MAR 19990028: ASPHALT/BUCKTON

Received date: Nov 29, 1999

Public release date: Nov 30, 2000

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ASPHALT AND BUCKTON PROPERTIES

Birch Mountains Area, Athabasca Region, Northeast Alberta

REPORT ON EXPLORATION 1997-1999

S.F.Sabag

October 14, 1999

TINTINA MINES LIMITED and NSR RESOURCES INC.
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C2 SRC PICKS PROBED: Indicator Minerals Recovered To Date From Tintina Mines Ltd.'s Buckton and Asphalt Properties, Birch Mountains Area, Northeast Alberta. M.Dufresne, APEX Geoscience Ltd., September 9, 1998.

C3 RESAMPLING PROGRAM 1998: Progress Report For Field Work Conducted September 17-20, 1998, At Tintina Mines Ltd.'s Asphalt Property, Northeast Alberta. M.Dufresne, APEX Geoscience Ltd., November 5, 1998.

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- C4.1 I.M.Morrison, Report on Lot# NW240798, October 8, 1998
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TERMS OF REFERENCE

This report summarizes exploration programs carried out during 1997-1999 at the Asphalt and Buckton Properties held by Tintina Mines Limited in the Birch Mountains Area of northeast Alberta. The report has been prepared for filing toward assessment work requirements for the two Properties by Tintina, Operator on behalf of its Northeast Alberta Joint Venture with NSR Resources Inc.

Considering their proximity and many geological similarities, the two contiguous Properties have in the past been explored by way of simultaneous joint field programs to facilitate logistical support. This report, accordingly, combines results from both Properties, due reference to Property-specific observations notwithstanding.

The bulk of this report concerns itself with analytical and metallurgical testwork on samples previously collected from the two Properties during 1996-97 drilling programs, and focuses on investigation of extractability of precious and base metals from metal enriched zones previously identified within the Second White Speckled Formation black shales. The report also includes results from ancillary investigation of indicator minerals discovered within drill core and in surface samples from the two Properties as an initial step toward assessing diamond potential, or in the least evaluating the possible existence of kimberlitic pipes thereupon. Some of the mineral samples examined are from the McIvor Property located to the north of the Buckton Property and contiguous thereto.

A number of reports from third-party consultants to Tintina are appended herein summarizing their findings from studies and work programs commissioned by Tintina during 1997-1999. Given the ongoing nature of some of the third-party work, reports therefrom included herein are in memo format intended to serve as progress summaries.

A at the date hereof, no additional work is in progress or pending at the two Properties.

Shahé F.Sabag
President & Chief Operating Officer
Tintina Mines Limited
October 14, 1999

1.PROPERTY LOCATION, DESCRIPTION, OWNERSHIP AND RIGHTS

1.1 PROPERTY LOCATION, OWNERSHIP AND DESCRIPTION

The Asphalt and Buckton Properties are located in the Birch Mountains area, approximately 120km to the northwest of Fort McMurray, collectively comprising 64,512 contiguous hectares held under ten metallic and industrial minerals permits (Asphalt Property - 36,864ha, 5 permits; Buckton Property 27,648ha, 5 permits). The permits were initially assembled during 1993 by Tintina Mines Limited, Operator on behalf of its joint venture with NSR Resources Inc., as part of a regional 3 million acre land position, which was held and jointly explored since its acquisition under the terms of their Northeast Alberta Joint Venture in the proportion of $^{2}/_{3}$ and $^{1}/_{3}$, respectively.

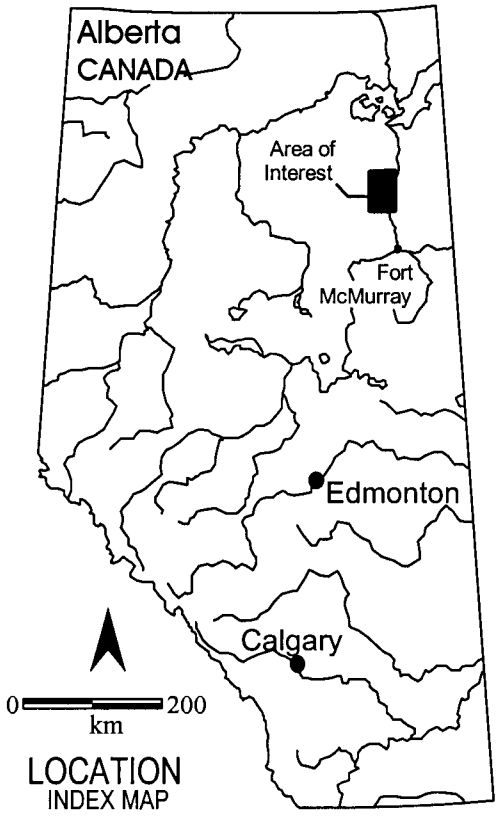


Figure 1. Area of interest

The 3 million acre land position was assembled during Jul-Oct/93, to secure specific locations throughout northeast Alberta, which were selected based on intrinsic precious and base metals potential relying on broad regional geological extrapolations and on compilation studies completed during June-July/93 immediately following acquisition by the two Companies of the Fort MacKay Property (7½ square miles presently held under two 15 year mineral leases issued in 1994).

Through continuous ranking and prioritization based on considerable regional and area-specific exploration completed during 1994-1996, many of the permits have since been allowed to lapse to retain only locations of merit.

The permits confer the exclusive right to explore for metallic and industrial minerals, inclusive of diamonds. In addition to properties held under permits, the Companies continue to also hold the Fort Mackay mineral leases.

The properties currently held by the Companies in the region are shown in Figure 2. The Asphalt, Buckton and McIvor Properties are shown in greater detail in a location sketch of the Birch Mountains Area (Figure 3).

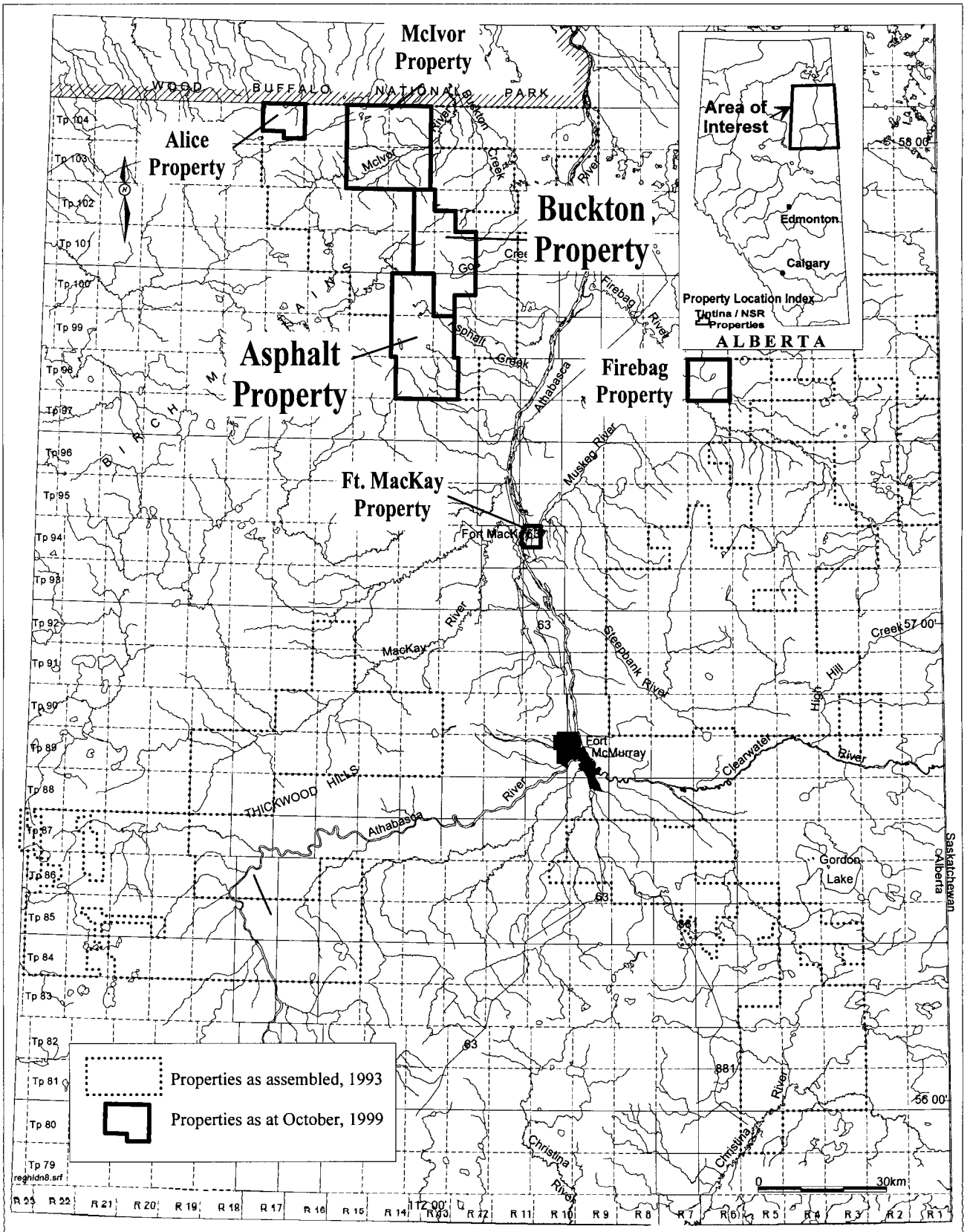


Figure 2. Location of Tintina Mines regional land position, northeast Alberta, showing the Asphalt and Buckton Properties

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SUMMARY

The Asphalt and Buckton Properties are located in the Birch Mountains area, approximately 120km to the northwest of Fort McMurray, collectively comprising 64,512 contiguous hectares held under ten metallic and industrial minerals permits (Asphalt Property - 36,864ha, 5 permits; Buckton Property 27,648ha, 5 permits). The Properties are held by Tintina Mines Limited under metallic and industrial minerals permits issued in 1993 which have anniversary dates of November 29, 1999 and 2001. The permits confer exclusive exploration rights to metallic and industrial minerals as well as diamonds.

The permits were initially assembled during 1993 by Tintina Mines Limited, Operator on behalf of its joint venture with NSR Resources Inc., as part of a regional 3 million acre land position, which has been held and jointly explored since acquisition under the terms of the Tintina-NSR Northeast Alberta Joint Venture in the proportion of $^{2}/_{3}$ and $^{1}/_{3}$, respectively. Considerable portions of the land position have since been allowed to lapse through continuous ranking and prioritization based on considerable regional and area-specific exploration completed since their acquisition. Intentions are to continue downsizing based on results of ongoing exploration.

An aggregate of $1,520,120 have previously been spent on exploration work at the two Properties (Asphalt $661,828; Buckton $858,292), all of which have previously been filed toward assessment work requirements representing the 1994-1995 and 1996-1997 work programs. An aggregate of $308,440 (Asphalt $165,124; Buckton $143,316; including a 10% provision for administrative overheads) were spent on exploration activities at the two Properties during the period December 1997 to October 1999 toward completion of Leaching Testwork (1997-1998), Benchtesting (1998-1999), diamond indicator mineral testwork (1998-1999) and an extensive check assaying program (1999) directed toward investigating native gold content of the Second White Specks black shales to resolve highly nuggetted grades reported from assaying during metallurgical tests completed by a third party unrelated to Tintina.

Information currently on hand from the Asphalt and Buckton Properties represents data documented from regional reconnaissance programs augmented by site-specific and follow-up work, collectively comprising the following: (i) LANDSAT remote sensing imagery analysis (1994); (ii) Airphoto imagery analysis (1995); (iii) Lake sediment/water geochemical sampling (1994); (iv) Stream sediment geochemical sampling (1994); (v) Stream sediment heavy mineral concentrate sampling (1994), and follow-up heavy mineral concentration testwork (1994-1995); (vi) Lake Sediment/Water geochemical infill sampling (1995); (vii) Stream sediment geochemical infill sampling (1995); (viii) Stream sediment infill heavy mineral concentrate sampling (1995); (ix) Lithogeochemical reconnaissance sampling (1994) and follow-up heavy mineral concentration; (x) Lithogeochemical reconnaissance sampling (1995); (xi) Stratigraphic compilation and modeling (1995); (xii) Soil geochemical sampling (1995); (xiii) Detailed follow-up soil sampling (1996); (xiv) Diamond Drilling (1996-1997); (xv) Aeromagnetic Survey (1996).

Near-surface stratigraphy at the Properties is dominated by Lower-Middle Cretaceous Formations comprising poorly consolidated recessive sequences sparse exposures of which are predominantly found along river cuts or along scarps which are almost always covered by considerable slumped material or mud-flows. The Cretaceous strata are dominated by unconsolidated shales and mudstones, all of which highly susceptible to landslides and slumping and are in various stages of active mass wasting. Slumpage is, in many cases, sufficiently advanced to introduce acute uncertainties to the definitive determination of stratigraphic position of often similar looking shaley units.

As with elsewhere throughout the Birch Mountains, bedrock exposures around the Asphalt and Buckton Properties are very poor, comprising a handful of exposures confined to creek and river valleys which generally trend northeasterly and incise the edge of the Birch Mountains. The Properties and their vicinities were explored in the course of numerous regional multimedia reconnaissance and follow-up sampling programs completed during the period 1994-1995. Based on these programs, a number of localities were identified at the two Properties characterized by multiple coincident, or spatially proximal, surface geochemical, mineral, stratigraphic, lithogeochemical and geophysical anomalies. The anomalous localities identified are typically characterized by geochemical anomalies in overlying and nearby lakes, by geochemical and mineral stream sediment anomalies downstream, and by overlying soil geochemical

anomalies. The majority of these localities overlie or are associated with faults or fault zones, with zones of stratigraphic disruption or thickening, and with occasional magnetic anomalies (closed and linear), and many are also located near, or overlie, a topographic "high". Lithogeochemical anomalies and interpreted metal enrichment trends at, and in the vicinity of, the anomalous localities define enrichment vectors suggestive of an intimate association between structural disruptions and metals enrichment in the area.

Some of the above localities, believed to be buried metallic mineralization within the Second White Specks Formation, were selected for further testing, comprising the 1996-1997 exploration programs entailing detailed soil sampling followed by diamond drilling. A high resolution airborne magnetic survey was also completed during 1996 to better define certain prospective structures and suspected volcanic centers associated with the previously discovered metal enriched shale horizons.

Principal previous discoveries made at the two Properties comprise metal enrichment zones within the Second White Specks Formation black shales characterized by abundant sulfides, dominated by various species of pyrite/marcassite. Exposures of the Second White Specks Formation at the two Properties host the better lithogeochemical metal anomalies characterized by elevated Ni/Co/Cu/V/Ag. Gold has also been recovered from samples of the Formation and from alluvial material recharged from same at the two Properties and throughout several other drainages in the Birch Mountains. Native gold grains recovered from one sample of shale at the GOS1 gossan at the Buckton Property represented an equivalent grade of nearly 1ppm per volumetric/gravimetric calculations. Despite the repeated recovery by Tintina and by others of gold grains from heavy mineral concentrates from Second White Specks shales at GOS1 and exposures upstream therefrom, analyses have failed to return equally high grades suggesting extreme nuggetting of gold. The gold grains are characterized by encrustations and inclusions of Fe±Cu-sulfides in various states of oxidation. Unusual heavy mineral assemblages were incidentally also documented from several drainages in the Birch Mountains which are relevant to diamond exploration potential of the area.

Work to date from the Asphalt and Buckton Properties, and the Birch Mountains Area in general, indicates that the Second White Specks Formation offers the most conspicuous geochemical relief in the area, providing the only geochemical variations within an otherwise featureless and monotonous stratigraphic package, and that while concentrations of many of the base metals (e.g. Ni, Mo, Zn) are highest nearer the Formation's upper contact dominated by intermixture of considerable bentonitic seams into the shale, other metals (e.g. V, Cu) are better concentrated throughout its midsection. In addition, metals enrichment within the upper sections of the Formation is also accompanied by Ba, S, Na and Corg enrichment, and by higher pyritic sulfide contents ranging upward to 20%. Interelemental variations, metals-Corg and metal-S relationships suggest that the metals are hosted within multiple carrier minerals some of which are sulfides and others are of organic forms.

Lithological, mineralogical and geochemical data collected from the area collectively indicate that culmination of the Second White Specks Formation depositional cycle coincided with a significant increase in volcanism as evidenced by the presence within the Formation of abundant of bentonites and ejecta material of probable localized provenance. The data suggest that at least some of the suspected volcanism is localized in the Birch Mountains defining volcanic centers which directly contributed to development of metallic mineralization within overlying Second White Specks shales in the area either by providing a source of metals or by locally enhancing geochemical conditions conducive to metals deposition/concentration from a generally available metallic budget. The confinement of metallic mineralization to the Second White Specks Formation and its relative absence within the enveloping Formations better support proposals of volcanism as a source of the metals rather than simply as a facilitator of their concentration.

Despite considerable sulfide content of much of the Second White Specks Formation shales, sampling results to date indicate that none of the metals is present in the black shales in sufficiently high concentrations to be of economic merit by itself. The grades are, however, encouraging when reviewed as a polymetallic assemblage of Ni+Co+Cu+Zn+V±Ag±Au ("pay metals") from the perspective of large bulk mining operations, especially those for poorly consolidated deposits representing in most part earth-moving activities with minimal mining cost (e.g. the Brasilia deposit - $2.5/tonne, mining and beneficiation; the Oil sands deposits - $6-$7.5/tonne mining and extraction; among others). In this framework, average in-situ values for contained Cu, Ni, Zn, Mo and V (±Ag±U) on a combined basis for the Second White Specks Formation range generally $10-$20/tonne, a significant portion of which is represented by V content. It is

self-evident that in-situ value of contained metals on a combined basis is sufficient to place the Second White Specks Formation shales well within reach of economic viability, subject to feasibility and of metals extraction on a combined basis.

Provided sufficient recoverable metallic budget is identified within the Second White Specks Formation shales, by far the most attractive features of the shales from an economic perspective at the two Properties are (i) their proximity to surface and their unconsolidated nature hence amenability to extraction by low cost large scale bulk mining; and (ii) the potentially immense lateral extent of metal enriched portions therein estimated to occupy tens of square kilometers as extrapolated from surface and subsurface exploration results. Accordingly, following completion of the 1996-1997 drilling programs, resolution of process metallurgical issues was identified to be of the highest priority for continuing work at the Properties, and all subsequent efforts were directed toward same comprising the bulk of the 1997-1999 programs. This work would also necessarily include investigation (i) of host mineralogy of the metals (sulfide, organic or clays?), and (ii) of the disparities between analytical gold grades compared to grades implied by native gold grains from the shales recovered.

The 1997-1999 exploration efforts at the Asphalt and Buckton Properties focused almost entirely on investigation of process metallurgical issues to enable formulation of an economically viable flowsheet for extraction of collective base metals from the mineralized shales. This work entailed completion of selective leaching testwork followed by broader flotation tests.

A suite of ten samples were selected during October 1997 from the Buckton Property drill core to investigate elemental partitioning via sequential selective leaching of the principal rockforming components. The suite comprised Second White Specks Formation drill core intercepts and consisted of six samples characterized by high V content, and four samples representing elevated Ni and Zn. The primary objective of the testwork was to determine metal content of the organic and the inorganic components of the samples by sequentially and selectively leaching and analyzing elemental make-up of five major fractions of the samples: the Light Organic, Heavy Organic, Oxide, Sulfide and Silicate fractions. The three sequential leaching solutions were Heptane, Acetic Acid and Sodium Pyrophosphate.

Although the sequential selective leaching testwork was intended to gather data which could be sufficiently quantitative to definitively establish elemental fractionation, several unexpected chemical reactions mitigated against achieving mass balance and the data can only be reviewed from a qualitative, albeit nonetheless useful, perspective. The leaching results indicated that a significant proportion of metallic content of the samples is in non-organic forms, although it failed to dissolve all organics from the samples since leach residues continued to report organic carbon contents similar to feed material. Sodium Pyrophosphate is a relatively caustic reagent which has traditionally proven to be a good liberator of organics from various matrices. Its failure as a leaching reagent for the Second White Specks black shales remains unresolved.

A decision was taken following completion of the leaching tests to proceed toward preparation of physical concentrates from larger samples under more rigorous metallurgical conditions relying on traditional flotation procedures. A 65kg weighted composite sample was prepared by Ortech Laboratories for a series of flotation tests which were carried out during 1998 under the direction of AGRA Monenco. The sample was reconstructed by combining proportionate amounts of previously crushed material from 1996-1997 drill core intervals of all samples from the Second White Specks Formation intercepts cored in Buckton Property drill holes 7BK02, 7BK04 and 7BK05. A variety of flotation procedures as well as magnetic separation tests were completed to achieve concentration. Low pH leaching test were also carried out.

Despite considerable efforts, the tests failed to produce concentrates since compositions of material flotated reported compositions nearly identical to the feed material. It is particularly significant that material produced by flotation did not report concentration of <u>any</u> element and that the tests only served to demonstrate unsuitability of flotation to the rock matrix. Flotation procedures showed no selectivity for any of the metal species, or any other element for that matter, regardless of mitigating activation reagents used, and concentrated fractions were found to be in most part slimes physically and chemically nearly identical to the feed material. AGRA's conclusions were that without due concentration, reagent consumption costs would be prohibitively high, and it recommended that no additional metallurgical tests be carried out on the samples.

Tintina was approached by Crowflight Minerals Ltd. during late 1998 with a proposal to investigate the application of certain de-sliming clay treatment procedures from the potash industry (deflocculation tests) as an alternative to flotation to produce a sulfide metal concentrate from the Second White Specks black shales. Subsamples of composite sample material were made available to Crowflight which carried out considerable testwork during late 1998 and early 1999 and reported the incidental discovery of good, though sporadic, gold grades during its tests. Gold grades reported by Crowflight (multi-ppm) were considerably higher than those documented by Tintina (5ppb-7ppb) from its previous routine analyses of subsamples from the material tested by Crowflight.

A check assaying program was, accordingly, initiated by Tintina during early 1999 to assess the veracity of data reported to it by Crowflight from the above testwork, and that of data collected by it from routine analyses during the 1996-1997 drilling programs. The check assaying program entailed (i) check assaying by Tintina of archived material from samples portions of which had been surrendered to, and analyzed by, Crowflight; (ii) considerable reassaying of drill core samples and drill core composite samples reconstructed by Tintina; (iii) experimental assaying of multiple sample fractions and of reconstructed samples to evaluate effects of pulverization on sample material; (iv) bottle roll cyanidation tests; and (v) assaying of a suite of deflocculated composite samples. Mineral investigations as well as an independent audit were also initiated under the direction of Strathcona Mineral Services which undertook an independent study of gold content of the Second White Specks shale drill core samples from the two Properties, including subsamples of material tested by Crowflight.

After considerable assaying tests which dominated 1999 activities, the check assaying program reiterated the presence of gold within Second White Specks Formation and suggested that same is present in physical forms prone to considerable nugget effect. The tests also suggested an as yet ill defined role of deflocculation as a pretreatment to assaying. The check assaying work failed, however, to corroborate initial test results obtained by Crowflight from its work on samples of the Second White Specks although some of the 1999 re-assaying did report some relatively good grades exceeding 1g/t Au. While nugget effect may be cited as a convenient culprit to account for highly variable gold analyses, a good deal of the erratic data documented during the check assaying and earlier work are better attributed to sample size and sample preparation issues.

The very low grades of gold within the Second White Specks shales tested presented extreme challenges during all analytical work, testing the capabilities of all of the laboratories utilized. In that regard, while nugget effect continued to offer a convenient scapegoat to account for erroneous or highly variable analytical results, some responsibility has to be placed on the analytical facilities themselves for repeated imprecisions and inaccuracies reported from analysis of certified control standards. Such variations clearly question the veracity of low detection limits claimed by various facilities or, alternatively, question the validity of analyses certified for a number of analytical standards.

Overall conclusions of the check assaying program were that while drill core footages of the Second White Specks Formation as intersected in the 1996-97 drilling do indeed carry gold, but that the overall gold grade is far too low (<<100ppb) in samples of core tested from the 1996-97 drilling to support expectations of any economic concentration within portions of the two Properties tested by the drilling.

In addition to investigating metallic content of the shales, efforts were also directed to evaluate diamond potential of the two Properties. In that regard, available airborne geophysical data from the Properties was reviewed in greater detail than before, samples previously collected (archived) from the Asphalt, Buckton and McIvor Properties were re-examined and indicator mineralogy was picked and probed. These efforts reported very favourable findings suggesting the presence of yet undiscovered kimberlitic at, or in the vicinity of, the Properties. The work concluded that likely one or more of the ashes or bentonites within the Second White Specks Formation intersected in 7AS01 from the Asphalt Property is kimberlitic in origin, and indicator minerals reported from the indicator mineral testwork included a titanian macrocrystic pyrope, several possible eclogitic garnets, abundant chromites from two distinct trends including a high chrome (>60 wt% Cr2O3) mantle derived chromite and one picroilmenite. Other important indicator minerals indicative of kimberlite and other related alkaline intrusions were also obtained from bentonitic sections of drill core from Asphalt and Buckton Properties drill hole. Although additional detailed and more aggressive exploration for kimberlites at the two Properties was recommended none has to date been implemented.

In closing, considerable work has been deployed during the past several years by Tintina as well as by others to resolve questions of grade and process metallurgy pertaining to the Second White Specks black shales. An unusually problematic organic matrix, however, difficulties of sample handling, peculiar physical properties and nuggetted metallic mineralogy have repeatedly frustrated all efforts despite their rigor. Given these challenges, and the low overall metal contents documented thus far from the Second White Specks black shales, it seems highly unlikely that the Formation might ultimately offer targets which can be exploited in the normal context of conventional mining operations. It is recommended, therefore, that no further work be carried out on the Second White Specks shales at the Asphalt and Buckton Properties unless localities can be identified with considerably higher grades (monometallic or combined grade) than those identified to date. Topics for future expansion, though better suited to academic research than to industry efforts, might include pursuit of a better understanding of organic components of the Cretaceous black shales.

The potentially detrital gold content of the shales, on the other hand, offers a relatively more promising direction for future exploration at the two Properties and throughout the Birch Mountains Area in general, since several localities have previously been identified characterized by abnormal thickening of the siliciclastic bone bed unit at the base of the Second White Specks Formation. These localities merit closer scrutiny as they are also associated with acute stratigraphic anomalies some of which reflected in anomalous surface geochemistry and topography.

Incidental recommendations regarding gold mineralization in the Birch Mountains Area concern the McIvor Property, wherein alluvial gold has been documented from a significant portion of the McIvor River Valley. Previous work in the area has been hampered by the high content of very fine clay within the McIvor placers and its deleterious effects during preparation of heavy mineral concentrates. Testwork completed during 1999 while investigating Ateba's deflocculant reagent A15 may have direct application to preparation of good quality concentrates from the McIvor material. Pursuit of same is recommended, by way of the experimental treatment of a small suite of large samples taken at the confluence of the McIvor River and KRC Tributary.

In marked contrast to assessment of metallic potential of the Second White Specks, diamond indicator mineral testwork completed to date has repeatedly met with considerable success indicating a good potential for the discovery of diamondiferous kimberlitic pipes in the area, and especially at the Asphalt Property. Active pursuit of this potential is strongly recommended, such work to commence with drilling of several very obvious anomalies throughout the southern one third of Asphalt Property wherein targets can be expected to be considerably nearer surface than at Buckton.

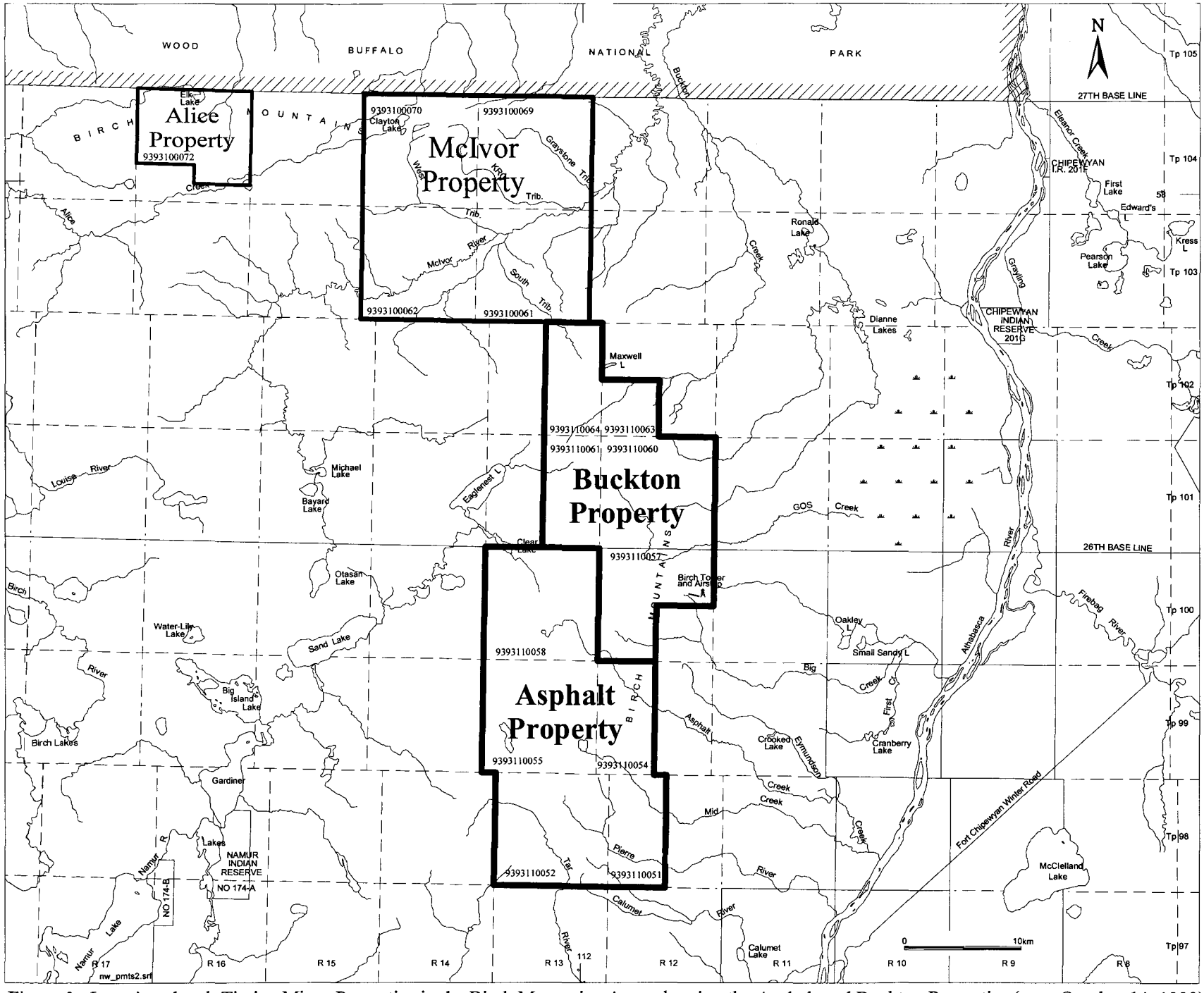


Figure 3. Location sketch Tintina Mines Properties in the Birch Mountains Area, showing the Asphalt and Buckton Properties (as at October 14, 1999)

The permits comprising the Asphalt, Buckton and McIvor Properties have commencement dates of November 29, 1993 and first anniversary dates of 1999 and 2001 as shown in Table 1. Permit descriptions and previously accumulated expenditures available for future renewals are also shown. (copies of the permits comprising the two Properties are appended in Appendixes A).

Buckton Property Permits Descriptions			Area	Accumulated	Anniversary Dates	
Permit Number	Ref#	Locator / Description	(ha)	Previous Reserves $	Commencement Date	Expiry Date
9393110057	70	4-12-100: 4-9; 16-36	6912	$ -	29-Nov-93	29-Nov-01
9393110060	73	4-12-101: 1-36	9216	$ -	29-Nov-93	29-Nov-01
9393110061	74	4-13-101: 1-3; 10-15; 22-27; 34-36	4608	$ -	29-Nov-93	29-Nov-99
9393110063	76	4-12-102: 4-9; 16-18	2304	$ -	29-Nov-93	29-Nov-01
9393110064	77	4-13-102: 1-3; 10-15; 22-27; 34-36	4608	$ -	29-Nov-93	29-Nov-01
		totals	27,648	$ -		

Asphalt Property Permits Descriptions			Area	Accumulated	Anniversary Dates	
Permit Number	Ref#	Locator / Description	(ha)	Previous Reserves $	Commencement Date	Expiry Date
9393110051	64	4-12-098: 4-9; 16-21; 28-33	4608	$ -	29-Nov-93	29-Nov-01
9393110052	65	4-13-098: 1-36	9216	$ -	29-Nov-93	29-Nov-01
9393110054	67	4-12-099: 4-9; 16-21; 28-33	4608	$ -	29-Nov-93	29-Nov-01
9393110055	68	4-13-099: 1-36	9216	$ 45,560	29-Nov-93	29-Nov-99
9393110058	71	4-13-100: 1-36	9216	$ -	29-Nov-93	29-Nov-01
		totals	36,864	$ 45,560		

Table 1. Asphalt and Buckton Properties permits description summary. Accumulated previous reserves represent exploration expenditures previously filed but not yet accrued toward renewals

An aggregate of $1,520,120 have previously been spent on exploration work at the two Properties (Asphalt $661,828; Buckton $858,292), all of which have previously been filed toward assessment work requirements representing the 1994-1995 and 1996-1997 work programs. An aggregate of $308,440 (Asphalt $165,124; Buckton $143,316; including a 10% provision for administrative overheads) were spent on exploration activities at the two Properties during the period December 1997 to October 1999 toward completion of Leaching Testwork, Benchtesting, diamond indicator mineral testwork and a check assaying program. Work program expenditures are summarized in Table 2.

	Asphalt + Buckton Expenditures	
Selective Leaching Testwork	$	36,436
Benchtesting	$	38,869
Diamond Indicator Minerals Testwrok	$	56,209
Check-Assaying Program	$	148,886
Subtotals	**$**	**280,400**
10% Administrative Overheads	$	28,040
Totals	**$**	**308,440**

Table 2. Summary of expenditures, Asphalt and Buckton Properties programs 1997-1999.

The above expenditures were incurred during the period December/97-October/99, and to the extent that the two Properties are contiguous, aggregate expenditures for the programs are pooled and reallocated to the various permits as shown in Table 3 for the purposes of filing toward necessary assessment work requirements for their renewal to secure 2001 and 2003 anniversaries.

Buckton Pty Permits		Expenditures Summary (1997-1999)			Excess $	Expiry	Renewal	Renewal
Number	Area (ha)	Total Allocated to Permit	Accum Prev Reserves $	Total Filed For Renewal	Future Reserves	Date	Requested (terms)	Requested to
9393110057	6912	$ -	$ -	$ -	$ -	29-Nov-01	2	29-Nov-01
9393110060	9216	$ -	$ -	$ -	$ -	29-Nov-01	1	29-Nov-01
9393110061	4608	$ 46,080	$ -	$ 46,080	$ -	29-Nov-99	0	29-Nov-01
9393110063	2304	$ -	$ -	$ -	$ -	29-Nov-01	2	29-Nov-01
9393110064	4608	$ -	$ -	$ -	$ -	29-Nov-01	2	29-Nov-01
totals	27,648	$ 46,080	$ -	$ 46,080	$ -			

Asphalt Pty Permits		Expenditures Summary (1997-1999)			Excess $	Expry	Renewal	Renewal
Number	Area (ha)	Total Allocated to Permit	Accum Prev Reserves $	Total Filed For Renewal	Future Reserves	Date	Requested (terms)	Requested to
9393110051	4608	$ 73,320	$ -	$ 69,120	$ 4,200	29-Nov-01	2	29-Nov-03
9393110052	9216	$ 142,440	$ -	$ 138,240	$ 4,200	29-Nov-01	2	29-Nov-03
9393110054	4608	$ -	$ -	$ -	$ -	29-Nov-01	2	29-Nov-01
9393110055	9216	$ 46,600	$ 45,560	$ 92,160	$ -	29-Nov-99	1	29-Nov-01
9393110058	9216	$ -	$ -		$ -	29-Nov-01	2	29-Nov-01
totals	36,864	$ 262,360	$ 45,560	$ 299,520	$ 8,400			

Table 3. Asphalt and Buckton Properties permits status and 1997-1999 assessment expenditures filing summary (figures include a 10% provision for overheads).

1.2 MINERAL RIGHTS AND LAND TENURE REQUIREMENTS

Rights to metallic and industrial minerals, to bitumen, to coal and to oil/gas within the region of interest are regulated under separate statutes, which collectively make it possible for several different "rights" to be held by different grantees over the same geographic location. Under this scheme, oil/gas leases, coal leases and metallic mineral permits coexist throughout the region and, within its central portion, rights to tar-sands and to any minerals/metals associated with the formation hosting same (McMurray Formation), present yet another layer of tenure. Coexisting rights in the Birch Mountains Area, in the vicinity of the Properties, comprise gas leases held in most part by Anderson Petroleum (previously by Home Oil). Several of the leases are under active exploration stages (seismic work and drilling) in search for deep seated gas in the McMurray Formation some 1500 feet below surface.

The Asphalt and Buckton Properties are held by Tintina under metallic and industrial minerals permits issued in 1993 which are in good standing for a period ten years effective issuance date consisting of five two year terms, subject to work requirements of $5/ha for the first term, $10/ha for each of the second and third terms, and $15/ha for each the fourth and fifth terms. The permits confer the exclusive right to explore for metallic and industrial minerals, inclusive of diamonds. The permits comprising the Properties are in their third or fourth term.

The Alberta Metallic and Industrial Mineral Regulations provide for the accumulation of excess work performed in any term for filing toward subsequent terms, and also enable the reduction of permit areas during their currency. There are no statutory provisions for the renewal of permits beyond their 10 year term, although they do provide for conversion of permits to Metallic Minerals Leases which confer the rights to minerals discovered thereupon. Mineral Leases require no work performance but are subject to annual payments of $3.5/ha for their maintenance in good standing. Mineral Leases are in good standing for a renewable term of 15 years.

1.3 Land Use and Environmental Issues

Despite the coexistence of metallic and hydrocarbon mineral tenure in the Birch Mountains Area, conflicts in precedence of land use have to date been minimal due mainly to the scarcity of previous exploration for non-hydrocarbon minerals. Land use is currently regulated by the Alberta Department of Environmental Protection and there are no aboriginal claims pending in the region.

The Birch Mountains lie immediately to the south of the Wood Buffalo National Park, hence the area is subject to environmental and heritage sensitivities to an extent comparable to elsewhere in Canada, and many of the sensitivities are germane to the recent development of a regional planning framework. Portions of the Birch Mountains were selected during late 1998 for consideration as candidate sites under the Province's Special Places 2000 program, and may be designated as protected areas subject to deliberation on local committee level. Such designation would affect the McIvor and Buckton Properties, and the northernmost permit at the Asphalt Property. As at the date hereof local committees have not yet been struck to initiate consultation procedures.

Moose and caribou calving season sensitivities present by far the most exigent restrictions to physical exploration activities, requiring the annual cessation of all field activity effective March 1 through July 1. The Birch Mountains Area does not overlap any caribou calving zones, although portions of the McIvor River valley fall within moose calving protection zone. Calving zones are shown in Figure 4.

Other practical constraints to mineral exploration in the region include trapping licenses, most of which are inactive, and the presence of known gas accumulations, especially in the southeast and southwestern portions of the region (Figure 5), none of which underlie any of the properties held by Tintina. Low pressure gas has been documented from the Viking Formation known to occur within the upper 100m-200m of stratigraphy in the Birch Mountains underlying portions of some of Tintina's properties in that area. Higher pressure gas has been documented from deeper within the stratigraphy, from the McMurray Formation, and certain such localities have been under active recent exploration by oil/gas groups. Scattered gas pockets are common throughout the region necessitating due precautions during drilling.

Timber rights for a considerable portion of the region, including the Birch Mountains Area, are held by various groups under Provincial Forest Management Agreements. Rights in the Birch Mountains Area are held mainly by Alberta Pacific, necessitating the remittance to Alpac of fees by way of timber damage assessment (TDA) which are applicable to all land clearing, regardless of quantity and quality of growth. TDA rates are in the order of some $1,000 per hectare of clearing and are levied on all clearing activities inclusive of clearing of roads and trails.

Roads and trails in the Birch Mountains are privately held and have of recent required special permission for access subject also to the payment of arbitrary fees.

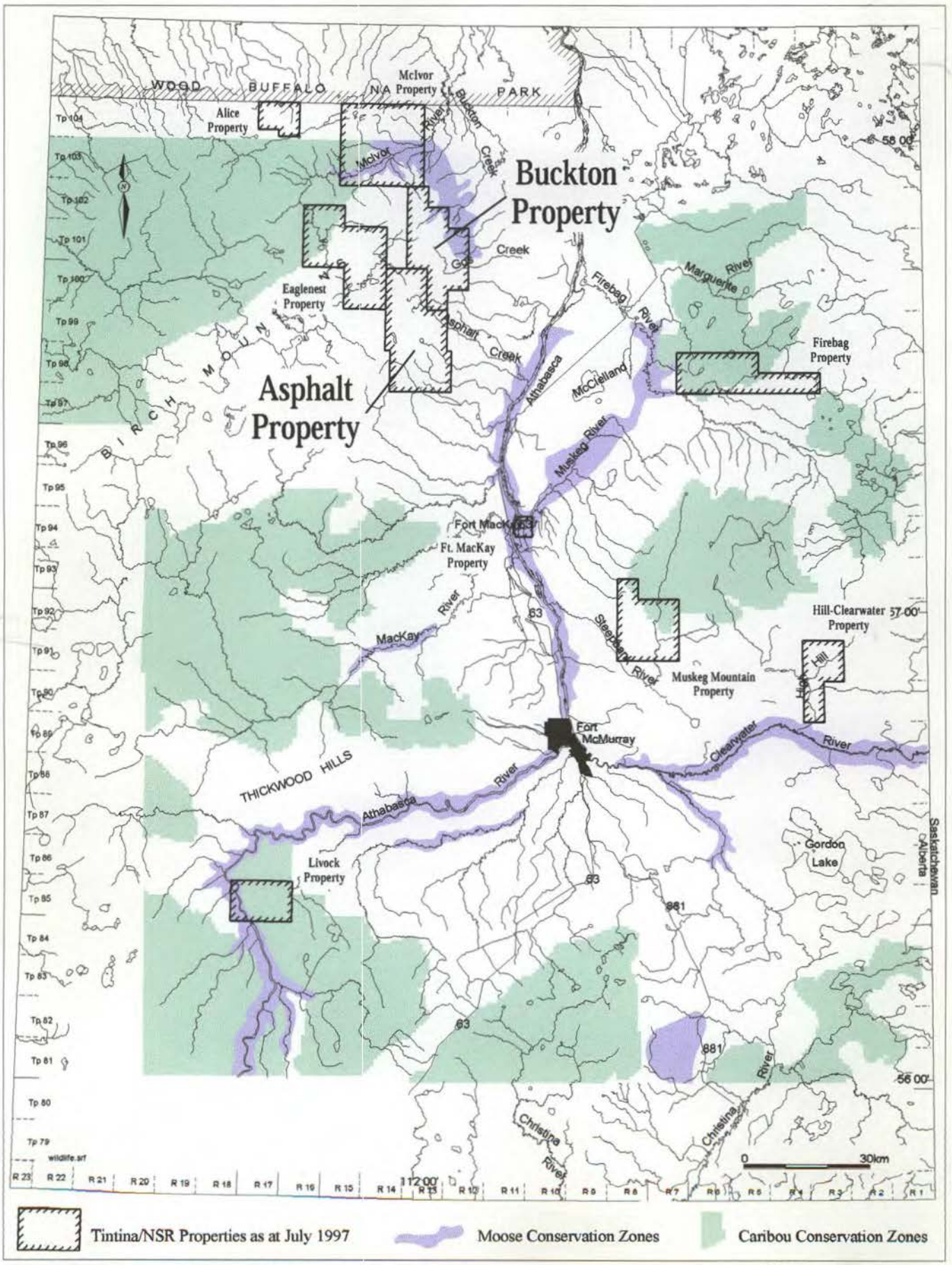


Figure 4. Regional sketch of moose and caribou calving zones.

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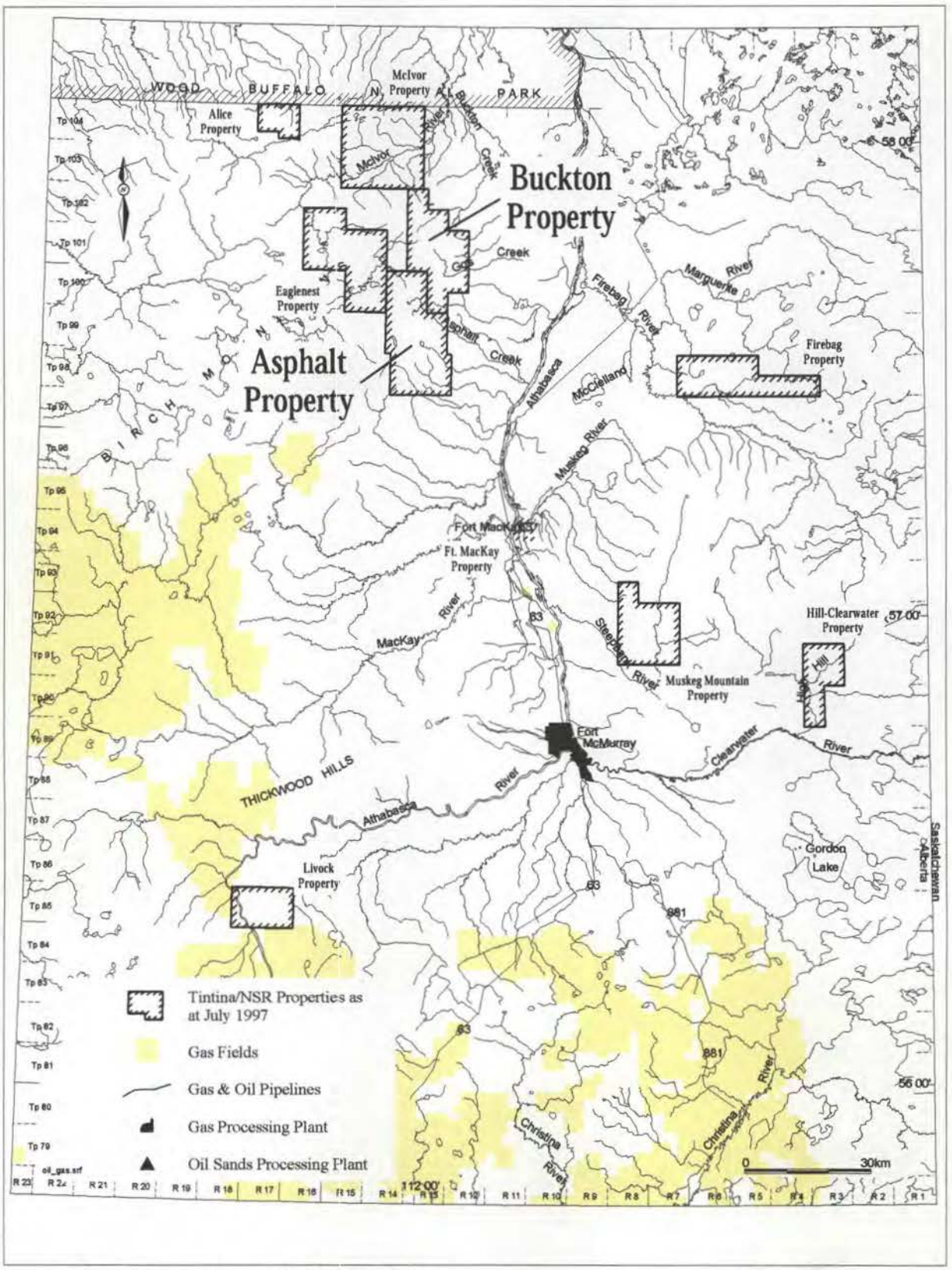


Figure 5. Regional Summary of known oil and gas accumulations.

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3.REGIONAL GEOLOGY & PREVIOUS WORK

3.1 REGIONAL SETTING

Alberta geology is dominated by sedimentary sequences of the Western Canada Sedimentary Basin underlain by a relatively stable Precambrian platform with localized reactivation zones. The sedimentary sequences are bounded by the Canadian Shield in the east and the thrust-fold foothills and the Rocky Mountains in the west. As the Basin extends southward well into the USA (Great Plains Basin) many Albertan stratigraphies also have American analogues.

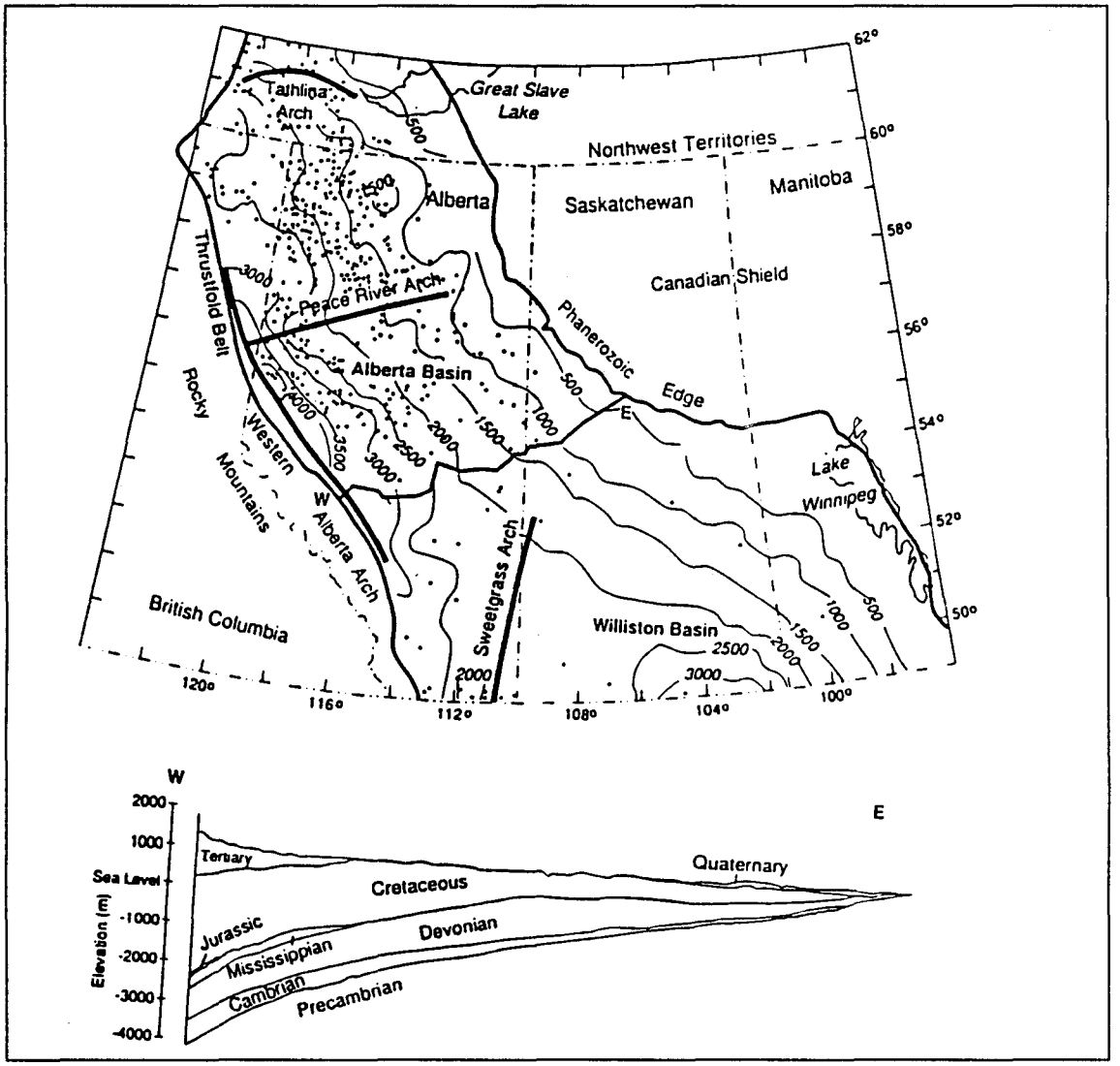


Figure 6. Alberta Sedimentary Basin. Showing sedimentary cover isopachs (m). From Bachu 1992.

The Western Canada Basin consists of several smaller sub-basins separated by a network of arches, such that the Alberta sub-basin represents a wedge shaped geometry, thickening from a thickness of 200m in the east to over 6,000m in the west (Figure 6). Gross stratigraphy comprises sediments unconformably overlying the Precambrian shield which is exposed some 150km to the northeast of Fort McMurray (Figure7), and is buried by progressively thicker sedimentary formations southward and southwestward.

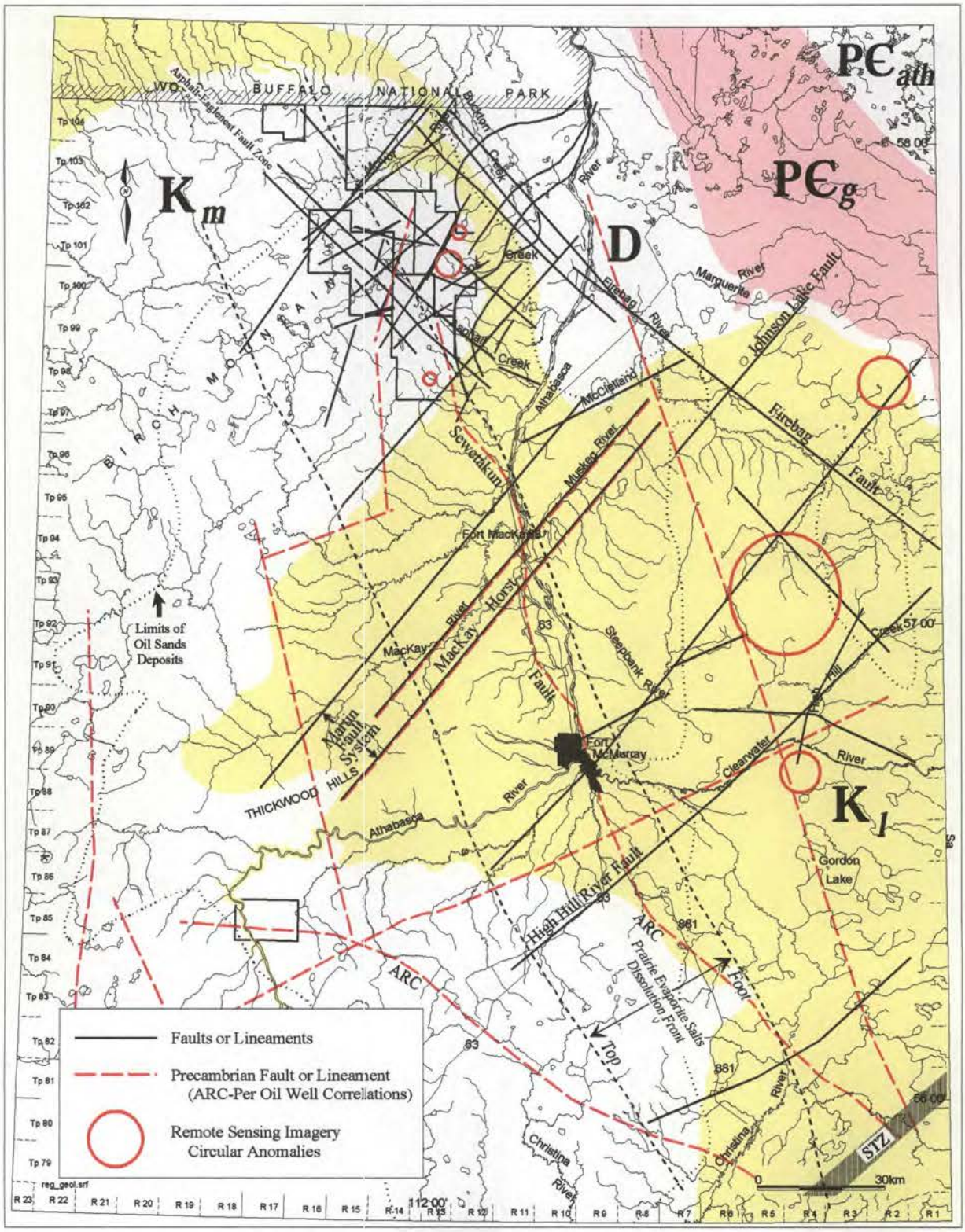


Figure 7. Sketch showing generalized geological features as follows: Athabasca basin sandstone (PCath), Precambrian (PCg), Middle Devonian (D), Lower Cretaceous (Kl), and Middle Cretaceous (Km), the distribution of the oil sands deposits, and principal structural elements. Snowbird Tectonic Zone (STZ). Location and trend of the Prairie Evaporite salts dissolution front is also shown, indicating the top and foot of the subsurface scarp face. Select circular anomalies also shown from remote sensing imagery studies

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2.ACCESS, PHYSIOGRAPHY AND LOGISTICS

2.1 ACCESS AND LOGISTICS

Access throughout the region is relatively good, facilitated by a network of highways, secondary roads and old seismic lines which serve well as winter roads and bush roads in accessible in some cases by all-terrain vehicles. Access throughout the southern and central portions of the region is better due to the abundance of highway and bush roads whereas throughout the northern half of the region with the exception of the Fort Chipawyn winter road all access is limited to old seismic lines.

Fort McMurray is nearly at the center of the region and is accessible by highway from Edmonton (350km away) and by regular daily commercial flights. It is well supplied and offers all necessary support services to exploration work, inclusive of expediting, fixed and rotary air support, communications, medical and equipment supplies. Radio as well as telephone communications are also excellent throughout the region. Cellular telephones (Telus and Cantel) provide by far the most flexible communications link with good reception to localities as far away as the Birch Mountains.

The Athabasca and the Clearwater rivers are the two principle waterways in the region with countless other streams and smaller rivers draining into them, the majority of which are characterized by jagged shapes consisting of many relatively straight water courses, reflecting in most part underlying faults and joint systems. The Athabasca River bisects the region and provides relatively good water access across most of the region and also a twice-weekly barge service over its northern portions to the north of Fort McMurray.

Although the Birch Mountains can be accessed in the summer months by barge/boat via the Athabasca River, principal access is by rotary aircraft or by fixed wing aircraft landing on the Birch Mountain Airstrip which also houses a seasonally manned Fire Tower and Telus communications relay station. The Birch airstrip has provided relatively reliable landing for fixed wing aircraft in the past except during periods of wet weather exceeding 3-4days which render the strip quite "soft" and requiring several days to drain.

Winter access is via the Birch Mountain Winter Road which passes northerly from the village of Fort MacKay and provides a sinuous path negotiable only after freeze-up as it crosses several streams and over wet muskeg. Previous winter exploration work has relied on an ice-bridge constructed during November by Northlands Forest Products Ltd. across the Athabasca River near Bitumont, to support harvesting activities in the area.

Access throughout the Birch Mountains is best by rotary aircraft, although countless old seismic lines offer adequate, albeit selective, access throughout much of the area especially during the winter.

2.2 PHYSIOGRAPHY AND VEGETATION

Physiography is highly variable throughout the Athabasca region which is characterized by low, often swampy, relief punctuated by a handful of physiographic features protruding above the otherwise flat terrain. The Birch Mountains are by far the most

conspicuous topographic feature, representing an abrupt 600 meter physiographic protrusion, with a sharp horseshoe shaped erosional edge above the surrounding terrain. Stony Mountains also present a similar, though smaller, feature located in the southern part of the region some 200km to the southeast of the Birch Mountains. Considering the relatively flatlying stratigraphy, river valleys in these areas provide the only outcrop exposures within the region across relatively large sections of stratigraphy which are otherwise buried or eroded.

The Birch Mountains Area is further characterized by sharp river and creek incisions in poorly consolidated stratigraphy susceptible to active landslides and slumps. River valley incisions in the area are progressively deeper as they near the erosional edges of the Mountains and the drainage in the area defines an overall approximate radial pattern. Localized radial drainages are also present within portions of the Birch Mountains, characterized by creeks flowing outward from what appear to be 1km-2km diameter circular domes (e.g. Buckton Creek, Asphalt Creek, Big Creek).

The most formidable topographic feature in the Birch Mountains area is the McIvor River Valley representing a 20km long east-northeasterly trending valley which opens to a near-circular shaped width of some 10km at its eastern extremity. Unlike other sharply incised valleys in the Mountains, it is a relatively flat-bottomed feature dominated by the McIvor River with its many braided meanders and countless tributaries. The valley is surrounded by zones of active slumpage representing broad zones of continual sediment recharge such that the active flow channel of the McIvor River is in a continual state of flux within the central section of the river valley, shifting back and forth within several hundred meters of valley bottom.

Vegetation over the Asphalt Property is predominated by scrubby bush and muskeg separating stands of merchantable small timber. Much of the Pierre River valley is an area of burn. By contrast, vegetation at the Buckton Property generally contains better growth despite expanses of muskeg, and good large diameter hardwood stands can be found in localities to the north of Gos Creek. These stands have presented challenges during the clearing of drill access trails during the previous drilling programs. In addition, the southern half of the Birch Mountains was subjected to a significant fire due to lightening strike during 1998. The fire extended northward to the Birch fire tower and airstrip, exacerbating on-foot access throughout much of the burn area. The southern portions of the Birch Mountains had previously experienced other fires.

Glacial history of the region is complex and as yet poorly understood. Principal ice direction throughout the northeastern portion of the region is southwesterly, although ice flow is believed to have splayed around (and over) the Birch Mountains such that throughout the balance of the region crosscutting composite directions are common, manifested as multiple tills. Considerable work is in progress by the Alberta Geological Survey toward resolution of Quaternary geology.

Regional geology of northeastern Alberta is represented in broad terms by a sequence of Devonian and younger sediments unconformably overlying the Precambrian Shield which is sporadically exposed only in the northeasternmost part of the region, near the Saskatchewan border, some 110km to the northeast of Fort MacKay, from whence southwestwards the Precambrian is buried by progressively thicker sedimentary formations of the Western Canada Sedimentary Basin. These sediments consist of Devonian sequences (carbonates, evaporite and red beds), which in turn are unconformably overlain by Cretaceous clastic sediments, the lowermost of which are host to the oil sands. The Lower Cretaceous sequences transition upward through a series of unconformities (and disconformities) to Upper Cretaceous clastic sequences separated from same by a principal extinction marker (the Fish Scales Marker Bed) and a lesser known extinction horizon, the Second White Specks Formation.

3.2 Regional Stratigraphic and Tectonic Setting

3.2.1 Precambrian

Several tectonic Precambrian domains are recognized in northeastern Alberta, with many similarities to the Precambrian Basement elsewhere in Canada (Figure 8). Precambrian basement within the southeast portion of the area is dominated by mylonites and granulite grade gneisses at the Snowbird Tectonic Zone, by peraluminous plutonic and metasedimentary belts and shear zones further north through the central portion (Talston Magmatic Arc), and by metaplutonic and subordinate felsic metavolcanics in the northwestern portion nearer the Great Slave Tectonic Zone (Buffalo Head Accreted Terrain). A very old Archean craton, the Rae Province (4Ga+) dominates the northeasternmost portion of the area, and its boundary with the much younger (2Ga) Talston Magmatic Arc is known to have undergone several readjustments.

Precambrian rocks underlying the region belong to the Talston Magmatic Arc (TMA) and the Rae Province. The TMA is a major crustal suture zone marking the boundary between the Archean Rae Province to the east and the Proterozoic Buffalo Head Terrain to the west (Ross and Bowring, 1991). It is characterized by a sinuous aeromagnetic fabric consistent with the geology of its exposed portions in the northeast of the region where large anastomosing mylonitic shear zones cut through large (up to 50km diameter) granitic batholiths intruding ortho and paragneisses with ages of 2.0-1.8Ga. The TMA can be traced northward for several hundred kilometers from the Snowbird Tectonic Zone (some 100km southeast of Fort McMurray) to the Great Slave Lake Shear Zone where it is displaced to the northeast and continues as the Thelon Magmatic Zone.

Studies of Basement Heat Flow in the Western Canada Sedimentary Basin (Bachu 1993) suggest the TMA underlying northeast Alberta to be a relatively young (2.0-1.8Ga) magmatic arc, characterized by high geothermal gradients suggestive of an upper layer of thermal activity in the crust. This work also shows a trend of progressive increase in calculated basement heat flows north-northeastward to a maximum in northeast and northern Alberta. Anomalously high geothermal gradient characterizes the area around Fort MacKay the outline of which approximates the tar sands deposit. Similar geothermal anomalies characterize the area over the Great Slave Tectonic Zone underlying the Pine Point deposits.

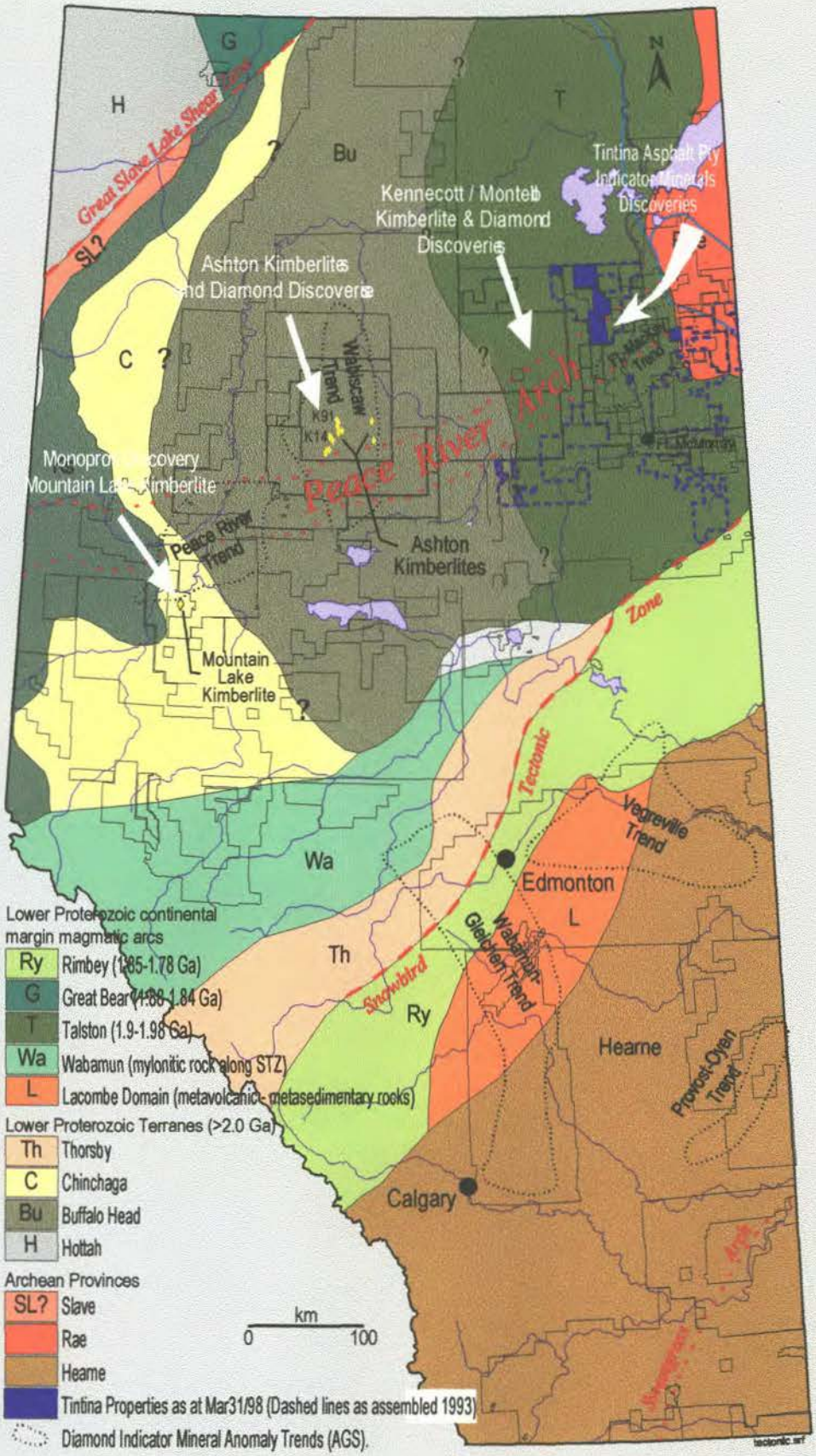


Figure 8. Summary sketch of principal Precambrian tectonic domains in Alberta, showing also principal diamond indicator trends

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3.2.2 Sedimentary Stratigraphy

Overall stratigraphy within the region of interest has been documented in gross terms, although sub-regional variations therein are poorly understood, being constrained by the general lack of subsurface information other than that available from oil well formational picks. Despite these shortfalls, regional stratigraphy can be reviewed in broad terms. Regional distribution of the nearly flat-lying stratigraphy is shown in a previously presented figure (Figure 7). A stratigraphic column for the region is summarized in Figure 9, and a regional north-south cross-section extending from the McIvor River, near Wood Buffalo National Park in the north, to Fort MacKay is presented in Figure 10. An overview of stratigraphy is described below.

Devonian Carbonates

Sedimentary rocks overlying the Precambrian in the region of interest consist primarily of gently southwesterly dipping (approx. 4°) Middle and Upper Devonian strata, unconformably overlain by Lower Cretaceous sequences. At, and in the vicinity of Fort MacKay, the Devonian is represented by a 1000ft thick sedimentary sequence dominated by siliceous carbonates near the surface giving way, through evaporite and dolomitic rocks, to progressively more clastic units and shales or red-beds at depth, all of which are separated from the Precambrian basement by a thin (±5ft) regolith unit (or "granite wash"). The Precambrian paleosurface dips gently to the southwest (approx. 5°-7°), such that the Devonian sequence is thinner in the northeast portion of the region where it has an estimated thickness of some 200-300ft in the Firebag River area.

The Devonian sequence is locally (e.g. Fort MacKay area) very fractured, especially near its upper and middle sections, and fractures are occupied by bituminous hydrocarbons at times ranging upward to 20% by volume. Bitumen lined fractures are not confined to the upper sections and have also been observed throughout and near the bottom of the sequence (also within the Precambrian).

The Devonian sequence is divided into the ***Elk Point, Beaverhill Lake and Woodbend Groups***. The Lower to Middle Devonian ***Elk Point Group*** consists of a lower succession of shales, red beds and salts and an upper section of platform carbonates and evaporites. The Middle to Late Devonian ***Beaverhill Lake Group*** and the Late ***Devonian Woodbend Group*** are composed of alternating calcareous shales and argillaceous limestones.

Of particular interest within the ***Elk Point Group*** are the ***Keg River Formation*** and overlying ***Prairie Evaporite Formation***. In the Fort McMurray area, ***Keg River Formation*** has been pervasively altered to sparry tan dolostone and dolomitic limestone, and can be observed in outcrops along the Firebag River just east of the Athabasca River. It has also been intersected in drilling in the Fort MacKay area and is known to locally carry Pb-Zn mineralization.

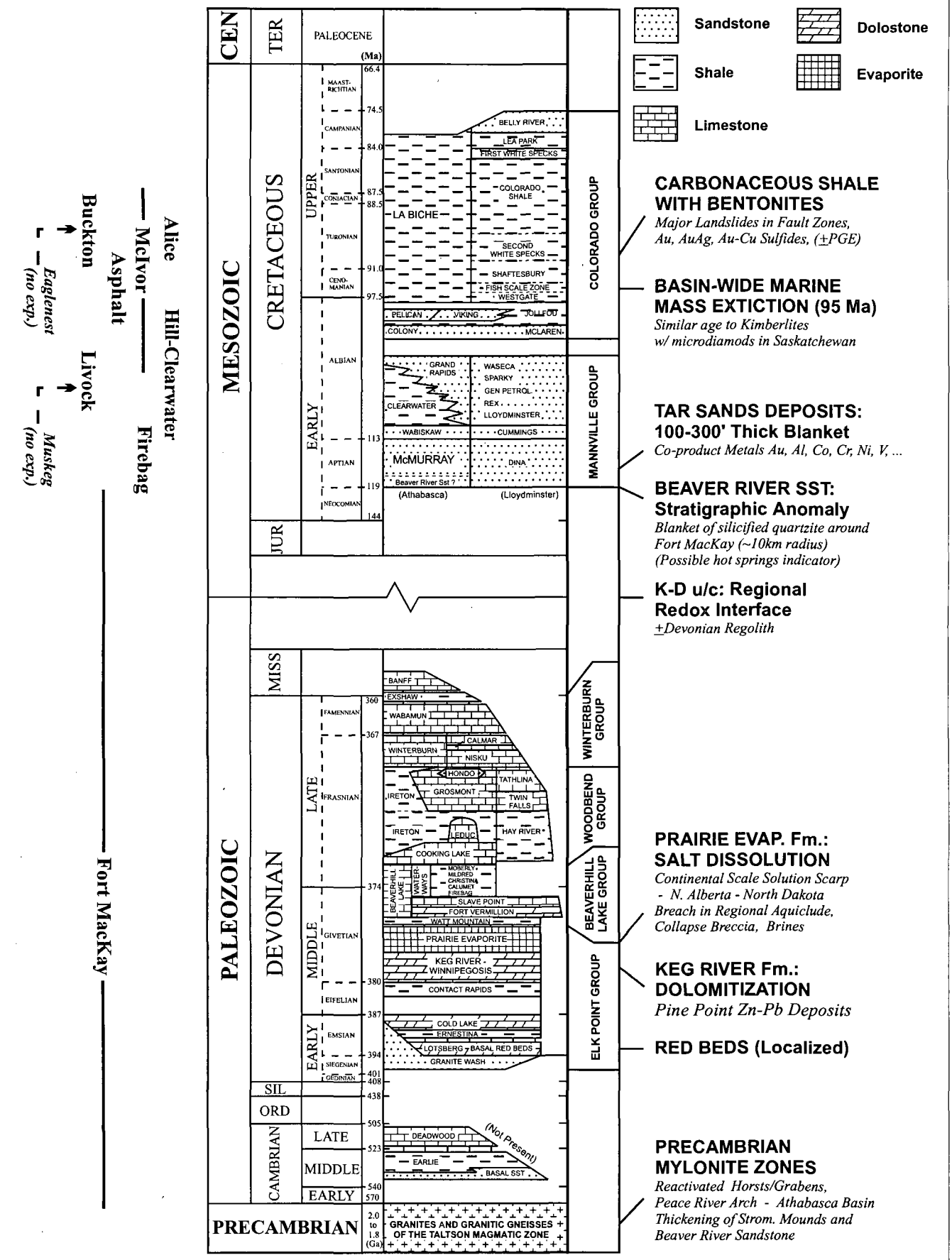


Figure 9. Summary stratigraphic column for northeast Alberta, showing also sections explored, or available to exploration, at each of the properties held by Tintina (for properties with no available exposures, stratigraphic position of property surface is shown).

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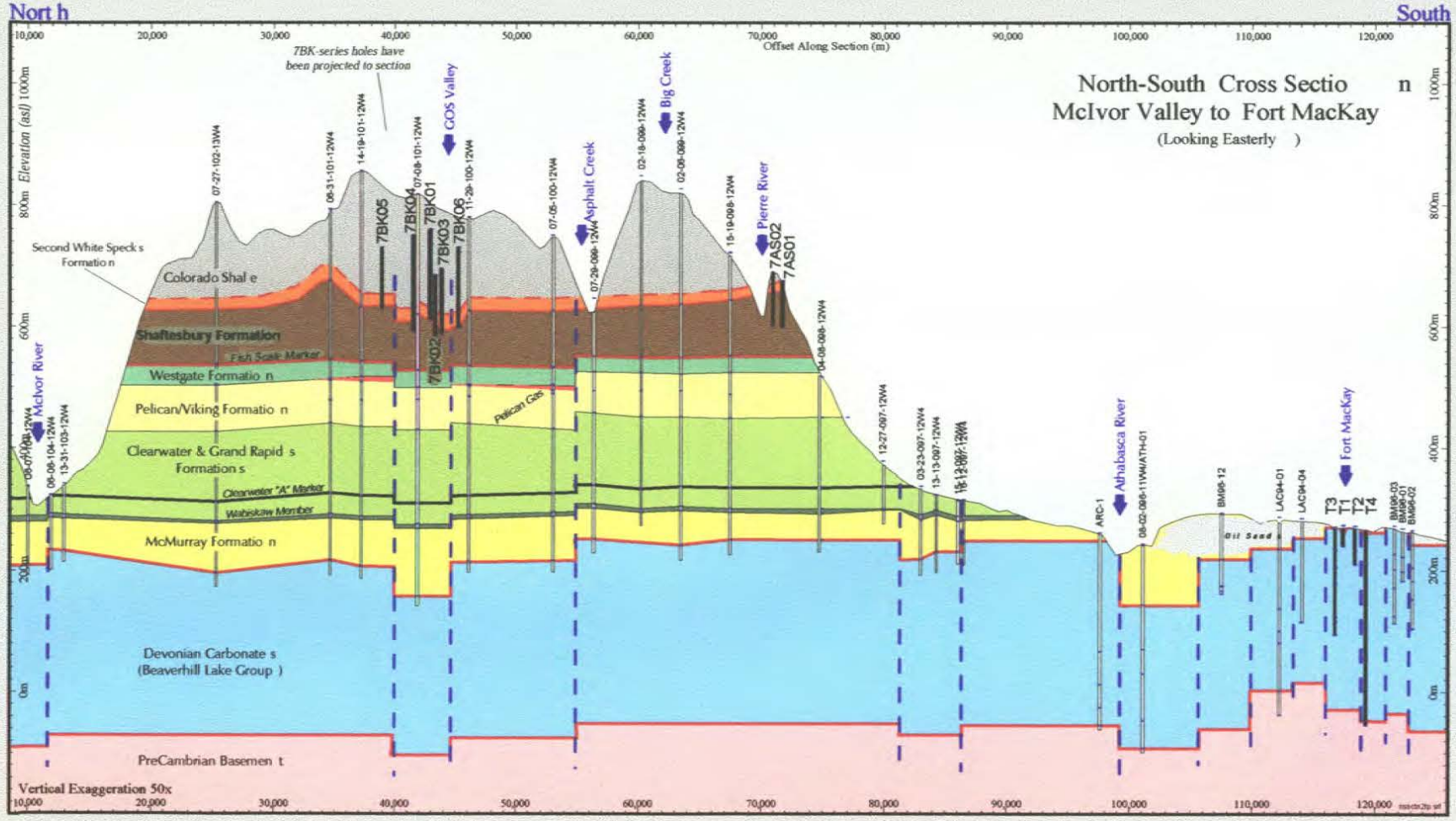


Figure 10. Regional north-south cross section McIvor Valley to Fort MacKay.

Subsurface data compiled from: 1) Wells ARC-1 and ATH-01/08-02-096-11W4: Structural Cross Section (Entire Sedimentary Sequence) North Portion Project Area, Fig. 5-1, Dwg No. FK-17, 1980. Alsands energy Ltd. 2) Drill holes LAC94 series: Assessment Report, Work Completed December 31, 1995, Athabasca Mineral Exploration For Precious and Base Metals in Northeast Alberta. Birch Mountain Resources Ltd. 3) Drill holes BM96 series: unpublished data, courtesy of Birch Mountain Resources Ltd. 4) Drill holes T1, T2, T3, and T4: unpublished data, Fort MacKay Property drilling, 1993. Tintina Mines Limited. 5) Drill holes 7BK and 7AS series: 1996-97 drilling program, Asphalt and Buckton Properties, Tintina Mines Limited (this report). 7BK series holes projected to section. 6) All other holes: Northwest Sector Subsurface Database Report, July 31, 1995. M.N. Attalla, P.Geol. Prepared for Tintina Mines Limited (filed in assessment work reports for the Asphalt and Buckton Properties, April 1996, Sabag 1998.

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The ***Keg River Formation*** is conformably overlain by an evaporitic succession, the Prairie Evaporite Formation, consisting primarily of extensive thicknesses of salt and lesser interbedded anhydrite/gypsum, which thicken to the northwest from 160m to 275m. Thinner intervals along this trend are the result of reef build-ups in the underlying Keg River Formation.

Portions of the salt beds within the Evaporite horizon, have been dissolved and are responsible for the creation of collapse breccias up-stratigraphy. The Prairie salts are a substantive regional feature, known to extend southward into North Dakota, and dissolution within the salts defines a north-northwesterly trending regional linear domain regarded as a dissolution front, or subterranean scarp, to the east of which salt members of the evaporite have been removed (e.g. Fort MacKay Property is located over the foot of the dissolution scarp, east of which salt removal is nearly complete, and it is believed that some 75m of salt were removed from the Prairie Evaporite by dissolution).

The eastern boundary of the ***Prairie Evaporite Formation*** is marked by a 20-25km wide salt dissolution scarp which extends north-northwesterly across the region from Twp104/Rng20 W4M in the northwest to Twp80/Rng5 W4M in the southeast. The scarp defines an abrupt facies change from anhydrite to salt and has been progressing basinward since the end of Middle Devonian time. Salt dissolution within the Prairie Evaporite Formation has traditionally been credited for the bulk of karsting and brecciation within overlying Formations throughout the region, often to the detriment of the resolution of other structures of purely tectonic affinities.

The Prairie Evaporite represents a principal basinal hydrogeological feature acting as a regional aquiclude below which saline and metal enriched oxidizing fluids flow updip northeasterly into the region until they are discharged along the dissolution scarp representing the main breach in the hydrological system. Leakages of fluids along faulting crosscutting the Prairie Evaporite also provide localized communication between "shallow" waters with those flowing below same. Formational fluids are discussed in a later section of the report.

Cretaceous Clastics

The Cretaceous of northeast Alberta comprises two major sequences which are the Mannville and the Colorado (or Alberta) Groups. The ***Mannville Group*** represents the first major depositional sequence of the Cretaceous throughout Alberta, following a long period of uplift and erosion of older strata. This Group consists in ascending order of the ***McMurray Formation***, the ***Wabiskaw*** member, the ***Clearwater Formation***, and the ***Grand Rapids Formation***.

The base of the ***McMurray Formation*** marks the Cretaceous-Devonian unconformity within the region, representing a principal temporal marker. The Devonian to Cretaceous transition is as yet poorly understood and is complicated by the localized presence of certain horizons and rocktypes which represent stratigraphic or temporal anomalies of unknown age and provenance. The unconformity is well-exposed near Fort MacKay, and

is occupied by a silicified 1m-3m thick "blanket" of crystalline quartz sandstone of assumed Jurassic or Lower Cretaceous age. This unit, referred to herein as the ***Beaver River Sandstone***, is best documented in geoarcheological literature and had previously been assumed to be confined to the Fort MacKay area. Work completed by Tintina within the region, however, has documented a similar rocktype at the base of the McMurray Formation in oil well drill core from areas of active structural and geochemical disturbances within the Birch Mountains. This unit has been interpreted by Tintina to represent an alteration (decalcification zone) marker in areas overlying venting or hot springs activity.

The second major clastic depositional sequence of northeast Alberta is the ***Colorado Group***, consisting of a lower section comprising the ***Joli Fou Formation***, which envelops the ***Pelican*** or ***Viking Formation***, and an upper section which is dominated by the ***La Biche Formation***. The La Biche Formation has been subdivided into the ***Westgate, Fish Scale, Belle Fourche, Second White Specks***, and ***Colorado Formations***. All of the outcrops mapped and sampled to date on the various Tintina properties in the Birch Mountains area are exposures of these Cretaceous units.

The two Groups are described below.

Mannville Group

The Mannville Group of northeast Alberta is composed of the ***McMurray Formation***, the ***Wabiskaw*** member, the ***Clearwater Formation*** and the ***Grand Rapids Formation***.

The ***McMurray Formation*** is the most well known of these units. It is a basal deltaic, quartzitic sandstone deposit which unconformably overlies the Devonian Carbonates. The McMurray Formation hosts the Athabasca Tar Sand deposits, centered around the Fort McMurray area, representing the largest accumulation of hydrocarbons in the world. It attains a maximum thickness north of Fort McMurray of approximately 50m and in the area of the Firebag River, it thins slightly and undergoes a facies transition to a more terrestrial sequence of shales and coals. Accumulations of near-economic gas have been known to occur within the Formation, and there is some current exploration for same within the region.

The ***Clearwater Formation*** is a collection of fine grained marine clastic sediments which developed as a result of a transgressive event which saw the end of the development of the McMurray delta. The Wabiskaw member is a transgressive siltstone to sandstone which overlies the McMurray Formation. The Clearwater Formation also contains several shale units which are used as stratigraphic markers, these include in ascending order (above the Wabiskaw member) the Clearwater "A" marker and the "Regional Marine Shale".

The ***Clearwater Formation*** grades laterally and vertically into the ***Grand Rapids Formation*** which represents the contemporaneous development of a prograding barrier bar complex. The Grand Rapids Formation thins to the northwest. The sandstones of the Grand Rapids Formation are easily distinguished from those of the underlying Clearwater Formation due to the usually considerable amount of glauconite and shaley interbeds in the latter.

Colorado Group

The Lower to Middle Cretaceous Colorado Group represents the second major clastic depositional sequence throughout the Alberta Sedimentary basin. In fact, the various formations of the Albian to Santonian Colorado Group represent deposition which extended over much of North America over a period of approximately 25 to 30 million years during a time when sea levels were high and the North American craton was experiencing a regional down warping (Leckie *et al*, 1994). As a result, the

Colorado Group is dominated by marine shales which are occasionally punctuated by coarser sediments deposited during brief high-stands.

The Colorado Group reaches a maximum thickness of approximately 1500m in northwest Alberta and is generally thickest nearer the Cordillera. The erosional edge of the Colorado Group in northeast Alberta is represented by a shale dominated package of strata which reaches a maximum thickness of approximately 450m to 500m in the Birch Mountains (the Colorado Group underlies all of Tintina's Properties in the Birch Mountains). The stratigraphy of the Colorado Group is complicated by several factors; (i) different terminologies are often used in different areas; (ii) the shale dominated sequence can only be sub-divided by micropaleontological work rather than gross lithologic features, and (iii) the sequence is not well exposed and thus not well understood lithologically, particularly in northeast Alberta. The Colorado group of northeast Alberta is best described in terms of the ***Joli Fou, Viking*** **(or** ***Pelican*****),** ***Westgate, Fish Scale, Belle Fourche,*** **and** ***Second White Specks Formations*** (Bloch *et al*, 1993).

The Upper Albian ***Joli Fou Formation*** in northeast Alberta unconformably overlies the Clearwater/Grand Rapids Formations of the Mannville Group and is composed of gray, non calcareous, marine shale with minor fine to medium-grained sandstone. The Joli Fou Formation is not well exposed in the region.

Sandstones of the ***Viking Formation*** overlie the Joli Fou Formation and they are more commonly known as the *Pelican Formation* in northeast Alberta. The Formation represents an eastward thinning wedge of coarse clastic detritus which extends from British Columbia to Saskatchewan. In central Alberta the thickness of the Viking Formation is 15 to 30m and is known to thicken southward to more than 75m. Within the region, the Pelican Formation represents somewhat of a stratigraphic anomaly as exposures of medium to coarse-grained, clean, quartzitic sandstones, and minor interbedded shales and mudstones, of up to 80m were mapped and sampled in the Birch Mountains (Twp 104, R 13 W4M). The uppermost 5-10m of the Formation are known to locally (e.g. Birch Mountains area) carry accumulations of low-pressure gas which are uneconomic.

The remainder of the Colorado Group of northeast Alberta consists almost entirely of shale and mudstone and has been subdivided based upon the presence of two distinctive basin-wide markers, the ***Fish Scales Zone*** and the ***Second White Specks Zone.*** The shales that conformably overlie the sandstones of the Viking Formation, but lie beneath the Fish Scale Zone, belong to the ***Westgate Formation*** which is described primarily from outcrops in the Peace River area, as a laminated to bioturbated mudstone to siltstone with a thickness of approximately 20 to 25m. (Bloch et al, 1993). Above the Westgate Formation are the Fish Scale bearing shales of the ***Shaftesbury Formation,*** which represents the stratigraphic interval between the Fish Scales Zone and the Second White Specks Formation, and comprises the ***Fish Scale Formation,*** near its base, and the overlying ***Belle Fourche Formation.***

The ***Fish Scales Formation*** is generally less than 20m thick and consists of a concentration of fish debris, such as bones, teeth and scales, within shales (and lesser amounts of sandstone) with relatively high total organic Carbon values of 5-10%. The Formation can contain >75% fish debris, but is as yet poorly understood and delineated. This zone may represent either an anoxic event at the Albian-Cenomanian boundary which prevented the normal decay of the bioclastic material or as a transgressive lag deposit. Overlying the Fish Scale Formation is the ***Belle Fourche Formation,*** composed of massive shales and mudstones and characterized by low amounts of total organic Carbon. A distinctive foraminiferal assemblage, and a lack of bioclastic material set it apart from the underlying Fish Scale Zone and the overlying Second White Speckled Shale (Bloch et al, 1993).

The ***Belle Fourche Formation,*** which may be referred to as the *Upper Shaftesbury Formation,* is not well exposed in the region of interest with the exception of numerous slump zones throughout the Birch Mountains area which contain masses of gray shales and mudstones. Although little detailed lithological information could be extracted from mapping/sampling of the slumps, the upper portions

of the Shaftesbury Formation at several localities are characterized by the occurrence of numerous large (0.5 to 2m) rounded, calcareous concretions containing abundant sulfides (predominantly FeS) as disseminations and as nodules. Both the shales and the concretions of the Shaftesbury Formation were found to locally contain abundant pyrite nodules. The nodules range 0.5-5cm and are generally rounded agglomerations of individual crystalline grains.

The ***Second White Speckled Shale*** (or ***Second White Specks Formation***) is another basin-wide subsurface stratigraphic marker based upon high radioactivity within its shales. The Second White Specks is so named for the common occurrence of coccoliths. This unit, and its surrounding shales, commonly form large slumping outcrops toward the top of many of the creeks draining the Birch Mountains. It is characterized by a distinctive coarse grained (occasionally conglomeratic), sub-rounded, chert and quartz sandstone which usually contains abundant fish debris similar to that of the Fish Scale Zone. The cherty bioclastic sandstone, referred to as the Siliciclastic Bone Bed or SBB (thus differentiating it from the Fish Scales bone bed - FSMB), ranges from a few centimeters up to 1.2m in thickness and is normally calcite cemented. Just above the SBB there is usually a thin (approx. 10cm) limestone or carbonate cemented siltstone layer followed by a 5 to 10m interval marked by numerous thin (1to 20cm) bentonites. The shales within this interval are characterized by total organic Carbon contents in excess of 10%. The shales of the Fish Scales-Second White Specks section are also characterized by the occurrence of large (0.5 to 2m) rounded, calcareous concretions.

Two small and badly slumping outcrops of massive gray Colorado or ***La Biche Formation*** shales were observed well above those of the Second White Specks Formation, representing the youngest strata of the Cretaceous Period preserved in the Birch Mountains area of northeast Alberta. However, due to the extremely poor exposure, very little can be concluded about this part of the stratigraphy.

An overview of stratigraphy in the context of mineral occurrences is presented in later chapters of this report.

3.2.3 Structures

While many of the structures extend into Alberta from neighboring Saskatchewan, despite serious efforts of the past decade toward the study of major tectonism in the region, only marginal progress has been made toward definitive resolution of major and localized structures which have been shown to comprise substantive faulting, shearing and arching within the region. The shortfall is principally due to traditional and inherent biases of hydrocarbon exploration toward resolution of sedimentation to the detriment of due attention to active structural elements and faulting. Recent structural modeling in the region from a hydrogeological perspective has, however, offered suggestions regarding principal fluid conduits within the region and further work may enable definition of structural grouping.

Structural elements in the northeast Alberta are represented by a broad variety of regional and localized features, many of which are within the Precambrian but others are confined to the overlying stratigraphic sequence in general, or the Devonian in particular. Highlights are as follows:

- Detailed studies of jointing patterns within the sediments in the area conclude that several of the patterns are conformable with structures within the underlying Precambrian basement, suggesting an as yet unresolved relationship between some of the major structures within the sediments and those within the underlying Precambrian, several readjustments along which have been generally recognized (see Babcock 1975, Babcock and Sheldon 1976).

- The boundary between the Archean Rae Province (approx. 4Ga) and the much younger Talston Magmatic Arc (approx. 2Ga) is the principal tectonic feature in the area, passing through the northeastern portion of the region. This boundary is known to have undergone some readjustments. Other major Precambrian structures in the area comprise a series of north-northwesterly features, currently only viewed as lineaments, two of which are known downdropped faults and have been correlated per measured offsets in deep oil well data.

  In broad terms, at least three different principal orientations of faulting can be recognized in the basement underlying northeast Alberta as follows: (i) northerly trending sinuous shear zones of the TMA (inferred from the aeromagnetic signatures of the area) characterized by mylonites of varying stages of deformation ranging from early, broad, Granulite facies to more brittle, late stage, Green Schist facies. Many of these structures are suspected reactivations of brittle structures; (ii) northeasterly extension of the Peace River Arch passing through the region, broadly through the Birch Mountains area with also possibly a splay trending through the Fort MacKay area, seen in northeast trending offsets in aeromagnetic contours as well as in vertical offsets documented from scant drilling; (iii) northwesterly, potentially fluid bearing, faults inferred from faults observed in the Andrew Lake region of northeastern Alberta wherefrom several late stage (cross-cutting) fault with extensive silicification and hematization of crushed country rock have been documented (Langenberg, 1994).

- Younger structures in the area, apparently restricted to the sedimentary sequence, are dominated by a series of regional northeasterly trending faults, several of which pass through the Fort MacKay area and vicinity. The principal member of this family of faults is a dextral strike-slip fault (Martin and Jamin 1963. See also Figure 7) whose location and trend are based on interpretations from stratigraphic correlation of well data. Other members of the northeasterly group of linear trends are interpreted per broad surficial features and per major offsets in regional aeromagnetic data, and have not as yet been corroborated by stratigraphic correlations, although it is of particular note that all metallic occurrences reported to date from the area are from locations which are at, or in the immediate vicinity of, northeasterly features, particularly where these features cross certain other Precambrian trends or where they intersect the Prairie Evaporite Dissolution front (scarp). Such locations include Tintina's Fort MacKay property and vicinity, and the site of the original discovery of gold in the area (1911), as well as other areas reporting cinnabar, Cu-Ni sulfides or placer gold.

- The limited drilling penetrating the Precambrian suggests that at least some of northeasterly structures noted within the sediments reflect Precambrian features, and that offsets along the structures also include a substantive vertical component defining a complex horst/graben framework. According to this scheme, Fort MacKay is within a major regional northeasterly horst coincident with the Martin Fault, and if the distribution of block movements are resolved per aeromagnetic data Fort MacKay also appears to be at the center of an arcuate trend broadly skirting the Carswel structure, a circular cryptovolcanic or impact crater structure located some 230km to the northeast of Fort MacKay in Saskatchewan, dominating the western portion of the uraniferous Athabasca Sedimentary Basin. It is of note that the Martin fault trends northeasterly into the Carswel structure suggesting a tenuous though speculative causative relationship.

- By far the largest zone of disturbance in the region is the **Peace River Arch**, which is a major regional tectonic zone extending east-northeasterly from the Front Ranges in northeastern British Columbia over some 750 kilometers across north-central Alberta to the Saskatchewan border. It comprises a 140km wide zone of structural disturbances which were active from as early as the Late Paleozoic to the Late Cretaceous, with no readily discernible aeromagnetic or gravity expression although a subtle crustal uplift at the Moho, partially coincident with its axis, is suggested by seismic studies. All inidications are that the Arch is not the result of a discrete Precambrian structure but is rather the end product of the confluence of a variety of complex and episodically active structures. The origin(s) of the Arch are poorly understood and mechanisms suggested as to its development

range from thermal to entirely flexural (non-thermal) hypotheses. It suffices to say that it represents a deeply buried structural feature with a complex tectonic history characterized by periodic reactivation and episodic crustal extension.

The Peace River Arch trends across northeastern Alberta within a wide zone passing to the north of Fort MacKay and underlies the southern parts of the Birch Mountains. Although the sedimentary record in the area suggests that it was an emergent feature during the late Devonian and principally a zone of subsidence during the Cretaceous, work completed by Tintina in the Birch Mountains Area indicate many localized variations suggesting that at least portions of the north flank of the Arch were the locus of considerable uplift during the Early-Late Cretaceous transition coincident also with the development of extinction marker horizons and of abundant bentonites in the area.

The overall genetic significance of the northeasterly regional faulting and that of the Peace River Arch to metallic mineral occurrences within the region is as yet unresolved, but it suffices to say that the Precambrian rocks noted in the limited drilling below some of these areas are often gneissic and sheared, and same have also reported precious metals in association with copper and lead. It is also of note that many locations characterized by the intersection of the NE trends with Precambrian structures are also the very locations considered by others, based on extrapolations from seismic data, to be areas underlain by (potentially mantle plumed) diapiric activity.

Other young structures within the region comprise a variety of localized faulting and jointing patterns reflected in surface (and paleo) topography, some of which as linear trends, and others as circular features attributed to salt dissolution sinkholes. A number of the larger (20km-30km diameter) circular features are also evident in LANDSAT remote sensing imagery for the region although their nature remains unresolved.

3.2.4 Formational Fluids and Brines

A detailed review of Alberta hydrogeology is beyond the scope of this report, but to the extent that regional geological discussions are meaningless in isolation from reference to formational waters and related processes, an overview of principal features are abstracted herein by way of context (see also Sabag 1996a).

The Western Canada Sedimentary Basin contains some 1.75 trillion barrels of crude oil and is one of the most prolific hydrocarbon domains on Earth. Although majority of the exploration within the Basin predates routine efforts to study and identify potential sources, hydrocarbon generation and migration patterns, particularly within the Alberta (sub)Basin, have been well documented during the past decade, and studies conclude that formational gross Basinal fluid flow played an instrumental role in the generation of crude oils as well as in the concentration of the immense Athabasca oil sands deposit. The oil sands, in general terms, are believed to have been concentrated by fluids flowing from the west-southwest which were trapped into local reservoirs, and were subsequently biodegraded and washed by meteoric waters introduced from local flow systems.

Northeast Alberta represents the northeasternmost "feather" edge of the Basin, and accordingly, local topography and physiographic features, particularly within the Athabasca River system, are believed to have a strong influence on most of the gross (Basinal) flow systems. The Prairie Evaporite Formation, occupying a substantial portion

at the middle of the stratigraphy, is probably the most prominent major hydrogeological feature throughout the region, and is a regionally extensive aquiclude which impedes hydraulic communication between "shallow" waters (surface and near surface) and those flowing beneath it trapped above the underlying impermeable Precambrian basement.

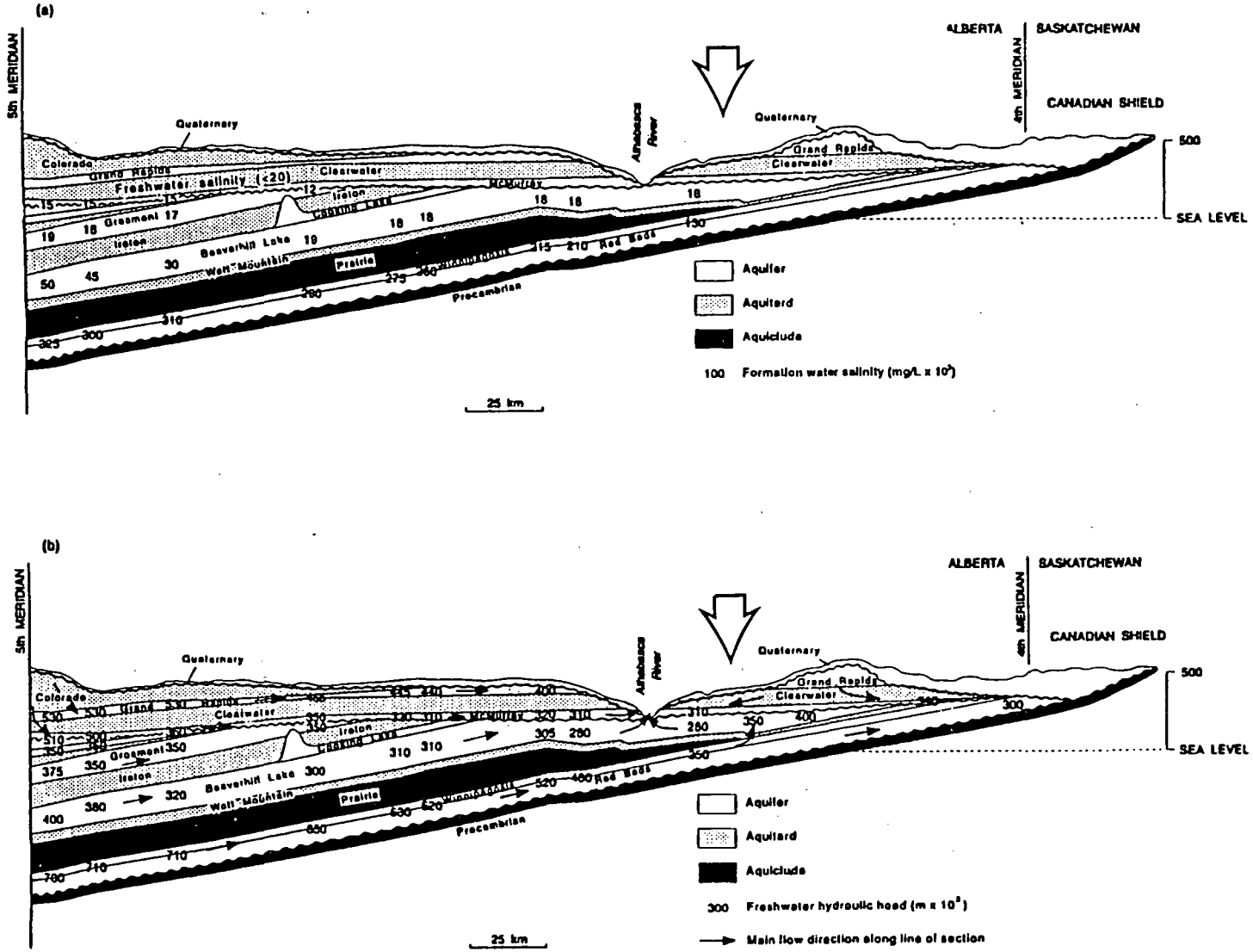
In the above context, post-Prairie Devonian aquifers and pre-Prairie aquifers are recognized, the latter characterized by northeasterly up-dip flows and the former by flows mostly in response to local physiography. It is also of note that, pre- and post-Prairie fluids have markedly different chemistries since pre-Prairie flows at the base of the stratigraphy are saline and flow within, and through, sedimentary sequences dominated by shales and red-bed sequences whereas post-Prairie flows are primarily within carbonates (Figure 11).

Salt dissolution within the Prairie Evaporite and related collapse breccia have been described in a previous section, and it suffices to say that over portions of the region (e.g. in the Fort MacKay area) salt removal from the unit is nearly complete to the east of the Athabasca River, and that the dissolution front (scarp) represents a major break in the aquiclude allowing the mixing of pre-Prairie formational waters with those above the formation, thereby bringing into contact waters of markedly different salinities, acidity, Eh and elemental compositions.

The significance of the above to the complexation, transport and deposition of metals is self evident, as solubility of many of the metals is a function of Eh/pH, and their transport is dependent upon the availability of complexing agents such as halides, bisulfate or other organic species. Transporting complexes are highly dependent on variations in Eh/pH and characteristic complexes gain prominence under different chemical conditions, such that chemical fronts similar to that created by the mixing of markedly different fluids provide formidable loci for the precipitation of the metallic content of the fluids. To that end, the Prairie Evaporite dissolution front, as well as other major structures within same allowing hydraulic communication between pre- and post-Prairie fluids, can be regarded as excellent metallogenic chemical environments.

Although a series of hydrogeological systems, flow regimes and aquifers have been identified and are known to be characterized by distinct chemical and isotopic profiles with many similarities to known ore forming solutions elsewhere, the relationship of northeast Albertan hydrogeology, formational waters, oil-field brines and oil migration patterns to metallic deposits and occurrences have only very recently attracted attention and remains yet poorly understood.

The extent of the role of regional and localized brines, whether prime concentrator or re-distributor of scavenged metals, also remains unresolved, although recent reassessments of the Pine Point Pb-Zn deposits (NWT) within the context of Albertan hydrogeology conclude that they differ in many fundamental aspects from typical Mississippi Valley Type ore deposits and that they should be designated a new deposit type.



HYDROGEOLOGICAL PROFILE

Showing (a) Formational Waters Salinity, and (b) Freshwater Hydraulic Heads (From Bachu and Underschultz 1993).
Position of Fort MacKay Property also shown (large arrow).

Figure 11

3.5 Glacial Overview

Glacial history of the area is complex and poorly understood since systematic reconnaissance mapping of Quaternary geology has only been recently initiated by the Provincial Geological Survey (Fenton et al). In gross terms, however, multiple glacial advances from the east/northeast/north (Laurentide source) and the west (Cordilleran or Rocky Mountain source) have been recognized, as have been also considerable interactions between the two principal glacial directions. Transverse advances in glacial directions in response to localized topography have also been documented and recent work suggests that the Birch Mountains have had a significant affect on local ice directions in the area. Generalized principal ice directions are shown in Figure 12.

Principal ice direction throughout the Birch Mountains Area is southwesterly, although ice flow is believed to have splayed around (and over) the Birch Mountains such that to its south crosscutting composite directions are common, manifested as multiple tills. Considerable work is in progress by the Alberta Geological Survey toward resolution of Quaternary geology.

3.6 Geophysical Overview

Regional aeromagnetics of northeastern Alberta (Figure 13) are characterized by a series of northerly and northwesterly features, offset along several strong and conspicuous northeasterly trends, many of which trends extend well into neighboring Saskatchewan. Aeromagnetics on a sub-regional scale typically also define elongate northerly trends of relatively gentle magnetic relief, albeit locally disrupted by abrupt offsets in magnetic contours, by flexures and dilative features. Many of these features can be correlated with other surficial as well as remote sensing imagery information and are interpreted as the manifestation of reactivated structures deeper within the precambrian, many of which characterized also by lateral offsets of 10-30km. Some of the interpreted structures have been corroborated by exploration work on a localized scale by mapping, drilling and by surface geochemistry (e.g. Tintina's Fort MacKay and Firebag Properties), and noted to be associated also by considerable vertical movement ranging 50-100m.

Several preliminary reviews of digital regional aeromagnetic data were undertaken by Tintina during its 1994-1995 regional exploration activities to better resolve discontinuities and lineaments (faulting), relying on first and second derivative manipulations of the available regional data. The best resolved linear trends were observed in contoured aeromagnetic second derivates all of which support structures interpreted for the region from the simple data. A review by others of the aeromagnetic data in horizontal vector gradient form has also proven successful in identifying a series of circular and radiating patterns which in most instances correlate well with circular anomalies seen in LANDSAT remote sensing imagery from the region. Provenance for these features has not as yet been established.

Gravity Bouguer Anomalies in the region define many trends corroborated by supporting aeromagnetics, and in general also depict Bouguer configurations compatible with horst-graben subsurface geometry suggesting block movements, especially in the general vicinity of, and to the north of, Fort McMurray.

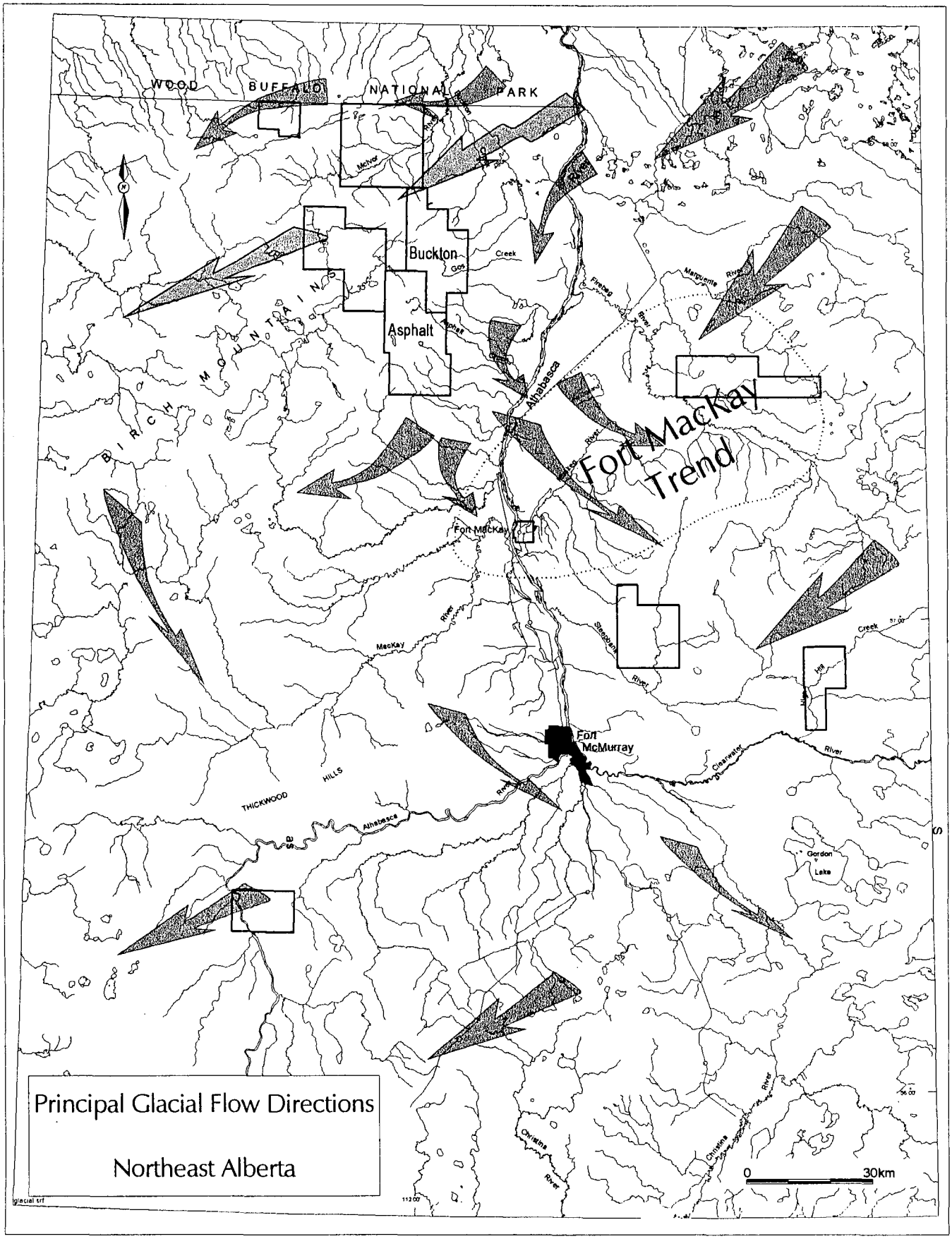


Figure 12. Principal glacial flow directions and Fort MacKay Diamond Indicator Mineral Anomaly Trend. Northeast Alberta (after Dufresne et al 1994b). Showing also Tintina Properties in the region.

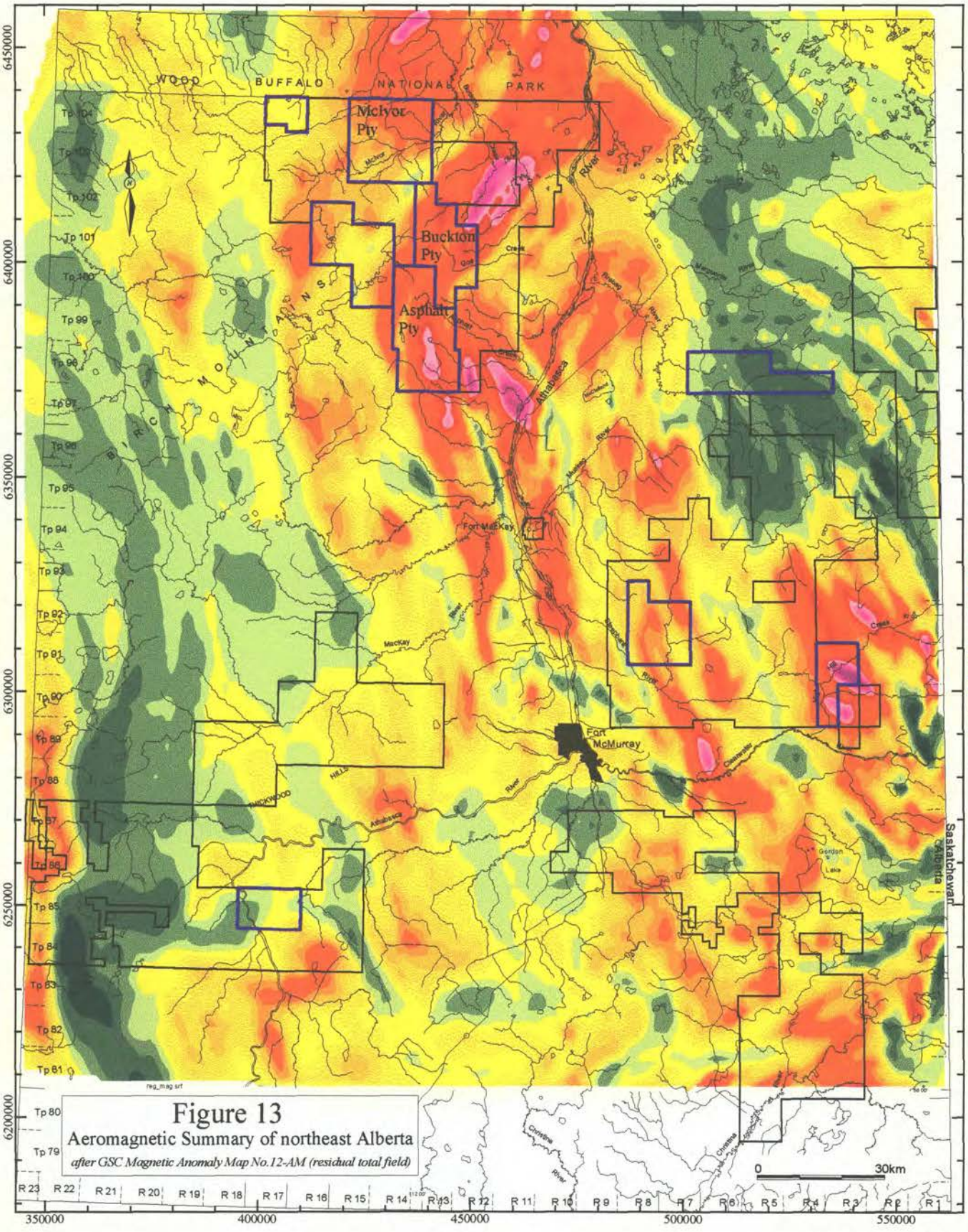


Figure 13

Aeromagnetic Summary of northeast Alberta

after GSC Magnetic Anomaly Map No.12-AM (residual total field)

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3.7 Stratigraphic Highlights and Regional Economic Potential

Northeastern Alberta is better known for its oil production and treatment facilities than for its mineral potential. Although oil sands have previously also yielded Vanadium and their co-product metallic mineral wealth recently attracted serious interest, assessment of the metallic mineral potential of the region is in its embryonic stages. Studies by industry and government geoscientists over the past five years indicate that northeast Alberta presents a variety of formidable physico-chemical environments conducive to the concentration of metals either transported into the area by basinal fluids (±mixed?) or flowing into the region through active structures from the precambrian basement below or hosted within Cretaceous strata associated with volcanogenic activity (venting).

The only compilation of mineral occurrences for Alberta is that by Olson et al 1994 which identified in excess of 600 occurrences of minerals, as well as geological, geochemical and geophysical anomalies, comprising a diverse suite of metals and minerals including precious metals, uranium, iron and kimberlite/diamond diatremes. Augmented by considerable exploration work over the past six years, a broad variety of precious as well as base metal occurrences have been to date been identified some of which are also associated with sulfide mineralization. Highlights include (i) carbonate hosted native Au+Ag+Cu±Pd in the Fort MacKay area; (ii) gold occurrences associated with bituminous coals in the Firebag River area; (iii) native Au in association with sulfide mineralization within Ni±Cu±Zn±V enriched carbonaceous Cretaceous shales in the Birch Mountains area; and (iv) tar-sand hosted co-product metals. Kimberlite indicator minerals have also been reported from reconnaissance till surveys in the region (e.g. Fort MacKay Trend), as have similar minerals reported also by industry from the various portions of the region.

Of particular significance to all of the above metallic mineral occurrences identified to date within the region is their close association with faults, fault junctions and circular structures and their broad classification into three fundamental styles of metallic accumulation, (i) immense tabular metal accumulation zones within sulfidic Cretaceous black shales overlying suspected hot-springs or volcanogenic venting, (ii) zones of metal deposition within fault breccias in Devonian carbonates; and (iii) redox controlled metals aggregations at stratigraphic and structurally controlled redox fronts. In addition, work by Tintina within the Cretaceous also suggests an as yet ill-defined volcanogenic component to some of the mineral occurrences discovered within sections of stratigraphy straddling the Albian-Cenomanian boundary, all of which associated with suspected venting or hot-springs activity.

A reassessment of the stratigraphic column, therefore, from the perspective of mineral and metallic occurrences is germane and same is summarized in Figure 9 (earlier in this chapter) showing also highlights which present several prospective physico-chemical settings highly conducive to the accumulation of metals. These are as follows:

1. Localized Early Devonian Red Bed sequences in the region serve to identify localities within which oxidizing fluids have been active. In the Fort MacKay area, the presence or absence of metallic minerals in carbonates overlying the oxidized shales can be correlated directly with the presence or absence of basal red beds. A Precambrian source to the oxidizing fluids is a distinct possibility;

2. The association of the Pine Point Zn-Pb deposits with the Keg River Formation is well documented, and sphalerite mineralization within same has been documented from Keg River carbonates in the region (Turner and McPhee 1994);
3. The significance of the Prairie salt dissolution front as a principal regional hydrological feature cannot be overstated. The front represents a breach in a major aquiclude enabling the infusion into the region of considerable metal budget carried by pre-Prairie oxidizing formational fluids;
4. The Beaver River Sandstone (BRSS) at the base of the McMurray Formation, immediately above the sub-Cretaceous unconformity represents a lithological and a stratigraphic anomaly, known to locally carry gold and other metals in the Fort MacKay area. BRSS has also been identified by Tintina in oil well drill core from locations characterized by stratigraphic disturbances and karsting underlying surface geochemical anomalies in Birch Mountains. As at the date hereof the BRSS can be regarded as a likely indicator of hot springs activity;
5. The base of tar-sands deposits represent formidable redox interfaces in the region;
6. Diamondiferous kimberlites, diatremes, vent facies and volcaniclastics have been identified in neighboring Saskatchewan, west central Alberta and to the western parts of the Birch Mountains in successions which are time equivalents to, or slightly younger than, the Upper Shaftesbury Formation and the Second White Specks Formation both of which mark basinwide marine extinction events. In addition, the association of the Albian-Cenomanian transition with bentonites suggests an as yet unrecognized and under-appreciated volcanic component to regional geology;
7. In addition to all of the above, proximity of the area to the Uraniferous Athabasca Basin also warrants reference, especially since the Albertan extremity of the Basin is metal enriched (Ni,Cr,As) and may well be hydrogeologically connected to the northeast Alberta geological setting via large grabens as suggested by Bouguer gravity anomalies. Many of the Uranium deposits of the Athabasca Basin are the manifestations of unconformity related phenomena, and are also associated with the accumulation of metals along with the Uranium minerals and salts.

In closing, sufficient information is currently available to demonstrate that the region presents numerous geotectonic and chemical settings which are highly favorable for the concentration of metallic minerals, especially in the framework of known ore forming processes associated with volcanism and basinal brinal activity.

3.8 Previous Regional Work and Current Work by Others

The reader is referred to Olson et al 1994, Fenton et al 1993-1994, Dufresne et al 1994b, Sabag 1996a and 1998 for a detailed and broad review of mineral occurrences in the region. In addition, considerable data, representing assessment reports filed by several groups who have been actively exploring within the region, are in public domain, as are results from other work by the Provincial and Federal surveys (publication of some key studies is pending).

Many occurrences of precious and metals have been reported during the past decade from many different sections of the stratigraphy by numerous groups from industry as well as from the Provincial and Federal Geological Surveys. Highlights are as follows:

- References to metallic sulfosalts and energite-tennantite in carbonates from the Clearwater-High Hill Rivers area are common, as are reports and studies documenting a broad variety of native as well as native metal alloys hosted within Devonian carbonates in the vicinity of Fort MacKay (see Sabag 1995, Sabag 1996, Feng & Abercrombie 1994, Ballantyne et al 1995). Precious metals reported from the Fort MacKay area and vicinity, are hosted within Devonian carbonates, particularly nearer the Devonian-Cretaceous unconformity. Considerable work was directed during the mid 1990's toward investigation of grade, form and metallogeny of these occurrences by Tintina Mines, Birch Mountain Resources, Focal Resources, Lac Minerals, the Geological Survey of Canada and the Alberta Geological Survey. Although successful in confirming the existence of gold, PGEs, copper and zinc within the Devonian carbonates, much of this work has been frustrated by analytical difficulties

manifested in poor data reproducibility. The unusual forms of metals occurrences in association with predominantly native alloys, brines and bitumens has also met with much controversy within the mineral industry. As at the date hereof, Birch Mountain Resources is the only group which is actively pursuing research and testing toward resolution of analytical difficulties associated with these rocks;

- The sporadic occurrence of very low grade precious metals (gold, platinum) within the tar-sands have from time to time attracted attention, although none has been produced and provenance for the metals has not been established. The co-product metal content of the tar-sands has also attracted ongoing attention throughout the history of the area and several studies, published during the past three years by the AGS or the Oil Sands Task Force, suggest potential for economic extraction;
- There is poorly documented "hobby" placer mining within the region. Alluvial gold has been discovered in several of the drainages in the Birch Mountains Area, in the High Hill River drainage and in the North Steepbank River. Alluvial gold occurrences along the Athabasca River have also been studied and their compositional and morphological characteristics documented (Giusti 1986, Ballantyne et al 1995). All indications are that at least some of the alluvial gold is locally derived from Cretaceous shales. Widespread, though apparently low grade, placer gold was also discovered within large portions of the McIvor River valley in the Birch Mountains (Tintina Mines, Sabag 1995, 1996c);
- A review of hydrochemical information from previously drilled ERCB water-well test sites indicates that groundwaters and well waters throughout certain localities within the region overlying major faulting (e.g. Kearl Lake area) are highly anomalous in gold (upward to 0.6ppb) as well as other associated metals (notably Cu and Zn);
- Abundant sulfides, dominated by various species of pyrite/marcassite, were discovered by Tintina within Cretaceous carbonaceous shales across the region in association with extinction marker beds at the Lower-Upper Cretaceous transition. Gold was also recovered from samples of the Second White Specks Formation and from alluvial material recharged from same throughout several drainages in the Birch Mountains and Thickwood Hills Areas (Sabag 1998, 1996a,b,c);
- Interest in the region was rekindled during 1997 by the discovery of diamondiferous kimberlites from north-central Alberta by Ashton Mining Canada, and more recently (1998) from the western Birch Mountains by Kennecott Exploration Canada. Despite a staking rush, the excitement has of recent abated due to generally disappointing grades reported from bulk sampling tests. Other diamond exploration programs which marginally reached fruition include joint efforts by Lytton Minerals and Birch Mountain Resources throughout the Firebag River area, and other more isolated campaign by smaller group throughout the western Birch Mountains. Heavy mineral assemblages indicative of existence of kimberlitic pipes have also been documented from several drainages in the Birch Mountains by Tintina (Sabag 1998) and by others;

General baseline geoscientific data for the region consist of a variety of studies by industry (filed toward assessment work) which are augmented by thematic and more localized work by the AGS. These are as follows:

- Several multimedia regional exploration programs completed by Tintina during 1994-1995, comprising lake sediment and stream sediment geochemical sampling, stream sediment heavy mineral concentrate sampling, as well as reconnaissance lithogeochemical sampling. Tintina regional programs are shown in Figure 14 (See also Sabag 1996a). Many findings from these programs were investigated in considerable detail throughout the Birch Mountains Area (Sabag 1998);
- Sampling and study of tills by the AGS in northeastern Alberta identified several localities characterized by the presence of favourable diamond indicator minerals. These localities collectively comprise the Fort MacKay Diamond Indicator Mineral Trend located to the north of Fort MacKay downslope from the Birch Mountains (Figures 12 and 8);
- Considerable modeling of structural geology by Birch Mountain Resources focusing on resolution of major hydrological conduits within the Devonian and underlying Precambrian;

- Airborne geophysical surveys and subsequent drilling by Lytton Minerals on Properties held by Birch Mountain Resources throughout the Firebag River area. Work by the AGS in the Firebag-Marguerite Rivers area also provides good baseline information of that portion of the region;
- By far the most significant thematic study in progress is the MDA-funded study initiated by members of the Alberta and Canadian Geological Surveys to investigate the Shaftesbury and surrounding Formations in west-central and northeastern Alberta. (final report due in 1999. Preliminary results made public at Calgary MEG Forums 1994, 1995, Dufresne et al, Shaftesbury Project). The study was initiated in response to the discovery by Tintina of precious and base metal mineralization in association with abundant sulfides within carbonaceous Cretaceous shales at the Lower-Upper Cretaceous transition across the region.

Other previous work of passing interest within the region are (i) 1995 deep drilling by Archean Corporation investigating the potential of certain deep basement structures for hosting hydrocarbons at depths upward to 15,000 feet below surface; (ii) exploration and failed pre-production work carried out by Solvex Corporation during the mid-1990's at its Bitumont property to produce oil from tar sands along with co-product Aluminum and Gold; (iii) the search for Sulfur in Cretaceous sequences in the Birch Mountains; (iv) limited exploration of Devonian carbonates nearer the tar-sands deposits in the search for supplies of industrial lime to oil sands producers; (v) sporadic and localized campaigns in the northeastern portion focusing on Uranium, and (vi) recent broad efforts focusing on evaluation of co-product metal content of oil sands.

In closing, many occurrences of precious metals have been reported throughout the past decade from many different sections of the stratigraphy by numerous independent groups who have explored the general area. As at the date hereof, however, the majority of the reports represent fragmented documentation of isolated localized exploration campaigns lacking a regional geoscientific framework and context. These reports, when consolidated by the provincial Survey over the next few years will eventually represent the first comprehensive compendium for the region.

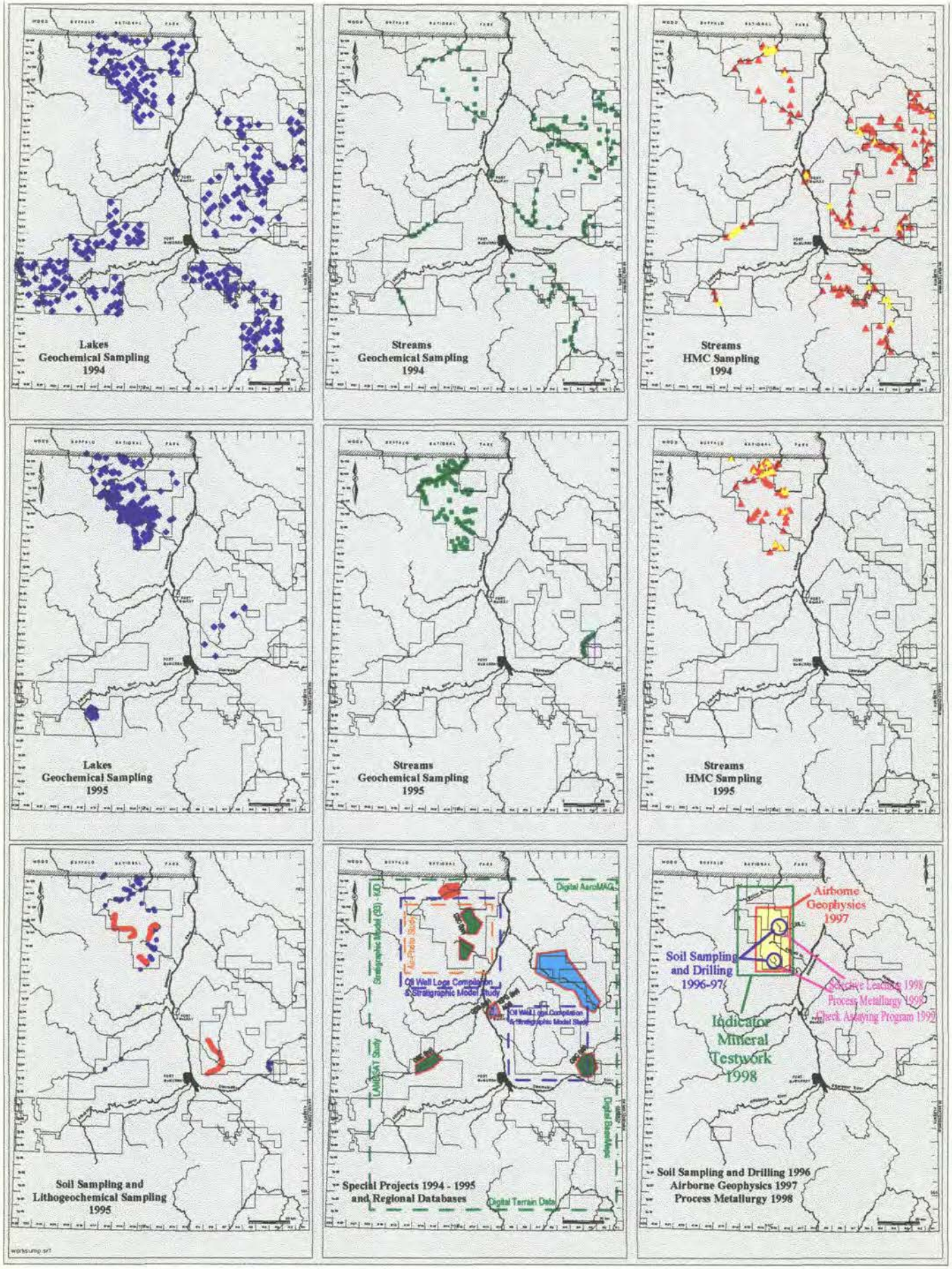


Figure 14. Summary of Tintina northeast Alberta exploration Programs 1994-1997. Property outlines shown are as assembled 1993.

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4.GEOLOGY - BIRCH MOUNTAINS AREA

4.1 General Stratigraphy

Bedrock exposures throughout the Birch Mountains Area are minimal (<2%), and are restricted to creek/river valleys which define incisions confined to the erosional edge of the Birch Mountains, forming a narrow 5-10km arcuate band. Despite their scarcity, however, the available exposures throughout the area enable intermittent observation and sampling across 1000ft of Cretaceous stratigraphy, extending upward from the top of the Manville to well into the Colorado Group, straddling the Albian-Cenomanian boundary. The area provides exposures of five Formations: the Clearwater/Grand Rapids Formation, the Viking/Pelican Formation, the Westgate Formation, the Fish Scales Formation, and the Second White Specks Formation.

The Cretaceous stratigraphy predominating near-surface geology in the area is characterized principally by poorly consolidated recessive sequences, sparse exposures of which are predominantly along river cuts or along scarps which are almost always covered by considerable slumped material or mud-flows. The Cretaceous strata are dominated by unconsolidated shales and mudstones, all of which highly susceptible to landslides and slumping and are in various stages of active mass wasting. Slumpage is, in many cases, sufficiently advanced to introduce acute uncertainties to the definitive determination of stratigraphic position of often similar looking shaley units.

Descriptive geology for the area is somewhat general and is based on field mapping completed by Tintina during 1994-1996 field programs, supported by a subsurface stratigraphic modeling study completed in 1995 relying on oil well stratigraphic picks (see Sabag 1996a, 1998). The subsurface database, though based on sparse well density, has proven useful in enabling gross correlations across the Birch Mountains.

The reader is referred to Sabag 1996a and 1996b for detailed descriptive field geology for the Birch Mountains Area. A review of the five Formations mapped and sampled to date are described below in the context of collective mapping of all of the properties explored by Tintina in the Birch Mountains extending from the Asphalt Property in the south, through the Buckton Property, to the McIvor Property to the north located along the southern boundary of Wood Buffalo Park:

The Clearwater/Grand Rapids Formation can be observed throughout the Birch Mountains area in exposures at the lowest elevations (e.g. KRC-A exposure, to the north of the McIvor River on KRC Tributary, the McIvor-A exposure and the South Tributary). It is generally characterized by thinly interbedded, dirty glauconitic sandstones, silty shales and mudstones with occasional interbedded channel sandstones which range in thickness from 5-50cm and are massive in appearance with occasional cross bedding and contain lags of very coarse grained sand with coal, occasional bivalve coquina, and locally abundant ammonites (e.g.McIvor-A). The interbedded sandstones and shales are locally cut by channel-filled sands which are often carbonate cemented and appear as prominent iron stained pods between 10-50cm in thickness and 1-5m in width. Minor disseminated pyrite has been observed in samples from this unit.

The Viking/Pelican Formation characterized by sections of a clean, unconsolidated, medium to coarse grained, well rounded, massive, quartzitic sandstones with minor interbedded shales. The predominance of quartz and its massive appearance are distinctive features which differentiate this

Formation from the glauconitic sands of the underlying Clearwater Formation. The contact between the Pelican Formation and the overlying shales of the Westgate Formation is characterized by a thin zone of interbedded quartzite and mudstone with abundant iron staining which is progressively more pervasive nearer the contact. Minor silicification was locally also observed, accompanied by considerable iron staining and massive manganese ("manganese wad" development).

The most interesting discovery made to date within the Pelican Formation is its abnormal thickness to the north of the McIvor River where a measurement in excess of 70m was made at the Greystone-A exposure. Elsewhere in the region, from both outcrop and subsurface geophysical measurements, the Formation has a relatively consistent thickness varying 40-45m. The abnormal thickening is provisionally attributed to infilling of an isolated feature developing as the result of Karsting in the underlying Devonian strata or as the result of the down-dropping of a fault block.

The Westgate Formation in the area is represented by a handful of poor exposures of badly slumping shales and mudstones which apparently overly the Pelican Formation and which are devoid of fish debris and can hence be assumed to underlie the Fish Scales (or Shaftesbury) Formation. The Westgate Formation has been characterized by Leckie et al (1993) as a laminated-to-bioturbated, heterolithic mudstone to siltstone that typically contains less than 2% organic Carbon and underlies the Fish Scales Zone (or Formation). Westgate mudstones are frequently iron and sulfur stained, and yellowish sulfates (jarosites?) can locally be observed near its base.

The Fish Scales (or Shaftesbury) Formation is normally characterized as a fish scale bearing mudstone or claystone, with minor associated sandstones and conglomerates, with up to 8% organic Carbon (Bloch et al 1993). The Formation is defined as the stratigraphic interval from the base of the Fish Scale Zone to the base of the Second White Specks Zone and is also referred to as the Shaftesbury Formation, which includes the Fish Scale and Belle Fourche Formations.

The Fish Scale Zone is marked by the sudden appearance of fish scales and other skeletal debris in an otherwise massive unit of silty shales and mudstones, hence representing a conspicuous marker bed (FSMB). The FSMB, described in sections from the Peace River area as a coarse grained sandstone with large concentrations of fish debris surrounded by organic Carbon-rich shales, is noticeably absent in the Birch Mountains where it is proxied for by fish scales bearing black shales.

Lithogeochemistry of the FSMB, to the extent represented by the scant surface sampling collected throughout the Birch Mountains area, show it to be a potential trap of metals with an apparent correlation between the better metal contents with the higher C-org content of samples. While the samples indicate that the Formation is enriched in metals relative to underlying units, U and Th concentrations are surprisingly low (averaging only 10.2ppm and 9.9ppm, respectively, Sabag 1996a, 1996b) and insufficient to produce the typical radioactive anomaly characterizing the FSMB picks in oil well down-hole geophysical logs. It is likely, therefore, that the FSMB as "picked" from well logs is not fully exposed in the Birch Mountains area.

Of particular significance is the presence throughout select localities in the Birch Mountains area of spherical and quasi-spherical carbonate concretions ranging in size upward to 2m diameter spatially associated with the FSMB. The concretions consist predominantly of black calcite and carry considerable sulfide mineralogy as disseminations of predominantly FeS and as pyrite nodules ranging in size upward to 5cm. The nodules consist of aggregations of crystalline grains.

The Second White Specks Formation as described from outcrops in the Peace River area of northwest Alberta (Bloch et al 1993) and from sub-surface data from around the Alberta Basin is a calcareous shale or siltstone in organic carbon rich shales commonly associated with a bentonite up to 20cm thick, in turn associated with a carbonate concretionary layer. With the possible exception of an abundance of carbonate matrix, the Second White Specks Formation was identified at many exposures throughout the Birch Mountains area, and it is relatively well exposed in the creeks and rivers. The Formation is available to mapping and sampling at exposures between the 600m and 650m elevations (asl) along Mid, Asphalt, Gos, Greystone, and Current Creeks.

Exposures located toward the headwaters of Asphalt Creek, represent a typical section of the Second White Specks Formation in the area, consisting of a succession of lithologies commencing at the bottom with a Siliciclastic Bone Bed (SBB) characterized by a coarse grained, sub-rounded, poorly sorted, carbonate cemented, black chert and glassy quartz sandstone, which often contains large concentrations of fish debris. A thin, 10cm-20cm thick, carbonate concretionary unit overlies the SBB (normally within ±1m), and is itself overlain by bentonite or a zone of bentonitic shale.

Whereas the SBB in the area typically varies in thickness 10cm-20cm, it attains a thickness exceeding 1m at the headwaters of the Gos Creek (Gos-C exposure) at the Buckton Property, wherein it is also associated with metals enrichment in surrounding shales (Gos-C is at the eastern flank of a principal stratigraphic disturbance in the area). It is of note that SBB has been documented in the area from several elevations varying 600m-640m (asl), and the variations are probably the result of multiple slumping. Repetitive sedimentary/extinction events cannot, however, be entirely ruled out.

The Second White Specks Formation has to date reported by far the most anomalous concentrations of base as well as precious metals in the Birch Mountains, in addition to yielding native gold grains from certain localities (e.g.GOS1 gossan, Gos Creek-C and Current Creek). Geochemical anomalies identified from the Formation define relatively systematic base metal enrichment zones, dominated by Ni/Cu/Mo/V/Zn (±Co/Cd/Ag/Au), spatially associated vertically with the more carbonaceous sections immediately overlying the SBB, and a suggested lateral association with proximity to certain faults in the Birch Mountains area. Intraformational geochemical inhomogeneities notwithstanding, Asphalt-H, GOS1 and Gos-C present by far the best metal enrichment localities documented from the Second White Specks Formation in the area. The former two localities were tested by drilling during the 1996-97 winter drilling programs (Sabag 1998).

A number of stratigraphic anomalies were identified in the Birch Mountains by surface mapping coupled with a subsurface stratigraphic data compilation and modeling (Sabag 1996a, 1998). These fall broadly into three categories as follows:

1. isopach anomalies representing abnormal thickening of the Cretaceous stratigraphic pile or uppermost portions thereof, only locally associated with karsting in the Devonian, but more often associated with interpreted readjustments in Precambrian faulting and suspected arching active well into the mid-Cretaceous. These anomalies would are compatible with existence of very localized venting by way of hot springs, volcanic vents or pipes;
2. linear, predominantly northeasterly, trends reflected as sharp lateral discontinuities in structural contours of lower as well as middle Cretaceous picks, interpreted to represent rotational faulting with possible considerable strike-slip component;
3. localized closures in structural contours particularly in the top of the Devonian, all of which interpreted to represent advanced karsting.

Many of the fault zones interpreted from the above work at the Asphalt and Buckton Properties underlie localities of considerable metal diffusion (Zn/Ni/Cu±V±Te±Pd) as shown by subsequent detailed outcrop and soil sampling (Sabag 1998).

4.2 Surface Geochemical and Mineral Anomalies

By far the strongest and most consistent surface geochemical anomalies (lakes and streams) documented in the region are from the Birch Mountains. These anomalies are characterized by elevated concentrations in most of the base and precious metals (notably Ni,Co,V,Cr,Cu,Zn,Au,Ag) generally defining trends associated with a number of structures, and locally from lakes with extreme natural acidity (pH 3-4) believed to be due to abundant sulfides therein. (Sabag 1996a, Appendix C).

In contrast to lake geochemistry, stream geochemistry and mineralogy have provided an excellent prospecting tool due to the continual recharge of streams by fresh sediments from active slumps. The streams, accordingly, almost always directly reflect lithogeochemistry and mineral make-up exposed upstream, and nearly all stream geochemical anomalies in the area are downstream from exposures of the Second White Specks and the Shaftesbury Formations which are exposed within a range of elevations varying 520m-650m asl.

By far the most consistently anomalous waterways in the Birch Mountains Area are the Pierre River, Mid Creek and Asphalt Creek characterized by coincident multimetal anomalies in addition to alluvial gold. Heavy mineralogy at these localities has also proven to be highly anomalous even in the context of the Birch Mountains returning a broad variety of base metal sulfides from alluvial heavy mineral concentrates (HMC) in addition to cinnabar and gold. It is of note that Pierre and Tar Rivers, and Mid Creek broadly radiate from an area at the headwaters of Pierre River which is also characterized by strong geochemical Zn/Cu/Ni diffusion anomalies in soils all of which are also coincident with a near-circular area of high magnetic expression. The anomalies are collectively compatible with the existence of venting "centers" or pipes in the area, especially throughout the southern portion of the Asphalt Property.

While the majority of stream geochemical anomalies in the area tend to be polymetallic, anomalies in Gos Creek at the Buckton Property are characterized mainly by elevated Ni traced to Ni-enriched exposures of Cretaceous shales upstream which also carry native gold. Native gold grains have also been recovered from Gos Creek.

Unlike the above watersheds wherein there is good agreement between alluvial mineral make-up and geochemistry, anomalies throughout the broader McIvor River are less well defined and are seasonally variable due mainly to continuous recharge of the river by fresh material throughout the field season and the constantly shifting course of the active river channel in response to sediment loading. In particular, despite the widespread presence of abundant alluvial gold throughout significant sections of the McIvor river, geochemical anomalies in gold are few and highly nuggetted due mainly to grain size of much of the gold grains exceeding the <80 mesh size fraction analyzed during geochemical surveys.

Of as yet uncertain significance in the area are isolated Cr anomalies in lakes and streams, locally also associated with elevated Na contents, Au and other metals. Of these, a domain of anomalous Cr/Na/Au in lakes in the Current Creek area is most conspicuous and can be attributed to exposures of the Second White Specks Formation which also carry native gold in addition to elevated Ni/Cu/Zn/V. Native gold has also been documented from Current Creek. Elevated Cr in the Asphalt Creek - Pierre River areas is also of note by virtue of its association with coincident Cu/Zn/Ni/Ag as well as with native Au and cinnabar (see Sabag 1996a, Appendix C). Cr in lakes and streams in the Birch Mountains area can be broadly attributed to chromite documented in Cretaceous shales at certain locations in the area notably from the GOS1 gossan and Asphalt and Pierre Creeks area.

4.3 LITHOGEOCHEMISTRY

Despite the many current uncertainties as to stratigraphy and structures throughout the Birch Mountains, sufficient information has been documented from work conducted in the area during the past several years to indicate that it presents a highly suitable environment for the accumulation of metals. An overview of known trends for the area are as follows:

1. metals enrichment zones in the area are predominantly within shales of the Second White Specks (and possibly also the Shaftesbury) Formation, associated vertically with marine extinction markers and laterally with certain structural disturbances (fault zones or doming). Metal enrichment zones are characterized mainly by Ni/Cu/Zn/V/Ag accompanied by Au, although two types of metal groupings are suggested by analytical data, namely; Ni-Co-Zn±(Cu,Cd) and V-Ag±Cu.
2. preliminary data from the MDA-funded joint AGS/GSC Shaftesbury Project (report in progress) indicates that shales in the Birch Mountains area are enriched in metals relative to same elsewhere within the Western Canada Sedimentary Basin (data released in poster sessions at the GSC Forum, 1996, Ottawa; and at the MEG Forum, 1996);
3. the Shaftesbury and Second White Specks Formations, straddling the Albian-Cenomanian transition may have affinities to resedimented kimberlitic material;
4. the possible association of metals enrichment zones throughout the Birch Mountains with interpreted hot springs activity and marine extinction markers are compatible with anticipations of submarine venting or exhalative activity;

The association of metal enrichment with carbonaceous shales immediately overlying marine extinction markers ("kill zones") provides a basic mineral cycle for the area suggestive of either (i) a close association between metals infusion and basinwide (or local ?) extinction events; or (ii) a close association between metal enrichment zones with permeability contrasts presented by the extinction markers, especially the siliciclastic bone bed (SBB) of the Second White Specks Formation.

Bulk chemistry from the area indicate good overall correlation among most of the metals, all of which are characterized also by a bimodal distribution in respect of Al content with the exception of Cr. By far the strongest correlation suites are Ni-Co-Zn±(Cu,Cd) and V-Ag±Cu. Correlations of the majority of metals with C-org are also generally good albeit often with some scatter, especially for shale samples (see Sabag 1998). While at first glance suggestive of an organometallic form to at least some of the metallic elements, otherwise is suggested by the presence within the shales of considerable Fe-sulfides as disseminations and as fine lamellae all of which are also carriers of other base metals (notably Ni and Cu per preliminary microinvestigative work). Preliminary mineralogical work (includes limited scanning electron microscopy of a handful of shale samples) completed to date indicates: (i) the presence of Ni in elemental form in the shales as adsorptions on FeS; (ii) the common presence of chromite, and(iii) the presence of Au as native gold grains. The form of analytically documented Zn, V and Ag are as yet to be determined.

While work to date provides only a preliminary glimpse into the nature of mineralization in the Birch Mountains Area it serves, nonetheless, to confirm the presence of conditions highly conducive to the accumulation of metals and indicates a substantive metallic budget mobile in the area associated with as yet unclarified suspected venting activity. It

is relatively obvious that metal accumulations in the Cretaceous of the Birch Mountains area can be expected to be of tabular geometry, characterized by relatively restricted thicknesses (100m-200m) but with vast lateral dimensions potentially ranging upward to 100km^2, occupying the near-surface sections of the stratigraphy dominated by Second White Specks and Shaftesbury shales. The proposed metal deposit configuration presents a natural working model for the area for exploration purposes.

Analogues to the above would include numerous large metallic accumulations in carbonaceous shale domains elsewhere in the world, many of which share considerable commonalities as to (i) a tectonic setting generally proximal to, or overlying, dilative zones; (ii) the association of the metallic mineralogy with exotic and often metastable native metal alloyed species; (iii) the intimate association with bitumens; (iv) the intimate genetic association with basinal brines as well as localized multi-brine mixing; (v) association with phosphates. While a review of world literature is well beyond the scope of this report, the reader is referred to Pasava 1993, Fan Delian et al 1992, Nathan et al 1996, and Hulbert et al 1992, to name a few, which collectively offer considerable geological guidelines to similar metal enrichment domains.

4.4 Geology - Asphalt and Buckton Properties

4.4.1 Previous Work

As with elsewhere throughout the Birch Mountains, bedrock exposures around the Asphalt and Buckton Properties are very poor, comprising a handful of exposures confined to creek and river valleys which generally trend northeasterly and incise the edge of the Birch Mountains.

The Properties and their vicinities were explored in the course of numerous regional multimedia reconnaissance and follow-up sampling programs completed during the period 1994-1995. Based on these programs, a number of localities were identified at the two Properties characterized by multiple coincident, or spatially proximal, surface geochemical, mineral, stratigraphic, lithogeochemical and geophysical anomalies. The anomalous localities identified are typically characterized by geochemical anomalies in overlying and nearby lakes, by geochemical and mineral stream sediment anomalies downstream, and by overlying soil geochemical anomalies. The majority of these localities overlie or are associated with faults or fault zones, with zones of stratigraphic disruption or thickening, and with occasional magnetic anomalies (closed and linear), and many are also located near, or overlie, a topographic "high". Lithogeochemical anomalies and interpreted metal enrichment trends at, and in the vicinity of, the anomalous localities define enrichment vectors suggestive of an intimate association between structural disruptions and metals enrichment in the area.

Some of the above localities, believed to be buried metallic mineralization within the Second White Specks Formation, were selected for further testing, comprising the 1996-1997 exploration programs entailing detailed soil sampling followed by diamond drilling. A high resolution airborne magnetic survey was also completed during 1996 to better define certain prospective structures and suspected volcanic centers associated with the previously discovered metal enriched shale horizons.

Information currently on hand from the Asphalt and Buckton Properties represents data documented from regional reconnaissance programs augmented by site-specific and follow-up work, collectively comprising the following: (i) LANDSAT remote sensing imagery analysis (1994); (ii) Airphoto imagery analysis (1995); (iii) Lake sediment/water geochemical sampling (1994); (iv) Stream sediment geochemical sampling (1994); (v) Stream sediment heavy mineral concentrate sampling (1994), and follow-up heavy mineral concentration testwork (1994-1995); (vi) Lake Sediment/Water geochemical infill sampling (1995); (vii) Stream sediment geochemical infill sampling (1995); (viii) Stream sediment infill heavy mineral concentrate sampling (1995); (ix) Lithogeochemical reconnaissance sampling (1994) and follow-up heavy mineral concentration; (x) Lithogeochemical reconnaissance sampling (1995); (xi) Stratigraphic compilation and modeling (1995); (xii) Soil geochemical sampling (1995); (xiii) Detailed follow-up soil sampling (1996); (xiv) Diamond Drilling (1996-1997); (xv) Aeromagnetic Survey (1996). Work being reported upon herein comprise considerable extractive and metallurgical testwork (1997-1999), indicator mineral testwork (1997-1998). and extensive check assaying (1999).

Details of the 1994-1995 and the 1996-1997 work programs were previously filed as assessment reports (Sabag 1996a , Sabag 1996b and Sabag 1998). Previous sampling at the two Properties is summarized in Figure 15. An overview is presented herein.

4.4.2 Buckton Property

Exposures on the Buckton Property comprise sections of the Cretaceous Colorado Group exposed as partly slumped zones of the Viking Formation, the Shaftesbury Formation (which includes the Westgate and Fish Scales Formations), the Second White Specks Formation, and the La Biche Formation, the latter two Formations representing by far those most commonly observed nearer surface. Thickness of the La Biche Formation overlying the Second White Specks Formation shales is predominantly a function of topographic elevation. The Second White Specks is typically exposed at an elevation of 600m-610m (base of Formation) with a thickness varying 20m-30m, localized variations (faulted uplifted blocks or abnormal thickening) notwithstanding.

Micropaleontological examination of Labiche Formation drill core samples from 1996-97 drilling at the property suggests an unexpected 4-6 million year gap between the top of the Second White Specks Formation and the base of Labiche Formation, and further indicates that shales logged/mapped at the Buckton Property (and possibly elsewhere in the Birch Mountains Area) as Labiche are likely part of the Upper Cretaceous Lea Park Formation. This work suggests that considerable thicknesses of Smoky Group and Labiche Formations have been removed and, considering evidence of regolithic material incorporated into the lag deposit often capping the Second White Specks Formation, it further suggests a period of significant uplift and erosion. Such tectonic activity is compatible with the suggested increase in volcanism marking the end of the Second White Specks depositional cycle.

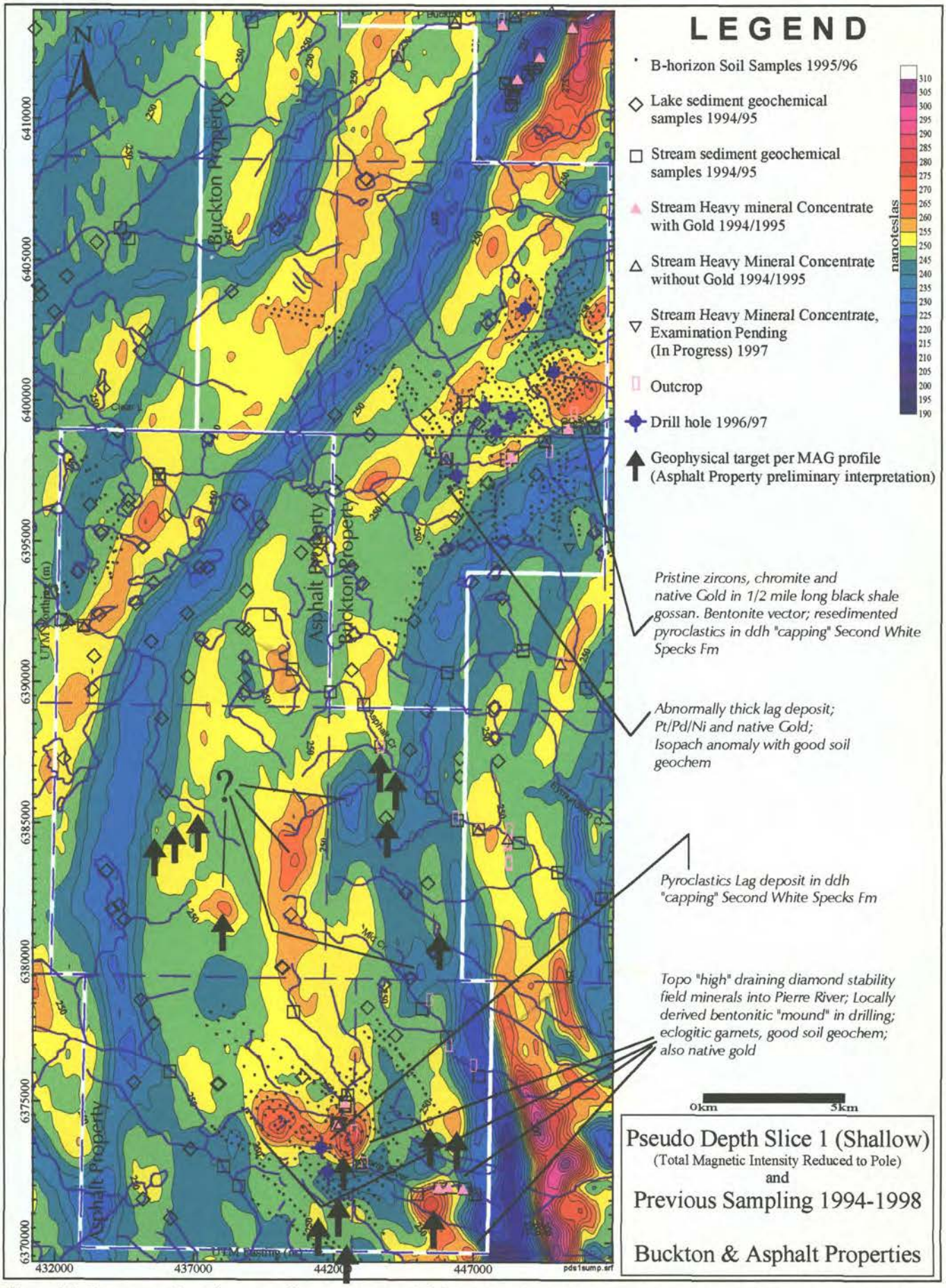


Figure 15. Summary of previous sampling programs and airborne geophysical work 1994-1998, Asphalt and Buckton Properties

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Gos Creek, the largest and most conspicuous creek at the Property located some 3km north of the Birch Mountain Airstrip, is a large V-shaped valley which contains the greatest amount of bedrock exposure on the property. Lesser exposures include those along Big Creek (south of the Birch Mountain Airstrip), and at the head-waters of the South Tributary which flows northwesterly across the north end of the property into the McIvor River. There is very little exposure in the north half of the property.

The most geochemically and geologically interesting exposures on the Property are those of the Second White Specks Formation. The GOS1 Gossan, located along the northern slopes of the Gos Creek valley, represents by far the most continuous outcropping of this Formation exposed for nearly 1km. Slumping exposures of this formation along Gos Creek form a large V-shape valley which opens to the east at an elevation of approximately 600m-610m (asl). Whereas the siliciclastic bone bed (SBB) marking the base of the Formation in the area (and in the Birch Mountains) typically varies in thickness 10cm-20cm, it attains a thickness exceeding 1m at the headwaters of the Gos Creek (Gos-C exposure) at the Buckton Property, wherein it is also associated with metals enrichment in surrounding shales located on the eastern flank of a principal stratigraphic disturbance in the area.

Similar to elsewhere throughout the Birch Mountains area, exposures of the Second White Specks Formation host the better lithogeochemical metal anomalies characterized by elevated Ni/Co/Cu/V/Ag. In addition, samples of the Second White Specks Formation at the Buckton Property have to date reported some of the most anomalous metals, mainly from the GOS1 gossan and the Gos Creek-C exposures (Sabag 1996b). The anomalies indicate that the Formation, particularly at GOS1, is enriched in V and Zn, with spotty Ni enrichment zones accompanied also by elevated Cd, Co, Cr and Cu.

The GOS1 gossan is exposed along a steep hillside characterized by several ledges in active state of creep, predominated by conspicuous red brick carbonaceous shales, and is located at the southeast portion of Twp101/R12, on a southeasterly facing hillside above the north flank of Gos Creek, overlying an area characterized by junction of several faults. Due to its distinct reddish coloration and the abundant metallic content, GOS1 was initially regarded to be a zone of advanced auto-oxidation, although subsequent work indicated that the coloration is likely due to a large fire some twenty years ago.

With the exception of the uppermost 5m-10m of the gossan ledge, the bulk of GOS1 comprises slumped material consisting of slimy muds or dislocated pieces of outcrop in various states of disaggregation. Available bedrock exposed along the uppermost ledge is characterized by carbonaceous shales, with bentonite seams and other seams of sulfur and sulfates. Shales at the gossan contain varying amounts of sulfides (mainly FeS) with a broad range of morphologies ranging from perfectly spherical pyrite/marcassite balls to twin pyramidal and specular aggregations. The FeS is accompanied by abundant euhedral Zircons, chromite and Mn-wads, all of which hosted in muddy shales predominated by illite clay, accompanied also by smectite and (locally) glauconite. Orientation microanalytical investigation of some subsamples indicate also the presence of 1μm-5μm granules of native Ni as overgrowths on FeS grains (especially those spherical).

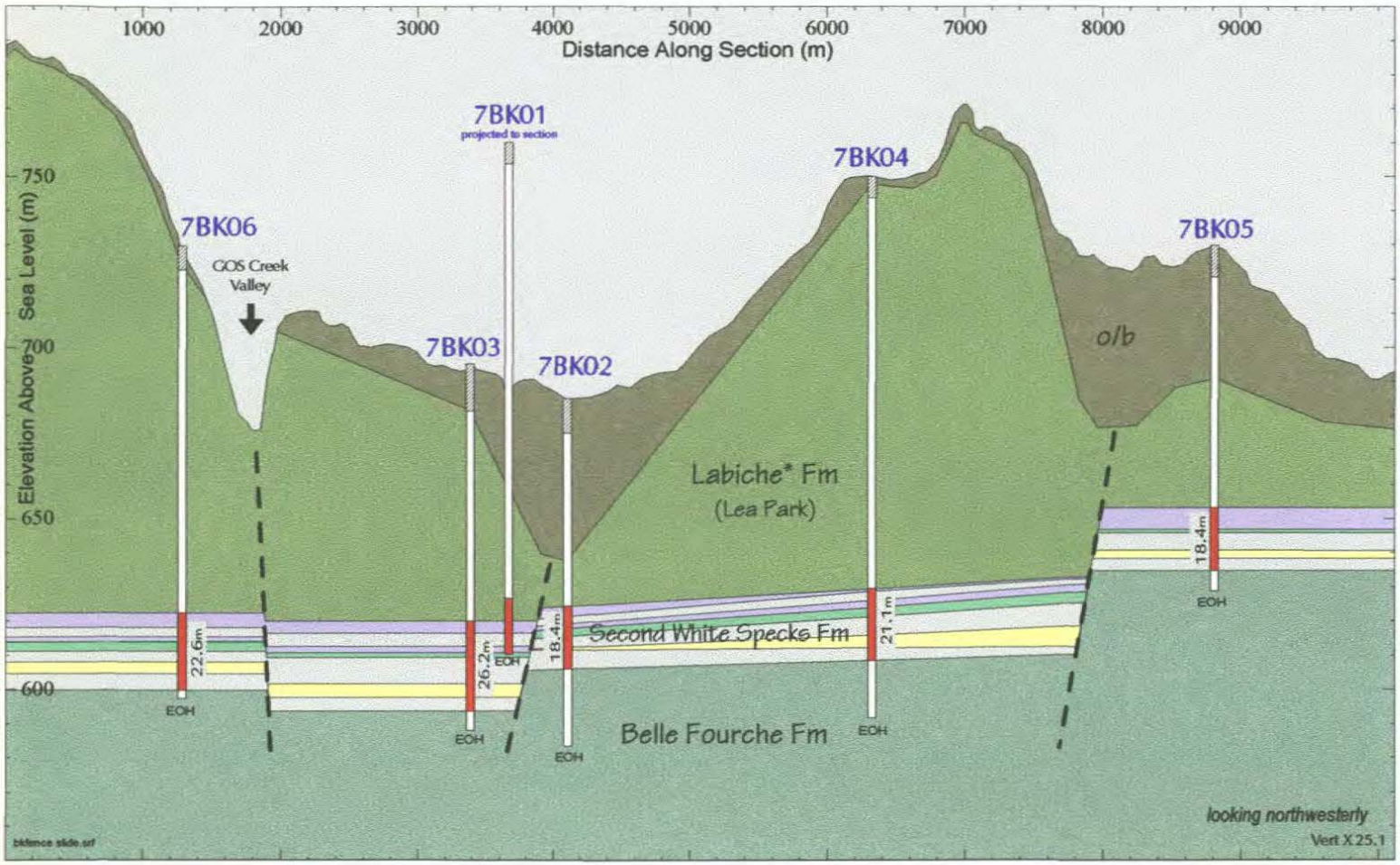
In addition to sulfide mineral species, native gold grains were also noted in heavy mineral concentrates from the GOS1 shales, and grains recovered from one sample (E5100, Sabag 1996b) represented an equivalent grade of nearly 1ppm per volumetric/gravimetric calculations. The gold grains are characterized by encrustations and inclusions of Fe±Cu-sulfides in various states of oxidation. Despite the repeated recovery by Tintina and by others of gold grains from heavy mineral concentrates from Second White Specks shales at GOS1 and exposure upstream therefrom (Gos Creek-C, MDA-funded joint AGS/GSC Shaftesbury project. Report in progress), analyses have failed to return equally high grades suggesting extreme nuggetting of gold. Lithogeochemical anomalies at the GOS1 exposure include 2.8ppm Ag, 36ppb Au, 7ppb Pt, 7ppb Pd, 120ppm Cu, 85ppm Mo, 300ppm Ni, 1051ppm V, and 845ppm Zn. Samples of the Second White Specks Formation also reported upward to 29% organic Carbon, and 250ppm U and 33ppm Th. Samples from the Gos Creek-C exposure reported up to 67ppb Au (fire assay), and 11ppb Pd and 14ppb Pt.

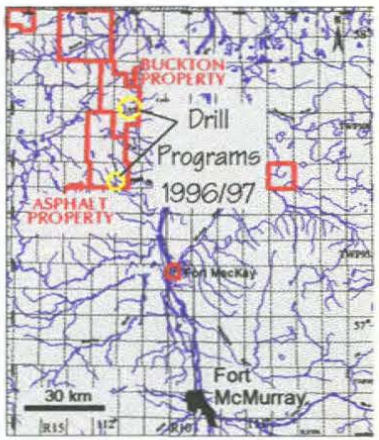
The area upslope from GOS1 was tested during winter 1996-97 by drilling of six holes along an 8km cross section (Figure 16a). The drilling confirmed metal enrichment within, and its confinement to, the Second White Specks Formation. Other findings from the drilling program are summarized below along with results from concurrent drilling at the Asphalt Property.

4.4.3 Asphalt Property

The property is named after Asphalt creek which flows conspicuously straight to the southeast and forms a large V-shaped valley containing the greatest amount of bedrock exposures at the property. Other (lesser) exposures are along the Tar River, the Pierre River, and Mid Creek. Exposures at the Property comprise sections of the Cretaceous Colorado Group, occurring at three distinct terraced elevations, corresponding to slumping exposures of the Viking Formation, the Shaftesbury Formation (which includes the Westgate and Fish Scales Formations), and the Second White Specks Formation which is at, or very near, surface throughout the southern parts of the Property.

The Second White Specks Formation presents the most interesting geochemical and geological exposures at the Property. It is exposed on Mid and Asphalt Creeks, in sections at an elevation of approximately 640m (asl) (at 20m-30m higher elevation than elsewhere in the Birch Mountains Area). Asphalt Creek exposures comprise poorly consolidated shales and mudstones (with variable organic components), containing numerous thin bentonites (1cm-15cm), a thin carbonate cemented siltstone/concretion (10cm-15cm thick), and a Siliciclastic Bone Bed (SBB). The SBB is interpreted as a transgressive lag deposit characterized by a calcite cemented, medium to very coarse grained, black chert and glassy quartz sandstone, containing variable amounts of fish debris. This chert and quartz sandstone is massive with very few sedimentary structures with the exception of vague cross-bedding and occasional mudstone rip-ups. The SBB is typically only 15-20cm thick, but thickens to over 1m at Mid Creek.





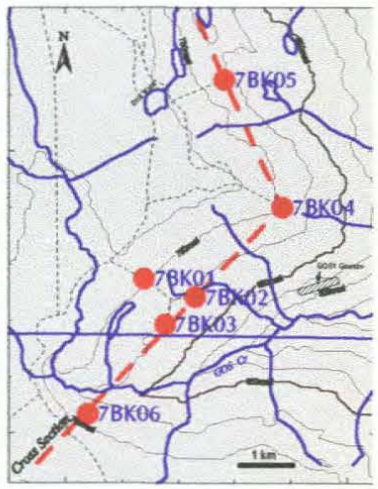


Figure 16a. Summary cross-section, Buckton Property drilling 1996-1997

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Similar to elsewhere throughout the Birch Mountains, exposures of the Second White Specks Formation have to date reported the better lithogeochemical metal anomalies at the Property characterized by elevated Ni/Co/Cu/V/Ag, including 3.6ppm Ag, 43ppb Au, 14ppb Pt, 22ppb Pd, 126ppm Cu, 227ppm Mo, 295ppm Ni, 863ppm V, and 653ppm Zn. Samples of the Formation contain upward to 15.7% C-org, 140ppm U and 20ppm Th.

The vicinity of Pierre Creek was selected as primary target and tested by drilling during the 196-97 winter drilling program. Two short holes were drilled to test anomalies identified from detailed soil sampling completed in advance of the drilling (Figure 16b).

4.4.4 General Discussion - Asphalt and Buckton Property Geology

Surface lithogeochemical sampling results from the Properties (and the Birch Mountains in general) and those from the 1996-97 drilling programs collectively indicate that:

- The Second White Specks Formation offers the most conspicuous geochemical relief in the area, providing the only geochemical variations within an otherwise featureless and monotonous stratigraphic package. Samples from the Labiche Formation are by far the most monotonous, and geochemical similarities of overburden material to the underlying Labiche shales indicate a predominance of locally derived overburden in the area;

- While metals enrichment within the Cretaceous stratigraphic package is conspicuously confined to the Second White Specks Formation, comparative geochemical profiles for all Cretaceous Formations exhibit an overall gross trend of progressively better metals enrichment upstratigraphy, reaching a hiatus in the Second White Specks Formation. While concentrations of many of the base metals (e.g. Ni, Mo, Zn) are highest nearer the Formation's upper contact and its vicinity, dominated by intermixture of considerable bentonitic seams into the shale, other metals (e.g. V, Cu) are better concentrated throughout its midsection. In addition, metals enrichment within the upper sections of the Formation is also accompanied by Ba, S, Na and Corg enrichment, and by higher pyritic sulfide contents ranging upward to 20%. The enrichment trend is reversed in Labiche Formation averages of which report relative depletions (the trend is best seen in relative Au, Zn, Ni, V and Ag enrichment, and is accompanied by similar trends for Ba and REE);

- Despite good apparent relationship between metals enrichment and Corg, interelemental variations, metals-Corg and metal-S relationships suggest that the metals are hosted within multiple carrier minerals some of which are sulfides and others are of organic forms. To the extent that good elemental correlations with S or Corg can be broadly interpreted to be indicative of mineral speciation, these trends further support grouping of metals into one group (Ni, Zn, Mo) characterized by affinities for enrichment predominantly in, or as, inorganic minerals and another (V, Cu) exhibiting affinities for enrichment in, or as, organic species.

Lithological, mineralogical and geochemical data collected from the Asphalt and Buckton Properties (and the Birch Mountains Area in general) collectively indicate that culmination of the Second White Specks Formation depositional cycle coincided with a significant increase in volcanism as evidenced by the presence within the Formation of abundant of bentonites and ejecta material of probable localized provenance. Cryptovolcanic activity, submarine volcanogenic venting or venting via kimberlitic pipes present equally likely sources to the ejecta material incorporated into the Formation, bentonite mineralogy and the presence of locally derived diamond indicator mineralogy in the area support speculations regarding the presence of much kimberlitic activity in the area (the Birch Mountains are a likely source for diamond indicator mineral anomalies comprising the Fort MacKay Diamond Indicator Mineral Trend located immediately down-drainage and down-ice from the Mountains).

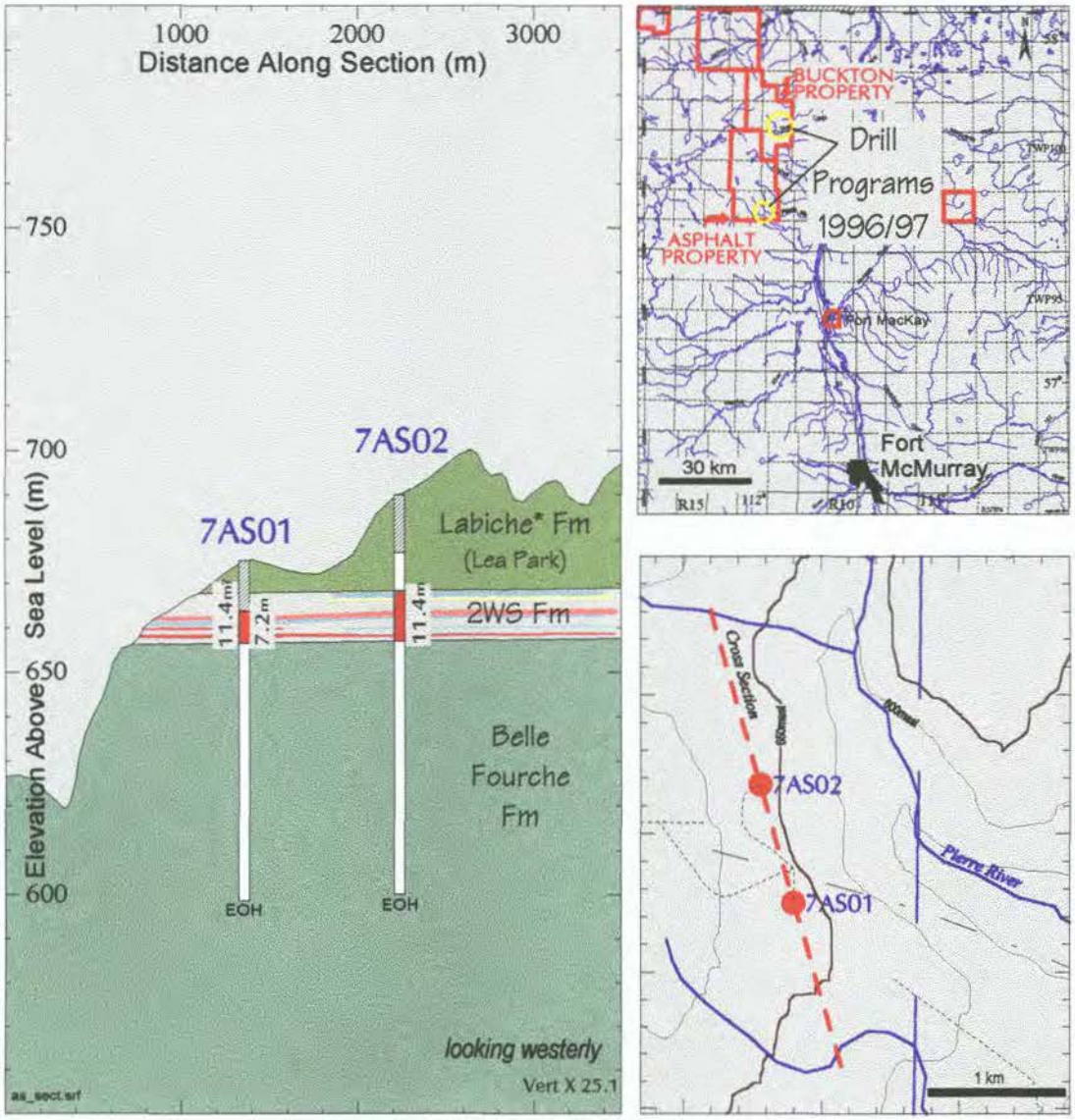


Figure 16b. Summary cross-section, Asphalt Property drilling 1996-1997

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The data also suggest that at least some of the suspected volcanism is localized in the Birch Mountains defining volcanic centers which directly contributed to development of metallic mineralization within overlying Second White Specks shales in the area either by providing a source of metals or by locally enhancing geochemical conditions conducive to metals deposition/concentration from a generally available metallic budget. The confinement of metallic mineralization to the Second White Specks Formation and its relative absence within the enveloping Formations better support proposals of volcanism as a source of the metals rather than simply as a facilitator of their concentration. Furthermore, lithogeochemistry of the Second White Specks is comparable with data from metal enriched black shales from elsewhere in the world many of which are believed to have formed via volcanogenic and hydrothermal input (e.g. metal enriched shales from Bohemian Massif, Czech Republic, Pasava et al 1996; the Talvivaara deposit Loukola-Ruskeeniemi and Heino 1996; gold bearing Russian black shales, Buryak 1976; to name a few).

The volcanogenic association proposed above is implicit in suggesting the existence within the region of as yet unidentified volcanic material either in the form of buried units or as resedimented material. The absence of any documentation of same from available regional geological records is likely due to the lack of geological mapping in the area despite the ubiquity of bentonites (e.g. dacitic debris was incidentally discovered at Clear Lake, Eaglenest Lake area, during 1995 reconnaissance field work).

4.4.5 Economic Considerations

Provided sufficient recoverable metallic budget is identified within the Second White Specks Formation shales, by far the most attractive features of the shales from an economic perspective at the two Properties are (i) their proximity to surface and their unconsolidated nature hence amenability to extraction by low cost large scale bulk mining; and (ii) the potentially immense lateral extent of metal enriched portions therein estimated to occupy tens of square kilometers as extrapolated from surface and subsurface exploration results.

Despite considerable sulfide content of much of the Second White Specks Formation shales, sampling results to date indicate that none of the metals is present in the black shales in sufficiently high concentrations to be of economic merit by itself. Gold grades have been particularly disappointing especially considering that native gold had previously been physically recovered from shale at the GOS1 Gossan (Buckton Property) representing grades upward to 1ppm (Sabag 1996b) and the common occurrence of abundant native gold in alluvial material downslope from exposures of the Second White Specks Formation at both Properties (especially in Pierre River, Asphalt Property).

The grades are, however, encouraging when reviewed as a polymetallic assemblage of Ni+Co+Cu+Zn+V±Ag±Au ("pay metals") from the perspective of large bulk mining operations, especially those for poorly consolidated deposits representing in most part earth-moving activities with minimal mining cost (e.g. the Brasilia deposit - $2.5/tonne, mining and beneficiation; the Oil sands deposits - $6-$7.5/tonne mining and extraction; among others). In this framework, average in-situ values for contained Cu, Ni, Zn, Mo

and V (±Ag±U) on a combined basis for the Second White Specks Formation range generally $10-$20/tonne, a significant portion of which is represented by V content. It is self-evident that in-situ value of contained metals on a combined basis is sufficient to place the Second White Specks Formation shales well within reach of economic viability, subject to feasibility and of metals extraction on a combined basis.

Should the surface and subsurface metallic anomalies identified to date at the two Properties indeed reflect the true size of underlying buried mineralization, metals concentration zones within the Formation can be conjectured to extend over areas measuring some 5km x 5km (e.g. an approximate 8km long cross-section drilled off at the Buckton Property), representing immense tonnages of some 1.5 billion tonnes per deposit (avg thickness 30m, avg density of 2.1gm/cm^3). These figures, though seemingly exceedingly large, are compatible with many typical black shale hosted polymetallic deposits elsewhere in the world.

It is relatively clear from the above that, provided extraction of the "pay" metals on a collective basis is practicable (e.g. as a physical or chemical concentrate), the shale sequences dominating near-surface geology at both Properties represent immense near-surface metal bearing tonnages, well suited to low cost extraction by bulk mining. Accordingly, following completion of the 1996-97 drilling programs, resolution of process metallurgical issues was identified to be of the highest priority for continuing work at the Properties, and all subsequent efforts were directed toward same comprising the bulk of the 1997-1999 programs. This work would also necessarily include investigation (i) of host mineralogy of the metals (sulfide, organic or clays?), and (ii) of the disparities between analytical gold grades compared to grades implied by native gold grains from the shales recovered.

4.5 1997-1999 Exploration Programs, Overview

The 1997-1999 exploration efforts at the Asphalt and Buckton Properties focused almost entirely on investigation of process metallurgical issues to enable formulation of an economically viable flowsheet for extraction of collective base metals from the mineralized shales. This work entailed completion of selective leaching testwork during 1997-1998, followed by broader flotation tests during 1998-1999. Considerable efforts were directed during 1999 toward native gold content of the shales to resolve highly nuggetted grades reported to Tintina by a third-party from their assaying work completed during independent metallurgical tests.

In addition to investigating metallic content of the shales, efforts were also directed to evaluate diamond potential of the area. In that regard, geophysical data from the Asphalt and Buckton Properties was reviewed in greater detail than before, samples previously collected (archived) from the Asphalt, Buckton and McIvor Properties were re-examined and indicator mineralogy was picked and probed.

5. SELECTIVE LEACHING TESTWORK 1997-1998

5.1 INTRODUCTION

A suite of ten samples were selected during October 1997 from the Buckton Property drill holes by way of an orientative suite to investigate elemental partitioning via sequential selective leaching of the principal rockforming components. The sample suite comprised Second White Specks Formation drill core intercepts and consisted of six samples characterized by high V content, and four samples representing elevated Ni and Zn. Samples comprising the Selective Leaching Suite are tabulated in Table 4.

	Ni-Suite						V-Suite			
Sample No.	7BK0412060	7BK0507680	7BK0307747	7BK0206078	7BK0113540	7BK0610962	7BK0508365	7BK0412792	7BK0611820	7BK0308625
Drill Hole	7BK04	7BK05	7BK03	7BK02	7BK01	7BK06	7BK05	7BK04	7BK06	7BK03
Easting	449850	448825	447770	448310	447390	446390	448825	449850	446390	447770
Northing	6401000	6403270	6398930	6399410	6399740	6397340	6403270	6401000	6397340	6398930
From (m)	629.40	653.20	617.53	624.22	624.60	620.38	646.35	622.08	611.80	608.75
To (m)	629.33	652.93	617.26	623.87	623.72	619.70	645.90	621.30	611.18	608.00
Length (m)	0.07	0.27	0.27	0.35	0.88	0.68	0.45	0.78	0.62	0.75
Position (m) below top of 2WS	0.0	-0.1	-2.6	-0.2	-2.9	-2.3	-7.1	-7.7	-10.9	-11.6
Position (m) above base of 2WS	21.0	18.3	23.6	18.2	17.2	20.2	11.3	13.4	11.7	14.6
Ag-ICP (ppm)	0.2	2.5	0.5	1.1	0.7	1.9	0.8	0.4	1.0	0.4
Al-ICP (%)	8.0	8.0	6.6	6.6	6.4	6.9	6.7	6.1	6.6	6.2
As-INA (ppm)	470.0	310.0	180.0	160.0	110.0	150.0	58.0	57.0	58.0	71.0
Au-INA (ppb)	12	6	10	13	11	19	9	12	1	9
Ba-INA (ppm)	31000	3900	9200	13000	7200	6800	940	800	1300	1500
Br-INA (ppm)	0.3	0.3	3.3	6.3	7.9	14.0	20.0	21.0	15.0	8.7
C-org-Leco (%)	1.9	3.6	4.0	5.3	5.9	7.5	9.3	9.6	7.8	6.4
Ca-ICP (%)	2.4	6.6	4.1	6.5	6.5	2.6	6.1	7.2	5.9	5.9
Cu-ICP (ppm)	51	76	94	118	96	126	93	87	102	102
Fe-INA (%)	11.4	9.4	7.8	8.0	5.9	8.9	4.4	4.2	4.3	4.3
K-ICP (%)	1.3	1.3	1.1	1.3	1.2	1.5	1.7	1.7	1.7	1.6
Mg-ICP (%)	0.59	0.79	0.91	0.57	0.83	0.76	0.80	0.86	0.78	0.78
Mn-ICP (ppm)	276	600	377	357	316	224	144	142	141	173
Mo-ICP (ppm)	205	365	116	108	126	114	101	99	78	76
Na-INA (%)	0.83	0.67	0.80	0.81	0.73	1.17	0.52	0.49	0.67	0.61
Ni-ICP (ppm)	414	375	344	331	293	316	183	175	175	184
P-ICP (%)	0.70	1.37	0.67	0.79	0.54	0.50	0.08	0.08	0.25	0.51
Pd-FA (ppb)	2	2	6	6	7	4	2	2	2	5
Pt-FA (ppb)	5	6	8	10	9	10	3	3	5	3
S-Leco (%)	12.9	11.2	6.5	6.3	6.1	6.9	4.2	4.0	4.2	4.3
Th-INA (ppm)	17	19	12	15	11	14	10	9	13	13
Ti-ICP (%)	0.24	0.18	0.25	0.21	0.22	0.22	0.23	0.23	0.22	0.23
U-INA (ppm)	74	170	120	160	100	93	18	22	35	56
V-ICP (ppm)	370	707	793	648	606	796	1289	1212	1163	1117
Zn-ICP (ppm)	787	681	713	810	642	664	421	383	422	465

Table 4. Summary list of samples and lithogeochemistry, Selective Leaching Suite, Buckton Property drilling 1997 (analyses by ActLabs 1996, Rpt#12622. See Sabag 1998).

The primary objective of the testwork was to determine metal content of the organic and the inorganic components of the samples by sequentially and selectively leaching and analyzing elemental make-up of five major fractions of the samples: the Light Organic, Heavy Organic, Oxide, Sulfide and Silicate fractions. Intentions were that the selective

leaching work be a precursor to more detailed benchtests to be undertaken at a future date to definitively establish practicability and economics of metals extraction, on a combined basis, from the shales.

The secondary objective of the testwork was to establish metals partitioning patterns within the Second White Specks Formation with a view to enabling grouping of the various metals for the purposes of blocking polymetallic enrichment domains within the Formation whose overall grade could be restated in easily communicable units of equivalent single metal content (e.g.in Cu-equivalent or Au-equivalent grades). Previous attempts to block out meaningful reserves within the Formation had been exacerbated by disparate vertical and lateral enrichment vectors exhibited by several of the metals of interest and the existence of multiple metal enrichment populations (e.g. Ni-Zn enrichment vectors in contrast to V±Cu enrichment patterns. See Sabag 1998).

The analytical work was completed during the period Nov/97-Jan/98 by Activation Laboratories (ActLabs) according to selective leaching procedures tailored to the samples by Dr.J.Robert Clark of Actlabs outlined in Table 5 (also presented in a flowsheet in Figure 17. Analytical certificates are appended in Appendix B1.

Clark Step1: Light Organics Separation

Separate metals bound to light organic compounds

1. Soak 1gram sample in 10ml heptane for 24hrs;
2. Drain off heptane;
3. Evaporate heptane at room temperature in test-tube;
4. Digest non-volatile organic residue with HNO3-H2O2 (5ml of 1:1)
5. Dilute to 20ml;
6. Analyze on ICP/MS using matrix-matched standards.

Clark Step2: Oxides Separation

Dissolve acetic acid soluble metals (oxides of V, Mo, As, etc...)

1. Soak air dried sample from Step1 above in 10ml 5% acetic acid (v/v) for 1 hour;
2. Decant as much solution as possible;
3. Spike leach solution with volume of standard appropriate for volume recover;
4. Analyze on ICP/MS using matrix-matched standards;
5. Rinse sample residue in test-tube twice with 5ml of H2O;
6. Drain off as much of rinse water as possible.

Clark Step3: Heavy Organics Separation

Selectively break down heavy organics and bitumen

1. Use Na-pyrophosphate leach on residue from Step2 above;
2. Analyze leach solution on ICP/MS using matrix matched standards;
3. Split residue from Step3 above into three cuts;
4. Determine efficiency of destruction of organics by determining organic carbon, graphitic carbon and sulfur by Leco;
5. Determine metals content of (predominantly) sulfide component by digesting split#2 in aqua regia and analyzing metals by ICP/INA;
6. Determine metals content of non-sulfide and silicate component by totally digesting split#3 in "four-acids" and analyzing metals by ICP/INA;

Notes: Procedures outlined above anticipate 1gm starting sample weight. Testwork utilized 10gm starting sample.

Table 5. Summary of Sequential Selective Leaching procedures, Selective Leaching Suite. Procedures per Dr.J.Robert Clark, Actlabs, Nov19/97

Duplicate cuts of head samples were also analyzed to assess inter-pulp and inter-reject inhomogeneities, and to compare the 1998 results to initial analyses of the samples during the 1997 drilling programs (Sabag 1998). A sample of SDO1 USGS black shale standard was concurrently analyzed as an internal analytical control standard.

5.2 Leaching Procedures

The leaching sequence and sample fractions are outlined in Figure 17. The Figure is self-explanatory and depicts the various leaching stages in considerable detail (ActLabs analytical certificates also referenced). Subsamples of coarse rejects were utilized during the tests, all of which had previously been crushed at Actlabs during initial routine analytical work completed during the 1996-1997 drilling program.

In basic terms, the leaching sequence was as follows: two subsamples were taken from each of the ten samples and one was analyzed in duplicate to establish head grades (referred to herein as fraction H). The other subsample (10gm) was first leached in Heptane to remove light organics, the solution was analyzed (fraction P) and the residues were leached in Acetic Acid to dissolve oxides. The Acetic acid solution (fraction T) was analyzed and the residues therefrom were leached in Sodium Pyrophosphate to collect heavy organics. The Sodium Pyrophosphate solution (fraction Z) was analyzed and the residues therefrom were split into four parts and analyzed as follows: one fraction was analyzed by INA (fraction Zina), another was analyzed by ICP following dissolution in Aqua Regia (Zaq); another was analyzed by ICP following dissolution in four-acids (Zttl); and the final fraction was split (Zcs1 and Zcs2) and analyzed in duplicate by Leco for C species (Corg, Cgrph, CO_2 and Cttl) and S.

A third subsample was subsequently also taken from each of the ten samples to evaluate the solubility of organics into Aqua Regia. The subsamples were dissolved in Aqua Regia and residues therefrom were analyzed for Corg and Cttl.

Given the lack of detailed information regarding mineral speciation within the samples, the following assumptions were necessarily made during the testwork to enable calculation, or in the least estimation, of mass balances: (i) Metal partitioning between Sulfide versus Silicate fractions of the sample was calculated by difference based on the assumption that aqua regia dissolution would predominantly attack sulfides whereas a four-acids digestion would dissolve both fractions; (ii) due to insolubility of many sulfates even in four-acids digestion, INA data was relied upon to best represent concentration of elements bound principally in sulfates; (iii) the Light Organic fraction is the heptane soluble portion of the organics within the samples; (iv) sodium pyrophosphate would be sufficient to dissolve all heavy organics within the samples.

5.3 Leaching Results

The sequential selective leaching testwork represents experimental work and although hopes were to gather data which could be sufficiently quantitative to definitively establish elemental fractionation patterns, several unexpected chemical reactions mitigated otherwise and the data can only be reviewed from a qualitative, albeit nonetheless useful, perspective.

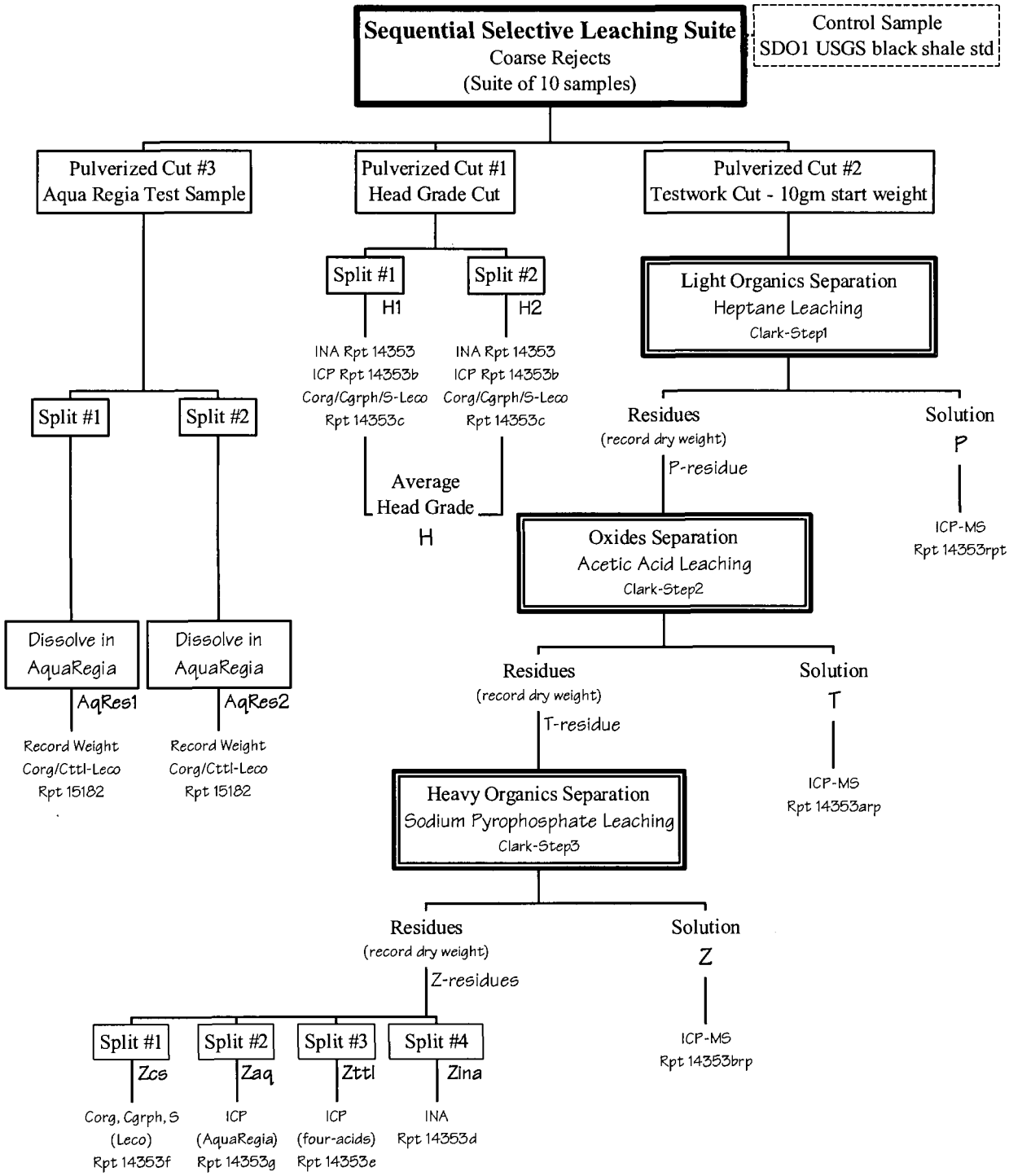


Figure 17. Selective Sequential Leaching Testwork flowsheet, showing leaching sequence, sample fractions, analytical certificate numbers. Tintina Selective Leaching Testwork 1997-98. Analyses by Activation Labs 1997-98)

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Results from analyses of duplicate head samples are presented in Table 6. The data are well within acceptable limits and are characterized by inter-pulp variations of some ±10%. These variations are particularly precise when considering that previous duplicate sampling of rejects has commonly returned intra-sample variations within the ±30% range. It is noteworthy that the analyses for SDO1 black shale standard exhibit similar variations as those from the samples, suggesting that the variations are not reflective of inhomogeneities in the samples but rather are due to analytical conditions.

Element	Detection Limit	7BK0412060	7BK0412060B	7BK0507680	7BK0507680B	7BK0307747	7BK0307747B	7BK0206078	7BK0206078B	7BK0113540	7BK0113540B	7BK0610962	7BK0610962B	7BK0508365	7BK0508365B	7BK0412792	7BK0412792B	7BK0611820	7BK0611820B	7BK0308625	7BK0308625B	SDO1	SDO1B
Au-INA	2 ppb	10	13	8	7	10	8	3	8	9	5	9	8	4	4	6	7	9	5	4	5	*na*	*na*
Ag-INA	5 ppm	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	*na*	*na*
As-INA	0.5 ppm	430	430	300	300	150	150	140	140	110	95	130	130	52	52	50	51	67	68	73	74	*na*	*na*
Ba-INA	50 ppm	22000	22000	3000	3000	8000	8200	11000	10000	5400	5300	4400	4500	540	550	510	480	1100	1100	1200	1200	*na*	*na*
Br-INA	0.5 ppm	3	3	2	2	4	4	6	6	8	8	12	12	20	20	20	20	17	17	10	10	*na*	*na*
Ca-INA	1 %	3	3	5	5	5	4	5	4	5	-5	2	2	5	6	6	6	5	5	5	6	*na*	*na*
Co-INA	1 ppm	170	170	55	55	41	43	42	42	31	29	40	42	20	20	19	19	25	25	25	25	*na*	*na*
Cr-INA	5 ppm	230	230	45	45	51	51	54	58	48	46	78	77	98	100	95	97	110	110	94	95	*na*	*na*
Cs-INA	1 ppm	2	3	2	2	1	1	1	1	2	2	2	3	5	5	5	5	5	5	5	5	*na*	*na*
Fe-INA	0.01 %	11.10	11.20	9.57	9.60	8.49	8.50	8.04	8.02	6.50	6.48	6.74	6.99	3.93	4.09	3.71	3.79	4.69	4.87	4.75	4.80	*na*	*na*
HfINA	1 ppm	10	10	5	5	6	6	7	8	5	6	7	7	4	4	4	5	6	6	5	6	*na*	*na*
Hg-INA	1 ppm	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	*na*	*na*
Ir-INA	5 ppb	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	5	-5	-5	-5	*na*	*na*
Mo-INA	1 ppm	213	214	350	350	150	150	120	111	130	110	108	121	93	98	91	93	90	96	82	87	*na*	*na*
Na-INA	0.01 %	0.83	0.83	0.51	0.50	0.68	0.66	0.64	0.68	0.55	0.59	1.06	1.08	0.46	0.49	0.46	0.48	0.78	0.81	0.67	0.70	*na*	*na*
Ni-INA	20 ppm	440	420	340	330	390	380	340	320	290	300	300	290	180	180	190	180	230	250	220	220	*na*	*na*
Rb-INA	15 ppm	41	43	35	34	38	38	31	31	42	42	52	54	86	83	83	84	88	92	71	76	*na*	*na*
Sb-INA	0.1 ppm	35	40	26	28	33	37	29	42	25	30	33	38	18	21	18	18	20	19	18	19	*na*	*na*
Sc-INA	0.1 ppm	13	13	11	11	11	11	11	12	12	10	11	11	10	10	10	10	13	13	14	14	*na*	*na*
Se-INA	3 ppm	-3	-3	33	30	68	72	73	80	55	60	79	82	46	49	48	47	50	48	41	46	*na*	*na*
Sn-INA	0.01 %	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	*na*	*na*
Sr-INA	0.05 %	0.07	0.07	0.06	-0.05	0.08	0.09	0.07	0.07	0.06	-0.05	0.10	0.11	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	0.05	0.06	*na*	*na*
Ta-INA	0.5 ppm	1.2	1.3	1.3	1.1	0.7	0.7	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	0.9	0.9	-0.5	-0.5	-0.5	0.6	-0.5	0.7	*na*	*na*
Th-INA	0.2 ppm	16.0	15.0	15.0	15.0	10.0	10.0	10.0	11.0	9.1	8.8	9.9	10.0	7.3	7.3	7.1	7.3	11.0	11.0	14.0	14.0	*na*	*na*
U -INA	0.5 ppm	71.0	75.0	170.0	160.0	110.0	110.0	100.0	110.0	85.0	85.0	65.0	68.0	18.0	19.0	18.0	20.0	34.0	35.0	53.0	58.0	*na*	*na*
W -INA	1 ppm	-1	-1	-1	-1	-1	-1	7	9	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	*na*	*na*
Zn-INA	50 ppm	910	940	632	639	819	838	667	692	525	510	630	638	440	444	450	461	525	524	533	571	*na*	*na*
La-INA	0.5 ppm	130.0	130.0	170.0	170.0	110.0	110.0	100.0	110.0	97.0	96.0	77.0	78.0	33.0	34.0	33.0	34.0	70.0	74.0	110.0	120.0	*na*	*na*
Ce-INA	3 ppm	180	180	210	210	150	150	140	150	130	120	110	110	52	55	54	53	110	110	150	150	*na*	*na*
Nd-INA	5 ppm	130	130	120	120	76	82	89	91	69	69	67	68	28	30	25	27	66	64	98	100	*na*	*na*
Sm-INA	0.1 ppm	24	24	23	23	15	16	15	16	13	12	10	11	4	4	4	4	11	11	17	18	*na*	*na*
Eu-INA	0.2 ppm	6.8	6.8	5.1	5.8	4.6	4.7	4.4	4.7	3.7	3.9	3.5	3.6	1.4	1.3	1.3	1.4	3.4	3.6	5.9	6.1	*na*	*na*
Tb-INA	0.5 ppm	4.5	4.5	4.2	4.2	2.5	2.7	3.4	3.4	2.2	2.2	2.0	2.0	0.8	-0.5	0.7	0.8	1.9	1.2	3.5	3.6	*na*	*na*
Yb-INA	0.2 ppm	10.9	10.6	10.2	10.5	7.2	7.3	7.7	7.9	6.7	6.4	5.9	6.0	3.0	3.2	3.1	3.2	6.4	6.7	10.0	10.0	*na*	*na*
Lu-INA	0.05 ppm	1.64	1.67	1.88	1.96	1.23	1.23	1.15	1.20	1.06	1.07	0.97	0.98	0.45	0.46	0.49	0.49	1.00	1.02	1.50	1.51	*na*	*na*
Mass-INA	0 g	15.55	16.42	30.54	30.70	30.68	30.55	30.54	30.56	30.51	31.06	30.60	30.96	30.55	30.29	30.40	30.80	15.01	14.80	25.60	25.43	*na*	*na*
Mo -ICP	2 ppm	197	203	341	334	127	123	110	102	122	118	108	104	103	101	98	95	76	80	71	70	156	144
Cu -ICP	1 ppm	47	49	61	58	101	97	119	110	93	88	118	112	95	95	89	87	98	102	96	94	60	55
Pb -ICP	4 ppm	19	23	28	30	16	21	19	18	20	16	25	21	18	20	19	17	23	20	22	25	34	33
Zn -ICP	1 ppm	684	724	603	579	755	716	712	635	579	505	548	511	421	394	379	375	382	407	397	393	63	56
Ag -ICP	0.4 ppm	-0.4	-0.4	0.9	0.9	1.3	1.1	1.5	1.3	0.7	1.1	1.2	1.1	0.5	1.3	1.5	0.7	0.7	1.2	0.8	1.0	-0.4	-0.4
Ni -ICP	1 ppm	419	434	326	319	377	367	339	317	281	271	301	287	196	193	183	176	175	183	176	173	103	95
Mn -ICP	1 ppm	275	291	555	540	400	389	387	359	335	309	266	256	154	160	133	134	160	176	165	171	326	302
Sr -ICP	1 ppm	164	181	401	390	443	413	380	347	436	402	604	568	219	219	229	224	319	330	351	345	80	73
Cd -ICP	0.5 ppm	20.5	21.7	22.1	21.0	23.2	22.3	24.0	22.0	17.1	15.4	21.1	19.6	20.7	20.0	19.2	18.7	19.3	20.4	17.8	17.5	-0.5	-0.5
Bi -ICP	5 ppm	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0
V -ICP	2 ppm	374	389	601	585	779	755	754	702	619	595	835	799	1324	1305	1312	1238	1142	1192	1092	1083	172	158
Ca -ICP	0.01 %	2.57	2.70	6.10	6.04	4.90	4.81	5.52	5.28	6.48	6.37	2.68	2.60	6.42	6.43	6.77	6.68	6.32	6.60	6.12	6.01	1.02	0.90
P -ICP	0 %	0.74	0.76	1.28	1.26	0.78	0.76	0.72	0.67	0.59	0.57	0.45	0.43	0.08	0.08	0.08	0.08	0.26	0.28	0.53	0.53	0.05	0.05
Mg -ICP	0.01 %	0.58	0.60	0.78	0.77	0.86	0.83	0.71	0.68	0.90	0.88	0.85	0.82	0.87	0.87	0.90	0.87	0.81	0.84	0.83	0.81	0.97	0.89
Ti -ICP	0.01 %	0.24	0.25	0.17	0.17	0.25	0.24	0.25	0.23	0.23	0.22	0.25	0.24	0.25	0.26	0.24	0.23	0.25	0.25	0.23	0.23	0.33	0.30
Al -ICP	0.01 %	7.29	7.68	7.36	7.27	6.89	6.74	7.12	6.86	6.56	6.47	7.17	6.98	6.48	6.49	6.35	6.26	6.29	6.61	6.35	6.26	6.79	6.19
K -ICP	0.01 %	1.21	1.24	1.01	1.00	1.25	1.19	1.41	1.30	1.22	1.18	1.48	1.41	1.71	1.67	1.59	1.54	1.61	1.67	1.62	1.58	2.75	2.53
Y -ICP	2 ppm	164	174	248	245	157	154	161	151	134	132	95	91	35	35	34	34	84	89	157	156	49	43
Be -ICP	2 ppm	-2	-2	-2	-2	-2	-2	2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	2	2
Cgrph-Leco	%	0.10	0.10	0.46	0.46	0.44	0.43	0.49	0.48	0.53	0.50	0.15	0.15	0.18	0.18	0.37	0.33	0.25	0.24	0.30	0.30	0.10	0.10
Corg-Leco	%	1.52	1.60	2.77	2.80	3.92	4.06	4.59	4.90	5.18	5.33	6.63	6.79	9.25	9.42	9.13	9.14	7.65	7.57	6.89	6.93	9.68	9.79
Cttl-Leco	%	1.66	1.67	3.88	3.76	4.93	4.89	5.89	5.85	6.86	6.86	6.97	7.03	10.80	10.70	10.80	10.70	8.91	8.98	8.07	8.06	10.0	10.0
CO2-Leco	%	-0.01	-0.01	2.85	2.55	1.61	1.69	2.50	2.44	4.16	3.95	0.61	0.69	5.70	5.16	5.43	5.19	4.54	4.71	3.77	3.74	0.81	0.77
S-Leco	%	11.30	11.20	9.49	9.74	8.61	8.45	8.15	8.09	6.97	6.98	7.46	7.44	4.46	4.38	4.19	4.17	4.47	4.46	4.69	4.70	5.34	5.26
All analyses by ActLabs 1997-98; Actlabs Rpt 14353, 14353b, 14353c																							

Table 6. Comparative summary of duplicate sample analyses, Selective Leaching Suite, Buckton Property drill core samples.

Comparisons of the 1998 head grades with previous analyses from the 1996-1997 drilling program for the ten samples are summarized in Table 7. The data is, as expected, similar to inter-reject comparisons and is characterized by variations of ±20% to ±30% even for the major elements. These variations can be attributed to sample inhomogeneities.

Sample No.& Method	Units	Detection Limit	7BK0412060		7BK0507680		7BK0307747		7BK0206078		7BK0113540		7BK0610962		7BK0508365		7BK0412792		7BK0611820		7BK0308625	
			Avg98	Data97	Avg98	Data97	Avg98	Data97	Avg98	Data97	Avg98	Data97	Avg98	Data97	Avg98	Data97	Avg98	Data97	Avg98	Data97	Avg98	Data97
Ag -ICP	ppm	0.4	-0.4	0.2	0.9	2.5	1.2	0.5	1.4	1.1	0.9	0.7	1.2	1.9	0.9	0.8	1.1	0.4	1.0	1.0	0.9	0.4
Al -ICP	%	0.01	7.49	8.04	7.32	8.03	6.82	6.58	6.99	6.62	6.52	6.39	7.08	6.88	6.49	6.65	6.31	6.09	6.45	6.59	6.31	6.23
As-INA	ppm	1	430	470	300	310	150	180	140	160	103	110	130	150	52	58	51	57	68	58	74	71
Au-FA	ppb	2	*na*	4	*na*	2	*na*	8	*na*	10	*na*	6	*na*	8	*na*	6	*na*	8	*na*	5	*na*	4
Au-INA	ppb	2	12	12	8	6	9	10	6	13	7	11	9	19	4	9	7	12	7	1	5	9
Ba-INA	ppm	50	22000	31000	3000	3900	8100	9200	10500	13000	5350	7200	4450	6800	545	940	495	800	1100	1300	1200	1500
Be -ICP	ppm	2	-2	5	-2	1	-2	1	0	2	-2	2	-2	1	-2	1	-2	2	-2	1	-2	1
Bi -ICP	ppm	5.0	-5.0	16.0	-5.0	2.5	-5.0	2.5	-5.0	2.5	-5.0	2.5	-5.0	2.5	-5.0	2.5	-5.0	7.0	-5.0	2.5	-5.0	2.5
Br-INA	ppm	1	3.4	0.3	2.0	0.3	4.2	3.3	5.5	6.3	8.0	7.9	12.0	14.0	20.0	20.0	20.0	21.0	17.0	15.0	10.0	8.7
Ca -ICP	%	0.01	2.64	2.36	6.07	6.61	4.86	4.13	5.40	6.52	6.43	6.52	2.64	2.58	6.43	6.13	6.73	7.15	6.46	5.93	6.07	5.86
Ca-INA	%	1	3.0	2.0	5.0	5.0	4.5	3.0	4.5	4.0	0.0	5.0	2.0	4.0	5.5	5.0	6.0	6.0	5.0	7.0	5.5	4.0
Cd -ICP	ppm	0.5	21.1	23.7	21.6	19.9	22.8	18.7	23.0	23.5	16.3	15.7	20.4	22.7	20.4	18.6	19.0	18.2	19.9	19.3	17.7	16.8
Ce-INA	ppm	3	180	150	210	240	150	130	145	240	125	130	110	160	54	61	54	59	110	100	150	120
Co-INA	ppm	1	170	180	55	66	42	47	42	55	30	38	41	52	20	23	19	22	25	22	25	23
Cr-INA	ppm	5	230	200	45	63	51	54	56	78	47	47	78	97	99	100	96	100	110	110	95	82
Cs-INA	ppm	1	3	3	2	3	1	2	1	2	2	2	3	3	5	5	5	5	5	5	5	4
Cu -ICP	ppm	1	48	51	60	76	99	94	115	118	91	96	115	126	95	93	88	87	100	102	95	102
Eu-INA	ppm	0.2	6.8	5.5	5.5	7.4	4.7	4.2	4.6	6.4	3.8	3.7	3.6	4.0	1.4	1.5	1.4	1.3	3.5	2.9	6.0	4.5
Fe-INA	%	0.01	11.15	11.40	9.59	9.37	8.50	7.75	8.03	7.96	6.49	5.87	6.87	8.90	4.01	4.38	3.75	4.18	4.78	4.27	4.78	4.32
HfINA	ppm	1	10.0	7.0	5.0	5.0	6.0	6.0	7.5	7.0	5.5	6.0	7.0	7.0	4.0	4.0	4.5	3.0	6.0	5.0	5.5	4.0
Hg-INA	ppm	1	-1.0	0.5	-1.0	0.5	-1.0	0.5	-1.0	0.5	-1.0	0.5	-1.0	0.5	-1.0	0.5	-1.0	0.5	-1.0	0.5	-1.0	0.5
K-ICP	%	0.01	1.23	1.33	1.01	1.25	1.22	1.09	1.36	1.32	1.20	1.19	1.45	1.49	1.69	1.74	1.57	1.71	1.64	1.69	1.60	1.62
La-INA	ppm	0.5	130.0	110.0	170.0	180.0	110.0	120.0	105.0	160.0	96.5	100.0	77.5	99.0	33.5	36.0	33.5	34.0	72.0	64.0	115.0	110.0
Lu-INA	ppm	0.05	1.66	1.38	1.92	1.88	1.23	1.36	1.18	1.92	1.07	1.21	0.98	1.46	0.46	0.55	0.49	0.54	1.01	1.08	1.51	1.44
Mg -ICP	%	0.01	0.59	0.59	0.78	0.79	0.85	0.91	0.70	0.57	0.89	0.83	0.84	0.76	0.87	0.80	0.89	0.86	0.83	0.78	0.82	0.78
Mn -ICP	ppm	1	283	276	548	600	395	377	373	357	322	316	261	224	157	144	134	142	168	141	168	173
Mo -ICP	ppm	2	200	205	338	365	125	116	106	108	120	126	106	114	102	101	97	99	78	78	71	76
Na-INA	%	0.01	0.83	0.83	0.51	0.67	0.67	0.80	0.66	0.81	0.57	0.73	1.07	1.17	0.48	0.52	0.47	0.49	0.80	0.67	0.69	0.61
Nd-INA	ppm	5	130	110	120	150	79	71	90	160	69	64	68	100	29	37	26	31	65	61	99	72
Ni -ICP	ppm	1	427	414	323	375	372	344	328	331	276	293	294	316	195	183	180	175	179	175	175	184
P-ICP	%	0.00	0.750	0.704	1.267	1.368	0.770	0.673	0.697	0.790	0.580	0.535	0.442	0.497	0.084	0.079	0.079	0.079	0.270	0.254	0.527	0.514
Pb -ICP	ppm	4	21	16	29	16	19	23	19	15	18	16	23	19	19	18	18	23	22	20	24	29
Pd-FA	ppb	2	*na*	2.0	*na*	2.0	*na*	6.0	*na*	6.0	*na*	7.0	*na*	4.0	*na*	2.0	*na*	2.0	*na*	2.0	*na*	5.0
Pt-FA	ppb	2	*na*	5.0	*na*	6.0	*na*	8.0	*na*	10.0	*na*	9.0	*na*	10.0	*na*	2.5	*na*	2.5	*na*	5.0	*na*	2.5
Rb-INA	ppm	15	42	50	35	45	38	42	31	69	42	39	53	77	85	110	84	84	90	81	74	72
Sb-INA	ppm	0	37.5	37.0	27.0	31.0	35.0	41.0	35.5	46.0	27.5	31.0	35.5	38.0	19.5	17.0	18.0	18.0	19.5	18.0	18.5	16.0
Sc-INA	ppm	0	13.0	12.0	11.0	14.0	11.0	12.0	11.5	17.0	10.8	12.0	11.0	16.0	9.8	11.0	9.7	9.9	13.0	13.0	14.0	12.0
Se-INA	ppm	3	-3.0	1.5	31.5	32.0	70.0	63.0	76.5	1.5	57.5	47.0	80.5	7.0	47.5	50.0	47.5	51.0	49.0	51.0	43.5	29.0
Sm-INA	ppm	0	24.0	22.0	23.0	29.0	15.5	15.0	15.5	28.0	12.5	13.0	10.5	17.0	4.3	5.2	4.2	5.1	11.0	11.0	17.5	15.0
Sn-INA	%	0.01	-0.010	0.010	-0.010	0.005	-0.010	0.010	-0.010	0.010	-0.010	0.005	-0.010	0.010	-0.010	0.005	-0.010	0.005	-0.010	0.005	-0.010	0.010
Sr -ICP	ppm	1	173	168	396	440	428	473	364	497	419	412	586	563	219	221	227	253	325	317	348	341
Sr-INA	%	0.05	0.070	0.025	0.005	0.025	0.085	0.110	0.070	0.025	0.005	0.070	0.105	0.130	-0.050	0.025	-0.050	0.025	-0.050	0.090	0.055	0.120
Ta-INA	ppm	0.5	1.25	2.20	1.20	3.00	0.70	0.25	-0.50	0.25	-0.50	0.25	-0.50	0.25	0.90	1.10	-0.50	0.80	0.05	1.10	0.10	0.25
Tb-INA	ppm	0.5	4.5	3.6	4.2	5.2	2.6	2.9	3.4	4.9	2.2	2.7	2.0	2.1	0.2	0.9	0.8	0.3	1.6	2.0	3.6	3.1
Th-INA	ppm	0.2	15.5	17.0	15.0	19.0	10.0	12.0	10.5	15.0	9.0	11.0	10.0	14.0	7.3	9.8	7.2	9.1	11.0	13.0	14.0	13.0
Ti -ICP	%	0.01	0.25	0.24	0.17	0.18	0.25	0.25	0.24	0.21	0.23	0.22	0.25	0.22	0.26	0.23	0.24	0.23	0.25	0.22	0.23	0.23
U-INA	ppm	0.5	73	74	165	170	110	120	105	160	85	100	67	93	19	18	19	22	35	35	56	56
V-ICP	ppm	2	382	370	593	707	767	793	728	648	607	606	817	796	1315	1289	1275	1212	1167	1163	1088	1117
W-INA	ppm	1	-1.0	0.5	-1.0	0.5	-1.0	0.5	8.0	11.0	-1.0	0.5	-1.0	0.5	-1.0	0.5	-1.0	0.5	-1.0	0.5	-1.0	0.5
Y-ICP	ppm	2	169	128	247	247	156	103	156	154	133	109	93	98	35	31	34	29	87	71	157	122
Yb-INA	ppm	0.2	10.8	8.6	10.4	12.0	7.3	6.9	7.8	11.6	6.6	7.3	6.0	8.4	3.1	3.3	3.2	3.1	6.6	6.0	10.0	7.6
Zn -ICP	ppm	1	704	787	591	681	736	713	674	810	542	642	530	664	408	421	377	383	395	422	395	465
C-org-Leco	%		1.56	1.88	2.79	3.64	3.99	3.96	4.75	5.26	5.26	5.89	6.71	7.54	9.34	9.29	9.14	9.60	7.61	7.82	6.91	6.37
C-grph-Leco	%		0.10	*na*	0.46	*na*	0.44	*na*	0.49	*na*	0.51	*na*	0.15	*na*	0.18	*na*	0.35	*na*	0.24	*na*	0.30	*na*
CO2-Leco	%		-0.01	*na*	2.70	*na*	1.65	*na*	2.47	*na*	4.06	*na*	0.65	*na*	5.43	*na*	5.31	*na*	4.63	*na*	3.76	*na*
C-ttl-Leco	%		1.67	*na*	3.82	*na*	4.91	*na*	5.87	*na*	6.86	*na*	7.00	*na*	10.75	*na*	10.75	*na*	8.95	*na*	8.07	*na*
S-Leco	%		11.25	12.90	9.62	11.20	8.53	6.45	8.12	6.27	6.98	6.08	7.45	6.90	4.42	4.17	4.18	3.97	4.47	4.18	4.70	4.31
ActLabs Rpt#			Rpt14353	Rpt12622	Rpt14353	Rpt12711	Rpt14353	Rpt12534	Rpt14353	Rpt12517	Rpt14353	Rpt12463	Rpt14353	Rpt12722	Rpt14353	Rpt12711	Rpt14353	Rpt12622	Rpt14353	Rpt12722	Rpt14353	Rpt12534

Table 7. Comparative data for average head grades (1998) and 1997 original analyses.

Sample weights and weights of the various leaching residues are presented in Table 8. Leaching results for a select group of elements are summarized in Table 9.

Assuming that the various selective leaching solutions did indeed succeed to selectively leach the intended target species, overall patterns depicted in Tables 8 indicate that the bulk of metallic content of the samples is in the final leach residues (residues after Na-Pyrophosphate leaching) suggesting that quantities contained within the leachable light organic, oxide and heavy organic fractions are negligible. This is supported by minimal weight losses noted in residue weights from one stage of the leaching to the next (Table 9) and indicates that much of the sample weight is preserved through the three leaching stages and is substantially accounted for by weights of the final residues.

Due to unexpected chemical behaviour of the samples, gains in residue weights were noted during the Acetic acid and Na-Pyrophosphate leaching stages. The weight gains are attributed to the formation of acetates during Acetic acid leaching, and the formation of various Na-phosphates during Na-Pyrophosphate leaching stage (supported also by considerable Na and P enrichment in residues as compared to head grades). Given these weight gains, calculation of mass balanced elemental partitioning has rendered impossible, although some qualitative inferences can be made within the confines of some reasonable assumptions.

Sample	Test Sample	Post Leaching Residue Weights (gm)		
No.	Weight (gm)	Heptane Leaching	Acetic Acid Leaching	Na-Pyrophosphate Leaching
7BK0412060	10.00	9.93	10.08	9.55
7BK0507680	10.00	9.94	9.98	10.33
7BK0307747	10.00	9.94	10.03	9.72
7BK0206078	10.00	9.92	10.08	10.89
7BK0113540	10.00	9.96	10.06	10.51
7BK0610962	10.00	9.98	10.18	9.77
7BK0508365	10.00	10.02	9.70	9.95
7BK0412792	10.00	9.95	9.77	10.37
7BK0611820	10.00	9.94	9.54	9.97
7BK0308625	10.00	9.93	9.77	9.94
SDO-1	10.00	9.99	10.03	9.87

Table 8. Summary of post leaching residue weights. Selective Leaching, Buckton 1997 drill core samples.

While weight gains documented from the Acetic acid leaching stage are negligible, gains measured after the Na-Pyrophosphate leaching stage are disconcerting since the leaching had been intended to dissolve all remaining organics from the samples. Considering that overall Corg content of the Second White Specks shale samples range 1.5%-10%, total organic content of the samples can be estimated to have ranged no more than 3%-15% by weight, hence weight losses from organic stripping by Na-Pyrophosphate should have reflected same, and should have reported equivalent losses in weight. A review of the C content of residues (Table 8) indicates that the Na-Pyrophosphate leaching failed to dissolve organics from the samples since C content of residues are substantially unchanged from those of the head grades (Table 10).

Na-Pyrophosphate is a relatively caustic reagent which has traditionally proven to be a good liberator of organics from various matrices. Its failure as a leaching reagent for the Second White Specks black shales remains unresolved.

Element	Units	Method	Leach Code	7BK0412060	7BK0507680	7BK0307747	7BK0206078	7BK0113540	7BK0610962	7BK0508365	7BK0412792	7BK0611820	7BK0308625	SDO1
C	%	Leco	H	1.67	3.82	4.91	5.87	6.86	7.00	10.75	10.75	8.95	8.07	10.00
C-org	%	Leco	H	1.56	2.79	3.99	4.75	5.26	6.71	9.34	9.14	7.61	6.91	9.74
C-grph	%	Leco	H	0.10	0.46	0.44	0.49	0.51	0.15	0.18	0.35	0.24	0.30	0.10
CO2	%	Leco	H	-0.01	2.70	1.65	2.47	4.06	0.65	5.43	5.31	4.63	3.76	0.79
S	%	Leco	H	11.25	9.62	8.53	8.12	6.98	7.45	4.42	4.18	4.47	4.70	5.30
Br	ppb	INA	H	3350	2000	4150	5500	7950	12000	20000	20000	17000	10000	0
Br	ppb	ICP-MS	P	-100	-100	-100	-100	-100	-100	-100	-100	-100	-100	-100
Br	ppb	ICP-MS	T	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200
Br	ppb	ICP-MS	Z	-4000	-4000	-4000	6245	-4000	6494	-4000	5888	4502	6993	13702
Br	ppb	INA	Zina	-500	1350	-500	3900	7600	12500	19500	18500	14500	8950	-500
Cl-sq	ppb	ICP-MS	P	28690	73797	59512	54872	50684	54021	46282	40939	39336	71083	-10000
Cl-sq	ppb	ICP-MS	T	21370	36051	-20000	-20000	40365	104769	80243	22177	70463	-20000	-20000
Cl-sq	ppb	ICP-MS	Z	1687802	3743717	3305463	2196971	1493511	3105303	2287527	1248072	1720137	2744143	3986134
I	ppb	ICP-MS	P	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40
I	ppb	ICP-MS	T	-70	-70	-70	-70	-70	-70	76	-70	86	-70	-70
I	ppb	ICP-MS	Z	-1350	-1350	-1350	-1350	-1350	-1350	-1350	-1350	-1350	-1350	-1350
Al	%	ICP	H	7.49	7.32	6.82	6.99	6.52	7.08	6.49	6.31	6.45	6.31	6.49
Al	%	ICP	Zaq	2.69	3.01	3.05	3.08	2.72	2.19	1.49	1.45	1.49	1.75	0.94
Al	%	ICPttl	Zttl	7.03	6.97	6.22	6.15	6.01	6.69	6.00	5.82	5.91	5.68	6.17
Ca	%	INA	H	3.00	5.00	4.50	4.50	0.00	2.00	5.50	6.00	5.00	5.50	0.00
Ca	%	ICP	H	2.64	6.07	4.86	5.40	6.43	2.64	6.43	6.73	6.46	6.07	0.96
Ca	%	ICP	Zaq	1.22	3.16	2.41	2.59	3.06	1.13	1.82	2.48	1.90	2.43	0.33
Ca	%	INA	Zina	2.00	1.50	3.00	1.50	1.50	2.00	0.50	2.00	0.50	4.50	-1.00
Ca	%	ICPttl	Zttl	2.35	5.38	3.94	4.20	4.61	2.13	2.54	3.61	2.66	3.47	0.47
Mg	%	ICP	H	0.59	0.78	0.85	0.70	0.89	0.84	0.87	0.89	0.83	0.82	0.93
Mg	%	ICP	Zaq	0.26	0.38	0.41	0.35	0.46	0.34	0.40	0.39	0.37	0.40	0.32
Mg	%	ICPttl	Zttl	0.49	0.63	0.65	0.52	0.72	0.67	0.74	0.75	0.68	0.64	0.66
K	%	ICP	H	1.23	1.01	1.22	1.36	1.20	1.45	1.69	1.57	1.64	1.60	2.64
K	%	ICP	Zaq	0.46	0.31	0.48	0.49	0.38	0.53	0.31	0.30	0.34	0.34	0.47
K	%	ICPttl	Zttl	1.26	0.98	1.18	1.26	1.14	1.44	1.59	1.51	1.51	1.49	2.63
Na	%	INA	H	0.83	0.51	0.67	0.66	0.57	1.07	0.48	0.47	0.80	0.69	0.00
Na	%	ICP	Zaq	1.59	2.04	2.29	2.80	2.54	1.85	2.16	2.74	2.22	2.07	1.09
Na	%	INA	Zina	1.86	2.25	2.51	2.87	2.71	2.21	2.33	2.80	2.45	2.26	1.28
Ba	ppb	INA	H	22000000	3000000	8100000	10500000	5350000	4450000	545000	495000	1100000	1200000	0
Ba	ppb	ICP-MS	P	4253	431	2017	1896	848	201	-5	34	77	144	-5
Ba	ppb	ICP-MS	T	1606	991	804	3474	1016	1139	3425	2472	3118	2224	839
Ba	ppb	ICP-MS	Z	807949	119940	359295	577045	96063	169698	7304	3029	6573	9743	19690
Ba	ppb	ICP	Zaq	7000	6000	6500	7000	7500	8000	25000	41500	17500	15500	26000
Ba	ppb	INA	Zina	21500000	2950000	7750000	10500000	5600000	5050000	615000	560000	950000	1150000	460000
P	%	ICP	H	0.750	1.267	0.770	0.697	0.580	0.442	0.084	0.079	0.270	0.527	0.052
P	%	ICP	Zaq	1.218	2.323	2.076	2.466	2.573	1.148	2.108	2.593	1.955	2.125	0.857
P	%	ICPttl	Zttl	1.583	3.010	2.642	3.090	3.159	1.406	2.430	3.160	2.152	2.387	0.965
Cr	ppb	INA	H	230000	45000	51000	56000	47000	77500	99000	96000	110000	94500	0
Cr	ppb	ICP	Zaq	52500	24500	25000	28500	23000	26000	37500	34500	37000	35500	13500
Cr	ppb	INA	Zina	140000	41000	43500	41500	44500	63000	87000	79500	82000	73500	61500
Fe	%	INA	H	11.15	9.59	8.50	8.03	6.49	6.87	4.01	3.75	4.78	4.78	0.00
Fe	%	ICP	Zaq	6.91	6.16	5.48	5.25	4.58	5.06	3.39	2.99	3.61	3.68	4.79
Fe	%	INA	Zina	9.78	8.07	6.89	5.84	5.28	6.53	3.85	3.35	3.96	4.22	5.83
Mn	ppb	ICP	H	283000	547500	394500	373000	322000	261000	157000	133500	168000	168000	314000
Mn	ppb	ICP-MS	P	338	206	195	379	191	233	310	285	394	-40	54
Mn	ppb	ICP-MS	T	4206	73578	42443	57909	51132	11662	32934	24022	41178	35443	38507
Mn	ppb	ICP-MS	Z	45947	79660	19741	40180	29725	40532	16091	7388	13461	21474	133404
Mn	ppb	ICP	Zaq	216500	381000	283500	260500	235000	188500	109500	98000	116500	121000	165000
Mn	ppb	ICPttl	Zttl	321500	535500	384000	337500	299000	257500	146000	132000	143500	147000	207000
As	ppb	INA	H	430000	300000	150000	140000	102500	130000	52000	50500	67500	73500	0
As	ppb	ICP-MS	P	41	47	40	27	22	-20	-20	-20	-20	-20	-20
As	ppb	ICP-MS	T	2987	2334	1466	1283	1463	1066	980	456	705	781	972
As	ppb	ICP-MS	Z	21728	19100	14124	14344	6842	8511	4844	1084	2333	1832	6131
As	ppb	ICP	Zaq	367000	284000	133500	126500	101500	111000	39500	43000	53000	61000	48000
As	ppb	INA	Zina	405000	315000	165000	140000	115000	135000	53000	50500	62500	74500	68000
Au	ppb	INA	H	11.5	7.5	9.0	5.5	7.0	8.5	4.0	6.5	7.0	4.5	0.0
Au	ppb	ICP-MS	P	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
Au	ppb	ICP-MS	T	-0.7	0.8	0.8	-0.7	-0.7	-0.7	-0.7	-0.7	0.7	-0.7	-0.7
Au	ppb	ICP-MS	Z	-15.0	18.0	23.0	-15.0	19.0	16.0	23.0	-15.0	-15.0	16.0	-15.0
Au	ppb	INA	Zina	3.5	-2.0	7.5	6.0	3.0	5.5	-2.0	1.5	0.5	0.0	1.5
Cd	ppb	ICP	H	21100	21550	22750	23000	16250	20350	20350	18950	19850	17650	-500
Cd	ppb	ICP-MS	P	4.8	0.7	5	2.2	2.4	0.7	1.7	3.6	4.3	2.4	0.7
Cd	ppb	ICP-MS	T	355	1885	984	1158	869	860	2224	2748	1807	1836	13
Cd	ppb	ICP-MS	Z	1693	2031	1644	2344	860	1154	370	295	422	684	112
Cd	ppb	ICP	Zaq	18800	18800	20600	20850	14500	17150	17100	16250	18200	15900	-500
Cd	ppb	ICPttl	Zttl	20400	19400	21800	21650	14850	18400	17300	17000	17000	15100	-500
Co	ppb	INA	H	170000	55000	42000	42000	30000	41000	20000	19000	25000	25000	0
Co	ppb	ICP-MS	P	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40
Co	ppb	ICP-MS	T	8561	9180	4834	5420	3884	1727	2454	1852	2452	2376	6737
Co	ppb	ICP-MS	Z	33287	15627	10626	9478	3384	8377	1572	882	1731	2291	21727
Co	ppb	ICP	Zaq	133000	48000	38500	37000	31500	34000	19500	18000	20000	21500	26500
Co	ppb	INA	Zina	145000	49500	42500	35000	33000	37500	20500	18000	20000	21500	26000

Table 9. Summary of selective leaching results, Tintina Selective Leaching Testwork 1997-1998

(continued next page)

Element	Units	Method	Leach Code	7BK0412060	7BK0507680	7BK0307747	7BK0206078	7BK0113540	7BK0610962	7BK0508365	7BK0412792	7BK0611820	7BK0308625	SDO1
Cu	ppb	ICP	H	48000	59500	99000	114500	90500	115000	95000	88000	100000	95000	57500
Cu	ppb	ICP-MS	P	-20	-20	34	23	-20	-20	-20	27	23	38	-20
Cu	ppb	ICP-MS	T	416	644	1528	2574	1168	1439	318	609	528	666	1758
Cu	ppb	ICP-MS	Z	4230	8350	19893	19753	8917	15056	6297	3250	5962	6412	16090
Cu	ppb	ICP	Zaq	41000	48000	77000	86000	73500	95500	77000	75000	85500	82500	40000
Cu	ppb	ICPttl	Zttl	49500	57500	88500	96500	81500	109500	87000	86000	91500	88500	46500
Mo	ppb	INA	H	213500	350000	150000	115500	120000	114500	95500	92000	93000	84500	0
Mo	ppb	ICP	H	200000	337500	125000	106000	120000	106000	102000	96500	78000	70500	150000
Mo	ppb	ICP-MS	P	25	42	29	15	19	5	-5	19	12	19	20
Mo	ppb	ICP-MS	T	937	3851	889	730	1124	536	1660	459	1006	639	1783
Mo	ppb	ICP-MS	Z	20593	68485	22583	18321	15494	18219	17273	4486	9021	6472	22880
Mo	ppb	ICP	Zaq	144500	220000	85000	72500	86000	75000	72500	77000	61000	57500	115500
Mo	ppb	INA	Zina	145000	195000	82000	60000	84500	91000	68500	78000	56500	54500	125000
Mo	ppb	ICPttl	Zttl	205000	296500	113000	93000	108000	98500	85500	97000	69000	65000	130500
Ni	ppb	INA	H	430000	335000	385000	330000	295000	295000	180000	185000	240000	220000	0
Ni	ppb	ICP	H	426500	322500	372000	328000	276000	294000	194500	179500	179000	174500	99000
Ni	ppb	ICP-MS	P	54	55	105	53	46	-20	-20	44	35	65	-20
Ni	ppb	ICP-MS	T	28137	56875	79576	62493	57193	30797	22842	15296	19531	16897	13267
Ni	ppb	ICP-MS	Z	98853	99667	152889	111332	52924	120424	23204	15785	23777	27731	43604
Ni	ppb	ICP	Zaq	275000	184000	184500	186000	175000	159500	150000	144000	139500	136500	49000
Ni	ppb	INA	Zina	110000	-200000	110000	115000	-200000	-200000	-200000	285000	270000	-200000	-200000
Ni	ppb	ICPttl	Zttl	360000	232000	223000	215000	200000	187500	158500	160500	138000	138500	61000
V	ppb	ICP	H	381500	593000	767000	728000	607000	817000	1314500	1275000	1167000	1087500	165000
V	ppb	ICP-MS	P	-20	-20	22	-20	-20	-20	-20	51	26	56	74
V	ppb	ICP-MS	T	992	1910	1572	1915	1724	1850	9455	4936	5122	3610	993
V	ppb	ICP-MS	Z	70173	65930	168561	125575	30323	135758	43037	15559	23429	43676	1967
V	ppb	ICP	Zaq	112000	354000	354500	347500	299500	293000	652500	611500	566000	592500	35500
V	ppb	ICPttl	Zttl	357500	591000	710000	660500	591500	788000	1275000	1274500	1128500	1049000	168000
Zn	ppb	INA	H	925000	635500	828500	679500	517500	634000	442000	455500	524500	552000	0
Zn	ppb	ICP	H	704000	591000	735500	673500	542000	529500	407500	377000	394500	395000	59500
Zn	ppb	ICP-MS	P	155	145	273	77	48	-10	-40	98	-40	137	-40
Zn	ppb	ICP-MS	T	19617	53978	28353	28217	25715	12754	28905	26510	24419	28511	2290
Zn	ppb	ICP-MS	Z	106188	106132	107828	98806	46699	84180	37474	24920	30875	49068	11659
Zn	ppb	ICP	Zaq	537500	436500	599500	549500	446000	424000	326000	310000	341000	338000	44000
Zn	ppb	INA	Zina	555000	475000	595000	440000	475000	455000	370000	345000	395000	330000	94000
Zn	ppb	ICPttl	Zttl	645500	506000	682500	594500	481500	482500	350000	344500	343500	339500	54500
Ce	ppb	INA	H	180000	210000	150000	145000	125000	110000	53500	53500	110000	150000	0
Ce	ppb	ICP-MS	P	16	15	24	15	12	5	-5	-5	8	27	-5
Ce	ppb	ICP-MS	T	1268	2988	2529	3163	1216	1157	1530	1799	1245	1035	1129
Ce	ppb	ICP-MS	Z	5368	2913	1937	2198	1000	1859	185	-140	247	351	3394
Ce	ppb	INA	Zina	154500	231500	170000	129000	129000	106500	46500	43000	86000	131000	70000
La	ppb	INA	H	130000	170000	110000	105000	96500	77500	33500	33500	72000	115000	0
La	ppb	ICP-MS	P	11	11	18	9	8	-5	-5	-5	5	21	-5
La	ppb	ICP-MS	T	644	1950	1523	1952	792	661	1125	1227	1035	933	372
La	ppb	ICP-MS	Z	4512	2154	1500	1642	785	1522	-140	-140	209	224	1135
La	ppb	INA	Zina	111000	173500	114500	101300	93700	72500	30200	28550	57900	99200	37000
Pb	ppb	ICP	H	21000	29000	18500	18500	18000	23000	19000	18000	21500	23500	33500
Pb	ppb	ICP-MS	P	-5	-5	-5	5	-5	-5	-5	-5	-5	-5	-5
Pb	ppb	ICP-MS	T	25	14	20	22	22	28	69	61	75	29	51
Pb	ppb	ICP-MS	Z	2800	1455	1770	1962	934	1859	503	241	670	494	536
Pb	ppb	ICP	Zaq	18000	19500	18500	16500	15500	16500	16000	16000	18000	19500	24500
Pb	ppb	ICPttl	Zttl	17000	27000	15000	23000	12500	19000	15000	17000	18500	20500	30000
Th	ppb	INA	H	15500	15000	10000	10500	8950	9950	7300	7200	11000	14000	0
Th	ppb	ICP-MS	P	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5
Th	ppb	ICP-MS	T	-7	-7	-7	-7	7	8	89	111	37	-7	152
Th	ppb	ICP-MS	Z	969	640	292	385	-140	307	-140	-140	-140	-140	595
Th	ppb	INA	Zina	13500	16500	11000	11000	9150	10500	7150	6950	10000	13500	8850
U	ppb	INA	H	73000	165000	110000	105000	85000	66500	18500	19000	34500	55500	0
U	ppb	ICP-MS	P	7	13	21	10	8	-5	-5	-5	-5	12	-5
U	ppb	ICP-MS	T	1203	4041	3258	3375	1011	1863	1810	2107	2062	2322	2044
U	ppb	ICP-MS	Z	8631	7358	9889	8366	4217	6727	2127	1844	2247	3128	7835
U	ppb	INA	Zina	53500	170000	105000	89500	77500	56000	11000	12500	24000	44000	37000
Zr	ppb	ICP-MS	P	-5	-5	17	10	10	5	-5	-5	-5	5	-5
Zr	ppb	ICP-MS	T	28	18	26	43	63	-7	184	52	88	22	114
Zr	ppb	ICP-MS	Z	4437	3638	10197	8293	3321	6381	1391	920	1525	2130	655
Zr	ppm	ICP	Zaq	0	0	500	1000	500	3500	3000	2000	500	500	0

Actlabs	Rpt#	INA	H	14353	14353	14353	14353	14353	14353	14353	14353	14353	14353	14353
Actlabs	Rpt#	ICP	H	14353b	14353b	14353b	14353b	14353b	14353b	14353b	14353b	14353b	14353b	14353b
Actlabs	Rpt#	Leco	H	14353c	14353c	14353c	14353c	14353c	14353c	14353c	14353c	14353c	14353c	14353c
Actlabs	Rpt#	ICP-MS	P	14353rpt	14353rpt	14353rpt	14353rpt	14353rpt	14353rpt	14353rpt	14353rpt	14353rpt	14353rpt	14353rpt
Actlabs	Rpt#	ICP-MS	T	14353arp	14353arp	14353arp	14353arp	14353arp	14353arp	14353arp	14353arp	14353arp	14353arp	14353arp
Actlabs	Rpt#	ICP-MS	Z	14353brp	14353brp	14353brp	14353brp	14353brp	14353brp	14353brp	14353brp	14353brp	14353brp	14353brp
Actlabs	Rpt#	ICP	Zaq	14353g	14353g	14353g	14353g	14353g	14353g	14353g	14353g	14353g	14353g	14353g
Actlabs	Rpt#	INA	Zina	14353d	14353d	14353d	14353d	14353d	14353d	14353d	14353d	14353d	14353d	14353d
Actlabs	Rpt#	ICPttl	Zttl	14353e	14353e	14353e	14353e	14353e	14353e	14353e	14353e	14353e	14353e	14353e

Notes: Analyses by Activation Labs; H=Head sample; P=Heptane leaching solution; T=Acetic Acid leaching solution;
Z=Sodium Pyrophosphate leaching solution; Zaq=aqua regia digested analyses for leaching residue; Zina=INA analysis of leaching res
Zttl=Four-acids digested analysis of leaching residue;

Sample ID	Cttl (%)				Cgrph (%)				CO2 (%)			Corg (%)				S (%)				Cttl (%)	Corg (%)
	H	H	Zcs1	Zcs2	H	H	Zcs1	Zcs2	H	H	Zcs1/Zcs2	H	H	Zcs1	Zcs2	H	H	Zcs1	Zcs2	AqRes1	AqRes2
7BK0412060	1.66	1.67	1.95	1.92	0.10	0.10	0.029	0.034	-0.01	-0.01	*na*	1.52	1.60	1.72	1.62	11.30	11.20	11.4	11.6	*na*	*na*
7BK0507680	3.88	3.76	3.63	3.48	0.46	0.46	0.141	0.138	2.85	2.55	*na*	2.77	2.80	2.89	2.78	9.49	9.74	9.13	9.14	4.16	3.11
7BK0307747	4.93	4.89	4.76	4.77	0.44	0.43	0.038	0.044	1.61	1.69	*na*	3.92	4.06	4.36	4.38	8.61	8.45	8.23	8.04	5.00	4.47
7BK0206078	5.89	5.85	5.66	5.71	0.49	0.48	0.039	0.043	2.50	2.44	*na*	4.59	4.90	4.91	4.83	8.15	8.09	6.98	7.08	5.53	5.00
7BK0113540	6.86	6.86	6.21	6.03	0.53	0.50	0.057	0.059	4.16	3.95	*na*	5.18	5.33	5.53	5.56	6.97	6.98	6.50	6.06	5.74	5.30
7BK0610962	6.97	7.03	6.99	7.47	0.15	0.15	0.027	0.029	0.61	0.69	*na*	6.63	6.79	6.65	6.92	7.46	7.44	7.22	7.03	6.16	5.59
7BK0508365	10.80	10.70	9.39	9.54	0.18	0.18	0.025	0.03	5.70	5.16	*na*	9.25	9.42	9.19	8.85	4.46	4.38	4.16	4.34	6.12	5.19
7BK0412792	10.80	10.70	9.35	9.66	0.37	0.33	0.025	0.035	5.43	5.19	*na*	9.13	9.14	8.78	8.22	4.19	4.17	6.96	6.82	6.14	5.42
7BK0611820	8.91	8.98	7.96	7.94	0.25	0.24	0.036	0.036	4.54	4.71	*na*	7.65	7.57	7.52	7.00	4.47	4.46	4.21	4.18	*na*	*na*
7BK0308625	8.07	8.06	7.38	7.12	0.30	0.30	0.033	0.036	3.77	3.74	*na*	6.89	6.93	7.02	6.48	4.69	4.70	4.32	4.40	4.87	5.54
SDO-1	10.00	10.00	9.89	9.32	0.10	0.10	0.021	0.022	0.81	0.77	*na*	9.68	9.79	9.70	9.03	5.34	5.26	4.07	4.25	9.69	8.95

(1) Analyses by ActLabs 1997-98. Certificates as follows: Rpt 14353 for H series, Rpt 14353f for Zcs1 and Zcs2 series; Rpt 15182 for AqRes series

(2) Sample fractions as follows: H=Head Sample; Zcs1/Zcs2=Residue after all selective leaching; AqRes=Residue from Aqua Regia digestion of head sample

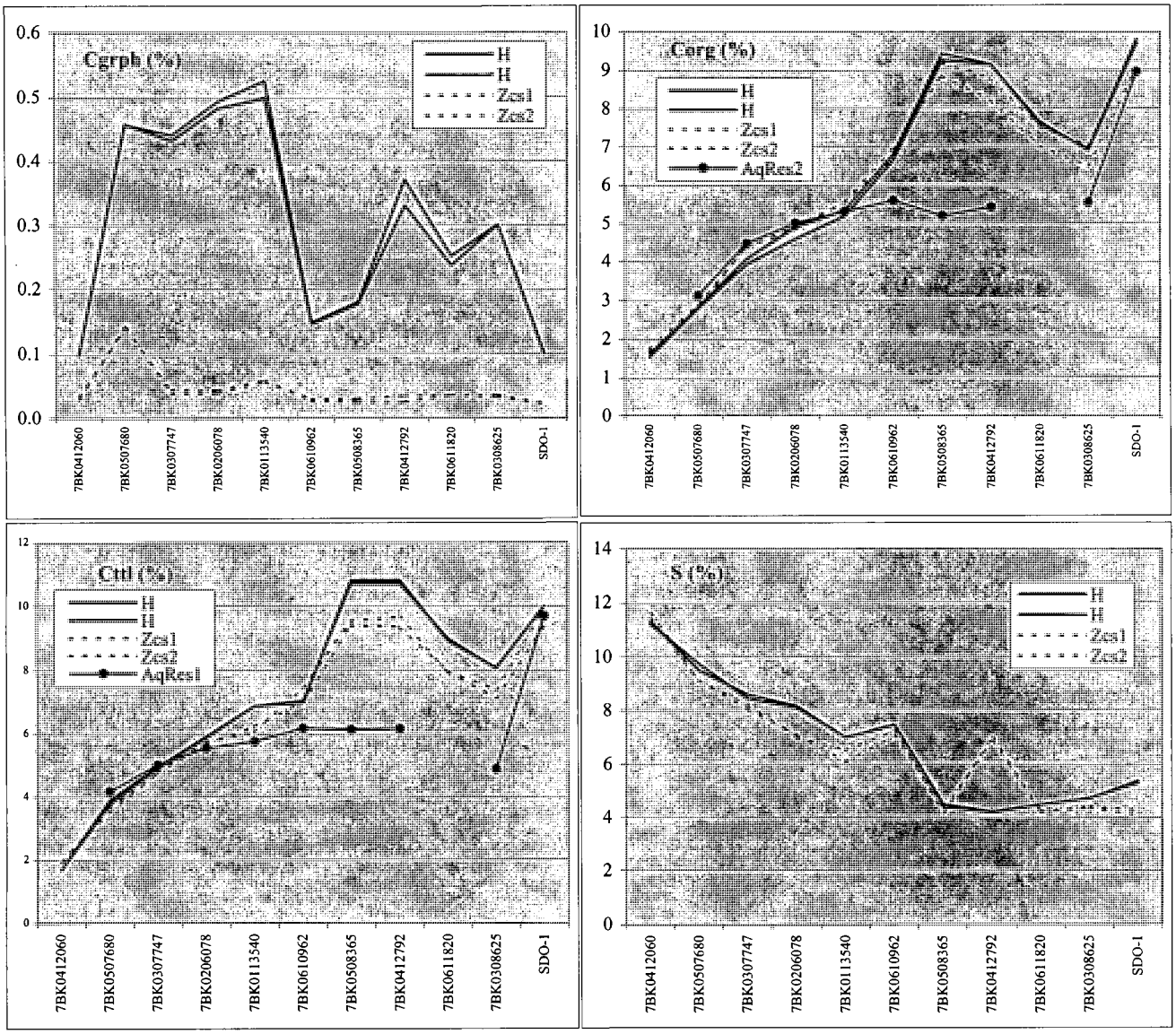


Table 10. Comparative Carbon contents for various leaching residue fractions. C content of residues from Aqua Regia dissolution of head samples also shown. Tintina Selective Leaching Testwork 1997-1998

Despite the complexities introduced by weight gains during two of the leaching stages, and failure to strip the samples of organics, inferences can be made regarding elemental partitioning within the final residues based on compositional comparisons of Aqua Regia dissolved samples (Zaq) with those from samples which were dissolved in four-acids (Zttl) and those which were analyzed without any dissolution by INA (Zina). As a reasonably good first approximation, data from the various sample digestion procedures can be expected to reflect the following speciation:

- AquaRegia soluble fraction (Zaq): predominantly Sulfides + native metals + minor clays;
- Four-acids soluble (Zttl): Sulfides + native metals + silicates + complex clays + minor sulfates + phosphates
- Zina: all of the above + sulfates + organically bound elements

According to the above scheme, non-sulfide resident metals can be estimated by difference from comparisons between Zaq and Zttl. Similarly, elements bound principally in sulfates (e.g. in barite, gypsum, anhydrite etc.) can be seen reflected predominantly in the Zina data.

To further investigate the above, a set of head samples were dissolved in AquaRegia, residues therefrom were weighed and analyzed for Cttl and Corg. The results (Table 11) indicate that AquaRegia soluble mineralogy of the samples comprises 25%-40% of their matrix, the balance being made up of organics (some 4%-8%) and other AquaRegia non-soluble material (remaining 50%-70%).

Sample No	Residue - Test1		Residue - Test2		Average	AquaRegia	AquaRegia	Cttl (%)	Corg (%)
	(gm)	(%)	(gm)	(%)	(%)	soluble (calc %)	non-soluble (%)	Residue1	Residue2
7BK0412060	0.295	59.0%	0.294	58.8%	59%	41%	59%	*na*	*na*
7BK0507680	0.266	53.2%	0.269	53.8%	54%	47%	54%	4.16	3.11
7BK0307747	0.291	58.2%	0.301	60.2%	59%	41%	59%	5.00	4.47
7BK0206078	0.299	59.8%	0.337	67.4%	64%	36%	64%	5.53	5.00
7BK0113540	0.296	59.2%	0.320	64.0%	62%	38%	62%	5.74	5.30
7BK0610962	0.353	70.6%	0.354	70.8%	71%	29%	71%	6.16	5.59
7BK0508365	0.347	69.4%	0.358	71.6%	71%	30%	71%	6.12	5.19
7BK0412792	0.326	65.2%	0.370	74.0%	70%	30%	70%	6.14	5.42
7BK0611820	0.367	73.4%	0.376	75.2%	74%	26%	74%	*na*	*na*
7BK0308625	0.377	75.4%	0.375	75.0%	75%	25%	75%	4.87	5.54
SDO-1	0.417	83.4%	0.377	75.4%	79%	21%	79%	9.69	8.95

(1) 0.5gm initial sample used. (2) Actlabs Rpt 14353h

Table 11. Residue weights following Aqua Regia dissolution: Head Sample Cut#3 Selective Leaching Suite, Buckton drill core

The persistence of considerable Corg in the residues is compatible with the balance of leaching tests previously discussed, reiterating insolubility of much of the organic content of the rock matrix. The lack of any discernible preferential Corg enrichment or depletion in the samples given the consumption of some sample material further indicates that at least some of the Corg is in forms soluble in Aqua Regia.

5.4 Concluding Remarks

It is evident from the above that the selective leaching testwork failed to achieve its intended goals of providing definitive and quantitative insight into elemental partitioning within the rock matrix. The analytical work was further complicated by the necessarily small sample sizes (10gm feed) and the even smaller residue weights requiring meticulous handling. Compound uncertainties attributable to restricted sample size are

difficult to assess at this time. The test results do, however, overall suggest that a considerable portion of the metallic content of the samples tested is in sulfide or, in the least, non-organic form given the lack of hyper-enrichment in residues which otherwise continued to report relatively high Corg. A decision was, accordingly, taken following completion of the leaching tests to proceed toward preparation of physical concentrates from larger samples under more rigorous metallurgical conditions relying on traditional flotation procedures.

6. BENCHTESTS - 1998

6.1 INTRODUCTION

By far the most attractive economic features of the laterally extensive metalliferous zones discovered in the Second White Specks Formation black shales at the Asphalt and Buckton Properties are their proximity to surface and unconsolidated nature hence amenability to extraction by low cost large scale bulk mining. Previous surface exploration work and drilling had successfully confirmed preferential metal enrichment of the Formation indicating also an association of the better grades with the more sulfidic and bentonitic sections of the Formation. Although grades for any given individual metal were found to be low, bulk grades for some of the "pay metals" on a combined basis (Cu+Mo+Ni+Co+V) represented sufficiently high in-situ values (avg $19/ton, max $65/ton) to warrant investigation of the feasibility and economics of their bulk extraction on a combined basis.

An initial step to achieve the above comprised selective leaching testwork initiated during late 1997 to evaluate metals partitioning among the various components of the shale (see previous Chapter). This work was completed by early 1998 and indicated that a significant proportion of the metals reported by assaying are hosted in non-organic forms. Given these findings, AGRA MONENCO were retained during March/98 to oversee the necessary benchtesting of larger samples to enable formulation of a suitable flowsheet and to evaluate reagent consumption costs. The testwork was carried out by Ortech Corporation at their Oakville, Ontario, laboratories. Although this work had originally been slated for completion by late July/98, its timely completion met with many delays due to difficulties encountered during flotation tests intended to produce a suitable concentrate.

6.2 TESTWORK DESCRIPTION

A 65kg weighted composite sample, herein referred to as sample CMPB245, was constructed early in 1998 at Ortech Laboratories for use in the beneficiation testwork completed during 1998. The composite sample was prepared by combining proportionate amounts of previously crushed material from 1996-1997 drill core intervals of all samples from the Second White Specks Formation intercepts cored in Buckton Property drill holes 7BK02, 7BK04 and 7BK05. Second White Specks Formation thicknesses as intersected in the three vertical holes are as follows: 7BK02-18.4m, 7BK04-21.1m, 7BK05-18.4m. Weighted average composition for the composite sample is summarized in Table 12. Sample weights, test procedures and results are outlined in a report by AGRA and Ortech appended herein (Appendix B2).

Considering the low metal concentrations within the shales, the initial sets of tests focused entirely on preparation of a concentrate suitable for subsequent leaching. A variety of flotation procedures as well as magnetic separation tests were completed to achieve concentration. Low pH leaching test were also carried out.

Element	Detection	Content	Element	Detection	Content	Element	Detection	Content	Element	Detection	Content
Ag-ICP	0.4 ppm	0.5	Co-INA	1 ppm	23	Mo-ICP	2 ppm	70	Sm-INA	0.1 ppm	9.2
Al-ICP	0.01 %	6.68	Cr-INA	5 ppm	94	Na-INA	0.01 %	0.55	Sn-INA	0.01 %	0.006
As-INA	0.5 ppm	61.4	Cs-INA	1 ppm	5	Nd-INA	5 ppm	49	Sr-ICP	1 ppm	249
Au-FA	1 ppb	4	Cu-ICP	1 ppm	73	Ni-ICP	1 ppm	136	Ta-INA	0.5 ppm	0.68
Au-INA	2 ppb	6	Eu-INA	0.2 ppm	2.4	P-ICP	0.001 %	0.236	Tb-INA	0.5 ppm	1.5
Ba-INA	50 ppm	1782	Fe-INA	0.01 %	4.77	Pb-ICP	4 ppm	19	Th-INA	0.2 ppm	12.1
Bi-ICP	5 ppm	3.4	Hf-INA	1 ppm	4.9	Pd-FA	3 ppb	2	Ti-ICP	0.01 %	0.25
Br-INA	0.5 ppm	13.9	K-ICP	0.01 %	1.75	Pt-FA	5 ppb	2.8	U-INA	0.5 ppm	29.1
C-org Leco	0.003 %	7.011	La-INA	0.5 ppm	57.8	Rb-INA	15 ppm	90	V-ICP	2 ppm	672
Ca-ICP	0.01 %	5.230	Lu-INA	0.05 ppm	0.79	S-Leco	0.003 %	4.050	W-INA	1 ppm	0.8
Cd-ICP	0.5 ppm	8.43	Mg-ICP	0.01 %	0.86	Sb-INA	0.1 ppm	12.2	Y-ICP	2 ppm	56
Ce-INA	3 ppm	91	Mn-ICP	1 ppm	202	Sc-INA	0.1 ppm	12.3	Yb-INA	0.2 ppm	5.0
						Se-INA	3 ppm	27.2	Zn-ICP	1 ppm	303

Table 12. Weighted average composition for composite sample CMPB245, Benchtesting 1998.

6.3 TEST RESULTS AND CONCLUSIONS

Despite considerable efforts, the tests failed to produce concentrates since compositions of material flotated reported compositions nearly identical to the feed material. It is particularly significant that material produced by flotation did not report concentration of any element and that the tests only served to demonstrate unsuitability of floatation to the rock matrix. Flotation procedures showed no selectivity for any of the metal species, or any other element for that matter, regardless of mitigating activation reagents used, and concentrated fractions were found to be in most part slimes physically and chemically nearly identical to the feed material.

AGRA's conclusions were that without due concentration, reagent consumption costs would be prohibitively high, and it recommended that no additional metallurgical tests be carried out on the samples.

The above findings are surprising considering that the Second White Specks black shales, on average, contain some 10%-20% (by volume) visible Fe-sulfides most of which should have reported to the flotation concentrates in the form of concentration in Fe. The failure of selective elemental concentration during the tests could be due to the generally fine and powdery nature of the shale samples (once dried) and the overall lack of a granularity hiatus between matrix and foreground mineralogy. The Second White Specks black shales easily disaggregate into a very fine clay powder once they are dried and crushed, and the fineness of the powder has previously regularly presented considerable challenges to all mineral concentration work carried out by Tintina, often necessitating treatment of the slimes with clay stabilizers (flocculents and deflocculants). Similar difficulties have also been encountered by others during preparation of mineral concentrates (personal communication M.Dufresne, SRC, 1997).

7. DIAMOND POTENTIAL & INDICATOR MINERAL STUDIES 1997-1999

7.1 INTRODUCTION

Tintina's focus during the past several years of its activities throughout northeast Alberta has been entirely on the region's metallic potential despite the frequent incidental discovery, during regional reconnaissance work of 1994-1996, of prospective mineralogy and geology bespeaking an equally favourable potential for the discovery of kimberlites in certain portions of the region, especially Cretaceous portions straddling the Peace River Arch. Such incidental discoveries included the common observation of abundant pristine euhedral fine zircons, ilmenites and chromite in mineral concentrates of alluvium as well as of outcrop samples examined during 1994-1995 regional programs from certain parts of the area, and the subsequent discovery during the 1996-1997 drilling programs at the Asphalt and Buckton Properties of pyroclastic material and possible eclogitic garnets in bentonitic Second White Specks Formation drill core supported also by other favourable mineralogy and by indications of nearby venting manifested as localized proximal bentonite mounds in the area.

Several studies were, accordingly, completed during 1997-1999 to collect orientative data with a view to initiating a broader assessment of the diamond potential of the Birch Mountains Area properties, and more specifically the Asphalt and Buckton Properties. These studies comprise review of previously gathered airborne geophysical data and detailed mineral studies of previously collected samples as well as of material from follow-up sampling.

The above work was initiated in response to a continuous stream of reports by Ashton Mining on the discovery of diamondiferous Kimberlite pipes venting into Cretaceous shales overlying the Peace River Arch in northern Alberta, from a similar geological setting as that of the Asphalt and Buckton Properties, and the discovery by Kennecott Canada Exploration of a new kimberlite field in the Birch Mountains located on trend of the Arch some 50km to the southwest of the Asphalt Property. The discoveries, when combined with Tintina's preliminary findings from its work in the Birch Mountains, suggested a strong likelihood for the existence of as yet undiscovered kimberlitic pipes in the Birch Mountains.

7.2 AEROMAGNETIC DATA (1997) REVIEW - ASPHALT AND BUCKTON PROPERTIES

A high resolution aeromagnetic survey was previously (Jun/97) completed over the Asphalt and Buckton Properties to better resolve structural trends in the area and to investigate the suspected presence of vents. The survey was carried out by Questor Surveys Limited and data therefrom were processed and presented by World Geoscience. (Data and reports previously filed toward assessment work, Sabag 1998.

In addition to helping define major magnetic trends across the Properties believed to be in most part Precambrian features some 1000m below surface, the aeromagnetic data also defined a number small near-circular or closed anomalies some of which underlie geochemically anomalous portions of the Asphalt and Buckton Properties. The most

conspicuous of these features are an easterly oblong anomaly at the top of the Pierre River valley at the Asphalt Property and a circular anomaly immediately to the north of GOS-1 gossan at Buckton Property.

The anomalies in the Pierre River area, are also associated with several conspicuous circular topographic features, one of which is also associated with alluvial gold discovered immediately downstream in the Pierre River at several sites during 1995 stream sediment sampling work (Sabag 1996a).

A preliminary review of the airborne geophysical data by Dr.W.G.Wahl of Wahlex Limited (Sabag 1998), in conjunction with heavy mineral concentrates databases and geochemical data compiled by Tintina from previous work in the area, had concluded that:

(i) that diamond stability field minerals were indeed recovered from surface sampling in the area, and that same are probably locally derived;

(ii) that the minerals are derived from surface exposures of ejecta from diatremes introduced during Cretaceous sedimentation;

(iii) that the diatremes would be reflected in the geophysical data as "blind" intrusives;

(iv) that several small magnetic anomalies can be discerned from the geophysical data indicative of circular intrusives at the precambrian surface. Two of these anomalies measure some 1500m in diameter and are indicative of zoned intrusives at the precambrian surface beneath the Asphalt and Buckton Properties.

Wahlex also identified a number of anomalies which could be readily investigated by field visits. While several of these anomalies located in the Asphalt Property were selected for field inspection during late 1997, field work was necessarily deferred after several attempts due to poor weather and snow cover.

The aeromagnetic data were reviewed in greater detail during the winter 1997-1998 by Mr.M.Dufresne of APEX Geoscience, with the intention of selecting specific localities for subsequent field follow-up and additional sampling. Following a cursory review of the contoured aeromagnetics data, seven general areas were selected at the Asphalt and Buckton Properties and further examined in greater detail (in line profiles rather than as contoured data) to determine the potential for locating discreet shallow sourced magnetic bodies such as kimberlitic intrusions or related proximal volcanics. APEX's findings are outlined in a memo report dated March 5, 1998 (Appendix C1), comments and conclusions therefrom are excerpted below, as is a location map which is reiterated herein as Figure 18. (maps by World Geoscience Ltd. referred to by APEX were previously filed by Tintina in assessment report Sabag 1998).

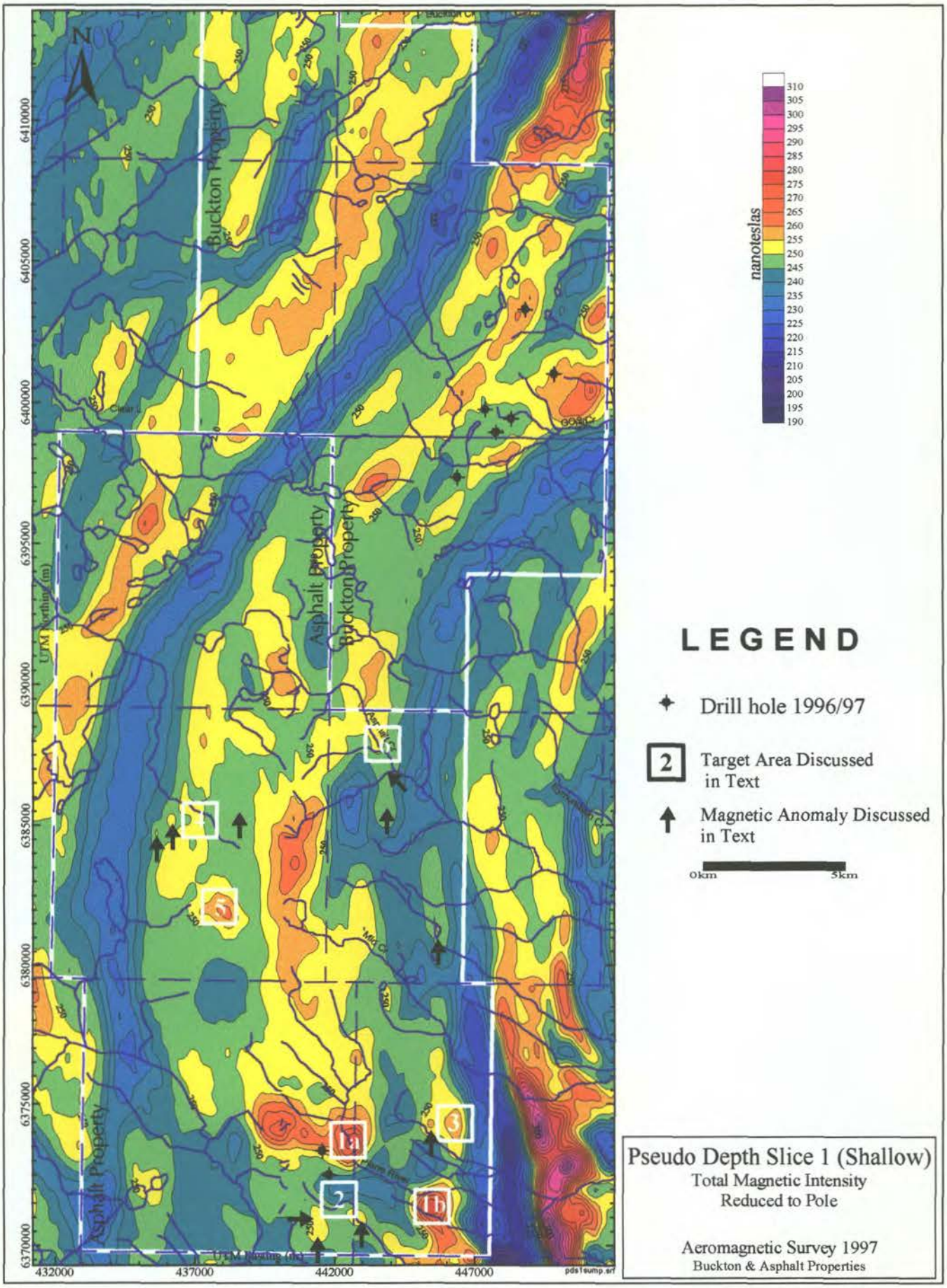


Figure 18. Aeromagnetic Survey 1997, Asphalt and Buckton Properties, showing localities selected for review, APEX Geoscience 1998. Total Magnetic Intensity contours, Pseudo Depth Slice 1 (after Figure 1, APEX Geoscience, memo report March 5, 1998).

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Localities selected by APEX as areas of merit are outlined below:

Area 1a: defined by two large magnetic anomalies near the headwaters of the Pierre River that are likely deeply rooted (as they are visible through all depth slice maps). Examination of the total field flight line magnetic profiles indicate that these two large magnetic anomalies can be resolved into several well defined 5 to 15 nT peaks and shoulder anomalies. These magnetic peaks and shoulder anomalies likely are the result of 1 to 1.2 km diameter deeply sourced magnetic features that are probably related to basement. There exists the possibility that some of the shoulder anomalies are the result of a more shallow magnetic source. One example exists on the east bank of the Pierre River, on line 41030 at the township boundary (World Geoscience Ltd's map of the Second Vertical Derivative of the Total Magnetic Field, in Sabag 1998). These magnetic anomalies are of low to moderate priority on the basis of their magnetic signature alone. The association of geochemical anomalies and geological anomalies in the Pierre drill holes and along the Pierre River drainage indicates that these anomalies warrant some follow-up investigation.

Area 1b: This anomaly appears to be a large amplitude basement feature up against a major north trending fault contact, lithologic contact or both in basement. This magnetic anomaly is not likely related to a shallow sourced feature and is therefore considered low priority in the search for near-surface intrusions or volcanics that exist high up in the sedimentary column.

Area 2: Several weak magnetic anomalies between the Tar River and the Pierre River along a tributary to the Tar River. At least three magnetic anomalies appear to be derived from sources that are from 150 to 250 m below surface that range from 10 to 45 nT in strength and are up to about 500 m in diameter (visible on World Geoscience LTD's map of the Second Vertical Derivative of the Total Magnetic Field, in Sabag 1998). These magnetic anomalies warrant further geophysical modelling and, depending upon the results of the modelling, follow-up fieldwork.

Area 3: A large magnetic anomaly which can be resolved into two magnetic anomalies along line 41010 (World Geoscience Ltd's map of the Second Vertical Derivative of the Total Magnetic Field, Sabag 1998). The eastern and visually larger of the two anomalies shows up as a poor total field magnetic anomaly in profile. The western anomaly shows up as a well defined 7 nT shoulder anomaly that is likely derived from a shallow magnetic source that is 200 to 300 m in diameter. The western anomaly warrants further work.

Several magnetic anomalies that exist east of the general area of anomalies 1a to 3, on the east side of the pronounced north trending magnetic trough, were also reviewed. All of the anomalies are poor and not likely related to shallow sourced intrusions or related pyroclastics but are likely either magnetic artefacts (related to noise or a result of gridding the data) or subtle variations in the basement rocks.

Area 4: Characterised by three pronounced high frequency magnetic anomalies in Pseudo Depth Slice 1 contours and in the Second Vertical Derivative map (World Geoscience Ltd, in Sabag 1998) all of which yielded extremely weak total field magnetic profiles and are likely the result of weak inflections of the magnetic data that likely reflect magnetic noise, topographic variations, variations in the basement signature or be an artifact of data gridding procedures. No follow-up work is recommended for these anomalies.

Area 5: Characterised by a strong basement feature that resolves into 2 or 3 discreet magnetic anomalies in Pseudo Depth Slice 1 contours. Upon more detailed examination, no evidence of shallow sourced magnetic anomalies was found. No further work is recommended for the anomalies in this area at this time.

Area 6: Located near the headwaters of Asphalt Creek, the area is characterised by a pair of interesting looking Pseudo Depth Slice 1 anomalies with 5 to 10 nT shoulder anomalies on the total field magnetic profiles. The northernmost anomaly along line 40700, corresponds almost exactly to an outcrop of Second White Specks Shale that yielded some interesting geochemistry (the anomaly may reflect an accumulation of magnetic material in the base of Second White Specks bone beds or an accumulation of magnetic minerals within pyroclastic horizons in upper Second White Specks). The second anomaly, about 1 km to the south of the northernmost anomaly, yields a well defined shoulder anomaly

of about 10 nT that appears to be related to a magnetic source that is 150 m or less below surface and 400 to 500 m in diameter. Both of these anomalies warrant follow-up work. A third interesting anomaly was identified about 5 km to the southeast beneath a small lake. The magnetic anomaly yielded a sharp shallow sourced 7 nT peak with a diameter of about 250 m along line 40840 (previous lake sediment sample has been collected from the lake overlying the magnetic anomaly). This anomaly is part of a linear trend that is about 3 km in length and may or may not warrant further work.

Other Areas: Other areas of possible interest for further investigation for shallow sourced volcanics includes the area north of Clear Lake where several interesting looking weak magnetic anomalies are visible on the Pseudo Depth Slice 1 map, particularly in the western half of Twps 101 and 102, Rge 13.

In closing, APEX concluded that that several of the magnetic anomalies reviewed could well be indicative of near-surface intrusions or related volcanics. Given the favourable findings based on a cursory review of a small subset of the available magnetic data from the Properties, APEX recommended that detailed review of all of the aeromagnetic data be completed, complemented by follow-up field work to include one or more of surface prospecting, ground geophysics and/or drill testing. Portions of these recommendations were implemented by way of a field resampling program during September 1998 confined to the southern portion of the Asphalt Property (details outlined in pages following).

7.3 SRC Garnet Picks - Asphalt and Buckton Properties

Five composite samples were reconstructed following the 1996-1997 drilling program from certain bentonitic sections of Second White Specks Formation drill core form the Asphalt and Buckton Properties (Table 13. See also Sabag 1998). The composite samples were submitted to the SRC for the preparation of heavy mineral concentrates, review and picking. The SRC identified and picked many garnets from the mineral concentrates, including possible eclogitic garnet from sample SRC97-1.

Sample No.	Drill Hole	From (m)	To (m)	Length (m)	Total Weight (gm)	SRC Concentrate Weights (gm)		
						+1.7mm	MAG-mid	MAG-heavy
SRC97-1	7AS01	11.27	14.50	3.23				
		15.19	15.28	0.09	5735	0.00	1.26	0.54
		15.61	17.29	1.68				
		18.39	18.48	0.09				
SRC97-2	7BK03	75.03	78.77	3.74	4568	0.00	1.32	0.21
SRC97-3	7BK03	78.77	84.31	5.54	8066	0.00	0.98	0.31
SRC97-4	7AS01	44.02	45.08	1.06	2458	0.00	0.09	0.01
SRC97-5	7BK03	93.36	97.35	3.99	5180	0.00	0.82	0.04

Table 13. Specifications for composite samples reconstructed for mineral concentration and picking by SRC 1997 (see also Sabag 1998)

A selection of 2-5 garnet grains was made from each of the five composite samples by Mr.M.Dufresne of APEX Geoscience and submitted to Mr.T.Bonil (University of Saskatchewan) for microprobe analysis. Results from this work are included in a September/98 memo report and attachments from APEX appended herein (Appendix C2). Microprobe analyses are reiterated below in Table 14, and Mr.Dufresne's conclusions are excerpted.

Sample#	Pt#	Mineral	SiO2	TiO2	Al2O3	Cr2O3	FeO	MgO	MnO	CaO	Na2O	K2O	Total
SRC 97-2	1	G_05_Magnesian_Almandine	38.9	0.09	21.6	0.05	25.8	5.6	0.43	7.8	0.13	0.00	100.4
SRC 97-2	2	G_03_Calcic_Pyrope_Almandine	38.1	0.05	22.3	0.01	23.0	5.8	0.66	10.3	0.02	0.00	100.2
SRC 97-3	3	G_03_Calcic_Pyrope_Almandine	39.2	0.03	22.9	0.00	21.5	6.5	0.57	10.0	0.00	0.00	100.6
SRC 97-3	4	G_05_Magnesian_Almandine	38.9	0.05	22.1	0.00	24.7	5.2	0.81	8.9	0.03	0.00	100.7
SRC 97-4	5	G_05_Magnesian_Almandine	38.0	0.06	21.3	0.05	23.4	4.4	0.95	11.0	0.01	0.00	99.2
SRC 97-4	6	G_03_Calcic_Pyrope_Almandine	39.3	0.21	22.2	0.00	23.6	6.5	0.75	8.3	0.06	0.00	100.8
SRC 97-4	7	Almandine	38.7	0.10	21.9	0.00	31.7	3.6	1.01	4.8	0.05	0.00	101.7
SRC 97-4	8	G_03_Calcic_Pyrope_Almandine	39.7	0.14	22.9	0.00	21.2	7.3	0.45	9.5	0.07	0.00	101.2
SRC 97-5	9	G_05_Magnesian_Almandine	39.2	0.06	22.1	0.02	24.0	5.8	0.55	8.7	0.07	0.00	100.4
SRC 97-5	10	G_05_Magnesian_Almandine	37.7	0.10	21.3	0.02	25.1	3.1	0.84	11.4	0.04	0.00	99.6
SRC 97-5	11	G_05_Magnesian_Almandine	37.7	0.09	21.6	0.04	26.8	3.3	0.67	9.6	0.03	0.00	99.7
SRC 97-5	12	Almandine	37.3	0.12	21.1	0.00	32.1	0.3	1.51	8.4	0.00	0.00	100.8
SRC 97-1	13	G_03_Calcic_Pyrope_Almandine	38.6	0.06	21.9	0.04	22.3	6.5	0.60	9.7	0.00	0.00	99.8
SRC 97-1	14	G_01_Titanian_Pyrope	42.3	0.83	20.9	2.30	9.0	19.7	0.27	5.0	0.07	0.00	100.4
SRC 97-1	15	G_03_Calcic_Pyrope_Almandine	39.1	0.09	22.7	0.00	22.7	5.1	0.65	10.4	0.00	0.00	100.8
SRC 97-1	16	G_05_Magnesian_Almandine	39.1	0.02	22.5	0.03	25.3	5.6	0.54	8.2	0.00	0.00	101.2
SPI pyrope std		G_09_Chrome_Pyrope	42.5	0.00	20.7	4.86	7.2	19.3	0.42	5.6	0.03	0.00	100.5

Table 14. Electron microprobe analytical results (oxide %) for select SRC-picked garnets from 1997 drill core samples. Analyses by T.Bonil, 1998 (See Appendix C2).

Mr.Dufresne's conclusions are as follows:

- The microprobe analytical data indicate that most of the garnets are almandines with some possible G3 or G5 of possible eclogitic origin which by themselves would likely not be considered significant in most sampling programs as almandine garnets of crustal origin are common in northern Alberta;
- one of the orange garnets picked from sample SRC-1, reported chemistry consistent with a G1 high titanium (0.83 wt% TiO2), high magnesium (19.69 wt% MgO) pyropic garnet with significant chromium (2.30 wt% Cr2O3). Garnets of this chemistry typify the macrocryst-megacryst suite of orange pyrope garnets that are commonly found in kimberlites but very few other rock types. The recovery of this single grain from the highly bentonitic Second White Specks shale, which contains little or no detrital clastic material, indicates that it could be derived from an ash fall possibly derived from a local kimberlite breaching surface in an explosive manner;
- The recovery of the above G1 pyropic garnet may also indicate that the low iron (<22 to 23 wt% FeO) G3 or G5 almandine garnets could be of eclogitic origin if they are derived from an ash possibly connected to the eruption of a kimberlite or of a related deeply derived alkaline volcanic rock of possible local origin. Several of the low iron garnets also yielded elevated concentrations of sodium and titanium, which is characteristic of those eclogitic garnets that have been recovered as inclusions in diamonds from around the world.

Based on the above findings, Mr.Dufresne recommended (i) that other possible garnet grains from the five samples be analysed, (ii) that concentrates from the five composites be re-examined in greater detail with the intent of picking possible garnets as well as any such other diagnostic minerals including oxides minerals that could be important, (iii) stream sediment concentrates collected during previous metal exploration programs by Tintina from the Birch Mountains Area be processed and examined for possible diamond indicator minerals.

Above recommendations (i) and (ii) were implemented during the latter part of 1998, and same are discussed in sections following.

7.4 Resampling Program 1998 - Asphalt Property

Several localities selected by APEX Geoscience following its review of the aeromagnetic data were visited during September/98 and nine large stream sediment samples were collected from key localities. The target areas visited were Areas 1a, 1b, 2 and 3 (see section above) all of which are within the southernmost parts of the Asphalt Property. Localities sampled comprise sediments downstream from Areas 3, 1a and 2. Sample locations are shown in Figure 18.

The nine samples (series 8CBH001-8CBH009) were submitted to Cominco mineral treatment facilities, Vancouver B.C., for sizing and concentration, and heavy mineral fractions therefrom were subsequently submitted to I.M.Morrison Geological Services, Delta B.C., for examination and picking.

APEX's field sampling report is appended herein (Appendix C3). Mineral examination results are discussed in the section below along with other samples with were submitted to I.M.Morrison for detailed microscopy and subsequent probing.

7.5 Indicator Mineral Studies - Asphalt, Buckton and McIvor Properties

Several suites of samples were submitted to I.M.Morrison Geological Services during 1998 for detailed microscopy and picking. The samples comprised the following: (i) incidental possible indicator minerals picked during 1994-1996 regional reconnaissance field programs; (ii) minerals picked by J.Lourim during 1995 (see J.Lourim report appended in Sabag 1996a); (iii) mineral concentrates previously reviewed by the SRC; and (iv) mineral concentrates from the above 1998 resampling at the Asphalt Property. The suites collectively provided sample coverage from the Asphalt, Buckton and the McIvor Properties (Figures 19, 20 and 21, respectively). Samples are tabulated below (Table 15).

Sample	Easting	Northing
5088	435840	6426780
5089	437390	6427440
5062, 9040	440645	6428175
C040WK022	436100	6426950
C064MM009	442200	6374200
C064MM012	442100	6374150
C064MM016	442400	6374800
C064MM019	442400	6374950
MM3	440241	6427919
P032EC029	426150	6394350
P032EC031	427750	6396650
P041MM026	426500	6428700
P041MM028	426400	6428400

Sample	Easting	Northing
P048AT060	439300	6431400
P048AT063	437400	6433400
P048DH003	435200	6434750
P049MM025	426500	6430500
P064EC025	445750	6371950
P064EC026	446100	6371975
P064EC027	446625	6371900
P064EC028	447100	6371650
P070JG006	446000	6397925
P076EC020	448500	6411250
P076EC023	449225	6411975
P076JG002	448000	6413400
P076JG003	444250	6412275

Resampling 198 Suite		
Sample	Easting	Northing
8CBH001	442230	6371460
8CBH002	442620	6371410
8CBH003	443230	6370510
8CBH004	442850	6370780
8CBH005	442320	6369290
8CBH006	443780	6372275
8CBH007	446340	6373100
8CBH008	443190	6372610
8CBH009	443510	6372450

SRC Sample Suite		
Sample	Easting	Northing
SRC97-1	441800	6372500
SRC97-2	447770	6398930
SRC97-3	447770	6398930
SRC97-4	441800	6372500
SRC97-5	447770	6398930

Table 15. List of samples re-examined (showing also UTM coordinates)

Concentrates were sized as required by I.M.Morrison and minerals were picked following detailed binocular examination. Indicator minerals documented are tabulated in reports from I.M.Morrison which are appended (Appendix C4.1 and C4.2). It suffices to say that, in addition to garnets, a number of potential indicator minerals were picked including chromite, ilmenite, chrome diopside, kyanite, and olivine. Select mineral grains were subsequently submitted by I.M.Morrison to R.L.Barnett for electron microprobe analyses. The analytical results are appended (Appendix C4.3).

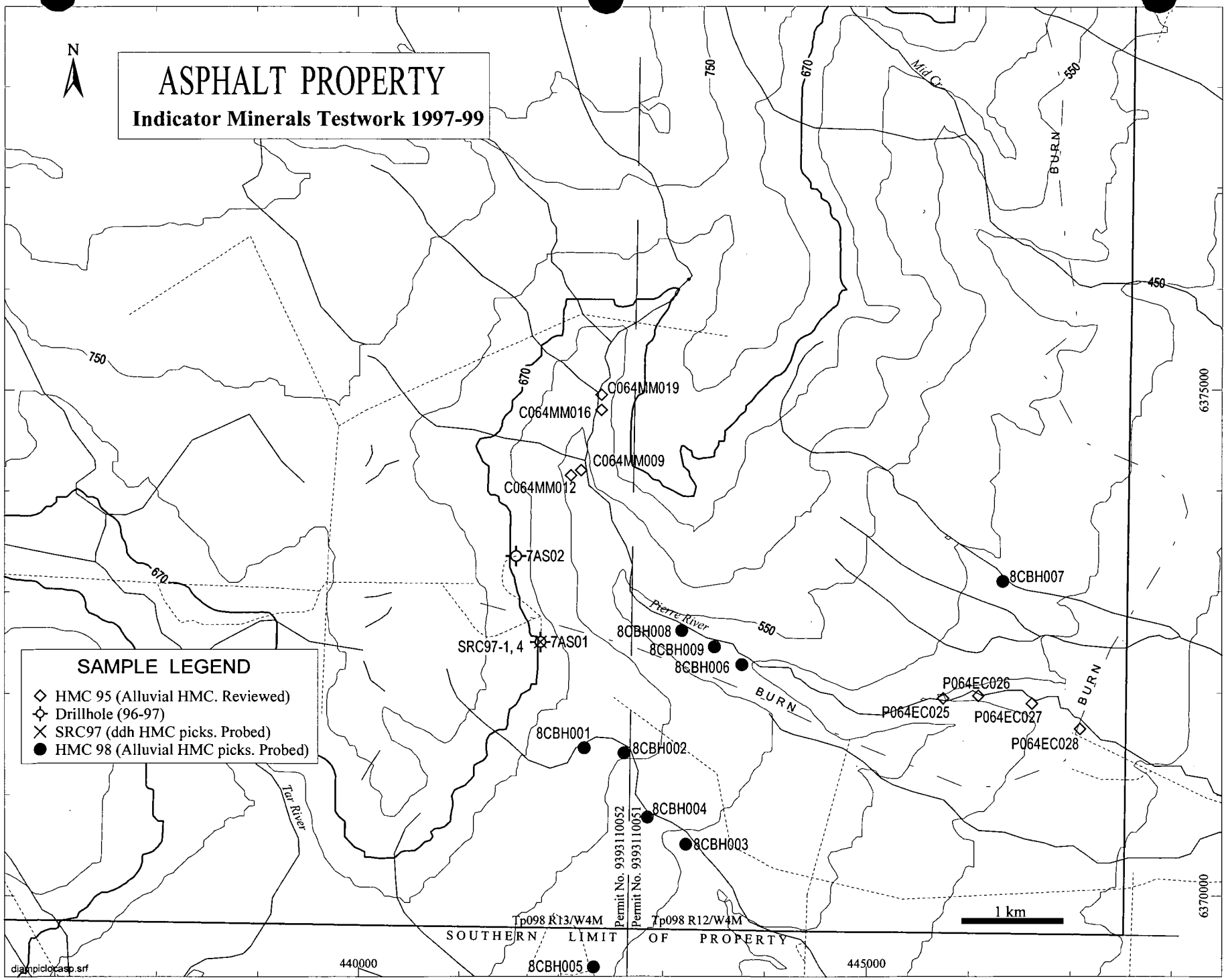

ASPHALT PROPERTY
Indicator Minerals Testwork 1997-99
N
SAMPLE LEGEND
HMC 95 (Alluvial HMC. Reviewed)
Drillhole (96-97)
SRC97 (ddh HMC picks. Probed)
HMC 98 (Alluvial HMC picks. Probed)
C064MM019
C064MM016
C064MM009
C064MM012
7AS02
7AS01
SRC97-1, 4
8CBH007
8CBH008
8CBH009
8CBH006
8CBH001
8CBH002
8CBH004
8CBH003
8CBH005
P064EC026
P064EC025
P064EC027
P064EC028
Pierre River
Tar River
Mid Cr.
BURN
BURN
BURN
750
670
550
450
750
670
670
550
Tp098 R13/W4M
Tp098 R12/W4M
Permit No. 9393110052
Permit No. 9393110051
SOUTHERN LIMIT OF PROPERTY
1 km
440000
445000
6375000
6370000
diampicorasp.srf

Figure 19

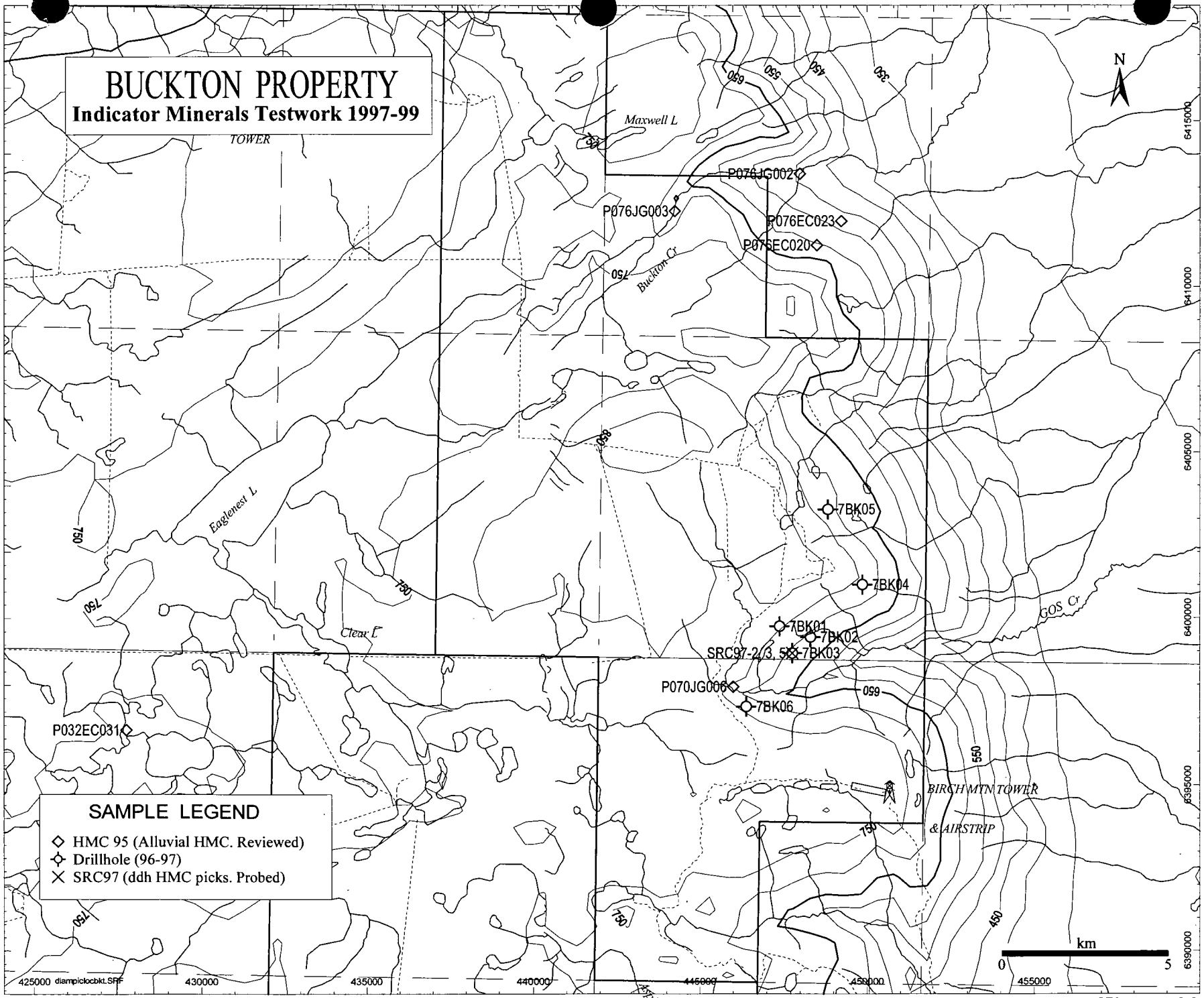

BUCKTON PROPERTY
Indicator Minerals Testwork 1997-99
TOWER
Maxwell L
Buckton Cr
Eaglenest L
Clear L
GOS Cr
BIRCH MTN TOWER
& AIRSTRIP
P076JG002
P076JG003
P076EC023
P075EC020
P070JG006
P032EC031
7BK01
7BK02
7BK03
7BK04
7BK05
7BK06
SRC97-2/3, 5
SAMPLE LEGEND
HMC 95 (Alluvial HMC. Reviewed)
Drillhole (96-97)
SRC97 (ddh HMC picks. Probed)
N
km
0
5
425000 diampiclocbkt.SRF
430000
435000
440000
445000
450000
455000
6415000
6410000
6405000
6400000
6395000
6390000

Figure 20

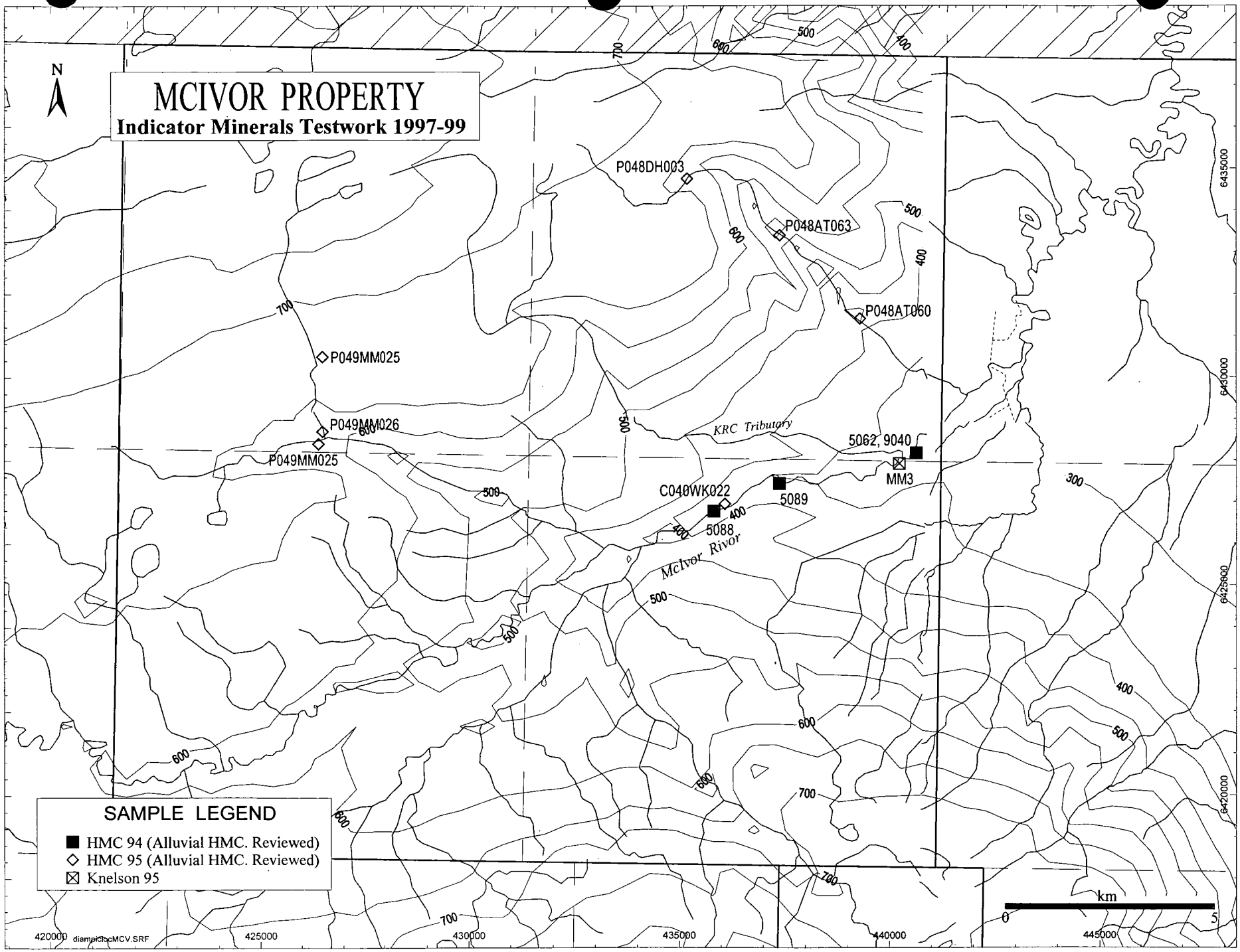

MCIVOR PROPERTY
Indicator Minerals Testwork 1997-99
N
P048DH003
P048AT063
P048AT060
P049MM025
P049MM026
P049MM025
KRC Tributary
5062, 9040
MM3
C040WK022
5089
5088
McIvor Rivor
SAMPLE LEGEND
HMC 94 (Alluvial HMC. Reviewed)
HMC 95 (Alluvial HMC. Reviewed)
Knelson 95
km
0
5
420000
425000
430000
435000
440000
445000
6435000
6430000
6425000
6420000
diamplotMCV.SRF

Figure 21

A number of very favourable mineral compositions were discovered in samples of drill core as well stream sediments, all of which were reviewed in detail by Mr.M.Dufresne of APEX Geoscience. The reader is referred to APEX's discussions of the data all of which are outlined in a report and related variograms appended herein (Appendix C5). APEX concluded the following from its review of the data:

- Important indicator minerals indicative of kimberlite and other related alkaline intrusions have been obtained from bentonitic sections of drill core from drill hole 7AS01 from the Asphalt Property, and from 7BK03 from the Buckton Property. Indicator minerals obtained include a titanian macrocrystic pyrope, several possible eclogitic garnets, abundant chromites from two distinct trends including a high chrome (>60 wt% Cr2O3) mantle derived chromite and one picroilmenite;
- stream sampling from the headwaters of the Pierre and Calumet rivers in the vicinity of 7AS01 has yielded a high chrome mantle derived chromium diopside, several important high chrome mantle derived picroilmenites, several iron rich chromites similar to those obtained from drill core, as well as a high chrome mantle derived chromite and a high titanium kimberlitic chromite.
- The macrocrystic pyrope, along with the high chrome picroilmenites, high chrome chromites and high titanium kimberlitic chromite are strong evidence that as yet undiscovered pipes of kimberlitic (or very closely related compositions) exist in the Birch Mountains at or near the Asphalt and Buckton Properties;
- Likely one or more of the ashes or bentonites within the Second White Specks mudstone intersected in 7AS01 from the Asphalt Property is kimberlitic in origin. The indicator minerals obtained to date suggest that these kimberlites tapped the upper mantle;
- Stream sediment samples collected from the Asphalt Property yielded far fewer indicator minerals (particularly chromites) than drill core samples from 7AS01. This supports the conclusion that the diamond indicator minerals derived from the drill core are likely derived from the bentonitic units within the Second White Specks and Upper Shaftesbury formations, which are far less voluminous than the enclosing mudstones that represent the bulk of the underlying bedrock in the area;
- Although the stream sediment samples collected closest to either drill hole 7AS01 and prospective high frequency magnetic anomalies at Target 2 yielded the highest number of indicator minerals, these samples yielded far less indicator minerals than the core samples from drill hole 7AS01, indicating that the diamond indicator minerals contained within bentonitic sections of the Second White Specks and Upper Shaftesbury formations are quickly lost and/or diluted downstream;

Based on its findings, APEX recommended that more aggressive exploration in search of kimberlite is warranted at the Asphalt and Buckton Properties. More specifically: it recommended that (i) that the 1997 airborne magnetic data from the Properties be combined with digital elevation and RadarSat data to help identify prospective kimberlite targets and structures that the kimberlite intrusions may have used during ascent to surface; (ii) that the 1997 airborne magnetic data be reviewed in detail especially as a line by line analysis of the "raw" magnetic profile; (iii) that additional fieldwork be initiated at the two Properties, said work to include detailed (0.5km) sampling of headwaters of the Pierre and Calumet Rivers as well as the sampling of tills in the area specifically targeting localities in the vicinity of magnetic anomalies identified.

As at the date hereof, none of the above recommendations have been implemented.

8. CHECK ASSAYING WORK 1999 - ASPHALT AND BUCKTON PROPERTIES

8.1 INTRODUCTION

Tintina was approached by Crowflight Minerals Ltd. during October/98 with a proposal to investigate the application of certain de-sliming clay treatment procedures from the potash industry as an alternative to flotation to produce a sulfide metal concentrate from the Second White Specks black shales. Crowflight requested access to Second White Specks black shale sample material to carry out independent experimentation.

Ortech Laboratories were, accordingly, directed during October/98 to forward a 5kg subsample of composite sample CMPB245 directly to Crowflight. Composite sample CMPB245 had previously been reconstructed by Ortech portions of which had been consumed during flotation tests completed earlier in the year (discussed in an earlier Chapter of this report). A second subsample (10kg) was subsequently also forwarded to Crowflight as were a number of other non-reconstructed samples from drill intercepts of the Second White Specks black shales from 1996-97 drilling programs, all of which had previously been archived at Tintina's Toronto warehouse facilities.

After considerable orientative tests, Crowflight advised Tintina during January/99 that it had incidentally encountered good, though sporadic, gold grades during its tests and that same warranted detailed investigation. Gold grades reported by Crowflight (multi-ppm) were considerably higher than those documented by Tintina (5ppb-7ppb) from its previous routine analyses of subsamples from the material tested by Crowflight.

As outlined elsewhere in this reports, although gold had previously been encountered in Second White Specks Formation shales by Tintina during its exploration programs in the Alberta Cretaceous, the disparities between grades as analyzed and those calculated from gold grains recovered in mineral concentrates had been attributed to extreme nugget effect due to expected inhomogeneities of gold grains distribution within samples tested.

Considering that the de-sliming and related tests were not rigorously formulated to determine gold grades, and considering that they were completed by a third party under its direction, supervision and at its initiative, a check assaying program was initiated by Tintina during late January/99 to assess the veracity of data reported to it by Crowflight from the above testwork, and that of data collected by it from routine analyses during the 1996-1997 drilling programs. Specific objectives of the check assaying program were (i) to investigate the possibility of inadvertent or deliberate contamination during Crowflight's tests; (ii) to evaluate veracity of analytical procedures utilized during the Crowflight testwork as well as those for the 1997 analytical work; and (iii) to help formulate a re-assaying program intended to definitively establish gold content of the zones otherwise previously drilled in search of base metals. Other objectives included expansion of scope of the work to assess the relevance of holes previously localized to probe base metal enriched zones to exploration for gold zones at the two Properties.

The above work entailed (i) check assaying by Tintina of archived material from samples portions of which had been surrendered to, and analyzed by, Crowflight; (ii) considerable

reassaying of drill core samples and drill core composite samples reconstructed by Tintina; (iii) experimental assaying of multiple sample fractions and of reconstructed samples to evaluate effects of pulverization on sample material; (iv) bottle roll cyanidation tests; and (iv) assaying of a suite of deflocculated composite samples. This work was initially carried out at Loring Labs (Calgary) but later transferred to Actlabs (Ancaster) and Lakefield Research Laboratories (Lakefield). All analytical work for the 1996-1997 drill programs at the Asphalt and Buckton Properties had been carried out by Actlabs. Canmet analytical standards were used during most of the analytical work to monitor inter-laboratory and analytical procedures.

In addition to analytical work, a series of mineral investigations were also initiated to compare concentrates previously analyzed with new material concentrated under more controlled conditions, and Strathcona Mineral Services were retained to concurrently undertake an independent study and audit of gold content of the Second White Specks shale drill core samples from the two Properties, including subsamples of material tested by Crowflight.

While the separate check-assaying and re-assaying work by the different parties proceeded concurrently and intermittently during the first half of the year, details of the various test programs are presented below in thematic, rather than chronological, order.

8.2 Third Party Work: Initial Tests

Crowflight's testwork as reported to Tintina is outlined herein by way of background and has been reconstructed from various conversation with Crowflight and its consultants. Supporting analytical certificates from this work are appended (Appendix D3.1).

A 65kg weighted composite sample (CMPB245) was constructed early in 1998 at Ortech Laboratories for use in beneficiation testwork completed during 1998. The composite sample was prepared by combining proportionate amounts of previously crushed material from 1996-1997 drill core intervals of all samples from the Second White Specks Formation intercepts cored in Buckton Property drill holes BK2, BK4 and BK5. A portion of the composite sample was consumed during the benchtesting and the balance was archived at Ortech along with unused left over portions of samples of the individual core intervals combined. Second White Specks Formation thickness as intersected in the three vertical holes are as follows: BK2-18.4m, BK4-21.1m, BK5-18.4m.

A 5kg subsample of CMPB245 was submitted by Crowflight to Claytech Environmental Services Inc. Sudbury facilities (a division of Ateba Mines Inc.) for de-sliming and pre-treatment using Ateba's patented deflocculant reagent A15. The non-pulverized subsample was macerated in a deflocculant solution and sufficient quantities of visible gold grains were noted during the testwork product material that a second non-pulverized subsample was subsequently also tested in a similar manner at Claytech under the supervision of Mr.K.Reading, consultant to Crowflight.

The deflocculated material from the above work was tabled to obtain a heavy mineral concentrate. Gold was again noted in the concentrates produced, different fractions of which were analyzed in duplicate and subsamples therefrom examined by microscope by

Mr.Reading. Analytical results from duplicate cuts of various tabling fractions are summarized in Table 16, along with tabling yields and a calculated weighted grade for the 5kg sample. Head assays of untreated pulverized subsamples are also tabulated. Weighted average grade per Tintina's 1996-97 analyses for the core intervals comprising the composite sample is 5ppb.

Tabling Fraction (wt) And Sample No.	Gold (g/t) Fire Assays of Tabling Yields composite sample CMPB245			Gold (g/t) Fire Assay Pulverized Head Sample	Gold (g/t) Fire Assay Pulverized Head Sample
	(Note1a)	*(Note1b)*	*(Note2)*	*(Note1c)*	*(Note3)*
Table Heavies (270gm) (Sample 98/11/1)	15.1	7.0	27.6		
Table Middlings1 (43gm) (Sample 98/11/2)	30.6	4.9	17.0		
Table Middlings2 (250gm) (Sample 98/11/3)	5.6	2.3	6.2		
Table "Lights" (4437gm)	na	na	na		
Weighted Sample Grade (Note4)	1.4	0.5	2.0	0.33	0.22
Notes: (1a) Chauncey Labs Rpt-KR-106-03, (1b) Chauncey Labs Rpt-KR-108-01, (1b Chauncey Labs, Sample KRTT04A, Rpt-KR-105-01; (2) Chemex Labs RptA9837383; (3) Chemex Labs, Sample KRTT04A, RptA9910683; (4) Calculated weighted sample grade assumes nil gold content of tabling lights.					

Table 16. Initial de-sliming test results, Buckton Property composite drill hole sample CMPB245, Crowflight Minerals1998. Sample CMPB245 is a weighted composite sample constructed from the aggregate of 57.9m cored in three holes within the zone at the Buckton Property as follows: Hole BK2 - 18.4m, hole BK4 - 21.1m and hole BK5 - 18.4m;

The above procedures were subsequently repeated at Chauncey Laboratories under Crowflight's supervision on a 275gm subsample from the composite CMPB245. Fire assaying of the various table fractions reported the following: Table Heavies 14.5g/t Au; Table Middlings1 2.0g/t Au; Table Middlings2 2.5g/t Au. Calculation of an overall sample grade for the 275gm initial sample is not possible due to uncertainties in weights of table yields for the various gravity fractions. A handful of other subsamples taken from the composite, were also pulverized then fire assayed returning grades ranging 0.03g/t to 0.47g/t Au from both facilities.

Several other subsamples of the above composite were subsequently examined and analyzed at Chauncey Laboratories. While some of these tests reported gold, others did not and the overall collective information gathered from the work is erratic, inconclusive and at best confusing.

Given the significant discrepancy between grades documented from composite sample CMPB245 by Crowflight from its work and the calculated average grade for the composite sample per Tintina's 1996-97 analyses of individual core intercepts, the likelihood of inadvertent contamination during sample reconstruction and homogenization at Ortech metallurgical testing facilities during the benchtesting work completed in 1998 could not be discounted. As previously outlined in this report, since the metallurgical testwork undertaken by Ortech were focused entirely on base metals in the sample, sample handling procedures may have lacked the rigors otherwise necessary to safeguard sample integrity had the testwork been intended for the determination of gold contents. A decision was, accordingly, taken by Crowflight to forego further work on composite CMPB245 in favour of investigating fresh samples archived from remaining holes which had not previously been handled at Ortech.

Pre-crushed core samples of the Second White Specks Formation archived by Tintina from Buckton Property drill holes BK1, BK3 and BK6, and Asphalt Property hole AS2 were halved by riffling during late December 1998 by Mr.Reading of Crowflight, one half was returned to Tintina archives and non-weighted composites were prepared from the other halves by combining equal volumes of material from each of the samples. Fire assay results from Crowflight's work for these composites are summarized in Table 17.

A volumetric composite sample (sample 98AS02CMP) weighing approximately 250gms was also prepared by Tintina from archived left over pre-crushed but unpulverized material from Asphalt hole AS2. The sample was halved and both halves were subsequently submitted to Loring Laboratories for analysis to provide comparative data to results obtained by Crowflight (Loring analytical certificate is appended herein as Appendix D1.1, analyses are included in Table 17. See also Section 8.5.2 of this report regarding instrumentation calibration deficiencies at Loring during the same period). Loring was instructed to manually disaggregate the sample in mortar and pestle in lieu of mechanical pulverization, to sieve the material at 100mesh and to fire assay each size fraction separately in as many cuts as necessary to consume the entire sample material. Calculated weighted average grade for the composite per 1996-1997 analyses is 7ppb.

Drill Hole	Total (m) Cored In Target Zone	Total Core (m) Represented by Composite Sample Tested	Fire Assay Gold (g/t) Head Sample *(Note1)*	Calculated (g/t) Sample Grade Per Concentrates *(Note2)*	Sieved Metallics Fire Assay Gold (g/t) *(Notes3,6)*	Sieved Metallics Fire Assay Gold (g/t) *(Notes4,5,6)*	Sieved Metallics Fire Assay Gold (g/t) *(Notes4,5,6)*
Buckton hole BK01	14.6	1.7	4.3	0.61	na	na	na
Buckton hole BK03	23.7	23.5	3.7	7.39	1.29	na	na
Buckton hole BK06	22.6	11.5	3.4	0.38	na	na	na
Asphalt hole AS02	11.4	11.3	11.6	6.70	1.03	8.07	6.03

Notes: (1) Samples fire assayed without mechanical pulverization; (2) based on weighted average of fire assays of table heavies from deflocculated material of 50gm subsamples. Gold also reported in middlings excluded due to uncertainties in tabling yields; (3) Weighted average of three fire assays of unpulverized material from three size fractions of sieved material, 60gm-64gm subsamples; (4) Weighted average of multiple fire assays of two size fractions of unpulverized 100gm-104gm subsamples from composite sample 98AS02CMP; (5) Composite sample tested represents 9.47m of 11.41m cored in zone; (6) The +100mesh size fractions account for the bulk of gold content of the sample. Analyses as follows: for (1)(2)and(3) by Chauncey Labs, Rpt KR110-01, Crowflight Minerals; for (4)and (5) by Loring Labs Rpt40861, Tintina Mines Check Assaying program 1999.

Table 17. Summary of analyses for composite samples from drill holes BK1, BK2, BK6 and AS2, Crowflight Minerals. Comparative Tintina check assaying data for composite sample for Asphalt drill hole AS2 (composite sample 98AS02CMP) also shown, Tintina Mines.

Considering that majority of reported gold from Crowflight's work had been from analyses or testwork undertaken at a single laboratory (Chauncey Labs), a suite of samples were submitted by Crowflight, at Tintina behest, to Swastika Laboratories during February/99 for a series of tests and analyses. The suite consisted of composite samples including composite samples for the Second White Specks Formation intersections in Buckton drill holes BK1, BK3 and BK6, and Asphalt drill hole AS2. (Swastika Labs Cert# 9W-0370-PA1 and 9W-0370-PA2, Appendix D3.1).

Work completed at Swastika entailed fire assaying as well as a series of deflocculation tests using Ateba's reagent A15. The samples were split in half, one half was deflocculated, and both halves were fire assayed in multiple cuts to consume the entire sample material. While the deflocculated samples reported nuggetted gold grades varying 0.2g/t to 0.45g/t, none of the analyses of non-deflocculated material reported any gold. Assaying of the deflocculant reagent A15 and filter paper reported nil gold content. The

Swastika tests reiterated an as yet poorly understood role of deflocculation as a sample pre-treatment.

8.3 TINTINA CHECK ASSAYING AND RE-ASSAYING WORK

8.3.1 Composite Samples: Asphalt drill holes AS1 and AS2

Comparative check assay results for Tintina composite sample for drill hole AS2 (sample 98AS02CMP) have been presented above in Table 17. A volumetric composite sample of the Second White Specks Formation as cored in Asphalt drill hole AS1 was also similarly constructed (sample 98AS01CMP) during early February by Tintina from its archives, by combining equal volumes of pre-crushed material from ten intervals representing the aggregate of 4.4m of drill core (5.1m cored). The composite sample was split into three fractions and submitted to Loring for fire assaying. Loring was instructed to mechanically pulverize on of the fractions prior to assaying but to only manually disaggregate the sample for the other two fraction. All fractions were sieved at 80mesh prior to assaying and the two size fractions were assayed separately in multiple 1AT cuts in order to consume the entire sample material. Analytical certificate is appended herein as Appendix D1.2, and results are summarized in Table 18. Calculated weighted average grade for the composite per 1996-997 analyses is 7ppb.

Results in Table 18 are self explanatory, and it is interesting to note that the +80mesh fraction accounted for the bulk of gold for the sample, similar to the previous trend noted during analysis of composite sample for Asphalt drill hole AS2 (sample 98AS02CMP, Table 17 above).

		Total (m) Cored In Target Zone	Total Core (m) Represented by Composite Sample Tested	Sieved Metallics Fire Assay Gold (g/t) (*Note*)
Asphalt hole AS01	Subsample#1 - (104gm) - Unpulverized	5.1	4.4	2.34
Asphalt hole AS01	Subsample#2 - (100gm) - Unpulverized	5.1	4.4	0.55
Asphalt hole AS01	Subsample#3 - (104gm) - Pulverized	5.1	4.4	nil
Notes: Weighted averages of four fire assays reported for each subsample; For subsamples #1 and #2, the +80mesh fractions reported the bulk of gold content of the entire sample tested; Loring Labs Rpt40909; Tintina check assaying program 1999				

Table 18. Comparative analyses for composite sample for Asphalt drill hole AS1 (composite sample 98AS01CMP), Tintina Check Assaying Program 1999

The obvious discrepancies between results from the pulverized and unpulverized subsamples (Table 18) were suggestive of possible losses of gold grains in the pulverizer circuit, hence all subsequent assaying initiated by Tintina was formulated to attempt to eliminate uncertainties by foregoing mechanical pulverization of crushed rejects in favour of manual disaggregation of samples prior to analysis. An experimental suite of samples was subsequently also reconstructed to more directly investigate the effects of mechanical pulverization on gold grains which were added to the samples during reconstruction (discussed in a subsection below).

8.3.2 Asphalt drill hole AS2: Reassaying

Re-assaying work initiated by Tintina during the balance of the check assaying program entailed re-analysis of samples comprising Second White Specks intercepts in Asphalt Property drill hole AS2, and Buckton Property drill holes BK2 and BK4.

A total of 29 samples, comprising the Second White Specks intercept in Asphalt drill hole AS2 were reanalyzed at Loring Laboratories in an attempt to provide more detailed data than that gleaned from previous analysis of composite samples from the hole. Previously pulverized pulps (Actlabs 1996-97) from the samples were submitted to Loring Laboratories, and the entire available pulp (approximately 40gm-60gm) was analyzed in multiple fire assays to consume he entire sample material. Analytical certificate is appended herein as Appendix D2.1, and results are summarized in Table 19. Calculated weighted average grade for the composite per 1996-997 analyses is 7ppb.

There was sufficient material from most of the samples to provide data from two cuts, and enough from several for three fire assays each. Results for individual samples typically range 0.2ppm to 0.5ppm with a weighted average for the entire sample suite of 0.62ppm (or 0.5ppm if gold grade of sample 7AS0202161 is cut to 1ppm. These figures compare poorly with results from previous assaying of composite sample for the hole 1ppm-11.6ppm (Table 18) and were attributed to nugget effect.

	Drill Intersection			1999 Re-assaying Results						1996-97 Results	
Sample No				Subsample 1		Subsample 2		Subsample 3		Gold (g/t)	
	From	To	Length	Wt (gm)	Grade	Wt (gm)	Grade	Wt (gm)	Grade	Fire	INA
	(m)	(m)	(m)	Analyzed	Gold (g/t)	Analyzed	Gold (g/t)	Analyzed	Gold (g/t)	Assay	
7AS0202161	21.61	21.73	0.12	23.0	0.87	22.0	13.43	-	-	0.009	0.009
7AS0202173	21.73	22.25	0.52	28.0	0.64	26.8	0.45	-	-	0.012	0.010
7AS0202225	22.25	22.99	0.74	18.0	0.67	17.6	0.68	-	-	0.010	0.003
7AS0202299	22.99	23.46	0.47	25.0	0.56	25.1	0.40	-	-	0.007	0.010
7AS0202346	23.46	23.79	0.33	30.0	2.07	30.0	0.40	31.1	0.42	0.008	0.010
7AS0202379	23.79	24.21	0.42	16.5	0.67	-	-	-	-	0.013	0.001
7AS0202421	24.21	24.85	0.64	22.0	0.50	22.0	0.59	22.5	0.27	0.012	0.014
7AS0202485	24.85	25.49	0.64	19.0	0.74	18.2	0.60	-	-	0.008	0.001
7AS0202549	25.49	26.12	0.63	13.4	0.60	-	-	-	-	0.005	0.010
7AS0202612	26.12	26.38	0.26	18.0	0.61	18.0	0.61	-	-	0.007	0.011
7AS0202638	26.38	26.95	0.57	24.0	1.29	22.9	0.44	-	-	0.004	0.008
7AS0202695	26.95	27.65	0.70	33.0	0.42	31.9	0.44	--	-	0.002	0.001
7AS0202765	27.65	27.82	0.17	30.5	0.39	-	-	-	-	0.005	0.001
7AS0202782	27.82	27.92	0.10	17.8	0.79	-	-	-	-	0.002	0.001
7AS0202792	27.92	28.08	0.16	12.2	0.57	-	-	-	-	0.001	0.001
7AS0202808	28.08	28.77	0.69	21.0	0.48	20.2	0.49	-	-	0.007	0.010
7AS0202877	28.77	29.46	0.69	18.0	0.56	-	-	-	-	0.003	0.006
7AS0202946	29.46	30.15	0.69	25.0	0.40	23.3	0.43	-	-	0.009	0.009
7AS0203015	30.15	30.64	0.49	30.0	0.30	29.2	0.62	-	-	0.009	0.007
7AS0203064	30.64	30.72	0.08	25.0	0.48	23.8	0.34	-	-	0.004	0.007
7AS0203072	30.72	30.95	0.23	21.0	0.57	20.1	0.50	-	-	0.006	0.008
7AS0203095	30.95	31.03	0.08	32.0	0.31	32.3	0.25	-	-	0.002	0.007
7AS0203103	31.03	31.53	0.50	20.0	0.45	19.2	0.42	-	-	0.010	0.011
7AS0203153	31.53	32.04	0.51	23.9	0.42	-	-	-	-	0.010	0.010
7AS0203204	32.04	32.28	0.24	18.0	0.61	17.7	0.51	-	-	0.008	0.010
7AS0203228	32.28	32.42	0.14	24.0	0.58	24.0	0.42	22.0	0.55	0.008	0.002
7AS0203242	32.42	32.58	0.16	28.0	0.32	28.0	0.36	27.3	0.44	0.006	0.010
7AS0203258	32.58	32.92	0.34	15.6	0.32	-	-	-	-	0.001	0.003
7AS0203292	32.92	33.02	0.10	19.0	0.68	18.4	0.71	-	-	0.005	0.007
Composite	21.61	33.02	11.41	Weighted Average (all analyses) = 0.62g/t (Notes 2, 3)						0.007g/t	
Note: 1999 analyses by Loring Labs Rpt-40912. 1996-97 analyses by Activation Labs (see Sabag 1998 for details)											

Table 19. Comparative results from 1999 re-assaying of multiple subsamples from Second White Specks intersection from Asphalt drill hole AS2, Tintina Check Assaying Program 1999. Previous data from 1996-97 drill program also shown.

8.3.3 Buckton drill hole BK2: Reassaying

Samples comprising the Second White Specks Formation intercept in Buckton drill hole BK2 were also reanalyzed. Two approximately 100gm subsamples were taken from each sample and each was fire assayed in multiple 1AT cuts to consume the entire sample material. The analytical work was completed at Loring Labs which was instructed, as before, to sieve the samples at 80mesh and analyze the two size fractions separately. Analytical certificates for the initial and duplicate analyses are appended herein as Appendix D2.2. Results for from the initial analyses are summarized in Table 20 (in the interest of brevity, results summarized in Table 20 have been grouped to show number of assays completed, minimum and maximum grade as well as the weighted average grade for each sample). Calculated weighted average grade for the composite per 1996-997 analyses is 5ppb.

Results from the initial set of analyses are highly variable but are on the whole sub-ppm, and more typically lower than 0.5ppm. Analytical results from the duplicate set of assays reported in most part nil or below detection gold contents (Appendix D2.2, Loring Labs Rpt41032). Although more nuggetted than previous (1996-97) analyses from BK2, the 1999 analytical results are substantially similar to results from the 1996-97 work given expected inter-laboratory variations.

Sample No.	Drill intersections			1999 Check Re-assaying Results					1996-97 Results Gold (g/t)	
				Aggregate	Total Number	1999 Re-assayed Grade - Gold (g/t)				
	From (m)	To (m)	Length (m)	Sample Wt Assayed (gm)	of Fire Assays completed	Min	Max	Weighted Average wtAvge	Fire Assay	INA
7BK0206078	60.78	61.13	0.35	65.2	3	0.68	3.41	1.21	0.010	0.013
7BK0206113	61.13	61.46	0.33	112.1	4	0.26	1.86	0.55	0.002	0.001
7BK0206146	61.46	61.78	0.32	110.1	5	nil	0.24	0.19	0.002	0.005
7BK0206178	61.78	62.74	0.96	40.4	2	0.22	1.55	0.67	0.004	0.008
7BK0206274	62.74	62.90	0.16	16.6	2	nil	0.07	0.06	0.001	0.001
7BK0206290	62.90	63.48	0.58	113.8	2	nil	0.21	0.16	0.006	0.006
7BK0206348	63.48	63.85	0.37	102.7	4	nil	0.10	0.09	0.009	0.012
7BK0206385	63.85	64.83	0.98	121.7	5	0.05	0.12	0.11	0.005	0.012
7BK0206483	64.83	65.83	1.00	120.9	5	nil	0.16	0.08	0.004	0.001
7BK0206583	65.83	66.27	0.44	114.5	5	nil	0.12	0.09	0.006	0.001
7BK0206627	66.27	67.18	0.91	117.9	5	nil	0.12	0.08	0.003	0.001
7BK0206718	67.18	67.30	0.12	49.9	3	0.05	0.65	0.20	0.002	0.007
7BK0206730	67.30	68.45	1.15	119.0	5	nil	0.12	0.08	0.000	0.008
7BK0206845	68.45	69.61	1.16	114.9	5	nil	0.04	0.03	0.003	0.006
7BK0207263	72.63	72.93	0.30	132.2	5	0.08	0.22	0.11	0.004	0.008
7BK0206961	69.61	70.62	1.01	112.0	5	0.08	0.58	0.13	0.006	0.009
7BK0207062	70.62	71.63	1.01	117.4	5	nil	0.04	0.03	0.007	0.010
7BK0207163	71.63	72.63	1.00	121.9	5	nil	0.04	0.02	0.005	0.016
7BK0207293	72.93	73.94	1.01	120.7	5	nil	0.04	0.03	0.006	0.001
7BK0207394	73.94	74.94	1.00	120.0	5	nil	0.04	0.01	0.004	0.008
7BK0207494	74.94	75.94	1.00	115.5	5	nil	0.04	0.01	0.006	0.001
7BK0207594	75.94	76.94	1.00	125.6	5	nil	0.08	0.02	0.002	0.002
7BK0207694	76.94	77.22	0.28	113.2	4	nil	0.13	0.10	0.004	0.006
7BK0207722	77.22	77.55	0.33	103.0	4	nil	0.27	0.19	0.004	0.008
7BK0207755	77.55	78.44	0.89	109.9	5	nil	nil	nil	0.002	0.009
7BK0207844	78.44	79.15	0.71	193.0	7	nil	0.08	0.03	0.002	0.001

Note: 1999 analyses by Loring Labs, Rpt-40928. 1996-97 analyses by Activation Labs (see Sabag 1998 for details)

Table 20. Comparative results from 1999 re-assaying of Second White Specks intersection from Buckton drill hole BK2, Tintina Check Assaying Program 1999. Previous data from 1996-97 drill program also shown.

8.3.4 Buckton drill hole BK4: Reassaying

Majority of samples comprising the Second White Specks intersection in Buckton drill hole BK4 were reanalyzed at Actlabs to check previous data also from work completed at Actlabs. A suite of 38 pre-pulverized pulps (Actlabs Rpt17338) and a second suite of 20 precrushed coarse rejects (Actlabs Rpt17401) were fire assayed. Sample weights analyzed raged 50gm-75gm for pulps and 100gm-200gm for coarse rejects, and same were assayed in multiple $^1/_2$AT cuts to consume the entire sample material. Gold contents reported by all analyses were less than detection (<5ppb). Analytical certificates are appended in Appendix D2.3. Data from previous analyses (1996-97) of the samples had reported gold contents ranging 2ppb-14ppb.

8.3.5 Belle Fourche Formation Reassaying: Asphalt drill hole AS2

A suite of 16 core intervals from the Belle Fourche Formation in Asphalt drill hole AS2 were selected and reassayed by fire assay at Actlabs. The samples represent intervals which had previously (1996-97 analyses, also at Actlabs) reported anomalous gold grades ranging upward to 12ppb in contrast to nil-2ppb more typically characterizing gold content of the Belle Fourche Formation.

The suite was tested since Belle Fourche Formation drill core interval in drill hole AS2 exhibits many visual and chemical similarities to the overlying Second White Specks Formation and had, accordingly, previously been suspected to represent paleoslumped material from the Second White Specks black shales (see Sabag 1998).

Approximately 240gm of material was fire assayed from each sample in multiple 1AT cuts to consume the entire sample material (9 fire assays each). Analytical results are summarized in Table 21 (certificates appended in Appendix D2.4).

While most of the samples reported nil gold, some of the Belle Fourche intervals reported higher gold grades (albeit low) than those documented from 1996-97 assaying (also at Actlabs).

The nuggetted results from samples 7AS0203880 and 7AS0207350 are quite interesting as the trend of progressively higher grades reported from the final analytical fractions (fractions -H) is suggestive of some degree of gold concentration within the final fractions during sample handling (similar trend observed during subsequent cyanidation work carried out at Lakefield Research. Section 8.4.3 of this report). While similar processes would be considered normal to sampling and handling of gold placers, their relevance to non-placer rock matrices is unusual. It is likely, nonetheless, that the typically poorly consolidated Cretaceous black shales when dried and crushed behave in many respects similarly to placers.

The above proposal is supported by the fine powdery nature of coarse crushed (yet unpulverized) samples from the shales, all of which typically disintegrate during sample shipping and handling to an even finer powder. Any distinct metallic minerals within the fine clay matrix could be expected to behave similarly to gold particles within placers and would be prone to gravity settling.

Sample No.	Drill Intersection			1999 Re-analysis			1996-97 Grade Gold (ppb)
	From(m)	To(m)	Length(m)	No.Fire Assays	Wt (gm) Analyzed	Avge Grade Gold (ppb)	
7AS0203302	33.0	33.4	0.4	9	229.5	-5	9
7AS0203342	33.4	34.1	0.7	9	231.2	-5	5
7AS0203618	36.2	36.9	0.7	9	232.5	-5	6
7AS0203687	36.9	37.6	0.7	9	230.9	-5	6
7AS0203756	37.6	38.0	0.4	9	232.2	-5	10
7AS0203795	38.0	38.8	0.9	9	246.2	-5	12
7AS0203880	38.8	39.7	0.9	1	29.9	-5	7
7AS0203880-A				1	29.8	-5	
7AS0203880-B				1	29.9	-5	
7AS0203880-C				1	29.8	25	
7AS0203880-D				1	15.0	25	
7AS0203880-E				1	29.8	25	
7AS0203880-F				1	29.9	90	
7AS0203880-G				1	29.7	80	
7AS0203880-H				1	7.5	105	
7AS0204208	42.1	42.2	0.1	1	29.9	20	
7AS0204208-A				1	29.8	5	
7AS0204208-B				1	29.9	5	7
7AS0204208-C				1	29.7	5	
7AS0204208-D				1	26.9	5	
7AS0204220	42.2	42.4	0.2	1	29.7	-5	6
7AS0204220-A				1	29.8	15	
7AS0204220-B				1	29.9	-5	
7AS0204220-C				1	15.0	25	
7AS0204220-D				1	29.8	-5	
7AS0204220-E				1	29.9	-5	
7AS0204220-F				1	29.8	-5	
7AS0204220-G				1	29.7	-5	
7AS0204220-H				1	6.7	-5	
7AS0205770	57.7	58.0	0.3	9	230.4	-5	8
7AS0205800	58.0	59.5	1.5	9	233.6	-5	6
7AS0207350	73.5	75.0	1.5	1	29.9	15	10
7AS0207350-A				1	29.8	5	
7AS0207350-B				1	29.9	5	
7AS0207350-C				1	29.9	15	
7AS0207350-D				1	30.0	5	
7AS0207350-E				1	15.0	10	
7AS0207350-F				1	30.0	-5	
7AS0207350-G				1	27.8	10	
7AS0207350-H				1	7.3	145	
7AS0207500	75.0	76.5	1.5	9	232.7	-5	5
7AS0207650	76.5	78.0	1.5	1	29.9	-5	
7AS0207650-A				1	30.0	-5	
7AS0207650-B				1	30.0	-5	
7AS0207650-C				1	29.9	-5	
7AS0207650-D				1	15.0	-5	1
7AS0207650-E				1	29.8	15	
7AS0207650-F				1	29.9	-5	
7AS0207650-G				1	29.9	-5	
7AS0207650-H				1	8.2	-5	
7AS0208680	86.8	87.8	1.0	9	243.3	-5	6
7AS0208780	87.8	88.8	1.0	9	232.2	-5	1

Note: 1999 Analyses by Activation Labs Rpt17415r. 1996-97 analyses by Activaltion Labs (see Sabag 1998 for details)

Table 21. Comparative results from 1999 re-assaying of select Belle Fourche Formation samples from Asphalt Property drill hole AS2, Tintina Check Assaying Program 1999. Previous data from 1996-97 drill program also shown.

8.3.6 Overview Remarks: Reassaying Work

Results from the check assaying and reassaying of previously analyzed samples reiterated the presence of gold within Second White Specks Formation and suggested that same is present in physical forms prone to considerable nugget effect. The tests also suggested an

as yet ill defined role of deflocculation as a pretreatment to assaying but indicated that Ateba's deflocculating reagent A15 is barren and can be ruled out as a contaminant.

The check assaying work failed to corroborate initial test results obtained by Crowflight from its work on samples of the Second White Specks, although it is conceivable that some (not all) of the disparities can be attributed to extreme nugget effect

8.4 TINTINA EXPERIMENTAL ANALYTICAL SUITES

8.4.1 Reconstructed Sample Analyses and Control Standards

A number of samples were inserted into various analytical suites as control standards to monitor analytical precision and accuracy. These samples consisted of Canmet Standard CH3 (1400ppb) as well as a series of other samples which were reconstructed by Tintina by the addition of measured amounts of CH3 to a blank "base stock" to construct material of known grade. For convenience, all samples used as control standards were marked TRS series. A summary of TRS series samples showing "base stock" and "spike" are summarized in Table 22.

Sample	Reconstruction	Base Stck			Spike			Reconstructed		Comments
No.	Type	Type	Wt(gm)	Au (ppb)	Type	Wt(gm)	Au (ppb)	Wt(gm)	Au (ppb)	
TRS1	Spiked w/ CH3	Pulp/BK0206730	32.6	5	CH3	10.9	1400	43.5	355	
TRS2	Spiked w/ CH3	Pulp/BK0206730	27.2	5	CH3	29.5	1400	56.7	731	
TRS3	Spiked w/ CH3	Reject/CMPB245	84.0	5	CH3	11.0	1400	95.0	167	
TRS4	none	CH3	26.6	1400	none			26.6	1400	CanMet Standard
TRS5	none	CH3	26.4	1400	none			26.4	1400	CanMet Standard
TRS6	Spiked w/ AlluvAu	Reject/CMPB245	70.3	5	nAu			70.3	1209	4 gold grains added (Note 1)
										nAu: 200x100x25 micron
										nAu: 400x200x50 micron
										nAu: 200x50x10 micron
										nAu: 200x100x20 micron
TRS7	Spiked w/ AlluvAu	Reject/CMPB245	58.7	5	nAu			58.7	1237	6 gold grains added (Note 1)
										nAu: 100x25x10 micron
										nAu: 200x10x25 micron
										nAu: 50x50x25 micron
										nAu: 50x20x10 micron
										nAu: 100x50x25 micron
										nAu: 400x200x50 micron
TRS8	Spiked w/ AlluvAu	Reject/CMPB245	83.7	5	nAu			83.7	1624	1 gold grain added (Note 1)
										nAu: 400x400x50
TRS9	Spiked w/ AlluvAu	Reject/CMPB245	38.4	5	nAu			38.4	1992	1 gold grain added (Note 1)
										nAu: 500x150x60 micron
TRS10	none	Reject/98AS02CMP	52.4	5	none			52.4	5	
TRS11	none	Reagent A15	9.5	0	none			9.5	0	A15 from Ateba Mines
TRS12	Spiked w/ CH3	CMPB245	32.5	5	CH3	2.5	1400	35.0	105	
TRS13	none	CH3	29.2	1400	none			29.2	1400	
TRS14	none	CH3	28.8	1400	none			28.8	1400	
TRS15	none	CH3	29.2	1400	none			29.2	1400	
TRS16	none	CH3	29.1	1400	none			29.1	1400	
TRS20A	Spiked w/ CH3	BK04-LaBiche Sh (Note 2)		2	CH3	see Note 2		25.3	265	
TRS20B	Spiked w/ CH3	BK04-LaBiche Sh (Note 2)		2	CH3	see Note 2		25.1	265	
TRS20C	Spiked w/ CH3	BK04-LaBiche Sh (Note 2)		2	CH3	see Note 2		25.1	265	
TRS20D	Spiked w/ CH3	BK04-LaBiche Sh (Note 2)		2	CH3	see Note 2		25.3	265	
TRS20E	Spiked w/ CH3	BK04-LaBiche Sh (Note 2)		2	CH3	see Note 2		25.2	265	
TRS20F	Spiked w/ CH3	BK04-LaBiche Sh (Note 2)		2	CH3	see Note 2		25.2	265	
TRS20G	Spiked w/ CH3	BK04-LaBiche Sh (Note 2)		2	CH3	see Note 2		25.3	265	
TRS20H	Spiked w/ CH3	BK04-LaBiche Sh (Note 2)		2	CH3	see Note 2		25.3	265	

Notes: (1) native gold grains added to test sample are from McIvor River heavy mineral concentrate HMC5088; (2) TRS20-series samples were reconstructed to an avergae grade of 265ppb by the addition of 102.7gm of CH3 to 440.5gm of composite material made up of pulps from eight LaBiche Shale footages from Buckton drill hole BK4. Samples combined are 7BK0407501, 7BK0407657, 7BK0407809, 7BK0407961, 7BK0408113, 7BK0408263, 7BK0408295, 7BK0408646; (3) Gold grades tabulated for "base stock" from 1996-97 analytical work (Sabag 1998); (4) nAu=native gold

Table 22. Details of reconstructed samples and control standards, Tintina Check Assaying Program 1999.

A suite of samples were also reconstructed by the addition of gold grains whose dimensions were painstakingly measured under binocular microscope to enable calculation of volumes toward estimation of an overall grade for the reconstructed (ie."spiked") sample. This suite was utilized to assess effects of pulverization on the gold grains within the samples.

Two sets of TRS-series samples were submitted for analysis for gold by INA to Actlabs to investigate several aspects of analytical work. The samples generally weighed approximately 50gm-100gm and had to be analyzed in multiple fractions to consume the entire sample material. Actlabs was instructed to pulverize one of the suites (TRS1903) prior to analysis and to analyze the other (TRS2003) without any mechanical pulverization. The two suites included (i) a set of samples reconstructed by the addition of gold grains, (ii) samples reconstructed by the addition of Canmet standard CH3, (iii) a sample of Ateba deflocculant reagent A15, and (iv) samples of Canmet standard CH3. Results from the tests are presented in Table 23 (analytical certificates for the two suites are appended in Appendix D1.3).

Analytical Test Suite, Lot#TRS1903 (samples routinely pulverized prior to analysis - nominal <200mesh) - Activation Labs Rpt 17216

	Au-INA	Wt (gm)	Summary For Entire Sample			Reconstruction Description			
Subsample	(ppb)	of fraction	Wt (gm)	Weighted Avg	Comments	Base Stock	"Spike"	Reconstructed Sample	
ID	*det 2ppb*	*det 0.01gm*	Analyzed	Au (ppb)				Wt (gm)	Au(ppb)
TRS6	326	23			TRS6 (fraction 1)	Reject/CMPB245	Spiked w/ AlluvAu	70.3	1209
TRS6A	2150	22	69.0	1103	TRS6 (fraction 2)				
TRS6B	889	24			TRS6 (fraction 3)				
TRS6SA	-2	35		-2	scrub sand (Fraction 1)				
TRS6SB	-2	39			scrub sand (Fraction 1)				
TRS8	37	26			TRS8 (fraction 1)	Reject/CMPB245	Spiked w/ AlluvAu	83.7	1624
TRS8A	30	30	81.0	37	TRS8 (fraction 2)				
TRS8B	45	25			TRS8 (fraction 3)				
TRS8SA	4	37		-2	scrub sand (Fraction 1)				
TRS8SB	-2	39			scrub sand (Fraction 1)				
TRS3	136	31			TRS3 (fraction 1)	Reject/CMPB245	Spiked w/ CH3	95.0	167
TRS3A	167	31	93.0	172	TRS3 (fraction 2)				
TRS3B	214	31			TRS3 (fraction 3)				
TRS3SA	-2	34		-2	scrub sand (Fraction 1)				
TRS3SB	-2	35			scrub sand (Fraction 1)				
TRS2	704	28	55.0	756	TRS2 (fraction 1)	Pulp/BK0206730	Spiked w/ CH3	56.7	731
TRS2A	810	27			TRS2 (fraction 2)				
TRS5	1520	26	26.0	1520	Canmet Standard CH3	CH3	none	26.4	1400

Analytical Test Suite, Lot#TRS2003 (samples analyzed without pulverizing) - Activation Labs Rpt17215

	Au-INA	Wt (gm)	Summary For Entire Sample			Reconstruction Description			
Subsample	(ppb)	of fraction	Wt (gm)	Weighted Avg	Comments	Base Stock	"Spike"	Reconstructed Sample	
ID	*det 2ppb*	*det 0.01gm*	Analyzed	Au (ppb)				Wt (gm)	Au(ppb)
TRS7	108	32	59.0	616	TRS7 (fraction 1)	Reject/CMPB245	Spiked w/ AlluvAu	58.7	1237
TRS7 A	1220	27			TRS7 (fraction 2)				
TRS9	150	22	38.6	1839	TRS9 (fraction 1)	Reject/CMPB245	Spiked w/ AlluvAu	38.4	1992
TRS9 A	4180	16			TRS9 (fraction 2)				
TRS10	15	25	47.9	16	TRS10 (fraction 1)	Reject/98AS02CMP	none	52.4	5
TRS10 A	18	23			TRS10 (fraction 2)				
TRS11	-2	10	9.8	-2	TRS11	Reagent A15	none	9.5	0
TRS12	118	35	35.1	118	TRS12	CMPB245	Spiked w/ CH3	35.0	105
TRS4	1500	27	26.5	1500	Canmet Standard CH3	CH3	none	26.6	1400

Table 23. Sample reconstruction specifications and analytical results, Reconstructed samples suites, Tintina Check Assaying Program 1999

The tests indicate the following:

- Analyses of Ateba's deflocculating reagent A15 reported nil gold;
- ActLabs reported acceptable grades for Canmet certified standard CH3 as well as for samples reconstructed by addition of CH3;
- Of the four samples reconstructed by the addition of alluvial gold grains, two samples were pulverized prior to analysis. Only one of the samples returned the reconstructed gold grade whereas the second sample reported near nil gold (ie. unexplained loss of 1.6g/t);
- Of the four samples reconstructed by the addition of alluvial gold grains, two samples were analyzed without mechanical pulverization. One of the two non-pulverized samples reported a grade equivalent to that calculated per the reconstruction. Oddly enough, while only a single grain of gold had been added to this sample, it was assayed in two fractions both of which reported gold. The second non-pulverized sample only reported only half the reconstructed grade;

While the above tests are not definitive as to the perils of pulverizing otherwise malleable gold, they serve to reiterate that native gold can get lost in the shuffle of sample weighing and handling. The tests do, however, suggest that pulverization does not necessarily contribute to systematic losses of native gold grains from samples.

A common characteristic of desiccated Second White Specks black shale samples and, especially, mineral concentrates therefrom is considerable static electricity which renders the mineral concentrates difficult to handle when dry. The static electricity has proven to be particularly problematic during picking of gold and other metallic grains from the concentrates, a problem which is circumvented only by mineral picking in wet form by immersing the sample in water. Where the typically flaked gold grains of the Second White Specks shales are concerned, the static electricity manifests itself in considerable clinging of grains to tweezers and sample container surfaces. It is highly likely therefore that the above analytical disparities for samples spiked with gold grains are due to static clinging of gold to container surfaces - much like a sock in a drier.

It is of note that all tests completed during the check assaying program by all parties repeatedly demonstrated that mineral concentrates produced from samples treated with Ateba's deflocculating reagent A15 are static free are considerably easier to handle dry than other concentrates produced by more conventional means (tabling, panning, etc.).

8.4.2 Deflocculation Tests

Considering that tests completed under Crowflight Minerals's direction had repeatedly reported good gold grades from samples pre-treated with Ateba's deflocculating reagent A15, and considering that references to deflocculated product material as "concentrates" had become habitual during discussions with Crowflight without the benefit of a detailed chemical profile of deflocculation products, it was paramount to definitively establish the effects of deflocculation using A15 on the shales. A suite of four composite samples were, accordingly, selected during April/99 for a series of tests to evaluate the effects of Ateba's deflocculant reagent A15 on the shale samples. The four samples selected are:

- AS2CMPD1 - Volumetric composite sample of Second White Specks in Asphalt drill hole AS2
- ORTCMPD1- Weighted composite CMPB245 prepared by Ortech during flotation testwork
- BKCMPD1 - Volumetric composite sample of Second White Specks in Buckton drill hole BK2
- BKCMPD2 - A duplicate sample from BKCMPD1 above

The samples, ranging in weight 2kg-4.6kg, were submitted to Ateba Mines Claytech Sudbury division where they were deflocculated using reagent A15. The deflocculated solution was sieved at 350mesh and the two fractions: -350mesh slimes (the float) and +350 sink were separated for separate analysis. The two fractions from three of the four samples were subsequently submitted to Actlabs for analysis (fractions from sample BK2CMPD2 are archived at Tintina's storage facilities, Toronto). Sample fractions and analytical flowsheet are summarized in Figure 22. Analytical results are summarized in Table 24 (certificates are appended in Appendix D1.4).

				Composite Sample ddh AS2			Composite Sample CMPB245			Composite Sample ddh BK2		
Element	Units	Detection Limit	Method	Defloc FLOAT AS2CMPD1-S	Defloc SINK AS2CMPD1-B	Wtd Avge (1997)	Defloc FLOAT ORTCMPD1-S	Defloc SINK ORTCMPD1-B	Wtd Avge (1997)	Defloc FLOAT BK2CMPD1-S	Defloc SINK BK2CMPD1-B	Wtd Avge (1997)
Ag	ppm	0.4	ICP	1.0	0.8	0.3	0.9	0.6	0.5	0.8	-0.4	0.5
Al	%	0.01	ICP	6.10	5.10	7.29	5.76	4.19	6.68	5.05	1.93	6.47
As	ppm	0.5	INA	73.2	59.6	51.4	71.0	71.4	61.4	64.0	45.9	56.4
Au	ppb	5	FA	10.0	-3.6	7.3	10.0	7.5	3.7	6.3	6.0	4.2
Au	ppb	2	INA	8	16	7	16	22	6	9	4	6
Ba	ppm	50	INA	2160	2638	3042	1250	1788	1782	1275	1333	2322
Br	ppm	0.5	INA	16.1	23.2	17.7	13.7	20.7	13.9	12.0	13.9	12.8
Ca	%	0.01	ICP	2.71	7.16	4.04	2.93	8.38	5.23	4.35	13.44	5.56
Ca	%	1	INA	2.2	6.6	3.5	3.0	7.8	4.8	4.0	11.8	5.7
Cd	ppm	0.5	ICP	8	13	7	8	14	8	8	11	8
Ce	ppm	3	INA	88	200	111	74	132	91	85	149	106
Co	ppm	1	INA	24	21	20	25	23	23	21	12	21
Corg	%			6.13	9.95	7.00	6.00	9.98	7.01	5.43	7.43	5.99
Cr	ppm	5	INA	92	86	110	86	79	94	76	39	95
Cs	ppm	1.0	INA	5.0	4.3	5.1	5.7	3.5	5.2	4.3	-0.3	5.0
Cu	ppm	1	ICP	117	100	89	96	92	73	85	55	70
Eu	ppm	0.2	INA	2.2	7.1	3.4	1.6	4.3	2.4	2.1	5.0	2.7
Fe	%	0.01	INA	5.32	4.22	4.46	5.17	5.04	4.77	4.54	3.15	4.53
Hf	ppm	1.0	INA	4.2	4.6	5.0	4.0	4.9	4.9	4.0	4.0	5.9
K	%	0.01	ICP	1.62	1.37	1.83	1.60	1.22	1.75	1.43	0.76	1.52
La	ppm	0.5	INA	52.4	157.3	82.5	42.8	96.6	57.8	51.1	114.2	64.4
Lu	ppm	0.05	INA	0.67	1.80	1.06	0.56	1.15	0.79	0.63	1.21	0.92
Mg	%	0.01	ICP	0.82	0.58	0.97	0.80	0.52	0.86	0.67	0.21	0.87
Mn	ppm	1	ICP	238	236	211	205	263	202	226	266	194
Mo	ppm	2	ICP	60	74	63	60	79	70	55	50	66
Mo	ppm	1	INA	61	77	92	62	81	84	55	53	85
Na	%	0.01	INA	0.57	0.51	0.71	0.32	0.37	0.55	0.48	0.34	0.61
Nd	ppm	5	INA	41	106	59	31	66	49	35	77	57
Ni	ppm	1	ICP	130	125	122	148	145	136	123	84	126
Ni	ppm	20	INA	171	197	93	177	204	144	139	141	145
P	%	0.001	ICP	0.433	0.787	0.310	0.316	0.574	0.236	0.347	0.646	0.235
Pb	ppm	4	ICP	29	24	20	25	21	19	25	14	19
Rb	ppm	15	INA	74	59	91	79	60	90	70	26	85
S	%	0.01	ICP	4.63	4.33	3.52	4.81	5.90	4.05	4.57	4.24	3.84
Sb	ppm	0.1	INA	14.4	12.9	11.8	13.6	14.0	12.2	12.3	8.4	13.6
Sc	ppm	0.1	INA	12.0	15.6	14.0	11.1	12.1	12.3	10.5	9.1	13.7
Sc	ppm	3	INA	27	35	25	23	26	27	20	19	27
Sm	ppm	0.1	INA	9.0	26.3	13.0	6.7	16.6	9.2	8.5	19.3	10.8
Sr	ppm	1	ICP	327	431	354	206	291	249	223	294	271
Sr	%	0.05	INA	-0.050	-0.050	0.036	-0.050	-0.050	0.028	-0.050	-0.050	0.031
Ta	ppm	0.5	INA	0.90	-0.50	0.77	0.85	-0.50	0.68	0.73	-0.50	0.85
Tb	ppm	0.5	INA	1.3	4.3	2.2	0.9	2.6	1.5	1.3	3.1	1.7
Th	ppm	0.2	INA	11.0	17.9	13.6	9.8	14.0	12.1	10.2	12.6	12.8
Ti	%	0.01	ICP	0.27	0.19	0.26	0.27	0.17	0.25	0.25	0.09	0.25
U	ppm	0.5	INA	18.4	51.9	31.0	18.5	50.0	29.1	20.2	52.5	34.1
V	ppm	2	ICP	584	481	664	609	476	672	503	136	648
W	ppm	1	INA	-1.0	-1.0	0.6	1.5	-1.0	0.8	-1.0	-1.0	1.0
Y	ppm	2	ICP	54	174	84	40	102	56	55	130	58
Yb	ppm	0.2	INA	4.4	11.5	6.5	3.5	7.3	5.0	4.1	7.9	5.9
Zn	ppm	1	ICP	286	341	282	285	403	303	263	302	305
Zn	ppm	50	INA	277	373	341	285	441	346	257	325	377
Actlabs Certificate No.				Rpt-17389	Rpt-17365		Rpt-17389	Rpt-17365		Rpt-17389	Rpt-17365	

Note: See Sabag 1998 for 1997 analytical data

Table 24. Comparative analytical data from "float" and "sink" fractions of deflocculated composite drill core samples, Asphalt and Buckton Property drill holes. Deflocculation Test Suite 1999, Tintina Mines. Wtd Avge (1997) is the weighted average of whole (non-deflocculated) sample per 1996-97 analyses.

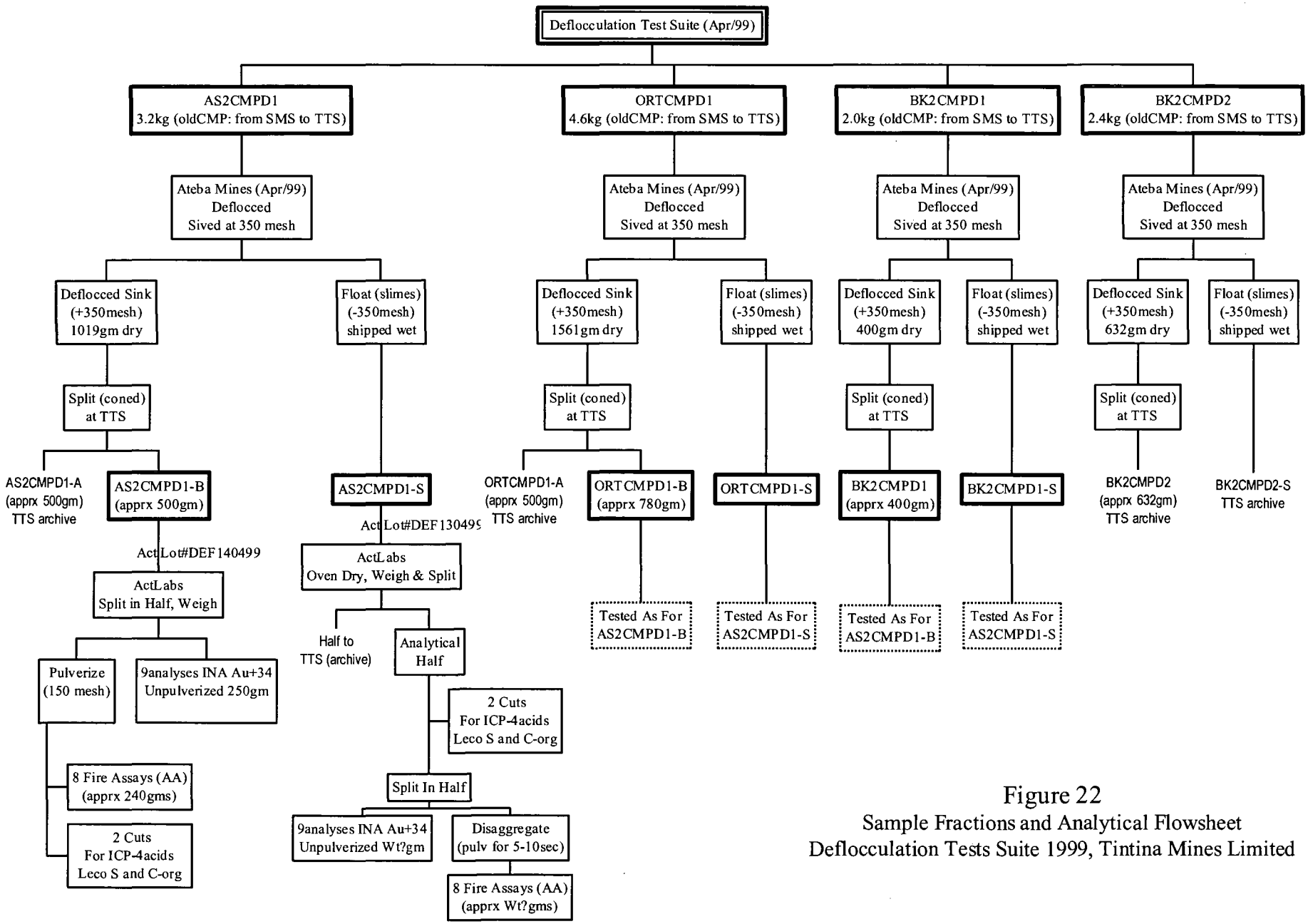


Figure 22
Sample Fractions and Analytical Flowsheet
Deflocculation Tests Suite 1999, Tintina Mines Limited

Notes: TTS=Tintina Mines; MS=Strathcona Minerals; CMP=composite sample

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Overall yields of sink material from the deflocculation work are quite good, ranging 20%-30% of original feed material, especially when compared to previous mineral concentration work undertaken by Tintina and many others relying on various gravity methods to produce heavy mineral concentrates from the shales (typical yields of 1%). Comparative analyses of the "sink" compared to "float" fractions, however, indicate very few gross chemical contrasts between the two fractions suggesting that the tests achieved only a segregation of size fraction rather than mineralogy. Other than some concentration in the sink fractions of REE, Ca, Corg and the odd metal (e.g.Zn), the magnitudes of concentration noted are hardly large enough to deem the sink, or float fraction for that matter, a bona fide "concentrate".

Considerable difficulties had previously been encountered by Tintina and others working in the Alberta Cretaceous shales during production of mineral concentrates, as sample wettability and proper disaggregation have repeatedly proven challenging. Close visual binocular examination of the sink and float fractions from the above testwork indicated superb properties of reagent A15 as a deflocculant and a good sequestering agent toward the expeditious production of well sized sink and float fractions from otherwise difficult to handle test material. Despite its pH of 9 requiring due handling care, reagent A15 can have excellent application toward the preparation of mineral concentrates from otherwise slimy and clay-rich muddy matrices.

8.4.3 Bottle Roll Cyanidation Tests

It became quite clear midway through the Check Assaying Program 1999 that assaying of small samples, ranging 100gm-300gm, would continue to return highly variable data partly due to suspected nugget effect but mainly due to the unknown effects of repeated sample handling during preparation of numerous multiple analytical fractions. Given sample size constraints of analysis by fire assaying or INA (some 30±gm), the need for identifying analytical procedures which could test larger sample with minimal handling became a priority. A series of bottle roll cyanidation tests were, accordingly, initiated at Lakefield Research Limited during February/99, to test larger sample fractions.

Following favourable findings from a suite of orientative tests, two subsequent sample suites were also similarly tested. The first two test suites were submitted to Lakefield on Tintina's behalf by Crowflight Minerals, whereas the third test suite was submitted on Tintina's behalf by Strathcona Mineral Services as an integral part of its audit of the Check Assaying Program 1999. Lakefield's test reports for the three sets of tests are included in Appendices D3.2, D3.3 and D3.4 (Lakefield's report for the third set of tests, completed under Strathcona's direction, is also appended in a separate report by Strathcona Mineral Services included herein as Appendix D4. Results from all of the cyanidation tests are summarized in Table 25

For the first two test suites, some 3kg-4kg of sample material was delivered to Lakefield. Three pairs (ie. total of six) of 500gm test charges were split from the sample after homogenizing and each pair was leached according to different procedures as follows: Pair 1 were leached without any pre-treatment; Pair 2 were leached after roasting; Pair 3 were leached after deflocculation with Ateba's reagent A15 using procedures as outlined

by Ateba (identical to its previous work on other Second White Specks samples. See previous sections of this report).

The sample suites tested are as follows:

- CMPB245 - Composite drill core sample of Second White Specks Formation intersection from Buckton holes BK2, BK4, BK5; Lakefield reference as sample 98T13A0038, Proj-4424-104;
- CMPAS2 - Composite drill core sample of Second White Specks Formation intersection from Asphalt hole AS2; Lakefield reference as sample CFL99-2, Proj-4424-104(Ct'd);
- Two samples tested (1) Composite drill core sample of Second White Specks Formation intersection from Asphalt hole AS2 (CMPAS2-*new*) as resampled by Strathcona Minerals Services from drill core previously archived at the Alberta Geological Survey core storage facilities, Edmonton; Lakefield reference as samples SMS201 and SMS202; (2) a reconstructed sample composed of a "blank" spiked with sufficient amount of Canmet certified standard M1b to represent a grade of 490ppb. A pre-crushed sample of Labiche shale which is devoid of gold was used as the "blank" base stock; Lakefield reference as sample SMS203. Lakefield Proj-2005-3.

The reader is referred to Lakefield's test reports for a detailed account of test procedures. In general terms, however, the tests entail the following : (i) the test charge is cyanidated in a rolling bottle, (ii) activated carbon is added to collect any dissolved gold; (iii) following some 24 hours of leaching, the carbon is recovered and the pulp (residue) is filtered; (iv) all fractions (carbon, residue and solution) are analyzed by gold fire assays to determine calculated gold recoveries and a calculated head grade.

A head grade sample is also routinely taken from the homogenized sample prior to leaching for comparison.

While activated carbon is normally added at the beginning of the leaching cycle (ie. Carbon In Leach - CIL), delaying its addition to the end of the leaching cycle (ie. Carbon In Pulp - CIP) provides a comparative benchmark for the assessment of any preg-robbing which might occur during the leaching process. Preg-robbing is common to cyanidation of carbonaceous ores wherein adsorption of leached gold by organics can considerably impede its recovery leading in some extreme cases to as much as 80% losses of the gold to tails. The addition of activated carbon was varied during the bottle roll test such that for each pair of test charges, one test charge was leached by CIL while the other by CIP procedures entailing the addition of activated carbon 24 hours after start of leaching and continuing leaching thereafter for an additional 6 hours.

Results from the three cyanidation test suites shown in Table 25 serve to outline a number of overall general trends, namely (i) that CIP calculated head grades are lower than those based on CIL tests suggesting that pre-robbing is at work; (ii) roasted samples report similar or lower grades than those from untreated material suggesting possible gold losses during roasting; (iii) deflocculated samples report the higher calculated head grades, especially for the second test suite for sample CMPAS2, suggesting an as yet ill understood role of deflocculation to gold liberation from the sample matrix; and (iv) all tests reported grades an order or two of magnitudes (70ppb-470ppb) higher than those documented from the 1996-97 drilling programs (5ppb-7ppb).

First Test Suite Lakefield Proj# 4424-104	Sample 98T13A0038 (Composite Sample CMPB245, Buckton ddh 2+4+5)																	
	Subsample 1 - Untreated						Subsample 2 - Preroasted						Subsample 3 - Deflocculated					
	Test 1 CIL			Test 2 CIP			Test 3 CIL			Test 4 CIP			Test 5 CIL			Test 6 CIP		
	Wt(gm)	Au(g/t)	AuDist%	Wt(gm)	Au(g/t)	AuDist%	Wt(gm)	Au(g/t)	AuDist%	Wt(gm)	Au(g/t)	AuDist%	Wt(gm)	Au(g/t)	AuDist%	Wt(gm)	Au(g/t)	AuDist%
Sample Wt	500gm	0.005		500gm	0.005		500gm	0.005		500gm	0.005		500gm	0.005		500gm	0.005	
Roasted Sample Wt							403			404								
Defloc Sink Wt													215			190		
Defloc Float Wt													285			310		
Float Fraction													265	0.03	16.0	299	0.03	26.4
Float Filtrate													1230ml	<0.01	24.7	1200ml	0.01	35.4
Solution	900ml	<0.01	13.5	720ml	<0.01	20.0	1100ml	<0.01	41.0	740ml	<0.01	35.4	630ml	<0.01	12.7	505ml	<0.01	14.9
Loaded Carbon	21.0	2.28	71.9	20.7	0.22	12.7	21.4	0.37	29.5	20.5	0.27	26.5	20.5	0.92	37.9	20.5	0.20	12.1
Leach Residue	485	<0.02	14.6	484	0.05	67.3	397	<0.02	29.6	398	<0.02	38.1	215	0.02	8.7	190	0.02	11.2
Calculated Head	500	<0.13	100.0	500	0.07	100.0	500	<0.05	100.0	500	<0.04	100.0	500	0.10	100.0	500	0.07	100.0
Calculated Recovery (%)			*85*			*33*			*70*			*62*			*51*			*27*

Second Test Suite Lakefield Proj# 4424-104 Ct'd	Sample CFL99-2 (Composite Sample CMPAS2, Asphalt ddh AS02)																	
	Subsample 1 - Untreated						Subsample 2 - Preroasted						Subsample 3 - Deflocculated					
	Test 7 CIL			Test 8 CIP			Test 9 CIL			Test 10 CIP			Test 11 CIL			Test 12 CIP		
	Wt(gm)	Au(g/t)	AuDist%	Wt(gm)	Au(g/t)	AuDist%	Wt(gm)	Au(g/t)	AuDist%	Wt(gm)	Au(g/t)	AuDist%	Wt(gm)	Au(g/t)	AuDist%	Wt(gm)	Au(g/t)	AuDist%
Sample Wt	500gm	0.007		500gm	0.007		500gm	0.007		500gm	0.007		500gm	0.007		500gm	0.007	
Roasted Sample Wt							390			390								
Defloc Sink Wt													105			134		
Defloc Float Wt													395			366		
Float Fraction													352	0.50	74.4	336	0.19	61.3
Float Filtrate													895ml	0.01	3.8	880ml	0.01	8.5
Solution	1280ml	<0.01	36.3	1440ml	<0.01	42.6	1050ml	<0.01	31.1	1050ml	<0.01	38.6	360ml	<0.01	1.5	470ml	<0.01	4.5
Loaded Carbon	23.3	0.37	24.5	21.6	0.47	30.0	21.2	0.19	11.9	21.1	0.25	19.4	12.1	3.70	18.9	10.4	1.67	16.7
Leach Residue	460	0.03	39.2	463	0.02	27.4	385	0.05	57.0	380	0.03	42.0	105	0.03	1.3	134	0.07	9.0
Calculated Head	500	0.07	100.0	500	0.07	100.0	500	0.07	100.0	500	0.05	100.0	500	0.47	100.0	500	0.21	100.0
Calculated Recovery (%)			*61*			*73*			*43*			*58*			*20*			*21*

Third Test Suite Lakefield Proj# 2005-3	Sample SMS201 CMPAS2 - Split2						Sample SMS202 CMPAS2 - Split3			Sample SMS203 Reconstructed Sample		
	Subsample 1A Deflocculated Test 1 CIL			Subsample 1B Deflocculated Test 2 CIL			Subsample 1 Untreated Test 4 CIL			(Labiche+M1b) Deflocculated Test 3 CIL		
	Wt(gm)	Au(g/t)	AuDist%	Wt(gm)	Au(g/t)	AuDist%	Wt(gm)	Au(g/t)	AuDist%	Wt(gm)	Au(g/t)	AuDist%
Sample Wt	503gm	0.007		503gm	0.007		513gm	0.007		499gm	0.5	
Roasted Sample Wt												
Defloc Sink Wt	164			183						216		
Defloc Float Wt	339			320						283		
Float Fraction	339.00	<0.02	<13	320.00	0.03	22.90				283.00	0.37	42.90
Float Filtrate	750ml	<0.01	<14.3	740ml	<0.01	<17.6				960ml	<0.01	<3.9
Solution	800ml	<0.01	<15.3	830ml	<0.01	<19.8	1440ml	<0.01	53.20	1060ml	<0.01	4.30
Loaded Carbon	10.00	0.02	0.40	11.00	0.02	0.50	22.00	0.11	8.90	11.10	6.88	31.30
Leach Residue	157.00	0.19	57.00	18.30	0.09	39.20	51.30	0.02	37.90	204.00	0.21	17.50
Calculated Head	503.00	<0.1	100.00	503.00	<0.08	100.00	513.00	0.05	100.00	499.00	<0.49	100.00

Table 25. Summary of bottle roll cyanidation test results. Tintina Check Assaying Program 1999. All analyses by Lakefield Research. Original sample grade shown is per Tintina 1996-97 data.

In addition to the above, a series of head sample assays reported by Lakefield from the second test suite are quite interesting, though they add confusion to an already confusing trend noted in grades reported from multiple analytical cuts taken from samples. Although a routine head sample fire assay for sample CMPAS2 taken by Lakefield upon receipt of the sample reported less than detection gold grade, the cyanidation testwork was carried out nonetheless upon Tintina's insistence, despite Lakefield's strong recommendations to abort the work. Following detection of upward to 470ppb of gold in the CIL tests for the sample, however, Lakefield fire assayed eleven head sample cuts from the remainder of sample CMPAS2 then on hand. These fire assays reported highly variable results ranging nil to 1.17ppm, reiterating that considerable nugget effect is associated with routine gold analyses of the shales and suggesting the presence of coarse gold therein. Cyanidation test results for composite material from Asphalt Property drill hole AS2 are summarized in Table 26, in addition to multiple head assays therefrom. Previous assaying results tabulated above are also reiterated for comparison.

Incredulous as it may seem, the above set of fire assays suggest that any existing gold grains within the sample may well be gradually concentrated in material remaining therefrom as progressive subsamples are taken out for analysis. The process bespeaks very high mobility and settling of the gold grains within the otherwise very fine clay sample material. This would be supported by the high density contrast and high grain size contrast between existing gold grains and their powder clay matrix. A similar trend was also noted in a handful of samples of Asphalt Property Belle Fourche Formation shale which reported progressively higher gold grades from the final analytical cuts from fire assaying of multiple 1AT cuts to consume the entire sample material (see Table 21 in an earlier sections in this report).

While it is tempting to draw additional conclusions from the tests, the exercise would be no more than speculative due to the variability of results (even from subsamples taken from the same sample) and complexities of reconciling detection limit uncertainties.

Total (m) Cored In Target Zone	Total Core (m) Represented by Composite Sample Tested	Average Weighted Grade per re-assaying of core intervals Gold (g/t) *(Note1)*	Lakefield Head Assays of Composite Sample For Entire Zone Gold (g/t) *(Note2)*	Grade per Cyanidation of Composite Sample For Entire Zone Gold (g/t) *(Note 3)*
11.4	11.4	0.62	<0.02, 0.2, <0.02, 0.43 0.47, 0.36, 1.17, <0.02 <0.02, 0.12, 0.24 Average = 0.27	0.47
Notes: (1) Weighted average of 55 fire assays from 29 drill core intersections, Loring Labs, Tintina check assaying program 1999, see previous section of this report; (2) 1AT Fire assays, Lakefield Research; (3) CIL bottle roll cyanidation of 500gm deflocculated sample, Lakefield Research				

Table 26. Comparative data for composite sample of Second White Specks Formation from Asphalt Property Drill Hole AS2. Tintina Check Assaying Program 1999.

Unlike the first two cyanidation test suites, only CIL cyanidation was completed for the third test suite. Three test charges of composite sample CMPAS2 were cyanidated, two of which were deflocculated prior to cyanidation and the third was leached untreated. Results from the leaching are confusing and conflict with previous trends as they

reported the higher gold content from the tails (residues), and the untreated test charge reported the higher gold collected into activated carbon.

Considering the overall low tenor of gold reported by all cyanidation tests (mostly sub-100ppb), a reconstructed sample of known gold grade was also leached during the third test suite to allay concerns about sample contamination from laboratory equipment at Lakefield. This sample was reconstructed by Strathcona Minerals by mixing sufficient amounts of Canmet Standard M1b with otherwise barren Labiche shale for an average grade of 490ppb. Calculated head grade per the leaching confirmed the reconstructed grade with uncanny accuracy.

Despite initial intents to repeat cyanidation tests on larger test charges 10kg-50kg range, additional leaching was not completed due to budgetary constraints.

8.4.4 Overview Remarks: Experimental Analytical Work

The check assaying work undertaken by Tintina failed to corroborate the results reported to it by Crowflight, although some of the 1999 re-assaying did report some relatively good grades exceeding 1g/t Au. Oddly enough, some of the 1999 results from analytical work completed at Actlabs are also in conflict with earlier routine analyses completed by Actlabs during the 1996-97 drilling programs, suggesting either gross inconsistencies in analytical precision and accuracy, or extreme nugget effect. Other conclusions made from the experimental check assaying work are as follows:

- Sample pulverization is not as significant and systematic an issue as previously thought regarding gold losses but that considerable gold losses do indeed occur during multiple sample handling, especially during sample splitting, due to unusually high static charges of the samples and the paramagnetic nature of our gold grains;
- The Ateba deflocculating reagent A15 is barren of gold and can be ruled out as a contaminant;
- Gold distribution in many of the samples is nuggetted as demonstrated by very variable results from multiple assaying of up to ten or so fractions per sample from several suites tested. A progressive concentration of gold within the final fractions of subsample suites is also suggested;
- The standard 30gm sample size routinely used during fire assaying is non-representative of the sample;
- Although deflocculation does appear to facilitate gold liberation and recovery during cyanidation reporting results suggestive of coarse as well as very fine gold, given the absence of additional tests which were omitted by Lakefield for reasons which remain unknown, it is difficult to evaluate the role of deflocculation during the cyanidation tests;
- Deflocculation with Ateba's reagent A15, though a useful procedure to improve physical properties of the sample material, does not serve to selectively concentrate majority of the elemental (and mineral?) components of the sample into a slime (float) or a sink fraction. Reference to deflocculated material as a "concentrate" is, accordingly, erroneous and misleading;
- While nugget effect is repeatedly cited as a convenient culprit to account for highly variable gold analyses, a good deal of the erratic data documented during the check assaying and earlier work are better attributed to sample size and sample preparation issues.

8.5 STRATHCONA MINERAL SERVICES - ASSAYING AUDIT 1999

8.5.1 Introduction

Strathcona Mineral Services, Toronto, were retained during the end of January/99 to review and audit tests completed by Crowflight on drill core samples of the Second White Specks Formation and to carry out all such other necessary testwork to definitively determine gold grade of drill core samples from the Second White Specks Formation collected by Tintina from its Asphalt and Buckton 1996-97 drilling programs. What started out as a simple three week investigation, however, quickly grew into a four month long endeavor comprising in most part a rigorous repetition of Tintina's 1996-97 analytical procedures, and in itself generated as much confusing data as that accumulated earlier by Crowflight from its work. Strathcona's work proceeded concurrently with Tintina's check assaying program.

Strathcona's study was conducted under chain-of-custody sample protocols and consisted of two round robin analytical suites (100gm samples each, analyzed concurrently at several separate analytical facilities) and preliminary, though detailed, mineral concentration tests and review of newly concentrated material as well as review of concentrates produced by Crowflight from its initial deflocculation testwork. Analytical work for the study was carried out concurrently by Lakefield Research, Activation Labs, Chauncey Labs and Loring Labs. Mineral concentrates examined were prepared by Lakefield Research. The study also included bottle roll cyanidation test completed at Lakefield Research in an attempt to duplicate similar previous work tests (discussed in section 8.4.3 of this report).

The reader is referred to a detailed stand-alone report submitted by Strathcona (Appendix D4) for various particulars of their audit and derivative work. A broad overview and salient conclusions are reiterated below.

8.5.2 Round Robin Suites #1 and #2

Two round robin analytical suites were analyzed concurrently at four analytical facilities: Lakefield Research, Activation Labs, Chauncey Labs and Loring Labs. The first suite consisted in most part of fractions of subsamples of precrushed composite drill core material previously tested by Crowflight. A Canmet certified standard was also analyzed during the tests as was sample of Labiche shale known to be barren of gold.

While Lakefield and Actlabs reported nil or below detection gold for the samples comprising the suite, Chauncey and Loring reported considerably higher gold contents for the samples and for the Canmet standard. Loring conceded to instrumentation calibration errors during the tests as the cause of its over-reporting of results (Loring subsequently remedied the shortfall as indicated by results from the second Round Robin analytical suite). It is uncertain whether the calibration errors noted at Loring Labs may have also been present during previous assaying conducted by Loring for Tintina during the same period (Feb/99) while assaying composite samples from Asphalt drill holes AS1 and AS2 both of which had reported gold contents from Loring assays which are considerably higher than those previously documented by Tintina from the 1996-97 drilling program (samples 98AS01CMP and 98AS02CMP. See Tables 17 and 18 this report, Section 8.2 and 8.3).

Following completion of Round Robin #1, a mutual decision was taken to utilize "fresh" samples from the archived drill core (core storage facilities, Alberta Geological Survey) for the second Round Robin of analyses. Resampling of two of the drill holes was, accordingly, carried out by Strathcona in Edmonton during late February and samples were shipped to Lakefield Laboratories for crushing and pulverization. The samples were, again, analyzed at the same four laboratories, and all but Chauncey reported nil to below detection gold grades as well as acceptable grades for the Canmet standard.

The Round Robin testwork concluded that analytical data from Chauncey is unreliable, and that the samples tested are substantially barren of gold. The test results equivocate earlier results reported by Crowflight most of which were from analyses completed at Chauncey Labs.

8.5.3 Mineral Studies

Two separate mineral studies were completed integral to Strathcona's work (by Mr.E.Walker of Petrologic Inc.) the first of which concerned itself with detailed examination of concentrates prepared by Crowflight from its initial deflocculation tests analyses of which reported considerable gold content. The samples studied included a handful of polished mounts and products from cascade washing of samples as prepared by Mr.Reading on behalf of Crowflight.

Gold was noted in several of the samples, either as liberated grains or "locked" within an assemblage of other minerals. While gold compositions reported high fineness ranging 92%-98% Au similar to other gold grains previously documented by Tintina from its work within the Cretaceous shales, one locked gold grain was noted surrounded by a mineral assemblage which is exotic to the rock and is likely representative of contamination introduced during sample crushing, drilling or tabling. Oddly enough, the sample reporting the exotic assemblage had reported no gold from previous analyses.

Considering that the concentrates examined during the above study had been prepared by third-parties under relatively ill documented conditions, a second mineral study was initiated to examine concentrates prepared under controlled conditions from fresh samples of drill core which had not been previously crushed. Drill core previously archived at the core storage facilities of the Alberta Geological Survey from hole AS02 and BK02 were, accordingly, resampled by Strathcona and select intervals were submitted to Lakefield Research for the preparation of heavy mineral concentrates therefrom. The concentrates were reviewed by Lakefield staff mineralogist and subsequently submitted to Petrologic Inc. for a more detailed examination. The concentrates were subsequently analyzed by INA at Actlabs.

Mineralogical examinations of the "fresh" concentrates reported no gold, but gold values were reported from analyses of the gravity sinks (0.1%-0.2% of the whole sample by weight) ranging 46ppb-3060ppb. Other metals were also concentrated within the gravity sinks, including Zn, As and Fe. Based on overall mineralogy of the concentrates replete with diagnostic detrital material, Strathcona concluded that gold within the Second White Specks is concentrated within portions (paleoplacers?) which represent considerable detrital component.

Strathcona concluded from its study that whereas traces of gold are indeed present within the Second White Specks black shales, its overall grade is far too low in samples of core tested from the 1996-97 drilling to enable expectation of any economic concentration within portions of the two Properties tested by the drilling. Strathcona offered no explanations regarding conflicting data from, and among, the cyanidation tests.

8.5.4 Bottle Roll Cyanidation Tests

In addition to analytical and mineral tests, a set of bottle cyanidation tests were also carried out at Lakefield Research on a suite of samples submitted by Strathcona (chain-of-custody samples). Details and results from this work were presented in an earlier section of this report in the comparative context of other cyanidation tests initiated by Tintina (Section 8.4.3).

8.5.5 Overview Remarks: Strathcona Audit

Nearly all of the analytical work initiated by Strathcona reported very low or negligible gold contents from the samples tested and, while comprising in most part a rigorous repetition of Tintina's 1996-97 analytical procedures, served to confirm earlier results documented by Tintina from the 1996-97 drilling programs. The results are in conflict with much of the data reported to Tintina by Crowflight.

While the Round Robin analyses concluded that analytical data from Chauncey Laboratories are unreliable, and that data from Loring Labs may from time to time be susceptible to calibration deficiencies, Strathcona failed to offer insights or explanations for data from cyanidation tests carried out under its direction all of which reported gold contents an order of magnitude higher than analyses of individual samples during the Round Robin tests. The audit study also failed to explain a number of other data sets gathered by Crowflight (e.g. Swastika Labs analyses, and other cyanidation suites).

The Strathcona study results equivocate earlier results reported by Crowflight most of which are from analyses completed at Chauncey Labs, and indicate that whereas traces of gold are indeed present within the Second White Specks black shales, overall gold grade is far too low in samples of core tested from the 1996-97 drilling to enable expectation of any economic concentration within portions of the two Properties tested by the drilling.

8.6 Closing Remarks: Check Assaying Program 1999

As can be seem from the section above, the 1999 Check Assaying Program comprised an exhaustive series of analytical tests supported by limited, though detailed, mineral examination, all of which collectively serve to confirm Tintina's earlier findings from the 1996-97 drilling work, namely (i) that the Second White Specks contains traces of gold; and (ii) that the gold is likely in native (physical) form and its analysis is, accordingly, susceptible to considerable nugget effect.

The very low grades of gold within the Second White Specks shales tested presented extreme challenges during all analytical work, testing the capabilities of all of the laboratories utilized. In that regard, while nugget effect continued to present a convenient

scapegoat to account for erroneous or highly variable analytical results, some responsibility has to be placed on the analytical facilities themselves for repeated imprecisions and inaccuracies reported from samples which are certified to be devoid of free gold. For example, gold grades reported from Canmet standard CH3 vary within some ±150ppb of its 1400ppb certified grade, from fire assay as well as INA analyses all of which boast detection limits as low as 5ppb (similar variations can also be seen in analyses from USGS standard SDO1 utilized during the selective leaching work completed during 1998. See Chapter 5, this report). Such variations clearly question the veracity of low detection limits claimed by various facilities or, alternatively, question the validity of analyses certified for the various analytical standards.

In addition to analytical difficulties, the often difficult-to-handle black shales also presented considerable challenges during sample splitting and preparation. The absence of standardization in sample preparation, crushing and pulverization procedures and equipment among laboratories continued to introduce uncertainties to already challenging analytical undertakings. While deflocculation did serve to mitigate some sample handling difficulties, its role during cyanidation testwork remains unresolved.

Overall conclusions of the collective work completed during the 1999 Check Assaying program are the following:

- Drill core footages of the Second White Specks Formation, as intersected in the 1996-97 drilling, do indeed carry gold, but the overall gold grade is far too low (<<100ppb) in samples of core tested from the 1996-97 drilling to support expectations of any economic concentration within portions of the two Properties tested by the drilling;
- The test results serve to rule out the possibility of inadvertent or deliberate contamination during testwork completed by Crowflight, and conclude that given the incidental discovery of gold during otherwise routine desliming tests, analytical work then carried out was completed in considerable haste and under test conditions ill-suited to accurate determination of gold grades. Some of the high as well as low assay results reported to Tintina are, accordingly, equivocal and are likely artifacts of the combined effects of less than rigorous analytical controls and shortfalls in sample preparation procedures, all of which compounded by the reliance on small sample sizes during analysis of concentrates as necessitated by fire assaying procedures.

9.CLOSING REMARKS & RECOMMENDATIONS

Considerable work has been deployed during the past several years by Tintina as well as by others to resolve questions of grade and process metallurgy pertaining to the Second White Specks Formation black shales. An unusually problematic organic matrix, however, coupled with difficulties of sample handling, peculiar physical properties and nuggetted metallic mineralogy have repeatedly frustrated all efforts despite their rigor. Given these challenges, and the low overall metal contents documented thus far from the shales, it seems highly unlikely that the Second White Specks Formation might ultimately offer targets which can be exploited in the normal context of conventional mining operations. It is recommended, therefore, that no further work be carried out on the Second White Specks shales at the Asphalt and Buckton Properties unless localities can be identified with considerably higher grades (monometallic or combined grade) than those identified to date. Topics for future expansion, though better suited to academic research than to industry efforts, might include pursuit of a better understanding of organic components of the Cretaceous black shales.

The potentially detrital gold content of the shales, on the other hand, offer a relatively more promising direction for future exploration at the two Properties and throughout the Birch Mountains Area in general, since several localities have previously been identified characterized by abnormal thickening of the siliciclastic bone bed unit at the base of the Second White Specks Formation (see Sabag 1996a, 1996b, 1998). These localities are candidates as likely paleochannels, and are also associated with acute stratigraphic anomalies some of which reflected also in anomalous surface geochemistry and topography (e.g.GOS-C exposure, Buckton Property).

Incidental recommendations regarding gold mineralization in the area concern the McIvor Property, wherein alluvial gold has been documented from a significant portion of the McIvor River Valley. Previous work in the area has to date been hampered by the high content of very fine clay within the McIvor placers and its deleterious effects during preparation of heavy mineral concentrates. Testwork completed during 1999 investigating Ateba's deflocculant reagent A15 suggest that it may have direct application to preparation of good quality concentrates from the McIvor material. Pursuit of same is recommended, by way of the experimental treatment of a small suite of samples taken at the confluence of the McIvor River and KRC Tributary.

In marked contrast to assessment of metallic potential of the Second White Specks, indicator mineral testwork has met with considerable and repeated success indicating a good potential for the discovery of diamondiferous kimberlitic pipes in the area, and especially at the Asphalt Property. Active pursuit of this potential is strongly recommended, such work to commence with drilling of several obvious anomalies throughout the southern one third of Asphalt Property wherein targets can be expected to be considerably nearer surface than at Buckton.

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APPENDIX A

Asphalt Property

Permit Ref.#64

Alberta
ENERGY
Mineral Resources Division

METALLIC AND INDUSTRIAL MINERALS PERMIT NO. 9393110051

Date of Issue: 1993 November 29

Term Commencement Date: 1993 November 29

In this Permit:

(a) "Date of Issue" means the date shown above as the Date of Issue;

(b) "Location" means the tract or tracts of land described under the heading "Description of Location" in the Appendix to this Permit;

(c) "Metallic and Industrial Minerals" means the minerals described under the heading "Permitted Substances" in the Appendix to this Permit;

(d) "Permit Holder" means Tintina Mines Limited

(e) "Term Commencement Date" means the date shown above as the Term Commencement Date.

(f) a reference in this Permit to the Mines and Minerals Act or to any other Act of the Legislature of Alberta shall be construed as a reference to

(i) that Act, as amended from time to time,

(ii) any replacement of all or part of that Act from time to time enacted by the Legislature, as amended from time to time, and

(iii) any regulations, orders, directives, by-laws or subordinate legislation from time to time made under any enactment referred to in paragraph (i) and (ii), as amended from time to time.

This Permit grants to the Permit Holder the right to explore for Metallic and Industrial Minerals that are the property of the Crown in right of Alberta in the Location subject to the following terms and conditions:

1. The Permit Holder shall comply with all provisions of the Mines and Minerals Act that pertain or relate to Metallic and Industrial Mineral Permits and those provisions shall be deemed to be incorporated into and to form part of this Permit.

2. Nothing in this Permit shall be construed as removing the necessity to obtain, in relation to the conduct of exploration on the Location, a right of entry, user and taking of the surface of the Location or an exploration approval for the conduct of the exploration, if such a right of entry or exploration approval is required by the Mines and Mineral Act or by any other Act of the Legislature of Alberta.

3(1) The Permit Holder shall comply with

(a) the provisions of the Mines and Minerals Act that relate to, apply to or affect the rights and obligations of a holder of metallic and industrial minerals rights that are the property of Her Majesty, or that relate to, apply to or affect the Permit Holder in the conduct of its operations or activities under this Permit, and

(b) the provisions of any other Act of the Legislature of Alberta relating to, applying to or affecting the rights and obligations of holders of metallic and industrial minerals rights that are the property of Her Majesty, or relating to, applying to or affecting the Permit Holder in the conduct of its operations or activities under this Permit.

(2) The provisions of the Acts and regulations referred to in section 3(1) of this Agreement shall be deemed to be incorporated into and to form part of this Permit.

(3) In the event of conflict between a provision of this Permit and a provision of an Act referred to in section 3(1) of this Agreement, the provision of the Act prevails.

4. This Permit is subject to the special provisions, if any, contained in the Appendix to this Permit.

David Finch

For Minister of Energy
on behalf of Her Majesty

APPENDIX ,

TO

METALLIC AND INDUSTRIAL MINERALS PERMIT NO. 9393110051

COMMENCEMENT OF TERM:

1993 NOVEMBER 29

AGGREGATE AREA:

9 216 HECTARES

DESCRIPTION OF LOCATION:

4-12-098: 1-36

PERMITTED SUBSTANCES:

METALLIC AND INDUSTRIAL MINERALS

SPECIAL PROVISIONS:

NIL

Asphalt Property

Permit Ref.#65

Alberta
ENERGY
Mineral Resources Division

METALLIC AND INDUSTRIAL MINERALS PERMIT NO. 9393110052

Date of Issue: 1993 November 29

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(a) "Date of Issue" means the date shown above as the Date of Issue;

(b) "Location" means the tract or tracts of land described under the heading "Description of Location" in the Appendix to this Permit;

(c) "Metallic and Industrial Minerals" means the minerals described under the heading "Permitted Substances" in the Appendix to this Permit;

(d) "Permit Holder" means Tintina Mines Limited

(e) "Term Commencement Date" means the date shown above as the Term Commencement Date.

(f) a reference in this Permit to the Mines and Minerals Act or to any other Act of the Legislature of Alberta shall be construed as a reference to

(i) that Act, as amended from time to time,

(ii) any replacement of all or part of that Act from time to time enacted by the Legislature, as amended from time to time, and

(iii) any regulations, orders, directives, by-laws or subordinate legislation from time to time made under any enactment referred to in paragraph (i) and (ii), as amended from time to time.

This Permit grants to the Permit Holder the right to explore for Metallic and Industrial Minerals that are the property of the Crown in right of Alberta in the Location subject to the following terms and conditions:

1. The Permit Holder shall comply with all provisions of the Mines and Minerals Act that pertain or relate to Metallic and Industrial Mineral Permits and those provisions shall be deemed to be incorporated into and to form part of this Permit.

2. Nothing in this Permit shall be construed as removing the necessity to obtain, in relation to the conduct of exploration on the Location, a right of entry, user and taking of the surface of the Location or an exploration approval for the conduct of the exploration, if such a right of entry or exploration approval is required by the Mines and Mineral Act or by any other Act of the Legislature of Alberta.

3(1) The Permit Holder shall comply with

(a) the provisions of the Mines and Minerals Act that relate to, apply to or affect the rights and obligations of a holder of metallic and industrial minerals rights that are the property of Her Majesty, or that relate to, apply to or affect the Permit Holder in the conduct of its operations or activities under this Permit, and

(b) the provisions of any other Act of the Legislature of Alberta relating to, applying to or affecting the rights and obligations of holders of metallic and industrial minerals rights that are the property of Her Majesty, or relating to, applying to or affecting the Permit Holder in the conduct of its operations or activities under this Permit.

(2) The provisions of the Acts and regulations referred to in section 3(1) of this Agreement shall be deemed to be incorporated into and to form part of this Permit.

(3) In the event of conflict between a provision of this Permit and a provision of an Act referred to in section 3(1) of this Agreement, the provision of the Act prevails.

4. This Permit is subject to the special provisions, if any, contained in the Appendix to this Permit.

For Minister of Energy
on behalf of Her Majesty

APPENDIX

TO

METALLIC AND INDUSTRIAL MINERALS PERMIT NO. 9393110052

COMMENCEMENT OF TERM:

1993 NOVEMBER 29

AGGREGATE AREA:

9 216 HECTARES

DESCRIPTION OF LOCATION:

4-13-098: 1-36

PERMITTED SUBSTANCES:

METALLIC AND INDUSTRIAL MINERALS

SPECIAL PROVISIONS:

NIL

Asphalt Property

Permit Ref.#67

Alberta
ENERGY
Mineral Resources Division

METALLIC AND INDUSTRIAL MINERALS PERMIT NO. 9393110054

Date of Issue: 1993 November 29

Term Commencement Date: 1993 November 29

In this Permit:

(a) "Date of Issue" means the date shown above as the Date of Issue;

(b) "Location" means the tract or tracts of land described under the heading "Description of Location" in the Appendix to this Permit;

(c) "Metallic and Industrial Minerals" means the minerals described under the heading "Permitted Substances" in the Appendix to this Permit;

(d) "Permit Holder" means Tintina Mines Limited

(e) "Term Commencement Date" means the date shown above as the Term Commencement Date.

(f) a reference in this Permit to the Mines and Minerals Act or to any other Act of the Legislature of Alberta shall be construed as a reference to

(i) that Act, as amended from time to time,

(ii) any replacement of all or part of that Act from time to time enacted by the Legislature, as amended from time to time, and

(iii) any regulations, orders, directives, by-laws or subordinate legislation from time to time made under any enactment referred to in paragraph (i) and (ii), as amended from time to time.

This Permit grants to the Permit Holder the right to explore for Metallic and Industrial Minerals that are the property of the Crown in right of Alberta in the Location subject to the following terms and conditions:

1. The Permit Holder shall comply with all provisions of the Mines and Minerals Act that pertain or relate to Metallic and Industrial Mineral Permits and those provisions shall be deemed to be incorporated into and to form part of this Permit.

2. Nothing in this Permit shall be construed as removing the necessity to obtain, in relation to the conduct of exploration on the Location, a right of entry, user and taking of the surface of the Location or an exploration approval for the conduct of the exploration, if such a right of entry or exploration approval is required by the Mines and Mineral Act or by any other Act of the Legislature of Alberta.

3(1) The Permit Holder shall comply with

(a) the provisions of the Mines and Minerals Act that relate to, apply to or affect the rights and obligations of a holder of metallic and industrial minerals rights that are the property of Her Majesty, or that relate to, apply to or affect the Permit Holder in the conduct of its operations or activities under this Permit, and

(b) the provisions of any other Act of the Legislature of Alberta relating to, applying to or affecting the rights and obligations of holders of metallic and industrial minerals rights that are the property of Her Majesty, or relating to, applying to or affecting the Permit Holder in the conduct of its operations or activities under this Permit.

(2) The provisions of the Acts and regulations referred to in section 3(1) of this Agreement shall be deemed to be incorporated into and to form part of this Permit.

(3) In the event of conflict between a provision of this Permit and a provision of an Act referred to in section 3(1) of this Agreement, the provision of the Act prevails.

4. This Permit is subject to the special provisions, if any, contained in the Appendix to this Permit.

For Minister of Energy
on behalf of Her Majesty

APPENDIX

TO

METALLIC AND INDUSTRIAL MINERALS PERMIT NO. 9393110054

COMMENCEMENT OF TERM:

1993 NOVEMBER 29

AGGREGATE AREA:

9 216 HECTARES

DESCRIPTION OF LOCATION:

4-12-099: 1-36

PERMITTED SUBSTANCES:

METALLIC AND INDUSTRIAL MINERALS

SPECIAL PROVISIONS:

NIL

Asphalt Property

Permit Ref.#68

Alberta
ENERGY
Mineral Resources Division

METALLIC AND INDUSTRIAL MINERALS PERMIT NO. 9393110055

Date of Issue: 1993 November 29

Term Commencement Date: 1993 November 29

In this Permit:

(a) "Date of Issue" means the date shown above as the Date of Issue;

(b) "Location" means the tract or tracts of land described under the heading "Description of Location" in the Appendix to this Permit;

(c) "Metallic and Industrial Minerals" means the minerals described under the heading "Permitted Substances" in the Appendix to this Permit;

(d) "Permit Holder" means Tintina Mines Limited

(e) "Term Commencement Date" means the date shown above as the Term Commencement Date.

(f) a reference in this Permit to the Mines and Minerals Act or to any other Act of the Legislature of Alberta shall be construed as a reference to

(i) that Act, as amended from time to time,

(ii) any replacement of all or part of that Act from time to time enacted by the Legislature, as amended from time to time, and

(iii) any regulations, orders, directives, by-laws or subordinate legislation from time to time made under any enactment referred to in paragraph (i) and (ii), as amended from time to time.

This Permit grants to the Permit Holder the right to explore for Metallic and Industrial Minerals that are the property of the Crown in right of Alberta in the Location subject to the following terms and conditions:

1. The Permit Holder shall comply with all provisions of the Mines and Minerals Act that pertain or relate to Metallic and Industrial Mineral Permits and those provisions shall be deemed to be incorporated into and to form part of this Permit.

2. Nothing in this Permit shall be construed as removing the necessity to obtain, in relation to the conduct of exploration on the Location, a right of entry, user and taking of the surface of the Location or an exploration approval for the conduct of the exploration, if such a right of entry or exploration approval is required by the Mines and Mineral Act or by any other Act of the Legislature of Alberta.

3(1) The Permit Holder shall comply with

(a) the provisions of the Mines and Minerals Act that relate to, apply to or affect the rights and obligations of a holder of metallic and industrial minerals rights that are the property of Her Majesty, or that relate to, apply to or affect the Permit Holder in the conduct of its operations or activities under this Permit, and

(b) the provisions of any other Act of the Legislature of Alberta relating to, applying to or affecting the rights and obligations of holders of metallic and industrial minerals rights that are the property of Her Majesty, or relating to, applying to or affecting the Permit Holder in the conduct of its operations or activities under this Permit.

(2) The provisions of the Acts and regulations referred to in section 3(1) of this Agreement shall be deemed to be incorporated into and to form part of this Permit.

(3) In the event of conflict between a provision of this Permit and a provision of an Act referred to in section 3(1) of this Agreement, the provision of the Act prevails.

4. This Permit is subject to the special provisions, if any, contained in the Appendix to this Permit.

For Minister of Energy
on behalf of Her Majesty

APPENDIX

TO

METALLIC AND INDUSTRIAL MINERALS PERMIT NO. 9393110055

COMMENCEMENT OF TERM:

1993 NOVEMBER 29

AGGREGATE AREA:

9 216 HECTARES

DESCRIPTION OF LOCATION:

4-13-099: 1-36

PERMITTED SUBSTANCES:

METALLIC AND INDUSTRIAL MINERALS

SPECIAL PROVISIONS:

NIL

Asphalt Property

Permit Ref.#71

Alberta
ENERGY
Mineral Resources Division

METALLIC AND INDUSTRIAL MINERALS PERMIT NO. 9393110058

Date of Issue: 1993 November 29

Term Commencement Date: 1993 November 29

In this Permit:

(a) "Date of Issue" means the date shown above as the Date of Issue;

(b) "Location" means the tract or tracts of land described under the heading "Description of Location" in the Appendix to this Permit;

(c) "Metallic and Industrial Minerals" means the minerals described under the heading "Permitted Substances" in the Appendix to this Permit;

(d) "Permit Holder" means Tintina Mines Limited

(e) "Term Commencement Date" means the date shown above as the Term Commencement Date.

(f) a reference in this Permit to the Mines and Minerals Act or to any other Act of the Legislature of Alberta shall be construed as a reference to

(i) that Act, as amended from time to time,

(ii) any replacement of all or part of that Act from time to time enacted by the Legislature, as amended from time to time, and

(iii) any regulations, orders, directives, by-laws or subordinate legislation from time to time made under any enactment referred to in paragraph (i) and (ii), as amended from time to time.

This Permit grants to the Permit Holder the right to explore for Metallic and Industrial Minerals that are the property of the Crown in right of Alberta in the Location subject to the following terms and conditions:

1. The Permit Holder shall comply with all provisions of the Mines and Minerals Act that pertain or relate to Metallic and Industrial Mineral Permits and those provisions shall be deemed to be incorporated into and to form part of this Permit.

2. Nothing in this Permit shall be construed as removing the necessity to obtain, in relation to the conduct of exploration on the Location, a right of entry, user and taking of the surface of the Location or an exploration approval for the conduct of the exploration, if such a right of entry or exploration approval is required by the Mines and Mineral Act or by any other Act of the Legislature of Alberta.

3(1) The Permit Holder shall comply with

(a) the provisions of the Mines and Minerals Act that relate to, apply to or affect the rights and obligations of a holder of metallic and industrial minerals rights that are the property of Her Majesty, or that relate to, apply to or affect the Permit Holder in the conduct of its operations or activities under this Permit, and

(b) the provisions of any other Act of the Legislature of Alberta relating to, applying to or affecting the rights and obligations of holders of metallic and industrial minerals rights that are the property of Her Majesty, or relating to, applying to or affecting the Permit Holder in the conduct of its operations or activities under this Permit.

(2) The provisions of the Acts and regulations referred to in section 3(1) of this Agreement shall be deemed to be incorporated into and to form part of this Permit.

(3) In the event of conflict between a provision of this Permit and a provision of an Act referred to in section 3(1) of this Agreement, the provision of the Act prevails.

4. This Permit is subject to the special provisions, if any, contained in the Appendix to this Permit.

For Minister of Energy
on behalf of Her Majesty

APPENDIX

TO

METALLIC AND INDUSTRIAL MINERALS PERMIT NO. 9393110058

COMMENCEMENT OF TERM:

1993 NOVEMBER 29

AGGREGATE AREA:

9 216 HECTARES

DESCRIPTION OF LOCATION:

4-13-100: 1-36

PERMITTED SUBSTANCES:

METALLIC AND INDUSTRIAL MINERALS

SPECIAL PROVISIONS:

NIL

Buckton Property

Permit Ref.#70

Alberta
ENERGY
Mineral Resources Division

METALLIC AND INDUSTRIAL MINERALS PERMIT NO. 9393110057

Date of Issue: 1993 November 29

Term Commencement Date: 1993 November 29

In this Permit:

(a) "Date of Issue" means the date shown above as the Date of Issue;

(b) "Location" means the tract or tracts of land described under the heading "Description of Location" in the Appendix to this Permit;

(c) "Metallic and Industrial Minerals" means the minerals described under the heading "Permitted Substances" in the Appendix to this Permit;

(d) "Permit Holder" means Tintina Mines Limited

(e) "Term Commencement Date" means the date shown above as the Term Commencement Date.

(f) a reference in this Permit to the Mines and Minerals Act or to any other Act of the Legislature of Alberta shall be construed as a reference to

(i) that Act, as amended from time to time,

(ii) any replacement of all or part of that Act from time to time enacted by the Legislature, as amended from time to time, and

(iii) any regulations, orders, directives, by-laws or subordinate legislation from time to time made under any enactment referred to in paragraph (i) and (ii), as amended from time to time.

This Permit grants to the Permit Holder the right to explore for Metallic and Industrial Minerals that are the property of the Crown in right of Alberta in the Location subject to the following terms and conditions:

1. The Permit Holder shall comply with all provisions of the Mines and Minerals Act that pertain or relate to Metallic and Industrial Mineral Permits and those provisions shall be deemed to be incorporated into and to form part of this Permit.

2. Nothing in this Permit shall be construed as removing the necessity to obtain, in relation to the conduct of exploration on the Location, a right of entry, user and taking of the surface of the Location or an exploration approval for the conduct of the exploration, if such a right of entry or exploration approval is required by the Mines and Mineral Act or by any other Act of the Legislature of Alberta.

3(1) The Permit Holder shall comply with

(a) the provisions of the Mines and Minerals Act that relate to, apply to or affect the rights and obligations of a holder of metallic and industrial minerals rights that are the property of Her Majesty, or that relate to, apply to or affect the Permit Holder in the conduct of its operations or activities under this Permit, and

(b) the provisions of any other Act of the Legislature of Alberta relating to, applying to or affecting the rights and obligations of holders of metallic and industrial minerals rights that are the property of Her Majesty, or relating to, applying to or affecting the Permit Holder in the conduct of its operations or activities under this Permit.

(2) The provisions of the Acts and regulations referred to in section 3(1) of this Agreement shall be deemed to be incorporated into and to form part of this Permit.

(3) In the event of conflict between a provision of this Permit and a provision of an Act referred to in section 3(1) of this Agreement, the provision of the Act prevails.

4. This Permit is subject to the special provisions, if any, contained in the Appendix to this Permit.

For Minister of Energy
on behalf of Her Majesty

APPENDIX

TO

METALLIC AND INDUSTRIAL MINERALS PERMIT NO. 9393110057

COMMENCEMENT OF TERM:

1993 NOVEMBER 29

AGGREGATE AREA:

9 216 HECTARES

DESCRIPTION OF LOCATION:

4-12-100: 1-36

PERMITTED SUBSTANCES:

METALLIC AND INDUSTRIAL MINERALS

SPECIAL PROVISIONS:

NIL

/L8

Buckton Property

Permit Ref.#73

Alberta
ENERGY
Mineral Resources Division

METALLIC AND INDUSTRIAL MINERALS PERMIT NO. 9393110060

Date of Issue: 1993 November 29

Term Commencement Date: 1993 November 29

In this Permit:

(a) "Date of Issue" means the date shown above as the Date of Issue;

(b) "Location" means the tract or tracts of land described under the heading "Description of Location" in the Appendix to this Permit;

(c) "Metallic and Industrial Minerals" means the minerals described under the heading "Permitted Substances" in the Appendix to this Permit;

(d) "Permit Holder" means Tintina Mines Limited

(e) "Term Commencement Date" means the date shown above as the Term Commencement Date.

(f) a reference in this Permit to the Mines and Minerals Act or to any other Act of the Legislature of Alberta shall be construed as a reference to

(i) that Act, as amended from time to time,

(ii) any replacement of all or part of that Act from time to time enacted by the Legislature, as amended from time to time, and

(iii) any regulations, orders, directives, by-laws or subordinate legislation from time to time made under any enactment referred to in paragraph (i) and (ii), as amended from time to time.

This Permit grants to the Permit Holder the right to explore for Metallic and Industrial Minerals that are the property of the Crown in right of Alberta in the Location subject to the following terms and conditions:

1. The Permit Holder shall comply with all provisions of the Mines and Minerals Act that pertain or relate to Metallic and Industrial Mineral Permits and those provisions shall be deemed to be incorporated into and to form part of this Permit.

2. Nothing in this Permit shall be construed as removing the necessity to obtain, in relation to the conduct of exploration on the Location, a right of entry, user and taking of the surface of the Location or an exploration approval for the conduct of the exploration, if such a right of entry or exploration approval is required by the Mines and Mineral Act or by any other Act of the Legislature of Alberta.

3(1) The Permit Holder shall comply with

(a) the provisions of the Mines and Minerals Act that relate to, apply to or affect the rights and obligations of a holder of metallic and industrial minerals rights that are the property of Her Majesty, or that relate to, apply to or affect the Permit Holder in the conduct of its operations or activities under this Permit, and

(b) the provisions of any other Act of the Legislature of Alberta relating to, applying to or affecting the rights and obligations of holders of metallic and industrial minerals rights that are the property of Her Majesty, or relating to, applying to or affecting the Permit Holder in the conduct of its operations or activities under this Permit.

(2) The provisions of the Acts and regulations referred to in section 3(1) of this Agreement shall be deemed to be incorporated into and to form part of this Permit.

(3) In the event of conflict between a provision of this Permit and a provision of an Act referred to in section 3(1) of this Agreement, the provision of the Act prevails.

4. This Permit is subject to the special provisions, if any, contained in the Appendix to this Permit.

For Minister of Energy
on behalf of Her Majesty

APPENDIX

TO

METALLIC AND INDUSTRIAL MINERALS PERMIT NO. 9393110060

COMMENCEMENT OF TERM:

1993 NOVEMBER 29

AGGREGATE AREA:

9 216 HECTARES

DESCRIPTION OF LOCATION:

4-12-101: 1-36

PERMITTED SUBSTANCES:

METALLIC AND INDUSTRIAL MINERALS

SPECIAL PROVISIONS:

NIL

Buckton Property

Permit Ref.#74

Alberta
ENERGY
Mineral Resources Division

METALLIC AND INDUSTRIAL MINERALS PERMIT NO. 9393110061

Date of Issue: 1993 November 29

Term Commencement Date: 1993 November 29

In this Permit:

(a) "Date of Issue" means the date shown above as the Date of Issue;

(b) "Location" means the tract or tracts of land described under the heading "Description of Location" in the Appendix to this Permit;

(c) "Metallic and Industrial Minerals" means the minerals described under the heading "Permitted Substances" in the Appendix to this Permit;

(d) "Permit Holder" means Tintina Mines Limited

(e) "Term Commencement Date" means the date shown above as the Term Commencement Date.

(f) a reference in this Permit to the Mines and Minerals Act or to any other Act of the Legislature of Alberta shall be construed as a reference to

(i) that Act, as amended from time to time,

(ii) any replacement of all or part of that Act from time to time enacted by the Legislature, as amended from time to time, and

(iii) any regulations, orders, directives, by-laws or subordinate legislation from time to time made under any enactment referred to in paragraph (i) and (ii), as amended from time to time.

This Permit grants to the Permit Holder the right to explore for Metallic and Industrial Minerals that are the property of the Crown in right of Alberta in the Location subject to the following terms and conditions:

1. The Permit Holder shall comply with all provisions of the Mines and Minerals Act that pertain or relate to Metallic and Industrial Mineral Permits and those provisions shall be deemed to be incorporated into and to form part of this Permit.

2. Nothing in this Permit shall be construed as removing the necessity to obtain, in relation to the conduct of exploration on the Location, a right of entry, user and taking of the surface of the Location or an exploration approval for the conduct of the exploration, if such a right of entry or exploration approval is required by the Mines and Mineral Act or by any other Act of the Legislature of Alberta.

3(1) The Permit Holder shall comply with

(a) the provisions of the Mines and Minerals Act that relate to, apply to or affect the rights and obligations of a holder of metallic and industrial minerals rights that are the property of Her Majesty, or that relate to, apply to or affect the Permit Holder in the conduct of its operations or activities under this Permit, and

(b) the provisions of any other Act of the Legislature of Alberta relating to, applying to or affecting the rights and obligations of holders of metallic and industrial minerals rights that are the property of Her Majesty, or relating to, applying to or affecting the Permit Holder in the conduct of its operations or activities under this Permit.

(2) The provisions of the Acts and regulations referred to in section 3(1) of this Agreement shall be deemed to be incorporated into and to form part of this Permit.

(3) In the event of conflict between a provision of this Permit and a provision of an Act referred to in section 3(1) of this Agreement, the provision of the Act prevails.

4. This Permit is subject to the special provisions, if any, contained in the Appendix to this Permit.

David Coutts

For Minister of Energy
on behalf of Her Majesty

APPENDIX

TO

METALLIC AND INDUSTRIAL MINERALS PERMIT NO. 9393110061

COMMENCEMENT OF TERM:

1993 NOVEMBER 29

AGGREGATE AREA:

9 216 HECTARES

DESCRIPTION OF LOCATION:

4-13-101: 1-36

PERMITTED SUBSTANCES:

METALLIC AND INDUSTRIAL MINERALS

SPECIAL PROVISIONS:

NIL

Buckton Property

Permit Ref.#76

Alberta
ENERGY
Mineral Resources Division

METALLIC AND INDUSTRIAL MINERALS PERMIT NO. 9393110063

Date of Issue: **1993 November 29**

Term Commencement Date: **1993 November 29**

In this Permit:

(a) "Date of Issue" means the date shown above as the Date of Issue;

(b) "Location" means the tract or tracts of land described under the heading "Description of Location" in the Appendix to this Permit;

(c) "Metallic and Industrial Minerals" means the minerals described under the heading "Permitted Substances" in the Appendix to this Permit;

(d) "Permit Holder" means **Tintina Mines Limited**

(e) "Term Commencement Date" means the date shown above as the Term Commencement Date.

(f) a reference in this Permit to the Mines and Minerals Act or to any other Act of the Legislature of Alberta shall be construed as a reference to

(i) that Act, as amended from time to time,

(ii) any replacement of all or part of that Act from time to time enacted by the Legislature, as amended from time to time, and

(iii) any regulations, orders, directives, by-laws or subordinate legislation from time to time made under any enactment referred to in paragraph (i) and (ii), as amended from time to time.

This Permit grants to the Permit Holder the right to explore for Metallic and Industrial Minerals that are the property of the Crown in right of Alberta in the Location subject to the following terms and conditions:

1. The Permit Holder shall comply with all provisions of the Mines and Minerals Act that pertain or relate to Metallic and Industrial Mineral Permits and those provisions shall be deemed to be incorporated into and to form part of this Permit.

2. Nothing in this Permit shall be construed as removing the necessity to obtain, in relation to the conduct of exploration on the Location, a right of entry, user and taking of the surface of the Location or an exploration approval for the conduct of the exploration, if such a right of entry or exploration approval is required by the Mines and Mineral Act or by any other Act of the Legislature of Alberta.

3(1) The Permit Holder shall comply with

(a) the provisions of the Mines and Minerals Act that relate to, apply to or affect the rights and obligations of a holder of metallic and industrial minerals rights that are the property of Her Majesty, or that relate to, apply to or affect the Permit Holder in the conduct of its operations or activities under this Permit, and

(b) the provisions of any other Act of the Legislature of Alberta relating to, applying to or affecting the rights and obligations of holders of metallic and industrial minerals rights that are the property of Her Majesty, or relating to, applying to or affecting the Permit Holder in the conduct of its operations or activities under this Permit.

(2) The provisions of the Acts and regulations referred to in section 3(1) of this Agreement shall be deemed to be incorporated into and to form part of this Permit.

(3) In the event of conflict between a provision of this Permit and a provision of an Act referred to in section 3(1) of this Agreement, the provision of the Act prevails.

4. This Permit is subject to the special provisions, if any, contained in the Appendix to this Permit.

For Minister of Energy
on behalf of Her Majesty

APPENDIX

TO

METALLIC AND INDUSTRIAL MINERALS PERMIT NO. 9393110063

COMMENCEMENT OF TERM:

1993 NOVEMBER 29

AGGREGATE AREA:

9 216 HECTARES

DESCRIPTION OF LOCATION:

4-11-102: 1-18
4-12-102: 1-18

PERMITTED SUBSTANCES:

METALLIC AND INDUSTRIAL MINERALS

SPECIAL PROVISIONS:

NIL

Buckton Property

Permit Ref.#77

Alberta
ENERGY
Mineral Resources Division

METALLIC AND INDUSTRIAL MINERALS PERMIT NO. 9393110064

Date of Issue: 1993 November 29

Term Commencement Date: 1993 November 29

In this Permit:

(a) "Date of Issue" means the date shown above as the Date of Issue;

(b) "Location" means the tract or tracts of land described under the heading "Description of Location" in the Appendix to this Permit;

(c) "Metallic and Industrial Minerals" means the minerals described under the heading "Permitted Substances" in the Appendix to this Permit;

(d) "Permit Holder" means Tintina Mines Limited

(e) "Term Commencement Date" means the date shown above as the Term Commencement Date.

(f) a reference in this Permit to the Mines and Minerals Act or to any other Act of the Legislature of Alberta shall be construed as a reference to

(i) that Act, as amended from time to time,

(ii) any replacement of all or part of that Act from time to time enacted by the Legislature, as amended from time to time, and

(iii) any regulations, orders, directives, by-laws or subordinate legislation from time to time made under any enactment referred to in paragraph (i) and (ii), as amended from time to time.

This Permit grants to the Permit Holder the right to explore for Metallic and Industrial Minerals that are the property of the Crown in right of Alberta in the Location subject to the following terms and conditions:

1. The Permit Holder shall comply with all provisions of the Mines and Minerals Act that pertain or relate to Metallic and Industrial Mineral Permits and those provisions shall be deemed to be incorporated into and to form part of this Permit.

2. Nothing in this Permit shall be construed as removing the necessity to obtain, in relation to the conduct of exploration on the Location, a right of entry, user and taking of the surface of the Location or an exploration approval for the conduct of the exploration, if such a right of entry or exploration approval is required by the Mines and Mineral Act or by any other Act of the Legislature of Alberta.

3(1) The Permit Holder shall comply with

(a) the provisions of the Mines and Minerals Act that relate to, apply to or affect the rights and obligations of a holder of metallic and industrial minerals rights that are the property of Her Majesty, or that relate to, apply to or affect the Permit Holder in the conduct of its operations or activities under this Permit, and

(b) the provisions of any other Act of the Legislature of Alberta relating to, applying to or affecting the rights and obligations of holders of metallic and industrial minerals rights that are the property of Her Majesty, or relating to, applying to or affecting the Permit Holder in the conduct of its operations or activities under this Permit.

(2) The provisions of the Acts and regulations referred to in section 3(1) of this Agreement shall be deemed to be incorporated into and to form part of this Permit.

(3) In the event of conflict between a provision of this Permit and a provision of an Act referred to in section 3(1) of this Agreement, the provision of the Act prevails.

4. This Permit is subject to the special provisions, if any, contained in the Appendix to this Permit.

David Taylor

For Minister of Energy
on behalf of Her Majesty

APPENDIX

TO

METALLIC AND INDUSTRIAL MINERALS PERMIT NO. 9393110064

COMMENCEMENT OF TERM:

1993 NOVEMBER 29

AGGREGATE AREA:

9 216 HECTARES

DESCRIPTION OF LOCATION:

4-13-102: 1-36

PERMITTED SUBSTANCES:

METALLIC AND INDUSTRIAL MINERALS

SPECIAL PROVISIONS:

NIL

APPENDIX B

ACTLABS

ACTIVATION LABORATORIES LTD

Invoice No.: 14353
Work Order: 14532
Invoice Date: 26-NOV-97
Date Submitted: 26-NOV-97
Your Reference: NONE
Account Number: 1244

TINTINA MINES LIMITED
SUITE 218 - 920 YONGE ST
TORONTO, ONTARIO
M4W 3C7
CANADA
ATTENTION: SHAHE F. SABAG

CERTIFICATE OF ANALYSIS

The following analytical packages were requested. Please see our current fee schedule for elements and detection limits.

REPORT 14353 INAA IN DUPLICATE
REPORT 14353 B TOTAL DIGESTION ICP IN DUPLICATE, SDO-1 USGS STD
REPORT 14353 C C GRAPHITIC, C-ORGANIC, CO2, S, C PRELEACH
REPORT 14353 RPT.XLS HEPTANE LEACH -10 GRAM SAMPLE
REPORT 14353 ARP.XLS ACETIC ACID LEACH-FOLLOWING HEPTANE LEACH
REPORT 14353 BRP.XLS SODIUM PYROPHOSPHATE LEACH FOLLOWING ACETIC ACID LEACH
REPORT 14353 CRP.XLS WEIGHTS AFTER EACH LEACH
REPORT 14353 D INAA POST LEACHING
REPORT 14353 E TOTAL DIGESTION POST LEACHING
REPORT 14353 F C GRAPHITIC, C-ORGANIC, CO2, S, C POST LEACH
REPORT 14353 G AQUA REGIA ICP ON RESIDUE

This report may only be reproduced in its entirety without the express consent of ACTIVATION LABS. If no instructions were received or will be received within 90 days from the date of this report, excess material will be discarded. Our liability is limited solely to the analytical cost of these analyses. Test results are representative only of material submitted for analysis

CERTIFIED BY :

[redacted]

DR E.HOFFMAN/GENERAL MANAGER

1336 SANDHILL DRIVE, ANCASTER, ONTARIO, CANADA L9G 4V5 • TEL: 905-648-9611 • FAX: 905-648-9613
E-MAIL: ACTLABA@IBM.NET or 102040.700 @ COMPUSERVE.COM

Sample description	AU PPB	AG PPM	AS PPM	BA PPM	BR PPM	CA %	CO PPM	CR PPM	CS PPM	FE %	HF PPM	HG PPM	IR PPB	MO PPM	NA %	NI PPM	RB PPM	SB PPM	SC PPM	SE PPM	SN %	SR %	TA PPM	TH PPM
7BK0412060	10	<5	430	22000	3.4	3	170	230	2	11.1	10	<1	<5	213	0.83	440	41	35	13	<3	<0.01	0.07	1.2	16
7BK0507680	8	<5	300	3000	2.0	5	55	45	2	9.57	5	<1	<5	350	0.51	340	35	26	11	33	<0.01	0.06	1.3	15
7BK0307747	10	<5	150	8000	4.1	5	41	51	1	8.49	6	<1	<5	150	0.68	390	38	33	11	68	<0.01	0.08	0.7	10
7BK0206078	3	<5	140	11000	5.5	5	42	54	1	8.04	7	<1	<5	120	0.64	340	31	29	11	73	<0.01	0.07	<0.5	10
7BK0113540	9	<5	110	5400	8.0	5	31	48	2	6.50	5	<1	<5	130	0.55	290	42	25	12	55	<0.01	0.06	<0.5	9.1
7BK0610962	9	<5	130	4400	12	2	40	78	2	6.74	7	<1	<5	108	1.06	300	52	33	11	79	<0.01	0.10	<0.5	9.9
7BK0508365	4	<5	52	540	20	5	20	98	5	3.93	4	<1	<5	93	0.46	180	86	18	9.6	46	<0.01	<0.05	0.9	7.3
7BK0412792	6	<5	50	510	20	6	19	95	5	3.71	4	<1	<5	91	0.46	190	83	18	9.6	48	<0.01	<0.05	<0.5	7.1
7BK0611820	9	<5	67	1100	17	5	25	110	5	4.69	6	<1	5	90	0.78	230	88	20	13	50	<0.01	<0.05	<0.5	11
7BK0308625	4	<5	73	1200	10	5	25	94	5	4.75	5	<1	<5	82	0.67	220	71	18	14	41	<0.01	0.05	<0.5	14
7BK0412060B	13	<5	430	22000	3.3	3	170	230	3	11.2	10	<1	<5	214	0.83	420	43	40	13	<3	<0.01	0.07	1.3	15
7BK0507680B	7	<5	300	3000	2.0	5	55	45	2	9.60	5	<1	<5	350	0.50	330	34	28	11	30	<0.01	<0.05	1.1	15
7BK0307747B	8	<5	150	8200	4.2	4	43	51	1	8.50	6	<1	<5	150	0.66	380	38	37	11	72	<0.01	0.09	0.7	10
7BK0206078B	8	<5	140	10000	5.5	4	42	58	1	8.02	8	<1	<5	111	0.68	320	31	42	12	80	<0.01	0.07	<0.5	11
7BK0113540B	5	<5	95	5300	7.9	<5	29	46	2	6.48	6	<1	<5	110	0.59	300	42	30	9.5	60	<0.01	<0.05	<0.5	8.8
7BK0610962B	8	<5	130	4500	12	2	42	77	3	6.99	7	<1	<5	121	1.08	290	54	38	11	82	<0.01	0.11	<0.5	10
7BK0508365B	4	<5	52	550	20	6	20	100	5	4.09	4	<1	<5	98	0.49	180	83	21	10	49	<0.01	<0.05	0.9	7.3
7BK0412792B	7	<5	51	480	20	6	19	97	5	3.79	5	<1	<5	93	0.48	180	84	18	9.8	47	<0.01	<0.05	<0.5	7.3
7BK0611820B	5	<5	68	1100	17	5	25	110	5	4.87	6	<1	<5	96	0.81	250	92	19	13	48	<0.01	<0.05	0.6	11
7BK0308625B	5	<5	74	1200	10	6	25	95	5	4.80	6	<1	<5	87	0.70	220	76	19	14	46	<0.01	0.06	0.7	14

Sample description	U PPM	W PPM	ZN PPM	LA PPM	CE PPM	ND PPM	SM PPM	EU PPM	TB PPM	YB PPM	LU PPM	Mass g
7BK0412060	71	<1	910	130	180	130	24	6.8	4.5	10.9	1.64	15.55
7BK0507680	170	<1	632	170	210	120	23	5.1	4.2	10.2	1.88	30.54
7BK0307747	110	<1	819	110	150	76	15	4.6	2.5	7.2	1.23	30.68
7BK0206078	100	7	667	100	140	89	15	4.4	3.4	7.7	1.15	30.54
7BK0113540	85	<1	525	97	130	69	13	3.7	2.2	6.7	1.06	30.51
7BK0610962	65	<1	630	77	110	67	10	3.5	2.0	5.9	0.97	30.60
7BK0508365	18	<1	440	33	52	28	4.2	1.4	0.8	3.0	0.45	30.55
7BK0412792	18	<1	450	33	54	25	4.2	1.3	0.7	3.1	0.49	30.40
7BK0611820	34	<1	525	70	110	66	11	3.4	1.9	6.4	1.00	15.01
7BK0308625	53	<1	533	110	150	98	17	5.9	3.5	10.0	1.50	25.60
7BK0412060B	75	<1	940	130	180	130	24	6.8	4.5	10.6	1.67	16.42
7BK0507680B	160	<1	639	170	210	120	23	5.8	4.2	10.5	1.96	30.70
7BK0307747B	110	<1	838	110	150	82	16	4.7	2.7	7.3	1.23	30.55
7BK0206078B	110	9	692	110	150	91	16	4.7	3.4	7.9	1.20	30.56
7BK0113540B	85	<1	510	96	120	69	12	3.9	2.2	6.4	1.07	31.06
7BK0610962B	68	<1	638	78	110	68	11	3.6	2.0	6.0	0.98	30.96
7BK0508365B	19	<1	444	34	55	30	4.3	1.3	<0.5	3.2	0.46	30.29
7BK0412792B	20	<1	461	34	53	27	4.2	1.4	0.8	3.2	0.49	30.80
7BK0611820B	35	<1	524	74	110	64	11	3.6	1.2	6.7	1.02	14.80
7BK0308625B	58	<1	571	120	150	100	18	6.1	3.6	10.0	1.51	25.43

Sample description	MO PPM	CU PPM	PB PPM	ZN PPM	AG PPM	NI PPM	MN PPM	SR PPM	CD PPM	BI PPM	V PPM	CA %	P %	MG %	TI %	AL %	K %	Y PPM	BE PPM
7BK0412060	197.	47.	19.	684.	<0.4	419.	275.	164.	20.5	<5.	374.	2.57	0.736	0.58	0.24	7.29	1.21	164.	<2.
7BK0507680	341.	61.	28.	603.	0.9	326.	555.	401.	22.1	<5.	601.	6.10	1.275	0.78	0.17	7.36	1.01	248.	<2.
7BK0307747	127.	101.	16.	755.	1.3	377.	400.	443.	23.2	<5.	779.	4.90	0.777	0.86	0.25	6.89	1.25	157.	<2.
7BK0206078	110.	119.	19.	712.	1.5	339.	387.	380.	24.0	<5.	754.	5.52	0.720	0.71	0.25	7.12	1.41	161.	2.
7BK0113540	122.	93.	20.	579.	0.7	281.	335.	436.	17.1	<5.	619.	6.48	0.593	0.90	0.23	6.56	1.22	134.	<2.
7BK0610962	108.	118.	25.	548.	1.2	301.	266.	604.	21.1	<5.	835.	2.68	0.450	0.85	0.25	7.17	1.48	95.	<2.
7BK0508365	103.	95.	18.	421.	0.5	196.	154.	219.	20.7	<5.	1324.	6.42	0.084	0.87	0.25	6.48	1.71	35.	<2.
7BK0412792	98.	89.	19.	379.	1.5	183.	133.	229.	19.2	<5.	1312.	6.77	0.079	0.90	0.24	6.35	1.59	34.	<2.
7BK0611820	76.	98.	23.	382.	0.7	175.	160.	319.	19.3	<5.	1142.	6.32	0.264	0.81	0.25	6.29	1.61	84.	<2.
7BK0308625	71.	96.	22.	397.	0.8	176.	165.	351.	17.8	<5.	1092.	6.12	0.525	0.83	0.23	6.35	1.62	157.	<2.
SD0-1	156.	60.	34.	63.	<0.4	103.	326.	80.	<0.5	<5.	172.	1.02	0.054	0.97	0.33	6.79	2.75	49.	2.
7BK0412060B	203.	49.	23.	724.	<0.4	434.	291.	181.	21.7	<5.	389.	2.70	0.764	0.60	0.25	7.68	1.24	174.	<2.
7BK0507680B	334.	58.	30.	579.	0.9	319.	540.	390.	21.0	<5.	585.	6.04	1.259	0.77	0.17	7.27	1.00	245.	<2.
7BK0307747B	123.	97.	21.	716.	1.1	367.	389.	413.	22.3	<5.	755.	4.81	0.762	0.83	0.24	6.74	1.19	154.	<2.
7BK0206078B	102.	110.	18.	635.	1.3	317.	359.	347.	22.0	<5.	702.	5.28	0.674	0.68	0.23	6.86	1.30	151.	<2.
7BK0113540B	118.	88.	16.	505.	1.1	271.	309.	402.	15.4	<5.	595.	6.37	0.566	0.88	0.22	6.47	1.18	132.	<2.
7BK0610962B	104.	112.	21.	511.	1.1	287.	256.	568.	19.6	<5.	799.	2.60	0.433	0.82	0.24	6.98	1.41	91.	<2.
7BK0508365B	101.	95.	20.	394.	1.3	193.	160.	219.	20.0	<5.	1305.	6.43	0.084	0.87	0.26	6.49	1.67	35.	<2.
7BK0412792B	95.	87.	17.	375.	0.7	176.	134.	224.	18.7	<5.	1238.	6.68	0.078	0.87	0.23	6.26	1.54	34.	<2.
7BK0611820B	80.	102.	20.	407.	1.2	183.	176.	330.	20.4	<5.	1192.	6.60	0.276	0.84	0.25	6.61	1.67	89.	<2.
7BK0308625B	70.	94.	25.	393.	1.0	173.	171.	345.	17.5	<5.	1083.	6.01	0.529	0.81	0.23	6.26	1.58	156.	<2.
SD0-1B	144.	55.	33.	56.	<0.4	95.	302.	73.	<0.5	<5.	158.	0.90	0.049	0.89	0.30	6.19	2.53	43.	2.

Sample ID Units	C GRAPHITIC %	C ORGANIC %	CO2 %	S %	C %
7BK0412060	0.097	1.52	-0.01	11.3	1.66
7BK0507680	0.456	2.77	2.85	9.49	3.88
7BK0307747	0.440	3.92	1.61	8.61	4.93
7BK0206078	0.493	4.59	2.50	8.15	5.89
7BK0113540	0.525	5.18	4.16	6.97	6.86
7BK0610962	0.148	6.63	0.61	7.46	6.97
7BK0508365	0.180	9.25	5.70	4.46	10.8
7BK0412792	0.371	9.13	5.43	4.19	10.8
7BK0611820	0.252	7.65	4.54	4.47	8.91
7BK0308625	0.301	6.89	3.77	4.69	8.07
SDO-1	0.101	9.68	0.81	5.34	10.0
7BK0412060B	0.097	1.60	-0.01	11.2	1.67
7BK0507680B	0.457	2.80	2.55	9.74	3.76
7BK0307747B	0.431	4.06	1.69	8.45	4.89
7BK0206078B	0.482	4.90	2.44	8.09	5.85
7BK0113540B	0.498	5.33	3.95	6.98	6.86
7BK0610962B	0.146	6.79	0.69	7.44	7.03
7BK0508365B	0.177	9.42	5.16	4.38	10.7
7BK0412792B	0.331	9.14	5.19	4.17	10.7
7BK0611820B	0.237	7.57	4.71	4.46	8.98
7BK0308625B	0.301	6.93	3.74	4.70	8.06
SDO-1B	0.099	9.79	0.77	5.26	10.0

Heptane Leach Job #: 14532 **Report#: 14353** **Customer: Tintina Mines Ltd.** **Geologist: Shahe Sabag**

Trace Element Values Are in Parts Per Billion. Negative Values Equal Not Detected at That Lower Limit.

Values = 999999 are greater than working range of instrument. S.Q.=That element is determined SEMIQUANTITATIVELY.

Sample ID:	S.Q.Li	S.Q.Be	S.Q.Cl	S.Q.Sc	S.Q.Ti	V	Mn	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Rb	Sr	Y	Zr	Nb	Mo
7bk0412060	-40	-70	28,690	-350	399	-20	338	-40	54	-20	155	-5	-5	41	-100	-100	-5	36	12	-5	-5	25
7bk0113540	-40	-70	50,684	-350	544	-20	191	-40	46	-20	48	-5	-5	22	106	-100	-5	40	9	10	-5	19
7bk0508365	-40	-70	46,282	-350	-350	-20	310	-40	-20	-20	-40	-5	-5	-20	-100	-100	-5	-5	-5	-5	-5	-5
7bk0611820	-40	-70	39,336	-350	-350	26	394	-40	35	23	-40	-5	-5	-20	-100	-100	-5	23	8	-5	-5	12
7bk0412792	-40	-70	40,939	-350	-350	51	285	-40	44	27	98	-5	-5	-20	-100	-100	6	32	-5	-5	-5	19
7bk0610962	-40	-70	54,021	-350	-350	-20	233	-40	-20	-20	-10	-5	-5	-20	-100	-100	-5	22	-5	5	-5	5
7bk0308625	-40	-70	71,083	-350	-350	56	-40	-40	65	38	137	-5	-5	-20	-100	-100	7	53	29	5	-5	19
7bk0206078	102	-70	54,872	-350	-350	-20	379	-40	53	23	77	-5	-5	27	-100	-100	-5	44	11	10	-5	15
7bk0507680	-40	-70	73,797	-350	-350	-20	206	-40	55	-20	145	-5	-5	47	-100	-100	-5	37	13	-5	-5	42
7bk0307747	-40	-70	59,512	-350	-350	22	195	-40	105	34	273	-5	-5	40	-100	-100	-5	91	19	17	-5	29
SDO-1	-40	-70	-10,000	-350	-350	74	54	-40	-20	-20	-40	-5	-5	-20	-100	-100	6	5	-5	-5	-5	20

Certified By: [redacted]

D. D'Anna, Dipl. T.
ICPMS Technical Manager, Actlabs Ltd.

Date: 23 Feb 98

This report shall not be reproduced except in full without the written approval of the laboratory.

Unless otherwise instructed, samples will be disposed of 90 days from the date of this report.

*"Rh & Ir have been dropped from the report due to a change in the standardization procedure."

Heptane Leach
Trace Element
Values = 99999

Sample ID:	Ru	Pd	Ag	Cd	In	Sn	Sb	Te	I	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	W	Re	Os	Pt
7bk0412060	-5	-5	-0.7	4.8	-0.7	-5	-5	-5	-40	-5	4,253	11	16	-5	14	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	0.5	-5	-5
7bk0113540	-5	-5	-0.7	2.4	-0.7	-5	-5	-5	-40	-5	848	8	12	-5	9	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-0.5	-5	-5
7bk0508365	-5	-5	-0.7	1.7	-0.7	6	-5	-5	-40	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-0.5	-5	-5
7bk0611820	-5	-5	-0.7	4.3	-0.7	-5	-5	-5	-40	-5	77	5	8	-5	6	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-0.5	-5	-5
7bk0412792	-5	-5	-0.7	3.6	-0.7	-5	-5	-5	-40	-5	34	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	16	-0.5	-5	-5
7bk0610962	-5	-5	-0.7	0.7	-0.7	-5	-5	-5	-40	-5	201	-5	5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-0.5	-5	-5
7bk0308625	-5	-5	-0.7	2.4	-0.7	5	-5	-5	-40	-5	144	21	27	5	17	5	-5	8	-5	5	-5	-5	-5	-5	-5	-5	-5	-5	-0.5	-5	-5
7bk0206078	-5	-5	-0.7	2.2	-0.7	-5	-5	-5	-40	-5	1,896	9	15	-5	7	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-0.5	-5	-5
7bk0507680	-5	-5	-0.7	0.7	-0.7	-5	-5	-5	-40	-5	431	11	15	-5	9	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-0.5	-5	-5
7bk0307747	-5	-5	-0.7	5.0	-0.7	-5	9	-5	-40	-5	2,017	18	24	-5	16	-5	-5	5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	0.6	-5	-5
SDO-1	-5	-5	-0.7	0.7	-0.7	-5	-5	-5	-40	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-0.5	-5	12

Heptane Leach
Trace Element
Values = 99999

Sample ID:	Au	S.Q.Hg	Tl	Pb	Bi	Th	U
7bk0412060	-0.5	-5	-5	-5	-5	-5	7
7bk0113540	-0.5	-5	-5	-5	-5	-5	8
7bk0508365	-0.5	-5	-5	-5	-5	-5	-5
7bk0611820	-0.5	-5	-5	-5	-5	-5	-5
7bk0412792	-0.5	-5	-5	-5	-5	-5	-5
7bk0610962	-0.5	-5	-5	-5	-5	-5	-5
7bk0308625	-0.5	-5	-5	-5	-5	-5	12
7bk0206078	-0.5	-5	-5	5	-5	-5	10
7bk0507680	-0.5	-5	-5	-5	-5	-5	13
7bk0307747	-0.5	-5	-5	-5	-5	-5	21
SDO-1	-0.5	-5	-5	-5	-5	-5	-5

Acetic Leach Job #: 14532A **Report#: 14353A** **Customer: Tintina Mines Ltd.** **Geologist: Shahe Sabag**

Trace Element Values Are in Parts Per Billion. Negative Values Equal Not Detected at That Lower Limit.
Values = 999999 are greater than working range of instrument. S.Q.=That element is determined SEMIQUANTITATIVELY.

Sample ID:	S.Q.Li	S.Q.Be	S.Q.Cl	S.Q.Sc	S.Q.Ti	V	Mn	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Rb	Sr
7bk0412060	931	-140	21370	-670	890	992	4206	8561	28137	416	19617	26	16	2987	771	-200	49	2539
7bk0113540	854	-140	40365	-670	1490	1724	51132	3884	57193	1168	25715	50	20	1463	1355	-200	213	29612
7bk0508365	1196	-140	80243	-670	1815	9455	32934	2454	22842	318	28905	43	27	980	1689	-200	602	78663
7bk0611820	983	-140	70463	-670	1477	5122	41178	2452	19531	528	24419	26	19	705	1464	-200	495	55408
7bk0412792	955	-140	22177	-670	1683	4936	24022	1852	15296	609	26510	25	15	456	933	-200	403	66888
7bk0610962	643	-140	104769	-670	-670	1850	11662	1727	30797	1439	12754	23	29	1066	1227	-200	101	10172
7bk0308625	871	-140	-20000	-670	1539	3610	35443	2376	16897	666	28511	27	21	781	1377	-200	362	46833
7bk0206078	802	-140	-20000	-670	1814	1915	57909	5420	62493	2574	28217	55	28	1283	1460	-200	111	14861
7bk0507680	776	-140	36051	-670	1045	1910	73578	9180	56875	644	53978	54	27	2334	1434	-200	167	23160
7bk0307747	840	-140	-20000	-670	1006	1572	42443	4834	79576	1528	28353	52	26	1466	1298	-200	95	17302
SDO-1	1689	-140	-20000	-670	8250	993	38507	6737	13267	1758	2290	59	9	972	-200	-200	330	1242

Certified By: [redacted]

D. D'Anna, Dipl. T.
ICPMS Technical Manager, Actlabs Ltd.

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Acetic Leach J
Trace Element V
Values = 99999

Sample ID:	Y	Zr	Nb	Mo	Ru	Pd	Ag	Cd	In	Sn	Sb	Te	I	Cs	Ba	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm
7bk0412060	1663	28	-7	937	-7	-7	-2.0	355	-2	-7	39	-7	-70	-7	1606	644	1268	316	1286	403	109	427	63	270	52	135	24
7bk0113540	2402	63	-7	1124	-7	-7	-2.0	869	5	-7	279	-7	-70	-7	1016	792	1216	204	790	216	50	225	28	136	26	82	13
7bk0508365	2671	184	-7	1660	-7	-7	-2.0	2224	8	-7	565	-7	76	-7	3425	1125	1530	251	992	299	75	333	42	225	43	137	20
7bk0611820	1873	88	-7	1006	-7	-7	-2.0	1807	5	-7	392	-7	86	-7	3118	1035	1245	190	774	227	57	260	31	189	39	126	19
7bk0412792	2392	52	-7	459	-7	-7	-2.0	2748	6	-7	229	-7	-70	-7	2472	1227	1799	289	1154	351	83	405	50	290	55	171	26
7bk0610962	1007	-7	-7	536	-7	-7	-2.0	860	4	-7	166	-7	-70	-7	1139	661	1157	199	857	256	54	298	31	164	32	90	12
7bk0308625	2641	22	-7	639	-7	-7	-2.0	1836	4	-7	320	-7	-70	-7	2224	933	1035	180	856	241	60	317	36	215	45	137	20
7bk0206078	3441	43	-7	730	-7	-7	-2.0	1158	7	-7	249	-7	-70	-7	3474	1952	3163	552	2359	669	150	762	82	465	84	246	36
7bk0507680	3288	18	-7	3851	-7	-7	-2.0	1885	5	-7	125	-7	-70	-7	991	1950	2988	516	2251	639	138	734	79	423	78	218	27
7bk0307747	2548	26	-7	889	-7	-7	-2.0	984	8	-7	320	-7	-70	-7	804	1523	2529	440	1909	500	122	585	65	334	59	183	21
SDO-1	1981	114	26	1783	-7	-7	-2.0	13	-2	-7	35	-7	-70	14	839	372	1129	181	956	360	97	491	57	303	53	147	17

Acetic Leach J
Trace Element V
Values = 99999

Sample ID:	Yb	Lu	Hf	Ta	W	Re	Os	Pt	Au	S.Q.Hg	Tl	Pb	Bi	Th	U
7bk0412060	102	30	-7	-7	-7	74	-7	-7	-0.7	7	7	25	-7	-7	1203
7bk0113540	64	14	-7	-7	-7	27	-7	-7	-0.7	-7	12	22	-7	7	1011
7bk0508365	127	20	-7	-7	-7	23	-7	-7	-0.7	-7	34	69	-7	89	1810
7bk0611820	127	20	-7	-7	-7	43	-7	-7	0.7	-7	66	75	-7	37	2062
7bk0412792	144	23	-7	-7	-7	27	-7	-7	-0.7	-7	70	61	-7	111	2107
7bk0610962	73	11	-7	-7	-7	26	-7	-7	-0.7	-7	14	28	-7	8	1863
7bk0308625	126	22	-7	-7	-7	32	-7	-7	-0.7	-7	87	29	-7	-7	2322
7bk0206078	195	32	-7	-7	-7	67	-7	-7	-0.7	-7	18	22	-7	-7	3375
7bk0507680	164	23	7	-7	-7	96	-7	-7	0.8	-7	52	14	-7	-7	4041
7bk0307747	127	20	-7	-7	-7	79	-7	-7	0.8	7	20	20	-7	-7	3258
SDO-1	89	14	-7	-7	-7	2.1	-7	-7	-0.7	10	9	51	-7	152	2044

Sodium Pyrophosphate Leach Job #: 14532B **Report#:14353B** **Customer: Tintina Mines Ltd.** **Geologist: Shahe Sabag**

Trace Element Values Are in Parts Per Billion. Negative Values Equal Not Detected at That Lower Limit.
Values = 999999 are greater than working range of instrument. S.Q.=That element is determined SEMIQUANTITATIVELY.

Sample ID:	S.Q.Li	S.Q.Be	S.Q.Cl	S.Q.Sc	S.Q.Ti	V	Mn	Co	Ni	Cu	Zn	Ga
7bk0412060	6196	-2700	1687802	-13400	341450	70173	45947	33287	98853	4230	106188	1599
7bk0113540	2374	-2700	1493511	-13400	-13400	30323	29725	3384	52924	8917	46699	339
7bk0508365	1966	-2700	2287527	-13400	-13400	43037	16091	1572	23204	6297	37474	-140
7bk0611820	-1350	-2700	1720137	-13400	-13400	23429	13461	1731	23777	5962	30875	-140
7bk0412792	-1350	-2700	1248072	-13400	-13400	15559	7388	882	15785	3250	24920	-140
7bk0610962	6180	-2700	3105303	-13400	101383	135758	40532	8377	120424	15056	84180	1448
7bk0308625	2902	-2700	2744143	-13400	-13400	43676	21474	2291	27731	6412	49068	205
7bk0206078	7501	-2700	2196971	-13400	122057	125575	40180	9478	111332	19753	98806	1639
7bk0507680	8319	-2700	3743717	-13400	-13400	65930	79660	15627	99667	8350	106132	1421
7bk0307747	12165	-2700	3305463	-13400	138754	168561	19741	10626	152889	19893	107828	2362
SDO-1	5265	-2700	3986134	-13400	-13400	1967	133404	21727	43604	16090	11659	213

Certified By: [redacted]

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Sodium Pyrop
Trace Element
Values = 99999

Sample ID:	Ge	As	Se	Br	Rb	Sr	Y	Zr	Nb	Mo	Ru	Pd	Ag	Cd	In	Sn	Sb	Te	I	Cs	Ba
7bk0412060	238	21728	-4000	-4000	4264	24080	4398	4437	499	20593	-140	-140	38	1693	-30	-140	2834	194	-1350	-140	807949
7bk0113540	-140	6842	-4000	-4000	1355	7674	833	3321	167	15494	-140	-140	37	860	-30	-140	2263	-140	-1350	-140	96063
7bk0508365	-140	4844	-4000	-4000	758	1540	291	1391	-140	17273	-140	-140	-30	370	-30	-140	1061	-140	-1350	-140	7304
7bk0611820	-140	2333	-4000	4502	714	3030	312	1525	-140	9021	-140	-140	-30	422	-30	-140	773	-140	-1350	-140	6573
7bk0412792	-140	1084	-4000	5888	573	1501	-140	920	-140	4486	-140	-140	-30	295	-30	-140	465	-140	-1350	-140	3029
7bk0610962	149	8511	5093	6494	3748	22745	1686	6381	423	18219	-140	174	80	1154	-30	-140	3012	-140	-1350	-140	169698
7bk0308625	-140	1832	-4000	6993	986	3896	504	2130	-140	6472	-140	-140	-30	684	-30	-140	714	183	-1350	-140	9743
7bk0206078	276	14344	-4000	6245	3905	22930	1840	8293	812	18321	-140	161	121	2344	-30	-140	4359	-140	-1350	-140	577045
7bk0507680	206	19100	-4000	-4000	2727	13985	2292	3638	545	68485	-140	-140	61	2031	-30	-140	2617	151	-1350	-140	119940
7bk0307747	189	14124	6448	-4000	3767	20287	1861	10197	867	22583	-140	194	98	1644	-30	-140	4631	-140	-1350	-140	359295
SDO-1	-140	6131	-4000	13702	270	2054	7477	655	-140	22880	-140	-140	-30	112	-30	-140	-140	-140	-1350	-140	19690

Sodium Pyrop
Trace Element
Values = 99999

Sample ID:	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	W	Re	Os	Pt	Au	S.Q.Hg	Tl
7bk0412060	4512	5368	944	3200	700	377	1085	190	554	-140	342	-140	339	-140	197	-140	-140	670	-140	-140	-15	-140	462
7bk0113540	785	1000	266	576	234	-140	231	-140	-140	-140	-140	-140	-140	-140	-140	-140	-140	369	-140	-140	19	142	285
7bk0508365	-140	185	-140	-140	-140	-140	-140	-140	-140	-140	-140	-140	-140	-140	-140	-140	-140	98	-140	-140	23	-140	-140
7bk0611820	209	247	-140	196	-140	-140	-140	-140	-140	-140	-140	-140	-140	-140	-140	-140	-140	101	-140	-140	-15	-140	208
7bk0412792	-140	-140	-140	-140	-140	-140	-140	-140	-140	-140	-140	-140	-140	-140	-140	-140	-140	69	-140	-140	-15	-140	142
7bk0610962	1522	1859	280	1224	239	-140	330	-140	-140	-140	143	-140	-140	-140	359	-140	-140	309	-140	-140	16	-140	430
7bk0308625	224	351	-140	225	-140	-140	-140	-140	-140	-140	-140	-140	-140	-140	-140	-140	-140	118	-140	-140	16	-140	234
7bk0206078	1642	2198	357	1376	230	271	387	-140	188	-140	-140	-140	302	-140	429	-140	152	402	-140	-140	-15	-140	473
7bk0507680	2154	2913	460	1767	418	-140	486	-140	220	-140	205	-140	159	-140	201	-140	-140	441	-140	-140	18	-140	470
7bk0307747	1500	1937	282	1168	195	195	300	-140	182	-140	162	-140	-140	-140	477	-140	-140	510	-140	-140	23	-140	655
SDO-1	1135	3394	666	3110	1313	370	1387	223	1084	186	513	-140	248	-140	-140	-140	-140	18	-140	-140	-15	-140	-140

Sodium Pyrop
Trace Element
Values = 99999

Sample ID:	Pb	Bi	Th	U
7bk0412060	2800	-140	969	8631
7bk0113540	934	-140	-140	4217
7bk0508365	503	-140	-140	2127
7bk0611820	670	-140	-140	2247
7bk0412792	241	-140	-140	1844
7bk0610962	1859	-140	307	6727
7bk0308625	494	-140	-140	3128
7bk0206078	1962	-140	385	8366
7bk0507680	1455	-140	640	7358
7bk0307747	1770	-140	292	9889
SDO-1	536	-140	595	7835

Tintina Experiment Weights WO#:14532 Report#14353

Sample ID:	Orig. Sample Wt. (g)	Wt. after Heptane Lch (g)	Wt. after Acetic Acid Lch (g)	Wt. after Pyrophosphate Lch (g)
7bk0412060	10.00	9.93	10.08	9.55
SDO-1	10.00	9.99	10.03	9.87
7bk0508365	10.00	10.02	9.70	9.95
7bk0611820	10.00	9.94	9.54	9.97
7bk0412792	10.00	9.95	9.77	10.37
7bk0610962	10.00	9.98	10.18	9.77
7bk0308625	10.00	9.93	9.77	9.94
7bk0206078	10.00	9.92	10.08	10.89
7bk0507680	10.00	9.94	9.98	10.33
7bk0307747	10.00	9.94	10.03	9.72
7bk0113540	10.00	9.96	10.06	10.51

Certified By: [redacted]

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Sample description	AU PPB	AG PPM	AS PPM	BA PPM	BR PPM	CA %	CO PPM	CR PPM	CS PPM	FE %	HF PPM	HG PPM	IR PPB	MO PPM	NA %	NI PPM	RB PPM	SB PPM	SC PPM	SE PPM	SN %	SR %	TA PPM	TH PPM
7BK0412060	<2	<5	380	21000	<0.5	2	140	140	2	9.62	6	<1	<5	130	1.86	420	39	27	9.6	<3	<0.02	<0.05	<0.5	13
7BK0507680	<2	<5	300	2900	3.2	4	48	37	2	8.00	4	<1	<5	170	2.16	<200	27	26	11	30	<0.02	<0.05	<0.5	16
7BK0307747	3	<5	160	7600	<0.5	3	42	44	2	6.80	5	<1	<5	78	2.43	420	34	39	11	58	<0.02	<0.05	<0.5	11
7BK0206078	7	<5	140	11000	3.3	4	37	43	3	5.88	5	<1	<5	54	2.85	430	40	33	10	52	<0.02	<0.05	<0.5	11
7BK0113540	8	<5	110	5400	8.0	4	32	45	2	5.18	4	<1	<5	75	2.62	<200	44	27	9.8	44	<0.01	<0.05	1.5	8.3
7BK0610962	13	<5	130	4700	11	2	38	57	2	6.43	4	<1	<5	93	2.14	<200	<15	29	10	55	<0.01	<0.05	<0.5	11
7BK0508365	<2	<5	53	570	19	2	20	85	6	3.79	3	<1	<5	66	2.27	<200	85	16	8.7	50	<0.01	<0.05	<0.5	7.1
7BK0412792	5	<5	50	580	18	2	17	78	5	3.22	3	<1	<5	75	2.62	230	69	16	7.9	34	<0.01	<0.05	<0.5	6.6
7BK0611820	3	<5	58	950	14	2	19	84	5	3.85	4	<1	<5	57	2.41	240	89	15	9.5	31	<0.01	<0.05	0.8	10
7BK0308625	<2	<5	72	1100	8.4	5	21	73	<1	4.12	3	<1	<5	62	2.23	<200	55	16	11	39	<0.01	<0.05	<0.5	13
SDO-1	5	<5	65	420	<0.5	<1	26	63	8	5.70	4	<1	<5	120	1.30	<200	110	4.2	11	<3	<0.01	<0.05	0.9	8.7
7BK0412060-2	9	<5	430	22000	<0.5	2	150	140	<1	9.93	5	<1	<5	160	1.85	<200	<15	31	10	<3	<0.02	<0.05	1.0	14
7BK0507680-2	<2	<5	330	3000	<0.5	<1	51	45	<1	8.14	3	<1	<5	220	2.33	<200	<15	29	13	39	<0.02	<0.05	<0.5	17
7BK0307747-2	12	<5	170	7900	<0.5	3	43	43	<1	6.97	5	<1	<5	86	2.59	<200	<15	39	11	52	<0.02	<0.05	<0.5	11
7BK0206078-2	5	<5	140	10000	4.5	<1	33	40	<1	5.80	5	<1	<5	66	2.88	<200	<15	33	10	51	<0.01	<0.05	<0.5	11
7BK0112540-2	<2	<5	120	5800	7.2	<1	34	44	4	5.37	4	<1	<5	94	2.80	<200	<15	29	11	41	<0.02	<0.05	<0.5	10
7BK0610962-2	<2	<5	140	5400	14	2	37	69	3	6.63	5	<1	<5	89	2.28	<200	58	31	9.4	45	<0.01	<0.05	2.1	10
7BK0508365-2	<2	<5	53	660	20	<1	21	89	6	3.91	3	<1	<5	71	2.38	<200	64	16	8.9	43	<0.01	<0.05	0.9	7.2
7BK0412792-2	<2	<5	51	540	19	2	19	81	5	3.47	3	3	<5	81	2.98	340	77	17	8.7	37	<0.01	<0.05	<0.5	7.3
7BK0611820-2	<2	<5	67	950	15	<1	21	80	5	4.06	4	<1	<5	56	2.48	300	72	15	9.7	39	<0.01	<0.05	<0.5	10
7BK0308625-2	2	<5	77	1200	9.5	4	22	74	5	4.31	3	<1	<5	47	2.28	<200	48	17	12	33	<0.01	<0.05	0.7	14
SDO-1-2	<2	<5	71	500	<0.5	<1	26	60	7	5.96	5	<1	<5	130	1.26	<200	140	4.8	10	<3	<0.01	<0.05	1.3	9.0

Sample description	U PPM	W PPM	ZN PPM	LA PPM	CE PPM	ND PPM	SM PPM	EU PPM	TB PPM	YB PPM	LU PPM	Mass g
7BK0412060	52	<1	510	112	159	92	24	5.2	3.2	8.0	1.03	1.027
7BK0507680	160	<1	460	168	230	130	27	6.0	4.4	9.9	1.37	0.9791
7BK0307747	100	8	530	110	175	91	21	4.2	3.2	6.9	1.04	0.7748
7BK0206078	90	<1	410	98.6	123	68	16	3.5	2.2	5.6	0.88	0.8823
7BK0113540	71	<1	410	84.4	113	59	13	3.2	2.1	5.4	0.80	0.8444
7BK0610962	60	<1	460	79.1	112	63	12	3.1	2.2	5.1	0.78	0.7717
7BK0508365	11	<1	350	30.1	48	23	4.3	0.9	<0.5	2.0	0.30	0.7674
7BK0412792	11	<1	330	27.2	40	17	3.7	0.8	<0.5	2.2	0.34	0.8860
7BK0611820	24	<1	390	55.2	82	37	9.1	2.0	1.3	4.0	0.59	0.9206
7BK0308625	41	<1	280	93.4	123	69	16	4.0	3.1	6.5	0.94	0.8706
SDO-1	37	<1	110	37.2	70	33	5.5	1.3	0.8	3.0	0.48	0.7590
7BK0412060-2	55	<1	600	110	150	99	24	5.1	3.3	7.6	1.14	0.8905
7BK0507680-2	180	<1	490	179	233	127	28	6.7	4.8	10.4	1.42	0.8158
7BK0307747-2	110	<1	660	119	165	96	20	4.2	2.7	6.8	0.95	0.6701
7BK0206078-2	89	<1	470	104	135	79	17	4.2	2.5	6.3	0.88	0.9051
7BK0112540-2	84	<1	540	103	145	78	17	3.8	2.7	6.7	0.96	0.6748
7BK0610962-2	52	<1	450	65.9	101	45	11	2.0	1.5	4.5	0.59	0.6589
7BK0508365-2	11	<1	390	30.3	45	19	4.5	1.2	1.3	2.3	0.35	0.7322
7BK0412792-2	14	<1	360	29.9	46	16	4.2	1.1	0.7	2.3	0.34	0.7043
7BK0611820-2	24	<1	400	60.6	90	43	10	2.5	1.4	4.4	0.55	0.7280
7BK0308625-2	47	<1	380	105	139	73	18	4.4	2.9	7.5	1.04	0.6886
SDO-1-2	37	<1	78	36.8	70	33	5.8	1.3	1.2	3.1	0.51	0.7234

Sample description	MO PPM	CU PPM	PB PPM	ZN PPM	AG PPM	NI PPM	MN PPM	SR PPM	CD PPM	BI PPM	V PPM	CA %	P %	MG %	TI %	AL %	K %	Y PPM	BE PPM
7BK0412060	204.	51.	18.	655.	1.0	355.	329.	163.	20.9	<5.	366.	2.32	1.591	0.51	0.27	7.17	1.30	181.	2.
7BK0507680	308.	61.	28.	529.	1.8	242.	537.	417.	20.2	<5.	625.	5.36	3.078	0.66	0.18	7.31	1.02	265.	3.
7BK0307747	114.	90.	14.	682.	2.3	227.	387.	489.	21.6	<5.	719.	3.91	2.640	0.65	0.24	6.21	1.18	161.	2.
7BK0206078	94.	97.	23.	602.	2.1	219.	345.	403.	22.1	<5.	667.	4.22	3.114	0.52	0.23	6.20	1.26	158.	2.
7BK0113540	111.	83.	12.	473.	1.8	205.	308.	394.	14.9	<5.	604.	4.64	3.228	0.74	0.23	6.09	1.16	131.	2.
7BK0610962	102.	115.	21.	547.	1.9	203.	275.	607.	20.9	<5.	806.	2.44	1.519	0.69	0.26	6.87	1.47	113.	2.
7BK0508365	85.	86.	15.	351.	1.7	159.	145.	152.	17.2	<5.	1282.	2.54	2.425	0.74	0.25	5.97	1.59	31.	<2.
7BK0412792	98.	88.	20.	347.	1.4	164.	139.	172.	17.1	<5.	1279.	3.72	3.262	0.75	0.24	5.80	1.52	31.	<2.
7BK0611820	69.	93.	16.	339.	1.8	140.	142.	272.	16.8	<5.	1135.	2.69	2.175	0.69	0.23	5.95	1.52	80.	<2.
7BK0308625	68.	91.	21.	338.	1.5	146.	152.	308.	15.0	<5.	1110.	3.59	2.512	0.68	0.24	5.90	1.55	148.	<2.
SDO-1	136.	47.	31.	57.	0.5	63.	211.	78.	<0.5	<5.	181.	0.46	0.992	0.69	0.33	6.50	2.78	37.	3.
7BK0412060-2	206.	48.	16.	636.	1.0	365.	314.	166.	19.9	<5.	349.	2.38	1.574	0.46	0.25	6.89	1.22	187.	2.
7BK0507680-2	285.	54.	26.	483.	1.6	222.	534.	415.	18.6	<5.	557.	5.40	2.941	0.59	0.17	6.63	0.93	271.	2.
7BK0307747-2	112.	87.	16.	683.	2.5	219.	381.	475.	22.0	<5.	701.	3.97	2.644	0.64	0.24	6.23	1.17	166.	2.
7BK0206078-2	92.	96.	23.	587.	2.1	211.	330.	371.	21.2	<5.	654.	4.18	3.065	0.51	0.22	6.09	1.25	158.	2.
7BK0113540-2	105.	80.	13.	490.	1.8	195.	290.	365.	14.8	<5.	579.	4.58	3.089	0.70	0.22	5.92	1.11	140.	2.
7BK0610962-2	95.	104.	17.	418.	1.9	172.	240.	553.	15.9	<5.	770.	1.82	1.292	0.65	0.25	6.51	1.41	79.	<2.
7BK0508365-2	86.	88.	15.	349.	1.8	158.	147.	153.	17.4	<5.	1268.	2.54	2.435	0.73	0.25	6.02	1.58	31.	<2.
7BK0412792-2	96.	84.	14.	342.	1.5	157.	125.	165.	16.9	<5.	1270.	3.49	3.058	0.75	0.23	5.84	1.50	31.	<2.
7BK0611820-2	69.	90.	21.	348.	1.4	136.	145.	269.	17.2	<5.	1122.	2.62	2.129	0.67	0.23	5.86	1.50	80.	<2.
7BK0308625-2	62.	86.	20.	341.	1.3	131.	142.	293.	15.2	<5.	988.	3.34	2.261	0.60	0.22	5.45	1.43	149.	<2.
SDO-1-2	125.	46.	29.	52.	<0.4	59.	203.	71.	<0.5	<5.	155.	0.47	0.938	0.63	0.31	5.84	2.48	35.	2.

Sample ID Units	S %	C %	C-org %	C-graph %
7BK0412060	11.4	1.95	1.72	0.029
7BK0507680	9.13	3.63	2.89	0.141
7BK0307747	8.23	4.76	4.36	0.038
7BK0206078	6.98	5.66	4.91	0.039
7BK0113540	6.50	6.21	5.53	0.057
7BK0610962	7.22	6.99	6.65	0.027
7BK0508365	4.16	9.39	9.19	0.025
7BK0412792	6.96	9.35	8.78	0.025
7BK0611820	4.21	7.96	7.52	0.036
7BK0308625	4.32	7.38	7.02	0.033
SDO-1	4.07	9.89	9.70	0.021
7BK0412060-2	11.6	1.92	1.62	0.034
7BK0507680-2	9.14	3.48	2.78	0.138
7BK0307747-2	8.04	4.77	4.38	0.044
7BK0206078-2	7.08	5.71	4.83	0.043
7BK0113540-2	6.06	6.03	5.56	0.059
7BK0610962-2	7.03	7.47	6.92	0.029
7BK0508365-2	4.34	9.54	8.85	0.03
7BK0412792-2	6.82	9.66	8.22	0.035
7BK0611820-2	4.18	7.94	7.00	0.036
7BK0308625-2	4.40	7.12	6.48	0.036
SDO1-2	4.25	9.32	9.03	0.022

SAMPLE	Ag	Cd	Cu	Mn	Mo	Ni	Pb	Zn	Al	As	Ba	Be	Bi	Ca	Co	Cr	Fe	K	Mg	Na	P	Sb	Sc	Sn	Sr	Ti	V	W	Y	Zr
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%	%	%	%	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm
7BK0412060	0.2	19.1	42	214	144	257	20	536	2.77	350	8	1	-10	1.18	126	54	6.98	0.38	0.27	1.70	11971	23	5	-10	35	0.02	115	-10	89	-1
7BK0507680	0.9	18.5	48	351	220	177	20	428	2.62	280	6	3	-10	3.04	47	22	6.18	0.22	0.35	2.08	22388	28	7	-10	178	-0.01	324	-10	133	-1
7BK0307747	1.3	19.8	75	280	86	182	19	584	2.76	130	6	3	-10	2.41	38	23	5.66	0.35	0.38	2.26	20350	30	6	-10	172	0.01	316	10	89	-1
7BK0206078	1.3	19.5	83	249	70	175	17	521	2.70	122	8	3	-10	2.61	35	24	5.23	0.35	0.31	2.76	23505	20	6	-10	102	-0.01	288	-10	90	-1
7BK0113540	0.9	12.9	70	223	85	163	16	408	2.27	95	8	2	-10	2.91	30	19	4.59	0.26	0.39	2.52	24867	27	5	-10	164	0.01	243	-10	73	-1
7BK0610962	1.3	18.2	92	187	74	157	17	455	1.88	110	8	2	-10	1.22	32	22	5.11	0.39	0.31	1.80	11885	19	5	-10	269	0.01	243	-10	57	3
7BK0508365	0.4	15.1	72	99	70	136	15	303	1.23	39	26	3	-10	1.72	18	31	3.28	0.22	0.34	2.12	20273	17	2	-10	85	-0.01	537	-10	14	4
7BK0412792	0.4	14.5	72	91	75	134	16	289	1.16	41	52	3	-10	2.40	17	28	2.95	0.21	0.33	2.65	25328	15	2	-10	107	-0.01	480	-10	14	2
7BK0611820	0.8	16.7	83	108	61	134	19	325	1.18	50	21	3	-10	1.86	19	30	3.61	0.23	0.31	2.25	19360	13	3	-10	114	-0.01	438	-10	51	-1
7BK0308625	0.6	14.1	80	116	58	131	21	310	1.54	55	17	3	-10	2.49	21	31	3.70	0.25	0.36	2.10	21293	17	5	-10	159	-0.01	515	-10	95	-1
SDO-1	0.2	-0.5	38	159	120	48	25	41	0.90	44	16	1	-10	0.31	25	13	4.74	0.38	0.31	1.17	8428	-10	2	-10	13	-0.01	34	-10	17	-1
7BK0412060-2	-0.2	18.5	40	219	145	293	16	539	2.61	384	6	1	-10	1.26	140	51	6.84	0.54	0.25	1.48	12388	31	5	-10	42	0.02	109	-10	98	1
7BK0507680-2	0.6	19.1	48	411	220	191	19	445	3.39	288	6	3	-10	3.27	49	27	6.14	0.40	0.41	1.99	24074	26	8	-10	197	0.01	384	-10	152	1
7BK0307747-2	1.1	21.4	79	287	84	187	18	615	3.34	137	7	4	-10	2.41	39	27	5.29	0.60	0.44	2.32	21160	35	7	-10	250	0.02	393	-10	94	2
7BK0206078-2	1.2	22.2	89	272	75	197	16	578	3.46	131	6	4	-10	2.56	39	33	5.27	0.62	0.38	2.84	25816	29	7	-10	98	0.02	407	10	96	3
7BK0113540-2	0.7	16.1	77	247	87	187	15	484	3.17	108	7	3	-10	3.20	33	27	4.56	0.49	0.52	2.55	26588	21	7	-10	175	0.02	356	-10	89	2
7BK0610962-2	1.1	16.1	99	190	76	162	16	393	2.50	112	8	3	-10	1.04	36	30	5.01	0.67	0.37	1.89	11081	28	4	-10	306	0.02	343	-10	46	4
7BK0508365-2	0.3	19.1	82	120	75	164	17	349	1.74	40	24	4	-10	1.91	21	44	3.49	0.40	0.45	2.20	21892	17	3	-10	81	-0.01	768	-10	17	2
7BK0412792-2	-0.2	18.0	78	105	79	154	16	331	1.74	45	31	4	-10	2.56	19	41	3.02	0.38	0.45	2.83	26537	20	3	-10	105	-0.01	743	-10	17	2
7BK0611820-2	0.4	19.7	88	125	61	145	17	357	1.80	56	14	4	-10	1.93	21	44	3.61	0.44	0.42	2.18	19748	18	4	-10	133	0.01	694	-10	53	2
7BK0308625-2	0.4	17.7	85	126	57	142	18	366	1.95	67	14	4	-10	2.36	22	40	3.66	0.43	0.43	2.03	21200	13	6	-10	165	0.01	670	-10	106	2
SDO-1	-0.2	-0.5	42	171	111	50	24	47	0.97	52	36	1	-10	0.35	28	14	4.83	0.55	0.32	1.00	8711	-10	2	-10	14	-0.01	37	-10	18	1

[redacted]

Adrienne I. Rittau, B.Sc., C.Chem
ICP Technical Manager

Negative values indicate less than the detection limit
99999 indicates greater than 10%
Assay recommended for Pb values greater than 5000 ppm

ACTLABS

ACTIVATION LABORATORIES LTD

Invoice No.: 15182
Work Order: 15383
Invoice Date: 13-APR-98
Your Reference: WO#14532
Account Number: 1239

TINTINA MINES LIMITED
SUITE 218 - 920 YONGE ST
TORONTO, ONTARIO
M4W 3C7
CANADA
ATTENTION: SHAHE F. SABAG

CERTIFICATE OF ANALYSIS

9 SAMPLES were submitted for analysis.

The following analytical packages were requested. Please see our current fee schedule for elements and detection limits.

REPORT 15182 TOTAL C & ORGANIC C

This report may only be reproduced in its entirety without the express consent of ACTIVATION LABS. If no instructions were received or will be received within 90 days from the date of this report, excess material will be discarded. Our liability is limited solely to the analytical cost of these analyses. Test results are representative only of material submitted for analysis.

CERTIFIED BY :

[redacted]

DR E.HOFFMAN/GENERAL MANAGER

1336 SANDHILL DRIVE, ANCASTER, ONTARIO, CANADA L9G 4V5 • TEL: 905-648-9611 • FAX: 905-648-9613
E-MAIL: ACTLABA@IBM.NET or 102040.700 @ COMPUSERVE.COM

Sample description	CTOT %	CORG %
7BK0113540	5.74	5.30
7BK0307747	5.00	4.47
7BK0507680	4.16	3.11
7BK0206078	5.53	5.00
7BK0308625	4.87	4.54
7BK0610962	6.16	5.59
7BK0412792	6.14	5.42
7BK0508365	6.12	5.19
SDO-1	9.69	8.95

APPENDIX C

FEB 05 1999

AGRA
ENGINEERING GLOBAL SOLUTIONS

AGRA Monenco Inc.
2010 Winston Park Drive
Oakville Ontario
Canada L6H 6A3
Tel (905) 829-5400
Fax (905) 829-5401

February 2, 1999
TML109774

Mr. Shahé F. Sabag, M.Sc.
Vice-President
Tintina Mines Limited
Suite 218, 920 Yonge Street
Toronto, Ontario
M4W 3C7

Dear Mr. Sabag:

Further to our telephone conversation last week, I am enclosing for your use our final report on the Birch Mountains polymetallic sulphide ore samples. After we spoke I had the opportunity to review the work with an old colleague on the odd chance that we had missed something, but nothing was found which would change the results.

Dr. Lakshmanan and I are both available at your convenience to discuss the results if you wish. We have enjoyed this assignment and hope to have the opportunity to meet with you at some time in the future.

Yours very truly,

[redacted]

Nairn M. McQueen, P.Eng.
Vice-President, Engineering

Tintina Mines Limited
Processing of Polymetallic Sulphide Ores
Tintina Project BKT0327
Agra Monenco Project TML109774

Background

Agra Monenco was retained by Tintina Mines Limited in March 1998 to investigate the treatability and the economics of processing polymetallic sulphide ores found in the Birch Mountains area of Alberta. A set of ninety-six course reject samples taken from drill cores in the area of interest were delivered to Ortech in April 1998 together with sample information, earlier analytical data and mineral description sheets.

Ore Beneficiation Testing

Since the concentrations of the metallic compounds of interest were low in the composite ore sample, it was clear that the ore would have to be concentrated prior to extraction of the metals. The initial testing program was agreed to address this issue.

The ORTECH Report 98-1-20-01-03-P8192-CI of October 28,1998 which is appended to this report describes the test work done to evaluate both flotation and magnetic separation as methods of ore beneficiation. The initial set of five flotation tests which was done at ORTECH's Oakville pilot plant did not produce any useful beneficiation. A subsequent set of three tests was done with technical assistance from Minnovex, world leaders in flotation technology and applications. These tests also failed to show any useful beneficiation of the ore.

Although the flotation tests which were conducted would not have produced optimum results, the range of conditions and reagents which were used should have produced some beneficiation and set the direction for optimization tests. Since there was effectively no beneficiation at all, it was concluded that flotation was not a viable process to improve the grade of this ore.

During the flotation tests, the magnetic properties of the ore were noticed by one of the technicians, and a single magnetic separation test was conducted. Even though magnetic separation produced a magnetic fraction equal to fifteen percent of the ore, the chemical analyses of the fractions indicated that there was no useful beneficiation.

Leach Testing

Even though the ore beneficiation tests were not successful, Tintina Mines requested that the leach tests be done for future reference.

Leaching test conditions were selected in order to maximize the recovery of as many as possible of the metal values present in two screening tests. The V, Fe, Ni, and Zn ions were selected for analysis due to their representative chemistry. If promising results were obtained, then optimization tests would be conducted.

The test results indicated low recoveries from the ore in spite of aggressive leach conditions. The analysis of the leach tails indicated residual metals levels similar to those observed in other projects which involved ores with higher initial grade of the same metals, suggesting that the low recoveries observed result from low feed grade rather than from ineffective leach conditions.

Due to the lower grade than normal in the ore leached, the acid consumption is very high by comparison.

Summary of Test Work

The scoping tests which were done in this study should normally have indicated the direction for further test work which would optimize recoveries and reagent consumptions for plant design. In this case, however, they did not do so, and the results can be summarized by the following four points:

1. Flotation scoping tests failed to produce any indication of successful beneficiation of the ore by this method.

2. Magnetic separation produced a concentrate of roughly 15% of the feed, but there was no difference in grade between the head, concentrate and tail streams.

3. Leach tests indicated low recoveries.

4. Leach tests indicated high reagent consumption.

It is felt that without substantial beneficiation of the ore, the leach performance in terms of both metal recovery and reagent consumption will be unacceptable.

Economics

Approximate market prices at the end of 1998 were:

V_2O_5	\$8.48/kg
Ni	\$6.44/kg
Zn	\$1.42/kg
Sulphuric Acid	\$0.12/kg

The value of these three metals in the ore can be calculated from the ore analysis which is taken as the average of the six analyses done by ORTECH:

V_2O_5	0.061% as V
Ni	0.018% as Ni
Zn	0.034% as Zn

The value of these three metals in the ore is therefore \$10.87 per metric tonne of ore.

The leach performance based on one metric tonne of ore is summarized in the following table:

Metal	Grade %	Metal kg	Extracted %	Extracted kg	Extracted Value $
V	0.061	0.61	33.6	0.205	3.10
Ni	0.018	0.18	97.2	0.175	1.13
Zn	0.034	0.34	100.0	0.34	0.48
Total Value of Metal Extracted					4.71

The consumption of sulphuric acid was 340 kg per metric tonne of ore. At $120/mt of acid, the cost of acid amounts to $39.10 per metric tonne of ore from which $4.71 of metals were extracted. By optimizing the leach solution pH and increasing the slurry density the acid consumption could be reduced to perhaps 300 kg/mt of ore, but the value of the acid would at $34.50 still far exceed the value of the extracted metals.

Previous work with vanadium suggests that a plant extracting vanadium must be able to operate profitably when the market price of the V_2O_5 is depressed to a value approximating the breakeven cost of the lowest cost producer, typically the steel mill slag based operations in South Africa. This leads to the conclusion that the vanadium grade in the concentrate should be in the order of 10% as V, or about 150 times higher than at present, although the values of the other metals present which are co-extracted with the vanadium can be credited to reduce this requirement. Nevertheless, there is a wide margin between the ore grade available and what is required in order to produce an economically viable operation.

Recommendation

Further work on these ore samples is not recommended at this time.

R E P O R T

Recovery of Valuable Metals from Tintina Ore

A Report to: AGRA Monenco
2010 Winston Park Drive
Oakville, Ontario
L6H 6A3

Attention: Mr. Nairn McQueen

Submitted by: Marc Rishea
V.I. Lakshmanan
Process Technologies

Report No.: 98-1-20-01-03-P8192-CI
ORTECH Account #11539
11 pages

Date: October 28, 1998



ORTECH

QMI ISO 9002 REGISTERED

ORTECH Corporation, 2395 Speakman Dr., Mississauga, Ontario, Canada L5K 1B3 Phone: (905) 822-4111 Fax: (905) 823-1446

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1. INTRODUCTION

ORTECH presented a proposal to AGRA Monenco to conduct an investigation for the recovery of metals from a low grade ore deposit. The ore deposit has nickel, zinc and vanadium. This work is being conducted by AGRA Monenco for Tintina Mines Limited of Toronto, Ontario, the owner of the ore deposit. The proposed treatment includes: flotation to concentration of metal values, oxidation roasting of flotation concentrate to convert the metals to acid soluble oxides and selective leaching of the metal oxides. ORTECH has prepared the following report on the test work conducted.

2. TEST WORK

2.1 Sample Preparation

The samples representing three drill cores samples from the ore deposit were sent by Tintina Mines Limited. There were 96 samples received. The amounts of each sample to be used for the testing was determined by the amount required for testing and the amount of each sample available as per instructions from Tintina Mines. The samples from each drill core was coded as per their position in length of the core. The three core samples were coded 7BK02, 7BK04 and 7BK05. The amount of each sample used to make the three representative samples are presented in Table 1 to 3. The samples were weighted, the representative amount removed and remaining sample placed back in the original sample bag and stored. The samples for each drill core were combined and ground down to less than 6 mesh using lab jaw and roll crushers. Representative sample from the three drill core were sent for multi-element analysis and the results are presented in Table 4. For subsequent test work the representative samples from the three core samples were combined equally.

2.2 Flotation Tests

There were five set of flotation tests conducted. The test conditions are presented in Table 5 and the test results are presented in Table 6. The variable parameters for flotation testing were pH and the activating agent for metal sulphide flotation. Each flotation test included two parts. The first part was carbon flotation using kerosene as the activation agent. The second part was metal sulphide flotation using metal activation agents copper sulphate or sodium sulphide. The carbon flotation was conducted at pH of 8 and 10.5 and the metal sulphide flotation was conducted at pH 8 and 10.5. The tests were conducted with 100% minus 100 mesh material. The collector for all the tests was sodium isopropyl xanthate and the frother for all the tests was MIBC.

Another set of flotation tests was conducted with selected samples with a higher sulphide content. The selection of material was made by the client. The material for the tests was taken from sample 7BK05 top material. The material that was selected is presented in Table 7 and the flotation results are presented in Table 8. Two tests were conducted and flotation tests conditions were the same as the initial Test #1 and #2.

2.3 Leaching Tests

The next step in the recovery of metal values was to perform a series of acid leaching tests on the whole ore material. Two tests were conducted at pH 1 and pH 2 using sulphuric acid. The leaching conditions were: 20% solids, temperature 75 to 80°C and six hours of leaching time. The material was ground to 100% minus 100 mesh and 200 grams was used for each test. The acid consumption was 0.34 grams of acid per gram of material for the pH 1 test and 0.14 grams of acid per gram of material for the pH 2 test. The levels of metals in solution and metal extraction are presented in Table 9.

2.4 Magnetic Separation Tests

The lack of metal selectivity with flotation prompted investigation into other methods of separation. A magnetic separation test was conducted on the material. A lab scale Sala magnetic drum was used. The material was ground to 100% minus 100 mesh and 1000 grams was used for the test. The ground material was slurried at 10% weight and fed into the test equipment. The slurry was passed though the test equipment several times to ensure efficient separation of the magnetic fraction. The magnetic weight fraction was 15%. The magnetic and non-magnetic fractions were submitted for analysis for V, Fe, Ni and Zn. The test results are presented in Table 10.

3. DISCUSSION/RECOMMENDATIONS

The flotation tests showed no selectivity for the metal species in the ore material. The activation agents used should have reacted with metals to produce simulated metal sulphide surface that could be floated by the sulphide collector. The poor selectivity for collection of the metal values could be due to the low metal content in the ore.

Attrition scrubbing using soil wash equipment was considered but not carried out because there was no indication of metal selectivity in the fine fraction in the flotation tests.

The acid leaching of the ground ore material did not produce a high metal extraction of vanadium and nickel, the high value metals in the ore. The high consumption of more than 1/4 kg acid per kg of ore material can not be justified because of the low economic value of the ore.

Magnetic treatment of the ground ore material did not produce a metal concentrate in the magnetic fraction.

Due to the failure to produce a metal concentrate with high metal values by flotation and magnetic treatment, low extraction of metals on acid leaching of the ground ore and the low levels of metal values present in the ore, it is not recommended that any further testing be conducted on the sample provided by Tintina Mines. The low economic value of the ore may not justify a process that needs to treat all of the ore.

[redacted]

M. Rishea
Manager
Process Technologies

[redacted]

V.I. Lakshmanan
Program Director
Process Technologies

Approved by:

[redacted]

R.G.W. Laughlin
Director
Process Technologies

Table 1

Composite Weights of Sample 7BK02

Sample No	Total Weight (kg)	Composite Weight (kg)	Left Over Weight (kg)
7BK0206078	0.687	0.42	0.27
7BK0206113	1.117	0.40	0.72
7BK0206146	0.826	0.38	0.44
7BK0206178	1.3	1.15	0.15
7BK0206274	0.262	0.19	0.07
7BK0206290	1.629	0.70	0.93
7BK0206348	0.873	0.44	0.43
7BK0206385	2.8	1.18	1.62
7BK0206483	2.5	1.20	1.30
7BK0206583	1.15	0.53	0.62
7BK0206627	2.3	1.09	1.21
7BK0206718	0.253	0.14	0.11
7BK0206730	2.75	1.38	1.37
7BK0206845	2.6	1.39	1.21
7BK0206961	2.718	1.21	1.51
7BK0207062	2.466	1.21	1.25
7BK0207163	2.695	1.20	1.50
7BK0207263	0.917	0.36	0.56
7BK0207293	2.689	1.21	1.48
7BK0207394	2.957	1.20	1.76
7BK0207494	2.438	1.20	1.24
7BK0207594	3.127	1.20	1.93
7BK0207694	0.77	0.34	0.43
7BK0207722	1.24	0.40	0.84
7BK0207755	2.0	1.07	0.93
7BK0207844	3.212	0.85	2.36
Totals	48.28	22.04	26.23

Table 2

Composite Weights of Sample 7BK04

Sample No	Total Weight (kg)	Composite Weight (kg)	Left Over Weight (kg)
7BK0412060	n/a	0.00	0.00
7BK0412067	0.220	0.22	0.0
7BK0412086	0.216	0.16	0.06
7BK0412099	0.880	0.30	0.58
7BK0412124	0.060	0.06	0.0
7BK0412216	3.000	1.09	1.91
7BK0412307	2.720	1.09	1.63
7BK0412398	0.875	0.36	0.52
7BK0412428	1.680	0.67	1.01
7BK0412484	2.660	0.94	1.72
7BK0412562	0.620	0.55	0.07
7BK0412608	2.510	1.10	1.41
7BK0412700	3.330	1.10	2.23
7BK0412792	2.300	0.94	1.36
7BK0412870	0.350	0.13	0.22
7BK0412881	2.084	0.82	1.27
7BK0412949	2.600	0.82	1.78
7BK0413017	1.790	0.82	0.97
7BK0413085	2.000	0.82	1.18
7BK0413153	1.270	0.46	0.81
7BK0413191	1.850	0.66	1.19
7BK0413246	1.310	0.47	0.84
7BK0413285	1.780	0.72	1.06
7BK0413410	2.500	0.90	1.60
7BK0413485	2.400	0.90	1.50
7BK0413560	2.550	0.96	1.59
7BK0413640	0.380	0.11	0.27
7BK0413649	0.210	0.10	0.11
7BK0413657	0.760	0.25	0.51
7BK0413678	0.840	0.82	0.02
7BK0413746	1.650	0.54	1.11
7BK0413791	2.100	0.72	1.38
7BK0413851	1.440	0.72	0.72
7BK0413911	1.810	0.72	1.09
7BK0413971	2.050	0.72	1.33
7BK0414031	1.800	0.72	1.08
7BK0414091	1.800	0.72	1.08
7BK0414151	0.090	0.09	0.0
Totals	58.485	23.27	35.22

Table 3

Composite Weights of Sample 7BK05

Sample No	Total Weight kg	Composite Weight kg	Left Over Weight kg
7BK0507680	0.689	0.32	0.37
7BK0507707	1.53	0.65	0.88
7BK0507761	0.89	0.46	0.43
7BK0507799	1.55	0.72	0.83
7BK0507859	1.44	0.48	0.96
7BK0507899	2.4	0.83	1.57
7BK0507968	0.042	0.042	0.0
7BK0507973	0.039	0.039	0.0
7BK0507979	2.15	0.77	1.38
7BK0508043	2.89	0.95	1.94
7BK0508122	1.5	0.47	1.03
7BK0508161	1.8	0.71	1.09
7BK0508320	1.21	0.54	0.67
7BK0508365	1.37	0.54	0.83
7BK0508410	1.1	0.08	1.02
7BK0508417	2.4	0.84	1.56
7BK0508487	2.2	0.73	1.47
7BK0508548	2.63	0.84	1.79
7BK0508618	2.37	0.98	1.39
7BK0508700	2.3	0.84	1.46
7BK0508870	1.68	0.64	1.04
7BK0508923	1.92	0.68	1.24
7BK0508980	0.37	0.16	0.21
7BK0508993	0.148	0.10	0.05
7BK0509001	0.36	0.16	0.20
7BK0509014	3.06	0.84	2.22
7BK0509084	2.55	0.91	1.64
7BK0509160	2.6	0.78	1.82
7BK0509225	2.63	0.78	1.85
7BK0509290	2.5	0.78	1.72
7BK0509355	2.6	0.90	1.70
7BK0509430	1.895	0.68	1.21
7BK0509487	1.25	0.38	0.87
Totals	56.06	19.62	36.45

Table 4

Chemical Analysis of Samples

Sample (A#)	4425	4426	4427
Lot#	7BK04	7BK05	7BK02
ELEMENT	wt %	wt %	wt %
Aluminum	6.41	6.27	6.12
Barium	0.127	0.119	0.189
Calcium	3.69	4.16	4.13
Cadmium	<0.01	<0.01	<0.01
Cobalt	<0.01	<0.01	<0.01
Chromium	<0.01	<0.01	<0.01
Copper	<0.01	<0.01	<0.01
Iron	4.09	4.43	3.87
Potassium	0.266	0.289	0.320
Lead	<0.01	<0.01	<0.01
Magnesium	0.865	0.910	0.901
Manganese	0.014	0.018	0.017
Molybdenum	<0.01	<0.01	<0.01
Sodium	0.469	0.520	0.611
Nickel	0.025	0.024	0.021
Phosphorous	0.480	0.526	0.584
Tin	<0.01	<0.01	<0.01
Titanium	0.318	0.307	0.291
Vanadium	0.057	0.054	0.055
Zinc	0.027	0.028	0.026
Silicon	30.3	29.3	29.4
Carbon	***7.81***	***8.25***	***7.18***
Sulphur	***3.81***	***3.61***	***3.10***

Table 5

Summary of Flotation Tests Conditions

Test No.	pH	Purpose	Reagent	Sample
1	8	Carbon	Kerosene	Conc. #1
	8	Sulphide	Copper Sulphate	Conc. #2
2	8	Carbon	Kerosene	Conc. #1
	8	Sulphide	Sodium Sulphide	Conc. #2
3	10.5	Carbon	Kerosene	Conc. #1
	10.5	Sulphide	Copper Sulphate	Conc. #2
4	10.5	Carbon	Kerosene	Conc. #1
	10.5	Sulphide	Sodium Sulphide	Conc. #2
5	8	Carbon	Kerosene	Conc. #1
	8	Sulphide	Copper Sulphate	Conc. #2
	8	Sulphide	Sodium Sulphide	Conc. #3

Table 6

Chemical Analysis of Flotation Tests

Test #	Sample	Weight (%)	Metal Content - wt%				
			V	Fe	Ni	Zn	C
1	Conc. #1	4.3	0.080	4.02	0.023	0.052	8.5
	Conc. #2	5.9	0.074	4.81	0.027	0.022	
	Tails	89.8	0.067	4.34	0.018	0.037	
2	Conc. #1	6.0	0.075	4.08	0.027	0.033	8.1
	Conc. #2	6.6	0.074	4.31	0.028	0.044	
	Tails	87.4	0.064	4.33	0.016	0.033	
3	Conc. #1	7.5	0.068	4.25	0.020	0.031	8.1
	Conc. #2	9.8	0.066	4.49	0.017	0.073	
	Tails	82.7	0.062	4.19	0.019	0.025	
4	Conc. #1	7.4	0.066	4.26	0.025	0.033	8.8
	Conc. #2	10.4	0.069	4.23	0.025	0.036	
	Tails	82.2	0.057	4.14	0.014	0.029	
5	Conc. #1	2.7	0.079	4.33	0.023	0.072	8.2
	Conc. #2	3.3	0.079	4.97	0.028	0.262	
	Conc. #3	3.9	0.080	6.40	0.023	0.102	
	Tails	91.2	0.066	4.33	0.02	0.066	

Test #	Sample	Weight (%)	Metal Content - wt%				
			Al	Ca	Mg	Na	Si
1	Conc#1	4.3	6.65	3.98	0.91	0.48	27.1
	Conc#2	5.9	6.61	3.77	0.92	0.53	27.3
	Tails	89.8	5.99	4.23	0.86	0.56	28.0
2	Conc#1	6.0	6.76	3.88	0.94	0.56	28.1
	Conc#2	6.6	6.72	3.74	0.95	0.56	27.4
	Tails	87.4	5.86	4.26	0.85	0.59	27.5
3	Conc#1	7.5	6.16	5.14	0.89	0.29	27.1
	Conc#2	9.8	6.19	5.01	0.87	0.29	27.0
	Tails	82.7	5.8	4.64	0.84	0.35	27.9

Table 7

Composite Weights of Sample 7BK05 Upper Section for Flotation Test

Sample No.	Sample Weight kg	Composite Weight kg	Left Over Weight kg
7BK0507680	0.37	0.31	0.06
7BK0507707	0.88	0.61	0.27
7BK0507761	0.43	0.43	0.0
7BK0507799	0.83	0.68	0.15
Total	2.51	2.03	0.48

Table 8

Chemical Analysis of Flotation Tests using Selected Material from Sample 7BK05 Upper Section

Test #	Sample	Weight (%)	Metal Content - wt% V
6	Conc. #1	4.2	0.089
	Conc. #2	6.8	0.080
	Tails	89.0	0.071
7	Conc. #1	5.9	0.086
	Conc. #2	8.2	0.086
	Tails	85.9	0.077

Table 9

Acid Leaching Test Results

A - Metal Level in Leach Solution

Condition	Metal Solution - ppm			
	V	Fe	Zn	Ni
pH 1	41	3590	120	35
pH 2	14	990	80	21

B - Metal Extraction

Condition	Metal Solution - %			
	V	Fe	Zn	Ni
pH 1	22.7	28.2	79.2	30.5
pH 2	9.3	9.6	74.2	40.4

Table 10

Magnetic Separation Test Results

Material	Weight (%)	Metal Content - wt%			
		V	Fe	Zn	Ni
Magnetic	15	0.056	3.80	0.046	0.012
Non-Magnetic	86	0.057	4.12	0.047	0.014

APEX Geoscience Ltd.

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March 5, 1998

Mr. Shahé Sabag
Tintina Mines Limited
Suite 218, 920 Yonge Street
Toronto, Ontario
M4W 3C7
Fax: (416) 929-2945; 6 Pages

Dear Shahé,

Enclosed (attached) is the finalized draft of the memo summarizing my observations from a review of the magnetic data to date. At present, I have referred to the pertinent areas on the basis of the Pseudo Depth Slice 1 map that you sent me a couple of months ago with the seven areas of interest (which I have named Figure 1).

Best Regards

[redacted]

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

Summary Observations For The 1997 Airborne Survey For The Birch Mountains

During November, 1997 to January 1998 APEX Geoscience Ltd, was commissioned to review magnetic data from a fixed-wing airborne geophysical survey conducted by World Geoscience Ltd. during 1997 over Tintina Mines Ltd.'s Buckton and Asphalt properties in the Birch Mountains northwest of Fort McKay. A cursory review of the data has been performed and several regional structures that are likely indicative of faults have been identified as well as several magnetic anomalies that could be indicative of shallow sourced kimberlitic intrusions. These magnetic anomalies warrant further investigation based upon their geophysical signature.

Signature of Kimberlite or Related Intrusives in Cretaceous Sedimentary Rocks

To date, 17 kimberlitic pipes have been identified by Ashton (16) and Monopros (1) in Northern Alberta. Two of the Ashton pipes have recently been identified east of the Buffalo Head Hills in close proximity to the southwestern most extent of the Birch Mountains. In addition, roughly 70 kimberlitic pipes have been identified in north-central Saskatchewan. The Saskatchewan pipes range from 94 to 101 Ma with reported precursor sills as old as 113 Ma. Based upon the presence of pyroclastic aprons intercalated with the enclosing Cretaceous sediments in the Buffalo Head Hills area, the Ashton pipes range from about 85 to 90 Ma. Coincidentally, the Buffalo Head Hills pipes were likely intruded about the same time as the time gap that exists between the Second White Specks Formation and the Lea Park Formation shales in the Birch Mountains. It is interesting to speculate upon what the relationship is between: (a) extensive bentonites in the upper Second White Specks Formation, (b) the time gap that likely indicates uplift at the top of the Second White Specks Formation, and (c) pyroclastic activity associated with intrusion of the Buffalo Head Hills Kimberlites which may be roughly coeval with the upper Second White Specks bentonites or may be slightly younger. Monopros' Mountain Lake diatreme is intercalated with Upper Cretaceous Wapiti Formation continental to estuarine sediments and is about 75 Ma based upon stratigraphy and radiometric age dating.

The magnetic signatures reported to date for kimberlitic pipes within sedimentary successions are highly variable depending upon the magnetic susceptibility of the intrusive or associated pyroclastic material, the susceptibility of the surrounding sedimentary rocks and the susceptibility and depth of the underlying basement rocks. For Example, at Fort à la Corne, Saskatchewan, the kimberlitic pipes yield magnetic signatures that range from 25 to 100 nT above background in airborne geophysical surveys. Follow-up ground geophysical surveys have yielded anomalies on the order of 200 to 600 nT above background. The size (diameter) of the anomalies range from about 200 m to greater than 1 km reflecting the large size of these pipes and their stratabound nature. Most of the Fort à la Corne pipes exist in an area of very low regional (basement) magnetic relief. The Fort à la Corne pipes are so distinctive magnetically that many of them can be seen on the regional GSC fixed-wing magnetic survey with 1,200 m spaced crosslines and a bird height of 300 m above ground surface. In contrast, the Mountain Lake diatreme, which is possibly kimberlitic, has a much more reduced magnetic signature. The airborne geophysical survey yielded a magnetic anomaly of about 2 to 5 nT but over 1 km in diameter. The

ground geophysical survey yielded a distinct 25 to 30 nT magnetic anomaly, however, other similar "distinct" magnetic anomalies in the area did not yield kimberlite. Several of the surrounding magnetic anomalies are likely due to paleochannel concentrations of magnetic minerals, some of which could be derived from kimberlite or related intrusions or from intrusions associated with uplift of the Rocky Mountains. The regional magnetic signature (which is due to basement) is of relatively low relief in the vicinity of the Mountain Lake diatreme. The Buffalo Head Hills Kimberlites yield variable airborne magnetic signatures from 2 to 5 nT up to more distinctive anomalies of 25 to 50 nT. Regional background magnetic signatures due to the underlying basement are more variable in the vicinity of the Buffalo Head Hills pipes. In general, the Buffalo Head Hills pipes show up as 200 to 400 m diameter magnetic anomalies that yield total field magnetic anomalies that in profile show up as distinct shoulder peaks on large amplitude magnetic highs that are due to basement. It is unknown what these pipes look like in ground geophysical surveys. Ashton has shown the ground magnetic data for one or two of the pipes. The diamondiferous K14 complex consists of three distinct 10 to 50 nT magnetic anomalies that form a ring with a central magnetic low. The entire complex appears to be about 400 to 500 m in diameter.

In Alberta, because of the thick sequence of relatively inert sedimentary rocks (magnetically) overlying basement, filtering techniques that delineate high frequency, low amplitude magnetic anomalies are being employed extensively to filter magnetic data in the search for kimberlitic pipes high up in the sedimentary column. These techniques include the use of band pass filters (a wavelength filter) and depth slice filters (based on frequency). The largest problem to date is that these techniques work so well on shallow magnetic features that they do an excellent job of picking up any and all culture as well as paleochannel concentrations of magnetic minerals in a variety of sediments including Cretaceous clastic sequences, preglacial Tertiary sediments, glaciofluvial sediments and modern day drainages. This is particularly the case for any sediments derived from the Cordillera. This seems to be much less of a problem in northeast Alberta where McMurray Formation sediments are derived from the shield and reworking of Athabasca sands. In addition, those clastic sequences that are derived form the west, such as the Grand Rapids and Pelican formation sediments, are extremely clean quarztose sediments with low concentrations of heavies. The Athabasca River and many of its major tributaries do not show up on magnetic maps, even those maps that employ filters looking for near surface weak magnetic signatures. This is in stark contrast to many drainages in the western half of northern Alberta.

Preliminary Review of Magnetic Data for the Asphalt to Tar River Area

Magnetic anomalies, defined by the Pseudo Depth Slice 1 map, were examined in more detail in seven discreet areas (1a to 6) of the Asphalt-Buckton Permits (Figure 1) in order to determine if there is any potential for the presence of discreet shallow sourced magnetic bodies such as kimberlitic intrusions or related local volcanics. Area 1a, defined by two large magnetic anomalies near the headwaters of the Pierre River that are likely deeply rooted (as they are visible through all depth slice maps), can be resolved into several smaller diameter magnetic anomalies. Examination of the total field flight line

magnetic profiles indicate that these two large magnetic anomalies can be resolved into several well defined 5 to 15 nT peaks and shoulder anomalies. These magnetic peaks and shoulder anomalies likely are the result of 1 to 1.2 km diameter deeply sourced magnetic features that are probably related to basement. There is a slight chance that some of the shoulder anomalies could be the result of a more shallow magnetic source. One example exists on the east bank of the Pierre River, on line 41030 at the township boundary (Refer to World Geoscience Ltd.'s Map of the Second Vertical Derivative of the Total Magnetic Field). These magnetic anomalies are of low to moderate priority on the basis of their magnetic signature alone. The association of geochemical anomalies and geological anomalies in the Pierre drillholes and along the Pierre River drainage indicates that these anomalies warrant some follow-up investigation.

The magnetic anomaly at area 1b appears to be a large amplitude basement feature up against a major north trending fault contact, lithologic contact or both in basement. This magnetic anomaly is not likely related to a shallow sourced feature and is therefore considered low priority in the search for near-surface intrusions or volcanics that exist high up in the sedimentary column.

Several weak magnetic anomalies were examined between the Tar River and the Pierre River at area 2 along a tributary to the Tar River (Figure 1). At least three magnetic anomalies appear to be derived from sources that are from 150 to 250 m below surface that range from 10 to 45 nT in strength and are up to about 500 m in diameter (the anomalies are visible on World Geoscience Ltd.'s Map of the Second Vertical Derivative of the Total Magnetic Field). These magnetic anomalies warrant further geophysical modelling and, depending upon the results of the modelling, follow-up fieldwork.

A large magnetic anomaly was examined at area 3. The anomaly can be resolved into two magnetic anomalies along line 41010 (Refer to World Geoscience Ltd.'s Map of the Second Vertical Derivative of the Total Magnetic Field). The eastern and visually larger of the two anomalies shows up as a poor total field magnetic anomaly in profile. The western anomaly shows up as a well defined 7 nT shoulder anomaly that is likely derived from a shallow magnetic source that is 200 to 300 m in diameter. The western anomaly warrants further work.

Several magnetic anomalies that exist east of the general area of anomalies 1a to 3, on the east side of the pronounced north trending magnetic trough, were reviewed. All of the anomalies reviewed are poor anomalies that are not likely related to shallow sourced intrusions or related pyroclastics but are likely either magnetic artifacts (related to noise or a result of gridding the data) or subtle variations in the basement rocks.

Three pronounced high frequency magnetic anomalies on the Pseudo Depth Slice 1 map and the Second Vertical Derivative map were reviewed in the vicinity of area 4 (Figure 1). All three magnetic anomalies yielded extremely weak total field magnetic profiles and are likely the result of weak inflections of the magnetic data that are likely magnetic artifacts. These anomalies could reflect magnetic noise, topographic variations, variations in the basement signature or be a result of the data gridding procedure. No

follow-up work is recommended for these anomalies.

A strong basement feature that resolves into 2 or 3 discreet magnetic anomalies on the Pseudo Depth Slice 1 at area 5 was examined for possible shallow sourced magnetic features that could be related to intrusions or near-surface volcanics. No evidence of shallow sourced magnetic anomalies was found. No further work is recommended for the anomalies in the vicinity of area 5 at this time.

Near the headwaters of Asphalt Creek (area 6), a pair of interesting looking Pseudo Depth Slice 1 anomalies yielded 5 to 10 nT shoulder anomalies on the total field magnetic profiles (Figure 1). The northernmost anomaly along line 40700, corresponds almost exactly to an outcrop of Second White Specks Shale that yielded some interesting geochemistry. I wonder whether this magnetic anomaly reflects an accumulation of magnetic material in the base of Second White Specks bone beds or magnetic minerals within pyroclastic horizons in upper Second White Specks. The second anomaly, about 1 km south of the northernmost anomaly yields a well defined shoulder anomaly of about 10 nT that appears to be related to a magnetic source that is 150 m or less below surface and 400 to 500 m in diameter. Both of these anomalies warrant follow-up work. A third interesting anomaly was identified about 5 km to the southeast beneath a small lake. The magnetic anomaly yielded a sharp shallow sourced 7 nT peak with a diameter of about 250 m along line 40840. A lake sediment sample has been collected from the lake overlying the magnetic anomaly. This anomaly is part of a linear trend that is about 3 km in length and may or may not warrant further work.

Other areas of possible interest for further investigation for shallow sourced volcanics includes the area north of Clear Lake where several interesting looking weak magnetic anomalies are visible on the Pseudo Depth Slice 1 map, particularly in the western half of Twp's 101 and 102, Rg 13.

Azimuth Maps

The azimuth maps represent various magnetic maps shadowed in three different directions and then recombined. The maps picked by Mr. D. Triggs for shadowing included total field in reverse polarity, mag slice (Pseudo Depth Slice) 1 and mag slice (Pseudo Depth Slice) 2. The intent of these maps is to highlight various subtle structural features. The total field azimuth map shows a prominent ENE trending structure that originates in the west-central portion of Twp 101, Rg 13W4 and trends to the northeast corner of Twp 101, Rg 12W4. This is perhaps the most prominent structure on all three azimuth maps and is particularly prominent on Pseudo Depth Slice 2. It should be very interesting to see if this feature lines up with any other notable geological or geochemical anomalies on the Buckton property. Pseudo Depth Slice 1 tends to show a bit of a disruption in the structure where it intersects the basement magnetic high in the east-central portion of Twp 101, Rg 13W4. About 6 to 8 km to the south, another similar oriented but much more subtle ENE structure may exist. The only other feature of note on the total field azimuth map is the grainy relief in the northwest corner of Twp 101, Rg 13W4 and the southwest corner of Twp 102, Rg 13W4. These subtle total field anomalies yielded a couple of interesting high

frequency profile anomalies upon inspection. These anomalies were not looked at in detail but should be as they could be indicative of shallow volcanic intrusives such as kimberlites. In the search for kimberlites the major obstacle in the area of this magnetic survey is the extremely high magnetic relief coming from basement. I recommend having colored maps completed of the first vertical derivative and the second vertical derivative of the total magnetic field at 1:50,000 scale in order to better evaluate the data for shallow sourced magnetic anomalies that might result from near-surface intrusions into sediments. Other maps that should also be considered include calculated horizontal and vertical gradient maps as well as a shallow target enhancement map.

The azimuth mag slice maps are particularly interesting in trying to delineate structure. On both mag slice maps I see two moderately prominent and one ore two more subtle NW trending lineaments in the center of the map area. As well, at the south end of the map area on mag slice 2 is a fairly prominent WNW trending structure that trends through about the area that we drilled in the Pierre River area. One of the more striking features of the maps, particularly for mag slice 1, is the strong set of E-W trending lineaments. My first reaction to these lineaments was that they are line artifacts due to levelling. The geophysicist indicated strongly that he did not believe this to be the case. In fact we attempted to overly the flight lines on the map in order to prove or disprove a relationship to the line data but we could see no obvious correlation. Many of the lineaments do show subtle north or south deviations in an arc like manner. These features are obviously very high frequency shallow sourced features that are perhaps related to a regional tension gash set of structures? It would be interesting to see how the gas anomalies line up with these lineaments. It could also be that the geophysicist is pushing the limits of 400 m linespaced data a little hard and that these are in fact some levelling artifact.

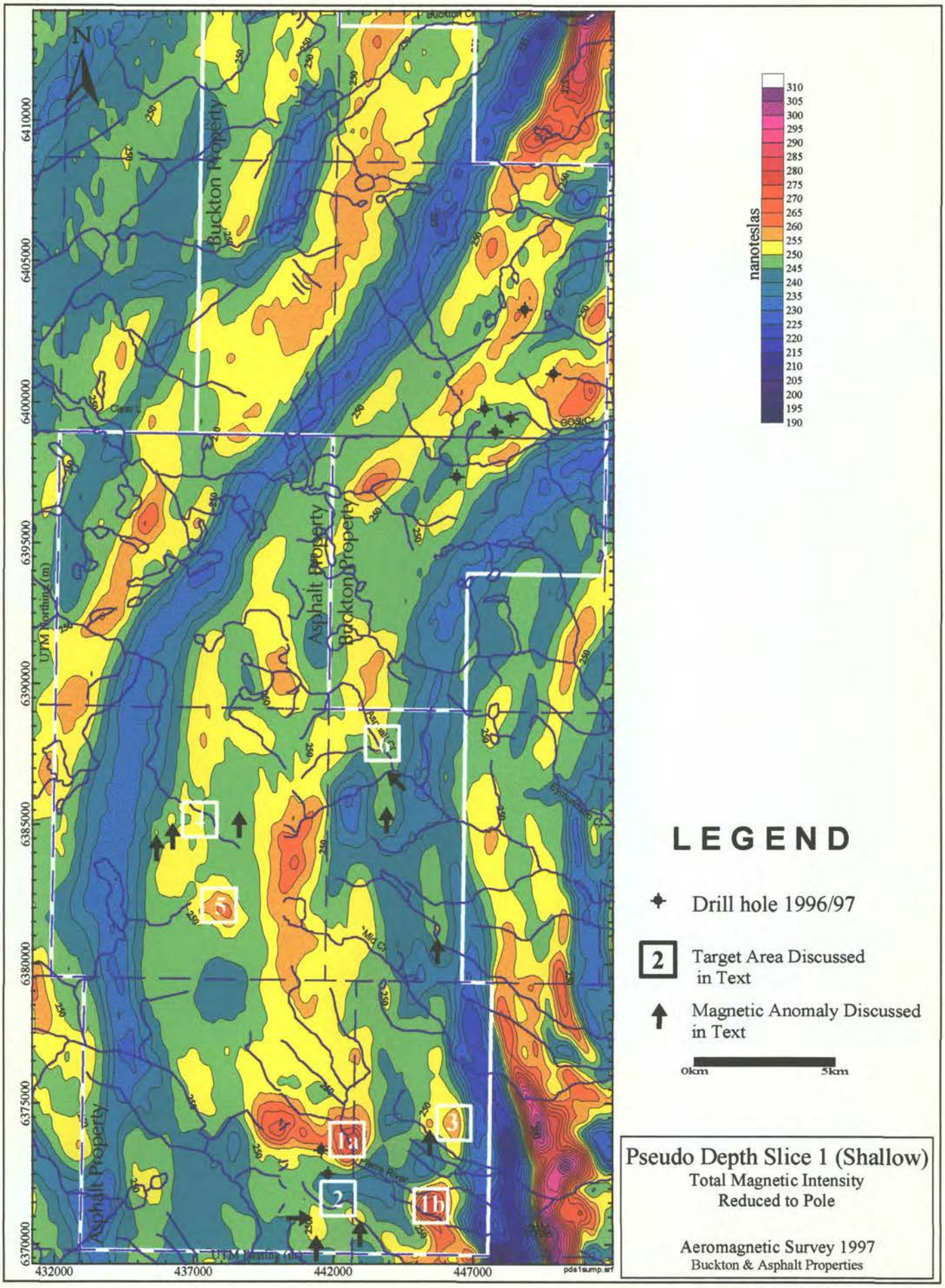
As in Birch's Athabasca data, I see very little evidence of paleochannel accumulation (placer) of magnetic minerals except on the mag slice 1 azimuth map where there appears to be a sinuous magnetic feature just north of Asphalt creek that roughly follows the drainage of Big Creek(?). I have pointed this out because in looking for kimberlites west of the Birch Mountains in places where there is significant input of clastic material being derived from the cordillera, magnetic anomalies are found in conjunction with paleochannel accumulations of magnetic minerals in Cretaceous sediments, preglacial near-surface tertiary sediments and in glacial sediments. These magnetic anomalies on wide-spaced magnetic surveys can and do yield a magnetic signature that can be very difficult to discern from possible intrusive related magnetic anomalies.

Recommendations

The work to date has only included a cursory review of the magnetic data in order to evaluate whether there is any potential for the existence of magnetic anomalies that could be indicative of near-surface volcanics related to kimberlitic or other local volcanic events. It is concluded that several of the magnetic anomalies reviewed could be indicative of near-surface intrusions or volcanics. Therefore a more detailed examination of the magnetic data is recommended along with follow-up ground work that could include one

or more of surface prospecting, ground geophysics and/or drill testing.

The first stage of follow-up work should consist of producing a set of three of four magnetic maps that are specifically designed to enhance shallow sourced high frequency magnetic anomalies including colored versions of the 1st and 2nd vertical derivative maps, vertical and horizontal gradient maps, and a shallow target enhancement map. These maps could be produced by World Geoscience Ltd, Spectra Exploration Geoscience Ltd. or GEDCO (Geophysical Exploration and Development Corp.). These maps should be produced with all known culture identified on the maps such as old well locations, camps, roads, bridges etc. Once these maps are produced, a number of possible anomalies of interest should be picked and then reviewed in detail using the total field magnetic profiles. Those anomalies that are deemed of interest should be ranked by modelling their depth below surface, diameter and strength. It is recommended that this be done by GEDCO at their office using their LCT Geophysical software that allows this type of modelling to be done in a cursory manor with the existing digital total field profiles. The estimated cost to conduct this more detailed evaluation, including producing the relevant maps, is about $20,000. This evaluation should be completed during march and April of 1998 in order to assist Tintina Mines Ltd. in determining its requirements for the 1998 field season.


N
Buckton Property
Asphalt Property
Buckton Property
Asphalt Property
UTM Northing (m)
6410000
6405000
6400000
6395000
6390000
6385000
6380000
6375000
6370000
432000
437000
442000
447000
1a
1b
2
3
5
nanoteslas
310
305
300
295
290
285
280
275
270
265
260
255
250
245
240
235
230
225
220
215
210
205
200
195
190
LEGEND
Drill hole 1996/97
2
Target Area Discussed in Text
Magnetic Anomaly Discussed in Text
0km
5km
Pseudo Depth Slice 1 (Shallow)
Total Magnetic Intensity
Reduced to Pole
Aeromagnetic Survey 1997
Buckton & Asphalt Properties

19990028

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Shahe Sabag
Tintina Mines Ltd.
Suite 218, 920 Yonge Street
Toronto, Ontario M4W 3C7
Fax: 416-929-2945
2 Pages including this cover page

Dear Shahe,

Re: Indicator Minerals Recovered To Date From Tintina Mines Ltd.'s Buckton and Asphalt Properties, Birch Mountains Area, Northeast Alberta

A total of five samples were collected during early 1997 from the amalgamation of several core intersections of the Second White Specks Shale from Tintina Mines Ltd.'s (Tintina's) Buckton and Asphalt properties in the Birch Mountains, northeast Alberta. The samples were amalgamated from those intersections where the shale is intercalated with a large number of bentonites. The Saskatchewan Research Council processed the five samples during the summer of 1997 with the resultant identification of large amounts of orange garnets, most of which were thought to be possible eclogitic garnets. The Second White Specks Shale is a black carbonaceous shale with little or no sediment of detrital clastic origin. The possible eclogitic garnets are most likely being derived from bentonites contained within the Second White Specks Formation based upon angular and fresh they look. A selection of about 2 to 5 garnets from each of the five samples that were collected were recently submitted for microprobe analysis. It should be noted that a couple of the samples yielded more than 50 possible light orange garnets of possible eclogitic origin. The microprobe analyses, which were conducted at the Department of Geology, University of Saskatchewan, indicate that most of the garnets sent for analysis are almandines with some possible G3 or G5 garnets (Dawson and Stephens 1976 garnet classification) of possible eclogitic origin.

The G3 and G5 garnets of possible eclogitic origin by themselves would likely not be considered significant in most sampling programs as almandine garnets of crustal origin are common in northern Alberta and could explain most of the grains analysed in this suite. However, one of the orange garnets that was picked from sample SRC-1, yielded chemistry consistent with a G1 high titanium (0.83 wt% TiO2), high magnesium (19.69 wt% MgO) pyropic garnet with significant chromium (2.30 wt% Cr2O3). Garnets of this chemistry typify the macrocryst-megacryst suite of orange pyrope garnets that are commonly found in kimberlites but very few other rock types. The recovery of this single grain from the highly bentonitic Second White Specks shale, which contains little or no detrital clastic material, indicates that it could be derived from an ash fall possibly derived from a local kimberlite breaching surface in an explosive manner. It should be noted that the accepted age for the Second White Specks Shale is very close to radiometric ages (of 86 to 88 Ma) reported for

some of the Buffalo Head Hills Kimberlites. The recovery of a possible G1 pyropic garnet indicates that further analyses should be conducted on other possible garnet grains from the five samples processed to date and any other samples that might be of interest. In particular, the concentrates from the five core samples should be looked at again with the intent to pick other possible garnets and possible oxide minerals that could be important. Any stream sediment concentrates collected during past gold and base metal exploration programs in the Birch Mountains should be processed and analysed for possible diamond indicator minerals. The recovery of the G1 pyropic garnet may also indicate that the low iron (<22 to 23 wt% FeO) G3 or G5 almandine garnets could be of eclogitic origin if they are derived from an ash possibly connected to the eruption of a kimberlite or of a related deeply derived alkaline volcanic rock of possible local origin. Several of the low iron garnets also yielded elevated concentrations of sodium and titanium, which is characteristic of those eclogitic garnets that have been recovered as inclusions in diamonds from around the world. Elevated sodium and titanium in garnets of possible eclogitic origin is therefore commonly used as an indication that the grains were derived from the diamond stability field. It should be noted that the use of titanium and sodium in possible eclogitic garnets is a bit controversial as there are many crustal almandines that yield favourable concentrations of sodium and titanium, but which have not been derived from the diamond stability field. These are very preliminary observations and should be treated with caution until the result is substantiated by the recovery and identification of other important indicator minerals in these five samples and/or other samples collected from past or future exploration programs.

If you should have any questions with respect to my observations and comments please feel free to call me at you convenience.

Best Regards,

Michael B. Dufresne, M.Sc., P.Geol.
09/09/98

Notes:

1 Graphs and tables from M.Dufresne
2 Analyses by T.Bonil, U of S (under Dufresne direction)
3 Garnets analyzed from Asphalt and Buckton Properties SRC suite picked in 1996 (see SRC_1.xls in Alta96)
4 See also email from Dufresne, Aug18/98
5 Dufresne requested to submit opinion memo Re: Titanian Pyrope (97-1 #14)

email text as follows:

Subj: Microprobe Results
Date: 98-08-18 11:36:42 EDT
From: Dufapex
To: Tintina

Shahe,

Attached are the microprobe results from T. Bonli at the U of S for the possible eclogitic garnets picked by the SRC. I have also included a couple of charts for comparative purposes. To summarize, I believe that several of the eclogitic garnets have very interesting chemistry, particularly those with less than about 22wt% FeO and high Na or Ti. One garnet from 97-1 is likely a macrocryst G1 or G2 pyropic garnet (the one with 2.3wt%Cr2O3 and 0.83wt%TiO2). This garnet is very significant in that G1/G2 macrocryst type garnets are really only known from kimberlites or related deep sourced mantle taping magmas. This suggests to me that one of the bentonites could be related to kimberlitic volcanism and that we should be conducting more indicator work on these cores and the concentrates. I regard these results as significant.

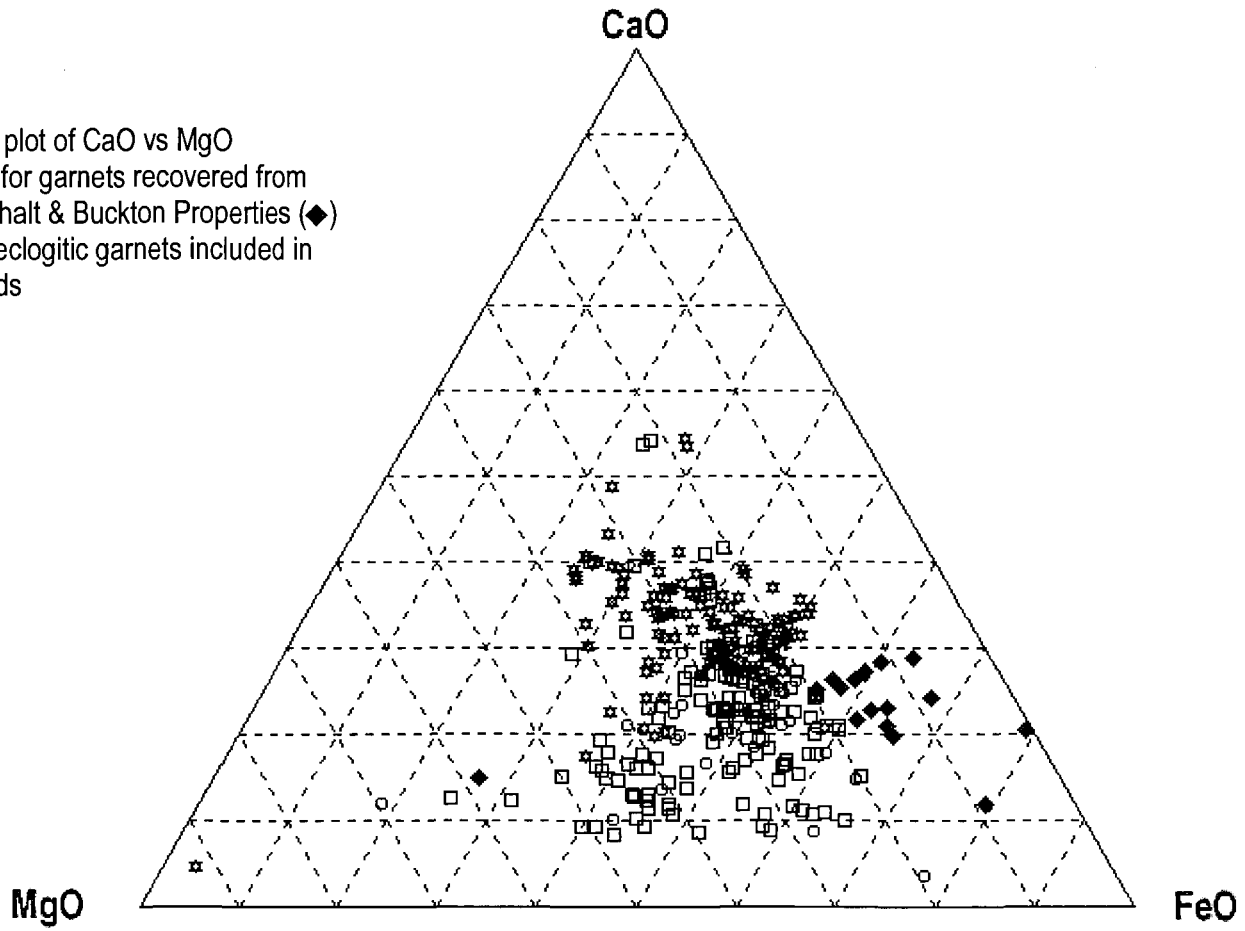
Mike

Asphalt and Buckton Properties **Tintina Mines Limited**

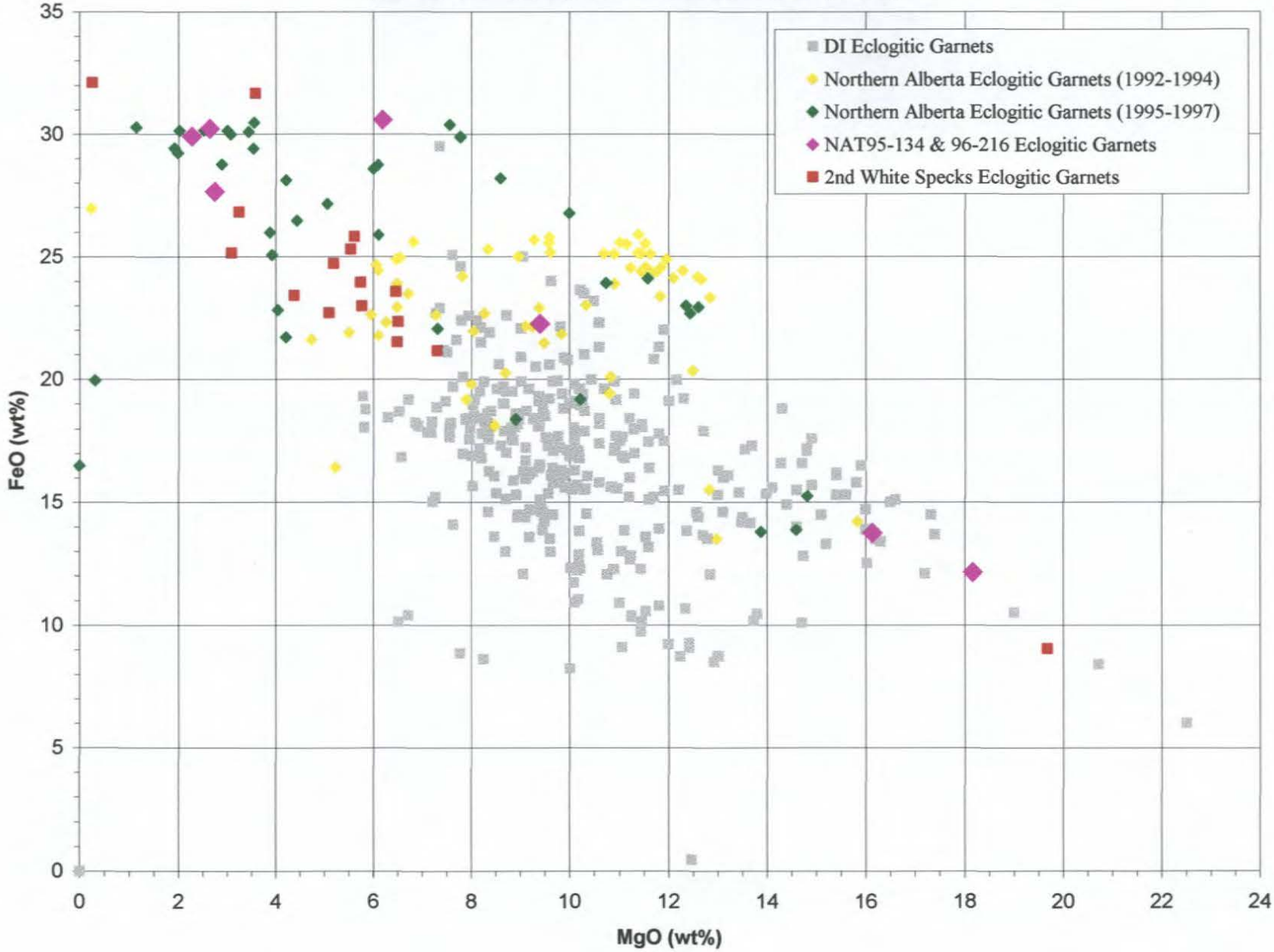
RESULTS OF ANALYSES FOR SRC PICKED GARNETS FROM 1997 DRILLING

Sample#	Pt#	Mineral (Min-id.asc)	SiO2	TiO2	Al2O3	Cr2O3	FeO	MgO	MnO	CaO	Na2O	K2O	Total	
SRC 97-2	1	G_05_MAGNESIAN_ALMANDINE	38.89	0.09	21.62	0.05	25.81	5.62	0.43	7.76	0.13	0.00	100.39	
SRC 97-2	2	G_03_CALCIC_PYROPE_ALMANDINE	38.13	0.05	22.33	0.01	22.98	5.77	0.66	10.26	0.02	0.00	100.20	
SRC 97-3	3	G_03_CALCIC_PYROPE_ALMANDINE	39.22	0.03	22.85	0.00	21.50	6.50	0.57	9.95	0.00	0.00	100.63	
SRC 97-3	4	G_05_MAGNESIAN_ALMANDINE	38.87	0.05	22.14	0.00	24.72	5.20	0.81	8.90	0.03	0.00	100.71	
SRC 97-4	5	G_05_MAGNESIAN_ALMANDINE	38.03	0.06	21.30	0.05	23.41	4.38	0.95	10.98	0.01	0.00	99.16	
SRC 97-4	6	G_03_CALCIC_PYROPE_ALMANDINE	39.26	0.21	22.15	0.00	23.57	6.48	0.75	8.30	0.06	0.00	100.78	
SRC 97-4	7	ALMANDINE	38.69	0.10	21.86	0.00	31.66	3.58	1.01	4.77	0.05	0.00	101.71	
SRC 97-4	8	G_03_CALCIC_PYROPE_ALMANDINE	39.67	0.14	22.87	0.00	21.16	7.32	0.45	9.51	0.07	0.00	101.19	
SRC 97-5	9	G_05_MAGNESIAN_ALMANDINE	39.20	0.06	22.12	0.02	23.95	5.75	0.55	8.72	0.07	0.00	100.43	
SRC 97-5	10	G_05_MAGNESIAN_ALMANDINE	37.69	0.10	21.32	0.02	25.14	3.09	0.84	11.38	0.04	0.00	99.61	
SRC 97-5	11	G_05_MAGNESIAN_ALMANDINE	37.70	0.09	21.59	0.04	26.81	3.25	0.67	9.55	0.03	0.00	99.73	
SRC 97-5	12	ALMANDINE	37.32	0.12	21.14	0.00	32.10	0.26	1.51	8.35	0.00	0.00	100.81	
SRC 97-1	13	G_03_CALCIC_PYROPE_ALMANDINE	38.64	0.06	21.87	0.04	22.34	6.52	0.60	9.74	0.00	0.00	99.80	
SRC 97-1	14	G_01_TITANIAN_PYROPE	42.32	0.83	20.90	2.30	9.04	19.69	0.27	5.00	0.07	0.00	100.41	**
SRC 97-1	15	G_03_CALCIC_PYROPE_ALMANDINE	39.11	0.09	22.68	0.00	22.71	5.10	0.65	10.43	0.00	0.00	100.77	
SRC 97-1	16	G_05_MAGNESIAN_ALMANDINE	39.09	0.02	22.49	0.03	25.30	5.55	0.54	8.20	0.00	0.00	101.21	
SPI pyrope	std	G_09_CHROME_PYROPE	42.45	0.00	20.69	4.86	7.24	19.28	0.42	5.55	0.03	0.00	100.53	

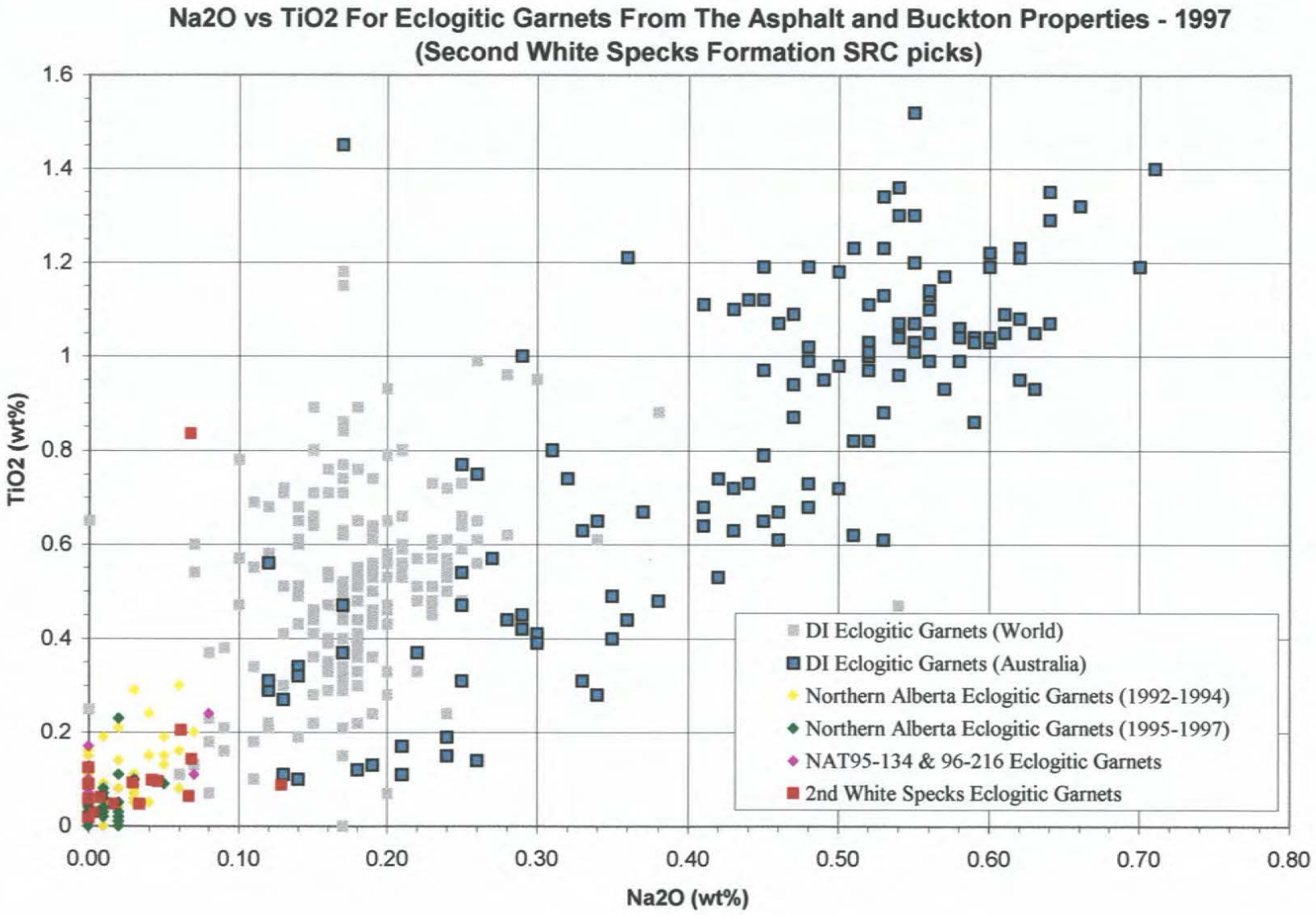
Ternary plot of CaO vs MgO vs FeO for garnets recovered from the Asphalt & Buckton Properties (◆) versus eclogitic garnets included in diamonds



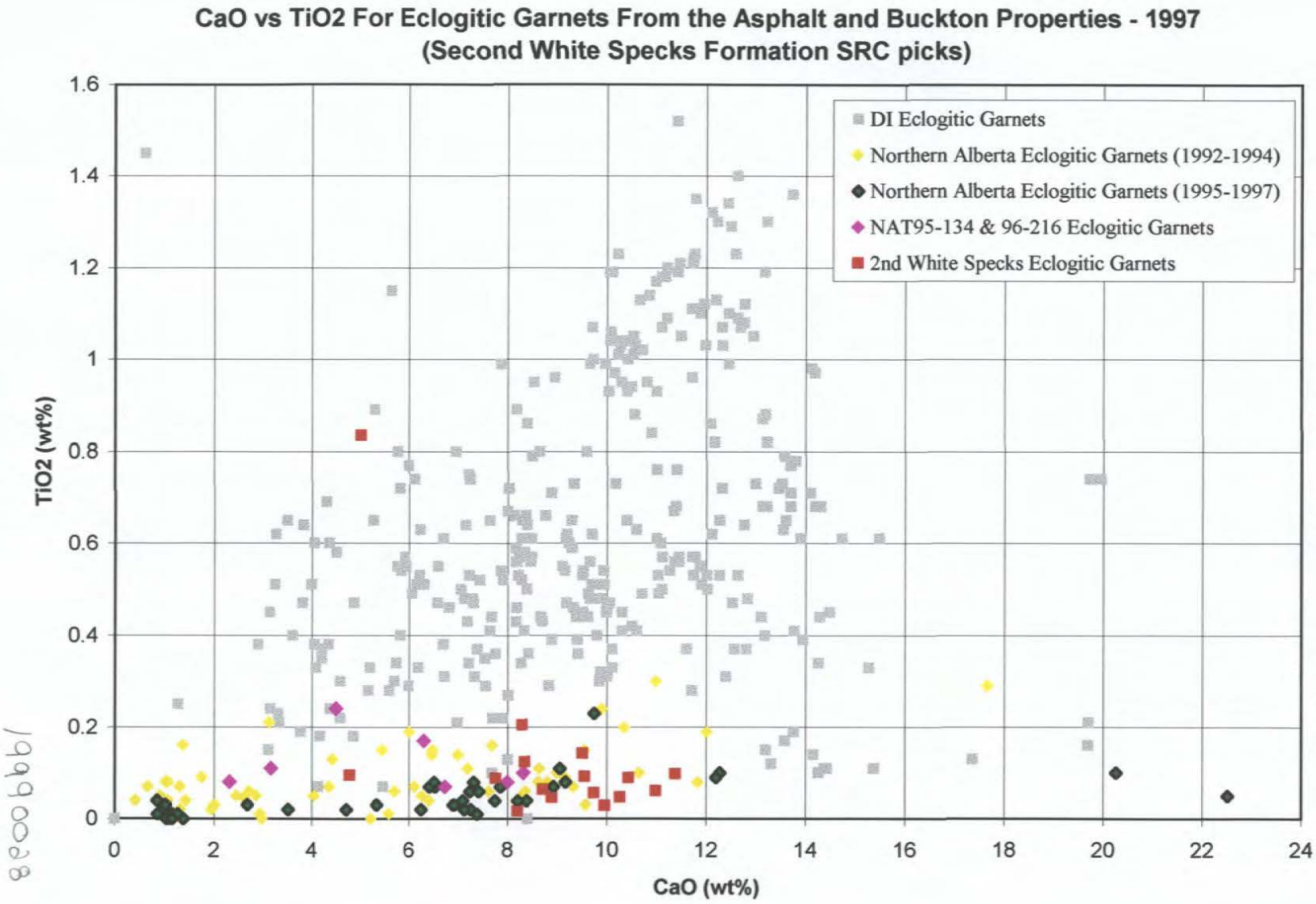
MgO vs FeO For Eclogitic Garnets From The Asphalt and Buckton Properties - 1997
(Second White Specks Formation SRC picks)



82006628


Na2O vs TiO2 For Eclogitic Garnets From The Asphalt and Buckton Properties - 1997
(Second White Specks Formation SRC picks)
TiO2 (wt%)
Na2O (wt%)
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
DI Eclogitic Garnets (World)
DI Eclogitic Garnets (Australia)
Northern Alberta Eclogitic Garnets (1992-1994)
Northern Alberta Eclogitic Garnets (1995-1997)
NAT95-134 & 96-216 Eclogitic Garnets
2nd White Specks Eclogitic Garnets

8600628


CaO vs TiO2 For Eclogitic Garnets From the Asphalt and Buckton Properties - 1997
(Second White Specks Formation SRC picks)
DI Eclogitic Garnets
Northern Alberta Eclogitic Garnets (1992-1994)
Northern Alberta Eclogitic Garnets (1995-1997)
NAT95-134 & 96-216 Eclogitic Garnets
2nd White Specks Eclogitic Garnets
TiO2 (wt%)
CaO (wt%)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
0
2
4
6
8
10
12
14
16
18
20
22
24

8200999

November 5, 1998

Progress Report For Fieldwork Conducted September 17 to 20, 1998

At Tintina Mines Ltd.'s Asphalt Property, Northeast Alberta

Fieldwork

During the period September 17 to September 20, 1998, APEX Geoscience Ltd. conducted 5 man-days of helicopter supported fieldwork at the Asphalt Property in Northeast Alberta. The fieldwork consisted of checking selected geophysical anomalies that could be prospective for kimberlite or related intrusions and collecting heavy mineral concentrate (HMC) samples proximal to the prospective geophysical anomalies. The anomalies that were the focus of the work are all contained within the southern half of Township 98 and Ranges 12 and 13.

A total of 9 HMC samples (Table 1) were collected from the Pierre River, the Calumet River and tributaries to each of these two rivers (Figure 1). Samples 8CBH001 to 8CBH005 were collected from the headwaters of the Calumet River and a tributary to the Calumet River in order to test two high frequency geophysical anomalies at target 2. The tributary forms a distinct semi-circle that flows around a distinct hill to the south which is underlain by the eastern magnetic anomaly. The area has been partially burned about 12 to 15 years ago, but the new and old vegetation combine to form a combined vegetation and topographic anomaly that is partially coincident with the eastern magnetic anomaly. The material in the tributary creek was dominantly comprised of some glacial debris but also a significant amount of local shale bedrock. The tributary contained only a small amount of water but the water was very clear and very cold. It is likely that the creek is being fed by spring water that could be run-off from permafrosted ground.

Three HMC samples (8CBH006, 8CBH008 and 8CBH009) were collected from the Pierre River at a spacing of about 400 m between samples approximately 1 km down river from Target 1a but upstream of Target 1b. All three samples contained a large amount of shale chips in both the material that was screened off and the material that made it through the screens. Evidence of the Second White Specks and/or Fish Scale bone beds was observed in the river.

A single HMC sample (8CBH007) was collected from a tributary to the Pierre River approximately 1.5 km downstream from Target 3. A large amount of shaley material was observed at this sample site.

All nine samples are presently sitting in storage at APEX Geoscience Ltd. awaiting instructions for sample processing.

Other Developments

Since the sampling program was completed, Kennecott Canada Exploration Ltd. in a joint venture with Montello Resources Ltd. and Everest Mines & Minerals Ltd. has intersected three kimberlites in the Birch Mountains. The easternmost kimberlite of the three intersected to date is in Township 97, near the western border of Range 19 approximately

50 km west of the Asphalt property. All three kimberlites were intersected at a depth between 100 to 120 m below surface. It is not known whether the pipes are overlain by overburden or by Cretaceous bedrock. Based upon a couple of photos on Montello's web page there looks to be evidence of more than 40 feet of hard bleached bedrock above at least one of the kimberlites. The hardened and bleached bedrock is either silicified or carbonatized kimberlite or country rock such as shale. This type of alteration has been noted in a couple of the Ashton pipes as well. An age of about 82 to 84 Ma has been reported for one of the Kennecott kimberlites. This age corresponds to the base of the Lea Park grey shale immediately above the unconformity on top of the Second White Specks black shale at the Asphalt Property. The kimberlites intersected to date are rumoured to be olivine rich and diamond indicator poor. It is unclear what this might mean other than the indicator trains derived from these pipes may be minimal. It is well known that the Ashton pipes are extremely complex and display wide varieties in textures, modal mineralogy and xenolith abundance and content from pipe to pipe and even from facies to facies within a single pipe. Many of the Ashton pipes are highly contaminated hybrid volcanic rocks with abundant shale incorporated into the kimberlites. The discovery of these pipes in conjunction with the numerous discontinuous ash horizons seen in the Asphalt and Buckton Property drill cores as well as potential diamond indicator minerals is highly suggestive that kimberlite pipes or related intrusions could exist on the Buckton and/or Asphalt properties.

A large number of possible picroilmenites, chromites and, to a lesser degree, olivines and chrome diopsides have been selected for follow-up identification by Maureen Morrison from archive samples. The abundance of potential picroilmenites at both Buckton and the Asphalt properties could be highly suggestive of nearby local intrusions. Several kimberlite clusters in South Africa and even the NWT have been found by the recovery of picroilmenite with little or no pyrope garnets. Some pipes do not yield a large population of traditional indicator minerals or they tend to be intensely altered and therefore do not survive any transport distance. The fact that a couple of the Ashton pipes and one of the Kennecott pipes possibly display deep silcrete type weathering profiles suggests the kimberlites were exposed for some period (likely between the period from the top of the Second White Specks to the base of the Lea Park Formation). Therefore many of the traditional indicator minerals could easily have been destroyed. Another point to consider is that if the samples were at all panned down in the field, many of the silicate indicator minerals such as chrome diopside and pyrope garnets could easily have been lost out of the pan. Currently, it is our general practice when collecting samples specifically for diamond indicator minerals that we do not conduct any on site uncontrolled panning. All of our samples are simply sieved and bagged. During much of our early sampling in Northern Alberta where panning was conducted for gold and base metal heavies, the pan fraction was often concentrated down till garnets were visible in the pan. I suspect that this methodology could easily have resulted in the loss of the fine-grained light silicate fractions where many of the desired pyropes or chrome diopsides could exist.

Recommendations

All of the potential diamond indicator minerals picked to date should be microprobed, particularly the possible picroilmenites, chromites, chrome diopsides and olivines. The five

samples collected from the drill core and processed by the SRC for diamond indicator minerals should be further picked with further microprobe analyses. Any possible phlogopite present in these samples should microprobed. The nine samples collected this fall should be processed and picked as soon as possible.

A suite of interesting bentonites in the drill core was collected for possible REE work. It is highly likely the AGS would be very interested geochemical work on these samples including REE analysis. They would be willing to conduct this work at no charge to the Tintina Mines Ltd. Although this work may not directly lead to the discovery of a kimberlite it should be conducted as it might provide us with some conclusive evidence that some of these ashes are derived from local kimberlitic volcanism.

Locations For 1998 HMC Samples From The Asphalt Property, Northeast Alberta
Tintina Mines Ltd.

Sample #	GPS Northing	GPS Easting	Measured Northing	Measured Easting
8CBH001	6371470	442170	6371460	442230
8CBH002	6371400	442615	6371410	442620
8CBH003	6370525	443225	6370510	443230
8CBH004	6370730	442810	6370780	442850
8CBH005	6369325	442260	6369290	442320
8CBH006	6372300	443775	6372275	443780
8CBH007	6373210	446320	6373100	446340
8CBH008	6372630	443120	6372610	443190
8CBH009	6372490	443425	6372450	443510

APEX Geoscience Ltd.

OCT 0 1 1998

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Suite 200, 365 Bay Street
Toronto, ON - M5H 2V1
Bus. 416-366-3781 • Fax 416-366-3671
apexto@istar.ca

To: Shahe Sabag

From: 416 929 2945

CC: 2 Pages

Fax: Mike Bwrzeno

Date: Sept 30/98

Re: Sample locations

Shahe

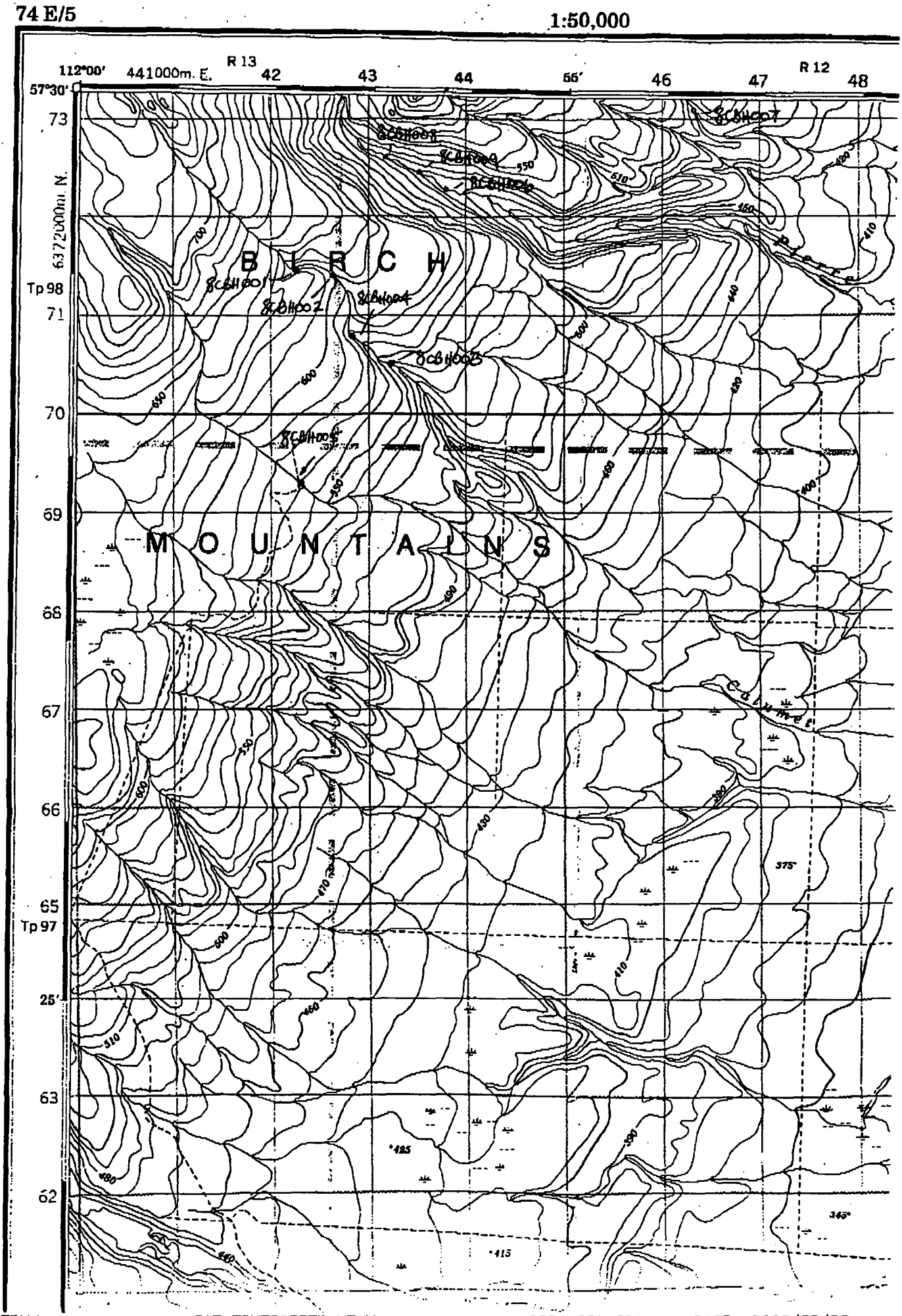
Attached are locations for samples

8CBH001 to 8CBH009

Mike

Number of Pages 2 (including cover sheet)
If you do not receive all pages, please call (403) 439-5380

10/01/1998 08:37 403-433-1336 APEX GEOSCIENCE LTD PAGE 01


74 E/5
1:50,000
112°00'
441000m. E.
R 13
42
43
44
55'
46
47
R 12
48
57°30'
73
6372000m. N.
Tp 98
71
70
69
68
67
66
65
Tp 97
25'
63
62
B L R C H
M O U N T A I N S
8CBH001
8CBH002
8CBH004
8CBH005
8CBH006
8CBH007
8CBH008
8CBH009
8CBH010
8CBH011
8CBH012

I. & M. MORRISON GEOLOGICAL SERVICES

11109 Prospect Drive, Delta, B. C. V4E 2R4
Ph. (604) 590-2153 Fax. (604) 590-2731
Email: pyropes@aol.com

October 8, 1998

Shahe Sabag
Vice President
Tintina Mines Limited
Suite 218 - 920 Yonge Street
Toronto, Ontario M4W 3C7

Dear Shahe,

Re: Tintina Lot# NW240798

Examination of the 29 heavy mineral concentrates submitted for microscopic analysis is complete and the results of our findings are tabulated in the attached sample record.

These findings are based on the visual examination of the samples using a binocular microscope. Samples are examined for pyrope garnets, eclogitic garnets, ilmenites, chromites, chrome diopside, zircons, kyanite, corundum and olivine. All grains picked from a sample are placed in 1/2 dram glass vials and the results are recorded. These picked grains are then examined by myself to further narrow down the number of potential indicators

A number of potential kimberlitic or lamproitic indicator minerals were picked from these samples, specifically ilmenite, chromite, chrome diopside, kyanite and olivine. Based on their appearance some of the ilmenites may be crustal in origin. As it is often difficult to distinguish between ilmenites and chromites visually, I would recommend that all the picked grains be sent for microprobe analysis to obtain a positive identification of the minerals and to determine their chemistry.

The accompanying sample records may need some explanation:

1. The numbers in the columns labelled S/PYR, S/ECL, etc, are the grains that I have selected as potential indicators from all the grains picked.

2. Columns labelled NS 1 (g) & NS 2 (g) list the gram weights for different portions of the sample. NS 1 is Normal Scan 1, where all potential indicators are picked out.. If there are a large number of oxides picked, the NS1 portion is put aside and weighed. Another portion, or possibly the rest of the sample, is then examined on Normal Scan 2 without picking any more oxides. This portion is also weighed. If a portion of the sample is not examined, that weight will be listed in the ND column. Each of these three portions is kept separate from the others. The total weight is also recorded. Please note: The results have not been normalised.

3. The columns labelled P/PYR, P/ECL are currently blank. You might want to use those to indicate how many grains from each sample you would like us to prepare for microprobe analysis. If we had already prepared a number of grains for analysis, the number and type of grain would be reported to you in those columns.

The unprocessed fractions from P049MM025 were examined briefly but not picked. The two coarse fractions could be examined as is but the light fraction should be screened before examination. This particular sample is not very large and we would probably examine the entire light fraction.

We will await further instructions from you regarding these samples. Please call if there are any questions or concerns.

Thank you for using I. & M. Morrison Geological Services Ltd. for this work. We look forward to working with you again.

Sincerely,
I. & M. MORRISON GEOLOGICAL SERVICES LTD.

[redacted]

Maureen Morrison, P.Geo

SAMPLE	SIZE	S/PYR	S/ECL	S/ILM	S/CHR	S/CD	S/ZR	S/KY	S.COR	S/OL	S/COMMENTS	NS 1 (g)	NS 2 (g)	ND (g)	MAG (g)	TOTAL (g)	PICK BATCH #	PROBE BATCH #	P/PY	P/EC	P/ILM	P/CH	P/CD	P/ZR	P/KY	P/CO	P/OL	P/OT	P/SU
P076EC020	-18+60	0	0	0	0	0	0	0	0	0	magnetite	<0.1				<0.1	98 TNT 02												
P076EC020	-60	0	0	0	0	0	0	0	0	0		0.5		0.4		0.9	98 TNT 02												
P076EC023	-18+60	0	0	7	1	0	0	0	0	0		0.2				0.2	98 TNT 02												
P076EC023	-60	0	0	9	1	0	0	0	0	0	sulphide noted	0.3				0.3	98 TNT 02												
P032EC029	-18+60	0	0	7	0	0	0	0	0	0		0.2				0.2	98 TNT 02												
P032EC029	-60	0	0	5	0	0	0	3	0	0		1.2				1.2	98 TNT 02												
P032EC031	-18+60	0	0	5	0	0	0	0	0	0	sulphide noted	0.9				0.9	98 TNT 02												
P032EC031	-60	0	0	4	0	0	1	0	0	0	sulphide noted	0.5				0.5	98 TNT 02												
P048DH003	-18+60	0	0	0	1	0	0	0	0	2	sulphide: ~98%	0.3				0.3	98 TNT 02												
P048DH003	-60	0	0	0	1	0	0	1	0	10		0.6				0.6	98 TNT 02												
C040WK022	-18+60	0	0	27	0	0	0	0	0	0		0.4				0.4	98 TNT 02												
C040WK022	-60	0	0	24	0	0	0	0	0	0	ILM: possibly more	1.5				1.5	98 TNT 02												
C064MM016	-18+60	0	0	11	0	0	0	4	0	0		0.1				0.1	98 TNT 02												
C064MM016	-60	0	0	8	0	0	0	8	0	0		0.8				0.8	98 TNT 02												
P041MM026	-18+60	0	0	1	0	0	0	0	0	0	sulphide: 90%	0.2				0.2	98 TNT 02												
P041MM026	-60	0	0	12	0	0	2	0	0	0	sulphide: 50%	1.2	2.2			3.4	98 TNT 02												
P041MM028	-18+60	0	0	12	0	0	0	0	0	0	sulphide: ~98%	0.1				0.1	98 TNT 02												
P041MM028	-60	0	0	2	0	0	0	1	0	2		1.5				1.5	98 TNT 02												
P049MM025	-18+60	0	0	6	0	0	1	0	0	0		0.3				0.3	98 TNT 02												
P049MM025	-60	0	0	20	0	0	0	0	0	0		0.7				0.7	98 TNT 02												
P076JG002	-18+60	0	0	14	0	0	0	2	0	0		0.6				0.6	98 TNT 02												
P076JG002	-60	0	0	13	0	0	0	1	0	0		0.8				0.8	98 TNT 02												
P076JG003	-18+60	0	0	15	2	0	0	0	0	0	sulphide: 10%	0.5				0.5	98 TNT 02												
P076JG003	-60	0	0	27	1	0	1	0	0	0		2.0				2.0	98 TNT 02												
P070JG006	-18+60	0	0	14	0	0	0	0	0	1		0.2				0.2	98 TNT 02												
P070JG006	-60	0	0	8	2	0	0	3	1	0		0.5				0.5	98 TNT 02												
P048AT060	-18+60	0	0	2	0	0	0	0	0	0	sulphide: 90%	0.9				0.9	98 TNT 02												
P048AT060	-60	0	0	2	0	0	0	0	0	0		0.8				0.8	98 TNT 02												
P048AT063	-18+60	0	0	5	0	0	0	0	0	0		0.9				0.9	98 TNT 02												
P048AT063	-60	0	0	0	0	0	1	0	0	0		2.7				2.7	98 TNT 02												
P064EC025	-18+60	0	0	27	2	0	0	0	0	0		0.2				0.2	98 TNT 02												
P064EC025	-60	0	0	50	4	0	4	0	0	0	ILM: +	1.1	1.2			2.3	98 TNT 02												
P064EC026	-18+60	0	0	16	0	0	0	0	0	0		0.1				0.1	98 TNT 02												
P064EC026	-60	0	0	10	0	0	0	1	0	0		2.0				2.0	98 TNT 02												
P064EC027	-18+60	0	0	25	0	0	0	0	0	0		0.3				0.3	98 TNT 02												
P064EC027	-60	0	0	20	3	0	5	0	0	0		1.2				1.2	98 TNT 02												
P064EC028	-18+60	0	0	22	5	0	0	2	0	0		0.6				0.6	98 TNT 02												

SAMPLE	SIZE	S/PYR	S/ECL	S/ILM	S/CHR	S/CD	S/ZR	S/KY	S.COR	S/OL	S/COMMENTS	NS 1 (g)	NS 2 (g)	ND (g)	MAG (g)	TOTAL (g)	PICK BATCH #	PROBE BATCH #	P/PY	P/EC	P/ILM	P/CH	P/CD	P/ZR	P/KY	P/CO	P/OL	P/OT	P/SU
P064EC028	-60	0	0	6	1	0	0	0	0	0		1.0				1.0	98 TNT 02												
C064MM009	-18+60	0	0	9	0	0	0	0	0	0		0.2				0.2	98 TNT 02												
C064MM009	-60	0	0	20	0	0	1	0	0	0		1.7				1.7	98 TNT 02												
C064MM012	-18+60	0	0	4	0	0	0	0	0	0		<0.1				<0.1	98 TNT 02												
C064MM012	-60	0	0	4	0	0	1	0	0	0		0.4				0.4	98 TNT 02												
C064MM019	-18+60	0	0	13	1	0	0	0	0	0		0.1				0.1	98 TNT 02												
C064MM019	-60	0	0	24	2	0	4	0	0	0		1.1				1.1	98 TNT 02												

SAMPLE	FRACTION	SIZE	S/PYR	S/ECL	S/ILM	S/CHR	S/CD	S/ZR	S/KY	S.COR	S/OL	S/COMMENTS	NS 1	NS 2	ND (g)	MAG (g)	TOTAL (g)	PICK BATCH #	PROBE BATCH #	P/PYR	P/ECL	P/ILM	P/CHR	P/CD	P/ZR	P/KY	P/COR	P/OL	P/OTH	P/SUR
5062	Batea Con	-18+60	0	0	4	0	0	0	0	0	0		1.3				1.3	98 TNT 03												
5062	Batea Light	-18										NOT EXAMINED						98 TNT 03												
5062	Mag	-18										NOT EXAMINED						98 TNT 03												
5088	Batea Con	-18+60	0	0	5	0	0	0	0	0	0	sulphide: 12	1.9				1.9	98 TNT 03												
5088	Batea Light	-18+60	0	0	8	0	0	0	0	0	0	sulphide: 19+	7.6	21.3	41.4		70.3	98 TNT 03												
5088	Batea Point	-18	0	0	0	0	0	0	0	0	0							98 TNT 03												
5088	Mag	-18										NOT EXAMINED						98 TNT 03												
5089	Batea Con	-18+60	0	0	7	0	0	1	0	0	0	sulphide: 50+	0.9				0.9	98 TNT 03												
5089	Batea Light	-18+60	0	0	7	0	1	0	0	0	0	sulphide: 30+	15.6	19.2			34.8	98 TNT 03												
5089	Batea Point	-18	0	0	0	0	0	0	0	0	0							98 TNT 03												
5089	Mag	-18										NOT EXAMINED						98 TNT 03												
9040	Batea Con	-18+60	0	0	18	2	0	0	0	0	0	sulphide: 1, ~1%	0.9				0.9	98 TNT 03												
9040	Batea Light	-18+60	0	0	42	2	0	0	0	0	0		1.5	6.8	18.2		28.5	98 TNT 03												
9040	Batea Point	-18	0	0	0	0	0	0	0	0	0							98 TNT 03												
9040	Mag	-18										NOT EXAMINED						98 TNT 03												
MM3	Batea Con	<250 MICRON										NOT EXAMINED						98 TNT 03												
MM3	Batea Light											NOT EXAMINED						98 TNT 03												
MM3	Mag	<250 MICRON										NOT EXAMINED						98 TNT 03												
MM3	Table Heavies	+18										NOT EXAMINED						98 TNT 03												
MM3	Table Heavies	-18+60										NOT EXAMINED						98 TNT 03												
P049MM025	HMC	+18										NOT EXAMINED						98 TNT 03												
P049MM025	HMC	-18+60										NOT EXAMINED						98 TNT 03												
P049MM025	CONC	WET										NOT EXAMINED						98 TNT 03												
P049MM025	Batea Point											NOT EXAMINED						98 TNT 03												
P049MM025		+18										NOT EXAMINED						98 TNT 03												
P049MM025		+10										NOT EXAMINED						98 TNT 03												
E5AT028	Batea Con	-18+60	0	0	0	0	0	0	0	0	0	sulphide: 6	2.8				2.8	98 TNT 03												
E5AT028	Batea Point	-18										NOT EXAMINED						98 TNT 03												
E5AT028	Batea Tail	-18+60										NOT EXAMINED						98 TNT 03												

C 4.2

I. & M. MORRISON GEOLOGICAL SERVICES

11109 Prospect Drive, Delta, B. C. V4E 2R4
Ph. (604) 590-2153 Fax. (604) 590-2731
Email: pyropes@aol.com

May 25, 1999

Shahe Sabag
Vice President
Tintina Mines Limited
Suite 218 - 920 Yonge Street
Toronto, Ontario M4W 3C7

Dear Shahe,

Re: Tintina Lot# NW240798 & Lot# ASP101198

Examination of the heavy mineral concentrates submitted for microscopic analysis is complete and the results of our findings are tabulated in the enclosed sample record. A disk with the Tintina Masterfile is enclosed as well. Please refer to the tabs on this file that are labelled 99TNT04 FINAL MAY 25-99 and 99TNT05 FINAL MAY25-99. These results are duplicates of those sent to you in January with the exception that the number of grains sent to Bob Barnett for microprobe analysis are now included in the columns on the right (ie P/PYR, P/ECL, etc) A detailed list that shows the grain numbers that I have assigned to each grain sent for analysis is also enclosed for reference.

These findings are based on the visual examination of the samples using a binocular microscope. Samples are examined for pyrope garnets, eclogitic garnets, ilmenites, chromites, chrome diopside, zircons, kyanite, corundum and olivine. All grains picked from a sample are placed in 1/2 dram glass vials and the results are recorded. These picked grains are then examined by myself to further narrow down the number of potential indicators

A number of potential kimberlitic or lamproitic indicator minerals were picked from these samples, specifically ilmenite, chromite, chrome diopside, kyanite and olivine. Based on their appearance some of the ilmenites may be crustal in origin. As it is often difficult to distinguish between ilmenites and chromites visually, I would recommend that all the picked grains be sent for microprobe analysis to obtain a positive identification of the minerals and to determine their chemistry.

The accompanying sample records may need some explanation:

1. The numbers in the columns labelled S/PYR, S/ECL, etc, are the grains that I have selected as potential indicators from all the grains picked.

2. Columns labelled NS 1 (g) & NS 2 (g) list the gram weights for different portions of the sample. NS 1 is Normal Scan 1, where all potential indicators are picked out.. If there are a large number of oxides picked, the NS1 portion is put aside and weighed. Another portion, or possibly the rest of the sample, is then examined on Normal Scan 2 without picking any more oxides. This portion is also weighed. If a portion of the sample is not examined, that weight will be listed in the ND column. Each of these three portions is kept separate from the others. The total weight is also recorded. Please note: The results have not been normalised.

3. The numbers in the columns labelled P/PYR, P/ECL ,etc. are the grains that have been sent to Bob Barnett for analysis.

These heavy mineral concentrates and picked grains are currently being stored in our warehouse. Unless instructed otherwise, we will store them until the end of December 1999, at which time we will contact you for further instructions. We can store them for an extended period for a nominal fee.

Thank you for using I. & M. Morrison Geological Services Ltd. for this work. We look forward to working with you again.

Sincerely,
I. & M. MORRISON GEOLOGICAL SERVICES LTD.

[redacted]

Maureen Morrison, P.Geo

encl.

cc Mike Dufresne, Apex Geoscience

SAMPLE	FRACTION	SIZE mm	S/PYR	S/ECL	S/ILM	S/CHR	S/CD	S/ZR	S/KY	S/CO	S/OL	S/COMMENTS	NS 1	NS 2	ND (g)	MAG (g)	TOTAL (g)	PROJ	PICK BATCH #	PROBE BATCH #	P/PYR	P/ECL	P/ILM	P/CHR	P/CD	P/ZR	P/KYP/COR	P/OL	P/OTH	P/SUM
SRC97-1	HEAVIES	-0.25	0	0	8	33	0	25	0	0	5	ILM: 1 lost; CHR: 1 lost; C	1.2	0.9				NW101198	98 TNT 04	352 TNT'01			7	32		6			5		50
SRC97-1	HEAVIES	+0.25	0	0	0	0	0	2	0	0	0	sulphide: 50%	0.6					NW101198	98 TNT 04											
SRC97-1	M-CON	-0.25	0	0	0	0	0	0	0	0	0	sulphide: M-CON minerals too small to pick	<0.1					NW101198	98 TNT 04											
SRC97-2	HEAVIES	-0.25	0	0	1	16	0	7	0	0	0	CHR: 4 lost; sulphide: 50%	1.7					NW101198	98 TNT 04	352 TNT'01			1	12						13
SRC97-2	HEAVIES	+0.25	0	0	0	0	0	0	0	0	0	sulphide: 75%+	2.9					NW101198	98 TNT 04											
SRC97-2	M-CON	-0.25	0	0	0	0	0	0	0	0	0	sulph: 99%; M-CON mins. too small to pick	<0.1					NW101198	98 TNT 04											
SRC97-3	HEAVIES	-0.25	0	0	4	19	0	0	0	0	5	CHR: 3 lost; sulphide: 50%	0.5					NW101198	98 TNT 04	352 TNT'01			4	16				4		24
SRC97-3	HEAVIES	+0.25	0	0	0	0	0	0	0	0	0	sulphide: 75%+	1.4					NW101198	98 TNT 04											
SRC97-3	M-CON	-0.25	0	0	0	0	0	0	0	0	0	sulph: 99%+; M-CON mins. too small to pick	<0.1					NW101198	98 TNT 04											
SRC97-4	HEAVIES	-0.25	0	0	8	11	0	25	0	0	0	ZR: +; sulphide: 25+	4.7					NW101198	98 TNT 04	352 TNT'01			8	11		5				24
SRC97-4	HEAVIES	+0.25	0	0	0	0	0	4	0	0	10	OL: 7; sulphide: 7	5.8					NW101198	98 TNT 04	352 TNT'01						3		10		13
SRC97-4	M-CON	-0.25	0	0	0	0	0	0	0	0	0	M-CON minerals too small to pick	<0.1					NW101198	98 TNT 04											
SRC97-5	HEAVIES	-0.25	0	0	14	38	0	25	0	0	2	ILM: 1 lost; CHR: 1 lost; ZR: +; sulphide: 50%+	1.4	2.7				NW101198	98 TNT 04	352 TNT'01			13	37				2		52
SRC97-5	HEAVIES	+0.25	0	0	0	0	0	1	0	0	0	]	1.5					NW101198	98 TNT 04	352 TNT'01						1				1
SRC97-5	M-CON	-0.25	0	0	0	0	0	0	0	0	0	sulph: 90%; M-CON mins too small to pick	<0.1					NW101198	98 TNT 04											

SAMPLE	SIZE mm	S/PYR	S/ECL	S/ILM	S/CHR	S/CD	S/ZR	S/KY	S/CO	S/OL	S/COMMENTS	NS 1	NS 2	ND (g)	MAG (g)	TOTAL (g)	PROJ.	PICK BATCH #	PROBE BATCH #	P/PYR	P/ECL	P/ILM	P/CHR	P/CD	P/ZR	P/KYP	P/COR	P/OLP	P/OTH	P/SUR
8CBH001	0.18-0.25										SAMPLE NOT DONE	0.2	16.5	9.7		26.4	ASP101198	98 TNT 05													
8CBH001	0.25-0.5	0	1	15	2	2	2	4	0	2		53.3				53.3	ASP101198	98 TNT 05	352 TNT 01		1	15	2	2	2	4		2		28
8CBH001	0.5-1.0										SAMPLE NOT DONE	5.6	17.0			22.6	ASP101198	98 TNT 05												
8CBH002	0.18-0.25										SAMPLE NOT DONE	6.0	8.9	10.9		25.8	ASP101198	98 TNT 05												
8CBH002	0.25-0.5	0	3	12	2	1	10	50	0	3	ECL: 1 lost; sulphide: 25+	13.8	11.6			25.2	ASP101198	98 TNT 05	352 TNT 01		2	12	2	1	7	5		3		32
8CBH002	0.5-1.0										SAMPLE NOT DONE	6.8				6.8	ASP101198	98 TNT 05												
8CBH003	0.18-0.25										SAMPLE NOT DONE	0.3	5.8	3.7		9.8	ASP101198	98 TNT 05												
8CBH003	0.25-0.5	0	0	12	2	0	1	4	0	0		16.0				16.0	ASP101198	98 TNT 05	352 TNT 01			12	2		1	4				19
8CBH003	0.5-1.0										SAMPLE NOT DONE	12.2				12.2	ASP101198	98 TNT 05												
8CBH004	0.18-0.25										SAMPLE NOT DONE	2.7		1.9		4.6	ASP101198	98 TNT 05												
8CBH004	0.25-0.5	0	1	6	1	0	0	13	0	2		7.6				7.6	ASP101198	98 TNT 05	352 TNT 01		1	6	1			5		2		15
8CBH004	0.5-1.0										SAMPLE NOT DONE	4.2				4.2	ASP101198	98 TNT 05												
8CBH005	0.18-0.25										SAMPLE NOT DONE	0.2	4.0	2.7		6.9	ASP101198	98 TNT 05												
8CBH005	0.25-0.5	0	0	9	0	0	1	50	0	0	sulphide: 8; ky: +	13.2				13.2	ASP101198	98 TNT 05	352 TNT 01			9			1	5				15
8CBH005	0.5-1.0										SAMPLE NOT DONE	12.7				12.7	ASP101198	98 TNT 05												
8CBH006	0.18-0.25										SAMPLE NOT DONE	3.8	5.0	5.2		14.0	ASP101198	98 TNT 05												
8CBH006	0.25-0.5	0	0	7	0	0	0	0	0	1	sulphide: 30+	12.8	14.8			27.6	ASP101198	98 TNT 05	352 TNT 01			7						1		8
8CBH006	0.5-1.0										SAMPLE NOT DONE	26.7				26.7	ASP101198	98 TNT 05												
8CBH007	0.18-0.25										SAMPLE NOT DONE	0.1	2.2	3.5		5.8	ASP101198	98 TNT 05												
8CBH007	0.25-0.5	0	0	3	0	1	0	0	0	0		5.2				5.2	ASP101198	98 TNT 05	352 TNT 01			3		1						4
8CBH007	0.5-1.0										SAMPLE NOT DONE	1.2				1.2	ASP101198	98 TNT 05												
8CBH008	0.18-0.25										SAMPLE NOT DONE	4.5	15.6	15.1		35.2	ASP101198	98 TNT 05												
8CBH008	0.25-0.5	0	0	17	1	1	5	45	0	0	sulphide: 25+, 75%	9.1	61.9			71.0	ASP101198	98 TNT 05	352 TNT 01			17	1	1	5	5				29
8CBH008	0.5-1.0										SAMPLE NOT DONE	90.8				90.8	ASP101198	98 TNT 05												
8CBH009	0.18-0.25										SAMPLE NOT DONE	4.8	19.6	19.7		44.1	ASP101198	98 TNT 05												
8CBH009	0.25-0.5	0	1	11	3	0	0	0	0	0	ILM: 1 lost; sulphide: 33, 9	87.7				87.7	ASP101198	98 TNT 05	352 TNT 01		1	10	3							14
8CBH009	0.5-1.0										SAMPLE NOT DONE	50.9				50.9	ASP101198	98 TNT 05												

352-TNT-01

PICKER: M. Morrison DATE: July. 8/99 PAGE: 1

YPE	SAMPLE NO.	GRAINNO	SIEVE	SPECIMEN		GRTYPE	SAMPLE NO.	GRAINNO	SIEVE	SPECIMEN
			mm.							
Ecl	BCBH001	1	0.25-0.5							
Ecl	BCBH002	1	"							
		2								
	Ecl last									
Ecl	BCBH004	1	0.25-0.5							
Ecl	BCBH009	1	0.25-0.5							

352-TNT-D1

PICKER: DATE: PAGE: 2

TYPE	SAMPLE NO.	GRAINNO	SIEVE	SPECIMEN		GRTYPE	SAMPLE NO.	GRAINNO	SIEVE	SPECIMEN
	98 TNT 124		mm.							
Ilm	SRC 97-1	1	-0.25			Ilm	SRC 97-2	1	-0.25	
		2				Chr		2		
		3						3		
		4						4		
		5						5		
		6						6		
		7						7		
Chr		8						8		
		9						9		
		10						10		
		11						11		
		12						12		
		13						13		
		14					(4 CHR LOST)			
		15				Ilm	SRC 97-3	1		
		16						2		
		17						3		
		18						4		
		19				Chr		5		
		20						6		
		21						7		
		22						8		
		23						9		
		24						10		
		25						11		
		26						12		
		27						13		
		28						14		
		29						15		
		30						16		
		31						17		
		32						18		
		33						19		
		34						20		
		35					(3 chr. lost)			
		36								
		37								
		38								
		39								

(1 Ilm 1 Chr lost)

352 TNT 04

PICKER: DATE: PAGE: 3

GRTYPE	SAMPLE NO.	GRAINNO	SIEVE	SPECIMEN		GRTYPE	SAMPLE NO.	GRAINNO	SIEVE	SPECIMEN
	98TNT04		mm							
Ilm	SRC 97-4	1	-0.25			Chr	SRC 97-5	21	-0.25	
		2						22		
		3						23		
		4						24		
		5						25		
		6						26		
		7						27		
		8						28		
Chr		9						29		
		10						30		
		11						31		
		12						32		
		13						33		
		14						34		
		15						35		
		16						36		
		17						37		
		18						38		
		19						39		
								40		
Ilm	SRC97-5	1	-0.25					41		
		2						42		
		3						43		
		4						44		
		5						45		
		6						46		
		7						47		
		8						48		
		9						49		
		10						50		
		11					1 Ilm. 1 Chr lost			
		12								
		13								
Chr		14								
		15								
		16								
		17								
		18								
		19								
		20								

352 TNT 01

PICKER: DATE: PAGE: 4

GRTYPE	SAMPLE NO.	GRAINNO	SIEVE	SPECIMEN	GRTYPE	SAMPLE NO.	GRAINNO	SIEVE	SPECIMEN
	9BTNT05		mm						
Ilm	BCBH001	2	0.25-0.5	·	Ilm	BCBH003	8		·
		3		·			9		·
		4		·			10		·
		5		·			11		·
		6		·			12		·
		7		·	Chr		13		·
		8		·			14		·
		9		·					
		10		·	Ilm	BCBH004	2	0.25-0.5	·
		11		·			3		·
		12		·			4		·
		13		·			5		·
		14		·			6		·
		15		·			7		·
		16		·	Chr		8		·
CHR		17		·					
		18		·	Ilm	BCBH005	1	0.25-0.5	·
							2		·
Ilm	BCBH002	3	0.25-0.5	·			3		·
		4		·			4		·
		5		·			5		·
		6		·			6		·
		7		·			7		·
		8		·			8		·
		9		·			9		·
		10		·					
		11		·	Ilm	BCBH006	1	0.25-0.5	·
		12		·			2		·
		13		·			3		·
		14		·			4		·
CHR		15		·			5		·
		16		·			6		·
							7		·
Ilm	BCBH003	1	0.25-0.5	·					
		2		·	Ilm	BCBH007	1	0.25-0.5	·
		3		·			2		·
		4		·			3		·
		5		·					
		6		·					
		7		·					

352 TNT 01

PICKER: DATE: PAGE: 5

TYPE	SAMPLE NO.	GRAINNO	SIEVE	SPECIMEN		GRTYPE	SAMPLE NO.	GRAINNO	SIEVE	SPECIMEN
Ilm	BCBH008	1	0.250.5	.						
		2		.						
		3		.						
		4		.						
		5		.						
		6		.						
		7		.						
		8		.						
		9		.						
		10		.						
		11		.						
		12		.						
		13		.						
		14		.						
		15		.						
		16		.						
		17		.						
Chr.		18		.						
Ilm	BCBH009	2	0.25.0.5	.						
		3		.						
		4		.						
		5		.						
		6		.						
		7		.						
		8		.						
		9		.						
		10		.						
		11		.						
Chr		12		.						
		13		.						
		14		.						
1 Ilm lost										

352-TNT-D1

PICKER: DATE: PAGE: 6

GRTYPE	SAMPLE NO.	GRAINNO	SIEVE	SPECIMEN		GRTYPE	SAMPLE NO.	GRAINNO	SIEVE	SPECIMEN
	9B TNT 05		Dup							
CD	8 CBH001	19	0.25-0.5							
		20								
CD	8 CBH002	17	0.25-0.5							
CD	8 CBH 007	4	0.25-0.5							
CD	8 CBH 008	19	0.25-0.5							

PICKER: DATE: PAGE: 7

TYPE	SAMPLE NO.	GRAINNO	SIEVE	SPECIMEN		GRTYPE	SAMPLE NO.	GRAINNO	SIEVE	SPECIMEN
	98 TNT 04		mm.							
Zircon?	SRC 97-1	40	+0.25	o		Zircon	BCBH 008	20	0.25-0.5	·
		41		o				21		·
		42		o				22		·
		43		o				23		·
		44		o				24		
		45		o						
Zircon?	SRC 97-4	20	-0.25	o						
		21		o						
		22		o						
		23		o						
		24		o						
		25	+0.25							
		26								
		27								
Zircon?	SRC 97-5	53	+0.25							
	98 TNT 05									
Zircon?	BCBH 001	21	0.25-0.5	·						??
		22		·						
Zircon	BCBH 002	18	0.25-0.5	·						
		19		·						
		20		·						
		21		·						
	reddish,	22		·						
	Brownish	23		·						
		24		·						
Zircon	BCBH 003	15	0.25-0.5	·						
Zircon	BCBH 005	10	0.25-0.5	·						

352-INT-01

PICKER: DATE: PAGE: 8

GRTYPE	SAMPLE NO.	GRAINNO	SIEVE	SPECIMEN		GRTYPE	SAMPLE NO.	GRAINNO	SIEVE	SPECIMEN
	98-INT05		mm							
KY	BCBH001	23	0.25-0.5							
		24								
		25								
		26								
KY	BCBH002	25	0.25-0.5							
		26								
		27								
		28								
		29								
KY	BCBH003	16	0.25-0.5							
		17								
		18								
		19								
KY	BCBH004	9	0.25-0.5							
		10								
		11								
		12								
		13								
KY	BCBH005	11	0.25-0.5							
		12								
		13								
		14								
		15								
KY	BCBH008	25	0.25-0.5							
		26								
		27								
		28								
		29								

352 TNT 01

PICKER: DATE:

YPE	SAMPLE NO.	GRAINNO	SIEVE	SPECIMEN		GRTYPE	SAMPLE NO.	GRAINNO	SIEVE	SPECIMEN
	98 TNT 04									
OLI	SRC 97-1	46	-0.25mm	O		OLI?	BCBH 004	14	0.25-0.5	
		47		O				15		
		48		O						
		49		O		OLI?	BCBH 006	8	0.25-0.5	
		50		O						
OLI?	SRC 97-3	21		O						
		22		O						
				LOST						
		23		O						
		24		O						
OLI?	SRC 97-4	28	+0.25mm							
		29								
	? OLI	30								
	whitish, fine	31								
	w/ tinge yellow	32								
	SR, frosted	33								
		34								
		35								
		36								
		37								
OLI?	SRC 97-5	51	-0.25	O						
		52		O						
	98 TNT 05									
OLI	BCBH001	27	0.25-0.5							
		28								
OLI	BCBH002	30	0.25-0.5							
		31								
		32								

Mr. Shahe F. Sabag,
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April 15 1999.

R. L. Barnett Geological Consulting Inc.,
9684 Longwoods Road,
RR 32, London, Ontario.
N6P 1P2

Ph. 1-519-652-1498
Fax 1-519-652-1475

Dear Shahe,

For your records, the identity of the "non-indicator" minerals in the batch of grains from Probe 352-TNT-01 LOT# ASBK260199, that was sent with I&M Morrison letter of February 8 1999, is:

8CBH001	grain 1	
8CBH002	grains 1,2	
8CBH004	grain 1	
8CBH009	grain 1	- staurolite
8CBH001	grains 23-26	
8CBH002	grains 24,25-29	
8CBH003	grains 16,17,19	
8CBH004	grains 9-13,15	
8CBH005	grains 11-15	
8CBH008	grains 22,25-29	- kyanite
SRC97-1	grain 41	
SRC97-5	grain 17	
8CBH001	grain 27	
8CBH002	grains 30,31,32	
8CBH004	grain 14	- apatite
SRC97-1	grains 40,42-50	
SRC97-3	grains 23,24	
SRC97-4	grains 20-24	
SRC97-5	grain 51,52,53	- quartz
SRC97-4	grains 25,26,28-37	- calcite

SRC97-1 grains 2,8,11,16,17,20-22,25,26,28,30,31,35,36,38,39
SRC97-2 grains 2,4,6,8
SRC97-3 grains 6,7
SRC97-5 grains 3,6,10,12,15,21,22,24-27,32,33,40,43,47,48,50
8CBH001 grains 2,3,4,6-16
8CBH002 grains 3-12,14
8CBH003 grains 1-10,12
8CBH004 grains 2-7
8CBH005 grains 1,2,4,5,7,8,9
8CBH006 grains 1-6
8CBH007 grain 2
8CBH008 grains 2-14,16
8CBH009 grains 2-10,13 - simple ilmenite

8CBH001 grains 5,17
8CBH002 grain 13
8CBH003 grain 11
8CBH005 grains 3,6
8CBH007 grains 1,3
8CBH008 grain 15 - rutile

8CBH001 grain 21
8CBH002 grains 18,19,21,22,23
8CBH003 grain 15
8CBH005 grain 10
8CBH008 grains 20,21,23,24 - zircon

SRC97-3 grain 21
8CBH001 grain 20
8CBH006 grain 8 - lost

SRC97-3 grain 22 - NaCl
SRC97-4 grains 6,7 - in plastic
SRC97-4 grain 27 - K-feldspar
SRC97-5 grain 11 - $CaFeSO_4$
8CBH001 grain 28 - sphene
8CBH003 grain 14 - magnetite
8CBH003 grain 18 - barite

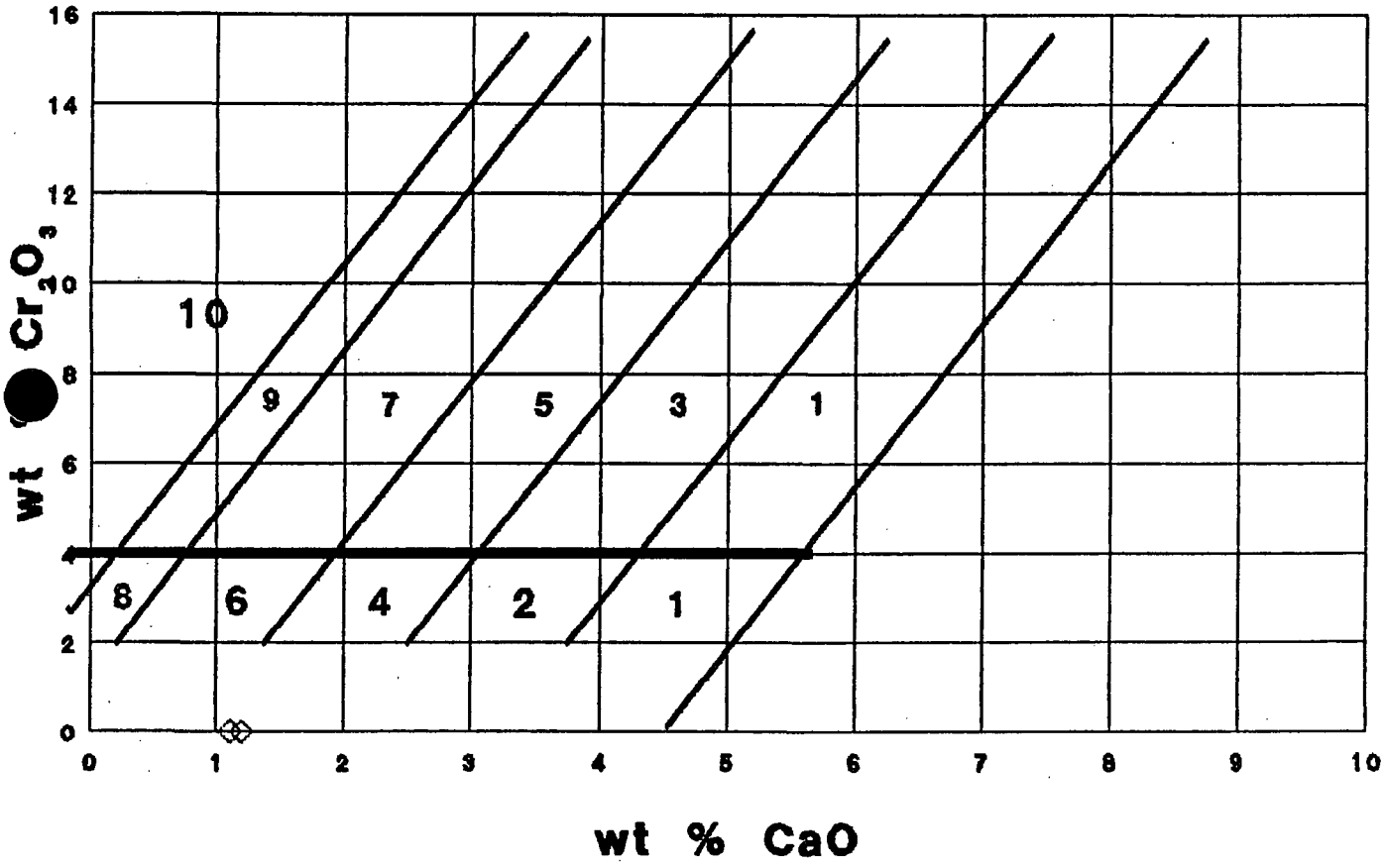
Sincerely,

[redacted]

R. L. Barnett

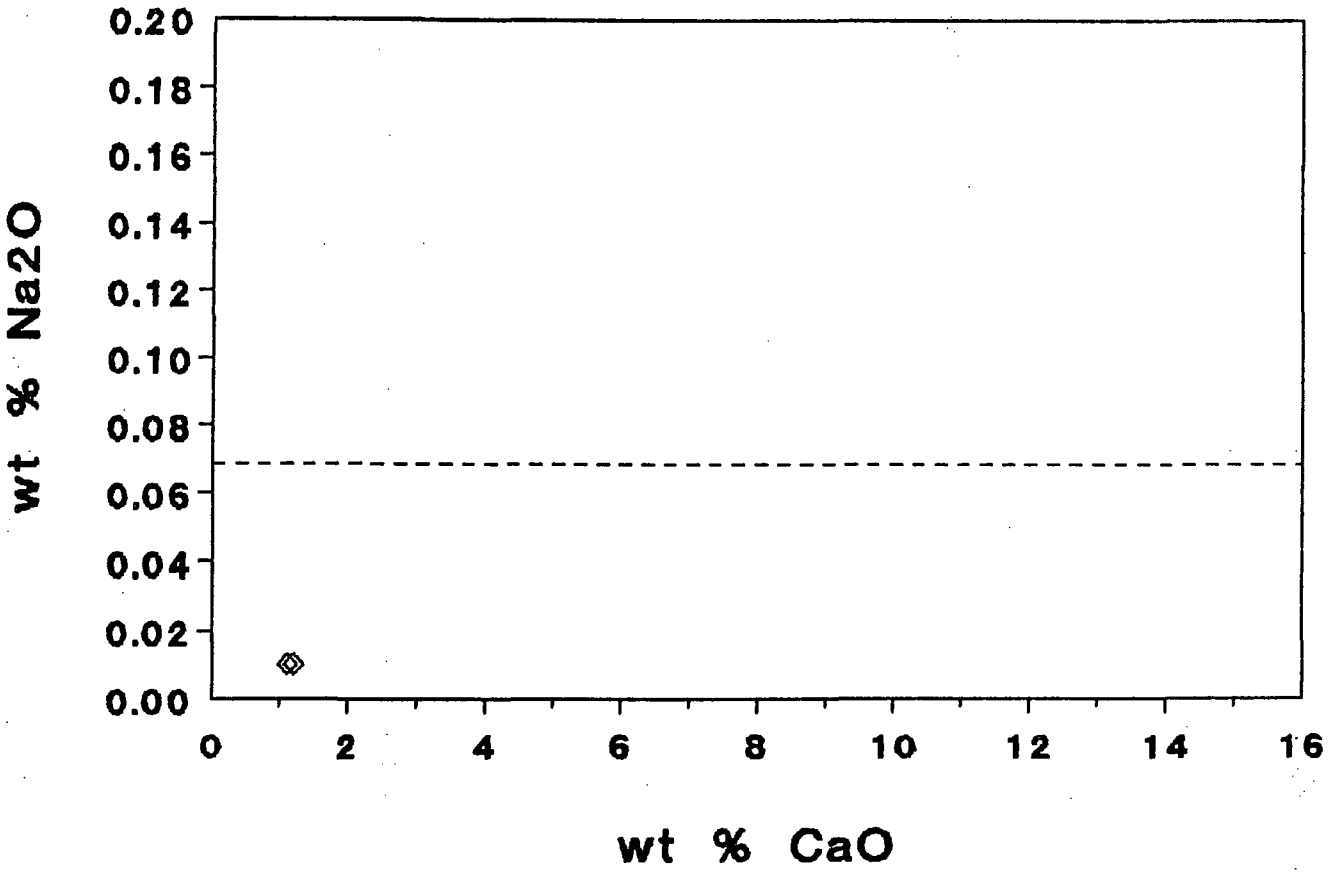
GARNET – TINTINA MINES LTD.

Probe 352-TNT-01

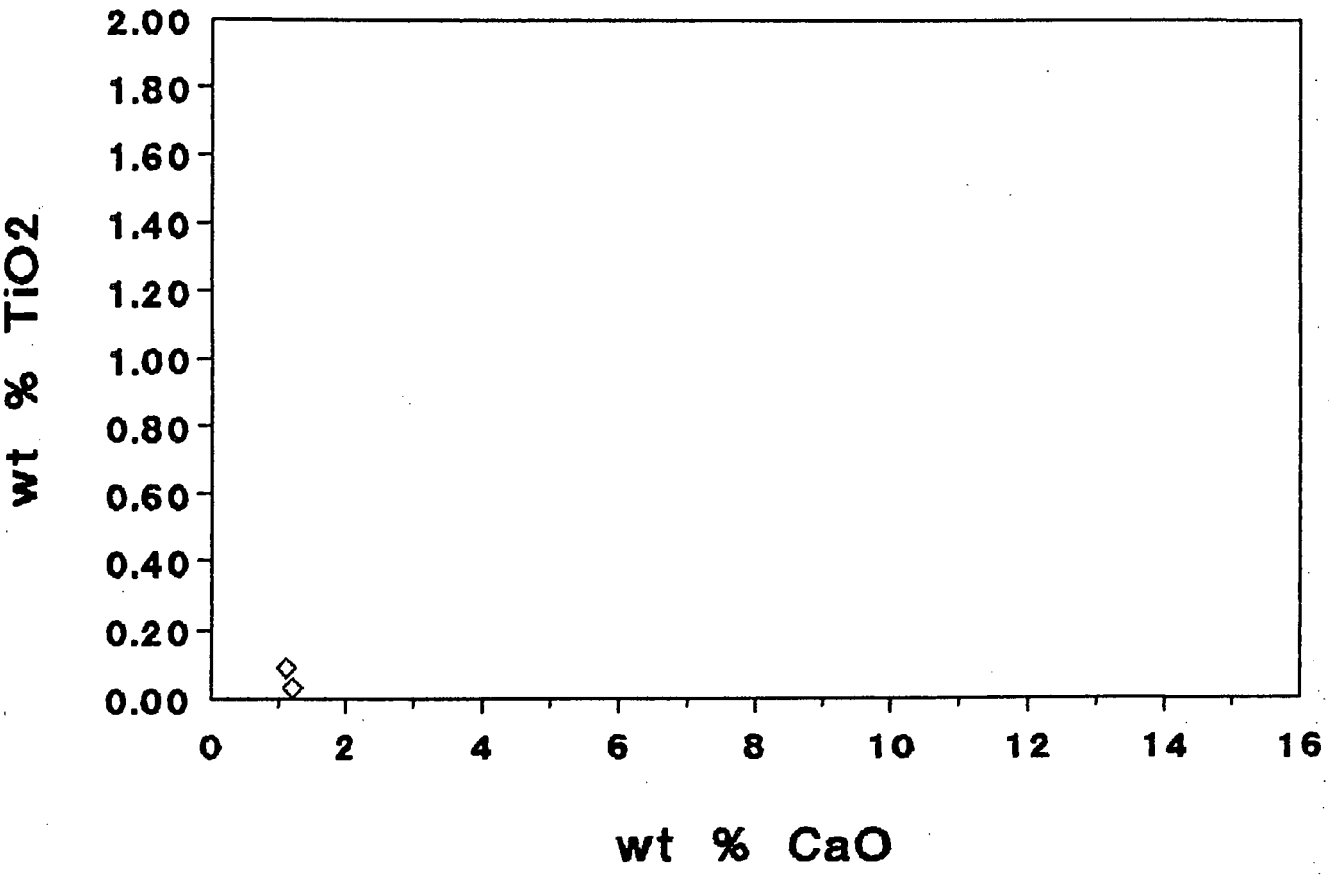


◇ RLB

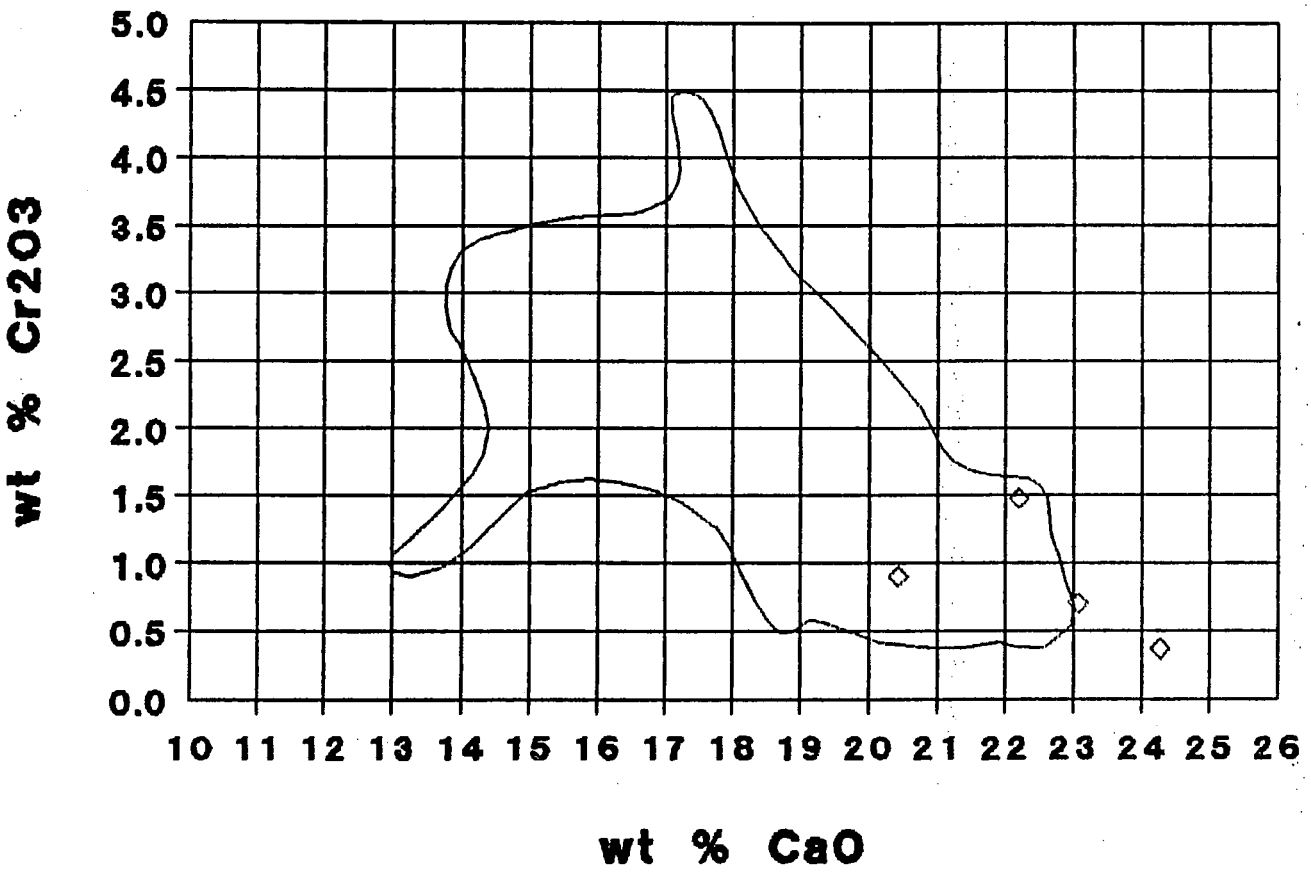
ECLOGITIC GARNET – TINTINA MINES LTD.
Probe 352-TNT-01



ECLOGITIC GARNET - TINTINA MINES LTD.
Probe 352-TNT-01

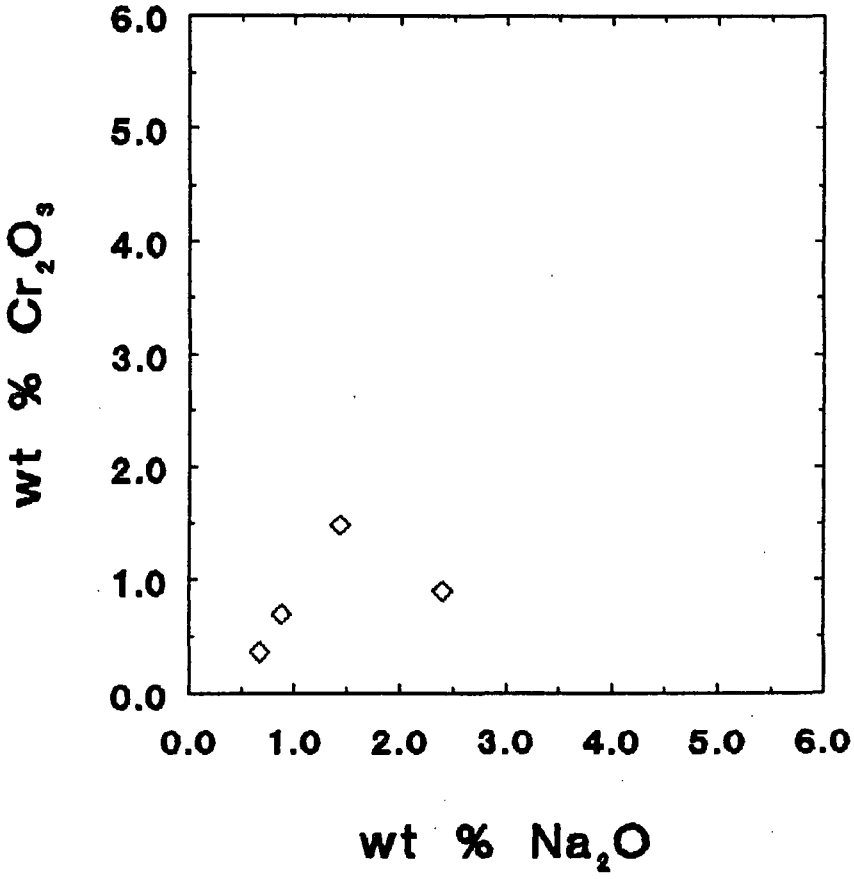


CHROME DIOPSIDE - TINTINA MINES LTD.
Probe 352-TNT-01

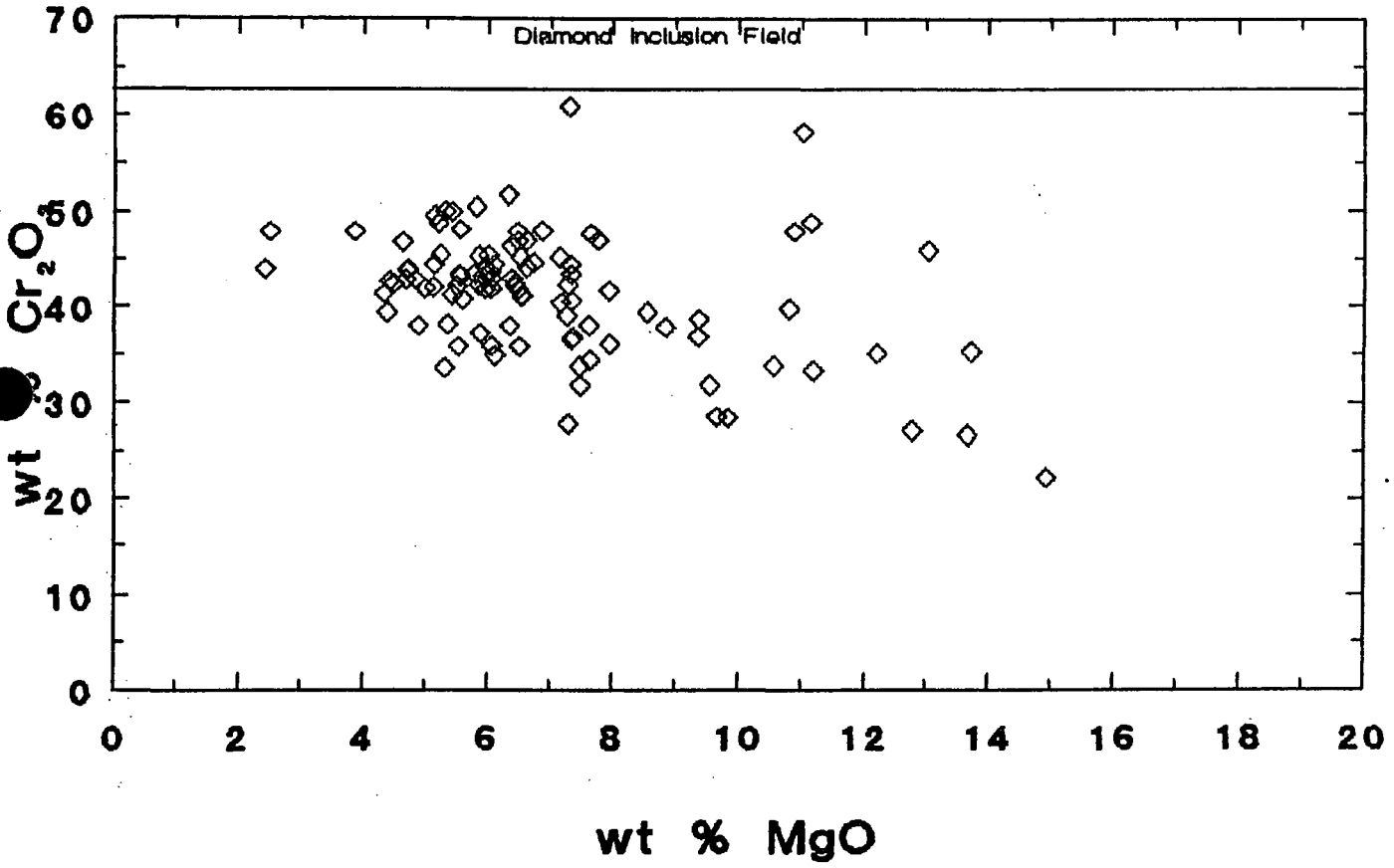


◇ RLB

CLINOPYROXENE – TINTINA MINES LTD.
Probe 352-TNT-01

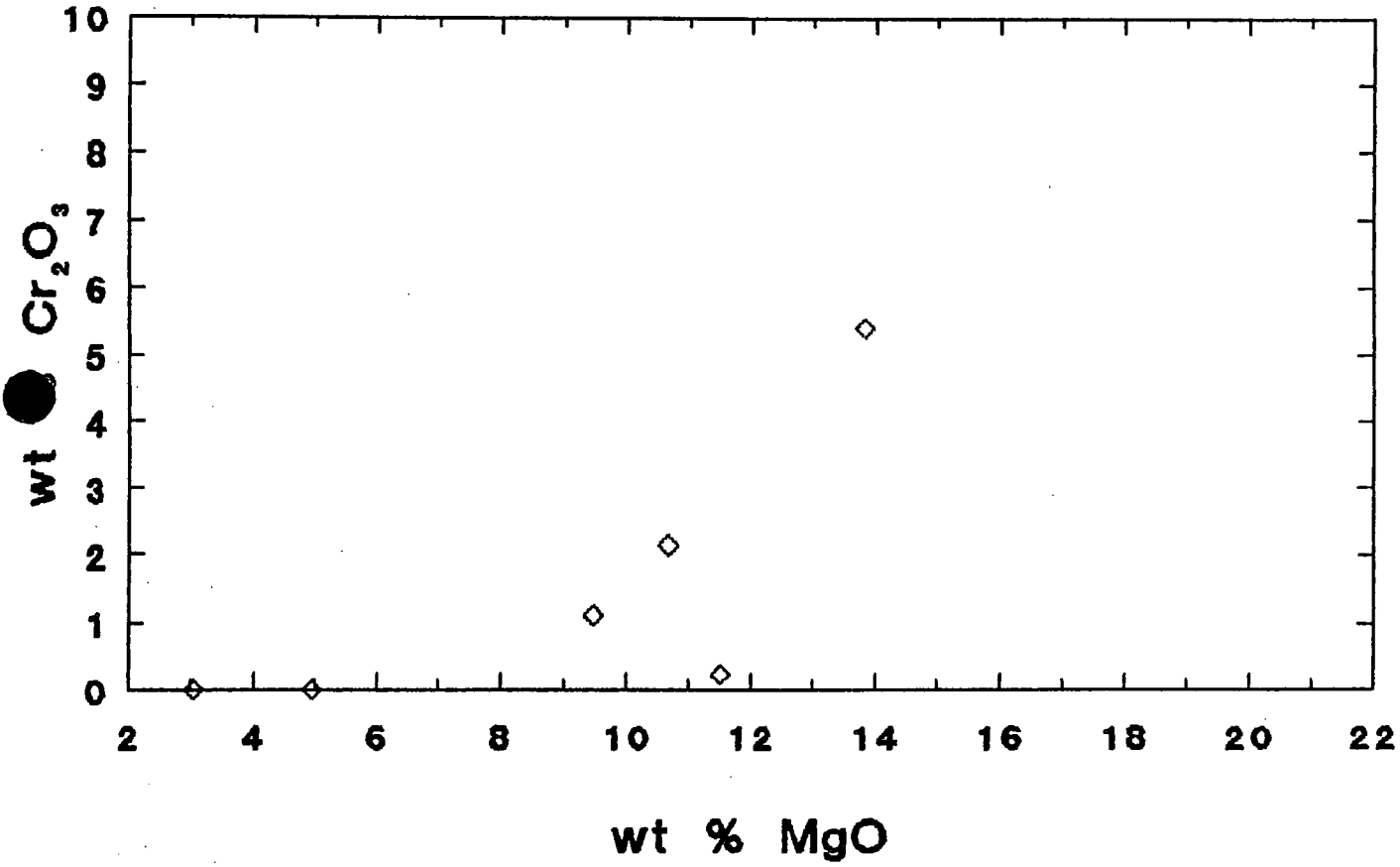


CHROMITE - TINTINA MINES LTD.
Probe 352-TNT-01



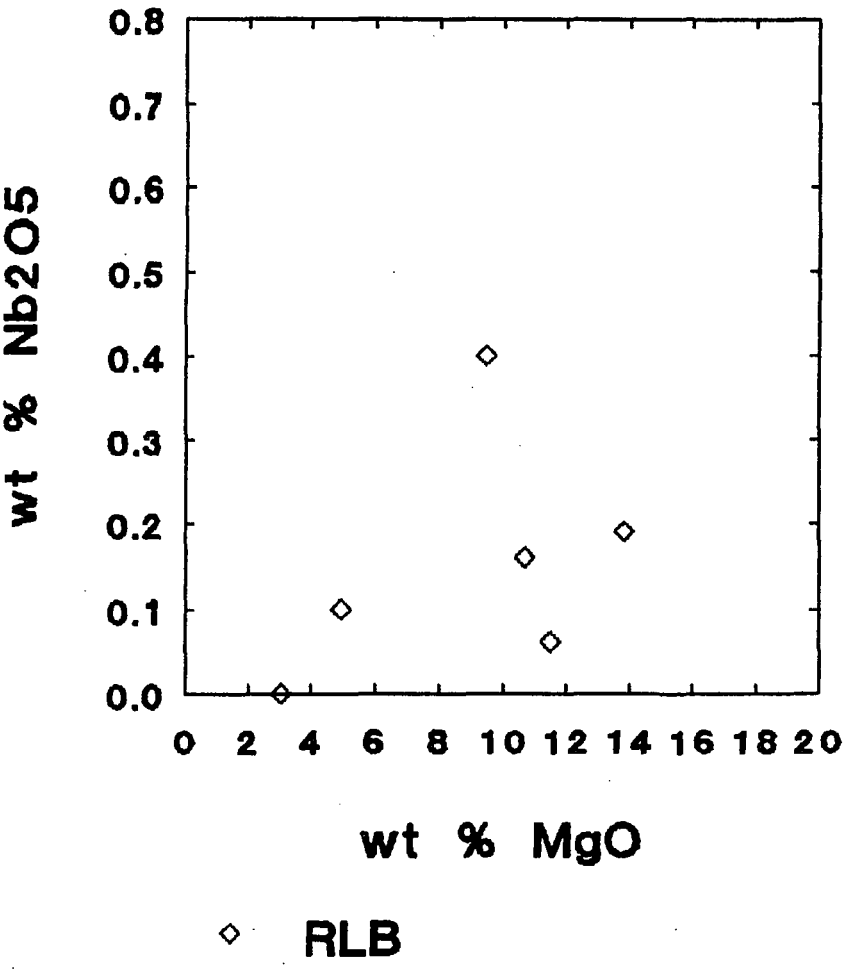
◇ RLB

ILMENITE – TINTINA MINES LTD.
Probe 352-TNT-01



◇ RLB

ILMENITE - TINTINA MINES LTD.
Probe 352-TNT-01



Mr. Shahe F. Sabag,
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April 15 1999,

R. L. Barnett Geological Consulting Inc.,
9684 Longwoods Road,
RR 32, London, Ontario.
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Dear Shahe,

For your records, the identity of the "non-indicator" minerals in the batch of grains from Probe 352-TNT-01 LOT# ASBK260199, that was sent with I&M Morrison letter of February 8 1999, is:

8CBH001	grain 1	
8CBH002	grains 1,2	
8CBH004	grain 1	
8CBH009	grain 1	- staurolite
8CBH001	grains 23-26	
8CBH002	grains 24,25-29	
8CBH003	grains 16,17,19	
8CBH004	grains 9-13,15	
8CBH005	grains 11-15	
8CBH008	grains 22,25-29	- kyanite
SRC97-1	grain 41	
SRC97-5	grain 17	
8CBH001	grain 27	
8CBH002	grains 30,31,32	
8CBH004	grain 14	- apatite
SRC97-1	grains 40,42-50	
SRC97-3	grains 23,24	
SRC97-4	grains 20-24	
SRC97-5	grain 51,52,53	- quartz
SRC97-4	grains 25,26,28-37	- calcite

SRC97-1 grains 2,8,11,16,17,20-22,25,26,28,30,31,35,36,38,39
SRC97-2 grains 2,4,6,8
SRC97-3 grains 6,7
SRC97-5 grains 3,6,10,12,15,21,22,24-27,32,33,40,43,47,48,50
8CBH001 grains 2,3,4,6-16
8CBH002 grains 3-12,14
8CBH003 grains 1-10,12
8CBH004 grains 2-7
8CBH005 grains 1,2,4,5,7,8,9
8CBH006 grains 1-6
8CBH007 grain 2
8CBH008 grains 2-14,16
8CBH009 grains 2-10,13 - simple ilmenite

8CBH001 grains 5,17
8CBH002 grain 13
8CBH003 grain 11
8CBH005 grains 3,6
8CBH007 grains 1,3
8CBH008 grain 15 - rutile

8CBH001 grain 21
8CBH002 grains 18,19,21,22,23
8CBH003 grain 15
8CBH005 grain 10
8CBH008 grains 20,21,23,24 - zircon

SRC97-3 grain 21
8CBH001 grain 20
8CBH006 grain 8 - lost

SRC97-3 grain 22 - NaCl
SRC97-4 grains 6,7 - in plastic
SRC97-4 grain 27 - K-feldspar
SRC97-5 grain 11 - $CaFeSO_4$
8CBH001 grain 28 - sphene
8CBH003 grain 14 - magnetite
8CBH003 grain 18 - barite

Sincerely,

[redacted]

R. L. Barnett

ECL-GARNET, TINTINA MINES, Probe 352-TNT-01 (LOT# AS8K260199) Apr.15 1999, R.L.B.

	1	2
SIO2	39.22	37.92
TIO2	.09	.03
A2O3	22.52	22.00
C2O3	.02	.00
FEO	26.94	34.15
MGO	9.72	4.78
MNO	.36	.41
CAO	1.11	1.20
NA2O	.01	.01
SUM	99.99	100.50

SI	5.998	*	5.983	*
AL	.002	6.000	.017	6.000
AL	4.056	*	4.073	*
TI	.010	*	.004	*
CR	.002	*	.000	*
FE	3.445	*	4.506	*
MN	.047	*	.055	*
MG	2.216	*	1.124	*
CA	.182	*	.203	*
NA	.003	9.961	.003	9.968
O	24.000	*	24.000	*
	F/M	1.576		4.057
	F/FM	.612		.802

1 SAMPLE 8C8H001 GRAIN 22
2 SAMPLE 8C8H002 GRAIN 20

CLINOPYROXENE, TINTINA MINES, 352-TNT-01 (LOT# ASBK260199) April 15 1999, R.L.B.

	1		2		3		4	
SIO2	53.98		54.22		53.93		53.95	
TIO2	.27		.11		.05		.08	
A2O3	2.82		2.28		1.12		1.18	
C2O3	1.48		.90		.36		.70	
FEO	3.28		6.49		4.75		5.24	
MGO	14.80		13.42		14.98		14.96	
MNO	.00		.08		.12		.12	
CAO	22.21		20.43		24.27		23.07	
K2O	.02		.03		.04		.02	
NA2O	1.44		2.40		.67		.88	
SUM	100.30		100.36		100.29		100.20	
SI	1.962	*	1.990	*	1.980	*	1.982	*
AL	.038	2.000	.010	2.000	.020	2.000	.018	2.000
AL	.082	*	.089	*	.028	*	.033	*
TI	.007	*	.003	*	.001	*	.002	*
CR	.043	*	.026	*	.010	*	.020	*
FE	.100	*	.199	*	.146	*	.161	*
MG	.802	*	.734	*	.820	*	.819	*
MN	.000	*	.002	*	.004	*	.004	*
CA	.865	*	.804	*	.955	*	.908	*
NA	.101	*	.171	*	.048	*	.063	*
K	.001	2.001	.001	2.030	.002	2.014	.001	2.012
	6.000	*	6.000	*	6.000	*	6.000	*
F/M	.124		.275		.182		.201	
F/FM	.111		.216		.154		.167	

1 SAMPLE 8CBH001 GRAIN 19
2 SAMPLE 8CBH002 GRAIN 17
3 SAMPLE 8CBH007 GRAIN 4
4 SAMPLE 8CBH008 GRAIN 19

CHROMITE, TINTINA MINES, Probe 352-TNT-01 (LOT #ASBK260199) April 15 1999, R.L.B.

	1	2	3	4	5	6	7	8
SIO2	.00	.00	.00	.00	.00	.01	.01	.01
TIO2	.31	.27	.16	.23	.22	.20	.00	.33
A2O3	11.74	12.00	35.09	19.79	13.80	11.23	9.06	8.00
C2O3	42.15	46.26	27.04	36.02	42.36	44.14	60.79	42.32
FEO	38.94	33.70	24.60	35.10	36.44	37.50	21.54	43.55
MNO	.48	.52	.27	.34	.38	.55	.46	.48
MGO	5.50	6.37	12.79	7.96	6.43	5.95	7.30	4.48
ZNO	.19	.37	.11	.28	.22	.11	.27	.25
NIO	.23	.23	.30	.10	.22	.18	.15	.21
SUM	99.54	99.72	100.36	99.82	100.07	99.87	99.58	99.63

SI	.000	*	.000	*	.000	*	.000	*	.000	*	.003	*	.003	*	.003	*
TI	.066	*	.056	*	.029	*	.046	*	.046	*	.042	*	.000	*	.073	*
AL	3.928	*	3.933	*	9.835	*	6.226	*	4.498	*	3.733	*	2.902	*	2.775	*
CR	9.461	*	10.171	*	5.085	*	7.604	*	9.264	*	9.844	*	13.062	*	9.849	*
FE	9.246	*	7.838	*	4.893	*	7.837	*	8.429	*	8.846	*	4.896	*	10.721	*
MN	.115	*	.122	*	.054	*	.077	*	.089	*	.131	*	.106	*	.120	*
MG	2.327	*	2.640	*	4.534	*	3.168	*	2.651	*	2.502	*	2.957	*	1.966	*
ZN	.040	*	.076	*	.019	*	.055	*	.045	*	.023	*	.054	*	.054	*
NI	.053	25.236	.051	24.889	.057	24.506	.021	25.035	.049	25.070	.041	25.164	.033	24.013	.050	25.610
O	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*
	F/M	4.022		3.015		1.091		2.498		3.213		3.589		1.691		5.515
	F/FM	.801		.751		.522		.714		.763		.782		.628		.847

1 SAMPLE SRC97-1 GRAIN 1
2 SAMPLE SRC97-1 GRAIN 3
3 SAMPLE SRC97-1 GRAIN 4
4 SAMPLE SRC97-1 GRAIN 5
5 SAMPLE SRC97-1 GRAIN 7
6 SAMPLE SRC97-1 GRAIN 9
7 SAMPLE SRC97-1 GRAIN 10
8 SAMPLE SRC97-1 GRAIN 12

CHROMITE, TINTINA MINES, Probe 352-TNT-01 (LOT #ASBK260199) April 15 1999, R.L.B

	9	10	11	12	13	14	15	16
SIO2	.00	.01	.00	.01	.01	.01	.01	.00
TIO2	.56	.57	.24	.27	.31	.34	.21	.16
A2O3	19.80	11.22	10.38	8.44	10.61	12.37	11.47	18.46
C2O3	39.38	42.13	48.06	42.78	43.38	44.41	46.81	35.75
FEO	30.62	37.74	34.82	42.33	39.13	35.69	34.10	37.90
MNO	.48	.52	.51	.37	.58	.47	.44	.38
MGO	8.56	6.43	5.55	4.83	5.78	6.10	6.47	6.51
ZNO	.22	.15	.23	.31	.23	.25	.20	.27
NIO	.16	.27	.15	.35	.29	.15	.19	.29
SUM	99.78	99.04	99.94	99.69	100.32	99.79	99.90	99.72

SI	.000	*	.003	*	.000	*	.003	*	.003	*	.003	*	.003	*	.000	*
TI	.111	*	.122	*	.051	*	.059	*	.066	*	.071	*	.044	*	.033	*
AL	6.139	*	3.758	*	3.439	*	2.906	*	3.543	*	4.066	*	3.762	*	5.927	*
CR	8.192	*	9.466	*	10.682	*	9.883	*	9.719	*	9.794	*	10.301	*	7.702	*
FE	6.738	*	8.970	*	8.186	*	10.344	*	9.273	*	8.326	*	7.937	*	8.637	*
MN	.107	*	.125	*	.121	*	.092	*	.139	*	.111	*	.104	*	.088	*
MG	3.357	*	2.724	*	2.326	*	2.104	*	2.441	*	2.536	*	2.684	*	2.644	*
ZN	.043	*	.031	*	.048	*	.067	*	.048	*	.051	*	.041	*	.054	*
NI	.034	24.720	.062	25.261	.034	24.886	.082	25.540	.066	25.298	.034	24.993	.043	24.919	.064	25.149
O	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*
	F/M	2.039		3.339		3.572		4.961		3.855		3.327		2.996		3.300
	F/FM	.671		.770		.781		.832		.794		.769		.750		.767

9 SAMPLE SRC97-1 GRAIN 13
10 SAMPLE SRC97-1 GRAIN 14
11 SAMPLE SRC97-1 GRAIN 15
12 SAMPLE SRC97-1 GRAIN 18
13 SAMPLE SRC97-1 GRAIN 19
14 SAMPLE SRC97-1 GRAIN 23
15 SAMPLE SRC97-1 GRAIN 24
16 SAMPLE SRC97-1 GRAIN 27

CHROMITE, TINTINA MINES, Probe 352-TNT-01 (LOT #ASBK260199) April 15 1999, R.L.B

	17	18	19	20	21	22	23	24
SIO2	.01	.00	.00	.01	.01	.01	.07	.00
TIO2	.15	.01	.33	.36	.24	.34	.20	.15
A2O3	8.52	20.82	12.58	7.07	9.74	7.45	8.51	12.82
C2O3	50.41	37.79	39.36	48.69	45.39	50.01	49.92	45.13
FEO	34.66	30.94	41.98	36.98	37.86	35.63	35.11	33.70
MNO	.47	.36	.52	.54	.48	.56	.57	.42
MGO	5.81	8.85	4.39	5.20	5.23	5.31	5.42	6.52
ZNO	.22	.20	.22	.33	.22	.31	.25	.29
NIO	.13	.17	.33	.18	.24	.17	.12	.17
SUM	100.38	99.14	99.71	99.36	99.41	99.79	100.17	99.20

SI	.003	*	.000	*	.000	*	.003	*	.003	*	.003	*	.020	*	.000	*
TI	.032	*	.002	*	.071	*	.079	*	.052	*	.073	*	.043	*	.031	*
AL	2.833	*	6.472	*	4.238	*	2.416	*	3.289	*	2.518	*	2.842	*	4.203	*
CR	11.246	*	7.882	*	8.896	*	11.165	*	10.285	*	11.341	*	11.187	*	9.926	*
FE	8.179	*	6.826	*	10.036	*	8.970	*	9.074	*	8.546	*	8.322	*	7.840	*
MN	.112	*	.080	*	.126	*	.133	*	.117	*	.136	*	.137	*	.099	*
MG	2.444	*	3.480	*	1.871	*	2.248	*	2.234	*	2.270	*	2.290	*	2.704	*
ZN	.046	*	.039	*	.046	*	.071	*	.047	*	.066	*	.052	*	.060	*
NI	.030	24.923	.036	24.817	.076	25.359	.042	25.126	.055	25.156	.039	24.992	.027	24.920	.038	24.901
O	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*
	F/M	3.393		1.985		5.433		4.049		4.114		3.825		3.694		2.937
	F/FM	.772		.665		.845		.802		.804		.793		.787		.746

17 SAMPLE SRC97-1 GRAIN 29
18 SAMPLE SRC97-1 GRAIN 32
19 SAMPLE SRC97-1 GRAIN 33
20 SAMPLE SRC97-1 GRAIN 34
21 SAMPLE SRC97-1 GRAIN 37
22 SAMPLE SRC97-2 GRAIN 1
23 SAMPLE SRC97-2 GRAIN 3
24 SAMPLE SRC97-2 GRAIN 5

CHROMITE, TINTINA MINES, Probe 352-TNT-01 (LOT #ASBK260199) April 15 1999, R.L.B

	25	26	27	28	29	30	31	32
SIO2	.00	.00	.00	.01	.00	.00	.00	.03
TIO2	.24	.13	.56	.31	.23	.45	.36	.15
A2O3	28.53	9.47	13.04	9.72	8.44	8.60	7.00	15.14
C2O3	28.39	51.64	41.81	43.34	43.82	47.80	42.63	47.82
FEO	31.97	31.47	37.62	39.20	41.59	38.20	44.19	24.76
MNO	.42	.51	.36	.56	.52	.38	.56	.28
MGO	9.84	6.32	6.06	5.54	4.69	3.86	4.41	10.88
ZNO	.19	.14	.12	.34	.37	.58	.30	.13
NIO	.18	.16	.26	.20	.19	.18	.29	.18
SUM	99.76	99.84	99.83	99.22	99.85	100.05	99.74	99.37

SI	.000	*	.000	*	.000	*	.003	*	.000	*	.000	*	.000	*	.008	*
TI	.046	*	.027	*	.118	*	.067	*	.050	*	.097	*	.080	*	.030	*
AL	8.503	*	3.116	*	4.291	*	3.302	*	2.896	*	2.917	*	2.445	*	4.711	*
CR	5.677	*	11.402	*	9.232	*	9.878	*	10.090	*	10.878	*	9.992	*	9.984	*
FE	6.762	*	7.350	*	8.786	*	9.451	*	10.129	*	9.196	*	10.956	*	5.468	*
MN	.090	*	.121	*	.085	*	.137	*	.128	*	.093	*	.141	*	.063	*
MG	3.710	*	2.631	*	2.523	*	2.381	*	2.036	*	1.656	*	1.949	*	4.283	*
ZN	.035	*	.029	*	.025	*	.072	*	.080	*	.123	*	.066	*	.025	*
NI	.037	24.859	.036	24.711	.058	25.118	.046	25.337	.045	25.454	.042	25.002	.069	25.699	.038	24.611
O	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*
	F/M	1.847		2.840		3.517		4.028		5.039		5.609		5.694		1.291
	F/FM	.649		.740		.779		.801		.834		.849		.851		.564

25 SAMPLE SRC97-2 GRAIN 7
26 SAMPLE SRC97-2 GRAIN 9
27 SAMPLE SRC97-2 GRAIN 10
28 SAMPLE SRC97-2 GRAIN 11
29 SAMPLE SRC97-2 GRAIN 12
30 SAMPLE SRC97-2 GRAIN 13
31 SAMPLE SRC97-3 GRAIN 1
32 SAMPLE SRC97-3 GRAIN 2

CHROMITE, TINTINA MINES, Probe 352-TNT-01 (LOT #AS8K260199) April 15 1999, R.L.B

	33	34	35	36	37	38	39	40
SIO2	.01	.00	.00	.02	.04	.00	.01	.00
TIO2	.20	.07	.18	.63	.14	.51	.41	.05
A2O3	11.99	35.59	14.93	8.70	16.36	12.42	6.87	27.06
C2O3	40.72	26.57	44.39	42.81	39.04	33.55	46.71	33.25
FEO	39.58	23.58	31.41	42.03	35.33	46.80	39.79	27.37
MNO	.52	.25	.44	.56	.38	.39	.50	.29
MGO	5.60	13.68	7.32	4.68	7.28	5.31	4.62	11.20
ZNO	.13	.06	.10	.19	.19	.09	.31	.25
NIO	.26	.28	.30	.21	.18	.32	.24	.22
SUM	99.01	100.08	99.07	99.83	98.94	99.39	99.46	99.69

SI	.003	*	.000	*	.000	*	.006	*	.011	*	.000	*	.003	*	.000	*
TI	.043	*	.012	*	.037	*	.138	*	.029	*	.111	*	.090	*	.009	*
AL	4.036	*	9.931	*	4.804	*	2.981	*	5.294	*	4.249	*	2.373	*	8.000	*
CR	9.198	*	4.974	*	9.584	*	9.842	*	8.476	*	7.701	*	10.823	*	6.595	*
FE	9.457	*	4.670	*	7.173	*	10.220	*	8.114	*	11.362	*	9.752	*	5.743	*
MN	.126	*	.050	*	.102	*	.138	*	.088	*	.096	*	.124	*	.062	*
MG	2.385	*	4.828	*	2.979	*	2.028	*	2.980	*	2.298	*	2.018	*	4.188	*
ZN	.027	*	.010	*	.020	*	.041	*	.039	*	.019	*	.067	*	.046	*
NI	.060	25.334	.053	24.529	.066	24.766	.049	25.443	.040	25.071	.075	25.911	.057	25.307	.044	24.688
O	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*
	F/M	4.018		.978		2.442		5.107		2.753		4.987		4.894		1.386
	F/FM	.801		.494		.709		.836		.734		.833		.830		.581

33 SAMPLE SRC97-3 GRAIN 3
34 SAMPLE SRC97-3 GRAIN 4
35 SAMPLE SRC97-3 GRAIN 5
36 SAMPLE SRC97-3 GRAIN 8
37 SAMPLE SRC97-3 GRAIN 9
38 SAMPLE SRC97-3 GRAIN 10
39 SAMPLE SRC97-3 GRAIN 11
40 SAMPLE SRC97-3 GRAIN 12

CHROMITE, TINTINA MINES, Probe 352-TNT-01 (LOT #ASBK260199) April 15 1999, R.L.B

	41	42	43	44	45	46	47	48
SIO2	.00	.09	.00	.00	.00	.00	.00	.01
TIO2	.28	.08	.38	.26	.22	.17	.17	.26
A2O3	12.82	26.26	11.98	10.33	16.26	12.50	11.78	16.14
C2O3	43.13	33.71	41.74	41.21	40.55	44.60	47.58	37.94
FEO	36.74	28.71	37.92	41.55	35.16	34.99	31.80	37.59
MNO	.31	.29	.44	.44	.42	.39	.44	.48
MGO	5.91	10.57	6.48	5.43	7.35	6.73	7.64	6.36
ZNO	.41	.19	.15	.26	.18	.17	.21	.34
NIO	.35	.28	.28	.22	.15	.27	.27	.19
SUM	99.95	100.18	99.37	99.70	100.29	99.82	99.89	99.31
SI	.000 *	.023 *	.000 *	.000 *	.000 *	.000 *	.000 *	.003 *
TI	.059 *	.015 *	.081 *	.056 *	.045 *	.036 *	.035 *	.054 *
AL	4.217 *	7.791 *	3.986 *	3.506 *	5.190 *	4.091 *	3.821 *	5.261 *
CR	9.520 *	6.711 *	9.317 *	9.383 *	8.684 *	9.793 *	10.356 *	8.298 *
FE	8.578 *	6.046 *	8.954 *	10.007 *	7.964 *	8.127 *	7.321 *	8.697 *
MN	.073 *	.062 *	.105 *	.107 *	.096 *	.092 *	.103 *	.112 *
MG	2.459 *	3.967 *	2.727 *	2.331 *	2.967 *	2.786 *	3.135 *	2.622 *
ZN	.085 *	.035 *	.031 *	.055 *	.036 *	.035 *	.043 *	.069 *
NI	.079 25.069	.057 24.706	.064 25.265	.051 25.497	.033 25.015	.060 25.019	.060 24.873	.042 25.160
O	32.000 *	32.000 *	32.000 *	32.000 *	32.000 *	32.000 *	32.000 *	32.000 *
F/M	3.518	1.540	3.322	4.339	2.716	2.950	2.368	3.359
F/FM	.779	.606	.769	.813	.731	.747	.703	.771

41 SAMPLE SRC97-3 GRAIN 13
42 SAMPLE SRC97-3 GRAIN 14
43 SAMPLE SRC97-3 GRAIN 15
44 SAMPLE SRC97-3 GRAIN 16
45 SAMPLE SRC97-3 GRAIN 17
46 SAMPLE SRC97-3 GRAIN 18
47 SAMPLE SRC97-3 GRAIN 19
48 SAMPLE SRC97-3 GRAIN 20

CHROMITE, TINTINA MINES, Probe 352-TNT-01 (LOT #ASBK260199) April 15 1999, R.L.B

	49	50	51	52	53	54	55	56
SIO2	.00	.00	.00	.01	.01	.01	.00	.00
TIO2	.13	.60	.32	.23	.48	.25	.40	.50
A2O3	12.40	10.01	12.70	10.15	10.15	10.56	6.60	21.39
C2O3	46.90	37.92	41.86	45.23	41.87	43.18	41.37	31.70
FEO	32.16	44.63	37.37	36.66	41.79	39.17	45.29	38.29
MNO	.36	.45	.47	.46	.51	.55	.54	.37
MGO	7.76	4.89	6.05	5.85	4.99	5.55	4.33	7.49
ZNO	.14	.18	.26	.17	.17	.13	.17	.23
NIO	.21	.26	.22	.33	.24	.25	.35	.29
SUM	100.06	98.94	99.25	99.09	100.21	99.65	99.05	100.26
SI	.000 *	.000 *	.000 *	.003 *	.003 *	.003 *	.000 *	.000 *
TI	.027 *	.133 *	.068 *	.049 *	.104 *	.054 *	.090 *	.100 *
AL	4.004 *	3.466 *	4.215 *	3.414 *	3.433 *	3.553 *	2.336 *	6.717 *
CR	10.160 *	8.809 *	9.321 *	10.207 *	9.502 *	9.748 *	9.825 *	6.679 *
FE	7.370 *	10.966 *	8.802 *	8.751 *	10.032 *	9.353 *	11.377 *	8.534 *
MN	.084 *	.112 *	.112 *	.111 *	.124 *	.133 *	.137 *	.084 *
MG	3.169 *	2.142 *	2.540 *	2.489 *	2.135 *	2.362 *	1.939 *	2.975 *
ZN	.028 *	.039 *	.054 *	.036 *	.036 *	.027 *	.038 *	.045 *
NI	.046 24.888	.061 25.727	.050 25.161	.076 25.135	.055 25.423	.057 25.290	.085 25.827	.062 25.197
O	32.000 *	32.000 *	32.000 *	32.000 *	32.000 *	32.000 *	32.000 *	32.000 *
	F/M 2.352	5.173	3.510	3.561	4.757	4.016	5.939	2.896
	F/FM .702	.838	.778	.781	.826	.801	.856	.743

49 SAMPLE SRC97-4 GRAIN 1
50 SAMPLE SRC97-4 GRAIN 2
51 SAMPLE SRC97-4 GRAIN 3
52 SAMPLE SRC97-4 GRAIN 4
53 SAMPLE SRC97-4 GRAIN 5
54 SAMPLE SRC97-4 GRAIN 8
55 SAMPLE SRC97-4 GRAIN 9
56 SAMPLE SRC97-4 GRAIN 10

CHROMITE, TINTINA MINES, Probe 352-TNT-01 (LOT #ASBK260199) April 15 1999, R.L.B

	57	58	59	60	61	62	63	64
SIO2	.00	.00	.00	.06	.02	.01	.00	.00
TIO2	.26	.26	.16	.34	.22	.17	.25	.30
A2O3	12.65	13.70	14.29	14.00	11.57	8.80	7.05	19.02
C2O3	44.09	45.15	41.09	40.35	47.90	44.39	49.48	36.71
FEO	35.76	32.36	37.24	36.01	32.61	39.23	36.96	35.89
MNO	.57	.46	.43	.55	.48	.47	.53	.38
MGO	6.62	7.15	6.53	7.17	6.86	5.13	5.14	7.37
ZNO	.22	.22	.12	.21	.38	.31	.22	.27
NIO	.25	.14	.23	.26	.21	.20	.18	.31
SUM	100.42	99.44	100.09	98.95	100.25	98.71	99.81	100.25

SI	.000	*	.000	*	.000	*	.017	*	.006	*	.003	*	.000	*	.000	*
TI	.054	*	.054	*	.033	*	.071	*	.046	*	.037	*	.054	*	.060	*
AL	4.124	*	4.433	*	4.655	*	4.596	*	3.761	*	3.024	*	2.398	*	6.007	*
CR	9.644	*	9.801	*	8.981	*	8.887	*	10.448	*	10.235	*	11.293	*	7.779	*
FE	8.273	*	7.430	*	8.609	*	8.389	*	7.524	*	9.568	*	8.923	*	8.045	*
MN	.134	*	.107	*	.101	*	.130	*	.112	*	.116	*	.130	*	.086	*
MG	2.730	*	2.926	*	2.691	*	2.977	*	2.821	*	2.230	*	2.212	*	2.944	*
ZN	.045	*	.045	*	.024	*	.043	*	.077	*	.067	*	.047	*	.053	*
NI	.056	25.059	.031	24.826	.051	25.146	.058	25.168	.047	24.841	.047	25.327	.042	25.098	.067	25.042
O	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*
	F/M	3.080		2.576		3.237		2.861		2.707		4.343		4.093		2.762
	F/FM	.755		.720		.764		.741		.730		.813		.804		.734

57 SAMPLE SRC97-4 GRAIN 11
58 SAMPLE SRC97-4 GRAIN 12
59 SAMPLE SRC97-4 GRAIN 13
60 SAMPLE SRC97-4 GRAIN 14
61 SAMPLE SRC97-4 GRAIN 15
62 SAMPLE SRC97-4 GRAIN 16
63 SAMPLE SRC97-4 GRAIN 17
64 SAMPLE SRC97-4 GRAIN 18

CHROMITE, TINTINA MINES, Probe 352-TNT-01 (LOT #ASBK260199) April 15 1999, R.L.B

	65	66	67	68	69	70	71	72
SIO2	.00	.00	.03	.00	.00	.00	.00	.00
TIO2	.46	.07	.21	.16	.24	.27	.43	.26
A2O3	20.92	27.67	16.26	15.53	25.49	9.80	9.52	18.88
C2O3	34.38	28.48	41.61	41.06	31.76	42.02	46.84	36.46
FEO	35.07	33.21	31.97	35.37	31.73	41.04	36.01	35.94
MNO	.39	.38	.39	.45	.41	.56	.46	.45
MGO	7.65	9.66	7.93	6.55	9.55	5.12	6.61	7.35
ZNO	.19	.29	.10	.38	.16	.21	.15	.10
NIO	.24	.27	.22	.29	.26	.21	.14	.26
SUM	99.30	100.03	98.72	99.79	99.60	99.23	100.16	99.70

SI	.000	*	.000	*	.008	*	.000	*	.000	*	.000	*	.000	*	.000	*
TI	.092	*	.013	*	.043	*	.033	*	.046	*	.059	*	.091	*	.053	*
AL	6.582	*	8.298	*	5.213	*	5.021	*	7.718	*	3.350	*	3.160	*	5.998	*
CR	7.257	*	5.731	*	8.951	*	8.907	*	6.452	*	9.636	*	10.431	*	7.772	*
FE	7.831	*	7.068	*	7.274	*	8.115	*	6.818	*	9.955	*	8.482	*	8.103	*
MN	.088	*	.082	*	.090	*	.105	*	.089	*	.138	*	.110	*	.103	*
MG	3.044	*	3.664	*	3.216	*	2.679	*	3.657	*	2.214	*	2.775	*	2.954	*
ZN	.037	*	.055	*	.020	*	.077	*	.030	*	.045	*	.031	*	.020	*
NI	.052	24.984	.055	24.967	.048	24.863	.064	25.000	.054	24.864	.049	25.445	.032	25.111	.056	25.058
O	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*
	F/M	2.601		1.951		2.290		3.069		1.889		4.560		3.096		2.778
	F/FM	.722		.661		.696		.754		.654		.820		.756		.735

65 SAMPLE SRC97-4 GRAIN 19
66 SAMPLE SRC97-5 GRAIN 1
67 SAMPLE SRC97-5 GRAIN 2
68 SAMPLE SRC97-5 GRAIN 4
69 SAMPLE SRC97-5 GRAIN 5
70 SAMPLE SRC97-5 GRAIN 7
71 SAMPLE SRC97-5 GRAIN 8
72 SAMPLE SRC97-5 GRAIN 9

CHROMITE, TINTINA MINES, Probe 352-TNT-01 (LOT #ASBK260199) April 15 1999, R.L.B

	73	74	75	76	77	78	79	80
SIO2	.00	.00	.00	.00	.00	.00	.00	.01
TIO2	.54	.31	.46	.27	.24	.33	.18	.37
A2O3	10.95	7.39	27.96	20.55	6.96	17.47	15.81	13.31
C2O3	42.26	42.41	35.03	33.73	43.90	34.83	42.23	38.08
FEO	39.37	43.34	22.93	36.05	42.59	39.21	33.55	41.42
MNO	.46	.54	.30	.47	.54	.51	.48	.52
MGO	5.85	4.48	12.22	7.48	4.72	6.12	7.28	5.36
ZNO	.24	.27	.00	.21	.37	.19	.18	.33
NIO	.33	.21	.13	.14	.31	.21	.26	.30
SUM	100.00	98.95	99.03	98.90	99.63	98.87	99.97	99.70

SI	.000	*	.000	*	.000	*	.000	*	.000	*	.000	*	.000	*	.003	*
TI	.115	*	.069	*	.086	*	.055	*	.053	*	.069	*	.037	*	.079	*
AL	3.661	*	2.590	*	8.146	*	6.528	*	2.422	*	5.711	*	5.054	*	4.448	*
CR	9.481	*	9.974	*	6.848	*	7.189	*	10.249	*	7.639	*	9.057	*	8.539	*
FE	9.343	*	10.781	*	4.741	*	8.127	*	10.518	*	9.097	*	7.611	*	9.824	*
MN	.111	*	.136	*	.063	*	.107	*	.135	*	.120	*	.110	*	.125	*
MG	2.474	*	1.986	*	4.503	*	3.005	*	2.077	*	2.531	*	2.943	*	2.266	*
ZN	.050	*	.059	*	.000	*	.042	*	.081	*	.039	*	.036	*	.069	*
NI	.075	25.311	.050	25.646	.026	24.413	.030	25.083	.074	25.609	.047	25.252	.057	24.905	.068	25.422
O	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*
	F/M	3.821		5.496		1.067		2.740		5.128		3.642		2.623		4.391
	F/FM	.793		.846		.516		.733		.837		.785		.724		.815

73 SAMPLE SRC97-5 GRAIN 13
74 SAMPLE SRC97-5 GRAIN 16
75 SAMPLE SRC97-5 GRAIN 18
76 SAMPLE SRC97-5 GRAIN 19
77 SAMPLE SRC97-5 GRAIN 20
78 SAMPLE SRC97-5 GRAIN 23
79 SAMPLE SRC97-5 GRAIN 29
80 SAMPLE SRC97-5 GRAIN 30

CHROMITE, TINTINA MINES, Probe 352-TNT-01 (LOT #ASBK260199) April 15 1999, R.L.B

	81	82	83	84	85	86	87	88
SIO2	.00	.00	.00	.00	.00	.00	.00	.00
TIO2	.27	.15	.26	.00	.14	.28	.19	.38
A2O3	12.99	19.41	13.09	41.17	23.26	14.98	11.50	16.75
C2O3	42.91	37.97	41.82	22.13	36.78	37.12	43.64	35.84
FEO	35.81	34.10	36.99	21.44	28.94	40.64	37.95	39.40
MNO	.55	.41	.48	.15	.35	.51	.42	.48
MGO	6.38	7.63	5.96	14.94	9.36	5.88	6.03	6.07
ZNO	.21	.19	.16	.14	.16	.29	.26	.17
NIO	.18	.22	.21	.34	.25	.25	.27	.23
SUM	99.30	100.08	98.97	100.31	99.24	99.95	100.26	99.32

SI	.000	*	.000	*	.000	*	.000	*	.000	*	.000	*	.000	*	.000	*
TI	.057	*	.030	*	.055	*	.000	*	.027	*	.059	*	.040	*	.079	*
AL	4.278	*	6.092	*	4.343	*	11.109	*	7.089	*	4.932	*	3.808	*	5.473	*
CR	9.482	*	7.996	*	9.310	*	4.006	*	7.521	*	8.200	*	9.696	*	7.857	*
FE	8.370	*	7.596	*	8.710	*	4.106	*	6.259	*	9.496	*	8.919	*	9.136	*
MN	.130	*	.093	*	.114	*	.029	*	.077	*	.121	*	.100	*	.113	*
MG	2.658	*	3.029	*	2.501	*	5.099	*	3.608	*	2.449	*	2.526	*	2.509	*
ZN	.043	*	.037	*	.033	*	.024	*	.031	*	.060	*	.054	*	.035	*
NI	.040	25.060	.047	24.922	.048	25.115	.063	24.436	.052	24.664	.056	25.372	.061	25.205	.051	25.252
O	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*
	F/M	3.198		2.538		3.528		.811		1.756		3.927		3.571		3.687
	F/FM	.762		.717		.779		.448		.637		.797		.781		.787

81 SAMPLE SRC97-5 GRAIN 31
82 SAMPLE SRC97-5 GRAIN 34
83 SAMPLE SRC97-5 GRAIN 35
84 SAMPLE SRC97-5 GRAIN 36
85 SAMPLE SRC97-5 GRAIN 37
86 SAMPLE SRC97-5 GRAIN 38
87 SAMPLE SRC97-5 GRAIN 39
88 SAMPLE SRC97-5 GRAIN 41

CHROMITE, TINTINA MINES, Probe 352-TNT-01 (LOT #AS8K260199) April 15 1999, R.L.B

	89	90	91	92	93	94	95	96
SIO2	.00	.00	.00	.00	.00	.05	.00	.00
TIO2	.28	.08	.22	.21	.66	1.67	.43	.31
A2O3	24.19	15.59	12.45	20.56	11.20	15.50	13.02	12.40
C2O3	27.74	43.36	42.95	38.65	35.76	48.79	45.31	47.83
FEO	39.28	32.84	37.14	30.17	44.34	22.11	34.06	31.96
MNO	.30	.45	.54	.39	.47	.17	.44	.40
MGO	7.30	7.33	6.06	9.38	5.53	11.15	6.00	6.47
ZNO	.24	.23	.08	.18	.18	.00	.59	.25
NIO	.38	.09	.21	.25	.31	.41	.31	.20
SUM	99.71	99.97	99.65	99.79	98.45	99.85	100.16	99.82

SI	.000	*	.000	*	.000	*	.000	*	.000	*	.013	*	.000	*	.000	*
TI	.056	*	.016	*	.046	*	.041	*	.145	*	.325	*	.089	*	.064	*
AL	7.566	*	4.977	*	4.116	*	6.335	*	3.864	*	4.734	*	4.236	*	4.025	*
CR	5.821	*	9.287	*	9.527	*	7.990	*	8.277	*	9.998	*	9.891	*	10.416	*
FE	8.719	*	7.440	*	8.714	*	6.597	*	10.855	*	4.792	*	7.865	*	7.362	*
MN	.067	*	.103	*	.128	*	.086	*	.117	*	.037	*	.103	*	.093	*
MG	2.888	*	2.960	*	2.534	*	3.656	*	2.413	*	4.307	*	2.469	*	2.656	*
ZN	.047	*	.046	*	.017	*	.035	*	.039	*	.000	*	.120	*	.051	*
NI	.081	25.246	.020	24.848	.047	25.129	.053	24.792	.073	25.782	.085	24.292	.069	24.844	.044	24.712
O	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*
	F/M	3.042		2.549		3.489		1.828		4.547		1.121		3.227		2.807
	F/FM	.753		.718		.777		.646		.820		.529		.763		.737

89 SAMPLE SRC97-5 GRAIN 42
90 SAMPLE SRC97-5 GRAIN 44
91 SAMPLE SRC97-5 GRAIN 45
92 SAMPLE SRC97-5 GRAIN 46
93 SAMPLE SRC97-5 GRAIN 49
94 SAMPLE 8CBH001 GRAIN 18
95 SAMPLE 8CBH002 GRAIN 15
96 SAMPLE 8CBH002 GRAIN 16

CHROMITE, TINTINA MINES, Probe 352-TNT-01 (LOT #ASBK260199) April 15 1999, R.L.B

	97	98	99	100	101	102
SIO2	.06	.04	.01	.00	.04	.01
TIO2	3.39	1.64	.16	.01	.07	1.43
A2O3	14.65	23.95	5.16	24.33	11.61	7.97
C2O3	39.69	35.21	47.81	45.84	58.12	43.94
FEO	31.06	25.17	38.42	16.64	18.24	42.36
MNO	.31	.25	2.87	.26	.19	.68
MGO	10.81	13.74	2.50	13.03	11.02	2.42
ZNO	.10	.00	1.74	.07	.11	.43
NIO	.28	.38	.25	.19	.27	.45
SUM	100.35	100.38	98.92	100.37	99.67	99.69

SI	.016	*	.010	*	.003	*	.000	*	.011	*	.003	*
TI	.675	*	.307	*	.036	*	.002	*	.014	*	.317	*
AL	4.571	*	7.017	*	1.838	*	6.995	*	3.595	*	2.766	*
CR	8.309	*	6.922	*	11.426	*	8.842	*	12.074	*	10.230	*
FE	6.878	*	5.234	*	9.712	*	3.395	*	4.008	*	10.432	*
MN	.070	*	.053	*	.735	*	.054	*	.042	*	.170	*
MG	4.267	*	5.092	*	1.126	*	4.738	*	4.316	*	1.062	*
ZN	.020	*	.000	*	.388	*	.013	*	.021	*	.094	*
NI	.060	24.865	.076	24.710	.061	25.326	.037	24.075	.057	24.138	.107	25.180
O	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*
	F/M	1.628		1.038		9.275		.728		.938		9.981
	F/FM	.620		.509		.903		.421		.484		.909

97 SAMPLE 8CBH003 GRAIN 13
98 SAMPLE 8CBH004 GRAIN 8
99 SAMPLE 8CBH008 GRAIN 18
100 SAMPLE 8CBH009 GRAIN 11
101 SAMPLE 8CBH009 GRAIN 12
102 SAMPLE 8CBH009 GRAIN 14

ILMENITE, TINTINA MINES, Probe 352-TNT-01 (LOT# AS8K260199) April 15 1999, R.L.B.

	1	2	3	4	5	6
SIO2	.03	.03	.00	.00	.01	.01
TIO2	53.52	51.14	45.17	54.53	54.18	50.36
A2O3	.59	.25	.39	.03	.20	.08
C2O3	.23	.00	.00	2.13	5.40	1.11
FEO	33.80	44.86	47.66	32.03	26.02	37.24
MNO	.21	.54	.65	.32	.26	.24
MGO	11.51	3.06	4.95	10.67	13.84	9.47
ZNO	.04	.20	.00	.10	.00	.00
NIO	.18	.09	.09	.24	.29	.19
N2O5	.06	.00	.10	.16	.19	.40
SUM	100.17	100.17	99.01	100.21	100.39	99.10

SI	.008	*	.008	*	.000	*	.000	*	.002	*	.003	*
TI	10.084	*	10.241	*	9.323	*	10.252	*	9.928	*	9.830	*
AL	.174	*	.078	*	.126	*	.009	*	.057	*	.024	*
CR	.046	*	.000	*	.000	*	.421	*	1.040	*	.228	*
FE	7.082	*	9.990	*	10.939	*	6.696	*	5.302	*	8.083	*
MN	.045	*	.122	*	.151	*	.068	*	.054	*	.053	*
MG	4.299	*	1.215	*	2.025	*	3.976	*	5.027	*	3.664	*
ZN	.007	*	.039	*	.000	*	.018	*	.000	*	.000	*
NI	.036	*	.019	*	.020	*	.048	*	.057	*	.040	*
NB	.007	21.788	.000	21.712	.012	22.596	.018	21.506	.021	21.489	.047	21.971
O	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*	32.000	*
	F/M	1.658		8.326		5.477		1.701		1.066		2.221
	F/FM	.624		.893		.846		.630		.516		.690

1 SAMPLE SRC97-1 GRAIN 6
2 SAMPLE SRC97-5 GRAIN 14
3 SAMPLE SRC97-5 GRAIN 28
4 SAMPLE 8CBH006 GRAIN 7
5 SAMPLE 8CBH008 GRAIN 1
6 SAMPLE 8CBH008 GRAIN 17

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Fax

To: Shahe Sabag, Tintina Mines Ltd.

From: Michael Dufresne **CC:**

Fax: 416-929-2945; 10 pages **Date:** June 27, 1999

Re: Summary of Diamond Indicator Work Conducted up to April 15, 1999

Dear Shahe:

Enclosed is the final copy of a memo that documents the findings related to certain diamond indicator work conducted over the last few months by I & M Morrison Geological and APEX Geoscience Ltd. on behalf of Tintina Mines Ltd. and NSR Resources Ltd. on the Asphalt property in the Birch Mountains northwest of Fort McKay.

If you should have any questions please feel free to call me at your convenience.

Mike

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Progress Report For Recently Completed Diamond Indicator Work At Tintina Mines Limited and NSR Resource Inc.'s Asphalt And Buckton Properties, Birch Mountains, Northeast Alberta

Summary

Important indicator minerals indicative of kimberlite and other related alkaline intrusions have been obtained from bentonitic sections of mudstones intersected in drillholes 7AS01 from the Asphalt Property, and from 7BK03 from the Buckton Property. Indicator minerals obtained from the drill core include a G1 (Dawson and Stephens) titanian megacrystic pyrope, several possible eclogitic garnets, abundant chromites from two distinct trends including a high chrome (>60 wt% Cr2O3) mantle derived chromite and one picroilmenite. In addition, stream sampling from the headwaters of the Pierre and Calumet rivers in the vicinity of 7AS01 has yielded a high chrome mantle derived chromium diopside, several important high chrome mantle derived picroilmenites, several iron rich chromites similar to those obtained from drill core, as well as a high chrome mantle derived chromite and a high titanium kimberlitic chromite.

The megacrystic pyrope, along with the high chrome picroilmenites, high chrome chromites and high titanium kimberlitic chromite are strong evidence that undiscovered pipes of kimberlitic or a very closely related composition exist in the Birch Mountains at or near the Asphalt and Buckton Properties. Likely one or more of the ashes or bentonites within the Second White Specks mudstone intersected in 7AS01 from the Asphalt Property is kimberlitic in origin. The indicator minerals obtained to date suggest that these kimberlites tapped the upper mantle. A large population of high iron chromites of undetermined origin have been recovered from the Second White Specks and Upper Shaftesbury formations, likely derived from ashes or bentonites within the mudstones.

The stream sediment samples collected from the Asphalt Property yielded far less indicator minerals, particularly with respect to chromites, than the core samples from 7AS01. This supports the conclusion that the diamond indicator minerals derived from the drill core are likely derived from locally derived bentonitic units within the Second White Specks and Upper Shaftesbury formations, which are far less voluminous than the enclosing mudstones that represent the bulk of the underlying bedrock in the area. The stream sediment samples collected closest to either drillhole 7AS01 or prospective high frequency magnetic anomalies at Target 2 yielded the highest number of indicator minerals. However, these samples yielded far less indicator minerals than the core samples indicating that the diamond indicator minerals contained within bentonitic sections of the Second White Specks and Upper Shaftesbury formations are quickly lost and/or diluted downstream.

Further exploration is warranted on the basis of the indicator minerals obtained to date from the stream sediment sampling program as well as the prior drill core sampling. The magnetic data obtained during the 1997 airborne geophysical survey indicates the presence of a number of prospective high frequency magnetic anomalies as well as high magnetic relief due to the underlying basement crystalline rocks. The 1997 magnetic data should be reviewed in detail for possible near surface intrusions including a line by line analysis of the raw profile data. The magnetic data should be combined with digital elevation data and RadarSat data in order to depict prospective targets and structures that the kimberlite intrusions may have used during ascent to surface. Work in progress by the Alberta Geological Survey using combined magnetic, digital elevation and RadarSat data has successfully identified the presence of kimberlite intrusions along subtle structures that transect Phanerozoic sediments in other parts of northern Alberta, even though the magnetic anomalies yielded by the kimberlites are indistinctive by themselves.

Based upon the diamond indicator minerals obtained to date and the presence of a number of prospective high frequency magnetic anomalies, further detailed fieldwork is warranted to search for kimberlites at both the Asphalt and Buckton properties. In particular, the headwaters of the Pierre and Calumet rivers should be sampled extensively at 0.5 km intervals. As well, a systematic till and stream sediment sampling program specifically targeting the most prospective high frequency magnetic anomalies should be conducted once the recommended remote sensing study is completed.

Fieldwork

During the period September 17 to September 20, 1998, APEX Geoscience Ltd. conducted 5 man-days of helicopter supported fieldwork at the Asphalt Property in Northeast Alberta. The fieldwork consisted of checking selected geophysical anomalies that could be prospective for kimberlite or related intrusions and collecting heavy mineral concentrate (HMC) samples proximal to the prospective geophysical anomalies. The anomalies that were the focus of the work are all contained within the southern half of Township 98 and Ranges 12 and 13.

A total of 9 HMC samples (Table 1) were collected from the Pierre River, the Calumet River and tributaries to each of these two rivers (Figure 1). Samples 8CBH001 to 8CBH005 were collected from the headwaters of the Calumet River and a tributary to the Calumet River in order to test a prospective high frequency magnetic anomaly at Target 2. The tributary forms a semi-circle that flows around a distinct hill to the south which is underlain by the eastern magnetic anomaly. The area has been partially burned about 12 to 15 years ago, but the new and old vegetation combine to form a combined vegetation and topographic anomaly that is partially coincident with the eastern magnetic anomaly. The material in the tributary creek was dominantly comprised of some glacial debris but also a significant amount of local shale bedrock. The tributary contained only a small amount of water but the water was very clear and very cold. It is likely that the creek is being fed by spring water that could be run-off from permafrosted ground.

Three HMC samples (8CBH006, 8CBH008 and 8CBH009) were collected from the Pierre River at a spacing of about 400 m between samples approximately 1 km down river

from Target 1a but upstream of Target 1b (Figure 1). All three samples contained a large amount of shale chips in both the material that was screened off and the material that made it through the screens. Evidence of the Second White Specks and/or Fish Scale bone beds was observed in the river.

A single HMC sample (8CBH007) was collected from a tributary to the Pierre River approximately 1.5 km downstream from Target 3 (Figure 1). A large amount of shaley material was observed at this sample site.

All nine stream sediment samples were sent to Cominco Ltd.'s Exploration Research Laboratory in North Vancouver for diamond indicator mineral processing by heavy liquids. The samples were subsequently picked for diamond indicator minerals by I & M Morrison Geological (Morrison) also of Vancouver. The bulk of the diamond indicator minerals were then confirmed with microprobe analysis by Mr. B. Barnett of London, Ontario.

In addition, five samples of amalgamated drill core samples (SRC97-1 to 97-5), which were processed by the Saskatchewan Research Council for diamond indicator minerals during 1997, were also submitted to Morrison for follow-up diamond indicator mineral picking. Samples SRC97-1 and 97-4 are from drillhole 7AS01 at the Asphalt Property, while samples SRC97-2, SRC97-3 and SRC97-5 are from drillhole 7BK03 at the Buckton Property.

Diamond Indicator Results

The diamond indicator results have been discussed in a couple of prior memos. All of the microprobe data received to date for possible diamond indicator minerals are presented in Table 1. The results are compiled on to 22 scatter plots, which are attached as Appendix 1, in order to compare the results to pertinent mineralogical data from kimberlites and other types of intrusions from around the world. The findings are presented and summarized in the following text.

Drill Core Samples (SRC97-1 to SRC97-5)

The initial drill core processing at the SRC resulted in the recovery of a number of orange colored possible eclogitic garnets. The chemistry obtained for the eclogitic garnets could easily indicate that they are crustal derived and would not be considered significant in most sampling programs. However, one grain of high titanium chrome bearing pyrope was also detected in the group of orange garnets. The chemistry of this grain (high TiO2 in conjunction with high MgO and moderate Na2O; refer to scatter plots Cr2O3 vs TiO2, MgO vs FeO, Na2O vs TiO2 in Appendix 1) is highly suggestive that it is a high titanium G1 or G2 pyrope as defined by Dawson and Stephens (1976). G1 and G2 titanium pyropes are related to the megacryst or macrocryst suite of orange titanium rich pyrope garnets and are considered highly diagnostic of kimberlite (Mitchell, 1986). As noted in prior work, the recovery of this grain from ashy Second White Specks Shale in drillhole 7AS01 at the Asphalt Property near the headwaters of the Pierre River is highly suggestive that an ash in the drill core is derived from a nearby kimberlite source. It may also indicate that several of the high titanium +/- high sodium G3 garnets with between 22 to 25 wt% Total Fe as FeO

could be derived from eclogite mantle and, therefore, would most likely be derived from a kimberlite ash or an ash from a related alkaline intrusive that sampled eclogitic mantle. Samples SRC97-1 and SRC97-4 both yielded possible eclogitic gamets with less than 23 wt% total Fe as FeO. In general, 22 to 23 wt% FeO is considered the upper cut off for garnets diagnostic of eclogite parentage (Schulze, In Press). Morrison did not pick any further garnets for microprobe analysis in follow-up examination of the five drill core samples. Morrison should be asked to pick another suite of about 10 to 20 possible garnets from each sample for further analysis in order to determine if any other possible megacrystic 1 or G2 pyropes are present in the drill core.

A large number of possible picroilmenites, chromites and, to a lesser degree, olivines were selected for follow-up identification by Maureen Morrison from the archive drill core samples. A total of 93 chromites and 3 picroilmenites were confirmed by microprobe analysis (Table 1). All the possible olivines were confirmed as other non kimberlitic minerals such as grossular, crustal clinopyroxene or quartz.

The chromites from the drill core yield a bimodal population of grains based upon major element chemistry. That is the bulk of the chromites (see Cr2O3 vs MgO for chromites in Appendix 1) form what appears to be an evolution trend (trend 1 - magmatic?) from moderate concentrations of Cr2O3 (40 to 50 wt%) and MgO (4 to 8 wt%) to low Cr2O3 (20 to 30 wt%) and high MgO (8 to 14 wt%). All samples yielded trend 1 chromites, therefore, it can be concluded that if the chromites are derived from the ashy horizons in 7AS01 and 7BK03, they are likely contained within multiple ash units at both the Buckton and Asphalt Properties. Based upon publicly available data, trend 1 is not likely indicative of kimberlite or lamproite or any other alkaline intrusive. However, it should be noted that Fe rich chromites can be found in certain kimberlites and related alkaline intrusives. This is well illustrated on a plot of Cr2O3 vs Total FeO which shows that the high FeO chromites derived from the drill core nicely overlap a known a population of high FeO chromites derived from the Sturgeon Lake Kimberlite in Saskatchewan. Interestingly, the Mountain Lake Kimberlite near Grande Prairie also yields a few similar chromites with high FeO. However, the Sturgeon Lake Kimberlite chromites with high FeO yield lower concentrations of Al2O3 and much higher concentrations of TiO2 than the Second White Specks trend 1 chromites (see FeO vs Al2O3 and FeO vs TiO2 in Appendix 1). Kimberlite derived chromites tend to yield a diagnostic population of chromites with greater than 50 wt% Cr2O3 and from 1 to 4 wt% TiO2, which trend 1 does not display (this is well illustrated by the kimberlite data and the Mountain Lake Kimberlite on the plot of Cr2O3 vs TiO2 in Appendix 1). One chromite, which was obtained from stream sample 8CBH003 on the Asphalt Property, does yield high TiO2 and looks to be potentially kimberlite derived. Other high Ti chromites were obtained from samples 8CBH001, 8CBH004 and 8CBH009, however, their chemistry is not unequivocally diagnostic of kimberlite.

The second poorly defined scattered population (trend 2) of chromites (mostly defined by the chromites derived from the stream samples with at least 2 chromites from the core samples) tends to display higher concentrations of Cr2O3 (48 to 60 wt%) for the equivalent MgO concentration (7 to 11 wt%) trending to lower Cr2O3 with higher MgO than the trend 1 chromites. This population lies much closer to the kimberlitic trend from high Cr2O3 and moderate to high MgO to low Cr2O3 and very high MgO illustrated on the plot of Cr2O3 vs MgO in Appendix 1. It should be noted that at least one grain from SRC97-1

from Target 1a but upstream of Target 1b (Figure 1). All three samples contained a large amount of shale chips in both the material that was screened off and the material that made it through the screens. Evidence of the Second White Specks and/or Fish Scale bone beds was observed in the river.

A single HMC sample (8CBH007) was collected from a tributary to the Pierre River approximately 1.5 km downstream from Target 3 (Figure 1). A large amount of shaley material was observed at this sample site.

All nine stream sediment samples were sent to Cominco Ltd.'s Exploration Research Laboratory in North Vancouver for diamond indicator mineral processing by heavy liquids. The samples were subsequently picked for diamond indicator minerals by I & M Morrison Geological (Morrison) also of Vancouver. The bulk of the diamond indicator minerals were then confirmed with microprobe analysis by Mr. B. Barnett of London, Ontario.

In addition, five samples of amalgamated drill core samples (SRC97-1 to 97-5), which were processed by the Saskatchewan Research Council for diamond indicator minerals during 1997, were also submitted to Morrison for follow-up diamond indicator mineral picking. Samples SRC97-1 and 97-4 are from drillhole 7AS01 at the Asphalt Property, while samples SRC97-2, SRC97-3 and SRC97-5 are from drillhole 7BK03 at the Buckton Property.

Diamond Indicator Results

The diamond indicator results have been discussed in a couple of prior memos. All of the microprobe data received to date for possible diamond indicator minerals are presented in Table 1. The results are compiled on to 22 scatter plots, which are attached as Appendix 1, in order to compare the results to pertinent mineralogical data from kimberlites and other types of intrusions from around the world. The findings are presented and summarized in the following text.

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The second poorly defined scattered population (trend 2) of chromites (mostly defined by the chromites derived from the stream samples with at least 2 chromites from the core samples) tends to display higher concentrations of Cr2O3 (48 to 60 wt%) for the equivalent MgO concentration (7 to 11 wt%) trending to lower Cr2O3 with higher MgO than the trend 1 chromites. This population lies much closer to the kimberlitic trend from high Cr2O3 and moderate to high MgO to low Cr2O3 and very high MgO illustrated on the plot of Cr2O3 vs MgO in Appendix 1. It should be noted that at least one grain from SRC97-1

(Asphalt drillhole 7AS01) and one grain from SRC97-2 (Buckton drillhole 7BK03) fall within trend 2. Several other grains with lower total FeO (less than 30 wt%) and high MgO (greater than 12 wt%) from trend 1 could belong to the trend 2 chromite population. One very interesting chromite with 60.79 wt% Cr2O3 and 7.3 wt% MgO was obtained from SRC97-1. This chromite, although not of chemistry that exactly corresponds to diamond inclusion chromites, is likely mantle derived based upon the high concentration of Cr2O3 and low concentration of Total FeO, TiO2 and Al2O3. Mantle derived minerals such as this chromite and the G1 titanian pyrope, also from SRC97-1, are likely an indication that one of the ashes or bentonitic units in drillhole 7AS01 is derived from a deeply sourced alkaline magma, such as a kimberlite or lamproite, that has tapped the mantle.

Only one picroilmenite of consequence was recovered and confirmed by microprobe analysis from the drill core samples. The grain (from SRC97-1) yielded 11.51 wt% MgO and 0.23 wt% Cr2O3. The high concentration of MgO and slightly elevated Cr2O3 are very diagnostic of kimberlite derived picroilmenites. Mitchell (1986) states that ilmenites containing greater than 10 wt% MgO appear to be confined to kimberlites. This is well illustrated on plots of FeO vs MgO and Cr2O3 vs MgO for picroilmenites in Appendix 1. This grain also yields elevated Ni and Nb, which can also be diagnostic of kimberlitic picroilmenites as illustrated by plots of Ni vs Nb and MgO vs Nb (Note that one exception exists with all the black triangles, from Ill Bizard, Quebec, an ultramafic lamprophyre). Ashton reports that only one of the kimberlites intersected to date in the Buffalo Head Hills yielded significant amounts of picroilmenite, however, the picroilmenites were characterized by high concentrations of Nb up to more than 1 wt%.

Stream Sediment Samples (8CBH001 to 8CBH009)

The stream sediment processing and diamond indicator picking at Cominco and Morrison yielded a number of possible eclogitic garnets, chrome diopsides, picroilmenites, chromites and a few possible olivines. Several important chromites, picroilmenites and one chrome diopside were confirmed with microprobe analysis.

The chrome diopside from sample 8CBH001 with 1.48 wt% Cr2O3 also yielded moderate CaO and low FeO, which is characteristic of mantle derived (lherzolite) chrome diopsides. The high level of Cr2O3 and low FeO are highly diagnostic of mantle chrome diopsides (as illustrated on a plot of Cr2O3 vs FeO for clinopyroxenes in Appendix 1), which are brought to surface by few other types of intrusions other than deeply sourced alkaline intrusions such as kimberlites or lamproite.

Several interesting chromites were also obtained from a number of the stream sediment samples including 8CBH001, 8CBH002, 8CHH003, 8CBH004 and 8CBH009. The most significant chromites are from sample 8CBH009, which yielded one chromite with high Cr2O3 (58.12 wt%), high MgO and low TiO2 that plots very near the diamond inclusion field for chromites. This chromite is likely mantle derived. Four chromites from samples 8CBH001, 8CBH003, 8CBH004 and 8CBH009 yielded high concentrations of TiO2, with the chromite from 8CBH003 containing 3.39 wt% TiO2 and 39.69 wt% Cr2O3, which is very diagnostic of kimberlitic (magmatic) chromites. Based upon FeO vs TiO2 at least three of these chromites look to be kimberlitic in origin. At least five of the chromites from the stream

samples yield high concentrations of FeO and have comparable chemistry to the trend 1 chromites derived from the Second White Specks Shale intersected in drill core.

Three excellent picroilmenites were obtained from stream sediment samples 8CBH006 and 8CBH008 (Table 1). All three contain from 9.47 up to 13.84 wt% MgO and from 1.11 to 5.4 wt% Cr2O3 (Table 1 and MgO vs Cr2O3 for picroilmenites in Appendix 1). The two grains with high Cr2O3 and high MgO are likely derived from kimberlite or lamproite. It is interesting that both stream sediment samples were collected from the Pierre River, less than 2 km from the location of drillhole 7AS01, which also yielded signficant diamond indicator minerals including a picroilmenite, abundant chromites, a G1 titanian pyrope garnet and several possible eclogitic garnets. It should also be pointed out that the stream sediment samples yielded far less indicator minerals, particularly with respect to chromites, than the core samples from 7AS01. This supports the conclusion that the diamond indicator minerals derived from the drill core are likely derived from one or more bentonitic units within the Second White Specks Formation and upper Shaftesbury Formation, which are far less voluminous than the enclosing mudstones. In the case of both the sampling along the Pierre River (8CBH006, 8CBH008 and 8CBH009) and the tributary of the Calumet River to the south, a larger number of indicator minerals were obtained in the samples collected from sample sites furthest upstream. This suggests that the diamond indicator minerals are actually being quickly diluted rather than concentrated downstream because of the large amount of non-bentonitic mudstone in the drainage downstream of the Second White Specks and Upper Shaftesbury formations.

Review of the 1997 Airborne Magnetic Survey Data

The 1997 airbome magnetic data was imported into ERMapper and briefly reviewed in order to evaluate whether any prospective high frequency magnetic anomalies exist that are potentially indicative of near surface intrusions such as kimberlite are present on the Buckton and Asphalt properties. A detailed review of the raw magnetic profile data was not conducted. The crystalline basement underlying the Phanerozoic sediments on the property is part of the Taltson Magmatic Zone and yields a highly corrugated high relief signature with more than 1,900 nT of relief across the property. The high magnetic relief along with the strong corrugation make the detection of high frequency near surface magnetic responses that could be related to kimberlites difficult. A total of 21 prospective magnetic targets were identified and are shown on Figures 1 and 2. Several of the targets are likely subtle variations in basement features. However, there are a number of higher priority targets that should be reviewed in detail including targets 2, 3, 4, 7, 8 and 9 in the southern half of the area and targets 13, 15, 17, 18, 19, 20 and 21 in the northern half of the survey area. All or a portion of these targets will likely require ground checking and reconnaissance to detailed diamond indicator sampling. A number of these magnetic anomalies exist along or immediately adjacent to basement lineaments that could be indicative of basement faults penetrative into the overlying Phanerozoic sediments. Work in progress by the Alberta Geological Survey using combined magnetic, digital elevation and RadarSat data has successfully identified the presence of kimberlite intrusions along subtle structures that transect Phanerozoic sediments in other parts of northern Alberta, even though the magnetic anomalies yielded by the kimberlites are indistinctive by themselves. Magnetic

anomalies at high priority targets 3, 4, 7, 8, 9, 13, 17, 20 and 21 exist adjacent to obvious basement lineaments (Figures 1 and 2).

Conclusions and Recommendations

Important indicator minerals indicative of kimberlite and other related alkaline intrusions have been obtained from bentonitic sections of mudstones intersected in drillholes 7AS01 from the Asphalt Property, and from 7BK03 from the Buckton Property. Indicator minerals obtained from the drill core include a G1 (Dawson and Stephens) titanian megacrystic pyrope, several possible eclogitic garnets, abundant chromites from two distinct trends including a high chrome (>60 wt% Cr2O3) mantle derived chromite and one picroilmenite. In addition, stream sampling from the headwaters of the Pierre and Calumet rivers in the vicinity of 7AS01 has yielded a high chrome mantle derived chromium diopside, several important high chrome mantle derived picroilmenites, several iron rich chromites similar to those obtained from drill core, as well as a high chrome mantle derived chromite and a high titanium kimberlitic chromite.

The megacrystic pyrope, along with the high chrome picroilmenites, high chrome chromites and high titanium kimberlitic chromite are strong evidence that undiscovered pipes of kimberlitic or a very closely related composition exist in the Birch Mountains at or near the Asphalt and Buckton Properties. Likely one or more of the ashes or bentonites within the Second White Specks mudstone intersected in 7AS01 from the Asphalt Property is kimberlitic in origin. The indicator minerals obtained to date suggest that these kimberlites tapped the upper mantle. A large population of high iron chromites of undetermined origin have been recovered from the Second White Specks and Upper Shaftesbury formations, likely derived from ashes or bentonites within the mudstones.

The stream sediment samples collected from the Asphalt Property yielded far less indicator minerals, particularly with respect to chromites, than the core samples from 7AS01. This supports the conclusion that the diamond indicator minerals derived from the drill core are likely derived from locally derived bentonitic units within the Second White Specks and Upper Shaftesbury formations, which are far less voluminous than the enclosing mudstones that represent the bulk of the underlying bedrock in the area. The stream sediment samples collected closest to either drillhole 7AS01 or prospective high frequency magnetic anomalies at Target 2 yielded the highest number of indicator minerals. However, these samples yielded far less indicator minerals than the core samples indicating that the diamond indicator minerals contained within bentonitic sections of the Second White Specks and Upper Shaftesbury formations are quickly lost and/or diluted downstream.

Further exploration is warranted on the basis of the indicator minerals obtained to date from the stream sediment sampling program as well as the prior drill core sampling. The magnetic data obtained during the 1997 airborne geophysical survey indicates the presence of a number of prospective high frequency magnetic anomalies as well as high magnetic relief due to the underlying basement crystalline rocks. The 1997 magnetic data should be reviewed in detail for possible near surface intrusions including a line by line analysis of the raw profile data. The magnetic data should be combined with digital elevation data and RadarSat data in order to depict prospective targets and structures that

the kimberlite intrusions may have used during ascent to surface. Work in progress by the Alberta Geological Survey using combined magnetic, digital elevation and RadarSat data has successfully identified the presence of kimberlite intrusions along subtle structures that transect Phanerozoic sediments in other parts of northern Alberta, even though the magnetic anomalies yielded by the kimberlites are indistinctive by themselves.

Based upon the diamond indicator minerals obtained to date and the presence of a number of prospective high frequency magnetic anomalies, further detailed fieldwork is warranted to search for kimberlites at both the Asphalt and Buckton properties. In particular, the headwaters of the Pierre and Calumet rivers should be sampled extensively at 0.5 km intervals. As well, a systematic till and stream sediment sampling program specifically targeting the most prospective high frequency magnetic anomalies should be conducted once the recommended remote sensing study is completed.

APEX Geoscience Ltd.

[redacted]

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

RESULTS OF ANALYSES FOR SRC AND MORRISON PICKED GRAINS FROM 1997 DRILLING AND 1998 STREAMS													
Sample#	Pt#	Mineral (Min-id.asc)	SiO2	TiO2	Al2O3	Cr2O3	FeO	MgO	MnO	CaO	Na2O	K2O	Total
Data Sorted By Sample Then By Mineral													
Stream Samples													
8CBH001	19	CPX_05_CHROME_DIOPSIDE	53.98	0.27	2.82	1.48	3.28	14.8	0	22.21	1.44	0.02	100.3
8CBH001	22	G_05_MAGNESIAN_ALMANDINE	39.22	0.09	22.52	0.02	26.94	9.72	0.36	1.11	0.01	n/a	99.99
8CBH001	18	PICRO_CHROMITE	0.05	1.67	15.5	48.79	22.11	11.15	0.17	n/a	n/a	n/a	99.85
8CBH002	20	ALMANDINE	37.92	0.03	22	0	34.15	4.78	0.41	1.2	0.01	n/a	100.5
8CBH002	17	CPX_02_UNKNOWN	54.22	0.11	2.28	0.9	6.49	13.42	0.08	20.43	2.4	0.03	100.36
8CBH002	15	SUB_PICRO_CHROMITE	0	0.43	13.02	45.31	34.06	6	0.44	n/a	n/a	n/a	100.16
8CBH002	16	SUB_PICRO_CHROMITE	0	0.31	12.4	47.83	31.96	6.47	0.4	n/a	n/a	n/a	99.82
8CBH003	13	SUB_PICRO_CHROMITE	0.06	3.39	14.65	39.69	31.06	10.81	0.31	n/a	n/a	n/a	100.35
8CBH004	8	SUB_PICRO_CHROMITE	0.04	1.64	23.95	35.21	25.17	13.74	0.25	n/a	n/a	n/a	100.38
8CBH006	7	PICRO_ILMENITE	0	54.53	0.03	2.13	32.03	10.67	0.32	n/a	n/a	n/a	100.21
8CBH007	4	CPX_02_UNKNOWN	53.93	0.05	1.12	0.36	4.75	14.98	0.12	24.27	0.67	0.04	100.29
8CBH008	18	CHROMITE	0.01	0.16	5.16	47.81	38.42	2.5	2.87	n/a	n/a	n/a	98.92
8CBH008	19	CPX_02_UNKNOWN	53.95	0.08	1.18	0.7	5.24	14.96	0.12	23.07	0.88	0.02	100.2
8CBH008	1	PICRO_ILMENITE	0.01	54.18	0.2	5.4	26.02	13.84	0.26	n/a	n/a	n/a	100.39
8CBH008	17	PICRO_ILMENITE	0.01	50.36	0.08	1.11	37.24	9.47	0.24	n/a	n/a	n/a	99.1
8CBH009	14	CHROMITE	0.01	1.43	7.97	43.94	42.36	2.42	0.68	n/a	n/a	n/a	99.69
8CBH009	12	PICRO_CHROMITE	0.04	0.07	11.61	58.12	18.24	11.02	0.19	n/a	n/a	n/a	99.67
8CBH009	11	UNKNOWN	0	0.01	24.33	45.84	16.64	13.03	0.26	n/a	n/a	n/a	100.37
2nd White Specks Drill Core													
SRC 97-1	13	G_03_CALCIC_PYROPE_ALMANDINE	38.64	0.06	21.87	0.04	22.34	6.52	0.60	9.74	0.00	0.00	99.80
SRC 97-1	14	G_01_TITANIAN_PYROPE	42.32	0.83	20.90	2.30	9.04	19.69	0.27	5.00	0.07	0.00	100.41
SRC 97-1	15	G_03_CALCIC_PYROPE_ALMANDINE	39.11	0.09	22.68	0.00	22.71	5.10	0.65	10.43	0.00	0.00	100.77
SRC 97-1	16	G_05_MAGNESIAN_ALMANDINE	39.09	0.02	22.49	0.03	25.30	5.55	0.54	8.20	0.00	0.00	101.21
SRC 97-2	2	G_03_CALCIC_PYROPE_ALMANDINE	38.13	0.05	22.33	0.01	22.98	5.77	0.66	10.26	0.02	0.00	100.20
SRC 97-2	1	G_05_MAGNESIAN_ALMANDINE	38.89	0.09	21.62	0.05	25.81	5.62	0.43	7.76	0.13	0.00	100.39
SRC 97-3	3	G_03_CALCIC_PYROPE_ALMANDINE	39.22	0.03	22.85	0.00	21.50	6.50	0.57	9.95	0.00	0.00	100.63
SRC 97-3	4	G_05_MAGNESIAN_ALMANDINE	38.87	0.05	22.14	0.00	24.72	5.20	0.81	8.90	0.03	0.00	100.71
SRC 97-4	7	ALMANDINE	38.69	0.10	21.86	0.00	31.66	3.58	1.01	4.77	0.05	0.00	101.71
SRC 97-4	6	G_03_CALCIC_PYROPE_ALMANDINE	39.26	0.21	22.15	0.00	23.57	6.48	0.75	8.30	0.06	0.00	100.78
SRC 97-4	8	G_03_CALCIC_PYROPE_ALMANDINE	39.67	0.14	22.87	0.00	21.16	7.32	0.45	9.51	0.07	0.00	101.19
SRC 97-4	5	G_05_MAGNESIAN_ALMANDINE	38.03	0.06	21.30	0.05	23.41	4.38	0.95	10.98	0.01	0.00	99.16
SRC 97-5	9	G_05_MAGNESIAN_ALMANDINE	39.20	0.06	22.12	0.02	23.95	5.75	0.55	8.72	0.07	0.00	100.43
SRC 97-5	12	ALMANDINE	37.32	0.12	21.14	0.00	32.10	0.26	1.51	8.35	0.00	0.00	100.81
SRC 97-5	10	G_05_MAGNESIAN_ALMANDINE	37.69	0.10	21.32	0.02	25.14	3.09	0.84	11.38	0.04	0.00	99.61
SRC 97-5	11	G_05_MAGNESIAN_ALMANDINE	37.70	0.09	21.59	0.04	26.81	3.25	0.67	9.55	0.03	0.00	99.73

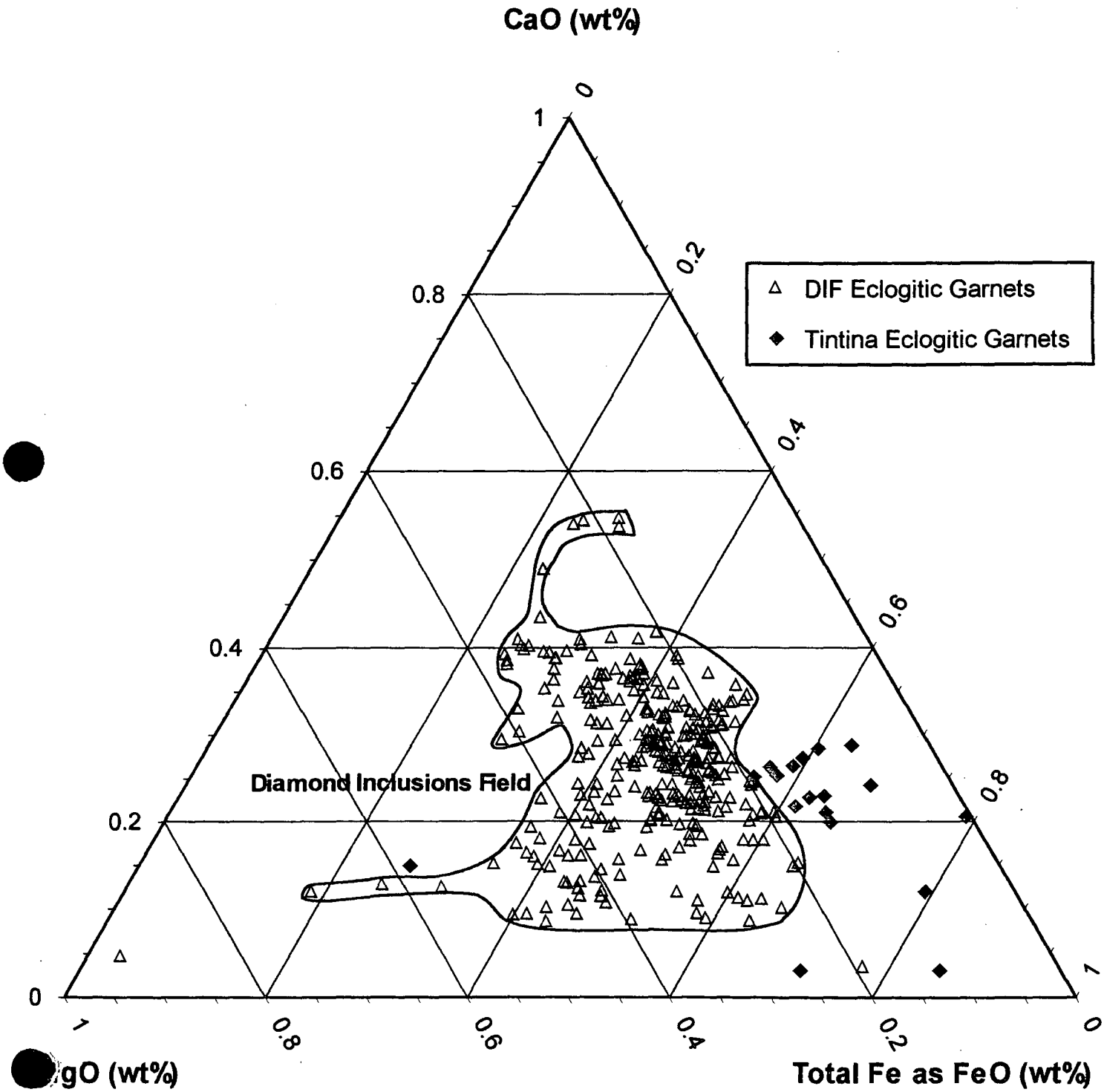
Sample#	Pt#	Mineral (Min-id.asc)	SiO2	TiO2	Al2O3	Cr2O3	FeO	MgO	MnO	CaO	Na2O	K2O	Total
SRC97-1	1	CHROMITE	0	0.31	11.74	42.15	38.94	5.5	0.48	n/a	n/a	n/a	99.54
SRC97-1	9	CHROMITE	0.01	0.2	11.23	44.14	37.5	5.95	0.55	n/a	n/a	n/a	99.87
SRC97-1	12	CHROMITE	0.01	0.33	8	42.32	43.55	4.48	0.48	n/a	n/a	n/a	99.63
SRC97-1	15	CHROMITE	0	0.24	10.38	48.06	34.82	5.55	0.51	n/a	n/a	n/a	99.94
SRC97-1	18	CHROMITE	0.01	0.27	8.44	42.78	42.33	4.83	0.37	n/a	n/a	n/a	99.69
SRC97-1	19	CHROMITE	0.01	0.31	10.61	43.38	39.13	5.78	0.58	n/a	n/a	n/a	100.32
SRC97-1	29	CHROMITE	0.01	0.15	8.52	50.41	34.66	5.81	0.47	n/a	n/a	n/a	100.38
SRC97-1	33	CHROMITE	0	0.33	12.58	39.36	41.98	4.39	0.52	n/a	n/a	n/a	99.71
SRC97-1	34	CHROMITE	0.01	0.36	7.07	48.69	36.98	5.2	0.54	n/a	n/a	n/a	99.36
SRC97-1	37	CHROMITE	0.01	0.24	9.74	45.39	37.86	5.23	0.48	n/a	n/a	n/a	99.41
SRC97-1	6	PICRO_ILMENITE	0.03	53.52	0.59	0.23	33.8	11.51	0.21	n/a	n/a	n/a	100.17
SRC97-1	3	SUB_PICRO_CHROMITE	0	0.27	12	46.26	33.7	6.37	0.52	n/a	n/a	n/a	99.72
SRC97-1	5	SUB_PICRO_CHROMITE	0	0.23	19.79	36.02	35.1	7.96	0.34	n/a	n/a	n/a	99.82
SRC97-1	7	SUB_PICRO_CHROMITE	0	0.22	13.8	42.36	36.44	6.43	0.38	n/a	n/a	n/a	100.07
SRC97-1	10	SUB_PICRO_CHROMITE	0.01	0	9.06	60.79	21.54	7.3	0.46	n/a	n/a	n/a	99.58
SRC97-1	13	SUB_PICRO_CHROMITE	0	0.56	19.8	39.38	30.62	8.56	0.48	n/a	n/a	n/a	99.78
SRC97-1	14	SUB_PICRO_CHROMITE	0.01	0.57	11.22	42.13	37.74	6.43	0.52	n/a	n/a	n/a	99.04
SRC97-1	23	SUB_PICRO_CHROMITE	0.01	0.34	12.37	44.41	35.69	6.1	0.47	n/a	n/a	n/a	99.79
SRC97-1	24	SUB_PICRO_CHROMITE	0.01	0.21	11.47	46.81	34.1	6.47	0.44	n/a	n/a	n/a	99.9
SRC97-1	27	SUB_PICRO_CHROMITE	0	0.16	18.46	35.75	37.9	6.51	0.38	n/a	n/a	n/a	99.72
SRC97-1	32	SUB_PICRO_CHROMITE	0	0.01	20.82	37.79	30.94	8.85	0.36	n/a	n/a	n/a	99.14
SRC97-1	4	UNKNOWN	0	0.16	35.09	27.04	24.6	12.79	0.27	n/a	n/a	n/a	100.36
SRC97-2	1	CHROMITE	0.01	0.34	7.45	50.01	35.63	5.31	0.56	n/a	n/a	n/a	99.79
SRC97-2	3	CHROMITE	0.07	0.2	8.51	49.92	35.11	5.42	0.57	n/a	n/a	n/a	100.17
SRC97-2	11	CHROMITE	0.01	0.31	9.72	43.34	39.2	5.54	0.56	n/a	n/a	n/a	99.22
SRC97-2	12	CHROMITE	0	0.23	8.44	43.82	41.59	4.69	0.52	n/a	n/a	n/a	99.85
SRC97-2	13	CHROMITE	0	0.45	8.6	47.8	38.2	3.86	0.38	n/a	n/a	n/a	100.05
SRC97-2	5	SUB_PICRO_CHROMITE	0	0.15	12.82	45.13	33.7	6.52	0.42	n/a	n/a	n/a	99.2
SRC97-2	9	SUB_PICRO_CHROMITE	0	0.13	9.47	51.64	31.47	6.32	0.51	n/a	n/a	n/a	99.84
SRC97-2	10	SUB_PICRO_CHROMITE	0	0.56	13.04	41.81	37.62	6.06	0.36	n/a	n/a	n/a	99.83
SRC97-2	7	UNKNOWN	0	0.24	28.53	28.39	31.97	9.84	0.42	n/a	n/a	n/a	99.76
SRC97-3	1	CHROMITE	0	0.36	7	42.63	44.19	4.41	0.56	n/a	n/a	n/a	99.74
SRC97-3	3	CHROMITE	0.01	0.2	11.99	40.72	39.58	5.6	0.52	n/a	n/a	n/a	99.01
SRC97-3	8	CHROMITE	0.02	0.63	8.7	42.81	42.03	4.68	0.56	n/a	n/a	n/a	99.83
SRC97-3	11	CHROMITE	0.01	0.41	6.87	46.71	39.79	4.62	0.5	n/a	n/a	n/a	99.46
SRC97-3	13	CHROMITE	0	0.28	12.82	43.13	36.74	5.91	0.31	n/a	n/a	n/a	99.95
SRC97-3	16	CHROMITE	0	0.26	10.33	41.21	41.55	5.43	0.44	n/a	n/a	n/a	99.7
SRC97-3	2	PICRO_CHROMITE	0.03	0.15	15.14	47.82	24.76	10.88	0.28	n/a	n/a	n/a	99.37
SRC97-3	5	SUB_PICRO_CHROMITE	0	0.18	14.93	44.39	31.41	7.32	0.44	n/a	n/a	n/a	99.07

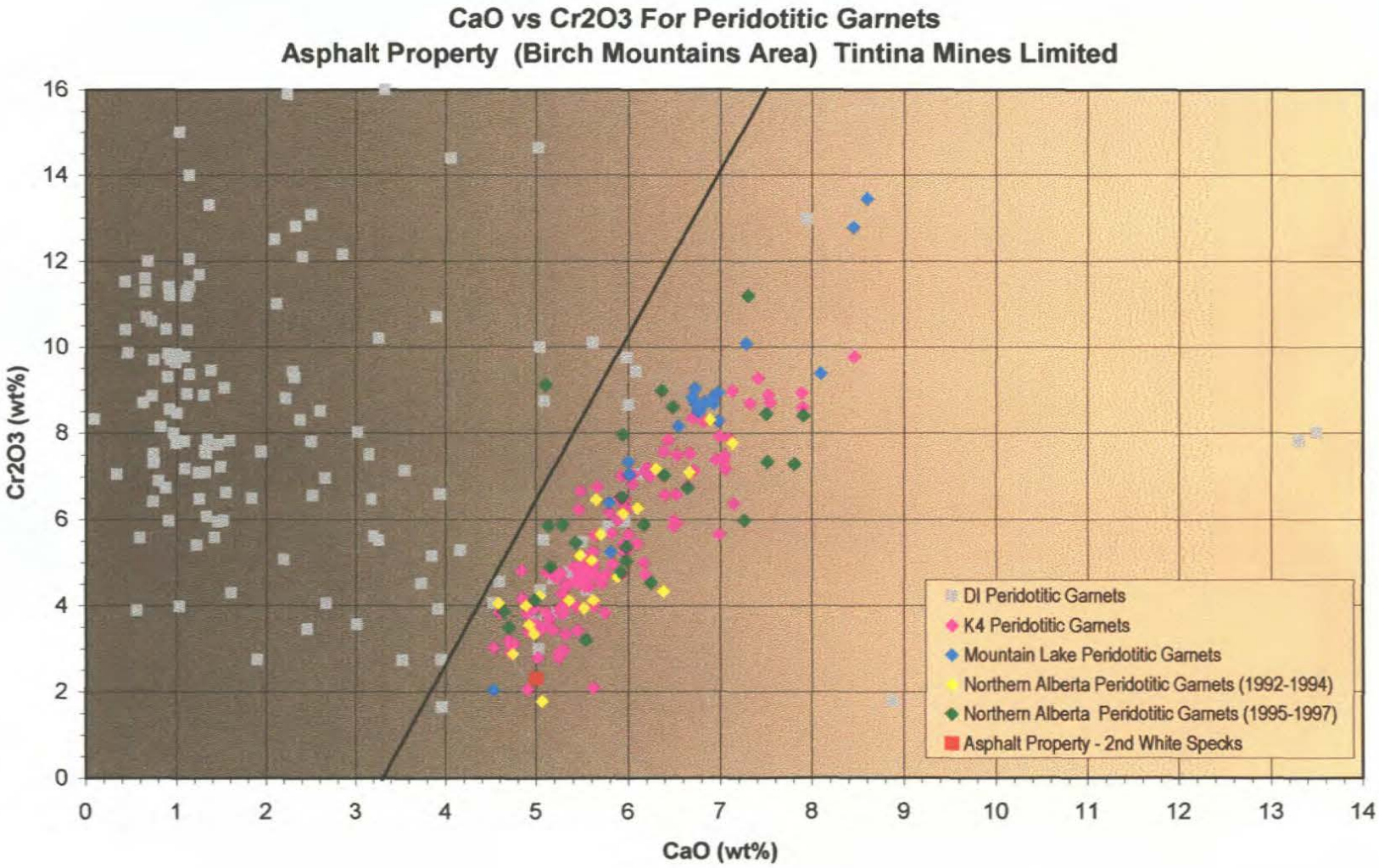
Sample#	Pt#	Mineral (Min-id.asc)	SiO2	TiO2	Al2O3	Cr2O3	FeO	MgO	MnO	CaO	Na2O	K2O	Total
SRC97-3	9	SUB_PICRO_CHROMITE	0.04	0.14	16.36	39.04	35.33	7.28	0.38	n/a	n/a	n/a	98.94
SRC97-3	15	SUB_PICRO_CHROMITE	0	0.38	11.98	41.74	37.92	6.48	0.44	n/a	n/a	n/a	99.37
SRC97-3	17	SUB_PICRO_CHROMITE	0	0.22	16.26	40.55	35.16	7.35	0.42	n/a	n/a	n/a	100.29
SRC97-3	18	SUB_PICRO_CHROMITE	0	0.17	12.5	44.6	34.99	6.73	0.39	n/a	n/a	n/a	99.82
SRC97-3	19	SUB_PICRO_CHROMITE	0	0.17	11.78	47.58	31.8	7.64	0.44	n/a	n/a	n/a	99.89
SRC97-3	20	SUB_PICRO_CHROMITE	0.01	0.26	16.14	37.94	37.59	6.36	0.48	n/a	n/a	n/a	99.31
SRC97-3	4	UNKNOWN	0	0.07	35.59	26.57	23.58	13.68	0.25	n/a	n/a	n/a	100.08
SRC97-3	10	UNKNOWN	0	0.51	12.42	33.55	46.8	5.31	0.39	n/a	n/a	n/a	99.39
SRC97-3	12	UNKNOWN	0	0.05	27.06	33.25	27.37	11.2	0.29	n/a	n/a	n/a	99.69
SRC97-3	14	UNKNOWN	0.09	0.08	26.26	33.71	28.71	10.57	0.29	n/a	n/a	n/a	100.18
SRC97-4	2	CHROMITE	0	0.6	10.01	37.92	44.63	4.89	0.45	n/a	n/a	n/a	98.94
SRC97-4	4	CHROMITE	0.01	0.23	10.15	45.23	36.66	5.85	0.46	n/a	n/a	n/a	99.09
SRC97-4	5	CHROMITE	0.01	0.48	10.15	41.87	41.79	4.99	0.51	n/a	n/a	n/a	100.21
SRC97-4	8	CHROMITE	0.01	0.25	10.56	43.18	39.17	5.55	0.55	n/a	n/a	n/a	99.65
SRC97-4	9	CHROMITE	0	0.4	6.6	41.37	45.29	4.33	0.54	n/a	n/a	n/a	99.05
SRC97-4	16	CHROMITE	0.01	0.17	8.8	44.39	39.23	5.13	0.47	n/a	n/a	n/a	98.71
SRC97-4	17	CHROMITE	0	0.25	7.05	49.48	36.96	5.14	0.53	n/a	n/a	n/a	99.81
SRC97-4	1	SUB_PICRO_CHROMITE	0	0.13	12.4	46.9	32.16	7.76	0.36	n/a	n/a	n/a	100.06
SRC97-4	3	SUB_PICRO_CHROMITE	0	0.32	12.7	41.86	37.37	6.05	0.47	n/a	n/a	n/a	99.25
SRC97-4	11	SUB_PICRO_CHROMITE	0	0.26	12.65	44.09	35.76	6.62	0.57	n/a	n/a	n/a	100.42
SRC97-4	12	SUB_PICRO_CHROMITE	0	0.26	13.7	45.15	32.36	7.15	0.46	n/a	n/a	n/a	99.44
SRC97-4	13	SUB_PICRO_CHROMITE	0	0.16	14.29	41.09	37.24	6.53	0.43	n/a	n/a	n/a	100.09
SRC97-4	14	SUB_PICRO_CHROMITE	0.06	0.34	14	40.35	36.01	7.17	0.55	n/a	n/a	n/a	98.95
SRC97-4	15	SUB_PICRO_CHROMITE	0.02	0.22	11.57	47.9	32.61	6.86	0.48	n/a	n/a	n/a	100.25
SRC97-4	18	SUB_PICRO_CHROMITE	0	0.3	19.02	36.71	35.89	7.37	0.38	n/a	n/a	n/a	100.25
SRC97-4	10	UNKNOWN	0	0.5	21.39	31.7	38.29	7.49	0.37	n/a	n/a	n/a	100.26
SRC97-4	19	UNKNOWN	0	0.46	20.92	34.38	35.07	7.65	0.39	n/a	n/a	n/a	99.3
SRC97-5	7	CHROMITE	0	0.27	9.8	42.02	41.04	5.12	0.56	n/a	n/a	n/a	99.23
SRC97-5	13	CHROMITE	0	0.54	10.95	42.26	39.37	5.85	0.46	n/a	n/a	n/a	100
SRC97-5	16	CHROMITE	0	0.31	7.39	42.41	43.34	4.48	0.54	n/a	n/a	n/a	98.95
SRC97-5	20	CHROMITE	0	0.24	6.96	43.9	42.59	4.72	0.54	n/a	n/a	n/a	99.63
SRC97-5	30	CHROMITE	0.01	0.37	13.31	38.08	41.42	5.36	0.52	n/a	n/a	n/a	99.7
SRC97-5	35	CHROMITE	0	0.26	13.09	41.82	36.99	5.96	0.48	n/a	n/a	n/a	98.97
SRC97-5	38	CHROMITE	0	0.28	14.98	37.12	40.64	5.88	0.51	n/a	n/a	n/a	99.95
SRC97-5	49	CHROMITE	0	0.66	11.2	35.76	44.34	5.53	0.47	n/a	n/a	n/a	98.45
SRC97-5	2	SUB_PICRO_CHROMITE	0.03	0.21	16.26	41.61	31.97	7.93	0.39	n/a	n/a	n/a	98.72
SRC97-5	4	SUB_PICRO_CHROMITE	0	0.16	15.53	41.06	35.37	6.55	0.45	n/a	n/a	n/a	99.79
SRC97-5	8	SUB_PICRO_CHROMITE	0	0.43	9.52	46.84	36.01	6.61	0.46	n/a	n/a	n/a	100.16
SRC97-5	9	SUB_PICRO_CHROMITE	0	0.26	18.88	36.46	35.94	7.35	0.45	n/a	n/a	n/a	99.7

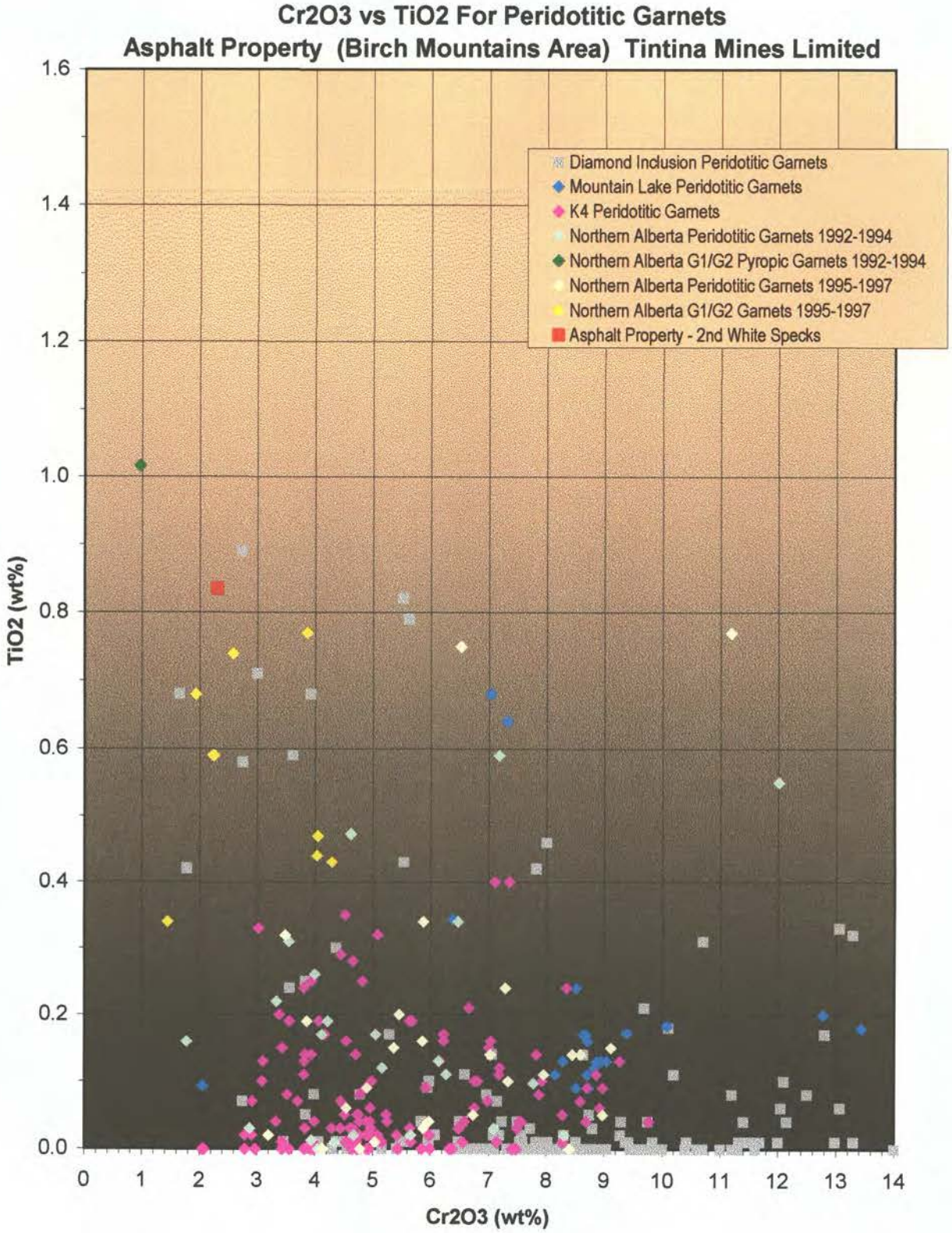
Sample#	Pt#	Mineral (Min-id.asc)	SiO2	TiO2	Al2O3	Cr2O3	FeO	MgO	MnO	CaO	Na2O	K2O	Total
SRC97-5	18	SUB_PICRO_CHROMITE	0	0.46	27.96	35.03	22.93	12.22	0.3	n/a	n/a	n/a	99.03
SRC97-5	29	SUB_PICRO_CHROMITE	0	0.18	15.81	42.23	33.55	7.28	0.48	n/a	n/a	n/a	99.97
SRC97-5	31	SUB_PICRO_CHROMITE	0	0.27	12.99	42.91	35.81	6.38	0.55	n/a	n/a	n/a	99.3
SRC97-5	34	SUB_PICRO_CHROMITE	0	0.15	19.41	37.97	34.1	7.63	0.41	n/a	n/a	n/a	100.08
SRC97-5	37	SUB_PICRO_CHROMITE	0	0.14	23.26	36.78	28.94	9.36	0.35	n/a	n/a	n/a	99.24
SRC97-5	39	SUB_PICRO_CHROMITE	0	0.19	11.5	43.64	37.95	6.03	0.42	n/a	n/a	n/a	100.26
SRC97-5	41	SUB_PICRO_CHROMITE	0	0.38	16.75	35.84	39.4	6.07	0.48	n/a	n/a	n/a	99.32
SRC97-5	44	SUB_PICRO_CHROMITE	0	0.08	15.59	43.36	32.84	7.33	0.45	n/a	n/a	n/a	99.97
SRC97-5	45	SUB_PICRO_CHROMITE	0	0.22	12.45	42.95	37.14	6.06	0.54	n/a	n/a	n/a	99.65
SRC97-5	46	SUB_PICRO_CHROMITE	0	0.21	20.56	38.65	30.17	9.38	0.39	n/a	n/a	n/a	99.79
SRC97-5	14	SUB_PICRO_ILMENITE	0.03	51.14	0.25	0	44.86	3.06	0.54	n/a	n/a	n/a	100.17
SRC97-5	28	SUB_PICRO_ILMENITE	0	45.17	0.39	0	47.66	4.95	0.65	n/a	n/a	n/a	99.01
SRC97-5	1	UNKNOWN	0	0.07	27.67	28.48	33.21	9.66	0.38	n/a	n/a	n/a	100.03
SRC97-5	5	UNKNOWN	0	0.24	25.49	31.76	31.73	9.55	0.41	n/a	n/a	n/a	99.6
SRC97-5	19	UNKNOWN	0	0.27	20.55	33.73	36.05	7.48	0.47	n/a	n/a	n/a	98.9
SRC97-5	23	UNKNOWN	0	0.33	17.47	34.83	39.21	6.12	0.51	n/a	n/a	n/a	98.87
SRC97-5	36	UNKNOWN	0	0	41.17	22.13	21.44	14.94	0.15	n/a	n/a	n/a	100.31
SRC97-5	42	UNKNOWN	0	0.28	24.19	27.74	39.28	7.3	0.3	n/a	n/a	n/a	99.71

APPENDIX 1: Various Scatter Plots Of Diamond Indicator Data

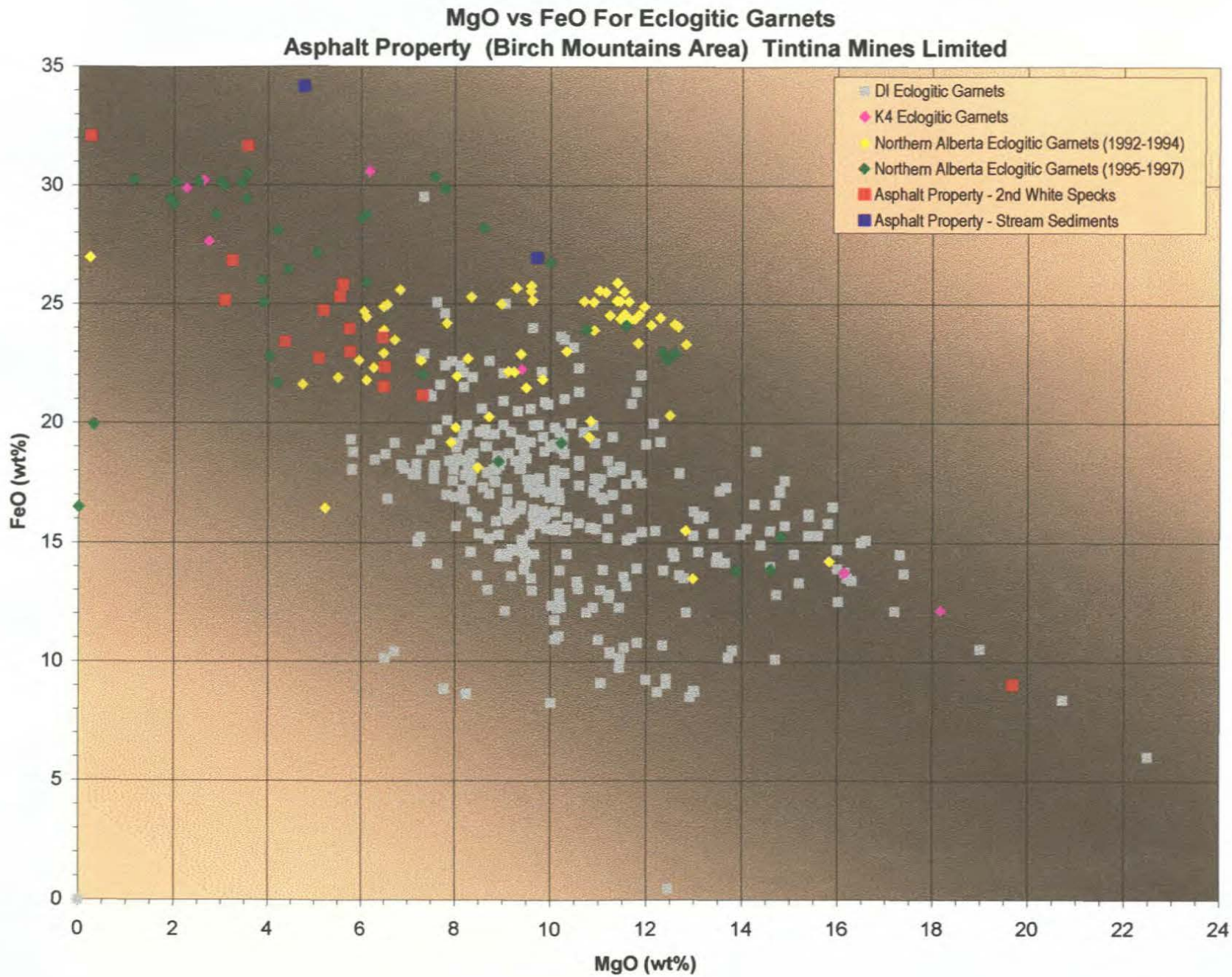
Eclogitic Garnets From Tintina Mines Limited's Asphalt Property, Northeast Alberta



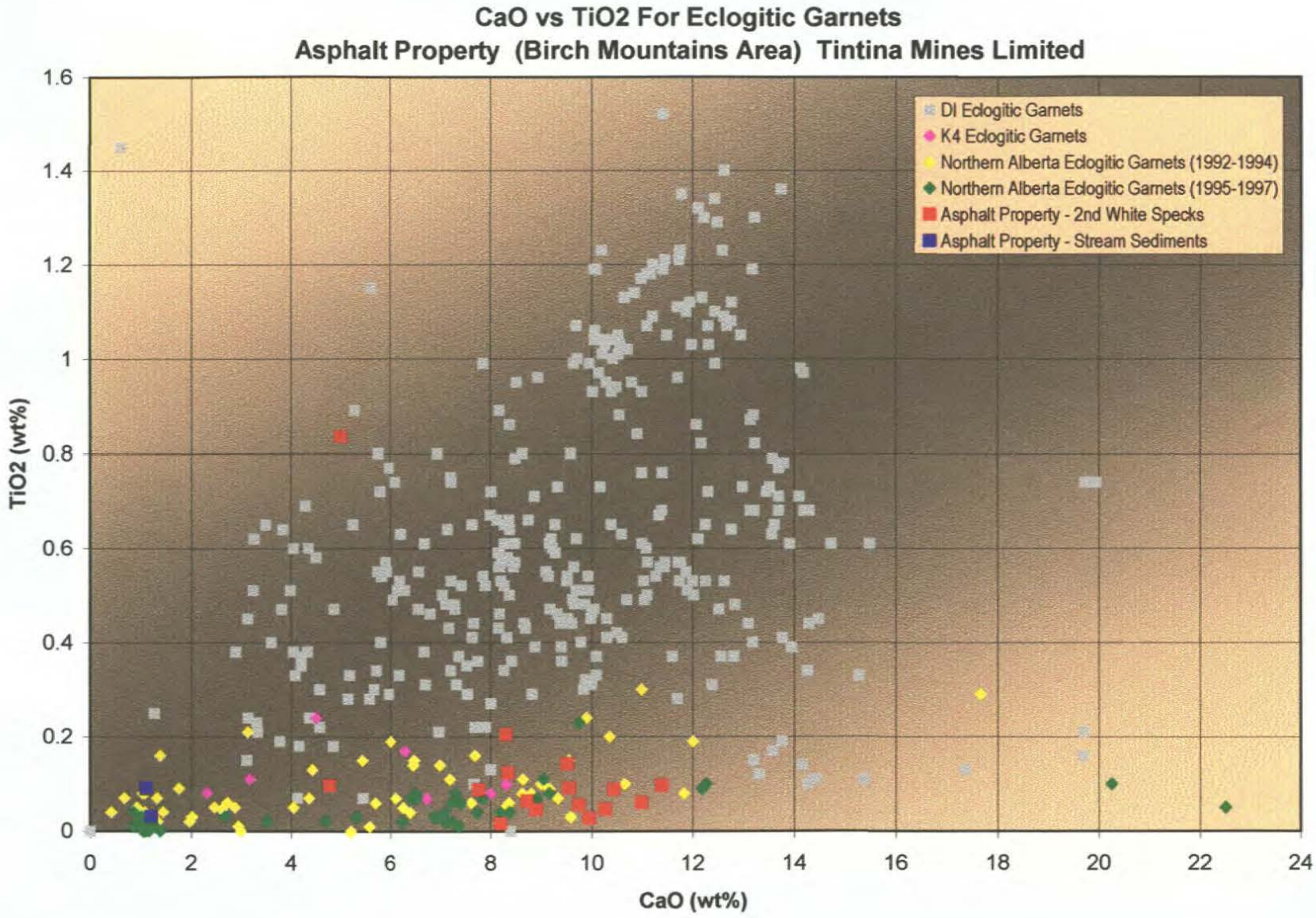

CaO vs Cr2O3 For Peridotitic Garnets
Asphalt Property (Birch Mountains Area) Tintina Mines Limited
Cr2O3 (wt%)
CaO (wt%)
0
2
4
6
8
10
12
14
16
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
DI Peridotitic Garnets
K4 Peridotitic Garnets
Mountain Lake Peridotitic Garnets
Northern Alberta Peridotitic Garnets (1992-1994)
Northern Alberta Peridotitic Garnets (1995-1997)
Asphalt Property - 2nd White Specks

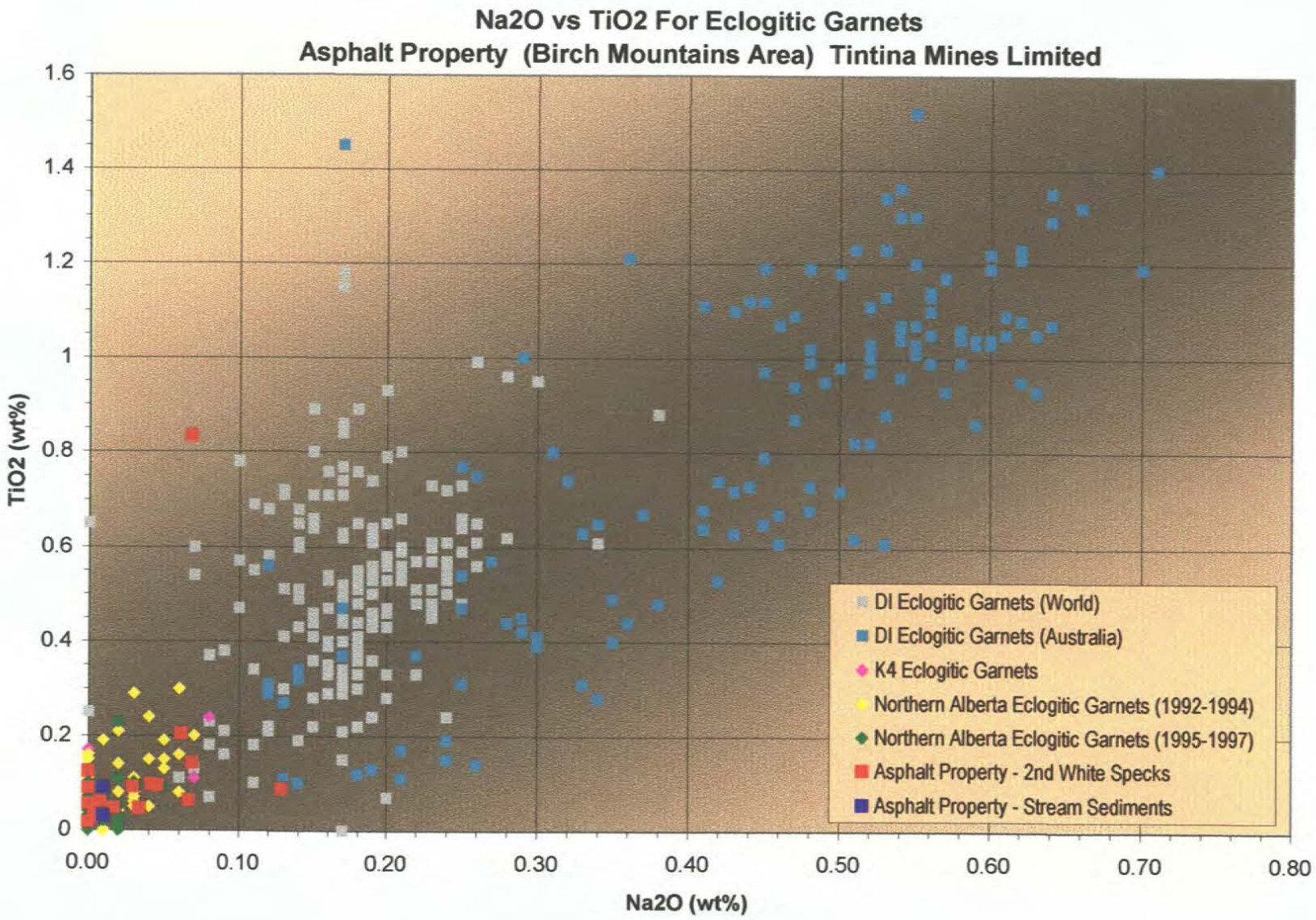

Cr2O3 vs TiO2 For Peridotitic Garnets
Asphalt Property (Birch Mountains Area) Tintina Mines Limited
Diamond Inclusion Peridotitic Garnets
Mountain Lake Peridotitic Garnets
K4 Peridotitic Garnets
Northern Alberta Peridotitic Garnets 1992-1994
Northern Alberta G1/G2 Pyropic Garnets 1992-1994
Northern Alberta Peridotitic Garnets 1995-1997
Northern Alberta G1/G2 Garnets 1995-1997
Asphalt Property - 2nd White Specks
TiO2 (wt%)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Cr2O3 (wt%)

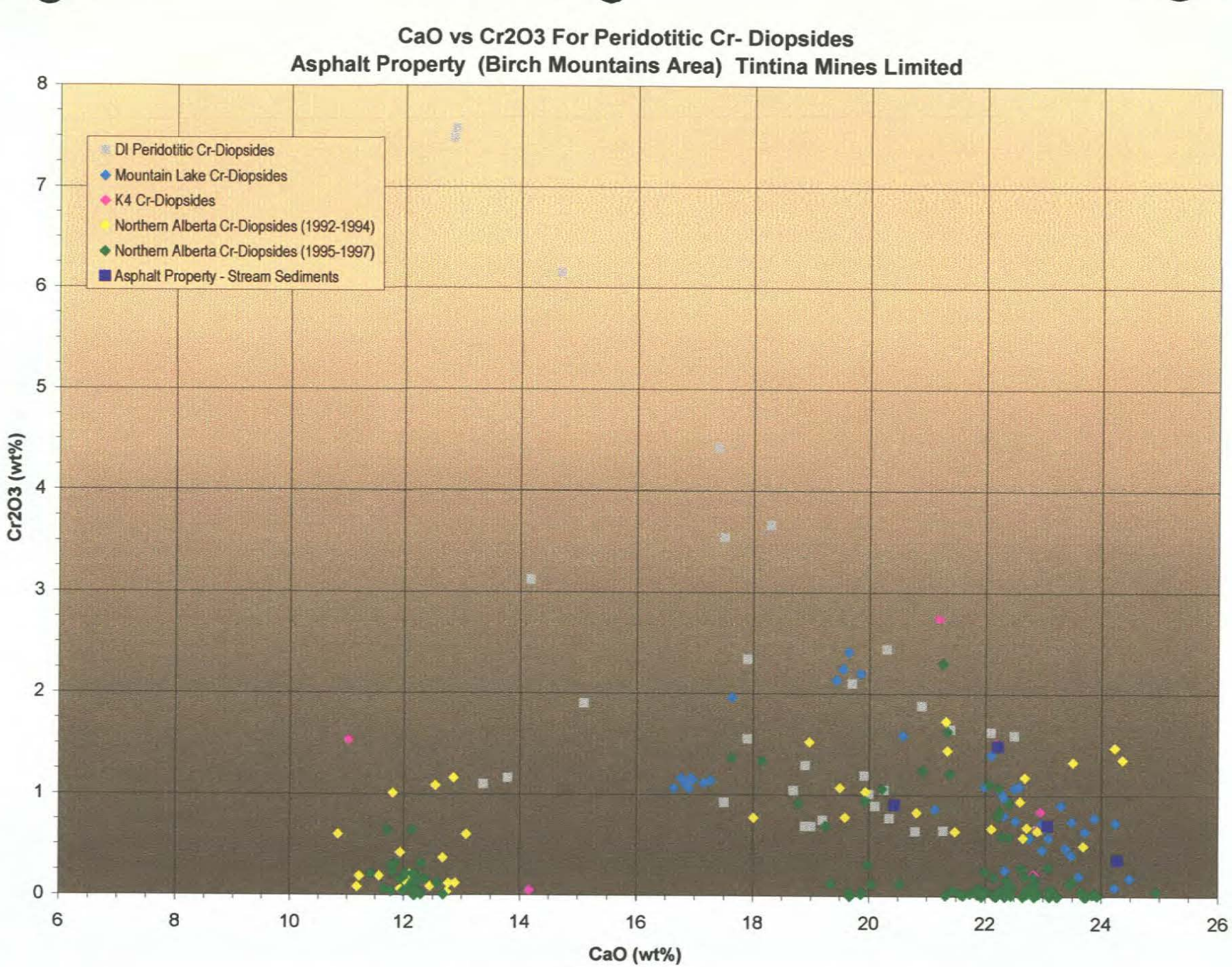
19990028


MgO vs FeO For Eclogitic Garnets
Asphalt Property (Birch Mountains Area) Tintina Mines Limited
DI Eclogitic Garnets
K4 Eclogitic Garnets
Northern Alberta Eclogitic Garnets (1992-1994)
Northern Alberta Eclogitic Garnets (1995-1997)
Asphalt Property - 2nd White Specks
Asphalt Property - Stream Sediments
FeO (wt%)
MgO (wt%)
0
5
10
15
20
25
30
35
0
2
4
6
8
10
12
14
16
18
20
22
24

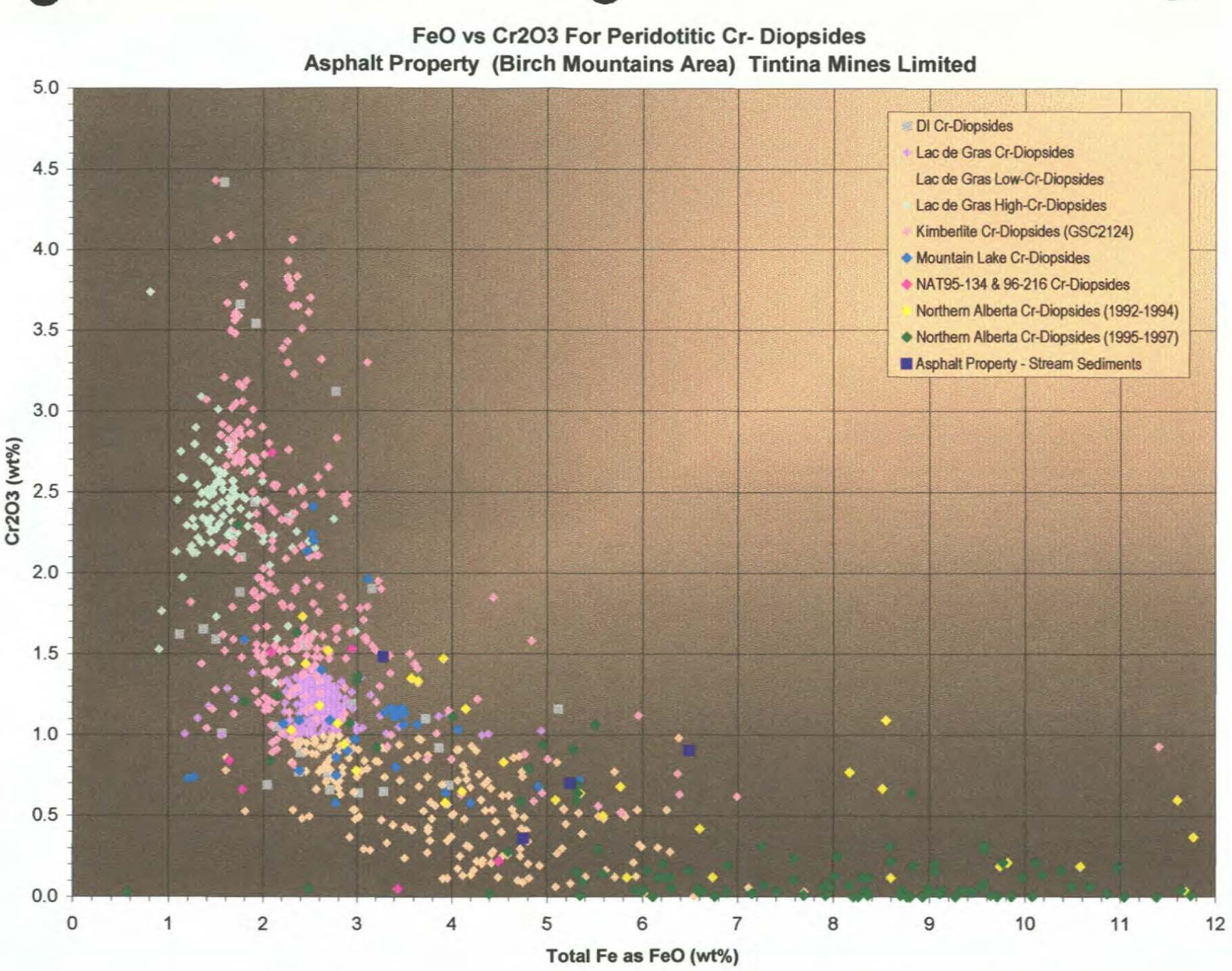
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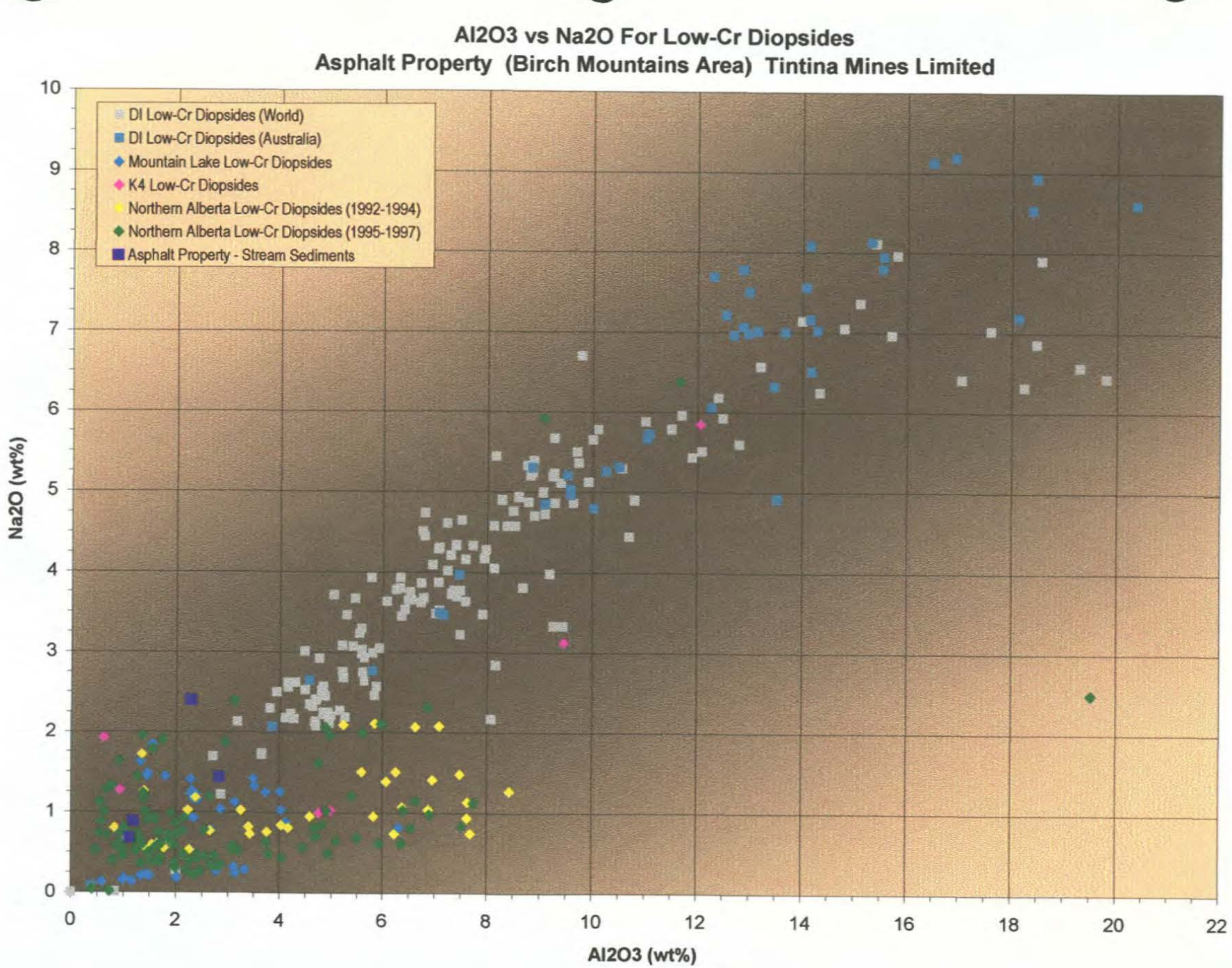

CaO vs TiO2 For Eclogitic Garnets
Asphalt Property (Birch Mountains Area) Tintina Mines Limited
DI Eclogitic Garnets
K4 Eclogitic Garnets
Northern Alberta Eclogitic Garnets (1992-1994)
Northern Alberta Eclogitic Garnets (1995-1997)
Asphalt Property - 2nd White Specks
Asphalt Property - Stream Sediments
TiO2 (wt%)
CaO (wt%)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
0
2
4
6
8
10
12
14
16
18
20
22
24

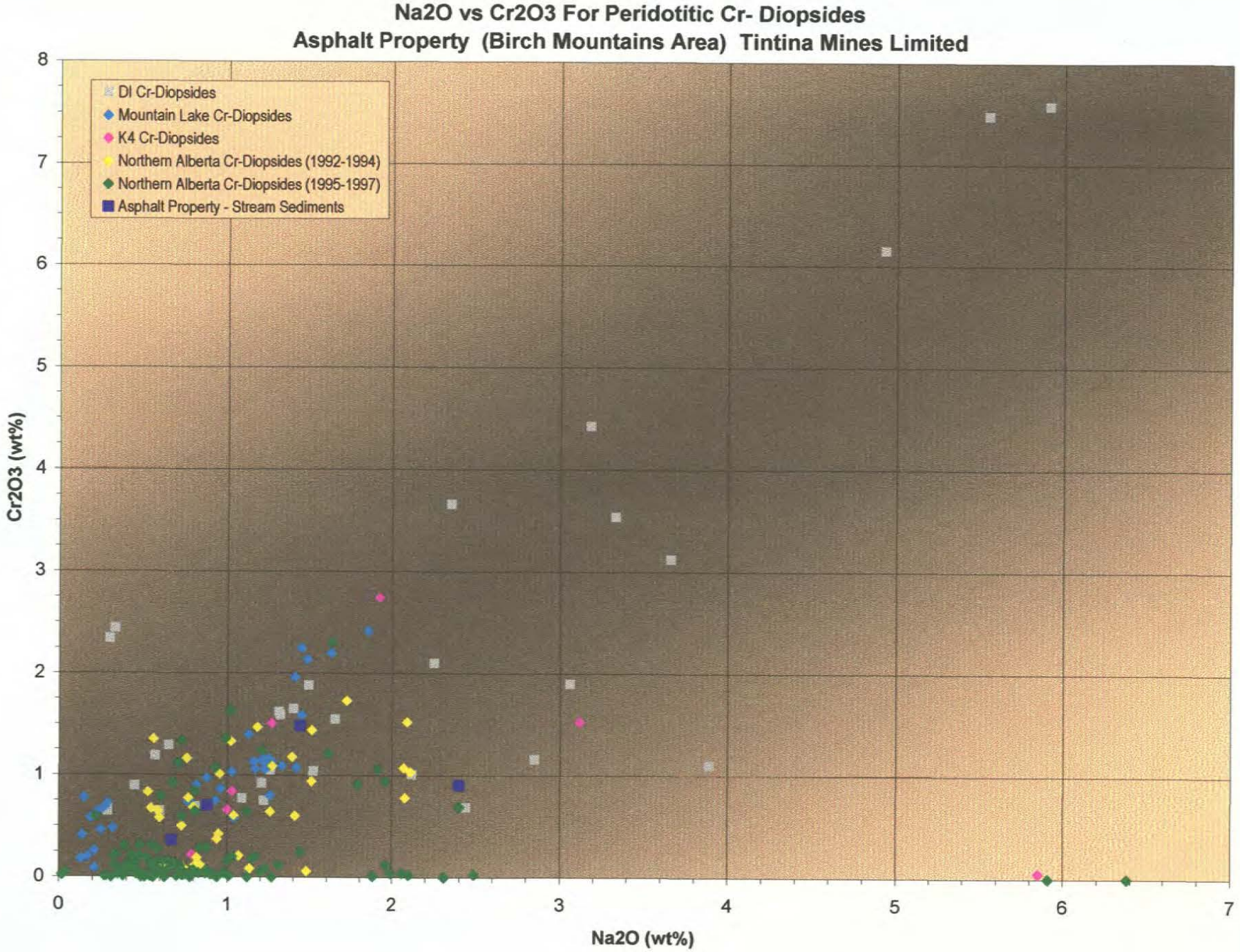

Na2O vs TiO2 For Eclogitic Garnets
Asphalt Property (Birch Mountains Area) Tintina Mines Limited
TiO2 (wt%)
Na2O (wt%)
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80
DI Eclogitic Garnets (World)
DI Eclogitic Garnets (Australia)
K4 Eclogitic Garnets
Northern Alberta Eclogitic Garnets (1992-1994)
Northern Alberta Eclogitic Garnets (1995-1997)
Asphalt Property - 2nd White Specks
Asphalt Property - Stream Sediments


CaO vs Cr2O3 For Peridotitic Cr- Diopsides
Asphalt Property (Birch Mountains Area) Tintina Mines Limited
DI Peridotitic Cr-Diopsides
Mountain Lake Cr-Diopsides
K4 Cr-Diopsides
Northern Alberta Cr-Diopsides (1992-1994)
Northern Alberta Cr-Diopsides (1995-1997)
Asphalt Property - Stream Sediments
Cr2O3 (wt%)
CaO (wt%)
0
1
2
3
4
5
6
7
8
6
8
10
12
14
16
18
20
22
24
26

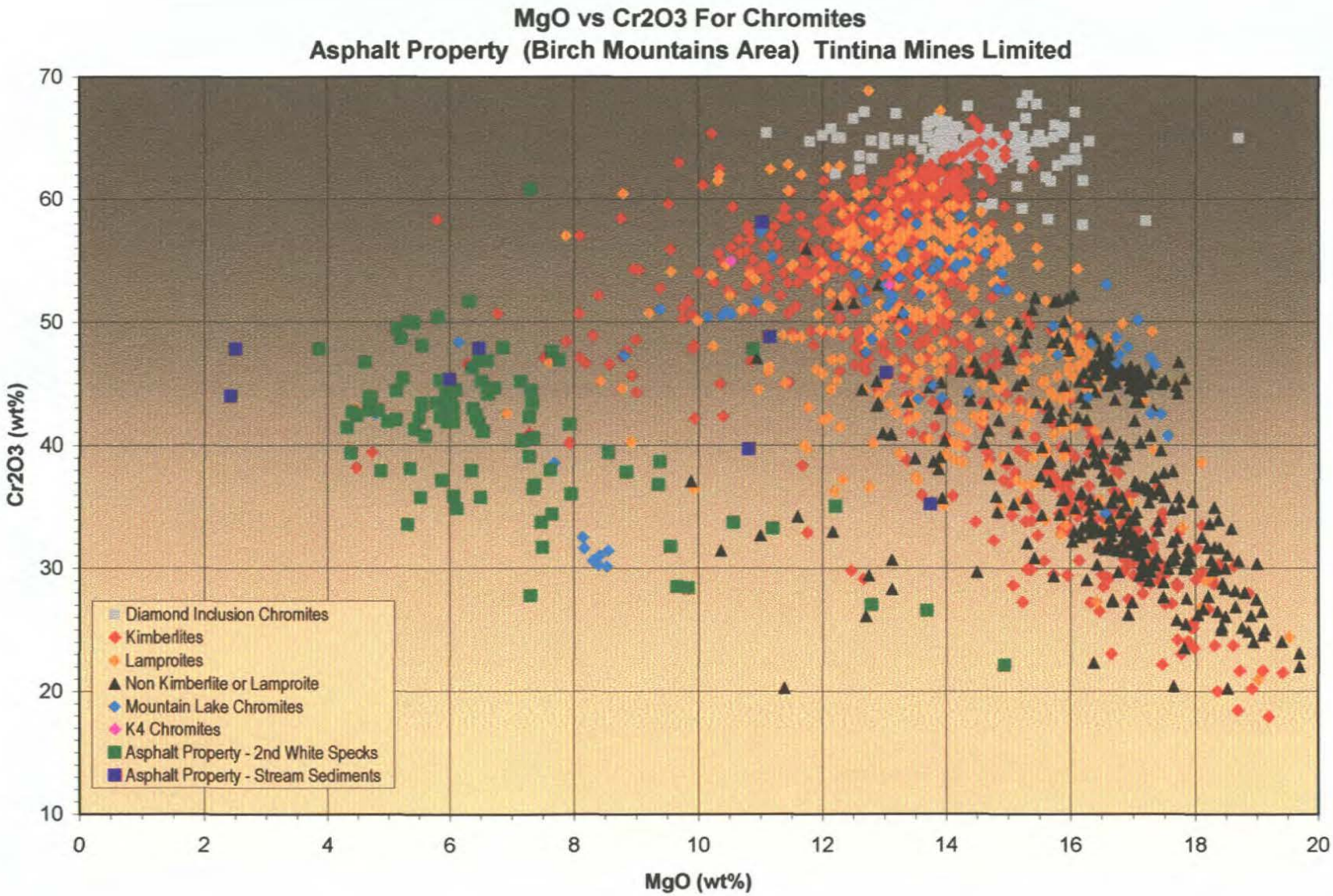
/9990038


FeO vs Cr2O3 For Peridotitic Cr- Diopsides
Asphalt Property (Birch Mountains Area) Tintina Mines Limited
Cr2O3 (wt%)
Total Fe as FeO (wt%)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
0
1
2
3
4
5
6
7
8
9
10
11
12
DI Cr-Diopsides
Lac de Gras Cr-Diopsides
Lac de Gras Low-Cr-Diopsides
Lac de Gras High-Cr-Diopsides
Kimberlite Cr-Diopsides (GSC2124)
Mountain Lake Cr-Diopsides
NAT95-134 & 96-216 Cr-Diopsides
Northern Alberta Cr-Diopsides (1992-1994)
Northern Alberta Cr-Diopsides (1995-1997)
Asphalt Property - Stream Sediments

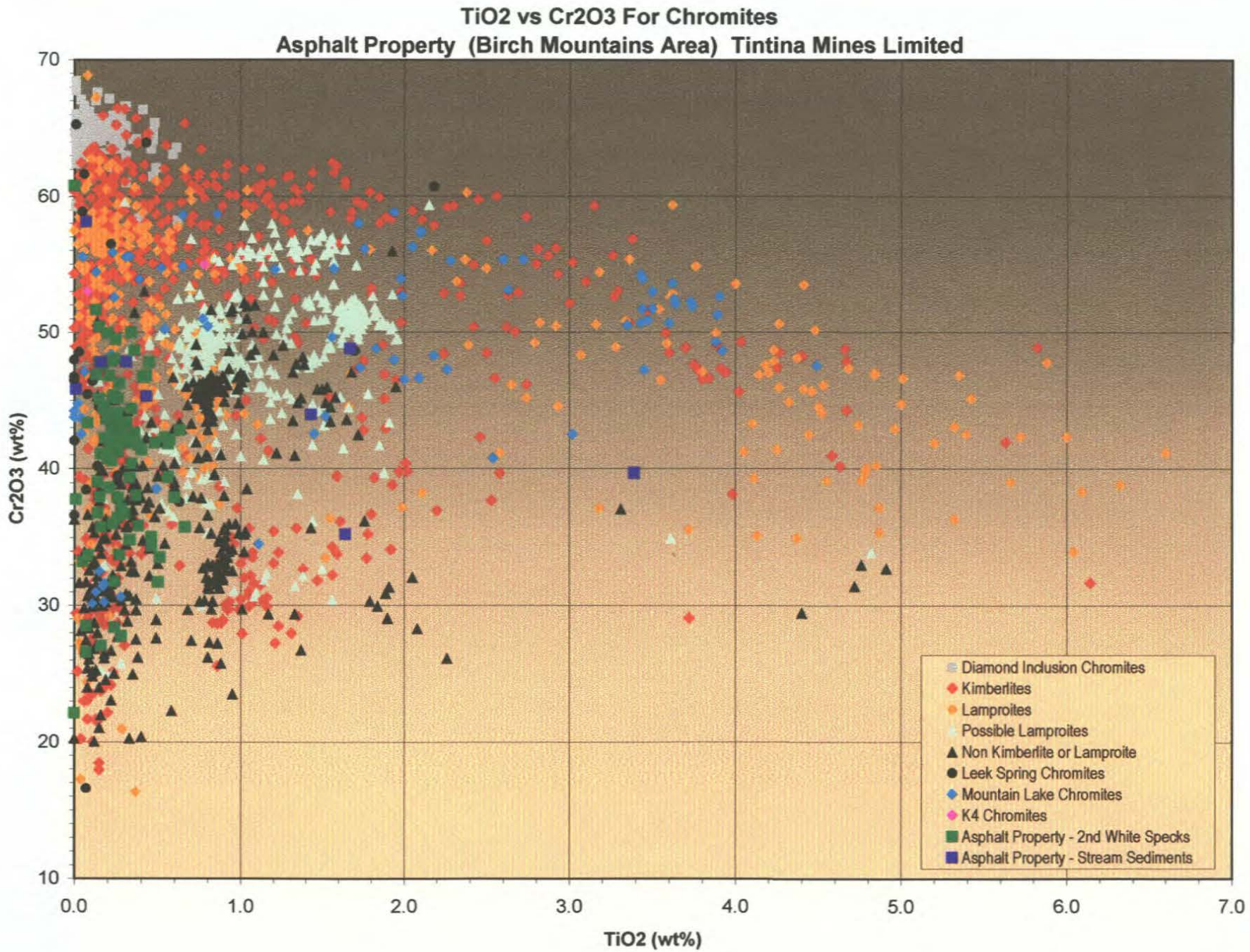

Al2O3 vs Na2O For Low-Cr Diopsides
Asphalt Property (Birch Mountains Area) Tintina Mines Limited
DI Low-Cr Diopsides (World)
DI Low-Cr Diopsides (Australia)
Mountain Lake Low-Cr Diopsides
K4 Low-Cr Diopsides
Northern Alberta Low-Cr Diopsides (1992-1994)
Northern Alberta Low-Cr Diopsides (1995-1997)
Asphalt Property - Stream Sediments
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


Na2O vs Cr2O3 For Peridotitic Cr- Diopsides
Asphalt Property (Birch Mountains Area) Tintina Mines Limited
DI Cr-Diopsides
Mountain Lake Cr-Diopsides
K4 Cr-Diopsides
Northern Alberta Cr-Diopsides (1992-1994)
Northern Alberta Cr-Diopsides (1995-1997)
Asphalt Property - Stream Sediments
Cr2O3 (wt%)
Na2O (wt%)
0
1
2
3
4
5
6
7
8

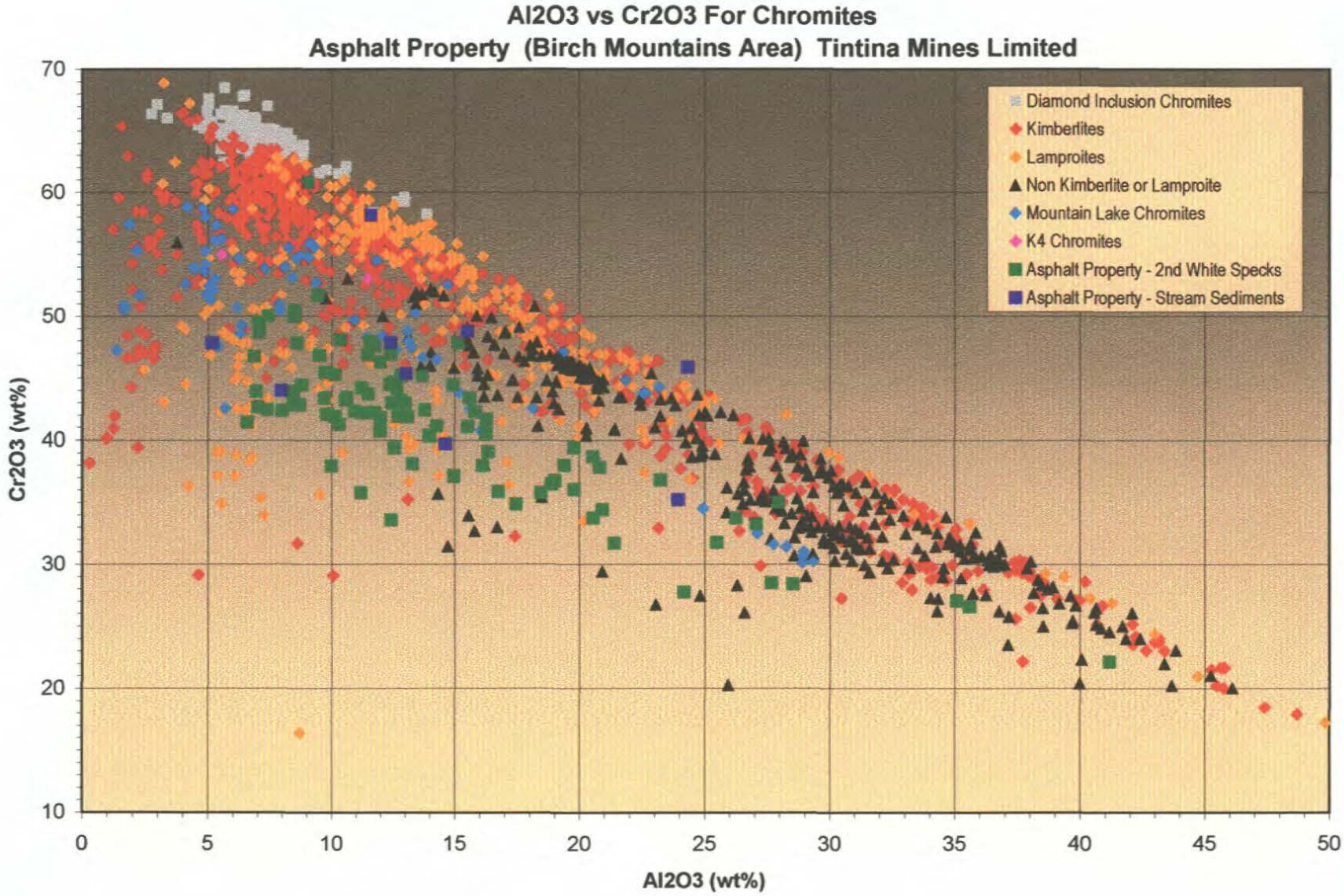
1999038


MgO vs Cr2O3 For Chromites
Asphalt Property (Birch Mountains Area) Tintina Mines Limited
Cr2O3 (wt%)
MgO (wt%)
70
60
50
40
30
20
10
0
2
4
6
8
10
12
14
16
18
20
Diamond Inclusion Chromites
Kimberlites
Lamproites
Non Kimberlite or Lamproite
Mountain Lake Chromites
K4 Chromites
Asphalt Property - 2nd White Specks
Asphalt Property - Stream Sediments

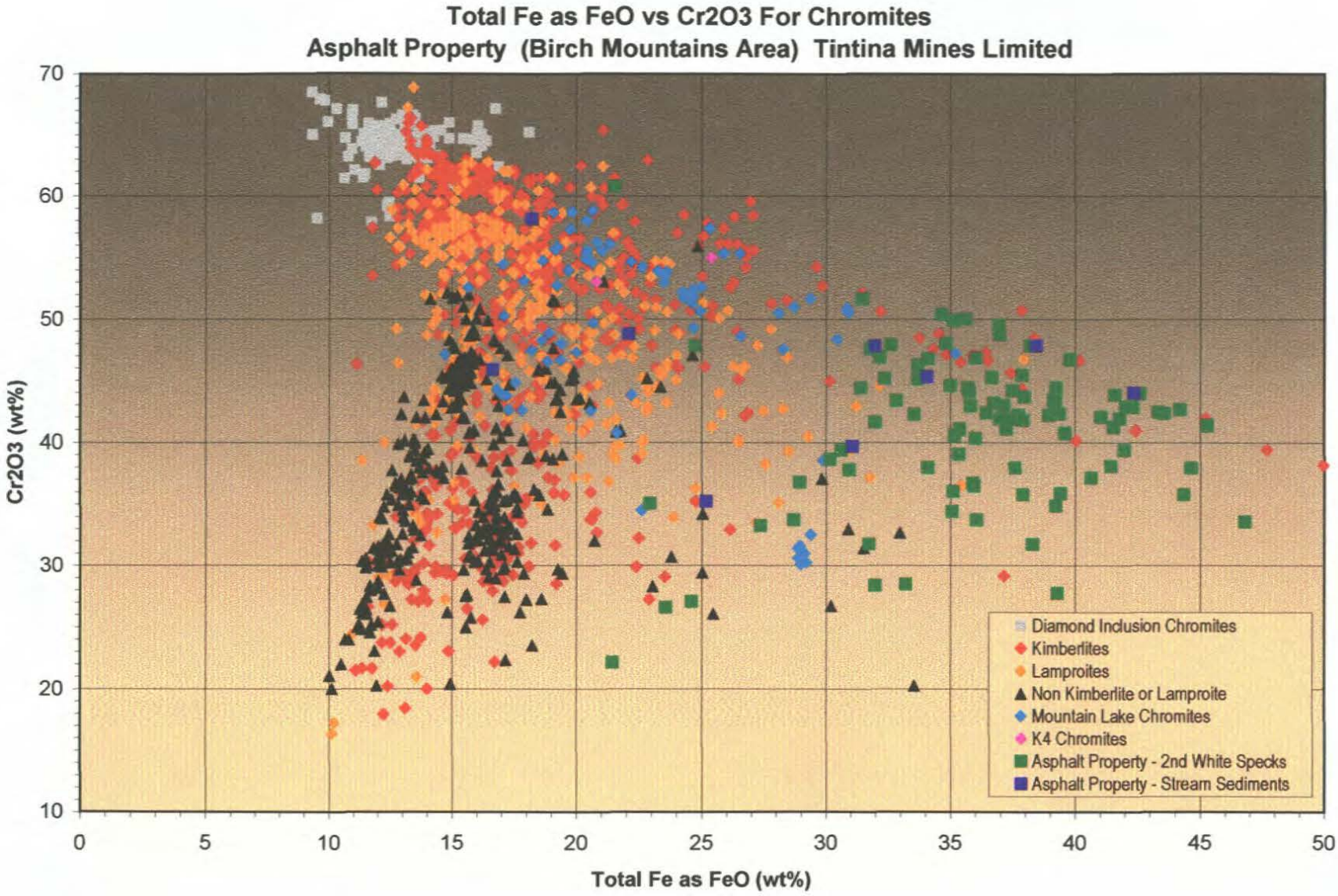
1994 0038


TiO2 vs Cr2O3 For Chromites
Asphalt Property (Birch Mountains Area) Tintina Mines Limited
Cr2O3 (wt%)
TiO2 (wt%)
70
60
50
40
30
20
10
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
Diamond Inclusion Chromites
Kimberlites
Lamproites
Possible Lamproites
Non Kimberlite or Lamproite
Leek Spring Chromites
Mountain Lake Chromites
K4 Chromites
Asphalt Property - 2nd White Specks
Asphalt Property - Stream Sediments

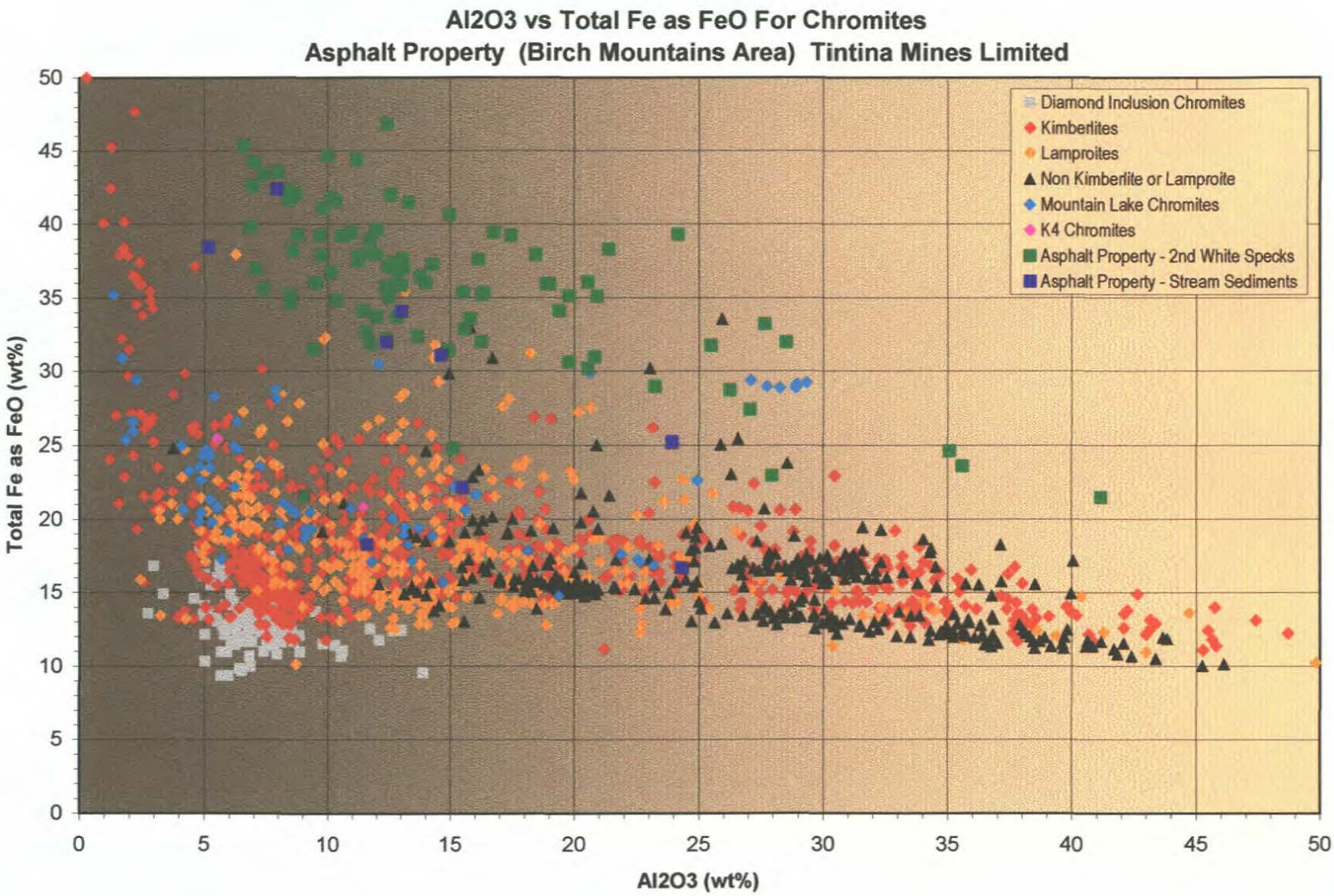
19990038


Al2O3 vs Cr2O3 For Chromites
Asphalt Property (Birch Mountains Area) Tintina Mines Limited
Cr2O3 (wt%)
Al2O3 (wt%)
70
60
50
40
30
20
10
0
5
10
15
20
25
30
35
40
45
50
Diamond Inclusion Chromites
Kimberlites
Lamproites
Non Kimberlite or Lamproite
Mountain Lake Chromites
K4 Chromites
Asphalt Property - 2nd White Specks
Asphalt Property - Stream Sediments

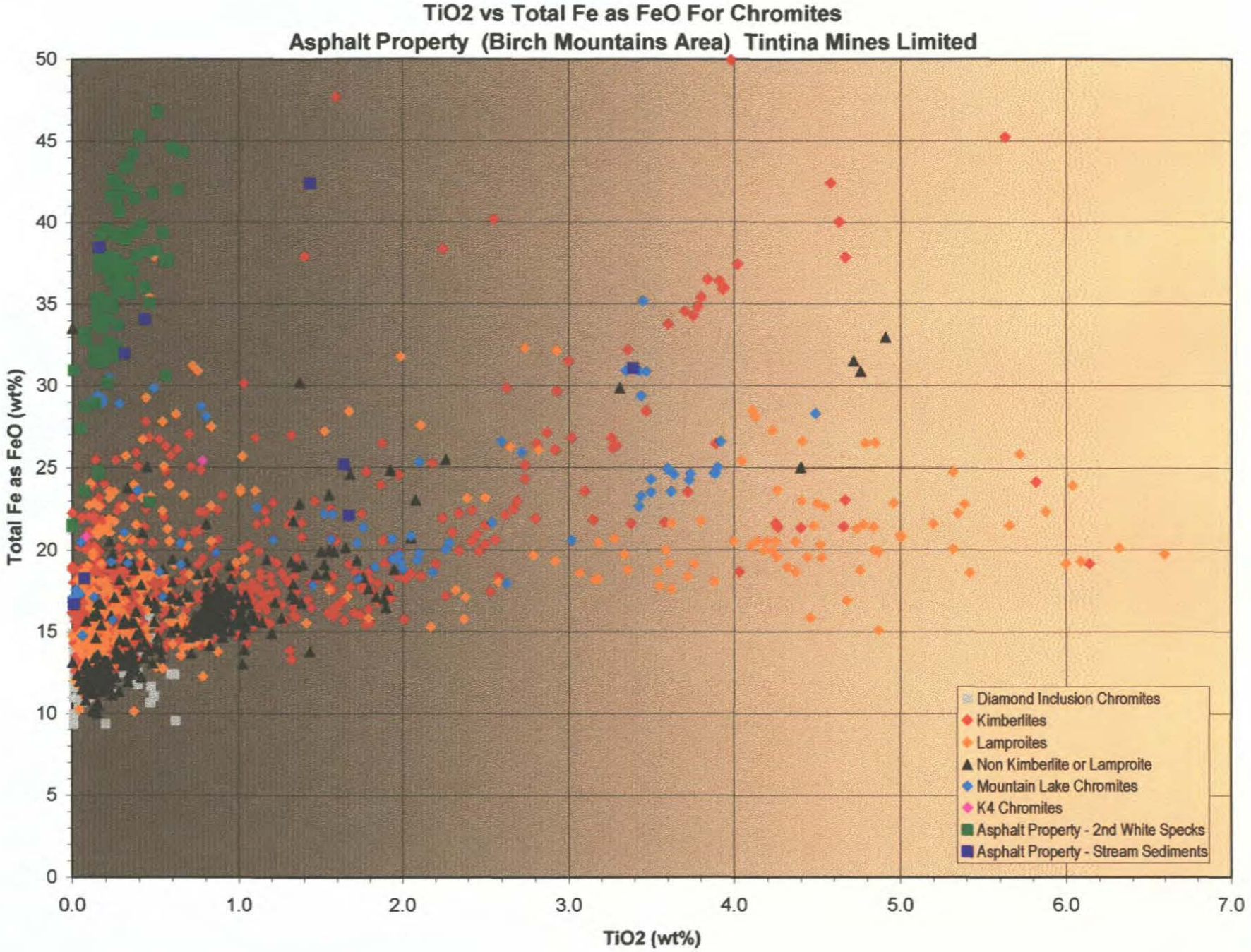
1990628


Total Fe as FeO vs Cr2O3 For Chromites
Asphalt Property (Birch Mountains Area) Tintina Mines Limited
Cr2O3 (wt%)
Total Fe as FeO (wt%)
70
60
50
40
30
20
10
0
5
10
15
20
25
30
35
40
45
50
Diamond Inclusion Chromites
Kimberlites
Lamproites
Non Kimberlite or Lamproite
Mountain Lake Chromites
K4 Chromites
Asphalt Property - 2nd White Specks
Asphalt Property - Stream Sediments

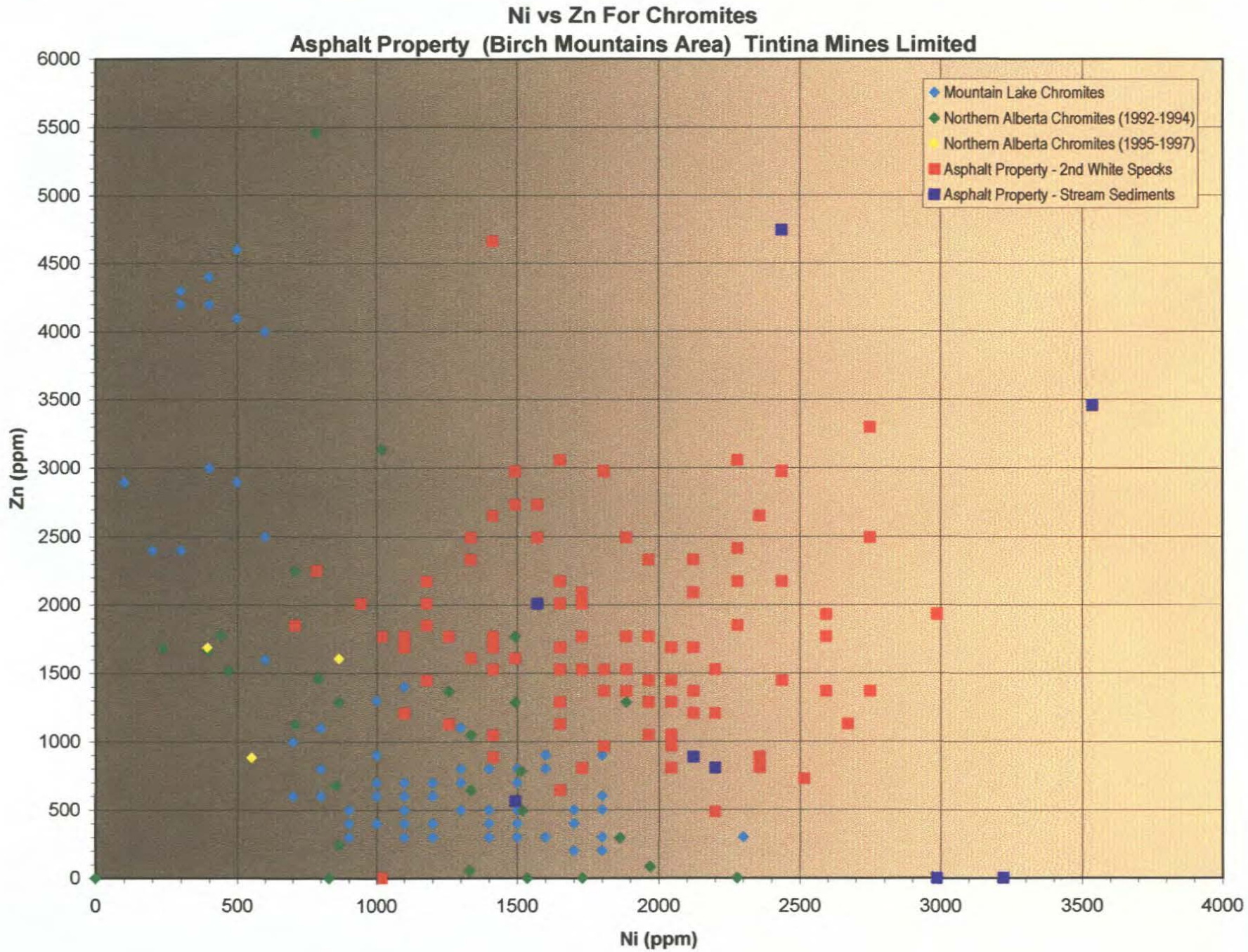
8e00bbb1

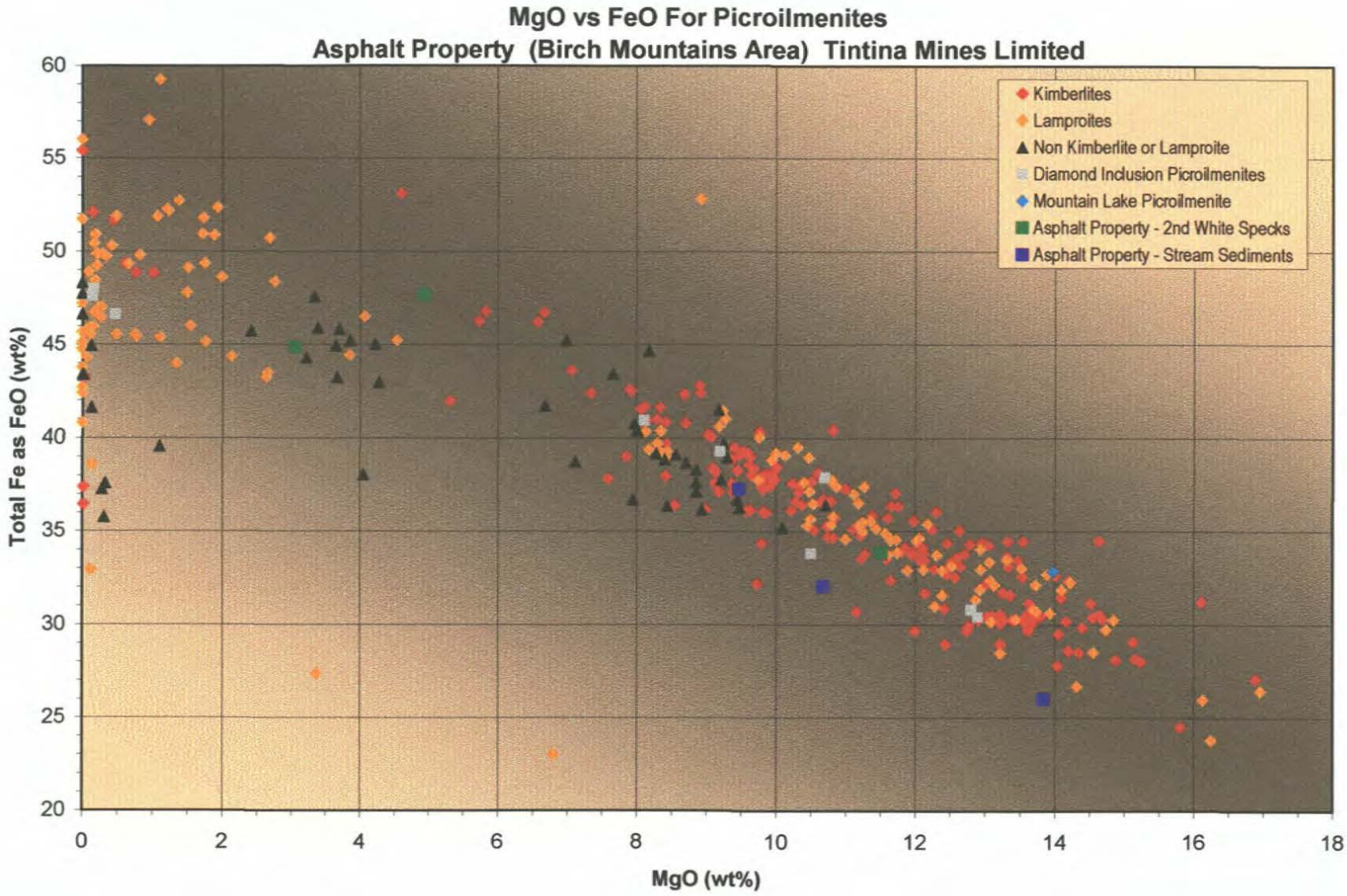

Al2O3 vs Total Fe as FeO For Chromites
Asphalt Property (Birch Mountains Area) Tintina Mines Limited
Diamond Inclusion Chromites
Kimberlites
Lamproites
Non Kimberlite or Lamproite
Mountain Lake Chromites
K4 Chromites
Asphalt Property - 2nd White Specks
Asphalt Property - Stream Sediments
Total Fe as FeO (wt%)
Al2O3 (wt%)
0
5
10
15
20
25
30
35
40
45
50

8000994

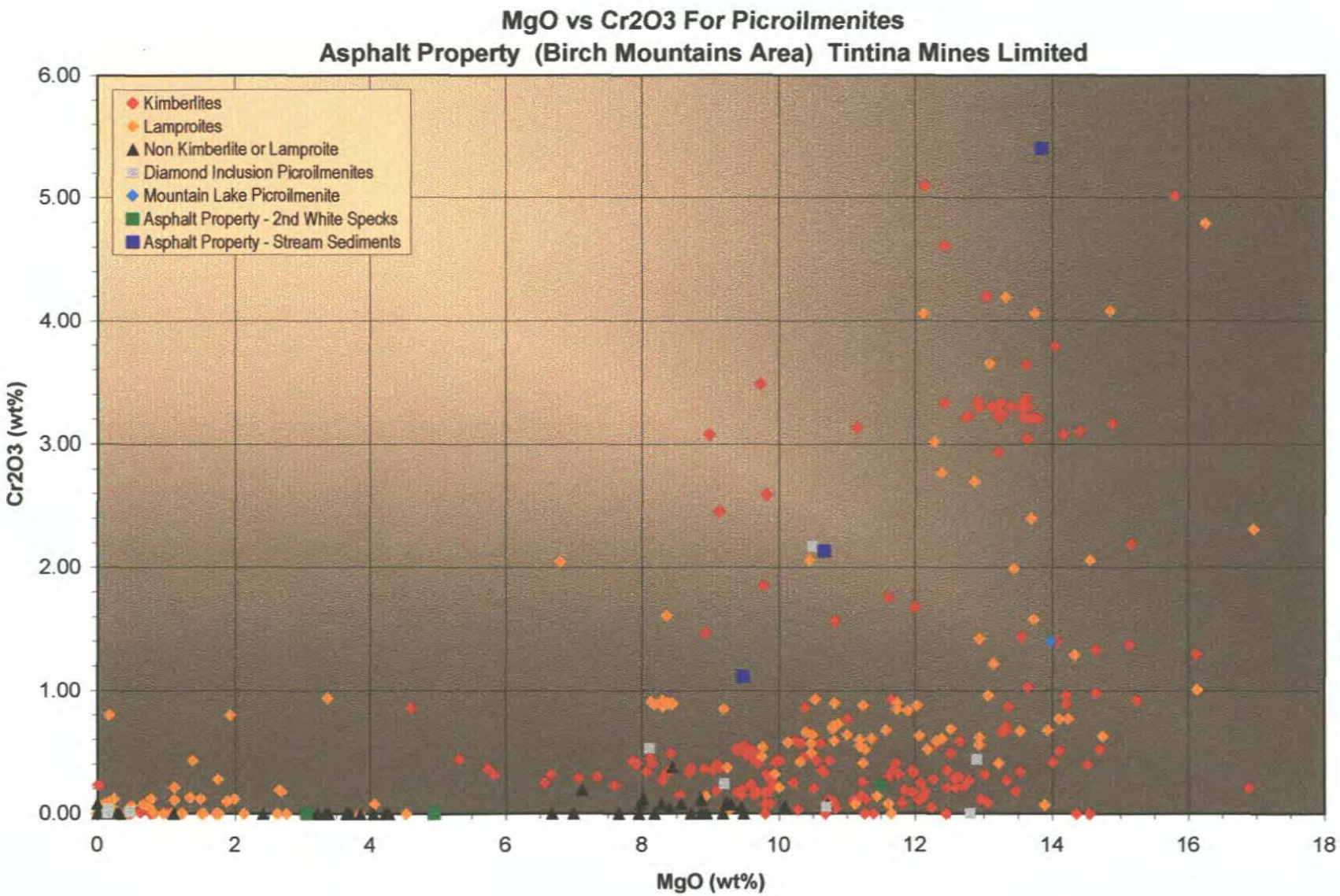

TiO2 vs Total Fe as FeO For Chromites
Asphalt Property (Birch Mountains Area) Tintina Mines Limited
Total Fe as FeO (wt%)
TiO2 (wt%)
0
5
10
15
20
25
30
35
40
45
50
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
Diamond Inclusion Chromites
Kimberlites
Lamproites
Non Kimberlite or Lamproite
Mountain Lake Chromites
K4 Chromites
Asphalt Property - 2nd White Specks
Asphalt Property - Stream Sediments

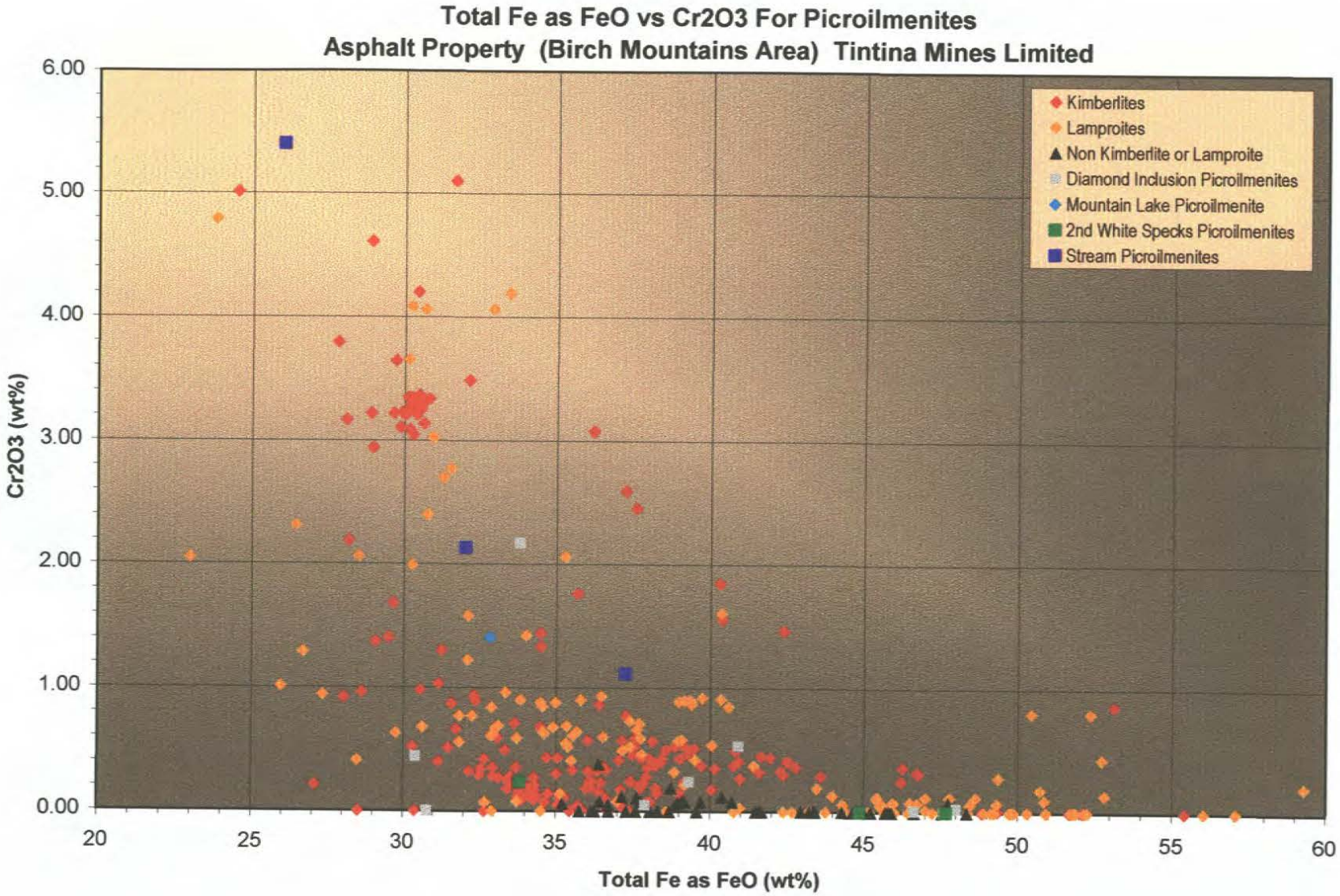
1990028


Ni vs Zn For Chromites
Asphalt Property (Birch Mountains Area) Tintina Mines Limited
Mountain Lake Chromites
Northern Alberta Chromites (1992-1994)
Northern Alberta Chromites (1995-1997)
Asphalt Property - 2nd White Specks
Asphalt Property - Stream Sediments
Zn (ppm)
Ni (ppm)
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000

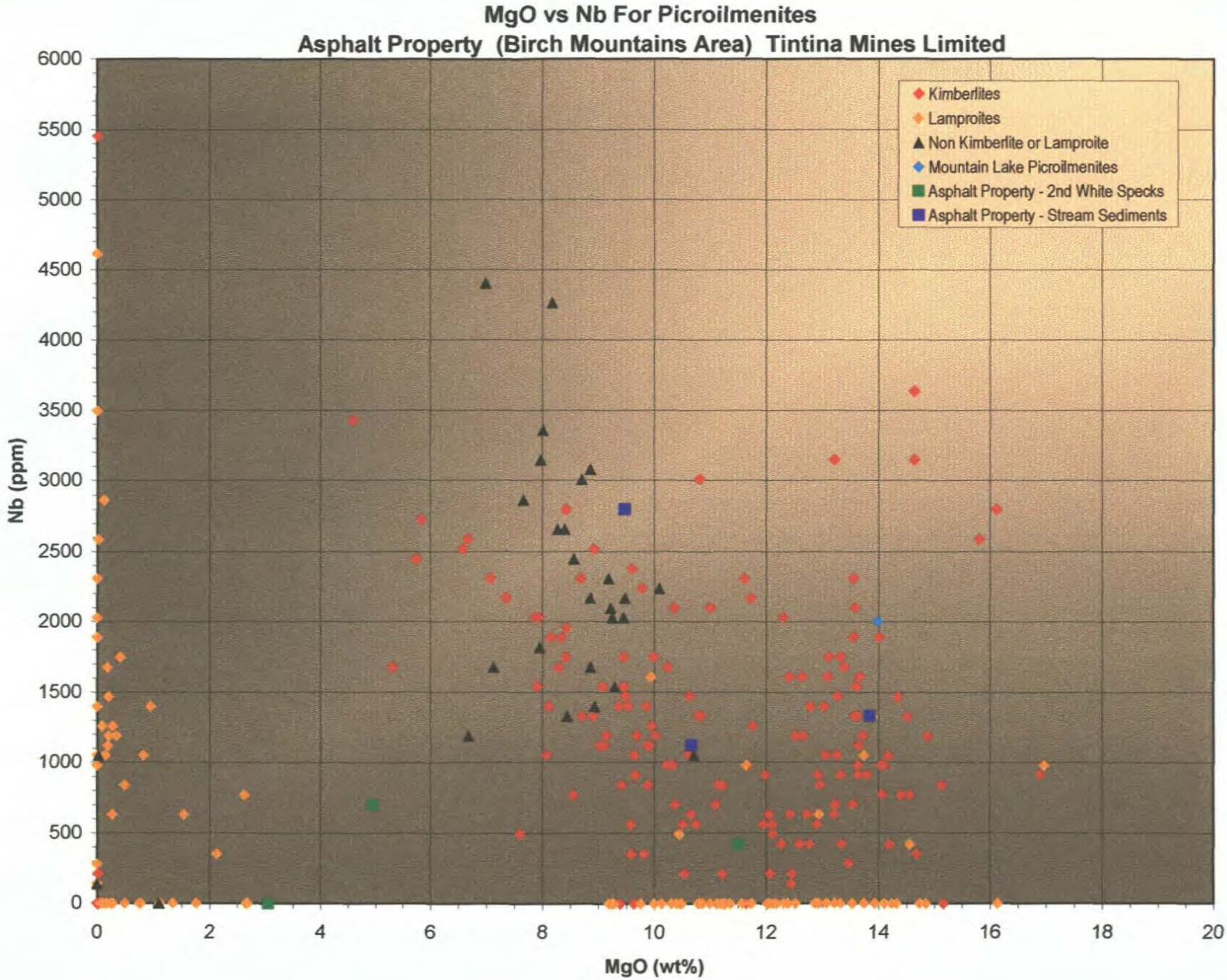

MgO vs FeO For Picroilmenites
Asphalt Property (Birch Mountains Area) Tintina Mines Limited
Total Fe as FeO (wt%)
MgO (wt%)
60
55
50
45
40
35
30
25
20
0
2
4
6
8
10
12
14
16
18
Kimberlites
Lamproites
Non Kimberlite or Lamproite
Diamond Inclusion Picroilmenites
Mountain Lake Picroilmenite
Asphalt Property - 2nd White Specks
Asphalt Property - Stream Sediments

8600628

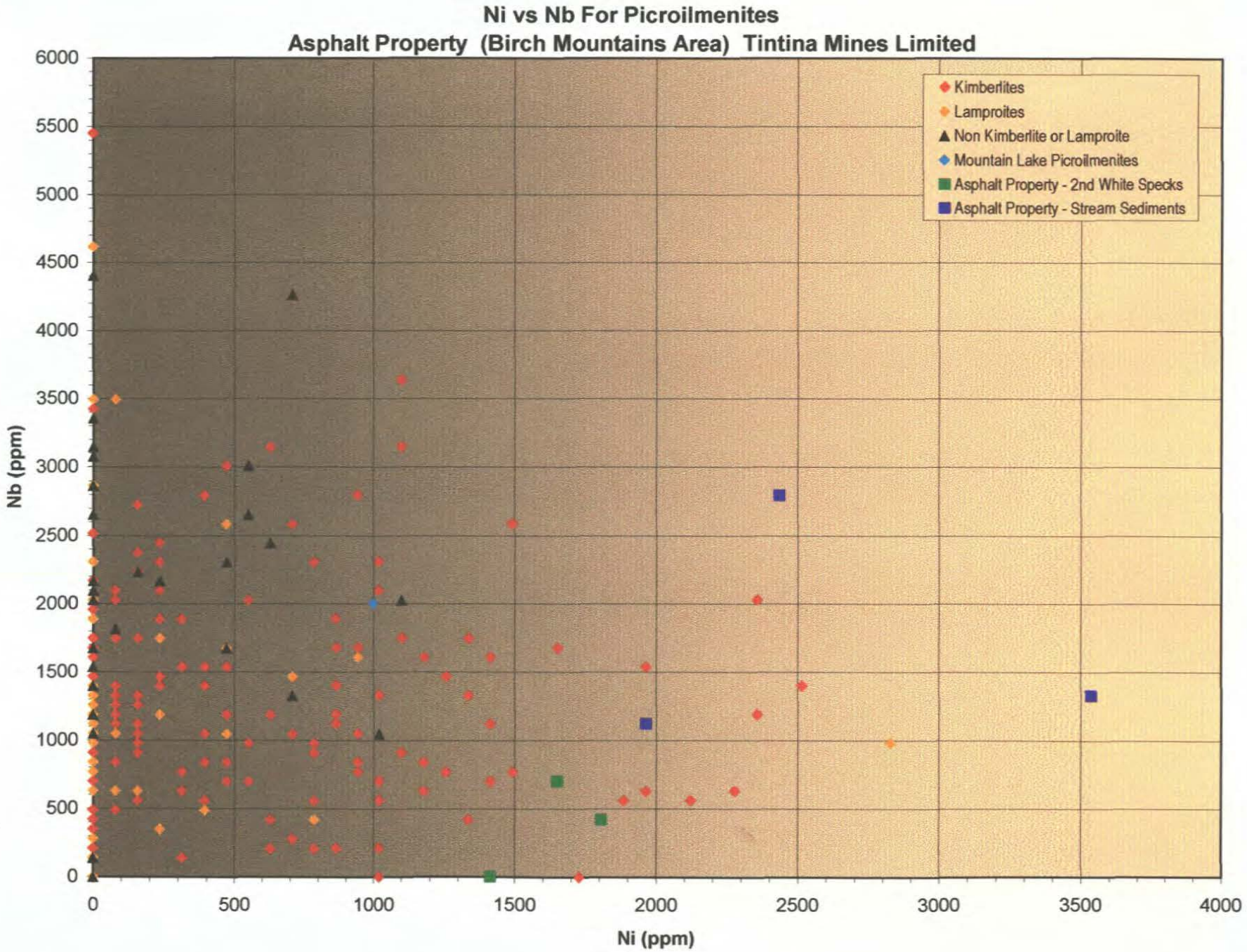

MgO vs Cr2O3 For Picroilmenites
Asphalt Property (Birch Mountains Area) Tintina Mines Limited
Kimberlites
Lamproites
Non Kimberlite or Lamproite
Diamond Inclusion Picroilmenites
Mountain Lake Picroilmenite
Asphalt Property - 2nd White Specks
Asphalt Property - Stream Sediments
Cr2O3 (wt%)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0
2
4
6
8
10
12
14
16
18
MgO (wt%)


Total Fe as FeO vs Cr2O3 For Picroilmenites
Asphalt Property (Birch Mountains Area) Tintina Mines Limited
Cr2O3 (wt%)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
20
25
30
35
40
45
50
55
60
Total Fe as FeO (wt%)
Kimberlites
Lamproites
Non Kimberlite or Lamproite
Diamond Inclusion Picroilmenites
Mountain Lake Picroilmenite
2nd White Specks Picroilmenites
Stream Picroilmenites

8200666/


MgO vs Nb For Picroilmenites
Asphalt Property (Birch Mountains Area) Tintina Mines Limited
Kimberlites
Lamproites
Non Kimberlite or Lamproite
Mountain Lake Picroilmenites
Asphalt Property - 2nd White Specks
Asphalt Property - Stream Sediments
Nb (ppm)
MgO (wt%)
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
0
2
4
6
8
10
12
14
16
18
20

/4990028


Ni vs Nb For Picroilmenites
Asphalt Property (Birch Mountains Area) Tintina Mines Limited
Kimberlites
Lamproites
Non Kimberlite or Lamproite
Mountain Lake Picroilmenites
Asphalt Property - 2nd White Specks
Asphalt Property - Stream Sediments
Nb (ppm)
Ni (ppm)
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5500
6000

1999028

RESULTS OF ANALYSES FOR SRC PICKED GARNETS FROM 1997 DRILLING

Sample#	Pt#	Mineral (Min-id.asc)	SiO2	TiO2	Al2O3	Cr2O3	FeO	MgO	MnO	CaO	Na2O	K2O	Total
SRC 97-2	1	G_05_MAGNESIAN_ALMANDINE	38.89	0.09	21.62	0.05	25.81	5.62	0.43	7.76	0.13	0.00	100.39
SRC 97-2	2	G_03_CALCIC_PYROPE_ALMANDINE	38.13	0.05	22.33	0.01	22.98	5.77	0.66	10.26	0.02	0.00	100.20
SRC 97-3	3	G_03_CALCIC_PYROPE_ALMANDINE	39.22	0.03	22.85	0.00	21.50	6.50	0.57	9.95	0.00	0.00	100.63
SRC 97-3	4	G_05_MAGNESIAN_ALMANDINE	38.87	0.05	22.14	0.00	24.72	5.20	0.81	8.90	0.03	0.00	100.71
SRC 97-4	5	G_05_MAGNESIAN_ALMANDINE	38.03	0.06	21.30	0.05	23.41	4.38	0.95	10.98	0.01	0.00	99.16
SRC 97-4	6	G_03_CALCIC_PYROPE_ALMANDINE	39.26	0.21	22.15	0.00	23.57	6.48	0.75	8.30	0.06	0.00	100.78
SRC 97-4	7	ALMANDINE	38.69	0.10	21.86	0.00	31.66	3.58	1.01	4.77	0.05	0.00	101.71
SRC 97-4	8	G_03_CALCIC_PYROPE_ALMANDINE	39.67	0.14	22.87	0.00	21.16	7.32	0.45	9.51	0.07	0.00	101.19
SRC 97-5	9	G_05_MAGNESIAN_ALMANDINE	39.20	0.06	22.12	0.02	23.95	5.75	0.55	8.72	0.07	0.00	100.43
SRC 97-5	10	G_05_MAGNESIAN_ALMANDINE	37.69	0.10	21.32	0.02	25.14	3.09	0.84	11.38	0.04	0.00	99.61
SRC 97-5	11	G_05_MAGNESIAN_ALMANDINE	37.70	0.09	21.59	0.04	26.81	3.25	0.67	9.55	0.03	0.00	99.73
SRC 97-5	12	ALMANDINE	37.32	0.12	21.14	0.00	32.10	0.26	1.51	8.35	0.00	0.00	100.81
SRC 97-1	13	G_03_CALCIC_PYROPE_ALMANDINE	38.64	0.06	21.87	0.04	22.34	6.52	0.60	9.74	0.00	0.00	99.80
SRC 97-1	14	G_01_TITANIAN_PYROPE	42.32	0.83	20.90	2.30	9.04	19.69	0.27	5.00	0.07	0.00	100.41
SRC 97-1	15	G_03_CALCIC_PYROPE_ALMANDINE	39.11	0.09	22.68	0.00	22.71	5.10	0.65	10.43	0.00	0.00	100.77
SRC 97-1	16	G_05_MAGNESIAN_ALMANDINE	39.09	0.02	22.49	0.03	25.30	5.55	0.54	8.20	0.00	0.00	101.21
SPI pyrope	std	G_09_CHROME_PYROPE	42.45	0.00	20.69	4.86	7.24	19.28	0.42	5.55	0.03	0.00	100.53

Sample	Grain	Mineral (Min-id.asc)	SiO2	TiO2	Al2O3	Cr2O3	FeO	MgO	MnO	CaO	Na2O	K2O	Total	ZnO	NiO	
8CBH001	18	PICRO_CHROMITE	0.05	1.67	15.5	48.79	22.11	11.15	0.17				99.85	0	0.41	
8CBH001	19	CPX_05_CHROME_DIOPSIDE	53.98	0.27	2.82	1.48	3.28	14.8	0	22.21	1.44	0.02	100.3			
8CBH001	22	G_05_MAGNESIAN_ALMANDINE	39.22	0.09	22.52	0.02	26.94	9.72	0.36	1.11	0.01	n/a	99.99			
8CBH002	15	SUB_PICRO_CHROMITE	0	0.43	13.02	45.31	34.06	6	0.44				100.16	0.59	0.31	
8CBH002	16	SUB_PICRO_CHROMITE	0	0.31	12.4	47.83	31.96	6.47	0.4				99.82	0.25	0.2	
8CBH002	17	CPX_02_UNKNOWN	54.22	0.11	2.28	0.9	6.49	13.42	0.08	20.43	2.4	0.03	100.36			
8CBH002	20	ALMANDINE	37.92	0.03	22	0	34.15	4.78	0.41	1.2	0.01	n/a	100.5			
8CBH003	13	SUB_PICRO_CHROMITE	0.06	3.39	14.65	39.69	31.06	10.81	0.31				100.35	0.1	0.28	
8CBH004	8	SUB_PICRO_CHROMITE	0.04	1.64	23.95	35.21	25.17	13.74	0.25				100.38	0	0.38	
8CBH006	7	PICRO_ILMENITE	0	54.53	0.03	2.13	32.03	10.67	0.32				100.21	0.1	0.24	0.16
8CBH007	4	CPX_02_UNKNOWN	53.93	0.05	1.12	0.36	4.75	14.98	0.12	24.27	0.67	0.04	100.29			
8CBH008	1	PICRO_ILMENITE	0.01	54.18	0.2	5.4	26.02	13.84	0.26				100.39	0	0.29	0.19
8CBH008	17	PICRO_ILMENITE	0.01	50.36	0.08	1.11	37.24	9.47	0.24				99.1	0	0.19	0.4
8CBH008	18	CHROMITE	0.01	0.16	5.16	47.81	38.42	2.5	2.87				98.92	1.74	0.25	
8CBH008	19	CPX_02_UNKNOWN	53.95	0.08	1.18	0.7	5.24	14.96	0.12	23.07	0.88	0.02	100.2			
8CBH009	11	UNKNOWN	0	0.01	24.33	45.84	16.64	13.03	0.26				100.37	0.07	0.19	
8CBH009	12	PICRO_CHROMITE	0.04	0.07	11.61	58.12	18.24	11.02	0.19				99.67	0.11	0.27	
8CBH009	14	CHROMITE	0.01	1.43	7.97	43.94	42.36	2.42	0.68				99.69	0.43	0.45	
SRC97-1	1	CHROMITE	0	0.31	11.74	42.15	38.94	5.5	0.48				99.54	0.19	0.23	
SRC97-1	3	SUB_PICRO_CHROMITE	0	0.27	12	46.26	33.7	6.37	0.52				99.72	0.37	0.23	
SRC97-1	4	UNKNOWN	0	0.16	35.09	27.04	24.6	12.79	0.27				100.36	0.11	0.3	
SRC97-1	5	SUB_PICRO_CHROMITE	0	0.23	19.79	36.02	35.1	7.96	0.34				99.82	0.28	0.1	
SRC97-1	6	PICRO_ILMENITE	0.03	53.52	0.59	0.23	33.8	11.51	0.21				100.17	0.04	0.18	0.06
SRC97-1	7	SUB_PICRO_CHROMITE	0	0.22	13.8	42.36	36.44	6.43	0.38				100.07	0.22	0.22	
SRC97-1	9	CHROMITE	0.01	0.2	11.23	44.14	37.5	5.95	0.55				99.87	0.11	0.18	
SRC97-1	10	SUB_PICRO_CHROMITE	0.01	0	9.06	60.79	21.54	7.3	0.46				99.58	0.27	0.15	
SRC97-1	12	CHROMITE	0.01	0.33	8	42.32	43.55	4.48	0.48				99.63	0.25	0.21	
SRC97-1	13	SUB_PICRO_CHROMITE	0	0.56	19.8	39.38	30.62	8.56	0.48				99.78	0.22	0.16	
SRC97-1	14	SUB_PICRO_CHROMITE	0.01	0.57	11.22	42.13	37.74	6.43	0.52				99.04	0.15	0.27	
SRC97-1	15	CHROMITE	0	0.24	10.38	48.06	34.82	5.55	0.51				99.94	0.23	0.15	
SRC97-1	18	CHROMITE	0.01	0.27	8.44	42.78	42.33	4.83	0.37				99.69	0.31	0.35	
SRC97-1	19	CHROMITE	0.01	0.31	10.61	43.38	39.13	5.78	0.58				100.32	0.23	0.29	
SRC97-1	23	SUB_PICRO_CHROMITE	0.01	0.34	12.37	44.41	35.69	6.1	0.47				99.79	0.25	0.15	
SRC97-1	24	SUB_PICRO_CHROMITE	0.01	0.21	11.47	46.81	34.1	6.47	0.44				99.9	0.2	0.19	
SRC97-1	27	SUB_PICRO_CHROMITE	0	0.16	18.46	35.75	37.9	6.51	0.38				99.72	0.27	0.29	
SRC97-1	29	CHROMITE	0.01	0.15	8.52	50.41	34.66	5.81	0.47				100.38	0.22	0.13	
SRC97-1	32	SUB_PICRO_CHROMITE	0	0.01	20.82	37.79	30.94	8.85	0.36				99.14	0.2	0.17	
SRC97-1	33	CHROMITE	0	0.33	12.58	39.36	41.98	4.39	0.52				99.71	0.22	0.33	
SRC97-1	34	CHROMITE	0.01	0.36	7.07	48.69	36.98	5.2	0.54				99.36	0.33	0.18	
SRC97-1	37	CHROMITE	0.01	0.24	9.74	45.39	37.86	5.23	0.48				99.41	0.22	0.24	
SRC97-2	1	CHROMITE	0.01	0.34	7.45	50.01	35.63	5.31	0.56				99.79	0.31	0.17	

Sample	Grain	Mineral (Min-id.asc)	SiO2	TiO2	Al2O3	Cr2O3	FeO	MgO	MnO	CaO	Na2O	K2O	Total	ZnO	NiO
SRC97-2	3	CHROMITE	0.07	0.2	8.51	49.92	35.11	5.42	0.57				100.17	0.25	0.12
SRC97-2	5	SUB_PICRO_CHROMITE	0	0.15	12.82	45.13	33.7	6.52	0.42				99.2	0.29	0.17
SRC97-2	7	UNKNOWN	0	0.24	28.53	28.39	31.97	9.84	0.42				99.76	0.19	0.18
SRC97-2	9	SUB_PICRO_CHROMITE	0	0.13	9.47	51.64	31.47	6.32	0.51				99.84	0.14	0.16
SRC97-2	10	SUB_PICRO_CHROMITE	0	0.56	13.04	41.81	37.62	6.06	0.36				99.83	0.12	0.26
SRC97-2	11	CHROMITE	0.01	0.31	9.72	43.34	39.2	5.54	0.56				99.22	0.34	0.2
SRC97-2	12	CHROMITE	0	0.23	8.44	43.82	41.59	4.69	0.52				99.85	0.37	0.19
SRC97-2	13	CHROMITE	0	0.45	8.6	47.8	38.2	3.86	0.38				100.05	0.58	0.18
SRC97-3	1	CHROMITE	0	0.36	7	42.63	44.19	4.41	0.56				99.74	0.3	0.29
SRC97-3	2	PICRO_CHROMITE	0.03	0.15	15.14	47.82	24.76	10.88	0.28				99.37	0.13	0.18
SRC97-3	3	CHROMITE	0.01	0.2	11.99	40.72	39.58	5.6	0.52				99.01	0.13	0.26
SRC97-3	4	UNKNOWN	0	0.07	35.59	26.57	23.58	13.68	0.25				100.08	0.06	0.28
SRC97-3	5	SUB_PICRO_CHROMITE	0	0.18	14.93	44.39	31.41	7.32	0.44				99.07	0.1	0.3
SRC97-3	8	CHROMITE	0.02	0.63	8.7	42.81	42.03	4.68	0.56				99.83	0.19	0.21
SRC97-3	9	SUB_PICRO_CHROMITE	0.04	0.14	16.36	39.04	35.33	7.28	0.38				98.94	0.19	0.18
SRC97-3	10	UNKNOWN	0	0.51	12.42	33.55	46.8	5.31	0.39				99.39	0.09	0.32
SRC97-3	11	CHROMITE	0.01	0.41	6.87	46.71	39.79	4.62	0.5				99.46	0.31	0.24
SRC97-3	12	UNKNOWN	0	0.05	27.06	33.25	27.37	11.2	0.29				99.69	0.25	0.22
SRC97-3	13	CHROMITE	0	0.28	12.82	43.13	36.74	5.91	0.31				99.95	0.41	0.35
SRC97-3	14	UNKNOWN	0.09	0.08	26.26	33.71	28.71	10.57	0.29				100.18	0.19	0.28
SRC97-3	15	SUB_PICRO_CHROMITE	0	0.38	11.98	41.74	37.92	6.48	0.44				99.37	0.15	0.28
SRC97-3	16	CHROMITE	0	0.26	10.33	41.21	41.55	5.43	0.44				99.7	0.26	0.22
SRC97-3	17	SUB_PICRO_CHROMITE	0	0.22	16.26	40.55	35.16	7.35	0.42				100.29	0.18	0.15
SRC97-3	18	SUB_PICRO_CHROMITE	0	0.17	12.5	44.6	34.99	6.73	0.39				99.82	0.17	0.27
SRC97-3	19	SUB_PICRO_CHROMITE	0	0.17	11.78	47.58	31.8	7.64	0.44				99.89	0.21	0.27
SRC97-3	20	SUB_PICRO_CHROMITE	0.01	0.26	16.14	37.94	37.59	6.36	0.48				99.31	0.34	0.19
SRC97-4	1	SUB_PICRO_CHROMITE	0	0.13	12.4	46.9	32.16	7.76	0.36				100.06	0.14	0.21
SRC97-4	2	CHROMITE	0	0.6	10.01	37.92	44.63	4.89	0.45				98.94	0.18	0.26
SRC97-4	3	SUB_PICRO_CHROMITE	0	0.32	12.7	41.86	37.37	6.05	0.47				99.25	0.26	0.22
SRC97-4	4	CHROMITE	0.01	0.23	10.15	45.23	36.66	5.85	0.46				99.09	0.17	0.33
SRC97-4	5	CHROMITE	0.01	0.48	10.15	41.87	41.79	4.99	0.51				100.21	0.17	0.24
SRC97-4	8	CHROMITE	0.01	0.25	10.56	43.18	39.17	5.55	0.55				99.65	0.13	0.25
SRC97-4	9	CHROMITE	0	0.4	6.6	41.37	45.29	4.33	0.54				99.05	0.17	0.35
SRC97-4	10	UNKNOWN	0	0.5	21.39	31.7	38.29	7.49	0.37				100.26	0.23	0.29
SRC97-4	11	SUB_PICRO_CHROMITE	0	0.26	12.65	44.09	35.76	6.62	0.57				100.42	0.22	0.25
SRC97-4	12	SUB_PICRO_CHROMITE	0	0.26	13.7	45.15	32.36	7.15	0.46				99.44	0.22	0.14
SRC97-4	13	SUB_PICRO_CHROMITE	0	0.16	14.29	41.09	37.24	6.53	0.43				100.09	0.12	0.23
SRC97-4	14	SUB_PICRO_CHROMITE	0.06	0.34	14	40.35	36.01	7.17	0.55				98.95	0.21	0.26
SRC97-4	15	SUB_PICRO_CHROMITE	0.02	0.22	11.57	47.9	32.61	6.86	0.48				100.25	0.38	0.21
SRC97-4	16	CHROMITE	0.01	0.17	8.8	44.39	39.23	5.13	0.47				98.71	0.31	0.2
SRC97-4	17	CHROMITE	0	0.25	7.05	49.48	36.96	5.14	0.53				99.81	0.22	0.18

Sample	Grain	Mineral (Min-id.asc)	SiO2	TiO2	Al2O3	Cr2O3	FeO	MgO	MnO	CaO	Na2O	K2O	Total	ZnO	NiO	
SRC97-4	18	SUB_PICRO_CHROMITE	0	0.3	19.02	36.71	35.89	7.37	0.38				100.25	0.27	0.31	
SRC97-4	19	UNKNOWN	0	0.46	20.92	34.38	35.07	7.65	0.39				99.3	0.19	0.24	
SRC97-5	1	UNKNOWN	0	0.07	27.67	28.48	33.21	9.66	0.38				100.03	0.29	0.27	
SRC97-5	2	SUB_PICRO_CHROMITE	0.03	0.21	16.26	41.61	31.97	7.93	0.39				98.72	0.1	0.22	
SRC97-5	4	SUB_PICRO_CHROMITE	0	0.16	15.53	41.06	35.37	6.55	0.45				99.79	0.38	0.29	
SRC97-5	5	UNKNOWN	0	0.24	25.49	31.76	31.73	9.55	0.41				99.6	0.16	0.26	
SRC97-5	7	CHROMITE	0	0.27	9.8	42.02	41.04	5.12	0.56				99.23	0.21	0.21	
SRC97-5	8	SUB_PICRO_CHROMITE	0	0.43	9.52	46.84	36.01	6.61	0.46				100.16	0.15	0.14	
SRC97-5	9	SUB_PICRO_CHROMITE	0	0.26	18.88	36.46	35.94	7.35	0.45				99.7	0.1	0.26	
SRC97-5	13	CHROMITE	0	0.54	10.95	42.26	39.37	5.85	0.46				100	0.24	0.33	
SRC97-5	14	SUB_PICRO_ILMENITE	0.03	51.14	0.25	0	44.86	3.06	0.54				100.17	0.2	0.09	0
SRC97-5	16	CHROMITE	0	0.31	7.39	42.41	43.34	4.48	0.54				98.95	0.27	0.21	
SRC97-5	18	SUB_PICRO_CHROMITE	0	0.46	27.96	35.03	22.93	12.22	0.3				99.03	0	0.13	
SRC97-5	19	UNKNOWN	0	0.27	20.55	33.73	36.05	7.48	0.47				98.9	0.21	0.14	
SRC97-5	20	CHROMITE	0	0.24	6.96	43.9	42.59	4.72	0.54				99.63	0.37	0.31	
SRC97-5	23	UNKNOWN	0	0.33	17.47	34.83	39.21	6.12	0.51				98.87	0.19	0.21	
SRC97-5	28	SUB_PICRO_ILMENITE	0	45.17	0.39	0	47.66	4.95	0.65				99.01	0	0.09	0.1
SRC97-5	29	SUB_PICRO_CHROMITE	0	0.18	15.81	42.23	33.55	7.28	0.48				99.97	0.18	0.26	
SRC97-5	30	CHROMITE	0.01	0.37	13.31	38.08	41.42	5.36	0.52				99.7	0.33	0.3	
SRC97-5	31	SUB_PICRO_CHROMITE	0	0.27	12.99	42.91	35.81	6.38	0.55				99.3	0.21	0.18	
SRC97-5	34	SUB_PICRO_CHROMITE	0	0.15	19.41	37.97	34.1	7.63	0.41				100.08	0.19	0.22	
SRC97-5	35	CHROMITE	0	0.26	13.09	41.82	36.99	5.96	0.48				98.97	0.16	0.21	
SRC97-5	36	UNKNOWN	0	0	41.17	22.13	21.44	14.94	0.15				100.31	0.14	0.34	
SRC97-5	37	SUB_PICRO_CHROMITE	0	0.14	23.26	36.78	28.94	9.36	0.35				99.24	0.16	0.25	
SRC97-5	38	CHROMITE	0	0.28	14.98	37.12	40.64	5.88	0.51				99.95	0.29	0.25	
SRC97-5	39	SUB_PICRO_CHROMITE	0	0.19	11.5	43.64	37.95	6.03	0.42				100.26	0.26	0.27	
SRC97-5	41	SUB_PICRO_CHROMITE	0	0.38	16.75	35.84	39.4	6.07	0.48				99.32	0.17	0.23	
SRC97-5	42	UNKNOWN	0	0.28	24.19	27.74	39.28	7.3	0.3				99.71	0.24	0.38	
SRC97-5	44	SUB_PICRO_CHROMITE	0	0.08	15.59	43.36	32.84	7.33	0.45				99.97	0.23	0.09	
SRC97-5	45	SUB_PICRO_CHROMITE	0	0.22	12.45	42.95	37.14	6.06	0.54				99.65	0.08	0.21	
SRC97-5	46	SUB_PICRO_CHROMITE	0	0.21	20.56	38.65	30.17	9.38	0.39				99.79	0.18	0.25	
SRC97-5	49	CHROMITE	0	0.66	11.2	35.76	44.34	5.53	0.47				98.45	0.18	0.31	

RESULTS OF ANALYSES FOR SRC AND MORRISON PICKED GRAINS FROM 1997 DRILLING AND 1998 STREAMS

Sample#	Pt#	Mineral (Min-id.asc)	SiO2	TiO2	Al2O3	Cr2O3	FeO	MgO	MnO	CaO	Na2O	K2O	Total	ZnO	NiO	Nb2O5
Data Sorted By Sample Then By Mineral																
Stream Samples																
8CBH001	19	CPX_05_CHROME_DIOPSIDE	53.98	0.27	2.82	1.48	3.28	14.8	0	22.21	1.44	0.02	100.3			
8CBH001	22	G_05_MAGNESIAN_ALMANDINE	39.22	0.09	22.52	0.02	26.94	9.72	0.36	1.11	0.01	n/a	99.99			
8CBH001	18	PICRO_CHROMITE	0.05	1.67	15.5	48.79	22.11	11.15	0.17	n/a	n/a	n/a	99.85	0	0.41	
8CBH002	20	ALMANDINE	37.92	0.03	22	0	34.15	4.78	0.41	1.2	0.01	n/a	100.5			
8CBH002	17	CPX_02_UNKNOWN	54.22	0.11	2.28	0.9	6.49	13.42	0.08	20.43	2.4	0.03	100.36			
8CBH002	15	SUB_PICRO_CHROMITE	0	0.43	13.02	45.31	34.06	6	0.44	n/a	n/a	n/a	100.16	0.59	0.31	
8CBH002	16	SUB_PICRO_CHROMITE	0	0.31	12.4	47.83	31.96	6.47	0.4	n/a	n/a	n/a	99.82	0.25	0.2	
8CBH003	13	SUB_PICRO_CHROMITE	0.06	3.39	14.65	39.69	31.06	10.81	0.31	n/a	n/a	n/a	100.35	0.1	0.28	
8CBH004	8	SUB_PICRO_CHROMITE	0.04	1.64	23.95	35.21	25.17	13.74	0.25	n/a	n/a	n/a	100.38	0	0.38	
8CBH006	7	PICRO_ILMENITE	0	54.53	0.03	2.13	32.03	10.67	0.32	n/a	n/a	n/a	100.21	0.1	0.24	0.16
8CBH007	4	CPX_02_UNKNOWN	53.93	0.05	1.12	0.36	4.75	14.98	0.12	24.27	0.67	0.04	100.29			
8CBH008	18	CHROMITE	0.01	0.16	5.16	47.81	38.42	2.5	2.87	n/a	n/a	n/a	98.92	1.74	0.25	
8CBH008	19	CPX_02_UNKNOWN	53.95	0.08	1.18	0.7	5.24	14.96	0.12	23.07	0.88	0.02	100.2			
8CBH008	1	PICRO_ILMENITE	0.01	54.18	0.2	5.4	26.02	13.84	0.26	n/a	n/a	n/a	100.39	0	0.29	0.19
8CBH008	17	PICRO_ILMENITE	0.01	50.36	0.08	1.11	37.24	9.47	0.24	n/a	n/a	n/a	99.1	0	0.19	0.4
8CBH009	14	CHROMITE	0.01	1.43	7.97	43.94	42.36	2.42	0.68	n/a	n/a	n/a	99.69	0.43	0.45	
8CBH009	12	PICRO_CHROMITE	0.04	0.07	11.61	58.12	18.24	11.02	0.19	n/a	n/a	n/a	99.67	0.11	0.27	
8CBH009	11	UNKNOWN	0	0.01	24.33	45.84	16.64	13.03	0.26	n/a	n/a	n/a	100.37	0.07	0.19	
2nd White Specks Drill Core																
SRC 97-1	13	G_03_CALCIC_PYROPE_ALMANDINE	38.64	0.06	21.87	0.04	22.34	6.52	0.60	9.74	0.00	0.00	99.80			
SRC 97-1	14	G_01_TITANIAN_PYROPE	42.32	0.83	20.90	2.30	9.04	19.69	0.27	5.00	0.07	0.00	100.41			
SRC 97-1	15	G_03_CALCIC_PYROPE_ALMANDINE	39.11	0.09	22.68	0.00	22.71	5.10	0.65	10.43	0.00	0.00	100.77			
SRC 97-1	16	G_05_MAGNESIAN_ALMANDINE	39.09	0.02	22.49	0.03	25.30	5.55	0.54	8.20	0.00	0.00	101.21			
SRC 97-2	2	G_03_CALCIC_PYROPE_ALMANDINE	38.13	0.05	22.33	0.01	22.98	5.77	0.66	10.26	0.02	0.00	100.20			
SRC 97-2	1	G_05_MAGNESIAN_ALMANDINE	38.89	0.09	21.62	0.05	25.81	5.62	0.43	7.76	0.13	0.00	100.39			
SRC 97-3	3	G_03_CALCIC_PYROPE_ALMANDINE	39.22	0.03	22.85	0.00	21.50	6.50	0.57	9.95	0.00	0.00	100.63			
SRC 97-3	4	G_05_MAGNESIAN_ALMANDINE	38.87	0.05	22.14	0.00	24.72	5.20	0.81	8.90	0.03	0.00	100.71			
SRC 97-4	7	ALMANDINE	38.69	0.10	21.86	0.00	31.66	3.58	1.01	4.77	0.05	0.00	101.71			
SRC 97-4	6	G_03_CALCIC_PYROPE_ALMANDINE	39.26	0.21	22.15	0.00	23.57	6.48	0.75	8.30	0.06	0.00	100.78			
SRC 97-4	8	G_03_CALCIC_PYROPE_ALMANDINE	39.67	0.14	22.87	0.00	21.16	7.32	0.45	9.51	0.07	0.00	101.19			
SRC 97-4	5	G_05_MAGNESIAN_ALMANDINE	38.03	0.06	21.30	0.05	23.41	4.38	0.95	10.98	0.01	0.00	99.16			
SRC 97-5	9	G_05_MAGNESIAN_ALMANDINE	39.20	0.06	22.12	0.02	23.95	5.75	0.55	8.72	0.07	0.00	100.43			
SRC 97-5	12	ALMANDINE	37.32	0.12	21.14	0.00	32.10	0.26	1.51	8.35	0.00	0.00	100.81			
SRC 97-5	10	G_05_MAGNESIAN_ALMANDINE	37.69	0.10	21.32	0.02	25.14	3.09	0.84	11.38	0.04	0.00	99.61			
SRC 97-5	11	G_05_MAGNESIAN_ALMANDINE	37.70	0.09	21.59	0.04	26.81	3.25	0.67	9.55	0.03	0.00	99.73			
SRC97-1	1	CHROMITE	0	0.31	11.74	42.15	38.94	5.5	0.48	n/a	n/a	n/a	99.54	0.19	0.23	
SRC97-1	9	CHROMITE	0.01	0.2	11.23	44.14	37.5	5.95	0.55	n/a	n/a	n/a	99.87	0.11	0.18	
SRC97-1	12	CHROMITE	0.01	0.33	8	42.32	43.55	4.48	0.48	n/a	n/a	n/a	99.63	0.25	0.21	
SRC97-1	15	CHROMITE	0	0.24	10.38	48.06	34.82	5.55	0.51	n/a	n/a	n/a	99.94	0.23	0.15	
SRC97-1	18	CHROMITE	0.01	0.27	8.44	42.78	42.33	4.83	0.37	n/a	n/a	n/a	99.69	0.31	0.35	

Sample#	Pt#	Mineral (Min-id.asc)	SiO2	TiO2	Al2O3	Cr2O3	FeO	MgO	MnO	CaO	Na2O	K2O	Total	ZnO	NiO	Nb2O5
SRC97-1	19	CHROMITE	0.01	0.31	10.61	43.38	39.13	5.78	0.58	n/a	n/a	n/a	100.32	0.23	0.29	
SRC97-1	29	CHROMITE	0.01	0.15	8.52	50.41	34.66	5.81	0.47	n/a	n/a	n/a	100.38	0.22	0.13	
SRC97-1	33	CHROMITE	0	0.33	12.58	39.36	41.98	4.39	0.52	n/a	n/a	n/a	99.71	0.22	0.33	
SRC97-1	34	CHROMITE	0.01	0.36	7.07	48.69	36.98	5.2	0.54	n/a	n/a	n/a	99.36	0.33	0.18	
SRC97-1	37	CHROMITE	0.01	0.24	9.74	45.39	37.86	5.23	0.48	n/a	n/a	n/a	99.41	0.22	0.24	
SRC97-1	6	PICRO_ILMENITE	0.03	53.52	0.59	0.23	33.8	11.51	0.21	n/a	n/a	n/a	100.17	0.04	0.18	0.06
SRC97-1	3	SUB_PICRO_CHROMITE	0	0.27	12	46.26	33.7	6.37	0.52	n/a	n/a	n/a	99.72	0.37	0.23	
SRC97-1	5	SUB_PICRO_CHROMITE	0	0.23	19.79	36.02	35.1	7.96	0.34	n/a	n/a	n/a	99.82	0.28	0.1	
SRC97-1	7	SUB_PICRO_CHROMITE	0	0.22	13.8	42.36	36.44	6.43	0.38	n/a	n/a	n/a	100.07	0.22	0.22	
SRC97-1	10	SUB_PICRO_CHROMITE	0.01	0	9.06	60.79	21.54	7.3	0.46	n/a	n/a	n/a	99.58	0.27	0.15	
SRC97-1	13	SUB_PICRO_CHROMITE	0	0.56	19.8	39.38	30.62	8.56	0.48	n/a	n/a	n/a	99.78	0.22	0.16	
SRC97-1	14	SUB_PICRO_CHROMITE	0.01	0.57	11.22	42.13	37.74	6.43	0.52	n/a	n/a	n/a	99.04	0.15	0.27	
SRC97-1	23	SUB_PICRO_CHROMITE	0.01	0.34	12.37	44.41	35.69	6.1	0.47	n/a	n/a	n/a	99.79	0.25	0.15	
SRC97-1	24	SUB_PICRO_CHROMITE	0.01	0.21	11.47	46.81	34.1	6.47	0.44	n/a	n/a	n/a	99.9	0.2	0.19	
SRC97-1	27	SUB_PICRO_CHROMITE	0	0.16	18.46	35.75	37.9	6.51	0.38	n/a	n/a	n/a	99.72	0.27	0.29	
SRC97-1	32	SUB_PICRO_CHROMITE	0	0.01	20.82	37.79	30.94	8.85	0.36	n/a	n/a	n/a	99.14	0.2	0.17	
SRC97-1	4	UNKNOWN	0	0.16	35.09	27.04	24.6	12.79	0.27	n/a	n/a	n/a	100.36	0.11	0.3	
SRC97-2	1	CHROMITE	0.01	0.34	7.45	50.01	35.63	5.31	0.56	n/a	n/a	n/a	99.79	0.31	0.17	
SRC97-2	3	CHROMITE	0.07	0.2	8.51	49.92	35.11	5.42	0.57	n/a	n/a	n/a	100.17	0.25	0.12	
SRC97-2	11	CHROMITE	0.01	0.31	9.72	43.34	39.2	5.54	0.56	n/a	n/a	n/a	99.22	0.34	0.2	
SRC97-2	12	CHROMITE	0	0.23	8.44	43.82	41.59	4.69	0.52	n/a	n/a	n/a	99.85	0.37	0.19	
SRC97-2	13	CHROMITE	0	0.45	8.6	47.8	38.2	3.86	0.38	n/a	n/a	n/a	100.05	0.58	0.18	
SRC97-2	5	SUB_PICRO_CHROMITE	0	0.15	12.82	45.13	33.7	6.52	0.42	n/a	n/a	n/a	99.2	0.29	0.17	
SRC97-2	9	SUB_PICRO_CHROMITE	0	0.13	9.47	51.64	31.47	6.32	0.51	n/a	n/a	n/a	99.84	0.14	0.16	
SRC97-2	10	SUB_PICRO_CHROMITE	0	0.56	13.04	41.81	37.62	6.06	0.36	n/a	n/a	n/a	99.83	0.12	0.26	
SRC97-2	7	UNKNOWN	0	0.24	28.53	28.39	31.97	9.84	0.42	n/a	n/a	n/a	99.76	0.19	0.18	
SRC97-3	1	CHROMITE	0	0.36	7	42.63	44.19	4.41	0.56	n/a	n/a	n/a	99.74	0.3	0.29	
SRC97-3	3	CHROMITE	0.01	0.2	11.99	40.72	39.58	5.6	0.52	n/a	n/a	n/a	99.01	0.13	0.26	
SRC97-3	8	CHROMITE	0.02	0.63	8.7	42.81	42.03	4.68	0.56	n/a	n/a	n/a	99.83	0.19	0.21	
SRC97-3	11	CHROMITE	0.01	0.41	6.87	46.71	39.79	4.62	0.5	n/a	n/a	n/a	99.46	0.31	0.24	
SRC97-3	13	CHROMITE	0	0.28	12.82	43.13	36.74	5.91	0.31	n/a	n/a	n/a	99.95	0.41	0.35	
SRC97-3	16	CHROMITE	0	0.26	10.33	41.21	41.55	5.43	0.44	n/a	n/a	n/a	99.7	0.26	0.22	
SRC97-3	2	PICRO_CHROMITE	0.03	0.15	15.14	47.82	24.76	10.88	0.28	n/a	n/a	n/a	99.37	0.13	0.18	
SRC97-3	5	SUB_PICRO_CHROMITE	0	0.18	14.93	44.39	31.41	7.32	0.44	n/a	n/a	n/a	99.07	0.1	0.3	
SRC97-3	9	SUB_PICRO_CHROMITE	0.04	0.14	16.36	39.04	35.33	7.28	0.38	n/a	n/a	n/a	98.94	0.19	0.18	
SRC97-3	15	SUB_PICRO_CHROMITE	0	0.38	11.98	41.74	37.92	6.48	0.44	n/a	n/a	n/a	99.37	0.15	0.28	
SRC97-3	17	SUB_PICRO_CHROMITE	0	0.22	16.26	40.55	35.16	7.35	0.42	n/a	n/a	n/a	100.29	0.18	0.15	
SRC97-3	18	SUB_PICRO_CHROMITE	0	0.17	12.5	44.6	34.99	6.73	0.39	n/a	n/a	n/a	99.82	0.17	0.27	
SRC97-3	19	SUB_PICRO_CHROMITE	0	0.17	11.78	47.58	31.8	7.64	0.44	n/a	n/a	n/a	99.89	0.21	0.27	
SRC97-3	20	SUB_PICRO_CHROMITE	0.01	0.26	16.14	37.94	37.59	6.36	0.48	n/a	n/a	n/a	99.31	0.34	0.19	
SRC97-3	4	UNKNOWN	0	0.07	35.59	26.57	23.58	13.68	0.25	n/a	n/a	n/a	100.08	0.06	0.28	
SRC97-3	10	UNKNOWN	0	0.51	12.42	33.55	46.8	5.31	0.39	n/a	n/a	n/a	99.39	0.09	0.32	
SRC97-3	12	UNKNOWN	0	0.05	27.06	33.25	27.37	11.2	0.29	n/a	n/a	n/a	99.69	0.25	0.22	
SRC97-3	14	UNKNOWN	0.09	0.08	26.26	33.71	28.71	10.57	0.29	n/a	n/a	n/a	100.18	0.19	0.28	

Sample#	Pt#	Mineral (Min-id.asc)	SiO2	TiO2	Al2O3	Cr2O3	FeO	MgO	MnO	CaO	Na2O	K2O	Total	ZnO	NiO	Nb2O5
SRC97-4	2	CHROMITE	0	0.6	10.01	37.92	44.63	4.89	0.45	n/a	n/a	n/a	98.94	0.18	0.26	
SRC97-4	4	CHROMITE	0.01	0.23	10.15	45.23	36.66	5.85	0.46	n/a	n/a	n/a	99.09	0.17	0.33	
SRC97-4	5	CHROMITE	0.01	0.48	10.15	41.87	41.79	4.99	0.51	n/a	n/a	n/a	100.21	0.17	0.24	
SRC97-4	8	CHROMITE	0.01	0.25	10.56	43.18	39.17	5.55	0.55	n/a	n/a	n/a	99.65	0.13	0.25	
SRC97-4	9	CHROMITE	0	0.4	6.6	41.37	45.29	4.33	0.54	n/a	n/a	n/a	99.05	0.17	0.35	
SRC97-4	16	CHROMITE	0.01	0.17	8.8	44.39	39.23	5.13	0.47	n/a	n/a	n/a	98.71	0.31	0.2	
SRC97-4	17	CHROMITE	0	0.25	7.05	49.48	36.96	5.14	0.53	n/a	n/a	n/a	99.81	0.22	0.18	
SRC97-4	1	SUB_PICRO_CHROMITE	0	0.13	12.4	46.9	32.16	7.76	0.36	n/a	n/a	n/a	100.06	0.14	0.21	
SRC97-4	3	SUB_PICRO_CHROMITE	0	0.32	12.7	41.86	37.37	6.05	0.47	n/a	n/a	n/a	99.25	0.26	0.22	
SRC97-4	11	SUB_PICRO_CHROMITE	0	0.26	12.65	44.09	35.76	6.62	0.57	n/a	n/a	n/a	100.42	0.22	0.25	
SRC97-4	12	SUB_PICRO_CHROMITE	0	0.26	13.7	45.15	32.36	7.15	0.46	n/a	n/a	n/a	99.44	0.22	0.14	
SRC97-4	13	SUB_PICRO_CHROMITE	0	0.16	14.29	41.09	37.24	6.53	0.43	n/a	n/a	n/a	100.09	0.12	0.23	
SRC97-4	14	SUB_PICRO_CHROMITE	0.06	0.34	14	40.35	36.01	7.17	0.55	n/a	n/a	n/a	98.95	0.21	0.26	
SRC97-4	15	SUB_PICRO_CHROMITE	0.02	0.22	11.57	47.9	32.61	6.86	0.48	n/a	n/a	n/a	100.25	0.38	0.21	
SRC97-4	18	SUB_PICRO_CHROMITE	0	0.3	19.02	36.71	35.89	7.37	0.38	n/a	n/a	n/a	100.25	0.27	0.31	
SRC97-4	10	UNKNOWN	0	0.5	21.39	31.7	38.29	7.49	0.37	n/a	n/a	n/a	100.26	0.23	0.29	
SRC97-4	19	UNKNOWN	0	0.46	20.92	34.38	35.07	7.65	0.39	n/a	n/a	n/a	99.3	0.19	0.24	
SRC97-5	7	CHROMITE	0	0.27	9.8	42.02	41.04	5.12	0.56	n/a	n/a	n/a	99.23	0.21	0.21	
SRC97-5	13	CHROMITE	0	0.54	10.95	42.26	39.37	5.85	0.46	n/a	n/a	n/a	100	0.24	0.33	
SRC97-5	16	CHROMITE	0	0.31	7.39	42.41	43.34	4.48	0.54	n/a	n/a	n/a	98.95	0.27	0.21	
SRC97-5	20	CHROMITE	0	0.24	6.96	43.9	42.59	4.72	0.54	n/a	n/a	n/a	99.63	0.37	0.31	
SRC97-5	30	CHROMITE	0.01	0.37	13.31	38.08	41.42	5.36	0.52	n/a	n/a	n/a	99.7	0.33	0.3	
SRC97-5	35	CHROMITE	0	0.26	13.09	41.82	36.99	5.96	0.48	n/a	n/a	n/a	98.97	0.16	0.21	
SRC97-5	38	CHROMITE	0	0.28	14.98	37.12	40.64	5.88	0.51	n/a	n/a	n/a	99.95	0.29	0.25	
SRC97-5	49	CHROMITE	0	0.66	11.2	35.76	44.34	5.53	0.47	n/a	n/a	n/a	98.45	0.18	0.31	
SRC97-5	2	SUB_PICRO_CHROMITE	0.03	0.21	16.26	41.61	31.97	7.93	0.39	n/a	n/a	n/a	98.72	0.1	0.22	
SRC97-5	4	SUB_PICRO_CHROMITE	0	0.16	15.53	41.06	35.37	6.55	0.45	n/a	n/a	n/a	99.79	0.38	0.29	
SRC97-5	8	SUB_PICRO_CHROMITE	0	0.43	9.52	46.84	36.01	6.61	0.46	n/a	n/a	n/a	100.16	0.15	0.14	
SRC97-5	9	SUB_PICRO_CHROMITE	0	0.26	18.88	36.46	35.94	7.35	0.45	n/a	n/a	n/a	99.7	0.1	0.26	
SRC97-5	18	SUB_PICRO_CHROMITE	0	0.46	27.96	35.03	22.93	12.22	0.3	n/a	n/a	n/a	99.03	0	0.13	
SRC97-5	29	SUB_PICRO_CHROMITE	0	0.18	15.81	42.23	33.55	7.28	0.48	n/a	n/a	n/a	99.97	0.18	0.26	
SRC97-5	31	SUB_PICRO_CHROMITE	0	0.27	12.99	42.91	35.81	6.38	0.55	n/a	n/a	n/a	99.3	0.21	0.18	
SRC97-5	34	SUB_PICRO_CHROMITE	0	0.15	19.41	37.97	34.1	7.63	0.41	n/a	n/a	n/a	100.08	0.19	0.22	
SRC97-5	37	SUB_PICRO_CHROMITE	0	0.14	23.26	36.78	28.94	9.36	0.35	n/a	n/a	n/a	99.24	0.16	0.25	
SRC97-5	39	SUB_PICRO_CHROMITE	0	0.19	11.5	43.64	37.95	6.03	0.42	n/a	n/a	n/a	100.26	0.26	0.27	
SRC97-5	41	SUB_PICRO_CHROMITE	0	0.38	16.75	35.84	39.4	6.07	0.48	n/a	n/a	n/a	99.32	0.17	0.23	
SRC97-5	44	SUB_PICRO_CHROMITE	0	0.08	15.59	43.36	32.84	7.33	0.45	n/a	n/a	n/a	99.97	0.23	0.09	
SRC97-5	45	SUB_PICRO_CHROMITE	0	0.22	12.45	42.95	37.14	6.06	0.54	n/a	n/a	n/a	99.65	0.08	0.21	
SRC97-5	46	SUB_PICRO_CHROMITE	0	0.21	20.56	38.65	30.17	9.38	0.39	n/a	n/a	n/a	99.79	0.18	0.25	
SRC97-5	14	SUB_PICRO_ILMENITE	0.03	51.14	0.25	0	44.86	3.06	0.54	n/a	n/a	n/a	100.17	0.2	0.09	0
SRC97-5	28	SUB_PICRO_ILMENITE	0	45.17	0.39	0	47.66	4.95	0.65	n/a	n/a	n/a	99.01	0	0.09	0.1
SRC97-5	1	UNKNOWN	0	0.07	27.67	28.48	33.21	9.66	0.38	n/a	n/a	n/a	100.03	0.29	0.27	
SRC97-5	5	UNKNOWN	0	0.24	25.49	31.76	31.73	9.55	0.41	n/a	n/a	n/a	99.6	0.16	0.26	
SRC97-5	19	UNKNOWN	0	0.27	20.55	33.73	36.05	7.48	0.47	n/a	n/a	n/a	98.9	0.21	0.14	

Sample#	Pt#	Mineral (Min-id.asc)	SiO2	TiO2	Al2O3	Cr2O3	FeO	MgO	MnO	CaO	Na2O	K2O	Total	ZnO	NiO	Nb2O5
SRC97-5	23	UNKNOWN	0	0.33	17.47	34.83	39.21	6.12	0.51	n/a	n/a	n/a	98.87	0.19	0.21	
SRC97-5	36	UNKNOWN	0	0	41.17	22.13	21.44	14.94	0.15	n/a	n/a	n/a	100.31	0.14	0.34	
SRC97-5	42	UNKNOWN	0	0.28	24.19	27.74	39.28	7.3	0.3	n/a	n/a	n/a	99.71	0.24	0.38	
Sorted By Mineral Then By Sample																
Stream Samples																
8CBH002	17	CPX_02_UNKNOWN	54.22	0.11	2.28	0.9	6.49	13.42	0.08	20.43	2.4	0.03	100.36			
8CBH007	4	CPX_02_UNKNOWN	53.93	0.05	1.12	0.36	4.75	14.98	0.12	24.27	0.67	0.04	100.29			
8CBH008	19	CPX_02_UNKNOWN	53.95	0.08	1.18	0.7	5.24	14.96	0.12	23.07	0.88	0.02	100.2			
8CBH001	19	CPX_05_CHROME_DIOPSIDE	53.98	0.27	2.82	1.48	3.28	14.8	0	22.21	1.44	0.02	100.3			
8CBH002	20	ALMANDINE	37.92	0.03	22	0	34.15	4.78	0.41	1.2	0.01	n/a	100.5			
8CBH001	22	G_05_MAGNESIAN_ALMANDINE	39.22	0.09	22.52	0.02	26.94	9.72	0.36	1.11	0.01	n/a	99.99			
8CBH008	18	CHROMITE	0.01	0.16	5.16	47.81	38.42	2.5	2.87				98.92	1.74	0.25	
8CBH009	14	CHROMITE	0.01	1.43	7.97	43.94	42.36	2.42	0.68				99.69	0.43	0.45	
8CBH002	15	SUB_PICRO_CHROMITE	0	0.43	13.02	45.31	34.06	6	0.44				100.16	0.59	0.31	
8CBH002	16	SUB_PICRO_CHROMITE	0	0.31	12.4	47.83	31.96	6.47	0.4				99.82	0.25	0.2	
8CBH003	13	SUB_PICRO_CHROMITE	0.06	3.39	14.65	39.69	31.06	10.81	0.31				100.35	0.1	0.28	
8CBH004	8	SUB_PICRO_CHROMITE	0.04	1.64	23.95	35.21	25.17	13.74	0.25				100.38	0	0.38	
8CBH009	11	UNKNOWN	0	0.01	24.33	45.84	16.64	13.03	0.26				100.37	0.07	0.19	
8CBH001	18	PICRO_CHROMITE	0.05	1.67	15.5	48.79	22.11	11.15	0.17				99.85	0	0.41	
8CBH009	12	PICRO_CHROMITE	0.04	0.07	11.61	58.12	18.24	11.02	0.19				99.67	0.11	0.27	
8CBH006	7	PICRO_ILMENITE	0	54.53	0.03	2.13	32.03	10.67	0.32				100.21	0.1	0.24	0.16
8CBH008	1	PICRO_ILMENITE	0.01	54.18	0.2	5.4	26.02	13.84	0.26				100.39	0	0.29	0.19
8CBH008	17	PICRO_ILMENITE	0.01	50.36	0.08	1.11	37.24	9.47	0.24				99.1	0	0.19	0.4
Drill Core																
SRC 97-1	14	G_01_TITANIAN_PYROPE	42.32	0.83	20.90	2.30	9.04	19.69	0.27	5.00	0.07	0.00	100.41			
SRC 97-4	7	ALMANDINE	38.69	0.10	21.86	0.00	31.66	3.58	1.01	4.77	0.05	0.00	101.71			
SRC 97-5	12	ALMANDINE	37.32	0.12	21.14	0.00	32.10	0.26	1.51	8.35	0.00	0.00	100.81			
SRC 97-1	13	G_03_CALCIC_PYROPE_ALMANDINE	38.64	0.06	21.87	0.04	22.34	6.52	0.60	9.74	0.00	0.00	99.80			
SRC 97-1	15	G_03_CALCIC_PYROPE_ALMANDINE	39.11	0.09	22.68	0.00	22.71	5.10	0.65	10.43	0.00	0.00	100.77			
SRC 97-2	2	G_03_CALCIC_PYROPE_ALMANDINE	38.13	0.05	22.33	0.01	22.98	5.77	0.66	10.26	0.02	0.00	100.20			
SRC 97-3	3	G_03_CALCIC_PYROPE_ALMANDINE	39.22	0.03	22.85	0.00	21.50	6.50	0.57	9.95	0.00	0.00	100.63			
SRC 97-4	6	G_03_CALCIC_PYROPE_ALMANDINE	39.26	0.21	22.15	0.00	23.57	6.48	0.75	8.30	0.06	0.00	100.78			
SRC 97-4	8	G_03_CALCIC_PYROPE_ALMANDINE	39.67	0.14	22.87	0.00	21.16	7.32	0.45	9.51	0.07	0.00	101.19			
SRC 97-1	16	G_05_MAGNESIAN_ALMANDINE	39.09	0.02	22.49	0.03	25.30	5.55	0.54	8.20	0.00	0.00	101.21			
SRC 97-2	1	G_05_MAGNESIAN_ALMANDINE	38.89	0.09	21.62	0.05	25.81	5.62	0.43	7.76	0.13	0.00	100.39			
SRC 97-3	4	G_05_MAGNESIAN_ALMANDINE	38.87	0.05	22.14	0.00	24.72	5.20	0.81	8.90	0.03	0.00	100.71			
SRC 97-4	5	G_05_MAGNESIAN_ALMANDINE	38.03	0.06	21.30	0.05	23.41	4.38	0.95	10.98	0.01	0.00	99.16			
SRC 97-5	9	G_05_MAGNESIAN_ALMANDINE	39.20	0.06	22.12	0.02	23.95	5.75	0.55	8.72	0.07	0.00	100.43			

Sample#	Pt#	Mineral (Min-id.asc)	SiO2	TiO2	Al2O3	Cr2O3	FeO	MgO	MnO	CaO	Na2O	K2O	Total	ZnO	NiO	Nb2O5
SRC 97-5	10	G_05_MAGNESIAN_ALMANDINE	37.69	0.10	21.32	0.02	25.14	3.09	0.84	11.38	0.04	0.00	99.61			
SRC 97-5	11	G_05_MAGNESIAN_ALMANDINE	37.70	0.09	21.59	0.04	26.81	3.25	0.67	9.55	0.03	0.00	99.73			
SRC97-1	1	CHROMITE	0	0.31	11.74	42.15	38.94	5.5	0.48				99.54	0.19	0.23	
SRC97-1	9	CHROMITE	0.01	0.2	11.23	44.14	37.5	5.95	0.55				99.87	0.11	0.18	
SRC97-1	12	CHROMITE	0.01	0.33	8	42.32	43.55	4.48	0.48				99.63	0.25	0.21	
SRC97-1	15	CHROMITE	0	0.24	10.38	48.06	34.82	5.55	0.51				99.94	0.23	0.15	
SRC97-1	18	CHROMITE	0.01	0.27	8.44	42.78	42.33	4.83	0.37				99.69	0.31	0.35	
SRC97-1	19	CHROMITE	0.01	0.31	10.61	43.38	39.13	5.78	0.58				100.32	0.23	0.29	
SRC97-1	29	CHROMITE	0.01	0.15	8.52	50.41	34.66	5.81	0.47				100.38	0.22	0.13	
SRC97-1	33	CHROMITE	0	0.33	12.58	39.36	41.98	4.39	0.52				99.71	0.22	0.33	
SRC97-1	34	CHROMITE	0.01	0.36	7.07	48.69	36.98	5.2	0.54				99.36	0.33	0.18	
SRC97-1	37	CHROMITE	0.01	0.24	9.74	45.39	37.86	5.23	0.48				99.41	0.22	0.24	
SRC97-2	1	CHROMITE	0.01	0.34	7.45	50.01	35.63	5.31	0.56				99.79	0.31	0.17	
SRC97-2	3	CHROMITE	0.07	0.2	8.51	49.92	35.11	5.42	0.57				100.17	0.25	0.12	
SRC97-2	11	CHROMITE	0.01	0.31	9.72	43.34	39.2	5.54	0.56				99.22	0.34	0.2	
SRC97-2	12	CHROMITE	0	0.23	8.44	43.82	41.59	4.69	0.52				99.85	0.37	0.19	
SRC97-2	13	CHROMITE	0	0.45	8.6	47.8	38.2	3.86	0.38				100.05	0.58	0.18	
SRC97-3	1	CHROMITE	0	0.36	7	42.63	44.19	4.41	0.56				99.74	0.3	0.29	
SRC97-3	3	CHROMITE	0.01	0.2	11.99	40.72	39.58	5.6	0.52				99.01	0.13	0.26	
SRC97-3	8	CHROMITE	0.02	0.63	8.7	42.81	42.03	4.68	0.56				99.83	0.19	0.21	
SRC97-3	11	CHROMITE	0.01	0.41	6.87	46.71	39.79	4.62	0.5				99.46	0.31	0.24	
SRC97-3	13	CHROMITE	0	0.28	12.82	43.13	36.74	5.91	0.31				99.95	0.41	0.35	
SRC97-3	16	CHROMITE	0	0.26	10.33	41.21	41.55	5.43	0.44				99.7	0.26	0.22	
SRC97-4	2	CHROMITE	0	0.6	10.01	37.92	44.63	4.89	0.45				98.94	0.18	0.26	
SRC97-4	4	CHROMITE	0.01	0.23	10.15	45.23	36.66	5.85	0.46				99.09	0.17	0.33	
SRC97-4	5	CHROMITE	0.01	0.48	10.15	41.87	41.79	4.99	0.51				100.21	0.17	0.24	
SRC97-4	8	CHROMITE	0.01	0.25	10.56	43.18	39.17	5.55	0.55				99.65	0.13	0.25	
SRC97-4	9	CHROMITE	0	0.4	6.6	41.37	45.29	4.33	0.54				99.05	0.17	0.35	
SRC97-4	16	CHROMITE	0.01	0.17	8.8	44.39	39.23	5.13	0.47				98.71	0.31	0.2	
SRC97-4	17	CHROMITE	0	0.25	7.05	49.48	36.96	5.14	0.53				99.81	0.22	0.18	
SRC97-5	7	CHROMITE	0	0.27	9.8	42.02	41.04	5.12	0.56				99.23	0.21	0.21	
SRC97-5	13	CHROMITE	0	0.54	10.95	42.26	39.37	5.85	0.46				100	0.24	0.33	
SRC97-5	16	CHROMITE	0	0.31	7.39	42.41	43.34	4.48	0.54				98.95	0.27	0.21	
SRC97-5	20	CHROMITE	0	0.24	6.96	43.9	42.59	4.72	0.54				99.63	0.37	0.31	
SRC97-5	30	CHROMITE	0.01	0.37	13.31	38.08	41.42	5.36	0.52				99.7	0.33	0.3	
SRC97-5	35	CHROMITE	0	0.26	13.09	41.82	36.99	5.96	0.48				98.97	0.16	0.21	
SRC97-5	38	CHROMITE	0	0.28	14.98	37.12	40.64	5.88	0.51				99.95	0.29	0.25	
SRC97-5	49	CHROMITE	0	0.66	11.2	35.76	44.34	5.53	0.47				98.45	0.18	0.31	
SRC97-3	2	PICRO_CHROMITE	0.03	0.15	15.14	47.82	24.76	10.88	0.28				99.37	0.13	0.18	
SRC97-1	3	SUB_PICRO_CHROMITE	0	0.27	12	46.26	33.7	6.37	0.52				99.72	0.37	0.23	
SRC97-1	5	SUB_PICRO_CHROMITE	0	0.23	19.79	36.02	35.1	7.96	0.34				99.82	0.28	0.1	
SRC97-1	7	SUB_PICRO_CHROMITE	0	0.22	13.8	42.36	36.44	6.43	0.38				100.07	0.22	0.22	
SRC97-1	10	SUB_PICRO_CHROMITE	0.01	0	9.06	60.79	21.54	7.3	0.46				99.58	0.27	0.15	

Sample#	Pt#	Mineral (Min-id.asc)	SiO2	TiO2	Al2O3	Cr2O3	FeO	MgO	MnO	CaO	Na2O	K2O	Total	ZnO	NiO	Nb2O5
SRC97-1	13	SUB_PICRO_CHROMITE	0	0.56	19.8	39.38	30.62	8.56	0.48				99.78	0.22	0.16	
SRC97-1	14	SUB_PICRO_CHROMITE	0.01	0.57	11.22	42.13	37.74	6.43	0.52				99.04	0.15	0.27	
SRC97-1	23	SUB_PICRO_CHROMITE	0.01	0.34	12.37	44.41	35.69	6.1	0.47				99.79	0.25	0.15	
SRC97-1	24	SUB_PICRO_CHROMITE	0.01	0.21	11.47	46.81	34.1	6.47	0.44				99.9	0.2	0.19	
SRC97-1	27	SUB_PICRO_CHROMITE	0	0.16	18.46	35.75	37.9	6.51	0.38				99.72	0.27	0.29	
SRC97-1	32	SUB_PICRO_CHROMITE	0	0.01	20.82	37.79	30.94	8.85	0.36				99.14	0.2	0.17	
SRC97-2	5	SUB_PICRO_CHROMITE	0	0.15	12.82	45.13	33.7	6.52	0.42				99.2	0.29	0.17	
SRC97-2	9	SUB_PICRO_CHROMITE	0	0.13	9.47	51.64	31.47	6.32	0.51				99.84	0.14	0.16	
SRC97-2	10	SUB_PICRO_CHROMITE	0	0.56	13.04	41.81	37.62	6.06	0.36				99.83	0.12	0.26	
SRC97-3	5	SUB_PICRO_CHROMITE	0	0.18	14.93	44.39	31.41	7.32	0.44				99.07	0.1	0.3	
SRC97-3	9	SUB_PICRO_CHROMITE	0.04	0.14	16.36	39.04	35.33	7.28	0.38				98.94	0.19	0.18	
SRC97-3	15	SUB_PICRO_CHROMITE	0	0.38	11.98	41.74	37.92	6.48	0.44				99.37	0.15	0.28	
SRC97-3	17	SUB_PICRO_CHROMITE	0	0.22	16.26	40.55	35.16	7.35	0.42				100.29	0.18	0.15	
SRC97-3	18	SUB_PICRO_CHROMITE	0	0.17	12.5	44.6	34.99	6.73	0.39				99.82	0.17	0.27	
SRC97-3	19	SUB_PICRO_CHROMITE	0	0.17	11.78	47.58	31.8	7.64	0.44				99.89	0.21	0.27	
SRC97-3	20	SUB_PICRO_CHROMITE	0.01	0.26	16.14	37.94	37.59	6.36	0.48				99.31	0.34	0.19	
SRC97-4	1	SUB_PICRO_CHROMITE	0	0.13	12.4	46.9	32.16	7.76	0.36				100.06	0.14	0.21	
SRC97-4	3	SUB_PICRO_CHROMITE	0	0.32	12.7	41.86	37.37	6.05	0.47				99.25	0.26	0.22	
SRC97-4	11	SUB_PICRO_CHROMITE	0	0.26	12.65	44.09	35.76	6.62	0.57				100.42	0.22	0.25	
SRC97-4	12	SUB_PICRO_CHROMITE	0	0.26	13.7	45.15	32.36	7.15	0.46				99.44	0.22	0.14	
SRC97-4	13	SUB_PICRO_CHROMITE	0	0.16	14.29	41.09	37.24	6.53	0.43				100.09	0.12	0.23	
SRC97-4	14	SUB_PICRO_CHROMITE	0.06	0.34	14	40.35	36.01	7.17	0.55				98.95	0.21	0.26	
SRC97-4	15	SUB_PICRO_CHROMITE	0.02	0.22	11.57	47.9	32.61	6.86	0.48				100.25	0.38	0.21	
SRC97-4	18	SUB_PICRO_CHROMITE	0	0.3	19.02	36.71	35.89	7.37	0.38				100.25	0.27	0.31	
SRC97-5	2	SUB_PICRO_CHROMITE	0.03	0.21	16.26	41.61	31.97	7.93	0.39				98.72	0.1	0.22	
SRC97-5	4	SUB_PICRO_CHROMITE	0	0.16	15.53	41.06	35.37	6.55	0.45				99.79	0.38	0.29	
SRC97-5	8	SUB_PICRO_CHROMITE	0	0.43	9.52	46.84	36.01	6.61	0.46				100.16	0.15	0.14	
SRC97-5	9	SUB_PICRO_CHROMITE	0	0.26	18.88	36.46	35.94	7.35	0.45				99.7	0.1	0.26	
SRC97-5	18	SUB_PICRO_CHROMITE	0	0.46	27.96	35.03	22.93	12.22	0.3				99.03	0	0.13	
SRC97-5	29	SUB_PICRO_CHROMITE	0	0.18	15.81	42.23	33.55	7.28	0.48				99.97	0.18	0.26	
SRC97-5	31	SUB_PICRO_CHROMITE	0	0.27	12.99	42.91	35.81	6.38	0.55				99.3	0.21	0.18	
SRC97-5	34	SUB_PICRO_CHROMITE	0	0.15	19.41	37.97	34.1	7.63	0.41				100.08	0.19	0.22	
SRC97-5	37	SUB_PICRO_CHROMITE	0	0.14	23.26	36.78	28.94	9.36	0.35				99.24	0.16	0.25	
SRC97-5	39	SUB_PICRO_CHROMITE	0	0.19	11.5	43.64	37.95	6.03	0.42				100.26	0.26	0.27	
SRC97-5	41	SUB_PICRO_CHROMITE	0	0.38	16.75	35.84	39.4	6.07	0.48				99.32	0.17	0.23	
SRC97-5	44	SUB_PICRO_CHROMITE	0	0.08	15.59	43.36	32.84	7.33	0.45				99.97	0.23	0.09	
SRC97-5	45	SUB_PICRO_CHROMITE	0	0.22	12.45	42.95	37.14	6.06	0.54				99.65	0.08	0.21	
SRC97-5	46	SUB_PICRO_CHROMITE	0	0.21	20.56	38.65	30.17	9.38	0.39				99.79	0.18	0.25	
SRC97-1	4	UNKNOWN	0	0.16	35.09	27.04	24.6	12.79	0.27				100.36	0.11	0.3	
SRC97-2	7	UNKNOWN	0	0.24	28.53	28.39	31.97	9.84	0.42				99.76	0.19	0.18	
SRC97-3	4	UNKNOWN	0	0.07	35.59	26.57	23.58	13.68	0.25				100.08	0.06	0.28	
SRC97-3	10	UNKNOWN	0	0.51	12.42	33.55	46.8	5.31	0.39				99.39	0.09	0.32	
SRC97-3	12	UNKNOWN	0	0.05	27.06	33.25	27.37	11.2	0.29				99.69	0.25	0.22	
SRC97-3	14	UNKNOWN	0.09	0.08	26.26	33.71	28.71	10.57	0.29				100.18	0.19	0.28	

Sample#	Pt#	Mineral (Min-id.asc)	SiO2	TiO2	Al2O3	Cr2O3	FeO	MgO	MnO	CaO	Na2O	K2O	Total	ZnO	NiO	Nb2O5
SRC97-4	10	UNKNOWN	0	0.5	21.39	31.7	38.29	7.49	0.37				100.26	0.23	0.29	
SRC97-4	19	UNKNOWN	0	0.46	20.92	34.38	35.07	7.65	0.39				99.3	0.19	0.24	
SRC97-5	1	UNKNOWN	0	0.07	27.67	28.48	33.21	9.66	0.38				100.03	0.29	0.27	
SRC97-5	5	UNKNOWN	0	0.24	25.49	31.76	31.73	9.55	0.41				99.6	0.16	0.26	
SRC97-5	19	UNKNOWN	0	0.27	20.55	33.73	36.05	7.48	0.47				98.9	0.21	0.14	
SRC97-5	23	UNKNOWN	0	0.33	17.47	34.83	39.21	6.12	0.51				98.87	0.19	0.21	
SRC97-5	42	UNKNOWN	0	0.28	24.19	27.74	39.28	7.3	0.3				99.71	0.24	0.38	
SRC97-5	36	UNKNOWN	0	0	41.17	22.13	21.44	14.94	0.15				100.31	0.14	0.34	
SRC97-1	6	PICRO_ILMENITE	0.03	53.52	0.59	0.23	33.8	11.51	0.21				100.17	0.04	0.18	0.06
SRC97-5	14	SUB_PICRO_ILMENITE	0.03	51.14	0.25	0	44.86	3.06	0.54				100.17	0.2	0.09	0
SRC97-5	28	SUB_PICRO_ILMENITE	0	45.17	0.39	0	47.66	4.95	0.65				99.01	0	0.09	0.1

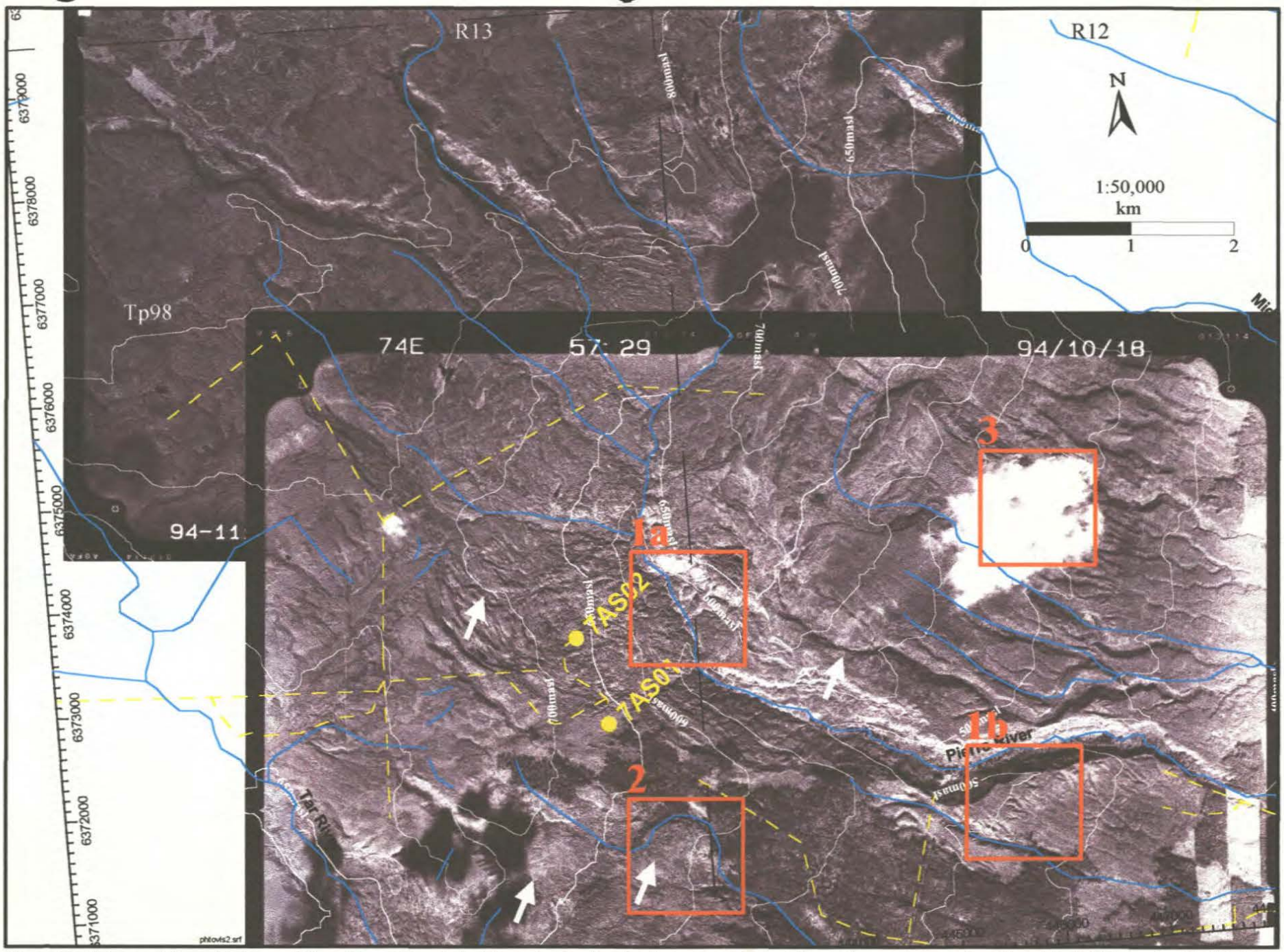
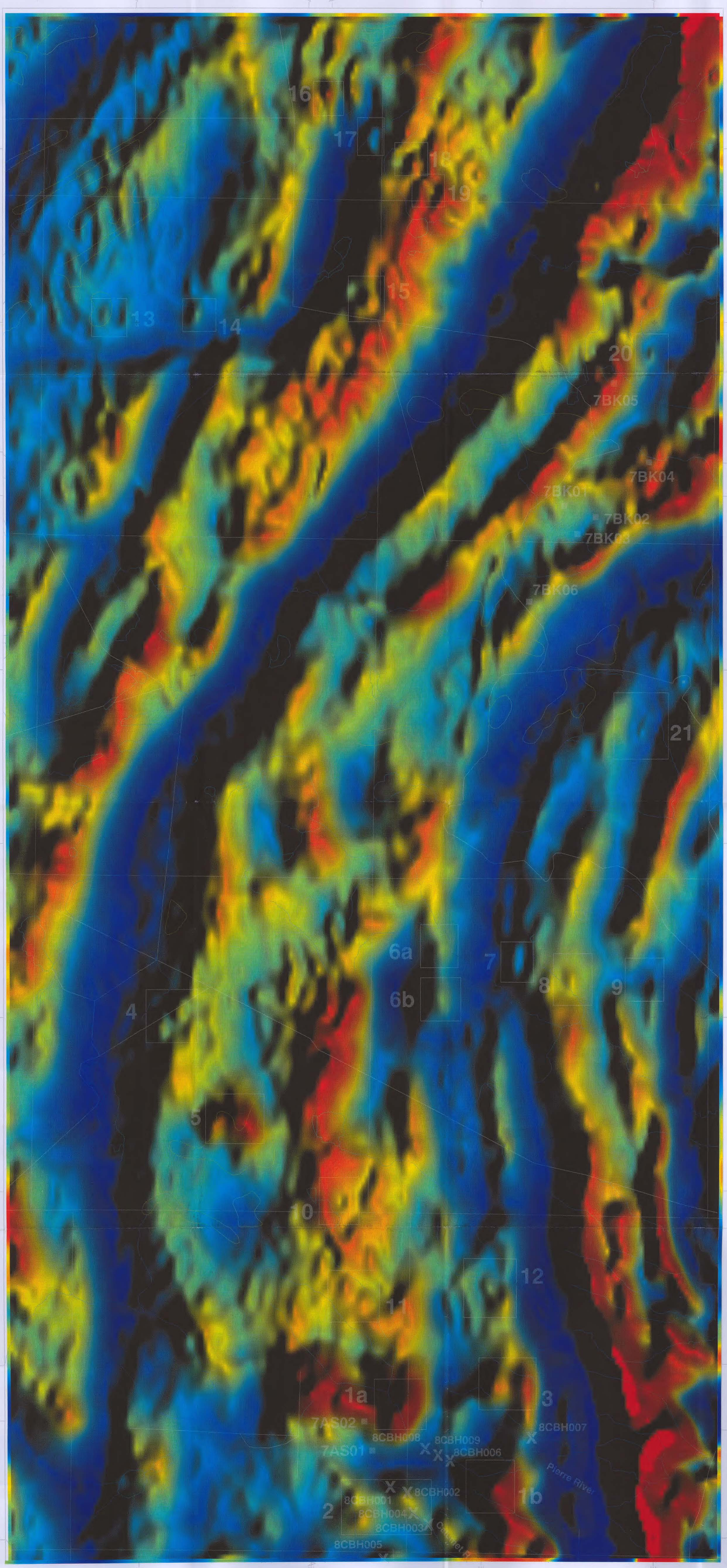


Figure 62. Airborne photographic image of Pierre River valley, Asphalt Property, showing circular topographic anomalies and magnetic anomalies selected for field inspection (Oct/97)(orang squares). Drill hole collar locations also shown. Airphotos and drainage are an uncontrolled best fit.



LEGEND

8CBH007
X Sample Site, identifier

7AS01
Drillhole, identifier

2
Target, identifier

Road or Cut Line

Drawing Specifications

Universall Transverse Mercator (UTM) Zone 12: North American Datum 1927 (NAD 27)

Color drape with Sun Azimuth 120 Degrees and Elevation 65 Degrees

Pseudo Depth Slice 1 prepared by World Geoscience Ltd.

The Airborne Magnetic Survey was Conducted during 1997 and was Flown at a Clearance of 100 m with Traverse Lines Spaced at 400 m and Control Lines at 1,200 m.

TINTINA MINES LIMITED

BUCKTON - ASPHALT PROPERTIES

DEPTH SLICE 1 (PDS1) OF TOTAL MAGNETIC INTENSITY

NTS: 84H

0 1 2 3

1:50,000

APEX Geoscience Ltd.

Edmonton, AB June, 1999

FIGURE 2

APPENDIX D

To : **TINTINA MINES LTD.**
Suite 218, 920 Yonge Street
Toronto, Ontario
M4W 3C7
ATTN : S. Sabag

File No : **40861**
Date : February 10, 1999
Samples :
Project :
P.O.#

Certificate of Assay

Loring Laboratories Ltd.

629 Beaverdam Road, NE Calgary Alberta
Tel: (403)274-2777 Fax: (403)275-0541

Sample No.	Au Total mg	Total Sample Wt grams	Au oz/ton	-100 mesh Wt grams	+100 mesh Wt grams	-100 mesh Au mg	+100 mesh Au mg
98 AS 02 CMP1	0.726	99.31	0.234	19.271	80.040	0.011	0.715
98 AS 02 CMP2	0.629	104.45	0.175	25.751	78.700	0.004	0.625

I HEREBY CERTIFY that the above results are those assays made by me upon the herein described samples :

[redacted]
Assayer

Rejects and pulps are retained for one month unless specific arrangements are made in advance.

To : **TINTINA MINES LTD.**
Suite 218, 920 Yonge Street
Toronto, Ontario
M4W 3C7
ATTN : S. Sabag

Certificate of Assay

Loring Laboratories Ltd.

629 Beaverdam Road, NE Calgary Alberta
Tel: (403)274-2777 Fax: (403)275-0541

File No : **40909**
Date : February 22, 1999
Samples :
Project :
P.O.#

Analytical Lot # AS110299

Sample No.	Sample Wt grams	Gold Wt mg	+80 mesh Wt grams	Gold oz/ton	% By Wt
98AS01CMP-1			75.25	0.068	
+80 mesh	24.000	0.080		0.097	69.25
	24.000	0.079			
	24.145	0.081			
-80 mesh	32.042	0.002		0.002	30.75
98AS01CMP-2			69.53	0.016	
+80 mesh	23.000	0.017		0.022	69.16
	23.000	0.016			
	23.460	0.020			
-80 mesh	30.971	0.002		0.002	30.84
98AS01CMP-3					
	26.000	0.001			
Pulverized	26.000	0.001			
	26.000	0.001			
	25.94	0.001			
Total Wt.	103.94				

I HEREBY CERTIFY that the above results are those assays made by me upon the herein described samples :

[redacted]
Assayer

Rejects and pulps are retained for one month unless specific arrangements are made in advance.

Invoice No.: 17215-REV
Work Order: 17392
Invoice Date: 19-APR-99
Date Submitted: 22-MAR-99
Your Reference: TRS2003
Account Number: 1239

TINTINA MINES LIMITED
SUITE 218 - 920 YONGE ST
TORONTO, ONTARIO
M4W 3C7
CANADA
ATTENTION: SHAHE F. SABAG

CERTIFICATE OF ANALYSIS

9 PULPS were submitted for analysis.

The following analytical packages were requested. Please see our current fee schedule for elements and detection limits.

REVISED REPORT 17215R CODE 1D ENHANCED INAA(INAAGEO.REV1)

NOTE: THE ATTACHED REVISED REPORT SUPERSEDES THE PREVIOUS REPORT SENT. 1D ENHANCED PACKAGE AS REQUESTED BY CUSTOMER APRIL 16, 1999.

This report may be reproduced without our consent. If only selected portions of the report are reproduced, permission must be obtained. If no instructions were given at time of sample submittal regarding excess material, it will be discarded within 90 days of this report. Our liability is limited solely to the analytical cost of these analyses. Test results are representative only of material submitted for analysis.

CERTIFIED BY :

[redacted]

DR E.HOFFMAN/GENERAL MANAGER

ACTIVATION LABORATORIES LTD.
1336 Sandhill Drive, Ancaster, Ontario Canada L9G 4V5 TELEPHONE +1.905.648.9611 or +1.888.228.5227 FAX +1.905.648.9613
E-MAIL ancaster@actlabs.com ACTLABS GROUP WEBSITE http://www.actlabs.com

Sample description	AU PPB	AG PPM	AS PPM	BA PPM	BR PPM	CA %	CO PPM	CR PPM	CS PPM	FE %	HF PPM	HG PPM	IR PPB	MO PPM	NA %	NI PPM	RB PPM	SB PPM	SC PPM	SE PPM	SN %	SR %	TA PPM	TH PPM
TRS7	108	<5	58.0	1200	14.5	4	22	88	6	4.46	4	<1	<5	64	0.48	127	80	10.4	11.7	24	<0.01	<0.05	0.8	10.1
TRS7 A	1220	<5	60.1	1300	14.9	4	24	91	6	4.53	4	<1	<5	71	0.48	<20	85	10.8	12.4	26	<0.01	<0.05	0.9	10.3
TRS9	150	<5	61.4	1300	15.9	4	24	97	6	4.86	4	<1	<5	70	0.51	266	95	11.5	12.7	25	<0.01	<0.05	1.0	10.8
TRS9 A	4180	<5	64.0	1300	15.7	5	25	101	7	5.03	4	<1	<5	76	0.53	275	85	11.5	13.2	27	<0.01	<0.05	1.3	11.8
TRS10	15	<5	58.1	2100	15.0	4	23	99	6	4.29	4	<1	<5	60	0.62	235	72	10.4	15.0	27	<0.01	<0.05	0.7	12.4
TRS10 A	18	<5	56.6	2200	15.9	5	23	106	6	4.63	4	<1	<5	66	0.65	<20	70	10.4	16.2	29	<0.01	<0.05	1.0	13.5
TRS11	<2	<5	1.6	<50	<0.5	<1	<1	<5	<1	0.02	<1	<1	<5	<1	31.9	<20	<15	<0.1	0.1	<3	<0.01	<0.05	<0.5	<0.2
TRS12	118	<5	61.6	1000	14.0	4	36	75	6	4.81	4	<1	<5	61	0.48	167	68	9.8	11.6	21	<0.01	<0.05	0.8	8.6
TRS4	1500	<5	144	<50	<0.5	4	228	43	<1	12.8	1	<1	<5	<1	1.04	<20	<15	<0.1	18.3	<3	<0.01	<0.05	0.5	<0.2

Sample description	U PPM	W PPM	ZN PPM	LA PPM	CE PPM	ND PPM	SM PPM	EU PPM	TB PPM	YB PPM	LU PPM	Mass g
TRS7	23.8	<1	318	48.2	89	39	8.2	2.1	1.1	3.5	0.56	32.00
TRS7 A	23.6	<1	327	49.6	86	37	8.6	2.3	1.2	3.8	0.57	26.95
TRS9	27.4	<1	340	54.1	103	49	9.6	2.4	1.3	4.4	0.67	22.43
TRS9 A	28.5	<1	364	56.1	103	51	10.3	2.4	1.3	4.5	0.70	16.18
TRS10	31.2	<1	326	104	171	90	20.1	5.5	3.0	7.3	1.16	24.83
TRS10 A	31.1	<1	362	104	182	89	20.7	5.8	3.2	7.6	1.16	23.11
TRS11	<0.5	<1	<50	<0.5	<3	<5	<0.1	<0.2	<0.5	<0.2	<0.05	9.840
TRS12	22.1	<1	284	44.2	82	35	7.4	1.7	1.1	3.2	0.49	35.12
TRS4	1.0	4	178	16.0	24	<5	1.6	0.8	<0.5	1.3	0.19	26.54

Invoice No.: 17215-REV
Work Order: 17392
Invoice Date: 19-APR-99
Date Submitted: 22-MAR-99
Your Reference: TRS2003
Account Number: 1239

TINTINA MINES LIMITED
SUITE 218 - 920 YONGE ST
TORONTO, ONTARIO
M4W 3C7
CANADA
ATTENTION: SHAHE F. SABAG

CERTIFICATE OF ANALYSIS

9 PULPS were submitted for analysis.

The following analytical packages were requested. Please see our current fee schedule for elements and detection limits.

REVISED REPORT 17215R CODE 1D ENHANCED INAA(INAAGEO.REV1)

NOTE: THE ATTACHED REVISED REPORT SUPERSEDES THE PREVIOUS REPORT SENT. 1D ENHANCED PACKAGE AS REQUESTED BY CUSTOMER APRIL 16, 1999.

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CERTIFIED BY :

[redacted]

DR E.HOFFMAN/GENERAL MANAGER

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1336 Sandhill Drive, Ancaster, Ontario Canada L9G 4V5 TELEPHONE +1.905.648.9611 or +1.888.228.5227 FAX +1.905.648.9613
E-MAIL ancaster@actlabs.com ACTLABS GROUP WEBSITE http://www.actlabs.com

Sample description	AU PPB	AG PPM	AS PPM	BA PPM	BR PPM	CA %	CO PPM	CR PPM	CS PPM	FE %	HF PPM	HG PPM	IR PPB	MO PPM	NA %	NI PPM	RB PPM	SB PPM	SC PPM	SE PPM	SN %	SR %	TA PPM	TH PPM
TRS7	108	<5	58.0	1200	14.5	4	22	88	6	4.46	4	<1	<5	64	0.48	127	80	10.4	11.7	24	<0.01	<0.05	0.8	10.1
TRS7 A	1220	<5	60.1	1300	14.9	4	24	91	6	4.53	4	<1	<5	71	0.48	<20	85	10.8	12.4	26	<0.01	<0.05	0.9	10.3
TRS9	150	<5	61.4	1300	15.9	4	24	97	6	4.86	4	<1	<5	70	0.51	266	95	11.5	12.7	25	<0.01	<0.05	1.0	10.8
TRS9 A	4180	<5	64.0	1300	15.7	5	25	101	7	5.03	4	<1	<5	76	0.53	275	85	11.5	13.2	27	<0.01	<0.05	1.3	11.8
TRS10	15	<5	58.1	2100	15.0	4	23	99	6	4.29	4	<1	<5	60	0.62	235	72	10.4	15.0	27	<0.01	<0.05	0.7	12.4
TRS10 A	18	<5	56.6	2200	15.9	5	23	106	6	4.63	4	<1	<5	66	0.65	<20	70	10.4	16.2	29	<0.01	<0.05	1.0	13.5
TRS11	<2	<5	1.6	<50	<0.5	<1	<1	<5	<1	0.02	<1	<1	<5	<1	31.9	<20	<15	<0.1	0.1	<3	<0.01	<0.05	<0.5	<0.2
TRS12	118	<5	61.6	1000	14.0	4	36	75	6	4.81	4	<1	<5	61	0.48	167	68	9.8	11.6	21	<0.01	<0.05	0.8	8.6
TRS4	1500	<5	144	<50	<0.5	4	228	43	<1	12.8	1	<1	<5	<1	1.04	<20	<15	<0.1	18.3	<3	<0.01	<0.05	0.5	<0.2

Sample description	U PPM	W PPM	ZN PPM	LA PPM	CE PPM	ND PPM	SM PPM	EU PPM	TB PPM	YB PPM	LU PPM	Mass g
TRS7	23.8	<1	318	48.2	89	39	8.2	2.1	1.1	3.5	0.56	32.00
TRS7 A	23.6	<1	327	49.6	86	37	8.6	2.3	1.2	3.8	0.57	26.95
TRS9	27.4	<1	340	54.1	103	49	9.6	2.4	1.3	4.4	0.67	22.43
TRS9 A	28.5	<1	364	56.1	103	51	10.3	2.4	1.3	4.5	0.70	16.18
TRS10	31.2	<1	326	104	171	90	20.1	5.5	3.0	7.3	1.16	24.83
TRS10 A	31.1	<1	362	104	182	89	20.7	5.8	3.2	7.6	1.16	23.11
TRS11	<0.5	<1	<50	<0.5	<3	<5	<0.1	<0.2	<0.5	<0.2	<0.05	9.840
TRS12	22.1	<1	284	44.2	82	35	7.4	1.7	1.1	3.2	0.49	35.12
TRS4	1.0	4	178	16.0	24	<5	1.6	0.8	<0.5	1.3	0.19	26.54

Invoice No.: 17389
Work Order: 17523
Invoice Date: 10-MAY-99
Date Submitted: 15-APR-99
Your Reference: DEF130499
Account Number: 1239

TINTINA MINES LIMITED
SUITE 218 - 920 YONGE ST
TORONTO, ONTARIO
M4W 3C7
CANADA
ATTENTION: SHAHE F. SABAG

CERTIFICATE OF ANALYSIS

3 CRUSHED ROCKS(PREP.REV3) were submitted for analysis.

The following analytical packages were requested. Please see current fee schedule for elements and detection limits.

REPORT 17389D SAMPLE WEIGHTS

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CERTIFIED BY :

[redacted]

DR E.HOFFMAN/GENERAL MANAGER

ACTIVATION LABORATORIES LTD.
1336 Sandhill Drive, Ancaster, Ontario Canada L9G 4V5 TELEPHONE +1.905.648.9611 or +1.888.228.5227 FAX +1.905.648.9613
E-MAIL ancaster@actlabs.com ACTLABS GROUP WEBSITE http://www.actlabs.com

Sample ID	Total Wt. g	Returned Wt. g	Analysis Wt. g	Au-Wt. g	C-Wt. g	Td-Wt. g
AS2CMPD1S	660.67	313.19	347.48	141.74	14.61	5.00
ORTCMPD1S	769.31	377.24	392.07	176.55	14.04	5.65
BK2CMPD1S	763.29	405.56	357.73	159.83	14.89	5.20

Invoice No.: 17389
Work Order: 17523
Invoice Date: 10-MAY-99
Date Submitted: 15-APR-99
Your Reference: DEF130499
Account Number: 1239

TINTINA MINES LIMITED
SUITE 218 - 920 YONGE ST
TORONTO, ONTARIO
M4W 3C7
CANADA
ATTENTION: SHAHE F. SABAG

CERTIFICATE OF ANALYSIS

3 CRUSHED ROCKS(PREP.REV3) were submitted for analysis.

The following analytical packages were requested. Please see our current fee schedule for elements and detection limits.

REPORT 17389 CODE 1D ENHANCED INAA(INAAGEO.REV1)
REPORT 17389 B CODE 1F-TOTAL DIGESTION ICP
REPORT 17389 C CODE 1A2-FIRE ASSAY ICP/ORGANIC C

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CERTIFIED BY :

[redacted]

DR E.HOFFMAN/GENERAL MANAGER

Sample description	AU PPB	AG PPM	AS PPM	BA PPM	BR PPM	CA %	CO PPM	CR PPM	CS PPM	FE %	HF PPM	HG PPM	IR PPB	MO PPM	NA %	NI PPM	RB PPM	SB PPM	SC PPM	SE PPM	SN %	SR %	TA PPM	TH PPM
AS2CMPD1S-A	5	<5	74.4	2200	16.5	2	24	94	5	5.37	5	<1	<5	57	0.57	191	75	14.7	12.2	31	<0.01	<0.05	0.8	11.4
AS2CMPD1S-B	13	<5	73.3	2200	16.6	2	24	95	5	5.39	4	<1	<5	59	0.58	190	70	14.7	12.3	25	<0.01	<0.05	1.0	11.4
AS2CMPD1S-C	5	<5	71.9	2100	15.8	2	23	90	5	5.21	4	<1	<5	60	0.57	160	80	14.0	11.7	26	<0.01	<0.05	1.0	10.5
AS2CMPD1S-D	10	<5	72.4	2000	15.1	3	23	87	5	5.11	4	<1	<5	57	0.53	154	65	13.7	11.3	25	<0.01	<0.05	0.8	10.3
AS2CMPD1S-E	8	<5	74.0	2300	16.4	2	24	96	5	5.54	4	<1	<5	70	0.58	158	78	14.8	12.4	29	<0.01	<0.05	0.9	11.4
ORTCMPD1S-A	12	<5	70.7	1400	14.0	3	26	89	6	5.34	4	<1	<5	62	0.33	170	80	13.9	11.6	25	<0.01	<0.05	1.0	10.1
ORTCMPD1S-B	11	<5	71.1	1300	13.9	3	25	84	5	4.96	4	<1	<5	58	0.31	178	79	13.3	10.7	23	<0.01	<0.05	1.3	9.9
ORTCMPD1S-C	18	<5	70.6	1200	13.1	3	24	85	5	4.97	4	<1	<5	60	0.31	137	74	13.2	10.8	22	<0.01	<0.05	0.7	9.3
ORTCMPD1S-D	21	<5	71.8	1200	14.2	2	27	87	6	5.32	4	<1	<5	64	0.32	197	74	13.7	11.3	23	<0.01	<0.05	0.6	9.8
ORTCMPD1S-E	15	<5	74.8	1300	14.2	4	26	90	6	5.36	4	<1	<5	63	0.32	192	79	14.0	11.6	25	<0.01	<0.05	0.8	10.3
ORTCMPD1S-F	17	<5	67.0	1100	12.9	3	24	81	6	5.07	4	<1	<5	64	0.31	189	85	13.7	10.7	20	<0.01	<0.05	0.7	9.3
BK2CMPD1S-A	12	<5	64.6	1300	12.0	4	22	76	4	4.62	4	<1	<5	53	0.49	173	72	12.6	10.6	21	<0.01	<0.05	0.8	10.5
BK2CMPD1S-B	15	<5	67.1	1300	12.3	4	22	79	5	4.67	4	<1	<5	57	0.49	140	75	12.5	10.8	20	<0.01	<0.05	0.6	10.4
BK2CMPD1S-C	4	<5	62.6	1200	11.2	4	21	75	4	4.46	4	<1	<5	56	0.46	120	55	12.2	10.5	19	<0.01	<0.05	0.8	9.8
BK2CMPD1S-D	3	<5	61.8	1300	12.4	4	20	72	4	4.41	4	<1	<5	55	0.48	124	77	11.9	10.1	18	<0.01	<0.05	0.7	9.9

Sample description	U PPM	W PPM	ZN PPM	LA PPM	CE PPM	ND PPM	SM PPM	EU PPM	TB PPM	YB PPM	LU PPM	Mass g
AS2CMPD1S-A	18.5	<1	275	52.8	88	40	9.0	2.3	1.3	4.3	0.65	29.97
AS2CMPD1S-B	18.3	<1	287	53.4	90	42	9.1	2.3	1.4	4.5	0.67	27.94
AS2CMPD1S-C	17.2	<1	282	51.4	84	40	8.7	2.2	1.1	4.5	0.67	30.51
AS2CMPD1S-D	18.3	<1	267	49.4	86	40	8.7	2.1	1.3	4.2	0.65	27.99
AS2CMPD1S-E	19.7	<1	276	55.0	91	45	9.4	2.3	1.3	4.7	0.73	17.43
ORTCMPD1S-A	18.8	1	280	44.9	75	31	6.9	1.7	0.9	3.6	0.56	30.19
ORTCMPD1S-B	18.7	2	287	41.7	71	31	6.5	1.6	0.9	3.5	0.55	28.59
ORTCMPD1S-C	17.9	1	289	40.7	72	34	6.4	1.5	1.1	3.3	0.56	32.11
ORTCMPD1S-D	19.4	2	291	43.6	75	29	6.7	1.7	0.8	3.5	0.54	32.78
ORTCMPD1S-E	19.5	2	264	44.8	77	30	7.0	1.7	1.0	3.8	0.58	27.62
ORTCMPD1S-F	16.6	1	297	41.0	71	31	6.4	1.6	0.9	3.5	0.55	33.43
BK2CMPD1S-A	20.4	<1	242	50.6	83	34	8.5	2.1	1.3	4.1	0.63	36.48
BK2CMPD1S-B	20.2	<1	266	53.6	88	36	8.8	2.2	1.4	4.2	0.64	31.70
BK2CMPD1S-C	19.6	<1	265	50.7	85	34	8.4	2.0	1.2	4.1	0.63	35.11
BK2CMPD1S-D	20.7	<1	254	49.3	84	35	8.2	2.0	1.2	3.9	0.62	34.80

Sample description	MO PPM	CU PPM	PB PPM	ZN PPM	AG PPM	NI PPM	MN PPM	SR PPM	CD PPM	BI PPM	V PPM	CA %	P %	MG %	TI %	AL %	K %	Y PPM	BE PPM	S %
AS2CMPDIS	60.	118.	27.	288.	0.9	130.	240.	333.	7.5	<5.	584.	2.73	0.434	0.82	0.27	6.15	1.63	54.	2.	4.63
RE AS2CMPDIS	60.	115.	30.	284.	1.0	129.	236.	320.	7.7	<5.	583.	2.69	0.432	0.81	0.26	6.05	1.61	54.	2.	4.63
ORTCMPD1S	59.	96.	26.	284.	0.8	148.	207.	208.	8.0	<5.	609.	2.95	0.315	0.81	0.27	5.81	1.61	40.	2.	4.80
RE ORTCMPD1S	60.	95.	24.	286.	0.9	147.	203.	204.	8.1	<5.	609.	2.90	0.316	0.79	0.27	5.71	1.58	40.	2.	4.82
BK2CMPD1S	55.	86.	23.	266.	0.8	125.	228.	225.	8.1	<5.	509.	4.40	0.350	0.68	0.25	5.12	1.45	56.	2.	4.61
RE BK2CMPD1S	54.	84.	26.	260.	0.8	121.	223.	220.	7.9	<5.	497.	4.29	0.344	0.66	0.24	4.97	1.40	54.	<2.	4.53

SAMPLE NO.	ORGINAL ORGANIC C %	DUPLICATE ORGANIC C %	Wt g	Au ppb
ASCMPD1S	6.1	6.15	30.00	10
ASCMPD1S A			30.00	10
ASCMPD1S B			30.00	10
ASCMPD1S C			30.00	10
ASCMPD1S D			18.69	10
ORTCMPD1S	5.85	6.15	30.00	10
ORTCMPD1S A			30.00	10
ORTCMPD1S B			30.00	10
ORTCMPD1S C			30.00	10
ORTCMPD1S D			30.00	10
ORTCMPD1S E			23.74	10
BK2CMPD1S	5.35	5.5	30.00	5
BK2CMPD1S A			30.00	5
BK2CMPD1S B			30.00	5
BK2CMPD1S C			30.00	10
BK2CMPD1S D			36.52	5
BLANK				-5
STD COR #2				855 (800)
STD COR #3				255 (220)

ATEBA MINES INC.

"A mining and exploration company"

Research Office: 43 Creighton Road, Copper Cliff, Ontario P0M 1N0
Tel: 1 (705) 682-9198; Fax: 1 (705) 682-9209; email: berardi@cyberbeach.net

April 5th, 1999

Tintina Mines Limited
920 Yonge Street
Suite 218
Toronto M4W 3C7
Tel: (416) 929 - 2944
Fax: (416) 929 - 2945

Attention: Mr. Shahe' F. Sabag

Copy to: Lina Noble
Peter Howe

Re: Tests on the samples BK2CMPD1, BK2CMPD2, AS2CMPD1, ORTCMPD1.

Dear Shahe',

Notwithstanding the fact that Mr. Krofchak said it would be $1,000 for a test, at the time that was stated we were not aware that you wanted four tests. We have to tell you that we worked 10 hours a day for four days to accomplish the four tests and therefore, we have to charge you in accordance with the Brady agreement, 4 days x1 $1,000 = $4,000 dollars.

However we are pleased to report that the tests are now finished and the package is ready to be sent and we will have Lina Noble, General Manager of Ateba invoicing you accordingly.

Please confirm were you wish us to send the samples of the concentrates and the fine slime/clays that we recovered from the deflocculation of the samples you sent us.

The work done was as follows:

1. All the four samples were separately macerated and deflocculated with A-15. No other chemicals were used.
2. All the samples went through wet screening to -325 mesh. The fine slime/clays of each sample were separately collected in buckets and let them settle overnight. Due to the physical-chemical characteristics of the clay particles that stay in suspension for a

very long period of time (in some cases even years), it was possible to recover only a small amount of the fines.

3. The concentrates were air-dried at room temperature.

	Original Weight in g	Concentrate produced in g
BK2CMPD1	2,000	400
BK2CMPD2	2,400	632
AS2CMPD1	3,200	1019
ORTCMPD1	4,600	1561

Yours Truly,

[redacted]

Dr. Roberto Berardi
(Executive Assistant)

Quality Analysis... **Actlabs** *Innovative Technologies*

Invoice No.: 17365
Work Order: 17522
Invoice Date: 25-MAY-99
Date Submitted: 15-APR-99
Your Reference: DEF140499
Account Number: 1239

TINTINA MINES LIMITED
SUITE 218 - 920 YONGE ST
TORONTO, ONTARIO
M4W 3C7
CANADA
ATTENTION: SHAHE F. SABAG

CERTIFICATE OF ANALYSIS

3 CRUSHED ROCKS(PREP.REV3) were submitted for analysis.

The following analytical packages were requested. Please see our current fee schedule for elements and detection limits.

REPORT 17365 CODE 1D ENHANCED INAA(INAAGEO.REV1)
REPORT 17365 B CODE 1F-TOTAL DIGESTION ICP
REVISED REPORT 17365 CR CODE 1A2-FIRE ASSAY ICP/ORGANIC C/WEIGHTS
REVISED REPORT 17365 DR SAMPLE SPLITS/WEIGHTS
REPORT 17365 E CODE 1A2-BALANCE OF FIRE ASSAY/WEIGHTS

NOTE: THE ATTACHED REPORT SUPERSEDES THE PREVIOUS REPORT SENT.
REPORT.17365CR HAS BEEN REVISED TO CORRECT WEIGHTS.
REPORT.17365DR HAS BEEN REVISED. PULV. AND NOT PULV. HEADINGS WERE SWITCHED.

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Our liability is limited solely to the analytical cost of these analyses.
Test results are representative only of material submitted for analysis.

CERTIFIED BY :

[redacted]

DR E.HOFFMAN/GENERAL MANAGER

ACTIVATION LABORATORIES LTD.
1336 Sandhill Drive, Ancaster, Ontario Canada L9G 4V5 **TELEPHONE** +1.905.648.9611 or +1.888.228.5227 **FAX** +1.905.648.9613
E-MAIL ancaster@actlabs.com **ACTLABS GROUP WEBSITE** http://www.actlabs.com

Sample description	AU PPB	AG PPM	AS PPM	BA PPM	BR PPM	CA %	CO PPM	CR PPM	CS PPM	FE %	HF PPM	HG PPM	IR PPB	MO PPM	NA %	NI PPM	RB PPM	SB PPM	SC PPM	SE PPM	SN %	SR %	TA PPM	TH PPM
AS2CMPD1B	12	<5	58.2	2500	22.4	7	20	86	4	4.27	5	<1	<5	76	0.51	176	66	12.7	15.6	34	<0.01	<0.05	<0.5	17.8
AS2CMPD1B-A	15	<5	62.2	2700	23.3	6	22	89	4	4.36	5	<1	<5	81	0.52	182	56	13.1	15.7	37	<0.01	<0.05	<0.5	18.2
AS2CMPD1B-B	50	<5	65.5	2700	23.9	7	21	90	4	4.23	5	<1	<5	68	0.51	210	43	12.7	15.7	39	<0.01	<0.05	<0.5	17.5
AS2CMPD1B-C	10	<5	57.5	2500	21.7	7	19	77	4	4.01	4	<1	<5	75	0.49	194	61	12.2	14.5	33	<0.01	<0.05	<0.5	16.4
AS2CMPD1B-D	12	<5	57.7	2800	23.5	7	22	77	4	4.22	5	<1	<5	72	0.51	200	63	13.1	15.7	32	<0.01	<0.05	<0.5	17.2
AS2CMPD1B-E	9	<5	56.4	2700	23.5	6	22	87	4	4.15	4	<1	<5	81	0.53	213	64	12.9	15.8	35	<0.01	<0.05	<0.5	18.3
AS2CMPD1B-F	11	<5	55.8	2400	23.3	7	21	78	5	3.85	4	<1	<5	78	0.48	199	62	12.4	15.1	28	<0.01	<0.05	<0.5	17.0
AS2CMPD1B-G	6	<5	63.2	2800	23.6	6	23	102	5	4.63	5	<1	<5	83	0.54	203	57	14.2	16.8	38	<0.01	<0.05	<0.5	20.4
ORTCMPD1B	24	<5	70.7	1800	20.2	8	23	78	4	5.06	5	<1	<5	83	0.38	218	61	14.0	12.3	20	<0.01	<0.05	<0.5	14.2
ORTCMPD1B-A	29	<5	71.3	1900	21.4	8	23	80	4	5.29	5	<1	<5	84	0.39	212	75	14.5	12.4	24	<0.01	<0.05	<0.5	14.9
ORTCMPD1B-B	16	5	70.5	1900	20.9	7	23	74	4	5.00	5	<1	<5	83	0.37	207	60	14.0	12.1	23	<0.01	<0.05	<0.5	14.0
ORTCMPD1B-C	17	<5	70.8	1800	20.7	8	23	78	3	5.05	5	<1	<5	82	0.37	156	57	13.7	12.1	25	<0.01	<0.05	<0.5	14.1
ORTCMPD1B-D	19	<5	70.8	1900	20.6	8	24	81	3	5.05	5	<1	<5	81	0.38	220	57	13.9	12.1	29	<0.01	<0.05	<0.5	14.1
ORTCMPD1B-E	20	<5	70.5	1700	19.7	8	23	82	3	4.89	5	<1	<5	78	0.37	210	63	13.2	11.8	27	<0.01	<0.05	<0.5	13.1
ORTCMPD1B-F	27	<5	69.5	1700	19.9	7	22	76	3	4.58	4	<1	<5	79	0.33	223	46	13.0	11.2	28	<0.01	<0.05	<0.5	13.4
ORTCMPD1B-G	25	<5	77.1	1600	22.1	8	25	80	4	5.37	5	<1	<5	78	0.37	183	60	15.4	12.9	30	<0.01	<0.05	<0.5	14.5
BK2CMPD1	7	<5	44.6	1400	13.9	11	12	41	<1	3.14	4	<1	<5	51	0.34	128	26	8.1	9.0	20	<0.01	<0.05	<0.5	12.4
BK2CMPD1-A	<2	<5	45.3	1200	12.8	11	11	39	<1	2.92	4	<1	<5	56	0.32	184	19	8.0	8.6	18	<0.01	<0.05	<0.5	11.8
BK2CMPD1-B	3	<5	45.0	1200	12.4	12	12	36	<1	3.01	4	<1	<5	51	0.33	119	22	7.8	8.5	14	<0.01	<0.05	<0.5	11.5
BK2CMPD1-C	5	<5	45.5	1300	13.4	12	12	33	<1	3.15	4	<1	<5	52	0.33	130	19	8.2	9.1	18	<0.01	<0.05	<0.5	12.8
BK2CMPD1-D	4	<5	47.5	1500	14.4	13	13	40	1	3.30	4	<1	<5	51	0.35	120	37	8.8	9.5	22	<0.01	<0.05	<0.5	13.0
BK2CMPD1-E	5	<5	47.4	1400	16.2	12	13	43	1	3.35	4	<1	<5	59	0.36	163	33	9.2	9.8	20	<0.01	<0.05	<0.5	13.9

Sample description	U PPM	W PPM	ZN PPM	LA PPM	CE PPM	ND PPM	SM PPM	EU PPM	TB PPM	YB PPM	LU PPM	Mass g
AS2CMPD1B	51.1	<1	358	154	199	107	26.1	7.3	4.3	11.3	1.76	28.18
AS2CMPD1B-A	53.8	<1	369	163	197	107	26.4	7.3	4.1	11.7	1.87	28.50
AS2CMPD1B-B	52.7	<1	387	156	196	100	25.8	7.1	4.4	11.0	1.80	27.81
AS2CMPD1B-C	51.1	<1	340	149	182	95	24.1	6.5	4.0	10.7	1.69	27.45
AS2CMPD1B-D	52.6	<1	372	157	198	104	26.3	7.2	4.2	11.6	1.79	28.35
AS2CMPD1B-E	51.2	<1	362	158	199	114	26.0	7.2	4.4	11.8	1.75	28.98
AS2CMPD1B-F	50.1	<1	368	149	192	102	24.6	6.5	3.9	11.2	1.69	26.26
AS2CMPD1B-G	52.3	<1	425	172	236	118	30.7	7.7	4.9	12.7	2.05	15.39
ORTCMPD1B	50.2	<1	442	97.2	133	67	16.6	4.3	2.6	7.2	1.18	27.85
ORTCMPD1B-A	51.0	<1	455	100	137	67	17.1	4.5	2.7	7.3	1.20	26.94
ORTCMPD1B-B	49.0	<1	442	97.0	129	63	16.3	4.2	2.7	7.1	1.20	27.39
ORTCMPD1B-C	49.7	<1	442	97.5	130	68	16.7	4.3	2.6	7.3	1.13	27.75
ORTCMPD1B-D	50.0	<1	424	96.1	133	67	16.7	4.3	2.7	7.4	1.13	27.06
ORTCMPD1B-E	49.6	<1	448	95.6	128	61	15.9	4.1	2.5	7.1	1.04	28.21
ORTCMPD1B-F	47.3	<1	405	90.8	119	60	15.1	3.8	2.4	6.7	1.06	28.51
ORTCMPD1B-G	52.8	<1	472	98.5	145	72	18.0	4.5	2.7	7.9	1.25	19.52
BK2CMPD1	52.1	<1	324	116	147	79	19.2	4.9	3.0	7.9	1.18	34.42
BK2CMPD1-A	50.8	<1	313	110	142	69	18.3	4.6	3.1	7.5	1.19	32.00
BK2CMPD1-B	50.3	<1	303	109	137	71	17.8	4.6	2.8	7.3	1.19	33.62
BK2CMPD1-C	52.0	<1	316	116	147	79	19.2	4.9	2.9	7.9	1.16	32.48
BK2CMPD1-D	53.6	<1	343	116	154	78	20.1	5.3	3.2	8.3	1.27	28.21
BK2CMPD1-E	55.9	<1	348	118	165	84	21.1	5.4	3.4	8.6	1.28	22.40

Sample description	MO PPM	CU PPM	PB PPM	ZN PPM	AG PPM	NI PPM	MN PPM	SR PPM	CD PPM	BI PPM	V PPM	CA %	P %	MG %	TI %	AL %	K %	Y PPM	BE PPM	S %
AS2CMPD1B	74.	99.	23.	343.	0.8	122.	235.	418.	13.2	<5.	474.	7.11	0.773	0.57	0.19	5.09	1.36	169.	2.	4.25
AS2CMPD1B (DUP)	74.	100.	24.	338.	0.7	127.	236.	443.	12.8	<5.	487.	7.20	0.801	0.58	0.19	5.11	1.37	179.	2.	4.40
ORTCMPD1B	79.	95.	21.	417.	0.6	144.	266.	295.	14.2	<5.	476.	8.50	0.574	0.53	0.17	4.23	1.23	101.	<2.	5.91
ORTCMPD1B (DUP)	78.	88.	20.	389.	0.6	145.	260.	287.	13.6	<5.	475.	8.26	0.574	0.51	0.16	4.14	1.21	102.	<2.	5.89
BK2CMPD1	49.	54.	13.	301.	<0.4	83.	265.	290.	10.8	<5.	135.	13.40	0.643	0.21	0.08	1.92	0.75	129.	<2.	4.22
BK2CMPD1 (DUP)	50.	55.	14.	303.	<0.4	85.	266.	297.	10.5	<5.	137.	13.47	0.649	0.21	0.09	1.93	0.76	130.	<2.	4.26

Sample ID	Split 1-Not Pulv. g	Split 2-Pulv. g	C/1F Split g
AS2CMPD1B	228.95	230.73	30.01
ORTCMPD1B	220.77	216.15	33.05
BK2CMPD1	189.86	177.65	28.22

SAMPLE NO.	Wt(grams)	FIRE ASSAY Au(ppb)	ORGANIC ORIGINAL C(%)	ORGANIC DUPLICATE C(%)
AS2CMPD1B	15.00	-5	9.95	9.95
AS2CMPD1B-A	15.00	5		
AS2CMPD1B-B	15.00	-5		
AS2CMPD1B-C	15.00	-5		
AS2CMPD1B-D	15.00	-5		
AS2CMPD1B-E	15.00	-5		
AS2CMPD1B-F	15.00	-5		
ORTCMPD1B	15.00	-5	9.95	10
ORTCMPD1B-A	15.00	5		
ORTCMPD1B-B	15.00	35		
ORTCMPD1B-C	15.00	5		
ORTCMPD1B-D	15.00	10		
ORTCMPD1B-E	15.00	-5		
BK2CMPD1	15.00	35	7.45	7.4
BK2CMPD1-A	15.00	-5		
BK2CMPD1-B	15.00	-5		
BK2CMPD1-C	15.00	10		
BK2CMPD1-D	15.00	-5		

To : **TINTINA MINES LTD.**
Suite 218, 920 Yonge Street
Toronto, Ontario
M4W 3C7
ATTN: S. Sabag

File No : **40912**
Date : February 26, 1999
Samples :
Project :
P.O.#

Certificate of Assay

Loring Laboratories Ltd.

629 Beaverdam Road, NE Calgary Alberta
Tel: (403)274-2777 Fax: (403)275-0541

Analytical Lot # AS170299

Sample No.	Sample Wt grams	Au mg	Au oz/ton	Total Wt grams
7AS0202161	45.033		0.202	45.033
(a)	23.000	0.020		
(b)	22.033	0.296		
7AS020173	54.790		0.016	54.790
(a)	28.000	0.018		
(b)	26.790	0.012		
7AS0202225	35.554		0.020	35.554
(a)	18.000	0.012		
(b)	17.554	0.012		
7AS0202299	50.143		0.014	50.143
(a)	25.000	0.014		
(b)	25.143	0.010		
7AS0202346	91.056		0.028	91.056
(a)	30.000	0.062		
(b)	30.000	0.012		
(c)	31.056	0.013		
7AS0202379	16.518	0.011	0.020	16.518
7AS020421	66.458		0.013	66.458
(a)	22.000	0.011		
(b)	22.000	0.013		
(c)	22.458	0.006		
7AS0202485	37.201		0.020	37.201
(a)	19.000	0.014		
(b)	18.201	0.011		

I HEREBY CERTIFY that the above results are those assays made by me upon the herein described samples :

[redacted]
Assayer

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M4W 3C7
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Analytical Lot # AS170299

Sample No.	Sample Wt grams	Au mg	Au oz/ton	Total Wt grams
7AS0202549	13.350	0.008	0.017	13.350
7AS0202612	35.976		0.018	35.976
(a)	18.000	0.011		
(b)	17.976	0.011		
7AS0202638	46.890		0.026	46.890
(a)	24.000	0.031		
(b)	22.890	0.010		
7AS0202695	64.850		~~0.006~~ 0.025	64.850
(a)	33.000	0.014		
(b)	31.850	0.014		
7AS0202765	30.450	0.012	0.011	30.450
7AS0202782	17.830	0.014	0.023	17.830
7AS0202792	12.181	0.007	0.017	12.181
7AS0202808	41.237		0.014	41.237
(a)	21.000	0.010		
(b)	20.237	0.010		
7AS0202877	36.270		0.016	36.270
(a)	18.000	0.010		
(b)	18.270	0.010		
7AS0202946	48.250		0.012	48.250
(a)	25.000	0.010		
(b)	23.250	0.010		

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Certificate of Assay

Loring Laboratories Ltd.

629 Beaverdam Road, NE Calgary Alberta
Tel: (403)274-2777 Fax: (403)275-0541

Analytical Lot # AS170299

Sample No.	Sample Wt grams	Au mg	Au oz/ton	Total Wt grams
7AS0203015	59.151		0.013	59.151
(a)	30.000	0.009		
(b)	29.151	0.018		
7AS0203064	48.760		0.012	48.760
(a)	25.000	0.012		
(b)	23.760	0.008		
7AS0203072	41.091		0.015	41.091
(a)	21.000	0.012		
(b)	20.091	0.010		
7AS0203095	64.261		0.008	64.261
(a)	32.000	0.010		
(b)	32.261	0.008		
7AS0203103	39.210		0.013	39.210
(a)	20.000	0.009		
(b)	19.210	0.008		
7AS0203153	23.939	0.010	0.012	23.939
7AS0203204	35.669		0.016	35.669
(a)	18.000	0.011		
(b)	17.669	0.009		
7AS0203228	70.000		0.015	70.000
(a)	24.000	0.014		
(b)	24.000	0.010		
(c)	22.000	0.012		

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[redacted]
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File No : **40912**
Date : February 26, 1999
Samples :
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Certificate of Assay

Loring Laboratories Ltd.

629 Beaverdam Road, NE Calgary Alberta
Tel: (403)274-2777 Fax: (403)275-0541

Analytical Lot # AS170299

Sample No.	Sample Wt grams	Au mg	Au oz/ton	Total Wt grams
7AS0203242	83.290		0.011	83.290
(a)	28.000	0.009		
(b)	28.000	0.010		
(c)	27.290	0.012		
7AS0203258	15.630	0.005	0.009	15.630
7AS0203292	37.430		0.020	37.430
(a)	19.000	0.013		
(b)	18.430	0.013		

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[redacted]
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To : **TINTINA MINES LTD.**
Suite 218, 920 Yonge Street
Toronto, Ontario
M4W 3C7
ATTN: S. Sabag

File No : **40928**
Date : March 12, 1999
Samples :
Analytical Lot # BK240299

Certificate of Assay
Loring Laboratories Ltd.

629 Beaverdam Road, NE Calgary Alberta
Tel: (403)274-2777 Fax: (403)275-0541

Sample No.	Sample Wt grams	Gold Wt mg	Total Wt +80 mesh
7BK0206078			54.03
+80 mesh	26.000	0.018	
+80 mesh	26.606	0.018	
-80 mesh	12.604	0.043	
7BK0206113			96.91
+80 mesh	32.000	0.010	
+80 mesh	32.000	0.013	
+80 mesh	31.350	0.008	
-80 mesh	16.705	0.031	
7BK0206146			104.70
+80 mesh	25.000	0.005	
+80 mesh	25.000	0.005	
+80 mesh	25.000	0.006	
+80 mesh	25.000	0.005	
-80 mesh	10.104	< 0.001	
7BK0206178			27.63
+80 mesh	26.804	0.006	
-80 mesh	13.580	0.021	
7BK0206274			16.30
+80 mesh	15.014	0.001	
-80 mesh	1.571	< 0.001	
7BK0206290			100.78
+80 mesh	25.000	0.004	
+80 mesh	25.000	0.005	
+80 mesh	25.000	0.004	
+80 mesh	23.677	0.005	
-80 mesh	15.160	< 0.001	

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[redacted]
Assayer

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To : **TINTINA MINES LTD.**
Suite 218, 920 Yonge Street
Toronto, Ontario
M4W 3C7
ATTN: S. Sabag

File No : **40928**
Date : March 12, 1999
Samples :
Analytical Lot # BK240299

Certificate of Assay
Loring Laboratories Ltd.

629 Beaverdam Road, NE Calgary Alberta
Tel: (403)274-2777 Fax: (403)275-0541

Sample No.	Sample Wt grams	Gold Wt mg	Total Wt +80 mesh
7BK0206348			93.74
+80 mesh	31.000	0.003	
+80 mesh	31.000	0.003	
+80 mesh	29.800	0.003	
-80 mesh	10.917	< 0.001	
7BK0206385			180.32
+80 mesh	25.000	0.003	
+80 mesh	25.000	0.003	
+80 mesh	25.000	0.003	
+80 mesh	25.000	0.003	
-80 mesh	21.700	0.001	
7BK0206483			159.27
+80 mesh	25.000	0.002	
+80 mesh	25.000	0.004	
+80 mesh	25.000	0.002	
+80 mesh	25.000	0.002	
-80 mesh	20.875	< 0.001	
7BK0206583			114.49
+80 mesh	25.000	0.002	
+80 mesh	25.000	0.002	
+80 mesh	25.000	0.003	
+80 mesh	25.000	0.003	
-80 mesh	14.451	< 0.001	

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[redacted]
Assayer

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Suite 218, 920 Yonge Street
Toronto, Ontario
M4W 3C7
ATTN: S. Sabag

File No : **40928**
Date : March 12, 1999
Samples :
Analytical Lot # BK240299

Certificate of Assay
Loring Laboratories Ltd.

629 Beaverdam Road, NE Calgary Alberta
Tel: (403)274-2777 Fax: (403)275-0541

Sample No.	Sample Wt grams	Gold Wt mg	Total Wt +80 mesh
7BK0206627			142.10
+80 mesh	25.000	0.002	
+80 mesh	25.000	0.003	
+80 mesh	25.000	0.002	
+80 mesh	25.000	0.002	
-80 mesh	17.886	< 0.001	
7BK0206718			38.90
+80 mesh	19.000	0.001	
+80 mesh	18.554	0.001	
-80 mesh	12.387	0.008	
7BK0206730			158.55
+80 mesh	25.000	0.002	
+80 mesh	25.000	0.003	
+80 mesh	25.000	0.002	
+80 mesh	25.000	0.002	
-80 mesh	18.990	< 0.001	
7BK0206845			118.23
+80 mesh	25.000	0.001	
+80 mesh	25.000	0.001	
+80 mesh	25.000	0.001	
+80 mesh	25.000	0.001	
-80 mesh	14.850	< 0.001	

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[redacted]
Assayer

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Toronto, Ontario
M4W 3C7
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File No : **40928**
Date : March 12, 1999
Samples :
Analytical Lot # BK240299

Certificate of Assay

Loring Laboratories Ltd.

629 Beaverdam Road, NE Calgary Alberta
Tel: (403)274-2777 Fax: (403)275-0541

Sample No.	Sample Wt grams	Gold Wt mg	Total Wt +80 mesh
7BK0207263			122.01
+80 mesh	25.000	0.002	
+80 mesh	25.000	0.002	
+80 mesh	25.000	0.002	
+80 mesh	25.000	0.002	
-80 mesh	32.160	0.007	
7BK0206961			171.90
+80 mesh	25.000	0.002	
+80 mesh	25.000	0.002	
+80 mesh	25.000	0.002	
+80 mesh	25.000	0.002	
-80 mesh	11.990	0.007	
7BK0207062			146.52
+80 mesh	25.000	0.001	
+80 mesh	25.000	0.001	
+80 mesh	25.000	0.001	
+80 mesh	25.000	0.001	
-80 mesh	17.400	< 0.001	
7BK0207163			161.69
+80 mesh	25.000	< 0.001	
+80 mesh	25.000	< 0.001	
+80 mesh	25.000	0.001	
+80 mesh	25.000	0.001	
-80 mesh	21.910	< 0.001	

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[redacted]
Assayer

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To : **TINTINA MINES LTD.**
Suite 218, 920 Yonge Street
Toronto, Ontario
M4W 3C7
ATTN: S. Sabag

File No : **40928**
Date : March 12, 1999
Samples :
Analytical Lot # BK240299

Certificate of Assay
Loring Laboratories Ltd.

629 Beaverdam Road, NE Calgary Alberta
Tel: (403)274-2777 Fax: (403)275-0541

Sample No.	Sample Wt grams	Gold Wt mg	Total Wt +80 mesh
7BK0207293			162.47
+80 mesh	25.000	0.001	
+80 mesh	25.000	0.001	
+80 mesh	25.000	0.001	
+80 mesh	25.000	0.001	
-80 mesh	20.690	< 0.001	
7BK0207394			231.17
+80 mesh	25.000	< 0.001	
+80 mesh	25.000	< 0.001	
+80 mesh	25.000	0.001	
+80 mesh	25.000	< 0.001	
-80 mesh	20.012	< 0.001	
7BK0207494			156.48
+80 mesh	25.000	< 0.001	
+80 mesh	25.000	0.001	
+80 mesh	25.000	< 0.001	
+80 mesh	25.000	< 0.001	
-80 mesh	15.494	< 0.001	
7BK0207594			195.76
+80 mesh	25.000	< 0.001	
+80 mesh	25.000	< 0.001	
+80 mesh	25.000	< 0.001	
+80 mesh	25.000	< 0.001	
-80 mesh	25.587	0.002	

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[redacted]
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To : **TINTINA MINES LTD.**
Suite 218, 920 Yonge Street
Toronto, Ontario
M4W 3C7
ATTN: S. Sabag

File No : **40928**
Date : March 12, 1999
Samples :
Analytical Lot # BK240299

Certificate of Assay

Loring Laboratories Ltd.

629 Beaverdam Road, NE Calgary Alberta
Tel: (403)274-2777 Fax: (403)275-0541

Sample No.	Sample Wt grams	Gold Wt mg	Total Wt +80 mesh
7BK0207694			95.36
+80 mesh	31.000	0.003	
+80 mesh	31.000	0.004	
+80 mesh	31.584	0.004	
-80 mesh	19.592	< 0.001	
7BK0207722			79.52
+80 mesh	26.000	0.007	
+80 mesh	26.000	0.007	
+80 mesh	25.486	0.006	
-80 mesh	25.504	< 0.001	
7BK0207755			106.18
+80 mesh	25.000	< 0.001	
+80 mesh	25.000	< 0.001	
+80 mesh	25.000	< 0.001	
+80 mesh	25.000	< 0.001	
-80 mesh	9.922	< 0.001	
7BK0207844			179.11
+80 mesh	25.000	0.001	
+80 mesh	25.000	0.002	
+80 mesh	25.000	0.002	
+80 mesh	25.000	0.001	
-80 mesh	31.000	< 0.001	
-80 mesh	31.000	< 0.001	
-80 mesh	31.030	< 0.001	

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[redacted]
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218, 920 Yonge Street
Toronto, Ontario
M4W 3C7
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Certificate of Assay
Loring Laboratories Ltd.

629 Beaverdam Road, NE Calgary Alberta
Tel: (403)274-2777 Fax: (403)275-0541

File No : **41032**
Date : April 20, 1999
Samples :
Project :
P.O. #

Analytical Lot # BK240299DUP

Sample No.	Sample Wt grams	Gold Wt mg
7BK0206078		
	14.000	0.001
	14.000	0.001
	14.000	< 0.001
	14.674	0.001
7BK0206113		
	25.000	< 0.001
	25.000	< 0.001
	25.000	< 0.001
	25.023	0.001
7BK0206146		
	25.000	< 0.001
	25.000	< 0.001
	25.000	< 0.001
	23.490	< 0.001
7BK0206178		
	14.000	< 0.001
	9.390	< 0.001
7BK0206274	12.209	< 0.001
7BK0206290		
	14.000	< 0.001
	14.000	< 0.001
	14.000	< 0.001
	14.000	< 0.001
	28.000	< 0.001

I HEREBY CERTIFY that the above results are those assays made by me upon the herein described samples :

[redacted]
Assayer

Rejects and pulps are retained for one month unless specific arrangements are made in advance.

To : **TINTINA MINES LTD.**
218, 920 Yonge Street
Toronto, Ontario
M4W 3C7
ATTN: S. Sabag

Certificate of Assay
Loring Laboratories Ltd.

629 Beaverdam Road, NE Calgary Alberta
Tel: (403)274-2777 Fax: (403)275-0541

File No : 41032
Date : April 20, 1999
Samples :
Project :
P.O. #

Analytical Lot # BK240299DUP

Sample No.	Sample Wt grams	Gold Wt mg
7BK026348		
	15.000	0.002
	15.000	< 0.001
	15.000	< 0.001
	15.000	< 0.001
	15.000	< 0.001
	15.383	< 0.001
7BK0206385		
	14.000	< 0.001
	14.000	< 0.001
	14.000	< 0.001
	14.000	< 0.001
	14.000	< 0.001
	14.000	< 0.001
	14.000	< 0.001
7BK0206483		
	14.000	< 0.001
	14.000	< 0.001
	14.000	< 0.001
	14.000	< 0.001
	14.000	< 0.001
	14.000	< 0.001
	14.000	< 0.001

I HEREBY CERTIFY that the above results are those assays made by me upon the herein described samples :

[redacted]
Assayer

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Toronto, Ontario
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ATTN: S. Sabag

Certificate of Assay
Loring Laboratories Ltd.

629 Beaverdam Road, NE Calgary Alberta
Tel: (403)274-2777 Fax: (403)275-0541

File No : **41032**
Date : April 20, 1999
Samples :
Project :
P.O. #

Analytical Lot # BK240299DUP

Sample No.	Sample Wt grams	Gold Wt mg
7BK0206583		
	16.000	< 0.001
	16.000	< 0.001
	16.000	< 0.001
	16.000	< 0.001
	16.000	< 0.001
	16.000	< 0.001
7BK0206627		
	16.000	< 0.001
	16.000	< 0.001
	16.000	< 0.001
	16.000	< 0.001
	16.000	< 0.001
	16.000	< 0.001
7BK0206718	19.603	< 0.001
7BK0206730		
	16.000	< 0.001
	16.000	< 0.001
	16.000	< 0.001
	16.000	< 0.001
	16.000	< 0.001
	16.000	< 0.001

I HEREBY CERTIFY that the above results are those assays made by me upon the herein described samples :

[redacted]
Assayer

Rejects and pulps are retained for one month unless specific arrangements are made in advance.

To : TINTINA MINES LTD.
218, 920 Yonge Street
Toronto, Ontario
M4W 3C7
ATTN: S. Sabag

Certificate of Assay
Loring Laboratories Ltd.

629 Beaverdam Road, NE Calgary Alberta
Tel: (403)274-2777 Fax: (403)275-0541

File No : 41032
Date : April 20, 1999
Samples :
Project :
P.O. #

Analytical Lot # BK240299DUP

Sample No.	Sample Wt grams	Gold Wt mg
7BK0206845		
	16.000	< 0.001
	16.000	< 0.001
	16.000	< 0.001
	16.000	< 0.001
	16.000	< 0.001
	16.000	< 0.001
7BK0206961		
	16.000	< 0.001
	16.000	< 0.001
	16.000	< 0.001
	16.000	< 0.001
	16.000	< 0.001
	16.000	< 0.001
7BK0207062		
	16.000	< 0.001
	16.000	< 0.001
	16.000	< 0.001
	16.000	< 0.001
	16.000	< 0.001
	16.000	< 0.001
7BK0207163		
	16.000	< 0.001
	16.000	< 0.001
	16.000	< 0.001
	16.000	< 0.001
	16.000	< 0.001
	16.000	< 0.001

I HEREBY CERTIFY that the above results are those assays made by me upon the herein described samples :

[redacted]
Assayer

Rejects and pulps are retained for one month unless specific arrangements are made in advance.

To : **TINTINA MINES LTD.**
218, 920 Yonge Street
Toronto, Ontario
M4W 3C7
ATTN: S. Sabag

Certificate of Assay
Loring Laboratories Ltd.

629 Beaverdam Road, NE Calgary Alberta
Tel: (403)274-2777 Fax: (403)275-0541

File No : **41032**
Date : April 20, 1999
Samples :
Project :
P.O. #

Analytical Lot # BK240299DUP

Sample No.	Sample Wt grams	Gold Wt mg
7BK0207263		
	25.000	< 0.001
	25.000	< 0.001
	25.000	< 0.001
	25.000	< 0.001
7BK0207293		
	25.000	< 0.001
	25.000	< 0.001
	25.000	< 0.001
	25.000	< 0.001
7BK0207394		
	25.000	< 0.001
	25.000	< 0.001
	25.000	< 0.001
	25.000	< 0.001
7BK0207494		
	25.000	< 0.001
	25.000	< 0.001
	25.000	< 0.001
	25.000	< 0.001
7BK0207594		
	25.000	< 0.001
	25.000	< 0.001
	25.000	< 0.001
	25.000	< 0.001

I HEREBY CERTIFY that the above results are those assays made by me upon the herein described samples :

[redacted]
Assayer

Rejects and pulps are retained for one month unless specific arrangements are made in advance.

To : **TINTINA MINES LTD.**
218, 920 Yonge Street
Toronto, Ontario
M4W 3C7
ATTN: S. Sabag

Certificate of Assay
Loring Laboratories Ltd.

629 Beaverdam Road, NE Calgary Alberta
Tel: (403)274-2777 Fax: (403)275-0541

File No : 41032
Date : April 20, 1999
Samples :
Project :
P.O. #

Analytical Lot # BK240299DUP

Sample No.	Sample Wt grams	Gold Wt mg
7BK0207694		
	19.000	< 0.001
	19.000	< 0.001
	19.000	< 0.001
	19.000	< 0.001
	18.160	< 0.001
7BK0207722		
	25.000	< 0.001
	25.000	< 0.001
	25.000	< 0.001
	25.000	< 0.001
7BK0207755		
	14.000	< 0.001
	14.000	< 0.001
	14.000	< 0.001
	14.000	< 0.001
	14.000	< 0.001
	14.000	< 0.001
	14.000	< 0.001
7BK0207844		
	25.000	< 0.001
	25.000	< 0.001
	25.000	< 0.001
	25.000	< 0.001
TRS - 1		
	24.000	0.014
	19.075	0.010

I HEREBY CERTIFY that the above results are those assays made by me upon the herein described samples :

[redacted]
Assayer

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To : **TINTINA MINES LTD.**
218, 920 Yonge Street
Toronto, Ontario
M4W 3C7
ATTN: S. Sabag

Certificate of Assay
Loring Laboratories Ltd.

629 Beaverdam Road, NE Calgary Alberta
Tel: (403)274-2777 Fax: (403)275-0541

File No : **41032**
Date : April 20, 1999
Samples :
Project :
P.O. #

Analytical Lot # BK240299DUP

Sample No.	Sample Wt grams	Gold Wt mg
TRS - 13	28.082	0.040
TRS - 20A	25.194	0.009
TRS - 20B	25.009	0.010

I HEREBY CERTIFY that the above results are those assays made by me upon the herein described samples :

[redacted]
Assayer

Rejects and pulps are retained for one month unless specific arrangements are made in advance.

Actlabs

Invoice No.: 17338
Work Order: 17459
Invoice Date: 26-APR-99
Date Submitted: 01-APR-99
Your Reference: WO#12993
Account Number: 1239

TINTINA MINES LIMITED
SUITE 218 - 920 YONGE ST
TORONTO, ONTARIO
M4W 3C7
CANADA
ATTENTION: SHAHE F. SABAG

CERTIFICATE OF ANALYSIS

38 PULPS were submitted for analysis.

The following analytical packages were requested. Please see our current fee schedule for elements and detection limits.

REPORT 17338 CODE 1A2-FIRE ASSAY AA

This report may be reproduced without our consent. If only selected portions of the report are reproduced, permission must be obtained. If no instructions were given at time of sample submittal regarding excess material, it will be discarded within 90 days of this report. Our liability is limited solely to the analytical cost of these analyses. Test results are representative only of material submitted for analysis.

CERTIFIED BY :

[redacted]

DR E.HOFFMAN/GENERAL MANAGER

ACTIVATION LABORATORIES LTD.
1336 Sandhill Drive, Ancaster, Ontario Canada L9G 4V5 **TELEPHONE** +1.905.648.9611 or +1.888.228.5227 **FAX** +1.905.648.9613
E-MAIL ancaster@actlabs.com **ACTLABS GROUP WEBSITE** http://www.actlabs.com

SAMPLE NO.	Wt g	Au ppb
7BK0412060-A	30.00	5
7BK0412060-B	18.34	-5
7BK0412307-A	32.84	-5
7BK0412700-A	26.72	-5
7BK0413085-A	28.95	-5
7BK0413485-A	30.00	-5
7BK0413485-B	30.90	-5
7BK0413485-C	10.79	-5
7BK0413746-A	30.00	-5
7BK0413746-B	17.13	-5
7BK0414091-A	25.26	-5
7BK0412067-A	30.00	-5
7BK0412067-B	30.00	-5
7BK0412067-C	8.57	-5
7BK0412398-A	23.83	-5
7BK0412792-A	28.65	-5
7BK0413153-A	30.00	-5
7BK0413153-B	13.47	-5
7BK0413560-A	30.00	-5
7BK0413560-B	30.00	-5
7BK0413791-A	21.41	-5
7BK0414151-A	30.00	-5
7BK0414151-B	32.55	-5
7BK0412086-A	30.00	-5
7BK0412086-B	30.00	-5
7BK0412086-C	32.11	-5
7BK0412428-A	30.29	-5
7BK0412870-A	30.00	-5
7BK0412870-B	22.42	-5
7BK0413191-A	32.68	-5
7BK0413640-A	30.76	-5
7BK0413851-A	30.00	-5
7BK0413851-B	6.99	-5
7BK0412099-A	30.00	-5
7BK0412099-B	30.00	-5
7BK0412099-C	9.10	-5
7BK0412484-A	29.16	-5
7BK0412881-A	32.76	-5
7BK0413246-A	30.00	-5
7BK0413246-B	11.49	-5
7BK0413649-A	30.00	-5
7BK0413649-B	14.68	-5
7BK0413911-A	30.00	-5
7BK0413911-B	19.22	-5
7BK0412124-A	32.82	-5
7BK0412562-A	30.00	-5

SAMPLE NO.	Wt g	Au ppb
7BK0412562-B	11.24	-5
7BK0412949-A	15.00	-5
7BK0412949-B	3.81	-5
7BK0413285-A	30.00	-5
7BK0413285-B	30.00	-5
7BK0413285-C	16.79	-5
7BK0413657-A	22.95	-5
7BK0413971-A	30.00	-5
7BK0413971-B	4.18	-5
7BK0412216-A	30.00	-5
7BK0412216-B	19.35	-5
7BK0412608-A	31.00	-5
7BK0413017-A	30.00	-5
7BK0413017-B	15.80	-5
7BK0413410-A	30.00	-5
7BK0413410-B	16.48	-5
7BK0413678-A	30.00	-5
7BK0413678-B	33.47	-5
7BK0414031-A	30.00	-5
7BK0414031-B	25.15	-5

Invoice No.: 17401
Work Order: 17528
Invoice Date: 10-MAY-99
Date Submitted: 16-APR-99
Your Reference: BK160499
Account Number: 1239

TINTINA MINES LIMITED
SUITE 218 - 920 YONGE ST
TORONTO, ONTARIO
M4W 3C7
CANADA
ATTENTION: SHAHE F. SABAG

CERTIFICATE OF ANALYSIS

17 DRY REJECTS(PREP.REV3) were submitted for analysis.
3 PULPS were submitted for analysis.

The following analytical packages were requested. Please see our current fee schedule for elements and detection limits.

REVISED REPORT 17401R CODE 1A2-FIRE ASSAY AA
REPORT 17401B CODE 1A2-FIRE ASSAY AA/WEIGHTS

NOTE: THE ATTACHED REVISED REPORT SUPERSEDES THE PREVIOUS REPORT SENT. SAMPLE WEIGHTS INCLUDED.

This report may be reproduced without our consent. If only selected portions of the report are reproduced, permission must be obtained. If no instructions were given at time of sample submittal regarding excess material, it will be discarded within 90 days of this report. Our liability is limited solely to the analytical cost of these analyses. Test results are representative only of material submitted for analysis.

CERTIFIED BY :

[redacted]

DR E.HOFFMAN/GENERAL MANAGER

SAMPLE NO.	Wt g	Au ppb
7BK0412099	15.00	-5
7BK0412099-A	15.00	-5
7BK0412099-B	15.00	-5
7BK0412099-C	15.00	-5
7BK0412099-D	15.00	-5
7BK0412099-E	15.00	-5
7BK0412099-F	15.00	5
7BK0412099-G	15.00	-5
7BK0412099-H	15.00	-5
7BK0412484	15.00	-5
7BK0412484-A	15.00	-5
7BK0412484-B	15.00	-5
7BK0412484-C	15.00	5
7BK0412484-D	15.00	-5
7BK0412484-E	15.00	5
7BK0412484-F	15.00	-5
7BK0412484-G	15.00	-5
7BK0412484-H	15.00	-5
7BK0412881	15.00	-5
7BK0412881-A	15.00	-5
7BK0412881-B	15.00	-5
7BK0412881-C	15.00	-5
7BK0412881-D	15.00	5
7BK0412881-E	15.00	-5
7BK0412881-F	15.00	-5
7BK0412881-G	15.00	-5
7BK0412881-H	15.00	-5
7BK0412881-I	15.00	-5
7BK0413191	15.00	-5
7BK0413191-A	15.00	-5
7BK0413191-B	14.97	-5
7BK0413191-C	15.00	-5
7BK0413191-D	15.00	-5
7BK0413191-E	15.00	-5
7BK0413191-F	15.00	-5
7BK0413191-G	15.00	-5
7BK0413191-H	15.00	-5
7BK0413191-I	15.00	-5
7BK0412216	15.00	-5
7BK0412216-A	15.00	-5
7BK0412216-B	15.00	-5
7BK0412216-C	15.00	-5
7BK0412216-D	15.00	-5
7BK0412216-E	15.00	-5
7BK0412216-F	15.00	-5
7BK0412216-G	15.00	-5

SAMPLE NO.	Wt g	Au ppb
7BK0412216-H	15.00	-5
7BK0412216-I	15.00	-5
7BK0412608	15.00	-5
7BK0412608-A	15.00	-5
7BK0412608-B	15.00	-5
7BK0412608-C	15.00	-5
7BK0412608-D	15.00	-5
7BK0412608-E	15.00	-5
7BK0412608-F	15.00	-5
7BK0412608-G	15.00	-5
7BK0412608-H	15.00	-5
7BK0412608-I	15.00	-5
7BK0412949	15.00	-5
7BK0412949-A	15.00	-5
7BK0412949-B	15.00	-5
7BK0412949-C	15.00	-5
7BK0412949-D	15.00	-5
7BK0412949-E	15.00	-5
7BK0412949-F	15.00	-5
7BK0412949-G	15.00	-5
7BK0412949-H	15.00	-5
7BK0412949-I	15.00	-5
7BK0413246	15.00	-5
7BK0413246-A	15.00	-5
7BK0413246-B	15.00	-5
7BK0413246-C	15.00	-5
7BK0413246-D	15.00	-5
7BK0413246-E	15.00	-5
7BK0413246-F	15.00	-5
7BK0413246-G	15.00	-5
7BK0413246-H	15.00	-5
7BK0413246-I	15.00	-5
7BK0412307	15.00	-5
7BK0412307-A	15.00	-5
7BK0412307-B	15.00	-5
7BK0412307-C	15.00	-5
7BK0412307-D	15.00	-5
7BK0412307-E	15.00	-5
7BK0412307-F	15.00	-5
7BK0412307-G	15.00	-5
7BK0412307-H	15.00	-5
7BK0412307-I	15.00	-5
7BK0412700	15.00	-5
7BK0412700-A	15.00	-5
7BK0412700-B	15.00	-5
7BK0412700-C	15.00	-5

SAMPLE NO.	Wt g	Au ppb
7BK0412700-D	15.00	-5
7BK0412700-E	15.00	-5
7BK0412700-F	15.00	-5
7BK0412700-G	15.00	-5
7BK0412700-H	15.00	-5
7BK0412700-I	15.00	-5
7BK0413017	15.00	-5
7BK0413017-A	15.00	-5
7BK0413017-B	15.00	-5
7BK0413017-C	15.00	-5
7BK0413017-D	15.00	-5
7BK0413017-E	15.00	-5
7BK0413017-F	15.00	-5
7BK0413017-G	15.00	-5
7BK0413017-H	15.00	-5
7BK0413017-I	15.00	-5
TRS20C	25.06	200
7BK0412398	15.00	-5
7BK0412398-A	15.00	-5
7BK0412398-B	15.00	-5
7BK0412398-C	15.00	-5
7BK0412398-D	15.00	-5
7BK0412398-E	15.00	-5
7BK0412398-F	15.00	-5
7BK0412398-G	15.00	-5
7BK0412792	15.00	-5
7BK0412792-A	15.00	-5
7BK0412792-B	15.00	-5
7BK0412792-C	15.00	-5
7BK0412792-D	15.00	-5
7BK0412792-E	15.00	-5
7BK0412792-F	15.00	-5
7BK0412792-G	15.00	-5
7BK0412792-H	15.00	-5
7BK0412792-I	15.00	-5
7BK0413085	15.00	-5
7BK0413085-A	15.00	-5
7BK0413085-B	15.00	-5
7BK0413085-C	15.00	-5
7BK0413085-D	15.00	-5
7BK0413085-E	15.00	-5
7BK0413085-F	15.00	-5
7BK0413085-G	15.00	-5
7BK0413085-H	15.00	-5
7BK0413085-I	15.00	-5
TRS20D	25.07	195

SAMPLE NO.	Wt g	Au ppb
7BK0412428	15.00	-5
7BK0412428-A	15.00	-5
7BK0412428-B	15.00	-5
7BK0412428-C	15.00	-5
7BK0412428-D	15.00	-5
7BK0412428-E	15.00	-5
7BK0412428-F	15.00	-5
7BK0412428-G	15.00	-5
7BK0412428-H	15.00	-5
7BK0412428-I	15.00	-5
7BK0412870	29.96	-5
7BK0412870-A	29.93	-5
7BK0412870-B	29.76	-5
7BK0412870-C	12.81	-5
TRS14	28.68	1600
7BK0413153	15.00	-5
7BK0413153-A	15.00	-5
7BK0413153-B	15.00	-5
7BK0413153-C	15.00	-5
7BK0413153-D	15.00	-5
7BK0413153-E	15.00	-5
7BK0413153-F	15.00	-5
7BK0413153-G	15.00	-5
7BK0413153-H	15.00	-5
7BK0413153-I	15.00	-5

SAMPLE NO.	Wt g	Au ppb
7BK0412099	11.79	-5
7BK0412099-A	14.96	-5
7BK0412099-B	14.89	-5
7BK0412099-C	15.64	-5
7BK0412099-D	12.00	-5
7BK0412099-E	4.50	5
7BK0412099-F	14.93	-5
7BK0412099-G	14.88	5
7BK0412099-H	4.61	-5
7BK0412484	12.08	-5
7BK0412484-A	14.98	-5
7BK0412484-B	15.00	-5
7BK0412484-C	15.03	-5
7BK0412484-D	14.97	-5
7BK0412484-E	12.07	-5
7BK0412484-F	14.99	-5
7BK0412484-G	15.00	-5
7BK0412484-H	15.27	-5
7BK0412881	15.07	-5
7BK0412881-A	12.01	-5
7BK0412881-B	15.03	-5
7BK0412881-C	15.03	-5
7BK0412881-D	14.94	5
7BK0412881-E	15.16	-5
7BK0412881-F	15.04	-5
7BK0412881-G	15.02	-5
7BK0412881-H	15.19	-5
7BK0412881-I	8.35	-5
7BK0413191	14.96	-5
7BK0413191-A	15.01	-5
7BK0413191-C	15.10	-5
7BK0413191-D	14.93	-5
7BK0413191-E	14.98	-5
7BK0413191-F	15.02	-5
7BK0413191-G	15.00	-5
7BK0413191-H	15.18	-5
7BK0413191-I	8.62	-5
7BK0412216	15.09	-5
7BK0412216-A	14.92	-5
7BK0412216-B	15.08	-5
7BK0412216-C	14.90	-5
7BK0412216-D	15.11	-5
7BK0412216-E	15.18	-5
7BK0412216-F	15.17	-5
7BK0412216-G	15.14	-5
7BK0412216-H	15.25	-5

SAMPLE NO.	Wt g	Au ppb
7BK0412216-I	6.83	-5
7BK0412608	15.00	-5
7BK0412608-A	14.96	-5
7BK0412608-B	15.03	-5
7BK0412608-C	15.02	-5
7BK0412608-D	15.14	-5
7BK0412608-E	15.07	-5
7BK0412608-F	15.13	-5
7BK0412608-G	15.10	-5
7BK0412608-H	15.12	-5
7BK0412608-I	8.56	-5
7BK0412949	15.10	-5
7BK0412949-A	14.90	-5
7BK0412949-B	15.07	-5
7BK0412949-C	15.00	-5
7BK0412949-D	14.98	-5
7BK0412949-E	14.82	-5
7BK0412949-F	14.98	-5
7BK0412949-G	14.99	-5
7BK0412949-H	15.16	-5
7BK0412949-I	8.14	-5
7BK0413246	15.11	-5
7BK0413246-A	14.87	-5
7BK0413246-B	14.96	-5
7BK0413246-C	14.99	-5
7BK0413246-D	14.99	-5
7BK0413246-E	15.01	-5
7BK0413246-F	15.06	-5
7BK0413246-G	15.00	-5
7BK0413246-H	14.95	-5
7BK0413246-I	9.37	-5
7BK0412307	15.04	-5
7BK0412307-A	14.85	-5
7BK0412307-B	15.00	-5
7BK0412307-C	14.95	-5
7BK0412307-D	15.03	-5
7BK0412307-E	15.00	-5
7BK0412307-F	14.91	-5
7BK0412307-G	14.94	-5
7BK0412307-H	14.93	-5
7BK0412307-I	7.31	-5
7BK0412700	15.05	-5
7BK0412700-A	14.87	-5
7BK0412700-B	14.93	-5
7BK0412700-C	14.97	-5
7BK0412700-D	15.10	-5

SAMPLE NO.	Wt g	Au ppb
7BK0412700-E	15.13	-5
7BK0412700-F	15.13	-5
7BK0412700-G	14.92	-5
7BK0412700-H	15.08	-5
7BK0412700-I	7.81	-5
7BK0413017	15.00	-5
7BK0413017-A	14.95	-5
7BK0413017-B	14.83	-5
7BK0413017-C	14.91	-5
7BK0413017-D	14.93	-5
7BK0413017-E	14.88	-5
7BK0413017-F	14.99	-5
7BK0413017-G	14.94	-5
7BK0413017-H	15.11	-5
7BK0413017-I	8.20	-5
7BK0412398	14.86	-5
7BK0412398-A	15.13	-5
7BK0412398-B	15.11	-5
7BK0412398-C	15.19	-5
7BK0412398-D	15.07	-5
7BK0412398-E	15.22	-5
7BK0412398-F	15.07	-5
7BK0412398-G	15.88	-5
7BK0412792	15.07	-5
7BK0412792-A	15.02	-5
7BK0412792-B	14.94	-5
7BK0412792-C	14.95	-5
7BK0412792-D	14.95	-5
7BK0412792-E	15.02	-5
7BK0412792-F	15.15	-5
7BK0412792-G	15.11	-5
7BK0412792-H	14.94	-5
7BK0412792-I	7.55	-5
7BK0413085	14.98	-5
7BK0413085-A	14.96	-5
7BK0413085-B	14.91	-5
7BK0413085-C	14.89	-5
7BK0413085-D	14.95	-5
7BK0413085-E	14.95	-5
7BK0413085-F	14.90	-5
7BK0413085-G	14.99	-5
7BK0413085-H	14.96	-5
7BK0413085-I	9.84	-5
7BK0412428	14.91	-5
7BK0412428-A	14.86	-5
7BK0412428-B	15.03	-5

SAMPLE NO.	Wt g	Au ppb
7BK0412428-C	14.89	-5
7BK0412428-D	14.85	-5
7BK0412428-E	14.99	-5
7BK0412428-F	15.00	-5
7BK0412428-G	14.86	-5
7BK0412428-H	14.92	-5
7BK0412428-I	10.00	-5
7BK0413153	14.86	-5
7BK0413153-A	14.85	-5
7BK0413153-B	14.90	-5
7BK0413153-C	14.86	-5
7BK0413153-D	15.05	-5
7BK0413153-E	14.92	-5
7BK0413153-F	14.80	-5
7BK0413153-G	14.77	-5
7BK0413153-H	14.84	-5
7BK0413153-I	6.83	-5
BLANK		-5
STD COR #2		775

Invoice No.: 17415-REV
Work Order: 17546
Invoice Date: 12-MAY-99
Date Submitted: 20-APR-99
Your Reference: AS190499
Account Number: 1239

TINTINA MINES LIMITED
SUITE 218 - 920 YONGE ST
TORONTO, ONTARIO
M4W 3C7
CANADA
ATTENTION: SHAHE F. SABAG

CERTIFICATE OF ANALYSIS

16 DRY REJECTS(PREP.REV3) were submitted for analysis.
1 PULP(S) were submitted for analysis.

The following analytical packages were requested. Please see our current fee schedule for elements and detection limits.

REVISED REPORT 17415R CODE 1A2-FIRE ASSAY AA

NOTE: THE ATTACHED REPORT SUPERSEDES THE PREVIOUS REPORT SENT. SAMPLE WEIGHTS ADDED.

This report may be reproduced without our consent. If only selected portions of the report are reproduced, permission must be obtained. If no instructions were given at time of sample submittal regarding excess material, it will be discarded within 90 days of this report. Our liability is limited solely to the analytical cost of these analyses. Test results are representative only of material submitted for analysis.

CERTIFIED BY :

[redacted]

DR E.HOFFMAN/GENERAL MANAGER

ACTIVATION LABORATORIES LTD.
1336 Sandhill Drive, Ancaster, Ontario Canada L9G 4V5 TELEPHONE +1.905.648.9611 or +1.888.228.5227 FAX +1.905.648.9613
E-MAIL ancaster@actlabs.com ACTLABS GROUP WEBSITE http://www.actlabs.com

SAMPLE NO.	Au ppb	Weight g
7AS0203302	-5	15.00
7AS0203302-A	-5	30.00
7AS0203302-B	-5	29.82
7AS0203302-C	-5	29.78
7AS0203302-D	-5	29.75
7AS0203302-E	-5	29.95
7AS0203302-F	-5	29.84
7AS0203302-G	-5	27.76
7AS0203302-H	-5	7.56
7AS0203795	-5	29.73
7AS0203795-A	-5	29.80
7AS0203795-B	-5	29.80
7AS0203795-C	-5	29.79
7AS0203795-D	-5	29.77
7AS0203795-E	-5	29.86
7AS0203795-F	-5	29.82
7AS0203795-G	-5	29.76
7AS0203795-H	-5	7.88
7AS0205800	-5	29.94
7AS0205800-A	-5	15.00
7AS0205800-B	-5	29.95
7AS0205800-C	-5	29.92
7AS0205800-D	-5	29.95
7AS0205800-E	-5	29.89
7AS0205800-F	-5	29.93
7AS0205800-G	-5	29.86
7AS0205800-H	-5	9.17
7AS0208780	-5	30.02
7AS0208780-A	-5	29.98
7AS0208780-B	-5	15.00
7AS0208780-C	-5	29.92
7AS0208780-D	-5	30.00
7AS0208780-E	-5	30.00
7AS0208780-F	-5	30.00
7AS0208780-G	-5	29.92
7AS0208780-H	-5	7.36
7AS0203342	-5	30.00
7AS0203342-A	-5	30.00
7AS0203342-B	-5	30.00
7AS0203342-C	-5	15.00
7AS0203342-D	-5	29.97
7AS0203342-E	-5	30.00
7AS0203342-F	-5	30.00
7AS0203342-G	-5	28.29
7AS0203342-H	-5	7.90
7AS0203880	-5	29.85

SAMPLE NO.	Au ppb	Weight g
7AS0203880-A	-5	29.84
7AS0203880-B	-5	29.92
7AS0203880-C	25	29.80
7AS0203880-D	25	15.00
7AS0203880-E	25	29.76
7AS0203880-F	90	29.88
7AS0203880-G	80	29.74
7AS0203880-H	105	7.54
7AS0207350	15	29.88
7AS0207350-A	5	29.81
7AS0207350-B	5	29.89
7AS0207350-C	15	29.88
7AS0207350-D	5	29.96
7AS0207350-E	10	15.00
7AS0207350-F	-5	30.00
7AS0207350-G	10	27.82
7AS0207350-H	145	7.32
TRS20E	230	25.05
7AS0203618	-5	29.96
7AS0203618-A	-5	29.95
7AS0203618-B	-5	29.81
7AS0203618-C	-5	29.85
7AS0203618-D	-5	29.76
7AS0203618-E	-5	15.00
7AS0203618-F	-5	29.93
7AS0203618-G	-5	29.92
7AS0203618-H	-5	8.28
7AS0204208	20	29.85
7AS0204208-A	5	29.81
7AS0204208-B	5	29.85
7AS0204208-C	5	29.74
7AS0204208-D	5	26.91
7AS0207500	-5	29.90
7AS0207500-A	-5	15.00
7AS0207500-B	-5	29.88
7AS0207500-C	-5	29.93
7AS0207500-D	-5	29.78
7AS0207500-E	-5	29.98
7AS0207500-F	-5	29.96
7AS0207500-G	-5	29.93
7AS0207500-H	-5	8.29
7AS0203687	-5	29.97
7AS0203687-A	-5	30.00
7AS0203687-B	-5	15.00
7AS0203687-C	-5	30.00
7AS0203687-D	-5	29.96

SAMPLE NO.	Au ppb	Weight g
7AS0203687-E	-5	30.00
7AS0203687-F	-5	29.98
7AS0203687-G	-5	29.83
7AS0203687-H	-5	6.19
7AS0204220	-5	29.70
7AS0204220-A	15	29.80
7AS0204220-B	-5	29.88
7AS0204220-C	25	15.00
7AS0204220-D	-5	29.76
7AS0204220-E	-5	29.87
7AS0204220-F	-5	29.77
7AS0204220-G	-5	29.73
7AS0204220-H	-5	6.67
7AS0207650	-5	29.94
7AS0207650-A	-5	30.00
7AS0207650-B	-5	29.96
7AS0207650-C	-5	29.88
7AS0207650-D	-5	15.00
7AS0207650-E	15	29.83
7AS0207650-F	-5	29.85
7AS0207650-G	-5	29.88
7AS0207650-H	-5	8.23
7AS0203756	-5	29.95
7AS0203756-A	-5	29.84
7AS0203756-B	-5	29.92
7AS0203756-C	-5	29.88
7AS0203756-D	-5	29.83
7AS0203756-E	-5	15.00
7AS0203756-F	-5	29.77
7AS0203756-G	-5	29.83
7AS0203756-H	-5	8.13
7AS0205770	-5	29.81
7AS0205770-A	-5	29.80
7AS0205770-B	-5	29.80
7AS0205770-C	-5	29.90
7AS0205770-D	-5	29.82
7AS0205770-E	-5	29.86
7AS0205770-F	-5	15.00
7AS0205770-G	-5	29.86
7AS0205770-H	-5	6.56
7AS0208680	-5	29.94
7AS0208680-A	-5	29.93
7AS0208680-B	-5	29.89
7AS0208680-C	-5	29.93
7AS0208680-D	-5	29.96
7AS0208680-E	-5	29.87

SAMPLE NO.	Au ppb	Weight g
7AS0208680-F	-5	30.00
7AS0208680-G	-5	27.23
7AS0208680-H	-5	6.57

CHAUNCEY ASSAY LABORATORIES LTD.

33 Chauncey Avenue, Toronto, Ontario M8Z 2Z2
Tel: (416) 239-3527 FAX: (416) 239-4012

CERTIFICATE OF ANALYSIS

CERTIFICATE NO.: KR-105-01 DATE: DECEMBER 2, 1998

SUBMITTED BY: ISHTAR EXPLORATIONS LTD

ATTENTION: MR. KEN READING

DATE RECEIVED: NOVEMBER 30, 1998 SAMPLE OF: CONCENTRATES

SAMPLE NO:	Au PPB
KRTT-01	365
KRTT-02	350
KRTT-03	474
KRTT-04A	330

THE CHEMICAL PROFESSION OF ONTARIO
CHARTERED
J. van Engelen
CHEMIST

J. van Engelen Mgr

33 Chauncey Avenue, Toronto, Ontario M8Z 2Z2
Tel: (416) 239-3527 FAX: (416) 239-4012

(E)

CERTIFICATE OF ANALYSIS

RECEIVED FROM: CROWFLIGHT MINERALS INC. DATE: JANUARY 22, 1999

REPORT NO: KR-110-01 SAMPLE OF: PULP

DATE RECEIVED: JANUARY 7, 1998 ATTENTION: MR. JIM BRADY

		Au grams/ton		
SAMPLE NO:	CONCENTRATE FRACTION %	UNTREATED ORE	TREATED CONC.	TREATED MIDLINGS
#07 BK-03	33 %	3.7	22.4	15.3
#07 BK-06	12 %	3.4	3.2	3.4
#07 AS-02	27 %	11.6	24.8	14.5
#07 BK-01	3 %	4.3	20.3	4.3



J. van Engelen Mgr.

CHAUNCEY ASSAY LABORATORIES LTD.

33 Chauncey Avenue, Toronto, Ontario M8Z 2Z2
Tel: (416) 239-3527 FAX: (416) 239-4012

CERTIFICATE OF ANALYSIS

RECEIVED FROM: ISHTAR EXPLORATIONS LTD. DATE: DECEMBER 30, 1998

REPORT NO: KR-108-01 SAMPLE OF: CONCENTRATE

DATE RECEIVED: DECEMBER 29, 1998 ATTENTION: MR. KEN READING

SAMPLE NO:	Au PPM	Ag PPM
98/11/1	6.97	19.6
98/11/2	4.87	14.8
98/11/3	2.30	33.4
	Au PPB	Ag PPM
KRTT-01	278	16.9
KRTT-02	312	32.1
KRTT-03	276	24.0
KRTT-04A	216	28.7

ASSOCIATION OF THE CHEMICAL PROFESSION OF ONTARIO
CHARTERED
J. van Engelen
CHEMIST

J. van Engelen Mgr.

CHAUNCEY ASSAY LABORATORIES LTD.

33 Chauncey Avenue, Toronto, Ontario M8Z 2Z2
Tel: (416) 239-3527 FAX: (416) 239-4012

CERTIFICATE OF ANALYSIS

RECEIVED FROM: ISHTAR EXPLORATIONS LTD. DATE: DECEMBER 14, 1998

REPORT NO: KR-106-03 SAMPLE OF: CONCENTRATES

DATE RECEIVED: DECEMBER 7, 1998 ATTENTION: MR. KEN READING

SAMPLE NO:	Au PPM
98/11/1	15.4 (REPEAT = 15.1)
98/11/2	30.9 (NO REPEAT)
98/11/3	5.55 (REPEAT = 5.63)

ASSOCIATION OF THE CHEMICAL PROFESSION OF ONTARIO
CHARTERED
J. van Engelen
CHEMIST

J. van Engelen Mgr.

A9836768 CLIENT CODE QQL - CARGILL CONSULTING GEOLOGISTS LIM--

1 samples for 33 analytical parameters project :

#	Sample descrpt.	999 Au g/t	386 Ag g/t	378 SiO2 % fusion	4001 Ag ppm	4002 Al %	4003 As ppm	4004 Ba ppm	4005 Be ppm	4006 Bi ppm	4007 Ca %	4008 Cd ppm	4009 Co ppm	4010 Cr ppm
1	98/11/1	27.57	2.4	44.9	3	1.09	90	1760	<5	10	8.43	15	20	120

>>MORE>>

PF3=scroll *Z=QUIT
PF1=top PF4=bottom

A9836768 CLIENT CODE QQL - CARGILL CONSULTING GEOLOGISTS LIM--

1 samples for 33 analytical parameters project :

#	Sample descrpt.	4011 Cu ppm	4012 Fe %	4013 Hg ppm	4014 K %	4015 Mg %	4016 Mn ppm	4017 Mo ppm	4018 Na %	4019 Ni ppm	4020 P ppm	4021 Pb ppm	4022 Sb ppm	4023 Sc ppm
1	98/11/1	100	5.40	<10	0.23	0.29	390	70	0.10	105	7800	55	<10	10

<<MORE<<

PF3=scroll *Z=QUIT
PF1=top PF4=bottom

A9836768 CLIENT CODE QQL - CARGILL CONSULTING GEOLOGISTS LIM--

1 samples for 33 analytical parameters project :

#	Sample descrpt.	4024 Sr ppm	4025 Ti %	4026 Tl ppm	4027 U ppm	4028 V ppm	4029 W ppm	4030 Zn ppm
1	98/11/1	315	0.01	<20	40	200	<20	530

<<MORE<<

PF3=scroll *Z=QUIT
PF1=top PF4=bottom

Chemex Labs Ltd.

Analytical Chemists * Geochemists * Registered Assayers
212 Brooksbank Ave., North Vancouver
British Columbia, Canada V7J 2C1
PHONE: 604-984-0221 FAX: 604-984-0218

To: CARGILL CONSULTING GEOLOGISTS LIMITED **

55 UNIVERSITY AVE., STE. 1210
TORONTO, ON
M5J 2H7

Project :
Comments: ATTN: D. CARGILL

Page Number 1-A
Total Pages 1
Certificate Date 26-NOV-98
Invoice No. I-9836768
P.O. Number :
Account :

CERTIFICATE OF ANALYSIS A9836768

SAMPLE DESCRIPTION	PREP CODE		Au g/t	Ag g/t	SiO2 % fusion	Ag ppm	Al %	As ppm	Ba ppm	Be ppm	Bi ppm	Ca %	Cd ppm	Co ppm	Cr ppm	Cu ppm	Fe %	Hg ppm	K %	Mg %	Mn ppm
98/11/1	205	234	27.57	2.4	44.9	3	1.09	98	1760	< 5	10	0.43	15	20	120	100	5.48	< 10	0.23	0.29	390

CERTIFICATION: _____

12/03/98 10:53AM CHEMEX LABS VAX-FAX2 PAGE 002

Chemex Labs Ltd.

Analytical Chemists * Geochemists * Registered Assayers

212 Brooksbank Ave., North Vancouver
British Columbia, Canada V7J 2C1
PHONE: 604-984-0221 FAX: 604-984-0218

To: CARGILL CONSULTING GEOLOGISTS LIMITED

55 UNIVERSITY AVE., STE. 1210
TORONTO, ON
M5J 2H7

Project :
Comments: ATTN: D. CARGILL

Page Number 1-B
Total Pages 1
Certificate Date 28-NOV-98
Invoice No. I-9836768
P.O. Number :
Account :

CERTIFICATE OF ANALYSIS A9836768

SAMPLE DESCRIPTION	PREP CODE		Mo ppm	Na %	Ni ppm	P ppm	Pb ppm	Sb ppm	Sc ppm	Sr ppm	Ti %	Tl ppm	U ppm	V ppm	W ppm	Zn ppm
98/11/1	205	214	70	0.10	105	7900	55	< 10	10	315	0.01	< 20	40	200	< 20	530

CERTIFICATION:

12/03/98 10:54AM CHEMEX LABS VAX-FAX2 PAGE 003

Chemex Labs Ltd.

Analytical Chemists * Geochemists * Registered Assayers

212 Brooksbank Ave., North Vancouver
British Columbia, Canada V7J 2C1
PHONE: 604-984-0221 FAX: 604-984-0218

To: CARGILL CONSULTING GEOLOGISTS LIMITED

55 UNIVERSITY AVE., STE. 1210
TORONTO, ON
M5J 2H7

Project : RERUNS
Comments: ATTN: D. CARGILL

Page Number 1-A
Total Pages 1
Certificate Date 04-DEC-98
Invoice No. I-9837383
P.O. Number :
Account :

CERTIFICATE OF ANALYSIS A9837383

SAMPLE DESCRIPTION	PREP CODE		Au g/t RUSH	Ag g/t RUSH	Ag ppm	Al %	As ppm	Ba ppm	Be ppm	Bi ppm	Ca %	Cd ppm	Co ppm	Cr ppm	Cu ppm	Fe %	Hg ppm	K %	Mg %	Mn ppm	Mo ppm
98/11/2	217	233	17.01	1.9	2	1.61	60	1640	< 5	< 10	6.64	15	20	70	100	4.35	< 10	0.34	0.43	260	95
98/11/3	217	233	6.18	2.2	1	1.29	40	1220	< 5	< 10	6.20	15	20	40	85	3.88	< 10	0.28	0.37	220	90

CERTIFICATION

12/06/98 1:48PM CHEMEX LABS VAX-FAX2 PAGE 001

Chemex Labs Ltd.

Analytical Chemists * Geochemists * Registered Assayers

212 Brooksbank Ave., North Vancouver
British Columbia, Canada V7J 2C1
PHONE: 604-984-0221 FAX: 604-984-0218

To: CARGILL CONSULTING GEOLOGISTS LIMITED

55 UNIVERSITY AVE., STE. 1210
TORONTO, ON
M5J 2H7

Project: RERUNS
Comments: ATTN: D. CARGILL

Page Number 1-B
Total Pages 1
Certificate Date 04-DEC-98
Invoice No. I-9837383
P.O. Number :
Account :

CERTIFICATE OF ANALYSIS A9837383

SAMPLE DESCRIPTION	PREP CODE		Na %	Ni ppm	P ppm	Pb ppm	Sb ppm	Sc ppm	Sr ppm	Ti %	Tl ppm	U ppm	V ppm	W ppm	Zn ppm
98/11/2	217	233	0.11	155	3800	20	< 10	5	235	0.02	< 20	< 20	360	< 20	390
98/11/3	217	233	0.11	140	4300	10	< 10	5	225	0.01	< 20	< 20	300	< 20	400

CERTIFICATION: _____

12/06/98 1:49PM CHEMEX LABS VAX-FAX2 PAGE 002

Chemex Labs Ltd.

Analytical Chemists * Geochemists * Registered Assayers

5175 Timberlea Blvd., Mississauga
Ontario, Canada L4W 2S3
PHONE: 905-624-2806 FAX: 905-624-6163

To: ISHTAR EXPLORATIONS LTD.

SUITE 206, 57 - 62 HWY. 7 EAST
MARKHAM, ON
L3P 1A8

Project : CHECK SAMPLE
Comments: ATTN: KEN READING

Page [redacted]ber : 1
Total [redacted]ges : 1
Certificate Date: 20-JAN-1999
Invoice No. : I9910683
P.O. Number :
Account : OQC

CERTIFICATE OF ANALYSIS A9910683

SAMPLE	PREP CODE.	Au ppb FA+AA
KRTT-04A	225 --	215

CERTIFICATION: [redacted]

Established 1928

Swastika Laboratories

A Division of Assayers Corporation Ltd.

Assaying - Consulting - Representation

February 19, 1999

Mr. J. M. Brady
Mr. K. Reading
Crowflight Minerals Inc
111 Richmond St. West
Suite 1220
Toronto, Ontario
M5H 2G4

RE: Cert # 9W-0370-PA1

JB#1 - sample was broken up by hand to pass a 35 mesh screen, then riffled into two parts then becoming samples JB#1-A and JB#1B.

JB#1-A (95.8g) This sample was placed in a 600 ml beaker, enough 10% TPT solution was added to make a sloppy slurry, then mixed well and let stand for 30 minutes. It was then decanted through a filter using suction without washing. This sample was then dried at a maximum of 80 degrees C and broken up to pass through a 35 mesh screen. We fire assayed the entire sample, filter paper, TPT filtrate and TPT solid reagent.

JB#1-B (93.9g) This entire sample was fire assayed and all values are reported.

RE: Cert #9W-0370-PA2

Using a Jones riffle, the entire sample was split in half with one half being put aside. The remaining half was then split in half again. Each respective quarter was marked by adding an "A" and "B" to the number.

This sample was broken up by using hand tools to pass through a 35 mesh screen. We assayed the entire quarters and reported all weights and values.

Continued...

1 Cameron Ave., P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705)642-3244 Fax (705)642-3300

RE: Cert #9W-0370-PA3

A 200g portion of stored reject was taken and a "C" was added to the sample number. The sample was then put in a blender and distilled water was added to the 500 ml mark with 8 ml of 10% TPT solution. The blender was run at medium for 5 minutes then more distilled water was added to the 700 ml mark and run for one minute at medium speed.

The contents were then poured into 1000 ml tall form beakers and let stand for 24 hours, then 60% of the contents were decanted into bottles and stored.

The reamining "Heavy" portion was poured into aluminum pie plates and dried at a maximum of 80 degrees C. This was then broken up and put through a 35 mesh screen and the entire "Heavy" portion was assayed with all weights and grades reported.

If you have any questions or require any additional information please do not hesitate to contact us at 705-642-3244.

Sincerely,

G. Lebel/Manager

Established 1928

Swastika Laboratories

A Division of Assayers Corporation Ltd.

Assaying - Consulting - Representation

Assay Certificate

9W-0370-PA1

Company: **CROWFLIGHT MINERALS INC**

Date: FEB-19-99

Project:

Attn: J.M. Brady/K. Reading

We hereby certify the following Assay of 1 lumpy pulp sample submitted FEB-01-99 by .

Sample Number	Au g/tonne	weight fused
JB#1A (95.8g)	0.02	29.17g
	0.47	29.17g
	0.04	29.17g
	0.25	8.31g
filter paper	<0.05	1.18g
TPT filtrate	<0.01	39.68g
JB#1B (93.9g)	0.02	29.17g
	0.02	29.17g
	0.01	29.17g
	0.01	6.31g
TPT solid reagent	<0.01	7.88g

Certified by [redacted]

1 Cameron Ave., P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705)642-3244 Fax (705)642-3300

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Established 1928

Assaying - Consulting - Representation

Assay Certificate

9W-0370-PA2

Company: **CROWFLIGHT MINERALS INC**

Date: FEB-19-99

Project:

Attn: J.M. Brady/K. Reading

We hereby certify the following Assay of 4 Lumpy Pulp samples submitted FEB-01-99 by .

Sample Number	Au g/tonne	Weight Fused
2BK01-A (71.48g)	0.02	29.17g
	<0.01	29.17g
	0.01	13.15g
2BK01-B (67.33g)	0.01	19.17g
	0.01	29.17g
	<0.01	8.99g
2AS02-A (403.57g)	0.01	29.17g
	0.01	29.17g
	0.01	29.17g
	<0.01	29.17g
	0.01	29.17g
	0.01	29.17g
	0.01	29.17g
	0.01	29.17g
	0.01	29.17g
	0.01	29.17g
	0.01	29.17g
	0.01	24.41g
2AS02-B (477.83g)	0.01	29.17g
	0.01	29.17g
	0.01	29.17g
	0.02	29.17g
	0.01	29.17g
	0.01	29.17g
	0.08	29.17g

Certified by [redacted]

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Assay Certificate

9W-0370-PA2

Company: **CROWFLIGHT MINERALS INC**

Date: FEB-19-99

Project:

Attn: J.M. Brady/K. Reading

We hereby certify the following Assay of 4 Lumpy Pulp samples submitted FEB-01-99 by .

Sample Number	Au g/tonne	Weight Fused
	0.04	29.17g
	0.01	29.17g
	0.01	29.17g
	0.02	29.17g
	0.01	29.17g
	0.02	29.17g
	0.01	29.17g
	0.01	29.17g
	0.01	29.17g
	0.01	11.17g
2BK03-A (596.20g)	0.01	29.17g
	<0.01	29.17g
	0.01	29.17g
	0.02	29.17g
	0.01	29.17g
	<0.01	29.17g
	0.02	29.17g
	0.01	29.17g
	0.01	29.17g
	<0.01	29.17g
	<0.01	29.17g
	0.03	29.17g
	0.01	29.17g
	0.01	29.17g
	0.01	29.17g
	0.01	29.17g
	0.01	29.17g
	0.01	29.17g

Certified by [redacted]

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Assay Certificate

9W-0370-PA2

Company: **CROWFLIGHT MINERALS INC**

Date: FEB-19-99

Project:

Attn: J.M. Brady/K. Reading

We hereby certify the following Assay of 4 Lumpy Pulp samples submitted FEB-01-99 by .

Sample Number	Au g/tonne	Weight Fused
	<0.01	29.17g
	0.01	12.80g
2BK03-B (597.53g)	0.01	29.17g
	0.01	29.17g
	0.01	29.17g
	0.01	29.17g
	0.01	29.17g
	0.01	29.17g
	0.01	29.17g
	0.01	29.17g
	0.02	29.17g
	<0.01	29.17g
	0.01	29.17g
	<0.01	29.17g
	0.01	29.17g
	0.01	29.17g
	<0.01	29.17g
	0.01	29.17g
	0.06	29.17g
	0.01	29.17g
	<0.01	29.17g
	<0.01	14.13g
2BK06-A (448.15g)	<0.01	29.17g
	0.01	29.17g
	0.01	29.17g
	0.05	29.17g
	0.01	29.17g

Certified by [redacted]

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Assay Certificate

9W-0370-PA2

Company: **CROWFLIGHT MINERALS INC**

Date: FEB-19-99

Project:

Attn: J.M. Brady/K. Reading

We hereby certify the following Assay of 4 Lumpy Pulp samples submitted FEB-01-99 by .

Sample Number	Au g/tonne	Weight Fused
	<0.01	29.17g
	<0.01	29.17g
	<0.01	29.17g
	0.01	29.17g
	0.01	29.17g
	<0.01	29.17g
	<0.01	29.17g
	<0.01	29.17g
	0.01	29.17g
	0.01	29.17g
	<0.01	10.60g
2BK06-B (461.16g)	0.01	29.17g
	<0.01	29.17g
	0.02	29.17g
	0.04	29.17g
	<0.01	29.17g
	<0.01	29.17g
	0.01	29.17g
	0.01	29.17g
	0.03	29.17g
	0.01	29.17g
	0.01	29.17g
	0.03	29.17g
	0.01	29.17g
	0.01	29.17g
	0.01	29.17g
	0.02	23.61g

Certified by [redacted]

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9W-0370-PA3

Company: CROWFLIGHT MINERALS INC

Date: FEB-19-99

Project:

Attn: J.M. Brady/K. Reading

We hereby certify the following Assay of 4 Lumpy Pulp samples submitted FEB-01-99 by .

Sample Number	Au g/tonne	Weight Fused
2BK01-C (61.98g)	0.02	29.17g
	0.01	29.17g
	<0.01	3.64g
2AS02-C (65.70g)	<0.01	29.17g
	0.01	19.03g
	0.02	17.50g
2BK03-C (88.96g)	<0.01	29.17g
	<0.01	29.17g
	0.01	30.62g
2BK06-C (67.80g)	0.01	29.17g
	0.01	21.13g
	0.01	17.50g

Certified by [redacted]

1 Cameron Ave., P.O. Box 10, Swastika, Ontario P0K 1T0
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LAKEFIELD RESEARCH

185 Concession Street, Postal Bag 4300, Lakefield, Ontario, K0L 2H0

Facsimile No. (705) 652-1918
Telephone No. (705) 652-2024

To: J. M. Brady
C/C: James Patterson, Warren Mc. Leod
From: Roch Marion, Cuong Trang

Company: CROWFLIGHT MINERALS INC.
Fax No.: (416) 368-0198
Project: 4424-104

Date: March 9, 1999

(Number of pages --9-- including this page)

RE: Results of Testwork on Tintina Composite 98T13A0038 Sample.

The sample (~3.6 kg of nominal minus 10 mesh ore) was dry screened at 28 mesh to break up coarse particle. The oversize fraction was dry pulverized and then recombined with the minus 28 mesh ore. The whole sample was blended well and then split into 500-g test charges. The following tests were conducted:

1. Test 1 (CIL Leach): 500-g ore was pulped with 750-g water (40% pulp density) in a bottle. Activated carbon (20 g) was added. Leaching was carried out at 1 g/L NaCN and pH 11 for 24 hours on a roller. The cyanide and pH levels were monitored and maintained during the test.

Following leaching, the carbon was recovered and the pulp filtered. All products were analyzed for gold. Gold recovery, calculated gold head grade and reagent consumption were determined.

2. Test 2 (CIP Leach): The procedure was the same as for Test 1 except the leach was started without carbon. After 24 hours of leaching, the carbon was added. The bottle was rolled for an additional 6 hours to load the gold onto the activated carbon. Following the test, the carbon was recovered and the pulp filtered. All products were analyzed for gold. Gold recovery, calculated gold head grade and reagent consumption were determined.

3. Test 3 (CIL Leach of Roasted Ore): A 500-g of test charge was roasted at 750°C for 6 hours. The roasted ore was weighed to determine weight loss. Leaching was conducted on the roasted ore using the same procedure as for Test 1.

4. Test 4 (CIP Leach of Roasted Ore): The test procedure was the same as for Test 2 except that the ore was roasted (as in Test 3) prior to leaching.

5. Test 5 (CIL of Deflocculated Ore): The test procedure was the same as for Test 1 except that the ore had been deflocculated with A-15 deflocculant as per the procedure supplied by Mr. Jim Brady of Crowflight Minerals Inc. in a fax dated March 3rd, 1999.

6. Test 6 (CIL of Deflocculated Ore): The test procedure was the same as for Test 2 after the ore had been deflocculated with A-15 deflocculant.

A summary of the test results and the details of the experiments are attached.

Weight lost upon roasting (Tests 3 and 4) was approximately 20%. Approximately 60% of the ore was removed (float fraction) during deflocculation (Tests 5 and 6). The ore filtered very slowly. However, the filtration rate improved greatly after roasting.

The results showed that very little gold was present in the ore. The results of cyanidation tests conducted on un-roasted ore indicated that CIL leaching was more effective than CIP. Roasting the ore prior to leaching improved the CIP results. These findings suggested the presence of preg-robbing materials in the ore.

Please call if you have any questions or concerns.

Best regards,

[redacted]

Roch Marion, B.Sc., C.Chem.
Assistant Manager, Analytical Services

[redacted]

Cuong Trang, M.A.Sc.
Metallurgist

Project 4424-104

Results of Bottle Roll Cyanidation Tests on Tintina Composite Sample 98T13A0038

Test	Mass			Leach	Leach	Leach	CIP	Mass	pH	NaCN			Lime		Au	Gold Recovery		Au in	Au
	Origi. Feed	PreTreat-ment Method	Leach Feed	Pulp Den-sity	Method	Reten-tion Time	Reten-tion Time	of Carbon		Conc.	Added	Consu.	Added	Consu.	on Loaded Carbon	in Float Fraction	by Cyanide Leach	Leach Resi-due	in Origi. Feed
	g		g	%		h	h	g		g/L	kg/t*	kg/t*	kg/t*	kg/t*	g/t	%	%	g/t	g/t
1	500	NA	500	40	CIL	24	NA	20	~11	1.0	3.29	2.42	7.04	6.99	2.28	NA	~85	<0.02	<0.13
2	500	NA	500	40	CIP	24	6	20	~11	1.0	2.93	2.25	7.28	7.25	0.22	NA	~33	0.05	0.07
3	500	Roast	403	40	CIL	24	NA	20	~11	1.0	1.91	1.04	0.81	0.67	0.37	NA	~70	<0.02	<0.05
4	500	Roast	404	40	CIP	24	6	20	~11	1.0	1.69	0.56	0.71	0.64	0.27	NA	~64	<0.02	<0.04
5	500	De-Floc	215	40	CIL	24	NA	20	~11	1.0	3.23	2.76	6.47	6.36	0.92	~41	~51	0.02	0.10
6	500	De-Floc	190	40	CIP	24	6	20	~11	1.0	2.55	2.23	6.48	6.41	0.20	~62	~27	0.02	0.07

Ore was dry screened at 28 mesh. The oversize was dry pulverized and the two fractions were recombined.

*Leach feed.

NA: Not applicable

CIL: Carbon-in-Leach

CIP: Carbon-in-Pulp

Project 4424-104 **Test 1** Operator: LP March 5, 1999

Purpose: To conduct a bottle roll CIL cyanidation test on Tintina Composite 98T13A0038 sample.

Procedure: The ore sample (approximately 3.5 kg of nominal minus 10 mesh ore) was delivered by Mr. James Patterson of Crowflight Minerals Inc. The sample was dry screened at 28 mesh. The oversize was dry pulverized and then recombined with the fine fraction. The entire sample was mixed well and split into 500 g test charges.

A 500 g test charge was pulped with water to 40% solids in a bottle. The pulp was adjusted to pH 11 with lime. Activated carbon (20 g of Calgon GRC-22, plus 20 mesh) was added. Leaching was carried out at 1 g/L NaCN for 24 hours on a roller.

Following leaching, the carbon was recovered on a 24 mesh screen. The pulp was filtered. The filter cake was washed with water. The filtrate and the wash were combined and all products were submitted for gold analysis.

Feed: 500 g Tintina Composite 98T13A0038 sample.

Solution Volume: 750 mL (40% solids) Activated Carbon: 20 g Calgon GRC-22 (+20 mesh)

pH: approx. 11 with lime Sol'n Composition: 1 g/L NaCN

Results:

Reagent Addition (kg/t of feed): NaCN: 3.29 CaO: 7.04

Reagent Consumption (kg/t of feed): NaCN: 2.42 CaO: 6.99

Lapsed Time (hr)	Added (g)				Residual (g)		Consumed (g)		pH
	Actual		Equivalent						
	NaCN 95%	Lime	NaCN	CaO	NaCN	CaO	NaCN	CaO	
0-1.5	0.79	3.50	0.75	2.66	0.15		0.60		10.9-10.2
1.5-4	0.63	0.65	0.60	0.49	0.53		0.22		11.1-10.6
4-7	0.23	0.25	0.22	0.19	0.67		0.08		11.0-10.8
7-24	0.08	0.23	0.08	0.17	0.43	0.02	0.31		11.1-10.5
Total	1.73	4.63	1.64	3.52	0.43	0.02	1.21	3.50	

Filtrate & wash vol: 900 mL Cyanide Feed: 500 g

Product	Amount		Analysis Au mg/L, g/t	Distrib. Au %
CIL barren & wash	900	mL	<0.01	13.5
Loaded carbon	21.0	g	2.28	71.9
Leach Residue	485	g	<0.02	14.6
Head (calc.)	500	g	<0.13	100.0

Cyanide Gold Extraction: 85 %

Project 4424-104 **Test 2** Operator: LP March 5, 1999

Purpose: To conduct a bottle roll CIP cyanidation test on Tintina Composite 98T13A0038 sample.

Procedure: A 500 g test charge (prepared in Test 1) was pulped with water to 40% solids in a bottle. The pulp was adjusted to pH 11 with lime. Leaching was carried out at 1 g/L NaCN on a roller. After 24 hours of leaching, 20 g of Calgon GRC-22 (plus 20 mesh) was added. The bottle was rolled for an additional 6 hours to load the gold onto the carbon.

Following the test, the carbon was recovered on a 24 mesh screen. The pulp was filtered. The filter cake was washed with water. The filtrate and the wash were combined and all products were submitted for gold analysis.

Feed: 500 g Tintina Composite 98T13A0038 sample.

Solution Volume: 750 mL (40% solids) pH: approx. 11 with lime

Sol'n Composition: 1 g/L NaCN Activated Carbon: 20 g Calgon GRC-22 (+20 mesh)

Results:

Reagent Addition (kg/t of feed): NaCN: 2.93 CaO: 7.28

Reagent Consumption (kg/t of feed): NaCN: 2.25 CaO: 7.25

Lapsed Time (hr)	Added (g)				Residual (g)		Consumed (g)		pH
	Actual		Equivalent						
	NaCN 95%	Lime	NaCN	CaO	NaCN	CaO	NaCN	CaO	
Cyanidation									
0-1.5	0.79	3.80	0.75	2.89	0.15		0.60		11.0-10.3
1.5-4	0.63	0.62	0.60	0.47	0.67		0.08		10.9-10.8
4-7	0.08	0.14	0.08	0.11	0.71		0.04		11.0-10.8
7-24	0.04	0.23	0.04	0.17	0.34	0.02	0.41		11.2-10.8
Carbon-in-Pulp									
24-30							0.34		10.8-10.4
Total	1.54	4.79	1.46	3.64	0.34	0.02	1.12	3.62	

Filtrate & wash vol: 720 mL Cyanide Feed: 500 g

Product	Amount		Analysis Au mg/L, g/t	Distrib. Au %
CIP barren & wash	720	mL	<0.01	20.0
Loaded carbon	20.7	g	0.22	12.7
Leach Residue	484	g	0.05	67.3
Head (calc.)	500	g	0.07	100.0

Cyanide Gold Extraction: 33 %

Project 4424-104 **Test 3** Operator: LP March 5, 1999

Purpose: To conduct a bottle roll CIL cyanidation test on roasted Tintina Composite 98T13A0038 sample.

Procedure: A 500 g test charge (prepared in Test 1) was roasted at 750°C in a muffle furnace for 6 hours. The roasted ore was air cooled and then pulped with water to 40% solids in a bottle. The pulp was adjusted to pH 11 with lime. Activated carbon (20 g of Calgon GRC-22, plus 20 mesh) was added. Leaching was carried out at 1 g/L NaCN for 24 hours on a roller.

Following leaching, the carbon was recovered on a 24 mesh screen. The pulp was filtered. The filter cake was washed with water. The filtrate and the wash were combined and all products were submitted for gold analysis.

Feed: 500 g Tintina Composite 98T13A0038 sample (roasted at 750°C for 6 hours).
Roasted ore was 403 g

Solution Volume: 603 mL (40% solids) Activated Carbon: 20 g Calgon GRC-22 (+20 mesh)

pH: approx. 11 with lime Sol'n Composition: 1 g/L NaCN

Results:

Reagent Addition: kg/t leach feed NaCN: 1.91 CaO: 0.81
kg/t original feed NaCN: 1.54 CaO: 0.65

Reagent Consumption: kg/t leach feed NaCN: 1.04 CaO: 0.67
kg/t original feed NaCN: 0.84 CaO: 0.54

Lapsed Time (hr)	Added (g)				Residual (g)		Consumed (g)		pH
	Actual		Equivalent						
	NaCN 95%	Lime	NaCN	CaO	NaCN	CaO	NaCN	CaO	
0-1.5	0.63	0.36	0.60	0.27	0.51		0.09		11.1-10.8
1.5-4	0.09	0.07	0.09	0.05	0.54		0.06		11.2-11.0
4-7	0.06	0.00	0.06	0.00	0.57		0.03		11.0-11.1
7-24	0.03	0.00	0.03	0.00	0.35	0.06	0.25		11.1-11.0
Total	0.81	0.43	0.77	0.33	0.35	0.06	0.42	0.27	

Filtrate & wash vol: 1100 mL Feed (before roast): 500 g
(Roasted ore: 403 g)

Product	Amount		Analysis Au mg/L, g/t	Distrib. Au %
CIL barren & wash	1100	mL	<0.01	41.0
Loaded carbon	21.4	g	0.37	29.5
Leach Residue	397	g	<0.02	29.6
Head (calc.)	500	g	<0.05	100.0

Cyanide Gold Extraction: 70 %

Project 4424-104 **Test 4** Operator: LP March 5, 1999

Purpose: To conduct a bottle roll CIP cyanidation test on roasted Tintina Composite 98T13A0038 sample.

Procedure: A 500 g test charge (prepared in Test 1) was roasted at 750°C in a muffle furnace for 6 hours. The roasted ore was air cooled and then pulped with water to 40% solids in a bottle. The pulp was adjusted to pH 11 with lime. Leaching was carried out at 1 g/L NaCN on a roller. After 24 hours of leaching, 20 g of Calgon GRC-22 (plus 20 mesh) was added. The bottle was rolled for an additional 6 hours to load the gold onto the carbon.

Following the test, the carbon was recovered on a 24 mesh screen. The pulp was filtered. The filter cake was washed with water. The filtrate and the wash were combined and all products were submitted for gold analysis.

Feed: 500 g Tintina Composite 98T13A0038 sample (roasted at 750°C for 6 hours).
Roasted ore was 404 g

Solution Volume: 606 mL (40% solids) pH: approx. 11 with lime

Sol'n Composition: 1 g/L NaCN Activated Carbon: 20 g Calgon GRC-22 (+20 mesh)

Results:

Reagent Addition: kg/t leach feed NaCN: 1.69 CaO: 0.71
kg/t original feed NaCN: 1.37 CaO: 0.58

Reagent Consumption: kg/t leach feed NaCN: 0.56 CaO: 0.64
kg/t original feed NaCN: 0.45 CaO: 0.52

Lapsed Time (hr)	Added (g)				Residual (g)		Consumed (g)		pH
	Actual		Equivalent						
	NaCN 95%	Lime	NaCN	CaO	NaCN	CaO	NaCN	CaO	
Cyanidation									
0-1.5	0.63	0.30	0.60	0.23	0.54		0.06		11.1-10.7
1.5-4	0.06	0.08	0.06	0.06	0.57		0.03		11.1-11.1
4-7	0.03	0.00	0.03	0.00	0.60		0.00		11.1-11.1
7-24	0.00	0.00	0.00	0.00	0.46	0.03	0.14		11.1-11.0
Carbon-in-Pulp									
24-30							0.46		11.0-11.0
Total	0.72	0.38	0.68	0.29	0.46	0.03	0.23	0.26	

Filtrate & wash vol: 740 mL Feed (before roast): 500 g
(Roasted ore: 404 g)

Product	Amount		Analysis Au mg/L, g/t	Distrib. Au %
CIP barren & wash	740	mL	<0.01	35.4
Loaded carbon	20.5	g	0.27	26.5
Leach Residue	398	g	<0.02	38.1
Head (calc.)	500	g	<0.04	100.0

Cyanide Gold Extraction: 62 %

Project 4424-104 Test 5 Operator: LP March 5, 1999

Purpose: To conduct a bottle roll CIL cyanidation test on deflocculated Tintina Composite 98T13A0038 sample.

Procedure: A 10% w/w deflocculant solution was prepared by dissolving 20 g of A-15 reagent in 180 g of water. The reagent and treatment procedure were provided by Crowflight Minerals Inc.

A 500 g test charge (prepared in Test 1) was pulped with 1000 g of water in a 2 L kettle. The pulp was mixed with a Caframo laboratory agitator. The deflocculant (50 g of 10% solution) was added. The pulp was mixed for another 10 minutes. The agitator was turned off and the pulp was allowed to settled for 30 minutes. The suspended slurry was decanted and filtered. The filter cake and the filtrate were analyzed for gold.

The pulp in the kettle was repulped with water to 40% solids in a bottle. The pulp was adjusted to pH 11 with lime. Activated carbon (20 g of Calgon GRC-22, plus 20 mesh) was added. Leaching was carried out at 1 g/L NaCN for 24 hours.

Following leaching, the carbon was recovered on a 24 mesh screen. The pulp was filtered. The filter cake was washed with water. The filtrate and the wash were combined and all products were submitted for gold analysis.

Feed: 500 g Tintina Composite 98T13A0038 sample (after treated with A-15 deflocculant).
Sink fraction for leaching: 215 g

Solution Volume: 334 mL (~40% solids) Activated Carbon: 20 g Calgon GRC-22 (+20 mesh)

pH: approx. 11 with lime Sol'n Composition: 1 g/L NaCN

Results:

Reagent Addition: kg/t leach feed NaCN: 3.23 CaO: 6.47
kg/t original feed NaCN: 1.39 CaO: 2.78

Reagent Consumption: kg/t leach feed NaCN: 2.76 CaO: 6.36
kg/t original feed NaCN: 1.19 CaO: 2.74

Lapsed Time (hr)	Added (g)				Residual (g)		Consumed (g)		pH
	Actual		Equivalent						
	NaCN 95%	Lime	NaCN	CaO	NaCN	CaO	NaCN	CaO	
0-1.5	0.35	0.96	0.33	0.73	0.08		0.25		11.1-9.8
1.5-4	0.26	0.39	0.25	0.30	0.25		0.08		11.0-10.4
4-7	0.08	0.28	0.08	0.21	0.29		0.04		11.0-10.6
7-24	0.04	0.20	0.04	0.15	0.10	0.02	0.23		11.1-10.4
Total	0.73	1.83	0.69	1.39	0.10	0.02	0.59	1.37	

Filtrate & wash vol: 630 mL Feed (original): 500 g
Feed to Leach: 215 g

Product	Amount		Analysis Au mg/L, g/t	Distrib. Au %
Float fraction	265	g	0.03	16.0
Float filtrate	1230	mL	<0.01	24.7
CIL barren & wash	630	mL	<0.01	12.7
Loaded carbon	20.5	g	0.92	37.9
Leach Residue	215	g	0.02	8.7
Head (calc.)	500	g	0.10	100.0

Cyanide Gold Extraction: 51 %

Project 4424-104 **Test 6** Operator: LP March 5, 1999

Purpose: To conduct a bottle roll CIP cyanidation test on deflocculated Tintina Composite 98T13A0038 sample.

Procedure: A 500 g test charge (prepared in Test 1) was treated with the deflocculant using the same procedure as described in Test 5.

The treated pulp in the kettle was repulped with water to 40% solids in a bottle. The pulp was adjusted to pH 11 with lime. Leaching was carried out at 1 g/L NaCN on a roller. After 24 hours of leaching, 20 g of Calgon GRC-22 (plus 20 mesh) was added. The bottle was rolled for an additional 6 hours to load the gold onto the carbon.

Following the test, the carbon was recovered on a 24 mesh screen. The pulp was filtered. The filter cake was washed with water. The filtrate and the wash were combined and all products were submitted for gold analysis.

Feed: 500 g Tintina Composite 98T13A0038 sample (after treated with A-15 deflocculant).
Sink fraction for leaching: 190 g

Solution Volume: 280 mL (~40% solids) pH: approx. 11 with lime

Sol'n Composition: 1 g/L NaCN Activated Carbon: 20 g Calgon GRC-22 (+20 mesh)

Results:

Reagent Addition: kg/t leach feed NaCN: 2.55 CaO: 6.48
kg/t original feed NaCN: 0.97 CaO: 2.46

Reagent Consumption: kg/t leach feed NaCN: 2.23 CaO: 6.41
kg/t original feed NaCN: 0.85 CaO: 2.43

Lapsed Time (hr)	Added (g) Actual NaCN 95%	Actual Lime	Equivalent NaCN	Equivalent CaO	Residual (g) NaCN	Residual (g) CaO	Consumed (g) NaCN	Consumed (g) CaO	pH
Cyanidation									
0-1.5	0.29	0.86	0.28	0.65	0.07		0.21		10.9-9.9
1.5-4	0.22	0.37	0.21	0.28	0.28		0.00		11.3-10.5
4-7	0.00	0.29	0.00	0.22	0.28		0.00		11.3-10.9
7-24	0.00	0.10	0.00	0.08	0.06	0.01	0.22		11.1-10.9
Carbon-in-Pulp									
24-30							0.06		10.9-10.7
Total	0.51	1.62	0.48	1.23	0.06	0.01	0.42	1.22	

Filtrate & wash vol: 505 mL Feed (original): 500 g
Feed to Leach: 190 g

Product	Amount		Analysis Au mg/L, g/t	Distrib. Au %
Float fraction	299	g	0.03	26.4
Float filtrate	1200	mL	0.01	35.4
CIP barren & wash	505	mL	<0.01	14.9
Loaded carbon	20.5	g	0.20	12.1
Leach Residue	190	g	0.02	11.2
Head (calc.)	500	g	0.07	100.0

Cyanide Gold Extraction: 27 %

LAKEFIELD RESEARCH

185 Concession Street, Postal Bag 4300, Lakefield, Ontario, K0L 2H0

Facsimile No. (705) 652-1918
Telephone No. (705) 652-2024

To: J. M. Brady
C/C: James Patterson, Warren Mc. Leod
From: Roch Marion, Cuong Trang

Company: CROWFLIGHT MINERALS INC.
Fax No.: (416) 368-0198
Project: 4424-104

Date: April 12, 1999

(Number of pages --16-- including this page)

RE: Testwork on CFL 99-2 Sample.

Procedure:

The sample (approximately 4.5 kg) consisted of fine ore and lumps of mostly dry fine ore particles that clung together was delivered by Mr. J. M. Patterson on March 23, 1999. The sample was to be prepared using a procedure provided with the sample by Mr. J. Patterson (attached Memorandum from Jim Patterson to Roch Marion and Cuong Trang dated March 22, 1999) as follows:

1. The sample was to be riffled into 2 halves. One half (H1) was to be dry screened at 28 mesh. The size fractions were to be weighed. The +28 mesh fraction was to be dry pulverized and recombined with the –28 mesh fraction. The sample was to be blended and homogenized and riffled into four 500 g test charges. The test charges were to be used to perform Test 7 (CIL cyanidation of sample as received), Test 8 (CIP cyanidation of sample as received), Test 9 (CIL cyanidation of sample roasted at 750°C for 6 hours) and Test 10 (CIP cyanidation of sample roasted at 750°C for 6 hours).

This part of the testwork was performed according to the above procedure. The first half of the sample (H1) was screened on a 28-mesh sieve. A clean rubber stopper was used to break up the lumps during screening. The undersize fraction was 2210 g. The oversize fraction (20 g of small pieces of hard rock) was dry pulverized and then recombined with the minus 28 mesh ore. The

sample was blended well. Four 500-g test charges were prepared for the above tests (Tests 7-10). The remainder was submitted for multiple gold analyses by fire assay. These analyses were not requested in the procedure but were conducted to provide information on sample gold grade by direct fire assay.

2. The above procedure stated that the other half of the CFL 99-2 sample (H2) was to be blended and homogenized without screening or pulverizing. The entire sample was to be deflocced and macerated using A-15 deflocculant. The slime (float) fraction was to be filtered and dried. The dry slime was to be split into two halves and the weights recorded. One half (H2as) was to be fire assayed for gold in multiple 1 AT cuts without pulverizing and the fire assays and fused weights reported individually. The entire sample H2as was to be consumed.

The deslimed (sink) sample was to be split in halves and dry weights recorded. One half was to be redesignated as H2a. The other half was to be reconstituted with the remaining half slime sample to form sample H2b. One CIL test and one CIP test were to be performed on each H2a and H2b samples.

Unfortunately, due to a combination of our communication mistake, the busy workload (other projects) that the operator had at the time and the urgent nature of the testwork, the above procedure was not carried out correctly. Instead, the deflocculation procedure used in previous testwork (Tests 5 and 6 in Testwork Report on Tintina Composite Sample 98T13A0038 dated March 9, 1999) was used by mistake as follows:

The second half (H2) was blended well and one head sample was riffled out for four gold analyses by fire assay. This head sample was not screened nor pulverized. The coarse pieces of ore were broken up by hand. These analyses were not requested by the procedure but were carried out to observe the effect of screening and pulverizing on fire assay of the sample. The remainder of the H2 half was prepared into 500-g test charges. Two deflocculation tests were conducted using one 500-g test charge each. Each test charge was de-flocculated with A-15 deflocculant as per the procedure supplied by Mr. Jim Brady of Crowflight Minerals Inc. in a fax dated March 3rd, 1999. However, most of the coarse pieces of ore did not breakdown. Owing to the time restraint and the need of recovering the loaded carbon from the residue following leaching, the pulp was passed through a 28-mesh screen to break up the lumps. The slurry was diluted with more water and allowed to settle.

The slime was decanted into a filter funnel. The filter cake (slime) was dried. The dry slime was broken up with a large rubber stopper. The fine slime was blended and the entire sample was fire assayed in 1 AT cuts for gold. Because of the low gold content of the feed, in order to improve

the detection of gold, the beads from cupelation of the lead buttons were dissolved together in aqua regia. The solution was read for gold on an atomic adsorption spectrophotometer (AAS). The filtrate from filtration of the slime was also analyzed for gold. One cyanidation test was conducted on the deflocced (sink) sample.

Cyanidation Tests:

1. Test 7 (CIL leach): A 500-g H1 test charge was pulped with 750 g water (40% solids) in a bottle. Activated carbon (20 g) was added. Leaching was carried out at 1 g/L NaCN and pH 11 for 24 hours on a roller. The cyanide and pH levels were monitored and maintained during the test.

Following leaching, the loaded carbon was recovered on a 24-mesh screen and the pulp filtered. The filter cake was washed with water. The barren solution (filtrate) and the wash were combined. The loaded carbon, the combined barren/wash and the leach residue were analyzed for gold. Gold recovery, calculated gold head grade and reagent consumption were determined.

2. Test 8 (CIP leach): The procedure was the same as for Test 7 except the leach was started without carbon. After 24 hours of leaching, the carbon was added. The bottle was rolled for an additional 6 hours to load the leached gold onto the activated carbon. Following the test, the carbon was recovered and the pulp filtered. The filter cake was washed with water. The barren solution and the wash were combined. The loaded carbon, the combined barren/wash and the leach residue were analyzed for gold. Gold recovery, calculated gold head grade and reagent consumption were determined.

3. Test 9 (CIL leach of roasted ore): A 500-g H1 test charge was roasted at 750°C for 6 hours. The roasted ore was weighed to determine weight loss. Leaching was conducted on the roasted ore using the same procedure as for Test 7.

4. Test 10 (CIP leach of roasted ore): The test procedure was the same as for Test 8 except that the ore was roasted at 750°C for 6 hours prior to leaching.

5. Test 11 (CIL of de-flocculated ore): A 500-g H2 test charge was de-flocculated with A-15 deflocculant as described above. Cyanidation was conducted on the sink fraction using the same procedure as for Test 7. Owing to the relatively small quantity of the sink fraction (100-150 g), only 10 g of activated carbon was used during leaching.

6. Test 12 (CIP of de-flocculated ore): The test procedure was the same as for Test 8 after the ore (one 500-g H2 test charge) had been deflocculated with A-15 deflocculant.

Results:

A summary of the head analysis, the experimental conditions and results and the details of the experiments are attached.

The gold head analysis varied from <0.02 g/t to 1.17 g/t. The results suggested the presence of coarse gold in the ore sample. In addition, the assay results appeared to be unaffected by the method used in preparation of the sample (with or without screening and pulverizing).

Weight lost during leaching of ore without pre-treatment (Tests 7 and 8) was approximately 7%. Although some of this loss might be due to handling of the ore with very high clay content (fine particles adhered to filter funnel and paper), the loss was significant and might have been due to dissolution of some water-soluble and/ore cyanide-soluble components.

Weight lost upon roasting (Tests 9 and 10) was approximately 22%. The sample turned brownish (from bluish black) after roasting.

Only approximately 25 % of the ore reported to the sink fraction following de-flocculation (Tests 11 and 12). Because the sink fraction was not dried prior to cyanide leaching, any weight lost during leaching was unknown. However, any water-soluble materials (if present) should have dissolved during de-flocculation and weight lost during leaching of the sink fraction would be likely low and limited to cyanide-soluble loss.

There were very little gold present in the feed in Tests 7-10 (0.05 to 0.07 g/t). The leach residues contained similar and negligible concentrations of gold. Therefore, it is impossible to draw firm conclusion, as far as the affects of CIL versus CIP, roasting versus not roasting are concerned. The pulp from leaching of ore without roasting filtered very slowly. However, the filtration rate improved greatly with pre-roasting.

The gold reported to the float fraction during de-flocculation was 74.4% (352 g at 0.50 g/t Au) for Test 11 and 61.3% (336 g at 0.19 g/t Au) for Test 12. The solution from filtration of the float fraction contained trace amount of gold (0.01 mg/L Au). This concentration of gold is at the detection limit and should be taken with reservation. Owing to the low head grade, this amount of gold was equivalent to 4 to 8% of the gold content of the feed.

The results of cyanide leaching of the sink fraction showed that the CIL test produced lower gold in the residue than the CIP test (0.03 g/t Au for CIL Test 11 versus 0.07 g/t Au for CIP Test 12). The calculated head grades of the two experiments with de-flocculation were significantly higher than those observed in Tests 7-10, and this appeared to be due to the uneven distribution of gold in the ore sample. In fact an additional de-flocculation test was conducted on another 500-g H2 test charge using the same procedure as for Tests 11 and 12. The analytical results showed that both the float fraction (298 g) and the float fraction filtrate contained negligible amounts of gold. The sink fraction from this additional test (180 g) was dried and saved.

Since the deflocculation testwork had not been performed according to the provided procedure, instruction was given by Mr. J. M. Patterson on April 8, 1999, to combine and deflocculate the remaining H2 samples (1110 g) in order to redo the required H2 tests. The sample was pulped in 2220 g of water and mixed overnight. The coarse materials remained in the pulp was then broken up by hand. The A-15 flocculant was added and the pulp was mixed for 30 minutes. Water was added to assist the separation of the slime. The pulp was allowed to stand for about 20 minutes. The slime was then decanted into two filter funnels. The deflocced sample was also filtered. The filtrates were combined (3.42 L) and a sample was saved. At this time, instruction to stop the testwork was received from Mr. J. M. Patterson. All samples were packaged and labelled for returning to Crowflight Minerals.

Best regards,

[redacted]

Roch Marion, B.Sc., C.Chem.
Assistant Manager, Analytical Services

[redacted]

Cuong Trang, M.A.Sc.
Metallurgist

LAKEFIELD RESEARCH LIMITED

Postal Bag 4300, 185 Concession St., Lakefield, Ontario, KOL 2HO
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Hydromet

Lakefield, March 31, 1999

Attn : C.Trang/L.P.

Date Rec. : March 26, 1999
LR. Ref. : **MAR1232.R99**
Reference : Crowflight Minerals Inc
Project : 4424-104

CERTIFICATE OF ANALYSIS

No.	Sample ID	Au g/t
1	CFL-99-2	< 0.02
2	CFL-99-2 Duplicate 1	0.20
3	CFL-99-2 Duplicate 2	< 0.02
4	CFL-99-2 Duplicate 3	0.43
5	CFL-99-2 Duplicate 4	0.47
6	CFL-99-2 Duplicate 5	0.36
7	CFL-99-2 Duplicate 6	1.17
8	CFL-99-2 (B)	< 0.02
9	CFL-99-2 (B) Duplicate 1	< 0.02
10	CFL-99-2 (B) Duplicate 2	0.12
11	CFL-99-2 (B) Duplicate 3	0.24

Sample CML-99-2 is a split of the original sample, pulverized and assayed seven times by fire assay.

Sample CML-99-2 (B) is a second split of the sample, unpulverized (coarse pieces were broken up by hand) and assayed four times by fire assay.

The wide variation in analyses is probably due to coarse gold in the sample.

[redacted]

Roch Marion, B.Sc., C.Chem.
Assistant Manager, Analytical Services

A MEMBER OF IAETL CANADA
Accredited by the Standards Council of Canada in partnership with CAEAL to the ISO/IEC Guide 25 standard for specific registered tests.
The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior written approval

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Hydromet

Attn : C.Trang/L.P.

Lakefield, March 31, 1999

Date Rec. : March 31, 1999
LR. Ref. : **MAR1287.R99**
Reference : Crowflight Minerals Inc
Project : 4424-104

CERTIFICATE OF ANALYSIS

Additional De-Floc Test

No.	Sample ID	Sample Wgt / Vol	Au g/t	Au mg/L
1	Flot Fraction	298g	< 0.02	--
2	Flot Fraction Filtrate	1.2L	--	< 0.02

[redacted]

Roch Marion, B.Sc., C.Chem.
Assistant Manager, Analytical Services

A MEMBER OF IAETL CANADA
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Project 4424-104

Bottle Roll Cyanidation Tests on Sample CFL99-2 - Experimental Conditions

Test	Feed Sample Preparation	Mass of Feed Used g	Pre-Treatment Method	Leach Method	Leach Pulp Den-sity %	pH	NaCN Conc. g/L	Leach Reten-tion Time h	CIP Reten-tion Time h	Mass of Carbon Used g
7	Prepared to -28 mesh	500	None	Carbon-in-Leach	40	~11	1.0	24	-	20
8	Prepared to -28 mesh	500	None	Carbon-in-Pulp	40	~11	1.0	24	6	20
9	Prepared to -28 mesh	500	Roasted at 750°C for 6 h	Carbon-in-Leach	40	~11	1.0	24	-	20
10	Prepared to -28 mesh	500	Roasted at 750°C for 6 h	Carbon-in-Pulp	40	~11	1.0	24	6	20
11	Used as received	500	De-Flocculated to remove float materials	Carbon-in-Leach	~40	~11	1.0	24	-	10
12	Used as received	500	De-Flocculated to remove float materials	Carbon-in-Pulp	~40	~11	1.0	24	6	10

Project 4424-104

Bottle Roll Cyanidation Tests on Sample CFL99-2 - Experimental Results

Test	Mass (g)				Mass of Loaded Carbon g	NaCN				CaO				Au in Float Fraction g/t	Au in Float Fract. Filtr. mg/L	Au on Loaded Carbon g/t	Au in Leach Residue g/t	Gold Recovery (%)				Calc. Au in Origi. Feed g/t
	Origi. Feed	Float Fraction	Leach Feed	Leach Residue		kg/t Leach Feed		kg/t Orig. Feed		kg/t Leach Feed		kg/t Orig. Feed						in Float Fraction	in Float Filtrate	by Cyanide Leach	Total	
						Added	Consumed	Added	Consumed	Added	Consumed	Added	Consumed									
7	500	-	500	460	23.3	3.46	2.38	3.46	2.38	9.38	9.34	9.38	9.34	-	-	0.37	0.03	-	-	60.8	60.8	0.07
8	500	-	500	463	21.6	3.57	2.37	3.57	2.37	9.70	9.64	9.70	9.64	-	-	0.47	0.02	-	-	72.6	72.6	0.07
9	500	-	390	385	21.2	1.73	0.86	1.35	0.67	1.11	0.98	0.87	0.77	-	-	0.19	0.05	-	-	43.0	43.0	0.07
10	500	-	390	380	21.1	1.73	0.42	1.35	0.33	0.84	0.79	0.65	0.62	-	-	0.25	0.03	-	-	58.0	58.0	0.05
11	500	352	~105	105	12.1	4.80	3.28	1.01	0.69	11.2	11.1	2.36	2.34	0.50	0.01	3.70	0.03	74.4	3.8	20.4	98.6	0.47
12	500	336	~134	134	10.4	4.85	3.51	1.30	0.94	10.2	9.94	2.73	2.66	0.19	0.01	1.67	0.07	61.3	8.5	21.2	91.0	0.21

Project 4424-104 **Test 7** Operator: LP March 24, 1999

Purpose: To conduct a bottle roll CIL cyanidation test on Sample CFL99-2.

Procedure: The ore sample (approximately 4.5 kg of nominal minus 10 mesh ore) was delivered by Mr. James Patterson of Crowflight Minerals Inc. on March 23, 1999. The sample was riffled into two halves. One half (H1) was dry screened at 28 mesh to break up the lumps. A large rubber stopper was used to break up the lumps. The oversize (<1% of the mass) was dry pulverized and then recombined with the fine fraction. The entire sample was mixed well and split into 500 g test charges.

The other half (H2) was riffled into 500 g test charges for deflocculation/leach tests (Tests 11 and 12).

A 500 g H1 test charge was pulped with water to 40% solids in a bottle. The pulp was adjusted to pH 11 with lime. Activated carbon (20 g of Calgon GRC-22, plus 20 mesh) was added. Leaching was carried out at 1 g/L NaCN for 24 hours on a roller.

Following leaching, the carbon was recovered on a 24 mesh screen. The pulp was filtered. The filter cake was washed with water. The filtrate and the wash were combined and all products were submitted for gold analysis.

Feed: 500 g of CFL99-2 sample (H1 test charge minus 28 mesh)

Solution Volume: 750 mL (40% solids) Activated Carbon: 20 g Calgon GRC-22 (+20 mesh)

pH: approx. 11 with lime Sol'n Composition: 1 g/L NaCN

Results:

Reagent Addition (kg/t of feed): NaCN: 3.46 CaO: 9.38

Reagent Consumption (kg/t of feed): NaCN: 2.38 CaO: 9.34

Lapsed Time (hr)	Added (g)				Residual (g)		Consumed (g)		pH
	Actual		Equivalent						
	NaCN 95%	Lime	NaCN	CaO	NaCN	CaO	NaCN	CaO	
0-2	0.79	4.09	0.75	3.11	0.08	-	0.67	-	10.9-10.5
2-4	0.71	1.10	0.67	0.84	0.60	-	0.15	-	11.1-10.1
4-7	0.16	0.51	0.15	0.39	0.60	-	0.15	-	11.0-10.4
7-24	0.16	0.47	0.15	0.36	0.54	0.02	0.21	4.67	11.1-10.4
Total	1.82	6.17	1.73	4.69	0.54	0.02	1.19	4.67	

Filtrate & wash vol: 1280 mL Cyanide Feed: 500 g

Product	Amount		Analysis Au mg/L, g/t	Distrib. Au %
CIL barren & wash	1280	mL	<0.01	36.3
Loaded carbon	23.3	g	0.37	24.5
Leach Residue	460	g	0.03	39.2
Head (calc.)	500	g	0.07	100.0

Cyanide Gold Extraction: 61 %

Project 4424-104 **Test 8** Operator: LP March 24, 1999

Purpose: To conduct a bottle roll CIP cyanidation test on Sample CFL99-2.

Procedure: A 500 g H1 test charge (prepared in Test 7) was pulped with water to 40% solids in a bottle. The pulp was adjusted to pH 11 with lime. Leaching was carried out at 1 g/L NaCN on a roller. After 24 hours of leaching, 20 g of Calgon GRC-22 (plus 20 mesh) was added. The bottle was rolled for an additional 6 hours to load the gold onto the carbon.

Following the test, the carbon was recovered on a 24 mesh screen. The pulp was filtered. The filter cake was washed with water. The filtrate and the wash were combined and all products were submitted for gold analysis.

Feed: 500 g of CFL99-2 sample (H1 test charge minus 28 mesh)

Solution Volume: 750 mL (40% solids) pH: approx. 11 with lime

Sol'n Composition: 1 g/L NaCN Activated Carbon: 20 g Calgon GRC-22 (+20 mesh)

Results:

Reagent Addition (kg/t of feed): NaCN: 3.57 CaO: 9.70

Reagent Consumption (kg/t of feed): NaCN: 2.37 CaO: 9.64

Lapsed Time (hr)	Added (g)				Residual (g)		Consumed (g)		pH
	Actual		Equivalent						
	NaCN 95%	Lime	NaCN	CaO	NaCN	CaO	NaCN	CaO	
Cyanidation									
0-2	0.79	4.10	0.75	3.12	0.08	-	0.71	-	10.8-9.5
2-4	0.81	1.00	0.77	0.76	0.71	-	0.04	-	10.9-10.0
4-7	0.04	0.69	0.04	0.52	0.67	-	0.08	-	11.1-10.5
7-24	0.08	0.38	0.08	0.29	0.60	-	0.15	-	11.0-10.5
Carbon-in-Pulp									
24-30	0.16	0.21	0.15	0.16	0.62	0.03	0.13	4.82	11.0-10.6
Total	1.88	6.38	1.78	4.85	0.60	0.03	1.18	4.82	

Filtrate & wash vol: 1440 mL Cyanide Feed: 500 g

Product	Amount		Analysis Au mg/L, g/t	Distrib. Au %
CIP barren & wash	1440	mL	<0.01	42.6
Loaded carbon	21.6	g	0.47	30.0
Leach Residue	463	g	0.02	27.4
Head (calc.)	500	g	0.07	100.0

Cyanide Gold Extraction: 73 %

Project 4424-104 **Test 9** Operator: LP March 24, 1999

Purpose: To conduct a bottle roll CIL cyanidation test on roasted Sample CFL99-2.

Procedure: A 500 g H1 test charge (prepared in Test 7) was roasted at 750°C in a muffle furnace for 6 hours. The roasted ore was air cooled and then pulped with water to 40% solids in a bottle. The pulp was adjusted to pH 11 with lime. Activated carbon (20 g of Calgon GRC-22, plus 20 mesh) was added. Leaching was carried out at 1 g/L NaCN for 24 hours on a roller.

Following leaching, the carbon was recovered on a 24 mesh screen. The pulp was filtered. The filter cake was washed with water. The filtrate and the wash were combined and all products were submitted for gold analysis.

Feed: 500 g of CFL99-2 sample (H1 testcharge minus 28 mesh) roasted at 750°C for 6 hours. Roasted ore was **390** g

Solution Volume: mL (40% solids) Activated Carbon: 20 g Calgon GRC-22 (+20 mesh)

pH: approx. 11 with lime Sol'n Composition: 1 g/L NaCN

Results:

Reagent Addition: kg/t leach feed NaCN: 1.73 CaO: 1.11
kg/t original feed NaCN: 1.35 CaO: 0.87

Reagent Consumption: kg/t leach feed NaCN: 0.86 CaO: 0.98
kg/t original feed NaCN: 0.67 CaO: 0.77

Lapsed Time (hr)	Added (g)				Residual (g)		Consumed (g)		pH
	Actual		Equivalent						
	NaCN 95%	Lime	NaCN	CaO	NaCN	CaO	NaCN	CaO	
0-2	0.62	0.50	0.59	0.38	0.56	-	0.03	-	12.2-11.3
2-4	0.03	0.00	0.03	0.00	0.53	-	0.06	-	11.3-11.0
4-7	0.06	0.00	0.06	0.00	0.59	-	0.00	-	11.0-10.8
7-24	0.00	0.07	0.00	0.05	0.34	0.05	0.25	0.38	11.1-10.9
Total	0.71	0.57	0.67	0.43	0.34	0.05	0.33	0.38	

Filtrate & wash vol: 1050 mL Feed (before roasting): 500 g
Feed to leach (roasted ore): 390 g

Product	Amount		Analysis Au mg/L, g/t	Distrib. Au %
CIL barren & wash	1050	mL	<0.01	31.1
Loaded carbon	21.2	g	0.19	11.9
Leach Residue	385	g	0.05	57.0
Head (calc.)	500	g	0.07	100.0

Cyanide Gold Extraction: 43 %

Project 4424-104 **Test 10** Operator: LP March 24, 1999

Purpose: To conduct a bottle roll CIP cyanidation test on roasted Sample CFL99-2.

Procedure: A 500 g H1 test charge (prepared in Test 7) was roasted at 750°C in a muffle furnace for 6 hours. The roasted ore was air cooled and then pulped with water to 40% solids in a bottle. The pulp was adjusted to pH 11 with lime. Leaching was carried out at 1 g/L NaCN on a roller. After 24 hours of leaching, 20 g of Calgon GRC-22 (plus 20 mesh) was added. The bottle was rolled for an additional 6 hours to load the gold onto the carbon.

Following the test, the carbon was recovered on a 24 mesh screen. The pulp was filtered. The filter cake was washed with water. The filtrate and the wash were combined and all products were submitted for gold analysis.

Feed: 500 g of CFL99-2 sample (H1 test charge minus 28 mesh) roasted at 750°C for 6 hours. Roasted ore was **390** g

Solution Volume: mL (40% solids) pH: approx. 11 with lime

Sol'n Composition: 1 g/L NaCN Activated Carbon: 20 g Calgon GRC-22 (+20 mesh)

Results:

Reagent Addition: kg/t leach feed NaCN: 1.73 CaO: 0.84
kg/t original feed NaCN: 1.35 CaO: 0.65

Reagent Consumption: kg/t leach feed NaCN: 0.42 CaO: 0.79
kg/t original feed NaCN: 0.33 CaO: 0.62

Lapsed Time (hr)	Added (g)				Residual (g)		Consumed (g)		pH
	Actual		Equivalent						
	NaCN 95%	Lime	NaCN	CaO	NaCN	CaO	NaCN	CaO	
Cyanidation									
0-2	0.62	0.25	0.59	0.19	0.56	-	0.03	-	11.6-10.7
2-4	0.03	0.10	0.03	0.08	0.59	-	0.00	-	11.2-10.9
4-7	0.00	0.00	0.00	0.00	0.53	-	0.06	-	10.9-11.0
7-24	0.06	0.00	0.06	0.00	0.59	-	0.00	-	11.0-10.7
Carbon-in-Pulp									
24-30	0.00	0.08	0.00	0.06	0.51	0.02	0.08	0.31	11.3-10.7
Total	0.71	0.43	0.67	0.33	0.51	0.02	0.16	0.31	

Filtrate & wash vol: 1050 mL Feed (before roasting): 500 g
Feed to leach (roasted ore): 390 g

Product	Amount		Analysis Au mg/L, g/t	Distrib. Au %
CIP barren & wash	1050	mL	<0.01	38.6
Loaded carbon	21.1	g	0.25	19.4
Leach Residue	380	g	0.03	42.0
Head (calc.)	500	g	0.05	100.0

Cyanide Gold Extraction: 58 %

Project 4424-104 Test 11 Operator: LP March 24, 1999

Purpose: To conduct a bottle roll CIL cyanidation test on deflocculated Sample CFL99-2.

Procedure: A 10% w/w deflocculant solution was prepared by dissolving 20 g of A-15 reagent in 180 g of water. The reagent and treatment procedure were provided by Crowflight Minerals Inc. (Memo from Mr. Jim Brady to Roch Marion on March 3, 1999.) A 500 g H2 test charge (prepared as described in Test 7) was pulped with 1000 g of water in a 2 L kettle. The pulp was mixed with a Caframo mixer. After approximately 1 hour of mixing, it was observed that the coarse pieces did not break up. The deflocculant (50 g of 10% solution) was added and the mixing continued. After 15 minutes, the pulp was passed through a 28-mesh sieve to break up all the lumps. This was to facilitate the recovery of loaded carbon from leaching of the sink fraction following deflocculation.

The pulp was mixed for about 10 minutes. More water was added. The agitator was turned off and the pulp was allowed to settled for approximately 20 minutes. The slime was decanted and filtered. The filter cake was submitted for gold whole sample assay. The filtrate was also analyzed for gold.

The pulp in the kettle (the sink fraction) was adjusted with water to 40% solids in a bottle. The pulp was adjusted to pH 11 with lime. Activated carbon (10 g of Calgon GRC-22, plus 20 mesh) was added. Leaching was carried out at 1 g/L NaCN for 24 hours.

Following leaching, the carbon was recovered on a 24 mesh screen. The pulp was filtered. The filter cake was washed with water. The filtrate and the wash were combined and all products were submitted for gold analysis.

Feed: 500 g Sample CFL99-2 (H2 test charge) treated with A-15 deflocculant. The sink fraction was leached.

Solution Volume: ~224 mL (~40% solids) Activated Carbon: 10 g Calgon GRC-22 (+20 mesh)

pH: approx. 11 with lime Sol'n Composition: 1 g/L NaCN

Results:

Reagent Addition: kg/t leach feed NaCN: 4.80 CaO: 11.2
kg/t original feed NaCN: 1.01 CaO: 2.36

Reagent Consumption: kg/t leach feed NaCN: 3.28 CaO: 11.1
kg/t original feed NaCN: 0.69 CaO: 2.34

Lapsed Time (hr)	Added (g)				Residual (g)		Consumed (g)		pH
	Actual		Equivalent						
	NaCN 95%	Lime	NaCN	CaO	NaCN	CaO	NaCN	CaO	
0-2	0.23	0.68	0.22	0.52	0.01	-	0.21	-	11.1-9.3
2-4	0.22	0.47	0.21	0.36	0.16	-	0.06	-	11.2-10.4
4-7	0.06	0.22	0.06	0.17	0.20	-	0.02	-	11.5-10.8
7-24	0.02	0.18	0.02	0.14	0.16	0.01	0.06	1.17	11.3-10.7
Total	0.53	1.55	0.50	1.18	0.16	0.01	0.34	1.17	

Filtrate & wash vol: 360 mL Feed to deflocculation: 500 g
Feed to leach (sink fraction): 105 g (approx.)

Product	Amount		Analysis Au mg/L, g/t	Distrib. Au %
Float fraction	352	g	0.50	74.4
Float filtrate	895	mL	0.01	3.8
CIL barren & wash	360	mL	<0.01	1.5
Loaded carbon	12.1	g	3.70	18.9
Leach Residue	105	g	0.03	1.3
Head (calc.)	500	g	0.47	100.0

Cyanide Gold Extraction: 20 %

Project 4424-104 Test 12 Operator: LP March 24, 1999

Purpose: To conduct a bottle roll CIP cyanidation test on deflocculated Sample CFL99-2.

Procedure: A 500 g H2 test charge (prepared as described in Test 7) was deflocculated using the same procedure as described in Test 11.

The treated pulp in the kettle was repulped with water to 40% solids in a bottle. The pulp was adjusted to pH 11 with lime. Leaching was carried out at 1 g/L NaCN on a roller. After 24 hours of leaching, 10 g of Calgon GRC-22 (plus 20 mesh) was added. The bottle was rolled for an additional 6 hours to load the gold onto the carbon.

Following the test, the carbon was recovered on a 24 mesh screen. The pulp was filtered. The filter cake was washed with water. The filtrate and the wash were combined and all products were submitted for gold analysis.

Feed: 500 g Sample CFL99-2 (H2 test charge)
After treatment with A-15 deflocculant, the sink fraction was leached.

Solution Volume: ~246 mL (~40% solids) pH: approx. 11 with lime

Sol'n Composition: 1 g/L NaCN Activated Carbon: 10 g Calgon GRC-22 (+20 mesh)

Results:

Reagent Addition: kg/t leach feed NaCN: 4.85 CaO: 10.2
kg/t original feed NaCN: 1.30 CaO: 2.73

Reagent Consumption: kg/t leach feed NaCN: 3.51 CaO: 9.94
kg/t original feed NaCN: 0.94 CaO: 2.66

Lapsed Time (hr)	Added (g) Actual NaCN 95%	Added (g) Actual Lime	Added (g) Equivalent NaCN	Added (g) Equivalent CaO	Residual (g) NaCN	Residual (g) CaO	Consumed (g) NaCN	Consumed (g) CaO	pH
Cyanidation									
0-2	0.26	0.69	0.25	0.52	0.02	-	0.23	-	10.9-9.1
2-4	0.24	0.47	0.23	0.36	0.17	-	0.08	-	11.0-10.1
4-7	0.08	0.20	0.08	0.15	0.22	-	0.03	-	11.1-10.2
7-24	0.03	0.21	0.03	0.16	0.18	-	0.07	-	11.3-10.2
Carbon-in-Pulp									
24-30	0.07	0.22	0.07	0.17	0.21	0.03	0.04	1.33	11.4-10.8
Total	0.68	1.79	0.65	1.36	0.18	0.03	0.47	1.33	

Filtrate & wash vol: 470 mL Feed to deflocculation: 500 g
Feed to leach (sink fraction): 134 g (approx.)

Product	Amount		Analysis Au mg/L, g/t	Distrib. Au %
Float fraction	336	g	0.19	61.3
Float filtrate	880	mL	0.01	8.5
CIP barren & wash	470	mL	<0.01	4.5
Loaded carbon	10.4	g	1.67	16.7
Leach Residue	134	g	0.07	9.0
Head (calc.)	500	g	0.21	100.0

Cyanide Gold Extraction: 21 %

LakefieldResearch

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FAX

Date:	April 30, 1999	**Page(s):**	9 (including cover sheet)
To:	**Mr. R. von Guttenberg**	**Fax:**	**416-367-3638**
Company:	Strathcona Mineral Services Limited	**Telephone:**	416-869-0772
From:	Roch Marion, Cuong Trang		
Re:	**Testwork Report - Strathcona's Project 2005-3**		

Samples:

Three ore samples (1 kg of SMS-201, 0.5 kg of SMS-202 and 0.5 kg of SMS-203) and one plastic bag of A-15 reagent were received at Lakefield in two shipments and were given reference numbers LR9901066 (04/16/1999) and LR9901080 (04/19/1999).

Experimental Procedure:

The procedure for conducting the experiments was provided by Mr. R. von Guttenberg in a letter to Roch Marion of Lakefield Research dated April 16, 1999.

Sample SMS-201 was riffled into 2 halves (SMS-201A and SMS-201B). Samples SMS-201A, SMS-201B and SMS-202 were deflocculated with A-15 reagent, using the procedure supplied by Mr. Jim Brady of Crowflight Minerals Inc. in a fax to Roch Marion of Lakefield dated March 3rd, 1999. The slimes fraction (float fraction) from each deflocculation test was filtered, and the filter cake was dried. The whole dry cake (including filter paper) was fire assayed in 30-g portions. The fire assay slags were saved for possible future analysis. The beads were combined for dissolution in aqua regia for gold analysis by AAS.

April 30, 1999

Each deflocculated material (sink fraction) was transferred to a 2.5-L bottle for cyanidation using the CIL method. CIL leaching was conducted at 40% solids, pH 10.5-11, 1 g/L NaCN and 10 g of Calgon GRC-22 activated carbon on a roller for 24 hours.

Following leaching, the loaded carbon, the combined filtrate (barren) and wash solution, and the leach residue were analyzed for gold. As for the slimes, the leach residue was assayed by multiple 30-g fire assays to extinction. All dry sample weights were recorded throughout the test. The reagent consumptions and gold mass balance were calculated.

Sample SMS-202 was dry screened at 28 mesh. The two size fractions were weighed. The +28 mesh fraction was dry pulverized and recombined with the –28 mesh fraction for CIL leaching using the same procedure as described above for the deflocculated samples. The only exception was that the amount of activated carbon was doubled to 20 g to compensate for the increase in the mass of the leach feed.

The gold content of the A-15 reagent used in the testwork was determined by fire assaying five 10-g portions of this reagent sample.

Results:

A summary of the experimental conditions and results and the details of the experiments are attached.

The A-15 reagent used in deflocculation of ore samples were fire assayed in five 10-g portions and found to contain <0.02 g/t Au.

Approximately one third of the SMS-201A and SMS-201B samples and almost half of the SMS-202 sample reported to the sink fraction following de-flocculation (Tests 1, 2 and 3). There was very little gold in the slimes fractions of samples SMS-201A and SMS-201B. The slimes fraction of sample SMS-202 contained 0.37 g/t Au. The filtrates from filtration of these slimes fractions contained <0.01 mg/L Au. Owing to the low feed grades and the fairly large volumes of the filtrates, these solutions might account for up to 14% and 18% of gold in samples SMS-201A and B, respectively, and 4% of gold in sample SMS-202.

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Cyanide consumption during leaching of the sink fractions of samples SMS-201A and SMS-201B was approximately 2.6 kg NaCN per tonne of CIL feed (equivalent to 0.9 kg/t original feed to deflocculation). The corresponding NaCN consumption for CIL leaching of the sink fraction of Sample SMS-202 was 1.6 kg/t (equivalent to 0.7 kg/t original feed to deflocculation).

The CIL residues assayed 0.19 g/t Au for Test 1 (sink fraction of sample SMS-201A), 0.09 g/t Au for Test 2 (sink fraction of SMS-201B), 0.21 g/t Au for Test 3 (sink fraction of sample SMS-202), and 0.02 g/t Au for Test 4 (sample SMS-203).

The calculated gold head grades were no more than 0.1 g/t for both samples SMS-201A and SMS-201B, 0.5 g/t for sample SMS-202, and 0.05 g/t Au for sample SMS-203.

Best regards,

[redacted]

Roch Marion, B.Sc., C.Chem.
Assistant Manager, Analytical Services

[redacted]

Cuong Trang, M.A.Sc.

Project 4424-105

Cyanidation Testwork on Strathcona's Project 2005-3 Samples - Experimental Conditions

Test	Feed Sample Preparation	Mass of Feed Used g	Pre-Treatment Method	Leach Method	Leach Pulp Density %	pH	NaCN Conc. g/L	Leach Retention Time h	Mass of Carbon Used g
1	Half of SMS-201, used as received	503	De-flocculated with A-15 reagent to remove slimes	CIL	40	10.5-11	1.0	24	10
2	Half of SMS-201, used as received	503	De-flocculated with A-15 reagent to remove slimes	CIL	40	10.5-11	1.0	24	10
3	SMS-202, used as received	499	De-flocculated with A-15 reagent to remove slimes	CIL	40	10.5-11	1.0	24	10
4	SMS-203, screened at 28#, pulverized O/S to -28#	513	None	CIL	40	10.5-11	1.0	24	20

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Cyanidation Testwork on Strathcona's Project 2005-3 Samples - Experimental Results

Test	Mass (g)				Mass of	NaCN				CaO				Au in	Au in	Au on	Au in	Gold Recovery (%)				Calc.
	Origi. Feed	Float Fraction	Calc. CIL Feed	Leach Residue	Loaded Carbon g	kg/t Leach Feed		kg/t Orig. Feed		kg/t Leach Feed		kg/t Orig. Feed		Float Fraction g/t	Float Fract. Filtr.* mg/L	Loaded Carbon g/t	Leach Residue g/t	in Float Fraction	in Float Filtrate	by Cyanide Leach	Total	Au in Origi. Feed g/t
						Added	Consumed	Added	Consumed	Added	Consumed	Added	Consumed									
1	503	339	164	157	10.0	4.05	2.59	1.32	0.84	7.92	7.73	2.58	2.52	<0.02	<0.01	0.02	0.19	<13	<14	<15	42	<0.10
2	503	320	183	183	11.0	4.15	2.70	1.51	0.98	7.64	7.51	2.78	2.73	0.03	<0.01	0.02	0.09	23	<18	<20	41	<0.08
3	499	283	216	204	11.1	2.77	1.59	1.20	0.69	7.67	7.45	3.32	3.23	0.37	<0.01	6.88	0.21	43	<4	36	83	<0.49
4	513	-	513	513	22.0	3.63	2.56	3.63	2.56	8.50	8.43	8.50	8.43	-	-	0.11	0.02	-	-	62	62	0.05

* The A-15 reagent used in deflocculation was fire assayed in 5 x 10 g portions and found <0.02 g/t Au.

Project 4424-105 Test 1 Operator: EM April 20, 1999

Purpose: To conduct a bottle roll CIL cyanidation test on deflocculated Sample SMS-201A.

Procedure: The SMS-201 sample (1007 g) was split into 2 x 503 g test charges for defocculation. A 10% deflocculant solution was prepared by dissolving 20 g A-15 reagent in 180 g of water. The reagent and treatment procedure were provided by Crowflight Minerals Inc. (Memo from Mr. Jim Braddy to Roch Marion on March 3, 1999.) One SMS-201 test charge (SMS-201A) was pulped with 1006 g of water in a 2 L kettle. The pulp was mixed with a Caframo mixer overnight to break up the lumps. Deflocculant (50 g of 10% solution) was added and the mixing continued. After 30 minutes, additional water was added to facilitate the separation of the slime.

The agitator was turned off and the pulp was allowed to settled for approximately 20 minutes. The slime was decanted and filtered. The whole filter cake (including filter paper) was assayed for gold in multiple 30 g portions. The slags were saved. The beads were combined and dissolved with aqua regia for reading of Au on an AAS. The filtrate was also analyzed for gold.

The pulp in the kettle (the sink fraction) was adjusted with water to 40% solids in a bottle. The pulp was adjusted to pH 11 with lime. Activated carbon (10 g of Calgon GRC-22, plus 20 mesh) was added. Leaching was carried out at 1 g/L NaCN for 24 hours.

Following leaching, the carbon was recovered on a 24 mesh screen. The pulp was filtered. The filter cake was washed with water. The filtrate and the wash were combined for gold analysis. The whole filter cake (residue) was assayed for gold using the same procedure as for the slime Carbon was submitted for gold analysis.

Feed: 503 g Sample SMS-201A treated with A-15 deflocculant. The sink fraction was leached.

Solution Volume: 330 mL (~40% solids) Activated Carbon: 10 g Calgon GRC-22 (+20 mesh)

pH: Approx. 11 with lime Sol'n Composition: 1 g/L NaCN

Results:

Reagent Addition: kg/t leach feed NaCN: 4.05 CaO: 7.92
kg/t original feed NaCN: 1.32 CaO: 2.58

Reagent Consumption: kg/t leach feed NaCN: 2.59 CaO: 7.73
kg/t original feed NaCN: 0.84 CaO: 2.52

Lapsed Time	Added (g)				Residual (g)		Consumed (g)		pH
	Actual		Equivalent						
(hr)	NaCN 95%	Lime	NaCN	CaO	NaCN	CaO	NaCN	CaO	
0-2	0.35	0.70	0.33	0.53	0.07	-	0.26	-	11.0-9.6
2-4	0.28	0.48	0.27	0.36	0.30	-	0.04	-	11.0-10.2
4-7	0.05	0.27	0.05	0.21	0.33	-	0.02	-	11.0-10.5
7-24	0.02	0.26	0.02	0.20	0.24	0.03	0.11		11.0-10.5
Total	0.70	1.71	0.67	1.30	0.24	0.03	0.43	1.27	

Filtrate & wash vol: 800 mL Feed to deflocculation: 503 g
Feed to leach (sink fraction): 164 g (calculated)

Product	Amount		Analysis Au mg/L, g/t	Distrib. Au %
Float fraction	339	g	<0.02	<13.0
Float filtrate	750	mL	<0.01	<14.3
CIL barren & wash	800	mL	<0.01	<15.3
Loaded carbon	10.0	g	0.02	0.4
Leach Residue	157	g	0.19	57.0
Head (calc.)	503	g	<0.10	100.0

40 mil of solution, 10 mils

0.06

Cyanide Gold Extraction: approx. 16 % Note: The A-15 reagent was fire assayed in 5 x 10 g portions and found <0.02 g/t Au.

Project 4424-105 Test 2 Operator: EM April 20, 1999

Purpose: To conduct a bottle roll CIL cyanidation test on deflocculated Sample SMS-201B.

Procedure: The SMS-201B test charge prepared as described in Test 1 was deflocculated using the same procedure of Test 1. The slime fraction was assayed for gold as decribed in Test 1.

The sink fraction was adjusted with water to 40% solids in a bottle. The pulp was adjusted to pH 11 with lime. Activated carbon (10 g of Calgon GRC-22, plus 20 mesh) was added. Leaching was carried out at 1 g/L NaCN for 24 hours.

Following leaching, the carbon was recovered on a 24 mesh screen. The pulp was filtered. The filter cake was washed with water. The filtrate and the wash were combined for gold analysis. The whole filter cake (residue) was assayed for gold using the same procedure as for the slime

Feed: 503 g Sample SMS-201B treated with A-15 deflocculant. The sink fraction was leached.

Solution Volume: 368 mL (~40% solids) Activated Carbon: 10 g Calgon GRC-22 (+20 mesh)

pH: approx. 11 with lime Sol'n Composition: 1 g/L NaCN

Results:

Reagent Addition: kg/t leach feed NaCN: 4.15 CaO: 7.64
kg/t original feed NaCN: 1.51 CaO: 2.78

Reagent Consumption: kg/t leach feed NaCN: 2.70 CaO: 7.51
kg/t original feed NaCN: 0.98 CaO: 2.73

Lapsed Time (hr)	Added (g)				Residual (g)		Consumed (g)		pH
	Actual		Equivalent						
	NaCN 95%	Lime	NaCN	CaO	NaCN	CaO	NaCN	CaO	
0-2	0.39	1.02	0.37	0.78	0.07	-	0.30	-	11.1-9.7
2-4	0.32	0.48	0.30	0.36	0.33	-	0.04	-	11.0-10.4
4-7	0.07	0.24	0.07	0.18	0.37	-	0.03	-	11.0-10.7
7-24	0.02	0.10	0.02	0.08	0.27	0.02	0.12		11.0-10.5
Total	0.80	1.84	0.76	1.40	0.27	0.02	0.49	1.38	

Filtrate & wash vol: 830 mL Feed to deflocculation: 503 g
Feed to leach (sink fraction): 183 g (calculated)

Product	Amount		Analysis Au mg/L, g/t	Distrib. Au %
Float fraction	320	g	0.03	22.9
Float filtrate	740	mL	<0.01	<17.6
CIL barren & wash	830	mL	<0.01	<19.8
Loaded carbon	11.0	g	0.02	0.5
Leach Residue	183	g	0.09	39.2
Head (calc.)	503	g	<0.08	100.0

0.03

Cyanide Gold Extraction: approx. 20 %

Project 4424-105 Test 3 Operator: EM April 20, 1999

Purpose: To conduct a bottle roll CIL cyanidation test on deflocculated Sample SMS-202.

Procedure: The SMS-202 sample (499 g) was deflocculated using the same procedure of Test 1. The slime fraction was assayed for gold as decribed in Test 1.

The sink fraction was adjusted with water to 40% solids in a bottle. The pulp was adjusted to pH 11 with lime. Activated carbon (10 g of Calgon GRC-22, plus 20 mesh) was added. Leaching was carried out at 1 g/L NaCN for 24 hours.

Following leaching, the carbon was recovered on a 24 mesh screen. The pulp was filtered. The filter cake was washed with water. The filtrate and the wash were combined for gold analysis. The whole filter cake (residue) was assayed for gold using the same procedure as for the slime

Feed: 499 g Sample SMS-202 treated with A-15 deflocculant. The sink fraction was leached.

Solution Volume: 320 mL (~40% solids) Activated Carbon: 10 g Calgon GRC-22 (+20 mesh)

pH: approx. 11 with lime Sol'n Composition: 1 g/L NaCN

Results:

Reagent Addition: kg/t leach feed NaCN: 2.77 CaO: 7.67
kg/t original feed NaCN: 1.20 CaO: 3.32

Reagent Consumption: kg/t leach feed NaCN: 1.59 CaO: 7.45
kg/t original feed NaCN: 0.69 CaO: 3.23

Lapsed Time	Added (g)				Residual (g)		Consumed (g)		pH
	Actual		Equivalent						
(hr)	NaCN 95%	Lime	NaCN	CaO	NaCN	CaO	NaCN	CaO	
0-2	0.34	0.84	0.32	0.64	0.10	-	0.22	-	11.0-9.3
2-4	0.24	0.66	0.23	0.50	0.29	-	0.04	-	11.0-10.3
4-7	0.05	0.68	0.05	0.52	0.32	-	0.02	-	11.3-11.0
7-24	0.02				0.25	0.05	0.07		11.1-10.6
Total	0.65	2.18	0.60	1.66	0.25	0.05	0.34	1.61	

Filtrate & wash vol: 1060 mL Feed to deflocculation: 499 g
Feed to leach (sink fraction): 216 g (calculated)

Product	Amount		Analysis Au mg/L, g/t	Distrib. Au %
Float fraction	283	g	0.37	42.9
Float filtrate	960	mL	<0.01	<3.9
CIL barren & wash	1060	mL	<0.01	4.3
Loaded carbon	11.1	g	6.88	31.3
Leach Residue	204	g	0.21	17.5
Head (calc.)	499	g	<0.49	100.0

Cyanide Gold Extraction: 36 %

Project 4424-105 Test 4 Operator: EM April 20, 1999

Purpose: To conduct a bottle roll CIL cyanidation test on Sample SMS-203.

Procedure: The ore sample (approximately 500 g of nominal minus 10 mesh ore) was dry screened at 28 mesh to break up the lumps. The screen undersize fraction weighed 253 g. The oversize (260g) was dry pulverized and then recombined with the fine fraction. The entire sample was used in CIL testing.

The sample was pulped with water to 40% solids in a bottle. The pulp was adjusted to pH 11 with lime. Activated carbon (20 g of Calgon GRC-22, plus 20 mesh) was added. Leaching was carried out at 1 g/L NaCN for 24 hours on a roller.

Following leaching, the carbon was recovered on a 24 mesh screen. The pulp was filtered. The filter cake was washed with water. The filtrate and the wash were combined and analyzed for gold. The carbon was assayed for gold. The whole filter cake (including filter paper) was assayed for gold in multiple 30 g portions. The slags were saved. The beads were combined and dissolved with aqua regia for reading of Au on an AAS.

Feed: 513 g of SMS-203 sample (minus 28 mesh)

Solution Volume: 770 mL (40% solids) Activated Carbon: 20 g Calgon GRC-22 (+20 mesh)

pH: approx. 11 with lime Sol'n Composition: 1 g/L NaCN

Results:

Reagent Addition (kg/t of feed): NaCN: 3.63 CaO: 8.50

Reagent Consumption (kg/t of feed): NaCN: 2.56 CaO: 8.43

Lapsed Time (hr)	Added (g)				Residual (g)		Consumed (g)		pH
	Actual		Equivalent						
	NaCN 95%	Lime	NaCN	CaO	NaCN	CaO	NaCN	CaO	
0-2	0.81	3.94	0.77	2.99	0.12	-	0.65	-	11.0-9.5
2-4	0.69	0.71	0.66	0.54	0.39	-	0.39	-	11.0-10.0
4-7	0.42	0.67	0.40	0.51	0.77	-	0.02	-	11.0-10.4
7-24	0.04	0.42	0.04	0.32	0.55	0.04	0.26		11.0-10.5
Total	1.96	5.74	1.86	4.36	0.55	0.04	1.31	4.32	

Filtrate & wash vol: 1440 mL Cyanide Feed: 513 g

Product	Amount		Analysis Au mg/L, g/t	Distrib. Au %
CIL barren & wash	1440	mL	<0.01	53.2
Loaded carbon	22.0	g	0.11	8.9
Leach Residue	513	g	0.02	37.9
Head (calc.)	513	g	0.05	100.0

Cyanide Gold Extraction: 62 %

D4

Strathcona Mineral Services Limited

AUDIT OF DRILL CORE SAMPLES
NORTHEAST ALBERTA PROJECT
TINTINA MINES LIMITED
NSR RESOURCES INC.

June 1999
Toronto, Canada

Reinhard von Guttenberg
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Strathcona Mineral Services Limited
12th Floor, 20 Toronto Street, Toronto, Ontario, Canada M5C 2B8

July 15, 1999

Shahé F. Sabag
Tintina Mines Limited
Suite 218, 920 Yonge Street
Toronto, ON M4W 3C7

Dear Mr. Sabag:

Northeast Alberta Project

Enclosed is our report summarizing the audit work that we have carried out on the drill core samples from the Ashphalt and Buckton areas of your northeast Alberta property as well as our observations resulting from the audit program.

This was a very challenging assignment because of conflicting results from earlier work and because of the very low gold levels that were being measured in the assessment. However, there is little doubt with respect to the overall conclusion that while trace amounts of gold may be found in the Second White Specks Formation we foresee no possibilities for economic concentrations of gold in those portions of the property represented by the drill core samples which were analysed in our audit program.

Thank you for the opportunity to participate in this assignment and we would hope that our audit will assist in the assessment of the merits of other Tintina properties in the area.

Yours sincerely,



Reinhard von Guttenberg

GF:jm
Enc.

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SUMMARY

Strathcona Mineral Services Limited has been retained by Tintina Mines Limited to resolve discrepancies involving gold assays for samples from the Asphalt and Buckton properties of Tintina in northeastern Alberta. Core samples from the Second White Specks Formation, a carbonaceous, sulfide-bearing mudstone horizon, were assayed in 1997 by neutron activation analysis and fire assays, which on average resulted in values below 10 parts per billion (ppb) gold. Testwork by Crowflight Minerals Inc. on a composite of crushed core rejects in late-1998 included de-sliming of the sample and tabling of the de-slimed fraction, and returned high gold values from the table products, which indicated a head grade for the sample of 1.4 to 1.9 grams gold per tonne (g/t). The Strathcona assay audit objective was to attempt to establish the gold content of the Second White Specks Formation based on the available core samples, and critically assess the testwork done by Crowflight Minerals.

The Strathcona work was carried out in two phases and results can be summarized as follows:

- The Second White Specks Formation carries very low quantities of gold (< 10 to 70 ppb range), which can be concentrated together with base metals in heavy mineral concentrates, consisting primarily of framboidal pyrite and minor apatite, magnetite, garnet and biotite. These minerals, together with rounded quartz grains and fossil fragments occur mainly in clastic intercalations near the base of the Second White Specks Formation. Pyrite is found throughout the unit.

- Since no visible gold was detected under the microscope in the fine-grained heavy mineral concentrates, it is unknown whether gold is present as fine flakes or intergrown with other sulfides such as pyrite and arsenopyrite. If it occurs as liberated gold, it is most likely part of a Cretaceous paleoplacer assemblage. The base metal, barium and vanadium component of the euxinic-facies Second White Specks Formation is more typical of a sedex-type depositional environment, and probably reflects syngenetic, exhalative mineralization.

- Relatively large (30-130 microns) liberated gold grains found in table products of the Crowflight tests, show iron oxide rims under the microscope, and in one case, gold is stuck together with pyrite, magnetite and metallic iron. The rusting iron particles have a lamellar texture and contain chrome, nickel and

manganese and are possibly fragments of the drilling, crushing or other processing equipment. The oxide rims on liberated gold grains and the presence of one grain in a cluster of rusting iron particles, pyrite and magnetite, suggest that the gold is not a primary component of the rock tested. It may have been introduced inadvertently during processing, possibly from contaminated equipment.

- The Ateba Process used by Crowflight is very effective in deflocculating clay-rich samples, but has no influence on the detection of gold in assays (which has never been claimed by Ateba). Its only positive effect is that similar to heavy liquid mineral concentration, it will increase the relative levels of minerals and elements including free gold, or gold in sulfides, by removing the bulk of the sample - clay.

- The inclusion of standards in the Strathcona sample suites allowed the identification of inaccurate and poor quality assaying, which we received in the first phase from Chauncey and Loring, and in the second phase from Chauncey only.

- The theory has been advanced that in the processing of previous samples there were gold losses during pulverization due to smearing, and gold losses during fire assaying through incomplete collection in the lead button but this was not supported by the results from our audit program.

- While the above findings explain most of the results of the Crowflight testwork, there is no easy explanation for the results of their cyanide leach work at Lakefield, which indicated a small gold content (0.27 g/t) in a sample taken from 7AS02-old core sample after deflocculation and leaching but not in material that had not been deflocculated. These results could not be repeated in similar tests by Strathcona on the same material.

In conclusion, drill core samples of the Second White Specks Formation from the Asphalt and Buckton properties on which we have carried out our audit program contain overall very low levels of gold, which would have to be at least an order of magnitude higher to become interesting to encourage further exploration. A definite link between the gold panned from drainages on Tintina's properties and traces of gold

in the core could not be established since no visible gold was found in heavy liquid mineral concentrates. High gold values from the Crowflight testing result from a combination of problems, including possible contamination from assaying equipment in Sudbury and erratic assays from the Chauncey laboratory. Conflicting results from Crowflight and Strathcona at Lakefield on gold recovery by cyanide leaching of one sample remain unexplained but we do not consider this small difference to warrant further investigation given the overall insignificant gold content of the Second White Specks Formation.

INTRODUCTION

Strathcona Mineral Services Limited (Strathcona) was retained by Tintina Mines Limited (Tintina) in January 1999 to undertake an audit of drill core sample assays from the Northeast Alberta Project, a joint venture of Tintina and NSR Resources Inc. In 1997, Tintina had drilled six holes at the Buckton property and two holes at the Asphalt property, to test the Second White Specks Formation (2WS), an Upper-Cretaceous, sulphidic and carbonaceous mudstone horizon for its base metal and precious metal content. The 2WS varies in thickness from 18 to 26 metres at Buckton and is approximately 11 metres thick at Asphalt, and is, relative to overlying and underlying mudstones, enriched in base metals, vanadium and barium. Fire assaying and neutron activation assaying at Actlabs returned no significant gold values from drill core samples from this horizon (all less than 24 ppb, average 7 ppb). Some metallurgical test work at Actlabs and Ortech Corporation through Agra Monenco Inc., was subsequently commissioned by Tintina to evaluate possibilities for the extraction of base metals and vanadium. Results of this work were not encouraging and no further testing was planned.

In the fall of 1998, Crowflight Minerals Inc. (Crowflight) initiated some new metallurgical work on the material remaining from a composite sample of crushed core used for the Ortech tests. The work consisted of deflocculation of the sample using a patented process (Ateba Process) for de-sliming of rocks with a high clay content, followed by tabling of the deflocculated material. The resulting table products returned low to high gold values in fire assays at Chauncey Laboratories, Toronto and at Chemex, Mississauga. These assays, and gold grains identified under the microscope in some of the table products, caused Crowflight to request an assay audit by Strathcona in late-December 1998. However, it was subsequently decided by Tintina and Crowflight that the audit should be done on behalf of Tintina, the majority owner and operator of the project.

The first phase of the Strathcona work consisted of assaying of crushed core rejects received from Ortech, Mississauga and from Tintina's warehouse in Toronto, and of mineralogical studies on some of the products from the Crowflight work In Sudbury. Fire assays and neutron activation assays were done at Lakefield Research in Lakefield, Ontario, Activation Labs in Ancaster, Ontario, Chauncey Laboratories in Toronto and Loring Laboratories Ltd. in Calgary, and mineralogical and petrographical work with Petrologic Inc.

Tests in the next phase were done on the second half-core from two Tintina drill holes, which were retrieved by Strathcona from the provincial core storage in Edmonton. The work included more gold assaying by fire assay and neutron activation analysis at the laboratories used in the first phase and at Chemex, as well as heavy liquid separation of core samples and cyanide leaching of samples deflocculated with the Ateba Process at Lakefield Research along with further mineralogic work.

All of the Strathcona sample preparation and some of the assaying was done at Lakefield Research.

The reader should also bear in mind that all of the assaying associated with the Northeast Alberta project is attempting to measure gold content levels that are at or near the detection limit for gold and therefore any assays should only be considered as to their relative values and not for their absolute accuracy. It was not very long ago that assaying at the gold levels considered in this report could not have been contemplated.

NORTHEAST ALBERTA PROJECT

The Northeast Alberta Project, a ⅔-⅓ joint venture of Tintina and NSR, comprises five properties - Asphalt, Buckton, McIvor, Alice and Firebag - near Fort MacKay in northeastern Alberta, with a combined area of 1175 square kilometres, held under 16 metallic and industrial mineral permits (Figure 1). In addition, the joint venture owns a 19.4 square kilometre mineral lease at Fort MacKay, which is under option to Birch Mountain Resources Ltd. These land holdings date back to 1993, when the joint venture assembled 12 140 square kilometres in the area, which has since been reduced to the six properties mentioned above. Work carried out on the properties comprises geochemical surveys including sampling of lake sediments, stream sediments, soils and rocks, and hand trenching, airborne geophysical surveys, and diamond drilling of eight HQ-size holes with a combined length of 916 metres in 1997.

Alberta geology is dominated by young sediments rich in fossil fuel and industrial mineral deposits, and includes only a very small area of the Precambrian Canadian Shield, known for its abundance of ore deposits in neighbouring Northwest Territories

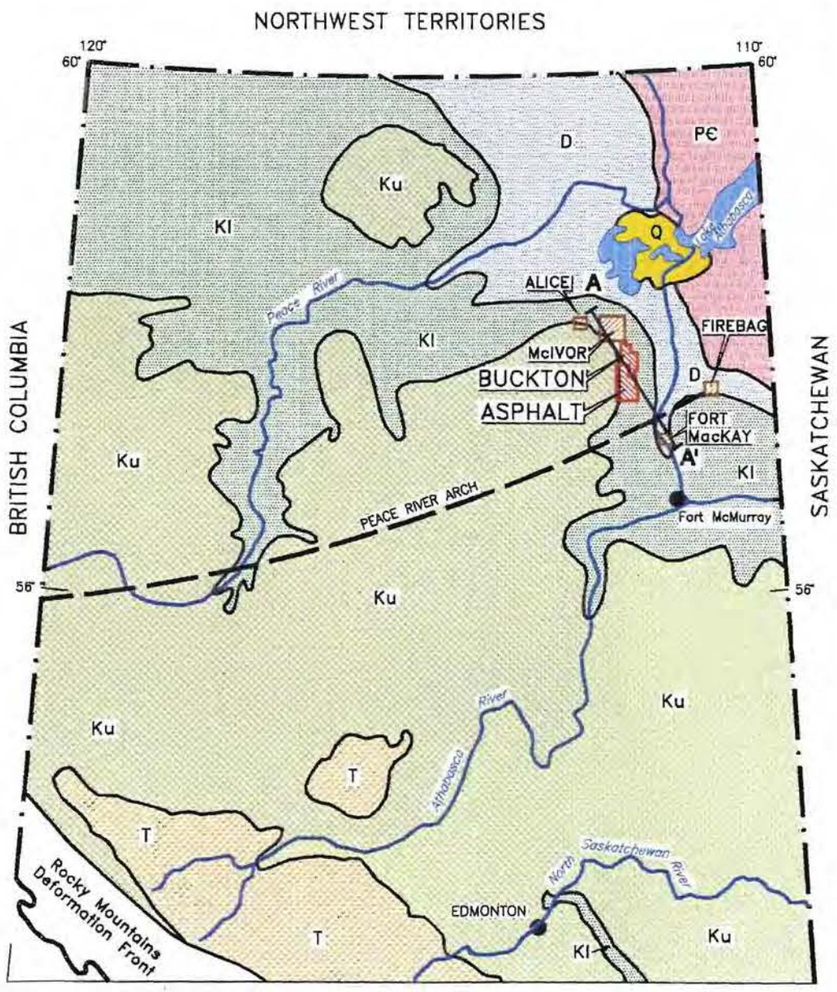
and Saskatchewan and elsewhere in Canada. The lack of Precambrian or other favourable host rocks for metallic mineral deposits has resulted in comparatively little work being directed into the search for these deposits. Northeastern Alberta was avoided by many exploration companies, after multi-ounce gold and platinum-group assays reported by U.S. laboratories in 1993 from samples of Devonian limestone from a property owned by Focal Resources could not be repeated by assaying at Canadian laboratories.

Since 1993, the Tintina-NSR joint venture and other junior companies active in the area, together with the Geological Survey of Canada and the Alberta Geological Survey, have advanced the knowledge of the geology of northeastern Alberta, through their work and joint research projects. The discovery of kimberlites has drawn the attention of diamond explorers to Alberta, and valuable information on the geology of northern Alberta is gained from their work.

Regional Geology

The properties of Tintina-NSR are situated near the eastern margin of the Western Canada Sedimentary Basin of north-central Alberta, close to the Peace River - Athabasca Arch, a southwest-northeast striking crustal-scale structural zone, which extends from the Rocky Mountains to northeast Alberta. Basin sediments on top of the Precambrian Shield pinch out to the east, and increase in thickness to the west, to about seven kilometres at the border with British Columbia. The following synopsis of the regional geology is based on publications by H.J. Abercrombie (1996), H.J. Abercrombie and R. Feng (1997), and on Tintina reports.

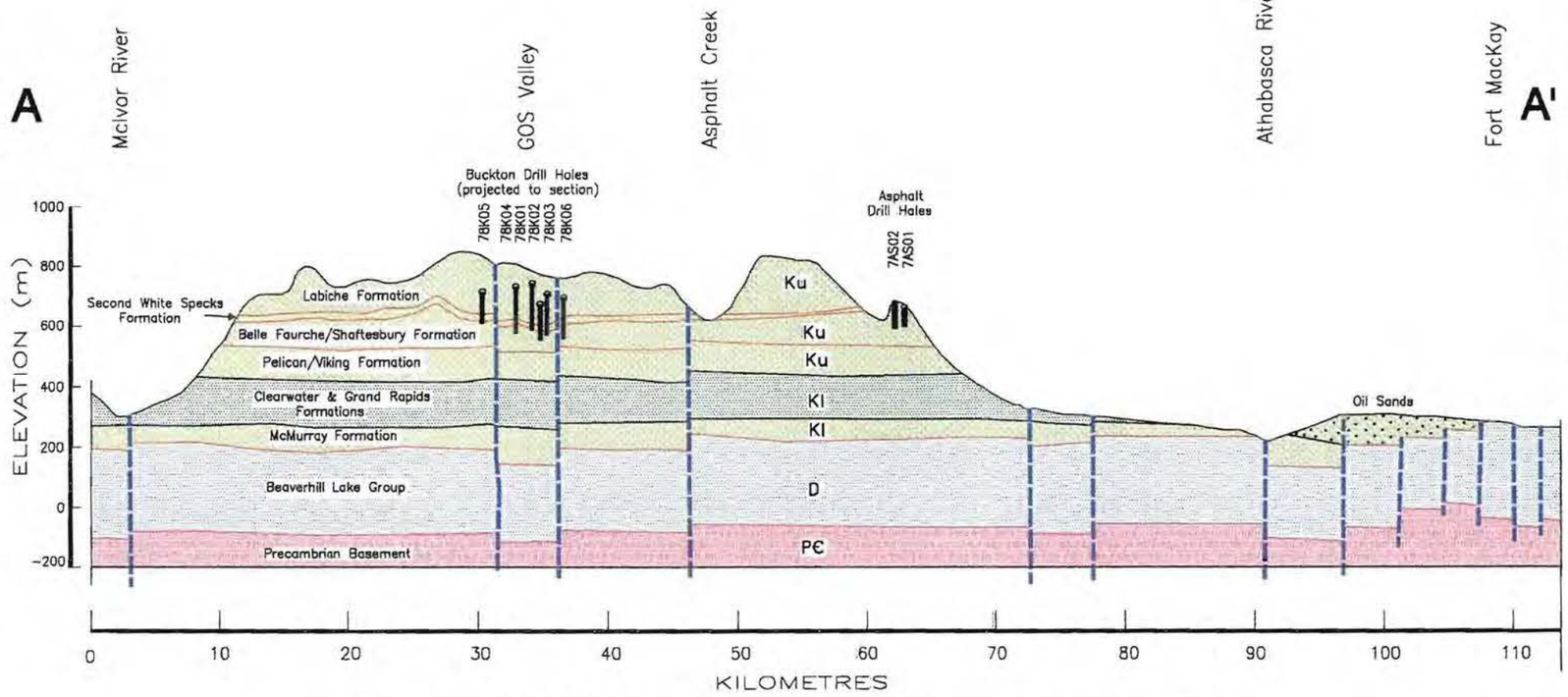
Precambrian basement granitoid gneisses in the Fort MacKay-Birch Mountain area are unconformably overlain by the Elk Point Group, a Lower to Middle Devonian red bed-evaporite-carbonate sequence. The Elk Point Group is succeeded by limestones, shales and minor evaporites of the Upper Devonian Beaverhill Lake Group, which is separated by an unconformity from siliciclastic sediments of the mid-Mesozoic-Tertiary Rocky Mountain foreland basin.



SCALE 1 : 5000000

0 100 200

KILOMETRES



Schematic North-South Section (looking east); Subsurface geology based on oil and gas drilling, and drilling by Tintina, Birch Mountain Resources Ltd. and others.

LEGEND

- Q — Quaternary
- T — Tertiary
- Ku — Upper Cretaceous
- Kl — Lower Cretaceous
- D — Devonian
- Pε — Precambrian
- Tintina–NSR Properties
- Unconformity
- Fault

CLIENT
TINTINA MINES LIMITED

PROJECT
NORTHEAST ALBERTA PROJECT

TITLE
PROPERTY LOCATION AND REGIONAL GEOLOGY

APPROVAL	DESIGN	DATE
R.v.G.	A.R.G.	June 1999

STRATHCONA MINERAL SERVICES LIMITED
TORONTO, ONTARIO, CANADA

PROJECT No.	File
2005–3	NEAlberta

Siliciclastic sediments of the Lower Cretaceous Mannville Group (McMurray, Clearwater, Grand Rapids Formations) are unconformably overlain by mudstones/shales of the Lower to Upper Cretaceous Colorado Group, which includes the Joli Fou, Pelican/Viking, Belle Fourche/Shaftesbury and Labiche formations. The Athabasca oil sand deposit at Fort MacKay is hosted by sandstones of the Lower Cretaceous McMurray Formation. The oil sands unconformably overly the uppermost unit of the Beaverhill Lake Group - the Waterways Formation - which consists of calcareous shale, argillaceous limestone and limestone.

The Second White Specks Formation (2WS) is an euxinic-facies mudstone horizon between the Labiche and Belle Fourche/Shaftesbury formations. It includes thin bentonitic beds, derived from volcanic ash, and siliciclastic units with rounded quartz grains and abundant fossil debris, mainly fish scales, teeth and bones. Based on fossil evidence, the 2WS is separated by time gaps of approximately one million years and five million years each from sediments above and below.

The Fish Scale Zone at the base of the Shaftesbury Formation is a basin-wide marine mass extinction marker with an age of about 95 million years. This age is contemporaneous with some of the volcanic activity between 100 and 85 million years, and the emplacement of kimberlites in Alberta and Northwest Territories.

The shallow westward dipping Precambrian and overlying sediments are cut by faults striking north-northwest and northeast, the best documented is the Sewetakun Fault, which is inferred to follow the Athabaska River valley between Fort McMurray and Fort MacKay. Salt dissolution of the Middle Devonian Prairie Formation locally has caused sink-holes and elongate fault-bounded depressions, and on a regional scale thickening of post-Elk Point strata over subbasins with salt removal.

The Devonian-Cretaceous sequence at the Asphalt and Buckton properties is approximately 600 to 800 metres thick, but the sequence is reduced to about 300 to 350 metres at Fort MacKay.

Exploration Targets

The Upper Cretaceous 2WS represents a black shale environment with anomalous metal concentrations attributed by Tintina to a local volcanic source, based on abundant intercalations of bentonitic material. Base metal, precious metal and vanadium mineralization hosted by sulphidic and carbonaceous 2WS mudstones, are the exploration target on the Asphalt, Buckton, McIvor and Alice properties, which are located in the Birch Mountains area. Gold has been panned from creeks and rivers in the larger area, including the Athabasca and McIvor, and from some local drainages on the Tintina properties, e.g., GOS creek, where gold is interpreted to have originated from outcrops of nearby 2WS.

The exploration target on Tintina's Firebag and Fort MacKay properties is precious and base metal enrichments in Upper Devonian carbonates. It is proposed by Abercrombie (1996) that gold-silver-copper enrichments in Devonian carbonates are the result of metals derived from basement rocks, which are carried by high-salinity, oxidized brines into zones of reducing conditions at stratigraphic redox boundaries and in zones of depressurization and cooling. The presence of hydrocarbons is viewed as a critical factor in the formation of this mineralization.

Geology - Asphalt and Buckton Properties

The Asphalt and Buckton properties are underlain by flat-lying Labiche shale, with exposures of 2WS and Belle Fourche/Shaftesbury Formations restricted to drainages, e.g., Pierre River, Asphalt Creek and GOS Creek. The 2WS intersected in Tintina drill holes, has a thickness of 11 metres at Asphalt and 18 to 26 metres at Buckton (drill holes 7AS01 and 7BK01 intersected only parts of the horizon). It is a flat-lying, laterally extensive, calcareous, sulphidic and carbonaceous dark grey mudstone, with volcanic (bentonite) and siliciclastic intercalations, and moderately anomalous concentrations of metals. At Buckton, several, up to 18-centimetre intervals of grey-blue bentonite occur mostly near the top of the unit, while siliciclastic horizons (bone bed, siliciclastic bone bed) consisting of fish debris - fish scales, teeth and bones - and rounded quartz grains, are found in two horizons near the base of the mudstone. A pyroclastic lag deposit is developed at the top of the unit. At Asphalt, bentonites

occur in the middle to bottom half of the interval. In contrast, the overlying and underlying Labiche and Shaftesbury shales are light to medium grey, non-calcareous and non-carbonaceous and frequently bioturbated.

Average geochemical sample assays for the 2WS and the overlying and underlying Labiche and Belle Fourche shales from drill core and outcrops at Asphalt and Buckton are listed in Table 1. Compared to the adjacent hanging wall and footwall shales, the 2WS is enriched in sulfur, organic carbon, calcium and very marginally in iron, and has lower concentrations of aluminum, potassium and sodium. All metals, with the exception of chromium, show generally higher levels in the 2WS, with averages (all approximately) for copper 80 ppm, zinc 300 ppm, arsenic 60 ppm, vanadium 700 ppm, uranium 35 ppm, and barium 1200 to 2200 ppm. Instrumental Neutron Activation Assaying (INAA) and Fire Assaying (FA) returned average gold values of 4 to 8 ppb. At Buckton, zinc, barium and arsenic are generally highest near the hanging wall contact of the 2WS, reaching maximum values of about 1000 ppm, 25 000 ppm and 500 ppm respectively over narrow intervals of less than 0.5 metres, while vanadium is somewhat increased near the centre of the unit with maximum values of about 1000 ppm. Only the second hole at Asphalt intersected the complete 2WS, with barium, vanadium and arsenic tending to be higher near the centre, while zinc is highest near the footwall, with values for the metals similar to Buckton. The highest copper values in the eight drill holes show a very narrow range of 106 to 126 ppm, and a highest gold value of 24 ppb was found in hole 7BK03. With the exception of these local enrichments, the metal distribution in the 2WS is quite homogeneous which is compatible with the black-shale depositional environment.

CROWFLIGHT MINERALS PROGRAM

Ateba Process

Tests by Crowflight Minerals Inc. started in late-1998, after a royalty agreement had been concluded by James Brady, president of Crowflight Minerals, with Ateba Mines Inc. and its wholly-owned subsidiary Claytech Environmental Services Inc., dealing with the recovery of minerals from clay-bearing rock formations by a patented process. This process has been developed *"to deal with the by-products of phosphate mining"*,

Table 1: DRILL HOLE ASSAYS AND FORMATIONAL LITHOGEOCHEMICAL VALUES - ASPHALT AND BUCKTON PROPERTIES

Asphalt

Drill Holes - Second White Specks Formation

DDH	From (m)	To (m)	Length (m)	Samples	Au ppb FA	Au ppb INA	Ag ppm ICP	Cu ppm ICP	Pb ppm ICP	Zn ppm ICP	As ppm INA	Sb ppm INA	Co ppm INA	Cr ppm INA	Ni ppm ICP	Mn ppm ICP	V ppm ICP	U ppm INA	Ba ppm INA	Al % ICP	Fe % INA	Ca % ICP	Mg % ICP	K % ICP	Na % INA	C-org % Leco	P % ICP	S % Leco
7AS01	11.3	18.5	7.2	13	5	8	<0.4	89	23	342	61	11	20	78	147	274	743	41	947	5.7	4.1	7.5	0.9	1.4	0.4	6.7	0.7	4.0
7AS02	21.6	33.0	11.4	29	7	7	<0.4	89	20	282	51	12	20	110	122	211	664	31	3 042	7.3	4.5	4.0	1.0	1.8	0.7	7.0	0.3	3.5
Average					**6**	**8**	**<0.4**	**89**	**21**	**305**	**55**	**12**	**20**	**98**	**132**	**235**	**695**	**35**	**2 231**	**6.7**	**4.3**	**5.4**	**0.9**	**1.7**	**0.6**	**6.9**	**0.4**	**3.7**

Outcrop Samples

		Au ppb FA	Au ppb INA	Ag ppm ICP	Cu ppm ICP	Pb ppm ICP	Zn ppm ICP	As ppm INA	Sb ppm INA	Co ppm INA	Cr ppm INA	Ni ppm ICP	Mn ppm ICP	V ppm ICP	U ppm INA	Ba ppm INA	Al % ICP	Fe % INA	Ca % ICP	Mg % ICP	K % ICP	Na % INA	C-org % Leco	P % ICP	S % Leco
Labiche Shale	5	na	1	<0.4	40	20	164	21	3	14	132	49	168	302	7	2 240	8.4	3.9	0.6	1.1	2.4	0.7	1.7	0.1	1.2
Second White Specks Shale	9	**7**	**7**	**0.4**	**100**	**23**	**374**	**62**	**10**	**22**	**101**	**128**	**210**	**730**	**41**	**1 192**	**6.3**	**4.5**	**5.3**	**0.8**	**1.8**	**0.5**	**5.4**	**0.8**	**3.9**
Belle Fourche Shale	96	5	3	<0.4	34	20	125	19	1	11	109	44	141	251	6	953	8.0	3.4	1.2	0.9	2.4	0.5	1.9	0.1	1.8

Buckton

Drill Holes - Second White Specks Formation

DDH	From (m)	To (m)	Length (m)	Samples	Au ppb FA	Au ppb INA	Ag ppm ICP	Cu ppm ICP	Pb ppm ICP	Zn ppm ICP	As ppm INA	Sb ppm INA	Co ppm INA	Cr ppm INA	Ni ppm ICP	Mn ppm ICP	V ppm ICP	U ppm INA	Ba ppm INA	Al % ICP	Fe % INA	Ca % ICP	Mg % ICP	K % ICP	Na % INA	C-org % Leco	P % ICP	S % Leco
7BK01	133.0	149.1	16.1	20	6	5	0.4	84	23	367	56	15	21	83	164	196	793	37	1 879	6.5	4.0	5.3	0.9	1.5	0.6	7.2	0.2	4.2
7BK02	60.8	79.2	18.4	26	4	6	0.5	70	19	305	56	14	21	95	126	194	648	34	2 322	6.5	4.5	5.6	0.9	1.5	0.6	6.0	0.2	3.8
7BK03	75.0	101.2	26.2	44	4	5	<0.4	72	22	289	60	11	19	84	123	211	618	32	2 148	6.4	4.1	5.4	0.9	1.5	0.6	6.1	0.2	3.7
7BK04	120.6	141.7	21.1	38	4	6	<0.4	75	22	290	64	12	23	97	133	196	661	27	1 618	6.8	4.8	4.7	0.9	1.9	0.5	7.4	0.2	4.0
7BK05	76.8	95.2	18.4	33	3	5	0.7	76	16	319	66	11	24	90	152	220	710	26	1 496	6.8	5.0	5.4	0.8	1.8	0.5	7.7	0.2	4.4
7BK06	107.7	130.2	22.5	50	4	5	0.8	78	20	282	55	12	21	98	133	201	668	30	1 965	7.0	4.6	5.9	0.9	1.8	0.7	7.2	0.2	4.2
Average					**4**	**6**	**0.4**	**75**	**21**	**305**	**60**	**12**	**21**	**91**	**137**	**203**	**676**	**31**	**1 916**	**6.7**	**4.5**	**5.4**	**0.9**	**1.7**	**0.6**	**6.9**	**0.2**	**4.0**

Outcrop Samples

		Au ppb FA	Au ppb INA	Ag ppm ICP	Cu ppm ICP	Pb ppm ICP	Zn ppm ICP	As ppm INA	Sb ppm INA	Co ppm INA	Cr ppm INA	Ni ppm ICP	Mn ppm ICP	V ppm ICP	U ppm INA	Ba ppm INA	Al % ICP	Fe % INA	Ca % ICP	Mg % ICP	K % ICP	Na % INA	C-org % Leco	P % ICP	S % Leco
Labiche Shale	251	na	2	<0.4	32	19	145	16	1	12	106	43	491	238	4	1175	8.3	3.9	0.8	1.0	2.1	0.4	1.1	0.1	0.8
Second White Specks Shale	106	**4**	**6**	**0.5**	**73**	**21**	**285**	**59**	**10**	**21**	**95**	**121**	**199**	**611**	**30**	**1484**	**6.6**	**4.7**	**5.6**	**0.9**	**1.8**	**0.5**	**6.7**	**0.3**	**4.0**
Belle Fourche Shale	42	na	3	<0.4	29	20	123	22	2	12	127	40	148	196	6	944	7.3	3.9	1.4	0.8	2.2	0.6	1.7	0.1	2.2

na: not assayed

and also *"relates to the recovery of precious metal particles and small precious stones (such as gold particles, diamonds, sapphires and rubies etc.) from aqueous clay/slime suspensions, otherwise lost in reject tailings or in the so called clay balls."* (Ateba Mines Inc. "The Treatment of Clays in Mining." - Technical information distributed during the March 1999 convention of the Prospectors and Developers Association). The process involves mixing of a crushed or ground rock sample with measured amounts of water and reagent A-15, which very effectively deflocculates clay-rich materials and allows better gravity recovery of heavy minerals in the de-slimed (sink) fraction. While the process may improve the recovery of gold from clay-rich materials, Ateba does not claim, that its process allows the detection of gold by fire assaying, neutron activation analysis or other assay methods, in samples that show no gold in assays of untreated samples.

Crowflight Testwork

Following is a summary description of the main testwork by Crowflight and its associates as known to Strathcona through information received from Ken Reading, consulting geologist to Crowflight, and from Shahé Sabag, president of Tintina. This account of the Crowflight testing may not be entirely complete, but is assessed since it is the reason for the work Strathcona did in close cooperation with Tintina.

For its tests, Crowflight used part of a sample composited by Ortech from 96 individual sample rejects of half-core from drill holes 7BK02, 7BK04, 7BK05 for metallurgical testwork in 1998 (Ortech Composite). These samples had been crushed at Actlabs in 1997 in preparation for assaying, and rejects had been stored at the laboratory prior to being sent to Ortech (Table 2). Leach tests at Lakefield were also done on a composite sample of 7AS02 (7AS02-old), a reject of Strathcona's first phase work.

Sudbury

One half of a 10-kilogram sample of the Ortech Composite was deflocculated using the Ateba process at Claytech Environmental Services Inc. in Sudbury. The deflocculated (sink) portion of the sample was further treated by gravity concentration on a Wilfley

table at Erana Laboratories in Sudbury. Three table products where sent for assaying to Chauncey Laboratories, Toronto and Chemex Labs, Mississauga. Both laboratories reported high gold values from fire assays of these samples (Table 2), which resulted in a calculated head grade of the five-kilogram sample of 1.9 grams per tonne (g/t) gold (Chemex) and 1.4 g/t gold (Chauncey), and silver assays of 0.3 g/t and 1.1g/t respectively.

Thornhill

The second half of the 10-kilogram sample was brought to Thornhill, where 2.5 kilograms were washed with water by letting the water-sample slurry run in a cascade over three five-gallon pails. The cleaned samples reported virtually no gold from fire assaying at Chauncey and Chemex, with the exception of one value of 0.18 g/t at Chemex, and calculated head grades are at or below detection limit for gold, and at 0.3 g/t (Chemex) and 4.1 g/t (Chauncey) for silver.

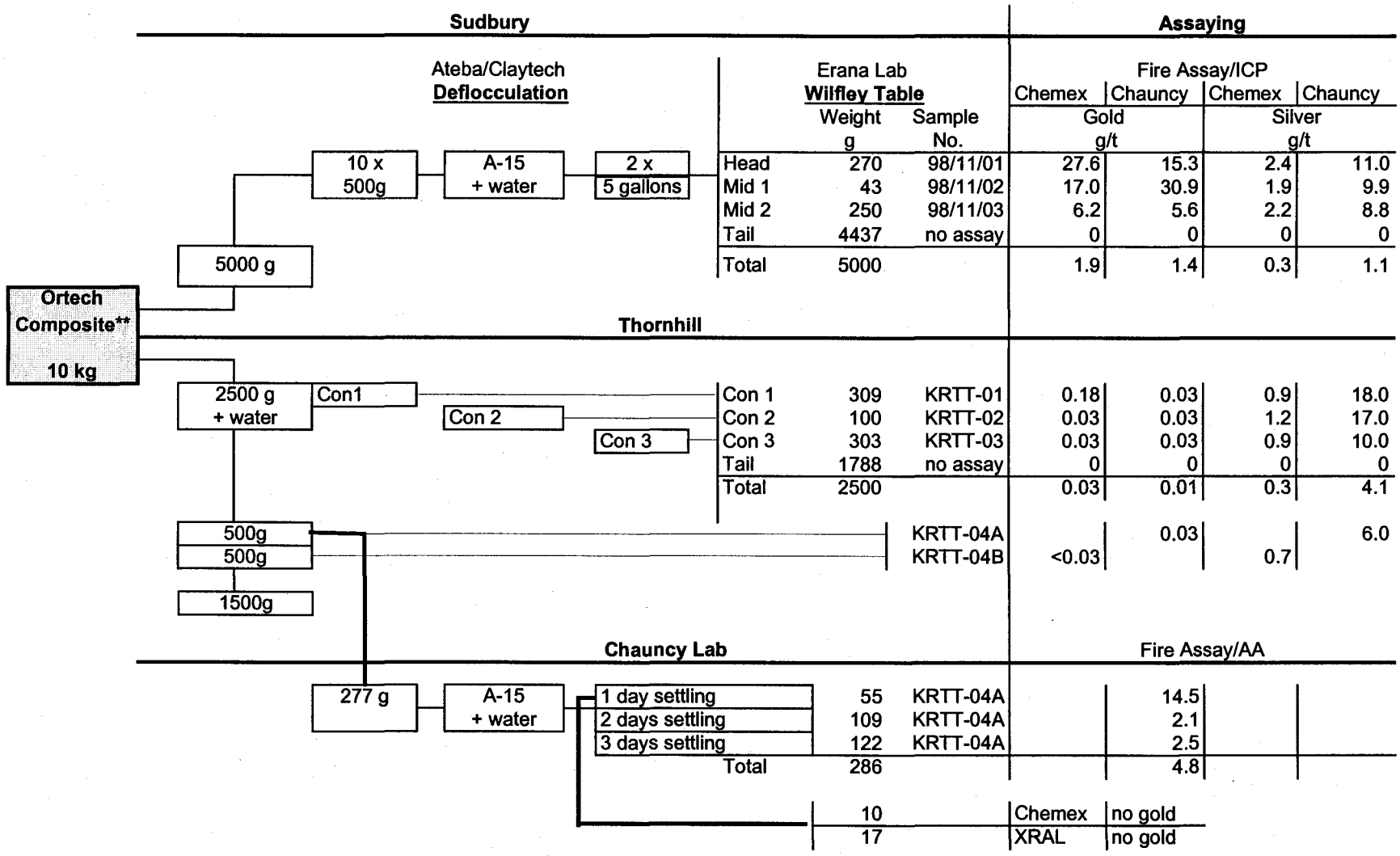
Two 500-gram splits of this sample returned no gold from fire assaying at both laboratories. However, a 277-gram sub-sample of one of the 500-gram samples deflocculated with the Ateba process at Chauncey, again had high gold values in Chauncey assays (4.8 g/t gold weighted average), while check samples run at XRAL and Chemex had no gold.

Liberated gold grains about 0.1 mm to 0.3 mm in size were observed under the microscope by Ken Reading in Wilfley table products (sample numbers 98/11/01 to 98/11/03).

Swastika Laboratories

In February of 1999, Swastika Laboratories assayed approximately 3600 grams of sample material from drill holes 7BK01, 7BK03, 7BK06 and 7AS02 and the Ortech Composite (?) for a total of 131 assays, generally one assay-ton fire assays. Untreated samples of the four holes (111 fire assays, 3123 grams) returned between <0.01 g/t and 0.08 g/t gold, for an average of 0.01 g/t for the three Buckton holes and 0.02 g/t for the Asphalt hole which is at or about the detection limit for gold.

Table 2: SECOND WHITE SPECKS FORMATION DRILL CORE - CROWFLIGHT TESTING, NOVEMBER 1998*



* The table is based on information received from Ken Reading

** Ortech Composite: 7BK02 (18.4 m), 7BK04 (21.1 m), 7BK05 (18.4 m)

One 199-gram sample (JB#1, Ortech Composite?) was split in half and one half assayed with fire assays to extinction (4 assays, 0.01 g/t to 0.02 g/t gold), while the other half was deflocculated, and the entire dried filter cake, the filter paper, the A-15 filtrate and A-15 reagent assayed. Four fire assays on the filter cake returned between 0.02 g/t and 0.47 g/t gold, for an average of 0.18 g/t. The filter paper, filtrate and reagent contained no detectable gold.

Three fire assays each on deflocculated material of the four holes (12 fire assays, 284 grams total) returned from <0.01 g/t to 0.02 g/t gold, for an average of 0.01 g/t for all the holes. These samples weighed initially 200 grams each, and after deflocculation, were allowed to settle for 24 hours, when 60% of the beaker contents was decanted and stored, while the rest, between 30% and 45% of the original sample weight, was dried and fire assayed.

Lakefield Research

In March of 1999, Crowflight processed a sample of crushed reject material from hole 7AS02 at Lakefield Research, after some bottle roll leach testing on the Ortech Composite done at Lakefield in early-March had returned calculated head assays of 0.01 g/t to 0.1 g/t gold. The sample weighed approximately 4.5 kilograms and was part of a larger sample composited in January 1999 by Strathcona from rejects of individual core intervals stored at Tintina's Toronto warehouse, which, together with other samples, had been used for the Strathcona first phase of work.

Lakefield work consisted of six tests, with one carbon-in-leach (CIL) and one carbon-in-pulp (CIP) test, on each of untreated samples, roasted samples, and samples deflocculated with the Ateba process using the A-15 reagent supplied by Ateba. In addition 11 fire assays were done on a head sample of which seven assays were on pulverized material and four assays on un-pulverized material, with coarse pieces of the latter broken by hand.

The 11 head samples returned from <0.02 g/t to 1.17 g/t gold in fire assays, with an average of 0.27 g/t gold. The four tests on un-treated and roasted samples returned calculated head grades of 0.05 to 0.07 g/t gold (0.03 to 0.04 g/t if assays below the detection limit are treated as zero), while the two deflocculated samples had calculated

head grades of 0.47 and 0.21 g/t gold. The bulk of the gold in these samples is in the ***float fraction*** of the de-slimed sample, while very little gold reported to the carbon and the leach residue, which is unusual with gold normally expected to report to the opposite fractions.

STRATHCONA PROGRAM

Phase I

Strathcona was authorized by Tintina on February 3, 1999 to audit the initial assay work by Crowflight Minerals, with the objective to confirm or disprove the gold values reported from the Ortech Composite. Several meetings were held with Ken Reading, who on behalf of Crowflight Minerals had collected the samples of crushed core from Ortech and from Tintina's warehouse in Toronto, and brought the samples to Sudbury. Ken Reading also had done some work at his home in Thornhill, which included cascade washing of the clay-rich samples in water, and preparation of polished thin sections and polished sections of grain and rock fragment mounts of mineral products from Sudbury and Thornhill. A set of photomicrographs taken by Mr. Reading from the heaviest fraction (98/11/1) of the Sudbury table concentrates included photos of isolated gold grains, varying in size from about 0.1 mm to 0.3 mm.

Sample Preparation

On February 3, 1999, Strathcona collected samples of individual core intervals from drill holes 7BK02, 7BK04, 7BK05 and the remaining portion of the Ortech Composite from Ortech in Mississauga, as well as similar core samples from drill holes 7BK03, 7BK06, 7AS02, including intervals of Labiche Shale from the Tintina warehouse in Toronto, and the remaining Ortech Composite from Ken Reading (Table 3).

Table 3: STRATHCONA PHASE I - CORE SAMPLES

Drill Hole/ Sample	Samples						
	From (m)	To (m)	Taken	Missing	Type	Wt. (g)	Source
7AS02	21.6	33.0	29	0	crush. rejects	16711	Tintina
7BK02	60.8	79.2	26	0	crush. rejects	13250	Ortech
7BK03	75.0	101.2	42	2	crush. rejects	22172	Tintina
7BK04	120.6	141.7	34	4	crush. rejects	17868	Ortech
7BK05	76.8	95.2	30	3	crush. rejects	17225	Ortech
7BK06	107.7	130.2	27	23	crush. rejects	20752	Tintina
Ortech Composite	7BK02, 7BK-04, 7BK -05, composited crusher rejects					13800	Ortech
K1	Ortech Composite					1273	Reading
SB (7BK06)	Labiche Shale, composited crusher rejects					16236	Tintina

Furthermore, we received from Ken Reading mineral concentrates from processing in Sudbury and Thornhill, polished sections and polished thin sections of these products (Table 4), and the remaining material for samples previously collected at the Tintina warehouse.

Sample preparation at Lakefield Research included weighing of samples, compositing of individual samples into one sample for each drill hole, and splitting of the composites with a 12-compartment rotary splitter to obtain a sample of about 150 grams for further processing.

Table 4: RECEIVED FROM K. READING - MINERAL PRODUCTS AND THIN SECTIONS

Petri Dishes		Thin Sections	Polished Thin Sections (two each)
Number	Description (K. Reading)		
7BK03	Chauncey reagent	98/11/1	98/11/1
KRTT-04A	Chauncey reagent heavy	98/11/2	98/11/2
KRTT-04A	Chauncey reagent middling	98/11/3	98/11/3
98/11/1	Reagent heavy 1	KRTT-01	KRTT-01
98/11/1	Reagent heavy 1a	KRTT-02	KRTT-02
98/11/1	Reagent heavy 2	KRTT-03	KRTT-03
KRTT-01	Reagent heavy tailings		
KRTT-01	Reagent heavy		
KRTT-01	Reagent middlings		
KRTT-01	Water heavy 1		
KRTT-01	Water heavy 2		

Compositing of the entire 2WS horizon for each drill hole was done under the assumption that gold would show up in assays if present in the amounts indicated by the Crowflight testing, and also because of the small size of some of the individual samples. Assay values would be qualitative rather than representing weighted averages for the 2WS intervals.

Screen analyses on the samples, which had previously been crushed to a nominal size of 95% passing 10 mesh, showed, that on average 75% were passing 10 mesh,

Seven suites of 11 samples each were prepared, with each suite including drill holes 7BK02, 7BK03, 7BK04, 7BK05, 7BK06, 7AS02, the Ortech Composite (Ortech), Ken Reading's Ortech Composite (K1), Labiche Shale (SB), one duplicate from one of the six drill hole samples, and one Canmet Standard (CH3) which is a gold-copper ore from Chibougamau, Quebec, with a certified value of 1.40 ± 0.03 g/t gold. The suites were delivered to Lakefield (2), Chauncey (1) and Loring Laboratories Ltd. of Calgary

(1) for fire assaying and to Actlabs (2) for fire assaying and INAA analysis. Lakefield and Actlabs were selected as two larger Canadian laboratories, with Actlabs also having previously assayed these cores. Chauncey had done much of the assaying for Crowflight, and Loring was used because of previous assaying for Tintina on Northeast Alberta project samples.

All samples were to be assayed to extinction by 30-gram fire assays. Since Tintina considered pulverizing might cause possible gold losses due to smearing, the laboratories were instructed to clean the pulverizing equipment after each sample with cleaning sand and fire-assay the entire sand used. Lakefield's second sample suite and Loring's samples were to be assayed without pulverization, with oversize material to be hand-crushed by mortar and pestle, and the +80 mesh fraction and the -80 mesh fraction assayed separately.

Assay Results

The assay results are summarized in Table 5, and certificates are enclosed in Appendix I. The Lakefield and Actlabs fire assays returned gold values at or below the detection limit, and the INAA results confirmed previous INAA assays, generally below 10 ppb gold. Loring and Chauncey reported significant gold values of 0.6 g/t to 6.5 g/t and 0.1 g/t to 2.1 g/t. The Lakefield CH-3 gold assays were 1.44 g/t and 1.50 g/t, and Actlabs reported values of 1.39 g/t (INAA) and 1.25 g/t (FA), all within an acceptable range for the standard. Loring reported an average value of 29.36 g/t gold from three assays for CH-3, and the Chauncey average was 1.98 g/t. Based on these results, it was obvious the Loring values were inaccurate and unreliable, and the Chauncey gold assays were at least doubtful, considering the high value for the standard, and the low gold values reported for all core samples by Lakefield and Actlabs.

Mineralogy

Mineralogical and petrographical studies on the mineral products and polished sample sections received from Ken Reading were done by Edward Walker of Petrologic Inc., with their report included in Appendix II. The six samples of gravity concentrates, three from Sudbury (98/11/1, 98/11/2, 98/11/3), and three from Thornhill (KRTT-01, KRTT-02, KRTT-03), contain approximately three to five percent opaque minerals -

Table 5: STRATHCONA PHASE I - ASSAY RESULTS

Lakefield - FA pulverized				Lakefield - FA crushed				
Sample Number	Source	Number of Assays	Au g/t	Sample Number	Source	Number of Assays	Au g/t	
1	7BK02	6	<0.02	8	7BK02	6	0.02	
9	7BK03	4	0.02	16	7BK03	4	<0.02	
17	7BK04	4	<0.02	24	7BK04	4	0.02	
25	7BK05	4	<0.02	31	7BK05	3	<0.02	
33	7BK06	4	<0.02	40	7BK06	5	0.02	
41	7AS02	4	<0.02	47	7AS02	4	<0.02	
49	Ortech	4	0.02	55	Ortech	4	<0.02	
57	SB	3	<0.02	63	SB	4	<0.02	
65	K1	3	0.02	71	K1	3	<0.02	
73	CH-3	3	1.44	78	CH-3	3	1.50	Standard
4	7BK02	5	<0.02	48	7AS02	4	<0.02	Duplicate

Actlabs - INAA crushed				Actlabs - FA pulverized				
Sample Number	Source	Number of Assays	Au g/t	Sample Number	Source	Number of Assays	Au g/t	
3	7BK02	5	0.008	2	7BK02	9	<0.005	
11	7BK03	4	0.006	10	7BK03	7	<0.005	
19	7BK04	3	0.008	18	7BK04	7	<0.005	
27	7BK05	3	0.004	26	7BK05	5	<0.005	
35	7BK06	4	0.004	34	7BK06	9	<0.005	
43	7AS02	3	0.005	42	7AS02	7	<0.005	
51	Ortech	3	0.013	50	Ortech	7	<0.005	
59	SB	3	<0.002	58	SB	2	<0.005	
67	K1	3	0.012	66	K1	7	<0.005	
75	CH-3	3	1.39	74	CH-3	2	1.25	Standard
20	7BK04	3	0.008	12	7BK03	10	<0.005	Duplicate

Chauncey - FA pulverized				Loring crushed				
Sample Number	Source	Number of Assays	Au g/t	Sample Number	Source	Number of Assays	Au g/t	
5	7BK02	6	1.85	7	7BK02	6	6.52	
13	7BK03	6	0.31	15	7BK03	5	4.87	
21	7BK04	5	0.68	23	7BK04	4	1.50	
28	7BK05	4	0.36	30	7BK05	4	1.14	
36	7BK06	4	0.31	38	7BK06	5	0.97	
44	7AS02	4	0.05	46	7AS02	4	1.37	
52	Ortech	4	2.14	54	Ortech	4	1.25	
60	SB	4	0.67	62	SB	4	0.55	
68	K1	3	0.59	70	K1	4	0.83	
76	CH-3	3	1.98	77	CH-3	3	29.36	Standard
29	7BK05	4	1.98	39	7BK06	5	0.69	Duplicate

Note : All sample numbers have the pre-fix "SMS"
Actlabs assays converted to "g/t" from "ppb"

Canmet standard CH-3 has a certified value of 1.40±0.03 g/t gold (Gold-copper ore Chibougamau)

pyrite, marcasite, and traces sphalerite, chalcopyrite, arsenopyrite, goethite and magnetite. Pyrite occurs as very fine-grained framboidal aggregates and as discrete grains. The bulk of the samples consists of fossilized bone, shell and teeth fragments (apatite), quartz and carbonate and up to five percent carbonaceous material and traces of white mica, phlogopite, glauconite, garnet and ilmenite. Liberated gold grains were found in KRTT-02, 98/11/1 and 98/11/3 (2 grains), a locked gold particle was found in 98/11/2. Gold was not seen in the concentrate samples. The gold seen in KRTT-02 is somewhat at odds with Ken Reading reporting no visible gold in the KRTT samples, and also with the lack of gold in assays, with the exception of one value of 0.18 g/t reported by Chemex from KRTT-01 (Table 2).

The gold particles vary in size from 15 x 27 microns to 26 x 128 microns and consist of about 92 to 98% gold and 2 to 8% silver. Two grains show goethite rims, one grain is locked in an aggregate of goethite, pyrite, magnetite and lamellar-textured iron particles which contain chrome, nickel and manganese (Appendix II). This is a mineral association which is highly unlikely to occur in euxinic-facies carbonaceous mudstone. A few similar oxide aggregates were found in the corresponding mineral concentrate, which suggests that oxidation of foreign iron particles, possible introduced during drilling, crushing or tabling, has taken place in this sample and caused aggregating of minerals during rusting. The goethite rims around gold grains and the liberated nature of the grains furthermore suggests that the particles were exposed to oxidation and are not part of the sulfide mineral assemblage found in the 2WS mudstones, which include the easily oxidizable marcasite.

A similar high gold-fineness is reported by Tintina from gold recovered by panning from stream sediments on the property, however, a definite link between these particles and their suspected source - the 2WS - has never been made, and would only be proved if similar gold particles without goethite rims could be identified in core samples, as part of the original 2WS mineral assemblage.

Phase II

During the first phase of Strathcona testing, Actlabs and Lakefield confirmed small traces of gold in the 2WS mudstone similar to values reported by Actlabs in 1997,

while the high gold assays from Chauncey and Loring left questions concerning the gold content and the reliability of assays from the two laboratories. To address these and other remaining questions, it was decided to go back one step and do more tests on the remaining half-core stored at the Alberta government core storage in Edmonton. The complete remaining 2WS intervals of HQ-diameter half-core from holes 7AS02 and 7BK02 were picked up by Strathcona on March 1, 1999 and shipped in cardboard boxes to Toronto by courier. The core had been split in the field by cutting it with a knife or chisel, which is possible during the first day or two after it leaves the core barrel, before it dries out and hardens.

The objectives of the second phase were to assay the new core samples at the laboratories used before and also at another larger laboratory, and, to collect gold particles in the core through heavy liquid concentration. Thirdly, cyanide leach tests on both un-treated and deflocculated samples would audit results obtained by Lakefield on 7AS02-old samples submitted by Crowflight.

Sample Preparation

The two cores were divided in 1.6 to 2.4 metre-intervals along geological boundaries, resulting in six samples for 7AS02, and nine samples for 7BK02, weighing between 4.8 and 8.5 kilograms each (Table 6). The samples were crushed at Lakefield to a nominal size of 90% passing 48 mesh, in an attempt to gain material useable for heavy liquid separation. The crushing of the soft mudstone proved rather tedious and resulted in material losses mainly due to dusting of 3.8% in 7BK02 and 5.6% in 7AS02. The crushed samples were then split with a riffle splitter with one-half stored, while the other half was further split with a rotary splitter to obtain samples weighing about 100 grams each from which seven sample suites were prepared and the remaining material stored.

The seven sample suites consisted of 17 or 18 samples each including six samples of 7AS02, nine samples of 7BK02 and two (in two cases three) Canmet standards. The standards included LKSD-2, a lake bottom sediment with a recommended gold value of 0.003 g/t, GTS-2 prepared from South Porcupine gold tailings with a certified value of 0.263 ±0.05 g/t gold, and the CH-3 standard used before.

Table 6: STRATHCONA PHASE II - CORE SAMPLES

		Total Sample					First Half			Second Half	
							7 Suites, calculated				
From	To	Length	Weight (g)		Loss		Total	Per Sample	Reject	Weight (g)	% of total
m	m	m	pre-crush	after-crush	g	%	g	g	Weight (g)	riffle-split	after-crush
7BK02											
60.8	62.9	2.12	6232	6071	161	2.6	916	131	2112	3043	50.1
62.9	64.8	1.93	6465	6232	233	3.6	779	111	2324	3129	50.2
64.8	66.3	1.44	4962	4791	171	3.4	701	100	1646	2444	51.0
66.3	68.5	2.18	7419	7155	264	3.6	848	121	2581	3726	52.1
68.5	70.6	2.17	7711	7340	371	4.8	728	104	2895	3717	50.6
70.6	72.9	2.31	8400	7982	418	5.0	744	106	3094	4144	51.9
72.9	74.9	2.01	6978	6742	236	3.4	895	128	2529	3318	49.2
74.9	77.2	2.28	7854	7546	308	3.9	733	105	3009	3804	50.4
77.2	79.2	1.93	7020	6775	245	3.5	851	122	2555	3369	49.7
		18.37	63041	60634	2407	3.8	7195		22745	30694	50.6
7AS02											
21.6	23.4	1.79	5098	4858	240	4.7	707	101	1693	2458	50.6
23.4	25.5	2.09	7094	6717	377	5.3	842	120	2547	3328	49.5
25.5	27.7	2.16	7145	6758	387	5.4	813	116	2450	3495	51.7
27.7	29.5	1.81	5726	5469	257	4.5	780	111	1877	2812	51.4
29.5	31.0	1.57	4830	4328	502	10.4	750	107	1292	2286	52.8
31.0	33.4	2.37	8541	8157	384	4.5	776	111	3165	4216	51.7
		11.79	38434	36287	2147	5.6	4668		13024	18595	51.2

Last 7AS02 sample includes 0.4 m of underlying Belle Fourche Shale

Samples used for heavy liquid tests

7AS02-old composite Heavy Liquid testing: 3.2 kg, Leach tests: 1.9 kg

One suite was sent to each of Lakefield, Actlabs, Chemex, Chauncey and Loring. The laboratories were instructed not to pulverize the samples, but hand crush the samples if necessary, and do one 30-gram fire assay per sample (one INAA assay at Actlabs) only. Lakefield also received four other samples including one sample reject of 7AS02-old (from the first phase of testing) and two samples from the hanging wall and footwall of the 2WS in hole 7BK02 for heavy liquid separation, and another sample of 7AS02-old for cyanide leach tests. The two 7BK02 samples were selected because they contained the largest amount of clastic material including rounded quartz grains, and in our opinion offered the best chance to contain gold of the size seen in the Crowflight samples.

Assay Results

Assay results received from the five laboratories are listed in Table 7. Lakefield, Chemex and Loring reported gold below the detection limit of the fire assay method for all 2WS samples, Actlabs had INAA gold values of 0.005 to 0.014 g/t. Chauncey assays varied from 0.07 to 1.18 g/t gold, clearly outside the range of all other laboratories. The erratic nature of the Chauncey assays was further documented by the results for the standards: LKSD-2, 0.063 g/t instead of 0.003 g/t, GTS-2, 1.04 g/t instead of 0.26 g/t and CH-3, 0.54 g/t instead of 1.40 g/t gold. Loring reported good values for the three standards (<0.005 g/t, 0.27 g/t, 1.29 g/t) as did Lakefield, Actlabs and Chemex for the two standards they each received.

These results together with results from Phase I allow the following conclusions:

- The rock samples analysed contain minor traces of gold, which can be detected by INAA, but are below the detection limit of fire assaying,

- Standard assays, and the comparison with assay results from Lakefield and Actlabs show that Loring were off with their gold values in the first round of assaying, but reported correct values in the second round,

- Gold assays from Chauncey are erratic and therefore not reliable.

Table 7: STRATHCONA PHASE II - ASSAY RESULTS

	Sample			Lakefield - FA		Actlabs - INAA		Chemex - FA		Chauncey - FA		Loring - FA	
Drill Hole/ Standard	From m	To m	Length m	Sample Number	Au g/t	Sample Number	Au g/t	Sample Number	Au g/t	Sample Number	Au g/t	Sample Number	Au g/t
7AS02	21.6	23.4	1.79	79	<0.02	80	0.014	81	<0.005	82	0.077	83	<0.005
7AS02	23.4	25.5	2.09	88	<0.02	89	0.009	90	<0.005	91	0.072	84*	<0.005
7AS02	25.5	27.7	2.16	97	<0.02	98	0.008	99	<0.005	100	0.063	101	<0.005
7AS02	27.7	29.5	1.81	106	<0.02	107	0.005	108	<0.005	109	0.122	110	<0.005
7AS02	29.5	31.0	1.57	115	<0.02	116	0.007	117	<0.005	118	0.155	119	<0.005
7AS02	31.0	33.4	2.37	124	<0.02	125	0.008	126	<0.005	127	0.125	128	<0.005
LKSD-2	Standard			86	<0.02	95	<0.005	104	<0.005	113	0.063	122	<0.005
GTS-2	Standard			87	0.29	96	0.282	105	0.24	114	1.039	123	0.265
7BK02	60.8	62.9	2.12	135	<0.02	136	0.005	137	<0.005	138	0.160	139	<0.005
7BK02	62.9	64.8	1.93	142	<0.02	143	0.005	144	<0.005	145	1.173	146	<0.005
7BK02	64.8	66.3	1.44	149	<0.02	150	0.008	151	<0.005	152	0.360	153	<0.005
7BK02	66.3	68.5	2.18	156	<0.02	157	0.005	158	<0.005	159	1.175	160	<0.005
7BK02	68.5	70.6	2.17	163	<0.02	164	0.008	165	<0.005	166	0.902	167	<0.005
7BK02	70.6	72.9	2.31	170	<0.02	171	0.007	172	<0.005	173	0.097	174	<0.005
7BK02	72.9	74.9	2.01	177	<0.02	178	0.005	179	<0.005	180	0.157	181	<0.005
7BK02	74.9	77.2	2.28	184	<0.02	185	<0.005	186	<0.005	187	0.135	188	<0.005
7BK02	77.2	79.2	1.93	191	<0.02	192	0.009	193	<0.005	194	0.060	195	<0.005
CH-3	Standard									198	0.542	199	1.285

Note : All sample numbers have the pre-fix "SMS"

Actlabs, Chauncey, Loring assays converted to "g/t" from "ppb"

* Sample had been submitted as SMS-92

Canmet Standards

Standard	Gold, g/t		Source
	Certified	Provisional	
CH-3	1.40 ± 0.03		Gold-copper ore, Chibougamau, (Westminer Canada Limited)
GTS-2	0.263 ± 0.005		Gold Tailings, South Porcupine, Ontario, (Placer Dome)
LKSD-2		0.003	Lake sediment, Calabogie Lake and 86K and 86L, NWT

Heavy Liquid Separation - Assays and Mineralogy

The results of heavy liquid separation tests at Lakefield are included with the reports by Petrologic Inc. and Lakefield Research in Appendix II and III. After conditioning of the first sample with water was unsuccessful, the samples were treated with a deflocculant (sodium hexa-meta-phosphate) in a bucket using an agitating mixer. The samples were then wet-screened, and the heavy mineral fraction of the +200 mesh and the -200 +400 mesh fractions separated using methylene iodide with a specific gravity of 3.3, in a separating funnel (+200 mesh) or centrifuge (-200 +400 mesh). The -400 mesh fraction was stored. The weight of the +200 mesh sink fraction in the three samples varied from 1.1 g to 11.6 g (0.03 % to 0.45% of the total sample), the weight of the -200 +400 mesh fraction from 1.1 g to 1.8 g (0.04 % to 0.05% of the total sample). The heavy liquid float and sink fractions were first examined under the microscope at Lakefield, and subsequently by Edward Walker of Petrologic Inc. No visible gold was found in the samples.

The sink fractions were then sent to Actlabs for INAA assaying, assay results are summarized in Tables 8 and 9 and are included with the assay certificates in Appendix I.

Gold values in the sink fractions range from 46 ppb to 3060 ppb, with the highest value in the +200 mesh sink fraction of the bottom two metres of the 2WS in hole 7BK02. This section is made up of two siliciclastic layers intercalated with calcareous black mudstone. The bottom layer of calcite-cemented sandstone is coarsest at the base and has a sharp contact with the underlying Belle Fourche mudstone. The -400 mesh fraction constitutes the bulk in all the samples, but was not assayed, since the many assays previously done by Tintina and Strathcona on 7AS02 and 7BK02 had returned only very low gold values (generally less than 10 ppb). A value of 10 ppb (0.01 g/t) was therefore attributed to the -400 mesh fractions of the three samples for the purpose of calculating a weighted average for the samples. Since the +200 mesh sink fraction of sample 7AS02-old had not been assayed, an arbitrary value of 1 g/t was used for the calculation. The resulting gold averages are 0.012 g/t (12 ppb) for sample 7AS02-old, 0.010 g/t (10 ppb) for the interval 60.8-62.9 metres in hole 7BK02 and 0.021 g/t for the interval 77.2-79.2 metres in hole 7BK02. These results agree generally with previous core assays of the 2WS, and indicate that very minor

Table 8: STRATHCONA PHASE II - GOLD ASSAYS, HEAVY LIQUID CONCENTRATES

	Weight		Float		Sink				Total
	g	%	g	wt%	Sample	g	wt%	Au (g/t)*	Au (g/t)
7AS02	1 000								**0.012**
+200 mesh	42	4.4	40.8	4.3		1.08	0.11	*1.00*	
-200+400 mesh	95	9.9	92.4	9.7	**SMS-204**	**1.75**	0.18	**1.10**	
-400 mesh	814	85.6	85.7	9.0				*0.01*	
Total	950	100.0							
7BK02 60.8-62.9	2 106								**0.010**
+200 mesh	111	5.3	105.7	5.0	**SMS-205**	**4.30**	0.20	**0.05**	
-200+400 mesh	35	1.6	32.8	1.6	**SMS-206**	**1.40**	0.07	**0.54**	
-400 mesh	1 957	93.1						*0.01*	
Total	2 103	100.0							
7BK02 77.2-79.2	2 554								**0.021**
+200 mesh	735	28.8	722.4	28.3	**SMS-207**	**11.60**	0.45	**3.06**	
-200+400 mesh	92	3.6	90.9	3.6	**SMS-208**	**1.10**	0.04	**0.16**	
-400 mesh	1 725	67.6						*0.01*	
Total	2 552	100.0							

* Numbers in italics are estimates used to calculate weighted averages

Table 9: STRATHCONA PHASE II - ASSAY COMPARISON, HEAVY LIQUID CONCENTRATES - CORE

	Au ppb	Ag ppm	Zn ppm	As ppm	Sb ppm	Co ppm	Cr ppm	Ni ppm	U ppm	Ba ppm	Fe %	Ca %	Weight g
7AS02													
SMS-204	1 100	<5	4 290	1 000	127	94	285	615	72	2 000	37	<1	
7AS02, avg. 2WS	7	<0.4	282	51	12	20	110	122	31	3 042	4	4	
Concentration factor	154		15	19	11	5	3	5	2	1	8	0	
7BK02 60.8-62.9													
SMS-205	46	<5	4 760	597	112	26	59	262	21	26 000	34	<1	4.3
SMS-206	538	9	6 490	1 140	179	87	90	267	44	800	42	<1	1.4
Weighted avg.	167	2	5 185	730	128	41	67	263	27	19 811	36	0	5.7
7BK02, 60.8-62.9	7	<2.5	444	84	22	24	47	140	71	11 213	5	4	
Concentration factor	25		12	9	6	2	1	2	0	2	7	0	
7BK02 77.2-79.2													
SMS-207	3 060	<5	1 250	997	75	362	584	902	39	<100	37	11	11.6
SMS-208	160	<5	4 570	881	66	69	365	88	37	710	41	11	1.1
Weighted avg.	2 809	0	1 538	987	74	337	565	831	39	61	37	11	12.7
7BK02, 77.2-79.2	6	<2.5	255	41	4	17	70	75	36	680	4	14	
Concentration factor	476		6	24	17	20	8	11	1	0	9	1	

gold is concentrated in detrital layers characterized by fossil fragments, rounded quartz and by minor heavy minerals such as magnetite and garnet.

Iron, zinc, arsenic, antimony, cobalt, chrome and nickel are all enriched in the heavy liquid sink fractions, with values for zinc up to 0.65% (Table 9). Converting all the iron in the sink fractions to pyrite results in about 70% - 90% pyrite, which agrees with mineralogical observations on the sink fractions. The highest barium content of 2.6% was found in the +200 mesh sink fraction in the interval 60.8-62.9 metres in hole 7BK02, which had 0.05 g/t gold, while the corresponding sink fraction in the lower interval had below detection barium but the highest gold value of 3.06 g/t.

The above results suggest that very minor gold is preferentially associated with a detrital component of the 2WS. The gold - possibly very fine grained - may have been transported intermittently together with quartz, garnet, magnetite and other heavy minerals into the shallow 2WS basin. Since gold could not be found under the microscope, the above is somewhat speculative, and gold could also be intergrown with other minerals, possibly arsenopyrite or with some of the less frequent pyrite species.

The assays also indicate that small amounts of elements more typical for sediment-hosted base metal deposits accumulated in the 2WS mudstone. These include iron, zinc, copper, barium and vanadium among others. The elevated chromium and nickel values may partly be due to minor detrital chromite (not described from mineralogical work), or may be derived from weathered mafic minerals (pyroxene, amphibole, biotite).

With the exception of gold, the heavy liquid concentrates and the Sudbury metallurgical products contain the same minerals (Appendix II). The relative abundance of minerals is different, the Sudbury products contain more light minerals - quartz, apatite - while the heavy liquid samples consist mostly of pyrite. Sample 7AS02-old carries iron particles, containing manganese and are different from the iron particles in the Sudbury products having chrome and nickel, suggesting that they were derived from another piece of equipment.

Cyanide Leaching

Cyanide leach tests were done, by using splits of the same material (7AS02-old) that Crowflight had used, which was stored with Strathcona following Phase I testing, and using the same procedure as for tests 11 and 12 of the Crowflight program. Five fire assays done on reagent A-15 returned below detection limit gold. Results of the tests are in Appendix IV and are summarized in Table 10.

One batch of 400 grams of 7AS02-old (SMS-200) was assayed to extinction with 13 fire assays, which all returned below detection limit gold (<0.02 g/t), similarly for six assays of cleaning sand used after pulverization of the samples. This was in contrast to the 11 head assays done on the Crowflight sample which had returned from <0.02 g/t to 1.17 g/t gold in fire assays, for an average of 0.27 g/t.

Table 10: LEACH TESTS - STRATHCONA PHASE II, CROWFLIGHT MINERALS

Sample/ Test	Type	Gold										
		Float		Float Filtrate		CIL/CIP Barren + Wash		Loaded Carbon		Leach Residue		Calc. Head*
		g/t	%	g/t	%	g/t	%	g/t	%	g/t	%	g/t
Strathcona												
201A	CIL Deflocc.	<0.02	<13.0	<0.01	<14.3	<0.01	<15.3	0.02	0.4	0.19	57.0	0.06-0.10
201B	CIL Deflocc.	0.03	22.9	<0.01	<17.6	<0.01	<19.8	0.02	0.5	0.09	39.2	0.03-0.08
202	CIL Deflocc.	0.37	42.9	<0.01	<3.9	<0.01	4.3	6.88	31.3	0.21	17.5	0.45-0.49
203	CIL Untreat.					<0.01	53.2	0.11	8.9	0.02	37.9	0.02-0.05
Crowflight Minerals												
7	CIL Untreat.					<0.01	36.3	0.37	24.5	0.03	39.2	0.04-0.07
8	CIP Untreat.					<0.01	42.6	0.47	30.0	0.02	27.4	0.04-0.07
9	CIL Roast					<0.01	31.1	0.19	11.9	0.05	57.0	0.05-0.07
10	CIP Roast					<0.01	38.6	0.25	19.4	0.03	42.0	0.03-0.05
11	CIL Deflocc.	0.50	74.4	0.01	3.8	<0.01	1.5	3.70	18.9	0.03	1.3	0.47
12	CIP Deflocc.	0.19	61.3	0.01	8.5	<0.01	4.5	1.67	16.7	0.07	9.0	0.20-0.21

* First number: values below detection limit taken as zero; Second number: values below detection limit taken as the detection limit value

Sample SMS-201 was split in two equal halves, weighing about 500 grams each and both samples were deflocculated with reagent A-15, received by Strathcona from Ateba. The sink fractions were treated with carbon-in-leach bottle-roll and products fire assayed. The calculated head grades were 0.06 g/t gold for SMS-201A and 0.03 g/t for SMS-201B.

SMS-202 consisted of 485.5 grams of Labiche Shale from drill hole 7BK06, mixed with 14.5 grams of Canmet Standard MA-1b with a certified grade of 17.00 ± 0.3 g/t gold, for a calculated average sample grade of 0.49 g/t gold. This sample was treated exactly as SMS-201A and SMS-201B and returned a calculated head grade of 0.49 g/t (0.45 g/t, if products with less than detection limit gold are given a grade of zero instead of the detection limit grade)

SMS-203, another 500-gram split of 7AS02-old, was not deflocculated, but otherwise treated identically to the above samples and had a calculated head grade of 0.02 g/t gold.

The deflocculated Strathcona samples have calculated head grades of <0.08 to <0.10 g/t gold or 0.03 to 0.06 g/t gold if values below detection limits are treated as zero. The un-treated sample returned 0.05 (0.02) g/t. The standard sample returned 0.49 (0.45) g/t gold, which agrees very well with the calculated value. Slags from fire assaying were tested for the possibility of suspended gold not collected by the lead button during fusion by INAA. These assays all returned below detection limit (5 ppb) gold.

DISCUSSION

Prior to the Crowflight testing in the fall of 1998, two facts were known about gold in the Buckton and Asphalt 2WS mudstone horizon. Minor gold could be panned from streams, reportedly more so downstream of outcrops of 2WS, and outcrop and core samples had returned practically no gold from fire assays and INAA assays (due to the lower detection limit of the INAA method, gold assays generally below 10 ppb were reported).

Gold in the Second White Specks Formation

The 2WS is an unlikely host for gold according to conventional geological thinking, however, two genetical concepts for the occurrence of gold have been discussed. One is gold being transported by brines together with other metals into the euxinic-facies sediment, resulting in very fine-grained gold. The other possibility - if one accepts that the source of the panned gold is the 2WS - is for gold being transported as particulate gold together with other heavy minerals into the 2WS sedimentary basin, which would explain the rather large size of the panned gold grains as compared to the very fine clay-size constituents of the mudstone. The gold grains would then be part of a Cretaceous-age paleoplacer assemblage and it was for this reason that the coarser clastic portions of 7BK02 were used for heavy liquid separation, since they offered the best chance of finding this type of gold.

The assays of heavy liquid mineral concentrates clearly show that gold is part of the heavy mineral assemblage of detrital horizons in the 2WS, since gold is highly increased in these samples from the trace levels found in rock assays. No visible gold could be seen under the microscope in the very fine-grained heavy mineral concentrates. The mode of gold occurrence is therefore still unknown, and gold could occur as fine flakes, or intergrown with other minerals, e.g., pyrite or arsenopyrite. While this work has confirmed minor gold in the 2WS, it has not proven that gold found in stream sediments is derived from this formation, although Tintina reports a good correlation between the distribution of surface exposures of 2WS and gold occurrence in drainages, which supports the concept of gold shedding from 2WS outcrops.

It is also conceivable that gold in streams of the Birch Mountains originates from remote sources, e.g., the Rocky Mountains or the Canadian Shield, and was transported to Northeastern Alberta during the course of the erosional and glacial history of the area. This would require that gold re-crystallized to form the high-fineness, pristine grains described by Tintina, which may be possible from the findings in a study by Giusti (1983), who describes three types of placer gold from Alberta rivers - detrital, re-crystallized and "new gold" and/or gold associated with carbonaceous material.

If one accepts that the 2WS is the source of the gold panned from rivers and drainages, one explanation for the lack of gold assays in the core samples is the relative small size of the samples (10 to 30 grams) which may not have captured the odd gold grain in the rock. This of course has consequences for the economic potential of the 2WS, since one would expect to see some of the assays report higher gold values to have any hope for a mineable deposit, even at low average grades of around one gram gold per tonne. The combined weight of all samples assayed by Tintina, Strathcona and Crowflight at reputable laboratories with fire assays and INAA assays is more than 20 kilograms, and it is highly unlikely that all these assays missed a gold deposit.

Sudbury Tests

When significant gold values were found in the Ortech composite after this sample was deflocculated with the Ateba process at the Ateba (Claytech) laboratory in Sudbury during the Crowflight testing in late 1998, one of the explanations was that very fine (micron-size) gold was encapsulated in clay and somehow was released during the deflocculation process. However, this concept is not supported by

- the size and nature of the gold particles found in the Sudbury table concentrates (30 to 130 microns),

- the lack of gold in previous INAA assays, which should have detected the gold irrespective of its fineness.

While the Ateba process allows better gravity recovery of gold from clay-rich material, it is highly unlikely, and not a claim put forward by Ateba, that the process will make gold detectable in samples which otherwise would show no or very little gold during conventional assaying. The remaining alternative theory for the explanation for the gold was that the rather large grains (compared to the overall small size of the 2WS mudstone components) were part of the core, but had somehow escaped previous assaying attempts. This concept could be supported by gold particles of similar size and composition panned from streams and drainages on Tintina properties.

The gold grains seen in polished sections of the Sudbury concentrates are associated with foreign iron particles and goethite which are not part of the primary, stable 2WS mudstone mineral assemblage, characterized by reduced mineral species including pyrite and marcasite and organic matter. While some oxidation of the Ortech sample along its process history cannot be categorically excluded, it is more likely that the gold grains are not part of the original 2WS mineral assemblage, but are from a surficial deposit that underwent oxidation. Oxidized outcrops of 2WS exist on the Asphalt property - at GOS traces of gold were found in trench assays (maximum of 90 ppb) and in panned surface samples - however, gold with iron oxide rims should not occur in core samples together with fine-grained pyrite and marcasite. The lack of obvious gold-silver zoning indicates that the grains were probably not exposed to long periods of weathering, which generally causes a silver depletion of the rim. More SEM work would be necessary to better characterize the grains.

The high fineness of the gold grains from the Sudbury tests is similar to the fineness reported from panned gold from the Tintina properties (verbal communication by Shahe Sabag). Alluvial gold found in other Alberta rivers may have a similar fineness of up to about 95% gold (Giusti, 1983). Generally, the fineness of gold increases downstream with distance from the source, however, this was apparently not confirmed by Giusti for the Alberta rivers, although in his conclusions he refers only to the core of gold grains, and not the bulk composition of the grains.

While the gold-silver content of gold grains from Tintina's panned samples and the Sudbury grains may suggest a similar, alluvial rather than primary origin for both, the similarities do not prove that the grains are from the same location and rock formation. Even if they are, it remains to be confirmed that the gold found by panning is derived from outcrops of 2WS, and that most important, 30-130 micron gold without iron oxide rims can also be recovered from other core samples.

In the light of all the above and the lack of similar gold assays, or similar gold grains found in core samples during the assay audit, the most logical explanation for the gold grains appearing during the Sudbury test work is a source other than the Ortech Composite. The source of the gold may be contaminated equipment used during the processing.

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APPENDIX I

ASSAY CERTIFICATES

LAKEFIELD RESEARCH LIMITED
P.O. Box 4300, 185 Concession St., Lakefield, Ontario, KOL 2HO
Phone : 705-652-2038 - FAX : 705-652-6441

Strathcona Mineral Services
12th Floor, 20 Toronto Street
Toronto, Ontario, M5C 2B8 - Canada

Attn : Reinhard Guttenberg
Fax : 416-367-3638

Lakefield, February 10, 1999

Date Rec. : February 5, 1999
LR. Ref. : FEB9030.R99
Reference : Cleaning Sands
Project : 9900336

CERTIFICATE OF ANALYSIS

Cleaning Sands

No.	Sample ID	Au g/t	WT. Pulv. g
1	SMS-01	< 0.02	58.4
2	SMS-04	< 0.02	62.9
3	SMS-09	< 0.02	62.2
4	SMS-17	< 0.02	66.6
5	SMS-25	< 0.02	49.2
6	SMS-33	< 0.02	45.2
7	SMS-41	< 0.02	54.0
8	SMS-49	< 0.02	47.8
9	SMS-57	< 0.02	65.9
10	SMS-65	< 0.02	52.4
-- Check --			
11	SMS-65	< 0.02	--



Roch Marion, B.Sc., C.Chem.
Assistant Manager, Analytical Services

A MEMBER OF IAETL CANADA
Accredited by the Standards Council of Canada in partnership with CAEAL to the ISO/IEC Guide 25 standard for specific registered tests.
The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior written approval.

File : 2005-3

LAKEFIELD RESEARCH LIMITED

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Strathcona Mineral Services
12th Floor, 20 Toronto Street
Toronto, Ontario, M5C 2B8 - Canada

Attn : Reinhard Guttenberg
Fax : 416-367-3638

Lakefield, February 17, 1999

Date Rec. : February 5, 1999
LR. Ref. : FEB9029.R99
Reference : N/A
Project : 9900336

CERTIFICATE OF ANALYSIS

No.	Sample ID	Au fire assy g/t	Au fire assy wt g	Ag g/t	ScreenWt grams	+150 g	-150 g	Loss g	% Passing
1	SMS-01 A	< 0.02	30.14	< 0.5	49.9	1.6	48.1	0.2	96.8
2	SMS-01 B	< 0.02	30.08	--	--	--	--	--	--
3	SMS-01 C	< 0.02	30.00	--	--	--	--	--	--
4	SMS-01 D	< 0.02	30.09	--	--	--	--	--	--
5	SMS-01 E	< 0.02	30.04	--	--	--	--	--	--
6	SMS-01 F	< 0.02	28.24	--	--	--	--	--	--
7	SMS-04 A	0.02	30.39	< 0.5	49.9	1.7	48.1	0.1	96.6
8	SMS-04 B	< 0.02	30.02	--	--	--	--	--	--
9	SMS-04 C	< 0.02	30.13	--	--	--	--	--	--
10	SMS-04 D	< 0.02	30.13	--	--	--	--	--	--
11	SMS-04 E	< 0.02	30.09	--	--	--	--	--	--
12	SMS-04 F	< 0.02	37.35	--	--	--	--	--	--
13	SMS-09 A	0.02	30.12	< 0.5	50.0	2.1	47.7	0.2	95.8
14	SMS-09 B	< 0.02	30.24	--	--	--	--	--	--
15	SMS-09 C	0.02	30.11	--	--	--	--	--	--
16	SMS-09 D	< 0.02	30.21	--	--	--	--	--	--
17	SMS-09 E	0.02	37.22	--	--	--	--	--	--
18	SMS-17 A	< 0.02	30.03	< 0.5	126.0	1.4	123.7	0.9	98.9
19	SMS-17 B	< 0.02	30.16	--	--	--	--	--	--
20	SMS-17 C	< 0.02	30.02	--	--	--	--	--	--
21	SMS-17 D	< 0.02	30.98	--	--	--	--	--	--
22	SMS-25 A	< 0.02	30.04	< 0.5	50.0	2.3	47.4	0.3	95.4
23	SMS-25 B	< 0.02	30.14	--	--	--	--	--	--
24	SMS-25 C	< 0.02	30.04	--	--	--	--	--	--
25	SMS-25 D	< 0.02	24.60	--	--	--	--	--	--
26	SMS-33 A	< 0.02	30.27	< 0.5	50.0	0.7	49.2	0.1	98.6
27	SMS-33 B	< 0.02	30.18	--	--	--	--	--	--
28	SMS-33 C	< 0.02	30.51	--	--	--	--	--	--
29	SMS-33 D	< 0.02	42.96	--	--	--	--	--	--
30	SMS-41 A	< 0.02	30.14	< 0.5	50.0	1.1	48.8	0.1	97.8
31	SMS-41 B	< 0.02	30.11	--	--	--	--	--	--
32	SMS-41 C	< 0.02	30.09	--	--	--	--	--	--
33	SMS-41 D	< 0.02	23.32	--	--	--	--	--	--
34	SMS-49 A	0.02	33.28	< 0.5	50.0	0.3	49.6	0.1	99.4
35	SMS-49 B	0.02	33.69	--	--	--	--	--	--
36	SMS-49 C	0.02	32.62	--	--	--	--	--	--
37	SMS-49 D	0.02	15.00	--	--	--	--	--	--
38	SMS-57 A	< 0.02	30.86	< 0.5	49.9	1.4	48.3	0.2	97.2
39	SMS-57 B	< 0.02	30.02	--	--	--	--	--	--

LAKEFIELD RESEARCH LIMITED

P.O. Box 4300, 185 Concession St., Lakefield, Ontario, KOL 2HO
Phone : 705-652-2038 - FAX : 705-652-6441

FEB9029.R99

No.	Sample ID	Au fire assy g/t	Au fire assy wt g	Ag g/t	ScreenWt grams	+150 g	-150 g	Loss g	% Passing
40	SMS-57 C	< 0.02	36.54	--	--	--	--	--	--
41	SMS-65 A	0.02	30.72	< 0.5	49.9	1.6	48.1	0.2	96.8
42	SMS-65 B	0.02	30.13	--	--	--	--	--	--
43	SMS-65 C	0.03	24.16	--	--	--	--	--	--
44	SMS-73 A	1.44	32.77	1.5	49.9	--	49.8	0.1	99.8
45	SMS-73 B	1.43	31.02	--	--	--	--	--	--
46	SMS-73 C	1.46	41.36	--	--	--	--	--	--
- Check --									
47	SMS-65	--	--	< 0.5	--	--	--	--	--

[redacted]

Roch Marion, B.Sc., C.Chem.
Assistant Manager, Analytical Services

A MEMBER OF IAETL CANADA

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File 2005-3

LAKEFIELD RESEARCH LIMITED

P.O. Box 4300, 185 Concession St., Lakefield, Ontario, KOL 2HO
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Attn : Henrik Thalenhorst
Fax : 416-367-3638

Lakefield, February 18, 1999

Date Rec. : February 12, 1999
LR. Ref. : FEB9061.R99
Reference : N/A
Project : 9900421

CERTIFICATE OF ANALYSIS

No.	Sample ID	Plus 80 g	Minus 80 g	Au FAS g/t	Weight g
1	SMS-8 +80 A	140.37	--	0.02	30.15
2	SMS-8 +80 B	--	--	< 0.02	30.37
3	SMS-8 +80 C	--	--	0.02	30.19
4	SMS-8 +80 D	--	--	< 0.02	30.13
5	SMS-8 +80 E	--	--	< 0.02	16.25
6	SMS-8 -80	--	37.10	0.04	36.81
7	SMS-16 +80 A	109.78	--	< 0.02	30.36
8	SMS-16 +80 B	--	--	< 0.02	30.24
9	SMS-16 +80 C	--	--	< 0.02	30.33
10	SMS-16 +80 D	--	--	0.03	18.66
11	SMS-16 -80	--	37.39	< 0.02	37.26
12	SMS-24 +80 A	91.71	--	< 0.02	30.65
13	SMS-24 +80 B	--	--	0.03	30.14
14	SMS-24 +80 C	--	--	< 0.02	30.77
15	SMS-24 -80	--	32.64	0.02	32.55
16	SMS-31 +80 A	88.62	--	0.03	30.53
17	SMS-31 +80 B	--	--	< 0.02	30.28
18	SMS-31 +80 C	--	--	0.02	27.72
19	SMS-31 -80	--	30.35	< 0.02	30.28
20	SMS-40 +80 A	105.94	--	0.04	30.51
21	SMS-40 +80 B	--	--	0.02	30.39
22	SMS-40 +80 C	--	--	0.02	30.29
23	SMS-40 +80 D	--	--	0.02	14.54
24	SMS-40 -80	--	31.53	< 0.02	31.50
25	SMS-47 +80 A	88.88	--	< 0.02	30.01
26	SMS-47 +80 B	--	--	< 0.02	30.02
27	SMS-47 +80 C	--	--	< 0.02	28.67
28	SMS-47 -80	--	25.96	< 0.02	26.10
29	SMS-48 +80 A	93.67	--	< 0.02	30.00
30	SMS-48 +80 B	--	--	< 0.02	30.02
31	SMS-48 +80 C	--	--	< 0.02	33.44
32	SMS-48 -80	--	24.36	< 0.02	24.27
33	SMS-55 +80 A	85.90	--	< 0.02	30.02
34	SMS-55 +80 B	--	--	< 0.02	30.02
35	SMS-55 +80 C	--	--	< 0.02	25.72
36	SMS-55 -80	--	32.36	0.03	32.36
37	SMS-63 +80 A	81.90	--	< 0.02	30.01
38	SMS-63 +80 B	--	--	< 0.02	30.02
39	SMS-63 +80 C	--	--	< 0.02	18.70

LAKEFIELD RESEARCH LIMITED
P.O. Box 4300, 185 Concession St., Lakefield, Ontario, KOL 2HO
Phone : 705-652-2038 - FAX : 705-652-6441

FEB9061.R99

No.	Sample ID	Plus 80 g	Minus 80 g	Au FAS g/t	Weight g
40	SMS-63 -80	--	16.33	< 0.02	16.10
41	SMS-71 +80 A	69.60	--	< 0.02	36.29
42	SMS-71 +80 B	--	--	< 0.02	33.23
43	SMS-71 -80	--	17.71	0.02	17.63
44	SMS-78 +80	0.00	--	--	--
45	SMS-78 -80 A	--	76.28	1.62	30.03
46	SMS-78 -80 B	--	--	1.39	30.04
-- Check --					
47	SMS-78 -80 C	--	--	1.28	13.17



Roch Marion, B.Sc., C.Chem.
Assistant Manager, Analytical Services

A MEMBER OF IAETL CANADA
Accredited by the Standards Council of Canada in partnership with CAEAL to the ISO/IEC Guide 25 standard for specific registered tests.
The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior written approval.

File 2005-3

Actlabs

Invoice No.: 16996
Work Order: 17155
Invoice Date: 23-FEB-99
Date Submitted: 08-FEB-99
Your Reference: 2205-3
Account Number: 110

STRATHCONA MINERAL SERVICES LTD
12TH FLOOR, 20 TORONTO ST.
TORONTO, ONTARIO
M C 2B8

ATTN: REINHARD VON GUTTENBERG

CERTIFICATE OF ANALYSIS

22 CRUSHED CORES(PREP.REV3) were submitted for analysis.

The following analytical packages were requested. Please see our current fee schedule for elements and detection limits.

REPORT 16996 CODE 1D ENHANCED INAA(INAAGEO.REV1)
REPORT 16996 B CODE 1E-AG-AQUA REGIA ICP(AQUAJA.REV3)
REPORT 16996 C CODE 1A2-FIRE ASSAY AA

This report may be reproduced without our consent. If only selected portions of the report are reproduced, permission must be obtained. If no instructions were given at time of sample submittal regarding excess material, it will be discarded within 90 days of this report. Our liability is limited solely to the analytical cost of these analyses. Test results are representative only of material submitted for analysis.

CERTIFIED BY :

[redacted]

DR E.HOFFMAN/GENERAL MANAGER

ACTIVATION LABORATORIES LTD.
1336 Sandhill Drive, Ancaster, Ontario Canada L9G 4V5 TELEPHONE +1.905.648.9611 or +1.888.228.5227 FAX +1.905.648.9613
E-MAIL ancaster@actlabs.com ACTLABS GROUP WEBSITE http://www.actlabs.com

Sample description	AU PPB	Mass g
SMS-03-1	10	36.93
SMS-03-2	5	38.90
SMS-03-3	6	38.46
SMS-03-4	10	34.61
SMS-03-5	8	30.05
SMS-11-1	7	38.28
SMS-11-2	4	39.67
SMS-11-3	7	40.00
SMS-11-4	8	39.70
SMS-19-1	9	38.76
SMS-19-2	<2	19.71
SMS-19-3	4	32.26
SMS-19-4	11	31.48
SMS-20-1	10	33.83
SMS-20-2	7	31.29
SMS-20-3	6	33.84
SMS-20-4	8	23.28
SMS-27-1	8	37.29
SMS-27-2	<2	38.06
SMS-27-3	7	37.82
SMS-35-1	5	36.06
SMS-35-2	<2	35.22
SMS-35-3	8	36.78
SMS-35-4	5	35.26
SMS-43-1	6	40.16
SMS-43-2	6	38.66
SMS-43-3	4	39.92
SMS-51-1	11	35.94
SMS-51-2	15	38.30
SMS-51-3	13	39.96
SMS-59-1	<2	34.74
SMS-59-2	<2	37.08
SMS-59-3	2	35.62
SMS-67-1	9	34.75
SMS-67-2	13	37.09
SMS-67-3	15	34.16
SMS-75-1	1400	33.42
SMS-75-2	1230	35.24
SMS-75-3	1540	34.20
BLANK	<2	30.00
MA1B	16500	31.81
MA1B CERT	17000	
MA2B	1490	26.82
MA2B CERT	1390	
MA3B	9040	25.26

Sample description	AU PPB	Mass g
MA3B CERT	8560	

SAMPLE	Ag ppm
SMS-2	0.5
SMS-10	0.5
SMS-12	0.5
SMS-18	0.6
SMS-26	0.6
SMS-34	0.4
SMS-42	0.5
SMS-50	0.6
SMS-58	-0.2
SMS-58/R	-0.2
SMS-66	0.4
SMS-74	2.8
METHOD REAGENT BLANK	-0.2
METHOD REAGENT BLANK	-0.2
GXR-6cert	1.3
GXR-6	0.2
GXR-2cert	17
GXR-2	19
GXR-1cert	31
GXR-1	31
GXR-4cert	4
GXR-4	3.6

Note: Certificate data underlined are recommended values; other values are proposed except those preceded by a "(" which are information values.

Clients are advised to obtain assays for Ag > 100 ppm and Pb > 5000 ppm due to potential solubility problems.
Values for Cu, Ni, Zn, Mo greater than 1% should be assayed if accuracy better than +/-10-15% is required.
Values above 1% are for informational purposes only and should not be relied upon for promotional or ore reserve calculations.
Assays are recommended for this purpose.

[redacted]
Adrienne I. Rittau, B.Sc., C.Chem
ICP Technical Manager

Negative values indicate less than the detection limit
99999 indicates greater than 10%, the linear working range of the instrument

SAMPLE	Au ppb	Au ppb	Au ppb	Au ppb	Au ppb	Au ppb	Au ppb	Au ppb	Au ppb	Au ppb
SMS-2	-5	-5	-5	-5	-5	-5	-5	-5	-5	
SMS-10	-5	-5	-5	-5	-5	-5	-5			
SMS-12	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5
SMS-18	-5	-5	-5	-5	-5	-5	-5			
SMS-26	-5	-5	-5	-5	-5					
SMS-34	-5	-5	-5	-5	-5	-5	-5	-5	-5	
SMS-42	-5	-5	-5	-5	-5	-5	-5			
SMS-50	-5	-5	-5	-5	-5	-5	-5			
SMS-58	-5	-5								
SMS-66	-5	-5	-5	-5	-5	-5	-5			
SMS-74	1150	1350								
SMS-2-1 cleaner	-5	-5								
SMS-10-1 cleaner	-5	-5								
SMS-12-1 cleaner	-5	-5								
SMS-18-1 cleaner	-5	-5								
SMS-26-1 cleaner	-5	-5								
SMS-34-1 cleaner	-5	-5								
SMS-42-1 cleaner	-5	-5								
SMS-50-1 cleaner	-5	-5								
SMS-58-1 cleaner	-5	-5								
SMS-66-1 cleaner	-5	-5								
SMS-74-1 cleaner	5	-5								

To : **TINTINA MINES LTD.**
Suite 218, 920 Yonge Street
Toronto, Ontario
M4W 3C7
ATTN : S. Sabag

Certificate of Assay

Loring Laboratories Ltd.

629 Beaverdam Road, NE Calgary Alberta
Tel: (403)274-2777 Fax (403)275-0541

File No : **40910**
Date : February 24, 1999
Samples :
Project :
P.O.#

Analytical Lot # AS090299

Sent by Strathcona Minerals

Sample No.	Sample Weight grams	Gold Weight mg	Total Weight +80 Mesh	Gold oz/ton	% By Wt.
SMS-7				0.190	
				0.037	15.77
-80 mesh	28.160	0.036		0.219	84.23
+80 mesh	30.000	0.250	150.382		
	30.000	0.230			
	30.000	0.215			
	30.000	0.227			
	30.382	0.206			
SMS-15				0.142	
				0.015	28.51
-80 mesh	41.930	0.022		0.192	71.49
+80 mesh	26.000	0.200	105.157		
	26.000	0.150			
	26.000	0.180			
	27.157	0.164			
SMS-23				0.044	
				0.015	28.28
-80 mesh	33.984	0.017		0.055	71.72
+80 mesh	29.000	0.057	86.185		
	29.000	0.055			
	28.185	0.051			
SMS-30				0.033	
				0.015	27.64
-80 mesh	30.954	0.016		0.040	72.36
+80 mesh	27.000	0.045	81.024		
	27.000	0.039			
	27.024	0.028			

I HEREBY CERTIFY that the above results are those assays made by me upon the herein described samples :

[redacted]
Assayer

Rejects and pulps are retained for one month unless specific arrangements are made in advance.

To : **TINTINA MINES LTD.**
Suite 218, 920 Yonge Street
Toronto, Ontario
M4W 3C7
ATTN : S. Sabag

Certificate of Assay

Loring Laboratories Ltd.

629 Beaverdam Road, NE Calgary Alberta
Tel: (403)274-2777 Fax: (403)275-0541

File No : **40910**
Date : February 24, 1999
Samples :
Project :
P.O.#

Analytical Lot # AS090299

Sent by Strathcona Minerals

Sample No.	Sample Weight grams	Gold Weight mg	Total Weight +80 Mesh	Gold oz/ton	% By Wt.
SMS-38				0.028	
				0.011	23.31
-80 mesh	31.516	0.012		0.033	76.69
+80 mesh	26.000	0.037	103.675		
	26.000	0.027			
	26.000	0.027			
	25.675	0.028			
SMS-39				0.020	
				0.012	23.55
-80 mesh	32.253	0.013		0.023	76.45
+80 mesh	27.000	0.023	104.713		
	27.000	0.021			
	27.000	0.023			
	23.713	0.015			
SMS-46				0.040	
				0.081	22.58
-80 mesh	23.903	0.066		0.028	77.42
+80 mesh	28.000	0.028	81.943		
	28.000	0.033			
	25.943	0.018			
SMS-54				0.037	
				0.048	23.78
-80 mesh	27.088	0.045		0.033	76.22
+80 mesh	29.000	0.034	86.836		
	29.000	0.035			
	28.836	0.028			

I HEREBY CERTIFY that the above results are those assays made by me upon the herein described samples :

[redacted]
Assayer

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To : **TINTINA MINES LTD.**
Suite 218, 920 Yonge Street
Toronto, Ontario
M4W 3C7
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Certificate of Assay

Loring Laboratories Ltd.

629 Beaverdam Road, NE Calgary Alberta
Tel: (403)274-2777 Fax: (403)275-0541

File No : **40910**
Date : February 24, 1999
Samples :
Project :
P.O.#

Analytical Lot # AS090299

Sent by Strathcona Minerals

Sample No.	Sample Weight grams	Gold Weight mg	Total Weight +80 Mesh	Gold oz/ton	% By Wt.
SMS-62				0.016	
				0.007	14.08
-80 mesh	13.646	0.003		0.018	85.92
+80 mesh	27.000	0.014	79.589		
	27.000	0.018			
	25.589	0.016			
SMS-70				0.024	
				0.036	23.20
-80 mesh	23.203	0.029		0.021	76.80
+80 mesh	26.000	0.021	76.820		
	26.000	0.019			
	24.820	0.014			
SMS-77				0.856	
-80 mesh	38.000	1.095			
	37.930	1.134			
+80 mesh	NIL	—	—	—	

I HEREBY CERTIFY that the above results are those assays made by me upon the herein described samples :

[redacted]
Assayer

Rejects and pulps are retained for one month unless specific arrangements are made in advance.

CHAUNCEY ASSAY LABORATORIES LTD.

33 Chaunc[illegible] Avenue, Toronto, Ontario, [illegible]8Z 2Z2
Tel: (416) 239-3527 FAX: (416) 239-4012

File 2005-3

CERTIFICATE OF ANALYSIS

RECEIVED FROM: STRATHCONA MINERAL SERVICES DATE: FEBRUARY 25, 1999

REPORT NO. MI-3947-01 SAMPLE OF: CRUSHED CORE

DATE RECEIVED: FEBRUARY 8, 1999 ATTENTION: MR. REINHARD VON GUTTENBERG

PROJECT 2205-3

SAMPLES RECEIVED IN A SEALED BAG IDENTIFIED AS A008662

SCREEN TEST - 150 MESH

SAMPLE NO:	WEIGHT TAKEN IN GRAMS	+150 MESH IN GRAMS	-150 MESH %
SMS-5	50.19	1.72	96.6
SMS-13	51.01	1.92	96.2
SMS-21	50.51	1.78	96.5
SMS-28	44.89	.58	98.7
SMS-29	50.03	2.24	95.5
SMS-36	50.96	2.70	94.7
SMS-44	50.29	2.17	95.7
SMS-52	50.26	1.73	96.6
SMS-60	50.52	1.92	96.2
SMS-68	50.90	2.42	95.2
SMS-76	51.54	.17	99.7

[redacted]

J van Engelen Mgr.

CHAUNCEY ASSAY LABORATORIES LTD.

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Tel: (416) 239-3527 FAX: (416) 239-4012

CERTIFICATE OF ANALYSIS

RECEIVED FROM: STRATHCONA MINERAL SERVICES DATE: FEBRUARY 25, 1999

REPORT NO. MI-3947-02 SAMPLE OF: CRUSHED CORE

DATE RECEIVED: FEBRUARY 8, 1999 ATTENTION: MR. REINHARD VON GUTTENBERG

SAMPLE NO:	TOTAL SAMPLE WEIGHT ASSAYED IN GRAMS	TOTAL Au IN PPB *
SMS-5	166.63	1847
SMS-13	139.55	310
SMS-21	117.10	681
SMS-28	110.42	361
SMS-29	109.33	1982
SMS-36	132.14	313
SMS-44	107.85	45
SMS-52	110.04	2140
SMS-60	96.04	666
SMS-68	98.74	593
SMS-76	73.11	1984

*DONE BY 30 GRAM FIRE ASSAY

[redacted]

J van Engelen Mgr.

CHAUNCEY ASSAY LABORATORIES LTD.

33 Chaunc[illegible] Avenue, Toronto, Ontario, [illegible]8Z 2Z2
Tel: (416) 239-3527 FAX: (416) 239-4012

CERTIFICATE OF ANALYSIS

RECEIVED FROM: STRATHCONA MINERAL SERVICES DATE: FEBRUARY 25, 1999

REPORT NO. MI-3947-03 SAMPLE OF: CRUSHED CORE

DATE RECEIVED: FEBRUARY 8, 1999 ATTENTION: MR. REINHARD VON GUTTENBERG

SILICA SAND TEST

SAMPLE NO:	WEIGHT OF SAND TAKEN IN GRAMS	WEIGHT OF SAND RECOVERED IN GRAMS	Au IN MICROGRAMS *
SMS-5	25.00	24.43	< 1
SMS-13	26.02	25.26	< 1
SMS-21	25.03	23.98	17.5
SMS-28	25.04	23.85	12.5
SMS-29	24.60	23.49	113.8
SMS-36	24.36	23.04	14.4
SMS-44	25.35	24.72	< 1
SMS-52	25.28	24.01	50.8
SMS-60	25.00	23.60	5.2
SMS-68	25.84	23.60	38.9
SMS-76	25.26	23.87	15.4

*THIS Au AMOUNT IS INCLUDED IN THE TOTAL Au ASSAY ON PAGE 2

[redacted]

J van Engelen Mgr.

CHAUNCEY ASSAY LABORATORIES LTD.
33 Chaunce Avenue, Toronto, Ontario, M8Z 2Z2
Tel: (416) 239-3527 FAX: (416) 2[illegible]-4012

CERTIFICATE OF ANALYSIS

RECEIVED FROM: STRATHCONA MINERAL SERVICES DATE: FEBRUARY 25, 1999

REPORT NO. MI-3947-04 SAMPLE OF: CRUSHED CORE

DATE RECEIVED: FEBRUARY 8, 1999 ATTENTION: MR. REINHARD VON GUTTENBERG

SAMPLE NO: SMS-05

	SAMPLE WEIGHT IN GRAMS	Au IN MICROGRAMS
	25.40	47.0
	25.31	36.4
	25.31	96.5
	27.99	76.3
	25.74	32.3
	36.88	19.2
SAND	24.44 *	< 1
	BLANK	.1
TOTALS:	166.63	307.7

SAMPLE NO: SMS-13

	SAMPLE WEIGHT IN GRAMS	Au IN MICROGRAMS
	23.55	26.0
	23.83	4.0
	24.42	3.0
	25.32	10.2
	23.45	< 1
	18.98	< 1
SAND	25.26 *	< 1
	BLANK	.1
TOTALS:	139.55	43.2

*SAND WEIGHT IS NOT INCLUDED IN TOTAL SAMPLE WEIGHTS

BLANK HAS ALREADY BEEN SUBTRACTED FROM Au VALUES.

[redacted]

J van Engelen Mgr.

CHAUNCEY ASSAY LABORATORIES LTD.
33 Chaunce Avenue, Toronto, Ontario, M8Z 2Z2
Tel: (416) 239-3527 FAX: (416) 2[illegible]-4012

CERTIFICATE OF ANALYSIS

RECEIVED FROM: STRATHCONA MINERAL SERVICES DATE: FEBRUARY 25, 1999

REPORT NO. MI-3947-05 SAMPLE OF: CRUSHED CORE

DATE RECEIVED: FEBRUARY 8, 1999 ATTENTION: MR. REINHARD VON GUTTENBERG

SAMPLE NO: SMS-21

	SAMPLE WEIGHT IN GRAMS	Au IN MICROGRAMS
	24.32	7.9
	24.14	18.0
	24.29	20.0
	22.07	8.1
	22.28	8.2
SAND	23.98 *	17.5
	BLANK	.2
TOTALS:	117.10	79.7

SAMPLE NO: SMS-28

	SAMPLE WEIGHT IN GRAMS	Au IN MICROGRAMS
	28.26	13.6
	27.31	2.7
	25.98	1.2
	28.87	9.9
SAND	23.85 *	12.5
	BLANK	.1
TOTALS:	110.42	39.9

*SAND WEIGHT IS NOT INCLUDED IN TOTAL SAMPLE WEIGHTS

BLANK HAS ALREADY BEEN SUBTRACTED FROM Au VALUES

[redacted]

J van Engelen Mgr.

CHAUNCEY ASSAY LABORATORIES LTD.
33 Chaunc[illegible] Avenue, Toronto, Ontario, M8Z 2Z2
Tel: (416) 239-3527 FAX: (416) [illegible]-4012

CERTIFICATE OF ANALYSIS

RECEIVED FROM: STRATHCONA MINERAL SERVICES DATE: FEBRUARY 25, 1999

REPORT NO. MI-3947-07 SAMPLE OF: CRUSHED CORE

DATE RECEIVED: FEBRUARY 8, 1999 ATTENTION: MR. REINHARD VON GUTTENBERG

SAMPLE NO: SMS-44

	SAMPLE WEIGHT IN GRAMS	Au IN MICROGRAMS
	26.68	< 1
	27.58	1.0
	26.40	3.8
	27.19	< 1
SAND	24.72 *	< 1
	BLANK	.2
TOTALS:	107.85	4.8

SAMPLE NO: SMS-52

	SAMPLE WEIGHT IN GRAMS	Au IN MICROGRAMS
	29.06	50.9
	29.90	58.8
	29.40	43.0
	21.68	32.1
SAND	24.01 *	50.8
	BLANK	.3
TOTALS:	110.04	235.6

*SAND WEIGHT IS NOT INCLUDED IN TOTAL SAMPLE WEIGHTS

BLANK HAS ALREADY BEEN SUBTRACTED FROM Au VALUES

[redacted]

J van Engelen Mgr.

CHAUNCEY ASSAY LABORATORIES LTD.
33 Chauncey Avenue, Toronto, Ontario, M8Z 2Z2
Tel: (416) 239-3527 FAX: (416) 2[illegible]-4012

CERTIFICATE OF ANALYSIS

RECEIVED FROM: STRATHCONA MINERAL SERVICES DATE: FEBRUARY 25, 1999

REPORT NO. MI-3947-06 SAMPLE OF: CRUSHED CORE

DATE RECEIVED: FEBRUARY 8, 1999 ATTENTION: MR. REINHARD VON GUTTENBERG

SAMPLE NO: SMS-29

	SAMPLE WEIGHT IN GRAMS	Au IN MICROGRAMS
	29.90	32.1
	29.61	30.4
	26.96	23.7
	22.86	16.7
SAND	23.49 *	113.8
	BLANK	.1
TOTALS:	109.33	216.7

SAMPLE NO: SMS-36

	SAMPLE WEIGHT IN GRAMS	Au IN MICROGRAMS
	35.99	8.6
	34.69	7.6
	34.78	6.2
	26.68	4.6
SAND	23.01 *	14.4
	BLANK	.1
TOTALS:	132.14	41.4

*SAND WEIGHT IS NOT INCLUDED IN TOTAL SAMPLE WEIGHTS

BLANK HAS ALREADY BEEN SUBTRACTED FROM Au VALUES

[redacted]

J van Engelen Mgr.

CHAUNCEY ASSAY LABORATORIES LTD.
33 Chauncey Avenue, Toronto, Ontario, M8Z 2Z2
Tel: (416) 239-3527 FAX: (416) 2 -4012

CERTIFICATE OF ANALYSIS

RECEIVED FROM: STRATHCONA MINERAL SERVICES DATE: FEBRUARY 25, 1999

REPORT NO. MI-3947-08 SAMPLE OF: CRUSHED CORE

DATE RECEIVED: FEBRUARY 8, 1999 ATTENTION: MR. REINHARD VON GUTTENBERG

SAMPLE NO: SMS-60

	SAMPLE WEIGHT IN GRAMS	Au IN MICROGRAMS
	27.39	16.7
	24.60	17.6
	23.75	11.4
	20.40	13.1
SAND	23.60 *	5.2
	BLANK	.1
TOTALS:	96.14	64.0

SAMPLE NO: SMS-68

	SAMPLE WEIGHT IN GRAMS	Au IN MICROGRAMS
	34.81	5.6
	31.29	7.9
	32.64	6.1
SAND	23.60 *	38.9
	BLANK	.3
TOTALS:	98.74	58.5

*SAND WEIGHT IS NOT INCLUDED IN TOTAL SAMPLE WEIGHTS

BLANK HAS ALREADY BEEN SUBTRACTED FROM Au VALUES

[redacted]

J van Engelen Mgr.

CHAUNCEY ASSAY LABORATORIES LTD.
33 Chaunce[illegible] Avenue, Toronto, Ontario, [illegible]8Z 2Z2
Tel: (416, [illegible]39-3527 FAX: (416) 2[illegible]-4012

CERTIFICATE OF ANALYSIS

RECEIVED FROM: STRATHCONA MINERAL SERVICES DATE: FEBRUARY 25, 1999

REPORT NO. MI-3947-09 SAMPLE OF: CRUSHED CORE

DATE RECEIVED: FEBRUARY 8, 1999 ATTENTION: MR. REINHARD VON GUTTENBERG

SAMPLE NO: SMS-76

	SAMPLE WEIGHT IN GRAMS	Au IN MICROGRAMS
	22.98	45.8
	27.30	48.1
	22.83	35.8
SAND	23.87 *	15.4
	BLANK	.2
TOTALS:	73.11	145.1

*SAND WEIGHT IS NOT INCLUDED IN TOTAL SAMPLE WEIGHTS

BLANK HAS ALREADY BEEN SUBTRACTED FROM Au VALUES

[redacted]

J van Engelen Mgr.

File 2005-3

LAKEFIELD RESEARCH LIMITED

P.O. Box 4300, 185 Concession St., Lakefield, Ontario, KOL 2HO
Phone : 705-652-2038 - FAX : 705-652-6441

Strathcona Mineral Services
12th Floor, 20 Toronto Street
Toronto, Ontario, M5C 2B8 - Canada

Attn : Reinhard Guttenberg
Fax : 416-367-3638

Lakefield, March 24, 1999

Date Rec. : March 22, 1999
LR. Ref. : MAR9085.R99
Reference : N/A
Project : 9900830

CERTIFICATE OF ANALYSIS

No.	Sample ID	Au g/t
1	79	< 0.02
2	86	< 0.02
3	87	0.29
4	88	< 0.02
5	97	< 0.02
6	106	< 0.02
7	115	< 0.02
8	124	< 0.02
9	135	< 0.02
10	142	< 0.02
11	149	< 0.02
12	156	< 0.02
13	163	< 0.02
14	170	< 0.02
15	177	< 0.02
16	184	< 0.02
17	191	< 0.02
-- Check --		
18	142	< 0.02

[redacted]

Roch Marion, B.Sc., C.Chem.
Assistant Manager, Analytical Services

A MEMBER OF IAETL CANADA

Accredited by the Standards Council of Canada in partnership with CAEAL to the ISO/IEC Guide 25 standard for specific registered tests.

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior written approval.

Chemex Labs Ltd.

Analytical Chemists * Geochemists * Registered Assayers

5175 Timberlea Blvd., Mississauga
Ontario, Canada L4W 2S3
PHONE: 905-624-2806 FAX: 905-624-6163

To: STRATHCONA MINERAL SERVICES LIMITED

12TH FLOOR, 20 TORONTO ST.
TORONTO, ON
M5C 2B8

A9914497

Comments: ATTN: REINHARD VON GUTTENBERG

CERTIFICATE A9914497

(DCG) - STRATHCONA MINERAL SERVICES LIMITED

Project: 2005-3
P.O. # :

Samples submitted to our lab in Mississauga, ON.
This report was printed on 01-APR-1999.

SAMPLE PREPARATION

CHEMEX CODE	NUMBER SAMPLES	DESCRIPTION
266	17	Special prep procedure
234	17	0-7 Kg splitting charge
3202	17	Rock - save entire reject

ANALYTICAL PROCEDURES

CHEMEX CODE	NUMBER SAMPLES	DESCRIPTION	METHOD	DETECTION LIMIT	UPPER LIMIT
494	17	Au g/t: Fuse 30 g sample	FA-AAS	0.005	10.00

Chemex Labs Ltd.

Analytical Chemists * Geochemists * Registered Assayers
5175 Timberlea Blvd., Mississauga
Ontario, Canada L4W 2S3
PHONE: 905-624-2806 FAX: 905-624-6163

To: STRATHCONA MINERAL SERVICES LIMITED

12TH FLOOR, 20 TORONTO ST.
TORONTO, ON
M5C 2B8

Project : 2005-3
Comments: ATTN: REINHARD VON GUTTENBERG

Page Number :1
Total Pages :1
Certificate Date: 01-APR-199
Invoice No. : I9914497
P.O. Number :
Account : DCG

CERTIFICATE OF ANALYSIS A9914497

SAMPLE	PREP CODE		Au g/t FA+AA
SMS-081	266	234	< 0.005
SMS-090	266	234	< 0.005
SMS-099	266	234	< 0.005
SMS-104	266	234	< 0.005
SMS-105	266	234	0.235
SMS-108	266	234	< 0.005
SMS-117	266	234	< 0.005
SMS-126	266	234	< 0.005
SMS-137	266	234	< 0.005
SMS-144	266	234	< 0.005
SMS-151	266	234	< 0.005
SMS-158	266	234	< 0.005
SMS-165	266	234	< 0.005
SMS-172	266	234	< 0.005
SMS-179	266	234	< 0.005
SMS-186	266	234	< 0.005
SMS-193	266	234	< 0.005

CERTIFICATION

File 2005-3

Actlabs

Invoice No.: 17234
Work Order: 17411
Invoice Date: 06-APR-99
Date Submitted: 25-MAR-99
Your Reference: PROJ 2005-3
Account Number: 110

STRATHCONA MINERAL SERVICES LTD
12TH FLOOR, 20 TORONTO ST.
TORONTO, ONTARIO
M5C 2B8

ATTN: REINHARD VON GUTTENBERG

CERTIFICATE OF ANALYSIS

17 PULPS were submitted for analysis.

The following analytical packages were requested. Please see our current fee schedule for elements and detection limits.

REPORT 17234 CODE 1D INAA(INAAGEO.REV1)

This report may be reproduced without our consent. If only selected portions of the report are reproduced, permission must be obtained. If no instructions were given at time of sample submittal regarding excess material, it will be discarded within 90 days of this report. Our liability is limited solely to the analytical cost of these analyses. Test results are representative only of material submitted for analysis.

CERTIFIED BY :

[redacted]

DR E.HOFFMAN/GENERAL MANAGER

ACTIVATION LABORATORIES LTD.
1336 Sandhill Drive, Ancaster, Ontario Canada L9G 4V5 TELEPHONE +1.905.648.9611 or +1.888.228.5227 FAX +1.905.648.9613
E-MAIL ancaster@actlabs.com ACTLABS GROUP WEBSITE http://www.actlabs.com

Sample description	AU PPB	AG PPM	AS PPM	BA PPM	BR PPM	CA %	CO PPM	CR PPM	CS PPM	FE %	HF PPM	HG PPM	IR PPB	MO PPM	NA %	NI PPM	RB PPM	SB PPM	SC PPM	SE PPM	SN %	SR %	TA PPM	TH PPM
SMS-80	14	<5	37	2300	22	<1	17	149	8	3.78	9	<1	<5	21	0.68	137	111	6.7	16.3	20	<0.05	<0.05	7	10.1
SMS-89	9	<5	51	3000	24	<1	21	137	7	4.55	6	<1	<5	32	0.76	116	100	8.5	15.9	16	<0.05	<0.05	1	11.0
SMS-95	<5	<5	12	790	21	2	19	61	2	4.58	8	<1	<5	6	1.43	<50	78	1.2	12.8	<5	<0.05	<0.05	1	12.7
SMS-96	282	<5	125	280	<1	4	24	226	<2	7.39	3	<1	<5	5	0.61	214	54	1.6	28.8	<5	<0.05	<0.05	<1	1.6
SMS-98	8	<5	47	2400	24	5	22	113	3	4.08	5	<1	<5	87	0.65	<50	93	11.2	13.2	18	<0.05	<0.05	<1	9.7
SMS-107	5	<5	59	2800	17	5	23	64	4	4.33	5	<1	<5	118	0.68	<50	41	13.8	9.8	24	<0.05	<0.05	<1	9.5
SMS-116	7	<5	72	1200	11	5	25	74	4	4.55	4	<1	<5	65	0.60	190	63	11.7	11.1	32	<0.05	<0.05	1	12.3
SMS-125	8	<5	51	850	10	5	20	101	6	3.84	4	<1	<5	37	0.47	<50	69	6.7	14.0	24	<0.05	<0.05	1	14.8
SMS-136	5	<5	85	7800	5	3	28	51	3	5.04	7	<1	<5	69	0.77	190	46	17.6	11.9	22	<0.05	0.05	<1	12.8
SMS-143	5	<5	69	2100	19	6	28	79	5	4.52	4	<1	<5	128	0.65	291	48	18.0	11.7	30	<0.05	<0.05	<1	11.1
SMS-150	8	<5	56	1200	18	7	23	81	5	4.27	4	<1	<5	102	0.57	226	70	13.4	10.6	21	<0.05	<0.05	1	8.0
SMS-157	5	<5	59	980	17	5	24	86	5	4.43	4	<1	<5	91	0.63	233	82	15.4	11.5	28	<0.05	<0.05	<1	9.2
SMS-164	8	<5	69	870	20	4	27	103	6	5.04	4	<1	<5	83	0.58	306	87	16.5	12.4	38	<0.05	<0.05	1	10.0
SMS-171	7	<5	74	780	19	3	28	116	7	5.16	5	<1	<5	45	0.54	245	77	12.8	13.1	43	<0.05	<0.05	<1	10.9
SMS-178	5	<5	42	820	12	2	18	104	8	3.60	6	<1	<5	19	0.51	257	65	4.6	13.8	8	<0.05	<0.05	1	11.4
SMS-185	<5	<5	47	930	9	2	19	119	10	3.95	6	<1	<5	16	0.48	<50	116	2.5	16.0	<5	<0.05	<0.05	<1	16.5
SMS-192	9	<5	47	480	11	14	17	61	5	3.92	3	<1	<5	39	0.25	<50	63	4.1	8.3	<5	<0.05	<0.05	<1	6.3

Sample description	U PPM	W PPM	ZN PPM	LA PPM	CE PPM	ND PPM	SM PPM	EU PPM	TB PPM	YB PPM	LU PPM	Mass g
SMS-80	12.6	4	232	41	71	31	6.5	1.9	1.0	4.4	0.65	26.30
SMS-89	16.4	<4	351	49	80	40	8.2	2.0	1.0	4.9	0.74	25.42
SMS-95	7.3	<4	268	68	114	52	10.6	2.3	1.2	4.8	0.72	22.05
SMS-96	<0.5	21	266	9	25	11	4.0	1.4	0.8	4.6	0.68	28.99
SMS-98	24.5	<4	306	41	72	32	7.1	1.6	1.0	4.1	0.65	23.67
SMS-107	36.2	<4	321	44	73	33	7.4	1.5	0.9	3.8	0.58	24.27
SMS-116	32.6	<4	368	77	115	58	14.7	3.6	2.0	7.0	0.99	28.25
SMS-125	24.4	<4	270	118	160	87	22.0	5.4	3.1	9.4	1.31	29.84
SMS-136	54.1	<4	418	76	121	58	13.4	2.5	1.6	5.8	0.83	25.47
SMS-143	54.3	<4	393	67	101	48	11.7	2.5	1.6	5.9	0.88	24.36
SMS-150	24.7	<4	340	34	60	29	5.6	1.3	0.8	3.2	0.53	24.86
SMS-157	26.0	<4	362	48	75	34	7.9	2.0	1.3	4.2	0.62	25.77
SMS-164	28.6	<4	473	49	74	32	7.7	2.1	1.1	4.6	0.71	24.60
SMS-171	21.2	<4	418	52	83	39	8.6	2.4	1.2	4.9	0.69	26.02
SMS-178	14.1	<4	210	59	93	43	9.6	2.4	1.2	5.1	0.71	27.03
SMS-185	15.3	<4	186	88	138	64	15.3	3.9	2.0	7.1	1.07	25.73
SMS-192	32.9	<4	216	52	80	35	7.9	2.2	0.9	3.1	0.45	29.09

Loring Laboratories Ltd.

629 Beaverdam Road N.E.,
Calgary Alberta T2K 4W7
Tel: 274-2777 Fax: 275-0541

To: **STRATHCONA MINERAL SERVICES LTD.**
12th Floor, 20 Toronto Street
Toronto, Ont.
M5C 2B8

FILE: 41001

DATE: April 07, 1999

Attn: Reinhard von Guttenberg

GOLD GEOCHEMICAL ANALYSIS

" Project 2005-3 "

Sample No.	Gold ppb
SMS - 83	<5
SMS - 84	<5
SMS -101	<5
SMS -110	<5
SMS -119	<5
SMS -122	<5
SMS -123	265
SMS -128	<5
SMS -139	<5
SMS -146	<5
SMS -153	<5
SMS -160	<5
SMS -167	<5
SMS -174	<5
SMS -181	<5
SMS -188	<5
SMS -195	<5
SMS -199	1285

Certified by: [redacted]

CHANCERY ASSAY LABORATORIES LTD.

33 Chaunc[illegible] Avenue, Toronto, Ontario, M8Z 2Z2
Tel: (416) 239-3527 FAX: (416) 239-4012

File 2005-3

CERTIFICATE OF ANALYSIS

RECEIVED FROM: STRATHCONA MINERAL SERVICES DATE: APRIL 9, 1999

REPORT NO. MI-3955 SAMPLE OF: PULPS

DATE RECEIVED: MARCH 25, 1999 ATTENTION: MR. REINHARD VON GUTTENBERG

PROJECT 2005-3

SAMPLE NO:	Au PPB
SMS-82	77
SMS-91	72
SMS-100	63
SMS-109	122
SMS-113	63
SMS-114	1039
SMS-118	155
SMS-127	125
SMS-138	160
SMS-145	1173
SMS-152	360
SMS-159	1175
SMS-166	902
SMS-173	97
SMS-180	157
SMS-187	135
SMS-194	60
SMS-198	542

ASSOCIATION OF THE CHEMICAL PROFESSION OF ONTARIO
CHARTERED
J. van Engelen
CHEMIST

J van Engelen Mgr.

File 2005-3

LAKEFIELD RESEARCH LIMITED

Postal Bag 4300, 185 Concession St., Lakefield, Ontario, KOL 2HO
Phone : 705-652-2038 - FAX : 705-652-6441

Strathcona Mineral Services
12th Floor, 20 Toronto Street
Toronto, Ontario, M5C 2B8 - Canada

Attn : Reinhard Guttenberg
Fax : 416-367-3638

Lakefield, April 16, 1999

Date Rec. : April 13, 1999
LR. Ref. : APR9044.R99
Reference : 2005-3
Project : 9901026

CERTIFICATE OF ANALYSIS

No.	Sample ID	Au g/t
1	SMS-200-1	< 0.02
2	SMS-200-2	< 0.02
3	SMS-200-3	< 0.02
4	SMS-200-4	< 0.02
5	SMS-200-5	< 0.02
6	SMS-200-6	< 0.02
7	SMS-200-7	< 0.02
8	SMS-200-8	< 0.02
9	SMS-200-9	< 0.02
10	SMS-200-10	< 0.02
11	SMS-200-11	< 0.02
12	SMS-200-12	< 0.02
13	SMS-200-13	< 0.02
14	Cleaning sand 1	< 0.02
15	Cleaning sand 2	< 0.02
16	Cleaning sand 3	< 0.02
17	Cleaning sand 4	< 0.02
18	Cleaning sand 5	< 0.02
19	Cleaning sand 6	< 0.02

[redacted]

Roch Marion, B.Sc., C.Chem.
Assistant Manager, Analytical Services

A MEMBER OF IAETL CANADA

Accredited by the Standards Council of Canada in partnership with CAEAL to the ISO/IEC Guide 25 standard for specific registered tests.

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior written approval.

Quality Analysis... Actlabs Innovative Technologies

Invoice No.: 17535
Work Order: 17689
Invoice Date: 08-JUN-99
Date Submitted: 17-MAY-99
Your Reference: LETTER
Account Number: 110

STRATHCONA MINERAL SERVICES LTD
12TH FLOOR, 20 TORONTO ST.
TORONTO, ONTARIO
M5C 2B8

ATTN: REINHARD VON GUTTENBERG

CERTIFICATE OF ANALYSIS

7 SLAG SAMPLES(PREP.REV3) were submitted for analysis.
5 HEAVY LIQUID CONCENTRATES were submitted for analysis.

The following analytical packages were requested. Please see current fee schedule for elements and detection limits.

REPORT 17535 CODE 1D INAA(INAAGEO.REV1)
REPORT 17535 B CODE 3A-HMC-INAA(INAAGEO.REV1)

This report may be reproduced without our consent. If only selected portions of the report are reproduced, permission must be obtained. If no instructions were given at time of sample submittal regarding excess material, it will be discarded within 90 days of this report. Our liability is limited solely to the analytical cost of these analyses. Test results are representative only of material submitted for analysis.

CERTIFIED BY :

[redacted]

DR E.HOFFMAN/GENERAL MANAGER

ACTIVATION LABORATORIES LTD.
1336 Sandhill Drive, Ancaster, Ontario Canada L9G 4V5 TELEPHONE +1.905.648.9611 or +1.888.228.5227 FAX +1.905.648.9613
E-MAIL ancaster@actlabs.com ACTLABS GROUP WEBSITE http://www.actlabs.com

Sample description	AU PPB	AG PPM	AS PPM	BA PPM	BR PPM	CA %	CO PPM	CR PPM	CS PPM	FE %	HF PPM	HG PPM	IR PPB	MO PPM	NA %	NI PPM	RB PPM	SB PPM	SC PPM	SE PPM	SN %	SR %	TA PPM	TH PPM
201A-SLIME	<5	<5	7	300	<1	<1	<5	23	<2	0.47	<1	<1	<5	<5	4.84	<50	<30	2.7	1.9	<5	<0.05	<0.1	<1	2.6
201A-RES	<5	<5	13	500	<1	<1	<5	37	<2	0.74	1	<1	<5	<5	11.8	<50	<30	3.7	3.5	<5	<0.05	<0.1	<1	4.7
201B-SLIME	<5	<5	5	240	<1	<1	5	20	<2	0.40	<1	<1	<5	<5	4.33	<50	<30	3.1	1.7	<5	<0.05	<0.1	<1	2.5
201B-RES	<5	<5	13	340	<1	<1	<5	29	<2	0.44	1	<1	<5	<5	7.27	<50	<30	4.4	2.3	<5	<0.05	<0.1	<1	4.1
202-SLIME	<5	<5	2	250	<1	<1	<5	15	<2	0.30	<1	<1	<5	<5	3.66	<50	<30	1.0	1.4	<5	<0.05	<0.1	<1	1.9
202A-RES	<5	<5	80	250	<1	<1	<5	32	<2	0.63	<1	<1	<5	<5	10.7	<50	<32	2.7	3.4	<5	<0.05	<0.1	<1	3.7
203-RES	<5	<5	12	450	<1	<1	<5	28	<2	0.54	<1	<1	<5	<5	8.44	<50	<30	4.5	2.5	<5	<0.05	<0.1	<1	3.8
201A-RES 100NG	107	<5	16	540	<1	<1	6	39	<2	0.90	1	<1	<5	12	11.9	<50	40	3.8	4.4	<5	<0.05	<0.1	<1	5.0
201A-RES 100NG	105	<5	16	570	<1	<1	6	44	<2	0.96	2	<1	<5	<5	13.8	<50	44	3.9	4.6	<5	<0.06	<0.1	<1	5.5
201A-RES 1000NG	957	<5	17	580	<1	<1	5	45	<2	0.99	2	<1	<5	<5	13.2	<50	41	3.7	4.5	<5	<0.06	<0.1	<1	5.2
201A-RES 1000NG	1040	<5	17	600	<1	<1	6	44	<2	0.97	1	<1	<5	<5	13.5	<50	44	3.7	4.5	<5	<0.05	<0.1	<1	5.2

Sample description	U PPM	W PPM	ZN PPM	LA PPM	CE PPM	ND PPM	SM PPM	EU PPM	TB PPM	YB PPM	LU PPM	Mass g
201A-SLIME	6.5	<4	<50	8	9	<5	0.5	0.3	<0.5	0.5	0.08	2.578
201A-RES	9.1	<4	186	13	23	10	2.8	0.6	0.6	1.4	0.24	1.615
201B-SLIME	5.0	<4	<50	6	6	<5	0.4	<0.2	<0.5	0.5	0.08	2.594
201B-RES	6.3	<4	<50	8	13	<5	1.6	0.3	<0.5	0.7	0.11	1.972
202-SLIME	1.4	<4	<50	4	5	<5	0.2	<0.2	<0.5	<0.2	<0.05	2.915
202A-RES	<0.6	<4	<50	8	11	<5	0.7	<0.2	<0.5	0.7	0.09	2.220
203-RES	10.4	<4	<50	10	13	<5	1.5	<0.2	<0.5	0.7	0.17	1.766
201A-RES 100NG	10.5	<4	122	16	24	10	2.7	0.6	0.6	1.3	0.21	1.074
201A-RES 100NG	9.4	<4	186	20	29	9	3.1	0.7	0.7	1.4	0.21	1.002
201A-RES 1000NG	12.4	<4	<101	20	18	<5	2.7	<0.2	<0.5	1.4	0.29	1.035
201A-RES 1000NG	10.2	<4	183	18	27	15	2.8	0.7	0.6	1.4	0.22	1.030

Sample description	AU PPB	AG PPM	AS PPM	BA PPM	BR PPM	CA %	CO PPM	CR PPM	CS PPM	FE %	HF PPM	HG PPM	IR PPB	MO PPM	NA %	NI PPM	RB PPM	SB PPM	SC PPM	SE PPM	SN %	SR %	TA PPM	TH PPM
207	3060	<5	997	<100	8	11	362	584	<2	36.6	43	3	<5	201	0.10	902	<30	75.1	11.0	68	<0.05	<0.1	55	14.2
204	1100	<5	1000	2000	<1	<1	94	285	<2	37.3	49	<1	<5	330	0.14	615	<30	127	21.4	291	<0.05	<0.1	15	41.0
205	46	<5	597	26000	<1	<1	26	59	<2	33.8	8	4	<5	180	0.29	262	<30	112	3.8	161	<0.05	<0.1	2	6.5
206	538	9	1140	800	<1	<1	87	90	<2	42.1	33	2	<5	500	0.30	267	<30	179	7.6	270	<0.05	<0.1	3	15.5
208	160	<5	881	710	15	11	69	365	<2	40.7	180	2	<5	150	0.09	<88	<30	66.0	9.7	64	<0.05	<0.1	10	75.0

Sample description	U PPM	W PPM	ZN PPM	LA PPM	CE PPM	ND PPM	SM PPM	EU PPM	TB PPM	YB PPM	LU PPM	Mass g
207	38.7	55	1250	122	185	82	20.4	5.5	3.3	8.7	1.24	11.31
204	72.2	<4	4290	360	474	293	59.7	16.0	9.3	28.3	4.10	1.517
205	21.0	<4	4760	55	71	41	8.6	2.4	1.7	3.8	0.59	3.035
206	43.8	<4	6490	111	181	86	18.3	4.8	2.5	9.0	1.46	1.209
208	36.5	<4	4570	262	592	191	31.4	3.9	4.0	14.2	2.18	0.9521

APPENDIX II

MINERALOGY REPORT - PETROLOGIC INC.

Petrologic Inc.

Quality Assurance with Mineralogy

Mineralogy Report

Prepared for
Strathcona Mineral Services Limited

May 6, 1999
Revised June 12, 1999

REFERENCE:PI990303

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Mineralogy Report

Introduction

Seven metallurgical products, six heavy liquid concentrates, six polished sections and six polished thin sections were submitted in three stages by Strathcona Mineral Services Limited to PetroLogic Inc. for gold and mineralogical analysis. The purpose of the analysis was to examine microscopically the samples for gold mineralization and to provide a general mineralogical report of the material submitted. In addition, gold and general mineralogy of the metallurgical products and prepared sections were to be compared with that observed in the heavy liquid concentrates.

Procedures

The metallurgical products and heavy liquid concentrates were examined at 25x to 400x magnification using a binocular microscope. Detailed examination of these samples included dispersing the mineral grains and particles in a petri dish one grain thick and systematically scanning the grains for gold with the microscope. Tweezers and a fine painters brush were used to sort through the grains and select gold if observed. The relatively coarser grained samples were systematically scanned at 250x magnification and the finer grains (<75 μm) were systematically scanned at 400x magnification. Individual particles were also examined for inclusions of gold.

The polished thin sections and the polished sections were examined at 25x to 500x magnification using an ore microscope. Detailed examination of each polished thin section and polished section was completed by scanning the entire prepared surface at a magnification of 200x.

Mineralogical analyses of the gold were obtained from a JEOL 333 electron microprobe equipped with energy dispersive spectral analysis and a Tracor Northern 5500 automation system. Pure gold and pure silver were used as standards for the reported analyses. Back scatter electron images and semi quantitative analyses were obtained to characterize the metallic iron particles.

Gold Mineralization

Gold mineralization was not observed in the metallurgical products or heavy liquid concentrates during the microscopic examination.

Gold mineralization in the form of native gold was observed in the polished thin sections and polished sections. Five gold grains were observed in four of the prepared polished sections and polished thin sections. They ranged from 27 to 128 μm and irregular to platy in form. Four of the grains were liberated and one was locked in an iron-rich particle containing iron, pyrite,

magnetite and goethite. Energy dispersive spectral analysis of each gold grain indicated that gold and silver were the primary elements (>99 weight percent) of the grain. Mineral chemical analysis of gold and silver by electron microprobe indicated silver values between 1.40 and 3.20 weight percent for four of the grains and approximately 7.45 weight percent was obtained from the gold grain in sample 98/11/1. The results are summarized in the table below.

Table 1. Gold Analyses

Sample	# of Grains	Grain Size (μm)	Au	Ag	Total	Textures and Associations
KRTT-02 (PTS)	1	58 x 35	98.83 98.05 98.47	1.64 1.71 1.70	100.47 99.76 100.17	liberated, irregular shape
98/11/1 (PS)	1	128 x 26	91.67 91.84 91.31	7.55 7.38 7.40	99.22 99.22 98.70	liberated, platy, attached goethite
98/11/2 (PS)	1	45 x 25	97.66 97.66 98.17	1.47 1.51 1.40	99.13 99.17 99.57	locked, triangular shape -iron-rich particle -goethite interstitial to grain boundaries -attached framboidal pyrite
98/11/3 (PTS)	1	27 x 15*	92.77 92.32 91.89	3.08 3.20 3.18	95.85** 95.52** 95.07**	liberated, rectangular in form
98/11/3 (PS)	1	37 x 15	97.26 97.11 97.02	1.95 2.09 2.10	99.21 99.20 99.12	liberated, irregular shape

*Shape and size are unreliable. Occurs at a location within the polished thin section where all other surrounding grains have been plucked out of the epoxy.
**Surface of grain was not adequately polished. Could not get the electron beam entirely enclosed on a smooth polished surface of the gold grain.

General Sample Characteristics

The samples submitted can be generally characterized as consisting primarily of apatite, quartz and carbonate with lesser amounts of phlogopite, white mica, carbonaceous material, pyrite, and marcasite. The samples also contain minor to trace amounts of goethite, magnetite, iron oxide, arsenopyrite, chalcopyrite, glauconite, garnet, ilmenite, zircon and sphalerite. Particles ranged in size from 50 μm to a maximum size of approximately 3 mm, whereas individual mineral grain sizes are generally less than 500 μm.

The mineral grains are typically sub-angular to sub-rounded with a minor proportion rounded. Bone, shell and teeth fragments have been fossilized to apatite. The fossilized fragments also occur in layered aggregates with quartz, carbonaceous material and carbonate. Quartz occurs as liberated grains and as aggregates and carbonate occurs primarily as aggregated particles. Pyrite consistently occurs in each of the samples as fine aggregates in the form of framboids,

liberated aggregates and discrete grains. Pyrite also occurs as composites with apatite, quartz and carbonate. Marcasite is present along pyrite grain boundaries and as pseudomorphs of pyrite.

Metallurgical Products and Heavy Liquid Concentrates

The metallurgical products and heavy liquid concentrates have the same suite of minerals and textural variations. Differences in the metallurgical products and the heavy liquid concentrates are primarily the modal mineral abundance which can be explained by the different processing techniques. The metallurgical products consisted primarily of apatite and quartz, and the heavy liquid concentrates 7BK02 60.8-62.9 and 7BK02 77.2-79.2 consisted primarily of pyrite. Heavy liquid concentrate 7AS02 was unique in having apatite as the primary mineral in the +200 mesh 3.3 sink portion and pyrite aggregates as the primary mineral in the –200 +400 mesh 3.3 sink portion. The occurrence of minor to trace amounts of quartz and carbonate grains in the heavy liquid concentrates is due to the greater efficiency in mineral separation by density using heavy liquids. The greater proportion of +200 mesh relative to –200 +400 mesh material in samples 7BK02 60.8-62.9 and 7BK02 77.2-79.2 compared with the reverse relationship in sample 7AS02 is likely due to the physical property differences of the samples.

Summary

Mineralogical and textural characteristics were collected for the current examination from different types of samples and sample submission times. The absence of observable gold in the six heavy liquid concentrates inhibits the ability to identify mineralogical and textural characteristics that are directly associated with gold in the samples examined. Gold assays of these samples and the rejects are necessary to determine if gold is present.

Gold in the prepared sections occurred as fine 27 to 128 μm liberated grains or locked in weathered iron-rich particles. Of the samples examined, there was no evidence to suggest in situ precipitation of gold within the sedimentary unit. The iron-rich particle with gold was platy, round, variably hard and oxidized to variable amounts of goethite. The similar Au/Ag to the liberated grains (Table 1) and the associated framboidal pyrite (Figure 5 to 8) suggests the providence of the gold may be related to these particles. The gold had a similar Au/Ag as the liberated gold and another grain in 98/11/1 was associated with goethite and apparently framboidal pyrite (Figure 3). The relatively larger size and rounded outline of the iron-rich particle could suggest a possible fluvial origin for the particle containing gold. However, metallic iron oxidized to goethite with lamellae of variable Cr in association with gold, magnetite, pyrite, monazite, and framboidal pyrite cemented by goethite indicates the paragenesis of the particle to be geologically unusual and possibly a result of cross contamination during sample preparation.

Similar iron-rich particles were also observed in sample 7AS02. They were primarily metallic iron (Table 3) and also rimmed by goethite but were not associated with other minerals nor did they have lamellae of variable composition. These particles are also likely a result of cross contamination during sample preparation but are different in origin than the metallic iron with lamellae.

If the liberated gold grains have the same origin as the gold locked in the iron-rich particle with metallic iron, it is possible that the gold is a result of cross contamination during sample preparation.

Best Regards,

PetroLogic Inc.

[redacted]

Edward C. Walker, Ph.D.
Mineralogical Consultant

Appendix 1

Detailed back scatter electron imaging (Figure 31 to 36) and semi quantitative analyses were completed for the metallic iron in the iron-rich particle of 98/11/2. Table 2 presents semi-quantitative analyses of the metallic particles obtained from the JEOL 333 electron microprobe.

The lamellae consisted of 4 distinctly different compositions readily observed in Figures 31 to 36. The lamellae that are white and pale white consist primarily of Fe with variable amounts of chrome, nickel and manganese. The other two lamellae are darker gray, one is iron-sulfur rich and the other is goethite, both readily volatilized under the electron beam and could not be analyzed.

The back scatter electron images also indicate metallic iron has serrate grain boundaries whereas the magnetite, pyrite and framboidal pyrite grain boundaries are relatively sharp and distinct. The goethite also appears to "cement" the particles together.

Table 2. Semi-quantitative analysis of metallic iron

	1	2	3	4	5
	Pale White*	Pale White*	White*	White*	White*
Si	0.02	0.01	0.90	0.00	0.59
Ti	0.00	0.00	0.02	0.00	0.01
Al	0.00	0.00	0.01	0.00	0.01
Cr	4.67	5.53	1.05	0.85	0.27
Fe	93.03	92.43	92.34	97.70	97.28
Mn	0.56	0.25	0.27	0.90	0.58
Mg	0.02	0.00	0.00	0.00	0.00
Zn	0.00	0.00	0.00	0.00	0.00
Ni	1.63	1.71	5.34	0.48	1.20

*Color reference to back scatter electron image color (Figure 31).

Appendix 2

Five of the approximately 25 iron-rich particles were selected from sample 7ASO2, +200 mesh 3.3 sink and prepared into polished sections for ore microscopic examination, back scatter electron imagining and semi quantitative analysis.

Attached are the semi-quantitative analyses of the metallic particles obtained from the JEOL 333 electron microprobe (Table 3) and photomicrographs (Figure 36 to 43). The compositions differ from the iron-rich particle in 98/11/2 by having relatively lower chrome and nickel and relatively higher manganese.

Each particle is partially to completely rimmed by thinly laminated goethite and occasionally associated with fine disseminated iron sulphide grains preferentially aligned parallel to the laminations. The composition of the grains were relatively homogeneous (no evidence of exsolution lamellae) and do not appear directly related to the iron-rich particles.

Gold was not observed to occur associated with the prepared particles.

Table 3. Semi-quantitative analysis of metallic iron

Particle	**1**	**2**	**3**	**4**	**5**
Si	0.33	0.00	0.14	0.15	0.29
Ti	0.06	0.03	0.00	0.00	0.00
Al	0.03	0.02	0.03	0.03	0.03
Cr	0.08	0.03	0.03	0.05	0.02
Fe	98.02	98.28	98.54	99.55	98.23
Mn	1.26	1.41	0.65	0.68	1.31
Mg	0.00	0.00	0.00	0.00	0.01
Zn	0.00	0.05	0.00	0.11	0.00
Ni	0.12	0.00	0.03	0.02	0.06

Samples Submited by:

Strathcona Mineral Services Limited

PetroLogic Inc.
Quality Assurance with Mineralogy

Reference
PI990303

Sample	Sample Product
KRTT-01	PS-A 01
KRTT-01	PTS 02
KRTT-01	water heavy 1
KRTT-01	reagent heavy
KRTT-02	PS-A 05
KRTT-02	PTS 06
KRTT-03	PS-A 07
KRTT-03	PTS 08
98/11/1	PS-A 09
98/11/1	PTS 10
98/11/1	Reagent heavy 1
98/11/1	Reagent heavy 1a
98/11/1	Reagent heavy 2
98/11/2	PS-A 14
98/11/2	PTS 15
98/11/3	PS-A 16
98/11/3	PTS 17
CR-1	petri
CR-2	petri
7AS02	+200 Mesh 3.3 Sink
7AS02	-200 +400 Mesh 3.3 Sink
7BK02 60.8 - 62.9	+200 mesh 3.3 Sink
7BK02 60.8 - 62.9	-200 +400 mesh 3.3 Sink
7BK02 77.2 - 79.2	+200 mesh 3.3 Sink
7BK02 77.2 - 79.2	-200 +400 mesh 3.3 Sink



200 µm

Figure 1. Sample: KRTT-02 Magnification: 200x

Liberated gold grain surrounded by aggregates of apatite with quartz and carbonate. Rounded white grains are framboidal pyrite. Poorly polished surface areas are due to plucking of grains during polishing.

19990028



Figure 2. Sample: KRTT-02 Magnification: 500x

65 µm

Same liberated grain as in Figure 1 surrounded by epoxy at a magnification of 500x

19990028

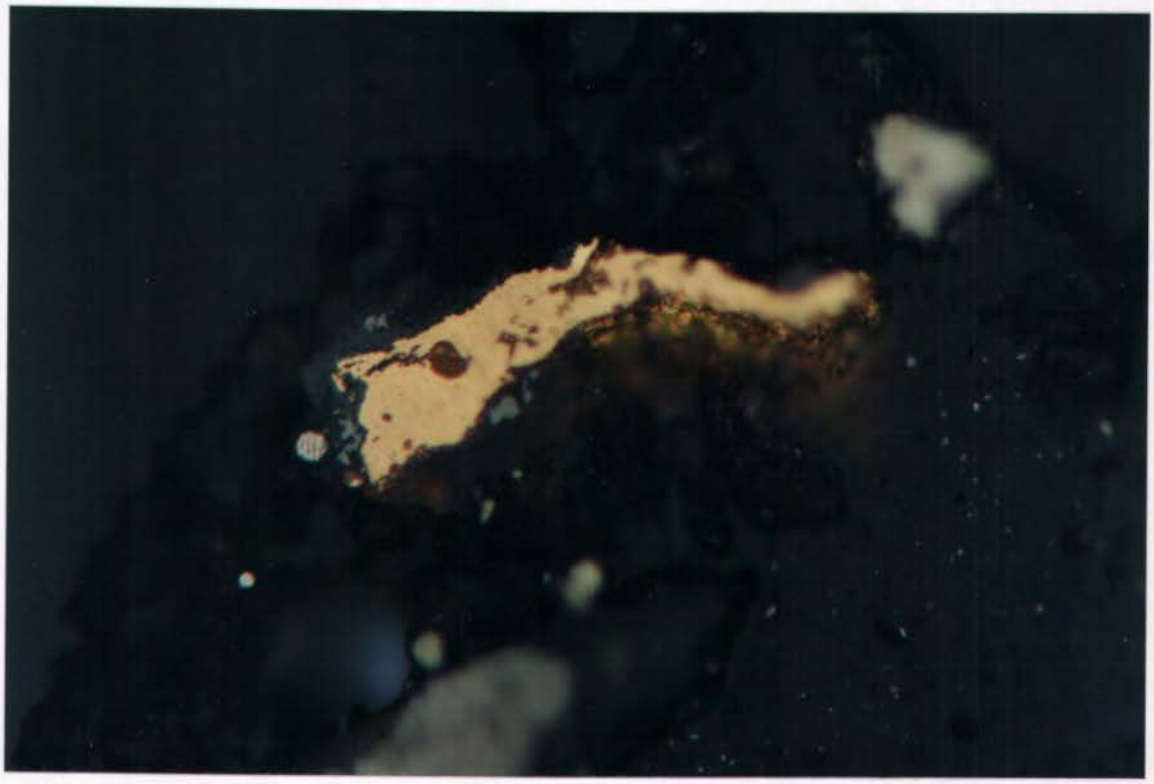


Figure 3. Sample: 98/11/1 Magnification: 500x

65 µm

Liberated gold with goethite attached to the left side of the grain. Attached to the goethite is what appears to be framboidal textured pyrite similar to the framboidal pyrite commonly observed in the samples. (Interpreting the framboidal pyrite as a direct link to the host samples must be made with caution. Its association as an attached grain to the particle grain boundary may be an artifact of processing.)

19990028

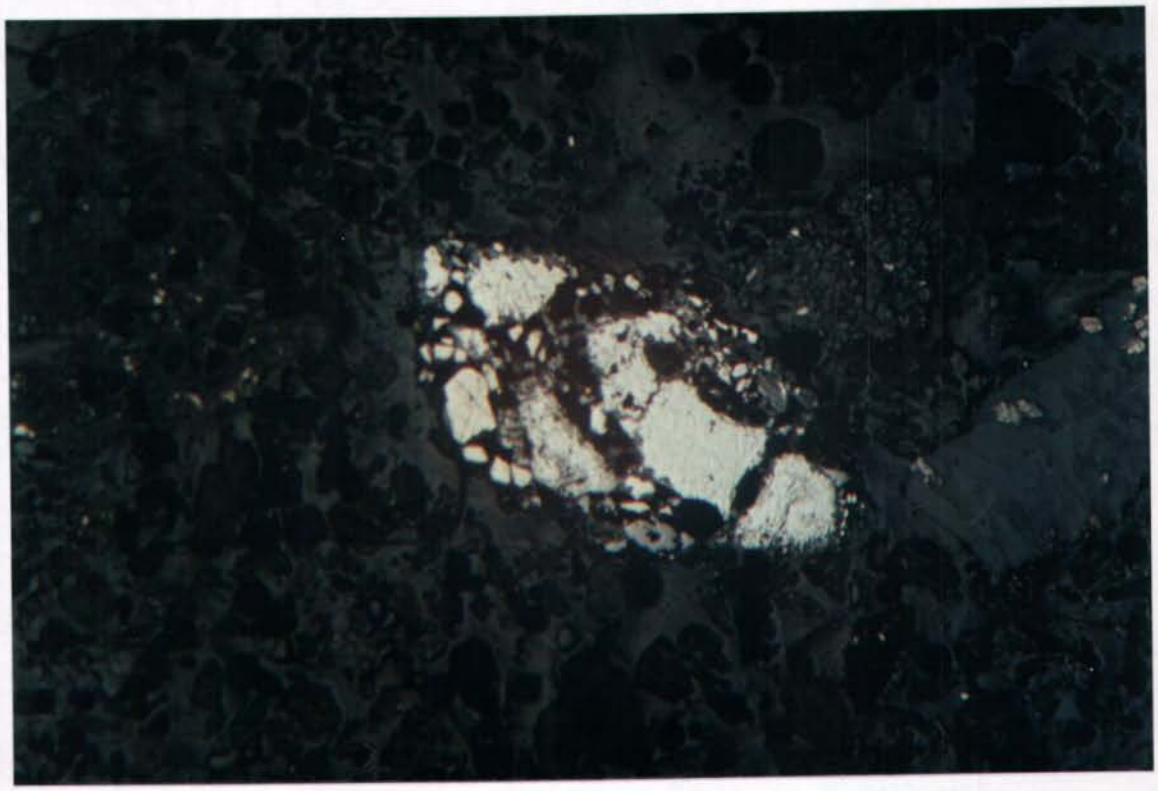


Figure 4. Sample: 98/11/2 Magnification: 25x

1.5 mm

Rounded, liberated 3 mm iron-rich particle. Gold is present within the central part of the particle that also consists of iron, pyrite, goethite and magnetite. The goethite is a matrix to the other minerals.

19990028

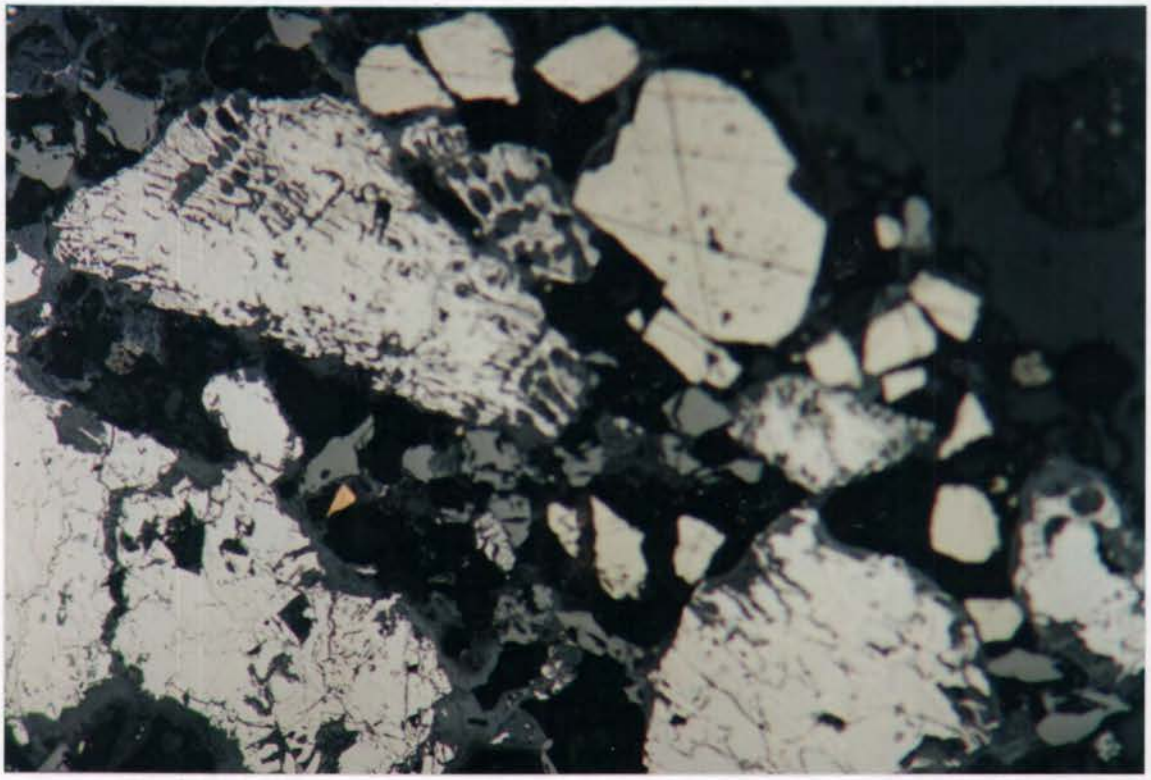


Figure 5. Sample: 98/11/2 Magnification: 100x

350 µm

Enlargement of Figure 4 to 100x magnification with gold present as a triangular shaped grain in the middle of the photomicrograph. The irregular textured white mineral appears to be metallic iron surrounded by goethite. Several grains of pyrite occur along the upper right side of the photomicrograph.

19990028

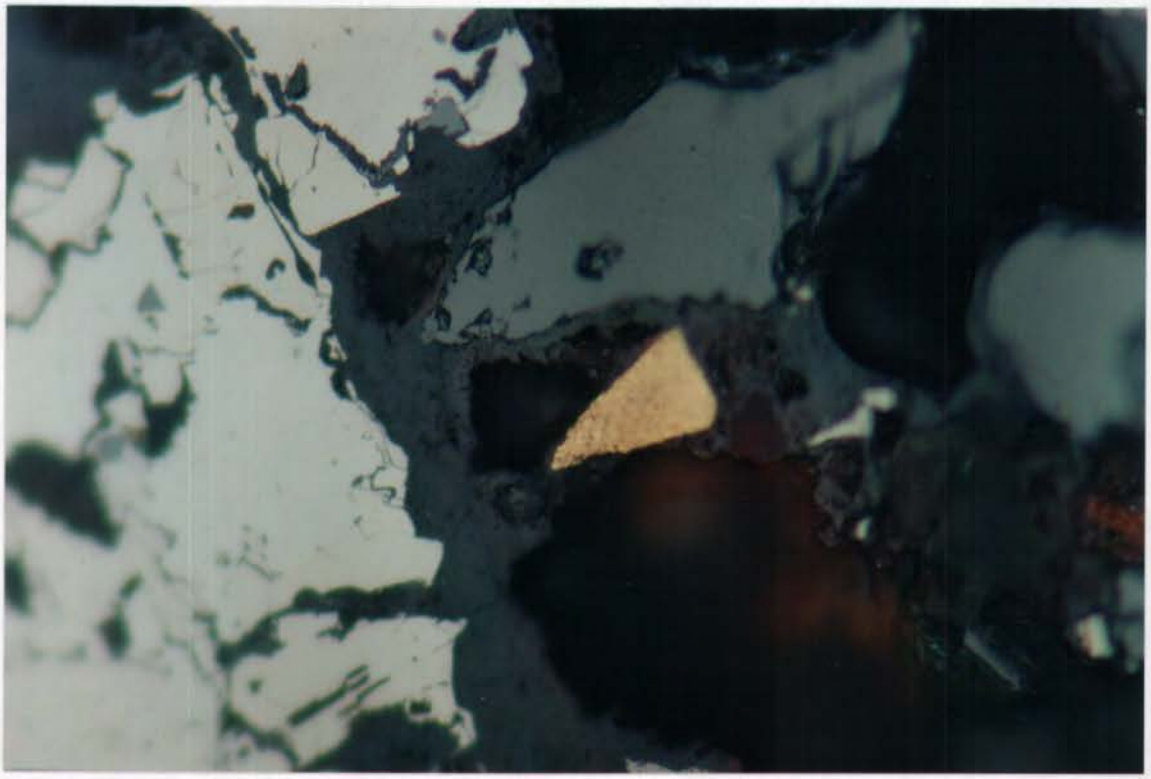


Figure 6. Sample: 98/11/2 Magnification: 500x

65 µm

Enlargement of Figure 4 and 5, at a magnification of 500x demonstrating the attachment of the gold grain to the particle. Above the gold grain is a grain of magnetite and to the left is what appears to be metallic iron. The goethite surrounds all the minerals present within the field of view and is porous.

19990028

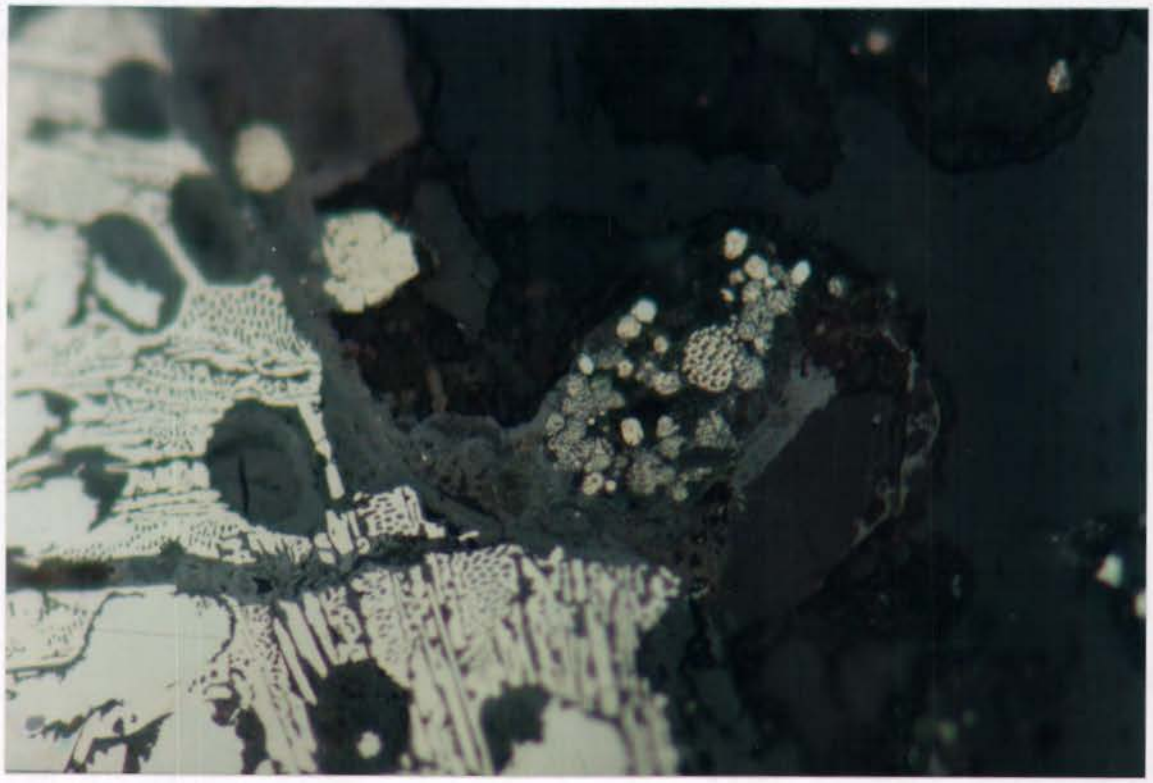


Figure 7. Sample: 98/11/2 Magnification: 500x

65 µm

Example of the intimate association of framboidal pyrite to the iron-rich particle. Central-right area is a cluster of framboidal pyrite and the left side is lamellae textured iron. Goethite is present along the grain boundaries, lamellae and within fractures cutting the lamellae.

1999 0038

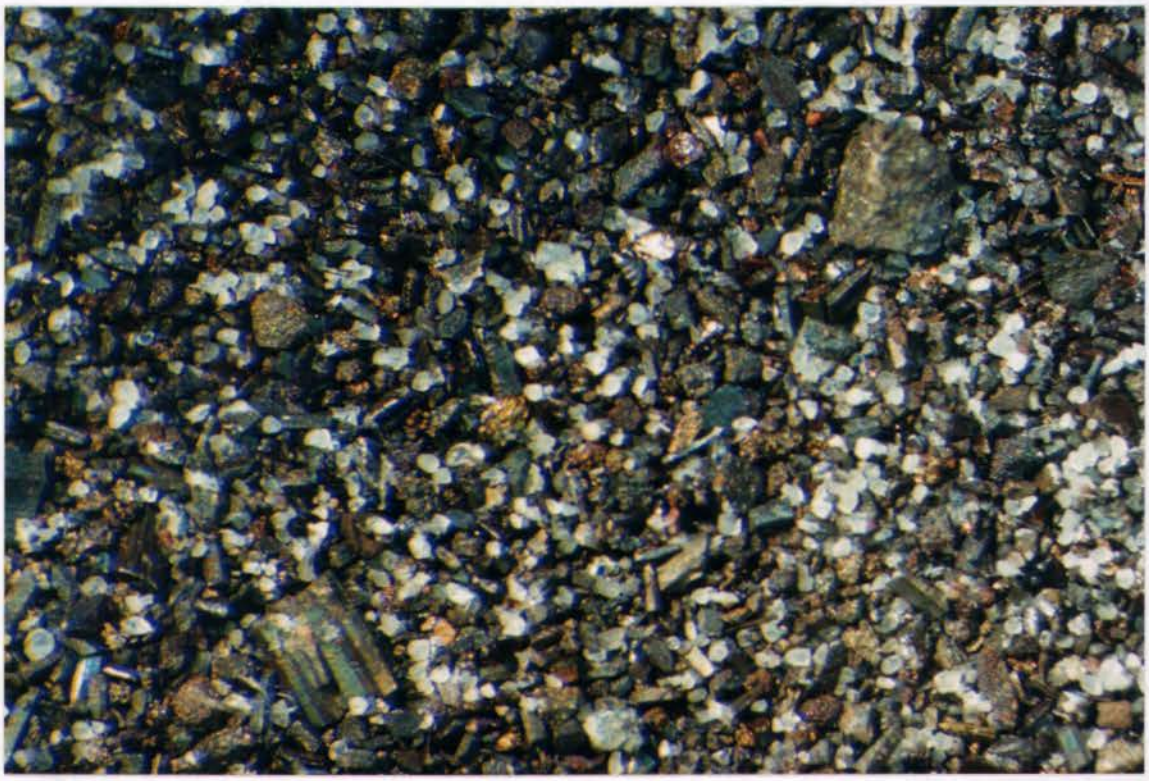


Figure 9. 98/11/1 Reagent Heavy 1 Magnification: 240x

1 mm

Photomicrograph exhibiting apatite, quartz and pyrite. Quartz varies in form from sub-angular to rounded. The columnar textured particle (bottom left) is indicative of pyrite formation controlled by fossil structures. A resin bead used in metallurgical processing for extracting Au an Cu from solution is present in the center of the photomicrograph (enlarged in Figure 10).

19990028

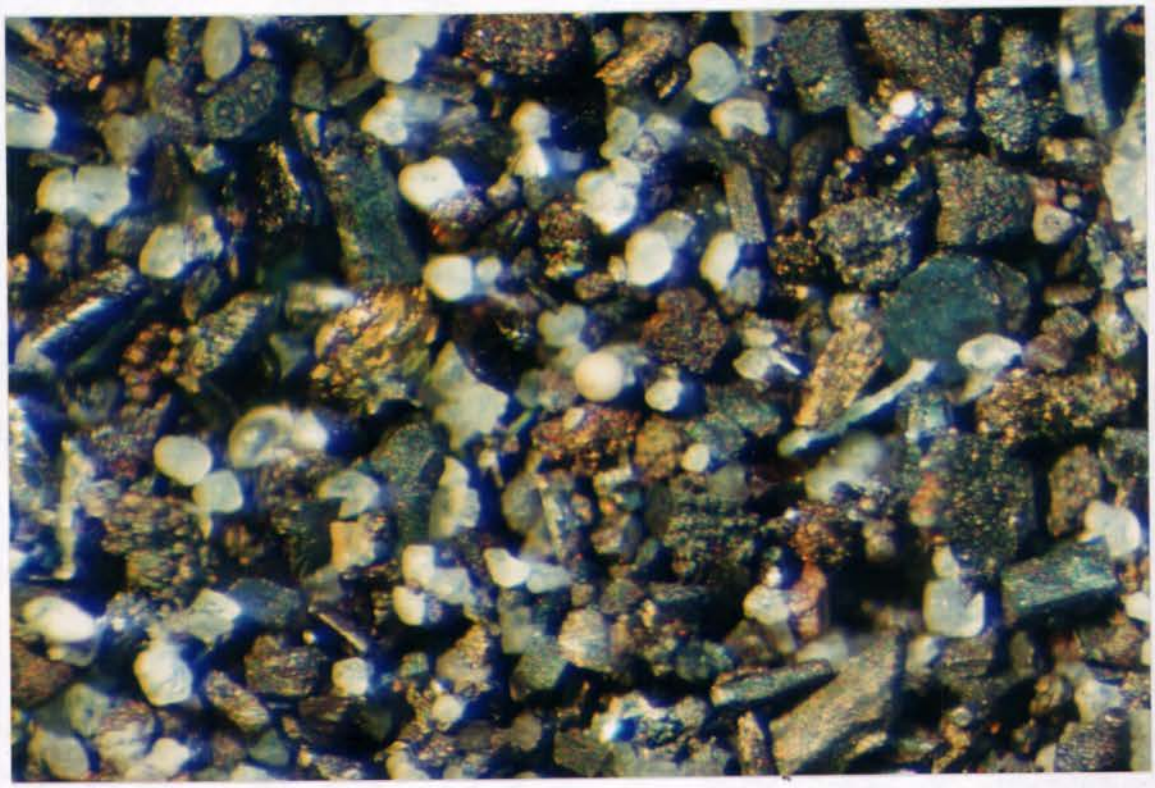


Figure 10. 98/11/1 Magnification: 640x
Reagent Heavy 1

0.4 mm

Photomicrograph exhibiting apatite, quartz and pyrite. Quartz grains are typically sub-rounded. A resin bead (creamy white) used in metallurgical processing for extracting Au an Cu from solution is present in the center of the photomicrograph.

19990028



Figure 11. 98/11/1 Magnification: 240x
Reagent Heavy 1

1 mm

Photomicrograph exhibiting apatite, quartz and pyrite. A sub-rounded grain of garnet is present near the center of the photomicrograph.

1990028



Figure 12. 98/11/1 Magnification: 240x
Reagent Heavy 1a

1 mm

Photomicrograph exhibiting quartz, apatite and pyrite.

19990028



Figure 13. 98/11/1 Magnification: 100x
Reagent Heavy 2

2.5 mm

Photomicrograph exhibiting apatite, quartz, carbonate and pyrite. Grains are typically sub-angular with a few sub-rounded grains.

19990028

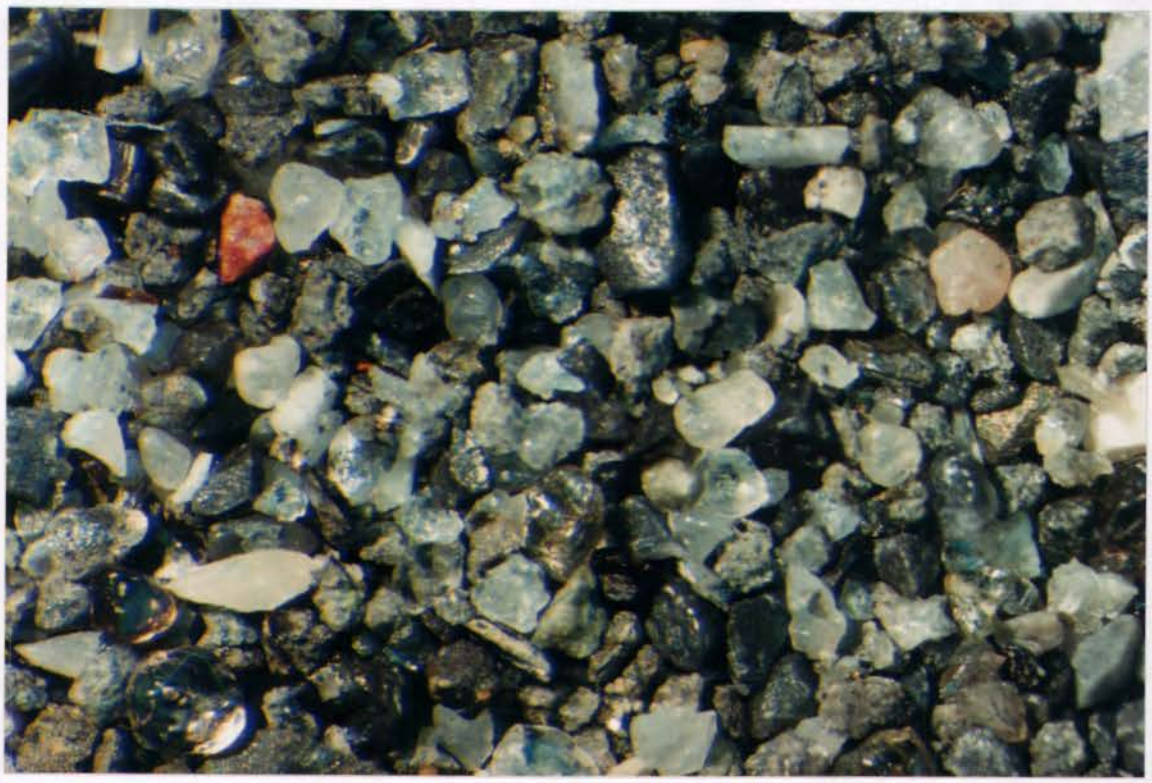


Figure 14. 98/11/1 Magnification: 240x
Reagent Heavy 2

1 mm

Photomicrograph exhibiting or primarily apatite and quartz illustrating significant rounding of the quartz grains.

19990088

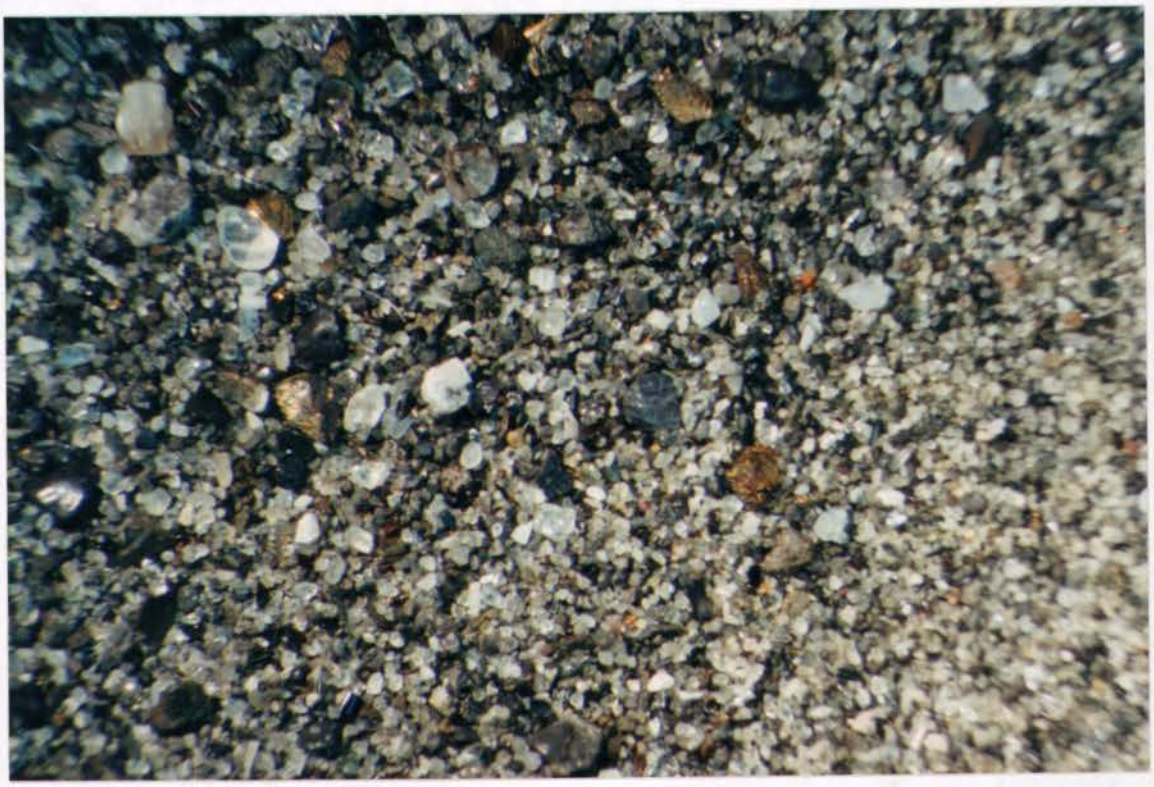


Figure 15. KRTT-01 Water Heavy 1 Magnification: 100x

2.5 mm

Photomicrograph exhibiting apatite, quartz, pyrite and carbonate.

19990028

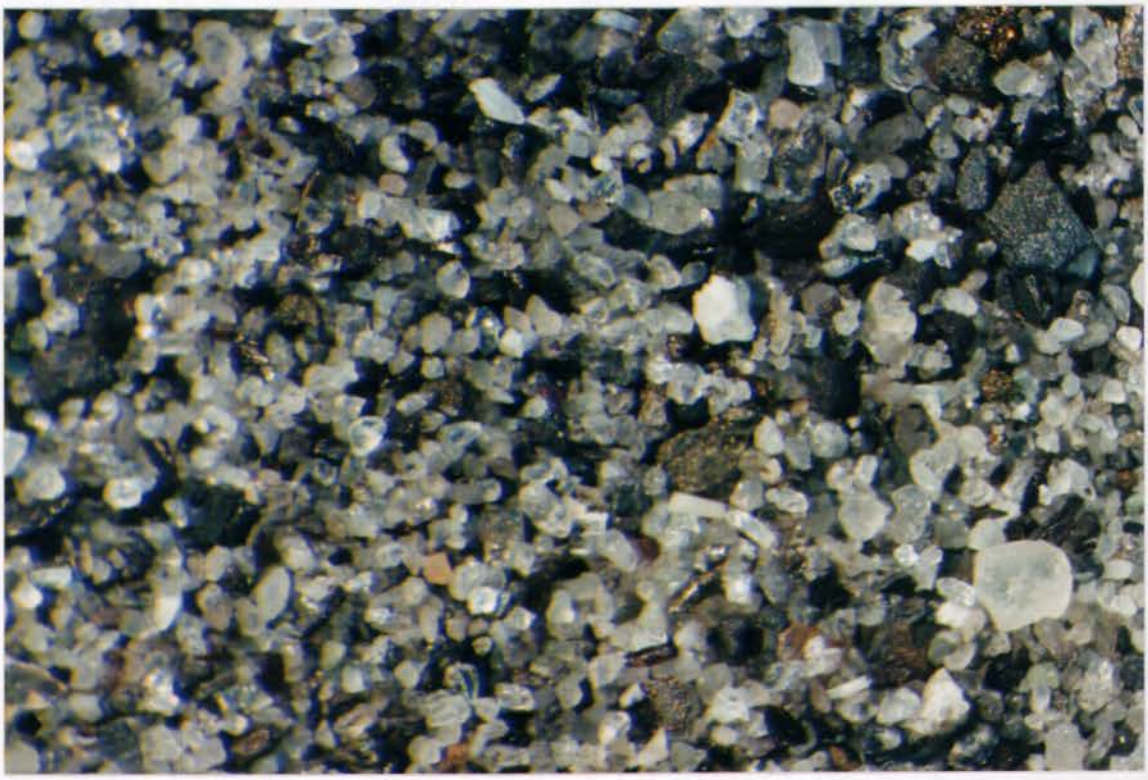


Figure 16. KRTT-01 Reagent Heavy Magnification: 240x

1 mm

Photomicrograph exhibiting primarily quartz with lesser amounts of apatite, pyrite and carbonate. Quartz grains are typically sub-angular to sub-rounded.

19990028

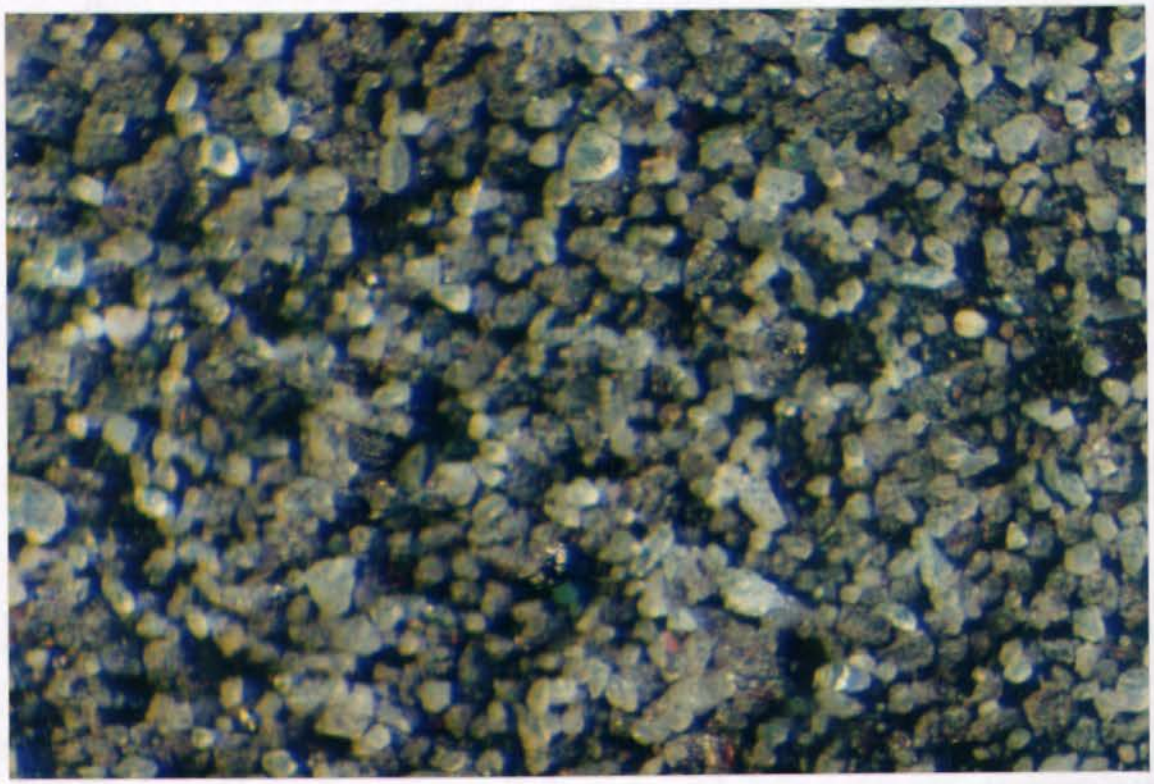


Figure 17. CR-1 Magnification: 640x

0.4 mm

Photomicrograph exhibiting primarily quartz and pyrite with lesser amounts of apatite and carbonate. Quartz grains are typically sub-angular to sub-rounded.

19990028

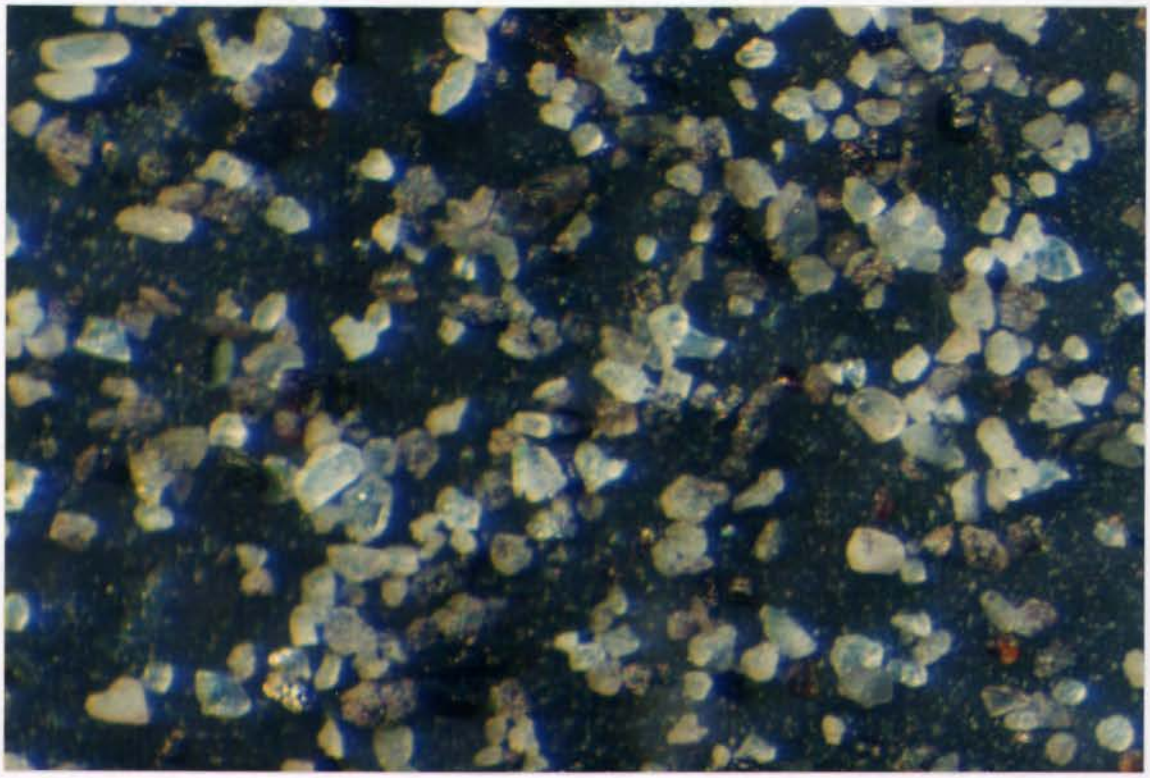


Figure 18. CR-2 Magnification: 640x

0.4 mm

Photomicrograph exhibiting primarily quartz with lesser amounts of apatite and pyrite. Quartz grains are typically sub-angular to sub-rounded.

19990028



Figure 19. 7AS02 +200 mesh 3.3 Sink Magnification: 100x

2.5 mm

Photomicrograph exhibiting primarily sub-angular fossilized apatite.

19990088



Figure 20. 7AS02 +200 mesh 3.3 Sink Magnification: 240x

1 mm

Photomicrograph exhibiting primarily sub-angular fossilized apatite. A tooth, shell and bone fragment can be readily identified on the right side of the photomicrograph.

19990028

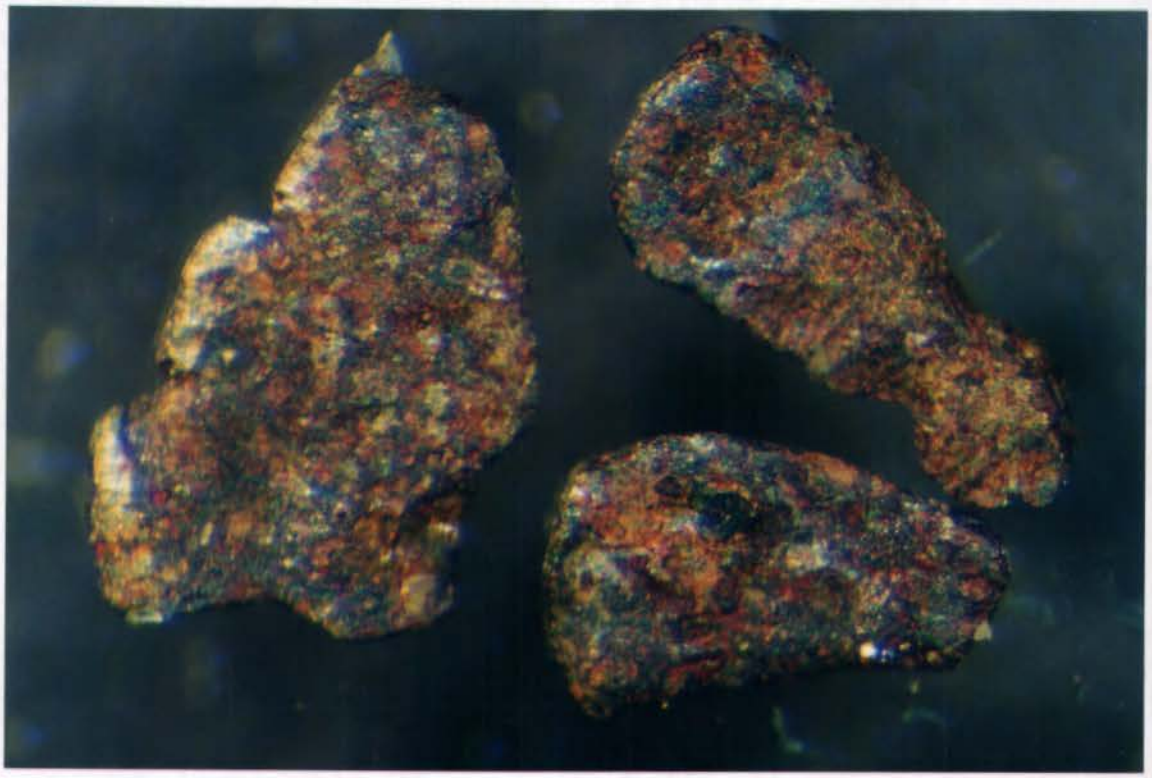


Figure 21. 7AS02 +200 mesh 3.3 Sink Magnification: 640x

0.4 mm

Photomicrograph exhibiting sub-rounded iron-rich plates. These particles appear to be splayed metallic fragments from sample preparation equipment. No gold was observed associated with these particles, however, they may be similar in origin to the metallic iron-rich particle in 98/11/1 that contained gold.

19990028

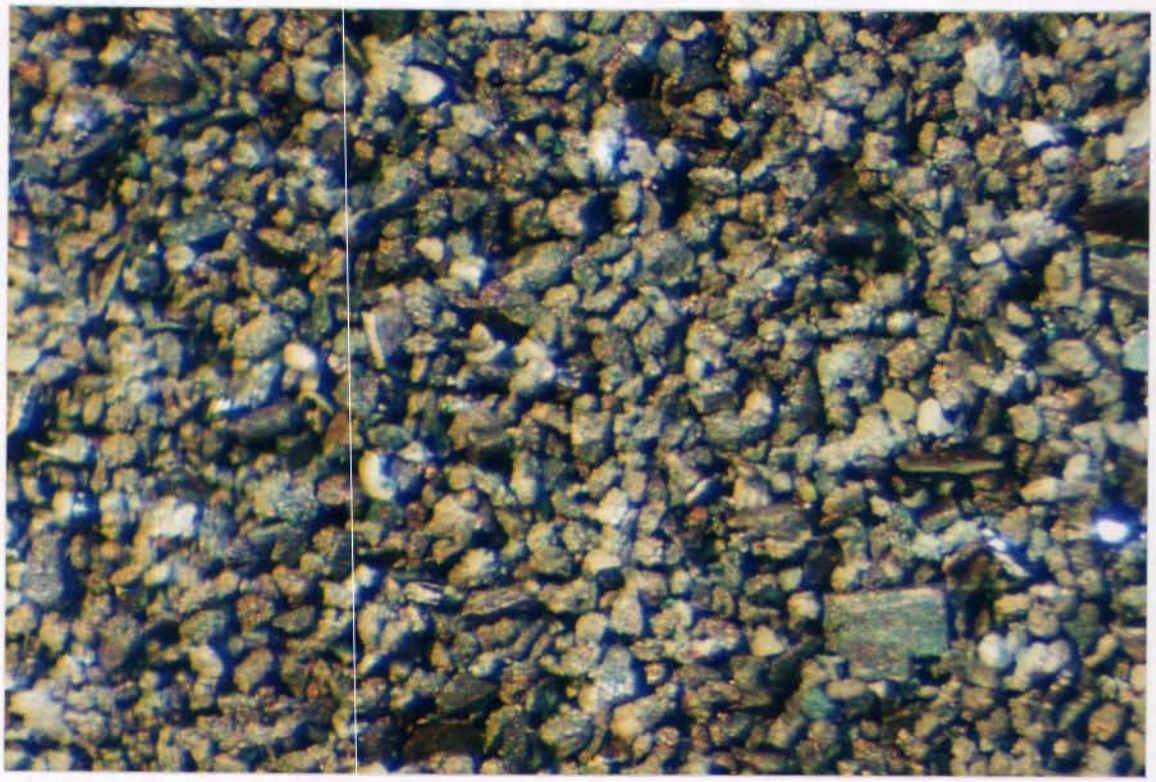


Figure 22. 7AS02 Magnification: 640x
-200 +400 mesh 3.3 Sink

0.4 mm

Photomicrograph exhibiting variably shaped pyrite aggregates with minor amounts of apatite.

19990038

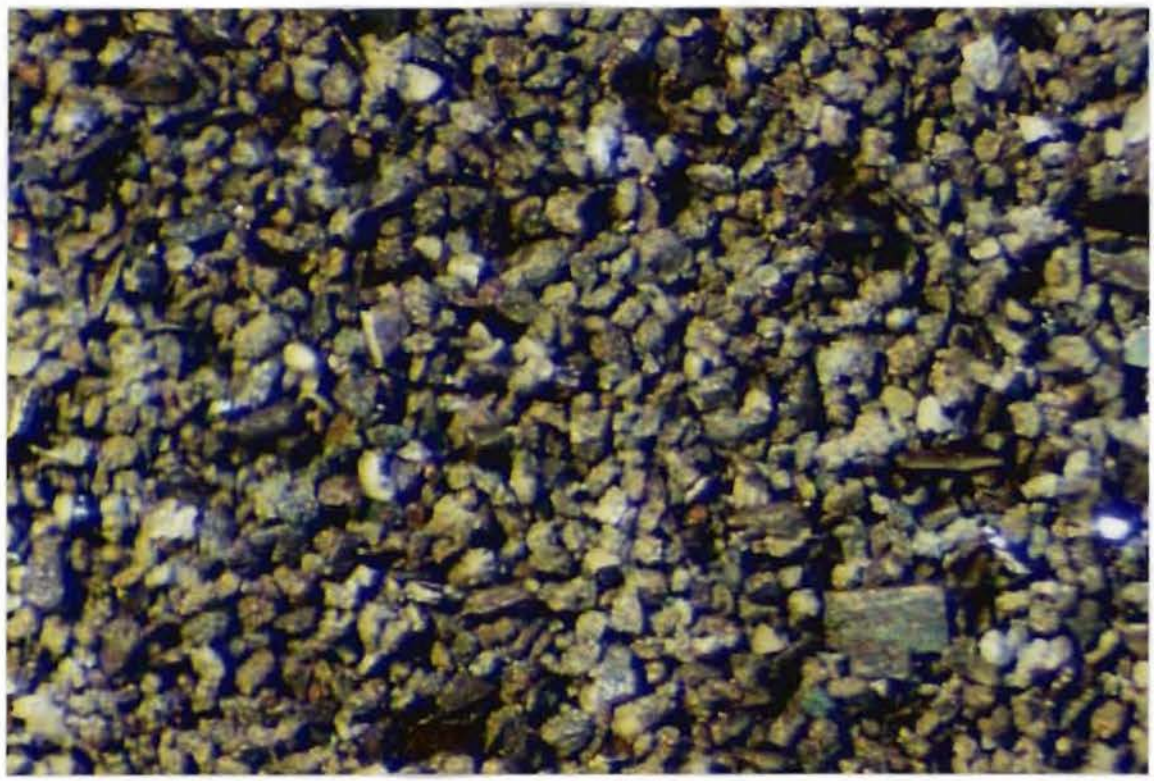


Figure 22. 7AS02 Magnification: 640x
-200 +400 mesh 3.3 Sink

0.4 mm

Photomicrograph exhibiting variably shaped pyrite aggregates with minor amounts of apatite.

19990088

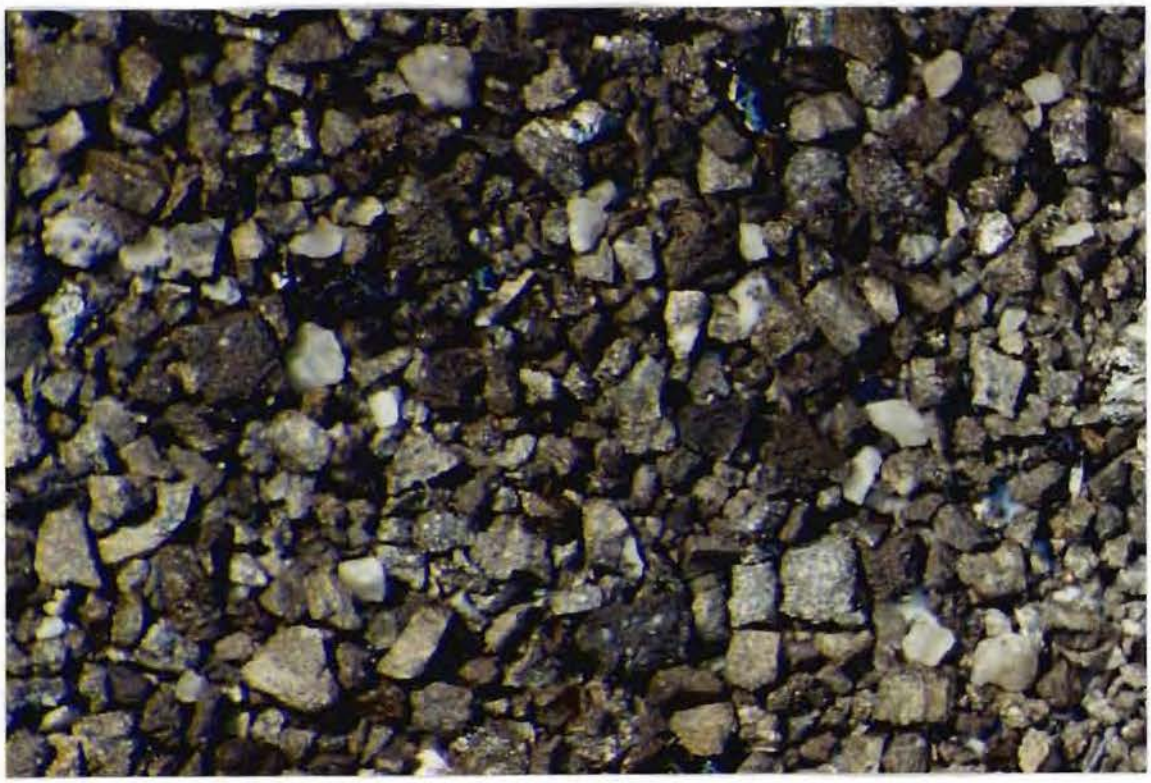


Figure 23. 7BK02 60.8-62.9 +200 mesh 3.3 Sink Magnification: 240x

1 mm

Photomicrograph exhibiting variably shaped pyrite aggregates with minor amounts of apatite and quartz.

19990028

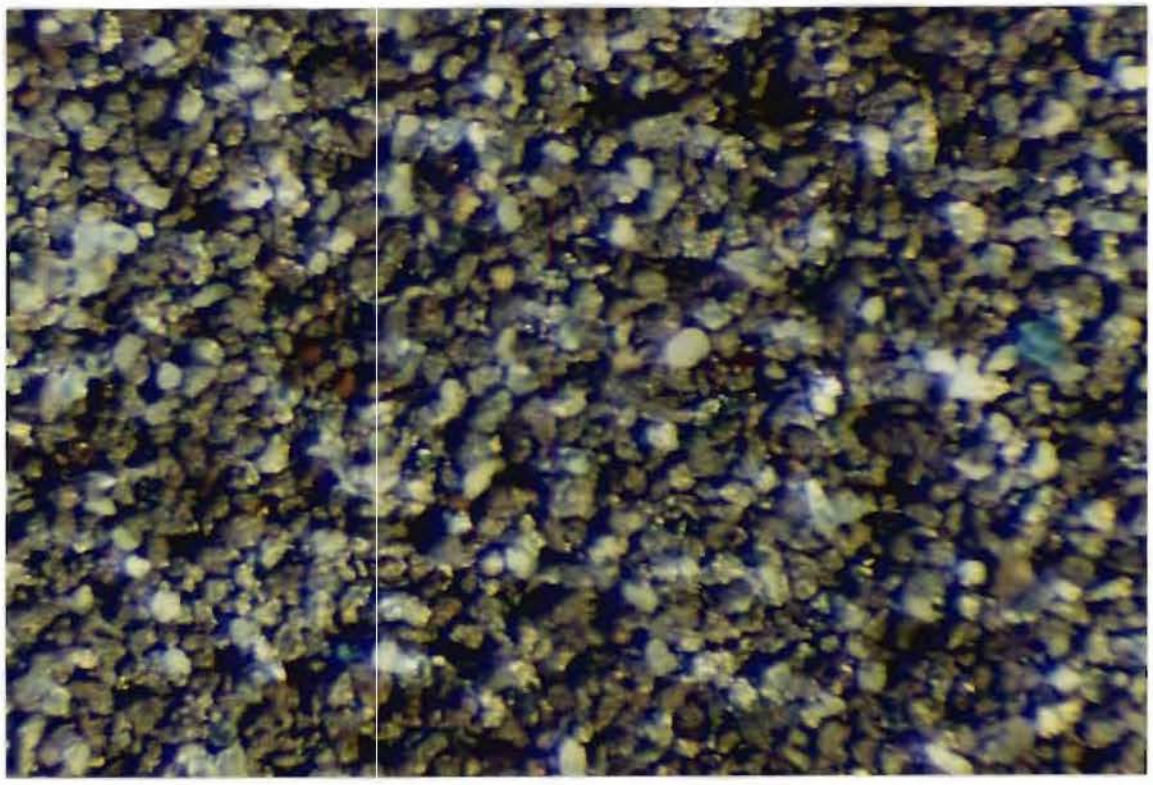


Figure 24. 7BK02 60.8-62.9 Magnification: 640x
-200 +400 mesh 3.3 Sink

0.4 mm

Photomicrograph exhibiting variably shaped pyrite aggregates with minor amounts of apatite and quartz.

19990028

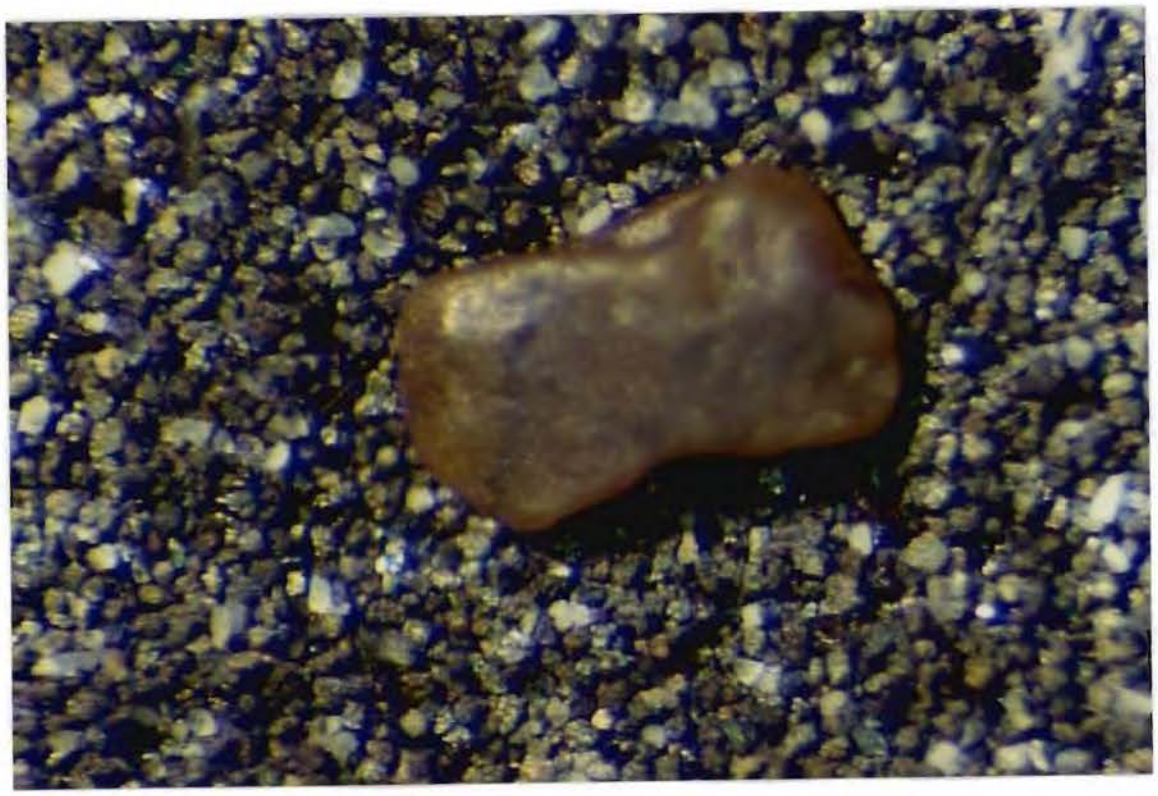


Figure 25. 7BK02 60.8-62.9 Magnification: 640x
-200 +400 mesh 3.3 Sink

0.4 mm

Photomicrograph exhibiting variably shaped pyrite aggregates with minor amounts of apatite and quartz and a rare large sub-rounded quartz particle. Particle size is greater than screen sizes used to process the sample.



Figure 26. 7BK02 77.2-79.2 +200 mesh 3.3 Sink Magnification: 240x

1 mm

Photomicrograph exhibiting variably shaped pyrite aggregates with minor amounts of apatite and quartz. A red, sub-angular garnet particle is present in the center of the photomicrograph.

19990028



Figure 27. 7BK02 77.2-79.2 +200 mesh 3.3 Sink Magnification: 240x

1 mm

Photomicrograph exhibiting a brown, sub-rounded quartz particle (right of center) present with variably shaped pyrite aggregates and minor proportions of apatite and quartz.

19990028



Figure 28. 7BK02 77.2-79.2 +200 mesh 3.3 Sink Magnification: 240x

1 mm

Photomicrograph exhibiting variably shaped pyrite aggregates with minor amounts of apatite and quartz. Apatite and quartz are typically present as composites with pyrite. A clear, round quartz grain attached to a quartz-pyrite composite is present in the center of the photomicrograph.

19990038

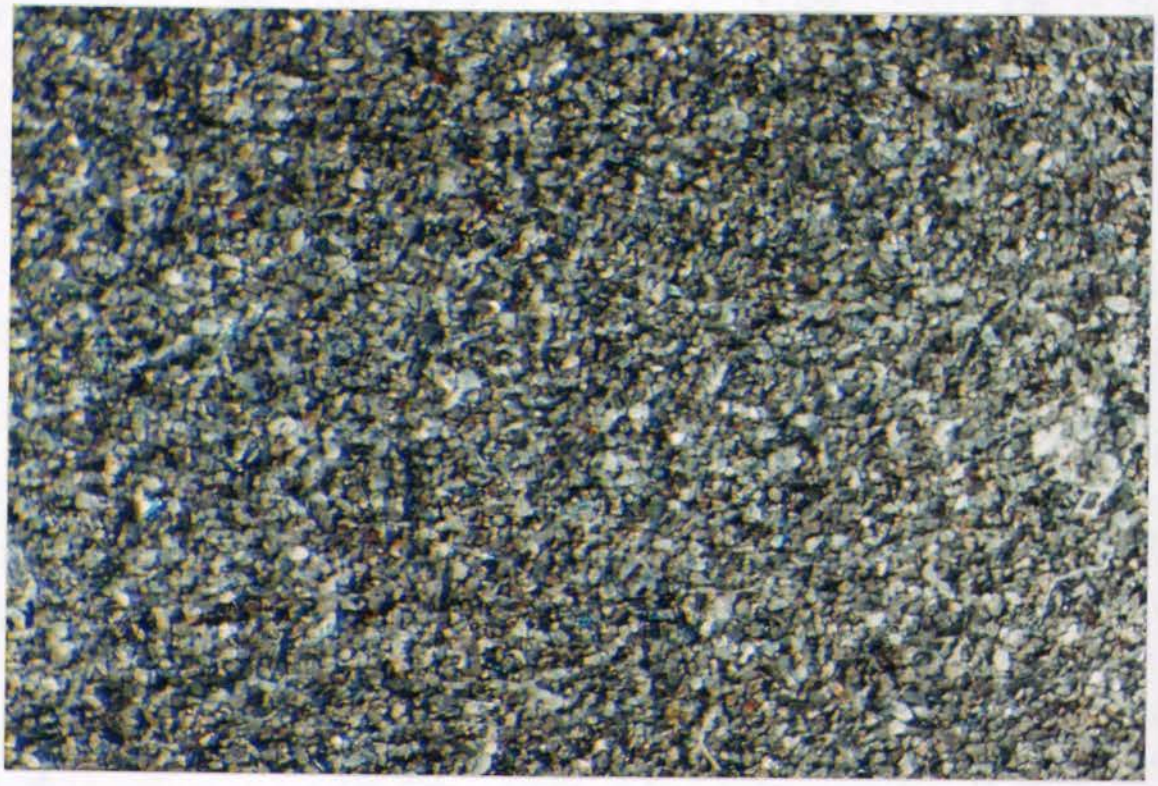


Figure 29. 7BK02 77.2-79.2 Magnification: 240x
-200 +400 mesh 3.3 Sink

1 mm

Photomicrograph exhibiting variably shaped pyrite aggregates with minor amounts of apatite and quartz.

19990088

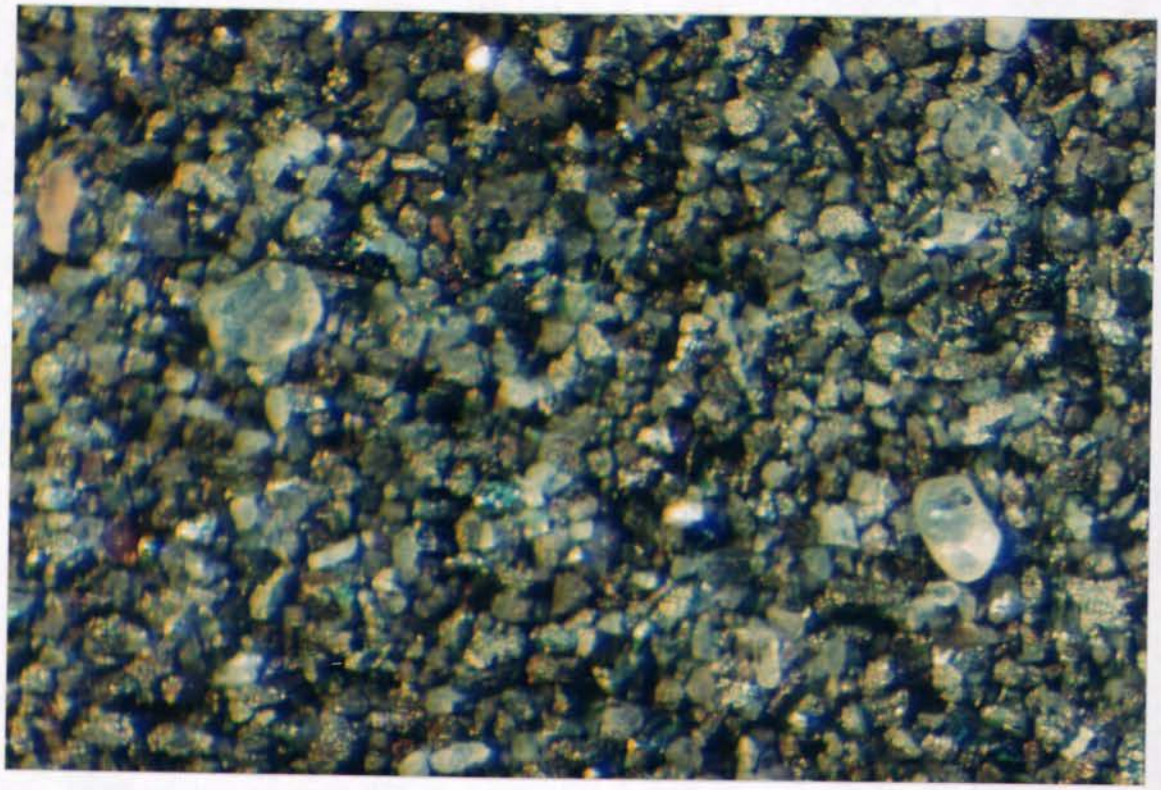


Figure 30. 7BK02 77.2-79.2 Magnification: 640x
-200 +400 mesh 3.3 Sink

0.4 mm

Photomicrograph exhibiting variably shaped pyrite aggregates with minor amounts of apatite and quartz. Two sub-rounded quartz grains are present in the photomicrograph (left of center and right lower).

19990028

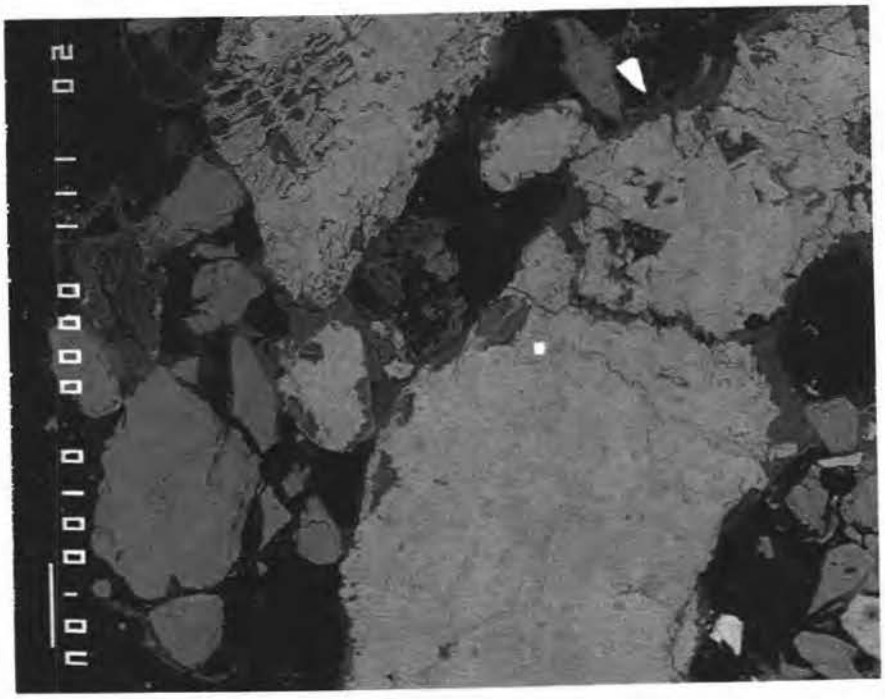


Figure 31. 98/11/1 Magnification: 111x Back Scatter Electron Image Scale Bar on Photomicrograph 100 µm

Photomicrograph of back scatter electron image illustrating the relative compositional variation of the iron-rich particle containing metallic iron (large white grains) and gold (white triangle, top right of center). The gray particles (lower left) are magnetite and the small bright white grain (right corner) is monazite. The metallic iron grain boundary is serrate and is encapsulated by thinly laminated goethite. The black areas within the particle are either epoxy or open spaces.

Note: The white square right of center is a screen marker and not a mineral.

19990038

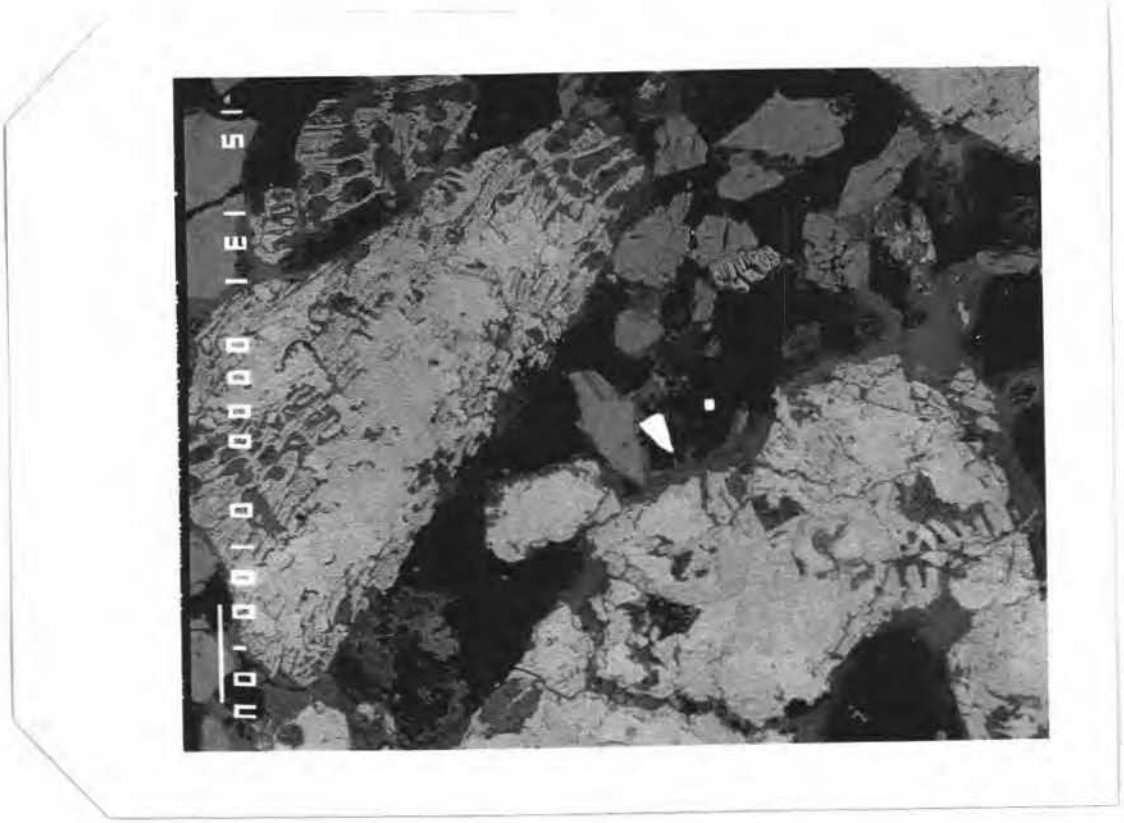


Figure 32. 98/11/1 Magnification: 131x Back Scatter Electron Image Scale Bar on Photomicrograph 100 µm

Photomicrograph of back scatter electron image illustrating a different area of the iron-rich particle at a slightly higher magnification. Gold (white triangle) is present in the center of the photomicrograph and pyrite grains (gray) are present in the upper right. The metallic iron (large white grains) grain boundary is serrate and is encapsulated by thinly laminated goethite. The lamellae within the grain consist of either goethite or an iron rich sulfate? mineral. The black areas within the particle are either epoxy or open spaces.

Note: The white square right of center is a screen marker and not a mineral.

19990028

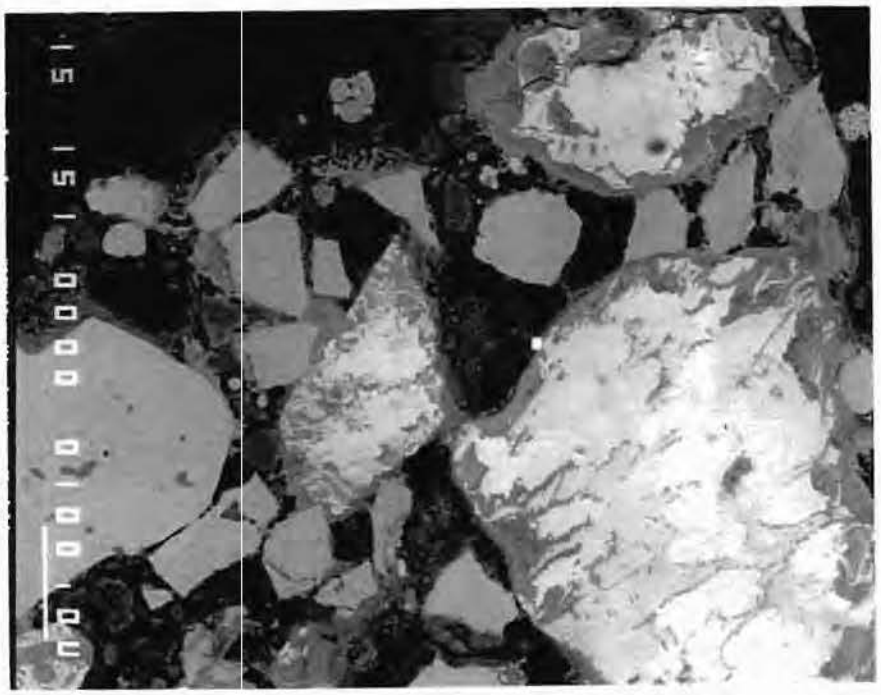


Figure 33. 98/11/1 Magnification: 151x Scale Bar on Photomicrograph
Back Scatter Electron Image 100 µm

Photomicrograph of back scatter electron image illustrating a another area of the iron-rich particle at a slightly higher magnification. Numerous pyrite grains (gray) are present between the metallic iron grains (white). Framboidal pyrite is present along the top right edge and left of center. The pyrite grain boundaries, including the framboidal pyrite, are not serrate and the goethite appears to "cement" the grains to the metallic iron (especially evident in the top right). The black areas within the particle are either epoxy or open spaces.

Note: The white square right of center is a screen marker and not a mineral.

19990028

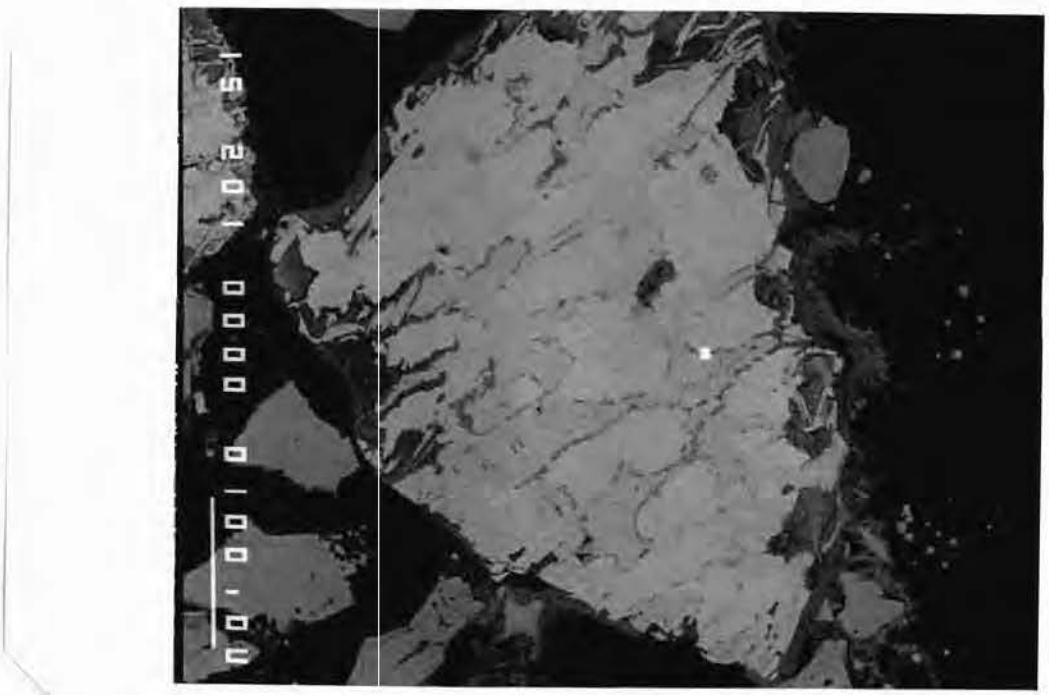


Figure 34. 98/11/1 Magnification: 201x Scale Bar on Photomicrograph
Back Scatter Electron Image 100 µm

Photomicrograph of back scatter electron image illustrating a slightly different texture of the lamellae in the metallic iron (white) and the thinly laminated goethite around the metallic iron.

Note: The white square right of center is a screen marker and not a mineral.

19990058



Figure 35. 98/11/1 Magnification: 361x Back Scatter Electron Image Scale Bar on Photomicrograph 100 µm

Photomicrograph of back scatter electron image illustrating the sulfur-rich lamellae (dark grey) with the metallic iron (white).

Note: The white square right of center is a screen marker and not a mineral.

19990028



Figure 36. 7AS02 Magnification: 100x
+200 mesh 3.3 Sink

350 µm

Photomicrograph illustrating iron-rich particle #1 selected from the concentrate and prepared into a polished section. Nearly the entire particle is rimmed by thinly laminated goethite with minor amounts of iron sulphides. The iron sulphides (Figure 37) appear to be related to the oxidation of the particle and the formation of goethite.

19990088

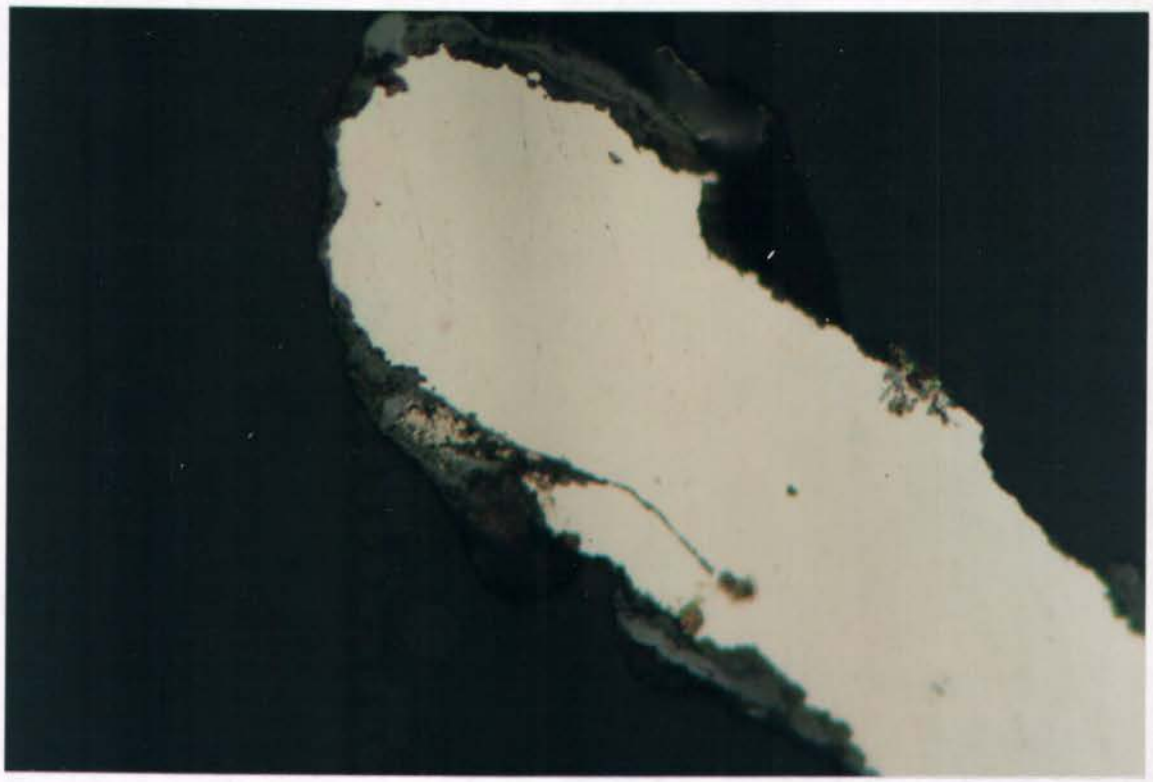


Figure 37. 7AS02 Magnification: 500x
+200 mesh 3.3 Sink

65 µm

Photomicrograph illustrating iron-rich particle #1 at a higher magnification with iron sulphides (left of center) intergrown with thinly laminated goethite.

19990028



Figure 38. 7AS02 Magnification: 100x
+200 mesh 3.3 Sink

350 µm

Photomicrograph illustrating iron-rich particle #2 selected from the concentrate and prepared into a polished section. A portion of the particle is rimmed by thinly laminated goethite thick enough to observe under the ore microscope.

19990088

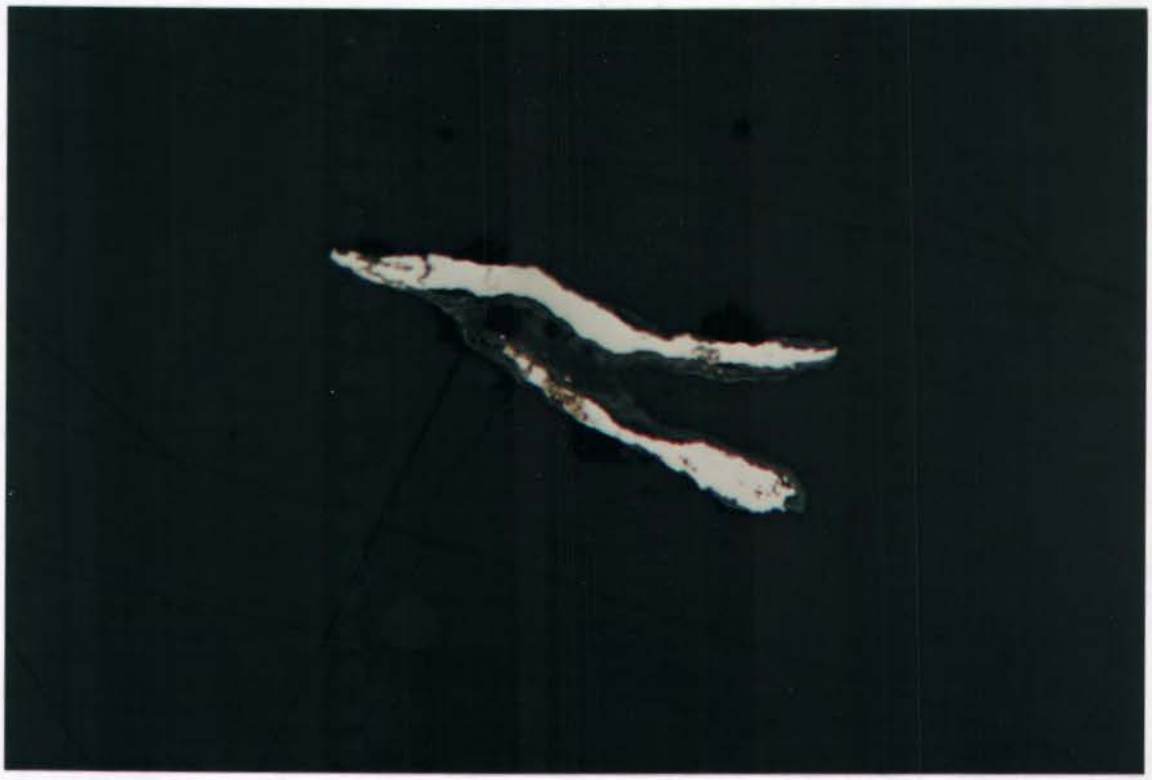


Figure 39. 7AS02 Magnification: 100x
+200 mesh 3.3 Sink

350 µm

Photomicrograph illustrating iron-rich particle #3 selected from the concentrate and prepared into a polished section. The particle actually consists of two metallic iron grains cemented together by goethite. Both grains are almost entirely rimmed by thinly laminated goethite with minor amounts of iron sulphides. The iron sulphides (Figure 40) appear to be related to the oxidation of the particle and the formation of goethite.

19990038



Figure 40. 7AS02 Magnification: 500x
+200 mesh 3.3 Sink

65 µm

Photomicrograph illustrating the contact between metallic iron two grains that makeup particle #3. Fine disseminated iron sulphides (left of center) intergrown with thinly laminated goethite are present primarily along the upper edge of the bottom grain.

19990038



Figure 41. 7AS02 Magnification: 100x
+200 mesh 3.3 Sink

350 µm

Photomicrograph illustrating iron-rich particle #4 selected from the concentrate and prepared into a polished section. A portion of the particle is rimmed by thinly laminated goethite thick enough to observe under the ore microscope.

19990088



Figure 42. 7AS02 Magnification: 100x
+200 mesh 3.3 Sink

350 µm

Photomicrograph illustrating iron-rich particle #5 selected from the concentrate and prepared into a polished section. A portion of the particle is rimmed by thinly laminated goethite thick enough to observe under the ore microscope with minor amounts of iron sulphides. The iron sulphides (Figure 43) appear to be related to the oxidation of the particle and the formation of goethite.

19990028

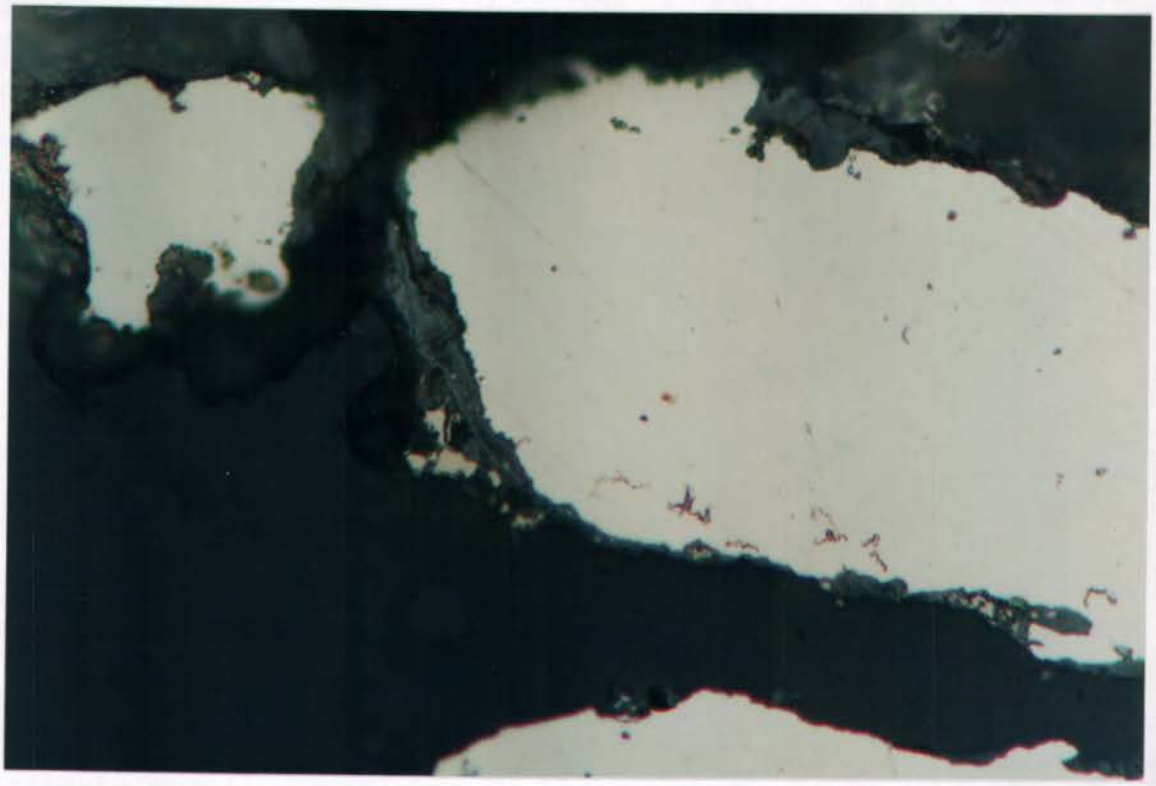


Figure 43. 7AS02 Magnification: 500x
+200 mesh 3.3 Sink

65 µm

Photomicrograph illustrating iron-rich particle #5 at a higher magnification with iron sulphides (left of center) intergrown with thinly laminated goethite.

19990028

Sample Descriptions

PetroLogic Inc.
Quality Assurance with Mineralogy

Reference Number
PI990303

Sample

KRTT-01 water heavy 1

The metallurgical product consists of 100 to 400 µm discrete and a minor proportion of larger 0.5 to 2 mm grains. The grains are sub-angular to sub-angular grains with a significant proportion of rounded grains. The grains consist primarily of quartz and apatite with lesser amounts of carbonate and pyrite. The product is similar to 98/11/1 reagent heavy 2 but with a greater modal abundance of quartz.

Bone, shell and teeth fragments have been fossilized to apatite. Some of the grains exhibit a highly polished surface and are occasionally covered with a series of circular depressions indicative of fossil structures. They vary in color from brown to black.

Pyrite occurs primarily as smaller aggregates and framboids and lesser larger irregular shaped aggregates. Some of the grains are composites with quartz and apatite. Tabular aggregates of pyrite a present and are typically tarnished dark yellow. Many of the grains exhibit a tarnished surface that varies in color from a dark yellow to blue and red. Marcasite appears to be present as aggregates with pyrite.

Magnetite was present as rare grains within the samples. They occurred as discrete sub-angular grains often coated with a red-brown surface coating.

The sample also contains particles with surface coatings of radiating gypsum crystals indicative of post-processing crystallization.

Gold mineralization was not observed during the examination.

Sample Descriptions

Petrologic Inc.
Quality Assurance with Mineralogy

Reference Number
PI990303

Sample
KRTT-01 reagent heavy

The metallurgical product consists primarily of sub-rounded to sub-angular (100 to 400 µm) particles with a significant proportion as rounded grains. A minor proportion of the grains were larger, ranging in size from 0.5 to 2 mm. The product is similar to 98/11/1 reagent heavy 2 but with a greater modal abundance of quartz.

Bone, shell and teeth fragments have been fossilized to apatite. Some of the grains exhibit a highly polished surface and are occasionally covered with a series of circular depressions.

Pyrite occurs primarily as smaller aggregates and framboids and lesser larger irregular shaped aggregates. Some of the grains are composites with quartz and apatite. Tabular aggregates of pyrite a present and are typically tarnished dark yellow. Many of the grains exhibit a tarnished surface, that varies in color from a dark yellow to blue and red. Marcasite appears to be present as aggregates with pyrite.

Magnetite was present as rare grains within the samples. They occurred as discrete sub-angular grains often coated with a red-brown iron oxide coating.

The sample also contains particles with surface coatings of radiating gypsum crystals indicative of post-processing crystallization.

Gold mineralization was not observed during the examination.

Sample Descriptions

Sample

98/11/1 Reagent heavy 1

The metallurgical product consists primarily of sub-angular to sub-rounded grains (100 to 300 µm) with several grains 0.5 to 1.5 mm that are typically sub-rounded to sub-angular with a significant proportion as rounded grains. The grains are primarily quartz, pyrite and apatite with minor amounts of carbonate.

Bone, shell and teeth fragments have been fossilized to apatite. Some of the particles exhibit a highly polished surface and are occasionally covered with a series of circular depressions analogous of shell fragments. The grains vary in color from black to brown.

Pyrite occurs primarily as framboids and irregular shaped aggregates. The relatively larger grains are typically irregular shape with many of the grains exhibiting a tarnished surface. Some of the grains are composites with quartz and apatite. Tabular aggregates of pyrite are present and are typically tarnished dark yellow and a few of the grains are tarnished blue and red. Marcasite appears to be present as aggregates with pyrite.

Rare magnetite and iron-rich detrital particles were observed as discrete sub-angular grains with rust-brown iron oxide surface coatings .

The sample also contains particles with surface coatings of radiating gypsum crystals indicative of post-processing crystallization. It also hosted what appears to be resin beads that are commonly used in metallurgical processing for extracting gold and copper from solutions.

›ld mineralization was not observed during the examination.

Sample Descriptions

Sample

98/11/1 Reagent heavy 1a

The metallurgical product consists of grains primarily 100 to 300 µm with several grains 0.5 to 1.5 mm that are typically sub-rounded to sub-angular with a significant proportion of rounded grains. The grains are primarily quartz, pyrite and apatite with minor amounts of carbonate, silicates and rare pyrrhotite.

Bone, shell and teeth fragments have been fossilized to apatite. Some of the grains exhibit a highly polished surface and are occasionally covered with a series of circular depressions analogous of shell fragments. They vary in color from brown to black.

Pyrite occurs primarily as framboids and irregular shaped aggregates. The relatively larger grains are typically irregular shape with many of the grains exhibiting a tarnished surface. Some of the grains are composites with quartz and apatite. Tabular aggregates of pyrite a present and are typically tarnished dark yellow and a few of the grains are tarnished blue and red. Marcasite appears to present as aggregates with pyrite.

A minor proportion of discrete magnetite grains and iron-rich detrital particles were also observed. Magnetite also occurred as composites with other silicates.

The sample also contains particles with surface coatings of radiating gypsum crystals indicative of post-processing crystallization. The sample also hosted what appear to be resin beads that are commonly used in metallurgical processing.

›ld mineralization was not observed during the examination.

Sample Descriptions

Sample

98/11/1 Reagent heavy 2

The metallurgical product consists primarily of sub-rounded to sub-angular grains (100 to 750 µm) with a significant proportion occurring as rounded grains. Several grains 1 to 3 mm are present in the sample unlike the other 98/11/1 metallurgical products. The grains are primarily quartz and apatite with lesser amounts of pyrite and carbonate. The sample contains significantly more material than the other 98/11/1 metallurgical products.

Bone, shell and teeth fragments have been fossilized to apatite. Some of the grains exhibit a highly polished surface and are occasionally covered with a series of circular depressions analogous of fossilized structures. They vary in color from brown to black.

Pyrite is much less abundant than in the other 98/11/1 metallurgical products and occurs primarily as framboids and irregular shaped aggregates, and less commonly as >0.5 mm grains and particles. The relatively larger grains are typically irregular shape with many of the grains exhibiting a tarnished surface. Some of the grains are composites with quartz and apatite. A few of the grains are tarnished blue and red.

A minor proportion of discrete magnetite grains and iron-rich detrital particles were also observed. The iron-rich detrital grains were more oxidized than the magnetite and were sub-angular in form.

Gold mineralization was not observed during the examination.

Sample Descriptions

Sample

CR-1 petri

The metallurgical product consists of fine grains (<50µm) with a minor proportion of discrete grains <150 µm in size that are rounded to sub-angular. The relatively coarser grains are primarily quartz with lesser amounts of pyrite and bone, shell and teeth fragments fossilized to apatite. Pyrite occurs as framboids, aggregates and discrete grains.

The amount of material is significantly less than that in the KRTT 01 and 98/11/1 series of metallurgical products included within the present study.

Gold mineralization was not observed during the examination.

Sample Descriptions

PetroLogic Inc.
Quality Assurance with Mineralogy

Reference Number
PI990303

Sample
CR-2 petri

The metallurgical product consists of 50 to 250 µm discrete sub-angular to sub-angular grains with a significant proportion of rounded grains. The grains consist primarily of quartz and bone, shell and teeth fragments fossilized to apatite, with lesser amounts of pyrite. Pyrite occurs as framboids, aggregates and discrete grains.

The amount of material is similar to CR-1 but significantly less than that in the KRTT 01 and 98/11/1 series of metallurgical products included within the present study.

Gold mineralization was not observed during the examination.

Sample Descriptions

Sample

7AS02 +200 Mesh 3.3 Sink

The sample (1.08g) consists primarily of 100µm to 2mm grains and particles of apatite with lesser amounts of pyrite and minor amounts of quartz, carbonate, zircon, garnets and magnetite. The particles are sub angular to rounded in form.

Bone, shell and teeth fragments have been fossilized to apatite. Some of the grains exhibit a very smooth round surface and are occasionally covered with a series of textures analogous of cellular structures. The grains are typically black with lesser amounts as brown.

Pyrite primarily occurs as framboids, irregular shaped aggregates, and discrete subhedral grains. A minor proportion of the grains are tarnished. Pyrite also occurs as composites with quartz, carbonate and apatite. Marcasite appears to be present along grain boundaries of pyrite possibly as discrete aggregates.

Iron-rich particles are present as discrete, sub-rounded plates with dark red-brown surfaces. They are magnetic, covered in goethite and occasionally host inclusions of sulphides. It is possible that these grains are similar to the gold-bearing iron-rich particles observed in 98/11/2 or are a result of the spalling of metallic material off of sample preparation equipment.

Magnetite was present as rare relatively fine (<250 µm) sub-angular to rounded grains.

Gold mineralization was not observed during the examination.

Sample Descriptions

Sample

7AS02 -200 +400 Mesh 3.3 Sink

The sample (1.75g) consists primarily of sub-angular to rounded grains 40 to 75 µm in size. The grains consist primarily of pyrite with lesser amounts of apatite and minor amounts of quartz, carbonate, zircon, garnets, and iron oxide.

Pyrite occurs as framboids, irregular shaped aggregates, and discrete subhedral grains. A minor proportion of the grains are slightly tarnished. Pyrite also occurs as composites with quartz, carbonate and apatite. Marcasite appears to be present along grain boundaries of pyrite possibly as discrete aggregates.

Bone, shell and teeth fragments have been fossilized to apatite. Some of the grains exhibit a very smooth surface and are occasionally covered with a series of textures analogous of cellular structures. The grains are typically black with lesser amounts as brown.

Iron-rich particles are present as discrete, sub-rounded plates with dark red-brown surfaces. They are magnetic, covered in goethite and occasionally host inclusions of sulphides. It is possible that these grains are similar to the gold-bearing iron-rich particles observed in 98/11/2 or are a result of the spalling of metallic material off of sample preparation equipment.

Magnetite was present as rare relatively fine (<250 µm) sub-angular to rounded grains.

Gold mineralization was not observed during the examination.

Sample Descriptions

PetroLogic Inc.
Quality Assurance with Mineralogy

Reference Number

Sample

7BK02 60.8 - 62.9 +200 mesh 3.3 Sink

The sample (4.3g) consists primarily of angular pyrite aggregates (100µm to 1mm) with minor to rare amounts of marcasite, apatite, phlogopite, magnetite, quartz, carbonate, ilmenite, zircon and garnet. The finer grain sizes tend to be sub-angular to sub-rounded with minor amounts of rounded grains and pyrite occurring as framboidal textured particles. Overall particle size appears to represent a typical distribution from finest to coarsest.

Pyrite occurred primarily as variably textured angular aggregates with the finer grain sizes exhibiting a framboidal texture. Pyrite also occurs as composites with quartz, carbonate and apatite. A rare proportion of the aggregates exhibit tarnishing to a light to dark yellow and blue. Marcasite appears to be present with pyrite aggregates. A minor proportion of the aggregates display fossilized textures with apatite.

Magnetite is present as discrete, angular, irregular shaped grains exhibiting conchoidal fractures. Rare grains were observed to have partially sub-angular to sub-rounded surfaces with variable amounts of rust-brown staining.

Phlogopite, ilmenite, zircon and garnet occur as discrete liberated grains.

Rare grains of metallic iron shavings likely derived from drill rods were also present. These are likely to have originated from the drill rods during sample collection.

Gold mineralization was not observed during the examination

Sample Descriptions

Sample

7BK02 60.8 - 62.9 -200 +400 mesh 3.3 Sink

The sample (1.4g) consists primarily of framboidal and irregular textured pyrite aggregates (<80 µm) with minor amounts of marcasite, apatite, phlogopite, magnetite, quartz, carbonate, ilmenite, zircon and garnet. Sample contains a greater proportion of silicates and sub-rounded to rounded grains than the coarser size fraction.

Pyrite occurred as both framboids and variably textured angular aggregates with a minor proportion occurring as fossilized shell fragments. Pyrite also occurs as composites with quartz, carbonate and apatite. A rare proportion of the aggregates exhibit tarnishing to a light to dark yellow and blue. Marcasite appears to be present with pyrite aggregates.

Magnetite is present as discrete angular, irregular shaped grains exhibiting conchoidal fractures. Rare grains were observed to have partially sub-angular to sub-rounded surfaces with variable amounts of of rust-brown staining.

Phlogopite, ilmenite, zircon and garnet occur as discrete liberated grains that tend to be angular to sub-rounded with a minor proportion of rounded grains.

Sample also contains a single sub-rounded quartz grain up to 1.5 mm in size and rare grains of metallic iron shavings likely derived from drill rods.

Gold mineralization was not observed during the examination

Sample Descriptions

PetroLogic Inc.
Quality Assurance with Mineralogy

Reference Number

Sample

7BK02 77.2 - 79.2 +200 mesh 3.3 Sink

The sample (11.6g) consists primarily of angular to sub-rounded irregular textured pyrite aggregates (100 µm to 1 mm) with minor amounts of marcasite, apatite, phlogopite, magnetite, quartz, carbonate, ilmenite, zircon, glauconite and garnet. The finer grain sizes tend to be more sub-rounded and pyrite occurs more as framboidal textured particles. Overall particle size appears to represent a typical distribution from finest to coarsest. Sample tends to differ from 60.8-62.9 by having a greater proportion of fossilized apatite, higher proportion of pyrite, apatite, quartz and carbonate composites and the grains tend to be more rounded.

Pyrite occurred primarily as variably textured angular to sub-rounded aggregates with the finer grain sizes exhibiting a framboidal texture. Pyrite also occurs as composites with quartz, carbonate and apatite and exhibits within these particles cementation texture around discrete grains. A rare proportion of the aggregates exhibit tarnishing to a light to dark yellow, red and blue. Marcasite appears to be present with pyrite aggregates. A minor proportion of the aggregates display fossilized textures with apatite.

Magnetite is present as angular irregular shaped grains exhibiting conchoidal fractures. Rare grains were observed to be partially rounded.

Rare grains of metallic iron shavings likely derived from drill rods are present and a single pyrite aggregate up to 2 mm size was also observed.

Phlogopite, ilmenite, zircon and garnet occur as discrete liberated grains and tend to be angular to sub-rounded. A higher proportion of these minerals, as well as apatite, are present than in sample 60.8-62.9 +200 mesh 3.3 sink.

Gold mineralization was not observed during the examination

Sample Descriptions

Sample

7BK02 77.2 - 79.2 -200 +400 mesh 3.3 Sink

The sample (1.1g) consists primarily of framboidal and irregular textured pyrite (<80 µm) with minor amounts of marcasite, apatite, phlogopite, magnetite, quartz, carbonate, ilmenite, zircon, glauconite and garnet. Sample tends to differ from 60.8-62.9 -200 +400 mesh 3.3 sink by having a greater proportion of fossilized apatite and silicates and a greater proportion of the grains being rounded.

Pyrite occurred as both framboids and variably textured sub-angular to sub-rounded aggregates with a minor proportion occurring as fossilized shell fragments with apatite. Pyrite also occurs as composites with quartz, carbonate and apatite. A rare proportion of the aggregates exhibit tarnishing to a light to dark yellow and blue. Marcasite appears to be present with pyrite aggregates.

Magnetite is present as angular irregular shaped grains exhibiting conchoidal fractures.

Phlogopite, ilmenite, zircon and garnet occur as discrete liberated grains and tend to be angular to sub-rounded. A higher proportion of these minerals, as well as apatite, are present relative to sample 60.8-62.9 +200 mesh 3.3 sink.

Rare grains of metallic iron shavings likely derived from drill rods are present and a single pyrite aggregate up to 2 mm size was also observed

Gold mineralization was not observed during the examination.

Petrographic Report

PetroLogic Inc.
Quality Assurance with Mineralogy

Sample	Sample Product	Reference Number
KRTT-01	PTS	PI990303

Mineralogy	Est. Vol. %	Grain Size (µm)	Textural Description
Apatite $Ca_5(PO_4)_3(F,OH,Cl)$	55	50 to 500	fossilized shell, bone and teeth layered aggregates with quartz and carbonate commonly displays fossilized structure rod-like shards and rounded grains shards often hollow typically brown to opaque
Quartz SiO_2	25	50 to 750	aggregates with apatite and carbonate monomineralic aggregates of quartz liberated sub-rounded grains
Carbonate $(Ca,Mg,Fe)CO_3$	10	50 to 300	aggregates with apatite and quartz monomineralic aggregates typically host to finely disseminated pyrite
Carbonaceous C Material	<5	<10	matrix to apatite particles inclusions in apatite
Opaques	4	<150	see opaque mineral descriptions primarily framboidal pyrite and aggregates of pyrite
White Mica	<1	<200	liberated aggregates matrix with quartz, carbonate and apatite
..logopite $K_2(Mg,Fe)_6(Si,Al)_8O_{20}(OH,F)_4$	1	<500	liberated flakes aggregates with apatite, quartz and carbonate

Description

The sample consists primarily of apatite with lesser amounts of quartz, and carbonate and minor amounts of carbonaceous material, phlogopite, white mica and opaques. The particles range in size from approximately 100 µm to 2 mm with an approximate average size of 0.5 mm. The larger particles are rock fragments that consist generally of layered apatite fossilized fragments in a variable matrix of apatite, quartz, carbonate and carbonaceous material. A significant number of monomineralic aggregates of apatite, quartz or carbonate are also present. The finer particles are typically liberated apatite fossilized shell fragments, quartz, and carbonate. Individual mineral grains are sub-angular to sub-rounded with lesser rounded grains.

Bone, shell and teeth fragments have been fossilized to apatite. The shapes vary from tubular to rounded particles. Remnant cellular structure can be routinely observed in the grains. The rod-like grains are aligned sub-parallel within the larger aggregates.

Gold mineralization was not observed during the microscopic examination.

Petrographic Report

Petrologic Inc.
Quality Assurance with Mineralogy

Sample	Sample Product	Reference Number
KRTT-01	PS-A	PI990303

Mineralogy	Est. Vol. %	Grain Size (µm)	Textural Description
Non-opaques	96	<750	see petrographic report for non-opaque description primarily liberated grains and aggregates of apatite
Pyrite FeS	3	<10 to 150	variable grain size and textural association typically as fine grained framboidal aggregates liberated particles (up to 2mm) of fine aggregates aggregates along grain edges of non-opaques marcasite along grain boundaries and pseudomorphs discrete subhedral to euhedral grains up to 100 µm composites with apatite, quartz and carbonate
Marcasite FeS	1	<15 to 150	aggregates along pyrite grain boundaries greater proportion with liberated pyrite aggregates aggregates within non-opaques occasional pseudomorphs after pyrite
Sphalerite ZnS	<0.1	<350	liberated, irregular shaped grains
Goethite FeO(OH)	<0.1	<50	liberated grains displaying thin laminations particles up to 125 µm in size along sulphide grain boundaries
Chalcopyrite $CuFeS_2$	<0.1	<75	liberated grains
Arsenopyrite FeAsS	<0.1	<50	clusters of euhedral inclusions in non-opaques

Description

The sample consists of approximately 4% opaque minerals in the form of pyrite and lesser marcasite with trace amounts of sphalerite, chalcopyrite, goethite and arsenopyrite. Pyrite occurs typically as framboidal aggregates or irregular shaped fine grained (<15 µm) aggregates disseminated throughout particles of primarily carbonate and apatite. Discrete grains of framboidal pyrite are present as liberated grains and as discrete grains locked in particles or as liberated grains up to 100 µm. Pyrite is commonly associated with marcasite along grain boundaries. Rare chalcopyrite and sphalerite were also observed in the sample as liberated grains and sphalerite also occurred locked in aggregates of pyrite.

Gold mineralization was not observed during the microscopic examination.

Petrographic Report

PetroLogic Inc.
Quality Assurance with Mineralogy

Sample	Sample Product	Reference Number
KRTT-02	PTS	PI990303

Mineralogy	Est. Vol. %	Grain Size (µm)	Textural Description
Apatite $Ca_5(PO_4)_3(F,OH,Cl)$	80	up to 1mm	fossilized shell, bone and teeth fragments liberated rod-like shards, fossilized fragments commonly exhibits remnant cellular structure aggregates of fine apatite with quartz and carbonate varies in color from brown to black
Quartz SiO_2	10	25 to 500	aggregates of fine quartz with apatite minor discrete liberated grains liberated aggregates of fine quartz
Carbonate $(Ca,Mg,Fe)CO_3$	5	<150	matrix to particles consisting of apatite and quartz minor liberated aggregates
Opaques	3	<100	see opaque mineral descriptions primarily framboidal pyrite and aggregates of pyrite
Carbonaceous Material C	<3	<10	fine grained groundmass of mineral aggregates inclusions in apatite
Phlogopite $K_2(Mg,Fe)_6(Si,Al)_8O_{20}(OH,F)_4$	<0.5		rare grains liberated and with aggregates of apatite
Glauconite (K,Na)(Fe,Al,Mg)2(Si,Al)4O10(OH)2	<0.5	<100	liberated grains within aggregates of apatite and quartz
Gold Au	grain - 1	58 x 35	liberated, irregular shape

Description

The sample consists primarily of apatite with lesser amounts of quartz, carbonate and opaques and minor to trace amounts of carbonaceous material, glauconite, phlogopite and gold. The particles are primarily aggregates of apatite with lesser quartz and carbonate and range in size from approximately 100 µm to 2 mm in size with an average size of approximately 0.5 mm. Liberated grains occur primarily as fossilized shell fragments of apatite and relatively coarser grains of quartz.

Bone, shell and teeth fragments have been fossilized to apatite. Apatite is also present as a matrix to aggregates of fossilized apatite, quartz and carbonate. The shapes vary from tubular to rounded. Apatite is also present within aggregates of quartz and to a lesser degree, carbonate. It also occurs primarily in the form of rod-like liberated particles and as sub-parallel aligned grains within the larger aggregates.

Fine disseminated opaques are associated with apatite and carbonate and occur primarily in the form of framboidal pyrite. See opaque description for more details.

Gold mineralization was observed to occur as a single, irregular shaped, liberated grain.

Petrographic Report

PetroLogic Inc.
Quality Assurance with Mineralogy

Sample	Sample Product	Reference Number
KRTT-02	PS-A	PI990303

Mineralogy	Est. Vol. %	Grain Size (µm)	Textural Description
Non-opaques	97	<750	see petrographic report for non-opaque description liberated grains and aggregates of apatite
Pyrite FeS	3	typically <100	variable grain size and textural association typically as aggregates and framboids grain within aggregates usually <75 µm fine disseminations in apatite and carbonate marcasite along grain boundaries and pseudomorphs subhedral grains up to 150 µm composites with apatite, quartz and carbonate
Marcasite FeS	<1	<25	associated with grain boundaries of pyrite aggregates within non-opaques occasional pseudomorphs after pyrite
Goethite FeO(OH)	<0.1	<125	liberated grains, thinly laminated
Arsenopyrite FeAsS	<0.1	<50	clusters of euhedral inclusions in non-opaques

Description

The sample consists of approximately 3% opaque minerals in the form of pyrite with trace amounts of marcasite and arsenopyrite. The pyrite occurs included or attached to non-opaque particles and as framboidal shaped mineral aggregates that do not exceed 400 µm. The framboids are well rounded and consist primarily of pyrite aggregates with marcasite along grain boundaries.

Gold mineralization was not observed during the examination.

Prepared for:
Strathcona Mineral Services Limited

Petrographic Report

PetroLogic Inc.
Quality Assurance with Mineralogy

Sample	Sample Product	Reference Number
KRTT-03	PTS	PI990303

Mineralogy	Est. Vol. %	Grain Size (µm)	Textural Description
Apatite $Ca_5(PO_4)_3(F,OH,Cl)$	80	50 to 300	fossilized shell, bone and teeth fragments liberated rod-like shards and platelets fossilized skeletal fragments commonly displays remnant cellular structure aggregates of fine apatite with quartz and carbonate varies in color from brown to black
Quartz SiO_2	10	50 to 250	grains within aggregates of apatite lesser as discrete liberated grains liberated monomineralic aggregates
Carbonate $(Ca,Mg,Fe)CO_3$	5	<150	primarily as matrix to apatite dominated fragments liberated monomineralic aggregates
Opaques	3	<100	see opaque mineral descriptions primarily framboidal pyrite aggregates of pyrite
Carbonaceous C Material	3	<10	groundmass to particles of mineral aggregates inclusions in apatite
Phlogopite $K_2(Mg,Fe)_6(Si,Al)_8O_{20}(OH,F)_4$	<0.5	<200	discrete liberated grains with aggregates of apatite and quartz

scription

.e sample consists primarily of apatite with lesser amounts of quartz and carbonate and minor amounts of carbonaceous material, phlogopite and aggregates of apatite. The particles are primarily aggregates of layered rod-like and platelet fossilized skeletal apatite in a matrix of apatite and quartz and liberated grains of skeletal fragments. The particles range in size from 50 µm to 3 mm with an average size of approximately 0.5 mm.

Bone, shell and teeth fragments have been fossilized to apatite. The shapes vary from tubular to rounded. Particles consist of aggregates of the skeletal apatite with a matrix of apatite, carbonate, quartz and carbonaceous material. The rod-like grains are aligned sub-parallel within the larger particle aggregates.

Gold was not observed during the examination.

Petrographic Report

PetroLogic Inc.
Quality Assurance with Mineralogy

Sample	Sample Product	Reference Number
KRTT-03	PS-A	PI990303

Mineralogy	Est. Vol. %	Grain Size (µm)	Textural Description
Non-opaques	97	<500	see petrographic report for minerals and descriptions primarily liberated grains and aggregates of apatite
Pyrite FeS	3	typically <100	variable grain size and textural associate typically as aggregates and framboids discrete larger grains up to 150 µm fine disseminations throughout apatite and carbonate rare discrete liberated subhedral grains composites with apatite, quartz and carbonate marcasite along grain boundaries and pseudomorph
Marcasite FeS	<0.5	<50	aggregates along grain boundaries of pyrite aggregates within apatite, quartz and carbonate occasional pseudomorphs after pyrite
Chalcopyrite $CuFeS_2$	<0.1	<75	rare liberated chalcopyrite grains

Description

The sample consists of approximately 3% opaque minerals in the form of pyrite with trace amounts of marcasite and rare chalcopyrite. The pyrite occurs typically included or attached to apatite or carbonate particles and occurs as mineral ıregates that typically do not exceed 400 µm in size. The framboids vary from well rounded to irregular in shape and sist primarily of pyrite. Larger framboids general consist of an aggregation of smaller framboids.

Gold mineralization was not observed during the microscopic examination.

Petrographic Report

Petrologic Inc.
Quality Assurance with Mineralogy

Sample	Sample Product	Reference Number
98/11/1	PTS	PI990303

Mineralogy	Est. Vol. %	Grain Size (µm)	Textural Description
Apatite $Ca_5(PO_4)_3(F,OH,Cl)$	60	50 to 600	fossilized bone, shell and teeth fragments typically in layered aggregates with quartz liberated discrete grains commonly exhibits remnant fossilized structures rod-like shards, platelets and rounded grains matrix to mineral aggregates
Quartz SiO_2	20	50 to 250	aggregates with apatite and carbonate minor discrete liberated grains
Carbonate $(Ca,Mg,Fe)CO_3$	10	<150	liberated aggregates and matrix of aggregates composites with pyrite and marcasite
Opaques	5	typically <150	see opaque mineral mineral descriptions primarily framboidal pyrite and aggregates of pyrite
Carbonaceous C Material	5	<10	within aggregate matrix and as inclusions in apatite
White Mica	<0.5	<100	included within layered aggregates of apatite
Phlogopite $K_2(Mg,Fe)_6(Si,Al)_8O_{20}(OH,F)_4$	<0.5	<300	liberated grains or as inclusions in mineral aggregates

Description

The sample consists primarily of apatite with lesser amounts of quartz and carbonate and minor to trace amounts of carbonaceous material, opaque minerals, phlogopite and white mica. The particles range in size from approximately 100 µm to 3 mm with an approximate average size of 0.5 mm. The particles are primarily aggregates of layered apatite with lesser sub-rounded to sub-angular quartz in a matrix of apatite, carbonate and carbonaceous material. Liberated grains occur as apatite in the form of fossilized shell fragments and relatively coarser grains of quartz.

Bone, shell and teeth fragments have been fossilized to apatite. The shape varies form tubular to rounded particles and commonly display fossilized cellular structures. The rod-like grains are aligned sub-parallel within the larger particle aggregates.

Aggregates within the sample consist of monomineralic apatite, carbonate and quartz and as aggregates of apatite, quartz and carbonate grains in a matrix of apatite, carbonate and carbonaceous material.

Opaque particles occur as relatively coarser liberated grains and aggregates and as fine disseminations primarily in carbonate.

Gold mineralization was not observed during the microscopic examination.

Petrographic Report

PetroLogic Inc.
Quality Assurance with Mineralogy

Sample	Sample Product	Reference Number
98/11/1	PS-A	PI990303

Mineralogy	Est. Vol. %	Grain Size (µm)	Textural Description
Non-opaques	95	<600	see petrographic report for non-opaque description liberated grains and aggregates of apatite
Pyrite FeS	4	<10 to 150	variable grain size and textural association typically as aggregates and framboidal liberated discrete grains up to 150 µm marcasite along grain boundaries and pseudomorphs grain size <100 µm, with particles up to 1 mm composites with quartz, carbonate and apatite
Marcasite FeS	1	<10 to 150	aggregates along grain boundaries of pyrite aggregates within non-opaques occasional pseudomorphs after pyrite
Goethite FeO(OH)	<0.2	<25	aggregates associated with pyrite aggregates thinly laminated, along grain boundaries of sulphides
Sphalerite ZnS	<0.1	<75	grains associated with pyrite coarser pyrite
Chalcopyrite $CuFeS_2$	<0.1	<200	rare liberated grains
Arsenopyrite FeAsS	<0.1	<75	clusters of euhedral inclusions in non-opaques
Gold Au	grain - 1	128 x 26	liberated, platy, attached goethite

Description

The sample consists of approximately 5% opaque minerals in the form of pyrite with lesser amounts of marcasite, and minor to trace amounts of sphalerite, chalcopyrite, goethite, arsenopyrite and gold. Opaque grains appear to occur as two distinct populations, framboidal aggregates and larger discrete grains and sulphide aggregates.

Pyrite occurs as framboidal aggregates and as larger discrete liberated grains and aggregates of non framboidal pyrite. Pyrite is commonly associated with marcasite along grain boundaries.

Goethite is associated with sulphide aggregates of arsenopyrite or pyrite and occurs as thin laminations within aggregated particles as a matrix mineral and along sulphide grain boundaries.

Gold mineralization occurred in the form of native gold as a liberated platy grain with attached goethite.

Petrographic Report

PetroLogic Inc.
Quality Assurance with Mineralogy

Sample	Sample Product	Reference Number
98/11/2	PTS	PI990303

Mineralogy	Est. Vol. %	Grain Size (µm)	Textural Description
Apatite $Ca_5(PO_4)_3(F,OH,Cl)$	80	50 to 500	fossilized bone, shell and teeth fragments liberated grains of rod-like fossilized fragments aggregates, layered with quartz and carbonate matrix of aggregated particles of apatite and quartz
Quartz SiO_2	8	50 to 200	aggregates with apatite and carbonate minor discrete liberated grains
Carbonate $(Ca,Mg,Fe)CO_3$	5	<75	typically as liberated monomineralic aggregates commonly with apatite and quartz minor discrete liberated grains
Carbonaceous C Material	5	<10	matrix of liberated aggregates inclusions in apatite
Opaques	3	<150	see opaque mineral report descriptions primarily framboidal pyrite and aggregates of pyrite

Description

The sample consists primarily of apatite with lesser amounts of quartz and carbonate and minor amounts of carbonaceous material, quartz, carbonate and opaque minerals. The particles range in size from approximately 50 µm to 2 mm with an approximate average size of 0.5 mm. The particles are primarily liberated apatite and aggregated particles of layered apatite with lesser quartz in a matrix of carbonate and carbonaceous material.

Bone, shell and teeth fragments have been fossilized to apatite. The rod-like apatite grains are aligned sub-parallel within the larger particle aggregates. Carbonaceous material occurs as matrix mineral with apatite aggregates and as inclusions in apatite.

Quartz occurs as discrete grains with apatite within particles and as a matrix mineral to the particles and carbonate is present primarily as a matrix mineral to aggregated particles of apatite.

Gold was not observed during the microscopic examination.

Petrographic Report

PetroLogic Inc.
(Quality Assurance with Microbeam)

Sample	Sample Product	Reference Number
98/11/2	PS-A	PI990303

Mineralogy	Est. Vol. %	Grain Size (µm)	Textural Description
Non-opaques	97	<500	see petrographic report for non-opaque description liberated grains and aggregates of apatite
Pyrite FeS	3	<15 to 150	variable grain size and textural association framboidal textured pyrite aggregates fine disseminations in apatite and carbonate within sulphide aggregates with goethite and gold discrete subhedral grains up to 150 µm minor liberated aggregates of subhedral grains marcasite along grain boundaries and pseudomorph composites with apatite, carbonate and quartz
Marcasite FeS	<0.5	<75	aggregates along particles of pyrite aggregates within non-opaques occasional pseudomorphs after pyrite
Magnetite Fe_3O_4	<0.1	<100	locked in particle with goethite, iron, pyrite and gold
Goethite FeO(OH)	<0.1	<75	associated with sulphide particles oxidation reaction with pyrite liberated grains, thin laminations
Chalcopyrite $CuFeS_2$	<0.1	<100	rare liberated grains
Arsenopyrite FeAsS	<0.1	<75	clusters of euhedral inclusions in non-opaques
Gold Au	grain - 1	45 x 25	triangular shape locked in iron-rich detrital particles goethite occurs interstitial to pyrite and iron oxide sulphide particle size relatively large attached and included framboidal pyrite iron occurs in the form of goethite, magnetite and iron

Description

The sample consists of approximately 3% opaque minerals in the form of pyrite with lesser amounts of marcasite and minor amounts of arsenopyrite, sphalerite, chalcopyrite and goethite. Pyrite occurs as fine aggregates that are framboidal in form and rare discrete coarser grains. Marcasite occurs as minor inclusions in non-opaque minerals and along grain boundaries of pyrite.

Gold mineralization was observed in the form of native gold locked in a large (3 mm) sulphide particle consisting of iron, pyrite, goethite and magnetite. The sulphide aggregate size and mineral textures are unique to the sample.

Prepared for:
Strathcona Mineral Services Limited

Petrographic Report

Petrologic Inc.
Quality Assurance with Mineralogy

Sample	Sample Product	Reference Number
98/11/3	PTS	PI990303

Mineralogy	Est. Vol. %	Grain Size (µm)	Textural Description
Apatite $Ca_5(PO_4)_3(F,OH,Cl)$	80	50 to 750	fossilized bone, shell and teeth fragments liberated rod-like grains aggregates with carbonate layered particles with quartz and lesser carbonate fossilized skeletal fragments and forms
Quartz SiO_2	10	50 to 300	locked in aggregates with apatite lesser discrete liberated grains matrix of aggregated particles
Carbonate $(Ca,Mg,Fe)CO_3$	5	<75	matrix of aggregated particles minor liberated discrete grains
Organic Material C	3		matrix to apatite inclusions in apatite
Opaques	3	<150	see opaque mineral report descriptions primarily framboidal pyrite and aggregates of pyrite
Gold Au	grain - 1	27 x 15	liberated, rectangular in form thinly polished area of slide with grain plucking polishing may have destroyed original texture

escription

The sample consists primarily of apatite with lesser amounts of quartz, carbonate and carbonaceous material and minor amounts of opaque minerals. The particles range in size from approximately 50 µm to 3 mm with an approximate average size of 750 µm. The particles are primarily liberated apatite and aggregated particles of layered apatite with lesser quartz in a matrix of apatite, carbonate and carbonaceous material.

Bone, shell and teeth fragments have been fossilized to apatite. The rod-like grains are aligned sub-parallel within the larger aggregates.

Quartz and carbonate occur as discrete grains within aggregated particles consisting primarily of apatite and as discrete liberated grains.

Gold mineralization was observed to occur as liberated, rectangular shaped, native gold. The grain is located in a thinly polished area of the section with substantial grain plucking. The size, shape and textural association may have been modified from its original form during polishing.

Petrographic Report

PetroLogic Inc.
Quality Assurance with Mineralogy

Sample	Sample Product	Reference Number
98/11/3	PS-A	PI990303

Mineralogy	Est. Vol. %	Grain Size (µm)	Textural Description
Non-opaques	97	<500	see petrographic report for non-opaque description liberated grains and aggregates of apatite
Pyrite FeS	3	<15 to 150	variable grain size and textural association framboidal textured pyrite finely disseminated pyrite in apatite and carbonate pyrite aggregates following host mineral boundaries subhedral grains present, but minor liberated pyrite aggregates with grains 50 to 75 µm marcasite along grain boundaries and pseudomorph composites with apatite, quartz and carbonate
Marcasite FeS	<0.5	<50	along grain boundaries of pyrite aggregates within non-opaques occasional pseudomorphs after pyrite
Sphalerite ZnS	<0.1	<150	liberated discrete grains attached to layered apatite aggregate
Goethite FeO(OH)	<0.1	<100	liberated aggregates, thinly laminated
Arsenopyrite FeAsS	<0.1	<75	clusters of euhedral inclusions in non-opaques
Gold Au	grain - 1	37 x 16	liberated, irregular shape

Description

The sample consists of approximately 3% opaque minerals in the form of pyrite with minor amounts of marcasite and trace amounts of arsenopyrite, goethite and sphalerite. Pyrite occurs as fine aggregates that are framboidal in from and as rare discrete grains. Commonly with aggregates of marcasite along grain boundaries. Marcasite occurs as minor inclusions within non opaques and along grain boundaries of pyrite.

Gold mineralization occurred in the form of native gold as a liberated irregular shaped grain.

Prepared for:
Strathcona Mineral Services Limited

APPENDIX III

MINERALOGY REPORT - LAKEFIELD RESEARCH

LakefieldResearch

Mineralogical Services

Mineralogical Processing and Examination of Three Drill Core Samples for Gold

Strathcona Mineral Services

Report by: **Geoff Lane, Project Mineralogist**

Submission Date: **May 7, 1999**

Project No: **8901-202 LIMS# MAR5013.R99, APR5001.R99**

Note

This report refers to the samples as received. The practice of this Company in issuing reports of this nature is to require the recipient not to publish the report or any part thereof without the written consent of Lakefield Research Limited.

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Summary

Three previously crushed, drill core samples identified as 7AS02, 7BK02 60.9-62.9, and 7BK02 77.2-79.2 were submitted to Mineralogical Services, Lakefield Research Limited, for mineralogical processing and examination for gold concentration. The purpose was to determine the gold content and deportment.

The sample labeled 7AS02 was initially submitted for preliminary testwork to establish a process to concentrate the gold. The sample was received as minus 48 mesh crushed material, and a one kilogram portion was riffled for preliminary processing.

The samples labeled 7BK02 60.8-62.9 and 7BK02 77.2-79.2 were previously crushed to minus 48 mesh. The entire amount of material for both these samples was processed.

Each sample was weighed and subsequently wet screened at 200 mesh and 400 mesh. The plus 200 mesh and minus 200 plus 400 mesh material from each sample was dried and then submitted for heavy mineral concentration using methylene iodide at a density split point of 3.3g/cc. The minus 400 mesh material was dried and stored for possible later work.

The heavy mineral products resulting from the heavy liquid separation ranged between 1.2 to 4.1 weight percent of the screened fraction. These 3.3g/cc sink fractions from each sample were submitted for mineralogical examination using a stereoscope at 60x magnification. Table 1 summarizes the minerals observed in each sample. Visible gold was not observed in any of the samples.

Table1: Mineralogical Summary

Sample	+200 Mesh Sink	+400 Mesh Sink	Gold Observed	Comments
7AS02	**py,** ap*, *mt,* gt	**py,** *mt, ap**, gt	**None**	Fresh, sub-angular grains
7BK02 60.8-62.9	**py,** *as, mt, ap**, bt, gt	**py,** *mt, rt, zr,* ap*, gt,	**None**	Fresh, sub-angular, and euhedral grains
7BK02 77.2-79.2	**py,** *mt, ap**, gt, bt	**py,** *zr, mt,* gt, rt, ap*	**None**	Fresh, sub-angular, grains trace pyrope as sub-rounded grains

Abreviations:

ap = apatite,
as = arsenopyrite,
bt = biotite,
gt = garnet,
mt = magnetite,
rt = rutile,
zr = zircon ;

Bold = >50%,
underline = 10-49%,
italic = 1-9%,
plain = <1%

*Apatite occurs as fossils of teeth, bone and scale and are usually filled with pyrite.

The sink fractions from each sample primarily contained pyrite as fragmented, sugary, massive and framboidal grains, as well as subhedral grains. Magnetite, garnet, arsenopyrite, and apatite (in the form of fossil fragments) were also observed in varying amounts. Biotite, rutile and zircon were observed in samples 7BK02 60.8-62.9 and 77.2-79.2 in varying amounts.

The float fractions of each sample mainly contained quartz as sub-rounded to angular discrete grains and as aggregated granular particles. Fine inclusions of possible magnetite and biotite were observed in the aggregated granular quartz grains. Varying amounts of rock fragments were also observed in the float fractions. These rock fragments are composed mainly of very fine clay-sized particles of mudstone. Apatite was observed as fossil fragments of teeth, bone and scale. Muscovite and biotite were also observed in samples 7AS02,and 7BK0260.8-62.1.

LAKEFIELD RESEARCH LIMITED
May 7, 1999

[redacted]

Geoff Lane
Project Mineralogist

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Introduction

Three previously crushed, drill core samples identified as 7AS02, 7BK02 60.9-62.9, and 7BK02 77.2-79.2 were submitted to Mineralogical Services, Lakefield Research Limited, for mineralogical processing and examination for gold concentration. The purpose was to determine the gold content and deportment.

Procedure

Sample 7AS02 was initially submitted to the Mineralogical Services to complete preliminary test work for process development for gold concentration by heavy liquid.

A one kilogram portion first was riffled from the minus 48 mesh pre-crushed sample, the remainder being kept in storage for further work. This one kilogram portion was initially conditioned by adding water to the material in a clean bucket and inserting an agitating mixer, allowing the particles to be physically disaggregated. This was allowed to mix for one hour. The material was then wet screened at 200 mesh. To continue the disaggregation of the +200 mesh material, a rubber stopper was used to break the aggregated grains against the screen. After screening, the plus 200 mesh fraction was examined using a stereoscope at a maximum magnification of 60x. It was determined that this fraction contained a large amount of aggregated grains, and therefore was submitted again for further conditioning. This time a 4% solution of a de-flocculent (sodium hexametaphosphate) was added to the material to assist in disaggregation, and allowed to mix for 30 minutes. The material was re-screened at 200 and 400 mesh. The addition of the de-flocculent assisted greatly in the screening of the material by reducing the material remaining on the screen.

The plus 200 and plus 400 mesh fraction were then dried and submitted for heavy liquid separation. The minus 400 mesh material was filtered, dried, weighed and stored for future analysis.

The plus 200 mesh fraction was separated in a 2 litre separatory funnel using methylene iodide at a specific gravity split point of 3.3g/cc. This material was added to the heavy liquid and stirred

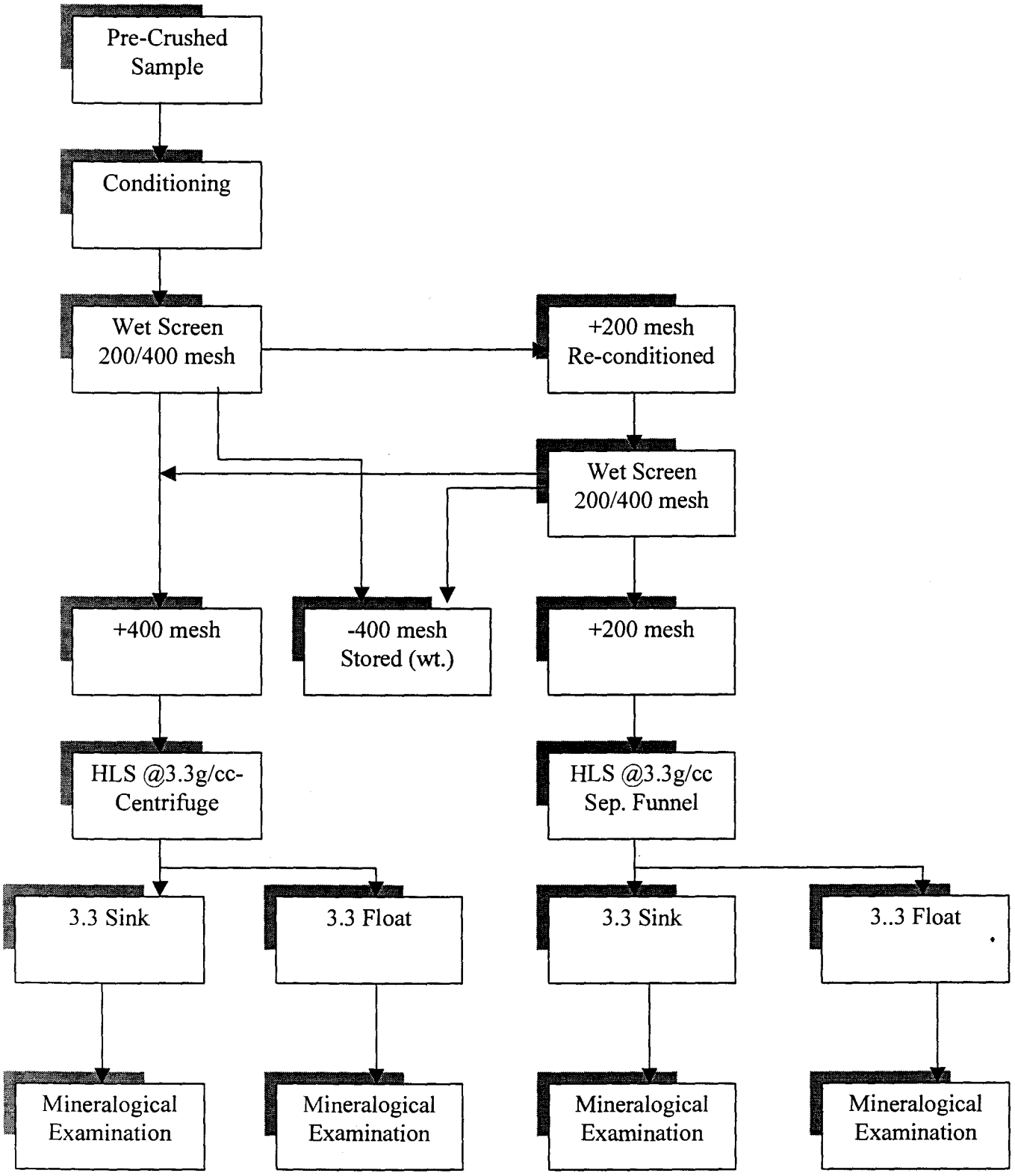
vigorously several times until visual inspection indicated that no additional heavy minerals were falling from the floating portion. The sink fraction was removed from the funnel and subsequently filtered, and washed with acetone, to remove residual methylene iodide. The float product was also removed, filtered and washed with acetone. All products were dried and submitted for mineralogical examination.

The plus 400 mesh fraction was separated in a centrifuge using methylene iodide at a specific gravity split point of 3.3g/cc. Approximately 25 grams of plus 400 mesh material was placed in a 100ml test tube with 70ml of methylene iodide. Four test tubes were run in the centrifuge at one time. The material in each test tube was stirred vigorously before the centrifuge was started to ensure that the material was wetted with the methylene iodide. The centrifuge was run at 3200 rpm for twenty-five minutes. When completed, the float material was removed from the surface of the test tube, filtered, and washed in acetone, with the sink fraction being treated in the same manner. All the products were dried and submitted for mineralogical observation.

After the preliminary testwork on this sample was completed, two additional samples were submitted for the same processing. The samples were pre-crushed to minus 48 mesh before being received by Mineralogical Services. These two additional samples were treated in the same manner as the previous sample although, the material was conditioned at the onset, with sodium hexametaphosphate for 3 hours, then screened at 200 and 400 mesh. The plus 200 mesh from each sample was conditioned again for another hour, and then screened again at 200 and 400 mesh.

The following flow sheet presented in Figure 1 further describes the processing steps.

Figure1: Mineralogical Processing Flowsheet



Results

Tables 2, 3, and 4 detail the weight distribution of each sample from the screening and heavy liquid procedures.

Table 2: Weight Distribution 7AS02

Sample	Initial Wt.	Wt %	Float (g)	Float wt %	Sink (g)	Sink wt%
Initial	3253.9	--	--	--	--	--
+200 mesh	42.2	4.4	40.81	97.4	1.08	2.6
+400 mesh	94.5	9.9	92.4	98.1	1.75	1.9
-400 mesh	813.5	85.7	--	--	--	--
Total	950.2	100.0	--	--	--	--

Table 3: Weight Distribution 7BK02 60.8-62.9

Sample	Initial Wt.	Wt %	Float (g)	Float wt %	Sink (g)	Sink wt%
Initial	2106	--	--	--	--	--
+200 mesh	111.3	5.3	105.7	96.1	4.3	3.9
+400 mesh	34.6	1.6	32.8	95.9	1.4	4.1
-400 mesh	1957.3	93.1	--	--	--	--
Total	2103.2	100.0	--	--	--	--

Table 4: Weight Distribution 7BK02 77.2-79.2

Sample	Wt. (g)	Wt %	Float (g)	Float wt %	Sink (g)	Sink wt%
Initial	2554	--	--	--	--	--
+200 mesh	734.7	28.8	722.4	98.4	11.6	1.6
+400 mesh	92.4	3.6	90.9	98.8	1.1	1.2
-400 mesh	1724.6	67.6	--	--	--	--
Total	2551.7	100.0	--	--	--	--

Mineralogical Observations

Sample 7AS02

+200 Mesh 3.3 Sink Fraction

This fraction is composed primarily of pyrite occurring as framboidal grains, angular, sugary masses, columnar-shaped grains and as remnant fossil centers. Apatitic fossil fragments occur in moderate amounts in which the centers have been replaced with pyrite. Minor amounts of magnetite were observed as fractured, sub-angular to sub-rounded, subhedral to euhedral grains. Garnets occurs in minor amounts as discrete grains with weakly, sub-rounded edges.

+200 Mesh Float Fraction

This fraction is primarily composed of flat rock fragments consisting of mainly fine-grained clay sized particles. Major amounts of quartz also compose this fraction, occurring mainly as sharp, angular, clear, colourless grains. A minor amount of this quartz contains fine dark inclusions. Apatite occurs in minor amounts as discrete fossils and as fragments of bone, scale and teeth. Trace amounts of biotite and muscovite were also observed.

+400 Mesh 3.3 Sink Fraction

This fraction is composed primarily of pyrite occurring as framboidal grains, angular, sugary masses, replaced fossil centers, and to a lesser extent as discrete subhedral to euhedral grains (octahedraon and dodectahedrons). Magnetite was observed in minor amounts as flat subhedral grains with sub-rounded to sub-angular edges. Fractured magnetite exhibiting conchoidal fractures was also noted. Garnet was also noted in trace amounts as weakly sub-rounded to sub-angular grains.

+400 Mesh 3.3 Float Fraction

This fraction is primarily composed of flat rock fragments composed of fine, clay-sized particles. Moderate amounts of quartz occur as discrete angular and sub-rounded grains; trace amounts occur as well-rounded grains and trace amounts contain inclusions and attachments of dark mafic minerals. Apatitic fossil fragments were also noted in moderate amounts. Biotite and muscovite were also noted in trace amounts.

7BK02 60.8-62.9

+200 Mesh Sink Fraction

This fraction is primarily composed of pyrite occurring as granular, sugary masses, framboidal grains, replacements of fossil centers and rarely as columnar forms. Arsenopyrite occurs in minor amounts as fine subhedral grains. Minor amounts of angular magnetite occur as subhedral to euhedral grains with sub-angular to sub-rounded edges and rarely exhibiting conchoidal fracture. Apatite occurs as fossil fragments with the centers replaced with pyrite. Garnet occurs in trace amounts as sub-rounded to angular grains. Biotite was also observed in trace amounts. Quartz was noted in trace amounts mainly as binary grains with pyrite.

+200 Mesh Float Fraction

This fraction is primarily composed of quartz occurring mainly as discrete, angular, clear grains and to a lesser extent as granular aggregates of fine discoloured grains. Moderate amounts of rock fragments composed of fine, clay-sized particles were also observed. Apatite occurs in moderate amounts as sub-rounded to angular fossil fragments.

+400 Mesh Sink Fraction

This fraction is primarily composed of pyrite occurring as framboidal aggregates, angular, sugary to massive grains and as euhedral octahedrons and dodecahedrons. A trace amount of the pyrite demonstrated some oxidation. Zircon occurs in minor amounts as fine, prismatic, euhedral grains. Minor amounts of magnetite were observed as sub-angular to sub-rounded, subhedral to euhedral grains with some exhibiting conchoidal fractures. Rutile as subhedral grains was also observed in minor amounts. Garnet occurs in minor amounts primarily as angular grains of possible almandine and / or andradite composition. Weakly coloured, well-rounded, possible pyrope garnet was observed in trace amounts. Trace amounts of apatitic fossil fragments were also observed. An intact tooth was observed which exhibited a sharp, root edge. This is the edge of the tooth that recedes into the gumline and is abraded quickly in an active environment.

+400 Mesh Float Fraction

This fraction is primarily composed of flat rock fragments composed of fine clay sized particles. Moderate to major amounts of quartz occur as discrete, angular and sub-rounded grains. Trace amounts of the quartz occurs as discoloured, aggregated grains containing fine, dark inclusions. Apatite occurs in moderate amounts as scale and bone fragments. Biotite was also noted in trace amounts.

7BK02 77.2-79.2

+200 Mesh Sink Fraction

This fraction is composed primarily of pyrite occurring as framboidal grains, angular, sugary masses, columnar shaped grains, and as remnant fossil centers. Minor amounts of magnetite were observed as sub-angular to sub-rounded, subhedral to euhedral grains, with some exhibiting conchoidal fractures. Minor amounts of apatitic fossil fragments occur with pyritic replaced centers. Garnet occurs in trace amounts as sub-rounded to angular shaped grains.

+200 Mesh Float Fraction

This fraction is primarily composed of quartz occurring mainly as discrete, sub-angular to sub-rounded, clear grains and to a lesser extent as granular aggregates of fine, discoloured grains. Moderate amounts of well-rounded to sub-rounded siliceous rock fragments were also observed. Sub-rounded, apatitic fossil fragments were observed in moderate amounts.

+400 Mesh Sink Fraction

This fraction is primarily composed of pyrite occurring as framboidal aggregates, angular sugary massive grains and as euhedral octahedrons and dodecahedrons. A trace amount of the pyrite was attached to quartz as binary grains. Zircon occurs in moderate amounts as fine, euhedral grains. Moderate amounts of magnetite were observed as angular to weakly sub-rounded grains with conchoidal fractures. Subhedral rutile was also observed in minor amounts. Garnet occurs in minor amounts primarily as angular grains of possible almandine and / or andradite composition. Weakly coloured, well rounded, possible pyrope garnet was observed in trace amounts. Trace amounts of apatitic fossil fragments were also observed with grain centers replaced by pyrite.

+400 Mesh Float Fraction

This fraction is primarily composed of siliceous, sub-rounded to rounded rock fragments. Moderate to major amounts of quartz occur as discrete, angular and sub-rounded grains. Trace amounts of the quartz occur as discoloured, granular, grain aggregates containing fine, dark inclusions. Apatite occurs in moderate amounts as scale and bone fragments. Trace amounts of biotite were also noted.

Discussion

The mineralogical observations indicate:

- No visible gold was observed in the samples.
- 60-90% of the material is in the –400 mesh fraction.
- Pyrite occurs as framboids, and euhedral octahedron and dodecahedron.
- Grain shapes range from angular to rounded.
- Quartz particles are a maximum of 1 mm in diameter.
- Fossilized teeth still have the root edge.
- Fossilized bone and teeth are partially replaced with pyrite, suggesting *in-situ* deposition.

The absence of gold in these samples may require that the petrogenesis of the deposit be re-examined. In this regard, it may be important to examine the observations noted thus far.

The high proportion of minus 400 mesh fines in the samples indicates that the material would have been deposited in a stagnant, lagoonal-type sedimentary environment. The presence of framboidal pyrite as well as euhedral octahedron and dodecahedron of pyrite indicate that the pyrite was deposited in a reducing environment. The presence of pyrite as replaced centers of the fossilized bone and teeth suggest that the pyrite also was deposited *in-situ*. A fossilized tooth was observed which exhibited a sharp root edge (this is the portion of the tooth that sticks up into the gumline). This edge would have abraded quickly in an active high energy depositional environment.

If free gold was observed previously in these samples, and the assumption is that this is a paleo-placer deposit, it would be useful to determine the physical or depositional condition that would suspend such gold grains. The size of the gold observed could be used to determine the current velocity needed to suspend the grain. This then can be related to the other more common grains. If a certain current velocity is required to suspend a gold grain of a certain size than that same current velocity would suspend a much larger grain of a much lower density. It would be important to examine the maximum particle size in the sample. These samples were crushed,

therefore, it will be difficult to determine the maximum particle size, unless another sample is treated in a different manner to preserve the grain size and surface features.

The presence of sub-angular to sub-rounded, grains in all the samples, and the presence of well rounded siliceous grains in 7BK02 77.2-79.2, may indicate transportation of material at some point before or after the deposition of the pyrite and fossils. The geologic horizon would need to be closely examined to understand the relationship between these two differing types of deposition.

It may be necessary to process another drill core sample to preserve some of the grain characteristics lost because of crushing. Conditioning the sample in an attrition mill with ceramic balls will liberate the particles without losing the grain features. Screening the material at coarser sizes such as 20, 65, 100, 200, and 400 mesh will help to determine the particle size distribution. These coarser fractions could then be examined to determine the maximum particle size, abrasion characteristics, and other depositional information.

The material that was examined was mainly fresh and un-oxidized, it may therefore be useful to examine altered or oxidized drill core samples for the presence of gold. This could be processed by acid leaching the material and performing a heavy liquid separation with the centrifuge on the residue. Scanning Electron Microscopy would then be used to examine the sink fraction for very fine gold.

APPENDIX IV

LEACH TEST REPORT - LAKEFIELD RESEARCH

LakefieldResearch

Lakefield Research Limited
Box 4300, 185 Concession St.
Lakefield, ON, Canada K0L 2H0
Telephone: (705) 652-2000
Direct Line: (705) 652 2045
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Email: ctrang@lakefield.com

PROJECT No. .....
FILE No. .....

DATE RECEIVED JUN 07 1999
READ BY .....
REFERRED TO .....
ANSWERED BY .....

FAX

Date:	April 30, 1999	**Page(s):**	9 (including cover sheet)
To:	**Mr. R. von Guttenberg**	**Fax:**	**416-367-3638**
Company:	Strathcona Mineral Services Limited	**Telephone:**	416-869-0772
From:	Roch Marion, Cuong Trang		
Re:	**Testwork Report - Strathcona's Project 2005-3**		

Samples:

Three ore samples (1 kg of SMS-201, 0.5 kg of SMS-202 and 0.5 kg of SMS-203) and one plastic bag of A-15 reagent were received at Lakefield in two shipments and were given reference numbers LR9901066 (04/16/1999) and LR9901080 (04/19/1999).

Experimental Procedure:

The procedure for conducting the experiments was provided by Mr. R. von Guttenberg in a letter to Roch Marion of Lakefield Research dated April 16, 1999.

Sample SMS-201 was riffled into 2 halves (SMS-201A and SMS-201B). Samples SMS-201A, SMS-201B and SMS-202 were deflocculated with A-15 reagent, using the procedure supplied by Mr. Jim Brady of Crowflight Minerals Inc. in a fax to Roch Marion of Lakefield dated March 3rd, 1999. The slimes fraction (float fraction) from each deflocculation test was filtered, and the filter cake was dried. The whole dry cake (including filter paper) was fire assayed in 30-g portions. The fire assay slags were saved for possible future analysis. The beads were combined for dissolution in aqua regia for gold analysis by AAS.

Each deflocculated material (sink fraction) was transferred to a 2.5-L bottle for cyanidation using the CIL method. CIL leaching was conducted at 40% solids, pH 10.5-11, 1 g/L NaCN and 10 g of Calgon GRC-22 activated carbon on a roller for 24 hours.

Following leaching, the loaded carbon, the combined filtrate (barren) and wash solution, and the leach residue were analyzed for gold. As for the slimes, the leach residue was assayed by multiple 30-g fire assays to extinction. All dry sample weights were recorded throughout the test. The reagent consumptions and gold mass balance were calculated.

Sample SMS-203 was dry screened at 28 mesh. The two size fractions were weighed. The +28 mesh fraction was dry pulverized and recombined with the –28 mesh fraction for CIL leaching using the same procedure as described above for the deflocculated samples. The only exception was that the amount of activated carbon was doubled to 20 g to compensate for the increase in the mass of the leach feed.

The gold content of the A-15 reagent used in the testwork was determined by fire assaying five 10-g portions of this reagent sample.

Results:

A summary of the experimental conditions and results and the details of the experiments are attached.

The A-15 reagent used in deflocculation of ore samples were fire assayed in five 10-g portions and found to contain <0.02 g/t Au.

Approximately one third of the SMS-201A and SMS-201B samples and almost half of the SMS-202 sample reported to the sink fraction following de-flocculation (Tests 1, 2 and 3). There was very little gold in the slimes fractions of samples SMS-201A and SMS-201B. The slimes fraction of sample SMS-202 contained 0.37 g/t Au. The filtrates from filtration of these slimes fractions contained <0.01 mg/L Au. Owing to the low feed grades and the fairly large volumes of the filtrates, these solutions might account for up to 14% and 18% of gold in samples SMS-201A and B, respectively, and 4% of gold in sample SMS-202.

Cyanide consumption during leaching of the sink fractions of samples SMS-201A and SMS-201B was approximately 2.6 kg NaCN per tonne of CIL feed (equivalent to 0.9 kg/t original feed to deflocculation). The corresponding NaCN consumption for CIL leaching of the sink fraction of Sample SMS-202 was 1.6 kg/t (equivalent to 0.7 kg/t original feed to deflocculation).

The CIL residues assayed 0.19 g/t Au for Test 1 (sink fraction of sample SMS-201A), 0.09 g/t Au for Test 2 (sink fraction of SMS-201B), 0.21 g/t Au for Test 3 (sink fraction of sample SMS-202), and 0.02 g/t Au for Test 4 (sample SMS-203).

The calculated gold head grades were no more than 0.1 g/t for both samples SMS-201A and SMS-201B, 0.5 g/t for sample SMS-202, and 0.05 g/t Au for sample SMS-203.

Best regards,

[redacted]

Roch Marion, B.Sc., C.Chem.
Assistant Manager, Analytical Services

[redacted]

Cuong Trang, M.A.Sc.

Project 4424-105

Cyanidation Testwork on Strathcona's Project 2005-3 Samples - Experimental Conditions

Test	Feed Sample Preparation	Mass of Feed Used g	Pre-Treatment Method	Leach Method	Leach Pulp Den-sity %	pH	NaCN Conc. g/L	Leach Reten-tion Time h	Mass of Carbon Used g
1	Half of SMS-201, used as received	503	De-flocculated with A-15 reagent to remove slimes	CIL	40	10.5-11	1.0	24	10
2	Half of SMS-201, used as received	503	De-flocculated with A-15 reagent to remove slimes	CIL	40	10.5-11	1.0	24	10
3	SMS-202, used as received	499	De-flocculated with A-15 reagent to remove slimes	CIL	40	10.5-11	1.0	24	10
4	SMS-203, screened at 28#, pulverized O/S to -28#	513	None	CIL	40	10.5-11	1.0	24	20

Project 4424-105

Cyanidation Testwork on Strathcona's Project 2005-3 Samples - Experimental Results

Test	Mass (g)				Mass	NaCN				CaO				Au in	Au in	Au	Au in	Gold Recovery (%)				Calc.
						kg/t Leach Feed		kg/t Orig. Feed		kg/t Leach Feed		kg/t Orig. Feed										
	Origi. Feed	Float Fraction	Calc. CIL Feed	Leach Residue	of Loaded Carbon g	Added	Consumed	Added	Consumed	Added	Consumed	Added	Consumed	Float Fraction g/t	Float Fract. Filtr.* mg/L	on Loaded Carbon g/t	Leach Residue g/t	in Float Fraction	in Float Filtrate	by Cyanide Leach	Total	Au in Origi. Feed g/t
1	503	339	164	157	10.0	4.05	2.59	1.32	0.84	7.92	7.73	2.58	2.52	<0.02	<0.01	0.02	0.19	<13	<14	<15	42	<0.10
2	503	320	183	183	11.0	4.15	2.70	1.51	0.98	7.64	7.51	2.78	2.73	0.03	<0.01	0.02	0.09	23	<18	<20	41	<0.08
3	499	283	216	204	11.1	2.77	1.59	1.20	0.69	7.67	7.45	3.32	3.23	0.37	<0.01	6.88	0.21	43	<4	36	83	<0.49
4	513	-	513	513	22.0	3.63	2.56	3.63	2.56	8.50	8.43	8.50	8.43	-	-	0.11	0.02	-	-	62	62	0.05

* The A-15 reagent used in deflocculation was fire assayed in 5 x 10 g portions and found <0.02 g/t Au.

Project 4424-105 Test 1 Operator: EM April 20, 1999

Purpose: To conduct a bottle roll CIL cyanidation test on deflocculated Sample SMS-201A.

Procedure: The SMS-201 sample (1007 g) was split into 2 x 503 g test charges for defocculation. A 10% deflocculant solution was prepared by dissolving 20 g A-15 reagent in 180 g of water. The reagent and treatment procedure were provided by Crowflight Minerals Inc. (Memo from Mr. Jim Braddy to Roch Marion on March 3, 1999.) One SMS-201 test charge (SMS-201A) was pulped with 1006 g of water in a 2 L kettle. The pulp was mixed with a Caframo mixer overnight to break up the lumps. Deflocculant (50 g of 10% solution) was added and the mixing continued. After 30 minutes, additional water was added to facilitate the separation of the slime.

The agitator was turned off and the pulp was allowed to settled for approximately 20 minutes. The slime was decanted and filtered. The whole filter cake (including filter paper) was assayed for gold in multiple 30 g portions. The slags were saved. The beads were combined and dissolved with aqua regia for reading of Au on an AAS. The filtrate was also analyzed for gold.

The pulp in the kettle (the sink fraction) was adjusted with water to 40% solids in a bottle. The pulp was adjusted to pH 11 with lime. Activated carbon (10 g of Calgon GRC-22, plus 20 mesh) was added. Leaching was carried out at 1 g/L NaCN for 24 hours.

Following leaching, the carbon was recovered on a 24 mesh screen. The pulp was filtered. The filter cake was washed with water. The filtrate and the wash were combined for gold analysis. The whole filter cake (residue) was assayed for gold using the same procedure as for the slime Carbon was submitted for gold analysis.

Feed: 503 g Sample SMS-201A treated with A-15 deflocculant. The sink fraction was leached.

Solution Volume: 330 mL (~40% solids) Activated Carbon: 10 g Calgon GRC-22 (+20 mesh)

pH: Approx. 11 with lime Sol'n Composition: 1 g/L NaCN

Results:

Reagent Addition: kg/t leach feed NaCN: 4.05 CaO: 7.92
kg/t original feed NaCN: 1.32 CaO: 2.58

Reagent Consumption: kg/t leach feed NaCN: 2.59 CaO: 7.73
kg/t original feed NaCN: 0.84 CaO: 2.52

Lapsed Time (hr)	Added (g) Actual NaCN 95%	Lime	Equivalent NaCN	CaO	Residual (g) NaCN	CaO	Consumed (g) NaCN	CaO	pH
0-2	0.35	0.70	0.33	0.53	0.07	-	0.26	-	11.0-9.6
2-4	0.28	0.48	0.27	0.36	0.30	-	0.04	-	11.0-10.2
4-7	0.05	0.27	0.05	0.21	0.33	-	0.02	-	11.0-10.5
7-24	0.02	0.26	0.02	0.20	0.24	0.03	0.11		11.0-10.5
Total	0.70	1.71	0.67	1.30	0.24	0.03	0.43	1.27	

Filtrate & wash vol: 800 mL Feed to deflocculation: 503 g
Feed to leach (sink fraction): 164 g (calculated)

Product	Amount		Analysis Au mg/L, g/t	Distrib. Au %
Float fraction	339	g	<0.02	<13.0
Float filtrate	750	mL	<0.01	<14.3
CIL barren & wash	800	mL	<0.01	<15.3
Loaded carbon	10.0	g	0.02	0.4
Leach Residue	157	g	0.19	57.0
Head (calc.)	503	g	<0.10	100.0

Cyanide Gold Extraction: approx. 16 % Note: The A-15 reagent was fire assayed in 5 x 10 g portions and found <0.02 g/t Au.

Project 4424-105 Test 2 Operator: EM April 20, 1999

Purpose: To conduct a bottle roll CIL cyanidation test on deflocculated Sample SMS-201B.

Procedure: The SMS-201B test charge prepared as described in Test 1 was deflocculated using the same procedure of Test 1. The slime fraction was assayed for gold as decribed in Test 1.

The sink fraction was adjusted with water to 40% solids in a bottle. The pulp was adjusted to pH 11 with lime. Activated carbon (10 g of Calgon GRC-22, plus 20 mesh) was added. Leaching was carried out at 1 g/L NaCN for 24 hours.

Following leaching, the carbon was recovered on a 24 mesh screen. The pulp was filtered. The filter cake was washed with water. The filtrate and the wash were combined for gold analysis. The whole filter cake (residue) was assayed for gold using the same procedure as for the slime

Feed: 503 g Sample SMS-201B treated with A-15 deflocculant. The sink fraction was leached.

Solution Volume: 368 mL (~40% solids) Activated Carbon: 10 g Calgon GRC-22 (+20 mesh)

pH: approx. 11 with lime Sol'n Composition: 1 g/L NaCN

Results:

Reagent Addition: kg/t leach feed NaCN: 4.15 CaO: 7.64
kg/t original feed NaCN: 1.51 CaO: 2.78

Reagent Consumption: kg/t leach feed NaCN: 2.70 CaO: 7.51
kg/t original feed NaCN: 0.98 CaO: 2.73

Lapsed Time (hr)	Added (g)				Residual (g)		Consumed (g)		pH
	Actual		Equivalent						
	NaCN 95%	Lime	NaCN	CaO	NaCN	CaO	NaCN	CaO	
0-2	0.39	1.02	0.37	0.78	0.07	-	0.30	-	11.1-9.7
2-4	0.32	0.48	0.30	0.36	0.33	-	0.04	-	11.0-10.4
4-7	0.07	0.24	0.07	0.18	0.37	-	0.03	-	11.0-10.7
7-24	0.02	0.10	0.02	0.08	0.27	0.02	0.12		11.0-10.5
Total	0.80	1.84	0.76	1.40	0.27	0.02	0.49	1.38	

Filtrate & wash vol: 830 mL Feed to deflocculation: 503 g
Feed to leach (sink fraction): 183 g (calculated)

Product	Amount		Analysis Au mg/L, g/t	Distrib. Au %
Float fraction	320	g	0.03	22.9
Float filtrate	740	mL	<0.01	<17.6
CIL barren & wash	830	mL	<0.01	<19.8
Loaded carbon	11.0	g	0.02	0.5
Leach Residue	183	g	0.09	39.2
Head (calc.)	503	g	<0.08	100.0

Cyanide Gold Extraction: approx. 20 %

Project 4424-105 Test 3 Operator: EM April 20, 1999

Purpose: To conduct a bottle roll CIL cyanidation test on deflocculated Sample SMS-202.

Procedure: The SMS-202 sample (499 g) was deflocculated using the same procedure of Test 1. The slime fraction was assayed for gold as decribed in Test 1.

The sink fraction was adjusted with water to 40% solids in a bottle. The pulp was adjusted to pH 11 with lime. Activated carbon (10 g of Calgon GRC-22, plus 20 mesh) was added. Leaching was carried out at 1 g/L NaCN for 24 hours.

Following leaching, the carbon was recovered on a 24 mesh screen. The pulp was filtered. The filter cake was washed with water. The filtrate and the wash were combined for gold analysis. The whole filter cake (residue) was assayed for gold using the same procedure as for the slime

Feed: 499 g Sample SMS-202 treated with A-15 deflocculant. The sink fraction was leached.

Solution Volume: 320 mL (~40% solids) Activated Carbon: 10 g Calgon GRC-22 (+20 mesh)

pH: approx. 11 with lime Sol'n Composition: 1 g/L NaCN

Results:

Reagent Addition: kg/t leach feed NaCN: 2.77 CaO: 7.67
kg/t original feed NaCN: 1.20 CaO: 3.32

Reagent Consumption: kg/t leach feed NaCN: 1.59 CaO: 7.45
kg/t original feed NaCN: 0.69 CaO: 3.23

Lapsed Time (hr)	Added (g)				Residual (g)		Consumed (g)		pH
	Actual		Equivalent						
	NaCN 95%	Lime	NaCN	CaO	NaCN	CaO	NaCN	CaO	
0-2	0.34	0.84	0.32	0.64	0.10	-	0.22	-	11.0-9.3
2-4	0.24	0.66	0.23	0.50	0.29	-	0.04	-	11.0-10.3
4-7	0.05	0.68	0.05	0.52	0.32	-	0.02	-	11.3-11.0
7-24	0.02				0.25	0.05	0.07		11.1-10.6
Total	0.65	2.18	0.60	1.66	0.25	0.05	0.34	1.61	

Filtrate & wash vol: 1060 mL Feed to deflocculation: 499 g
Feed to leach (sink fraction): 216 g (calculated)

Product	Amount		Analysis Au mg/L, g/t	Distrib. Au %
Float fraction	283	g	0.37	42.9
Float filtrate	960	mL	<0.01	<3.9
CIL barren & wash	1060	mL	<0.01	4.3
Loaded carbon	11.1	g	6.88	31.3
Leach Residue	204	g	0.21	17.5
Head (calc.)	499	g	<0.49	100.0

Cyanide Gold Extraction: 36 %

Project 4424-105 Test 4 Operator: EM April 20, 1999

Purpose: To conduct a bottle roll CIL cyanidation test on Sample SMS-203.

Procedure: The ore sample (approximately 500 g of nominal minus 10 mesh ore) was dry screened at 28 mesh to break up the lumps. The screen undersize fraction weighed 253 g. The oversize (260g) was dry pulverized and then recombined with the fine fraction. The entire sample was used in CIL testing.

The sample was pulped with water to 40% solids in a bottle. The pulp was adjusted to pH 11 with lime. Activated carbon (20 g of Calgon GRC-22, plus 20 mesh) was added. Leaching was carried out at 1 g/L NaCN for 24 hours on a roller.

Following leaching, the carbon was recovered on a 24 mesh screen. The pulp was filtered. The filter cake was washed with water. The filtrate and the wash were combined and analyzed for gold. The carbon was assayed for gold. The whole filter cake (including filter paper) was assayed for gold in multiple 30 g portions. The slags were saved. The beads were combined and dissolved with aqua regia for reading of Au on an AAS.

Feed: 513 g of SMS-203 sample (minus 28 mesh)

Solution Volume: 770 mL (40% solids) Activated Carbon: 20 g Calgon GRC-22 (+20 mesh)

pH: approx. 11 with lime Sol'n Composition: 1 g/L NaCN

Results:

Reagent Addition (kg/t of feed): NaCN: 3.63 CaO: 8.50

Reagent Consumption (kg/t of feed): NaCN: 2.56 CaO: 8.43

Lapsed Time (hr)	Added (g)				Residual (g)		Consumed (g)		pH
	Actual		Equivalent						
	NaCN 95%	Lime	NaCN	CaO	NaCN	CaO	NaCN	CaO	
0-2	0.81	3.94	0.77	2.99	0.12	-	0.65	-	11.0-9.5
2-4	0.69	0.71	0.66	0.54	0.39	-	0.39	-	11.0-10.0
4-7	0.42	0.67	0.40	0.51	0.77	-	0.02	-	11.0-10.4
7-24	0.04	0.42	0.04	0.32	0.55	0.04	0.26		11.0-10.5
Total	1.96	5.74	1.86	4.36	0.55	0.04	1.31	4.32	

Filtrate & wash vol: 1440 mL Cyanide Feed: 513 g

Product	Amount		Analysis Au mg/L, g/t	Distrib. Au %
CIL barren & wash	1440	mL	<0.01	53.2
Loaded carbon	22.0	g	0.11	8.9
Leach Residue	513	g	0.02	37.9
Head (calc.)	513	g	0.05	100.0

Cyanide Gold Extraction: 62 %