NOAA Data Report OMPA-12

# MESA NEW YORK BIGHT PROJECT

# TRACE METAL DATA:

# EXPANDED WATER COLUMN CHARACTERIZATION

# CRUISES XWCC-12, 13, 15, AND 16

# NOAA SHIP GEORGE B. KELEZ

# 1977

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## DISCLAIMER

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## ABSTRACT

Total dissolved trace metal data from samples collected in the New York Bight during Extended Water Column Characterization (XWCC) Cruises in April, June, August, and October 1977 are reported. During the August cruise, an anomalous cell of surface water with high concentrations of trace metals was observed just south of the Bight Apex, extending for approximately 40 nautical miles. This cell could be the result of acid-waste dumping in the area, combined with a steady southwest flow of surface water.

# 1. INTRODUCTION

This is a chemistry data report on the NOAA Marine Ecosystem Analysis (MESA) Program's New York Bight Project Water Column Characterization (WCC) and Expanded Water Column Characterization (XWCC) cruises (Cantillo et al., 1976). In 1977, five cruises were conducted by personnel from NOAA's Atlantic Oceanographic and Meteorological Laboratories (AOML), Miami, Florida, aboard the NOAA Ship GEORGE B. KELEZ. During four of these cruises, seawater samples were collected and analyzed for certain dissolved trace metals. The cruises were designated XWCC numbers 12, 13, 15, and 16. The area of investigation and the station positions are given in Figure I and Table V, respectively. The dates of the cruises are given in Tables I through IV. Water sampling was performed simultaneously with collection of physical oceanographic data used to define the density structure of the water column. The physical oceanographic and nutrient data from the cruises have been reported elsewhere (Hazelworth et al., 1977, 1978a,b,c).

# 2. FIELD PROCEDURES AND LABORATORY ANALYSES

Not all stations of the XWCC grid were occupied during each cruise. For information concerning specific cruise tracks, CSTD profiles, nutrients, and dissolved oxygen data, see Hazelworth (1977, 1978a,b,c). Sampling operations continued on a 24-hour basis until all stations were occupied or the cruise was terminated due to adverse conditions.

At each station, continuous vertical profiles of temperature, salinity, conductivity, transmissivity, and dissolved oxygen were obtained using an Interocean CSTD. Seawater samples were collected at discrete depths for various analyses using specially designed 2.5-liter GO-FLO Niskin bottles mounted on a rosette multi-sampling device. These bottles, made of polyvinyl chloride (PVC), are metal free. Special precautions were taken to eliminate contamination of the samples arising from ship maneuvers or procedures performed while on board the ship.

After recovery of the rosette, the sampling bottles were taken to a constant temperature laboratory van equipped with special air filtration units. Immediately after drawing dissolved oxygen samples, the trace metal samples were collected by pressurizing the sampling bottle with nitrogen gas and attaching an acid-washed Millipore filter holder with a 0.45 μm pore size Nuclepore filter to the stopcock of the bottle. After allowing approximately 100 ml of seawater to flow, in order to rinse the filter assembly, the filtered seawater was collected directly into a 125-ml acid-cleaned, linear-polyethylene bottle. The filtered seawater was acidified with 100 ml of silica-redistilled, concentrated nitric acid and stored for later analysis at AOML in Miami. All the Nuclepore filters were "pre-loaded" into the acid-cleaned filter heads, on board ship, in an enclosed portion of the laboratory-van that was equipped with air filters and a positive air-flow system to minimize airborne particles. After use, the filter holders were rinsed with deionized distilled water (Millipore Super-Q high-purity water, 18 megohm-centimeter resistivity level) and reloaded with new filters using plastic tweezers.

The acidified, filtered seawater samples were analyzed for total dissolved Fe, Mn, Cu, Cd, and Zn by the method of Segar and Cantillo (1975), using a Perkin-Elmer Atomic Absorption Spectrophotometer Model 503 equipped with a Heated Graphite Atomizer HGA 2100, an AS-1 Automatic Injection System, and a Deuterium Arc Background Corrector. To minimize matrix effects, all standards were prepared by dilution of Alfa Inorganics Ventron primary standards with acidified, filtered, surface Gulf Stream seawater. The approximate detection limits of the analyses of dissolved trace metals in seawater were as follows: Fe, 0.4 μg/l; Mn, 0.3 μg/l; Cu, 0.5 μg/l; Cd, 0.01 μg/l; and Zn, 0.01 μg/l. The precision of the analyses varied, but was always better than ± 10 percent for concentrations in excess of 10 times the detection limit. Analyses were completed within three months after collection.

## 3. DISCUSSION

The first cruise, XWCC-12, took place from April 28 to May 6, 1977. Due to malfunction of the rosette, only five stations were sampled for trace metals. The results of these analyses are reported in Table I. No conclusions could be reached, based on this data set.

The following cruise, XWCC-13, took place from May 31 to June 7, 1977; the complete station grid was occupied. The GO-FLO Niskin bottles misfired sporadically during this cruise, so 1.7 l Niskin bottles were used to replace all bottles except for the one bottle fired at the bottom; therefore, not all stations were sampled at all depths for trace metals. The results of the trace metal analyses are listed in Table II. During the cruise, a sharp thermocline was present, with surface temperatures ranging from 14 to 15¼C, and bottom temperatures from 6 to 8¼C. The surface salinity distribution indicates that the Hudson River plume did not extend much past the Apex of the Middle Atlantic Bight (MAB), and was close to the New Jersey coast (Figure 2). An apparent intrusion of slope water, characterized by high salinity values, was observed along the shelf break, near stations 146 and 156. The distribution of bottom dissolved oxygen shows an area of low values, between 4 and 5 ml/l, near the New Jersey coast. The concentration of dissolved oxygen in this area continued to decrease during the rest of the summer (Figure 3).

The bottom distributions of total dissolved Mn, Fe, Cu, Cd, and Zn for XWCC-13 are shown in Figures 4a-e. Total dissolved Fe is significantly higher in the Apex and along the New Jersey coast than in the rest of the MAB. This higher concentration was observed in the area that had slightly lower dissolved oxygen values. Both Mn and Zn, and to a lesser extent Cd, are high in the deeper water at the shelf break of the southern-most two transects. This correlates well with the high-salinity shelf water intrusion. There is little evidence of input of total dissolved Cu or Cd into the Apex during the cruise. Total dissolved Zn concentrations are only moderately high. Cells of water with high concentrations of trace metals continue to be observed in the

MAB. Although some may be artifacts of the sampling and analytical procedures, especially if the cell is characterized by only one sample, others encompass two or more high values, and so appear to be real. It is important to realize that Figures 4a-e show bottom sample values, and not values at a common depth or sigma-t surface. This is an important consideration; e.g., the value of 20 μg/l Mn at station 79 makes more sense when we note in Table II that stations 68, 69, 113, and 114 all have similarly high values at ~ 50 m. On the other hand, the Cu value of 39 μg/l at station 39 is isolated and, therefore, subject to suspicion. Further work on the extent and lifetime of these cells, as well as work on the speciation of the metals within the cells, is necessary before their presence can be explained.

The vertical distribution of trace metals from the Apex along the Hudson Shelf Valley to the shelf break shows clearly the river input of trace metals into the MAB (Figures 5a-e). As the river water mixes with seawater, the concentrations of total dissolved Mn and Fe decrease. At station 26, at the exit of the Estuary, surface values of total dissolved Mn and Fe are 32 and 168 μg/l, respectively, whereas at station 7, surface values are 17 and 104 μg/l. The concentrations continue to decrease with increasing distance from shore. Total dissolved Mn and Fe appear slightly higher on the surface and at the bottom near the Apex. Total dissolved Cu is low except for isolated cells with high concentrations. These have been observed before (Segar and Cantillo, 1976) and no explanation is available at the present time. Cadmium concentrations seem relatively uniform throughout the shelf valley with no obvious input from the Estuary.

Due to repeated failures of the GO-FLO bottles, no surface samples were obtained for trace metal analyses during XWCC-13; therefore, no surface distributions are available.

The next cruise, for which trace metal data are available, took place August 1-9, 1977 (XWCC-15). The complete station grid was occupied and trace metal samples were obtained for all stations, resulting in the most extensive data set for 1977 (Table III). At that time, stratification of the water column continued, with surface temperatures ranging from 18-24¼C, and bottom values from 8-14¼C. The salinity distribution indicates that the Hudson-Raritan River plume had some effect on the water column along the New Jersey coast. The intrusion of shelf water was again observed, at the southeast portion of the grid, near station 146 and, to a lesser extent, at stations 32 and 57 to the northeast (Figure 6). Bottom dissolved oxygen values show the presence of a narrow band of low oxygen, ranging between 1-4 ml/l, along the New Jersey coast (Figure 7). As indicated above, these two features were also observed during XWCC-13, earlier in the year.

Surface distributions of total dissolved Mn, Fe, Cu, Cd, and Zn (Figure 8a-e) show an area of anomalously high values that appears to extend from just south of the Apex to about latitude 30¼N. However, in the cases of Mn, Fe, Cu, and Zn, the contours drawn are highly dpendent on one extremely high value for each metal at the surface of station 84. Without these single-point, high values, the surface distributions appear to be close to "background" levels for the rest of the Bight. If real, this feature could be the result of an acid dump, spread southward by the steady flow of surface water in that direction. This is consistent with flow patterns observed at that time, i.e., a steady flow of surface water to the southwest (Han, personal communication) at about 6 cm/second. Due to the presence of the strong thermocline, between 15 and 20 meters, anomalous high concentrations in surface waters did not mix into the lower layer of the water column and the bottom distributions of the dissolved trace metals do not show this cell (Figure 9a-e). As observed in previous years (Segar and Cantillo, 1976; Atwood et al., 1978), areas of low bottom oxygen content have higher bottom concentrations of total dissolved Mn. None of the other four trace metals has a distribution similar to Mn. Total dissolved Fe is unusually high in the northern half of the MAB near the Long Island coast, throughout the water column. The distribution of Cu, Cd, and Zn show great variability at the bottom and no obvious distribution patterns.

To illustrate the effect of the thermocline on vertical distributions of trace metals near the anomalous water cell, the temperature profile and the trace metal distribution in the water column are shown in Figures 10a-f. A strong thermocline is present at approximately 15 m. The five trace metals do not show high concentrations at the thermocline, although they do so above and below it. It is also evident from these distributions that little, if any, vertical mixing of the anomalous cell has occurred. The vertical distributions along the axis of the anomalous cell are shown in Figures 11a-e, further illustrating this point.

The last cruise, XWCC-16, was October 6-12, 1977. Due to adverse weather conditions, only part of the station grid was sampled. At that time, the shallow stations were isothermal, while those in the vicinity of the Hudson Shelf Valley still had a thermocline. The bottom dissolved oxygen values increased after the passage of the storm. Because of the sparse quality of the data in space and time, and the effect of the storms on the water column, little can be said about the trace metal distribution at this time.

## 4. ACKNOWLEDGMENTS

The authors wish to express their thanks to the officers and crew of the NOAA Ship GEORGE B. KELEZ, under Commander Michael Kawka, for the long and patient hours dedicated to collecting the data.

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# 6. FIGURES

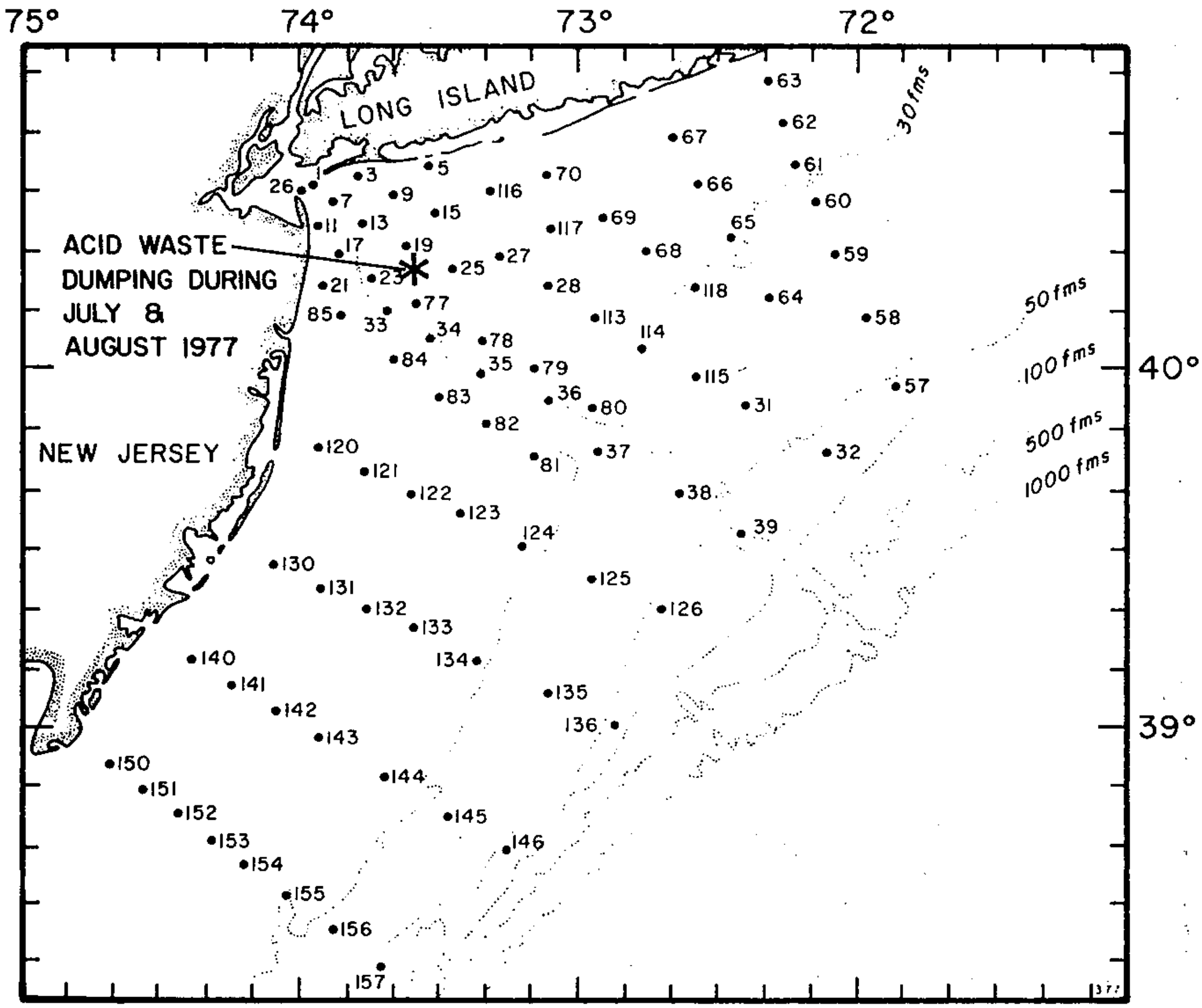



Figure 1. Sample grid for MESA XWCC cruises in 1977.

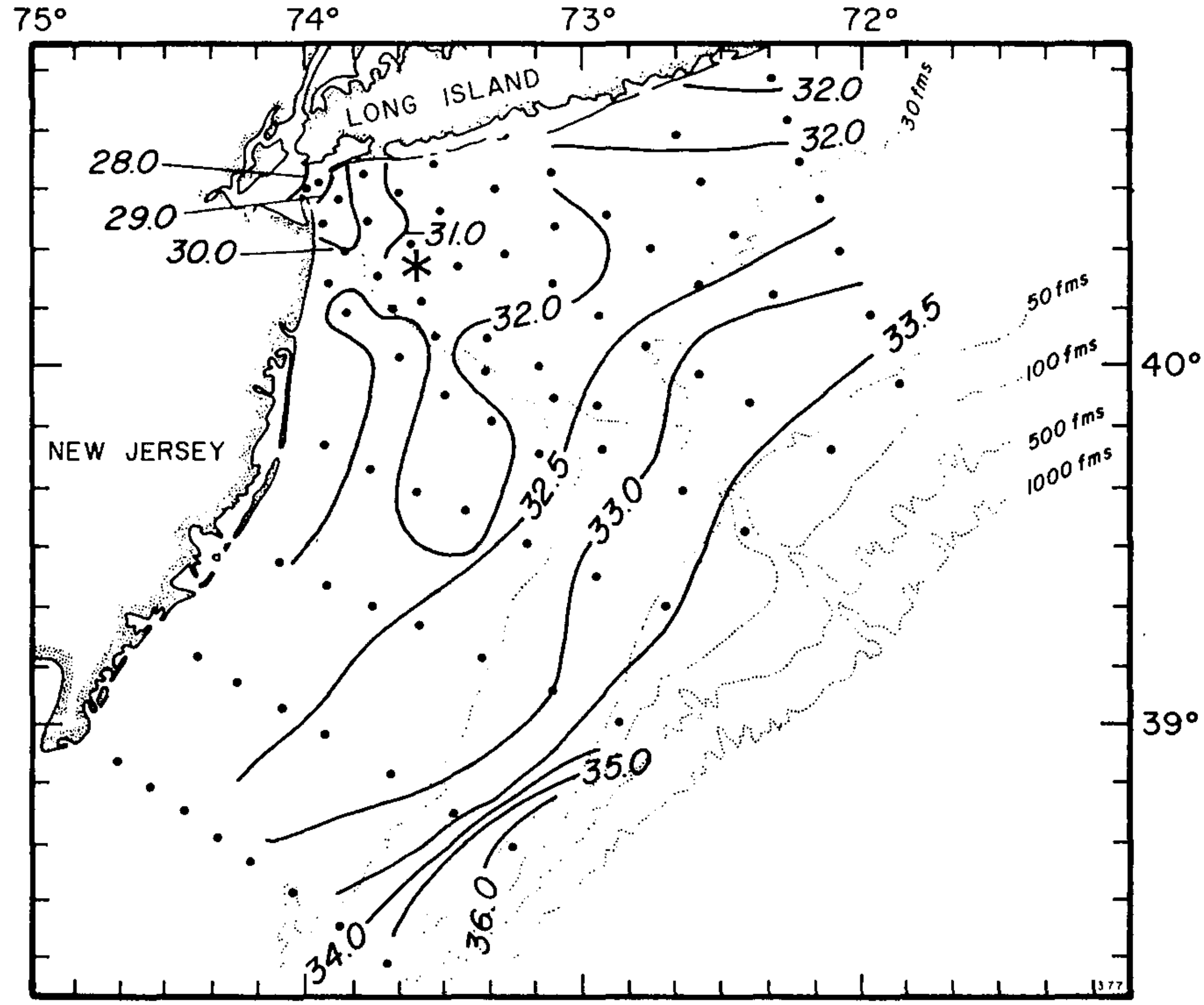



Figure 2. Distribution of corrected surface salinities ($^{0}/oo$) for XWCC-13.

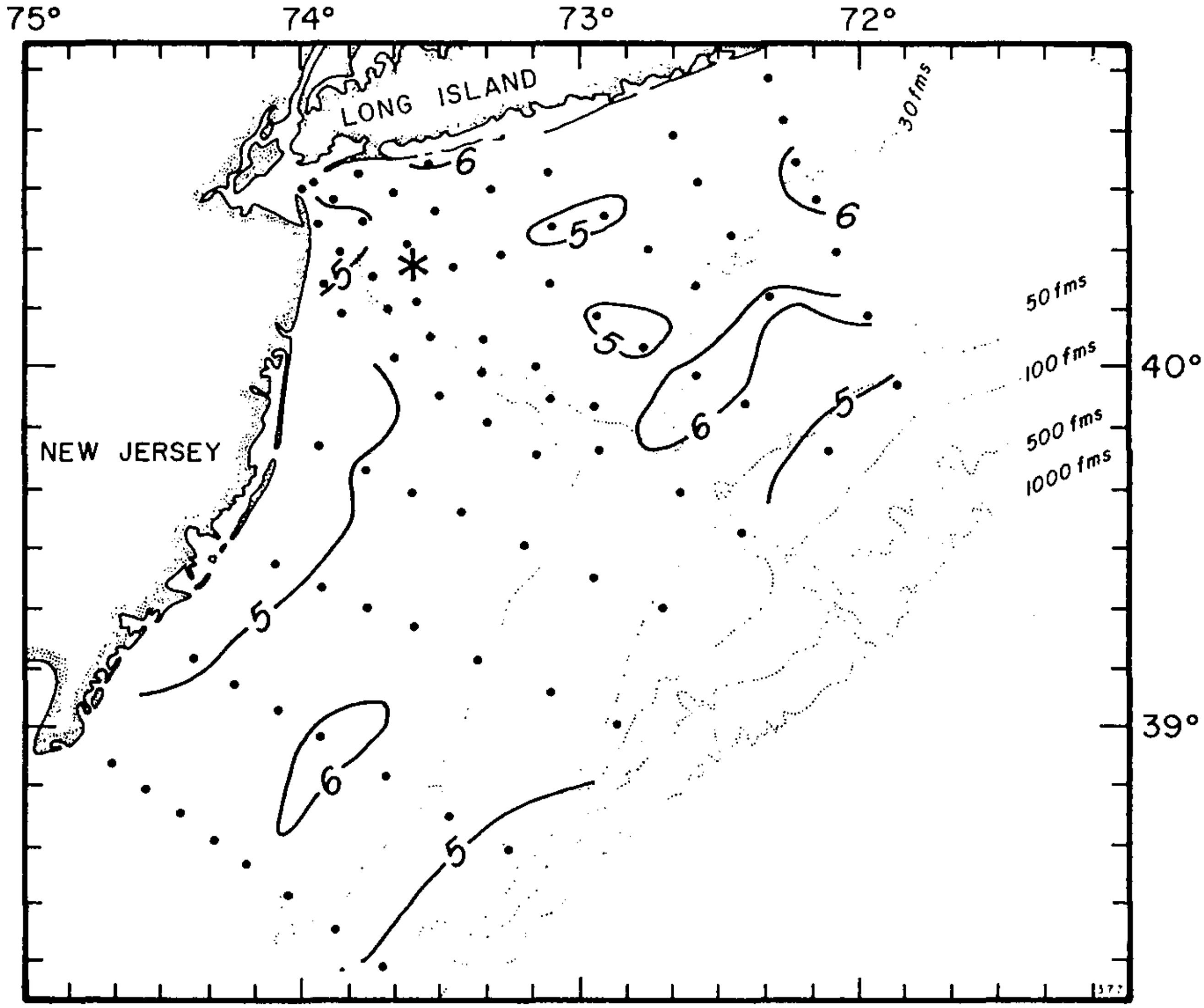



Figure 3. Bottom distribution of dissolved oxygen (ml/l) for XWCC-13.

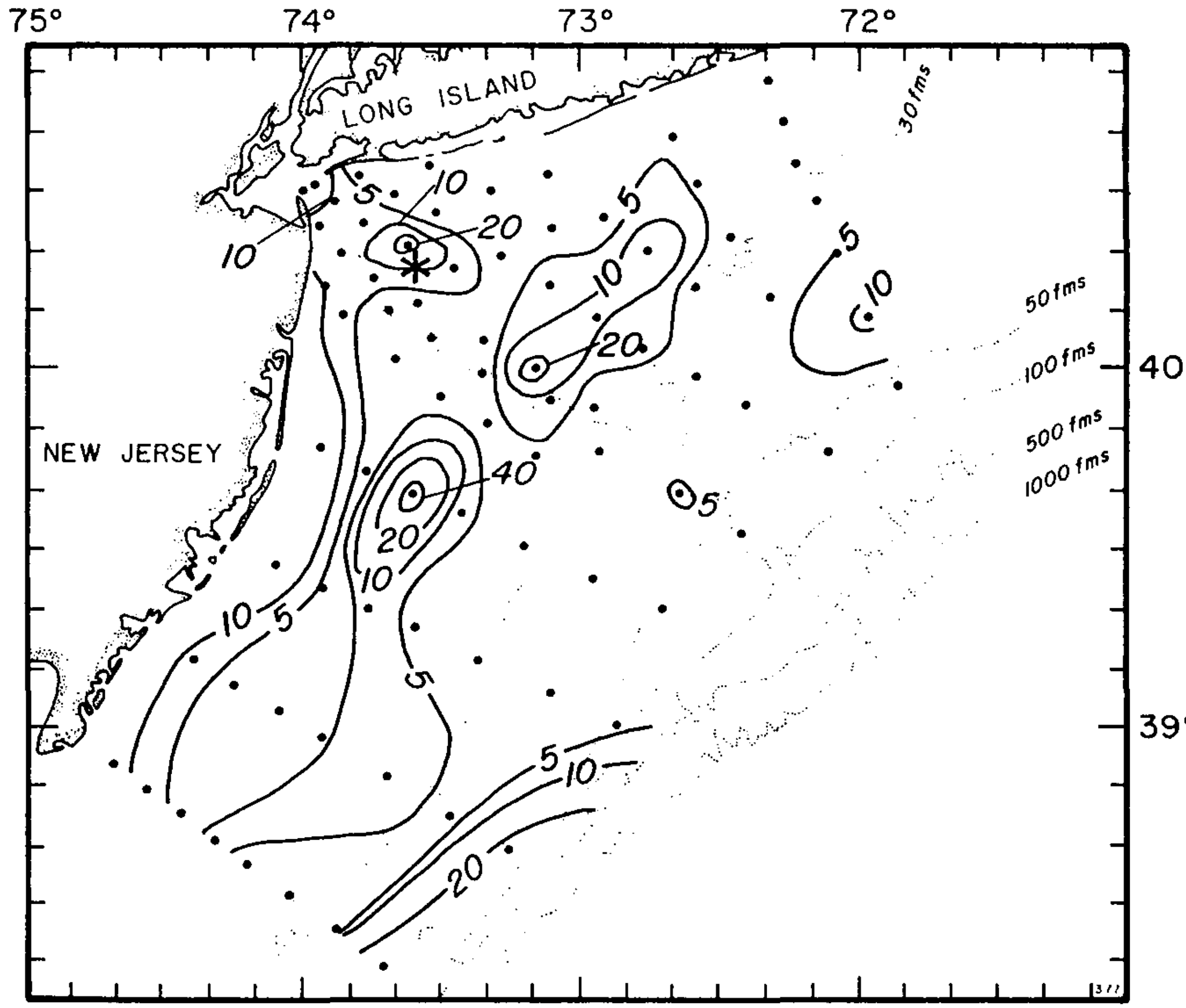



Figure 4a. Bottom distribution of total dissolved Mn (µg/l) for XWCC-13.

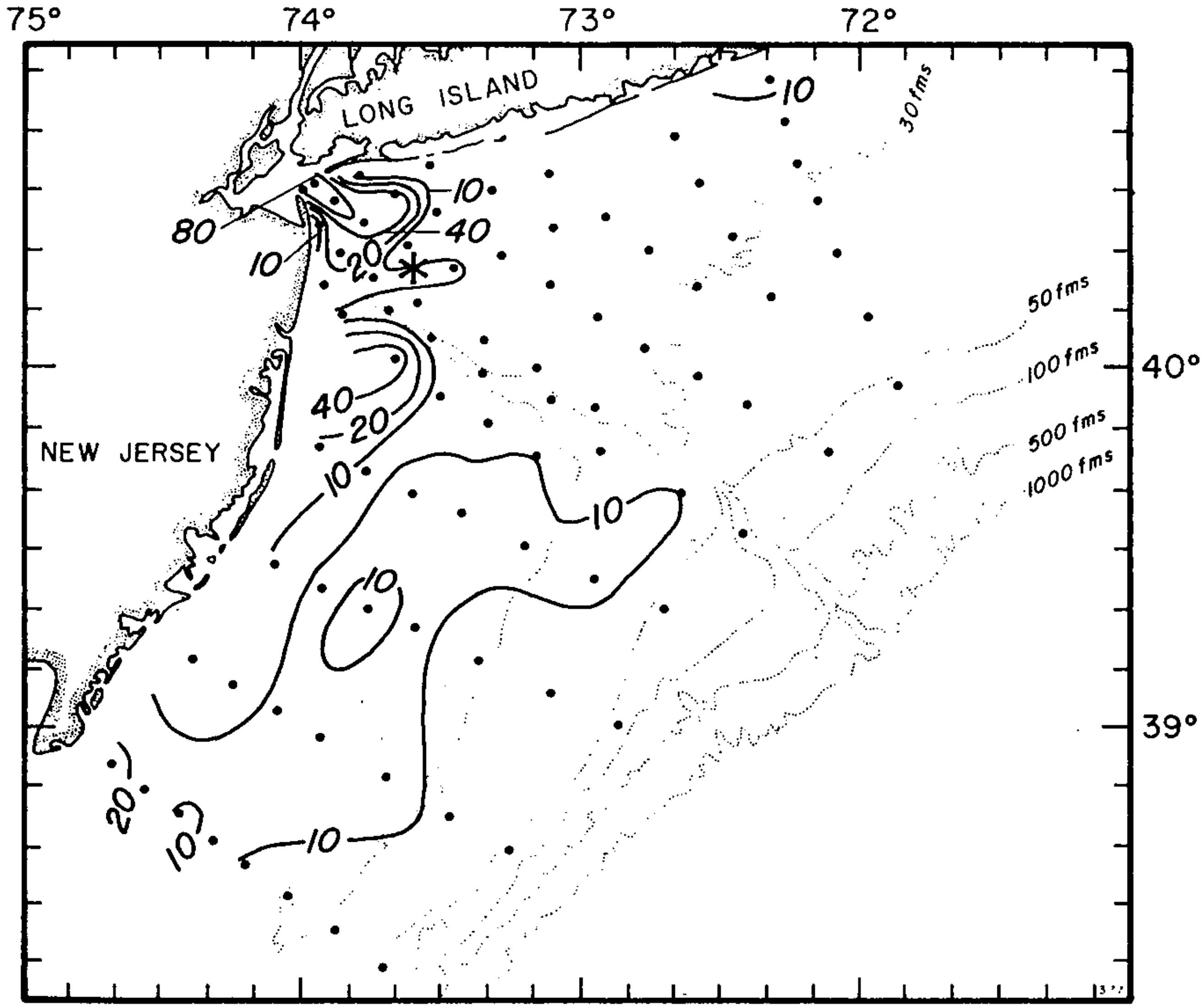



Figure 4b. Bottom distribution of total dissolved Fe (μg/l) for XWCC-13.

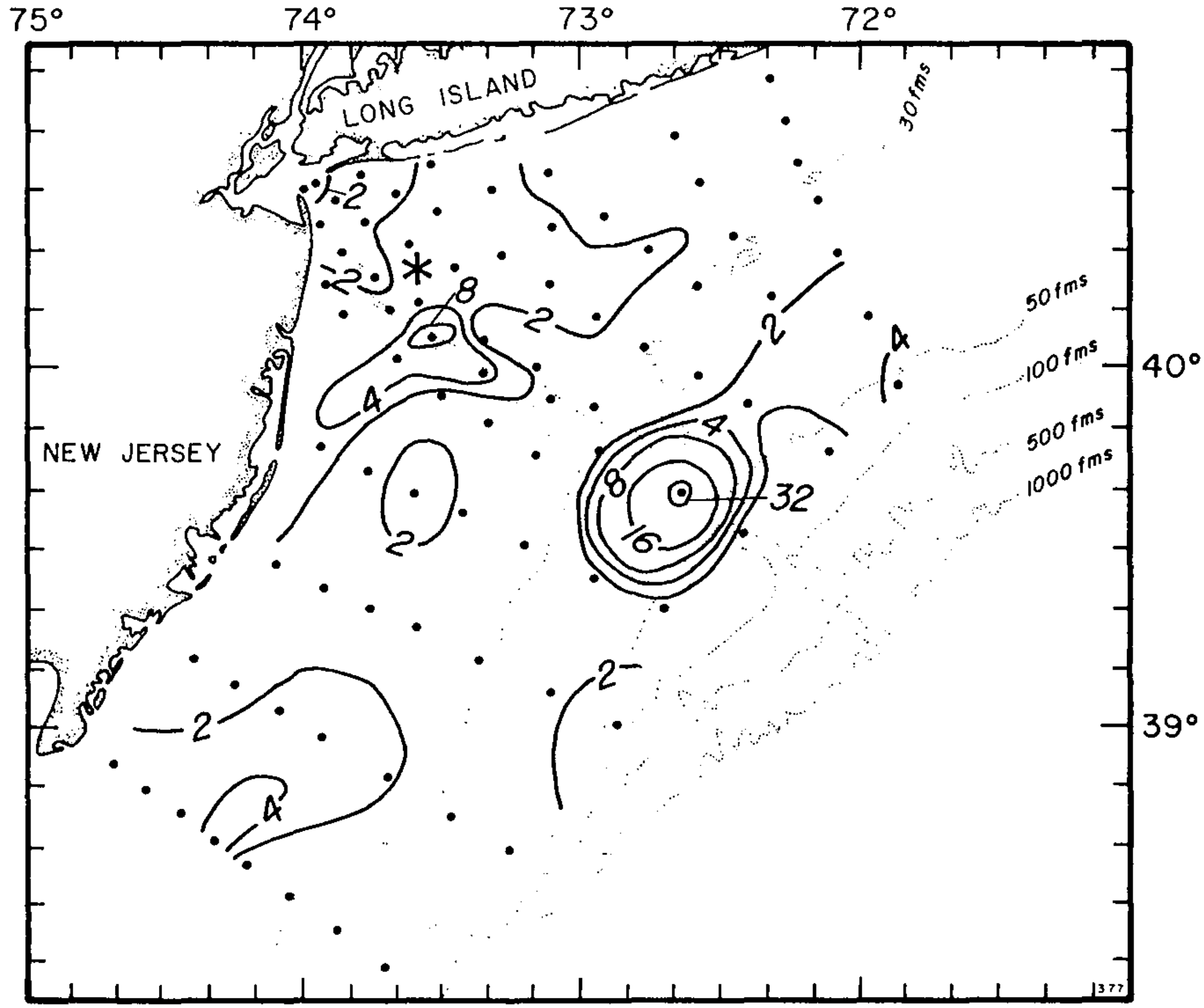



Figure 4c. Bottom distribution of total dissolved Cu (μg/l) for XWCC-13.

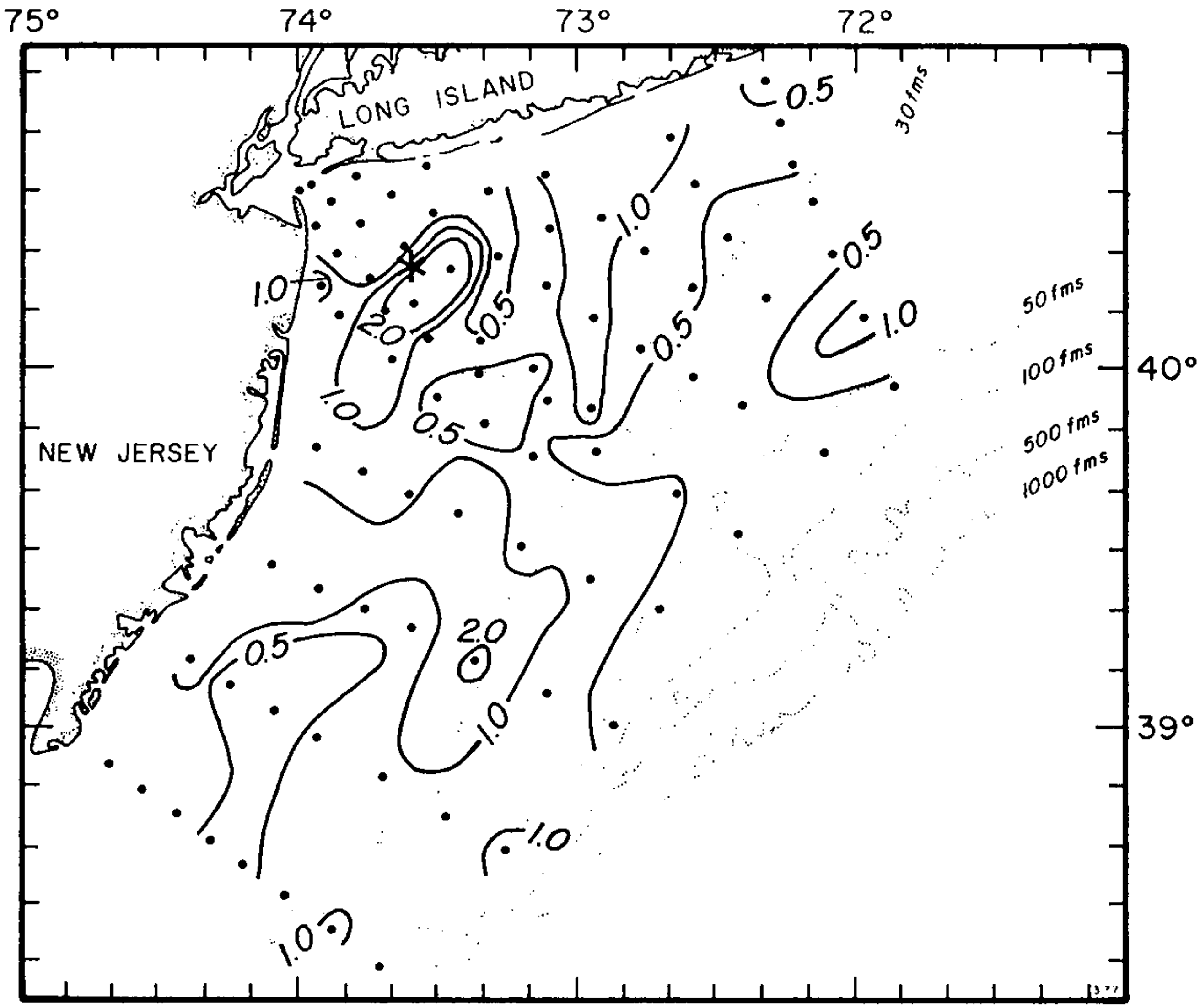



Figure 4d. Bottom distribution of total dissolved Cd (μg/l) for XWCC-13.

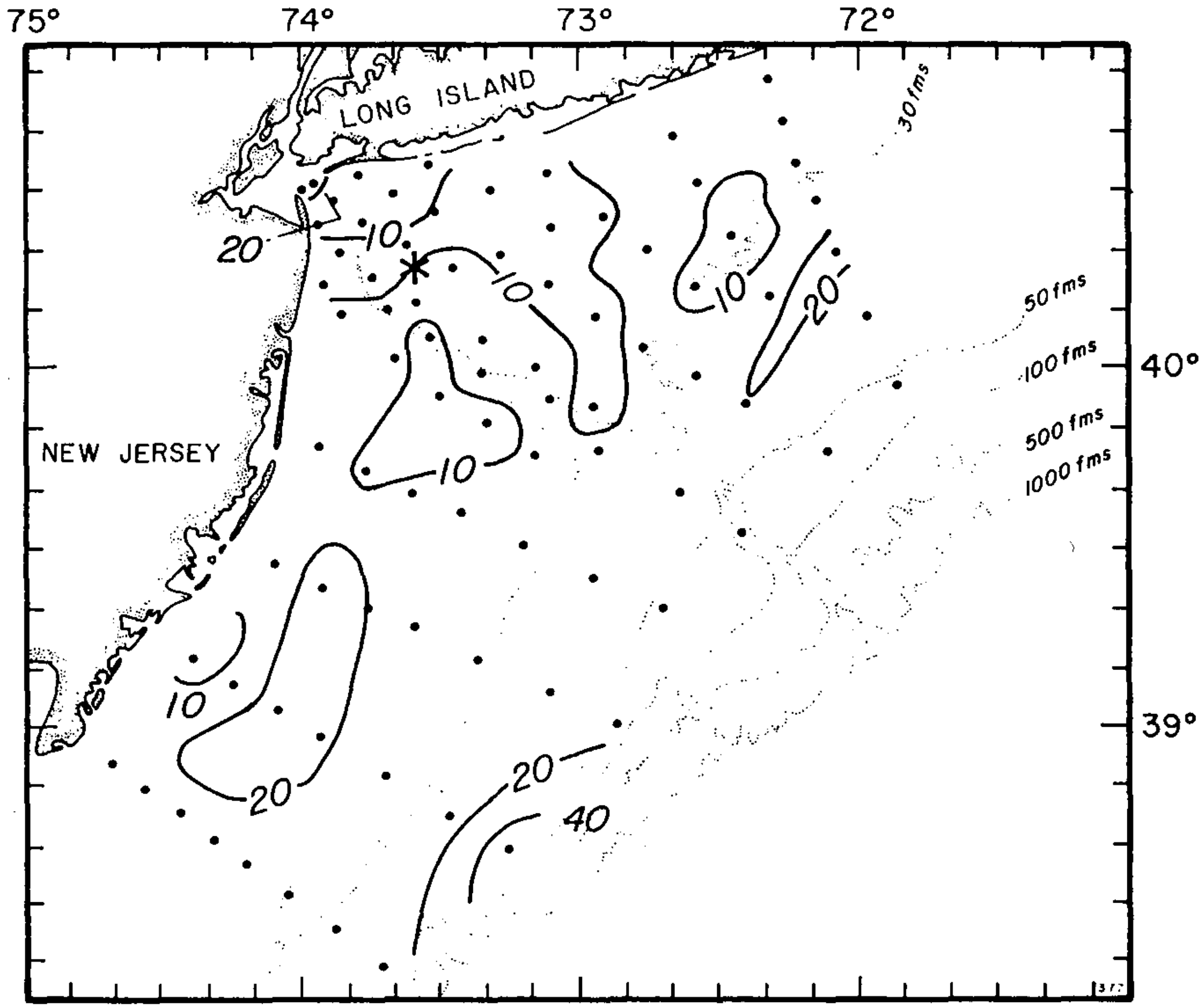



Figure 4e. Bottom distribution of total dissolved Zn (μg/l) for XWCC-13.

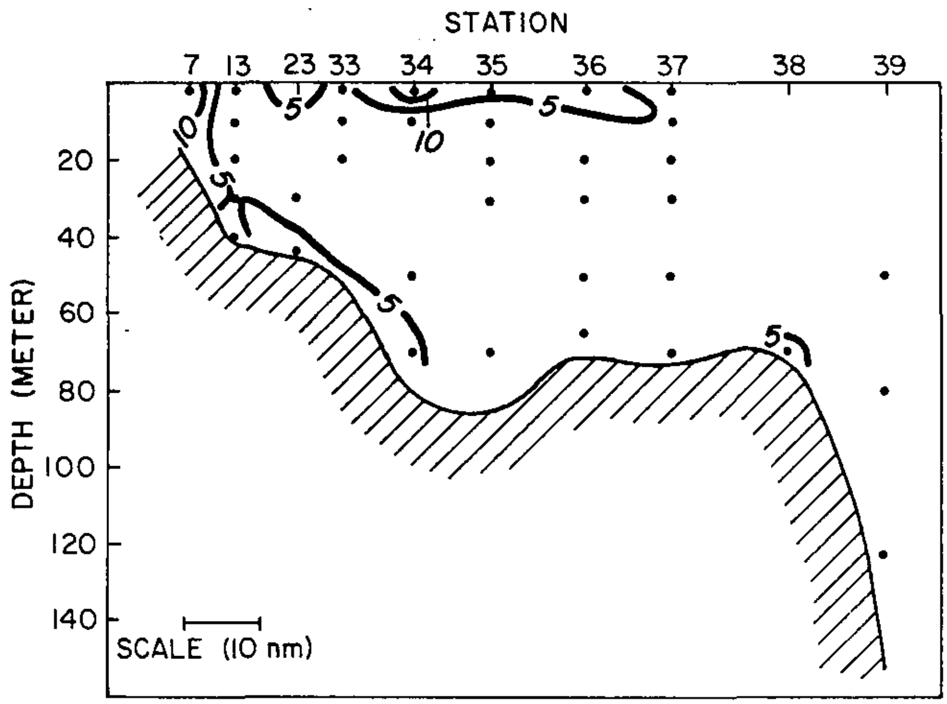



Figure 5a. Distribution of total dissolved Mn (μg/l) along the Hudson Shelf Valley.

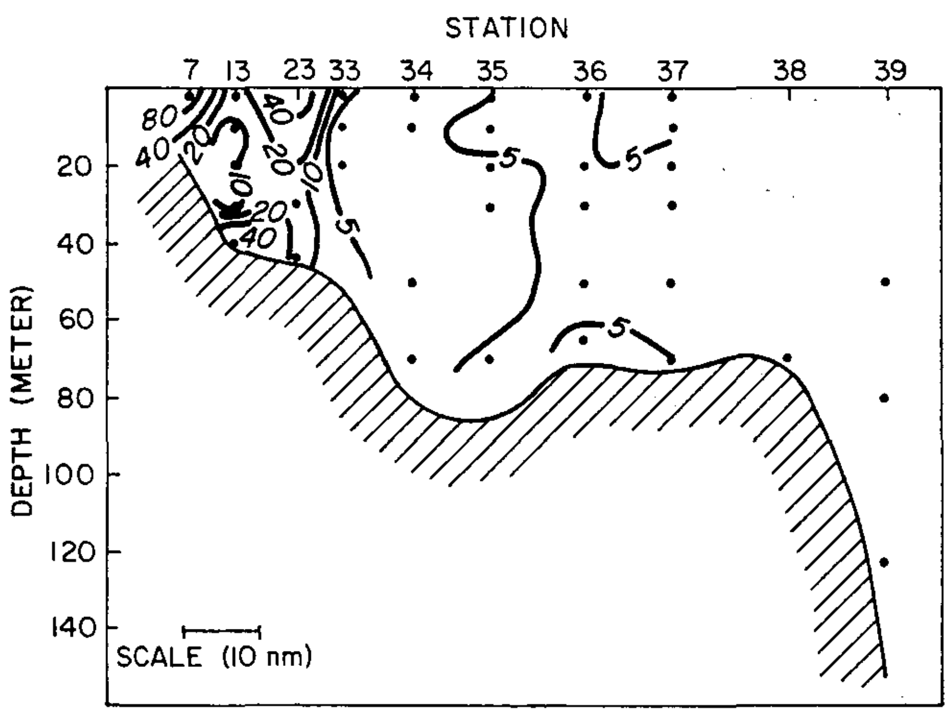



Figure 5b. Distribution of total dissolved Fe (μg/l) along the Hudson Shelf Valley.

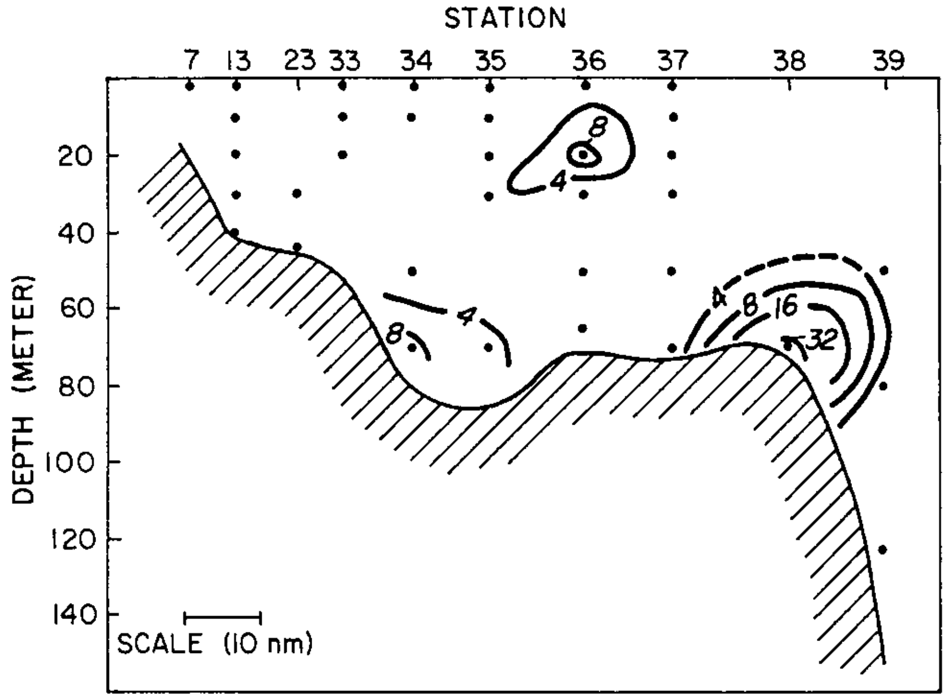



Figure 5c. Distribution of total dissolved Cu (μg/l) along the Hudson Shelf Valley.

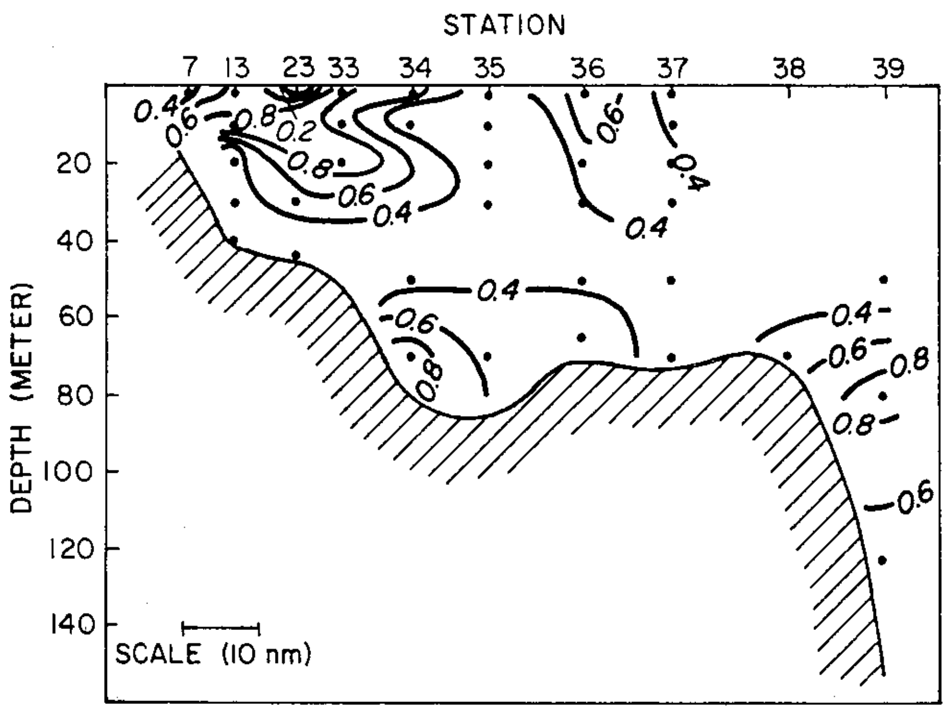



Figure 5d. Distribution of total dissolved Cd (μg/l) along the Hudson Shelf Valley.

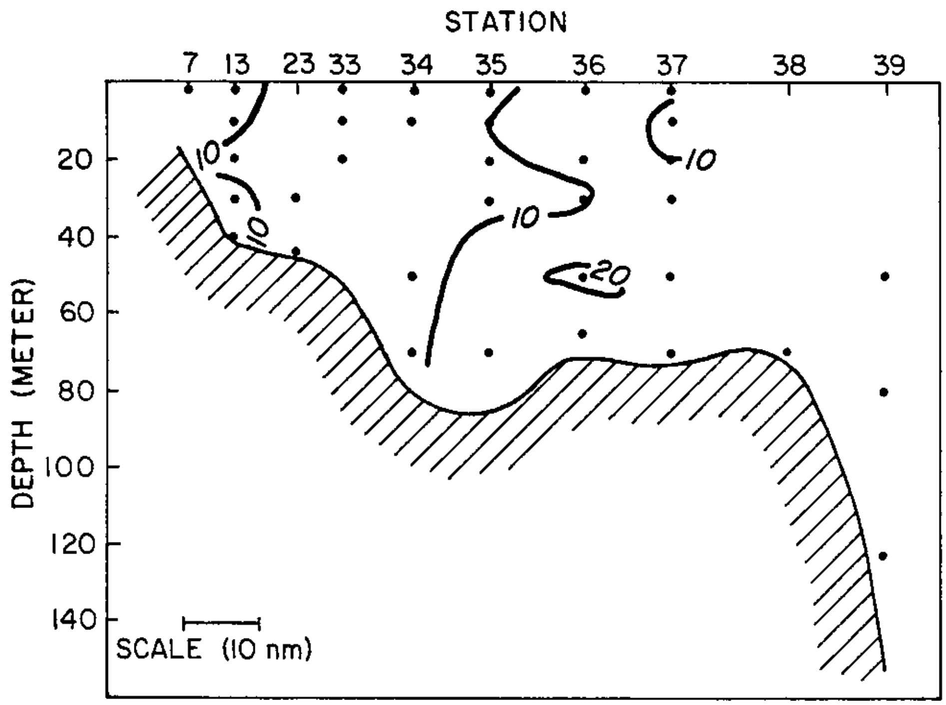



Figure 5e. Distribution of total dissolved Zn (μg/l) along the Hudson Shelf Valley.

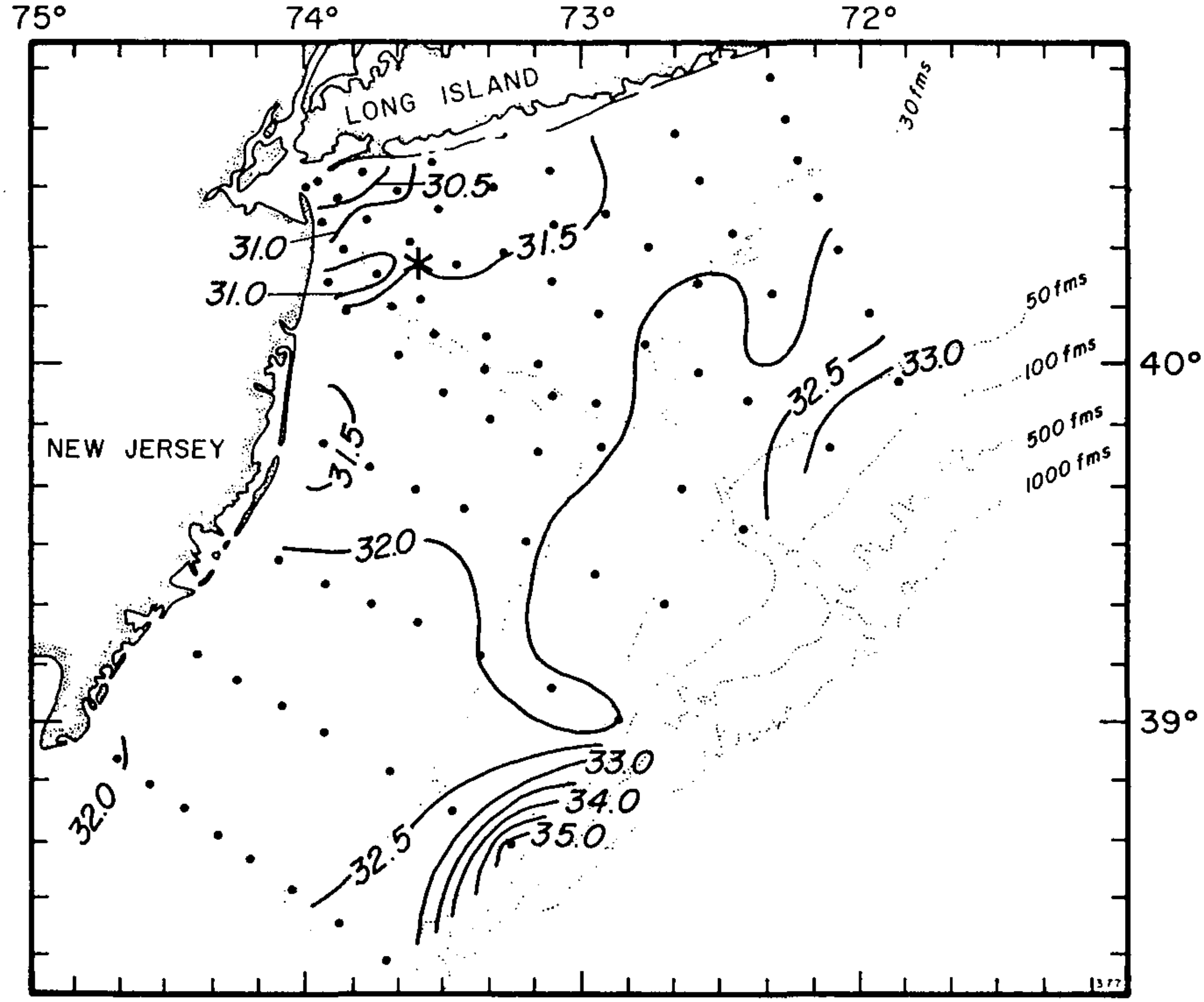



Figure 6. Distribution of corrected STD surface salinities ($^{o}$/oo) for XWCC-15.

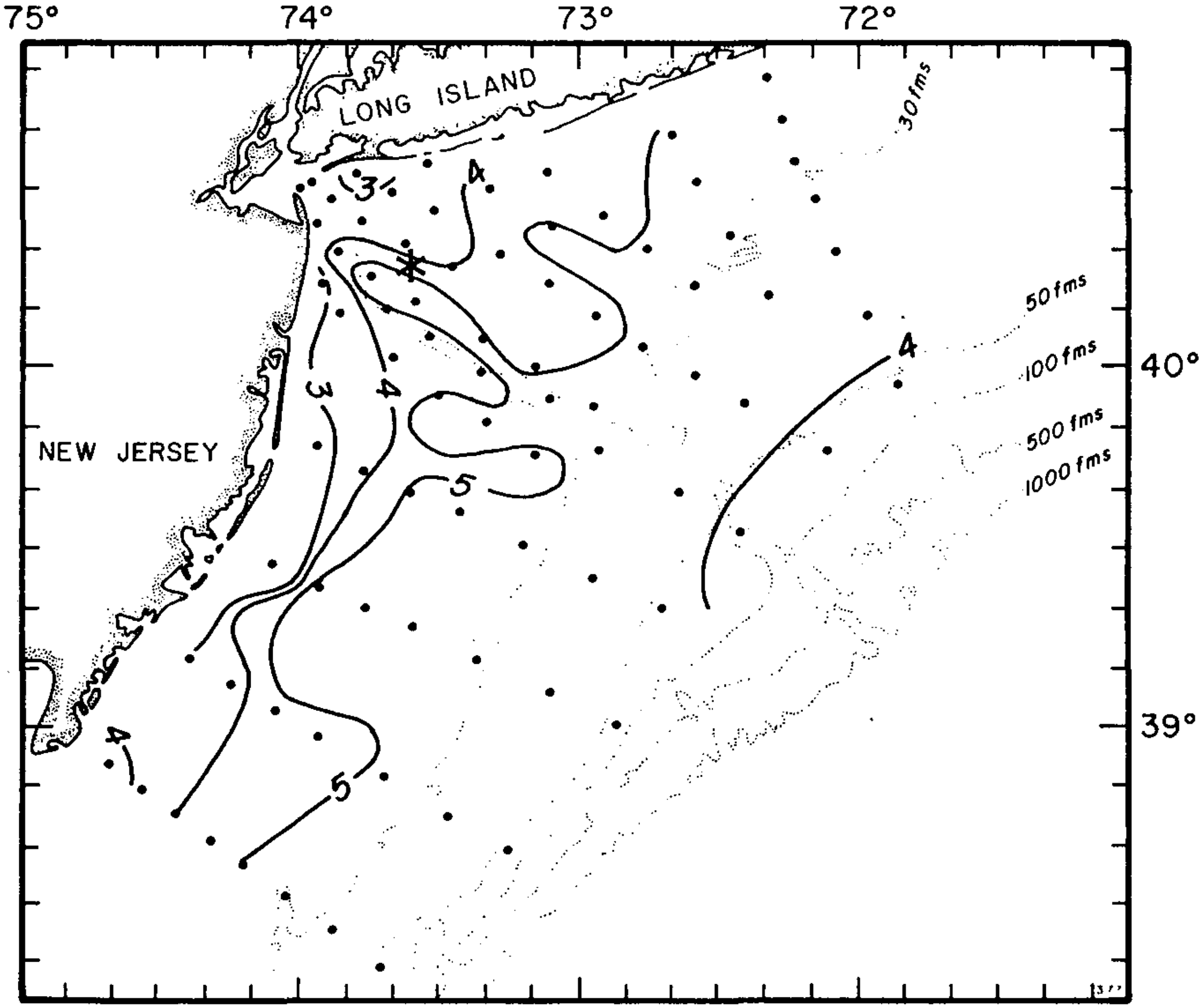



Figure 7. Bottom distribution of dissolved oxygen (ml/l) for XWCC-15.

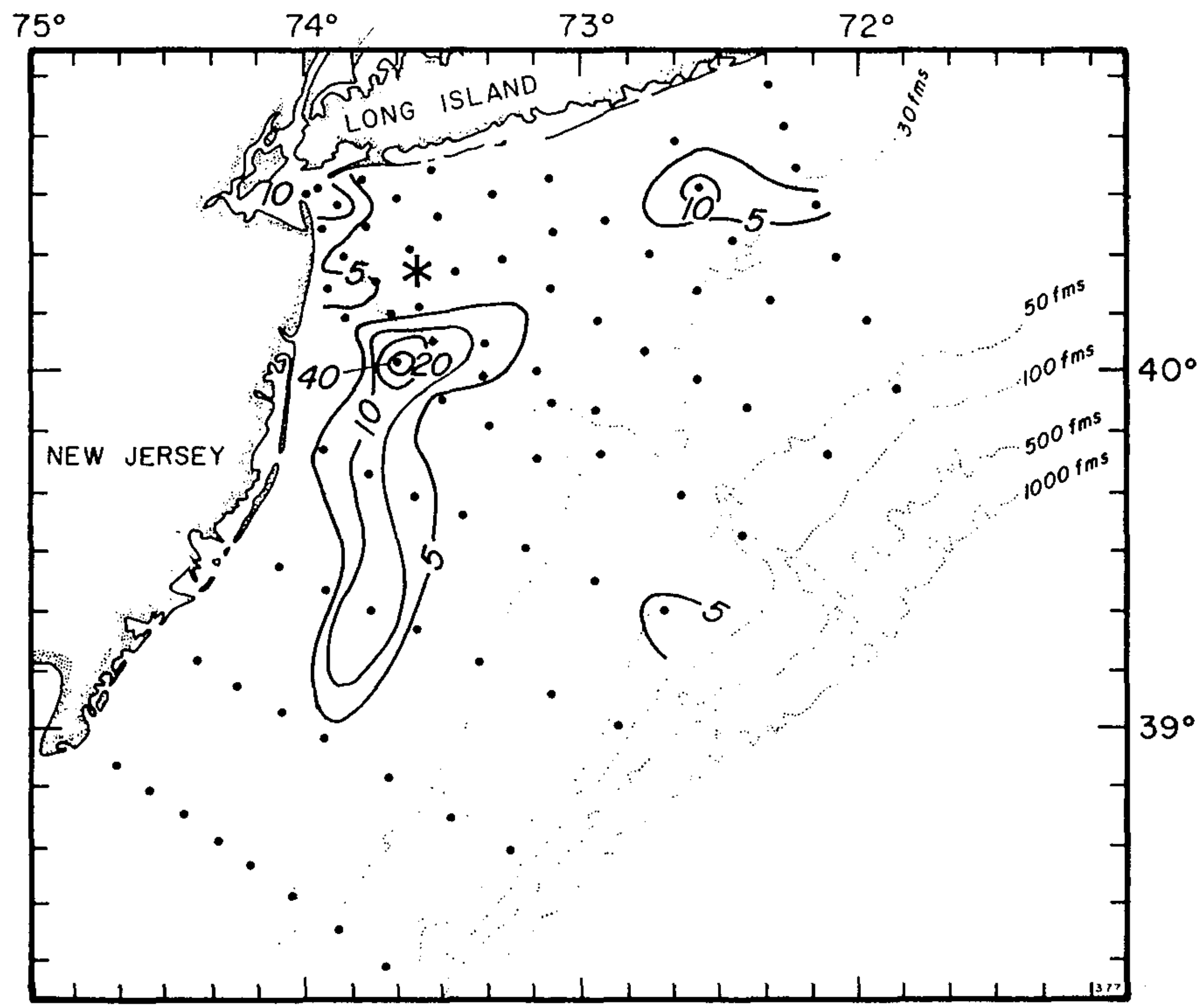



Figure 8a. Surface distribution of total dissolved Mn (μg/l) for XWCC-15.

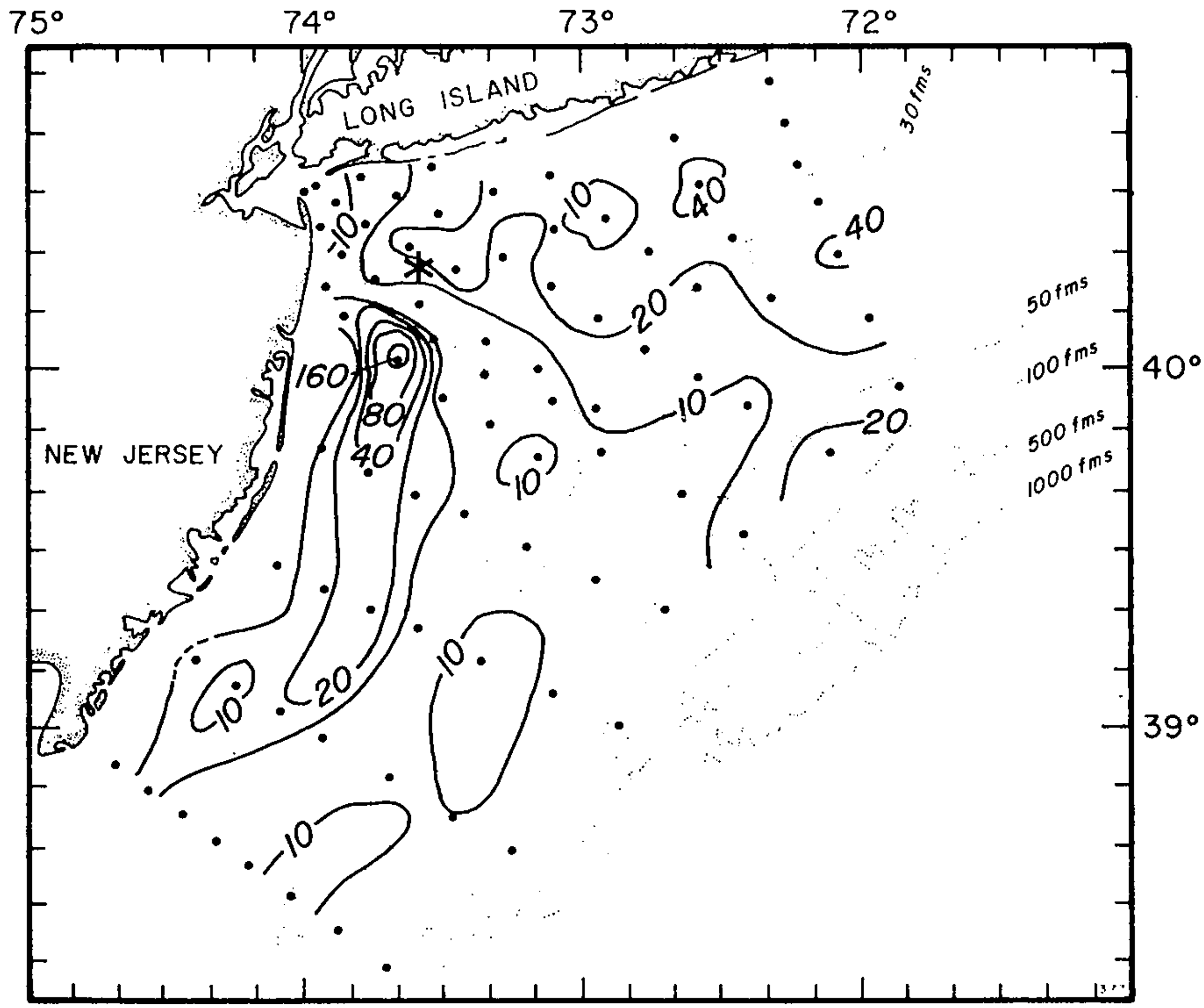



Figure 8b. Surface distribution of total dissolved Fe (μg/l) for XWCC-15.

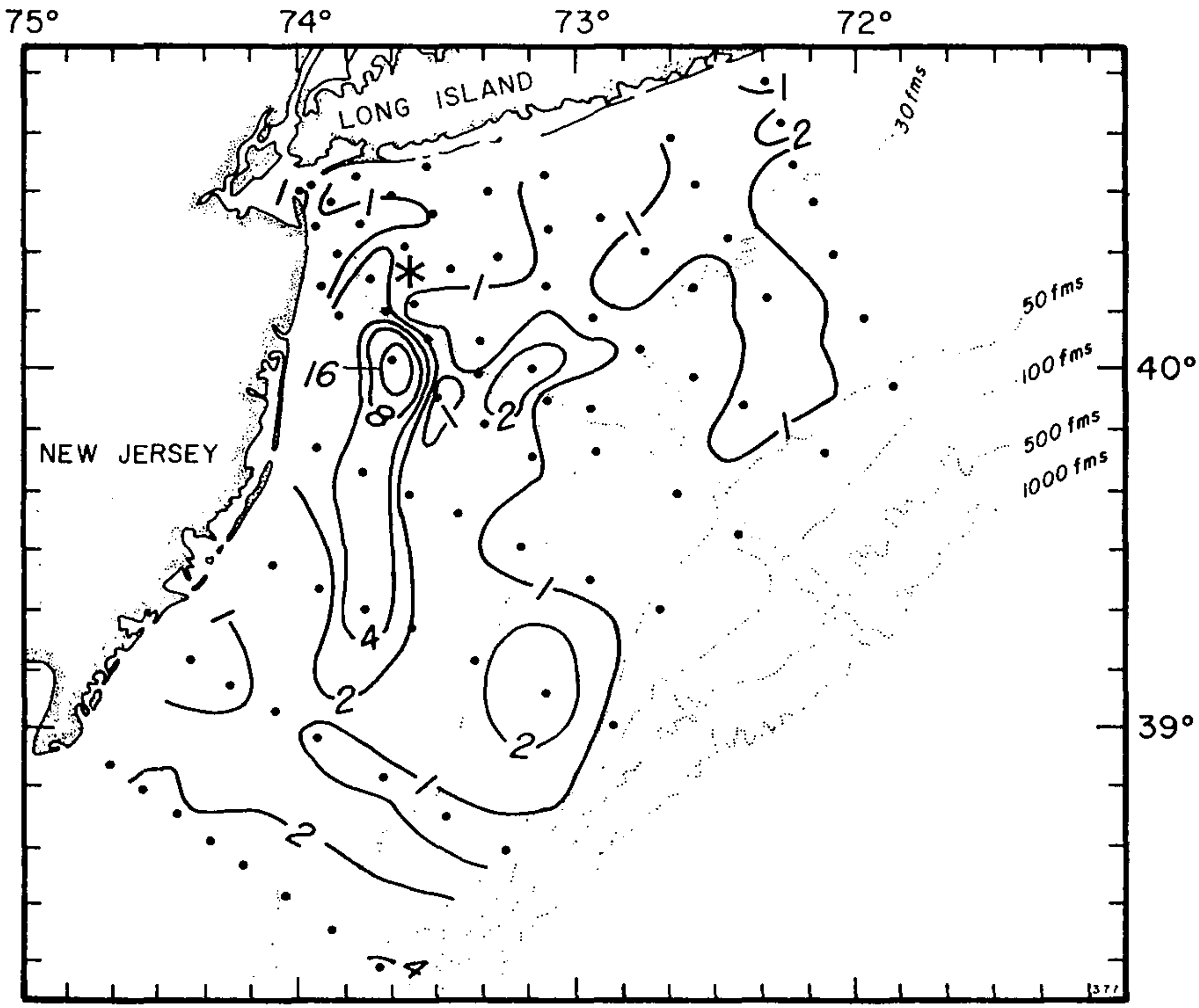



Figure 8c. Surface distribution of total dissolved Cu (μg/l) for XWCC-15.

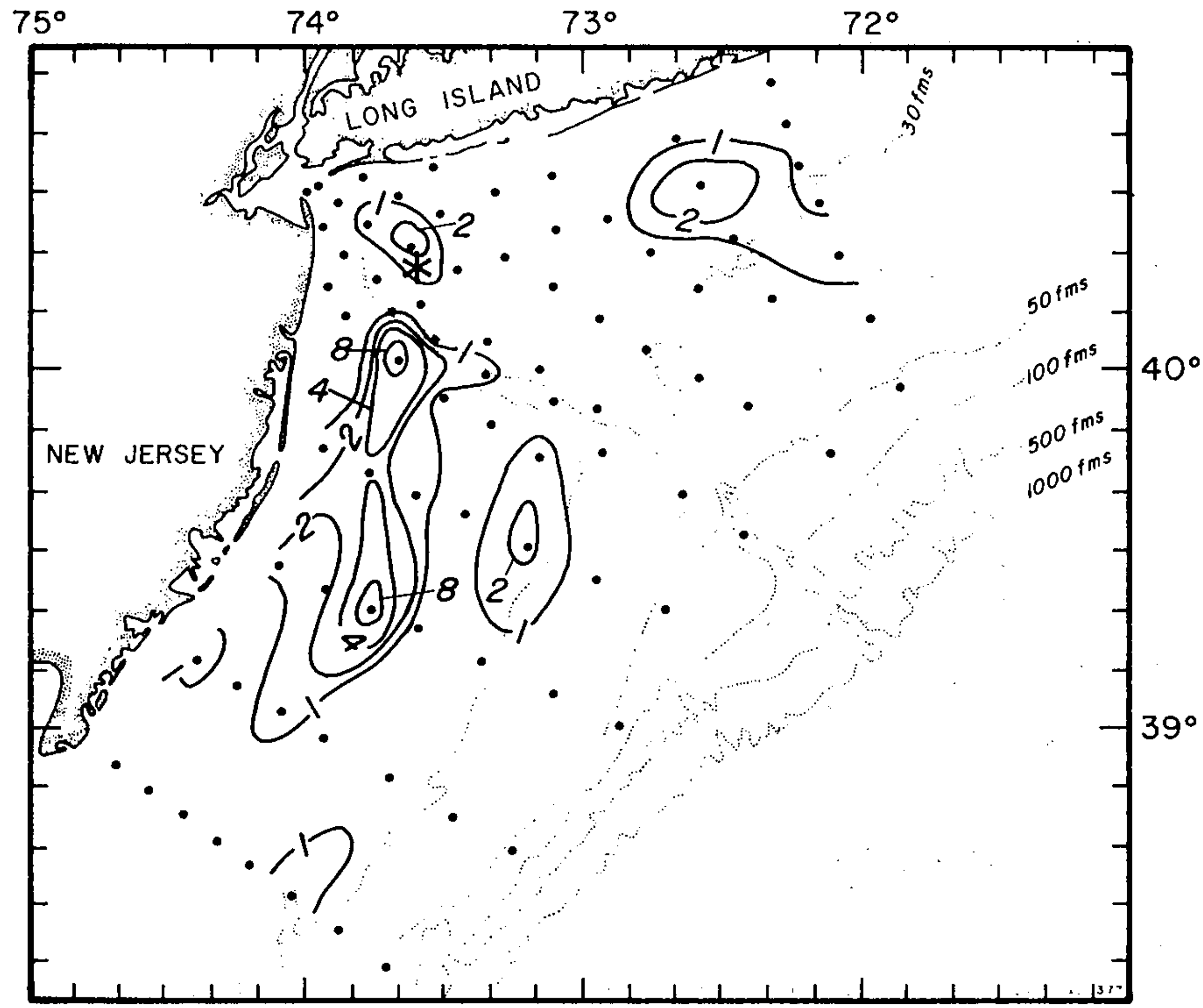



Figure 8d. Surface distribution of total dissolved Cd (μg/l) for XWCC-15.

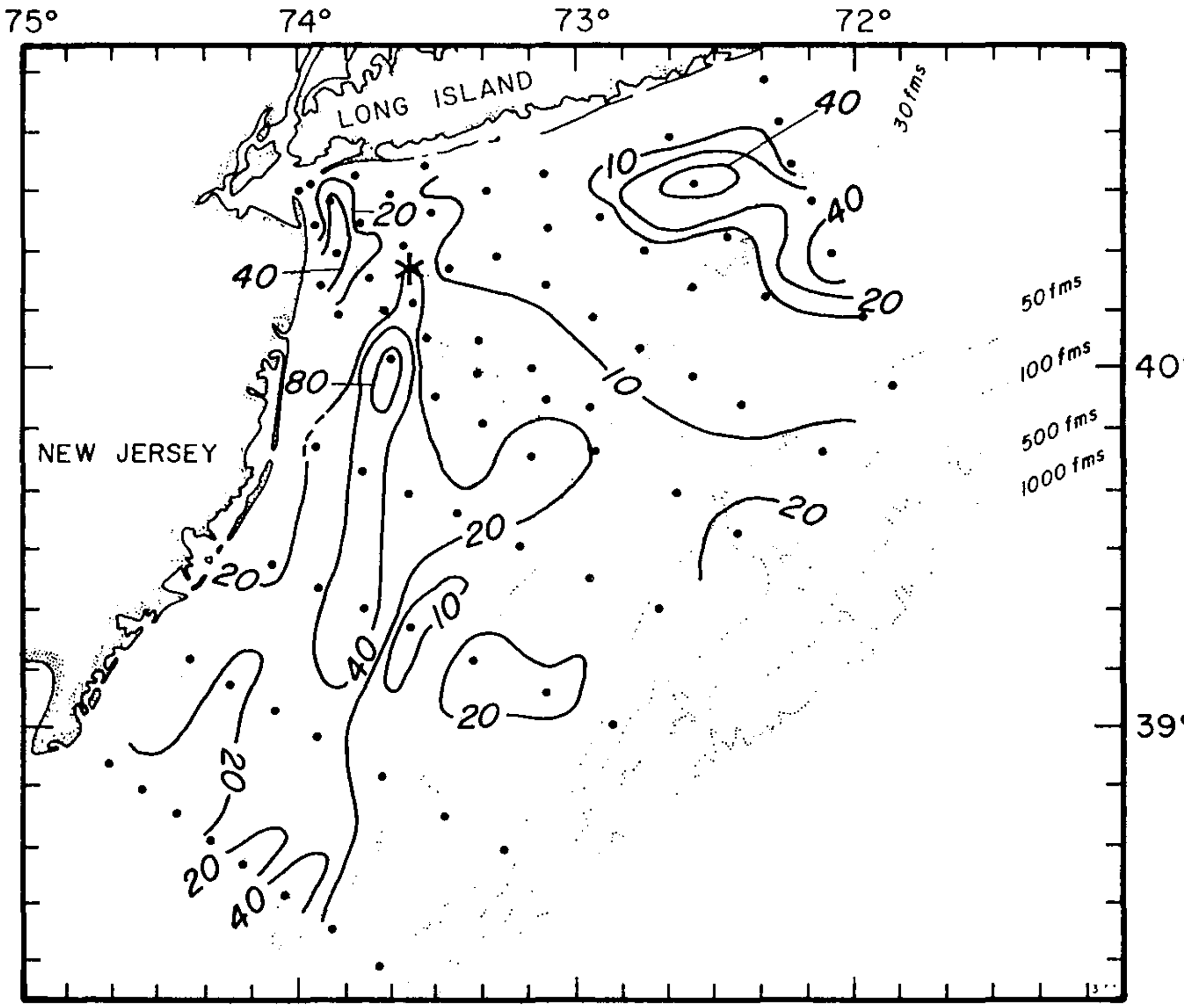



Figure 8e. Surface distribution of total dissolved Zn (μg/l) for XWCC-15.

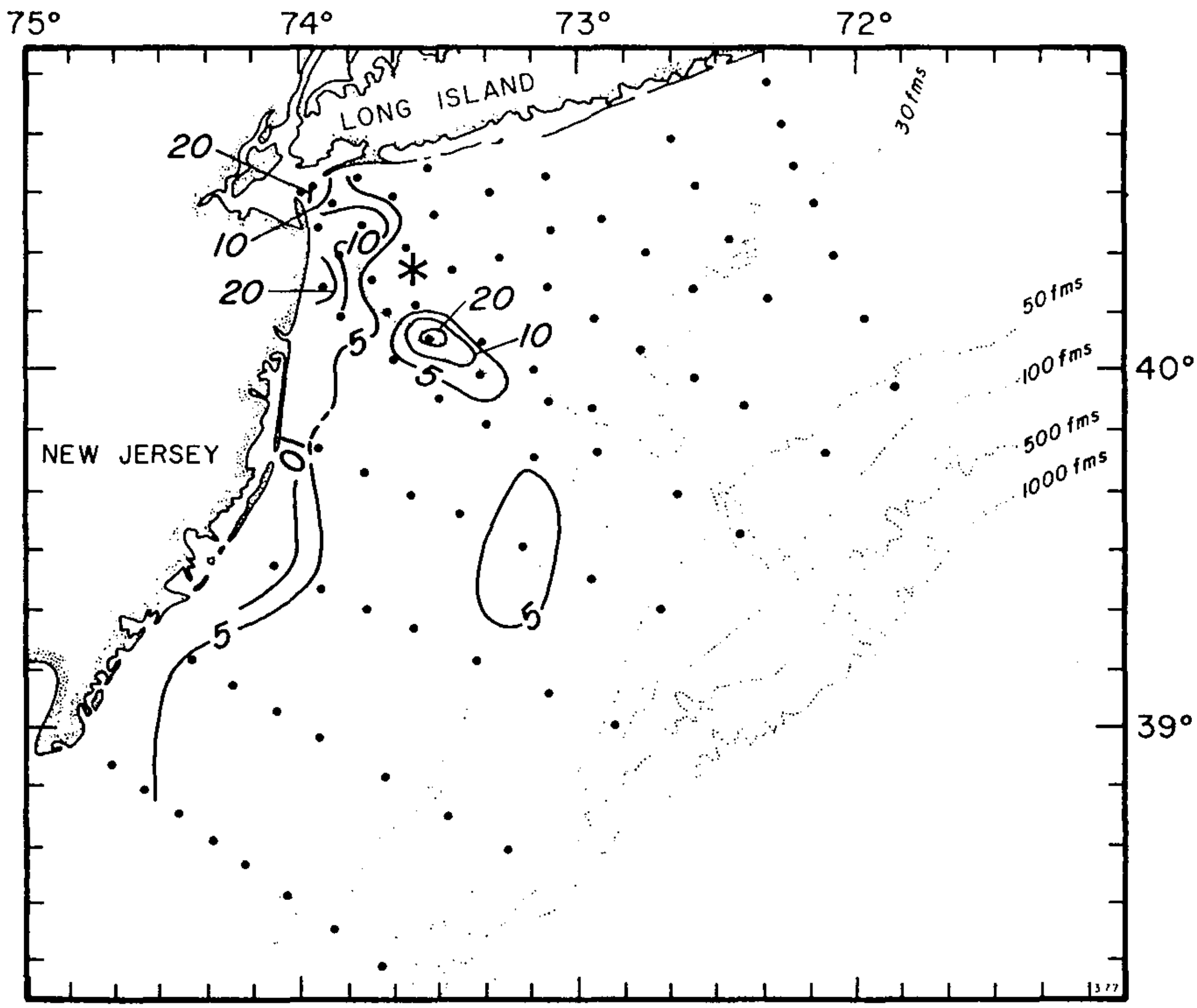



Figure 9a. Bottom distribution of total dissolved Mn (µg/l) for XWCC-15.

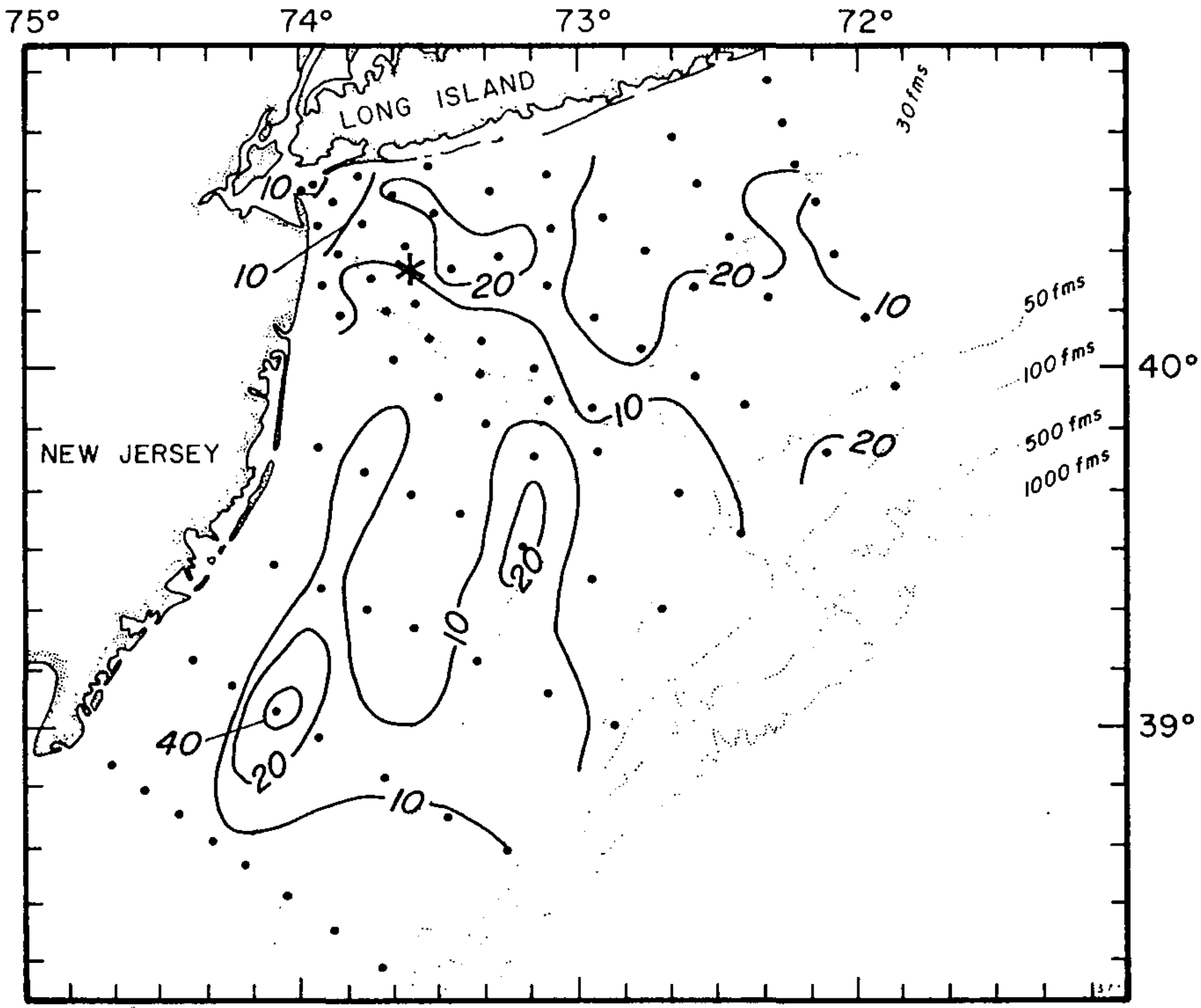
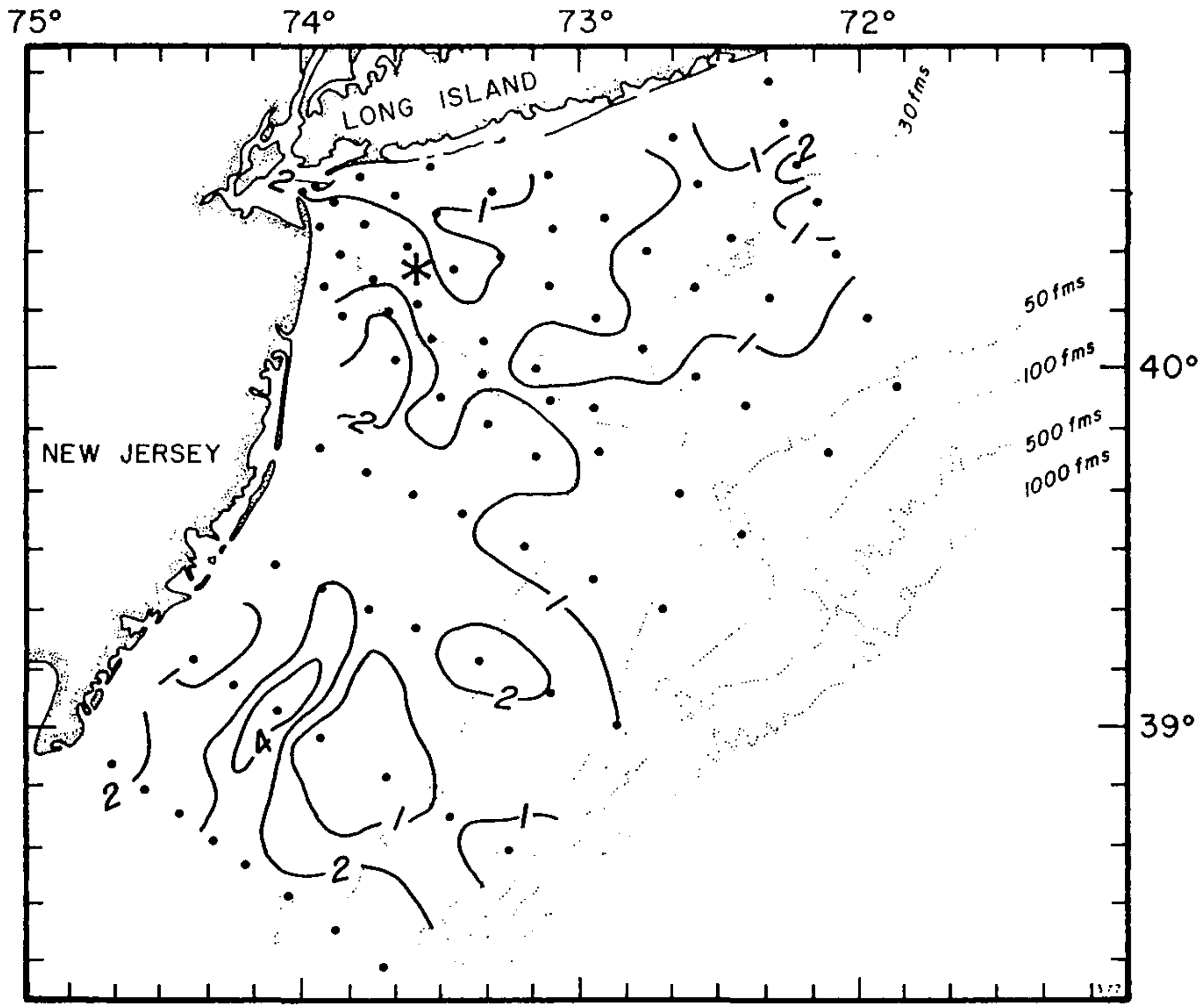



Figure 9b. Bottom distribution of total dissolved Fe (μg/l) for XWCC-15.

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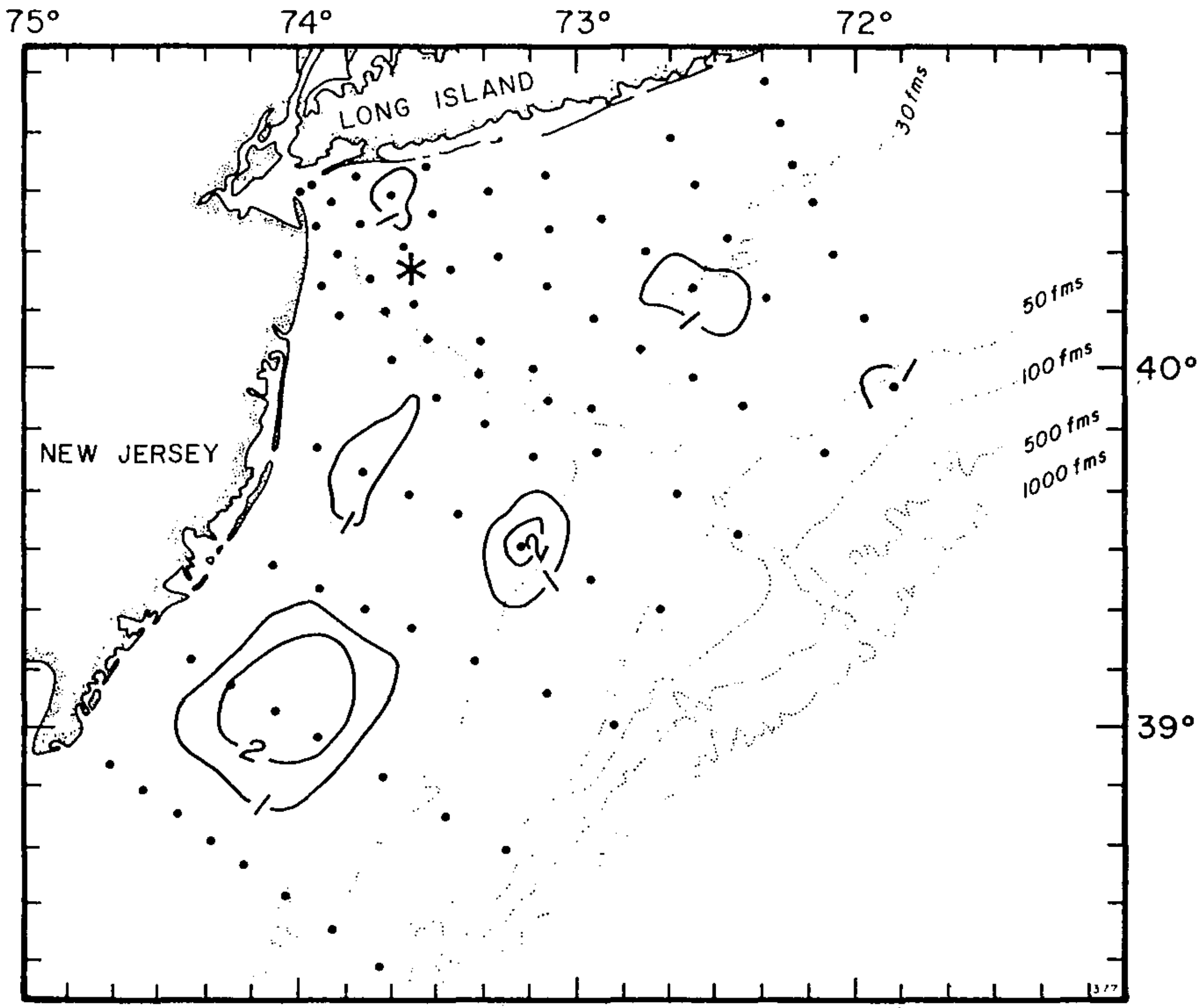


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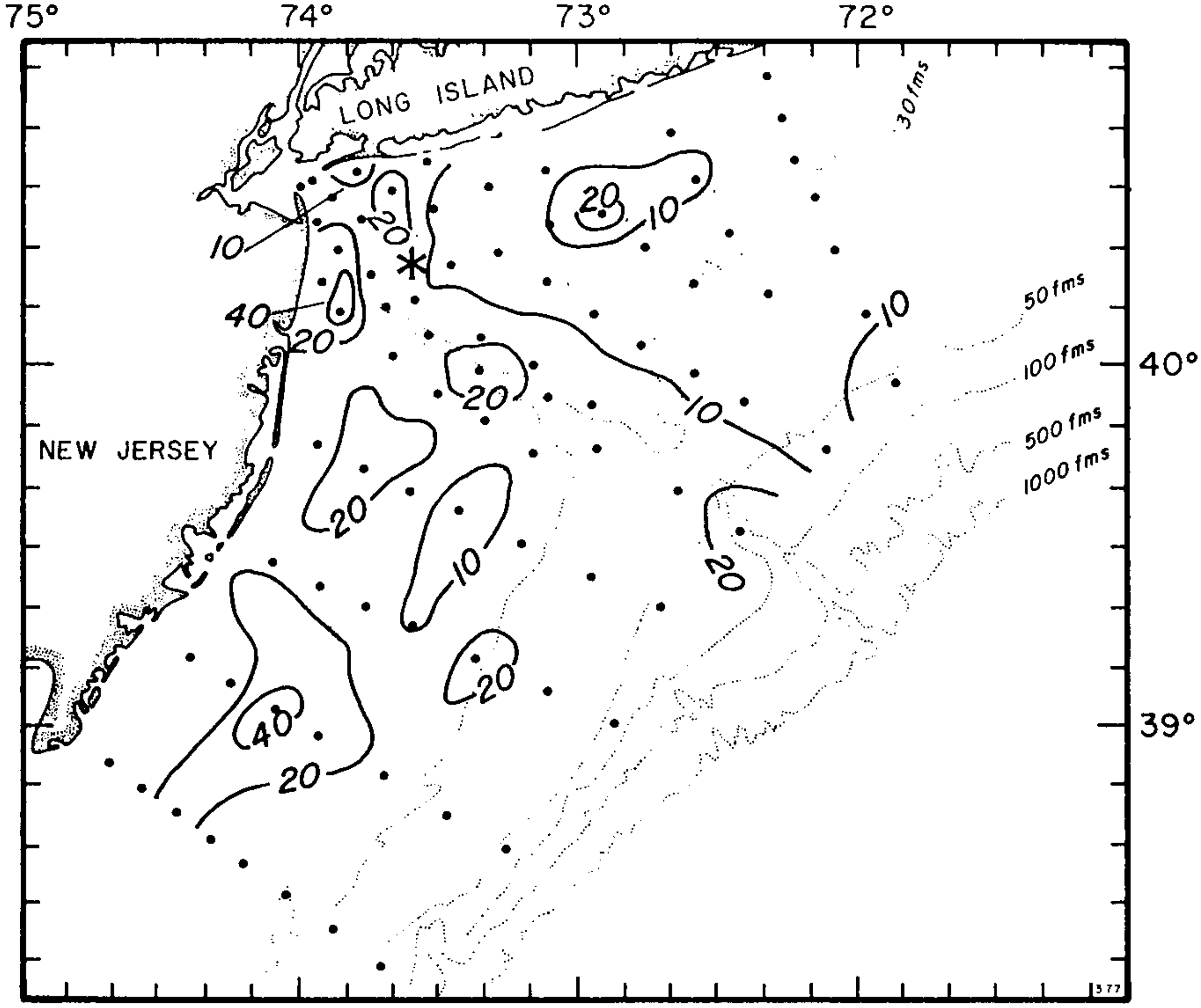


Figure 9e. Bottom distribution of total dissolved Zn (μg/l) for XWCC-15.

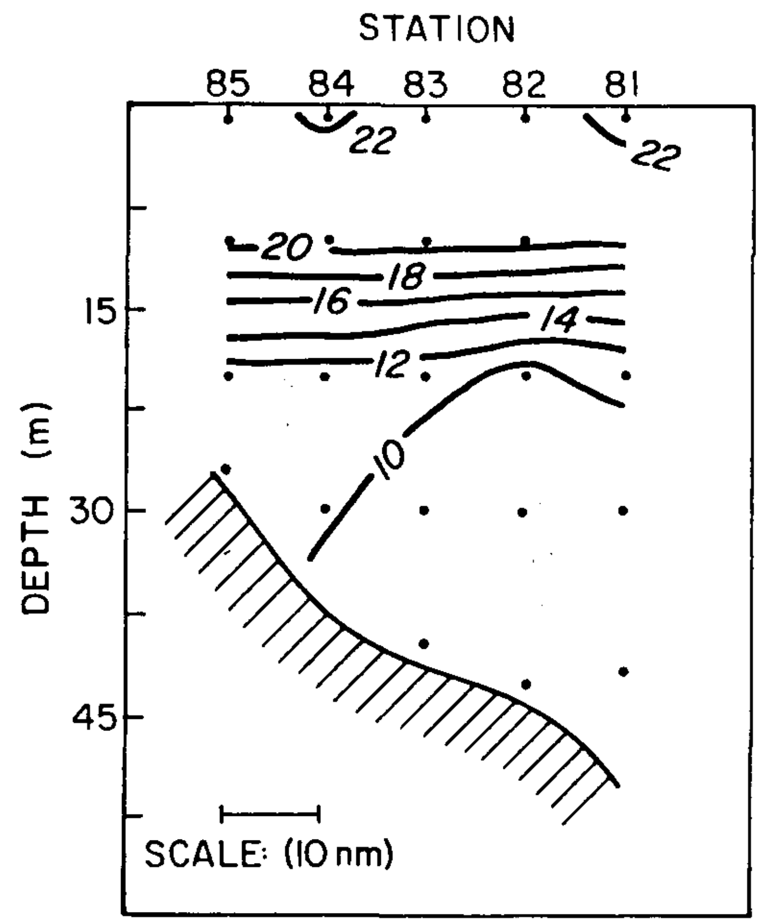


Figure 10a. Temperature profile along transect of stations 81-85 for XWCC-15.

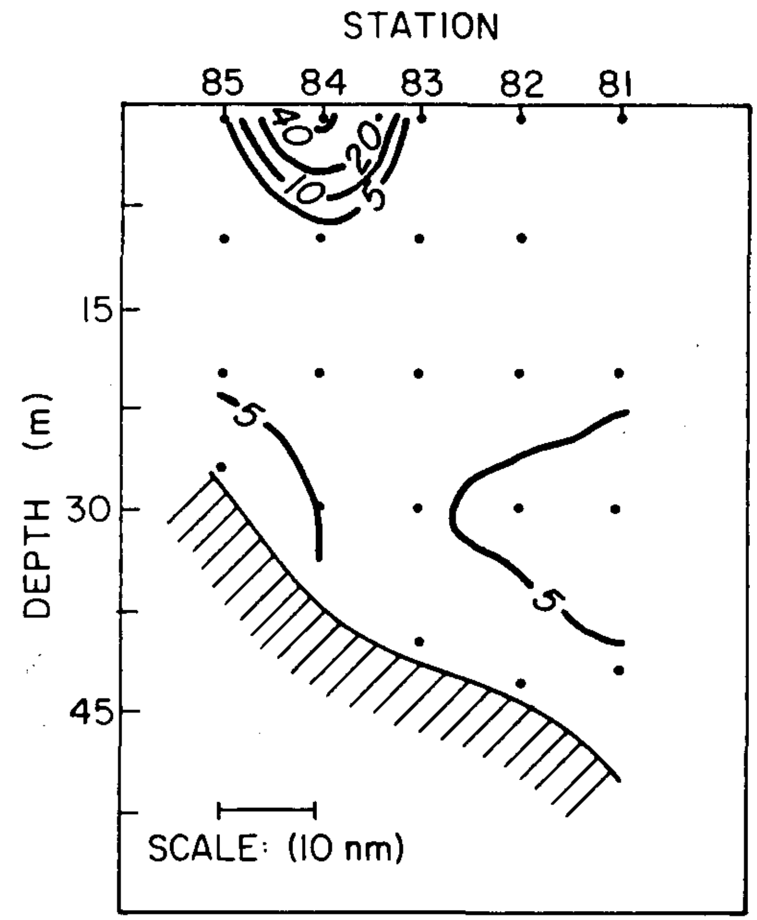


Figure 10b. Distribution of total dissolved Mn (µg/l) along transect of stations 81-85 for XWCC-15.

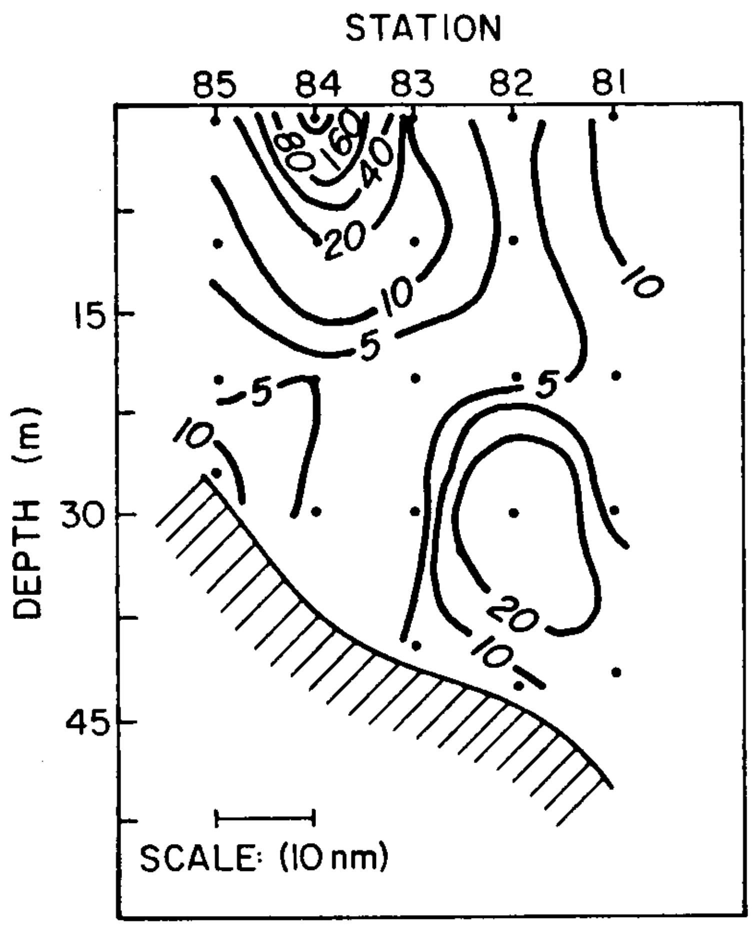


Figure 10c. Distribution of total dissolved Fe (µg/l) along transect of stations 81-85 for XWCC-15.

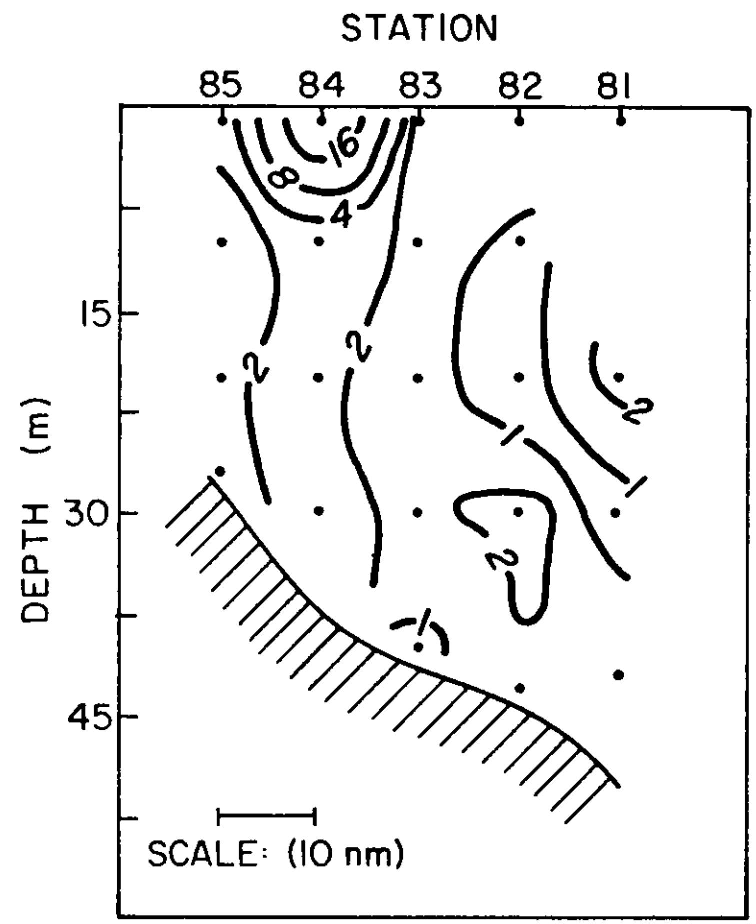


Figure 10d. Distribution of total dissolved Cu (µg/l) along transect of stations 81-85 for XWCC-15.

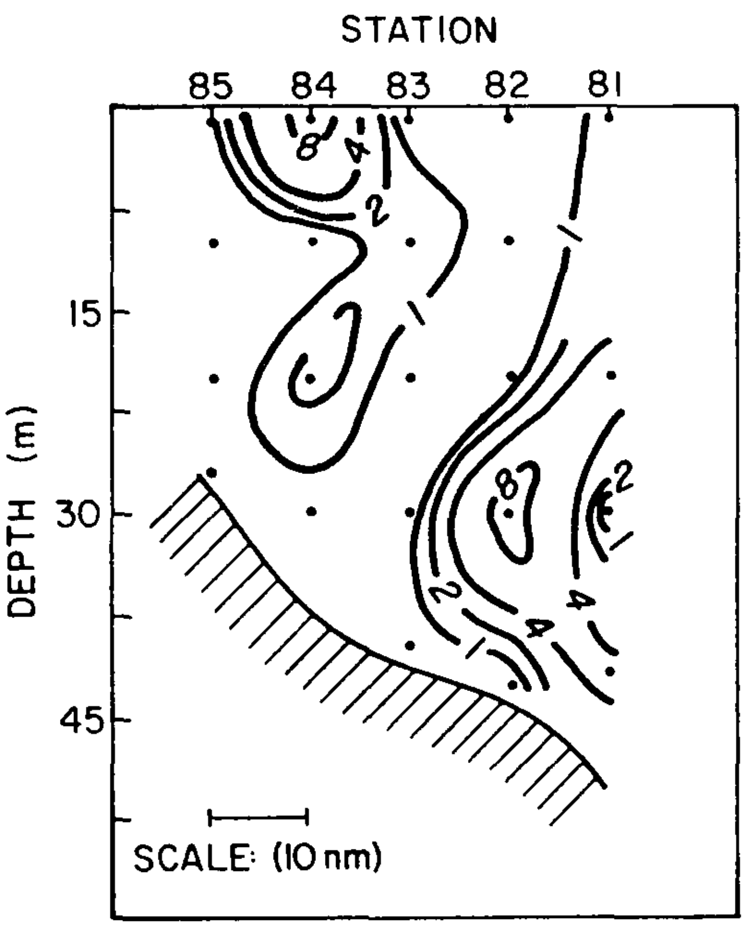


Figure 10e. Distribution of total dissolved Cd (μg/l) along transect of stations 81-85 for XWCC-15.

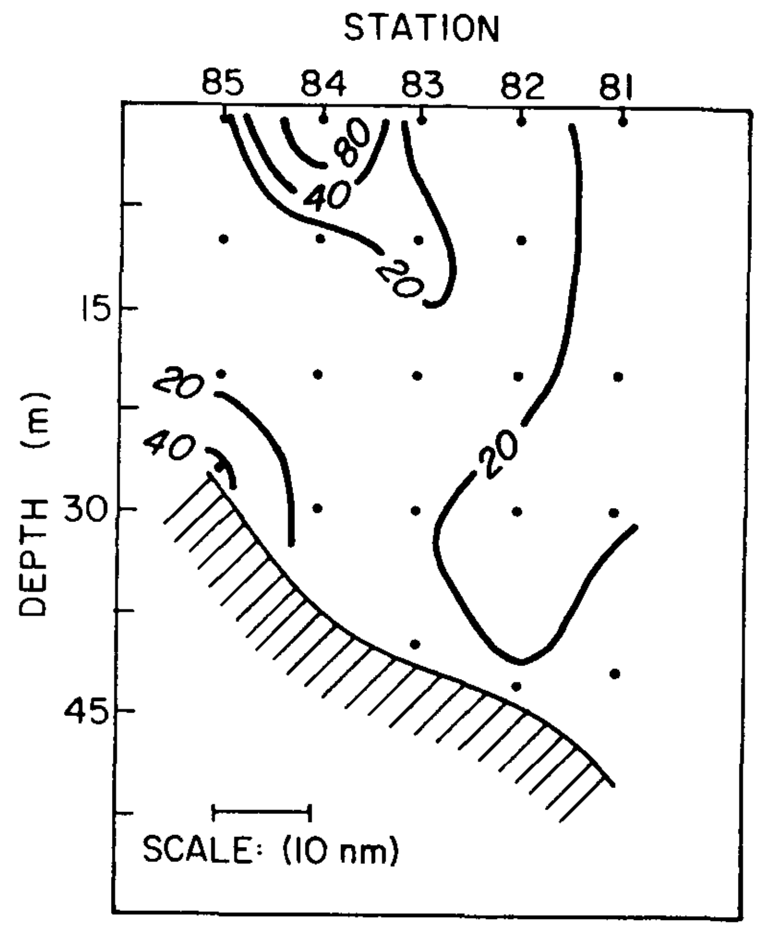


Figure 10f. Distribution of total dissolved Zn (μg/l) along transect of stations 81-85 for XWCC-15.

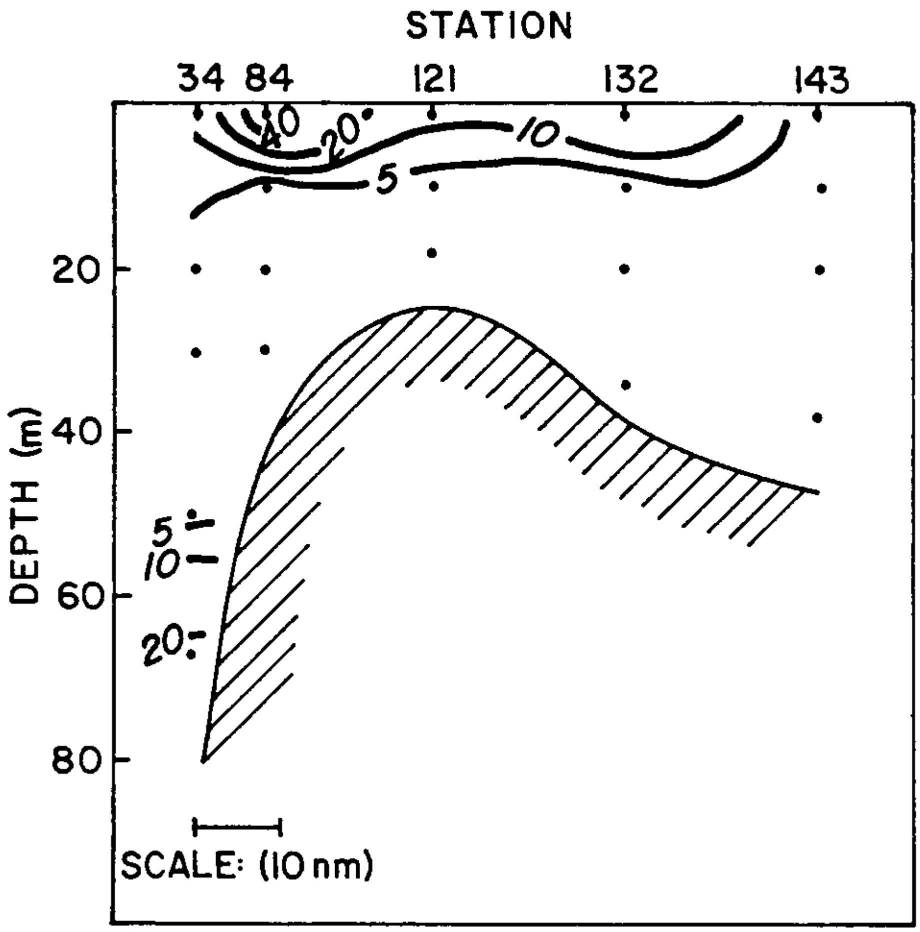


Figure 11a. Distribution of total dissolved Mn (μg/l) along the axis of the anomalous cell for XWCC-15.

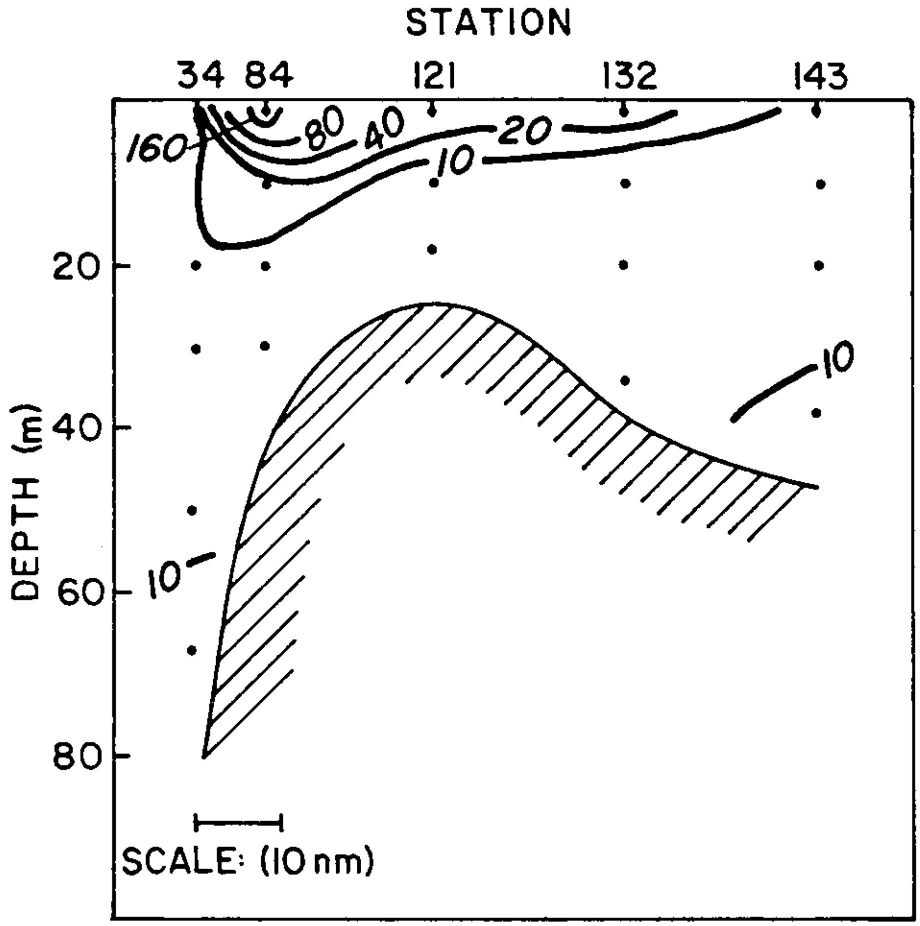


Figure 11b. Distribution of total dissolved Fe (µg/l) along the axis of the anomalous cell for XWCC-15.

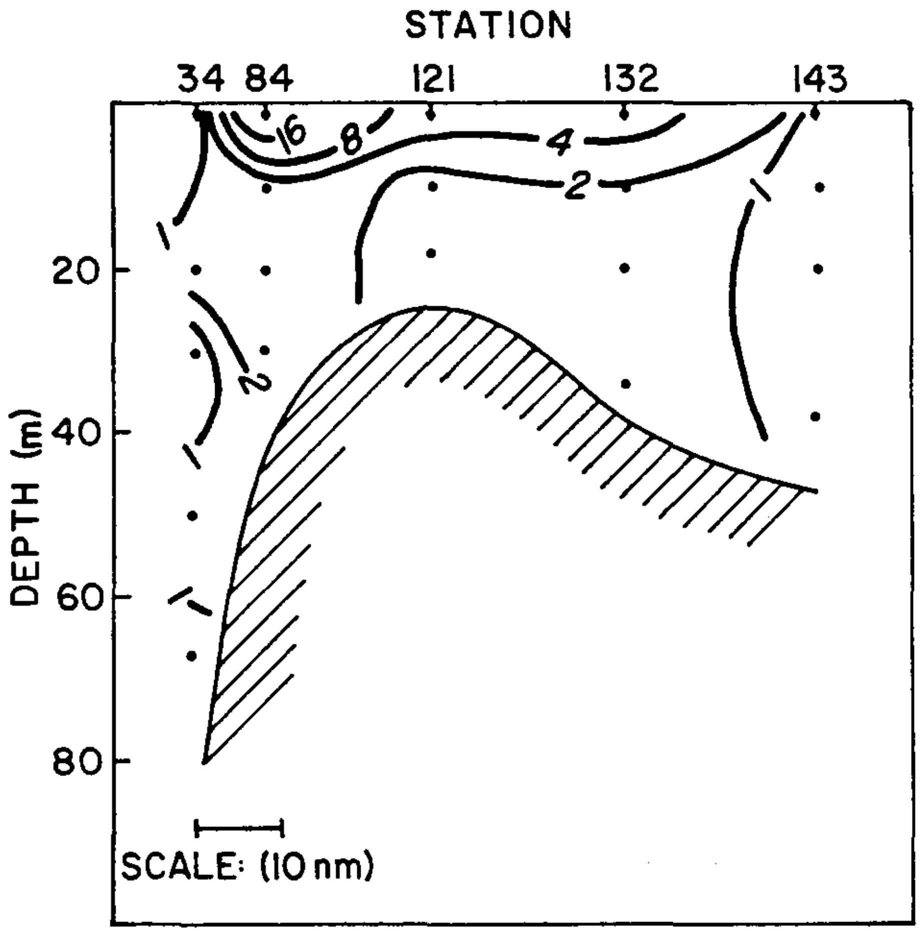


Figure 11c. Distribution of total dissolved Cu (μg/l) along the axis of the anomalous cell for XWCC-15.

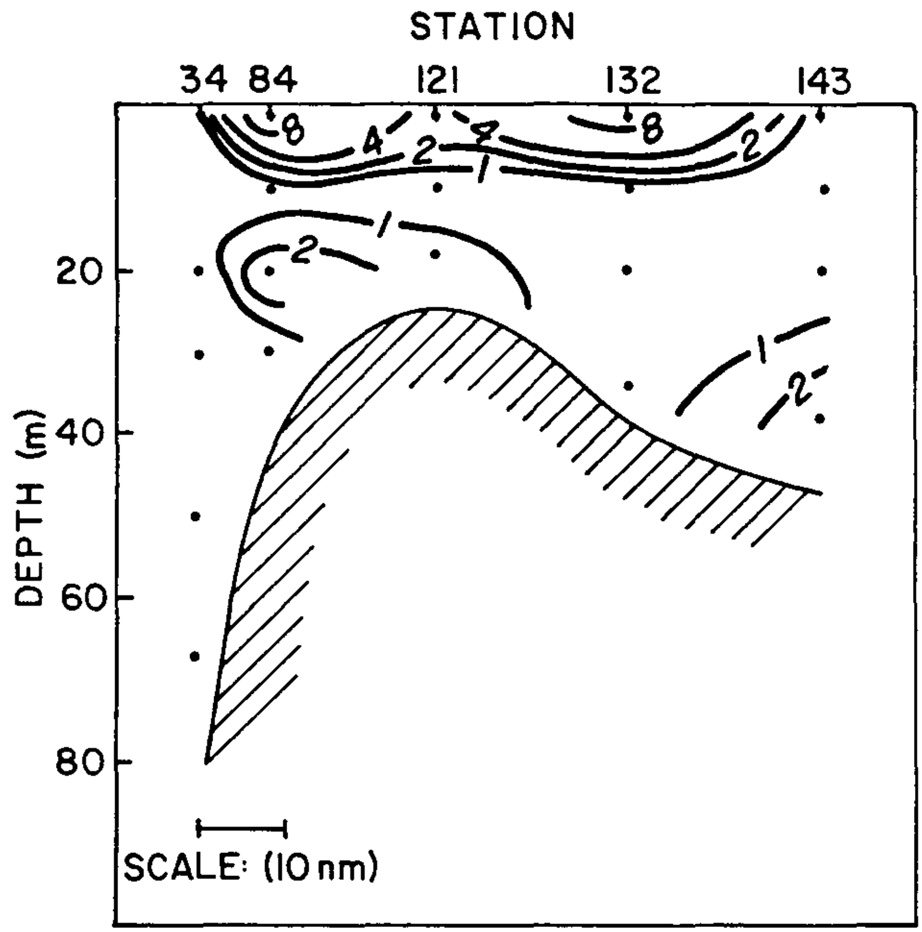


Figure 11d. Distribution of total dissolved Cd (μg/l) along the axis of the anomalous cell for XWCC-15.

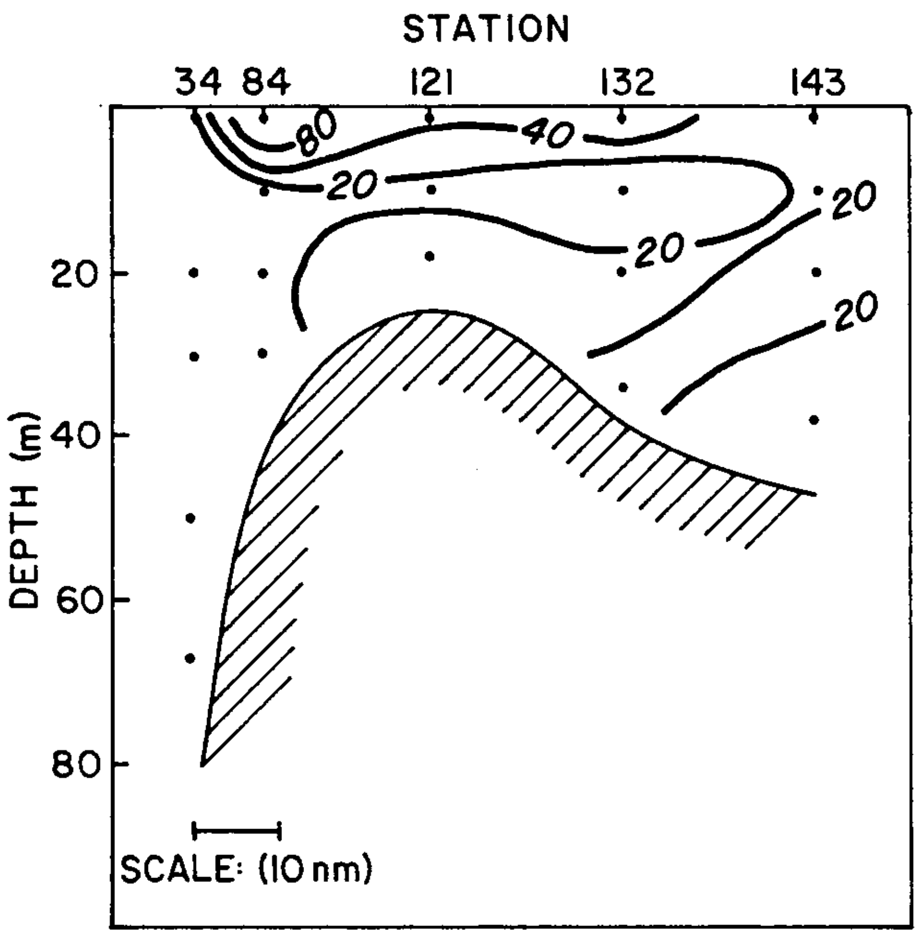


Figure 11e. Distribution of total dissolved Zn (μg/1) along the axis of the anomalous cell for XWCC-15.

# 7. KEY TO UNITS

STATION -

DEPTH - (meters)

OXYGEN - Dissolved Oxygen (ml/l)

FE - Total Dissolved Iron (μg/l)

MN - Total Dissolved Manganese (μg/l)

CU - Total Dissolved Copper (μg/l)

CD - Total Dissolved Cadmium (μg/l)

ZN - Total Dissolved Zinc (μg/l)

## 8. LIST OF TABLES

TABLE I

TRACE METAL DATA XWCC 12, APR-MAY 77

| STATION | DEPTH | O2 | FE | MN | CU | | CD | ZN |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 5.89 | 84.00 | 25.00 | 7.90 | | .28 | 9.5 |
| 1 | 11 | 6.02 | 12.00 | 6.00 | 2.60 | < | .07 | 5.6 |
| 7 | 1 | 6.66 | 3.20 | 4.90 | 1.80 | < | .07 | 6.8 |
| 7 | 10 | 6.33 | 29.00 | 4.50 | 3.10 | | .69 | 9.3 |
| 7 | 21 | 6.15 | 62.00 | 13.00 | 7.90 | | .93 | 28.0 |
| 26 | 1 | 6.08 | 55.00 | 27.00 | 7.90 | | .67 | 29.0 |
| 26 | 3 | 6.04 | 13.00 | 8.60 | 2.20 | < | .07 | 6.1 |

TABLE II

TRACE METAL DATA XWCC 13, MAY-JUNE 77

| STATION | DEPTH | O2 | FE | MN | CU | CD | ZN |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 5.93 | 118.00 | 21.00 | 2.60 | .28 | 13.0 |
| 1 | 9 | 5.86 | 99.00 | 16.00 | 2.10 | .28 | 22.0 |
| 3 | 1 | 6.75 | 4.20 | 3.00 | 1.80 | .47 | 21.0 |
| 3 | 14 | 5.19 | 4.00 | 3.60 | 1.20 | .24 | 16.0 |
| 5 | 1 | 6.52 | 28.00 | 2.10 | 3.50 | < .06 | 8.0 |
| 5 | 13 | 6.05 | 8.30 | 2.90 | 2.50 | < .08 | 14.0 |
| 7 | 1 | 6.09 | 1 4.00 | 17.00 | 2.00 | .28 | 16.0 |
| 9 | 1 | 6.29 | 11.00 | 1.90 | 1.50 | 1.30 | 11.0 |
| 9 | 10 | 6.31 | 5.40 | 2.90 | 1.90 | 1.10 | 6.9 |
| 9 | 22 | 5.19 | 58.00 | 3.30 | 1.80 | < .08 | 12.0 |
| 11 | 1 | 7.45 | 11.00 | 8.90 | 2.70 | 1.10 | 8.5 |
| 11 | 14 | 4.89 | 9.60 | 9.60 | 1.10 | .07 | 11.0 |
| 13 | 1 | 6.34 | 16.00 | 1.80 | 1.50 | .65 | 12.0 |
| 13 | 10 | 5.59 | 6.10 | 3.80 | 2.30 | .98 | 17.0 |
| 13 | 20 | 5.40 | 10.00 | 2.70 | 1.30 | .36 | 8.3 |
| 13 | 30 | 4.99 | 8.00 | 5.00 | 1.50 | .36 | 13.0 |
| 13 | 40 | 4.99 | 75.00 | 4.30 | .95 | .33 | 11.0 |
| 15 | 1 | 6.08 | 1.10 | 2.60 | 2.20 | .51 | 12.0 |
| 15 | 10 | 5.03 | 3.90 | 3.00 | 3.30 | .19 | 7.7 |
| 15 | 20 | 5.07 | 3.30 | 1.50 | 4.40 | .40 | 7.7 |
| 15 | 25 | 5.14 | 2.20 | 3.20 | 3.30 | .26 | 10.0 |
| 17 | 1 | 7.31 | 7.50 | 7.30 | 1.70 | .36 | 7.0 |
| 17 | 10 | 6.22 | 21.00 | 1.50 | .83 | .36 | 7.4 |
| 17 | 25 | 4.67 | 26.00 | 9.70 | 1.10 | .22 | 7.4 |
| 19 | 1 | 6.23 | 29.00 | 3.40 | 1.70 | .22 | 7.0 |
| 19 | 10 | 6.08 | 2.80 | 4.10 | 1.10 | .51 | 5.4 |
| 19 | 20 | 5.24 | 5.50 | 2.50 | 2.80 | .18 | 5.8 |
| 19 | 25 | 5.26 | 5.10 | 25.00 | 3.30 | .29 | 6.6 |
| 21 | 1 | 6.51 | 6.40 | 2.80 | 2.50 | 1.40 | 8.1 |
| 21 | 10 | 6.08 | 7.20 | 2.30 | 2.10 | 1.40 | 9.3 |
| 21 | 19 | 4.60 | 13.00 | 10.00 | 2.50 | 1.30 | 17.0 |
| 23 | 1 | 6.17 | 56.00 | 6.20 | 3.70 | .18 | 6.2 |
| 23 | 30 | 5.69 | 15.00 | 2.50 | 2.10 | .51 | 7.8 |
| 23 | 44 | 5.26 | 12.00 | 6.10 | 1.20 | .26 | 7.2 |
| 25 | 1 | 6.11 | 23.00 | 4.50 | 4.60 | 2.10 | 11.0 |

TABLE II (CONT)

TRACE METAL DATA XWCC 13, MAY-JUNE 77

| STATION | DEPTH | O2 | FE | MN | CU | CD | ZN |
|---|---|---|---|---|---|---|---|
| 25 | 11 | 6.01 | 8.30 | 8.00 | 1 2.00 | .56 | 11.0 |
| 25 | 20 | 5.23 | 23.00 | 5.00 | 6.90 | 1.00 | 11.0 |
| 25 | 32 | 5.24 | 11.00 | 9.20 | 2.30 | 3.20 | 13.0 |
| 26 | 1 | 5.52 | 168.00 | 32.00 | 5.80 | .71 | 26.0 |
| 27 | 1 | 6.15 | 4.40 | 2.10 | 4.00 | .49 | 7.9 |
| 27 | 10 | 6.36 | 53.00 | 2.20 | 2.80 | 1.20 | 9.9 |
| 27 | 30 | 5.14 | 6.10 | 1.40 | 2.30 | .30 | 6.1 |
| 28 | 1 | 6.52 | 9.00 | 6.80 | .76 | .28 | 12.0 |
| 28 | 10 | 6.26 | 5.70 | 2.10 | .76 | .24 | 9.0 |
| 31 | 1 | 6.65 | 7.30 | 3.40 | 1.50 | .21 | 34.0 |
| 31 | 10 | 6.85 | 8.60 | 1.10 | 1.50 | .85 | 13.0 |
| 31 | 20 | 6.72 | 3.60 | 1.10 | 7.00 | .17 | 11.0 |
| 31 | 30 | 6.34 | 2.70 | .69 | 1.80 | .25 | 9.9 |
| 31 | 50 | 6.04 | 19.00 | .99 | 2.20 | .17 | 14.0 |
| 31 | 70 | 5.96 | 8.20 | .84 | 2.20 | .22 | 20.0 |
| 32 | 10 | 6.87 | 3.60 | 1.80 | 1 2.00 | .34 | 24.0 |
| 32 | 20 | 6.58 | 3.60 | .99 | 2.20 | .22 | 12.0 |
| 32 | 30 | 6.23 | 10.00 | .92 | 1.50 | .25 | 13.0 |
| 32 | 50 | 5.99 | 4.50 | .99 | 1.80 | .29 | 14.0 |
| 32 | 125 | 4.45 | 10.00 | .92 | 1.30 | .25 | 13.0 |
| 33 | 1 | 6.32 | 5.40 | 4.20 | 2.00 | .81 | 7.2 |
| 33 | 10 | 6.24 | 24.00 | 3.40 | 2.20 | .66 | 8.7 |
| 33 | 20 | 5.82 | 44.00 | 2.00 | 1.80 | 1.00 | 9.9 |
| 34 | 1 | 6.14 | .91 | 14.00 | 1.70 | .68 | 8.1 |
| 34 | 10 | 6.09 | .91 | 3.50 | 1.10 | .23 | 7.3 |
| 34 | 50 | 5.22 | .91 | 4.10 | 1.10 | .23 | 7.7 |
| 34 | 70 | 5.01 | 1.40 | 5.20 | 8.60 | .90 | 9.7 |
| 35 | 1 | 6.16 | 5.00 | 5.80 | 1.70 | .14 | 7.2 |
| 35 | 10 | 6.13 | 9.80 | 2.60 | 1.70 | .14 | 10.0 |
| 35 | 20 | 6.90 | 4.10 | 1.60 | 1.70 | < .07 | 8.1 |
| 35 | 30 | 6.91 | 1.80 | 2.10 | 3.50 | .24 | 9.7 |
| 35 | 70 | 5.60 | 6.40 | 2.80 | 4.60 | .48 | 14.0 |
| 36 | 1 | 6.20 | 7.70 | 7.80 | 2.10 | .77 | 17.0 |
| 36 | 20 | 7.01 | 5.70 | 2.80 | 8.30 | .44 | 12.0 |
| 36 | 30 | 6.53 | 9.30 | 3.10 | 1.30 | .40 | 9.9 |
| 36 | 50 | 5.63 | 6.10 | 3.80 | 1.80 | .37 | 21.0 |
| 36 | 65 | 5.63 | 4.50 | 9.90 | 1.50 | .59 | 13.0 |

TABLE II (CONT)

TRACE METAL DATA XWCC 13, MAY-JUNE 77

| STATION | DEPTH | O2 | FE | MN | CU | CD | ZN |
|---|---|---|---|---|---|---|---|
| 37 | 1 | 6.11 | 3.60 | 3.90 | .88 | .26 | 14.0 |
| 37 | 10 | 6.21 | 3.40 | 4.70 | 1.50 | .28 | 8.2 |
| 37 | 20 | 7.07 | 10.00 | 3.20 | .88 | .73 | 10.0 |
| 37 | 30 | 5.79 | 8.60 | 3.60 | 1.50 | .48 | 12.0 |
| 37 | 50 | 5.22 | 10.00 | 2.00 | .88 | .22 | 10.0 |
| 37 | 70 | 5.72 | 5.00 | 2.70 | .88 | .29 | 13.0 |
| | | | | | | | |
| 38 | 70 | 5.63 | 32.00 | 5.10 | 3 9.00 | .51 | 16.0 |
| | | | | | | | |
| 39 | 50 | 6.06 | 10.00 | 3.00 | 1.50 | .34 | 15.0 |
| 39 | 80 | 5.94 | 8.60 | 1.20 | 1.50 | .64 | 16.0 |
| 39 | 122 | 5.10 | 7.60 | 3.20 | 1.10 | .34 | 14.0 |
| | | | | | | | |
| 57 | 1 | 6.56 | 13.00 | 1.80 | 2.00 | .46 | 15.0 |
| 57 | 30 | 7.17 | 5.40 | 1.20 | 2.00 | .46 | 15.0 |
| 57 | 40 | 6.05 | 7.30 | 3.20 | 1.30 | .21 | 15.0 |
| 57 | 50 | 5.50 | 6.40 | 1.20 | 4.70 | .42 | 13.0 |
| | | | | | | | |
| 58 | 1 | 6.81 | 8.20 | 6.10 | 2.70 | 1.70 | 13.0 |
| 58 | 20 | 7.72 | 12.00 | 3.70 | 4.00 | .38 | 16.0 |
| 58 | 30 | 7.16 | 3.60 | 7.70 | 4.70 | .50 | 23.0 |
| 58 | 40 | 6.61 | 14.00 | 7.20 | 3.40 | 1.10 | 23.0 |
| 58 | 55 | 6.12 | 12.00 | 4.20 | 4.70 | 1.50 | 16.0 |
| 58 | 71 | 6.13 | 68.00 | 11.00 | 3.40 | 1.50 | 12.0 |
| | | | | | | | |
| 59 | 10 | 6.58 | 8.20 | 4.30 | 2.90 | 2.30 | 17.0 |
| 59 | 20 | 7.75 | 7.00 | 8.10 | 1.80 | .76 | 17.0 |
| 59 | 30 | 6.68 | 15.00 | 4.70 | 1.80 | 1.50 | 21.0 |
| 59 | 40 | 6.37 | 11.00 | 3.20 | 1.80 | .28 | 17.0 |
| 59 | 60 | 6.31 | 7.00 | 5.00 | 1.00 | .22 | 21.0 |
| | | | | | | | |
| 60 | 1 | 6.47 | 4.10 | 1.80 | 1.00 | .17 | 26.0 |
| 60 | 10 | 6.52 | 2.30 | 3.20 | 1.80 | 1.30 | 21.0 |
| 60 | 20 | 7.82 | 5.90 | 2.00 | 1.60 | .07 | 25.0 |
| 60 | 30 | 6.70 | 4.70 | 3.00 | 1.60 | .66 | 10.0 |
| 60 | 50 | 6.19 | 22.00 | 2.30 | 1.60 | .24 | 17.0 |
| 60 | 58 | 6.19 | 7.00 | 2.20 | 1.80 | .35 | 13.0 |
| | | | | | | | |
| 61 | 1 | 6.49 | 5.20 | 3.50 | .96 | .17 | 17.0 |
| 61 | 10 | 6.46 | 1.40 | 3.20 | 2.10 | .42 | 17.0 |
| 61 | 20 | 8.00 | 1.40 | 1.80 | 2.40 | .24 | 14.0 |
| 61 | 30 | 6.60 | 2.40 | 1.20 | 1.60 | .68 | 37.0 |
| 61 | 40 | 6.37 | 7.20 | 3.10 | .96 | .34 | 17.0 |
| 61 | 50 | 6.31 | 3.40 | 2.80 | .96 | .58 | 15.0 |
| | | | | | | | |
| 62 | 1 | 6.84 | 12.00 | 3.80 | 1.70 | .58 | 15.0 |
| 62 | 20 | 7.29 | 1.40 | 1.30 | .96 | .48 | 24.0 |

TABLE II (CONT)

TRACE METAL DATA XWCC 13, MAY-JUNE 77

| STATION | DEPTH | O2 | FE | MN | CU | CD | ZN |
|---|---|---|---|---|---|---|---|
| 62 | 30 | 6.18 | 8.90 | 4.00 | 2.00 | .48 | 19.0 |
| 62 | 47 | 5.86 | 4.70 | 2.90 | 1.40 | .58 | 18.0 |
| 63 | 1 | 6.46 | 14.00 | 4.20 | 2.90 | 1.50 | 13.0 |
| 63 | 21 | 6.27 | 9.60 | 3.80 | .96 | .51 | 24.0 |
| 63 | 33 | 5.29 | 3.10 | 3.50 | 1.40 | .27 | 15.0 |
| 64 | 1 | 6.48 | 10.00 | 5.30 | 2.00 | 1.70 | 9.5 |
| 64 | 20 | 7.72 | 6.30 | 1.60 | 1.70 | .43 | 6.4 |
| 65 | 1 | 6.27 | 5.90 | 31.00 | 1.70 | .63 | 6.6 |
| 65 | 20 | 6.87 | 35.00 | 2.20 | 2.00 | .45 | 6.8 |
| 65 | 30 | 5.40 | 4.10 | 3.20 | 3.50 | .24 | 8.5 |
| 65 | 50 | 5.49 | 2.60 | 2.80 | 1.40 | .24 | 6.4 |
| 66 | 1 | ---- | 2.60 | 4.00 | 1.70 | .31 | 6.6 |
| 67 | 1 | 6.38 | 8.90 | 16.00 | 3.80 | 1.60 | 31.0 |
| 67 | 10 | 6.39 | 7.50 | 5.70 | 1.70 | .95 | 56.0 |
| 67 | 10 | 6.59 | 7.50 | 5.10 | 1.40 | .85 | 25.0 |
| 67 | 20 | | 6.50 | 4.40 | 1.40 | 1.10 | 20.0 |
| 68 | 1 | 6.07 | 30.00 | 6.10 | 1.00 | 1.90 | 8.1 |
| 68 | 20 | 7.35 | 4.40 | 3.20 | 1.20 | .60 | 9.1 |
| 68 | 33 | 5.31 | 6.70 | 19.00 | 2.60 | .00 | 17.0 |
| 69 | 1 | 6.31 | 8.30 | 6.50 | 2.10 | .73 | 9.4 |
| 69 | 10 | 6.16 | 8.30 | 8.20 | 1.40 | 2.50 | 15.0 |
| 69 | 30 | 4.90 | 6.40 | 12.00 | 3.50 | 2.00 | 8.9 |
| 69 | 40 | 4.87 | 7.20 | 3.80 | 1.00 | 1.20 | 9.1 |
| 70 | 1 | 6.24 | 2.30 | 3.30 | 1.90 | .52 | 5.9 |
| 70 | 10 | 6.26 | 1.90 | 2.80 | .69 | .24 | 5.5 |
| 70 | 20 | 5.95 | 3.00 | 4.50 | 1.00 | .24 | 7.7 |
| 70 | 26 | 5.82 | 4.10 | 4.50 | 1.50 | 1.20 | 6.3 |
| 77 | 1 | 6.08 | 3.30 | 4.50 | 1.70 | .38 | 9.5 |
| 77 | 22 | 6.22 | 9.30 | 3.70 | 5.70 | .68 | 10.0 |
| 77 | 36 | 5.33 | 6.10 | 2.60 | 2.30 | 3.90 | 12.0 |
| 78 | 1 | 6.13 | 4.80 | 3.00 | 1.70 | .14 | 8.7 |
| 78 | 10 | 6.09 | 3.20 | 3.20 | 1.70 | .45 | 14.0 |
| 78 | 20 | 7.18 | 2.30 | 1.20 | 1.50 | .21 | 9.5 |
| 78 | 30 | 5.72 | 3.60 | 1.70 | 1.20 | .38 | 13.0 |
| 78 | 40 | 5.62 | 3.20 | 2.70 | 1.50 | .55 | 19.0 |
| 79 | 1 | 6.06 | 7.70 | .00 | 6.00 | .48 | 14.0 |

TABLE II (CONT)

TRACE METAL DATA XWCC 13, MAY-JUNE 77

| STATION | DEPTH | O2 | FE | MN | CU | CD | ZN |
|---|---|---|---|---|---|---|---|
| 79 | 10 | 6.01 | 11.00 | 7.10 | 1.70 | 1.60 | 16.0 |
| 79 | 20 | 7.04 | 5.90 | 6.00 | 1.30 | .55 | 11.0 |
| 79 | 40 | 5.44 | 11.00 | 2.60 | 4.80 | .27 | 15.0 |
| 79 | 47 | 5.48 | 3.20 | 24.00 | .97 | .31 | 13.0 |
| 80 | 1 | 6.21 | 9.10 | 3.90 | 1.30 | .16 | 7.2 |
| 80 | 10 | 6.25 | 40.00 | 5.50 | 1.10 | .16 | 6.2 |
| 80 | 20 | 6.38 | 3.70 | 4.50 | .76 | .20 | 7.0 |
| 80 | 30 | 7.23 | 3.20 | 1.90 | .86 | .52 | 8.0 |
| 80 | 40 | 5.04 | 3.70 | 3.40 | .88 | .40 | 7.6 |
| 80 | 50 | 5.00 | 8.90 | 3.20 | 1.10 | 1.10 | 7.0 |
| 81 | 1 | 6.21 | 8.20 | 4.50 | 5 3.00 | 1.30 | 18.0 |
| 81 | 10 | 6.37 | 7.80 | 3.60 | .88 | .11 | 16.0 |
| 81 | 30 | ---- | 23.00 | 5.40 | 4 9.00 | .22 | 7.5 |
| 81 | 42 | 5.44 | 10.00 | 2.70 | 2.90 | .51 | 11.0 |
| 82 | 1 | 5.94 | 5.90 | 3.80 | 7.90 | .63 | 11.0 |
| 82 | 1 | 5.94 | 7.30 | 4.70 | 7.20 | .40 | 10.0 |
| 82 | 20 | 7.00 | 14.00 | 6.90 | 2.20 | .51 | 8.8 |
| 82 | 20 | 7.05 | 6.10 | 2.60 | 2.60 | .66 | 12.0 |
| 82 | 43 | 5.22 | 3.60 | 2.70 | .88 | .33 | 8.6 |
| 83 | 1 | 6.24 | .91 | 9.30 | 1.20 | .48 | 9.1 |
| 83 | 10 | 6.20 | 3.60 | 19.00 | 4.60 | 1.50 | 8.7 |
| 83 | 20 | 6.20 | 10.00 | 19.00 | 1.70 | .51 | 8.9 |
| 83 | 30 | 5.27 | 1.80 | 4.30 | 1.20 | .48 | 6.4 |
| 84 | 1 | 6.15 | 10.00 | 6.40 | 2.30 | 1.50 | 17.0 |
| 84 | 10 | 6.12 | 5.40 | 5.60 | 2.80 | .41 | 10.0 |
| 84 | 20 | 6.66 | 12.00 | 13.00 | 4.00 | .31 | 9.1 |
| 84 | 30 | 5.20 | 67.00 | 3.30 | 4.60 | 1.90 | 11.0 |
| 85 | 1 | 6.03 | 12.00 | 3.70 | 7.70 | .33 | 14.0 |
| 85 | 23 | 5.25 | 9.10 | 5.40 | 2.70 | .51 | 16.0 |
| 113 | 1 | 6.18 | 1.50 | 2.20 | 2.70 | .32 | 5.7 |
| 113 | 20 | 6.80 | 1.50 | 2.30 | .76 | 1.20 | 5.1 |
| 113 | 40 | 5.13 | 1.50 | 2.10 | 1 9.00 | .69 | 9.3 |
| 113 | 47 | 4.98 | 1.50 | 11.00 | 2.70 | 1.60 | 6.9 |
| 114 | 1 | 6.71 | 5.60 | 12.00 | .76 | 1.40 | 9.2 |
| 114 | 10 | 6.52 | 5.20 | 3.80 | .76 | 1.40 | 9.0 |
| 114 | 20 |  | 7.50 | 7.90 | 1.30 | .00 | 14.0 |
| 114 | 50 | 6.44 | 9.00 | 41.00 | .76 | 4.80 | 19.0 |
| 114 | 57 | 4.79 | 5.20 | 6.10 | 1.10 | .69 | 14.0 |

TABLE II (CONT)

TRACE METAL DATA XWCC 13, MAY-JUNE 77

| STATION | DEPTH | O2 | FE | MN | CU | CD | ZN |
|---|---|---|---|---|---|---|---|
| 116 | 1 | 6.24 | 10.00 | 1.40 | 1.70 | .15 | 3.1 |
| 116 | 10 | 6.30 | 3.30 | 2.00 | 2.30 | .26 | 3.8 |
| 116 | 20 | 5.30 | 4.40 | 1.20 | 2.80 | .15 | 7.7 |
| 116 | 25 | 5.26 | 4.40 | 1.80 | 5.00 | .15 | 4.6 |
| 117 | 1 | 6.26 | 7.50 | 2.10 | .76 | .24 | 10.0 |
| 117 | 10 | 6.14 | 2.60 | 2.10 | 1.50 | 1.60 | 10.0 |
| 117 | 30 | 4.84 | 2.60 | 2.00 | .00 | .77 | 7.9 |
| 117 | 35 | 4.82 | 1.50 | 3.30 | 2.50 | .97 | 6.1 |
| 118 | 1 | 6.33 | 11.00 | 3.80 | 1.20 | .48 | 6.7 |
| 118 | 40 | 5.17 | 15.00 | 5.90 | 2.60 | .77 | 12.0 |
| 118 | 54 | 5.02 | 8.10 | 3.90 | 1.20 | .52 | 8.3 |
| 119 | 20 | 4.12 | 20.00 | 14.00 | 3.80 | .73 | 16.0 |
| 120 | 23 | 3.86 | 18.00 | 15.00 | 2.10 | .64 | 13.0 |
| 120 | 24 | 4.28 | 1.60 | 2.20 | 1.00 | .76 | 11.0 |
| 121 | 17 | 5.34 | 5.50 | 2.70 | 1.70 | .60 | 9.8 |
| 122 | 32 | 5.60 | 17.00 | 46.00 | 2.60 | .76 | 13.0 |
| 123 | 33 | 5.81 | 14.00 | 5.10 | 1.80 | 1.90 | 15.0 |
| 124 | 38 | 5.86 | 11.00 | 4.40 | 1.10 | .60 | 17.0 |
| 125 | 60 | 5.12 | 28.00 | 1.70 | 1.50 | .92 | 19.0 |
| 126 | 80 | 5.61 | 3.80 | 13.00 | .73 | .71 | 13.0 |
| 126 | 102 | 5.38 | 1.90 | 2.30 | .73 | 2.30 | 13.0 |
| 129 | 15 | 5.49 | 12.00 | 6.40 | 2.80 | 1.50 | 13.0 |
| 130 | 20 | 4.03 | 1.60 | 15.00 | 1.40 | 2.00 | 13.0 |
| 131 | 28 | 5.79 | 12.00 | 4.10 | 1.40 | 1.60 | 29.0 |
| 132 | 30 | 5.87 | 7.10 | 5.50 | 1.40 | .60 | 20.0 |
| 133 | 46 | 5.58 | 12.00 | 4.60 | 1.00 | .54 | 12.0 |
| 134 | 54 | 5.63 | 5.50 | 2.80 | 1.00 | 2.10 | 11.0 |
| 135 | 70 | 5.95 | 5.50 | 3.70 | 1.40 | .76 | 14.0 |
| 136 | 115 | 5.98 | 1.60 | 1.70 | 3.80 | 4.70 | 10.0 |

TABLE II (CONT)

TRACE METAL DATA XWCC 13, MAY-JUNE 77

| STATION | DEPTH | O2 | FE | MN | CU | CD | ZN |
|---|---|---|---|---|---|---|---|
| 139 | 15 | 4.56 | 7.80 | 13.00 | 1.00 | .83 | 17.0 |
| 140 | 20 | 4.81 | 2.30 | 5.80 | 1.40 | 1.10 | 9.7 |
| 141 | 26 | 5.53 | 4.70 | 1.80 | 1.40 | .23 | 11.0 |
| 142 | 32 | 5.77 | 28.00 | 3.10 | 2.40 | .32 | 27.0 |
| 144 | 45 | 5.83 | 14.00 | 8.00 | 2.10 | .87 | 12.0 |
| 145 | 72 | 5.78 | 6.30 | 3.90 | 1.00 | .65 | 15.0 |
| 146 | 103 | 4.27 | 8.60 | 29.00 | 1.40 | 1.20 | 65.0 |
| 150 | 17 | 5.70 | 33.00 | 11.00 | 2.40 | .64 | 14.0 |
| 152 | 29 | 5.66 | 9.40 | 3.80 | 2.40 | .73 | 15.0 |
| 153 | 31 | 5.56 | 20.00 | 6.00 | 8.00 | .32 | 17.0 |
| 154 | 45 | 5.99 | 1.60 | 2.00 | 1.40 | .46 | 12.0 |
| 155 | 53 | 5.88 | 7.10 | 2.50 | 1.00 | .96 | 12.0 |
| 156 | 62 | 5.71 | 7.80 | 4.10 | 1.40 | 1.10 | 15.0 |
| 157 | 113 | 4.33 | 20.00 | 40.00 | 1.00 | .55 | 14.0 |

TABLE III

TRACE METAL DATA XWCC 15, AUG 1977

| STATION | DEPTH | O2 | FE | MN | CU | CD | ZN |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 4.96 | 11.00 | 14.00 | .59 | .14 | 12.0 |
| 1 | 9 | 4.07 | 14.00 | 15.00 | 2.50 | .12 | 11.0 |
| 3 | 1 | 5.03 | 9.10 | 4.20 | 1.50 | .33 | 11.0 |
| 3 | 10 | 4.24 | 3.90 | .56 | .77 | .23 | 9.6 |
| 3 | 16 | 2.55 | 4.50 | 1.70 | 1.80 | .13 | 9.3 |
| 5 | 1 | 5.19 | 11.00 | .84 | 1.50 | .26 | 11.0 |
| 5 | 13 | 3.53 | 12.00 | 2.20 | 1.30 | .63 | 14.0 |
| 7 | 1 | 5.69 | 11.00 | 19.00 | 1.30 | .32 | 45.0 |
| 7 | 10 | 4.69 | 3.90 | 4.90 | 1.20 | 1.90 | 47.0 |
| 7 | 21 | 3.88 | 3.90 | 7.20 | .76 | .16 | 13.0 |
| 9 | 1 | 6.79 | 7.50 | 1.70 | 1.00 | .47 | 11.0 |
| 9 | 10 | 5.36 | 11.00 | < .56 | 1.00 | .38 | 9.8 |
| 9 | 22 | 3.06 | 22.00 | 3.60 | 1.50 | 1.40 | 38.0 |
| 11 | 1 | 5.70 | 17.00 | 7.90 | .34 | .75 | 11.0 |
| 11 | 13 | 3.63 | 1.10 | 15.00 | .48 | .24 | 13.0 |
| 13 | 1 | 6.26 | 4.40 | 3.80 | .50 | 1.60 | 12.0 |
| 13 | 10 | 5.37 | 3.80 | 2.10 | .42 | .63 | 14.0 |
| 13 | 20 | 4.07 | 9.40 | 4.80 | .34 | .16 | 16.0 |
| 13 | 30 | 3.93 | 13.00 | 9.40 | .50 | .67 | 16.0 |
| 13 | 37 | 3.91 | 14.00 | 14.00 | .59 | .12 | 14.0 |
| 15 | 1 | 6.15 | 18.00 | .58 | 1.00 | .49 | 11.0 |
| 15 | 10 | 5.55 | 25.00 | .58 | 2.00 | .20 | 8.5 |
| 15 | 20 | 4.04 | 31.00 | .86 | 1.00 | 1.80 | 12.0 |
| 15 | 24 | 3.11 | 20.00 | .58 | 1.00 | .28 | 9.7 |
| 17 | 1 | 6.21 | 8.20 | 4.30 | .96 | .44 | 46.0 |
| 17 | 10 | 4.07 | 11.00 | 9.20 | 1.20 | .40 | 21.0 |
| 17 | 26 | 4.15 | 11.00 | 8.10 | .48 | .56 | 38.0 |
| 19 | 1 | 6.37 | 32.00 | 1.70 | 1.30 | 2.40 | 19.0 |
| 19 | 10 | 5.45 | 29.00 | .58 | 1.00 | .20 | 7.5 |
| 19 | 20 | 3.49 | 15.00 | .58 | 1.00 | .28 | 9.2 |
| 19 | 25 | 3.14 | 14.00 | .58 | 8.20 | .81 | 20.0 |
| 21 | 1 | 5.93 | 5.50 | 8.20 | .72 | .36 | 41.0 |
| 21 | 11 | 3.93 | 7.60 | 4.00 | 1.40 | .63 | 17.0 |
| 21 | 21 | 2.27 | 12.00 | 26.00 | .48 | .28 | 33.0 |
| 23 | 1 | 6.39 | 12.00 | 5.00 | 3.00 | .32 | 13.0 |
| 23 | 10 | 5.44 | 2.50 | .32 | 1.40 | .32 | 15.0 |

TABLE III (CONT)

TRACE METAL DATA XWCC 15, AUG 1977

| STATION | DEPTH | O2 | FE | MN | CU | CD | ZN |
|---|---|---|---|---|---|---|---|
| 23 | 20 | 5.77 | 2.10 | .83 | .78 | .12 | 17.0 |
| 23 | 30 | 5.70 | 1.70 | 1.10 | .78 | .12 | 13.0 |
| 23 | 38 | 5.49 | 5.90 | 3.50 | .65 | .28 | 13.0 |
| 25 | 1 | 5.90 | 23.00 | .86 | 1.30 | .18 | 6.3 |
| 25 | 10 | 5.61 | 16.00 | .58 | .77 | .26 | 7.3 |
| 25 | 20 | 4.11 | 25.00 | .58 | 1.00 | .20 | 8.1 |
| 25 | 31 | 3.86 | 22.00 | 1.10 | 1.30 | .53 | 5.9 |
| 26 | 1 | 4.44 | 15.00 | 20.00 | 1.10 | .16 | 18.0 |
| 26 | 5 | 3.94 | 19.00 | 24.00 | 1.00 | .24 | 16.0 |
| 27 | 1 | 5.72 | 14.00 | 1.40 | 1.30 | < .09 | 5.0 |
| 27 | 10 | 5.80 | 22.00 | .86 | 1.30 | .18 | 4.8 |
| 27 | 20 | 6.51 | 33.00 | .58 | 1.30 | < .09 | 5.2 |
| 27 | 34 | 4.58 | 23.00 | .68 | 1.00 | < .09 | 5.6 |
| 28 | 1 | 5.41 | 25.00 | .72 | .73 | .11 | 6.0 |
| 28 | 30 | 4.05 | 33.00 | .72 | .49 | .11 | 8.4 |
| 28 | 41 | 4.02 | 19.00 | 1.10 | .73 | .42 | 5.6 |
| 28 | 41 | 4.02 | 24.00 | < .72 | .49 | .11 | 7.2 |
| 31 | 1 | 5.64 | 9.00 | .80 | 1.40 | .18 | 5.2 |
| 31 | 50 | 5.35 | 22.00 | .80 | .47 | .18 | 5.6 |
| 31 | 60 | 5.28 | 20.00 | 2.20 | 1.20 | .73 | 6.0 |
| 31 | 68 | 5.19 | 16.00 | .60 | .47 | .14 | 6.0 |
| 32 | 1 | 5.37 | 24.00 | 1.80 | .68 | 1.30 | 16.0 |
| 32 | 60 | 4.79 | 15.00 | < .49 | .68 | < .10 | 11.0 |
| 32 | 80 | 4.47 | 23.00 | .98 | .68 | < .10 | 7.0 |
| 32 | 100 | 4.35 | 23.00 | .49 | .68 | < .10 | 6.6 |
| 33 | 1 | 5.60 | .84 | 2.30 | 3.00 | .24 | 13.0 |
| 33 | 20 | 5.92 | 4.00 | 1.90 | .76 | .00 | 13.0 |
| 33 | 30 | 5.60 | 3.30 | .78 | 1.10 | .34 | 13.0 |
| 33 | 40 | 5.27 | 2.70 | 1.60 | 1.20 | .20 | 17.0 |
| 33 | 52 | 4.98 | 3.80 | 3.70 | 3.10 | .36 | 14.0 |
| 34 | 1 | 5.55 | 4.00 | 11.00 | 1.30 | .54 | 15.0 |
| 34 | 22 | 6.32 | 8.40 | 2.50 | 2.50 | .20 | 14.0 |
| 34 | 30 | 5.90 | 2.80 | 2.50 | .51 | .60 | 13.0 |
| 34 | 50 | 5.04 | 5.60 | 4.50 | 1.30 | .87 | 16.0 |
| 34 | 67 | 4.59 | 16.00 | 22.00 | .89 | .58 | 18.0 |
| 35 | 1 | 6.01 | 4.00 | 5.10 | 1.20 | 1.10 | 19.0 |
| 35 | 20 | 6.74 | 5.20 | 1.80 | 1.40 | .43 | 14.0 |
| 35 | 30 | 5.66 | 7.20 | 1.80 | 1.50 | .50 | 21.0 |

TABLE III (CONT)

TRACE METAL DATA XWCC 15, AUG 1977

| STATION | DEPTH | O2 | FE | MN | CU | | CD | ZN |
|---|---|---|---|---|---|---|---|---|
| 35 | 51 | 5.09 | 6.20 | 3.50 | .96 | | 1.20 | 18.0 |
| 35 | 66 | 4.78 | 6.40 | 8.80 | .58 | | .33 | 29.0 |
| 36 | 1 | 5.71 | 2.80 | 1.50 | .85 | | .60 | 16.0 |
| 36 | 40 | 6.68 | 5.00 | 1.00 | .56 | < | .09 | 18.0 |
| 36 | 50 | 5.65 | 4.40 | .73 | .56 | < | .09 | 19.0 |
| 36 | 64 | 5.52 | 4.20 | .73 | .56 | | .58 | 16.0 |
| 37 | 1 | 5.56 | 3.50 | 1.90 | .56 | | .45 | 20.0 |
| 37 | 50 | 5.56 | 8.10 | 1.10 | .56 | < | .10 | 17.0 |
| 37 | 60 | 5.37 | 2.90 | .48 | .56 | | .40 | 17.0 |
| 37 | 75 | 5.45 | 2.00 | 1.10 | .56 | < | .10 | 17.0 |
| 38 | 1 | 5.71 | 3.50 | 1.30 | .56 | | .40 | 17.0 |
| 38 | 50 | 5.44 | 3.00 | .65 | .68 | | 2.10 | 16.0 |
| 38 | 60 | 5.47 | 4.60 | 1.10 | .56 | < | .10 | 24.0 |
| 38 | 75 | 5.59 | 5.80 | .81 | .56 | | .95 | 19.0 |
| 39 | 1 | 5.69 | 18.00 | 1.90 | .68 | < | .10 | 23.0 |
| 39 | 60 | 5.14 | 18.00 | 1.30 | .68 | | .33 | 18.0 |
| 39 | 80 | 4.84 | 11.00 | 1.80 | 4.70 | < | .10 | 23.0 |
| 39 | 100 | 4.60 | 10.00 | .97 | .68 | | .81 | 22.0 |
| 57 | 1 | 5.50 | 16.00 | .98 | .85 | < | .10 | 6.1 |
| 57 | 60 | 5.41 | 4.20 | .82 | 1.60 | | .29 | 7.9 |
| 57 | 80 | 5.29 | 20.00 | 1.60 | .63 | | .57 | 12.0 |
| 57 | 100 | 4.75 | 10.00 | 1.50 | .68 | | 1.10 | 17.0 |
| 58 | 1 | 8.69 | 25.00 | .98 | .63 | < | .09 | 9.2 |
| 58 | 50 | 5.59 | 4.10 | .98 | .63 | | .48 | 5.3 |
| 58 | 60 | 5.51 | 16.00 | 2.90 | .63 | | .72 | 6.6 |
| 58 | 75 | 5.35 | 12.00 | 2.50 | 1.90 | < | .09 | 5.7 |
| 59 | 1 | 5.69 | 41.00 | 3.70 | .63 | | 1.90 | 68.0 |
| 59 | 20 | 7.79 | 34.00 | 2.10 | .63 | | .89 | 28.0 |
| 59 | 40 | 6.06 | 22.00 | 1.30 | .63 | | .26 | 6.6 |
| 59 | 60 | 5.26 | 6.60 | 2.50 | 1.20 | | .35 | 5.7 |
| 60 | 1 | 5.80 | 22.00 | 5.70 | .63 | | 1.40 | 39.0 |
| 60 | 40 | 6.32 | 22.00 | 1.50 | .83 | | .23 | 6.6 |
| 60 | 50 | 5.31 | 18.00 | 1.30 | .63 | | .17 | 6.6 |
| 60 | 57 | 5.67 | 4.10 | 2.70 | .63 | < | .10 | 7.5 |
| 61 | 1 | 5.77 | 17.00 | 1.90 | 5.10 | | 1.00 | 5.7 |
| 61 | 30 | 6.59 | 18.00 | 1.20 | 1.90 | | 1.10 | 5.3 |
| 61 | 40 | 6.38 | 14.00 | 1.20 | .56 | | .23 | 5.7 |
| 61 | 53 | 5.49 | 26.00 | 1.30 | 2.10 | | .13 | 6.1 |

TABLE III (CONT)

TRACE METAL DATA XWCC 15, AUG 1977

| STATION | DEPTH | O2 | FE | MN | CU | CD | ZN |
|---|---|---|---|---|---|---|---|
| 62 | 1 | 5.83 | 19.00 | 1.70 | 2.20 | .21 | 7.0 |
| 62 | 30 | 5.56 | 15.00 | 1.50 | .83 | 1.60 | 5.7 |
| 62 | 40 | 5.54 | 26.00 | 1.30 | .56 | .13 | 6.0 |
| 62 | 46 | 5.32 | 20.00 | 2.10 | .83 | .09 | 6.6 |
| 63 | 1 | 6.31 | 19.00 | 1.70 | .83 | .25 | 5.7 |
| 63 | 10 | 6.21 | 23.00 | 1.90 | 2.10 | .25 | 6.8 |
| 63 | 20 | 5.91 | 22.00 | 1.70 | 1.80 | .15 | 5.6 |
| 63 | 32 | 5.04 | 22.00 | 3.00 | .56 | .29 | 6.8 |
| 64 | 1 | 5.67 | 21.00 | 1.10 | 1.90 | .39 | 6.0 |
| 64 | 40 | 5.93 | 23.00 | .76 | .93 | .32 | 7.6 |
| 64 | 50 | 5.22 | 20.00 | 1.10 | 2.10 | .14 | 6.0 |
| 64 | 65 | 5.10 | 18.00 | 1.50 | 1.90 | 1.00 | 7.6 |
| 65 | 1 | 5.64 | 22.00 | 1.50 | 1.20 | 1.10 | 6.4 |
| 65 | 30 | 5.80 | 20.00 | 2.40 | .93 | .82 | 6.4 |
| 65 | 40 | 5.76 | 22.00 | .75 | 2.10 | .18 | 6.4 |
| 65 | 51 | 5.37 | 31.00 | 1.70 | 1.40 | < .09 | 6.8 |
| 66 | 1 | 5.72 | 52.00 | 11.00 | 1.30 | 3.30 | 21.0 |
| 66 | 20 | 6.05 | 4.70 | 2.60 | .94 | .39 | 5.6 |
| 66 | 30 | 6.39 | 20.00 | 4.70 | .56 | .10 | 5.4 |
| 66 | 42 | 5.45 | 25.00 | 4.10 | 1.10 | .39 | 11.0 |
| 67 | 1 | 6.14 | 20.00 | 3.20 | 1.10 | .15 | 6.8 |
| 67 | 11 | 6.46 | 39.00 | 2.10 | 2.80 | .34 | 10.0 |
| 67 | 20 | 5.37 | 24.00 | 2.10 | .70 | .20 | 7.7 |
| 67 | 34 | 5.52 | 24.00 | 1.50 | 1.10 | .25 | 8.5 |
| 68 | 1 | 5.42 | 28.00 | < .72 | 1.90 | .24 | 8.9 |
| 68 | 9 | 5.46 | 16.00 | .72 | .49 | .40 | 23.0 |
| 68 | 20 | 6.70 | 20.00 | .72 | .73 | .24 | 6.9 |
| 68 | 30 | 6.08 | 16.00 | .72 | .49 | .20 | 5.3 |
| 68 | 40 | 5.24 | 20.00 | < .72 | .49 | .20 | 8.5 |
| 68 | 48 | 5.09 | 28.00 | < .72 | 1.20 | .41 | 7.3 |
| 69 | 1 | 5.63 | 41.00 | .72 | .53 | .34 | 16.0 |
| 69 | 30 | 5.00 | 12.00 | .72 | .53 | .15 | 8.5 |
| 69 | 40 | 4.60 | 26.00 | 1.10 | .53 | 1.20 | 7.5 |
| 69 | 40 | 4.58 | 22.00 | .72 | .53 | 1.00 | 30.0 |
| 70 | 1 | 6.14 | 25.00 | .68 | .79 | .15 | 8.0 |
| 70 | 10 | 6.10 | 19.00 | 1.40 | 1.30 | .27 | 5.9 |
| 70 | 20 | 4.57 | 23.00 | .68 | 1.00 | .19 | 8.5 |
| 70 | 27 | 4.60 | 18.00 | .68 | .79 | .15 | 7.0 |

TABLE III (CONT)

TRACE METAL DATA XWCC 15, AUG 1977

| STATION | DEPTH | $O^2$ | FE | MN | CU | CD | ZN |
|---|---|---|---|---|---|---|---|
| 77 | 1 | 5.55 | .84 | 2.10 | .51 | .12 | 24.0 |
| 77 | 10 | 5.56 | 3.00 | 1.20 | .63 | 1.60 | 15.0 |
| 77 | 19 | 5.46 | 1.20 | 1.40 | 2.00 | .79 | 12.0 |
| 77 | 35 | 5.26 | 1.30 | .63 | .51 | .12 | 11.0 |
| 78 | 1 | 5.62 | 3.00 | 9.20 | .48 | .40 | 18.0 |
| 78 | 11 | 5.83 | 2.60 | 5.80 | .38 | .38 | 15.0 |
| 78 | 21 | 6.17 | 4.60 | 4.10 | .67 | .48 | 21.0 |
| 78 | 31 | 5.22 | 1.60 | 1.90 | .58 | .20 | 14.0 |
| 78 | 40 | 5.16 | 3.40 | 2.00 | .38 | .32 | 16.0 |
| 79 | 1 | 5.69 | 8.40 | 1.40 | 3.40 | .60 | 16.0 |
| 79 | 30 | 4.99 | 2.40 | 1.50 | .56 | < .09 | 17.0 |
| 79 | 40 | 4.94 | 8.40 | 1.60 | .85 | < .09 | 19.0 |
| 79 | 47 | 4.99 | 7.60 | 1.40 | .56 | .82 | 18.0 |
| 80 | 1 | 5.52 | 14.00 | 1.30 | .85 | < .10 | 16.0 |
| 80 | 30 | 5.52 | 4.40 | 1.10 | .56 | 2.40 | 15.0 |
| 80 | 40 | 5.67 | 7.20 | 1.10 | .56 | < .10 | 15.0 |
| 80 | 52 | 5.65 | 18.00 | 2.10 | .56 | < .10 | 16.0 |
| 81 | 1 | 5.67 | 13.00 | 1.80 | 1.10 | 1.10 | 27.0 |
| 81 | 20 | 7.31 | 9.70 | 2.00 | 2.80 | 4.90 | 28.0 |
| 81 | 30 | 5.97 | 3.90 | 10.00 | .56 | .97 | 21.0 |
| 81 | 42 | 4.80 | 18.00 | 4.80 | 1.40 | 4.30 | 15.0 |
| 82 | 1 | 5.56 | 3.40 | 2.30 | 1.80 | .10 | 11.0 |
| 82 | 10 | 5.56 | 3.10 | 3.10 | .96 | .23 | 15.0 |
| 82 | 20 | 7.20 | .88 | .75 | .48 | .14 | 12.0 |
| 82 | 30 | 5.87 | 37.00 | 7.10 | 2.70 | 11.00 | 36.0 |
| 82 | 43 | 5.09 | 8.40 | 2.70 | 1.90 | .10 | 14.0 |
| 83 | 1 | 5.55 | 6.80 | 4.10 | .96 | .54 | 17.0 |
| 83 | 10 | 5.49 | 14.00 | 3.60 | 1.90 | 1.70 | 23.0 |
| 83 | 20 | 6.63 | < .88 | .55 | 1.20 | .19 | 17.0 |
| 83 | 30 | 5.49 | 1.50 | 1.80 | 1.70 | < .08 | 14.0 |
| 83 | 40 | 5.08 | 5.30 | 3.40 | .48 | .82 | 17.0 |
| 84 | 1 | 5.61 | 167.00 | 42.00 | 2 8.00 | 12.00 | 58.0 |
| 84 | 10 | 5.57 | 20.00 | 2.70 | 2.50 | .37 | 14.0 |
| 84 | 20 | 4.01 | 5.00 | 2.20 | 2.60 | 2.60 | 14.0 |
| 84 | 30 | 4.19 | 3.30 | 5.00 | 2.60 | .14 | 14.0 |
| 85 | 1 | 6.01 | 13.00 | 4.00 | 2.40 | .60 | 19.0 |
| 85 | 10 | 6.06 | 6.40 | 1.60 | 1.30 | .16 | 13.0 |
| 85 | 20 | 3.17 | 1.30 | 4.10 | 1.80 | .12 | 13.0 |

TABLE III (CONT)

TRACE METAL DATA XWCC 15, AUG 1977

| STATION | DEPTH | O2 | FE | MN | CU | CD | ZN |
|---|---|---|---|---|---|---|---|
| 85 | 27 | 3.51 | 11.00 | 7.30 | 1.30 | .40 | 42.0 |
| 113 | 1 | 5.50 | 22.00 | .72 | .73 | .23 | 6.9 |
| 113 | 30 | 5.89 | 25.00 | .72 | .49 | 1.30 | 5.7 |
| 113 | 40 | 4.54 | 23.00 | 1.80 | .73 | .19 | 6.9 |
| 113 | 47 | 4.50 | 28.00 | 1.10 | .73 | .84 | 7.7 |
| 114 | 1 | 5.28 | 17.00 | < .72 | .85 | .16 | 6.4 |
| 114 | 40 | 5.27 | 16.00 | .72 | .43 | < .08 | 6.8 |
| 114 | 50 | 5.19 | 5.50 | .72 | 1.10 | .16 | 5.6 |
| 114 | 56 | 5.13 | 21.00 | .72 | 1.90 | .16 | 6.8 |
| 115 | 1 | 5.47 | 15.00 | .76 | .47 | .12 | 5.2 |
| 115 | 42 | 5.75 | 24.00 | .76 | 1.30 | .41 | 11.0 |
| 115 | 50 | 5.25 | 8.60 | .76 | 1.30 | .20 | 6.8 |
| 115 | 62 | 5.42 | 14.00 | .76 | .43 | .20 | 6.0 |
| 116 | 1 | 6.05 | 21.00 | < .68 | 1.50 | < .09 | 5.7 |
| 116 | 10 | 6.09 | 13.00 | .68 | 1.00 | < .09 | 4.4 |
| 116 | 20 | 4.78 | 17.00 | .68 | 1.30 | .13 | 4.8 |
| 116 | 24 | 4.56 | 14.00 | < .68 | 1.30 | .35 | 5.6 |
| 117 | 1 | 5.73 | 20.00 | .72 | .79 | .15 | 8.2 |
| 117 | 30 | 5.41 | 18.00 | 1.40 | .53 | .15 | 8.5 |
| 117 | 35 | 5.19 | 20.00 | < .72 | .53 | 2.60 | 7.5 |
| 117 | 35 | 5.16 | 19.00 | < .72 | .53 | .19 | 10.0 |
| 118 | 1 | 5.31 | 18.00 | .72 | .64 | .33 | 8.1 |
| 118 | 30 | 6.29 | 19.00 | .72 | .43 | .20 | 5.7 |
| 118 | 40 | 5.71 | 19.00 | .72 | .43 | .24 | 6.1 |
| 118 | 54 | 5.22 | 17.00 | 1.10 | 1.50 | 1.90 | 5.7 |
| 119 | 1 | 6.64 | 5.80 | 2.50 | 2.40 | .83 | 15.0 |
| 119 | 10 | 4.20 | 3.20 | 3.40 | 1.70 | .73 | 24.0 |
| 119 | 19 | 2.05 | 3.80 | 15.00 | 2.20 | .37 | 17.0 |
| 120 | 1 | 7.05 | 10.00 | 6.60 | 3.40 | 1.80 | 21.0 |
| 120 | 10 | 3.00 | 10.00 | 5.40 | 2.60 | .53 | 17.0 |
| 120 | 22 | 2.56 | 3.10 | 2.50 | 1.70 | .50 | 17.0 |
| 121 | 1 | 5.80 | 36.00 | 11.00 | 5.70 | 3.90 | 41.0 |
| 121 | 10 | 5.75 | 5.90 | 3.50 | 1.40 | .55 | 18.0 |
| 121 | 18 | 3.99 | 17.00 | 4.60 | 1.60 | 1.60 | 39.0 |
| 122 | 1 | 5.70 | 19.00 | 5.60 | 1.40 | 1.20 | 25.0 |
| 122 | 11 | 5.77 | 1.20 | 2.20 | 1.40 | .09 | 15.0 |
| 122 | 20 | 6.69 | .78 | < .66 | 2.00 | .09 | 13.0 |

TABLE III (CONT)

TRACE METAL DATA XWCC 15, AUG 1977

| STATION | DEPTH | O2 | FE | MN | CU | CD | ZN |
|---|---|---|---|---|---|---|---|
| 122 | 34 | 5.09 | < .78 | .83 | 1.70 | .09 | 18.0 |
| 123 | 1 | 5.73 | .78 | 2.70 | 1.40 | < .09 | 23.0 |
| 123 | 20 | 7.22 | 1.20 | < .66 | 1.10 | .08 | 6.3 |
| 123 | 30 | 5.37 | 1.20 | < .66 | 1.70 | .09 | 6.3 |
| 123 | 37 | 5.36 | .78 | 1.60 | 1.10 | .14 | 6.7 |
| 124 | 10 | 5.65 | 3.00 | 2.30 | .56 | < .08 | 15.0 |
| 124 | 20 | 7.36 | 6.60 | 1.30 | .77 | .36 | 18.0 |
| 124 | 30 | 5.56 | 4.20 | 2.50 | 1.00 | .36 | 17.0 |
| 124 | 38 | 5.36 | 25.00 | 9.80 | .51 | 2.60 | 15.0 |
| 125 | 1 | 5.59 | 2.20 | 1.20 | .51 | .52 | 14.0 |
| 125 | 40 | 6.51 | 5.70 | 1.10 | .51 | 1.20 | 25.0 |
| 125 | 50 | 5.54 | 3.30 | 1.00 | .51 | .32 | 19.0 |
| 125 | 62 | 5.31 | 4.20 | .95 | .77 | .58 | 17.0 |
| 126 | 1 | 5.71 | 2.00 | .73 | .51 | .30 | 17.0 |
| 126 | 60 | 5.90 | 4.30 | < .73 | 1.00 | .95 | 20.0 |
| 126 | 79 | 5.76 | 3.90 | .58 | .51 | 2.70 | 17.0 |
| 126 | 100 | 5.37 | 2.30 | .73 | .77 | .38 | 16.0 |
| 127 | 1 | 6.03 | < .80 | 2.20 | 2.40 | .09 | 13.0 |
| 127 | 10 | 5.32 | 3.80 | 4.80 | 2.00 | .18 | 20.0 |
| 127 | 24 | 3.53 | 2.40 | 3.70 | 2.60 | .46 | 17.0 |
| 129 | 1 | 6.17 | 8.40 | 2.40 | 1.40 | 2.30 | 23.0 |
| 129 | 10 | 2.34 | 7.10 | 23.00 | 1.10 | .34 | 15.0 |
| 129 | 16 | 2.28 | 6.90 | 33.00 | 1.10 | .51 | 15.0 |
| 130 | 1 | 6.01 | 4.20 | 3.20 | 1.70 | 1.30 | 17.0 |
| 130 | 10 | 4.40 | 2.50 | 17.00 | 1.40 | .24 | 17.0 |
| 130 | 19 | 2.53 | 7.00 | 14.00 | 1.40 | .38 | 18.0 |
| 131 | 1 | 5.61 | 19.00 | 4.50 | 1.40 | 1.40 | 33.0 |
| 131 | 10 | 5.54 | 2.50 | 3.10 | 1.40 | .64 | 13.0 |
| 131 | 20 | 5.04 | 4.60 | 1.10 | 2.00 | .43 | 19.0 |
| 131 | 27 | 5.08 | 11.00 | 2.50 | 2.00 | .75 | 17.0 |
| 132 | 1 | 5.62 | 32.00 | 20.00 | 5.10 | 10.00 | 60.0 |
| 132 | 10 | 5.49 | 2.30 | 4.20 | 2.00 | .23 | 10.0 |
| 132 | 20 | 5.35 | 1.30 | 1.20 | 1.70 | .17 | 24.0 |
| 132 | 34 | 5.31 | 2.90 | < .59 | 1.90 | .41 | 16.0 |
| 133 | 1 | 5.46 | 1.20 | 2.60 | 1.40 | .12 | 7.9 |
| 133 | 10 | 5.52 | < .77 | 1.90 | 1.10 | .29 | 8.3 |
| 133 | 20 | 6.51 | < .77 | < .59 | 1.70 | .08 | 6.3 |

TABLE III (CONT)

TRACE METAL DATA XWCC 15, AUG 1977

| STATION | DEPTH | O2 | FE | MN | CU | CD | ZN |
|---|---|---|---|---|---|---|---|
| 133 | 30 | 5.77 | .78 | 1.30 | 1.60 | .17 | 11.0 |
| 133 | 43 | 5.77 | 2.00 | 3.80 | 1.60 | .33 | 9.9 |
| 134 | 1 | 5.50 | 15.00 | 2.10 | 1.80 | .39 | 22.0 |
| 134 | 30 | 5.49 | 1.40 | 1.20 | .67 | .54 | 15.0 |
| 134 | 40 | 5.35 | 14.00 | 1.80 | 1.60 | .38 | 20.0 |
| 134 | 50 | 5.30 | 13.00 | 2.00 | 2.50 | .53 | 21.0 |
| 135 | 1 | 5.64 | 9.80 | 2.60 | 2.90 | .44 | 22.0 |
| 135 | 50 | 6.42 | 7.90 | 1.00 | .90 | .40 | 16.0 |
| 135 | 60 | 5.50 | .98 | 1.60 | .67 | .27 | 17.0 |
| 135 | 69 | 5.39 | 14.00 | 2.30 | 2.00 | .13 | 17.0 |
| 136 | 1 | 5.66 | 10.00 | 1.20 | .90 | .17 | 17.0 |
| 136 | 60 | 6.05 | 34.00 | 1.20 | .77 | .43 | 16.0 |
| 136 | 80 | 5.62 | 11.00 | 1.00 | .77 | .18 | 17.0 |
| 136 | 100 | 5.80 | 9.50 | 1.20 | 1.00 | .18 | 19.0 |
| 137 | 1 | 5.69 | 2.00 | 1.30 | 1.40 | .24 | 23.0 |
| 137 | 10 | 5.62 | 6.50 | 1.80 | .95 | .34 | 26.0 |
| 137 | 20 | 4.95 | 16.00 | 2.50 | 1.70 | 1.20 | 50.0 |
| 137 | 26 | 4.96 | 2.20 | 1.30 | 1.10 | .14 | 22.0 |
| 139 | 1 | 5.81 | 4.40 | 9.90 | .63 | .22 | 14.0 |
| 139 | 10 | 4.06 | 30.00 | 3.50 | 2.50 | 1.00 | 17.0 |
| 139 | 16 | 1.69 | 4.70 | 22.00 | 1.40 | 1.20 | 14.0 |
| 140 | 1 | 6.16 | 14.00 | 4.30 | .87 | 1.30 | 30.0 |
| 140 | 10 | 5.01 | 46.00 | 8.10 | .79 | 5.20 | 50.0 |
| 140 | 19 | 3.20 | 3.00 | 3.80 | .87 | .81 | 15.0 |
| 141 | 1 | 6.20 | .79 | 1.60 | .95 | < .20 | 14.0 |
| 141 | 10 | 5.92 | 2.00 | < .66 | .79 | .24 | 14.0 |
| 141 | 20 | 3.78 | .79 | < .66 | 1.10 | .20 | 14.0 |
| 141 | 24 | 3.92 | .79 | < .66 | 1.10 | < .20 | 15.0 |
| 142 | 1 | 6.37 | 18.00 | 3.80 | 1.60 | 1.10 | 27.0 |
| 142 | 10 | 6.07 | 4.90 | .98 | .95 | .12 | 14.0 |
| 142 | 20 | 5.08 | 1.60 | < .66 | .95 | .20 | 14.0 |
| 142 | 32 | 4.91 | 53.00 | 8.70 | 5.60 | 3.30 | 52.0 |
| 143 | 1 | 6.00 | 8.40 | 2.20 | .79 | .48 | 24.0 |
| 143 | 10 | 5.50 | 5.30 | 4.40 | .32 | .50 | 21.0 |
| 143 | 20 | 5.09 | 1.40 | < .66 | .32 | .20 | 14.0 |
| 143 | 38 | 4.58 | 15.00 | 2.40 | .32 | 2.80 | 27.0 |
| 144 | 1 | 5.51 | 7.70 | 3.30 | .90 | .14 | 14.0 |

TABLE III (CONT)

TRACE METAL DATA XWCC 15, AUG 1977

| STATION | DEPTH | O2 | FE | MN | CU | CD | ZN |
|---|---|---|---|---|---|---|---|
| 144 | 10 | 5.52 | 10.00 | 4.10 | .90 | .21 | 24.0 |
| 144 | 20 | 7.59 | 12.00 | .79 | 1.60 | .25 | 18.0 |
| 144 | 30 | 5.34 | 35.00 | 11.00 | 1 1.00 | 2.30 | 45.0 |
| 144 | 44 | 5.31 | 14.00 | < .63 | .67 | .15 | 17.0 |
| 145 | 1 | 5.41 | .00 | < .71 | .62 | .31 | 12.0 |
| 145 | 29 | 7.18 | 10.00 | < .63 | 1.10 | < .05 | 18.0 |
| 145 | 50 | 5.42 | 7.40 | < .63 | 1.00 | < .05 | 12.0 |
| 145 | 60 | 5.31 | 12.00 | < .63 | 1.00 | .43 | 18.0 |
| 145 | 69 | 5.13 | 10.00 | .63 | 1.00 | .26 | 14.0 |
| 146 | 1 | 5.10 | 6.00 | .63 | .83 | .42 | 17.0 |
| 146 | 30 | 3.97 | 5.00 | .60 | .42 | .43 | 13.0 |
| 146 | 60 | 4.57 | 5.50 | < .63 | .62 | < .05 | 14.0 |
| 146 | 76 | 4.27 | 4.10 | < .63 | .42 | .17 | 12.0 |
| 146 | 103 | 3.61 | 10.00 | < .63 | .83 | < .05 | 15.0 |
| 150 | 1 | 5.27 | 4.40 | .89 | 1.70 | .20 | 17.0 |
| 150 | 10 | 4.42 | 5.50 | 2.40 | 2.10 | .18 | 16.0 |
| 150 | 17 | 4.06 | 4.20 | 5.50 | 2.50 | .16 | 17.0 |
| 151 | 1 | 5.64 | 14.00 | 1.20 | 2.10 | .40 | 17.0 |
| 151 | 10 | 5.35 | 12.00 | 1.00 | 2.50 | .75 | 23.0 |
| 151 | 23 | 3.30 | 6.70 | 5.70 | 1.70 | .24 | 17.0 |
| 152 | 1 | 5.80 | 4.20 | .76 | 2.10 | .53 | 12.0 |
| 152 | 10 | 5.70 | 2.30 | 1.00 | 2.50 | .11 | 13.0 |
| 152 | 20 | 4.02 | 6.00 | 1.00 | 2.10 | .26 | 25.0 |
| 152 | 29 | 4.07 | 3.10 | .89 | 1.70 | .11 | 26.0 |
| 153 | 1 | 5.76 | 6.10 | 1.30 | 2.50 | .59 | 26.0 |
| 153 | 10 | 5.96 | 3.80 | < .63 | 1.70 | 1.20 | 19.0 |
| 153 | 20 | 4.90 | 1.40 | 1.30 | 2.50 | 2.00 | 17.0 |
| 153 | 32 | 4.79 | 4.20 | 1.60 | 2.50 | .18 | 18.0 |
| 154 | 1 | 5.80 | 1.50 | < .63 | 2.60 | .11 | 14.0 |
| 154 | 20 | 6.88 | 3.60 | 1.20 | 2.10 | .22 | 13.0 |
| 154 | 30 | 5.50 | 2.30 | < .63 | 2.50 | .15 | 13.0 |
| 154 | 40 | 5.45 | .70 | < .63 | 2.10 | .21 | 14.0 |
| 154 | 45 | 5.51 | 2.00 | < .63 | 2.10 | .15 | 14.0 |
| 155 | 1 | 5.45 | 19.00 | 5.00 | 2.50 | 1.90 | 74.0 |
| 155 | 30 | 6.43 | 1.60 | < .63 | 3.00 | .92 | 14.0 |
| 155 | 40 | 5.44 | 1.40 | < .63 | 3.00 | .57 | 13.0 |
| 155 | 50 | 5.39 | 2.10 | 1.60 | 2.20 | .25 | 15.0 |
| 155 | 59 | 5.37 | 1.30 | < .63 | 2.10 | .12 | 15.0 |

TABLE III (CONT)

TRACE METAL DATA XWCC 15, AUG 1977

| STATION | DEPTH | O2 | FE | MN | CU | CD | ZN |
|---|---|---|---|---|---|---|---|
| 156 | 1 | 5.39 | 2.40 | 1.20 | 3.70 | .74 | 12.0 |
| 156 | 30 | 6.42 | 3.30 | 1.10 | 4.10 | .26 | 12.0 |
| 156 | 41 | 5.54 | 2.70 | < .63 | 3.70 | .18 | 11.0 |
| 156 | 50 | 5.61 | 3.70 | < .63 | 3.30 | 1.40 | 14.0 |
| 156 | 61 | 5.36 | 4.40 | .86 | 3.70 | .57 | 18.0 |
| 157 | 1 | 5.35 | 7.10 | < .63 | 4.10 | .92 | 16.0 |
| 157 | 30 | 6.63 | 18.00 | 1.60 | 1.50 | 1.20 | 19.0 |
| 157 | 60 | 5.25 | 8.90 | 1.10 | 3.30 | .25 | 18.0 |
| 157 | 80 | 4.88 | 6.00 | < .63 | 4.40 | .37 | 39.0 |
| 157 | 101 | 4.57 | 5.70 | .86 | 4.80 | .29 | 16.0 |

TABLE IV

TRACE METAL DATA XWCC 16, OCT 1977

| STATION | DEPTH | $O^2$ | FE | MN | CU | CD | ZN |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 5.14 | 56.00 | 22.00 | 1.20 | 1.00 | 12.0 |
| 1 | 10 | 4.50 | 157.00 | 16.00 | 1.20 | .09 | 11.0 |
| 3 | 1 | 5.18 | 42.00 | 19.00 | 1.20 | .21 | 12.0 |
| 3 | 10 | 5.01 | 51.00 | 4.60 | .94 | .30 | 22.0 |
| 3 | 20 | 4.45 | 63.00 | 4.50 | .94 | .23 | 26.0 |
| 5 | 1 | 6.28 | 26.00 | 4.20 | 1.70 | .34 | 39.0 |
| 5 | 10 | 4.96 | 120.00 | 10.00 | .94 | .13 | 11.0 |
| 7 | 1 | 5.57 | 28.00 | 15.00 | 1.60 | .18 | 10.0 |
| 7 | 10 | 5.43 | 33.00 | 16.00 | .63 | .12 | 26.0 |
| 7 | 19 | 3.64 | 99.00 | 15.00 | 1.20 | .13 | 11.0 |
| 9 | 1 | 6.07 | 13.00 | 2.80 | .63 | .13 | 9.3 |
| 9 | 10 | 6.00 | 37.00 | 3.10 | .63 | .42 | 10.0 |
| 9 | 20 | 3.37 | 9.10 | 9.10 | .63 | .08 | 10.0 |
| 11 | 1 | 5.78 | 5.60 | 8.90 | .63 | .10 | 11.0 |
| 11 | 12 | 4.35 | 21.00 | 3.10 | .63 | .15 | 9.2 |
| 13 | 1 | 5.91 | 8.10 | 2.10 | .63 | .08 | 9.9 |
| 13 | 10 | 5.70 | 18.00 | 3.10 | .63 | .14 | 8.6 |
| 13 | 20 | 5.52 | 11.00 | 3.00 | .63 | .08 | 9.7 |
| 13 | 30 | 3.84 | 14.00 | 17.00 | .63 | .18 | 9.1 |
| 13 | 36 | 3.76 | 22.00 | 16.00 | .63 | .17 | 10.0 |
| 15 | 1 | 6.15 | 2.60 | 1.90 | 1.60 | .12 | 8.7 |
| 15 | 10 | 5.90 | 2.00 | 1.90 | 1.80 | .14 | 7.8 |
| 15 | 24 | 4.46 | 5.00 | 3.60 | .89 | .12 | 23.0 |
| 17 | 1 | 5.39 | 1.50 | 3.50 | .78 | .08 | 9.8 |
| 17 | 10 | 5.39 | 1.60 | 3.50 | .63 | .08 | 8.1 |
| 17 | 23 | 3.95 | 5.90 | 7.10 | .94 | .08 | 7.3 |
| 19 | 1 | 4.45 | 2.80 | 1.90 | .67 | .24 | 32.0 |
| 19 | 10 | 5.96 | 3.80 | 2.00 | 1.10 | .08 | 8.9 |
| 19 | 20 | 4.39 | 3.50 | 1.70 | .67 | .08 | 10.0 |
| 19 | 25 | 4.44 | 2.80 | 4.30 | .89 | .18 | 8.5 |
| 21 | 1 | 4.89 | 6.80 | 3.00 | .63 | < .08 | 8.1 |
| 21 | 10 | 4.88 | 5.30 | 2.90 | .63 | .08 | 8.3 |
| 21 | 18 | 3.05 | 12.00 | 3.10 | .63 | .08 | 8.1 |
| 23 | 1 | 5.90 | 2.20 | 1.90 | .63 | .08 | 9.3 |
| 23 | 10 | 6.06 | 2.00 | 1.90 | .89 | .08 | 9.7 |
| 23 | 20 | 5.89 | 1.90 | 2.30 | .63 | .12 | 11.0 |

TABLE IV (CONT)

TRACE METAL DATA XWCC 16, OCT 1977

| STATION | DEPTH | O2 | FE | MN | CU | | CD | ZN |
|---|---|---|---|---|---|---|---|---|
| 23 | 29 | 5.69 | 2.20 | 1.40 | .63 | | .08 | 9.5 |
| 25 | 1 | 6.02 | 1.30 | 1.10 | .71 | | .12 | 7.6 |
| 25 | 10 | 5.98 | 2.00 | .73 | .71 | | .16 | 8.2 |
| 25 | 20 | 5.76 | 9.30 | 1.10 | 2.50 | | 1.30 | 10.0 |
| 25 | 29 | 5.71 | 2.30 | 3.90 | .71 | < | .08 | 7.2 |
| 26 | 1 | 4.90 | 116.00 | 30.00 | 1.90 | | .18 | 14.0 |
| 26 | 8 | 4.96 | 149.00 | 38.00 | 1.60 | | .18 | 41.0 |
| 27 | 1 | 5.85 | 2.60 | 1.80 | 1.10 | | .20 | 9.3 |
| 27 | 10 | 5.90 | 2.00 | .79 | 1.80 | | .18 | 21.0 |
| 27 | 20 | 3.86 | 2.00 | .97 | 1.60 | | .12 | 7.4 |
| 27 | 32 | 4.03 | 2.30 | 5.20 | 1.30 | < | .08 | 14.0 |
| 28 | 1 | 5.77 | 2.00 | .56 | 1.20 | | .42 | 15.0 |
| 28 | 10 | 5.74 | 2.00 | .50 | 2.80 | | .08 | 37.0 |
| 28 | 20 | 5.75 | 2.50 | 1.80 | 1.70 | | .12 | 29.0 |
| 28 | 30 | 5.33 | 2.30 | .68 | .63 | | .07 | 8.4 |
| 28 | 42 | 4.00 | 2.50 | 1.30 | 1.00 | | .07 | 8.3 |
| 31 | 1 | 5.83 | 4.90 | 8.10 | 3.20 | | .15 | 26.0 |
| 31 | 10 | 5.87 | 5.90 | .68 | .56 | | .12 | 19.0 |
| 31 | 20 | 5.63 | 5.80 | .81 | .56 | | .12 | 23.0 |
| 31 | 30 | 5.58 | 4.90 | 1.20 | .56 | | .15 | 22.0 |
| 31 | 50 | 5.23 | 4.60 | .92 | .56 | | .11 | 22.0 |
| 31 | 70 | 4.22 | 9.50 | .95 | 2.30 | < | .07 | 23.0 |
| 32 | 1 | 5.66 | 3.60 | .90 | .59 | | .10 | 13.0 |
| 32 | 10 | 5.65 | 6.50 | .92 | 1.40 | | .18 | 12.0 |
| 32 | 30 | 5.51 | 6.30 | .54 | .59 | | .17 | 11.0 |
| 32 | 50 | 4.59 | 3.30 | .46 | .86 | | .17 | 13.0 |
| 32 | 80 | 3.89 | 8.80 | .95 | .59 | | .24 | 17.0 |
| 32 | 120 | 3.69 | 12.00 | .53 | .59 | | .22 | 26.0 |
| 33 | 1 | 5.85 | 2.60 | 2.70 | .63 | | .15 | 9.9 |
| 33 | 10 | 5.88 | 2.70 | .82 | .63 | | .17 | 10.0 |
| 33 | 20 | 5.64 | 6.00 | 1.40 | .63 | | 2.90 | 16.0 |
| 33 | 30 | 4.95 | 2.50 | 1.60 | .94 | | .14 | 11.0 |
| 33 | 46 | 3.62 | 5.60 | 5.50 | 1.90 | | .17 | 9.3 |
| 33 | 59 | 3.52 | 10.00 | 12.00 | .63 | | .17 | 12.0 |
| 34 | 1 | 5.97 | 2.80 | 1.60 | .71 | | .12 | 8.2 |
| 34 | 10 | 5.88 | 3.60 | 2.30 | .57 | | .12 | 8.3 |
| 34 | 20 | 5.83 | 2.90 | .61 | 2.00 | < | .08 | 6.5 |
| 34 | 30 | 5.32 | 3.10 | 1.10 | .71 | | .13 | 11.0 |
| 34 | 50 | 3.99 | 3.90 | 6.30 | .71 | < | .08 | 7.2 |

TABLE IV (CONT)

TRACE METAL DATA XWCC 16, OCT 1977

| STATION | DEPTH | O2 | FE | MN | CU | | CD | ZN |
|---|---|---|---|---|---|---|---|---|
| 34 | 65 | 3.97 | 5.60 | 6.90 | .71 | | .12 | 7.6 |
| 35 | 1 | 5.90 | 7.10 | 2.20 | .57 | | .12 | 6.9 |
| 35 | 10 | 5.87 | 4.60 | 1.00 | .56 | | .11 | 7.2 |
| 35 | 20 | 5.53 | 2.40 | .88 | .56 | | .12 | 6.3 |
| 35 | 30 | 4.47 | 5.30 | 1.30 | .56 | | .08 | 8.0 |
| 35 | 50 | 4.24 | 5.40 | 2.30 | .56 | < | .07 | 5.9 |
| 35 | 67 | 4.18 | 13.00 | 7.60 | .56 | < | .09 | 7.7 |
| 36 | 1 | 5.72 | 3.20 | .51 | .56 | < | .06 | 7.4 |
| 36 | 10 | 5.72 | 2.30 | .51 | .90 | < | .07 | 12.0 |
| 36 | 20 | 5.78 | 2.40 | .74 | .56 | | 1.00 | 8.0 |
| 36 | 30 | 4.63 | 2.40 | .69 | .56 | | .10 | 8.0 |
| 36 | 39 | 4.71 | 2.60 | 1.00 | .56 | < | .07 | 30.0 |
| 36 | 62 | 4.62 | 3.60 | 3.40 | 1.10 | | .16 | 39.0 |
| 37 | 1 | 5.78 | 4.60 | 1.20 | .90 | < | .07 | 12.0 |
| 37 | 10 | 5.69 | 3.90 | .74 | 1.20 | < | .08 | 13.0 |
| 37 | 20 | 5.69 | 3.80 | .57 | 1.00 | | .17 | 7.0 |
| 37 | 30 | 5.30 | 2.60 | 1.80 | .60 | | .12 | 8.0 |
| 37 | 50 | 4.99 | 3.20 | 2.00 | .60 | < | .08 | 5.6 |
| 37 | 73 | 4.94 | 12.00 | 2.40 | .60 | < | .07 | 8.8 |
| 57 | 1 | 5.52 | 4.40 | .43 | .57 | < | .08 | 17.0 |
| 57 | 10 | 5.55 | 6.10 | .64 | .57 | | .11 | 14.0 |
| 57 | 30 | 5.51 | 4.40 | .48 | .57 | | .06 | 13.0 |
| 57 | 50 | 4.36 | 4.60 | .53 | .57 | | .43 | 12.0 |
| 57 | 71 | 3.70 | 4.20 | .32 | .57 | | 4.10 | 14.0 |
| 57 | 94 | 3.64 | 4.40 | .74 | .57 | | .17 | 12.0 |
| 58 | 1 | 5.79 | 3.80 | .53 | .56 | | .48 | 43.0 |
| 58 | 20 | 5.75 | 3.60 | .64 | .56 | | .12 | 42.0 |
| 58 | 30 | 5.62 | 4.70 | .64 | .56 | | .11 | 15.0 |
| 58 | 50 | 4.51 | 4.60 | .85 | .56 | < | .08 | 18.0 |
| 58 | 70 | 4.36 | 7.30 | .85 | .56 | | .50 | 27.0 |
| 59 | 1 | 5.60 | 3.90 | .53 | .56 | | .08 | 11.0 |
| 59 | 10 | 5.71 | 5.40 | .64 | .56 | | .10 | 22.0 |
| 59 | 20 | 5.71 | 5.70 | .59 | .56 | | .12 | 11.0 |
| 59 | 30 | 5.65 | 3.60 | .53 | .56 | | .08 | 12.0 |
| 59 | 50 | 4.52 | 5.70 | .80 | .56 | | 2.80 | 13.0 |
| 59 | 58 | 4.45 | 8.50 | .96 | .56 | | .11 | 10.0 |
| 60 | 1 | 5.66 | 8.40 | 3.50 | .59 | | .55 | 21.0 |
| 60 | 10 | 5.71 | 2.90 | .74 | 1.90 | | .08 | 9.6 |
| 60 | 20 | 5.62 | 3.70 | .64 | .59 | | .11 | 10.0 |
| 60 | 30 | 5.43 | 3.70 | .64 | .59 | | .08 | 30.0 |

TABLE IV (CONT)

TRACE METAL DATA XWCC 16, OCT 1977

| STATION | DEPTH | $O^2$ | FE | MN | CU | CD | ZN |
|---|---|---|---|---|---|---|---|
| 60 | 50 | | 4.90 | .90 | .59 | .08 | 15.0 |
| 60 | 56 | 4.37 | 5.60 | .74 | .59 | .11 | 12.0 |
| 61 | 1 | 5.55 | 5.00 | 1.10 | .59 | .15 | 18.0 |
| 61 | 10 | 5.52 | 4.90 | 1.30 | 1.10 | .19 | 17.0 |
| 61 | 20 | 5.54 | 3.50 | 1.10 | .59 | .23 | 14.0 |
| 61 | 30 | 4.43 | 3.70 | .97 | .59 | .08 | 10.0 |
| 61 | 40 | 5.55 | 6.20 | 3.90 | .59 | .14 | 18.0 |
| 61 | 50 | 4.40 | 5.00 | 1.50 | .59 | .08 | 7.4 |
| 62 | 1 | 5.70 | 4.70 | 2.10 | .74 | .12 | 14.0 |
| 62 | 10 | 5.64 | 3.60 | 1.10 | .59 | .08 | 8.1 |
| 62 | 20 | 5.61 | 12.00 | 1.20 | .59 | .33 | 22.0 |
| 62 | 30 | 5.51 | 5.10 | .82 | .59 | < .08 | 8.7 |
| 62 | 45 | 4.05 | 6.70 | 1.20 | .59 | .12 | 13.0 |
| 63 | 1 | 5.61 | 7.00 | 1.40 | .59 | .27 | 13.0 |
| 63 | 10 | 5.60 | 5.00 | 1.20 | .88 | .19 | 8.1 |
| 63 | 20 | 5.56 | 8.60 | 1.50 | .74 | .92 | 11.0 |
| 63 | 33 | 5.46 | 4.80 | 1.40 | .59 | < .10 | 14.0 |
| 64 | 1 | 6.60 | 4.20 | .46 | .78 | .12 | 9.4 |
| 64 | 10 | 6.02 | 1.80 | .62 | .39 | .11 | 20.0 |
| 64 | 20 | 6.04 | 2.80 | .62 | .39 | 4.50 | 15.0 |
| 64 | 30 | 5.76 | 5.30 | .62 | .39 | .66 | 15.0 |
| 64 | 50 | 4.75 | 4.10 | .98 | .98 | .25 | 11.0 |
| 64 | 63 | 4.75 | 3.40 | .93 | .98 | .19 | 13.0 |
| 65 | 1 | 5.98 | 10.00 | .93 | .78 | .31 | 30.0 |
| 65 | 10 | 5.90 | 2.40 | .56 | .49 | .11 | 18.0 |
| 65 | 20 | 5.83 | 2.50 | .40 | .49 | .07 | 10.0 |
| 65 | 30 | 4.62 | 3.70 | .71 | .49 | .29 | 17.0 |
| 65 | 38 | 5.84 | 3.30 | 1.40 | .49 | .09 | 37.0 |
| 65 | 50 | 4.56 | 6.60 | 1.70 | .39 | < .07 | 29.0 |
| 66 | 1 | 5.60 | 2.50 | 1.50 | .49 | .18 | 11.0 |
| 66 | 20 | 5.69 | 2.70 | 1.00 | .49 | .08 | 13.0 |
| 66 | 30 | 6.04 | 3.90 | 1.10 | .49 | < .07 | 36.0 |
| 66 | 35 | 5.28 | 3.20 | 3.10 | .49 | .11 | 28.0 |
| 67 | 1 | 5.48 | 6.50 | 1.00 | .49 | < .08 | 14.0 |
| 67 | 10 | 5.47 | 11.00 | 1.40 | 2.10 | .10 | 12.0 |
| 67 | 20 | 5.47 | 10.00 | 1.20 | .59 | .07 | 12.0 |
| 67 | 30 | 5.46 | 6.90 | 1.10 | .59 | < .08 | 13.0 |
| 68 | 1 | 5.88 | 2.90 | 1.60 | .86 | .18 | 25.0 |
| 68 | 20 | 5.90 | 2.50 | .66 | .86 | .14 | 12.0 |

TABLE IV (CONT)

TRACE METAL DATA XWCC 16, OCT 1977

| STATION | DEPTH | O2 | FE | MN | CU | CD | ZN |
|---|---|---|---|---|---|---|---|
| 68 | 30 | 5.71 | 1.90 | .82 | .86 | < .08 | 10.0 |
| 68 | 40 | 5.61 | 2.40 | .82 | .86 | < .08 | 18.0 |
| 68 | 46 | 4.99 | 4.00 | 1.40 | .86 | .08 | 30.0 |
| 69 | 1 | 6.05 | 1.90 | .39 | .86 | .08 | 13.0 |
| 69 | 10 | 6.01 | 1.80 | 1.70 | .86 | .12 | 20.0 |
| 69 | 20 | 5.95 | 2.60 | .56 | .86 | .07 | 11.0 |
| 69 | 30 | 3.61 | 2.20 | .67 | 2.10 | .08 | 10.0 |
| 69 | 39 | 5.87 | 3.50 | 2.90 | .86 | .12 | 10.0 |
| 70 | 1 | 5.60 | 3.70 | 3.40 | 1.30 | .11 | 8.9 |
| 70 | 10 | 5.71 | 2.30 | 3.30 | .86 | .07 | 11.0 |
| 70 | 20 | 5.66 | 2.00 | 3.10 | 1.70 | .17 | 7.2 |
| 70 | 26 | 3.00 | 3.90 | 14.00 | .86 | .17 | 10.0 |
| 77 | 1 | 5.88 | 1.70 | 2.10 | 1.10 | .12 | 7.4 |
| 77 | 10 | 5.95 | 2.60 | 1.80 | .71 | .12 | 8.5 |
| 77 | 21 | 5.94 | 1.30 | .79 | 1.10 | < .08 | 7.0 |
| 77 | 33 | 3.16 | 5.10 | 4.20 | .89 | .11 | 7.4 |
| 78 | 1 | 5.78 | 4.50 | .88 | .56 | .17 | 6.8 |
| 78 | 10 | 5.76 | 4.00 | .96 | .56 | < .08 | 11.0 |
| 78 | 20 | 5.68 | 3.40 | .88 | .56 | .08 | 6.9 |
| 78 | 30 | 4.97 | 8.50 | 1.10 | .56 | .08 | 8.5 |
| 78 | 40 | 3.97 | 4.80 | 2.20 | .56 | .16 | 11.0 |
| 79 | 1 | 5.81 | 3.20 | .80 | .56 | .08 | 6.9 |
| 79 | 11 | 5.78 | 2.80 | .72 | .56 | < .08 | 6.3 |
| 79 | 20 | 5.72 | 2.80 | .80 | .56 | < .07 | 7.2 |
| 79 | 31 | 5.12 | 2.40 | .88 | .56 | .17 | 6.3 |
| 79 | 43 | 4.34 | 3.40 | 2.10 | .56 | .08 | 7.6 |
| 80 | 1 | 5.98 | 4.00 | .76 | 1.00 | .14 | 13.0 |
| 80 | 10 | 5.92 | 5.50 | .76 | .70 | .16 | 12.0 |
| 80 | 20 | 5.94 | 3.10 | .32 | 1.00 | .13 | 15.0 |
| 80 | 30 | 5.48 | 2.40 | .25 | 1.00 | < .07 | 11.0 |
| 80 | 40 | 4.68 | 2.70 | .32 | 1.40 | .12 | 11.0 |
| 80 | 50 | | 2.30 | .64 | 1.40 | .17 | 13.0 |
| 81 | 1 | 5.58 | 2.90 | 5.90 | .60 | < .08 | 13.0 |
| 81 | 10 | 5.70 | 2.40 | .97 | .60 | .59 | 23.0 |
| 81 | 20 | 5.69 | 4.20 | 1.00 | .60 | .07 | 14.0 |
| 81 | 30 | 4.25 | 5.60 | 3.80 | .60 | .12 | 33.0 |
| 81 | 39 | 4.08 | 5.30 | 6.60 | .60 | .20 | 16.0 |
| 82 | 1 | 5.77 | 3.60 | .46 | .60 | < .07 | 15.0 |
| 82 | 10 | 5.66 | 3.60 | .75 | .60 | < .08 | 13.0 |

TABLE IV (CONT)

TRACE METAL DATA XWCC 16, OCT 1977

| STATION | DEPTH | O2 | FE | MN | CU | | CD | ZN |
|---|---|---|---|---|---|---|---|---|
| 82 | 20 | 5.70 | 7.40 | 1.20 | .60 | | 1.90 | 13.0 |
| 82 | 30 | 4.23 | 5.30 | 1.10 | .90 | | .07 | 11.0 |
| 82 | 42 | 4.16 | 5.20 | 4.50 | .60 | | .07 | 11.0 |
| 83 | 1 | 5.95 | 4.80 | .94 | .71 | < | .08 | 6.7 |
| 83 | 10 | 6.13 | 3.60 | 3.10 | .57 | | .70 | 9.0 |
| 83 | 20 | 5.89 | 11.00 | .83 | .57 | < | .08 | 5.9 |
| 83 | 30 | 5.53 | 5.40 | .89 | .57 | < | .08 | 6.3 |
| 83 | 38 | 3.85 | 4.40 | 6.80 | .57 | | .13 | 5.9 |
| 84 | 1 | 5.88 | 3.20 | 1.20 | .86 | | .23 | 6.8 |
| 84 | 10 | 5.93 | 5.20 | 1.00 | .57 | | .12 | 7.2 |
| 84 | 20 | 5.94 | 4.10 | 1.20 | .57 | < | .06 | 6.7 |
| 84 | 29 | 3.42 | 9.20 | 14.00 | .57 | | .16 | 8.1 |
| 85 | 1 | 5.55 | 9.70 | 2.90 | .86 | | .79 | 26.0 |
| 85 | 1 | 6.01 | 7.00 | 7.20 | .94 | | .11 | 11.0 |
| 85 | 10 | 5.59 | 7.90 | 3.30 | 4.30 | | .07 | 35.0 |
| 85 | 10 | 5.63 | 11.00 | 9.10 | 6.60 | | .10 | 9.5 |
| 85 | 20 | 5.04 | 9.90 | 4.00 | 1.70 | < | .08 | 19.0 |
| 85 | 21 | 5.59 | 10.00 | 14.00 | 3.10 | | .11 | 11.0 |
| 113 | 1 | 6.00 | 2.40 | .79 | 1.60 | | .07 | 7.2 |
| 113 | 10 | 5.98 | 2.00 | .66 | 1.60 | | .14 | 12.0 |
| 113 | 20 | 4.91 | 2.00 | .66 | .63 | | .11 | 6.5 |
| 113 | 30 | 5.90 | 2.20 | .53 | 1.60 | < | .07 | 29.0 |
| 113 | 40 | 4.55 | 3.10 | 1.80 | 1.20 | < | .07 | 26.0 |
| 113 | 46 | 4.44 | 2.80 | 1.50 | .94 | < | .07 | 9.9 |
| 114 | 1 | 6.09 | 2.40 | 1.60 | .63 | | .16 | 15.0 |
| 114 | 10 | 5.03 | 2.70 | .86 | .94 | < | .08 | 9.0 |
| 114 | 20 | 5.75 | 4.20 | .59 | 1.20 | < | .08 | 28.0 |
| 114 | 30 | 5.13 | 2.90 | 1.40 | .63 | | .14 | 9.6 |
| 114 | 40 | 4.69 | 2.60 | .72 | 1.20 | | .07 | 7.6 |
| 114 | 54 | 4.65 | 6.00 | 1.70 | .94 | | .08 | 13.0 |
| 115 | 1 | 5.83 | 5.30 | 1.40 | .56 | | .09 | 17.0 |
| 115 | 10 | 5.78 | 5.80 | .92 | .56 | | .08 | 14.0 |
| 115 | 20 | 5.79 | 4.80 | .92 | .56 | | .48 | 21.0 |
| 115 | 0 | 5.80 | 4.90 | 1.20 | .56 | | .13 | 34.0 |
| 115 | 50 | 4.87 | 4.40 | 1.20 | .56 | | .13 | 34.0 |
| 115 | 60 | 4.63 | 14.00 | 2.00 | .56 | | .09 | 15.0 |
| 116 | 1 | 5.76 | 2.50 | 2.90 | 1.80 | < | .08 | 6.5 |
| 116 | 10 | 5.64 | 5.00 | 2.30 | 1.10 | | .31 | 7.2 |
| 116 | 20 | 3.80 | 5.30 | 4.00 | 1.30 | | .21 | 6.1 |
| 116 | 24 | 3.80 | 4.10 | 5.90 | 1.60 | | .11 | 15.0 |

TABLE IV (CONT)

TRACE METAL DATA XWCC 16, OCT 1977

| STATION | DEPTH | $O^2$ | FE | MN | CU | CD | ZN |
|---|---|---|---|---|---|---|---|
| 117 | 1 | | 2.80 | .62 | 2.80 | < .08 | 12.0 |
| 117 | 10 | 6.06 | 3.60 | .93 | 4.30 | .11 | 7.4 |
| 117 | 20 | 5.92 | 2.70 | .62 | 1.50 | 1.70 | 9.2 |
| 117 | 30 | 3.64 | 4.80 | 1.10 | 1.50 | .08 | 7.6 |
| 117 | 35 | 3.30 | 4.90 | 10.00 | .86 | < .08 | 7.6 |
| 118 | 1 | 5.86 | 1.80 | .44 | .86 | < .08 | 11.0 |
| 118 | 10 | 5.91 | 2.00 | .67 | .86 | .16 | 9.9 |
| 118 | 20 | 5.85 | 2.00 | .46 | .86 | .07 | 8.3 |
| 118 | 30 | 5.77 | 1.90 | .52 | .86 | .10 | 9.6 |
| 118 | 50 | 4.74 | 3.90 | .87 | .86 | < .08 | 8.6 |
| 118 | 54 | 4.74 | 2.00 | .98 | 1.30 | < .08 | 9.2 |

TABLE V.

NEW YORK BIGHT STATION POSITIONS

| STATION | LATITUDE | LONGITUDE |
|---|---|---|
| 1 | 40°30.2' | 73°57.3' |
| 3 | 40°31.5' | 73°48.4' |
| 5 | 40°33.3' | 73°32.5' |
| 7 | 40°26.9' | 73°53.0' |
| 9 | 40°28.3' | 73°39.6' |
| 11 | 40°22.2' | 73°56.7' |
| 13 | 40°23.3' | 73°47.0' |
| 15 | 40°25.2' | 73°30.4' |
| 17 | 40°18.5' | 73°51.8' |
| 19 | 40°20.2' | 73°37.9' |
| 21 | 40°13.5' | 73°56.1' |
| 23 | 40°14.8' | 73°45.6' |
| 25 | 40°16.9' | 73°28.3' |
| 26 | 40°29.0' | 73°59.5' |
| 27 | 40°18.0' | 73°17.5' |
| 28 | 40°13.5' | 73°07.0' |
| 31 | 39°54.0' | 72°25.0' |
| 32 | 39°46.0' | 72°07.0' |
| 33 | 40°10.0' | 73°41.5' |
| 34 | 40°05.5' | 73°31.5' |
| 35 | 39°59.0' | 73°21.5' |
| 36 | 39°55.0' | 73°06.5' |
| 37 | 39°46.0' | 72°57.0' |
| 38 | 39°39.0' | 72°39.5' |
| 39 | 39°32.0' | 72°26.0' |
| 57 | 39°57.0' | 71°52.0' |
| 58 | 40°08.0' | 71°58.0' |
| 59 | 40°18.0' | 72°04.0' |
| 60 | 40°27.0' | 72°09.0' |
| 61 | 40°33.0' | 72°13.0' |
| 62 | 40°40.0' | 72°16.0' |
| 63 | 40°47.0' | 72°20.0' |
| 64 | 40°12.0' | 72°20.0' |
| 66 | 40°30.0' | 72°34.0' |
| 67 | 40°38.0' | 72°40.0' |
| 68 | 40°19.0' | 72°46.0' |
| 69 | 40°25.0' | 72°55.0' |
| 70 | 40°32.0' | 73°07.0' |
| 77 | 40°10.5' | 73°34.0' |
| 78 | 40°05.0' | 73°21.5' |
| 79 | 40°00.0' | 73°09.5' |
| 80 | 39°54.5' | 72°57.0' |
| 81 | 39°44.5' | 73°10.0' |
| 82 | 39°50.5' | 73°20.5' |
| 83 | 39°56.5' | 73°30.5' |
| 84 | 40°02.0' | 73°41.0' |
| 85 | 40°08.0' | 73°51.5' |
| 113 | 40°08.8' | 72°55.5' |
| 114 | 40°04.0' | 72°45.2' |
| 115 | 39°58.7' | 72°34.1' |
| 120 | 39°46.5' | 73°55.5' |
| 121 | 39°42.9' | 73°46.5' |
| 122 | 39°39.5' | 73°36.0' |
| 123 | 39°35.0' | 73°26.0' |
| 124 | 39°30.0' | 73°12.2' |
| 125 | 39°23.8' | 72°57.2' |
| 126 | 39°18.9' | 72°42.5' |
| 130 | 39°27.7' | 74°06.1' |
| 131 | 39°23.2' | 73°55.5' |
| 132 | 39°20.0' | 73°46.5' |
| 133 | 39°16.9' | 73°35.8' |
| 134 | 39°11.1' | 73°21.9' |
| 135 | 39°05.2' | 73°06.5' |
| 136 | 39°00.0' | 72°52.0' |
| 140 | 39°11.1' | 74°24.5' |
| 141 | 39°06.8' | 74°15.1' |
| 142 | 39°02.9' | 74°05.9' |
| 143 | 38°58.1' | 73°56.0' |
| 144 | 38°51.6' | 73°42.0' |
| 145 | 38°45.0' | 73°27.9' |
| 146 | 38°39.4' | 73°16.1' |
| 150 | 38°53.8' | 74°41.9' |
| 151 | 38°49.7' | 74°34.0' |
| 152 | 38°45.4' | 74°27.2' |
| 153 | 38°41.5' | 74°20.0' |
| 154 | 38°37.1' | 74°12.8' |
| 155 | 38°31.4' | 74°04.5' |
| 156 | 38°25.3' | 73°53.0' |
| 157 | 38°19.5' | 73°43.2' |



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