United States Department of the Interior

Geological Survey

CONCENTRATIONS OF SELECTED TRACE METALS IN SHALLOW CORES FROM THE TIDAL POTOMAC RIVER AND ESTUARY: 1978 and 1979

by

E. A. Martin, J. L. Glenn, C. A. Rice,
G. Harrison, E. Gum, and M. Curington

OPEN-FILE REPORT

81-1175

1981

Contents

List of Tables

Illustrations

Abstract

During 1978 and 1979, 37 cores were collected by divers from the tidal Potomac River system and from the adjacent marginal embayments. These 1-m cores are representative of geomorphic divisions within the riverine, transitional, and estuarine parts of the Potomac and of several tributaries. Cores were cut in half longitudinally immediately after collection; one half was sampled at 2-cm intervals for analyses of selected trace metals (Cd, Cu, Pb, and Zn) by atomic-absorption spectrophotometry. Analyses for Fe and Mn were performed on 23 of the cores. The unsampled half of each core was sent to the laboratory, where X-radiographs were made and details of structure and stratigraphy were determined. The data presented in this report are being used to assess the natural and anthropogenic contributions of trace metals to the sediment column and to supplement the sedimentation-rate studies in the tidal Potomac River system.

Introduction

This data report is compiled from a study that is part of a 5-year interdisciplinary Potomac River and Estuary program to be completed in 1982. The objective of the trace-metals study is to determine the natural and anthropogenic contributions of trace metals to sediments of the tidal Potomac River between Washington, D.C., and Point Lookout, Maryland, where the river joins Chesapeake Bay (Fig. 1). This objective supplements the overall purposes of the larger program, which include assessing the effect of man's activities on modern sedimentation and eutrophication and improving techniques for studying tidal river and estuarine systems.

Although man's influence in the Potomac valley began when Indians occupied the area, the effect was probably minimal, until the European settlers occupied the area about 350 years ago. Since this time, the Potomac valley has been cleared for farming and urban development, and the Potomac River has been used for water supply and for disposal of municipal and industrial waters. These activities are reflected in the sediments, and analysis of the sediment column should provide a record of natural and man-related effects.

Regional Setting

The Potomac Estuary occupies a drowned river valley that was formed during the last low stand of sea level (about 17,000 yrs B.P.) and that adjusted to its present shape as the sea level began to rise. The present shape is the result of shoreline erosion and sediment deposition that accompanied the rise in sea level. The length of the channel from Washington, D.C., to the Chesapeake Bay is a little more than 160 km; the width ranges from 61 m to 10.6 km, and the average depth is 1.5 m.

The study area, which includes about 1,000 square km of tidal waters, is divided into three reaches on the basis of salinity (Fig. 1). The upper (riverine) reach of the river is predominantly fresh and extends 60 km from Washington, D.C., to Quantico. The salinities in the middle (transitional) reach, from Quantico south to the U.S. Route 301 bridge, range from 0.5 ppt (parts per thousand) to 5 ppt. The lower (estuarine) reach extends from

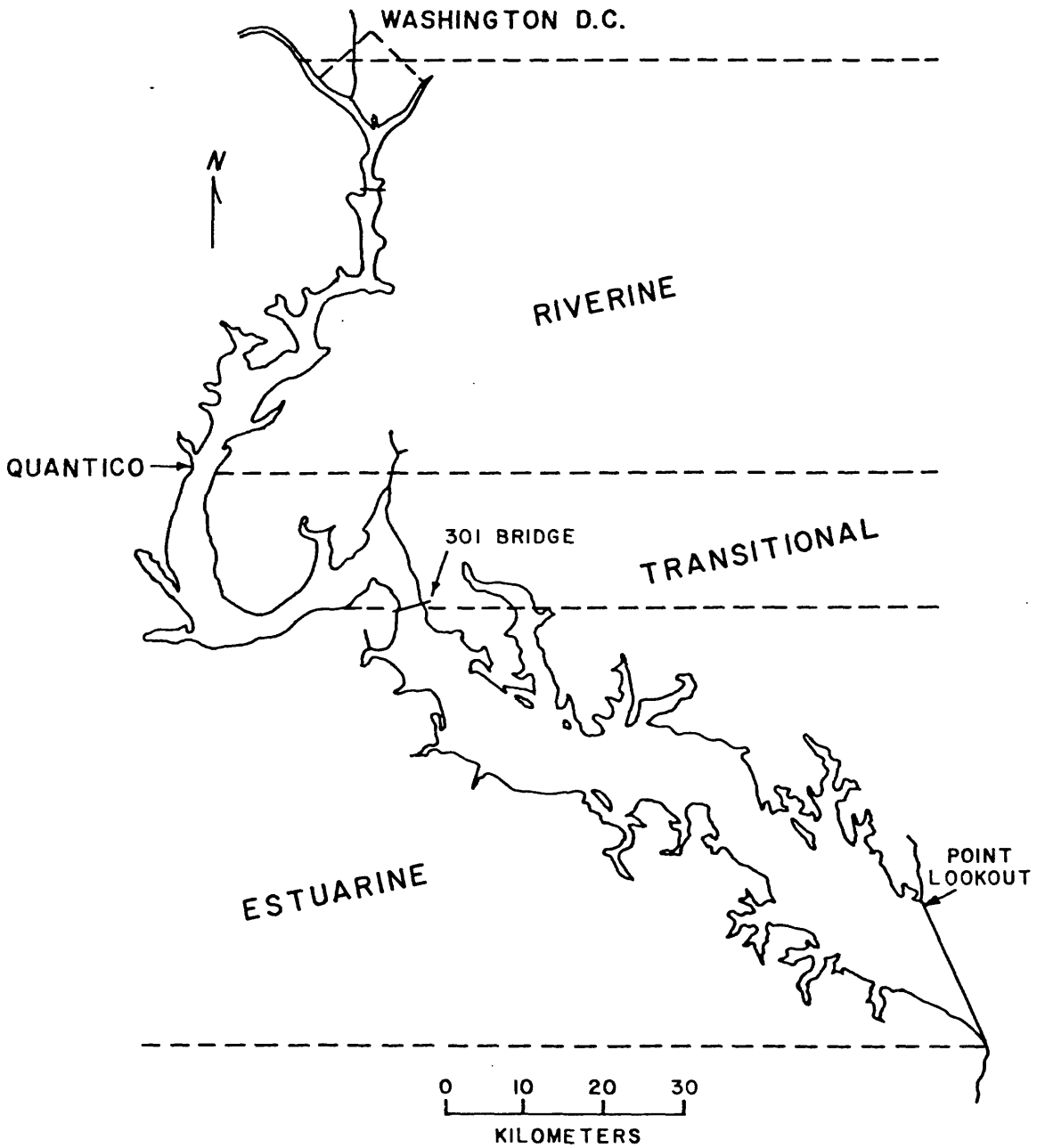


Figure 1. Index map of the tidal Potomac River and Estuary showing division of the study area into riverine, transitional, and estuarine reaches.

the U.S. Route 301 bridge to Point Lookout; salinities range at the mouth from about 11 ppt to 20 ppt.

Background

Trace metals in the sediment column are derived from natural sources and from anthropogenic sources. Natural sources of metals include weathering products from soils and rocks; these products consist of both suspended and dissolved materials that are transported primarily by water. The anthropogenic constituents may be transported either by the atmosphere or by water, but usually material found in the sediment column has been transported by water. Anthropogenic trace metals come from domestic and industrial wastes and are usually introduced to the waterways by runoff and water effluents. Domestic sources include wastes from urban development and sewage disposal. Industrial sources include mining wastes, by-products of the combustion of fuels, and waste from small enterprises.

Increased trace-metal content may be the result of point or nonpoint sources. Point sources are generally easily identified; they are usually single industries or catastrophic events. Nonpoint sources, which are generally harder to identify, include trace metals from street runoff, emissions from smokestacks and automobile exhausts (leaded fuels), and from wide areas of low contamination (e.g., cadmium picked up from water pipes). Because of the limited amount of industrial development, trace-metal input to the Potomac is dominantly from nonpoint sources.

In the absence of diagenetic remobilization or physical mixing of the sediments, periods of nondeposition, or periods of erosion, the sediment column should reflect the chronological input of metals from all sources. Because the anthropogenic contributions are relatively recent, trace-metal concentrations in deeper parts of a core represent natural background levels.

Sampling

Core locations (Table 1; Figs. 1 and 2) were selected to cover the study area and to represent longitudinal hydrologic divisions (riverine, transitional, and estuarine) and lateral geomorphic divisions (flats, slopes, channels, embayments) within the area. Nearshore environments where sands and gravels crop out and deep-water areas known to be disturbed by man's activities (dredging, spoil disposal, harvesting shellfish, weapon firing) were generally avoided.

Sampling was accomplished during two cruises, one in October 1978 and another in August 1979.

Cruise I

October 17 to October 20, 1978

Ship: R/V ORION

Operating institution: University of Maryland
Chesapeake Biological Laboratory

Table 1. Sampling locations

Site	Latitude	Longitude
	Cruise I	
1	38°00.25'	76°21.05'
2	38°06.93'	76°32.12'
3	38°10.85'	76°47.73'
4	38°12.75'	76°47.22'
5	38°16.75'	76°48.95'
6	38°21.00'	76°51.08'
7	38°16.00'	76°55.75'
8	38°24.80'	77°02.00'
9	38°29.13'	77°01.60'
10	38°26.40'	77°01.60'
11	38°32.87'	77°16.07'
12	38°37.13'	77°08.83'
13	38°41.92'	77°04.00'
14	38°42.72'	77°02.58'
15	38°42.03'	77°02.12'
16	38°49.35'	77°01.92'
17	38°52.27'	77°01.27'
	Cruise II	
18	37°59.20'	76°23.57'
19	38°01.89'	76°24.84'
20	38°04.98'	76°30.99'
21	38°08.68'	76°27.05'
22	38°14.40'	76°56.40'
23	38°11.24'	76°42.53'
24	38°16.70'	76°37.83'
25	38°15.25'	76°40.12'
26	38°23.72'	77°06.86'
27	38°21.63'	77°00.21'
28	38°21.68'	76°59.71'
29	38°28.28'	77°17.76'
30	38°20.73'	77°13.68'
31	38°21.39'	77°13.17'
32	38°36.42'	77°13.67'
33	38°40.82'	77°07.28'
34	38°36.40'	77°11.52'
35	38°41.69'	77°07.22'
36	38°45.27'	77°01.83'
37	38°45.27'	77°02.24'

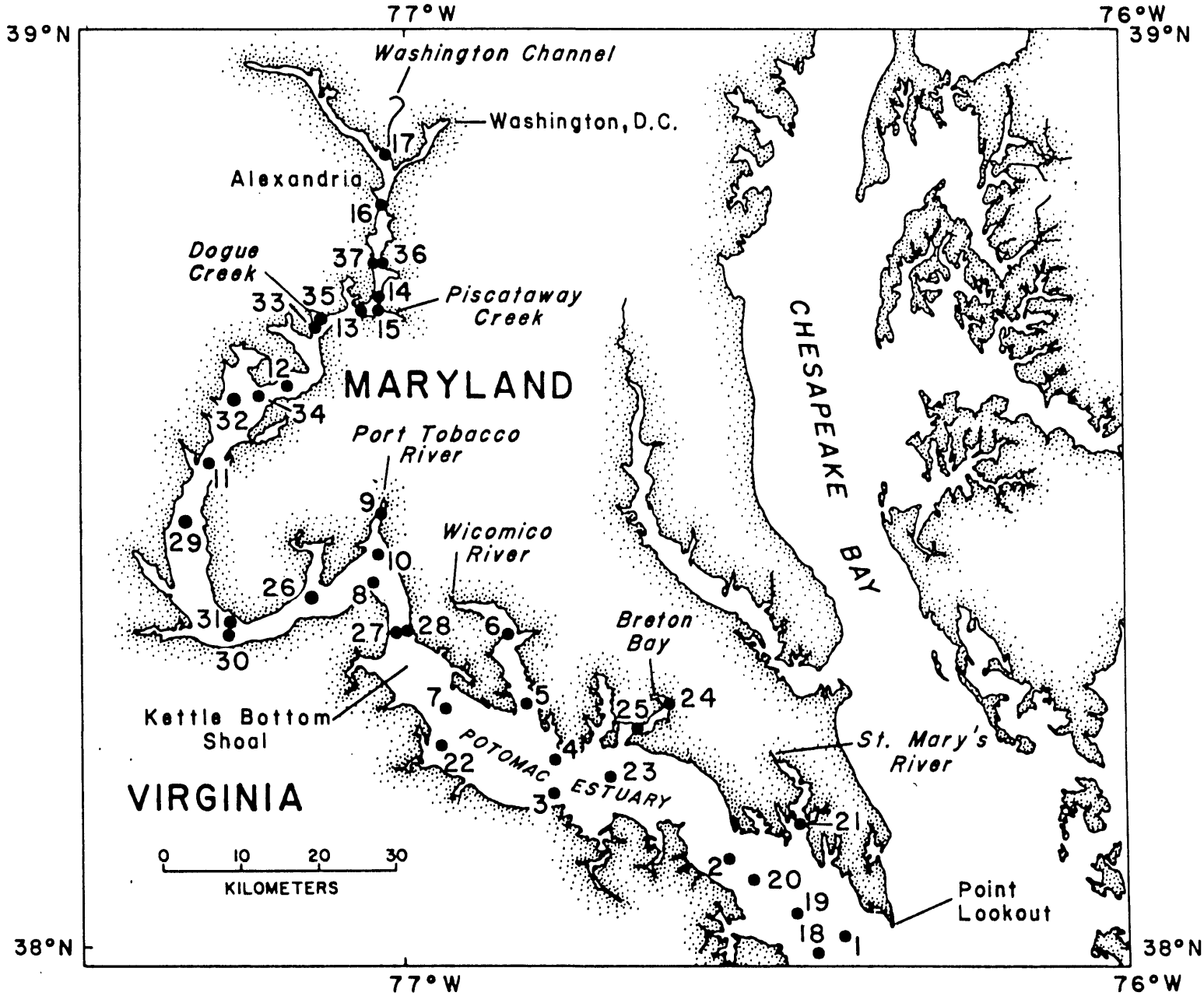


Figure 2. Sampling locations.

Area of operation: Tidal Potomac River and adjacent embayments from Chesapeake Bay to Washington, D.C.

Navigation: Radar

Work completed: Seventeen sites were occupied, and the following data and samples were obtained at each site:

1. The geomorphic position was determined from lateral and longitudinal depth profiles or from available bathymetric maps.

2. A Benthos gravity core was taken, extruded, described, and sampled on board for additional analyses.

3. Salinity, conductivity, and temperature were measured at sampling sites 1-12 (Table 2).

4. A core was taken by divers and split. One half was sampled on board; the second half of each core was wrapped and placed in a D-tube for transport to Corpus Christi, Texas, for X-radiography and subsequent sampling for additional analyses.

Cruise II

July 30 to August 3, 1979

Ship: R/V AQUARIUS

Operating institution: University of Maryland
Chesapeake Biological Laboratory

Area of operation: Tidal Potomac River and adjacent embayments from Chesapeake Bay to Washington, D.C.

Navigation: Loran C

Work completed: Twenty sites were occupied, and the following were obtained at each site:

1. The geomorphic position was determined from lateral and longitudinal depth profiles or from bathymetric maps.

2. A piston core was taken, extruded, and described. Samples were taken from selected cores.

3. Salinity, conductivity, and temperature were measured at sites 19-33 (Table 2).

4. A core was taken by divers. The core was split longitudinally, and one half was sampled on board. The second half was wrapped and placed in a D-tube for transport to Corpus Christi, Texas, for X-radiography and subsequent sampling for additional analyses.

Table 2. Salinity, conductivity, and temperature measurements*
[No measurements were taken at sites 13-18, 34-37]

Site	Depth (meters)	Salinity (‰)	Conductivity (milliohms/cm)	Temperature (°C)	Date/Time (Oct. 1978)
1	Near Surface	17.29	23.40	17.28	18/0830
	6.0	16.68	23.13	17.85	
	11.0	18.54	25.52	18.23	
	Near Surface	16.34	22.26	17.24	
2	Near Surface	16.26	22.50	17.80	18/1154
	10.0	18.96	25.33	19.19	
	20.0	18.35	26.02	19.62	
	Near Surface	16.35	22.60	16.88	
2	Near Surface	15.38	22.98	17.36	18/1208
	11.0	17.80	24.78	18.74	
	Near Bottom 23.0	18.13	25.45	19.17	
3	Near Surface	10.96	14.86	16.21	18/1427
	3.1	10.85	14.74	15.81	
	6.8	13.76	18.97	17.13	
4	1.0	11.42	15.90	16.47	18/1549
	5.2	13.92	19.25	17.15	
	10.5	15.35	21.24	17.71	
5	1.0	12.20	16.92	16.93	18/1715
	4.5	12.52	17.10	16.29	
6	1.0	10.72	14.43	15.25	18/1814
	3.0	10.71	14.52	15.27	
7	1.0	9.74	13.03	15.80	19/0811
	6.0	13.30	15.62	16.23	
	12.0	13.12	18.03	16.65	
8	1.0	8.24	11.35	16.11	19/~1121
	15.0	8.81	12.31	16.35	
	Near Bottom	9.00	12.55	16.75	
9	1.0	6.42	8.5	13.50	19/~1235
10	1.0	7.05	9.45	14.61	19/~1300
	2.5	7.03	9.49	14.59	
11	1.0	0.25	0.28	15.42	19/1551
	8.0	0.25	0.32	15.44	
12	~1.0	0.27	0.33	14.67	20/0805

*Measurements made by a Beckman RS-5 field salinometer. Duplicate measurements were made at site 2 when new sensor and recorder units were used.

Table 2. Salinity, conductivity, and temperature measurements (continued).

Site	Depth (meters)	Salinity (°/₀₀)	Conductivity (milliohms/cm)	Temperature (°C)	Date/Time (July-Aug. 1979)
19	0.5	11.60	19.52	27.00	7-30/1212
	6.0	11.60	19.45	27.10	
	12.0	16.15	25.02	24.00	
20	0.5	9.57	16.17	27.50	7-30/1412
	6.0	10.55	17.55	26.36	
	11.5	16.10	24.80	24.15	
21	0.5	11.00	18.62	27.71	7-30/1624
	4.0	11.09	18.69	27.73	
	7.5	14.11	22.49	25.17	
22	0.5	5.72	9.92	27.79	7-31/0930
	2.5	5.68	9.90	27.51	
	5.0	5.74	9.87	27.51	
23	0.5	8.20	14.10	27.98	7-31/1200
	3.5	8.28	14.10	27.50	
	7.5	14.25	22.43	24.32	
24	0.5	7.30	12.64	27.68	7-31/1437
	2.5	9.60	16.45	27.84	
25	0.5	7.75	13.55	29.15	7-31/1551
	2.0	8.26	14.35	28.23	
	4.5	12.39	20.05	25.50	
26	0.5	2.54	4.45	28.12	8-1/~0850
	3.0	3.02	5.30	27.90	
	7.0	5.20	8.95	27.37	
27	0.5	5.56	9.82	28.44	8-1/1106
	3.0	5.62	9.77	27.74	
28	0.5	5.52	9.65	27.88	8-1/1146
	5.0	5.63	9.98	27.89	
	10.5	9.23	15.40	26.23	
29	0.5	0.19	0.30	30.71	8-1/1445
	5.0	0.16	0.24	28.28	
30	0.5	1.27	0.74	28.20	8-2/0810
	3.0	1.64	0.89	28.30	

Table 2. Salinity, conductivity, and temperature measurements (continued).

Site	Depth (meters)	Salinity (°/₀₀)	Conductivity (milliohms/cm)	Temperature (°C)	Date/Time (July-Aug. 1979)
31	0.5	1.38	2.49	28.93	8-2/1100
	3.0	1.53	2.75	28.45	
	6.0	1.83	3.24	28.35	
32	1.5	0.19	0.32	29.69	8-2/1311
33	0.5	0.25	0.39	29.80	8-2/1530

5. Photographs were made, and each core was described.

6. A bottom grab sampler was used to obtain sediment samples for additional geochemical analyses.

Field Methods

Cores 12 cm in diameter and averaging 100 cm in length were obtained by two divers using a coring system (Fig. 3) designed to retrieve relatively undisturbed cores from soft sediments such as those found in the Potomac. A split hydroplastic core barrel (B) that had been taped together was pushed slowly into the sediments. Once the corer had been inserted, a core retriever made of aluminum (D) was attached, the top of the core barrel was plugged with a core sealer (E), and the system was pulled from the sediment. A cap (F) was placed over the lower end of the core before transport to the surface. Immediately after collection, the core was split by use of a stainless steel wire. Half the core was placed in a D-tube and stored for later X-radiography and sampling for additional analyses; the remaining half was sampled on board ship for trace-metal analyses.

Laboratory Methods

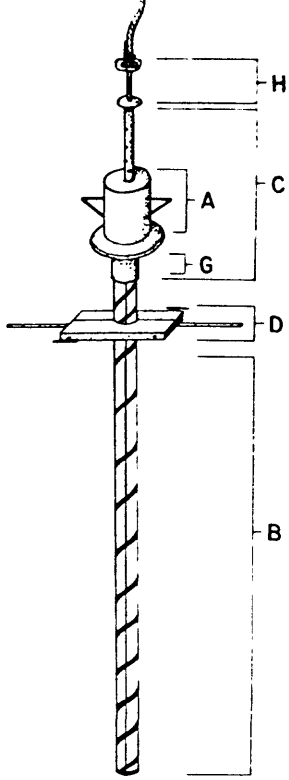
X-radiography

X-radiographs of the unsampled core halves were made and were examined for evidence of reworking by benthic organisms; the presence of burrows, structural elements, and discontinuities; and the evidence of any disturbances that could make the core data unusable for project purposes. X-radiographs also were used to confirm field observations and to reveal features not readily apparent by visual examination of the cores.

Trace-Metal Analyses

The samples were weighed, dried under heat lamps at 101°C, cooled, and reweighed to determine the moisture content. The sample then was ground to a fine powder in a ceramic mortar. For cadmium, chromium, copper, iron, lead, manganese, and zinc determinations, 1-g subsamples were weighed, heated in a muffle furnace at 450°C for 6 hours to destroy the organic matter, cooled in a desiccator, and reweighed. Dry samples were transferred to precleaned (acid-washed) culture tubes and were digested in 16N nitric acid while being heated and stirred. The solution was transferred to a Teflon beaker and evaporated to dryness. The dried sample was brought into solution by the addition of exactly 1 ml of deionized water and 9 ml of concentrated (16N) HNO_3, transferred to a clean culture tube, and analyzed by standard flame (Cu, Fe, Mn, Zn) and furnace (Cd, Pb) atomic-absorption methods.

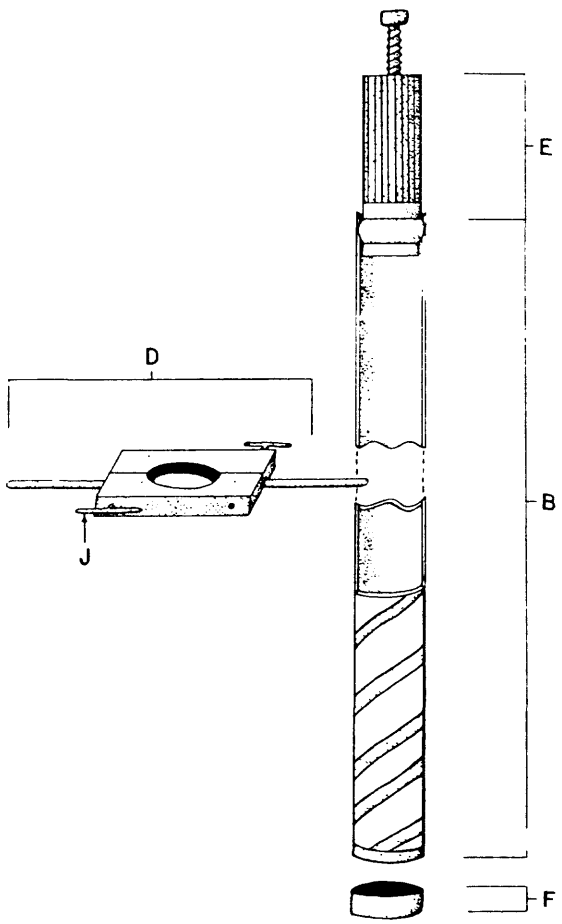
Trace-metal concentrations for 35 of the 37 cores are presented in Appendix 1. Core 6 contained a large number of oyster shells and therefore an insufficient amount of sediment to perform analyses. Core 18 was not analyzed because it was badly disturbed.



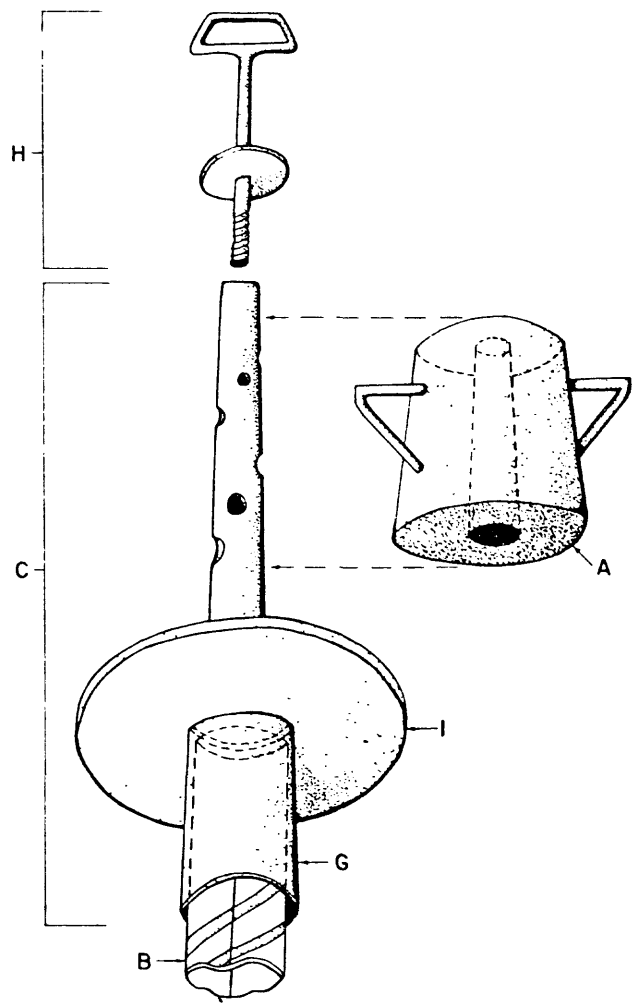
ASSEMBLED DIVER CORING DEVICE

LEGEND

A. Hammer 11-23 kg. (36 cm. high)
B. Split core barrel wrapped w/filament tape
C. Hammer support (60 cm. long), barrel support (16 cm. long)
D. Core retriever
E. Core sealer (2.5 cm. gasket)
F. Core cap
G. Sleeve (barrel support, 16 cm. long)
H. Hammer retainer/cable attachment (33 cm. long)
I. Hammer plate
J. Wing screw



CORE BARREL WITH RETRIEVER, SEALER, AND CAP



DIVER-CORER ASSEMBLY

Figure 3. Coring device operated by divers.

General Implications

The data presented in this report supplement the deposition-rate studies in the tidal Potomac system, and, conversely, the rate studies will assist in the interpretation of the trace-metal concentrations within a time context. Generally, the highest concentrations of trace-metals were found in cores from channels in the riverine environment, and the lowest concentrations were determined in cores from channels in the estuarine environment. Most cores show significant increases in metal concentrations in the upper sample intervals; these increases most likely represent anthropogenic influences, and probably reflect nonpoint sources.

Appendix

Concentrations of trace metals in cores 1-5, 7-17, 19-37. See Figure 2 for core locations.

Deviations calculated from duplicate sample analyses are:

Cd - 3.8%
Cu - 2.3%
Fe - 3.1%
Mn - 2.1%
Pb - 4.4%
Zn - 1.7%

--indicates that the sample was lost during processing or that the volume of the acid leach was insufficient for all trace-metal analyses to be performed.

Concentrations of trace metals in core 1 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)
0-3	0.73	24.0	21.1	176
3-6	0.61	24.5	23.7	172
6-8	0.71	25.1	24.0	165
8-10	0.57	21.8	23.2	150
10-12	0.50	20.2	18.8	131
12-14	0.31	18.7	15.8	92
14-16	0.30	17.8	15.4	82
16-18	0.24	16.2	13.7	89
18-20	0.19	17.6	14.9	88
20-22	0.20	15.5	14.7	93
22-24	0.17	15.9	15.3	92
24-26	0.15	14.7	13.3	88
26-28	0.15	14.8	13.2	85
28-30	0.16	14.8	14.1	91
30-32	0.20	15.7	13.0	89
32-34	0.20	13.4	11.4	86
34-36	0.19	11.7	10.5	80
36-38	0.19	14.3	13.3	80
38-40	0.14	12.0	10.8	77
40-42	0.15	13.5	14.9	81
42-44	0.14	10.1	12.4	87
44-46	0.15	11.9	12.9	83
46-48	0.15	12.0	9.8	77
48-50	0.16	11.1	12.7	82
50-52	0.17	11.8	12.6	83
52-54	0.16	12.3	12.5	81
54-56	0.17	11.3	11.0	81
56-58	0.31	12.1	12.3	76
58-60	0.19	11.4	9.5	79
60-62	0.17	11.0	8.9	75
62-64	0.17	10.8	8.9	85
64-66	0.15	10.0	9.2	81
66-68	0.15	9.0	7.6	79
68-70	0.17	8.2	7.8	93
70-72	0.14	10.2	8.3	81
72-74	0.12	10.1	8.8	80
74-76	0.16	9.0	9.1	84
76-78	0.15	11.0	9.0	80
78-80	0.14	8.0	8.5	80
80-82	0.13	9.5	8.7	79
82-84	0.15	9.7	9.0	78
84-86	0.15	10.2	9.1	77
86-88	0.18	10.9	8.9	75
88-90	0.18	11.3	9.4	75
90-92	0.15	8.4	9.0	76
92-94	0.16	10.5	9.3	80
94-96	0.13	11.1	9.1	76
96-98	0.12	10.9	9.3	79
98-100	0.13	10.7	9.1	76
100-101	0.12	10.6	8.6	75

Concentrations of trace metals in core 2 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)	Fe (ppm)	Mn (ppm)
0-4	0.86	24.5	32.7	190	45,250	340
4-6	--	25.2	32.2	189	45,330	350
6-8	1.01	25.3	34.9	190	40,060	347
8-10	0.74	24.7	35.9	205	37,380	500
10-12	0.99	26.8	37.2	223	41,010	410
12-14	0.87	25.3	33.7	229	42,780	789
14-16	0.73	25.2	34.7	200	42,560	455
16-18	0.86	24.9	34.1	219	43,680	390
18-20	1.04	23.3	34.0	213	40,910	345
20-22	1.11	23.0	35.2	234	39,720	400
22-24	0.90	21.3	32.7	222	48,430	470
24-26	0.79	20.1	32.2	215	39,630	--
26-28	0.88	26.7	32.3	220	41,210	740
28-30	0.93	18.4	33.5	229	48,830	916
30-32	1.16	21.3	31.7	219	41,830	862
32-34	0.99	17.7	30.8	225	44,430	797
34-36	0.98	25.9	33.1	226	42,680	--
36-38	0.78	20.5	30.8	219	46,550	803
38-40	0.74	22.1	32.0	219	44,930	--
40-42	0.83	20.9	29.4	242	41,650	782
42-44	0.93	20.7	32.9	213	49,470	562
44-46	0.74	14.7	27.7	182	45,710	873
46-48	0.80	15.5	30.9	183	39,810	--
48-50	1.03	18.3	27.8	177	38,560	764
50-52	0.90	18.6	27.2	193	43,590	562
52-54	0.98	17.1	28.8	182	44,670	545
54-56	0.94	18.8	29.7	174	44,560	542
56-58	0.71	16.6	27.0	176	47,260	566
58-60	0.65	16.8	31.4	176	44,260	500
65-67	0.53	19.5	--	187	42,550	423
70-72	0.53	18.7	27.5	170	50,380	491
75-77	0.48	21.0	28.2	183	48,180	439
80-82	0.73	20.1	25.4	124	44,140	711
85-87	0.78	16.1	25.2	131	42,950	--
90-92	0.70	18.2	25.8	146	43,550	719
95-97	0.53	18.3	26.3	131	47,050	--
100-102	0.51	15.2	23.7	136	47,770	--

Concentrations of trace metals in core 3 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)
0-4	0.78	48.6	42.2	255
4-6	0.80	54.9	49.8	260
6-8	0.74	48.3	51.1	282
8-10	0.70	44.2	45.5	254
10-12	0.80	40.2	46.3	254
12-14	0.57	39.5	43.5	257
14-16	0.57	41.0	42.8	265
16-18	0.48	39.7	37.6	205
18-20	0.44	43.2	39.8	190
20-22	0.43	36.1	42.8	185
22-24	0.40	33.8	39.8	197
24-26	0.34	31.3	39.8	170
26-28	0.36	42.2	40.6	179
28-30	0.37	34.2	41.2	171
30-32	0.35	33.2	39.5	164
32-34	0.31	31.0	40.1	158
34-36	0.32	30.9	41.2	157
36-38	0.33	33.3	39.4	170
38-40	0.32	31.5	35.8	156
40-42	0.29	31.4	31.0	139
42-44	0.31	34.3	30.2	164
44-46	0.23	30.6	21.5	135
46-48	0.22	29.3	16.7	115
48-50	0.26	32.8	28.9	134
55-57	0.20	29.6	15.4	116
60-62	0.23	30.5	14.6	125
65-67	0.22	26.5	14.2	116
70-72	0.28	25.7	13.9	121
75-77	0.25	24.0	15.2	118
80-82	0.24	23.3	15.3	113
85-87	0.21	21.3	14.0	107
90-92	0.20	20.8	13.8	103

Concentrations of trace metals in core 4 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)
0-2	0.56	31.2	24.7	191
2-6	0.72	29.8	33.8	196
6-10	0.93	28.2	36.5	207
10-12	0.78	28.1	50.0	179
12-14	0.59	26.8	27.3	185
14-16	0.50	22.8	27.5	179
16-18	0.50	30.2	29.0	201
18-20	0.52	28.2	28.8	197
20-22	0.39	29.0	32.3	172
22-24	0.26	26.9	29.6	159
24-26	0.28	29.2	26.7	185
26-28	0.32	26.6	26.7	133
28-30	0.34	28.6	26.9	140
35-37	0.22	27.8	18.5	122
40-42	0.16	25.9	18.1	119
45-47	0.16	30.2	16.9	107
50-52	0.19	24.9	18.9	120
55-57	0.12	26.6	15.8	106
60-62	0.14	24.4	20.7	107
65-67	0.15	21.8	19.4	106
70-72	0.14	18.3	13.8	89
75-77	0.14	16.0	12.5	86
80-82	0.15	15.3	12.1	90
85-87	0.11	12.3	9.6	81
90-92	0.11	10.1	8.4	69
95-97	0.09	8.8	5.9	58

Concentrations of trace metals in core 5 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)
0-4	0.35	30.3	21.0	142
4-6	0.33	27.2	18.0	127
6-8	0.28	27.1	16.8	124
8-10	0.27	35.8	18.4	125
10-12	0.25	32.1	15.5	123
12-14	0.24	26.2	23.6	108
14-16	0.24	20.6	13.5	112
16-18	0.22	22.3	13.5	102
18-20	0.22	25.1	14.8	104
20-22	0.27	23.4	12.6	112
22-24	0.23	24.3	13.3	114
24-26	0.24	27.4	13.4	114
26-28	0.25	22.8	14.7	102
28-30	0.24	21.7	14.8	103
30-32	0.25	23.9	12.7	98
32-34	0.25	20.3	15.3	107
34-36	0.23	24.4	14.2	99
36-38	0.25	22.1	15.4	100
38-40	--	22.2	13.2	103
40-42	0.24	23.6	12.7	97
42-44	0.28	30.2	12.1	104
44-46	0.27	25.4	12.6	119
46-48	0.26	26.3	12.0	101
48-50	0.29	23.4	12.4	103
50-52	0.29	23.1	10.9	107
52-54	0.30	24.6	12.1	109
54-56	0.24	25.2	11.4	104
56-58	0.25	23.6	10.7	108
58-60	0.27	21.2	10.5	98
60-62	0.29	21.8	10.6	98
62-64	0.24	29.7	9.1	93
64-66	0.27	18.6	9.3	92
66-68	0.25	22.3	10.2	104
68-70	0.27	23.5	10.6	100
70-72	0.22	24.7	10.4	101
72-74	0.20	25.7	9.9	104
74-76	0.22	38.6	9.6	109
76-78	0.21	29.3	11.1	113
78-80	0.23	22.4	10.5	99
80-82	0.22	21.5	10.6	96

Concentrations of trace metal in core 7 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)	Fe (ppm)	Mn (ppm)
Top	0.71	39.2	35.0	264	38,870	622
0-2	0.42	35.6	32.7	264	36,690	461
2-4	0.43	35.0	39.4	256	35,280	427
4-6	0.46	36.3	34.7	247	38,530	454
6-8	0.51	38.0	33.6	246	35,350	418
8-10	0.58	35.4	37.0	239	33,810	420
10-12	0.57	32.5	29.2	234	33,620	452
12-14	0.75	37.3	34.7	289	42,190	588
14-16	0.49	35.2	35.9	209	27,540	416
16-18	0.61	32.5	36.2	277	34,960	416
18-20	0.71	35.5	31.1	266	35,510	447
20-22	0.72	27.3	33.2	242	36,550	436
24-26	0.60	28.2	37.5	242	34,490	410
26-28	0.57	32.7	33.7	240	36,320	450
28-30	0.62	28.3	29.5	251	36,350	386
30-32	0.62	32.5	29.8	258	38,140	413
32-34	0.71	28.9	28.7	263	37,450	407
34-36	0.70	29.8	28.5	252	38,020	462
36-38	0.61	27.9	36.2	262	39,650	454
38-40	0.57	30.7	33.5	272	37,210	462
40-42	0.67	28.7	27.3	269	39,960	414
42-44	0.61	28.2	27.4	264	36,450	405
44-46	0.49	27.6	32.0	250	37,010	456
46-48	0.51	30.3	30.4	269	36,820	444
48-50	0.68	27.8	30.6	264	41,000	429
50-52	--	--	--	--	41,040	515
52-54	0.51	31.0	28.2	197	38,890	417
54-56	0.42	29.6	30.9	200	40,640	372
56-58	0.36	27.8	32.5	190	38,600	403
58-60	0.41	27.2	27.2	192	39,560	380
60-62	0.34	23.9	27.0	175	40,490	371
62-64	0.18	23.9	25.7	157	38,250	361
64-66	0.18	21.7	26.6	147	36,940	373
66-68	0.30	26.9	29.5	184	41,300	459
68-70	0.25	24.7	29.9	181	43,510	441
70-72	0.24	23.8	27.5	183	43,470	451
72-74	0.29	23.8	27.6	169	45,970	441
74-76	0.53	21.7	31.6	179	46,220	458
76-78	0.25	25.2	35.8	173	44,260	429
78-80	0.24	31.4	32.8	181	43,750	437
80-82	0.21	29.4	33.2	163	42,950	427
82-84	0.22	27.8	32.6	167	42,700	482
84-86	0.25	29.2	27.8	173	46,940	433
86-88	0.24	29.2	31.4	181	44,210	463
88-90	0.22	--	30.3	178	45,020	505
90-92	0.20	28.6	29.1	170	43,860	478
92-94	0.21	27.5	30.1	177	43,910	455
94-96	0.20	25.0	26.0	160	41,050	447
96-98	0.19	27.4	22.9	157	41,430	453
98-100	0.18	30.3	26.1	174	44,650	570
110-112	0.15	25.0	18.1	138	43,000	504

Concentrations of trace metal in core 8 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)	Fe (ppm)	Mn (ppm)
0-2	0.20	74.4	12.8	199	100,980	3,613
2-4	0.20	75.8	11.1	213	119,950	2,080
4-6	0.19	70.7	13.4	174	94,890	2,593
6-8	0.21	79.7	13.1	172	98,990	3,548
8-10	0.20	70.5	12.2	188	85,570	1,220
10-12	0.19	61.9	11.6	159	83,710	1,063
12-14	0.21	64.0	12.6	171	84,340	1,236
14-16	0.24	66.7	14.2	204	101,870	2,251
16-18	0.18	67.7	10.3	181	97,010	2,643
18-20	0.20	63.3	10.5	187	109,100	3,195
20-22	0.20	66.2	11.5	177	99,040	3,998
22-24	0.18	63.1	10.7	195	103,330	2,024
24-26	0.18	61.7	9.8	158	82,970	1,301
26-28	0.17	62.7	10.2	168	90,840	1,287
28-30	0.18	57.1	11.2	163	96,140	1,616
30-32	0.16	46.2	10.7	180	98,580	2,343
32-34	0.19	43.2	8.8	190	102,590	2,688
34-36	0.17	56.4	10.5	178	90,500	1,268
36-38	0.16	49.3	11.1	183	102,370	1,822
38-40	0.17	43.6	11.8	191	107,440	2,395
40-42	0.14	68.4	11.4	179	101,470	2,635
42-44	0.14	63.3	10.8	198	104,260	2,589
44-46	0.16	55.4	14.4	162	97,730	2,760
46-48	0.16	54.5	9.8	163	96,820	1,822
48-50	0.17	55.5	10.0	156	88,800	1,456
50-52	0.15	55.0	10.1	160	96,700	1,861
52-54	0.17	69.3	9.8	185	108,270	1,501
54-56	0.17	59.3	10.3	160	86,370	1,113
56-58	0.19	58.9	9.0	159	97,060	1,285
58-60	0.15	60.6	10.0	185	107,840	1,706
60-62	0.16	59.1	9.9	182	111,590	2,599
62-64	0.18	59.7	10.1	176	114,170	2,933
64-66	0.17	58.0	9.8	164	93,710	2,210
66-68	0.16	57.2	8.3	148	85,530	1,078
68-70	0.19	53.9	--	164	97,400	1,147
70-72	0.19	52.5	9.2	159	96,840	2,308
72-74	0.21	59.6	9.4	207	---	2,146
74-76	0.19	58.0	--	186	93,410	1,084
76-78	0.23	55.6	9.7	200	108,620	2,490
78-80	0.20	54.8	7.8	155	91,390	2,751
80-82	0.15	61.2	9.9	196	109,350	1,760
82-84	0.15	61.4	9.6	212	126,350	1,915
84-86	0.15	58.7	10.2	204	122,330	2,651
86-88	0.15	--	10.1	169	109,230	2,455
88-90	0.16	56.6	9.6	177	110,620	1,647
90-92	0.22	53.3	16.1	170	115,150	2,435
92-94	0.20	52.7	8.5	177	112,900	2,097
94-96	0.16	48.7	6.7	158	96,880	1,243
96-98	0.16	51.0	8.4	170	103,680	1,429
98-100	0.13	55.3	10.0	164	100,290	1,701
105-107	0.19	56.2	7.4	189	120,590	3,467

Concentrations of trace metals in core 9 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)
Top	2.65	26.8	20.8	202
0-2	2.67	28.6	22.8	202
2-4	2.87	27.7	27.4	205
4-6	2.60	27.0	25.7	203
6-8	2.58	26.4	26.6	208
8-10	2.55	32.3	26.9	236
10-12	2.79	24.1	28.3	186
12-14	2.79	25.3	27.9	203
14-16	2.88	24.5	27.4	193
16-18	2.60	22.8	28.0	183
18-20	2.46	26.8	28.6	198
20-22	2.01	20.1	30.6	196
22-24	1.79	19.8	26.0	218
24-26	1.90	20.6	26.4	193
26-28	1.83	--	25.6	192
28-30	1.96	18.8	25.5	188
30-32	1.81	19.5	24.8	182
32-34	1.55	18.7	17.5	158
34-36	1.23	11.5	12.2	104
36-38	1.03	13.7	12.5	94
38-40	1.07	13.1	13.1	101
40-42	1.12	12.3	10.7	102
42-44	0.94	12.8	14.1	104
44-46	0.92	13.1	10.3	95
46-48	0.91	12.0	10.0	105
48-50	0.97	13.5	9.8	102
50-52	1.06	--	8.0	99
52-54	1.17	9.4	9.4	106
54-56	1.43	12.7	10.0	113
56-58	1.59	12.0	9.0	100
58-60	1.84	13.7	9.0	126
60-62	1.81	15.4	6.9	128
62-64	1.88	15.4	5.6	134
64-66	1.71	15.9	8.3	114
66-68	1.65	--	6.2	117
68-70	1.87	15.1	6.2	133
70-72	1.89	16.8	5.2	131
72-74	2.10	--	7.6	133
74-76	1.89	15.5	7.3	133
76-78	1.67	18.5	6.8	133
78-80	1.76	18.9	7.1	132
80-82	1.95	16.6	7.6	132
82-84	2.06	18.7	6.1	125
84-86	2.28	18.9	6.2	135
86-88	2.24	17.8	6.1	126
88-90	2.22	15.5	7.1	112

Concentrations of trace metal in core 10 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)
Top	0.42	26.6	145.3	212
0-2	0.40	23.4	49.3	214
2-4	0.41	23.2	43.7	197
4-6	0.43	23.0	46.3	231
6-8	0.48	22.7	45.3	211
8-10	0.58	22.9	44.0	223
10-12	0.47	22.7	40.9	236
12-14	0.43	22.1	43.0	233
14-16	0.41	22.2	40.4	193
16-18	0.35	22.0	42.4	158
18-20	0.31	21.9	44.7	153
20-22	0.31	20.0	21.6	135
22-24	0.29	19.7	20.9	140
24-26	0.31	20.5	17.4	125
26-28	0.29	21.7	16.0	118
28-30	0.30	22.0	14.9	118
30-32	0.27	21.0	13.6	112
32-34	0.23	19.2	13.6	103
34-36	0.21	17.0	11.6	91
36-38	0.19	16.1	10.6	87
38-40	0.18	17.2	11.3	83
40-42	0.22	18.0	10.7	88
42-44	0.21	14.9	9.8	88
44-46	0.21	15.2	9.6	76
46-48	0.18	13.2	9.3	81
48-50	0.24	13.5	9.4	89
50-52	0.20	13.1	9.2	79
52-54	0.28	13.9	9.8	94
54-56	0.22	13.7	10.1	90
56-58	0.25	13.0	9.3	91
58-60	0.25	12.7	9.8	88
60-62	0.24	14.5	9.7	87
62-64	0.25	10.2	8.8	84
64-66	0.25	14.0	11.3	84
66-68	0.27	13.8	8.9	95
68-70	0.47	14.0	9.1	107
70-72	0.26	15.0	8.6	97
72-74	0.27	14.2	9.6	98
74-76	0.29	13.4	8.8	106
76-78	0.57	12.9	11.3	106
78-80	0.30	13.6	9.0	102
80-82	0.30	14.6	9.0	102
82-84	0.22	15.7	9.2	101
84-86	0.29	12.7	9.4	106
86-88	0.25	13.4	9.8	107
88-90	0.26	11.4	8.8	109
90-92	0.23	12.2	9.5	109
92-94	0.27	12.7	11.9	108
94-96	0.26	12.1	9.3	110
96-98	0.28	14.0	9.4	112

Concentrations of trace metals in core 11 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)
0-2	1.05	43.4	36.7	292
2-4	0.94	46.4	32.2	299
4-6	0.95	42.2	37.6	282
6-8	0.95	36.7	39.8	314
8-10	1.03	46.1	43.2	--
10-12	1.02	45.1	32.8	323
12-14	1.04	41.5	33.4	346
14-16	1.03	46.4	31.2	330
16-18	1.00	40.1	28.9	285
18-20	1.07	44.1	44.1	341
20-22	1.14	56.7	35.6	362
22-24	1.17	40.0	31.7	338
24-26	1.17	40.1	26.3	348
26-28	1.18	41.6	25.5	354
28-30	1.09	40.9	31.0	336
30-32	1.14	38.1	32.1	313
32-34	1.05	38.5	29.3	343
34-36	1.06	40.9	30.1	336
36-38	1.11	40.5	27.6	348
38-40	1.03	--	--	341
40-42	1.02	42.1	25.9	343
42-44	1.00	41.6	26.2	356
44-46	0.97	39.5	31.5	317
46-48	1.02	40.9	28.7	351
48-50	1.01	38.3	27.8	352
50-52	0.99	40.3	27.5	341
52-54	0.98	36.3	25.1	357
54-56	1.10	55.4	25.3	364
56-58	1.06	41.4	30.2	398
58-60	1.09	38.4	25.2	424
60-62	1.13	37.9	19.8	491
62-64	1.13	37.8	23.8	497
64-66	1.17	38.8	21.9	477
66-68	0.91	35.1	21.2	240
68-70	0.70	39.4	22.9	208
70-72	0.61	36.7	22.1	205
72-74	0.55	28.9	17.0	153
74-76	0.51	26.2	17.3	152
76-78	0.54	31.1	17.6	156
78-80	0.54	29.9	16.5	162
80-82	0.48	39.5	26.3	163
82-84	0.56	33.8	23.3	198
84-86	0.55	32.7	23.4	202
86-88	0.54	31.2	24.5	204
88-90	0.56	33.4	23.8	196
90-92	0.51	33.2	26.9	191
92-94	0.50	31.5	23.6	192
94-96	0.51	42.7	33.1	200
96-98	0.55	31.4	34.8	195
98-100	0.58	29.0	40.4	202
100-102	0.51	31.2	41.0	188
102-104	0.70	33.3	33.8	224

Concentrations of trace metals in core 12 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)
0-2	0.57	37.0	37.9	300
2-4	0.58	34.3	54.5	299
6-8	0.61	34.5	57.2	175
8-10	0.69	52.9	74.6	470
10-12	0.63	48.8	78.0	452
12-14	0.64	49.5	72.6	480
14-16	0.63	48.3	70.9	442
16-18	0.76	47.5	66.7	442
18-20	0.66	49.3	67.1	423
20-24	1.15	59.4	76.3	403
22-24	1.09	52.1	64.4	372
24-26	1.27	47.1	70.8	383
26-28	0.96	35.7	61.1	241
28-30	0.64	34.4	44.8	139
30-32	0.59	32.1	27.8	135
32-34	0.63	32.7	31.4	140
34-36	0.63	35.2	34.8	143
36-38	0.60	32.4	29.3	143
38-40	0.56	33.4	28.2	191
40-42	0.48	27.3	29.1	102
42-44	0.52	26.1	27.9	117
44-46	0.46	28.4	27.0	118
46-48	0.45	32.1	23.4	109
48-50	0.51	31.9	27.5	118
50-52	0.47	29.8	25.7	131
52-54	0.49	28.4	25.1	113
54-56	0.33	22.6	24.0	85
56-58	0.46	31.9	23.2	105
58-60	0.56	28.7	31.4	131
60-62	0.61	30.7	32.9	168
62-64	0.57	33.1	36.7	152
66-68	0.56	31.5	35.3	164
68-70	0.52	51.0	57.0	174
70-72	0.57	33.1	59.2	175
72-74	0.56	29.2	53.3	165
74-76	0.55	30.9	53.7	161
76-78	0.49	30.1	49.6	161
78-80	0.40	29.8	26.0	119
80-82	0.35	--	20.1	123
82-84	0.29	24.7	15.2	115
84-86	0.25	31.3	14.7	108
86-88	0.32	26.0	14.7	86
88-90	0.32	32.9	12.7	93
90-92	0.21	23.8	10.3	90
94-96	0.20	26.3	12.1	88
96-98	--	30.0	13.1	95
98-100	0.21	29.0	11.8	96

Concentrations of trace metals in core 13 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)	Fe (ppm)	Mn (ppm)
0-2	0.41	35.3	42.2	249	35,450	1,495
2-4	0.19	36.1	32.7	230	33,660	1,309
4-6	0.31	35.6	32.4	238	32,410	1,221
6-8	0.66	35.3	29.0	240	30,680	1,219
8-10	0.70	32.7	32.2	256	31,560	1,251
10-12	0.36	--	28.9	229	29,170	1,111
12-14	0.84	24.4	28.6	204	29,120	1,106
14-16	0.49	30.9	18.4	234	31,960	1,087
16-18	0.56	28.1	31.5	218	27,560	1,013
18-20	0.43	32.1	31.3	223	31,170	1,244
20-22	0.67	37.0	36.6	232	33,720	1,172
22-24	0.69	38.4	36.8	267	32,560	1,326
24-26	0.76	34.8	36.9	269	32,680	1,126
26-28	0.58	37.7	32.9	240	32,550	1,079
28-30	0.64	44.4	37.5	249	35,770	1,252
30-32	0.62	40.7	36.2	229	32,400	1,225
32-34	0.73	42.5	40.6	246	32,800	1,079
34-36	0.80	41.0	43.1	293	32,400	1,348
36-38	0.87	47.7	49.3	328	34,090	1,239
38-40	0.92	43.9	42.7	322	34,190	1,236
40-42	0.84	39.2	41.5	311	32,510	972
42-44	0.63	35.7	40.9	250	37,200	1,002
44-46	0.71	41.5	50.0	326	32,780	1,240
46-48	0.96	42.3	55.7	375	33,470	1,151
48-50	0.97	42.9	44.5	382	35,100	1.133
50-52	1.00	41.3	50.7	364	34,150	1,257
52-54	0.88	38.2	44.4	267	31,450	1,164
54-56	0.85	36.5	46.2	298	33,090	1,439
56-58	0.89	60.0	45.1	306	34,000	1,535
58-60	0.68	45.2	48.7	347	34,620	1,395
60-62	0.95	45.0	59.9	344	34,700	1,150
62-64	1.02	47.6	58.1	352	33,810	1,196
64-66	1.09	49.1	47.6	349	33,760	1,247
66-68	0.86	35.2	42.9	325	30,550	1,175
68-70	1.26	42.4	53.0	357	34,820	1,325
70-72	0.76	42.2	47.2	372	34,040	1,067
72-74	0.80	38.2	38.5	311	32,460	1,275
74-76	0.71	35.9	28.3	385	33,530	1,002
76-78	0.80	33.7	34.4	486	35,120	905
78-80	1.07	41.4	43.0	691	34,420	1,029

Concentrations of trace metals in core 14 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)
0-2	0.45	33.8	43.8	192
2-4	0.01	26.2	46.9	111
4-6	0.13	23.4	8.6	127
6-8	0.13	27.4	10.1	96
8-10	0.13	27.0	11.2	99
10-12	0.14	25.2	13.2	103
12-14	0.14	27.2	11.1	104
14-16	0.14	27.0	12.5	99
16-18	0.15	25.9	11.8	97
18-20	0.15	26.7	12.0	103
20-22	0.16	24.6	15.7	90
22-24	0.18	17.3	11.0	90
24-26	0.17	16.2	10.1	85
26-28	0.18	14.2	10.7	90
28-30	0.18	13.6	10.1	83
30-32	0.18	10.9	9.2	67
32-34	0.21	9.9	8.3	67
34-36	0.20	13.6	9.3	74
36-38	0.22	10.8	8.7	68
38-40	0.22	11.3	10.0	80
40-42	0.22	11.7	10.0	85
42-44	--	13.9	11.1	83
44-46	0.20	13.5	9.7	73
46-48	0.23	14.0	10.2	72
48-50	0.25	14.3	9.0	89
50-52	0.24	9.5	10.0	67
52-54	0.24	10.9	9.9	69
54-56	0.24	13.4	9.4	72
56-58	0.34	17.9	13.9	92
58-60	0.33	18.1	12.7	117
60-62	0.35	16.7	14.2	92
62-64	--	13.0	9.8	104
64-66	--	--	10.0	117
66-68	--	14.4	11.9	111
68-70	0.26	12.5	11.0	78
70-72	0.26	12.3	10.5	78
72-74	0.28	--	11.7	112
74-76	--	14.3	11.1	83

Concentrations of trace metals in core 15 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)
0-2	0.75	33.2	41.0	260
2-4	0.62	32.6	41.9	261
4-6	0.63	35.1	47.8	262
6-8	0.62	38.8	42.7	254
8-10	0.68	38.1	44.8	277
10-12	0.78	39.2	55.8	314
12-14	0.78	42.5	44.5	338
14-16	0.71	36.7	43.3	293
16-18	0.75	41.2	43.6	273
18-20	0.84	40.0	49.5	326
20-22	0.95	43.1	57.6	340
22-24	0.79	32.2	43.7	273
24-26	0.83	36.8	47.1	368
26-28	0.84	34.0	49.0	348
28-30	0.77	35.0	41.8	332
30-32	0.38	27.6	36.2	198
32-34	0.25	28.4	32.2	156
34-36	0.31	28.9	33.8	145
36-38	0.50	36.6	46.5	171
38-40	0.51	35.1	47.8	168
40-42	0.45	29.1	40.1	139
42-44	0.46	54.0	46.8	789
44-46	0.19	14.6	30.7	135
46-48	0.35	28.8	67.8	--
48-50	0.30	29.2	46.4	122
52-54	0.24	23.7	25.2	112
54-56	0.29	25.8	26.0	124
56-58	0.25	23.6	22.4	87
58-60	0.30	26.3	23.7	118
60-62	0.31	26.0	22.0	117
62-64	0.35	27.4	24.2	118
64-66	0.31	27.8	22.0	109
66-68	0.30	25.3	21.3	113
68-70	0.32	14.3	21.1	103
70-72	0.38	25.6	21.7	110
72-74	0.34	24.4	20.8	102
76-78	0.34	25.0	19.9	95
78-80	0.29	25.4	22.3	95

Concentrations of trace metals in core 16 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)
0-2	0.29	18.9	23.1	107
2-4	0.25	12.8	12.5	86
4-6	0.12	7.3	9.4	64
6-8	0.08	5.0	5.4	50
8-10	0.23	14.1	11.0	68
10-12	2.81	106.9	102.9	648
12-14	3.25	122.4	134.2	789
14-16	2.64	100.0	113.7	678
16-18	2.65	101.6	116.5	679
18-20	2.26	80.5	103.2	592
20-22	2.20	81.7	98.0	486
22-24	1.36	53.7	97.9	325
24-26	0.88	40.1	70.3	232
26-28	1.11	47.9	89.6	250
28-30	1.07	45.8	77.6	281
30-32	1.06	48.2	85.9	280
32-34	1.78	73.1	131.5	371
34-36	4.03	85.5	132.3	661
36-38	2.71	77.8	93.3	495
38-40	1.92	74.6	128.0	416
40-42	1.43	45.0	76.3	241
42-44	1.10	45.4	77.3	247
44-46	0.77	45.0	55.1	283
46-48	0.96	45.5	68.6	317
48-50	1.03	44.4	65.4	326
50-52	1.07	49.1	61.2	316
52-54	1.13	43.5	60.7	309
54-56	2.23	88.3	96.3	470
56-58	2.40	88.5	127.4	473
58-60	2.48	90.9	115.0	514
60-62	2.11	65.7	111.4	350
62-64	1.48	64.0	76.2	373
64-66	1.58	49.0	76.6	341
66-68	2.21	78.7	110.8	507
68-70	2.16	68.8	137.2	477
70-72	1.49	49.4	82.2	345
72-74	0.95	45.7	57.4	302
74-76	1.01	34.5	67.5	309
76-78	1.78	57.4	82.3	379
78-80	1.98	65.0	83.9	430
80-82	1.66	51.5	112.7	340
82-84	1.25	38.6	71.5	274
84-86	0.18	8.1	29.3	72
86-88	0.36	10.6	13.2	94
88-90	0.22	9.7	10.0	73
90-92	0.16	33.2	60.9	171
92-94	0.17	6.9	27.1	50
94-96	0.20	9.2	21.0	40
96-98	0.05	4.6	4.5	27
98-100	0.06	5.5	7.2	27
100-102	0.05	9.8	5.4	25
102-104	0.05	4.6	6.4	23
104-106	0.06	4.6	5.8	25
106-108	0.05	15.1	4.7	26

Concentrations of trace metals in core 17 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)
0-2	1.91	91.3	164.8	505
2-4	1.83	83.6	168.4	545
4-6	1.11	85.2	125.7	509
6-8	1.97	92.4	176.6	556
8-10	1.79	90.4	177.6	536
10-12	1.97	109.1	180.3	539
12-14	1.85	79.0	167.0	500
14-16	2.09	97.1	183.4	577
16-18	2.15	96.1	188.8	595
18-20	1.98	92.8	169.8	606
20-22	1.79	86.1	153.5	576
24-26	2.03	114.3	164.7	531
26-28	1.83	105.2	192.2	523
28-30	1.83	99.6	194.7	494
30-32	2.11	99.7	204.9	564
32-34	2.00	90.0	195.3	596
34-36	1.72	75.4	180.1	511
36-38	2.34	93.6	222.8	738
38-40	2.78	106.3	216.5	822
40-42	2.38	71.1	198.0	683
42-44	2.23	83.8	251.0	494
44-46	2.59	112.3	230.0	541
46-48	3.05	99.0	177.5	529
48-50	2.28	86.1	172.4	455
50-52	2.10	97.3	182.2	505
52-54	1.88	101.9	171.0	519
54-56	2.07	111.3	200.7	548
56-58	2.26	76.7	148.7	530
58-60	3.90	102.8	123.9	855
60-62	4.43	94.5	124.2	563
62-64	4.05	115.0	172.1	1555
64-66	3.01	105.9	169.6	670
66-68	2.16	88.5	172.0	522
68-70	1.61	74.2	137.6	377
70-72	1.84	83.7	156.5	397
72-74	1.29	69.7	160.0	327
74-76	1.38	70.0	139.5	327
76-78	1.04	--	121.3	293
78-80	--	--	107.3	--
80-82	1.84	85.7	155.6	390
82-84	1.49	77.1	168.0	397
84-86	0.73	69.8	95.5	334
86-88	1.33	71.0	209.4	430
88-90	1.02	75.3	154.5	410
90-92	0.41	73.8	82.2	285
92-94	0.48	57.3	168.2	347
94-96	0.64	82.8	270.1	421
96-98	0.42	42.3	120.5	283
98-100	0.47	85.3	328.3	344

Continued

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)
100-102	0.46	67.6	324.7	458
102-104	0.31	59.8	95.2	330
104-106	0.30	69.2	100.1	301
106-108	0.33	52.6	102.2	272
108-110	0.37	51.4	146.2	283
110-112	0.32	53.1	137.8	242
112-114	0.39	47.6	210.9	253
114-116	0.32	33.1	86.9	157
116-118	0.28	26.0	69.5	145
118-120	0.26	23.5	152.5	115
120-122	0.25	27.6	155.0	110
122-124	0.27	32.0	175.8	148
124-126	0.41	50.5	518.4	--

Concentrations of trace metals in core 19 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Fe (ppm)	Mn (ppm)	Pb (ppm)	Zn (ppm)
0-2	1.75	30.4	36,110	355	46.9	241
4-6	1.40	22.6	34,800	322	23.6	223
6-8	1.38	24.3	35,330	340	21.6	230
8-10	1.41	23.2	30,000	340	24.4	221
10-12	1.35	21.0	33,880	348	23.8	213
12-14	1.36	21.7	35,770	392	25.4	185
14-16	1.09	37.5	44,800	374	24.3	161
16-18	1.08	19.5	36,020	360	23.7	178
18-20	0.99	20.6	36,730	351	19.0	192
20-22	0.63	17.5	35,390	314	21.9	132
22-24	0.57	18.0	37,110	313	21.7	376
24-26	0.48	16.2	38,550	223	17.6	134
26-28	0.34	14.0	38,560	201	14.9	98
28-30	0.32	12.8	38,770	314	15.1	97
30-32	0.30	13.1	36,450	265	14.7	125
32-34	0.26	11.6	36,580	309	15.3	98
34-36	0.27	11.4	35,570	311	15.7	100
36-38	0.26	32.7	37,130	304	15.3	95
38-40	0.26	15.0	35,820	310	20.3	96
40-42	0.30	13.6	35,590	306	15.9	273
42-44	0.28	8.9	33,730	263	14.6	94
44-46	0.46	11.8	39,970	301	19.7	95
46-48	0.30	9.8	38,580	306	16.3	101
48-50	0.27	--	40,190	298	15.8	85
50-52	0.29	11.0	37,230	301	16.0	94
52-54	0.23	12.3	36,900	347	14.3	108
54-56	0.27	9.8	37,040	296	15.3	84
56-58	0.22	11.8	38,170	279	15.4	420
58-60	0.07	14.0	14,480	108	4.4	33
60-62	0.26	12.6	37,480	288	12.5	88
62-64	0.23	9.8	35,160	244	15.8	107
64-66	0.26	10.5	36,300	259	15.2	106
66-68	0.26	11.9	37,480	252	14.7	123
68-70	0.21	11.5	37,050	257	15.3	100
70-72	0.21	11.1	37,430	250	14.0	106
72-74	0.22	9.2	30,478	231	12.1	93
74-76	0.23	9.2	34,880	252	11.9	110
76-78	0.21	--	37,180	264	15.3	107
78-80	0.32	9.3	34,300	252	15.0	104
80-82	0.29	9.6	33,820	253	11.6	96
82-84	0.22	9.7	33,620	262	13.0	115
84-86	0.22	8.8	33,750	271	11.8	111
86-88	0.25	10.0	37,870	285	12.9	96
88-90	0.25	9.5	34,930	265	11.9	115
90-92	0.19	9.0	33,600	263	15.3	109
92-94	0.17	9.6	34,260	255	11.7	130
94-96	0.20	8.7	32,880	254	14.8	107
96-98	0.20	9.6	33,660	260	14.6	96
98-100	0.18	9.8	33,740	254	--	98
100-102	0.18	13.1	35,290	267	14.9	106
102-104	0.23	12.8	37,600	267	16.8	97
104-106	0.21	12.3	36,200	262	11.4	95

Concentrations of trace metals in core 20 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Fe (ppm)	Mn (ppm)	Pb (ppm)	Zn (ppm)
0-2	1.03	26.5	26,180	300	30.6	229
2-4	1.10	--	--	--	--	232
4-6	1.24	24.4	29,890	260	31.6	288
6-8	1.06	22.7	28,270	265	35.5	223
8-10	1.05	23.0	28,270	282	31.0	243
10-12	1.37	30.7	32,080	340	24.6	245
12-14	0.77	--	50,240	343	40.0	268
14-16	1.90	--	36,900	344	19.8	244
16-18	0.90	22.6	32,090	385	39.7	246
18-20	1.31	24.6	34,110	412	19.1	239
20-22	0.85	--	--	--	39.9	--
22-24	1.02	19.4	31,920	360	30.4	306
24-26	0.85	20.0	28,820	314	30.5	393
26-28	0.82	26.6	28,020	312	27.8	423
28-30	1.03	19.7	27,970	284	29.3	245
30-32	0.94	21.7	30,350	292	27.6	266
32-34	1.03	17.9	27,940	299	28.4	282
34-36	1.07	21.5	33,030	366	27.4	350
36-38	1.05	20.2	30,130	335	28.8	249
38-40	1.04	21.5	31,500	364	26.5	242
40-42	1.07	19.4	30,820	331	27.1	248
42-44	0.97	24.8	33,570	346	26.0	394
44-46	0.91	22.5	30,520	334	24.4	203
46-48	0.95	22.0	32,190	347	24.2	89
48-50	0.80	17.6	30,850	336	23.1	183
50-52	0.77	20.7	31,310	361	22.8	192
52-54	0.78	19.1	31,010	347	22.7	180
54-56	0.71	--	56,970	362	25.2	225
56-58	0.68	15.4	26,590	296	21.4	142
58-60	0.37	21.9	31,320	295	21.8	175
60-62	0.69	19.2	31,390	302	23.9	203
62-64	0.74	17.2	24,420	301	22.7	154
64-66	0.33	8.6	17,750	136	10.4	72
66-68	0.66	16.1	29,290	278	22.8	144
68-70	0.19	6.5	12,690	100	8.5	38
70-72	0.50	16.6	30,720	291	23.6	127
72-74	0.54	14.9	30,860	285	18.5	121
76-78	0.37	19.1	32,520	287	17.1	128
80-82	0.36	17.2	31,210	231	15.3	99
82-84	0.36	26.8	32,040	229	15.7	98
84-86	0.30	17.9	33,510	230	14.8	98
86-88	0.33	14.0	31,420	214	14.5	95
88-90	0.32	16.2	34,310	243	13.3	101
90-92	0.37	14.8	34,410	280	13.2	132
92-94	0.37	13.6	34,170	266	12.8	96
94-96	0.31	14.3	34,360	259	13.5	108

Concentrations of trace metals in core 21 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Fe (ppm)	Mn (ppm)	Pb (ppm)	Zn (ppm)
0-2	0.76	28.8	44,990	134	39.2	145
4-6	1.03	32.9	45,710	206	42.0	159
8-10	0.96	53.8	43,140	162	41.9	151
12-14	1.14	30.7	41,470	159	45.2	170
16-18	1.28	34.6	41,900	155	46.2	190
20-22	1.16	--	45,180	191	40.4	183
24-26	1.15	27.7	46,450	235	38.7	166
28-30	1.15	29.3	44,230	242	40.4	156
36-38	0.64	25.2	41,660	193	31.3	105
40-42	0.58	24.7	43,640	164	30.4	97
44-46	0.40	--	50,980	172	32.2	83
48-50	0.40	22.8	48,140	179	30.7	114
52-54	0.27	20.0	50,480	225	24.4	83
56-58	0.35	46.8	52,640	249	24.8	77
60-62	0.32	19.0	49,860	247	15.8	81
64-66	0.32	19.3	45,380	270	15.8	78
68-70	0.27	17.5	55,400	335	15.6	75
72-74	0.27	16.6	44,770	216	12.6	73
76-78	0.29	27.3	46,580	272	13.7	74
80-82	0.33	26.9	47,120	228	13.1	73
84-86	0.36	17.3	47,450	236	12.3	77
88-90	0.36	18.7	58,350	232	12.8	79

Concentrations of trace metals in core 22 in parts per millions. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Fe (ppm)	Mn (ppm)	Pb (ppm)	Zn (ppm)
0-2	0.65	39.0	66,660	656	55.0	442
4-6	0.69	38.9	61,000	655	58.9	351
8-10	0.77	--	63,920	618	52.8	341
12-14	0.40	38.3	61,070	610	38.7	242
16-18	0.43	41.8	62,950	681	36.7	230
20-22	0.29	25.2	61,410	679	25.1	188
24-26	0.28	25.4	67,330	720	19.8	181
28-30	0.29	25.3	59,700	648	24.7	167
32-34	0.24	25.4	57,910	650	23.1	163
36-38	0.22	24.2	56,960	579	17.0	160
40-42	0.30	28.9	61,290	690	20.5	169
44-46	0.29	24.3	59,020	582	19.2	161
48-50	0.29	22.2	59,000	551	20.5	166
52-54	0.28	22.1	58,720	549	22.6	159
56-58	0.29	32.5	61,700	695	19.5	156
60-62	0.29	21.0	61,280	548	17.6	153
64-66	0.34	19.1	63,060	558	22.4	153
68-70	0.33	20.0	64,300	585	22.7	159
72-74	0.28	29.0	61,420	519	22.8	156
76-78	0.28	--	63,120	548	23.1	150
80-82	0.29	--	70,660	586	19.9	150
84-86	0.27	25.2	59,350	578	20.8	193
88-90	0.30	--	62,700	587	18.3	145
92-94	0.27	18.9	61,890	587	20.5	150
96-98	0.26	18.6	58,050	577	18.5	138

Concentrations of trace metals in core 23 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Fe (ppm)	Mn (ppm)	Pb (ppm)	Zn (ppm)
0-2	0.96	38.7	68,790	340	54.7	272
4-6	0.75	39.7	63,370	386	53.0	280
8-10	0.89	35.5	68,680	401	50.5	281
12-14	0.81	33.2	70,010	420	43.6	249
16-18	0.42	32.9	68,180	480	29.6	189
20-22	0.28	26.2	69,420	540	20.6	146
24-26	0.22	25.0	66,660	586	22.9	127
28-30	0.54	22.2	66,960	657	17.4	124
32-34	0.18	18.9	62,670	847	13.2	116
36-38	0.22	20.1	66,770	771	15.5	123
40-42	0.20	17.9	66,010	735	17.0	112
44-46	0.19	16.5	67,260	756	11.3	107
48-50	0.32	17.1	69,210	692	15.9	112
52-54	0.19	18.6	68,390	231	15.9	111
56-58	0.22	17.1	67,980	628	12.9	111
60-62	0.22	16.9	61,880	623	12.8	112
64-66	0.22	17.3	56,490	660	19.3	115
68-70	0.21	17.4	59,440	652	18.5	114
72-74	0.21	18.9	53,970	533	16.3	112
76-78	0.20	16.5	51,190	596	15.1	109
80-82	0.18	15.9	63,930	--	16.2	108
88-90	0.18	16.4	65,420	554	14.5	106
92-94	0.20	18.4	70,760	569	17.2	114
96-98	0.20	17.9	69,610	602	15.6	112

Concentrations of trace metals in core 24 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Fe (ppm)	Mn (ppm)	Pb (ppm)	Zn (ppm)
0-2	0.69	19.3	43,530	159	47.0	137
4-6	0.71	19.1	42,160	135	48.6	137
8-10	0.76	20.3	42,980	146	47.3	141
12-14	0.76	19.0	41,250	146	47.7	146
16-18	0.87	21.4	43,740	113	60.2	147
20-22	1.04	18.0	44,630	124	48.6	142
24-26	0.82	--	51,410	124	60.7	142
28-30	0.74	16.9	41,090	101	46.6	138
32-34	0.81	77.3	44,990	101	53.3	152
36-38	0.70	19.1	43,840	101	47.3	144
40-42	0.70	24.8	45,560	113	43.9	136
44-46	0.66	20.1	47,100	123	50.8	147
48-50	0.24	16.8	51,000	123	59.7	149
52-54	0.24	19.0	49,890	134	59.1	148
56-58	0.25	20.1	54,260	145	49.5	137
60-62	0.24	142.6	51,160	146	43.8	135
64-66	0.24	18.0	47,830	135	41.8	131
68-70	0.25	16.7	49,290	--	43.4	--
72-74	0.34	15.7	50,030	--	40.3	--
76-78	0.22	15.6	47,790	--	40.8	--
80-82	0.21	17.7	50,180	--	41.1	--
84-86	0.22	16.6	47,550	--	36.9	--
88-90	0.37	16.7	50,470	--	48.1	--
92-94	0.23	16.6	46,690	--	37.2	--

Concentrations of trace metals in core 25 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Fe (ppm)	Mn (ppm)	Pb (ppm)	Zn (ppm)
4-6	0.16	32.0	44,530	224	55.1	173
8-10	0.13	--	40,070	198	51.2	171
12-14	0.12	26.8	45,230	184	53.7	165
16-18	0.52	23.8	44,570	194	37.1	154
20-22	0.40	23.1	41,620	175	33.5	142
24-26	0.34	22.1	40,680	161	32.7	123
28-30	0.40	21.4	42,900	156	35.6	117
32-34	0.17	20.6	35,030	114	27.2	88
36-38	0.18	16.8	39,530	124	25.9	95
40-42	0.17	15.1	40,160	138	25.3	89
44-46	0.15	13.9	46,780	158	12.3	85
48-50	0.13	21.8	42,740	183	13.6	84
52-54	0.17	13.0	40,510	207	11.0	85
56-58	0.12	12.0	43,820	213	12.0	82
60-62	0.16	28.3	42,050	213	21.1	87
64-66	0.16	--	43,740	212	12.5	88
68-70	0.13	15.0	47,770	272	12.4	88
72-74	0.16	15.1	44,110	273	12.0	86
76-78	0.18	17.9	44,790	261	12.4	98
80-82	0.16	15.5	45,000	262	12.9	95

Concentrations of trace metals in core 26 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Fe (ppm)	Mn (ppm)	Pb (ppm)	Zn (ppm)
0-2	0.95	32.1	47,130	1,773	49.9	325
4-6	0.74	28.0	42,100	850	41.3	313
8-10	0.76	27.6	46,310	1,182	47.2	353
12-14	0.79	32.7	47,010	1,304	41.8	311
16-18	0.75	27.4	43,580	1,193	44.6	274
20-22	0.88	27.4	46,590	1,116	41.6	300
24-26	0.84	27.7	44,300	1,242	35.9	310
28-30	0.91	29.6	46,520	1,078	46.5	347
32-34	0.57	30.1	46,260	1,064	43.5	334
36-38	0.80	30.1	46,700	1,111	43.6	351
40-42	0.97	33.0	44,970	1,065	45.3	413
44-46	0.70	27.6	45,680	1,332	41.8	350
48-50	0.63	29.8	44,290	893	37.7	280
52-54	0.58	32.3	46,010	950	44.3	219
56-58	0.51	34.7	48,587	1,176	54.0	217
60-62	0.46	34.8	48,140	950	64.9	224
68-70	0.36	33.0	48,300	1,009	36.9	204
72-74	0.38	29.0	47,080	1,522	38.5	192
76-78	0.36	29.5	50,210	1,010	29.9	187

Concentrations of trace metals in core 27 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Fe (ppm)	Mn (ppm)	Pb (ppm)	Zn (ppm)
0-2	0.53	28.8	54,440	1,770	45.1	242
4-6	0.62	29.6	56,390	1,728	45.8	272
8-10	0.59	31.5	57,900	2,476	57.4	287
12-14	0.37	31.2	59,070	--	49.0	257
16-18	0.59	33.7	58,410	3,056	46.7	290
20-22	0.36	35.4	57,590	2,856	48.9	267
24-26	0.41	25.8	53,770	1,498	40.4	222
28-30	0.47	24.4	55,280	1,404	42.6	216
32-34	0.39	22.4	53,160	1,309	35.1	194
36-38	0.34	21.8	52,070	1,274	32.2	196
40-42	0.29	19.4	50,800	1,163	24.7	167
44-46	0.26	14.5	50,150	1,032	11.1	106
48-50	0.17	11.1	47,250	723	8.6	53
52-54	0.20	11.4	48,330	689	8.1	79
56-58	0.21	11.3	45,890	692	8.1	82
60-62	0.20	11.3	48,120	689	6.9	74
64-66	0.16	11.4	45,850	737	6.9	71
68-70	0.17	10.8	46,730	763	6.5	70
72-74	0.18	10.0	44,640	735	6.7	64
76-78	0.21	10.6	43,290	754	6.6	69
80-82	0.16	10.6	43,600	634	6.5	65
84-86	0.21	11.2	41,500	727	7.0	74
88-90	0.23	11.3	45,430	694	7.0	75

Concentrations of trace metals in core 28 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Fe (ppm)	Mn (ppm)	Pb (ppm)	Zn (ppm)
0-2	0.49	29.8	45,820	1,528	26.9	260
4-6	0.46	32.9	47,770	1,908	27.8	265
8-10	0.36	26.4	41,560	868	25.7	225
12-14	0.39	23.1	45,730	1,152	19.6	190
16-18	0.30	20.7	46,510	1,123	28.9	187
20-22	0.34	22.3	45,230	1,065	18.9	156
24-26	0.34	22.8	45,460	1,087	32.6	148
28-30	0.17	26.9	47,360	727	16.6	139
32-34	0.23	19.4	47,830	1,133	14.6	134
36-38	0.19	19.6	48,780	1,511	12.7	127
40-42	0.17	19.5	45,660	1,177	13.7	118
44-46	0.18	20.3	44,970	874	13.0	118
48-50	0.15	20.3	47,780	811	13.9	117
52-54	0.19	21.7	46,200	780	12.7	126
56-58	0.25	21.0	46,350	1,158	13.7	118
60-62	0.23	19.8	45,320	956	15.9	117
64-66	0.81	21.0	44,150	1,121	14.2	121
68-70	0.11	--	53,000	962	16.6	118
72-74	0.15	20.3	41,460	794	13.3	117
76-78	0.15	16.5	44,030	815	12.6	108
80-82	0.16	16.9	41,060	891	11.3	104
84-86	0.20	15.9	46,610	705	12.7	109
88-90	0.15	16.6	41,710	793	11.4	104
92-94	0.19	14.3	42,050	754	12.4	109
96-98	0.24	15.1	40,120	726	10.0	103

Concentrations of trace metals in core 29 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Fe (ppm)	Mn (ppm)	Pb (ppm)	Zn (ppm)
0-2	0.73	36.6	45,370	1,536	44.7	306
4-6	0.80	34.9	44,010	1,281	48.4	359
8-10	0.86	33.1	43,620	1,446	50.2	330
12-14	0.76	32.4	46,720	2,014	52.1	337
16-18	0.71	33.3	45,990	1,135	50.8	381
20-22	0.67	24.3	45,230	779	43.6	346
24-26	0.53	19.8	41,430	755	35.4	221
28-30	0.35	18.9	42,750	749	42.4	190
32-34	0.27	18.8	42,250	736	30.5	159
36-38	0.25	17.4	46,100	967	25.0	141
40-42	0.17	16.2	45,300	832	16.8	120
44-46	0.16	17.0	42,730	830	14.6	116
48-50	0.16	13.5	42,520	909	15.1	108
52-54	0.17	8.1	39,700	815	13.0	105
56-58	0.23	7.4	39,340	831	13.8	105
60-62	0.26	11.4	40,270	999	14.2	110
64-66	0.23	7.4	41,870	934	11.8	105
68-70	0.26	8.5	41,180	930	11.8	101
72-74	0.24	10.1	40,230	822	11.7	92
76-78	0.28	8.5	38,030	913	13.0	109
80-82	0.24	--	40,320	818	14.8	101
84-86	0.28	19.5	37,220	789	14.4	105
88-90	0.19	6.6	34,470	675	11.9	82
92-94	0.15	5.3	22,750	414	8.4	54
96-98	0.13	5.8	22,970	416	7.3	50

Concentrations of trace metals in core 30 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Fe (ppm)	Mn (ppm)	Pb (ppm)	Zn (ppm)
0-2	0.26	15.9	42,430	882	21.7	163
4-6	0.15	15.5	49,110	767	15.4	127
8-10	0.16	14.8	46,610	861	14.1	124
12-14	0.19	15.1	46,830	1,123	17.5	136
16-18	0.18	17.5	45,260	1,111	16.3	145
20-22	0.16	13.8	44,370	879	13.2	124
24-26	0.17	13.3	39,340	897	13.1	118
28-30	0.15	16.6	44,200	899	14.4	121
32-34	0.12	15.9	31,340	506	9.9	81
36-38	0.07	--	22,710	256	17.9	48
44-46	0.69	5.3	11,410	189	2.9	28
48-50	0.06	8.5	15,880	260	8.0	46
52-54	0.08	8.5	18,330	332	5.0	51
56-58	0.07	5.2	18,380	323	4.8	49
64-66	0.06	8.3	17,640	239	4.3	41
68-70	0.10	7.6	23,880	336	6.5	54
72-74	0.08	6.6	22,960	309	5.7	52
76-78	0.06	5.4	19,880	249	5.0	45
80-82	0.08	7.5	25,380	347	6.4	53
84-86	0.16	10.8	45,740	1,241	10.3	172
88-90	0.06	6.2	19,340	240	5.5	45
92-94	0.11	8.3	29,740	343	7.1	66
96-98	0.04	5.2	18,510	202	5.8	38
100-102	0.06	6.5	21,830	229	5.5	50
104-106	0.08	8.7	28,090	296	7.3	66
108-110	0.08	7.9	28,010	288	6.0	62
116-118	0.12	--	47,620	531	8.8	89
120-122	0.16	10.9	42,750	531	8.7	108
124-126	0.14	10.9	44,460	402	9.3	112
128-130	0.11	8.6	37,150	342	7.4	81
132-134	0.07	7.1	30,290	283	5.8	66
136-138	0.04	6.4	25,900	385	3.4	30

Concentrations of trace metals in core 31 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Fe (ppm)	Mn (ppm)	Pb (ppm)	Zn (ppm)
4-6	0.77	25.3	49,330	2,392	38.9	350
8-10	0.76	21.0	45,870	1,789	35.3	352
12-14	1.13	25.2	47,760	1,816	30.4	319
16-18	0.80	21.5	46,980	1,226	29.6	273
20-22	1.00	28.6	48,280	1,209	31.4	294
24-26	0.84	25.0	49,460	1,664	29.3	277
28-30	0.90	18.9	49,160	1,531	29.6	289
32-34	0.92	25.5	46,280	1,882	31.5	286
36-38	0.82	67.7	45,650	2,779	34.0	293
40-42	0.80	26.0	49,340	2,417	33.2	285
44-46	0.80	20.1	49,160	2,013	35.5	280
48-50	0.77	22.7	50,000	3,505	34.0	288
52-54	0.82	28.2	47,980	1,105	32.3	292
56-58	0.66	18.3	44,030	746	12.1	118
60-62	0.88	21.5	45,690	1,141	36.5	327
64-66	0.80	22.2	48,520	1,854	35.3	302
68-70	0.79	24.5	47,870	1,192	37.0	404
72-74	0.76	27.9	48,640	1,765	38.1	488
76-78	0.80	22.7	47,270	1,568	36.1	538
80-82	0.90	26.3	47,020	1,474	38.5	371
84-86	0.72	26.9	47,000	1,176	35.6	292
88-90	0.53	21.9	47,580	1,489	37.0	215
92-94	0.60	20.2	47,080	1,317	31.7	188

Concentrations of trace metals in core 32 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Fe (ppm)	Mn (ppm)	Pb (ppm)	Zn (ppm)
4-6	0.77	27.3	42,220	978	49.9	342
8-10	0.71	27.7	42,230	869	45.0	314
12-14	0.74	23.3	41,480	826	42.1	279
16-18	0.72	26.7	41,750	768	44.2	277
20-22	0.66	23.9	41,520	696	38.5	311
24-26	0.66	24.9	43,240	690	42.0	360
28-30	0.39	21.0	40,350	590	36.0	175
32-34	0.34	20.5	37,890	608	31.3	149
36-38	0.31	24.8	41,720	646	40.6	180
40-42	0.29	23.4	42,920	674	34.1	161
44-46	0.19	18.8	42,320	559	23.1	129
48-50	0.16	20.9	39,900	598	17.0	110
52-54	0.11	18.9	35,400	528	12.7	99
56-58	0.72	21.0	47,200	1,430	43.8	286
60-62	0.14	17.4	38,140	641	18.5	104
64-66	0.25	13.2	38,060	642	13.2	107
68-70	0.28	12.9	39,870	711	15.3	106
72-74	0.30	11.4	42,290	710	12.8	101
76-78	0.31	12.0	40,240	745	11.6	104
80-82	0.32	11.1	43,510	757	10.9	103
84-86	0.34	13.7	45,400	847	12.8	112
88-90	0.32	13.2	39,320	734	11.4	103
92-94	0.35	13.0	39,420	748	11.5	101
96-98	0.37	12.4	39,600	713	12.2	104
100-102	0.32	11.8	38,410	614	9.8	84
104-106	0.42	11.3	37,010	736	11.4	100
108-110	0.28	10.2	35,310	629	10.9	92

Concentrations of trace metals in core 33 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Fe (ppm)	Mn (ppm)	Pb (ppm)	Zn (ppm)
0-2	0.70	32.8	30,290	1,104	40.8	204
4-6	0.66	34.6	29,960	968	43.3	208
8-10	0.79	33.3	29,570	1,037	42.2	214
12-14	0.89	33.0	31,930	1,057	48.7	250
16-18	0.73	30.4	27,100	1,094	47.2	246
20-22	0.97	43.2	33,150	1,197	55.0	372
24-26	0.78	36.5	30,520	965	43.4	302
28-30	0.47	31.2	31,100	978	41.1	152
32-34	0.43	27.8	30,030	672	35.8	132
36-38	0.39	22.3	24,330	595	55.4	111
40-42	0.24	20.5	24,570	657	34.4	98
44-46	0.39	25.2	28,670	881	40.8	111
48-50	0.34	24.3	32,530	1,114	35.2	120
52-54	0.87	26.5	32,230	803	56.9	157
56-58	0.15	18.5	25,080	872	17.8	76
60-62	0.29	21.4	30,710	1,312	18.3	104
64-66	0.18	16.2	20,180	687	16.8	68
68-70	0.16	18.4	27,690	917	13.2	77
72-74	0.15	16.7	26,560	728	13.4	67
76-78	0.24	20.5	30,760	1,030	14.1	81
80-82	0.13	19.3	25,810	1,377	11.4	57
84-86	0.22	--	32,860	1,288	14.8	72
88-90	0.58	13.3	21,420	1,034	7.5	43
92-94	0.13	18.4	23,970	1,249	13.8	49
96-98	0.56	10.4	15,820	629	6.6	33

Concentrations of trace metals in core 34 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Fe (ppm)	Mn (ppm)	Pb (ppm)	Zn (ppm)
0-2	1.04	32.8	41,770	1,533	50.6	306
4-6	0.96	32.3	42,920	1,640	45.7	343
8-10	0.95	33.1	41,390	1,546	51.5	344
12-14	1.10	35.0	40,350	1,371	51.9	367
16-18	0.97	32.5	40,930	1,687	51.9	387
20-22	0.92	35.2	45,500	1,518	54.4	374
24-26	1.11	32.4	44,300	2,065	48.4	348
28-30	0.98	32.4	39,390	913	49.7	371
32-34	1.29	40.9	45,040	1,255	58.7	422
36-38	1.03	35.6	41,010	1,690	57.0	299
40-42	0.97	33.2	42,090	1,700	43.3	273
44-46	0.98	33.7	40,070	1,147	46.2	268
48-50	1.04	31.7	39,830	1,037	57.0	297
52-54	1.25	30.3	41,790	882	54.0	349
56-58	0.95	33.8	42,120	1,001	49.0	345
60-62	1.00	31.4	43,350	1,305	52.4	362
64-66	1.12	33.9	42,710	1,284	47.0	398
68-70	1.10	35.7	40,980	801	51.0	542
72-74	1.32	32.3	41,100	1,085	52.9	577
76-78	1.47	30.7	40,880	1,016	48.5	610
80-82	1.03	30.6	39,040	951	47.0	264
84-86	0.53	33.1	43,100	924	47.8	189
88-90	0.48	27.5	40,880	1,154	46.6	178
92-94	0.48	29.6	42,070	1,463	50.7	167
96-98	0.57	29.3	38,080	746	48.7	143
100-102	0.48	30.7	44,470	1,324	55.4	191

Concentrations of trace metals in core 35 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Fe (ppm)	Mn (ppm)	Pb (ppm)	Zn (ppm)
0-2	0.98	34.5	37,500	895	57.8	261
4-6	0.99	33.0	38,670	795	54.6	257
8-10	0.82	35.7	40,340	860	61.6	285
12-14	0.97	32.7	35,680	863	57.7	281
16-18	1.12	32.9	38,200	794	59.6	263
20-22	1.15	36.4	38,560	858	62.7	324
24-26	0.83	36.9	40,440	796	60.6	284
28-30	1.02	33.5	37,800	642	56.5	260
32-34	1.02	36.0	37,040	667	59.7	271
36-38	1.22	34.7	38,250	731	65.0	277
40-42	1.01	33.3	37,350	649	49.8	261
44-46	1.04	20.6	32,880	404	34.8	170
48-50	0.39	20.2	32,140	401	23.8	163
52-54	0.48	20.1	30,980	403	24.7	159
56-58	0.95	31.9	37,110	543	40.3	326
60-62	0.91	33.9	36,210	588	44.0	437
64-66	1.10	35.1	36,340	576	47.8	553
68-70	0.87	28.7	35,610	552	43.2	199
72-74	0.47	29.3	38,690	545	48.9	185
76-78	0.64	30.3	40,130	610	65.8	191
80-82	0.44	25.4	33,600	385	65.1	163
84-86	0.27	22.1	33,870	376	24.9	124
88-90	0.27	21.9	35,200	405	21.2	122
92-94	0.17	--	44,320	448	24.6	122
96-98	0.24	21.4	33,290	370	18.5	129

Concentrations of trace metals in core 36 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Fe (ppm)	Mn (ppm)	Pb (ppm)	Zn (ppm)
0-2	0.23	8.0	8,800	232	11.9	66
4-6	0.21	5.6	5,360	101	6.9	56
8-10	0.41	22.4	24,910	343	30.4	150
12-14	0.46	30.8	31,150	497	39.9	168
16-18	0.31	24.5	25,100	440	38.4	120
20-22	0.37	25.7	30,540	639	45.9	137
24-26	0.34	27.3	28,670	615	49.7	146
28-30	0.49	32.5	35,240	410	153.0	198
32-34	0.43	32.8	36,370	434	106.7	175
36-38	0.49	28.2	32,000	411	78.5	177
40-42	0.54	31.4	36,780	547	78.1	205
44-46	0.42	27.9	31,470	382	72.9	171
48-50	0.27	21.7	30,410	362	22.7	121
52-54	0.28	20.1	30,470	350	20.4	116
56-58	0.22	24.1	30,410	392	20.1	103
60-62	0.21	24.1	35,470	384	19.1	57
64-66	0.24	20.4	29,620	546	17.2	97
68-70	0.18	19.9	27,870	397	16.5	91
72-74	0.13	16.7	22,120	260	13.4	70
76-78	0.19	22.9	29,540	498	16.6	90
80-82	0.16	23.1	33,310	473	18.2	105
84-86	0.17	21.7	28,760	302	20.1	95
88-90	0.18	20.5	31,690	331	19.1	98
92-94	0.17	20.7	28,420	405	16.2	90

Concentrations of trace metals in core 37 in parts per million. See figure 2 for core location.

Sample Interval (cm)	Cd (ppm)	Cu (ppm)	Fe (ppm)	Mn (ppm)	Pb (ppm)	Zn (ppm)
0-2	0.37	40.6	26,440	696	35.8	182
4-6	0.76	37.1	44,020	1,095	54.6	260
8-10	0.89	40.0	46,660	1,302	50.4	306
12-14	0.95	42.1	43,380	1,237	52.1	304
16-18	0.78	30.7	31,300	923	46.7	281
20-22	0.94	36.7	39,380	1,104	47.5	307
24-26	0.38	23.0	23,020	555	37.3	188
28-30	0.24	21.7	21,650	457	31.9	161
32-34	0.17	23.3	26,080	484	40.6	156
36-38	0.15	17.8	21,220	379	16.1	137
40-42	0.50	37.5	28,470	832	63.3	265
44-46	0.98	51.3	41,890	1,165	79.0	448
48-50	0.38	--	28,420	773	35.8	229
52-54	1.02	41.9	36,430	1,051	52.1	380
56-58	0.53	29.0	30,720	899	42.9	259
60-62	0.68	35.8	39,090	1,105	47.7	309
64-66	0.61	35.3	35,950	961	44.8	263
68-70	0.28	22.7	22,830	567	29.3	136
72-74	0.69	37.4	36,620	948	53.3	267
76-78	1.15	38.3	40,040	1,203	56.3	361
80-82	0.80	37.7	35,170	918	61.6	286
84-86	0.87	38.0	34,830	746	58.4	371
88-90	1.01	36.5	33,090	846	56.8	288
92-94	0.71	35.9	37,440	965	47.5	255
96-98	1.13	43.1	39,280	880	68.4	337