U.S. DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

LITHOLOGIC DESCRIPTION OF SEDIMENT CORES FROM WOCUS MARSH, KLAMATH COUNTY, OREGON

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Introduction

As part of a series of investigations designed to study the Quaternary climatic histories of the western U.S. and the adjacent northeastern Pacific Ocean, two sediment cores were collected from Wocus Marsh, Klamath County, Oregon, in the fall of 1991. This report presents basic data concerning the Wocus Marsh site, as well as lithologic descriptions of the recovered sediments. The drilling methods and core sampling and curation techniques used are described by Adam (1993).

Acknowledgement

Coring at Wocus Marsh was made possible by the gracious cooperation of the owners and staff of the Running Y Ranch. We particularly thank the manager, Mr. Don Hagglund.

Site description

Wocus Marsh is a broad open valley about 3 km wide and 7.7 km long that lies just west of the southern end of Upper Klamath Lake, Oregon (Figure 1), at an elevation of about 1261 meters. The name is derived from the local Indian name for the yellow pond lily, *Nuphar polysepalum*, which was abundant in the marsh and was an important food source.

The basin was an isolated arm of Upper Klamath Lake until about 1900, when reclamation efforts began. The floor of the basin has been farmed for several decades; a series of roads and drainage ditches in a grid pattern allow easy access. The core location (Figure 1) was selected to be close to the geographical center of the basin, well away from any edge effects.

Regional bedrock consists of basalt and basaltic andesites of Pliocene and upper Miocene age (Walker and McLeod, 1991; Sherrod and Pickthorn, 1992). The eastern rim of the basin consists of low faulted blocks oriented NNW-SSE; the western side of the basin is formed by steep, normal fault scarps that extend up to 430 m above the present basin floor. The region is tectonically active; a series of earthquakes with Richter magnitudes up to 5.5 occurred within a few km of Wocus Marsh in the fall of 1993, causing extensive damage in Klamath Falls.

Portions of the Upper Klamath Lake drainage were heavily glaciated at times during the Pleistocene (Crandell, 1965). The Mountain Lakes Wilderness Area, just west of Upper Klamath Lake, was glaciated during at least the most recent Pleistocene glacial interval (Carver, 1972), with the glaciers mostly confined to the north side of the peaks. Further north, the crest of the Cascades between Mt. McLaughlin and Mt. Mazama (now Crater Lake) was extensively glaciated. None of these glaciers reached as far as Upper Klamath Lake, but glacial runoff from both the Mountain Lakes and southern Cascade glaciers flowed into the basin.

Core descriptions

Two cores, designated here as Core 1 and Core 2, were taken at Wocus Marsh between September 17th and 20th, 1991.

Core 1 reached a maximum depth of 23.65 meters, at which depth drilling mud circulation was lost. Shelby tubes were used to sample the top 8.4 meters of the core. Below 8.4 meters, cores were taken using a conventional rotary drill rig and drilling mud, as described by Adam (1993).

Core 2 was taken about 20 meters east of Core 1 to attempt deeper core recovery. Because Core 1 produced excellent core recovery of the top part of the section, no Shelby tubes were taken at the top of Core 2; rotary drilling began at a depth of 3.96 meters. Core 2 reached

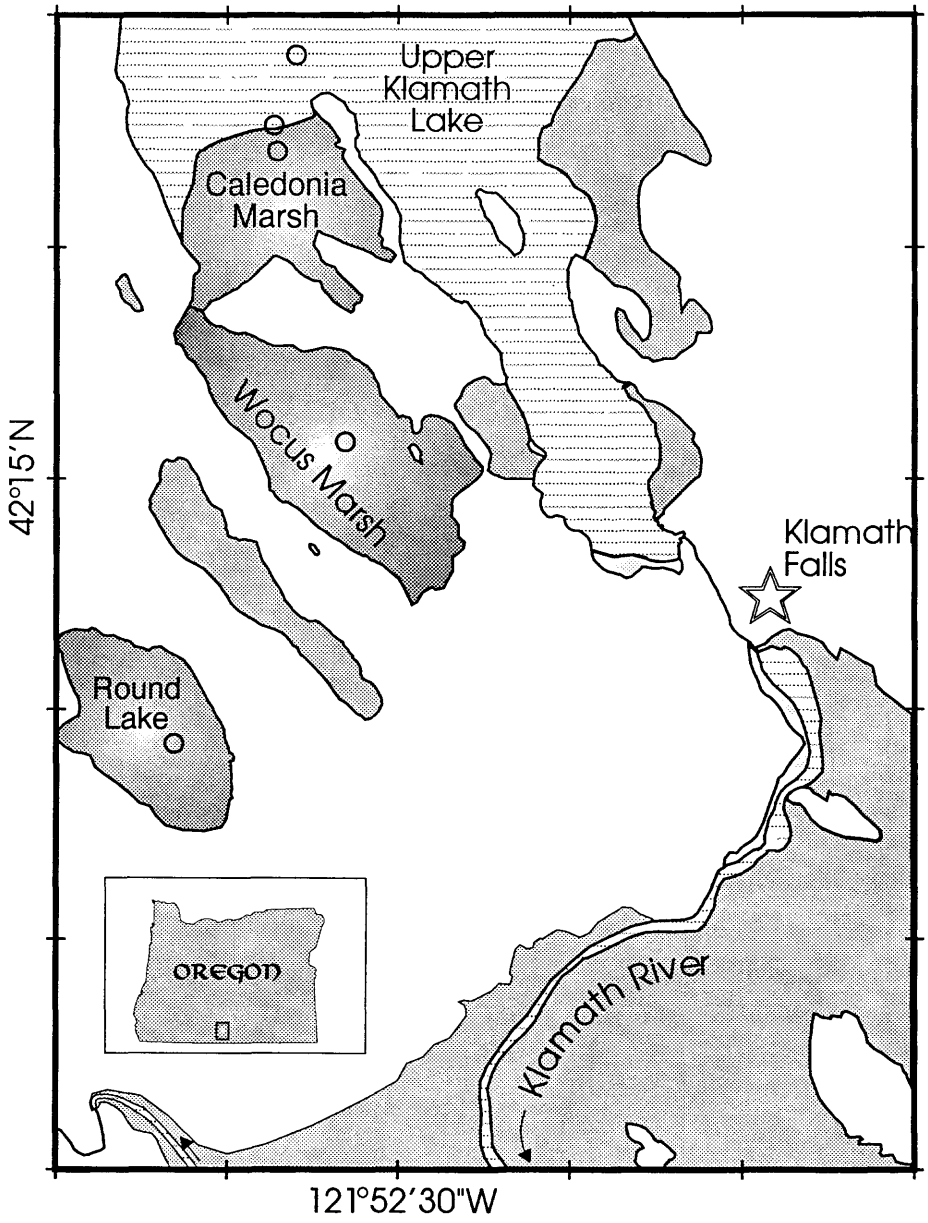

Figure 1.--Map of the southern Cascades region, showing locations of drill sites (circles). Light shaded pattern represents marshland. Map ticks represent 7.5'. Inset shows location of main map.

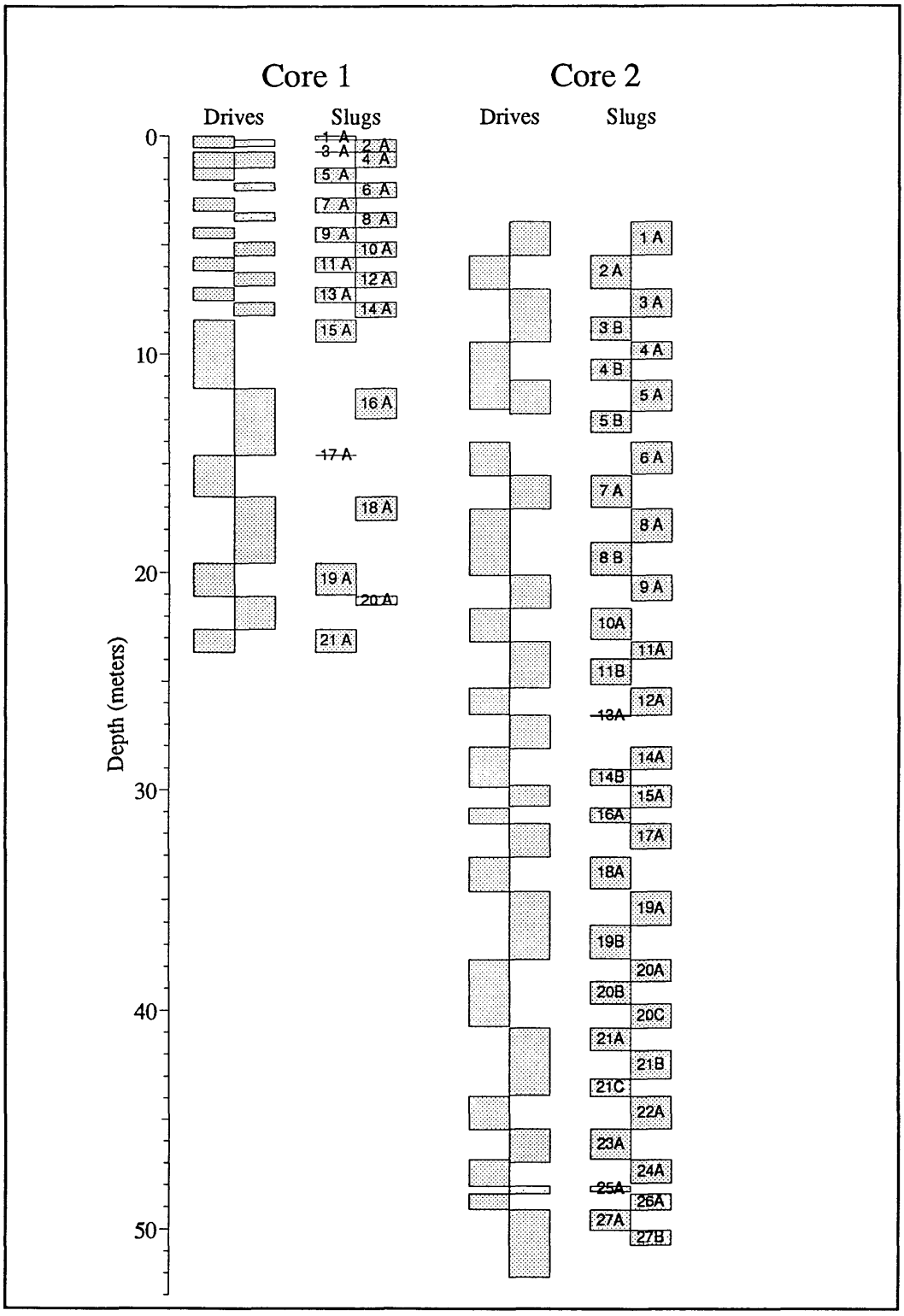

Figure 2.--Graphical representation of core recovery for Wocus Marsh cores 1 and 2. See text for explanation.

a maximum depth of 52.1 meters. Drilling was stopped when a target depth was reached, in order to move on to other sites.

Core recovery

The depth interval drilled for each drive and the percent recovery are shown in Figure 2 and in Tables 1 (Core 1) and 2 (Core 2). For each core, the Figure 2 column labeled "Drives" shows an unlabeled, shaded box for each drive recovered. The upper boundary represents the depth at which drilling began for that drive as reported by the driller plus a possible adjustment to account for >100% recovery. These boxes are offset in an alternating pattern to facilitate comparison of the bottom of one drive with the top of the next drive. Immediately to the right of the "Drives" column, the "Slugs" column displays similar but labeled boxes that identify the drive, the slugs (A, and sometimes B and C) into which the drive was divided for storage, and the thickness of sediment actually recovered. In addition, some drives are plotted using a vertical offset that compensates for apparent overlap between drives (see example below). The data used are shown in Tables 1 and 2.

As an example, consider Core 2, Drives 4 and 5. Drive 4 extended from a starting depth of 9.45 m to a bottom depth of 12.5 meters, recovering 1.76 meters of sediment from an interval 3.05 m thick, for a recovery of 57.7% (Table 2). Drive 5 extended from 12.50 to 14.02 m and recovered 2.35 m of sediment from a 1.52-m-thick interval, for a recovery of 154.2%. The "extra" recovery for drive 5 is assumed to represent material left in the hole when drive 4 was recovered. Similar overlaps are found between drives 15 and 16, 20 and 21, and 21 and 22. However, the total amount of sediment recovered from the hole, as shown in the "Slugs" column, can be accommodated within the total depth drilled if a few adjustments are made to the top depths of selected drives. The adjustment for drive 5 is -1.29 m, as shown in the column labeled "Offset" (Table 2). The offset is added to the driller's depth for the top of the drive to produce a calculated depth for the top of the drive. The depths shown on the lithologic logs in Appendices B and C are based on the calculated depths for the tops of the drives.

Dating

Age control for the cores is derived from tephra layers identified in Core 2 (Table 3) and from four radiocarbon age estimates (Table 4). The section is of middle and upper Pleistocene and Holocene age. An additional tephra, not listed in Table 3, was recovered from an apparent depth of 23 m in core 1, and was identified as the Trego Hot Springs ash layer, which has been radiocarbon dated as about 21,800 years old (Negrini and Davis, 1992). If both the recorded depth and the ash identification are correct, the implied changes in sedimentation rates through time are difficult to explain. A more likely explanation is that the recorded depth of the tephra layer is much deeper than the actual depth. The sample in question came from an apparent depth of 22.66-22.67 m in drive 21 of core 1. Core recovery was very poor below a depth of 9 m in core 1 (Fig. 2), and it seems likely that the tephra recovered in drive 21 originated much higher in the section than the driller's depths for the drive would indicate. The absence of the Trego Hot Springs bed in core 2 suggests that either the ash bed is discontinuous at Wocus Marsh or the bed corresponds to one of the gaps in the core 2 record.

Table 1.--Drive data for Wocus Marsh core 1						
Drive number	Driller's Depth (m)		Recovery		Offset	Calculated depth for top of drive (m)
	Top	Bottom	meters	Percent		
1	0.00	0.53	0.19	35.6	0.00	0.00
2	1.19	1.50	0.54	177.1	-1.00	0.19
3	1.50	2.21	0.00	0.0	-0.77	0.73
4	2.21	2.92	0.70	97.7	-1.48	0.73
5	2.92	3.51	0.71	121.5	-1.48	1.44
6	3.51	3.86	0.69	194.0	-1.36	2.15
7	3.86	4.47	0.68	111.5	-1.03	2.84
8	4.47	4.88	0.69	169.7	-0.96	3.51
9	4.88	5.39	0.68	133.8	-0.68	4.20
10	5.39	6.00	0.68	111.5	-0.50	4.88
11	6.00	6.61	0.69	113.2	-0.43	5.56
12	6.61	7.22	0.68	111.5	-0.35	6.25
13	7.22	7.83	0.69	113.2	-0.28	6.93
14	7.83	8.43	0.67	109.9	-0.20	7.62
15	8.43	11.56	1.00	32.0	0.00	8.43
16	11.56	14.61	1.39	45.6	0.00	11.56
17	14.61	16.51	0.00	0.0	0.00	14.61
18	16.51	19.56	1.09	35.8	0.00	16.51
19	19.56	21.09	1.46	95.8	0.00	19.56
20	21.09	22.61	0.41	26.9	0.00	21.09
21	22.61	23.65	1.04	99.8	0.00	22.61

Table 2.--Drive data for Wocus Marsh core 2						
Drive Number	Driller's depths		Recovery		Offset	Calculated depth for top of drive (m)
	Top	Bottom	meters	percent		
1	3.96	5.49	1.50	98.4	0.00	3.96
2	5.49	7.01	1.49	97.7	0.00	5.49
3	7.01	9.45	2.35	96.4	0.00	7.01
4	9.45	12.50	1.76	57.7	0.00	9.45
5	12.50	14.02	2.35	154.2	-1.29	11.21
6	14.02	15.55	1.46	95.8	0.00	14.02
7	15.55	17.07	1.44	94.5	0.00	15.55
8	17.07	20.12	3.04	99.7	0.00	17.07
9	20.12	21.65	1.16	76.1	0.00	20.12
10	21.65	23.17	1.43	93.8	0.00	21.65
11	23.17	25.30	1.98	92.8	0.00	23.17
12	25.30	26.52	1.28	105.0	0.00	25.30
13	26.52	28.05	0.04	2.6	0.06	26.59
14	28.05	29.88	1.75	95.7	0.00	28.05
15	29.88	30.82	0.99	105.3	-0.08	29.80
16	30.82	31.53	0.67	94.2	0.00	30.82
17	31.53	33.08	1.16	74.8	0.00	31.53
18	33.08	34.63	1.42	91.6	0.00	33.08
19	34.63	37.68	3.00	98.4	0.00	34.63
20	37.68	40.73	3.13	102.7	0.00	37.68
21	40.73	43.78	3.10	101.7	0.08	40.81
22	43.78	45.30	1.51	99.1	0.13	43.91

23	45.30	46.82	1.39	91.2	0.13	45.43
24	46.82	48.04	1.07	87.7	0.00	46.82
25	48.04	48.37	0.24	72.7	0.00	48.04
26	48.37	49.09	0.75	105.4	0.00	48.37
27	49.09	52.13	1.58	51.8	0.04	49.12

Table 3.--Tephra from Wocus marsh core 2

Tephra layer	Depth (m)	Age (kyr)
Rockland ash bed	26.58-28.11	400-470
previously undescribed	33.80-33.81	?
previously undescribed	41.81-41.83	?
previously undescribed, also found at base of Round Lake core	49.38-49.42	<1.45 Ma

Table 4.--Radiocarbon dates from Wocus Marsh core 2

Depth (m)	Material	Radiocarbon age	Lab number
11.21 - 11.25	bulk sediment	31,720 ± 860	USGS-3341
14.47 - 14.52	bulk sediment	27,550 ± 780	USGS-3328
20.42 - 20.47	bulk sediment	>48,000	USGS-3331
20.98 - 21.02	bulk sediment	>49,000	USGS-3340

Lithology

A very generalized lithology of the section is shown in Figure 3; detailed lithologic logs for cores 1 and 2 are shown in Appendices B and C, using the patterns shown in Appendix A. Depths are shown in meters from the ground surface. Each stratigraphic unit is described to the right of the stratigraphic column. Most descriptions were taken from the fresh cores in the field, but some further descriptions were done in the laboratory. Color codes are taken from the Rock Color Chart distributed by the Geological Society of America (Rock Color Chart Committee, 1948).

The record indicates that the Wocus Marsh basin has existed for at least the past several hundred thousand years, with alternating intervals of highly organic vs. inorganic sedimentation. Study of the climatic record preserved in the cores will help to separate the effects of climate on sediment type from possible tectonic effects on the connection between the Wocus Marsh sub-basin and the rest of Upper Klamath Lake.

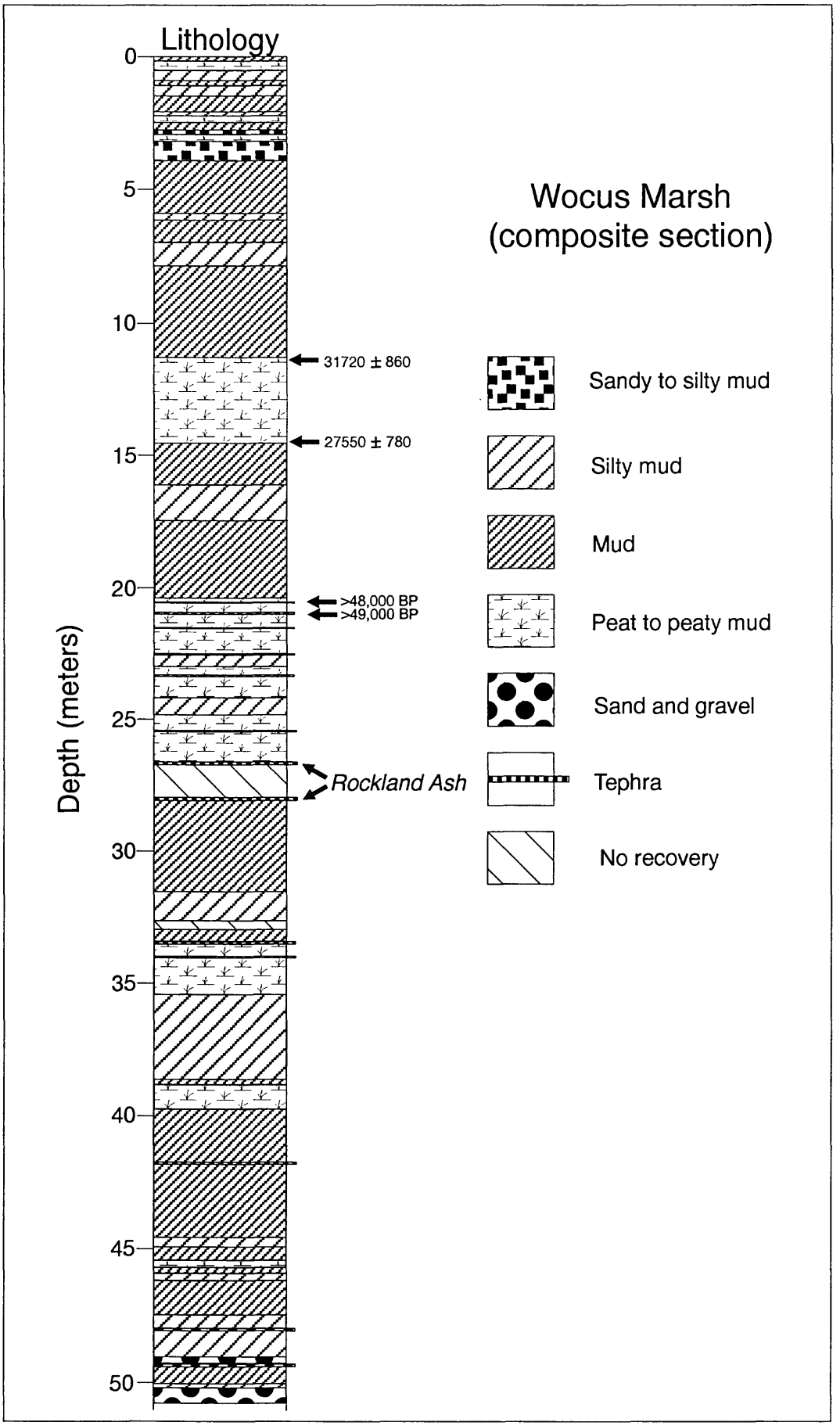

Figure 3.-- Generalized lithology of the Wocus Marsh section. See appendices for more detail.

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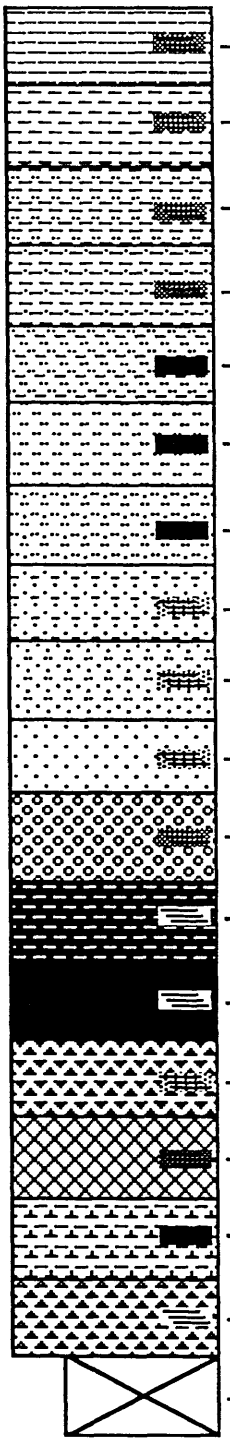
Appendix A
Legend showing patterns used for Lithologic Logs

Small box inset within each pattern is used to indicate laminations within the unit (see written descriptions for more detail).

KEY TO LITHOLOGIES AND LAMINATION SYMBOL



CLAY

SILTY CLAY OR MUD

SILTY MUD

SANDY MUD

MUDDY SILT

SILT

SANDY SILT

MUDDY SAND

SILTY SAND

SAND

GRAVEL OR CINDERS

ORGANIC

TEPHRA

BRECCIA

BASALT

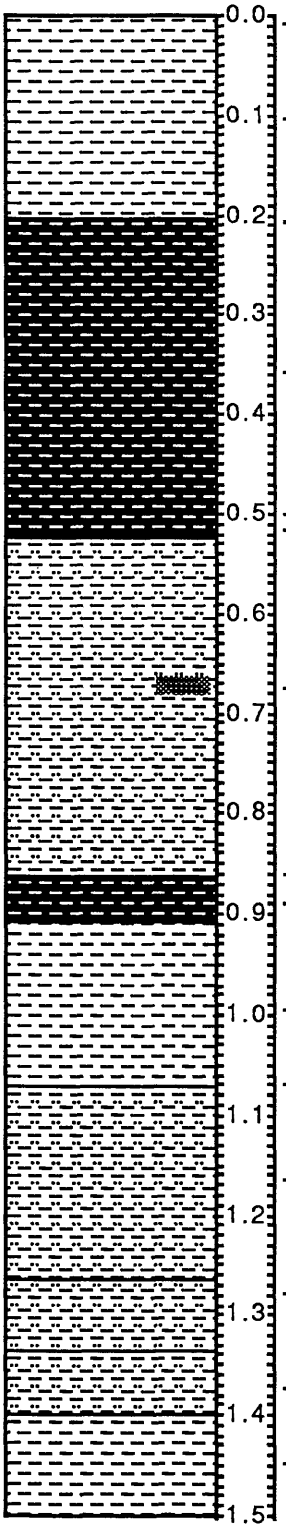
MARL

CHERT

NO CORE RECOVERED

Appendix B
Core 1 Lithologic Log

Wocus Marsh, Core 1
Klamath County, Oregon



Start of Drive 1 [0.00-0.50 m].

MUD (SOIL) WITH GRASS ON UPPER SURFACE AND ROOTS THROUGHOUT [0.00-0.21 m]; dark/dusky yellowish brown (10YR3/2); non-calcareous; unconsolidated to massive; fractured; gradational lower contact.

Break in core at 0.21 m.

PEAT WITH ROOTS THROUGHOUT [0.21-0.50 m]; dusky brown (5YR2/2); non-calcareous; massive, fractured.

Start of Drive 2 [0.50-1.07 m].

PEAT WITH ROOTS [0.50-0.53 m]; dusky brown (5YR2/2); non-calcareous; unconsolidated; sharp, irregular lower contact.

VERY SLIGHTLY SILTY MUD WITH ROOTS [0.53-0.86 m]; 1 cm laminations grading down to 2-5 mm laminations; mud is dark yellowish brown (10YR4/2) and laminations are dark/dusky yellowish brown (10YR3/2); non-calcareous; sharp, irregular lower contact.

Break in core at 0.86 m.

PEAT WITH ROOTS THROUGHOUT [0.86-0.91 m]; dusky brown (5YR2/2); non-calcareous; unconsolidated; gradational lower contact.

MUD (SOIL) WITH ROOTS THROUGHOUT [0.91-1.07 m]; dark/dusky yellowish brown (10YR3/2); non-calcareous; dry, unconsolidated.

Start of Drive 3 [1.07-1.53 m].

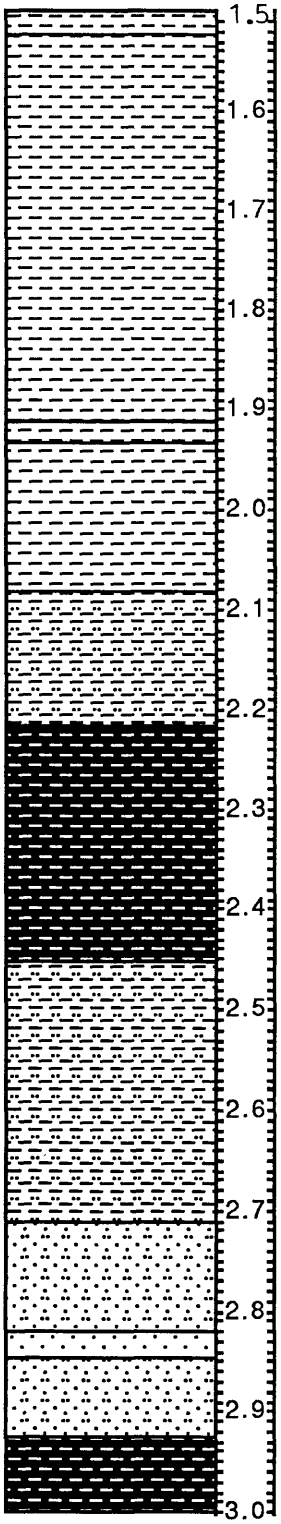
VERY SLIGHTLY SILTY MUD [1.07-1.27 m]; light olive gray-brown (5Y5/4); non-calcareous; massive; gradational lower contact.

VERY SLIGHTLY SILTY MUD WITH MUD BLEB [1.27-1.34 m]; dark yellowish brown (10YR4/2) with mud bleb (1.2 x 3.5 cm) olive gray (5Y3/2); non-calcareous; massive; grad. lower contact over 3 cm.

VERY SLIGHTLY SILTY MUD [1.34-1.40 m]; mottled light olive gray-brown (5Y5/4) and rust (shelby tube rusting?); non-calcareous; massive, granular; gradational lower contact.

MUD [1.40-1.53 m]; dark yellowish brown (10YR4/2); non-calcareous; massive.

Wocus Marsh, Core 1
Klamath County, Oregon



MUD [1.40-1.53 m]; dark yellowish brown (10YR4/2); non-calcareous; massive.

Start of Drive 4 [1.53-2.22 m].

MUD WITH MUD BLEBS [1.53-1.92 m]; mottled dark/dusky yellowish brown (10YR3/2) with mud bleb olive gray (5Y3/2); mud bleb from 1.70-1.85 m, 15 cm long x 1/2-2 cm wide; non-calcareous; sharp, wavy lower contact.

MUD [1.92-1.93 m]; pale/dark yellowish brown (10YR5/2); non-calcareous; massive; sharp, wavy lower contact.

MUD [1.93-2.09 m]; dark yellowish brown (10YR4/2); non-calcareous; massive; sharp, irregular lower contact over 1 cm (2.09-2.10 m).

VERY SLIGHTLY SILTY MUD [2.09-2.22 m]; mottled light olive gray-brown (5Y5/4) and rust (shelby tube rusting?); non-calcareous; granular.

Start of Drive 5 [2.22-2.93 m].

PEAT WITH ROOTS [2.22-2.45 m]; brownish black (5YR2/1); non-calcareous; massive; gradational lower contact from 2.43-2.45 m.

SILTY MUD [2.45-2.71 m]; dark yellowish brown (10YR4/2); non-calcareous; pebble (1.0 x 1.1 cm) at 2.51 m; massive; gradational lower contact.

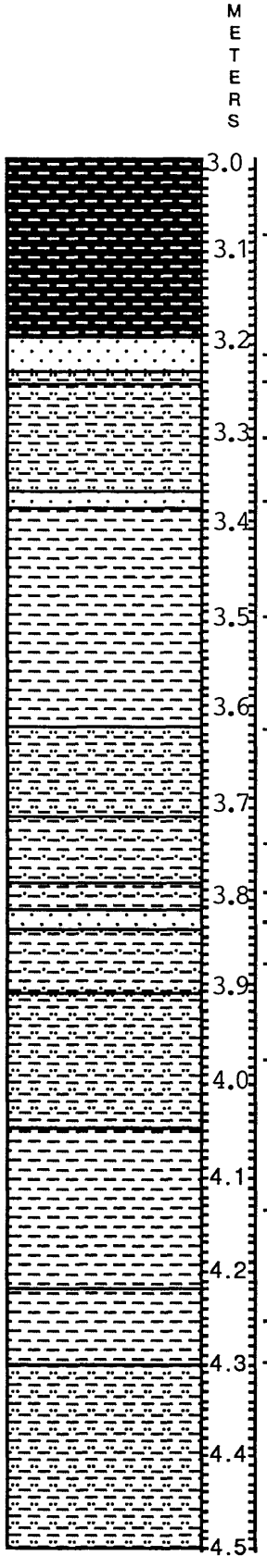
MEDIUM SAND FINING UPWARD INTO SILT [2.71-2.82 m]; dark yellowish brown (10YR4/2); non-calcareous; massive; gradational lower contact.

MEDIUM SAND [2.82-2.85 m]; olive gray (5Y4/2); non-calcareous; massive; gradational lower contact.

VERY SLIGHTLY SILTY SAND WITH MUD BLEBS [2.85-2.93 m]; mottled: dark yellowish brown matrix of mud (10YR4/2) with olive gray (5Y3/2) and dark/dusky yellowish brown (10YR3/2) mud blebs; non-calcareous.

Start of Drive 6 [2.93-3.62 m]. PEAT [2.93-3.20 m]; see next page.

Wocus Marsh, Core 1
Klamath County, Oregon



PEAT MOTTLED WITH MUD [2.93-3.20 m]; peat is brownish black (5YR2/1), mud is dark yellowish brown (10YR4/2); non-calcareous; gradational lower contact.

MEDIUM TO COARSE SAND [3.20-3.23 m]; olive gray (5Y4/1); non-calcareous; massive; gradational lower contact.

SILTY MUD WITH RARE MEDIUM SAND [3.23-3.25 m]; dark yellowish brown (10YR4/2); non-calcareous; massive, chunky; gradational lower contact.

VERY SLIGHTLY SILTY MUD [3.25-3.36 m]; dark/dusky yellowish brown (10YR3/2); non-calcareous; massive; gradational lower contact.

MEDIUM SAND [3.36-3.37 m]; dark/dusky yellowish brown (10YR3/2); non-calcareous; massive; gradational lower contact.

MUD [3.37-3.62 m]; dark yellowish brown (10YR4/2) mottled with green blebs; non-calcareous; massive.

Start of Drive 7 [3.62-4.30 m].
VERY SLIGHTLY SILTY MUD WITH MUD BLEB [3.62-3.72 m]; dark yellowish brown (10YR4/2); non-calcareous; uppermost unit in a fining upward sequence from 3.83-3.62 m; gradational lower contact.

FINE SAND TO SILT IN MUD MATRIX [3.72-3.78 m]; dark yellowish brown (10YR4/2); non-calcareous; unit in a fining upward sequence from 3.83-3.62 m; gradational lower contact.

FINE TO MEDIUM SAND IN MUD MATRIX [3.78-3.81 m]; dark yellowish brown (10YR4/2); non-calcareous; unit in a fining upward sequence from 3.83-3.62 m; gradational lower contact.

MEDIUM SAND [3.81-3.83 m]; olive gray (5Y4/2); non-calcareous; unit in a fining upward sequence from 3.83-3.62 m; sharp, irregular lower contact.

FINE SAND TO SILT IN MUD MATRIX WITH MEDIUM SAND BLEB [3.83-3.90 m]; dark yellowish brown (10YR4/2); non-calcareous; massive; medium sand bleb from 3.855-3.875 m; gradational lower contact.

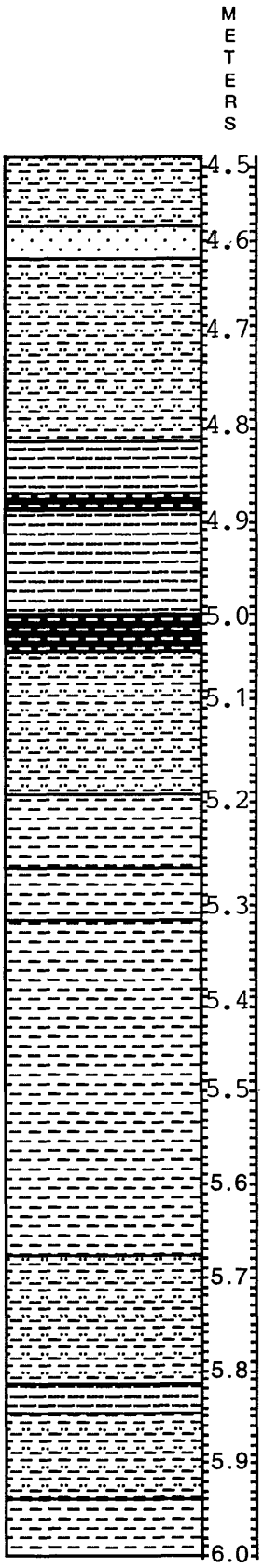
SILTY MUD [3.90-4.05 m]; dark yellowish brown (10YR4/2); non-calcareous; massive, chunky; gradational lower contact.

MUD WITH MUD BLEB [4.05-4.22 m]; dark yellowish brown (10YR4/2) with olive gray (5Y3/2) mud bleb from 4.185-4.21 m; non-calcareous; massive, firm; sharp, irregular lower contact from 4.22-4.24 m.

MUD [4.22-4.30 m]; medium yellowish brown (10YR5/2); non-calcareous; massive, hard.

Start of Drive 8 [4.30-4.99 m].
SILTY MUD WITH OCCASIONAL PEAT BLEBS [4.30-4.58 m]; break in core at 4.40 m; see full description, next page.

Wocus Marsh, Core 1
Klamath County, Oregon



SILTY MUD WITH OCCASIONAL PEAT BLEBS [4.30-4.58 m]; dark yellowish brown (10YR4/2); non-calcareous; massive, soft.

DISCONTINUOUS MEDIUM SAND LAYER [4.58-4.61 m]; dark yellowish brown (10YR4/2); non-calcareous; gradational lower contact.

MATRIX OF MUD TO SILTY MUD WITH MUD BLEBS, PEAT BLEBS AND SAND BLEBS [4.61-4.81 m]; dark yellowish brown (10YR4/2) grading to dusky yellowish brown (10YR2/2); non-calcareous; one medium sand stringer, vertically from 4.65-4.72 m; mottled, heterogeneous, soft; gradational lower contact.

CLAY [4.81-4.86 m]; light olive gray (5Y5/2); non-calcareous; massive, mottled, firm; sharp lower contact.

DISCONTINUOUS PEAT LAYER [4.86-4.88 m]; brownish black (5YR2/1); non-calcareous; gradational lower contact.

CLAY [4.88-4.99 m]; light olive gray (5Y5/2); non-calcareous; massive, mottled, hard.

Start of Drive 9 [4.99-5.68 m].

PEAT WITH A LITTLE MUD [4.99-5.03 m]; brownish black (5YR2/1); non-calcareous; slightly mottled; gradational lower contact.

SLIGHTLY SILTY MUD [5.03-5.19 m]; dark/dusky yellowish brown (10YR3/2); non-calcareous; massive, moderately soft; gradational lower contact.

MUD [5.19-5.26 m]; medium yellowish brown (10YR5/2); non-calcareous; massive; gradational lower contact.

MUD [5.26-5.32 m]; dark/dusky yellowish brown (10YR3/2); non-calcareous; massive, hard; sharp, irregular lower contact from 5.32-5.35 m.

MUD [5.32-5.68 m]; dark yellowish brown (10YR4/2); non-calcareous; massive, hard.

Start of Drive 10 [5.68-6.36 m].

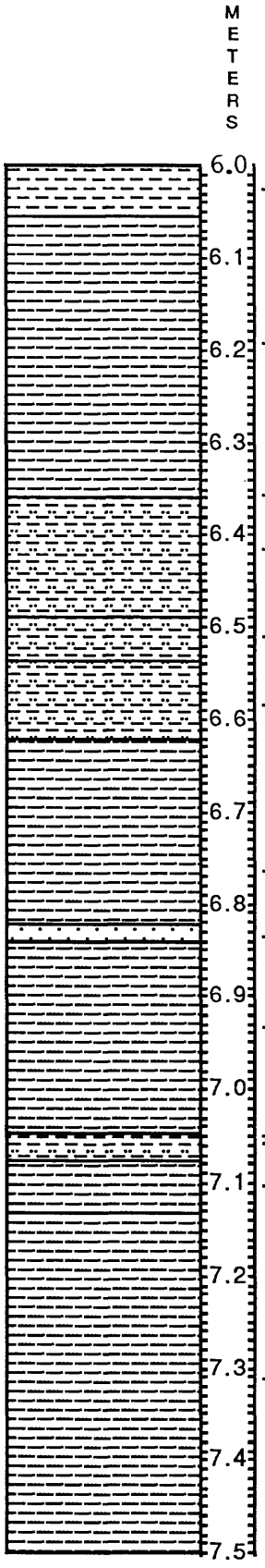
SILTY MUD [5.68-5.82 m]; dark/dusky yellowish brown (10YR3/2); non-calcareous; discontinuous medium sand lens from 5.74-5.78 m; massive; sharp, irregular lower contact from 5.78-5.82 m.

CLAY [5.82-5.85 m]; pale yellowish brown (10YR6/2); non-calcareous; massive; gradational lower contact.

VERY SLIGHTLY SILTY MUD [5.85-5.94 m]; dark yellowish brown (10YR4/2); non-calcareous; massive, chunky; grad. lower contact.

MUD [5.94-6.06 m]; dark yellowish brown (10YR5/2); hard; non-calcareous; massive; sharp, irregular lower contact (6.05-6.06 m).

Wocus Marsh, Core 1
Klamath County, Oregon



MUD [5.94-6.06 m]; dark yellowish brown (10YR5/2); non-calcareous; massive, hard; sharp, irregular lower contact from 6.05-6.06 m.

CLAY [6.06-6.36 m]; light olive gray-brown (5Y5/4); non-calcareous; massive, hard.

Start of Drive 11 [6.36-7.05 m].

SILTY MUD WITH DISCONTINUOUS FINE SAND LAYER [6.36-6.49 m]; dark/dusky yellowish brown (10YR3/2); non-calcareous; fine sand layer from 6.48-6.49 m; massive, moderately firm; gradational lower contact.

VERY SLIGHTLY SILTY MUD [6.49-6.54 m]; mottled dark/dusky yellowish brown (10YR3/2) and dark yellowish brown (10YR4/2); non-calcareous; gradational lower contact.

VERY SLIGHTLY SILTY MUD [6.54-6.63 m]; dark yellowish brown (10YR4/2); non-calcareous; massive, firm, slightly chunky; sharp, irregular lower contact.

CLAY [6.63-6.825 m]; light olive gray-brown (5Y5/4); non-calcareous; massive, hard; sharp lower contact.

FINE TO MEDIUM SAND [6.825-6.84 m]; light olive gray-brown (5Y5/4); non-calcareous; gradational lower contact.

CLAY [6.84-7.05 m]; light olive gray-brown (5Y5/4); non-calcareous; massive, hard.

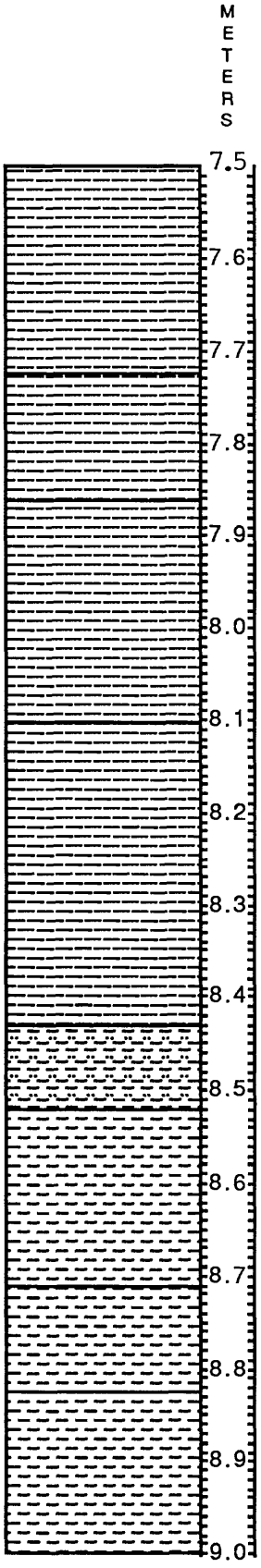
Start of Drive 12 [7.05-7.73 m].

VERY SLIGHTLY SILTY MUD [7.05-7.08 m]; dark yellowish brown (10YR4/2); non-calcareous; massive; gradational lower contact.

CLAY [7.08-7.13 m]; light olive gray-brown (5Y5/4), just slightly mottled; non-calcareous; massive, chunky, moderately soft; gradational lower contact.

CLAY [7.13-7.73 m]; light olive gray-brown (5Y5/4), just slightly mottled; non-calcareous; massive, hard.

Wocus Marsh, Core 1
Klamath County, Oregon



CLAY [7.13-7.73 m]; light olive gray-brown (5Y5/4), just slightly mottled; non-calcareous; massive, hard.

Start of Drive 13 [7.73-8.43 m].

CLAY [7.73-7.87 m]; light olive gray-brown (5Y5/4); non-calcareous; massive, moderately firm; gradational lower contact.

CLAY [7.87-8.11 m]; mottled dark yellowish brown (10YR4/2) and medium yellowish brown (10YR5/2); non-calcareous; hard; gradational lower contact.

CLAY [8.11-8.43 m]; dark/dusky yellowish brown (10YR3/2); non-calcareous; massive, hard.

Start of Drive 14 [8.43-9.10 m].

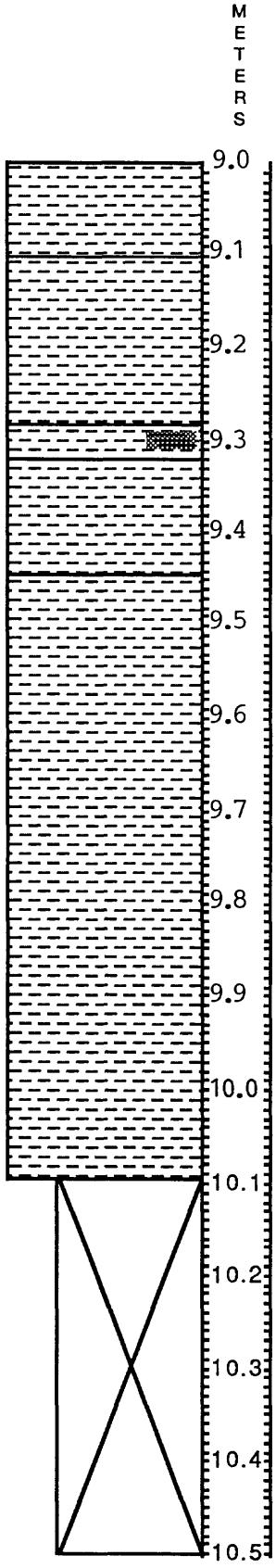
SLIGHTLY SILTY MUD [8.43-8.52 m]; light olive gray-brown (5Y5/4); non-calcareous; massive, relatively soft; gradational lower contact.

MUD [8.52-8.71 m]; mottled light olive gray-brown (5Y5/4) and dark/dusky yellowish brown (10YR3/2); non-calcareous; massive, hard; gradational lower contact.

MUD [8.71-8.83 m]; dark/dusky yellowish brown (10YR3/2); non-calcareous; massive, hard; lower contact sharp with pockets of fine to medium sand extending 1/2-1 cm below remainder of contact at 8.83 m. "Pockets" are burrow-like and are 1/4-1/2 cm wide x 1/2-1 cm long.

MUD [8.83-9.10 m]; slightly mottled, dark yellowish brown (10YR4/2) to brownish gray (5YR4/1); non-calcareous; massive, hard.

Wocus Marsh, Core 1
Klamath County, Oregon



MUD [8.83-9.10 m]; slightly mottled, dark yellowish brown (10YR4/2) to brownish gray (5YR4/1); non-calcareous; massive, hard.

Start of Drive 15 [9.10-10.10 m].

MUD [9.10-9.29 m]; olive gray (5Y4/1) with brownish gray (5YR4/1) mottles; fractures in core at 9.20 and 9.25 m; penetrometer reading at 9.13 m >4.5.

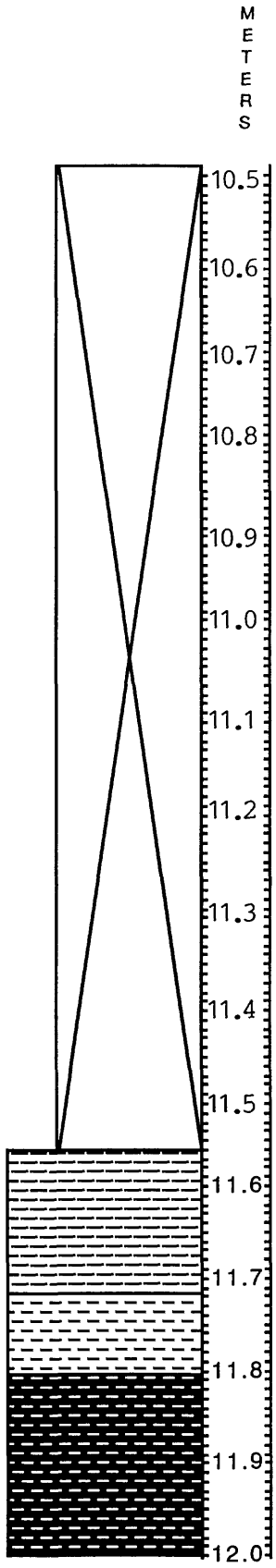
MUD [9.29-9.32 m]; brownish gray (5YR4/1); thin bedding.

MUD [9.32-9.45 m]; brownish gray (5YR4/1); rubbly; very hard; penetrometer breaks core at 9.40 m; fracture in core at 9.45 m.

MUD [9.45-10.10 m]; olive gray (5Y4/1); fractures in core at 9.56 and 9.71 m; massive, undisturbed (?) from 9.73-10.10; penetrometer reading at 9.90 m = 2.4.

No core recovered [10.10-11.56 m].

Wocus Marsh, Core 1
Klamath County, Oregon



No core recovered [10.10-11.56 m].

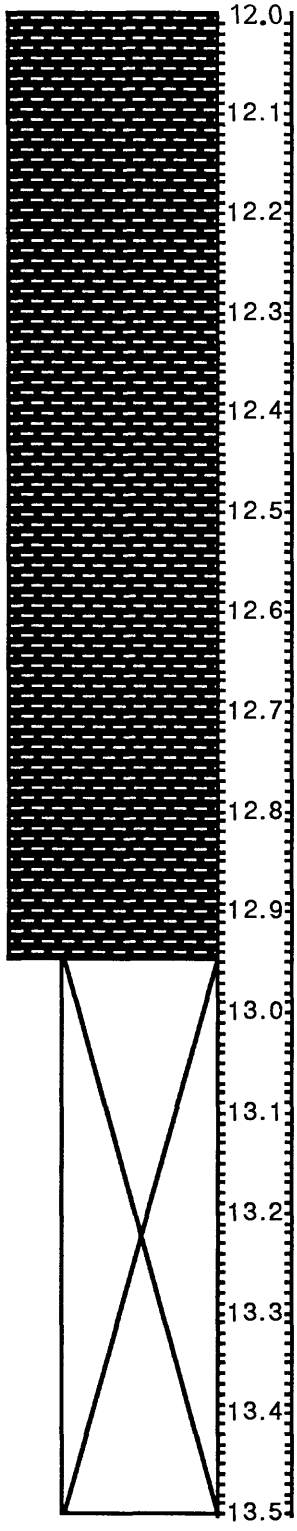
Start of Drive 16 [11.56-12.95 m].

CLAY [11.56-11.72 m]; medium olive gray (5Y3/2); very soft, mushy, no structure; probably disturbed and out of place.

MUD [11.72-11.81 m]; medium olive gray (5Y3/2); firmer than unit above; penetrometer reading at 11.75 m = 1.0 (fractures).

PEATY MUD [11.81-12.01 m]; black (N1); gradational lower contact.

Wocus Marsh, Core 1
Klamath County, Oregon



PEATY MUD [11.81-12.01 m]; black (N1); gradational lower contact.

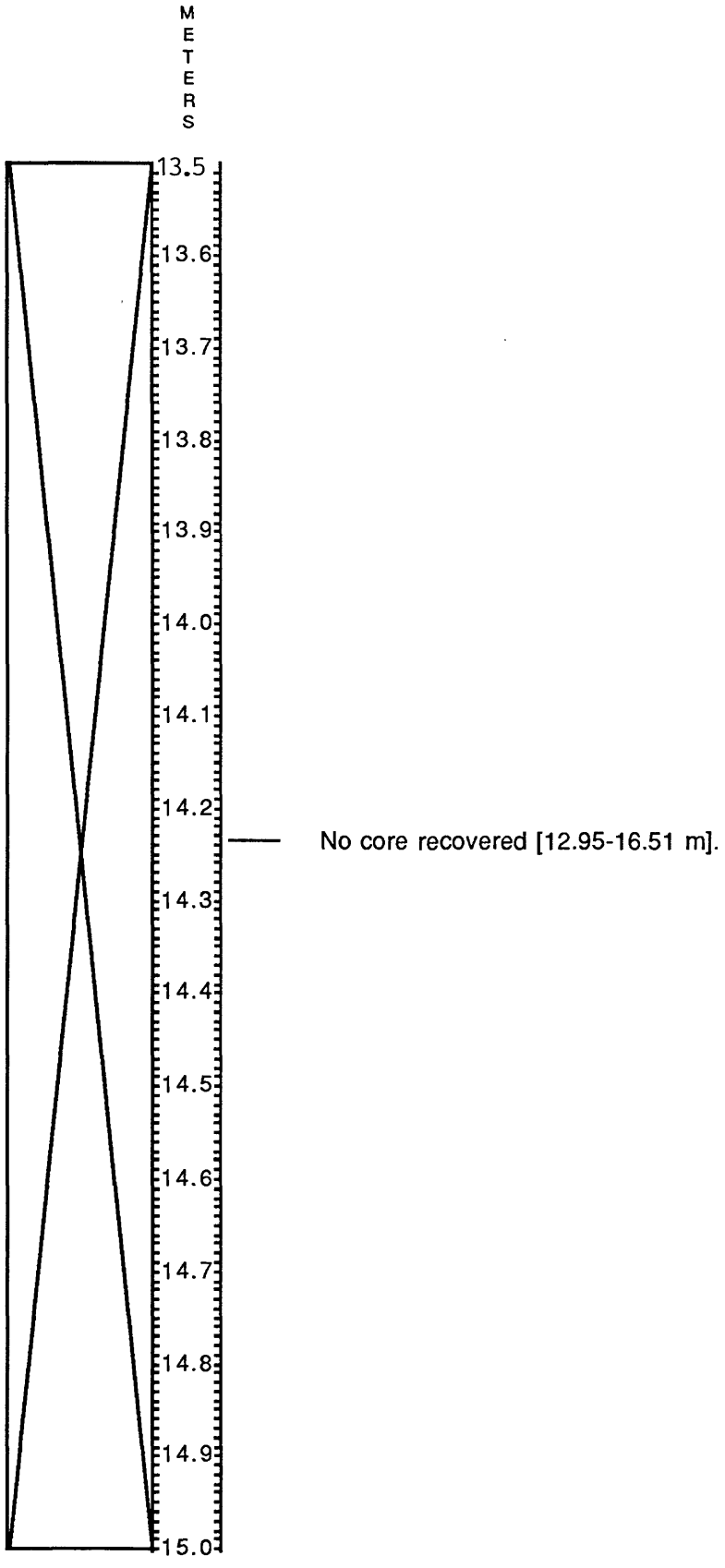
ORGANIC MUD [12.01-12.95 m]; medium yellowish brown (10YR3/2); massive; penetrometer readings: 12.16 m = 1.6, 12.66 m = 0.8.

Slightly crumbly from 12.76-12.88 m.

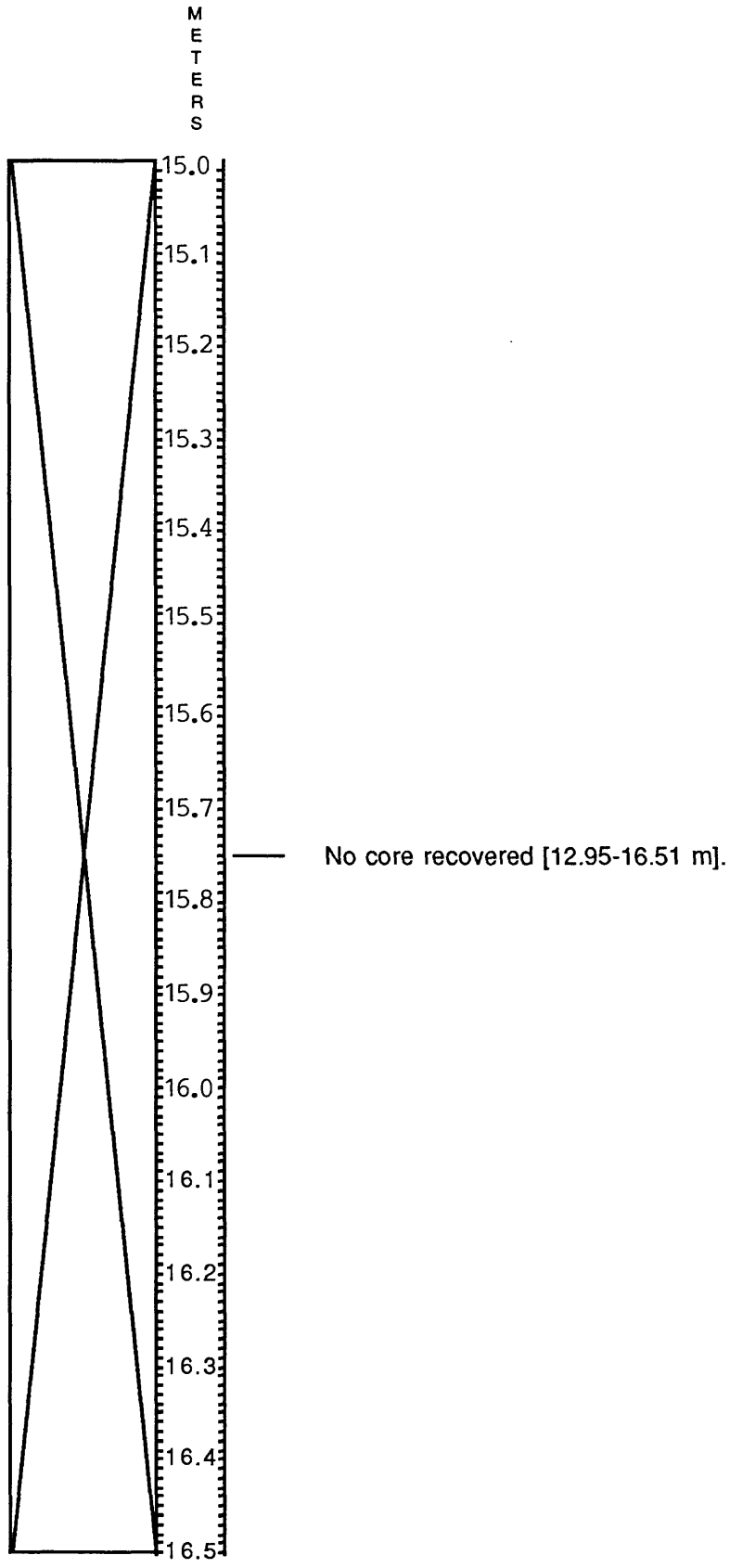
Start of Drive 17 [no recovery].

No core recovered [12.95-16.51 m].

Wocus Marsh, Core 1
Klamath County, Oregon



Wocus Marsh, Core 1
Klamath County, Oregon



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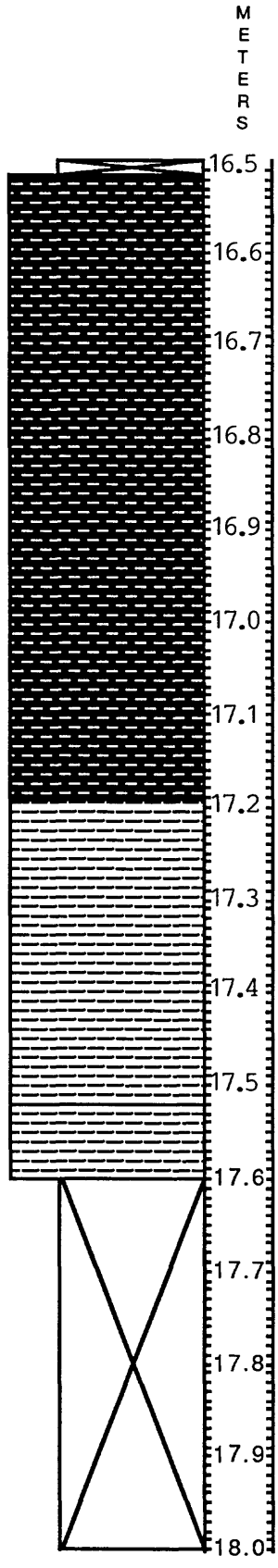
Klamath County, Oregon



No core recovered [12.95-16.51 m].

Start of Drive 18 [16.51-17.60 m].

ORGANIC MUD [16.51-16.85 m]; dusky yellowish brown (10YR2/2); penetrometer reading at 16.71 m = 1.0.

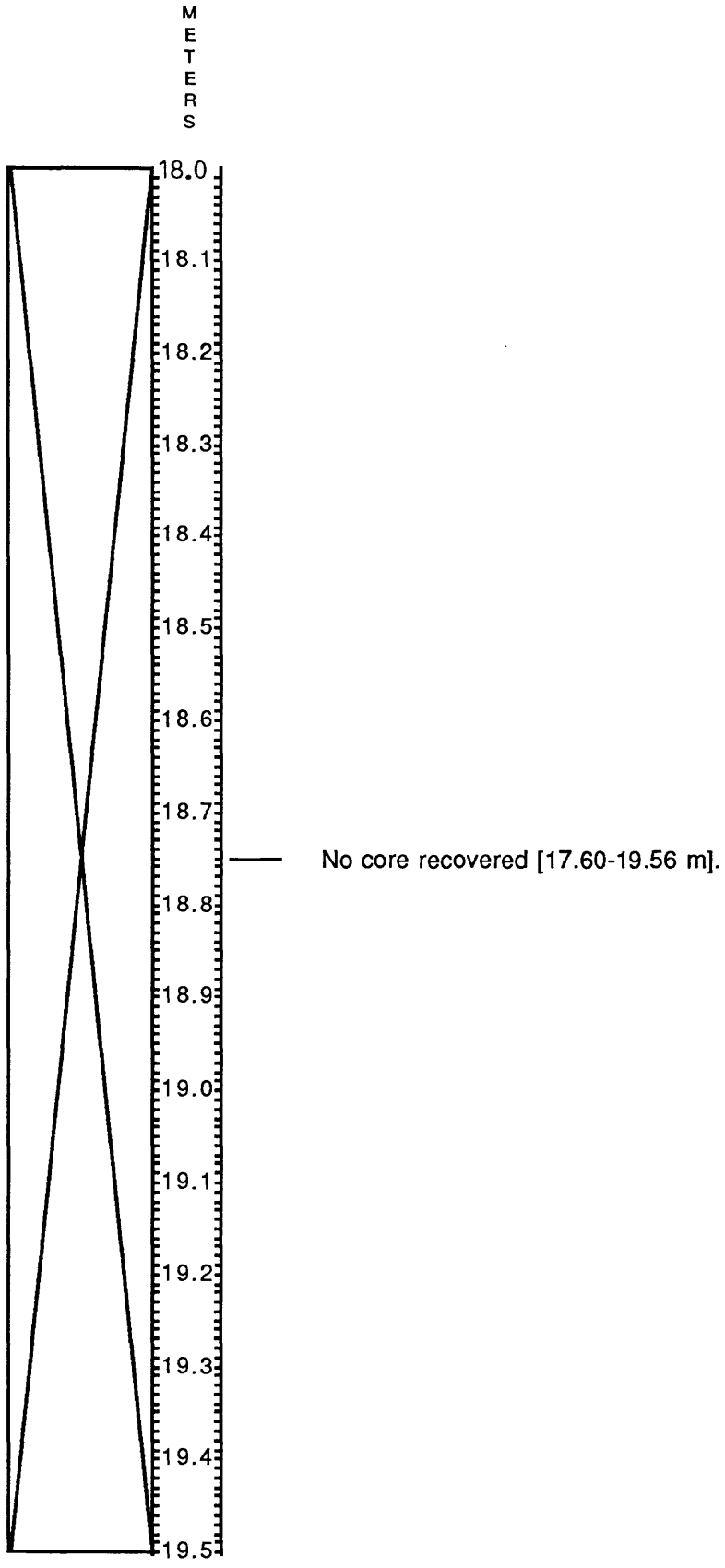
ORGANIC MUD [16.85-17.20 m]; brownish black (5YR2/1); very sharp lower contact; penetrometer reading at 17.01 m = 0.6.

CLAY [17.20-17.52 m]; olive gray (5Y4/1); crumbly on half of core, not as crumbly on other half; sharp lower contact; penetrometer readings: 17.26 m = 0.8 (fractured the core), 17.40 m = 0.2.

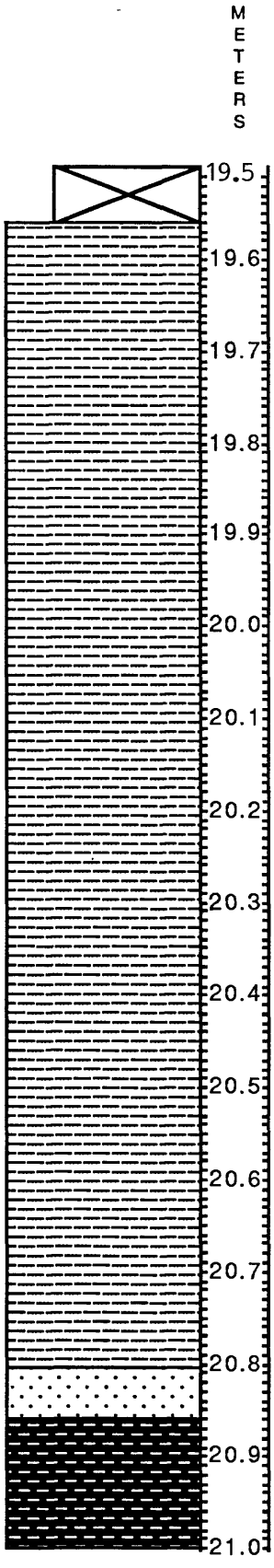
CLAY [17.52-17.60 m]; slightly redder than the olive gray (5Y4/1) above; very soft and crumbly.

No core recovered [17.60-19.56 m].

Wocus Marsh, Core 1
Klamath County, Oregon



Wocus Marsh, Core 1
Klamath County, Oregon



No core recovered [17.60-19.56 m].

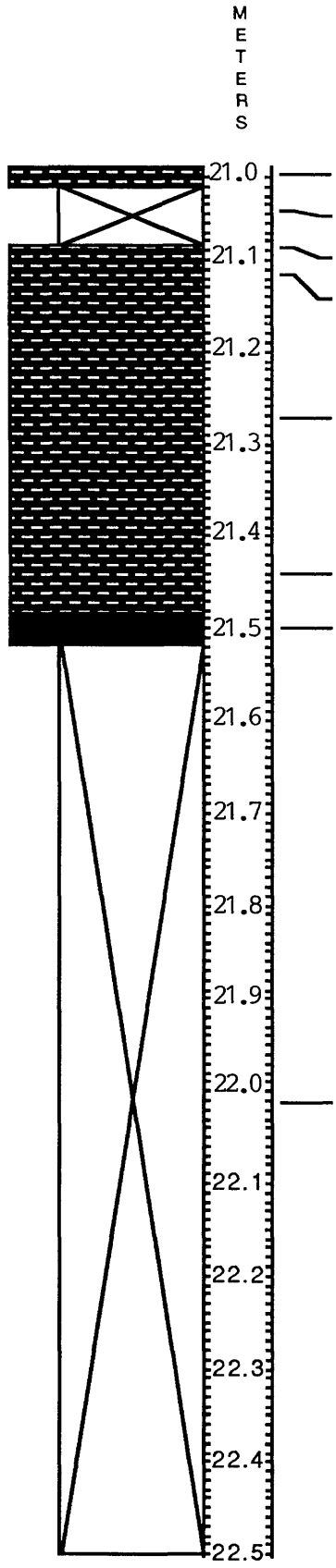
Start of Drive 19 [19.56-21.02 m].

CLAY [19.56-20.81 m]; olive gray (5Y4/1); penetrometer readings: 19.96 m = 0.4, 20.33 m = 2.0.

FINE SAND [20.81-20.86 m]; tephra (?).

PEAT [20.86-21.02 m]; dark brownish gray (5YR2/2); penetrometer reading at 20.93 m = 2.5.

Wocus Marsh, Core 1
Klamath County, Oregon



PEAT [20.86-21.02 m]; dark brownish gray (5YR2/2).

No core recovered [21.02-21.09 m].

Start of Drive 20 [21.09-21.52 m].

PEAT [21.09-21.14 m]; black (N1); fractured.

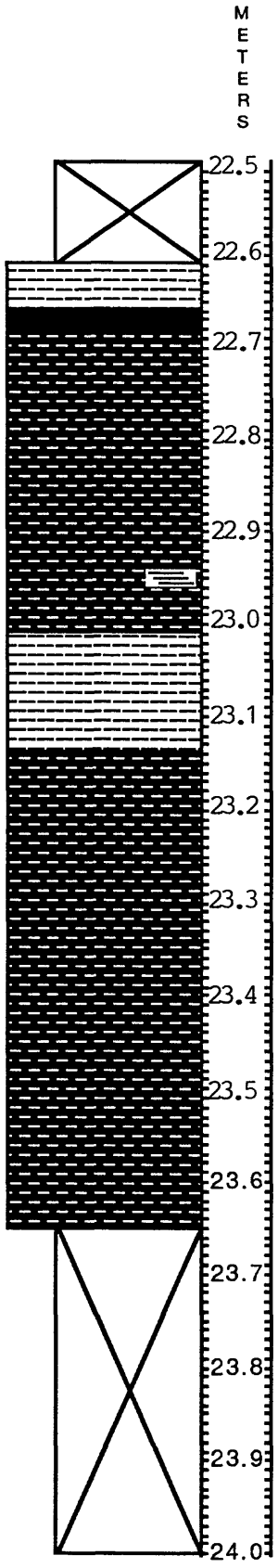
PEAT [21.14-21.44 m]; dusky yellowish brown (10YR2/2); fibrous.

PEAT [21.44-21.49 m]; brownish black (5YR2/1); fractured.

TEPHRA [21.49-21.52 m]; medium yellowish gray (5Y6/2); hard.

No core recovered [21.52-22.61 m].

Wocus Marsh, Core 1
Klamath County, Oregon



No core recovered [21.52-22.61 m].

Start of Drive 21 [22.61-23.65 m].

CLAY [22.61-22.66 m]; gray; possibly out of place.

TEPHRA [22.66-22.68 m].

PEAT [22.68-22.89 m]; brownish black (5YR2/1); crumbly.

PEAT [22.89-23.01 m]; brown; weakly laminated.

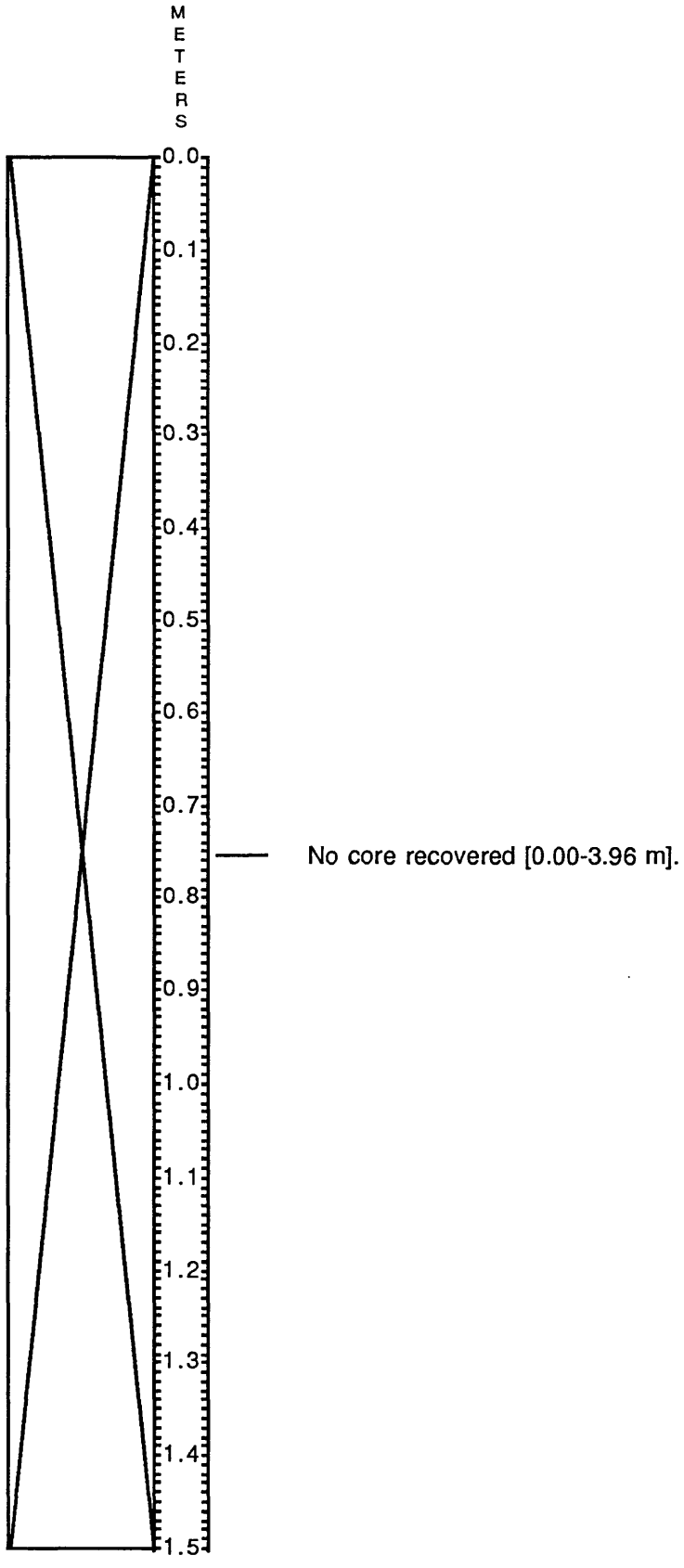
CLAY [23.01-23.14 m]; light olive gray (5Y5/2).

SHALLOW LACUSTRINE MUD WITH SEDGE STEMS [23.14-23.65 m]; light olive brown (5Y5/6).

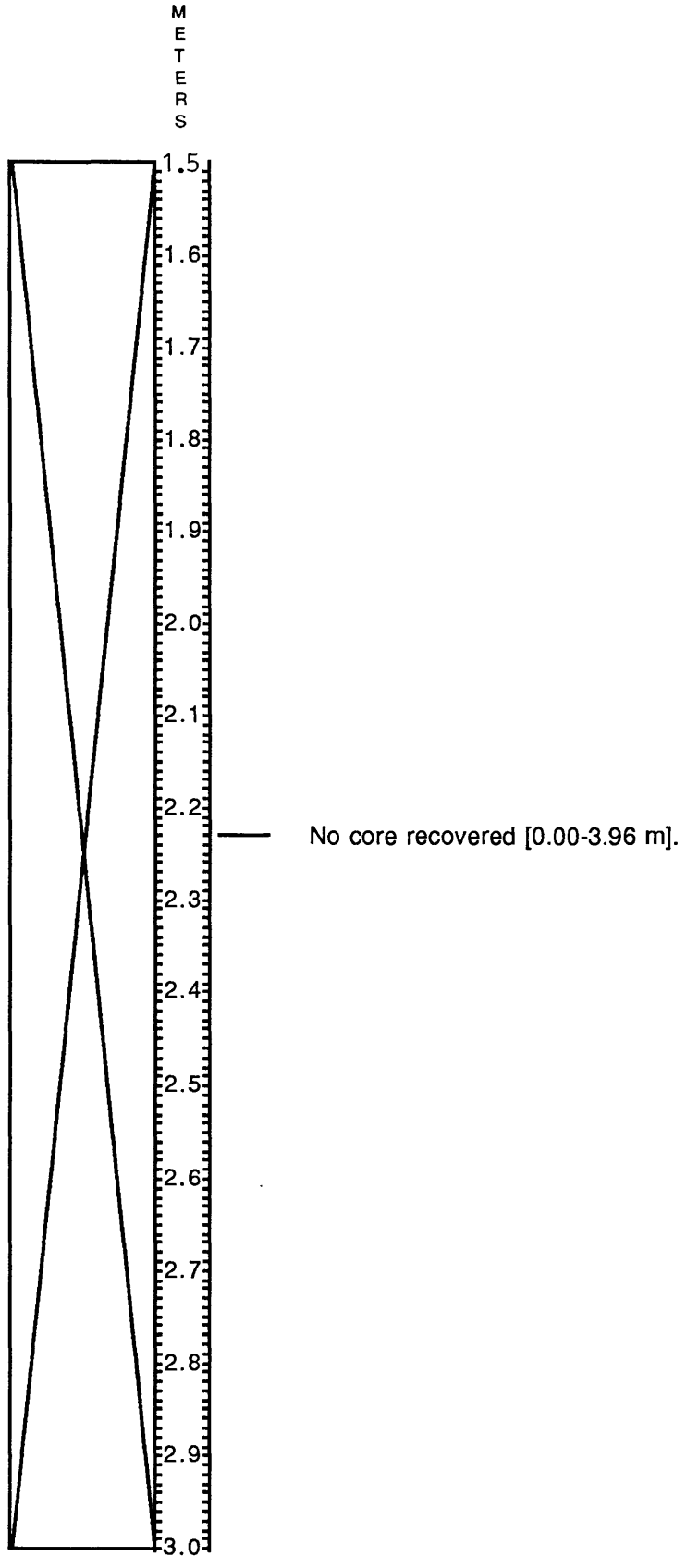
Base of core at 23.65 m.

Appendix C
Core 2 Lithologic Log

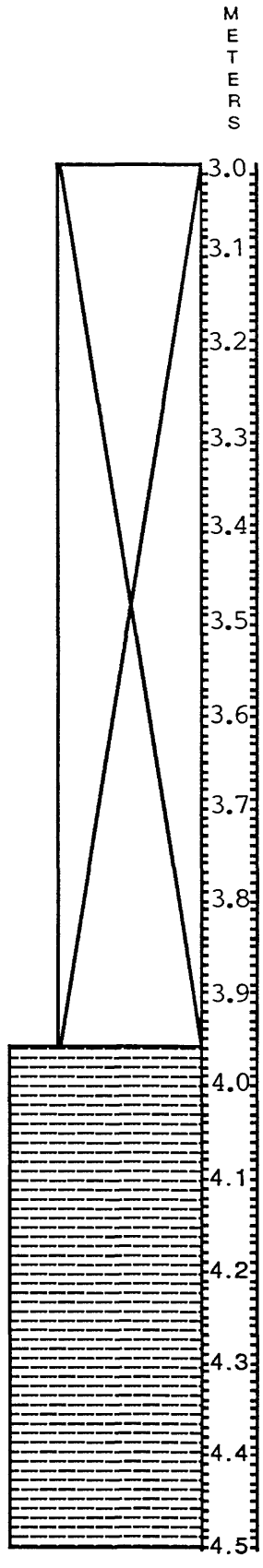
Wocus Marsh, Core 2
Klamath County, Oregon



Wocus Marsh, Core 2
Klamath County, Oregon



Wocus Marsh, Core 2
Klamath County, Oregon

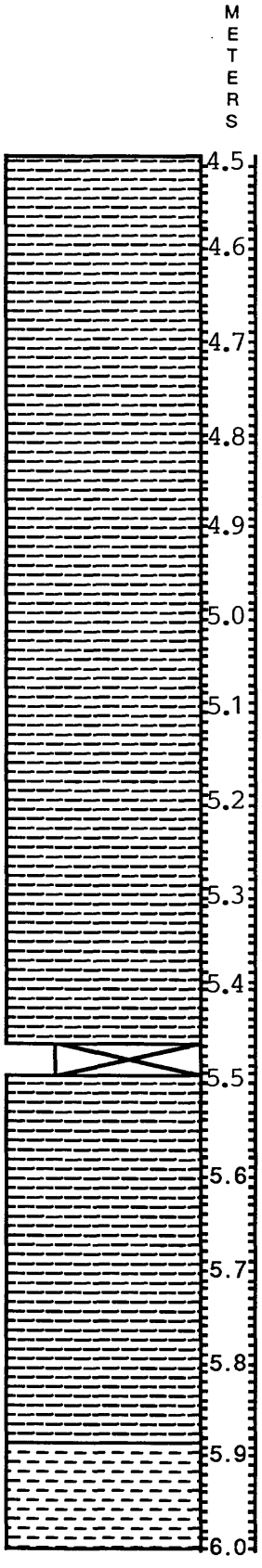


No core recovered [0.00-3.96 m].

Start of Drive 1 [3.96-5.46 m].

CLAY [3.96-5.46 m]; dark greenish gray (5GY4/1), mottled with darker bluish vertical stringers; massive, hard.

Wocus Marsh, Core 2
Klamath County, Oregon



CLAY [3.96-5.46 m]; dark greenish gray (5GY4/1), mottled with darker bluish vertical stringers; massive, hard.

No core recovered [5.46-5.49 m].

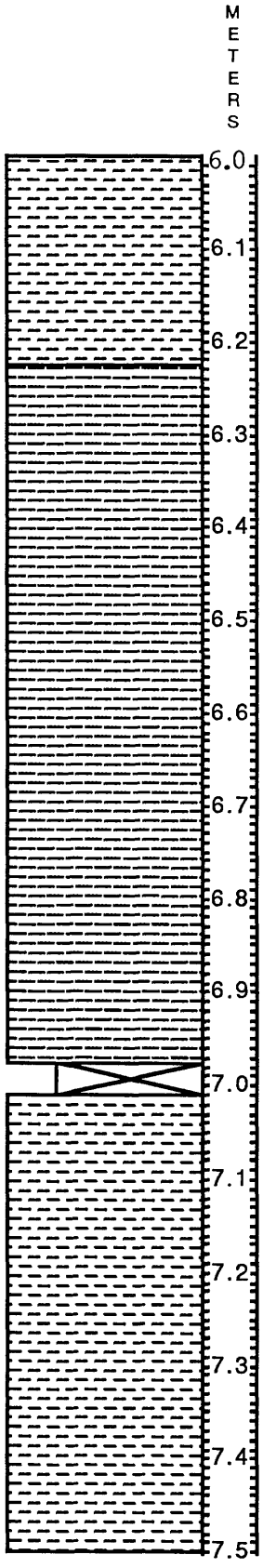
Start of Drive 2 [5.49-6.98 m].

CLAY [5.49-5.89 m]; medium greenish gray (5GY5/1); darker vertical stringer through interval; massive.

Coring fracture at 5.89 m.

SOMEWHAT GRITTY CLAY [5.89-6.23 m]; medium greenish gray (5GY5/1).

Wocus Marsh, Core 2
Klamath County, Oregon



SOMEWHAT GRITTY CLAY [5.89-6.23 m]; medium greenish gray (5GY5/1).

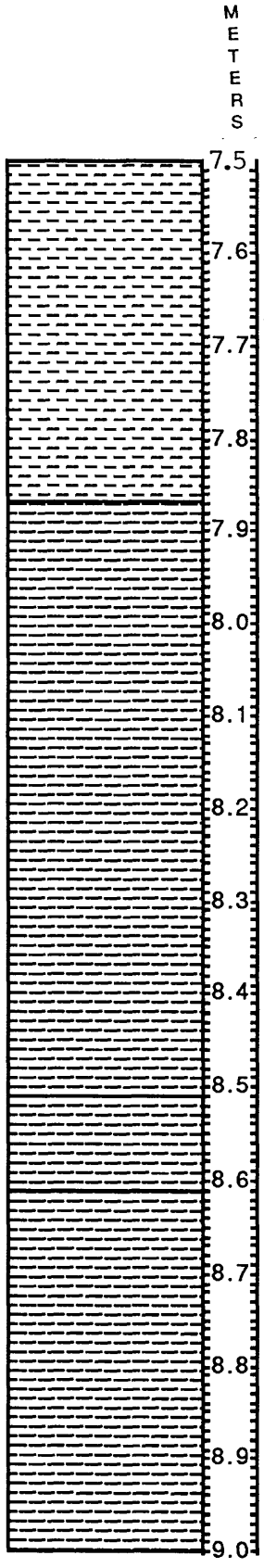
CLAY [6.23-6.98 m], not gritty; medium greenish gray (5GY5/1).

Coring fracture at 6.98 m. No core recovered [6.98-7.01 m].

Start of Drive 3 [7.01-9.36 m].

VERY SLIGHTLY SILTY CLAY [7.01-7.87 m]; grayish green (10GY5/2) grading down into olive gray (5Y4/1); massive.

Wocus Marsh, Core 2
Klamath County, Oregon



VERY SLIGHTLY SILTY CLAY [7.01-7.87 m]; grayish green (10GY5/2) grading down into olive gray (5Y4/1); massive.

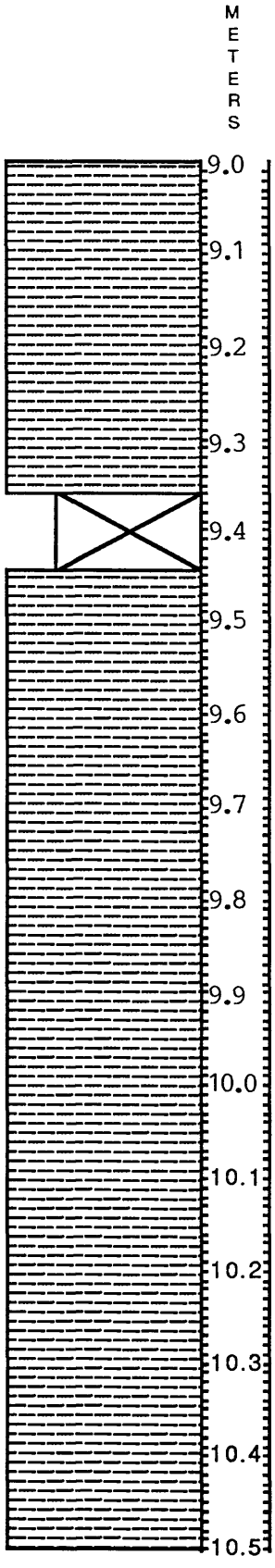
CLAY [7.87-8.51 m]; brownish gray (5YR4/1); massive.

CLAY [8.51-8.61 m]; gradational zone between units above and below.

CLAY [8.61-9.36 m]; olive gray (5Y4/1).

Large black pebble or charcoal at 8.90 m.

Wocus Marsh, Core 2
Klamath County, Oregon



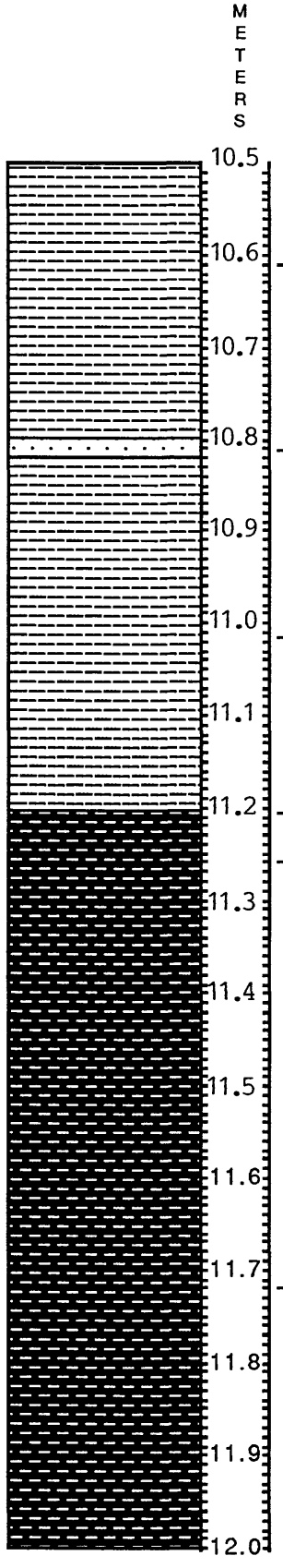
CLAY [8.61-9.36 m]; olive gray (5Y4/1).

No core recovered [9.36-9.45 m].

Start of Drive 4 [9.45-11.21 m].

CLAY [9.45-10.80 m]; olive gray (5Y4/1); massive.

Wocus Marsh, Core 2
Klamath County, Oregon



CLAY [9.45-10.80 m]; olive gray (5Y4/1); massive.

SAND [10.80-10.82 m]; disseminated tephra?

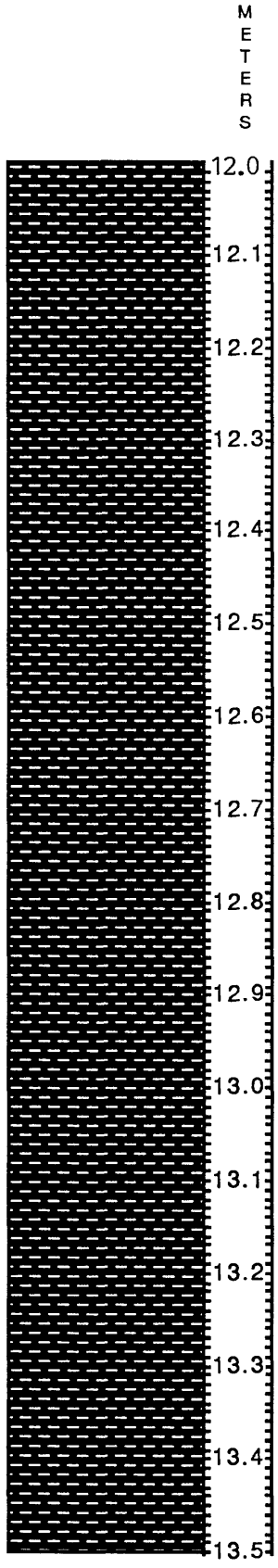
CLAY [10.82-11.21 m]; olive gray (5Y4/1); massive.

Start of Drive 5 [11.21-13.56 m].

PEAT [11.21-11.30 m]; brownish black (5YR2/1); hard, rubbly.

MUDDY PEAT [11.30-13.56 m]; dusky yellowish brown (10YR2/2); massive.

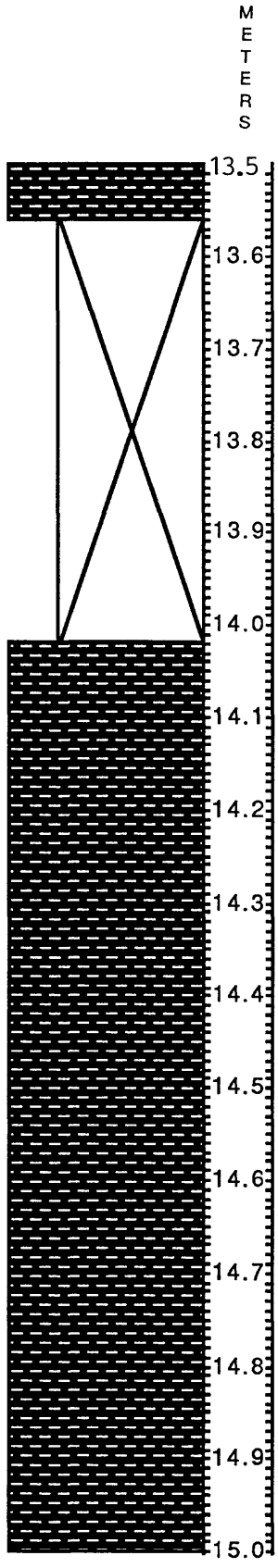
Wocus Marsh, Core 2
Klamath County, Oregon



—— Possible tephra (?) at approximately 12.26 m.

—— MUDDY PEAT [11.30-13.56 m]; dusky yellowish brown (10YR2/2); massive.

Wocus Marsh, Core 2
Klamath County, Oregon



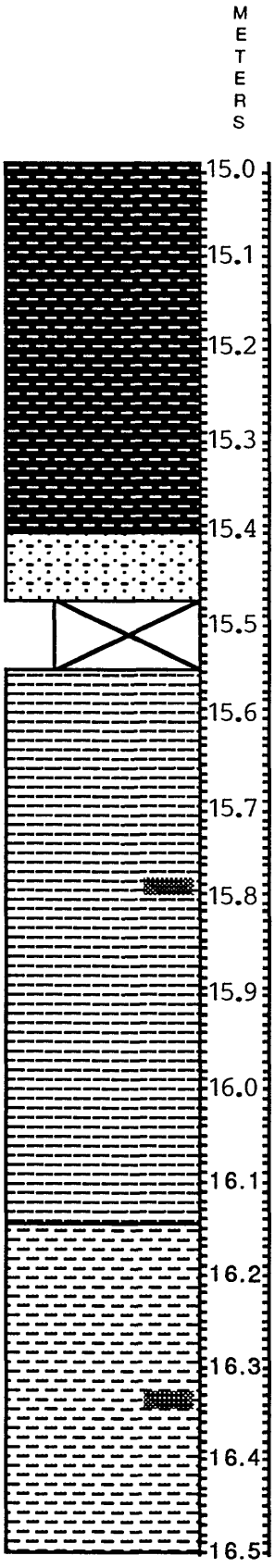
MUDDY PEAT [11.30-13.56 m]; dusky yellowish brown (10YR2/2); massive.

No core recovered [13.56-14.02 m].

Start of Drive 6 [14.02-15.48 m].

MUDDY PEAT [14.02-15.40 m]; dusky yellowish brown (10YR2/2); massive.

Wocus Marsh, Core 2
Klamath County, Oregon



MUDDY PEAT [14.02-15.40 m]; dusky yellowish brown (10YR2/2); massive.

FINE TO MEDIUM SAND WITH SOME GRAY CLAY [15.40-15.48 m].

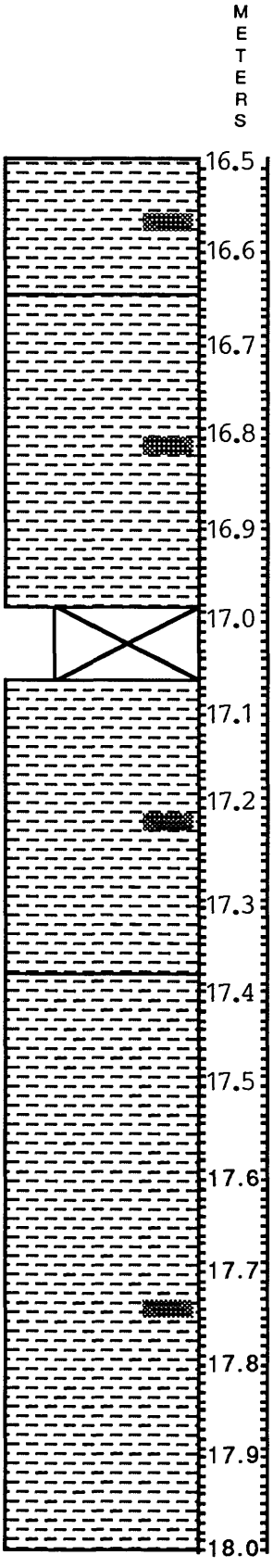
No core recovered [15.48-15.55 m].

Start of Drive 7 [15.55-16.99 m].

CLAY [15.55-16.15 m]; dusky yellowish brown (10YR2/2); very faintly thin-bedded to massive; gradational lower contact over 10 cm (16.15-16.25 m); penetrometer reading at 15.80 m <1.25.

SILTY CLAY [16.15-16.65 m] with a trace of very fine sand - coarser at base, fining upward to ~16.15 m; olive gray (5Y3/2); regular, faint 1 cm-thick bedding, silty/clayey alternation; penetrometer reading at 16.45 m < 0.90.

Wocus Marsh, Core 2
Klamath County, Oregon



SILTY CLAY [16.15-16.65 m] with a trace of very fine sand - coarser at base, fining upward to ~16.15 m; olive gray (5Y3/2); regular, faint 1 cm-thick bedding, silty/clayey alternation; sharp lower contact.

SILTY CLAY [16.65-16.99 m]; dusky yellowish brown (10YR2/2); very faint to massive bedding; penetrometer reading at 16.85 < 0.90.

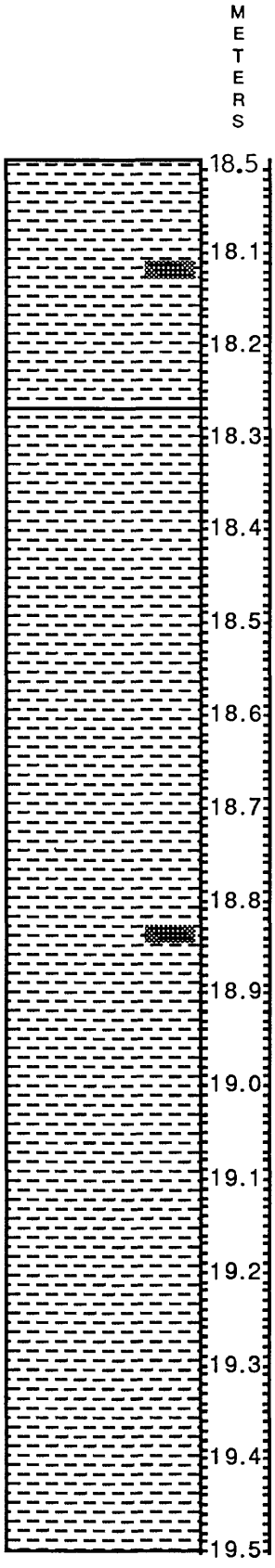
No core recovered [16.99-17.07 m].

Start of Drive 8 [17.07-20.11 m].

INORGANIC SILTY CLAY [17.07-17.38 m]; olive black (5Y2/1); faint cm-scale bedding seen in slight grain-size variation; crumbly fracture; sharp lower contact; penetrometer readings: 17.25 m = 0.6, 17.35 m = 0.8.

INORGANIC MUD [17.38-18.27 m]; dusky yellowish brown (10YR2/2); very faint 0.5-1.0 cm-scale bedding; crumbly fracture.

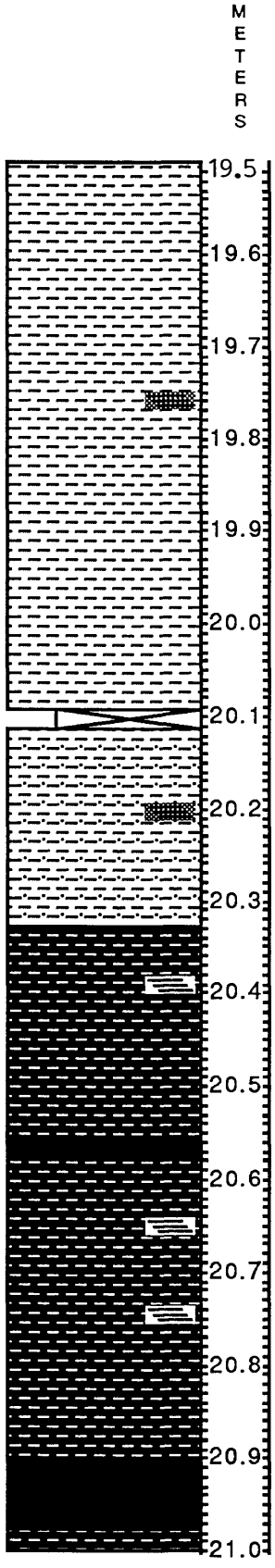
Wocus Marsh, Core 2
Klamath County, Oregon



INORGANIC MUD [17.38-18.27 m]; dusky yellowish brown (10YR2/2); very faint 0.5-1.0 cm-scale bedding; crumbly fracture; gradational lower contact over 2-3 cm; penetrometer reading at 18.20 m = 0.75.

INORGANIC MUD [18.27-20.11 m]; brownish gray (5YR4/1); very faint cm-scale bedding to massive; crumbly fracture.

Wocus Marsh, Core 2
Klamath County, Oregon



INORGANIC MUD [18.27-20.11 m]; brownish gray (5YR4/1); very faint cm-scale bedding to massive; crumbly fracture.

No core recovered [20.11-20.12 m]. Start of Drive 9 [20.12-21.28 m].

INORGANIC MUD, SLIGHTLY SANDY AT BASE [20.12-20.33 m]; olive black (5Y2/1); very faintly thin-bedded to laminated; crumbly fracture; sharp lower contact.

PEAT [20.33-20.52 m] with possible, but unlikely, tephra from 20.42-20.47 m; brownish black (5YR2/1); indistinct laminations (show up on broken surfaces); gradational lower contact.

ORGANIC MUD [20.52-20.56 m]; dusky yellowish brown (10YR2/2).

POSSIBLE TEPHRA [20.56-20.58 m]; dusky yellowish brown (10YR2/2); sharp, irregular lower contact.

PEAT [20.58-20.68 m]; black; indistinct, discontinuous laminations; sharp lower contact.

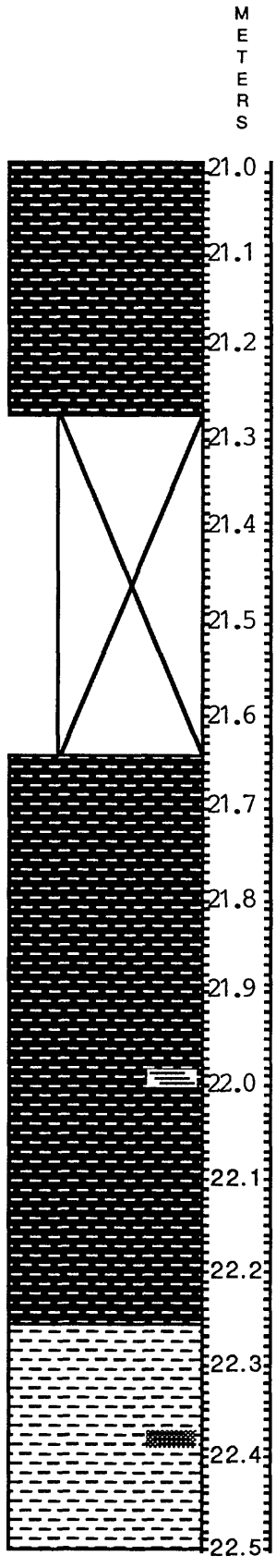
PEAT [20.68-20.85 m]; yellowish brown; indistinct, discontinuous laminations; core fractured at lower contact.

PEAT [20.85-20.90 m]; sharp lower contact.

TEPHRA [20.90-20.98 m] with roots and minor staining; light olive gray (5Y6/1); sharp, irregular lower contact.

PEAT [20.98-21.28 m]; brownish black (5YR2/1).

Wocus Marsh, Core 2
Klamath County, Oregon



PEAT [20.98-21.28 m]; brownish black (5YR2/1).

No core recovered [21.28-21.65 m].

Start of Drive 10 [21.65-23.08 m].

1 mm thick irregular tephra at ~21.70 m.

1 mm thick irregular tephra at ~21.80 m.

MUDDY PEAT [21.65-22.26 m]; dusky yellowish brown (10YR2/2); very faint irregular discontinuous laminations; gradational lower contact over 4 cm.

MUD [22.26-22.52 m]; dusky light olive gray (5Y5/4); very faint thin-bedded to laminated.

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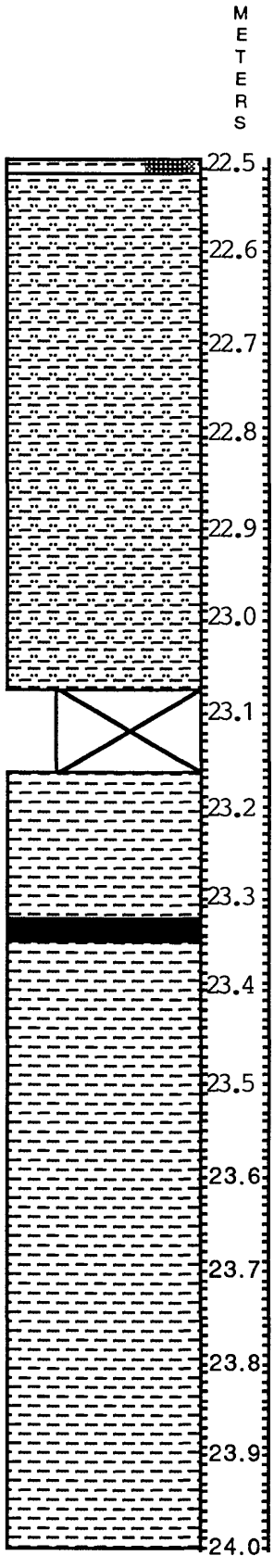

MUD [22.26-22.52 m]; dusky light olive gray (5Y5/4); very faint thin-bedded to laminated; sharp, irregular lower contact.

SLIGHTLY SILTY MUD [22.52-23.08 m]; moderate olive brown (5Y4/4).

No core recovered [23.08-23.17 m].

Start of Drive 11 [23.17-25.15 m].

INORGANIC MUD [23.17-23.32 m]; grayish olive (10Y4/2); uniform, massive.

TEPHRA [23.32-23.35 m].

INORGANIC MUD [23.35-24.11 m]; dark greenish gray (5GY4/1); uniform, massive; penetrometer reading at 23.69 m > 2.75.

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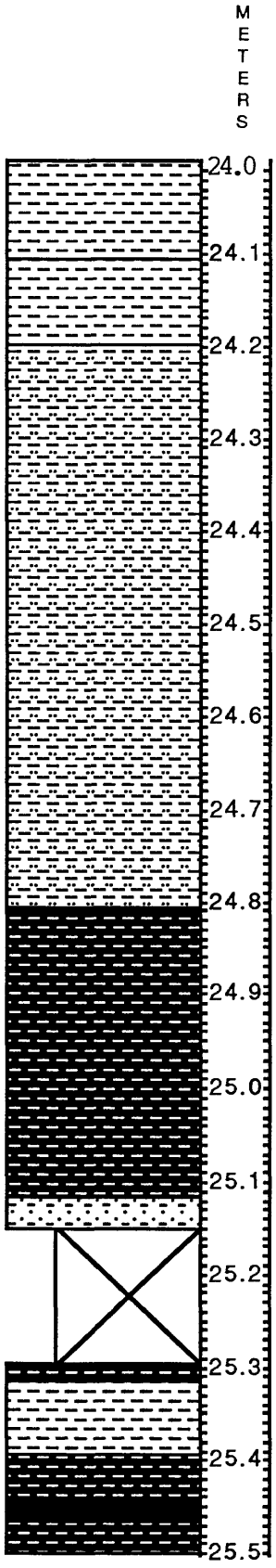

INORGANIC MUD [23.35-24.11 m]; dark greenish gray (5GY4/1); uniform, massive; sharp lower contact.

MUD [24.11-24.20 m]; dark olive brown (5Y3/4).

SILTY MUD [24.20-24.81 m]; moderate olive gray (5Y4/2); sharp lower contact.

ORGANIC MUD WITH INCREASINGLY DOWNWARD FINE TO COARSE SAND COMPONENT [24.81-25.12 m]; brownish black (5YR2/1); sand suspended in mud/peat matrix .

MUDDY COARSE SAND WITH GRANULES [25.12-25.15 m].

No core recovered [25.15-25.30 m].

Start of Drive 12 [25.30-26.58 m].

ORGANIC MUD WITH PEAT [25.30-25.32 m]; olive black (5Y2/1).

MUD [25.32-25.40 m]; olive black (5Y2/1); irregular, "mixed" lower contact.

TWO PEAT UNITS [25.40-25.45 m and 25.46-25.86 m], moderate brown (5YR3/4) oxidizing to black very quickly, separated by a DISSEMINATED SANDY TEPHRA LAYER [25.45-25.46 m]

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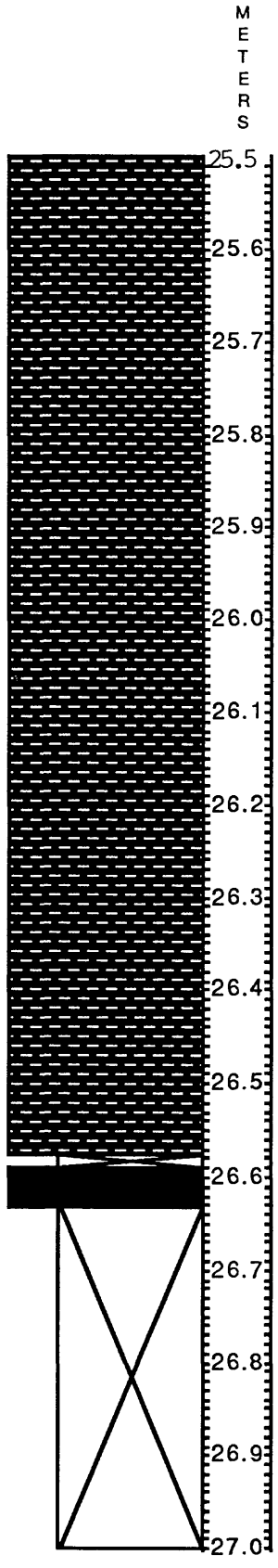

PEAT [25.46-25.86 m]; moderate brown (5YR3/4); oxidizing to black very quickly; gradational lower contact over 2 cm.

ORGANIC MUD [25.86-26.58 m]; olive gray (5Y4/2).

No core recovered [26.58-26.59 m]. Start of Drive 13 [26.59-26.63 m].

TEPHRA [26.59-26.63 m].

No core recovered [26.63-28.05 m].

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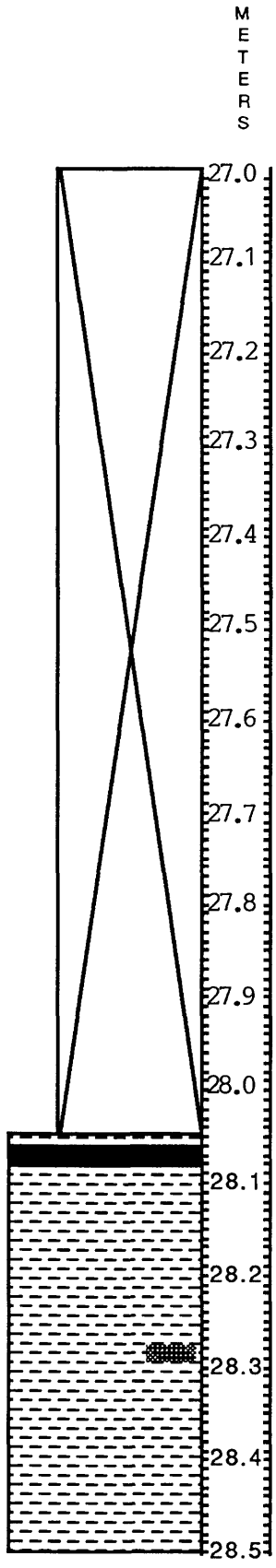

No core recovered [26.63-28.05 m].

Start of Drive 14 [28.05-29.80 m].

Trash at top of drive [28.05-28.06 m].

TEPHRA [28.06-28.07 m].

MUD [28.07-28.72 m]; primarily olive gray (5Y4/2) but slight color changes from 28.15-28.23 m, 28.23-28.28 m, and moderate olive brown (5Y4/6) from 28.43-28.48 m; medium-bedded to massive; penetrometer reading at 28.21 m = 0.25.

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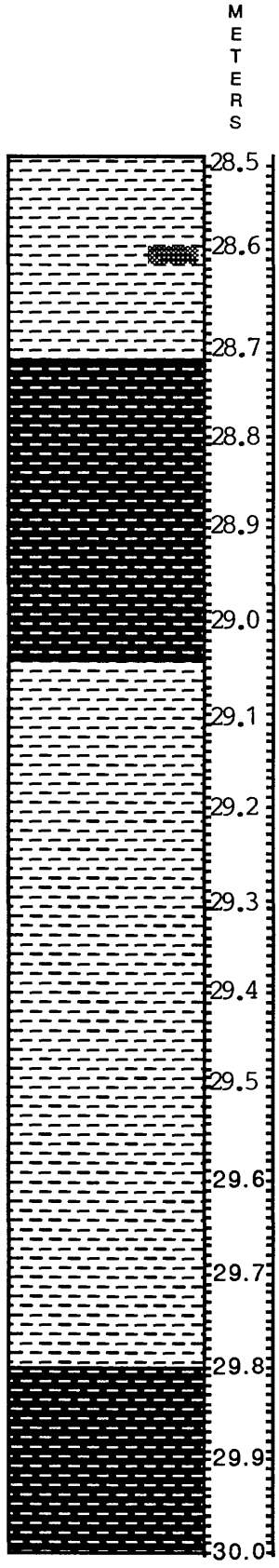

MUD [28.07-28.72 m]; primarily olive gray (5Y4/2) but slight color changes from 28.15-28.23 m, 28.23-28.28 m, and moderate olive brown (5Y4/6) from 28.43-28.48 m; medium-bedded to massive.

ORGANIC MUD WITH DISSEMINATED "BLEBS" OF TEPHRA [28.72-29.05 m], with gradationally less organic material with depth; light olive gray (5Y5/2); disseminated "blebs" of tephra at 28.74, 28.82, and 28.88 m; massive with exception of tephra blebs; penetrometer reading at 28.85 m = 0.25.

MUD [29.05-29.80 m]; olive gray (5Y3/2); massive; penetrometer reading at 29.54 = 0.7.

Start of Drive 15 [29.80-30.79 m].

ORGANIC MUD [29.80-30.40 m]; olive gray (5Y4/1); massive.

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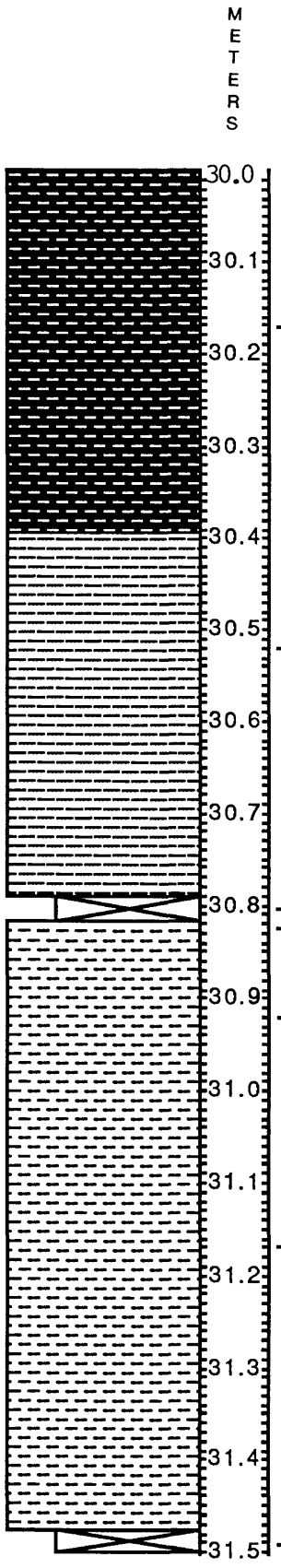

ORGANIC MUD [29.80-30.40 m]; olive gray (5Y4/1); massive; penetrometer reading at 30.10 m = 1.5; fibrous seam at 30.16-30.17 m.

CLAY [30.40-30.79 m]; dark greenish gray (5GY4/1); massive with crumbly incipient soil structure; penetrometer readings: 30.41 m = 1.3 (brittle fracture), and 30.64 m = 2.0 (brittle).

No core recovered [30.79-30.82 m].

Start of Drive 16 [30.82-31.49 m].

Organic layer [30.92-30.93 m]; dark yellowish brown (10YR4/2).

MUD [30.82-31.49 m]; olive gray (5Y3/2); crumbly; penetrometer reading at 31.06 m = 0.6; hard lump (clast) from 31.17-31.19 m.

No core recovered [31.49-31.53 m].

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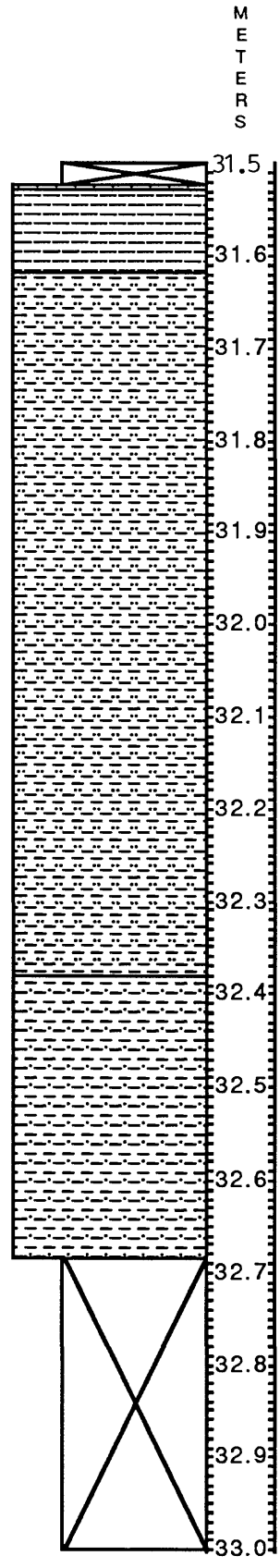

No core recovered [31.49-31.53 m].

Start of Drive 17 [31.53-32.69 m].

CLAY [31.53-31.62 m]; olive gray (5Y3/2); soft; brittle fractures, otherwise massive; penetrometer reading at 31.58 m = 0.

SILTY MUD [31.62-32.38 m]; olive gray (5Y3/2); brittle fractures, otherwise massive; penetrometer readings: 31.75 m = 2.3 (brittle fracture), 32.05 m = 1.9 (brittle fracture).

VERY FINE SANDY MUD, SLIGHTLY SANDIER TOWARD BASE [32.38-32.69 m]; crumbly with brittle fractures throughout; harder clasts (2-3 cm) from 32.48-32.50 m and 1-2 cm clasts from 32.58-32.60 m; matrix and clasts greenish black (5G2/1); penetrometer readings: matrix = 0.8, clasts >3.0.

No core recovered [32.69-33.08 m].

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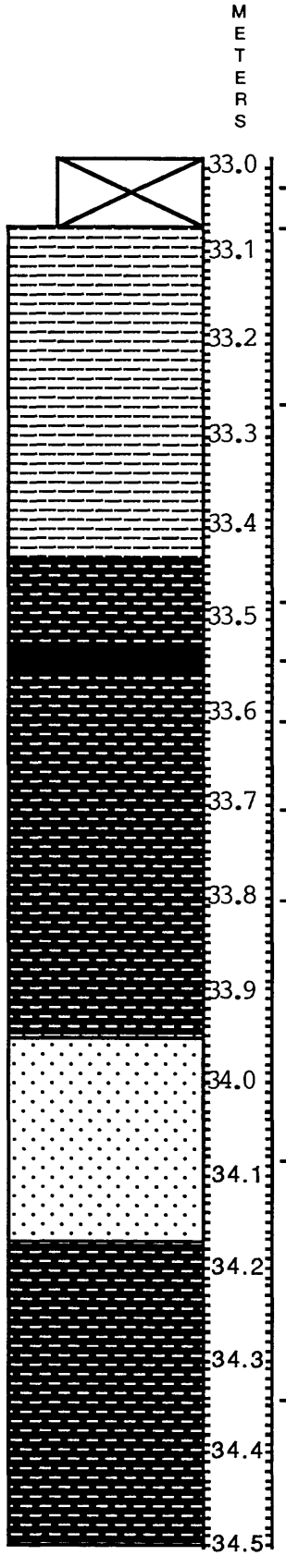

No core recovered [32.69-33.08 m].

Start of Drive 18 [33.08-34.50 m].

CLAY [33.08-33.44]; "gray"; hard; brittle fracture.

ORGANIC MUD [33.44-33.53 m].

POSSIBLE TEPHRA [33.53-33.56 m].

2 mm thick tephra at 33.61 m.

ORGANIC MUD [33.56-33.95 m].

<1 mm thick tephra at 33.80 m.

MEDIUM SAND [33.95-34.17 m]; black.

ORGANIC MUD [34.17-34.50 m]; olive gray.

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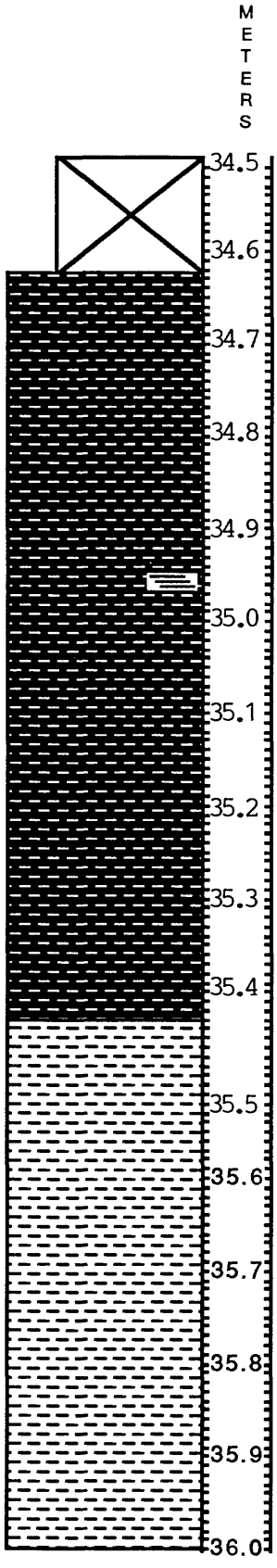

No core recovered [34.50-34.63 m].

Start of Drive 19 [34.63-37.63 m].

ORGANIC MUD [34.63-35.43 m]; medium olive gray (5Y4/2); small, darker olive gray (5Y3/2) blobs from 34.98-35.00 m and 35.05-35.06 m; very faint mm-scale lamination (platy structure); penetrometer reading at 35.13 m = 0.8.

SILTY CLAY [35.43-37.63 m]; olive black (5Y2/1); massive; penetrometer reading at 35.63 m = 0.85.

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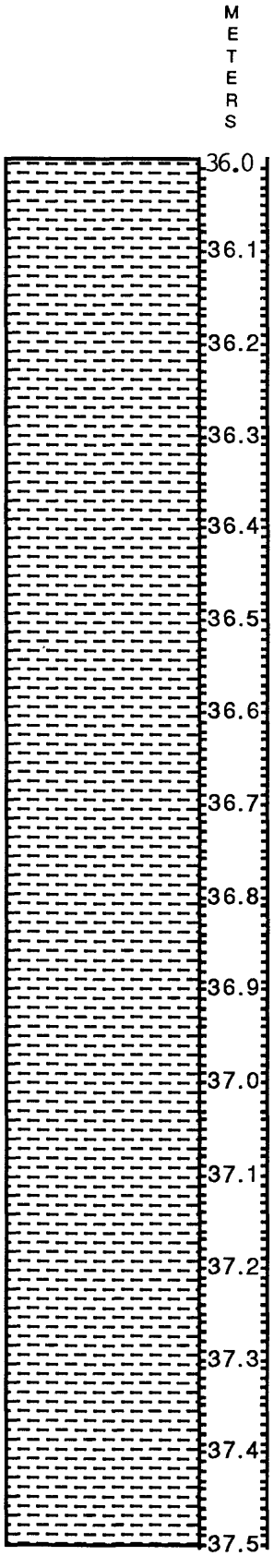

SILTY CLAY [35.43-37.63 m]; olive black (5Y2/1); massive; penetrometer readings: 36.08 m = 1.3, 36.63 m = 0.9, 37.13 m = 1.5; floating granule at 37.03 m.

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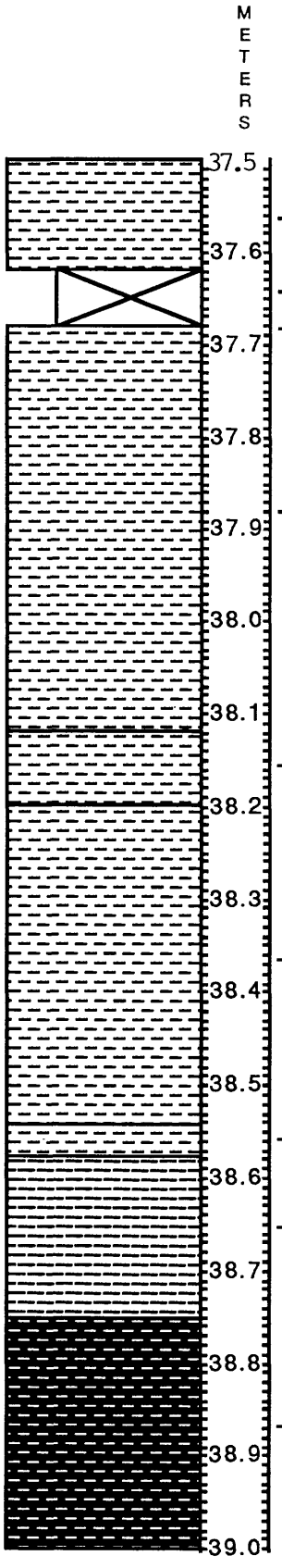

SILTY CLAY [35.43-37.63 m]; olive black (5Y2/1); massive; penetrometer reading at 37.53 m = 1.5.

No core recovered [37.63-37.68 m].

Start of Drive 20 [37.68-40.81 m].

SILTY CLAY [37.68-38.12 m]; olive gray (5Y3/1); massive.

SLIGHTLY SILTY CLAY TO SILTY CLAY [38.12-38.20 m]; gradational change between units above and below over 8 cm.

SLIGHTLY SILTY CLAY [38.20-38.54 m]; olive gray (5Y4/1); massive.

SLIGHTLY SILTY CLAY WITH DISSEMINATED TEPHRA [38.54-38.58 m]; olive gray (5Y4/1).

CLAY [38.58-38.75 m]; dark greenish gray (5GY4/1); massive.

ORGANIC SILTY MUD [38.75-39.72]; olive black (5Y2/1); mottled (bioturbated?) near base of unit (39.52-39.72 m).

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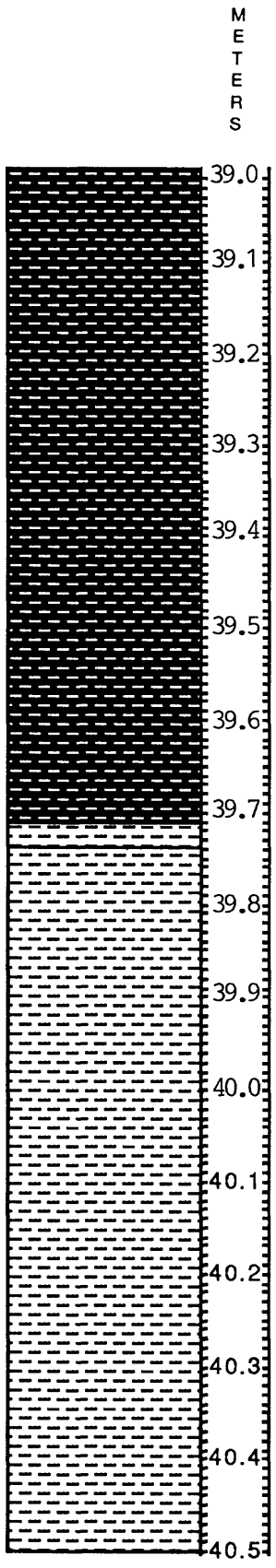

ORGANIC SILTY MUD [38.75-39.72]; olive black (5Y2/1); mottled (bioturbated?) near base of unit (39.52-39.72 m).

MUD WITH DISSEMINATED TEPHRA [39.72-39.74 m]; olive black (5Y2/1).

MUD [39.74-40.52 m]; olive black (5Y2/1); massive.

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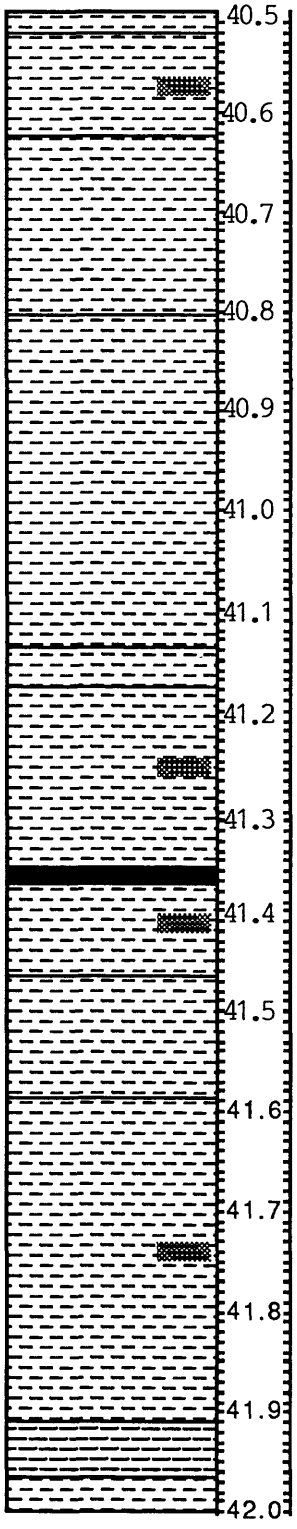

MUD [39.74-40.52 m]; olive black (5Y2/1); massive.

MUD [40.52-40.63 m]; olive gray (5Y3/1); laminated.

MUD [40.63-40.81 m]; olive gray (5Y3/1); massive.

Start of Drive 21 [40.81-43.91 m].

MUD [40.81-41.14 m]; olive black (5Y2/1).

MUD [41.14-41.18 m]; gradational change between unit above and below.

MUD [41.18-41.36 m]; olive gray (5Y3/1); very faint cm-scale bedding.

MUD WITH BLEBS OF TEPHRA [41.36-41.37 m].

MUD [41.37-41.47 m]; olive gray (5Y3/1); very faint cm-scale bedding; irregular lower contact.

MUD [41.47-41.59 m]; olive gray (5Y3/1); platy structure; gradational lower contact.

MUD [41.59-41.91 m]; olive black (5Y2/1); platy (laminated?); gradational lower contact.

CLAY [41.91-41.97 m]; olive black (5Y2/1); massive.

MUD [41.97-42.37 m].

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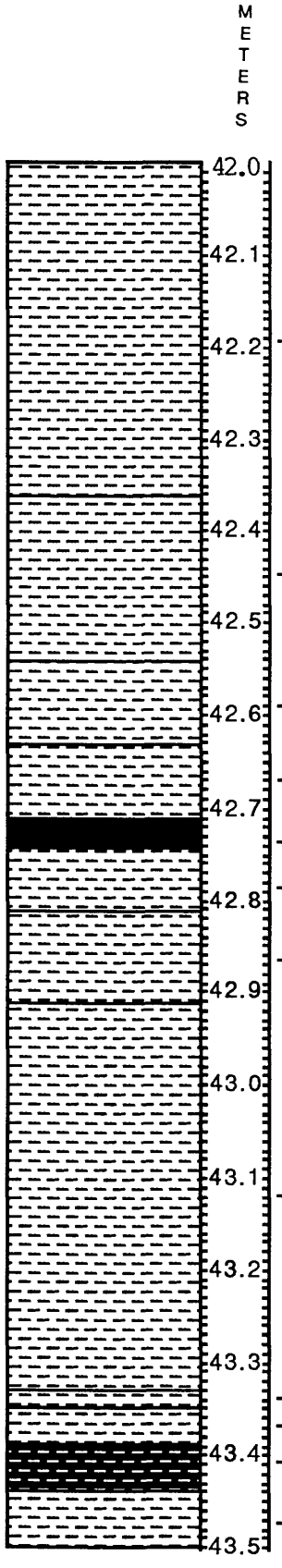

MUD [41.97-42.37 m].

MUD [42.37-42.55 m]; greenish black (5G2/1).

MUD [42.55-42.64 m]; olive gray (5Y3/2).

MUD [42.64-42.72 m]; more massive.

MUD WITH TEPHRA CHUNKS [42.72-42.74 m].

MUD WITH COARSE WHITE TEPHRA BLEBS [42.74-42.81 m].

MUD WITH POSSIBLE TEPHRA BLEBS [42.81-42.91 m]; olive black (5Y2/1).

MUD [42.91-43.33 m]; olive black (5Y2/1).

MUD [43.33-43.34 m]; thin olive brown band (5Y3/4).

MUD [43.34-43.39 m]; olive black (5Y2/1).

ORGANIC MUD (POSSIBLE TEPHRA) [43.39-43.44 m]; olive brown (5Y3/4).

MUD [43.44-43.61 m]; olive black (5Y2/1).

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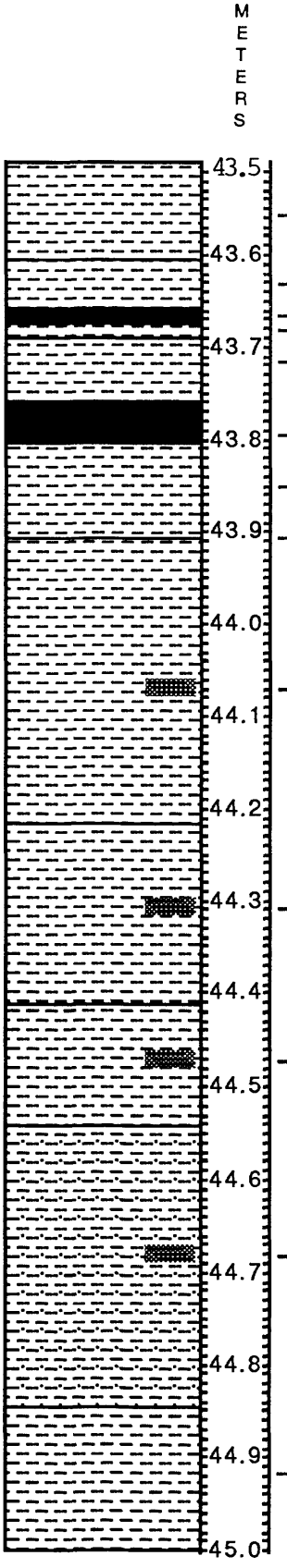

MUD [43.44-43.61 m]; olive black (5Y2/1).

MUD [43.61-43.66 m]; olive brown (5Y3/4).

THIN AIRFALL TEPHRA [43.66-43.67 m]; olive brown (5Y3/4).

MUD [43.67-43.69 m]; olive brown (5Y3/4).

MUD [43.69-43.76 m]; olive black (5Y2/1).

POSSIBLE TEPHRA [43.76-43.81 m]; olive black (5Y2/1).

MUD [43.81-43.91 m]; olive black (5Y2/1).

Start of Drive 22 [43.91-45.42 m].

MUD WITH A FEW DARKER BLEBS (1-2 cm across) [43.91-44.22 m]; dark greenish gray (5GY4/1); non-calcareous; very faint 1-2 cm thick bedding revealed by color and very faint color changes.

MUD [44.22-44.41 m]; olive gray (5Y4/2); moderately calcareous; irregular, platy lamination.

MUD [44.41-44.54 m]; olive gray (5Y3/2); questionable faint <1 cm-scale bedding.

SLIGHTLY SANDY MUD WITH DISSEMINATED CALCIUM CARBONATE AND WHITE FLECKS [44.54-44.85 m]; olive gray (5Y3/2); calcareous at 44.67 m; wavy, very faint cm-scale bedding revealed by slight color variation (grain size is uniform); shell fragments throughout the unit.

MUD [44.85-45.00 m]; olive gray (5Y3/2).

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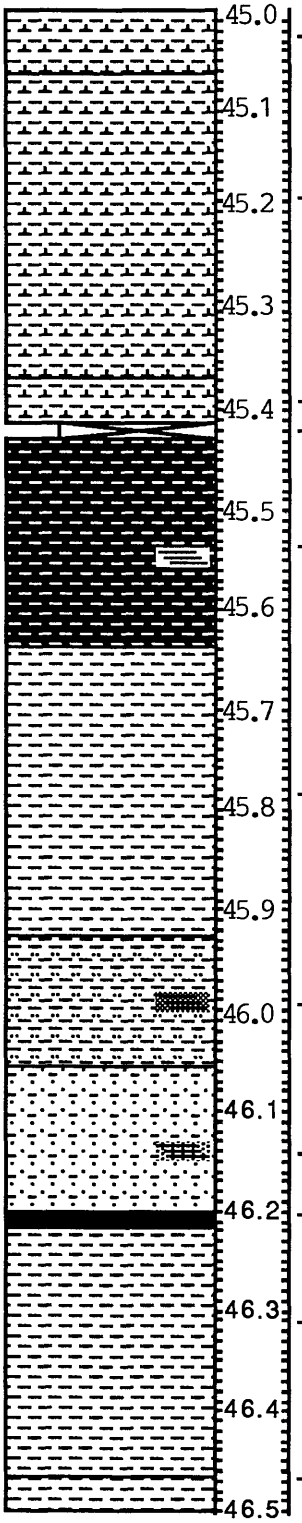

MARL [45.00-45.07 m]; light olive gray (5Y4/2); calcareous at 45.02 m.

MARLY MUD [45.07-45.37 m]; light olive gray (5Y4/2); calcareous at 45.27 m; look for ostracodes in this unit.

MARLY MUD [45.37-45.42 m]; olive gray (5Y3/2).

No core recovered [45.42-45.43 m]. Start of Drive 23 [45.43-46.82 m].

ORGANIC MUD [45.43-45.64 m]; olive gray (5Y3/2); calcareous; platy lamination, very faint <1 cm-scale bedding based on color.

MUD WITH SOME MOTTLING [45.64-45.93 m]; olive gray (5Y3/2); calcareous; massive with blocky fracture.

SILTY MUD [45.93-46.06 m]; olive black (5Y2/1); massive to very faint cm-scale bedding based on color; gradational lower contact.

MUDDY VERY FINE SAND [46.06-46.20 m]; olive black (5Y2/1); calcareous; massive to very faint cm-scale bedding based on color.

SAND, BASALTIC TEPHRA? [46.20-46.21 m]; olive black (5Y2/1); subangular lithic fragments.

MUD [46.21-46.47 m]; dark greenish gray (5G4/1); highly calcareous; massive.

MUD [46.47-47.42 m]; dark greenish gray (5G4/1); slightly calcareous at 46.58 m, non-calcareous at 46.73 m; massive with blocky brittle fracture well developed.

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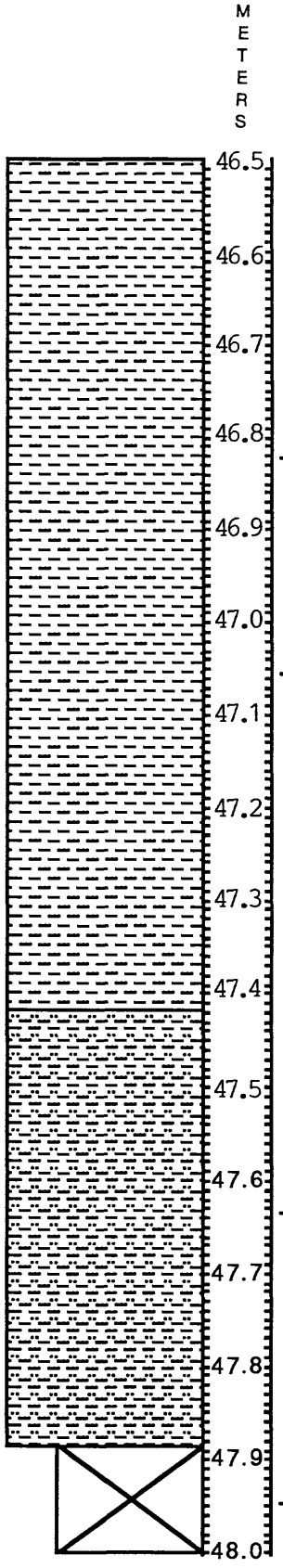

Start of Drive 24 [46.82-47.89 m].

MUD [46.47-47.42 m]; dark greenish gray (5G4/1); slightly calcareous at 46.58 m, non-calcareous at 46.73 m; massive with blocky brittle fracture well developed, tending toward imaginary bedding (still massive) in lower half of unit.

SILTY MUD [47.42-47.89 m]; dark greenish gray (5G4/1); slightly calcareous; more coherent; massive bedding.

No core recovered [47.89-48.04 m].

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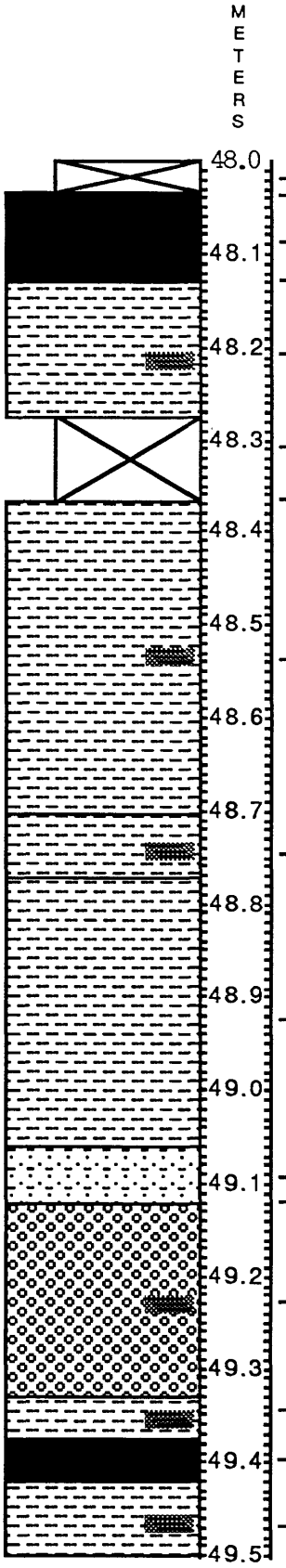

No core recovered [47.89-48.04 m].

Start of Drive 25 [48.04-48.28 m].

TEPHRA [48.04-48.12 m]; light olive gray (5Y6/1); massive.

TEPHRA (SAND?) [48.12-48.13 m]; black.

MUD [48.13-48.28 m]; dark greenish gray (5GY4/1); non-calcareous; platy lamination.

No core recovered [48.28-48.37 m].

Start of Drive 26 [48.37-49.12 m].

MUD (SILT AND CLAY) [48.37-48.71 m]; olive gray (5Y3/2); platy lamination on scraped surface; subtle variations in color and grain size displayed by the units in the entire drive (48.37-49.12 m).

MUD (SLIGHT SILT COMPONENT) [48.71-48.77 m]; olive gray (5Y3/2); laminated on <mm scale.

MUD (SILT AND CLAY) [48.77-49.06 m]; olive gray (5Y3/2).

MUDDY FINE SAND [49.06-49.12 m]; grayish black (N2).

Start of Drive 27 [49.12-50.70 m].

MUDDY BASALTIC LITHIC FRAGMENTS AND GRAVEL [49.12-49.33 m]; mud, sand and gravel up to small pebble size; faint, crude bedding (low angle bedding to core axis).

MUD [49.33-49.38 m]; greenish black (5G2/1); mm-scale bedding; sharp, irregular lower contact.

TEPHRA (irregular thickness, 2-4 cm) [49.38-49.42 m]; light gray (N7); massive; sharp, irregular lower contact.

MUD [49.42-50.04 m]; greenish black (5G2/1); massive bedding with blocky, crumbly fractures.

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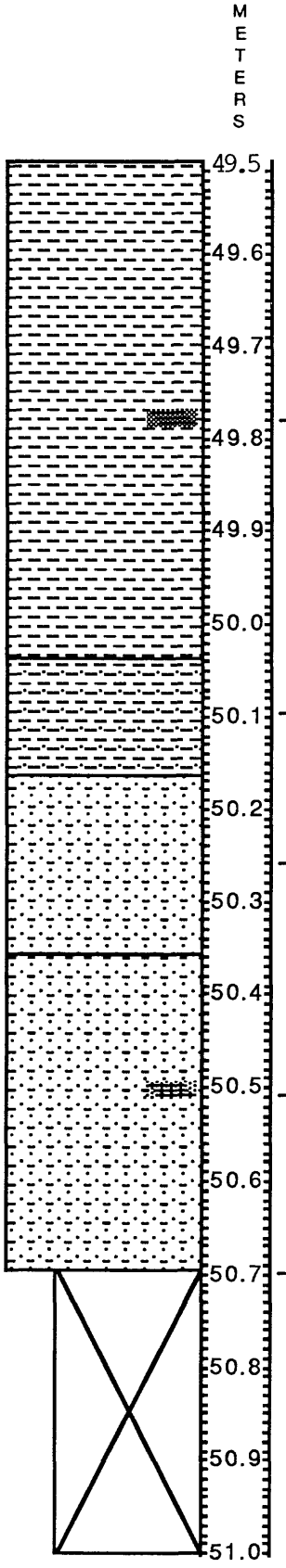

MUD [49.42-50.04 m]; greenish black (5G2/1); massive bedding with blocky, crumbly fractures; drilling fracture spun (material lost) at lower contact - exact contact not preserved in core.

VERY FINE SANDY MUD [50.04-50.17 m]; grayish black (N2); massive.

MUDDY SAND TO MEDIUM SAND [50.17-50.36 m]; grayish black (N2); fining upward sequence; gradational lower contact.

MUDDY SAND CONTAINING BASALTIC LITHIC FRAGMENTS AND POSSIBLY BASALTIC TEPHRA [50.36-50.70 m]; black (N1); well bedded, <1mm-thick laminations to 2 cm-thick beds.

Base of core at 50.70 m.