AUGER CORE LITHOLOGS FROM THE WABASCA / RED EARTH AREA, NORTH-CENTRAL ALBERTA

Alberta Geological Survey Open File Report 1998-3

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TABLE OF CONTENTS

SUMMARY

This report contains the lithologs from an auger core drilling program carried out during September, 1997 in the Red Earth region of north-central Alberta. The purpose of drilling was to collect shallow subsurface information to help in the understanding of the surficial geology and drift stratigraphy. This investigation was initiated to provide geologic information to the members of the mineral industry exploring for diamonds in the region.

The drill program consisted of five holes drilled to a maximum depth of 46 m. The core was lithologged in the field, boxed, and then transported to Edmonton for further inspection and sampling. The drilling incorporated a CME five foot (1.52m) split core barrel for continuous coring from surface using a Bratt 22 auger rig. The core diameter is three inches (76mm).

Subsequently, samples were taken from approximately one metre intervals from each core and submitted for geochemical analysis. Texture and matrix carbonate content analyses were also carried out on these samples. Additional larger bulk samples, over approximately a five metre core interval were transfered to a five gallon pail and submitted for diamond indicator analysis. Laboratory results of these analyses will be available in another subsequent report.

ACKNOWLEDGEMENTS

The authors wish to thank Brenda Simmonds for typing of the lithologs from field notes and Jessica Meeks for her help in editing, figure production and formatting of this report. Gordon Jean helped organize and implement the auger drilling program. Canadian Geological Drilling Ltd. did the drilling.

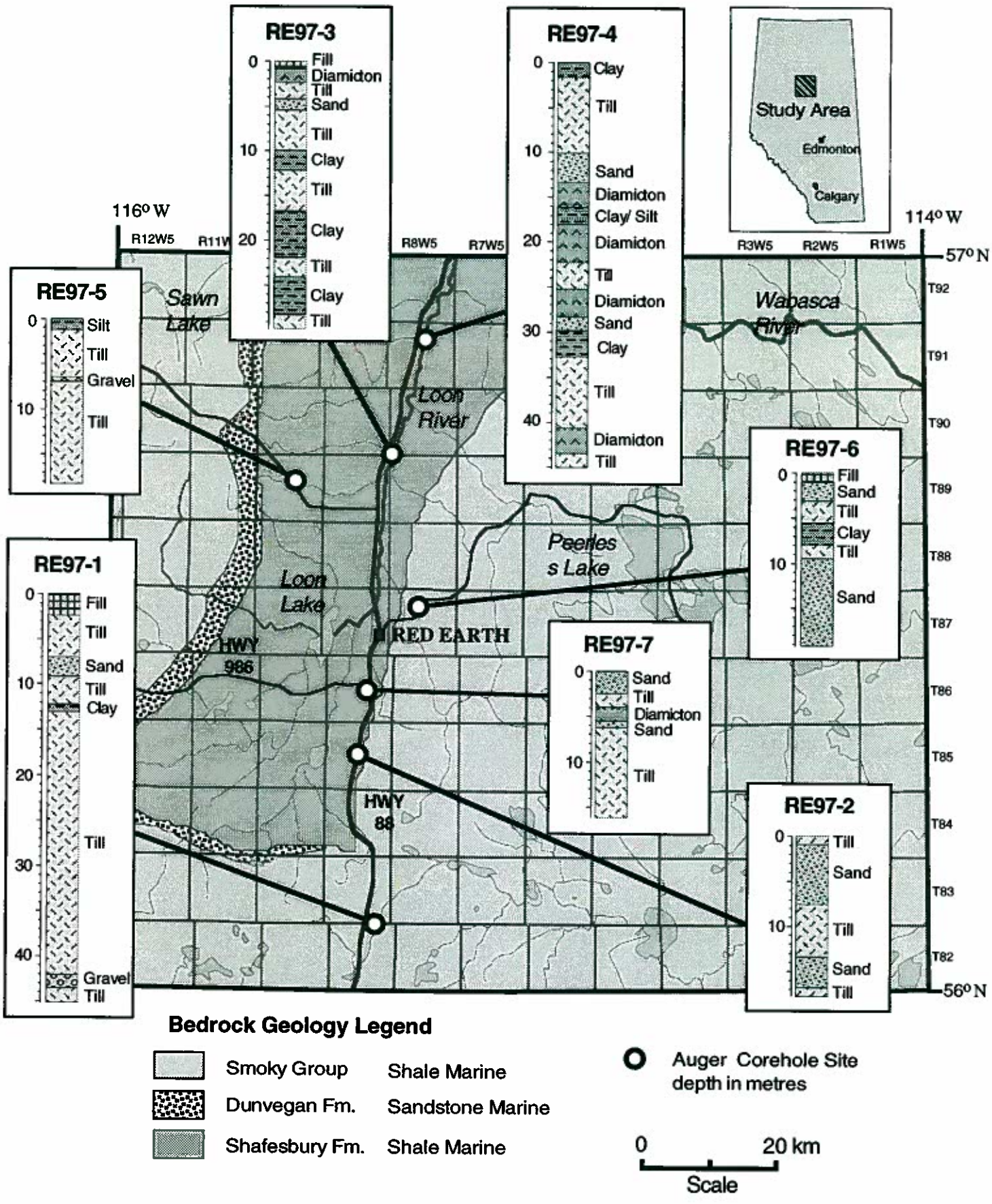

Figure 1. Location map showing auger core lithologs in the Red Earth area, north-central Alberta. (bedrock geology from Green, 1972).

Table 1. Location of auger core holes.

HOLE #	APPROXIMATE LOCATION (DLS)	LONGITUDE (GPS)	LATITUDE (GPS)	APPROXIMATE ELEVATION (m)	DEPTH OF HOLE (m)
RE97-1	6-2-83-9 W5	115.307217	56.163817	649	45.1
RE97-2	7-21-85-9 W5	115.352967	56.382667	562	17.7
RE97-3	8-1-90-9 W5	115.283778	56.775556	502	29.9
RE97-4	12-27-91-8 W5	115.203283	56.926133	478	46.6
RE97-5	13-22-89-10 W5	115.508017	56.738700	541	16.2
RE97-5A	13-22-89-10 W5	115.508017	56.738700	541	18.3
RE97-6	11-28-87-8 W5	115.213133	56.576333	560	19.2
RE97-7	3-22-86-9 W5	115.333817	56.467033	545	16.2

LITHOLOGIC DESCRIPTIONS OF CORE FROM BOREHOLES

RE97-1
RE97-2
RE97-3
RE97-4
RE97-5
RE97-5A
RE97-6
RE97-7

PROJECT: Red Earth/ Wabasca	DATA NO: RE97-1	LOGGED BY: J. Pawlowicz L. Andriashek	DATE: 18 Sept 97
DRILLER: Canadian Geological, K. Pearson	TYPE DRILL: Bratt 22, CME 5' auger core barrel	SURFACE ELEV. 649m	FROM: 1:250 000 map
LOCATION: map	LSD 06 SEC 02 TP 83 R 09 W 5		
LOCATION: GPS	LONGITUDE: 115° 18.433'	LATITUDE: 56° 09.829'	
COMMENTS ON LOCATION: Hwy 88, 44km south of Red Earth, transportation gravel stockpile pad on west side of road			

DRILLED DEPTH (meters)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
0	1.22	0		fill	drilled down, gravel and asphalt
1.22	2.44	45	40	fill	SAB
			5	till	silty clay till, dark olive grey, no HCl reaction
2.44	3.96	98	36	till	SAB, few pebbles, quartzite, grey
			42	till	SAB, white calcareous deposits, top of C soil horizon, grey
			22	till	SAB, mottled olive brown and olive grey, oxidized zones, minor pebbles, quartzite, sandstone, slightly calcareous
3.96	5.49	152	152	till	silty, sandy, clay till, mottled dark olive brown with minor dark grey, oxidized, slight calcareous. Stiff massive, thin sand lenses (< 1 cm) at 60 cm and 120 cm from top, lower sand lense is strongly Fe oxidized, minor Mn oxidized. Clasts-quartzite,rotten igneous, minor limestone, Fe stone. till is stony
5.49	7.01	152	20	till	SAB, mottled oxidized and unoxidized. transition to unoxidized.
			127	till	dark grey, unoxidized, silty clay till, massive plastic, stiff, stoney, numerous white limestone clasts, quartzite, granite, Fe blebs, slightly calcareous, sandstone clasts
			5	till	sandy clay, brown, strongly oxidized
7.01	8.53	100	30	sand	fine grain, brown, oxidized, loose, wet, massive
			40	silt	clayey, brown, oxidized, wavy, fine sand, 1 cm bedding
			20	sand	fine grained sand, pebbly,brown, strongly oxidized
			10	sand	coarse sand, granules, black chert, quartzite, igneous. loose, wet, massive, brown, strongly oxidized
8.53	10.06	90	30	sand	SAB, coarse sand

* SAB - Same As Before

Continuation RE 97-1

DRILLED DEPTH (meters)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
			40	gravel	fine gravel
			20	till	stiff, silty clay till, dark grey, pebbles, unoxidized, with horizontal non silt lenses - 1-2 cm thick, 6-8 cm spacing, silt is olive brown-oxidized clasts - limestone, igneous, quartzite
10.06	11.58	150	15	sand	poorly sorted massive silty sand, oxidized olive brown, pebbles
			5	till	oxidized olive brown, very clayey, few stones, little sand, clay till
			10	silt	massive, clayey, unoxidized dark grey
			108	till	oxidized olive brown,very clay rich, some calcareous zones (streaks), reaction med-strong HCl; very little sand, some granite pebbles, mottled at base
			20	till	unoxidized, very dark grey, silty-clay till; mottled olive streaks
11.58	13.11	162	35	till	clayey, mottled, oxidized and unoxidized, olive brown and dark grey, Fe stain, stony lense?
			30	till	olive brown, clayey, oxidized, abundant Fe oxidized nodules, non calcareous, massive, 1cm of sandy clay at lower contact
			30	clay	olive, brown , oxidized, massive, silty , abundant Fe oxide blebs, abundant grey clay clasts, massive lacustrine, some debris flow, non calcareous
			40	clay	SAB, weakly bedded - dark grey clay at 30 cm, Fe nodules, horizontal calcite lense/parting 2mm thick, bottom 5 cm is till (diamicton) with clay clast and Fe nodule, some sand
			25	clay	horizontal beds of clay and silt, interbedded dark grey and dark brown, non calcareous - till in this interval likely waterlain
13.11	14.63	162	112	diamicton	mixed clay and diamicton, high angle oxidized silt lenses, high angle strong Fe stain fractures, minor quartzite pebbles, numerous dark grey clay clasts (shale?) and Fe oxide nodules - water lain, debris flow sediment, non calcareous
			50	till	dark grey with olive grey zones, Fe oxided fractures, silty clay, plastic, stiff, dense, massive, non calcareous, quartzite, igneous clasts, Fe oxide blebs, dark grey clay (shale?) clasts

DRILLED DEPTH (meters)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
14.63	16.15	80	60	till	SAB, clay rich, dark grey, massive, Fe oxidized fractures and blebs, clasts- abundant dark grey shale, few Fe stone, quartzite, igneous, non calcareous
			20	till	drier, fissile clay rich, subhorizontal Fe oxide staining on subhorizontal and vertical fractures, cracks into shards, shale like, abundant shale pebbles, sand in matrix
16.15	17.68	20	20	till	dark grey, silty clay, plastic, stiff, unoxidized with Fe oxidized fractures and blebs, core loss due to rock in shoe
17.68	19.20	0		till	SAB, rock in shoe, till fragments in barrel
19.20	20.72	0			no recovery - drilled rock out of hole
20.72	22.25	50	50	till	dark grey, unoxidized, silty clay, stiff, plastic, minor pebbles, quartzite-rounded, abundant and dark grey shale clasts - < 2 mm, non calcareous, minor calcareous grains - likely limestone clasts Note: - poor recovery due to pushing stone in shoe - most notable change is no oxidation
22.25	22.55	0			drilled out rock with plug
22.55	23.77	0			stiffer drilling - pushing stone
23.77	25.30	100	100	till	SAB, dark grey unoxidized, silty clay, very plastic
25.30	25.91	50	50	till	SAB, rock in shoe - recovered, igneous 6 cm stone
25.91	28.34	155	155	till	SAB, dark grey silty clay, unoxidized, numerous shale clasts - dark grey, igneous, quartz pebbles and sand grains, massive non calcareous, minor calcareous grains, stiff plastic till
28.34	29.87	155	60	till	SAB
			95	till	SAB, but stonier, abundant shale clasts black chert, limestone, quartzite, igneous pebbles to 3 cm, non calcareous, massive, dark grey, silty clay, stiff and plastic, pyrite nodules <2mm
29.87	31.39	155	155	till	SAB
31.39	32.92	155	155	till	SAB, stony, mostly rounded quartzites, abundant shale clasts
32.92	34.44	144	144	till	SAB, dark grey, silty clay, unoxidized, massive stony, abundant shale clasts, igneous, quartzite pebbles, minor oxidized sandstone and siltstone clasts < 3mm, non calcareous, minor calcareous grains - limestone, pyritized concretion - soft - 1 cm diameter, a few more granules than previous

Continuation RE 97-1

DRILLED DEPTH (meters)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
34.44	35.96	125	125	till	SAB, uniform, stiff, plastic, minor limestone and oxidized siltstone/sandstone clasts <2mm, non calcareous
35.96	37.49	155	155	till	SAB, abundant dark grey shale clasts < 5mm, minor oxidized siltstone/sandstone clasts - <2mm
37.49	39.01	155	155	till	SAB, dark grey, silty clay, unoxidized, non calcareous, stiff, plastic, stony, abundant dark grey shale clasts, quartzite, igneous, minor limestone, few oxidized siltstone/sandstone clasts. Note: - rounded quartzite clasts than granites - no pyrite visible
39.01	40.54	155	155	till	SAB, dark grey, silty clay, fewer shale clasts than above, minor oxidized sandstone/siltstone clasts < 2mm
40.54	42.06	155	155	till	SAB, dark grey, silty clay, numerous shale clasts, pyrite concretion - 8mm - bright brass color, end of day
42.06	43.58	0	139-144	sand & gravel	first run of new day - water sitting in open hole may have caused core loss - water at about 5 m depth
43.58	45.11	0	144-148	till	no recovery - drilled like sand and gravel from 139 ft. to 148 ft. (42.4- 45.1m) - dark grey, silty clay
					- end of hole 148 ft. (45.1m) -samples taken from auger flight 1) sand and gravel 139'-144' (42.4- 43.9m) 2) till (2 bags) 144'-148' (43.9- 45.1m)

PROJECT: Red Earth/ Wabasca	DATA NO: RE97-2	LOGGED BY: J. Pawlowicz M. Fenton	DATE: 20 Sept 97
DRILLER: Canadian Geological, K. Pearson	TYPE DRILL: Bratt 22, CME 5' Auger Core barrel	SURFACE ELEV. 562m	FROM 1: 250 000map
LOCATION: map	LSD 07 SEC 021 TP 85 R 09 W 5		
LOCATION: GPS	LONGITUDE: 115° 21.178'	LATITUDE: 56° 22.960'	
COMMENTS ON LOCATION: Hwy 88, 20km south of Red Earth, transportation gravel pit - west side			

DRILLED DEPTH (meters)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
0	.91	90	50	fill	gravel - density, mixed sand, clay gravel
			5	gravel	topsoil, black, Ao
			5	sand	silty, Ae, brown, stony
			15	sand	clayey, B horizon, stony
			2	silt	white, strong calcareous, top of C horizon
			2	silt	clayey, stony, calcareous, Fe oxidized
.91	2.44	78	45	sand	fine- medium grained, brown oxidized, strong calcareous, white calcareous interbeds in top 15 cm, thin brown clayey lamina from 20-25cm, loose
			15	sand	very fine grained, minor clay, massive, brown oxidized, strongly calcareous, cohesive
			18	sand	medium- coarse grained, strong calcareous, loose, igneous, quartzite, chert grains, pinkish brown
2.44	3.96	82	12	sand	very fine grained, brown, oxidized, massive, strong calcareous
			70	sand	fine- medium grain, loose, brown, oxidized, strongly calcareous, 3 thin (< 3cm) diamicton beds, pebbles in diamicton beds, stony drilling at 10 ft (3.0m)
3.96	4.42	40	15	sand	medium grain, loose, wet, brown oxidized
			25	diamicton	dark brown, very stony, mixed with sand, strongly calcareous, looks like fill, oxidized
4.42	5.48	0		sand	augered down with plug - likely sand and gravel
5.48	7.01	0		sand	augered down, sand and gravel layer at 22 ft.
7.01	7.62			sand	augered - SAB
7.62	8.68	0		till ?	augered - easier drilling, likely till
8.68	10.05	140	140	till	dark grey, silty clay till, unoxidized, strong calcareous, abundant granules, no shale clasts, igneous, quartzite, limestone clasts, moderately stony, black chert, massive, stiff and plastic

* SAB - Same As Before

Continuation RE97-2

DRILLED DEPTH (meters)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
10.05	11.58	150	70	till	clay till, higher clay content, few stones, strong calcareous, dark grey unoxidized
			80	till	SAB, silty clay but sandier and more pebbles and granules, dark grey, unoxidized, very strong calcareous, stiff
11.58	12.80	130	130	till	SAB, stony, core refusal because of boulder at 42' (12.8m), no shale clasts observed, strong calcareous, stones to 5 cm, igneous, quartzite
12.80	13.41	0			augering down through stone
13.41	14.63	55	35	sand	fine- medium grain, grey, loose, wet, one stone -mafic
			8	mixed	sand and diamicton, dark grey
			22	sand	very fine grained, grey, loose, wet
14.63	16.76	0		sand	SAB, - drilled down
16.76	17.68	0		till?	stiff drilling - no recovery, likely till
					T.D. 58', 17.68m - stopped drilling because of poor hole conditions

PROJECT: Red Earth/ Wabasca	DATA NO: RE97-3	LOGGED BY: J. Pawlowicz M. Fenton	DATE: 21 Sept 97
DRILLER: Canadian Geological, K. Pearson	TYPE DRILL: Bratt 22, CME 5' Auger core barrel	SURFACE ELEV. 503m	FROM 1: 250 000 map
LOCATION: map	LSD 08 SEC 01 TP 90 R 09 W 5		
LOCATION: GPS	LONGITUDE: 115° 17.016'	LATITUDE: 56° 46.320'	
COMMENTS ON LOCATION: New site near site 10 , 24 km north of Red Earth on HWY 88			

DRILLED DEPTH (meters)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
0	.91	92	15	fill	gravel road base, brown
			30	fill	clay, brown
			12	topsoil	A soil horizontal Ao and Ae
			35	clay	silty, brown and olive, mottled, oxidized, massive, lacustrine?, Loon River is ≈ 2 km to the east - maybe flood plain sediments, quartzite pebbles, non calcareous
.91	2.44	152	60	diamicton	silty, clayey, sandy, minor pebbles, quartzite, igneous, mottled grey and brown, strongly calcareous, top of C horizon
			92	till	clay silt, sandy, massive, brown, oxidized, stony quartzite, igneous, sandstone clasts, Fe oxidized grains < 3 mm, small sand lenses < 1 cm thick throughout, shows some water movement, moderate calcareous
2.44	3.96	100	100	till	sandy clay, silty, brown oxidized, moderate calcareous becoming more calcareous with depth, massive, stony quartzite, igneous, limestone, oxidized sandstone, rotten igneous, well developed Fe staining on horizontal fractures
3.96	5.18	100	32	till	SAB, mottled olive grey and brown, oxidized, sandy clay silt, massive, stony, sharp lower contact
			15	sand	fine grain, loose, wet, olive grey, few stones
			15	sand	very coarse grain, gravelly < 2 cm pebbles, glacial, oxidized brown, quartzite, igneous
			38	sand	very fine grain with horizontal silt laminae, grey unoxidized, moderate calcareous, clean sand, sharp upper contact, black chert pebble near base
5.18	6.70	40	25	sand	SAB, grey, very fine grain
			15	till	dark grey, unoxidized, moderate calcareous, clayey silt till, stony, igneous, quartzite pebbles, small 1 cm very fine grain horizontal sand lenses, pushing on boulder at 19 ft (5.8m)
6.70	7.01	0			drilling on boulder, T.D. at 23 ft (7m)- stopped on large boulder. move rig over to new hole 5ft (1.5m) away

Continuation RE97-3

DRILLED DEPTH (meters)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
7.01	8.53	155	155	till	dark grey, SAB, silty clay, unoxidized, not much sand, noticable granules and pebbles, igneous, quartzite, black chert, moderate calcareous, massive, grey silt lenses 2cm thick at 60cm from top, 5cm thick at 80cm from top, stiff and plastic Note: this till looks like lower till in RE97-2, few pink sediment blebs < 3mm diameter
8.53	10.05	155	142	till	SAB, dark grey, unoxidized, silty clay, moderate strong calcareous, no pink sediment, 4cm clay bed near top of interval
			13	clay	dark grey, massive, abrupt upper contact, slight calcareous, very stiff and plastic, no grains or pebbles
10.05	11.58	162	162	clay	SAB, dark grey, massive, very stiff and plastic, very few pink sediment blebs, white limestone clasts < 3mm - lacustrime
11.58	13.10	160	75	clay	SAB, drops-stone pebbles 25cm from top, in 10cm bands
			90	till	same texture as till above, dark grey unoxidized, moderately strong calcareous, abundant green- grey clasts of local bedrock - appear to be shale - but strongly calcareous - possibly Ireton shale, stony - quartzite, igneous, few oxidized blebs , few limestone clasts - this till is different from till above because of abundant green clasts
13.10	14.63	160	140	till	SAB - with 5cm thick clay layers - 2 near the top and 1 near the base - lower clay layer has high angle sharp contacts with till - due to rotation from drilling ?
			20	clay	dark grey with subhorizontal diamicton layers - 1 cm thick, diamicton has green shale clasts
14.63	16.15	155	80	clay	dark grey, massive SAB, minor pebbles near top otherwise pebble-free
			35	till	same till as above, abundant green calcareous clasts, shale, sharp upper contact with clay
			20	silt	grey, loose, moderate calcareous, minor green clasts
			20	till	diamicton?, greenish grey, abundant green calcareous shale clasts, strong calcareous
16.15	17.68	135	60	till	SAB, green grey, strongly calcareous, very strong near lower contact - mixed with lower clay unit from drilling through stones
			75	clay	dark grey, massive, stiff and plastic, non-calcareous, deformation in clay - due to drilling?

Continuation RE97-3

DRILLED DEPTH (meters)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
17.68	19.20	155	155	clay	SAB, massive, non calcareous, thin (< 5mm) diamicton layers dipping 10° in lower 20 cm
19.20	20.72	155	100	clay	SAB, dark grey, massive
			40	till	dark grey, massive, silty clay, strong calcareous, green grey shale clasts, abrupt upper and lower contacts, igneous, athabasca sandstone, quartzite pebbles
			15	clay	SAB, dark grey, massive, non calcareous, stiff plastic
20.72	22.25	155	117	clay	SAB
			38	till	dark grey, sandy silty clay, massive, strong calcareous, fewer green shale clasts, stony igneous, quartzite, athabasca sandstone, dense, stiff, no visible black shale
22.25	23.77	140	140	till	stony drilling 74-78' (22.6- 23.8m). same till as above, dark grey, strongly calcareous
23.77	25.30	158	33	till	SAB
			125	clay	dark grey, massive, non calcareous, granules and a few pebbles throughout unit
25.30	26.82	155	100	clay	SAB, 10 cm dark grey diamicton mass at top , pebbly zone 35 cm from top - includes minor pink bleb, massive, non calcareous
			40	silt	gray, faint bedding in upper 15 cm - horizontal, strong calcareous
			15	clay	dark grey, moderate calcareous, with grey strong calcareous bedded masses < 5mm orientated subhorizontal, few pebbles and granules throughout
26.82	28.34	160	45	silt	grey, massive, moderate calcareous, loose, 5 cm grey clay bed near base, abrupt lower contact
			95	clay	dark grey, non calcareous, massive, silt lense at 40cm from top, subhorizontal irregular silt laminae in bottom 25cm, minor clasts in lower 25cm, abrupt lower contact
			20	till	very dark grey, silty clay, numerous granules, pebbles, this till is different from above tills by : 1) no grey shale clasts 2) some black shale clasts present 3) non calcareous

DRILLED DEPTH (meters)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
28.34	29.87	155	155	till	very dark grey, massive, silty clay, slightly calcareous becoming non calcareous towards base of unit, abundant black shale clasts, numerous limestone grains, few igneous, athabasca sandstone clasts
					T.D. 98' (29.9m) - auger refusal on large boulder

PROJECT: Red Earth/ Wabasca	DATA NO: RE97-4	LOGGED BY: J. Pawlowicz	DATE: 22 Sept 97
DRILLER: Canadian Geological, K. Pearson	TYPE DRILL: Bratt 22, CME 5' auger core barrel	SURFACE ELEV. 478m	FROM 1: 250 000 map
LOCATION: map	LSD 12 SEC 27 TP 91 R08 W 5		
LOCATION: GPS	LONGITUDE: 115° 12.197'	LATITUDE: 56° 55.568'	
COMMENTS ON LOCATION: Hwy 88, 46km north of Red Earth, old burrow pit - access road			

DRILLED DEPTH (meters)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
0	.91	76	10	fill	clay, dark brown
			40	clay	dark brown, massive, oxidized, silty
			26	clay	sandy, oxidized, orange brown, numerous pink massives, top of C horizon - 5 cm from base, massive
.91	2.44	140	80	diamicton	mixed sand, silt, clay, pebbles throughout, dark brown, olive grey and orange brown- oxidized, strong calcareous, pink blebs and masses of clay, limestone pebbles
			27	sand	coarse grain, brown, glacial, loose wet, clean
			7	clay	sandy, brown, minor pebbles, strong calcareous
			7	sand	coarse grained, clean, loose
			6	sand	fine grained, clayey, strong calcareous
			10	sand	medium grain, clean loose - all units above oxidized
2.44	2.74	25	25	till	sandy clay, mottled dark grey with orange brown oxidation along various angle fractures, massive, few stones - igneous, quartzite, limestone
2.74	3.96	0			drilled out through stone
3.96	5. 48	105	90	till	dark grey, sand silty clay, unoxidized, stronglty calcareous, stiff, stony - igneous, quartzite Athabasca sandstone, no pink blebs, green or black shale clasts
			6	clay	dark grey, mottled with grey silt, strong calcareous
			2	diamicton	dark grey, sandy clay, granules
			3	clay	dark grey, massive, strong calcareous
			4	sand	grey, medium grain, loose, moderate calcareous

* SAB - same as before

Continuation RE97-4

DRILLED DEPTH (meters)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
5.48	7.01	130	45	sand	SAB, medium grain, loose, grey with very fine grain sand interbeds, moderate calcareous
			85	till	dark grey, sandy silty clay, unoxidized, moderate stony, granules, quartzite, igneous, Athabasca sandstone, no black and green shale clasts or pink blebs, numerous sub horizontal thin sand and silt lenses throughout unit, strong calcareous
7.01	8.53	160	160	till	SAB, sandy silty clay till, strongly calcareous, massive, stiff and plastic, 8cm dark grey clay layer at 55cm from top, pebbly and granules, no shale clasts
8.53	10.06	155	155	till	SAB, very few small black shale clasts are starting to appear < 2mm and pink blebs - 1 mm, strongly calcareous, 3mm sand lense near base of unit
10.06	10.97	70	30	sand	fine grain, grey , loose, moderately calcareous
			40	diamicton	with very fine grain sand interbeds - 10cm thick, dark grey, very strong calcareous, weathered tan limestone, minor pink blebs, no shale clasts, limestone clasts, brown
10.97	12.65	60	60	sand	fine grain, grey, loose, a few 2cm thick diamicton horizon layers throughout unit, strong calcareous, minor igneous and limestone pebbles
12.65	14.63	110	70	sand	SAB, clean, loose, few pebbles
			30	diamicton	SAB, dark grey, sandy silty clay, strongly calcareous, igneous, quartzite, limestone clasts, massive
			10	diamicton	SAB, with horizontal very fine grain sand and silt laminae
14.63	16.15	140	102	sand	fine- medium grained, clean, loose, grey
			38	diamicton	SAB, dark grey, strong calcareous, sandy silty clay, lower 5cm is pebbly clay - dark grey
16.15	17.68	145	115	silt	clayey, dark grey, massive, strong calcareous,very fine sand and clay interbeds, no pebbles
			30	clay	dark grey, faint horizontal silt laminae, strong calcareous, no pebbles
17.68	19.20	125	25	sand	fine grain, grey loose
			8	clay	sandy, grey
			92	till	dark grey, sandy silty clay, massive, stiff, moderately strong calcareous, abundant pink blebs < 3mm and streaks, limestone, quartzite, igneous clasts, no green or black shale

Continuation RE97-4

DRILLED DEPTH (meters)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
19.20	20.72	105	50	diamicton	dark grey, sandy clayey silt, massive, moderate calcareous, igneous, quartzite pebbles
			55	diamicton	very sandy, medium grain, very slight calcareous, few pebbles, faint silt laminae between 20-30 cm from top
					Note: Hcl reaction changes to weak at about 65' (19.8m)
20.72	22.25	100	95	diamicton	SAB, medium-coarse grain very sandy, minor clay, minor pebbles throughout, massive, dark grey, slight calcareous, one horizontal silt laminae near base
			5	clay	dark grey, minor pebbles, horizontal silt laminae, slight calcareous
					Note: black shale clasts at 73' (22.25)
22.25	23.77	155	95	till	dark grey, massive, slight calcareous, sandy silty clay, stiff, granules and stones, limestone, igneous, quartzite, black shale clasts
			60	sand	medium grain, dark grey, massive clean, non calcareous, upper 15cm is clayey, no pebbles
23.77	25.30	155	155	till	SAB, dark grey, sandy clay, massive, slight calcareous, numerous black shale clasts, few horizontal fine grain sand lenses < 1cm, igneous, quartzite, limestone clasts, minor pink sediment blebs
25.30	26.82	115	70	diamicton	sandy, poorly sorted, dirty, pebbly, clasts to 4cm, numerous black angular shale clasts, non calcareous,
			45	till	dark grey, silty clay, stiff and plastic, slight calcareous, numerous black shale clasts, igneous, quartzite, Athabasca sandstone clasts
26.82	28.34	30	30	diamicton	dark grey, clayey silt, massive,slight calcareous, 2 horizontal - 3cm thick very fine grain sand lenses, abundant black shale clasts, minor pebbles
28.34	29.87	45	5	cobble	grey brown dolomite - lost core due to this stone in core barrel shoe
			40	sand	grey, very fine grain, silty, moderate calcareous
29.87	31.39	115	115	silt	dark grey, fine grain and very fine grain sand inter beds, few pebbly horizons - grey brown dolomite rounded pebble, slight to moderately calcareous, clayey in bottom 30cm

DRILLED DEPTH (meters)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
31.39	32.92	155	80	silt	SAB,massive, dark grey, weak calcareous, stiff clayey, few pebbles throughout, minor pink blebs - start new day
			75	clay	silty, dark grey, weak calcareous, few pebbles, massive, pink blebs
32.92	34.44	155	90	till	dark grey, sandy clay silt till, non calcareous, massive, few stones, limestone, igneous, quartzite clasts
			65	till	SAB but clayey, minor pink blebs, no black shale clasts, very thin 2cm long horizontal silt lenses, non calcareous
					different looking till at 113' (34.4m), more pink blebs, shale, black Note: moderately calcareous.
34.44	35.96	135	135	till	silty, clay till, dark grey, stony, more pink blebs and masses to 3cm , limestone and dolomite pebbles - rounded, igneous, quartzite, weak to mod calcareous, sandy clay till in lower 80cm, drilled through large stone at 116' (35.4m), no black or green shale clasts
35.96	37.49	125	125	till	SAB, clayey silt, moderate calcareous, abundant pink sediment blebs and masses to 3cm, black shale clasts - angular, limestone, igneous, Athabasca sandstone, clasts Note: light grey silt coating on fractures - oriented vertical and horizontal
37.49	39.01	155	120	till	SAB, clay silt, abundant pink sediment which is strongly calcareous, massive , minor black shale
			35	till?	clay till, very dark grey, abundant and subhorizontal light grey silt stringers, few pebbles and granules , very weak calcareous - this till looks different from unit above, little pink sediment, mixed masses black clay and dark grey silty clay, numerous slicken-slides at different orientations
39.01	40.54	155	50	till?	SAB, clayey, slight-moderate calcareous, waterlain till?, silt structures - streaks
			105	till?	silty clay - numerous deformed horizontal silt laminae, few pebbles and granules, soft sediment deformation, slight-moderate calcareous, - pink sediment masses, faintly bedded in places - easy drilling

Continuation RE97-4

DRILLED DEPTH (meters)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
40.54	42.06	152	100	diamicton	clayey silt, lacustrine?, massive, slight calcareous, few pebbles, minor pink blebs, few black shale clasts
			52	lacustrine	silty clay, poorly bedded grey silt and very dark grey clay, waxy, few pebbles, non calcareous, few pink blebs
42.06	43.58	160	5	clay	SAB
			70	diamicton	clayey silt, massive, few pebbles and granules, minor pink sediment, minor black shale clasts
			90	diamicton	silty clay, massive, few pebbles, non-calcareous, lacustrine?, no sand
43.58	45.11	152	152	till	silty clay, massive, silty zones 80cm in middle of unit, a 20cm zone that is very sandy 70cm from top, light grey (bentonitic?) clayey silt - 5cm thick - 30cm from top, non calcareous, dark grey, few pebbles and granules, minor pink sediment, one pyrite nodule - 3mm near base, igneous, quartzite, limestone, dolomite clasts
45.11	46.63	155	155	till	SAB, clay silt, with clay rich zones about 50cm thick, some have fewer pebbles than other parts of unit, possible lacustrine clay intervals, sandy 20cm at 70cm from top, non calcareous,massive, igneous, quartzite, limestone, Athabasca sandstone clasts, no black shale, no pink sediment - does not look like base till
					T.D. 153' (46.6m) - end of hole

PROJECT: Red Earth/ Wabasca	DATA NO: RE97-5	LOGGED BY: J. Pawlowicz	DATE: 24 Sept 97
DRILLER: Canadian Geological, K. Pearson	TYPE DRILL: Bratt 22, CME 5' auger core barrel	SURFACE ELEV. 541m	FROM 1: 250 000 map
LOCATION: map	LSD 13 SEC 22 TW89 R 10 W5		
LOCATION: GPS	LONGITUDE: 115° 30.481'	LATITUDE: 56° 44.322'	
COMMENTS ON LOCATION: Renaissance Road - 14.2 km from Hwy 88, Field Site #38, NW of Red Earth			

DRILLED DEPTH (meters)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
0	.91	90	3	topsoil	black organic silt
			13	silt	light brown Ae soil horizon
			43	silt	clay, organic brown, oxidized, non calcareous, massive, very few quartzite pebbles. B soil
			31	silt	dark brown, clayey, oxidized, calcareous, massive, very few pebbles, top of C soil
.91	2.44	160	40	silt	SAB, few stones, strong oxidized silty masses, massive, strongly weathered, strong calcareous
			20	till	clayey silt, massive, oxidized, brown, strong calcareous, numerous rotten clasts, igneous, quartzite, limestone, Athabasca sandstone, Fe ozidized blebs, rotten limestone clasts
			100	till	SAB, grey silty clay, moderate calcareous
2.44	3.96	155	155	till	SAB, brown, oxidized, moderate calcareous, silty clay, abundant granules, stony, numerous rotten clasts - igneous, limestone, Athabasca sandstone, strong Fe oxidization on vertical and horizontal fractures, Fe oxidized blebs
3.96	5.48	155	35	till	SAB
			90	till	SAB, dark olive brown and dark grey mottled, silty clay, high angle 1 cm thick fracture filled with fine grain gypsum, moderate calcareous, oxidation transition zone
			30	till	SAB, silty clay, massive, dark grey, minor black shale clasts, moderate calcareous, till, hard rounded shale clasts, down to here has numerous rotten clasts
5.48	7.01	155	105	till	SAB, silty clay, unoxidized, slight calcareous, black shale clasts, sharp lower contact
			48	sand & gravel	fine gravel < 5mm size pebbles, loose, clean, wet, igneous, quartzite, limestone, subangular
			2	sand	fine grain, grey

Continuation RE97-5

DRILLED DEPTH (meters)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
7.01	8.53	155	30	till	SAB, sandy clay, dark grey, slight calcareous, stony, abundant black shale clasts, massive
			125	till	SAB, silty clay, black shale clasts, stony anuglar clasts, abundant, no rotten clasts, stiffer and denser than till above sand
8.53	10.05	155	155	till	sandy, silty clay, dark grey, unoxidized, stiff and dense, sandier with more pebbles and granules than till above, stongly calcareous, limestone lens, igneous clasts, quartzite and siltstone, minor black shale
10.05	11.58	155	155	till	SAB, very gritty, dense, stiff, Athabasca sandstone, black chert
11.58	13.10	70	70	till	SAB, core broken and lost due to granite rock in core barrel shoe
13.10	14.63	160	160	till	dark grey, silty clay, very sense and stiff, slight calcareous, massive, few granules and pebbles, abundant black shale clasts, clasts - few limestone, igneous, quartzite, few olive siltstone? clasts < 2mm
14.63	14.93	20	10	till	SAB
			10	Sand ?	black, moderate hard, no pebbles, possibly till, minor possible dark red grains, garnet?, rock has coarse grain appearance, looks like quartz grains with black clay matrix, unable to penetrate deeper with core barrel
14.93	16.15	0		Sand?	drilled down with plug - hard drilling, unable to obtain sample with A casing or 1" penetrometer, till/bedrock contact? very stony
					T.D. @ 53' (16.2m) auger refusal - moved rig over 3m to drill new hole

PROJECT: Red Earth/ Wabasca	DATA NO: RE97-5A	LOGGED BY: J. Pawlowicz	DATE: 24 Sept 97
DRILLER: Canadian Geological, K. Pearson	TYPE DRILL: Bratt 22, CME 5' auger core barrel	SURFACE ELEV. 541m	FROM 1: 250 000 map
LOCATION: map	LSD 13 SEC 22 TW89 R 10 W5		
LOCATION: GPS	LONGITUDE: 115° 30.481'	LATITUDE: 56° 44.322'	
COMMENTS ON LOCATION: moved 3m west of adjacent hole RE97-5			

DRILLED DEPTH (meters)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
0	11.58	0			- drilled down to core point at 38 ft (11.58m) - see litholog RE97-5
11.58	13.10	20	20	till	dark grey, silty clay, core sample 38-39' granite boulder at 39', strong calcareous matrix, pebbles and granules
13.10	14.63	10	10	till	stones in till causing poor recovery - same dense till, silty clay, strong calcareous
14.63	16.15	130	105	till	dark grey, clay silt, strong calcareous,massive very hard and dense, stony - igneous, quartzite, limestone, rottem Athabasca sandstone, feels sandy, very dry and hard Note: this is the depth that hard black sand was intersected in adjacent hole RE97-5
			25	till	silty clay, slight calcareous, dark grey, more clayey than above, abundant black shale clasts, igneous, quartzite, clasts, minor grey horizontal silt stringers
16.15	17.68	115	15	till	SAB
			98	till	SAB - but more silty, moderately calcareous, very hard, no shale clasts, igneous, quartzite clasts, massive
			2	sand	medium grain, grey, horizontal lense
17.68	18.29	25	25	till	SAB, clayey silt, slight to moderate calcareous, quartzite, limestone, igneous, Athabasca sandstone clasts, large stones affecting core recovery
					T.D. 60 ft (18.29 m) - auger refusal on Athabasca sandstone boulder

* SAB - Same As Before

PROJECT: Red Earth/ Wabasca	DATA NO: RE97-6	LOGGED BY: J. Pawlowicz	DATE: 25 Sept 97
DRILLER: Canadian Geological, K. Pearson	TYPE DRILL: Bratt 22, CME 5' auger core barrel	SURFACE ELEV. 561m	FROM 1: 250 000 map
LOCATION: map	LSD 11 SEC 28 TW87 R 08 W 5		
LOCATION: GPS	LONGITUDE: 115° 12.788'	LATITUDE: 56° 34.580'	
COMMENTS ON LOCATION: Peerless Lake Road, 6km east of Highway 88 old hwy burrow pit north side of road , 6km NE of Red Earth			

DRILLED DEPTH (meters)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
0	.91	95	87	fill	mixed and interbedded, clayey silt and sand and till, silty clay, massive, mottled dark brown and orange brown, oxidized, strong calcareous, stony, igneous, quartzite
			8	fill	olive grey, massive, plastic, non calcareous
0.91	2.44	140	22	fill	SAB, clay
			30	fill	fine grain sand, brown, oxidized, clayey, strong calcareous, sharp lower contact, irregular high angle upper contact, few small pebbles and granules, organic layers 1 cm thick dipping 30°
			15	clay	silty, massive, olive grey, moderate calcareous, numerous carbonaceous clasts and masses - high angle - looks like old roots - peat, white carbonate deposits
			45	sand	fine grain, brown oxidized, strong calcareous at top becomes moderate calcareous towards base, abrupt irregular upper contact, lower contact gradational into sandy till, becoming pebbly and clayey (towards base)?
			25	till	clayey sand, pebbles, brown oxidized, moderate calcareous, few white carbonate deposits, thin < 5mm silt and sand lenses - horizontal bedded
					Stony- between 4' and 10'
2.44	3.96	95	10	diamicton	olive grey, clayey, few pebbles, massive, sand deposits along high angle fractures - drilling?, moderate calcareous
			57	sand	fine - medium grain, brown, oxidized, strong calcareous, massive and broken near top, horizontal brown clay interbeds in lower half, becoming dominant clay towards base

* SAB - same as before

Continuation RE97-6

DRILLED DEPTH (meters)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
			20	clay	dark brown, moderate calcareous, horizontal thin sand interbeds < 2mm
			8	till	dark grey brown, with oxidized thin sand stringers, till is silty clay, few pebbles and granules
3.96	5.48	155	155	till	dark grey, unoxidized, massive, high angle oxidized fractures in upper 80cm, moderately strong calcareous, 10cm thick fine grain sand lense at 80cm from top, stiff and plastic, silty clay, stony, igneous, quartzite, Athabasca sandstone, limestone, black chert, one green grey shale clast in upper 10cm
5. 48	7.01	155	120	till	SAB, gradational contact with underlying clay
			35	clay	massive dark grey, few small pebbles, diamicton interbeds with upper unit, moderate strong calcareous, unoxidized
7.01	8.53	155	95	clay	dark grey, SAB, silty, a grey silt interbeds, few limestone and Athabasca sandstone pebbles to 3 cm, moderate strong calcareous
			33	diamicton	clayey silt, same texture as clay above but with pebbles and granules, gradational upper and lower contacts
			13	clay	SAB
			15	diamicton	SAB - this drill inerval is stiff and plastic
8.53	10.06	96	95	till	sandy clay, stiff, grey, unoxidized, moderate-strong calcareous, massive, few pebbles, granules
			1	sand	fine grain, grey, loose wet, core loss in sand, appears to be abrupt contact
					- jammed in hole in loose sand at 32' (9.8m)
10.06	11.58	120	116	sand	grey, fine grained, clean, massive, slight calcareous, at top - becoming strong calcareous at base, mostly quartz grains with some feldspar, very uniform grain size
			4	sand	very fine grain, darker grey, massive, strong calcareous, sharp horizontal contact with upper sand
					Note: end of hole - sluffing at 10'- abandon this hole, move rig over and drill down to this depth
11.58	14.63	0		sand	drilling down to core point below sand (with plug in Auger). drillers log - same sand as above, few small stones at 40' (12.2m)
14.63	15.24	0		sand	hard, stiff drilling
15.24	16.15	0		sand	soft easy drilling - possible silt or fine sand

Continuation RE97-6

DRILLED DEPTH (meters)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
16.15	17.68	0		sand	drilled down - soft, easy drilling
17.68	19.20	0		sand	tried to core, jammed core barrel - trip out of hole
					T.D. 63', 19.2m - end of hole - sand flowing in bottom of hole

PROJECT: Red Earth/ Wabasca	DATA NO: RE97-7	LOGGED BY: J. Pawlowicz	DATE: 25 Sept 97
DRILLER: Canadian Geological, K. Pearson	TYPE DRILL: Bratt 22, CME 5' auger core barrel	SURFACE ELEV. 545m	FROM 1: 250 000 map
LOCATION: map	LSD 03 SEC 22 TW 86 R 09 W4		
LOCATION: GPS	LONGITUDE: 115° 20.029'	LATITUDE: 56° 28.022'	
COMMENTS ON LOCATION: 12 km south of Red Earth on Hwy 88, Field Site #46			

DRILLED DEPTH (meters)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
0	0.91	0		sand	fine grain, loose, oxidized, stones and boulders drilled down to 3' (0.91m)
0.91	2.44	45	25	sand	SAB, fine grain loose, brown oxidized, non calcareous, few igneous and quartzite stones, dry
			15	till?	sandy and very stony, minor clay, strong calcareous, top of C soil, on dirty gravel, dry, brown, oxidized, massive, poorly sorted, angular clasts, sand interbeds - 2cm thick
2.44	3.96	125	50	till	clayey sandy till, massive, brown oxidized, Fe oxidized on horizontal and vertical fractures, very stony, strong calcareous
			5	diamicton	pink, horizontal banding with brown diamicton
			26	till	brown, oxidized, strong calcareous, sandy clay, minor horizontal sand beds 1cm at bottom 10 cm, gypsum xtals along fracture
			12	sand	brown, oxidized, fine grain, loose, massive, strong calcareous
			15	till	same till as above, brown, sandy clay, oxidized with strong Fe oxidized vertical fractures, stony, strong calcareous
3.96	5.48	95	45	sand & gravel	fine gravel to 1cm, oxidized brown, loose, massive, no clay, strong calcareous, igneous and quartzite clast, wet
			50	diamicton	horizontal bedding of medium-coarse grain sand, < 5mm very stony, oxidized brown and orange brown, strong calcareous, one thin 2mm black carbonaceous lamina
5.48	7.01	130	15	sand	fine grain, loose, wet, upper 5 cm is oxidized brown, lower 10cm is unoxidized grey
			65	sand	medium grain, clean at top - more clayey and pebbly towards base, unoxidized grey, strong calcareous, gradational lower contact with till

* SAB - Same As Before

Continuation RE7-7

DRILLED DEPTH (meters)		CORE RECOVERY (cm)	DESCRIBED INTERVAL (cm)	LITHOLOGY	COMMENTS
FROM	TO				
			50	till	dark grey, unoxidized, clay silt, sandy, numerous stones and granules, massive, stiff, strong calcareous, igneous, quartzite, - limestone, Athabasca sandstone clasts, no shale or pink sediment
7.01	8.53	155	155	till	dark grey, silty clay, stony and granules, massive stiff and plastic, minor pink sediment masses < 2cm, few black shale clasts, igneous, quartzite, limestone, Athabasca sandstone, strong calcareous, 3 - 1mm wavy horizontal silt lamina from 80-100cm from top
8.53	10.06	155	155	till	SAB, dark grey, silty clay, abundant hard and soft limestone pebbles and granules, no black shale visible, strong calcareous
10.06	11.58	155	155	till	SAB, few black shale clasts, lower 100cm has faint very dark grey horizontal banding - more clayey (< 1 cm) pebbles and granules throughout, more plastic than till above
11.58	13.10	90	90	till	SAB, distorted core due to rock in shoe, dark grey, silty clay, strong calcareous,
13.10	14.63	5	5	till	likely all till as above, chasing stone down hole in core barrel shoe, 5cm black quartzite rounded
14.63	16.15	75	35	sand	grey, fine grained, massive, loose, wet, sand from 46' - 51' (14-15.5m)
			40	till	SAB,dark grey, strong calcareous, abrupt contact with sand, massive, sandy silty clay at top - becoming more clayey towards base, pebbles and granules, igneous, quartzite, limestone, Athabasca sandstone
					T.D. 53' (16.15m) - abandon hole and back fill