

RECOMMENDATIONS for Exploration

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

2016 - 2017

Mo
Molybdenum

42
13
1

96

Tc
Technetium
[98]

Ru
Ruthenium
101.07

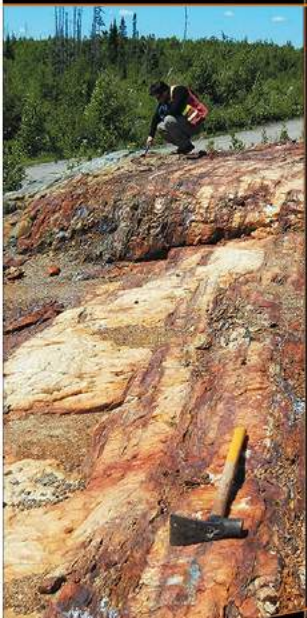
Rh
Rhodium
102.9055

Pd
Palladium
106.42

Ag
Silver
107.8682

Cd
Cadmium
112.411

In
Indium
114.818



75
Re
Rhenium
186.207

2
8
18
32
13
2

76
Os
Osmium
190.23

2
8
18
32
14
2



78
Pt
Platinum
195.084

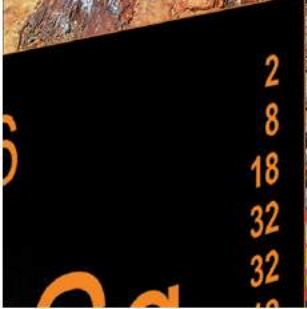
2
8
18
32
17
1



80
Hg
Mercury
200.59

2
8
18
32
18
2

81
Tl
Thallium
204.3833



108
Hs
Hassium

2
8
18
32
32
14
2



111
Au
Gold
196.966569

2
8
18
32
16
1

112
Cn
Copernicium
[285]

2
8
18
32
18
2

113
Nh
Nihonium
[286]

114
Fl
Flerovium
[287]

Recommendations for Exploration

2016-2017



● General Area that is Recommended for Mineral Exploration

ONTARIO
CANADA

Ontario Geological Survey

Resident Geologist Program

Recommendations for Exploration 2016–2017

The Ontario Geological Survey is pleased to issue its 2017 Recommendations for Exploration. These recommendations are the product of the Ministry's dedicated and knowledgeable staff located across the province.

Each year, recommendations are developed based on the wealth of geological and exploration data available to our staff (and you) and any new information or concepts derived from the current year's activities.

Please review our current recommendations and feel free to discuss these in detail with any of our geoscientists.

Visit OGS Earth on the MNDM Mines and Minerals Division Web site (<http://www.mndm.gov.on.ca/en/mines-and-minerals/applications/ogsearth>) to see what else is available.

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About the Resident Geologist Program

Resident Geologists are the stewards of public geological and mineral exploration information for their districts. They provide a broad range of advisory services on geological topics of interest to the public, to municipal governments and to the mineral industry.

They are the local experts on why geoscience information is important, what information is available and what is happening in exploration.

The program provides primary client services through a network of 8 field offices strategically located across the province.

Our services include

- collecting and maintaining geological data
- monitoring exploration activity
- conducting property examinations
- providing geological and exploration advice

We provide geoscience information to support

- public safety
- environmental planning
- land use planning
- mineral sector investment and economic development

We provide information and training to First Nation Communities regarding prospecting, mineral exploration and mining.

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HIGHLIGHTS



- **Several zinc-rich VMS occurrences have been identified in the Melchett Lake greenstone belt which all remain open for staking.**
- **Widespread VMS-related alteration recognized within a dominantly felsic metavolcanic package.**

Volcanogenic Massive Sulphide-Hosted Base and Precious Metal Potential in the Melchett Lake Greenstone Belt

The Melchett Lake greenstone belt (MLGB) hosts a number of gold and base metal occurrences, some of which suggest a volcanogenic massive sulphide (VMS) environment (Table 1). The Melchett Lake banded iron formation was the focus of iron exploration in the 1960s and hosts 2 iron resources: Skibi Lake (335 000 000 tons of 26.2% acid-soluble Fe) and Stewart Lake (49 500 000 tons grading 30% Fe; Ontario Geological Survey 2016). The MLGB is approximately 8 by 40 km in size, and consists largely of felsic metavolcanic rocks, namely east-trending, amphibolite-facies lithological units (Figure 1; Bond and Foster 1981a, 1981b; Devaney 1999). It is flanked to the south by the Melchett Lake banded iron formation, which extends for over 60 km. The MLGB is located approximately 65 km north-northwest of Nakina and can be accessed by the Anaconda Road, which extends north from Nakina to the southwestern corner of the MLGB. The remainder of the belt can be accessed by boat on Melchett Lake and Nass Lake or by float-plane or helicopter.

The Ontario Geological Survey (OGS) released an aeromagnetic survey in the Melchett Lake area, north of Nakina, in 2010 (Figure 2; OGS 2010). A detailed interpretation of these aeromagnetic data was completed by Stott and Rainsford (2010). The survey area largely straddles high-grade, gneissic, metasedimentary and granitoid rocks of the English River basin between the Neoarchean Uchi domain (including the Fort Hope greenstone belt) to the north and the Winnipeg River (Caribou Lake greenstone belt) and Marmion terranes (Marshall Lake and O'Sullivan Lake greenstone belts) to the south. The MLGB occurs in the midst of this high-grade gneissic terrane.

Exploration for VMS deposits in the MLGB has occurred sporadically following the discovery of zinc mineralization at the Nakina Mine prospect (Nakina 1) in 1959. The area, which hosts the Nakina 1 and Relf zones, was described by Wahl (1985) as a lenticular felsic metavolcanic sequence, approximately 15 km in strike length and upwards of 1500 m thick, which appears to thin at the eastern and western ends. Mineralization was interpreted to occur in paleotopographic depressions as a result of fumarolic activity during a volcanic hiatus, depositing polymetallic massive sulphides in 2 currently recognized areas (Nakina 1 and Relf; Wahl 1985). Alteration, characterized by sodium depletion and iron + magnesium enrichment, were noted in areas proximal to the Nakina 1 and Relf zones, as well as in northeastern portion of the MLGB around Colpitts Lake (Wahl 1985; Devaney 1999). The Nakina 2 zone was recognized by Ottone (1987) as a gold target and lies stratigraphically above the Nakina 1 target, possibly representing a later-stage, gold-rich mineralizing event related to VMS deposition.

The potential for discovery of economic zinc-lead-silver-gold-bearing VMS deposits in the Melchett Lake greenstone belt is high. A compilation of all historical work on the property is recommended to provide a

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VMS-Hosted Base and Precious Metals: Melchett Lake Greenstone Belt

comprehensive framework of rock types, structures and alteration systems controlling mineralization within the belt. Locating and sampling all occurrences, historical trenches and drill collars is recommended following compilation. Considerable attention should be paid to the alteration system noted by Devaney (1999) and the structures controlling currently recognized mineralized zones. Geophysical methods suitable for VMS exploration (e.g., high-resolution magnetometer, electromagnetic and borehole techniques) should aid in identifying and prioritizing drilling targets. Assessment files for all work conducted on the property are available on GeologyOntario (<http://www.geologyontario.mndm.gov.on.ca/>), through the OGSEarth Assessment Files application (<http://www.mndmf.gov.on.ca/en/mines-and-minerals/applications/ogsearth>) or in the Resident Geologist's files in the Thunder Bay Regional office. Ontario Geological Survey products covering the Melchett Lake area include bedrock geological maps (Table 2), airborne geophysical surveys and mineral deposit inventory points, which provide an excellent framework for the area's mineral potential.

Table 1. Summary of occurrences/prospects in the Melchett Lake greenstone belt (excluding iron occurrences and deposits; MDI data from OGS 2016). Universal Transverse Mercator (UTM) co-ordinates in North American Datum 83 (NAD83), Zone 16.

Occurrence/Prospect and Location	Mineral Deposit Inventory (MDI) Number	Assay Highlights	Description of Occurrence
Nakina Mines Prospect (Nakina 1 Zone) (499534E, 5622152N)	MDI42L14SE00005	14.85% Zn, 0.13% Cu, 0.92 oz/ton Ag and 0.30 oz/ton Au (assay from trench; Nakina Mines Ltd., 1968) 8.25% Zn, 1.08% Pb, 0.76 oz/ton Ag and 0.20 oz/ton Au (Hole N-4, Nakina Mines Ltd., 1968)	Polymetallic pyrite-sphalerite-chalcocopyrite-galena mineralization occurs within felsic to intermediate metavolcanic schists within abundant pyrite, sericite and chloritic alteration.
Lun-Kerr Occurrence (Relf Zone) (503908E, 5622130N)	MDI42L15SW00003	19.1% Zn, 0.40% Cu, 2.2% Pb and 16.4 oz/ton Ag (assay from trench, Shawmine Explorations Ltd., 1964)	Polymetallic pyrite-sphalerite-chalcocopyrite-galena mineralization occurs within muscovite-sericite schists and quartzo-feldspathic mica schists
Aldor Exploration Gold Occurrence (512492E, 5616455N)	MDI42L10NW00007	0.52 oz/ton over 25 cm	Sample from quartz vein in a quartz gabbro dike (later interpreted to be a mafic metavolcanic unit)
Campbell Occurrence (506406E, 5618999N; location approximate)	n/a	1.8% Zn, 1.0% Cu and 0.06 oz/ton Au (assay from grab sample)	Disseminated copper, zinc, gold mineralization from pyritic quartz-sericite schist (altered felsic pyroclastic rocks)
Molly Lake Occurrence (508192E, 5617632N; location approximate)	n/a	1.5 % Zn and 0.17 oz/ton Au	Mineralization consists of massive pyrrhotite in a 3 m thick amphibolite schist layer

N.B., oz/ton – ounces per ton.

Table 2. Summary of relevant Ontario Geological survey map products available for the Melchett Lake greenstone belt.

Map No.	Map name	Authors	Year	Scale
P.2392	Precambrian geology of the Melchett Lake area, west part, District of Thunder Bay	W.D. Bond and J.R. Foster	1981	1:15 840
P.2393	Precambrian geology of the Melchett Lake area, east part, District of Thunder Bay	W.D. Bond and J.R. Foster	1981	1:15 840
OFM234	Precambrian geology, Colpitts–Bury lakes area, west part	J.R. Devaney and S.M. Nacha	1994	1:20 000
P.565	Operation Fort Hope, Makokibatan–Melchett lakes sheet, districts of Kenora (Patricia Portion), Cochrane and Thunder Bay	P.C. Thurston and M.W. Carter	1969	1:126 720
P.275-REV	Compilation Series, Ogoki Lake sheet, Thunder Bay and Cochrane districts	G.M. Stott, C.D. McConnell and J.K. Mason	1984	1:126 720

VMS-Hosted Base and Precious Metals: Melchett Lake Greenstone Belt

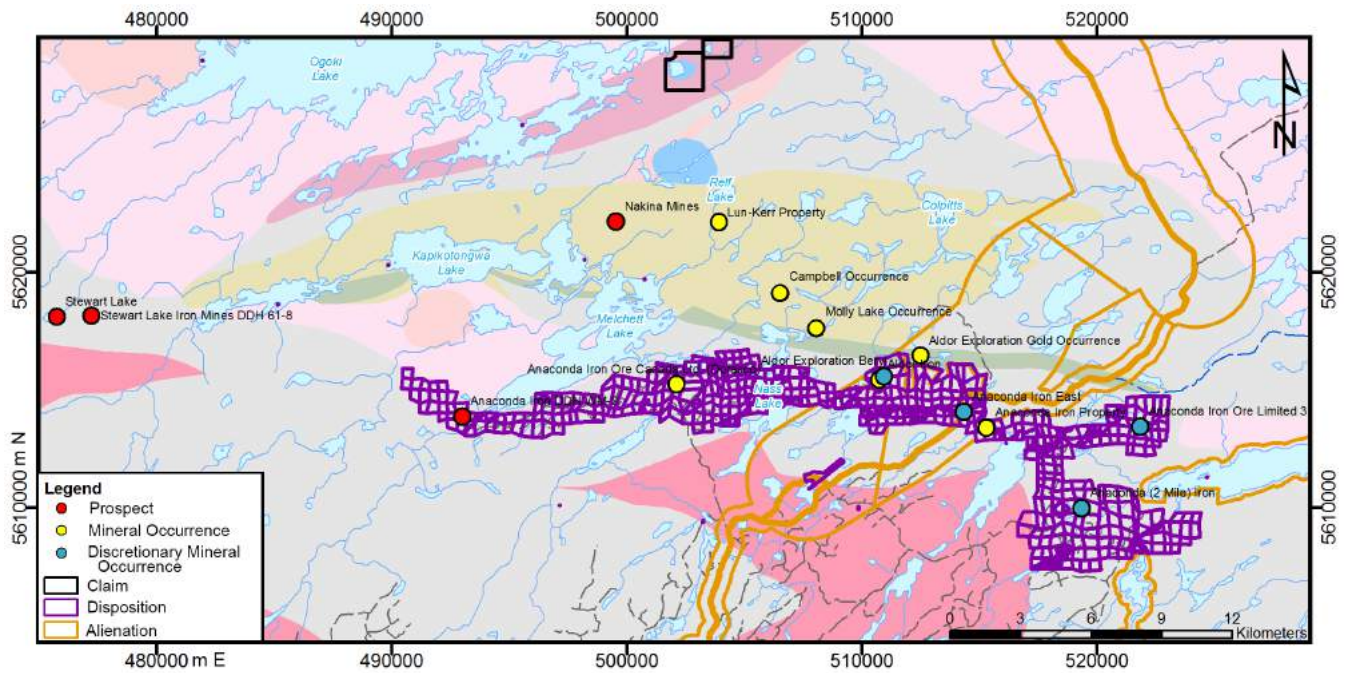


Figure 1. Geological map showing Mineral Deposit Inventory points in the Melchett Lake greenstone belt (beige and olive green). UTM co-ordinates in NAD83, Zone 16; claim units as of October 4, 2016; regional geology from Ontario Geological Survey (2011).

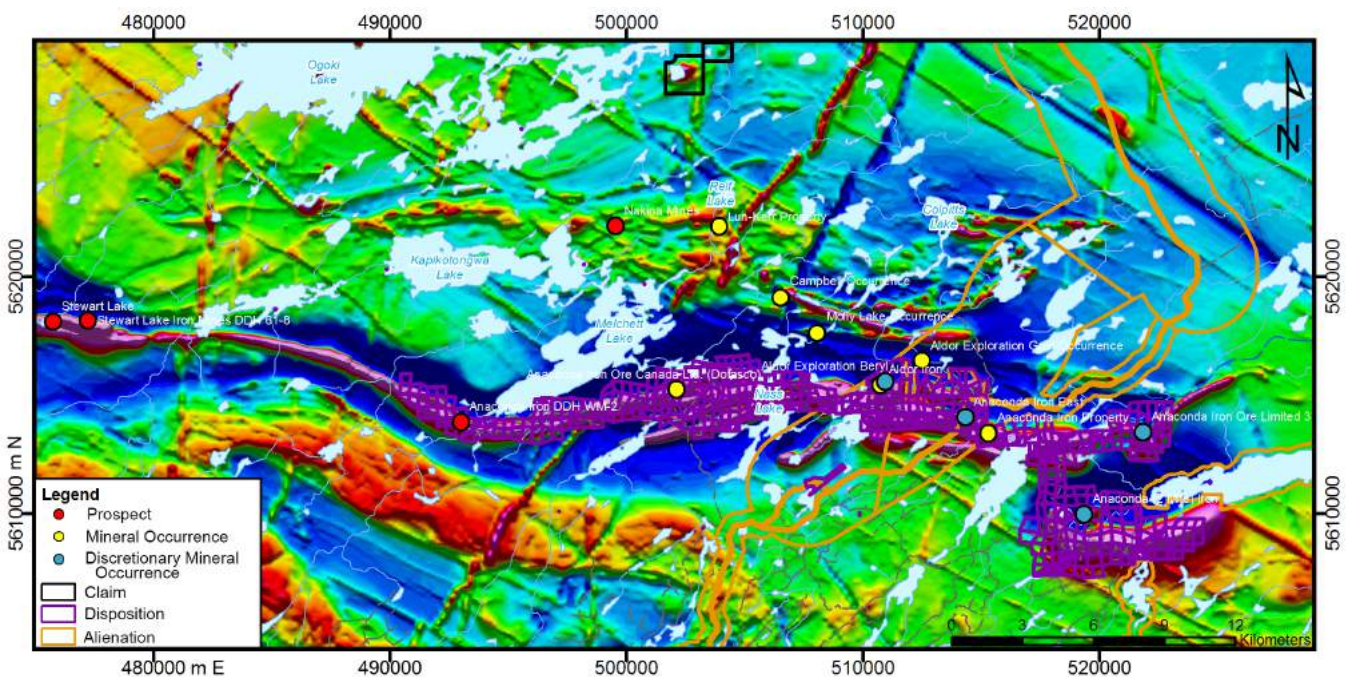


Figure 2. Total residual magnetic field map showing Mineral Deposit Inventory points in the Melchett Lake greenstone belt. UTM co-ordinates in NAD83, Zone 16; claim units as of October 4, 2016; geophysical data from Ontario Geological Survey (2010).

VMS-Hosted Base and Precious Metals: Melchett Lake Greenstone Belt

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