FINAL PROJECT INSTRUCTIONS
4 June 2002

NOAA SHIP *RONALD H. BROWN*
Cruise RB-02-05
The New England Air Quality Study

12 July – 10 August 2002

Chief Scientist
Timothy S. Bates

NOAA/Pacific Marine Environmental Laboratory
Ocean Climate Research Division
7600 Sand Point Way, NE
Seattle, Washington 98115

ENDORSEMENTS:

/s/ Eddie N. Bernard

Dr. Eddie N. Bernard
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Director, Marine Center
Norfolk, VA 23510

NOAA RESEARCH CRUISE NEAQS 2002

The New England Air Quality Study

Participating Organizations:

NOAA Pacific Marine Environ. Lab., Seattle, WA	(PMEL)
NOAA Aeronomy Laboratory, Boulder, CO	(AL)
NOAA Environ. Technology Laboratory, Boulder, CO	(ETL)
NOAA Forecast Systems Laboratory, Boulder, CO	(FSL)
NOAA Atlantic Ocean. Met. Lab., Miami, FL	(AOML)
University of New Hampshire, Durham, NH	(UNH)
Mount Washington Observatory, North Conway, NH	(MWO)
University of Washington, Seattle, WA	(UW)
Joint Institute Study Atmosphere Ocean, Seattle, WA	(JISAO)
Cooperative Inst. Res. In Environ. Sci., Boulder, CO	(CIRES)
Georgia Institute of Technology, Atlanta, GA	(GIT)
New Mexico Inst. of Mining & Tech., Socorro, NM	(NMT)
Central Michigan University, Mount Pleasant, Mich.	(CMU)
Western Michigan University, Kalamazoo, MI	(WMU)
Aerodyne Research Inc., Billerica, MA	(Aerodyne)
University of Virginia, Charlottesville, VA	(UVA)
Brookhaven National Lab., Upton, NY	(BNL)

NOAA SHIP: *RONALD H. BROWN*
Cruise No: RB-02-05
Area: East Coast US

Itinerary:

Leg 1:
d. Charleston 12 July 2002
a. Portsmouth 26 July 2002

Leg 2:
d. Portsmouth 29 July 2002
a. Charleston 10 Aug 2002

Cruise Description and Objectives:

NEAQS 2002 is an atmospheric chemistry and meteorology project along the East Coast of the United States from Charleston, SC to the Gulf of Maine. Sampling will be coordinated with ground based sampling in New England. Most of the research will be concentrated in the Boston, MA and Portsmouth, NH region. Sampling aboard *RONALD H. BROWN* will take place continuously with the following goals:

- To characterize sources (local vs. distant), pollutant mix, and reactivity of the boundary layer along the New England seacoast and adjacent waters
- To characterize transport (vertical and horizontal mixing) and transformation processes (day/night chemistry) that affect the levels of ozone and aerosols in the marine boundary layer of the study region,
- To determine how coastal atmospheric dynamic processes (e.g., land breeze – sea breeze circulation) affect air quality in the study region.
- To characterize the chemical composition of regional air masses along the East Coast of the United States.

The proposed research will address significant information gaps and deliver sound science leading to an improved understanding of the processes that influence the air pollution levels in New England.

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Scientific Operations Contact:
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LCDR Brian Lake (206-526-4485)
NOAA/PMEL (R/PMEL)
7600 Sand Point Way N.E., Bldg. 3
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1.0 SCIENTIFIC OBJECTIVES

AIRMAP (Atmospheric Investigation, Regional Modeling, Analysis, and Prediction) is a NOAA Cooperative Institute, a joint collaboration involving researchers in New Hampshire (University of New Hampshire, Plymouth State College, Mount Washington Observatory and the New Hampshire Department of Environmental Services) and NOAA's Aeronomy Laboratory (AL), Forecast Systems Laboratory (FSL), Pacific Marine Environmental Laboratory (PMEL) and Environmental Technology Laboratory (ETL). The primary mission of AIRMAP is to develop a detailed understanding of climate variability and the source of persistent air pollutants in New England. AIRMAP is focused on atmospheric chemical and physical observations in rural and semi-remote areas of New Hampshire with the goal of understanding the interrelationships in regional air quality, meteorology, and climate phenomena. **The New England Air Quality Study (NEAQS)** is an intensive field experiment during the summer of 2002 coordinated through AIRMAP.

The transport of polluted air within the Gulf of Maine plays an important role in shaping the air quality in coastal New England. The source of the polluted air is less clear. Recirculation of pollution from urban areas within New England and long-range transport from the Washington – New York corridor both have to be considered. The conditions in the Gulf are also expected to play a role as the marine boundary layer is expected to act as a huge chemical reactor converting primary pollutants like nitrogen oxides and organics into more-toxic secondary pollutants like ozone and aerosols. An instrumented ship is an ideal way to study the meteorological and chemical processes that are occurring along the coast of New England. A ship can be used to sample polluted air masses as they move offshore, study the chemical transformations in the polluted marine boundary layer, and characterize polluted air masses at they move onshore. Previous attempts to perform these measurements from sites on shore have resulted in data that are difficult to interpret due to contamination by local land-based sources. The operational capabilities, and facilities on *RONALD H. BROWN* make it the ideal platform for these kinds of studies. The availability of an on-board radar wind profiler is particularly important.

The NEAQS objectives of this research cruise are:

- To characterize sources (local vs. distant), pollutant mix, and reactivity of the boundary layer along the New England seacoast and over adjacent waters
- To characterize transport (vertical and horizontal mixing) and transformation processes (day/night chemistry) that affect the levels of ozone and aerosols in the marine boundary layer of the study region
- To determine how coastal atmospheric dynamic processes (e.g., land breeze – sea breeze circulation) affect air quality in the study region, and
- To characterize the chemical composition of regional air masses along the East Coast of the United States.

Anticipated Benefits

The proposed research will address significant information gaps and deliver sound science leading to an improved understanding of the processes that influence the air pollution levels to which the citizens of New England are exposed. More specifically, the proposed research program will advance the understanding of the following:

- The distribution of ozone and aerosols throughout the region.
- The relative importance of local and distant sources to measured pollution levels.
- The interaction between air quality and the weather, and ultimately climate.

The proposed effort will be an integral part of NOAA's effort to develop the tools needed to provide reliable air quality forecasts. The New England area will be an initial test bed for the proposed air quality forecasting system. The routine and intensive data sets will provide a means to evaluate alternative forecast approaches and fine-tune the chemical observing system that will be needed in a nationwide implementation.

2.0 PERSONNEL

2.1 Chief Scientist

Dr. Tim Bates (PMEL)

The Chief Scientist is authorized to alter the scientific portion of this cruise plan with the concurrence of the Commanding Officer, provided that the proposed changes will not: (1) jeopardize the safety of the personnel or the ship; (2) exceed the allotted time for the cruise; (3) result in undue additional expense; or (4) change the general intent of the cruise.

2.2 Participating Scientists

	Name	Gender	Nationality	Affiliation	Leg1	Leg2
1.	Dr. Tim Bates	M	USA	PMEL	x	x
2.	Dr. Patricia Quinn	F	USA	PMEL	x	
3.	Dr. Theresa Miller	F	USA	JISAO/PMEL	x	x
4.	Dr. James Johnson	M	USA	JISAO/PMEL	x	
5.	Mr. Derek Coffman	M	USA	JISAO/PMEL	x	x
6.	Mr. Drew Hamilton	M	USA	JISAO/PMEL	x	x
7.	Dr. Aki Virkkula	M	Finland	PMEL		x
8.	Dr. Eric Williams	M	USA	AL/CIRES	x	x
9.	Mr. Paul Murphy	M	USA	AL/CIRES	x	x
10.	Mr. Brian Lerner	M	USA	AL/CIRES	x	x
11.	Mr. Matthew Marchewka	M	USA	WMU	x	x
12.	Mr. Roger Jakoubek*	M	USA	AL	x	
13.	Dr. Steven Brown	M	USA	AL/CIRES	x	
14.	Dr. Harald Stark	M	Germany	AL/CIRES		x
15.	Mr. Mattias Aldener	M	Sweden	AL/CIRES	x	x
16.	Dr. Paul Goldan	M	USA	AL	x	x

17. Mr. William Kuster	M	USA	AL	x	x
18. Dr. Joost de Gouw	M	Netherlands	AL/CIRES		x
19. Dr. Carsten Warnecke	M	Austria	AL/CIRES	x	
20. Dr. Anne Middlebrook	F	USA	AL	x	x
21. Dr. Manjula Canagaratna *	F	USA	Aerodyne	x	
22. Dr. Doug Worsnop *	M	USA	Aerodyne	x	
23. Dr. Fred Fehsenfeld	M	USA	AL	x	
24. Dr. James Meagher	M	USA	AL	x	
25. Dr. Christoph Senff	M	Germany	ETL	x	
26. Mr. Richard Marchbanks	M	USA	ETL	x	
27. Ms. Joanne George	F	USA	ETL	x	
28. Dr. Raul Alvarez	M	USA	ETL		x
29. Dr. Wynn Eberhard	M	USA	ETL		x
30. Ms. Brandi McCarty	F	USA	ETL		x
31. Mr. Scott McLaughlin	M	USA	ETL	x	
32. Mr. Sergio Pezoa	M	USA	ETL		x
33. Ms. Marcy Vozella	F	USA	UNH	x	x
34. Ms. Sallie Whitlow	F	USA	UNH	x	x
35. Mr. John R. Maben	M	USA	UVA	x	x
36. Dr. William C. Keene	M	USA	UVA	x	x
37. Dr. Alex Pszenny	M	USA	UNH/MWO	x	x
38. Mr. Eric Stevenson	M	USA	MWO	x	x
39. Dr. Oliver Wingenter	M	USA	NMT	x	x
40. Mr. Karl Hasse	M	USA	NMT		x
41. Mr. Robert Elvander **	M	USA	NWS		x
Total				**32**	**28**

* will disembark at Star Island around July 19 if possible
** will embark at Star Island on August 6 if possible

3.0 SCHEDULE

The NEAQS 2002 project will begin loading vans and equipment on July 8, 2002. The project will depart Charleston, SC on July 12 for the first leg of the cruise. A tentative cruise track is shown in Appendix A. The actual transect will depend on meteorological conditions. The scientific party aboard *RONALD H. BROWN* will meet twice each day at 0800 (brief update) and 1830 (main science team meeting) to discuss the plan for the next few days and results from the previous day. Meteorological forecasts will be sent to the ship prior to the meetings. Leg 1 will end in Portsmouth, NH on July 26.

The port stop will be used for meetings with scientists at the University of New Hampshire and the regional ground stations. We anticipate that our only loading/unloading in Portsmouth will be to replenish our liquid nitrogen supply. Arrival and departure from Portsmouth, NH, will be scheduled in consideration of currents.

Leg 2 will begin on Monday July 29 and end in Charleston on August 10, 2002. Weather permitting personnel changes may occur by small boat at Star Island at the end of the first and third weeks of the cruise.

4.0 OPERATIONS

4.1 Underway Measurements

Parameter	**Method**	**Laboratory**	**PI**
Ozone	UV absorbance	AL/PMEL	Williams/ Johnson
Ozone	NO chemiluminescence	AL	Williams
Carbon monoxide	Non-dispersive IR	AL	Williams
Carbon dioxide	Non-dispersive IR	AL	Williams
Sulfur dioxide	Pulsed fluorescence	AL/PMEL	Williams/ Bates
Nitric oxide	Chemiluminescence	AL	Williams
Nitrogen dioxide	Photolysis cell	AL	Williams
Total nitrogen oxides	Au tube reduction	AL	Williams
PANs	GC/ECD	AL/WMU	Roberts
Alkyl nitrates	GC/FID	AL/WMU	Roberts
NO3/N2O5	Cavity ring-down spect.	AL	Brown
Photolysis rates	Spectral radiometer	AL	Jakoubek
Ionic aerosol composition Sub micron at 55% RH	PILS-IC	PMEL/GIT	Quinn & Weber
Ionic aerosol composition 2 stage (sub/super micron) & 7 stage at 55% RH	Impactors (IC, XRF and thermal optical OC/EC, total gravimetric weight)	PMEL	Quinn & Bates
Aerosol size and composition	Aerosol mass spectrometer	AL/ Aerodyne	Middlebrook & Worsnop
Total and sub-micron aerosol scattering & backscattering (400, 550 and 700 nm) at 55% RH	TSI 3563 nephelometer	PMEL	Quinn
Total and sub-micron aerosol absorption (550 nm)	Radiance Research PSAP	PMEL	Quinn
Aerosol optical depth	Microtops	PMEL	Quinn
Aerosol number	CNC (TSI 3010, 3025)	PMEL	Bates & Covert
Aerosol size distribution 5-10,000 nm at 55% RH	Twin DMAs and an APS	PMEL/UW	Bates & Covert
Aerosol hygroscopic	Tandem DMAs	UW	Covert

Parameter	Method	Laboratory	PI
growth			
Continuous speciation of VOCs	PTR-MS/CIMS	AL	de Gouw
VOC speciation	GC/MS	AL	Goldan & Kuster
Nitric acid	Automated mist chamber/IC	UNH	Dibb
Radon	Radon gas decay	PMEL	Johnson
Ozone/aerosol vertical profiles	DIAL lidar/aerosol backscatter	ETL	Senff
Wind/Temp/RH Profiles	Wind profiler	ETL	McLaughlin
Seawater and atmospheric pCO2		PMEL/ AOML	Feely/ Wanninkhof
Methyl halides and NMHC in surface seawater and air	GC/ECD	NMT/CMU	Wingenter/ Sive
Aerosol acid balance	Mist chambers/hi-vol PH and IC	UNH/MWO /UVA	Pszenny/ Keene
Irradiance	PRP	BNL	Reynolds

Air samples will be collected using equipment mounted on the forward part of the 02 level. A mast will extend approximately 8 meters above the deck as the main aerosol sampling inlet on the Aero2 van. Additional air sampling lines and equipment will be mounted on top of the Aeronomy Laboratory van and the Aero1 van.

Ship and scientific personnel must constantly be aware of potential sample contamination. Work activities and smoking forward of the main stack must be secured during sampling operations. This includes the bow, boat deck forward of the stack, bridge deck and flying bridge. The scientists on watch must be notified of any change in ship course or speed that will move the relative wind abaft the ship's beam or if anyone needs access to the bow. The scientists on watch should also be notified when the ship enters a rain squall and when the rain subsides.

Continuous water sampling will be made from the ship's bow intake system. This system must be capable of delivering 75 liters per minute through the main deck piping. Seawater will be drawn off this line to the sea/air CO2 and trace gas equilibrators in the hydro lab. Care must be taken to prevent contamination from smoke, solvent, cleaning solutions, etc.

4.2 Balloon Launches

Atmospheric temperature, humidity and wind profiles will be obtained from rawindsondes released up to four times per day at 0500, 1100, 1700 and 2300 UCT. The data from these launches will be sent from the ship to the National Weather Service.

4.3 Personnel Changes

Scientific personnel aboard *RONALD H. BROWN* will be responsible for equipment on the ship and at the ground stations. Personnel changes may be required by small boat when the ship is in the vicinity of Star Island, NH.

5.0 FACILITIES

5.1 Equipment and capabilities to be provided by ship

The following systems and their associated support services are essential to the cruise. Sufficient consumables, back-up units, and on-site spare parts and technical support must be in place to assure that operational interruptions are minimal. All measurement instruments are expected to have current calibrations and all pertinent calibration information shall be included in the data package.

1) Navigational systems including high resolution GPS.

2) Thermosalinograph calibrated to within 0.1°C and 0.01 ppt.

3) Dry compressed air (120 psi, 4 CFM) to the pump van. Power, water, telephone, and ethernet connections to vans (see section 5.2).

4) Continuously flowing seawater to the vans and equilibrator (minimum of 75 liters per minute).

5) Laboratory/work space.

6) Freezer space for air samples.

7) Refrigerator space (10 cubic feet) for air samples (no chemicals).

8) Satellite receiving station (AVHRR and GOES capable).

9) Radiosonde deployment system.

10) Hood for use of solvents.

5.2 Equipment, capabilities and supplies provided by scientific party

Measured weights from a truck scale or similar will be provided for all science vans. It is understood that vans without current measured weights will not be accepted aboard.

1) Vans (van locations are shown in appendix C)

a) Aeronomy Lab van

wt	15,000 lbs
size	20' x 8’
power	70 amp 480 v three phase
location	starboard side, 02 level, inlets mounted on roof
	Needs phone, Ethernet line

b) PMEL Chemistry van

wt	12,000 lbs
size	8' x 20'
power	30 amps 480 v three phase
location	port side 01 level
	Needs freshwater line, Ethernet connection and phone.

c) PMEL Old Aerosol van (Aero1) (Aeronomy Lab Equipment)

wt	15,000 lbs
size	8' x 18'
power	70 amp 480 v three phase
location	port side 02 level, sampling line connected to Aero2
	A single section walk-up tower will be mounted on the roof.
	Needs a phone and Ethernet connection.

d) PMEL New Aerosol van (Aero2)

wt	15,000 lbs
size	8' x 20'
power	70 amp 480 v three phase
location	port side 02 level, sampling mast mounted on roof
	Needs phone and Ethernet connection.

e) PMEL Pump van

wt	4,000 lbs
size	7' x 12'
power	from aerosol van
location	aft of old aerosol van, 02 level
	Needs compressed air (120 psi/4 CFM).

f) PMEL spare parts/storage van,

wt	12,000 lbs
size	8' x 20'
power	none
location	port side, 01 level

g) ETL Lidar van (OPAL)

wt	19,000 lbs
size	20' x 8'
power	30 amp 480 v three phase
location	starboard side, 02 level
	Needs phone and Ethernet connection

2) I-beam and ISO fittings to secure vans to O2 deck (shown in Appendix C). Note this work is scheduled to be done in Jacksonville after the yard period.

3) Transformers for the AL and ETL vans which will be housed in a metal boxes, 32"W x 26"D x 32"H, weight ca. 300 lbs and mounted outside the vans aft of the AL van (not in walkways).

4) Air sampling equipment including pumps, flowmeters, filters, gas and aerosol analyzers, aerosol sizing instrumentations, condensation nuclei counters, radiometers and lidar.

5) Aerosol sampling mast and short walk up tower

6) Chemical reagents, compressed gases, and liquid nitrogen. A complete listing of all chemicals to be brought onboard is included in Appendix B. Material Data Safety Sheets will be provided to ship before any chemicals are loaded. Tanks will be secured vertically in tank racks. All tanks will have current hydrostatic test dates stamped on the tank as required by DOT regulations.

7) Portable Radiation Package (PRP) incorporating a Precision Spectral Pyranometer (PSP) for broadband irradiance, a Precision Infrared Radiometer (PIR) for broadband longwave irradiance, and a Fast Rotating Shadowband Radiometer (FRSR) to derive the global, direct-beam, and diffuse irradiance in six 10-nm channels (415, 500, 615, 680, 870, 940 nm) and one broadband channel.

8) Other consumable- i.e. pens, pencils, paper, data storage media, etc.

6.0 DISPOSITION OF DATA AND REPORTS

6.1 Data responsibilities

The Chief Scientist is responsible for the disposition, feedback on data quality, and archiving of data and specimens collected on board the ship for the primary project. The Chief Scientist is also responsible for the dissemination of copies of these data to participants on the cruise and to any other requesters. The ship will assist in copying data and reports insofar as facilities allow. The ship will provide the Chief Scientist copies of the following data:

Sightings log (position, speed, course, distance upwind) of other vessels
Navigational log sheets (MOAs)

Weather observation sheets
Thermosalinograph calibration reports
SCS data CDs

The Chief Scientist will receive all original data gathered by the ship for the primary and piggy-back projects, and this data transfer will be documented on NOAA form 61-29 "Letter Transmitting Data". The Chief Scientist in turn will furnish the ship a complete inventory listing of all data gathered by the scientific party, detailing types and quantities of data.

The Commanding Officer is responsible for all data collected for ancillary projects until those data have been transferred to the projects' principal investigators or their designees. Data transfers will be documented on NOAA Form 61-29. Copies of ancillary project data will be provided to the Chief Scientist when requested. Reporting and sending copies of ancillary data to NESDIS (ROSCOP) is the responsibility of the program office sponsoring those projects.

6.2 Ship operation evaluation form

A Ship Operations Evaluation Form will be completed by the Chief Scientist and given to the Director, PMEL, for review and then forwarded to OMAO.

6.3 Foreign research clearance reports

A request for research clearance in foreign waters (Canada) has been submitted by PMEL. Copies of clearances received will be provided to the ship before departure. The Chief Scientist is responsible for satisfying the post-cruise obligations associated with diplomatic clearances to conduct research operations in foreign waters. These obligations consist of (1) submitting a "Preliminary Cruise Report" immediately following the completion of the cruise involving the research in foreign waters (due within 30 days); and (2) ultimately meeting the commitments to submit data copies of the primary project to the host foreign countries.

7.0 ADDITIONAL INVESTIGATIONS AND PROJECTS

Any ancillary work done during this project will be accomplished with the concurrence of the Chief Scientist and on a not-to-interfere basis with the programs described in these instructions and in accordance with the NOAA Fleet Standing Ancillary Instructions.

Personnel assigned to ancillary projects and participating in the cruise may be assigned additional scientific duties in support of the project by the Chief Scientist.

Synoptic weather reports will be handled in accordance with NC Instruction 3142D, SEAS Data Collection and Transmission Procedures.

Any additional work will be subordinate to the primary project and will be accomplished only with the concurrence of the Chief Scientist and Commanding Officer on a not-to-interfere basis.

8.0 HAZARDOUS MATERIAL

RONALD H BROWN will operate in full compliance with all environmental compliance requirements imposed by NOAA. All use, storage, cleanup, removal and disposition of scientific hazmats must conform with the requirements stated in BROWN's Standing Orders, Appendix "Scientific Hazardous Materials and Waste." A copy of the appendix was provided to the Chief Scientist prior to the cruise. **All hazardous materials/substances needed to carry out the objectives of the embarked science mission, including ancillary tasks, are the direct responsibility of the embarked designated Chief Scientist, whether or not that Chief Scientist is using them directly.** The *RONALD H BROWN* Environmental Compliance Officer will work with the Chief Scientist to ensure that this management policy is properly executed, and that any problems are brought promptly to the attention of the Commanding Officer.

All hazardous materials require a Material Safety Data Sheet (MSDS). Copies of all MSDSs shall be forwarded to the ship at least two weeks prior to sailing. The Chief Scientist shall have copies of each MSDS available when the hazardous materials are loaded aboard. **Hazardous material for which the MSDS is not provided will not be loaded aboard.**

The Chief Scientist will provide the Commanding Officer with an inventory indicating the amount, concentrations, and intended storage area of each hazardous material brought onboard, and for which the Chief Scientist is responsible (see Appendix B). This inventory shall be verified at time of departure from port, and again upon completion of the cruise, accounting for the amount of material being removed, the amount consumed in science operations, and the amount being removed in the form of used or dirty chemicals. A list of chemicals and gases that will be brought onboard the ship for this cruise is shown in Appendix B.

The ship's dedicated HAZMAT Locker contains two 45-gallon capacity flammable storage cabinets and one 22-gallon capacity flammable storage cabinet. Unless there are dedicated storage lockers (meeting OSHA/NFPA standards) in each van, all HAZMAT, except small amounts for ready use, must be stored in the HAZMAT Locker. [Storage on deck is not approved].

The scientific party, under the supervision of the Chief Scientist, shall be prepared to respond fully to emergencies involving spills of any mission HAZMAT. This includes providing properly-trained personnel for response, as well as the necessary neutralizing chemicals and clean-up materials. Ship’s personnel are not first responders and will act in a support role only, in the event of a spill. Drew Hamilton, Derek Coffman, and Theresa Miller have been trained in hazardous material response.

The Chief Scientist is directly responsible for the handling, both administrative and physical, of all scientific party hazardous wastes. No liquid wastes shall be introduced into the ship's drainage system or disposed of over the side. No solid waste material shall be placed in the ship's garbage.

All scientific hazardous materials will be removed from the ship at the end of the cruise.

9.0 RADIOACTIVE ISOTOPES

No radioactive isotopes will be used on this cruise.

10.0 COMMUNICATIONS

Good communications of data and weather products between the NOAA laboratories and the ship will be critical to the success of this project. Data (email) transfers will take place three times per day at approximately 0700, 1200 and 1730 LT. The weather data transferred at 0700 and 1730 (approximately 1 megabit) will be essential for the science team meetings scheduled for 0800 and 1830. Scientific data from the ship will also be sent to Boulder during these transfers to update the project web page maintained in Boulder.

The Chief Scientist or designated representative will have access to ship's telecommunications systems. Direct payment (e.g. by credit card) to the communications provider (e.g. the telephone company) shall be used as opposed to after-the-fact reimbursement. Specific information on how to contact Ronald H. Brown and all other fleet vessels can be found at http://www.moc.noaa.gov/phone.htm.

Ship's systems include:

- INMARSAT-B

INMARSAT-B provides high quality voice and fax communications (9600 baud) and high speed data transmission, including FTP; it is the primary means of transferring email. Cost is $2.60/min for voice and fax; $7.25/min for high speed. INMARSAT-B calls may be made collect or charged to credit card; cost is approximately $2.60/min **.

- INMARSAT-M

INMARSAT-M (or Mini-M) provides medium quality voice communications. Cost is $2.15/min. INMARSAT-M may be charged to credit card or collect.

- INMARSAT-A

INMARSAT-A provides high quality voice communications as a backup system. It can also provide fax communications (9600 baud) and high speed data transmission, including FTP. Cost varies from $2.65/min to $5.60/min for voice and fax depending on vendor and peak vs off-peak rates. High speed costs $10.80 - $15.60/min. INMARSAT-A may be charged to credit card or collect.

**Note: All rates listed are 2001 rates based on direct-dialed business calls to the US. Collect, or calls charged to credit calls are charged higher rates, subject to additional fees, and may have minimum charges.

E-MAIL

An e-mail account for each embarked scientist will be established by the ship's LET. The account name will use the person's first and last name as listed in Personnel Section. The e- mail address for scientists will use the format:
firstname.lastname.atsea@rbnems.ronbrown.omao.noaa.gov

Example: tim.bates.atsea@rbnems.ronbrown.omao.noaa.gov

Each member of the ship's complement (crew and scientists) will be authorized to send/receive up to 15 KB (approximately 3 pages of text) of data per day ($1.50/day or $45/month) at no cost. E-mail costs accrued in excess of this amount must be reimbursed by the individual. At or near the end of each leg, the Commanding Officer will provide the Chief Scientist with a detailed billing statement for all personnel in his party. Prior to their departure, the chief scientist will be responsible for obtaining reimbursement from any member of the party whose e-mail costs have exceeded the complimentary amount.

CONTACTS

Important phone numbers, fax numbers and e-mail addresses: (Up-to-date phone numbers can be found on the MOC web site at www.moc.noaa.gov/phone.htm#RB)

RONALD H. BROWN (to call from US)

- INMARSAT-B VOICE: 011-OAC-336-899-620 (approx $2.60/min)
- INMARSAT-B FAX: 011-OAC-336-899-621
- INMARSAT "M" VOICE: 011-OAC-761-831-360 (approx $2.99/min)
- INMARSAT-A VOICE: 011-OAC-154-2643 (approx $5.60/min)
- CELLULAR: 757-635-0678
- OOD CELLULAR: 206-910-3584

NOTE: For RB-02-05 cruise, the ship will be operating in range of the Atlantic Ocean Satellite (West) with Ocean Area Code (OAC) = 874.

E-mail addresses:

MOP radio room:	Radio.Room@noaa.gov
Commanding Officer, RHB	CO.Ronald.Brown@noaa.gov
Executive Officer, RHB	XO.Ronald.Brown@noaa.gov
Field Operations Officer, RHB	FOO.Ronald.Brown@noaa.gov
Medical Officer, RHB	Medical.Ronald.Brown@noaa.gov

[The scientific party should expect to be charged for e-mailing costs that exceed the monthly $45 per person limit. MOC is currently pursuing options that will make accounting and billing possible.]

11.0 MISCELLANEOUS

11.1 Radio interference

Radio transmission can interfere with several of the continuous data streams. If this becomes a problem, the Commanding Officer and Chief Scientist will work out a transmission schedule to minimize data interferences to the extent that vessel communication needs allow. Nothing will preclude or interfere with the use of VHF radio for communications related to the safe navigation of the vessel.

11.2 Pre & post-cruise meetings

A pre-cruise meeting between the Commanding Officer and the Chief Scientist will be conducted either the day before or the day of departure, with the express purpose of identifying day-to-day project requirements, in order to best use shipboard resources and identify overtime needs.

A post-cruise debriefing will be held between the Chief Scientist and the Commanding Officer.

11.3 Scientific berthing

The Chief Scientist is responsible for assigning berthing for the scientific party within the spaces approved as dedicated scientific berthing. The ship will send stateroom diagrams to the Chief Scientist showing authorized berthing spaces. The Chief Scientist is responsible for returning the scientific berthing spaces back over to the ship in clean and ready-to-use condition for the next scientific party, for stripping bedding and for 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 and storage areas used by the science party, both during the cruise and at its conclusion prior to departing the ship.

11.4 Implied consent

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.

11.5 Emergency contacts

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

11.6 Shipboard Safety

A discussion of shipboard safety policies is in the "Science User's Guide" which is available on *RONALD H. BROWN* and is the responsibility of the scientific party to read. This information is also available on the ship's web page: www.moc.noaa.gov/rb/science/welcome.htm. A meeting with the Operations Officer will be held for the scientific party at the beginning of the cruise which will include a safety briefing. All members of the scientific party are expected to be aware of shipboard safety regulations and to comply with them.

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. Steel-toed shoes are required to participate in any work dealing with suspended loads, including CTD deployments and recovery. The ship does not provide steel-toed boots. 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.

11.7 Wage marine dayworker working hours and rest periods

Chief Scientists shall be cognizant of the reduced capability of *RONALD H BROWN*'s operating crew to support 24-hour mission activities with a high tempo of deck operations at all hours. Wage marine employees are subject to negotiated work rules contained in the applicable collective bargaining agreement. Dayworkers' hours of duty are a continuous eight-hour period, beginning no earlier than 0600 and ending no later than 1800. It is not permissible to separate such an employee's workday into several short work periods with interspersed nonwork periods. Dayworkers called out to work between the hours of 0000 and 0600 are entitled to a rest period of one hour for each such hour worked. Such rest periods begin at 0800 and will result in no dayworkers being available to support science operations until the rest period has been observed. All wage marine employees are supervised and assigned work only by the Commanding Officer or designee. The Chief Scientist and the Commanding Officer shall consult regularly to ensure that the shipboard resources available to support the embarked mission are utilized safely, efficiently and with due economy.

11.8 Medical Forms

The NOAA Health Services Questionnaire must be completed in advance by each participating scientist. It should reach the ship no later than 4 weeks prior to the cruise. This will allow time to medically clear the individual and to request more information if needed. All personnel should bring any prescription medication they may need and any over-the-counter medicine that is taken routinely (e.g. an aspirin per day, etc.). The ship maintains a stock of medications aboard, but supplies are limited and chances to restock are few.

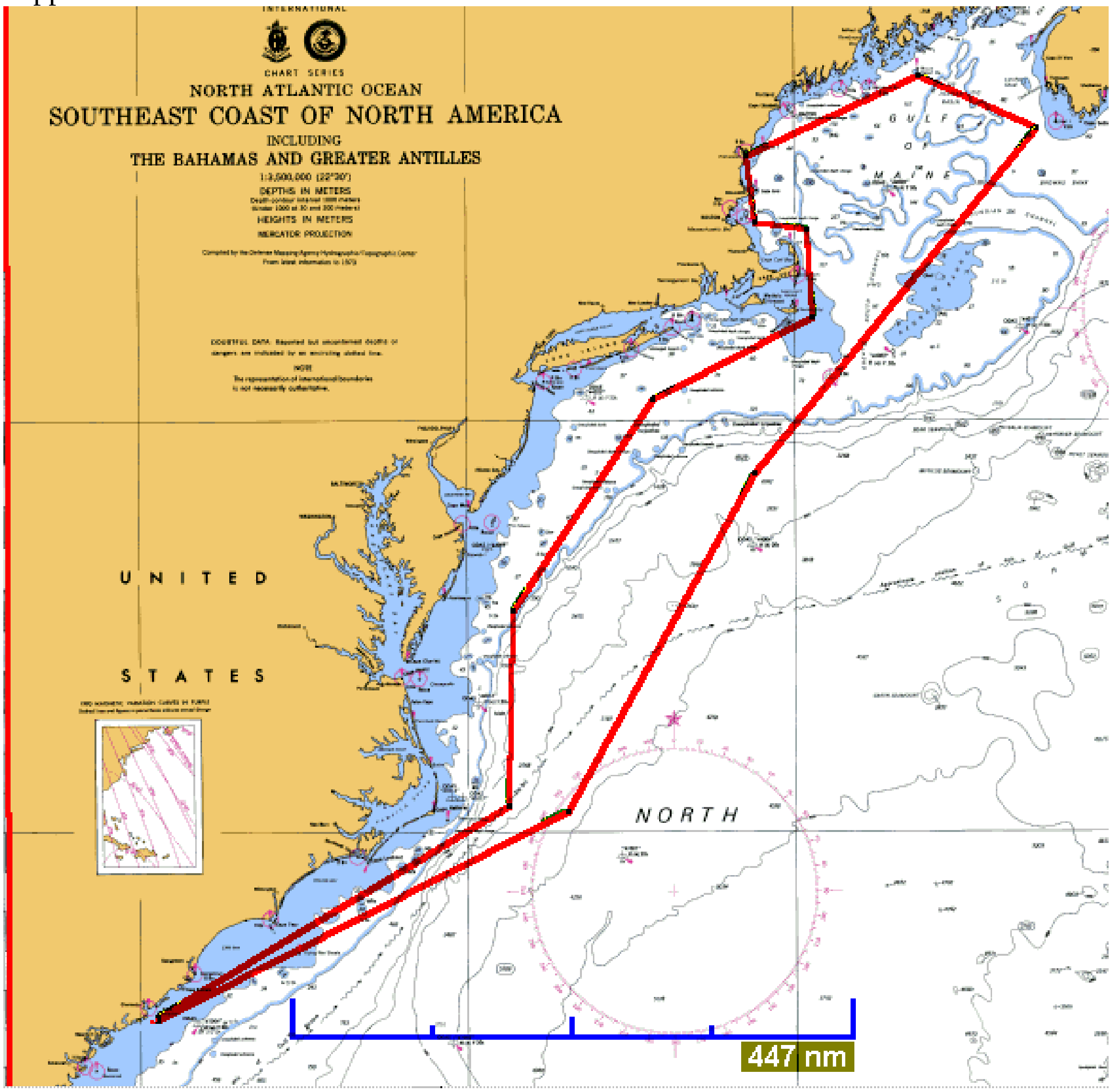
11.9 Port Agent Services/Billing

Contractual agreements exist between the port agents and the Commanding Officer for services provided to NOAA SHIP *RONALD H. BROWN*. The costs or required reimbursements for any services arranged through the ship's agents by the scientific program, which are considered to be outside the scope of the agent/ship support agreement, will be the responsibility of that program. Where possible, it is requested that direct payment be arranged between the science party and port agent, as opposed to after-the-fact reimbursement to the ship's accounts.

11.0 APPENDICES

(A) Cruise track
(B) List of gases and chemicals onboard
(C) Van locations and I-beam supports

Appendix A. Cruise Track



Appendix B. List of chemicals

Compressed gases	Num. Cyls.	Quantity	Location	Chemicals	Quantity	Location
Tim Bates, Trish Quinn, Dave Covert, Derek Coffman, Theresa Miller, Drew Hamilton, NOAA/PMEL Aerosol properties						
CO_2 (Neph)	2	150 cf	in Aero2van	ammonium sulfate	500 g	Chem van
UHP Helium (IC)	6	230 cf	in Chem van	butanol	32 L	Chem van
UHP H_2 (OC/EC)	2	230 cf	deck chem van	calcium sulfate (drierite)	10 kg	Chem van
O_2 10% balance He (OC/EC)	2	230 cf	deck chem van	charcoal	500 g	Chem van
CH_4 5% balance He (OC/EC)	2	230 cf	deck chem van	citric acid	2 kg	Chem van
UHP He (OC/EC)	2	230 cf	deck chem van	Dipicolinic acid	500 g	Chem van
Breathing air (OC/EC)	3	230 cf	deck chem van	hexane	2 L	Chem van
				hydrochloric acid	500 ml	Chem van
				hydrogen peroxide	500 ml	Chem van
				methanesulfonic acid	1 L	Chem van
				methanol	4 L	Chem van
				phosphoric acid	1 L	Chem van
				Potassium bicarbonate	500 g	Chem van
				potassium carbonate	2 kg	Chem van
				sodium hydroxide (50% w/w)	1 L	Chem van
				sulfuric acid (0.1 M)	500 ml	Chem van
Eric Williams, Paul Murphy, NOAA/AL, NO_x/NO_y/O_3/CO/SO_2/met						
Zero air	15	150 cf	deck AL van	Methanol	5 L	AL van
UHP Oxygen	6	144 cf	deck AL van	Molecular sieve	500 g	AL van
NO 5 ppm in N_2	1	150 cf	in AL van	Charcoal	500 g	AL van
NO 5 ppm in N_2	1	30 cf	in AL van	Pd 0.5% on alumina	1 kg	AL van
CO 200 ppm/SO_2 5 ppm in N_2	1	150 cf	in AL van			
CO 200 ppm/SO_2 5 ppm in N_2	1	50 cf	in AL van			
CO_2 3.5% in Air	1	30 cf	in AL van			
NO 99%	1	8 cf	deck AL van			
H_2 99.99%	1	30 cf	deck AL van			
Steven Bertman, Roger Jakoubek, WMU, PANs/Alkyl nitrates						
UHP He	2	230 cf	deck AL van	Tridecane	100 g	AL van
UHP N_2	2	230 cf	deck AL van	Pentadecane	100g	AL van
Zero Air	4	150 cf	deck AL van	Acetone	500 mL	AL van
NO 5 ppm in N_2	1	150 cf	in AL van	Molecular sieve	500 g	AL van
CO 10 ppm/Acetone 5 ppm in Air	1	150 cf	in AL van	Charcoal	500 g	AL van
Air (calibration standard)	1	150 cf	in AL van	Hopcalite	500 g	AL van
Roger Jakoubek, NOAA/AL, Photolysis Rates						
N/A	N/A					

Compressed gases	Num. Cyls.	Quantity	Location	Chemicals	Quantity	Location
Steve Brown, Harald Stark, NOAA/AL, NO3/N2O5						
UHP N2	5	230 cf	deck AL van	Methanol	8 L	AL van
NO 10 ppm in N2	2	30 cf	in AL van	Acetone	1 L	AL van
				DCM laser dye	1 g	AL van
				LDS 698 laser dye	1 g	AL van
Paul Goldan, Bill Kuster, NOAA/AL, VOCs/GCMS						
UHP He	3	230 cf	deck AERO1 van	Sodium sulfite	500 g	AERO1 van
UHP H2	2	230 cf	deck AERO1 van	Ascarite	1 kg	AERO1 van
Zero air	4	150 cf	deck AERO1 van	Methanol	1 L	AERO1 van
N2	14	230 cf	deck AERO1 van	Ethanol	1 L	AERO1 van
Air (calibration standard)	1	150 cf	in AERO1 van			
VOC mix 10 ppm in Air	2	0.25 cf	in AERO1 van			
Liquid N2	7	160 L	main lab	Refill in Portsmouth		
Joost de Gouw, Carsten Warnecke,NOAA/AL, VOCs/PTR-MS						
He	2	230 cf	deck AERO1 van			
Zero air	2	230 cf	deck AERO1 van			
N2 (calibration standard)	1	0.25 cf	in AERO1 van			
N2 (calibration standard)	1	2 cf	deck AERO1 van			
UHP He	1	2 cf	In AERO1 van			
Ann Middlebrook, Manjula Canagaratna, Doug Worsnop, NOAA/AL, Aerodyne, Particle composition						
UHP N2	1	230 cf	in AERO1 van	Ammonium sulfate	50 g	AERO1 van
				Ammonium nitrate	50 g	AERO1 van
				Isopropyl alcohol	500 mL	AERO1 van
Christoph Senff, Richard Marchbacks, Joanne George, Raul Alvarez, Wynn Eberhard, Brandi McCarty, NOAA/ETL, Aerosol/O3 profiles						
H2	1	30 cf	deck LIDAR van	Acetone	1 L	LIDAR van
D2	1	30 cf	deck LIDAR van	Methanol	1 L	LIDAR van
Ar	1	30 cf	in LIDAR van			
Scott McLaughlin, Sergio Pezoa, NOAA/ETL, Wind/temp/RH profiles (sondes)						
He	40	230 cf	fantail			
Jack Dibb, Marcy Vozella, UNH, HNO3/HONO						
UHP He	2	150 cf	deck AL van	Sodium carbonate	250 g	Main lab
				Sodium bicarbonate	250 g	Main lab
				Methanol	1 L	Main lab
				Aqueous standards (0.1 w/w)	1 L	Main lab

Compressed gases	Num. Cyls.	Quantity	Location	Chemicals	Quantity	Location
Barkley Sive, Oliver Wingenter, CMU/NMT, VOC-CFC-HCFC, air-sea exchange						
UHP N2	8	230 cf	hydro lab			
UHP He	8	230 cf	hydro lab			
Air (calibration standards)	4	150 cf	hydro lab			
Zero air	8	230 cf	hydro lab			
Liquid N2	6	160 L	hydro lab	Refill in Portsmouth		
Alex Pszenny, Bill Keene, John Maben, Eric Stevenson, UVA/MWO, aerosol acid balance						
He	2	230 cf	Bio lab	methanesulfonic acid	500 mL	Bio lab
				sodium carbonate	1 L	Bio lab
				sodium hydroxide	500 mL	Bio lab
				sulfuric acid	500 mL	Bio lab
				hydrogen peroxide	500 mL	Bio lab
Rik Wanninkhof, Dick Feely, NOAA/AOML/PMEL, underway pCO2 system						
Standard air tanks	5	230 cf	hydro lab	acetone	4 L	hydro lab
				coulometer solution	8 L	hydro lab
				isopropyl alcohol	2 L	hydro lab
				magnesium perchlorate	2 kg	hydro lab
				Malcosorb	2 kg	hydro lab
				potassium iodide	500 g	hydro lab

Appendix c. Van locations and I-beam mounting system.