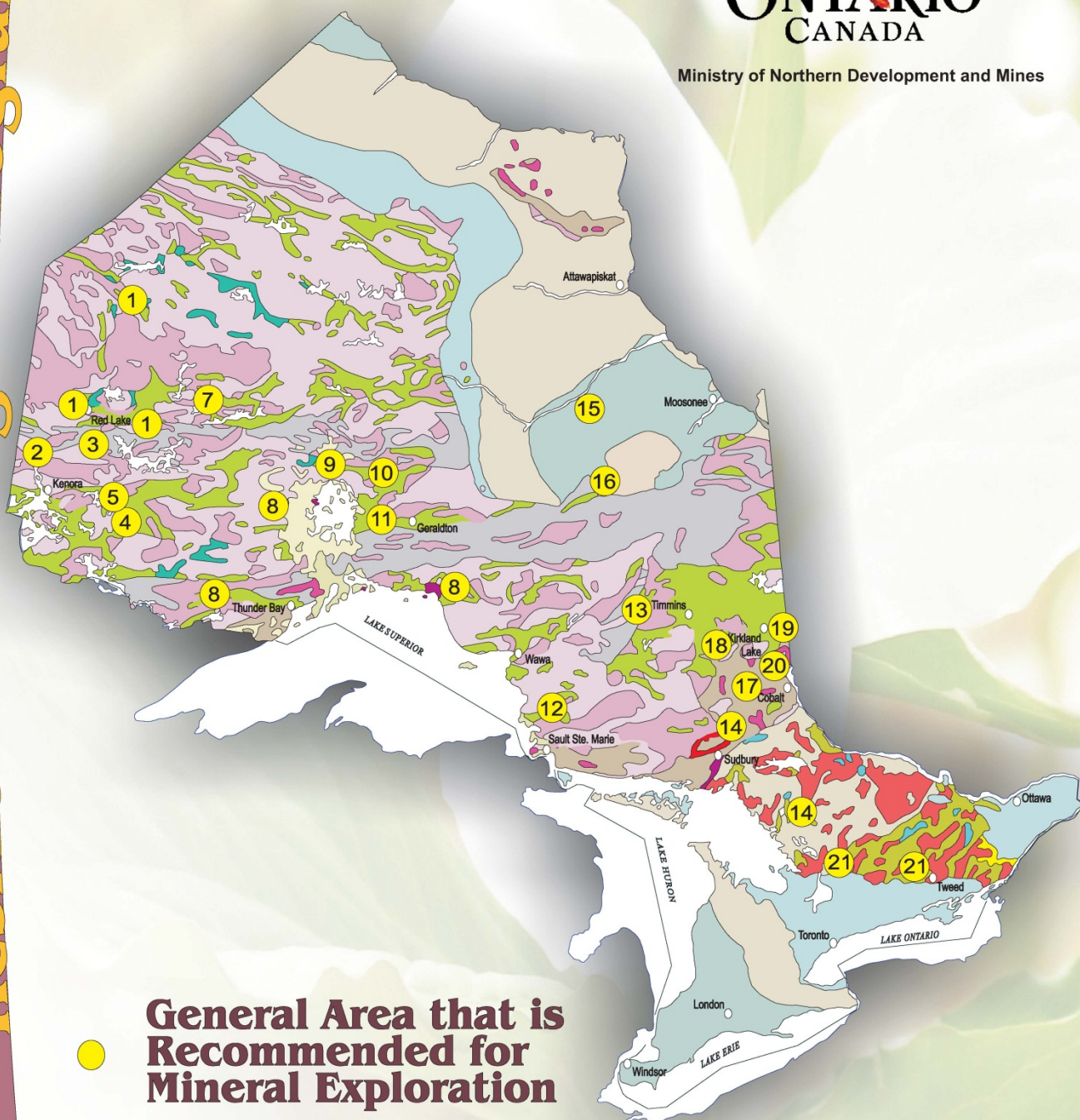


Ontario Geological Survey Resident Geologist Program

Explore the Opportunities Recommendations for Exploration 2006-2007

ONTARIO
CANADA

Ministry of Northern Development and Mines



The Ontario Resident Geologist's Program


The role of the Ontario Geological Survey's Resident Geologist Program is to monitor, stimulate and facilitate mineral exploration and support the sustainable development and stewardship of Ontario's mineral resources. The program is provincial in scope, forms the primary client service component of the Ontario Geological Survey and operates with a staff complement of 40 through a network of 10 field offices strategically located across the province. Six Regional Resident Geologists, supported by District Geologists, 10 District and Regional Support Geologists provide a variety of services to mineral industry clients as well as functions internal to government that support the mineral resource sector. The Program's Land Use Policy and Planning Co-ordinator and 3 Regional Land Use Geologists provide input into land use planning issues in support of the mineral exploration industry.

Program services and functions are grouped into the following 7 key areas:

- **Provide expert geological consultation and advisory services to promote and stimulate mineral exploration and support the development and stewardship of Ontario's mineral resources in an environmentally responsible manner**
- **Generate and transfer new geoscientific data and ideas**
- **Maintain and provide public access to geoscience databases/other resource materials**
- **Monitor and report on mineral exploration and development activity**
- **Provide input into land use planning issues and initiatives to support the stewardship of Ontario's mineral resources**
- **Foster relationships amongst government, the mineral sector and Aboriginal communities**
- **Participate in marketing forums to promote Ontario's mineral endowment and attract mineral resource investment to the province**

The Resident Geologist Program also provides support to MNDM's Mining Lands Section front-counter client services.

The Senior Manager for the Resident Geologist Program is Johial Newsome. Mr. Newsome and the Resident Geologist Program's headquarters are based in Sudbury.

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For additional information on the Resident Geologist Program and the Ontario Geological Survey please log on to: http://www.mndm.gov.on.ca/mndm/mines/resgeol/default_e.asp

2006-2007 RECOMMENDATIONS FOR MINERAL EXPLORATION—ONTARIO

1) RECOMMENDATIONS FOR EXPLORATION IN THE RED LAKE DISTRICT

Gold

Recent significant gold discoveries in the heart of the Red Lake camp by Sabina Silver Corporation and Wolfden Resources Inc. (**Follansbee and Bonanza** properties, now held by Premier Gold Mines Limited) and Southern Star/Exall Resources (**Bruce Channel Zone**) are interpreted to occur immediately adjacent to the **Neoarchean–Mesoarchean unconformity**. Exploration along the unconformity's 105 km length within the Red Lake greenstone belt is highly recommended.

Mineralization in the Phoenix Zone and at Wolfden Resources/Goldcorp Canada Ltd.'s GAZ is associated with east-southeast fractures (parallel to D_2) in the structural hanging wall of the East Bay serpentinite, a belt-scale lithologic unit that can be interpreted to extend from the Sidace Lake property of Goldcorp Canada Ltd./Planet Exploration, southwest to the Cochenour Mine area, a distance of approximately 30 km. Proximity to the serpentinite may be a controlling factor in the localization of a number of other gold occurrences (e.g., Abino, Beatrice) along this "**East Bay Trend**". A significant amount of strike length exists between the known southern and northern extent of the serpentinite: D_2 structures through this unit should be systematically explored.

Gold occurrences have been documented along portions of the **Lake St. Joseph–Sydney Lake Fault** that are within a few kilometres of the Papaonga Lake quartz-diorite stock. The fault represents the subprovince boundary between the Uchi volcanic terrane to the north, and the English River metasedimentary gneisses to the south. At least six gold showings are known between Curie and Papaonga lakes; they are hosted by sheared, silicified, sericitized tuffs and sediments, which are cut by **quartz-tourmaline-arsenopyrite veins**. At one occurrence, sulphide-bearing, graphitic greywacke hosts a 1.7 km long zone of contorted quartz-tourmaline veining. Channel samples as high as 0.33 ounce per ton gold over 0.5 m were reported during

- **importance of Red Lake unconformity confirmed**
- **advanced exploration program underway on Cu-Zn VMS deposit: Confederation Lake**
- **known iron deposits on strike with past producer**
- **past-producing Ag-Au-Pb vein deposit**
- **numerous Mo, U showings along Bearhead Fault**
- **gold mineralization along volcanic-sedimentary subprovince boundary**

the last exploration work performed in the mid-1980's.

Polymetallic Veins

The **Favourable Lake greenstone belt** contains several silver-gold-base metal vein deposits (polymetallic veins) noted for silver content greater than gold content and economic base metal content (Berens River Mine). Recent exploration activity in the Favourable Lake belt by Shoreham Resources Ltd. (optioned from Gold Canyon Resources Ltd.) has been directed at this type of mineralization. The entire Favourable Lake, Setting Net Lake and North Spirit Lake greenstone belts are prospective for this type of mineralization.

Molybdenum and Uranium

There are numerous reported molybdenum and uranium occurrences along the **Bearhead fault** between the Sachigo and Berens River subprovinces (Ayres 1970; Ayres et al. 1973; Stone 1998b). Documented resources include the Setting Net Lake deposit (100 000 000 tons of 0.09% MoS_2) and uranium at the Bearhead Lake prospect (978 810 tons of 0.06% U_3O_8 to a depth of 500 feet). There has been no exploration activity for these commodities for many years. The Setting Net Lake area is highly prospective for molybdenum and uranium.

Molybdenum is also reported from the northern portion of the Lingman Lake greenstone belt, the eastern portion of the Birch–Uchi greenstone belt at the southeast corner of McNaughten Township, at Senior Lake and Fawthrop Lake.

Base Metals

Copper-nickel has not been produced from the Red Lake or Birch–Uchi greenstone belts, but copper-nickel (and associated PGE) mineral occurrences have been reported from several mafic intrusive bodies. In particular, the **Trout Bay assemblage**, a mafic volcanic sequence of ocean floor affinity in the western part of the Red Lake greenstone belt, comprises tholeiitic volcanic rocks, and associated mafic to ultramafic intrusions, which host at least 7 Ni-Cu-PGE occurrences (e.g., Trout Bay Nickel, Goldcorp Canada Ltd.).

Sanukitoid-type intrusive bodies have been identified in the Red Lake greenstone belt (Faulkenham Lake stock: Sanborn-Barrie, Skulski and Parker 2004) and in some parts of the Berens River and Sachigo subprovinces to the north (Frame Lake, Stormer Lake and Nungesser Lake: Stone 1998a, 2005). No record of prospecting in these areas exists, although an OGS mapping crew reported an unassayed Cu-Ni occurrence in the margins of the Frame Lake intrusion (Stone 1998a). Recent Ontario Geological Survey mapping (at 1:50 000) in this area will be released in April 2007.

Volcanogenic massive sulphide (VMS) deposits and prospects, and associated proximal chloritic and alumino-silicate alteration, have been documented in the Red Lake and Birch–Uchi greenstone belts, hosted in Confederation assemblage rocks.

FII-type and FIII-type rhyolites occur throughout a 100 km band extending east from Red Lake to the past-producing South Bay Mine (1.6 million tons grading 11.06% Zn, 1.8% Cu and 2.12 ounces Ag per ton). Tribute Minerals continues to build upon its success in tracking mineralized horizons with deep-penetrating Titan-24 magnetotelluric-induced polarization geophysical surveys. The company is in the first stages of permitting for a ramp to extract a bulk sample and perform underground delineation drilling on its **Arrow Zone** (indicated resource of 1.3

million tonnes at 8.1% Zn, 0.8% Cu, 0.64 g/t Au, 22.9 g/t Ag, with Indium and Gallium credits).

Increasing commodity prices are rejuvenating interest in the area for VMS deposits. In particular, the portion of the belt between Red Lake and South Bay Mine, is of prime exploration potential, but the other areas of Confederation assemblage rocks deserve attention to locate FII- and FIII-type rhyolites and possible VMS-type mineralization.

IRON

Iron was produced from the Griffith Mine at the Uchi-English River Subprovince boundary from 1968 to 1986. Total production for the mine was 22 850 000 tons of pellets grading 66.7% Fe. There is an estimated 120 000 000 tons of iron bearing rock grading 29% iron remaining. There are several more iron deposits along the subprovince boundary with resource estimates reported for four of them (**Bluffy Lake, Kesaka Lake, Ogoni Lake and Papaonga Lake**). The entire subprovince boundary east from Highway 105 is highly prospective for iron (Table 1).

Concentrations of iron bearing rock (iron formation) occur in other greenstone belts most notably at North Spirit Lake where a historical resource estimate of 1.3 million tons per vertical foot of 33.94% Fe was published (Wood 1977).

Ayres, L.D. 1970. Setting Net Lake area; Ontario Department of Mines, Preliminary Map P.538 (revised), scale 1:15 840.

Ayres, L.D., Raudsepp, M., Averill, S.A. and Edwards, G.R. 1973. Favourable Lake–Berens Lake; Ontario Division of Mines, Map 2262, scale 1:253 440.

Breaks, F.W., Bond, W.D., Desnoyers, D.W., Stone, D. and Harris, N. 1976. Operation Kenora–Ear Falls, Bruce–Bluffy lakes sheet, District of Kenora; Ontario Division of Mines, Preliminary Map P.1199, scale 1:63 360.

Ontario Geological Survey 2006. Papaonga Lake; in Mineral Deposit Inventory, Ontario Geological Survey MDIR#52K16NE00006

Sanborn-Barrie, M., Skulski, T. and Parker, J. 2004. Geology, Red Lake greenstone belt, western Superior Province Ontario; Geological Survey of Canada, Open File 4594, scale 1:50 000.

Shklanka, R. 1968. Iron deposits of Ontario; Ontario

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Department of Mines, Mineral Resources Circular 11, p.217.

——— 1970. Geology of the Bruce Lake area, District of Kenora; Ontario Department of Mines, Geological Report 82, 27p.

Stone, D. 1998a. Precambrian geology of the Berens River area, northwest Ontario; Ontario Geological Survey,

Open File Report 5963, 116p.

——— 2005. Geology of the northern Superior area, Ontario; Ontario Geological Survey, Open File Report 6140, 94p

Wood, J. 1977. Geology of North Spirit Lake area, District of Kenora (Patricia Portion); Ontario Division of Mines, Geoscience Report 150, 60p.

Table 1. Iron deposits not being mined, Red Lake District

Deposit Name and NTS	Commodity	Tonnage-Grade Estimates and/or Dimensions	Reserve References	Status
Bluffy Lake (52K/14SE)	Fe	<u>Reserves:</u> 21 000 000 tons at 22.86% Fe	Prelim. Map P.1199 (Breaks et al. 1976)	Licence of Occupation
Griffith Mine (52K/14SW)	Fe	<u>Reserves:</u> 120 000 000 tons of 29% Fe	GR 82 (Shklanka 1970)	Withdrawn from staking
Kesaka Lake (52K/16NW)	Fe	<u>Reserves:</u> 312 500 000 tons of 31.1% Fe to a depth of 100 feet	MRC11 (Shklanka 1968)	Open, Staked Claim
North Spirit Lake (Crown Trust) (53C/07NW)	Fe	<u>Reserves:</u> 1.3 million tons per vertical foot of 33.94% Fe	MRC 11 (Shklanka 1968) GR150 (Wood 1977)	Patent, Leased
Ogani Lake (52K/15NE)	Fe	<u>Reserves:</u> 100 000 000 tons of 21.6% Fe	MDC (Shklanka 1968)	Open
Papaonga Lake (52K/16NE)	Fe	<u>Reserves:</u> 13 500 000 tons of 31.06% Fe	MDIR	Open

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2) CU-NI-CO-CR-PGE POTENTIAL OF THE ENGLISH RIVER SUBPROVINCE

Numerous Cu-Ni-Co-Cr-PGE occurrences are known in the **Werner-Rex lakes** area. The following description is summarized from Parker's (1989) evaluation of the mineral potential of the area. Mineralization is hosted in a number of mafic intrusive pods associated with the extensive Werner-Rex fault system. The ultramafic-mafic rocks, that are host to mineralization, were part of a syn-tectonic **stratiform intrusion** that was deformed after emplacement. The present pods of mafic intrusive rocks are tectonic fragments of these stratiform intrusive body(s).

Mineralization is associated with 3 deposit model types:

- **123 386 pounds Cobalt past production in skarnoid-type deposit**
- **1.3 M tons mined @ 0.92% Ni, 0.47% Cu, 0.027 opt Pt+Pd from magmatic-type deposit**
- **1.1 M tons reserves @ 1.2% Ni, 0.5% Cu**
- **other ultramafic bodies known throughout English River Subprovince**

- 1) **Magmatic** mineral deposits-disseminated and remobilized Ni-Cu sulphide, Cr and PGE mineralization (Norpax and Gordon Lake deposits);
- 2) Cobalt-copper **skarnoid** mineral deposits (Werner Lake Cobalt Deposit);

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- 3) **Remobilized** sulphide mineralization in migmatite, pegmatite and gneiss mineral deposits (Rex–Lower Fortune occurrences).

There are approximately 37 related mineral showings in the Werner–Rex lakes area. Larger segments of mafic intrusive bodies could exist associated with the fault system. Ultramafic–mafic bodies distributed throughout the extensive English River Subprovince

are associated with metasedimentary assemblages and are occasionally aligned with extensive fault systems. These intrusive bodies should be examined for similar mineralizing environments.

Parker, J.R. 1998. Geology of nickel-copper-chromite deposits and cobalt-copper deposits at Werner–Rex–Bug lakes, English River Subprovince, northwestern Ontario; Ontario Geological Survey, Open File Report 5975, 178p.

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3) URANIUM POTENTIAL IN THE KENORA DISTRICT

Numerous Precambrian **uraniferous pegmatite occurrences** are found in the western parts of the English River, Winnipeg River and Wabigoon subprovinces. Regionally these occurrences are associated with metasedimentary rocks, felsic intrusive rocks and major fault systems. Breaks (1982) presented a provisional classification of rock types that host uranium mineralization: 1) the “white granitoid” or metasedimentary migmatite association, and 2) the “pink to red granitoid” or potassic granitoid suite association.

Uranium mineralization hosted in pegmatite has the potential for **low-grade, large tonnage “porphyry style”** deposits. The Richard Lake Deposit, situated in the western Wabigoon Subprovince, has a historic resource of 650 000 tonnes at 0.10% U₃O₈ (Pryslak 1976).

Known uranium occurrences cluster in areas of the subprovinces that have received past exploration. The remainder of the subprovinces have potential to host similar mineralizing environments, but have not been prospected. Analytical results from recently completed Ontario Geological Survey lake sediment

- **historic U₃O₈ resource in “porphyry style” deposit**
- **OGS lake sediment survey anomalies focus target selection areas**

sampling programs have located sites that returned highly anomalous uranium values. Selection of areas to examine could be guided by comparing these sites with the airborne radiometric survey (OGS-GSC 1977), rock types, major structures and known uranium occurrences.

Breaks, F.W., 1982. Uraniferous granitoid rocks from the Superior Province of Northwestern Ontario: in Uranium in Granites; Geological Survey of Canada, Paper 81-23, p.61-69.

OGS-GSC, 1977. Airborne Gamma-Ray Spectrometry Survey, District of Kenora and Rainy River; Ontario Geological Survey, Geophysical Series, scale 1:250,000

Pryslak, A.P. 1976. Geology of the Bruin Lake–Edison Lake Area, District of Kenora; Ontario Division of Mines, Geological Report 130, 61p.

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4) POLY-METALLIC POTENTIAL NEAR INTERSECTION OF THE MANITOU STRAITS FAULT AND BRETZ LAKE STOCK

The results from a high-density lake sediment geochemical survey over the Kakagi-Rowan Lakes greenstone (OFR 6188; Dyer et al. 2006) include a strong poly-metallic anomalous area that occurs in an interesting geological and structural setting. Known as the Bretz Lake-James Lake anomaly, it is located ~50 km due south of Dryden, adjacent to the Manitou Straits.

This is a **multi-site and multi-element** (As, Au, Cu, Sb, Mo, Cd, Ag, Zn) anomalous area (designated as anomalous area #8 in OFR 6188) that occurs to the north of the Bretz Lake felsic intrusion and includes the highest Zn value of the survey (197 ppm) and an anomalous Au value of 11 ppb. Two lake sites returned strongly anomalous levels of Cu, Zn, Cd and As. Many other samples from sites within the area returned multi-element (two or more of As, Sb, Mo, Ag, Zn) anomalous levels.

The area is located south of the junction of the eastern trending Manitou Stretch–Pipestone Lake fault and the northeast trending Manitou Straits fault. OGS

- **multi-site and multi-element (As, Au, Cu, Sb, Mo, Cd, Ag, Zn) anomalous area near junction of regional faults and felsic intrusion**
- **base metal sulphides in drill holes**
- **open for staking**

mapping by Berger and Jeffrey (1991) indicate the bedrock geology consists of metavolcanic, metasedimentary and felsic intrusive rocks and that several diamond drill holes intersected sulphides (including chalcopyrite and sphalerite). However, this area has seen relatively little exploration activity and as of October 2006, was completely open for staking.

Berger, B.R. and Jeffrey, D.S. 1991. Precambrian geology, Manitou Stretch area; Ontario Geological Survey, Map 2561, scale 1:20000.

Dyer, R.D., Ravnaas, C., Felix, V.E. and Russell, D.F. 2006. Kakagi Lake area lake sediment geochemical survey, northwestern Ontario; Ontario Geological Survey, Open File report 6188, 68p.

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5) CU-AG±AU POTENTIAL, SOUTH OF MERIDIAN BAY, EAGLE LAKE.

The results from a high-density lake sediment geochemical survey over the Eagle–Wabigoon–Manitou Lakes greenstone belt (OFR 6104; Felix 2005) include a broad **Cu-Ag anomalous area** that occurs over a relatively under-explored portion of the greenstone belt. This anomalous area is centered on Passover Lake, located ~35 km southwest of Dryden.

This large Cu anomaly (designated as anomaly #11 in OFR 6104) stretches from Robbins Lake in the

- **broad Cu-Ag anomalous area discovered by OGS lake sediment survey**
- **~10 km area underlain by under-explored greenstone belt near contact with Atikwa Batholith**
- **open for staking**

northeast to Canal Bay (Atikwa Lake) in the southwest, a distance of ~10 km. In general, Cu levels increase from south to north and include the highest value of Cu for the entire survey (136 ppm).

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Anomalous silver levels are also widespread throughout the area and anomalous levels of Pd, Au, Zn, Ni, Co, Cd, Sb, W and Mo were obtained from some lakes.

The area lacks systematic detailed bedrock mapping; the compilation map for the region (Map 2443, Blackburn 1991) shows this anomalous area is situated over a northeast trending assemblage of metavolcanic rocks near the contact with the Atikwa Batholith. The **Meridian Bay gold occurrence**, located ~3 km to the north, is the only documented mineralization near this area. Grab samples of sulphide-rich material from this occurrence have been reported to assay between 0.20 and 0.45 ounce gold per ton (6220–13 996 ppb Au), 3.9 ounces silver per ton (93 ppm Ag), 0.9 to 4.22% Cu (9000–42 200 ppm) and 0.5 to 1.0% Ni (5000–10 000 ppm) (Parker

1989). The broad zone of Cu-Ag anomalous lake bottom sediments to the south of the Meridian Bay occurrence may be related to similar style mineralization. This area was open for staking as of October 2006.

Blackburn, C.E. 1981. Kenora-Fort Frances, Geological Compilation Series, Kenora and Rainy River districts; Ontario Geological Survey, Map 2443, scale 1:253 440.

Felix, V.E. 2005. Eagle Lake area high density lake sediment and water geochemical survey, northwestern Ontario; Ontario Geological Survey, Open File report 6104, 79p.

Parker, J.R. Geology, gold mineralization and property visits in the area investigated by the Dryden-Ignace economic geologist, 1984–1987; Ontario Geological Survey, Open File Report 5723, 306p.

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6) INACTIVE MINERAL PROSPECTS IN THE KENORA DISTRICT

The following prospects have been subject to exploration activity, but, in the past few years, have been dormant and are presently available for option.

The **Marchington Road property**, held by Commander Resources Ltd., is located in the Savant Lake greenstone belt. The property hosts a historical resource of 96 456 tons at 2.20% Cu, 1.18% Zn, 2.81% Pb and 2.81 ounces Ag per ton (www.commanderresources.com, accessed March 7, 2006)].

The rocks in the area include intermediate to felsic volcanic rocks that display evidence of widespread hydrothermal alteration. Five zones of base and precious metal mineralization have been identified on the property. This part of the greenstone belt has high base-metal potential.

- **properties with historical gold and base metal resources available for option**
- **layered ultramafic-mafic intrusion may host reef-type PGE mineralization**

The **Mulcahy Lake intrusion** is located in the Eagle-Wabigoon lakes greenstone belt. The intrusion is a northeast-trending, vertical-dipping layered mafic intrusive body. Studies of the intrusion have identified 4 zones (Sutcliffe and Smith 1985). The Marginal and Lower zones are 2.5 km thick and consist of layered gabbro and gabbro-norite rocks. The Middle Zone is 3 km thick at the widest part and consists of norite, gabbro-norite and magnetite-bearing rocks. The Upper Zone is 1.5 km thick and consists of gabbro-norite to ultramafic rocks. This intrusion has the potential to host a “reef-type” PGE mineralizing environment.

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The **Dubenski property** held by Kenora prospector Paul Dubenski, is located in the Kakagi–Rowan lakes greenstone belt. A historical resource of 355 286 tonnes at 0.185 ounces Au per ton exists on the property (Kenora District Office, assessment file, 52F05SW WWW-5). Gold mineralization is present in zones of sericite schist and lenses of quartz that can be interpreted to extend for 500 m along strike. The property is underlain by highly strained felsic volcanic rocks that have been deformed by up to 3 deformation events, the most prominent of which is associated with the Pipestone–Cameron fault. The Cedartree Lake area has been the focus of numerous exploration programs and has high potential for gold mineralization.

The **Wendigo property** held by Witch Bay Camp owner Steve Hockett, is located in the Gibi Lake assemblage, part of the Lake of the Woods greenstone belt. The rocks in the area are highly strained in proximity to the east-trending Andrew Bay–Witch Bay fault. The Wendigo quartz vein system is developed predominantly within sheared and altered mafic volcanic rocks north of the fault. At least 3 quartz veins occur in the area near the Wendigo

Prospect. The most prominent vein is 100 m long, 0.8 m wide and has been drilled to a depth of 230 m. Production from this vein is reported as totalling 206 054 tonnes at 0.327 ounces Au per ton, 0.071 ounces Ag per ton and 0.42% Cu (Davies and Smith 1988). Copper mineralization is associated with altered mafic volcanic wall rocks. Numerous other gold and base-metal occurrences are known in this part of the greenstone belt.

Powerpoint presentations with attached notes related to these and other prospects can be viewed on the Resident Geologist website http://www.mndm.gov.on.ca/mndm/mines/resgeol/northwest/kenora/Prospecting/prospect_e.asp.

Davies, J.C. and Smith, P.M. 1988. The geological setting of gold occurrences in the Lake of the Woods area; Ontario Geological Survey, Open File Report 5695, 381p.

Sutcliffe, R.H. and Smith, A.R. 1985. Precambrian geology of the Mulcahy gabbro, District of Kenora; Ontario Geological Survey, Preliminary Map P.2826, scale 1:15 840.

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7) GOLD POTENTIAL IN THE FRY LAKE AREA, MEEN-DEMPSTER GREENSTONE BELT, UCHI SUBPROVINCE

The Fry Lake area covers the southwestern portion of the Meen-Dempster greenstone belt which lies within the Uchi Subprovince. The economic potential in the Meen-Dempster greenstone belt consists primarily of lode and disseminated gold mineralization, exemplified by the past producing Golden Patricia Mine (620,000 oz @ 0.51 oz/t (Mason *et al.* 1997)), located in the northeast part of the belt. Recent bedrock mapping has identified 2 previously unrecognized areas of gold potential.

New areas of gold potential include:

The western portion of the feldspar porphyritic **Fry Lake stock** exhibits strong, pervasive sericite-

- **past production of 620 000 ounces gold**
- **historical gold showings in structurally complex, strongly altered diverse lithologies and deposit types**
- **recent OGS mapping identified two additional areas of gold potential**

carbonate alteration +/- fine-grained disseminated pyrite and minor tourmaline as well as locally strong, fracture controlled iron carbonate (with minor quartz and pyrite) alteration and/or veining. This area contains the most pervasive iron carbonate alteration observed at Fry Lake.

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Outcrop exposure in the western portion of the stock is poor and no historical drilling has targeted this alteration, assays from grab samples collected this past summer are pending.

The **Relyea Lake porphyry** is a strata-parallel, aphanitic, quartz porphyry intrusion, hosted in clastic metasedimentary rocks and is reminiscent of the quartz and quartz-feldspar porphyry “syenitic” intrusive rock found in the Kirkland Lake area of the Abitibi Subprovince. Local metre scale zones of moderate silicification and the presence of local 1 to 20 cm wide greasy, translucent, bluish quartz veins suggest potential for Au mineralization. Outcrop exposure in the area is poor and no historical drilling has been conducted on the porphyry, assays from grab samples collected this past summer are pending.

Recommendations for select historical showings include:

The area surrounding the **Flicka lode Au occurrences** is structurally complex, consisting of several east-northeast trending shear zones cutting a package of mafic to felsic metavolcanic rocks, chemical metasedimentary rocks and gabbro intrusions. The **Flicka occurrence** consists of three gold-bearing structures of limited extent hosted by gabbroic rocks which strike perpendicular to the main shear zones in the area and dip 55 to 65° to the east. Assays as high as 11.182 g/t Au over 1.47 m, have been intersected in diamond drilling, a grab sample collected this past summer returned 0.85 oz/t Au (Smyk pers. comm. 2006). Approximately 300 m to the south of the Flicka occurrence is the **Fry Lake #9 zone**, which is hosted in a large (up to 50 m wide) east-northeast trending iron carbonate-rich shear zone. This zone was tested by 6 diamond drill holes in 1945, the best of which returned 0.70 oz/t Au over 0.23 m. Much of the past exploration work has focused on the relatively small structures hosting the Flicka occurrence proper and it is recommended that the larger east-northeast trending shear zones (such as the Fry Lake #9 zone) should be investigated more closely, for areas of increased quartz veining/sulphide mineralization.

The area surrounding the **Don’s Lake suite of shear zone hosted Au-U-Th occurrences** has been the focus of the most intense exploration in the Fry Lake area with values of up to 0.51 oz/t Au over 1.1 m in diamond drilling, a grab sample collected this past summer returned 0.28 oz/t Au (Smyk pers. comm. 2006). These showings are hosted by intensely sericite-quartz-calc-silicate-disseminated pyrite altered shear zones at the contact of quartz-feldspar porphyry dykes and mafic volcanic rocks as well as wholly within the porphyry intrusive rocks. The felsic intrusive rocks are related to the North Bamaji pluton; indicating that exploration should not be limited to areas with abundant mafic volcanic rocks. These shear zones are also S_1 parallel and have been folded by D_2 ; any future work must take into account this folding event.

The **Sanderson suite of lode Au-Ag-Cu-Pb-Zn occurrences** have historically produced some high grades, up to 25.12 oz/t Au over 0.21 m in diamond drilling. The quartz veins are hosted by discrete centimetre to metre-scale biotite-chlorite-calcite, east striking shear zones. These structures cut both the mafic volcanic rocks and the North Bamaji pluton; hence exploration for this style of mineralization should not be restricted to the volcanic rocks. Future exploration should trace these structures further east into the Rockmere Lake area.

An occurrence of **Iron formation hosted Au**, located approximately 3 km east of McVean Lake was discovered by diamond drilling in 1991. Values up to 24.07 g/t Au over 0.5 m were obtained from an anomalous gold bearing iron formation within a strongly deformed zone of intercalated quartz-feldspar porphyry dykes and chemical sediments. This occurrence is in an area of poor outcrop exposure with only limited drilling. Further investigation is recommended as this style of mineralization may have similarities to the iron formation hosted gold deposits in the nearby Pickle Lake greenstone belt.

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8) RECOMMENDATIONS FOR EXPLORATION-THUNDER BAY SOUTH DISTRICT

The Thunder Bay South District is currently actively being explored for a variety of deposit types that include copper-zinc VMS, copper-nickel-PGM, gold, unconformity uranium, Olympic Dam (IOCG), copper-molybdenum, diamonds, amethyst, stone and peat. With the increase in the demand for iron from Asia, the iron deposits in the Thunder Bay South District should be re-evaluated.

In the last two decades the Ontario Geological Survey and the Geological Survey of Canada have released many reports dealing with lake bottom sediment and lake water geochemistry, till geochemistry, kimberlite

indicator mineral data, geophysics, and geology. These reports should be consulted and mineral trends discerned from the data. Much of this data is available in digital form and can be displayed and analyzed with suitable software on a computer. With hard copy paper maps a visual analysis is also possible but would not be as precise as a GIS computer analysis.

For the prospector, for instance, if the data indicates overlapping copper, zinc, and lead values over a definable area, then that area should be targeted for VMS exploration if the geology is correct. If the data suggests a copper-nickel-cobalt association in another area, then exploration should focus on looking for Cu-Ni-PGM deposits, if the geology is correct. Likewise, if the data indicates an overlap of copper,

- numerous OGS and GSC geochemical and geophysical datasets available for analysis
- unexplained geochemical anomalies over prospective bedrock geology
- known large-tonnage, low-grade gold deposits, as well as high-grade gold veins
- recent OTH surveys detailed the mafic-ultramafic layered intrusion in the Obonga Lake greenstone belt

molybdenum and gold values, then a porphyry system should be suspect.

With the use of geophysics the prospective area can further be defined. Thus if the prospector has a good correlation of regional geochemistry data for VMS-style deposits, and the geophysics indicated a magnetic high coupled with a good electromagnetic anomaly, then that area should be targeted for VMS exploration. This also would apply to other deposit types such as magmatic Cu-Ni-PGM and others.

A cursory examination of the 1:2 M scale regional geochemical data put out in 1979/1980 (Coker 1981), as well as the subsequent detailed surveys that resulted from the initial helicopter surveys, does reveal excellent correlation of the geochemistry with found deposits or occurrences. The examples cited in Table 1 are for illustrative purposes and even in this short list there are four areas where the anomalies are unexplained and require further research.

Table 1. Linking Geochemical Anomalies and their Probable Origins

No.	Area	Overlapping Metals	NAD 27 UTM ZONE 16		Feature
			Easting	Northing	
1.	W. Shebandowan	Cu-Zn	213100	5368600	Wye Lake Occurrence
2.	W. Shebandowan	Cu-Mo-Au	220900	5376400	Hamlin Lake
3.	Northern Light L.	Cu-Ni-Co	227500	5355000	Unknown
4.	Saganaga Lake	Co-Ni	203900	5348000	Unknown-Ultramafic Rocks
5.	Black Sturgeon	Cu-Ni	358500	5433200	Leckie Lake-Seagull Lake
6.	Black Sturgeon	U	369600	5466500	Black Sturgeon Lake-Split Rapids Dam Occ.
7.	Black Sturgeon	Au	342800	5450000	Elevated Au along IF Trend
8.	Atikokan-Sapawe	As	180600	5412600	Atikokan IF Gold assoc. with Arsenopyrite
9.	Marathon	Cu-Zn	555600	5409900	Pic R. Felsic Rock - Sulphide Occurrences
10.	Marathon	Cu-Ni	553000	5406800	Marathon PGM
11.	Manitouwadge	Cu-Zn	591400	5447900	Geco-Willroy-Willecho

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No.	Area	Overlapping Metals	NAD 27 UTM ZONE 16		Feature
			Easting	Northing	
12.	Schreiber	Cu-Zn	472600	5425700	Zenmac-Winston Lake
13.	Schreiber	Mo	468800	5412900	Cu-Mo Assoc. Faults in Granite
14.	Dorion	Pb-Zn	379500	5413500	Proterozoic Pb-Zn
15.	White River	U	636000	5383100	Unknown U-Granite

One such area lies just east of the Port Coldwell Complex on the Pic River and merits attention as it is underlain by felsic metavolcanic rocks and has a copper-zinc geochemical response and it is not staked (as of 03/02/2006). The area was mapped by Thompson (1931) and Milne (1967) as well reported on by Schnieders and Smyk (1994). Schnieders and Smyk (1994) described the geology on a traverse along the powerline from Page Lake southwesterly to the Pic River and from east to west, encountered magnesium tholeiitic basalts, iron formation, turbidites, and felsic volcanic rocks including rhyolite, rhyolite breccias and debris flows. A quick review of the Kerr Addison Mines Ltd. 1971 drill logs in the Thunder Bay assessment files indicates that in Hole KP-71-4 there was a 20 foot intersection from 15 feet to 35 feet that averaged 1.15% Zn; and in hole KP-71-6, there was a 0.5 foot intersection at 27 feet that assayed 1.84% Zn and a 2.5 foot intersection from 35 feet to 37.5 feet that assayed 1.76% Zn. This area should be explored again in light of the high mineral potential as well as the evolving VMS model which was, at that time (1971) in its infancy. The current knowledge base with respect to VMS deposits would certainly aid in the proper exploration for Cu-Zn massive sulfides in this area.

Granted that many of the picked areas might already be staked, but that should not deter a mining company in approaching the owner of the claims to suggest an option or joint venture program. Many times the claim maps might indicate that the area has a leased or patent status, but closer inspection might reveal that only the surface rights are leased or patent. In these cases the mineral rights are available for staking. If the area falls into one of the target zones, by all means acquire the ground.

One such area is situated east of Highway 527 (Spruce River Road) and north of Highway 11/17 just north of where the major powerline crosses Highway 11/17. Mapping by Scott (1986) indicates the

presence of felsic volcanic rocks, iron formation, and metasedimentary rocks in a complexly faulted environment. An assessment file search revealed an airborne EM survey that delineated several **unexplained EM conductors**. The area has excellent potential for both VMS-type of deposits as well as gold. A cursory examination of the claim map reveals that while the area is patented for surface rights, virtually all the **mineral rights are available** for staking.

Sometimes geophysics and to a lesser degree, geochemistry do not seem to be able to detect gold deposits. In the area between Atikokan and Mine Centre, gold is associated with large shear structures and porphyry systems. Examples of these would be the Hammond Reef and Sawbill occurrences. The gold might be disseminated in a **large tonnage-low grade deposit** or the gold might be concentrated in **high-grade quartz veins**, such as the Fern Elizabeth Mine. While the geochemistry and geophysical tools help in the discovery, structure must not be overlooked. Work by Stone (1992) in the Atikokan area has delineated many of these large structures.

Many times a magnetometer survey can reveal structure that might be missed during regional mapping. One such area is located in the Obonga lake metavolcanic belt where the recent Operation Treasure Hunt magnetometer/electromagnetic survey has revealed a possible **multi-pulsed layered intrusion**. While the layers appear stacked, there is a degree of folding present as evidenced by the hook shapes in the magnetic survey. The area was mapped in the mid-1960s and was interpreted to be underlain by **peridotites, serpentinites and gabbro** (Thurston, 1967; Kustra, 1966). Kustra (1966) further describes the unit as a “dioritic rock, partly serpentized” and contains “phases of gabbro, peridotite, pyroxenite and dunite”. Kustra (1966) also reports that the serpentized portions of this unit are magnetic and nickeliferous. No assays were given. Figure 1

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depicts this feature. The area in question is situated between Awkward Lake and Survey Lake. Figure 2 depicts the geology at the same scale. If this is a layered complex, then it should be explored for Cu-Ni-PGM.

The southwestern end of the Obonga Volcanic belt is underlain by felsic volcanic rocks that have been

explored for VMS-style deposits in the past. This area contains numerous coincident EM and Magnetic anomalies that should be explored for base metals. Many of the anomalies are outlined in the recent Obonga-Garden Operation Treasure Hunt geophysical release as well as assessment work done by various mineral exploration companies that have worked in the area.

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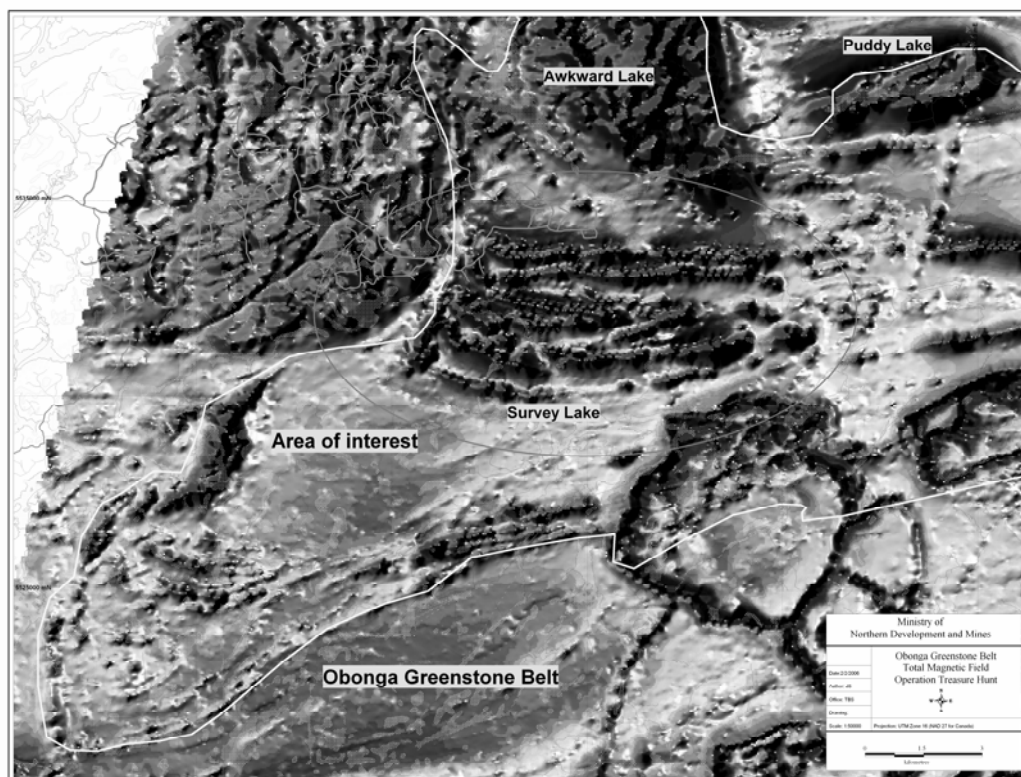


Figure 1. Total Field Magnetometer

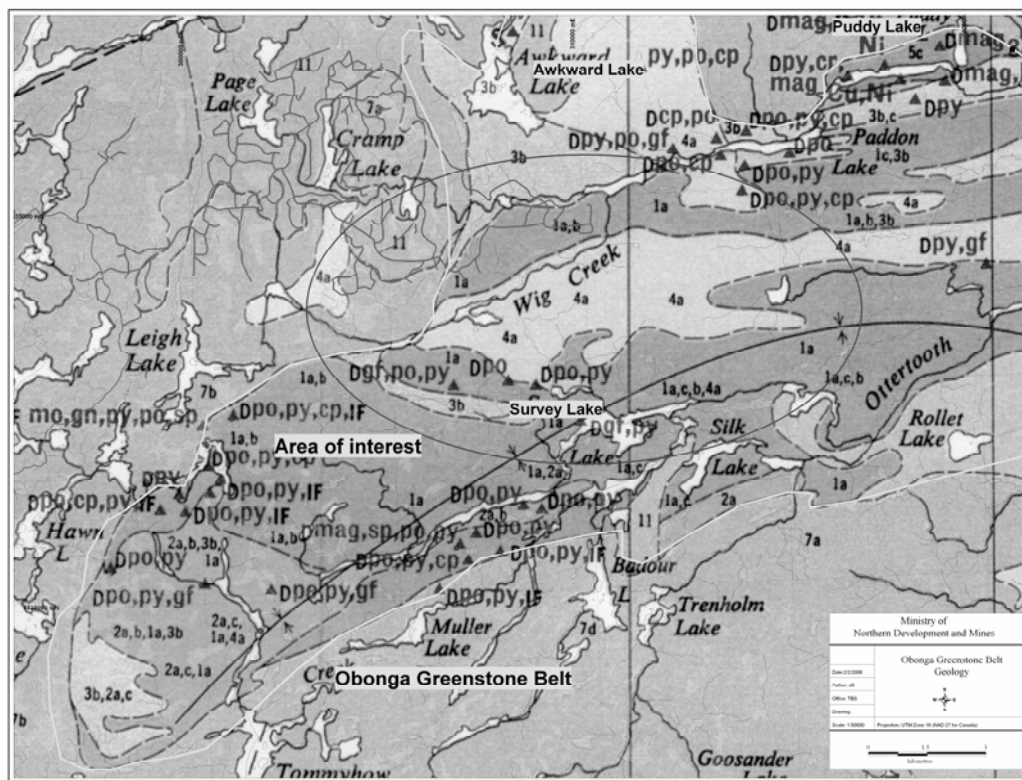


Figure 2. Obonga Lake Metavolcanic Belt

9) BASE METAL, GOLD AND REE PEGMATITE POTENTIAL IN THE CARIBOU LAKE GREENSTONE BELT

The Caribou Lake Greenstone Belt (CLGB) is located 230 km northeast of Thunder Bay and 15 km north of Lake Nipigon. The belt ranges from 15 to 30 km in width, and extends east-west over 100 km where it lies along strike with the Onaman-Tashota greenstone belt. Numerous historic occurrences of copper, copper-gold, copper-zinc, copper-nickel, as well as molybdenum, tin and lithium are distributed throughout the CLGB. Recent exploration work by Landore Resources Inc., Linear Metals (formerly Linear Gold) and Falconbridge (now Xstrata) has further identified several **new occurrences of nickel-copper-PGE, copper-molybdenum, and gold**. The potential for more of these discoveries is high as much of the belt is still largely under-explored. As of November 2006 much of the ground in the CLGB was open for staking.

The presence of felsic to intermediate metavolcanic rocks with **garnet-amphibole hydrothermal**

- **new base and precious metal occurrences in under-explored belt**
- **regional-scale VMS-related alteration**
- **OGS mapping discovered sulphidic outcrops and boulders, and a pegmatite occurrence**

alteration southeast of Tape Lake and south of Swole Lake should be further investigated. If these units are equivalent to the Marshall assemblage then these areas may hold significant potential for the discovery of VMS deposits. Semi-conformable, sericite-epidote hydrothermal alteration recorded in the pillow basalts extending from east of Boras Lake to the Ketchikan Lake area may also be indicative of a **regional-scale VMS-related hydrothermal system**.

Trace disseminated pyrite and pyrrhotite were noted in medium- to coarse-grained gabbro west of Swole Lake. If this gabbro intrusion is correlative with the

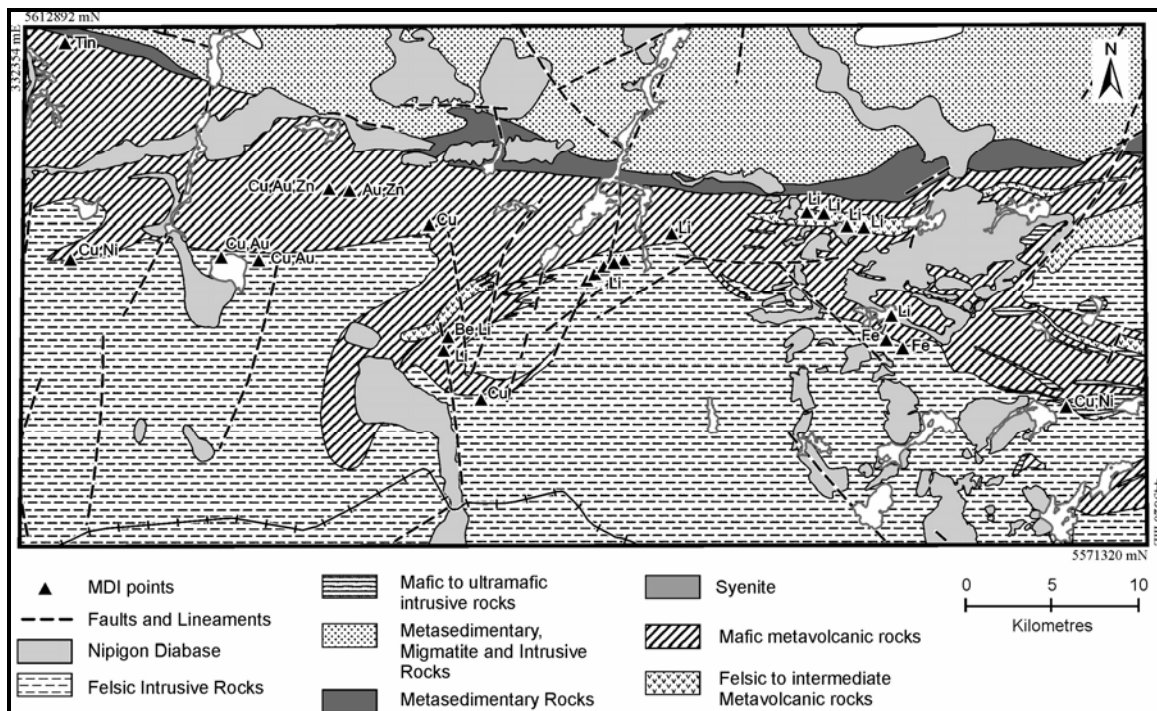
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Grassy Pond sill it may hold potential to host nickel-copper-PGE mineralization.

A **new pegmatite occurrence** was found south of Tape Lake at the contact between biotite-rich metawackes and mafic metavolcanics. No unusual minerals were noted during field work and sample collection, however samples of the pegmatite and adjacent metavolcanics will be submitted for whole rock and trace element analysis.

Several possible new sulphide occurrences were noted during the 2006 field season including rusty boulders southwest of Ratte Lake, a rusty sulphidic outcrop south of Lee Lake, and rusty sulphide-bearing boulders and outcrop southeast of Tape Lake. Each of these occurrences are located within or in proximity to volcanic or metasedimentary rocks.

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10) VOLCANOGENIC MASSIVE SULPHIDE DEPOSITS IN THE EASTERN WABIGOON SUBPROVINCE

Felsic metavolcanic terrains in the eastern Wabigoon Subprovince, extending from the Onaman–Tashota belt west to the Crescent–Caribou lakes belt, should be re-examined for volcanogenic massive sulphide (VMS) mineralization. Recently published compilation maps depicting the geology and

- **VMS-style altered felsic pyroclastic rocks over large areas**
- **undeveloped deposit with historic base metal reserves**

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tectonostratigraphic assemblages in the eastern Wabigoon (Stott et al. 2002) should be used to target prospective areas on the basis of lithology, alteration and mineralization. Recent logging and related road construction east of Armstrong has provided remarkable access and new exposure in an area last mapped by Pye (1968) and Berger (1992) and currently by MacDonald (in progress).

Garnetiferous, gossanous, hydrothermally altered, intermediate to felsic pyroclastic rocks were noted by Smyk et al. (2004) on the main (Jackfish) haulage road, midway between North Lamaune and Juneau lakes. Follow-up reconnaissance by Resident Geologist Program staff, in conjunction with ongoing Quaternary and bedrock mapping by Barnett (2005; in progress) and MacDonald (in progress), respectively, has led to the recognition of similarly altered, felsic to intermediate pyroclastic rocks over a large area along the southern margin of the Summit Lake pluton (SLP on the accompanying map). These likely represent the westerly extension of the pyroclastic units mapped by Berger (1992). Whole-rock geochemical analysis of samples of garnetiferous tuff-breccia suggests possible depletion in sodium and calcium, as well as enrichment of iron and magnesium, **typical of VMS-related alteration.**

A recrystallized, rusty-weathering, quartz-magnetite banded iron formation (BIF) boulder with disseminated, fine-grained pyrite was collected south

of Swole Lake in 2005. It returned 459 ppm Cu, >3000 ppm Zn, nil Ag and nil Au. It is probable that the up-ice, bedrock source of similar BIF boulders lies near the southern margin of the Summit Lake pluton between Swole and Junior lakes.

Berger (1992) suggested 2 broad subdivisions of supracrustal rocks in the Toronto Lake area: the first group occupies the southern margin of the greenstone belt, north of the Robinson pluton, and extends west of Ketchikan Lake; the second envelops the Summit Lake pluton and extends east towards Marshall Lake. These subdivisions roughly correspond to the Willet assemblage (ca. 2740 Ma) and Marshall assemblages (ca. 2739 Ma) of Stott et al. (2002), respectively. The Marshall Lake assemblage, which wraps around the synvolcanic Summit Lake pluton, has a demonstrated VMS potential. The **Marshall Lake deposit** has a drill-indicated reserve of 2 211 000 tons averaging 1.22% Cu, 4.20% Zn, 2.45 ounces Ag per ton and 0.012 ounce Au per ton (*Canadian and American Mines Handbook*, 2005–2006, p.289).

It is recommended that prospecting and reconnaissance mapping be carried out along the margins of the Summit Lake pluton, southeast of Tape Lake, in order to identify and connect felsic pyroclastic units, BIF's and other favourably altered units that extend west from the Marshall Lake (Straub et al. 2000) and Toronto Lake areas (Berger 1992).

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11) GOLD AND BASE METAL POTENTIAL OF THE ONAMAN–TASHOTA GREENSTONE BELT

The Onaman–Tashota greenstone belt is located east of Lake Nipigon, within the eastern Wabigoon Subprovince. The area is underlain predominantly by intermediate to felsic metavolcanic rocks and hosts 7 **past-producing gold mines**. These mines collectively produced in excess of 100 000 ounces of gold and

- **historic production in excess of 100 000 ounces gold and 360 000 pounds copper**
- **overlap of lode gold and VMS mineralization provides continuum of lode gold and copper-dominated systems**

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32 000 ounces of silver. The Tashota-Nipigon Mine produced over 360 000 pounds of copper. Despite recent, renewed interest and a resurgence in exploration in the Onaman–Tashota belt, it remains under-explored and highly prospective for **gold, copper-nickel and copper-zinc mineralization**.

In many cases, there appears to be an overlap or juxtaposition of lode gold and volcanogenic massive sulphide (VMS) mineralization. Deformation has not only remobilized primary (syngenetic) base metal sulphides (\pm gold) into younger structures, but has also introduced epigenetic gold and related hydrothermal alteration in the same or similar structures (e.g. Lynx deposits, Onaman property). Structurally controlled, gold-rich, copper-dominated systems have been identified at the Tashota-Nipigon Mine and at Miner Lake. Exploration would benefit by applying not only

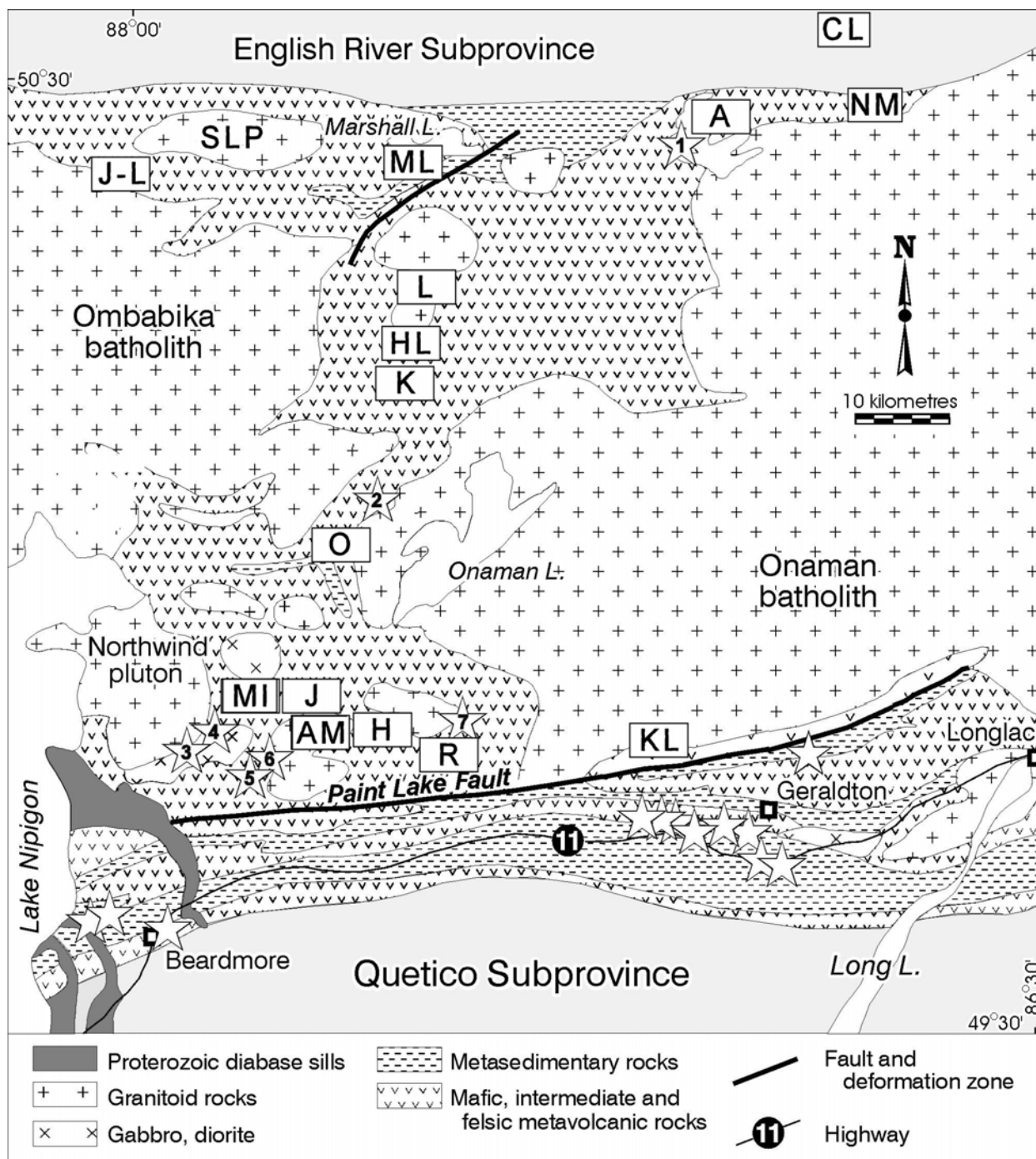
VMS and/or lode gold models, but also by recognizing that there is likely a continuum of “mixed” mineralization styles in between these 2 deposit types.

The accompanying map shows the general geology of the Onaman–Tashota greenstone belt and portions of the eastern Wabigoon Subprovince (*modified from* Stott and Straub 1999). The Beardmore–Geraldton greenstone belt lies south of the Paint Lake fault.

On the map below, stars represent past-producing gold mines: 1) Consolidated Louanna; 2) Tashota–Nipigon; 3) Maloney Sturgeon; 4) Crooked Green Creek; 5) Brenbar (Bregold); 6) Quebec Sturgeon River; and 7) Dikdik (Orphan). The rectangles represent active properties:

Key	Property	Company or Individual	Commodities
A	Aurum	Superior Canadian Resources Inc.	Au
AM	Mud Lake	Alto Ventures Ltd.	Au
CL	Colpitts Lake	Teck Cominco Limited	Au
H	Hercules	Kodiak Exploration Limited	Au
HL	Hull Lake	Spruce Ridge Resources Ltd.	Au
J	Jacobus	Sage Gold Inc.	Cu-Ni
J-L	Junior-Lamaune Lakes	Landore Resources Limited	Cu-Ni
K	Knucklethumb	Kodiak Exploration Limited	Cu-Zn-Au; Cu-Ni
KL	Kirby Lake	T. Johansen et al.	Cu-Zn
L	Lincoln	Sage Gold Inc.	Au
MI	Miner Lake	R. Cote / J. Bond	Cu-Au
ML	Marshall Lake	East West Resource Corporation / N.W.T. Copper Mines Limited	Cu-Zn
NM	Muriel Lake	Nuinsco Resources Limited	Cu-Zn
O	Onaman	Sage Gold Inc.	Cu-Pb-Zn-Ag-Au
R	Rickaby	J. Wheeler	Cu-Zn; Au

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12) POTENTIAL FOR ZINC COPPER SILVER, GOLD AND MAGMATIC SULPHIDES WITHIN THE DISMAL ASSEMBLAGE–BATCHAWANA GREENSTONE BELT–ABITIBI SUB PROVINCE

The 2711 to 2698 million-year-old (Corfu and Grunsky 1987) northwest-trending, west facing Dismal assemblage consists of dominantly calc-alkalic and minor tholeiitic pillowed basalt interlayered with pyroclastic flows, metasedimentary rocks and komatiitic basalt. These rocks are located approximately 60 km north of Sault Ste. Marie Ontario and can be accessed by new logging roads leading off Highway 552. Active logging within and marginal to the Batchawana belt continues to provide **additional new access** for prospecting and mineral exploration.

Metamorphic grade ranges from greenschist in the central part of the belt, to mid-amphibolite near the margins and adjacent to later intrusive rocks. A major power line cut southeast across the greenstone belt and an active CNR railway line linking Wawa and Sault Ste. Marie trends north through the western portion of the assemblage.

The western boundary of the Dismal assemblage is a north-northwest trending, dextral sheared contact with the Wart assemblage consisting of dominantly south facing metasedimentary rocks. **This tectonic regional scale shear presents a significant gold target.**

The northern and eastern portions of the assemblage consist dominantly of pillowed, amygdaloidal, variolitic and iron-rich tholeiitic basalt intercalated with pyroclastic flows that have been folded into a

- **regional scale shear zone prospective for gold**
- **altered volcanic rocks with 12 known Cu-Zn occurrences**
- **Keweenawan magmatic Copper-Nickel-PGE target**

westerly trending syncline.

In the northern portion of the assemblage through Schembri, Moen, Moggy and Neill townships, there are at least 12 known copper-zinc occurrences. Bain (1996) has suggested that in the Percy Lake area sulphides are deposited as interflow sediments between 2 cycles of subaqueous volcanism. Mineralization consists predominantly of 0.5% to 5% finely disseminated pyrite and pyrrhotite and occasional fine stringers of pyrite-pyrrhotite concordant with the foliation direction. Associated with mineralization, the volcanic rocks are chloritized, epidotized, carbonatized and silicified.

This northern area is recommended for exploration for VMS style mineralization.

A fault trending east-northeast across the northern half of Lunkie and Dablon township has a pronounced reversely polarized magnetic expression. This may be due to a reversely polarized early Keweenawan peridotite magma intruding along the fault conduit. Two reconnaissance traverses were conducted into the

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area this past summer but were unable to locate any peridotite.

This intrusion, if present, could present a **significant magmatic Copper-Nickel-PGE target** similar to the Yellow Dog peridotite in Michigan, host to the Eagle Mine.

Along the same east-northeast trending fault, the south block appears to have been down dropped for a considerable distance as evidenced by an outlier of early Proterozoic Gowganda conglomerate. This has preserved a large area underlain predominantly by Archean felsic volcanic rocks made easily accessible

by new logging roads and trails. The area has a past exploration history of 2 companies, Hudson Bay Oil and Gas Mining Co. Limited in 1976 and Noranda Limited in 1982-83.

The Lunkie Township area is recommended for grass roots prospecting for Zinc, Copper and Silver associated with VMS style mineralization.

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13) MCARTHUR TOWNSHIP, TIMMINS—RECOMMENDATION FOR EXPLORATION

Only a few mineral occurrences have been found to date in McArthur Township. However, a number of favourable geological settings representing a variety of mineralization types may be present in this area.

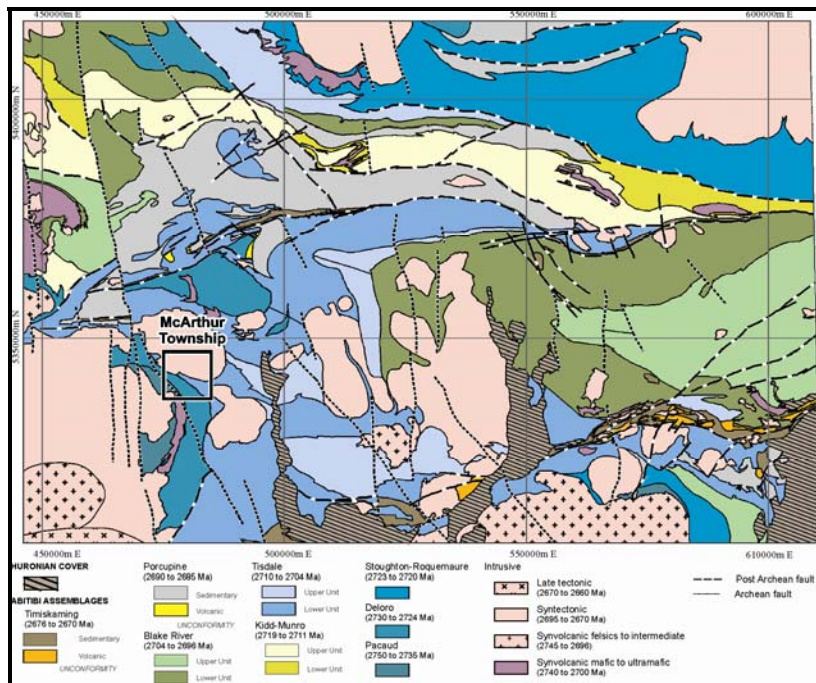
The contact between the tonalite stocks and the surrounding metavolcanic and sedimentary rocks south of McArthur Lake is a prospective zone for gold mineralization. Several showings at, or near this contact indicate the entire zone along those felsic intrusion should be re-examined. The **association between gold and iron formation** is also well established in greenstone belt. The Carshaw-Malga Mine in the Shaw Dome area represents a good example of this type of association between gold and iron formation. Numerous and relatively continuous iron formations in McArthur Township could represent an interesting target for this type of mineralization. Furthermore, rusty zones on exposures of the middle iron formation horizon observed during the mapping should be tested for gold and base metal content.

A close spatial relationship between komatiites and sedimentary rocks (banded iron formation and sulfidic

- **recent OGS mapping has delineated prospective environments for gold mineralization**
- **sulphide mineralization mapped within komatiites on strike of past producer**

graphitic argillite), abundant olivine cumulates, and spinifex-textured sills hosted within komatiite flows in the map area, provide a favourable location for **nickel sulphide mineralization associated with the komatiites**. Observations during the mapping indicate high volumes of magma were associated with these komatiites and are thus potentially sufficient to dissolve sulphur and precipitate sulphide minerals that carry the nickel, copper and platinum group elements.

During this bedrock mapping project, a small gossan was observed southeast of McArthur Lake. It exhibits some disseminated, blebby and millimetre-scale sulphides veinlets (pyrrhotite, pyrite). Furthermore, the komatiites in the map area are **along strike from the former Texmont Mine**, a komatiite-associated nickel sulphide deposit.



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14) SUDBURY DISTRICT–PLATINUM GROUP ELEMENTS (PGE), NI, CU POTENTIAL

Exploration for platinum group elements has been the dominant activity in the Sudbury District for the past several seasons. The majority of exploration work is being conducted on differentiated mafic intrusive rocks of the 2.45 Ga East Bull Lake suite of rocks that include the River Valley, Agnew, and East Bull Lake complexes. Some work is also being carried out on 2.22 Ga Nipissing gabbro intrusive rocks, both east and west of Sudbury.

Much of this ground is held in good standing under the Mining Act as claims, leases, and patents, with a substantial amount of assessment work yet to be applied. As such, opportunities for land acquisition on ground underlain by these mafic intrusive rocks are limited. However, several **marginal areas of mafic intrusive rocks may also be prospective for platinum groups elements**. These include, but are not necessarily restricted to the following: 1) mafic intrusive rocks north of the East Bull Lake complex in

- **prospective areas for PGE exist outside currently explored ground and areas explored only for Ni-Cu mineralization**
- **exploration for offset dykes is strong and has seen recent successes**
- **flagstone is being economically mined in the district warrants further development work**

Lockyer and Mandamin townships; 2) mafic intrusive rocks, particularly those currently considered as Nipissing gabbro west of Sudbury to Elliot Lake and hosted in Huronian Supergroup metasedimentary rocks of the Penokean Fold Belt; 3) Archean mafic intrusive rocks hosted within the

Benny greenstone belt; 4) mafic intrusive complexes hosted within the Central Gneiss Belt (i.e. Whitestone, Arnstein, Eau Claire, Mattawan Township, McConkey Township); 5) areas within the

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Grenville Front Tectonic Zone east of the River Valley complex (Flett, Angus, and Parkman townships).

Targets to consider include known Ni-Cu occurrences, previously considered uneconomic for those metals, with emphasis on platinum group elements. There are two distinct styles of mineralization, namely: 1) disseminated magmatic sulphides, particularly within inclusion leucogabbro; 2) disseminated to massive, structurally controlled sulphides.

Both types are **enriched in platinum, palladium, copper, nickel, and gold**. However, recent work in the area suggests the magmatic sulphides are more strongly enriched in the platinum group elements.

Offset Dikes of the Sudbury Igneous Complex

Exploration activity related to the search of undiscovered Offset Dikes of the Sudbury Igneous

Complex is strong, following recent discoveries by Inco Limited at Kelly Lake on the Copper Cliff Offset and the Totten Mine on the Worthington Offset; FNX Mining Company Incorporated on the Parkin Offset; and Tearlach Resources Limited on the Worthington Offset. Prospective ground includes those areas underlain by Archean Algoman granitic and migmatitic rocks, particularly north and west of the Sudbury Igneous Complex.

Flagstone

Exploration for high-quality flagstone should be emphasized as production from one of Ontario's oldest and largest flagstone operations, the Mill Lake Stone Quarry, will be constrained in the coming years. This type of gneissic rock can be found along the Parry Sound shear zone from Parry Sound east to Huntsville. The Muskoka flagstone is in high demand and close to large markets.

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15) LOW SULPHIDE PLATINUM GROUP ELEMENT MINERALIZATION IN SULPHIDE SATURATED MAFIC-ULTRAMAFIC INTRUSIONS

In the Timmins area, a number of large mafic to ultramafic intrusions have been identified with only very limited exploration for platinum group elements (PGE). Recent discovery of PGE mineralization in sulphide saturated, low sulphide settings within intrusive rocks at Sudbury and Lac des Isles suggest similar mineralization may be found in the Timmins District.

In the James Bay Lowlands, modern alluvial sampling completed under Operation Treasure Hunt (Crabtree 2003) has identified **several chromium anomalous areas**, specifically at Swan River, Muketei River, Stopping River and High Bank Lake. Chromite is a pathfinder mineral to mafic-ultramafic intrusions, hence these areas warrant investigation follow up for PGE. Platinum in place has been reported from Reame township, Ontario; it occurs with **chromite in a diamond bearing, basic intrusive rock** which

- **very limited PGE exploration in large UM intrusions**
- **OTH identified Cr-anomalous areas in the James Bay Lowlands**

gave an assay of 13.44% CrO₂; 14.58% Fe, 0.066 opt Pt.

Sulphide saturated intrusions hold greatest promise for PGE prospectivity. A number of these have been identified and tested with limited sampling (Vaillancourt et al. 2003).

Crabtree, D. C. 2003. Preliminary results from the James Bay Lowland indicator mineral sampling program; Ontario Geological Survey, Open File Report 6108, 115p.

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O'Neill, J. J. 1918. Summary Report, 1918, Part G; The Platinum Situation in Canada, 1918: Canada Department of Mines Geological Survey

Vaillancourt, C., Sproule, R. A., MacDonald, C. A. and

Leshner, C. M. 2003. Investigation of mafic-ultramafic intrusions in Ontario and implications for platinum group element mineralization: Operation Treasure Hunt; Ontario Geological Survey, Open File Report 6102, 335p.

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16) FOREST RINGS: ECONOMIC SOURCE OF NATURAL GAS?

Forest rings are large circular features in Ontario's Boreal forests that OGS studies have shown are centres of negative redox charge in glacial overburden and/or rock. At least several thousand of these features exist across Ontario, most of which occur in a broad east-west band north of Highway 11 that extends from the Quebec border to Geraldton. In 2004, the OGS demonstrated that most of the rings are centred on **accumulations of shallow methane** (natural gas). The rings can be quite large and many hundreds exceed a kilometre in diameter.

Methane was sampled using shallow collectors installed in selected rings and its isotopic composition was determined. Clusters of rings contain methane with similar isotopic composition and **at least 3 different sources of methane** have been identified. The most common one appears to be due to the presence of organic matter in marine and lacustrine clays. A second source, in the Martison Lake area, may be related to shallow Cretaceous coal measures.

A third, cluster northeast of Jog Lake, shows a very different isotopic composition that is suggestive of

- **hundreds of forest rings >1 km diameter centred on accumulations of methane**
- **some may indicate deep source of methane**
- **large rings themselves may contain economic quantities of shallow methane**

deeper Phanerozoic bedrock-sourced methane. Isotope data for only one methane sample is available for this latter cluster and more samples will be required to confirm the anomalous result.

The linear distribution of some of the rings near the Precambrian-Phanerozoic contact at the edge of the James Bay Lowlands suggests that other groups of rings may be due to upward methane seepage along geological structures from deeper sources. This may indicate **deeper sources of natural gas in the James Bay Lowlands**. In addition, many of the rings are sufficiently large (>1 km diameter) to themselves be of interest as economic **sources of natural gas**. Studies are currently ongoing to further characterize the source of the methane. It should be noted that not all the rings are methane sourced. Some are centred on other sources of negative charge such as hydrogen sulphide accumulations.

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17) PALEOPLACER GOLD POTENTIAL IN THE LORRAIN FORMATION OF THE HURONIAN SUPERGROUP

Broad geological similarities between the sediments of the Witwatersrand Basin in South Africa, hosting the largest known global gold deposits, and sedimentary rocks of the Huronian Supergroup in Ontario are well known. Not only are the rock types similar, they are also similar in age. The formation of orthoquartzite and quartz pebble conglomerate of the Lorrain Formation of the Cobalt Group suggests that hydro-mechanical sorting mechanisms for some of the Huronian and Witwatersrand sediments were similar.

Huronian sediments in the northern Cobalt Embayment area are likely the detrital **erosional products of gold-bearing Archean rocks** derived from the north. Deep, south-trending paleovalleys were carved in Huronian times north of the Cobalt embayment. These valleys, up to 70 km in length and several kilometres in width, are now filled with Huronian sediments. One such sediment-filled paleovalley starts about 30 km south of Timmins. In all likelihood, eroded material derived from the Timmins Gold Camp traveled down this valley to the south. Another sediment filled paleovalley is continuous up to 20 km south of the Porcupine–Destor deformation zone near Matheson and another such valley transects the Larder Lake Gold Camp near Virginiatown.

The occurrence of quartz pebble conglomerate beds and orthoquartzite in the Lorrain Formation make it attractive for **potential paleoplacer gold deposits**. The major sedimentary horizons of the 2000 to 3000 m thick Lorrain Formation, from top to bottom, are orthoquartzite, hematitic orthoquartzite, micaceous sandstone, feldspathic sandstone and hematitic siltstone. Pebble conglomerate beds occur throughout (Colvine 1982). Anomalous gold values have been obtained in sampling some of the quartz pebble beds of the Huronian Formation. Clearly gold is present and the environment was potentially conducive to forming **paleoplacer, reef style gold** deposits similar to those in South Africa. Colvine (1982) came to the conclusion that it is not a question if gold is present but rather “where and in which formation it is concentrated?” and “is it concentrated enough over sufficient widths and areas to allow its economic extraction?”

- **Huronian Supergroup has same age and origin as gold-bearing Witwatersrand Basin**
- **local high gold concentrations in Lorrain formation, with key alteration patterns**
- **untested potential for placer diamonds**

To follow up on evaluating the paleoplacer gold potential, Long and Leslie (1986) sampled mostly the Gowganda Formation, which underlies the Lorrain Formation. They found **high background values for gold** (5 ppb) in the Gowganda Formation do represent a 2 to 3 times enrichment in respect to crustal abundance. They further concluded that the absence of extensive fluvial strata in the Gowganda Formation of the northern Cobalt Plain makes the potential for placer concentrations of heavy minerals very low. However, Colvine (1981) considers that local high concentrations of gold in the Lorrain formation may reflect further concentration of heavy minerals by rivers, which eroded and reworked parts of the underlying Gowganda Formation.

Law (2000), in the quest for “Witwatersrand style” mineralization potential, considers a 2 stage approach: 1) basin selection based on a close geological match with the Witwatersrand; and 2) use of a hydrothermal model for the mineralization, including evidence for appropriate diagenetic and hydrothermal processes within the basin, their relationships to structure and known mineralization.

Law further points out that the overwhelming majority of gold and uranium mineralization is located within the upper Witwatersrand succession. Furthermore, mineralization is localized on unconformity surfaces along the proximal northern and western margins.

The Lorrain formation is near the top of the Huronian Supergroup and there is ample evidence for hydrothermal alteration of the sediments. Most likely low-angle, crosscutting pebble conglomerate beds would also be significant for gold concentrations in the Lorrain Formation. Such relationships can only be identified in a geological environment with numerous marker horizons, good outcrop and/or good diamond-drill hole coverage.

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The concept of potential paleoplacer gold deposits in the Huronian Supergroup is not new. The application of this concept led to the discovery of the quartz pebble conglomerate beds in the Elliott Lake area. It can be argued that the Elliott Lake uranium discoveries caused exploration to focus on that area at the expense of exploring other areas of the Cobalt Embayment for paleoplacer gold. Although various attempts at determining the **paleoplacer gold potential of the Cobalt Embayment** have been made, the potential remains virtually untested. Extensive sorting of sand grains occurred when the orthoquartzite of the Lorrain Formation formed, and quartz pebble conglomerate beds within them should have the best potential for gold.

Another, perhaps less promising potential, is the concentration of **diamonds in the quartz pebble conglomerate beds**. Diamonds have been discovered in some of the Witwatersrand quartz pebble conglomerates. Some Archean-aged lamprophyre dikes in the Abitibi are now known to be diamondiferous. It is conceivable that diamonds freed up during erosion could have become concentrated in

some of the quartz pebble conglomerate beds of the Huronian sediments.

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18) DIAMOND EXPLORATION—WEST OF KIRKLAND LAKE

Diamond exploration in the Kirkland Lake Resident Geologist District has increased over the past several years. Contact Diamond Corporation completed a mini-bulk sample on the 95-2 kimberlite pipe in Lundy Township in 2003. The results indicated that at that time, the pipe was uneconomical on its own. This stimulated an aggressive program of testing additional targets in the region. Since then, Contact Diamond announced the discovery of 2 pipes in Klock and Van Nostrand townships in 2004 and one pipe in Hudson township in 2005. A recent study has shown that a number of **lamprophyre dikes in the district are diamondiferous** (Grabowski and Wilson 2005).

- **diamondiferous kimberlites and lamprophyres**
- **OTH airborne surveys identified targets along Matachewan dikes**
- **numerous KIM anomalies north and west of the Lapointe pipe**

On May 19, 2005, Arctic Star Diamond Corp. and Tres-Or Resources Ltd. announced the discovery of a kimberlite pipe (**Lapointe**) in northeast Sharpe Township. The discovery was a follow-up to the recently released Discover Abitibi Round Lake airborne magnetic survey (OGS 2004). The companies staked priority targets and these were explored by a high-resolution airborne magnetic and

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electromagnetic survey, till sampling and finally diamond drilling. Since that time, the pipe has been confirmed to be **multiphase, diamondiferous and over 23 ha** in area. Located in approximately the centre of the Round Lake batholith, it appears to be unrelated to either the New Liskeard or Kirkland Lake kimberlite clusters. Dianor Resources Inc. reported that narrow dikes in southwest Pacaud Township, about 11.5 km east of the Lapointe discovery are kimberlite.

In December 2005, the results of modern alluvium sampling, collected during the summer of 2003, were released (Guindon and Reid 2005). The 5500 km² survey area is northwest of the New Liskeard kimberlite field, covering the Round Lake and Watabeag batholiths. Diamond potential kimberlite indicator mineral grains were found in Pacaud, Beauchamp, Cairo, Bannockburn and Milner townships. Numerous samples collected near the Montreal River Fault, north and south of Matachewan, contained kimberlite indicator minerals (KIMs). Other KIM anomalies are found in the Watabeag Batholith and the eastern part of the Round Lake batholith. An interesting cluster of anomalies occurs in northeast Pacaud Township.

Since the announcement of the discovery in Sharpe Township, large areas have been staked, mainly to the west of the pipe. Between May 18 and December 13, 2005, open ground in Yarrow, Morel, Kimberly, Shillington, Willison and Farr townships has been staked up. Between December 13, 2005, and February 1, 2006, the remainder of the open ground in Davidson, Sharpe, Smyth, Truax, Doon, Chown and Mickle townships has been staked, as well as, the north half of Rankin Township.

Areas to the north of the Lapointe kimberlite pipe, within and to the west of the Watabeag Batholith, have not been subjected to intense diamond exploration. Recent detailed airborne magnetometer surveys (Operation Treasure Hunt and Discover Abitibi) have identified numerous targets. Many

subtle targets can be found within the north-trending band of Matachewan diabase dikes.

Numerous modern alluvium samples, collected by the OGS, returned kimberlite indicator minerals within this area. It should be noted that a lack of kimberlite indicator minerals in the OGS sampling does not necessarily diminish the potential of the area. Sample sites were selected by the OGS for modern alluvium samples prior to the release of the airborne magnetic survey. No KIM anomalies from OGS sampling exist in the vicinity of the Lapointe pipe, though till samples collected by Tres-Or Resources Ltd. contained KIMs. No modern alluvium samples were collected by the OGS from the stream crossing the pipe. The Lapointe pipe is within the Lake Timiskaming Structural Zone but it is more than 36 km from the closest pipe in the Kirkland Lake cluster and more than 40 km from the New Liskeard cluster. How and if the pipe fits in with the 2 clusters may significantly increase the potential for more pipes to be found away from the 2 clusters.

The availability of high resolution airborne magnetic data, recently published kimberlite indicator mineral data from modern alluvium samples, combined with geological mapping, make the large tracts of relatively unexplored ground, north and west of the Lapointe pipe, an exciting area for diamond exploration.

Grabowski, G.P.B. and Wilson, A.C 2005. Sampling lamprophyre dikes for diamonds: Discover Abitibi Initiative; Ontario Geological Survey, Open File Report 6170, 262p.

Guindon, D.L. and Reid, J.L. 2005. Regional modern alluvium sampling of the Kirkland Lake–Matachewan area, northeastern Ontario; Ontario Geological Survey, Open File Report 6124, 121p.

Ontario Geological Survey 2004. Ontario airborne geophysical surveys, magnetic data, Round Lake batholith area; Ontario Geological Survey, Geophysical Data Set 1048.

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19) KERR MINE–GAUTHIER ASSEMBLAGE–NETTIE LAKE GOLD TREND

Queenston Mining Inc.'s successful exploration at the Upper Beaver Mine site has once again brought to the forefront the significance of **gold mineralization associated with structures** along the northern contact of the Gauthier Assemblage as well as nearby subparallel structures.

- **u/g advanced exploration and Au-Cu mineralization along altered, sheared Nettie Lake trend**
- **possible splay off the Cadillac-Larder Lake deformation zone**

Two significant areas with gold mineralization have been discovered along this trend. They are the Victoria Creek gold deposits and the Upper Beaver Mine deposits, both in Gauthier Township. The Victoria Creek deposits occur just below the stratigraphic top of the Gauthier Assemblage, and the Upper Beaver deposits, approximately 7 km to the east-southeast, occur above and below this contact.

The Victoria Creek deposits are silicified, albitized and carbonatized, hydrothermally altered shear zones in volcanic rocks (tuff?). The Upper Beaver Mine deposits are characterized by the occurrence of quartz, magnetite, chalcopyrite, pyrite and gold in a variety of host rocks. In addition to the known mineralized zones, several zones of intense hydrothermal alteration, possibly associated with gold mineralization, have been discovered within the Gauthier Assemblage. These alteration zones and their gold potential have been discussed previously (Meyer et al. 1993, 1994, 1995, 1999 and 2004).

The Victoria Creek gold deposits have been explored by Sudbury Contact Mines Limited (now Contact Diamond Corporation) and a surface diamond drill-inferred resource of 5.5 million tons grading 0.10 ounce gold per ton was calculated in 1998. An underground advanced exploration project in the same year determined that the deposits were uneconomical at the time and the infrastructure was dismantled.

Between 1912 and 1972 the Upper Beaver Mine recovered 140 709 ounces of gold from 580 562 tons of ore at a recovered grade of 0.242 ounce per ton gold, as well as 5978 tons of copper. Recent diamond drilling by Queenston Mining Inc. intersected **impressive gold-copper** mineralized zones north of and below previous mine workings as well as adjacent to and south of the workings.

Four kilometres west-northwest of the Gauthier Assemblage, a group of rocks east of Nettie Lake in

Morrisette Township have been considered an outlier of the Timiskaming Assemblage. The rocks are partly **strongly carbonatized** and some may be hydrothermally altered volcanic rocks. The potential for gold mineralization was previously discussed (Meyer et al. 1994). These rocks align with the long axis of the Gauthier Assemblage and may be part of this assemblage. Occasional specks of jasper in the sediments do not support this possibility. Recently, Gold Insight Resources Ltd. completed a diamond-drill hole (DDH 05-01) from north to south to intersect the northern contact of the Nettie Lake sedimentary/felsic volcanic rocks. The hole penetrated mafic volcanic rocks of the Lower Blake River Assemblage before intersecting 3 m of conglomerate followed by greywacke ranging from finely laminated, fine-grained to gritty sedimentary rock. A conglomerate (possibly agglomerate) bed occurs at or very near to the stratigraphic top of the Gauthier group of calc-alkalic volcanic rocks both north of the Victoria Creek gold deposits and at the Upper Beaver Mine. The conglomerate unit at the Victoria Creek zone is overlain by a 1 m wide argillite (or tuff) unit, which in turn is overlain, apparently conformably, by the Lower Blake River Assemblage. At the Upper Beaver Mine, the geology is similar; however, the conglomerate unit is much thicker. Conglomerate/agglomerate at each of the 3 sites perhaps suggests that the Nettie Lake sediments and volcanic rocks could be part of the Gauthier Assemblage (?). This could have some implications for gold mineralization.

The Kir-Vit Property located in McVittie Township, approximately 7 km east-southeast of the Upper Beaver Mine, aligns with the Victoria Creek and Upper Beaver Mine deposits. An exploration shaft was sunk on the property to a depth of 300 feet and gold mineralization was indicated over a strike length of 600 feet. Drill intersections ranged from 0.1 to 1.32 ounce gold per ton over core lengths of 1.5 to 15 feet (The Northern Miner, June 26, 1980). Follow-up diamond drilling by Edomar Resources Inc.

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intersected a carbonatized zone with the best diamond-drill hole (E-80-3 or MNM DCL # KL 1668) intersecting 2 sections grading 0.08 ounce per ton gold over 5 feet and 0.06 ounce per ton gold over 4 feet. If the Kir-Vit gold mineralization is part of this general trend, then further extrapolation of it to the east would suggest that it is a possible **splay structure off the Cadillac-Larder Lake deformation zone** commencing near the Kerr Mine.

Toogood (D. Toogood, personal communication with G. Grabowski in 1986) suggested that the favourable trend could perhaps even be extrapolated as far west-northwest as the Bourkes Gold Mine in Benoit Township. This structure could be analogous with the **Pipestone and/or North Branch Porcupine-Destor fault zone**.

Gold mineralization along the Kerr-Nettie Lake trend, and possibly beyond, is mostly associated with pyrite or both pyrite and chalcopyrite. Some sections along this trend, particularly in overburden-covered areas in Gauthier Township, should be covered with IP surveys to search for possible gold-associated conductors.

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Meyer, G., Grabowski, G.P.B., Guindon, D.L. and Chaloux, E.C. 2004. Report of Activities 2003, Resident Geologist Program, Kirkland Lake Regional Resident Geologist Report: Kirkland Lake District; Ontario Geological Survey, Open File Report 6131, 52p.

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20) DIAMOND-BEARING LAMPROPHYRE IN THE KIRKLAND LAKE-COBALT AREA

The Discover Abitibi lamprophyre sampling project, has demonstrated that lamprophyre dikes and breccias in the Kirkland Lake-Cobalt area contain diamonds. The conclusions reported in OFR 6170 (Grabowski and Wilson 2005) are summarized below.

A 25 kg sample represents about one cubic foot of rock. Although every attempt was made to collect as representative a sample as possible from each exposure, the relatively small volume sampled may have easily missed a diamond. Therefore, sample

- **30 known kimberlite pipes; over half contain diamonds**
- **diamonds in lamprophyre dikes may be hosted by xenoliths**
- **numerous lamprophyres not sampled**

locations that did not return a diamond should not be considered barren.

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Further study is needed to determine where the diamonds are located within the dikes. Most dikes sampled that returned diamonds contained xenoliths. Spider Resources Inc. recently postulated that **diamonds recovered from their Wawa property are found in xenoliths** (Spider Resources Inc., press release, May 17, 2005).

A variety of rock types host lamprophyre dikes and breccia, including all types of metavolcanic and metasedimentary rocks, as well as felsic intrusive rocks, including granodiorite, granite and syenite. No preference is apparent for those that contain diamonds.

There are **numerous lamprophyre locations that were not sampled** in this project. Published Ontario Geological Survey (and its predecessors) reports and maps can be used to locate these exposures.

The Kirkland Lake–Cobalt area hosts more than 30 kimberlite pipes, over half of which are diamondiferous. There are many targets being tested for potential kimberlite. In May 2005, Tres-Or

Resources Ltd. discovered a kimberlite pipe on its Temagami North property, Lapointe 1 target, which is located 16 km northwest of sample GGDA0402.

Some further reasons to continue the search include: Dianor Resources Inc.'s report that the DBR (Diamond-Bearing Rock) at the Leadbetter property in Wawa is a conglomerate! (Dianor press releases, December 21, 2005 and December 21, 2005). The sample, which returned the **most diamonds (23)**, came from the Nipissing silver mine in Cobalt, where lamprophyre was identified in 1907!

A search of “lamprophyre” in the General Index to Published Reports, Volumes 1 to 9, reveals more than 20 references. Diamond-bearing lamprophyre in the Kirkland Lake–Cobalt area are geochemically similar to those in Wawa.

Grabowski, G.P.B. and Wilson, A.C 2005. Sampling lamprophyre dikes for diamonds: Discover Abitibi Initiative; Ontario Geological Survey, Open File Report 6170, 262p.

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21) GOLD AND INDUSTRIAL MINERALS IN SOUTHEASTERN ONTARIO

Madoc–Grimsthorpe Area

Gold was first discovered in Ontario in 1866 near the community of Eldorado north of Madoc. From 1895 to 1908, gold production in the area peaked with **12 mines in production**. In the 1930's Cominco Ltd. undertook extensive underground exploration at both the Cordova and Addington gold mines. By 1939 all gold production and exploration activity in the region had ceased. It was not until the late 1970's that exploration for gold recommenced in this area, mainly due to the commodity's increased price. Exploration capital raised by “flow through financing” along with new discoveries fueled renewed gold exploration activity during the 1980's. In 1990, gold exploration activity diminished once again to be revived in 1996.

- **several identified gold resources in a variety of deposit types**
- **past producers with identified resources of garnet and corundum**
- **focus on exploration in southeastern Ontario to supply the high demand for dimension stone, landscaping and crushed rock**

In 2006, there has been renewed interest in gold in the Southeast District. In the Madoc–Grimsthorpe area there are a number of gold prospects **including several with identified resources** in a variety of geological settings. Positive results from previous exploration have identified areas of high potential where further investigation is warranted.

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Table 1. Gold Deposits of the Madoc – Grimsthorpe Area, Southeastern Ontario*

Deposit	Status
Madoc Township	
Bannockburn	Developed Prospect Published resource - 225 000 tons grading 0.267 oz/ton
Richardson	1899 – 68 Produced 75 to 100 oz. Avg. grade 0.408 opt
Sophia	1900 Produced 50oz. 1941 Produced 60 oz from 300 tons milled.
Elzevir Township	
Cooper	Developed Prospect Published resource 40 000 t @ 8.0 gpt Au and 3 Mt @ 30-33% recoverable talc
Belmont Township	
Cordova	1892 Produced 22 774 oz from 120 670 tons milled. Avg grade 0.19 opt
Ledyard	1893-94 Produced 13 oz from 55 tons milled Avg grade 0.24
Tudor Township	
Craig	1905-06 Produced 248 oz from 1 850 tons milled. Avg grade 0.13opt
Grimsthorpe Township	
Gilmour	1909-10 Produced 172 oz from 550 tons milled. Avg grade 0.31opt
Marmora Township	
Dingman	Developed Prospect Published resource 7 Mt @ 1.8 gpt Au
Cook	1901-04 Produced 289 oz from 1 483 tons milled. Avg grade 0.26 opt
Sovereign	1878, 1892-1900. Produced 370 oz from 1 962 tons milled. Avg grade 0.19 opt
Pearce	1893-08 Produced 302 oz from 239 tons milled. Avg. grade 1.26opt
Gatling 5 Acre	1900-03 Produced 2 353 oz from 6 114 tons milled. Avg grade 0.38 opt
Deloro	1897-02 Produced 10 360 oz from 39 143 tons milled. Avg grade 0.26opt

* The resource estimates listed above do not follow the required disclosure for reserves and resources as outlined in National Instrument 43-101, and are historic resource figures generated by past workers.

Harlowe Gold

A second area considered to have high potential is near the hamlet of Harlowe in Kennebec Township.

In the Harlowe area, a 2 km wide belt of tightly folded mafic metavolcanic and metasediments hosts a number of gold occurrences. The belt trends northeast along the margin of a granodiorite pluton. In 1990-91, Rio Algom Exploration Limited completed geological and geochemical surveys, trenching and diamond drilling on 2 blocks of patented land acquired through option agreements. The company examined previously known gold showings and identified a new occurrence. **Gold values of up to 32g/t** but more commonly 10g/t were returned from surface sampling. Drill core and logs from the program are on file with the Tweed Resident Geologist Office. Further examination of this area to evaluate its potential is recommended. (LeBaron 1991, MDI Files Tweed RGO, Drill Core Library Files Tweed RGO)

Mineral Abrasives

The coating and surface preparation industries are moving away from silica sand in favour of **non-silica and recyclable products**. Significant growth is expected in recyclable products in the next 8 to 10 years.

Historically, southeastern Ontario saw production of a variety of abrasives including corundum, garnet and emery. At the peak of production in 1906, Ontario supplied 82% of the world's corundum. Subsequently, many of these abrasives were replaced by silica and synthetic materials. New health and safety regulations recognize the hazard and control the use of free silica in abrasive products and compounds.

There is a demand for alternate natural abrasives including **corundum, garnet and staurolite**.

Mineral deposit inventory records on file with the Tweed Resident Geologist Office document 20 garnet occurrences and 25 corundum occurrences including **past producers with identified resources**. These are worthy of further investigation. In the 1980's during

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research and geological mapping completed as part of a refractory mineral project, the Tweed Resident Geologist Office identified a **large area of staurolite mineralization** near Ferleigh. These results remain unpublished. Investigation of this area as a potential source of staurolite is recommended. (C. Verschuren, personal communications, 2004, Tweed RGO unpublished reports)

Ontario Stone

Southern Ontario is a major producer of stone including dolostone, gneiss, granite, limestone, sandstone, marble and trap rock. For use as dimension stone, landscape stone and crushed stone aggregate. Most crushed stone comes from Paleozoic limestone and dolostone. In 2003, the last year for which production figures are available, Ontario's stone production was **valued at \$506M**. Most of this production came from Southern Ontario.

The following recommendations focus on commodities with **identified market potential** as well as favourable geology. Exploration for new sources of the following stone is recommended:

1. **Dimension stone**, particularly unusual granites and marbles. New opportunities result from the introduction of new processing techniques, in particular the use of resins to impregnate and stabilize stone. Targets: Grenville province, southeastern Ontario;
2. **Unique landscaping stone** for domestic use and for export. Targets: Gull River Limestone and Landscape Stone in the Orillia, Minden–Peterborough areas;
3. **High quality crushed stone aggregate** for the Greater Toronto Area including carbonates, granite and traprock. Pressures on existing sources of aggregate for the Greater Toronto Area are of growing concern.

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NB: The various references to mineral reserves/resources in this document may be based on data before National Instrument 43-101 went into effect. These reserve/resource calculations may not meet criteria for National Instrument 43-101.

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