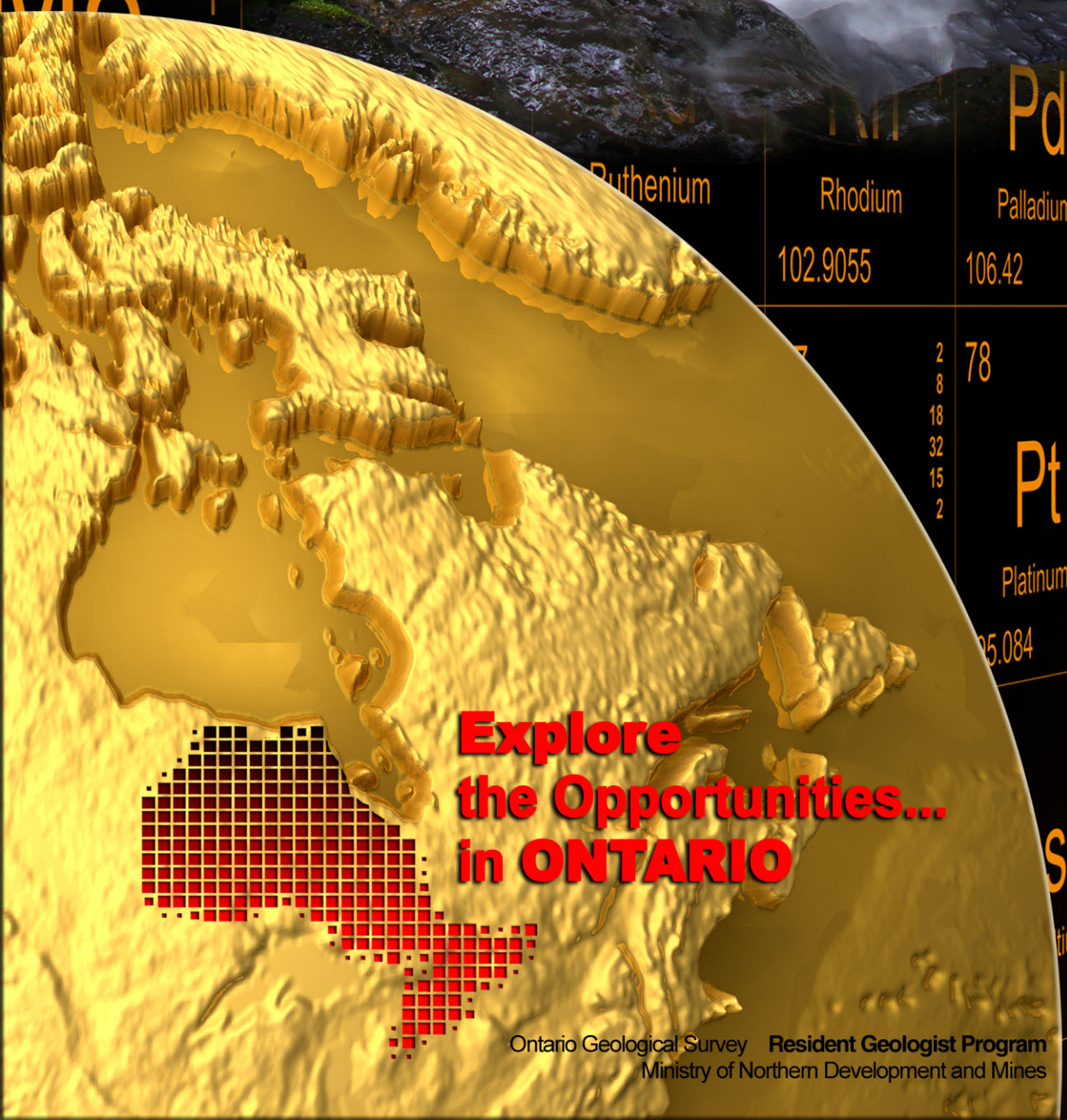
Ontario

RECOMMENDATIONS *for* Exploration

2011 - 2012



Ontario Geological Survey **Resident Geologist Program**
Ministry of Northern Development and Mines

ONTARIO CANADA

Recommendations for Exploration

2011-2012

General Area that is Recommended for Mineral Exploration

ONTARIO
CANADA

Photo courtesy of Karen Labonte

The Ontario Resident Geologist Program

The primary responsibility of the Ontario Geological Survey's Resident Geologist Program is to monitor, stimulate and facilitate mineral exploration and to support the sustainable development and stewardship of Ontario's mineral resources. The program is provincial in scope and provides primary client services through a network of 8 field offices strategically located across the province. Six Regional Resident Geologists, supported by 8 District Geologists, 8 District Geological Assistants, 2 Mineral Deposit Compilation Geologists and 2 GIS/Data Specialists provide a comprehensive list of services to mineral industry clients, to functions internal to government that support the mineral resource sector and to the public in general, in order to promote "Geoscience for the Public Good".

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 Provincial interests. The First Nations Minerals Information officers, based in Thunder Bay and Timmins provide education, information, advice and expertise regarding prospecting, mineral exploration and mining to First Nation Communities throughout Ontario generally, and northern Ontario particularly.

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 internally to other programs within the Ontario Geological Survey (Information and Marketing Services, Publication Services, GeoLabs) as well as to other branches of the Mines and Minerals Division, Ministry of Northern Development and Mines, including Mineral Development and Lands Branch and the Aboriginal Relations Branch. The Senior Manager for the Resident Geologist Program is Jim Ireland, who is resident 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.ontario.ca/residentgeologist

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Contents

HIGHLIGHTS

- **Gold occurs within sheared and altered volcanic rocks**
- **The intensity of alteration generally correlates with the intensity of foliation and may indicate proximity to faults**
- **Areas of strong alteration and lithologic contacts are priority exploration targets**

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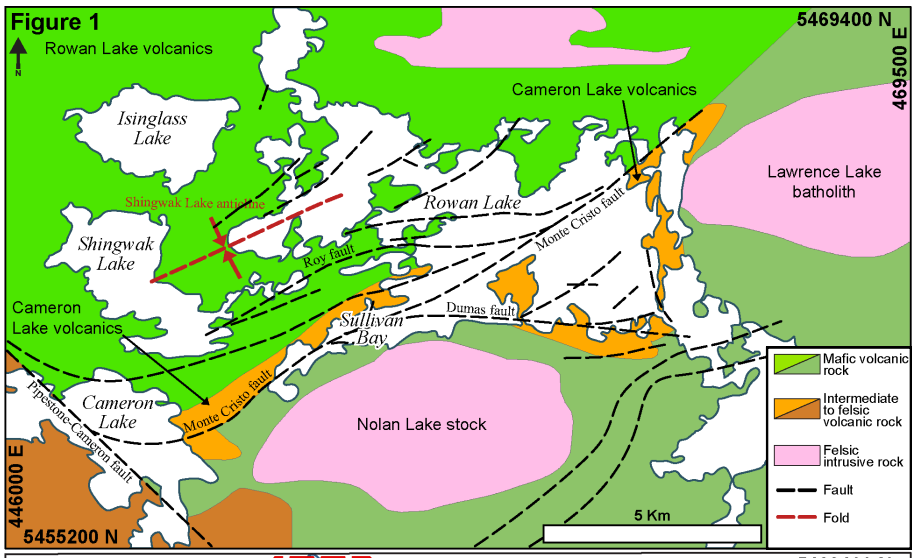
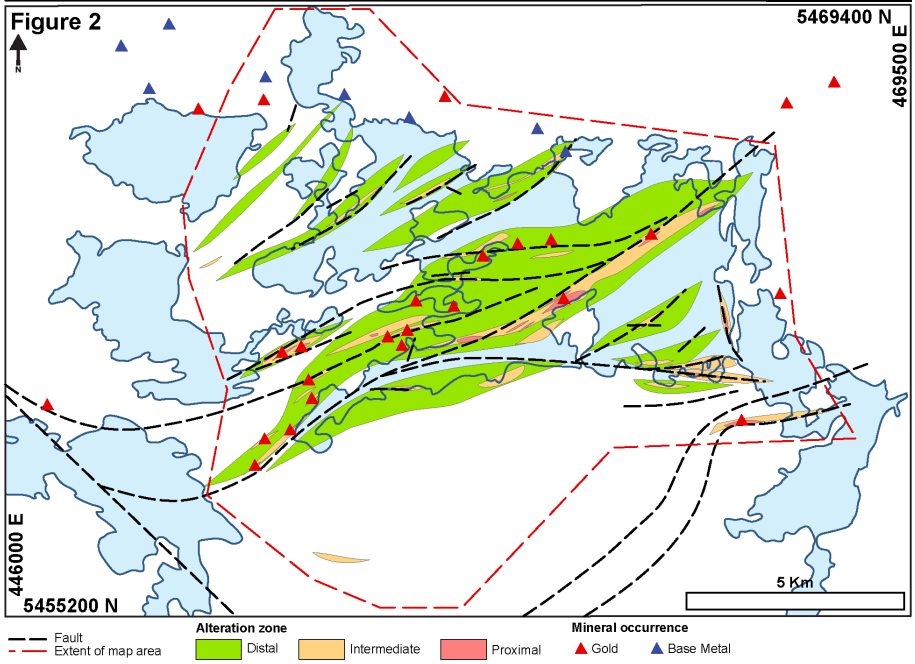
Gold Mineralization at Rowan Lake

The Rowan Lake area, located approximately 40 km east of Sioux Narrows, Ontario, is actively being explored for orogenic lode-gold mineralization. Numerous gold occurrences (including the Cameron Lake deposit) are associated with the Monte Cristo fault, a splay of the Pipestone – Cameron fault (Figure 1).

The Monte Cristo fault and second-order splay and/or conjugate faults are characterized by a strong fabric which controls the development of secondary alteration (Lewis and Woolgar 2011). The distal alteration zone is characterized by quartz, chlorite, epidote, hematite, and carbonate alteration minerals. The intermediate zone is characterized by enhanced quartz, calcite, and ankerite (both as silicification and veining), and the addition of tourmaline and muscovite.





Gold Mineralization at Rowan Lake …cont'd

The proximal zone is characterized by a sharp increase in muscovite and green mica, quartz veining, ankerite, and the presence of pyrite, and/or chalcopyrite. These zones are shown on Figure 2.

Exploration should target areas located along the Monte Cristo fault and associated splay faults. Areas where these structures coincide with lithologic contacts and intermediate to proximal alteration zones are especially prospective. Although these concepts are based on observations in the Rowan Lake area, they may be more generally applicable to the western extent of the Savant Lake – Crow Lake greenstone belt.

For additional information on the Rowan Lake area, consult:

Lewis, D., and Woolgar, S. 2011. Structural controls and alteration patterns of gold mineralization at Rowan Lake, Northwest Ontario; in Summary of Field Work and Other Activities 2011, Ontario Geological Survey, Open File Report 6270, p.10-1 to 10-9.

HIGHLIGHTS

- **The McCombe pegmatite in the Root Lake area contains significant Ta mineralization**
- **The Bear Head Lake Fault contains the Pakeagama Lake rare metal pegmatite along with several more reported rare metal pegmatite occurrences with significant exploration potential**

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Rare Metal Pegmatites

Rare metal pegmatites in parts of the Red Lake district and exploration guidelines for them have been described by Breaks, Selway and Tindle (2003). Breaks, Selway and Tindle (2001) re-evaluated the McCombe pegmatite in the Root Lake area and found significant Ta mineralization. This result, as well as Ta values reported by Storey et al. (2000) also from the Root Lake area, indicate significant rare metal exploration potential in pegmatitic rocks hosted in mafic metavolcanics of the Uchi Subprovince north of the Lake St. Joseph fault. The area of interest includes the western and southern margins of the Allison Lake batholith; the eastern tail of the batholith that extends east-southeast from Birkett Township; and the pegmatites hosted in mafic metavolcanic rocks along the south margin of the Uchi Subprovince, proximal to the English River subprovince boundary (see Figure 3).

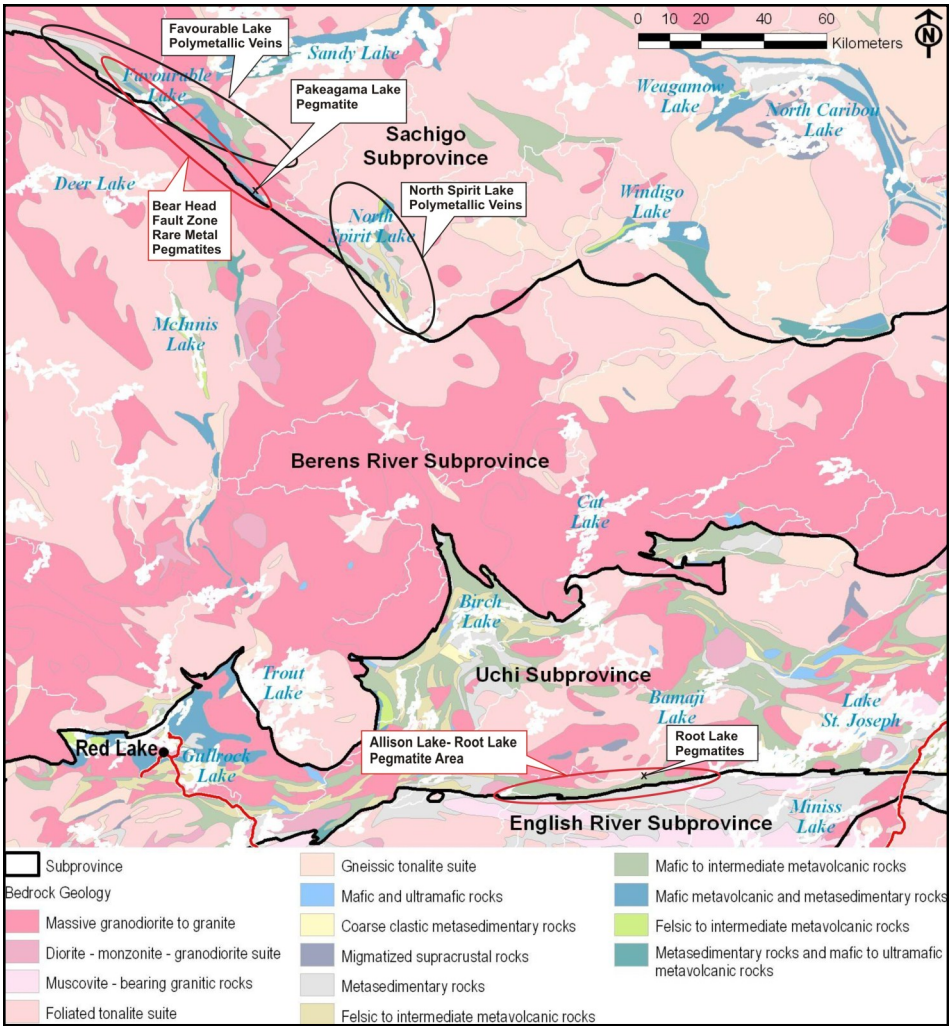

Figure 3.

Rare Metal Pegmatites …cont'd

Rare metal pegmatites have also been identified on the Bear Head Lake fault system that separates the Berens River Subprovince from the Sachigo Subprovince (Breaks et al. 1999). The Pakeagama Lake pegmatite has received considerable OGS and industry attention. There are several more reported pegmatite occurrences along the Bear Head fault system. OGS mapping indicated beryl southwest of Setting Net Lake and lithium at two locations nearby in the same area (see Figure 3).

Breaks, F.W., Selway, J.B. and Tindle, A.G. 2003. Fertile peraluminous granites and related rare-element mineralization in pegmatites, Superior Province, northwest and northeast Ontario: Operation Treasure Hunt; Ontario Geological Survey, Open File Report 6099, 179p.

Breaks, F.W., Selway, J.B. and Tindle, A.G. 2001. Fertile peraluminous granites and related rare element pegmatite mineralization, Superior Province, Northwest and Northeast Ontario; in Summary of Field Work and Other Activities 2001, Ontario Geological Survey, Open File Report 6070, p.39-1 to 39-39.

Storey, C.C., Hinz, P., Gosselin, S.DM., Blackburn, C.C. and Kosloski, L. 2000. Report of Activities 1999, Resident Geologist Program, Red Lake Regional Resident Geologist Report: Red Lake and Kenora Districts, Ontario Geological Survey, Open File Report 6003, 66p.

Breaks, F.W., Tindle, A.G. and Smith, S.R. 1999. Rare-metal mineralization associated with the Berens River–Sachigo subprovincial boundary, northwestern Ontario: discovery of a new zone of, complex-type, petalite-subtype pegmatite and implications for future exploration; in Summary of Field Work and Other Activities 1998, Ontario Geological Survey, Miscellaneous Paper 169, p.168-182.

HIGHLIGHTS

- **Polymetallic vein mineralization is a current exploration target of Guyana Frontier Mining Corp. at Borland Lake northwest of Favourable Lake**

- **Numerous other examples of this mineralization type are present in the Favourable Lake Belt**

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Polymetallic Veins in the Favourable Lake Greenstone Belt

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 (lead and zinc). This type of mineralization is found throughout the Favourable Lake, North Spirit Lake and western North Caribou greenstone belts (Puumala and Bennett 2011). The Berens River Mine near Setting Net lake produced 5.79 million ounces of silver, 157 000 ounces of gold 6 million pounds of lead, and 1.79 million pounds of zinc between 1939 and 1948 (Lichtblau et al. 2011) from a vein system of this type.

Recent exploration activity in the Favourable Lake belt by Guyana Frontier Mining Corp. (formerly Shoreham Resources Ltd.) has been directed at this type of mineralization in the Borland Lake area. The entire Favourable Lake, Setting Net Lake and North Spirit Lake greenstone belts are prospective for this type of mineralization (see Figure 3).

Lichtblau, A.F., Ravnaas, C., Storey, C.C., Bongfeldt, J., McDonald, S., Lockwood, H.C., Bennett, N.A. and Jeffries, T. 2011. Report of Activities 2010, Resident Geologist Program, Red Lake Regional Resident Geologist Report: Red Lake and Kenora Districts; Ontario Geological Survey, Open File Report 6261, 93p.

Puumala, M.A. and Bennett, N.A. 2011. Mineral occurrences of the central North Caribou terrane; Ontario Geological Survey, Open File Report 6256, 203p.

HIGHLIGHTS

- **PGE Ni-Cu occurrences in the Kenora District are known to occur within ultramafic, mafic and intermediate intrusive rocks**
- **Historical exploration in most areas has not evaluated the PGE potential but mainly focused on nickel copper potential**
- **In addition to staking of large amounts of open Crown Land, there exists significant opportunity for option or joint venture agreements, or revitalization of dormant exploration projects**

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Platinum Group Elements, Nickel and Copper Potential in the Kenora District

Platinum group element (PGE) and Ni-Cu occurrences are known to occur within ultramafic, mafic and intermediate intrusive rocks in the Kenora District. Historical exploration efforts have targeted the Ni-Cu potential but only a limited number of projects have targeted PGE mineralization. Except for advanced programs conducted at the Grassy Portage Intrusion, Entwine Lake Intrusion and the Rex-Werner Lake deposits, all other PGE exploration projects only involved prospecting and sampling. Exploration activity is presently dormant in the majority of areas with PGE-Ni-Cu potential; there could be the opportunity for option or joint venture agreements, or project generation. Several intrusions which have historically not been evaluated for their PGE potential, remain open for staking.

The following table provides a general description of the geology and mineralization of the major ultramafic, mafic and intermediate intrusive bodies in the Kenora District. The resource column indicates the most significant PGE-copper-nickel mineralization associated with the bodies. The following figure, keyed to the table, illustrates the locations of mineral potential areas.

No	AREA / NTS	STATUS Dec. 05, 2011	GEOLOGY / MINERALIZATION	RESOURCE / REFERENCES
1	Dobie Intrusion 52C/12 NW	Patent, First Nation Reserve and open Crown land	A norite - gabbro intrusion with po, py, pent, cpy mineralization. Sulphides are present in pockets or disseminations.	Young Option, 5 Mt @ 0.28% Cu and 0.24% Ni based upon 165 ddhs. (Kenora Assessment Files 52C/12 NW B-3)
2	Grassy Portage Intrusion 52C/11 NW / NE	Staked	Gabbro - anorthosite rocks in a steeply, north dipping, layered intrusion. Basal segregation of cpy, po and pent noted. The 3.7 m thick mineralized zone consists of 8% stringer and disseminated pyrrhotite and chalcopyrite at the contact between mafic volcanics and coarse grained gabbro.	North Rock Mine - 1.0M tons @ 1.17% Cu (Poulson 2000) A 3.4 m interval in diamond drill program returned 12.2 g/t Pt (Press release, MetalCORP Ltd., March 6, 2006)
3	Bad Vermilion Lake Intrusion 52C/10 NE	Staked and open Crown land	Layered mafic rocks of the intrusion are composed of equigranular medium-grained gabbro, leucogabbro and anorthosite, with disseminated magnetite and ilmenite.	Coarse-grained mineralization is located in isolated lenses within massive-textured zones of ilmenite and titaniferous magnetite. (Poulson 2000)
4	Bennett Lake intrusions 52C/16 SE / SW	Open Crown land	Gabbroic rocks that form lobate intrusions of diorite to quartz diorite.	Grab samples of altered anorthosite from Grey Trout Road exposures returned 1.46% Cu, 0.18% Ni, 0.07% Co and 46 ppb Pd (Blackburn and Hinz 1996)

Platinum Group Elements, Nickel and Copper Potential in the Kenora District …cont'd

No	AREA / NTS	STATUS Dec. 05, 2011	GEOLOGY / MINERALIZATION	RESOURCE / REFERENCES
5	Entwine Lake Intrusion 52F/02 NE	Staked	Stone (2000) identified this intrusion as a sanukitoid suite of quartz monzonite to quartz diorite composition. Mineralization is hosted in altered diorite.	Campbell Zone has been traced for 1000 m by 45 m to a depth of 150 m. DDH ER-23 returned 1.2 g/t Au-Pd-Pt, 4.8 g/t Ag, 0.5% Cu over 30 m. (Press Releases, Champion Bear Resources Ltd. 2000)
6	Jackfish - Weller Lakes Pluton 52F/03	Open Crown land and patents	A possible sanukitoid intrusion. A porphyritic monzonite, syenite to diorite intrusive body that has received no PGE exploration (Stern 1989)	Jackfish Lake – grab sample returned 4.8% Cu, 0.96% Co. Mineralization included Cu, Co, and Bi. (Blackburn 1976)
7	Caliper Lake Intrusion 52F/04 SW	Open Crown land	Southward, steeply dipping, layered gabbroic intrusion composed of pyroxenite to quartz diorite.	5 grab samples returned 1154-2245 ppm Cr with low Cu and Ni values (<300 ppm) (Kenora Resident Geologist Office Field Work, 2000)
8	Zone #34 52D/16SE	Staked and Patents	Magmatic Ni-Cu-Co-PGE mineralization found in a sub-horizontal tabular, pyroxenite -gabbro intrusion that cuts the ODM/17 gold zone.	57 000 tonnes grading 457 ppb Pt, 1160 ppb Pd, 7562 ppm Ni, 4714 ppm Cu (Technical Report, Rainy River Resources Ltd, July 2009)
9	Denmark Lake intrusions 52F/05 NE	Staked	Variable textured gabbro with remobilized sulphides along shear zones. At Kenbridge sulphides were remobilized in a breccia pipe conduit and situated in matrix around and as filling within fragmental rocks.	Nielson – Gauthier – grab samples assayed 0.65% Cu and 0.48% Ni over 6m (Davies, 1973) Kenbridge Mine - indicated 3.7 Mt @ 0.64% Ni and 0.34% Cu. (Press release, Canadian Arrow Mines Ltd., January 2, 2008)
10	Mulcahy Intrusion 52F/11 SW	Staked	A layered gabbro in NW border of Atikwa Batholith. The Mulcahy Intrusions can be divided into 3 marginal zones. Chromite bands containing 2% sulphides were noted.	Mulcahy Lake - grab samples returned 2190 ppm Cu and 1350 ppm Ni. (Sutcliffe and Smith, 1985) Samples from Trench 7 had 870 ppb Pd (Kenora Assessment Files 52F/11SW L1 to L-4)
11	Mafic intrusions around the Atikwa Batholith	Patents, staked and open Crown land	PGE and Cu-Ni occurrences occur within ultramafic, mafic and intermediate intrusive rocks peripheral to the Atikwa batholith. These include the Emmons Lake, Nabish, and Mile Lake intrusions.	Emmons Lake - grab samples from an altered gabbro returned 717 ppm Pt and 1012 ppm Pd. (Hinz and Ravnaas 1998)
12	Boyer Lake Intrusion 52F/07NE	Open Crown land	Strongly zoned, gabbroic sill composed of gabbro to quartz-eye gabbro. Weak sulphide mineralization has been located at the periphery.	Massval Mines - 0.2% Cu over 0.6 m and high MgO (12-15 wt%) in leucocratic zone. (Blackburn 1981)
13	Pike Lake Intrusion 52G/14 SW / SE	Staked	Composed of variable textured quartz diorite to diorite with disseminated chalcopyrite. Cu has been the target of past exploration but not PGEs.	Trench samples returned 2 % Cu and 0.5% Ni (Kenora Assessment Files 52G/14SE 0061)

Platinum Group Elements, Nickel and Copper Potential in the Kenora District …cont'd

No	AREA / NTS	STATUS Dec. 05, 2011	GEOLOGY / MINERALIZATION	RESOURCE / REFERENCES
14	Barge Lake intrusions 52G/15 NW	Open Crown land	A number of gabbro to serpentinized peridotite intrusions with disseminated chalcopyrite. There has been no exploration targeting PGE.	
15	Handcuff Lake intrusions 52J/03 NE	Open Crown land	Unexplored variable textured gabbro, anorthosite gabbro, quartz diorite intrusions.	
16	Marchington Road intrusions 52J/06 SE / SW 52J/07 SW	Open Crown land	Several mafic sills composed of diorite to quartz diorite rocks. These intrusions have not been explored for PGE.	Py and cpy noted in intrusive rocks. (Bond 1980)
17	Rex - Werner Lake Ultramafic rocks 52L/06 52L/07	Staked and Patents	Disseminated to massive magmatic Ni - Cu - Co - PGE mineralization associated with ultramafic - mafic lenses and pods. Cu - Co deposits are known in the area.	Rexora - 140 000 tons of 1.5% Ni and 0.7% Cu. Gordon Mine - produced 1.4M tons of 0.9% Ni, 0.5% Cu and 0.023 oz/t Pd Norpax – 1M tons of 1.2% Ni and 0.5% Cu (Parker 1998)

Abbreviations: cpy-chalcopyrite; pent-pentlandite; po-pyrrhotite; py-pyrite; ddhs-drillholes

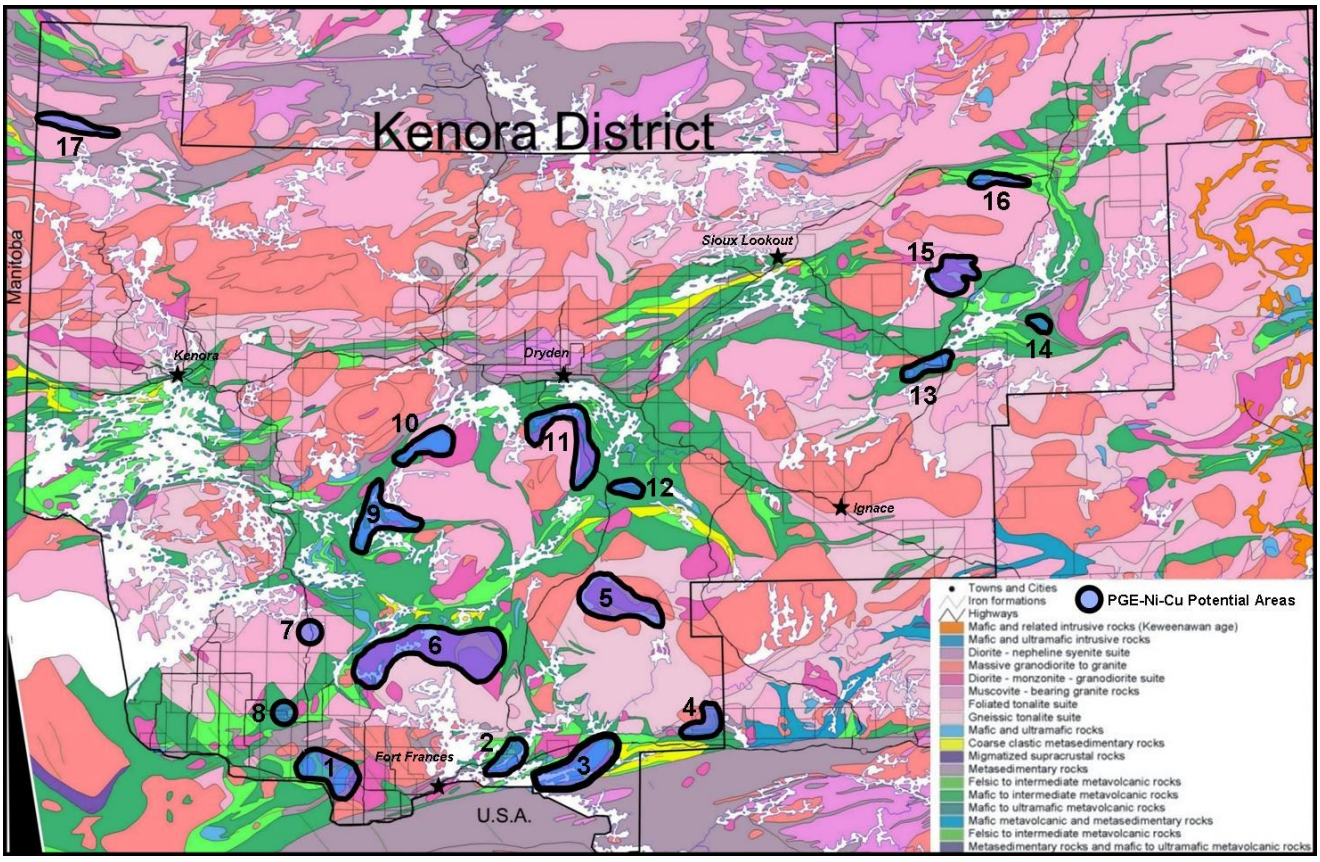

Figure 4. Location of areas of PGE-Ni-Cu potential in the Kenora District (*modified from* OGS 2003, MRD 126).

Platinum Group Elements, Nickel and Copper Potential in the Kenora District …cont'd

Blackburn, C.E., Hinz, P., Storey, C.C., Kosloski, L. and Ravnaas, C.B. 1999. Report of Activities 1998, Resident Geologist Program, Red Lake Regional Resident Geologist Report: Red Lake and Kenora Districts; Ontario Geological Survey, Open File Report 5987, 88p.

Blackburn, C.E. 1976. Geology of the Off-Burditt Lake Area, District of Rainy River; Ontario Div. Mines, GR 140, 62p.

Blackburn, C.E. 1981. Geology of the Boyer Lake-Meggisi Lake Area, District of Kenora; Ontario Geological Survey Report 202, 107p.

Blackburn, C.E., and Hinz, P. 1996. Kenora Resident Geologist's District; in Report of Activities 1996, Ontario Geological Survey, Open File Report 5958, 465p.

Bond, W.D. 1980. Geology of the Houghton-Hough Lakes Area (Savant Lake Area), District of Thunder Bay; Ontario Geological Survey Report 195, 112p.

Davies, J.C. 1973. Geology of the Atikwa Lake Area, District of Kenora; Ontario Div. Mines, GR 111, 57p.

Hinz, P., and Ravnaas, C. 1998. Kenora Resident Geologist's District; in Report of Activities 1999, Ontario Geological Survey, Open File Report 5987, 31p.

Ontario Geological Survey 2003. 1:250 000 scale bedrock geology of Ontario; Ontario Geological Survey, Miscellaneous Release—Data 126.

Poulson, K.H. 2000. Geological setting of mineralization in the Mine Centre-Fort Frances area; Ontario Geological Survey, Mineral Deposits Circular 29, 78p.

Sutcliffe, R.H., and Smith, A.R. 1985. Precambrian Geology of the Mulcahy Gabbro, District of Kenora; Ontario Geological Survey, Map P.2826, Geological Series, Preliminary Map, scale 1: 15 840, Geology 1984.

Magmatic Sulphide Mineralization in Orogenic Plutons Along the Uchi-English River Subprovince Boundary

HIGHLIGHTS

- **Cluster of possible sanukitoid plutons with known magmatic Cu-bearing sulphides also returned anomalous Pt-Au**
- **Very limited exploration and significant amount of open ground make this a high priority target area**

A cluster of 7 gabbroic plutons, of possible sanukitoid affinity, is found in the Gerry Lake and Joyce River areas, 50 km east of Red Lake. The recent discovery of magmatic sulphide mineralization by an independent prospector in the Joyce River gabbro (>1% Cu, anomalous Pt-Au) underscores the potential of this poorly mapped area.

The 7 known gabbro intrusions (shown in blue in Figure 5) occur within a cluster approximately 20 km in diameter, immediately north of the subprovince boundary, represented by Sydney Lake fault (2 others intrusions are interpreted from airborne magnetometer surveys). The largest of the bodies has an interpreted surface expression of 20 km2. Lack of outcrop due to extensive glacially derived overburden has hindered past exploration. The discovery of Cu-mineralization in the Joyce River gabbro, on claim KRL3009732, was made by following up gossans on small outcrops dominated by metasedimentary gneisses hosting banded magnetite iron formation. Previous exploration work in the area focussed on VMS style base metal mineralization similar to the South Bay deposit, 30 km to the NE.

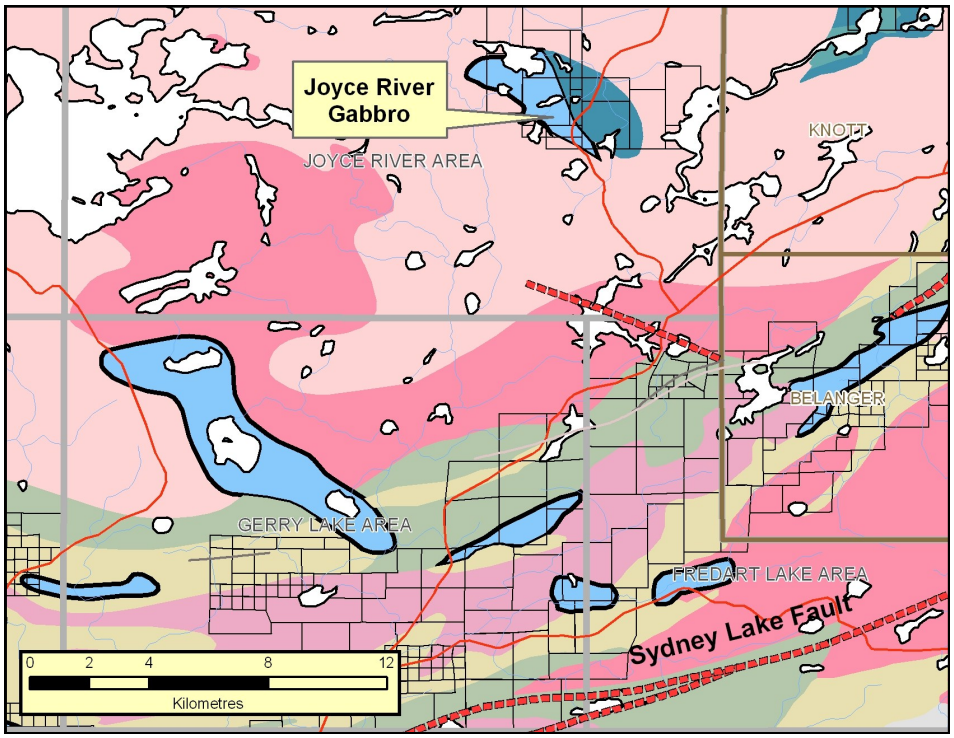

Figure 5.

The lack of full geological mapping coverage makes the 1960 joint federal-provincial government regional airborne magnetometer survey maps (scale 1:63 360) a valuable tool to locate anomalous magnetic features due to gabbroic intrusions. In particular, Maps 861G and 862G should be consulted in conjunction with geological maps P.1199 (Breaks et al. 1976), P.2858 (Thurston and Paktunc 1985) and Stone and Crawford (1994).

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Magmatic Sulphide Mineralization in Orogenic Plutons Along the Uchi-English River Subprovince Boundary …cont'd

Ontario Department of Mines-Geological Survey of Canada. 1960. Bruce Lake Sheet, Kenora District, Ontario; Map 861G, Airborne Magnetic Survey, scale 1:63,360

Ontario Department of Mines-Geological Survey of Canada. 1960. Trout Lake Sheet, Kenora District, Ontario; Map 821G, Airborne Magnetic Survey, scale 1:63,360

Stone, D. and Crawford, J. 1994. Precambrian geology, Little Trout Lake area; Ontario Geological Survey, Preliminary Map P.3280, scale 1:50 000

Thurston, P.C. and Paktunc, D. 1985. Western Uchi Subprovince Stratigraphy (Troutlake River Area), Pakwash Lake Sheet, District of Kenora (Patricia Portion); Ontario Geological Survey, Preliminary Map P.2858, scale 1:50 000

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

Sanborn-Barrie, M., Rogers, N., Skulski, T., Parker, J., McNicoll, V., and Devaney, J. 2004. Geology and Tectonostratigraphic Assemblages, East Uchi Subprovince, Red Lake and Birch-Uchi belts, Ontario; Geological Survey of Canada, Open File 4256; Ontario Geological Survey, Preliminary Map P.3460, scale 1:250 000

HIGHLIGHTS

- **Gold controlled regionally by assemblage-bounding deformation zones**
- **Gold controlled locally by higher order deformation zones associated with lithological contacts**

Western Wabigoon Gold

Gold mineralization is present locally throughout much of the Manitou – Stormy Lakes area in the western Wabigoon Subprovince but clusters of occurrences are present in three areas; i) in the Upper Manitou Lake volcanics and mostly within approximately 4 kilometres of the Manitou Straits fault, ii) within the Kawashegamuk Lake volcanics and iii) proximal to the unconformity between the younger Manitou and Stormy Lake groups and underlying Wapageisi volcanics. The distribution of known mineralization suggests that boundaries between the various stratigraphic elements of the greenstone belt have exerted a first order control on the distribution of gold mineralization with the vast majority of gold occurrences occurring on the outer (granite) side and within approximately 4 kilometres of the faults/deformation zones that coincide with these boundaries.

On a more detailed scale, the characteristics and control on gold mineralization varies somewhat from deposit to deposit but certain general characteristics are common to many of the gold occurrences. Gold mineralization is commonly spatially associated with iron-carbonate and quartz-carbonate veins although gold may occur in the veins and/or adjacent sulphide-bearing wall-rock. Alteration and mineralization is generally localized in smaller-scale high-strain zones that are commonly developed at lithological contacts and are interpreted to be higher order structures related to the regional faults originating in response to lithologically-controlled ductility contrasts.

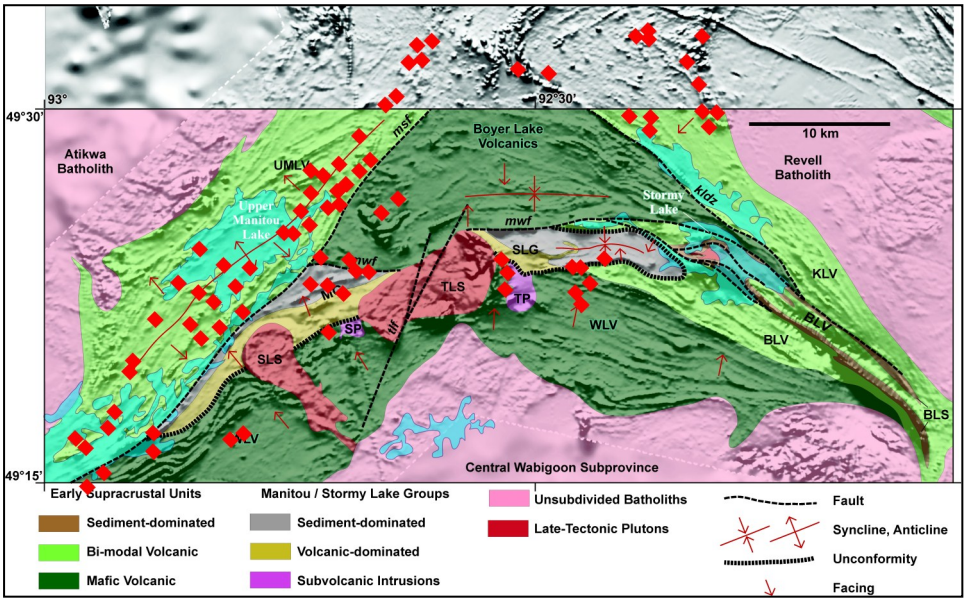

Figure 6.

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HIGHLIGHTS

- **Potential for copper-gold -silver-molybdenite and porphyry copper / IOCG models**
- **Widespread area of anomalous copper, gold and molybdenum as determined in lake sediment and lake water geochemistry sample surveys**
- **Widespread areas that contain copper-gold occurrences; many of these are being investigated at present**
- **Located in the southwest portion of Moss Township and surrounding area**
- **Accessed by logging roads from Highway 11**
- **Land status: open areas with staked and patented claims**

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Tilly Creek Occurrence – Western Shebandowan Area

An area in the southwestern portion of Moss Township in the Western Shebandowan volcanic belt, and formerly held by Costy Bumbu, has come open for staking.

The property centre is located at UTM coordinates 657632E, 5375669N (UTM Zone 15, NAD 83). Access is by all weather logging road (Swamp Road) that intersects Highway 11 just south of Sitches Lakes.

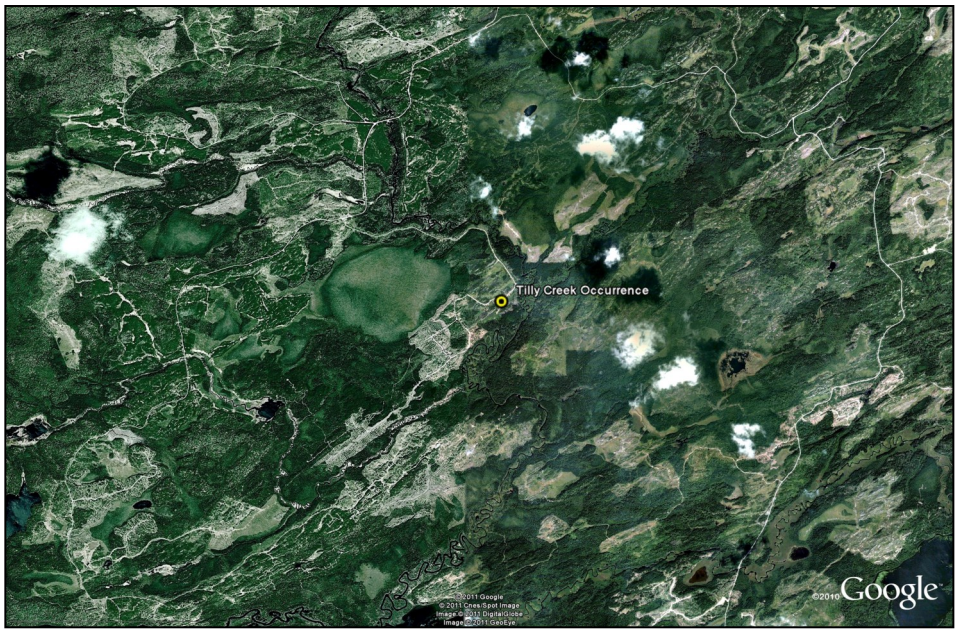

Figure 7.

Geology

The area has been mapped for the Ontario Government by Harris (1970) and Osmani (1997). As well, numerous assessment reports by various mineral exploration companies are on file at the Thunder Bay Resident Geologist office.

Quartz vein systems and zones of silicification are contained in metasedimentary rocks described by Osmani (1997) as wacke and siltstone. These in turn have been intruded by feldspar porphyries and gabbro.

Previous work

Trenching and stripping by Costy Bumbu has exposed numerous zones of quartz veins and silicified areas. These zones contain more than 10% pyrite plus chalcopyrite. Larouche (1999) reports on exploration work completed between March 11, 1999 and May 10, 1999 consisted of stripping, trenching and sampling. Quartz veins up to 15 feet wide were exposed. Results were reported with assays up to 5.2% Cu, up to 2214 ppb Au and 191 ppm Ag.

Tilly Creek Occurrence – Western Shebandowan Area …cont'd

Recommendation

As of November 15, 2011 the property was open for staking and further exploration is highly recommended. Nearby claims owned by Russell Kwiatkowski also have numerous copper occurrences on them and these might belong to the same system of mineralization. A larger ground package would facilitate a regional approach in exploring the copper-gold-silver potential of the area.

Harris, F. R. 1970. Geology of the Moss lake Area, District of Thunder Bay; Ontario Department of Mines, Geological Report 85, 61 p

Larouche, C. 1999. Stripping and Sampling on the Tilly Creek Property, Thunder Bay Mining District, Assessment report AFRO# 2.19463

Osmani, I. A. 1997. Geology and Mineral Potential Greenwater Lake Area, West-Central Shebandowan Greenstone Belt, Ontario Geological Survey Report 296, 135 p

HIGHLIGHTS

- **Belts host past production and numerous documented gold occurrences**
- **Areas of know gold mineralization, favorable lithology, alteration and structure, remain unstaked**

Gold in the Meen-Dempster-Lang Lake Greenstone Belts

The Meen-Dempster-Lang Lake Greenstone Belts occupy the central portion of the Uchi Subprovince in the Pickle Lake area and warrant re-examination of gold targets. Past gold production at the Golden Patricia Mine (which produced 620,000 ounces of gold between 1988 and 1997; Resident Geologist's Office files, Thunder bay North District, Thunder Bay) and numerous documented gold occurrences indicate the high potential of this area. The belts have drawn the attention of the exploration community recently, however many areas of known gold mineralization remain un-staked.

Seim (1993) studied and documented many of the gold occurrences in the Meen-Dempster Belt and described five principal types of mineralization:

1) Gold-bearing quartz veins occurring in discrete shear zones (e.g. Golden Patricia Vein, Tonsil zone, Koromond occurrence, Flicka occurrence).

2) Gold-bearing quartz veins filling tension-induced fractures (e.g. Sudbury Point occurrence, South Dunlop Lake occurrence).

3) Shear zone-hosted areas of silicification and/or sericitization and/or carbonatization and/or sulphidization (e.g. Dobie River zone, Umex–Dorothy Lake, Koval–Ohman).

4) Gold-bearing sulphide replacement zones within iron formation and ferruginous metasediments (e.g. Kasagiminnis Lake deposit, McVean Lake occurrence, Esker zone, Powerline zone, B-zone).

5) Gold-uranium mineralization in the sheared contact between the metavolcanics [sic] and the North Bamaji Pluton (e.g. Kirkland Townsite Showing #1).

Many of the gold occurrences described in this report include mineralization that can be placed into one or more of the above deposit sites. For many others, the geological information available is not sufficient to classify the deposit type.

A common feature of the majority of the gold occurrences in the Meen–Dempster greenstone belt is their association with highly sheared and deformed rocks. These highly deformed rocks may be parts of a belt-wide set of deformation zones as suggested above. Andrews et al. (1986) suggested that, in the Red Lake greenstone belt, the gold deposits are essentially products of hydrothermal fluids introduced into ductile deformation zones at a late stage in the tectonic history of the belt and at about the time of plutonic emplacements. This may also be the case on the Meen–Dempster greenstone belt. Stott and Wallace (1984) and Stott and Corfu (1991) suggest that the deformation zones in the Meen–Dempster greenstone belt were active at different points late in the tectonic history of the belt and at about the time of the emplacement of some of the internal plutons. Thus, it is suggested that the role of the deformation zones in the Meen–Dempster greenstone belt, with respect to gold mineralization, may have been similar to that of the deformation zones in the Red Lake greenstone belt.

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Gold in the Meen-Dempster-Lang Lake Greenstone Belts …cont'd

The Fry Lake area, in the central portion of the Meen-Dempster greenstone belt, was mapped by the Ontario Geological Survey in 2006 (Dinel and Pettigrew 2008). A number of exploration recommendations were made by Dinel and Pettigrew (2008), focusing not only on areas of known mineralization, but also on relatively unexplored areas that displayed favorable lithologic, alteration and/or structural characteristics.

Those areas of known mineralization that merit further investigation include the Flicka (gold); Don's Lake (gold-uranium-thorium); Sanderson (gold-silver-lead-zinc-copper; cf. Smyk et al. 2008); and McVean Lake (gold) occurrence area. The majority of these occurrences were previously documented by Seim (1993). It should be noted that recent exploration activity in this area has resulted in the staking of some of the known gold occurrences.

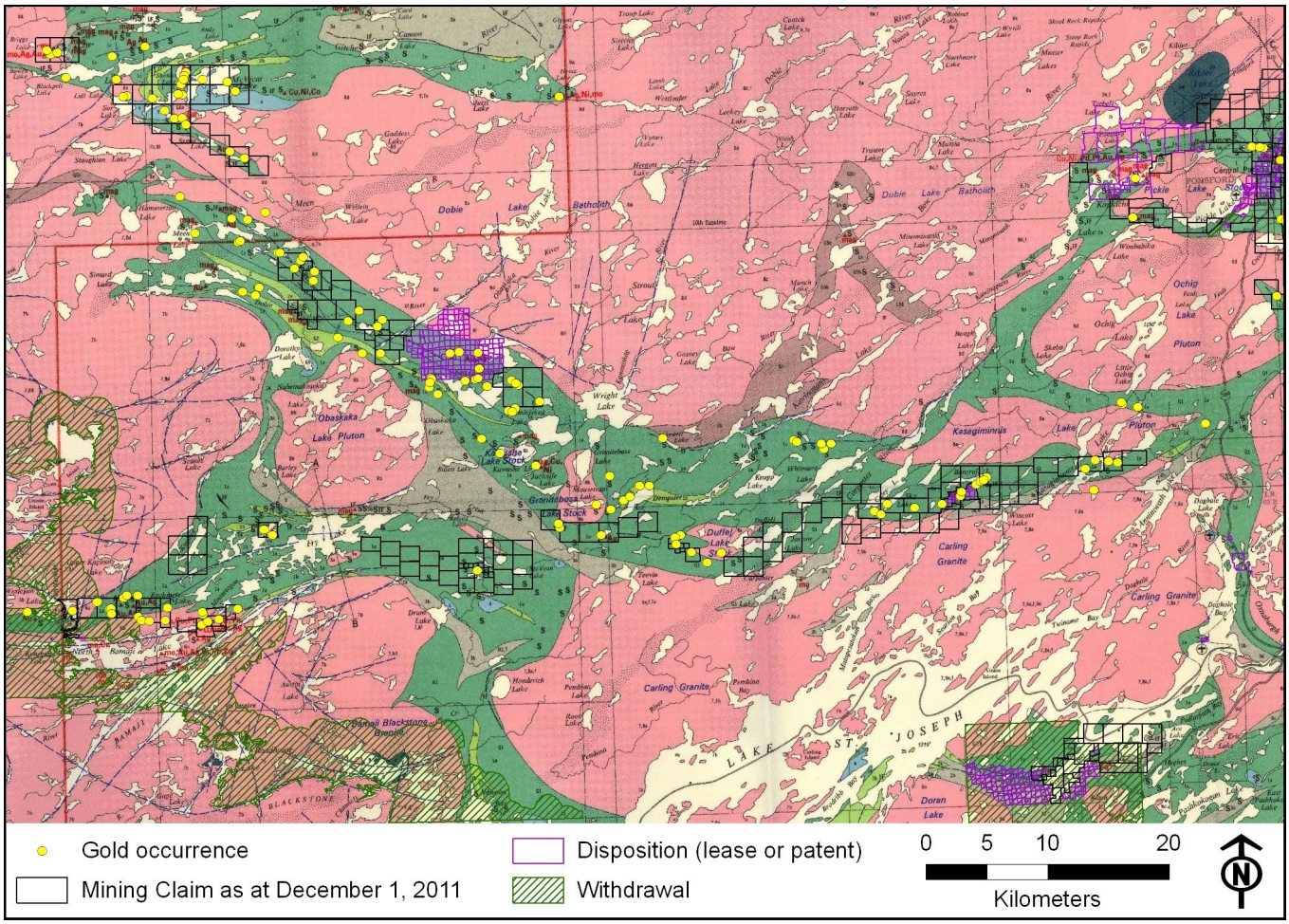

Figure 8.

Gold in the Meen-Dempster-Lang Lake Greenstone Belts …cont'd

Occurrence / Area (UTM Zone 15; NAD83)	Commodity	Targets For Exploration
Flicka occurrence (613800E 5677600N)	Gold	large northeast-trending shear zones (such as the Fry Lake #9 zone), specifically high-angle splay faults as well as sub horizontal, north-trending extensional fractures hosted within the shear zones in areas of increased quartz veining and sulphide mineralization
Don's Lake occurrence (610120E 5670215N)	Gold-uranium-thorium	gold-uranium-thorium-mineralized, S1-parallel shear zones; Au-U-Th–mineralized shear zones within felsic intrusive rocks related to the North Bamaji pluton
Sanderson occurrence (602285E 5671945N)	Gold-silver-lead-zinc-copper	discrete centimetre- to metre-scale shear zones that strike eastwards and dip steeply, consisting primarily of biotite, chlorite and calcite (and quartz veins contained therein), cutting both mafic metavolcanic rocks and the surrounding North Bamaji pluton, perhaps traced further east into the Rockmere Lake area
McVean Lake occurrence (631200E 5674000N)	Gold	gold-bearing banded iron formation within a strongly deformed zone of intercalated quartz-feldspar porphyry dikes and chemical sedimentary rocks

Relatively unexplored areas that should attract exploration consideration for gold include the Fry Lake stock, the Relyea Lake porphyry and an area to the north of Relyea.

Occurrence / Area (UTM Zone 15; NAD83)	Targets For Exploration
Fry Lake stock (620000E 5675500N)	sericite-carbonate alteration, fine-grained disseminated pyrite and minor tourmaline, as well as locally pervasive, fracture-controlled iron carbonate (with minor quartz and pyrite) alteration and/or veining; 5 cm quartz-tourmaline veins; silicification
Relyea Lake porphyry (627000E 5678000N)	meter-scale zones of moderate silicification and 1 to 20 cm wide greasy, translucent, bluish quartz veins
North of Relyea Lake (629000E 5680000N)	gold-anomalous quartz vein in a strongly foliated and tightly folded zone of biotite-sericite alteration in fine-grained sandstone

Recommendations were also made by Dinel and Pettigrew (2008) for volcanogenic massive sulphide copper-zinc, orthomagmatic copper-nickel and molybdenum-copper-gold-silver mineralization in the Fry Lake area.

Dinel, E. and Pettigrew, N.T. 2008. Archean bedrock mapping in the Fry Lake area, Meen–Dempster greenstone belt, northwestern Ontario; Ontario Geological Survey, Open File Report 6208,45p.

Seim, G.W. 1993. Mineral deposits of the central portion of the Uchi Subprovince, Volume 1, Meen Lake to Kasagiminnis Lake portion; Ontario Geological Survey, Open File Report 5869, 390p.

Smyk, M.C., White, G.D., Hinz, P. and Komar, C.L. 2009. Report of Activities 2008, Resident Geologist Program, Thunder Bay North Regional Resident Geologist Report: Thunder Bay North District; Ontario Geological Survey, Open File Report 6233, 40p.

HIGHLIGHTS

- **Native copper in amygdaloidal volcanic float have been traced back to their source on the North Shore of Lake Superior**
- **Drift prospecting should be re-evaluated as a method for locating mineralized float and tracing it back along glacial deposition directions to its source**

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Drift Prospecting in the Thunder Bay Area

Copper occurrences hosted in amygdaloidal volcanic rocks have long been known to occur in the Thunder Bay area. The nature of the mineralization is often native copper or copper-bearing minerals (malachite, cuprite) infilling amygdules of weakly -moderately mafic amygdaloidal flows. Tanton (1931) was the first to report copper-bearing minerals as well as native copper occurring in amygdules. He cited copper occurrences in basic lavas of the Osler Group Volcanics on Porphyry Island, Edward Island and the peninsula East of Black Bay.

Three copper occurrences to the west of Thunder Bay were reported by Tanton (1931); Lot 4, concession II, Crooks Township; Lot 8, concession VI, Blake Township; and Lot 12, concession III, Oliver Township. These were reported as copper-bearing amygdaloidal lavas, likely float material of Animikie age.

The Crooks township occurrence was further explored by Salem Exploration Ltd. who reported native copper infilling amygdules up to one inch in diameter (Salem Exploration Ltd. Assessment File, 1964). They determined that the volcanic body was a large volcanic float as overburden was intersected at variable depths beneath the mineralized zone. The Resident Geologist Staff visited the showing and confirmed the presence of native copper (314068E 5334014N; UTM Zone 16, NAD 83). Copper mineralization occurs as native copper in-filling amygdules and is often times concentrically zoned with calcite cores and outer rims of chlorite. Flakes of native copper were also present within amygdules in-filled with calcite and/or malachite. Volcanic textures within the unit vary from reddish brown, highly vesicular material to fresh dark, greenish grey material with a relatively low abundance of amygdules. Mineralization occurs within the fresh greenish grey volcanic rock with non-copper bearing amygdules predominantly in-filled with chlorite.

Copper occurrences reported within the Osler volcanic rocks on Black Bay Peninsula and St. Ignace Island appear to be of similar character to those observed at the Crooks township occurrence and are likely similar to those present in Blake and Oliver Townships. Furthermore, volcanic textures present at the Crooks Township occurrence are akin to those of the Osler Group volcanic rocks (P. Hollings, personal communication). During the last glacial period, the Marquette Readvance (~10 025 Ka), the Superior lobe crossed the Ontario north shore terminating to the west and south of Thunder Bay (Bajc 2000). This suggests that the native-copper bearing volcanic float was derived from the Osler Group volcanic rocks located on the North shore of Lake Superior.

The occurrences of copper-bearing float material and the evidence for their transport from a nearby source suggests that glacial advances have re-mobilized these amygdaloidal copper occurrences. Therefore, it is quite likely that Quaternary glacial activity may have re-located other near-surface deposits of various commodities. The case study presented here proves that drift prospecting is a useful tool in tracking down mineralized float material as well as using glacial patterns to trace it back to its source. Attention should be paid to large-scale, angular, mineralized float in the field as well as glacial striae and till formations to assist in localizing the source of mineralization which may lead to discovery.

Drift Prospecting in the Thunder Bay Area …cont'd

Bajc, Andy. 2000. Glacial History and Regional Till Sampling in the Archean Shebandowan Greenstone Belt. 46th Institute on Lake Superior Geology, Annual Meeting, Thunder Bay, Ontario, Proceedings v. 46, Part 2, 148-180.

Salem Exploration Ltd., 1963. Report on Cloud Lake Property Diamond Drilling. Salem Exploration Ltd., Assessment File, 52A04SW0069.

Tanton, T.L. 1931. Fort William and Port Arthur, and Thunder Bay Map-areas, Thunder Bay District, Ontario. Geological Survey of Canada, Memoir 167.

HIGHLIGHTS

- **Potential for uranium, Pt-Pd-Cu-Ni, gold, VMS**
- **Located in NTS Sheet 52H07**
- **Accessed by logging roads east of the Black Sturgeon Road, east of Black Sturgeon River**
- **Land status: mainly open for staking**

Uranium, Gold, Base Metals: Black Surgeon Lake Area

The area between Black Sturgeon Lake and Krug Lake has good potential to host deposits of uranium, gold, and copper-zinc-bearing base metals. Recent geological work in the area by RPT Resources Ltd., now ArPetrol Ltd., and Teck Cominco Ltd., has laid the foundation for further mineral exploration opportunities.

The area is situated between Krug Lake, just south of McIntyre Bay, Lake Nipigon, and Black Sturgeon Lake. The area is centered on NTS Sheet 52 H 07.

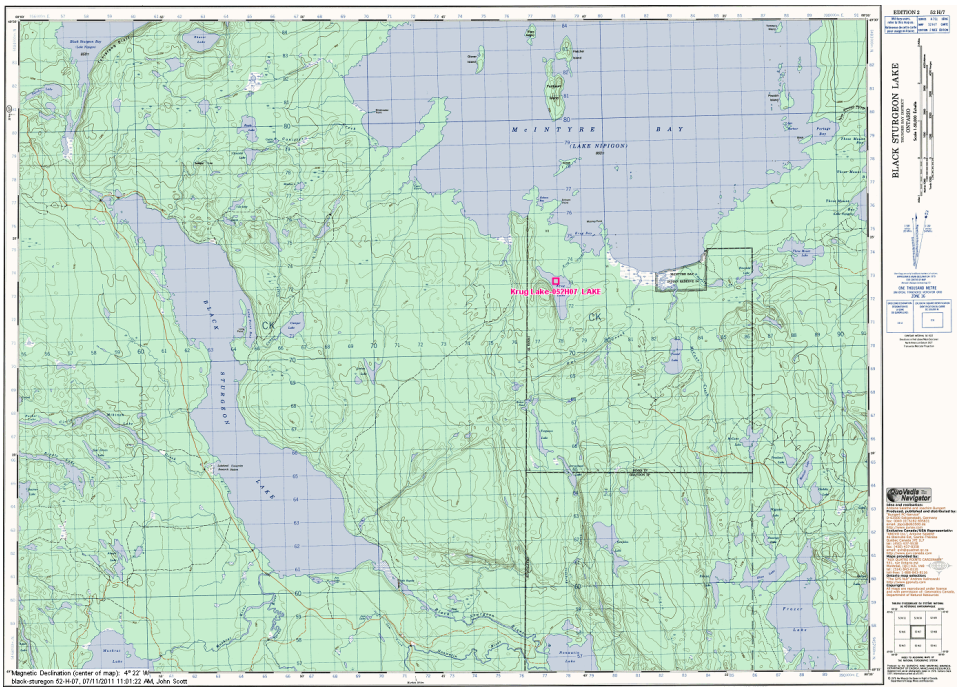

Figure 9.

Access is by logging roads off the Black Sturgeon Road, which intersects Highway 11/17 at its junction with Highway 582, approximately 6.6 km north of Dorion. Follow the Black Sturgeon Road northward for approximately 27.8 km, and then just after a set of pulp truck load aligners, turn east and cross the Black Sturgeon River. Follow this road northerly, cross the TransCanada Pipeline and continue past the west side of Frazer Lake into the area.

Geology

The geology of the area has been described by Coleman (1909), Coates (1972), Sutcliffe (1982), and Hart et al. (2004). In the southern part of the area, in the vicinity of Frazer Lake, the geology is dominated by metamorphic rocks of the Quetico Subprovince, including andalusite schists, various types of gneiss and migmatite that have been intruded by granitic stocks. All units have been intruded by diabase and gabbro dikes, sills, and stocks of various sizes. In the area to the north of Frazer Lake, the geology and terrain is dominated by thick succession of diabase sills and related intrusive rocks of Nipigon Basin.

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Uranium, Gold, Base Metals: Black Surgeon Lake Area …cont'd

The iron formation that is characteristic of the Beardmore Geraldton volcanic belt can be traced south westerly from Beardmore, under Lake Nipigon, to the Krug Lake and Black Sturgeon Lake area. This is significant as it is this iron formation that is intimately associated with the gold deposits of the Beardmore-Geraldton area. Gold occurrences associated with this iron formation also occur in the Max Lake area near Highway 527.

Scott (1987), Thompson (1984), and Bowdidge (2006) have described uranium occurrences within the iron formation where the iron formation lies under rocks of the Sibley Group. Here the iron formation has acted as a reducing environment that has precipitated pitchblende into veins cross cutting the iron formation. Secondary deposits of hematite and hematite-quartz breccias have been described by Coleman (1909), and were assessed for a source of iron. All of these types of hematite occurrences are associated with the Black Sturgeon Fault or related faults, and all of the ones visited were radioactive.

In 2002, Teck-Cominco Limited conducted a program of geological mapping, ground magnetometer and horizontal loop EM, plus sampling. Several HLEM anomalies were delineated. The intent was to conduct follow-up diamond drilling. The limited sampling indicated the presence of olivine-bearing gabbro that was thought to represent portions of a layered mafic/ultramafic complex. McRoberts et al. (2002) had the following recommendation for the area:

Despite the general poor base-metal and PGM results received from the sampling to date, the presence of a mafic/ ultramafic intrusive complex in contact with sulphide-bearing sedimentary rocks could provide a possible contaminant to induce sulphur-saturation and hence precipitation of sulphides from a sulphur undersaturated magma, analogous to that in the Noril'sk-Talnalk region of Siberia. The presence of several strong conductive bodies, defined by the geophysics to date would tend to support this hypothesis.

Geophysics

The area was surveyed with airborne magnetometer and radiometric surveys by the Ontario Geological Survey as part of the Lake Nipigon Embayment survey. A check with the magnetometer survey results reveals numerous dike-like magnetic anomalies that could represent feeder conduits to the sills. In addition, the extension of the Beardmore-Geraldton iron formation is clearly discernable.

With respect to figure 10, the large northeasterly trending magnetic anomaly coincides with iron formation outcrop and reflects the location of the Beardmore-Geraldton iron formation unit. The smaller northeast trending anomaly is also probably an iron formation, or some other magnetic unit in the basement. The north northwesterly trending linear anomalies are gabbro or diabase dikes that are probably feeders to the sills in the area.

Areas where the iron formation has been off set by faulting should be prospected for gold. An area within the southwestern extension of the main magnetic anomaly is underlain by garnet-anthophylite schist that contains 1 to 3 % pyrite. This area should be investigated for VMS-base metals, as this unit might represent an alteration zone typical of VMS deposits. Whole rock analysis of this unit is pending.

As of November 24, 2011, with the exception of the ArPetrol claims near the southwestern end of the large linear magnetic anomaly, and some delineated park areas, the entire are is open for staking.

Uranium, Gold, Base Metals: Black Surgeon Lake Area ...cont'd

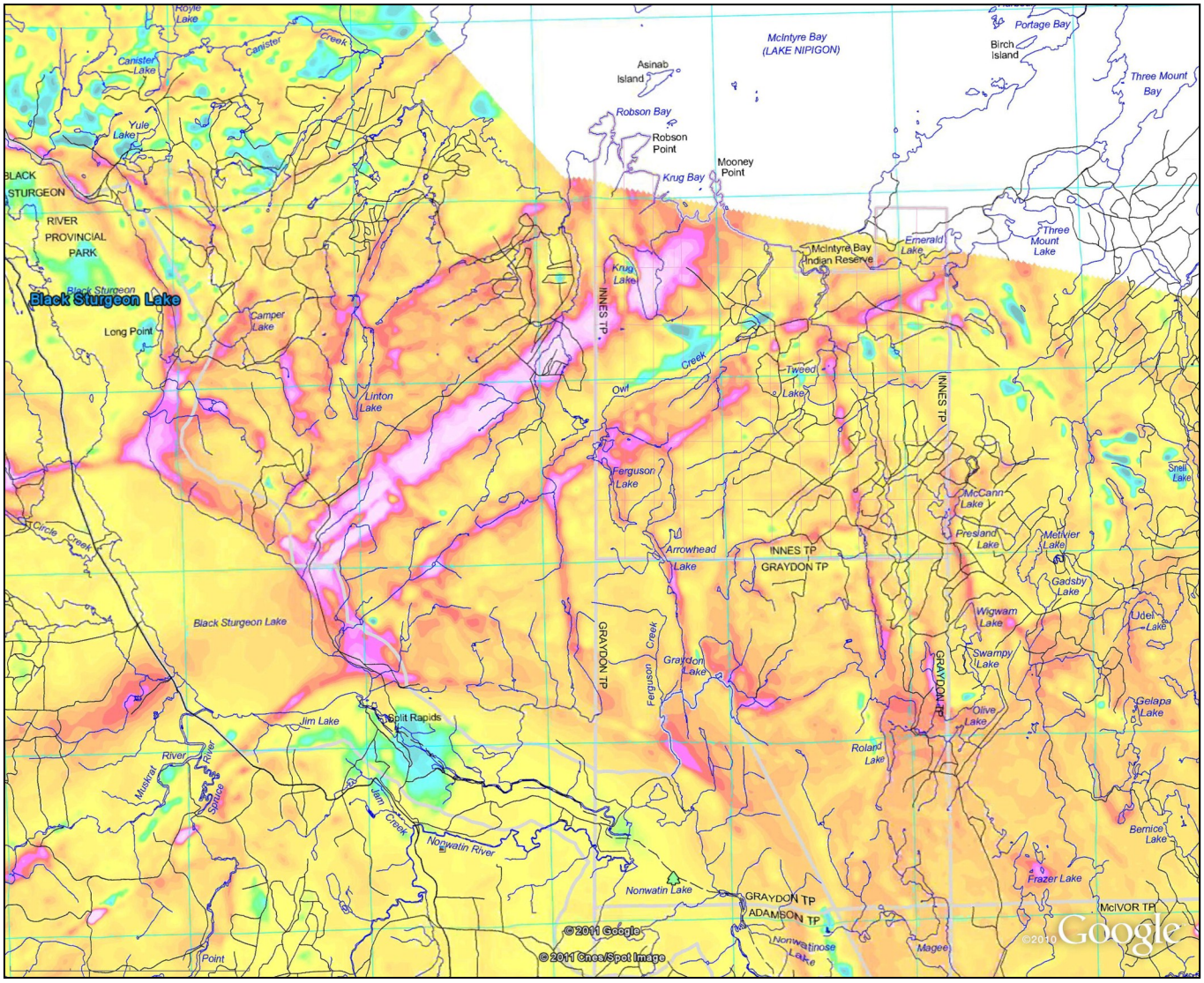

Figure 10.

Bowdidge, C. R. 2006 Black Sturgeon Uranium Project, Thunder Bay Mining Division, Northwest Ontario; Report on 2005 Diamond Drilling, Black Sturgeon East Block; Rampart Ventuires Ltd., New Shoshoni Ventures Ltd. Assessment Work Report, Thunder Bay Assessment Files 2.31947

Hart, T. & Magyarosi, Z., 2004. Precambrian Geology of the Northern Black Sturgeon River and Disraeli Lake Area, Nipigon Embayment, Northwestern Ontario. Ont. Geol. Surv. Open File Rept. 6138, with Maps P.3538, P.3539 and P.3540.

McRoberts, S., Lajoie, J., MacRobbie, P., 2002; Report on the 2002 Exploration Program on the Black Sturgeon Lake East Property, Northwestern Ontario; Teck Cominco Limted assessment file report, Thunder Bay Regional Geologist files assessment report 2.6879

Uranium, Gold, Base Metals: Black Surgeon Lake Area …cont'd

Ontario Geological Survey 2004. Ontario airborne geophysical surveys, magnetic and gamma-ray spectrometer data, Lake Nipigon Embayment Area; Geophysical Data Set 1047

Scott, J. F. 1987. Uranium Occurrences of the Thunder Bay – Nipigon- Marathon Area; Ontario Geological Survey, Open File Report 5634, 158 p., 11 figures, 12 tables,13 photographs, 11 maps in text, and 1 map in back pocket.

Sutcliffe, R. H., 1982 Precambrian Geology of the Wabigoon-Quetico Subprovince Boundary, Black Sturgeon Lake Sheet, Thunder Bay District, Ontario Geological Survey Map P 2531, Geological Series, Preliminary Map, scale 1:50000.

Thompson, S. V. 1984 Uranium Mineralization of the Black Sturgeon Lake Uranium Occurrence, District of Thunder Bay, Ontario; Bachelor of Science Thesis, Carleton University, Ottawa, Ontario

Recommendations for Exploration in the Miminiska Lake Area, Fort Hope Greenstone Belt, Northwestern Ontario

HIGHLIGHTS

- **Au mineralization within the Miminiska sedimentary basin and northern volcanic terrane**
- **VMS style alteration along the southern portion of Miminiska Lake**

The Miminiska Lake area, located in the northwestern portion of the Fort Hope greenstone belt in the eastern Uchi Domain, holds abundant mineral potential. The area has had previous mineral exploration, dominantly for its vast gold potential, but the structural geology of the area was poorly understood. New interpretations and field investigations regarding the structural geology, mineralization, alteration and overall tectonic setting provide insight on the existing mineral occurrences and provide new areas for exploration.

There are two main areas of gold potential in the Miminiska Lake area: northwest of Miminiska Lake within the northern metavolcanic terrane, and west of Miminiska Lake within the metasedimentary terrane. The first area on the northwest side of Miminiska Lake (Box A on accompanying figure) hosts gold occurrences that are found in a linear trend extending from Keezhik Creek to southwest of Howell's Lake The occurrences are found in mafic metavolcanic rocks within the northern volcanic terrane and appear to be associated with a large dextral shear zone. A broad alteration zone of the mafic metavolcanic rocks includes quartz veins as well as chlorite, local calcite patches and stringers as well as local silicification. In the more intensely altered areas, which are associated with more intense shearing, the alteration assemblage includes ankerite, calcite, quartz and chlorite and there is often very low primary textural preservation due to both shearing and alteration. Mineralization associated with these occurrences includes minor amounts of disseminated pyrite both in the shear zones and in the metasedimentary rocks directly to the south where thin stringers of pyrite up to 4 mm long are observed.

The second area of gold potential includes the gold occurrences within the metasedimentary terrane on the east side of Miminiska Lake (Box B on accompanying figure). These occurrences are hosted within lithic wackes and silicate -facies iron formation and are often associated with several generations of quartz veins. One set of veins is folded and recrystallized and appears to be associated with pyrite and arsenopyrite mineralization. The veins are folded by F2 folds indicating that the mineralization is likely syn-D2. Arsenopyrite is the most common mineral found at these occurrences and it ranges from blebby and disseminated to locally massive. One of the occurrences that has several trenches exhibits arsenopyrite, pyrite, bornite and chalcopyrite within quartz veins, lithic wacke and silicate-facies iron formation.

At the southern margin of the sedimentary basin on Miminiska Lake, there is a zone of metamorphosed, synvolcanic alteration similar to distal volcanogenic massive sulphide (VMS) alteration (Box C on accompanying figure). The zone stretches approximately 10 by 2 km along the southern edge of Miminiska Peninsula and the southern shore of Miminiska Lake and has previously been unrecognized. The alteration ranges from a weak amphibolitization with euhedral to subhedral hornblende crystals, to strongly altered with large hornblende and garnet crystals. In the strongly altered areas, the original texture is often weakly preserved, but the outlines of pillows and quartz amygdules are visible. On the southeastern side of Miminiska Peninsula, disseminated and patchy pyrite, up to 15% locally, and minor pyrrhotite was observed in a 3 by 15 m zone that is associated with the alteration.

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Recommendations for Exploration in the Miminiska Lake Area, Fort Hope Greenstone Belt, Northwestern Ontario …cont'd

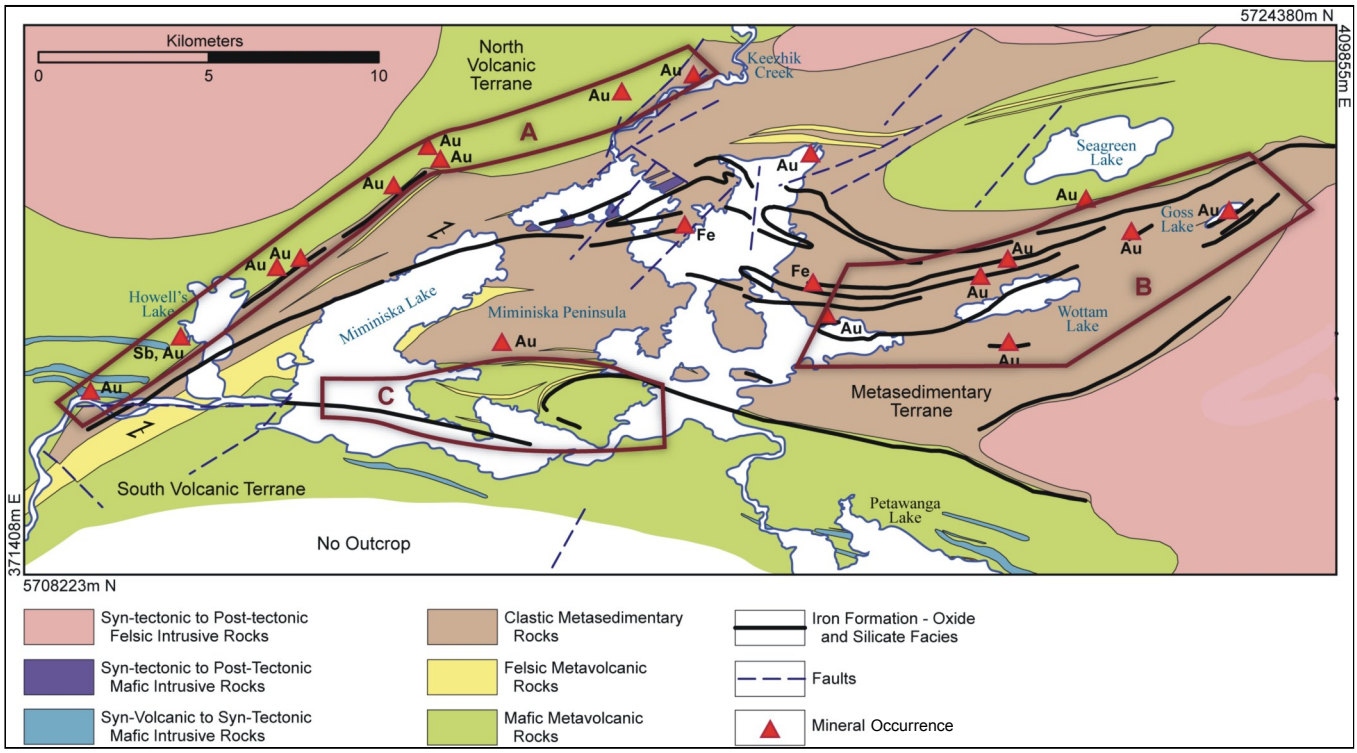

Figure 11.

Buse, S. 2011. Preliminary Results from the Eastern Uchi Bedrock Geology Mapping Project in the Miminiska Lake Area, Fort Hope Greenstone Belt, Uchi Subprovince. *In* Summary of Field Work and Other Activities 2011, Ontario Geological Survey, Open File Report 6270, p. 13-1 to 13-11.

Interpretation of Coldwell Complex Area Airborne VTEM Versatile Time Domain Electromagnetic Geophysical Survey

HIGHLIGHTS

- **An airborne EM anomaly may represent a PGE-Cu or Cu-Fe-Ti-PGE target similar to eastern gabbro deposits**

The eastern gabbro of the Coldwell Complex is prospective for PGE-Cu and Cu-Fe-Ti-PGE deposits as shown from the extensive work carried out by numerous exploration companies, but most recently by the following:

- Stillwater Canada Inc. and their predecessors on the Marathon PGM-Cu deposit
- Benton's Sally Lake and Wullie Lake Cu-Fe-Ti+/-PGE deposits currently under option to Stillwater Canada Inc.

The eastern gabbro is shown in purple along the northeast perimeter of the Coldwell Complex and the deposits are outlined in black as shown on the following geological map (modified from Walker et al. 1993).

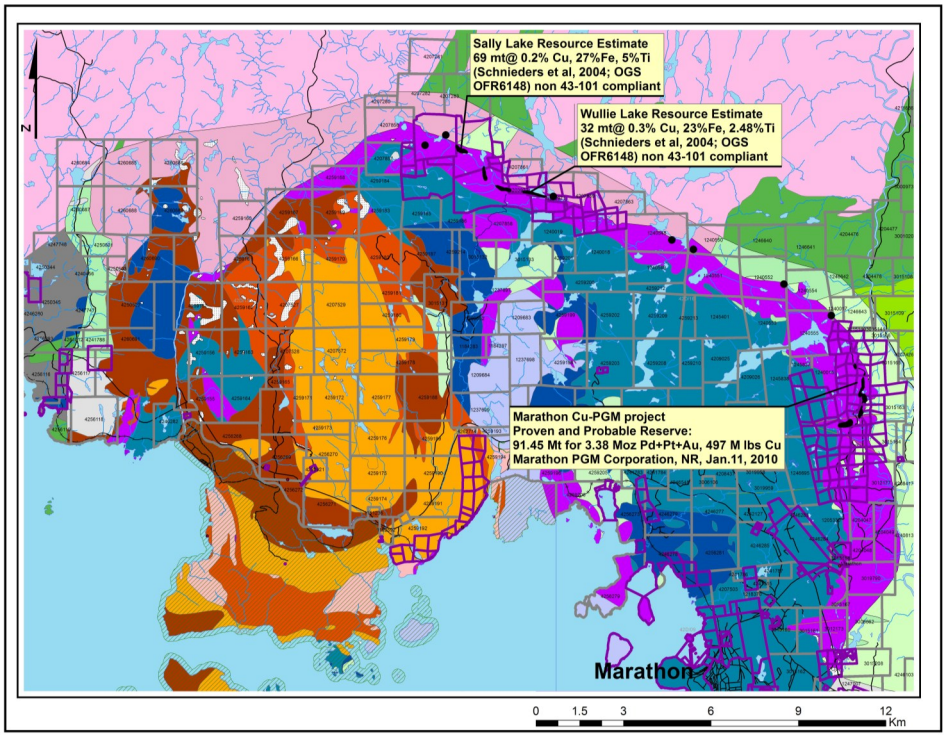

Figure 12.

An airborne magnetic survey and a versatile time domain electromagnetic survey as presented below was flown in the fall of 2007, by Geotech Ltd. on behalf of Pacific North West Capital Corp. The eastern gabbro is represented by a magnetic low indicated on the airborne magnetic map in blue. The magnetics indicate that the eastern gabbro extends further to the west than the geological mapping suggests (highlighted with red circle on the maps below). At the time of writing this report (December 5, 2011) this area is open for staking. The eastern gabbro is also represented by a topographic high; further examination of the area on Google™ Earth also indicates the eastern gabbro may extend further to west than mapping indicates.

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Interpretation of Coldwell Complex Area Airborne VTEM Versatile Time Domain Electromagnetic Geophysical Survey …cont'd

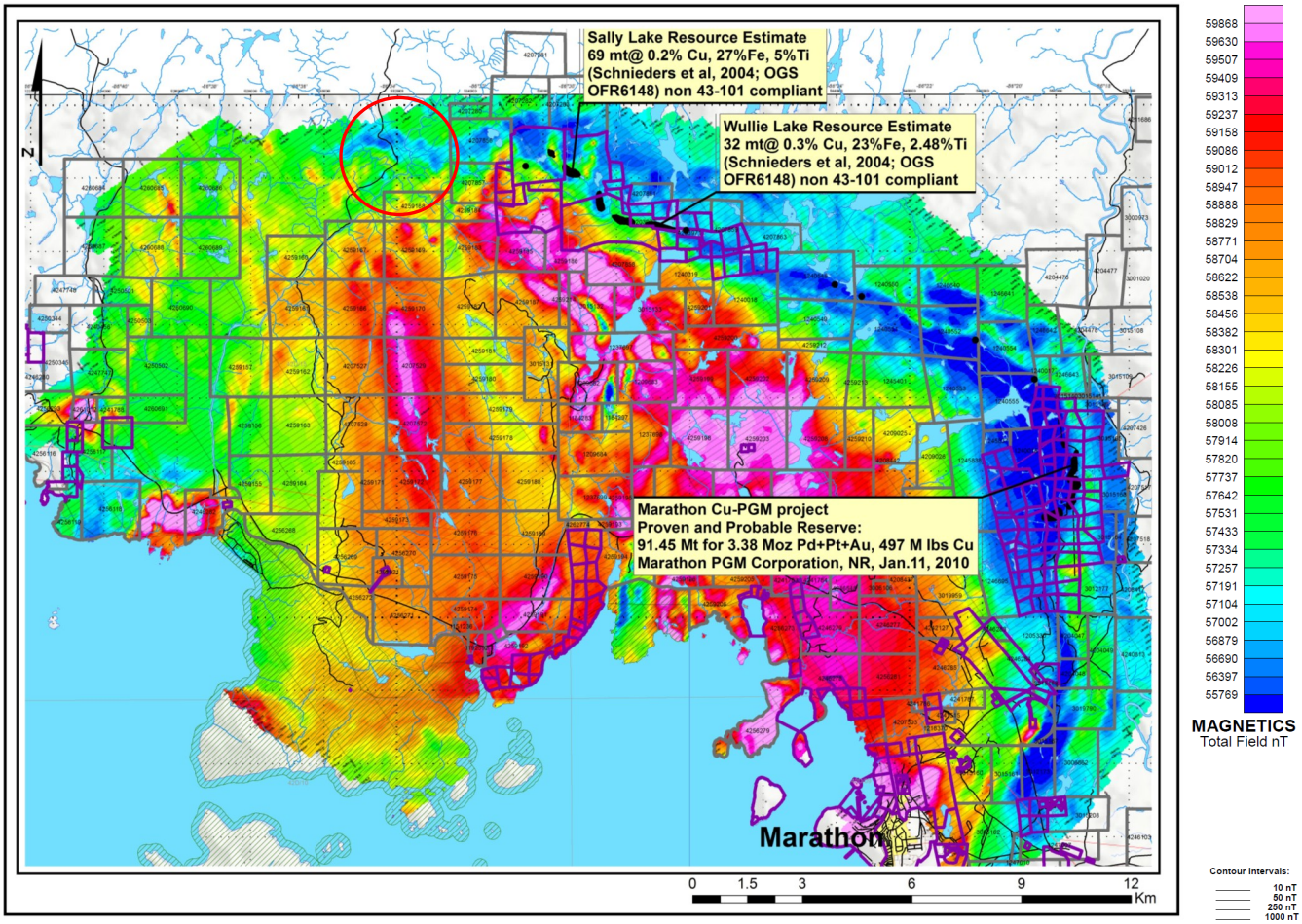

Figure 13.

The versatile time domain electromagnetic survey indicates EM anomalies corresponding to the areas where deposits are situated, as well as one EM anomaly where the eastern gabbro may potentially extend. The anomaly is open for staking and is recommended for further exploration.

Interpretation of Coldwell Complex Area Airborne VTEM Versatile Time Domain Electromagnetic Geophysical Survey …cont'd

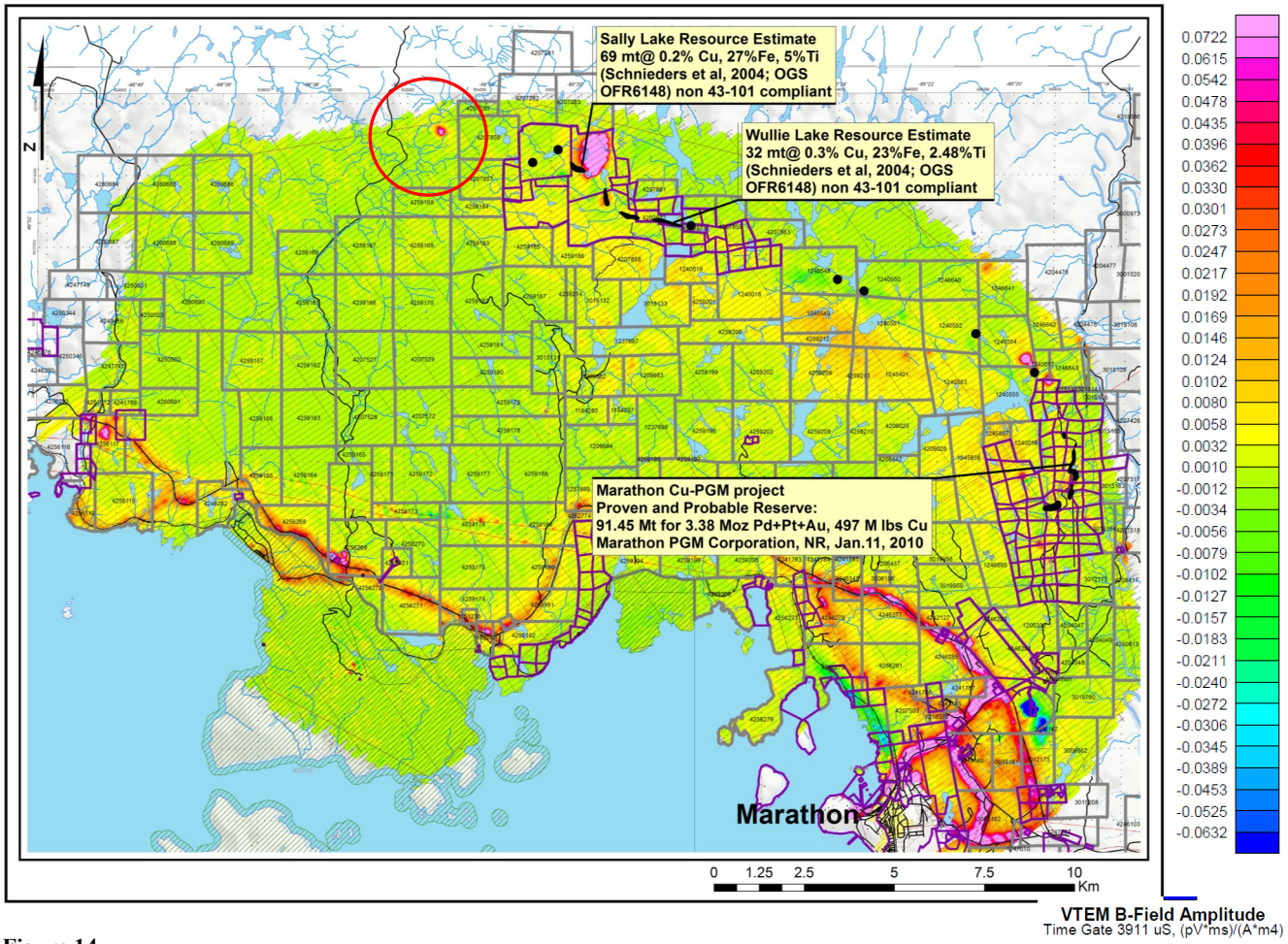

Figure 14.

Walker, E.C., Sutcliffe, R.H., Shore, G.T. and Penczak, R.S. 1993. Precambrian geology, Port Coldwell Complex; Ontario Geological Survey, preliminary map P3232 and map P3233, scale 1:20,000.

Yee, R. 2008. Assessment report on a helicopter-borne VTEM versatile time domain electromagnetic geophysical survey, Coldwell Complex area by Geotech Ltd. for Pacific North West Capital Corp., unpublished report, Thunder Bay South Resident Geologist's office, assessment file AFRO# 2.38721.

HIGHLIGHTS

- **High priority, multi-element Cu-Ni-PGE anomalies are open for staking**

Cu-Ni-PGE Mineralization in the Quetico-Marmion Domain Boundary

The Quetico-Marmion Domain boundary east of Longlac has experienced minimal exploration activity related to Cu-Ni-PGE mineralization. The lack of any detailed geological mapping, in particular where rocks of the eastern Marmion domain are overlain by Paleozoic cover of the James Bay Lowlands northeast of Caramat, has deterred exploration in this area. Discovery of PGE-bearing mafic intrusive bodies along the northern boundary of the Quetico basin both in the Atikokan-Shebandowan area to the west and in the Hearst area to the east, enhances the mineral potential of the entire domain boundary zone east of Lake Nipigon. Work by East West Resource Corporation and Canadian Golden Dragon Resources Ltd. (1999-2000) on their McCoig-Fintry- Shuel township properties, 80 km west of Hearst, has identified several pyroxenite-gabbro bodies containing anomalous Cu-Ni-PGE mineralization.

There are several sources of information, both past and recent, that can be used to locate magnetic anomalies, which may be related to mafic intrusive bodies in this area. The 1962 joint federal-provincial government regional airborne magnetometer survey maps (scale 1:63 360) and the 1:1 000000 scale Geology of Ontario (1991) maps should be studied. In particular the total magnetic field (Map 2586, OGS 1991) and vertical magnetic gradient (Map 2590, OGS 1991) series are highly useful in delineating anomalous magnetic features. The Operation Treasure Hunt Nakina-Longlac Area Lake Sediment Survey (OGS 2000b) contains information that should be utilized in conjunction with the geophysical data (1991 and 1962) for the eastern Longlac region. Several anomalous areas related to Cu-Ni-PGE mineralization have been identified by the survey and should be explored. These are listed in order of importance as follows:

1. East Chipman Lake-Fernow Lake area (O'Meara-Fernow townships).
2. Sadie-Meg-McKay lakes area (south-southeast of Longlac).
3. Caramat-Mustela Creek area (Caramat area).
4. East Lukinto-Sandlink lakes area (east of Longlac).

It is significant to note that all four of these areas display multi-site, multi-element anomalies, i.e. PGE with accompanying base metal signatures. The drainage systems within each of these areas should be studied carefully with special attention to in-flow points, basin influence and any known local bedrock geology.

Gupta, V.K. 1991. Vertical magnetic gradient of Ontario, east-central sheet; Ontario Geological Survey, Map 2590, scale 1:1 000 000.

Gupta, V.K. 1991. Shaded image of total magnetic field of Ontario, east-central sheet; Ontario Geological Survey, Map 2586, scale 1:1 000 000.

Innes, D.G. and Ayres, L.R. 1969. Caramat-Pagwa sheet, Thunder Bay and Cochrane districts; Ontario Department of Mines, Geological Compilation Series Map 2202, scale 1:253 440.

Ontario Department of Mines-Geological Survey of Canada. 1962. Lake Sheet, Thunder Bay District, Ontario; Ontario Department of Mines-Geological Survey of Canada, Map 7101G, Airborne magnetic Survey, scale 1 inch to 4 mile.

Ontario Geological Survey. 2000b. Nakina-Longlac area lake sediment survey: Operation Treasure Hunt - Area B; Ontario Geological Survey, Open File Report 6035, 144p.

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HIGHLIGHTS

- **The past 10 years have seen unprecedented growth in the proppant demand and known supplies can no longer meet the demand**
- **The North American drilling market is showing healthy demand for proppants at present with year-on-year increases of 40%**

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Ontario Sandstone Deposits – Potential New Source of Proppants

The process of hydraulic fracturing has been used to enhance production in oil and gas wells since the 1940s. In the last decade, significant changes in the technology of horizontal drilling and fracturing technology coupled with growing energy demands have changed the focus of the oil and gas industry.

Proppant comprises sized particles mixed with fracturing fluid to hold fractures open after a hydraulic fracturing treatment. Proppant materials ("frac sand") are carefully sorted for size and sphericity to provide an efficient conduit for production of fluid from the reservoir to the well bore. Hydraulic fracturing is used both in the drilling and development of new wells and in the stimulating of old wells to increase or prolong production.

- The past 10 years have seen unprecedented growth in the frac sand demand and known supplies can no longer meet the demand.
- Temporary arrangements are being made to import frac sand from as far away as China.
- There are limited suitable deposits in the United States and most of the known deposits have been investigated.
- The opportunity exists to develop a new sand resource in Ontario, close to the US market.
- Physical characteristics of the sand are the primary consideration as to whether or not it will be suitable for proppant.
- Grain size, sphericity, crush resistance and mineralogy are critical factors.

Selected Ontario sandstone deposits appear to meet the requirements for silica content (minimum 99%), grain size, roundness and sphericity. Additional testing including crush resistance, solubility and turbidity is warranted for those deposits of similar geology known to produce industrial sand in other jurisdictions.

Southeastern Ontario contains extensive deposits of sandstone with physical and chemical properties that make it suitable as source material for industrial silica sand. The potential suitability of this material for proppants should be evaluated. Significant deposits of sandstone have been identified in municipal official plans as areas of mineral resource. Although some deposits have been lost to competing land use, substantial areas of potential resource remain available.
Other sandstone deposits in Ontario with potential for the development of industrial silica sand resources include Mesozoic silica or kaolin deposits in the Moose River Basin in the James Bay Lowland and selected Proterozoic sandstone deposits in the Sault Ste. Marie area in northeastern Ontario.

Ontario Sandstone Deposits – Potential New Source of Proppants …cont'd

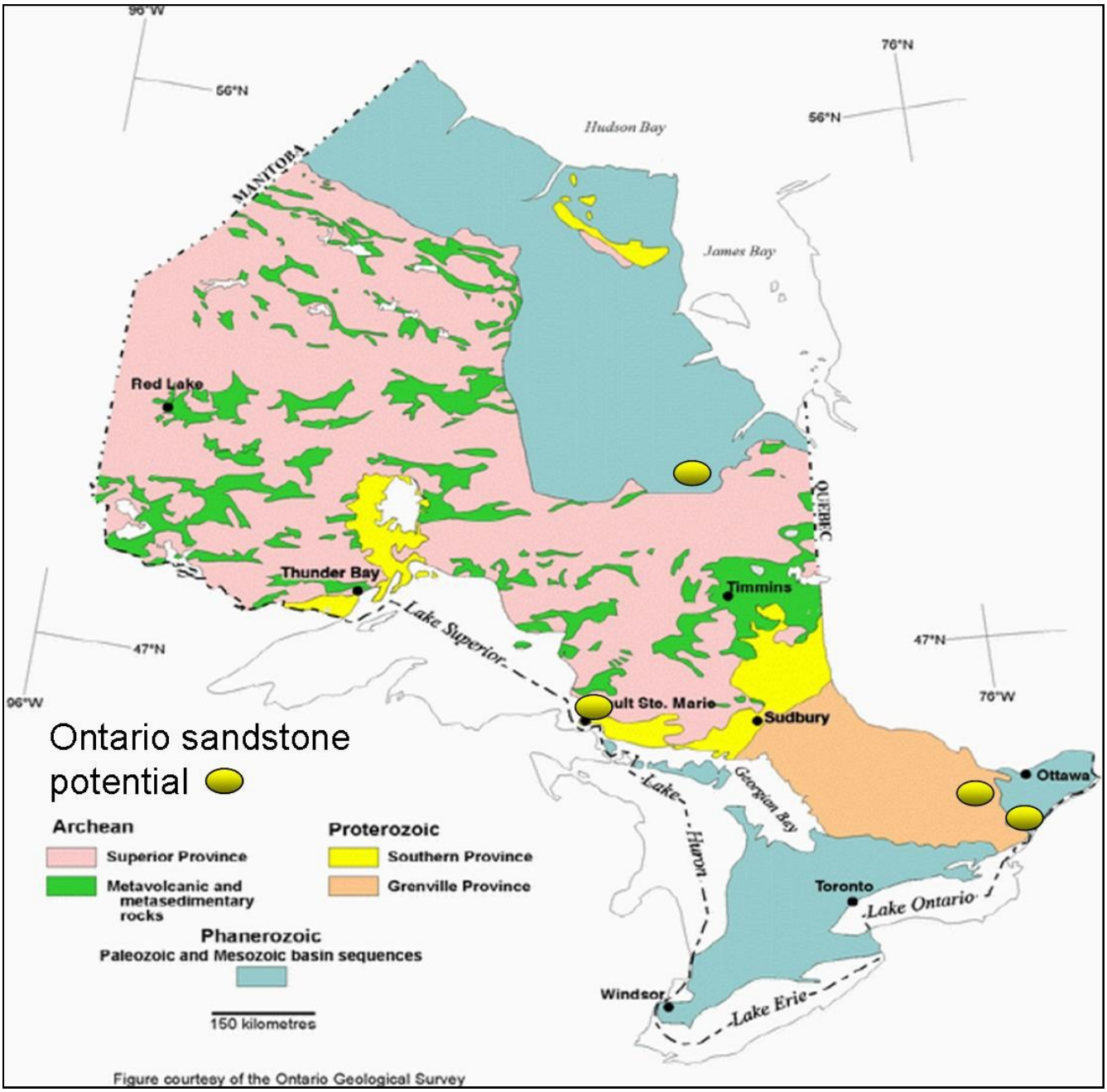

Figure 15.

HIGHLIGHTS

- **New gold discovery in the Kapuskasing Structural Zone**
- **Timiskaming sediments again prove prospective for gold**

Gold, Timiskaming Sediments and the Kapuskasing Structural Zone

Recent discoveries of significant quantities of gold mineralization in the Borden Lake area by Probe Mines Limited are noteworthy both for the drill indicated quantity (+4 million ounces Au, inferred) and also for the unique geographic location on the west side of the Kapuskasing Structural Zone (KSZ).

Traditionally, gold exploration in the western Abitibi subprovince has stopped at the Ivanhoe Lake Cataclastic Zone which delineates the eastern boundary of the KSZ. This is understandable considering the complex geological history, relative remoteness, the high metamorphic grade of rocks and the lack of detailed geological mapping within and west of the KSZ. The Borden Lake belt (Moser 1994, Percival 2008) consists of mafic to ultramafic gneiss, pillow basalt, felsic volcanic rocks, porphyries and tonalite overlain by a +30 m thick sequence of Timiskaming metasedimentary rocks that include greywacke, arkose, arenite and polymictic cobble conglomerate. The belt is affected by several episodes of deformation including tectonic uplift of the KSZ and the rocks retain that structural imprint.

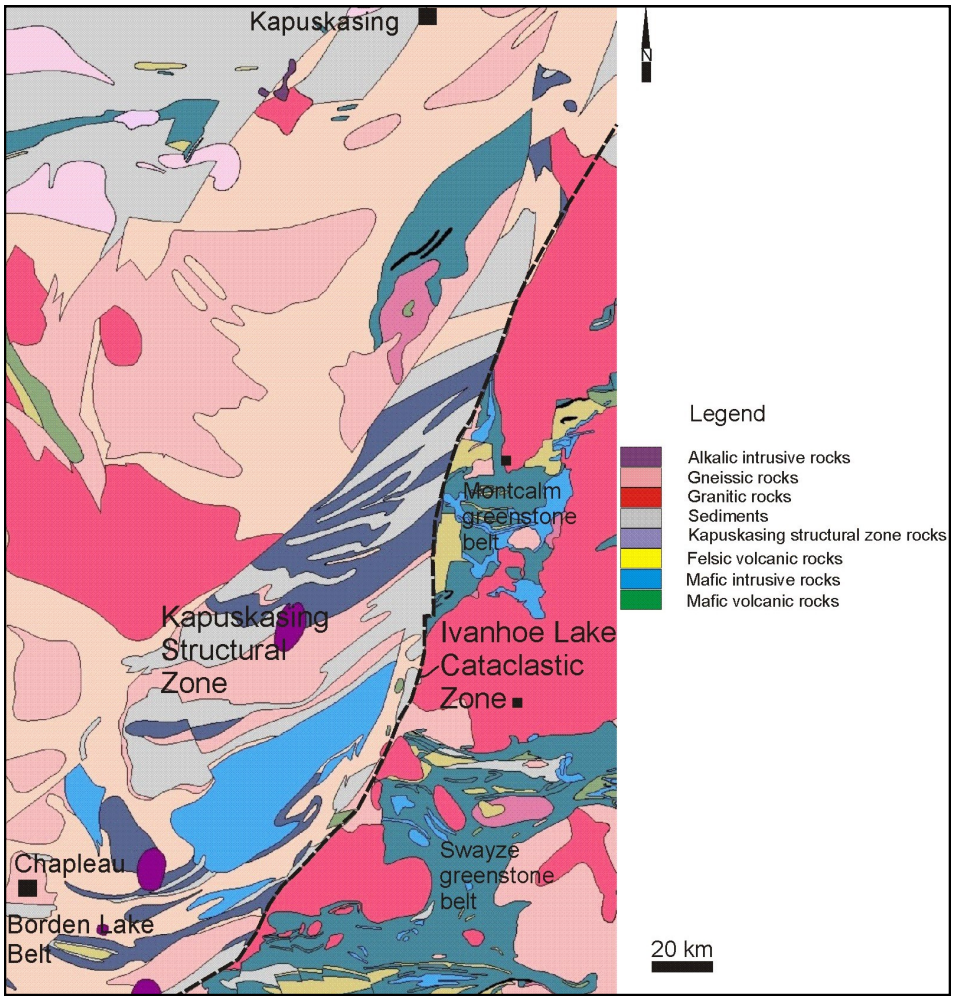

Figure 16.

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Gold, Timiskaming Sediments and the Kapuskasing Structural Zone …cont'd

Only regional scale mapping to the north of the Borden Lake belt and west of the KSZ has been completed to date (eg. Thurston et al. 1977). However, the area is readily accessible via networks of recent logging roads that extend south from Kapuskasing. Thin overburden and variable amounts of bedrock outcroppings in the area present good prospecting conditions. A variety of rock types including mafic gneisses, metamorphosed felsic volcanic rocks, garnetiferous paragneiss and iron formation indicate the presence of metamorphosed supracrustal rocks that warrant prospecting for Archean lode gold deposits in this extensive but under-explored region. Attention should be paid to any coarse clastic sediments including conglomerates with granitic clasts that could indicate the presence of Timiskaming sediments and gold affinity.

Moser, D.E. 1994. The geology and structure of the mid-crustal Wawa gneiss domain – a key to understanding tectonic variation with depth and time in the late Archean Abitibi-Wawa Orogen: Canadian Journal of Earth Sciences; v.31, p.1064-1080.

Percival, J. 2008. Field guide to the Kapuskasing Uplift, Chapleau-Foleyet transect: a window on the deep crust; in Geological Society of America, Field Forum "Late Archean Crust: Magmatism and Tectonics of the Abitibi Subprovince, Canadian Shield", p.46-76.

Thurston, P.E., Siragusa, G.M. and Sage, R.P. 1977. Geology of the Chapleau Area, Districts of Algoma, Sudbury, and Cochrane; Ontario Div. Mines, GR157, 293p.

HIGHLIGHTS

- **The Paleoproterozoic Stone Ridge Intrusion is related to the East Bull Lake intrusive suite which is known to be favourable for contact-style Ni-Cu-PGE mineralization**
- **The intrusion coincides with a regional lake sediment geochemical Cu-Ni-PGE anomaly**
- **The recognition and reclassification of this intrusive suggests that many of the mafic rocks cutting intermediate to felsic plutonic rocks of the Superior Province and Archean Greenstone belts in the Elliot Lake region require further investigation**

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Nickel-Copper-PGE Mineralization in the Stone Ridge Intrusion

A compilation mapping project of the Pecors–Whiskey Lake Area has been recently published (Easton 2009, 2010). The area was selected for mapping due to a renewed interest and increase in uranium exploration in the area. During the mapping project an east-trending metagabbro intrusion, 700 to 1000 m wide, with a minimum strike length of 15 km, was identified lying 1 to 2 km south of and roughly parallel to the Archean-Proterozoic unconformity (Easton 2009).

Historical maps indicate this intrusive to be a Nipissing intrusive suite metagabbro. Field and geochemical observations have suggested that this classification is incorrect and that the intrusion is Paleoproterozoic in age and related to the East Bull Lake intrusive suite. Dr. Easton of the Ontario Geological Survey's Precambrian Geoscience Section has named the intrusion the Stone Ridge Intrusion due to its close proximity to the Stone Ridge golf course where the intrusion is well exposed.

The intrusion has been classified as a leuconorite to leucogabbronorite. The rock is weakly metamorphosed, grey-weathering and medium-grained, and is dominated by orthopyroxene and plagioclase. The intrusion is uniform in texture with coarser-grained patches occurring along the margins of the intrusion. The East Bull Lake Intrusion is east of the Pecors–Whiskey Lake mapping area (See Figure 17), as are the Agnew Lake and River Valley intrusions.

Although part of the East Bull Lake intrusive suite, the Stone Ridge Intrusion is not a thick, layered mafic intrusion in comparison to the East Bull Lake, Agnew and River Valley intrusions (Easton 2009). Rather, it is a linear, relatively massive body with cryptic igneous layering exposed in some locations, possibly representing part of the feeder system to the large East Bull Lake intrusive complexes (Easton, Jobin-Bevans, and James 2010).

The margins of the layered East Bull Lake intrusion are known to be favourable exploration targets for contact-style Ni-Cu-PGE mineralization (James, Jobin-Bevans et al. 2002). The mineral potential of the Stone Ridge Intrusion is not fully known at this point but the intrusion is sulphur undersaturated, with Pd and Pt contents of 35 to 50 ppb, respectively, in unmineralized rock. In addition, it is associated with a regional lake sediment geochemical Cu-Ni-PGE anomaly (Dyer 2010).

Results from the compilation mapping of the Pecors–Whiskey Lake Area during the 2009 and 2010 field seasons have improved our understanding of the nature of these undifferentiated mafic rocks. To distinguish between them, methods have been developed that use geochemical analyses and a hand-held scintillometer to determine potassium, uranium and thorium contents of the rocks. These techniques have greatly assisted and may continue to assist in mapping many of the undifferentiated mafic rocks within the Elliot Lake area. For more information regarding the use of the scintillometer to differentiate mafic rocks please refer to Easton (2009, 2010).

The recognition and reclassification of this intrusive suggests that many of the mafic rocks cutting intermediate to felsic plutonic rocks of the Superior Province and Archean Greenstone belts in the Elliot Lake region require further investigation. The discovery of additional intrusions related to the East Bull Lake intrusive suite in the region could bring new attention to the exploration potential for Ni-Cu-PGE mineralization in the area.

Nickel-Copper-PGE Mineralization in the Stone Ridge Intrusion …cont'd

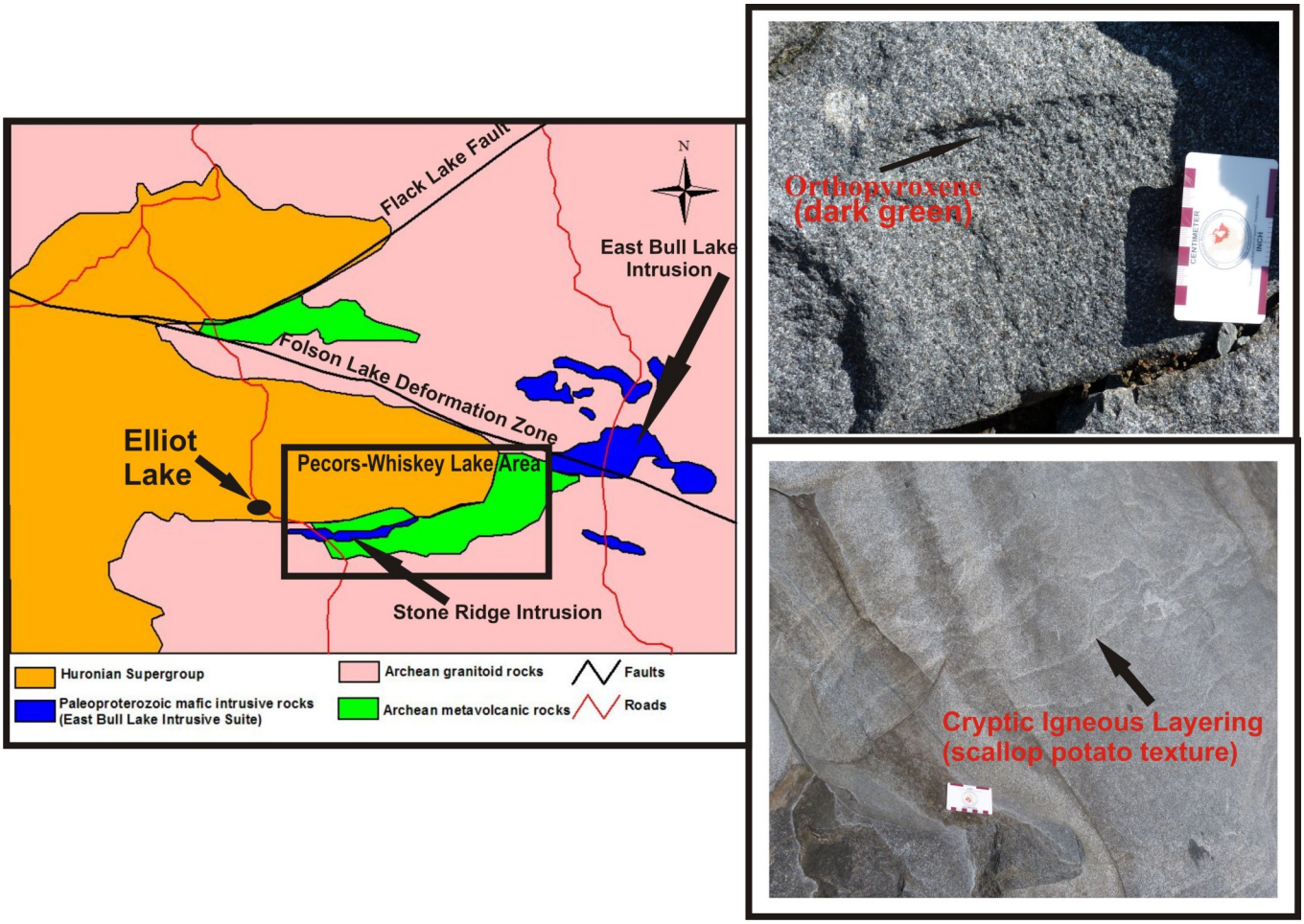

Figure 17. Simplified geological map of the Elliot Lake area (Easton, M.R., 2010, *modified* by A. Pace). Photos illustrating textural features commonly associated with the Stone Ridge Intrusion (photos taken by A. Pace)

Easton, R.M., 2009. Compilation Mapping, Pecors–Whiskey Lake Area, Southern and Superior Provinces; in Summary of Field Work and Other Activities 2009, Ontario Geological Survey, Open File Report 6240 p.10-1 to 10-21.

Easton, R.M., Jobin-Bevans, L.S. and James, R.S., 2010. Geological Guidebook to the Paleoproterozoic East Bull Lake Intrusive Suite Plutons at East Bull Lake, Agnew Lake and River Valley, Ontario: A Field Trip for the 11th International Platinum Symposium.

Easton, R.M., 2010. Compilation Mapping, Pecors–Whiskey Lake Area, Southern and Superior Provinces; in Summary of Field Work and Other Activities 2010, Ontario Geological Survey, Open File Report 6260 p.8-1 to 8-12.

Dyer, R.D., 2010. Elliot Lake–Sault Ste. Marie Area Lake Sediment Geochemical Survey, Northeastern Ontario; Ontario Geological Survey, Open File Report 6251, 195p.

HIGHLIGHTS

- **Several small gold deposits are hosted in regionally albitized sedimentary rocks**
- **Prominent zones of alteration are south and east of Wanapitei Lake and in the Espanola - Whitefish Falls area**
- **Zones of intense albite alteration are found outside the SIC in areas of intense brecciation**
- **Alteration zones are mostly fine-grained and pink or tan coloured**
- **Variably associated with ankerite, chlorite, sulphide and magnetite alteration**

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Gold in Na-Metasomatic Alteration Zones, Sudbury

Several small gold deposits are hosted in regionally albitized (Na-metasomatic) sedimentary rocks of the Paleoproterozoic upper Huronian Supergroup. The most prominent zones of alteration are located south and east of Wanapitei Lake and in the Espanola - Whitefish Falls area. These have formed part of an ongoing study by staff of the Sudbury Resident Geologist's Office for several years.

Zones of intense albite alteration are found in an area broadly coincident with that part of the Sudbury Structure which lies outside the Sudbury Igneous Complex, and which is characterized by areas of intense brecciation. The Na-metasomatic zones have been dated at about 1.7 Ga (Schandl et al. 1994), and thus are younger than the Sudbury Structure by about 150 million years. Whether or not there is a genetic link between the 2 events remains to be established.

The alteration zones are mostly fine-grained and pink or tan coloured, and are easily recognized visually. They are variably associated with brecciation, further alteration characterized by coarsely crystalline calcium-magnesium-iron carbonates, chlorite, sulphides, and magnetite. Anomalous metal concentrations most commonly found are gold, copper, cobalt and nickel. A deep hole drilled in 1992 intersected about 300 m of albitized rock with green chromium-rich micas.

Two small past producers, the Scadding Gold Mine in Scadding Township, and the Norstar Au-Cu Mine in Davis Township, were closely associated with Na-metasomatic zones. Remapping of many old showings east of Wanapitei Lake (Gates 1991) has shown that most old showings are associated with ubiquitous albite alteration, a phenomenon not appreciated years ago.

Along the north shore of Evangeline Lake in McKinnon Township, the Bob Tough and Pit Island gold showings are both associated with Na-metasomatism. Both properties are located in Serpent Formation arkose which has been albitized and contains associated ankerite, chlorite, and hematite alteration. Mineralization consisting of white to black quartz with pyrite and arsenopyrite mineralization is closely associated with albitization.

To the east in Mongowin Township, the McMillan Mine is located within Gowganda Formation near the contact with the Lorrain Formation and near the northwest-trending McMillan Fault. The property produced 10 593 ounces Au from 60 139 tons of ore mined from 1934 to 1937. Gold is associated with quartz veins near feldspathic sandstone-pelite and feldspathic sandstone-amphibolite contacts.

Schandl, E.S., Gorton, M.P., Davis, D.W. 1994: Albitization at 1700 +/- 2 Ma in the Sudbury - Wanapitei Lake area, Ontario; implications for deep-seated magmatism in the Southern Province. Canadian Journal of Earth Science. vol. 31, 597-607.

Gates, B.I. and Cosec, M., Sudbury Resident Geologist's District 1991; *in* Report of Activities 1991, Resident Geologists, Ontario Geological Survey, Miscellaneous Paper 158, p. 331-332.

Gates, B.I. 1991. Sudbury Mineral Occurrence Study; Ontario Geological Survey, Open File Report 5771, 235p.

HIGHLIGHTS

- **Offset dykes are fine- to medium-grained norite (quartz diorite) with mafic to ultramafic Sudbury Breccia inclusions**
- **Extend radially from the base of the SIC, or lie concentrically about it parallel to the footwall rocks of the SIC contact**
- **Mineralized offsets display a characteristic pockmarked weathered surface**
- **Kitchener and Tyrone townships northeast of the basin contain little-documented occurrences of Sudbury Breccia**

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Ni-Cu-PGM Potential of Offset Dykes, NE Sudbury

Several producing mines in the Sudbury camp have exploited economic base metal mineralization in offset dykes, which are essentially Sublayer intrusive rocks penetrating the footwall of the Sudbury Igneous Complex (SIC). Accordingly, these dykes have been popular exploration targets in Sudbury.

Quartz diorite is a variety of the Sublayer of the SIC, comprising the largest part of the offset dikes that extend radially from the base of the SIC, or lie concentrically about it parallel to the footwall rocks of the SIC contact. Many of the large Ni-Cu sulphide deposits associated with the SIC are hosted by offset dikes (Giblin et al. 1984).

Sudbury Breccia, a pseudotachylite of varying composition, occurs around the SIC in both radial and concentric patterns. It has been identified as far as 80 km from the SIC in the northeast. Many offset dikes are associated with Sudbury Breccia. Radial offsets project outward from embayments along fractures that are commonly filled with Sudbury Breccia; the Frood–Stobie offset is entirely within Sudbury Breccia.

Exploration activity for undiscovered offset dikes of the SIC has been strong in the past few years. Recent work has resulted in the discovery of the Kelly Lake deposit on the Copper Cliff Offset and additional mineralization at the Totten Mine on the Worthington Offset. More recently, Wallbridge Mining Company Limited has discovered previously unknown segments of the Parkin Offset and the Trill Offset.

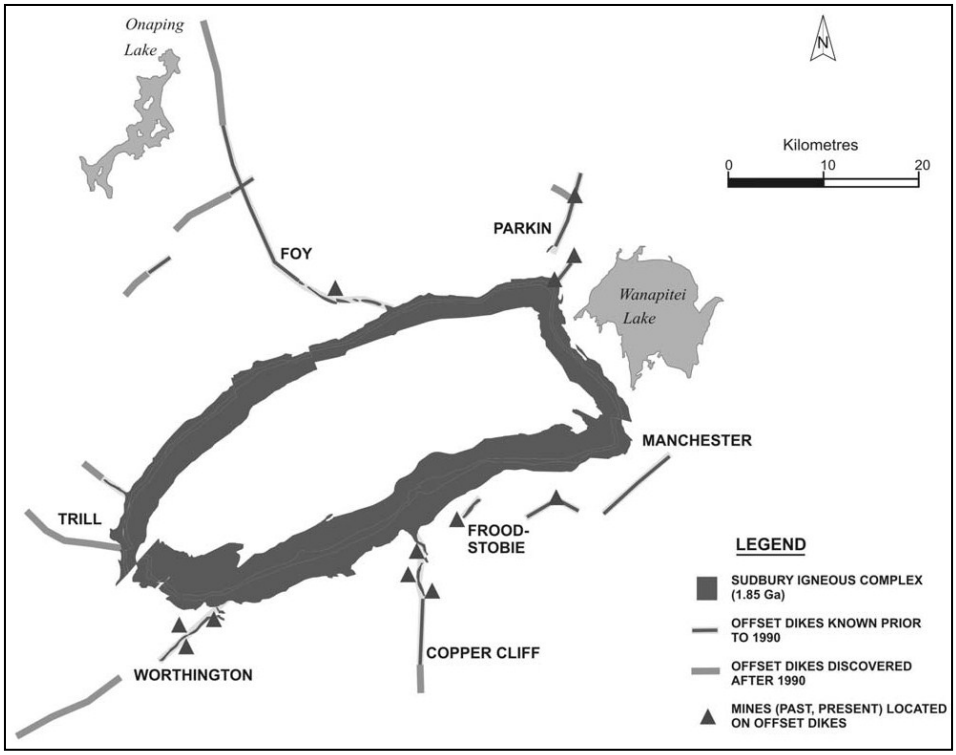

Figure 18.

Ni-Cu-PGM Potential of Offset Dykes, NE Sudbury …cont'd

Another mineralized extension of the Worthington Offset was discovered by an independent prospector in 2001. Discovered first around 1900, it was classified geologically as Nipissing diabase and as such, not prospective for massive Ni-Cu sulphide deposits. Only recently was it redefined as a mineralized extension of the Worthington Offset.

Offset dikes are composed of fine- to medium-grained norite (quartz diorite) with inclusions of mafic to ultramafic composition. The inclusions vary in size from several millimetres to more than one metre. These dikes may be mineralized or unmineralized; those that are mineralized display a characteristic pockmarked weathered surface that distinguishes them from other types of dikes. The commonly weathered minerals are chalcopyrite and pyrrhotite (Meyer et al. 2002).

In summary, offset dikes of the SIC may be found by methods including, but not necessarily limited to:
i) prospecting and geological mapping belts of Sudbury Breccia;
ii) examining previously mapped mafic dikes, particularly in the North and West ranges of the Sudbury Structure;
iii) geophysical surveys (magnetic and magnetotelluric methods have been proven successful); and
iv) locating and identifying the mining rights holders of properties not currently held by active mineral exploration companies (through the Provincial Recording Office and the Land Titles Office).

In the highly-staked ground surrounding the Sudbury Basin, one of the last areas affording unstaked Crown Land is found in the granites and gneisses of Kitchener and Tyrone townships, northeast of the basin. Proximal to the prolific Foy offset, this area contains little-documented occurrences of Sudbury Breccia which warrant further examination for possible offset dykes of both radial and concentric nature.

Meyer, G., Cosec, M., Grabowski, G.P.B., Guindon, D.L., Chaloux, E.C. and Stewart, J.M. 2002. Report of Activities 2001, Resident Geologist Program, Kirkland Lake Regional Resident Geologist Report: Kirkland Lake and Sudbury Districts; Ontario Geological Survey, Open File Report 6083, 94p.

Giblin, P.E., 1984: Chapter l. History of Exploration and Development, of Geological Studies and Development of Geological Concepts; p.3-23 *in* The Geology and Ore Deposits of the Sudbury Structure, edited by E.G. Pye, A.J. Naldrett, and P.E. Giblin, Ontario Geological Survey, Special Volume l, 603 p. Accompanied by Map 2491, at a scale of 1:50 000, Map NL-16/17-AM Sudbury, at a scale of l: l 000 000, and 3 charts.

HIGHLIGHTS

- **The two most prolific and well known gold related structures are the Porcupine-Destor (PDFZ) and Larder Lake-Cadillac (LLCB) faults**
- **Company promotional maps show the LLCB extending southwest from Matachewan through Shining Tree**
- **The location of the LLCB is typically related to occurrences of "green carbonate"**
- **The occurrence of green carbonate north of Gowganda would place a potential break too far east for considering the LLCB to pass through Shining Tree**
- **The Ridout Fault is a major structure in the Swayze greenstone belt, to the west of Shining Tree and may be extended to form a "new" break along the southern margin of the Round Lake Batholith, as speculated by Transition Metals Corp.**

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Shining Tree - Give me a break

The Shining Tree area is currently a hot exploration play for gold. Recent and historic exploration has outlined resources of more than 1 500 000 ounces of gold. It seems that in order to have an important gold play in Ontario, you need to be on or near a major fault system or break. What could be better than to be on the Howey Bay-Flat Lake Deformation Zone (Red Lake), the Hemlo-Heron Bay regional fault (Hemlo), the Porcupine-Destor (Timmins), or the Larder Lake-Cadillac Break (Kirkland Lake)? The Larder Lake-Cadillac and the Porcupine-Destor breaks are major east-west trending structures with numerous related gold deposits. More than 150 000 000 ounces of gold have been produced from deposits associated with these two structures.

From west of Kirkland Lake to Matachewan, the trace of the Larder Lake-Cadillac Break (LLCB) is often obscured by overlying Huronian Supergroup sedimentary rocks. West of Matachewan, the location of the LLCB is more problematic: it corresponds with either a north-west-trending fault through the northern part of Powell and Bannockburn townships or a southwest-trending fault extending through Midlothian Township.

Numerous comments from press releases and company promotional maps show the Larder Lake-Cadillac Break extending southwest from Matachewan through Shining Tree, but this interpretation is still open to question.

The Ridout Fault is a major structure in the Swayze greenstone belt, to the west of Shining Tree. The fault has been traced through a sliver of greenstone south of the Kenogamissi Batholith to Groves Township.

Exploration companies currently active in Shining Tree are concentrating on northwest-trending structures such as the Michiwakenda Lake fault, Jess Lake fault and the Tyrrell shear zone. The location of the LLCB is typically related to occurrences of "green carbonate". The presence of "green-carbonate" indicates that ultramafic units were subjected to hydrothermal alteration. There are a number of outcrops of altered ultramafic volcanic rocks ("green-carbonate") in the Shining Tree area, however, they are not part of a continuous unit, as could be found east of Kirkland Lake.

There isn't a well defined west-trending break in the Shining Tree area and, if there were, it is not the Larder Lake-Cadillac. The occurrence of green carbonate on Transition Metal Corp.'s Haultain Township property north of Gowganda would place a potential break too far east for considering the Larder Lake-Cadillac break to pass through Shining Tree. As exploration continues, the relationship between the northwest trending faults and the green carbonate may help define either a "new" break that extends east through Shining Tree and Gowganda along the southern margin of the Round Lake Batholith as speculated by Transition Metals Corp. (http://www.transitionmetalscorp.com/).

Shining Tree - Give me a break …cont'd

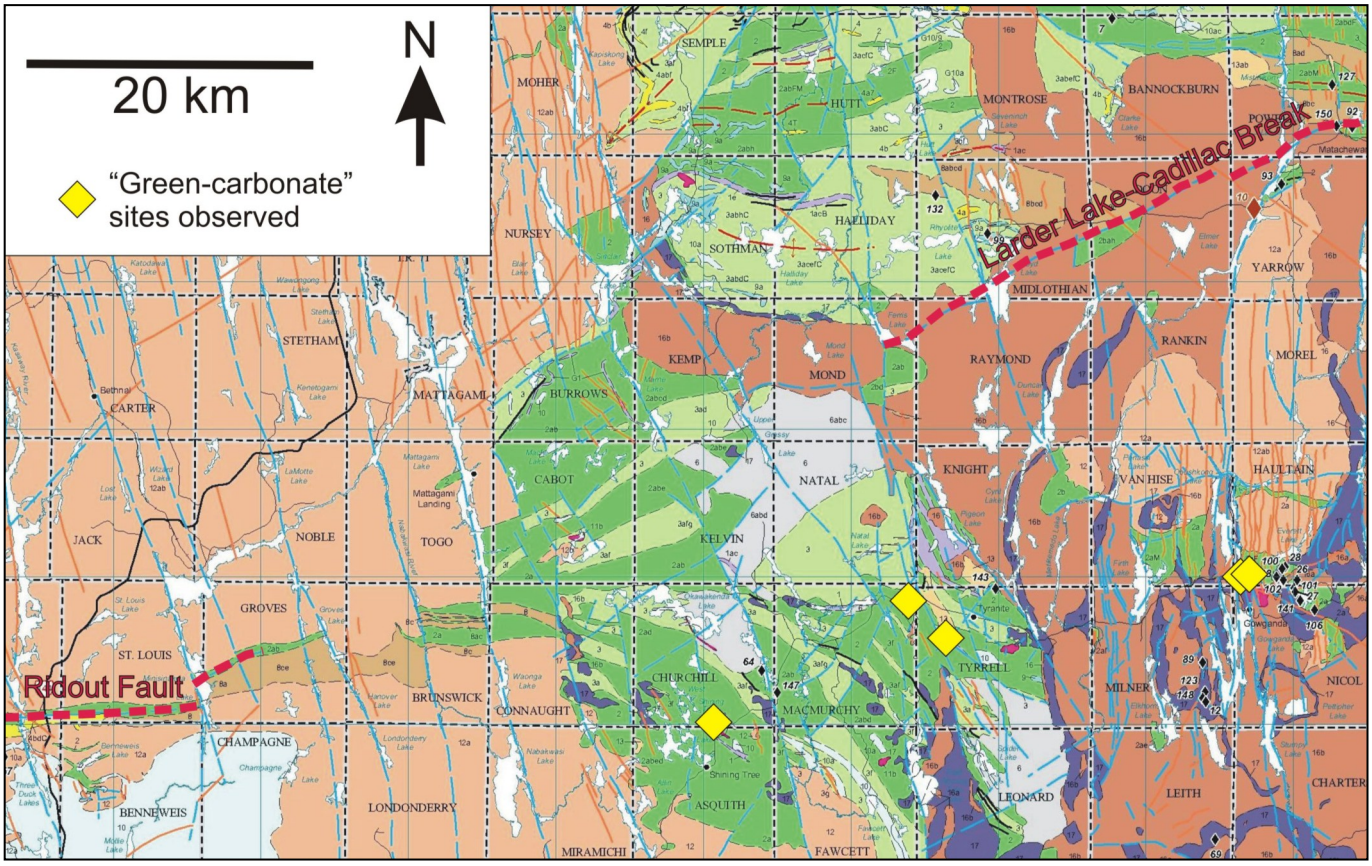

Figure 18.

Preliminary Observation on the Alteration and Mineralization found in Midlothian Township, Abitibi Greenstone Belt

HIGHLIGHTS

- **Enhanced Au, Ni-Cu-PGE and base metal potential of Midlothian Tp.**
- **Alteration corridor follows the contact between the metavolcanic rocks of the Tisdale assemblage and Timiskaming assemblage metasedimentary rocks**

Rocks in Midlothian Township are significantly more hydrothermally altered than in other parts of the Halliday dome. The alteration defines a corridor following the contact between the metavolcanic rocks of the Tisdale assemblage and the Timiskaming assemblage metasedimentary rocks. Alteration is most intense in the Timiskaming metasediments between Midlothian Lake and Lloyd Lake and becomes less intense going further west, north and south (Figure 19). The lack of outcrop exposure and the Huronian cover limits the interpretation of the alteration to the east. The expression of the alteration in the conglomerate depends on the intensity. Intense alteration in the Timiskaming conglomerate is dominated by disseminated ankerite making clast identification difficult. Less intense alteration selectively replaces conglomerate clasts with ankerite and green mica. A more sericitic alteration is present in the felsic metavolcanic rocks of the Tisdale assemblage. For more information on the geology, alteration and mineralization the reader is referred to Préfontaine (2011).

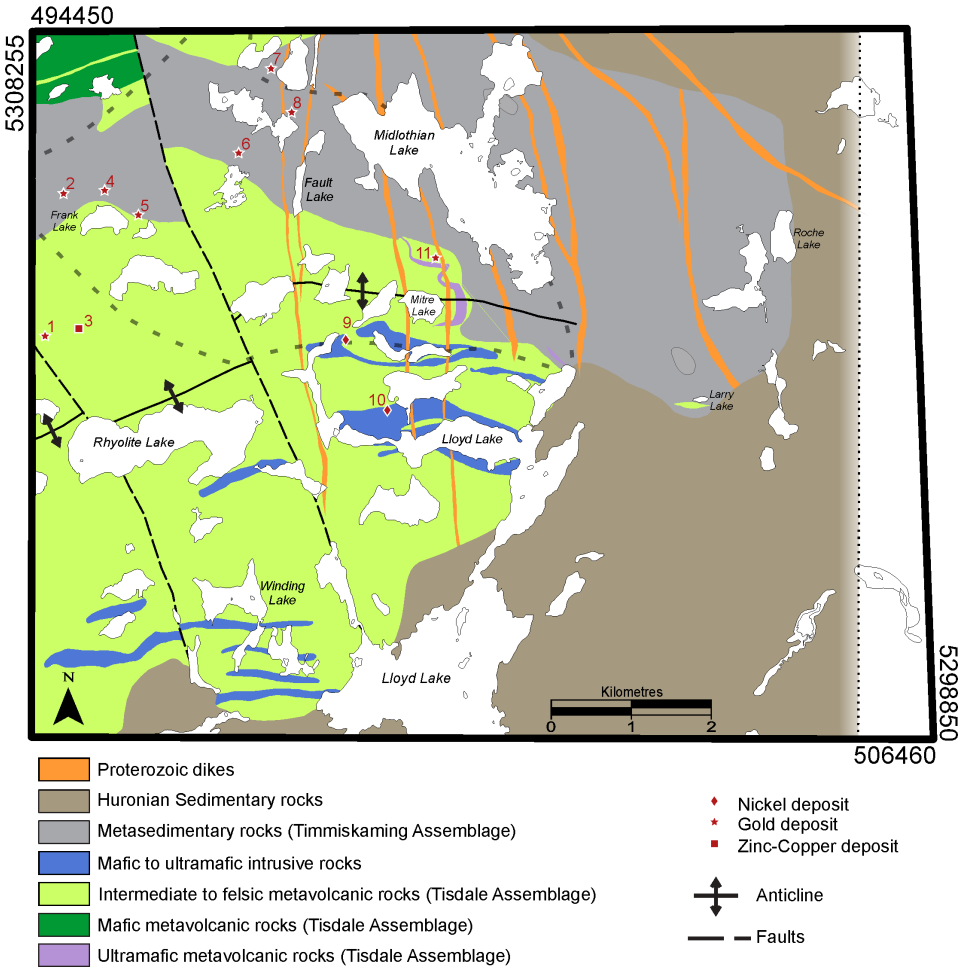

Figure 19.

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Preliminary Observation on the Alteration and Mineralization found in Midlothian Township, Abitibi Greenstone Belt …cont'd

Several types of mineralization are found in Midlothian Township: Au, Ni-Cu-PGE and base metal. By far, gold is the main commodity; of 11 mineral deposit inventory (MDI) sites, 8 are related to gold mineralization. Gold mineralization occurs mostly within shear-hosted quartz-carbonate veins of which the Stairs Mine is the most obvious example (deposit number 5, Figure 19).

Several favourable indicators for lode gold mineralization are found in Midlothian Township:

- Ankerite alteration at the contact between the Timiskaming and Tisdale assemblages is commonly associated with gold mineralization
- Local, small shear zones are found predominantly in the metasedimentary rocks of the Timiskaming assemblage
- Disseminated pyrite is widespread within the alteration corridor both in the felsic metavolcanic rocks of the Tisdale assemblage and in the metasedimentary rocks of the Timiskaming assemblage.
- Minor pervasive silicification and quartz veins

Two nickel occurrences found in the study area are hosted within the ultramafic portion of the mafic to ultramafic intrusions (deposit number 9-10, Figure 19). Several of the mafic to ultramafic bodies that intruded the volcanic packages contain sulphide minerals making them potential targets for nickel exploration. Most intrusions have had little to no exploration for Ni, Cu and PGEs.

Only one base metal occurrence has been reported (deposit number 3, Figure 19), although several discretionary occurrences have been reported. Most of the base metals are described as either disseminated base metals within the metavolcanic rocks and are associated with quartz veins or as veins/pods cross-cutting the host rock. The minerals reported consist of: pyrite, pyrrhotite, chalcopyrite, sphalerite and galena. Also, mineralized clasts, dominantly pyrite but minor chalcopyrite and pyrrhotite, were observed in the conglomerate of the Timiskaming assemblage mainly at the southern margin with the Tisdale metavolcanic rocks.

Préfontaine, S. 2011. Geology and Mineral Potential of Midlothian Township, Halliday Dome, Abitibi Greenstone Belt,; in Summary of Field Work and Other Activities 2011, Ontario Geological Survey, Open File Report 6270, p. 4-1 to 4-12.

HIGHLIGHTS

- **Good potential for additional carbonatite-related rare earth element properties**
- **Good potential for discovery of other industrial mineral deposits**

Rare Earth Element Potential of the Ottawa -Bonnechere Graben

The emplacement of alkalic rocks, carbonatites and kimberlites has a close spatial relationship with regional crustal fractures such as the Ottawa-Bonnechere Graben. The graben lies along the Ontario-Quebec border and is approximately 60 km wide. At Lake Nipissing, the system splits into a west-trending branch and the northwest-trending Lake Timiskaming Fault system. Seven alkalic-carbonatite complexes have been identified along the approximately 300 km long structure.

Niobium and uranium mineralization is associated with the four alkalic complexes lying within Lake Nipissing. Based on the limited mineral exploration conducted on the showings, typical assays from the Iron Island Complex include: 0.30% Nb2O5 and 0.10% U3O8 over 5 feet in Nipiron Mines Ltd. DDH-13. In 1953, diamond drilling completed by Beaucage Mines Ltd. outlined at least 27 000 tons of ore grading 0.104% U3O8, 0.38% Nb2O5 and 10% P2O5 within the Manitou Islands Complex (**MDI000000000676**). No islands within Lake Nipissing are open for staking.

The Lavergne Prospect (**MDI31L05NW00002**) lies within Springer Township, approximately 12 km north of Lake Nipissing. The prospect consists of carbonate veins within a fenitized intrusion. In 2011, Rare Earth Metals Inc. completed 7 diamond drill holes on the property. Assays from their exploration project include: DDH SL-01: 0.94% TREO (Total Rare Earth Oxides) over 359.8 m, incl. 1.50% over 94.2 m; DDH SL-02: 0-97% TREO over 301.6 m incl. 1.57% over 40.7 m and DDH SL-03: 1.43% TREO over 157.7 m incl. 1.51% over 124.7 m. Numerous other potential drill targets have been identified through a recently completed airborne survey.

Very little mineral exploration of any kind has been conducted within the graben; however there are some areas that warrant further investigation. In 1953, a single drill hole (255 feet) was completed on Lot 19 Concession 17 of Bonfield Township (**MDI31L06SE00005**). The drill log notes the intersection of a thick sequence of what was described as calcite. This may represent a carbonatite or carbonate dike similar to that found at the Lavergne Prospect. Traces of uranium mineralization have also been reported from late pegmatite dikes in Calvin, Chisholm and Hardy townships.

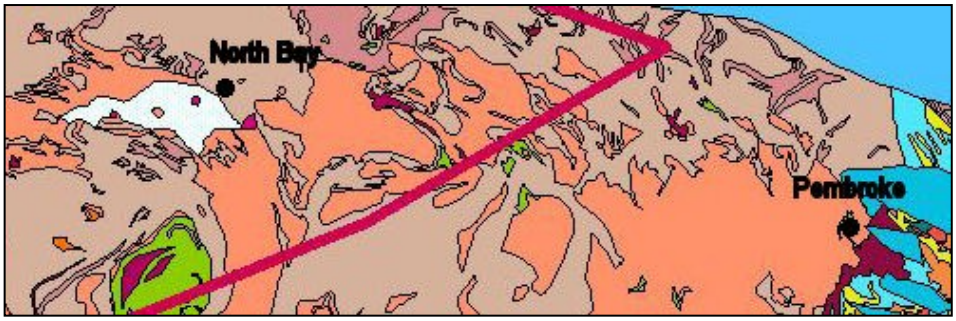

Figure 20.

Lumbers, S.B. 1971. Geology of the North Bay Area, Districts of Nipissing and Parry Sound; Ontario Geological Survey, Report 94, 104 p.

Sage, R.P. 1991. Alkalic Rock, carbonatite and kimberlite complexes of Ontario, Superior Province; *in* Geology of Ontario, Ontario Geological Survey, Special volume 4, Part 1, p.683-709

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Zinc, Copper and Copper-Nickel (Platinum Group Elements) Potential in the Vicinity of the Central Metasedimentary Belt Boundary Zone in Southeastern Ontario

HIGHLIGHTS

- **Recent OGS mapping identifies marbles with potential for MVT and SEDEX type Zn mineralization near major tectonic sub-province boundary zone**
- **Significant anomalies of Zn, Cu and Ni in till proximal to tectonic boundary zone**
- **Known deposits and occurrences of marble-hosted Zn and mafic intrusion-hosted Cu and Cu-Ni (PGE) in the area**

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Recent mapping by the Ontario Geological Survey has identified areas with potential for Zn, Cu and Cu-Ni (PGE) mineralization. The Admaston-Horton, Brudenell and Raglan OGS project areas lie roughly between Pembroke and Bancroft along the southeastern margin of the Central Metasedimentary Belt Boundary Zone (CMBBZ). The CMBBZ is an area of highly deformed and flattened gneisses which separates rocks of the Central Gneiss Belt (CGB) to the northwest from those of the Central Metasedimentary Belt (CMB) to the southeast.

The CGB consists mainly of upper amphibolite to granulite facies, quartzofeldspathic gneisses, predominantly of igneous origin with subordinate paragneiss. Rocks of the CMB adjacent to the CMBBZ consist predominantly of calcitic and dolomitic marbles and marble tectonic breccia, intruded by tonalite, gabbro and syenite plutons (Easton et al. 2011).

Geological Survey of Canada Open File Report 3175 (Kettles and Shilts 1996) shows a concentration of Zn, Cu, and Ni anomalies in till within the CMBBZ and adjacent rocks of the CGB and CMB (Figure 21). The points shown represent the 95 to 100 percentile groups of the GSC analyses, corresponding to values of 225 to 4500 ppm Zn, 223 to 1115 ppm Cu and 86 to 950 ppm Ni. There are no documented mineral occurrences up ice of the till anomalies, but there are examples of Zn, Cu and Ni mineralization in both the CGB and the CMB in the vicinity of the CMBBZ.

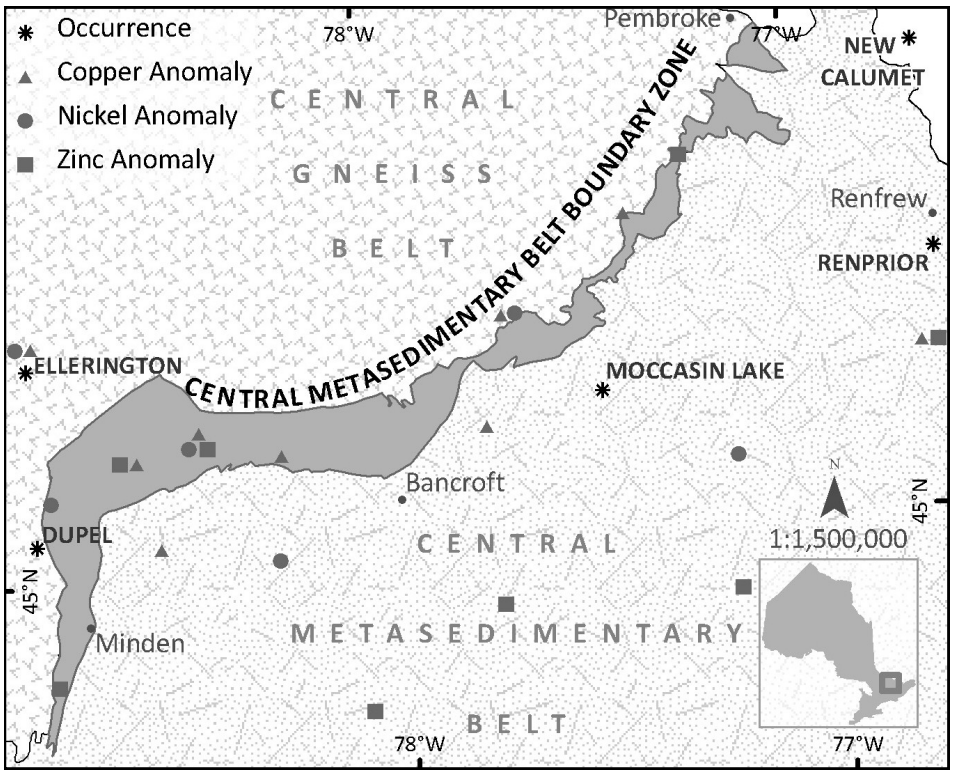

Figure 21. Locations of Zn, Cu and Ni occurrences in bedrock and concentrations in till in the vicinity of the Central Metasedimentary Belt Boundary Zone, southeastern Ontario.

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One such example, the New Calumet zinc deposit on Calumet Island, east of Pembroke, produced 4Mt of ore averaging 5.8% Zn, 1.6% Pb, 70 g/t Ag and 3 g/t Au between 1942 and 1968. The deposit lies conformably along a thin marble unit above a siliceous biotite gneiss. The Renprior (Cadieux) zinc deposit, 7 km south of Renfrew, hosts 1Mt grading 9.6% Zn in silicified dolomitic marble. In 2009, First Nickel Inc. discovered a Cu-Ni-PGE mineral occurrence 40 km NE of Bancroft. Diamond drill intersections of up to 0.76 g/t Pt and 1.22g/t Pd /5.0 m are associated with disseminated sulphides within the Moccasin Lake Gabbro (Easton et al 2011).

Within the CGB, Cu-Ni mineralization is associated with mafic intrusive rocks at the Ellerington occurrence in McClintock Township and the Dupel occurrence in Hindon Township. Best drill hole intersections at the former were 1.36% Ni and 0.2% Cu/ 4.5 m (with a report of 1.12 g/t Pt in a grab sample) and, at the latter, 1.2% Cu/ 5 m (Tweed Resident Geologist Office, assessment files: Slocan van Roi Mines and Orogrande Resources, McClintock Twp; Dupel Mines Ltd., Hindon Twp.).

Potential for mineralization in the northeastern part of the CMB as suggested by Easton et al. (2011) includes:

- Mississippi Valley type and SEDEX type zinc mineralization in the carbonate basins of the CMB.
- Cu (-Mo-W) skarn mineralization associated with granodiorite to tonalite intrusions.
- Cu-Ni-PGE mineralization in mafic intrusions.

Based upon the presence of Zn, Cu and Ni mineralization in bedrock and anomalous concentrations in till, exploration for these types of deposits in and adjacent to the entire CMBBZ is recommended.

Easton, R.M., Duguet, M. and Magnus, S.J. 2011. Geology and mineral potential of the northeastern Central Metasedimentary Belt, Grenville Province; in Summary of Field Work and Other Activities 2011, Ontario Geological Survey, Open File Report 6270, p.5-1 to 5-23.

Kettles, I.M. and Shilts, W.W. 1996. Geochemical and lithological composition of surficial sediments, southeastern Ontario; Geological Survey of Canada, Open File 3175, 33p

Rare Earth Elements in Magnetite Skarns, Southeastern Ontario

HIGHLIGHTS

- **Samples of magnetite skarn mineralization contain from 0.4% to 3.5% combined La and Ce**
- **Similar mineralization to Clay-Howells magnetite/REE deposit with potential for co-product iron and REE**
- **190 magnetite occurrences in SE Ontario; very few have been tested for REE content**

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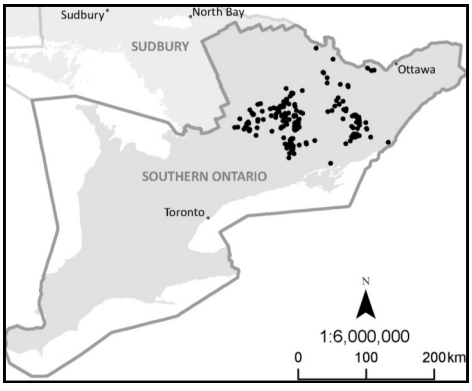
Iron ore has been mined from skarn magnetite deposits in southeastern Ontario since 1821. The largest - the Marmoraton Iron Mine deposit, which produced 25 million tonnes grading 43% Fe - is situated at the contact between a diorite/syenite body and interlayered carbonate and siliceous metasediments about 3.5 km southwest of the Deloro Granite, an alkali-rich intrusive complex that hosts past producers of fluorite, gold and iron. Recent sampling of skarn material from the Marmoraton mine has indicated highly anomalous levels of light rare earth elements.

Two samples of magnetite taken from the Marmoraton iron mine waste pile in 2010 by Tweed RGO staff were analysed for REE content. One sample, consisting of about 80% magnetite, 5% combined pyrite and chalcopyrite, and minor biotite, chlorite and ankerite, contains no anomalous levels of REE. However, a second sample consisting of about 75% magnetite and 25% epidote with traces of pyrite and pyrrhotite, contains 1840 ppm La, 1720 ppm Ce, and anomalous levels of Pr and Nd (121 and 282 ppm, respectively). These values, converted to rare earth oxide content are 2158 ppm La2O3 and 2014 ppm Ce2O3, or about 0.4% combined REO.

High levels of LREEs have been documented in two other magnetite skarn deposits in southeastern Ontario. A magnetite-bearing sample from the Victoria Mine in Snowdon Township contained 17 400 ppm La, 17 200 ppm Ce and 2560 ppm Nd (Easton 1987) and a sample from the Radenhurst-Caldwell deposit in Lavant Township contained 1222 ppm La, 1434 ppm Ce and 385 ppm Nd (Easton 1988).

Similar mineralization occurs at the Clay-Howells alkalic complex in northern Ontario. A 10 million tonne magnetite deposit, outlined by diamond drilling in the 1950s, was acquired by Rare Earth Metals Inc. in 2009 and tested for REE content. A 2010 drill hole intersected 105 m grading 58% iron oxide, 0.69% total rare earth oxides (TREO) and 0.14% niobium oxide, including a 4.9 m width of 2.45% TREO. Preliminary metallurgical tests indicate that a high grade iron concentrate and a REE concentrate can be produced (http://www.rareearthmetals.ca/article/clayhowells-project-117.asp).

Magnetite occurrences in southeastern Ontario, including those not obviously associated with alkalic intrusive rocks, should be examined for rare earth element content. The Clay-Howells REE-bearing magnetite zone and associated carbonatitic rocks lie well within the intrusion, at least 250 m from the margin and are not exposed in outcrop. Magnetic highs within topographic lows in the interior of intrusive bodies associated with magnetite skarn mineralization should be considered as exploration targets. Skarn/hydrothermal mineralization associated with late-stage fluids enriched in iron oxide and REEs may have been deposited at the margins of the intrusive bodies or at contact zones within complex intrusions.



A search of the Mineral Deposits Inventory database in GeologyOntario for magnetite in southeastern Ontario gives 190 records (Figure 22) of which at least 25 are listed as past-producing magnetite mines.

Figure 22: Locations of Mineral Deposit Inventory points for magnetite occurrences in southeastern Ontario.

Rare Earth Elements in Magnetite Skarns, Southeastern Ontario …cont'd

Easton, R.M. 1987. Geology of the Howland area, Haliburton, Peterborough and Victoria counties; Ontario Geological Survey, Open File Report 5639, 188p.

Easton, R.M. 1988. Geology of the Darling area, Lanark and Renfrew Counties; Ontario Geological Survey, Open File Report 5693. 206p.