

NE - 1 - 78 CRUISE REPORT

BOAT: R/V NEECHO

PROJECT: Great Lakes

CRUISE DATES: 26 Nov. - 8 Dec. 1978

LOCATION: Lake George, New York

78037

PERSONNEL: Deborah R. Hutchinson, Chief Scientist, U.S.G.S.  
Bill Jaworski, Boat Operations, U.S.G.S.  
Paul Loud, Captain, U.S.G.S.  
Ken Parolski, Technician, U.S.G.S.  
Frank Jennings, Technician, U.S.G.S.  
Dave Mason, Technician, U.S.G.S.  
Richard J. Wold, Project Chief, U.S.G.S.  
Yngvar Isachsen, Project Chief, N.Y.S.G.S.  
Bruce Ambuter, OBIP Designer, U.S.G.S.  
Ray Davis, OBIP Designer, U.S.G.S.  
Tom Davies, Guest, Middlebury College  
Debbie Blank, Guest, Middlebury College

DOCK FACILITIES:

- A. Bolton Landing: N.Y. State Dept. of Environmental Conservation (NYSDEC) dock facilities on Green Island, courtesy of Frank Leonbruno.
- B. Lake George Village: Steam Boat Dock, courtesy of Steam Boat Company of Lake George.

OBJECTIVES:

- A. To obtain piston cores (24' rig, 1.5" diam.) and grab samples in order to correlate lithology with the acoustic stratigraphy determined in the 1976 Lake George cruise.
- B. To side-scan specific locations in the lake to obtain orientations on features seen in acoustic records (e.g. gas-filled sediments, possible faults, possible channels, bedrock ridges, etc.)
- C. To "shakedown" the NEECHO, i.e. to test her operating systems, evaluate her performance while collecting data, test the hydraulics-compressor system, and other shipward instrumentation and to determine where modifications to equipment and design are needed.
- D. To collect a variety of acoustic data (e.g. 7 kHz side scan, airgun, 1.5 kHz fish, 3.5 kHz, etc.) over selected areas where UNIBOOM and 7 kHz data were collected in 1976 in order to monitor the quality of acoustic data.
- E. To test OBIP (Ocean Bottom Instrument Package) in a quiet water environment.

## INSTRUMENTATION

### Sampling Gear

1. Alpine piston corer with 300 lb. weight barrel and 24 foot length barrel, 1.5" diameter liner.
2. Van Veen grab sampler
3. Smith-McIntyre sampler (not used)

### Acoustic Sources

- \*1. 200 kHz fathometer with graphic recorder (Raytheon DE 719)
- \*2. 3.5/7 kHz hull mounted transceiver (Raytheon PTR 106)  
Recorder: EPC Model 3200
3. Edo Western side scan fish Model 604-150 with 2.5 kHz subbottom signal (248E to run profiling system)  
Recorder: Edo Western Model 606
4. Bolt 40" airgun with waveshaper chamber (Model 600B)  
5" airgun (Model 600B)  
Teledyne Model 300LF amplifier and Teledyne streamer  
Recorder: EPC Model 4100
5. Edo Western 1.5 kHz fish with 248E to run profiling system (not used)
- \* Hull mounted permanent installation

### Other

1. Ocean Bottom Instrument Package (OBIP) designed and built by Bruce Ambuter, U.S.G.S.

## NAVIGATION:

LORAN C navigation (NORTH-STAR) was used after the proposed Mini Ranger system was cancelled by the Project Chiefs. Because no LORAN charts exist for the lake, four hours were taken 30 NOV (Wed) to circumnavigate the lake and take readings at seventeen known land points for calibration. Best fit LORAN lines were constructed on TOPO sheets using these calibration stations. The SS60 chain (Northeast Chain), stations W (Caribou, Maine), X (Nantucket, Mass.) and Y (Carolina Beach, N.C.) were recorded. The chart was constructed with W and X. The northern 3/4 of the lake (north of Cannon Pt.) showed excellent consistency with straight line construction. The southern 1/4 of the lake (south of Cannon Pt.) showed good signal to noise readings at all calibration points, but reconstruction required curved (i.e. distorted) lines. The southern quarter of the lake is extremely narrow (1 km) with tall mountains immediately to the east, possibly a cause for topographic distortion of the LORAN signal. An additional three calibration points were taken in the southern 1/4 of the lake later in the cruise to help reconstruct that configuration.

## CHRONOLOGICAL LOG

- 21 Nov 1978 (Tues.) R/V NEECHO to Lake George with Jaworski, Loud, Parolski, Jennings and Mason. (Flatbed, Pickup and Trailer = 3 vehicles)
- 22 Nov (Wed.) NEECHO remains in Lake George over Thanksgiving, above people return via chartered plane.
- 26 Nov (Sun) Jaworski, Loud, Parolski, Jennings and Mason return to Lake George via chartered plane.
- 27 Nov (Mon) R/V NEECHO launched from Steam Boat Dock with Albany Crane Service crane. Hutchinson arrives.
- Gauge breaks on hydraulics (110V system)  
Motor burned out on A-frame  
Ambuter arrives
- 28 Nov (Tues) Repairs continue on hydraulics and motor, U.S.G.S. (Honda) spare generator hooked up. Ambuter, Hutchinson and 2 personnel from NYSDEC deploy 1 OBIP in Northwest Bay. Wold arrives.
- 29 Nov (Wed) Repairs continue, Isachsen arrives. Test piston core (7001) and Van Veen grab in early afternoon. Wold and Isachsen take news reporters in chase boat, NEECHO collects first 24-foot core (7002) in late afternoon. Honda generator has a faulty regulator - NYSDEC loans us one of theirs. Isachsen leaves.
- 30 Nov (Thurs) Wold, Hutchinson and Loud take NEECHO 0830-1300 hrs. to calibrate Loran at known points around the lake. Jaworski et al work on generator, core rig, etc. at Green Island Dock. Davis arrives. Wold leaves (returns W.H.)
- 1 Dec (Fri) Loud, Jaworski, Parolski, Jennings, Mason and Hutchinson depart dock 0830 to collect cores. Recover 7003, on site at 7004 when chase boat appears with television crew (6, 10 Albany). Recover 7004, winch breaks (hydraulics problems), and we return Green Island, 1100, for repairs.
- Morning - Ambuter and Davis recover OBIP with chase boat.
- Afternoon - Ambuter, Davis, Loud with 1 person from NYSDEC deploy 3 OBIP's in Northwest Bay. with NYSDEC boat. Ambuter, Davis depart.
- 2 Dec (Sat) Loud, Jennings, Parolski, Mason and Hutchinson collect cores 7005 to 7012 with no major problems.
- 3 Dec (Sun) Loud, Jennings, Parolski, Mason and Hutchinson collect cores 7013 to 7015 and grabs 7016 to 7019 (Van Veen). Weather 14°F all day, heavy snow at times.
- 4 Dec (Mon) Guests Davies and Blank arrive for day. Jaworski, Jennings, Parolski, Mason and Hutchinson collect side scan. Change at lunch (in Lake George Village), leave Parolski and Mason on shore - return to collect side scan. Lose basal plate of fish on shoal area north of Diamond Island at 1430. -Return to Green Island dock to make arrangements for scuba diver. Winds blowing strongly out of the south made the southern (protected) area the first priority site.

(Chronological Log Cont.)

- 5 Dec (Tues) Mason and Jaworski take chase boat to mark Diamond Island Shoal area for scuba search. Jennings and Parolski spent morning re-rigging airguns. On trial run, EPC recorder is broken, so we return to Green Island for new recorder. Underway shooting of airgun begins at 1315 in northern part of Lake. Loud concerned about gas tanks being low and expresses desire to maintain low speeds and remain in northern half of lake. Jaworski comes aboard 1400 and demands NEECHO standby at Diamond Island at 1515 for scuba diver. 1430 Jaworski leaves with Mason on chase boat to meet diver. We try 40" gun at 4 sec, 3.5 sec, 3 sec shooting rate, then terminate cruise at 1445 to proceed south to Diamond Island. Jaworski, Mason and diver arrive at 1530. NEECHO sets anchor and backs to buoy. Diver begins work from chase boat and recovers side scan basal plate in approximately 5 minutes, returns to chase boat with fish. Loud decides to tie NEECHO up at Steam Boat Dock due to low fuel. Diver comes aboard NEECHO. Mason and Parolski return chase boat to Green Island facility. NEECHO proceeds to Steam Boat Dock and ties up, 1640.
- 6 Dec. (Wed) Standby in a.m. for fuel delivery at 0915. Jaworski and Parolski stay ashore for packing. Loud, Jennings, Mason, Hutchinson proceed and collect grab 7020, then rig for airgun (5" gun, 1 sec rep rate, 100-300 Hz) and shoot to 1355, rerig and shoot 40" airgun (1200 psi, 2 sec firing rate, 100-300 Hz) over one identical line. End cruise at 1445, return to Green Island, unpack generator, thank N.Y. people and Jennings takes flat bed to Lake George Village. Loud, Mason and Hutchinson steam with NEECHO to Steam Boat Dock and meet Jaworski, Parolski and Jennings, 1745 at the Lake George Dock. Secure boat for the night.
- 7 Dec (Thurs) NEECHO secured and prepared for hauling. Albany Crane Service arrives 1030 and hauls NEECHO. Hutchinson leaves. Jaworski, Jennings, Parolski, Loud and Mason depart with NEECHO, flatbed and pickup for Woods Hole.
- 8 Dec (Fri) NEECHO et al return Woods Hole approximately 1230.

SUMMARY OF DATA: NE-1-78

Number of days collecting data: 8

Kilometers of continuous seismic profiling:

Sidescan: = 14.4 km  
 Airgun: = 25.4 (5" gun)  
 = 11.8 (40" gun)  
 7 kHz = 130 km

Stations occupied: 20 stationary stations (see table below)

Core *	Total Recovery m	ft	W S 1	X S 2	Y S 3	m Water Depth
7001 PC	2.9	9'6.5"	43 34.1 N	73 38.8 W		12.2
7002 PC	6.9	22'7"	14794.4	27363.7	45030.5	48.0
7003 PC	6.2	20'4"	14789.3	27362.0	45031.2	47.1
7004 PC	6.1	20'2"	14792.8	27362.3	45030.0	47.7
7005 PC	5.1	16'7"	14779.5	27359.5		54.8
7006 PC	7.3	24'	14821.3	27373.9	45027.6	31.5
7007 PC	6.7	22'	14816.5	27366.8	45024.2	24.0
7008 PC	7.3	24'	14815.3	27365.3	45023.4	25.2
7009 PC	7.3	24'	14817.8	27369.6	45025.6	32.8
7010 PC	6.2	20'3"	14845.1	27373.1	45017.4	23.0
7011 PC	7.3	24'	14859.6	27377.2	45014.5	34.7
7012 PC	no recovery		14873.8	27382.3	45011.8	18.3
7013 PC	7.3	24'	14775.6	27367.0	45040.0	21.7
7014 PC	7.3	24'	14861.1	27377.7	45014.0	34.0
7015 PC	4.6	15'	14827.3	27369.3	45030.7	18.4
7016 VV			14820.8	27374.6	(TEST)	
7017 VV			14819.9	27372.0	45026.6	30.2
7018 VV			14792.3	27366.2	45033.2	20.8
7019 VV			14794.2	27366.7	45032.8	20.8
7020 VV ?			14872.4	27382.4	45012.5	20.5

\* PC = Alpine Piston Core

VV = Van Veen Grab Sampler

Equipment lost or destroyed

1 trigger weight from Piston Core (snapped line)  
2 20 foot core barrels  
1 4 foot core barrel  
2 core catchers  
1 heavy chain (stolen from NEECHO trailer)

cc: D. Folger  
H. Knebel  
R. Wold  
B. Jaworski  
P. Loud  
F. Jennings  
K. Parolski  
R. Sylwester  
D. Mason  
S. Wood  
D. Hutchinson

# LAKE GEORGE

0 1 2 KM



Bolton Landing  
Dock facilities  
(NYSDEC,  
Green Island)

## NE-1-78 CORE SITES

- ⊙ 7003 Piston Core location
- 7016 Van Yeen Grab location
- LORAN C calibration points

— Tracklines 1976  
Lake George Cruise } Basemap.

Cannon Point

Steam Boat  
Dock, Lake  
George Village

Note: Core locations south of  
Cannon Point only approximate  
(pending revised LORAN C  
construction)

FIG 1: Index map and Sample Sites

# LAKE GEORGE

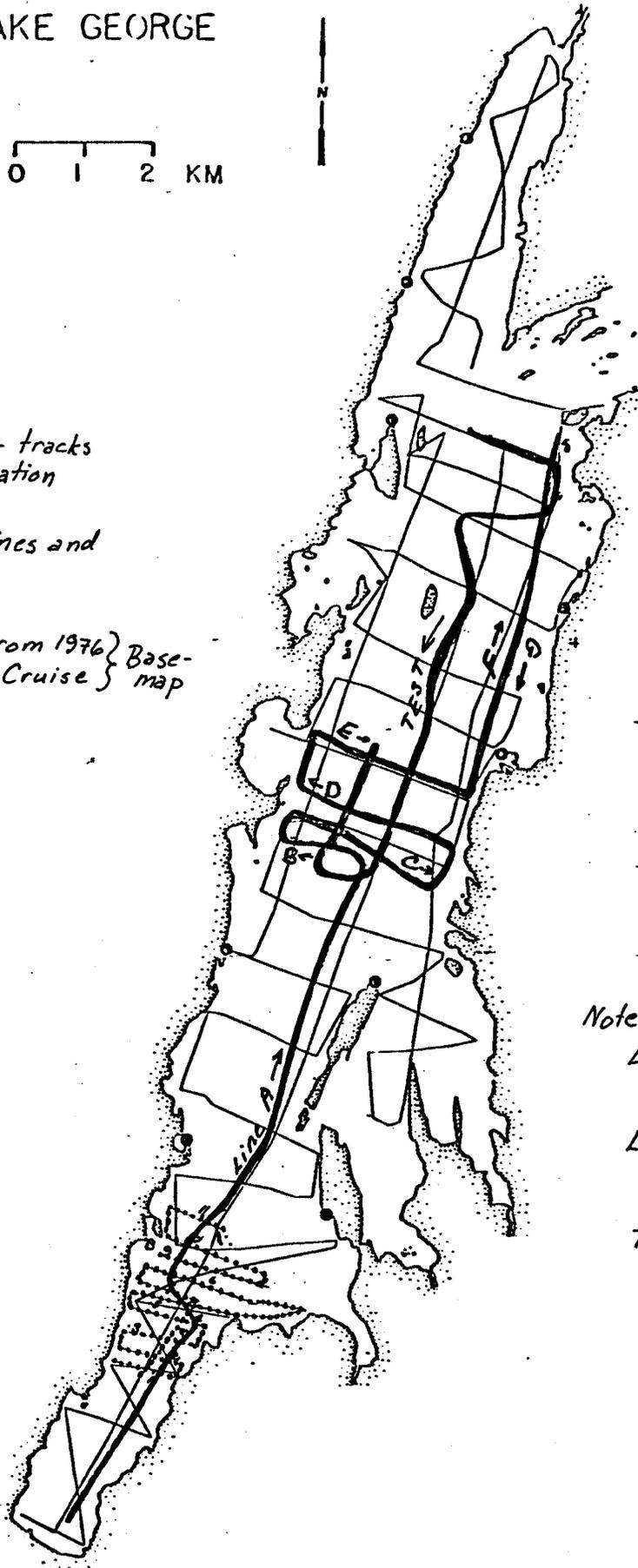
0 1 2 KM

N

••• Side Scan Sonar tracks and line designation

D Airgun track lines and designation

— Tracklines from 1976 } Base-Lake George Cruise } map



Note:

Lines A-F: 5" gun, 100-300 Hz, 1sec firing rate, 2000 psi

Line G: 40" gun, 100-300 Hz, 2sec firing rate, 1200 psi

TEST: 40" gun 75-200 Hz, 3sec firing rate, 2000 psi

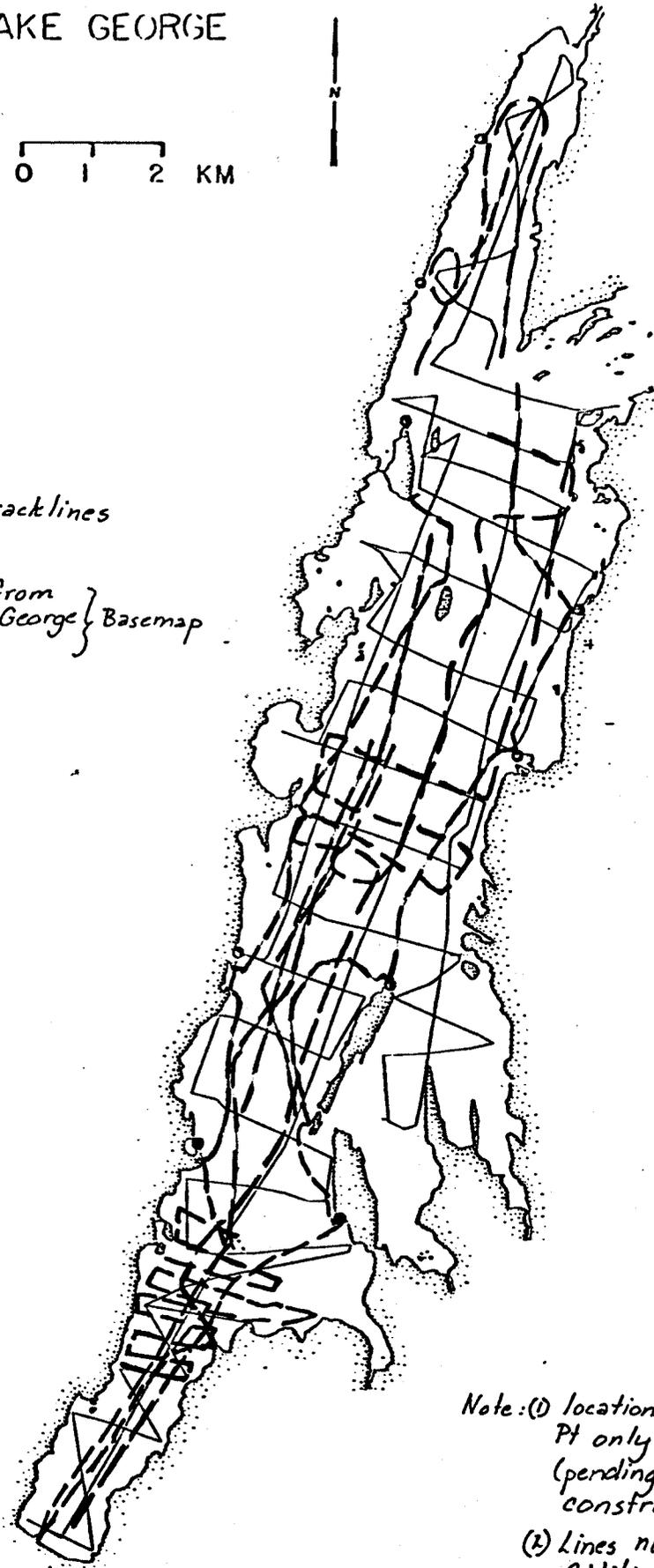
FIG 2: Side Scan sonar and Airgun tracklines

LAKE GEORGE

0 1 2 KM



— — 7 kHz tracklines  
— Tracklines from 1976 Lake George } Basemap  
Cruise



Note: (1) locations south of Cannon Pt only approximate (pending revised LORAN construction)  
(2) Lines numbered as in fig 2  
Additional tracks not designated by number or letter

FIG 3: 7 kHz tracklines

## The Lessons of NE-1-78

The following is a topical summary of some of the problems and encouragements resulting from NE-1-78.

Science vs. Shakedown: The difference in purpose between conducting a scientific vs. shakedown cruise leads to somewhat incompatible objectives. The prime objective of a shakedown cruise is to test the operations (mechanical, electrical and instrumental) of the NEECHO with an eye towards the completeness of the system. The objective of a science cruise is to collect specific types of data using specific instruments. The conflict came in on the one hand trying to collect specialized information about the lake while on the other trying to test the general systems of the boat. An instance that illustrates this problem involved the ship's generator. When it malfunctioned, a gas-run, independent generator was used to complete the cruise, rather than repairing and testing the ship's generator. Such a situation prevented "shaking down" that piece of the boat's equipment because of the need to collect scientific data.

Authority: On this cruise, three people were directly involved in the decision making process aboard the NEECHO: the boat's captain (Paul Loud), the chief scientist (Deborah Hutchinson) and the boat's designer (Bill Jaworski). In ordinary cruises, the chief scientist makes decisions about the boat's operations, while the boat's captain determines the safety. Because this cruise was also a shakedown cruise, the boat's designer was responsible for overseeing the boat equipment: engine, hydraulics, compressor, and, to a certain extent, instrumentation. Such a tripartite arrangement resulted in communication problems (for example, personnel assignment and the presence of guest scientists). The lack of communication indicated a more fundamental problem dealing with authority of the vessel: in this case, between chief scientist and boat designer. A specific instance involved the termination of scientific work in order that NEECHO stand by for the scuba diver hired to search for the lost side scan plate. This action was demanded by the boat designer, despite the availability and use of a smaller 18' chase boat. The responsibility of NEECHO was to set an anchor and drift back to a marker buoy. The diver returned aboard NEECHO to the Steam Boat dock in Lake George Village where NEECHO was secured for the night. The use of the NEECHO was a convenience, rather than necessity in this instance, and resulted in terminating the day's scientific work 1-3/4 hours early, or losing approximately 1/4 of a days work time.

While this is an isolated experience, other incidents that will not be recounted here occurred that again point to the need for more clearly defined rolls of the personnel involved in future NEECHO cruises. The crux of the problem may be that on a shakedown cruise, the boat's designer should be rightly in charge, as it is his equipment being tested. On the other hand, the foremost objective of the cruise was to collect scientific data and no where prior to the cruise was it made clear on whom the final word rested. It is imperative this situation be clarified in the future.

Equipment Problems: Many equipment malfunctions occurred that could have been found and checked in Woods Hole prior to the cruise: e.g. EPC recorder which did not print, no replacement pens for EDO WESTERN side scan recorder, faulty sealer for plastic sample bags, and improperly rigged airguns (both).

Other problems resulted from new equipment operations. These are legitimate "shakedown" problems: e.g. faulty fathometer, bad signal in 3.5 kHz hull mounted transceiver, misaligned radar.

Still other problems resulted from the lake environment: e.g. loss of basal plate of side scan fish from hitting a bedrock/boulder ridge (recovered by scuba diver), loss of trigger weight in piston core from a snapped line, and bending 2 core barrels from gravel and/or sand.

The shakedown and underway problems are expected; those that could be avoided prior to the cruise should be more thoroughly checked prior to cruise departure.

Cold Weather Operations: Considerations due to cold weather may be unique to the Lake George project, as the NEECHO is not designed for cold water usage. Some of the problems we encountered were extended warm-up time for the engines, potentially dangerous working conditions (from cold fingers, icy and slippery decks, freezing controls), time constraint to remove liners from core barrels before they froze, unavoidable freezing of cores, general slowing down of deck work due to cold hands and frozen tools, the need to break for a hot lunch in the middle of the day and finally, a shortened work day (1800-1530 work time) due to darkness and cold. The combined effect of these variables is to reduce the length of the working day and efficiency of the working crew. These criteria were not included in the initial planning, specifically length, of this cruise and are worthy of note in future cruises planned in cold weather.

Public Relations: This cruise generated considerable local and regional news coverage (2 newspapers, 2 television channels (6, 10 Albany) and radio coverage). The need for the boat and its crew to perform as a professional group is to the advantage of the U.S.G.S. and the local group hosting the NEECHO. Three potentially damaging incidents in Lake George occurred that were rectified by good judgement and action. The first instance involved the recovery of core 7004 during filming by Channels 6 and 10 T.V. The winch hydraulics failed at the moment the core barrel emerged from the lake. By lowering the A-frame, Frank Jennings and Bill Jaworski successfully maneuvered the core aboard, and appeared on the news as if that were typical procedure. That potential embarrassment was succeeded by the more lasting one, that final T.V. coverage did not include an interview with any U.S.G.S. people. The second, in which the head of a local organization publically claimed NEECHO had no holding tank for human waste was allayed by F. Leonbruno of the NYSDEC who spoke with this person and clarified that we did not pump raw sewage into the lake (in fact, we did not even have a head). The final incident occurred after we departed a dock and were accused of leaving an oil slick. The prompt action of Dave Mason and Ken Parolski (who had remained ashore) to point that the source of the slick was from a gas station up the road deserves mention. The crucial lesson is that NEECHO is and may be continually in the public eye, favorably and unfavorably, and the entire crew should be prepared to cope with this. If the U.S.G.S. is to have an "official policy" on public relations (e.g. whether the chief scientist is spokesman, whether articles should include all personnel involved, or whether the help of local facilities is emphasized, etc.) the precedent for such a policy should be set prior to future cruises.

Optimum Crew Size: We found the ideal crew size for this cruise was 5 for sampling (captain, scientist, 3 technicians) and 4 for continuous seismic profiling (captain, scientist, 2 technicians). Once the deploying and retrieval of gear becomes routine, and the electronics become permanent installations, one technician could probably be omitted. More than this number of people aboard made crowded conditions inside the cabin and tended to interfere with the efficiency of the operation. Some of this may have been intensified by cold weather and the desire for everyone to be inside as well as the abundance of bulky winter and rain clothes.

Modifications: A complete list of the required modifications to NEECHO equipment and design does not belong in a cruise report. However, some of the more important empirical discoveries included: (1) the use of support vehicles (flatbed with the NEECHO van and pickup truck) were invaluable for safe storage of loose gear and logistics of travel between dock and hotel. If these vehicles are not available as regular NEECHO tenders, acquisition of an additional flatbed, or at least large van, expressly for NEECHO use in field operations, should be considered; (2) coring was best done with the NEECHO faced into the wind; and (3) seismic sound sources (specifically the airguns) generated cleaner records when towed to the side, rather than directly behind the NEECHO.

Fulfillment of Objectives: Despite the equipment malfunctions, frustrations, and aggravations of NE-1-78, the objectives of the cruise were overwhelmingly fulfilled. From the science viewpoint, 20 stations (or 100% of the proposed sites) were sampled, acoustic tests were run with all but the 1.5 kHz fish and 3.5 kHz hull mounted transceiver, and four deployments of the OBIP were completed. From the shakedown viewpoint, the need for modifications and repairs in the hydraulics and electrical system, as well as in instruments and equipment, were discovered in the course of running the boat. The problems of collecting long cores (>24 feet) from a small boat (38 feet) are more clearly understood. In addition, the prospect that LORAN navigation might be adapted to inland lake surveys may be an unexpected bonus of this cruise.

Final Comments: The NEECHO holds tremendous potential as a research vessel. Under the most adverse conditions, such as those faced on Lake George, her show of data is impressive. We acquired excellent core penetration, excellent side scan data, and ideas on how to improve the efficiency and performance of the NEECHO and her operating crew. The efforts and performance of the technical crew and boat operator were outstanding. Finally, much of the repair work could not have been completed without the support vessels, generator, machine shops and advice of the NYSDEC people.