November 21, 1984

TO:

Barbee, W.D.	- UNOLS
Gerard, S.	- LDGO
Langseth, M.	- LDGO
Leyden, R.	- LDGO
Raleigh, B.	- LDGO
Ruddiman, W.	- LDGO
Ryan, W.F.B.	- LDGO
Sykes, L.R.	- LDGO
Takahashi, T.	- LDGO
Science Officer	- LDGO
Captain	- CONRAD

RESEARCH CRUISE REPORT

R/V ROBERT D. CONRAD 25-10

Attached is a copy of a cruise report for the above CONRAD cruise.

Ann Burns
Marine Office

ROBERT CONRAD CRUISE 25-10
CRUISE REPORT

SCIENTIFIC PARTY: As listed on attached.
Note: Invitations were extended to Dr. Alan Grant at Bedford Institute of Oceanograpy (Dartmouth, N.S.), and through him to other B.I.O. personnel, to join in the cruise. Unfortunately, no one from B.I.O. was able to participate because of their other commitments.

DEPARTURE: 9 August 1984 St. Johns, Newfoundland

ARRIVAL: 8 September 1984 St. Georges, Bermuda

AREA OF OPERATIONS: Newfoundland Basin, east of Grand Banks (see attached track chart).

DATA ACQUIRED: Approximately 4700 km of multichannel seismic reflection profiles (48-trace, 24-fold), 74 wide-angle-reflection/refraction sonobuoy profiles (Newfoundland Basin); approxi- mately 6700 km of Sea Beam bathymetric swathmapping profiles, 3.5-kHz echosounding profiles, gravity profiles and magnetic profiles (whole cruise).

SCIENTIFIC PROGRAM:

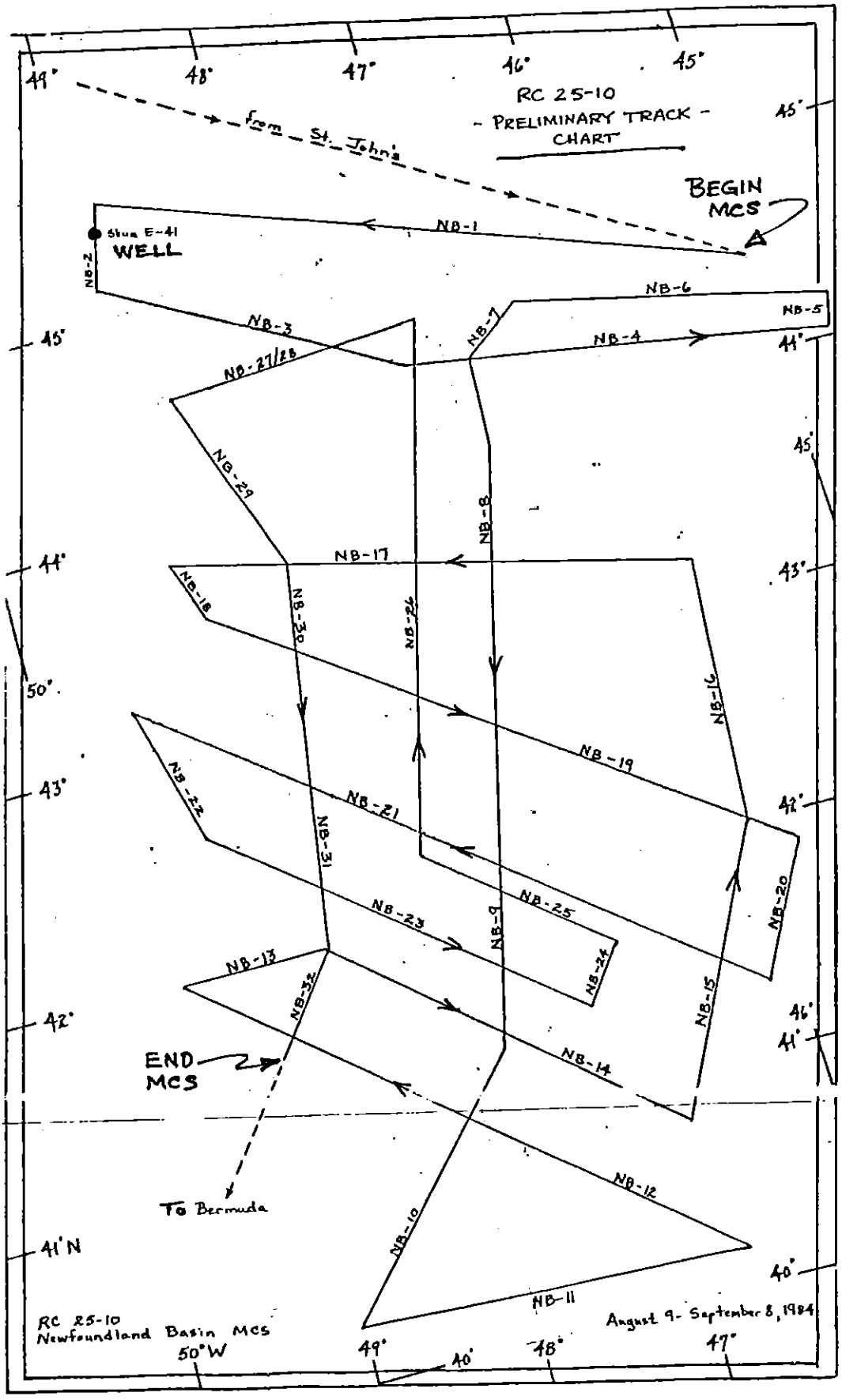
The purpose of the cruise was to study 1) the position and nature of the boundary between continental and oceanic crust east of the Grand Banks, 2) the depositional history of the basin through analysis of the seismic-stratigraphic sequences, and 3) the nature of the dynamic sedimentary processes presently affecting the seafloor. The cruise tracks were positioned to obtain both dip lines across the O/C boundary and strike lines to either side of the boundary. Preliminary analyses indicate that the O/C boundary is located near the 4000 m bathymetric contour and is marked by a large-amplitude (~400-600γ) magnetic anomaly and (in the southern part of the basin) by a buried basement ridge 1 to 2 km in height. Seaward of the boundary, normal hyperbolic reflections are observed from oceanic basement and the magnetic field is marked by small-amplitude (100-300γ), thus far uncorrelated magnetic anomalies. Landward of the boundary the magnetic field is smooth and the basement appears to be broken into asymmetric, faulted blocks. Unusually smooth "basement" was observed in strike lines in the western half of the continental part of the basin, and this most likely is the synrift/ breakup unconformity formed during the final separation of Iberia and the Grand Banks; the high reflection amplitude of the unconformity here mostly masks deeper basement structure in the MCS monitor records. Processing of these MCS records will greatly clarify the basement structure in the basin.

Data processing for navigation, magnetics, and Sea Beam bathymetry are expected to be complete in early 1985. MCS processing will take approximately two years and is expected to be complete about September, 1986. Sonobuoy processing will be completed about September, 1985. There are currently no plans (or available funds) to process the gravity data. Thus we can expect to provide final copies of processed data to the appropriate Canadian office by September, 1986.

Data analysis and preparation of scientific reports will proceed in concert with data processing. We expect to prepare articles for publication in scientific journals during the period 1985 to 1987, and we will provide these papers to whomever wishes a copy.

RC25-10
SCIENTIFIC PARTY

Dr. Brian Tucholke (Co-Chief Scientist)	Associate Scientist	Woods Hole Oceanographic Institution
Dr. James Austin, Jr. (Co-Chief Scientist)	Research Scientist	University of Texas, Austin
Ruth Gorski	Research Assistant	Woods Hole Oceanographic Institution
Cynthia Ebinger	Graduate Student	Woods Hole Oceanographic Institution
Ann Martin	Research Assistant	Woods Hole Oceanographic Institution
John Crowe	Research Scientist Associate II	University of Texas, Austin
Julie McEuen	Research Assistant	University of Texas, Austin
Karen Meador	Graduate Student	University of Texas, Austin
Dan Chayes	SEABEAM Technican	University of Rhode Island
Steve Paulet	SEABEAM Technican	University of Rhode Island
James Smith	Science Officer	Lamont-Doherty Geological Observatory
Steve Hudson	MCS Technician	Lamont-Doherty Geological Observatory
Harry Van Santford	E.T.	Lamont-Doherty Geological Observatory
Barry Allen	E.T.	Lamont-Doherty Geological Observatory
Martin Iltzsche	Airgunner	Lamont-Doherty Geological Observatory
Dan Bolles	Airgunner	Lamont-Doherty Geological Observatory
Ropate Maiwiriwiri	Airgunner	Lamont-Doherty Geological Observatory


RC 25-10
- PRELIMINARY TRACK -
CHART
from St. John's
BEGIN MCS
Sun E-41
WELL
NB-1
NB-2
NB-3
NB-4
NB-5
NB-6
NB-7
NB-8
NB-9
NB-10
NB-11
NB-12
NB-13
NB-14
NB-15
NB-16
NB-17
NB-18
NB-19
NB-20
NB-21
NB-22
NB-23
NB-24
NB-25
NB-26
NB-27/28
NB-29
NB-30
NB-31
END MCS
To Bermuda
49°
48°
47°
46°
45°
44°
43°
42°
41°
40°
50°
41'N
RC 25-10
Newfoundland Basin MCS
August 9- September 8, 1984

NOTICE OF RESEARCH PROJECT
SCIENCE INFORMATION EXCHANGE
SMITHSONIAN INSTITUTION
NATIONAL SCIENCE FOUNDATION
PROJECT SUMMARY

EXHIBIT II 8

PROJECT NO. (Do not use this space)
NSF AWARD NO.

1. NAME OF INSTITUTION (INCLUDE BRANCH/CAMPUS & SCHOOL OR DIVISION)

University of Texas at Austin
Institute for Geophysics
Galveston Marine Geophysics Laboratory

Woods Hole Oceanographic Institution
Department of Geology and Geophysics

2. MAILING ADDRESS

700 The Strand
Galveston, TX 77550

Woods Hole, MA 02543

3. PRINCIPAL INVESTIGATOR AND FIELD OF SCIENCE/SPECIALTY

James A. Austin, Jr.

Brian E. Tucholke
Elazar Uchupi

4. TITLE OF PROJECT

MULTICHANNEL SEISMIC REFLECTION STUDY OF THE OCEAN-CONTINENT CRUSTAL TRANSITION SOUTHEAST OF THE GRAND BANKS

5. SUMMARY OF PROPOSED WORK (LIMIT TO 22 PICA OR 18 ELITE TYPEWRITTEN LINES)

One of the most fundamental and yet least understood geologic boundaries in the ocean basins is the transition from continental to oceanic crust along passive ("Atlantic-type") continental margins. A variety of models have been advanced to explain the nature of the ocean/continent boundary and the adjacent rifted continental crust - none is totally satisfactory nor probably universally applicable. Fortunately, the evolution of a passive margin can be studied with considerable success by observing the shallower part of the basement structure and the overlying stratigraphic sequence, provided the margin is not too deeply buried. We propose a multichannel-seismic-reflection/sonobuoy/magnetics investigation of the passive margin southeast of the Grand Banks in order to document more clearly the late-rift/early drift evolution of this margin and to test and constrain existing crustal models. The margin off eastern Canada is uniquely suited to such a study because: 1) the sedimentary cover is thin (1-5km), 2) the ages of rifting and initiation of drift are well known, and 3) stratigraphic ties can be made to numerous existing wells and MCS lines on the adjacent Grand Banks. Therefore, the geologic record is both accessible and geochronologically well controlled. This margin also is ideally suited for study of how Late Mesozoic and Cenozoic stratigraphic development was controlled by interaction of sea level, bottom currents, and "pelagic" processes because the Newfoundland basin is relatively isolated from riverine input and lies beneath the abyssal boundary currents of the North Atlantic. Seismic stratigraphic analysis of the MCS data will allow us to determine the interaction of these processes and their relative influence on the construction of continental slope and rise.

FOR NSF USE ONLY

DIVISION (OFFICE) AND DIRECTORATE	PROGRAM	
SECTION	PROPOSAL NO.	F.Y.

FOR OGC USE ONLY

START AND END DATES	AMOUNT GRANTED

NSF FORM 4 (2-78) 1. Proposal Folder 3. Division of Grants & Contracts 5. Principal Investigator 7. Assistant
2. Program Suspense 4. Science Information Exchange 6. Off of Govt & Pub. Progs. Director

CRUISE REPORT

SHIP UTILIZATION DATA

UNOLS
Rev. 4/83

SHIP NAME R/V CONRAD	OPERATING INST. LAMONT-DOHERTY GEOL. OBSERVATORY	PARTICIPATING PERSONNEL
CRUISE (LEG) NO. CRUISE 25 LEG 10	DATES 9 AUG. – 8 SEPT. 1984	
AREA OF OPERATIONS: NEWFOUNDLAND BASIN	PORT CALLS:	
DAYS AT SEA 30 / DAYS IN PORT 4		

PORT CALLS:

PLACE	DATES
ST. JOHNS, NEWF.	6-9 AUG.
ST GEORGES, BERMUDA	8- SEPT.

PARTICIPATING PERSONNEL

CODE	NAME	TITLE	AFFILIATION
1	DR. [illegible]	[illegible]	W.H.O.I.
2	DR. JAMES AUSTIN JR.	RESEARCH SCIENTIST	U. TEX, AUSTIN
3.	[illegible]	RESEARCH ASST.	W.H.O.I.
4.	[illegible]	GRAD STUDENT	W.H.O.I.
5.	[illegible]	[illegible] ASST.	W.H.O.I.

Use Reverse If Additional Space Required. (OVER)

WAS RESEARCH CONDUCTED IN FOREIGN WATERS? YES, PARTIALLY COUNTRY: CANADA

PRIMARY PROJECTS (those which govern the principal operations, area and movements of the ship)

PROJECT TITLE AND PRINCIPAL INVESTIGATOR	SPONSORING ACTIVITY	GRANT OR CONTRACT NUMBER	PARTICIPATING PERSONNEL (AS CODED ABOVE)
MULTICHANNEL SEISMIC REFLECTION STUDY OF THE OCEAN-CONTINENT CRUSTAL TRANSITION SOUTHEAST OF THE GRAND BANKS. BRIAN E. TUCHOLKE, WOODS HOLE OCEAN. INST.; JAMES A. AUSTIN, JR., UNIV. TEXAS AT AUSTIN	NATIONAL SCIENCE FOUNDATION	TO BE PROVIDED ON RETURN FROM SEA.	SAME AS ABOVE
DISCIPLINE: SUBMARINE GEOLOGY & GEOPHYSICS			

ANCILLARY PROJECTS (which are accomplished on a not-to-interfere basis and contribute to the overall effectiveness of the cruise)

PROJECT TITLE AND PRINCIPAL INVESTIGATOR	SPONSORING ACTIVITY	GRANT OR CONTRACT NUMBER	PARTICIPATING PERSONNEL (AS CODED ABOVE)
NONE			

SIGNATURE [illegible signature] DATE [illegible]
CHIEF SCIENTIST

TOTAL SCIENTISTS 6 TOTAL TECHNICIANS 9
TOTAL GRAD STUDENTS [illegible] TOTAL STUDENTS/OBSERVERS ___

ATTACH PAGE SIZE CRUISE TRACK

COST ALLOCATION DATA

DAYS CHARGED	AGENCY OR ACTIVITY CHARGED	GRANT OR CONTRACT NO.

SIGNATURE DATE

UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

An association of institutions for the coordination and support of university oceanographic facilities

UNOLS Office, AK-15
School of Oceanography
University of Washington
SEATTLE, WA 98195

RESEARCH VESSEL CRUISE ASSESSMENT

PI/SIC: James A Austin, Jr.	SHIP: R/V Robert Conrad
PI/SIC INSTITUTION: University of Texas Institute for Geophysics	General Type of Work and Procedures Employed: MCS, Gravity, Magnetics, SEABEAM, 3.5kHz, Sonobuoys
AREA OF OPERATIONS: Newfoundland Basin northwest Atlantic Ocean	
Cruise, Expedition, and Leg #, and/or Project Name: R/V CONRAD, cruise 25, leg 10	
Dates of Cruise: 9 August - 8 September 1984	Was cruise successful in terms of your scientific project? Please circle best choice. FULLY- PARTIALLY- MARGINALLY- SUCCESSFUL UNSUCCESSFUL
Days Total: 30	
Days Transit: 5	
Days Stations: 1 (streamer manipulation and balancing)	
Days Underway Surveying: 24	

What ship did you request if not this one? _____

Were you given adequate advance information by the operating institution concerning equipment and technician services provided? yes NO/

Work lost because of weather: days none stations _____

Work lost because of ship, ship's equipment or ship's personnel: days none stations _____

Work lost because of scientific equipment: days c. 0.5 stations _____

Factors adversely affecting cruise success (include percentage estimate if possible). Please circle equipment used.

Main engine	0%	Crane or A-Frame	
Electric power	1% (SEABEAM)	Winches	2%
Officers & Crew	0%	Computers	2%
Ship's technicians	0%	Other electronics	1% (fire cables
Pre-cruise liaison	1%	Other (specify)	air guns)

Comments, details of problems, suggestions, and praise, if appropriate, for both successful and unsuccessful cruises. Use other side and additional pages as necessary.

These evaluations are an attempt to assist ship users, operating institutions, and fundi agencies to improve the quality of research vessel operations. Copies will be sent to UNOLS Advisory Council and the operating institutions only, but summarized edited data w be sent to all UNOLS members and associate members and funding agencies. Please fill ou as completely and frankly as possible.

UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

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UNOLS Office, AK-15
School of Oceanography
University of Washington
SEATTLE, WA 98195

RESEARCH VESSEL CRUISE ASSESSMENT

PI/SIC: Brian E. Tucholke	SHIP: R/V Conrad
PI/SIC INSTITUTION: Woods Hole Oceanographic Inst.	General Type of Work and Procedures Employed: Multichannel Seismic, Magnetics, Gravity, Seabeam, Sonobuoys, 3.5 kHz E/S } Underway Geophysics
AREA OF OPERATIONS: Newfoundland Basin	
Cruise, Expedition, and Leg #, and/or Project Name: R/V Conrad Cruise 25, Leg 10	
Dates of Cruise: 9 August - 8 Sept. 1984	Was cruise successful in terms of your scientific project? Please circle best choice. (FULLY)- PARTIALLY- MARGINALLY- SUCCESSFUL UNSUCCESSFUL
Days Total: 30	
Days Transit: 5.5	
Days Stations: 1.0 (Streamer manipulation)	
Days Underway Surveying: 23.5	

What ship did you request if not this one? —

Were you given adequate advance information by the operating institution concerning equipment and technician services provided? Yes, but staff on ship could have been better informed by LDGO of our plans. NO/S

Work lost because of weather: days * stations 0

Work lost because of ship, ship's equipment or ship's personnel: days < 1 hr stations 0

Work lost because of scientific equipment: days * stations 0

Factors adversely affecting cruise success (include percentage estimate if possible).

Main engine 0
Electric power < 1% (Seabeam)
Officers & Crew 0
Ship's technicians 0
Pre-cruise liaison 0

Please circle equipment used.

Crane or A-Frame —
Winches —
(Computers) 1-2% down time
(Other electronics) 1% down time
Other (specify)

Comments, details of problems, suggestions, and praise, if appropriate, for both successful and unsuccessful cruises. Use other side and additional pages as necessary.

* About 12 hours lost due primarily to a combination of bad weather and a shallow-towing streamer section, plus miscellaneous instrument failures.

Attached report summarizes views of both co-chief scientists.

These evaluations are an attempt to assist ship users, operating institutions, and fundi agencies to improve the quality of research vessel operations. Copies will be sent to UNOLS Advisory Council and the operating institutions only, but summarized edited data w be sent to all UNOLS members and associate members and fuoding agencies. Please fill ou as completely and frankly as possible.

On the whole, this was a completely successful effort. Liaison with LDGO personnel (Jim Smith, Steve Hudson, Harry van Santford, and Barry Allen) and URI/SEABEAM technicians (Dan Chayes, Steve Paulet) was good to excellent, and weather was far better than anticipated. (In this regard, thanks are due to LDGO and UNOLS for scheduling this cruise during the short good weather window which exists off eastern Canada.) Consequently, the comments below should be taken as constructive criticisms designed to make an already smooth operation even better:

1) The biggest and only potentially crippling weakness in the present LDGO seismic acquisition system is the data logger. It controls a variety of functions (e.g. air gun firing times, DFS IV start command, sonobuoy acquisition, and digital magnetics), but is itself unreliable. A number of factors, including bad circuit boards, voltage surges, and bad weather (aggravating a faulty power connection to a terminal) caused it to malfunction repeatedly. At present, THERE IS NO EFFECTIVE BACKUP SYSTEM, and it is critical that a backup system be available.

2) Air guns are generally reliable, but repeated failures of air hoses and firing cables near their tail-piece connections with air guns suggest excessive vibration, particularly during rough weather and intermittent shallow towing. LDGO should consider alternate towing arrangements aboard CONRAD. Martin Iltzsche, assisted by Danny Bolles and Ropate Naiwiriwiri, is to be highly commended for his diligent efforts to keep guns in the water and firing as much as possible.

3) The streamer performed adequately, but it was never ballasted to the complete satisfaction of either the LDGO science officer (Smith) of the co-chief scientists. In future, MCS cruises aboard CONRAD should be granted additional seatime (1-2 days) for streamer manipulation, particularly if the gear is going into service after a long period of disuse, which was the case here.

4) CONRAD needs a built-in tank, pump and on-deck dispenser for streamer oil. This would facilitate streamer operations, where time is most certainly money.

5) If the CONRAD is to be a truly effective seismic vessel, she also needs stern steering and power controls. At one point during this cruise, the ship was heading into the wind recovering streamer when the steering failed. Had not the Chief Engineer taken immediate action to restore steering control to the bridge, the ship would have floated downwind across its own streamer, possibly damaging or severing it. Dual controls would minimize such hazards, if only by reducing response times of personnel. Furthermore, it would speed up both deployment and recovery operations and allow more even winding on the streamer reel.

6) The main lab on CONRAD is extremely noisy and the noise becomes nearly intolerable on long watches. The main lab should be carpeted with industry-grade carpet in order to reduce noise.

This is now standard operating procedure on seismic vessels in industry. U.T. put a tough, woven carpet into the FRED H. MOORE for less than $6,000 approximately 2 years ago. Other noise-reducing wall tiles or alternate equipment should be considered (the screaming Kennedy tape drives for the data logger are particularly bad.)

7) Air conditioning in the CONRAD's main lab should not continuously recirculate air, and the lab A/C should be separate from the ship's A/C plant in order to provide a back-up for the lab's electronics. At one point during the CONRAD's final transit to Bermuda, the ship's A/C failed. Both SEABEAM and data logging computers had to be shut down. (Lab temperatures reached 90 degrees F, with 90% humidity!)

8) The lab should have a separate sonobuoy acquisition system. Better sonobuoy receivers are also desirable. Noise levels in the present receivers are excessive, and limit the range of effective sonobuoy reception.

9) Using carbon paper to produce copies of lab forms is messy and often ineffective. (We almost ran out of carbon paper on this cruise!) Use of pressure-sensitive paper copies (e.g. "Main Lab Log")) is far better. In addition, some of CONRAD's lab forms should be redesigned (e.g. "Sonobuoy Log").

10) The Edo PDR that we used for the "Profiler B" records needs some overhaul: 1) styli consistently gummed up and skipped printing, 2) paper takeup/feed is skewed, necessitating paper adjustment every few hours. The SEABEAM UGR also needs overhaul, especially the gain control, which is very sensitive (virtually heavy-print/no-print).

11) The TPX-1 tape drive, although generally reliable, had intermittent problems (load light misfunction, continuous running, continuous reverse running) that may need checking.

12) Line isolating transformer failed, which caused SEABEAM to stop. Total down time was about 3 hours. Also, data logger problems may have been caused by power problems (spikes, surges, brownouts). These failures provide good reasons to have a UPS system to run the electronic equipment in the main lab.

13) In total, the cruise is considered to be a resounding success, through the efforts of all personnel.