DAMOS

DISPOSAL AREA MONITORING SYSTEM

ANNUAL DATA REPORT - 1978

SUPPLEMENT I

WESTERN LONG ISLAND SOUND DISPOSAL SITES

Naval Underwater Systems Center

Newport, Rhode Island

New England Division
Corps of Engineers
Waltham, Massachusetts

May 1979

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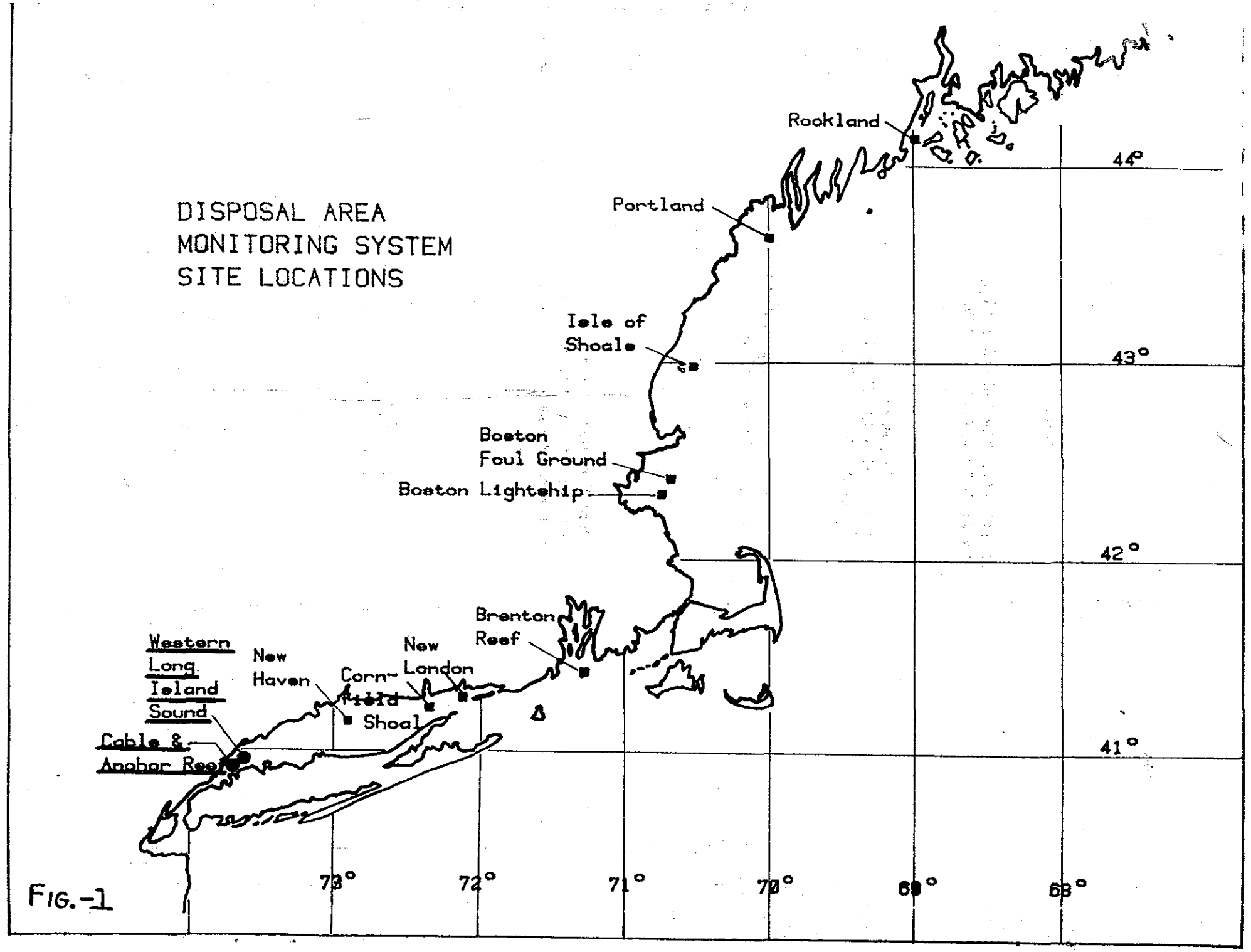

DISPOSAL AREA
MONITORING SYSTEM
SITE LOCATIONS
Rookland
Portland
Isle of
Shoals
Boston
Foul Ground
Boston Lightship
Brenton
Reef
New
London
Corn-
field
Shoal
New
Haven
Western
Long
Island
Sound
Cable &
Anchor Reef
44°
43°
42°
41°
73°
72°
71°
70°
69°
68°

FIG.-1

DISPOSAL AREA MONITORING SYSTEM

This is one of a series of site specific data reports resulting from the DAMOS program, now two years in progress. DAMOS is the culmination of nearly a decade of prior study efforts, actually preceding NEPA, which have been directed towards the understanding of the effects of and the responsible management of the ocean disposal of dredged materials in New England waters as they fall under the authority ot the New England Division of the Corps of Engineers. The individual site reports henceforth will be updated approximately on an annual bases as additional knowledge is gained, at least with respect to those sites where significant disposal activities will have occurred.

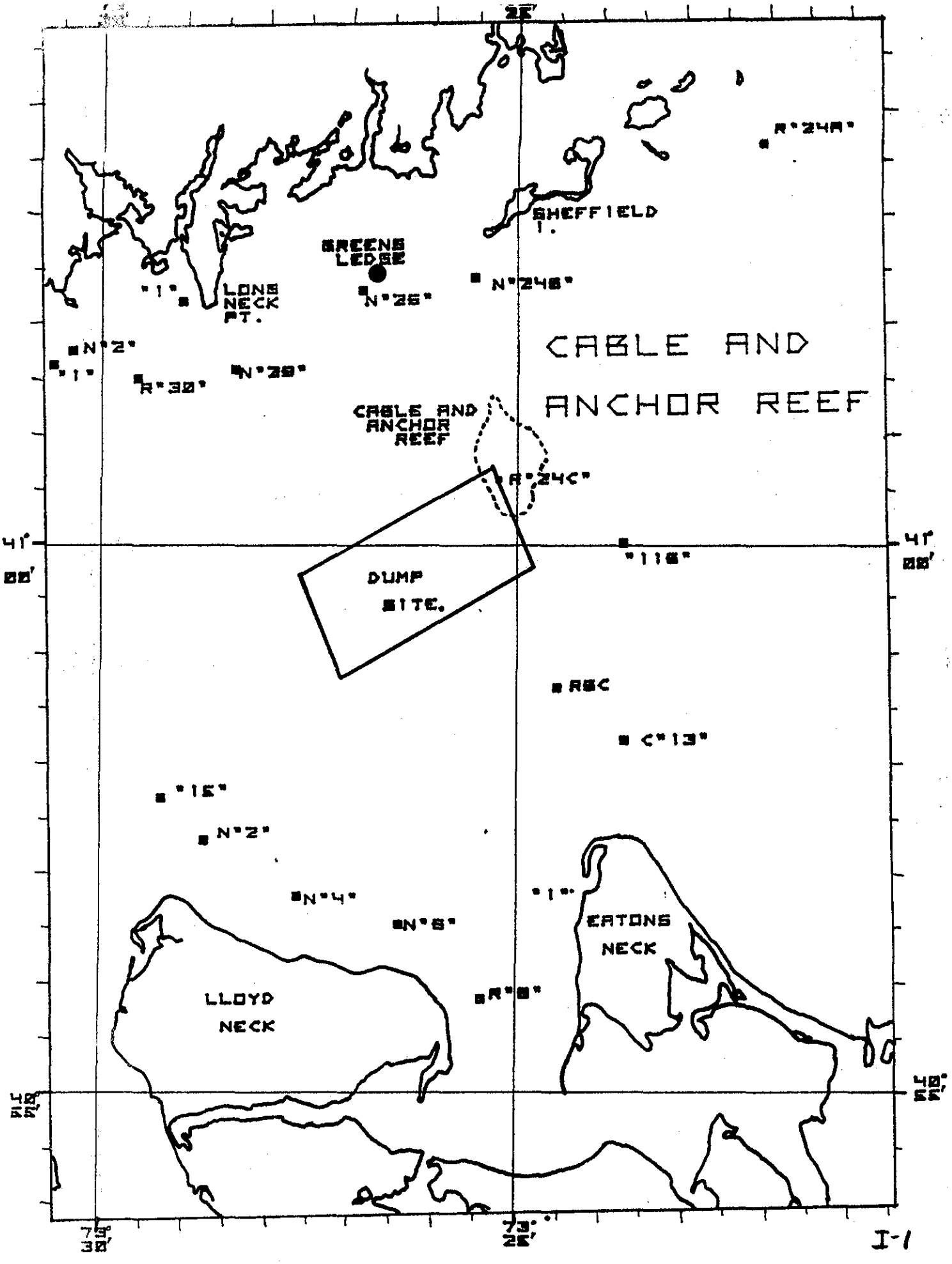
WESTERN LONG ISLAND SOUND

Disposal of dredge spoils from harbors in the Western Long Island Sound area has taken place at the Cable and Anchor Reef site (Fig. I-1) since the beginning of the twentieth century. A rough estimate of 10 million cubic meters of spoil had been dumped at this site through 1973, most of which resulted from maintenance dredging of surrounding harbors. This site has become a major lobstering area and therefore, no longer suitable for future disposal of spoils.

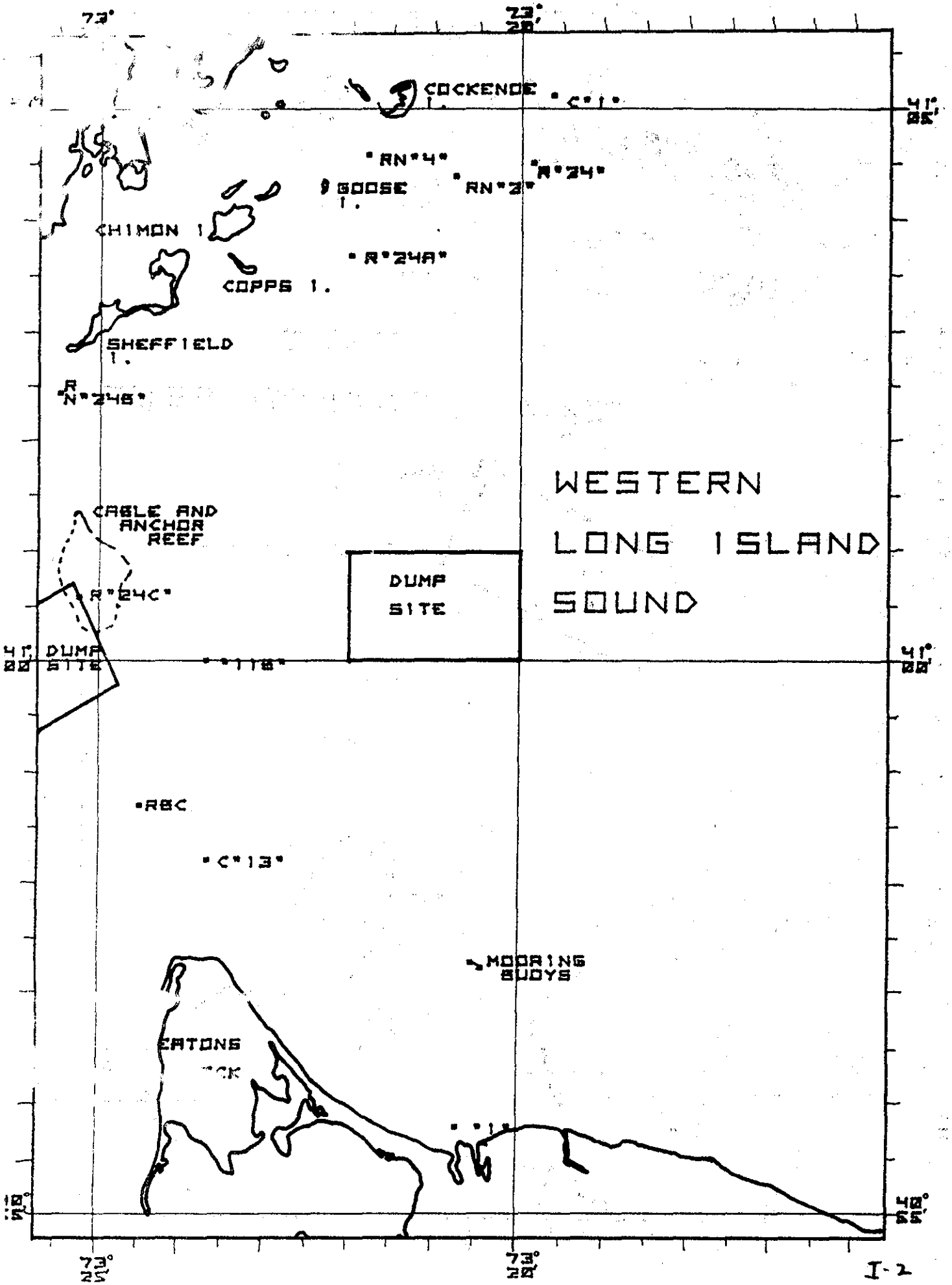
An alternative to the Cable and Anchor Reef site has been proposed by a combination of state and federal agencies in a depression two miles east of the original area. This Western Long Island Sound disposal site (Fig. I-2) is being studied as part of the DAMOS program to provide background data should a requirement for a disposal area arise in the future. Meanwhile, a somewhat reduced monitoring effort will be conducted at the Cable and Anchor Reef site to provide continuity for long term effects.

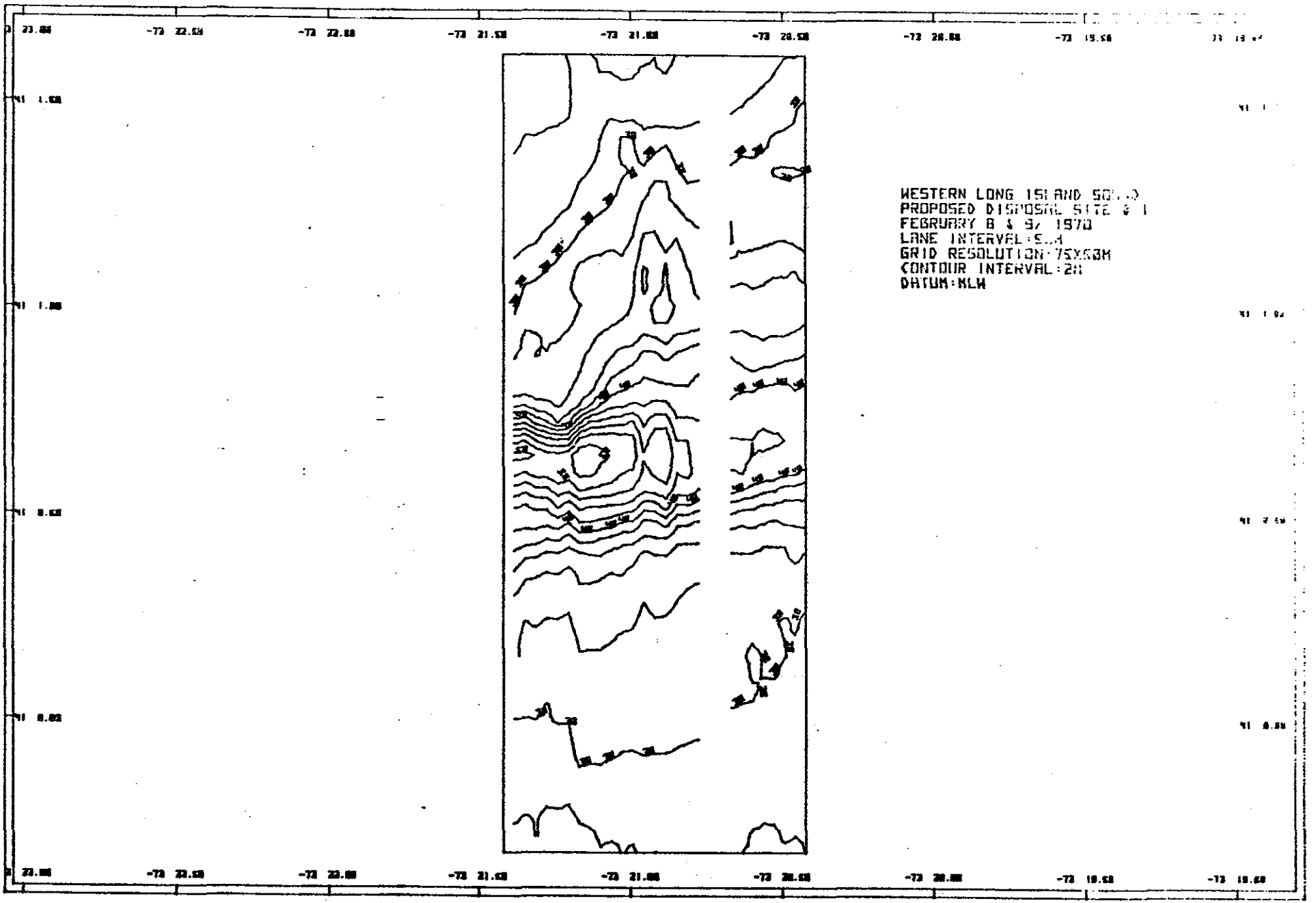
Bathymetry

The first survey of the Western Long Island Sound disposal site was conducted on February 8 and 9, 1978, (Fig. I-3(a-h)). This survey confirmed the presence of a depression with a maximum depth of 50 meters, however, it was apparent that the major axis of the depression was east-west, while the survey was oriented north-south. Therefore, the second survey, on July 25, 1978, (Fig. I-4(a-m)), was altered such that the north-south lanes were shortened and increased in number to provide more coverage in the east-west direction. This survey provided a better description of the depression, indicating a steeper slope on the northern margin and more gentle, uniform slopes on the southern side. A significant


25'
R"24A"
SHEFFIELD I.
GREENS LEDGE
"1"
LONG NECK PT.
N"26"
N"24B"
N"2"
"1"
R"30"
N"28"
CABLE AND ANCHOR REEF
CABLE AND ANCHOR REEF
R"24C"
41° 00'
"11B"
41° 00'
DUMP SITE.
R8C
C"13"
"15"
N"2"
N"4"
N"6"
"1"
EATONS NECK
LLOYD NECK
R"8"
40° 52'
40° 52'
73° 30'
73° 25'

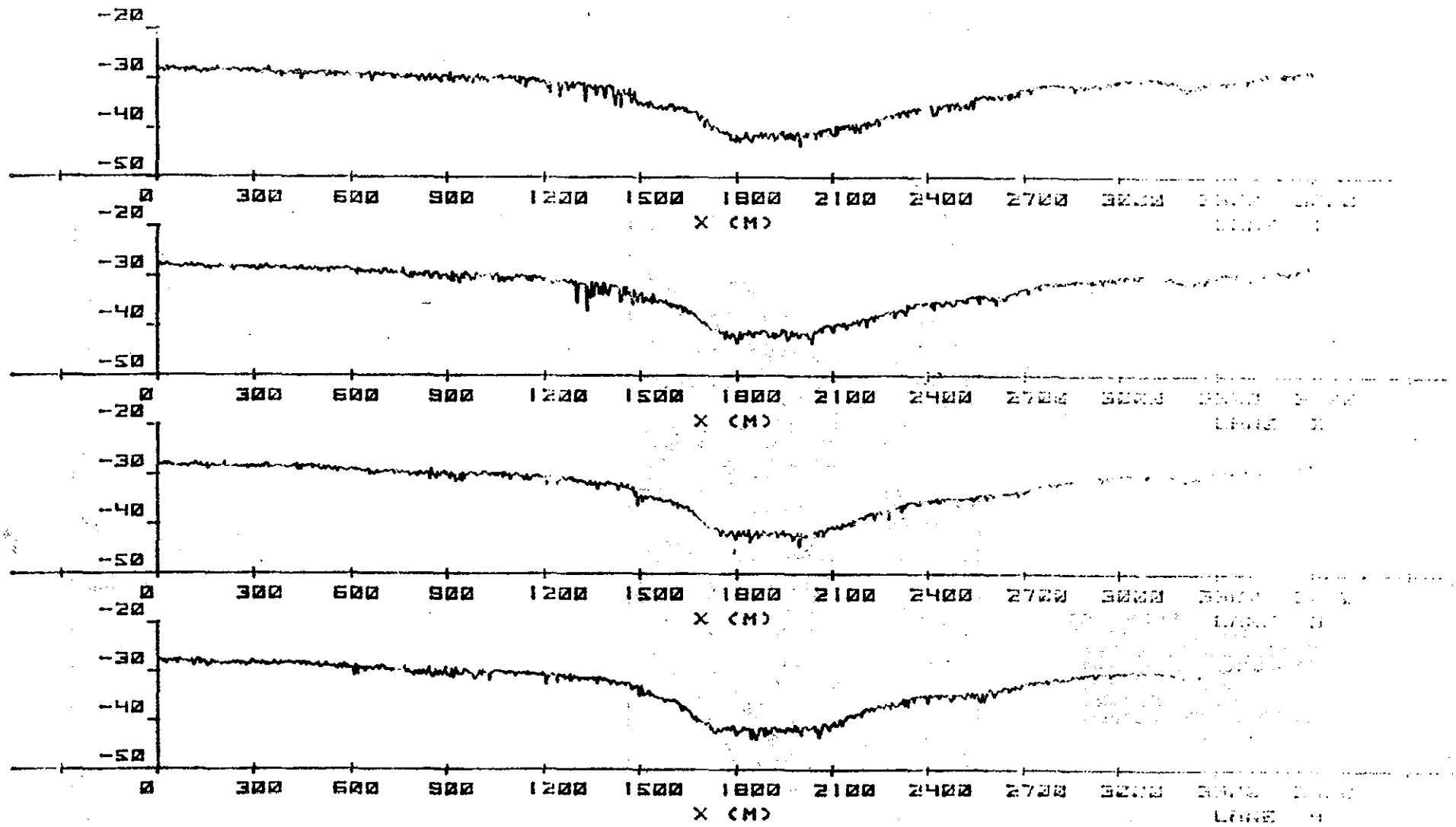
I-1

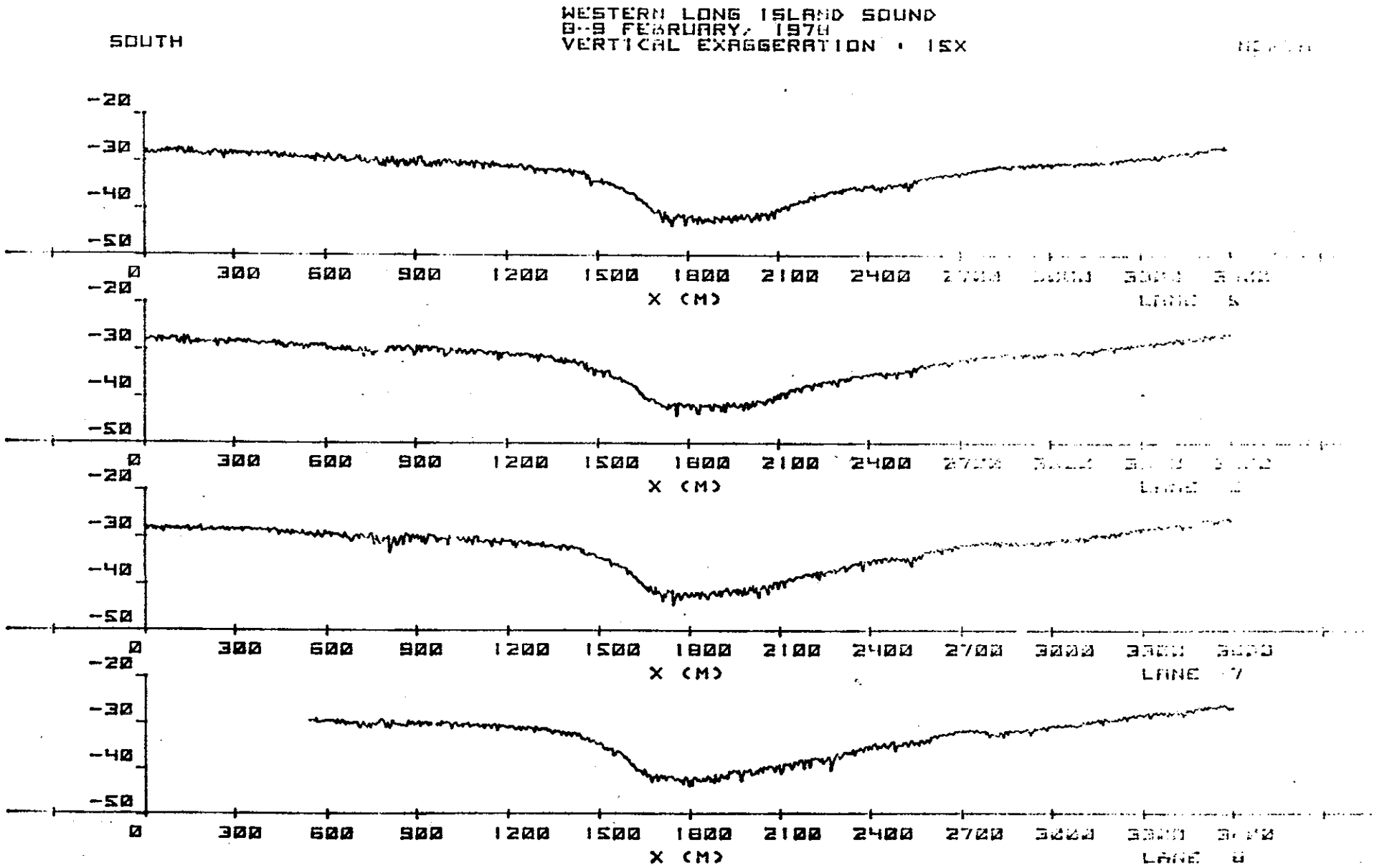

73°
25'
73°
20'
41°
05'
COCKENOE I.
"C"1"
"RN"4"
"R"24"
GOOSE I.
"RN"3"
CHIMON I.
"R"24A"
COPPS I.
SHEFFIELD I.
"RN"24B"
WESTERN
LONG ISLAND
SOUND
CABLE AND ANCHOR REEF
DUMP SITE
"R"24C"
41° 00'
DUMP SITE
"1"8"
41° 00'
"R8C
"C"13"
MOORING BUOYS
EATONS
NECK
"1"
40° 55'
73° 25'
73° 20'


WESTERN LONG ISLAND SOUND
PROPOSED DISPOSAL SITE # 1
FEBRUARY 8 & 9, 1978
LANE INTERVAL: 5.4
GRID RESOLUTION: 75X50M
CONTOUR INTERVAL: 2ft
DATUM: MLW

I-3A

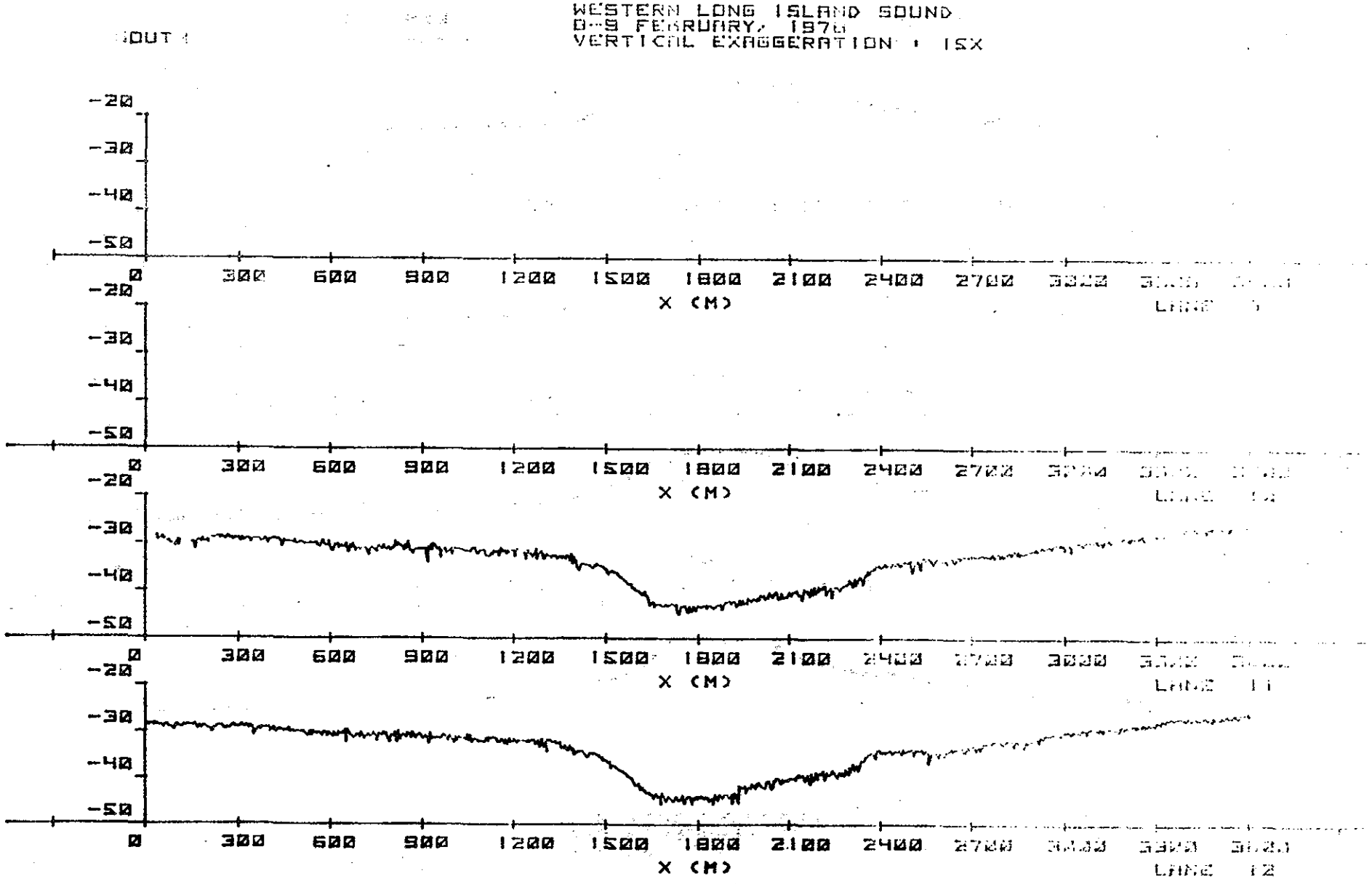
I-3a


WESTERN LONG ISLAND SOUND
8-9 FEBRUARY, 1970
VERTICAL EXAGGERATION = 15X
SOUTH
-20
-30
-40
-50
0
300
600
900
1200
1500
1800
2100
2400
X (M)

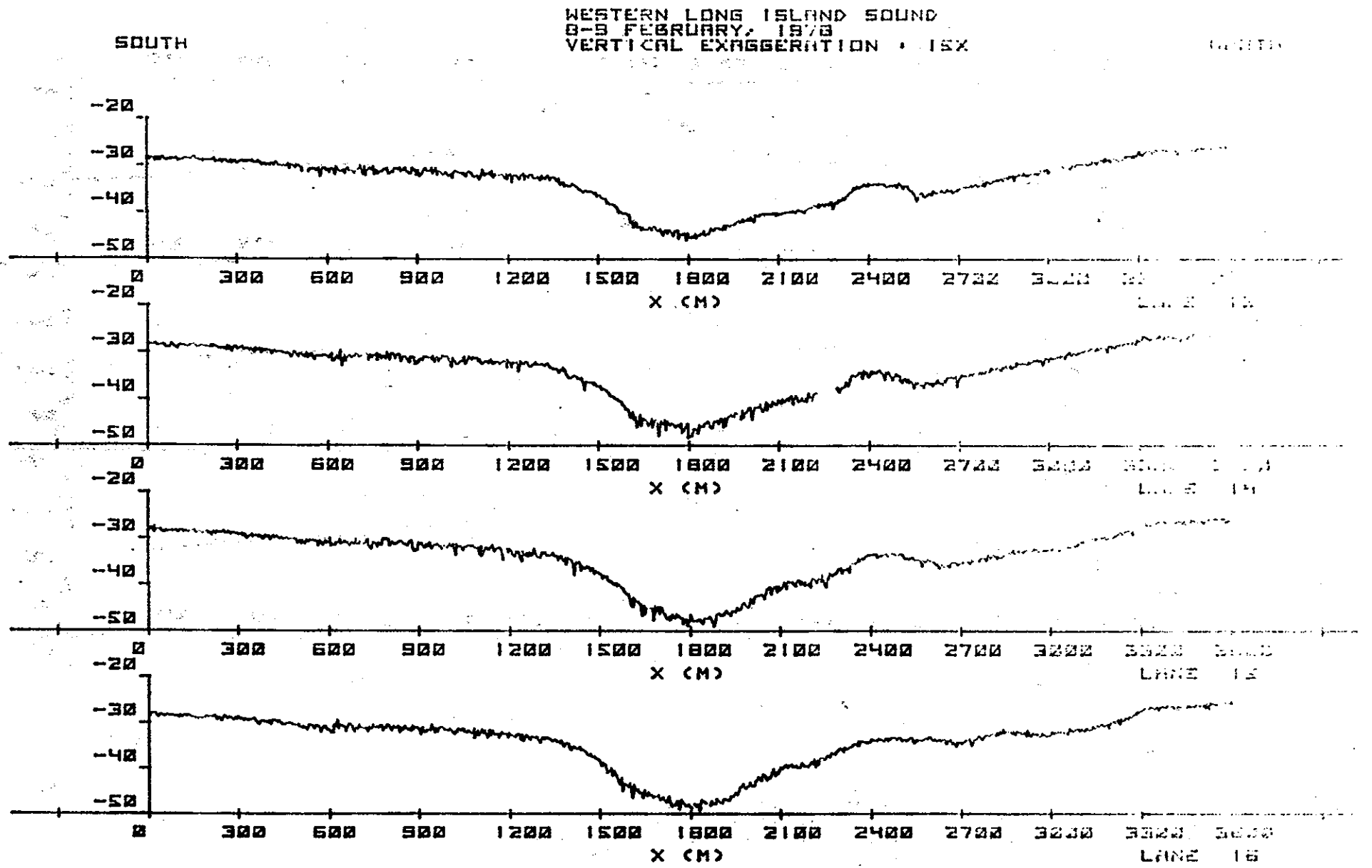

WESTERN LONG ISLAND SOUND
8-9 FEBRUARY, 1970
VERTICAL EXAGGERATION = 15X
SOUTH
-20
-30
-40
-50
0
300
600
900
1200
1500
1800
2100
2400
2700
3000
X (M)
LINE 5
LINE 6
LINE 7
LINE 8

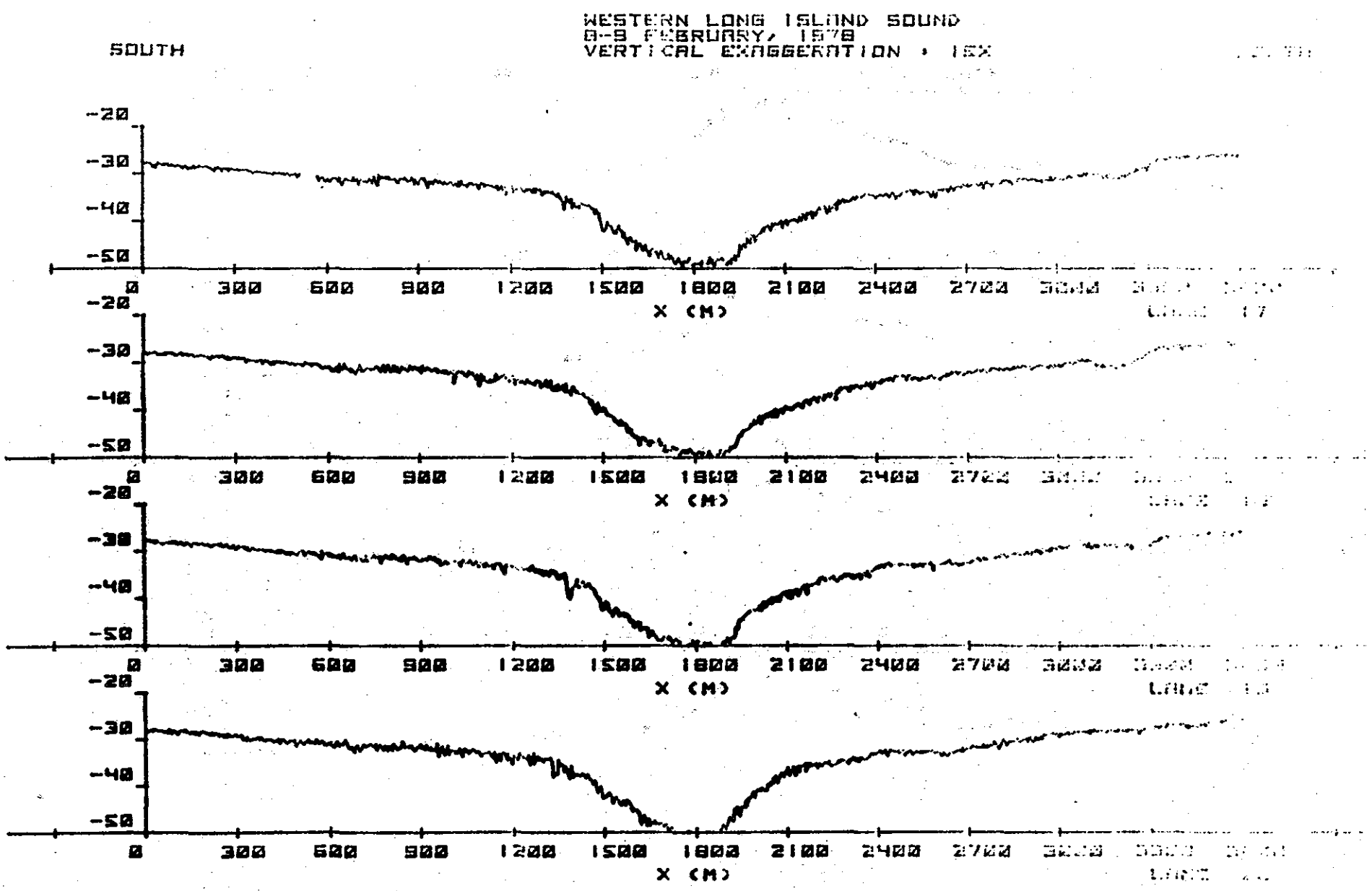
T-3c

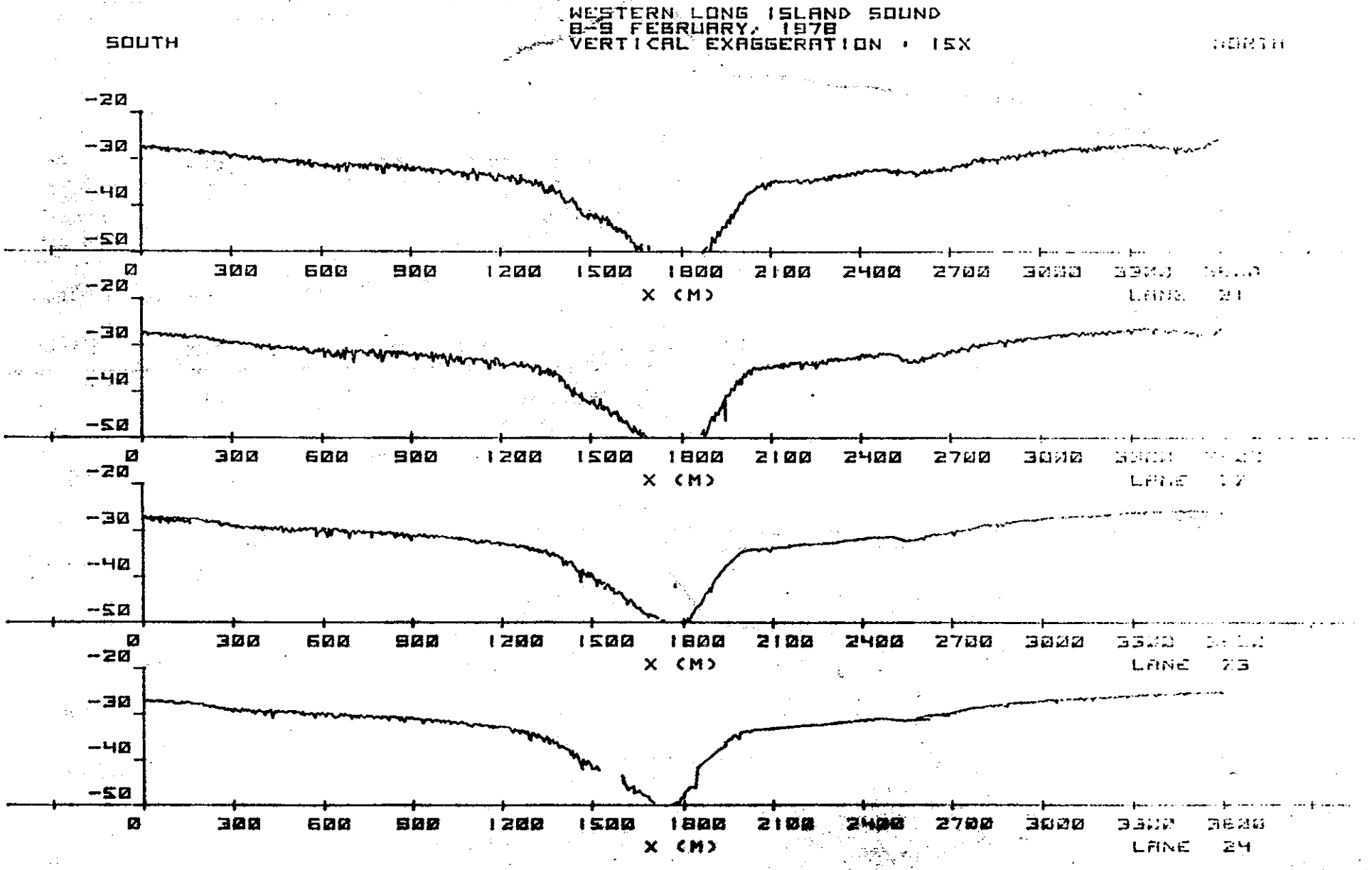
T 3-c


WESTERN LONG ISLAND SOUND
8-9 FEBRUARY, 1976
VERTICAL EXAGGERATION = 15X
-20
-30
-40
-50
0
300
600
900
1200
1500
1800
2100
2400
2700
X (M)
LINE 11
LINE 12

I-3d


WESTERN LONG ISLAND SOUND
8-9 FEBRUARY, 1978
VERTICAL EXAGGERATION = 15X
SOUTH
-20
-30
-40
-50
0
300
600
900
1200
1500
1800
2100
2400
X (M)
LANE 16


WESTERN LONG ISLAND SOUND
8-9 FEBRUARY, 1978
VERTICAL EXAGGERATION = 15X
SOUTH
-20
-30
-40
-50
0
300
600
900
1200
1500
1800
2100
2400
X (M)

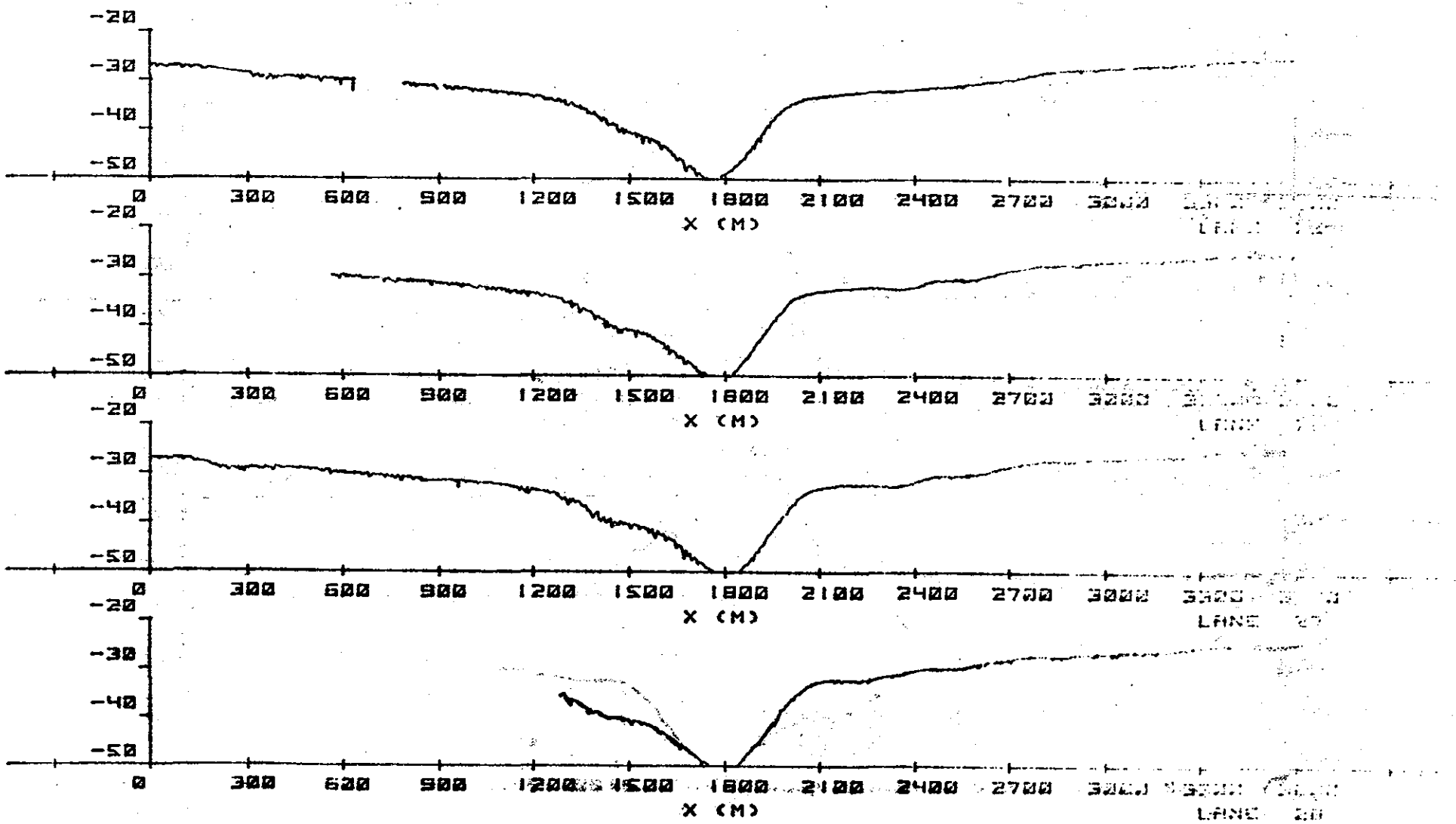

WESTERN LONG ISLAND SOUND
8-9 FEBRUARY, 1978
VERTICAL EXAGGERATION = 15X
SOUTH
NORTH
-20
-30
-40
-50
0
300
600
900
1200
1500
1800
2100
2400
2700
3000
X (M)
LANE 21
LANE 22
LANE 23
LANE 24

T-3-

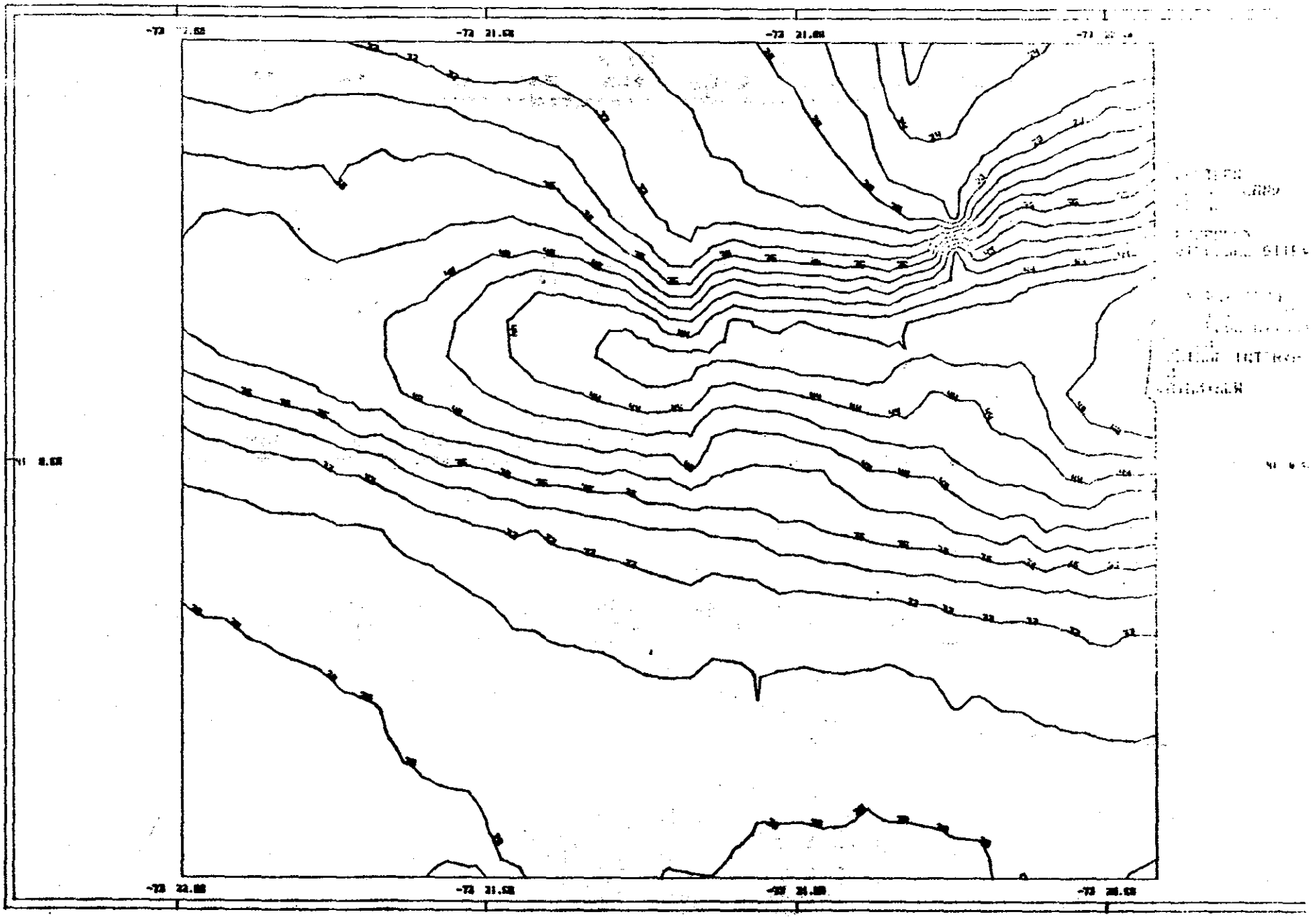
WESTERN LONG ISLAND SOUND
8--9 FEBRUARY, 1978
VERTICAL EXAGGERATION = 15X.

SOUTH

NORTH

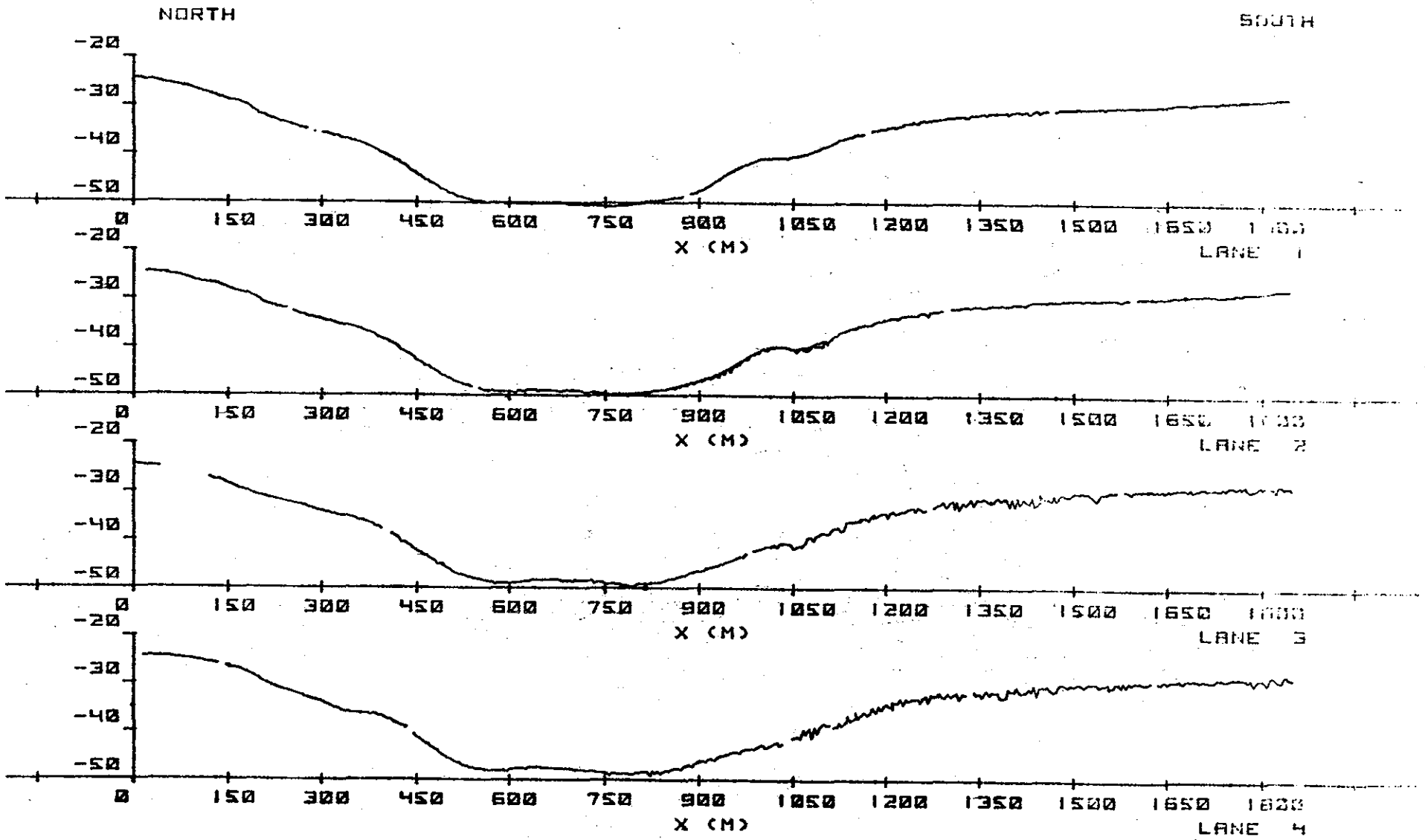


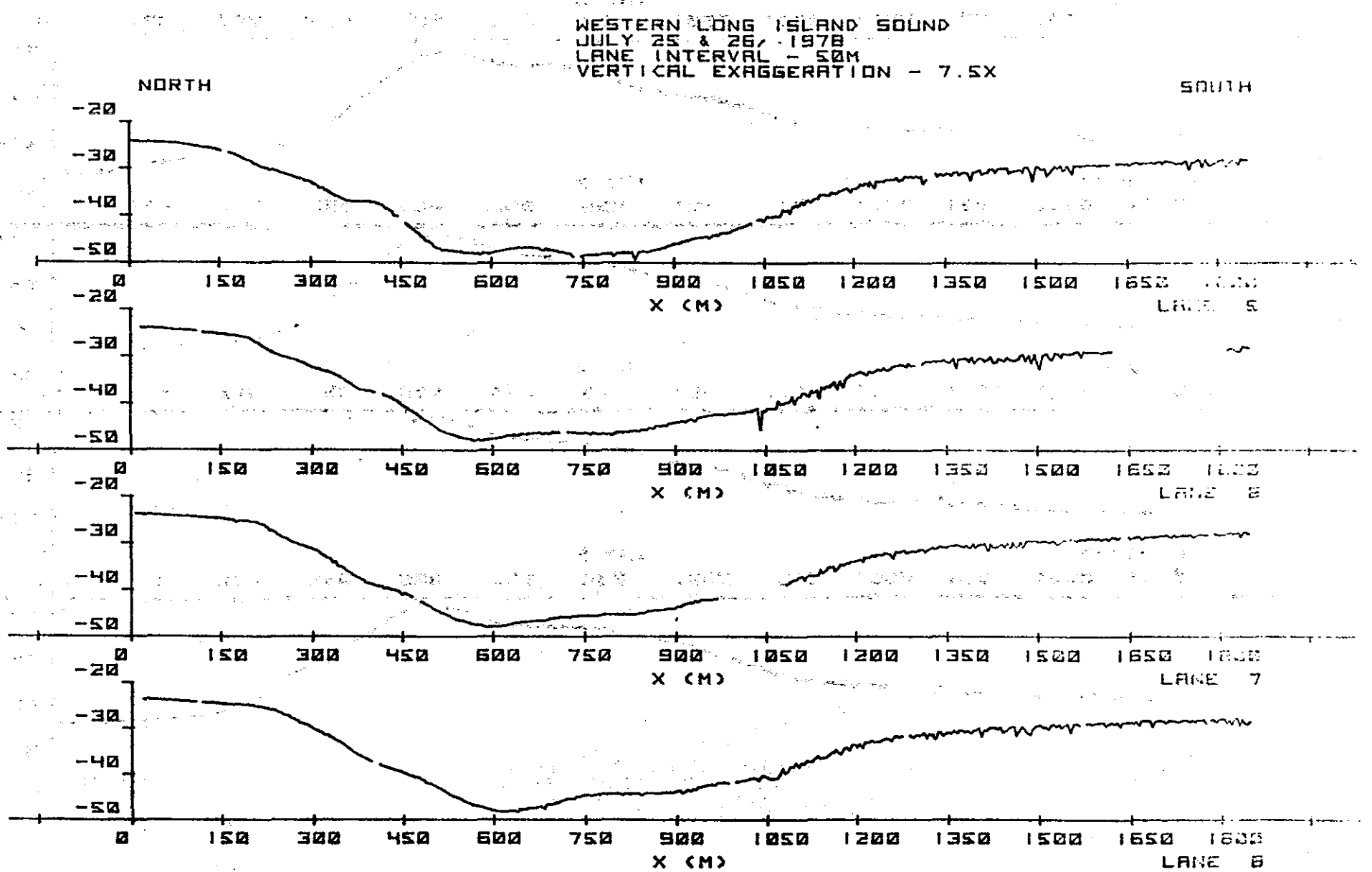
F-31



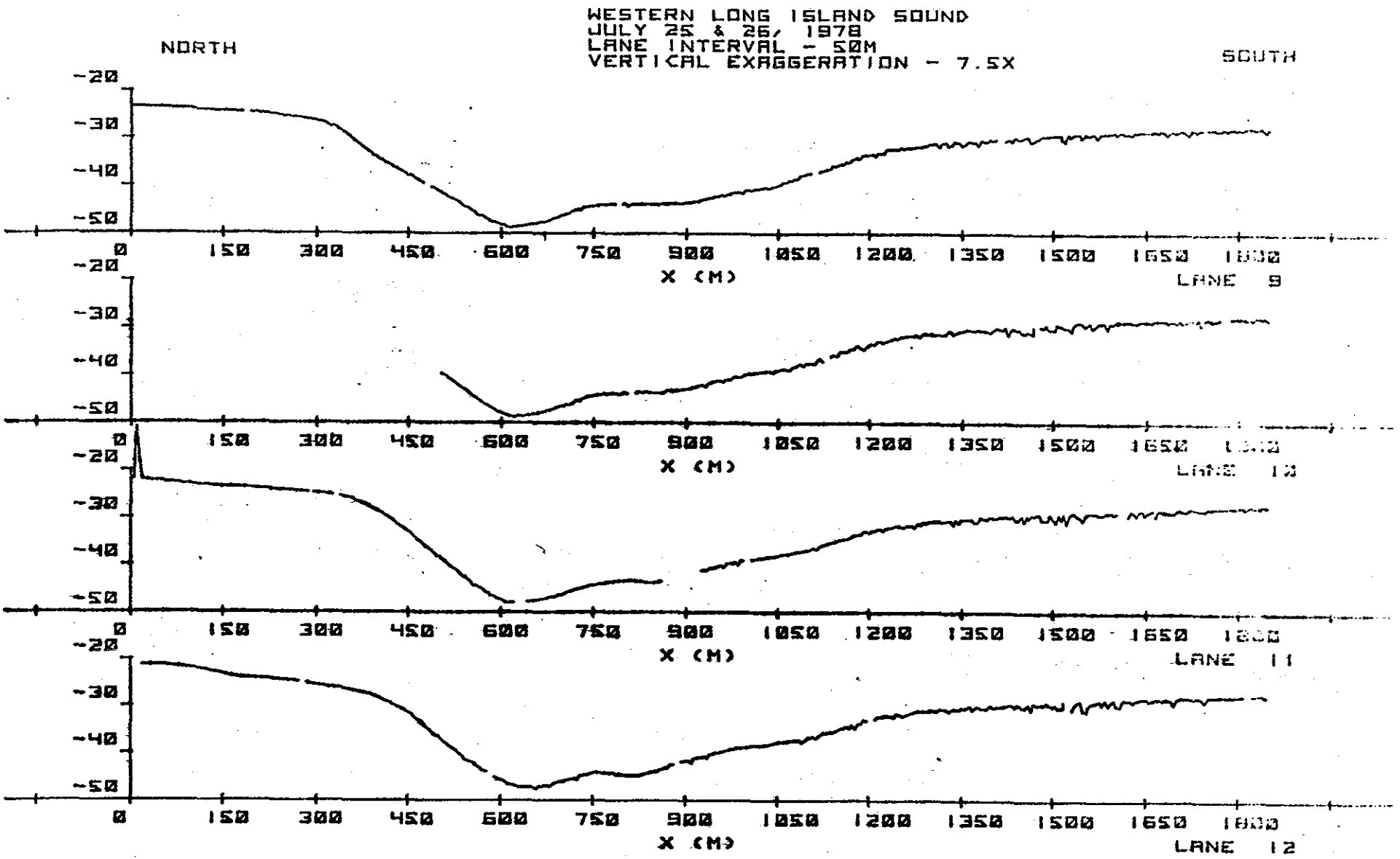
F 4a

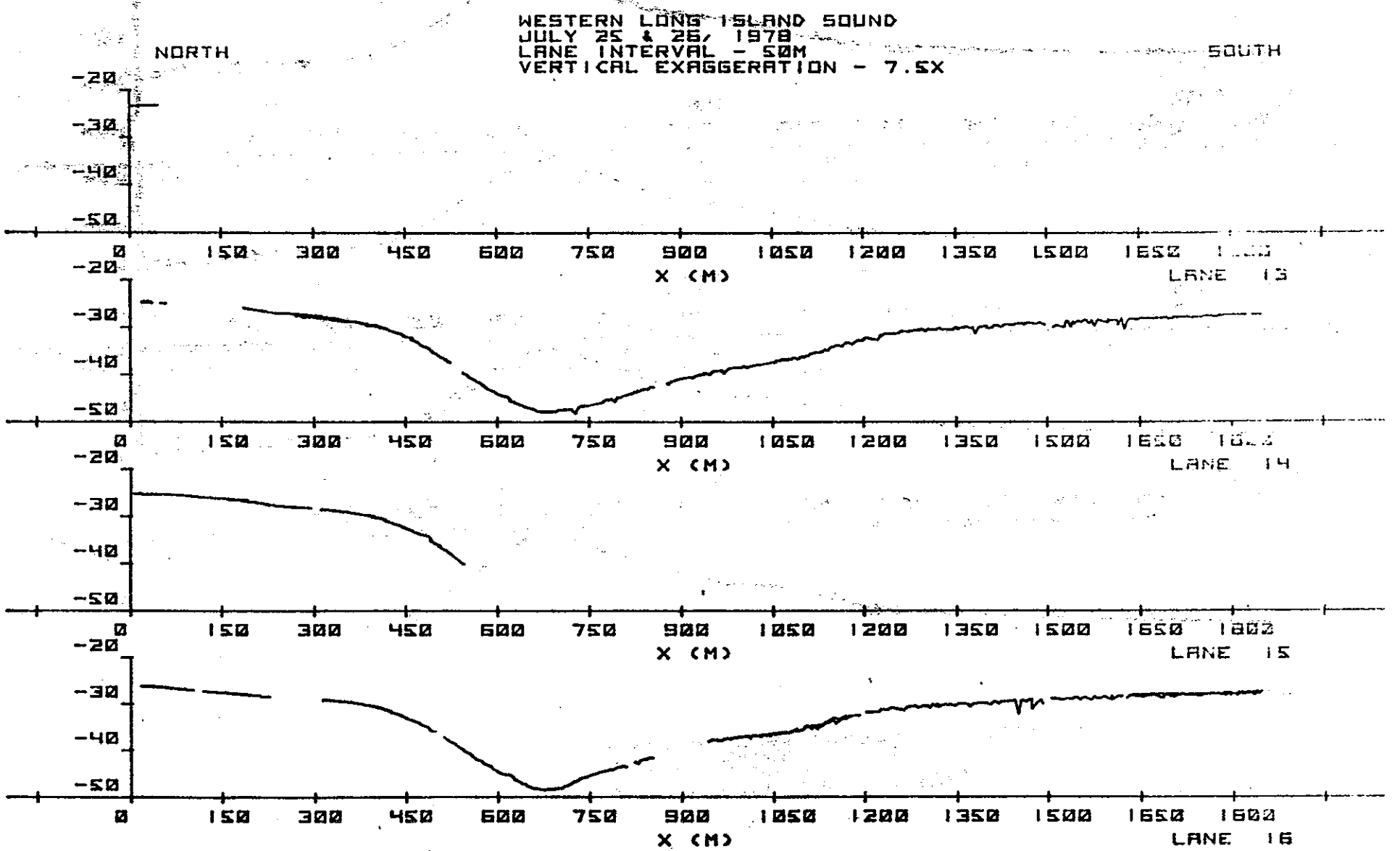
WESTERN LONG ISLAND SOUND
JULY 25 & 26, 1978
LANE INTERVAL - 50M
VERTICAL EXAGGERATION - 7.5X



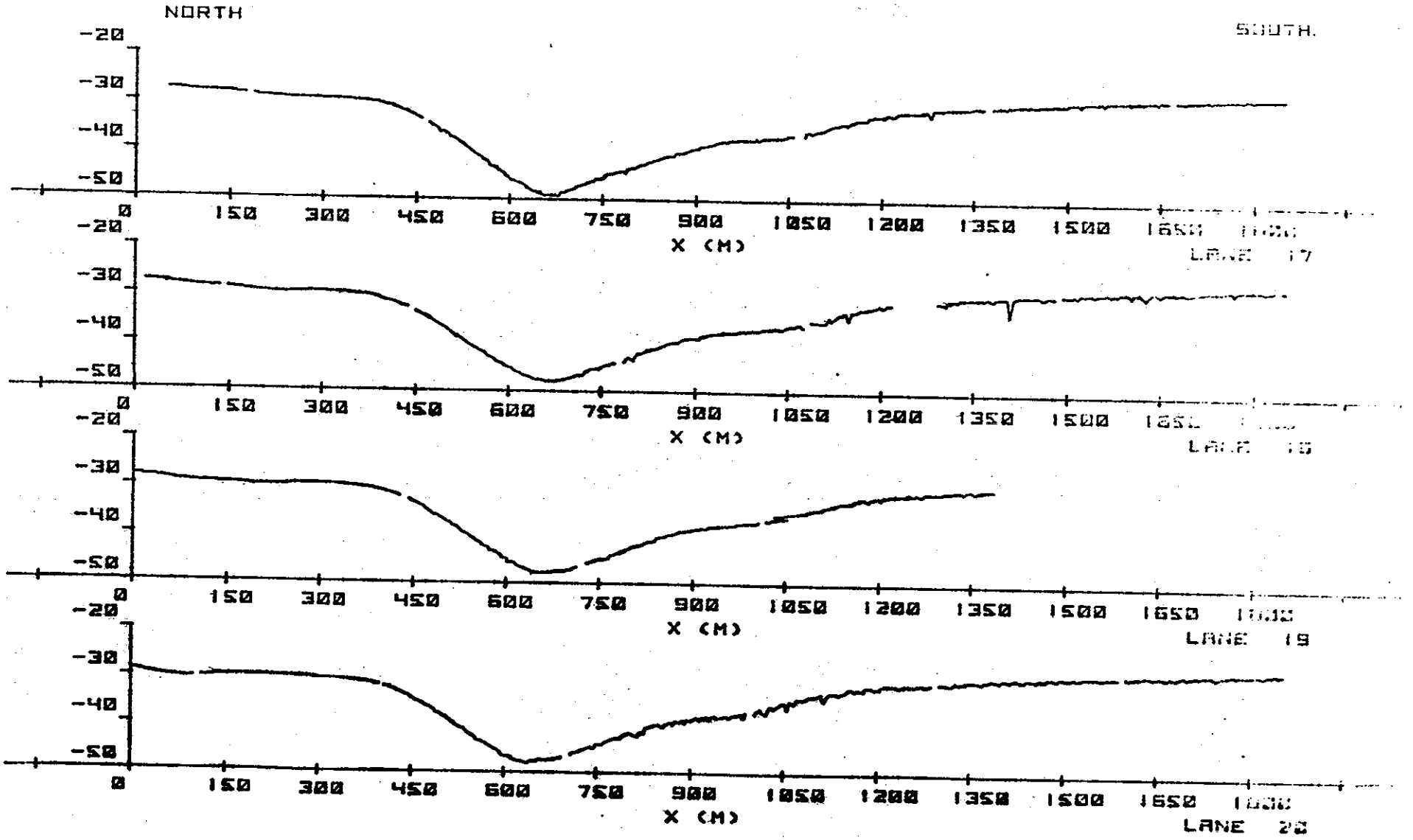

WESTERN LONG ISLAND SOUND
JULY 25 & 26, 1978
LANE INTERVAL - 50M
VERTICAL EXAGGERATION - 7.5X
NORTH
SOUTH
-20
-30
-40
-50
0
150
300
450
600
750
900
1050
1200
1350
1500
1650
X (M)
LANE 5
LANE 8
LANE 7
LANE 6

I-4c


WESTERN LONG ISLAND SOUND
JULY 25 & 26, 1978
LANE INTERVAL - 50M
VERTICAL EXAGGERATION - 7.5X
NORTH
SOUTH
-20
-30
-40
-50
0
150
300
450
600
750
900
1050
1200
1350
1500
1650
1800
X (M)
LANE 9
LANE 11
LANE 12

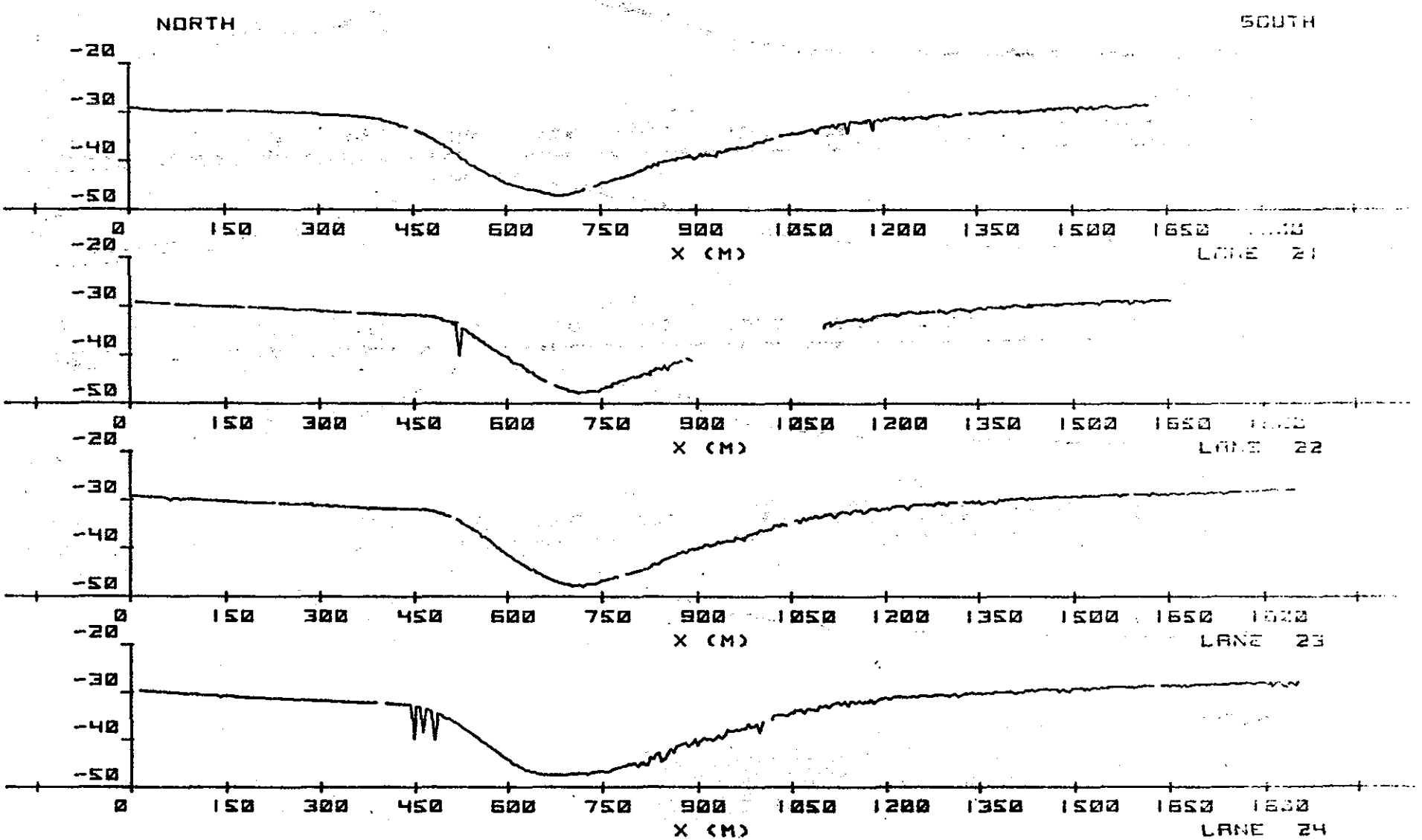

WESTERN LONG ISLAND SOUND
JULY 25 & 26, 1978
LANE INTERVAL - 50M
VERTICAL EXAGGERATION - 7.5X
NORTH
SOUTH
-20
-30
-40
-50
0
150
300
450
600
750
900
1050
1200
1350
1500
1650
X (M)
LANE 13
LANE 14
LANE 15
LANE 16

WESTERN LONG ISLAND SOUND
JULY 25 & 26, 1978
LANE INTERVAL - 50M
VERTICAL EXAGGERATION - 7.5X

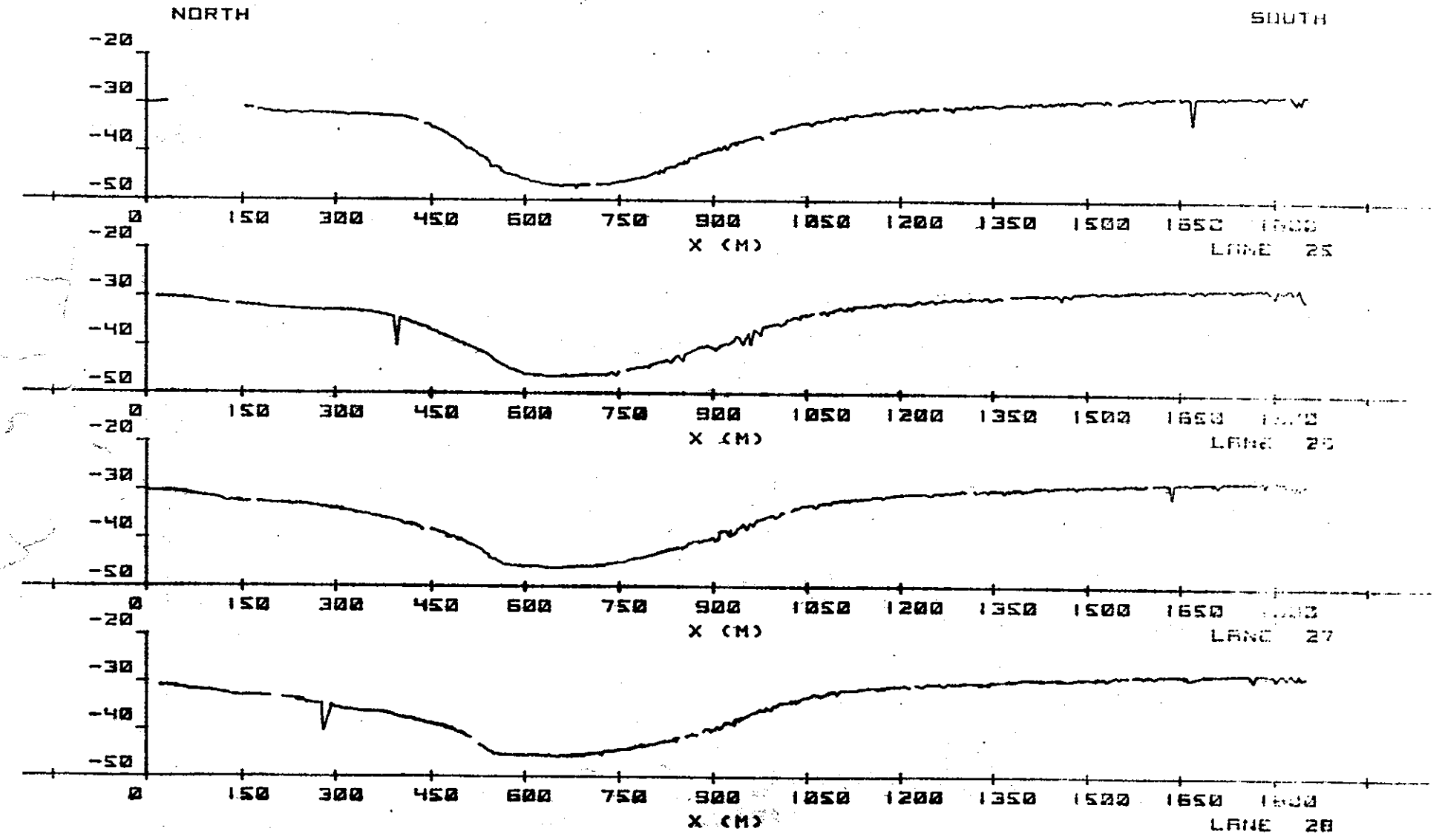


I-21f

WESTERN LONG ISLAND SOUND
JULY 25 & 26, 1978
LANE INTERVAL - 50M
VERTICAL EXAGGERATION - 7.5X.

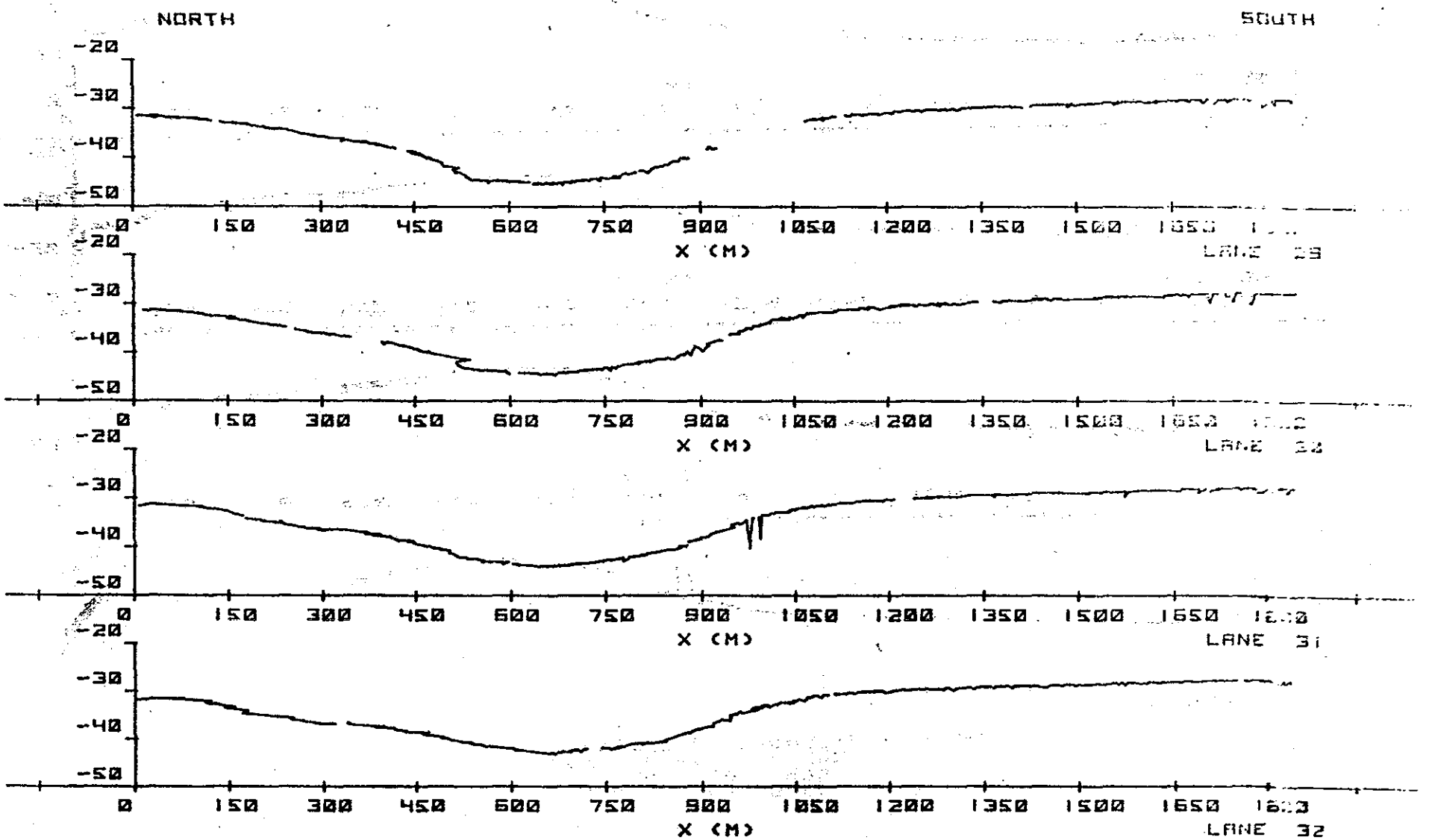


WESTERN LONG ISLAND SOUND
JULY 25 & 26, 1978
LANE INTERVAL - 50M
VERTICAL EXAGGERATION - 7.5X

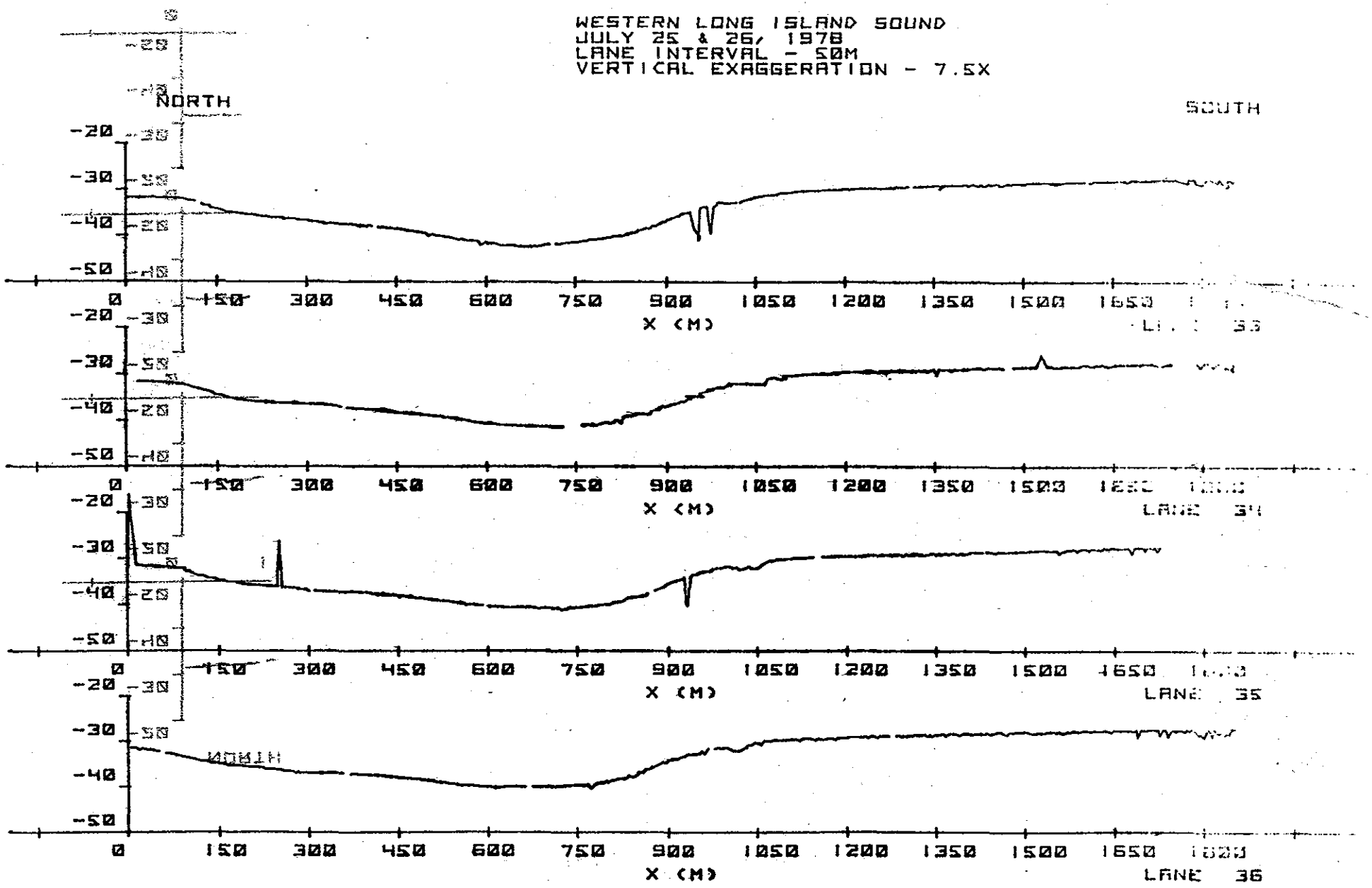


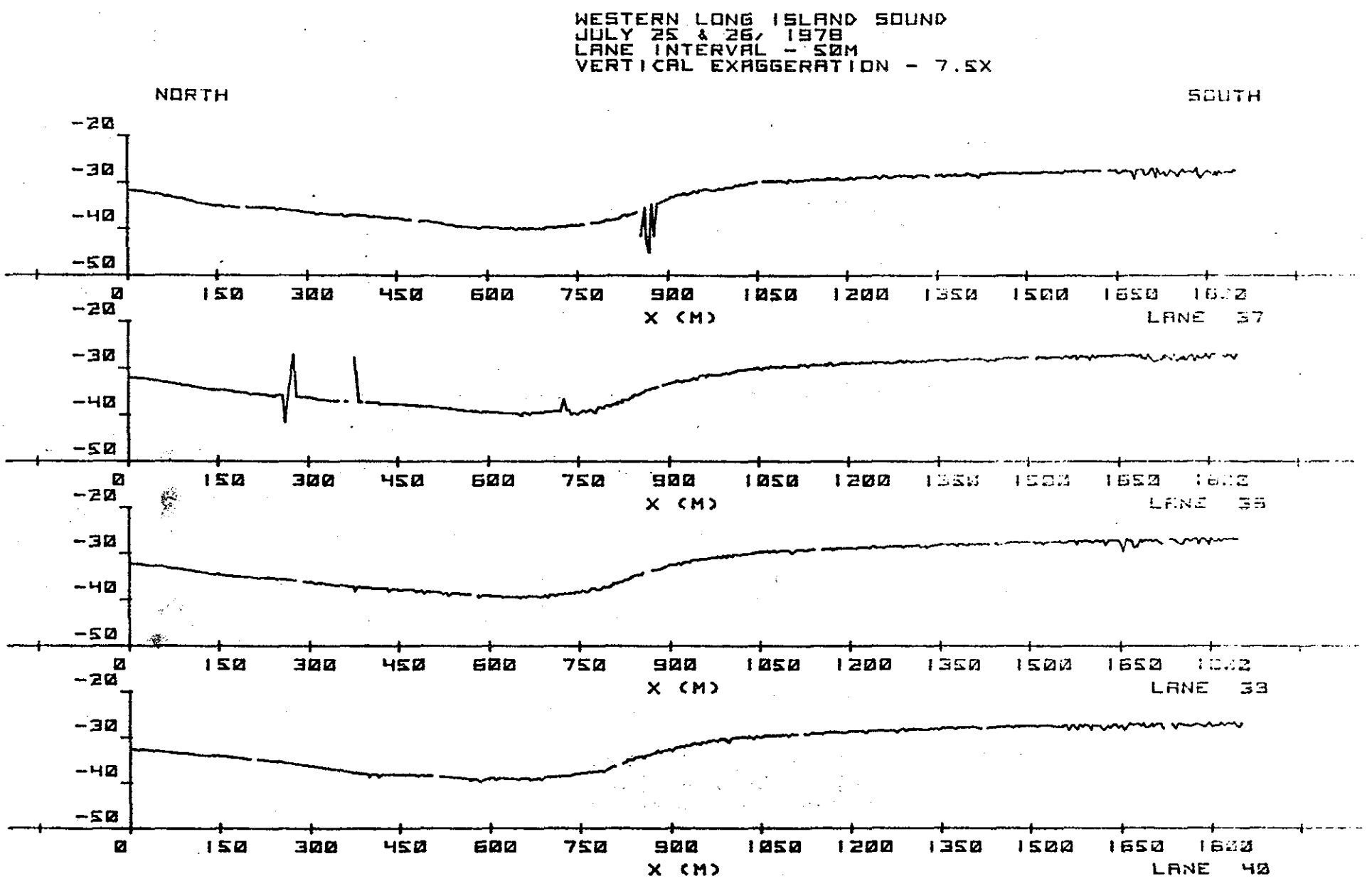
I-4 h

WESTERN LONG ISLAND SOUND
JULY 25 & 26, 1978
LANE INTERVAL - 50M
VERTICAL EXAGGERATION - 7.5X

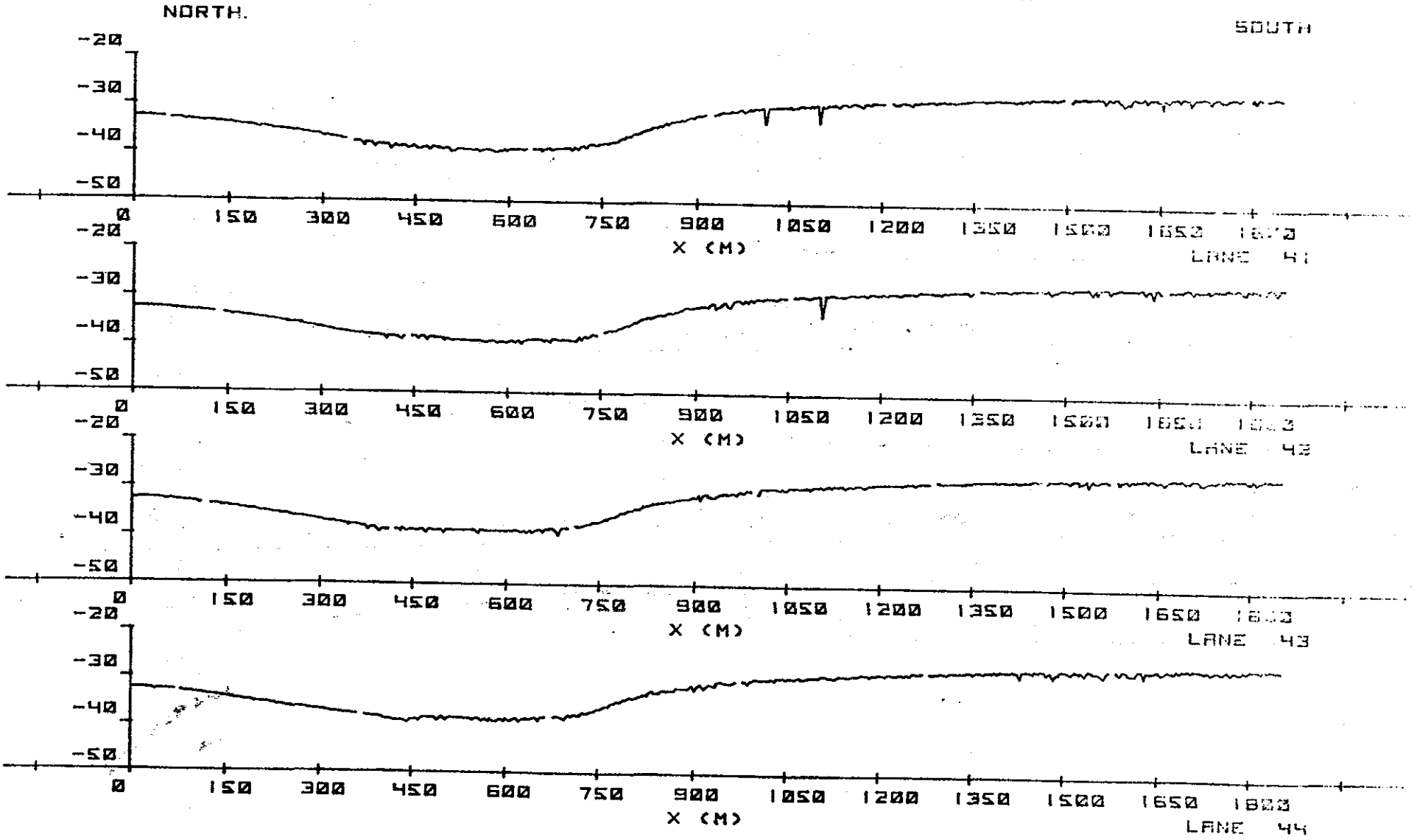


I-4 L

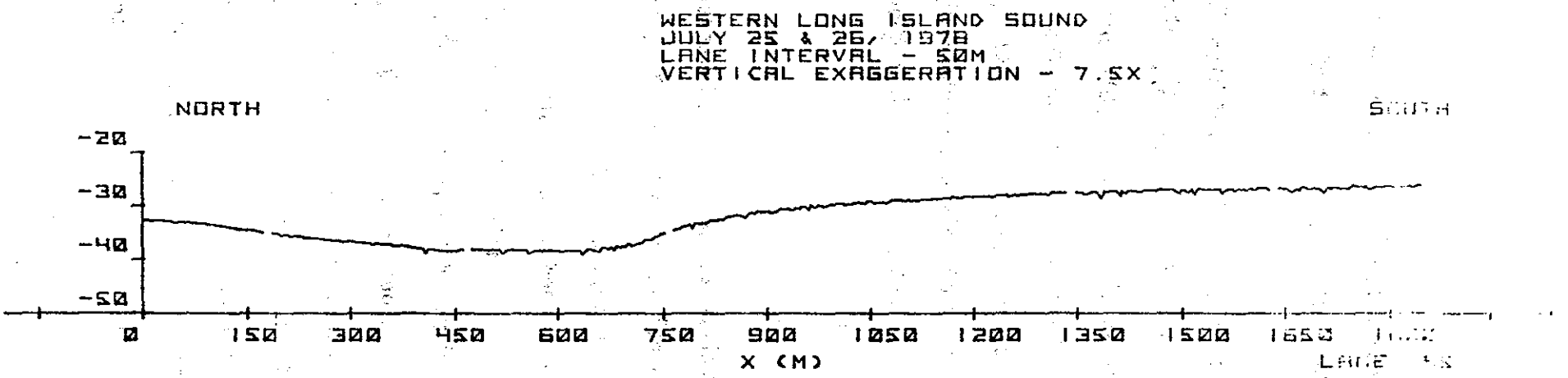

WESTERN LONG ISLAND SOUND
JULY 25 & 26, 1978
LANE INTERVAL - 50M
VERTICAL EXAGGERATION - 7.5X
NORTH
SOUTH
-20
-30
-40
-50
0
150
300
450
600
750
900
1050
1200
1350
1500
1650
X (M)
LANE 35
LANE 36


WESTERN LONG ISLAND SOUND
JULY 25 & 26, 1978
LANE INTERVAL - 50M
VERTICAL EXAGGERATION - 7.5X
NORTH
SOUTH
-20
-30
-40
-50
0
150
300
450
600
750
900
1050
1200
1350
1500
1650
X (M)
LANE 37
LANE 35
LANE 33
LANE 40

WESTERN LONG ISLAND SOUND
JULY 25 & 26, 1978
LANE INTERVAL - 50M
VERTICAL EXAGGERATION - 7.5X



I-41


WESTERN LONG ISLAND SOUND
JULY 25 & 26, 1978
LANE INTERVAL - 50M
VERTICAL EXAGGERATION - 7.5X
NORTH
-20
-30
-40
-50
0
150
300
450
600
750
900
1050
1200
1350
1500
1650
X (M)

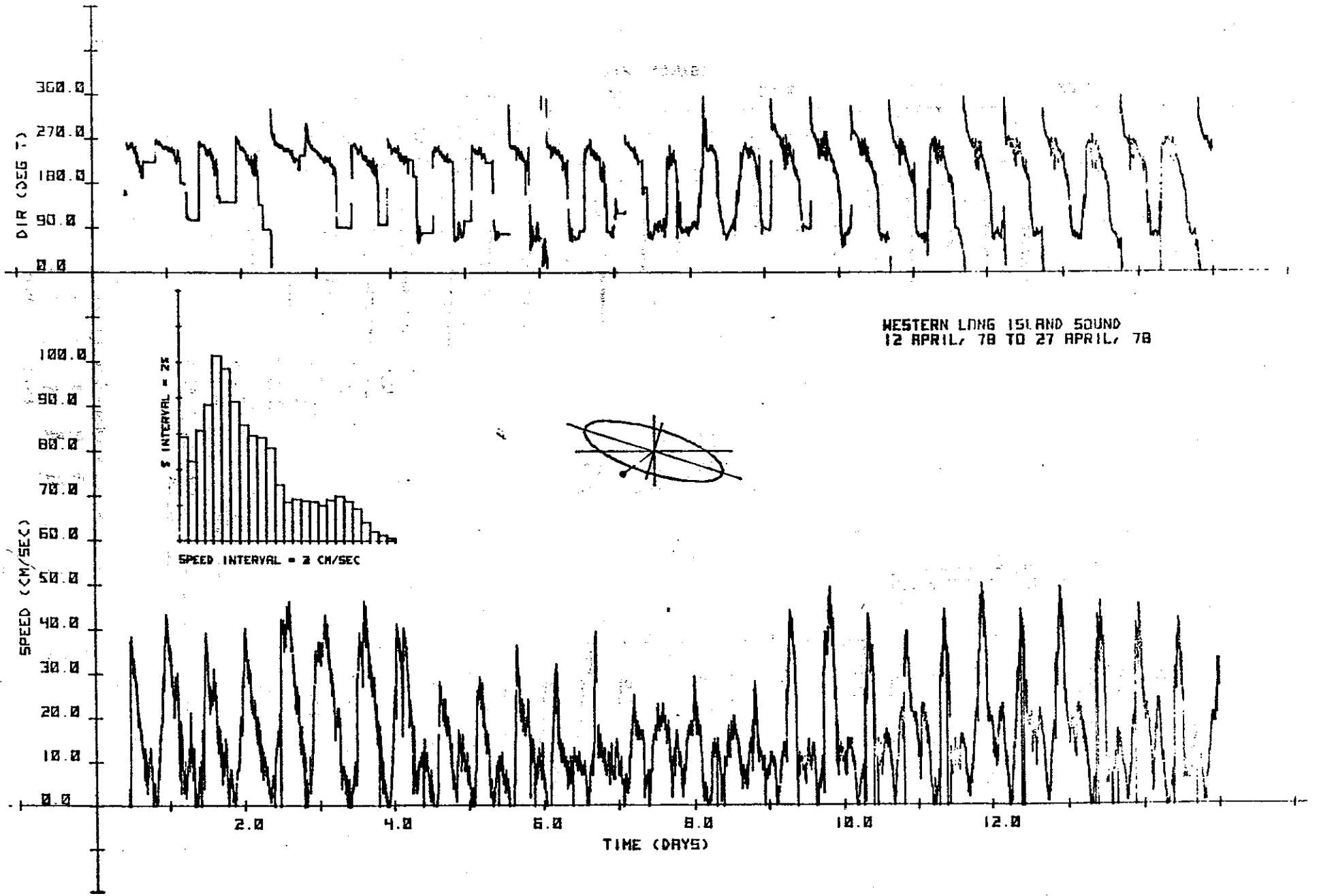
I-4/m

observation made during this survey, that eventually caused the rejection of this site as a potential disposal area, was the presence of many lobster trawls along the northern slope of the depression.

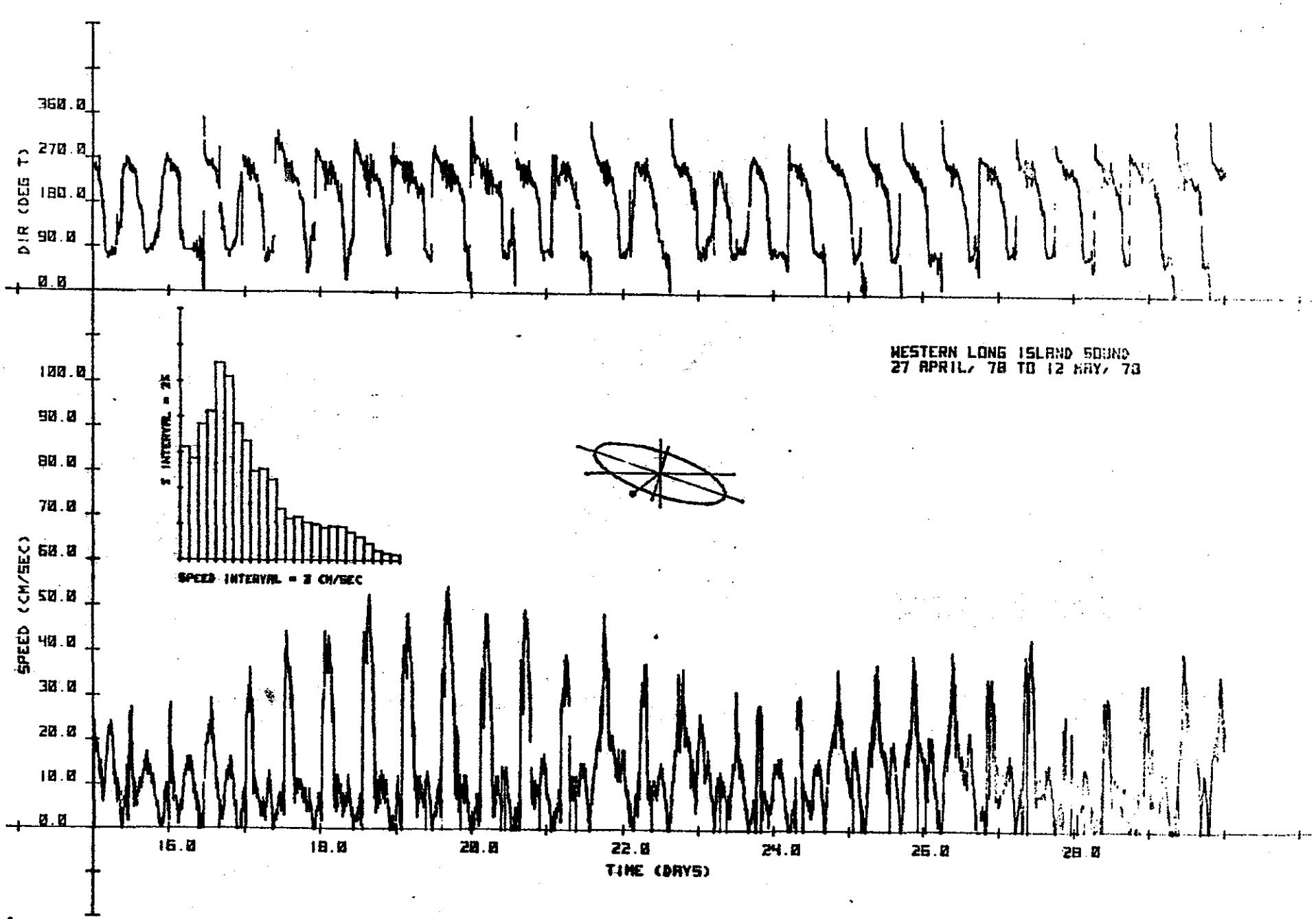
Bathymetric surveys were conducted at the Cable and Anchor Reef site on February 9, 1978 (Fig. I-5(a-)), and on July 26, 1978 (Fig. I-6(a-)). The predominant features on these surveys were the steep slope toward Cable and Anchor Reef on the eastern edge of the area, a NE-SW trending mound on the northeast section of the site and a circular mound in the western section. All features are repeated on both surveys, however, the size of this site compares with that of Boston Foul Ground and Lightship and detailed comparisons of contours are prohibited because of the scale factors involved.

Currents

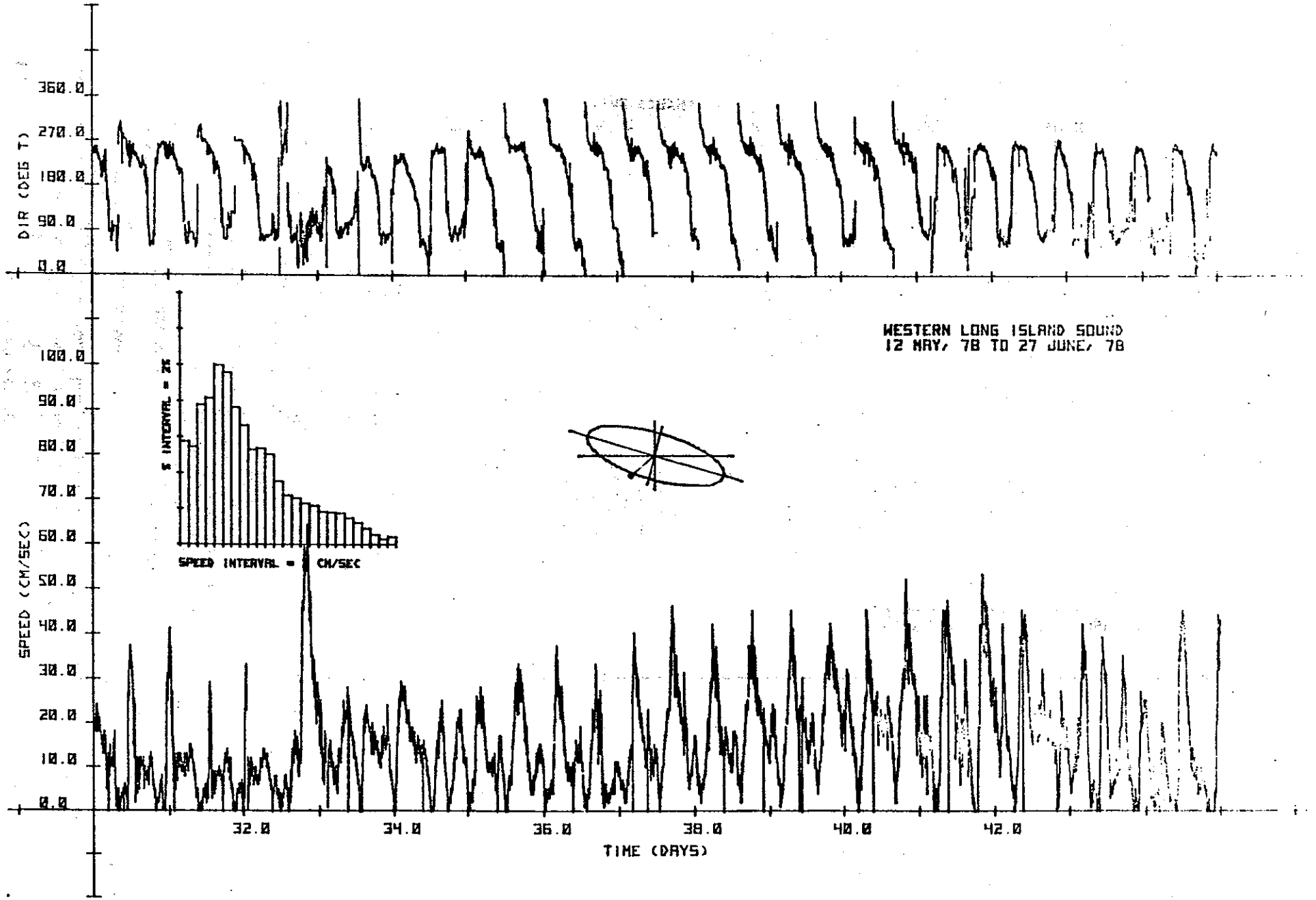
Two sets of current meter data have been obtained at the proposed Western Long Island Sound disposal site, the first from April 12 to July 1, 1978 (Fig. I-7(a-d), Table I-1), and the second from July 26 to September 7, 1978 (Fig. I-8(a-c), Table I-2). A similar record was also obtained at the Cable and Anchor Reef site from April 11 to May 20, 1978 (Fig. I-9(a-c), Table I-3), although there are recording problems for the first twelve days of the record. The two records from Western Long Island Sound cover the same period of time that data were obtained at New Haven and exhibit similar characteristics in that greater energy is present in the second record and the effects of a storm surge can be seen in the data. In this case, however, the major increase in kinetic energy is not restricted to the residual component but includes tidal energy as well. Significantly, the ratio of tidal energy to total energy is constant for both series of data.


DIR (DEG T)
360.0
270.0
180.0
90.0
0.0
WESTERN LONG ISLAND SOUND
12 APRIL, 78 TO 27 APRIL, 78
5 INTERVAL = 25
SPEED INTERVAL = 2 CM/SEC
SPEED (CM/SEC)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
TIME (DAYS)

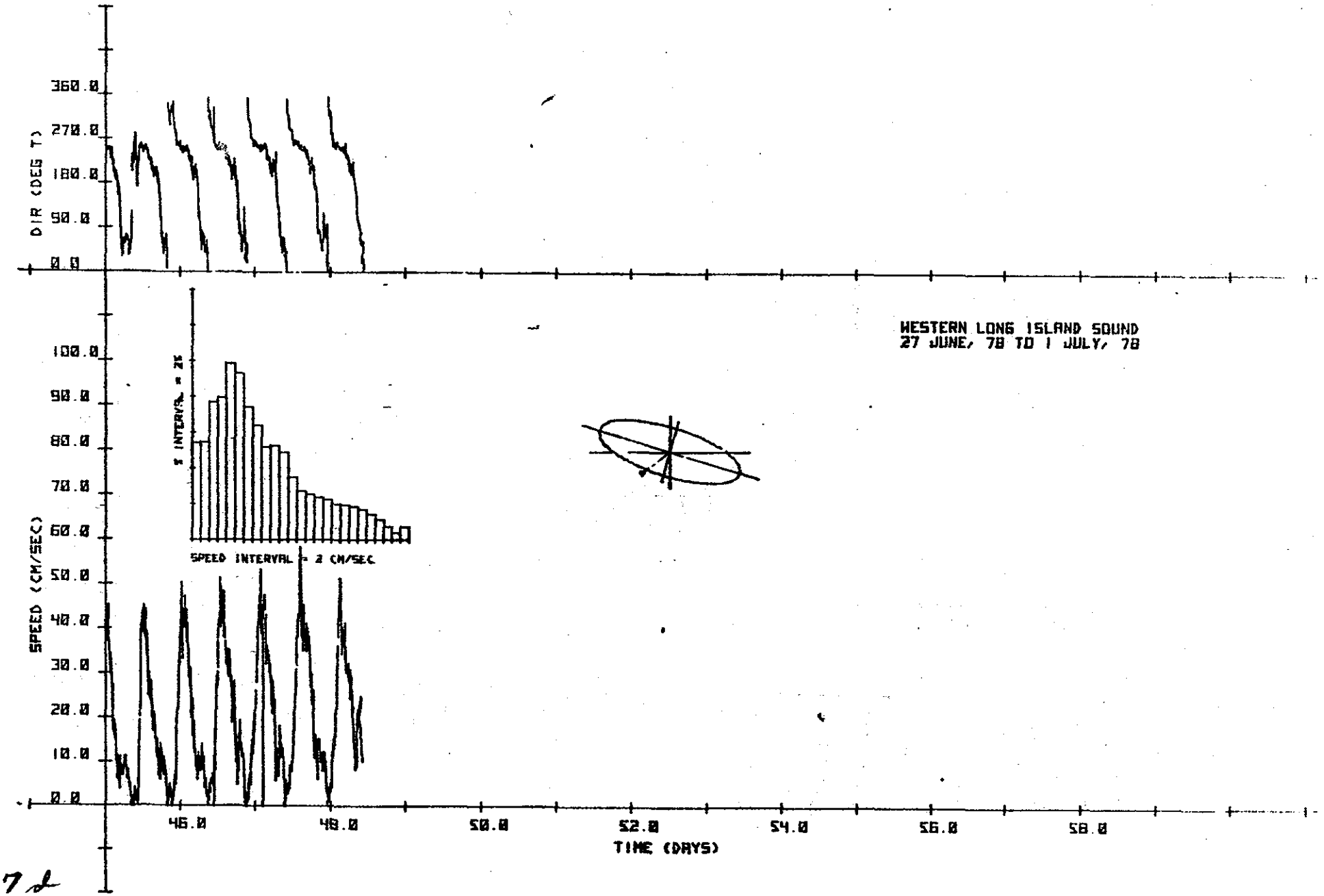
I-7a


DIR (DEG T)
360.0
270.0
180.0
90.0
0.0
WESTERN LONG ISLAND SOUND
27 APRIL, 78 TO 12 MAY, 78
SPEED (CM/SEC)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
SPEED INTERVAL = 2 CM/SEC
16.0
18.0
20.0
22.0
24.0
26.0
28.0
TIME (DAYS)

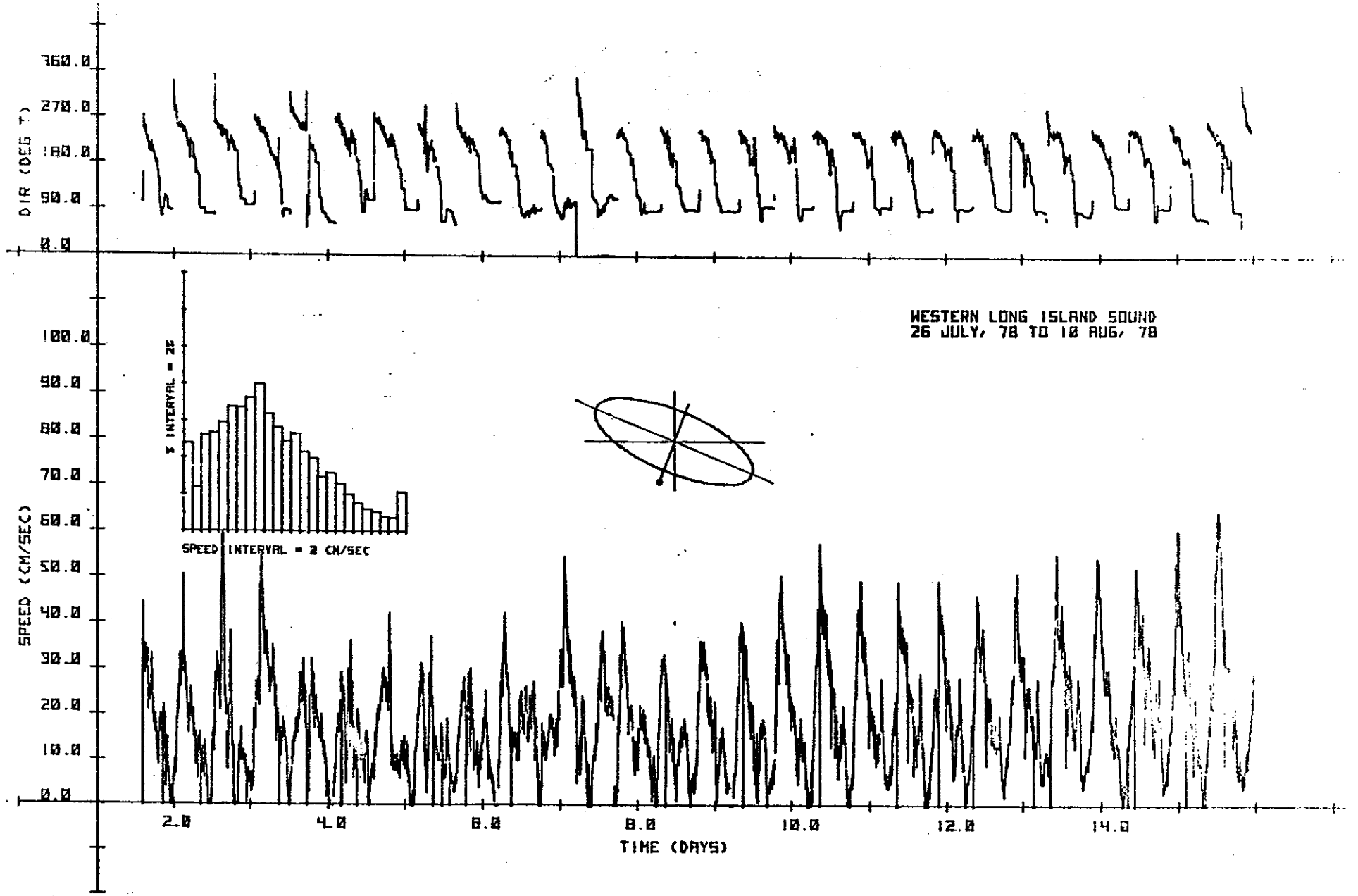
I-7 b

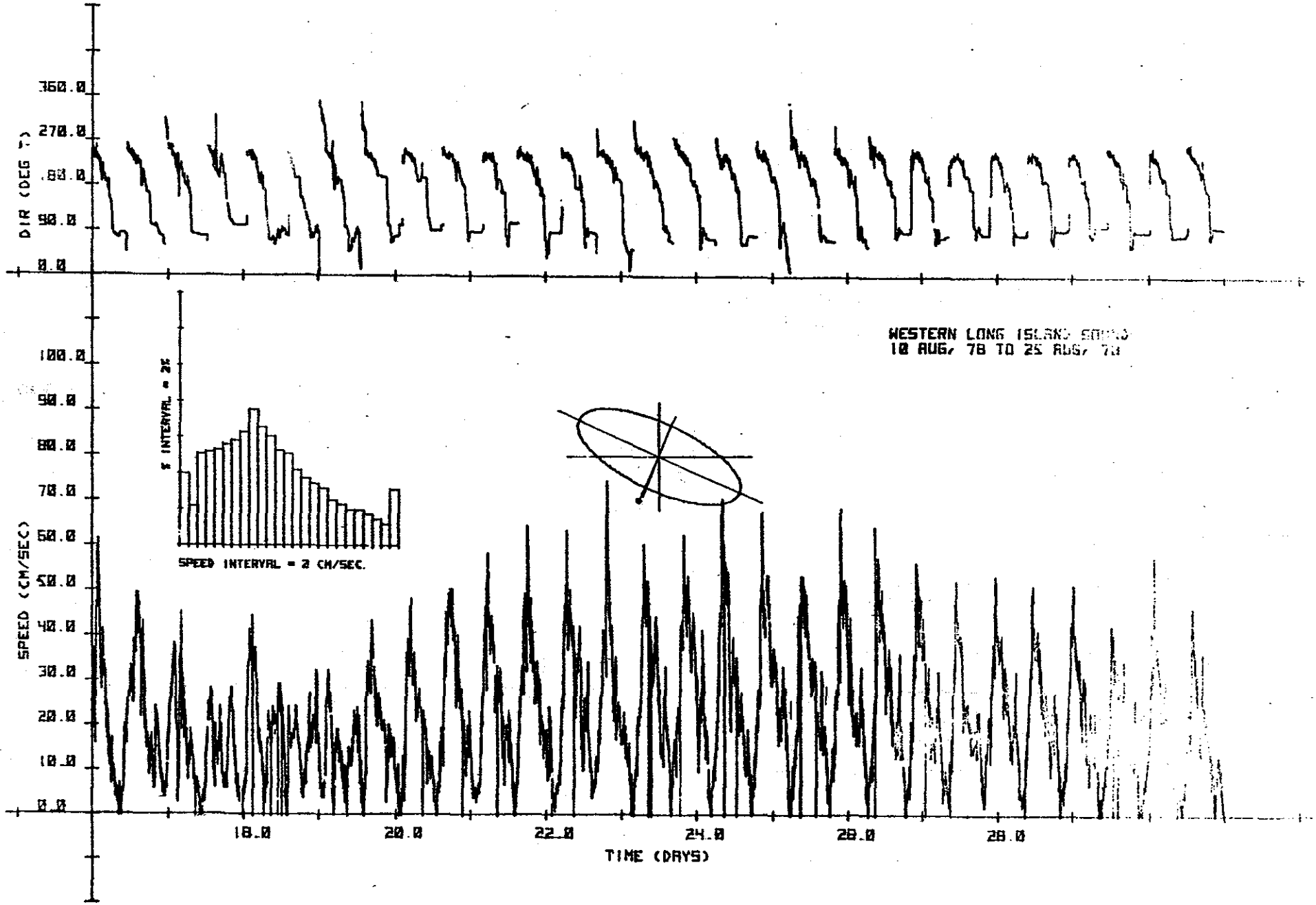

DIR (DEG T)
360.0
270.0
180.0
90.0
0.0
WESTERN LONG ISLAND SOUND
12 MAY, 78 TO 27 JUNE, 78
% INTERVAL = 2%
SPEED INTERVAL = 1 CM/SEC
SPEED (CM/SEC)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
32.0
34.0
36.0
38.0
40.0
42.0
TIME (DAYS)

I-7c

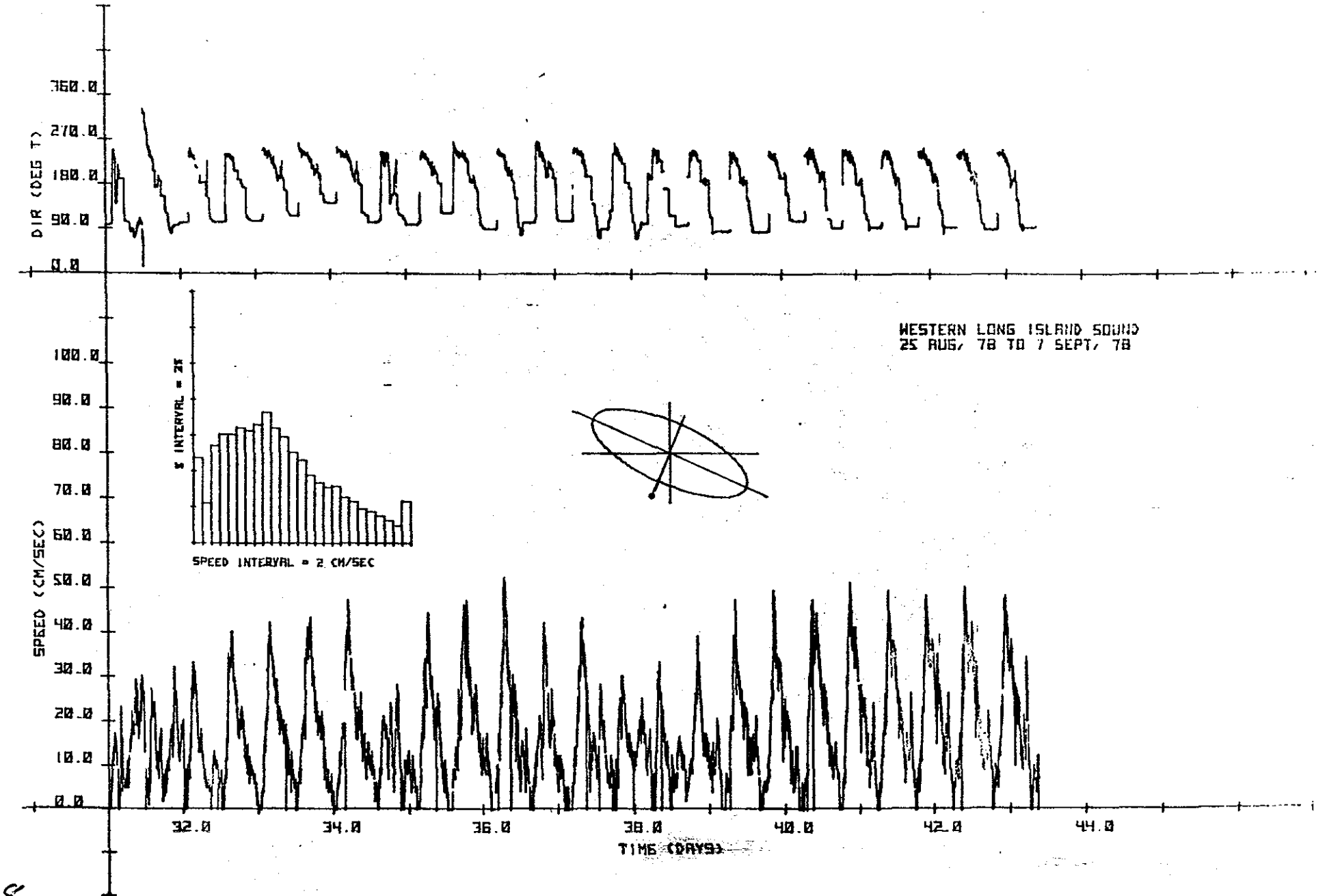

DIR (DEG T)
360.0
270.0
180.0
90.0
0.0
WESTERN LONG ISLAND SOUND
27 JUNE, 78 TO 1 JULY, 78
% INTERVAL = 2%
SPEED INTERVAL = 2 CM/SEC
SPEED (CM/SEC)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
46.0
48.0
50.0
52.0
54.0
56.0
58.0
TIME (DAYS)

I-7d

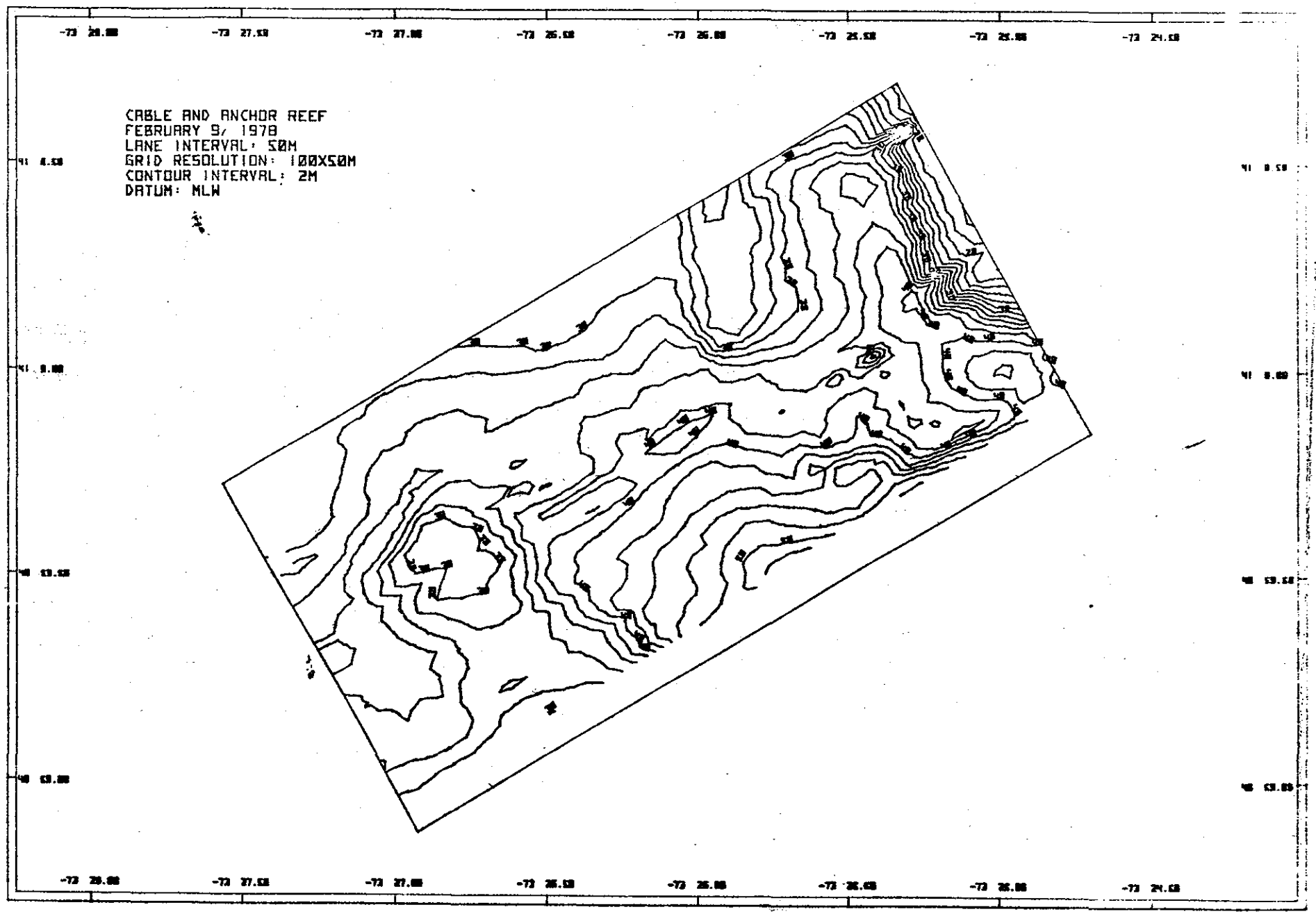

DIR (DEG T)
360.0
270.0
180.0
90.0
0.0
WESTERN LONG ISLAND SOUND
26 JULY, 78 TO 10 AUG, 78
5 INTERVAL = 2%
SPEED INTERVAL = 2 CM/SEC
SPEED (CM/SEC)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
TIME (DAYS)


DIR (DEG T)
360.0
270.0
180.0
90.0
0.0
WESTERN LONG ISLAND SOUND
10 AUG, 78 TO 25 AUG, 78
% INTERVAL = 2%
SPEED INTERVAL = 2 CM/SEC.
SPEED (CM/SEC)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
18.0
20.0
22.0
24.0
26.0
28.0
TIME (DAYS)

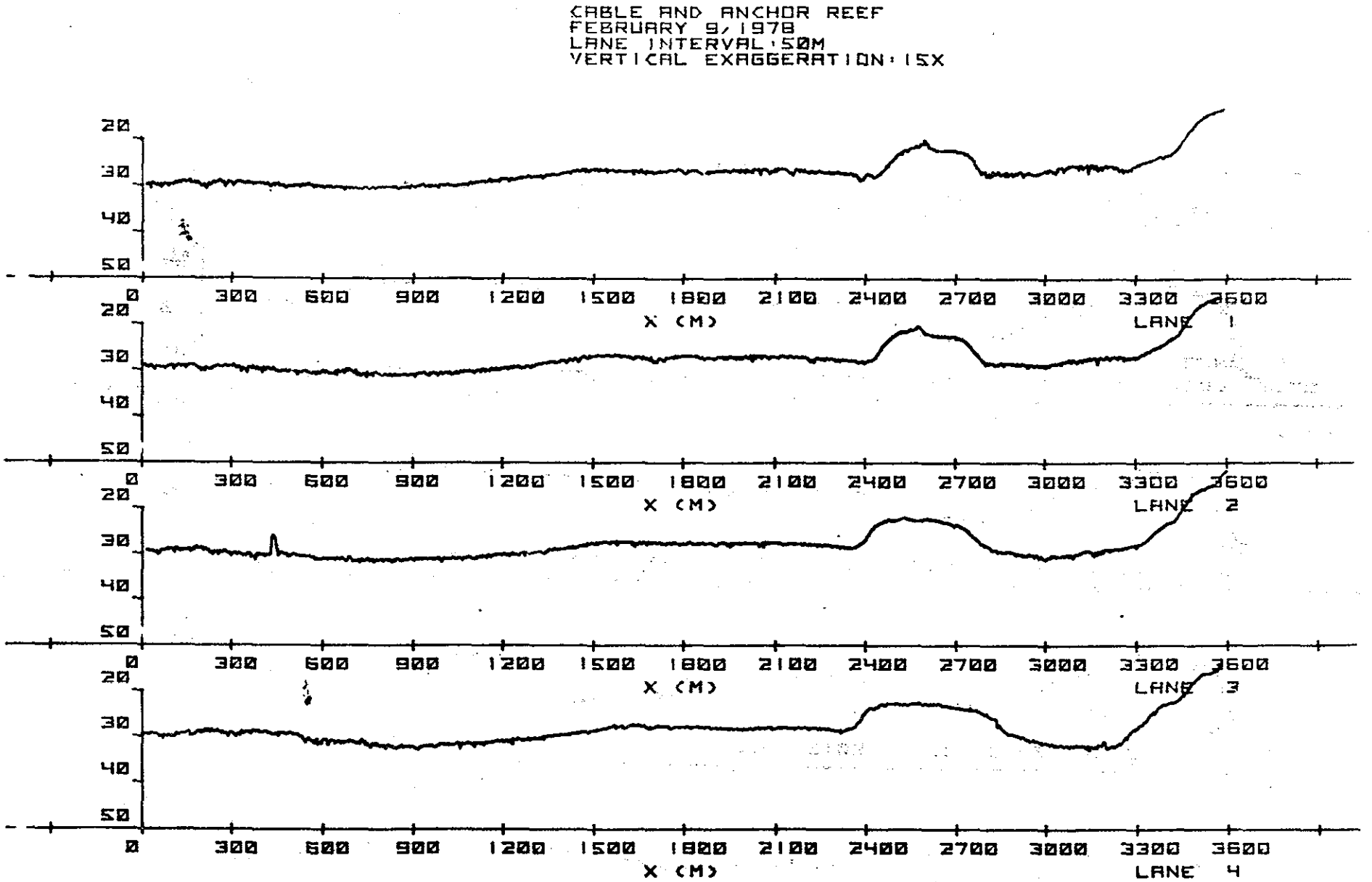
I-8B

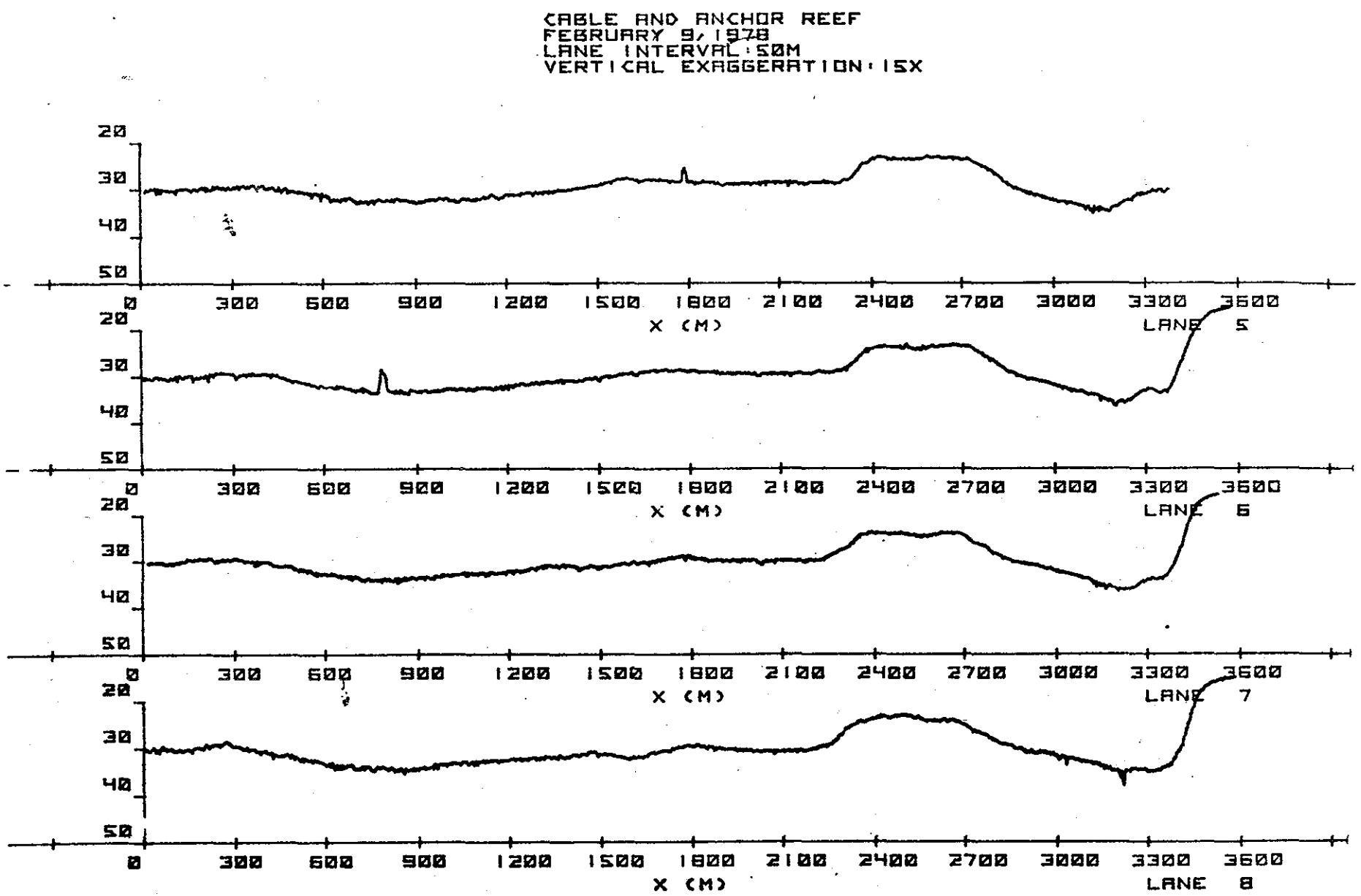

DIR (DEG T)
360.0
270.0
180.0
90.0
0.0
WESTERN LONG ISLAND SOUND
25 AUG, 78 TO 7 SEPT, 78
% INTERVAL = 2%
SPEED INTERVAL = 2 CM/SEC
SPEED (CM/SEC)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
32.0
34.0
36.0
38.0
40.0
42.0
44.0
TIME (DAYS)

I-8.c

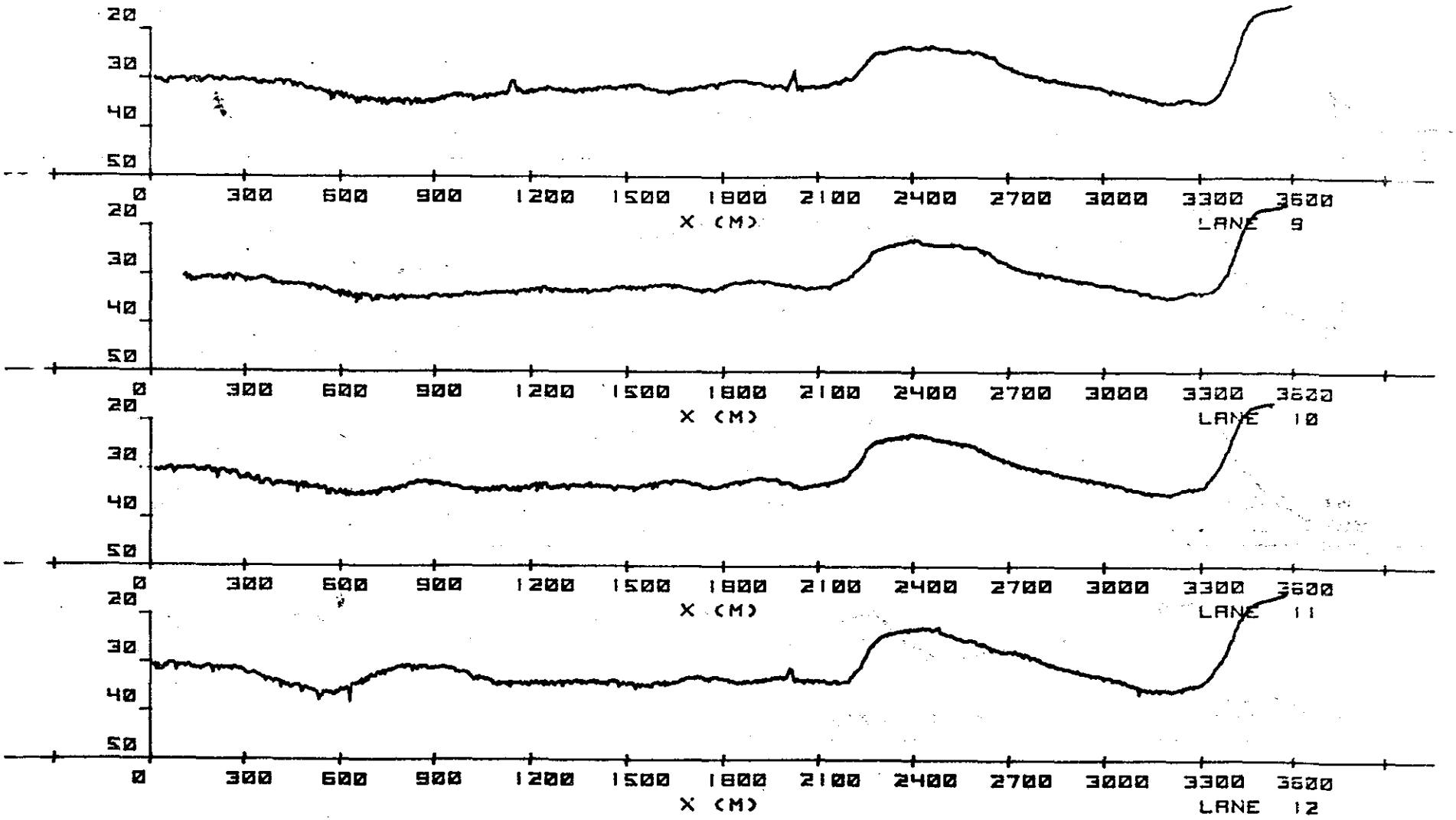

CABLE AND ANCHOR REEF
FEBRUARY 9, 1978
LANE INTERVAL: 50M
GRID RESOLUTION: 100X50M
CONTOUR INTERVAL: 2M
DATUM: MLW

I-5a

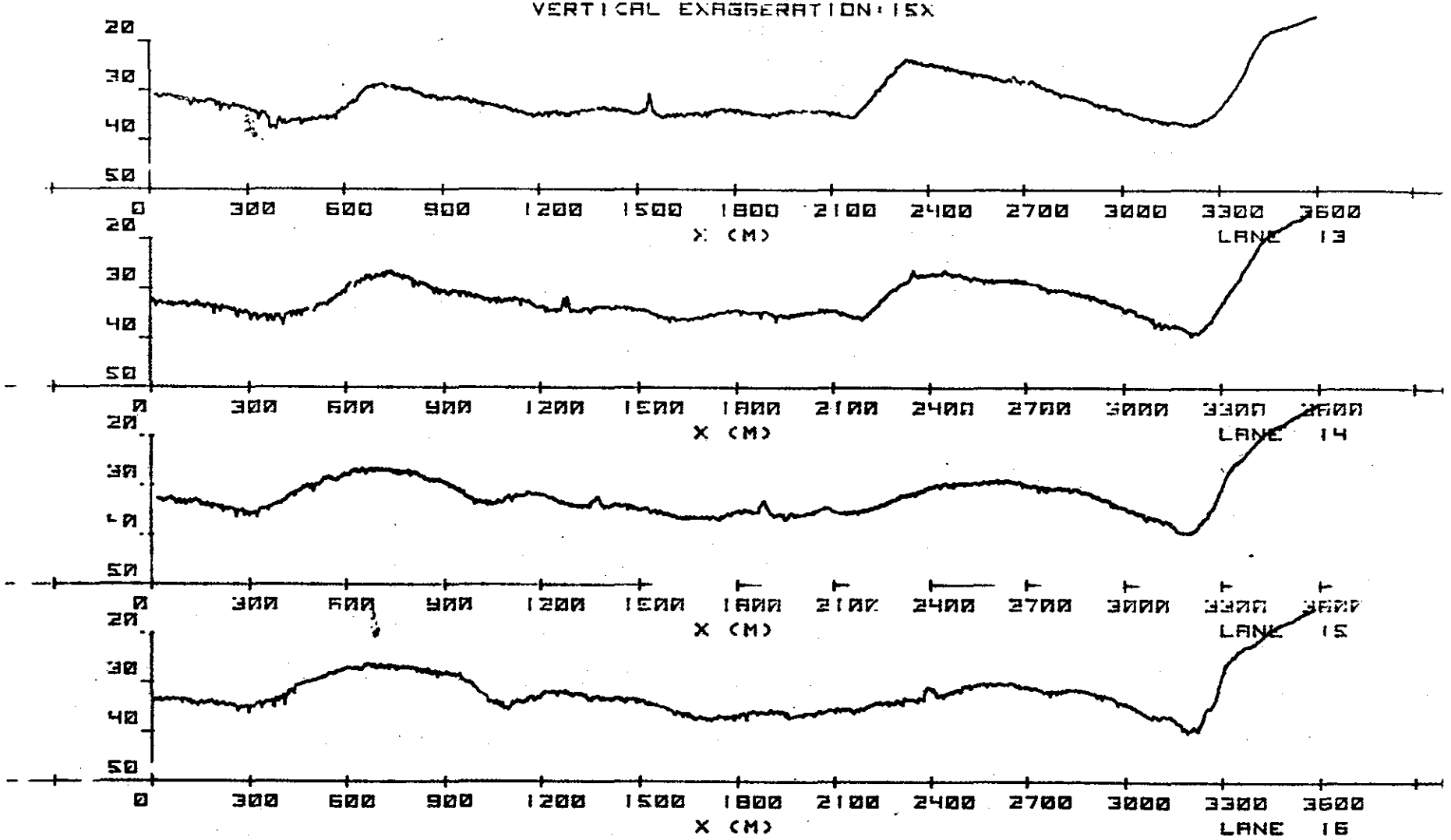

CABLE AND ANCHOR REEF
FEBRUARY 9, 1978
LANE INTERVAL: 50M
VERTICAL EXAGGERATION: 15X
20
30
40
50
0
300
600
900
1200
1500
1800
2100
2400
2700
3000
3300
3600
X (M)
LANE 1
LANE 2
LANE 3
LANE 4


CABLE AND ANCHOR REEF
FEBRUARY 9, 1978
LANE INTERVAL: 50M
VERTICAL EXAGGERATION: 15X
20
30
40
50
0
300
600
900
1200
1500
1800
2100
2400
2700
3000
3300
3600
X (M)
LANE 5
LANE 6
LANE 7
LANE 8

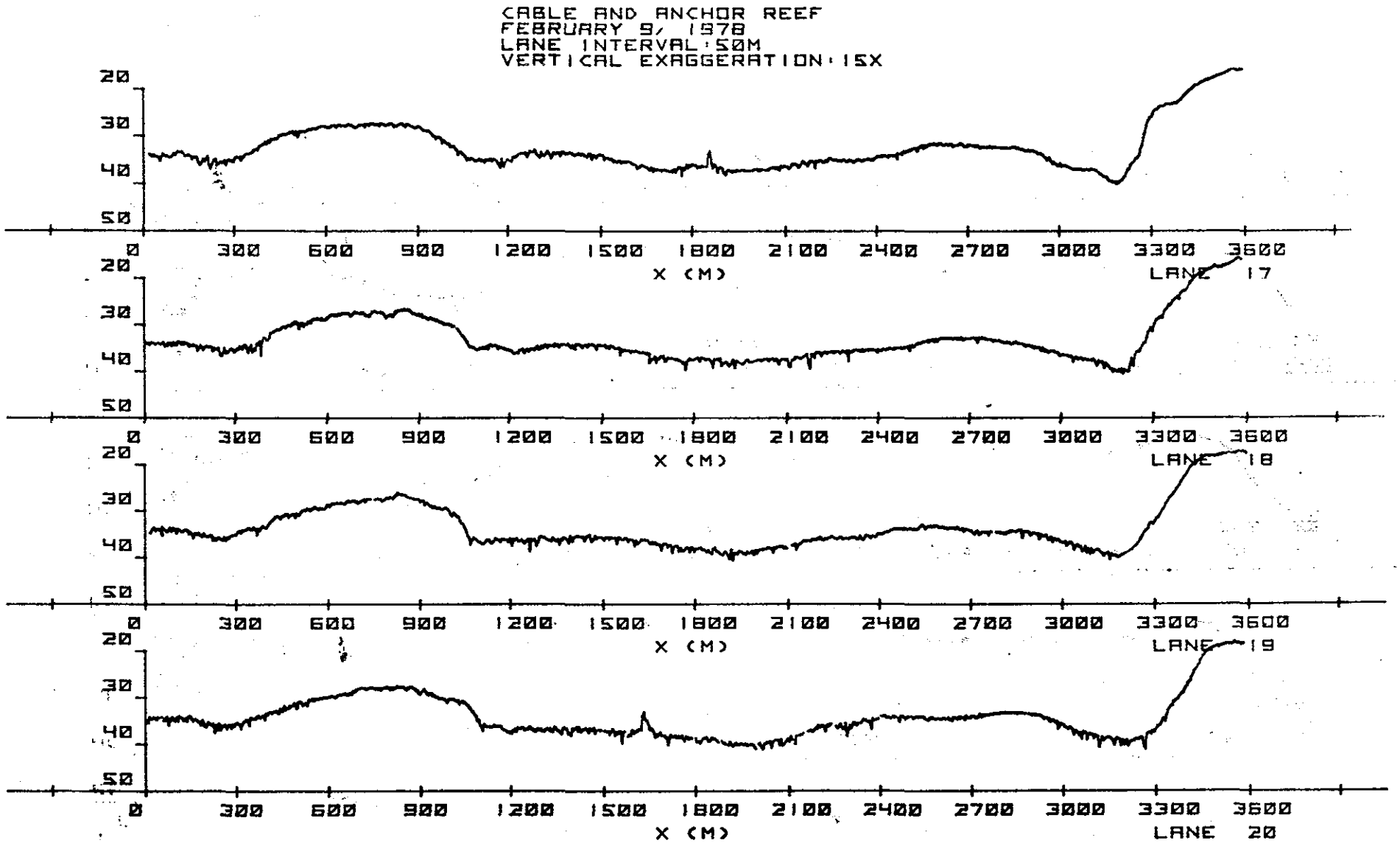
I-5c


CABLE AND ANCHOR REEF
FEBRUARY 9, 1978
LANE INTERVAL: 50M
VERTICAL EXAGGERATION: 15X
20
30
40
50
0
300
600
900
1200
1500
1800
2100
2400
2700
3000
3300
3600
X (M)
LANE 9
LANE 10
LANE 11
LANE 12

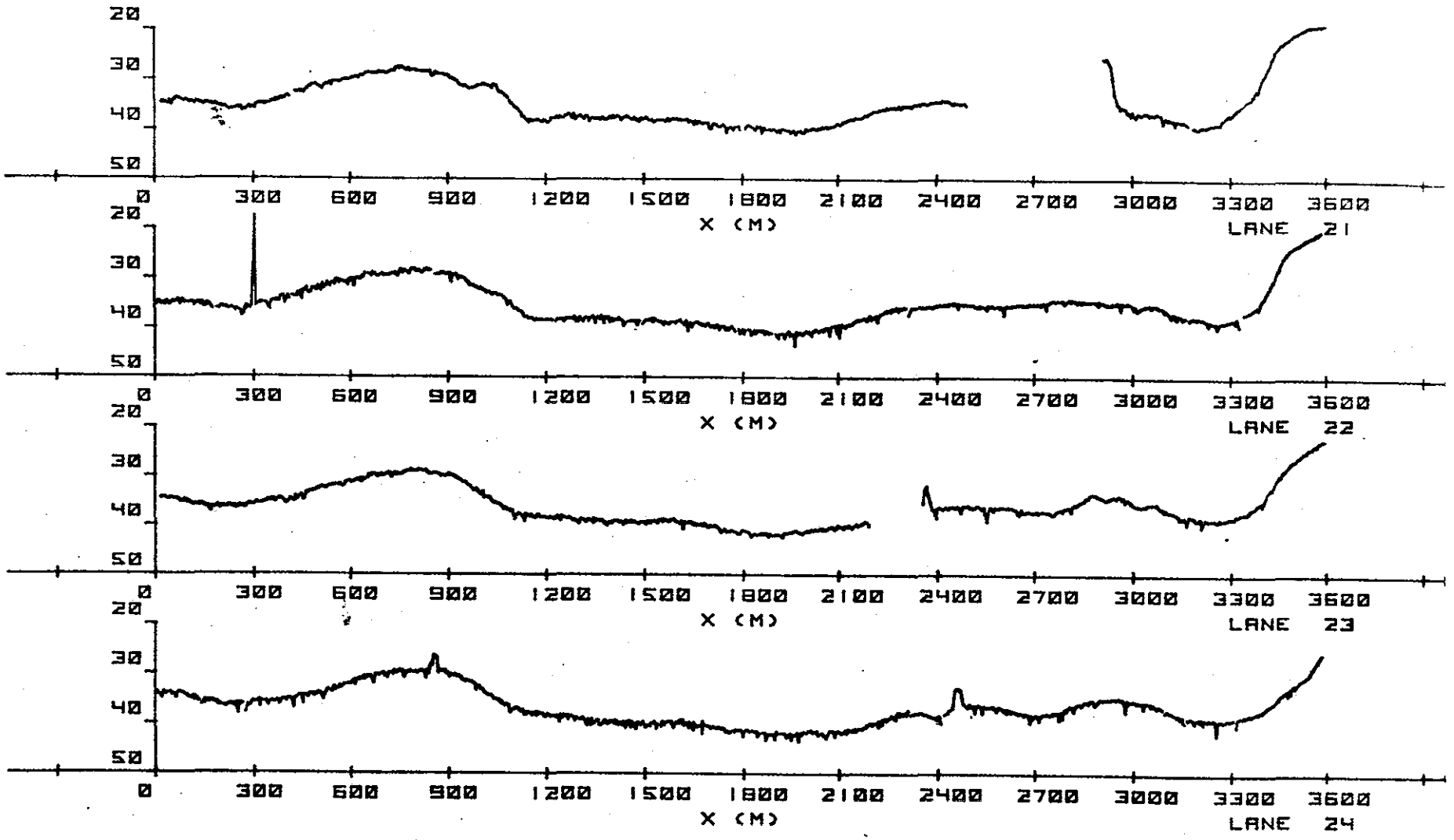
I-5d

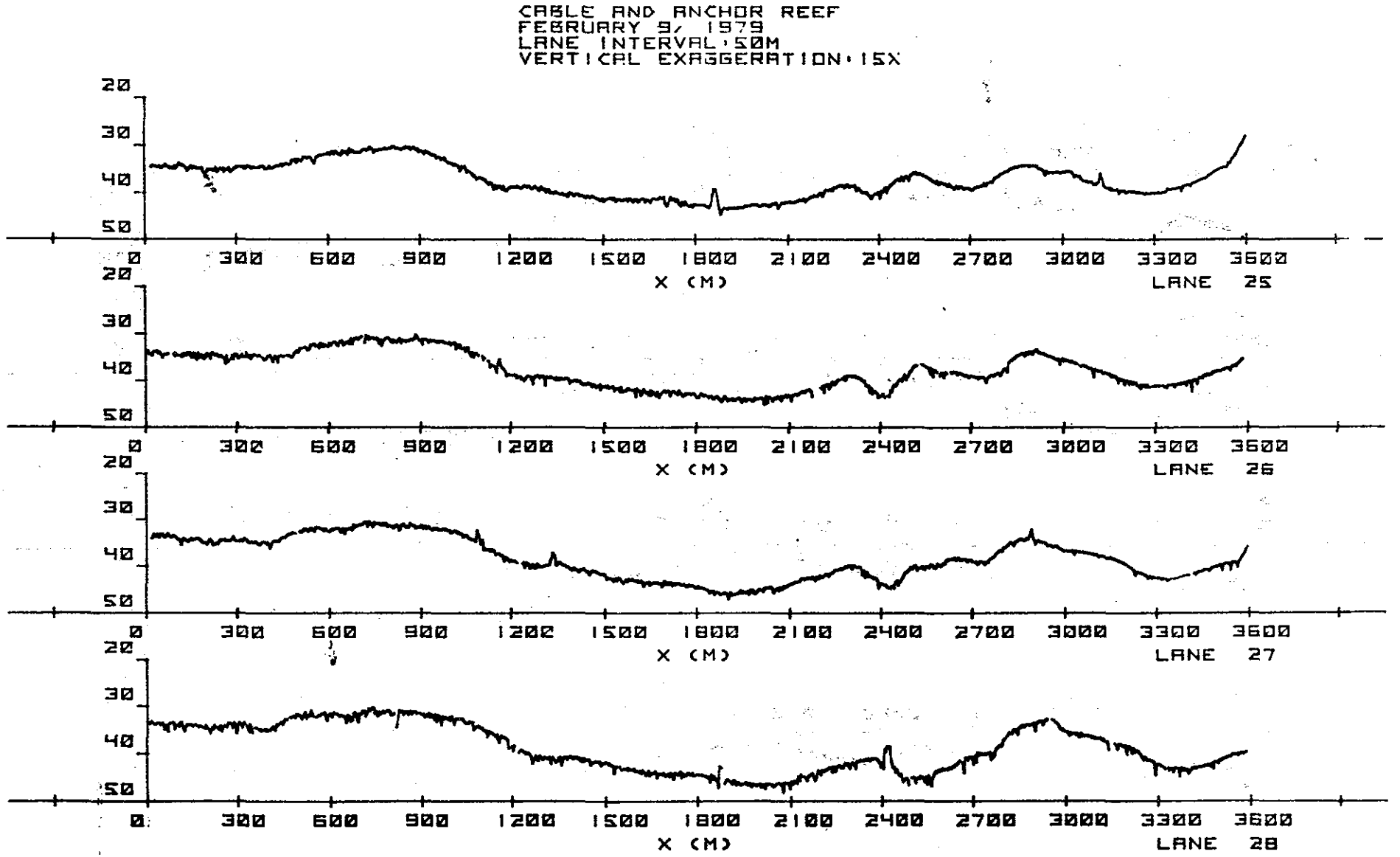

CABLE AND ANCHOR REEF
FEBRUARY 9, 1970
LANE INTERVAL: 50M
VERTICAL EXAGGERATION: 15X
20
30
40
50
0
300
600
900
1200
1500
1800
2100
2400
2700
3000
3300
3600
X (M)
LANE 13
LANE 14
LANE 15
LANE 16

I-5e

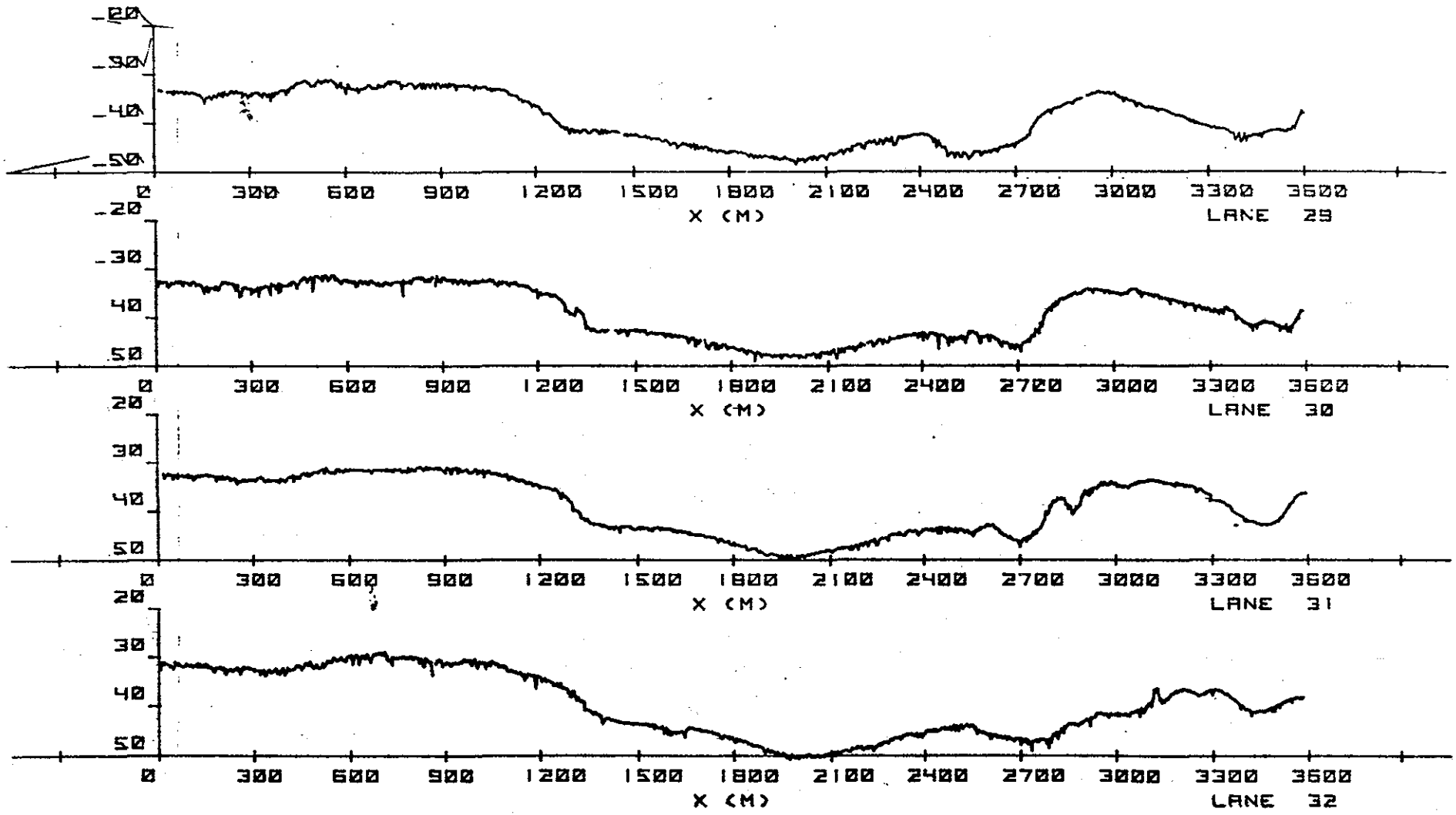

CABLE AND ANCHOR REEF
FEBRUARY 9, 1978
LANE INTERVAL: 50M
VERTICAL EXAGGERATION: 15X
20
30
40
50
0
300
600
900
1200
1500
1800
2100
2400
2700
3000
3300
3600
X (M)
LANE 17
LANE 18
LANE 19
LANE 20

I-5f

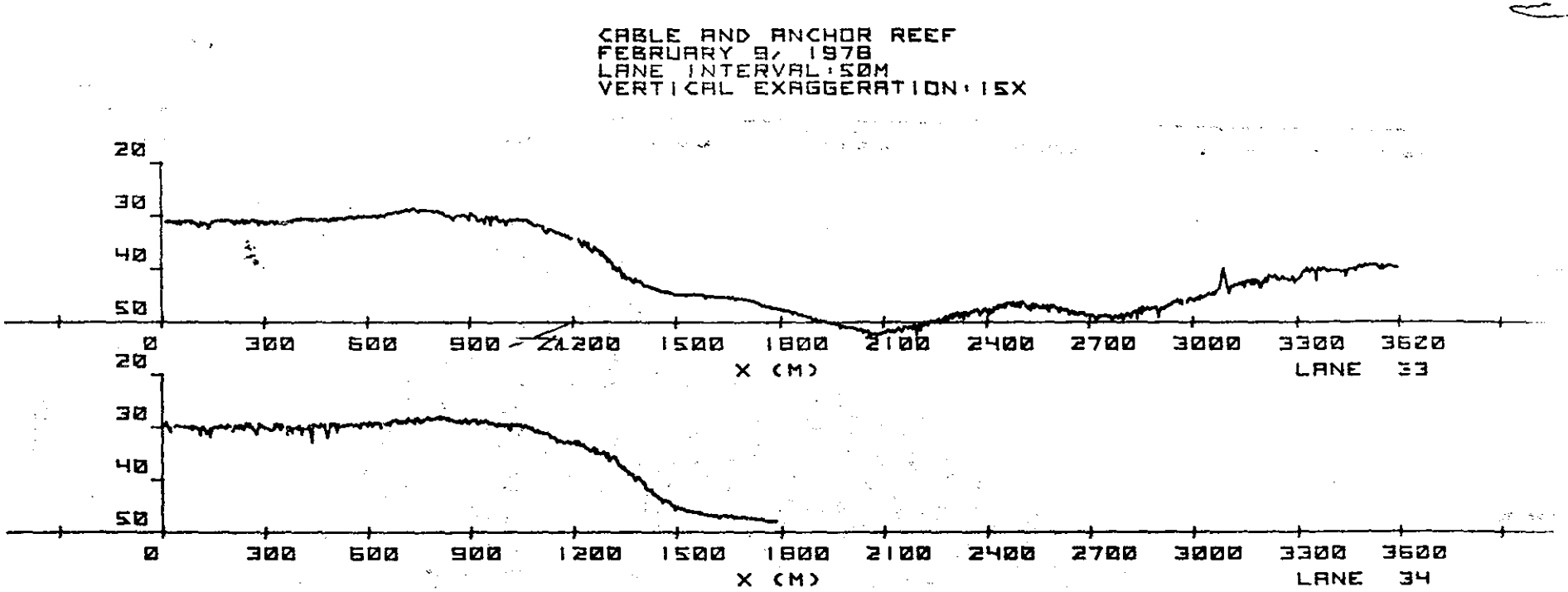

CABLE AND ANCHOR REEF
FEBRUARY 9, 1978
LANE INTERVAL: 50M
VERTICAL EXAGGERATION: 15X
20
30
40
50
0
300
600
900
1200
1500
1800
2100
2400
2700
3000
3300
3600
X (M)
LANE 21
LANE 22
LANE 23
LANE 24


CABLE AND ANCHOR REEF
FEBRUARY 9, 1979
LANE INTERVAL: 50M
VERTICAL EXAGGERATION: 15X
20
30
40
50
0 300 600 900 1200 1500 1800 2100 2400 2700 3000 3300 3600
X (M)
LANE 25
LANE 26
LANE 27
LANE 28

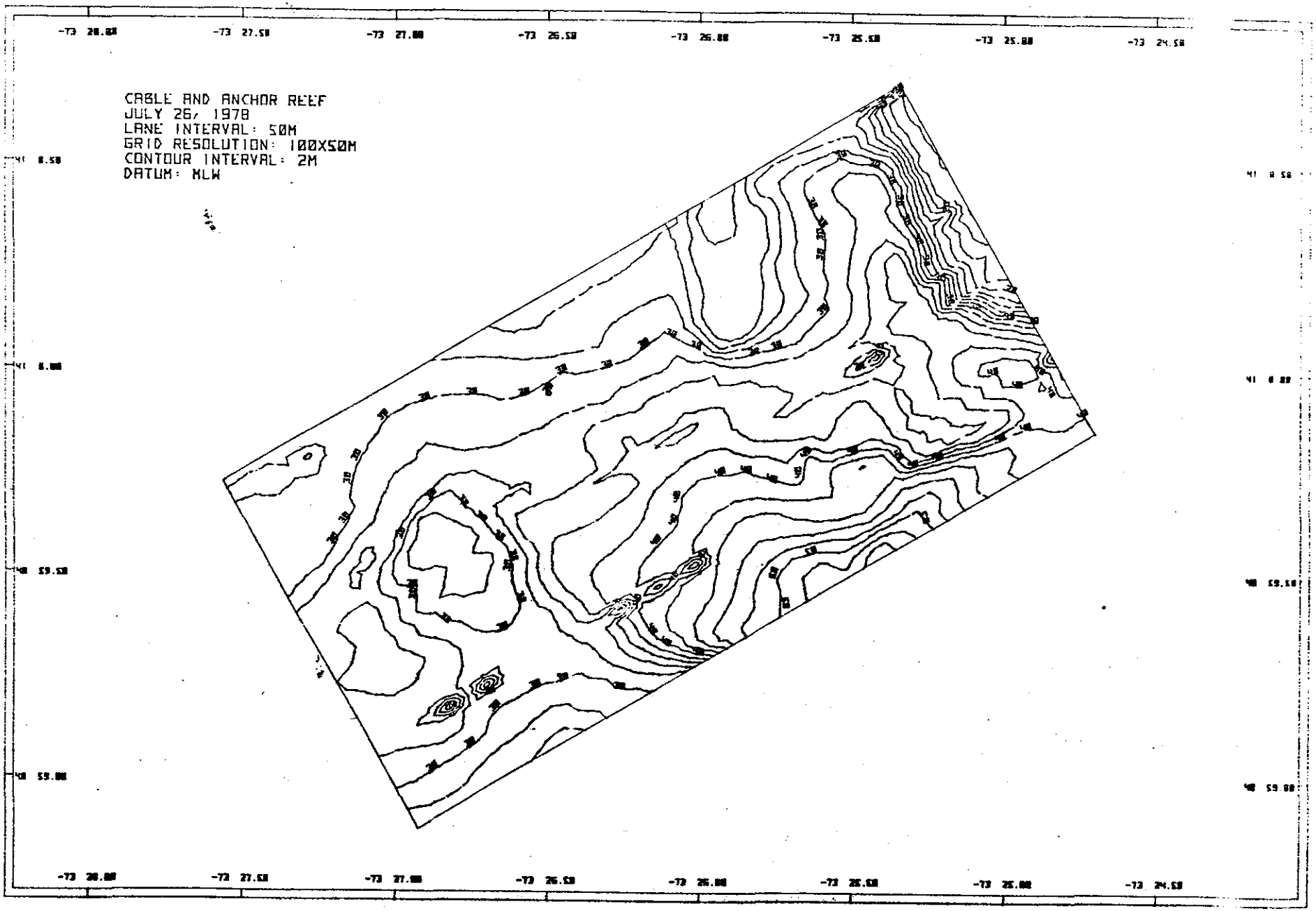
J-5H


CABLE AND ANCHOR REEF
FEBRUARY 9, 1979
LANE INTERVAL: 50M
VERTICAL EXAGGERATION: 15X
-20
-30
-40
-50
0 300 600 900 1200 1500 1800 2100 2400 2700 3000 3300 3600
X (M)
LANE 29
-20
-30
40
50
0 300 600 900 1200 1500 1800 2100 2400 2700 3000 3300 3600
X (M)
LANE 30
20
30
40
50
0 300 600 900 1200 1500 1800 2100 2400 2700 3000 3300 3600
X (M)
LANE 31
20
30
40
50
0 300 600 900 1200 1500 1800 2100 2400 2700 3000 3300 3600
X (M)
LANE 32

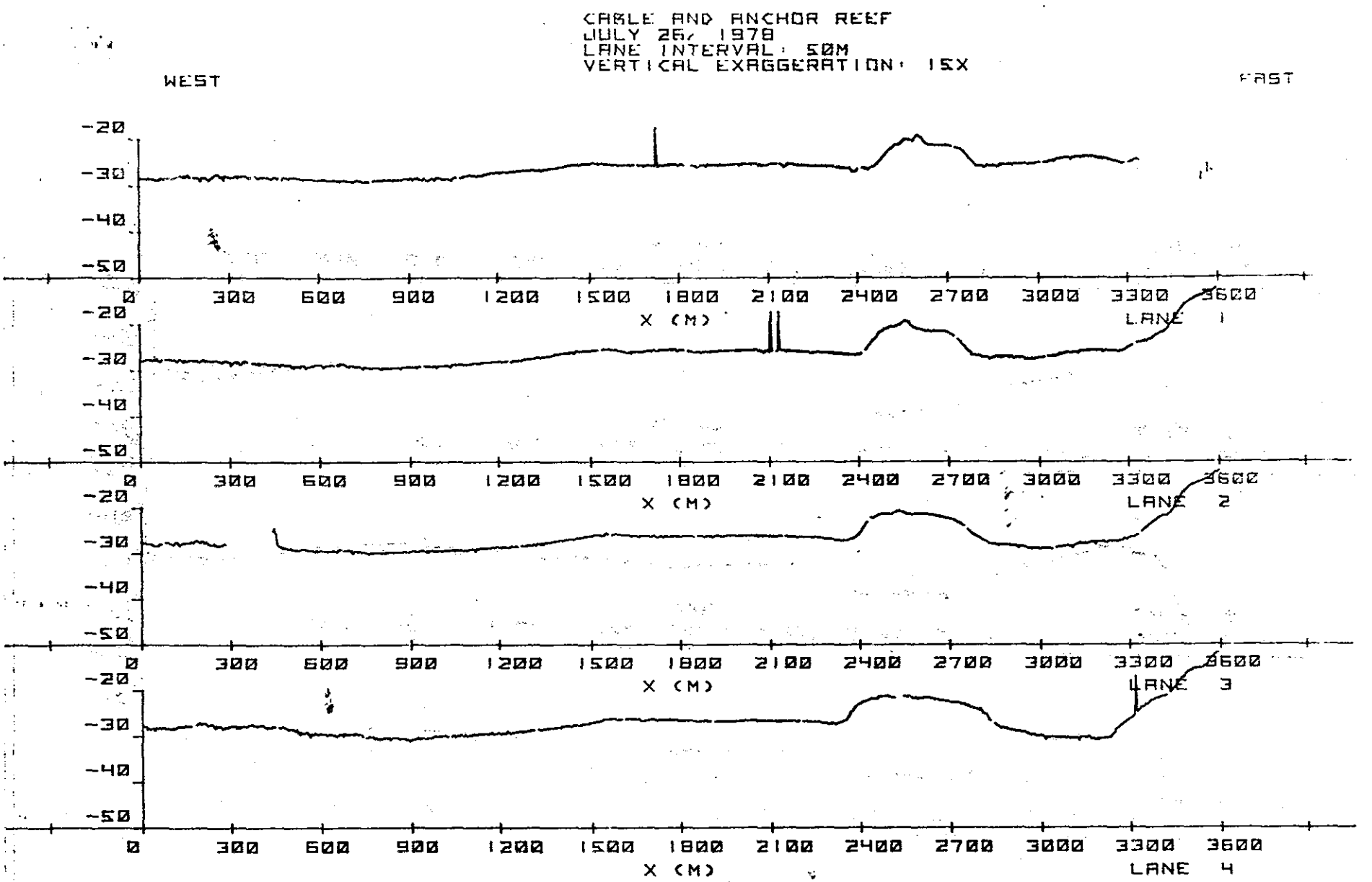
I-5i

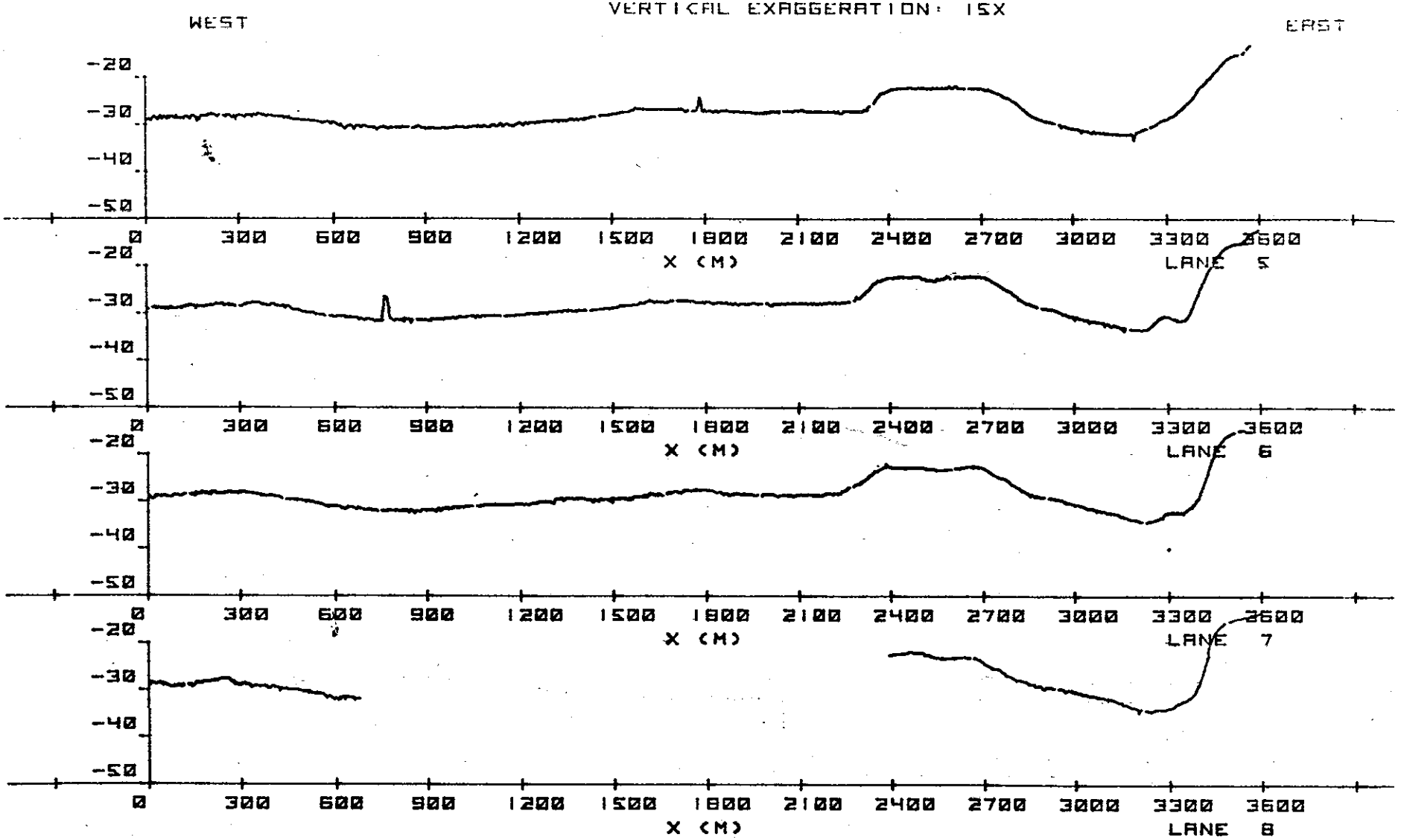

CABLE AND ANCHOR REEF
FEBRUARY 9, 1978
LANE INTERVAL: 50M
VERTICAL EXAGGERATION: 15X
20
30
40
50
0
300
600
900
1200
1500
1800
2100
2400
2700
3000
3300
3620
X (M)
LANE 33
20
30
40
50
0
300
600
900
1200
1500
1800
2100
2400
2700
3000
3300
3600
X (M)
LANE 34

I-5j

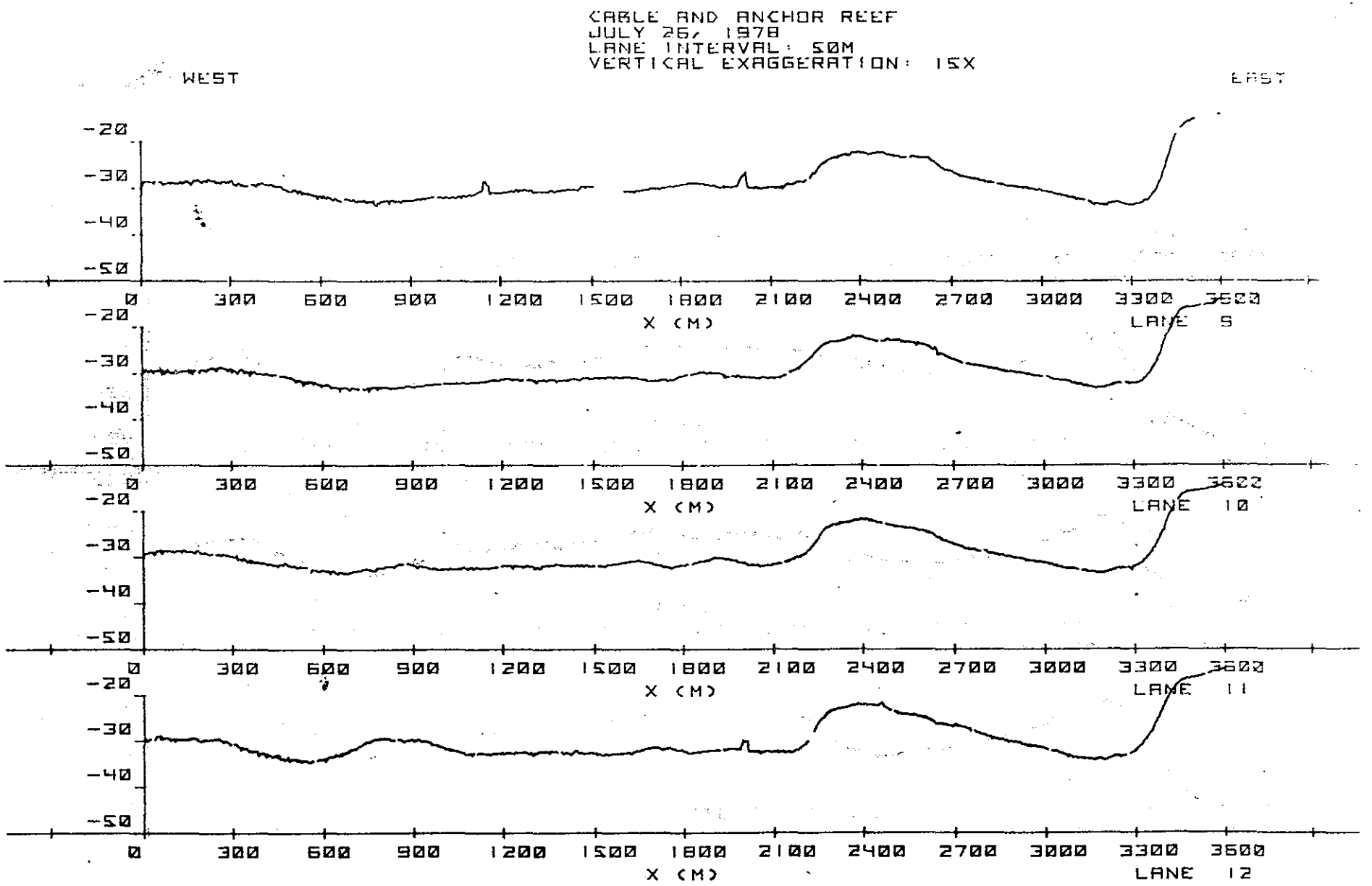

CABLE AND ANCHOR REEF
JULY 26, 1978
LANE INTERVAL: 50M
GRID RESOLUTION: 100X50M
CONTOUR INTERVAL: 2M
DATUM: MLW
-73 28.00
-73 27.50
-73 27.00
-73 26.50
-73 26.00
-73 25.50
-73 25.00
-73 24.50
41 8.50
41 8.00
40 59.50
40 59.00

I-6a


CABLE AND ANCHOR REEF
JULY 26, 1978
LANE INTERVAL: 50M
VERTICAL EXAGGERATION: 15X
WEST
EAST
-20
-30
-40
-50
0
300
600
900
1200
1500
1800
2100
2400
2700
3000
3300
3600
X (M)
LANE 1
LANE 2
LANE 3
LANE 4

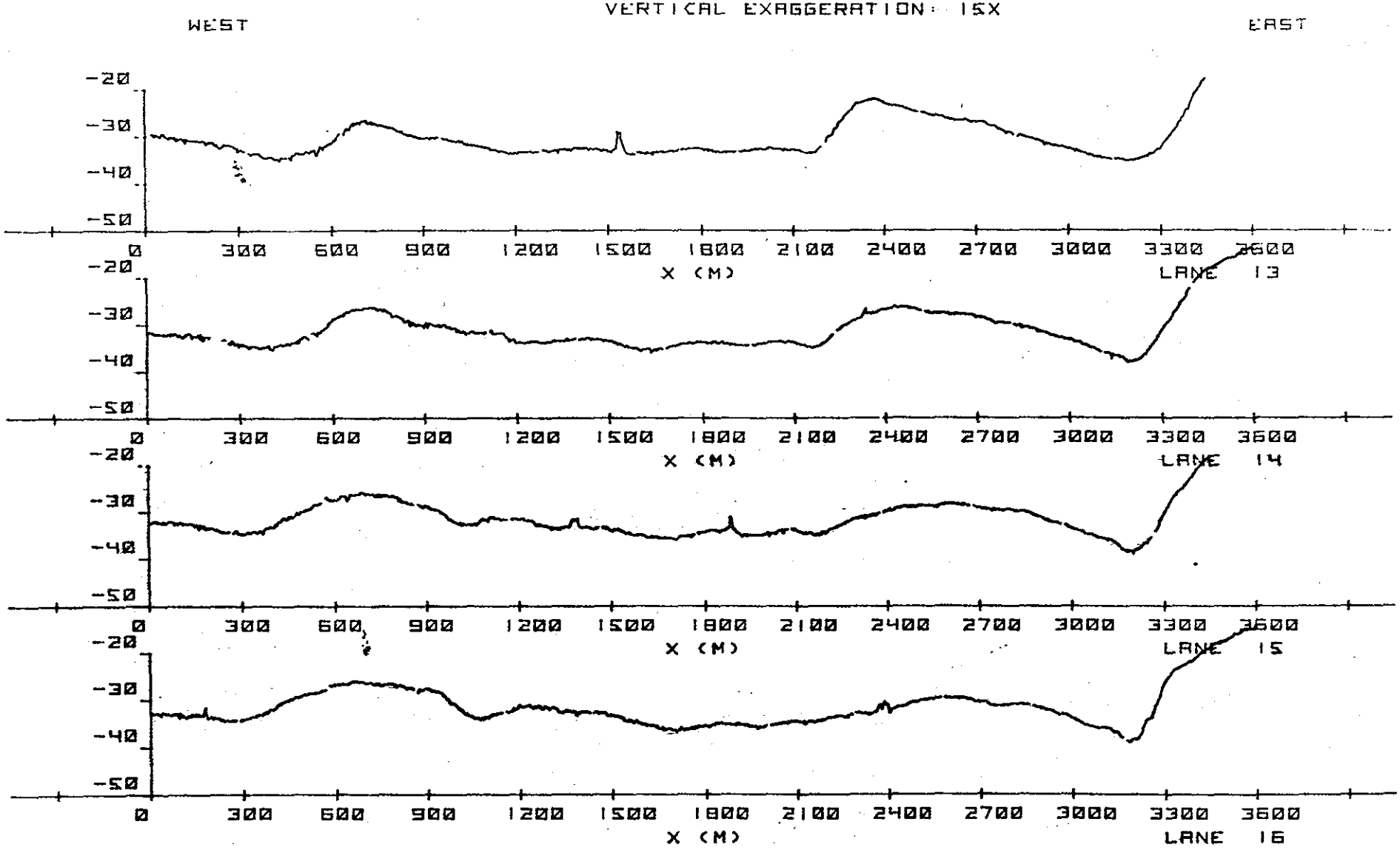

CABLE AND ANCHOR REEF
JULY 25, 1978
LANE INTERVAL: 50M
VERTICAL EXAGGERATION: 15X
WEST
EAST
-20
-30
-40
-50
0
300
600
900
1200
1500
1800
2100
2400
2700
3000
3300
3600
X (M)
LANE 5
LANE 6
LANE 7
LANE 8

I-6c

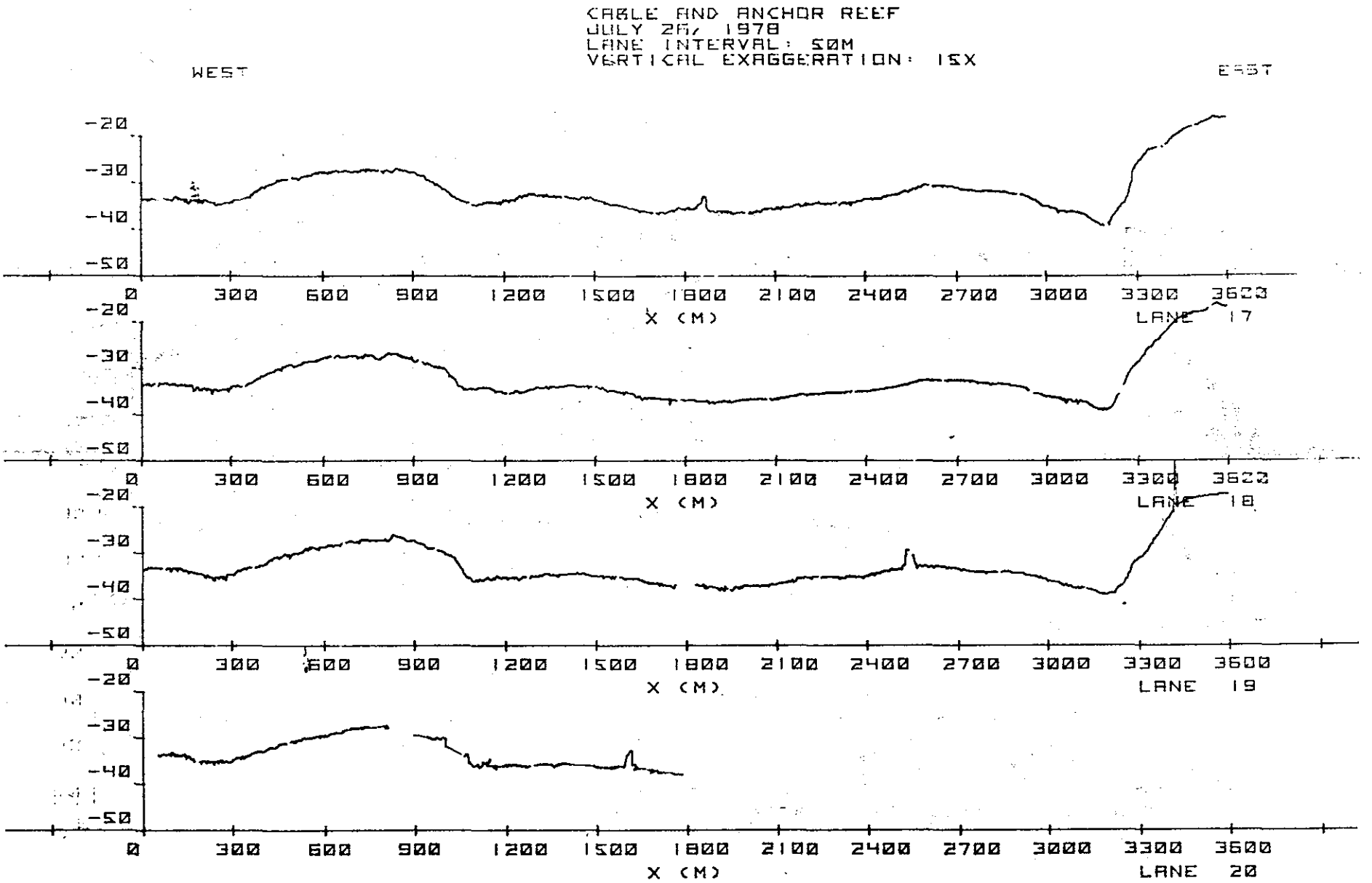

CABLE AND ANCHOR REEF
JULY 26, 1978
LANE INTERVAL: 50M
VERTICAL EXAGGERATION: 15X
WEST
EAST
-20
-30
-40
-50
0
300
600
900
1200
1500
1800
2100
2400
2700
3000
3300
3600
X (M)
LANE 9
LANE 10
LANE 11
LANE 12

I-6d

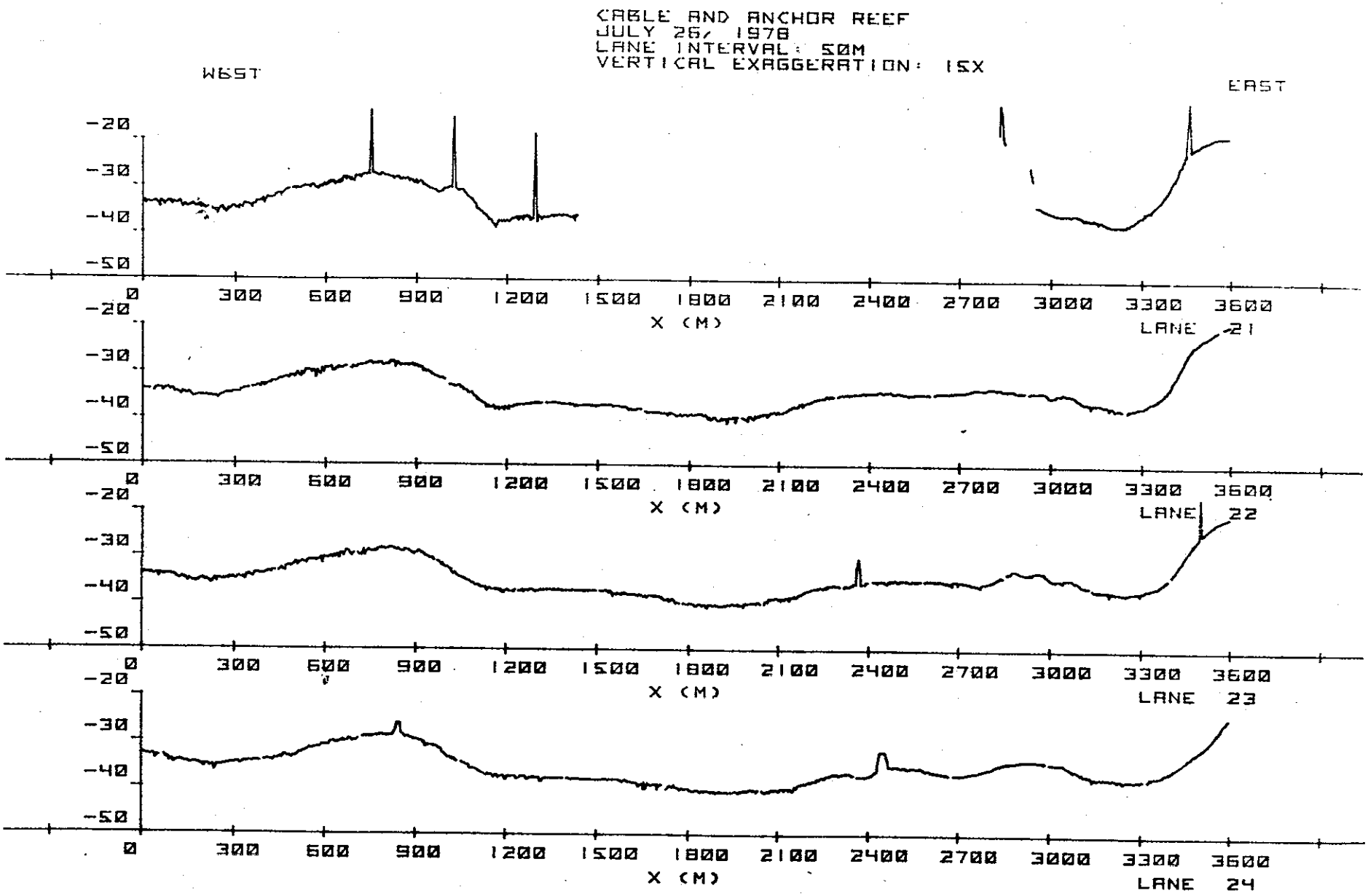
CABLE AND ANCHOR REEF
JULY 26, 1978
LANE INTERVAL: 50M
VERTICAL EXAGGERATION: 15X



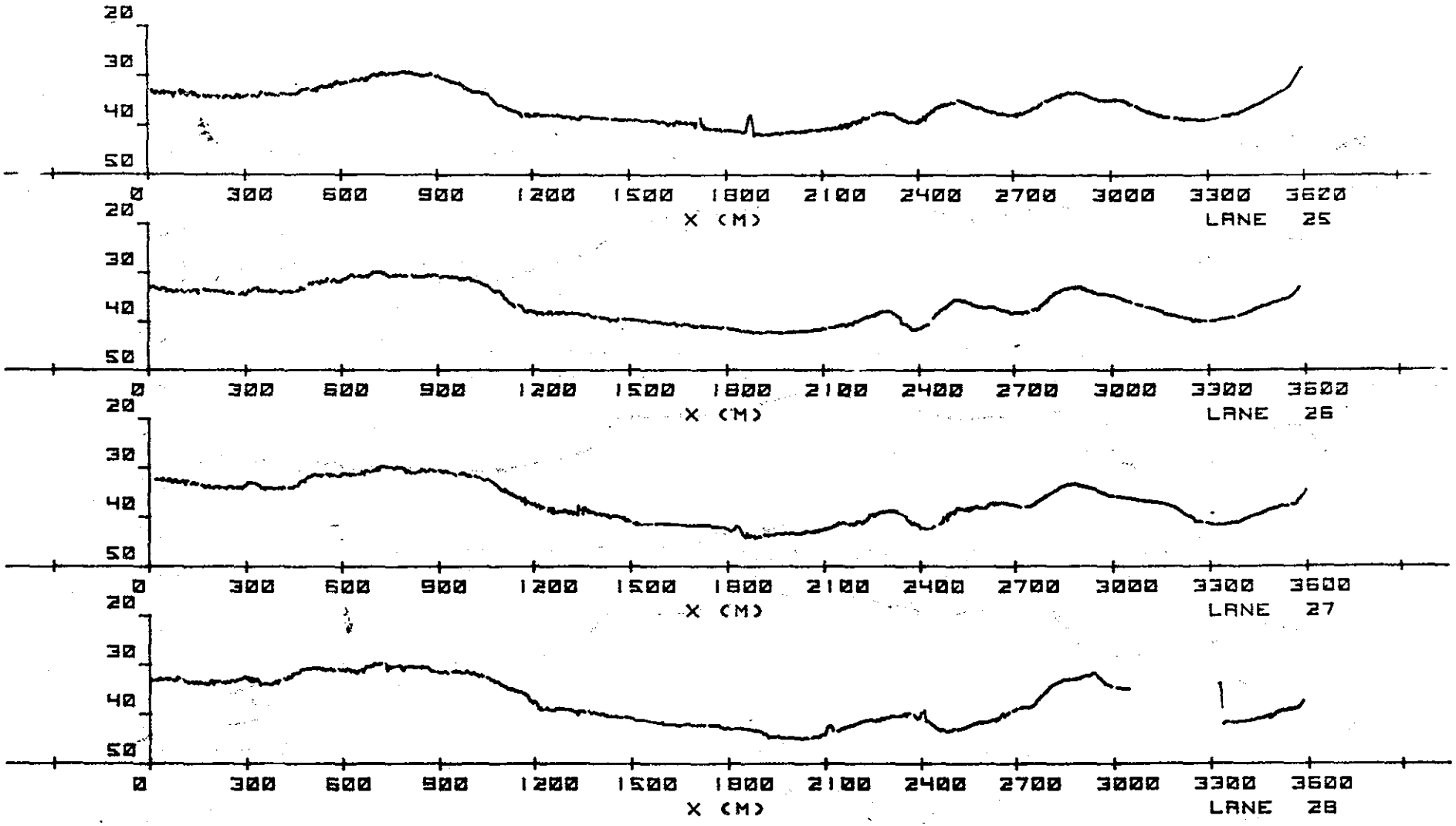
I-6e


CABLE AND ANCHOR REEF
JULY 26, 1978
LANE INTERVAL: 50M
VERTICAL EXAGGERATION: 15X
WEST
EAST
-20
-30
-40
-50
0
300
600
900
1200
1500
1800
2100
2400
2700
3000
3300
3623
X (M)
LANE 17
3622
LANE 18
3600
LANE 19
LANE 20

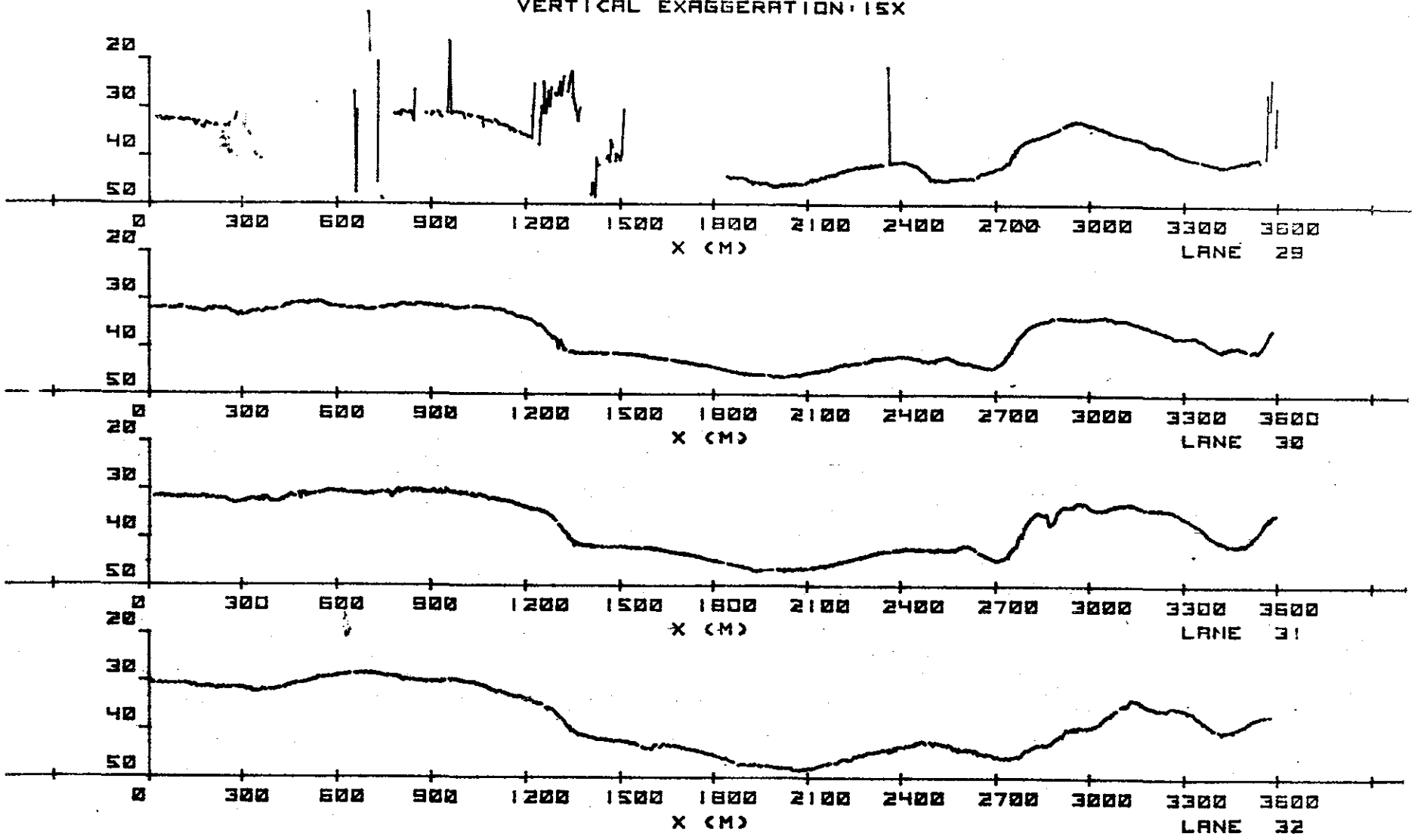
I-6f

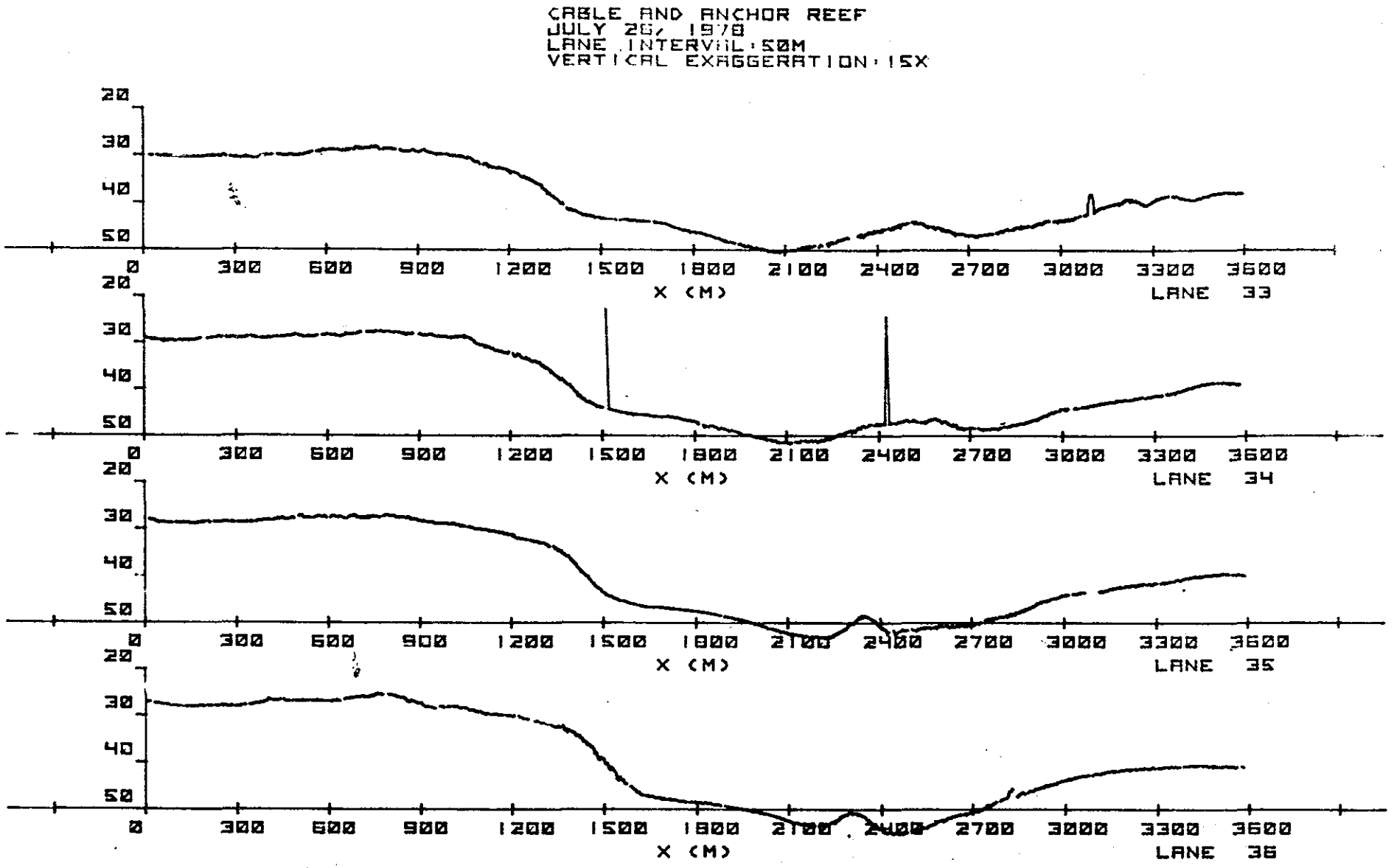

CABLE AND ANCHOR REEF
JULY 26, 1978
LANE INTERVAL: 50M
VERTICAL EXAGGERATION: 15X
WEST
EAST
-20
-30
-40
-50
0
300
600
900
1200
1500
1800
2100
2400
2700
3000
3300
3600
X (M)
LANE 21
LANE 22
LANE 23
LANE 24

CABLE AND ANCHOR REEF
FEBRUARY 9, 1979
LANE INTERVAL:50M
VERTICAL EXAGGERATION

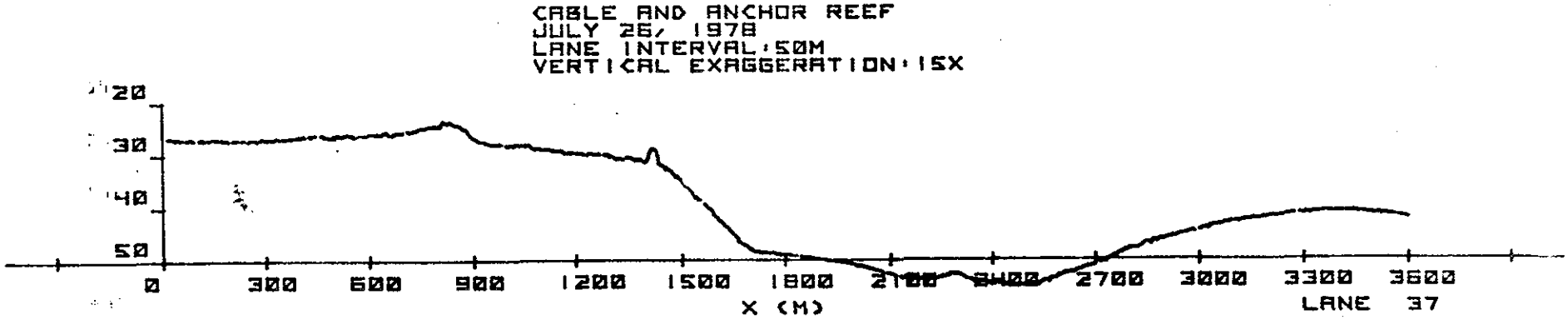


TCH

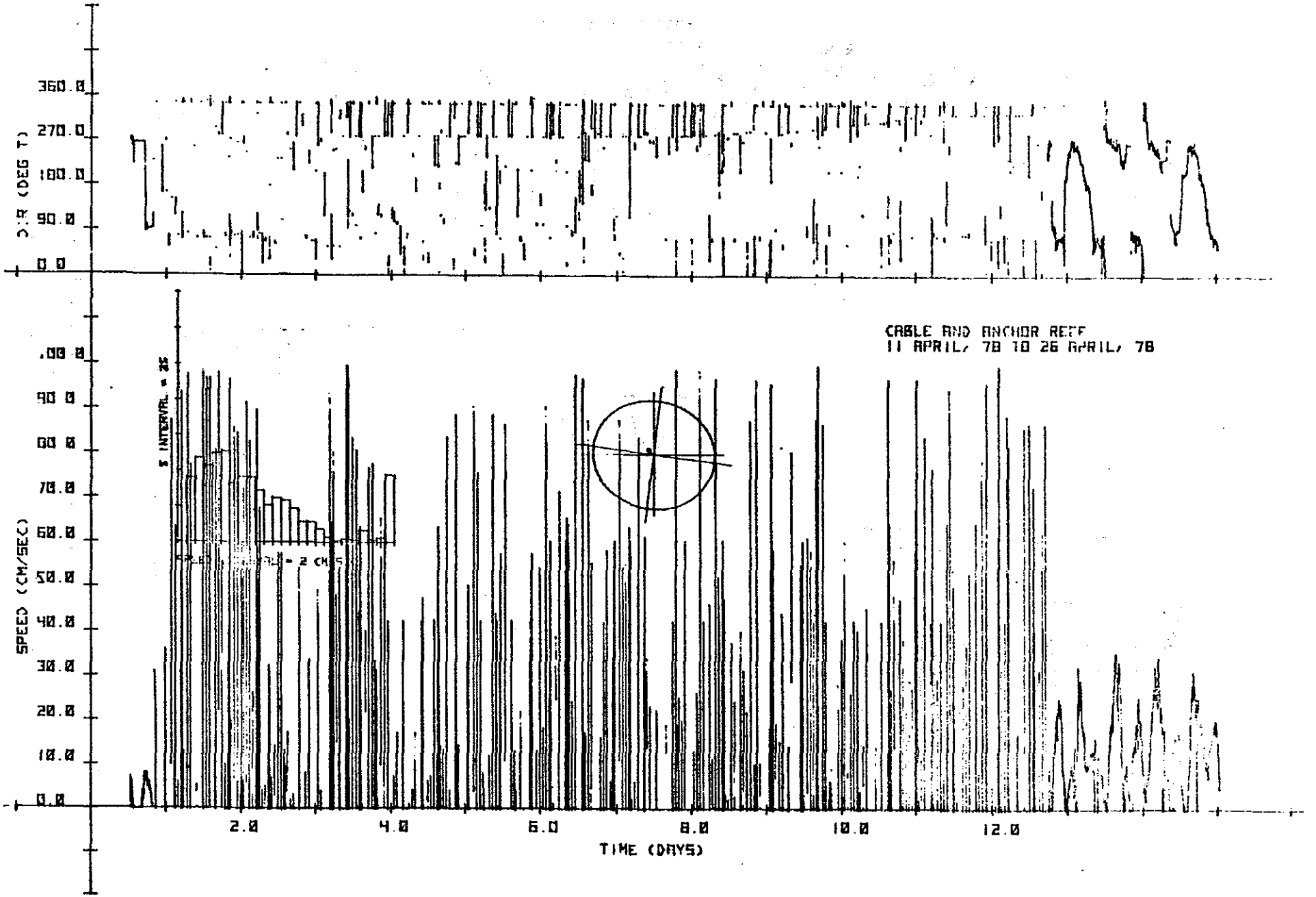

CABLE AND ANCHOR REEF
JULY 26, 1978
LANE INTERVAL: 50M
VERTICAL EXAGGERATION: 15X
20
30
40
50
0
300
600
900
1200
1500
1800
2100
2400
2700
3000
3300
3600
X (M)
LANE 29
LANE 30
LANE 31
LANE 32


CABLE AND ANCHOR REEF
JULY 26, 1978
LANE INTERVAL: 50M
VERTICAL EXAGGERATION: 15X
20
30
40
50
0
300
600
900
1200
1500
1800
2100
2400
2700
3000
3300
3600
X (M)
LANE 33
LANE 34
LANE 35
LANE 36

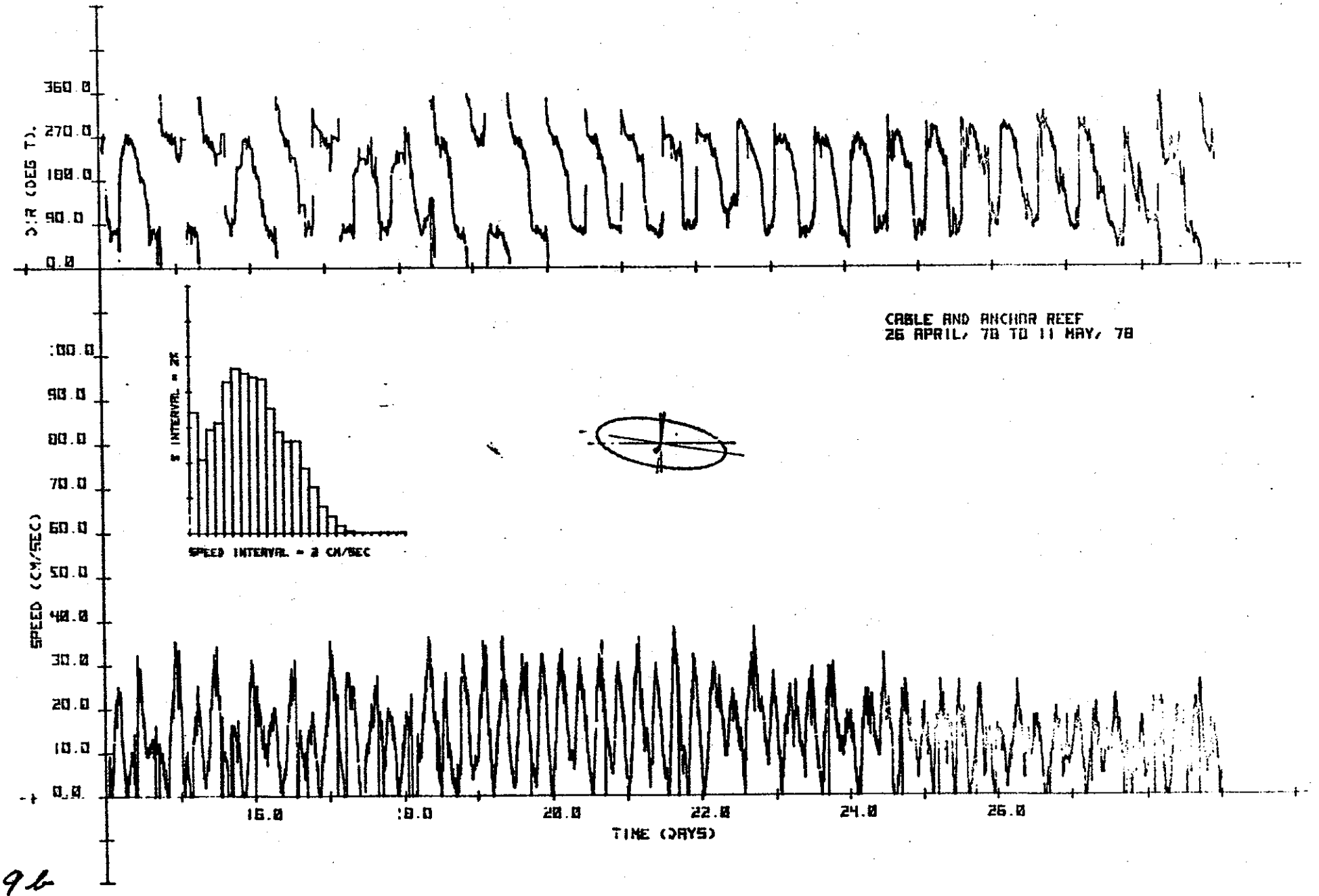
I-6


CABLE AND ANCHOR REEF
JULY 26, 1978
LANE INTERVAL: 50M
VERTICAL EXAGGERATION: 15X
20
30
40
50
0
300
600
900
1200
1500
1800
2700
3000
3300
3600
X (M)
LANE 37

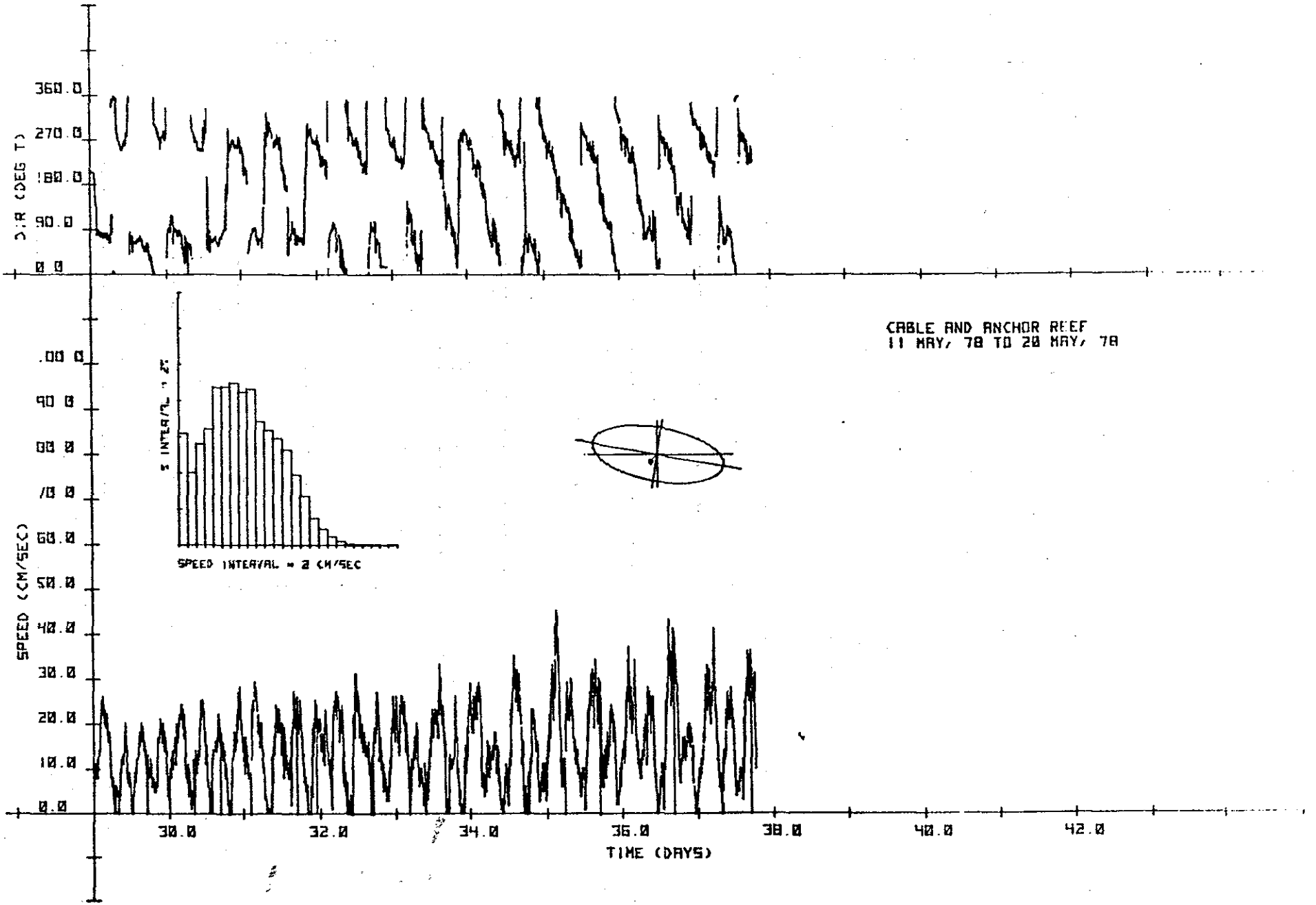
I-6k


D.R (DEG T)
360.0
270.0
180.0
90.0
0.0
CABLE AND ANCHOR REEF
11 APRIL, 78 TO 26 APRIL, 78
SPEED (CM/SEC)
.00.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
TIME (DAYS)

I-9a


360.0
270.0
180.0
90.0
0.0
DIR (DEG T).
CABLE AND ANCHOR REEF
26 APRIL, 78 TO 11 MAY, 78
% INTERVAL = 2%
SPEED INTERVAL = 2 CM/SEC
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
SPEED (CM/SEC)
16.0
18.0
20.0
22.0
24.0
26.0
TIME (DAYS)

I 96


CABLE AND ANCHOR REEF
11 MAY, 78 TO 20 MAY, 78
DIR (DEG T)
360.0
270.0
180.0
90.0
0.0
SPEED (CM/SEC)
.00 0
90 0
80 0
70 0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
SPEED INTERVAL = 2 CM/SEC
30.0
32.0
34.0
36.0
38.0
40.0
42.0
TIME (DAYS)

T-9-

WESTERN LONG ISLAND SOUND
12 April-1 July, 1978

TABLE I-1

	Total OBS. Current	Tidal Current Inc. Mean	Residual Current	Mean Current
Semi-major axis (cm/sec)	16.9	16.17	8.92	-
Semi-minor axis (cm/sec)	5.5	4.11	4.42	-
Direction (^oT)	73.7	-	-	-
Horizontal Kinetic energy (cm^2/sec^2)	157.90	139.23	49.55	30.88
10% Highest speeds (cm/sec)	40.1 9.9%	-	-	-
Peak speed (cm/sec)	-	28.35	-	-
Average maximum speed (cm/sec)	-	23.60	-	-

WESTERN LONG ISLAND SOUND
26 July-7 Sept., 1978

TABLE I-2

	Total OBS. Current	Tidal Current Inc. Mean	Residual Current	Mean Current
Semi-major axis (cm/sec)	19.3	18.30	10.64	-
Semi-minor axis (cm/sec)	7.0	7.61	4.71	-
Direction (^oT)	67.0	-	-	-
Horizontal Kinetic energy (cm^2/sec^2)	210.65	196.35	67.60	53.43
10% Highest speeds (cm/sec)	44.0 9.5%	-	-	-
Peak speed (cm/sec)	-	32.98	-	-
Average maximum speed (cm/sec)	-	28.02	-	-

CABLE AND ANCHOR REEF

11 April-20 May, 1978

TABLE I-3

	Total OBS. Current	Tidal Current Inc. Mean	Residual Current	Mean Current
Semi-major axis (cm/sec)	15.3	14.13	6.11	-
Semi-minor axis (cm/sec)	6.0	3.75	4.80	-
Direction (°T)	79.6	-	-	-
Horizontal Kinetic energy (cm^2/sec^2)	134.70	106.88	30.19	2.37
10% Highest speeds (cm/sec)	29.6 10%	-	-	-
Peak speed (cm/sec)	-	28.13	-	-
Average maximum speed (cm/sec)	-	20.68	-	-

The burst of energy resulting from the easterly storm that occurred in the New Haven current data appears at the end of day 32 of the Western Long Island Sound data. At New Haven, the effect of the storm could be seen through two tidal cycles while in this set of data a single peak of 65 cm/sec was observed, that is more than twice the average maximum speed.

At the Cable and Anchor Reef station, located approximately 2 NM west of the Western Long Island Sound Station, the currents are significantly less. The 10% highest speeds at Western Long Island Sound are on the order of 40-45 cm/sec while at Cable and Anchor Reef, they are only 30 cm/sec. It should be noted,

however, that the tidal kinetic energy less the mean current results in similar values of 109 dynes/sec and 106 dynes/sec respectively for the same period of time. Residual and mean current components are substantially lower for the Cable and Anchor record.

It is interesting that no indication of the anomalous high current velocities caused by the storm at New Haven and Western Long Island Sound are present at Cable and Anchor Reef. The higher velocities were all directed westward, hence, the meter at this site may have been in the lee of shoals east of the mooring location. However, it is doubtful that such a major burst of energy would be completely lost, since normal tidal flow has a significant westerly component at this site.

Sediments

Data resulting from the heavy metal analysis of sediments from the Western Long Island Sound area are presented in Table I-4. Although the Cable and Anchor Reef stations generally have higher concentrations than those from Western Long Island Sound, both sites are similar and significantly higher than all other areas sampled in this study. Since the background sediments at the Western Long Island Sound site are so high, it is doubtful that spoils would be easily detected at this location based on chemical data.

Biochemical Studies

Mussels from Latimer's Light were deployed at the proposed Western Long Island Sound disposal site at 41°00'51.9" N, 73°21'16.5" W, at the Cable and Anchor Reef site at 41°00'27.6" N, 73°26'10" W, and at a common reference station at 41°23'24.8" N, 73°23'52.3" W. Both of the stations on the disposal sites were sampled in July, 1978, but the release mechanism on the reference site

TABLE I-4

LONG ISLAND SOUND DUMP SITES

SURFACE SEDIMENT ANALYSIS

SAMPLING	Cd	Co	Cr	Cu	Fe*	Hg	Ni	Pb	Zn	Vol/Sol	Oil/Grease
					All metals ppm					(%)	(ppm)
APRIL 1978					CABLE AND ANCHOR REEF						
CAR Ref	.31	8.1	31	20	1.2	.18	14	17	70	3.0	
CAR 1	.37	9.6	43	60	2.0	.30	55	59	144	11	6.8
CAR 3	.86	8.0	52	69	1.6	.56	49	75	138	7.0	1.6
					WESTERN LONG ISLAND SOUND						
WLIS 1	.61	4.4	34	43	1.3	.23	32	34	110	7.6	.9
WLIS 2	.62	8.3	39	49	1.5	.26	41	43	121	8.1	4.8
WLIS 3	.36	7.6	35	48	1.5	.18	35	35	111	6.8	1.8
WLIS R1	.25	8.7	39	60	1.8	.28	41	29	124	6.2	.9
JULY 1978											
					CABLE AND ANCHOR REEF						
CAR 1	.83	8.5	74	78	1.6	.69	22	69	184	19	
CAR 2	.72	7.8	64	61	1.6	.69	22	64	169	12	
CAR 3	.99	9.5	84	86	1.7	.48	26	71	218	22	
CAR, WLIS Ref 1	.75	8.7	73	76	1.6	.28	21	45	173	15	
WLIS 1	.50	8.0	58	61	1.4	.22	18	37	147	8.7	
% S.D.	25	9	5	7	3	14	5	13	15	5	15

*All Fe values multiply by 10^4

TABLE I-4a

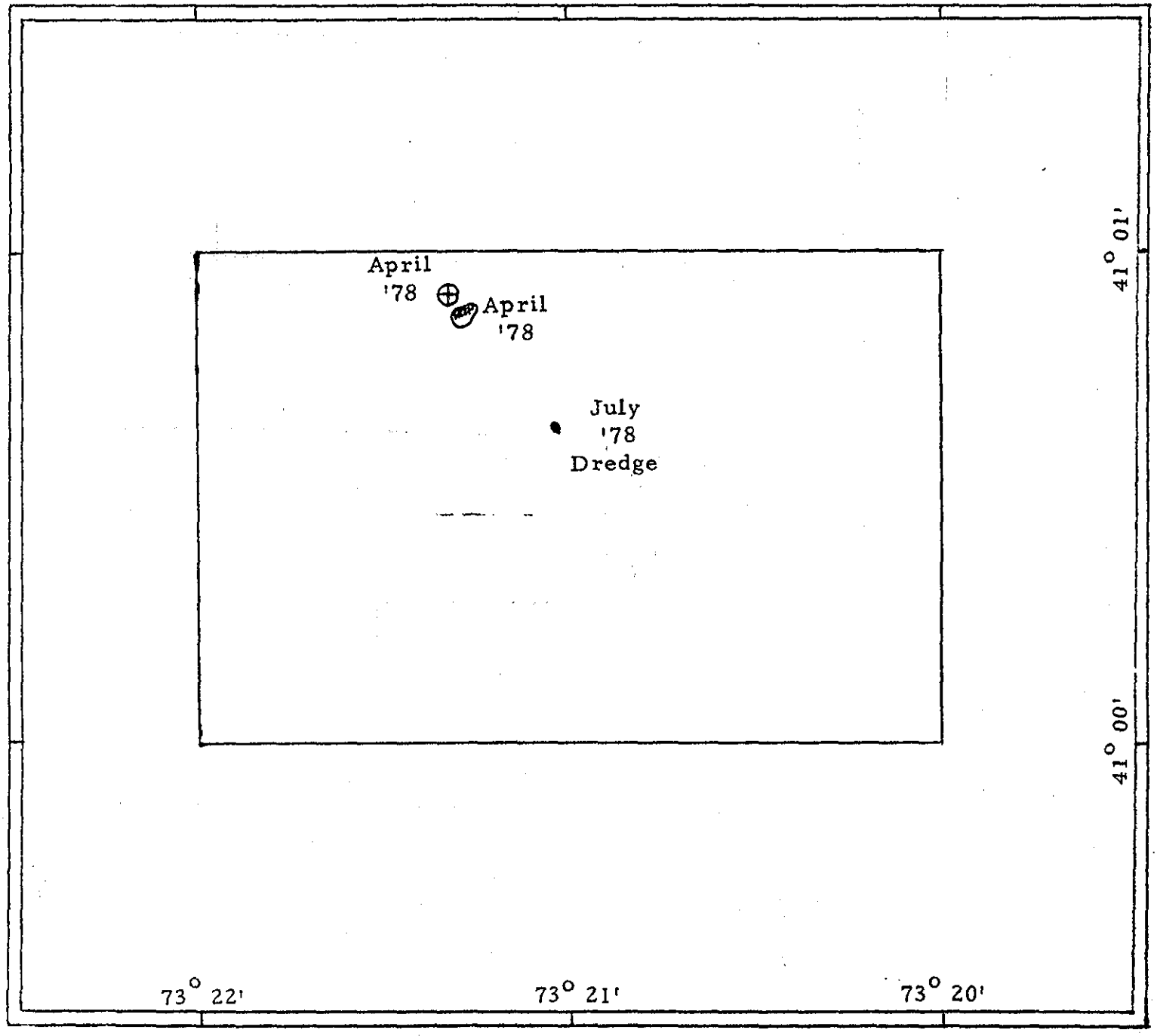
SAMPLE LOCATIONS

SITE: WLIS (Western Long Island Sound)

DATE	DISPOSAL SITE: CURRENT METER	MUSSELS	BENTHIC SAMPLES DREDGES	BENTHIC SAMPLES GRABS	REFERENCE SITE MUSSELS	BENTHIC SAMPLES DREDGES	BENTHIC SAMPLES GRABS
12/April/78	41°00'54.5" 73°21'18.6"	41°00'51.9" 73°21'16.5"			41°23'24.8" 73°23'52.3"		
26/July/78		Sample					
27/July/78			41°00'40.4" 73°21'01.8"			41°01'05.7" 73°23'56.7" +	

+ Same Ref. for CAR/ANC.

Western Long Island Sound



⊕ Current Meter Mussell Cage ● Benthic Sample

TABLE I-4b

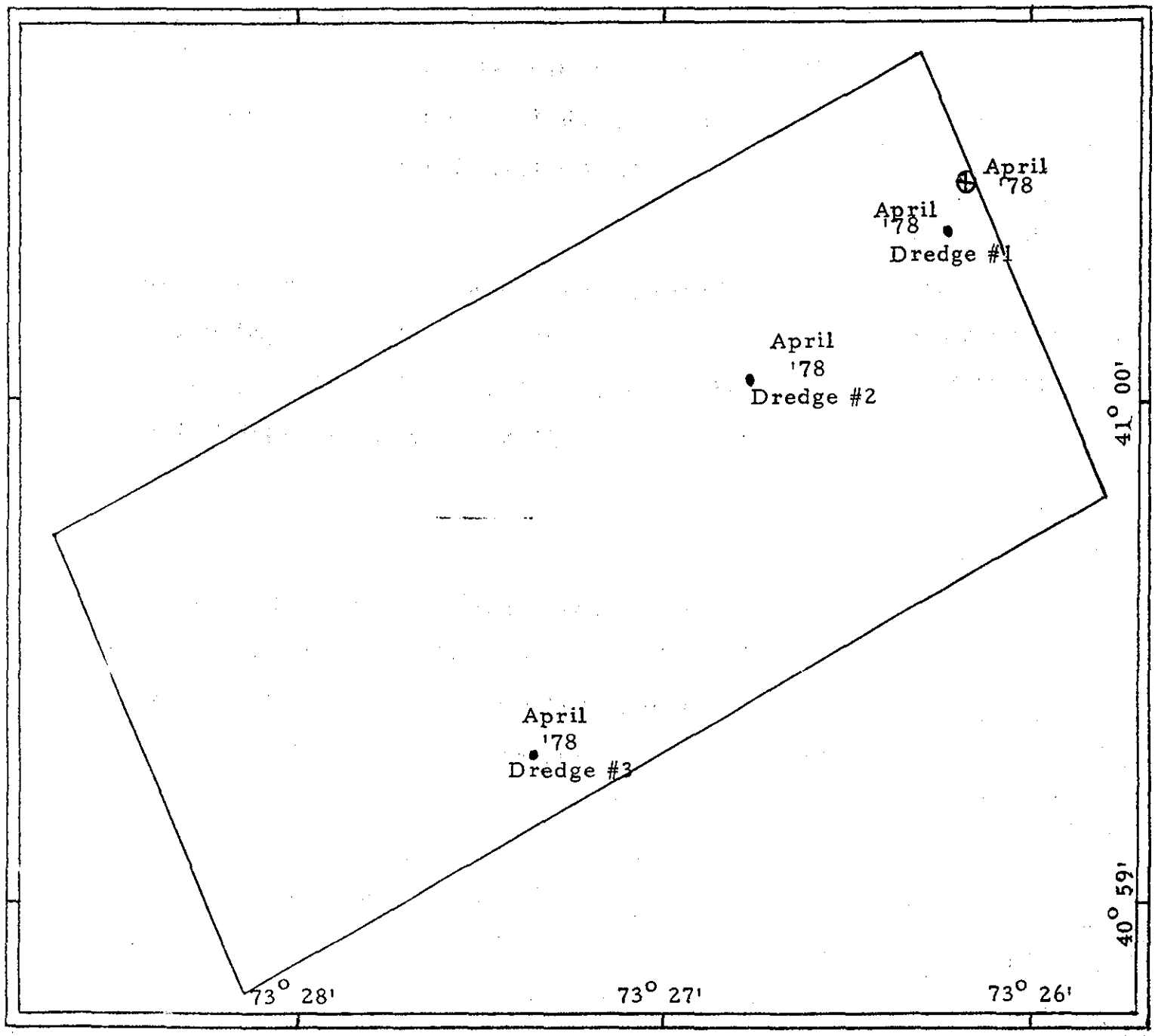
SAMPLE LOCATIONS

SITE: Cable and Anchor Reef

DATE	DISPOSAL SITE: CURRENT METER	MUSSELS	BENTHIC SAMPLES DREDGES	BENTHIC SAMPLES GRABS	REFERENCE SITE MUSSELS	BENTHIC SAMPLES DREDGES	BENTHIC SAMPLES GRABS
11/April/78	41°00'27.6" 73°26'10.0"	(?)	41°00'21.5" 73°26'14.5"			41°01'05.7" 73°23'56.7" +	
11/April/78			41°00'02.7" 73°26'47.6"				
11/April/78			40°59'19.7" 73°27'19.6"				
28/July/78							
12/April/78							

+ Same Ref. For WLIS

Cable and Anchor Reef



⊕ Current Meter

● Benthic Samples

failed and no samples were obtained. The baseline data and results from the cages are presented in Table I-5 and Figure I-10. At both disposal sites the behavior of the mussels was similar with Cd and Cu showing significant increases in concentration while Zn approached but did not exceed the confidence limits.

Following sampling in July, the Western Long Island Sound cage was destroyed by a dragger and problems were experienced retrieving the cage at Cable and Anchor Reef. It appears that the large amount of fishing activity in this area will severely restrict the use of instrumentation in this area.

Benthic Macrofauna

The numeric density data of the benthic population in Western Long Island Sound are presented in Tables I-6, I-7, and I-8. The most significant factor noticed in this area is the comparatively low number of individuals sampled relative to other sites in this study. Values for Diversity and Equitability are similar for all three stations.

Fisheries

The major objective of fisheries studies in this area is to map fisheries in the area east of Cable and Anchor Reef for a distance of approximately 7 miles. This information will be used along with bottom current measurements to choose a possible disposal site. Information on recovery times and fisheries potential of discontinued disposal areas is also being collected.

Choice of a disposal area in Western Long Island Sound is difficult because almost all of the area deeper than 20 meters is used by commercial lobstermen. Fishermen from different ports are limited to informal "territories" and so are concerned about any reduction in their fishable area.

TABLE I-5. HEAVY METAL CONCENTRATIONS (PPM) IN *MYTILUS EDULIS* FROM LATIMER'S LIGHT DEPLOYED AT CORNFIELD SHOALS, NEW HAVEN, WLIS AND CABLE AND ANCHOR REEF DISPOSAL SITES (SOUTHERN NEW ENGLAND).

DATE	LOCATION		CD	CR	CU	HG	PB	ZN
1-16-78	LATIMER'S LIGHT	$\bar{x}$	2.18	4.34	10.80	0.210	8.58	162
		S.D.	0.32	0.50	0.54	0.028	1.61	23
4-10-78		$\bar{x}$	2.06	7.71	8.53	0.199	5.17	110
		S.D.	0.46	2.88	0.38	0.027	2.29	45
8-9-78		$\bar{x}$	1.37	2.45	8.68	0.169	5.52	112
		S.D.				0.009	1.44	
7-26-78	WLIS DISPOSAL SITE	$\bar{x}$	4.65	5.92	12.14	0.170	4.66	197
		S.D.	0.09	1.59	0.57	0.014	2.25	6
7-27-78	CABLE & ANCHOR REEF DISPOSAL SITE	$\bar{x}$	3.36	6.47	12.72	0.188	5.19	194
		S.D.	0.12	1.15	1.15	0.025	0.01	0.09

TABLE I-6

DAMOS BENTHOS - TABLE OF NUMERIC DENSITY DATA

WLIS DUMP SITE - 12 APRIL 1978

PREDOMINANT SPECIES	DREDGE NUMBER #1	#2	#3	TOTAL	MEAN	STANDARD DEVIATION	COEFF. OF DISPERSION	95 PERCENT CONF. LIMITS OF MEAN	NUMERIC RANK	% OF TOTAL	CUMUL. % OF TOTAL
1. Nephythys incisa	2	6	1	9	3.0	2.6	2.3	0-9.5	1	47.4	47.4
2. Pherusa affinis	2	1	0	3	1.0	1.0	1.0	0-3.5	2	15.8	63.2
3. Corymorpha pendula	0	0	1	1	0.3	0.6	1.1	0-1.8	3	5.3	68.5
4. Cerianthus sp.	1	0	0	1	0.3	0.6	1.1	0-1.8	3	5.3	73.8
5. Nassarius trivittatus	0	1	0	1	0.3	0.6	1.1	0-1.8	3	5.3	79.1
6. Pitar morrhuana	0	1	0	1	0.3	0.6	1.1	0-1.8	3	5.3	84.4
7. Glycera americana	0	1	0	1	0.3	0.6	1.1	0-1.8	3	5.3	89.7
8. Maldanid sp.	0	1	0	1	0.3	0.6	1.1	0-1.8	3	5.3	95.0
9. Pagurus longicarpus	1	0	0	1	0.3	0.6	1.1	0-1.8	3	5.3	100.0
TOTAL	6	11	2	19	6.3	4.5	3.2	0-17.5			
TOTAL # OF SPP PER DREDGE	4	6	2	9	4.0	2.0		0- 9.0			
SPECIES DIVERSITY (H')	1.33	1.42	0.69	3.44	1.15	0.40					
EQUITABILITY (J')	0.96	0.79	1.00	2.75	0.92	0.11					

TOTAL # OF INDIVIDUALS THIS STATION = 19

TABLE I-7

DAMOS BENTHOS - TABLE OF NUMERIC DENSITY DATA

CAR DUMP SITE - 11 APRIL 1978

	PREDOMINANT SPECIES	DREDGE NUMBER #1	#2	#3	TOTAL	MEAN	STANDARD DEVIATION	COEFF. OF DISPERSION	95 PERCENT CONF. LIMITS OF MEAN	NUMERIC RANK	% OF TOTAL	CUMU.. % OF TOTAL
1.	Nephthys incisa	6	14	7	27	9.0	4.4	2.1	0-15.3	1	60.0	60.0
2.	Nucula proxima	6	0	0	6	2.0	3.5	6.0	0-10.7	2	13.3	73.3
3.	Nassarius trivittatus	0	1	1	2	0.7	0.6	0.5	0- 2.2	3	4.4	77.7
4.	Pitar morrhuana	1	1	0	2	0.7	0.6	0.5	0- 2.2	3	4.4	82.1
5.	Yoldia limatula	2	0	0	2	0.7	1.2	1.9	0- 3.7	3	4.4	86.5
6.	Thuiaria sp.	0	1	0	1	0.3	0.6	1.1	0- 1.8	4	2.2	88.7
7.	Cerianthus sp.	0	1	0	1	0.3	0.6	1.1	0- 1.8	4	2.2	90.9
8.	Cerebratulus sp.	0	1	0	1	0.3	0.6	1.1	0- 1.8	4	2.2	93.1
9.	Mulinia lateralis	1	0	0	1	0.3	0.6	1.1	0- 1.8	4	2.2	95.3
10.	Lumbrineris fragilis	1	0	0	1	0.3	0.6	1.1	0- 1.8	4	2.2	97.5
11.	Pectinaria (gouldii)	0	1	0	1	0.3	0.6	1.1	0- 1.8	4	2.2	99.7
	TOTAL	17	20	8	45	15.0	6.2	2.6	0-30.4			
	TOTAL # OF SPP PER DREDGE	6	7	2	11	5.0	2.6		0-11.6			
	SPECIES DIVERSITY (H')	1.49	1.15	0.38	3.02	1.01	0.57					
	EQUITABILITY (J')	0.83	0.59	0.54	1.96	0.65	0.16					

TOTAL # OF INDIVIDUALS THIS STATION = 45

TABLE I-8

DAMOS BENTHOS - TABLE OF NUMERIC DENSITY DATA

CAR & WLIS REFERENCE STATION - 12 APRIL 1978

PREDOMINANT SPECIES	DREDGE NUMBER #1	#2	#3	TOTAL	MEAN	STANDARD DEVIATION	COEFF. OF DISPERSICN	95 PERCENT CONF. LIMITS OF MEAN	NUMERIC RANK	% OF TOTAL	CUMUL. % OF TOTAL
1. Nephythys incisa	26	10	20	56	18.7	8.1	3.5	0-38.8	1	70.9	70.9
2. Euclymene collaris	1	3	0	4	1.3	1.5	1.8	0- 5.0	2	5.1	76.0
3. Nassarius tribittatus	0	0	3	3	1.0	1.7	3.0	0- 5.2	3	3.8	79.8
4. Macoma sp.	0	0	3	3	1.0	1.7	3.0	0- 5.2	3	3.8	83.6
5. Pherusa affinia	0	1	2	3	1.0	1.0	1.0	0- 3.5	3	3.8	87.4
6. Cerianthus sp.	0	2	0	2	0.7	1.2	1.9	0- 3.7	4	2.5	89.9
7. Clymenella zonalis	0	1	1	2	0.7	0.6	0.5	0- 2.2	4	2.5	92.4
TOTAL	27	17	29	73	24.3	6.4	1.7	8.4-40.2			
TOTAL # OF SPP PER DREDGE	5	6	7	13	6.0	1.0		3.5- 8.5			
SPECIES DIVERSITY (H')	0.58	1.35	1.24	3.17	1.06	0.42					
EQUITABILITY (J')	0.36	0.75	0.64	1.75	0.58	0.20					

TOTAL # OF INDIVIDUALS THIS STATION = 79

TABLE I-9

LOBSTER CATCH DATA FOR 1977

Conn. Dept. Environmental Protection, Logbock Statistics

% of N. Y. and Conn. Catch From Areas Within L. I. S.		% of N. Y. and Conn. Catch Landed At Larger Conn. Ports	
Western Sound		Greenwich	2.3
Conn. 40.81. N. Y. 3.59		Stanford	6.4
		Darien	4.7
		Norwalk	7.1
		Westport	1.3
		Fairfield	0.7
		Bridgeport	10.6
		Stratford	0.2
Central Sound		Milford	1.3
Conn. 18.61 N. Y. 0.55		West Haven	0.1
		New Haven	8.3
		East Haven	0.1
		Bramford	3.6
		Gilford	0.7
		Madison	0.3
		Clinton	2.6
		Westbrook	1.7
		Saybrook	0.5
Eastern Sound		Old Lyne	0.2
Conn. 8.15 N. Y. 21.77		Waterford	0.7
		New London	0.6
		Groton	16.0
		Noank	1.1
		Stonington	6.5

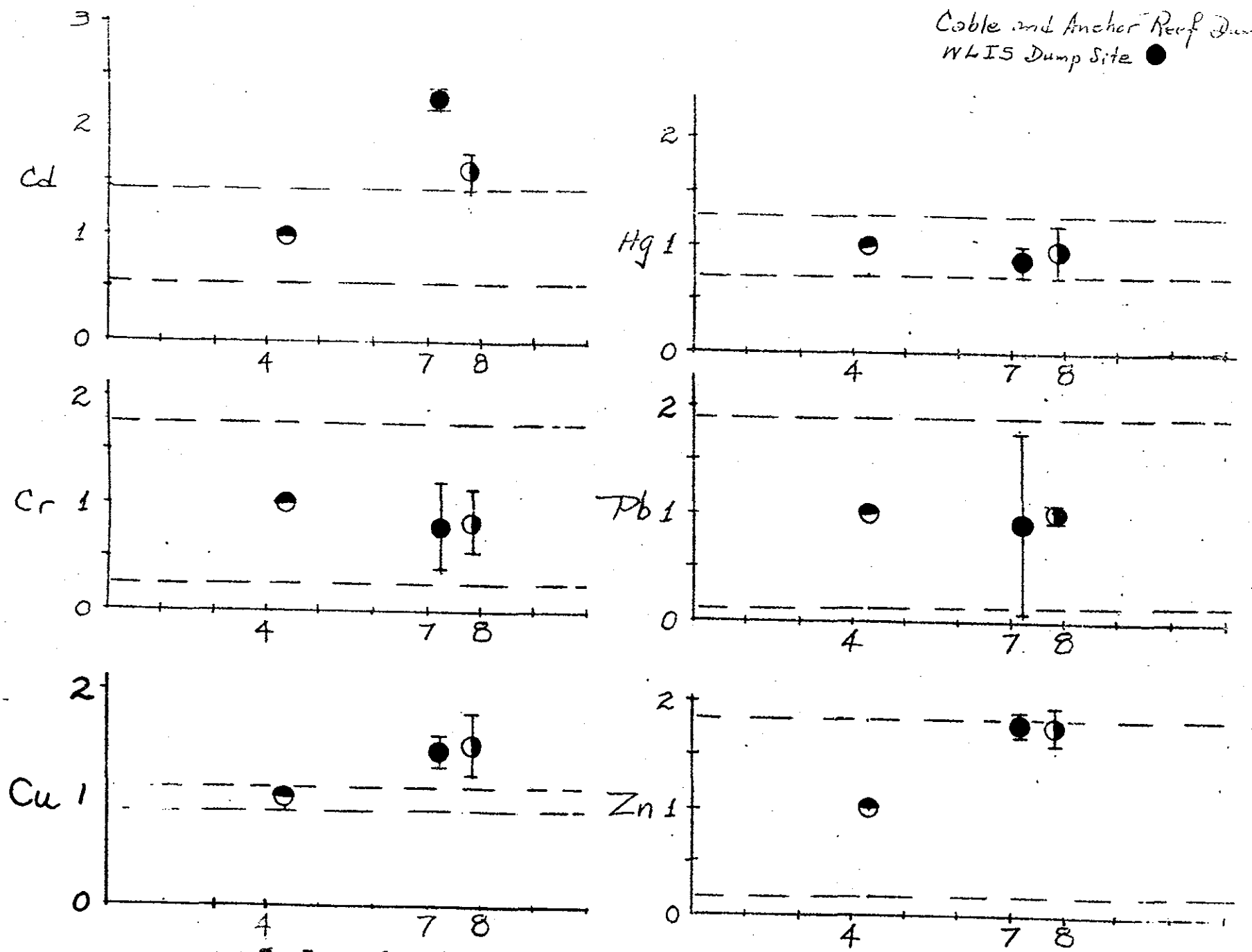
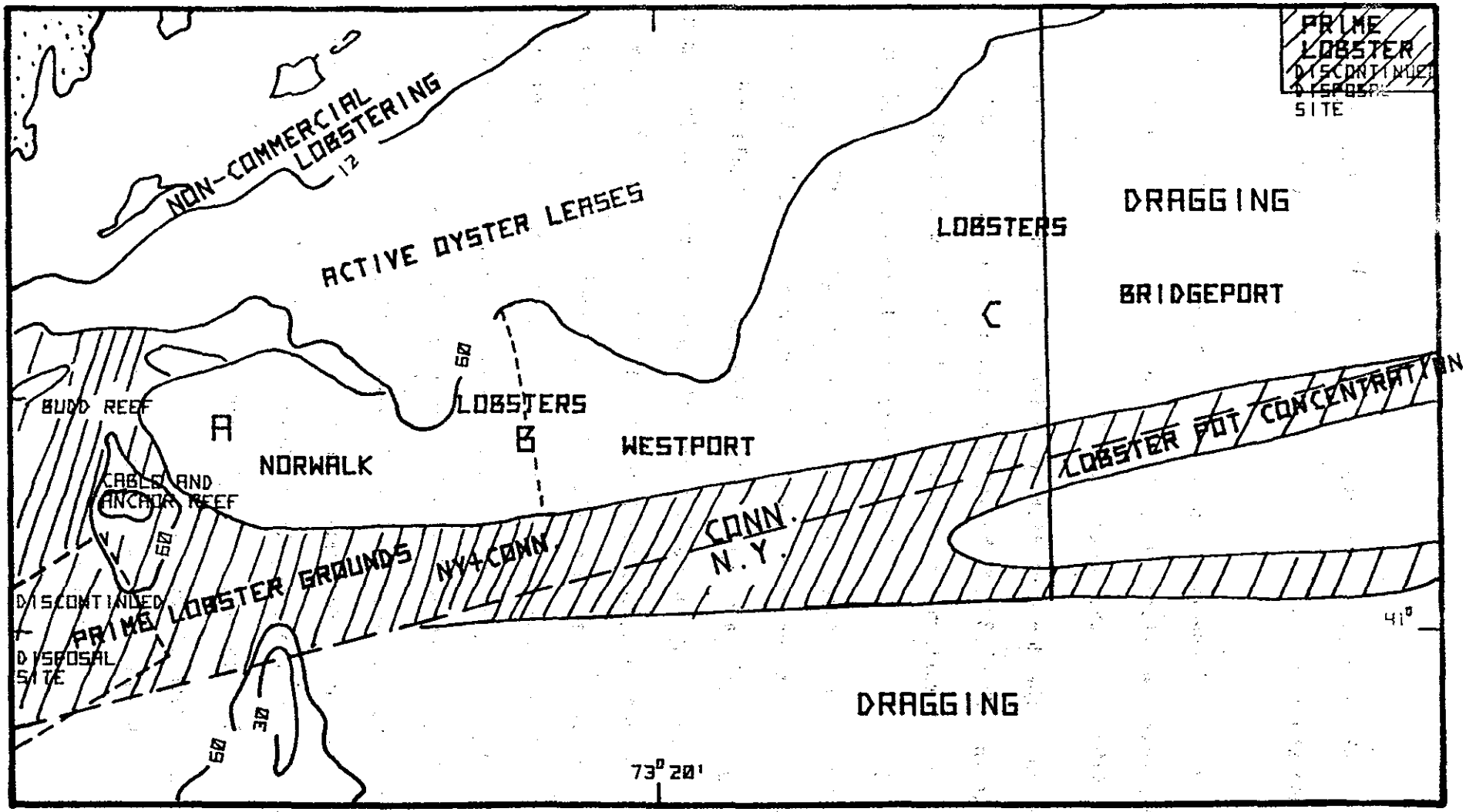


Fig. 5. Temporal variation in the ratios of heavy metals in Mytilus edulis from Latimer's Light (◐) deployed at WLIS (●) and Cable and Anchor Reef (◐) disposal site.

I-10



FISHERIES IN WESTERN LONG ISLAND SOUND

This report is based on field observations in August, 1978 and interviews with 4 lobstermen and should be considered as a "first pass" to be expanded and corrected.

In September, 1978 the Connecticut Commercial Fisherman's Association was formed. It is hoped that the existance of this group will help in assembling information on the fisheries of the Western Sound.

Fisheries. Lobstering is the dominant fishery in the area under consideration. Table H-9 shows that in 1977 41.8% of the lobsters caught in the Sound came from a relatively small area of western Connecticut (Fig. I-11). The adjacent NY area yielded only 3.6% of the catch. Although there are large lobster landings at Northport N.Y., most of this catch is also from Connecticut waters.

The following annual pattern of fishing was described by Norwalk lobstermen: In March, fishing begins in the area between the 20 meter line and Cable and Anchor Reef. During late spring and early summer the gear is spread to the limit of Norwalk grounds east and west, between 2 meters and the N.Y. line. Pots are relatively heavy at the Eatons Neck dump site, Cable and Anchor Reef, Budd Reef, and along the 20 meter line. Gear may be placed in the deep channel east of the dump site in August. N.Y. fishermen may fish this channel from spring on, however.

Cobb et al (1978) mapped lobstering grounds near the Eatons Neck dump site from observations made from November to June, 1974-75. Heavy pot densities were found in the disposal ground in the summer. In the winter there were fewer pots, but these were found east of Cable and Anchor Reef. Travel samples taken by Cobb et al showed a similar movement in lobster densities in the valley east of the dump site which were seen in August, 1978. This map can be interpreted as showing the pattern of the New York-based fishery and the absence of near shore populations off New York in the winter.

Penfield Reef dumping ground in the northeast corner of the map, has been a prime lobstering ground since its use was discontinued. A fisherman who fishes the area extensively reported that he lost gear during the last disposal project there and that catches were low in the area until the year following its use.

Details of lobstering effort have not yet been obtained for areas east of the area fished by Norwalk vessels. Concentration of gear on the edges of the central valley of the Sound has been reported. There may be advantages to a disposal site in areas "B" or "C" (Fig. I-11). The very productive grounds at the Eatons Neck dump site and the deep channel are avoided and the greater area fished would allow adjustments to be made away from the site when active. The current measurements and background measurements of metals "in" blue mussels being made in area "A" by DAMOS should be applicable to the general area.

Finfish. Cobb et al (1978) also collected bottom fish at three stations monthly from November to June. They found 37 species, but 3 species dominated the catches. Windowpane flounder and winter flounder were found throughout the year, but were most abundant in April and January respectively. Red hake were abundant in June especially east of the disposal site.

Commercial dragging is limited by the density of lobster pots in this area. There is a tow path from the Eatons Neck dump site 5 miles west to Buoy "32". Dragging is done in New York water south of 41° latitude and east of a line about 7 miles east of Cable and Anchor Reef.

The fall scup fishery is the most intense. There may be fish on or off the bottom depending on the level of the fish. Bottom fishing may also catch lobsters.

Oysters. The areas being studied lie seaward of hard bottomed areas used for oyster mariculture. Leases as deep as 40-50 feet are active (H. Bloom, Norwalk). Oyster set was very successful throughout Long Island Sound in 1978.

Ocean Quahog. The ocean quahog (Arctica Islandica) can be found in this area but there is no chance that it will be of commercial value in the study site due to the depth and nearly rocky bottoms. Much more favorable grounds are found off Massachusetts and Rhode Island (20-40 meters deep). These areas can easily saturate the market and the fishery has been barely economically viable in the last year.