PRELIMINARY STRATIGRAPHIC TESTS TO SUPPORT MINERAL EXPLORATION: NORTHERN ALBERTA

MDA PROJECT M94-04-039

Alberta Geological Survey Open File Report 1995-11

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SUMMARY

This report presents the results of a small drilling program carried out in the Peace River region during March, 1995. Drilling was done with an auger rig and focussed on collecting data from areas with thick glacial sediments. Core was collected from nine boreholes at eight sites (numbered PR95-1, PR95-2, PR95-3, PR95-5, PR95-7, PR95-8, PR95-9, and with the initial hole PR95-11 being abandoned and drilled at the same site as hole PR95-11A). The boreholes ranged in depth from 5.8 m to 45.1 m, and the core from each hole was initially lithologged in the field and then retained for further detailed study. Sample subsets were later taken from selected core intervals, and the samples were submitted for geochemical analysis and the recovery and study of diamond indicator minerals.

With respect to the stratigraphy encountered in the core from the eight sites, the three boreholes (PR95-1 to PR95-3) which were drilled northwest of Valleyview each have relatively thin till overlying Wapiti Formation. At site PR95-5, which is about 100 km north of Peace River, 33 m of glaciofluvial sediments exist. At site PR95-7, is about 50 km north of Peace River, about 26 m of till and glaciofluvial sediments overlie the Shaftesbury Formation. At sites PR95-8 and PR95-9, which are up to about 70 km northeasterly of Peace River, till and less amounts of glacial silt and clay that are up to more than 43 m thick, are present. Lastly, at site PR95-11, which is east-northeasterly of Peace River and about 30 km west of Red Earth, there is evidence of a buried weathered zone in the till, which indicates a possible earlier and separate depositional event.

ACKNOWLEDGEMENTS

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OBJECTIVE

The purpose of this program was to drill a limited number of test holes in areas of moderately thick glacial drift in northern Alberta to obtain core from both the drift, and where possible, the upper portion of the underlying bedrock. The primary objectives were to collect and disseminate geological and geochemical data from subsurface core samples in support of the mineral exploration industry. The results of this project will complement work being done in two other projects: a) the Shaftesbury Formation study (Leckie *et al.*, in prep.), and b) till geochemical and mineralogical reconnaissance study of northern Alberta (Fenton and Pawlowicz, 1993, 1994 and in prep.).

BACKGROUND

There has been a need for baseline geological data to assist the mineral exploration industry in assessing the mineral potential of northern Alberta. For many areas of Alberta, in particular northern Alberta, mineralogical and geochemical data are either nonexistent or, at best, are of limited amount and quality. After consultation with members of the mineral exploration industry and the Geological Survey of Canada (GSC), the areas targeted by the Alberta Geological Survey (AGS) for drilling in this current study are in the Valleyview, Peace River and Red Earth region of northwestern Alberta. During the past few years, several exploration companies have been exploring this region for diamondiferous diatremes and some other types of mineral resources.

This is the first part of a joint AGS/GSC initiative to drill a limited number of test holes in northern Alberta. Staff of the GSC will have access to the core and conduct sedimentological studies. As well, this current program will be complemented by a joint AGS/GSC drilling program that will investigate the Shaftesbury Formation.

This project was based on the following considerations:

1) There is very little information on the stratigraphy, mineralogy and geochemistry of the drift, and the mineralogy and geochemistry of the underlying bedrock in

northern Alberta. Hence, drilling under this AGS/GSC program should be done in those selected areas of greatest interest to the Alberta mineral exploration industry, and hence the acquired information would or could potentially increase the effectiveness of industry's programs in northwestern Alberta and perhaps hasten their discovery of significant mineral resources within the province.

2) The drilling should take place at road accessible sites in order to minimize the amount of funds spent on setting up a camp and site clearing, and should be confined to a limited number of areas to reduce travel time.
3) Drilling should be done at those selected sites where it can be expected to recover both significant thickness of drift (i.e., till and inter-till sediments) and also some of the underlying bedrock.
4) As well, where possible the drilling should compliment and assist the Canada-Alberta MDA project which is studying the Shaftesbury Formation because the preliminary data which was collected during summer 1994 by the Northern Alberta Till Geochemistry and Mineralogy project, coupled with the encouraging exploration results published by Tintina Mines Limited, indicates that the Shaftesbury Formation in northern Alberta has potential to host both diamondiferous and precious-base metal deposits.

LOCATION AND METHODOLOGY

Drilling was carried out by the AGS in March, 1995 at eight sites at the Valleyview, Peace River and Red Earth region (Figure 1). The test holes were continuously cored from surface to a maximum depth of 45.1 m using a hollow stem auger drilling rig with a CME core barrel. Table 1 provides the location and depth of each hole. The core was collected and lithologged on site, and boxed for sampling at a later date. Surveying in of the sites was not done; instead, each drill site was located by means of airphotos and National Topographic System 1:50,000 scale maps. The core was later sampled and analyzed for geochemistry and diamond indicator minerals. The results of this analytical work will be included in another MDA project; namely "Till Reconnaissance Mineral and Geochemical Survey, Northern Alberta" (Fenton and Pawlowicz, in prep.).

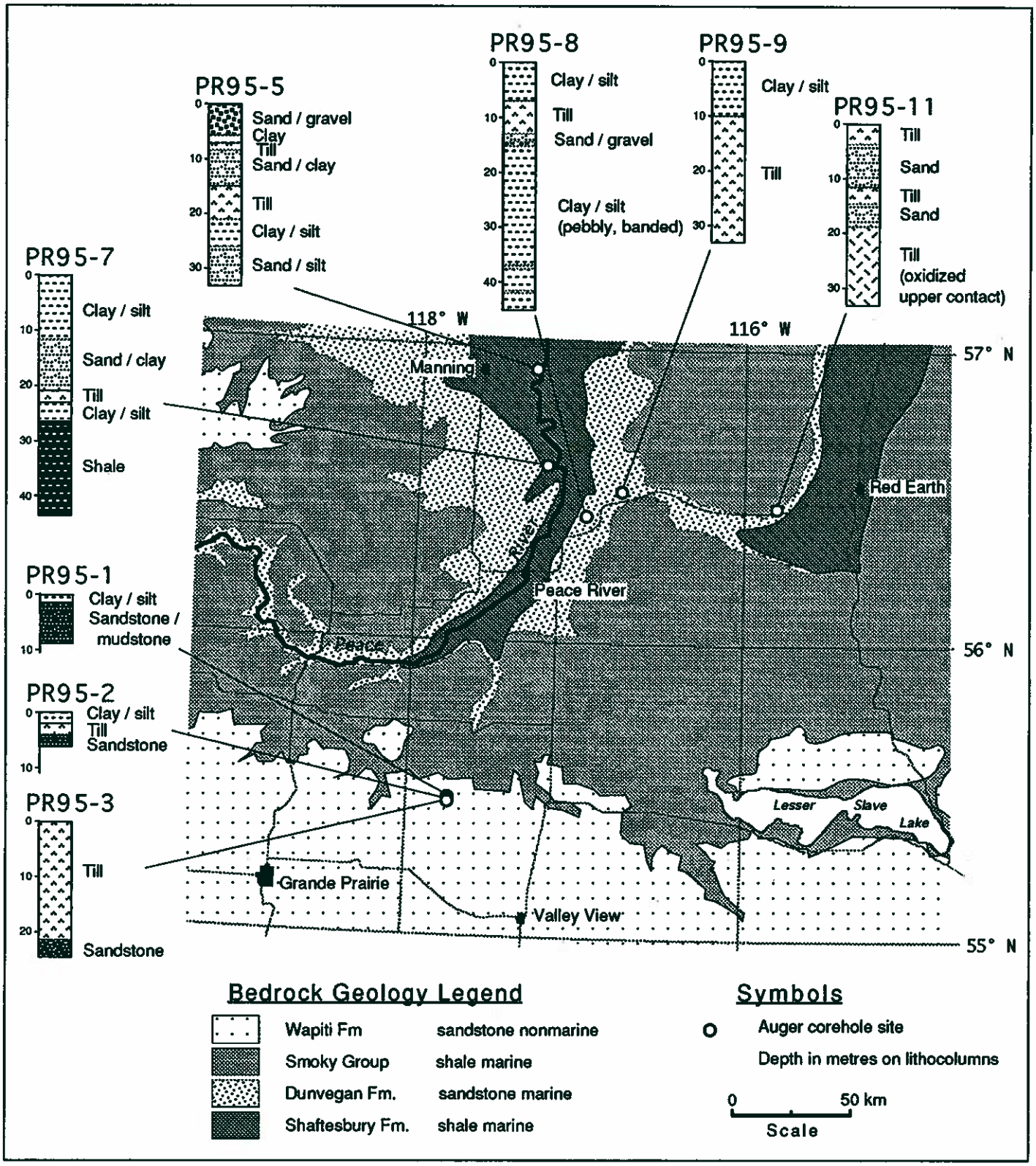

Figure 1. Generalized borehole lithology and location of borehole sites in northwestern Alberta (bedrock geology from Green, 1972).

Table 1. Location and depths of boreholes.

HOLE #	LOCATION (area)	LOCATION (DLS)	ELEVATION (m-approximate)	DEPTH (metres)
PR95-1	Valleyview	12-35-74-25W5	668	8.5
PR95-2	Valleyview	5-26-74-25W5	700	5.8
PR95-3	Valleyview	2-23-74-25W5	710	24.4
PR95-5	Peace R. North	9-22-91-21W5	442	32.9
PR95-7	Peace R. North	6-36-87-21W5	505	43.6
PR95-8	Peace R. East	10-32-85-19W5	585	45.1
PR95-9	Peace R. East	15-27-86-18W5	590	32.9
PR95-11	Red Earth	2-15-86-12W5	587	19.8
PR95-11A	Red Earth	2-15-86-12W5	587	32.9

RESULTS

Core recovery was very good in all holes with the exception of PR95-5, which was poor because of an abundance of sand and gravel beds. Detailed lithologs for each testhole are included in Appendix A. Following is a brief description of the observations from the detailed lithologs. Figure 1 illustrates the borehole lithology from each site.

In the Valleyview area, holes PR95-1 and PR95-2 intersected bedrock at shallower depths than expected; about 1.0 m and 4.0 m respectively. At site PR95-3, 21.5 m of silty clay till overlies sandstone bedrock of the Wapiti Formation.

About 100 km north of the town of Peace River, at site PR95-5, glaciofluvial sediments and, in places, thin till units were encountered from surface to the base of the hole at 32.9 m. These sediments consist of interbedded clay, silt, sand and gravel. Minor interbeds of till and diamicton, less than about 1 m thick, were intersected in the upper 20.7 m. At site PR95-7, which is located about 50 km north of the town of Peace River, Shaftesbury Formation shale was intersected at about 26 m. The overlying drift sequence consists of 5 m of till intermixed with sand to clay horizons, overlain by 21 m of interbedded glaciofluvial sand, silt and clay.

Sites PR95-8 and PR95-9 are up to about 70 km northeasterly of Peace River, and neither hole penetrated the bedrock. In testhole PR95-8, the upper 23.8 m consists of a clay-rich, till-like sediment containing few pebbles and faint mostly horizontal banding. In the remainder of the hole down to about 44.1 m, interbeds of sand, silt and clay with minor amounts of igneous and quartzite pebbles were intersected, indicating a glaciofluvial environment. At site PR95-9, till was present throughout the entire length of the borehole to 32.9 m. However, the upper 10 m consists of faintly banded till, which likely correlates with the till in the upper part of the hole PR95-8. In both of these holes, abundant angular to well rounded shale clasts are present.

At site PR95-11, which is about 30 km west of Red Earth, glacial sediment was encountered to the base of the hole at 32.9 m in depth. Interbeds of sand and till are present in the upper 19 m, and from 19 m to 32.9 m a massive till was intersected. Of interest here is the suggestion of a paleosurface at about 19 m in depth, where 1.5 m of oxidized till containing abundant gypsum crystals was found to lie beneath 12 m of unoxidized sediment. This suggests a possible earlier and separate depositional event from the overlying sediment.

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APPENDIX A

LITHOLOGIC DESCRIPTION OF CORE FROM BOREHOLES

PR95-1

PR95-2

PR95-3

PR95-5

PR95-7

PR95-8

PR95-9

PR95-11

PR95-11A

PROJECT: N. Alberta	DATA NO: **PR95-1**	LOGGED BY: J. Pawlowicz	DATE: 2 March/95
DRILLER: Canadian Geological Drilling	TYPE DRILL: BRAT 22	SURFACE ELEV. 668 m	FROM 1:50,000 map
LOCATION: 83N	LSD 12 SEC 35 TP 74 R 25 W 5		
U.T.M. ZONE	EASTING	NORTHING	CME 5' core barrel
COMMENTS ON LOCATION: 1 mile west of Mountain Lake. Oil well site on logging road, 500m south of Highway 676.			

DRILLED [1] DEPTH (m)		CORE [1] RECOVERY (cm)	DESCRIBED [1] INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
0	1.22	122	25	Fill	Clayey, dark brown, looks disturbed
			9	Silt	Light olive brown, massive, non calcareous.
			12	Clay	Brown, oxidized, massive, non calcareous, silty.
			35	Clay	Brown, oxidized, calcareous, massive, minor white calcareous deposits, silty.
			13	Siltstone	Yellow/orange brown, oxidized, massive, non calcareous, weathered bedrock.
			28	Siltstone	Clayey, yellow/orange brown, oxidized, massive, non calcareous, 4 cm soft white calcareous deposit.
1.22	2.44	122	85	Siltstone	Clayey, friable, faint subhorizontal, clayey laminae weathered olive brown, non calcareous, faint subhorizontal bedding.
			37	Sandstone	Fining up from fine grained to siltstone, weathered olive brown as above, non calcareous, faint subhorizontal bedding.
2.44	3.96	145	70	Sandstone	Medium grained, olive brown,oxidized, massive, poorly, consolidated, non calcareous, sharp 30^0 lower contact.
			35	Siltstone	Massive, olive brown, strongly oxidized from facies, highly fractured and broken, non calcareous.
			16	Siltstone	SAB [2], clayey.
			24	Siltstone	SAB, becoming more clayey, very stiff, massive dark brown.

NOTES:

1 Drilled depth refers to the drillers estimate of drilled depth interval. The core recovery may differ from the depth interval drilled for of a variety of reasons; for example, loss of core, core expansion from fractured sediment, or compression from drilling often results in a core length that is different from the drilled interval. Soft sediment coring is particularily prone to this. The described intervals are measured from the top of each core run.

2 SAB - Denotes "Same As Above" for lithologs for all holes

Continuation PR95-1

DRILLED DEPTH (m)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
3.96	5.49	122	67	Siltstone	Clayey, brown, oxidized, massive, strongly Fe oxidized fractured and clast facies, highly fractured bentonitic - swelling in core barrel.
			55	Mudstone	Dark grey, bentonitic, swelling in core barrel, Fe oxidized band near top, iron oxidized parting near base, massive, dense, very stiff.
5.49	6.10	60	25	Siltstone	Dark grey, argillaceous, highly fractured, friable, strong iron oxidation on fractured facies.
			35	Siltstone	SAB, argillaceous, massive, slight oxidized on fractured facies.
6.10	7.16	107	107	Siltstone	Argillaceous, horizontal interbeds of mudstone (1 cm thick), dark grey unoxidized, minor carbonaceous and coaly clasts, non calcareous.
7.16	8.53	137	71	Siltstone	SAB, friable.
			45	Sandstone	Very fine grained, finely interbedded with bentonitic mudstone, dark grey, highly fractured.
			21	Sandstone	Fine grained, fining up, rhythmic bedding with mudstone, minor soft tan nodules, mudstone appears bentonitic.
					TD = 8.53m No water in hole.

PROJECT: N. Alberta	DATA NO: PR95-2	LOGGED BY: J. Pawlowicz	DATE: 1 March/95
DRILLER: Canadian Geological Drilling	TYPE DRILL: BRAT 22	SURFACE ELEV. 700 m	FROM 1:50,000 map
LOCATION: 83N	LSD 5 SEC 26 TP 74 R 25 W5		
U.T.M. ZONE	EASTING	NORTHING	CME 5' core barrel
COMMENTS ON LOCATION: 3 km South West of Mountain Lake 2 miles south of Highway 676.			

DRILLED DEPTH (m)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
0	1.07	107	12	Silt/Clay	Topsoil, black, organic, Ao soil, frozen, calcareous.
			30	Silt	Very light grey brown, Ae soil, non calcareous, frozen.
			65	Clay	Mottled grey and olive brown, oxidized, massive minor pebbles throughout unit, becoming slightly calcareous towards base, pebbles include coal, granite, rotten, olive coloured, igneous clast, black chert, sandstone.
1.07	2.44	90	50	Clay/Silt	Mottled, olive brown and grey, faint banding (clay/silt) oxidized, slightly calcareous, abundant clasts - local bedrock, sandstone/siltstone, igneous clasts, coal, quartzites.
			40	Till	Brown, oxidized, slight calcareous, massive, sandy clay till, same pebbles as above.
2.44	3.96	153	153	Till	SAB, brown, oxidized, silty clay till, grey unoxidized, mottling, abundant clasts - local bedrock, sandstone, shale, coal, igneous and quartzite pebbles.
3.96	5.49	110	40	Sandstone	Fine grained, olive brown, oxidized, soft, poorly consolidated, massive.
			40	Siltstone	Clayey, stiff, olive brown, oxidized, fractured and brecciated, massive.
			25	Siltstone	Clayey, olive grey, slightly oxidized, slightly calcareous, massive, stiff.
			5	Calcite	Light orange yellow, may be calcite crystals or precipitate zone in fracture, consolidated but soft, strong HCL reaction, disturbed from drilling.
5.49	5.79	30	28	Siltstone	Clayey, stiff, disturbed, fractured, massive, abundant bands, calcite crystals (beds) precipitate, strong HCL reaction.
			2	Siltstone	Grey, fine grained, very hard, strongly calcareous, massive, carbonacous material. **Note: Bottom 30 cm of hole - unusual calcite deposits, layering of crystal growth along what appears to be fractures, Fe oxidized**
					TD - 5.79 m Auger refusal.

PROJECT: N. Alberta	DATA NO: **PR95-3**	LOGGED BY: J. Pawlowicz	DATE: 2 March/95
DRILLER: Canadian Geological Drilling	TYPE DRILL: BRAT 22	SURFACE ELEV. 710 m	FROM 1:50,000 Map
LOCATION: 83N	LSD 2 SEC 23 TP 74 R25 W5		
U.T.M. ZONE	EASTING	NORTHING	CME 5' core barrel
COMMENTS ON LOCATION: Mountain Lake 3 miles South of Highway 676.			

DRILLED DEPTH (m)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
0	1.22	122	13	Organic	Dark brown, woody, Ao soil.
			29	Silt	Ae soil, light grey, non calcareous.
			53	Silt	B soil, clayey, non calcareous, sandy lenses, olive brown, oxidized, massive, frozen.
			27	Till	Silty clay, olive brown, oxidized, slightly calcareous, massive, abundant local bedrock clasts, sandstone, siltstone, shale, coal, minor igneous clasts. sandstone clasts are strongly oxidized.
1.22	2.59	150	46	Till	SAB, silty clay, olive brown with grey unoxidized mottling, slightly calcareous.
			104	Till	SAB, but calcareous, large siltstone clasts, 5 cm, whitish calcareous, soft deposits along high angle fracture zones.
2.59	3.96	152	152	Till	SAB, silty clay till, olive brown, oxidized, no secondary calcareous deposits present, but till is moderately calcareous. Few igneous and quartzite pebbles, abundant sandstone, siltstone, coal and shale clasts, few dark brown horizontal banding (1-2 cm wide), more clayey in lower 50 cm.
3.96	5.49	152	58	Till	SAB
			94	Till	Clay till, 10^0 bedding/banding of dark grey clay till and olive brown clay silt, moderately calcareous, same clast lithology as above.
5.49	7.01	152	15	Till	Clayey, dark grey unoxidized with minor olive brown mottling, moderately calcareous, abundant load bedrock clasts.
			137	Till	Clayey and silty, dark grey, unoxidized, stiff, massive, clast lithology change, few igneous, granite, sandstone and coal clasts, abundant grey and greenish shale clasts, moderately calcareous.

Continuation PR95-3

DRILLED DEPTH (m)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
7.01	8.53	152	152	Till	SAB, silty clay till, stiff and plastic, shale rich clasts, very uniform.
8.53	10.06	153	153	Till	SAB
10.06	11.58	152	152	Till	SAB
11.58	13.11	153	100	Till	SAB, sandy clay.
			53	Till	SAB, clayey-moist to this depth/no water.
13.11	14.63	152	152	Till	SAB, clayey, shale rich/clasts, very few igneous and quartzite pebbles.
14.63	16.15	152	106	Till	SAB
			34	Sand	Fine to medium grey and olive brown horizontal banding, silty and clayey bands, minor band shale clasts.-possibly thrust sandstone, slightly oxidized, non calcareous.
			8	Till	Same till as above, moderately calcareous.
			4	Sand	Fine grain, olive, massive, non calcareous.
16.15	17.68	113	4	Sand/Till	Interbedded, horizontal.
			64	Till	Same as above till, cl ayey, dark grey, unoxidized. Low 10 cm has sand layers, subhorizontal, moderately calcareous.
			43	Sand/clay	Fine grain sand/calyey interbeds, 10^0 bedding, also silt/clay interbeds, sand is olive color (looks slightly oxidized), clay is unoxidized grey, slightly calcareous, pebble free.
			2	Till	Clayey, dark grey.
17.68	19.20	0	0		Lost core - rock in core barrel shoe.
19.20	19.51	0			Drilled past rock with plug in drillbit.

Continuation PR95-3

DRILLED DEPTH (m)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
19.51	20.73	143	93	Till	Same till as above, clayey, dark grey, abundant shale clast, few igneous and quartzites, moderately calcareous.
			50	Till	Different looking till - same colour, dark grey clayey, very plastic, dense, minor shale clasts, more abundant quartzite and igneous pebbles, moderately to strongly calcareous. *** this till has fewer clasts, much fewer shale clasts - larger stones in this unit.**
20.73	22.25	142	80	Till	SAB, sharp horizontal lower contact.
			62	Sand	Fine grain, olive - slightly, oxidized, minor grey unoxidized bands - horizontal 1 -5 cm. Black, quartzite pebbles. Some grains appear to be igneous- glacial sand? Possible bedrock -sand is saturated and non calcareous.
22.25	23.16	90	78	Sandstone	SAB, fine grained, olive grey, loose, clean, saturated, massive.
			12	Sandstone ?	Bedrock?, moderately hard, clayey, non calcareous, massive, auger refusal.
23.16	23.77	0			Augered down.
23.77	24.38	40	25	Sandstone	Fine grained, olive grey, clean, loose, massive, saturated, non calcareous.
			15	Sandstone	Medium grained, moderately hard, calcareous, massive, mottled olive grey and blue grey, 2 cm horizontal orange oxidized bed.
					TD = 24.38m auger refusal.

PROJECT: N. Alberta	DATA NO: **PR95-5**	LOGGED BY: J. Pawlowicz	DATE: 7 March/95
DRILLER: Canadian Geological Drilling	TYPE DRILL: BRAT 22	SURFACE ELEV. 442 m	FROM 1:50,000 Map
LOCATION: 84C	LSD 9 SEC 22 TP 91 R 21 W 5		
U.T.M. ZONE	EASTING	NORTHING	CME 5' core barrel
COMMENTS ON LOCATION: Manning east - gravel piton top of west side.			

DRILLED DEPTH (m)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
0	.91			Gravel	Clayey, dirty, quartzite, igneous, oxidized.
.91	1.52			Sand and Gravel	Clean, calcareous, orange brown.
1.52	3.05			Sand	Medium to coarse grained, orange, brown, calcareous.
3.05	3.96			Sand	SAB, minor brown clay beds.
3.96	4.27			Clay	Brown, mottled with dark brown, calcareous, oxidized.
4.27	4.57			Sand	Brown, oxidized, loose, calcareous.
4.57	5.79			Sand	SAB, minor pebbles less than 1 cm, igneous, quartzite.
5.79	6.10			Clay	Brown and orange brown oxidized, numberous pebbles, igneous, quartzite, red sandstone, calcareous.
6.10	7.01			Clay	SAB, oxidized fractures, calcareous, pebbles, gypsum crystals.
START OF CORING 7.01m					
7.01	8.53	152	114	Till	Olive brown, oxidized, sandy clay, strongly oxidized, high angle fractures, igneous, quartzite, limestone pebbles, strongly calcareous.
			36	Diamicton	Clayey, massive, pebbles, calcareous.
			2	Sand	Medium grained, orange brown, oxidized.

Continuation PR95-5

DRILLED DEPTH (m)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
8.53	10.06	153	51	Clay	Dark grey, unoxidized, minor pebbles, minor sand lenses, strongly calcareous.
			20	Sand	Fine grained orange brown, strong oxidization, strongly calcareous.
			23	Clay	Dark grey, minor pebbles, gypsum crystals, calcareous, unoxidized with strong oxidized fractures.
			7	Sand	Medium to coarse grained, orange brown, igneous clasts, oxidized, calcareous.
			40	Clay	Silt, dark grey brown, unoxidized, massive, pebbly, calcareous, gypsum crystals at upper contact.
			2	Sand	Fine grain, grey, unoxidized.
			10	Clay	Dark grey, calcareous, massive, silty, minor pebbles.
					-end of day at 33' 7 Mar./95 -start new day at 33' at 9:00 8 Mar./95
10.06	11.58	152	24	Till?	Clayey, silty, very soft, massive, dark grey, unoxidized, numerous pebbles, igneous, quartzite, moderately calcareous.
			10	Sand	Grey, medium grain, clayey, dirty.
			98	Till?	Same till as above.
			17	Clay	Very dark grey brown, massive, plastic and stiff, minor pebbles, horizontal, strongly oxidized, silty laminae in bottom 5 cm.
			3	Sand	Light brown, medium grain, strongly calcareous, strong oxidation.
11.58	13.11	60	40	Sand	Yellow brown, medium grain, strongly oxidized, bedding from 5-20^0, 1 cm clay seam dipping 30^0, strongly calcareous.
			20	Sand	Light yellow brown, medium grain, oxidized, very strongly calcareous, 10^0 bedding, interbedded, calcareous cemented 2 cm beds.
13.11	14.63	80	80	Sand	Orange brown, fine grain, massive, 2 cm wide curved clay drapes-strongly oxidized, strongly calcareous, brown, 20 cm is dark orange brown - saturated.

Continuation PR95-5

DRILLED DEPTH (m)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
14.63	16.15	152	30	Silt	Clay, dark grey, unoxidized, saturated, high angle, clay seams, strongly calcareous.
			107	Till?	Clayey, silty dark grey, unoxidized, stongly calcareous, massive, soft, very pebbly, igneous, quartzite.
			15	Clay	Silty, dark grey, faint subhorizontal bedding, minor pebbles, strongly calcareous, unoxidized.
16.15	17.68	153	153	Till?	Clayey, silty, massive, plastic, stiff, dark grey, unoxidized, igneous, quartzite clasts, minor fine grain sand lenses, bedrock, strongly calcareous.
17.68	19.20	152	120	Till	SAB, igneous, quartzite, ironstone, limestone clasts.
			32	Clay/Silt	Dark grey, subhorizontal, interbeds, strong calcareous, minor pebbles, very stiff.
19.2	20.73	153	103	Till	Same till as above, soft numerous clasts up to 3 cm.
			50	Clay	Dark grey, subhorizontal, silt stringers, no pebbles, stiff, strongly calcareous, silty.
20.73	22.25	152	152	Silt	Dark grey, clayey, massive looking, contorted, light grey, silt stringers, strongly calcareous, no pebbles.
22.25	23.77	152	100	Silt	SAB, clayey, strongly calcareous.
			40	Clay	Very dark grey, stiff, plastic, massive, strongly calcareous.
			5	Silt	Dark grey, clayey, massive, horizontal contacts.
			7	Clay	Very dark grey, massive, strongly calcareous.
23.77	25.30	153	53	Clay	SAB, no pebbles.
			100	Silt	Dark grey, clayey, contorted, light grey silt laminae, strongly calcareous. No pebbles.

Continuation PR95-5

DRILLED DEPTH (m)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
25.30	26.82	78	70	Silt	SAB
			4	Sand	Grey, very fine grained, 5^0 bedding, strongly calcareous.
			4	Sand	Light grey, fine grained, 5^0 bedding strongly calcareous.
26.82	28.35	90	35	Sand	Light grey, fine grained and very fine grained interbeds, finely laminated with silt and clay, soft sedimentary deformation, strongly calcareous.
			17	Silt	Clayey, grey, wavy laminae, strongly calcareous.
			2	Clay	Massive, dark grey.
			36	Sand	Fining up from fine grained to silt, dark brown laminae, fine cross-bedding, strongly oxidized orange brown strongly calcareous -photos.
28.35	29.87	60	60	Sand	Fine grained, light yellow brown, oxidized, strongly calcareous, whitish brown near base, horizontal laminae of dark orange brown loose.
29.87	31.39	85	36	Sand	Very fine grained, SAB, fine grained sandy interbeds, horizontal and cross bedding, strongly oxidized bedding planes, strongly calcareous.
			7	Silt	Clayey, dark grey, unoxidized, massive.
			10	Sand	SAB, oxidized
			5	Silt	Orange brown, oxidized, horizontal bedding.
			27	Sand	Fine grained, orange brown, horizontal and cross beding, strongly oxidized, strongly calcareous.
31.39	32.92	80	77	Sand	Fine grained, orange brown, SAB, saturated, loose- flowing.
			3	Sand	Fine grained, black manganese oxide & dark orange Fe oxide.
					TD = 32.92 m

PROJECT: N. Alberta	DATA NO: **PR95-7**	LOGGED BY: J. Pawlowicz	DATE: 6 March/95
DRILLER: Canadian Geological Drilling	TYPE DRILL: BRAT 22	SURFACE ELEV. 505 m	FROM 1:50,000 map
LOCATION: 84C	LSD 6 SEC 36 TP 87 R 21 W 5		
U.T.M. ZONE	EASTING	NORTHING	CME 5' core barrel
COMMENTS ON LOCATION: Manning south - south of Whitemud River crossing.			

DRILLED DEPTH (m)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
0	.91	0			Drilled through frost.
.91	2.44	150	150	Clay/Silt	Dark brown clay with light brown silty interbeds, bedding is contorted subhorizontal, oxidized, minor gypsum crystals, strongly calcareous with slightly calcareous, clayey beds, no pebbles.
2.44	3.96	145	87	Clay/Silt	SAB, light brown silt, dark brown and brown clay beds, silt interbeds 2-3 cm thick.
			26	Clay	Dark brown, massive, minor contorted brown beds, clay, strongly calcareous, oxidized, very plastic.
			32	Silt	Light brown, horizontal bedding , very strongly calcareous, oxidized.
3.96	5.47	140	20	Silt	SAB
			120	Clay	Same as clay above, dark brown, oxidized, horizontal bedding, interbeds of light brown silt from .5 cm -15 cm thick. Silt is very strongly calcareous, both gradational and sharp contacts with silt.
5.47	7.01	140	33	Clay/Silt	SAB
			83	Clay	Same clay as above, minor contorted thin silt beds.
			24	Silt	Same silt as above, light brown, very strongly calcareous, dark brown clay interbeds.
7.01	8.53	152	13	Clay	SAB, minor thin silt beds, horizontal, strongly calcareous.
			64	Clay	Dark grey brown, oxidized, massive, no silt, moderately calcareous, gypsum crystals along 60^0 fracture zones, crystals to 3 mm.
			75	Clay	SAB, no gypsum, dak grey brown, slightly oxidized, minor quartzite & igneous pebbles, no silt, very plastic.

Continuation PR95-7

DRILLED DEPTH (m)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
8.53	10.06	153	110	Clay	Dark grey, massive, unoxidized, minor pebbles, igneous, quartzite, limestone, iron stone, <2 cm diameter, slightly calcareous.
			43	Clay	SAB, faint subhorizontal bedding, minor pebbles, becoming silty towards base.
10.06	11.58	122	30	Clay/Silt	Dark grey, light grey silt interbeds, silt is very strongly calcareous.
			52	Clay	Dark grey, massive, no pebbles, slightly calcareous.
			37	Silt	Light grey, horizontal interbeds, thin clay, contorted bedding very strongly calcareous, 10 cm top of unit.
			3	Sand/Silt	Very fine grained sand and silt interbeds, horizontal, light grey, very strongly calcareous.
11.58	13.11	115	115	Sand/Silt	Very fine grained sand and silt and clay interbeds, horizontal, cross bedding and ripple bedding, finely bedded and laminated. No pebbles, very strongly calcareous with minor non calcareous beds, weakly consolidated-might be bedrock.
13.11	14.63	85	85	Sand/Silt	SAB, finely laminated, minor soft sedimentary deformation, very strongly calcareous.
14.63	16.15	75	25	Sand	Very fine grained, light grey, silt and clay laminae, horizontal strongly calcareous.
			15	Clay	Dark grey, silty, massive, very strongly calcareous.
			35	Sand	Very fine grained, light grey, fining up to silt and clay laminae cross-bedding, ripple bedding, very strongly calcareous.
16.15	17.68	93	50	Sand	Fine grained, light grey, massive, loose, slight moist calcareous.
			22	Sand	Fine grained, light grey, abundant clay laminae, contorted, subhorizontal, strongly calcareous.
			21	Clay	Grey, very fine grained sand interbeds, saturated, strongly calcareous.

Continuation PR95-7

DRILLED DEPTH (m)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
17.68	19. 20	95	35	Clay	Grey, massive, minor quartzite, igneous and shale clasts, strongly calcareous.
			35	Sand	Fine grained- very fine grained, light grey, strongly calcareous, silt laminae.
			5	Sand	Fine grained -medium grained, light grey, abundant pink feldspars, calcareous.
			20	Sand	Fine grained -medium grained, grey, horizontal clay interbeds, saturated, strongly calcareous, pink feldspar grains -but fewer than above.
19.20	20.73	75	75	Sand	Coarse grained, grey, massive, loose, saturated, minor quartzite and igneous pebbles up to 1 cm diameter, pink feldspar grains, minor clay, horizontal beds, note- entire 5 ft run is sand (driller), calcareous.
20.73	22.25	152	62	Till	Grey, massive, unoxidized, clayey, plastic, igneous, quartzite, limestone, shale clasts, strongly calcareous.
			68	Clay/Silt	Grey, interbedded, saturated, slightly calcareous.
			22	Till	Grey, massive, silty clay, plastic and stiff, unoxidized, numerous pebbles and clasts - igneous, quartzite, sandstone, limestone, shale, strongly calcareous.
22.25	23.77	152	75	Till	SAB, abrupt contact with lower unit.
			8	Silt	Olive grey, massive, saturated.
			42	Clay	Grey, silty, massive, slightly calcareous.
			27	Clay	Grey, very dense, stiff and plastic, contorted laminae and bedding, slight calcareous, pebble free.
23.77	25.30	153	125	Clay	Silty, grey, weakly calcareous, deformed 20^0 to bedding.
			9	Sand	Very fine grained, grey silty, laminae 20^0 to bedding.
			19	Clay	Same clay as above, noncalcareous.

Continuation PR95-7

DRILLED DEPTH (m)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
25.30	26.82	152	23	Silt	Clayey, grey, massive, noncalcareous.
			55	Silt	Grey with 20 cm olive grey zone, massive noncalcareous.
			17	Clay	Silty, grey, subhorizontal bedding, noncalcareous.
			8	Clay	Very dark grey, massive, noncalcareous, small white specks, very stiff (ground up bedrock).
			33	Shale	Black, wavy, subhorizontal fissile, abrupt upper contact, abundant yellow sulphur along horizontal bedding and along some vertical fractures, very stiff, fractured.
			9	Shale	Dark orange brown, oxidized, horizontal bedding, gradational upper and lower contact.
			7	Shale	Black, sulphur deposits and horizontal bedding planes.
26.82	28.35	140	140	Shale	Black, SAB, highly fractured, blocky, abundant yellow sulphur deposits on fractures and block facies, noncalcareous, grey bentonite clasts, core swelled in barrel.
28.35	29.26	85	85	Shale Bentonite?	Dark grey, bentonitic, SAB, fractured, blockly, sulphur deposits in mid 30 cm, band along fractures, very waxy, minor slickensides on block facies.
29.26	30.33	80	80	Shale	Dark grey, becoming very dark grey towards base, bentonitic in top 60 cm, highly fractured, sulphur deposits along fractures in lower 20 cm.
30.33	31.39	75	75	Shale	Dark grey, no sulphur deposits, highly fractured, abundant polished & slickensided block facies, waxy, bentonitic.

Continuation PR95-7

DRILLED DEPTH (m)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
31.39	32.92	65	65	Shale	Very dark grey, bentonitic, 2 thin (2 mm) grey bentonite seams, highly fractured, blocky Note: 30 cm of ground up shale (slough) at top of core - this was discarded.
32.92	34.44	110	110	Shale	Very dary grey, massive, noncalcareous, highly fractured, slickensided fractures, broken, blocky thin (1 mm) crystals? on 1 bedding plane, near base of unit (1 cm long) bentonitic.
34.44	35.97	153	153	Shale	Very dark grey to black, subhorizontal bedding, fissile, nonbentonitic.
35.97	37.49	105	105	Shale	Very dark grey, massive, highly fractured, black soft, waxy, bentonitic, jammed in core barrel, sticky - 40 cm slough was discarded - slickensided and polished fractures.
37.49	39.01	110	110	Shale	Very dark grey, subhorizontal fissility, highly fractured, blocky, soft, silty, noncalcareous.
39.01	40.54	150	150	Shale	Very dark grey, SAB, minor black deposits - 1 cm diameter on parting plane in top 50 cm of core (carbonaceous?), minor isolated gypsum crystals (less than 1 cm clear selenite) isolated.
40.54	42.06	130	130	Shale	SAB, very dark grey, low number of bedding planes with high concentration of thick black and brown carbonaceous material at 80 cm from base of unit, highly fractured, shale is harder, silty, horizontal fissility .
42.06	43.59	140	140	Shale	SAB
					TD = 43.59 m

PROJECT: N. Alberta	DATA NO: **PR95-8**	LOGGED BY: J. Pawlowicz	DATE: 3 March/95
DRILLER: Canadian Geological Drilling	TYPE DRILL: BRAT 22	SURFACE ELEV. 585m	FROM 1:50,000 map
LOCATION: 84C	LSD 10 SEC 32 TP 85 R 19 W 5		
U.T.M. ZONE	EASTING	NORTHING	CME 5' core barrel
COMMENTS ON LOCATION: Peace River east - grazing resource.			

DRILLED DEPTH (m)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
0	1.22	55	30	Silt	Light grey brown, noncalcareous.
			10	Clay	Brown, silty, oxidized, noncalcareous.
			10	Clay	Dark grey brown, massive, noncalcareous.
			5	Clay	Dark grey brown, massive, slightly calcareous.
1.22	2.44	94	15	Clay	SAB, mottled dark grey brown and brown, slightly calcareous, deposits of fine grain gypsum crystals, oxidized.
			10	Sand	Olive, very fine grained, silty, massive, noncalcareous.
			69	Silt	Clay laminae, olive and dark brown, highly deformed contorted vertical bedding- becoming low angle at base, noncalcareous, small gypsum crystal deposits.
2.44	3.96	115	30	Clay	Silty, olive brown, mottled, oxidized, massive.
			12	Silt	Olive brown, oxidized, massive.
			38	Clay	Silty, mottled olive brown and brown, oxidized, contorted, silt/clay laminae, slightly calcareous, minor small pebbles.
			35	Clay	Silty, dark brown, massive, uniform, plastic, dense, numerous small pebbles - igneous, quartzite, coal, slightly calcareous.
3.96	5.49	58	58	Clay (Till?)	Silty clay till, dark grey brown, slightly oxidized, massive abundant small gypsum crystals in matrix, banded brown and dark brown - horizontal, pebbles and clasts igneous, quartzite sandstone slight calcareous.

Continuation PR95-8

DRILLED DEPTH (m)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
5.49	7.01	135	135	Clay (Till?)	Silty, dark grey, unoxidized, vertical iron oxidized, fractured, massive, small pebbles throughout - till like but no sand, minor gypsum crystals on horizontal planes, slightly calcareous.
7.01	8.53	150	150	Till	Silty clay, dark grey, faint banding, subhorizontal, plastic, igneous, quartzite and abundant very dark grey shale clasts, slightly calcareous, water lain till? little sand.
8.53	10.06	153	153	Till	Silty clay, SAB, dark grey, abundant shale clasts, massive, minor horizontal silty beds (.5 cm) thick, slightly calcareous, igneous, quartzite, limestone clasts.
10.06	11.58	152	152	Till	SAB, interbeds of massive and banded clay/silt, pebbles throughout of igneous, quartzite, limestone. Athabasca sandstone, abundant shale clasts (very dark grey), slightly calcareous, pyrite pebbles, black chert.
11.58	13.11	153	153	Till	SAB, faint banding, subrounded, striated shale clasts, minor tan clay on horizontal bedding plane, noncalcareous.
13.11	14.63	123	25	Sand	Fine grained, dark grey, clayey, massive.
			85	Silt	Dark grey, clayey horizontal interbeds 1 cm thick, minor pebbles, slightly calcareous.
			13	Till	Dark grey, massive, stoney, calcareous, igneous, quartzite, sandstone clasts.
14.63	16.15	90	55	Gravel	Sandy, very clayey lenses, slightly moist, calcareous, massive igneous, quartzite, sandstone, ironstone (rusty) clasts and pebbles up to 3 cm diameter.
			35	Clay/Silt	Dark grey, interbedded (1 cm beds), minor pebbles and clasts as above, slightly calcareous, core loss- rock in shoe.

Continuation PR95-8

DRILLED DEPTH (m)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
16.15	17.68	0			Core loss- rock in shoe.
17.68	17.98	0			Drilled with plug.
17.98	19.20	30	30	Clay/Silt	SAB, disturbed sample from drilling, quartzite pebbles.
19.20	19.51	0			Drilled out stone.
19.51	20.73	140	55 90	Silt Clay	Clayey, horizontal parting, pebbles, dark grey. Silt, very dark grey, faint horizontal bedding, small pebbles, igneous, quartzite, few pebbles in lower 50 cm, slightly calcareous.
20.73	21.64	90	90	Clay (Till?)	SAB, silty interbeds, very dense at base, auger refusal, stones at base, slightly calcareous, abundant shale clasts.
21.64	22.25	0			Drilled out, hard drilling.
22.25	23.77	152	152	Clay (Till?)	Silty, dark grey, faint very dark grey horizontal bedding minor pebbles, very stiff, silty bedding - light grey at 50 cm from base, slightly calcareous.
23.77	25.30	145	145	Silt	SAB, dark grey, faint very dark grey horizontal bedding, slightly calcareous, clayey, stiff, quartzite and igneous pebbles. - till like appearance
25.30	26.82	117	117	Silt	SAB, dark grey, massive, minor small quartzite pebbles, shale clasts, clayey, stiff, slightly calcareous.
26.82	28.35	145	145	Silt	SAB, clayey, dark grey, faint 10^0 bedding, quartzite and igneous pebbles - minor, shale clasts, ironstone pebbles (4 cm).
28.35	29.87	142	142	Silt	SAB, clayey, dark grey, igneous pebbles (3 cm), pyrite pebbles with fine grain texture.
29.87	31.39	0			No core- rock in shoe
31.39	32.92	0			Drilled out with plug.

Continuation PR95-8

DRILLED DEPTH (m)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
32.92	34.44	145	145	Silt	SAB, clayey, dark grey silt with horizontal, very dark grey clay interbeds, silt beds 2 cm, clay beds .5 cm, pebbles through out, abundant shale clasts, moderately calcareous, very dense and stiff.
34.44	35.97	145	110	Silt	SAB, pebbly, faint horizontal bedding, clayey, moderately calcareous.
			35	Silt/Clay	Subhorizontal interbeds, prominent bedding, very few pebbles, silt beds are dark grey and 2-3 cm thick, clay beds are very dark grey and .5 cm thick, moderately calcareous, very fine grained sand bed 4 cm thick at top of unit.
35.97	37.49	130	90	Sand/Silt	Highly contorted interbeds, high angles, very fine grained sand/silt, grey and dark grey, moisture in this interval, noncalcareous, few small quartzite pebbles, soft sedimentary deformation.
			30	Silt/Clay	SAB, horizontal interbeds, moderately calcareous, few pebbles.
			10	Sand	Very fine grained, dark grey, clayey and silty.
37.49	39.01	80	57	Sand	Very fine grained, SAB, dark grey, silt and clay contorted interbeds, minor pebbles, noncalcareous.
			10	Silt/Clay	SAB, horizontal interbeds, igneous and quartzite pebbles, slightly calcareous.
			3	Sand	Medium grained - to very coarse grained, very dark grey, clayey, horizontal bedding, moderately calcareous.
			10	Silt	Clayey, SAB, slightly calcareous.

Continuation PR95-8

DRILLED DEPTH (m)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
39.01	40.54	153	10	Silt	Clayey, SAB.
			3	Sand	Medium grained - to coarse grained, very dark grey, saturated.
			20	Silt	Clayey, SAB, dark grey, slightly calcareous, saturated.
			3	Silt	SAB, pebble rich bedrock, quartzite, igneous, ironstone, saturated.
			97	Silt	SAB, very fine grained, sandy, few pebbles, igneous, quartzite, slightly calcareous, saturated.
			20	Clay	Silty, dark grey, slightly calcareous.
40.54	42.06	126	46	Silt	Clayey, dark grey, noncalcareous.
			72	Clay/Silt	Horizontal Interbeds, slightly calcareous, minor pebbles, shale clasts.
			8	Sand	Medium grained, very dark grey, clayey, horizontal bedding.
42.06	43.59	97	28	Silt	Clayey, dark grey, minor pebbles
			42	Sand	Medium grained, dark grey, saturated, minor igneous, quartzite pebbles to 2 cm loose, gradational upper and lower contacts, slightly calcareous.
			27	Silt/Clay	Interbeds, dark grey, rhythmic horizontal bedding, minor igneous, quartzite pebbles, shale clasts, slightly calcareous.
43.59	45.11	140	140	Silt/Clay	SAB, moderately calcareous.
					TD = 45.11 m

PROJECT: N. Alberta	DATA NO: PR95-9	LOGGED BY: J. Pawlowicz	DATE: 5 March/95
DRILLER: Canadian Geological Drilling	TYPE DRILL: BRAT 22	SURFACE ELEV. 590 m	FROM 1:50,000 map
LOCATION: 84C	LSD 15 SEC 27 TP 86 R 18 W 5		
U.T.M. ZONE	EASTING	NORTHING	CME 5' core barrel
COMMENTS ON LOCATION: Peace River - east Cadotte compression station- 2 km north of Highway 686			

DRILLED DEPTH (feet)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
0	.61				Drilled down, no core.
.61	1.22	60	15	Fill	Brown - gravelly clay.
			12	Silt	Light grey brown, massive, noncalcareous.
			33	Clay	Silty, massive, oxidized, brown yellow, white, calcareous deposits.
1.22	2.44	153	153	Clay/Silt	Silty, brown, oxidized, massive, calcareous, abundant calcite & gypsum deposits, fine grained texture, calcite deposits are yellow white, minor pebbles - quartzite, limestone.
2.44	3.96	97	40	Clay/Till	Mottled, olive and dark brown, oxidized, massive, numerous pebbles, shale, quartzite, igneous, ironstone, limestone, sandstone, siltstone, calcareous, 2 cm black chert pebble.
			57	Clay/Till	Dark brown, minor olive mottling, same pebbles as above, calcareous, 2 fractures 10^0 & 15^0 filled with white calcite precipitate.
3.96	5.49	20	20	Clay/Till	SAB - poor recovery.
5.49	7.01	0			Core loss - drilled out rock and stones.
7.01	8.53	128	58	Clay/Silt	Dark grey, unoxidized, massive, very few small pebbles, coarsening up from clay to silt, strongly calcareous.
			70	Clay/Silt	SAB, few pebbles, faint subhorizontal bedding, coarsening up, strongly calcareous, sharp contact with unit above.
8.53	10.06	60	50	Clay/Silt	Dark grey, subhorizontal interbeds, rhythmic, no clasts, strongly calcareous.
			10	Till	Dark grey, clayey, strongly calcareous, massive, numerous pebbles - igneous, quartzite.
10.06	11.58	147	147	Till	SAB, stoney - igneous, quartzite, sandstone, siltstone, shale, clasts, silty clay, strongly calcareous.

Continuation PR95-9

DRILLED DEPTH (m)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
11.58	13.11	80	80	Till	SAB
13.11	14.63	30	30	Clay	Till?, pebbley clay, dark grey, slightly calcareous, doesn't look like good till, massive, stone in core shoe.
14.63	16.15	0			Core loss- drilled out rock.
16.15	17.68	118	118	Till	Dark grey, massive, clayey, plastic, very stiff, moderately calcareous, clasts- igneous, quartzite, shale.
17.68	19.20	145	145	Till	SAB, massive, silty clay, limestone clasts, moderately calcareous, very dense.
19.20	20.73	130	130	Till	SAB, very clayey, strongly calcareous, dark grey, massive igneous, quartzite, limestone, shale clasts.
20.73	22.25	130	130	Till	SAB, strongly calcareous, very stiff.
22.25	23.77	152	152	Till	SAB, silty clay, dark grey, very stiff, plastic, massive, pebbley clasts- igneous, quartzite, shale, sandstone, limestone.
23.77	25.30	153	153	Till	SAB, till from 53 to 83 m, has small pebbles, less than 1 cm, no large stones intersected by drilling, strongly calcareous.
25.30	26.82	146	20 126	Till Till?	SAB, clayey silt, massive. SAB, faint rhythmic bedding 0.5 thick, dark grey and very dark grey, pebbley, igneous, quartzite, limestone clasts, water lain diamicton/?, strongly calcareous.
26.82	28.35	153	153	Till	SAB, massive, strongly calcareous, higher percent of pebbles and clasts - same lithologies.
28.35	29.87	152	152	Till	SAB, massive, stiff, at 50 cm from base is 2 cm wide horizon containing numerous small light greenish grey bentonite clasts, shale clasts.
29.87	31.39	110	110	Till	SAB, very stiff, hard drilling, strongly calcareous, limestone clasts and same clast lithologies as above.
31.39	32.92	150	150	Till	SAB, strongly calcareous, in lower 1 m.
					TD = 32.92m

PROJECT: N. Alberta	DATA NO: **PR95-11**	LOGGED BY: J. Pawlowicz	DATE: 9 March/95
DRILLER: Canadian Geological Drilling	TYPE DRILL: BRAT 22	SURFACE ELEV. 587m	FROM 1:50,000 map
LOCATION: 84B	LSD 2 SEC 15 TP 86 R 12 W 5		
U.T.M. ZONE	EASTING	NORTHING	CME 5' core barrel
COMMENTS ON LOCATION: Red Earth - 40 km west on Highway 686, borough pit north side of road.			

DRILLED DEPTH (m)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
0	.91	0			Drilled down through frost, no core.
.91	2.44	153	153	Till	Olive brown, sandy clay, oxidized, strongly calcareous, massive, minor white blebs, calcareous deposits, minor orange iron oxide fractures, blocky structure, igneous, quartzite, ironstone clasts, rotten granite.
2.44	3.96	100	85	Till	SAB, limestone clasts, strongly oxidized vertical fractures.
			15	Sand	Medium grained to coarse grained, brown, oxidized, sharp horizontal upper contact.
3.96	5.49	60	30	Sand	Medium grain, SAB, loose.
			20	Sand	Fine grained, clayey and silty, brown, oxidized, strongly calcareous.
			10	Sand	Coarse grained, brown, oxidized, strongly calcareous, igneous, quartzite pebbles.
5.49	7.01	60	60	Sand	Very coarse grained, brown, strongly oxidized, massive, calcareous pebbles, quartzite, igneous, black chert, wet, saturated.
7.01	8.53	95	82	Sand	SAB.
			4	Sand	Fine grained, horizontal silt laminae, brown, strongly oxidized.
			9	Sand	Very fine grained, grey, unoxidized, horizontal dark grey silt laminae, strongly calcareous.
8.53	10.06	130	80	Sand	Coarse grained to very coarse grained, brown grey, unoxidized, igneous, quartzite, chert grains, wet loose.
			30	Sand	Fine grained, brown grey, unoxidized, wet, loose.
			20	Clay/Silt	Grey and dark grey, horizontal laminae, strongly calcareous, unoxidized.

Continuation PR95-11

DRILLED DEPTH (m)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
10.06	11.58	152	140	Sand	Fine grained to coarse grained, grey, oxidized, loose wet, massive minors to 3 cm, quartzite, igneous.
			12	Till	Dark grey, massive, sandy, silty clay, unoxidized, quartzite, igneous clasts, strongly calcareous.
11.58	13.11	153	52	Till	SAB, strongly calcareous, sandy clay.
			41	Clay	Dark grey, stiff, plastic, calcareous, minor pebbles - igneous, quartzite and coal, silty.
			60	Till	SAB, dirty sand lenses and bands 10 cm thick, limestone.
13.11	14.63	100	100	Till	SAB, sandy clay, coal, limestone, quartzite, igneous, black chert clasts, strongly calcareous.
14.63	16.15	0		Sand	Lost core- likely loose wet sand.
16.15	17.68	100	100	Sand	Grey, medium grained to coarse grained, interbeds, loose, wet.
17.68	19.20	120	22	Clay	Dark grey, massive, strongly calcareous, unoxidized.
			5	Gravel	Igneous, quartzite, Athabasca sandstone.
			26	Clay	Dark grey, massive, strongly calcareous, unoxidized, silty towards base.
			5	Limestone	Boulder, grey.
			6	Sand	Fine grained, dark olive grey, massive, slight oxidation?
			20	Till	Silty clay, banded dark grey and dark olive grey, strongly calcareous, gypsum crystals, igneous, chert, quartzite clasts, yellowish white sugar - texture deposits - noncalcareous. Looks like buried weathered bedrock.
			36	Till	SAB, slightly calcareous, very dense, stiff, oxidized horizontal bands.

Continuation PR95-11

DRILLED DEPTH (m)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
19.20	19.81	0			No core - auger refusal, hard boulder at 19.81m - Athabasca sandstone? unable to break through boulder. Abandoned hole at 19.81m Moved rig over 3m to continue in new hole. See litholog PR95-11A.

PROJECT: N. Alberta	DATA NO: **PR95-11A**	LOGGED BY: J. Pawlowicz	DATE: 9 March/95
DRILLER: Canadian Geological Drilling	TYPE DRILL: BRAT 22	SURFACE ELEV. 585 m	FROM 1:50,000 map
LOCATION: 84B	LSD 2 SEC 15 TP 86 R 12 W 5		
U.T.M. ZONE	EASTING	NORTHING	CME 5' core barrel
COMMENTS ON LOCATION: Moved west of PR95-11 ~ 3m			

DRILLED DEPTH (m)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
0	17.68	Auger down to core point at 17.68m			
17.68	19.20	105	40	Sand	Brown grey, fine grained to medium grained, slightly oxidized, wet, loose.
			9	Till	Brown, oxidized, sandy clay, strongly oxidized, igneous, quartzite, coal, ironstone clasts, sharp upper and lower contact.
			10	Clay	Silty, grey, massive, stiff and plastic, unoxidized.
			11	Sand/Gravel	Grey unoxidized, igneous, quartzite pebbles.
			14	Clay/Silt	Horizontal bedding, grey unoxidized.
			21	Sand	Grey, unoxidized, fine grained, massive.
19.20	20.73	153	27	Till	Dark grey, massive, clayey, silty, igneous, quartzite, ironstone pebbles, unoxidized, gypsum crystals, olive mottling - oxidation? SAB, minor white calcareous deposits.
			56	Till	SAB, dark grey, unoxidized, limestone clasts, moderately calcareous.
			43	Till	SAB, dark grey with horizontal olive bands - oxidation? abundant gypsum crystals on fractured zone.
			27	Till	SAB, unoxidized, dark grey, moderately calcareous20.73
20.73	22.25	152	60	Till	SAB, dark grey, unoxidized with olive brown oxidized zones, moderately calcareous, shale clasts, massive.
			92	Till	SAB, dark grey, unoxidized, strongly calcareous, massive, on their sand lense.

Continuation PR95-11A

DRILLED DEPTH (m)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
22.25	23.77	115	48	Till	Dark grey, unoxidized, massive, silty clay, moderately calcareous, igneous, quartzite, shale clasts, minor soft white calcareous deposits.
			4	Clay	Very dark grey, massive, slightly calcareous.
					SAB, strong calcareous.
			20	Till	
			43	Till	Very dark grey, horizontal banding, silty clay, unoxidized 2 mm horizontal sand lense, strongly calcareous, minor pebbles.
23.77	25.30	153	90	Till	Dark grey, SAB, massive, silty clay - looks like pebbly lacustrine silty clay.
			63	Till	Sandy silty clay, dark grey, faint horizontal banding, sand lenses, moderately calcareous, igneous, quartzite, shale clasts.
25.30	26.82	152	52	Till	SAB, silty clay, pebbles, massive, moderately calcareous, dark grey, unoxidized.
			100	Till	Sandy silty clay, massive, dark grey, unoxidized, strongly calcareous, igneous, quartzite, shale pebbles.
26.82	28.35	153	153	Till	SAB, massive till, moderately calcareous, Athabasca sandstone clasts.
28.35	29.87	152	152	Till	SAB, massive, strongly calcareous, sandy, silty clay.
29.87	31.39	153	153	Till	SAB
31.39	32.92	153	153	Till	SAB
					TD = 32.92 m