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1999

Open-File Report 1999-05
16 p

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QUATERNARY GEOLOGY IN THE VICINITY OF THE BEND DEPOSIT, TAYLOR COUNTY, WISCONSIN

John W. Attig
September, 1999

Introduction

The Bend Deposit is a massive-sulfide deposit in the Precambrian rock underlying north-central Taylor County, Wisconsin (fig 1; Larsen, 1999). In the vicinity of the Bend Deposit, Precambrian rock is typically overlain by 100 to 120 feet of Quaternary materials (Attig, 1993, Larsen, 1999). As a part of a regional study of the geochemistry of Quaternary materials, the U S. Geological Survey contracted for five rotosonic holes to be drilled to bedrock in the vicinity of the Bend Deposit during the summer of 1999 These five drillholes were placed along a north-south transect, on or adjacent to U.S Forest Service Road 112 (fig 2) The northernmost drillhole is located just south of where the road crosses the North Fork of the Yellow River in secs 34 and 35, T33N, R2W and secs. 2 and 3, T32N, R2W (fig 2). The Wisconsin Geological and Natural History Survey cooperated with the U S Geological Survey in describing the geology of the Quaternary materials in the area

Regional Quaternary geology

The Bend Deposit lies approximately 9.0 miles north of the maximum late Wisconsin extent of the southeastern margin of the Chippewa Lobe of the Laurentide Ice Sheet (Attig, 1993). As shown in figure 2 the Bend Deposit lies beneath an irregularly shaped, north-south trending hill. This hill was interpreted by Attig (1993, plate 1) to be underlain by till and supraglacial debris-flow sediment of the Copper Falls Formation. In the Taylor County area diamicton of the Copper Falls Formation interpreted to be till or supraglacial debris-flow sediment is typically reddish brown and sandy and contains abundant gravel composed of rock types derived from the Superior basin. The lithologic character of diamicton of the Copper Falls Formation, its regional distribution, and the pattern of associated landforms, all indicate it was tranported by ice flowing out of the Superior basin into north-central Wisconsin. The orientation of the eastern edge of the Chippewa Lobe indicates ice-flow direction of the Chippewa Lobe in the area of the Bend Deposit was to the south-southeast (Attig, 1993).

Regional stratigraphic relationships (Attig, 1993; Attig and Muldoon, 1989; Attig and others, 1988) indicate that several lithostratigraphic units containing till or supraglacial debris-flow sediment were deposited in the Taylor County area prior to deposition of the Copper Falls Formation. These are, from oldest to youngest, the Medford and Edgar Members of the Marathon Formation and the Merrill Member of the Lincoln Formation. Diamicton of the

Medford and Edgar Members of the Marathon Formation is silt-rich, gray to light brown, calcareous, and derived from a west to northwest source area. The Merrill Member of the Lincoln Formation is sandy, reddish brown, non-calcareous, and derived from a northern source in the Superior lowland. These units are described in more detail by Attig (1993), Attig and Muldoon (1989), Attig and others (1988), and Mickelson and others (1984).

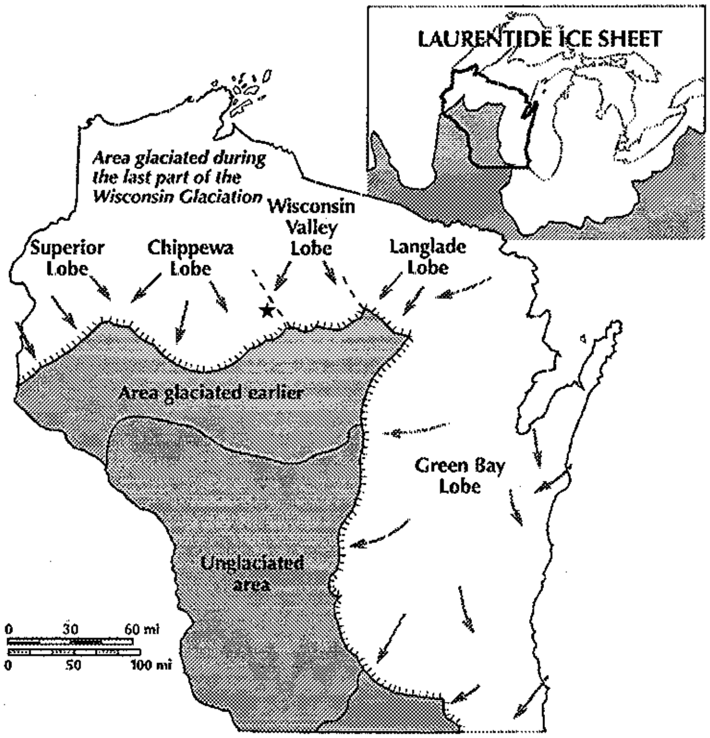

Figure 1: Map showing the approximate location of the Bend Deposit (star) and the maximum extent of the Laurentide Ice Sheet (hachured line) during the last part of the Wisconsin Glaciation.

Procedures for sampling and describing cores

Drillhole locations and elevations were determined by examination of the Jump River Fire Tower Quadrangle (U.S. Geological Survey, 7.5 minute, topographic, 1:24,000, 1970). All five drillholes penetrated completely through the Quaternary materials and reached bedrock or residuum believed to lie directly on bedrock. The drilling produced 3.0 inch diameter core of the Quaternary materials. Core recovery was generally good with nearly continuous core recovery from all intervals except those that were primarily sand or mixtures of sand and gravel that contained little silt and clay. During drilling operations core segments were preserved in plastic bags that were marked to indicate the depth below the surface from which the core segment was collected Core segments were then removed to a core building where the core from each of the five holes was laid out in sequence, split, described, and sampled. Appendix one contains the logs of the drillholes The core was sampled for analysis of grain-size distribution of the less-than-2mm fraction. Munsell color and magnetic susceptibility were also determined Samples were analyzed in the Quaternary Geology Laboratory in the Department of Geology and Geophysics at the University of Wisconsin-Madison. The results of the laboratory analysis of samples are shown in Appendix 2

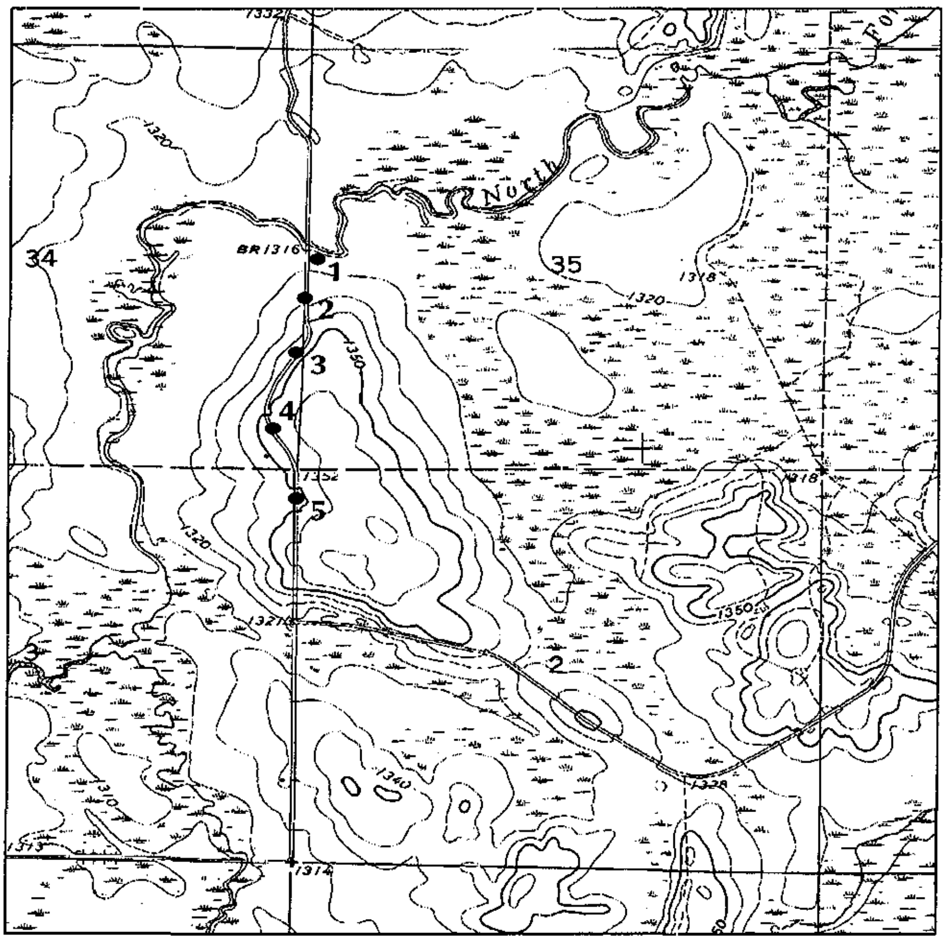

Figure 2: West-central part of the Jump River Fire Tower Quadrangle (U.S. Geological Survey, 7.5-minute series, topographic, 1970) showing drillhole locations The Bend Deposit is located along a northeast-southwest trending line near drillhole 2 Contour interval is 10 feet

Subsurface Quaternary stratigraphy in the vicinity of the Bend Deposit

The stratigraphy of the Quaternary materials that overlie the Bend Deposit is complex A summary of the stratigraphy of the area is shown in figure 3. The five drillholes reported here are the only subsurface information used for evaluating the Quaternary subsurface stratigraphy in the area. A sequence of outwash and lake deposits overlies bedrock in the northern part of the transect covered by the drillholes This sequence is truncated by diamicton of the Marathon Formation that lies directly on bedrock in the southern part of the transect (fig 3.) This diamicton is interpreted to consist of basal till and glacigenic debris-flow sediment.

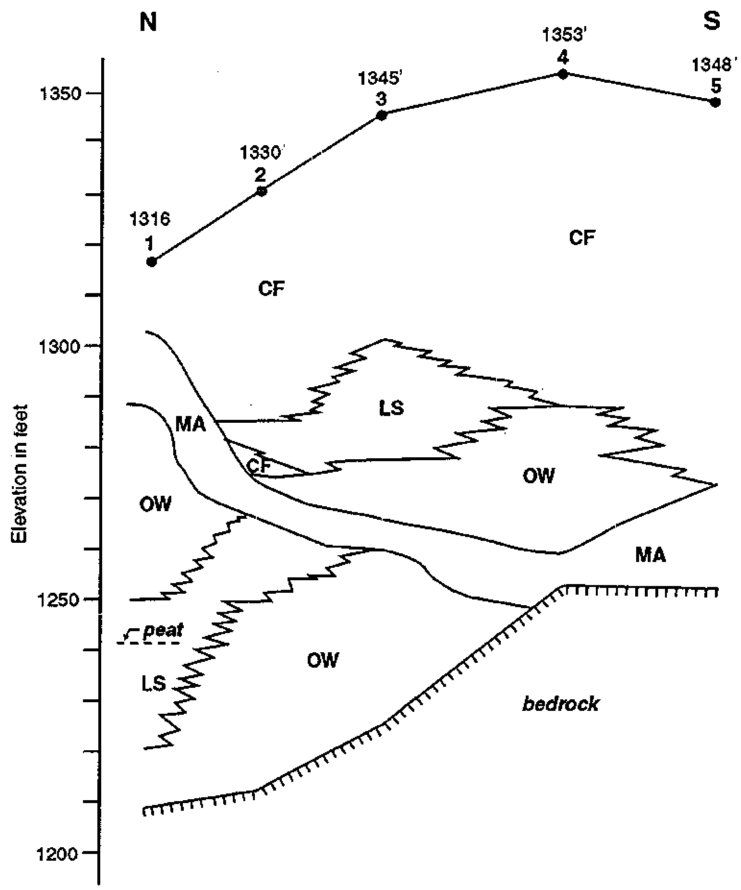

Figure 3: Diagram showing the stratigraphic relationships between geologic materials encountered in the drillholes. Drillhole locations and elevations are shown along the topographic profile at the top of the diagram. CF=basal till and glacigenic debris-flow sediment of the Copper Falls Formation, MA=basal till and glacigenic debris-flow sediment of the Marathon Formation, LS=lake sediment, OW=outwash.

Ice- flow direction during deposition of the gray, silty diamicton units of the Marathon Formation in the Taylor County area was from the west or northwest (Attig, 1993; Attig and Muldoon, 1989). The time of deposition of the outwash and lake sediment underlying the diamicton of the Marathon Formation is unknown. They may have been deposited as the glacier that deposited the diamicton of the Marathon Formation advanced into the area or they may have been deposited earlier. At a depth of 74 feet in drill hole USGS Ta-1 an organic-rich layer containing plant fragments is contained within a sequence of lake sediment. A conventional radiocarbon date of the peat yielded an age of greater than 45,760 years BP (Beta 132783). This age detemination is consistant with regional stratigraphic relationships that indicate the peat was deposited too long ago to be dated using radiocarbon (Attig, 1993) In other parts of north-central Wisconsin the gray silty diamicton units of the Marathon Formation have been divided into the Edgar and Medford Members (Attig and Muldoon, 1989) No evidence was recognized during the examination of the core or in the results of laboratory analyses to allow subdividing the gray silty diamicton penetrated in the drillholes into different lithostratigraphic units.

The gray, silty, diamicton of the Marathon Formation is overlain by a sequence of outwash, lake sediment, and the reddish-brown, sandy, diamicton of the Copper Falls Formation. The outwash and lake sediment overlying the diamicton of the Marathon Formation is included in the Copper Falls Formation because in hole USGS Ta- 2 between 53.5 and 61 feet below the surface there is reddish-brown diamicton beneath the lake sediment. The diamicton of the Copper Falls Formation was deposited in the area of the drillholes by the Chippewa Lobe of the Laurentide Ice Sheet This lobe reached its maximum extent about 9 miles south-southeast of the drill sites Ice-flow direction in the area was to the south-southeast

Regional stratigraphic relationships indicate that the Merrill Member of the Lincoln Formation lies between the Marathon Formation and the Copper Falls Formation in the Taylor County area (Attig, 1993; Attig and Muldoon, 1989; Mickelson and others, 1984) In the Taylor County area diamicton of the Merrill Member is nearly identical to diamicton of the Copper Falls Formation (Attig, 1993) If sediment of the Merrill Member was penetrated by the drillholes, it could not be distinguished from sediment of the Copper Falls Formation

References

Attig, J.W , 1993, Pleistocene geology of Taylor County, Wisconsin:Wisconsin Geological and Natural History Survey Bulletin 90, 25 p

Attig J.W , and Muldoon, M A ,1989, Pleistocene geology of Marathon County, Wisconsin: Wisconsin Geological and Natural History Survey Information Circular 65, 27 p.

Attig, J.W., Clayton, Lee, and Mickelson, D.M., (Editors), 1988, Pleistocene Stratigraphic units of Wisconsin 1984-1987: Wisconsin Geological and Natural History Survey Information Circular 52, 61 p

Larsen, R M , 1999, Royal Standard Minerals Incorporated Annual Report, 1998, 10 p.

Mickelson, D M , Clayton, Lee, Baker, R W., Mode, W N., and Schneider, A F., 1984, Pleistocene stratigraphic units of Wisconsin: Wisconsin Geological and Natural History Survey Miscellaneous Paper 84-1

Appendix 1: Logs of drillholes

Drillhole USGS Ta-1 (surface elevation 1,316 feet)			
DEPTH (FEET)	DESCRIPTION	SAMPLES	INTERPRETATION
0-5	reddish-brown to brown gravelly sand with silt-rich layers; upper 0.5 ft contains fragments of organic material; poor core recovery		post-glacial fluvial deposits of the North Fork Yellow River
5-15	uniform, compact, reddish-brown sandy diamicton; contains abundant gravel to 0 2 ft maximum diameter; good core recovery	Ta-1-99@7 ft Ta-2-99@12 ft	basal till and glacigenic debris-flow sediment of the Copper Falls Formation
15-28	compact, brown to brownish-gray silt-rich diamicton; gravel abundance decreases downward; nature of contact with the overlying reddish-brown diamicton apparently occurs at the break between core runs and was not observed; good core recovery	Ta-3-99@17 ft Ta-4-99@24 ft	basal till and glacigenic debris-flow sediment of the Marathon Formation
28-66	gravelly sand; gravel to 0 1 ft common; poor core recovery	Ta-5-99@42 ft Ta-6-99@50 ft Ta-7-99@60 ft	outwash of the Marathon Formation
66-74	compact, grayish-brown, well sorted, silty fine sand ;contains some medium and coarse sand between 67.5 and 68 5 ft; material in core was mixed by drilling but thin dark brown organic-rich layers were evident near the bottom of this interval; some lamination was also preserved in the core; good core recovery	Ta-8-99@70 ft	lake sediment of the Marathon Formation

74-75	compact, very dark brown to black organic- rich silt containing plant fragments; good core recovery	Ta-9-99@74 ft	peat
75-92	compact, brown to dark brown sandy, clayey, silt; little to no coarse sand; fragments of organic material throughout; well preserved laminations; good core recovery	Ta-10-99@80 ft Ta-11-99@84 ft Ta-12-99@87 ft	lake sediment of the Marathon Formation
92-95	compact, light brown to gray silt; few scattered fragments of organic material; no bedding evident; good core recovery	Ta-13-99@94 ft	lake sediment of the Marathon Formation
95-107	poorly sorted gravelly sand; very poor core recovery		outwash
107	rock fragments; solid rock		

Drillhole USGS-Ta 2 (surface elevation 1,330 feet)			
DEPTH (FEET)	DESCRIPTION	SAMPLES	INTERPRETATION
0-5	no core recovered		
5-7	sandy gravel		road subgrade
7-21	compact, reddish-brown to brown sandy diamicton; some thin (less than 0.1 ft sand-rich layers; dark gray gravel clasts common; good core recovery	Ta-14-99@12 ft Ta-15-99@18 ft	basal till and glacigenic debris-flow sediment of the Copper Falls Formation; grain-size variations and sand lenses indicate possible supraglacial debris-flow deposits
21-22	brown gravelly sand		sandy lens in diamicton of the Copper Falls Formation
22-45	uniform, compact, reddish-brown sandy diamicton; most clasts in upper part of this interval are mafic; more variety of lithologies in lower part of the interval; good core recovery	Ta-16-99@24 ft Ta-17-99@28 ft Ta-18-99@34 ft Ta-19-99@38 ft Ta-20-99@44 ft	basal till and glacigenic debris-flow sediment of the Copper Falls Formation; sediment uniformity through this intervel may indicate basal till
45-51	compact, uniform gray silt; no bedding visible; good core recovery	Ta-21-99@47 ft Ta-22-99@51 ft	lake sediment of the Copper Falls
51-53.5	gray to brown, very poorly sorted, sandy gravel; poor core recovery		outwash of the Copper Falls Formation
53.5-61	compact, reddish-brown, sandy diamicton; good core recovery	Ta-23-99@54 ft Ta-24-99@58 ft	basal till and glacigenic debris-flow sediment of the Copper Falls Formation

61-65	compact, gray, silty diamicton; contains many coarse-sand size fragments of white to gray-white rock that react to dilute HCL and reddish-brown fragments believed to be iron oxide; good core recovery	Ta-25-99@62 ft Ta-26-99@64 ft	basal till and glacigenic debris-flow sediment of the Marathon Formation
65-74	poor core recovery; core barrel end plugged with about 0 3 ftof silty organic-rich material		possible silty lake sediment with an organic-rich layer
74-75	silt-rich organic material	Ta-27-99@74 ft	silty peat
75-118	very poorly sorted gravelly sand with some silty layers; most gravel well rounded; material appears to vary greatly through this interval; poor core recovery	Ta-28-99@80 ft	ice-proximal outwash or glacigenic debris-flow sediment of the Marathon Formation
118-119	weathered bedrock		
119	rock fragments		bedrock

Drillhole USGS-Ta 3 (surface elevation 1,345 feet)			
DEPTH (FEET)	DESCRIPTION	SAMPLES	INTERPRETATION
0-5	no core recovered		
5-46	compact, reddish-brown, sandy diamicton; quite uniform throughout this interval; somewhat more gravel rich at 7 and 11 ft; 0.5 ft thick sandy layer at 15.5 ft; more sand rich and less compact between 40 and 45 ft; good core recovery	Ta-29-99@8 ft Ta-30-99@14 ft Ta-31-99@18 ft Ta-32-99@24 ft Ta-33-99@28 ft Ta-34-99@34 ft Ta-35-99@38 ft Ta-36-99@44 ft	basal till and glacigenic debris-flow sediment of the Copper Falls Formation
46-69	sharp contact with above material; uniform, compact, brown to gray silt; mostly gray below upper 5 ft; few clasts; no bedding preserved in core; very silty in the interval between about 67 and 69 ft; about half of the core from this interval was recovered	Ta-37-99@50 ft Ta-38-99@54 ft Ta-39-99@56 ft Ta-40-99@60 ft Ta-41-99@64 ft Ta-42-99@68 ft	may be glacigenic diamicton or lake sediment; interpreted as lake sediment based on the abundance of silt and clay in the less-than-2mm fraction; the grain-size uniformity throughout the interval and the lack of much material greater than 2 mm diameter
69-80	sandy gravel; poor core recovery		outwash
80-85	compact, gray, silty, diamicton; some small fragments of shale; good recovery	Ta-43-99@82 ft	basal till or glacigenic debris-flow sediment of the Marathon Formation
85-120	sandy gravel; poor recovery		outwash
120-125	gravelly clay; rounded and angular gravel clasts		residuum

Drillhole USGS-Ta 4 (surface elevation 1,353 feet)			
DEPTH (FEET)	DESCRIPTION	SAMPLES	INTERPRETATION
0-5	no core recovered		
5-65	compact, reddish-brown, sandy, diamicton; quite uniform through this interval; several thin (less than 0.5 ft thick) layers of sand or gravelly sand; good core recovery	Ta-44-99@27 ft Ta-45-99@34 ft Ta-46-99@36 ft Ta-47-99@43 ft Ta-48-99@46 ft Ta-49-99@53 ft Ta-50-99@57 ft Ta-51-99@64 ft	basal till and glacigenic debris-flow sediment of the Copper Falls Formation
65-85	sandy gravel and gravelly sand; very poor core recovery		outwash of the Copper Falls Formation
85-95	very sandy reddish-brown diamicton; very poor core recovery		glacigenic debris-flow sediment or proximal outwash; color indicates Copper Falls Formation
95-101	compact, gray, silt-rich diamicton; contains fragments of shale and fragments of white to light gray rock that react to dilute HCL; good core recovery	Ta-52-99@97 ft Ta-53-99@100 ft	basal till and glacigenic debris-flow sediment of the Marathon Formation
101-105	very compact, greenish-gray, gravelly clay; good core recovery		residuum

Drillhole USGS-Ta 5 (surface elevation 1,348 feet)			
DEPTH (FEET)	DESCRIPTION	SAMPLES	INTERPRETATION
0-5	no core recovered		
5-60	compact, reddish-brown sandy diamicton; remarkably uniform throughout the interval; several thin (less than 0 2 ft) layers of silt or well-sorted sand; thin (less than 0 1 ft) layer of sand with black coating on grains at 42 ft; good core recovery	Ta-54-99@7 ft Ta-55-99@14 ft Ta-56-99@24 ft Ta-57-99@26 ft Ta-58-99@34 ft Ta-59-99@40 ft Ta-60-99@47 ft Ta-61-99@54 ft Ta-62-99@57 ft	basal till and glacigenic debris-flow sediment of the Copper Falls Formation
60-70	very gravelly, reddish-brown sandy diamicton; very poor core recovery; samples from this interval are probably mixed	Ta-63-99@62 ft Ta-64-99@67 ft	glacigenic debris-flow sediment or proximal outwash of the Copper Falls Formation
70-81	compact, reddish-brown, sandy diamicton; becomes more brown to gray and more silt rich downward in this interval; good core recovery	Ta-65-99@72 ft Ta-66-99@78 ft	transition zone between diamicton of the Copper Falls Formation above and diamicton of the Marathon Formation below
81-95	uniform, compact, gray, silt-rich diamicton; good core recovery	Ta-67-99@82 ft Ta-68-99@88 ft Ta-69-99@93 ft	basal till and glacigenic debris-flow sediment of the Marathon Formation
95-97	sharp rock fragments mixed with well rounded rock fragments		weathered bedrock mixed with glacially transported material
97	solid rock		

APPENDIX 2. Results of laboratory analysis of sediment samples.

County Code	Sample Number	Year Sampled	Unit	Material Code	Type of Sample	Drill Hole #	Depth (ft.)	Lat.	Long.	Munsell Hue value/ Chroma	Magnetic Susceptibility (MKS value)	% Sand (2.0 to 0.0625mm)	% Silt (0.0625 to 0.002mm)	% Clay (<0.002) (mm)
Ta	1	1999	CF	3	3" core	USGS Ta-1	7	45.298N	90.596W	5YR6/6	0.0031757	77.81	8.24	13.95
Ta	2	1999	CF	3	3" core	USGS Ta-1	12	45.298N	90.596W	5YR6/6	0.0040500	61.20	26.62	12.18
Ta	3	1999	MA	3	3" core	USGS Ta-1	17	45.298N	90.596W	2.5Y6/2	0.0007669	18.11	45.92	35.97
Ta	4	1999	MA	3	3" core	USGS Ta-1	24	45.298N	90.596W	7.5YR2/2	0.0011982	41.18	36.70	22.12
Ta	5	1999	MA	4	3" core	USGS Ta-1	42	45.298N	90.596W	10YR7/6	0.0019411	94.96	3.03	2.01
Ta	6	1999	MA	4	3" core	USGS Ta-1	50	45.298N	90.596W	10YR7/3	0.0020370	95.48	3.38	1.14
Ta	7	1999	MA	4	3" core	USGS Ta-1	60	45.298N	90.596W	10YR7/6	0.0008627	93.29	2.41	4.30
Ta	8	1999	MA	5	3" core	USGS Ta-1	70	45.298N	90.596W	7.5YR3/1	0.0002636	1.97	64.36	33.68
Ta	9	1999	MA	13	3" core	USGS Ta-1	74	45.298N	90.596W	7.5YR3/1	0.0007189	7.93	56.36	35.71
Ta	10	1999	MA	5	3" core	USGS Ta-1	80	45.298N	90.596W	2.5Y2/0	0.0004314	13.61	67.12	19.27
Ta	11	1999	MA	5	3" core	USGS Ta-1	84	45.298N	90.596W	7.5Y3/1	0.0004553	1.76	65.54	32.70
Ta	12	1999	MA	5	3" core	USGS Ta-1	87	45.298N	90.596W	7.5Y3/1	0.0008388	3.50	72.53	23.97
Ta	13	1999	MA	5	3" core	USGS Ta-1	94	45.298N	90.596W	7.5YR3/3	0.0017494	1.75	78.06	20.19
Ta	14	1999	CF	3	3" core	USGS Ta-2	12	45.297N	90.597W	5YR5/6	0.0034269	45.82	45.28	8.90
Ta	15	1999	CF	3	3" core	USGS Ta-2	18	45.297N	90.597W	5YR5/6	0.0032592	63.26	24.08	12.67
Ta	16	1999	CF	3	3" core	USGS Ta-2	24	45.297N	90.597W	5YR5/6	0.0028997	58.22	33.10	8.68
Ta	17	1999	CF	3	3" core	USGS Ta-2	28	45.297N	90.597W	5YR5/6	0.0030435	57.81	32.67	9.52
Ta	18	1999	CF	3	3" core	USGS Ta-2	34	45.297N	90.597W	5YR5/6	0.0031154	55.62	33.32	11.06
Ta	19	1999	CF	3	3" core	USGS Ta-2	38	45.297N	90.597W	5YR5/4	0.0029476	58.35	30.94	10.71
Ta	20	1999	CF	3	3" core	USGS Ta-2	44	45.297N	90.597W	5YR5/6	0.0016775	52.84	41.62	5.54
Ta	21	1999	CF	5	3" core	USGS Ta-2	47	45.297N	90.597W	10YR4/2	0.0008388	6.89	84.82	8.29
Ta	22	1999	CF	5	3" core	USGS Ta-2	51	45.297N	90.597W	10YR4/2	0.0009586	9.43	80.88	9.69
Ta	23	1999	CF	3	3" core	USGS Ta-2	54	45.297N	90.597W	5YR5/6	0.0017734	46.21	47.11	6.68
Ta	24	1999	CF	3	3" core	USGS Ta-2	58	45.297N	90.597W	5YR5/6	0.0018453	45.52	46.87	7.61
Ta	25	1999	MA	3	3" core	USGS Ta-2	62	45.297N	90.597W	7.5YR4/4	0.0023485	38.95	51.31	9.74
Ta	26	1999	MA	3	3" core	USGS Ta-2	64	45.297N	90.597W	7.5YR4/4	0.0020609	29.33	59.48	11.19
Ta	27	1999	MA	13	3" core	USGS Ta-2	74	45.297N	90.597W	2.5Y3/1	0.0006470	32.93	47.21	19.86
Ta	28	1999	MA	4	3" core	USGS Ta-2	80	45.297N	90.597W	5YR4/6	0.0025402	65.72	28.98	5.31
Ta	29	1999	CF	3	3" core	USGS Ta-3	8	45.295N	90.597W	5YR4/6	0.0036186	60.94	29.73	9.33
Ta	30	1999	CF	3	3" core	USGS Ta-3	14	45.295N	90.597W	5YR4/6	0.0038583	58.32	28.26	13.42
Ta	31	1999	CF	3	3" core	USGS Ta-3	18	45.295N	90.597W	5YR4/6	0.0040021	58.29	25.79	15.92
Ta	32	1999	CF	3	3" core	USGS Ta-3	24	45.295N	90.597W	5YR4/6	0.0041459	60.15	26.44	13.41
Ta	33	1999	CF	3	3" core	USGS Ta-3	28	45.295N	90.597W	5YR4/6	0.0036905	61.45	29.14	9.41
Ta	34	1999	CF	3	3" core	USGS Ta-3	34	45.295N	90.597W	5YR4/6	0.0033311	44.46	44.06	11.49

For Unit: CF=Copper Falls Formation, LN=Lincoln Formation, MA=Marathon Formation
For Material code: 3=undifferentiated till, 4=outwash, 5=lake sediment, 13=organic-rich sediment
Sample numbers with a 'D' are duplicates analyzed to check for repeatability of results from lab procedures.

APPENDIX 2. Continued.

County Code	Sample Number	Year Sampled	Unit	Material Code	Type of Sample	Drill Hole #	Depth (ft.)	Lat.	Long.	Munsell Hue value/ Chroma	Magnetic Susceptibility (MKS value)	% Sand (2.0 to 0.0625mm)	% Silt (0.0625 to 0.002mm)	% Clay (<0.002) (mm)
Ta	35	1999	CF	3	3" core	USGS Ta-3	38	45.295N	90.597W	5YR5/6	0.0028518	61.40	28.37	10.23
Ta	36	1999	CF	3	3" core	USGS Ta-3	44	45.295N	90.597W	5YR4/6	0.0026840	60.36	29.19	10.45
Ta	37	1999	CF	5	3" core	USGS Ta-3	50	45.295N	90.597W	2.5Y6/4	0.0017973	18.31	50.35	31.34
Ta	38	1999	CF	5	3" core	USGS Ta-3	54	45.295N	90.597W	2.5Y6/4	0.0018453	18.27	47.85	33.88
Ta	39	1999	CF	5	3" core	USGS Ta-3	56	45.295N	90.597W	2.5Y5/1	0.0012222	15.89	43.93	40.17
Ta	40	1999	CF	5	3" core	USGS Ta-3	60	45.295N	90.597W	2.5Y5/1	0.0015577	16.42	41.16	42.41
Ta	41	1999	CF	5	3" core	USGS Ta-3	64	45.295N	90.597W	2.5Y7/1	0.0019891	16.33	38.33	45.34
Ta	42	1999	CF	5	3" core	USGS Ta-3	68	45.295N	90.597W	10YR4/1	0.0009107	6.89	73.52	19.59
Ta	43	1999	MA	3	3" core	USGS Ta-3	82	45.295N	90.597W	10YR6/3	0.0036186	46.12	29.88	24.01
Ta	44	1999	CF	3	3" core	USGS Ta-4	27	45.292N	90.598W	5YR5/6	0.0037385	59.00	20.97	20.03
Ta	45	1999	CF	3	3" core	USGS Ta-4	34	45.292N	90.598W	5YR5/6	0.0036186	58.72	23.57	17.71
Ta	46	1999	CF	3	3" core	USGS Ta-4	36	45.292N	90.598W	5YR5/6	0.0034030	60.90	19.15	19.95
Ta	47	1999	CF	3	3" core	USGS Ta-4	43	45.292N	90.598W	5YR5/6	0.0033790	61.64	22.97	15.39
Ta	48	1999	CF	3	3" core	USGS Ta-4	46	45.292N	90.598W	5YR5/6	0.0027320	58.11	27.65	14.24
Ta	49	1999	CF	3	3" core	USGS Ta-4	53	45.292N	90.598W	7.5YR5/8	0.0045772	63.82	23.50	12.67
Ta	50	1999	CF	3	3" core	USGS Ta-4	57	45.292N	90.598W	5YR5/6	0.0038822	67.63	18.89	13.48
Ta	51	1999	CF	3	3" core	USGS Ta-4	64	45.292N	90.598W	5YR5/6	0.0031154	63.25	23.40	13.35
Ta	52	1999	MA	3	3" core	USGS Ta-4	97	45.292N	90.598W	10YR5/3	0.0033550	44.41	33.79	21.80
Ta	53	1999	MA	3	3" core	USGS Ta-4	100	45.292N	90.598W	10YR4/1	0.0024204	47.64	30.81	21.55
Ta	54	1999	CF	3	3" core	USGS Ta-5	7	45.29N	90.597W	5YR4/8	0.0045533	60.54	23.87	15.59
Ta	55	1999	CF	3	3" core	USGS Ta-5	14	45.29N	90.597W	5YR4/6	0.0043136	55.42	25.23	19.35
Ta	56	1999	CF	3	3" core	USGS Ta-5	24	45.29N	90.597W	5YR4/6	0.0032352	56.24	24.12	19.65
Ta	57	1999	CF	3	3" core	USGS Ta-5	26	45.29N	90.597W	5YR4/6	0.0041938	52.70	25.61	21.69
Ta	58	1999	CF	3	3" core	USGS Ta-5	34	45.29N	90.597W	5YR4/6	0.0027320	55.03	24.42	20.55
Ta	59	1999	CF	3	3" core	USGS Ta-5	40	45.29N	90.597W	5YR4/6	0.0032112	67.44	18.69	13.88
Ta	60	1999	CF	3	3" core	USGS Ta-5	47	45.29N	90.597W	7.5YR5/8	0.0037385	55.56	26.43	18.01
Ta	61	1999	CF	3	3" core	USGS Ta-5	54	45.29N	90.597W	5YR4/6	0.0040260	55.62	23.66	20.72
Ta	62	1999	CF	3	3" core	USGS Ta-5	57	45.29N	90.597W	7.5YR5/6	0.0032352	55.80	27.24	16.96
Ta	63	1999	CF	3	3" core	USGS Ta-5	62	45.29N	90.597W	7.5YR5/6	0.0026361	78.65	6.39	14.96
Ta	64	1999	CF	3	3" core	USGS Ta-5	67	45.29N	90.597W	7.5YR5/6	0.0018932	58.24	25.96	15.80
Ta	65	1999	CF	3	3" core	USGS Ta-5	72	45.29N	90.597W	10YR5/6	0.0034748	82.58	7.66	9.76
Ta	66	1999	MA	3	3" core	USGS Ta-5	78	45.29N	90.597W	10YR5/4	0.0042417	61.86	23.26	14.88
Ta	67	1999	MA	3	3" core	USGS Ta-5	82	45.29N	90.597W	10YR5/4	0.0040740	65.30	18.50	16.20
Ta	68	1999	MA	3	3" core	USGS Ta-5	88	45.29N	90.597W	10YR4/4	0.0036426	56.89	20.79	22.32

APPENDIX 2. Continued.

County Code	Sample Number	Year Sampled	Unit	Material Code	Type of Sample	Drill Hole #	Depth (ft.)	Lat.	Long.	Munsell Hue value/ Chroma	Magnetic Susceptibility (MKS value)	% Sand (2.0 to 0.0625mm)	% Silt (0.0625 to 0.002mm)	% Clay (<0.002) (mm)
Ta	69	1999	MA	3	3" core	USGS Ta-5	93	45.29N	90.597W	10YR4/4	0.0037145	53.47	26.99	19.54
Ta	15D	1999	CF	3	3" core	USGS Ta-2	18	45.297N	90.597W	5YR4/6	0.0033790	57.35	28.73	13.91
Ta	32D	1999	CF	3	3" core	USGS Ta-3	24	45.295N	90.597W	5YR4/6	0.0040021	59.34	28.44	12.22
Ta	44D	1999	CF	3	3" core	USGS Ta-4	27	45.292N	90.598W	5YR5/6	0.0035228	61.06	21.88	17.05
Ta	55D	1999	CF	3	3" core	USGS Ta-5	14	45.29N	90.597W	5YR4/6	0.0032592	56.94	23.39	19.67