SCIENCE APPLICATIONS, INC.

INTERIM SURVEY OF WESTERN LONG ISLAND SOUND III DISPOSAL SITE

CONTRIBUTION #18

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TABLE OF CONTENTS

1.0 Introduction

2.0 Vertical Depth Profiles

3.0 Sediment Sampling

4.0 Visual Observations

5.0 Summary

LIST OF FIGURES

1.0-1 Western Long Island Sound III NOS Chart 12363

2.0-1 Vertical depth profile transects

2.0-2 Depth profile #1

2.0-3 Depth profile #2

2.0-4 Depth profile #3

2.0-5 Depth profile #4

2.0-6 Depth profile #5

2.0-7 Depth profile #6

2.0-8 Depth profile #7

LIST OF TABLES

3.0-1 Heavy Metal Concentrations in Sediments from WLIS Disposal Site

3.0-2 Comparison of Heavy Metal Concentrations from Bulk Sediment Analysis

4.0-1 DAMOS Diver Monitoring Log

Appendix A - Visual Observations

INTERIM SURVEY OF WLIS III DISPOSAL SITE

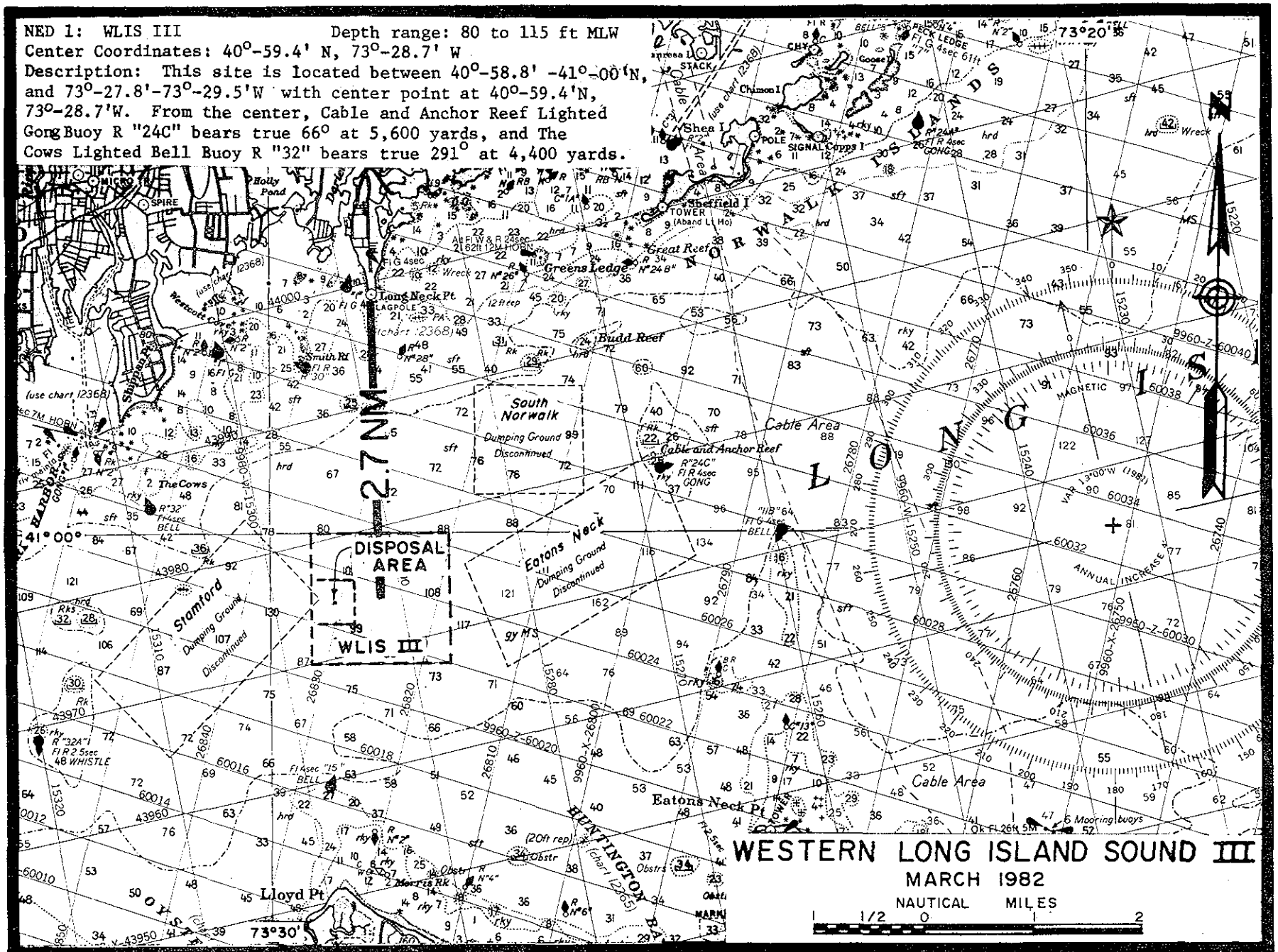
1.0 INTRODUCTION

On 23 April 1982, DAMOS personnel conducted a brief inspection survey of the Western Long Island Sound WLIS III disposal site in order to assess the impacts of permit disposal of dredged material at the recently designated dumping location (Fig. 1.0-1). Following installation of a taut wire disposal buoy at 40° 59.34'N, 73° 29.21'W on 19 March, 1982, dredged material primarily from Mamaroneck Harbor had been dumped on a daily basis. The intermim inspection survey consisted of depth profiles obtained in the vicinity of the disposal point, sediment samples taken south of the buoy and visual observations obtained by divers. Further, more extensive, monitoring studies are planned as part of the DAMOS program and will be conducted in June following cessation of dumping for the summer months.

2.0 VERTICAL DEPTH PROFILES

A series of vertical depth profiles were made in the vicinity of the disposal buoy consisting of five east-west transects and two north-south transects as shown in Figure 2.0-1. Navigation control was provided by calibrated Loran-C and depth measurements were made with the 24 KHz EDO fathometer used on all DAMOS surveys. The transects ranged approximately 400 meters east and west of the disposal buoy at distances north and south of the buoy as follows:

NED 1: WLIS III Depth range: 80 to 115 ft MLW
Center Coordinates: 40°-59.4' N, 73°-28.7' W
Description: This site is located between 40°-58.8' -41°-00'N, and 73°-27.8'-73°-29.5'W with center point at 40°-59.4'N, 73°-28.7'W. From the center, Cable and Anchor Reef Lighted Gong Buoy R "24C" bears true 66° at 5,600 yards, and The Cows Lighted Bell Buoy R "32" bears true 291° at 4,400 yards.



Ref. N.O.S. CHART 12363, Jan. 1981

WLIS III JAN82 CHART SCALE: 1/4000

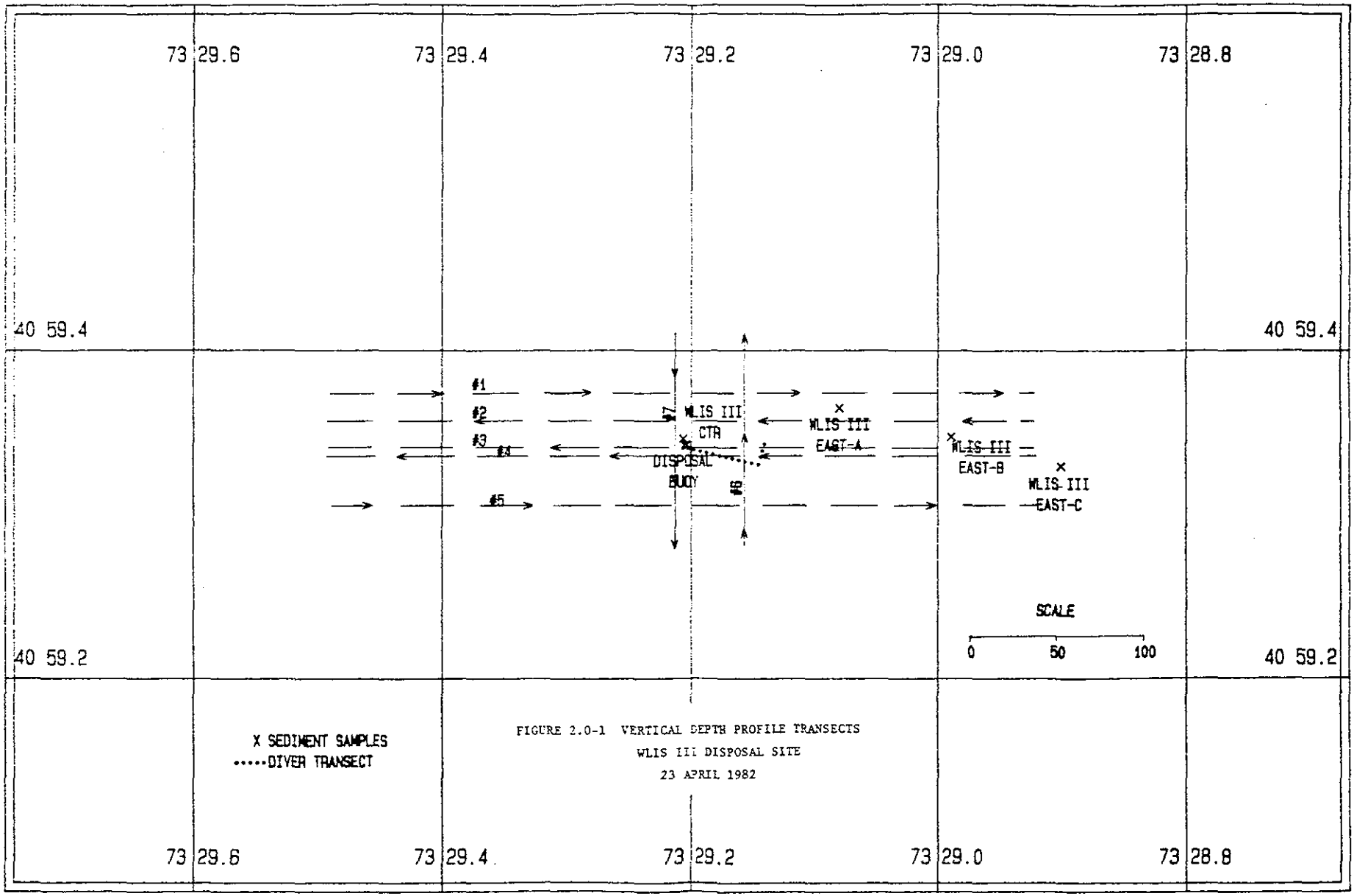


FIGURE 2.0-1 VERTICAL DEPTH PROFILE TRANSECTS
WLIS III DISPOSAL SITE
23 APRIL 1982

Profile	1	50m north
	2	20m north
	3	10m south
	4	20m south
	5	75m south

The two north south profiles were made 10 meters west and 70 meters east of the buoy.

Results of the profile measurements are presented in Figures 2.0-2 through 2.0-8. In general, the data indicate that the dredged material has formed a distinct mound immediately south and east of the disposal buoy with maximum thickness approaching 4 meters on profile 3. The mound has a radius of approximately 100 meters in the east west direction, and somewhat less than 50 meters in the north south direction.

This topography closely resembles the features created by point dumping at the Central Long Island Sound (CLIS) Disposal Site and indicates that the disposal operation has been successful in controlling the spread of material. Creation of a mound such as shown in these profiles reduces the amount of sediment exposed to the biota and water column and the area of the bottom impacted by the dumping operation. Furthermore, the formation of a mound indicates that the sediments being dredged are cohesive and consequently should be more resistant to erosion and dispersion.

An interesting feature was observed in Profile 2 (Fig. 2.0-3) approximately 200m east of the buoy. This feature is approximately 5 meters high, but shows vertical sides indicating it may be a wreck or other man made object. Side scan or diver observations will be used to investigate this formation during a future survey.

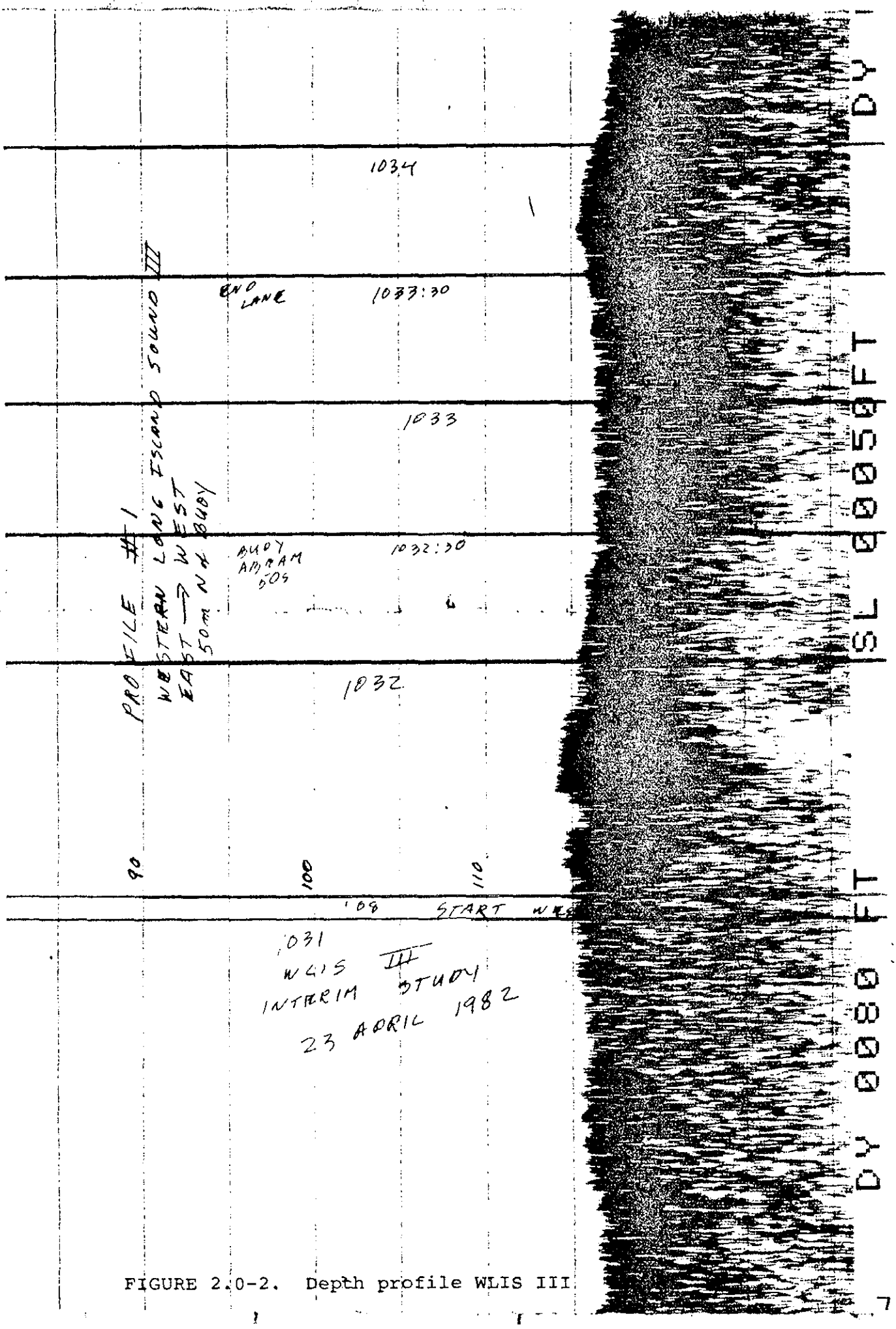


FIGURE 2.0-2. Depth profile WLIS III

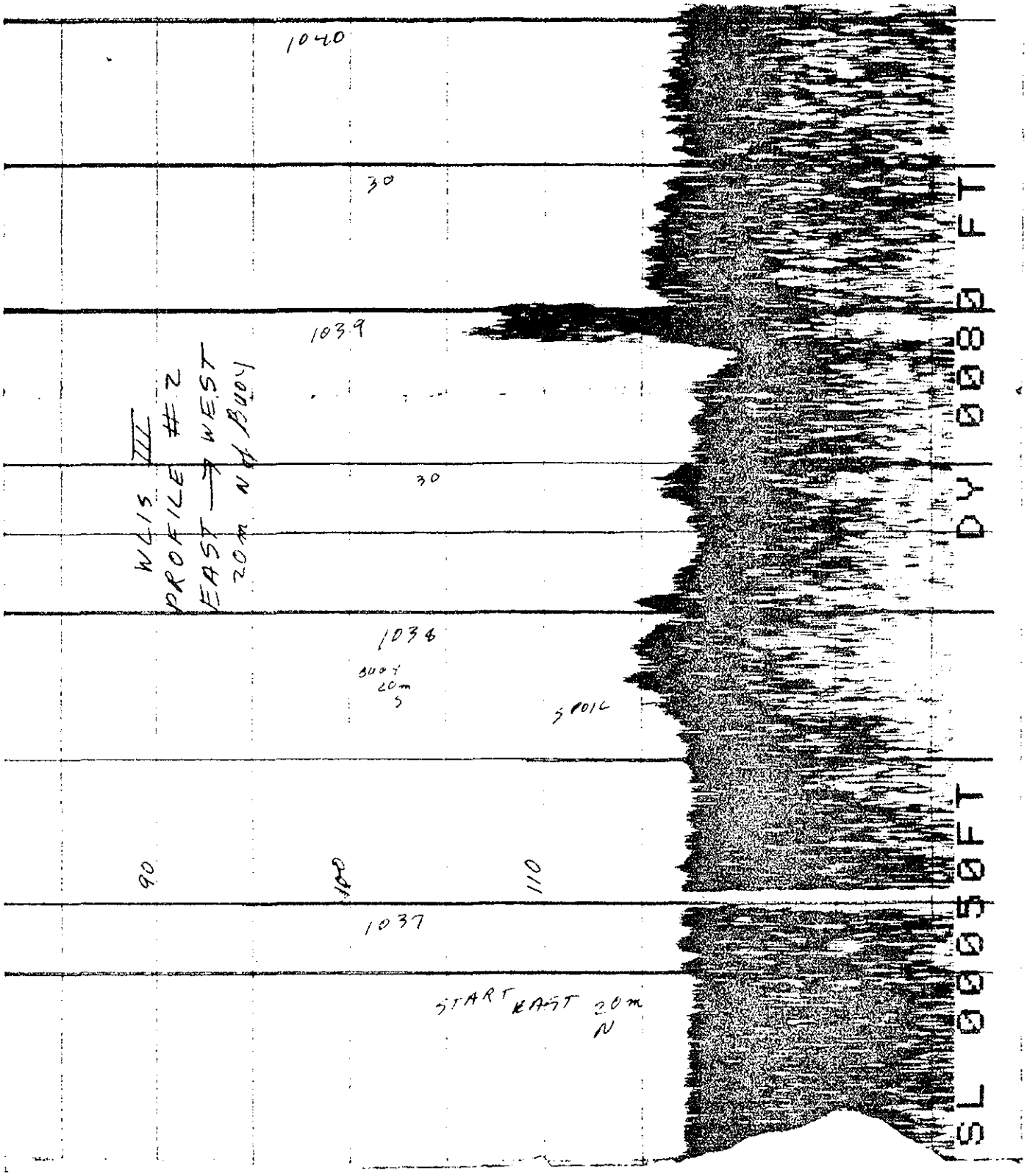


FIGURE 2.0-3. Depth profile WLIS III

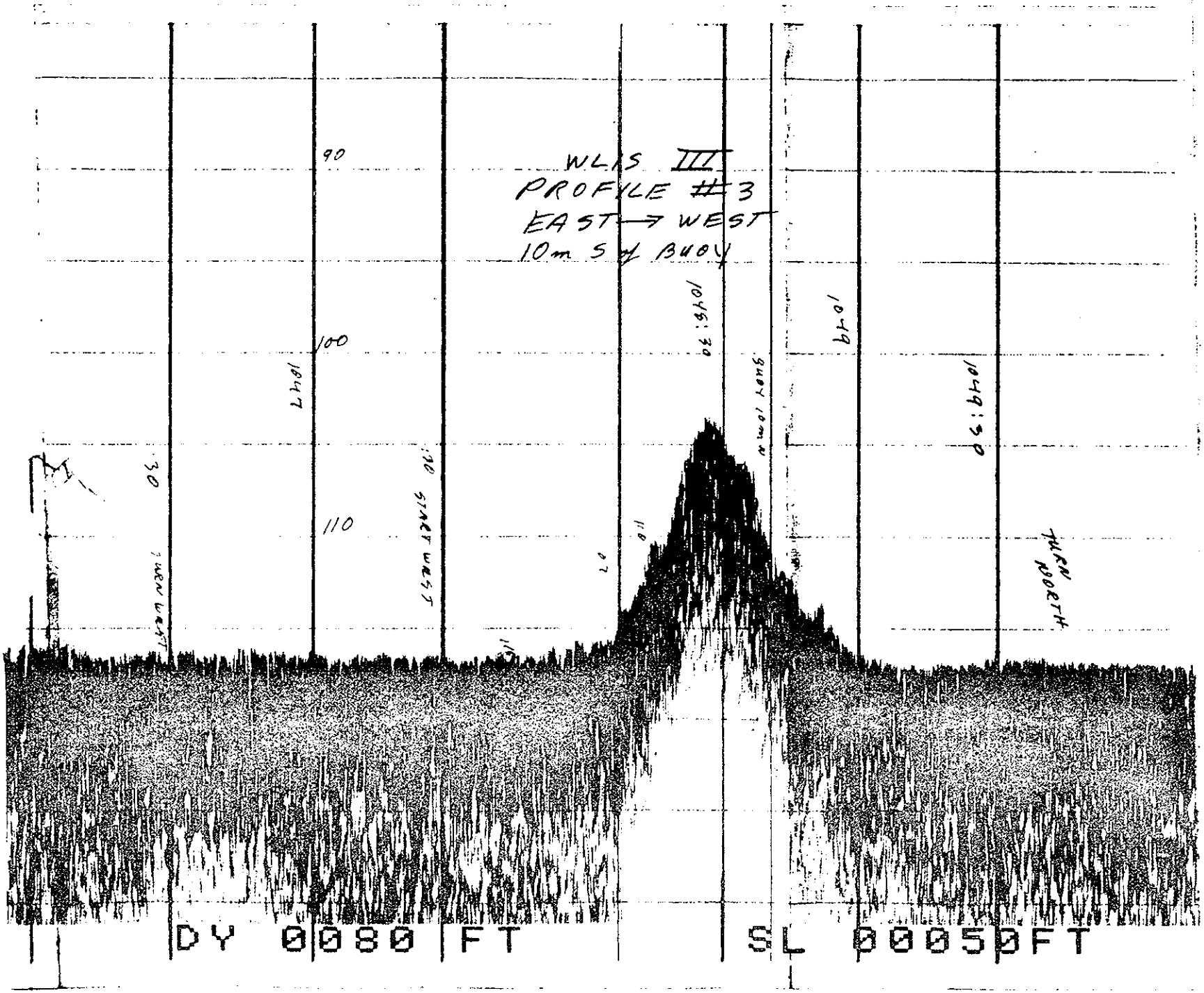
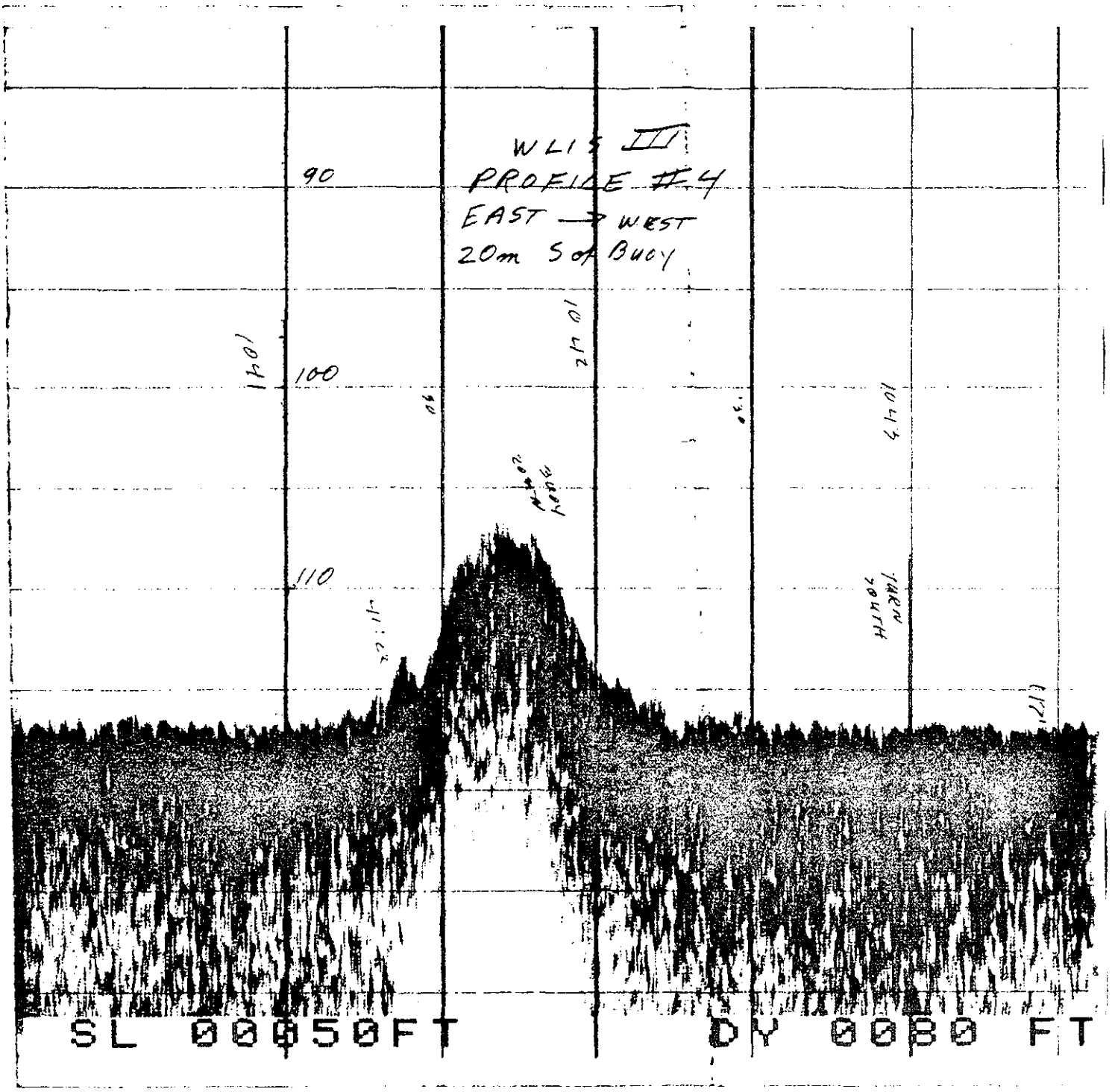


FIGURE 2.0-4. Depth profile WLIS III



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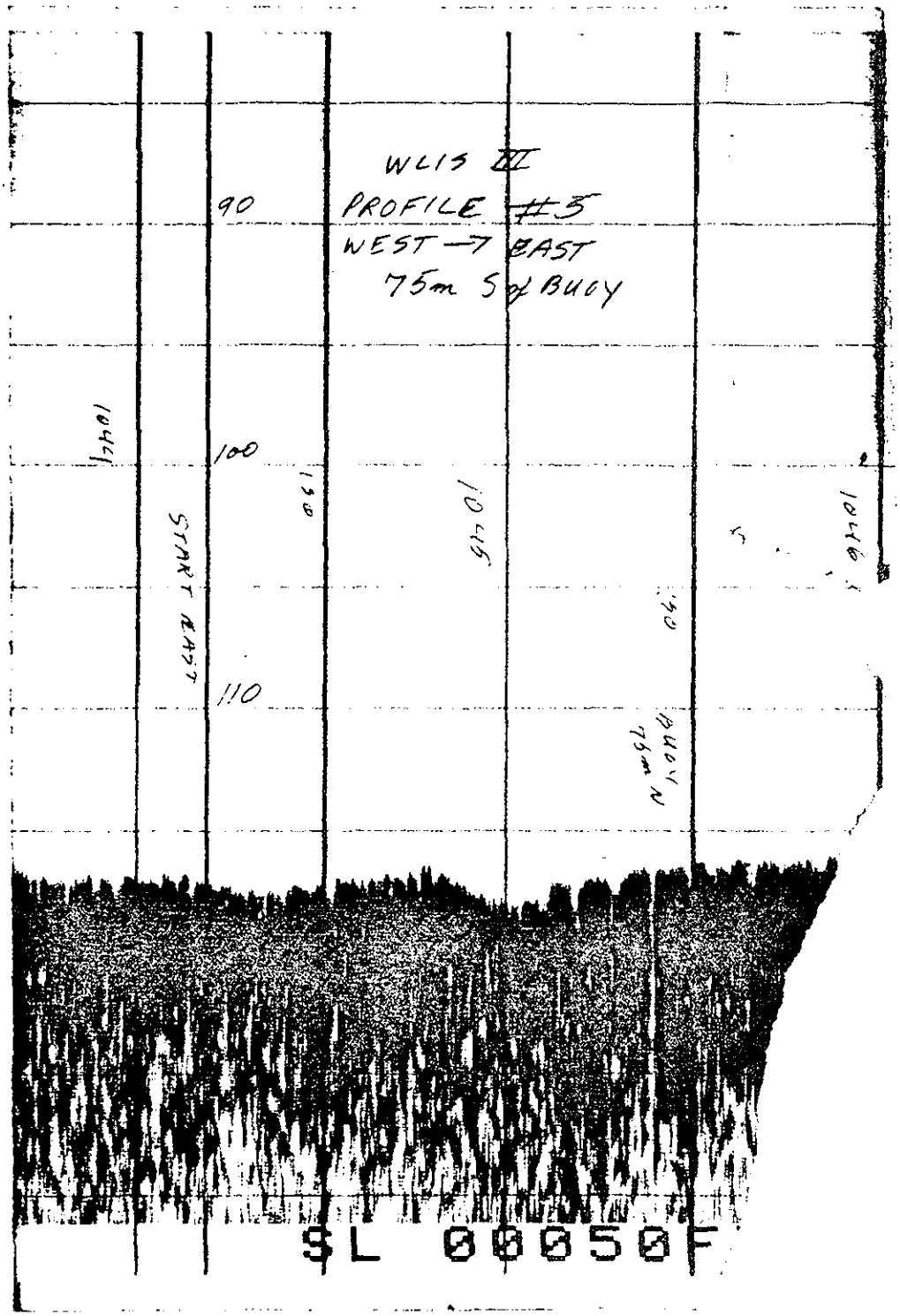

FIGURE 2.0-6. Depth profile WLIS III

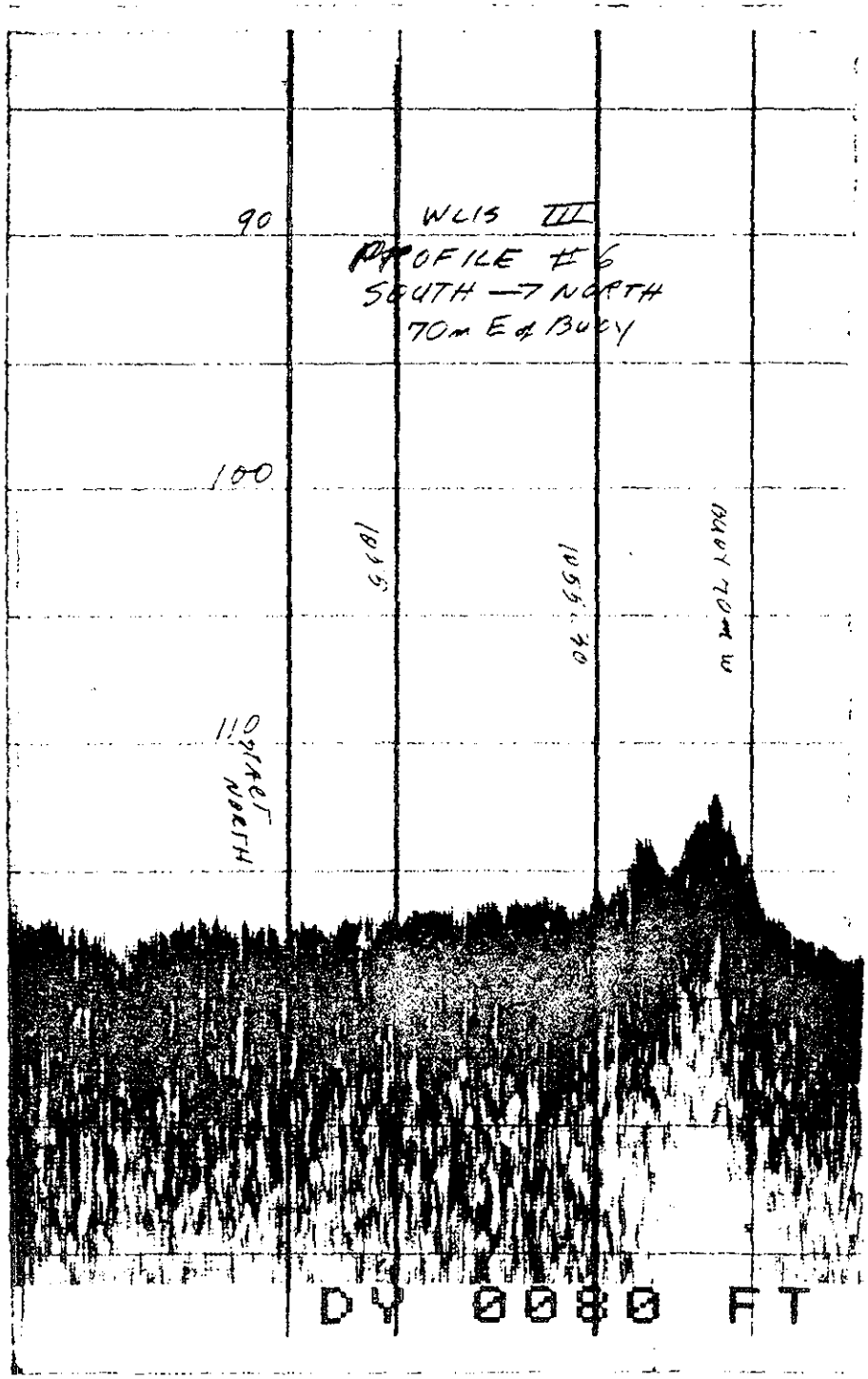

FIGURE 2.0-7. Depth profile WLIS III

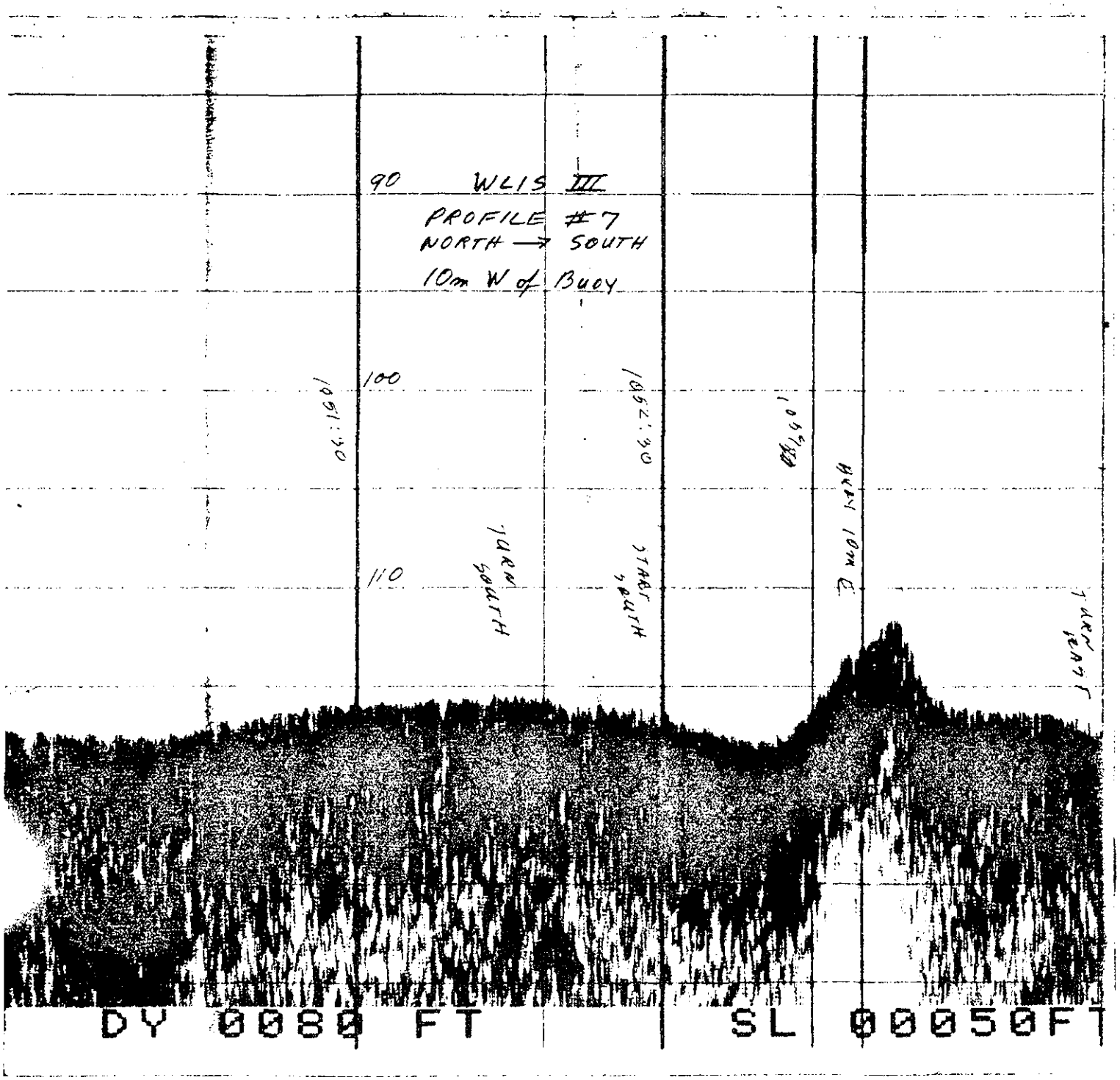

FIGURE 2.0-8. Depth profile WLIS III

3.0 SEDIMENT SAMPLING

Three sediment samples were obtained for bulk sediment chemical analyses from the dredged material immediately south of the buoy and at three locations east of the site beyond the margin of current disposal operations. The dredged material was a light grey cohesive clay sediment, with a thin layer of fine black silt intermixed between the clay modules.

The samples taken east of the site were similar to previous samples obtained prior to disposal consisting primarily of a dark grey organic silt with a higher water content than the current dredged material. This silt is overlaid by a thin oxidized silt layer and some small shell hash on the sediment surface.

Bulk sediment analysis of heavy metal content (Table 3.0-1) indicated that the disposed dredge material had metal concentrations on the order of background levels but with higher variability. Two of the three samples from the center of the site had relatively low metal concentrations while the third was substantially higher than background. Such high variability is characteristic of disposed dredge material, however, all levels seem quite low when compared with disposal operations at the Central Long Island Sound Disposal Site. For example, copper concentrations from Stamford dredged material were on the order of 5-600 ppm, while New Haven silts were between 1 and 200 ppm.

The samples taken east of the disposal site were much less variable and were approximately the same level of concentration as baseline sediments obtained in January, 1982.

SAMPLE NUMBER	STATION	DATE OBTAINED	OIL AND GREASE	PERCENT SOLIDS	PERCENT VOLITILE SOLIDS-NED	PERCENT VOLITILE SOLIDS-EPA	HG	PB	ZN	AS	CD	CR	CU	NI	V	COD
2082	WLIS-CTR-A	4/23/82	73	45.5	4.31	6.29	.04	72	79	3.8	3	42	35	42	100	71000
2083	WLIS-CTR-B	4/23/82	42	46.8	4.13	6.09	.04	75	69	4.1	3	36	30	40	100	71000
2084	WLIS-CTR-C	4/23/82	840	40.7	6.27	8.91	.42	157	310	3.6	3	65	175	48	100	100000
2086	WLIS-EAST-A	4/23/82	440	31.7	5.64	8.84	.11	117	219	5.8	3	86	118	53	100	71000
2087	WLIS-EAST-B	4/23/82	330	36.1	4.48	7.96	.04	38	219	4.0	3	29	89	47	100	75000
2088	WLIS-EAST-C	4/23/82	560	30.3	5.80	8.88	.04	125	210	3.8	3	87	113	49	100	83000

TABLE 3.0-1. Heavy Metal Concentrations in Sediments from Western Long Island Sound Disposal Site.

VALUES IN PARTS PER MILLION (PPM)

A comparison of concentration data from the interim survey with heavy metal concentrations from previous sources is presented in Table 3.0-2. Although only a small number of samples are available, first indications are that the changes in heavy metal concentrations throughout the disposal site should be negligible.

4.0 VISUAL OBSERVATIONS

Based upon the results of the depth profiles described in Section 2.0, an east-southeasterly inspection dive from the area of the disposal buoy was considered most appropriate relative to predicted current dispersion vectors in the direction toward the Cable and Anchor Reef lobster ground. Direct observation and photography were obtained on a diver transect from the buoy base in an east-southeasterly direction (50m) and then north along the pile (20-30m) providing a visual assessment of benthic conditions (Fig. 2.0-1).

The one month old dredged material pile revealed less verticle microtopographic relief (.5m) over the surface than previously inspected sites in shallower water (i.e. New London and CLIS). Observations indicated the dredged material may have been more highly compacted (dense) than the natural deposited sediment at the site, and on disposal, may have settled deeper into the soft natural sediments. A distinct border region could be detected by divers after the disappearance of small grey clay fragments. This periphery zone was followed north (20m) on the inspection dive. Similar to the CLIS site, a light brown (1 cm deep) nepheloid layer had migrated up onto the pile and was evident in the interspaces between protruding clay masses and organic debris.

	WLIS III EIS	CLIS DAMOS '79	WLIS	WLIS III DISPOSAL POINT	WLISIII POST-DISPOSAL	WLIS III POST DISPOSAL EAST TRANSECT
Hg	.26	.26	.09	.02	.17	.06
Pb	41	44	56	70	101	93
Zn	117	134	150	230	153	213
Cr	63	40	71	79	48	67
Cu	73	51	76	121	80	107

TABLE 3.0-2. Comparison of Heavy Metal Concentrations from Bulk Sediment Analysis (all values = mean ppm)

A continuous, undisturbed flat "suspension" nepheloid layer was characteristic of the adjacent natural bottom sediment. Detailed diver descriptions are presented on the DAMOS diver monitoring log attached (Fig. 4.0-1).

A series of underwater photographs were taken along the course of the east and north transect legs. These photos (App. A) document surface sediment conditions and densities of organims noted on the dive.

5.0 SUMMARY

The results of this interim survey indicate that disposal operations at WLIS III have been conducted successfully to date and that a small compact mound of dredged material has been created. The properties of the dredged material, particularly the cohesive nature of the gray clay sediment, combined with the management and operational procedures used at this site, have generated the expected results which should create a stable deposit and would not have significant impacts beyond the immediate area of disposal. Further monitoring will be conducted to insure that no further impacts occur.

D.A.M.O.S. DIVER MONITORING LOG

DATE: 23 April 82 **LOCATION:** WLIS III R/V Schock (U.R.I.)

DIVERS: Stewart, DeGoursey **TIME:** 1114-1129 **DEPTH:** 118' **T°C:** **VISIBILITY:** 2 m

DIVE (in/out Loran C):
at buoy → east 20 m then N on spoil
edge surfaced ~ 30 m NOS of buoy

DISPOSAL or REFERENCE BUOY L/C:
WLIS buoy = 26830.6
III 43975.0

I. OBSERVATIONS:

A. BENTHIC CONDITIONS (PHYSICAL) - Bottom current vel. and direction, turbidity, sediment grain size, neffloid layer, surface features (composition), shell hash (% cover), topography (slope/contour/ apron), compaction, bioturbation, perimeter Loran C.

Slack high, 0 kt. current slight start ebb W-E, no evident turbidity. Clay clump diam~10 cm - 75 cm spaced 1-4 m apart, soft interspace spoil, patchy light brown nepheloid layer throughout spoil relief (low 5 cm - .25 cm height clumps). High organic (upland debris): leaf, phragmites, Spartina, peat components. Relict shell-Crassostrea white bleached condition, Mya (live specimen diver collected). Mulinia/Gemma valves incorporated in surficial spoil. Gradual slope to SE (toward 120' depth) grading rapidly to flat, soft natural bottom. Recent spoil condition - faceted fractures of cohesive clay.

B. (BIOLOGICAL) - Diver species count, densities (est. no.) photo log nos., spoil/organism dynamics, behavior, transect observations (on/off) difference, biogenic sediment structures (burrows, tubes, tracks, casts, etc.).

On spoil: Few megabenthic species on spoil. Snails dominant - (2 sps) Nassarius obsoletus, N. trivattatus est. (~10-20 m^2) ubiquitous, numerous interlaced mucal trails over new spoil surface.
(2) Pseudo americanus (buried to indetectable level).
(6) lobster and/or crab tracks, no live specimens observed.

At border: No evidence of small clay (10 cm diam) fragments, epibenthic sample = (1) Squilla cast tail section. (1) Totoga onitus (12 cm) dormant, resting at clay mound base.

Off spoil: Very flat featureless bottom, less compact (diver sense) than spoil, .5 - 1 cm surficial nepheloid layer with numerous mucal trails interlaced.

Photos R.D. 3:1 Nikonos (1-9)
L.S. Canon - (#1-22) Surface sediment conditions; evident invasion species.

II. DISCRETE SAMPLES OR METHODS:

X **A. Epibenthic net (~~30~~ 15 sec. traverse): on or off spoil, target specie** at periphery in E direction

X **B. .25 m^2 quadrant count/photography.** 18 Nassarius (sp) actively grazing.

____ **C. Penetrometer tests, elevation stake readings, sediment trap.**

____ **D. Mussel deployment - bioaccumulation subsample.**

____ **E. Sonic beacon placement or electrolyte change.**

____ **F. Remote bathymetric camera photos.**

____ **G. Video tape (location, time min. run, tape index).**

X **H. Opportunistic collection (i.e. natural mussel bed, Corymorpha Axius).** Squilla cast tail section.

TABLE 4.0-1

APPENDIX A

Western Long Island Sound III
Dredge Disposal Site.
Diver Inspection and Photography at Interim Stage
23 April 1982

The following prints of selected underwater slides represent a series taken on the Western Long Island III ocean disposal site (Southeast sector), 23 April 1982. The sequence starts with Figure 1, at the WLIS buoy base and proceeds across recent dredged material to the east-southeast periphery and natural sediment border. Descriptions of each photo provide an observational assessment of benthic conditions existing at this time.

Figure 1. Surface texture typical of cohesive clay mound protruding from soft interspace dredge material. Note evidence of Zostera blades at base and to lee of mound. Horizontal Field of View (HFV) = 9 cm.

Figure 2. Marsh reed, Phragmites, stalks incorporated in clay material, peat fragments, and high organic debris were characteristics of the disposal pile. HFV = 7 cm.

Figure 3. Faceted clay surfaces provide entrapment crevices for nephaloid layer material. Two Nassarius graze the upper mound surface. A Mercenaria valve shows in left background. HFV = 20 cm.

Figure 4. Granular, flocculant nature of natural nephaloid layer is illustrated in close-up photo within depression zones of spoil surface. HFV = 12 cm.

Figure 5. Several observations of live transplanted coastal zone mollusks were noted in observational transects. A live transplanted Mercenaria protrudes from dredge material, Nassarius traverse the upper left. Also, noted were live Mya individuals. HFV = 9 cm.

Figure 6. Shell fragments were often bleached white and did not reveal discolorations indicative of origin from H_2S or petroleum contaminate zones. The overlay of the light-brown nephaloid veneer is evident in this photo, as in previous prints. HFV = 7 cm.

Figure 7. Typical dredge sediment surface conditions - small clay clusters, marsh vegetation, Nassarius presence, and the natural suspension nephaloid layer. HFV - 10 cm.

Figure 8. Periphery (east southeast border 50 m from buoy) margins were distinct. The undisturbed flat sediment veneer of natural bottom directly abuted the dredge pile. Mucal tracks of Nassarius created an interlaced pattern on natural bottom. HFV - 15 cm.

Figure 9. Numerous contagious concentrations of Nassarius and Mulinia valve patches were typical of natural bottom along the border region. HFV = 25 cm.

Figure 10. The tautog, Tautoga onitus (30cm t.l.) was observed in overwintering dormant state at the base of a border region clay mound. HFV = 40 cm.

Figure 11. Close-up anterior photo of the dormant tautog revealed the vascularized fin condition and evidence of immobility (accumulation of tidal-flux nephaloid layer over tautog exterior). HFV = 10 cm.

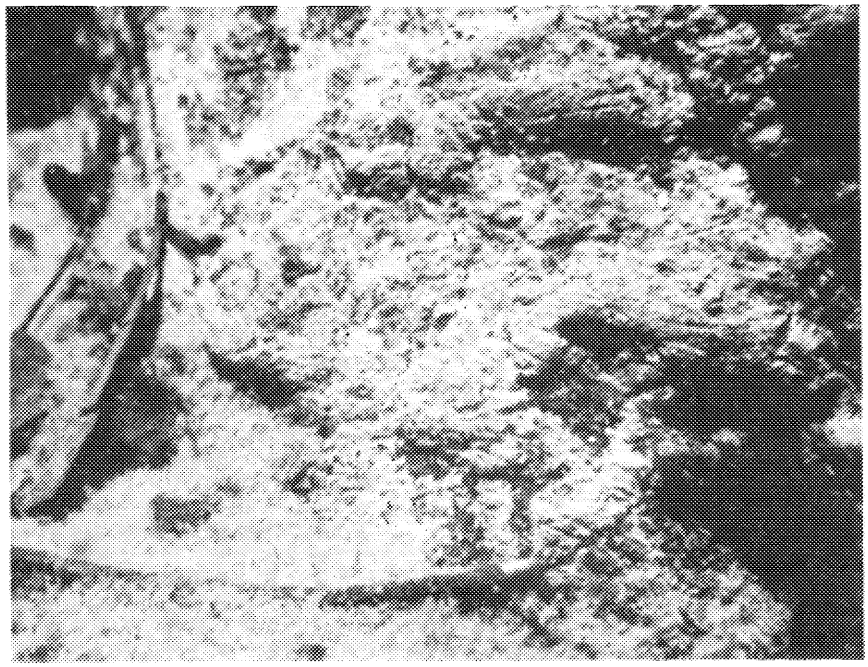

Fig. 1.

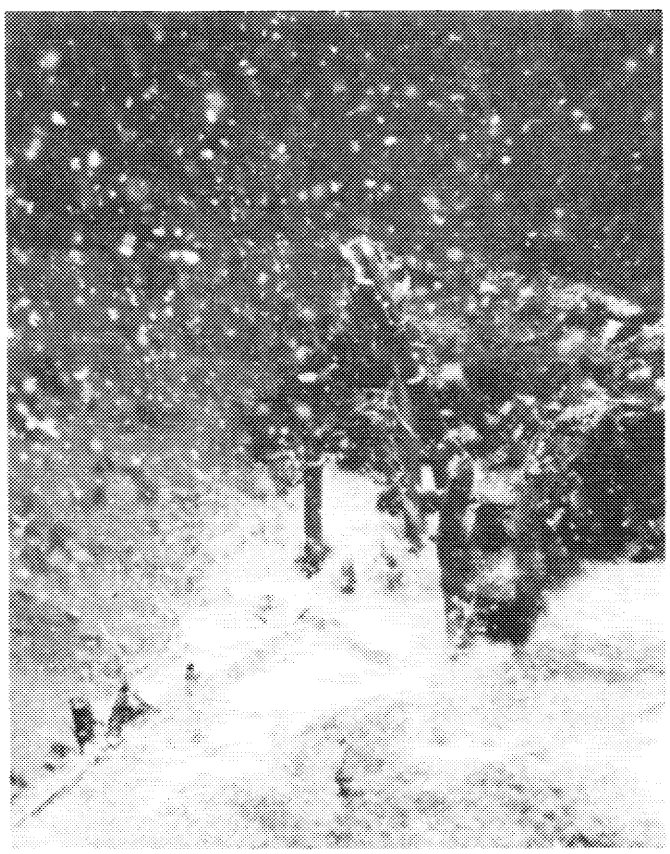

Fig. 2.

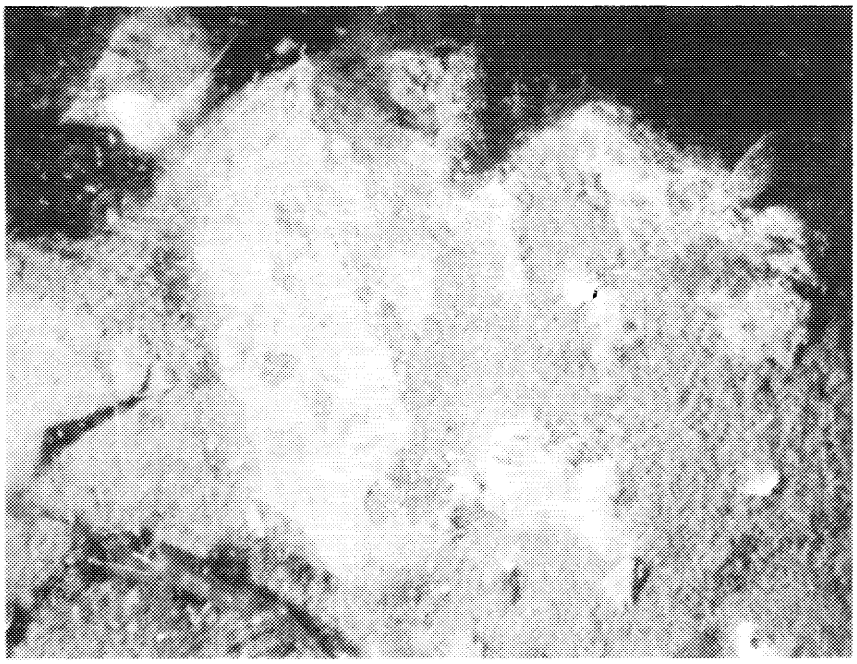

Fig. 3.

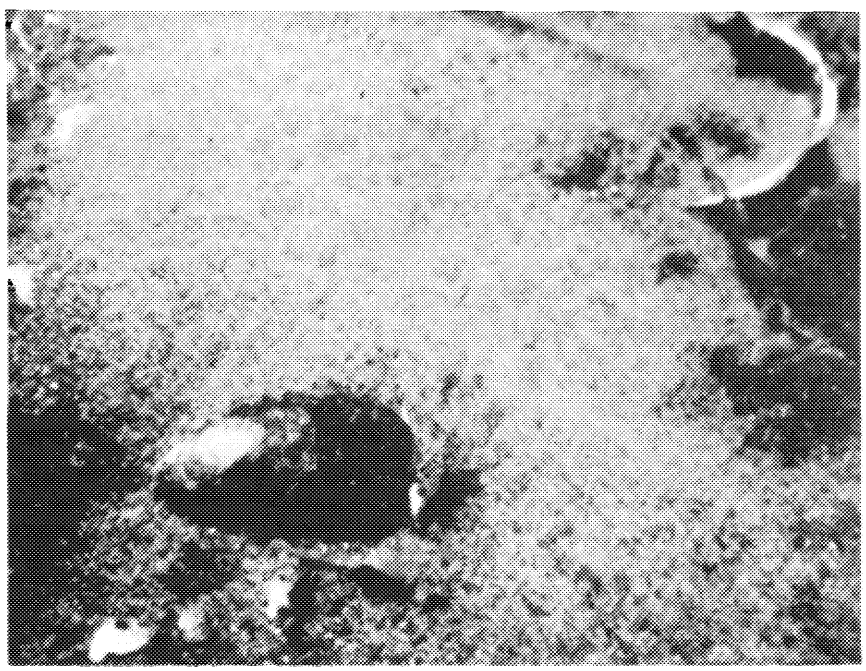

Fig. 4.

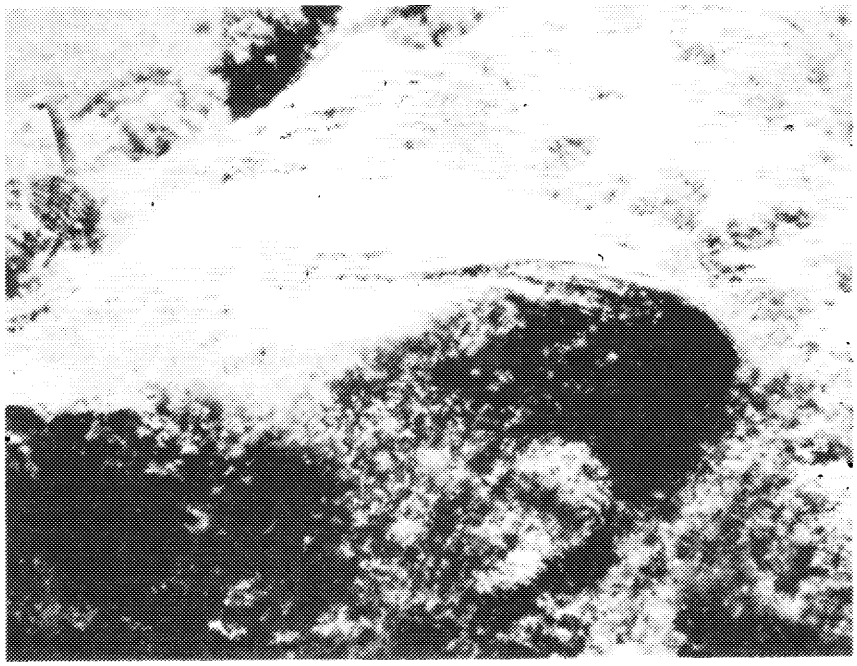

Fig. 5.

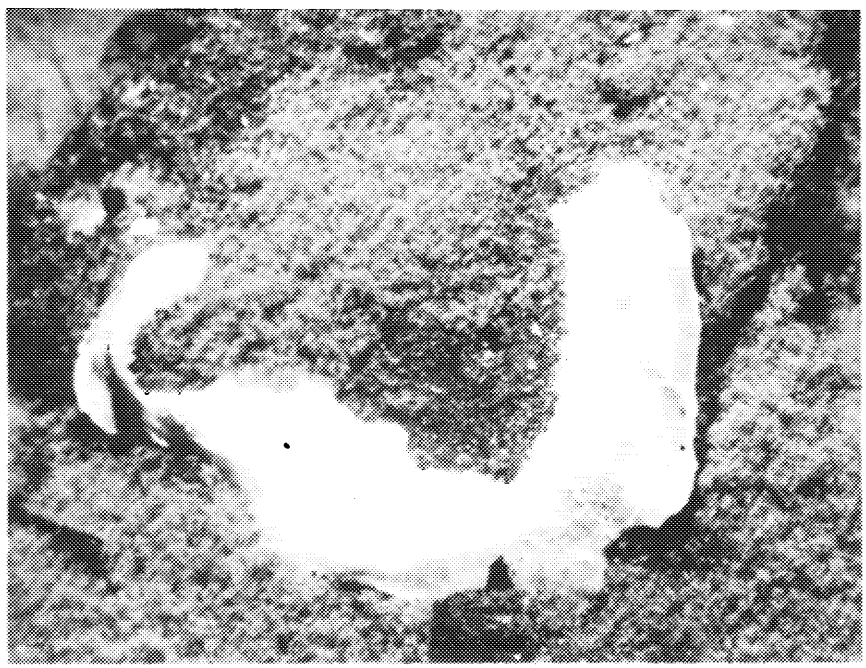

Fig. 6.

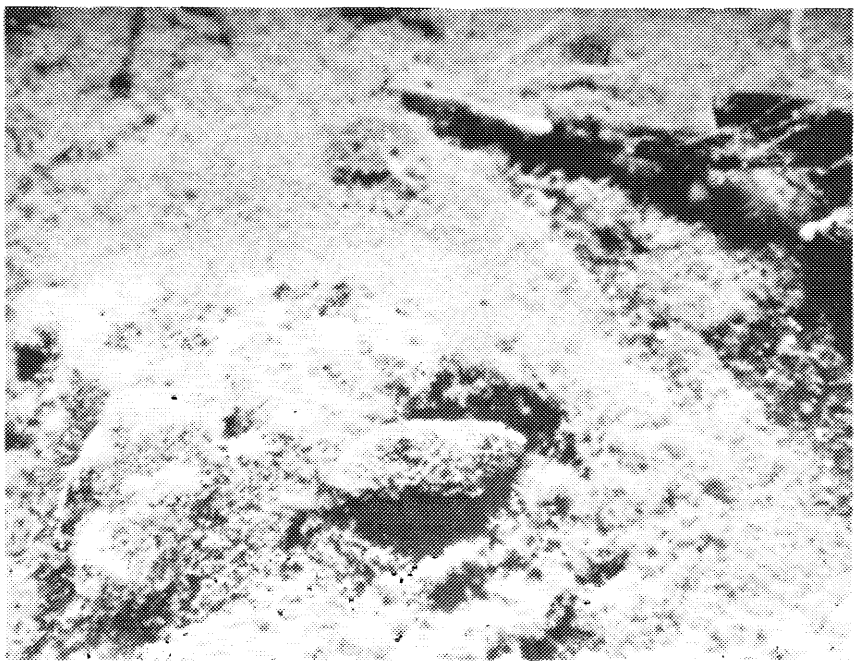

Fig. 7.

Fig. 8.

Fig. 9.

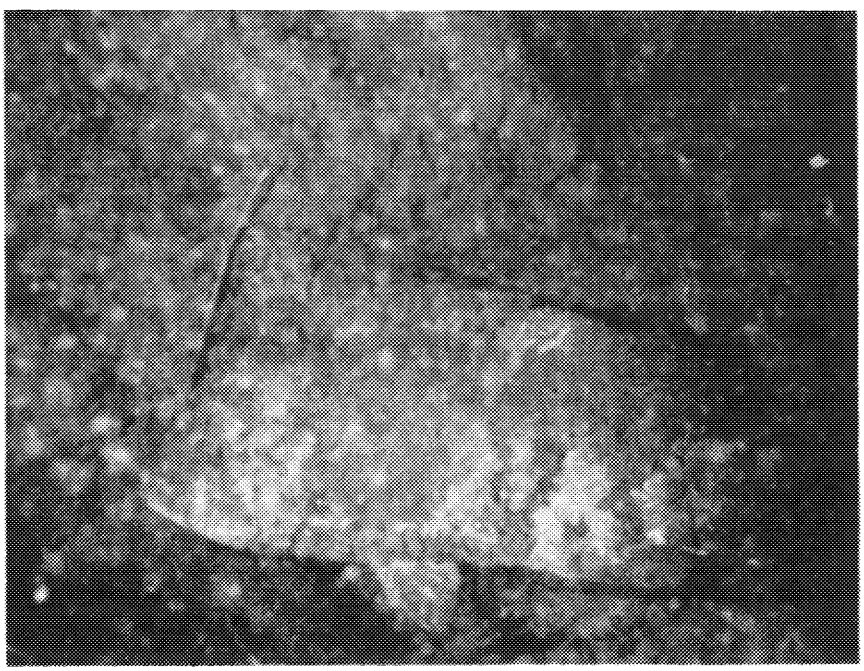

Fig. 10.

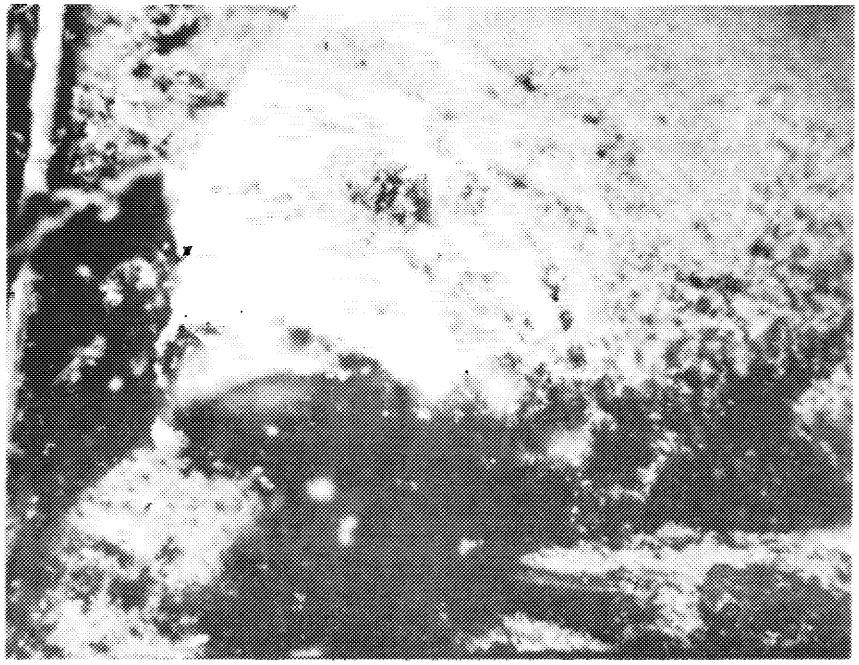

Fig. 11.