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CRUISE REPORT: NE-82-4

by Deborah R. Hutchinson

SHIP: R/V NEECHO

CRUISE NO: NE-82-4

PROJECT: 01830, Mid Atlantic Resource Assessment

AREA OF OPERATIONS: Long Island Sound

DATES/PORTS:

13-16 June - Stamford, Ct. (Yacht Haven West)
17-23 June - Stratford, Ct. (Stratford Marina, Inc.)
24 June - Noank, Ct. (Univ. Conn. Marine Facility)
25 June - Cataumet, Mass

SCIENTIFIC PARTY:

Deborah Hutchinson, Chief Scientist
Greg Miller, DFS V technician
Dave Mason, Boat Operator/Gun Technician
Arnie Tanner, Shore support/watch

CRUISE OBJECTIVES:

1. To profile across the large positive gravity anomaly which crosses Long Island Sound in order to identify basement or subbasement structure.

2. To complete the survey begun in June 1981 to identify the southward termination of the Hartford graben in Long Island Sound.

3. To compare profiles collected with the pre-amp 12-channel streamer and 15-in watergun (June 1981) with those collected this cruise with the transformer 12-channel streamer and 15-in watergun.

NAVIGATION: LORAN C (Northstar 6000)

Mountain systems interface box (to write LORAN data as an extended header on the DFS V seismic tapes).

Northstar 6700 General Purpose interface adapter

Texas Instruments Silent 700 data terminal.

EQUIPMENT:

A. Fathometer:

Raytheon Model DE-719B survey fathometer (200 kHz).

B. Magnetometer:

G801G Geometrics Marine proton magnetometer

H/P 7130A graphic recorder

H/P 5150A thermal printer

C. Satellite Clock:

True time division Model 468-DC satellite clock

D. Seismic reflection system:

1. Source

Seismic Systems, Inc. Mica-T 80 in^3 watergun
Seismic Systems, Inc. Mica-T 15 in^3 watergun

2. Streamer

Teledyne 200-element streamer
Fairfield Industries 120 m and 240 m streamer with 10-m and 20-m group spacings respectively.

3. Acquisition

DFS V Controller Module
DFS V Analog Module
Fairfield Industries Interface Box
Syntron, Inc. Command Console CC-801
2 x Lambda Model LMG12-RCS regulated power supply
2 x T.I. DFS V Tape Transports
2 x BNC Model 7010 Digital Delay generator boxes

4. Graphical Display

EPC Model 3200 graphic recorder
SIE, Inc. Model R-10A oscillograph

TOTAL KM OF DATA: 185.2 km

Fathometer: 185.2 km
Magnetometer: 28.0 km
12-channel (10-m groups): 80-in^3 watergun: 102.6 jn
15-in^3 watergun: 65.8 km
12-channel (20-m groups) 15-in^3 watergun: 2.6 km
200-element streamer: 80-in^3: 14.2 km

TABULATED DATA:

Start/End points: see Table I
Reflection data: see Table II
Magnetic data: see Table III

TRACKCHART: see Figure 4.

GENERAL CHRONOLOGICAL LOG:

13 June (Sun): Scientific party transit from Woods Hole to Stamford, Ct. to meet NEECHO. Unpack gear; open boat; GM completed DFS V tests.

14 June (Mon): Shore day: rig maggie, repair shapes, measure streamer, add faring, order 15-in watergun tools, replace oil in tail section, damage/destroy streamer deck cable by leaving it connected to the winch while rewinding the streamer.

15 June (Tues): Reconfigure for single-channel work (200 element streamer patched into Channel 12). Complete line 7. Joe Newell drove down from Woods Hole with 100' deck cable and replacement drum for streamer winch. Replace brake on old drum rather than replacing the entire drum.

16 June (Wed): Shore day: GM replace connector on lead-in cable, rerig 80-in^3 watergun for more controlled deployment, check out Stratford area for marina and hotel.

17 June (Thurs): Final tests on connectors; remove spacer from brake on streamer winch, lengthen tail buoy line; shoot line 7A head to Stratford, Ct.

18 June (Fri): Shoot line 7A cont. and line 8. Intermittent problems on channels 2, 5, 6 related to deck cable. Terminate work for weekend due to recreational traffic. GM took deck cable back to Woods Hole to redo connector.

20 June (Sun): Scientific party reconvene at Stratford.

21 June (Mon): Reshoot line 8 (we rewrote over one of the tapes from 18 June); shoot line 1C. Streamer working well except tail depth sensor which has been bad the entire trip. A.T. ashore to track down SSI tools for the 15-in watergun. John Madsen from URI aboard.

22 June (Tues): DM finish repairing 15-in watergun; shoot line 1D and line 9. Channel 4 - weak.

23 June (Wed): Shoot line 10 and line 11, Channel 7 - weak or bad. Temporary problem with DFS V system during line 10. Strong currents on line 11 caused bad crab in line. Common depth point assumption may not hold.

24 June (Thurs): Transit to Noank, Ct. and test 240-m streamer. Channels 3, 4, 7 may be intermittent. D.H. return to Woods Hole with tan van.

25 June (Fri): NEECHO transit to Cataumet, Mass. from Noank, Ct.

PRELIMINARY RESULTS:

A. Gravity Anomaly

The near trace monitor record across the gravity high (line 7A) using the 80 in^3 watergun shows no convincing subbasement reflectors. However, the low frequencies and multiples make the record difficult to read.

B. Triassic graben

Several additional crossings of the large valley south of New Haven that we first profiled in June 1981, show that this potential continuation of the Hartford graben turns southward toward Stratford shoal. The valley loses its distinct cut-out shape and many widen and shallow toward the shoal, making it difficult to distinguish reflectors other than the Coastal Plain and basement surfaces. However, our present grid of profiles should be sufficient to locate the graben if it continues under the shoal using the processed data.

EQUIPMENT PERFORMANCE:

A. 120-m Streamer

All 12 channels are working and look very good on AGC. However, the fixed gain display (fig 1) shows that channels 10, 2, and 1 are very weak and channel 8 is somewhat weak. It is not clear whether these are hydrophone problems or transformer problems.

B. 240-m Streamer

Channels 12-2 look good on AGC whereas channel 1 has noise spikes (fig 2). On fixed gain, however, channels 11, 10, 8, 5, 2, and 1 are very poor and weak. As with the 120m streamer it is uncertain whether this is hydrophone or transformer related.

C. 80in Watergun

The compressor on the Neecho can shoot the 80in gun at 1500-1700psi every 10s (20m spacing at 4.0kts). This means data collected with the 120m streamer can only be processed 3-fold. The gun functioned very well. Because of its heavy weight the gun is awkward to manage on the Neecho in any but calm seas.

D. 15in Watergun

A power spectrum on the small watergun has indicated it has little energy below 100 Hz. Therefore we set the DFS V filters at 77-512 Hz and recorded 1/2 ms sample interval. This provided exceptionally clean near trace monitors (see E, below).

E. DFS V filters

Fig. 3 shows an example of the harmful effect of recording low frequency noise on the DFS V when only high frequency signal is present. In this case, the EPC near trace was filtered 120-500 Hz. However, on the left half, the DFS V was recorded out-512 and the signal is notably weak and intermittent. On the right half, the DFS V was set 77-512 Hz, and the signal is remarkably improved. This is a clear example of how low frequency noise alters the dynamic range of the recording system such that some of the signal is lost.

F. LORAN C

Stations X(26000) and Y(44000) consistently had signal-to-noise ratios of 800-900 in Long Island Sound whereas W(15000) and Z(60000) had SNR between 200 and 300. Stations X and Y also have the least distance between 10 microseconds, making the accuracy of these 2 stations superior to that of W and Z.

TABLE I: START/END POINTS

LINE NO.	DAMOYR	START OF LINE SP NO.	START OF LINE TIME (Z)	START OF LINE X	START OF LINE Y	END OF LINE SP NO.	END OF LINE TIME (Z)	END OF LINE X	END OF LINE Y	TOTAL KM
7	150682	1	1808	26882.9	43970.0	743	2012	26807.7	43970.0	14.2
7A	170682	1	1647	26850.1	43970.1	1706	2132	26655.1	43971.3	36.0
7A Cont	180682	1707	1534	26656.0	43969.7	2703	1820	26536.0	43969.8	21.1
8	180682	1	1950	26578.6	43010.7	428	2101	26628.8	40010.0	8.9
8	210682	500	1550	26726.4	44010.8	1764	1921	26574.4	44009.7	27.5
1C	210682	1	1951	26581.4	44020.6	511	2116	26642.1	44027.4	9.1
1D	220682	1	1650	26645.2	44030.1	1760	1804	26588.8	44021.2	9.4
9	220682	1	1959	26579.8	43965.3	1636	2201	26580.0	44033.9	16.7
10	230682	1	1454	26638.2	44031.3	2082	1800	26639.4	43942.0	21.7
11	230682	1	1902	26672.9	43938.0	1743	2128	26670.0	44012.6	18.0
TEST	240682	1	1532			285	1558			2.6

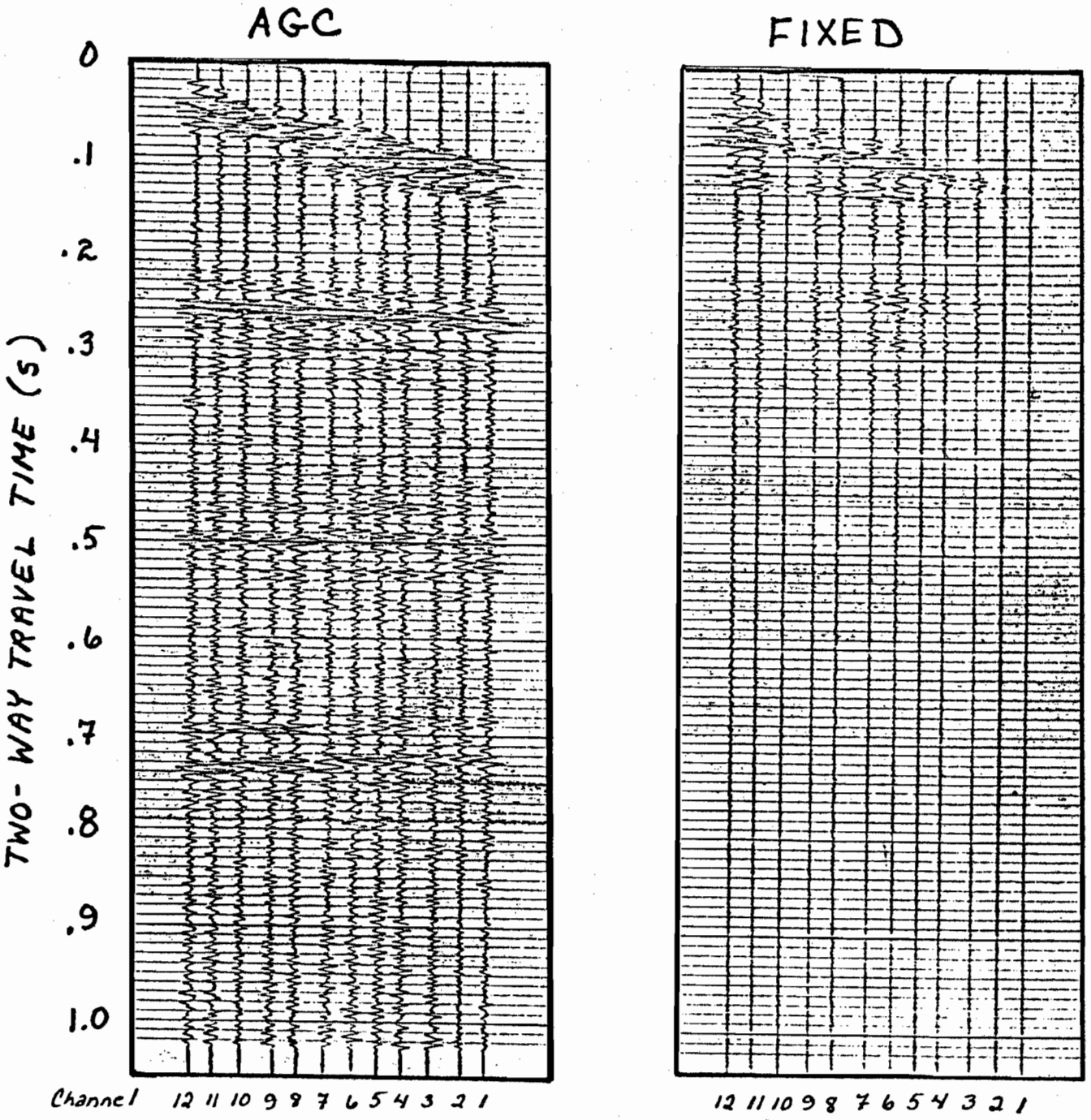
TABLE II: SEISMIC REFLECTION DATA

LINE NO.	SOURCE (WATER GUN)	SHOT INT. (S)	GUN DEPTH (M)	OFFSET (M)	RECEIVER	GROUP LENGTH (M)	GROUP INT (M)	DEPTH (M)	SAMPLE LENGTH (S)	SAMPLE RATE (MS)	DFSV FILTER (HZ)
7	80	10.0	4	15, 25 35	200 el	30	N/A	?	2	1	18-256
7A	"	"	"	40	120-m	4.2	10	3	"	"	"
8	"	"	"	"	"	"	"	"	"	"	"
1C	"	"	"	"	"	"	"	"	"	"	"
1D	15	2.5	1.5	30	"	"	"	"	1	0.5	77-512
9	"	5.0	"	"	"	"	"	"	"	"	"
10	"	"	"	"	"	"	"	"	"	"	"
11	"	"	"	"	"	"	"	"	"	"	"
TEST	"	"	"	20	240-m	"	20	"	"	"	OUT-512 77-512

TABLE III - MAGNETIC DATA SUMMARY

LINE NO.	DATE DAMOY R	START TIME (Z)	END TIME (Z)	TOTAL KM
7A	170682	2050	2132	6.9
7A	180682	1534	1820	21.9

120-M STREAMER

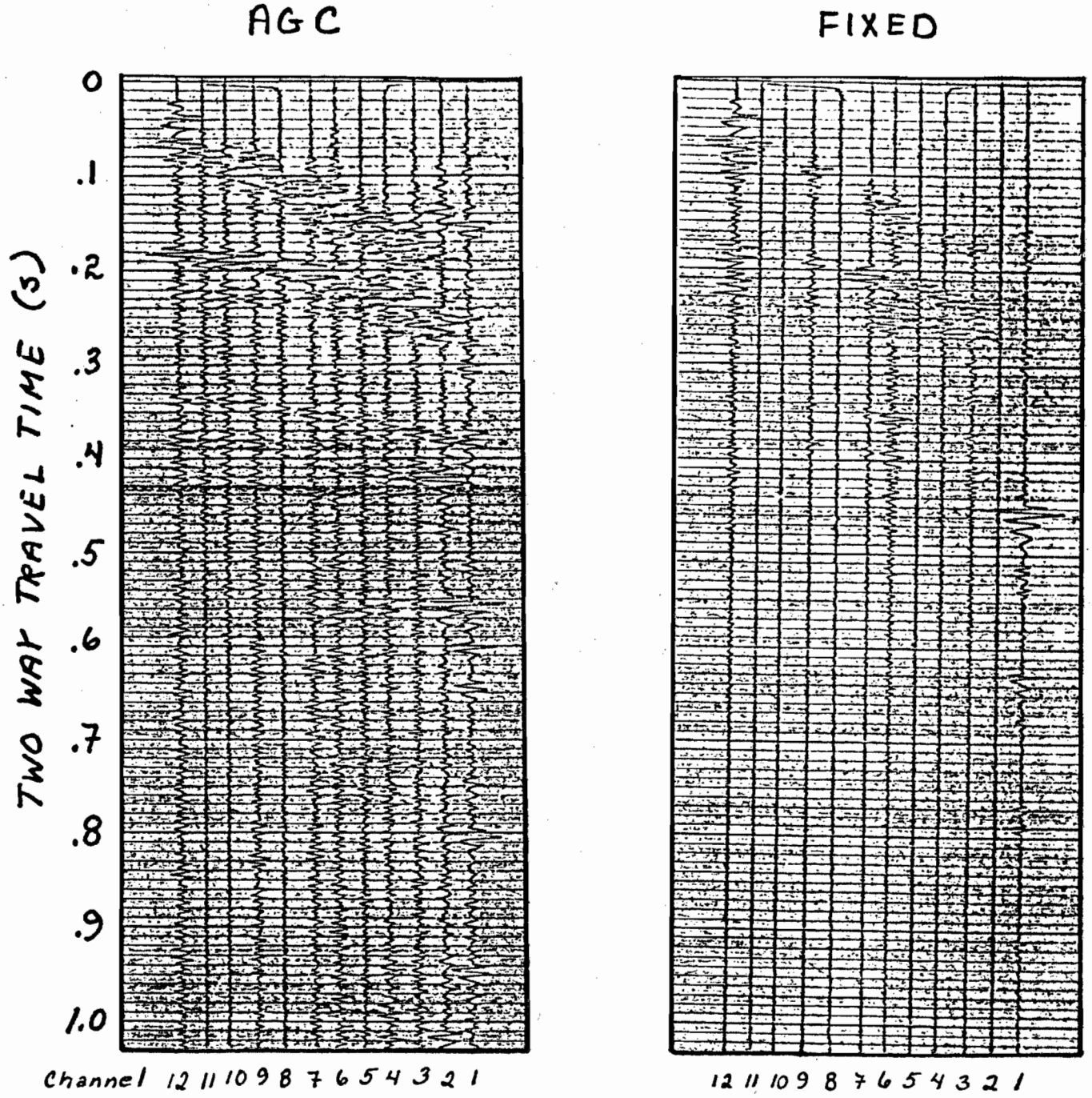


Line 11
SP 1047
15 in watergun
77 - 512 Hz

Line 11
SP 868
15 in watergun
77 - 512 Hz

Fig. 1

240 - M STREAMER



Test Line
SP 138
15 in watergun
77 - 512 Hz

Test Line
SP 139
15 in watergun
77 - 512 Hz

Fig. 2

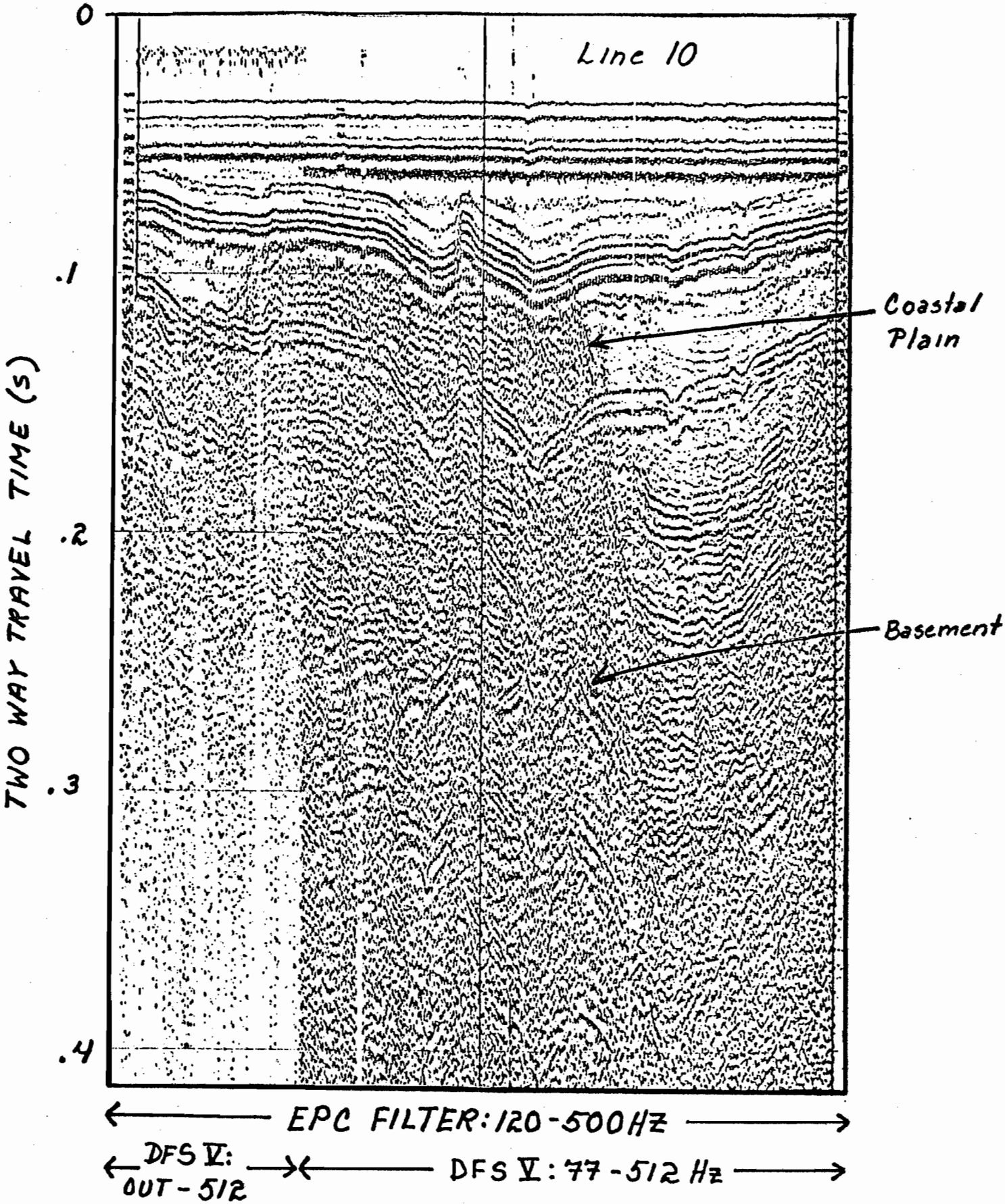

Line 10
0
.1
.2
.3
.4
TWO WAY TRAVEL TIME (s)
Coastal Plain
Basement
EPC FILTER: 120-500 Hz
DFS V: OUT-512
DFS V: 77-512 Hz

Fig. 3

NE-82-4

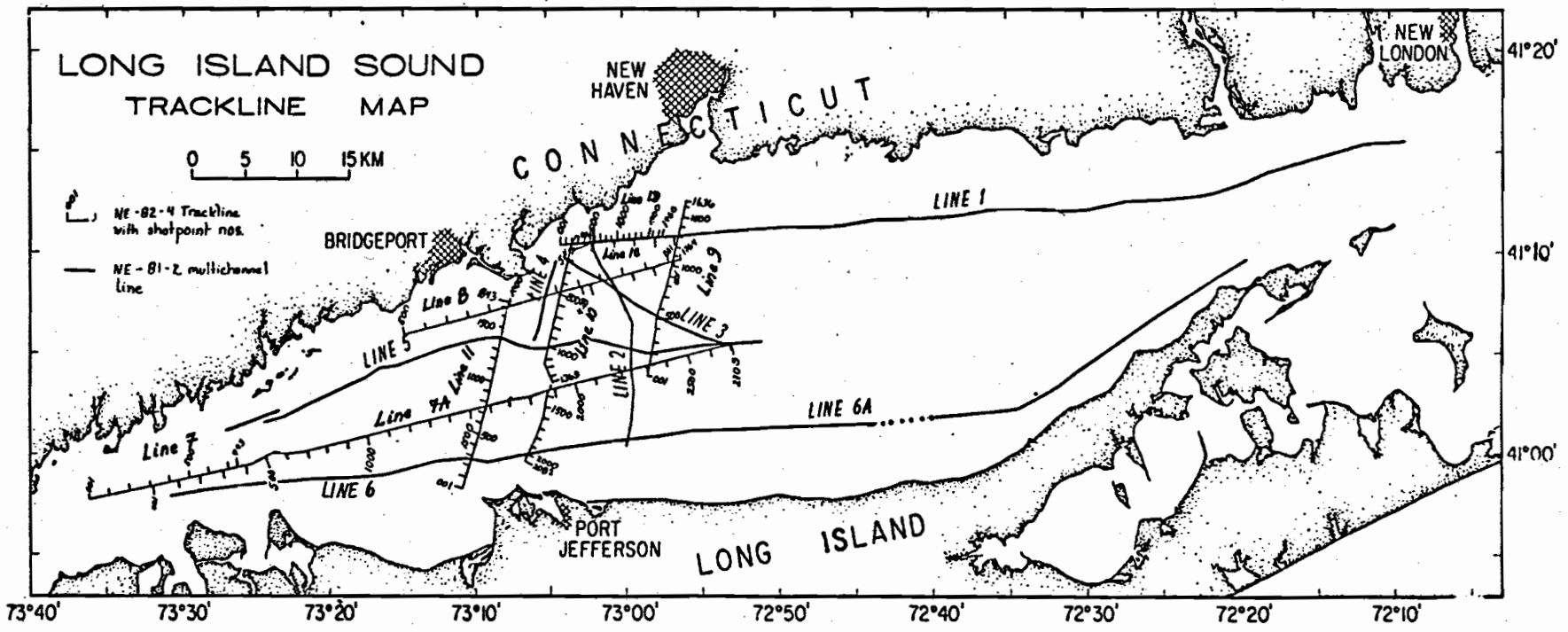

LONG ISLAND SOUND
TRACKLINE MAP
0 5 10 15KM
NE-82-4 Trackline with shotpoint nos.
NE-81-2 multichannel line
NEW HAVEN
NEW LONDON
CONNECTICUT
BRIDGEPORT
LINE 1
LINE 2
LINE 3
LINE 4
LINE 5
LINE 6
LINE 6A
Line 7
Line 7A
Line 8
Line 9
Line 10
Line 11
PORT JEFFERSON
LONG ISLAND
41°20'
41°10'
41°00'
73°40'
73°30'
73°20'
73°10'
73°00'
72°50'
72°40'
72°30'
72°20'
72°10'

Fig. 4