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

MEMORANDUM FOR: Lieutenant Commander Jeffrey Shoup, NOAA
Commanding Officer, NOAA Ship *Nancy Foster*

FROM: Captain Anne K. Lynch, NOAA
Commanding Officer, NOAA Marine Operations Center-Atlantic

SUBJECT: Project Instruction for NF-14-05
EPA Dam Neck, VA

Attached is the final Project Instruction for NF-14-05, EPA Dam Neck, VA, which is scheduled aboard NOAA Ship *Nancy Foster* during the period of May 19 to May 27, 2014. Of the 9 DAS scheduled for this project, 9 days are funded by EPA. 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.

Attachment

cc:
MOA1

EPA Region 3 Final Project Instructions

Date Submitted: May 2, 2014

Platform: NOAA Ship *Nancy Foster*

Project Number: NF-14-05

Project Title: EPA Region 3 Norfolk Ocean Disposal Site, Coastal Eutrophication, and Ocean Acidification Study

Project Dates: May 19th, 2014 – May 27th, 2014

Prepared by: _____ Dated: 5-5-14
Renee Searfoss
Chief Scientist
EPA Region 3

Approved by: _____ Dated: 5/5/14
John R. Pomponio
Director
Environmental Assessment and Innovation Division

Approved by: _____ Dated: 5/16/14
Captain Anne K. Lynch, NOAA
Commanding Officer
Marine Operations Center - Atlantic

I. Overview

A. Brief Summary and Project Period

Below is a brief summary of each of the operations intended on being implemented during Region 3's time aboard *Nancy Foster*. The project period is from May 19th through the 27th, including time associated with ship transit, mobilizing, and demobilizing.
Mobilization Date: 20 May 2014
Mobilization Time: 1400
Location: Norfolk, VA
*Due to the 5.5 to 6 hour commute from Philadelphia to Norfolk, combined with cuts in travel funding, the scientists will be driving south to meet the ship on the morning of mobilization.

Planned Survey Duration (days): 3
Allowable Weather/Breakdown Days: 2
Demobilization Date: 25 May 2014
Demobilization Time: 1400
Location: Norfolk, VA

Prioritization of the projects is listed in order of most important to least important. Therefore, the collection of sediment samples and water samples at the Norfolk Ocean Disposal Site is the most important aspect of this survey and must be completed prior to considering moving along the coast to collect the nutrient samples (lower priority) and/or the ocean acidification samples (lowest priority). The order of the stations can be discussed with the ship crew and chief scientist either prior to the survey or immediately after mobilization.

I. **Norfolk Ocean Disposal Site Survey**

The objective is to continue the monitoring of the biennial survey of the Norfolk Ocean Disposal Site, used for the disposal of dredged material from reaches other than Army Corps maintained channels, located southeast of the mouth of the Chesapeake Bay and approximately 10-30 nautical miles off the coast of Virginia. The survey is part of a requirement for use of the site under the Site Management and Monitoring Plan required under the Water Resources Development Act.

II. **Coastal Eutrophication**

Region 3 continues to collect water quality samples along the Mid-Atlantic Bight. Almost 30 years' worth of data have been collected and will be utilized to determine whether any long term statistically significant changes in nutrient concentrations can be noted. This data is being prepared as part of a Region 3 State of the Oceans report and will be available to the public once the report goes through the peer review process.

III. **Ocean Acidification Study**

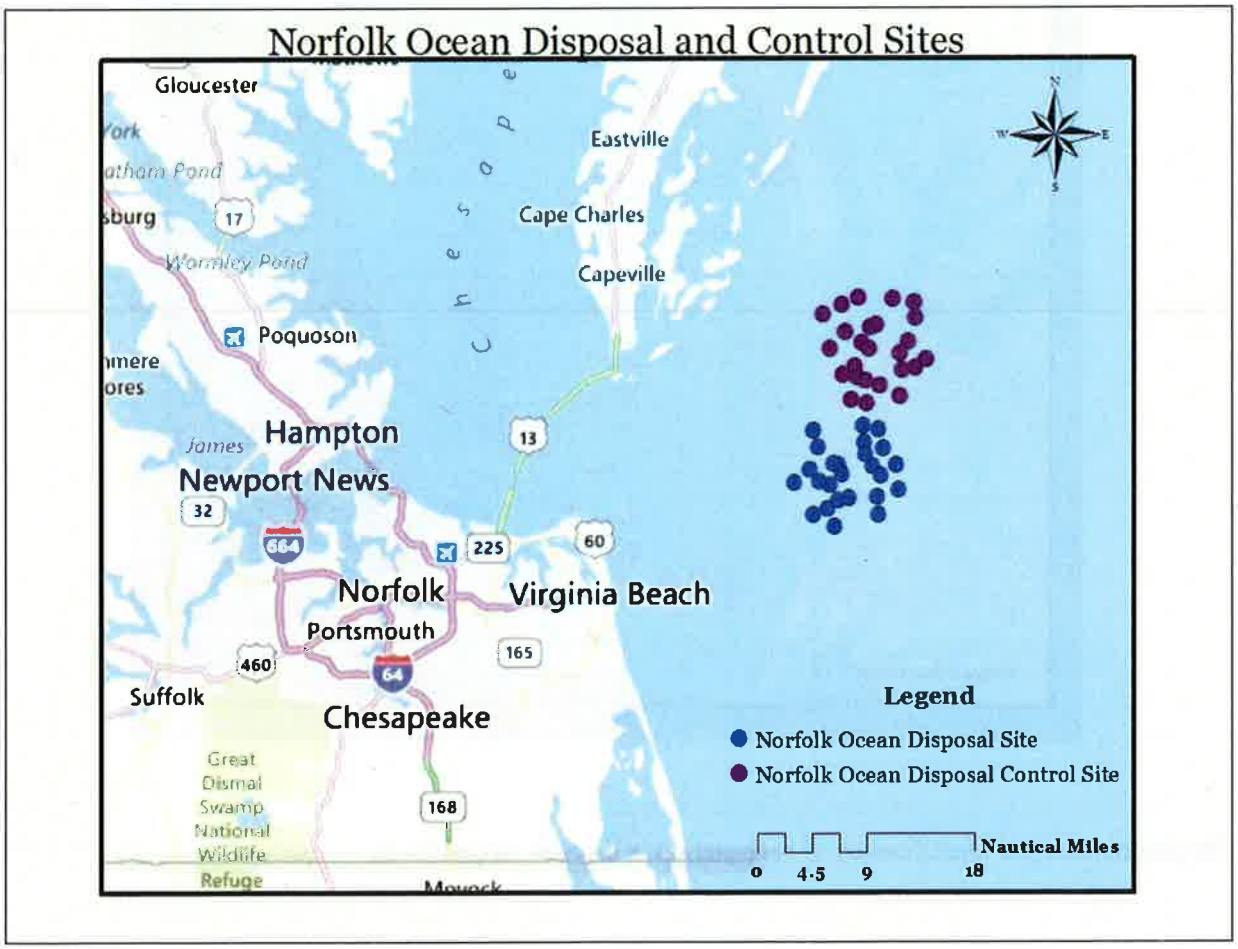
The ocean plays an important role in regulating the amount of carbon dioxide in the atmosphere. As atmospheric concentrations increase, the ability for the ocean to absorb more carbon dioxide decreases. Surface, mid-thermocline, and bottom samples will be collected along three identified transects. The objective is to collect baseline data for pH in the Mid-Atlantic Bight near the mouth of the Delaware and Chesapeake Bays in addition to select nutrient stations.

B. Service Level Agreements

Ship time is program funded through EPA HQ and all analytical tests associated with the water and sediment samples will be funded by EPA HQ through two different contracts.

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

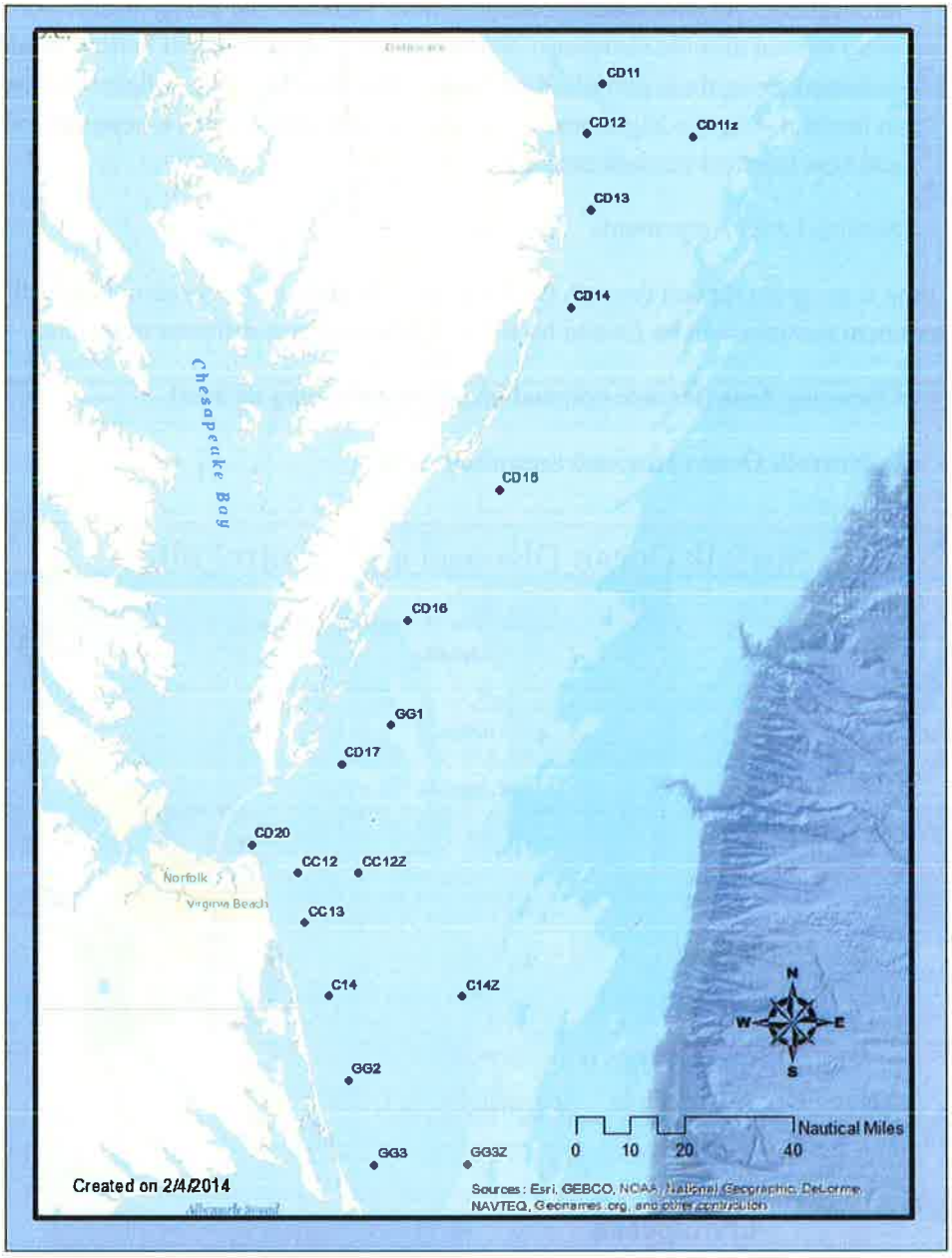
I. **Norfolk Ocean Disposal Sampling Area**



*The locations on the Norfolk ocean disposal map are for reference only and do not reflect the actual locations of the sampling points for this survey. The actual coordinates are located in Appendix A.

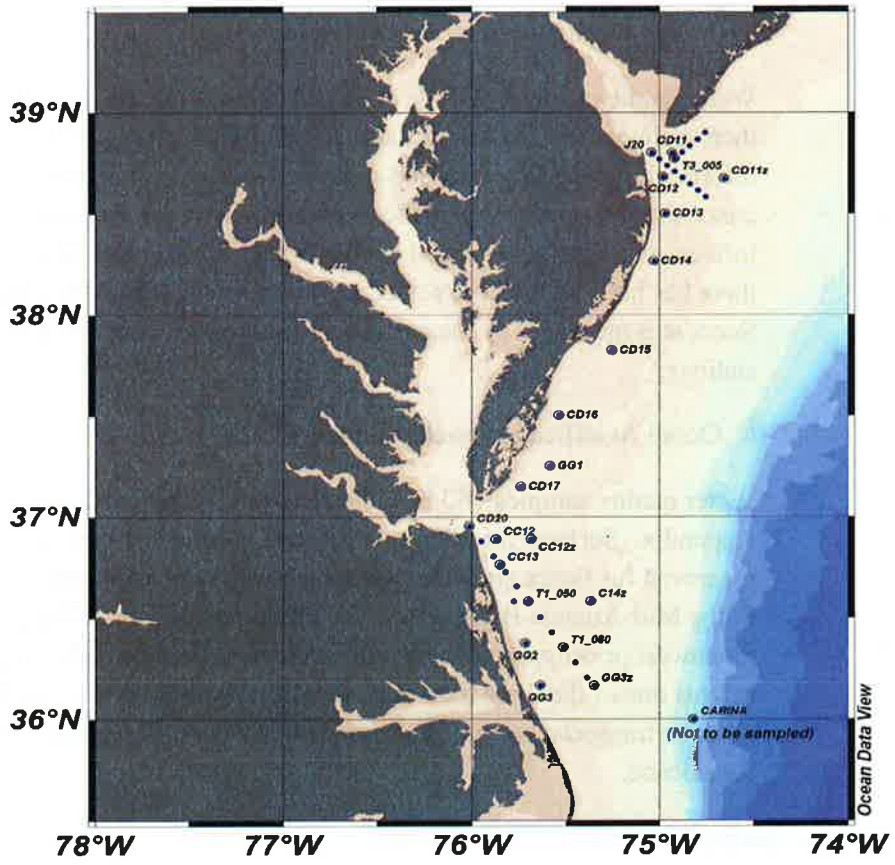
II. **Coastal Eutrophication Locations**

Mid-Atlantic Bight Nutrient Stations



The coordinates and identification of each station is listed in Appendix B.

III. **Ocean Acidification Study**



The coordinates and identification of each station is listed in Appendix C.

D. Summary of Objectives

I. Collect data in order of highest to lowest priority:

a. Norfolk Ocean Disposal Site (water and sediment samples)

The objective of the data collection at the Norfolk disposal site is to collect sediment samples for total organic carbon, metals, grain size and benthic organisms. Water quality parameters are also recorded at the site. This data will be compared to data collected 2 years ago at this site to determine if the conditions at the site are degrading as a result of the placement of dredge material. If degradation is detected, environmental management decisions will need to be made regarding the use of the site and the protection against further degradation. Success is measured by collecting all 50 samples at the approximate locations for further analysis.

b. Coastal Eutrophication (water samples)

Water quality samples will be collected at the surface and middle of the thermocline along the Mid-Atlantic Bight. These samples provide EPA with information regarding total and dissolved nutrient concentrations. These concentrations can help provide the Agency with information regarding estuarine influences on the near coastal environment. It also helps in determining whether there has been an increase or decrease in nutrient concentrations over the years. Success is measured by the collection of all of the samples at the identified stations.

c. Ocean Acidification (water samples)

Water quality samples will be collected at the meter increments identified in the Appendix. Surface, mid-thermocline, and bottom samples will be collected and preserved for future analysis. The objective is to create baseline data of the pH of the Mid-Atlantic Bight waters for future comparison. This project is ranked as the lowest priority, so success will be characterized as collecting information for at least one of the three transects. Ideally, it would be beneficial to collect data in all three transects, but time and weather will most likely make that determination for science.

E. Participating Institutions

The U.S. Environmental Protection Agency.

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

Name (Last, First)	**Title**	**Date Aboard**	**Date Disembark**	**Gender**	**Affiliation**	**Nationality**
Renee Searfoss	Chief Scientist	05-20-14	05-25-2014	F	EPA	American
Rome Arquines	Scientist	05-20-14	05-25-2014	M	EPA	American
Bill Richardson	Scientist	05-20-14	05-25-2014	M	EPA	American
David Talley	Scientist	05-20-14	05-25-2014	M	EPA	American
David Rider	Scientist	05-20-14	05-25-2014	M	EPA	American
Sherilyn Morgan	Scientist (second in command)	05-20-14	05-25-2014	F	EPA	American
Rose Krakowiak	Scientist	05-20-14	05-25-2014	F	Student	American
Cathleen Van Osten	Scientist	05-20-14	05-25-2014	F	EPA	American

Ken Hendrickson	Scientist	05-20-14	05-25-2014	M	EPA	American
Jason Grear	Scientist	05-20-14	05-25-2014	M	EPA	American

G. Administrative

1. Points of Contacts:

I. Renee Searfoss, Chief Scientist
1650 Arch St. Philadelphia, PA 19103
215-814-2137
Searfoss.renee@epa.gov

II. Sherilyn Morgan, Second in Command
1650 Arch St. Philadelphia, PA 19103
215-814-2786
Morgan.sherilyn@epa.gov

III. LT Colin Kliewer, Operations Officer
NOAA Ship *Nancy Foster*
439 W York Street
Norfolk, VA 23510

2. Diplomatic Clearances

This project involves Marine Scientific Research in waters under the jurisdiction of the United States of America. Diplomatic clearance is not necessary.

3. Licenses and Permits

None of these projects require any state or federal permits.

II. Operations

A. Project Itinerary

Date	Time	Activity
5/19/14	tbd	*Nancy Foster* departs Moorehead City, North Carolina
5/20/14	1400	EPA Scientific crew arrives in Norfolk, Virginia and embarks on *Nancy Foster*
5/20/14	1700	Leave Norfolk, Virginia
		Transit to Norfolk ocean disposal site
		Complete welcome aboard/ risk management / health and safety briefings
5/20/14	2100	Begin Norfolk ocean disposal sample collection
5/22/14	0400	Finish NODS sample collection
5/22/14	0430	Begin transit to collect nutrient and ocean acidification samples Collect nutrient samples and ocean acidification samples
5/25/14	1030	Head into port
05/25/14	1400	Arrive in Norfolk, Virginia and disembark scientific crew
5/25/14	1600	*Nancy Foster* departs Norfolk, Virginia

B. Staging and Destaging

Staging and destaging should be relatively simple. The most cumbersome device brought on board will be the Van Veen sediment sampler. This is typically brought up the gangway unless NOAA directs EPA otherwise. All other pieces of equipment are brought onboard by hand, including sampling jars and travel bags. Staging will take approximately 1 – 1.5 hours.

Destaging is similar to staging and should also take approximately 1.5 – 2 hours, due to the heavy nature of all of the samples.

C. Operations to be Conducted

Norfolk Ocean Disposal Site Survey

1. A total of fifty (50) locations will be sampled at the disposal (study) site and the designated control site. Sediment samples will be collected for the following analyses: grain size, total organic carbon (TOC), metals, and benthics. A minimum of two sediment grabs will be collected at each sampling location for sediment. A minimum of 7cm of sediment in the Van Veen is considered an acceptable sample for the benthic sample. Sediment <7cm will be used for the other analyses. Multiple drops will be deployed until 7cm or greater is collected, or until a decision is made to move the station location.

2. A Hydrocast will also be performed at 10-20% of the randomly selected locations within each of the two study areas to determine physical/chemical water quality characteristics in the water column.

Coastal Eutrophication Locations

1. A series of coastal stations will be sampled from the North Carolina border to southern New Jersey. This project includes water quality samples only. Surface and samples in the middle of the thermocline (determined by each watch captain) will be collected at each of the stations to support and determine long-term nutrient trends. Hydrographic profiles will also be conducted and recorded at each station. Most of the stations are located approximately three miles away from the coastline, with the exception of four sample locations (control sites) that are situated approximately 20 miles off the coast. The offshore samples are used to determine background concentrations.

Ocean Acidification Study

1. Three transect areas for ocean acidification have been identified. This project includes water quality samples only. The transects are numbered by order of priority, the first being the highest priority. Surface, mid-thermocline samples, and bottom samples will be collected at each of the locations along the transect. Hydrographic profiles will also be conducted and recorded at each station.

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.

No dives are planned for this project.

E. Applicable Restrictions

EPA will follow the sea state and operating protocol that NOAA has in place for its vessels as the guidelines for all EPA operations while out to sea.

III. Equipment

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

a. CTD (with capabilities for recording temperature, depth, salinity, dissolved oxygen (mg/L), pH), including rosette, niskin bottles, and ability to observe and record data electronically
b. Winch operator
c. Assistance with CTD operations
d. Large freezer for samples
e. Large refrigerator for samples
f. A protected area to store 10 to 12 large Tupperware totes containing samples

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

a. Van Veen sediment sampler
b. Support stand for sediment sampler
c. Associated weights for sampler
d. All sampling will be done by scientists
e. All supplies will be provided by scientists
f. Assistance with CTD operations
g. YSIs (6600 series)
h. PPE
i. Judgment calls on what is a "good sample"
j. Distilled deionized water

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 the anticipated quantity brought aboard, MSDS and appropriate neutralizing agents, buffers, or absorbents in amounts adequate to address spills of a size equal to the amount of chemical brought aboard, and a chemical hygiene plan. Documentation regarding those requirements will be provided by the Chief of Operations, Marine Operations Center, upon request.

Per FEC 07, the scientific party will include with their project instructions and provide to the CO of the respective ship 60 to 90 days before departure:

- A list of hazardous materials by name and anticipated quantity

  EPA Region 3 will be bringing no more than 300 mL of mercuric chloride on board as a fixative for the ocean acidification samples.

  EPA Region 3 will also be bringing approximately 20 one gallon containers of NOTOXhisto. NOTOXhisto is an aqueous alcohol solution used as a fixative with relative minor hazards. http://www.scientificdevice.com/notoxhisto/

- Include a chemical spill plan the addresses all of the chemicals the program is bringing aboard. This shall include:
  - Procedures on how the spilled chemicals will be contained and cleaned up.
  - A complete inventory (including volumes/amounts) of the chemical spill supplies and equipment brought aboard by the program. This must be sufficient to clean and neutralize all of the chemicals brought aboard by the program.
  - A list of the trained personnel that will be accompanying the project and the training they've completed.

The EPA Region 3 spill response plan, designated cleanup crew and MSDSs for both mercurial chloride and NOTOXhisto are included in Appendices D, E, and F. A mercury spill pack containing pumps and neutralizing agents will also be brought on board by EPA Region 3 in the event that there is a spill.

Upon embarkation and prior to loading hazardous materials aboard the vessel, the chief scientist 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.

Upon departure from the ship, the chief scientist will provide the CO or their designee an inventory of hazardous material indicating all materials have been used or removed from the vessel. The CO's designee will maintain a log to track scientific party hazardous materials. MSDS will be made available to the ship's complement, in compliance with Hazard Communication Laws.

Scientific parties are expected to manage and respond to spills of scientific hazardous materials. Overboard discharge of scientific chemicals is not permitted during projects aboard NOAA ships.

B. Radioactive Isotopes

EPA Region 3 does not work with, nor will they be bringing any radioactive isotopes onto the vessel.

V. Additional Projects

There are no additional projects during this survey that the Region is aware of.

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*

EPA requests that all electronic data collected by the ship's CTD be accessible and transferred to EPA via a cd/dvd at the end of the survey.

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.omao.noaa.gov/fleeteval.html and provides a "Submit" button at the end.

The Customer Satisfaction Survey is one of the primary methods OMAO and Marine Operations (MO) utilize to improve ship customer service. Information submitted through the form is automatically input into a spreadsheet accessible to OMAO and MO management for use in preparing quarterly briefings. Marine Operations Centers (MOC) address concerns and praise with the applicable ship. Following the quarterly briefings the data are briefed to the Deputy Director of OMAO.

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 survey.

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

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

that the ship becomes uninhabitable and/or the galley is closed during any part of the scheduled project.

All persons boarding NOAA vessels give implied consent to comply with all safety and security policies and regulations which are administered by the Commanding Officer. All spaces and equipment on the vessel are subject to inspection or search at any time. All personnel must comply with OMAO's Drug and Alcohol Policy dated May 7, 1999 which forbids the possession and/or use of illegal drugs and alcohol aboard NOAA Vessels.

B. Medical Forms and Emergency Contacts

The NOAA Health Services Questionnaire (NHSQ, Revised: 02 JAN 2012) must be completed in advance by each participating scientist. The NHSQ can be obtained from the Chief Scientist or the NOAA website http://www.corporateservices.noaa.gov/~noaaforms/eforms/nf57-10-01.pdf. The completed form should be sent to the Regional Director of Health Services at Marine Operations Center. The participant can mail, fax, or scan the form into an email using the contact information below. The NHSQ should reach the Health Services Office no later than 4 weeks prior to the project to allow time for the participant to obtain and submit additional information that health services might require before clearance to sail can be granted. Please contact MOC Health Services with any questions regarding eligibility or completion of the NHSQ. Be sure to include proof of tuberculosis (TB) testing, sign and date the form, and indicate the ship or ships the participant will be sailing on. The participant will receive an email notice when medically cleared to sail if a legible email address is provided on the NHSQ.

Contact information:

Regional Director of Health Services
Marine Operations Center – Atlantic
439 W. York Street
Norfolk, VA 23510
Telephone 757-441-6320
Fax 757-441-3760
E-mail 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

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

D. Communications

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

E. IT Security

Any computer that will be hooked into the ship's network must comply with the OMAO Fleet IT Security Policy prior to establishing a direct connection to the NOAA WAN. This policy applies to all operating systems. Requirements include, but are not limited to:

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

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

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

F. Foreign National Guests Access to OMAO Facilities and Platforms

No foreign nationals are participating in this project.

Appendices

A. Norfolk Ocean Disposal Coordinates

B. Nutrient Sample Locations

C. Ocean Acidification Station Locations

D. Spill Plan for Mercuric Chloride

E. MSDS for Mercuric Chloride

F. MSDS for NOTOXhisto

G. EPA Chain of Command and Emergency Notification

Appendix A				
2014 Norfolk Ocean Disposal Site Coordinates				
Sample ID	degrees W	decimal minutes	degrees N	decimal minutes
NODS 1	75	36.178352	36	56.853009
NODS 2	75	39.451713	36	57.159235
NODS 3	75	39.259173	36	57.968099
NODS 4	75	41.967645	37	1.21704
NODS 5	75	38.104474	36	56.252875
NODS 6	75	39.823079	36	57.486082
NODS 7	75	43.533397	36	58.611051
NODS 8	75	40.283026	37	1.967814
NODS 9	75	35.937596	36	58.321596
NODS 10	75	42.926328	36	59.217429
NODS 11	75	39.2217	37	0.01713
NODS 12	75	37.880023	37	2.207595
NODS 13	75	37.699798	36	58.257602
NODS 14	75	41.624702	36	56.5134
NODS 15	75	42.345603	37	0.01713
NODS 16	75	36.938847	37	0.62481
NODS 17	75	37.920073	37	2.783017
NODS 18	75	42.625953	36	58.081612
NODS 19	75	38.901299	37	1.744008
NODS 20	75	35.917571	36	59.697267
NODS 21	75	36.578397	36	59.201433
NODS 22	75	43.366879	36	57.345579
NODS 23	75	40.242976	36	59.457354
NODS 24	75	34.736095	36	58.417587
NODS 25	75	34.255495	36	59.809221
NODCS 1	75	35.494691	37	10.930225
NODCS 2	75	41.238456	37	7.508857
NODCS 3	75	37.772043	37	10.865998
NODCS 4	75	34.890084	37	5.531962
NODCS 5	75	32.854574	37	8.328292
NODCS 6	75	37.268204	37	7.573131
NODCS 7	75	38.759568	37	8.633535
NODCS 8	75	34.507166	37	7.701678
NODCS 9	75	34.345938	37	8.922692

NODCS 10	75	40.492774	37	4.808493
NODCS 11	75	38.920796	37	10.320029
NODCS 12	75	35.393923	37	6.239242
NODCS 13	75	37.207743	37	3.489875
NODCS 14	75	37.328665	37	6.142802
NODCS 15	75	36.703904	37	4.679864
NODCS 16	75	31.987971	37	6.753559
NODCS 17	75	34.063788	37	5.451582
NODCS 18	75	38.134807	37	8.231896
NODCS 19	75	37.5302	37	9.115454
NODCS 20	75	36.744212	37	7.76595
NODCS 21	75	40.250931	37	7.380304
NODCS 22	75	37.651122	37	4.840649
NODCS 23	75	40.432313	37	8.681729
NODCS 24	75	35.09162	37	10.07914
NODCS 25	75	32.632885	37	7.990896

Appendix B				
2014 Nutrient Coordinates				
Sample ID	Degrees W	Decimal Minutes	Degrees N	Decimal Minutes
GG3z	75	21.00	36	10.00
GG3	75	38.20	36	10.00
GG2	75	43.00	36	22.50
C14z	75	22.00	36	35.00
C14	75	46.60	36	35.00
CC13	75	51.00	36	45.80
CC12z	75	41.12	36	53.13
CC12	75	52.20	36	53.10
CD20	76	0.70	36	57.20
CD17	75	44.20	37	9.10
GG1	75	35.00	37	15.00
CD16	75	32.00	37	30.10
CD15	75	15.00	37	49.40
CD14	75	1.90	38	15.90
CD13	74	58.20	38	30.00
CD12	74	58.90	38	41.00
J20	75	2.60	38	48.20
CD11z	74	39.40	38	40.50
CD11	74	56.00	38	48.10

Appendix C				
2014 Ocean Acidification Coordinates				
Sample ID	**Degrees W**	**Decimal Minutes**	**Degrees N**	**Decimal Minutes**
.CD20	76	41.976	36	57.1998
T1_010	75	56.9532	36	52.7094
T1_020	75	53.196	36	48.237
T1_030	75	49.4442	36	43.7628
T1_040	75	45.6996	36	39.2862
T1_050	75	41.964	36	34.8078
T1_060	75	38.2344	36	30.3276
T1_070	75	34.512	36	25.8456
T1_080	75	30.7968	36	21.3612
T1_090	75	27.0888	36	16.875
T1_100	75	23.3862	36	12.387
T1_110	75	21.0096	36	9.9396
T1_120	75	15.58769	36	6.82679
T1_130	75	10.17264	36	3.709139
T1_140	75	4.764539	36	0.58674
GG3z	75	21.0006	36	10.0002
J20	75	2.5998	38	48.1998
T2_005	75	0.1248	38	46.3182
T2_010	74	57.6528	38	44.4354
T2_015	74	55.1826	38	42.5514
T2_020	74	52.7142	38	40.6668
T2_025	74	50.2476	38	38.7816
T2_030	74	47.7834	38	36.8952
T2_035	74	45.3222	38	35.0082
T3_005	74	55.239	38	46.3644
T3_010	74	52.824	38	48.2928
T3_015	74	50.4054	38	50.22
T3_020	74	47.9862	38	52.1466
T3_025	74	45.564	38	54.072

APPENDIX D

SPILL PREVENTION AND CONTAINMENT PLAN

MERCURIC CHLORIDE ($HgCl_2$)

Activity Location: *Nancy Foster*, at sea.
Primary Contact on Board for implementation of this plan: Renee Searfoss
Secondary Contact on Board: Jason Grear

A small quantity (<300 ml) of a saturated solution of mercuric chloride ($HgCl_2$) will be brought on board for preservation of seawater samples collected during the May 20th – May 25th, 2014 survey.

Spill Prevention

Work Area: All handling of $HgCl_2$ will be conducted under the hood on board the *Nancy Foster*. The $HgCl_2$ will be contained in primary and secondary containment unless in use. Absorbant sponges and paper towels will be maintained in ample supply at all times. All containers containing $HgCl_2$ will be properly labeled. Material Safety Data Sheets will be available for review in the work area by all survey staff.

Work Procedure:

Anyone handling the mercuric chloride is required to wear nitrile gloves, chemical goggles, and the proper work attire at all times.

Dissolved Inorganic Carbon and Total Alkalinity
Sample bottles will be carried to the designated area (i.e., with secondary containment) and preserved with mercuric chloride ($HgCl_2$). This will be achieved by adding a volume of saturated $HgCl_2$ that is equivalent to 0.02 – 0.05% of the total sample volume. For the 40 mL DIC sample, this will be 8-20 uL; for the 120 mL TA sample, this will be 24 – 60 uL (about 1 drop). A dispenser will be set up in advance to produce these volumes. All staff involved in handling of the preservative will have been properly briefed on safe handling, proper PPE, and locations of MSDS and the spill prevention and control plan. The bottles will be tightly capped, taking care not to overtighten the septum vial caps. Each bottle will be labeled and stored upright in low light refrigeration (2-6 °C).

Inspections: The work area and spill prevention equipment will be inspected by the watch captain before and after each sample station is visited. At the end of work at each sampling station (ten times per transect with three transects), primary and secondary containment will be checked to ensure that all containers are closed and secured. After arriving on board and prior to leaving the ship, the watch captains will inspect the integrity of all containers containing $HgCl_2$ and check for leaks and proper labeling.

Spill Response: Responders are required to wear nitrile gloves, chemical goggles, and the proper work attire during the clean up. A spill response kit and will be provided which contains absorbent material and a container to store the hazardous waste for disposal.

End of Survey: At the end of the survey (May 25, 2014), all $HgCl_2$ brought on board by EPA Region 3 will be removed from the ship.

Training: Discussions on the handling and use of the chemical will be discussed at the science meeting one month prior to the survey. Once on the ship, all science will be trained in the proper handling of $HgCl_2$, spill prevention, response, and notification procedures. In addition, the spill responders will be OSHA 40 hour Hazardous Waste Operations and Emergency Response certified.

Personal Protective Equipment: Science will wear chemical goggles and nitrile gloves while using mercuric chloride to protect against splash hazards.

APPENDIX E

MSDS FOR MERCURIC CHLORIDE

MATERIAL SAFETY DATA SHEET

MERCURIC CHLORIDE, 1:10,000
CAROLINA BIOLOGICAL

Revised: 15/05/08
Replaces: 10/07/07
Printed: 20/05/08

1. PRODUCT DESCRIPTION

Product Name: Mercuric Chloride
Product Code(s): 87-4463
Size: 500ml
Chemical Name: Mercuric Chloride
CAS Number: 7487-94-7
Formula: HgCl2
Synonyms: Mercury (II) chloride; mercury bichloride; mercury perchloride
Distributor: Carolina Biological Supply Company
2700 York Road
Burlington, NC 27215
Chemical Information: 800-227-1150 (8am-5pm (ET) M-F)
Chemtrec (Transportation Spill Response 24 hours): 800-424-9300

2. COMPOSITION/INFORMATION ON INGREDIENTS

Principle Hazardous Components: Mercury bichloride(7487-94-7) 98-100%
TLV and PEL units: ACGIH-TLV 0.1 mg/m3(TWA)
OSHA-PEL 0.1 mg/m3(TWA)

3. HAZARD IDENTIFICATION

Emergency Overview: Causes severe irritation. May be fatal if swallowed,
inhaled, or absorbed through skin.
Potential Health Effects:
Eyes: May cause irritation.
Skin: May cause irritation.
Ingestion: May cause gastrointestinal discomfort.
Inhalation: May cause irritation to respiratory tract.

4. FIRST AID MEASURES

Emergency and First Aid Procedures:
Eyes - Flush with water for at least 15 minutes, raising and lowering eyelids occasionally. Get medical attention if irritation persists.
Skin - Thoroughly wash exposed area for at least 15 minutes. Remove contaminated clothing. Launder contaminated clothing before reuse. Get medical attention if irritation persists.
Ingestion - Do not induce vomiting. If swallowed, if conscious, give plenty of water immediately and call a physician or poison control center. Never give anything by mouth to an unconscious person.
Inhalation - Remove to fresh air. Give oxygen if breathing is difficult; give artificial respiration if breathing has stopped. Keep person warm, quiet, and get medical attention.

5. FIREFIGHTING PROCEDURES

Flash Point(Method Used): N/A
NFPA Rating: Health: 3
Fire: 0
Reactivity: 0
Extinguisher Media:
Use media suitable to extinguish surrounding fire.
Flammable Limits in Air % by Volume: N/A
Autoignition Temperature: N/A
Special Firefighting Procedures:
Firefighters should wear full protective equipment and NIOSH approved

self-contained breathing apparatus.
Unusual Fire and Explosion Hazards:
Closed containers exposed to heat may explode

6. SPILL OR LEAK PROCEDURES

Steps to be Taken in Case Material is Released or Spilled:
Ventilate area of spill. Eliminate all sources of ignition. Remove all non-essential personnel from area. Clean-up personnel should wear proper protective equipment and clothing. Absorb material with suitable absorbent and containerize for disposal.

7. SPECIAL PRECAUTIONS

Precautions to be Taken in Handling or Storing: Keep container tightly closed. Store in secure poison area.
Other Precautions: Keep product out of light. Isolate from incompatible
materials

8. SPECIAL PROTECTION INFORMATION

Respiratory Protection(Specify Type):
A NIOSH/MSHA chemical cartridge respirator should be worn if PEL or TLV is exceeded.
Ventilation:
Local Exhaust: Yes
Mechanical(General): Yes
Special: No
Other: no
Protective Gloves:
Rubber, neoprene, PVC, or equivalent.
Eye Protection:
Splash proof chemical safety goggles should be worn at all times.
Other Protective Clothing or Equipment:
Lab apron, eye wash, and safety shower.

9. PHYSICAL DATA

Molecular Weight:	271.50
Melting Point:	277 C (530 F) (at 760 MM HG)
Boiling Point:	302 C (575 F) (at 760 MM HG)
Vapor Pressure:	N/A
Vapor Density(Air=1):	8.7
Specific Gravity(H2O=1):	5.44 (H2O=1)
Percent Volatile by Volume:	0 (21 C)
Evaporation Rate(H2O=1):	N/A
Solubility in Water:	Moderate (1-10%)
Appearance and Odor:	White crystals or powder, odorless

10. REACTIVITY DATA

Stability: Stable
Conditions to Avoid: Heat, friction, shock
Incompatibility(Materials to Avoid): Strong acids, alkalis, carbonates, strong bases, amines & ammonia, most common metals, bromides, antimony, arsenic, sodium, potassium, metallic salts, albumin, gelatin, tannic acid,
formats, sulfites, hypophosphites, phosphates
Hazardous Decomposition Products: Hydrogen chloride, mercury fumes.
Hazardous Polymerization: Will not occur

11. TOXICITY DATA

Toxicity Data: Oral rat LD50 for Mercury Bichloride 1 mg/kg. Intraperitoneal mouse LD50 for Mercury Bichloride 5 mg/kg. Subcutaneous rat LD50 for Mercury Bichloride 14 mg/kg.
Effects of Overexposure:
Acute: See section 3
Chronic: Mercury build-up in the brain, liver, & kidneys, headache,
shakes, loose teeth, loss of appetite, skin ulceration, impaired memory.
Conditions Aggravated by Overexposure: Inhalation; may be fatal. Irritation of upper respiratory .
Target Organs: Central nervous system, liver, kidneys, respiratory system,
lungs, eyes, skin, GI tract
Primary Route(s) of Entry: Inhalation, ingestion, skin contact, eye contact,
absorption.

12. ECOLOGICAL DATA

EPA Waste Numbers: D009, U151, D002

13. DISPOSAL INFORMATION

Waste Disposal Methods: Dispose in accordance with all applicable Federal,
State and Local regulations.
Always contact a permitted waste disposer (TSD) to assure compliance.

14. TRANSPORT INFORMATION

Description: Mercuric Chloride, 6.1, UN1624, II

15. REGULATORY INFORMATION

EPA TSCA Status: On TSCA Inventory
Hazard Category for SARA Section 311/312 Reporting: Acute, Chronic

Product or Components	SARA EHS Sec. 302 TPQ	SARA Sec. 313 Chemicals Name List	Chemical Category	CERCLA Sec. 103 RQ lbs.	RCRA Sec. 261.33
Mercuric Chloride	500/10000	Yes	Yes	1 LB	Yes

16. ADDITIONAL INFORMATION

The information provided in this Material Safety Data Sheet represents a compilation of data drawn directly from various sources available to us. Carolina Biological Supply makes no representation or guarantee as to the suitability of this information to a particular application of the substance covered in the Material Safety Data Sheet. Any employer must carefully assess the applicability of any information contained herein in regards to the particular use to which the employer puts the material.
Glossary
ACGIH.....American Conference of Governmental Industrial Hygienists
CAS Number..Chemical Abstracts Service Number

CERCLA.....Comprehensive Environmental Response, Compensation, and Liability Act
DOT.....U.S. Department of Transportation
IARC.....International Agency of Research on Cancer
mppcf.....million particles per cubic foot
N/A.....Not Available
NTP.....National Toxicology Program
OSHA.....Occupational Safety and Health Administration
PEL.....Permissible Exposure Limit
ppm.....parts per million
RCRA.....Resource Conservation and Recovery Act
SARA.....Superfund Amendments and Reauthorization Act
TLV.....Threshold Limit Value
TSCA.....Toxic Substances Control Act

APPENDIX F

MSDS FOR NOTOX HISTO

Reviewed October 2011

Section 1. Identity

Product Name: **NOTOXhisto**

Cat#	Description		SDL Prod ID
614-01	NOTOXhisto	1 gallon/pkg	00344
614-05	NOTOXhisto 5 gallon	5 gallon/pkg	00345
614-15	NOTOXhisto 15 ML Containers	50 vials/pkg	00347
614-30	NOTOXhisto 30 ML Containers	50 vials/pkg	00351
614-60	NOTOXhisto 60 ML Containers	50 vials/pkg	00353
614-90	NOTOXhisto 90 ML Containers	50 vials/pkg	00354

Manufacturer/Supplier: Scientific Device Laboratory, 411 Jarvis Avenue, Des Plaines, IL 60018
Phone 847-803-9495

Emergency Information: In case of a chemical emergency, spill, fire, exposure or accident contact Scientific Device Laboratory (847) 803-9495 or CHEMTREC 1-800-424-9300 or 703-527-3887

Section 2. Hazardous Ingredients/Identity Information

Components: Aqueous alcoholic solution with other hydroxlated compounds. (90% non aromatic alcohols)
Product consists of an aqueous solution of stabilizing chemicals.

Section 3. Physical/Chemical Characteristics

Boiling Point: 165°F
Flash Point 118°F
Specific Gravity: 1.044
Vapor Pressure (mmHg): N/A
Vapor Density (AIR=1): N/A
Melting Point: N/A
Evaporation Rate: vd >1
Solubility in H_2O: souble
Appearance: clear
Odor: none
Consists of: aqueous solution of stabilizing chemicals

Section 4. Fire and Explosion Hazard Data

Flash point: 118°F
Flammable limits: unknown
LEL/UEL: N/A
Extinguishing medium: water
Special Fire Fighting Procedures: none found
Unusual Fire and Explosion Hazards: none known

Section 5. Reactivity Data

Stability: stable
Condition to avoid: swallowing
Reagent incompatibility: not known
Hazardous decomposition or By-products: none known

Hazardous polymerization: does not occur

Conditions to avoid: freezing or mixing with organic solvents

Section 6. Health Hazard Data

Routes of entry: ingestion: unknown

Inhalation unknown

Skin: unknown

Ingestion: avoid ingestion

Health Hazards: none known in final concentration

Carcinogenicity: none known

Signs and symptoms of exposure: unknown

Medical conditions aggravated by exposure: unknown

Emergency First Aid Procedures: skin contact: wash hands or area thoroughly for 15 minutes with water and soap. Respiratory: Wash with water

Section 7. Precautions for Safe Handling and Use

Steps to be taken if material is spilled: clean with cloth - Discard in flame retardant receptacle.

Waste Disposal Method: no special treatment, can be discarded down drain barring any local restrictions for alcohol

Precautions to be taken in Handling and Storage: store at room temperature

Other Precautions: none

Section 8. Control Measures

Respiratory Protection: mask preferred

Ventilation: respiratory mask suggested

Protective Gloves: chemical resistant gloves

Protective Clothing: Chemical resistant

Work/Hygiene Practices: good general microbiology techniques

Eye Protection: chemical safety goggles

Section 9. Transportation

UN 1987 Alcohol N.O.S. (Aqueous Ethanol Solutions) Class 3 Group III

Revision History

CR NUMBER	REVISION
0908-001	00
0211-001	01
0511-001	02
0911-007	03

Reviewed October 2011

Section 1. Identity

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614-60	NOTOXhisto 60 ML Containers	50 vials/pkg	00353
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Section 3. Physical/Chemical Characteristics

Boiling Point: 165°F
Flash Point 118°F
Specific Gravity: 1.044
Vapor Pressure (mmHg): N/A
Vapor Density (AIR=1): N/A
Melting Point: N/A
Evaporation Rate: vd >1
Solubility in H_2O: souble
Appearance: clear
Odor: none
Consists of: aqueous solution of stabilizing chemicals

Section 4. Fire and Explosion Hazard Data

Flash point: 118°F
Flammable limits: unknown
LEL/UEL: N/A
Extinguishing medium: water
Special Fire Fighting Procedures: none found
Unusual Fire and Explosion Hazards: none known

Section 5. Reactivity Data

Stability: stable
Condition to avoid: swallowing
Reagent incompatibility: not known
Hazardous decomposition or By-products: none known

Hazardous polymerization: does not occur

Conditions to avoid: freezing or mixing with organic solvents

Section 6. Health Hazard Data

Routes of entry: ingestion: unknown

Inhalation unknown

Skin: unknown

Ingestion: avoid ingestion

Health Hazards: none known in final concentration

Carcinogenicity: none known

Signs and symptoms of exposure: unknown

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Steps to be taken if material is spilled: clean with cloth - Discard in flame retardant receptacle.

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Precautions to be taken in Handling and Storage: store at room temperature

Other Precautions: none

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Respiratory Protection: mask preferred

Ventilation: respiratory mask suggested

Protective Gloves: chemical resistant gloves

Protective Clothing: Chemical resistant

Work/Hygiene Practices: good general microbiology techniques

Eye Protection: chemical safety goggles

Section 9. Transportation

UN 1987 Alcohol N.O.S. (Aqueous Ethanol Solutions) Class 3 Group III

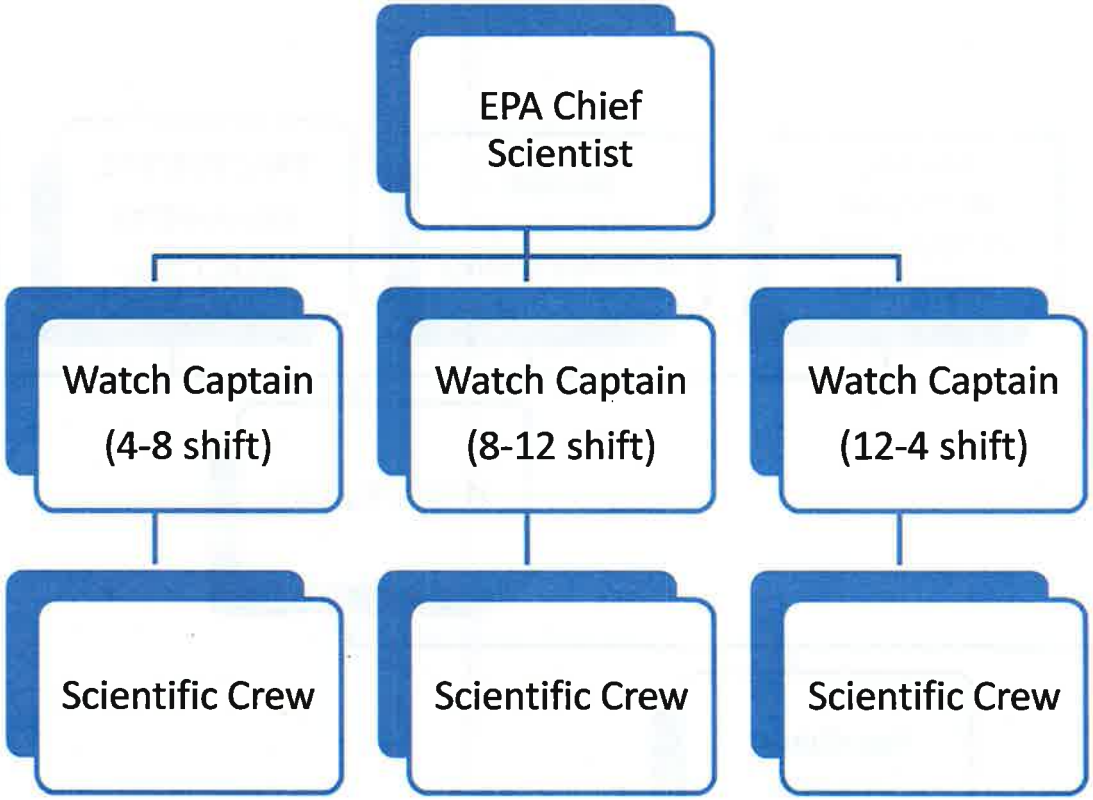
Revision History

CR NUMBER	REVISION
0908-001	00
0211-001	01
0511-001	02
0911-007	03

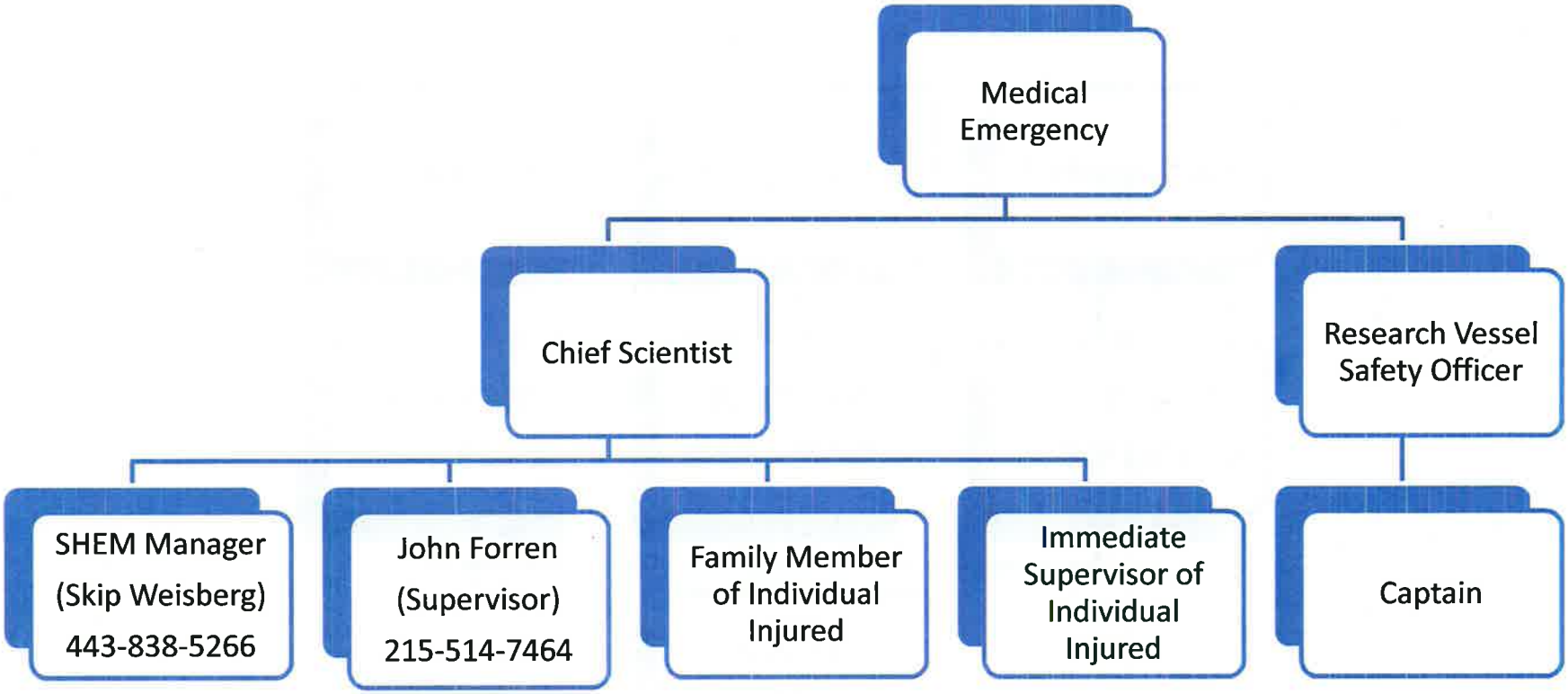
APPENDIX G

EPA CHAIN OF COMMAND AND EMERGENCY NOTIFICATION

EPA Chain of Command



Emergency Notification



-In the event of an emergency, the Chief Scientist and Research Vessel Safety Officer are to be informed immediately

-In the event that the Chief Scientist is injured, the most senior watch captain assumes responsibilities aboard the ship

-the most senior watch captain will be identified during the EPA scientist safety and logistics meeting

-In the event that the injured individual needs to be taken to the hospital, the Chief Scientist and Captain will coordinate logistics to take the injured person to the nearest hospital

-The hospital will be notified of the arrival ahead of time, as well as the emergency point of contact for the injured person so they can meet them at the hospital

-All appropriate medical and workman's comp forms will be sent with the injured individual