MAR 19990029: MARTINEAU RIVER

Received date: Oct 29, 1999

Public release date: Oct 30, 2000

NTS 73L

EVALUATION OF THE DIAMOND POTENTIAL OF ICE RIVER MINING LTD.'S MARTINEAU RIVER PROPERTY (PERMIT #9397080001), EAST-CENTRAL ALBERTA

Prepared for

Sunburst Mines Ltd. and
Ice River Mining Ltd.

APEX Geoscience Ltd.

December, 1999

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SUMMARY

APEX Geoscience Ltd. (APEX), was retained in the summer of 1999 as consultants by Ice River Mining Ltd. (Ice River) to aid Ice River in the exploration for diamonds on the Company's Martineau River property, near Cold Lake. Although diamond exploration at the property is still in the early stages, the potential for discovery of diamondiferous kimberlites on Ice River's property is considered high based upon the regional geological setting in conjunction with the positive results of limited exploration that has been conducted to date.

The Martineau River permits were originally staked by Sunburst Mines Ltd. on the basis of a favourable regional geological and structural setting, as well as the presence of diamond indicator minerals in the Cold Lake region. Ice River holds a 50% interest in the Martineau River property, which is located along the north side of Cold Lake about 300 km east of Edmonton, just west of the Alberta–Saskatchewan border.

The results of diamond indicator mineral sampling on and in the vicinity of Ice River's Martineau River permits are encouraging based on the abundant diamond indicator minerals recovered from a limited number of samples collected to date. The Martineau River and tributaries have yielded several diamond indicator minerals at different sites including pyrope garnets, chrome diopsides, picroilmenites and chromites, indicating the probable existence of a mantle derived intrusive such as a kimberlite in the area. The size and morphology of the diamond indicator grains, including pyrope garnets with orange peel texture and partially preserved kelphytic rims up to 1.2 mm in diameter indicates that the grains have not likely travelled further than 10 km from their original source. The chemistry of the diamond indicator minerals, including the recovery of two Gurney G10 pyrope garnets, indicates high potential for the existence of diamondiferous kimberlites in the region.

In conclusion, the potential for discovery of diamondiferous kimberlites within or in close proximity to Ice River's Martineau River permits is considered high based upon (a) the number, diversity, morphology and chemistry of diamond indicator minerals that have been recovered to date, (b) the favourable basement and tectonic setting, and c) the presence of areas of thin drift. An aggressive, systematic two-stage exploration program is warranted to search for diamondiferous kimberlites.

The **Stage 1** exploration should consist of regional stream sediment, till and beach sand sampling program, with a drift thickness and Quaternary geological study. **Stage 2** should comprise a detailed high-resolution fixed-wing airborne magnetic survey over the Martineau River mineral permits.

The estimated cost of the two-stage exploration program and compilation for the Martineau River property is $75,000 for the **Stage 1** surface sampling and compilation program, and approximately $25,000 for the **Stage 2** airborne geophysical survey.

INTRODUCTION

Terms of Reference

APEX Geoscience Ltd. (APEX), was retained during the summer of 1999 as consultants by Ice River Mining Ltd. (Ice River) to conduct diamond exploration and prepare an independent evaluation of the diamond potential of Ice River's Martineau River property. This evaluation has been prepared on the basis of available published and unpublished material. The authors have personally visited the Martineau River property.

Property Description and Location

The Martineau River property is located north of Cold Lake about 15 km northeast of the town of Cold Lake, Alberta (Figure 1). This property encompasses one mineral permit (939397080001) totalling approximately 4,958 ha, which is located within the Sand River (73L) 1:250,000 scale National Topographic System (NTS) map sheet, more specifically 73L/9 (Marie Lake) 1:50,000 scale NTS map sheet. Ice River has obtained a 50% interest through a joint venture agreement with Sunburst Mines Ltd. (Sunburst) in the subsurface metallic and diamond interests of the Martineau River permits. In addition, Ice River has agreed to provide Sunburst with 10% gross sale of placer precious metals and 10% of net profits resulting from the production and sale of industrial minerals, excluding sand and gravel.

Accessibility, Climate and Local Resources

The Martineau River property may be accessed via Alberta Provincial Highway 897 and 892 or Saskatchewan Provincial Highway 919, all weather and dry weather gravel roads, cart trails and seismic lines. Portions of the permit area may be accessed by four-wheel drive vehicles or Argos. Accommodation, food, fuel, and supplies are best obtained in the towns of Grand Centre and Cold Lake (now amalgamated). Camping facilities may be available in English Bay and Ethel Lake Provincial Recreation Areas.

The Martineau River property is situated within the Eastern Alberta Plains and Mostoos Hills Upland physiographic zones (Klassen, 1989). Relief generally comprises rolling hills and undulating plains. Elevation in the region varies from 535 m to 640 m above sea level (ASL). Major topographic features in the region include: Cold, Primrose, and Marie lakes, situated in the vicinity of the property; areas of extensive muskeg to the northwest of the property; and the Martineau and Medley rivers. Numerous streams and creeks drain the region, flowing into Cold Lake, which in turn drains into the Beaver River to the south. The Sand River map sheet is the locus of a subcontinent divide where the Beaver River and its tributary, the Sand River, drain in to Hudson Bay via the Churchill River System. The northwest corner of the map sheet (73L) drains into the Arctic Ocean via the La Biche–Athabasca–MacKenzie River System. In addition to the numerous small lakes and ponds, much of the property is covered by swamps, marshes and fens. A boreal forest containing mainly spruce and jack pine covers the property. Annual temperatures range from -40°C in January to 25°C in July.

Bistcho Lake
Lake Athabasca
Lake Claire
High Level
Manning
Fort McMurray
Grande Prairie
High Prairie
Slave Lake
Lesser Slave Lake
Cold Lake Air Weapons Range
Martineau River Mineral Permits
Edmonton
Hanna
Calgary
Lethbridge
Legend
Provincial and/or National Parks
Provincial Highway
Cities
Rivers
Mineral Permits held by Sunburst Mines Ltd.
SUNBURST MINES LTD.
ALBERTA
MINERAL PERMIT LOCATIONS
Scale 0 100 200 Kilometres
APEX Geoscience Ltd.
EDMONTON, ALBERTA
December, 1999

FIGURE 1.

DIAMOND INDICATOR MINERALS, KIMBERLITES, AND EXPLORATION METHODS

To understand the significance of diamond indicator minerals ("DIM"), it is important to understand the type of igneous rocks from which primary diamond deposits are mined. The most common rock type from which diamonds are mined are kimberlites and to a lesser extent lamproites and orangeites. Diamond indicator minerals describe minerals which are common constituents of these three rock types, but for the purposes of this discussion, DIM will refer to minerals that are characteristic of kimberlites.

Kimberlite is best described as a hybrid igneous rock. Kimberlites are igneous in nature since they have crystallised from a molten liquid (kimberlitic magma) originating from the earth's upper mantle. Kimberlite magma contains volatile gases and is relatively buoyant with respect to the upper mantle. As a result, pockets of kimberlitic magma will begin to ascend upward through the upper mantle and along a path of least resistance to the earth's surface. As the kimberlitic magma ascends, the volatile gases within the magma expand, fracturing the overlying rock, continually creating and expanding its own conduit to the earth's surface. As a kimberlitic magma begins to ascend to the earth's surface it rips up and incorporates xenoliths of the various rock types the magma passes through on its way to surface. As the magma breaks down and incorporates these xenoliths, the chemistry and mineralogy of the original magma becomes altered or hybridised. The amount and type of foreign rock types a kimberlite may assimilate during its ascent will determine what types of minerals are present in the kimberlite when it erupts at surface.

When kimberlitic magma reaches or erupts at the earth's surface, the resulting volcanic event is typically violent, creating a broad shallow crater surrounded by a ring of kimberlitic volcanic ash and debris ("tuffaceous kimberlite"). The geological feature created by the eruption of a kimberlite is referred to as a diatreme or kimberlite pipe. In a simplified cross section a kimberlite diatreme appears as a near vertical, roughly "carrot shaped" body of solidified kimberlite capped by a broad shallow crater on surface that is both ringed and filled with tuffaceous kimberlite and fragments of the different rock types the kimberlite may have erupted through on route to surface.

Due to the unique geometry of a kimberlite pipe and the manner in which the kimberlite has intruded a pre-existing host rock type, there are often differences in the physical characteristics of a kimberlite and the host rock. Sometimes these contrasting physical characteristics are significant enough to be detected by airborne or ground geophysical surveys. Two of the most commonly used geophysical techniques are airborne or ground magnetic surveys and EM surveys. A magnetic survey measures the magnetic susceptibility and EM surveys measure the resistivity of the material at or near the earth's surface. When magnetic or resistivity measurements are collected at regular spaced intervals along parallel lines, the data can be plotted on a map and individual values can be compared. If a geophysical survey is conducted over an area where the bedrock and overburden geology is constant and there are no prominent structures or faults, there will be little variation in magnetic or resistivity data. However, when a kimberlite intrudes a homogenous geologic unit and erupts on surface, there is often a change in the geophysical signature or anomalous magnetic or resistivity data over the kimberlite diatreme. When the data is contoured the anomalous results often occur as a circular or oval anomaly outlining the surface or near surface expression of the diatreme.

The effectiveness of geophysical methods in kimberlite exploration is dependent on the assumption that the difference between the geophysical signature of the hosting rock unit and a potential kimberlite is significant enough to be recognised by the geophysical techniques available. There are many examples of economic kimberlites that produce very subtle, unrecognisable geophysical responses as well as non kimberlite geologic features and man made structures (referred to as "cultural interference") such as oil wells, fences, bridges, buildings which can produce kimberlite like anomalies. For these reasons, it is extremely important that other information such as DIM surveys be used in tandem with geophysical evidence to confirm whether there is other information to support the occurrence of a kimberlite pipe (Fipke *et al.*, 1995).

Diamonds do not crystallise from a kimberlitic magma: they crystallise within a variety diamond bearing igneous rocks in the upper mantle called peridotites and eclogites. Peridotites and eclogites are each made up of a diagnostic assemblage of minerals that crystallise under specific pressure and temperature conditions similar to those conditions necessary to form and preserve diamonds ("diamond stability field"). Diamond bearing peridotite can be further broken down into three varieties which are, in order of greatest diamond bearing significance, garnet harzburgite, chromite harzburgite, and to a lesser extent garnet lherzolite. For a kimberlite to be diamond bearing, the primary kimberlitic magma must dissaggregate and incorporate some amount of diamond bearing peridotite or eclogite during its ascent to the earth's surface. The type and amount of diamond bearing peridotite or eclogite the kimberlitic magma incorporates during its ascent will determine the diamond content or grade of that specific kimberlite as well as the size and quality of diamonds. Diamond bearing peridotite and eclogite occur as discontinuous pods and horizons in the upper mantle, typically underlying the thickest, most stable regions of Archean continental crust or cratons (Helmstaedt, 1993). As a result, almost all of the economic diamond bearing kimberlites worldwide occur in the middle of stable Archean cratons.

Diamond indicator minerals include minerals that have crystallised directly from a kimberlitic magma, or minerals that have been incorporated into the kimberlitic magma as it ascends to the earth's surface. Examples of DIMs are picroilmenite, titanium and magnesium rich chromite, chrome diopside, magnesium rich olivine, pyrope garnets (varieties which include Dawson and Stephen's (1975) G1, G2, G9, G10, G11, G12 and Gurney's (1984), and Gurney and Moore's (1993) G9 and G10 garnets) and eclogitic garnets (varieties which include Dawson and Stephen's G3, G4, G5, and G6). From this paragraph on, reference to G1 and G2 pyrope garnets refers to Dawson and Stephens' (1975) classification, and G9 and G10 refers to Gurney (1984) G9 and G10 pyrope garnets.

There are a limited variety of DIMs from which information pertaining to the diamond bearing potential of the host kimberlite can be gained. These are typically DIMs which have been derived from diamond bearing peridotite and eclogite in the upper mantle (Mitchell, 1989). The most common examples of these would include sub-calcic, chromium rich G10 pyrope garnets (diagnostic of garnet harzburgite), in some instances G9 pyrope garnets (diagnostic of garnet lherzolite), chromium and magnesium rich chromite (referred to as diamond inclusion quality or "DIF" chromite and diagnostic of chromite or spinel harzburgite), diamond inclusion quality "DIF" eclogitic garnets and chemically distinct chrome diopside (diagnostic of diamond bearing eclogites).

Other indicator minerals that have crystallised from a kimberlitic magma can provide information as to how well the diamonds in a given kimberlite have been preserved during their ascent to surface. For instance, the presence of low iron and high magnesium picroilmenites in a kimberlite is a positive indication that the oxidising conditions of a kimberlitic magma were favourable for the preservation of diamonds during their ascent to surface in the kimberlitic magma (Fipke *et al.*, 1989).

REGIONAL GEOLOGICAL SETTING

Precambrian

The Martineau River permits lie in the Western Canada Sedimentary Basin along the northern flank of the Meadow Lake Escarpment (MLE). Precambrian rocks are not exposed within the Sand River map sheet (NTS 73L). The basement underlying the Martineau River permits borders the Archean Hearne Subprovince (HSP), the Rimbey Magmatic Zone (RMZ) (Figure 2). Basement to the Martineau permits is part of the Rimbey Magmatic Zone (RMZ), a 2.0 to 1.8 Ga aged terrane, that represents a magmatic arc, related to collisional orogeny of the Buffalo Head Terrane and HSP during the Proterozoic (Burwash *et al.*, 1962; Burwash and Culbert, 1976; Burwash *et al.*, 1994; Ross *et al.*, 1991, 1998; Villeneuve *et al.*, 1993; Ross and Stephenson, 1989). Thick Archean cratons such as the HSP are considered favourable for the formation and preservation of diamonds within the upper mantle. The location of the contact zone between the RMZ and the HSP is highly uncertain but has been broadly ascertained on the basis of available drill hole intersection, regional airborne geophysics, and geochronology. The RMZ is characterised by a highly corrugated internal fabric comprised of extremely high relief, northeast-trending sinuous magnetic anomalies. Seismic refraction and reflection studies indicate that the Archean and Proterozoic crust in the Cold Lake region is likely around 35 to 40 km thick, a trait favourable for the formation and preservation of diamonds in the upper mantle (Dufresne *et al.*, 1996). In addition, studies by Lithoprobe have indicated that a deep mantle root, as illustrated in Fig. 25 in Helmstaedt (1993), exists proximal to the area. Due to their relatively stable history since accretion, the RMZ and the Hearne Subprovince are currently the focus of diamond exploration in eastern Alberta.

To the north of the Martineau River permits, the underlying Rimbey Magmatic Zone is divided from the Talston Magmatic Zone by the STZ. The STZ is a major northeast-trending crustal lineament that is a prominent lineament on both the aeromagnetic and the gravity maps of Canada (GSC, 1990a, b). The STZ separates the Churchill Structural

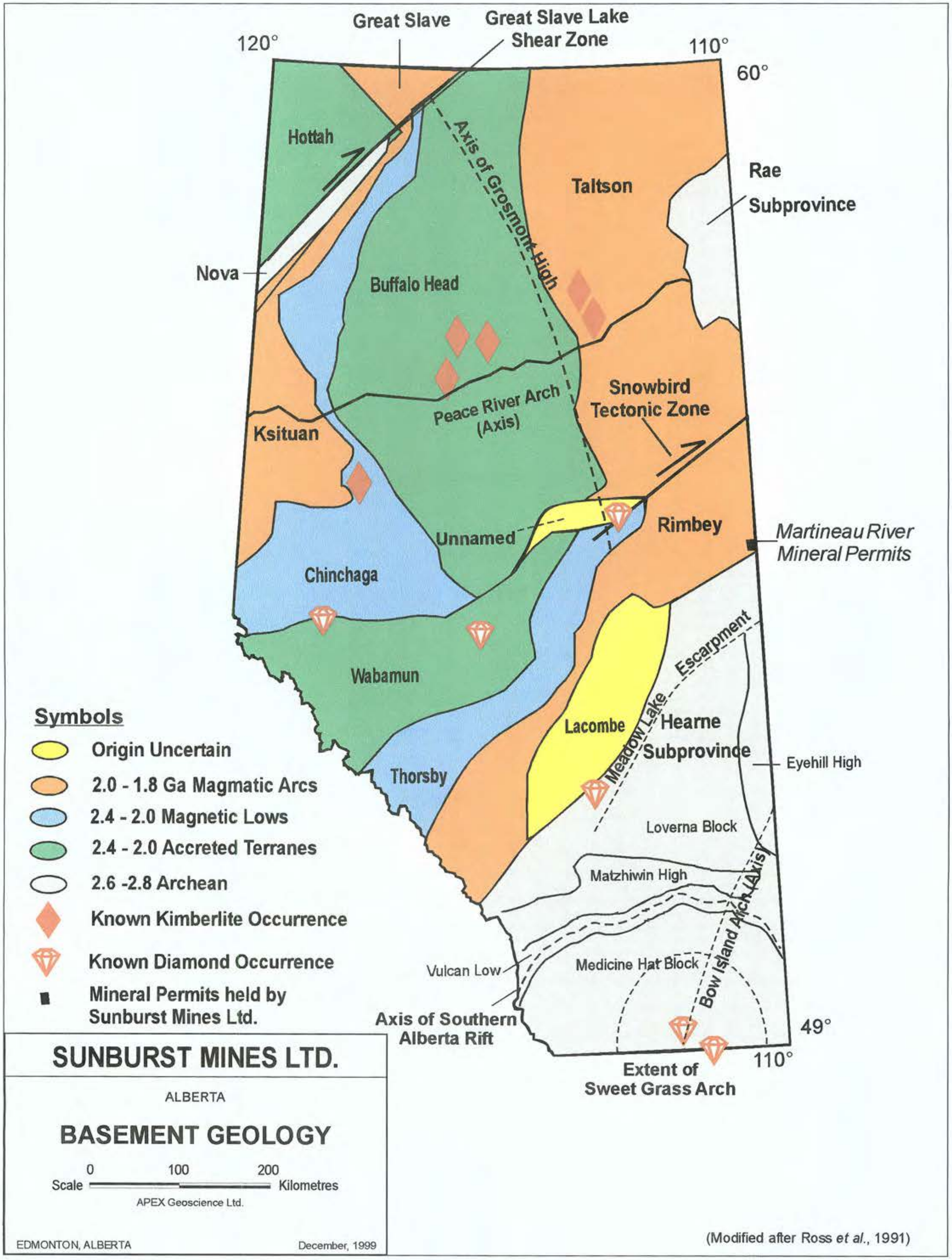

Great Slave
Great Slave Lake Shear Zone
120°
110°
60°
Hottah
Taltson
Rae Subprovince
Axis of Grosmont High
Nova
Buffalo Head
Snowbird Tectonic Zone
Peace River Arch (Axis)
Ksituan
Unnamed
Rimbey
Martineau River Mineral Permits
Chinchaga
Wabamun
Escarpment
Meadow Lake
Lacombe
Hearne Subprovince
Eyehill High
Thorsby
Loverna Block
Matzhiwin High
Bow Island Arch (Axis)
Medicine Hat Block
Vulcan Low
Axis of Southern Alberta Rift
49°
110°
Extent of Sweet Grass Arch
Symbols
Origin Uncertain
2.0 - 1.8 Ga Magmatic Arcs
2.4 - 2.0 Magnetic Lows
2.4 - 2.0 Accreted Terranes
2.6 -2.8 Archean
Known Kimberlite Occurrence
Known Diamond Occurrence
Mineral Permits held by Sunburst Mines Ltd.
SUNBURST MINES LTD.
ALBERTA
BASEMENT GEOLOGY
0 100 200
Scale Kilometres
APEX Geoscience Ltd.
EDMONTON, ALBERTA
December, 1999
(Modified after Ross *et al.*, 1991)

FIGURE 2.

Province into two distinct basement domains, the Rae and Hearne Subprovinces, and extends to the northeast as far as Baker Lake, Nunavut (Ross *et al.*, 1991).

Phanerozoic

Overlying the basement in the Cold Lake region is a thick sequence of Phanerozoic rocks comprising mainly Cretaceous sandstone and shale near surface and Cambrian to Ordovician sandstone and shale to Devonian carbonates and salts at depth (Hitchon and Andriashek, 1985; Mossop and Shetson, 1994). Bedrock exposure within the permit blocks is limited primarily to river and stream cuts and topographic highs. Table 1 shows the upper units found in the region. Further information pertaining to the distribution and character of these and older units can be obtained from well log data in government databases and various geological and hydrogeological reports (Carrigy, 1971; Ozoray *et al.*, 1980; Hitchon and Andriashek, 1985).

Underlying the near surface Cretaceous units in the Cold Lake area is a thick succession of Cambrian to Devonian sandstone, carbonates, calcareous shale and salt horizons (Hitchon and Andriashek, 1985; Mossop and Shetson, 1994). Several of the Devonian carbonate units are part of the Grosmont Reef Complex, a large structure whose eastern edge extends in a northwesterly direction from the Cold Lake area to the N.W.T. (Bloy and Hadley, 1989). The Grosmont Reef Complex is likely the result of tectonic uplift during the Devonian along this trend. During the middle Devonian, a large part of the Siluro-Ordovician stratigraphy was eroded or faulted away to form the northeast trending Meadow Lake Escarpment, a prominent Phanerozoic structural feature within the Western Canadian Sedimentary Basin. These structures in conjunction with the PRA could have played a significant role in the localisation of faults and other structures that could have provided favourable pathways for kimberlite volcanism.

In general, the Cretaceous strata underlying the Cold Lake permits is composed of alternating units of marine and nonmarine sandstones, shales, siltstones, mudstones and bentonites. The oldest documented units exposed in the permit area belong to the Lea Park Formation, a sequence of Upper Cretaceous calcareous and noncalcareous shales with thin intercalated sandstone layers (Figure 3). However, older units from the base of the Fort St. John and/or the top of the Colorado groups may be exposed in river and stream cuts.

The Colorado Group is Lower Cretaceous in age and contains numerous formations, including the Joli Fou and the Viking formations, which are correlative with the Peace River Formation of the Fort St. John Group further west (Dufresne *et al.*, 1996). The Joli Fou Formation is comprised of shale with interbedded, bioturbated to glauconitic sandstones and minor amounts of bentonite, pelecypod coquinas, nodular phosphorite and concretionary layers of calcite, siderite and pyrite (Glass, 1990). The Viking Formation disconformably overlies the Joli Fou Formation and is gradational with the overlying Shaftesbury Formation (shales of the Colorado Group) and is correlative with the Cadotte and Paddy Sands of the Peace River area (Fort St. John Group). The Viking Formation is comprised of glauconitic sands, interbedded siltstone and mudstone with minor amounts of conglomerate. Coalified plant fragments and bioturbated sandstones are locally abundant.

TABLE 1
GENERALIZED STRATIGRAPHY
MARTINEAU RIVER PERMIT AREA

SYSTEM	GROUP	FORMATION	AGE* (MA)	DOMINANT LITHOLOGY
PLEISTOCENE			Recent	Glacial till and associated sediments
TERTIARY			6.5 to Recent	Preglacial sand and gravels
UPPER CRETACEOUS		Belly River	70 to 80	Shale, silty-shale and ironstone
	Smoky	Lea Park	75 to 86	Shale, silty-shale and ironstone, First White Specks
		Bad Heart	86 to 88	Thin or absent; Sandstone
		Kaskapau	88 to 92	Shale, silty-shale and ironstone, Second White Specks
		Dunvegan	92 to 95	Thin or absent; Sandstone and siltstone
	Fort St. John	Shaftesbury	95 to 98	Shale, bentonites, Fish-Scale Fm.
LOWER CRETACEOUS	Colorado	Viking	98 to 100	Glauconitic sands, siltstone, mudstone and conglomerate
		Joli Fou	100 to 103	Shale, glauconitic sandstone and bentonite

*Ages approximated from Green *et al.* (1970), Glass (1990), Dufresne *et al.* (1996) and Leckie *et al.* (1997).

The La Biche Formation is a frequently incorrectly used term correlative to units of the Shaftesbury Formation and other formations within the Smoky and Colorado groups (Glass, 1990). In the Martineau River permit area, the term Shaftesbury Formation (Fort St. John Group) is more commonly used. This unit is correlative with the shales overlying and underlying the Fish Scale unit in the Colorado Group. The Shaftesbury Formation is lower Upper Cretaceous in age and is comprised of marine shales with fish- scale bearing silts, thin bentonitic streaks and ironstones. The upper contact is conformable and transitional with the Dunvegan Formation, however, the Dunvegan Formation is likely absent in the Cold Lake region, as sandy units within the Cretaceous stratigraphy generally thin out or become absent in deeper parts of the Western Sedimentary Basin. The Shaftesbury Formation may be exposed along deep river and stream cuts. Evidence of extensive volcanism during deposition of the Kaskapau and the Shaftesbury formations

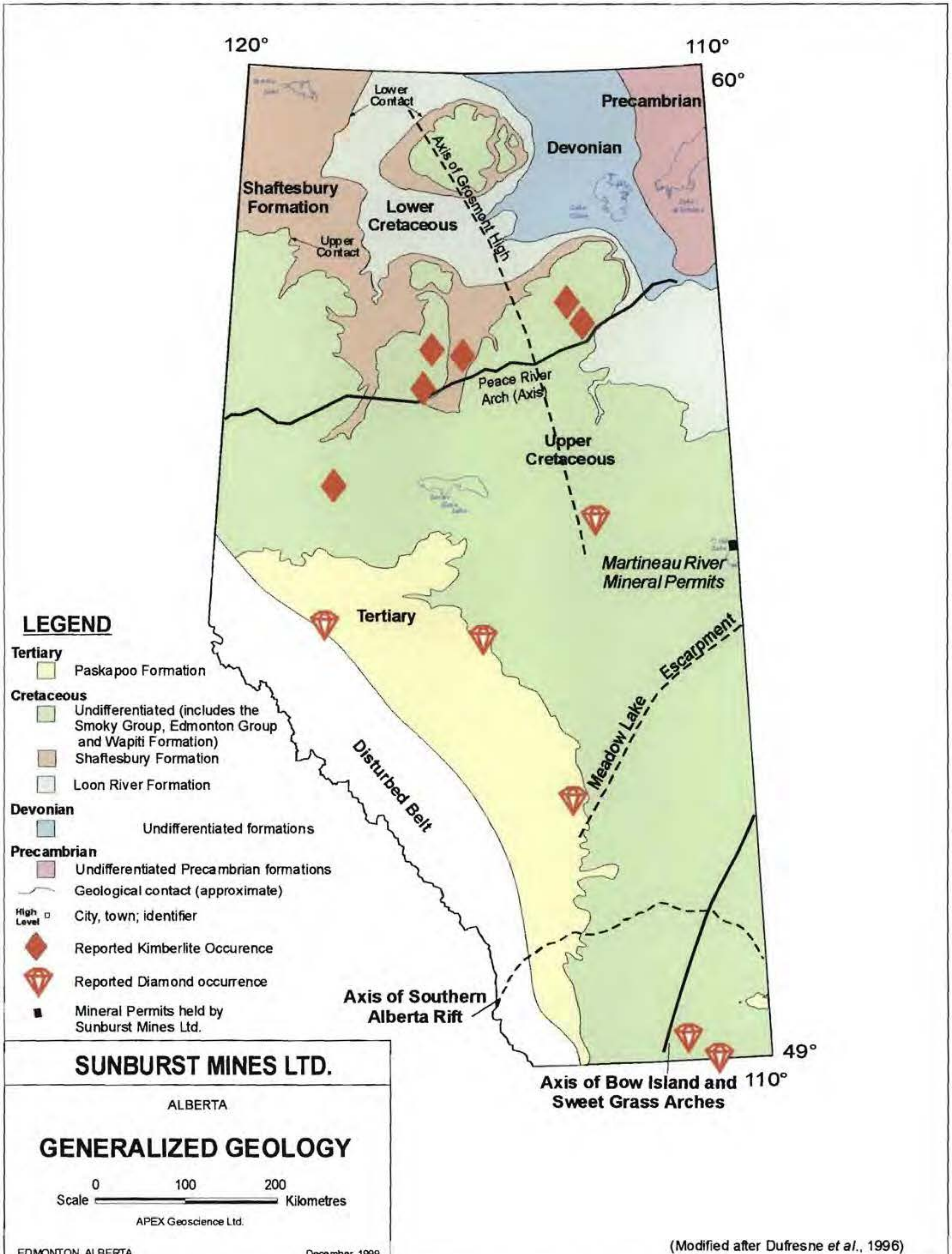

120°
110°
60°
Lower Contact
Precambrian
Devonian
Axis of Grosmont High
Shaftesbury Formation
Lower Cretaceous
Upper Contact
Peace River Arch (Axis)
Upper Cretaceous
Martineau River Mineral Permits
Tertiary
Meadow Lake Escarpment
Disturbed Belt
Axis of Southern Alberta Rift
49°
110°
Axis of Bow Island and Sweet Grass Arches
LEGEND
Tertiary
Paskapoo Formation
Cretaceous
Undifferentiated (includes the Smoky Group, Edmonton Group and Wapiti Formation)
Shaftesbury Formation
Loon River Formation
Devonian
Undifferentiated formations
Precambrian
Undifferentiated Precambrian formations
Geological contact (approximate)
High Level
City, town; identifier
Reported Kimberlite Occurence
Reported Diamond occurrence
Mineral Permits held by Sunburst Mines Ltd.
SUNBURST MINES LTD.
ALBERTA
GENERALIZED GEOLOGY
0
100
200
Scale
Kilometres
APEX Geoscience Ltd.
EDMONTON, ALBERTA
December, 1999
(Modified after Dufresne et al., 1996)

FIGURE 3.

exists in the form of bentonites of variable thickness, distribution and composition. Numerous bentonitic horizons exist throughout the Shaftesbury Formation, especially within and near the Fish Scales horizon across much of Alberta (Leckie *et al.*, 1992; Bloch *et al.*, 1993). The time span of deposition of the Shaftesbury Formation is also chronologically correlative with the deposition of the Crowsnest Formation volcanics of southwest Alberta (Olson *et al.*, 1994; Dufresne *et al.*, 1995) and with kimberlitic volcanism near Fort à la Corne in Saskatchewan (Lehnert–Thiel *et al.*, 1992; Scott Smith *et al.*, 1994). In addition, there is documented igneous activity associated with the Steen River Anomaly, a possible impact structure, which formed in northwestern Alberta about this time (Carrigy, 1968; Dufresne *et al.*, 1995).

The Smoky Group is Upper Cretaceous in age and is comprised of thinly bedded, marine, silty shale with occasional ironstone and claystone nodules and thin bentonite streaks. The group is divided into three formations: (a) a lower shale unit, Kaskapau, which includes the Second White Specks marker unit; (b) a middle sandstone, named the Bad Heart; and, (c) an upper shale, Lea Park, which contains the First White Specks marker unit. The Smoky Group is conformably and transitionally overlain by the Wapiti Formation. Ammonite fossils and concretions are present in both the Puskwaskau and the Kaskapau formations. In addition, foraminifera are present in the lower arenaceous units (Glass, 1990). The upper formations of the Smoky Group are correlative with the Lea Park Formation. The lower portions of the Smoky Group are correlative with the middle to upper units of the Colorado Group, including the First and Second White Speckled Shale marker units (Glass, 1990). The Bad Heart, Dunvegan, and Wapiti formations are likely absent to very thin within the Cretaceous stratigraphy underlying the Cold Lake area. Bedrock exposures in the Cold Lake permits comprised the Lea Park and Belly River formations, however much (up to 1 km) of the upper portions of the Smoky Group have been eroded away by glacial and/or post-depositional processes. In general, exposures of the Smoky Group are limited to river and stream cuts, topographic highs, and regions with thin drift veneer. There is strong evidence of volcanism associated within the depositional time span of the Smoky Group in the vicinity of the PRA (Auston, 1998; Carlson *et al.*, 1998). Ashton's recently discovered Buffalo Head Hills kimberlites intrude Kaskapau shale and yield emplacement ages of 86 to 88 Ma (Auston, 1998; Carlson *et al.*, 1998).

The youngest bedrock unit in the Cold Lake area is the Belly River and Lea Park formations of Upper Cretaceous age, comprised of marine, thinly bedded to massive shales. The upper surfaces of the Belly River and Lea Park formations are generally erosional. Thickness of the unit may exceed 100 m (Glass, 1990). The Belly River Formation is exposed in the southeastern half of the Sand River map sheet around Cold Lake. The Lea Park formation outcrops within the northeast half of the Sand River map sheet. The Mountain Lake Kimberlite near Grande Prairie intrudes the Wapiti Formation, which is time correlative with the sedimentary rocks of the Belly River Formation and yields an emplacement age of 75 Ma (Leckie *et al.,* 1997).

Quaternary

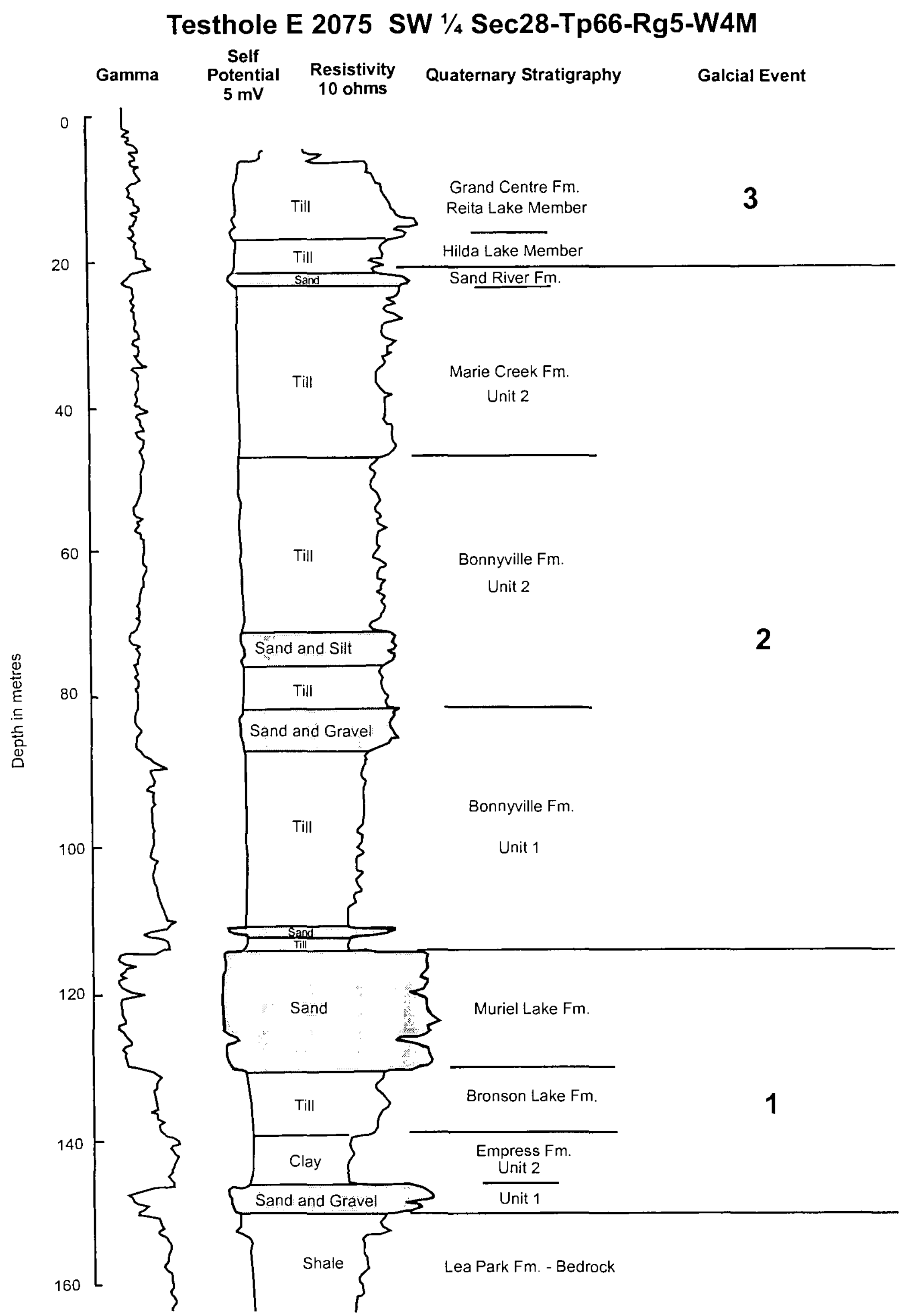
Data and information about the surficial geology in central to northern Alberta is sparse and regional in nature (Klassen, 1989; Shetson, 1990). Prior to continental glaciation during the Pleistocene, most of Alberta, including the Cold Lake region, had reached a mature stage of erosion. Large, broad paleochannels and their tributaries drained much of the region, flowing in an east to northeasterly direction (Edwards *et al.*, 1994; Dufresne *et al.*, 1996). In addition, fluvial sand and gravel was deposited preglacially in much of the region.

During the Pleistocene, multiple southwesterly and southerly glacial advances of the Laurentide Ice Sheet across the region resulted in the deposition of ground moraine and associated sediments (Figure 5 in Dufresne *et al.,* 1996). In addition, the advance of glacial ice resulted in the erosion and glaciotectonism of the underlying bedrock. Ice thrusted bedrock has been documented at the southwest terminus of Primrose Lake (Andriashek, pers com., 1999). Glacial sediments infilled low-lying and depressional areas, draped topographic highs and covered much of the Cold Lake area as veneers and/or blankets of till and diamict. Localised pockets of deposits from glacial meltwater and proglacial lakes infill the numerous spillway channels present near the area.

Glacial ice is believed to have receded from the area about 15,000 years ago. After the final glacial retreat, lacustrine clays and silts were deposited in low-lying regions along with organic sediments. Rivers previously re-routed due to glaciation, re-established easterly to northeasterly drainage regimes similar to that of the pre-Pleistocene. Extensive colluvial and alluvial sediments accompanied post-glacial river and stream incision.

The Quaternary stratigraphy within the Cold Lake area is complex and has been developed during three episodes of glaciation (Hitchon and Andriashek, 1985). The Quaternary stratigraphy is defined by several formations that are related to specific glacial events (Figure 4). The oldest and lowermost unit within the regional stratigraphy is the Empress Formation which comprises a lower sand and gravel horizon (Unit 1) with an overlying fluvial or lacustrine silt and clay (Unit 2). Unit one is largely composed of quartzite, chert and sandstone cobbles that were deposited in paleochannels by rivers flowing eastward from the Rocky Mountains. During the first glaciation event, a thick sheet of glacial sediment or till of the Bronson Lake Formation was deposited above the preglacial Empress Formation and local bedrock of the Lea Park Formation. This till is very clay rich and mainly occupies buried bedrock valleys such as those at Bronson Lake and Helina Valley.

Following the retreat of the first glacial event and perhaps during the advance of the second glaciation extensive glaciofluvial sand of the Muriel Lake Formation was deposited above the Bronson Lake till sheet. The second glacial event deposited the very thick till sequences of the Bonnyville Formation. This till is characterised by a relatively high ratio of quartz to rock fragment within the matrix. The formation, divided into Units 1 and 2, commonly contains intercalations of glaciofluvial sand and gravel at the unit contacts. Following retreat of the second glacial ice advance silt and lacustrine sediment of the Ethel



SUNBURST MINES LTD.

Martineau River Property

Quaternary Stratigraphy
Cold Lake, Alberta

APEX Geoscience Ltd.

EDMONTON, ALBERTA — December, 1999

After Hitchon and Andriashek (1985)

FIGURE 4

Lake Formation were deposited on top of the Bonnyville Formation tills, in the central and eastern art of map sheet NTS 73L.

The third and final glaciation event deposited an extensive cover of till and glacially thrust sediments of the Grand Centre Formation. Based on spatial, textural and landform characteristics the Grand Centre Formation has been divided into four members. The lowermost (Hilda Lake Member) is found only in the east, and consists clay rich till that was intermixed with glacially thrust sediment of the Lea Park formation. The predominant glacial direction is oriented northeast to southwest based on the geometry of glacial flutes and drumlins of the Hilda Lake Member. The Reita Lake Member is also found within the eastern part of NTS 73L and overlies most of the Hilda Lake Member. The Reita Lake Member comprises sandy clay till that occurs within higher relief landforms on the south side of major lakes, with glacially displaced masses of Marie Creek till forming the majority of the Member. These types of landforms have been referred to as "hill–hole pairs" and represent glacially thrusted material. Seismic profiles within the Cold Lake region show evidence that glacial thrust planes, ramps, and duplexes may commence at the bedrock interface (Andriashek, pers. com., 1999). This shows that the overburden and Tertiary/Quaternary stratigraphy may in places be piggybacked, and thickened by the related glacial tectonism. This has important implications for the design of a surface till sampling program for diamond indicator minerals. Overlying the Reita Lake Member are the sandy tills of the Kehiwin Lake Member. This member gradationally interfingers with the Reita Lake Member in the centre of NTS 73L along a north-south trend. The predominant glacial orientation of flutes within the Kehiwin Member is north–south. Overlying the Kehiwin Member in the western half of the Sand River map sheet are the till of the Vilna Member which are typified by glacial flutes that are oriented northwest–southeast. In general the tills of the Grand Centre Formation are higher in crystalline rock fragments than the underlying till formations. It is interpreted that the Grand Centre tills saw very little interaction with bedrock and thus represent an ablation till. This has important implications for the design of a regional till sampling program for diamond indicator minerals in that, the upper till sheet likely did not interact with possible kimberlite diatremes that are age correlative with the underlying Upper Cretaceous Lea Park stratigraphy. More specific details of the glacial stratigraphy of the Cold Lake area and Sand River map sheet are presented in Hitchon and Andriashek (1985) and Andriashek (1985).

The majority of area within the Martineau River permits is underlain by drift of variable thickness, ranging from less than 1 m to likely over 175 m (Fenton and Andriashek, 1983). Drift thickness decreases considerably outside of infilled depressions and meltwater channels and in areas of high topographic relief, in particular near the west-side of Cold Lake. However, local drift thicknesses can not be confirmed without detailed compilation of available drill hole data. Information regarding bedrock topography and drift thickness in northwest Alberta is available from the logs of holes drilled for petroleum, coal or groundwater exploration and from regional government compilations (Fenton and Andriashek, 1985; Pawlowicz and Fenton, 1995a, b; Dufresne *et al.*, 1996).

Structural Geology

In central eastern Alberta, the MLE occurs in a region where the younger Phanerozoic rocks which overlie the Precambrian basement, have undergone periodic vertical and, possibly, compressive deformation from the Proterozoic into Tertiary time (Cant, 1988; O'Connell *et al.*, 1990; Dufresne *et al.*, 1995, 1996). This pattern of long-lived, periodic uplift and subsidence has imposed a structural control on the deposition patterns of the Phanerozoic strata in eastern Alberta. In addition, this periodic movement has resulted in a rectilinear pattern of faults that not only is responsible for structurally controlled oil and gas pools, but may have provided potential pathways for later deep-seated intrusive kimberlitic magmas (Herbaly, 1974).

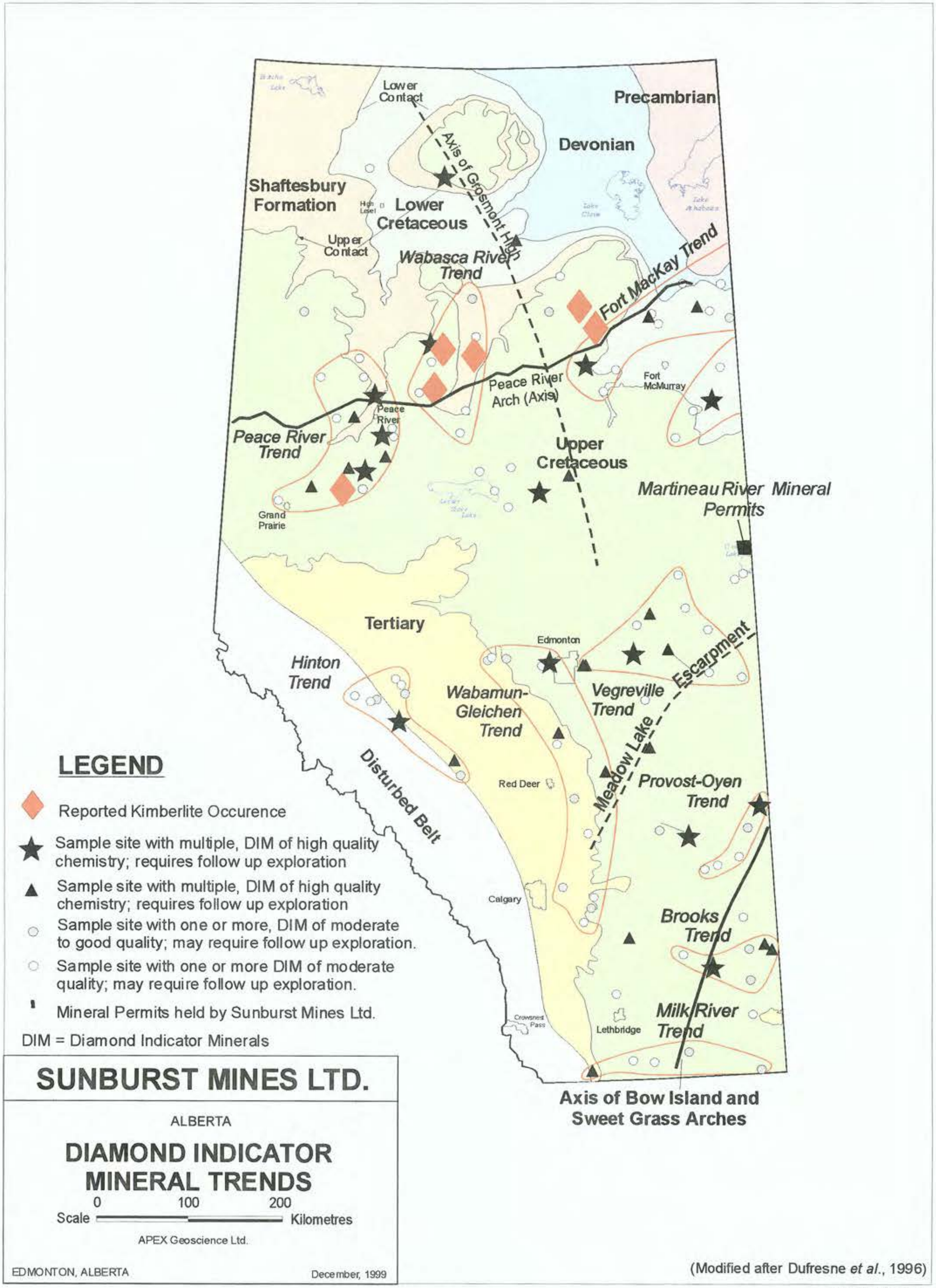
During the mid-Cretaceous and Early Tertiary, compressive deformation occurred as a result of the orogenic event that eventually led to the formation of the Rocky Mountains. The MLE was emergent during this period resulting in the reactivation of many prominent basement faults. The Phanerozoic rocks beneath the Martineau River permits lie within the northern edge of the MLE and are underlain by and proximal to basement faults related to the STZ, and the Grosmont Reef Complex, the latter being formed over the Grosmont High (Bloy and Hadley, 1990; Dufresne *et al.*, 1996). Basement faults may have controlled the emplacement of the Mountain Lake Kimberlite and the Buffalo Head Hills kimberlites northwest of the Martineau River permits (Dufresne *et al.*, 1996; Leckie *et al.*, 1997). Therefore, structures in the Cold Lake area resulting from tectonic activity associated with movement along the MLE, the Grosmont High, and the STZ, or even along contacts between different basement terranes could be pathways for kimberlitic volcanism.

PREVIOUS EXPLORATION

Previous exploration in the Cold Lake area has focussed primarily on the search for hydrocarbon and aggregate deposits and the determination of hydrogeological and geothermal regimes (Hackbarth and Nastasa, 1979; Scafe *et al.*, 1987; Madryk and Richardson, 1988; Edwards *et al.*, 1991, 1993; Bachu *et al.*, 1993). Only recently has the focus of exploration been redirected towards diamonds (Dufresne *et al.*, 1996). In summary, exploration for diamonds conducted within the Martineau River permits comprised staking, reconnaissance prospecting, and sampling (gravel and sand).

Prospecting and Surface Sampling

The Alberta Geological Survey and the Geological Survey of Canada collected three till samples (NAT92-32, NAT92-33, and 43-4-1-T) from the Cold Lake region in 1992 (Dufresne *et al.*, 1995, 1996). These samples were collected for regional diamond indicator mineral analysis to provide background information on the diamond potential of the region (Fig. 5). Sample NAT92-32 yielded 1 Cr-grossular garnet. Chrome-grossular is not unique to kimberlite intrusives but may be sourced from mantle derived intrusives such as kimberlite and lamproite. Sample NAT92-33 yielded no diamond indicator minerals. Sample 43-4-1-T was collected from the southwest side of Cold Lake. This till



(Modified after Dufresne *et al.*, 1996)

FIGURE 5.

sample returned one G1 calcic Cr-pyrope, and one G2 calcic Cr-pyrope. The latter is often considered a diagnostic mineral indicator of local kimberlite intrusives.

During July and August, 1999, Hoffman (1999) of Retread Resources Ltd., Calgary, Alberta, conducted 2 days of geological observation, prospecting and sampling on Permit No. 9397080001 for Sunburst Mines Ltd. (Appendix 2). The objective of Hoffman's visit was to locate and sample exposures of sand and gravel, and to make geological observations that might be associated with the economical potential of the permit area. In total 5 samples were collected from sand and gravel outcrops within the permit area (Figure 6). These samples, as well as several bulk samples, were processed for gold and platinum by Ice River, but not for diamond indicator minerals. The processed samples are currently in the possession of APEX and will be submitted for diamond indicator analysis in the near future.

Airborne Geophysical Surveys

During 1952, the Geological Survey of Canada conducted an aeromagnetic survey of the Sand River NTS map sheet (73L) as part of a regional study (GSC, 1983). The survey was flown at an altitude of 300 m with flight lines spaced every one mile and cross-lines every 15 miles. The results of the airborne magnetic survey undertaken by the GSC indicate the presence of major bedrock magnetic trends that signify the existence of bedrock structural and lithological contrasts. These northeast structural (e.g. Snowbird Tectonic Zone) and lithological (e.g. Archean/Proterozoic suture zones) trends are suitable areas for the ascent of kimberlite magmas through the earth's crust, as described above. The flight line spacing (approximately 1.5 km) of the survey performed by the GSC was to wide to realistically be useful in the location of specific kimberlite bodies or clusters of kimberlite bodies; due to the average limited diameter of individual pipes (300 m to 800 m).

Prior Expenditures

Prior expenditures by the Sunburst Mines Ltd. include charges by G. Hoffman of Retread Resources Ltd. of $5,497.13 for fieldwork and reporting (Appendix 2). Ice River processed Hoffman's samples as well as several large bulk samples for gold and platinum for a total cost of $5,350 (Appendix 3).

1999 EXPLORATION

Surface Sampling

During late summer of 1999, Mr. M. Dufresne of APEX conducted two days of gravel and river sediment (heavy mineral concentrate) sampling along the Martineau River and its tributaries. These samples (9TK006 to 9TK010) consisted of nearly full five-gallon pails of unscreened riverbed (recent and ancient) gravel (Figure 6). Many of the larger cobble to boulder sized detritus was not collected for sampling, as this size fraction is unnecessary for diamond indicator mineral recovery. During November of 1999, Mr. D.

Copeland of APEX conducted one day of follow-up heavy mineral concentrate sampling along the Martineau River in Alberta and Saskatchewan (Figure 6). Three samples (9DCH400 to 402) weighing 30 kg were screened to <5 mm size. Larger cobbles and boulders (> 5 mm) were sampled for microscope analysis. The samples were sent for diamond indicator mineral processing and picking to the Saskatchewan Research Council, Saskatoon, Saskatchewan. The samples were also processed for gold grains. The diamond indicator mineral results, received to date, are presented in Appendix 4a. Microprobe analyses of the picked diamond indicator grains were performed by the Saskatchewan Research Council and are presented in Appendix 4b. Diamond indicator mineral results are pending for samples 9DCH400 to 402.

The two periods of sampling by APEX along with the diamond indicator processing, compilation of regional geophysical and DEM data and completion of this report are valued at $16,000.00. This brings total expenditures by the Sunburst/Ice River joint venture to $26,867.13, to date.

RESULTS TO DATE AND DISCUSSION OF DIAMOND POTENTIAL

Quaternary and Bedrock Geology

A complex history of glaciation is evident within the Cold Lake area. The variable drift thickness (ranging from negligible to 175 m) and glacial complexity place constraints on implementation of a systematic exploration program for kimberlites and diamonds in the Cold Lake area. A full compilation of the glacial geology and drift thickness based on the extensive work of Andriashek (1985) and Fenton and Andriashek (1983) is required to fully assess the impact of the Quaternary geology/stratigraphy on the exploration opportunities and diamond potential for the area. The data should be compiled in order to delineate those areas of thick versus thin drift and areas of less complex glacial history. The areas of thin drift and less glacial complexity should be the focus of any future exploration programs.

Based on the fieldwork conducted to date, there is little bedrock exposure within the area. Fenton and Andriashek (1983) report that the Lea Park and Belly River formations are exposed within the Cold Lake area, whereas shales of the Smoky Group may be exposed within incised valleys. The bedrock exposed in the area (Belly River Formation) or intersected near the surface in drilling is age correlative to bedrock in other parts of Northern Alberta that has been intruded by kimberlites.

The bedrock geology and associated Archean, Proterozoic, and Phanerozoic structures underlying the Cold Lake area are an ideal environment for the formation and ascent of kimberlitic diatremes. The significant crustal thickness (40 km) underlying the area is suitable for the formation and preservation of diamonds within the upper mantle. The existence of basement structures such as the STZ and the contact between the Thorsby Terrane and the Hearne Sub-Province, and Phanerozoic structures such as the Meadow Lake Escarpment, indicate that the area is highly prospective for the required pathways for the upward migration of kimberlite intrusives from the upper mantle through the Phanerozoic to surface.

Indicator Results From 1999 Sampling

Diamond indicator minerals were recovered from all five of the glacial gravel (9TK007) and fluvial sediment samples (9TK006, 9TK008 to 9TK010) collected by APEX along the Martineau River (Appendix 4a). The majority of the indicator minerals were recovered from samples 9TK008 and 9TK010, which were collected from gravel bars within the Martineau River. Indicator minerals were recovered from recent river and stream gravel as well as glacial gravel deposits. The morphology, size and abundance of the indicator minerals recovered from the Martineau River indicate that some of the indicator minerals are likely sourced directly from a nearby kimberlite that is being eroded by recent drainage (Martineau River or its tributaries). Sampling of streams within 1 km of known kimberlites in northern Alberta is known to produce on the order of 10 to 20 indicator minerals in samples of comparable size.

Samples 9TK008 and 9TK010 contain a diverse assemblage of indicator minerals including pyrope garnets, Cr-diopsides, chromites and picroilmenites. Sample 9TK010 yielded 10 pyrope garnets, 1 Cr-diopside and 2 picroilmenites. Sample 9TK008 yielded 14 pyrope garnets, 1 Cr-diopside, 1 picroilmenite and 1 chromite. Several of the pyropes recovered from these samples are between 0.8 and 1.2 mm in diameter (Figure 7). A few of the pyropes from these two samples display weak orange peel texture and partially preserved kelphyte rims, which represent the remnant of the reaction rim normally formed by interaction of the xenocryst with the host kimberlite magma. The size of these pyrope garnets in conjunction with the presence of weak orange peel texture is likely indicative of a nearby primary kimberlite source.

Sample 9TK007 was collected from a glacial gravel unit in an overburden sequence along the flank of a hill and yielded a few indicator minerals, implying that perched glacial gravels are likely contributing some indicator minerals to the Martineau River. Three pyrope garnets, 1 chrome diopside and one picroilmenite were recovered from sample 9TK007. These and other glacial gravels are good targets for further sampling programs.

Samples 9TK006, and 9TK009 were collected from tributaries on the north side of the Martineau River. Sample 9TK009 yielded only a chromite and a spinel, both of which may or may not be derived from a kimberlite. Sample 9TK006 yielded 3 pyrope garnets and one Cr-diopside. The indicators recovered from sample 9TK006 may indicate the presence of a possible kimberlite or glacial gravel source north of the Martineau River.

Indicator Mineral Chemistry From 1999 Sampling

A total of 43 diamond indicator minerals were confirmed by microprobe analysis from the five samples with the bulk of the indicator minerals coming from samples 9TK008 and 9TK010, which were both collected from the Martineau River. The indicator minerals confirmed include G1, G2, G9, and G10 pyrope garnets, Cr-diopsides, picroilmenites and

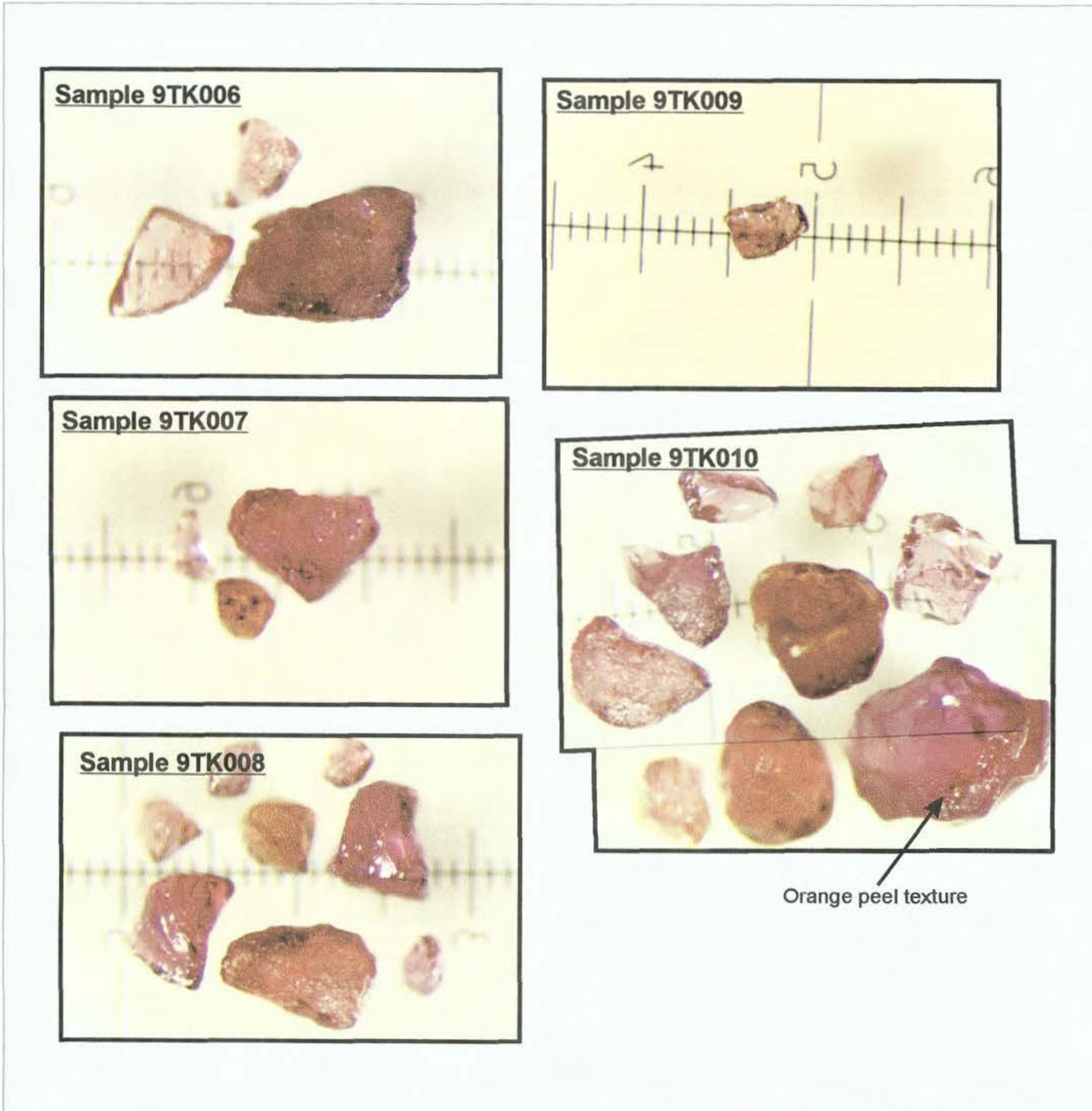


Figure 7. Pyrope photomicrographs from Sunburst Mines Ltd.'s Martineau River heavy mineral concentrate samples. The scale in the background is in milimetres. Note the "frosted" orange peel texture around some of the larger grains; notably 9TK008 and 9TK010.

chromites. Microprobe data from the picked diamond indicator minerals is presented with x–y scatter plots in Appendix 4b.

Four of the five samples yielded pyrope garnets including G1 or G2 pyropes comparable to kimberlite megacryst/macrocryst populations, lherzolitic G9 pyropes and harzburgitic G10 pyropes. Sample 9TK008 yielded 3 high TiO_2 (> 0.6 wt%) low Cr_2O_3 (< 4.0 wt%) G1 or G2 pyrope garnets, which are commonly associated with kimberlite megacryst/macrocryst phases and are unique to kimberlites (Mitchell, 1989). Samples 9TK006, 9TK007, 9TK008, and 9TK010 all yielded calcic G9 lherzolitic pyrope garnets (Appendix 4b). All of these pyropes are likely derived from kimberlites that have sampled upper lherzolitic mantle in the region. Although the pyropes are likely derived from kimberlites they are of little or no use in interpreting the diamond potential of the source kimberlite.

Sample 9TK008 yielded 2 subcalcic harzburgitic Gurney G10 pyrope garnets Gurney (1984), that have low concentrations of CaO and high concentrations of Cr_2O_3 and plot to the left of Gurney's (1984) 85% line within the region indicative of high diamond potential. G10 pyropes are derived from harzburgitic mantle and are commonly associated with diamonds that have been incorporated into the kimberlite. It is generally well accepted, that most highly diamondiferous kimberlites contain a large population of Gurney G10 pyrope garnets.

Some of the pyrope garnets recovered from samples 9TK008 and 9TK010 display orange peel texture and, in a few of cases, partial kelphytic rims (Figure 7). The presence of these reaction rims in conjunction with the exceptional size (up to 1 mm) and unabraded character of the grains likely indicates the grains were derived from a nearby source, potentially within 1 to 10 kilometres of the Martineau River. The presence of these grains in combination with the Gurney G10 pyrope garnets indicates that there is high potential for the presence of diamondiferous kimberlites in the Martineau River area.

Four chrome diopsides were recovered from the Martineau River samples; one each from samples 9TK006, 9TK007, 9TK008 and 9TK010. These grains have chemistries similar to Cr-diopsides from the Mountain Lake Kimberlite and the Lac de Gras area and plot within the field of mantle derived Cr-diopsides derived from kimberlites. The Cr-diopsides cannot be used to assess diamond potential but they are likely derived from lherzolitic mantle that has been brought to surface by a kimberlite or related alkaline intrusive.

Four picroilmenite grains were recovered from the Martineau River samples; one each from sample 9TK007 and 9TK008, and two from 9TK010. These picroilmenites are characterized by elevated MgO (11–13 wt%) and low concentration of total Fe (< 40 wt% total Fe as FeO). The low Fe and high MgO generally indicate a state of low oxygen fugacity within the kimberlite magma, a trait that is favourable for the preservation of diamonds. In hot, oxidising environments, diamonds readily revert to CO_2 and/or graphite. Also of significance, two of the picroilmenite grains (sample 9TK010) yield extremely high concentrations of Cr_2O_3 (3.5 and 4.1 wt%). High chrome in picroilmenites likely indicates that they were derived from the upper mantle and were brought to surface by a local kimberlite. Several diamond explorationists have also noted a strong association between highly diamondiferous kimberlites and the presence of high Cr picroilmenites (Smith *et al.*, 1994).

Diamond Potential

The diamond potential of the Martineau River area cannot be fully assessed with the limited amount of sampling, and the small number diamond indicator minerals recovered to date. Although diamond stability field indicator minerals were recovered, only a small part of the property has been sampled, and therefore a limited population of diamond indicator minerals have been recovered. It is suspected that the recovered diamond indicator minerals represent a limited aspect of the property geology. Further systematic sampling will lead to a better understanding of the diamond potential of the property. To date, the indicator minerals are highly encouraging for the presence of a diamondiferous kimberlitic source within an approximate distance of 1 to 10 km.

The presence of thick Proterozoic and Archean basement, and several major Proterozoic and Phanerozoic structures underlying the Martineau River property are favourable traits for the formation and preservation of diamonds in the upper mantle, as well as, the migration of kimberlite through the crust to surface.

Abundant indicator minerals were recovered from both glacial gravels and recent fluvial deposits along the Martineau River, leading to the assumption that the glacial gravels are in part a source for the indicators recovered from the Martineau RIver. However, the presence of large and unabraded pyrope garnets with orange peel texture and partially preserved kelphytic rims, including 2 G10s, within the Martineau River indicates that the Martineau River drainage is eroding a possible diamondiferous kimberlite nearby. The orange peel texture of the pyropes coming from the Martineau River would likely not be so well preserved with lengthy transport within the glacial gravels. The source for the indicator minerals within both the glacial and recent gravels is likely to the north and or east, as the flow direction of the ancient glacial stream that deposited the glacial gravels was likely towards the southwest. This happens to parallel the present day southwest flow direction of the Martineau River and may indicate a common bedrock source location for both the glacial and recent river derived indicator minerals.

The presence of potentially diamondiferous kimberlites regionally is indicated by the chemistry of the two Gurney (1984) G10 pyropes that were recovered to date. This occurrence is only the fourth known occurrence of G10 pyrope garnets in Alberta and is a significant early stage discovery in a grassroots diamond exploration program. The variety, size, volume and morphology of the indicator minerals recovered to date strongly suggest that a kimberlitic source may exist within 1 to 10 km of the Martineau River.

The high Ti G1/G2 pyropes and high Mg, low Fe and high Cr picroilmenites likely indicate the presence of a local kimberlite diatreme in the Martineau River are, since these diamond indicators minerals are almost exclusive to kimberlites. Additionally, the chemistry of the picroilmenites is indicative of a low oxygen fugacity magmatic environment, which is important in the preservation of any diamonds carried by the host kimberlite.

The geophysical characteristics of the property visible on the GSC regional airborne survey do not provide enough information to be of use in the exploration for kimberlites on the Martineau River property. Thus, a high-resolution airborne geophysical survey is required to locate potentially magnetic kimberlite bodies.

CONCLUSIONS

The regional setting for Ice River's Martineau River mineral permits is considered highly encouraging for the presence of diamondiferous kimberlites as the permits are underlain by Early Proterozoic basement of the Rimbey Magmatic Zone near its southeastern most limit and Archean basement of the Hearne Sub-Province. The Martineau River permits are located along the north flank of the Meadow Lake Escarpment near the eastern terminus of the Grosmont high and in an area where seismic refraction indicates crustal thickness ranges from 35 to 40 km. In addition, the permit area is in close proximity to the northeast trending Snowbird Tectonic Zone, a major crustal lineament. This regional structural setting is considered complex but favourable for the formation and preservation of diamonds in the upper mantle and their transport to surface in kimberlitic magmas during periodic tectonic activity associated with movement along either the Peace River Arch, the Grosmont High, the Meadow Lake Escarpment or the Snowbird Tectonic Zone.

The Cold Lake area is underlain by Upper Cretaceous Lea Park and Belly River formation shales, which are roughly age equivalent or slightly younger than the shales that host the diamondiferous kimberlites discovered in the Buffalo Head Hills area and the Birch Mountains. Drift thickness in the Cold Lake area is considered to be moderate to thin, therefore, the diamond indicator results to date are considered favourable and potentially indicative of the presence of diamoniferous kimberlites in the vicinity of Ice River's Martineau River mineral permits.

Recent, limited exploration by APEX on behalf of Ice River and Sunburst has yielded indications of the presence of local mantle-derived intrusives, such as kimberlite, in the Cold Lake region with the detection of diamond indicator minerals particularly in and around the Martineau River. Indicator minerals recovered to date include G1, G2, G9 and G10 pyrope garnets, chrome diopsides, Mg and Cr-rich picroilmenites and chromites. The Martineau River G10 pyropes are one of only four known occurrences of Gurney G10 pyropes in Alberta. Gurney G10 pyrope garnets are generally associated with highly diamondiferous kimberlites in most kimberlite areas of the world.

Based on these results an aggressive follow-up property-scale exploration program is warranted for the Martineau River area including detailed sampling in conjunction with a compilation of drift thickness and Quaternary geology. In addition a high-resolution airborne geophysical survey for the Martineau River permits should be completed as quickly as possible.

RECOMMENDATIONS

Based upon the favourable regional geological setting and the positive results of exploration conducted to date within the Martineau River permit, an aggressive, systematic follow-up exploration program, potentially leading to drilling, is highly recommended to search for diamondiferous kimberlites at the property. Exploration at the permit area should be staged and include data compilation, systematic regional till, stream, and beach sand sampling, and airborne geophysical surveying.

Although the exploration recommended at Ice River Mining Ltd.'s Martineau River mineral permits is still considered high risk because the presence of kimberlite has not yet been confirmed, the potential for discovery of a diamondiferous mantle-derived intrusive, such as a kimberlite, is considered high based upon the regional geological setting in conjunction with the positive results of limited exploration to date.

At the **Martineau River mineral permits,** exploration should be conducted in two stages and consist of the following:

Stage 1: Conduct a systematic regional till, stream sediment, and lake sediment/beach sand sampling program for diamond indicator minerals, and a drift thickness and Quaternary geology study to identify areas of thin drift. The estimated cost of this program including sample collection, processing, analysis and data interpretation is $75,000, not including GST.

Stage 2: Concurrent with Stage 1 or even prior to Stage 1, initiate a property scale high resolution airborne magnetic survey with a line spacing of 100 to 200 m. The estimated cost of this survey including data compilation, interpretation and target picking is approximately $ 25,000, not including GST.

APEX Geoscience Ltd.

PERMIT TO PRACTICE
APEX Geoscience Ltd.
Signature
Date December 1999
PERMIT NUMBER: P-5824
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

PROFESSIONAL GEOLOGIST MICHAEL B. DUFRESNE ALBERTA

M. B. Dufresne M.Sc., P.Geol.

D.A. Copeland, M.Sc., G.I.T.

December, 1999
Edmonton, Alberta

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CERTIFICATION

I, M.B. DUFRESNE OF [redacted] EDMONTON, ALBERTA, CERTIFY AND DECLARE THAT I AM A GRADUATE OF THE UNIVERSITY OF NORTH CAROLINA AT WILMINGTON WITH A B.SC. DEGREE IN GEOLOGY (1983) AND A GRADUATE OF THE UNIVERSITY OF ALBERTA WITH A M.SC. DEGREE IN ECONOMIC GEOLOGY (1987). I AM REGISTERED AS A PROFESSIONAL GEOLOGIST WITH THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS AND GEOPHYSICISTS OF ALBERTA.

MY EXPERIENCE INCLUDES SERVICE AS AN EXPLORATION GEOLOGIST WITH THE DEPARTMENT OF INDIAN AFFAIRS AND NORTHERN DEVELOPMENT, YUKON, FROM 1983 TO 1985. FROM 1986 TO 1993, I HAVE CONDUCTED AND DIRECTED PROPERTY EXAMINATIONS AND EXPLORATION PROGRAMS ON BEHALF OF COMPANIES AS A GEOLOGIST IN THE EMPLOY OF R.A. OLSON CONSULTING LTD. AND ITS PREDECESSOR COMPANY TRIGG, WOOLLETT, OLSON CONSULTING LTD. OF EDMONTON, ALBERTA. SINCE JANUARY 1994, I HAVE CONDUCTED AND DIRECTED PROPERTY EXAMINATIONS, PROPERTY EVALUATIONS AND EXPLORATION PROGRAMS ON BEHALF OF COMPANIES AS A PRINCIPAL IN APEX GEOSCIENCE LTD.

I HAVE NO INTEREST, DIRECT OR INDIRECT, IN THE PROPERTY THAT IS THE SUBJECT OF THIS REPORT OR SECURITIES OF OR ICE RIVER MINING LTD. OR SUNBURST MINES LTD., NOR DO I EXPECT TO RECEIVE SUCH INTEREST. AS WELL, APEX GEOSCIENCE LTD. HAS NO INTEREST, DIRECT OR INDIRECT, IN THE PROPERTIES, OR SECURITIES OF ICE RIVER MINING LTD. OR SUNBURST MINES LTD., NOR DOES IT EXPECT TO RECEIVE SUCH INTEREST.

THIS REPORT ENTITLED "EVALUATION OF THE DIAMOND POTENTIAL OF ICE RIVER MINING LTD.'S MARTINEAU RIVER PROPERTY (PERMIT #9397080001), ALBERTA" WAS WRITTEN UNDER MY SUPERVISION AND IS BASED UPON THE STUDY OF PUBLISHED AND UNPUBLISHED DATA. I HAVE PERFORMED A FIELD EXAMINATION OF THE MARTINEAU RIVER PROPERTY, AND HAVE CONDUCTED CONSIDERABLE FIELDWORK IN THE REGIONS SURROUNDING THIS PROPERTY.

I HEREBY GRANT SUNBURST MINES LTD. OF SHERWOOD PARK, ALBERTA, PERMISSION TO USE THIS REPORT AS A QUALIFYING REPORT FOR THE MARTINEAU RIVER PROPERTY.

PROFESSIONAL GEOLOGIST
MICHAEL B. DUFRESNE
ALBERTA

M.B. DUFRESNE, M.SC., P.GEOL.

December, 1999
EDMONTON, ALBERTA

CERTIFICATION

I, D.A. COPELAND OF [redacted] EDMONTON, ALBERTA, CERTIFY AND DECLARE THAT I AM A GRADUATE OF THE UNIVERSITY OF NEW BRUNSWICK AT FREDERICTON WITH A B.SC. DEGREE IN GEOLOGY (1995) AND A GRADUATE OF THE UNIVERSITY OF NEW BRUNSWICK WITH A M.SC. DEGREE IN STRUCTURAL GEOLOGY (1999). I AM REGISTERED AS A GEOLOGIST IN TRAINING WITH THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS AND GEOPHYSICISTS OF ALBERTA.

MY EXPERIENCE INCLUDES SERVICE AS A GEOLOGICAL ASSITANT WITH THE UNIVERSITY OF NEW BRUNSWICK AND THE GEOLOGICAL SURVEY OF CANADA FROM 1993 TO 1997, AND EXPLORATION GEOLOGIST WITH A JUNIOR MINING COMPANY DURING 1997 AND 1998. I HAVE CONDUCTED PROPERTY EXAMINATIONS AND EXPLORATION PROGRAMS ON BEHALF OF COMPANIES AS A GEOLOGIST IN THE EMPLOY OF APEX GEOSCIENCE LTD. SINCE 1998.

I HAVE NO INTEREST, DIRECT OR INDIRECT, IN THE PROPERTIES THAT ARE THE SUBJECT OF THIS REPORT, OR SECURITIES OF ICE RIVER MINING LTD. OR SUNBURST MINES LTD., NOR DO I EXPECT TO RECEIVE SUCH INTEREST. AS WELL, APEX GEOSCIENCE LTD. HAS NO INTEREST, DIRECT OR INDIRECT, IN THE PROPERTIES, OR SECURITIES OF ICE RIVER MINING LTD. OR SUNBURST MINES LTD., NOR DOES IT EXPECT TO RECEIVE SUCH INTEREST.

THIS REPORT ENTITLED "DIAMOND POTENTIAL OF ICE RIVER MINING LTD.'S MARTINEAU RIVER PROPERTY (PERMIT #9397080001), ALBERTA" IS BASED UPON THE STUDY OF PUBLISHED AND UNPUBLISHED DATA. I HAVE PERFORMED A FIELD EXAMINATION OF THE MARTINEAU RIVER PROPERTY.

I HEREBY GRANT SUNBURST MINES LTD. OF SHERWOOD PARK, ALBERTA, PERMISSION TO USE THIS REPORT AS A QUALIFYING REPORT FOR THE MARTINEAU RIVER PROPERTY.

[redacted]

D.A. COPELAND, M.SC., G.I.T.

DECEMBER, 1999
EDMONTON, ALBERTA

APPENDIX 1

LEGAL PROPERTY DESCRIPTIONS FOR ICE RIVER MINING LTD.'S MARTINEAU RIVER PERMITS

APPENDIX 1
Mineral Permit Status
Martineau River Property, Alberta
ICE RIVER MINING LTD.
PROJECT (99227)

Permit #	Term Date	Current Expiry Date	Status	Area (Ha)	Owner	Legal Description
0939397080001	1997-08-06	2007-08-06	Active	4958	Sunburst Mines Ltd.	4-01-065:parts of 30-35; 4-01-066: 3-11,13-18,parts of 1-2,12

APPENDIX 2

REPORT BY G. HOFFMAN, 1999, FOR SUNBURST MINING LTD.'S MARTINIEAU RIVER PROPERTY

SUNBURST MINING LTD.
PERMIT NO. 9397080001:
REPORT ON WORK DURING JULY AND AUGUST, 1999

Submitted to
Sunburst Mining Ltd.

by
Georgia L. Hoffman, P.Geol.
1 November 1999

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SUNBURST MINING LTD.
PERMIT NO. 9397080001:
REPORT ON WORK DURING JULY AND AUGUST, 1999

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SUNBURST MINING LTD.
PERMIT NO. 9397080001:
REPORT ON WORK DURING JULY AND AUGUST, 1999

1. INTRODUCTION

Between 30 July and 1 August 1999, the author, representing Retread Resources Ltd. (Retread), traveled to the Cold Lake area of Alberta (Fig. 1) to visit Permit No. 9397080001 (the Permit Area) (Fig. 2), which is held by Sunburst Mines Ltd. (Sunburst) of Edmonton, Alberta. The author was accompanied by Ms. Edna Lawrence and Mr. Jim McMullen of Sunburst.

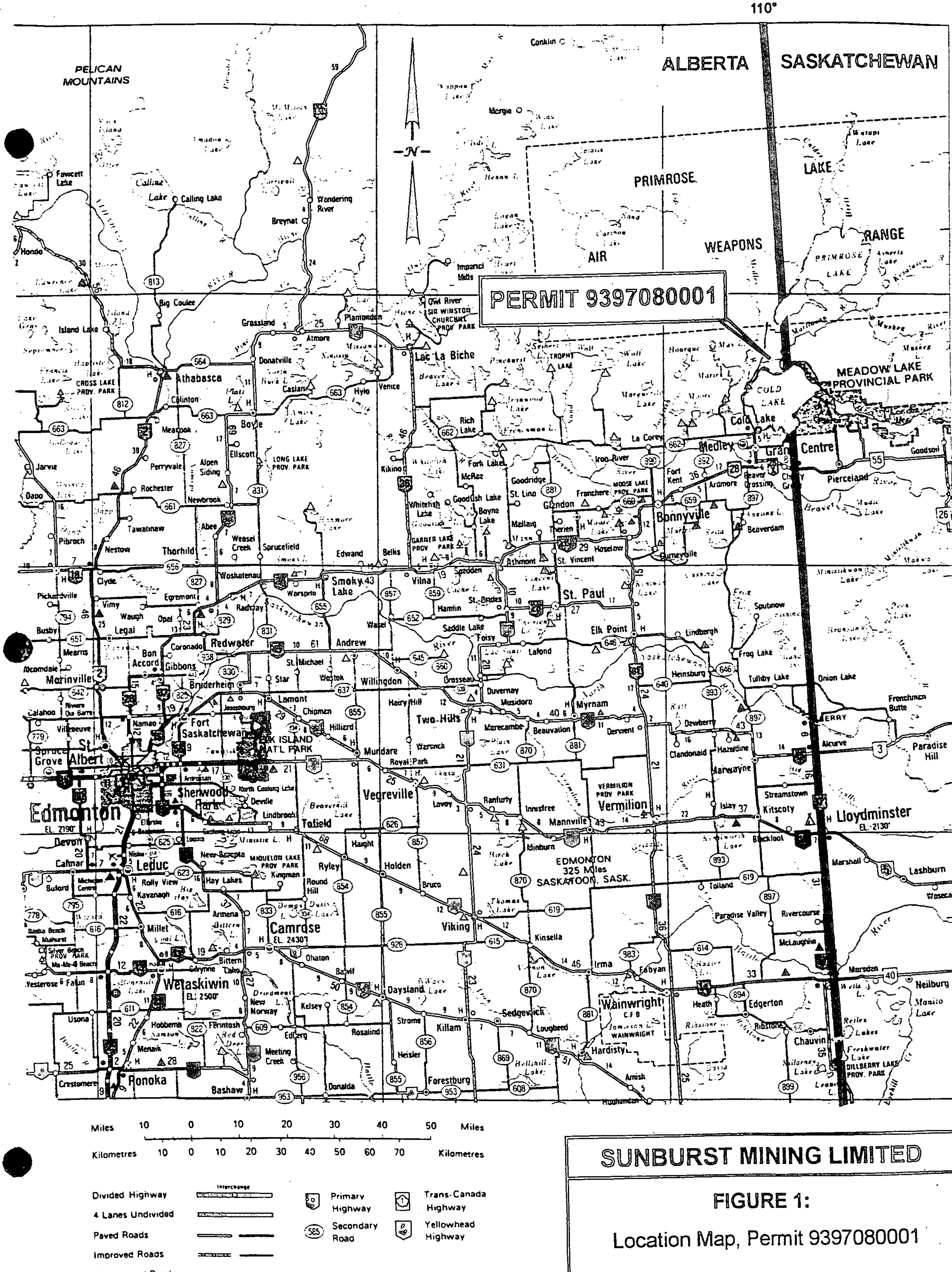
The economic potential of the Permit Area lies in:

- aggregate deposits, in the form of glaciofluvial and/or fluvial sands and gravels;
- minerals such as magnetite, ilmenite, garnet, and gold, that are sometimes present within the sand/gravel deposits and could represent economically significant co-products; and
- the possibility that diamond-bearing intrusives may be present within the bedrock.

The objectives of the visit were:

- to locate exposures of sand and/or gravel and take "grab" samples of that material; and
- to make whatever geological observations might be possible within the limited time-frame of the visit.

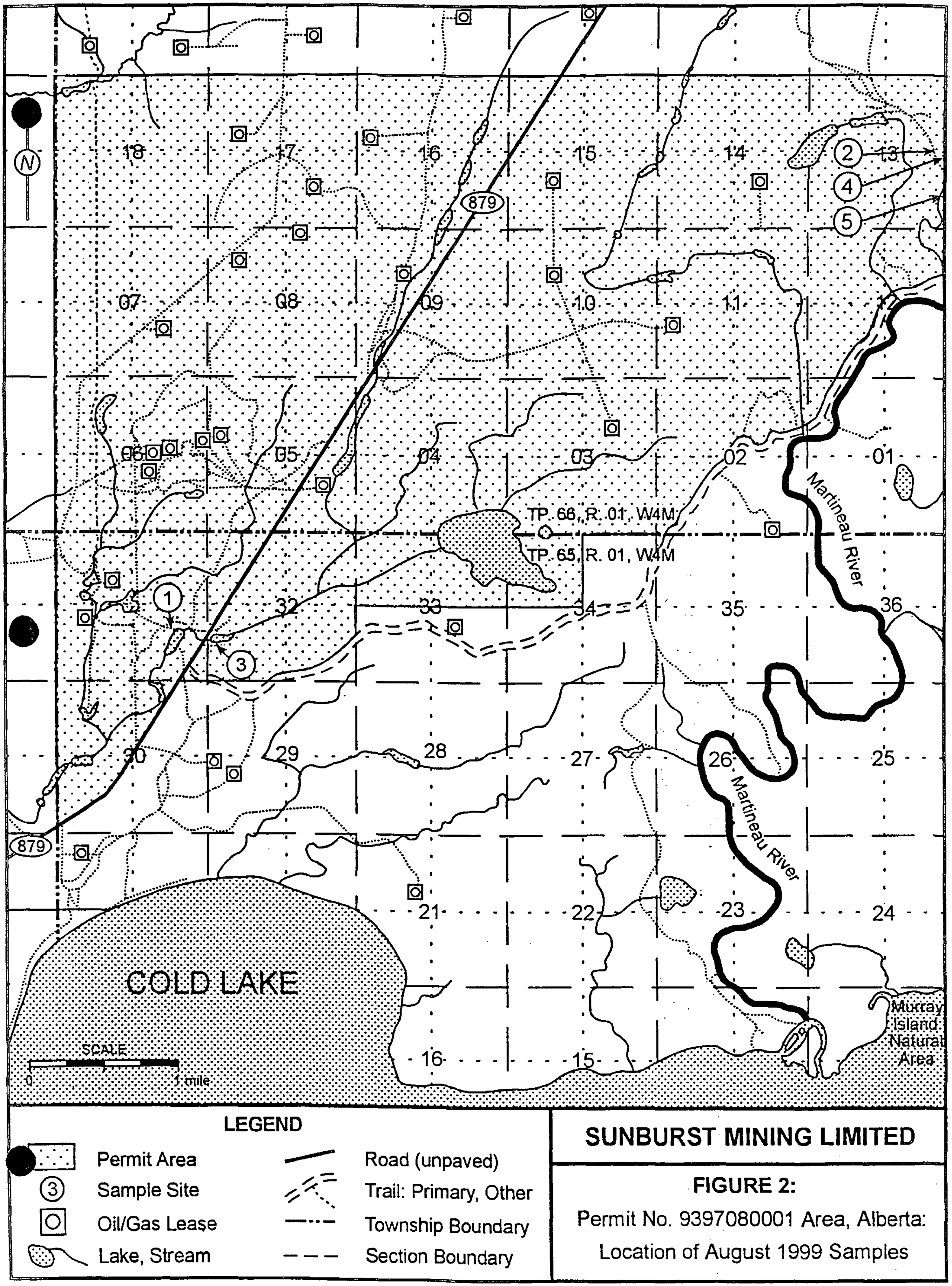
This report is based on observations made by the author during the site visit, and on unpublished data supplied by Sunburst. The land description of the Permit Area given in Table 1 was supplied by Sunburst, and neither the land description nor the validity of the Permit have been verified by the author.



SUNBURST MINING LIMITED

FIGURE 1:

Location Map, Permit 9397080001



SUNBURST MINING LIMITED

FIGURE 2:

Permit No. 9397080001 Area, Alberta: Location of August 1999 Samples

2. LOCATION AND ACCESS

The Permit Area lies in northeastern Alberta, about 300 km northeast of the city of Edmonton (Fig. 1). It includes parts of Townships 65 and 66, Range 1, west of the 4th Meridian, according to the land description provided by Sunburst, which is shown in Table 1 below.

Table 1. Land Description, Permit 9397080001

Township 65, Range 01, W4		Township 66, Range 01, W4	
Section:	30N part, SW part;	Section:	01NW part;
	31 all;		02N part, SW part;
	32S part, N all;		03 to 11 all;
	33N all;		12N part, SW part;
	34NW part;		13 to 18 all.
	35NW part.		

The Permit Area lies north of Cold Lake, west of the Alberta-Saskatchewan boundary, and south of the Primrose Lake Air Weapons Range (Fig. 1). It is covered by boreal forest (primarily spruce, pine and aspen), with some areas of muskeg. Land use includes hunting, fishing, trapping, petroleum production, forestry, recreation and tourism (primarily hunting, fishing, camping and boating).

The western part of the Permit Area is crossed by Alberta Secondary Route 879, a good-quality, all-weather gravel road that runs from the town of Cold Lake, Alberta to the Air Weapons Range (Fig. 1). The eastern part is accessed from Pierceland, Saskatchewan, via Saskatchewan Secondary Route 919, and a major trail system that runs westward from Route 919 into the Permit Area. That trail system currently supports logging operations, and has good bridges at the Cold and Martineau Rivers.

Numerous minor trails and tracks that originate from the above routes extend into most parts of the Permit Area (Fig. 2). Established by hunting, petroleum and forestry activities, few of them are maintained and most are in poor to very poor condition. Some of them are passable by 4-wheel-drive vehicles, but many are suitable only for all-terrain vehicles, snowmobiles or foot travel.

All trails were very muddy and difficult to negotiate at the time of the visit, and we were unable to reach the central part of the Permit Area. Sample sites 1 and 3 (Fig. 2) in the western part of the Permit Area were reached from Route 879 by driving and walking along trails. Sample sites 2, 4 and 5 were accessed from Saskatchewan. From Route 919, the logging road was followed across the Cold and Martineau Rivers to the eastern boundary of the Permit Area, and then secondary trails were followed on foot.

3. GEOLOGY

The bedrock in the Cold Lake area belongs to the Upper Cretaceous Lea Park Formation, which consists of grey marine shale and claystone, with subordinate amounts of silt, sand, and ironstone concretions. The bedrock is covered by a mantle of unconsolidated glacial and recent (Quaternary age) and preglacial (late Tertiary age) sediment that may reach thickness as great as 80 m or more in parts of the Permit Area (Andriashek and Fenton, 1989; Alberta Research Council Bulletin No. 57). The unconsolidated sediment consists mainly of clay-rich materials such as till, but also includes scattered deposits of sand and/or gravel.

3.1 Sand/Gravel Deposits

Sand/gravel deposits that would be suitable for use as aggregate are the primary exploration targets. Previous work by Sunburst has demonstrated that sand/gravel deposits are present within the Permit Area (see accompanying reports), but their size and extent have not yet been determined. Most of the sand/gravel deposits are fluvial or glaciofluvial in origin, deposited by streams and rivers flowing before, during and after glaciation. Because the drainage and sedimentation patterns shifted repeatedly as a series of ice-sheets advanced and retreated across the region, the sand/gravel deposits are irregular in size, shape and distribution. According to Andriashek and Fenton (1989, op. cit.), as many as four separate ice-sheets may have affected the area.

3.2 Co-product Minerals

Previous work by Sunburst has demonstrated that minerals such as magnetite, ilmenite, garnet, and gold are present within some of the sand/gravel deposits of the Permit Area, in concentrations that may make them economically significant as co-products (see accompanying reports). The most favorable sand/gravel deposits for these minerals are those that were derived from the Canadian Shield to the northeast. Sands that were sourced from the south and west were derived mainly from Cretaceous rocks that seldom contain significant amounts of such minerals.

3.3 Diamonds

A number of companies have been conducting diamond exploration projects in the Cold Lake region, and it is geologically possible that the bedrock within the Permit Area could include diamondiferous intrusive rocks. Diamond indicator minerals (minerals that occur primarily or exclusively in diamondiferous rock types) have been reported from samples that Sunburst submitted to the Saskatchewan Research Council for analysis (see accompanying reports).

4. SAMPLING

Sand/gravel deposits are exposed at the surface at several locations on Permit No. 9397080001. However, it was not possible to determine the thickness, aerial extent, or tonnages in of any of the deposits, due to the limited nature of the exposures, the difficult access conditions that prevailed at the time of the visit, and the short time-frame of the visit. Samples were taken where sand/gravel was exposed and accessible, and sample locations were dictated by accessibility, rather than being chosen according to geological setting.

Five samples were taken, two in the western part of the Permit Area, and three in the eastern part (Fig. 2). All were "grab" samples from exposed sand/gravel, and as such, they may provide an approximate indication of the nature of the deposits, but they are not suitable for quantitative use in reserve calculations. About 5 to 10 kg of exposed sand/gravel was simply shoveled into a sample-container at each site. The base of the deposit was not exposed at any of the locations, so neither the total thickness of sand/gravel not the stratigraphic position of the sample within the deposit could be determined. Sample locations were estimated as closely as possible using the available base map, but should be considered approximate.

All samples were submitted to Ms. Lawrence and Mr. McMullen of Sunburst for shipment to appropriate laboratory and testing facilities. They should be examined for diamond indicator minerals and all types of garnet, as well as for magnetite, ilmenite and gold. Low values are to be expected, because it is likely that none of the samples came from the basal part of a deposit, where heavy minerals such as magnetite, ilmenite, garnet and gold are usually concentrated. Any occurrences of those minerals should therefore be regarded as encouraging.

5. CONCLUSIONS

1. The author has confirmed that sand/gravel deposits are present on Permit No. 9397080001. The size and quality of those deposits has not yet been determined, but they could be economically significant as aggregate deposits if sufficient tonnages are proven to be present.

2. The demand for aggregate in the area appears to be fairly strong, and a large aggregate pit is currently operating south of Cherry Grove, near the Beaver River (Fig. 1). Local markets, including the Primrose Lake Air Weapons Range (Fig. 1), could be accessed from the Permit Area via Alberta Secondary Highway 879 (Fig. 2).

3. Previous work by Sunburst indicates that minerals such as magnetite, ilmenite, garnet and gold are present within some of the sand/gravel deposits. Those minerals could be economically significant as co-products if they are proven to be present in large enough quantities, and if they can be separated and concentrated at an acceptable cost.

4. Diamond indicator minerals have been reported from sand/gravel samples taken previously by Sunburst, and diamond exploration is being conducted in the region by other companies. Permit No. 9397080001 may therefore have potential to host diamondiferous rock types.

Because of the above findings, further exploration work is warranted on Permit No. 9397080001 to document the tonnages and quality of the sand/gravel deposits and potential co-product minerals. Further work should also be done to evaluate the potential for diamondiferous rock types within the Permit Area. A recommended work program is outlined in the next section.

6. RECOMMENDATIONS

One or two areas of sand/gravel should be selected for detailed evaluation. The objectives should be:

- to prove economically significant tonnages of aggregate material of known quality;
- to prove tonnages and separability of potential co-product minerals such as magnetite, ilmenite, garnet and gold; and
- to map the types and distribution of diamond indicator minerals.

To accomplish those objectives, the work program should be designed to determine:

- the aerial extent and thickness of the selected deposit(s);
- the variation of aggregate particle size (relative percentages of cobbles, gravel, sand, silt, and clay) throughout the deposit(s);
- the range of bulk density (metric tonnes per cubic metre) of the raw material;
- the distribution of potential co-product minerals such as magnetite, ilmenite, garnet and gold within the deposit(s), and the total in-place tonnages of each;
- the cost and efficiency of procedures for separating potential co-product minerals into marketable products; and
- the occurrences and distribution of diamond indicator minerals.

The necessary data can be obtained by completing a pattern of auger holes and/or backhoe trenches in the selected area(s), and taking well-documented, quantitative samples of the intersected material. A limited number of trenches, supplemented by auger holes, may be the most practical approach. The trenches should be used to provide channel and bulk samples, and information on deposit stratigraphy and sedimentology. The auger holes should be used to provide supplemental data in areas between the trenches.

The following points should be considered during project planning:

1. Drilling and trenching equipment must be capable negotiating narrow, muddy access trails, and should be capable of reaching depths of at least 15 feet (about 5 metres).

2. The number and spacing of data points (auger holes and trenches) should be determined according to the degree of confidence required, within the available budget.

3. In the field, locations of all data points (auger holes, trenches and natural exposures) should be determined to an accuracy of at least few metres or better. Most of the currently available GPS receivers are not sufficiently accurate for this purpose without additional base-station data and post-processing.

4. Sampling should be done by a qualified geologist so that results will be acceptable to financial institutions.

5. Trench exposures should be photographed, and a channel sample should be taken from each lithologically distinct layer. The geologist should ensure that each sample is representative of the layer, therefore all of the material present, including cobbles, should be included in the sample. Sample location, depth, thickness, in-place volume, and weight should be recorded. Sample weights should be determined on site, before any significant drying can occur. Samples should then be sealed to prevent tampering, and labeled for shipment to laboratory and testing facilities.

6. In general, data from large trench samples is more representative of the quality of the deposit than data from relatively small auger hole samples. The geologist should therefore ensure that each trench sample is large enough to allow for all of the appropriate tests, including aggregate particles size, aggregate bulk density, determination of co-product mineral concentrations, mineral separation tests, and identification of diamond indicator minerals.

7. In addition to examining samples for diamond indicator minerals (e.g., microdiamonds, chrome diopside, certain types of garnet, magnesian ilmenite, and chromite), gravel and cobbles should be examined for fragments of potentially diamondiferous rock types such as kimberlite and lamproite. All occurrences of indicator minerals and rock types, and their probable direction of transport (if known), should be plotted on a base map.

8. It may be productive to have any available geophysical data from government surveys and/or other sources, examined, reprocessed and interpreted by a geophysicist, to identify specific anomalies that could represent diamondiferous intrusives.

STATEMENT OF QUALIFICATIONS

I, Georgia Lynne Hoffman, Professional Geologist, of Retread Resources Ltd., 215 Cedarwood Road S.W., Calgary, Alberta, do hereby certify that:

1. I have been a member of the Association of Professional Engineers, Geologists and Geophysicists of Alberta since 1977 (Membership Number 240110;

2. I received a Bachelor's degree in Geology from the University of Pennsylvania in 1970, and a Master's degree in Biological Sciences from the University of Alberta in 1995;

3. I have practiced as a geologist for more than 25 years in Canada and the Unites States;

4. The present report is based on work that I have personally undertaken, and on information provided by Sunburst Mining Ltd.;

5. I have no financial interest in Sunburst Mining Ltd. or in the Permit Area discussed in this report;

6. I have no financial interest in any mineral properties in northern Alberta at present; and

7. I consent to the use of this report by Sunburst Mining Ltd. in submissions to regulatory bodies, and to the distribution of all or parts of this report to shareholders and other parties, provided that the meaning and/or spirit of the report is not altered by use of partial quotes.

Georgia L. Hoffman, P.Geol.
1 November 1999

Retread Resources Ltd .
215 CEDARWOOD ROAD SW
CALGARY, ALBERTA
T2W 3G8
PHONE OR FAX (403) 281-5622
E-mail: nikolsd@cadvision.com

GST#89951 0960
Alberta Office

Invoice # 991124

Date: November 24, 19999

Client:
Sunburst Mining Ltd.

Project: Cold Lake Project

Time: **For Field Work and Report Preparation**

Person	Hours	Rate/Hour	
[redacted]			$0.00
	60	85.625	$5,137.50
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00

Total Time on Project: **$5,137.50**

Expenses:

Expense Sheet #1	$0.00
Administration Fees	$0.00

Total Expenses on Project: **$0.00**

Total GST on Project: **$359.63**

Total of this Invoice: **$5,497.13**

APPENDIX 3

PREVIOUS EXPENDITURES BY THE ICE RIVER/SUNBURST JOINT VENTURE ON THE MARTINEAU RIVER PROPERTY

ICE RIVER MINING INC.
8728 - 51 AVENUE, 2ND FLOOR
EDMONTON, Alberta T6E 5E6

1

10/2/99

SUNBURST MINE LTD.
24 GALVESTON AVENUE
SHERWOOD PARK, Alberta
T8A 2N6

SUNBURST MINE LTD.

EDMONTON, Alberta

Business No.: 867725749RT0001

2	SAMPLE 01- 2 MANDAYS LABOUR	3	250.00	500.00
2	SAMPLE 02 -2 MANDAYS LABOUR	3	250.00	500.00
2	SAMPLE 03-2 MANDAYS LABOUR	3	250.00	500.00
2	SAMPLE 04-2 MANDAYS LABOUR	3	250.00	500.00
2	SAMPLE 05-2 MANDAYS LABOUR	3	250.00	500.00
1	SAMPLE 01-SEPERATION PROCESSING	3	100.00	100.00
1	SAMPLE 02-SEPERATION PROCESSING	3	100.00	100.00
1	SAMPLE 03-SEPERATION PROCESSING	3	100.00	100.00
1	SAMPLE 04-SEPERATION PROCESSING	3	100.00	100.00
1	SAMPLE 05-SEPERATION PROCESSING	3	100.00	100.00
1	SAMPLE 01-HEAVY MINERAL CONCENTRATION	3	200.00	200.00
1	SAMPLE 02-HEAVY MINERAL CONCENTRATION	3	200.00	200.00
1	SAMPLE 03-HEAVY MINERAL CONCENTRATION	3	200.00	200.00
1	SAMPLE 04-HEAVY MINERAL CONCENTRATION	3	200.00	200.00
1	SAMPLE 05-HEAVY MINERAL CONCENTRATION	3	200.00	200.00
	3 - GST @ 7.0%			280.00

PROCESSING FIVE SAMPLES FROM SUNBURST MINE LTD. 4,280.00

ICE RIVER MINING INC.
8728 - 51 AVENUE, 2ND FLOOR
EDMONTON, Alberta T6E 5E6

2

10/2/99

SUNBURST MINE LTD.
24 GALVESTON AVENUE
SHERWOOD PARK, Alberta
T8A 2N6

SUNBURST MINE LTD.

EDMONTON, Alberta

Business No.: 867725749RT0001

1	SAMPLE 01-HEAVY MINERAL SEPERATION	3	200.00	200.00
1	SAMPLE 02-HEAVY MINERAL SEPERATION	3	200.00	200.00
1	SAMPLE 03-HEAVY MINERAL SEPERATION	3	200.00	200.00
1	SAMPLE 04-HEAVY MINERAL SEPERATION	3	200.00	200.00
1	SAMPLE 05-HEAVY MINERAL SEPERATION	3	200.00	200.00
	3 - GST @ 7.0%			70.00

PROCESSING FIVE SAMPLES FROM SUNBURST MINE LTD. 1,070.00

APPENDIX 4a

PICKED DIAMOND INDICATOR MINERAL DATA FROM SURFACE SAMPLING

APPENDIX 4a
Picked Indicator Mineral Results 1999 Surface Sampling
Martineau River Property, Alberta
ICE RIVER MINING LTD.
PROJECT (99227)

Sample	Pyrope Garnet		Chrome Diopside		Eclogitic Garnet	Olivine	% picked	Picroilmenite		Chromite		% picked
	def	poss	def	poss	poss	poss		def	poss	def	poss	
9TK006	3	1	0	1	0	0	100	0	2	0	0	13
9TK007	3	1	0	1	0	0	100	0	6	0	0	10
9TK008	8	8	0	2	2	0	100	0	10	0	1	4
9TK009	1	1	0	0	0	0	100	0	6	0	1	12
9TK010	10	2	1	0	0	0	100	0	5	0	0	3

APPENDIX 4b
Microprobe Data For The Martineau River Area Indicator Minerals
Martineau River Property, Alberta-Saskatchewan
ICE RIVER MINING LTD.
PROJECT (99227)

Sample	Grain	Mineral ~	TiO2	Cr2O3	FeO*	MgO	CaO	SiO2	Al2O3	Na2O	MnO	K2O	TOTAL
9TK-008	38	GROSSULAR	0.37	10.86	5.11	0.16	34.51	38.28	11.27	0.00	0.26	0.00	100.83
9TK-009	9	CHROMITE	0.18	51.06	38.08	0.41	0.00	0.00	4.47	0.00	1.24	n/a	97.89
9TK-009	39	SPINEL	0.11	0.01	3.79	22.92	0.00	0.04	60.86	0.00	0.17	0.00	87.90
9TK-010	7	CPX_05_CHROME_DIOPSIDE	0.06	0.88	2.31	15.22	23.13	52.86	3.95	0.68	0.08	0.00	99.16
9TK-010	10	PICRO_ILMENITE	47.25	4.10	36.53	11.11	0.00	0.00	0.30	0.00	0.24	n/a	100.07
9TK-010	11	PICRO_ILMENITE	53.37	3.38	29.52	12.97	0.00	0.05	0.08	0.00	0.29	n/a	99.98
9TK-010	40	G_02_HIGH_TITANIUM_PYROPE	0.95	6.72	7.28	19.65	6.12	41.16	16.91	0.09	0.35	0.00	99.22
9TK-010	41	G_09_CHROME_PYROPE	0.18	5.35	7.33	19.98	5.24	41.29	19.63	0.03	0.44	0.00	99.47
9TK-010	42	G_09_CHROME_PYROPE	0.25	5.45	7.32	20.24	5.47	42.31	17.64	0.03	0.45	0.04	99.21
9TK-010	43	G_09_CHROME_PYROPE	0.12	4.03	7.99	19.27	6.09	42.10	19.65	0.06	0.47	0.00	99.78
9TK-010	44	G_10_LOW_CALCIUM_CHROME_PYROPE	0.09	6.72	7.89	19.40	5.97	41.32	18.46	0.03	0.48	0.00	100.36
9TK-010	45	G_09_CHROME_PYROPE	0.15	4.77	7.93	19.96	5.34	41.61	19.57	0.03	0.41	0.00	99.77
9TK-010	46	G_09_CHROME_PYROPE	0.07	4.80	7.03	20.93	5.21	41.59	19.51	0.02	0.37	0.00	99.51
9TK-010	47	G_10_LOW_CALCIUM_CHROME_PYROPE	0.09	6.67	7.91	19.19	6.02	40.98	18.69	0.05	0.48	0.02	100.09
9TK-010	48	G_09_CHROME_PYROPE	0.00	5.31	7.26	20.09	5.89	41.49	20.07	0.00	0.44	0.04	100.58
9TK-010	49	G_09_CHROME_PYROPE	0.12	2.65	7.18	20.08	5.61	42.72	20.29	0.06	0.44	0.00	99.15
9TK-010	50	G_09_CHROME_PYROPE	0.22	2.85	8.41	21.11	4.45	41.58	20.85	0.01	0.40	0.05	99.93

* Fe^{2+} and Fe^{3+} reported as total Fe.

~ Mineral classification from the program by Quirt (1992a, b).

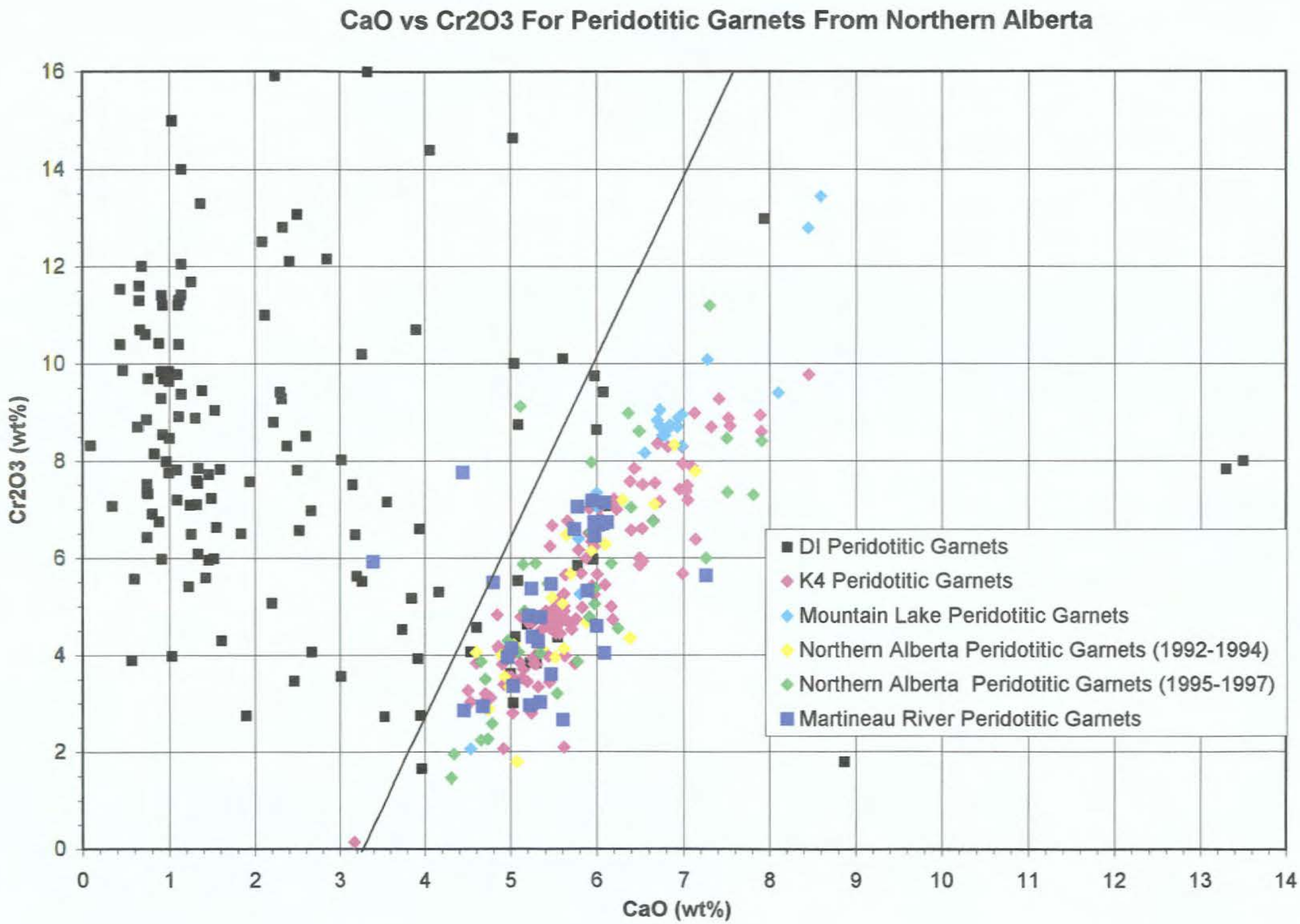
n/a = not analysed

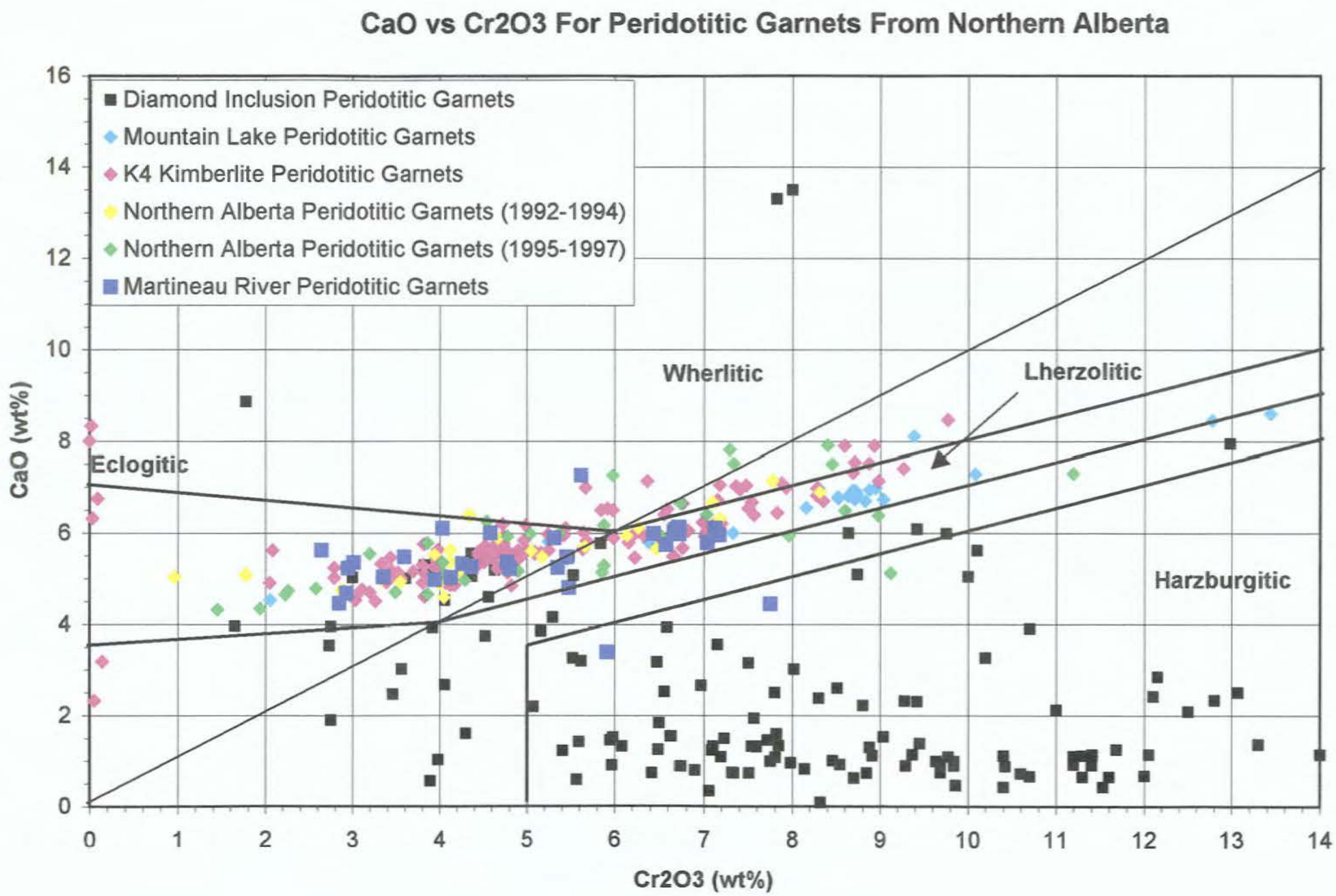
APPENDIX 4b

MICROPROBE RESULTS FOR DIAMOND INDICATOR MINERALS FROM SURFACE SAMPLING WITH SCATTER PLOTS

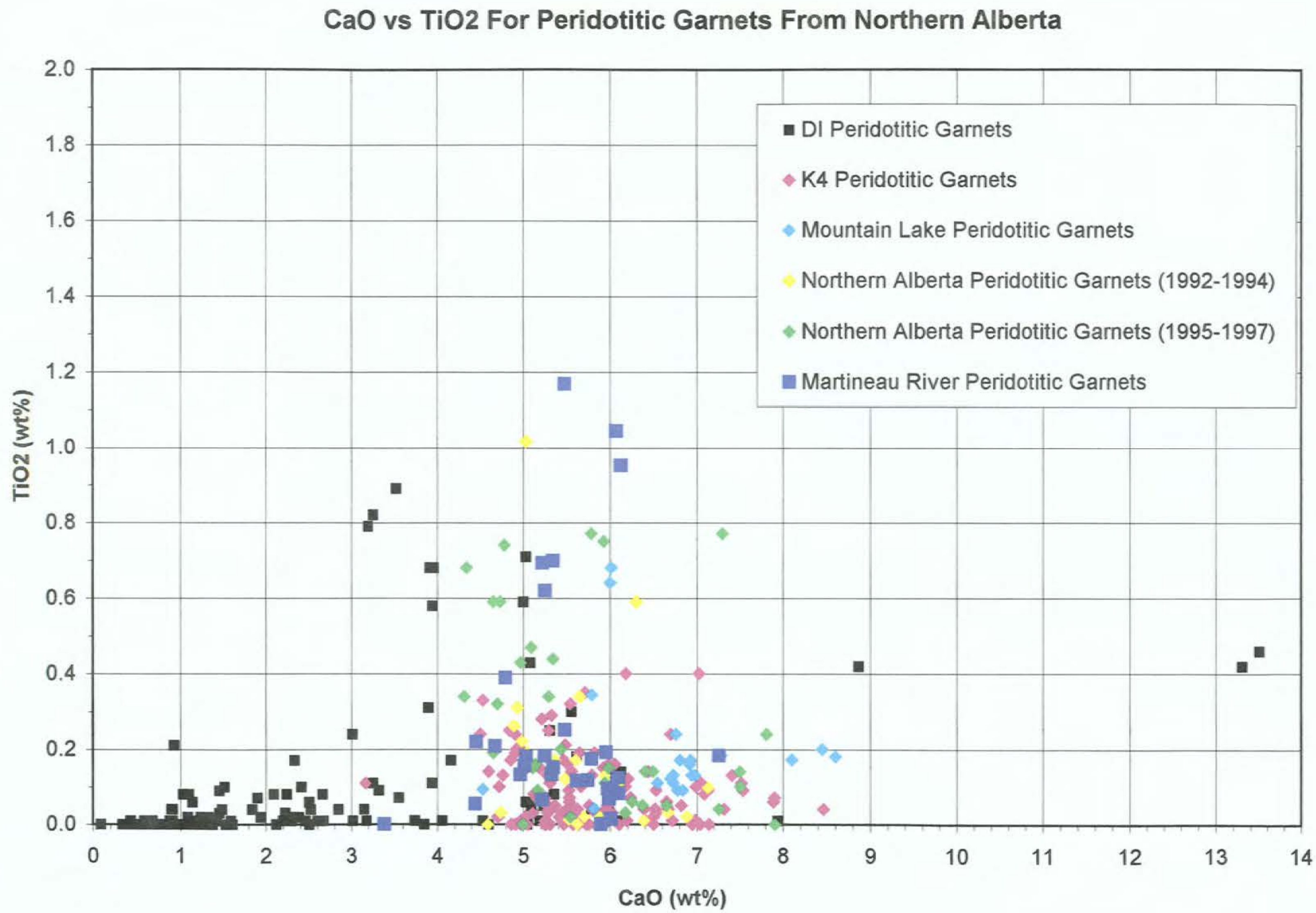
APPENDIX 4b
Microprobe Data For The Martineau River Area Indicator Minerals
Martineau River Property, Alberta-Saskatchewan
ICE RIVER MINING LTD.
PROJECT (99227)

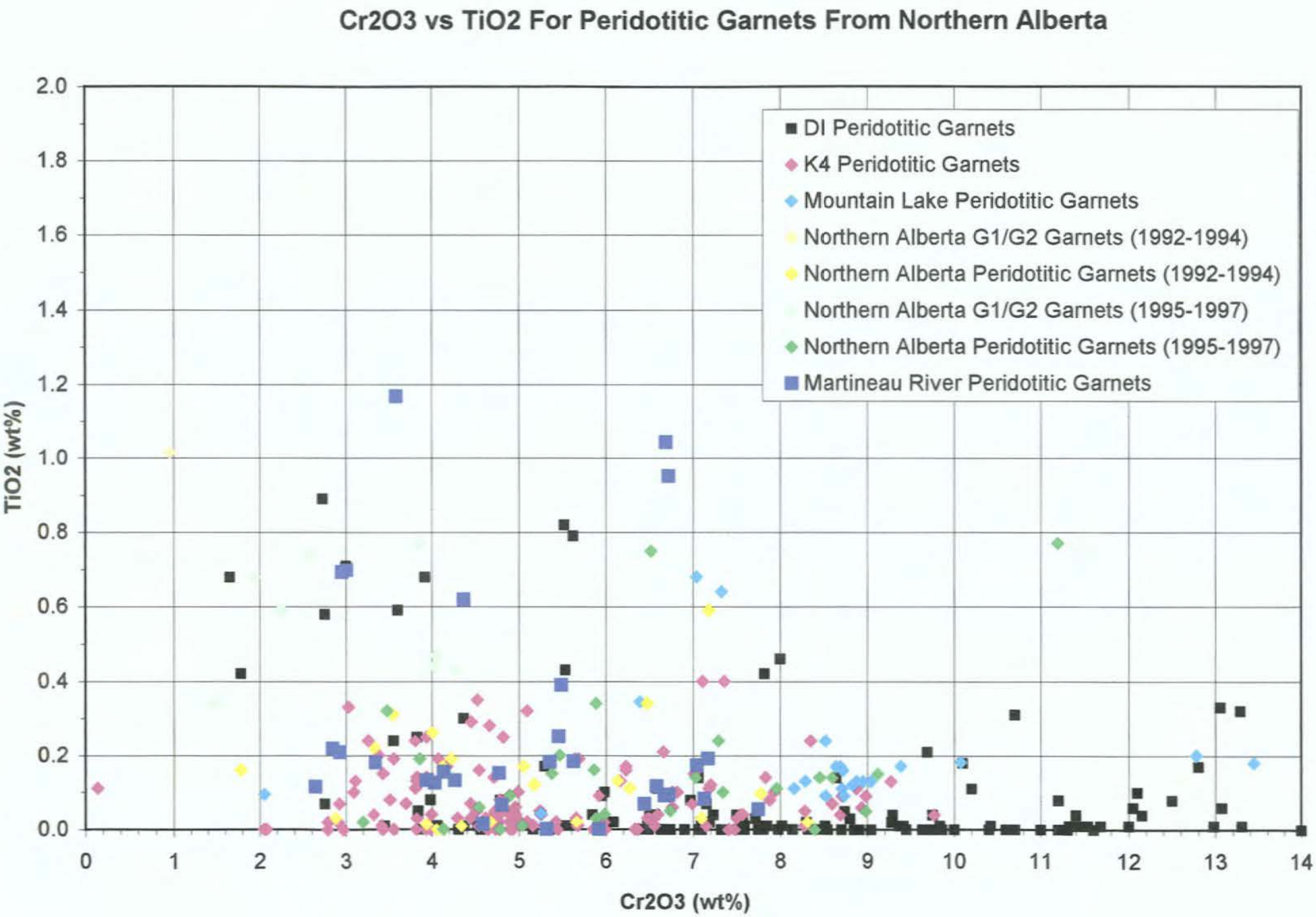
Sample	Grain	Mineral ~	TiO2	Cr2O3	FeO*	MgO	CaO	SiO2	Al2O3	Na2O	MnO	K2O	TOTAL
9TK-006	14	SPINEL	0.05	0.07	3.74	25.06	0.00	0.04	65.76	0.02	0.03	0.00	94.77
9TK-006	4	CPX_05_CHROME_DIOPSIDE	0.27	0.98	2.54	15.14	22.02	52.93	4.99	1.15	0.09	0.00	100.09
9TK-006	15	G_10_LOW_CALCIUM_CHROME_PYROPE	0.19	7.17	7.06	19.54	5.95	42.13	17.87	0.06	0.48	0.00	100.44
9TK-006	16	G_09_CHROME_PYROPE	0.18	3.35	8.09	20.52	5.03	42.62	20.17	0.05	0.38	0.00	100.40
9TK-006	17	G_09_CHROME_PYROPE	0.13	3.94	8.47	19.57	4.96	42.35	19.42	0.04	0.53	0.00	99.40
9TK-007	5	CPX_02_UNKNOWN	0.47	0.81	3.31	14.82	20.19	52.88	6.42	1.55	0.12	0.00	100.55
9TK-007	6	PICRO_ILMENITE	51.50	0.25	35.13	12.52	0.00	0.00	0.54	0.00	0.24	n/a	100.32
9TK-007	18	G_10_LOW_CALCIUM_CHROME_PYROPE	0.12	6.58	7.90	19.83	5.74	41.36	18.52	0.08	0.49	0.05	100.68
9TK-007	19	G_09_CHROME_PYROPE	0.01	4.58	6.72	19.94	6.00	42.73	18.71	0.01	0.39	0.00	99.10
9TK-007	20	G_09_CHROME_PYROPE	0.18	5.62	11.91	15.73	7.26	40.81	17.19	0.00	0.64	0.00	99.35
9TK-007	21	UNKNOWN	0.01	0.03	0.10	0.00	0.68	70.72	19.79	10.42	0.00	0.28	102.04
9TK-008	6	CPX_05_CHROME_DIOPSIDE	0.31	0.93	3.02	14.35	21.91	52.88	5.76	1.39	0.15	0.00	100.68
9TK-008	7	PICRO_CHROMITE	0.14	40.65	20.56	12.38	0.00	0.00	25.63	0.00	0.27	n/a	100.00
9TK-008	8	PICRO_ILMENITE	51.98	0.39	33.98	12.58	0.00	0.03	0.59	0.00	0.20	n/a	100.12
9TK-008	22	G_10_LOW_CALCIUM_CHROME_PYROPE	0.05	7.75	6.82	21.23	4.44	41.06	17.25	0.03	0.39	0.00	99.02
9TK-008	23	G_09_CHROME_PYROPE	0.39	5.48	7.67	20.48	4.79	42.21	17.93	0.09	0.34	0.00	99.39
9TK-008	24	G_10_LOW_CALCIUM_CHROME_PYROPE	0.08	7.13	7.58	19.52	6.09	42.11	17.48	0.08	0.43	0.00	100.50
9TK-008	25	G_10_LOW_CALCIUM_CHROME_PYROPE	0.17	7.04	7.25	19.74	5.78	42.28	16.40	0.05	0.43	0.00	99.14
9TK-008	26	G_10_LOW_CALCIUM_CHROME_PYROPE	0.00	5.91	7.87	21.37	3.39	41.50	19.42	0.03	0.46	0.00	99.94
9TK-008	27	G_02_HIGH_TITANIUM_PYROPE	1.04	6.69	6.59	20.53	6.07	41.24	16.80	0.09	0.32	0.00	99.37
9TK-008	28	G_09_CHROME_PYROPE	0.16	4.13	7.80	20.68	5.01	41.69	18.98	0.02	0.49	0.00	98.95
9TK-008	29	UNKNOWN (G2 Pyrope)	1.17	3.59	8.05	20.66	5.47	42.38	17.51	0.06	0.30	0.00	99.20
9TK-008	30	G_09_CHROME_PYROPE	0.13	4.26	7.91	19.78	5.32	42.29	18.95	0.05	0.54	0.02	99.25
9TK-008	31	G_10_LOW_CALCIUM_CHROME_PYROPE	0.07	6.44	6.84	20.55	5.98	42.60	17.34	0.05	0.36	0.00	100.22
9TK-008	32	G_09_CHROME_PYROPE	0.21	2.93	7.72	21.02	4.67	42.60	19.56	0.08	0.42	0.00	99.21
9TK-008	33	G_01_TITANIAN_PYROPE	0.69	2.95	8.00	20.79	5.22	42.01	20.33	0.03	0.27	0.00	100.31
9TK-008	34	G_01_TITANIAN_PYROPE	0.70	3.01	7.92	20.81	5.34	42.41	18.51	0.03	0.26	0.00	99.00
9TK-008	35	G_01_TITANIAN_PYROPE	0.62	4.36	6.95	21.76	5.25	41.94	18.84	0.03	0.20	0.00	99.95
9TK-008	36	G_05_MAGNESIAN_ALMANDINE	0.02	0.06	28.06	5.43	5.94	38.20	20.90	0.00	2.06	0.00	100.67
9TK-008	37	G_05_MAGNESIAN_ALMANDINE	0.04	0.01	25.76	11.19	2.05	39.09	21.41	0.00	0.65	0.00	100.19


CaO vs Cr2O3 For Peridotitic Garnets From Northern Alberta
Cr2O3 (wt%)
CaO (wt%)
0
2
4
6
8
10
12
14
16
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
DI Peridotitic Garnets
K4 Peridotitic Garnets
Mountain Lake Peridotitic Garnets
Northern Alberta Peridotitic Garnets (1992-1994)
Northern Alberta Peridotitic Garnets (1995-1997)
Martineau River Peridotitic Garnets



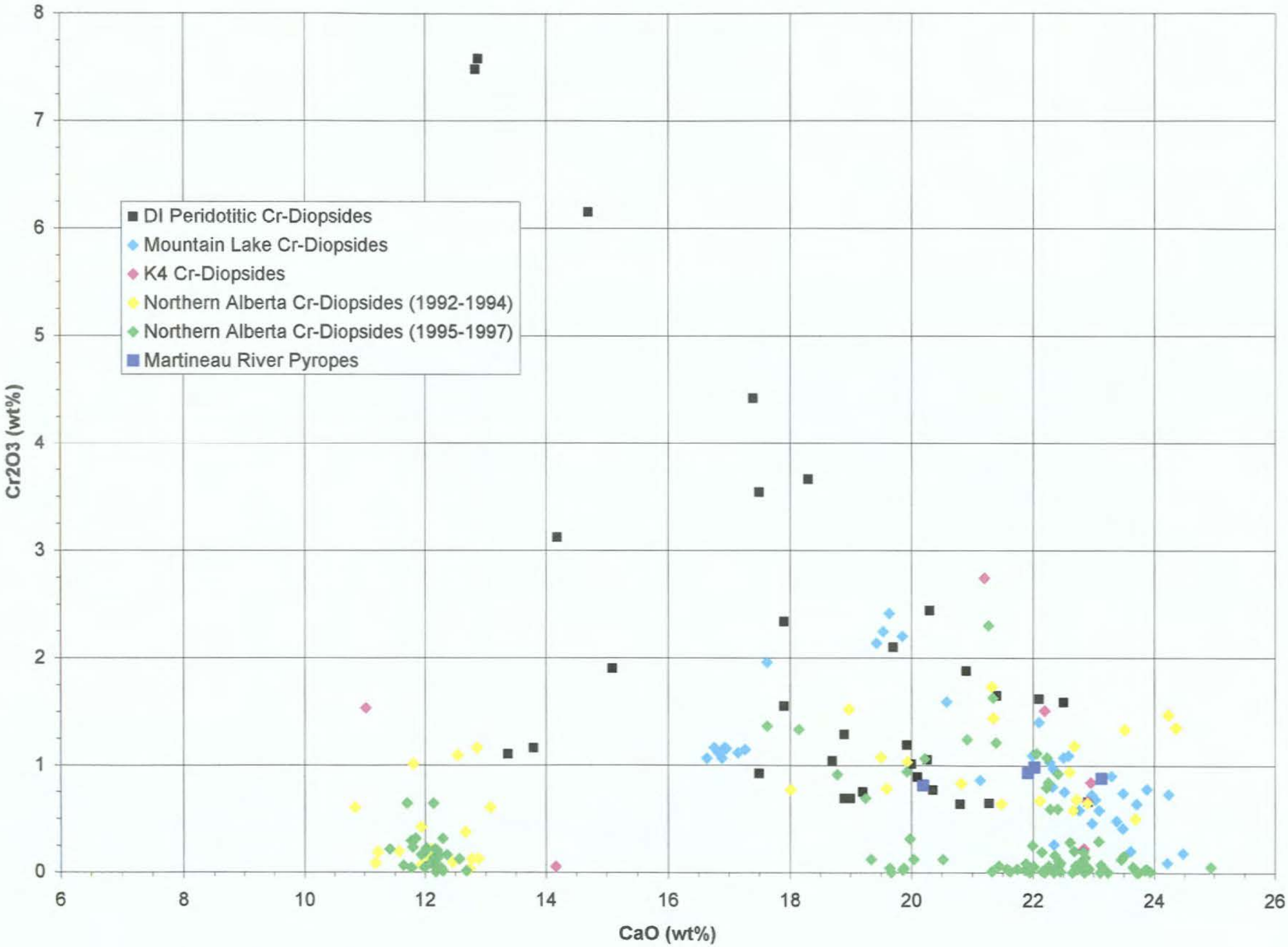
CaO vs Cr2O3 For Peridotitic Garnets From Northern Alberta
Diamond Inclusion Peridotitic Garnets
Mountain Lake Peridotitic Garnets
K4 Kimberlite Peridotitic Garnets
Northern Alberta Peridotitic Garnets (1992-1994)
Northern Alberta Peridotitic Garnets (1995-1997)
Martineau River Peridotitic Garnets
Wherlitic
Lherzolitic
Eclogitic
Harzburgitic
CaO (wt%)
Cr2O3 (wt%)
16
14
12
10
8
6
4
2
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

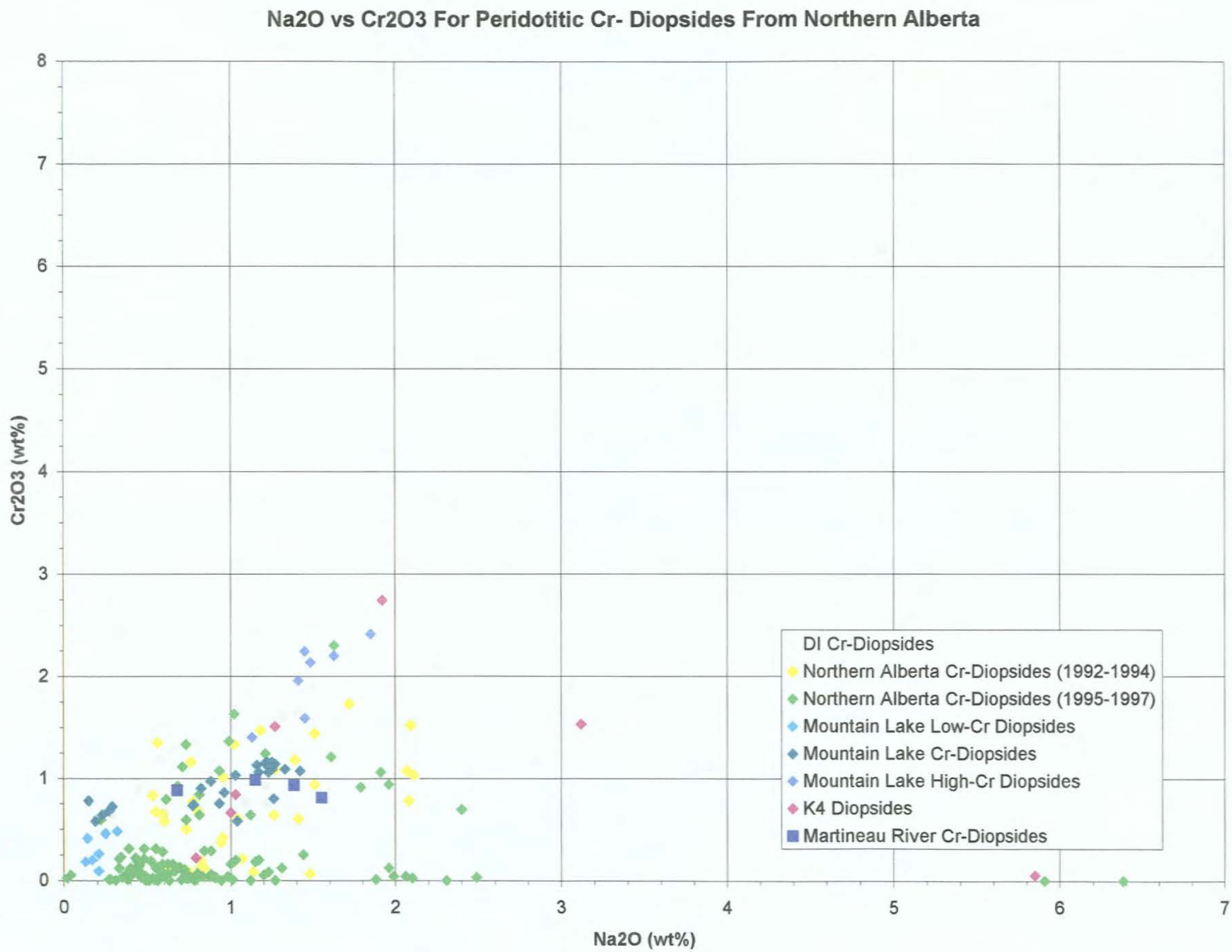

CaO vs TiO2 For Peridotitic Garnets From Northern Alberta
TiO2 (wt%)
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
CaO (wt%)
DI Peridotitic Garnets
K4 Peridotitic Garnets
Mountain Lake Peridotitic Garnets
Northern Alberta Peridotitic Garnets (1992-1994)
Northern Alberta Peridotitic Garnets (1995-1997)
Martineau River Peridotitic Garnets



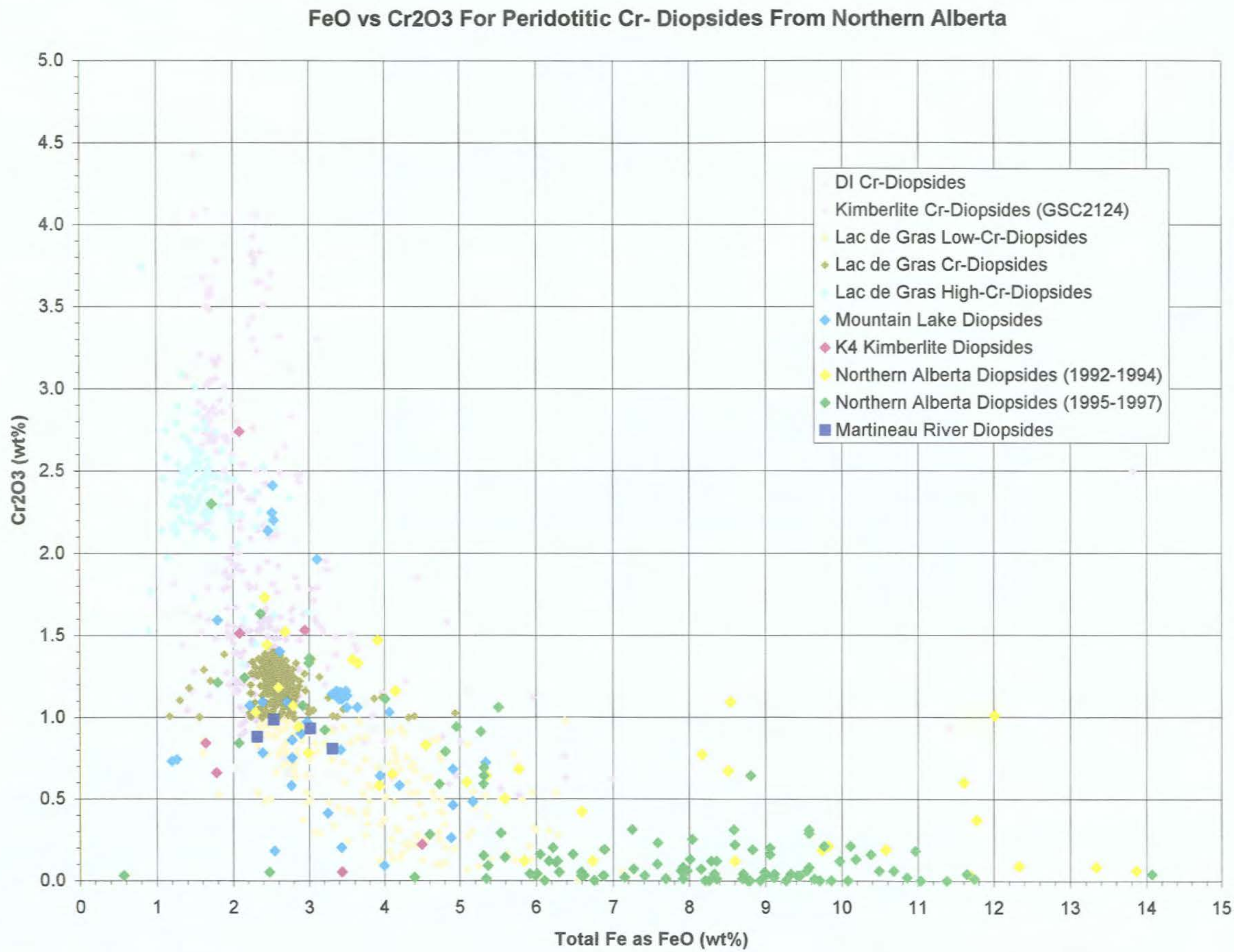
Cr2O3 vs TiO2 For Peridotitic Garnets From Northern Alberta
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
TiO2 (wt%)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Cr2O3 (wt%)
DI Peridotitic Garnets
K4 Peridotitic Garnets
Mountain Lake Peridotitic Garnets
Northern Alberta G1/G2 Garnets (1992-1994)
Northern Alberta Peridotitic Garnets (1992-1994)
Northern Alberta G1/G2 Garnets (1995-1997)
Northern Alberta Peridotitic Garnets (1995-1997)
Martineau River Peridotitic Garnets

CaO vs Cr2O3 For Peridotitic Cr- Diopsides From Northern Alberta

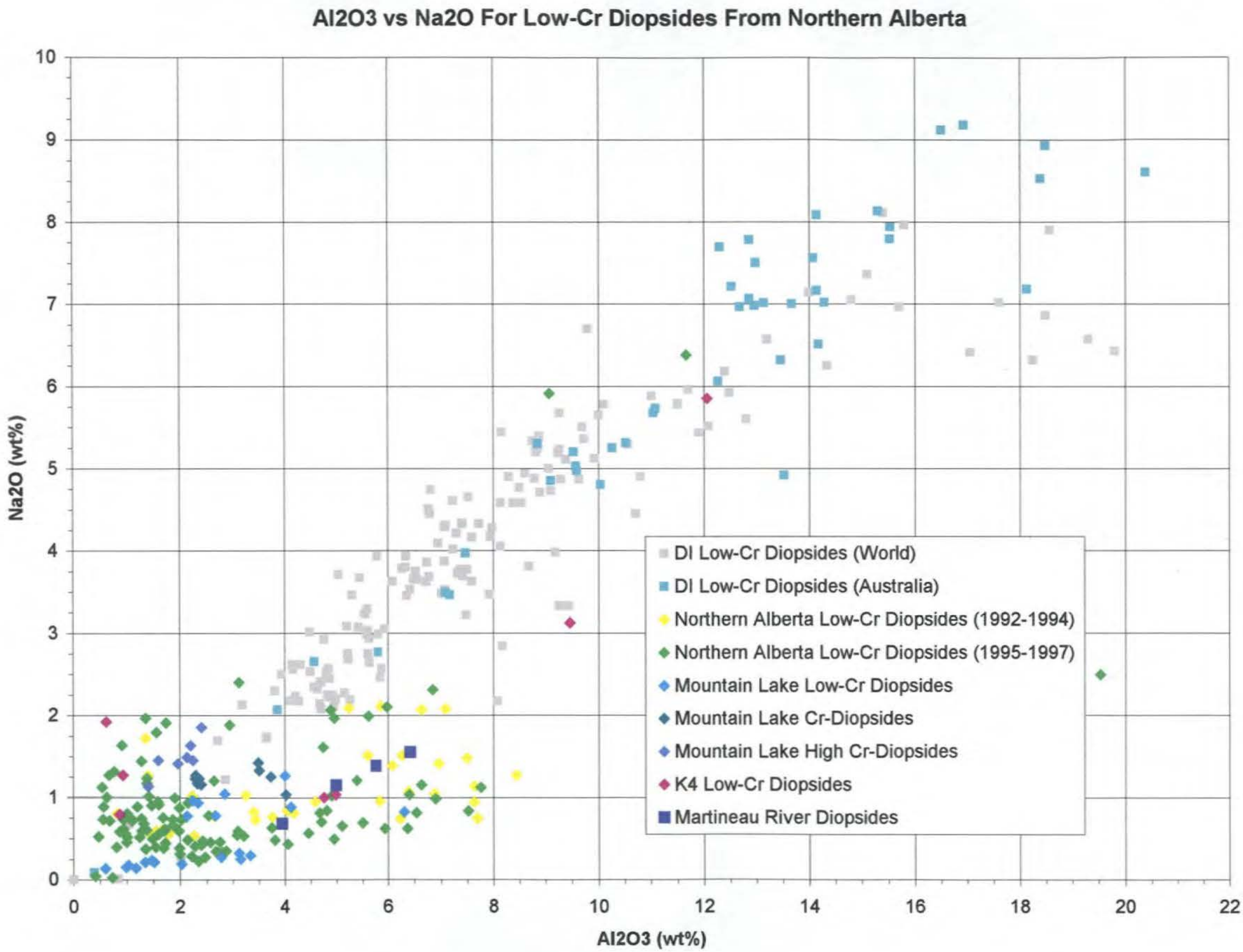




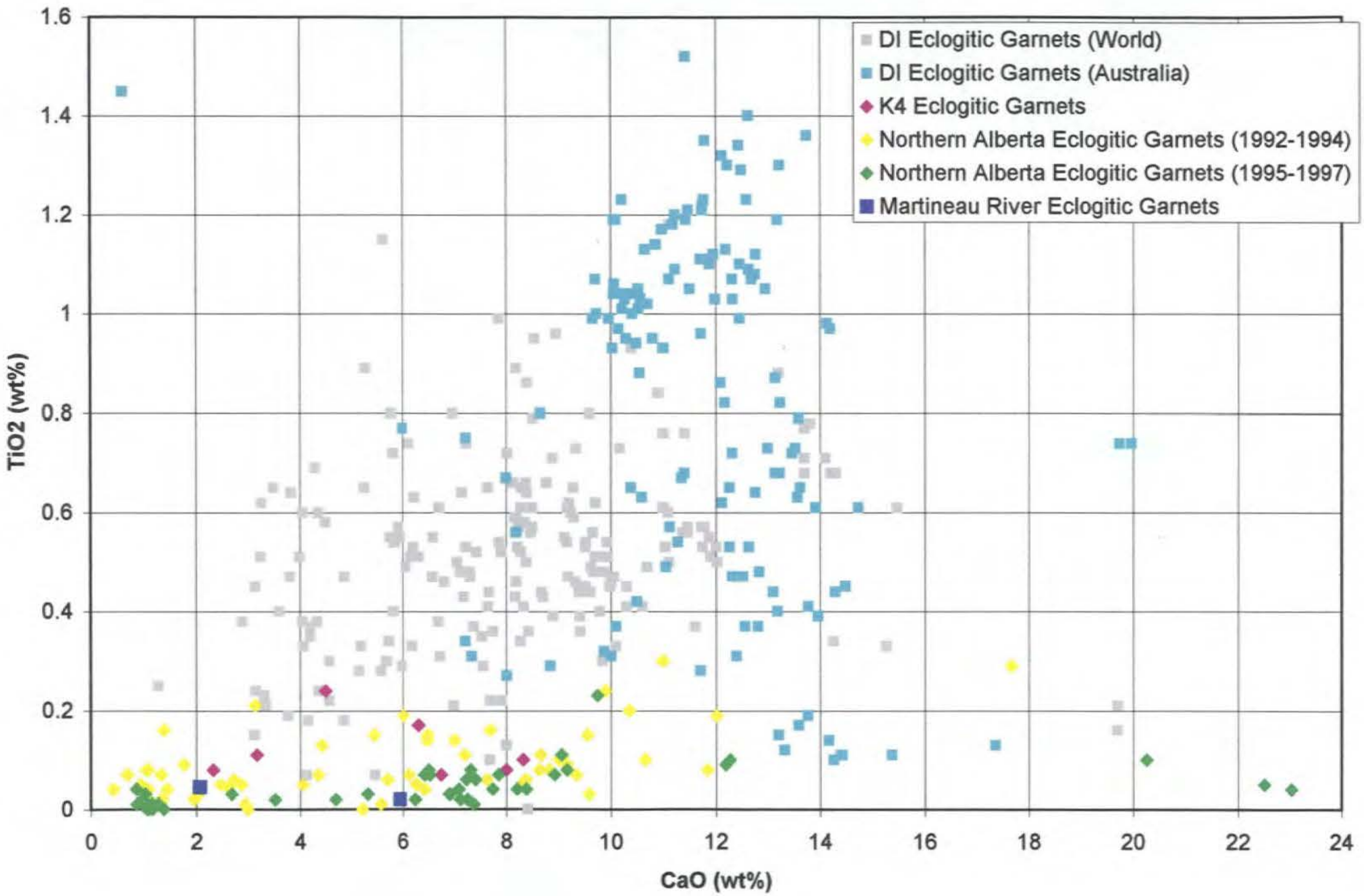
Na2O vs Cr2O3 For Peridotitic Cr- Diopsides From Northern Alberta
Cr2O3 (wt%)
Na2O (wt%)
0
1
2
3
4
5
6
7
8
DI Cr-Diopsides
Northern Alberta Cr-Diopsides (1992-1994)
Northern Alberta Cr-Diopsides (1995-1997)
Mountain Lake Low-Cr Diopsides
Mountain Lake Cr-Diopsides
Mountain Lake High-Cr Diopsides
K4 Diopsides
Martineau River Cr-Diopsides

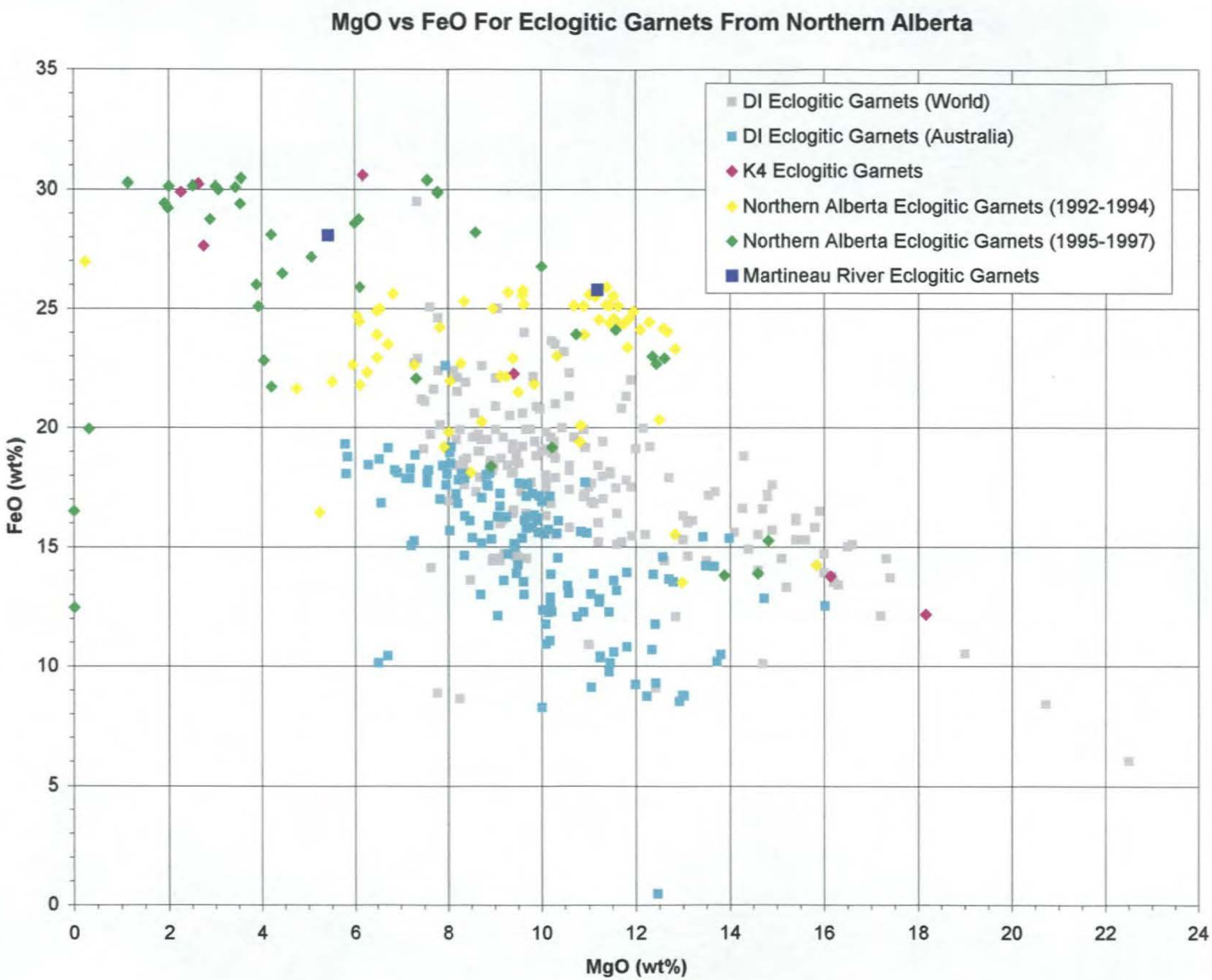


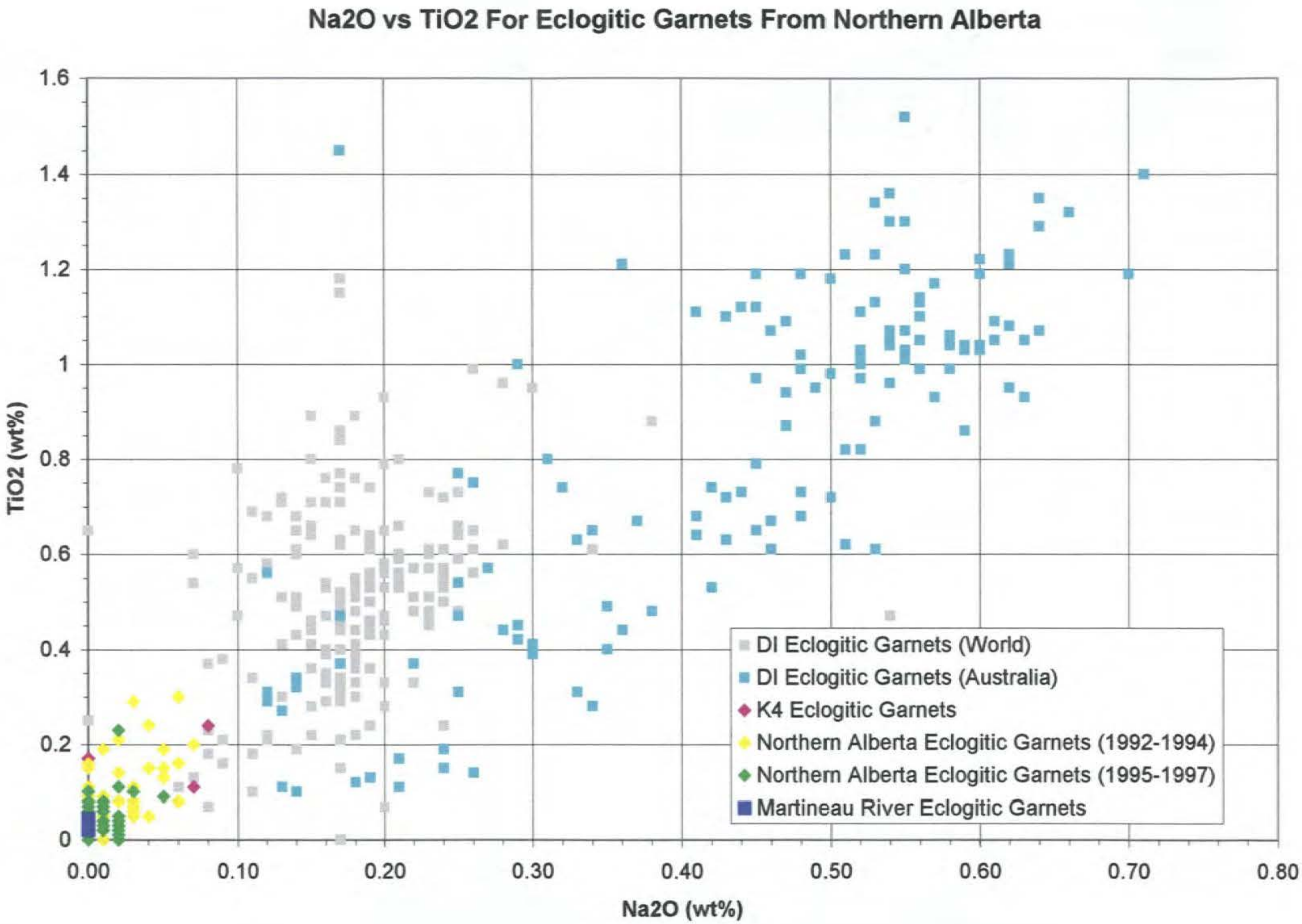
FeO vs Cr2O3 For Peridotitic Cr- Diopsides From Northern Alberta
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Cr2O3 (wt%)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Total Fe as FeO (wt%)
DI Cr-Diopsides
Kimberlite Cr-Diopsides (GSC2124)
Lac de Gras Low-Cr-Diopsides
Lac de Gras Cr-Diopsides
Lac de Gras High-Cr-Diopsides
Mountain Lake Diopsides
K4 Kimberlite Diopsides
Northern Alberta Diopsides (1992-1994)
Northern Alberta Diopsides (1995-1997)
Martineau River Diopsides


Al2O3 vs Na2O For Low-Cr Diopsides From Northern Alberta
Na2O (wt%)
Al2O3 (wt%)
0
1
2
3
4
5
6
7
8
9
10
0
2
4
6
8
10
12
14
16
18
20
22
DI Low-Cr Diopsides (World)
DI Low-Cr Diopsides (Australia)
Northern Alberta Low-Cr Diopsides (1992-1994)
Northern Alberta Low-Cr Diopsides (1995-1997)
Mountain Lake Low-Cr Diopsides
Mountain Lake Cr-Diopsides
Mountain Lake High Cr-Diopsides
K4 Low-Cr Diopsides
Martineau River Diopsides

CaO vs TiO2 For Eclogitic Garnets From Northern Alberta

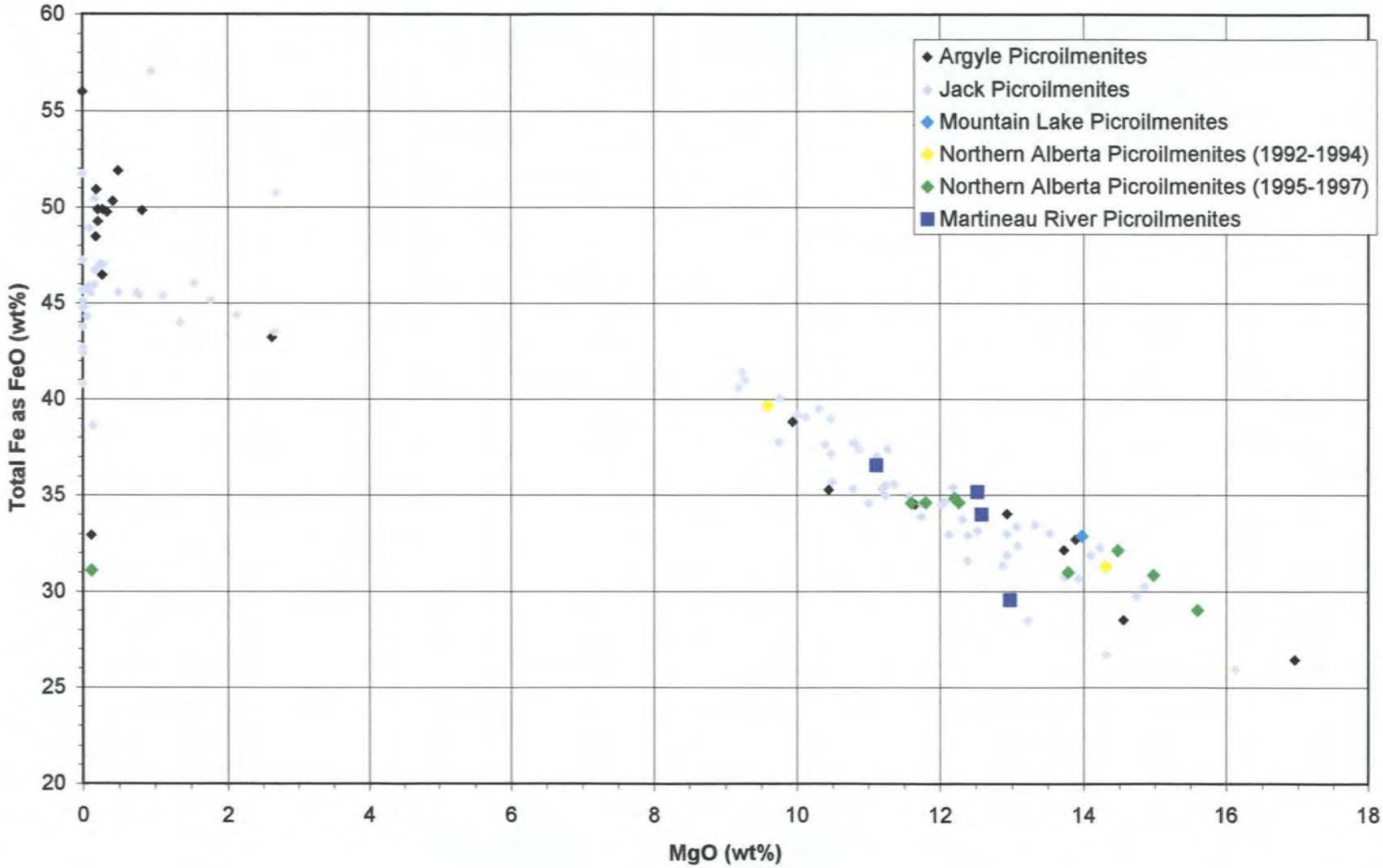


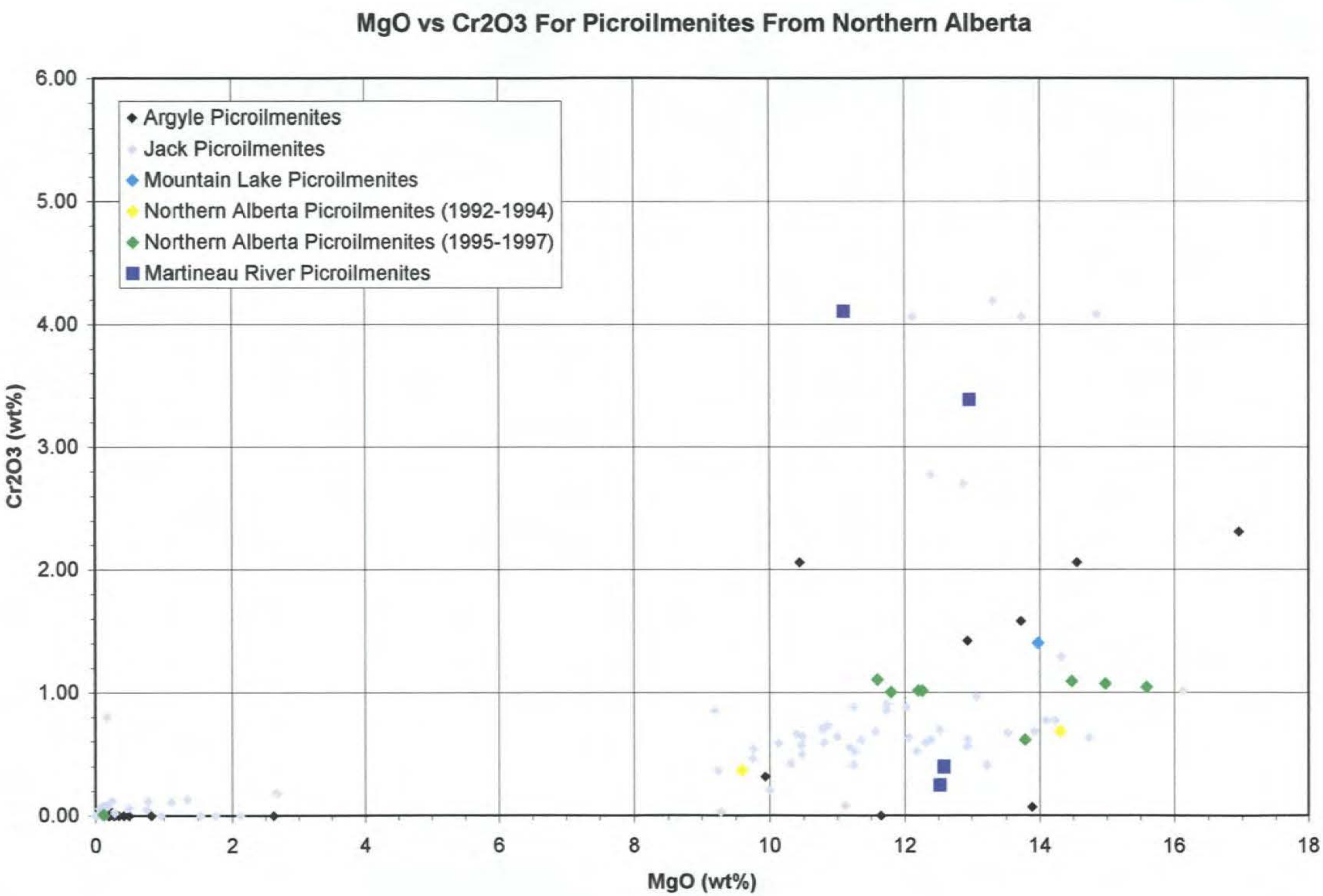

MgO vs FeO For Eclogitic Garnets From Northern Alberta
35
30
25
20
15
10
5
0
FeO (wt%)
0
2
4
6
8
10
12
14
16
18
20
22
24
MgO (wt%)
DI Eclogitic Garnets (World)
DI Eclogitic Garnets (Australia)
K4 Eclogitic Garnets
Northern Alberta Eclogitic Garnets (1992-1994)
Northern Alberta Eclogitic Garnets (1995-1997)
Martineau River Eclogitic Garnets

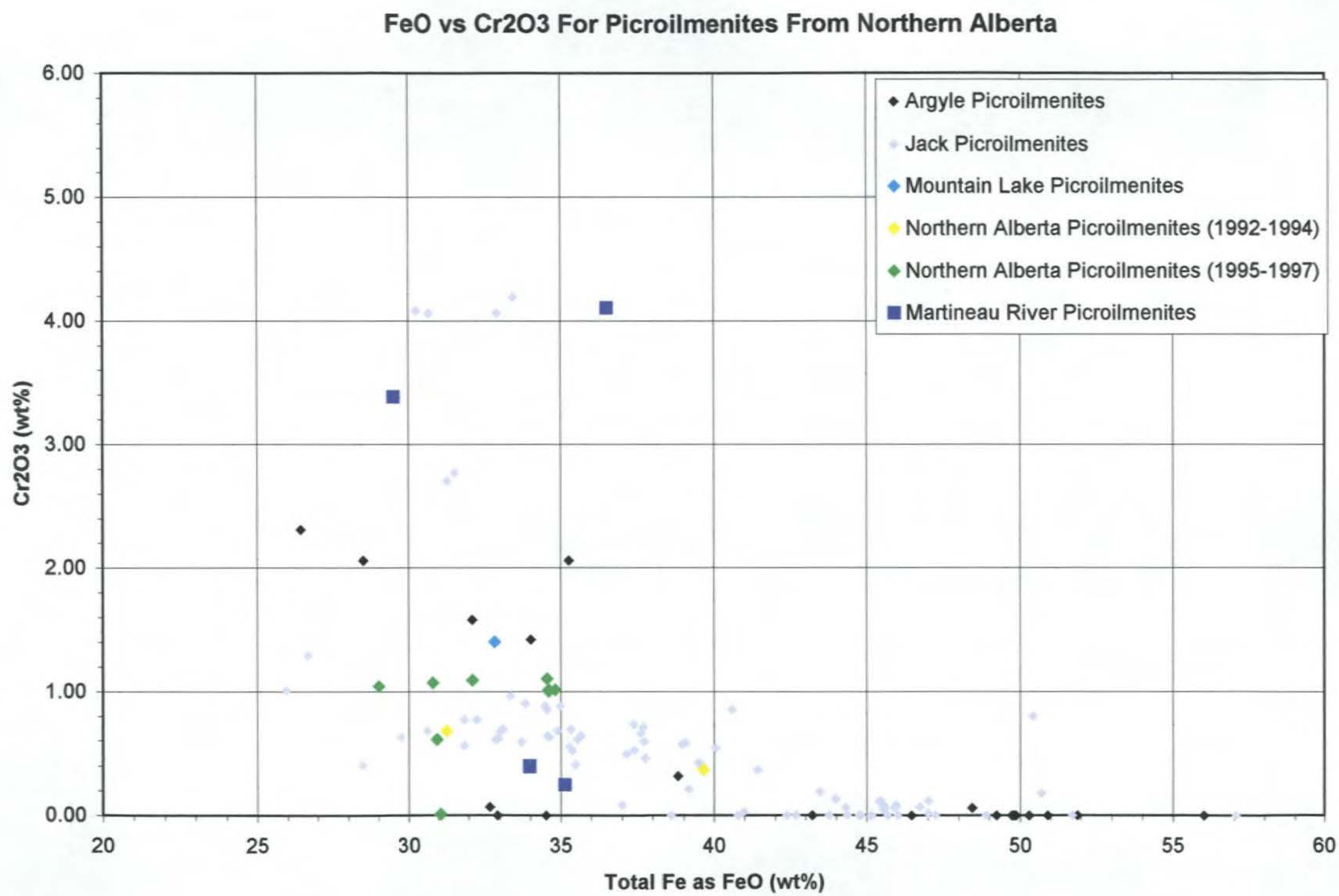


Na2O vs TiO2 For Eclogitic Garnets From Northern Alberta
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
TiO2 (wt%)
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
Na2O (wt%)
DI Eclogitic Garnets (World)
DI Eclogitic Garnets (Australia)
K4 Eclogitic Garnets
Northern Alberta Eclogitic Garnets (1992-1994)
Northern Alberta Eclogitic Garnets (1995-1997)
Martineau River Eclogitic Garnets

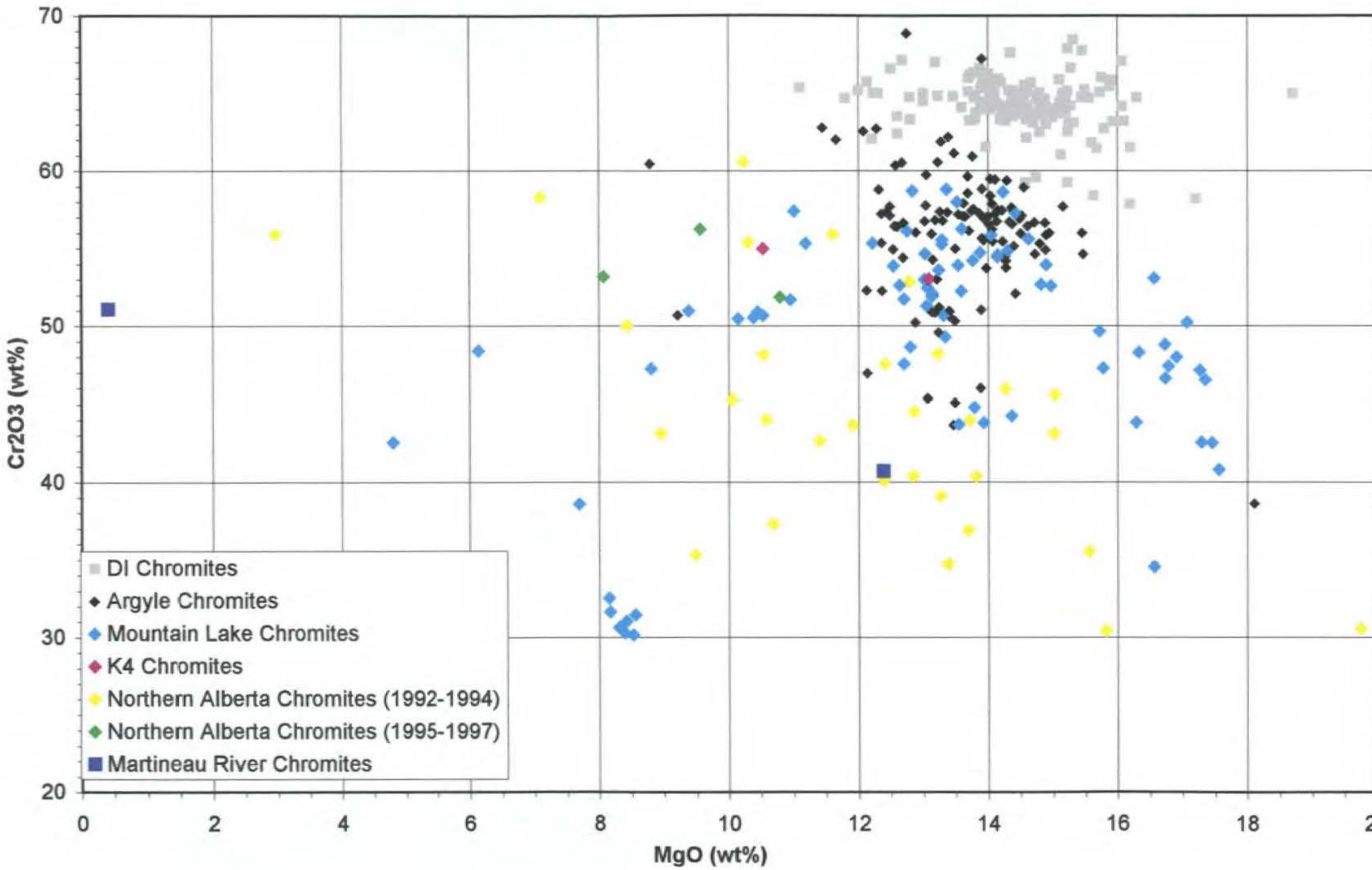
MgO vs Total Fe as FeO For Picroilmenites From Northern Alberta

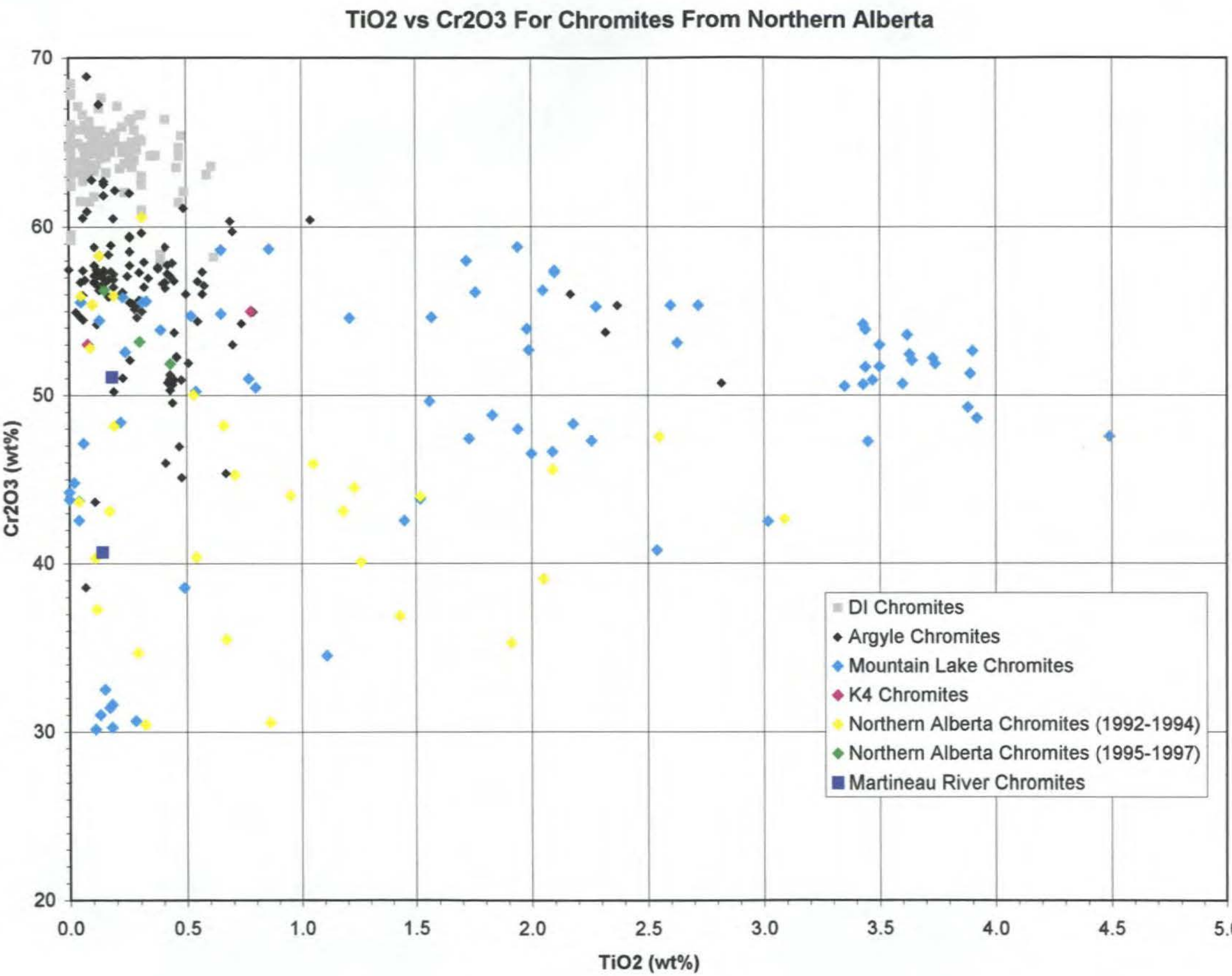



MgO vs Cr2O3 For Picroilmenites From Northern Alberta
Argyle Picroilmenites
Jack Picroilmenites
Mountain Lake Picroilmenites
Northern Alberta Picroilmenites (1992-1994)
Northern Alberta Picroilmenites (1995-1997)
Martineau River Picroilmenites
Cr2O3 (wt%)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0
2
4
6
8
10
12
14
16
18
MgO (wt%)


FeO vs Cr2O3 For Picroilmenites From Northern Alberta
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Cr2O3 (wt%)
20
25
30
35
40
45
50
55
60
Total Fe as FeO (wt%)
Argyle Picroilmenites
Jack Picroilmenites
Mountain Lake Picroilmenites
Northern Alberta Picroilmenites (1992-1994)
Northern Alberta Picroilmenites (1995-1997)
Martineau River Picroilmenites

MgO vs Cr2O3 For Chromites From Northern Alberta




TiO2 vs Cr2O3 For Chromites From Northern Alberta
70
60
50
40
30
20
Cr2O3 (wt%)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
TiO2 (wt%)
DI Chromites
Argyle Chromites
Mountain Lake Chromites
K4 Chromites
Northern Alberta Chromites (1992-1994)
Northern Alberta Chromites (1995-1997)
Martineau River Chromites

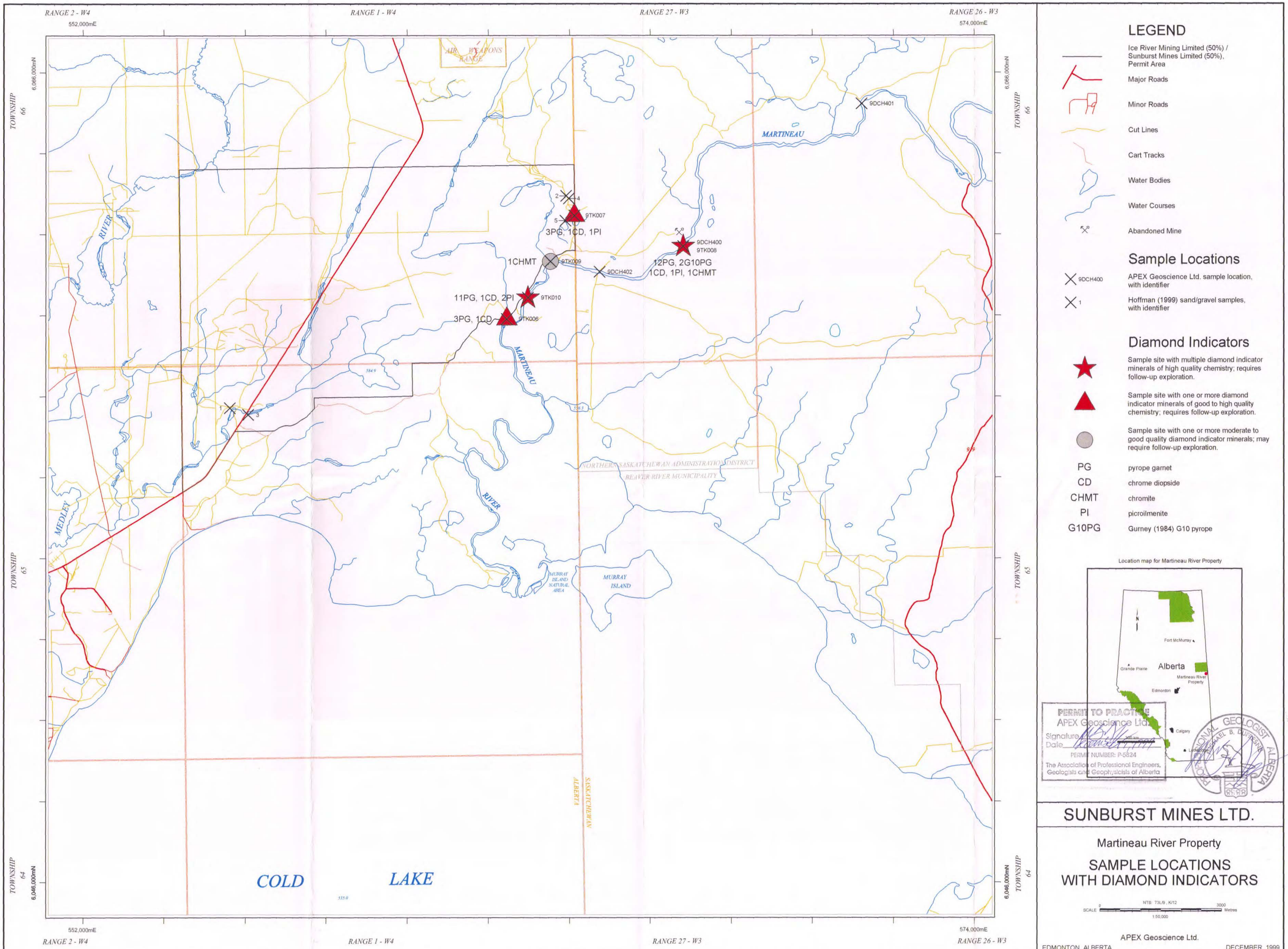


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FIGURE 6.