GM 58270

ASSESSMENT REPORT, PERMITS 1469, 1492 AND 1522, ABLOVIAK FJORD

NTS 24P06/07

ASSESSMENT REPORT
PERMITS 1469, 1492, AND 1522
ABLOVIAK FJORD, QUEBEC

Company Name: Dumont Nickel Inc.
Permit Group: 1469, 1492, and 1522
Nature of Report: Prospecting and Sampling
Work Conducted During: June to October 2000
Location of Claims: Abloviak Fjord area
NTS 24P06/07

APEX Geoscience Ltd.

November, 2000

D.J. BESSERER
A.K. NOYES

REPORT
ABLOVIAK FJORD PROPERTIES
UNGAVA BAY AREA, QUEBEC

TABLE OF CONTENTS

PAGE

TABLES

FIGURES

APPENDICES

REPORT
ABLOVIAK FJORD PROPERTIES
UNGAVA BAY AREA, QUEBEC

EXECUTIVE SUMMARY

Diamondiferous kimberlite dykes exist within the Abloviak Fjord area. During August and September 2000, APEX Geoscience Ltd. and Dumont Nickel Inc. conducted field exploration within permits held by Dumont Nickel Inc. in the Abloviak Fjord area. Subsequently, 21 ultramafic dykes, a number of which are possibly kimberlitic were discovered within the 3 permits held by Dumont Nickel Inc.

All 21 dykes discovered to date were sampled for thin section study and 18 of the dykes were sampled for: (a) caustic fusion; and (b) diamond indicator minerals. Finally, one other dyke was sampled for diamond indicator minerals. Not all of the dykes were sampled because: (a) only a small amount of material was available/discovered for sampling; (b) there was deep snow cover; (c) the dykes were sampled on adjacent properties; and/or (d) the dykes are believed to be extensions of previously discovered dykes. The samples have been submitted to the Saskatchewan Research Council in Saskatoon for analysis. Indicator mineral results have been received from five dykes.

Further systematic exploration is necessary within the Dumont permits at this time in order to prioritize known dykes and determine whether or not they have favorable indicator mineral chemistry for the preservation of diamonds and/or contain diamonds. The proposed kimberlite testing and exploration should comprise a staged program consisting of: **STAGE 1:** (a) completing caustic analysis, processing for diamond indicators, thin section and microprobe work on the already existing samples collected at the properties during August and September 2000; (b) further staking prospective areas in surrounding areas where dykes are known to exist; (c) geophysical leveling and interpretation of the existing geophysical data. **STAGE 2:** (a) A 45 day field program during summer 2001 utilizing an eight person crew. The program should include mapping of existing dykes, sampling dykes where diamonds were discovered, ground geophysical surveying, prospecting and possibly staking. **STAGE 3:** Premised on success of both the 2000 and 2001 exploration programs: (a) collect mini-bulk samples (10 tonne samples) from diamond-bearing ultramafic dykes; (b) process the sample(s) using a dense media separation (DMS) plant at either Torngat and/or another Canadian location and ship all the recovered concentrates for diamond recovery to determine a preliminary grade and diamond distribution. The program would be completed during fall 2001. The preliminary budget for all three stages is about **$1,500,000**, not including a provision for GST and QST.

INTRODUCTION

Terms of Reference

APEX Geoscience Ltd. (APEX), was retained during summer of 2000 as consultants by Dumont Nickel Inc. (Dumont) to conduct and manage an exploration program at Dumont's Abloviak Fjord area properties. The property is situated in northeast Quebec within the Torngat mountains and comprises three permits (1469, 1492, and 1522). This report has been prepared on the basis of available published and unpublished data and fieldwork thereon. The authors have both personally visited the properties and conducted exploration work thereon.

Property Description and Location

The legal description for the Torngat/Abloviak Fjord properties is provided in Table 1. Situated within the most northerly portion of Quebec, within the Torngat mountains, the Abloviak Fjord properties, which encompass 37,550 hectares, lie about 150 miles (230 km) north and northeast of Kuujjuaq (Figure 1). The properties are within the 1:250,000 scale National Topographic System (NTS) map sheet 24 P. The location of the property is shown on Figures 1 and 2.

TABLE 1
LEGAL PERMIT DESCRIPTION, ABLOVIAK FJORD PROPERTIES*

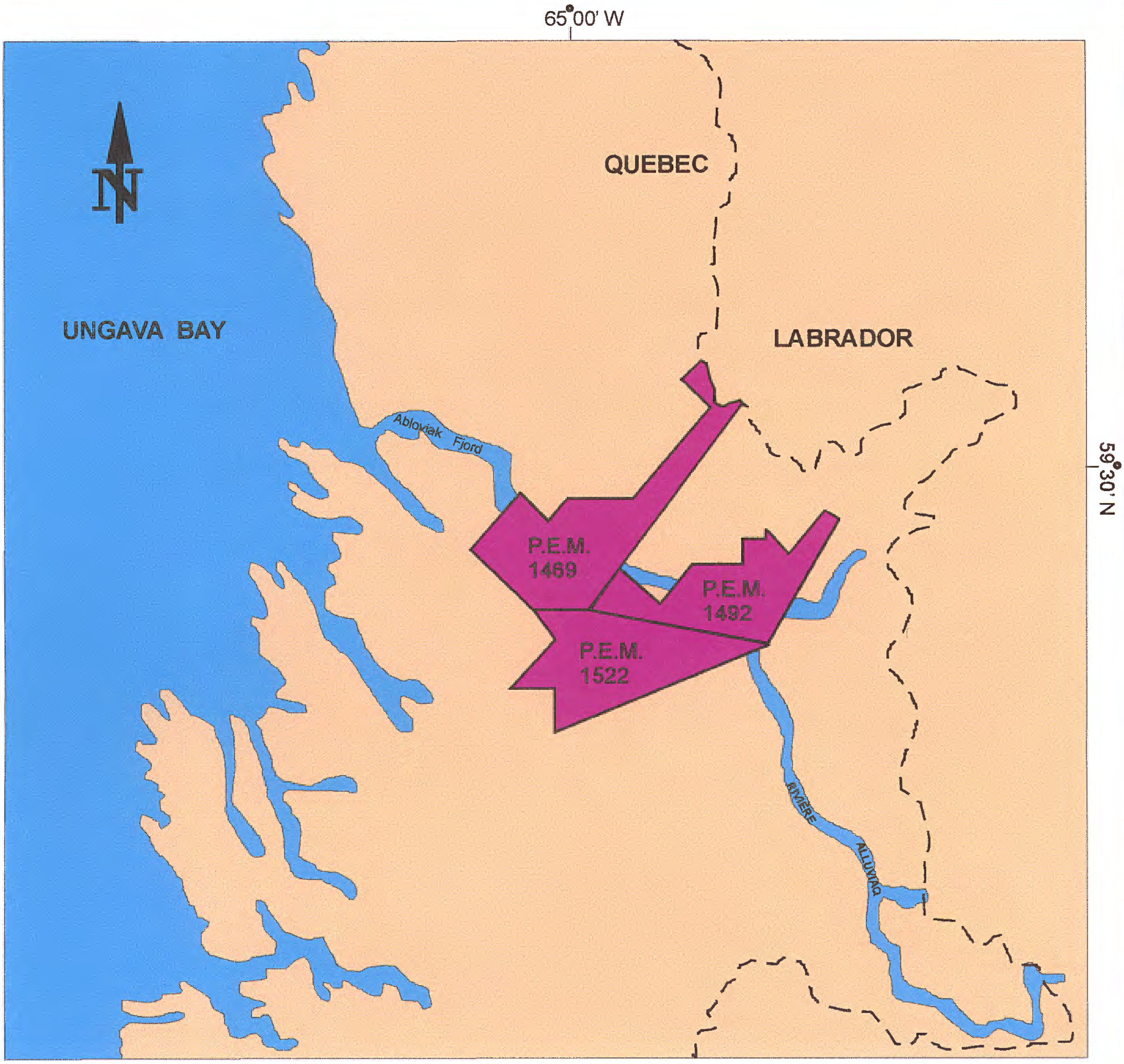
Permit Number	Issue Date	Permit Holder	Map Area	Hectares
1469	October 19, 1999	Dumont Nickel Inc.	24 P/07	15,200
1492	November 19, 1999	Dumont Nickel Inc.	24 P/07	9,750
1522	May 03, 2000	Dumont Nickel Inc.	24 P/06/07	12,600

*Provided by Dumont Nickel Inc.

Accessibility, Climate and Local Resources

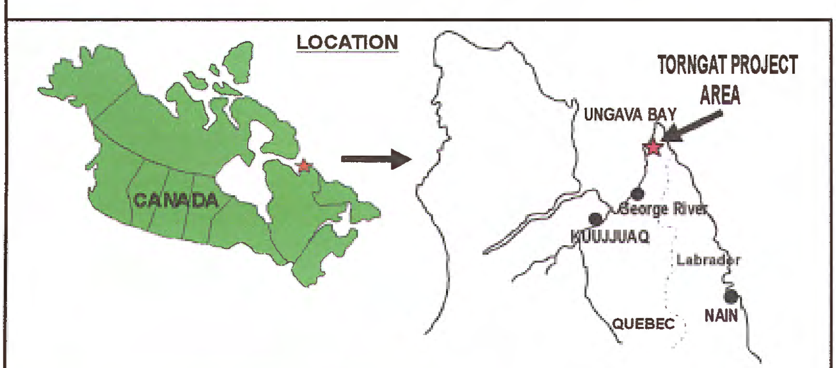
The Torngat Property may be accessed from both Kuujjuaq and George River using: (a) Float or wheel equipped aircraft from either Kuujjuaq or George River; (b) helicopter from either Kuujjuaq or George River; or (c) boat from either George River or Kuujjuaq. Kuujjuaq is serviced daily by First Air from Montreal. Helicopter access is limited to suitable landing locations. A small natural airstrip is located at the camp along the Abloviak River. Accommodation at Kuujjuaq and/or George River can be obtained at local hotels. Accommodation at the property is obtained from an existing outfitters camp located along the Abloviak River. Food and supplies are also obtained from the camp. Limited supplies are available in Kuujjuaq and George River.

Dumont's properties lie within the Torngat Mountains physiographic zone. Elevation in the Abloviak property rises from about sea level to more than 2700 feet. The properties saddle the Abloviak River and Abloviak Fjord. Average annual temperatures range from -40°C in winter to about +20°C during summer months. The majority of the area is void of tree cover and typically has greater than 80 per cent outcrop.



Legend

P.E.M. 1492 — Permits Held by Dumont Nickel Inc.; Identifier



Dumont Nickel Inc.

LOCATION

Scale 0 10 20 Km

NTS 24P

APEX Geoscience Ltd.

EDMONTON, ALBERTA NOVEMBER, 2000

FIGURE 1

Microfilm

PAGE DE DIMENSION HORS STANDARD

MICROFILMÉE SUR 35 MM ET

POSITIONNÉE À LA SUITE DES

PRÉSENTES PAGES STANDARDS

Numérique

PAGE DE DIMENSION HORS STANDARD

NUMÉRISÉE ET POSITIONNÉE À LA

SUITE DES PRÉSENTES PAGES STANDARDS

REGIONAL GEOLOGICAL SETTING

In the Ungava Bay area, the north-eastern Churchill Province separates Archean cratons of the Superior and Nain provinces. The eastern boundary of the Churchill Province (Rae Subprovince) is marked by an orogenic suture zone known as the Torngat Orogen. The Paleoproterozoic Torngat Orogen defines the collision zone between the Rae and Nain provinces. Within the Torngat Orogen exist numerous high-grade metamorphic domains. Some of these domains include the Tasiuyak and Lac Lomier Complex. The Tasiuyak Domain forms the axis of the Torngat Orogen and consists mainly of the 30 kilometre wide, north-south trending Tasiuyak Gneiss (Mitton, 1999). The Tasiuyak gneiss is comprised of a sequence of garnet-rich amphibolite to granulite facies paragneiss believed to be Paleoproterozoic in age. The gneiss developed as an east verging accretionary prism on the Nain Craton during the eastward thrusting of the Rae Province (Digonnet *et. al.*, 1999). The Abloviak shear zone defines the southern margin of the unit and is the most prominent deformational feature of the Torngat Orogen. In northern Labrador and Quebec the Abloviak shear zone and the Tasiuyak domain diverge eastward towards the Nain Province and pass under the Abloviak Fjord area. The Abloviak shear zone is contained within the Tasiuyak Gneiss but also affects the adjacent Rae and Nain province rocks (Digonnet *et. al.,* 1999; Mitton, 1999). The regional geology is shown on Figure 3.

Abloviak Fjord Area Geology

The ultramafic dykes at the Torngat area are located within the Tasiuyak gneisses and are, in part, within the Abloviak shear zone. The dykes have been described as having an inequigranular texture in which anhedral macrocrysts of olivine, garnet, phlogopite, rare ilmenite and rare clinopyroxene xenocrysts are within a finer-grained matrix of phlogopite, spinel, olivine, perovskite and carbonate. Olivine and phlogopite are often replaced by secondary serpentine and chlorite, respectively (Digonnet *et. al.,* 1999). Phlogopite age dating using Ar/Ar method, determined the dykes to be about 544 Ma or Cambrian-aged.

The Abloviak dykes are believed to have been emplaced into tension fractures associated with the reactivation of major structures during the opening of the lapetus Ocean (650-550 Ma). The dykes are subvertical and discontinuous and range from a few centimetres up to greater than 2 m in width (Digonnet *et. al.,* 1996; Mitton, 1999).

PREVIOUS EXPLORATION

Cambrian-aged hypabyssal kimberlite dykes which cut Tasiuyak Gneiss were identified during a regional study begun in 1991 by the Université du Québec, Montreal (Digonnet *et. al.*, 1996; Mitton, 1999).

During 1997, Fjordland Minerals Ltd. staked a 39,000 hectare property in the Ungava Quebec area to cover 12 kimberlite dykes discovered by a University of Quebec post-graduate student which reportedly contained a gem quality macrodiamond. The

Microfilm

PAGE DE DIMENSION HORS STANDARD

MICROFILMÉE SUR 35 MM ET

POSITIONNÉE À LA SUITE DES

PRÉSENTES PAGES STANDARDS

Numérique

PAGE DE DIMENSION HORS STANDARD

NUMÉRISÉE ET POSITIONNÉE À LA

SUITE DES PRÉSENTES PAGES STANDARDS

properties lapsed and Twin Gold Corporation re-staked the area previously held by Fjordland Minerals Ltd. and began conducting diamond exploration for kimberlite dykes, blows, and pipes in the Abloviak Fjord area (Mitton, 1999). Mr. B. Mitton prepared an 'Information Report' during November 1999 on behalf of Dumont after acquiring property within the Abloviak fjord area during the fall of 1999. The report is enclosed in Appendix 1.

Subsequently, Twin Gold Corporation and/or Twin Mining have announced the presence of macrodiamonds in kimberlite dykes along Abloviak fjord, which are up to 3.2 mm in size (Twin Mining press release, August, 2000). More recently, Tandem Resources Ltd. have announced the presence of macrodiamonds in ultramafic dykes along Abloviak fjord (Tandem Resources Ltd. press release, September, 2000). At least three ultramafic dykes discovered by Tandem Resources Ltd. are in close proximity to, or are extensions of, dykes existing within permits held by Dumont.

PROPERTY EXPLORATION

Personnel and Logistics

On August 6th, Mr. D. Besserer, the party leader from APEX, an APEX geologist and a geologist and prospector from Dumont, mobilized to Torngat Mountain Outfitters Ltd's, Abloviak Fjord camp, from Kuujjuaq, Quebec. Mr. D. Besserer and a Dumont prospector demobilized from the Torngat camp on August 24, 2000 and both the APEX and Dumont geologists demobilized from the Torngat camp on August 28, 2000. The crew concurrently conducted exploration on behalf of three other companies within the area. On September 10th, Mr. D. Besserer, the party leader from APEX, an APEX geologist, Dr. Jon North, the vice-president of exploration for Dumont Nickel Inc. and Mr. Lee Barker, an independent geological consultant, mobilized to Torngat Mountain Outfitters Ltd's, Abloviak Fjord camp, from Kuujjuaq, Quebec. Dr. North and Mr. Barker demobilized on September 16th and the APEX crew demobilized on September 25th, 2000 from the Torngat camp.

Airborne Geophysical Surveys

Airborne geophysical surveys were performed by Spectra Aviation Services Corp., Calgary, Alberta, over three project areas in the Torngat Mountains during the period of March 2000 through October 2000. Airborne high sensitivity and high-resolution magnetic surveys were carried out over the project areas to assess the areas for anomalies and magnetic features to aid in mineral exploration. Geophysical surveys were conducted along parallel traverse lines 150m apart and at approximately 130m drape mode elevation. High winds, low cloud cover and snowy conditions hindered progress in data acquisition during this time. Phase 1 was completed by July 2000 and Phase 2 was completed during the first week of August 2000 with a total of 20 flights conducted for each phase. To date, Phase 3 has not been completed, as weather conditions did not improve. The survey crew demobilized from Kuujjuaq on September 13th, 2000 and will be remobilized as soon as weather conditions are favorable. The data has not been included as part of this report.

August / September 2000 Exploration

On August 7, both foot and helicopter traversing within Dumonts' permits 1469, 1492, and 1522 began. At the completion of the August exploration program a total of 15 ultramafic dykes were discovered within the Dumont permits which are believed to be geochemically related to kimberlite and/or lamprophyre and are in places similar to those discovered by Twin Mining within the Abloviak area. During September, a total of 6 dykes were discovered by helicopter traversing within the permits. In total, 21 ultramafic dykes have been discovered within permits held by Dumont and are summarized in Table 2.

TABLE 2
PRELIMINARY DYKE DESCRIPTIONS

Dyke Name	Permit Number	Strike length/ Approx. direction in degrees	Generalized Mineralogy	Comments
K1	1469	4.0 km/ 30	Altered Ol; phlog; pyx; carb	Up to 1m wide. Visible from the Fjord.
K3	1469	1.5 km/ 30	Pyx; phlog; carb	Up to 1m wide. Possible continuation of K1.
K4	1492	700 m/ 30	Pyx; phlog; carb;+/- gar	East of K3.
K5	1492	400 m/ 30	Ol; phlog; pyx; carb; +/-gar	Also within permit held by other.
K6	1492	700 m/ 30	Ol; phlog; gar; carb veins; +/- gar; breccia	Mineralogically similar to Twin Mining dykes.
K7	1492	700 m/ 30	Phlog; carb	West of K6.
K8	1492	800 m/ 30	Pyx; phlog; carb; brecciated at contact	Also within permit held by other.
K9	1492	1.9 km/ 360	Phlog; carb; gneissic fragments	Also within permit held by other.
K10	1522	200 m/ 15	Phlog; carb	Very micaceous. May be continuous to the north.
K11	1522	1.0 km/ 15	Phlog; ol; carb	May be continuous to the south.
K15	1492	300 m/ 15-30	Brecciated at contact; phlog; carb	Poorly exposed. Also within permit held by other.
K16	1492	1 km/ 15	Brecciated; phlog; ol; gar; pyx	Kimberlitic mineralogy.
K17	1492	Unknown	Phlog; ol	Poorly exposed. Likely a fracture from K16.
K18	1469	200 m/ 30	Phlog; ol; carb	Poorly exposed. East of K1.
K20	1492	850 m/ 30	Phlog; pyx; carb	Also within permit held by other.
K21	1522	100 m/ 360	Phlog; ol; pyx	Possibly an extension of K6.
K22	1522	200 m / 60	Phlog; ol	Poorly exposed. Possibly an extension of K7?
K23	1522	200 m/ 360-20?	Ol; mag; Phlog	Up to 3 m wide.
K24	1522	100 m/ 360	Very micaceous; Ol; Phlog	Most likely northern extension of K10.
K25	1522	1.0 km/ 30	Phlog; serpentinized clasts.	Up to 3-5 m wide in places.
K27	1522	100 m/ 30	Phlog; carb	Micaceous. Poorly exposed.

Note: phlog=phlogopite; ol=olivine;pyx=pyroxene;carb=carbonate;gar=garnet.

Of the 21 spatially separate dykes discovered to date, 3 are within permit 1469, 10 are within permit 1492, and 8 are within permit 1522. The dykes typically strike from 360 degrees to 60 degrees. Although the true strike length and width of most dykes are not yet known, the in some cases for up to 4.0 km within the Dumont permits. At least seven of the dykes which have been discovered within the Dumont permits, continue off Dumont permits onto permits held by others (Table 2).

Mineralogically, at least six dykes contain some of the classic kimberlite indicator minerals visible in hand samples (garnet, chrome-diopside, and chromite, Table 2). Breccias were observed within a number of dykes (Table 2). As well, dykes typically have calcite and/or brucite within the matrix and, in places, as veins. All of the dykes have a recessive weathering pattern and often are discovered within open fractures along hill tops and cliff faces (see photo attached of K11; Appendix 2). Dyke rock is often difficult to find, as outcrops are rare. Mostly frost heaved rock (felsenmeer) and sub-crops are visible at surface. All of the dykes discovered to date are moderately to highly magnetic but are usually about 1 m in thickness and have been difficult to trace using the unlevelled proprietary airborne geophysical data available.

Rock Sampling

All 21 dykes discovered to date were sampled for thin section study and 18 of the dykes were sampled for: (a) caustic fusion; and (b) diamond indicator minerals. Not all of the dykes were sampled because: (a) only a small amount of material was available/discovered for sampling; (b) there was deep snow cover; (c) the dykes were sampled on adjacent properties; or (d) the dykes are believed to be extensions of previously discovered dykes. Two 10 gallon pails of dyke rock and one full 10 L sample bag of material was collected at each of the 18 sample sites. The two pails of rock (about 50 kg) were collected for caustic fusion to be tested for micro-diamonds and the bag of material (about 15 kg) was collected for crushing and processing for diamond indicator mineral chemistry. Any possible kimberlite indicator mineral grains recovered from the processing for diamond indicator minerals will be sent to R.L. Barnett Geological Consulting Ltd. for microprobe analyses. All of the Dumont samples were collected and sealed using zip ties and/or security seals under the supervision of Mr. D. Besserer. The samples (both pails and bags) from the August exploration were shipped to the Saskatchewan Research Council (SRC) in Saskatoon, Saskatchewan on August 24, 2000 from Kuujjuaq, Quebec and were received on September 5, 2000, where they are being held, unopened, in a secure compound. One sample, which was collected on August 25, 2000 by an APEX and Dumont geologist was shipped to the laboratory in Saskatoon on September 16th and has been received. The samples (pails only) from the September exploration were shipped to the SRC on September 25th, 2000 from Kuujjuaq, Quebec and were received during the first week of October 2000. The sample details and locations are listed in Appendix 3 and both the samples and dykes are shown on Figure 4.

Microfilm

PAGE DE DIMENSION HORS STANDARD

MICROFILMÉE SUR 35 MM ET

POSITIONNÉE À LA SUITE DES

PRÉSENTES PAGES STANDARDS

Numérique

PAGE DE DIMENSION HORS STANDARD

NUMÉRISÉE ET POSITIONNÉE À LA

SUITE DES PRÉSENTES PAGES STANDARDS

2000 Exploration Results

The results from diamond indicator analyses for ultramafic dykes K5, K6, K9, K15 and K16 have been received. Pyrope garnet, chrome (Cr)- diopside, picroilmenite, olivine and chromites are among the diamond indicator minerals picked from these dykes. Table 3 summarizes the diamond indicator mineral pick results.

Table 3
Results for Diamond Indicator Minerals from Ultramafic Dykes

Sample Name	Pyrope Garnet		Cr-Diopside		Picroilmenite		Eclogite	Olivine	Chromite	
	DEF	POS	DEF	POS	DEF	POS	POS	POS	DEF	POS
K5	0	0	0	0	0	0	0	50	0	0
K6	0	0	56	0	0	41	0	56	0	0
K9	0	0	0	0	0	0	0	36	0	0
K15	0	0	3	0	0	7*	0	0	0	0
K16	0	0	11	4	0	0	0	55	0	0
K16 (2 run)	65	0	6	0	0	0	0	21	0	0

DEF = definite; POS = possible
*microprobe results identified these picroilmenites to be chromites

There were no diamond indicator minerals found within samples K5 and K9. There was however an abundance of olivine that was extracted. Cr-diopside and possible picroilmenite grains were found in samples K6 and K15 and only Cr-diopside were initially found within sample K16.

The initial processing of K16 samples yielded no pyrope garnets however they were found in a hand sample collected by Mr. D. Besserer. The hand sample was sent to the SRC and SRC personnel removed the pyrope garnet. During extraction, the garnet disintegrated yielding 65 pyrope garnet fragments. Therefore, the 65 picked pyrope garnets are essentially from one pyrope garnet. It was noted that the composition of the rim surrounding the pyrope garnet was actinolite and not a kelyphite rim. Additionally, picks from the first K16 analysis yielded three possible perovksite grains.

To date, microprobe results for diamond indicator minerals from K15 were received from R.L. Barnett Geological Consulting. Also included were phlogopite analyses from K9 and K15. All mineral chemistry analyses are in Appendix 4 and respective chemistry plots are in Appendix 5. Two analyses from the Cr-diospide grains indicate that they are from the Cr-rich megacryst suite as the chrome oxide (Cr_2O_3) contents are between 0.8 and 2.4 weight percent (wt%) as outlined by Mitchell (1986). The mineral chemistry results for the seven grains picked as possible picroilmenite grains identified them to be chromite. The Cr_2O_3 contents range from 39.5-45.5 wt% and titanium oxide (TiO_2) contents are low, ranging from 0-0.18 wt%. There is an analysis available for one picroilmenite grain yielding a magnesium oxide (MgO) content of 9.12 wt% and a moderate Cr_2O_3 content of 0.54 wt%.

Phlogopite grains were separated during diamond indicator mineral picking, as they were abundant within the samples. Sixteen microprobe mineral chemistry analyses for phlogopite from K15 are available and are included in Appendix 4. Two chemistry plots outline the trends for kimberlites and other ultramafic rocks based on the chemical compositions of Al_2O_3, FeO and TiO_2 of phlogopite (Appendix 5). The Al_2O_3 vs. FeO chemistry plot identifies a trend towards the composition of minettes with a slight tendency towards the orangeite trend. In the Al_2O_3 vs. TiO_2 chemistry plot, there are two distinct populations both plotting as kimberlitic in composition as the Al_2O_3 contents are fairly constant, however one population appears to be associated with the minette trend.

Fifteen phlogopite microprobe analyses from the ultramafic dyke K9 are included in Appendix 4. The Al_2O_3 vs. FeO chemistry plot show similarities to the phlogopite analyses from K15. The phlogopite shows a slight trend towards minettes with a few analyses trending towards orangeites. The Al_2O_3 vs. TiO_2 chemistry plot shows that there are two populations of phlogopite. One population has constant Al_2O_3 compositions and is consistent with kimberlite trend 1. The other phlogopite population trends toward minette compositions with a slight increase in Al_2O_3 with increasing TiO_2. Both of these chemistry plots are included in Appendix 5. The exploration expenditures for the 2000 exploration season are summarized in Appendix 6.

DISCUSSION

Diamond Potential

Exploration conducted to date on the Abloviak Property for diamonds is very limited considering the size of the area. The true potential of the Abloviak Property for diamondiferous kimberlites and associated intrusives can not be properly evaluated based on the sparse data currently available.

The regional geological and tectonic setting for the Abloviak Property is favourable for the formation and preservation of diamonds in the upper mantle beneath the permit area. The chromite mineral chemistry presented in this assessment report compares very well with the chromites from diamondiferous kimberlite pipes of the Temiscamingue and Desmaraisville kimberlite fields of Quebec. The Cr_2O_3 contents of chromites in these diamondiferous kimberlite fields are less than 60 wt% Cr_2O_3 as reported by Moorhead *et al.* (2000) bearing similarities to the chromites analysed from the ultramafic dyke K15 (Appendix 4 and 5). The presence of numerous dykes within Dumonts' permits in close proximity with mineralogically similar diamondiferous dykes indicates that there is potential for discovery of one or more diamondiferous kimberlite or lamprophyre dykes, pipes or blows. However, the potential for discovery of an economic diamondiferous kimberlite within Dumonts' permits is low based upon world statistics for the discovery of economic kimberlites and therefore the risk for finding an economic diamondiferous dyke and/or possibly pipe within Dumonts' permits is high.

CONCLUSIONS AND RECOMMENDATIONS

Further systematic exploration is necessary within the Dumont Nickel Inc. permits at this time in order to prioritize known dykes and determine whether or not they have favorable indicator mineral chemistry for the preservation of diamonds. Diamondiferous dykes exist in the area which appear to be similar mineralogically to some of those found on Dumont Nickel Inc.'s properties.

APEX Geoscience Ltd. recommends further exploration at this time. The proposed testing and kimberlite exploration should comprise a staged program consisting of: **STAGE 1:** (a) completing caustic analysis, processing for diamond indicators, thin section and microprobe work on the already existing samples collected at the properties during August and September 2000; (b) further staking prospective areas in and around areas where dykes are known to exist; and (c) geophysical leveling and interpretation of the existing geophysical data. **STAGE 2:** (a) A 45 day field program during summer 2001 utilizing an eight person crew. The program should include mapping of existing dykes, sampling dykes where diamonds were discovered, ground geophysical surveying, prospecting and possibly staking. **STAGE 3:** Premised on success of both the 2000 and 2001 exploration programs: (a) collect mini-bulk samples (10 tonne samples) from diamond-bearing ultramafic dykes; (b) process the sample(s) using a dense media separation (DMS) plant at either Torngat and/or another Canadian location and ship all the recovered concentrates for diamond recovery to determine a preliminary grade and diamond distribution. The program would be completed during fall 2001. The preliminary budget for all three stages is about **$1,500,000**, not including a provision for GST and QST. A more detailed break down of the proposed exploration budget is shown in Appendix 7.

APEX Geoscience Ltd.

PERMIT TO PRACTICE
APEX Geoscience Ltd.
Signature
Date Nov. 9/00
PERMIT NUMBER: P-5824
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

Dean J. Besserer, B.Sc., P.Geol.

Andrea K. Noyes, M.Sc.

November, 2000
Edmonton, Alberta

REFERENCES

Digonnet, S., Goulet, N., Bourne, J., Stevenson, R., and Archibald, D. (1999). Petrology of the Abloviak Aillikite dykes, New Quebec: evidence for a Cambrian diamondiferous alkaline province in north-eastern North America. In, Canadian Journal of Earth Sciences, Vol. 37, pp. 517 to 533.

Digonnet, S., Goulet, N., Bourne, J., and Stevenson, R. (1996). Model de mise en place des kimberlites diamantiferes dans les Torngats, Nouveau Quebec. Dan: Vers de Nouvelles decouvertes, Seminaire d'information sure la recherche geologique, program et resumes, Ministere des Resources naturelles, Quebec, Seminaire. DV 96-02, p.18.

Dufresne, M.B., Eccles, D.R., McKinstry, B., Schmitt, D.R., Fenton, M.M., Pawlowicz, J.G. and Edwards, W.A.D. (1996). The Diamond Potential of Alberta; Alberta Geological Survey, Bulletin No. 63, 158 pp.

Mitchell, R.H., (1986). *Kimberlites: Mineralogy, Geochemistry, and Petrology.* Plenum Press, New York, 442 pp.

Mitton, B. (1999). Information Report, Torngat Project, Abloviak Fjord Area, Ungava Bay, Quebec. An unpublished report prepared for Dumont Nickel Inc., November 29, 1999.

Moorhead, J., Perreault, S., Berclaz, A., Sharma, K., Beaumier, M., and Cadieux, A. (2000). Kimberlites and Diamonds in Northern Quebec. Geologie Quebec, PRO 99-09.

CERTIFICATION

I, D.J. BESSERER OF 131 FOXBORO LANDING, EDMONTON, ALBERTA, CERTIFY AND DECLARE THAT I AM A GRADUATE OF THE UNIVERSITY OF WESTERN ONTARIO, LONDON WITH A B.SC. DEGREE IN GEOLOGY (1994). I AM REGISTERED AS A PROFESSIONAL GEOLOGIST WITH THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS AND GEOPHYSICISTS OF ALBERTA.

MY EXPERIENCE INCLUDES SERVICE AS A CONTRACT GEOLOGICAL ASSISTANT WITH THE MINISTRY OF NORTHERN DEVELOPMENT AND MINES, ONTARIO, FROM 1991 TO 1992 AND THE GEOLOGICAL SURVEY OF CANADA, OTTAWA IN 1993. FROM 1994 TO 1999, I HAVE CONDUCTED AND DIRECTED PROPERTY EXAMINATIONS AND EXPLORATION PROGRAMS ON BEHALF OF COMPANIES AS A GEOLOGIST IN THE EMPLOY OF APEX GEOSCIENCE LTD. SINCE JANUARY 2000, I HAVE BEEN A PRINCIPAL AND SHAREHOLDER OF APEX GEOSCIENCE LTD.

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

MY REPORT ENTITLED " ASSESSMENT REPORT, PERMITS 1469, 1492, AND 1522, ABLOVIAK FJORD, QUEBEC " IS BASED UPON THE STUDY OF PUBLISHED AND UNPUBLISHED DATA AND FIELD EXAMINATIONS CONDUCTED THEREON. I HAVE PERSONALLY VISITED THE PROPERTIES THAT ARE THE SUBJECT OF THIS REPORT.

I HEREBY GRANT DUMONT NICKEL INC. OF TORONTO, ONTARIO, CANADA PERMISSION TO USE THIS REPORT.

PROFESSIONAL GEOLOGIST D.J. BESSERER ALBERTA

D.J. BESSERER, B.SC., P.GEOL.

NOVEMBER, 2000
EDMONTON, ALBERTA

CERTIFICATION

I, A.K. NOYES OF #610 10175 114TH ST., EDMONTON, ALBERTA, CERTIFY AND DECLARE THAT I AM A GRADUATE OF THE UNIVERSITY OF WESTERN ONTARIO WITH A B.SC. DEGREE IN GEOLOGY (1997) AND A GRADUATE OF THE UNIVERSITY OF ALBERTA WITH AN M.SC. DEGREE IN GEOLOGY (2000).

MY EXPERIENCE INCLUDES SERVICE AS A GEOLOGICAL ASSISTANT WITH MONOPROS LTD., YELLOWKNIFE, NORTHWEST TERRITORIES DURING THE SUMMERS OF 1996 TO 1999. SINCE JUNE 2000, I HAVE BEEN EMPLOYED BY APEX GEOSCIENCE LTD. AS AN EXPLORATION GEOLOGIST.

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

THIS REPORT ENTITLED "ASSESSMENT REPORT, PERMITS 1469, 1492, AND 1522, ABLOVIAK FJORD, QUEBEC" IS BASED UPON STUDY OF PUBLISHED AND UNPUBLISHED DATA AND FIELD EXAMINATIONS CONDUCTED THEREON. I HAVE PERSONALLY VISITED THE PROPERTIES THAT ARE THE SUBJECT OF THIS REPORT.

I HEREBY GRANT DUMONT NICKEL INC. OF TORONTO, ONTARIO, CANADA PERMISSION TO USE THIS REPORT.

Andrea Noyes

A.K. NOYES, M.SC.

NOVEMBER, 2000
EDMONTON, ALBERTA

APPENDIX 1

B. MITTON REPORT, NOVEMBER, 1999

Information Report

Torngat Project

Abloviak Fjord Area

Ungava Bay, Quebec

NTS 24P\6, 7 and 11

Prepared for

Dumont Nickel Incorporated
120 Adelaide Street West
Suite 512
Toronto, Ontario
M5H 1T1

Bruce Mitton, B.Sc., P.Geo.
370 Hennessy Street
Bathurst
New Brunswick
E2A 2N7
Tel: (506) 546-2183
e-mail: bmitton@nb.sympatico.ca

November 29, 1999
Bathurst
New Brunswick

TABLE of CONTENTS

LIST of FIGURES

LIST of TABLES

LIST of APPENDICES

SUMMARY

This report summarizes the recent discovery of high quality diamonds in the eastern Ungava Bay region at Abloviak Fjord, northern Quebec and Dumont Nickel Incorporated's **Torngat Project**.

The project area is at the boundary between the ~2.8-1.7 Ga southeastern Churchill (Rae) Province and the 3.8-2.5 Ga Nain Province Archean craton. The properties are within the Torngat Orogen underlain by Paleoproterozoic Tasiuyak Gneiss. The Torngat Orogeny defines the transpressional collision between the Rae Province and the Archean Nain craton to the east.

The Abloviak shear zone is the prominent deformational feature of the Torngat Orogen. Together with the Tasiuyak domain, they define the interpreted suture zone between the Nain and Rae provinces. In northernmost Labrador and Quebec, the Abloviak shear zone and the Tasiuyak domain diverge westward, away from the Nain Province, and pass under the Abloviak Fjord area.

It is interpreted that the Cambrian-aged diamondiferous kimberlite dykes were emplaced into tension cracks and fractures, within Tasiuyak Gneiss, associated with reactivation of major structures during the opening of the Iapetus Ocean.

Following the identification of a macrodiamond in kimberlite dykes by a Université du Quebec a Montreal thesis student, Twin Gold Corporation undertook a reconnaissance exploration program in the area. To date Twin Gold has extracted a total of 161 high quality diamonds, including 22 macrodiamonds, from 277 kilograms of kimberlite dyke material. Three vertical, northeast-striking dykes have been located to date. Dyke dimensions are up to 1500 meters long x >300 meters high x 2.5 meters thick.

Dumont Nickel Incorporated has staked 330.5 square kilometers of ground contiguous with Twin Gold's Abloviak Fjord properties. Diamond-bearing kimberlite intrusives typically occur in clusters.

An exploration program is proposed to explore for diamonds on Dumont Nickel Incorporated's **Torngat Project** within this newly developing area of diamond exploration.

1. *Introduction*

This **Information Report** describes the geology and mineral potential of the **Torngat Diamond Project** located approximately 230 kilometers northeast of Kuujjuaq, Quebec on the east shore of Ungava Bay.

This project consists of three Exploration Permits totaling 330.5 square kilometers 100% owned by Dumont Nickel Incorporated. The properties are contiguous with the Torngat Diamond Property of Twin Gold Corporation, which has recently yielded diamonds from kimberlite dykes.

At the request of Dr. Jon North, Vice-President Exploration of Dumont Nickel Incorporated, a review of the above properties was undertaken to highlight the geology and exploration potential of the area. A recommended exploration program for diamonds is provided.

This report is not intended to be a thorough review of relevant assessment material and/or data on each property but is an overview of the author's observations from government data and material provided to him by Dumont Nickel Incorporated. The author did not visit the project area.

2. *Property Location, Access and Physiography*

The **Torngat Project** area is located in northern Quebec, 230 kilometers northeast of Kuujjuaq, on the east shore of Ungava Bay (**Figure 1**). The properties are at Abloviak Fjord, 100 kilometers north of the community of George River, Kangiqsualujjuaq. Daily flights are available from Montreal to Kuujjuaq, and onto Kangiqsualujjuaq. Access to the project site is provided by charter boat or aircraft.

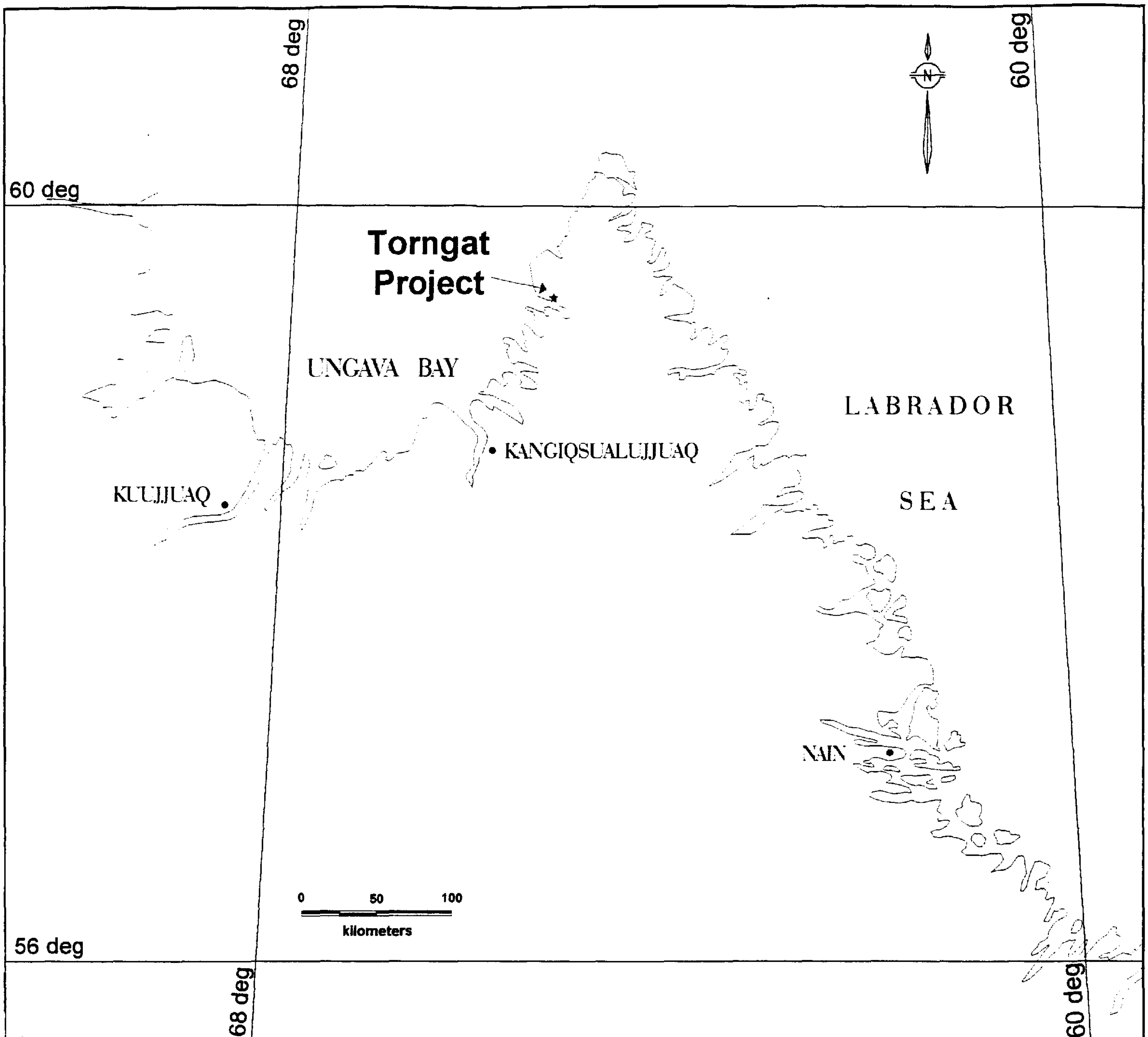
Basic supplies are available in Kuujjuaq or Kangiqsualujjuaq. Major supplies must be flown from Montreal or Val d'Or, Quebec. There is no infrastructure (water, electricity and transportation) for an exploration\mining operation present at the project site.

Physiography of the **Torngat Project** area is a rugged, mountainous area with elevated plateaus ~300 meters above sea level. Elevation varies from sea level to ~300 meters above sea level. The Abloviak Fjord cuts the area in a southeast-trend and has 300 meter-high cliffs. The landscape is a barren, arctic terrain.

3. *Claim Statistics and Ownership*

The **Torngat Project** comprises 330.5 square kilometers covering the Abloviak Fjord area of northern Quebec (**Figure 2**). All claims are owned 100% by Dumont Nickel Incorporated (**Table 1**).

The project comprises three separate Permits of Exploration contiguous with Twin Gold Corporation's 444 square kilometer Torngat Diamond Project property. Exploration Permit PEM 1470 (81 sq. km) is immediately northwest of Twin Gold's property, PEM 1469 (152 sq. km) is to the immediate southeast and PEM 1492, contiguous with it, is immediately to the southeast.



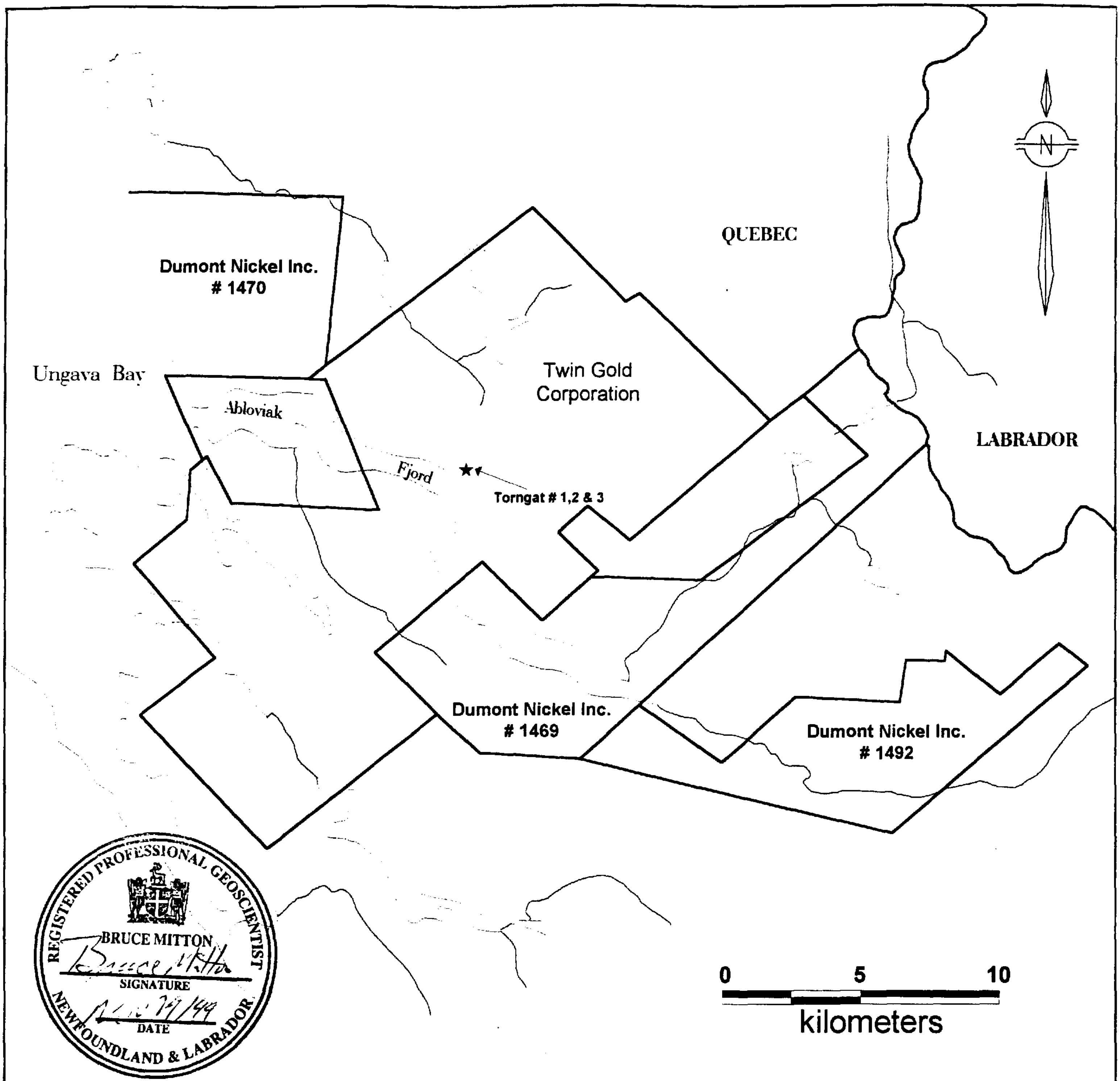
BRUCE MITTON
SIGNATURE
Nov 29/99
DATE
NEWFOUNDLAND & LABRADOR

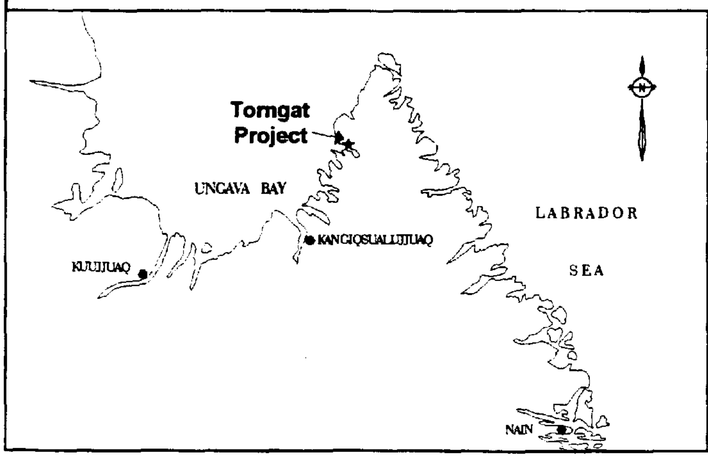
DUMONT NICKEL INCORPORATED

Torngat Project

LOCATION MAP

Project :	Torngat	N.T.S. :	24 P \ 6, 7, & 11
Workspace :		Scale :	
Drawn By :	B.E. Mitton	Date :	November 29, 1999
Revised By :		Figure :	Figure 1





DUMONT NICKEL INCORPORATED

Torngat Project

CLAIM LOCATION MAP

Project :	Torngat	N.T.S. :	24 P \ 6, 7, & 11
Workspace :		Scale :	1:200,000
Drawn By :	B.E. Mitton	Date :	November 29, 1999
Revised By :		Figure :	Figure 2

CLAIM STATISTICS ***TORNGAT PROJECT*** ***TABLE 1***

Exploration Permit	Registration Date	Recorded Holder	NTS Area	Area (square km)
1469	19 October 1999	Dumont Nickel Inc.	24 P \ 6, 7	152.0
1470	19 October 1999	Dumont Nickel Inc.	24 P \ 11	81.0
1492	19 November 1999	Dumont Nickel Inc.	24 P \ 7	97.5

4. *Ungava Bay Regional Geology*

Within the eastern Canadian Shield of the Ungava Bay area, the ~2.8-1.7 Ga ~~south~~northeastern Churchill (Rae) Province separates Archean cratons of the ~ 2.7 Ga Superior and 3.8-2.5 Ga Nain provinces (**Figure 3a**). The west and east boundary of the Rae Province is each marked by an orogenic suture zone, the New Quebec Orogen and the Torngat Orogen, respectively.

The Paleoproterozoic New Quebec Orogen (NQO) is defined as a west-verging fold and thrust belt of predominately low-grade sedimentary and mafic volcanic rocks of the Labrador Trough (**Appendix I**; Wardle *et al*. 1990). The NQO is interpreted as a collision of the Superior and Rae protocontinents during the Hudsonian Orogeny (Kearey, 1976). Modeling of gravity data suggests a westward transport of rocks over the Superior craton (Mareschal *et al*, 1990).

The southeast Churchill (Rae) Province consists of reworked Archean crust and in-folded Paleoproterozoic supracrustal cover sequences (Machado *et al*, 1989: Nunn *et al*, 1990: Wardle *et al*, 1990: James *et al*, 1994).

The Paleoproterozoic Torngat Orogen (TO) defines the transpressional collision between the Rae Province and the Archean Nain craton to the east. It includes strongly deformed, high-grade metamorphic domains such as the Tasiuyak domain, the Lac Lomier Complex and the Burwell Terrane (**Figure 3b**).

The Tasiuyak domain forms the axis of the TO and consists mainly of Paleoproterozoic Tasiuyak Gneiss, a 30-kilometer-wide, north-south trending garnetiferous paragneiss that underlies the easternmost margin of the Churchill (Rae) Province (Ryan *et al*, 1995). The unit extends intermittently for approximately 500 kilometers from Harp Lake in central Labrador to northern Quebec at Abloviak Fjord (**Figure 4**).

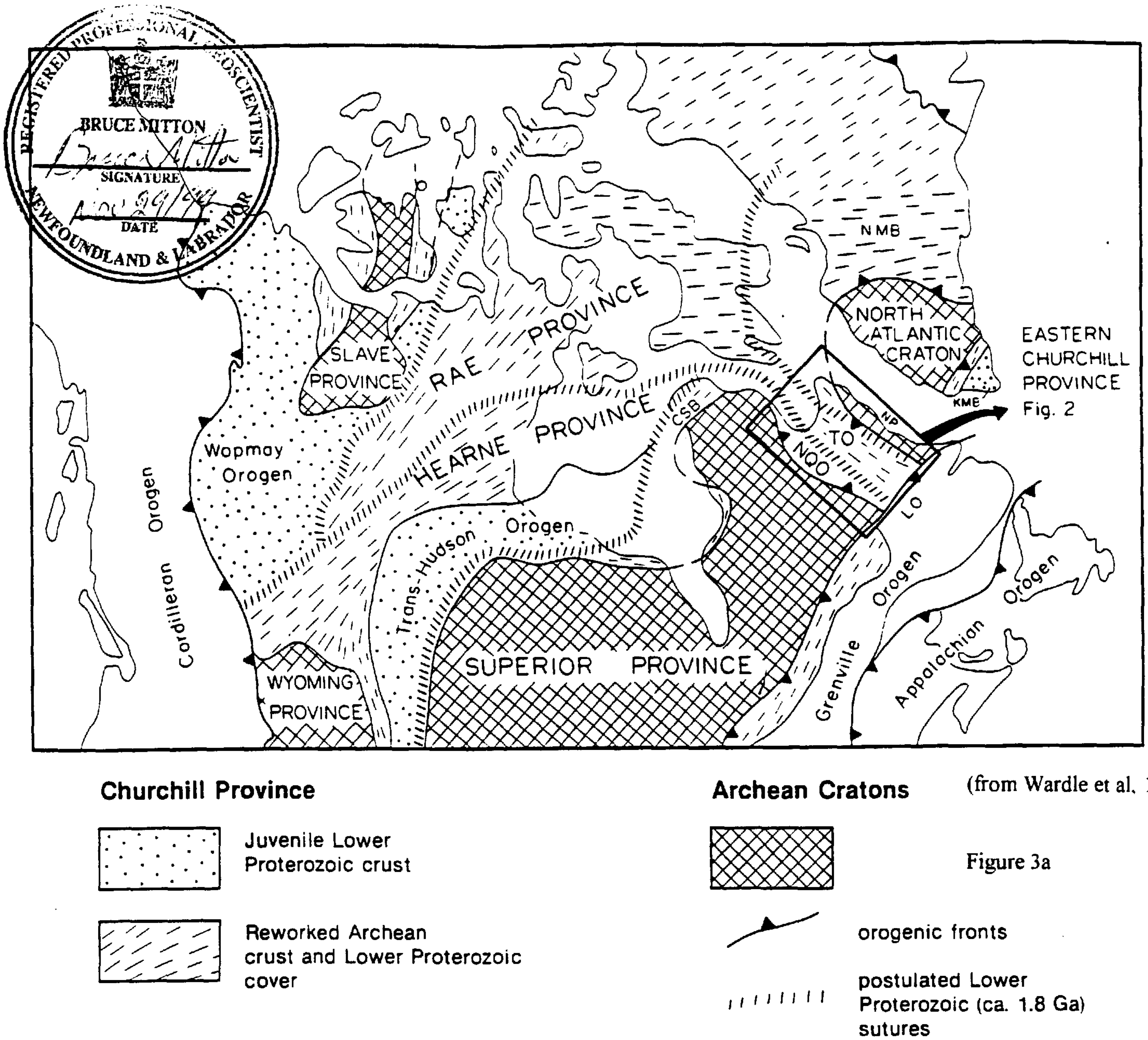
The Abloviak shear zone (ASZ) is the most prominent deformational feature of the Torngat Orogen. Together with the Tasiuyak domain, they define the interpreted suture zone between the Nain and Rae provinces. In northernmost Labrador and Quebec, the ASZ and the Tasiuyak domain diverge westward, away from the Nain Province, and pass under the Abloviak Fjord area (**Figure 3b**).

Overall, the ASZ is contained mainly within Tasiuyak Gneiss, but also affects adjacent rocks of the Rae and Nain provinces. The ASZ represents a later stage of deformation, seen as sinistral shearing within the TO in the northern regions, possibly related to continued thrusting on the margin of the Orogen (Wardle, 1990). Recent gravity studies of the Ungava Bay area have interpreted the northern extension of the ASZ to project northwest under the Abloviak Fjord area (Telmat *et al*, 1999).

4.1 Torngat Project Area Geology

The **Torngat Project** area is underlain by Paleoproterozoic Tasiuyak Gneiss of the southeastern Churchill (Rae) Province (**Appendix II**; Digonnet et al, 1996). The unit

REGISTERED PROFESSIONAL GEOSCIENTIST
BRUCE MITTON
SIGNATURE
DATE
NEWFOUNDLAND & LABRADOR



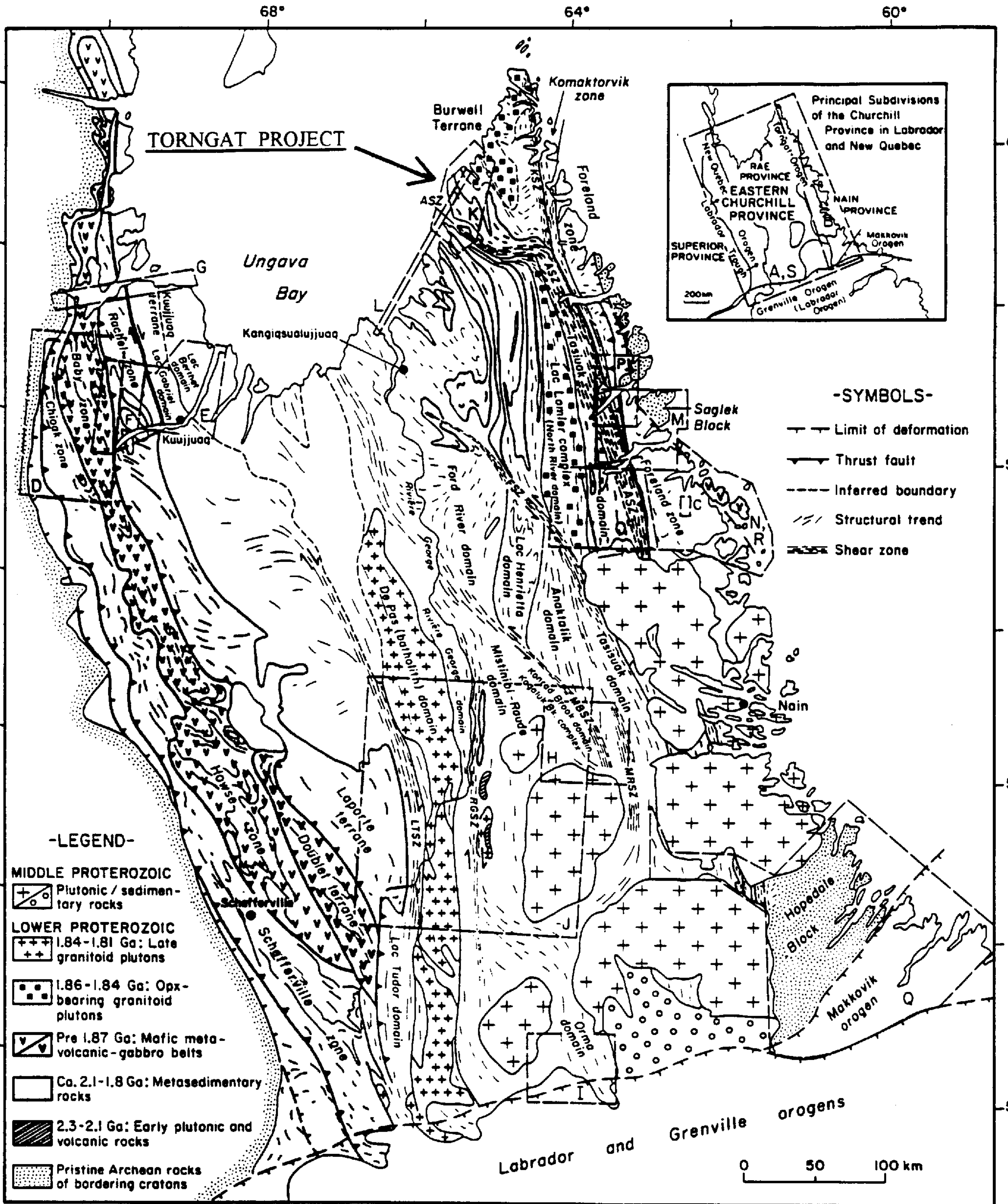
(from Wardle et al. 1990)

Figure 3a

Major subdivisions of the Churchill Province showing location of eastern Churchill Province. Boxed area refers to Figure 2. ***NQO****, New Québec Orogen;* ***TO****, Torngat Orogen;* ***CSB****, Cape Smith Belt;* ***NMB****, Nagssugtoqidian Mobile Belt;* ***NP****, Nain Province;* ***KMB****, Ketilidian Mobile Belt;* ***LO****, Labrador Orogen.*

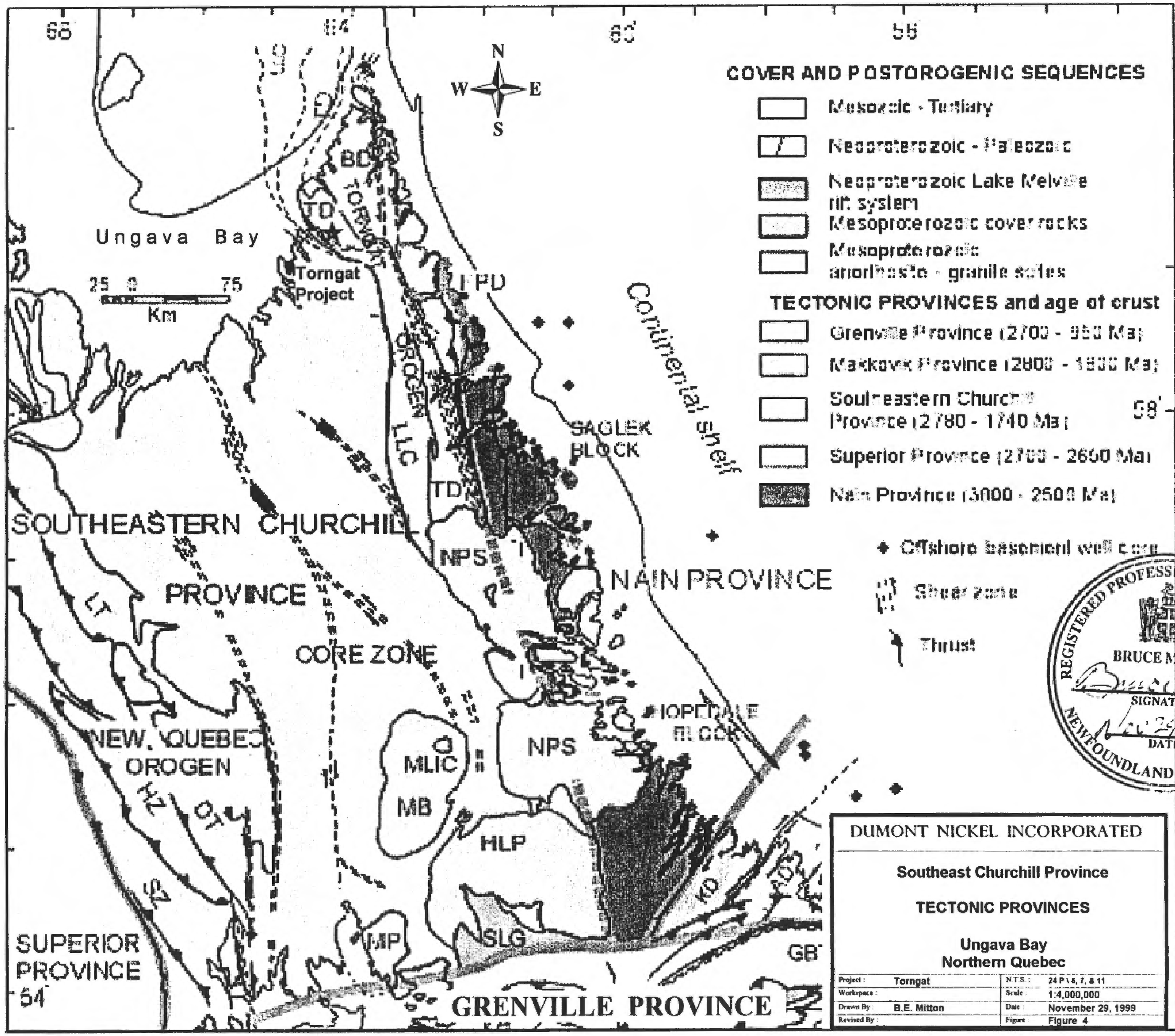
(opposite page) *The eastern Churchill Province of Labrador and northeastern Québec showing tectonic subdivisions. The Torngat Orogen, New Québec Orogen and Rae Province are shown in the inset. Shear zones indicated as follows:* ***KSZ****, Komaktorvik;* ***ASZ****, Abloviak;* ***FSZ****, Falcoz;* ***MBSZ****, Moonbase;* ***MRSZ****, Mistastin River;* ***RGSZ****, Rivière George;* ***LTSZ****, Lac Tudor. Outlined areas refer to papers presented in this issue and are keyed alphabetically to the bold references in the text.*

***(A)* Hoffman**: Dynamics of the tectonic assembly of northeast Laurentia in geon 18 (1.9–1.8 Ga)
(B)* Schiøtte *et al.: U-Pb mineral ages from northern Labrador: Possible evidence for interlayering of Early and Middle Archean tectonic slices
***(C)* Van Kranendonk and Helmstaedt**: Late Archean geologic history of the Nain Province, North River–Nutak map area, Labrador, and its tectonic significance
***(D)* Wares and Goutier**: Deformational style in the foreland of the northern New Québec Orogen
***(E)* Perreault and Hynes**: Tectonic evolution of the Kuujjuaq terrane, New Québec Orogen
***(F)* Moorhead and Hynes**: Nappes in the internal zone of the northern Labrador Trough: Evidence for major early, NW-vergent basement transport
(G)* Mareschal *et al.: Gravity profile and crustal structure across the northern New Québec Orogen
***(H)* Ryan**: Does the Labrador–Québec border area of the Rae (Churchill) Province preserve vestiges of an Archean history?
(I)* Nunn *et al.: U-Pb geochronological evidence for Archean crust in the continuation of the Rae Province (eastern Churchill Province), Grenville Front Tectonic Zone, Labrador
***(J)* Girard**: Evidence d'un magmatisme d'Arc protérozoïque Inférieur (2.3 Ga) sur le plateau de la rivière George
***(K)* Goulet and Ciesielski**: The Abloviak shear zone and the NW Torngat Orogen, eastern Ungava Bay, Québec
***(L)* Seguin and Goulet**: Gravimetric transect of eastern Ungava Bay, northern Torngat Orogen
***(M)* Ryan**: Basement-cover relationships and metamorphic patterns in the foreland of the Torngat Orogen in the Saglek–Hebron area, Labrador
***(N)* Ermanovics and Van Kranendonk**: The Torngat Orogen in the North River–Nutak transect area of Nain and Churchill provinces
***(O)* Van Kranendonk and Ermanovics**: Structural evolution of the Hudsonian Torngat Orogen in the North River map area, Labrador: Evidence for east-west transpressive collision of Nain and Rae continental blocks
***(P)* Mengel and Rivers**: The synmetamorphic P-T-*t* path of granulite-facies gneisses from the Torngat Orogen, and its bearing on their tectonic history
***(Q)* Ermanovics and Ryan**: Early Proterozoic orogenic activity adjacent to the Hopedale block of southern Nain Province
(R)* Bertrand *et al.: Structural and metamorphic geochronology of the Torngat Orogen in the North River–Nutak transect area, Labrador: Preliminary results of U-Pb dating
***(S)* Girard**: Les cisaillements latéraux dans l'arrière-pays des orogènes du Nouveau-Québec et de Torngat: une revue
(Not shown)* Bridgwater *et al.: The Proterozoic Nagssugtoqidian mobile belt of southeast Greenland: a link between the eastern Canadian and Baltic Shields



(from Wardle et al, 1990) Figure 3b

REGISTERED PROFESSIONAL GEOSCIENTIST
BRUCE MITTON
SIGNATURE
Nov 29/99
DATE
NEWFOUNDLAND AND LABRADOR



(after Newfoundland and Labrador Geological Surveys website, 1999) occupies a tectonic zone within the Torngat Orogen between the Rae Province to the southwest and Nain Province to the east (**Figure 4**). The Abloviak shear zone defines the southern margin of the unit and together they trend northwest-southeast under the **Torngat Project** area (Wardle, 1990; Telmat *et al*, 1999).

Cambrian-aged hypabyssal kimberlite has been identified in northeast-trending (030-060 degree) dykes cutting Tasiuyak Gneiss during a regional study begun in 19991 by the Université du Quebec - Montreal (Digonnet et al, 1996). Dating of phlogopite by D. H. Archibald of Queen's University, using Ar\Ar method, determined the dykes to be 544+\- 12 Ma (Digonnet et al, 1996).

Digonnet (1996) indicates the dykes were emplaced into tension cracks and fractures associated with reactivation of major structures during the opening of the lapetus Ocean (~650-550 Ma).

Since August 1999, Twin Gold Corporation has identified three NE trending diamond-bearing kimberlite dykes (from 0.6 to 2.5m wide) north of the Abloviak Fjord. At last report, a total of 161 diamonds, including 22 macrodiamonds, have been extracted from 277 kilograms of kimberlite dyke material (Twin Gold Corporation press release – dated November 9, 1999). Mineralogical Services of Lakefield Research Limited has consistently identified the diamonds as being very high quality gems, mostly white and transparent. They report the percentage preservation is between 95% and 62.5%, comparable to the higher range of microdiamonds from other cratonic areas of Canada (Twin Gold Corporation press release – dated September 29, 1999).

The first discovered dyke (TORNGAT 1) has dimensions of 1500 by 300 meters approximately. The dyke outcrops along strike across the elevated plateau and in the ~300 meter-high near-vertical cliff face of Abloviak Fjord.

Two similar dykes (TORNGAT 2 and 3) have been located 700 meters north of TORNGAT 1. The are approximately 0.6 and 1.0 meter wide, respectively.

Diamond indicator minerals (high temperature G9 and G10 garnets) are reported by Professor J. H. Bourne (Université du Quebec - Montreal) from the kimberlite dyke outcropping on Twin Gold's Torngat property north of Abloviak Fjord (Twin Gold Corporation press release – dated August 23, 1999).

5. *Exploration History*

Limited diamond exploration has been conducted in the arctic region of northern Quebec and Labrador.

Fjordland Minerals Limited staked a 39,000 hectare property in Ungava Quebec (Fjordland Minerals Ltd. press release – dated April 21, 1997). They staked ground to cover the "12 kimberlite dykes recently discovered by a University of Quebec student". They report the thesis confirms kimberlite dykes containing a macrodiamond of gem quality. A summer till sampling and prospecting program was planned for the summer of 1997.

Twin Gold Corporation staked the Fjordland Minerals property area in 1999 and conducted the above-described petrologic studies of the kimberlite dykes and diamonds.

6. *Exploration Targets and Recommendations*

Recent exploration success by Twin Gold Corporation, supported by Universite du Quebec a Montreal studies, have identified the eastern Ungava Bay area, and in particular the **Torngat Project** at Abloviak Fjord, to be a new and developing area for diamond exploration.

The potential for success in this area is considerable because diamondiferous dykes and diatremes (or "pipes") typically occur in clusters within a specific area. Historical diamond mining camps consistently show this fact with the Lesotho occurrences as a good example (Nixon, 1973). The Lac d' Gras area of northern Canada illustrates a North American example of multiple diamondiferous intrusions within one area.

Exploration for kimberlite and\or lamprophyre dykes and pipes should be undertaken on Dumont Nickel's Torngat Project.

The identification of diamondiferous kimberlite dykes the Abloviak Fjord area is relatively new and the area has only received preliminary exploration for a diamond deposit, therefore the potential for new discoveries is significant.

Of significance, are the consistently very high quality diamonds reported by Twin Gold Corporation. From a revenue point of view, often it is not the highest grade diamond mines which provide the greatest monetary return, but those which have a greater percentage of gem quality diamonds (Evans, 1987).

Further work is recommended by the author to locate and identify additional diamondiferous dykes or pipes underlying Dumont Nickel Incorporated's property. The **Torngat Project** area represents an attractive exploration target with a good chance of success.

6.1 Proposed Program and Budget

The three properties comprising Dumont Nickel's **Torngat Project** each warrant further work to define anticipated kimberlite intrusive bodies underlying the properties.

An analysis and interpretation of aerial and LANDSAT satellite photographs with archival government airborne surveys is required to identify and locate favourable structures representative of diamondiferous intrusive bodies. This should be completed before a recommended aeromagnetic survey to help prioritize areas of significance for surveying and\or additional acquisition. A follow-up integration of photograph analysis with the proposed aeromagnetic survey results will further aid target identification.

Significant magnetic anomalies and favourable structures should be followed-up, by detailed prospecting, whole rock geochemical and petrologic analysis of rock samples, ground geophysics and diamond drilling.

Identification of structures in the field can be greatly assisted using a helicopter. The identification of favourable structures from the air can prioritize targets for follow-up and the necessary, detailed, ground inspection. Similarly, the cliffs of Abloviak Fjord and coast of Ungava Bay can be best reconnoitered by helicopter for intrusions and related structures.

The recommended exploration budget is as follows:

Proposed Exploration Budget *Torngat Project* *Table 2*

Phase 1

Compilation of archival Landsat 5 TM data, SPOT data, Government airborne magnetometer data, and air photographs	$25,000	
Interpretation of remotely sensed data, plotting products at 1:250, 000, 1:100,000, and 1:10,000 scales and exploration targeting	$10,000	
Reconnaissance exploration with a prospector-geologist (4 man) field crew based in Kangiqsualujjuaq in the summer of 2000, 21 days wages and support at $2,000 per day plus mob/demob	$47,000	
Sixty hours helicopter time at a rate of $1,000 per hour including fuel	$60,000	
Caustic fusion analysis of samples	$20,000	
Reporting and interpretation of field data	$17,550	
Total cost of Phase 1		**$179,550**

Phase 2

High resolution airborne magnetometer survey, helicopter, 1400 km of surveying at $45 per km plus $5,000 mob/demob and $7000 standby charges	$75,000	
Plotting, analysis, and interpretation of magnetic data	$15,000	
Diamond drilling of kimberlite occurrences, 800 m of diamond drilling, (approximately 6 to 8 drill holes) at a total all inclusive cost of $300 per meter including mob/demob, camp, helicopter, and supply	$240,000	
Caustic fusion analysis of samples	$11,200	
Total cost of Phase 2		**$341,200**

Phase 3

Diamond drilling of kimberlite occurrences, 1,200 m of diamond drilling, (approximately 9 to 12 drill holes) at a total all inclusive cost of $300 per meter including mob/demob, camp, helicopter, and supply	$360,000	
Caustic fusion analysis of samples	$16,800	
Reporting and interpretation of drilling data	$47,450	
Total cost of Phase 3		**$424,250**

Total cost of Phases 1, 2 and 3 — $945,000

7. *Conclusion*

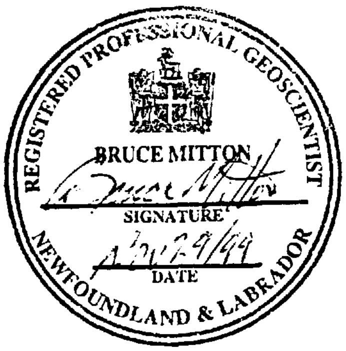
Twin Gold Corporation's diamond property in northern Quebec has yielded a significant quality of diamonds providing a new and developing area for exploration.

As diamond-bearing intrusive bodies are typically located in clusters within a specific area, the potential is good that additional intrusives can be discovered here.

Further work is recommended at each Dumont Nickel Incorporated property area to locate additional diamondiferous kimberlite dykes or pipes. Based on the preliminary information to date on this newly discovered occurrence, the **Torngat Project** area represents an attractive exploration target with good indications for success.

Respectfully submitted,

Bruce Mitton, B.Sc., P. Geo.



REFERENCES

Digonnet, S., Goulet, N., Bourne, J., and Stevenson, R., 1996. Model de mise en place des kimberlites diamantiferes dans les Torngats, Nouveau Quebec. Dans: Vers de Nouvelles decouvertes, Seminaire d'information sur la recherche geologique, program et resumes, Ministere des Ressources naturelles, Quebec, Seminaire. DV 96-02, p.18.

Evans, A.M., 1987. *An Introduction to Ore Geology*, 2nd edition. Blackwell Scientific Publications, London, England, 358 p.

James, D.T., Connely, J.N., Wasteneys, H.A. and Kilfoil, G.J. 1994. Paleoproterozoic lithotectonic divisions of the southeastern Churchill Province, Western Labrador. Canadian Journal of Earth Sciences, vol. 33. pp 216-230.

Kearey, P. 1976. A regional structural model of the Labrador trough., northern Quebec, from gravity studies, and its relevance to continent collision in the Precambrian. Earth and Planetary Science Letters, vol. 28. pp. 371-378.

Machado, N., Goulet, N., Gariepy, C. 1989. U-Pb geochronology of reactivated Archean basement and of Hudsonian metamorphism in the northern Labrador Trough. Canadian Journal of Earth Sciences, vol. 26. pp 1-15.

Mareschal, J.C., Dalla Colletta, G., Clevenot, I. And Goulet, N. 1990. Gravity profile and crustal structure across the northern New Quebec Orogen. Geoscience Canada, vol. 17. pp. 250-255.

Nixon, P.H., 1973. *ed., Lesotho Kimberlites.* Lesotho National Development Corporation, Maseru.

Nunn, G.A.G., Heaman, L.M. and Krogh, T.E. 1990. U-Pb geochronological evidence for Archean crust in the continuation of the Rae Province (eastern Churchill Province), Grenville Front Tectonic Zone, Labrador. Geoscience Canada, vol. 17. pp. 259-264.

Ryan, B., Wardle, R., Gower, C. and Nunn, G. 1995. Nickel-copper sulphide mineralization in Labrador: the Voisey Bay Discovery and its exploration implications. *In* Current Research, Newfoundland Department of Natural Resources, Geological Survey, Report 95-1, pp. 177-204.

Telmat, H., Mareschal, L.C., Gariepy, C. 1999. The gravity field over the Ungava Bay region from satellite altimetry and new land-based data: implications for the geology of the area. Canadian Journal of Earth Sciences, vol. 36, pp. 75-89.

Wardle, R.J., Ryan, B. and Ermanovics, I. 1990. The eastern Churchill Province, Torngat and New Quebec Orogens: an overview. Geoscience Canada, vol.17. pp. 217-222.

CERTIFICATE of QUALIFICATION

I, Bruce Edgar Mitton, Consulting Geologist, with my residence and office at 370 Hennessy Street, Bathurst, New Brunswick, hereby certify that :

- Graduation from High School at Riverview, New Brunswick in 1981 and received my Bachelor of Science degree from the University of New Brunswick in 1985. My unpublished undergraduate thesis is titled *Hydrothermal Alteration of Granitoids Associated with Little Dungarvon Tin Deposit, New Brunswick.*
- I have practised my profession of Geologist for fourteen years having worked in Eastern Canada mainly with one multi-national exploration/mining company. I am well informed with VMS and magmatic basemetal deposit geology having worked in the Bathurst Mining District of New Brunswick from 1985 to the present. I have worked the latter from 1995 to the present in Labrador and northern Quebec.
- Been a Consulting Geologist since August 1997.
- I have no relevant experience in the areas of corporate planning and financial analysis.
- I am a Professional Geoscientist currently registered with the Association of Professional Engineers and Geoscientists of Newfoundland. I am also a member of the Prospectors and Developers Association of Canada, New Brunswick Branch of the Canadian Institute of Mining, Metallurgy & Petroleum and New Brunswick Prospectors and Developers Association.
- The review of material for this report was conducted from November 23 to 29, 1999.
- I have no conflict of interest through any direct or indirect relationship with Dumont Nickel Inc or its management. I do not expect to acquire any direct equity in the subject properties of this report, nor in any mineral claim within the province of Quebec.
- I own 2000 shares of Dumont Nickel Inc. purchased for investment purposes. I will receive only normal consulting fees for the preparation of this report.

LETTER of RELEASE

Directors,
Dumont Nickel Inc.
120 Adelaide St. W
Toronto, ONT
M5H 1T1

Gentlemen,

With this letter is transmitted my report on Torngat Project in northern Quebec.

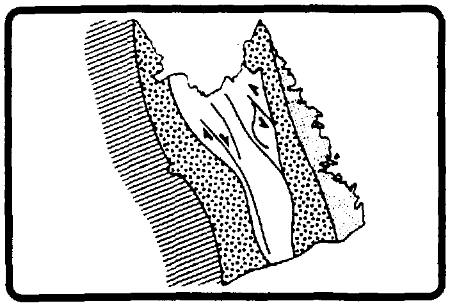
This letter is authorisation for you to use this report for submission to regulatory authorities for the purpose of filing a prospectus, statement of material facts, or any other purpose, subject to keeping extracts from the report in their proper context.

Respectfully Submitted
this 29th day of November, 1999

Bruce Mitton, B.Sc., P. Geo.
Consulting Geologist

Appendix 1

Articles



The eastern Churchill Province, Torngat and New Québec orogens: An overview

Richard J. Wardle and Bruce Ryan
Geological Survey Branch
Newfoundland Department of Mines and Energy
P.O. Box 8700
St. John's, Newfoundland A1B 4J6

Ingo Ermanovics
Continental Geoscience Division
Geological Survey of Canada
588 Booth Street
Ottawa, Ontario K1A 0E4

Summary

The eastern Churchill Province, which separates the Archean cratons of the Superior and Nain provinces in the eastern Canadian Shield, is a rare example of a two-sided Early Proterozoic orogenic belt. The interior of the eastern Churchill Province is composed largely of reworked Archean rocks, which appear to form an extension of the Rae Province, sutured against the adjoining Superior and Nain provinces by the New Québec and Torngat orogens. Both orogens contain continental margin sequences that record the transition from initial rift to foredeep environments. Deformation was predominantly of transpressional character and was controlled by oblique convergence of the Superior and Nain cratons on the Rae Province. The New Québec and Torngat orogens have a mirror-image symmetry defined by outward-verging fold and thrust belts associated with dextral (west) and sinistral (east) transcurrent shear on their interior margins. The dominant feature of the New Québec Orogen is its broad fold and thrust belt which is developed in low- to medium-grade rocks and is analogous to the foreland zones of Phanerozoic orogens. The Torngat Orogen, however, is dominated by an extensive sinistral shear system, developed in granulite-facies crust, that provides an excellent lower crustal analogue for modern crustal-scale transcurrent fault systems.

Introduction

The papers presented in this issue result from a two-day conference entitled "Recent Advances in the Geology of the Eastern Churchill Province (New Québec and Torngat Orogens)" which was held in Wakefield, Québec, in March 1990, and was attended by 25 active researchers.

The 2.4–1.8 Ga Churchill Province (Figure 1) has been referred to as "the glue that binds the Canadian Shield", a statement that underlines its monumental importance in the assembly of the North American Shield as a whole. Despite such fundamental significance, it is only comparatively recently that we have begun to understand this enormous and complex orogenic system. Our understanding to date is built principally on detailed work in the western parts of the Province and in the Cape Smith Belt, which has led to a series of regional syntheses, summarized in the Trans-Hudson Orogen Symposium volume (Lewry and Stauffer, 1990), and the landmark compilations of Hoffman (1988, 1990). Although models for the western part of the Churchill Province and Cape Smith Belt, are now relatively well constrained, our knowledge of the rest of the remote northern and eastern regions of the Province remains woefully inadequate.

The first regional syntheses of what is referred to here as the eastern Churchill Province were presented at the Geological Association of Canada — Mineralogical Association of Canada (Saskatoon '87 Annual Meeting) Trans-Hudson Symposium (van der Leeden *et al.*, 1990; Wardle *et al.*, 1990; Hoffman, 1990). Much work has been done since that time, and plans are under way for an enhanced research program in the area. These plans have been given added impetus by the recent approval of the Phase III LITHOPROBE ECSOOT (Eastern Canadian Shield Onshore – Offshore Transect) project which plans to conduct reflection seismic and allied onshore geoscience studies along the Labrador coast and across the strike of the Churchill Province in Ungava Bay (LITHOPROBE, 1990). Planning for this transect formed a major component of the Wakefield meeting.

It has been recognized for some time that the eastern Churchill Province has a fundamental tripartite division, consisting of a western low-grade volcano-sedimentary package (Labrador Trough), a central region of reworked Archean gneiss and Proterozoic cover (Rae Province; Hoffman, 1988) and an eastern region comprising reworked Archean rocks of the Nain Province. Hoffman (1990) has integrated this scheme into his overall synthesis of the Churchill Province and proposed the existence of two orogenic sutures: in the east the Torngat Orogen, which forms the Nain/Rae province boundary, and in the west the New Québec Orogen, which similarly links the Rae and Superior provinces (Figure 2, inset A: **Hoffman**). This terminology has been adopted by the majority of conference participants, though the full extent of the two orogens has yet to be firmly defined. We retain the term eastern Churchill Province for the area affected by lower Proterozoic (Hudsonian) orogenesis as a whole.

The following is a review of the principal aspects of the eastern Churchill Province with emphasis on the contributions of the Wakefield papers. This review also draws extensively on previous work, in particular the results of regional mapping programs by the provincial geological surveys of Québec and Newfoundland (see references *in* Dimroth (1972), van der Leeden *et al.* (1990), and Wardle *et al.* (1990)). Much of the northern part of the eastern Churchill Province is, however, known only from the reconnaissance work of Taylor (1979). References to articles appearing in this issue are shown in bold and are keyed alphabetically to Figure 2.

Nain and Superior Provinces

The recognition of the predominantly Archean character of the Rae Province has stressed the need for comparisons with the

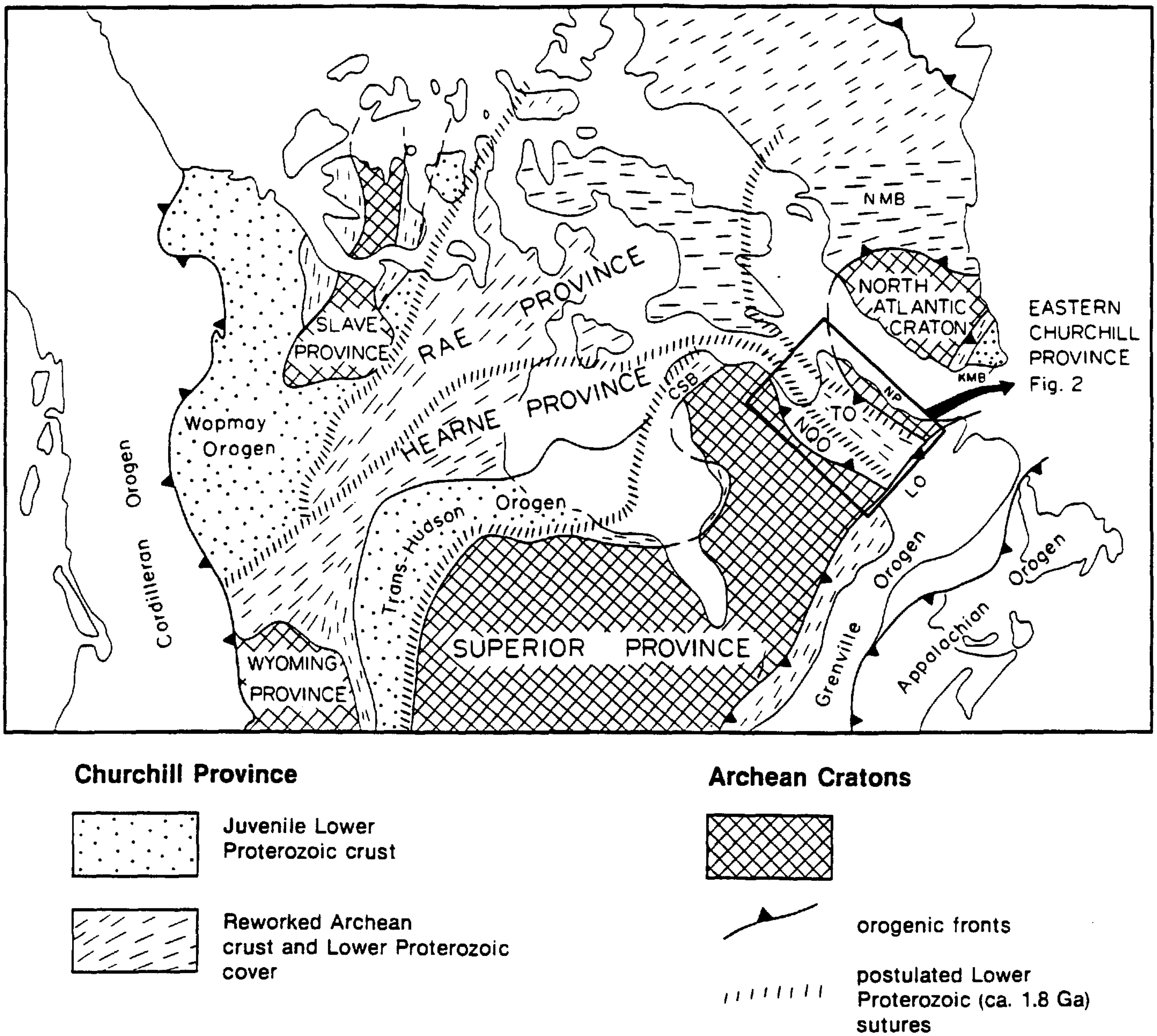
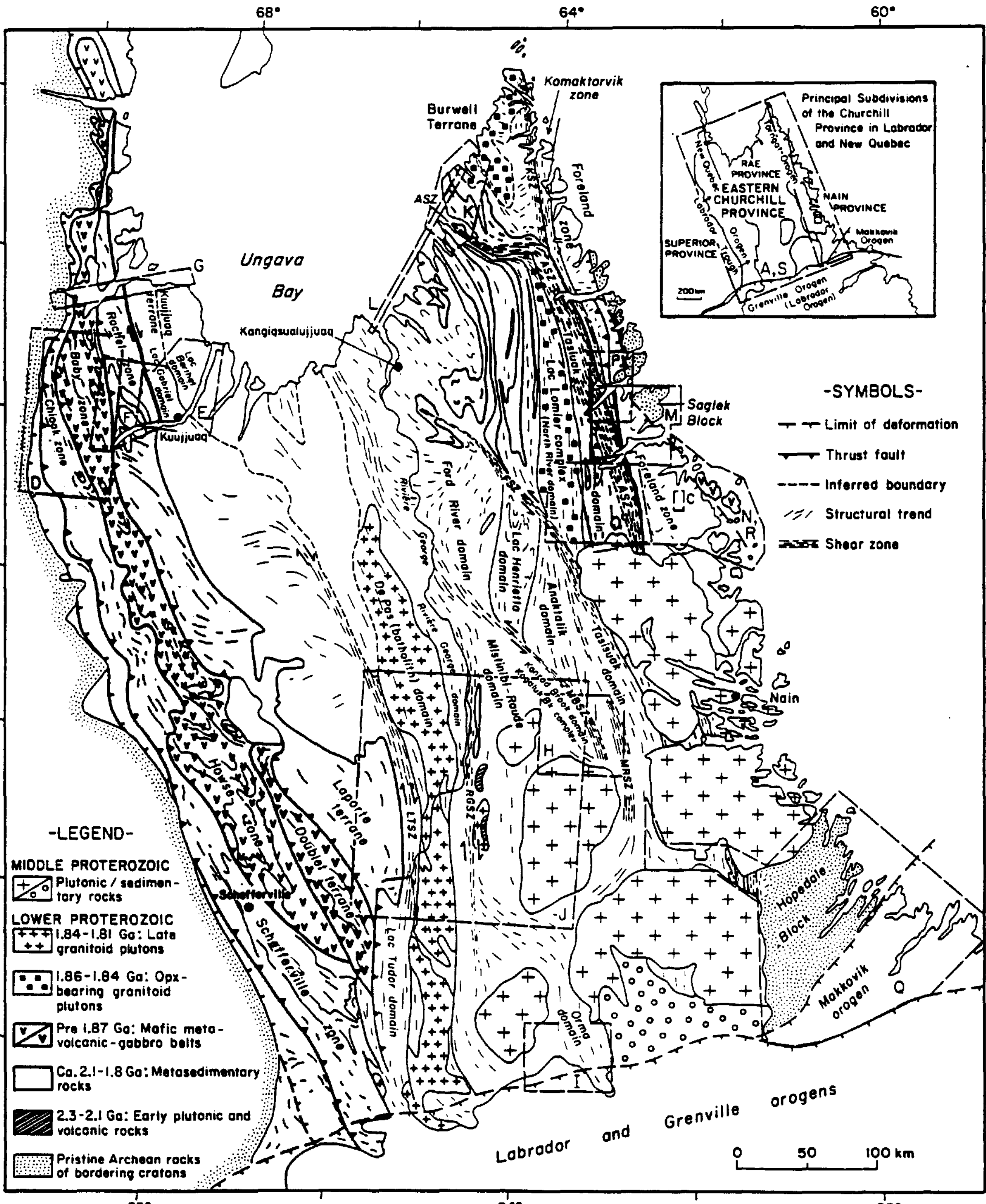


Figure 1 *Major subdivisions of the Churchill Province showing location of eastern Churchill Province. Boxed area refers to Figure 2. **NQO**, New Québec Orogen; **TO**, Torngat Orogen; **CSB**, Cape Smith Belt; **NMB**, Nagssugtoqidian Mobile Belt; **NP**, Nain Province; **KMB**, Ketilidian Mobile Belt; **LO**, Labrador Orogen.*

Figure 2 ***(opposite page)*** *The eastern Churchill Province of Labrador and northeastern Québec showing tectonic subdivisions. The Torngat Orogen, New Québec Orogen and Rae Province are shown in the inset. Shear zones indicated as follows: **KSZ**, Komaktorvik; **ASZ**, Abloviak; **FSZ**, Falcoz; **MBSZ**, Moonbase; **MRSZ**, Mistastin River; **RGSZ**, Rivière George; **LTSZ**, Lac Tudor. Outlined areas refer to papers presented in this issue and are keyed alphabetically to the bold references in the text.*

(A) **Hoffman**: Dynamics of the tectonic assembly of northeast Laurentia in geon 18 (1.9–1.8 Ga)
(B) **Schiøtte *et al.***: U-Pb mineral ages from northern Labrador: Possible evidence for interlayering of Early and Middle Archean tectonic slices
(C) **Van Kranendonk and Helmstaedt**: Late Archean geologic history of the Nain Province, North River–Nutak map area, Labrador, and its tectonic significance
(D) **Wares and Goutier**: Deformational style in the foreland of the northern New Québec Orogen
(E) **Perreault and Hynes**: Tectonic evolution of the Kuujjuaq terrane, New Québec Orogen
(F) **Moorhead and Hynes**: Nappes in the internal zone of the northern Labrador Trough: Evidence for major early, NW-vergent basement transport
(G) **Mareschal *et al.***: Gravity profile and crustal structure across the northern New Québec Orogen
(H) **Ryan**: Does the Labrador–Québec border area of the Rae (Churchill) Province preserve vestiges of an Archean history?
(I) **Nunn *et al.***: U-Pb geochronological evidence for Archean crust in the continuation of the Rae Province (eastern Churchill Province), Grenville Front Tectonic Zone, Labrador
(J) **Girard**: Evidence d'un magmatisme d'Arc protérozoïque Inférieur (2.3 Ga) sur le plateau de la rivière George
(K) **Goulet and Ciesielski**: The Abloviak shear zone and the NW Torngat Orogen, eastern Ungava Bay, Québec
(L) **Seguin and Goulet**: Gravimetric transect of eastern Ungava Bay, northern Torngat Orogen
(M) **Ryan**: Basement-cover relationships and metamorphic patterns in the foreland of the Torngat Orogen in the Saglek–Hebron area, Labrador
(N) **Ermanovics and Van Kranendonk**: The Torngat Orogen in the North River–Nutak transect area of Nain and Churchill provinces
(O) **Van Kranendonk and Ermanovics**: Structural evolution of the Hudsonian Torngat Orogen in the North River map area, Labrador: Evidence for east-west transpressive collision of Nain and Rae continental blocks
(P) **Mengel and Rivers**: The synmetamorphic P-T-*t* path of granulite-facies gneisses from the Torngat Orogen, and its bearing on their tectonic history
(Q) **Ermanovics and Ryan**: Early Proterozoic orogenic activity adjacent to the Hopedale block of southern Nain Province
(R) **Bertrand *et al.***: Structural and metamorphic geochronology of the Torngat Orogen in the North River–Nutak transect area, Labrador: Preliminary results of U-Pb dating
(S) **Girard**: Les cisaillements latéraux dans l'arrière-pays des orogènes du Nouveau-Québec et de Torngat: une revue
(Not shown) **Bridgwater *et al.***: The Proterozoic Nagssugtoqidian mobile belt of southeast Greenland: a link between the eastern Canadian and Baltic Shields


Ungava
Bay
Kangiqsualujjuaq
Kuujjuaq
Burwell
Terrane
Komaktorvik
zone
Foreland zone
Saglek
Block
Nain
Schefferville
Hopedale
Block
Makkovik
orogen
Labrador and Grenville orogens
Principal Subdivisions of the Churchill Province in Labrador and New Quebec
RAE PROVINCE
EASTERN CHURCHILL PROVINCE
NAIN PROVINCE
SUPERIOR PROVINCE
Makkovik Orogen
Grenville Orogen (Labrador Orogen)
-SYMBOLS-
Limit of deformation
Thrust fault
Inferred boundary
Structural trend
Shear zone
-LEGEND-
MIDDLE PROTEROZOIC
Plutonic / sedimentary rocks
LOWER PROTEROZOIC
1.84-1.81 Ga: Late granitoid plutons
1.86-1.84 Ga: Opx-bearing granitoid plutons
Pre 1.87 Ga: Mafic metavolcanic-gabbro belts
Ca. 2.1-1.8 Ga: Metasedimentary rocks
2.3-2.1 Ga: Early plutonic and volcanic rocks
Pristine Archean rocks of bordering cratons
0 50 100 km
68°
64°
60°
58°
56°
54°

stable cratons of the Nain and Superior provinces. Relatively little is known about the Superior Province adjacent to the New Québec Orogen, but dating by Mortensen and Percival (1987) and Machado *et al.* (1989) indicates a comparatively short crustal history between 2.8 and 2.65 Ga. **Schiøtte *et al.*** (Figure 2, inset B) review the chronology of the better known Nain Province and describe a fundamental difference between the Saglek (northern Nain) block, which is characterized by 3.86–3.7 Ga crust, and the Hopedale (southern Nain) block, which is dominated by 3.2–3.1 Ga crust. Both share a common Late Archean (post-2.7 Ga) history. **Schiøtte *et al.*** (B) suggest that the interleaving of Early and Middle Archean crust in southern Saglek block is the result of Middle to Late Archean terrane amalgamation. ***Van Kranendonk and Helmstaedt*** (C) describe tectonic relationships between Archean supracrustal sequences and older *ca.* 3.7 Ga orthogneiss crust in the Saglek block and conclude that these are fundamentally no different from those seen in higher level granite-greenstone belts.

New Québec Orogen

This Orogen consists predominantly of the low-grade sedimentary and mafic volcanic rocks of the Labrador Trough (Figure 2) disposed in a west-verging fold and thrust belt. The western part of the belt (Chioak–Schefferville zones) comprises sedimentary rocks inferred to have formed in a setting that evolved from an intial rifted margin to a subsequent foredeep, the latter in response to encroachment of thrust sheets from the east. The Baby and Howse zones and Doublet terrane consist primarily of turbidites, basalt flows and voluminous gabbro sills (including ultramafic sills in the Doublet terrane) interpreted by most workers (*e.g.*, **Wares and Goutier**, D) to have formed during rifting of the Superior continent and the formation of oceanic crust. Initial rifting of the Superior margin appears to have commenced *ca.* 2.1 Ga; paradoxically, the few available U-Pb dates indicate that gabbro sill intrusion culminated at 1.87 Ga, the approximate time of foredeep formation according to Hoffman (1987). A potential resolution of this dilemma is offered by **Hoffman's** (A) model for ocean opening in a dextral pull-apart basin which formed along the eastern edge of the Superior craton during its northward indentation into the Churchill hinterland.

The hinterland of the New Québec Orogen is represented by: (i) the Rachel zone–Laporte terrane, a tract of metasedimentary schist correlative, in part at least, with rocks of the western zones, and (ii) the Kuujjuaq terrane, a metasedimentary sequence underlain by Archean basement and intruded by the 1.84–1.83 Ga Kuujjuaq batholith (**Perreault and Hynes**, E). The calc-alkaline nature of the batholith suggests an origin as a magmatic arc, but it is uncertain whether this was developed on the Superior margin, or accreted against it.

Wares and Goutier (D) analyze the deformational history of the northern New Québec Orogen in the Baby and Chioak zones and distinguish an early episode of low-angle, in-sequence thrusting from a later period of major high-angle, out-of-sequence thrusting. Out-of-sequence thrusting is thought to be responsible for the bulk of crustal thickening in this part of the New Québec Orogen and may have developed in response to syntectonic erosion of the orogenic wedge and attempts by the wedge to maintain critical taper. **Moorhead and Hynes** (F) review the structural development of the Rachel zone and describe large, west-verging, basement-cored nappes that developed through early décollement at the basement-cover interface and were refolded during later northwest- and southwest-directed thrust-fold phases. Gravity modelling by **Mareschal *et al.*** (G) confirms that significant crustal thickening has occurred under the Chioak and Baby zones, presumably in response to southwest-directed overthrusting. An eastward rise in the gravity gradient from the Rachel zone into the Rae Province is proposed to result from crustal thickening and uplift of dense lower crustal material in response to collision and overthrusting of the Rae Province onto the Superior margin.

Initial thrusting and collision in the New Québec Orogen is proposed by **Hoffman** (A), on the basis of comparisons with the Cape Smith Belt, to have commenced no later than 1.88 Ga. An initial metamorphic peak in the hinterland *ca.* 1.84 Ga is separated from a second peak *ca.* 1.83 Ga (Machado, 1990; **Perreault and Hynes**, E) by intrusion of the Kuujjuaq batholith. Penetrative deformation in the foreland (Chioak and Baby zones) appears to have ceased by 1.813 Ga; however, pegmatite intrusion and retrograde metamorphism persisted until 1.77 Ga (Machado, 1990; **Perreault and Hynes**, E).

Rae Province

The location of the suture(s) that separates the New Québec Orogen and its Superior Province basement from the Rae Province is still uncertain, but must lie somewhere between the Rachel zone–Laporte terrane and De Pas domain. The Lac Tudor shear zone is a possible candidate, but so are the shear zones that bound the eastern margin of the Rachel zone–Laporte terrane. The Rae Province has long been suspected to consist predominantly of reworked Archean crust, a suspicion that is now being confirmed in several areas. Machado *et al.* (1989) have reported ages of *ca.* 2.9–2.8 Ga from the central Rae Province near Ungava Bay. **Ryan** (H) describes a large area of Archean granitoid gneiss and anorthosite cut by early Proterozoic (?) dykes that bears a remarkable resemblance to rocks of the Nain Province; rocks from the same general area have also yielded preliminary Archean zircon ages. Finally, **Nunn *et al.*** (I) report the discovery of a well-preserved Archean (2.7–2.6 Ga) tonalite-mafic volcanic assemblage in the Orma domain of the southern Rae Province.

An intriguing *ca.* 2.3 Ga magmatic event is described by **Girard** (J) from the Rivière George domain. This event, which may be arc-related, probably predates deposition of other Early Proterozoic platformal sequences such as the Lake Harbour Group in the interior Rae Province, and also appears to predate rifting of the Superior Province *ca.* 2.1 Ga (Wardle *et al.*, 1990); its regional significance, however, remains uncertain. A later stage of crustal development in the Rae Province is marked by the *ca.* 1.84–1.81 Ga De Pas batholith, which has been variably interpreted as an Andean-type magmatic arc by van der Leeden *et al.* (1990) and **Girard** (J), and as a syn- to post-collisional batholith by Wardle *et al.* (1990). As the result of Early Proterozoic deformation,the Rae Province was subjected to dextral shearing along the Lac Tudor and Rivière George shear zones and sinistral shearing along the Mistastin, Moonbase and Falcoz shears. The relative timing of these opposed shear events has not been established, but is clearly important. Penetrative deformation apparently ceased by 1.8 Ga, the age of the youngest De Pas plutonism.

The Torngat Orogen

The axis of the Torngat Orogen is the Tasiuyak domain, which together with the Abloviak shear zone forms the postulated suture zone between the Nain and Rae provinces. The effects of the Torngat deformation on the Nain Province wane eastward through the Komaktorvik zone, where they are intense, to the Foreland zone where they die out. In northernmost Labrador, the Tasiuyak domain and Abloviak shear zone diverge from the Nain Province to enclose the triangular Burwell terrane, the age and origin of which are so far unknown. **Hoffman** (A) suggests that the Burwell terrane may represent an independent province that has been sutured along the Abloviak and Komaktorvik shear zones. **Goulet and Ciesielski** (K), however, propose a correlation between metasedimentary gneisses of the eastern Burwell terrane with the Tasiuyak domain and Lake Harbour Group, implying pretectonic continuity across the Burwell terrane–Rae Province boundary and a possible link with the Superior Province. A gravity transect across this boundary (**Seguin and Goulet**, L) indicates a pronounced high over the western Burwell terrane which is attributed to its higher density.

The fundamental components of the Nain–Rae Province boundary south of the Burwell terrane are the Tasiuyak domain, the Lac Lomier complex (part of the North River domain) and reworked Archean rocks of the Nain craton, which are reviewed by **Ryan** (M),

Ermanovics and Van Kranendonk (N), and **Van Kranendonk and Ermanovics** (O). The Tasiuyak domain is composed predominantly of the distinctive garnetiferous Tasiuyak paragneiss, derived by granulite-facies migmatization of a pelitic-psammitic protolith, and elongate bodies of lineated charnockite. A gravity profile across the Tasiuyak gneiss by T. Feininger (summarized in **Ermanovics and Van Kranendonk**, N) indicates an eastward thickening prism which reaches a maximum thickness of 13 km adjacent to the Nain Province. The Lac Lomier complex (**Ermanovics and Van Kranendonk**, N) consists of Archean orthogneiss intermixed with lower Proterozoic (?) metasedimentary gneiss and charnockite plutons. The latter form a magmatic belt that may represent the roots of a magmatic arc (**Van Kranendonk and Ermanovics**, O) along the western side of the Tasiuyak domain.

All authors are agreed that the Torngat Orogen developed principally through transpressional deformation and sinistral transcurrent shear. **Van Kranendonk and Ermanovics** (N) propose that early transpression was dominated by thrusting, crustal thickening and attainment of peak (granulite-facies) metamorphic conditions, possibly in relation to the attempted subduction of Nain crust under the Rae Province. Subsequent deformation in the interior of the Torngat Orogen was dominated by sinistral shear, possibly coeval with continued thrusting on the margins of the Orogen, which was localized in the Abloviak shear zone. Sinistral shear propagated into the interior of the Rae Province along the subsidiary Falcoz and Moonbase shear zones, interpreted by **Van Kranendonk and Ermanovics** (N) as crustal-scale extensional shears. The Abloviak shear zone is contained largely within the Tasiuyak gneiss, but also affects adjacent rocks of the Nain and Rae provinces. P-T-*t* studies by **Mengel and Rivers** (P) indicate that sinistral shearing took place in an already thickened (possibly doubled) crust, thus lending support to the concept of early thrust-dominated transpression. Although shearing is most intense within the discrete shear zones shown in Figure 2, it is important to point out that all rocks for a distance of about 70 km west of the Abloviak Zone are affected by a pervasive shear fabric and subhorizontal extension lineation. Wardle (1984), working at latitude 59°N, has described a fan of structural attitudes across this broad shear belt, the eastern side of which is marked by west-dipping structures and the western side, by east-dipping shear fabrics. The east-dipping fabrics, which are probably related to west-directed thrusts, may characterize the western boundary of the Torngat Orogen in this area. A narrow belt of dip-lineated ultramylonites, extending along the eastern edge of the Abloviak shear zone and into the Komaktorvik shear zone, is interpreted by **Van Kranendonk and Ermanovics** (N) to mark a late shortening stage during which the Torngat Orogen was exhumed from deeper crustal levels. In the southern part of the Rae/Nain Province boundary is reviewed by **Ermanovics and Ryan** (Q), who conclude that it is probably a suture marked by a zone of low-grade, west-dipping reverse faults. The Rae/Nain boundary at this latitude lacks the transcurrent shearing which is so dominant farther north, but it is not clear whether this is simply the result of exposure at different crustal levels, or has some other cause. **Ermanovics and Ryan** (Q) also review the effects of deformation in the Early Proterozoic Makkovikian Orogen, the trans-Labrador Sea extension of the Ketilidian Mobile Belt of Greenland (Figure 1), along the southern margin of the Hopedale block. The relative chronology of the Makkovikian and Torngat orogenies is crucial to regional tectonic interpretations, but insufficient data exist for detailed comparisons. Deformation in the Makkovik Orogen terminated *ca.* 1.81 Ga; however the age(s) of initial (high-grade) tectonism is unknown.

The chronology of events in the Torngat Orogen has until now been vague; however, U-Pb dates reported by **Bertrand *et al.*** (R) add important new constraints. Intrusion of the Lac Lomier charnockites probably occurred syntectonically *ca.* 1.86 Ga and was followed by a prolonged period of granulite-facies metamorphism, associated with transcurrent shearing in the Abloviak zone, that lasted until *ca.* 1.82 Ga. Late, east-directed thrusting, accompanied by formation of the dip-lineated ultramylonites and injection of granite and pegmatite, persisted until 1.805 Ga and was followed by the closure of monazite *ca.* 1.78 Ga, and hornblende (**Mengel and Rivers**, P) *ca.* 1.75 Ga (Ar-Ar). It is significant that there is little evidence of Archean inheritance in the Tasiuyak gneiss or the charnockites, hinting that these may represent juvenile crustal elements.

Models and Challenges

The early stages of development in the New Québec and Torngat orogens are at present only dimly perceived. **Girard's** (J) description of 2.3 Ga magmatism is intriguing and indicates a previously unsuspected very early event that may be of considerable importance, particularly if it is arc-related. Development of the Rae/Nain province boundary likely involved early westward subduction of the Nain under the Rae Province to produce the Lac Lomier (arc?) complex. The Kuujjuaq (and De Pas?) batholith may similarly record the early convergence of the Superior and Rae provinces. The late convergent history of the eastern Churchill Province is more completely understood and was clearly dominated by oblique convergence and collision in an overall transpressional environment. **Hoffman** (A) and **Girard** (S) emphasize the mirror-image symmetry of the two orogens in which the west-directed thrusting and dextral shearing of the New Québec Orogen are reflected in the east-directed thrusts and sinistral shear pattern of the Torngat Orogen. The sigmoidal shear-lozenge pattern that dominates the Torngat Orogen and the eastern Rae Province is one of the more obvious effects of this transpression. **Hoffman** (A), using an analogy with the India/Asia collision, has modelled the development of the eastern Churchill Province as the result of northward indentation of the Superior Province into a northern Churchill hinterland, followed by oblique collision and accretion of the Burwell and Nain provinces. This model provides testable predictions that will challenge geologists working in the eastern Shield for years to come.

In the final contribution, **Bridgwater *et al.*** summarize the eastern Nagssugtoqidian Mobile Belt of Greenland; a trans-Labrador Sea analogue of the eastern Churchill Province that provides a connection with the Baltic Shield.

It was obvious from the animated discussions at the Wakefield meeting that work in the eastern Churchill Province has reached an exciting and crucial stage. Sufficient data are now available to support general working models; however, much remains to be done before these can be verified, and many surprises are undoubtedly in store. It is perhaps fitting to end this overview with a summary of the major challenges that lie ahead. The most important requirement is obviously for more regional mapping in the area south and east of Ungava Bay. The Burwell terrane/province is a key element in the reconstruction of the Churchill Province in this region and must be investigated in more detail. In the Torngat Orogen, the Abloviak shear zone provides what may be the type example of a transform plate boundary exposed at lower crustal depth. The coincidence of the Tasiuyak gneiss and Abloviak shear zone in this context has to be explained; for example, is the gneiss the root of an accretionary complex? The dramatic north to south change in character of the Torngat Orogen also requires further investigation: is this transition simply an apparent one due to the exposure of higher crustal levels to the south, or is there a fundamental change in tectonic environment?

In the New Québec Orogen, priority needs to be given to establishing the location of the suture with the Rae Province, and to delineating the full extent of the Kuujjuaq batholith. With regard to the Rae Province, it is essential to establish its parentage; is it a rifted fragment of the Nain or Superior provinces, or an independent plate? In this respect, the detailed crustal-age model provided by **Schiøtte *et al.*** (B) will provide a powerful tool for testing potential comparisons with the Nain Province. Finally, it is obvious that throughout the eastern Churchill Province there is an urgent need for greatly expanded geochronological studies.

The eastern Churchill Province is a unique and superb example of a two-sided, Early Proterozoic orogen that is exposed in complete coastal cross-section. With sufficient commitment, there is, therefore, no reason why these challenges cannot be overcome in the years ahead.

Acknowledgements

We are indebted to the participants of the Wakefield conference for their hard work and enthusiasm, and to the authors who have contributed their ideas and support to this special issue. Normand Goulet is thanked for editing the French-language articles; our thanks as a group are extended to the editorial staff of *Geoscience Canada* for their offer to publish the proceedings of the Wakefield conference. Todd Leawood, Joanne Matthews, Ken Byrne and Tony Paltanavage of the Newfoundland Geological Survey Branch provided invaluable assistance in the initial preparation and editing of this issue. Finally, we acknowledge our debt to Fred Taylor, whose pioneering mapping stimulated many of our ideas and continues to provide the background for much of our work. Newfoundland Geological Survey Branch Contribution No. 90-01.

References

[Note: bold references in the text are listed in the caption to Figure 2.]

Dimroth, E., 1972, The Labrador Geosyncline revisited: American Journal of Science, v. 272, p. 487-506.

Hoffman, P.F., 1987, Early Proterozoic foredeeps, foredeep magmatism and Superior-type iron formations of the Canadian shield, *in* Kröner, A., ed., Proterozoic Lithospheric Evolution: American Geophysical Union, Geodynamic Series, v. 17, p. 85-98.

Hoffman, P.F., 1988, United plates of America, the birth of a craton: Early Proterozoic assembly and growth of Laurentia: Annual Reviews of Earth and Planetary Sciences, v. 16, p. 543-603.

Hoffman, P.F., 1990, Subdivision of the Churchill Province and extent of the Trans-Hudson Orogen, *in* Lewry, J.F. and Stauffer, M.R., eds., The Early Proterozoic Trans-Hudson Orogen of North America: Geological Association of Canada, Special Paper 37, p. 15-38.

Lewry, J.F. and Stauffer, M.R., 1990, eds., The Early Proterozoic Trans-Hudson Orogen of North America: Geological Association of Canada, Special Paper 37, 512 p.

LITHOPROBE, 1990, LITHOPROBE Phase III Proposal, the Evolution of a Continent: document submitted to National Sciences and Research Council of Canada, p. 3-55–3-69.

Lucas, S.B., Picard, C. and St-Onge, M.R., 1989, Tectonic, magmatic and metallogenic evolution of the Early Proterozoic Cape Smith Thrust Belt: Preface: Geoscience Canada, v. 16, p. 117-118.

Machado, N., 1990, Timing of major tectonic eve in the Ungava segment of the Trans-Hud Orogen, *in* Recent Advances in the geolog the eastern Churchill Province (New Qué and Torngat orogens), Abstracts, Wakef Conference, Québec, p. 11.

Machado, N., Goulet, N. and Gariépy, C., 19 U-Pb geochronology of reactivated Arch basement and of Hudsonian metamorphisr the northern Labrador Trough: Canadian J nal of Earth Sciences, v. 26, p. 1-15.

Mortenson, J.K. and Percival, J.A., 1987, Rec naissance U-Pb zircon and monazite geoc nology of the Lac Clairambault area, Ashua Complex, Québec, *in* Radiogenic Age and topic Studies: Report 1: Geological Surve Canada, Paper 87-2, p. 135-142.

Taylor, F.C., 1979, Reconnaissance geology part of the Precambrian Shield, northeas Québec, northern Labrador and Northwest ritories: Geological Survey of Canada, Mer 393, 99 p.

van der Leeden, J., Bélanger, M., Danis, D., Gir R. and Martelain, J., 1990, Lithotectonic mains in the high-grade terrain east of the brador Trough (Québec), *in* Lewry, J.F. Stauffer, M.R., eds., The Early Protero: Trans-Hudson Orogen of North America: G logical Association of Canada, Special Pa 37, p. 371-386.

Wardle, R.J., 1984, Nain–Churchill Province cro section: Rivière Baudancourt–Nachvak L *in* Current Research: Newfoundland Dep ment of Mines and Energy, Mineral Deve ment Division, Report 84-1, p. 1-11.

Wardle, R.J., Ryan, B., Nunn, G.A.G. and Men F.C., 1990, Labrador segment of the Trans-H son Orogen: crustal development through lique convergence and collision, *in* Lewry, and Stauffer, M.R., eds., The Early Protero: Trans-Hudson Orogen of North America: G logical Association of Canada, Special Pa 37, p. 353-370.

Accepted, as received, 11 December 19

"The eastern Churchill Province, Torngat and New Quebec orogens"

Reprints of these articles are available as a bound set only. Inquiries should be directed to:

R.J. Wardle
Geological Survey Branch
Newfoundland Department of
Mines and Energy
P.O. Box 8700
St. John's, Newfoundland A1B 4J6

Appendix 2

MODELE DE MISE EN PLACE DE KIMBERLITES DIAMANTIFERES DANS LES MONTS TORNGAT, NOUVEAU QUEBEC.

Digonnet, Stéphane, Goulet, Normand, Bourne, James et Stevenson, Ross. Université du Québec à Montréal.

Des dykes ultramafiques ont été identifiés dans la partie orientale de la baie d'Ungava lors d'une campagne de cartographie durant l'été 1991. Le premier objectif de la maîtrise qui en découla était d'identifier, de classifier et d'évaluer le potentiel économique de ces roches. Par la suite, une cartographie détaillée du fjord d'Abloviak, effectuée au cours de l'été 1994, ainsi que l'interprétation de photographies aériennes ont permis de comprendre les phénomènes tectoniques à l'origine de ces intrusions.

Ces dykes sont composés de macrocristaux d'olivine (Fo_{78}-Fo_{88}), fréquemment serpentinisés, et de phlogopite qui présentent des bordures de tétraferriphlogopite (appauvries en TiO_2 et Al_2O_3 et enrichies en FeO et MgO). Ces minéraux sont inclus dans une matrice gris sombre à grains fins composée de phlogopites, d'olivines, de spinelles (Ti-Mg chromites, Mg-Al chromites et Ti-Mg magnétites), de pérovskites et de carbonates interstitiels. L'analyses des xénolites (pyrope et diopside), la signature isotopique (Sm-Nd), la composition géochimique, l'assemblage minéralogique et la découverte d'un macrodiamant de qualité gemme a permis de classer ces roches comme kimberlites à phlogopites hypabyssales du groupe I. La zonation des micas et la présence de grenats de type andradite (schorlomites) suggèrent une complexité de cristallisation, soit dans deux environnements géochimiques différents.

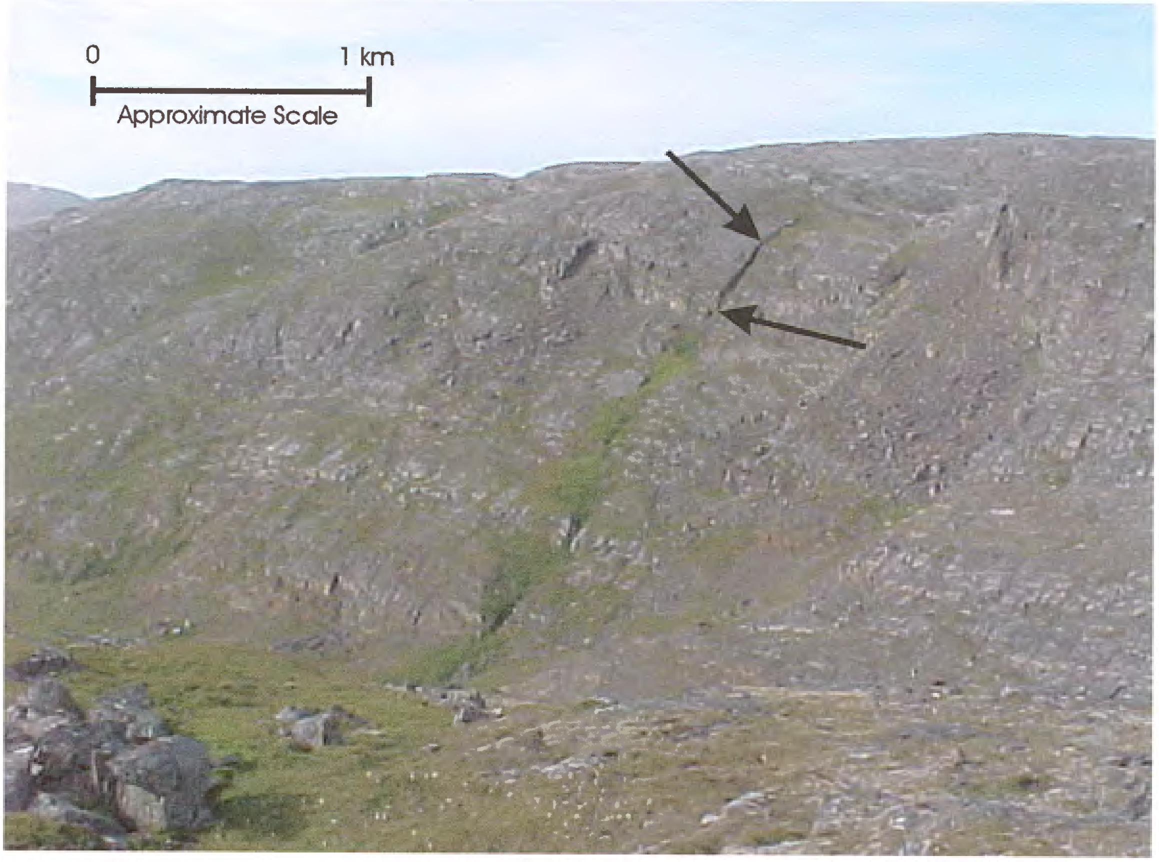
Ces kimberlites se sont mises en place dans les gneiss de Tasiuyak qui correspondent à des métasédiments à quartz, biotite, grenat, plagioclase, sillimanite et rutile d'âge Paléoprotérozoïque, de faciès amphibolite à granulite. Cette unité occupe la zone de contact tectonique entre la Province du Rae au sud-ouest et la Province du Nain à l'est. Elle est traversée par la zone de cisaillement d'Abloviak, une fracture régionale majeure de composante senestre, orientée nord-sud puis est-ouest dans mon secteur d'étude. Ces intrusions se sont mises en place au cours du Cambrien. Des datations suivant la méthode Ar/Ar sur phlogopites, effectuées en collaboration avec D. H. Archibald (Queen's), ont donné des âges de 544±12 Ma. L'orientation de ces dykes (N030-060) et des fractures tardives semblent correspondre à un système de Riedel associé à un mouvement cisaillant senestre. Le magma se serait donc mis en place à l'intérieur de fentes de tension associées à ce système durant la réactivation des structures majeures et des fractures associées lors de l'ouverture de l'océan Iapétus entre 620 et 550 Ma. C'est certainement le même superplume mantellique qui a à la fois provoqué la rupture du continent Laurentia et qui a entraîné l'intrusion de matériel ultramafique. La présence d'une ancienne zone de subduction (le Rae ayant glissé sous la plaque du Nain entre 1910 et 1869 Ma) sous une chaîne d'obduction (l'Orogène des Torngat) laisse planer un doute sur l'origine des diamants tout en sachant que le magma provient d'une source appauvrie (εNd=+8.2 sur pyrope), donc de grande profondeur.

Les caractéristiques géochimiques et minéralogiques, l'environnement géologique (au voisinage de zones de cisaillement de Ikertooq et de Itilleq), les âges des dykes de kimberlite d'Holsteinsborg et de Sukkertoppen, sud-ouest groenlandais, montrent une grande similitude avec les kimberlites d'Abloviak. De plus, leur proximité géographique avant l'ouverture de la mer du Labrador nous pousse à les associer au même événement magmatique.

La découverte de kimberlites, présentant un potentiel économique certain, dans le secteur d'Abloviak nous permet de définir une province kimberlitique de grande échelle, au sein de zones orogéniques entre des cratons Archéens et à proximité de zones de cisaillement majeures, s'étendant du nord-est québécois, du nord du Labrador jusqu'au sud-ouest groenlandais.

APPENDIX 2

PHOTOS



K11 Dyke (shown by arrows). View looking Northwest.

K6 Dyke (geologist for scale). View looking South.

APPENDIX 3

SAMPLE LOCATIONS

APPENDIX 3

SAMPLE LOCATIONS

Sample Identifier*	Location		Dyke	Description
	Easting	Northing	Name	
DNI-01	398245	6581408	K16	Fresh olivine. Pyroxene +/-garnet, magnetite, carbonate in matrix, phlogopite.
DNI-02	388941	6585281	K1	Fresh olivine 2 cm with kelyphite rimming. Fine grained matrix with phlogopite. Chromite up to 1cm. Minor amounts of carbonate in the matrix. Pyroxene present. Moderately magnetic.
DNI-03	389889	6580707	K5	Micaceous. Carbonate veins. Trace amounts of olivine.
DNI-04	388336	6580950	K7	10% matrix carbonate in a fine grained blue-grey mafic matrix. 10% matrix carbonate, calcite veining. Evidence of flow banding. Moderate to weakly magnetic. Grey-brown weathering.
DNI-05	388790	6580365	K6	Altered garnet. Chromite macrocrysts present. Up to 2% pyrite. Brecciated. Moderately magnetic. Altered olivine. Pyroxene present. Orange weathered surface.
DNI-06	387109	6582383	K4	30% fine grained phlogopite. 10% Altered olivine. 15% pyroxene. Some small xenoliths of country rock. Brown-green weathering. Carbonate veining.
DNI-07	387018	6582547	K3	Micaceous. Carbonate in the matrix. Altered olivine. Medium to coarse grained. Up to 30% phlogopite 2mm in size.
DNI-08	389251	6585198	K18	Fresh and altered olivine. Undetermined altered phenocrysts with rims comprised mostly of phlogopite. Fine grained micaceous matrix. Occasional chromite. Trace amounts of matrix carbonate and pyroxene. Weakly magnetic.
DNI-09	396748	6583052	K8	Micaceous. Magnetic. Evidence of flow banding. Phlogopite and pyroxene phenocrysts. No clasts or nodules. Carbonate in matrix.
DNI-10	386034	6574088	K10	Coarse grained phlogopite ~0.5cm. Abundant pyroxene, 1cm. No carbonate. Weakly magnetic. Green blue matrix, serpentine? No garnet.
DNI-11	383866	6571918	K11	Micaceous dyke in steep crevase. Magnetic. Approximately 1m wide. Carbonate in matrix. Some altered olivine.
DNI-16	401156	6585030	K20	Medium grained, blue-grey matrix. No matrix carbonate. 30% matrix phlogopite, calcite nodules up to 7mm. Pyroxene xenocrysts approximately 2mm. Weathers green-grey and dark brown grey. No evidence of garnet or olivine. Width ranges from 0.5m to 1.5m along strike. Chilled margins and stringers into country rock easily visible.
DNI-17	392341	6573238	K25	Coarse grained phlogopite abundant. Dyke is approximately 2-3 m in width. Abundant outcrop available. Some minerals altered to serpentine. Moderately magnetic. Weathered out clasts on surface of outcrop. Strike ranges from 5 to 30°.
DNI-18	389970	6575570	K23	Altered 1cm olivine (to serpentine). Well-rounded magnetite nodules up to 7mm in diameter. Strongly magnetic. Large phlogopite megacrysts as well as groundmass phlogopite. N-S striking.
DNI-19	386053	6575551	K27	Very micaceous. Dyke approximately 1m in width. Moderately magnetic. <5% calcite in matrix. Abundant pyroxene. Strike approximately 10°.
DNI-20	387839	6579365	K22	Outcrop is scarce. Moderately magnetic. Weathered out nodules on surface. 10-15% altered olivine. Abundant phlogopite medium grained 20%. 10% calcite in matrix. 60° strike direction.
MMU-01	397262	6583882	K9	Moderately magnetic. Fine grained at contact. Calcite veins and stringers, 10-15% matrix carbonate. 30% coarse grained phlogopite. No weathered-out clasts. Some brecciation seen.
MMU-02	396318	6584120	K15	Very micaceous. Strongly magnetic. Minor matrix carbonate. Few nodules. Veins cutting through country rock. Ranges from coarse grained to very fine grained chilled margins.
NS	398601	6581537	K17	Not sampled as it is believed to be a splay off of K16 and is discontinuous.
NS	388937	6578500	K21	Not sampled due to snow cover.
NS	387038	6575560	K24	Not sampled as it is believed to be an extension from K10 and also due to lack of material.

*Note: at each sample site a sample was also collected for DIM's and one for thin section work.
NS=not sampled.

APPENDIX 4

MICROPROBE ANALYSES

APPENDIX 4

MICROPOROBE ANALYSES

Microprobe analyses for phlogopite from K9

	Phlogopite									
	1	2 (core)	2 (inter)	2 (rim)	5 (core)	5 (dark)	5 (inter)	5 (rim)	10 (core)	10 (rim)
SIO2	37.65	37.14	37.74	39.06	38.29	40.32	38.86	39.88	37.73	37.05
TIO2	3.96	4.67	4.01	2.03	2.46	1.09	2.31	0.57	3.82	4.13
AL2O3	13.36	15.29	14.27	13.39	11.26	12.13	11.46	11.59	14.48	14.74
CR2O3	0.17	0.08	0.05	0.08	0.05	0.09	0.02	0.01	0.08	0.08
FEO	7.92	8.82	7.22	6.85	9.44	7.10	9.36	6.44	7.23	6.39
MGO	21.65	19.48	22.05	23.04	22.07	24.50	22.35	25.03	22.15	21.68
MNO	0.02	0.03	0.09	0.18	0.14	0.11	0.15	0.12	0.06	0.05
CAO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BAO	0.26	0.58	0.65	0.52	0.66	0.49	0.54	0.43	0.69	0.93
K20	8.33	9.06	9.46	9.41	9.26	9.56	9.37	9.72	9.33	9.41
NA2O	0.36	0.53	0.46	0.39	0.37	0.36	0.34	0.25	0.40	0.36
F	0.57	0.64	0.60	0.64	0.67	0.72	0.61	0.78	0.57	0.52
CL	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	94.25	96.33	96.60	95.59	94.67	96.47	95.37	94.82	96.54	95.34
O=F+CL	0.24	0.27	0.25	0.27	0.28	0.30	0.26	0.33	0.24	0.22
TOTAL	94.01	96.06	96.35	95.32	94.39	96.17	95.11	94.49	96.30	95.12

	Phlogopite cont'd				
	11	15	18	21	24
SIO2	37.67	37.46	37.58	37.39	37.10
TIO2	3.97	4.18	5.09	4.29	4.23
AL2O3	14.16	14.07	14.03	14.19	14.95
CR2O3	0.12	0.05	0.08	0.05	0.03
FEO	6.94	7.49	8.09	7.19	6.83
MGO	21.74	21.52	20.41	21.58	21.46
MNO	0.02	0.09	0.06	0.06	0.07
CAO	0.00	0.00	0.00	0.00	0.00
BAO	0.59	0.49	0.69	0.61	0.89
K20	9.50	9.35	8.99	9.24	9.28
NA2O	0.41	0.45	0.46	0.36	0.32
F	0.64	0.55	0.59	0.57	0.64
CL					
TOTAL	95.76	95.70	96.07	95.53	95.80
O=F+CL	0.27	0.23	0.25	0.24	0.27
TOTAL	95.49	95.47	95.82	95.29	95.53

inter-intermediate; dark-dark portion of grain

Microprobe analyses of diamond indicator minerals from K15

	Ilmenite	Cr-diopside		Chromite						
	1	1	2	1	2	3	4	5	6	7
SIO2	0.00	54.36	54.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TIO2	46.78	0.18	0.11	0.08	0.16	0.08	0.00	0.05	0.10	0.18
AL2O3	0.51	2.19	1.90	29.82	28.00	29.28	24.86	29.63	29.57	27.60
CR2O3	0.54	1.65	1.60	39.84	41.84	41.26	45.49	39.99	39.49	41.33
FEO	40.64	2.00	2.14	15.21	16.93	15.64	15.74	16.29	15.85	17.19
MNO	0.28	0.06	0.06	0.30	0.37	0.25	0.34	0.36	0.25	0.32
MGO	9.12	16.50	16.64	14.88	13.10	13.93	13.93	13.83	14.35	12.82
CAO	N/A	21.00	21.22	N/A	N/A	N/A	N/A	N/A	N/A	N/A
K2O	N/A	0.03	0.02	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NA2O	N/A	1.82	1.69	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ZNO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NIO	0.13	N/A	N/A	0.21	0.14	0.13	0.14	0.10	0.08	0.15
NB2O5	0.26	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL	98.26	99.79	100.02	100.34	100.54	100.57	100.50	100.25	99.69	99.59

	Phlogopite									
	1 (core)	1 (rim)	5 (basal)	5 (dark)	7 (core)	7 (dark)	10 (basal)	10 (inter)	10	10 (core)
SIO2	37.20	37.42	37.17	37.55	37.74	36.63	37.34	37.06	37.13	37.13
TIO2	5.55	5.07	5.23	4.77	4.80	4.70	5.20	5.21	4.98	2.99
AL2O3	12.95	13.48	13.49	13.48	13.58	13.37	13.06	13.40	13.83	11.22
CR2O3	0.08	0.13	0.10	0.14	0.20	0.28	0.12	0.13	0.15	0.10
FEO	7.92	7.79	7.40	7.63	7.91	7.83	7.71	7.49	7.97	14.49
MGO	20.67	21.23	21.13	20.92	20.25	20.04	21.00	21.29	21.20	18.55
MNO	0.05	0.04	0.04	0.09	0.04	0.03	0.09	0.01	0.00	0.19
CAO	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
BAO	0.51	0.45	0.52	0.44	0.42	0.38	0.40	0.54	0.39	0.58
K20	9.48	9.31	9.44	9.36	9.29	9.58	9.42	9.17	9.27	8.30
NA2O	0.47	0.35	0.41	0.37	0.46	0.41	0.40	0.36	0.44	0.38
F	1.02	1.08	1.02	0.98	0.81	0.65	0.95	0.92	1.08	1.47
CL	0.01	0.00	0.00	0.00	0.00	0.02	0.01	0.01	0.00	0.01
-	95.91	96.36	95.95	95.73	95.50	93.92	95.70	95.59	96.44	95.43
O=F+CL	0.43	0.45	0.43	0.41	0.34	0.28	0.40	0.39	0.45	0.62
TOTAL	95.48	95.91	95.52	95.32	95.16	93.64	95.30	95.20	95.99	94.81

basal=basal section
dark=dark portion of grain
inter=intermediate
N/A=not analysed

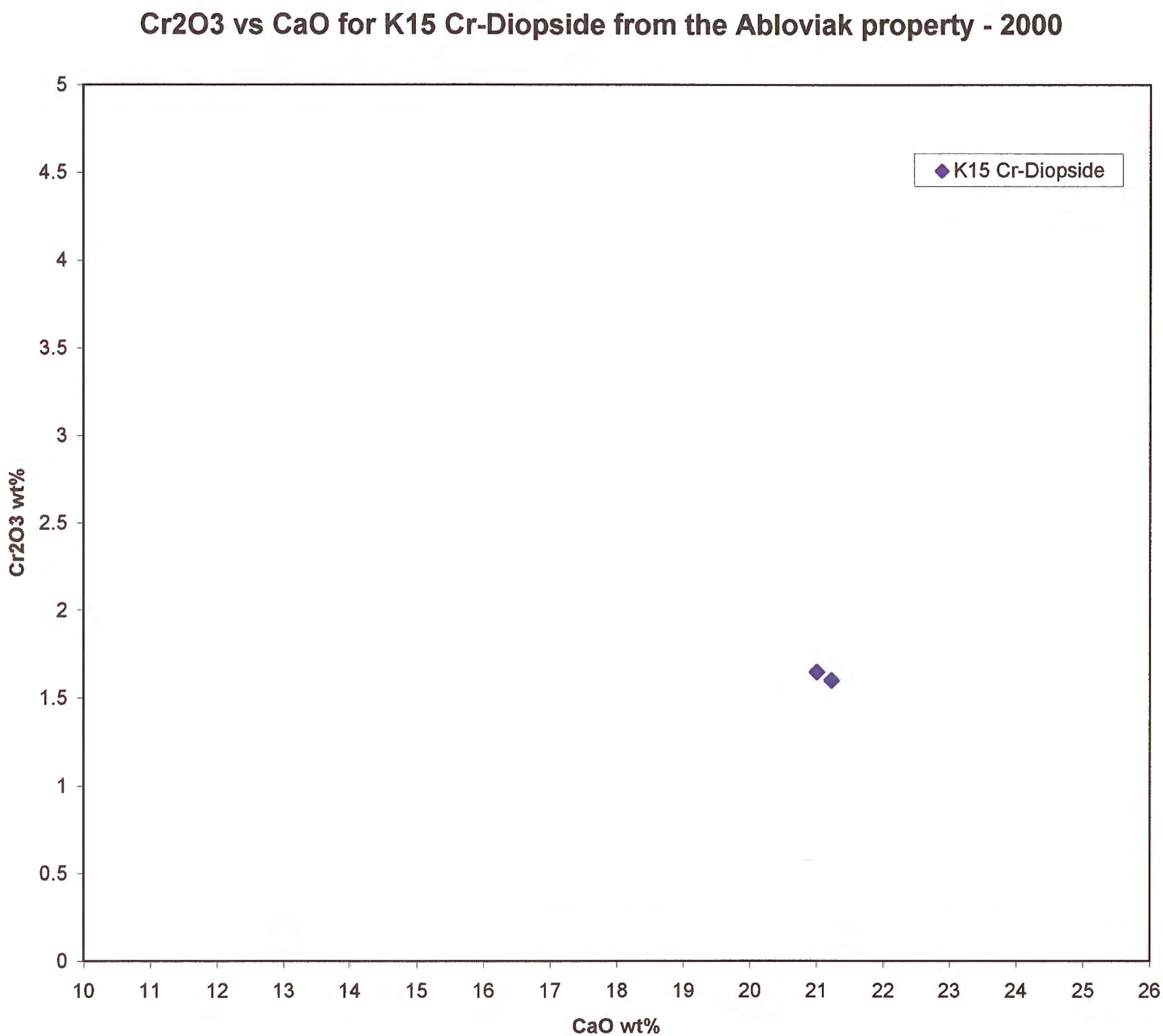
Microprobe analyses for K15 cont'd

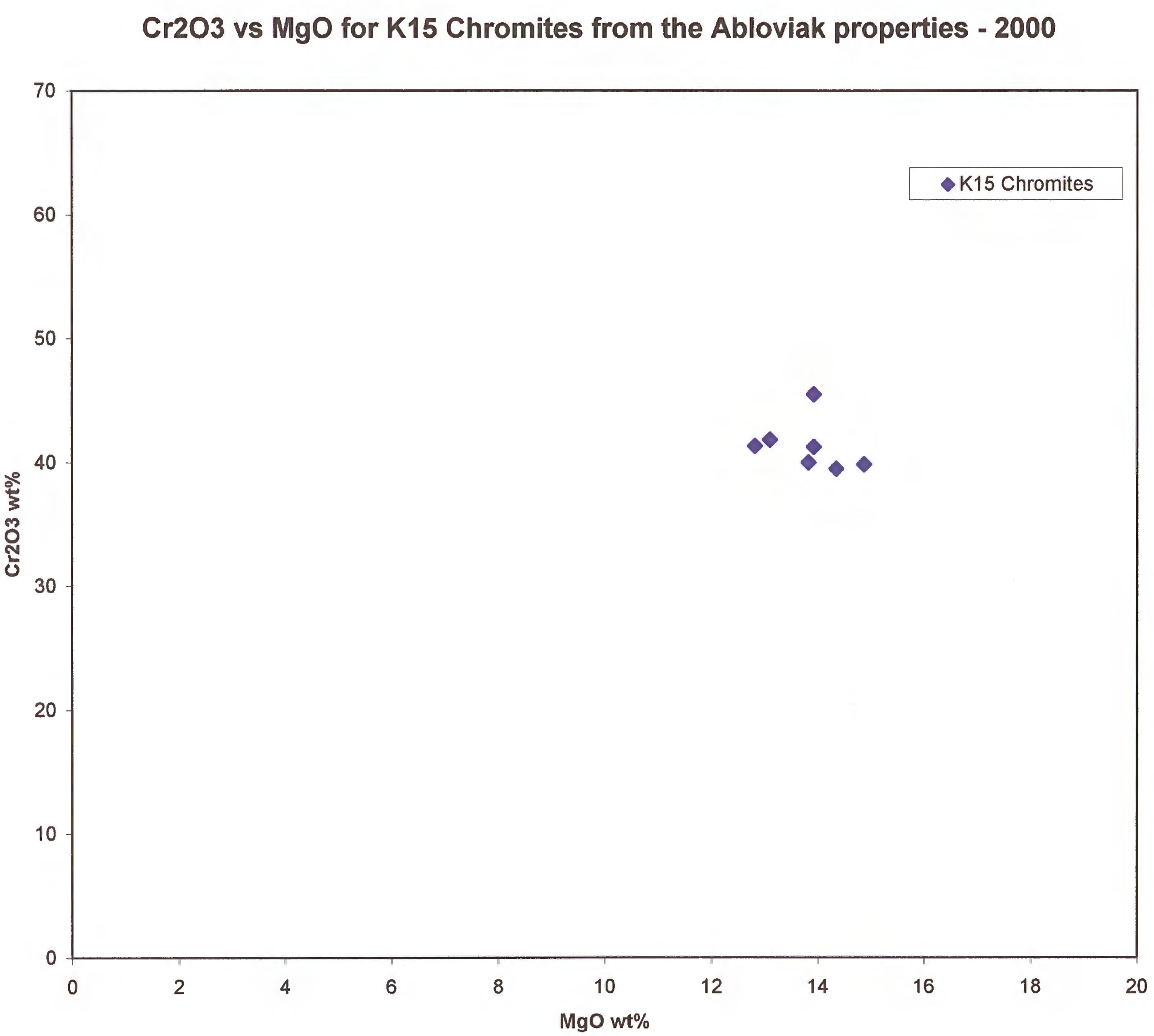
	Phlogopite					
	10 (rim)	13 (core)	13 (inter)	13	19	25
SIO2	36.50	38.08	37.68	37.67	37.13	37.54
TIO2	3.42	5.24	4.77	3.40	4.93	5.06
AL2O3	10.80	13.32	13.54	11.56	13.23	13.17
CR2O3	0.12	0.20	0.11	0.05	0.12	0.09
FEO	20.66	8.10	7.73	12.86	7.32	7.54
MGO	13.61	20.34	21.05	18.03	20.69	21.03
MNO	0.25	0.05	0.04	0.24	0.06	0.03
CAO	0.01	0.00	0.00	0.00	0.00	0.01
BAO	0.72	0.47	0.49	0.75	0.39	0.57
K20	9.14	9.19	9.36	9.01	9.29	9.42
NA2O	0.30	0.49	0.36	0.38	0.43	0.42
F	1.26	0.88	0.96	1.51	0.91	0.91
CL	0.00	0.01	0.01	0.01	0.01	0.00
TOTAL	96.79	96.37	96.10	95.47	94.51	95.79
O=F+CL	0.53	0.37	0.41	0.64	0.39	0.38
TOTAL	96.26	96.00	95.69	94.83	94.12	95.41

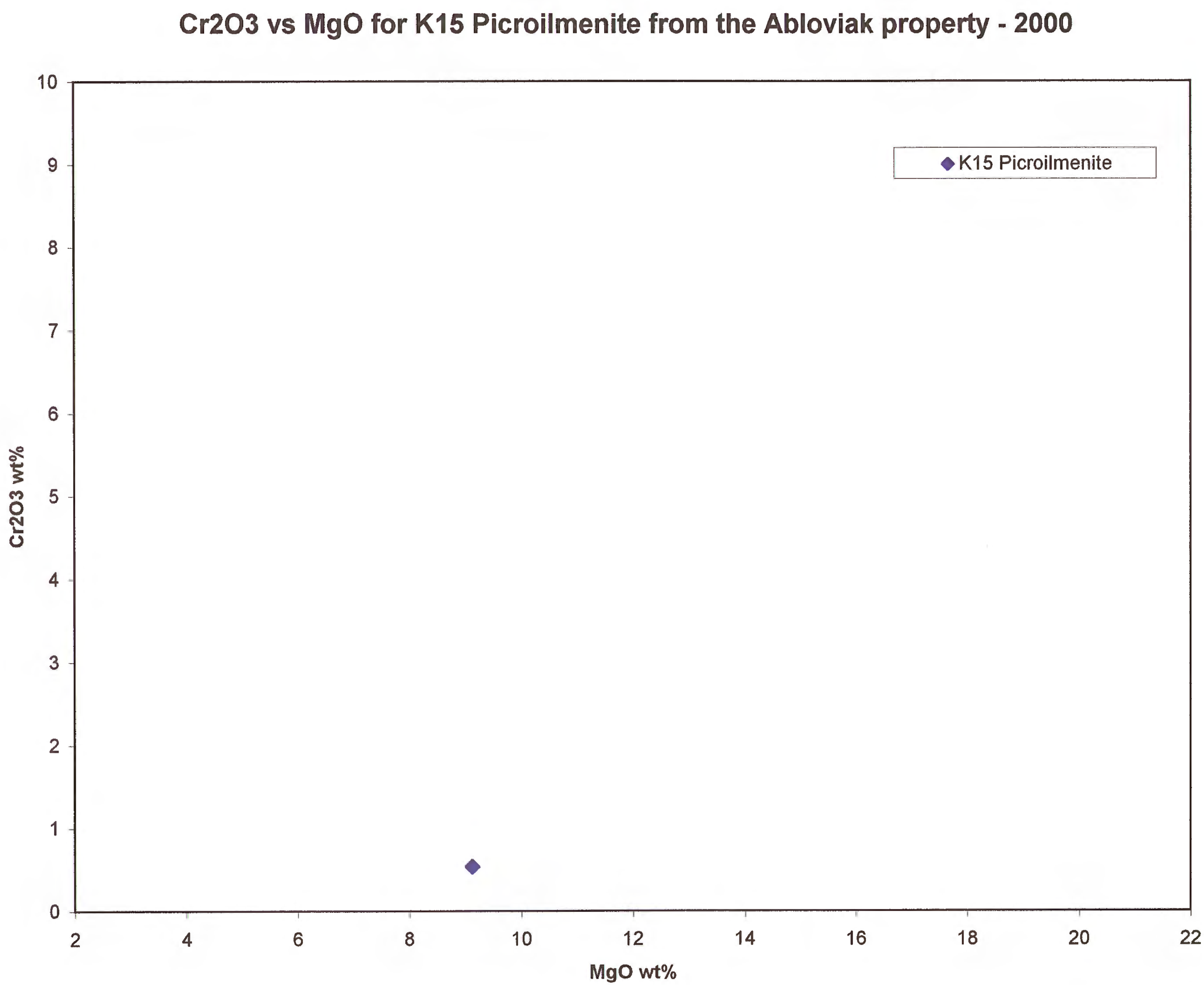
inter-intermediate

APPENDIX 5

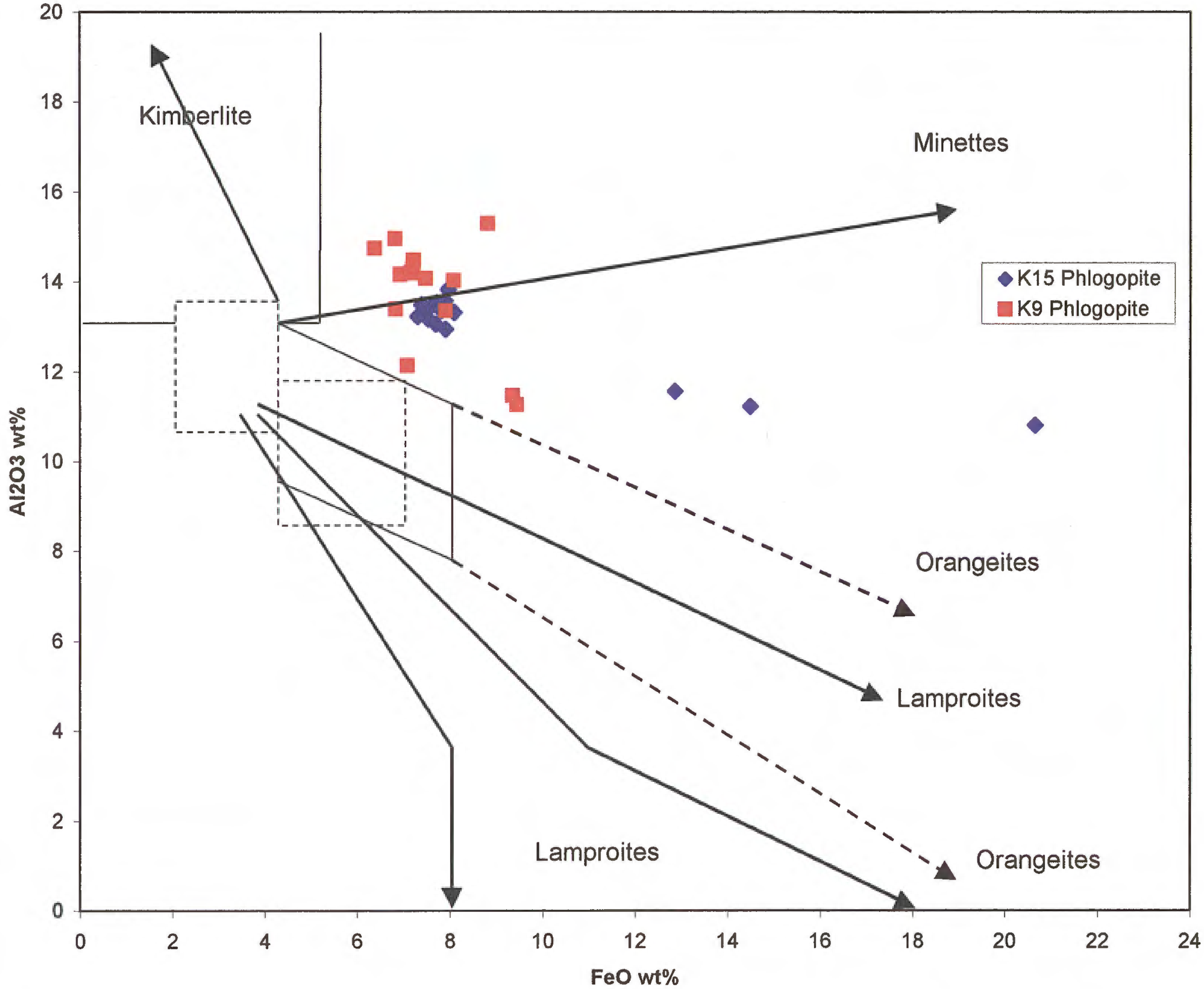
CHEMISTRY PLOTS


Cr2O3 vs CaO for K15 Cr-Diopside from the Abloviak property - 2000
K15 Cr-Diopside
Cr2O3 wt%
CaO wt%
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26

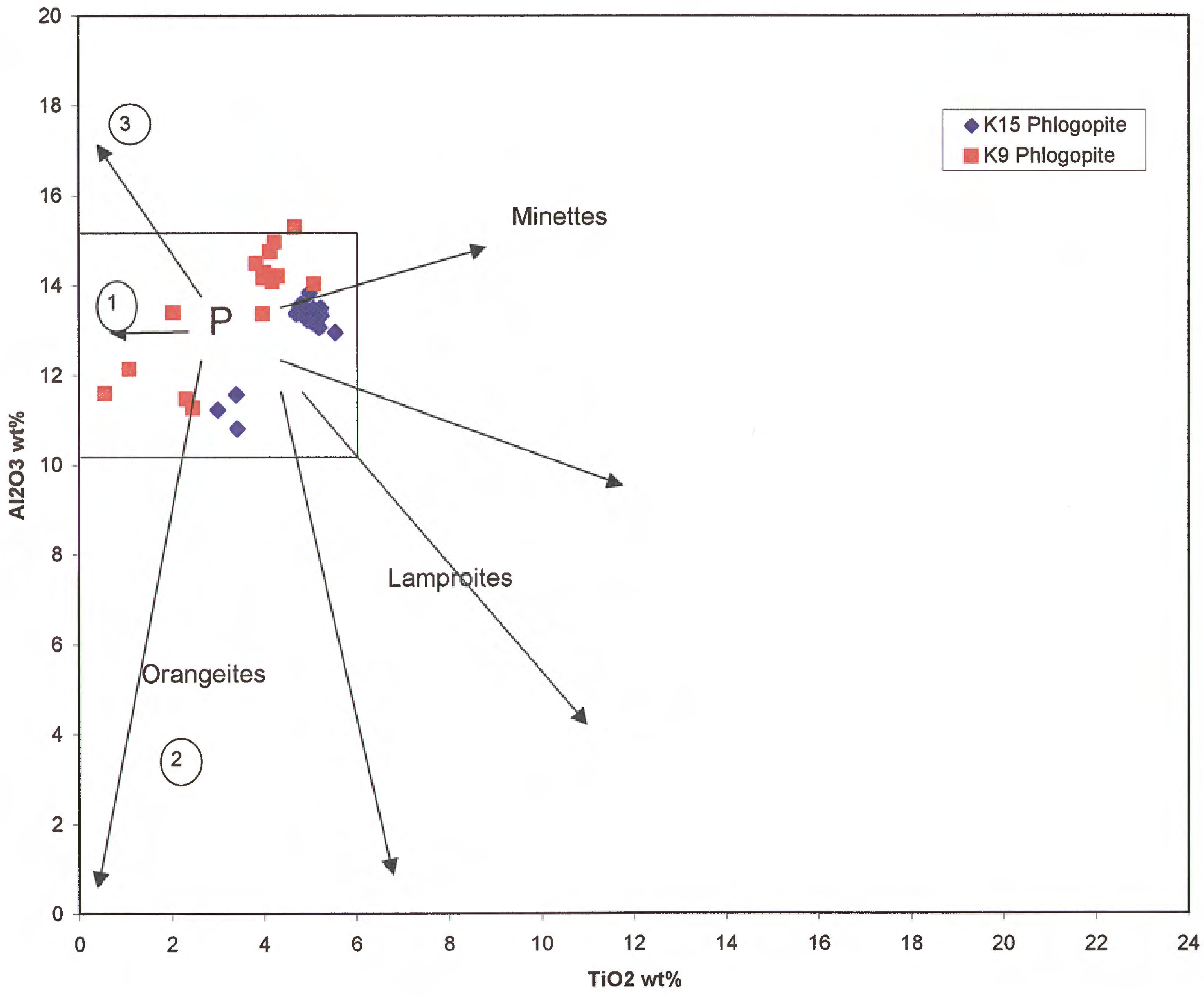

Cr2O3 vs MgO for K15 Chromites from the Abloviak properties - 2000
K15 Chromites
Cr2O3 wt%
MgO wt%
0
10
20
30
40
50
60
70
0
2
4
6
8
10
12
14
16
18
20


Cr2O3 vs MgO for K15 Picroilmenite from the Abloviak property - 2000
K15 Picroilmenite
Cr2O3 wt%
MgO wt%
0
1
2
3
4
5
6
7
8
9
10
2
4
6
8
10
12
14
16
18
20
22

Al2O3 vs FeO for K9 and K15 Phlogopite from the Abloviak property - 2000



Al2O3 vs TiO2 for K9 and K15 Phlogopite from the Abloviak property - 2000



APPENDIX 6

EXPLORATION EXPENDITURES

APPENDIX 7

PROPOSED BUDGET

APPENDIX 7

PROPOSED BUDGET

BUDGET ITEM	ESTIMATED COST
FIELD RELATED COSTS	
Stage 1 – Analyse Existing Samples and Reporting Includes caustic fusion, thin section and diamond indicator mineral processing on samples collected during August/September 2000. Geophysical leveling and interpretation of the existing geophysical data.	$125,000
Stage 2 – 2001 Field Work Assumes about 115 hours of helicopter (Bell Long Ranger) per day @ about $785/hour and fuel consumption of about 1 drum (205 L) per hour at $800 / barrel landed. Also assumes camp accommodation for eight persons for 60 days at $300/day/ person. Assumes a provision for bags, flagging, plastic pails and field gear etc.	$420,000
Stage 3 – Mini-Bulk Sampling and Purchasing DMS Plant Assumes a DMS plant is either purchased or leased and delivered to the Abloviak Fjord area. As well, assumes processing about 50 tonnes of material or 5 mini-bulk samples. Assumes a small blasting, drilling and processing plant crew will be mobilized to the area etc.	$935,000
Miscellaneous Expenses (a) Includes miscellaneous rental charges, satellite telephone, courier, administration, shipping, office supplies etc.	$20,000
Total Estimated Project Costs (Excluding GST, QST)**	**$1,500,000****