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ASSESSMENT REPORT

889966 ALBERTA LTD.
METALLIC AND INDUSTRIAL MINERALS PERMITS
9302020053 TO 9302020059

SHALE AND SANDSTONE IN THE CLEARWATER REGION

Submitted by 889966 Alberta Ltd.

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ASSESSMENT REPORT

GEOLOGICAL POTENTIAL FOR ALUMINA, IRON AND SILICA-BEARING RAW MATERIALS IN THE CLEARWATER REGION

SUMMARY:

Analyses of bedrock shale and sandstone in the Clearwater region are used to target potential quarry sites underlain by sedimentary rocks containing elevated alumina, iron and silica.

INTRODUCTION:

Reconnaissance investigations in the region adjacent to the Clearwater Property (Fig. 1) are aimed at locating alumina and iron-enriched raw materials. Seven areas are under permit (Figure 2, Table 1). Twenty seven road-accessible shale prospects have been identified (Fig. 3, Table 2). Eight of the better exposed prospects in the permitted areas were sampled, emphasis being given to examining stratigraphic sections that might contain the more aluminous Thistle (Wapiabi Formation) and Vimy (Blackstone Formation) shale members.

Analyses of bedrock samples indicate that many of the shales are relatively enriched in silica, and sulphur compared to those currently used by industry. Nevertheless, several samples from both the Blackstone and Wapiabi formations (especially those with relatively minor sideritic concretionary layers), plot within the $SiO_2/Al_2O_3/Fe_2O_3$ compositional field, coincident with samples used by industry. Equivalent alkali contents are significantly below the maximum of 3% recommended by industry, and most other elements (MgO, S, Cl, F, MnO P_2O_5, TiO_2) are below levels considered to be deleterious.

Shallow drilling is recommended in six prospects to determine the thickness, extent and compositional variations in the targeted shale units.

A concurrent investigation, looking for sources of secondary materials enriched in silica (Fig. 3, Table 2), concluded that sandstones in the Brazeau and Blairmore formations are relatively feldspathic, have high equivalent alkali contents, and are unsuitable as feedstock.

In contrast, sandstone from the lower member of the Cardium Formation consistently contains >90% SiO_2, with low equivalent alkali contents. Shallow drilling is recommended for one prospect east of the Clearwater Property, and three prospects to the north and west, to determine the thickness, extent, and compositional consistency of the sandstone. Follow-up investigations are also recommended for two other prospects near Seven Mile Creek (Fig. 3).

GEOLOGICAL CONTEXT:

Geological formations present in the area are shown in Table 3. Scafe (1991) presented some of the few analyses of clay and shale formations in Alberta, conducted as part of his evaluation into their ceramic potential. Within the target area (NTS 82 O, 82 N, 83 B, and 83C), analyses are reported for shales from the Brazeau, Porcupine Hills, Wapiabi and Blairmore formations (Table 4):

Table 4: Chemical analyses of shales within the target area (Scafe, 1991).

Formation	NTS	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	P_2O_5	MnO	CaO	MgO	Na_2O	K_2O	S	H_2O	L.O.I.
Brazeau	82 O	73.96	13.30	2.44	0.70	0.16	0.01	0.27	0.98	0.37	2.40	0.26	0.70	4.15
Porcupine Hills	82 O	53.59	14.12	3.72	0.55	0.18	0.04	7.85	2.68	0.22	2.78	0.29	0.80	11.74
Wapiabi	82 O	66.22	15.53	4.07	0.68	0.00	0.01	0.99	1.68	0.56	2.98	1.15	0.49	6.02
Blairmore	82 O	60.60	18.18	6.57	0.78	0.02	0.08	0.99	2.56	2.16	2.67	0.41	0.51	4.49

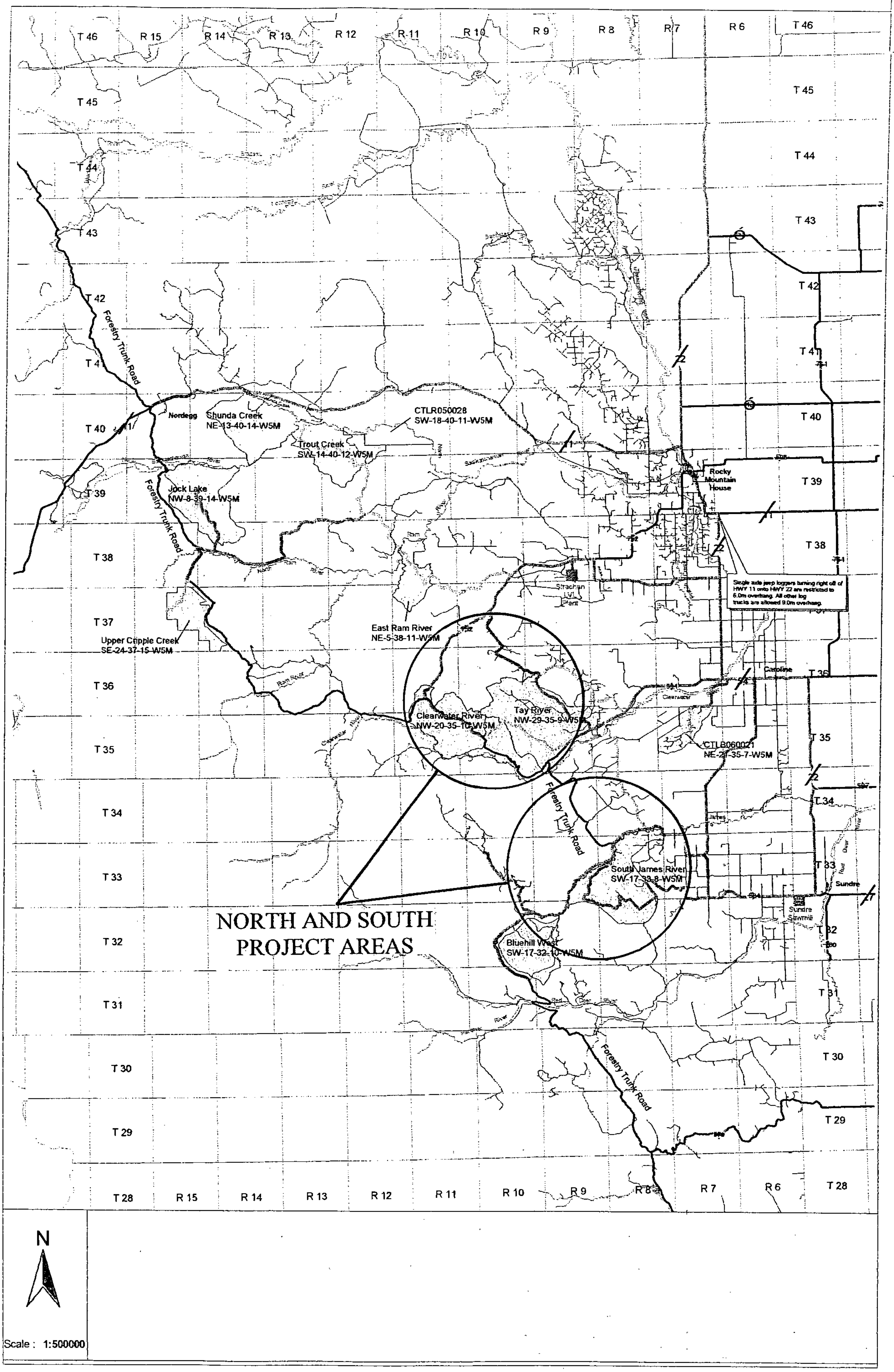


Figure 1: Regional setting of north and south project areas

METALLIC AND INDUSTRIAL MINERALS PERMITS, CLEARWATER REGION			
889966 ALBERTA LTD.			
PERMIT #	***PROSPECT#***	***LOCATION***	***HECTARES***
9302020053	FTRS 6, 7, 23	5-09-033: 13; 14; 15L9, L16; 22N, SE; 23; 26L3, L4: 27S,L10-L12	1200
9302020054	FTRS 1, 2	5-09-034: 2NE, L11, L14; 11S, NW, L10, L15	320
9302020055	FTRN 1	5-09-035: 5NE, L11, L14; 7NE; 8S, NW, L10, L15	384
9302020056	FTRN 4, 5	5-10-035: 19NW, L6-L10, L15; 20L5, L12; 30L3, L4	640
		5-11-035: 24NE, L14; 25S, NW, L10,L15; 26L8, L9, L16; 35L1;	
		36L2-L4	
9302020057	FTRN 29	5-10-035: 24; 25S, NW; 26N, SE	640
9302020058	FTRN 8	5-11-035: 34L16; 35L13, L14	304
		5-11-036: 2SW, L11,L12; 3NE, L1, L7, L8, L11, L13, L14	
9302020059	FTRN 10, 27, 28	5-11-036: 11N; 14; 15L13-L16; 21E; 22; 23W	960
		TOTAL	**4448**

Table 1: Metallic and Industrial Minerals permits, Clearwater Region, 889966 Alberta Ltd.

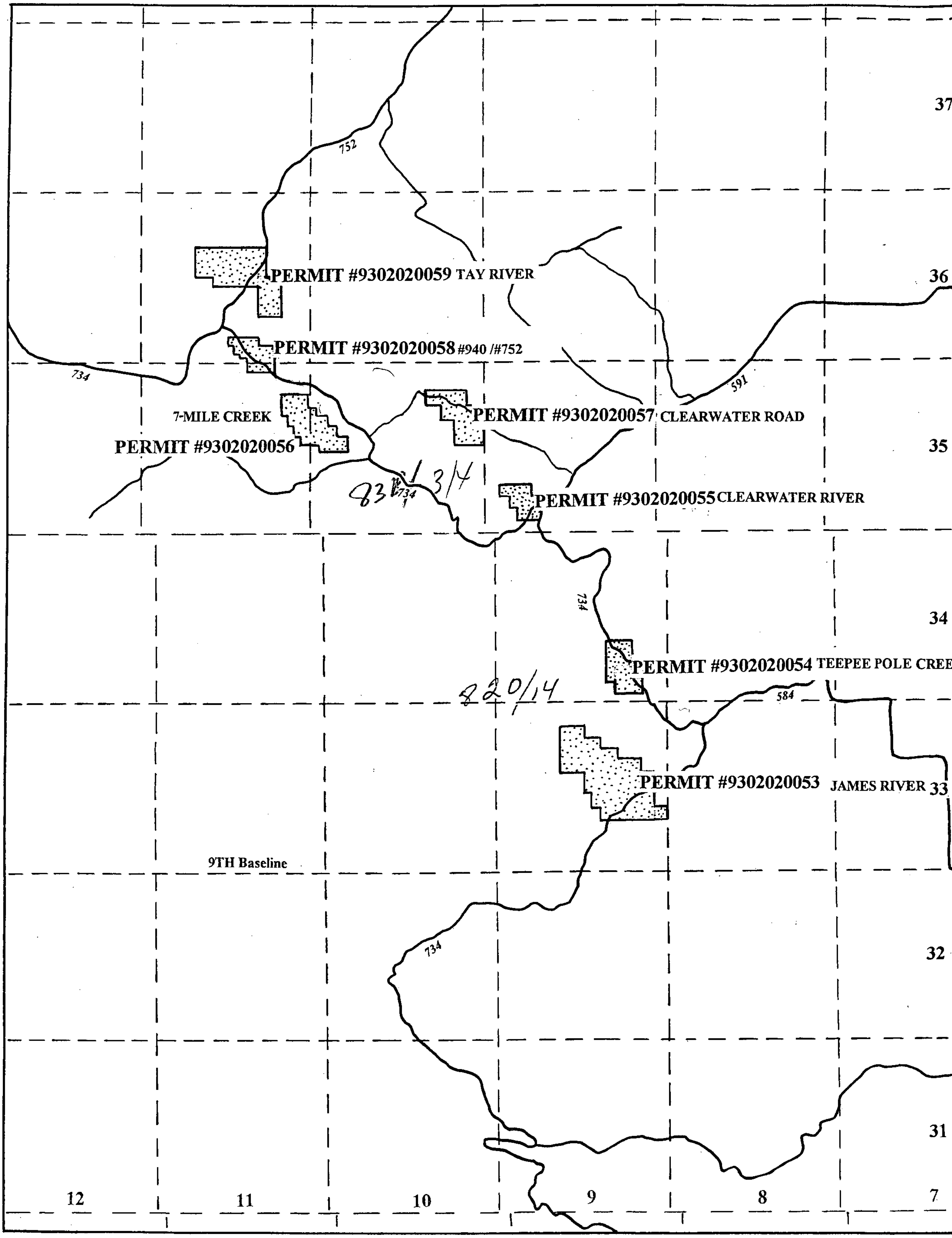


Figure 2: Metallic and Industrial Minerals Permit Applications.

Table 2: Shale and sandstone prospects, Clearwater Region.

SHALE AND SANDSTONE PROSPECTS, CLEARWATER REGION
(Note that Bighorn sandstone is synonymous with Cardium sandstone)

FTRS 1: Teepee Pole Creek N - *Wapiabi shale*

FTRS 2: Teepee Pole Creek S - *Wapiabi shale*

FTRS 3: Bread Creek - *Wapiabi shale and Brazeau sandstone*

FTRS 4: Bearberry Creek - *Wapiabi shale*

FTRS 5: Old Baldy Mountain - *Wapiabi shale*

FTRS 6: South James River - *Wapiabi shale*

FTRS 7: Sawtooth Ridge - *Wapiabi shale*

FTRS 8: Willson Creek N - *Wapiabi shale*

FTRS 9: Whisky Jack Crossing - *Wapiabi shale*

FTRS 10: Strawberry Ridge - *Wapiabi shale*

FTRS 11: Windfall Creek - *Wapiabi shale*

FTRS 12: Bridgeland Creek - *Wapiabi shale*

FTRS 13: Willson Creek E & W - *Kootenay sandstone*

FTRS 14: Bridgeland Creek - *Kootenay sandstone*

FTRS 15: Clearwater Ridge - *Wapiabi shales*

FTRS 16: Crossover Ridge - *Wapiabi shales*

FTRS 17: Teepee Bridge - *Belly River sdst.*

FTRS 18: Seismic line - *Belly River sdst.*

FTRS 19: Teepee Ridge - *Belly River sdst.*

FTRS 20: James R. section - *Wapiabi shales*

FTRS 21: JR Meander 2 - *Wapiabi shales*

FTRS 22: JR Meander 2 - *Wapiabi shales*

FTRS 23: Glades - *Wapiabi shales*

FTRS 24: Clearwater - *gravel/sand*

FTRS 25: Teepee Pole Creek - *Blairmore sandstone*

FTRN 1: Ranger Station - *Blackstone shale, Wapiabi shale and Cardium sandstone*

FTRN 2: 7 Mile Creek SE - *Bighorn sandstone*

FTRN 3: 7 Mile Creek NW - *Bighorn sandstone*

FTRN 4: 7 Mile Creek S - *Bighorn sandstone*

FTRN 5: Idlewilde Mountain - *Bighorn sandstone*

FTRN 6: 7 Mile Creek Far NW - *Bighorn sandstone*

FTRN 7: Idlewilde North - *Blairmore qtz-rich sdst.*

FTRN 8: #940-25 km - *Bighorn sandstone*

FTRN 9: Tay River S - *Bighorn sandstone*

FTRN 10: Tay River N - *Blairmore qtz-rich sdst.*

FTRN 11: Prairie Creek W - *Blairmore qtz-rich sdst.*

FTRN 12: Prairie creek S - *Blairmore qtz-rich sdst.*

FTRN 13: Idlewilde Creek N - *Bighorn sandstone*

FTRN 14: Jct. 752/940 - *Bighorn sandstone*

FTRN 15: Idlewilde Creek W - *Blairmore qtz-rich sdst.*

FTRN 16: Radiant Creek - *Bighorn sandstone*

FTRN 17: Elk Creek - *Bighorn sandstone*

FTRN 18: Elk Creek N - *Wapiabi shale*

FTRN 19: Elk Creek West - *Wapiabi shale*

FTRN 20: Peppers Creek - *Wapiabi shale*

FTRN 21: Clearwater River - *Wapiabi shale*

FTRN 22: Clearwater River S - *Wapiabi shale*

FTRN 23: Cutoff Creek W - *Rocky Mtn. qzite*

FTRN 24: Cutoff Creek E - *Blairmore qtz-rich sdst.*

FTRN 25: Cutoff Creek - *Rundle limestone*

FTRN 26: 7 Mile Creek - *Blackstone shale*

FTRN 27: Upper Tay R. - *Blackstone shale*

FTRN 28: Tay River NW - *Blackstone shale*

FTRN 29: Clearwater Road – Cardium sandstone and shale

Follow-up drilling is recommended for Bolded prospects

Southern and Central Foothills				Description	Northern Foothills			
Series	Group	Formation	Member		Member	Formation	Group	Series
			Nomad 90'–130'	Rusty weathering, rubbly shales, grading upwards into greenish grey shales and fine-grained, thinly bedded sandstones. Base is marked by band of pebbles.	Nomad 100' ±			
			Chungo 135'–416'	Fine-grained, thickly bedded, light brown weathering sandstones (lithic arenites to quartz wackes), and dark grey siltstone with reddish brown weathering concretions.	Chungo 205' ±			
			Hanson 0–232'	Dark grey, rusty weathering, blocky to rubbly shales, with reddish brown weathering sideritic concretions.	Hanson ?			
		Wapiabi 1,043'–2,146'	Thistle 384'–778'	Dark grey to black, calcareous, platy to fissile shales, weathers grey to light grey, with thin, dense, bluish grey dolomitic beds.	Thistle 650' ±	Wapiabi 1,550' ±		
			Dowling 101'–351'	Dark grey, rubbly to platy shales, weathers rust, with reddish brown weathering sideritic concretions.	Dowling 250' ±			
Upper Cretaceous	Alberta 2,000'–4,100'		Marshy-bank 41'–104'	Dark grey, massive, argillaceous siltstone, with large reddish brown concretions; siltstone grades into sandstone.	Marshy-bank ?		Smoky 2,900'	Upper Cretacec
			Muskiki 144'–325'	Dark grey, rubbly to platy shales, weathers rust and has banded or striped appearance, some reddish brown sideritic concretions. Bed of coarse-grained, pebbly sandstone or pebble-conglomerate at base.	Muskiki 250'–275'			
			Sturrock 15'–166'	Fine-grained, thickly to thinly bedded sandstone (lithic arenite to quartz wacke), weathers rusty brown. In some regions, includes brackish and nonmarine, greyish and greenish shales.	Sturrock ?			
			Leyland 30'–175'	Dark grey to black, rubbly to blocky shales, with reddish brown sideritic concretions.	Leyland ?			
		Cardium 74'–357'	Cardinal 0–35'	Dark grey, massive, argillaceous siltstone, with large, reddish brown concretions.	(Cardinal and Kiska members not recognized)	Cardium		
			Kiska 0–37'	Dark grey to black, rubbly to blocky shales, with reddish brown sideritic concretions.				
			Moose-hound 0–134'	Greyish green to brown, carbonaceous, rubbly shales, friable carbonaceous sandstones, thin coal beds, minor conglomerate.	Moose-hound –134'			
			Ram 24'–103'	Fine-grained, thickly bedded sandstone (lithic arenite), weathers rusty brown.	Ram 40'–90'			
			Opabin 70'–213'	Dark grey, rusty weathering, blocky to rubbly shales, with reddish brown weathering sideritic concretions.	Opabin –300			
		Blackstone 262'–1,734'	Haven 35'–319'	Dark grey to black, rubbly to platy shales, weathers rust, with yellow sulphur staining and fetid odour.	Haven 179'	Kaskapau 1,200'–1,500'		
			Vimy 154'–605'	Dark grey to black, calcareous, platy to fissile shales, weathers light grey to white (silver-grey), with dense dolomitic limestone beds.	Vimy 500'–600'			
			Sunkay 15'–631'	Dark grey, rubbly to platy shales, weathers rust, with some argillaceous siltstone, few large kettle concretions, thin beds of coarse-grained sandstones, and pebble bed at the base.	Sunkay 125'–175'			
				Medium- to coarse-grained, carbonaceous, crossbedded sandstone, with greyish green, nonmarine, carbonaceous shales, and also dark grey marine shales and siltstones, few oyster beds.		Dunvegan 210'–281'		
Lower Cretaceous				Dark grey, rubbly to platy shales, weathers rust, with some argillaceous siltstone, few large kettle concretions, pebble bed at base.		Shales of the Fort St. John group 325'–400'		Low Cretac

Table 3: Subdivision of the Upper Cretaceous Alberta Group in the Southern and Central Foothills, Alberta. (Stott, 1963).

Although all of these formations occur within the target area, only the Wapiabi and Blackstone shales reach thicknesses that provide attractive prospects for follow-up investigations.

Accordingly the search for quarriable shale deposits meeting the criteria of this study focused principally on the Blackstone and Wapiabi Formations.

Stott's work on the Alberta Group constitutes the principal source document for information on the Blackstone and Wapiabi Shales. The study was conducted as a part of a Ph. D. research program at Princeton University (1954-1957). At that time most of the Front Ranges and Foothills area had been mapped by officers of the Geological Survey of Canada, and so Stott had a considerable body of contemporary observations and mapping to draw upon in building his synthesis of the Alberta Group.

Subsequent work by Ollerenshaw in the Burnt Timber (1962-63), Limestone Mountain (1964), and Marble Mountain (1965), regions provided an upgraded understanding of the structure in the region, but the lithologic descriptions of the major Formations in the Alberta Group reflected only minor modifications from those given by Stott.

Most of Stott's measured sections occur to the north and south of the Clearwater region, so there is a dearth of systematic stratigraphic information between the South Ram River in the north, and Burnt Timber Creek in the south. Nevertheless the stratigraphic variations appear to have been relatively minor within any one Formation or Member and consequently the following section provides detailed extracts from Stott's final report which was ultimately printed as GSC Bulletin 317, in 1963.

Malloch (1911) working in the Bighorn Basin near North Saskatchewan River, divided the marine Cretaceous beds into three formations that he called the Blackstone, Bighorn and Wapiabi. The shales of the Blackstone Formation lay on top of the Blairmore Formation, and were in turn, overlain by bands of sandstone, shale and conglomerate that comprised the Bighorn Formation. The shales between the Bighorn Formation and Malloch's Brazeau Formation were placed into the Wapiabi Formation. In 1934, Webb and Hertlein recommended that the name of the Bighorn should be replaced by Cardium, and they subdivided the formation into the lower sandstone, middle shale and upper sandstone members. In addition, they subdivided the Blackstone shales into four members, the Barren Zone, *Inoceramus labiatus* zone, Rusty shale zone and Transition Zone. Four lithologic zones were established for the Wapiabi Formation: Lower concretionary shale zone; Platy shale zone, Upper concretionary zone, and Transition zone.

Scott (1951), in a study of folded faults south of the Brazeau River recognized an additional siltstone unit near the top of the Wapiabi Formation, and in 1956, Stott recognized an additional siltstone unit near the base of the Wapiabi bringing the number of subdivisions in this formation to seven (see Table of Formations, Fig. 3).

Alberta Group:

The Alberta Group, extends from the International border in the south, northward to Athabasca River. It comprises the Blackstone, Cardium and Wapiabi Formations (Table 3). The Blackstone and Wapiabi Formations consist predominantly of dark grey, silty shales and their individual members are characterized by limestone bands and sideritic concretions. The Cardium Formation is a prominent sandstone in the middle of the group. On Burnt Timber Creek, just south of the target area, the Wapiabi and Cardium Formations, most of the Blackstone Formation and the upper and lower contacts of the group are well exposed, and the thickness is approximately 1000 m (Table 3). Composite sections from Bighorn and Thistle Creeks give approximate thicknesses of 1240 m and 1150 m respectively.

Shales:

The shales of the Blackstone and Wapiabi formations are similar in many respects. Weathering characteristics are diagnostic and appear to be closely related to the grainsize. The rubbly and fissile shales apparently contain much less silt than the platy and blocky types. The Vimy shales are a characteristic silvery-grey and contrast with the dark grey to greyish black of the rest of the formation. Yellow sulphur staining is prominent in outcrops of the Haven Member along the eastern side of the area. Black organic material is abundant in the coarser fraction of most shale. mica is found in almost all samples. Fine pyrite is present in the Thistle and Vimy members and much is concentrated around the organic masses. Glauconite is abundant in the shales and siltstones of the Chungo Member and upper part of the Hanson Member; only traces were found in samples from the Dunvegan, Muskiki, Marshybank and Leyland members. The Vimy and Thistle are calcareous, but the former appears to contain more calcium carbonate. The shales of the concretionary members are rarely calcareous, and never match the Vimy shales.

The Vimy and Thistle members contain magnesium-rich carbonate layers which, as shown by X-ray analysis, approach dolomite in composition. The beds were probably laid down as calcium carbonate which reacted with the magnesium in the connate water to form dolomite. The diagenetic change has resulted in the elimination of much of the original structure, leaving an aphanitic rock.

Stratigraphic cross-sections show many repetitions from shale to siltstone in both the Blackstone and Wapiabi Formations, and from shale to littoral sands and coal bearing rocks in the Cardium Formation and Chungo Member .

The lower Megacycle includes the Blackstone and Cardium formations. The second megacycle is found within the Wapiabi Formation, with the lower three rusty-weathering members representing the transgressive phase, the calcareous Thistle member the inundative phase, and the Hanson and Chungo members the regressive phase.

X-ray identification of these rocks indicate the shales are composed of the micaceous and expanding clay minerals and include illite, montmorillonite, chlorite and probably some kaolinite.

Blackstone shales:
The lowermost Formation, the Blackstone shales, includes those beds between the thickly bedded basal sandstone (Ram Member) of the Cardium Formation and the underlying nonmarine beds of the Blairmore or Mountain Park formations. More specifically, this places within the Blackstone Formation, the thinly bedded sandstones below the thickly bedded to massive basal Cardium sandstone on Bighorn River, Wapiabi Creek, Brazeau River, Thistle Creek and Mackenzie Creek.

The beds under the Blackstone have been designated variously as the Blairmore Formation, Mountain Park Formation, and the Luscar and Mountain Park formations. These beds, of nonmarine origin, consist of greenish to brownish sandstones and shales which contain considerable carbonaceous material and coal beds. No evidence has been found of a gradational contact between the Blackstone and the underlying Blairmore Formation.

The Blackstone Formation is divided into four members which are, in ascending order, the Sunkay, Vimy, Haven and Opabin . The members correspond to the Barren, *Inoceramus labiatus*, Rusty Shale and Transition zones defined by Webb and Hertlein (1934). The Opabin member is transitional into the overlying Cardium Formation, but the other members have distinct contacts.

The shales of the Blackstone Formation are easily eroded and usually form broad valleys between prominent sandstone ridges of the Cardium and Blairmore Formations. These valleys, some of which have been modified by glacial action, are wide with relatively flat bottoms; they form good pasture land for wild game and, in more recent years, for livestock.

The Blackstone Formation thickens from southeast to northwest. Sections measured on Burnt Timber Creek and the South Ram River gave thicknesses of 320 and 345 m respectively. In both sections the uppermost Opabin Member (35-50 m thick) is concretionary. The lower boundary of the Opabin is drawn in most sections at the base of the concretionary shales. The contact is generally conformable. The Opabin represents the transition from the shales of the Blackstone Formation to sandstones of the Cardium Formation, and accordingly contains sediments that range from sandstone through siltstone to blocky and rubbly shales. The member typically contains large reddish-brown weathering ironstone concretions. These shales with their ironstone concretions are in sharp contrast to the remainder of the Blackstone Formation, but are similar to those of the Wapiabi Formation.

Wapiabi shales:
The Wapiabi formation was named by Malloch (1911) from Wapiabi Creek, one of the main streams in the region of the Bighorn Range. It includes the shales between the greenish-grey sandstones of the Brazeau Formation and the sandstones of the Cardium Formation. The Wapiabi overlies the Cardium Formation with only a slight disconformity. A zone of coarse material, ranging in thickness from less than 2.5 cm of small pebbles to a few metres of large pebbles or tens of metres of coarse grained sandstone, lies at the base of the shale formation.

The contact between the Wapiabi and Brazeau formations can generally be determined without difficulty although a transition zone is present in the upper part of the Wapiabi. The boundary is drawn at the base of the lowest thick, greenish grey, medium-coarse-grained sandstone. Locally this bed consists of chert pebbles or pebble conglomerate.

The underlying sandstones of the Transition beds are greenish coloured, fine-grained and commonly soft and crumbly.

The basal contact of the Belly River Formation sandstone (equivalent to the Brazeau sandstone) is gradational. From Clearwater River south beyond Bow River, the contact of the Belly River and the Wapiabi formations is drawn above the Nomad Member. The Belly River formation is recognized in the Foothills from the International Boundary to about Clearwater River (Beach, 1942). North of the Nordegg area, partly equivalent beds have been placed in the Brazeau Formation. The basal beds of the Belly River formation in southern Alberta are older than those in the north. The basal 500 feet are considered to be equivalent to the Chungo Member.

The Formation is 560 m thick on Burnt Timber Creek and 600 m thick on Cripple Creek to the north. Seven members have been identified in the Wapiabi Formation; from the base upwards these are the Muskiki, Marshybank, Dowling, Thistle, Hanson, Chungo and Nomad members.

The shales of the Wapiabi Formation vary from fissile to rubbly, and platy. They are dark grey, weather rusty, and contain abundant dark organic material. Glauconite (a hydrated iron silicate) occurs in the concretionary shales. Reddish-brown weathering, sideritic concretions are in the basal and upper one third of the formation. The sandstone is generally fine-grained, thickly bedded, weathers light brown, and most is classified as quartz-wacke. Thin bentonite (volcanic ash?) layers occur throughout the formation but most are near the base. Beds of aphanitic, dense, argillaceous dolomitic limestone in the central part resemble those of the Vimy Member in the Blackstone Formation. Carbonaceous material may be present in the beds transitional to the overlying formation. Coarse grained sandstone with pebbles and cobbles of chert occurs at the base of the formation.

Sandstone:

Sandstone, quartzite and glacial or fluvial sands constitute the principal sources of silica in the region (Table 3, Fig. 3). From a bedrock perspective the most obvious targets are, from bottom to top, the sandstones of the Blairmore, Cardium and Belly River (Brazeau) formations, as well as other potentially siliceous sandstone beds in the Wapiabi shale, i.e. the Chungo Member.

In mapping the Tay River and Fall Creek map sheets, Henderson (1944, 1945) noted a pinkish weathering, very hard, fine-grained quartzite, 20-30 feet thick, at the contact between the Rundle and Fernie formations, 2000 feet northwest of Cutoff Creek, on the southwest flank of an anticline. This unit was not observed elsewhere in the area but might represent the Pennsylvanian Rocky Mountain Quartzite. The same unit was mapped above the McConnell Thrust in the extreme SW corner of the Limestone Mountain Map sheet by Ollerenshaw (1964).

Henderson (1944, 1945) noted "the base of the non-marine Blairmore Group was a massive chert and quartzite pebble conglomerate up to 35-45 feet thick. The conglomerate is overlain by coarse-grained siliceous sandstones, cross bedded, dark brown, sandstones, and brown, carbonaceous shales. Sandstones near the top of the Formation were fine-grained, greenish grey, and cross bedded, with another massive chert, pebble conglomerate as much as 30 feet thick at or near the top."

The marine Bighorn (Cardium) Formation was divided into three members, a lower member consisting of 50 feet or more of siliceous grey sandstone; an intermediate member comprising 200 feet of soft shales and shaly sandstones; and an upper member 20-30 feet thick of siliceous sandstone similar to the lower member. This formation typically caps many of the hills in the region.

On top of the Wapiabi shales, the non-marine Brazeau sandstones were described as yellowish green, brown weathering, cross bedded, medium to coarse-grained arkosic rocks. Beds of chert pebble conglomerate are interbedded with sandstone and are most abundant near the base of the formation. Dark green sandy shales are also common. Ollerenshaw (1964, 1965) also noted that the Brazeau sandstones were feldspathic.

From the above, it appears that the Cardium Formation represents the best target, for locating sandstones with an elevated silica content.

CURRENT WORK:

Permits are illustrated in Figure 2 and Table 1 and Prospects in Figure 3 and Table 2.

Eighteen road-accessible shale prospects were identified within a 45 km driving distance from the Clearwater Property, 13 of these being within 30 km. Several of the better exposed prospects were sampled in the initial reconnaissance in June. In August emphasis was given to examining those closer to the Clearwater location and to those that might contain the more aluminous Thistle Member of the Wapiabi Formation. The three sandstone prospects along #734, within 30 km of the Clearwater Property, were disappointing in that analyses of the Brazeau sandstone all appear to indicate relatively feldspathic compositions with silica less than 75%. Cardium sandstone outcrops underlying Prospect FTRN 29 were examined and sampled in September.

The following section describes the prospects with increasing distance (decreasing transportation attributes) from the Clearwater Property.

A) Southern prospects (Forestry Trunk Road South - FTRS)

FTRS 15 and FTRS 16:

These two shale prospects occur 4-5 km south of the junction between FTR#734 and Secondary Road #591 (Fig. 3). Extensive and recent logging east of #734 failed to reveal any outcrop in this region. River gravels are thick along the northern fringe of the new cut blocks and thick light brown soils appear to dominate the densely wooded southern slopes. Access to Prospect #FTRS 16 is through a protected area designated as the Moose Creek Habitat Enhancement Project, with signposts declaring *no motorized access*. The prospect was not examined, even though there is some potential to contain quarriable Wapiabi shales on south-facing slopes overlooking Moose Creek. Further work is not recommended.

FTRS 1 Teepee-Pole Creek North: PERMIT #9302020054

A single sample of Wapiabi shale, collected in June from a small road cut at Station 003-1 on the Marble Mtn. access road, returned suitable levels of alumina and silica, warranting a second look at this prospect prior to drilling (Fig. 4). Surface outcrops are extremely rare throughout most of this area. However, the GSC map indicates several small exposures along Teepee-Pole Creek. The banks of the Creek were walked out for over 1.5 km above the bridge on #734. No outcrops were observed in the deeply incised underfit creek bed, but at Stations 214 and 215, extensive digging in the 15 m high perched bank of the old river revealed a 9.5 m thick section of Wapiabi shales with only two thin layers of discontinuous ironstone concretions. 5 samples (each representing a two metre interval) were collected for analysis. Dips to the east are relatively shallow (22°), in contrast to those indicated on the GSC map. The terrace above the river is extensive and could be quarried if the shales have a suitable composition.

FTRS 2 Teepee-Pole Creek South: PERMIT #9302020054

No outcrops were found along the seismic lines crossing this prospect (Fig. 4). A prominent east-trending ridge crosses the prospect providing a potentially quarriable target provided Wapiabi shales lie close to the surface. Drilling of several (4-6) shallow (20-40 m) holes will be necessary to evaluate this Prospect further.

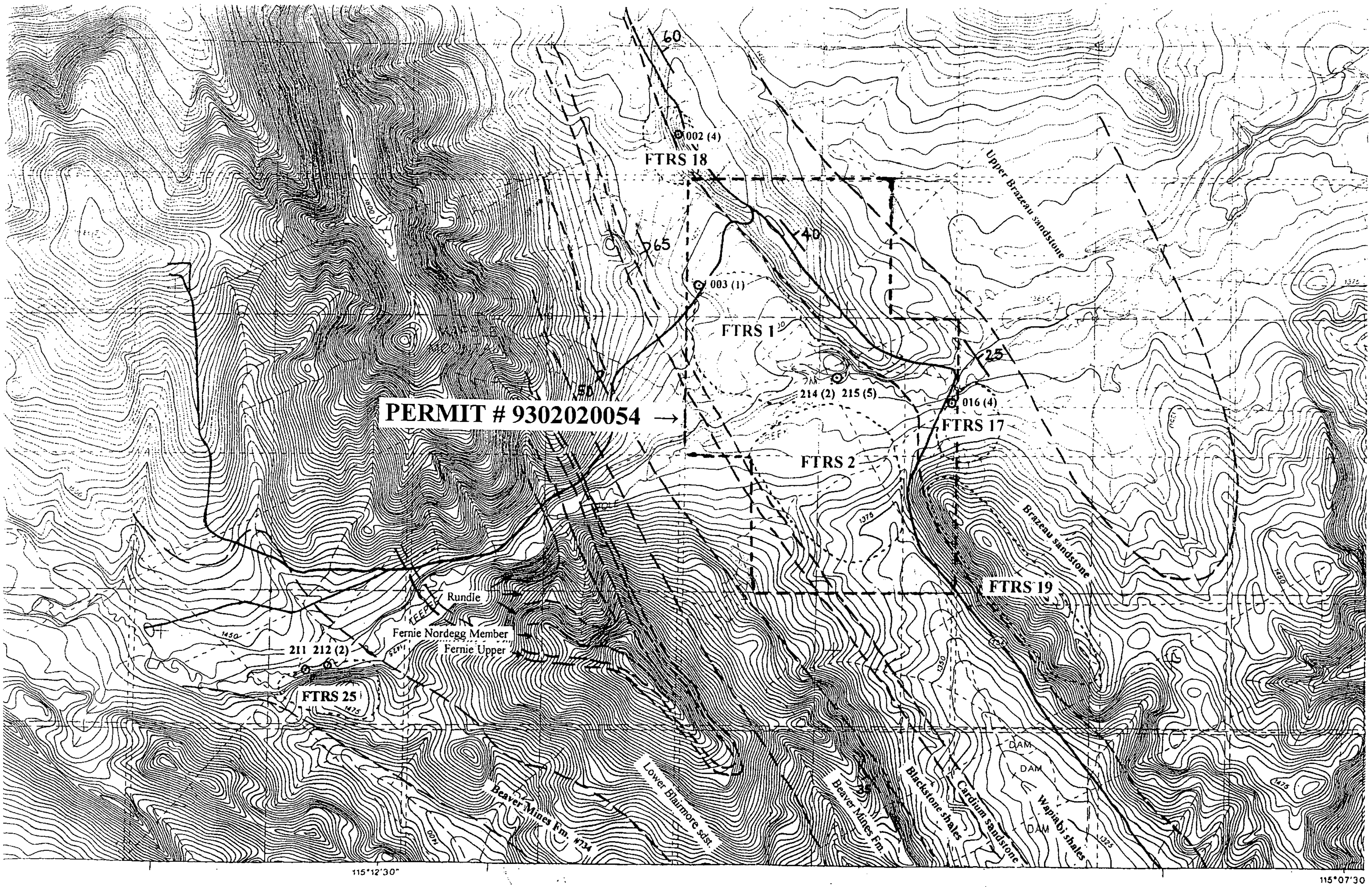
FTRS 25 Teepee-Pole Creek: PERMIT #9302020054

Geological reports by Ollerenshaw (1969) and Beach (1942) indicate the presence of siliceous sandstones in the Blairmore Group on Teepee-Pole Creek west of Marble Mtn. Three samples were collected from cliff sections of the Beaver Mines Formation at two stations (211 and 212) on the south bank of Teepee-Pole Creek. Relatively massive beds are interlayered with more flaggy bedded units in a section that approaches 20 m in thickness. All phases appeared green grey in colour and relatively feldspathic. Further work is not recommended.

FTRS 3 Bread Creek (southern extension of FTRS 17 and 19):

Wapiabi shale underlies the lower west-facing slopes of this prospect but dips into the hillside. This presents a relatively unsuitable setting for quarrying, compounded by the fact that FTR #734 runs along the centre of the Formation, where the quarrying might be expected to take place. Samples of the overlying Brazeau sandstone

Figure 4: Metallic and Industrial Minerals Permit # 9302020054 and prospects
FTRS 1, 2, 18, 19, 25; Teepee-Pole Creek. Geology and sample sites.



formation were collected from a high point at the south end of the ridge overlooking Bread creek (Station 216). All appeared to be relatively feldspathic, flaggy bedded and unsuitable as a source of secondary silica. This ridge is the southern extension of prospects FTRS 17 and 19. The most recent samples appear to confirm the absence of thick siliceous phases in the Brazeau sandstone from this region. Further work is not recommended.

FTRS 20 James River Section: PERMIT #9302020053

Earlier sampling of Wapiabi shales from the James River region (Prospects FTRS 21, 22 and 23) (Figs. 3 and 5) indicated they were marginally suited as a secondary feedstock, but that silica levels were near the limits of acceptability (M^c^Ritchie, June 2001). In August, an attempt was made to locate the central Thistle Member of the Wapiabi Formation, since this was reputed to be more aluminous. Descriptions by Stott (1963) suggested that the absence of ironstone concretions could be diagnostic for the Thistle Member as well as a higher degree of fissility.

3 km south of the junction with #584, a new oil and gas access road (Amoco Canada LSD 3-28-33-5W and Surface 9-29-33-8-W5/bottom hole 18-29-33-8-W5) crosses to the east bank of the James River. Outcrops of the Wapiabi Formation at this location contain prominent hard siltstone units (1-3 m thick), indicating this is not likely to be the Thistle Member. Further work is not recommended.

FTRS 7 Sawtooth Ridge: PERMIT #9302020053

GSC map 7-1969 (Ollerenshaw) indicates Wapiabi shale underlying a 2-3 km wide belt south and west of Sawtooth Ridge (Figs. 3 and 5). No outcrops could be found in this region which is generally elevated and well suited to an open pit type of operation. On the SE side of FTR #734 the James River swings to the south leaving a broad bench 400 m wide and almost a kilometre in length, between it and the Forestry Trunk Road. The area has been logged and contains only a few scattered poplars. A driveable trail leads across the cut-over area and down to the river. The river banks are 15-20 metres high. Gently dipping Wapiabi shales, with almost no ironstone concretions (Thistle Member?) are well exposed. 5 samples were collected across a 9 m thick section at Station 217. Rusty films are present on many bedding planes and the shales appear more fissile than those in Prospects FTRS 21 and 22. A white efflorescence was recorded in a 20 cm thick zone 1.5 m above the base of the section. This is attributed to the oxidation of the iron sulphide producing the mineral melanterite or iron sulphate. This prospect appears well suited to follow-up drilling on either side of the Forestry Trunk Road. Pending the results of the chemical analyses, 4-6 vertical shallow (20-40 m) holes are recommended to determine the extent and thickness of shales with a suitable chemistry.

FTRS 9 Whisky Jack Crossing:

Wapiabi shales at this location (Fig. 3) contain an abundance of large 20 X 30 X 10 cm ovoidal ironstone concretions. This was taken to indicate a general unsuitability for sampling, since the Thistle Member is noted for containing a dearth of these concretions. No further work is recommended for this Prospect.

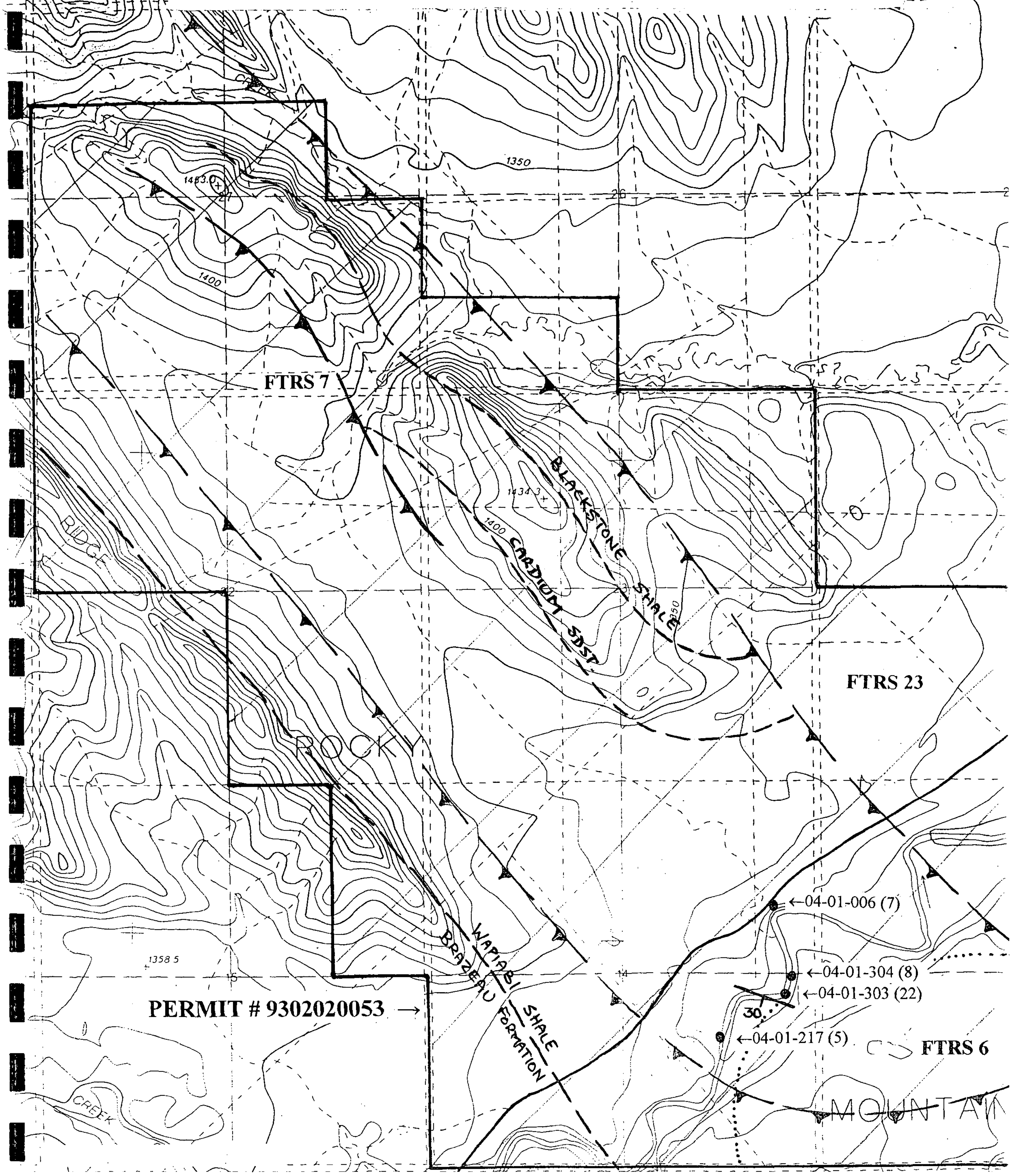
B) *North and West of the Clearwater Property (Forestry Trunk Road North – FTRN)*

As noted above, the geology of the northern region contrasts with that to the south in that Wapiabi shales are rarely exposed, and yet Blackstone shale outcrops are widespread in roadcuts along the 7 Mile Creek stretch of FTR #734, and in roadcuts along Secondary Road #752. Furthermore, the Cardium sandstone caps many of the hills in the region surrounding 7 Mile Flats, forming a relatively modest but persistent escarpment underlain by extensive talus slopes of flaggy bedded sandstone fragments. On the negative side, FTR #734 follows a serpentine path as it climbs around the western flanks of Corkscrew Mountain toward 7 Mile Flats, with tight corners and precipitous drop offs down to the Clearwater River. This may be a handicap to transportation of raw materials from the north to the Clearwater Property.

FTRN 1 (PERMIT #9302020055)

Ollerenshaw's maps of the Limestone Mountain (1968) and Marble Mountain (1969) areas indicate the presence of Blackstone shales, Cardium sandstone and Wapiabi shale in a 330° striking belt west and northwest of the Clearwater River Ranger Cabin at the junction between FTR #734 and Secondary Road #591 (Figs. 3 and 6). An

Figure 5: Metallic and Industrial Minerals Permit #9302020053 and prospects FTRS 6, 7 and 23; James River. Geology and sample sites.



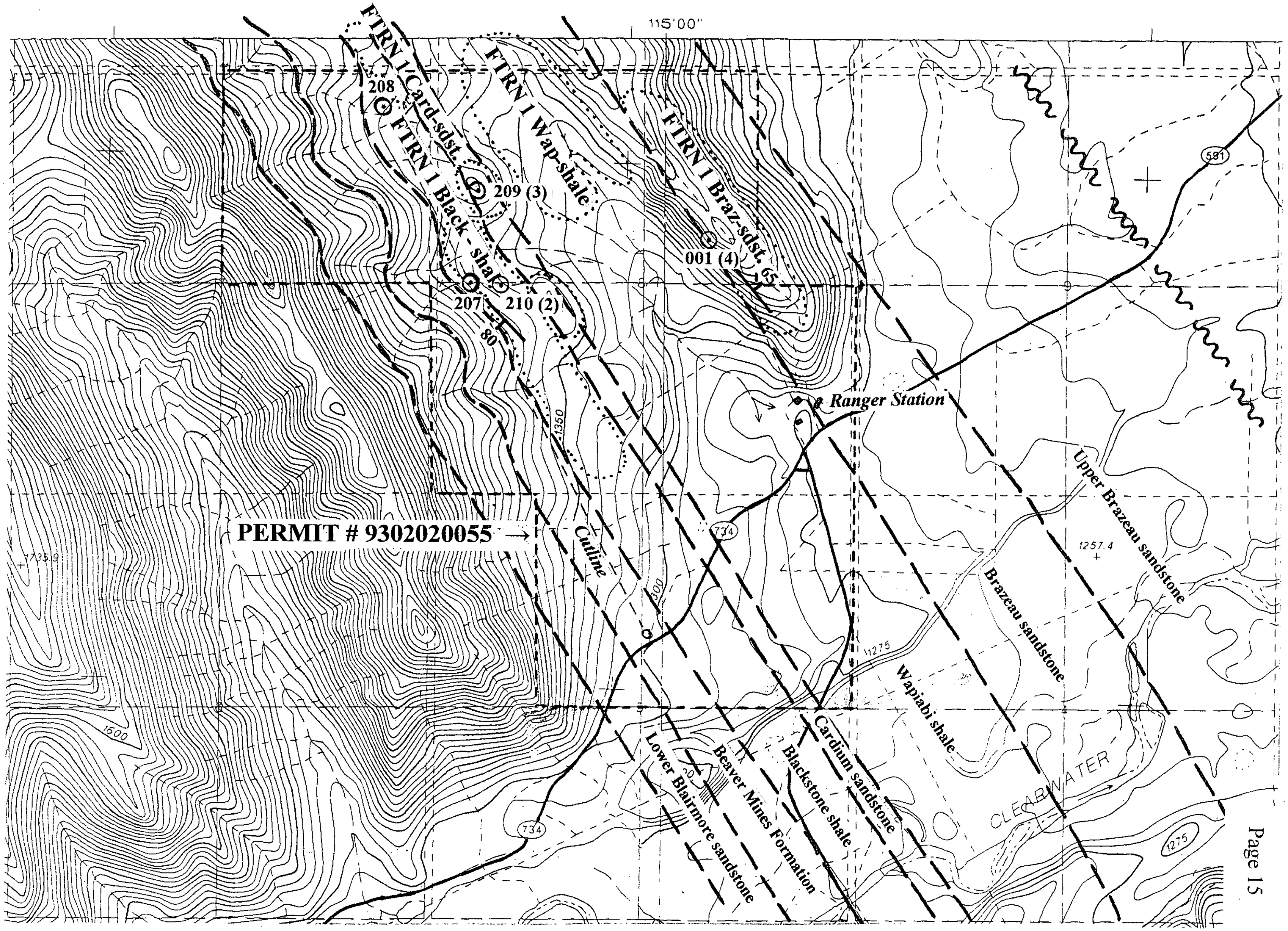


Figure 6: Metallic and Industrial Minerals Permit #9302020055 and prospect FTRN 1, near Clearwater River Ranger Station. Geology and sample sites.

earlier traverse up the ridge, north of the cabin, found only outcrops of the relatively feldspathic Brazeau sandstone and grit, with no surface evidence of the underlying Wapiabi shales to the west.

Much of this country is covered by dense old-growth pine and spruce, with tall poplars being dominant on the lower slopes of the main (east-facing) Front Range. Undergrowth is also dense with abundant thickets of alder, and willow, and tall groundcover including Wildrose, Hawthorn and Labrador Tea. Outcrops are virtually non-existent.

An old cut line was traced northwestwards from UTM E620211 N5759981 on FTR #734 to the second occurrence of open grassy meadows at UTM E619145 N5761980. A small (80 cm high by 3 m wide) outcrop of steeply dipping Blackstone shale was sampled in the north bank of a deeply incised creek at Station 207. 110 m downstream at Station 210, two additional samples were collected from the 4 m high south bank of the same stream. No other shale outcrops were observed along the 2 km length of the traverse. A shallow excavation into a shaley erosional scar at the upper (west) end of the first (most southern) grassy meadows failed to reach convincing bedrock.

At Station 209, the ridge of a prominent knoll, treed with open pines, is littered with abundant angular fragments and blocks of rusty stained siliceous Cardium sandstone. Three grab samples were collected to represent the different lithologies along this ridge. Although no in-situ bedrock is exposed indications are that overburden thicknesses are limited and Cardium sandstone underlies the entire ridge with a width of 15-20 m. A second topographic prominence 500 m to the southeast was not visited.

The shale and sandstone prospects in this cluster are all advantageously close to the Clearwater Property (i.e. 6 km). Consequently, follow-up drilling is recommended, even though hard evidence confirming the presence of suitable aluminous shale and siliceous sandstone is sparse. 4-6 shallow (20-40 m), 45-55° angled holes are recommended for each of the three major formations (Wapiabi/Cardium/Blackstone), along profiles perpendicular to the strike of each belt.

This will confirm or refute the existence of suitable chemistries, with additional drilling being required once the initial samples have been analyzed and evaluated. Water is available in the stream on the SW flank of the southern meadow.

FTRN 29 Clearwater Road (PERMIT #9302020057)

Construction of the new Clearwater Road by Sunpine Forest Products Ltd. has opened up an important new access route to prospects north of the Clearwater Property.

18 channel samples representing a total stratigraphic thickness of ~ 40 m were collected from new shale outcrops in a road cut on the NE shoulder of Clearwater Road at Station 04-01-300. 15 of the samples are from the shale unit. Elevated silica contents were anticipated in the shales based on their immediate proximity to the overlying Cardium sandstone (See also Blackstone Shale section at Station 04-01-010, McRitchie, August, 2001) and the presence of between 5 and 10% siderite concretions.

This locality is not considered to have any potential as a source of suitable shales.

The upper 6 m of the section at Station 300 is occupied by the highly siliceous Cardium Sandstone (Samples 300-16, 17, 18). As with all other occurrences of this unit, the silica contents are consistently >90%, qualifying it as an ideal source of secondary silica. The thickness of the unit at this location is somewhat limited. Accordingly, additional field mapping and sampling is recommended a short distance to the south (Prospect FTRN 29) where Henderson's geological map (1945) indicates numerous outcrops in a potentially favourable quarriable location in the hinge of a major fold.

600 m to the north of Station 300, the new Clearwater Road has been driven through a low ridge, exposing shale and sandstone beds in two new road cuts (Station 301) (Fig. 3). The shale units exhibit considerable variation in composition. Unfortunately, the locality appears structurally disturbed and many of the shale units are intimately interlayered with thin flaggy sandstone layers. As noted above, if drilling is contemplated for this region, an attempt must be made to locate sites midway between the upper and lower contacts of the Blackstone Formation, with the intent of intersecting the Vimy Member.

: PROSPECT FTRN 29 - CARDIUM SANDSTONE

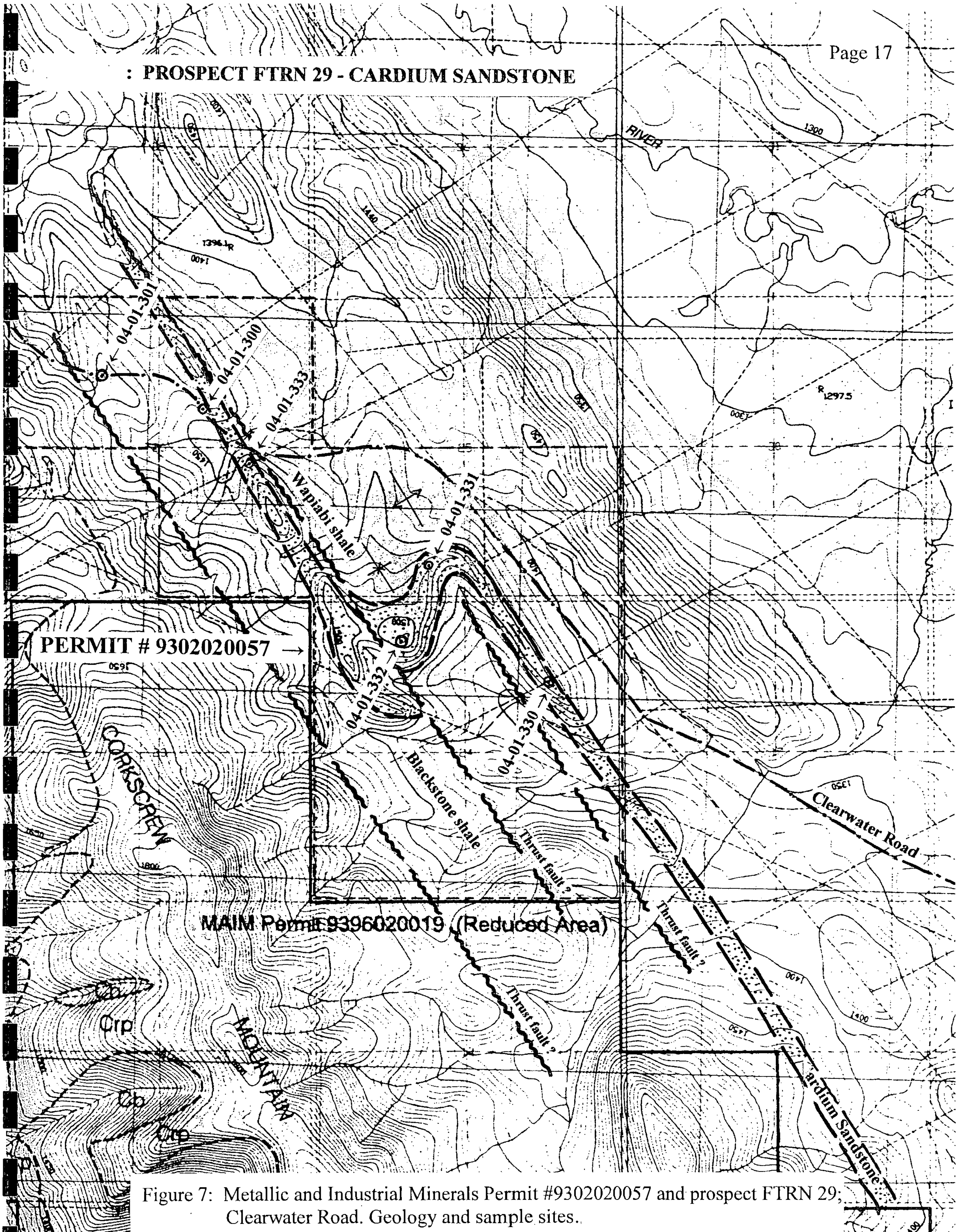


Figure 7: Metallic and Industrial Minerals Permit #9302020057 and prospect FTRN 29; Clearwater Road. Geology and sample sites.

A narrow belt of Cardium sandstone deformed into a large Z - fold (Fig. 7) presents an interesting prospect west of the road (Henderson, 1944, 1945). One day was spent traversing this sandstone ridge looking for outcrops and sampling units with a potential to contain high silica (>90%) sandstone.

The sandstone unit was sampled at four locations (Fig. 7). In-situ bedrock exposures were confirmed at only two sites (Stations 331 and 333). Elsewhere, the presence of the unit is inferred from an abundance of angular sandstone slabs along the crest of the ridge, which is topographically elevated almost 100 m above the surrounding terrain. Ground cover is sparse, being restricted to Bearberry and grasses carpeted by conifer needles. Evenly-spaced 10 m high Lodgepole Pine grows along the crest of the ridge, spruce a little lower on the flanks and gnarled willow and alder on the east-facing slopes. Old cut lines are typically overgrown by 1-5 m high alder.

The main north-trending ridge comprises sandstone beds dipping at ~ 60° to the east. In the anticlinal hinge of the fold the dip of the sandstone beds decreases to ~ 35- 40° to the NW, the fold hinge plunging northwards at ~ 35°. The 20-30 m width of the ridge crest widens to over 50 m in both the anticlinal and synclinal hinges of the fold, providing wider and potentially more attractive sites for quarrying. Two distinct topographic benches in the anticlinal closure suggest the presence of two sandstone layers separated by a thin shale. This would match the sequence observed in the partially exposed section at Station 333.

Follow-up drilling of the hinge sites should be prefaced by drilling a single test hole at location 04-01-333 to the north. This site has good access along an established ATV trail and is only 40 m west of Clearwater Road. Water is available in a nearby creek. Drilling at site 333, perpendicular to the bedding, would aim to determine the thickness and number of quarriable sandstone units in this belt. If successful, then an additional four holes are recommended in the hinges of the fold, where it will be necessary to cut a 1.2 km cat trail to access the sites. The synclinal hinge is about 1 km west of Clearwater Road, the anticlinal hinge less than half a km.

10 samples of the sandstone were analysed.

FTRN 2 Seven Mile Creek SE:

Two new roads run around the south flank of the high ground underlying this prospect which is presumably capped by the resistant sandstone of the Cardium Formation (Henderson, 1945). The southernmost road has been constructed to aid forestry operations on the northwestern slopes of Corkscrew Mountain. 50 m north of this junction with FTR #734, a second road has been constructed by Northrock Resources Ltd. (100/4-4-36-10-W5) to access its well site 1.5 km northeast from the junction. 100 m south of the well site a decommissioned forestry road swings around the east side of the prospect before heading due north to cut blocks on the high ground 2 km to the north. At UTM E611135 N5765351, this road forks and the left offshoot was used to access the main ridge by way of an old quad trail. An even older trail, now overgrown with 4 m high alders, follows the ridgeline throughout its length. Rubbly blocks of Cardium sandstone were sampled at two localities (Station 220) where a laterally persistent overgrown hump in the hillside appeared to indicate the presence of an outcrop band 50-60 m below the crest of the ridge. No in situ outcrops were observed throughout the length of this 2.5 km circular traverse. No further work is recommended.

Immediately east of the more northerly bridge across 7 Mile Creek, a new, north-northwest-trending, Forestry Road was used to access the ridge that extends 5 km northwest from Prospect FTRN 2. At the end of the road and on the crest of the ridge, 150 m to the east (UTM E608131 N5769754), numerous angular blocks of Cardium sandstone appear to indicate bedrock at very shallow depths (Station 219). Black shales with westerly dips, are exposed in the ditch on the east side of the road at slightly lower elevations. These may be hitherto unmapped Wapiabi shales in the core of a shallow syncline that Henderson (1945) identified on the west side of the ridge. Henderson indicates outcrops of the Cardium sandstone to the north and south along the crest of the ridge, but these were not visited. Most of this region is covered by a 1-2m veneer of overburden rich in slabs of Cardium sandstone. This region has some potential but since other nearby prospects are more attractive, no further work is recommended at this time.

FTRN 4 Seven Mile Creek S., and FTRN 5 Idlewilde Mountain: PERMIT #9302020056

These two prospects can now be reached by way of a new >8 km long forestry road that extends northwestwards from a point 500 m south of the bridge over Seven Mile Creek at Seven Mile Flats, around the western side of Prospect FTRN 5 and northwards up the east flank of Idlewilde Mountain (Figs. 3 and 8). Henderson's (1945) map shows the Cardium (Bighorn) sandstone underlying all of the high ground southwest of Seven Mile Creek, with scattered exposures at sundry points along the SW-facing ridge. The new road crosses the southern reaches of

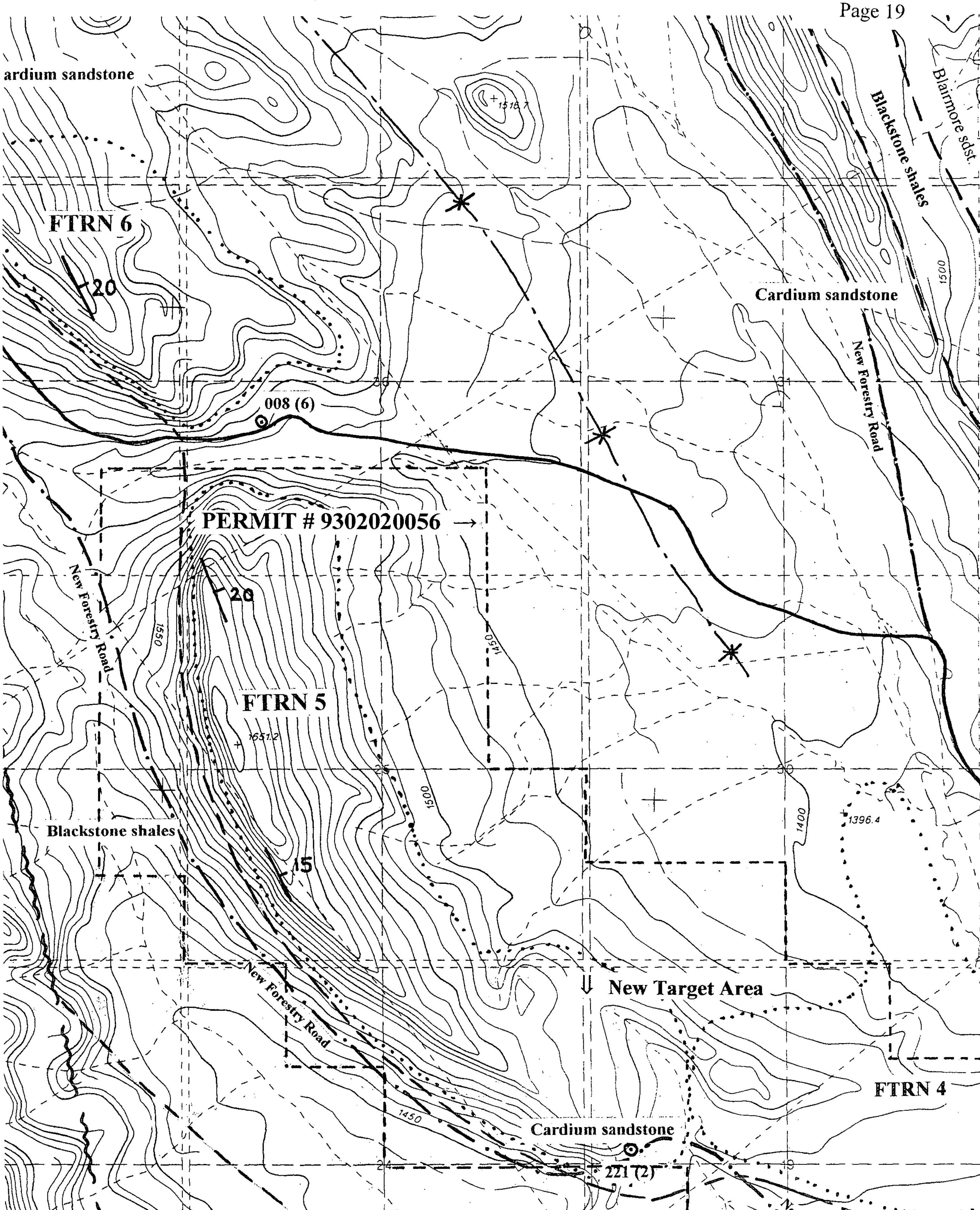


Figure 8: Metallic and Industrial Minerals Permit #9302020056 and prospects FTRN 4, 5 and 6; Seven Mile Creek. Geology and sample sites.

Prospect FTRN 4 and then sweeps northwestwards around the base of Prospect FTRN 5, staying mostly in the Blackstone shales that are exposed in numerous sloughed roadcuts. At UTM E608136 N5764417 (Station 221) the roadcuts are orange-yellow and contain >95% angular blocks of rusty stained Cardium sandstone. The area has been clear-cut, and a bench rising to the north also appears to be underlain by numerous large blocks of Cardium sandstone indicating bedrock at relatively shallow depths.

Although no in-situ outcrops were observed, this area has excellent access, all vegetation has been cleared, and extensive tracts of shallow dipping (15°) Cardium sandstone can likely be excavated from dip slope exposures with minimum (<1 m) overburden. 4-6 shallow (20-30 m) vertical holes are recommended to confirm the thickness and extent of the Cardium sandstone.

FTRN 6 Seven Mile Creek - far NW, and FTRN 8 #940-25 km: PERMIT #9302020058

A well defined unit of highly siliceous Cardium sandstone caps the west-facing escarpment that runs along the northeast side of, and parallel to, FTR #734, south of the junction with Secondary Road #752 (McRitchie, June 2001) (Figs. 3 and 9). This unit lies above the Blackstone shales that are exposed in roadcuts along #734 and #752. The June reconnaissance suggested the sandstone unit has a thickness of ~ 12 m, based on observations along a 300 m stretch of outcrop in which only part of the section was exposed.

In August, a new forestry road provided access to the southern end of FTRN 14 where Henderson (1945) had mapped the sandstone. Exposures at Station 223 (UTM E603465 N5769758) revealed a very narrow (20-30 m) belt of the Cardium sandstone capping the ridge with shales on both sides of the ridge. The sequence dips at 60° to the northeast and numerous dextral offsets along the western contact of the sandstone may reflect the presence of parasitic Z folds on the west flank of a shallow synclinal axis mapped by Henderson (1945). The very limited width of the sandstone and potentially shallow depth in the inferred synclinal trough both suggest that no further work is warranted in the ground between the southern limits of FTRN 14 and the northern extension of FTRN 8.

Further south, a 16 m thick section of the Cardium sandstone is well exposed in SW facing cliffs at Station 222. The cliffs cap the ridge, and are underlain by 50-60 m of steep scree comprising large flagstones and flat slabs of the sandstone. Six samples were collected, each representing a two metre interval. The base of the 16 m section is buried in the scree, so the total thickness of sandstone is >16 m.

Provided the new analyses confirm the highly siliceous composition of this unit, Prospect FTRN 8 continues to offer some of the better attributes/potential in the region. The sandstone has a significant thickness, and strike length (2 km), access up an existing trail is available, and the unit can be quarried on the hilltop where overburden is minimal to non existent. 4-6 shallow (20-30 m) vertical holes are recommended along the strike of the unit in Sections 2 and 3 of Township 36, Range 11.

[It should be noted that Stott (1963) recorded thicknesses for the Ram sandstone Member of the Cardium Formation as being 24 m on Burnt Timber Creek and 32 m on South Ram River. Even allowing for a 7.5 m shaley zone near the centre of the member, the overall thickness of sandstone available on Prospect FTRN 8 is unlikely to be less than the 16 m observed, and could be as much as 20 m or 66 feet].

FTRN 27 Tay River SE: PERMIT #9302020059

A broad SE-trending seismic line provides access from #752 to the ridge that comprises much of this prospect (Figs. 3 and 9). West of the seismic line, cliffs of Cardium sandstone are underlain by extensive talus slopes made up from blocks and slabs of the sandstone. No outcrops of the underlying shales were encountered along the seismic line or in the thickly wooded slopes to the east. Drilling will be needed to confirm the presence of the Haven and Vimy members underlying the slopes between the Tay River and the seismic line.

FTRN 28 Tay River NW: PERMIT #9302020059

Samples collected from Blackstone shale Prospects FTRN 14 and 26 exhibited silica contents that were at, or higher than, the limits acceptable for feedstock. Stott's (1963) description of the Blackstone Shale Formation indicates that the upper and lower members of the formation are silty (siliceous), with the central Haven and Vimy members reflecting more argillaceous compositions. As with the Wapiabi Formation, the absence of ironstone concretions was described as being diagnostic for the more argillaceous members and accordingly two shale samples were collected from roadcuts along #752 (Station 224), where the concretions and concretionary layers appeared to be rare to non-existent (Figs. 3 and 9). If these analyses confirm the chemical suitability of the shales, then further samples should be collected across a greater stratigraphic thickness to reinforce the potential of this new prospect. A potentially quarriable location appears to occur on the west side of #752, immediately north of the sample site.

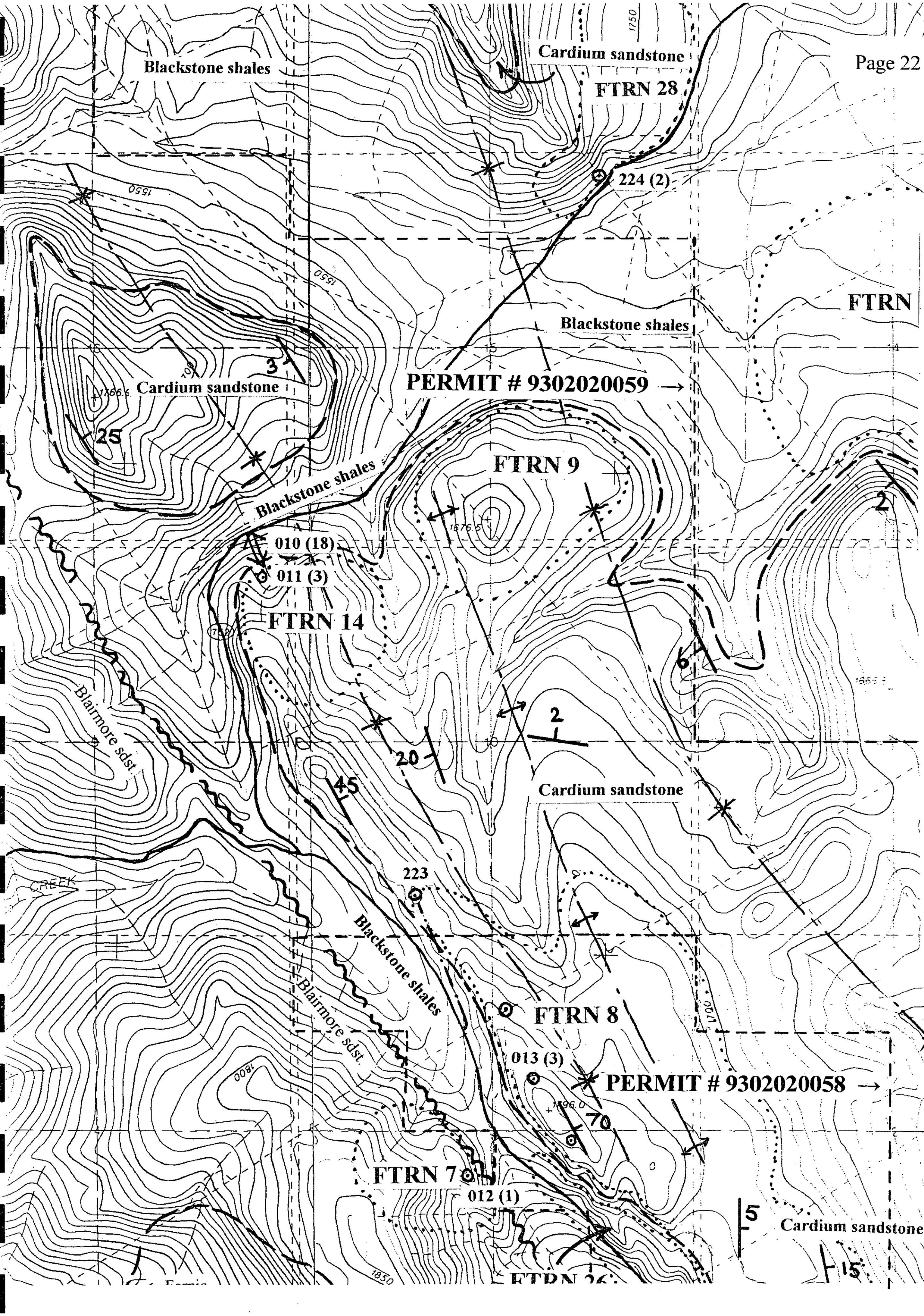


Figure 9: Metallic and Industrial Minerals Permit #9302020058 and #9302020059 and Prospects FTRN 7, 8, 9, 14, 27 and 28; Tay River. Geology and sample sites.

CHEMICAL ANALYSES:

Samples were collected for Group 4A analysis by ICP. The analytical results are presented in the appendix and in tables relating to the lithologies under investigation (Tables 5, 6).

Additional shale samples were collected from stratigraphic profiles across the Wapiabi and Blackstone Formations. Previous sampling of these formations (McRitchie, June and August 2001) yielded chemical compositions that were relatively enriched in silica and only marginally acceptable as feedstock. Accordingly, the subsequent sampling attempted to focus on the central, and potentially more aluminous and iron-enriched Thistle and Vimy Members (Stott, 1963) in the two formations. Unfortunately, shale outcrops are quite rare if not absent in the flat terrain set back from the river exposures. Furthermore, the bedrock in this region has been impacted by both folding and thrust faulting, both of which complicate the task of determining where the centre of the formations can be expected to outcrop. Nevertheless, Stott reported that the central members were typified by a lack of siderite concretions and this feature was used in the selection of the outcrops sampled during September, in conjunction with what appeared to be a significant stratigraphic separation (100-200 m) from the overlying Cardium or Brazeau sandstones.

Shale Investigations:

The shale samples collected from the Wapiabi and Blackstone Formations (Table 5) all display Equivalent Alkali contents ($Na_2O + 0.658\ K_2O$) below 3%, the recommended cut-off for feedstock (Lamar and Harvey, 1966, Chatterjee, 1979). Most of the other potentially deleterious oxides (MnO, S, P_2O_5, TiO_2) are below the limits recommended for feedstock.

Wapiabi shale samples from stations 214 and 215 are too siliceous for suitable feedstock. In the $Al_2O_3/SiO_2/Fe_2O_3$ diagram (Fig. 10), all samples from this locality plot in the extreme silica-enriched corner of the feedstock field for shales, or between this field and the Silica apex. Silica Ratios ($SiO_2/Al_2O_3 + Fe_2O_3$) (Table 6) between 4.0 and 4.3 are also unacceptably high.

Shallow test-hole drilling at the SE corner of FTRS 1 is therefore not recommended. Drilling in the NW corner of this prospect still seems warranted since the sample from this area (003-1, McRitchie, June 2001) is less siliceous and plots well within the field of suitable shale feedstock.

Three of the five Wapiabi shale samples from Prospect FTRS 7 plot within the field for suitable shale feedstock (Fig. 10), and have Silica Ratios ranging between 3.3 and 3.5 (Table 6). The other two (217-1 and 217-5) are more siliceous and are not acceptable. Shale exposures at this location contain only sparse sideritic ironstone concretions, a feature considered diagnostic of the more aluminous Thistle Member.

Accordingly, shallow test drilling of this prospect and the neighbouring prospect (FTRS 23) is still recommended.

Blackstone shale samples from Stations 207 and 210 plot within the suitable feedstock field (Fig. 10), although once again their compositions are markedly siliceous as is reflected by their high Silica Ratios (Table 6). Shallow test drilling of this Prospect (FTRN 1) is still recommended, given its proximity to the Clearwater Property.

Two samples from station 224 contain significant CaO, but are otherwise marginally acceptable as feedstock. Silica Ratios (Table 6) are 3.7 and 3.8. MgO contents of shales from this locality are slightly elevated, but are well below the recommended 4% cut-off for shale feedstock. Sulphur contents (2.16% and 2.12%) are also significantly higher than previously recorded from the Blackstone Formation. More extended surface sampling of this (Prospect FTRN 28) and immediately neighbouring sites is recommended, with follow-up shallow test drilling, if the new analyses suggest that the zone being investigated is the more aluminous Vimy Member of the Blackstone Formation.

Blackstone shale samples from stations 300 and 301 on the new Clearwater Road, all plot well outside the ideal field. However, a significant number of Wapiabi shale samples from stations 303 and 304 plot within the field suited to cement production and all of the Blackstone shale samples from station 302 plot within this field. Figure 12 shows the relationships of shale samples from prospects FTRN 28–1 to 4, FTRS 07–1 to 33 and FTRS 02-1 to 4 plotted in the $CaO/SiO_2/Al_2O_3+Fe_2O_3$ diagram,

Table 5: Equivalent Alkali ($Na_2O + 0.658\ K_2O$) contents of shale samples from the Blackstone and Wapiabi Formations:

Sample No.	($Na_2O + 0.658\ K_2O$)	Formation	Locality
04-01-207	2.07	Blackstone	FTRN 1 Ranger Station NW
04-01-210-1	2.55	Blackstone	FTRN 1 Ranger Station NW
04-01-210-2	2.52	Blackstone	FTRN 1 Ranger Station NW
04-01-224-1	2.09	Blackstone	FTRS 28 Tay River N
04-01-224-2	2.10	Blackstone	FTRS 28 Tay River N
04-01-214-1	2.39	Wapiabi	FTRS 1 Teepee Pole Creek
04-01-214-2	2.40	Wapiabi	FTRS 1 Teepee Pole Creek
04-01-215-1	2.47	Wapiabi	FTRS 1 Teepee Pole Creek
04-01-215-2	2.37	Wapiabi	FTRS 1 Teepee Pole Creek
04-01-215-3	2.35	Wapiabi	FTRS 1 Teepee Pole Creek
04-01-215-4	2.34	Wapiabi	FTRS 1 Teepee Pole Creek
04-01-215-5	2.30	Wapiabi	FTRS 1 Teepee Pole Creek
04-01-217-1	2.42	Wapiabi	FTRS 7 James River West
04-01-217-2	2.88	Wapiabi	FTRS 7 James River West
04-01-217-3	1.49	Wapiabi	FTRS 7 James River West
04-01-217-4	2.62	Wapiabi	FTRS 7 James River West
04-01-217-5	2.00	Wapiabi	FTRS 7 James River West

Table 5: Equivalent Alkali contents, Blackstone and Wapiabi shales (continued):

Sample No.	$(Na_2O + 0.658\ K_2O)$	Sample No.	$(Na_2O + 0.658\ K_2O)$
04-01-300-1	2.19	04-01-303-1	2.22
300-2	2.15	303-2	2.16
300-3	1.65	303-3	2.13
300-4	2.25	303-4	2.34
300-5	1.92	303-5	2.23
300-6	1.86	303-6	1.98
300-7	1.78	303-7	1.91
300-8	1.99	303-8	2.05
300-9	1.80	303-9	2.01
300-10	1.71	303-10	2.04
300-11	1.98	303-11	2.49
300-12	2.09	303-12	2.49
300-13	2.13	303-13	2.50
300-14	1.86	303-14	2.29
300-15	1.38	303-15	2.34
300-16	0.59	303-16	2.27
300-17	0.52	303-17	2.24
300-18	0.76	303-18	2.22
		303-19	2.20
		303-20	1.97
301-1	2.1	303-21	1.87
301-2	2.24	303-22	2.08
301-3	1.78		
301-4	2.88		
301-5	2.89	304-5	2.25
		304-4	2.22
		304-3	2.23
302-1	2.25	304-2	2.42
302-2	2.53	304-1	2.36
302-3	2.42	304-6	2.49
302-4	2.45	304-7	2.27
302-5	2.55	304-8	2.34
302-6	2.49		
302-7	2.03		
302-8	2.53		
302-9	2.56		
302-10	2.44		
302-11	2.36		
302-12	2.55		
302-13	2.36		
302-14	2.34		
302-15	2.19		
302-16	2.18		
302-17	2.11		
302-18	1.95		
302-19	2.31		
302-20	2.34		

Table 6: Silica Ratios ($SiO_2/Al_2O_3 + Fe_2O_3$) of shale samples from the Blackstone and Wapiabi Formations

Sample No.	Silica Ratio	Formation	Locality
04-01-207	3.8	Blackstone	FTRN 1 Ranger Cabin NW
04-01-210-1	3.6	Blackstone	FTRN 1 Ranger Cabin NW
04-01-210-2	3.7	Blackstone	FTRN 1 Ranger Cabin NW
04-01-224-1	3.7	Blackstone	FTRN 28 Tay River N
04-01-224-2	3.8	Blackstone	FTRN 28 Tay River N
Base			
04-01-300-1	3.7	Blackstone	FTRN 28 Tay River N
04-01-300-2	4.0	Blackstone	FTRN 28 Tay River N
04-01-300-3	5.8	Blackstone	FTRN 28 Tay River N
04-01-300-4	4.2	Blackstone	FTRN 28 Tay River N
04-01-300-5	5.3	Blackstone	FTRN 28 Tay River N
04-01-300-6	5.6	Blackstone	FTRN 28 Tay River N
04-01-300-7	5.5	Blackstone	FTRN 28 Tay River N
04-01-300-8	5.6	Blackstone	FTRN 28 Tay River N
04-01-300-9	6.4	Blackstone	FTRN 28 Tay River N
04-01-300-10	6.4	Blackstone	FTRN 28 Tay River N
04-01-300-11	5.0	Blackstone	FTRN 28 Tay River N
04-01-300-12	4.9	Blackstone	FTRN 28 Tay River N
04-01-300-13	4.8	Blackstone	FTRN 28 Tay River N
04-01-300-14	6.1	Blackstone	FTRN 28 Tay River N
04-01-300-15	9.2	Blackstone	FTRN 28 Tay River N
04-01-300-16	21.1	Blackstone	FTRN 28 Tay River N
04-01-300-17	22.2	Blackstone	FTRN 28 Tay River N
04-01-300-18	19.3	Blackstone	FTRN 28 Tay River N
Top			
Base			
04-01-301-1	4.8	Blackstone	FTRN 28 Tay River N
04-01-301-2	3.9	Blackstone	FTRN 28 Tay River N
04-01-301-3	4.6	Blackstone	FTRN 28 Tay River N
04-01-301-4	2.3	Blackstone	FTRN 28 Tay River N
04-01-301-5	2.4	Blackstone	FTRN 28 Tay River N
Top			
Base			
04-01-302-1	2.8	Blackstone	FTRN 28 Tay River N
04-01-302-2	2.8	Blackstone	FTRN 28 Tay River N
04-01-302-3	2.8	Blackstone	FTRN 28 Tay River N
04-01-302-4	2.8	Blackstone	FTRN 28 Tay River N
04-01-302-5	2.8	Blackstone	FTRN 28 Tay River N
04-01-302-6	2.8	Blackstone	FTRN 28 Tay River N
04-01-302-7	2.6	Blackstone	FTRN 28 Tay River N
04-01-302-8	2.8	Blackstone	FTRN 28 Tay River N
04-01-302-9	2.9	Blackstone	FTRN 28 Tay River N
04-01-302-10	2.8	Blackstone	FTRN 28 Tay River N
04-01-302-11	2.7	Blackstone	FTRN 28 Tay River N
04-01-302-12	2.9	Blackstone	FTRN 28 Tay River N
04-01-302-13	3.1	Blackstone	FTRN 28 Tay River N
04-01-302-14	2.9	Blackstone	FTRN 28 Tay River N
04-01-302-15	3.5	Blackstone	FTRN 28 Tay River N
04-01-302-16	3.4	Blackstone	FTRN 28 Tay River N

04-01-302-17	3.9	Blackstone	FTRN 28 Tay River N
04-01-302-18	3.6	Blackstone	FTRN 28 Tay River N
04-01-302-19	3.2	Blackstone	FTRN 28 Tay River N
04-01-302-20	3.2	Blackstone	FTRN 28 Tay River N
Top			
04-01-214-1	4.4	Wapiabi	FTRS 1 Teepee Pole Creek
04-01-214-2	4.2	Wapiabi	FTRS 1 Teepee Pole Creek
04-01-215-1	4.1	Wapiabi	FTRS 1 Teepee Pole Creek
04-01-215-2	4.1	Wapiabi	FTRS 1 Teepee Pole Creek
04-01-215-3	4.0	Wapiabi	FTRS 1 Teepee Pole Creek
04-01-215-4	4.3	Wapiabi	FTRS 1 Teepee Pole Creek
04-01-215-5	4.3	Wapiabi	FTRS 1 Teepee Pole Creek
04-01-217-1	4.1	Wapiabi	FTRS 7 James River West
04-01-217-2	3.3	Wapiabi	FTRS 7 James River West
04-01-217-3	3.5	Wapiabi	FTRS 7 James River West
04-01-217-4	3.4	Wapiabi	FTRS 7 James River West
04-01-217-5	5.4	Wapiabi	FTRS 7 James River West
Base			
04-01-303-1	3.7	Wapiabi	FTRS 7 James River West
04-01-303-2	3.9	Wapiabi	FTRS 7 James River West
04-01-303-3	3.9	Wapiabi	FTRS 7 James River West
04-01-303-4	3.4	Wapiabi	FTRS 7 James River West
04-01-303-5	3.7	Wapiabi	FTRS 7 James River West
04-01-303-6	3.9	Wapiabi	FTRS 7 James River West
04-01-303-7	4.5	Wapiabi	FTRS 7 James River West
04-01-303-8	4.5	Wapiabi	FTRS 7 James River West
04-01-303-9	4.5	Wapiabi	FTRS 7 James River West
04-01-303-10	4.7	Wapiabi	FTRS 7 James River West
04-01-303-11	3.0	Wapiabi	FTRS 7 James River West
04-01-303-12	3.0	Wapiabi	FTRS 7 James River West
04-01-303-13	3.1	Wapiabi	FTRS 7 James River West
04-01-303-14	3.4	Wapiabi	FTRS 7 James River West
04-01-303-15	3.4	Wapiabi	FTRS 7 James River West
04-01-303-16	3.2	Wapiabi	FTRS 7 James River West
04-01-303-17	3.2	Wapiabi	FTRS 7 James River West
04-01-303-18	3.4	Wapiabi	FTRS 7 James River West
04-01-303-19	3.5	Wapiabi	FTRS 7 James River West
04-01-303-20	4.2	Wapiabi	FTRS 7 James River West
04-01-303-21	4.4	Wapiabi	FTRS 7 James River West
04-01-303-22	3.9	Wapiabi	FTRS 7 James River West
Top			
Top			
04-01-304-5	3.8	Wapiabi	FTRS 7 James River West
04-01-304-4	3.8	Wapiabi	FTRS 7 James River West
04-01-304-3	3.9	Wapiabi	FTRS 7 James River West
04-01-304-2	3.5	Wapiabi	FTRS 7 James River West
04-01-304-1	3.6	Wapiabi	FTRS 7 James River West
04-01-304-6	3.5	Wapiabi	FTRS 7 James River West
04-01-304-7	3.8	Wapiabi	FTRS 7 James River West
04-01-304-8	3.6	Wapiabi	FTRS 7 James River West
Base			

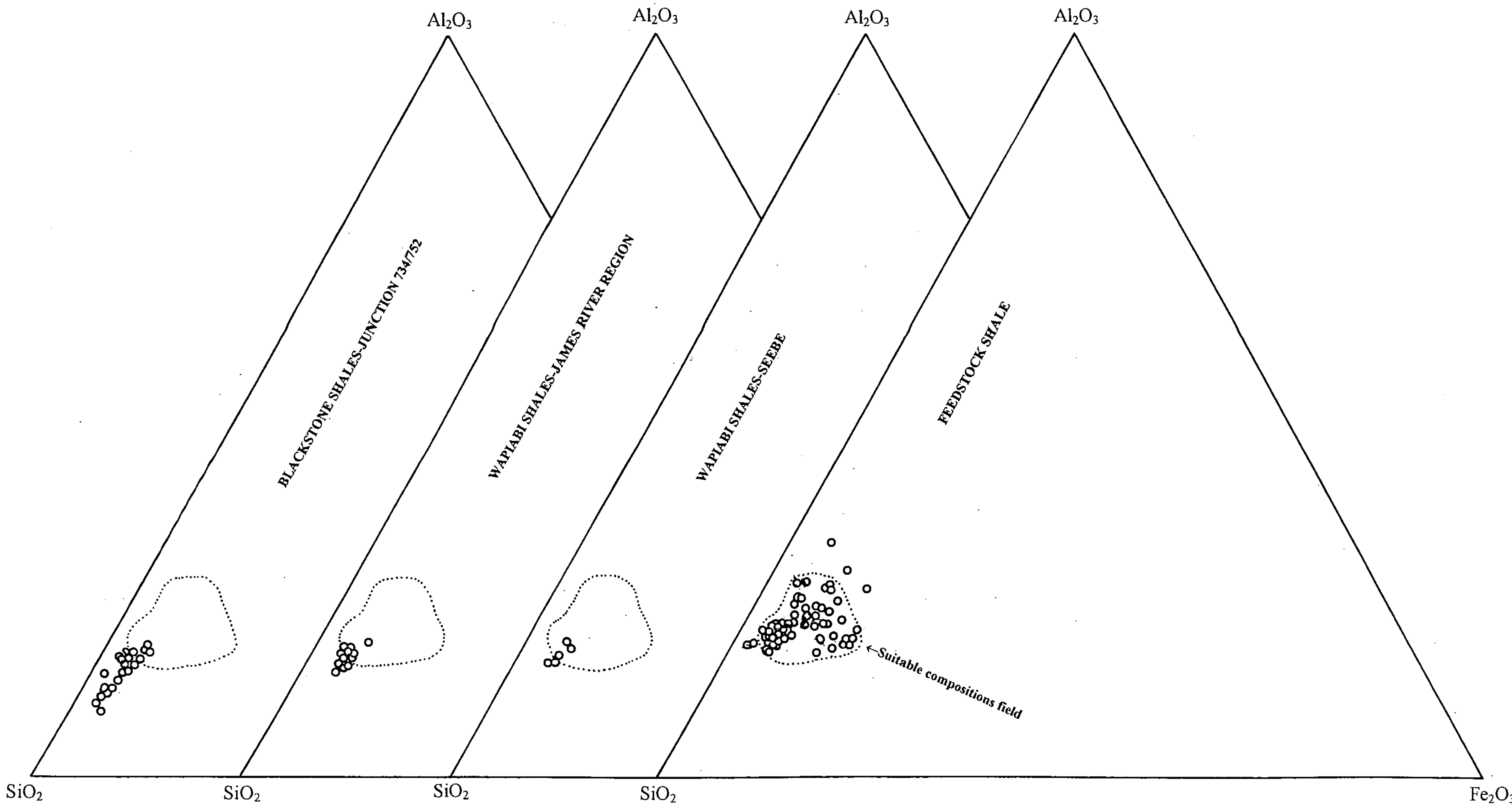


Figure 10: $SiO_2/Al_2O_3/Fe_2O_3$ relationships in Blackstone and Wapiabi shales (1).

Figure 11: $SiO_2/Al_2O_3/Fe_2O_3$ relationships in Blackstone and Wapiabi shales (2).

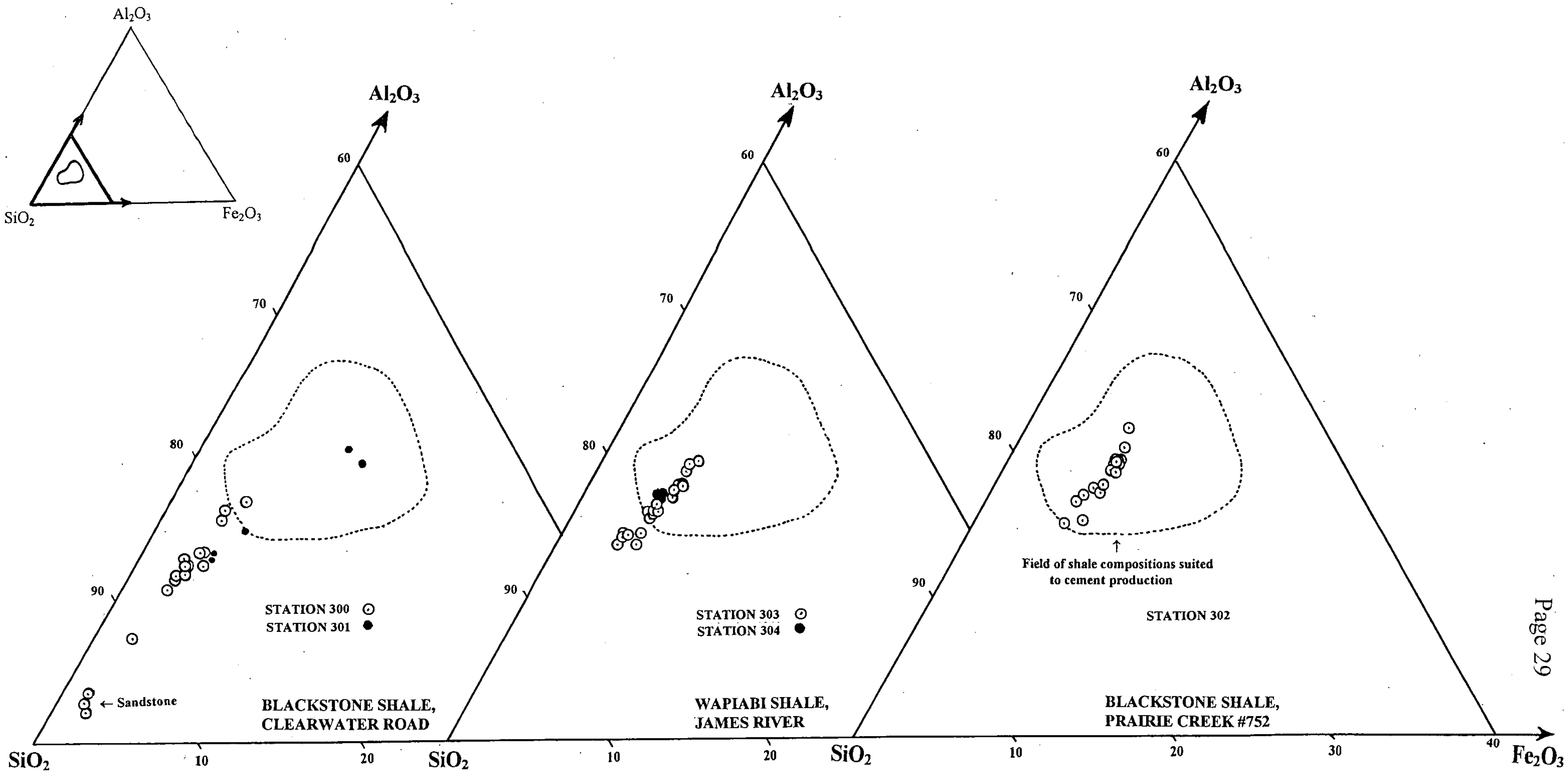
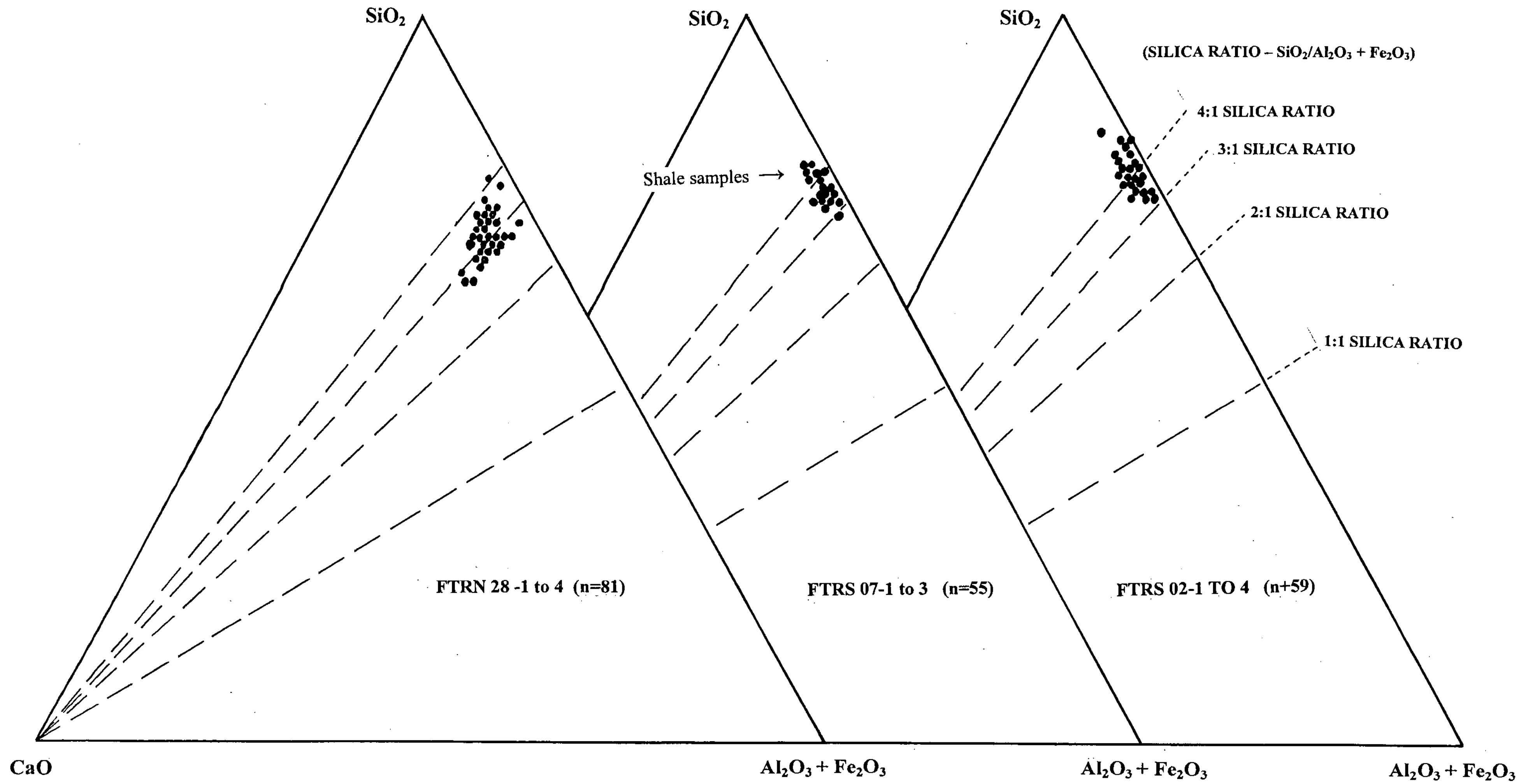


Figure 12: CaO/SiO_2/Al_2O_3+Fe_2O_3 plot of Blackstone shales (FTRN 28) and Wapiabi shales (FTRS 07 and FTRS 02).

CaO/SiO_2/Al_2O_3+Fe_2O_3 plot of Blackstone shales (FTRN 28) and Wapiabi shales (FTRS 07 and FTRS 02)



Silica Investigations:

Sandstone samples from the Blairmore and Brazeau Formations (Table 7) rarely exhibit silica contents greater than 75% and in many instances exhibit equivalent alkali ($Na_2O + 0.658\ K_2O$) contents close to, or above, the recommended cut-off of 3%. No further work is recommended for these two formations.

All sandstone samples collected from outcrops of the Cardium Formation exhibit SiO_2 contents greater than 90%, making this formation ideally suitable as a source of secondary silica. Samples from station 222 appear to show a consistent increase in silica contents up section, from 90% near the base of the 16 m thick unit, to almost 95% near the top (Table 8). Alumina and iron contents show a corresponding decrease in the upper parts of the section, as does zirconium. At this locality the unit is apparently cleaning up (becoming more siliceous) as the sedimentation moves away from the deeper water conditions that prevailed during deposition of the underlying Blackstone Formation. Similar trends in the Chungo sandstone have been referred to as "Upward Shoaling" (Lerand, 1982).

Further work (shallow, 30 m drilling, perpendicular to the bedding planes) is therefore recommended for several of the Cardium Sandstone prospects, giving priority to those with good access and proximity to the Clearwater Property (FTRN 1, FTRN 5 and FTRN 8 - in that order). Other localities where the Cardium sandstone is known to occur (FTRN 27, FTRN 6), can be drilled at a later date.

Table 7: Sandstone analyses from the Brazeau and Blairmore Formations; Teepee-Pole Creek, FTRS 25 and Bread Creek, FTRS 3 and 19.

SAMPLE#	SiO_2 %	Al_2O_3 %	Fe_2O_3 %	MgO %	CaO %	Na_2O %	K_2O %	TiO_2 %	P_2O_5 %	MnO %	Cr_2O_3 %	Ba ppm	Ni ppm	Sr ppm	Zr ppm	Y ppm	Nb ppm	Sc ppm	LOI %	TOT/C %	TOT/S %	SUM %
04-01-211	62.78	14.52	7.40	2.33	1.16	4.54	1.98	.70	.24	.05	.011	2080	<20	322	127	14	<10	10	4.0	.26	.02	100.00
04-01-212-1	66.92	13.83	5.52	1.55	.84	4.51	2.41	.45	.21	.09	.005	1934	<20	278	110	14	18	7	3.4	.29	.02	100.01
04-01-212-2	66.45	14.29	6.15	1.87	.48	4.56	1.87	.56	.15	.04	.009	1829	28	274	106	12	<10	9	3.3	.23	.04	99.99
04-01-213	68.48	11.56	5.36	1.13	2.16	3.25	.97	.39	.10	.09	.003	529	25	174	66	<10	<10	4	5.0	.66	<.01	98.59
RE 04-01-213	69.68	11.63	5.46	1.15	2.17	3.27	.94	.39	.10	.09	.005	537	<20	175	80	<10	<10	5	5.1	.65	.01	100.08
04-01-216-1	71.51	12.03	4.75	1.04	.75	3.36	.83	.65	.15	.08	.016	488	25	136	181	12	<10	8	4.3	.28	.01	99.56
04-01-216-2	78.80	9.54	3.67	.87	.25	2.58	.69	.47	.14	.02	.010	435	27	98	86	<10	<10	6	2.4	.18	.04	99.52
04-01-216-3	63.13	7.94	2.40	.61	10.30	2.28	.62	.31	.10	.53	.004	947	20	305	69	10	<10	5	11.2	3.01	.03	99.58

Table 8: Cardium sandstone analyses; FTRN 1, FTRN 2, FTRN 2N, FTRN 5 and FTRN 8.

SAMPLE#	SiO2 %	Al2O3 %	Fe2O3 %	MgO %	CaO %	Na2O %	K2O %	TiO2 %	P2O5 %	MnO %	Cr2O3 %	Ba ppm	Ni ppm	Sr ppm	Zr ppm	Y ppm	Nb ppm	Sc ppm	LOI %	TOT/C %	TOT/S %	SUM %
04-01-209-1	92.09	3.12	1.13	.27	.26	.44	.67	.19	.13	<.01	.004	258	<20	39	169	<10	15	2	1.6	.22	<.01	99.97
04-01-209-2	92.06	2.64	1.96	.20	.17	.43	.48	.22	.14	.01	.011	215	24	38	391	11	19	2	1.5	.16	<.01	99.91
04-01-209-3	92.09	2.50	1.48	.20	.17	.39	.46	.23	.14	<.01	.006	217	30	41	524	<10	29	2	1.3	.19	<.01	99.08
04-01-219-1	92.91	2.85	.94	.18	.13	.32	.53	.11	.08	.01	<.001	213	29	27	65	<10	10	2	1.6	.08	<.01	99.70
04-01-219-2	93.15	2.16	1.59	.11	.06	.20	.38	.08	.06	.01	<.001	177	22	18	30	<10	<10	1	2.0	.11	.02	99.83
04-01-220-1	92.28	2.53	2.09	.12	.08	.24	.48	.12	.11	<.01	<.001	262	33	23	74	<10	<10	2	1.6	.09	<.01	99.70
04-01-220-2	92.60	2.40	1.30	.19	.21	.18	.52	.40	.17	.01	.002	185	26	48	1111	22	10	3	1.5	.09	.02	99.67
04-01-221-1	92.71	2.41	1.40	.24	.19	.20	.42	.36	.14	.01	.009	189	44	46	1154	21	<10	3	1.3	.04	.02	99.59
04-01-221-2	93.40	2.30	1.27	.18	.15	.25	.44	.20	.13	.01	<.001	160	23	32	321	11	<10	2	1.4	.07	.01	99.80
04-01-222-1	88.67	2.85	2.70	.37	.48	.25	.69	.50	.20	.01	.007	286	42	63	1832	29	13	3	2.4	.53	.04	99.43
04-01-222-2	90.71	2.75	2.77	.23	.18	.24	.48	.23	.14	.01	.002	236	56	41	462	14	10	3	1.7	.17	<.01	99.54
04-01-222-3	91.80	2.93	2.38	.22	.17	.25	.59	.19	.16	.01	<.001	257	31	36	180	10	<10	2	1.4	.15	.01	100.17
RE 04-01-222-3	91.44	2.92	2.34	.22	.16	.27	.57	.19	.15	<.01	<.001	256	33	37	203	11	<10	2	1.3	.15	<.01	99.64
04-01-222-4	93.95	2.53	.89	.16	.14	.27	.59	.12	.10	<.01	<.001	303	<20	25	79	<10	<10	1	.9	.08	.01	99.70
04-01-222-5	93.05	2.38	2.07	.14	.13	.29	.53	.11	.11	.01	<.001	217	32	25	76	<10	<10	2	.8	.08	<.01	99.66
04-01-222-6	94.77	2.04	.99	.12	.07	.20	.49	.11	.05	.01	<.001	182	20	21	82	<10	<10	1	.7	.07	<.01	99.59
04-01-223	91.43	3.28	1.97	.29	.12	.27	.62	.20	.11	<.01	.001	253	<20	43	292	10	<10	2	1.2	.10	.01	99.57

METALLIC AND INDUSTRIAL MINERALS PERMITS, CLEARWATER REGION			
889966 ALBERTA LTD. PROPOSED CONSOLIDATED HOLDINGS			
PERMIT #	*PROSPECT#*	*LOCATION*	*HECTARES*
9302020054	FTRS 1, 2	5-09-034: 2NE, L11, L14; 11S, NW, L10, L15	320
9302020055	FTRN 1	5-09-035: 5NE, L11, L14; 7NE; 8S, NW, L10, L15	384
9302020056	FTRN 4, 5	5-10-035: 19L12-L14: 30L3, L4 5-11-035: 24NE, L14; 26L8, L9, L16; 35L1; 36L4; 25L1-L6, L12, L13	368
9302020057	FTRN 29	5-10-035: 24N; 25S; 26SE	320
9302020058	FTRN 8	5-11-036: 2SW; 3NE, L1, L7, L8, L11, L13, L14	224
		PROPOSED NEW TOTAL	**1616**

CONCLUSIONS AND RECOMMENDATIONS:

Reconnaissance investigations in the region adjacent to the Clearwater Property aimed at locating alumina-enriched secondary raw materials for kiln feedstock. Restricted intervals/geological units near the centre of the Blackstone and Wapiabi shale formations show promising potential. Sampling of bedrock exposures indicates the shales are relatively enriched in silica compared to those currently used by industry. Nevertheless, several samples analyzed from both the Blackstone and Wapiabi formations plot within the $SiO_2/Al_2O_3/Fe_2O_3$ compositional field suited to production. Equivalent alkali contents are significantly below 3% (the recommended upper limit), and most other elements are well below levels considered to be deleterious.

Shallow drilling is recommended in seven prospects (Prospects FTRN 28 and FTRS 2, 6, 7, 23) to determine the thickness, extent and compositional variations in the targeted shale units. Five prospects are east and south of the Clearwater Property, three are to the north and west. Since it has now been shown that the Blackstone and Wapiabi shale formations contain members with a chemistry potentially suited to feedstock, other prospects closer to the Clearwater Property (FTRN 1 and FTRN 29 adjacent to the new Clearwater Road) should also be subjected to follow-up drilling, with the intent of locating the more aluminous and iron-rich Vimy and Thistle members.

A concurrent investigation, looking for sources of secondary raw materials enriched in silica, concluded that sandstones in the Brazeau and Blairmore formations are relatively feldspathic and are unsuitable as feedstock.

At all locations sampled, sandstone from the Cardium Formation consistently contains > 90% SiO_2. Drilling is proposed for Prospects FTRN 4, 5 and 8, as well as FTRN 1. The new Clearwater Road offers opportunities for accessing the northern region as well as ready access to outcrops of the Cardium sandstone (FTRN 29) that appear to have favourable quarrying attributes. This locality should be evaluated further to confirm the presence of quarriable siliceous sandstone and to outline a follow-up drilling program aimed at defining suitable reserves.

Consolidation of permitted areas is recommended (Table 9).

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APPENDIX

CHEMICAL ANALYSES

FILE NUMBERS	A101793
	A102606
	A102606R
	A103238
	A103238R
	A103732

[redacted]ME [redacted]TI[redacted] LA[redacted]TOR[redacted] LTD[redacted] 8[redacted]E. [redacted]ING[redacted]. V[redacted]UVE[redacted]C V[redacted]LR6 [redacted] PH[redacted]604[redacted]-31[redacted]FAX[redacted]5[redacted]16 [redacted]
(ISO 02 Accredited Co.)

WHOLE ROCK ICP ANALYSIS

File # A101793 Page 1

SAMPLE#	SiO2 %	Al2O3 %	Fe2O3 %	MgO %	CaO %	Na2O %	K2O %	TiO2 %	P2O5 %	MnO %	Cr2O3 %	Ba ppm	Ni ppm	Sr ppm	Zr ppm	Y ppm	Nb ppm	Sc ppm	LOI %	TOT/C %	TOT/S %	SUM %
04-01-CB1	68.53	12.91	4.36	1.67	1.36	.47	2.43	.74	.14	.01	.012	1385	59	132	182	24	20	13	7.0	1.55	1.19	99.85
04-01-CB2	69.09	12.69	3.94	1.83	1.42	.45	2.41	.71	.16	.01	.014	1428	48	127	188	23	19	12	6.9	1.58	.97	99.84
04-01-CB3	66.47	13.70	3.89	2.14	1.62	.42	2.74	.75	.17	.02	.010	1419	53	145	169	24	18	13	7.7	1.84	.66	99.85
04-01-CB4	65.05	14.90	4.55	1.98	1.15	.42	2.88	.81	.16	.01	.011	1543	49	142	160	26	20	14	7.7	1.79	1.07	99.84
04-01-CB5	64.15	14.54	4.74	2.13	1.66	.45	2.88	.78	.23	.01	.011	1507	46	145	164	28	20	15	8.0	2.00	1.22	99.81
04-01-BR1	81.23	4.12	3.15	1.76	2.92	.27	.76	.29	.17	.02	.006	561	26	133	186	12	15	4	5.0	1.08	.03	99.81
04-01-BR2	76.05	6.11	4.00	2.40	3.02	.44	1.07	.30	.15	.02	<.001	487	<20	77	110	14	14	4	6.2	1.58	.21	99.85
04-01-BR3	91.34	1.83	1.56	.85	1.37	.22	.39	.10	.10	.01	.008	263	25	35	48	<10	10	2	2.0	.57	.14	99.82
04-01-BR4	95.37	1.64	.80	.25	.22	.13	.42	.10	.08	.01	.004	322	20	31	47	<10	<10	2	.9	.12	.06	99.98
04-01-BR5	96.09	1.16	.82	.21	.16	.10	.33	.08	.04	.01	.011	194	25	25	41	<10	<10	2	.9	.11	.14	99.94
04-01-BR6	91.30	2.51	1.11	.66	1.13	.24	.51	.11	.07	.01	.002	231	<20	51	44	<10	<10	2	2.2	.42	.20	99.89
04-01-001-1	85.97	6.19	2.39	.59	.27	1.34	.62	.27	.08	.03	.012	505	22	70	50	<10	<10	5	2.0	.17	<.01	99.84
04-01-001-2	75.53	11.57	3.43	.92	.55	2.63	.96	.52	.13	.11	.008	658	39	124	85	<10	10	7	3.3	.19	<.01	99.76
04-01-001-3	79.02	9.91	3.33	.84	.32	2.47	.51	.31	.10	.04	.006	453	34	102	64	<10	<10	6	2.8	.10	.01	99.74
04-01-001-4	73.27	12.81	3.89	1.03	.40	3.14	.96	.52	.12	.08	.004	635	28	138	115	<10	<10	8	3.4	.12	<.01	99.73
RE 04-01-001-4	73.51	12.72	3.89	1.03	.40	3.14	.99	.51	.12	.08	.009	634	38	137	97	<10	<10	8	3.4	.13	.01	99.91
04-01-002-1	72.64	13.87	3.35	1.00	.40	2.99	.69	.71	.11	.03	.009	498	36	112	129	11	11	11	4.0	.13	<.01	99.89
04-01-002-2	63.72	12.11	4.87	1.25	5.81	2.85	.66	.50	.10	.17	.008	507	48	269	70	10	<10	8	7.7	1.40	<.01	99.85
04-01-002-3	69.22	14.27	3.97	1.03	1.47	3.40	.76	.59	.14	.15	.008	757	45	143	103	14	<10	9	4.8	.34	.01	99.93
04-01-002-4	60.24	13.07	4.43	1.54	6.53	2.18	1.30	.70	.13	.32	.009	1497	39	254	133	18	10	10	9.0	1.62	.02	99.67
04-01-003	64.19	15.50	5.20	1.63	.48	.44	3.00	.85	.15	.02	.011	2018	46	126	158	25	20	15	8.1	1.35	.03	99.85
04-01-005-1	67.80	14.25	4.13	1.71	.88	.44	2.60	.83	.17	.01	.014	1236	67	121	189	27	22	14	6.8	1.41	.28	99.83
04-01-005-2	69.61	13.48	3.65	1.67	.92	.44	2.46	.80	.20	.01	.013	1018	149	110	194	27	24	13	6.3	1.39	.25	99.73
04-01-005-3	67.88	13.94	4.26	1.66	.84	.44	2.58	.82	.18	.01	.015	1296	55	110	185	25	22	14	6.9	1.45	.51	99.72
04-01-005-4	69.12	13.52	4.03	1.57	.75	.43	2.55	.79	.19	.01	.012	1117	47	104	191	26	22	13	6.7	1.38	.41	99.85
04-01-005-5	67.68	14.40	3.95	1.58	.67	.43	2.81	.81	.17	.01	.011	1447	59	110	174	27	19	14	7.0	1.44	.14	99.74
04-01-006-1	67.42	14.15	4.05	1.92	1.15	.39	2.80	.77	.16	.01	.011	1447	63	116	169	25	20	14	6.8	1.41	.48	99.85
04-01-006-2	67.89	14.45	3.84	1.71	.88	.41	2.75	.82	.16	.01	.014	1336	42	114	192	26	20	15	6.7	1.51	.45	99.84
STANDARD SO-15/CSB	48.93	12.54	7.36	7.32	5.90	2.37	1.86	1.75	2.72	1.40	1.062	1978	81	399	999	21	30	12	5.9	2.50	5.39	99.54

GROUP 4A - 0.200 GM SAMPLE BY LIBO2 FUSION, ANALYSIS BY ICP-ES. LOI BY LOSS ON IGNITION.
TOTAL C & S BY LECO. (NOT INCLUDED IN THE SUM)
- SAMPLE TYPE: ROCK R150 60C
Samples beginning 'RE' are Reruns and 'RRE' are Reject Reruns.

DATE RECEIVED: JUN 22 2001 DATE REPORT MAILED: July 5/01 SIGNED BY [redacted] D. TOYE, C.LEONG, J. WANG; CERTIFIED B.C. ASSAYERS

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Data FA

SAMPLE#	SiO_2 %	Al_2O_3 %	Fe_2O_3 %	MgO %	CaO %	Na_2O %	K_2O %	TiO_2 %	P_2O_5 %	MnO %	Cr_2O_3 %	Ba ppm	Ni ppm	Sr ppm	Zr ppm	Y ppm	Nb ppm	Sc ppm	LOI %	TOT/C %	TOT/S %	SUM %
04-01-006-3	69.52	13.83	3.54	1.51	.81	.44	2.40	.80	.17	.01	.016	1233	55	102	186	27	23	13	6.7	1.34	.34	99.94
04-01-006-4	70.02	13.03	3.91	1.51	.99	.47	2.31	.77	.19	.01	.010	1288	31	106	209	27	22	12	6.5	1.45	.77	99.92
04-01-006-5	70.67	12.14	3.97	1.47	1.16	.42	2.18	.72	.20	.01	.011	1263	40	104	209	26	17	12	6.8	1.34	.94	99.95
04-01-006-6	71.59	12.35	3.32	1.54	1.01	.42	2.28	.72	.19	.01	.015	1184	48	108	208	26	14	11	6.3	1.29	.37	99.93
04-01-006-7	69.25	12.90	4.18	1.58	1.00	.43	2.40	.76	.19	.01	.016	1264	71	114	219	25	15	12	6.9	1.30	1.03	99.82
04-01-007	.68	.12	.08	17.48	34.60	.02	.02	.01	.04	<.01	.006	20	26	300	<10	<10	<10	<1	46.2	13.44	.02	99.30
04-01-008-1	94.02	2.11	1.43	.24	.23	.26	.28	.12	.11	.01	.004	240	<20	28	63	<10	<10	2	1.2	.12	<.01	100.06
04-01-008-2	92.85	2.93	1.38	.29	.24	.34	.44	.14	.11	.01	.006	286	37	32	106	<10	<10	2	1.3	.08	<.01	100.09
04-01-008-3	94.46	1.91	1.35	.18	.17	.29	.32	.11	.10	.01	.006	219	41	24	57	<10	<10	1	1.1	.06	<.01	100.04
04-01-008-4	94.46	1.64	1.50	.15	.23	.24	.31	.22	.16	.01	.008	166	36	39	355	12	<10	2	1.0	.06	.01	100.00
04-01-008-5	94.07	1.65	1.42	.14	.30	.23	.33	.40	.21	.02	.019	163	47	56	947	18	12	2	1.0	.05	<.01	99.95
04-01-008-6	94.44	2.16	1.09	.22	.16	.30	.39	.11	.08	<.01	.006	210	31	30	52	<10	<10	1	1.0	.07	<.01	100.00
04-01-009-1	70.94	14.50	3.00	1.15	.27	.38	2.57	.85	.17	.01	.019	1064	62	114	215	27	21	14	5.9	.97	<.01	99.93
04-01-009-2	69.30	15.13	3.20	1.19	.30	.36	2.68	.86	.17	.01	.015	1231	42	115	208	29	23	14	6.4	.95	.02	99.81
04-01-009-3	67.08	14.45	5.53	1.18	.32	.37	2.60	.83	.25	.02	.015	1033	53	113	196	30	20	13	7.0	.95	<.01	99.81
04-01-009-4	70.14	14.56	3.07	1.15	.27	.38	2.60	.85	.19	.01	.016	992	38	129	220	27	20	14	6.4	.93	.03	99.80
RE 04-01-009-4	70.12	14.66	3.06	1.14	.28	.38	2.65	.86	.18	.01	.013	1007	45	129	213	27	20	14	6.3	.94	.02	99.82
04-01-010-1	70.77	13.87	3.56	1.15	.33	.38	2.55	.81	.20	.01	.014	991	57	114	219	32	19	13	6.0	.84	<.01	99.81
04-01-010-2	71.21	13.92	3.14	1.16	.30	.38	2.63	.81	.17	.01	.013	1005	36	123	225	28	19	13	5.9	.86	.04	99.81
04-01-010-3	70.31	13.45	4.30	1.16	.30	.37	2.61	.78	.23	.02	.015	1014	53	122	234	30	16	13	6.1	.87	.08	99.82
04-01-010-4	73.60	12.23	3.01	1.04	.23	.37	2.37	.73	.15	<.01	.019	903	147	112	252	23	17	11	5.9	.78	.13	99.83
04-01-010-5	70.56	13.82	3.34	1.20	.25	.37	2.72	.78	.18	.01	.016	1039	45	126	227	26	19	13	6.4	.84	.11	99.82
04-01-010-6	69.96	14.33	3.48	1.27	.30	.39	2.73	.79	.18	.01	.018	1013	52	119	216	28	17	13	6.2	.88	.03	99.83
04-01-010-7	71.17	14.14	2.86	1.23	.30	.42	2.83	.79	.18	.01	.022	1019	91	129	224	25	16	13	5.7	.92	.03	99.83
04-01-010-8	72.57	12.85	3.62	1.11	.33	.43	2.31	.76	.18	.02	.015	1027	64	99	254	28	22	12	5.6	.90	.02	99.97
04-01-010-9	73.09	12.42	3.41	1.07	.34	.41	2.27	.75	.18	.01	.014	994	61	94	276	29	19	12	5.8	.89	<.01	99.94
04-01-010-10	76.87	10.80	3.12	.96	.33	.42	1.98	.68	.19	.01	.007	870	37	84	288	28	17	10	4.3	.74	.01	99.83
04-01-010-11	75.96	11.10	2.94	1.03	.30	.42	2.11	.68	.20	.01	.014	902	74	101	269	26	17	11	4.9	.84	.02	99.83
04-01-010-12	77.43	10.11	2.93	.96	.30	.43	1.94	.65	.19	.01	.011	752	59	94	300	27	17	10	4.8	.78	.03	99.91
04-01-010-13	71.22	13.58	3.08	1.22	.29	.43	2.88	.77	.17	.01	.015	1093	82	116	226	25	18	13	6.0	.92	.03	99.85
04-01-010-14	74.72	11.78	3.45	1.05	.28	.47	2.27	.72	.17	.01	.013	1018	54	101	291	25	24	12	4.7	.78	.02	99.81
04-01-010-15	77.27	10.61	3.10	.98	.29	.44	1.93	.67	.16	.01	.011	912	44	84	306	25	19	10	4.2	.65	.04	99.84
04-01-010-16	79.45	9.48	2.65	.91	.29	.46	1.82	.62	.18	.01	.010	923	43	79	305	23	18	9	3.8	.62	.02	99.84
04-01-010-17	80.31	8.71	2.86	.87	.30	.41	1.64	.57	.17	.01	.013	731	57	73	341	24	16	9	3.8	.57	.01	99.81
STANDARD SO-15/CSB	48.86	12.74	7.34	7.30	5.85	2.42	1.86	1.78	2.72	1.40	1.062	2026	80	398	959	21	35	12	5.9	2.52	5.47	99.65

Sample type: ROCK R150 60C. Samples beginning 'RE' are Reruns and 'RRE' are Reject Reruns.

Data FA

SAMPLE#	SiO2 %	Al2O3 %	Fe2O3 %	MgO %	CaO %	Na2O %	K2O %	TiO2 %	P2O5 %	MnO %	Cr2O3 %	Ba ppm	Ni ppm	Sr ppm	Zr ppm	Y ppm	Nb ppm	Sc ppm	LOI %	TOT/C %	TOT/S %	SUM %
04-01-010-18	80.57	8.99	2.59	.80	.27	.40	1.77	.56	.18	.01	.013	672	42	71	349	24	16	9	3.7	.59	<.01	99.99
04-01-011-1	93.95	2.13	1.37	.15	.13	.31	.40	.11	.10	<.01	.011	188	57	24	73	<10	<10	2	1.3	.24	<.01	100.01
04-01-011-2	92.43	2.18	2.61	.16	.09	.29	.41	.10	.09	.01	.012	185	27	24	62	<10	<10	2	1.6	.18	<.01	100.02
04-01-011-3	92.46	2.27	1.96	.20	.14	.20	.32	.24	.13	.01	.010	196	28	42	585	16	<10	3	1.8	.12	<.01	99.85
04-01-012-1	71.23	13.19	4.28	1.58	.51	3.44	1.40	.50	.19	.04	.013	993	29	169	89	14	<10	10	3.3	.15	<.01	99.82
04-01-012-2	68.23	13.87	6.14	2.07	.47	3.73	1.02	.54	.17	.07	.010	620	42	167	80	14	<10	12	3.5	.15	<.01	99.93
04-01-013-1	93.59	2.10	1.50	.18	.09	.20	.37	.22	.10	<.01	.017	183	29	35	462	11	<10	2	1.5	.12	<.01	99.96
04-01-013-2	94.81	1.64	1.42	.14	.08	.19	.32	.09	.07	.01	.003	189	23	24	48	<10	<10	2	1.2	.21	<.01	100.01
04-01-013-3	94.86	1.66	1.26	.12	.04	.19	.37	.09	.07	.01	.009	171	<20	23	61	<10	<10	2	1.2	.18	<.01	99.91
04-01-014-1	94.63	1.71	1.02	.16	.19	.18	.27	.37	.14	<.01	.011	172	<20	44	1109	23	<10	3	1.2	.05	<.01	100.07
04-01-014-2	93.23	2.26	.84	.18	.24	.23	.41	.57	.18	<.01	.029	183	52	55	2766	38	14	4	1.3	.07	<.01	99.89
04-01-015-1	58.20	1.95	1.06	5.57	14.20	.26	.61	.12	.12	.04	.002	267	<20	120	95	<10	<10	2	17.7	5.08	<.01	99.89
04-01-015-2	63.14	2.54	1.47	4.02	12.48	.37	.67	.14	.12	.04	.010	337	33	131	87	10	<10	2	15.0	4.17	.01	100.07
RE 04-01-015-2	63.35	2.54	1.47	4.00	12.37	.39	.63	.13	.13	.04	.009	339	20	131	87	11	<10	2	14.9	4.14	.01	100.03
04-01-016-1	49.10	9.79	3.17	.73	17.65	2.16	.98	.34	.14	.33	.001	984	34	339	62	<10	<10	6	15.5	4.00	<.01	100.05
04-01-016-2	45.35	9.71	3.20	.83	19.88	1.96	.80	.49	.11	.38	.010	763	30	379	83	15	<10	8	16.9	4.56	<.01	99.77
04-01-016-3	63.31	11.80	3.27	.76	7.70	2.95	.72	.43	.12	.24	.005	677	22	263	81	11	<10	7	8.5	1.82	<.01	99.93
04-01-016-4	74.51	12.46	3.96	.82	.60	3.37	.48	.37	.14	.04	.009	578	24	135	70	13	<10	6	3.2	.12	<.01	100.05
STANDARD SO-15/CSB	49.62	12.88	7.13	7.09	5.72	2.35	1.86	1.72	2.64	1.36	1.053	1997	72	387	1077	23	33	13	5.9	2.52	5.34	99.75

Sample type: ROCK R150 60C. Samples beginning 'RE' are Reruns and 'RRE' are Reject Reruns.

Data ___ FA ___

SAMPLE#	SiO_2 %	Al_2O_3 %	Fe_2O_3 %	MgO %	CaO %	Na_2O %	K_2O %	TiO_2 %	P_2O_5 %	MnO %	Cr_2O_3 %	Ba ppm	Ni ppm	Sr ppm	Zr ppm	Y ppm	Nb ppm	Sc ppm	LOI %	TOT/C %	TOT/S %	SUM %
04-01-207	68.67	12.37	5.81	1.05	.29	.60	2.24	.85	.21	.01	.017	944	31	115	251	34	19	12	7.7	1.89	.13	99.98
04-01-209-1	92.09	3.12	1.13	.27	.26	.44	.67	.19	.13	<.01	.004	258	<20	39	169	<10	15	2	1.6	.22	<.01	99.97
04-01-209-2	92.06	2.64	1.96	.20	.17	.43	.48	.22	.14	.01	.011	215	24	38	391	11	19	2	1.5	.16	<.01	99.91
04-01-209-3	92.09	2.50	1.48	.20	.17	.39	.46	.23	.14	<.01	.006	217	30	41	524	<10	29	2	1.3	.19	<.01	99.08
04-01-210-1	66.70	13.73	4.71	.99	.14	.45	3.20	.80	.26	<.01	.016	931	29	103	208	16	36	9	8.8	2.13	.33	99.96
04-01-210-2	67.74	13.75	4.44	.99	.20	.46	3.13	.79	.21	<.01	.013	1048	<20	106	188	14	13	9	8.1	2.05	.25	99.98
04-01-211	62.78	14.52	7.40	2.33	1.16	4.54	1.98	.70	.24	.05	.011	2080	<20	322	127	14	<10	10	4.0	.26	.02	100.00
04-01-212-1	66.92	13.83	5.52	1.55	.84	4.51	2.41	.45	.21	.09	.005	1934	<20	278	110	14	18	7	3.4	.29	.02	100.01
04-01-212-2	66.45	14.29	6.15	1.87	.48	4.56	1.87	.56	.15	.04	.009	1829	28	274	106	12	<10	9	3.3	.23	.04	99.99
04-01-213	68.48	11.56	5.36	1.13	2.16	3.25	.97	.39	.10	.09	.003	529	25	174	66	<10	<10	4	5.0	.66	<.01	98.59
RE 04-01-213	69.68	11.63	5.46	1.15	2.17	3.27	.94	.39	.10	.09	.005	537	<20	175	80	<10	<10	5	5.1	.65	.01	100.08
04-01-214-1	71.25	11.60	4.94	1.25	.40	.47	2.92	.72	.18	.02	.008	1239	20	93	262	25	31	10	6.0	.82	.07	99.95
04-01-214-2	70.65	12.44	4.55	1.33	.38	.52	2.86	.78	.15	.01	.013	1076	41	98	252	25	15	11	6.1	.89	.02	99.96
04-01-215-1	70.59	12.24	4.86	1.31	.36	.50	2.99	.77	.15	.01	.013	1246	<20	99	262	24	<10	11	6.0	.86	.01	99.99
04-01-215-2	70.56	12.31	4.80	1.35	.40	.49	2.85	.76	.15	.01	.013	1057	29	96	255	24	16	11	6.1	.95	.03	99.97
04-01-215-3	69.28	12.88	4.64	1.48	.55	.49	2.82	.79	.14	.01	.012	1271	25	104	241	25	<10	11	6.7	1.08	.03	99.99
04-01-215-4	70.60	11.90	4.63	1.44	.61	.50	2.79	.74	.14	.01	.020	1246	<20	95	258	22	<10	10	6.3	1.02	.06	99.87
04-01-215-5	71.37	11.93	4.85	1.21	.30	.48	2.77	.76	.16	.01	.014	1168	23	90	272	28	13	11	5.9	.83	.03	99.94
04-01-216-1	71.51	12.03	4.75	1.04	.75	3.36	.83	.65	.15	.08	.016	488	25	136	181	12	<10	8	4.3	.28	.01	99.56
04-01-216-2	78.80	9.54	3.67	.87	.25	2.58	.69	.47	.14	.02	.010	435	27	98	86	<10	<10	6	2.4	.18	.04	99.52
04-01-216-3	63.13	7.94	2.40	.61	10.30	2.28	.62	.31	.10	.53	.004	947	20	305	69	10	<10	5	11.2	3.01	.03	99.58
04-01-217-1	67.07	11.55	4.86	1.74	1.80	.51	2.91	.65	.17	.02	.011	1234	51	125	197	26	<10	11	7.9	1.95	1.73	99.38
04-01-217-2	65.25	14.19	5.34	1.35	.31	.54	3.56	.82	.14	.01	.012	1565	34	112	193	20	11	12	8.2	1.81	.51	99.95
04-01-217-3	66.04	13.74	5.15	1.33	.81	.48	2.84	.75	.15	.01	.014	1628	38	110	181	25	<10	12	8.3	1.60	.84	99.85
04-01-217-4	64.41	12.93	5.79	1.47	1.38	.53	3.18	.73	.15	.02	.014	1368	38	110	205	24	13	11	9.0	1.80	1.10	99.81
04-01-217-5	73.79	9.80	3.82	1.23	1.24	.51	2.27	.55	.18	.02	.010	905	32	100	209	28	<10	10	6.3	1.50	.63	99.87
STANDARD SO-16/CSB	57.50	10.60	11.28	5.68	.10	.35	5.76	.89	.24	.07	.011	845	58	51	239	90	11	22	3.6	2.32	5.31	96.24

GROUP 4A - 0.200 GM SAMPLE BY LIBO2 FUSION, ANALYSIS BY ICP-ES. LOI BY LOSS ON IGNITION.
TOTAL C & S BY LECO. (NOT INCLUDED IN THE SUM)
- SAMPLE TYPE: ROCK R150 60C
Samples beginning 'RE' are Reruns and 'RRE' are Reject Reruns.

DATE RECEIVED: AUG 9 2001 **DATE REPORT MAILED:** Aug 22/01 **SIGNED BY** [redacted] D. TOYE, C.LEONG, J. WANG; CERTIFIED B.C. ASSAYERS

Data ✓ FA ___

SAMPLE#	SiO2 %	Al2O3 %	Fe2O3 %	MgO %	CaO %	Na2O %	K2O %	TiO2 %	P2O5 %	MnO %	Cr2O3 %	Ba ppm	Ni ppm	Sr ppm	Zr ppm	Y ppm	Nb ppm	Sc ppm	LOI %	TOT/C %	TOT/S %	SUM %
04-01-219-1	92.91	2.85	.94	.18	.13	.32	.53	.11	.08	.01	<.001	213	29	27	65	<10	10	2	1.6	.08	<.01	99.70
04-01-219-2	93.15	2.16	1.59	.11	.06	.20	.38	.08	.06	.01	<.001	177	22	18	30	<10	<10	1	2.0	.11	.02	99.83
04-01-220-1	92.28	2.53	2.09	.12	.08	.24	.48	.12	.11	<.01	<.001	262	33	23	74	<10	<10	2	1.6	.09	<.01	99.70
04-01-220-2	92.60	2.40	1.30	.19	.21	.18	.52	.40	.17	.01	.002	185	26	48	1111	22	10	3	1.5	.09	.02	99.67
04-01-221-1	92.71	2.41	1.40	.24	.19	.20	.42	.36	.14	.01	.009	189	44	46	1154	21	<10	3	1.3	.04	.02	99.59
04-01-221-2	93.40	2.30	1.27	.18	.15	.25	.44	.20	.13	.01	<.001	160	23	32	321	11	<10	2	1.4	.07	.01	99.80
04-01-222-1	88.67	2.85	2.70	.37	.48	.25	.69	.50	.20	.01	.007	286	42	63	1832	29	13	3	2.4	.53	.04	99.43
04-01-222-2	90.71	2.75	2.77	.23	.18	.24	.48	.23	.14	.01	.002	236	56	41	462	14	10	3	1.7	.17	<.01	99.54
04-01-222-3	91.80	2.93	2.38	.22	.17	.25	.59	.19	.16	.01	<.001	257	31	36	180	10	<10	2	1.4	.15	.01	100.17
RE 04-01-222-3	91.44	2.92	2.34	.22	.16	.27	.57	.19	.15	<.01	<.001	256	33	37	203	11	<10	2	1.3	.15	<.01	99.64
04-01-222-4	93.95	2.53	.89	.16	.14	.27	.59	.12	.10	<.01	<.001	303	<20	25	79	<10	<10	1	.9	.08	.01	99.70
04-01-222-5	93.05	2.38	2.07	.14	.13	.29	.53	.11	.11	.01	<.001	217	32	25	76	<10	<10	2	.8	.08	<.01	99.66
04-01-222-6	94.77	2.04	.99	.12	.07	.20	.49	.11	.05	.01	<.001	182	20	21	82	<10	<10	1	.7	.07	<.01	99.59
04-01-223	91.43	3.28	1.97	.29	.12	.27	.62	.20	.11	<.01	.001	253	<20	43	292	10	<10	2	1.2	.10	.01	99.57
04-01-224-1	60.34	11.54	4.94	2.09	5.57	.41	2.56	.66	.19	.01	.007	747	66	176	170	23	15	11	11.5	3.49	2.22	99.96
04-01-224-2	63.11	11.89	4.53	1.85	4.40	.38	2.62	.69	.22	.01	.007	687	46	150	170	25	11	12	10.1	3.08	2.16	99.94
STANDARD SO-16/CSB	58.64	10.75	11.23	5.66	.10	.31	5.74	.91	.26	.07	.008	824	46	52	225	93	28	12	3.6	2.39	5.33	97.43

Sample type: ROCK R150 60C. Samples beginning 'RE' are Reruns and 'RRE' are Reject Reruns.

 Data ___ FA ___

[redacted]CME [redacted]T[redacted] LA[redacted]ATOR[redacted] LT[redacted] [redacted]E. [redacted]TINC[redacted]T. V[redacted]OUV[redacted]C [redacted]1R6[redacted] PH[redacted](604[redacted]3-3[redacted]FAX[redacted]716[redacted]
(ISC)02 Accredited Co.)

GEOCHEMICAL ANALYSIS CERTIFICATE

File # A102606R

SAMPLE#	Cl ppm
04-01-222-1	76
04-01-222-2	<10
04-01-222-3	<10
04-01-222-4	<10
04-01-222-5	<10
04-01-222-6	<10
RE 04-01-222-6	<10
STANDARD HA40	41

25 GM SAMPLE BY WATER LEACHED, ANALYSIS BY ICP-MS.
- SAMPLE TYPE: ROCK PULP

Samples beginning 'RE' are Reruns and 'RRE' are Reject Reruns.

DATE RECEIVED: OCT 23 2001 **DATE REPORT MAILED:** Nov 1/01 **SIGNED BY** [redacted]. TOYE, C.LEONG, J. WANG; CERTIFIED B.C. ASSAYERS

Data ___ FA ___

SAMPLE#	SiO_2 %	Al_2O_3 %	Fe_2O_3 %	MgO %	CaO %	Na_2O %	K_2O %	TiO_2 %	P_2O_5 %	MnO %	Cr_2O_3 %	Ba ppm	Ni ppm	Sr ppm	Zr ppm	Y ppm	Nb ppm	Sc ppm	LOI %	TOT/C %	TOT/S %	SUM %
04-01-300-1	68.06	14.57	3.94	1.12	.43	.46	2.63	.87	.21	.01	.016	1130	40	120	228	32	<10	14	7.4	.90	.04	99.90
04-01-300-2	69.80	14.03	3.28	1.07	.39	.43	2.62	.83	.16	.01	.013	1098	68	115	255	32	<10	14	7.1	.90	.02	99.92
04-01-300-3	77.11	10.50	2.72	.85	.34	.41	1.89	.66	.20	.01	.010	754	24	89	312	27	<10	10	5.1	.65	.02	99.95
04-01-300-4	70.70	13.59	3.27	1.15	.34	.37	2.85	.77	.17	.01	.014	1057	35	109	262	30	<10	13	6.5	.71	.02	99.91
04-01-300-5	75.18	11.39	2.74	.98	.28	.40	2.31	.69	.18	.01	.015	852	45	95	293	27	<10	11	5.6	.70	.02	99.93
04-01-300-6	76.57	10.67	2.93	.88	.26	.37	2.26	.65	.17	<.01	.012	791	28	88	304	27	<10	10	5.0	.65	.02	99.93
04-01-300-7	75.87	10.92	2.91	.88	.26	.37	2.14	.67	.18	<.01	.011	791	22	93	336	24	<10	11	5.6	.69	.03	99.97
04-01-300-8	75.94	11.02	2.67	.97	.30	.42	2.39	.68	.18	.01	.010	811	32	88	313	25	<10	10	5.2	.69	.03	99.94
04-01-300-9	78.36	9.77	2.56	.87	.29	.40	2.13	.62	.17	<.01	.010	852	36	84	382	26	<10	9	4.6	.61	.03	99.95
04-01-300-10	78.70	9.52	2.70	.84	.23	.41	1.99	.60	.19	<.01	.013	770	40	83	396	23	<10	9	4.6	.64	.06	99.95
04-01-300-11	74.20	10.91	3.91	1.08	.34	.43	2.35	.67	.18	.01	.014	823	39	85	320	26	<10	10	5.7	.78	.01	99.95
04-01-300-12	73.96	11.81	3.25	1.06	.29	.44	2.50	.70	.17	<.01	.018	825	33	88	305	25	<10	11	5.6	.70	.01	99.96
04-01-300-13	73.46	11.79	3.63	1.08	.33	.42	2.60	.71	.18	.01	.011	827	40	87	301	27	<10	11	5.6	.61	.03	99.98
04-01-300-14	76.94	9.98	2.74	.90	.31	.45	2.14	.64	.18	<.01	.013	704	40	79	432	25	<10	9	5.5	.70	<.01	99.95
04-01-300-15	84.17	6.72	2.47	.61	.25	.38	1.52	.46	.19	<.01	.009	541	36	62	481	21	<10	6	3.1	.34	.03	100.02
04-01-300-16	91.78	2.65	1.71	.25	.17	.23	.54	.27	.15	<.01	.006	322	24	42	513	16	<10	3	1.9	.16	.01	99.77
RE 04-01-300-16	92.04	2.72	1.73	.27	.18	.26	.53	.28	.14	<.01	.012	329	46	43	545	15	<10	3	1.8	.18	<.01	100.09
04-01-300-17	92.30	2.25	1.90	.20	.15	.21	.47	.26	.15	.01	.007	274	38	38	545	16	10	3	1.6	.19	<.01	99.63
04-01-300-18	91.22	3.54	1.48	.36	.24	.31	.68	.27	.19	<.01	.011	371	84	46	288	15	<10	3	1.6	.10	<.01	100.00
04-01-301-1	72.71	11.15	4.08	1.00	.27	.42	2.55	.67	.16	<.01	.011	895	33	135	237	23	<10	10	6.8	1.14	.12	99.98
04-01-301-2	68.49	12.58	4.84	1.19	.41	.36	2.86	.70	.23	.01	.015	938	40	181	184	25	<10	12	8.1	1.47	.17	99.94
04-01-301-3	72.60	11.55	4.14	1.16	.48	.44	2.03	.65	.21	.02	.014	1147	86	95	254	32	<10	9	6.5	1.18	.04	99.99
04-01-301-4	58.47	15.98	9.10	2.25	.73	1.34	2.34	.82	.21	.13	.013	814	85	113	145	27	<10	17	8.4	1.13	.02	99.92
04-01-301-5	58.25	16.73	7.64	2.56	.57	1.19	2.59	.84	.14	.08	.015	956	83	108	128	26	<10	18	9.2	1.51	.03	99.94
04-01-302-1	57.36	14.71	5.50	1.55	4.82	.38	2.84	.75	.18	.01	.012	852	70	148	156	26	<10	13	11.7	2.93	1.41	99.96
04-01-302-2	58.38	14.92	5.70	1.36	3.67	.37	3.28	.76	.21	.01	.016	1427	75	149	164	26	<10	13	11.0	2.75	1.04	99.89
04-01-302-3	58.65	15.42	5.62	1.19	3.67	.39	3.09	.78	.21	.01	.017	967	76	154	162	28	<10	14	10.7	2.63	.60	99.91
04-01-302-4	60.20	15.55	5.80	1.16	2.30	.38	3.15	.80	.21	.01	.017	910	85	121	160	27	<10	14	10.2	2.33	.08	99.93
04-01-302-5	59.95	15.56	5.84	1.15	2.46	.41	3.25	.80	.20	.01	.014	1006	77	124	177	27	<10	14	10.1	2.39	.21	99.91
04-01-302-6	60.74	15.59	5.82	1.22	1.86	.40	3.18	.81	.21	.01	.023	998	108	114	163	27	<10	14	9.9	2.30	.28	99.93
04-01-302-7	60.36	17.92	5.61	1.13	1.16	.34	2.57	.88	.18	.01	.016	928	136	94	178	40	<10	16	9.5	2.01	.06	99.83
04-01-302-8	61.55	15.96	5.89	1.17	.99	.40	3.23	.82	.21	.01	.018	1091	122	107	158	26	<10	14	9.5	1.98	.09	99.92
04-01-302-9	61.15	15.88	5.59	1.22	1.31	.38	3.31	.82	.21	.01	.019	999	104	107	159	27	<10	14	9.7	2.06	.05	99.77
STANDARD SO-16/CSB	57.72	10.80	11.11	5.60	.10	.30	5.68	.88	.27	.06	.006	826	45	49	236	92	<10	11	3.6	2.38	5.43	96.27

GROUP 4A - 0.200 GM SAMPLE BY LIBO2 FUSION, ANALYSIS BY ICP-ES. LOI BY LOSS ON IGNITION.
TOTAL C & S BY LECO. (NOT INCLUDED IN THE SUM)
- SAMPLE TYPE: ROCK R150 60C
Samples beginning 'RE' are Reruns and 'RRE' are Reject Reruns.

DATE RECEIVED: SEP 20 2001 **DATE REPORT MAILED:** Sept 29/01 **SIGNED BY** [redacted]. TOYE, C.LEONG, J. WANG; CERTIFIED B.C. ASSAYERS

Data ✓ FA ___

ACME ANALYTICAL

FILE # A103238

ACME ANALYTICAL

SAMPLE#	SiO2 %	Al2O3 %	Fe2O3 %	MgO %	CaO %	Na2O %	K2O %	TiO2 %	P2O5 %	MnO %	Cr2O3 %	Ba ppm	Ni ppm	Sr ppm	Zr ppm	Y ppm	Nb ppm	Sc ppm	LOI %	TOT/C %	TOT/S %	SUM %
01-01-302-10	60.64	15.72	5.82	1.14	1.86	.39	3.12	.76	.20	.01	.012	1103	58	117	170	29	17	14	10.1	2.14	.06	99.95
04-01-302-11	61.61	16.92	5.80	1.16	.69	.37	3.02	.85	.23	.01	.012	1133	71	104	158	29	<10	15	9.1	1.83	.08	99.94
04-01-302-12	63.14	15.53	5.97	1.07	.41	.39	3.28	.82	.22	.01	.016	982	71	96	202	29	<10	14	8.9	1.58	.05	99.92
04-01-302-13	64.83	14.91	6.05	1.06	.46	.41	2.97	.81	.22	.02	.014	1021	75	94	201	33	<10	13	8.0	1.38	.06	99.92
04-01-302-14	62.83	15.39	6.11	1.11	.79	.39	2.96	.81	.26	.02	.014	1109	88	106	183	33	<10	13	9.1	1.61	.08	99.96
04-01-302-15	67.24	13.91	5.28	.97	.21	.41	2.70	.78	.21	.03	.013	992	111	81	221	75	<10	12	8.0	1.53	.08	99.93
04-01-302-16	66.26	14.43	5.21	1.05	.41	.42	2.67	.77	.21	.02	.017	1032	75	90	202	39	<10	13	8.3	1.42	.05	99.94
01-01-302-17	67.75	12.58	4.83	1.25	1.36	.45	2.52	.66	.21	.01	.017	887	101	91	216	33	23	11	8.0	1.47	.11	99.80
04-01-302-18	64.11	12.34	5.71	1.23	2.81	.40	2.35	.69	.22	.02	.009	815	98	103	207	64	<10	12	9.9	2.13	.09	99.95
04-01-302-19	64.86	14.69	5.84	1.08	.20	.43	2.85	.79	.22	.02	.016	959	81	84	197	54	<10	14	8.8	1.65	.06	99.96
04-01-302-20	65.13	14.83	5.30	1.03	.18	.39	2.97	.80	.21	.01	.008	969	53	84	205	32	<10	15	8.9	1.77	.08	99.92
04-01-303-1	67.24	13.52	4.48	1.69	1.26	.44	2.71	.74	.36	.01	.007	1347	25	106	209	32	20	11	7.2	1.28	.49	99.86
04-01-303-2	69.03	13.17	4.35	1.60	.68	.48	2.56	.80	.16	.01	.013	1370	40	103	235	28	<10	12	6.9	1.23	.73	99.96
04-01-303-3	68.76	13.37	4.20	1.64	.73	.48	2.51	.79	.17	.01	.007	1279	30	96	222	27	<10	12	7.1	1.33	.73	99.96
04-01-303-4	64.52	14.61	4.62	2.02	1.03	.45	2.87	.80	.17	.01	.010	1379	49	106	213	28	<10	13	8.6	1.95	1.09	99.91
RE 04-01-303-4	64.50	14.53	4.58	2.01	1.02	.44	2.94	.80	.17	.01	.010	1376	47	106	218	28	<10	14	8.7	1.93	1.08	99.92
04-01-303-5	66.48	13.85	4.18	1.98	1.04	.48	2.66	.78	.17	.01	.014	1290	38	103	213	28	<10	13	8.1	1.90	.93	99.94
04-01-303-6	68.07	13.40	3.98	1.82	.91	.47	2.29	.77	.17	.01	.011	1269	31	98	197	27	<10	12	7.9	1.63	.80	99.99
04-01-303-7	70.18	12.01	3.68	1.95	1.20	.46	2.20	.71	.18	.01	.010	1175	20	93	232	27	<10	11	7.2	1.69	.97	99.97
04-01-303-8	69.32	11.99	3.53	2.04	1.35	.48	2.39	.70	.16	.01	.010	1078	31	93	235	27	<10	11	7.8	1.89	.97	99.95
04-01-303-9	69.83	12.05	3.61	1.92	1.16	.46	2.36	.70	.17	.01	.010	1245	44	92	225	26	<10	11	7.5	1.81	1.03	99.97
04-01-303-10	70.47	11.63	3.54	1.84	1.13	.44	2.43	.66	.19	.01	.009	1230	33	92	225	26	<10	11	7.4	1.75	.96	99.93
04-01-303-11	62.19	16.09	4.93	1.97	.79	.44	3.11	.85	.15	.01	.010	1519	25	103	188	29	<10	15	9.2	2.13	1.66	99.96
04-01-303-12	62.71	15.95	4.79	1.88	.73	.45	3.10	.86	.16	.01	.015	1486	40	105	202	29	<10	15	9.1	1.97	1.53	99.97
04-01-303-13	63.09	15.48	4.75	1.90	.82	.46	3.10	.83	.16	.01	.010	1496	27	107	203	29	<10	15	9.0	2.03	1.41	99.83
04-01-303-14	65.26	14.32	5.00	1.86	.89	.46	2.78	.80	.18	.01	.011	1321	<20	102	222	29	<10	13	8.2	2.00	1.75	99.96
04-01-303-15	65.46	14.58	4.66	1.89	.87	.50	2.79	.80	.16	.01	.015	1355	65	109	211	28	<10	14	8.0	1.81	1.44	99.94
04-01-303-16	64.62	14.88	5.12	1.40	.49	.43	2.80	.80	.29	.01	.012	1530	39	120	196	38	<10	15	8.9	1.75	.97	99.98
04-01-303-17	64.70	14.80	5.17	1.71	.90	.42	2.77	.76	.14	.01	.011	1470	28	115	192	28	<10	13	8.3	1.90	1.51	99.91
04-01-303-18	64.83	14.04	5.12	1.81	1.08	.44	2.71	.76	.15	.01	.011	1283	32	102	189	28	<10	13	8.7	2.10	1.83	99.85
04-01-303-19	66.16	14.19	4.95	1.58	.71	.44	2.68	.76	.16	.02	.011	1384	53	97	209	30	<10	13	8.1	1.77	1.41	99.97
04-01-303-20	69.08	12.12	4.27	1.67	1.41	.45	2.31	.67	.17	.01	.008	1279	31	109	205	25	<10	11	7.5	1.72	1.24	99.86
04-01-303-21	69.51	11.47	4.26	1.84	1.60	.49	2.09	.65	.18	.01	.007	1162	<20	105	221	24	<10	10	7.7	1.87	1.34	99.99
04-01-303-22	68.71	13.02	4.53	1.43	.64	.45	2.48	.71	.16	.01	.007	1352	28	94	229	27	<10	12	7.6	1.52	.65	99.95
STANDARD SO-16/CSB	58.34	11.17	11.14	5.61	.08	.29	5.69	.90	.26	.06	.010	828	53	48	226	97	15	12	3.6	2.41	5.31	97.30

Sample type: ROCK R150 60C. Samples beginning 'RE' are Reruns and 'RRE' are Reject Reruns.

Data FA

SAMPLE#	SiO_2 %	Al_2O_3 %	Fe_2O_3 %	MgO %	CaO %	Na_2O %	K_2O %	TiO_2 %	P_2O_5 %	MnO %	Cr_2O_3 %	Ba ppm	Ni ppm	Sr ppm	Zr ppm	Y ppm	Nb ppm	Sc ppm	LOI %	TOT/C %	TOT/S %	SUM %
04-01-303-23	52.40	4.39	4.37	1.16	18.35	.23	.78	.24	.18	.04	.006	781	59	393	58	24	<10	12	17.6	4.99	1.36	99.90
04-01-304-1	67.64	14.59	4.18	1.55	.63	.51	2.81	.85	.18	.01	.013	1455	82	126	198	29	<10	14	6.9	1.15	.34	100.09
04-01-304-2	66.55	14.38	4.52	1.66	.84	.49	2.92	.83	.16	.01	.012	1476	50	115	192	29	<10	14	7.5	1.36	.63	100.09
04-01-304-3	68.93	13.48	4.07	1.56	.78	.50	2.63	.81	.19	.01	.014	1321	70	110	226	29	<10	13	6.9	1.28	.58	100.08
04-01-304-4	68.74	13.76	4.20	1.51	.68	.52	2.59	.83	.20	.01	.014	1345	64	116	207	32	<10	14	6.7	1.12	.40	99.96
04-01-304-5	68.34	13.21	4.69	1.57	.90	.47	2.70	.78	.19	.01	.009	1324	51	103	214	27	<10	13	6.9	1.28	1.02	99.96
04-01-304-6	66.60	14.44	4.64	1.59	.69	.52	2.99	.84	.18	.01	.010	1545	70	130	207	31	<10	15	7.2	1.24	.33	99.94
04-01-304-7	67.92	13.89	4.24	1.63	.80	.53	2.65	.82	.16	.01	.013	1360	51	120	198	29	<10	14	7.2	1.29	.44	100.07
04-01-304-8	67.05	14.50	4.40	1.59	.65	.52	2.76	.84	.16	.01	.009	1356	58	115	206	29	<10	13	7.4	1.24	.52	100.09

Sample type: ROCK R150 60C. Samples beginning 'RE' are Reruns and 'RRE' are Reject Reruns.

Data ✓ FA ___

[redacted]CME [redacted] L[redacted]ATO[redacted] LT[redacted] [redacted]E. [redacted]TINC[redacted]T. [redacted]OUV[redacted]C [redacted]1R6[redacted] P[redacted](60[redacted]3-3[redacted] FAX[redacted]716[redacted]
(ISO 9002 Accredited Co.)

GEOCHEMICAL ANALYSIS CERTIFICATE

File # A103238R Page 1

SAMPLE#	Cl ppm
04-01-302-1	<10
04-01-302-2	<10
04-01-302-3	<10
04-01-302-4	<10
04-01-302-5	<10
04-01-302-6	<10
04-01-302-7	<10
04-01-302-8	<10
04-01-302-9	<10
04-01-302-10	<10
04-01-302-11	<10
04-01-302-12	<10
04-01-302-13	<10
04-01-302-14	<10
04-01-302-15	<10
04-01-302-16	<10
04-01-302-17	<10
04-01-302-18	<10
04-01-302-19	<10
04-01-302-20	<10
04-01-303-1	<10
04-01-303-2	<10
04-01-303-3	<10
04-01-303-4	<10
04-01-303-5	<10
RE 04-01-303-5	<10
04-01-303-6	<10
04-01-303-7	<10
04-01-303-8	<10
04-01-303-9	<10
04-01-303-10	<10
04-01-303-11	<10
04-01-303-12	<10
STANDARD HA40	43

25 GM SAMPLE BY WATER LEACHED, ANALYSIS BY ICP-MS.
- SAMPLE TYPE: ROCK PULP
Samples beginning 'RE' are Reruns and 'RRE' are Reject Reruns.

DATE RECEIVED: OCT 23 2001 **DATE REPORT MAILED:** Nov 1/01 **SIGNED BY** [redacted] D. TOYE, C.LEONG, J. WANG; CERTIFIED B.C. ASSAYERS

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Data ✓ FA ___

SAMPLE#	Cl ppm
04-01-303-13	<10
04-01-303-14	<10
04-01-303-15	<10
04-01-303-16	<10
04-01-303-17	<10
04-01-303-18	<10
RE 04-01-303-18	<10
04-01-303-19	<10
04-01-303-20	<10
04-01-303-21	<10
04-01-303-22	<10
STANDARD HA40	41

Sample type: ROCK PULP. Samples beginning 'RE' are Reruns and 'RRE' are Reject Reruns.

Data ✓ FA ___

[redacted]
(ISO [illegible]02 Accredited Co.)

WHOLE ROCK ICP ANALYSIS

File # A103732

SAMPLE#	SiO2 %	Al2O3 %	Fe2O3 %	MgO %	CaO %	Na2O %	K2O %	TiO2 %	P2O5 %	MnO %	Cr2O3 %	Ba ppm	Ni ppm	Sr ppm	Zr ppm	Y ppm	Nb ppm	Sc ppm	LOI %	TOT/C %	TOT/S %	SUM %
04-01-330-1	93.62	2.52	.80	.20	.20	.36	.43	.20	.16	<.01	.017	228	<20	49	303	10	16	2	1.4	.30	<.01	99.98
04-01-330-2	93.72	1.90	.85	.15	.16	.29	.35	.21	.11	<.01	.015	192	<20	51	458	10	<10	2	2.1	.33	.02	99.95
04-01-331-1	92.96	2.51	1.17	.17	.11	.30	.45	.21	.09	.01	.021	198	<20	39	298	<10	<10	2	2.0	.22	.01	100.07
04-01-331-2	92.37	2.74	.87	.18	.16	.33	.53	.20	.15	<.01	.018	217	<20	41	257	10	<10	2	2.5	.32	<.01	100.12
04-01-332-3	91.79	2.83	1.52	.25	.16	.32	.55	.19	.10	<.01	.018	210	<20	43	181	10	<10	3	2.4	.30	<.01	100.19
04-01-332-4	93.32	2.30	1.17	.18	.19	.28	.47	.19	.13	.01	.016	198	<20	44	261	10	<10	2	1.8	.32	<.01	100.12
04-01-332-5	92.20	2.62	1.15	.20	.16	.30	.46	.17	.06	<.01	.019	224	<20	37	134	<10	<10	2	2.6	.68	<.01	100.00
04-01-333-1	93.71	2.21	1.23	.20	.18	.22	.39	.30	.22	<.01	.017	180	<20	43	636	14	<10	3	1.3	.29	<.01	100.09
04-01-333-3	92.58	2.32	1.40	.20	.18	.23	.48	.32	.16	.01	.020	176	<20	43	856	19	<10	3	2.1	.29	<.01	100.15
04-01-333-4	90.45	3.55	2.02	.29	.09	.31	.57	.21	.09	<.01	.015	289	<20	39	173	11	<10	3	2.5	.28	.01	100.17
RE 04-01-333-4	90.57	3.52	2.01	.29	.09	.30	.57	.21	.14	<.01	.015	289	<20	39	183	<10	<10	3	2.3	.28	<.01	100.09
STANDARD SO-17/CSB	61.43	14.06	5.82	2.34	4.66	4.11	1.40	.65	.93	.53	.456	400	31	304	367	26	16	23	3.4	2.43	5.35	99.93

GROUP 4A - 0.200 GM SAMPLE BY LIBO2 FUSION, ANALYSIS BY ICP-ES. LOI BY LOSS ON IGNITION.
TOTAL C & S BY LECO. (NOT INCLUDED IN THE SUM)
- SAMPLE TYPE: ROCK R150
Samples beginning 'RE' are Reruns and 'RRE' are Reject Reruns.

DATE RECEIVED: OCT 22 2001 **DATE REPORT MAILED:** Oct 31/01 **SIGNED BY** [redacted] D. TOYE, C.LEONG, J. WANG; CERTIFIED B.C. ASSAYERS

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Data ✓ FA ___

STATEMENT OF QUALIFICATIONS:
Dr. W. D. McRitchie

Employed with Manitoba Energy and Mines for 31 years 9 months (1965-1997).

1962 B.Sc. Hons. Geology, Durham University, England
1965 Ph. D. Durham University, England
1965-1969 Project Geologist, Precambrian Subdivision
1970-1975 Project Leader/Coordinator, Precambrian Subdivision
1975-1997 Director, Manitoba Geological Survey.
Prior to retirement in November 1997, Manitoba rep. on Provincial Geologists' Committee (1979-1997), and National Geological Surveys Committee (1979-1997), and numerous other appointments including Provincial Co-chair NATMAP program (1992-1996), Provincial Co-Chair Man/Can Mineral Agreements (1979-1997), Prov. Rep on Geological Foundation, Min. Deposits Divn., GAC, and Geoscience Council Evaluation Committees for Ontario and BC Geological Surveys. As Director of Manitoba Survey, reported directly to Deputy Minister 1992-1997; Departmental Co-Chair of Manitoba's Mineral Exploration Liaison Committee-MELC, and member of evaluation board for Provincial Mineral Exploration Assistance Program-MEAP (1994-1997).
During career with Manitoba Energy and Mines authored and co-authored over 130 technical publications dealing with Manitoba's geological and mineral endowment.

1998-2001 East Kootenay Science Council
1998-2004 LKAR Geological Consulting- 20+ confidential reports on industrial minerals.

2003-2004 Southern Rocky Mountain Management Plan Advisory Committee

2000-2004 Fernie and District Search and Rescue Director/Treasurer

Figure 3: Sandstone and shale prospects in the Clearwater River region.

MINERAL AGREEMENTS AND PROSPECTS (Shale and sandstone-silica), CORKSCREW MOUNTAIN REGION, 2001