas

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Iodine	TWA: 0.01 ppm STEL: 0.1 ppm	Ceiling: 1 mg/m ³ Ceiling: 0.1 ppm (Vacated) Ceiling: 0.1 ppm (Vacated) Ceiling: 1 mg/m ³ Ceiling: 1 mg/m ³	IDLH: 2 ppm Ceiling: 0.1 ppm Ceiling: 1 mg/m ³
Potassium iodide	TWA: 0.01 ppm		

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Iodine	Ceiling: 1.0 mg/m ³ Ceiling: 0.1 ppm	Peak: 1 mg/m ³ Peak: 0.1 ppm	CEV: 0.1 ppm CEV: 1 mg/m ³

NIOSH IDLH: Immediately Dangerous to Life or Health**Personal Protective Equipment****Eye/face Protection**

Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166

Skin and body protection

Wear appropriate protective gloves and clothing to prevent skin exposure

Respiratory Protection

Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State

Liquid

Appearance

Yellow-orange

odor

No information available

Odor Threshold

No information available.

pH

No information available.

Vapor Pressure

No information available.

Vapor Density

No information available.

Viscosity

No information available.

Boiling Point/Range

No information available.

Melting Point/Range

No information available.

Decomposition temperature

No information available.

Flash Point

No information available.

Evaporation Rate

No information available.

Specific Gravity

No information available.

Solubility

No information available.

log Pow

No data available

10. STABILITY AND REACTIVITY

Stability

Stable under normal conditions.

Conditions to Avoid

Incompatible products

Incompatible Materials

Strong oxidizing agents

Hazardous Decomposition Products	None under normal use
Hazardous Polymerization	Hazardous polymerization does not occur
Hazardous Reactions .	None under normal processing.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Iodine	14 g/kg (Rat)	220 mg/kg (rat)	Not listed

Irritation	No information available.
Toxicologically Synergistic Products	No information available.
Chronic Toxicity	
Carcinogenicity	There are no known carcinogenic chemicals in this product
Sensitization	No information available.
Mutagenic Effects	No information available.
Reproductive Effects	No information available.
Developmental Effects	No information available.
Teratogenicity	No information available.
Other Adverse Effects	The toxicological properties have not been fully investigated.
Endocrine Disruptor Information	No information available

12. ECOLOGICAL INFORMATION

Ecotoxicity

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Iodine	Not listed	Oncorhynchus mykiss: LC50 = 1,7 mg/l/96 h	Not listed	EC50 = 0,2 mg/l/48 h
Potassium iodide	Not listed	Onchorhynchus mykiss: LC50: 3200 mg/L/120h	Not listed	Not listed

Persistence and Degradability No information available

Bioaccumulation/ Accumulation No information available

Mobility No information available

Component	log Pow
Iodine	2.49
Potassium iodide	0.04

13. DISPOSAL CONSIDERATIONS

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification

14. TRANSPORT INFORMATION

DOT Not regulated

TDG Not regulated

IATA Not regulated

IMDG/IMO Not regulated

15. REGULATORY INFORMATION

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	CHINA	KECL
Iodine	X	X	-	231-442-4	-		X	-	X	X	KE-21023 X
Potassium iodide	X	X	-	231-659-4	-		X	X	X	X	KE-29149 X

Legend:

X - Listed

E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.

F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.

N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.

P - Indicates a commenced PMN substance

R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.

S - Indicates a substance that is identified in a proposed or final Significant New Use Rule

T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.

XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B)).

Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.

Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313
Not applicable

SARA 311/312 Hazardous Categorization

Acute Health Hazard	No
Chronic Health Hazard	No
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act
Not applicable

Clean Air Act
Not applicable

OSHA
Not applicable

CERCLA
Not Applicable

California Proposition 65
This product does not contain any Proposition 65 chemicals.

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Iodine	X	X	X	-	X

U.S. Department of Transportation

Reportable Quantity (RQ):	N
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class

D2B Toxic materials

**16. OTHER INFORMATION**

Prepared By Regulatory Affairs
Remel
Tel: 1-800-255-6730

Print Date 30-Jun-2010

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End of MSDS