

Utik Lake greenstone belt, Manitoba

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Utik Lake greenstone belt mapping project

An Archean mafic metavolcanic-dominated greenstone belt at Utik Lake, central Manitoba, was mapped and studied in detail to 1) determine the nature, age and composition of the supracrustal rocks, in order to compare them with greenstone belts elsewhere in the northwestern Superior Province (e.g., Knee and Oxford lakes areas; see above map and geochemistry);

2) analyze the kinematics and structural evolution of the Utik Lake greenstone belt; and

3) reassess the potential of the area to host orogenic and/or syngenetic gold and volcanogenic massive sulphide deposits .

The greenstone belt at Utik Lake forms an east- to northeast-trending, subvertically dipping and southward-facing homoclinal succession intruded and bounded by younger granitoid rocks (see satellite image and geological map). The greenstone belt can be subdivided into several east- to northeasttrending panels of mafic metavolcanic and mafic intrusive rocks that are separated by metasedimentary sequences, including iron formation, mudstone and mafic volcanic-derived conglomerate. The metavolcanic rocks at Utik Lake have geochemical, compositional and textural similarities, occur along strike with, and are thus likely correlative with mafic metavolcanic rocks of the ca. 2.83 Ga Hayes River Group at Knee Lake. In contrast, the felsic to intermediate, tuffaceous and volcanogenic sediment-dominated supracrustal rocks at nearby Bear Lake form part of the ca. 2.73-2.71 Ga Oxford Lake Group (see results below).

The mafic metavolcanic and associated volcanogenic metasedimentary rocks at Utik Lake are overlain by a sequence of clastic sedimentary rocks that includes polymictic conglomerate, siltstone-mudstone turbidite, cordierite- and garnet-porphyroblastic wacke, and quartz arenite to sandstone. This younger metasedimentary sequence is similar in composition and tectonic position to the Opischikona metasedimentary rocks at central Knee Lake, whose age is estimated to be between 2.82 and 2.78

All supracrustal rocks at Utik Lake were intruded by at least three suites of felsic plutonic rocks of dominantly granitoid composition. The entire supracrustal assemblage was locally highly strained and sheared prior to, during and after the felsic plutonism that invaded and enveloped the supracrustal belt. The tectonic evolution of the belt is thus very favourable for orogenic and possibly syngenetic gold occurrences similar to those along regional strike at Knee Lake and Monument Bay.

Volcanic rocks at Bear Lake:

central supracrustal panel is likely part of the ca. 2.73 Ga Oxford Lake volcanic subgroup orthern and southern greenstone belts are likely parts of the ca. 2.83 Ga Hayes River Group



make up less than 5% of the volcanic package. note the dark garnet- and hornblende-rich pillow selvages





most mafic metavolcanic panel at Utik Lake are associated with form potential traps for sulphide and precious metal (Au) fluids

and thus indicates an environment favourable for the formation

Gold at Utik Lake

Assay results of samples of up to several metres wide and over few kilometres continuous iron formation at Utik Lake yielded high Au concentrations up to 8.5 g/t. Together with Au/Ag ratios <8 and only minor quartz veining in the iron formations, these results indicate excellent potential for high-grade syngenetic (epithermal) gold at Utik Lake

		Actlabs,	Report Date: 19/1	0/2007
		Analyte Sy	mbol	Au
		Unit Symb	ol	dqq
	705,000	Detection	Limit	2
		Analysis M	lethod	INAA
		107-07-731	BIF	2540
	17 14	107-07-100)2 BIF	6760
		97-07-1235	silic-ox±sulph IF	8500
Lake.	VE 40	97-07-238	diabase	54
•	17 17	107-07-110)1 peridotite	39
1.	∞ 14 50 km × 70 / ×	97-07-156	diabase	38
10	50 14 45 67	107-07-630	altered basalt/IF	19
	80 TT 17 37 35	97-07-481	sulph IF	< 2
	dd	97-07-484	silic basalt	7
61 52	A90 4 18	107-07-900) silic basalt	< 2
74 9	55 4 3 72 975 × ×	~~~~		
		15 15 15 15 15 15 15 15 15 15	The main each syngenetic potential for associated Orogenic g within major regional structure potential is likely to b (and locally northern an Subsidiary is are common shear lens generally each with net northern an generally each with net north	conor (see pale mass old c r trans ike at for v e hig deve d sou fault s n site geom r nor ast-tre theas
	Legend		favourable i thus occur a	for foo along

Legen	d		
Archea	n Rocks		
Post Vol	canic Intrusive Rocks		
18	K-feldspar porphyritic leucogranite: undeformed to weakly foliated		
17	Leucogranite and biotite granite: pink-beige, fine-grained, variably foliated		
16	Biotite +/- hornblende porphyritic intermediate (tonalite to diorite) dikes		
15	Alaskite, K-feldspar rich leucogranite: medium-grained to pegmatitc, white, muscovite +/- biotite bearing weakly foliated to highly strained		
14	Granite and granodiorite gneiss: hornblende- and/or biotite-rich, medium- to coarse-grained, locally K-feldspar porphyritic		
13	Granite and granodiorite gneiss: lit-par-lit		
12	Hornblende tonalite-quartz diorite-leucogabbro: fine- to medium- grained		
11	Gabbro, diabase, and minor peridotite: anorthositic to mesocratic; plagioclase-phyric, equigranular, or ophitic; massive to strongly foliated		
Post Vol	canic Sedimentary Rocks		
10	Polymictic conglomerate: pebble-cobble		
9	Clastic marine sedimentary rocks: pelite, psammite, mudstone-siltstone turbidite ; garnet +/- cordierite +/- anthophyllite +/- sillimanite porphyroblastic		
8	Quartz pebble conglomerate		
/olcano	genic Sedimentary Rocks		
7	Mafic to intermediate sandstone, greywacke, tubiditic mudstone, resedimented crystal tuff		
6	Greenstone-derived mafic conglomerate		
-5	Banded iron formation: silicate- sulphide- and oxide-facies		
Synvolc	anic Intrusive Rocks		
4	Gabbro, diabase, and minor ultramafic sills and dikes		
Volcanic	Rocks		
3	Glomeroporphyritic basalt: massive and pillowed, intrusive equivalents		
2	Feldspar-phyric basalt: massive and pillowed		

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The main economic mineral potential in the Utik Lake area is fo syngenetic (see above) and orogenic gold, with minor potential for paleoplacer gold mineralization and volcanicassociated massive sulphide (VMS) deposits.

37 72 7L 41 81 779

46 50

12.4 0.9

Orogenic gold deposits are known to be localized near or within major transpressive shear zone structures, such as along regional strike at Knee Lake and Monument Bay. At Utik Lake, the potential for volcanic-associated vein and shear-zone gold is likely to be highest along the east-trending high-strain zones (and locally developed, subparallel alteration zones) along the northern and southern margins of the greenstone belt. Subsidiary fault structures branching from regional shear zones are common sites of gold mineralization. The principal dextral shear lens geometry of the Utik Lake greenstone belt, caused by the major northeast-trending dextral shears that overprint the generally east-trending fabrics, resulted in dilational structures with net northeast-southwest extension. Areas particularly favourable for focusing gold-bearing metamorphic fluids would thus occur along the transposed belt margins and contacts between major lithological assemblages within the belt (i.e., between metavolcanic flow panels and metasedimentary assemblages). Shear-hosted sulphide occurrences, consisting of disseminated and stringer pyrite ±pyrrhotite ±chalcopyrite were noted, and first assay results of samples from high-strain zones along the margins and within the greenstone belt are listed in the table above.

Potential for paleoplacer gold deposits needs to be further investigated in the locally voluminous fluvial-alluvial conglomerate units (e.g. photo below) at Utik Lake. Their volcanic-associated setting and high fluid permeability make these units highly prospective for Witwatersrand-type placer gold enrichment.

The Stull-Wunnummin (SWSZ) and similar regional shear zones and splays originating from it are commonly the locus for gold mineralization in this part of the Superior Province. Principal directions of compression are northwest and southeast at Utik Lake. Main strike-slip movement along the shear zones are all dextral and form extensional (dilational) structures favourable for focusing gold-bearing metamorphic fluids.

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