REFINEMENT OF THE EASTERN CONTACT OF THE OFF LAKE FELSIC DYKE COMPLEX AND ASSESSMENT AND GENESIS OF ASSOCIATED PYRITE-PYRRHOTITE-SPHALERITE-CHALCOPYRITE- GOLD-SILVER MINERALIZATION. NORTHWESTERN ONTARIO

UTM Zone 15-NAD83

438300mE, 5419600mN

by

L. D. AYRES

LORNE AYRES GEOLOGICAL CONSULTING,
1120 ABRAHAM DRIVE,
P.O. BOX 965,
TOFINO, BC
V0R 2Z0

And

ANDREW TIMS

NORTHERN MINERAL EXPLORATION SERICES
THUNDER BAY, ONTARIO

REPORT PREPARED FOR RAINY RIVER RESOURCES LTD.

JANUARY 13, 2008

SUMMARY

Field work in October, 2007 has 1) resulted in recognition of a new volcaniclastic unit, a polymictic, clast-supported, mafic to felsic volcanic, pebble to boulder conglomerate and breccia, 2) refined the eastern and northeastern contact between the Off Lake felsic dike complex and metagabbro country rocks, the locus of significant sulphide and gold mineralization, 3) extended the Off Lake fault, which is another locus of mineralization, and 4) provided a better description and genetic interpretation of the mineralization in the eastern part of the Off Lake felsic dike complex.

The mafic to felsic volcanic conglomerate and breccia forms a thin unit near the top of the mafic metavolcanic sequence. This conglomerate differs from that in the previously defined, felsic volcaniclastic units of the Clearwater Lake and Pinewood Lake sequences (Ayres, 2007) in a higher proportion of mafic clasts and greater angularity of clasts. It was probably deposited closer to source areas during the period when volcanism was changing from mafic to felsic and subaqueous to subaerial. Much of the conglomerate and breccia unit is close to the eastern contact of the Off Lake felsic dike complex, and sulphide mineralization occurs in this unit.

Much of the eastern and northeastern contact of the Off Lake felsic dike complex, which represents the original upper part and roof of a quartz- ± plagioclase-phyric, felsic, subvolcanic magma chamber, is poorly exposed. Along this contact, the country rocks are largely metagabbro, which are part of an ovoid 3.5-km-long, older, subvolcanic magma chamber in the uppermost part of the mafic metavolcanic sequence. Where exposed, the contact varies from sharp to gradational. The eastern contact is defined by a 60- to >100-m-wide, northerly-trending, composite felsic sill composed of numerous dikes and sills. The composite sill was traced northward into metagabbro country rocks for 600 m where it is truncated by the Off Lake fault; the southern extension of the sill is covered by Off Lake.

The Off Lake fault was traced northward for an additional 600 m and southward for an additional 2 km. In 2006, gold values were obtained in a random grab sample collected from a quartz-phyric felsic dike near the fault. Near the collection site, the fault is marked by a quartz stockwork, and, during the 2007 field work, a similar stockwork was observed along the southern extension of the fault.

Numerous sulphide-mineral occurrences have been discovered within 500 m of the composite felsic sill that forms the eastern contact of the Off Lake felsic dike complex; mineralization has been found along 2.5 km of the contact. Sulphide mineralization occurs in the composite sill, in narrower felsic dikes and sills in

metagabbro country rocks, and in the metagabbro country rocks. Because of poor exposure and coverage by Off Lake, many mineral occurrences remain to be discovered.

Sulphide-mineral occurrences in the Off Lake felsic dike complex and metagabbro are similar. They are generally <1-m-wide, rusty-weathering zones that contain concentrations of pyrite, and, in places, chalcopyrite, sphalerite, rare galena, and gold and silver values; pyrrhotite is also present in some occurrences in metagabbro. Many occurrences contain accessory ferruginous calcite and quartz. Where well exposed, the occurrences are spatially associated with fractures, fracture systems, and shear zones. Many of the occurrences are subparallel to the contact of the composite felsic sill, but some cross the contacts. Locally, sulphide-mineral-rich occurrences are truncated by late phases of the Off Lake felsic dike complex; these late phases are compositionally and texturally identical to older phases that contain mineralization, but they are less altered and less foliated. Many of the occurrences are discontinuous pods, some of which are connected by more weakly mineralized zones, and the occurrence and abundance of mineralization appear to change rapidly along strike and with depth.

Although sulphide mineralization occurs throughout the Off Lake felsic dike complex, mineralization is concentrated in the eastern part, particularly near the composite felsic sill that forms the eastern contact. The spatial association with the contact, which was the roof of the subvolcanic magma chamber, indicates that fluids responsible for deposition of the sulphide minerals, gold, and silver were derived from the felsic magmatic system. Mineralization was deposited in, and adjacent to, small shear zones, fracture systems, and individual fractures that developed in both felsic dikes and metagabbro country rocks during emplacement and cooling of the felsic dike complex. Post-mineralization, felsic dikes in this part of the complex indicate that minor felsic plutonism continued after the mineralization event.

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INTRODUCTION

In 2005, Rainy River Resources Ltd. began an exploration program in the Off Lake-Clearwater (Burditt) Lake area of Northwestern Ontario, about 30 km north of Emo (Fig. 1). Since then the company has staked a large group of claims and holds options on other claims and patents in Menary, Senn, Potts, and Fleming Townships. The claims cover the northeastward extension of the Archean greenstone belt that hosts the company's gold prospect in Richardson Township. Off Lake, where exploration work is currently centred, is about 17 km from the Richardson Township gold prospect (Fig. 2). The claims contain known gold, silver, copper, zinc, and lead mineralization (Baker, 2006; Ayres, 2007).

In 2006, as part of the exploration program, the author mapped, at a scale of 1:20,000, felsic metavolcanic and subvolcanic, felsic intrusive rocks between Highways 71 and 615 in the southwest and Clearwater Lake in the northeast (Fig. 2; Ayres, 2007), a distance of about 20 km. The purpose of that work was to 1) determine the distribution and genesis of felsic metavolcanic rocks previously mapped in reconnaissance surveys by Fletcher and Irvine (1955) and Blackburn (1976); 2) examine the physical and genetic continuity of these felsic metavolcanic rocks with those that host the gold prospect in Richardson Township to the southwest; 3) determine the stratigraphic and structural relationship between the felsic metavolcanic rocks and mafic metavolcanic and metagabbroic rocks that occur northwest of the felsic units (Fig. 2); and 4) examine the economic potential of the felsic units and nearby units. The results of this work, as reported in Ayres (2007), are partly responsible for the present focus of the exploration work in the Off Lake part of the claim group, particularly the Off Lake felsic dike complex. These results are summarized below; for details refer to Ayres (2007).

In October, 2007, as part of the ongoing exploration program, the author spent another 22 days in the Off Lake area. The purpose of this new work, as presented herein, was to 1) relog three diamond drill holes that were drilled at the north end of Off Lake in the spring of 2007, and analyze the results of this drilling with respect to surface geology, mineralization, and future drilling (3.67 days); 2) examine several mineral showings that had been stripped and washed shortly before the author's visit (4.5 days); and 3) conduct additional field mapping to better define the eastern and northeastern contact between the Off Lake felsic dike complex on the southwest and adjacent mafic metavolcanic and metagabbroic country rocks (9.33 days); sulphide and gold mineralization are spatially associated with this contact. Unfortunately, 4.5 field days were lost due to rain, but this time was utilized for analysis of 2007 drill holes and report writing. The author was ably assisted in the field by Robert Morrison.

REGIONAL GEOLOGY

The Off Lake area is in the southwestern part of the Wabigoon greenstone-granitoid subprovince of the Archean Superior Province of the Canadian Shield (Fig. 1). In this part of the subprovince, anastomosing greenstone belts surround younger, amoeboid granitoid batholiths. The area examined is in a narrow segment of a greenstone belt between two large batholiths (Figs. 1, 2).

GEOLOGIC SETTING OF THE OFF LAKE AREA

The region mapped in 2006 and 2007 is part of a northeast-trending greenstone belt that has a minimum width of 10 km (Fig. 1). This greenstone belt consists of a south- to southeast-facing, subvertically dipping, homoclinal, metavolcanic-metasedimentary sequence that comprises a lower formation of mafic lava flows in the northwest overlain by felsic volcaniclastic rocks on the southeast (Fig. 2; Table 1; Blackburn, 1976). East of Pinewood Lake, there is another mafic metavolcanic sequence that may overlie the felsic volcaniclastic units, but, because of strong deformation and contact metamorphism, the age relationship between mafic and felsic units here is uncertain. The original thicknesses of the major rock units could not be determined because of extensive flattening in many rock units. The greenstone belt is bounded on the northwest by the younger Sabaskong granitoid batholith (Fig. 2), on the southeast by the Fleming-Kingsford granitoid batholith (Fig. 2), and on the east by the Jackfish Lake complex (east of the area shown on Fig. 2), a dioritic to granitic pluton; all of these plutons are interpreted to be syntectonic (Blackburn, 1976). Three, late tectonic plutons of monzonitic to quartz monzonitic composition, the Burditt Lake, Finland, and Black Hawk stocks, intruded the greenstone belt (Fig. 2). Metamorphic grade is greenschist facies except adjacent to the plutons where metamorphic grade is amphibolite facies.

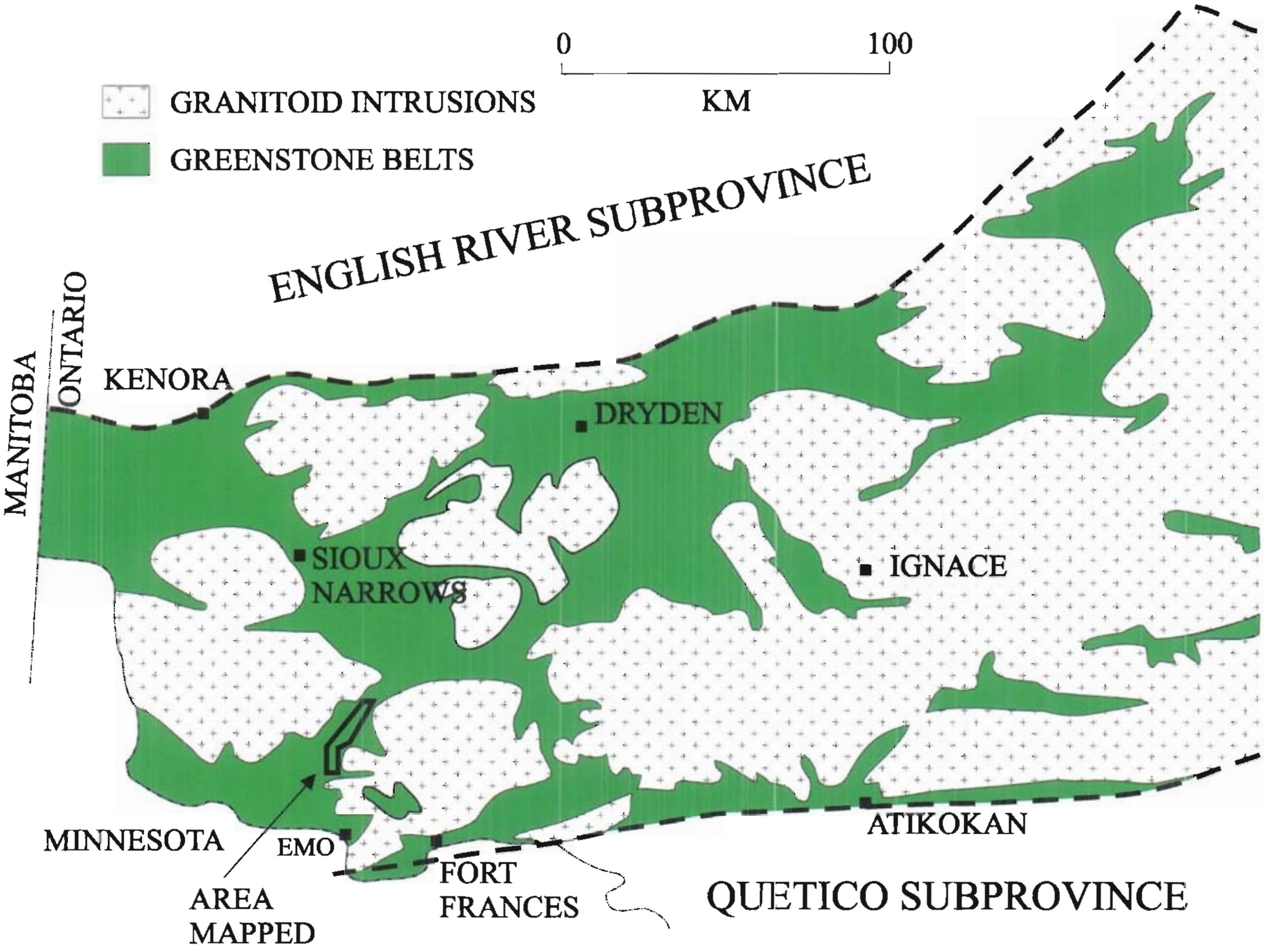


Fig. 1. Map of the western part of the Wabigoon Subprovince of the Archean Superior Province in Ontario showing distribution of greenstone belts and granitoid intrusions (after Blackburn *et al.*, 1991). Area mapped in detail in 2006 and 2007 is outlined by heavy black lines.

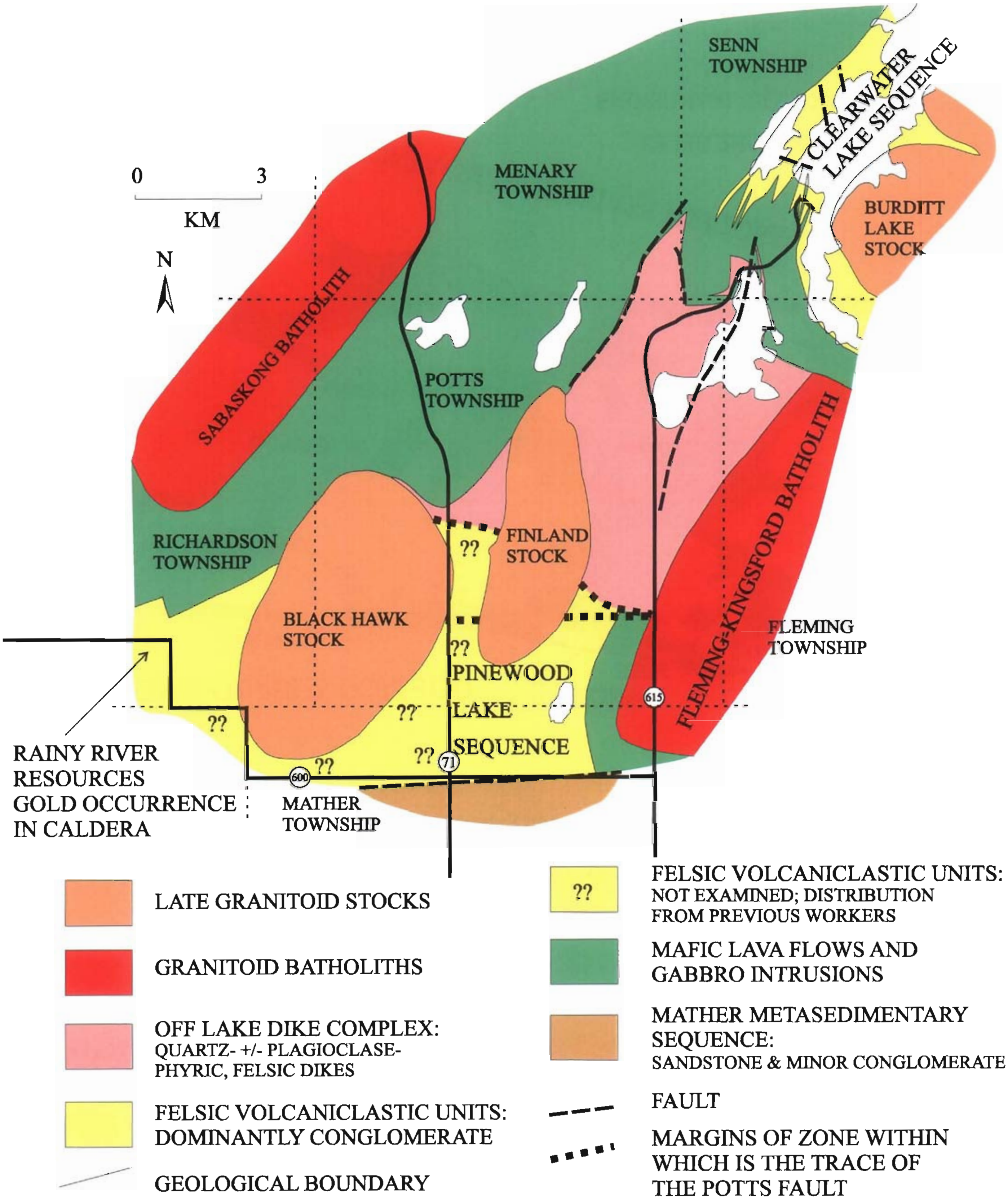


Fig. 2. Sketch map showing location of units defined during the 2006 and 2007 surveys as well as those mapped by Blackburn (1976) and Fletcher and Irvine (1955). The Potts fault, the inferred boundary between the Off Lake felsic dike complex and the Pinewood Lake felsic volcaniclastic sequence, was not precisely located, but it is in the zone between the two dotted lines east of the Black Hawk stock.

Table 1. Stratigraphy of the Off Lake area (modified after Blackburn, (1976), and Fletcher and Irvine (1955)). Units given here are those shown on the accompanying maps or described in present report and Ayres (2007).

LATE TECTONIC GRANITOID STOCKS
Granodiorite, quartz monzonite, monzonite

Intrusive contact

SYNTECTONIC GRANITOID BATHOLITHS
Trondhjemite to granodiorite

Intrusive contact (?)

SUBVOLCANIC INTRUSIONS

BEADLE LAKE PLUTON
Monzonite to granodiorite with numerous mafic xenoliths

Intrusive contact (?)

MAFIC TO INTERMEDIATE DIKES

Intrusive contact

QUARTZ- +/- PLAGIOCLASE-PHYRIC FELSIC INTRUSIONS
Off Lake dike complex
Buckhorn Point pluton
Potts pluton
Isolated dikes in metavolcanic sequences

Intrusive contact

METAGABBRO
Equigranular and plagioclase-megacrystic gabbro; probably several ages of intrusion

Intrusive contact

UPPER MAFIC METAVOLCANIC SEQUENCE (?)
Gneissic lava flows

PINEWOOD LAKE FELSIC VOLCANICLASTIC SEQUENCE	CLEARWATER LAKE FELSIC VOLCANICLASTIC SEQUENCE		MATHER METASEDIMENTARY SEQUENCE
Polymictic, clast- to locally matrix-supported, felsic volcanic, pebble to cobble conglomerate, minor pebbly sandstone and lithic sandstone, minor felsic lava flows	Polymictic, clast- to locally matrix-supported, felsic volcanic, pebble to boulder conglomerate, minor pebbly sandstone and lithic sandstone, minor felsic lava flows and possible felsic pyroclastic flow deposits, rare oligomictic conglomerate, mudstone, and chert	Fault Contact	Arenite

LOWER MAFIC METAVOLCANIC SEQUENCE

Pillowed and non-pillowed, basalt lava flows, minor pillow breccia and polymictic, clast-supported, mafic to felsic volcanic, pebble to boulder conglomerate and breccia, and rare oxide-facies, iron formation

The felsic volcaniclastic rocks are dominantly polymictic, clast-supported, felsic volcanic, pebble to cobble and locally boulder conglomerate with less abundant felsic volcanic, lithic sandstone, pebbly sandstone, and polymictic, matrix-supported conglomerate. There are minor intercalated felsic lava flows, oligomictic conglomerate, and possible pyroclastic flow deposits. East of Off Lake, a more mafic volcaniclastic unit consisting of polymictic, clast-supported, mafic to felsic volcanic, pebble to boulder conglomerate and breccia is intercalated with mafic lava flows in the uppermost part of the mafic metavolcanic sequence.

The felsic volcaniclastic rocks occur in two distinct, but lithologically and apparently genetically similar, domains that are separated by 1) a subvolcanic felsic intrusion, termed the Off Lake felsic dike complex by Ayres (2007); 2) part of the mafic metavolcanic sequence that, near the south end of Clearwater Lake, has been bent into a southeasterly trend; and 3) an inferred early fault, which was termed the Potts fault (Fig. 2; Ayres, 2007). In the southern domain, the Pinewood Lake sequence (Ayres, 2007) is lithologically similar to, and is probably contiguous with, the felsic volcaniclastic sequence in Richardson Township that hosts the company's gold prospect (Fig. 2). However, the Pinewood Lake sequence probably accumulated on the flank of a mafic shield volcano rather than in a caldera as proposed for the sequence in Richardson Township (Averill, 1997; Ayres, 1997, 2006). The Clearwater Lake sequence in the northern domain was probably originally continuous with the Pinewood Lake sequence, but was possibly deposited on the opposite flank of the volcano (Fig. 3); it has been offset more than 10 km from the Pinewood Lake sequence by the Potts fault. The Pinewood Lake and Clearwater Lake volcaniclastic sequences were probably a subaqueous apron around a subaerial stratovolcano that was outside of the section exposed by the present erosion surface.

The Potts fault probably began as a gravity-induced, normal fault initiated during volcanism; along the fault, the Pinewood Lake sequence was down dropped relative to the Clearwater Lake sequence and the Off Lake felsic dike complex. Movement on the fault continued during later tectonic events to produce the large offset, but all movement occurred prior to intrusion of the bordering Fleming-Kingsford granitoid batholith.

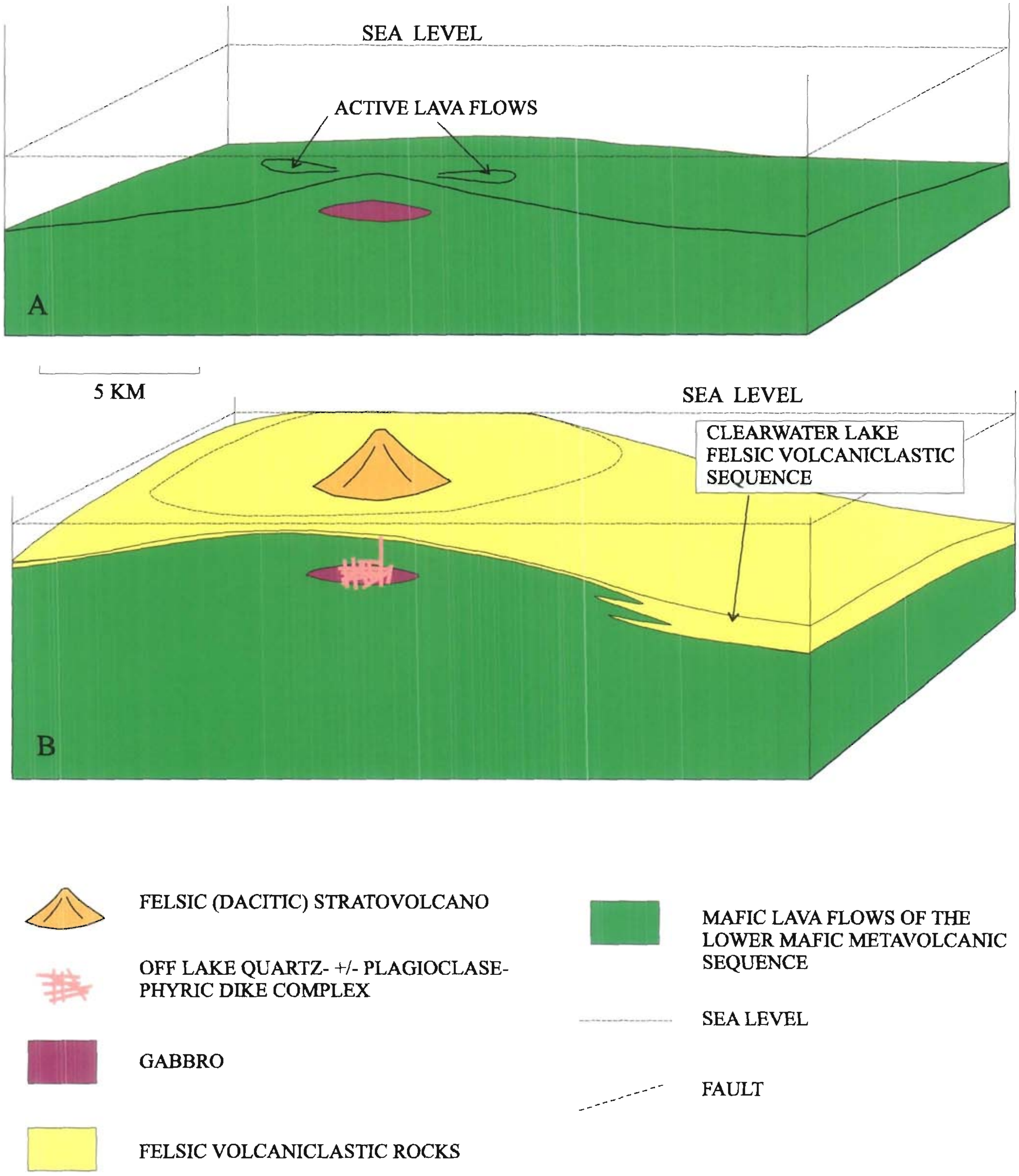
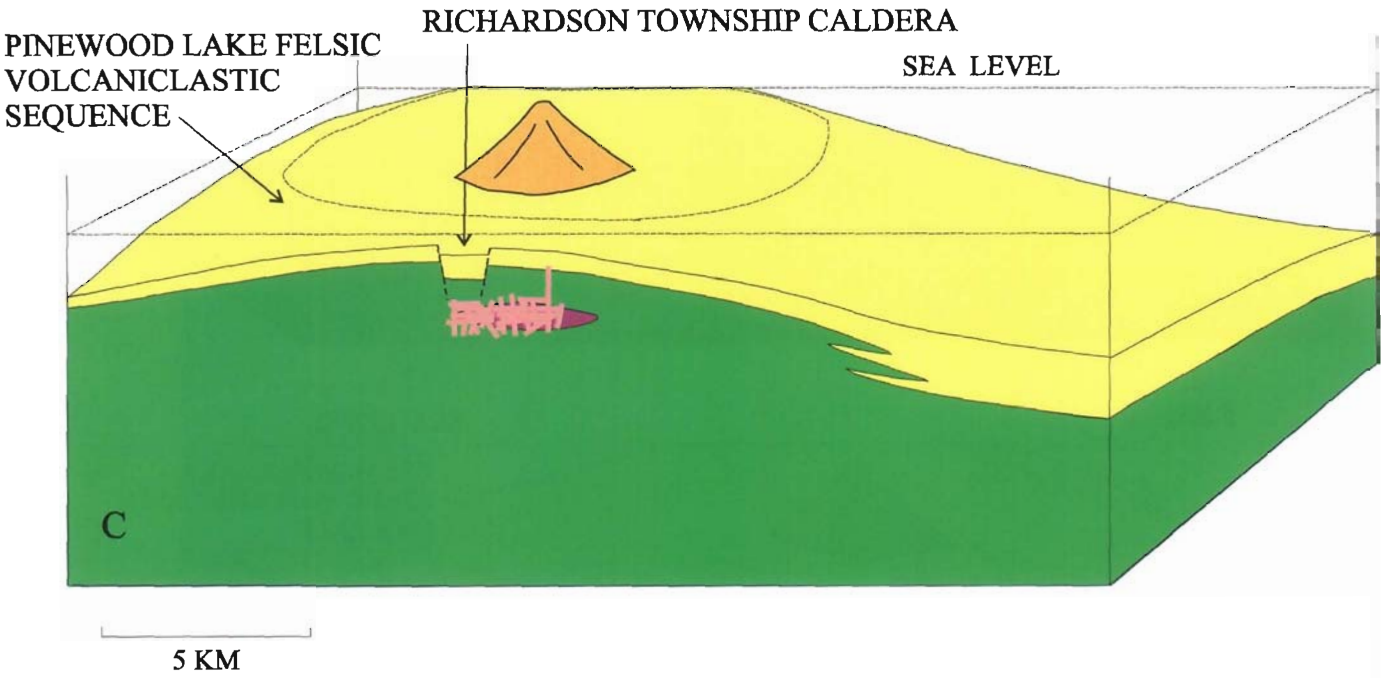


Fig. 3. Four stages in the evolution of the Off Lake volcano. The front face of the block diagram shows the stratigraphic relationship of sequences exposed in the Clearwater to Pinewood Lake area. A. Eruption of basalt flows of the lower mafic metavolcanic sequence resulted in a submarine shield volcano. Upper level gabbro magma chamber fed these flows. B. Early stage in eruption of felsic volcaniclastic sequences from subaerial dacitic stratovolcanoes. Fluctuating dacitic and basaltic volcanism resulted in interdigitation on flank of volcano. Off Lake dike complex was upper magma chamber feeding dacitic volcanism, but only the margin of the chamber is exposed in the section.



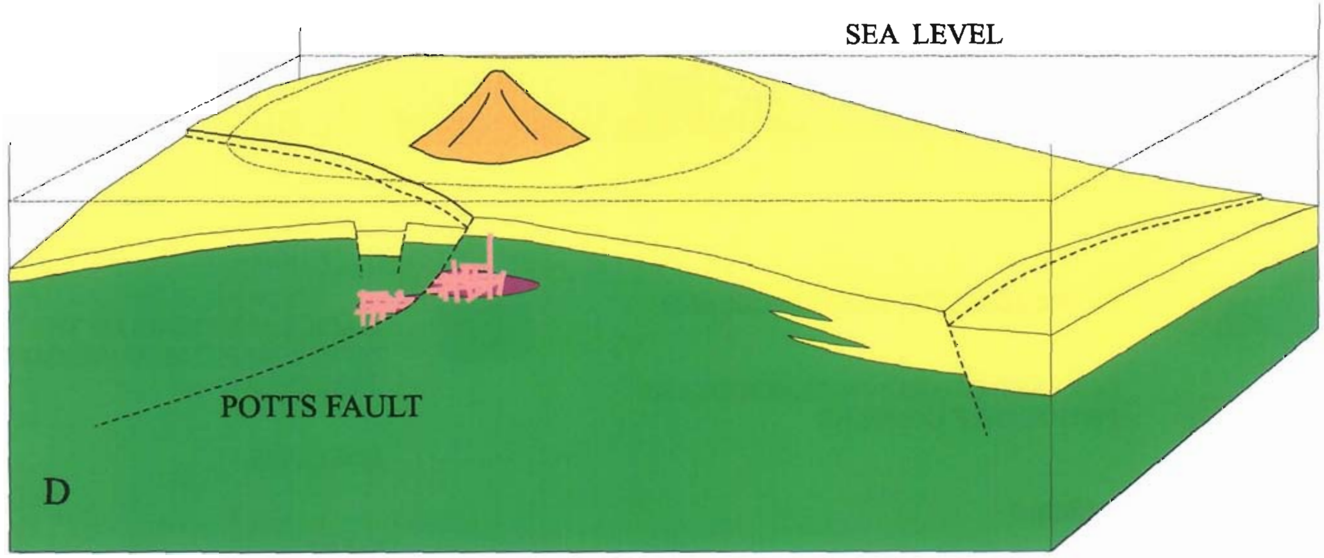


Fig. 3 (continued). Four stages in the evolution of the Off Lake volcano. C. Submarine caldera forms on upper slope of volcano, possibly representing a flank vent. Off Lake dike complex is inferred to expand in size. D. Normal faults develop on flanks of volcano because of gravitational instability. Potts fault on left side is in initial stage of development. Eventually caldera is moved 10 to 15 km away from the original location.

The caldera structure, which hosts the Richardson Township gold prospect, may have been shifted to its present location by movement along the Potts fault. The original location of the caldera may have been above the Off Lake felsic dike complex (Fig. 3).

The Off Lake area is the locus of two subvolcanic magma chambers, both of which have subsequently been deformed and metamorphosed. The earlier of these is a relatively widespread suite of equigranular to megacrystic to oikocrystic metagabbro sills and dikes that may have been the high-level source for basaltic flows in the upper part of the mafic metavolcanic sequence. Only part of the metagabbro has been mapped. The gabbro was later intruded by various quartz- and plagioclase-phyric, felsic dikes and sills, including the Off Lake felsic dike complex, which is 4.5 km wide and 9 km long (Fig. 2). Many of these synvolcanic plutons were not recognized during the earlier reconnaissance surveys of Fletcher and Irvine (1955) and Blackburn (1976).

The Off Lake felsic dike complex, which is now the main focus of the exploration program, consists of hundreds to thousands of dikes, many of which are <5 m wide. As much as 15% of the complex is blocks, megablocks, and septa of mafic metavolcanic and metagabbroic country rocks, many of which appear to be in original stratigraphic position. Most of the dikes are in contact with other dikes, but, unless outcrops are well exposed, such contacts are difficult to identify because the dikes are very similar in composition and texture, although they do differ in abundance and size of quartz and plagioclase phenocrysts. Sulphide and some gold mineralization occurs throughout the Off Lake felsic dike complex, but, to date, economically important mineralization has been found mostly in the eastern part of the complex, particularly near the eastern contact; during volcanism, this would have been the upper part and roof of the felsic magma chamber. As speculated by Ayres (2007), the Off Lake felsic dike complex may have been the source of mineralizing fluids that resulted in the gold, silver, zinc, lead, and copper mineralization in the Richardson Township caldera. This possible genetic relationship between the Off Lake felsic dike complex and mineralization in Richardson Township highlights the importance of the current exploration program in the Off Lake area.

LITHOLOGY

The various rock units in the Off Lake area have been described previously (Ayres, 2007), and these descriptions will not be repeated here. The present report will deal only with new observations made in 2007 and interpretations resulting from these observations.

MAFIC TO FELSIC VOLCANICLASTIC UNIT

Description

This is a newly recognized and mapped (map unit 1h), polymictic, clast-supported, mafic to felsic volcanic, pebble, cobble, and locally boulder conglomerate and breccia unit that is 50 to 150 m wide and has been traced laterally for 1200 m on, and near, the power line right of way east of Off Lake and south of Highway 615 (revised Menary Township map, in pocket); as noted below, it may also occur north of Highway 615. Relationships with adjacent units are complicated by poor exposure and small outcrops, low density of outcrop, metagabbro intrusions, and structural complications produced by the eastward bending of the mafic metavolcanic sequence east of Off Lake. The unit is intercalated with mafic lava flows that are in part pillowed, and it appears to be within 200 m of the original top of the mafic metavolcanic formation as exposed between Off and Clearwater Lakes. Blackburn (1976) mapped the unit as breccia, but he did not describe the unit nor define unit boundaries.

This type of conglomerate or breccia unit was locally observed north of Highway 615. The only mappable unit here is a 10-m-wide unit intercalated with mafic lava flows on the power line right of way north of Spring Lake (439340E; 5420400N); it was previously mapped as a heterolithic, mafic lapilli-tuff to tuff-breccia (Ayres, 2007, p. 14), but it is now classified as volcaniclastic conglomerate and breccia (see revised Menary Township map, in pocket). Poorly exposed, mafic to felsic volcanic conglomerate was also observed in 2006 on the power line right of way about 150 m north of Highway 615 and in 2007 on the subsidiary power-telephone line right of way between the highway and Spring Lake; although contacts are not exposed, these two exposures are inferred to be small xenoliths in metagabbro and the felsic dike complex. The lithology may also have been intersected by drill hole OF07-02 (see below).

The unit is distinguished from other volcaniclastic conglomerates in the area (Ayres, 2007) by 1) a high proportion of mafic clasts, 2) a range in shape of clasts, particularly felsic clasts, from rounded to angular (Figs. 4, 5), and 3) in many places, a low degree of flattening on horizontal outcrop surfaces. Like volcaniclastic conglomerate in the Pinewood Lake sequence to the southwest, the unit is compositionally bimodal and contains both mafic and felsic clasts, but, unlike Pinewood Lake conglomerate, where mafic clasts are a minor component of the clast population, mafic clasts dominate in the new unit.

This unit contains 10 to 60% felsic clasts, 35 to 80% mafic clasts, and 0 to 10% identifiable matrix. Clasts range in size from 1 to more than 50 cm. As observed on horizontal outcrop surfaces, most clasts are only slightly deformed (Figs. 4, 5, 6), but, in some outcrops, clasts are flattened as much as 5:1. Clasts range in shape from subrounded to angular, but mafic clasts generally have a higher degree of rounding than felsic clasts (Figs. 4, 5). Clast shape varies from place to place as do the abundance and size of felsic clasts; although no bed contacts were observed; these variations

Fig. 4. Polymictic, mafic to felsic volcanic, clast-supported, cobble conglomerate in which mafic clasts dominate (441000E; 5417600N). Mafic clasts are rounded and include both fine-grained volcanic and medium-grained metagabbroic clasts; where fine-grained clasts are in contact, clast boundaries are difficult to discern. Felsic clasts are more angular than mafic clasts. Pencil for scale is about 15 cm long.

Fig. 5. Mafic to felsic volcanic, clast-supported, cobble conglomerate to breccia unit (440500E; 5418500N). In this small exposure, felsic clasts dominate, and, where these clasts touch, it is difficult to identify clast boundaries; on casual inspection, the felsic component resembles irregular felsic dikelets. Mafic clasts are rounded, but felsic clasts are subrounded to angular. Pencil for scale is about 15 cm long.

in shape, size, and abundance are probably indicative of a bedded unit, in which beds are largely amalgamated. Where rounded clasts dominate, the unit is conglomerate, but, where angular clasts dominate, it is breccia.

Felsic clasts are texturally variable; most clasts are quartz phyric, but the abundance of 1- to 5-mm, quartz phenocrysts is variable among clasts, ranging from trace to 8%; the phenocrysts occur in a fine-grained groundmass. Locally there are sparse aphyric, felsic clasts that range in texture from fine to medium grained. The most angular, felsic clasts were found adjacent to large boulders and blocks, the outer 10 to 15 cm of which are fractured and incipiently brecciated (Fig. 6); these angular clasts appear to have been spalled from the margins of adjacent boulders.

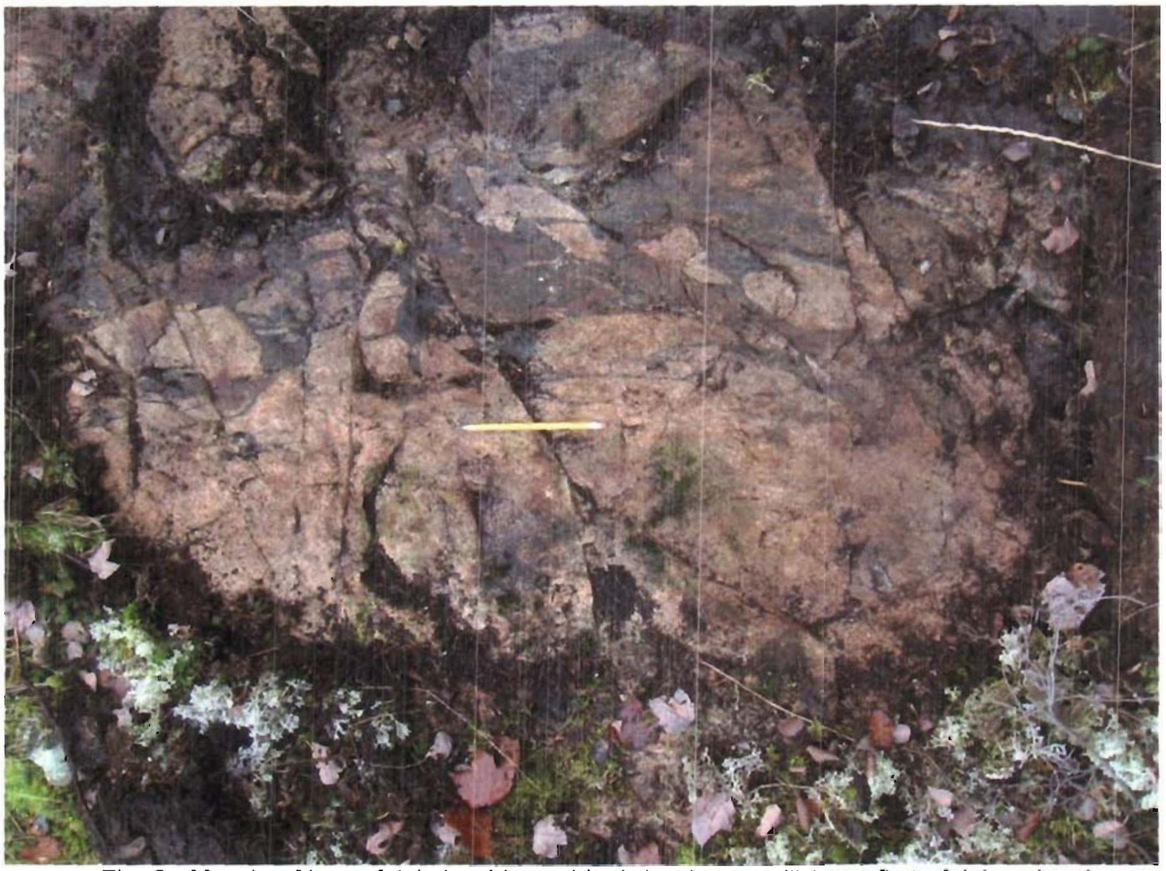


Fig. 6. Margin of large felsic boulder or block (under pencil) in mafic to felsic volcanic, clast-supported conglomerate and breccia unit (440840E; 5417700N). Margin of block is fractured, and some, nearby, angular felsic clasts appear to have been spalled from the large block. Pencil for scale is about 15 cm long.

Most mafic clasts are fine grained and were derived from mafic lava flows, but trace to 5% and locally as much as 75% of the mafic clasts are medium grained with a maximum grain size of 2 mm (Fig. 4); the medium-grained clasts were derived from either gabbro intrusions or the centres of thick lava flows. Where observed, the matrix is a coarse lithic sandstone that contains 5 to 10% visible quartz.

Where the conglomerate-breccia unit is poorly exposed and the abundance of felsic clasts is relatively high, the outcrop resembles net-veining produced when irregular, quartz-phyric, felsic dikelets are intruded into brecciated mafic country rocks. This intrusive appearance, however, is not real, and it results when the boundaries of touching felsic clasts cannot be readily distinguished (Fig. 5). This appearance complicates identification of the clastic nature of the unit because most outcrops are poorly exposed; one outcrop on the power line right of way, east of Off Lake, mapped previously as mafic lava flows intruded by quartz-phyric felsic dikes (440500E; 5418500N; Ayres, 2007) is actually poorly exposed conglomerate.

Interpretation

Although part of this unit is characterized by angular felsic clasts and is breccia, the unit is a polymictic, sedimentary unit comprising interbedded conglomerate and breccia. The variability in clast shape probably reflects differing degrees of reworking and transport, possibly related to proximity of source terranes. The better rounded habit of mafic clasts and the textural variability of these clasts suggests that mafic units were being eroded and transported, probably from outside the plane of the present exposure, to a depositional site on the upper flank of the volcano. The more angular felsic clasts have undergone less transport, and they may be a more direct product of explosive vulcanian eruptions. The brecciated margins of some large blocks and the apparent spalling of angular pieces from these blocks (Fig. 6) could mean that these blocks were still hot when deposited. Overall, this unit appears to be the product of the same type of explosive felsic volcanism, reworking, and mass-flow transportation as the felsic volcanic conglomerate of the Clearwater Lake and Pinewood Lake sequences (Ayres, 2007), but it was closer to the felsic stratovolcano source, and closer to an exposed mafic volcanic terrane. Temporally, the deposition of this unit was probably close to the transition from older mafic volcanism to younger felsic volcanism. It may also be close to the transition from subaqueous to subaerial eruptions in the volcano.

SOME ADDITIONAL COMMENTS ON THE OFF LAKE FELSIC DIKE COMPLEX

During the October mapping, several outcrops were examined east of Highway 615 and south of Off Lake to fill in a gap in the 2006 mapping. These outcrops are on patented ground not held by Rainy River Resources Ltd. As mapped by Blackburn (1976), these outcrops are less than 1200 m from the Fleming-Kingsford batholith, and, based on mapping farther north (Ayres, 2007), they should be in the contact metamorphic aureole of the batholith. The felsic dikes in the newly mapped outcrops are recrystallized, but the degree of recrystallization appears to be less than that observed in the dike complex farther north at comparable distances from the batholith. In many places, groundmass grain size is about 1 mm, and the groundmass does not appear to be strongly recrystallized. Consequently, these outcrops were mapped as greenschist facies (unit 6a) rather than hornblende hornfels facies (unit 6b; see revised Potts Township geological map, in pocket).

EASTERN CONTACT OF THE OFF LAKE FELSIC DIKE COMPLEX

Description

The eastern and northeastern margins of the Off Lake felsic dike complex have now been reasonably well defined for a distance of about 3 km between the northeast corner of claim 4208907 on the south to the north edge of claim 3019809 in the north (revised Menary Township map, in pocket). Country rocks are metagabbro north and east of Off Lake and a mix of mafic lava flows and metagabbro west of the north end of Off Lake. The contact is best defined in the north where outcrop density is higher, although some of these outcrops are poorly exposed. To the south, low outcrop density combined with poor exposure hampers better definition of the contact, and, near the southeast corner of Off Lake, where outcrop density is low, the contact can only be inferred.

The contact relations are complex, and they are more complex than can be shown on the 1:20,000 scale map (revised Menary Township map, in pocket). At the north end of Off Lake, a 1-km-wide, northward apophysis of the dike complex is intersected by the northerly-trending Off Lake fault. The north contact of this apophysis varies from relatively sharp and easterly trending on the west side of the fault to a sequence of interlayered, metagabbro septa and northerly-trending, composite, quartz- ± plagioclase-phyric, felsic sills on the east side of the fault; the felsic intrusions are semi-concordant to regional stratigraphy. The interlayering occurs on a variety of scales: some of the sills and septa are mappable, whereas others are only a few metres wide. The interlayering relationships are best observed in core from drill holes drilled for Nuinsco Resources Ltd. in 1995 (Ayres, 2007, Fig. 39) and Rainy River Resources Ltd. in 2007 (Figs. 28, 29; Appendix).

COMPOSITE FELSIC SILL FORMING THE EASTERN CONTACT OF THE OLDC

The largest and best exposed of these sills is a 60- to 100-m-wide, northerly-trending, composite intrusion composed of multiple, quartz- ± plagioclase-phyric felsic dikes and sills; the composite sill is variable in width along strike, and it widens to the south. This sill forms the eastern contact of the dike complex, but it also extends into metagabbro country rocks north of the main felsic dike complex (Fig. 7; revised Menary Township map, in pocket). The northward extension of the sill can be mapped for 600 m, but it is then truncated by the Off Lake fault; on the west side of the fault, there are two mappable, quartz- ± plagioclase-phyric felsic intrusions, one of which could be the faulted extension of this composite sill (revised Menary Township map, in pocket). At the north end of the composite sill, both contacts have been traced for a distance of 1100 m. However, to the south, the west contact disappears beneath Off Lake, and only the east contact was located in scattered outcrops; in the northeast part of claim 4208907, the east contact also disappears beneath the lake. The sill may extend farther south, through an area of no exposure, to the east-central part of claim 4208907 where it would join the main part of the complex (Fig. 8), or, alternatively, it may have been offset about 200 m westward along an undiscovered fault (Fig. 7). In the former case, metagabbro exposed on the small northern peninsula on the east shore of Off Lake would be part of a megablock or septum (Fig. 8). In the latter case, the east contact of the sill is in an outcrop along the north side of the northern peninsula (Fig. 7). The latter interpretation is shown on the accompanying geological map (revised Menary Township map, in pocket). The location of this composite sill is important because it is the locus of the most significant mineralization discovered to date in the Off Lake area. Descriptions of the composite sill given below also apply to other, narrower sills at the north end of Off Lake.

Contacts between the composite sill and metagabbro country rocks vary from sharp to gradational, and from straight to curved to undulating to zigzag; in places, the nature of the contact changes rapidly over distances of less than 100 m. Gradational contacts are zones as much as 45 m wide in which there are progressive increases in width and abundance of metagabbro septa and corresponding decreases in width and abundance of felsic dikes and sills. Within the gradational zones, contacts between individual felsic units and metagabbro are sharp and vary from chilled intrusive contacts to minor faults, some of which are marked by narrow quartz and calcite veins. Contact attitudes observed in drill core differ from place to place by as

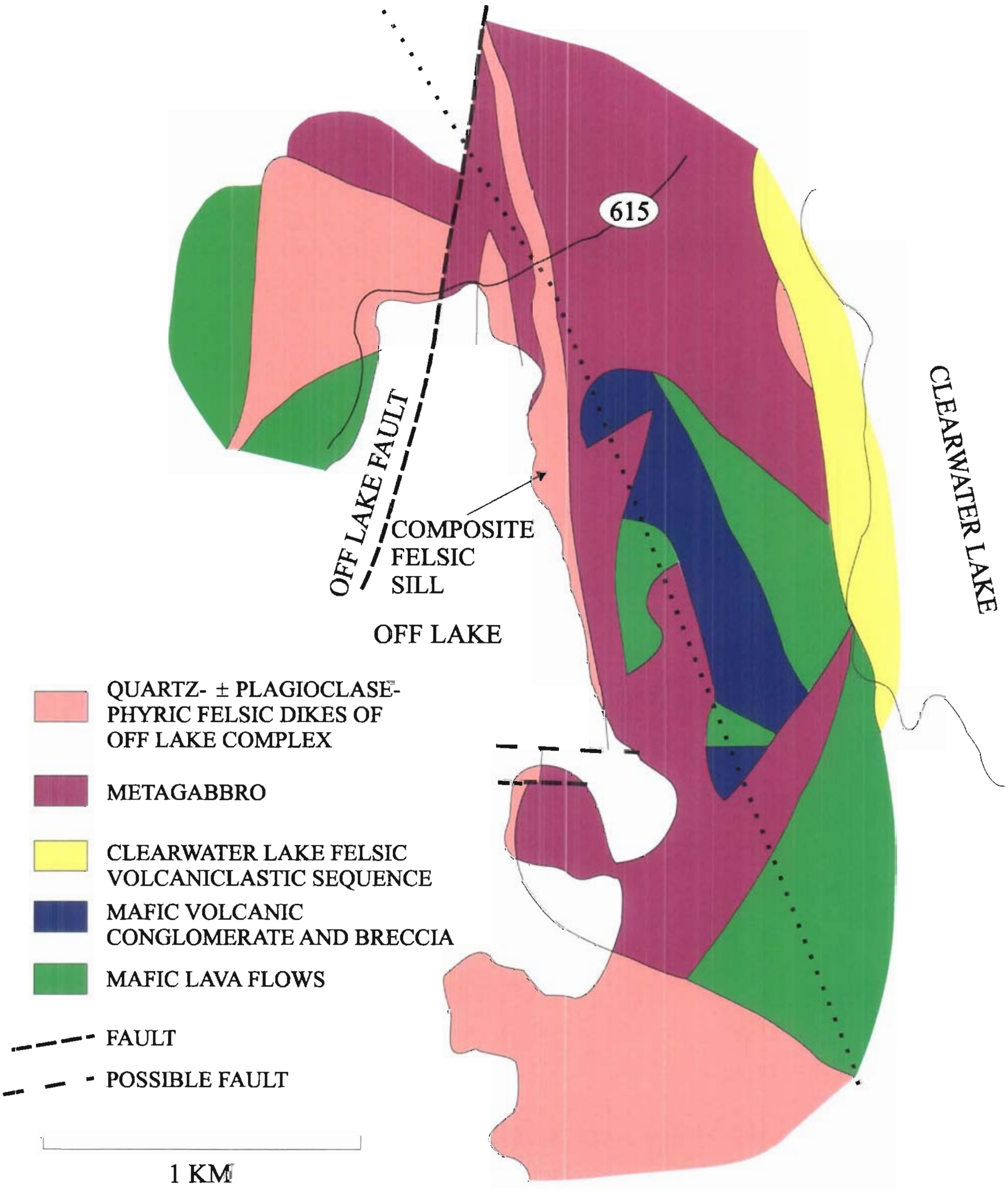


Fig. 7. Map of the eastern and northeastern contacts of the Off Lake felsic dike complex showing the relationship between the dike complex and an older metagabbro pluton. In the lower part of the figure, the contact is offset, in a right lateral sense, along a possible fault. See Fig. 8 for an alternative explanation of contact relations.

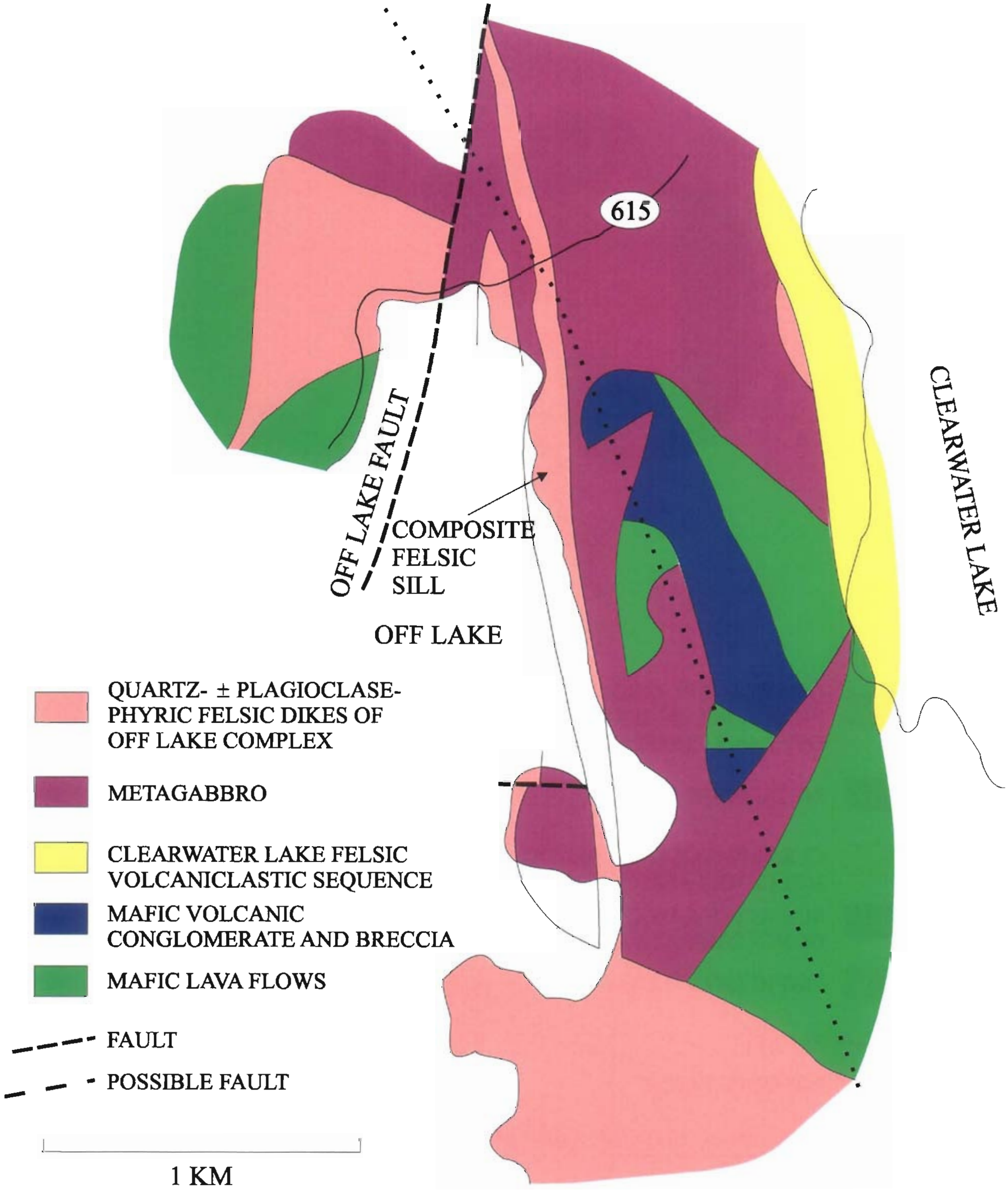


Fig. 8. Map of the eastern and northeastern contacts of the Off Lake felsic dike complex showing the relationship between the dike complex and an older metagabbro pluton. In the lower part of the figure, the composite sill is inferred to extend southward to intersect the main part of the complex. See Fig. 7 for an alternative explanation of contact relations.

much as 60°; this variation could reflect a variable attitude of the intrusions within the contact zones, or curving or zigzag contacts of the felsic intrusions. Zigzag contacts were observed at the external boundaries of the composite sill and at the contacts of other, narrower, felsic dikes in the metagabbro (Fig. 9); zigzag contacts are the result of both intrusion of felsic dikes along two, intersecting joint sets, and minor offset along faults. Where observed, curved contacts vary from small-scale undulations to large curves that change in orientation by as much as 50° over distances of several tens of metres. As described by Ayres (2007), some felsic dikes west of the composite sill are folded producing curved contacts, but, as described below (see Stares showing), curved contacts observed along the composite sill appear to be primary, or, at least, the curvature predates mineralization.

The composite nature of the sill is best seen in drill core where sharp, chilled contacts were observed between some phases (Figs. 10, 11, 12, 13); where contacts were observed, phases range in width from several centimetres to several tens of metres. Younger phases in older phases were also observed locally on clean outcrops (Fig. 14). On the basis of hand sample examination, adjacent phases appear to be compositionally similar, but some contacts are also marked by colour changes and by textural changes such as 1) a change in abundance of quartz phenocrysts, 2) a change in degree of recrystallization and ease of recognition of quartz phenocrysts, 3) presence or absence of plagioclase phenocrysts, 4) change in groundmass grain size, 5) change in degree of alteration and fracturing, 6) truncation of veins, and 7) change in intensity of foliation (Figs. 10, 11, 12, 13, 14). The three latter parameters indicate overlap of intrusion, alteration, and deformation events within the composite sill and probably within the Off Lake felsic dike complex. This overlapping of events indicates a prolonged period of activity in the subvolcanic magma chamber.

The orientation of individual intrusions within the composite sill is difficult to define because, on many outcrops, internal contacts between intrusions were not observed. In drill core, the attitude of chilled internal contacts varies by as much as 70°. As in the gradational contact zones of the sill, this variation within the main part of the sill reflects either, or both, a variable attitude of the intrusions that comprise the composite sill, or curving or zigzag contacts of these intrusions.

Fig. 9. Zigzag, west contact of a 5-m-wide, quartz-phyric, felsic dike intruded into metagabbro on the power line right of way, about 30 m west of the composite felsic sill that forms the east contact of the Off Lake felsic dike complex (440169E; 5419043N; locality 2 on Fig. 17)). Zigzag contact here is similar in habit to, but smaller in scale than, zigzag contacts at margin of composite felsic sill that forms the east margin of the Off Lake felsic dike complex. A rusty-weathering, sulphide-mineral-rich zone in the metagabbro is in sharp contact with, and appears to be older than, the felsic dike. The rusty-weathering zone appears to have a feathery termination (under hammer); a narrow subsidiary, fracture-controlled, rusty-weathering zone branches from the main zone in lower left. Variable density of rusty weathering appears to reflect an anastomosing fracture pattern. Sample 398098 was taken from the rusty-weathering zone.

Fig. 10. Chilled, irregular margin of a paler-grey, quartz-phyric, felsic dike intruded into a darker-grey, more altered, quartz- + plagioclase-phyric, felsic dike; the younger dike is subparallel to the core axis. The younger dike truncates narrow calcite veins in the older dike. This contact is in the composite felsic sill that forms the east contact of the Off Lake felsic dike complex. Drill hole OF07-03, 81.5 m; quarter for scale.

Fig. 11. Contact between a younger, quartz-phyric, felsic dike on left and an older, more altered, quartz-phyric felsic dike on right; contact is marked by a 1-mm-wide, quartz vein or silicified zone. This contact is in the composite felsic sill that forms the east contact of the Off Lake felsic dike complex. Drill hole OL07-03, 96.4 m; quarter for scale.

Fig. 12. Contact between a younger, paler-grey, weakly foliated, quartz-phyric, felsic dike on right and an older, darker-grey, more strongly foliated and altered, quartz-phyric, felsic dike on left. This contact is in the composite felsic sill that forms the east contact of the Off Lake felsic dike complex. Drill hole OL07-03, 125.5 m; quarter for scale.

Fig. 13. A 1-cm-wide, dark-grey, quartz-phyric, felsic dikelet intruded into a paler-grey, more altered, quartz-phyric, felsic dike that contains fewer quartz phenocrysts. This is in a mappable, composite felsic sill about 125 m west of the composite felsic sill that defines the east contact of the Off Lake felsic dike complex. Drill hole OF07-02, 165 m.

Fig. 14. A younger, paler-grey, quartz-phyric, felsic dike intruded into an older, slightly darker grey, quartz-phyric, felsic dike in the composite felsic sill that forms the east contact of the Off Lake felsic dike complex (440275E; 5418840N). Contacts are undulating to zigzag although the zigzag reentrants have been deformed into lobes, one of which is under hammer in upper left part of photograph. White streaks are scrapes made during mechanical cleaning of outcrop. The exposure is on the power line right of way in the northwest part of the north block of the main Stares showing.

On well cleaned outcrops, zigzag contacts were locally observed on dikes within the composite felsic sill (Fig. 14), and some of these dikes are as much as 90° discordant to the overall trend of the composite sill.

The intrusions that comprise the composite sill are variably altered although, in most outcrops, the alteration is masked by surface weathering. In drill core, however, the alteration is readily apparent and has resulted in variable abundances of 1) garnet, 2) calcite, 3) pyrite, 4) sericite, 5) bleaching associated with fractures (Fig. 15), 6) mottled bleaching that is not apparently related to fractures, 7) calcite and quartz veins, and 8) locally silicification and chloritization (see drill hole logs in Appendix).

Fig. 15. Flattened, fracture-controlled, bleaching in a quartz-phyric, felsic dike of the composite felsic sill that forms the east contact of the Off Lake felsic dike complex. Drill hole OL07-03, 145 m; quarter for scale.

The metagabbro country rocks are generally similar to those described in the previous report (Ayres, 2007). However, at the west contact of the composite felsic sill, immediately north of highway 615, diamond drill hole OF07-02 intersected about 30 m of metagabbro that contains fragmental zones that range in width from several millimetres to 18 m (Fig. 29; Appendix). The narrower fragmental zones, which are as much as several tens of centimetres wide, are brecciated metagabbro in which <2-mm, metagabbro fragments are cemented by calcite ± quartz. The widest zone, however, is distinctly heterolithic, and it contains 0.5- to 10-cm-long, angular to rounded to flattened fragments that include medium-grained metagabbro, a finer-grained mafic to intermediate lithology, and sparse quartz; the matrix is a mixture of quartz, calcite, and unidentified mafic minerals. The wider fragmental unit could be brecciated metagabbro in which the finer-grained fragments are altered metagabbro and the sparse quartz fragments are broken pieces of early matrix indicating several periods of brecciation. Alternatively, this unit could be a septum or xenolith of the mafic to felsic volcanic conglomerate and breccia unit described above (this drill hole was logged prior to discovering the conglomerate-breccia unit farther south).

East and northeast of the composite felsic sill, isolated, quartz- ± plagioclase-phyric, felsic dikes and sills were observed in both metagabbro and mafic metavolcanic outcrops. These felsic intrusions are generally less than 15 m wide although several intrusions are mappable (revised Menary Township map, in pocket). The isolated sills and dikes were observed as much as 800 m away from the Off Lake felsic dike complex, and they have diverse trends.

Interpretation

Prior to folding, the composite felsic sill, which now forms the east contact of the Off Lake felsic dike complex, was the uppermost part of a high-level, felsic, magma chamber. This magma chamber was the source for felsic eruptions that produced a stratovolcano somewhere outside of the cross section exposed by the present erosion surface (Fig. 3; Ayres, 2007). This stratovolcano, in turn, was a major source for clasts that now form both the Clearwater Lake and Pinewood Lake felsic volcaniclastic sequences, and possibly also the felsic clasts found in the mafic to felsic volcanic conglomerate-breccia unit that occurs in the upper part of the mafic metavolcanic sequence.

At the present time, the lower contact of the Clearwater Lake felsic volcaniclastic sequence, as mapped by Blackburn (1976), is only 550 to 800 m above the top of the composite felsic sill (Fig. 7; revised Menary Township map, in pocket). The top of the magma chamber is too close to the upper surface of the mafic volcano to have been the magmatic source for felsic clasts that occur in the lowermost part of the Clearwater Lake sequence. It is thus inferred that 1) when felsic volcanism was initiated, the felsic magma chamber was deeper in the volcano, and this deeper level is the present western part of the Off Lake felsic dike complex; and 2) as felsic volcanism continued, the top of the magma chamber moved upward as successive magma batches were added to the chamber and intruded overlying roof rocks. The numerous dikes that comprise the Off Lake felsic dike complex are evidence of the long intrusive, and presumably eruptive, history of the magma chamber. A long intrusive history is also indicated by the overlapping of intrusive, alteration, and deformation events. In this scenario, the composite felsic sill that now forms the east side of, but was originally the top of, the felsic dike complex, and the associated mineralization are probably late in the history of the magma chamber and the mineralization may be related to accumulation, over time, of mineralizing fluids in the chamber.

STRUCTURE

EXTENSION OF OFF LAKE FAULT

The northerly trending, Off Lake fault, which is near the west shore of the north part of Off Lake, was first defined by Blackburn (1976), and it was extended northward by the author in 2006 (Ayres, 2007). Copper and gold mineralization are spatially associated with this fault (Blackburn, 1976; Baker, 2006; Ayres, 2007), and, because of this association, extensions of the fault have been mapped both north and south of Off Lake. The fault has been traced about 600 m farther to the north along a linear valley, the east side of which is marked by an increased intensity of foliation. The north end of the Off Lake fault is terminated by a fault that trends 060° and is part of a set of faults of similar trend.

On the south, the Off Lake fault has been traced for an additional 2 km by the presence of a localized quartz vein stockwork and by an increased degree of foliation in the Off Lake felsic dike complex. The fault is about 200 m east of the location shown by Blackburn (1976). The southern part of the fault is mostly on patented ground not held by Rainy River Resources Ltd.

A quartz vein stockwork (Fig. 16) was observed in only one outcrop (437990E; 5413865N) where it forms a discrete zone at the east side of an outcrop. The zone is at least 20 m wide and trends approximately 020°; this is parallel to the inferred trend of the Off Lake fault. Veins within this zone range in width from <1 mm to 1 m, and they form 10 to 20%, and locally as much as 50%, of the zone. Individual veins are interconnected (Fig. 16) and have diverse trends, but most veins trend 160 ± 25°, which is about 40° divergent from both the overall trend of the zone and the inferred trend of the fault. Veins are locally rusty and contain minor pyrite; the host, quartz-phyric, felsic dike suite contains trace to 2% disseminated pyrite.

Also at the east edge of this outcrop, the felsic unit has a moderately well developed shear foliation trending 020°, but 50 m farther west the felsic unit is poorly foliated and contains only trace amounts of pyrite. There are, however, localized shear zones that range in width from a few millimetres to 20 cm and commonly contain a central quartz vein that ranges in width from <1 mm to 15 cm. There are two distinct sets of shear zones that trend 130 ± 10° and 030 ± 10°; the 030° set, which is subparallel to the inferred trend of the Off Lake fault, is the better developed set. This set transects sparse, 0.5- to 5-cm-wide, aplite dikes that are probably related to the Fleming-Kingsford batholith, the inferred contact of which is about 1 km farther east.

Fig. 16. Quartz vein stockwork exposed on the under side of a slab of a quartz-phyric, felsic dike of the Off Lake felsic dike complex (437990E; 5413865N). The stockwork is close to the Off Lake fault. Pencil for scale is about 15 cm long.

In nearby outcrops, the felsic dike complex is generally poorly foliated although shear zones as much as 1 m wide and trending between 030 and 345° were observed; these shear zones contain as much as 5% pyrite. Farther south, the presence of the Off Lake fault is indicated by an increase in intensity of foliation. Foliation is not uniformly developed, and there are 1- to 10-m-wide zones of well developed foliation alternating with zones with less well developed foliation.

The quartz stockwork described above is similar to that observed farther north, near 438501E; 5415153N; this location is near, but east of the inferred location of the Off Lake fault. A sample of the host rock collected from this location in 2006 contained 2.9 g/t gold (Ayres, 2007).

STRUCTURAL COMPLICATIONS EAST OF THE SOUTH END OF OFF LAKE

The intrusion of the Fleming-Kingsford batholith has produced complex foliation patterns in mafic metavolcanic rocks east of the south end of Off Lake. Farther north, between Off Lake, Clearwater Lake, and Cedar Lake, foliation trends are northerly, and foliation is commonly concordant to lithologic contacts. However, east of the south end of Off Lake, foliation orientation changes rapidly to an easterly trend (revised Menary Township map, in pocket), and the change in orientation is more abrupt than the more gentle bend in rock units mapped by Blackburn (1976); thus, in some outcrops, foliation is discordant to lithologic boundaries. In places, foliation trend is variable over short distances changing by as much as 45° over distances of less than 10 m. This rapid variation in foliation attitude is not obviously related to small-scale folds, but many outcrops are too poorly exposed to be certain of this interpretation. In one outcrop, foliation trend varies from 035° to 315°, and the change in attitude occurs at small-scale faults; the result is a jumbled outcrop in terms of foliation attitude, but lithology is constant. East of the south end of Off Lake, isolated, quartz-phyric, felsic dikes that occur in mafic metavolcanic rocks but are related to the Off Lake felsic dike complex, vary in attitude from concordant to discordant to the trend of foliation in the country rocks.

ECONOMIC GEOLOGY

MINERALIZATION RELATED TO THE OFF LAKE FELSIC DIKE COMPLEX

As described previously (Ayres, 2007), pyrite mineralization is widespread in the Off Lake felsic dike complex, but mineralization appears to be concentrated 1) near the top of the complex on the east side of Off Lake, and 2) near the Off Lake fault, which is also in the upper part of the complex. In the western, deeper part of the complex, there are numerous pyrite occurrences and in Lot 4, Concession III of Potts Township, there is a well developed quartz vein stockwork with associated pyrite. Unfortunately, Off Lake covers much of the trace of the Off Lake fault as well as the area between the fault and the east contact of the Off Lake complex (Fig. 7; revised Menary Township map, in pocket).

Mineralization Associated with the Eastern Margin of the Off Lake Felsic Dike Complex

Mineralization here occurs mostly in quartz- ± plagioclase-phyric, felsic dikes and sills, and metagabbro, but, locally, mafic lava flows and mafic to felsic volcanic conglomerate and breccia also contain mineralization. Most of the mineralization observed to date is within 500 m of both the east shore of the lake and the composite felsic sill that forms the east contact of the Off Lake felsic dike complex (Fig. 17). At the north end of Off Lake, mineralization occurs between the Off Lake fault and the east margin of the complex, a distance of only 340 m at this location. The fault and contact diverge southward, and both extend beneath the lake; the only exposures of units between the contact and the fault are at the north and south ends of Off Lake, a separation of 3 km. Except for several showings on the power line right of way, in the central part of claim 3019309, which have been stripped and washed, many of the sulphide-mineral occurrences are poorly exposed, and the habit and extent of the mineralization cannot be fully determined.

East and immediately north of Off Lake, the Off Lake felsic dike complex is in contact with metagabbro, which is part of an irregularly shaped, older, metagabbro pluton at least 3.5 km long and 1.4 km wide. This pluton is the easternmost, and also uppermost, of a suite of incompletely mapped, metagabbro plutons that occur in the upper part of the lower mafic metavolcanic sequence. In most of this eastern, metagabbro pluton, there is trace to 1% disseminated pyrite + pyrrhotite, but, in a zone 300 to 500 m wide adjacent to the east side and northeast corner of the Off Lake felsic dike complex, sulphide-mineral abundance increases, relatively abruptly, to 1 to 5%; sulphide minerals in this zone are ubiquitous pyrite and less abundant pyrrhotite as disseminations and veinlets, and, locally, sphalerite and chalcopyrite, and, rarely, galena.

In this zone of increased sulphide-mineral content, there are numerous, rusty-weathering patches, pods, and linear zones that contain 5 to 20%, and, locally, as much as 80% or as little as 1% sulphide minerals (Figs. 9, 18, 19). Most of the sphalerite, chalcopyrite, and galena observed to date are in these zones of increased sulphide-mineral content, and some zones have gold and silver values; sphalerite is commonly associated with ferruginous calcite. The rusty-weathering, mineralized patches, pods, and zones have sharp to gradational contacts, range in width from several centimetres to several metres, although most are <1 m wide, and have diverse orientations, although many are subparallel to the northerly trend of the contact of the Off Lake felsic dike complex. Some of the sulphide-mineral concentrations are spatially associated with fractures and shear zones. Metagabbro away from sulphide-mineral concentrations is, in places, fractured and locally brecciated with fractures defined by thin veins and associated alteration zones that are locally as much as 1 cm wide. The quartz- ± plagioclase-phyric, composite felsic sill exposed on the east side of Off Lake commonly contains 1 to 3% disseminated pyrite, discontinuous pyrite veinlets, and pyrite + quartz veins, and, south of Highway 615, there are numerous, rusty-weathering patches, pods, and linear zones that range in width from several centimetres to several metres and contain 10 to 30% and locally as much as 80% pyrite along with some sphalerite and

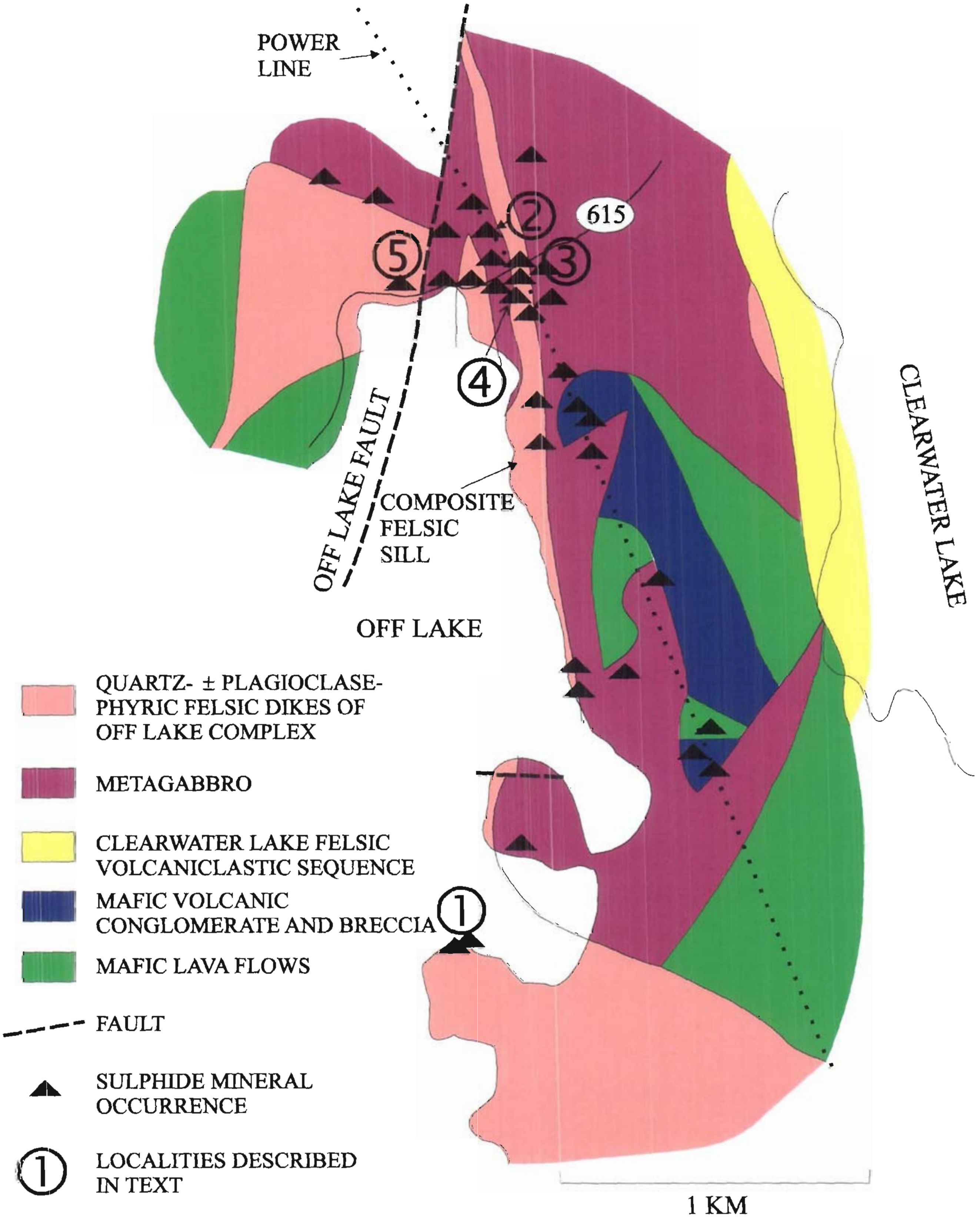


Fig. 17. Map of the eastern and northeastern contact of the Off Lake felsic dike complex showing distribution of sulphide mineral occurrences observed by the author during field mapping. The erratic distribution of occurrences is an artifact of poor exposure and low outcrop density in much of the contact zone, particularly in the southern part. Where outcrop density is low, many mineralized blocks have been found along, and near, the east shore of Off Lake by prospectors (Cj Baker, oral communication, 2007).

Fig. 18. Abrupt termination of a 1-m-wide, rusty-weathering, sulphide-mineral-rich zone in metagabbro that is several metres east of the east contact of the composite felsic sill that forms the east contact of the Off Lake felsic dike complex. At the termination of the zone, several, narrow, mineralized fractures extend away from the zone. In places, irregularities in the boundary of the rusty-weathering zone are an artifact of exfoliation. This exposure is on the power line right of way in the northeast part of the north block of the main Stares showing.

Fig. 19. Rusty-weathering, sulphide-mineral-rich metagabbro is in sharp contact with weakly mineralized metagabbro. A fault filled by a later quartz vein slightly offsets the rusty-weathering zone. The quartz vein, in turn, is bent, and slightly offset at the contact between rusty- and non-rusty-weathering metagabbro. This exposure is about 5 m east of the east contact of the composite felsic sill that forms the east contact of the Off Lake felsic dike complex; it is on the power line right of way in the northeast part of the north block of the main Stares showing.

chalcopyrite, and rare galena; gold and silver values occur in some zones (Figs. 20, 21, 22, 23, 24, 25, 26). North of Highway 615, only rare sulphide-mineral concentrations have been observed to date in the composite felsic sill either on surface exposures or in two diamond drill holes drilled by Nuinsco Resources Ltd. (NS95-02; Ayres, 2007) and Rainy River Resources Ltd. (OL07-03; Fig. 29; Appendix), and no concentrations have been observed more than 100 m north of the highway; however, exposure here is spotty. In the metagabbro, numerous, rusty-weathering, sulphide-mineral concentrations were observed as much as 300 m north of the highway (Fig. 9), particularly on, or near, the power line right of way and between the power line and Spring Lake.

As in the metagabbro, the rusty-weathering, sulphide-mineral-rich patches, pods, and zones in the composite felsic sill, south of Highway 615, have sharp to gradational boundaries (Figs. 20, 21, 22, 23, 26). The mineralized zones vary from straight to zigzag, but, overall, many of the zones are subparallel to the boundaries of the sill, although some are discordant (Fig. 25), and many of the rusty-weathering zones have a more consistent orientation than the boundaries of the composite felsic sill, which undulate and zigzag. Many of the mineralized zones have a better developed foliation than adjacent, non-rusty-weathering, felsic rocks, which are massive to poorly foliated, and some mineralized zones are spatially associated with shear zones and fractures (Figs. 21, 22, 23, 24, 26). In the only well exposed area, which is immediately south of Highway 615 on the power line right of way near the centre of claim 3019809 optioned from the Stares brothers, the rusty-weathering, more strongly mineralized zones are concentrated in the eastern part of the composite felsic sill adjacent to metagabbro country rocks, but they also occur near the west contact and in the central part of the sill. In places, mineralization in the metagabbro is also concentrated at, or near, the eastern contact of the sill, but, in other places, metagabbro adjacent to sulphide-mineral-rich, quartz- ± plagioclase-phyric, felsic units contains only trace to 5% sulphide minerals and does not weather rusty. Locally, discordant mineralized zones extend across the boundary between the composite felsic sill and metagabbro. Rarely, sulphide-mineral-poor, quartz-phyric, felsic dikes that are part of the composite sill have been intruded into mineralized zones, indicating that mineralization was an integral part of the emplacement of the Off Lake felsic dike complex. At the main Stares showing, which is on the power line right of way, immediately south of Highway 615, the sulphide-mineral-rich zones are discontinuous (Figs. 18, 25), and the abundance and distribution of sulphide-mineral concentrations changes rapidly along strike and with depth. Where exposure is poor, particularly south of the main Stares showing, the habit of sulphide-mineral-rich zones and the spatial relationship of these zones to the boundaries of the composite sill could not be determined. However, some high assay values have been obtained south of the main Stares showing (Cj Baker, written communication, 2007). Narrower, simple to composite, quartz-phyric, felsic dikes that occur in the metagabbro near the composite sill vary in sulphide-mineral content from trace to 10%, and some dikes that are <1 m wide contain sphalerite, chalcopyrite, galena, and silver mineralization (e.g. drill hole NS95-02; Ayres, 2007).

Mafic lava flows and mafic to felsic volcanic conglomerate and breccia locally occur within the mineralized aureole adjacent to the east contact of the Off Lake felsic dike complex (Fig. 17). These units contain trace to 2% disseminated pyrite as well as local, rusty-weathering, sulphide-mineral concentrations that contain as much as 5%

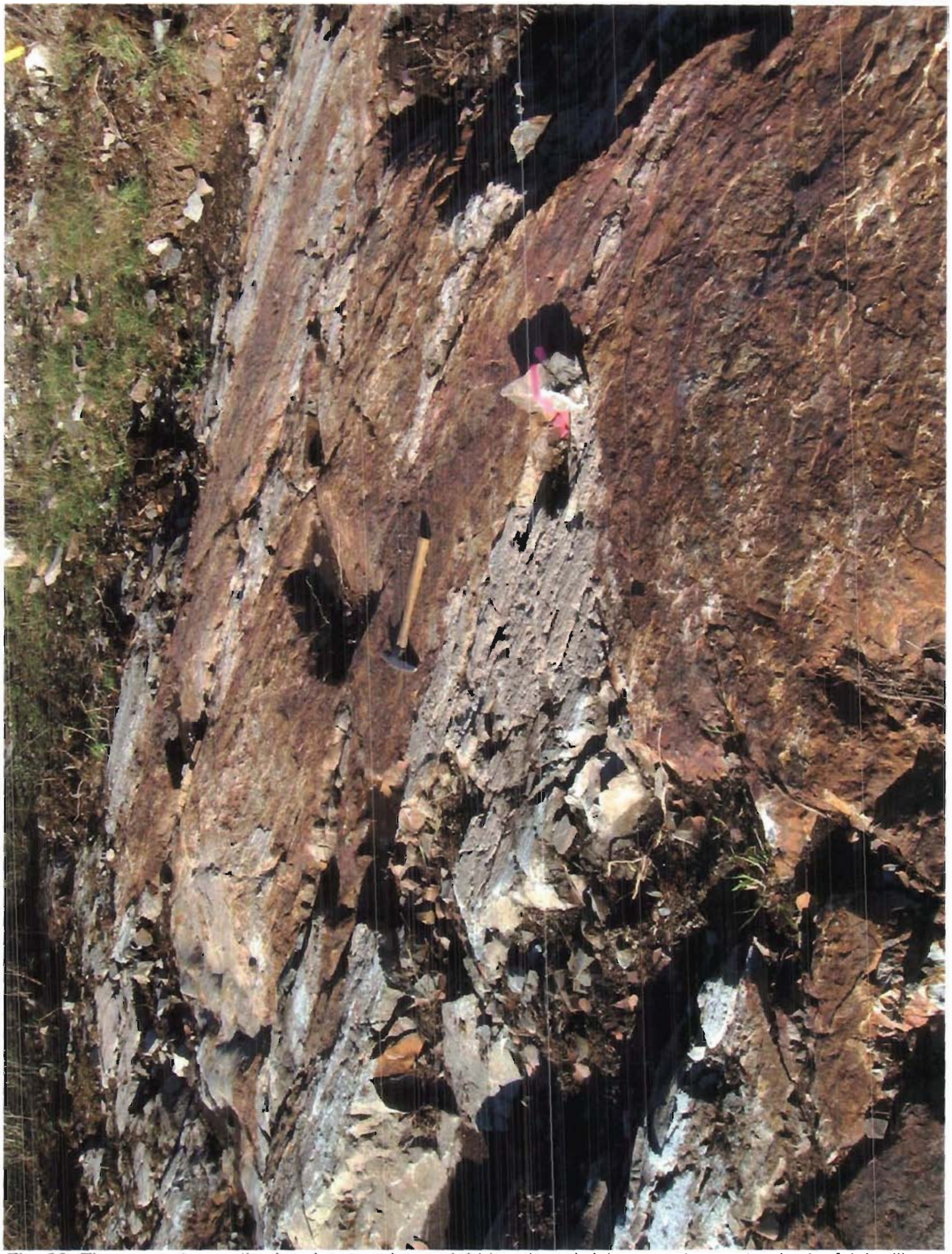


Fig. 20. Zigzag, rusty-weathering, intersecting, sulphide-mineral-rich zones in quartz-phyric, felsic dikes are in sharp contact with non-rusty-weathering parts of the dikes; the non-rusty-weathering parts contain lower sulphide-mineral abundances than rusty-weathering zones. The non-rusty-weathering patches within the rusty-weathering zones appear to be residual, less mineralized parts of the felsic unit. This exposure is in the composite felsic sill that forms the east contact of the Off Lake felsic dike complex; it is on the power line right of way in the northeast part of the north block of the main Stares showing.

Fig. 21. A narrow, rusty-weathering, zigzag, sulphide-mineral-rich zone occurs along two intersecting fracture sets in quartz-phyric, felsic dikes near the west side of the composite felsic sill that forms the east contact of the Off Lake felsic dike complex. A third arm of the zone, subparallel to the lower arm, occurs about 1 m above head of hammer and extends toward the left side of the photograph, but it is not visible from this vantage point. Shearing occurs along the middle arm of the zone. This exposure is on the power line right of way in the northwest part of the north block of the main Stares showing. White streaks are scrapes made during mechanical cleaning of the outcrop.

Fig. 22. Rusty-weathering, sulphide mineralization is associated with a shear zone in a quartz-phyric, felsic dike in the composite felsic sill that forms the east contact of the Off Lake felsic dike complex. This exposure is on the power line right of way in the south part of the north block of the main Stares showing. The grooves in the outcrop are locations of channel samples collected by previous owners of the property.

Fig. 23. Rusty-weathering, sulphide mineralization is associated with fractures in a quartz-phyric, felsic dike within the composite felsic sill that forms the east contact of the Off Lake felsic dike complex. The main fracture is parallel to the pencil (about 15 cm long). Rusty-weathering streaks that are approximately perpendicular to the main fracture are, in part, subsidiary fractures, and, in part, surface staining produced by run off. This exposure is on the power line right of way in the south part of the north block of the main Stares showing.

Fig. 24. Anastomosing fractures, defined by a a greater intensity of rusty weathering, control distribution of sulphide mineralization in a quartz-phyric, felsic dike within the composite felsic sill that forms the east contact of the Off Lake felsic dike complex. This exposure is on the power line right of way in the south part of the north block of the main Stares showing. Pencil for scale is about 15 cm long.

pyrite + pyrrhotite. These concentrations form discrete zones as much as 3 m wide, and some of the mineralized zones have a central 1) more strongly foliated zone and 2)quartz veins or lenses that are as much as 10 cm wide. A sample of conglomerate collected on the power line right of way south of Highway 615 (440420E; 5418500N) by a prospector, Jessica Bjorkman, contained anomalous values of a number of elements, but samples collected from nearby parts of the conglomerate did not have anomalous values (Cj. Baker, oral communication, 2007). The higher metal values in this sample could reflect the fragmental nature of the sampled unit; the anomalous values could have been in a single, unusual clast of unknown composition, or possibly in the matrix of the conglomerate.

The better exposed occurrences are described below as a precursor to more general statements about the genesis of the mineralization and as a guide to future exploration. Numerous grab samples have been collected from the eastern contact zone of the Off Lake felsic dike complex by the author, Cj Baker, and several prospectors

Fig. 25. Sharp, curving contact between dark-grey-weathering metagabbro in foreground and pale-grey-weathering, quartz-phyric, felsic dikes of the composite felsic sill that forms the east contact of the Off lake felsic dike complex. This is the east contact of the composite sill in the south block of the main Stares showing. Several, subparallel, rusty-weathering, apparently interconnected or bifurcating, sulphide-mineral-rich zones are visible; these zones are slightly discordant to the contact. The rusty-weathering zone in centre of photograph pinches out just to the left of the small scarp. Exposure is on the west side of the power line right of way.

employed by Rainy River Resources. However, the author has not seen most of the assay results from grab samples nor results from channel sampling done on the main Stares showing in October and November, 2007. From the assays that have been seen, and from general information about assay values obtained from Cj Baker (oral and written communications, 2005, 2006, 2007), it is apparent that high values of gold, silver, zinc, copper, and lead occur sporadically along a strike length of more than 2 km in both metagabbro and quartz- ± plagioclase-phyric, felsic units near the eastern contact of the Off Lake felsic dike complex.

South-central part of claim 4208907 *(Locality 1 On Fig. 17):* On the north shore of the southern peninsula on the east side of Off Lake (440160E; 5416700N), three, rusty-weathering, pyrite-rich zones were observed at lake level, within an interval several tens of metres wide. These zones occur in recrystallized quartz-phyric, felsic phases of the Off Lake felsic dike complex, and they could be traced inland for only short distances

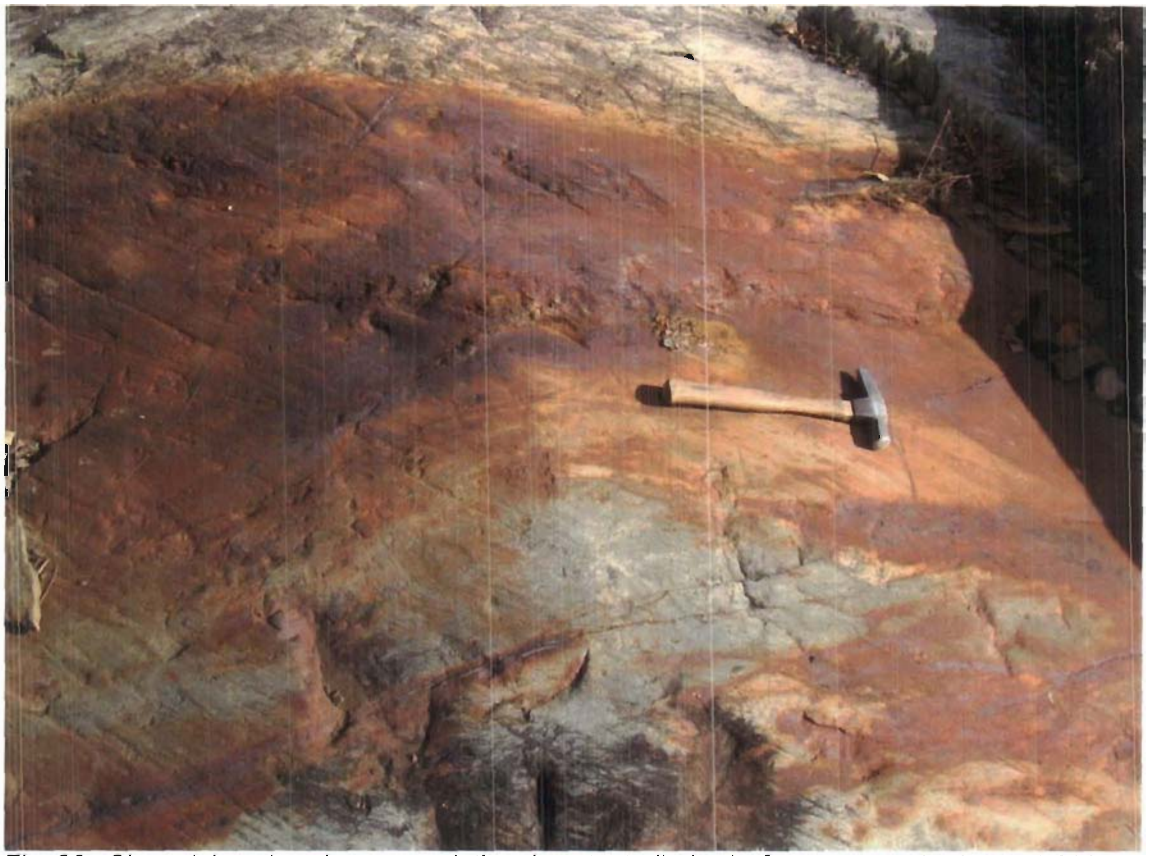


Fig. 26. Sharp (above) and more gradational contacts (below) of a rusty-weathering, sulphide-mineral-rich zone in quartz-phyric, felsic dikes of the composite felsic sill that forms the east contact of the Off Lake felsic dike complex. In the lower part of the photograph, mineralization occurs along fractures that, in lower right, are more closely spaced, interconnected, and anastomosing and form a distinct mineralized zone connected to the main zone above. This is a view, from the opposite side, of the rusty-weathering zone in the centre of Fig. 25. Exposure is on the power line right of way in the south block of the main Stares showing.

because of poor exposure. These zones are about 200 m south of metagabbro exposed on the northern peninsula, and this metagabbro is either a large block in the Off Lake felsic dike complex, or the eastern country rocks (Figs. 7, 8). The rusty-weathering zones are well foliated, and the foliation is markedly better developed than that in adjacent parts of the felsic dike complex; the zones contain concordant quartz veins and as much as 30% pyrite. The zones range in width from 10 to 70 cm, and, as exposed over lengths of several metres, they are relatively straight. The three zones, however, are not parallel: measured trends are 040°/75°NE, 035°/80°NE, and 005°/80°W. Mineralization here appears to be associated with shear zones. These zones have been sampled by Cj Baker and prospectors employed by Rainy River Resources Ltd., but the author has not seen the assay results.

Northwest part of claim 3019809 *(Stares option; Locality 2 on Fig. 17):* On the power line right of way, about 200 m north of Highway 615 (440174E; 5419041N), a 5-m-wide, quartz-phyric, felsic dike and adjacent metagabbro country rocks were stripped and washed in October, 2007 exposing both relationships between the metagabbro and felsic dike and relationships of sulphide mineralization to both rock units. The washed outcrop is about 30 m west of the composite felsic dike that forms the east boundary of the Off Lake felsic dike complex, and relationships observed here may be representative of those in more poorly exposed metagabbro country rocks elsewhere.

The felsic dike has an average trend of 010°, but contacts vary from curved to zigzag to irregular. The western contact is bent, apparently as part of a zigzag, with the strike of the contact changing by 30° over a distance of 3 m (Fig. 9); superimposed on the zigzag contact are smaller scale irregularities, including undulations and reentrants, with amplitudes of 10 cm. The eastern contact, which is exposed over a length of 5 m, is irregular: irregularities vary from gentle curves, to rounded protuberances 10 to 15 cm deep, to sharp 90° reentrants as much as 30 cm deep, to 5-cm-wide tongues that are subparallel to the contact; the subparallel trend of the tongues may be the result of deformation. In 1.5- to 2-m-wide zones near both margins of the felsic dike, there is a distinct striped pattern on the outcrop surface (Fig. 27). The stripes are about 1 cm wide and form an interconnected, but discontinuous and anastomosing, network that has a relatively consistent trend of 020°; the trend is more consistent than that of nearby contacts. The stripes form 15 to 20% of these zones and are identified by a darker colour on weathered surface and a better developed foliation than host rock. The stripes probably represent alteration related to an early fracture system. The consistency of fracture orientation could be a function of 1) later deformation or 2) fracture development parallel to the overall trend of the dike, and not to local irregularities in the contact.

The dike contains only rare pyrite except in a 20-cm-wide and 2.5-m-long, lenticular brecciated zone that occurs 5 to 15 cm inside the east contact and is more strongly foliated than the rest of the dike; the breccia merges southward with the contact, which is also brecciated for a short distance, at a zigzag reentrant in the contact. The breccia consists of three zones: an outer zone in which angular, tabular to lenticular and oriented, felsic fragments several millimetres to more than 5 cm long are cemented by quartz, calcite, and unidentified green mafic minerals; a central zone in which green material dominates; and an inner felsic zone that contains only rare visible cement or matrix. In the central zone, the green material may be a mixture of cement and deformed gabbro fragments that were incorporated into the breccia from nearby country rocks; this zone contains 10 to 15% pyrite (sample 298272; Appendix). Metagabbro

Fig. 27. A darker-grey-brown, anastomosing network of more altered and more foliated material occurs near the west contact of the 5-m-wide, quartz-phyric, felsic dike (440170E; 5419043N) shown on Fig. 9 (Locality 2 on Fig. 17). The alteration appears to have been controlled by a fracture network. This felsic dike is on the power line right of way about 30 m west of the composite felsic sill that forms the east contact of the Off Lake felsic dike complex. Pencil for scale is about 15 cm long.

near the dike weathers rusty, particularly in 30- to 60-cm-wide zones that are at, or near, the contact with the felsic dike (Fig. 9); these zones contain 2 to 4% pyrite and pyrrhotite. In places, at the west contact, the felsic dike is in sharp contact with the rusty-weathering zone, but the rusty-weathering zone has a straighter trend than the contact, and, to the north, the rusty-weathering zone diverges away from the contact (Fig. 9). Because of the sharp contact and slightly divergent trends of the mineralized zone and the felsic dike, dike intrusion probably post-dated mineralization in the metagabbro; however, no direct evidence of such an intrusive relationship was found. The rusty-weathering zone in the metagabbro terminates northward, relatively abruptly, in a short, anastomosing network of thinner, rusty-weathering stripes enclosing non-rusty-weathering metagabbro (Fig. 9); the stripes probably represent an original fracture pattern that controlled deposition of sulphide minerals in the metagabbro. Within and adjacent to the mineralized zone, there is other evidence of fracture control. These include 1) variations in the intensity of the rusty weathering, with red stripes defining an anastomosing pattern within an orange-grey host, and 2) narrow subsidiary, rusty-weathering zones that branch from the main zone (Fig. 9).

Away from the dike, in the stripped area, all of the metagabbro has weakly developed rusty weathering, but there are also more discrete, 20- to 100-cm-wide, northerly trending (±25°), rusty-weathering zones and patches; some of these zones are interconnected and are associated with distinct fractures, some of which contain quartz veins as much as 10 cm wide. The rusty-weathering metagabbro generally contains 2 to 4% pyrite ± pyrrhotite and minor chalcopyrite; quartz veins associated with the rusty zones contain as much as 20% pyrite. Based on examination of this cleaned outcrop, pyrite, pyrrhotite, and rusty weathering, which are common elsewhere in less well exposed parts of the metagabbro, north of Highway 615, are probably also concentrated in discrete zones that are fracture controlled.

A sample collected in 2006 from rusty weathering metagabbro at the east contact of the dike contained anomalous values of copper, zinc, and silver (Ayres, 2007, sample 398077). Several other samples were collected by the author in 2007, and numerous other samples have been collected by Cj Baker and prospectors in the contact zone north of Highway 615, but assay values are not readily available to the author.

Will showing *(Locality 3 on Fig. 17):* This showing, which was discovered by William Averill in 2006, is about 15 m south of Highway 615 and about 50 m east of both the power line right of way and the east margin of the composite felsic sill; it is on claim

3019809 optioned from the Stares brothers. This showing, which is exposed for a distance of 20 m along a cliff face several metres high, consists of a set of rusty-weathering zones in medium-grained metagabbro. The zones range in width from 15 to 35 cm, trend 015° ± 15°, dip 80° east, and have a spacing of 1 to 2 m. Metagabbro between the zones is massive to weakly foliated and contains trace to 2% disseminated pyrite. Most of the rusty-weathered zones, which have relatively sharp boundaries, are more strongly foliated metagabbro that contains 5 to 20% pyrite in discontinuous, concordant, 1- to 3-mm-wide veins; these zones trend 010° to 030°. However, one of the rusty-weathering zones, which has a more northerly trend of 000°, is a 20-cm-wide, apparently silicified, quartz-phyric, felsic dike that contains 3 to 5% disseminated pyrite; the dike is moderately foliated parallel to contacts. This is the only felsic dike observed at this showing.

Diamond drill hole OL07-01, which was drilled at an azimuth of about 150°, would have intersected the Will showing at a relatively low angle. This drill hole, which was drilled to a depth of 203 m, intersected metagabbro intruded by sparse, quartz-phyric, felsic dikes (Fig. 28). In most of the metagabbro, there is <1% pyrrhotite and pyrite, but, in places, the sulphide-mineral content is as high as 25% with sphalerite and locally chalcopyrite and rare galena associated with pyrite and pyrrhotite. Sulphide-mineral abundances are highest in 0.5- to 60-cm-wide zones, as measured along the core axis, and these zones probably correspond to rusty-weathering zones observed on surface. Where present, sphalerite is commonly associated with calcite ± quartz in discontinuous, pinch-and-swell veins that are as much as 2 cm wide and contain as much as 80% sulphide minerals; the veins vary from concordant to as much as 25° discordant to foliation. In places, the veins are interconnected to form anastomosing networks as much as 10 cm wide, and some of these networks appear to cement brecciated metagabbro. Chalcopyrite occurs both associated with sphalerite and separately in disseminated aggregates and discontinuous veinlets as much as 2 mm wide. Sulphide-mineral-rich zones intersected between 86.0 and 105.5 m, may correspond with the Will showing (Fig. 28); one 1.5-m-wide interval (86.0 to 87.5 m) contained 2.218 g/t gold and 42 g/t silver (see drill log in Appendix).

Several quartz-phyric to locally aphyric, felsic dikes ranging in intersection width from 0.1 to 9.4 m were intersected by this drill hole east of the composite felsic sill. Many of the dikes contain only minor pyrite, but several dikes contain as much as 15% pyrite and locally pyrrhotite and sphalerite.

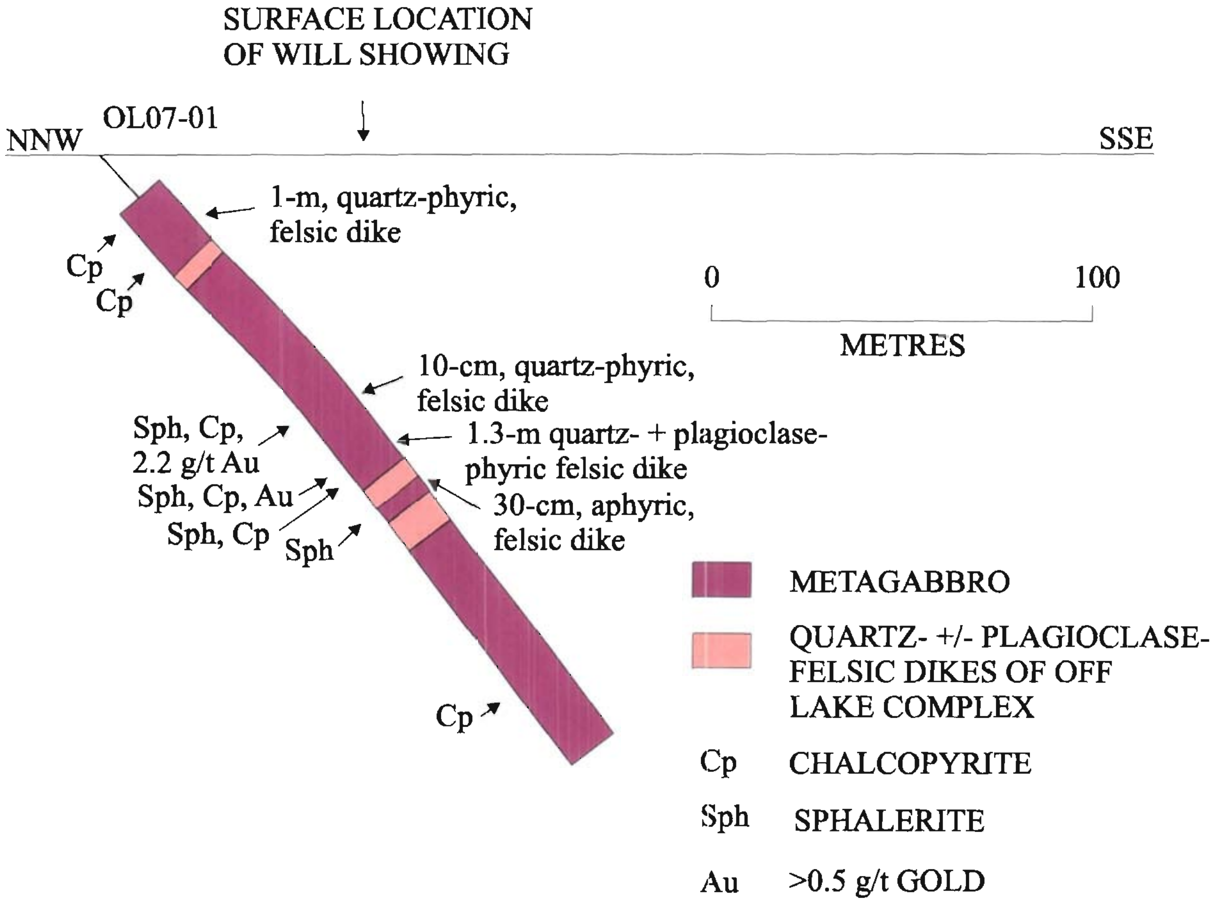


Fig. 28. Simplified lithologic log and distribution of gold, sphalerite, and chalcopyrite mineralization in drill hole OL07-01, drilled for Rainy River Resources Ltd. beneath the Will Showing on claim 3019809 optioned from the Stares brothers. Section trends 150°.

Main Stares showing *(Locality 4 on Fig. 17):*

Introduction:

Claim 3019809, optioned from the Stares brothers, covers the northeast contact of the Off Lake felsic dike complex where there is a higher density of outcrop and outcrops are better exposed than elsewhere along the contact and where relationships between the dike complex, country rocks, and sulphide mineralization are complex. Mineralization is widespread throughout this claim in both quartz- ± plagioclase-phyric, felsic dikes and metagabbro country rocks; mineralization also occurs locally in mafic lava flows and mafic to felsic volcanic conglomerate and breccia. However, the main focus of exploration work done by other companies, and work done to date Rainy River

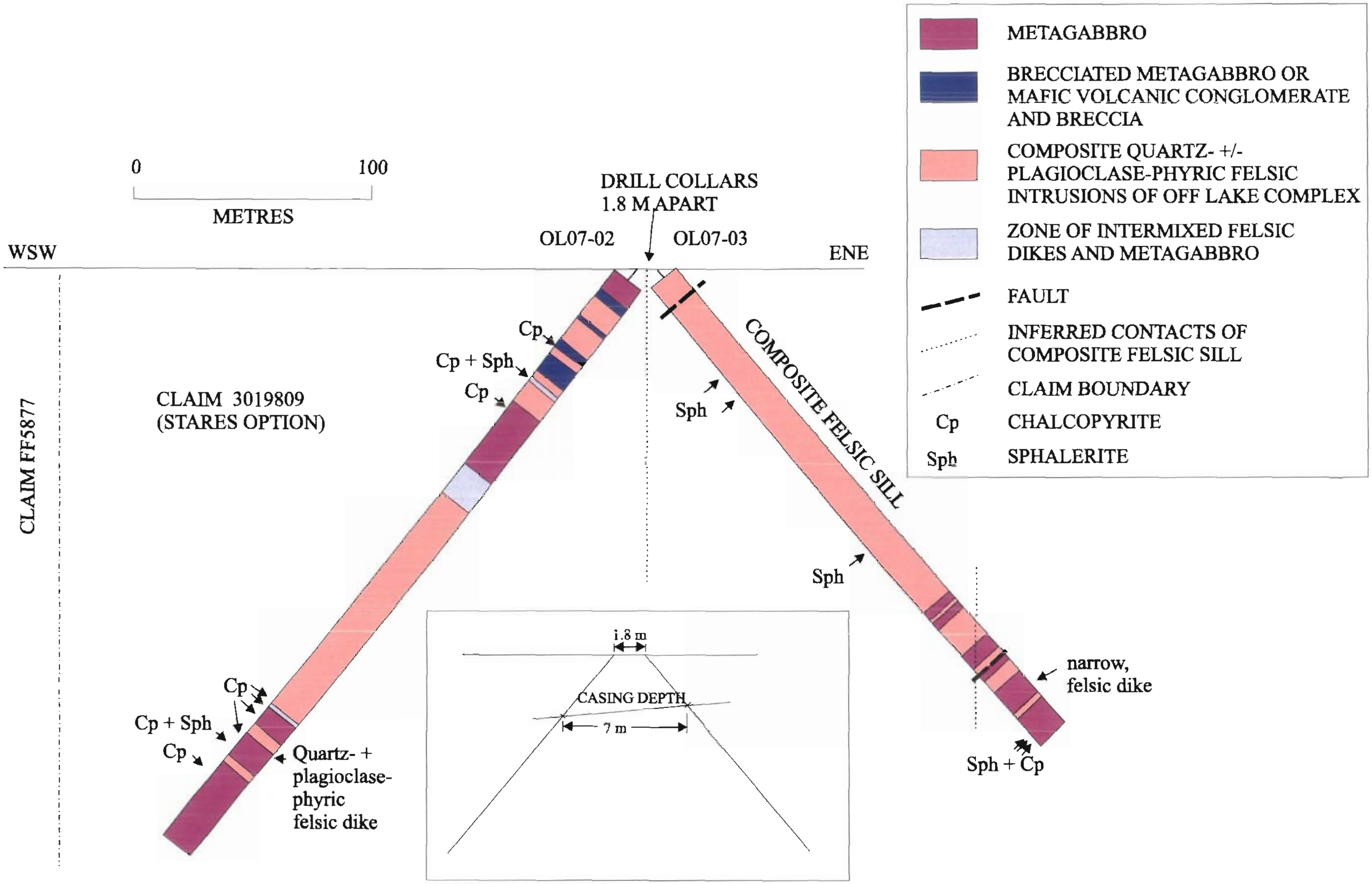


Fig. 29. Simplified lithologic logs and distribution of sphalerite and chalcopyrite mineralization in two diamond drill holes drilled for Rainy River Resources on a claim currently optioned from the Stares brothers. The two holes were drilled in opposite directions from the same setup. As shown on the inset diagram, there is an unexplored gap of 7 m between the two drill holes. The orientation of the section is 060°. On surface exposures, contacts of the composite felsic sill are irregular, and the inferred vertical contacts shown here are an oversimplification.

Resources Ltd., is sulphide ± gold and silver mineralization in the composite felsic sill that forms the east contact of the Off Lake felsic dike complex, particularly a 250-m-long part of the sill exposed on the power line right of way immediately south of Highway 615. Some of the outcrop in this zone were mechanically stripped and cleaned in October, 2007, and have since been channel sampled. Mineralization here is concentrated in the eastern part of the composite felsic sill and in adjacent metagabbro country rocks, but it also occurs at the west contact and in adjacent metagabbro, and in the central part of the sill. This mineralized area is separated into two blocks by a fault trending about 050°; the fault is represented by a gully and by apparent offset of the east contact of the composite felsic sill. The amount of offset is uncertain because the contact is curved and there is no outcrop in the gully, which is several tens of metres wide, or on the north side of the gully at the inferred location of the east contact; however, the horizontal offset is inferred to be 10 to 20 m with the north block moved east. On the basis of geological relationships north and south of the fault, there may have been considerable vertical movement on the fault. The author spent 2.5 days examining this showing, but, to properly understand the relationship among felsic dikes, metagabbro, and mineralization, more detailed mapping should be done.

North part of north block: Several tens of metres south of Highway 615, in the block north of the fault, the east contact between the composite sill and metagabbro country rocks has been stripped and cleaned and is exposed for a length of several tens of metres; however, the area cleaned is about 75 m north of the fault. The contact here undulates and zigzags and the amplitude of these irregularities is as much as 10 m. Zigzag contacts represent both intrusion of felsic dikes along intersecting joints and, more locally, minor fault offset. The average trend of the contact is 175°, but, in detail, short, straighter segments of the contact vary in trend by as much as 80° ranging from 040° to 320°. This irregularity indicates that measurement of contact trends in small exposures is not reliable.

No metagabbro xenoliths or septa were observed in the quartz-phyric, composite felsic sill at this location, and felsic dikes are rare in the metagabbro near the contact. However, in Rainy River Resources', diamond drill hole OL07-03, which was drilled through the composite felsic sill, about 150 m north of the cleaned area, and intersected the east contact at depth, the contact is more gradational. In the eastern 25 m of the sill, there are 2, 2.5- and 3.8-m-wide, metagabbro septa and, in the 50 m of metagabbro country rocks intersected, there are 4, quartz-phyric, felsic dikes ranging in width from <1 to 4.6 m (Fig. 29); similar dikes occur in metagabbro in the south block and metagabbro septa are common on the south side of the north block. Thus abundances of metagabbro septa in the composite felsic sill and felsic dikes in country rocks change rapidly along strike and with depth.

On weathered surfaces of the quartz- ± plagioclase-phyric, composite felsic sill near the contact, colour varies from white to grey to rusty brown, and there are apparent sharp contacts between grey zones and rusty zones; the grey-weathering, felsic rock typically contains 1 to 4% disseminated pyrite whereas the rusty-brown-weathering, felsic rock contains 10 to 30% pyrite. However, surface rust masks the internal fabric and contact relations of some of the mineralized zones. In places, what appear to be sharp, irregular contacts on weathered surfaces between grey- and rusty-brown-weathering, felsic units are an artifact of exfoliation of a glacially polished surface; most rusty parts of the outcrop have commonly lost the glacial polish as a result of exfoliation, but adjacent, non-rusty-weathering parts of the outcrop retain the glacial polish (Fig. 30). Within non-rusty parts of the outcrop there are local exfoliated patches, and these exfoliated patches have rusty weathering. Thus, rusty weathering is only an approximate guide to abundance of sulphide minerals. The descriptions that follow are based on examination of outcrop surface because many parts of the outcrop are too smooth to properly sample with a hammer; thus the focus is on zones defined by rusty weathering rather than sulphide-mineral type and abundance.

Both grey- and rusty-weathering, felsic zones contain quartz phenocrysts, but phenocrysts are better preserved in the grey-weathering rock. In the composite felsic sill in the north part of the north block, rusty-weathering, pyrite-rich zones are best developed and are, in fact, almost ubiquitous within 20 m of the exposed east contact, but they also occur farther from the contact. Contacts between grey- and rusty-weathering zones vary in trend from 040° to 355°. In places, on outcrop surface, the grey-weathering, pyrite-poor rock forms angular areas as much as several metres wide surrounded by linear, but diversely trending, rusty-weathering zones (Fig.20).

Where both grey- and rusty-weathering zones are present at the contact between the composite felsic sill and metagabbro, the rusty-weathering zones are commonly at an angle to the contact, and one rusty-weathering zone extends across the contact into the adjacent metagabbro. In the rusty-weathering, sulphide-mineral-rich zone that extends across the contact, the lithology changes at the contact from quartz-phyric, felsic dike to silicified metagabbro. In places, rusty-weathering zones are characterized by a closely spaced cleavage, or an increased incidence of <5-mm-wide veins; in other

Fig. 30. Difference in weathering characteristics between unexfoliated, pale-grey-weathering, quartz-phyric, felsic dike and exfoliated, rusty-weathering parts of the same dike; the irregular contact between pale-grey and rusty parts is an artifact of exfoliation. Sulphide mineralization occurs in both parts of the dike, but fractures are only readily visible in the pale-grey-weathering component. This exposure is on the power line right of way in the northern part of the north block of the main Stares showing. Pencil for scale is 7 mm wide.

places, intensity of foliation appears to be higher, but this is, at least partly, an artifact of exfoliation.

Only a narrow strip, about 5 m wide, of the adjacent, eastern metagabbro has been cleaned. In this strip, there are numerous, sharply bounded, rusty-weathering zones (Figs. 18, 19), many of which are about 50 cm wide and trend between 030° and 355°, subparallel with the rusty-weathering zones in the adjacent composite felsic sill. Contacts vary from straight to irregular; irregular margins result when 5- to 10-cm-wide, rusty-weathering zones developed along subsidiary fractures that are as much as 60° divergent from the trend of the wider zones. Some of these subsidiary fractures contain quartz and ferruginous calcite veins. Some subsidiary zones pinch and swell, and, in places, where they intersect another fracture, they widen into triangular patches.

Locally, two rusty-weathering zones of similar width intersect at low angles producing a bifurcation-like effect. Because of the limited exposure, the end of a rusty-weathering zone was observed at only 1 location; here a 1-m-wide zone terminates over a distance of <50 cm (Fig. 18). The termination has a zigzag habit, possibly indicative of two intersecting fracture sets, and rusty weathering continues away from the termination along several, <10-cm-wide zones that developed along fractures to produce a feathery appearance. The trend and habit of the rusty-weathering, pyrite-rich zones in metagabbro suggest that mineralization was controlled by fractures even though direct evidence of fractures was not observed in most of the wider, rusty-weathering zones.

Late, somewhat irregular, <20-cm-wide, white, quartz veins that trend 120° ± 15° cross both weakly and strongly mineralized metagabbro. At, or just inside, the margins of rusty-weathering zones, there is left-lateral offset of the veins as a result of either bending of the veins or breakage of the veins; the amount of offset is several tens of centimetres (Fig. 19). Where some of these veins cross wide, rusty-weathering zones, the veins narrow and are, themselves, rusty.

A single, 10-cm-wide, aphyric, felsic dike trending 045° extends across both rusty-weathering and non-rusty-weathering, quartz-phyric, felsic rocks near the east side of the composite felsic sill. This dike, which has a slightly wavy trend, chilled contacts that are defined by fractures oriented 60 to 90° to contacts, and foliation that parallels contacts, appears to be part of the Off Lake felsic dike complex. It post-dates mineralization, but, where it crosses a rusty-weathering zone, it has rust along foliation planes. A similar, or possibly the same dike, was intersected in diamond drill hole OL07-01 between 119.3 and 119.6 m (Appendix).

In the central part of the composite felsic sill in the northern part of the north block, away from the contact with metagabbro, there are local, 5- to 20-cm-wide, rusty-weathering zones that are spatially associated with both fractures and 1- to 5-cm-wide, shear zones, some of which contain quartz and ferruginous calcite veins (Fig. 21). Rusty weathering and associated sulphide mineralization extend outward as much as 20 cm away from these fractures and shear zones, but sulphide mineralization is not symmetrically developed adjacent to the fractures and shear zones. In some of these rusty-weathering zones, there are closely spaced, <5-cm-apart, interconnected, diversely oriented fractures filled by hairline to <5-mm-wide quartz veins; although diversely oriented, fracture orientation is not random, and many of the fractures are within 25° of concordancy to the trend of the rusty-weathering zone. The host, quartz-phyric, felsic rocks within 10 to 30 cm of some of these rusty-weathering zones are more fractured than elsewhere, although the fracture intensity is less than in the rusty-weathering zones; fractures are defined by cracks and <1-mm-wide veinlets (Fig. 30). These fractures are observed on non-exfoliated surfaces, and were not observed on exfoliated surfaces over the rusty-weathering zones. At least one of the rusty-weathering zones in the central part of the composite felsic sill has a zigzag habit produced by mineralization along intersecting fractures and shear zones that trend 040° ± 15° and 170° ± 20° (Fig. 21).

Non-rusty-weathering parts of the quartz-phyric unit generally contain only minor pyrite, and, locally, there are fractured zones that do not have an increased content of sulphide minerals. Fractures and associated alteration form 25 to 30% of these zones and are defined by an anastomosing, darker-grey network that surrounds lensy, <2-cm-wide, lighter-grey zones.

Southeast part of north block: Adjacent to, and on the north side of the fault, the contact between the composite felsic sill and metagabbro is not exposed, and the mineralization exposed here appears to be in the east-central part of the composite sill rather than at the east margin. At this location, a 45 m width of the composite felsic sill has been stripped and cleaned, and metagabbro septa as much as 5 m, and possibly as much as 15 m wide, form 50 to 60% of the exposure; this is a distinct contrast to the relationships observed only 70 m to the north where no septa were observed. Rusty-weathering zones that range in width from <1 cm to 1.5 m and contain 10 to 30% pyrite and minor chalcopyrite occur in both metagabbro septa and intervening, quartz-phyric, felsic dikes; away from the rusty-weathering zones, the host rocks contain trace to 3% disseminated pyrite. Many of the mineralized zones here trend 020° ± 10°, similar to that in the north part of the block, but other trends are also present; the mineralized zones pinch and swell and locally splay, and, in places, narrower subsidiary mineralized zones are connected to the main zones. The mineralized zones are fracture controlled; narrower zones are spatially associated with single fractures or narrow shear zones (Figs. 22, 23), and wider zones are characterized by multiple, interconnected fractures that vary in trend from concordant to discordant to the trend of the mineralized zone (Fig. 24). In the wider zones, fractures have a spacing of 0.5 to 5 cm; the fractures are recognized by thin zones of higher pyrite content, a more strongly developed rusty weathering, and better developed foliation, and some of the fractures have a central, <1-cm-wide, calcite + quartz vein. There are also ferruginous calcite-filled fractures between the rusty-weathering zones, but the spacing of these fractures is much greater than in rusty-weathering zones. The widest, mineralized zone is about 40 m west of the inferred contact with metagabbro and occurs in a quartz-phyric, felsic dike (Fig. 24) adjacent to a metagabbro septum; this zone is 45° discordant to the contact between the metagabbro septum and the felsic dike. There are local, younger unmineralized faults that trend 020°; movement along these faults is generally 10 to 20 cm.

In the easternmost and widest metagabbro septum, rusty-weathering, pyrite-rich zones <20 cm wide extend across the western contact with quartz-phyric, felsic units, but, at the eastern contact, mineralized zones are truncated by a quartz-phyric, felsic dike that contains only sparse pyrite. These relationships indicate that there were pre- and post-mineralization stages of intrusion at this locality.

Southwest part of north block: In the southwest corner of the block north of the fault, on the power line access road, about 15 m of the west contact between the composite felsic sill and metagabbro country rocks was cleaned and washed. The contact, which here has a general trend of 020°, is undulating with an amplitude of about 1 m on the undulations; there is also local offset of the contact along small-scale faults.

There is a single, 10- to 20-cm-wide, metagabbro septum that is 0.4 to 2.5 m away from the metagabbro country rocks; the trend of the septum is about 35° divergent from that of the main contact, and the septum appears to have been wedged from the western metagabbro. Although this septum, and another septum farther south in the south block (Fig. 31), have the appearance of dikes, the metagabbro has a consistent grain size of 1 mm, and this, combined with lack of chilling, shows that the metagabbro is a septum and not a dike. At the margins of the septum, however, there is evidence of shear and fluid activity; the outer 5- to 10-mm of the septum is finer grained as a result of variably developed shear along the contact, and, locally, there is a foliation in the margins that trends about 090°, approximately perpendicular to the septum contacts. In places, 1- to 3-mm-long, acicular actinolite has grown parallel to the foliation and has resulted in a coarsening at the contact. Locally, there is a 2- to 5-mm-wide, reaction zone in the adjacent quartz-phyric, felsic unit defined by the presence of 10% actinolite. The septum is offset by several faults: these vary from thin cracks that trend 060° and have 10 to 20 cm of offset to sulphide-rich, 5- to 30-cm-wide, well-foliated zones that trend 020° to 040° and have offsets of tens of centimetres. In the adjacent quartz-phyric, felsic unit, these wider faults, which are subparallel to the western contact of the composite felsic sill, are well-foliated, rusty-weathering zones that contain 3 to 10% pyrite. In one shear zone, rusty weathering, and associated sulphide mineralization terminate abruptly in the south although the well-foliated, shear zone continues as a

Fig. 31. A dike-like, metagabbro septum in quartz-phyric, felsic dikes of the composite felsic sill that forms the east contact of the Off Lake felsic dike complex (440320E; 5418540N). This septum is in the south block of the main Stares showing. Note curving trend and irregular contacts.

<10-cm-wide, weakly mineralized structure. Other, subparallel, well-foliated, rusty-weathering zones occur in the composite felsic sill within 10 m of the contact, the limits of exposure here. One of these rusty zones, which pinches and swells and ranges in width from 10 to 40 cm, was traced along strike for 10 m; contacts of this zone are sharp where the zone is narrow and gradational where the zone is wider. In one place, where the contact between the composite felsic sill and western metagabbro country rocks is sheared, rusty weathering and increased sulphide-mineral content occur along the contact in both the quartz-phyric, felsic unit and metagabbro; this zone is about 1 m wide. To the south, this rusty-weathering zone, which here trends 170°, migrates away from the contact and joins a 040°-trending, rusty-weathering, shear zone; the result is an abrupt bend in the rusty-weathering, mineralized zone.

Only a small area of metagabbro country rocks is exposed west of the composite felsic sill. This metagabbro contains trace to 5% disseminated pyrite, and it is fractured with fractures defined by 1- to 3-mm-wide, calcite veins trending 175° ± 10°; fractures have a spacing of 1 to 25 cm. There are local, rusty-weathering zones as much as 20 cm wide that have higher pyrite abundances.

South block: On the south side of the fault, mineralization, which includes pyrite, sphalerite, chalcopyrite, and galena is concentrated in the composite, quartz- ± plagioclase-phyric, felsic sill within a 17-m-wide zone adjacent to the eastern contact with metagabbro, but less concentrated mineralization also occurs both farther west in the sill and in metagabbro country rocks. Mineralization here is more extensive than immediately north of the fault, and based on surface examination, this part of the showing contains the widest, most extensive, and best grade mineralization on the Stares option discovered to date. However, exposure here, which has been stripped and washed, is limited to a strike length of 50 m and a width of 4 to 30 m on the side of an outcrop hill; it must also be remembered that, immediately north of the fault, the eastern contact of the composite felsic sill is not exposed, and the mineralization observed there is in the eastern interior part of the composite sill. The closest exposure of the eastern contact on the north side of the fault is about 70 m farther north.

On the south side of the fault, the eastern contact between the composite felsic sill and metagabbro country rocks is gently curved with the trend changing from 010° on the north to 320° in the south, a change of 50° in a distance of less than 50 m. Only a single, 1-m-wide, metagabbro septum was observed in the composite felsic sill at this location, and this septum is about 20 m west of the contact; the paucity of septa is in marked contrast to the relationships observed immediately north of the fault. Also in contrast to relationships north of the fault, there are at least 2, quartz-phyric, felsic dikes in poorly exposed metagabbro east of the contact; one of these dikes, which pinches and swells and ranges in width from 1 to 5 m, has a general trend of 010 ±10° and was traced along strike for 35 m.

Pyrite mineralization occurs throughout the quartz-phyric, felsic unit, but sulphide minerals are concentrated in discrete zones that trend 010° ± 15°, are at least 2 m wide, and are defined by rusty weathering (Figs. 25, 26); this trend is comparable to that observed in the north block. Contacts of these zones range from sharp to gradational (Fig. 26); zones with the highest sulphide-mineral content generally have sharp contacts. Because of curvature of the contact, the mineralized zones at the north end of the exposure are subparallel to the contact, but, at the south end, they are discordant to the contact (Fig. 25). In the south, one mineralized zone extends across the discordant contact, but sulphide-mineral content of the zone in the metagabbro is much less than in the adjacent, quartz-phyric, felsic unit. The well-mineralized, rusty-weathering zones vary in habit from relatively continuous across the length of the exposure to discontinuous pods to patches (Fig. 25), and there is no difference in width between pods and more continuous zones. Pod terminations vary from abrupt to gradual narrowing and lensing out to interdigitating or feathery (Fig. 25). As on the north side of the fault, some mineralized zones contain interconnected, anastomosing, semi-concordant fractures defined by <5-mm-wide, rusty-weathering, ferruginous calcite veins ± increased sulphide-mineral content (Fig. 26), and, at abrupt terminations, narrow, rusty-weathering veins with marginal wall-rock mineralization extend outward, past the main mineralized zones, for several tens of centimetres. Locally, well-mineralized zones appear to be brecciated with rounded, more rusty fragments enclosed in less rusty, more siliceous matrix. In places, 015°-trending faults cross the mineralized zones at low angles; offset on these faults is generally <1 m, and there is a greater sulphide-mineral abundance in the faults than in adjacent parts of the mineralized zone.

Between well-mineralized zones, there are more weakly mineralized zones, some of which contain diversely oriented, <1-cm-wide, rusty weathering veins that define an interconnected fracture pattern (Fig. 26). In these zones, the veins have marginal rusty weathering zones 1 to 15 cm wide. Some of these weakly mineralized zones grade along strike into more strongly mineralized zones by an increase in vein width and abundance. On a larger scale, the 1-m-wide, rusty-weathering zones with strong to moderately developed rust form an anastomosing pattern surrounding less rusty lenses as much as 2 m wide and 6 m long.

In the mineralized quartz-phyric unit, there is a set of younger, unmineralized quartz veins that are as much as 15 cm wide and trend 170° and dip 70° east. The veins narrow, and, in places, appear to pinch out where they cross well-mineralized zones.

In 1995, Nuinsco Resources Ltd. drilled a diamond drill hole (NS95-01) underneath the showing on the power line right of way south of Highway 615. The collar location is unknown, but lithologies and mineralization intersected in the drill hole compare best with units observed on surface south of the fault (Fig 39 and Appendix 3 in Ayres, 2007). This drill hole intersected two mineralized zones. The western zone, which was intersected at a vertical depth of about 4 m, is 35 m west of the east contact of the composite felsic sill and is not apparently exposed on surface; this interval extends from 3.54 to 5.64 m, and, between 4.89 and 5.64 m, there is 6.89 g/t Au. The eastern zone, which was intersected immediately west of the east margin of the composite felsic sill at a vertical depth of about 30 m, was only 3 m wide. This is considerably narrower than the mineralization observed on surface. The best values (3.94 g/t Au; 21.8 g/t Ag, 0.309% Pb, 0.153% Cu, and 2.44% Zn between 42.35 and 42.77 m) were in a 1-m-wide, strongly fractured interval of an altered, quartz-phyric, felsic unit. In this interval 5 to 10% pyrite and sphalerite occur in 0.5- to 2-mm-wide veinlets that form a semi-concordant network filling a deformed fracture system.

Analysis of holes drilled in 2007 near Off Lake: In February and March, 2007, 3 diamond drill holes, with a total length of 756 m, were drilled for Rainy River Resources Ltd. at the northeast corner of Off Lake on claim 3019809 optioned from the Stares brothers. All three drill holes encountered metagabbro country rocks and quartz- ± plagioclase-phyric, felsic dikes of the Off Lake felsic dike complex; no other lithologies were observed during relogging of the drill core in October, 2007, although, as noted previously, a unit originally interpreted to be brecciated metagabbro may be part of the mafic to felsic volcanic conglomerate and breccia unit. Drill logs are in the Appendix and simplified lithologic logs are presented in Figures 28 and 29.

Drill hole OL07-01: This hole was drilled to test the Will showing (described above), which occurs in metagabbro immediately south of Highway 615 and east of both the power line right of way and the main showing on the Stares option. This drill hole apparently intersected the Will showing at a vertical depth of 60 to 80 m (Fig. 28), where, over a core interval of 26.3 m (86.0 to 112.3 m), erratic sphalerite, galena, and chalcopyrite mineralization were observed in metagabbro. The sulphide minerals are associated with pyrite, pyrrhotite, calcite and, in places, quartz in narrow veins or narrow brecciated intervals; anomalous gold and silver values are associated with some of the sulphide mineralization. The best gold value is 2.218 g/t between 86.0 and 87.5 m; this interval also has silver, copper, zinc, and lead values (Appendix). Within this assayed interval, there is a 2-cm-wide vein of sphalerite that contains rounded quartz inclusions as much as 5 mm in diameter. This vein is part of a 10-cm-wide zone of higher sulphide-mineral abundances. Marginal to the main vein, there are networks of sphalerite veinlets that have associated pyrite and pyrrhotite. This zone appears to be a breccia with calcite and sulphide-mineral cement.

This drill hole, which was drilled at an azimuth of 150° would have intersected the mineralized zones of the Will showing, which trend between 000° and 030°, at a low angle. Mineralized intervals intersected by this drill hole are thus not true widths.

In the drill core, metagabbro, above and below the intersection that is ascribed to the Will showing, contains variable amounts of pyrrhotite and pyrite mineralization as well as localized chalcopyrite and less commonly sphalerite mineralization. As noted in the drill logs (Appendix), much of this mineralization was not originally sampled, including intervals that contain more than 20% sulphide minerals. Much of this metagabbro has now been sampled by Cj Baker, but the author has not seen these assays. The widespread mineralization encountered in this drill hole corresponds with the widespread, rusty-weathering, mineralized zones observed in surface exposures of metagabbro east of the power line.

Drill holes OL07-02 and OL07-03: These holes were drilled in opposite directions from the same site. In so doing, the drill holes missed intersecting the critical contact between metagabbro on the west and the composite, quartz- ± plagioclase-phyric, felsic sill on the east (Fig. 29). Both holes were drilled at an initial dip of -50°. Where the holes enter the ground, the collars are 1.8 m apart, and they intersected 4.4 and 3.7 m of overburden respectively. With this geometry and overburden thickness, a 7-m-wide interval was not intersected by the drill holes. At the subcrop surface, drill hole OL07-02, drilled at an initial azimuth of 240°, encountered metagabbro, and drill hole OL07-03, drilled at an initial azimuth of 060°, encountered quartz- ± plagioclase-phyric dikes of the composite felsic sill forming the east side of the Off Lake felsic dike complex (Fig. 29). Intersecting the western contact of the composite felsic sill should have been a critical objective of the drill program, because, in the ditch on the north side of Highway 615, about 50 m south of the drill collars, a zone of sulphide mineralization that contains gold, silver, copper, zinc, and lead (Baker, 2006) occurs in the quartz-phyric, composite felsic sill <2 m east of the contact with metagabbro.

It should be noted that UTM coordinates given on the original drill logs for these drill holes are the same as those given for drill hole OL07-01, which is more than 100 m farther east.

<u>Drill Hole OL07-2</u>: The objectives of this drill hole were 1) to intersect quartz- ± plagioclase-phyric, felsic dikes and metagabbro country rocks that, in rubbly surface exposures west of the power line, contain widespread sulphide mineralization, and 2) to check for evidence of the Off Lake fault at the north end of Off Lake. The drill hole did intersect numerous zones of pyrrhotite and/or pyrite mineralization as well as minor chalcopyrite and sphalerite mineralization in both metagabbro and felsic dikes (Fig. 29). Assay values, particularly for gold, are low. However, some sulphide-mineral-rich intervals, particularly in brecciated metagabbro or mafic volcanic conglomerate and breccia in the upper part of the drill hole were not originally sampled. Some additional sampling has now been done by Cj Baker, but the author has not seen the assays.

The drill hole did not apparently intersect the zone of sphalerite ± galena + silver mineralization found in drill hole NS95-02, drilled by Nuinsco Resources in 1995 (see Ayres (2007) for logs). The collar location of the Nuinsco drill hole is not known, but it was apparently west of the power line and north of Highway 615; based on lithologies intersected, the collar of this hole is probably a few tens of metres south and west of that of OL07-02. The Nuinsco hole was drilled at an azimuth of 090° and intersected the mineralization in a 6-m-wide zone (measured along core axis) where 5, <1-m-wide, quartz- ± plagioclase-phyric, felsic dikes occur in metagabbro; the mineralization, which is mostly in the felsic dikes, but also occurs in metagabbro, is 4 to 8 m (true width) west of the contact between metagabbro on the west and the composite felsic sill on the east. No comparable interval of narrow, closely spaced, felsic dikes was intersected in the uppermost part of drill hole OL07-02.

Drill hole OL07-02 was stopped in massive metagabbro about 40 m east of the east boundary of patented claim FF5877 (location based on GPS readings). No evidence of the Off Lake fault was found in the drill core, but the mapped location of the fault is about 60 m west of the claim boundary. To reach the projected location of the fault, which is assumed to have a subvertical dip, this drill hole would have to be extended at least 160 m.

<u>Drill Hole OL07-03</u>: The objectives of this drill hole were 1) to drill through the north-trending, composite, quartz- ± plagioclase-phyric, felsic sill that, south of Highway 615, hosts the main gold-silver-lead-zinc-copper showing of the Stares option, and 2) to test for mineralization along both west and east contacts of the composite sill and in

metagabbro country rocks east of the sill. As noted above, the drill hole was collared slightly too far east to test for mineralization along the west contact, where gold, silver, copper, zinc, and lead mineralization occurs on surface 50 m to the south. However, the east contact was intersected; this contact is gradational, and it is marked by a general eastward increase, over a core length of 56 m, in abundance and width of metagabbro septa and a corresponding decrease in abundance and thickness of quartz-phyric, felsic dikes (Fig. 29).

In the contact zone, the abundance of disseminated pyrite mineralization in quartz-phyric, felsic dikes increases eastward, but the increase is erratic. Only a single pyrite concentration was intersected in the contact zone, and this 10- to 15-cm-wide zone was not originally sampled. In terms of mineralization, the east margin of the composite felsic sill is markedly different from that observed on the south side of Highway 615, about 150 m away; in the south, mineralization is concentrated in the felsic sill at, or near, the contact, which, in many places, is relatively abrupt (see previous description of main Stares showing).

In the drill core, sphalerite and minor chalcopyrite were observed at several places in both the composite felsic sill and metagabbro country rocks (Fig. 32), but gold values associated with this mineralization in the composite sill are low. The best gold values, which are associated with silver, lead, and zinc, were found in a 7-m-long interval within metagabbro; the bottom of this interval is only 3 m above the end of the drill hole. The highest gold value obtained is 375 ppb over a distance of 1 m. This 7-m-long interval is about 40 m east of the contact of the composite felsic sill; because of the gradational nature, the contact location is approximate, and it was defined by a change from dominantly felsic dikes on the west to dominantly metagabbro on the east. The mineralized intersection is similar to that observed in the Will showing on the south side of the highway and in drill hole OL07-01, but the location may be slightly west of the northward extension of the Will showing. In the author's opinion, this drill hole should have been drilled at least 20 m deeper. Some additional sampling of the drill core has now been done, but the author has not seen the assay results. Near the inferred eastern contact of the composite felsic sill, metagabbro that contains 5 to 15% pyrite ± pyrrhotite and minor sphalerite was intruded by a 16-m-wide, composite, quartz- ± plagioclase-phyric, felsic dike; the felsic phase in the contact with metagabbro contains only minor pyrite (Figs. 33, 34). The contact between this felsic phase and mineralized metagabbro is sharp and chilled, and the mineralization does not appear to extend into

Fig. 32. Semi-concordant zones of sphalerite and pyrite mineralization in foliated and altered metagabbro. Within the red-brown, sphalerite-rich zones, the sphalerite occurs as interconnected networks of fine veinlets, which form about 30% of the zones; minor calcite is associated with the pyrite. On the left, a late quartz vein transects a sphalerite-rich zone. Drill hole OL07-03, 245.0 m; quarter for scale.

the felsic dike. This dike, which is only part of the wider unit, appears to be post-mineralization. Elsewhere, this composite dike does contain as much as 10% pyrite, but the pyrite-rich zone may be in an older dike within the composite dike.

Genesis of mineralization along the east contact of the Off Lake felsic dike complex: There is a strong spatial correlation between mineralization and the eastern contact of the Off Lake felsic dike complex (Fig. 17). Sulphide mineralization here is ubiquitous, but concentrations of sulphide minerals occur in discrete, rusty-weathering zones in both felsic dike rocks and metagabbro, and, less commonly, in mafic lava flows and mafic to felsic volcanic conglomerate and breccia. The morphology and sulphide mineralogy of the rusty-weathering zones are generally similar in both felsic dikes and metagabbro, except for the occurrence of pyrrhotite in metagabbro, but, to date, grade of mineralization is generally higher in felsic dikes than in metagabbro; however, this is a preliminary assessment because the author does not have complete assay data from surface exposures. The spatial association combined with similarities in morphology and

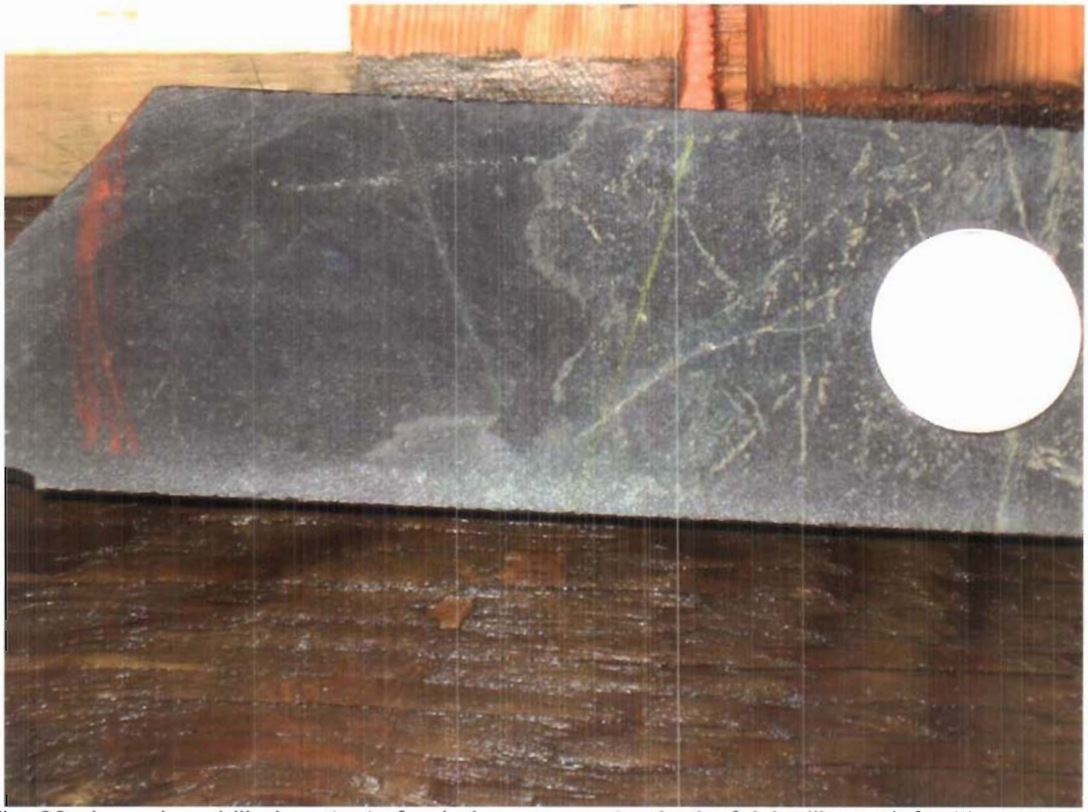


Fig. 33. Irregular, chilled contact of a dark-grey, quartz-phyric, felsic dike on left with sulphide-rich metagabbro on right; this is in the east contact zone of the composite felsic sill that forms the east contact of the Off Lake felsic dike complex. Drill hole OL07-03, 202.5 m; quarter for scale.

Fig. 34. Rounded, sulphide-rich, metagabbro xenolith in quartz-phyric, felsic dike in east contact zone of composite felsic sill that forms the east contact of the Off Lake felsic dike complex. Drill hole OL07-03, 202.2 m; quarter for scale.

mineralogy indicate that the extensive sulphide mineralization along the east side of Off Lake is genetically related to emplacement of the Off Lake felsic dike complex. The local observation that late dikes in the complex were intruded into mineralized zones indicate that mineralization was an integral part of emplacement of the dike complex. When the dike complex was emplaced, the present eastern side was the top of a subvolcanic magma chamber. High abundances of sulphide minerals along with gold and silver were probably deposited by fluids that accumulated in the upper part of the chamber, and mineralization here was probably a late-stage event in the history of the subvolcanic magma chamber. Because of poor exposure along much of the contact, many sulphide-mineral-rich zones remain to be discovered.

A number of facts suggest that the deposition of high abundances of pyrite, other sulphide minerals, and locally gold and silver, in discrete zones, represented on outcrop surfaces by rusty weathering, was controlled, at least in part, by fractures and shear zones:

1) the width of the rusty-weathering zones is generally 1 m or less;
2) the rusty-weathering zones have diverse, intersecting trends, although, at the Stares option, many zones trend between 010° and 020°, subparallel to the mapped trend of the composite felsic sill;
3) some zones bend abruptly, bifurcate, or zigzag, but segments of zones between bends and zigzags are relatively straight;
4) many zones have narrower subsidiary zones that intersect the main zone at low to high angles;
5) some rusty-weathering zones are spatially associated with single fractures and veins, but others, particularly in felsic dikes, are characterized by a high incidence of interconnected, anastomosing fractures; similar fractures occur in adjacent, more weakly mineralized parts of the dikes, but they are less abundant and more widely spaced;
6) some rusty-weathering zones are associated with shear zones;
7) some rusty-weathering zones have a better developed foliation than adjacent, non-rusty-weathering rocks;
8) in the composite felsic sill and adjacent metagabbro, the rusty-weathering zones are subparallel, and zones appear to have a more constant trend than do the contacts between felsic dikes and metagabbro;
9) several rusty-weathering zones extend across the contact between the felsic unit and adjacent metagabbro without change in width or trend; however, the

lithology changes at the contact, and, in some zones, the abundance of sulphide minerals also changes at the contact;

10) although the length of many rusty-weathering zones cannot be determined because of insufficient exposure, many rusty-weathering zones are discontinuous, and some 1-m-wide zones end abruptly;

11) as observed in drill core, sphalerite and pyrite mineralization is, in places, associated with calcite ± quartz veins;

12) in places, discontinuous, rusty-weathering zones appear to be connected to nearby zones, in either the same plane or different planes, by more weakly mineralized zones; and

13) the abundance and distribution of sulphide-mineral-rich zones change rapidly along strike and with depth.

In drill core from hole NS95-01, drilled by Nuinsco Resources Ltd., some sulphide-mineral concentrations appear to be spatially related to specific dikes within the composite felsic sill (Ayres, 2007). This observation, combined with the observed subparallelism of rusty-weathering zones with the eastern contact of the composite, quartz- ± plagioclase-phyric, felsic sill, led the author to speculate that sulphide mineralization may have been spatially and genetically associated with specific dike phases (Ayres, 2007). Specific dike phases may be one of the controls on the location of mineralization, but, on the basis of new exposures, the author now believes that the major control on location of mineralization is fractures and shear zones, most of which are subparallel to the east contact of the composite felsic sill. Such fractures and shear zones probably developed during expansion of the hot, but solid, subvolcanic magma chamber by emplacement of later phases. The location and orientation of favourable fracture systems and shear zones may have been controlled by the contact between the dike complex and metagabbro, by temperature gradients within the complex as younger dikes were intruded into older dikes, and by the contacts of specific dike phases.

The Off Lake felsic dike complex was a long-lived, subvolcanic, felsic, magma chamber that probably expanded upward as the volcano grew. A long history of magmatic activity is indicated by 1) the presence of hundred to thousands of dikes, many of which have a relatively fine-grained groundmass, 2) variable degrees of alteration with older dikes being more altered than younger dikes, 3) variable degrees of foliation in dikes with younger, less foliated dikes having sharp chilled contacts against older, more foliated dikes, and 4) the presence of post-mineralization dikes. At any one time, only a small part of the chamber was probably magma, although much of the pluton probably remained hot, facilitating fluid ingress and movement. The presence of pyrite throughout the complex indicates that the mineralization event was also long lived and widespread.

Mineralization Associated with the Off Lake Fault

The Off Lake fault is mostly beneath Off Lake. During the recent field work, the fault was extended both north and south (see above), but only a single showing was examined. Nine samples were collected for assay from quartz-phyric, felsic units near the southern extension of the fault (Appendix), but assay results are not yet available. Gold and copper mineralization is associated with the fault near the west side of the northern part of Off Lake, near the east side of the south part of Off Lake, and south of Off Lake (Blackburn, 1976; Baker, 2006; Ayres, 2007).

Trench southeast of Spring Lake *(Locality 5 on Fig. 17):* A small, old trench, about 2.5 m long, was located and sampled by Cj Baker on the subsidiary, power-telephone-line right of way between Highway 615 and Spring Lake; this trench is on patented claim FF5877, which has been optioned by Rainy River Resources Ltd. At the trench, which is about 1 m south of a contact between a quartz-phyric, felsic dike and a metagabbro block, the felsic unit is sheared and bleached, and, within a 75-cm-wide zone, there are numerous concordant quartz veins and pods as much as 5 cm wide. Traces of pyrite occur in both the veins and country rock. Foliation in the felsic dike and the contact between the felsic dike and metagabbro both trend 100° ± 20°, which is markedly different from the northerly trend of both foliation in nearby outcrops and the Off Lake fault. This trench is about 60 m west of the inferred trace of the Off Lake fault. The strongly foliated zone exposed in the trench is probably a subsidiary fault, the location and trend of which may be, in part, controlled by the contact with metagabbro.

Mineralization in the South Part of the Off Lake Felsic Dike Complex in Potts Township

Introduction: On property optioned from Mr. Leroy Cunningham (south half of Lot 4, Concession III, Potts Township; revised Potts Township map, in pocket), two outcrops in the south part of the Off Lake felsic dike complex contain extensive quartz vein systems. The vein systems were discovered by the author in 2006 (Ayres, 2007) during the course of geological mapping. Veins and associated wallrock in the southern outcrop (near 436580E; 5412100N) were sampled by Joe Hackl in the spring of 2007; he also stripped small exposures of the vein system. The vein system in the northern outcrop (near 436670E; 5412250N), which is referred to as Lorne's showing, was mechanically cleaned and washed in October, 2007, and has since been channel sampled, but the author has not seen the assay results. Both vein systems were reexamined by the author in October, 2007. As discussed below, the two outcrops may be part of a single vein system.

The host rock in both outcrops is a suite of white-, to pale-grey-, to pale-brown-, to rusty-weathering, quartz-phyric, felsic dikes that contain 1 to 3%, 1- to 4-mm, quartz phenocrysts. Groundmass of the dikes has been recrystallized and is now fine grained. Dikes vary from foliated to massive.

Northern outcrop: This is a relatively small, subcircular outcrop, the cleaned part of which is 35 m (east-west) by 25 m (north-south). On this outcrop, there is evidence of at least three intrusive events, three vein injection events, several periods of deformation, and sulphide mineralization.

Felsic dike complex: The first intrusive event was emplacement of felsic dikes. Because of 1) early deformation of the dikes, resulting in a well developed fabric, 2) injection of voluminous quartz veins, and 3) other stages of intrusion, vein injection, and deformation, it was not possible to identify more than one phase of dike emplacement on the northern outcrop. However, based on observations made elsewhere (Ayres, 2007), including the larger southern outcrop, dike emplacement was a multiple intrusive event with some dike emplacement possibly post-dating mineralization. The early fabric, which trends 000° and has a vertical dip, is a combination of sericitic foliation, fractures, and <0.5-cm-wide, quartz veins.

Mineralization: The quartz-phyric, felsic dikes contain as much as 10% pyrite and minor chalcopyrite. The sulphide minerals occur as disseminated grains and aggregates, which are as much as 1 cm in diameter, and in narrow, sericitic, shear zones. Anomalous gold values occur in a sample collected in 2006 (Ayres, 2007). As noted below, sulphide mineralization also occurs in early quartz veins.

Early quartz veins: At the northern outcrop, the felsic dike complex was injected by an early stockwork of pale-grey, glassy, quartz veins that contain <5% pyrite and have localized malachite staining. Most veins are 1 to 5 cm wide and are typically 5 to 30 cm apart, but locally veins are 40 to 120 cm wide; the wider veins appear to be discontinuous pods and/or the result of amalgamation of veins (Figs. 35, 36). Although the veins are interconnected to form a stockwork, there is, in most places, a preferred orientation to many veins. Vein orientation ranges from 100° to 160°, and the veins dip between 45° SW and 90°; connector veins are as much as 90° divergent to this trend. Variations in vein trend are a function of both differences in orientation from place to place across the outcrop and warping of veins. The preferred orientation of veins may be a function of a dominant fracture system and associated subsidiary fracture systems,

Fig. 35. Low abundance of early quartz veins form a poorly developed stockwork near the southwest edge of the stockwork system; the stockwork is in quartz-phyric felsic dikes of the Off Lake felsic dike complex on the Cunningham option (436667E; 5412250N), Lot 4, Concession III, Potts Township. Although veins are interconnected, most veins have a northwesterly trend. On the left side of the photograph, a several-centimetre-wide, late granitoid dike has intruded the quartz veins.

flattening, or a combination of these factors. Some vein deformation is suggested by localized warping of the veins. orientation to many veins. Vein orientation ranges from 100° to 160°, and the veins dip between 45° SW and 90°; connector veins are as much as 90° divergent to this trend. Variations in vein trend are a function of both differences in orientation from place to place across the outcrop and warping of veins. The preferred orientation of veins may be a function of a dominant fracture system and associated subsidiary fracture systems, flattening, or a combination of these factors. Some vein deformation is suggested by localized warping of the veins.

In most of the northern outcrop, the early quartz veins range in abundance from 10 to 70% (Figs. 35, 36), although there are local areas where only a few veins were observed (see Fig. 39). Veins are most abundant in the central part of the outcrop (Fig. 36) and decrease in abundance toward the southwest and northeast margins (Fig. 35).

Fig. 36. High abundance of amalgamated quartz veins in the central part of the quartz stockwork in quartz-phyric, felsic dikes of the Off lake felsic dike complex on the Cunningham option (436667E; 5412250N), Lot 4, Concession III, Potts Township. A quartz + chlorite vein in a later fault is visible in lower part of photograph. White streaks are scrapes produced during mechanical cleaning of outcrop. Pencil for scale is about 15 cm long.

Where veins are abundant, the quartz-phyric, felsic, host rock forms angular, elongated fragments surrounded by quartz (Figs. 36, 37, 38). Where veins are less abundant, vein habit is variable, and this variation is, at least in part, a function of vein abundance: 1) in some places, particularly where vein width is variable, the host rock has a brecciated appearance with rounded to angular, more equidimensional fragments separated by 1- to 5-cm-wide veins; <1-cm-wide, subsidiary veins extend into, and across, the larger fragments (Fig. 37); and 2) in other places, particularly where vein abundance is only 10 to 15%, veins have a relatively consistent trend (Fig. 35), and few veins deviate more than 20° from this trend; these veins are partly interconnected and, in places, bifurcate and rejoin, surrounding lenticular rock areas, but there is no obvious stockwork or breccia pattern.

Fig. 37. A stockwork of grey quartz veins of variable width cement brecciated, quartz-phyric felsic dike in the Off Lake felsic dike complex, Cunningham option (436667E; 5412250N), Lot 4, Concession III, Potts Township. The two, subparallel, slightly darker coloured veins fill a later fault and fracture system. This is a close-up view of part of area shown in Fig. 38. Pencil for scale is about 15 cm long.

Fig. 38. Stockwork of grey quartz veins in a brecciated, quartz-phyric, felsic dike of the Off Lake felsic dike complex, Cunningham option (436667E; 5412250N), Lot 4 Concession III, Potts Township. Note varying widths and subparallelism of many veins. Stockwork is transected by a later, quartz- + chlorite-vein set that fills fractures and faults. Early quartz veins are truncated by a later quartz + chlorite vein in lower half of photograph. Fig. 37 is a close-up view of the right part of this photograph. Pencil for scale is about 15 cm long.

On the southwest side of the outcrop, there is a relatively abrupt boundary, with a general trend of 120°, between an area that contains abundant quartz veins on the northeast and an area with only sparse veins on the southwest. This boundary is gradational over 1 to 2 m, and the trend of the boundary is irregular; the irregularities have amplitudes of several metres. From this boundary, the vein zone extends northeastward for 23 m to the edge of the cleaned exposure. On the northeast side of the exposure, vein abundance is less than in the central part of the stockwork zone, but quartz veins are still present in a small outcrop, which was not cleaned, about 15 m northeast of the cleaned exposure. Near the east side of the outcrop, there are two, fault-bounded blocks that are 1 to 3 m wide and contain only sparse, early quartz veins.

Fig. 39. Fault contact (below eraser end of pencil) between quartz-phyric, felsic dikes that contain a stockwork of quartz veins and a block of the quartz-phyric, felsic unit that lacks quartz veins. A more poorly defined fault occurs on left side of photograph. In the stockwork, vein abundance is variable, but veins are the dominant component on the left side of the photograph. This is part of the Off Lake felsic dike complex on the Cunningham option (436667E; 5422250N), Lot 4, Concession III, Potts Township. Pencil for scale is about 15 cm long.

Boundary faults truncate early quartz veins in adjacent parts of the outcrop (Fig. 39). These blocks are wedge-shaped on horizontal outcrop surfaces, consist of the same quartz-phyric, felsic host rock as elsewhere on the outcrop, and have the same intensity and orientation of foliation. The best defined of these blocks is 4 m long and 1 m wide; it has a general northerly trend, subparallel to the well developed foliation. A second northerly trending block at least 3 m wide is incompletely exposed in the southeast corner of the outcrop.

Early faults and veins: The early quartz veins are offset along faults that typically trend 020 to 030°; in most places the offset is only a few centimetres. The faults vary from ductile to brittle structures (Figs. 38, 40, 41). On the outcrop surface, ductile faults lack obvious fault lines whereas brittle faults have obvious fault lines (Fig. 40), some of which are filled by relatively straight, quartz + chlorite veins that are as much as several

Fig. 40. Veins of the quartz stockwork are truncated by brittle faults (lower and upper parts of photograph) and by a more ductile fault (below pencil); the ductile fault is more irregular than the brittle faults and there is no obvious fault plane. The stockwork is in a quartz-phyric, felsic dike of the Off Lake felsic dike complex on the Cunningham option (436667E; 5412250N), Lot 4, Concession III, Potts Township. Pencil for scale in about 15 cm long.

centimetres wide (Fig. 38). Locally, early quartz veins have been dragged and rotated against faults that are now filled by quartz + chlorite veins (Fig. 41). The dragging indicates a left-lateral sense of movement and some dragged veins now almost parallel the early faults.

Late quartz veins: On the northwest side of the outcrop, several, white to locally rusty, quartz veins as much as 40 cm wide transect both the early quartz veins and the quartz + chlorite veins (Fig. 42); no sulphide minerals were observed in these veins. These late veins have an average trend of 045°, and dip ranges from 40°NW to 70°SE. Vein margins vary from straight to irregular with narrow vein offshoots extending as much as several metres subparallel to the main veins and 40 cm perpendicular to the main veins.

Late granitoid dikes: Two distinct ages of granitoid dikes were intruded into the late quartz veins and all older structures and rock units (Fig. 42). The granitoid dikes are

Fig. 41. Veins of the quartz stockwork are truncated, dragged, and rotated by movement along faults, some of which are filled by quartz + chlorite veins. Veins at the top of the photograph have the regional trend, but the trend of other veins appears to be the result of rotational deformation. The stockwork occurs in a quartz-phyric, felsic dike of the Off Lake felsic dike complex on the Cunningham option (436667E; 5412250N), Lot 4, Concession III, Potts Township.

distinguished by colour and trend, and they comprise an earlier, texturally variable, pink- to pale-grey-weathering phase and a younger pale-grey- to cream-weathering phase. Dikes of both phases extend completely across the outcrop. These dikes have not been metamorphosed, and they are probably related to the late tectonic Finland stock. As mapped by Blackburn (1976), the margin of this stock is 600 m west of the northern outcrop. Alternatively, the dikes could be related to the Fleming batholith, the western edge of which is 1200 m east of this outcrop.

Three, pink- to grey-weathering, leucocratic dikes, ranging in width from 1 to 15 cm, were observed; the dikes are slightly sinuous, but the average trend is 060°, and the dip is 75°NW (Fig. 42). The dikes contain at least 25% quartz and <1% mafic minerals, and, texturally, they vary from aplitic to pegmatitic. The pegmatitic dike, which ranges in width from 1 to 3 cm, has a central, 5- to 10-mm-wide, quartz-muscovite zone with a grain size of 5 to 8 mm.

Fig. 42. A complex intrusive and vein relationship in quartz-phyric, felsic dikes of the Off Lake felsic dike complex on the Cunningham option (436667E; 5412250N), Lot 4, Concession III, Potts Township. The earliest quartz veins are narrow and slightly rusty weathering. These were injected by a white quartz vein (near centre of photograph, just above hammer head). This was intruded in turn by a pink leucogranitoid dike (extending from lower left to upper right) and then by a grey granitoid dike (extending vertically across photograph).

The younger, pale-grey- to cream-weathering dikes have straight to sinuous to zigzag habits (Fig. 42), and they trend 020° to 030°. They include a >3-m-wide dike that is incompletely exposed at the southwest corner of the exposure, and two, closely spaced, 10- to 20-cm-wide dikes in the centre of the outcrop; one of the narrow dikes bifurcates, but the second branch terminates within 2 m. These dikes have a grain size of 1 to 2 mm, and they contain 25 to 30% quartz and 5% biotite. The wider dike contains sparse, 1- to 2-cm-wide, unmineralized, quartz veins, and it is weakly foliated parallel to the contact, which is a 2-mm-wide, pinch and swell shear zone.

Sampling: Channel samples to be collected from this outcrop should be oriented approximately perpendicular to the trend of the grey quartz veins, but they should also extend across the early faults and quartz + chlorite veins.

Southern outcrop: In this outcrop, which is considerably larger than the northern outcrop, the quartz vein system occurs along the relatively poorly exposed northwest edge; the vein system has been stripped in a number of places by Joe Hackl and the author. The quartz vein system is very similar to that in the better exposed northern outcrop. Pale-grey, quartz veins that are generally <5 cm wide, but locally are as much as 50 cm wide, occur in foliated, rusty-weathering, quartz-phyric, felsic dikes. Most veins preferentially trend between 030° and 100°, but the veins are interconnected to form a stockwork within an *in situ* breccia. The vein system is at least 30 m wide, and it was traced about 100 m to the northeast, along a trend of 045°, before disappearing in an area of poor exposure about half way across the outcrop. To the northeast, the vein system appears to decrease in width, and the system here is less obvious because there is less rusty weathering.

On the southeast side of the quartz-injection zone, foliated, rusty-weathering, quartz-phyric, felsic dikes that contain the vein system are in sharp contact with a more massive, quartz-phyric, felsic phase that lacks quartz veins and rusty weathering. The contact is covered by a 1-m width of overburden, and it was not actually observed. However, there is good control on the contact location, and the contact trends 030°, subparallel to the vein system. The more massive phase could be a younger intrusion, although still part of the Off Lake felsic dike complex.

The vein system in this outcrop was intruded by two dikes that may be related to the late tectonic, Finland stock. These include 1) a 30-cm-wide, pink-weathering, feldspar-phyric, granitoid dike that contains sparse, 1-cm-long, feldspar phenocrysts in a medium-grained groundmass, and 2) a 20-cm-wide, zigzag, pegmatite dike. The granitoid dike trends 030° and the average trend of the pegmatite is 060°.

Genesis of the vein systems: If the pale-grey vein system in the southern outcrop is projected along the apparent trend of the system, as established by the dominant trend of the veins and tracing of the system, it would be close to the early vein system in the northern outcrop, although the vein system in the northern outcrop has a different average trend. This spatial relationship in addition to the lack of vein systems on outcrops farther north suggests that the two vein systems are genetically related.

The early quartz veins predate several generations of later quartz veins, both ductile and brittle faults, and two periods of granitoid intrusions. The early age of the veins and the sharp contact on the southern outcrop between foliated, quartz-phyric, felsic rocks containing the quartz stockwork and a more massive, quartz-phyric, felsic unit that lacks quartz veins suggests that the vein system may be related to emplacement of the Off Lake felsic dike complex.

The only similar quartz stockwork observed to date in the area is associated with the Off Lake fault (Fig. 16). The vein system on the Cunningham option has a distinctly different trend to that of both the Off Lake fault, the inferred extension of which is about 800 m to the east, and the Potts fault, which is about 1 km to the south. However, the quartz stockwork on the Cunningham option may be related to an undiscovered, early fault in the southern part of the Off Lake felsic dike complex.

MINERALIZATION IN METAVOLCANIC UNITS NORTHEAST OF OFF LAKE

As noted previously (Ayres, 2007), many sulphide-mineral showings have been found within a distance of about 600 m of the microwave tower on the road to the Clearwater-Off Lake garbage disposal site (440600E; 5420600N; revised Menary Township map, in pocket), but, to date, only very low abundances of economically important elements have been found in these showings (Cj Baker, oral communication, 2007; Ayres, 2007). Two of these showings, termed the Teddy Bear and Tower showings were cleaned, washed, and channel sampled in September, 2007. For safety reasons, the Teddy Bear showing, which occurs along the edge of a public road, was largely reburied prior to the author's visit in October. The Tower showing, however, was still available for examination.

Tower Showing

This showing occurs along the southeast side of an outcrop that is separated from an outcrop of pillowed, mafic lava flows about 25 m to the southeast by a deep gully trending 050°. The gully parallels minor faults observed at the showing as well as foliation and schistosity trends near the sides of the gully in both outcrops. The gully is probably the trace of a fault, and this fault is part of the 060°-trending fault set that has been observed elsewhere in this part of the map area, and, farther west, truncates the Off Lake fault. Some of the other faults of this trend also have associated mineralization.

Mineralization at the showing occurs mainly in a felsic volcanic, metasedimentary tongue or lens of the Clearwater Lake felsic volcaniclastic sequence; the unit is exposed for a width of about 15 m. This tongue is separated from north-facing, pillowed, mafic lava flows to the northwest by a covered interval several tens of metres wide; this pillowed sequence is not deformed. The mineralized volcaniclastic sequence is separated into two blocks by a subsidiary fault trending 055° and dipping 75° SE.

In the southeastern block, which is 7 to 8 m wide and occurs adjacent to the gully, the sequence is well bedded. Although lithologies are masked by rusty weathering and foliation development, the sequence appears to be dominantly white- to pale-grey-weathering, medium to coarse, felsic volcanic sandstone. In some of the coarser beds, which are also the thicker beds, there is as much as 1%, 2- to 4-mm, quartz crystals. A few beds also contain 0.1- to 2-cm-wide, strongly flattened felsic clasts; these beds appear to be pebbly sandstone. Beds range in thickness from 1 to 30 cm and are defined by differences in grain size and pyrite abundance; at least some of the beds have sharp bedding planes. Beds are offset slightly by right-lateral movement along minor faults that parallel major faults. Bedding trends 090° and dips 85° south, parallel to pillow orientation in mafic lava flows northwest of the showing. Pyrite mineralization occurs throughout the sandstone although pyrite abundance appears to be an indirect function of grain size with the coarsest beds containing the least amount of pyrite. The highest abundance of pyrite, however, is in a 3-m-wide, concordant, green, brecciated unit. This unit contains rounded to flattened, <5-cm-wide, very fine grained, apparently monolithic, black fragments in a pyrite-rich matrix. The origin of this unit could not be determined during the author's brief inspection of the showing, but it could be a brecciated, sulphide-mineral-rich, mudstone unit.

In the northwestern block, which is about 6 m wide, bedding in the metasedimentary sequence, which also appears to be felsic volcanic sandstone, is parallel to the boundary fault; the trend of bedding in this block is thus distinctly different from that in the southeastern block and pillow orientation immediately to the northwest. Finer grained parts of the sandstone sequence are well foliated to schistose. The sandstone was intruded by a >4-m-wide, pale-grey-weathering, quartz- + plagioclase-phyric felsic sill. This unit contains 1 to 2%, slightly flattened, 2- to 4-mm, quartz phenocrysts, and 5 to 10%, lenticular, white aggregates that are probably recrystallized plagioclase phenocrysts. This sill, only the southeastern contact of which is exposed, appears to be similar to the Off Lake felsic dike complex. Pyrite abundance in the northwestern block appears to be <5%.

CONCLUSIONS

1. The new mapping was focused on the eastern contact of the Off Lake felsic dike complex, a major locus of gold, silver, copper, and zinc mineralization. As a result of the mapping program, a) the eastern and northeastern contact of the Off Lake felsic dike complex with metagabbro country rocks was better defined; b) a genetic model for mineralization associated with the Off Lake felsic dike complex was developed; c) a new rock unit, polymictic, clast-supported, mafic to felsic volcanic conglomerate and breccia was identified; and d) the Off Lake fault was extended both northward and southward.
2. The eastern and northeastern contacts of the Off Lake felsic dike complex are, in many places, poorly exposed. Where exposure is good, the contact varies from relatively sharp to gradational. A major feature of the contact is a 60- to 100-m-wide, northerly-trending composite sill composed of numerous, quartz- ± plagioclase-phyric, felsic dikes and sills. This composite sill forms the eastern contact of the complex and extends at least 600 m north into metagabbro country rocks.
3. Pyrite, sphalerite, chalcopyrite, gold, and silver mineralization is concentrated along the eastern and northeastern contact of the Off Lake felsic dike complex, particularly in the composite felsic sill, but it also occurs in metagabbro country rocks as much as 500 m away from the Off Lake felsic dike complex. In many places, prospecting and mapping are hampered by poor exposure and low outcrop density; toward the south, the composite felsic sill is covered by Off Lake. Because of the extensive cover, many mineral occurrences remain to be discovered.
4. Where exposure is good, mineralization in the felsic intrusive rocks and the metagabbro country rocks is very similar except for the presence of pyrrhotite in many occurrences in metagabbro. Many of the mineral occurrences are only 0.1 to 2 m wide, and they are commonly discontinuous pods that are subparallel to both the eastern contact of the Off Lake felsic dike complex and to each other. Mineralized zones locally cross the contact between felsic intrusions and metagabbro, but, in

other places, late phases of the Off Lake felsic dike complex have intruded mineralized zones.

5. The major depositional sites for mineralization are fractures and shear zones including single fractures, zones of anastomosing, interconnected fractures, 0.01- to 1-m-wide, shear zones, and intersecting fractures and shear zones. Mineralizing fluids were an integral part of the emplacement and crystallization of the Off Lake felsic dike complex.
6. On the basis of the limited work done to date, sulphide-mineral occurrences near the Off Lake felsic dike complex appear to be discontinuous pods in both horizontal and vertical dimensions.
7. The Off Lake felsic dike complex was a long-lived magma chamber produced by intrusion, over time, of small magma batches that fed an overlying felsic stratovolcano. As the volcano expanded upward by eruptions, the magma chamber probably also migrated upward as new magma batches traveled higher into the volcano; thus the eastern side of the complex, which was originally the uppermost part of the magma chamber, represented the latest events in the complex. Mineralized metagabbro country rocks were the original roof of the magma chamber.
8. Within the Off Lake felsic dike complex, intrusion, alteration, deformation, and mineralization were ongoing and overlapping events. Mineralization occurs throughout the complex as a result of ongoing fluid and magmatic activity, but the concentration of major mineralization near the original roof of the chamber indicates that this mineralization was the result of late-stage accumulation of fluids at the top of the chamber. Mineralization was deposited in fractures and shear zones that developed a) from stress associated with emplacement of dikes and resulting expansion of the chamber, and b) localized temperature gradients that developed as new magma batches were injected into a cooling chamber.
9. The polymictic, clast-supported, mafic to felsic volcanic conglomerate and breccia unit occurs near the top of the mafic metavolcanic sequence. It represents a nearby provenance and a transition from mafic to felsic volcanism.
10. The Off Lake fault, which also appears to be a locus of mineralization, was extended about 600 m to the north and 2 km to the south.
11. The 2007 drill program, specifically holes OL07-02 and OL07-03, did not intersect the critical west contact of the composite felsic sill north of Highway 615.

RECOMMENDATIONS

1. Prospecting activity should be continued along the east side of the Off Lake felsic dike complex, and there should be a prospecting program focused on the southern part of the Off Lake fault where gold values have been obtained.
2. If initial prospecting work on claims held by Rainy River Resources and optioned from Western Warrior yield gold values, then patented lots on the east side of Highway 615, south of Off Lake should be optioned.
3. Geological mapping and prospecting should be extended eastward to include the west and east sides of Clearwater Lake, east of the Off Lake felsic dike complex. Although no mineralization has been reported here (Blackburn (1976), there is a possibility that fluids emanating from the Off Lake complex percolated upward into the overlying Clearwater Lake felsic volcaniclastic sequence and may have deposited sulphide and gold mineralization.
4. A geophysical survey should be done this winter over the northern and western part of Off Lake to test the area between the eastern contact of the Off Lake felsic dike complex and the Off Lake fault, and the area adjacent to the fault.
5. Because of the combination of lake cover, low outcrop density, poor exposure of outcrops, proximity to the power line and resulting lack of geophysical information, and discontinuous nature of the mineralization, it is impossible to provide many specific drill targets. The author also does not have assay results from most of the numerous samples that have been collected along the eastern contact of the Off Lake complex. Study of these assay results is a necessary prerequisite to planning a drill program. In general, the entire length of the eastern contact of the Off Lake felsic dike complex between Highway 615 and the southeast corner of Off Lake, a distance of 2.5 km, should be tested by drilling.
6. If drilling is done this winter, then the first target should be mineralization in the south block of the main Stares showing. The initial drill hole should extend completely through the composite felsic sill and well into metagabbro country rocks east of the sill. If significant results are obtained from the metagabbro, then a second hole should be drilled above the first hole; the collar should be in the metagabbro on the power line right of way.
7. Subsequent holes, collared on the ice of Off Lake, should then be drilled through the composite felsic sill, south of the main Stares showing. The initial spacing of these holes should be about 200 m, followed by infill drilling if significant mineralization is intersected in the first holes. Specific siting of these drill holes should be based on

assay values obtained from samples collected during prospecting along and near the east shore of Off Lake, and on geophysical results obtained during the winter of 2007-2008.

8. If good assay values are obtained from channel sampling of the north block of the main Stares showing, then a hole should be drilled through the composite sill midway between the proposed hole under the south block and OL07-03; this hole should extend well into the metagabbro country rocks east of the sill where the Will showing is located. Furthermore, if good assay values are obtained, then the well-exposed outcrops along the power line right of way should be mapped in detail to better constrain the genesis of the mineralization.
9. In addition to geological mapping near Clearwater Lake, geological mapping should be done in several other areas: a) the remaining outcrops of the Off Lake felsic dike complex east of Highway 615 and south of Off Lake, b) outcrops near Highway 71 between the Finland and Black Hawk stocks to better constrain the location of the Potts fault, and c) outcrops near Highway 600 between Highway 71 and Richardson Township to extend the Pinewood Lake felsic volcaniclastic sequence into Richardson Township.
10. In addition, outcrops in Concession I of Richardson Township on the east side of Highway 600 should be examined. When the author briefly examined these outcrops in 1997 (Ayres, 1997), very little genetic information was obtained because of lichen and moss cover, and the origin of the rock units here is still undetermined. Subsequent work elsewhere has shown that genetic information can normally be obtained from felsic volcaniclastic outcrops with a similar degree of exposure. Because genetic information is difficult to obtain from the outcrops east of Highway 600, these outcrops may be part of a subvolcanic felsic intrusive complex, possibly even part of the Off Lake felsic dike complex, rather than the Pinewood Lake felsic volcaniclastic sequence.

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APPENDIX I

LIST OF SAMPLES COLLECTED FOR ASSAY

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Table A1. Assay samples from metagabbro near the east contact of the Off Lake felsic dike complex; samples collected by the author in October, 2007.

SAMPLE NUMBER	EASTING	NORTHING	DESCRIPTION
398084	440334	5418452	Metagabbro adjacent to rusty-weathering quartz-phyric, felsic dike (sample 398083); contains 5% pyrite.
398086	440335	5418379	Metagabbro septum contains ~5% pyrite as disseminations and narrow veins.
398090	440732	5417907	Altered, sheared metagabbro contains 5% pyrite.
398091	440644	5417610	Metagabbro contains disseminated pyrite and pyrite + quartz veins.
398092	440491	5417624	Metagabbro contains 2% disseminated pyrite and pyrite + calcite veins.
398093	440504	5417904	Metagabbro contains 2 to 3% disseminated pyrite and minor chalcopyrite.
398095	440327	5417076	Metagabbro contains 1 to 2% disseminated pyrite and pyrite + calcite veins; sample consists of three pieces taken from three loose blocks on surface of outcrop; blocks occur within a 1-m-diameter area and were derived from underlying outcrop.
398097	440377	5419357	Metagabbro contains 1 to 2% pyrrhotite.
398098	440169	5419043	Metagabbro adjacent to a quartz-phyric, felsic dike; contains 2 to 4% pyrite + pyrrhotite.
398099	440176	5419040	Rusty-weathering zone in metagabbro; sample is from central part of zone, and it is a quartz vein that contains 15 to 20% pyrite.
398100	440060	5419045	Foliated metagabbro near Off Lake fault; contains 2 to 4% pyrite as disseminations and discontinuous, <1-mm-wide veinlets.
398270	444009	5419014	Metagabbro conains 5% disseminated pyrite and 3 to 5%, <5-mm-wide, dicontinuous pyrite veinlets.

Table A2. Assay samples from quartz-phyric, felsic dikes near the east contact of the Off Lake felsic dike complex; samples collected by the author in October, 2007.

SAMPLE NUMBER	EASTING	NORTHING	DESCRIPTION
398082	440286	5410927	Quartz-phyric, felsic dike contains 1% pyrite in disseminations and narrow, quartz + pyrite veins.
398083	440334	5418452	Rusty and silicified, foliated, quartz-phyric, felsic dike that contains narrow, concordant, quartz veins but only minor visible sulphide minerals. Collected adjacent to sample 398084.
398085	440348	5418376	Bleached, foliated, quartz-phyric, felsic dike; sample is from a rusty-weathering zone, but sample contains only minor visible sulphide minerals.
398096	440386	5419374	Bleached, quartz-phyric, felsic dike contains 2 to 3% disseminated pyrite and discontinuous pyrite veinlets.
398271	440009	5419014	Quartz-phyric, felsic dike contains 3 to 4% pyrite in disseminations and <1-mm-wide veinlets.
398272	440174	5419042	Green, central part of narrow brecciated zone in, but near, margin of a quartz-phyric, felsic dike; contains 10 to 15%, disseminated pyrite.

Table A3. Assay samples from other rock units in the mineralized aureole adjacent to the east contact of the Off Lake felsic dike complex; samples collected by the author in October, 2007.

SAMPLE NUMBER	EASTING	NORTHING	DESCRIPTION
398087	440882	5417393	Foliated, mafic to felsic volcanic conglomerate contains 5% pyrite as disseminations and discontinuous veinlets.
398088	440897	5417422	Discordant, rusty-weathering zone in mafic lava flow contains 5% pyrite and pyrrhotite as disseminations and discontinuous veinlets.
398089	440879	5417437	Concordant, rusty-weathering zone in mafic lava flow contains 3 to 4% pyrite and pyrrhotite.

Table A4. Assay samples from quartz- +/- plagioclase-phyric, felsic dikes of the Off Lake felsic dike complex near the southern extension of the Off Lake fault; samples collected by the author in October, 2007.

SAMPLE NUMBER	EASTING	NORTHING	DESCRIPTION
398276	437966	5413909	Sample comprises 65% quartz veins that contain trace amounts of pyrite and 35%, sheared, quartz-phyric, felsic dike that contains 1 to 2% pyrite.
398277	437994	5413859	Quartz-phyric felsic dike contains 2 to 3%, <2-mm-wide, quartz veins and 1% pyrite.
398278	437994	5413859	Slightly rusty quartz vein in quartz-phyric, felsic dike contains <1% pyrite; sample contains <10% fragments of host rock.
398279	438106	5413765	Sheared, quartz-phyric, felsic dike contains 3 to 5% pyrite.
398280	438427	5413765	Mafic metavolcanic septum in quartz-phyric felsic unit contains 3 to 5% pyrite.
398281	438192	5413146	Strongly foliated, shear zone in quartz-phyric, felsic dike contains 1 to 2% pyrite in concordant veinlets.
398282	437961	5412876	Rusty shear zone in quartz-phyric, felsic dike contains minor quartz veins and 1 to 2% pyrite.
398283	437850	5412704	Weakly foliated, quartz-phyric, felsic dike contains 5% pyrite as disseminations and discontinuous veins.
398284	437690	5413229	Quartz-phyric felsic dike contains chlorite-cemented microbreccia and 5% pyrite.

Table A5. Assay samples from elsewhere in the Off Lake felsic dike complex; samples collected by the author in October, 2007

SAMPLE NUMBER	EASTING	NORTHING	DESCRIPTION
398081	436533	5412411	Quartz-phyric, felsic dike contains disseminated pyrite and narrow quartz + pyrite veinlets

Table A6. Other assay samples collected by the author in October, 2007.

SAMPLE NUMBER	EASTING	NORTHING	DESCRIPTION
398094	440777	5417904	2+-m-wide, milky, quartz vein in mafic to felsic volcanic conglomerate in mineralized aureole east of the Off Lake felsic dike complex.
398273	440485	5420061	Mafic lava flow contains 1 to 2% disseminated pyrite and minor, discontinuous, <1-mm-wide, pyrite veinlets.
398274	439956	5420061	Slightly rusty-weathering, cherty, quartz vein in a quartz-phyric felsic dike contains minor pyrite; felsic dike is north of the Off Lake felsic dike complex.
398275	439953	5420061	Angular block of quartz-phyric, felsic dike adjacent to outcrop of same lithology; sample contains 20% pyrite. Felsic dike is north of the Off Lake felsic dike complex.

APPENDIX II

LOGS OF DIAMOND DRILL HOLES OL07-01, OL07-02, AND OL07-03

Drill Hole: OL07-02 Relogged by: L. D. Ayres Date: October 4, 5, 2007
East: 440222 North: 5418922 Azimuth: 240°(?) Inclination: -50°

Notes: 1) Azimuth of drill hole is not given on drill logs available to me. Azimuth given here is taken from a compass reading of drill collar.
2) UTM coordinates given on original drill log are identical to those given for drill hole OL07-01, but drill holes are about 100 m apart. Coordinates given above are readings made at drill site by LDA.
3) Drill test results given on original drill log are erroneous. Drill log should be revised.

0-4.4 m Casing

4.4-18.9 m **Metagabbro**

This is a texturally variable unit in which primary grain size ranges from 0.5 to 2 mm. Unit is massive to weakly foliated with foliation at 45° to core axis. Above 14.0 m. the unit is variably fractured with diversely oriented, straight, calcite and calcite + quartz veins that vary in width from hairline to 5 cm. The wider veins contain <2-cm long fragments and appear to occupy narrow breccia zones. There are also wider, but locally developed, zones of brecciation that consist of 0.5- to 5-cm-wide, rounded to angular to flattened fragments in a quartz + calcite + mafic mineral matrix. In the brecciated zones, fragment size, composition, and abundance as well as the composition of the matrix vary from place to place. In the upper part of the metagabbro unit, brecciated zones are several tens of centimetres wide, and fragments are compositionally and texturally similar. Below 12.5 m, the brecciated intervals are more variable and they are comparable to the unit between 14.9 and 18.9 m, which is entirely breccia. Fragments in this lower breccia include 1) green to dark-green, gabbroic-textured mafic fragments, 2) dark-grey to dark-brownish-grey, fine-grained, apparently intermediate fragments, and 3) apparent quartz fragments that appear to be broken pieces of early matrix. The intermediate fragments are larger than mafic fragments and they are as much as 10 cm long, as measured along the core axis. The brecciated intervals are cut by sparse quartz and calcite veins that are as much as 2 cm wide; some of these quartz veins are deformed and broken. The intermediate fragments are texturally uniform with a grain size of 0.5 mm and they contain 25 to 40% mafic minerals, including both biotite and amphibole. It is difficult to see the mafic minerals in the intermediate fragments, which are the dominant component of the breccia below 14.9 m. The intermediate fragments are probably altered metagabbro.

Mineralization

The unit contains 1 to 5%, disseminated pyrite and pyrrhotite in grains and aggregates as much as 2 mm in diameter. Pyrite and pyrrhotite also occur in calcite veins including a 1.5-cm-wide zone of massive pyrrhotite in the centre of a 2-cm-wide, calcite + quartz vein at 5.0 m. **THIS PYRRHOTITE WAS NOT SAMPLED.**

In the lower, brecciated part of the unit, the abundance of pyrite and pyrrhotite are variable as a function of fragment size. The sulphide minerals are dominantly in the matrix as disseminated grains and aggregates that are as much as 4 mm wide and as discontinuous veinlets that are as much as 2 mm wide.

18.9-19.2 m **Intermediate unit of uncertain genesis**

This is a dark-brownish-grey, fine-grained unit that is texturally uniform and is very similar to fragments in the preceding unit, but the unit contains sparse, 1- to 3-mm, rounded, recrystallized, quartz crystals. Mafic mineral abundance is about 25%. Although the unit is dominantly brownish grey, there are several, centimetre-wide, green blotches; these blotches suggest that this unit could be altered metagabbro. The unit is weakly foliated with foliation at 45° to core axis. The unit contains sparse, mostly semi-concordant, calcite ± quartz veins that are as much as 3 mm wide.

The upper contact with brecciated metagabbro is sharp and 45° to core axis; it is marked by a 1- to 2-cm-wide, quartz + calcite vein that is similar to the material forming the breccia matrix.

Mineralization
This unit contains 5 to 10% pyrite as disseminated grains and aggregates that are as much as 5 mm long and are generally aligned parallel to foliation. Pyrite is also concentrated in some quartz ± pyrite veins.

19.2-30.2 m **Quartz-phyric, felsic dike**
This is a grey unit that contains 2 to 3%, 2- to 5-mm, rounded, quartz phenocrysts and 5% biotite. In places, the phenocrysts are difficult to identify because they are recrystallized and are similar in colour to the groundmass. The unit is massive and no internal contacts were observed. There are minor, diversely oriented, straight, <1-mm-wide, calcite veins, and there are sparse quartz ± chlorite veins as much as 3 cm wide.

The upper contact is sharp and apparently chilled, and it is oriented 70° to the core axis; grain size increases away from the contact and grain size in centre of unit is 1.5 mm. There is no apparent change in grain size toward the lower contact, which is marked by a 5-mm-wide, quartz vein oriented at 70° to core axis.

Mineralization
The unit contains trace to 1%, fine-grained, disseminated pyrite.

30.2-32.1 m **Metagabbro**
This unit is brecciated and is similar to that at 14.9 to 18.9 m.

Mineralization
The unit contains trace to 5% pyrite + pyrrhotite that occurs as disseminated grains, as irregular aggregates as much as 5 mm wide, and in veins associated with calcite and quartz.

32.1-35.4 m **Quartz-phyric, felsic unit that is probably a dike**
This is a grey unit that contains 2 to 3%, 2- to 5-mm, rounded, quartz phenocrysts that, in places, are difficult to identify. Groundmass is recrystallized, but primary grain size was 1 to 1.5 mm. At both upper and lower contacts, no change in groundmass grain size was observed, although the contacts are sharp; contact orientation is 70° to core axis. The lower contact is marked by a 5- to 10-mm-wide, quartz + calcite vein. There are sparse calcite ± quartz veins as much as 2 mm wide, and rare quartz veins as much as 1 cm wide. The veins are straight and have diverse orientations.

Mineralization
The unit contains trace to rarely 1%, <1-mm- diameter, disseminated pyrite.

35.4-35.9 m **Brecciated, quartz-phyric, felsic unit, possibly part of dike**
Origin of this unit is uncertain. It contains about 20% veins composed of quartz, calcite, and pale-green, mafic minerals. Veins are as much as 5 cm wide and have a spacing of 2 to 5 cm; most veins are subparallel, but some are divergent producing the breccia-like appearance. Wider veins contain as much as 35%, pale-green, chloritic patches that are molded around quartz pods.

Mineralization
This unit contains trace to rarely 1% pyrite that occurs in both veins and host rock.

35.9-41.1 m **Quartz-phyric, felsic unit, possibly a continuation of unit at 32.1 to 35.4 m**
This interval still contains quartz and calcite veins, but vein spacing is now much greater, particularly for veins >5 mm wide. Quartz veins are as much as 10 cm wide and are oriented 45 to 70° to core axis. Vein habit varies from straight to irregular. In the upper 2 m of this interval, there are several alteration zones that are as much as 3 cm wide. These are zones of silicification

and chloritization that are spatially associated with hairline to 1-mm-wide, calcite veins that are younger than the quartz veins.

The lower contact is sharp with no apparent change in grain size toward contact. Contact orientation is 30° to core axis.

Mineralization
This unit contains only trace amounts of disseminated pyrite.

41.1-44.1 (to 44.7) m **Metagabbro**
This is a brecciated unit similar to that at 14.9 to 18.9 m. The lower contact is somewhat irregular and at a low angle to core axis; the contact is thus exposed over a core length of 60 cm, from 44.1 to 44.7 m.

Mineralization
Sulphide-mineral abundance of this unit is variable ranging from 2 to 10%. Both pyrite and pyrrhotite are present but the ratio of these two minerals is very variable. The sulphide minerals occur in both fragments and matrix as disseminated grains and aggregates that are as much as 1 cm long and as local discontinuous veins that are <1 m wide. Rare chalcopyrite was observed.

44.1 (to 44.7)-48.5 m **Quartz-phyric, felsic unit, probably a dike**
This is a grey unit that contains 3 to 4%, 2- to 5-mm, rounded, quartz phenocrysts in a 1-mm groundmass; mafic mineral abundance is 5%. Both contacts are sharp, but there is no change in groundmass grain size toward contacts. Upper contact was described previously; lower contact is 15° to core axis.

Mineralization
The unit contains trace amounts of disseminated pyrite.

48.5-56.7 m **Metagabbro**
This is a variably brecciated unit in which primary grain size is 1 to 1.5 mm, and mafic mineral abundance is 40 to 45%. The uppermost 3 m is a breccia that is very similar to that at 14.9 to 18.9 m, but the abundance of brownish-grey fragments decreases downward, and such fragments are minor below 51.5 m. From 51.5 to 56.7 m, the unit is still brecciated, but fragments are larger and are more flattened, and there is less matrix. There is a variably developed foliation in the unit, and the foliation varies in orientation from 45 to 70° to core axis over short distances.

Mineralization
The unit contains 5 to 10% pyrite + pyrrhotite with the ratio of pyrite to pyrrhotite being variable through the interval. The sulphide minerals occur as disseminations, as aggregates that are as much as 5 mm wide, in quartz veins, and in <1-mm-wide veinlets and vein networks.

56.7-60.5 m **Quartz-phyric, felsic dike**
This is a grey unit that contains 2 to 5%, 2- to 5-mm, rounded, quartz phenocrysts. Phenocryst abundance is higher in the upper part of the unit than in the lower part, but no internal contact was observed. Grain size of groundmass is generally 1 mm and the unit contains 5% biotite. Unit is massive to weakly foliated. There are sparse, diversely oriented, straight, calcite and quartz + calcite veins; most veins are <2 mm wide, but quartz + calcite veins are locally 1 cm wide.

Upper contact is sharp and 20° to core axis; there is a 5-mm-wide, finer-grained zone at contact, and this zone could be the result of chilling. The lower contact is sharp and 20° to the core axis; the felsic unit is well foliated in a 1-cm-wide zone at the contact; this contact zone is also possibly finer grained.

Mineralization

The unit contains only trace amounts of pyrite.

60.5-62.6 m **Mixed lithology comprising quartz-phyric, felsic unit and a mafic unit that is probably metagabbro**

This interval is about 50%, grey, quartz-phyric, felsic unit and 50% brecciated, mafic unit in which fragments are silicified and, in places, well foliated. The felsic component contains 1%, 2- to 5-mm, rounded, quartz phenocrysts. The original grain size of the mafic component could not be determined because primary texture is masked by recrystallization and alteration. Part, or all, of the reason for the lithologic mixing is a very low orientation, relative to core axis, of mafic-felsic contacts; in the upper part of the interval, contacts are subparallel to core axis over distances of 80 cm.

Mineralization

The brecciated mafic component contains 3 to 20%, disseminated pyrite; in places, this high sulphide-mineral abundance is also found in the margins of the felsic component, but, in other places, the high sulphide-mineral abundance stops abruptly at the contact. Away from the contacts, only trace amounts of pyrite are found in the felsic component. Pyrite is typically associated with quartz and calcite, and it forms individual grains and aggregates. There is local sphalerite in networks of interconnected, hairline veinlets; the networks are discontinuous and are up to 2 cm wide. Some pyrite also occurs in networks that contain 10 to 20% sphalerite. Sphalerite was observed in a 15-cm-long interval at the lower end of the mixed interval.

Sampling began in this unit.
62.0 to 62.5 m: 108 ppb Au; 3 g/t Ag; 0.1432% Pb; 0.5275 Zn; 0.119% Cu

62.6-64.9 m **Quartz-phyric, felsic dike**

This is a pale-grey unit that contains 1%, 2- to 5-mm, mostly flattened, quartz phenocrysts. Upper contact with brecciated mafic unit is sharp and 65° to core axis. The marginal part of the felsic unit is finer grained than elsewhere and appears to be chilled. The felsic unit is massive at the upper contact, but becomes foliated 5 cm from contact. The degree of foliation varies from weak to strong across the unit with several strongly foliated zones about 50 cm long; foliation orientation is 45° to core axis. Upper contact is a 2-cm-wide quartz vein. The unit has a variable abundance of calcite, and some strongly foliated zones contain 10 to 20% calcite as concordant lenses that are as much as 3 mm wide.

At 63.8 to 64.2 m, there is a zone of quartz injection that contains about 75%, 2- to 5-cm-wide quartz veins that are mostly subparallel and are parallel to the foliation in the intervening host rock, but rarely veins crosscut the foliation. The host rock is mostly a well-foliated, felsic unit, but there are several 2- to 3-cm-wide mafic intervals that are also well foliated and are probably deformed breccia.

Mineralization

This interval contains only trace amounts of disseminated pyrite in the felsic units, but one of the narrow mafic septum contains 10% pyrite.

64.9-65.5 m **Quartz-phyric, felsic unit**

This is a strongly foliated, grey unit that contains 1%, deformed quartz phenocrysts and 10 to 15% ferruginous calcite.

Mineralization

The only mineralization is rare disseminated pyrite.

65.5-65.8 m **Quartz-phyric, felsic dike**

This is a grey, weakly foliated unit that contains 1%, 1- to 3-mm, quartz phenocrysts. The unit contains a 1-cm-wide septum of the highly foliated, probably older felsic unit.

The upper contact is sharp, slightly undulating, and chilled; it trends 70° to core axis and truncates foliation in adjacent unit. The lower contact is sharp and 45° to core axis; it is parallel to foliation in adjacent unit.

Mineralization
This unit contains 1 to 2% disseminated pyrite grains and aggregates.

65.8-66.0 m **Felsic unit**
This is a strongly foliated, calcite-rich unit in which foliation is slightly bent. It is probably a continuation of the unit encountered at 64.9 to 65.5 m. The calcite appears to be ferruginous.

Mineralization
This unit contains trace to 1% pyrite.

66.0-66.5 m **Quartz-phyric, felsic unit**
This is a moderately foliated, calcite-poor, felsic unit that contains 1 to 2%, 1- to 3-mm, quartz phenocrysts that are difficult to identify. Contacts are sharp at 45° to core axis and are subparallel to foliation in adjacent, more foliated, felsic unit; however, contact slightly truncates foliation in adjacent unit.

Mineralization
The unit contains trace to 2%, disseminated pyrite.

66.5-67.6 m **Quartz-phyric, felsic unit**
This is a well foliated, grey to brownish-grey unit that contains 1%, 2- to 5-mm, somewhat flattened quartz phenocrysts. There is a high abundance of ferruginous calcite. Degree of foliation intensity is variable across the unit although it is generally strong. There is some contortion of the foliation including bending of a 1-cm-wide quartz vein.

Mineralization
The unit contains trace to 2% pyrite.

67.6-71.5 m **Quartz-phyric, felsic dike**
This is a grey to pale-grey unit that contain 1%, 1- to 4-mm, quartz phenocrysts that, in many places, are difficult to identify. Unit is weakly to well foliated; foliation is 60° to core axis. The pale-grey colour is fracture-controlled alteration and occurs in patches; fractures are filled by <1-mm-wide quartz + chlorite(?) veins.

The upper contact is sharp and about 15° discordant to foliation in adjacent unit. Lower contact is sharp and apparently concordant.

Mineralization
The unit generally contains 1 to 5% disseminated pyrite, but in a local zone, 5 cm wide, there is 15 to 20% pyrite as disseminated grains and interconnected aggregates, many of which are aligned along foliation.

71.5-105.0 m **Metagabbro**
This is mostly a massive unit in which primary grain size of 2 to 3 mm is well preserved. The unit contains trace to 5% bluish quartz that decreases in abundance downward. The metagabbro is non-magnetic above 79.5 m, but is magnetic below 79.5 m; magnetite is observed in the core. Pyrite abundance is spatially associated with the degree of magnetism, and is highest in the non-magnetic interval. In the massive metagabbro, there are local, 1- to 50-cm-long, foliated zones that appear to have a higher chlorite content than massive metagabbro, and they contain 1- to 2-mm-wide calcite lenses. Foliation, where present, is 45° to the core axis. There are rare, discontinuous

calcite veins as much as 5 mm wide, and sparse unmineralized quartz veins as much as 10 cm wide.

Mineralization
From 72.5 to 79.5 m, pyrite abundance ranges from 2 to 80%, abundance is variable through this interval. Pyrite abundances of >10% occur in discrete intervals, 5 to 70 cm long, and some of these are associated with 5- to 10-cm-wide, foliated zones, although some zones of high pyrite abundance are scattered through massive parts of the unit. The pyrite occurs as disseminated grains that are as much as 6 mm in diameter, as aggregates, some of which are elongated, and in discontinuous veinlets that, in foliated zones, are concordant. There is as much as 1% chalcopyrite in 2- to 3-cm-wide zones of high pyrite abundance. Pyrite also locally occurs in 1- to 3-mm-wide quartz veins.

Below 77.5 m, there is trace to 2% pyrite and rarely 5 to 10% disseminated pyrite in zones 1- to 15-cm-wide.
72.5 to 74.0 m: 8 ppb Au; 12 g/t Ag; 0.2718% Cu; 0.0793% Zn
74.0 to 75.5 m; 49 ppb Au; 12 g/t Ag; 0.3015% Cu; 0.0803% Zn
75.5 to 77.0 m; 46 ppb Au; 11 g/t Ag; 0.1365% Cu; 0.1019% Zn
77.0 to 78.5 m: 41 ppb Au; 13 g/t Ag; 0.1518% Cu; 0.1084% Zn

NOT ALL OF THE ZONES OF HIGH PYRITE ABUNDANCE IN THIS UNIT WERE SAMPLED.

105.0-107.2 m **Quartz-phyric, felsic dike**
This is a grey unit that contains 1 to 3%, 2- to 4-mm, rounded, bluish, quartz phenocrysts. The unit contains 1 to 2% mafic minerals that typically occur in rounded, 1- to 3-mm-diameter aggregates. The unit is possibly silicified.

Unit contacts are sharp and slightly undulating, but there is no obvious chilling. The upper contact is 90° and the lower contact 60° to the core axis.

Mineralization
He unit contains 1 to 2%, and locally as much as 15%, fine-grained pyrite that is disseminated and in discontinuous veinlets.

107.2-113.4 m **Metagabbro**
This is a magnetic to non-magnetic unit that is generally massive with a primary grain size of 1 to 2mm, but there are local, 1- to 10-cm-wide, foliated intervals. There are rare, discontinuous calcite veins as much as 1 cm wide.

At 108.7 and 110.0 m, there are irregular to undulating, quartz-phyric, felsic dikes that are subparallel to the core axis. These dikes occur over intervals as much as 40 cm long, but the dikes are <5 cm wide, and both occurrences could be the same dike.

Mineralization
Most of the metagabbro contains 1 to2% disseminated pyrite, but locally there is 5 to 10% pyrite in 1- to 5-cm-wide zones. The narrow felsic dikes contain trace to 2% pyrite.

113.4-114.6 m **Quartz- + plagioclase-phyric, felsic dike**
This is a massive. grey unit that contains <1%, 2- to 5-mm, blue, quartz phenocrysts, 10 to 15%, 2- to 5-mm, plagioclase phenocrysts, and 2 to 5% biotite. Within the unit there are 2 to 3, metagabbro xenoliths that are as much as 15 cm long along the core axis, but the true dimensions and shapes of the xenoliths are uncertain because boundaries are undulating. Both upper and lower contacts of the dike are sharp, undulating, and possibly chilled; contacts are oriented 45° to core axis.

Mineralization
The felsic dike contains 1 to 2% and locally as much as 5 to 10% pyrite that is disseminated in the dike and also occurs in 1- to 5-mm-wide, quartz veins. The metagabbro xenoliths contain 1 to 5% pyrite.

114.6-115.2 m **Metagabbro**
This is a massive, magnetic unit that has a primary grain size of 2 mm and contains 2 to 3% quartz.

Mineralization
The unit contains 5 to 10% pyrite that is disseminated and also occurs in diversely oriented, discontinuous veins less than 2 mm wide.

115.2-117.2 m **Quartz- + plagioclase-phyric, felsic dike**
This is a grey, massive unit that contains 1%, 2- to 5-mm, quartz phenocrysts and 2 to 4% biotite; 2- to 4-mm, plagioclase phenocrysts are locally visible, and, where observed, they form 10 to 15% of the unit. A single metagabbro xenolith, 6 cm across, was observed in the dike. Within the dike there are sparse, irregular chloritic patches and discontinuous veins that are as much as 1 cm wide.

Upper and lower contacts are sharp and undulating. The upper contact is 35°, and the lower contact is 70° to the core axis

Mineralization
The dike contains 2 to 5% pyrite that is mostly disseminated, but locally occurs in discontinuous veins less than 1 mm wide. The metagabbro xenolith contains 5% pyrite.

117.2-121.6 m **Metagabbro**
This unit has a primary grain size of about 2 mm although primary texture is poorly preserved. The metagabbro is magnetic where primary texture is well preserved, but is non-magnetic where primary texture is poorly preserved. The lower 2 m of the interval is moderately foliated at 60° to core axis, but most of the interval is massive to weakly foliated. The interval contains more numerous calcite ± quartz veins than metagabbro higher in the drill hole. These veins are as much as 2 cm wide and vary from concordant in the foliated, lowermost part of the unit to diversely oriented elsewhere; the highest calcite abundance is in the lower 2 m.

At 119.0 and 119.8 m, there are 8-cm-wide, quartz-phyric, felsic dikes. These dikes have sharp contacts with an orientation of 70 to 80° to core axis.

Mineralization
The unit contains 2 to 5%, and locally as much as 25% pyrite that occurs disseminated and in <2-mm-wide veins. Pyrite is preferentially associated with calcite in both veins and patches.

121.6-232.7 m **Quartz- ± plagioclase-phyric, felsic unit that is part of the dike complex**
This is a pale-grey to pale-brown to almost white unit in which colour is variable from place to place as a result of differing degrees and scales of alteration. The unit contains 1 to 4%, 1- to 5-mm, quartz phenocrysts that vary in shape from spherical to ovoid. Plagioclase phenocrysts were observed only in some parts of the unit, and, where present, they form 10 to 15% of the unit and are 2 to 4 mm in size. Plagioclase phenocrysts may be ubiquitous, but have been masked by alteration in much of the unit. The upper 3 m of the unit is well foliated but the remainder of the unit is massive to weakly foliated. The intensity of foliation decreases downward, and, below 170 m, foliation is very weak or absent except for sparse, 1- to 2-cm-wide, sharply bounded zones of strongly developed foliation. Where present, foliation is 60° to core axis.

The upper contact is 80° to the core axis and is marked by a 1- to 2-cm-wide, quartz vein. The lower contact is sharp and straight, and it is 30° to core axis.

There are sharp boundaries throughout the interval defined by colour differences, particularly between darker-grey intervals in which the only visible phenocrysts are quartz and paler-grey intervals in which both quartz and plagioclase phenocrysts are visible. Many of these colour boundaries are probably the result of differing degrees of alteration, because there is no change in quartz phenocryst abundance at most boundaries. However, several colour boundaries correspond with abrupt changes in abundance of quartz phenocrysts, and these represent boundaries between different intrusive phases. One of these boundaries is a 2-cm-wide dike at 165.0 m; this dike trends 45° to core axis, has sharp, slightly undulating contacts, contains 3 to 4% quartz phenocrysts as opposed to 1 to 2% in the adjacent phase, and has a finer groundmass. Other probable phase boundaries occur in intervals where colour is uniform, but boundaries can be defined by two-fold changes in abundance of quartz phenocrysts; although these boundaries were not precisely located, they occur within a core interval of 1 to 2 cm. There are also more subtle variations in abundance and size of quartz phenocrysts; phenocryst abundance ranges from 1 to 4%, and size from 1 to 3 mm to 2 to 5 mm. Although no boundaries were observed corresponding with these changes, these changes may also represent phase boundaries.

The pale-grey to locally almost white intervals within this unit are probably largely the result of alteration. Patchy alteration dominates in the upper 50 m of the unit, but the abundance of alteration decreases downward, and, by 170 m, the colour of the unit is more uniform. The paucity of colour variation is most pronounced below 186 m; the unit here still varies in colour from grey to pale grey, but the scale of colour variation is greater, and intervals of uniform colour are several metres long. Plagioclase phenocrysts, which are most readily identified in the whiter alteration patches are now only rarely recognized.

Fractures and veins, including both calcite and quartz veins, are rare in this unit. There are, however, local bleached, schistose zones as much as 1 cm wide that may represent minor faults. In some pale-grey intervals, there are <2-mm-wide, chlorite-filled fractures that may have controlled alteration.

At 222.5 m, there is a 20-cm-long, as measured along the core axis, incipiently brecciated interval. The breccia is defined by a network of 1- to 2-mm-wide, quartz + chlorite veins that outline 2- to 10-cm-wide fragments. The fragments have an outer brownish-grey margin that surrounds a rounded grey core. The margin is probably the result of alteration because quartz-phenocryst abundances are similar in both core and rim of fragments. There was no apparent, relative movement of fragments so this is a fractured, possibly incipiently brecciated zone rather than a true breccia. There is no apparent difference in sulphide-mineral abundance and habit between the brecciated interval and adjacent parts of the unit.

Mineralization

Massive to weakly foliated parts of the unit contain 3 to 10% pyrite that is relatively uniformly distributed and typically occurs as 0.5- to 2-mm, and rarely 5-mm, disseminated grains and aggregates. In the well-foliated, uppermost part of the unit, however, pyrite abundance is as high as 20% in 5- to 10-cm-wide intervals. In these intervals, pyrite is generally in elongated, concordant aggregates; these intervals have higher calcite contents than other parts of the unit. Elsewhere in the unit, where foliation is present, there are local concordant zones as much as 2 cm wide that contain 10 to 15 % and locally as much as 50% pyrite; pyrite abundance in foliated zones is at least twice as high as in adjacent massive to poorly foliated parts of the unit. Rarely pyrite is concentrated in, or immediately adjacent to, 0.5- to 5-mm-wide fractures filled by quartz + chlorite veins. These veins contain 10 to 15%, discontinuous pyrite concentrations that are as much as 1 cm wide and occur at a shallow angle to the core axis; rarely, <1-cm-wide zones of white alteration are associated with these fractures.

At 200.6 m, there is a 7-cm-wide interval, as measured along the core axis, that contains 20 to 25% disseminated pyrite in grains as much as 5 mm in diameter. This interval has relatively sharp boundaries that are oriented at 45 to 60° to core axis, and the interval has slightly better developed foliation than adjacent units, and it contains calcite lenses as much as 5 mm wide; foliation in this interval is best developed in a 5-mm-wide zone at the margin of the interval.

From 207 to 223 m, pyrite abundance decreases to 2 to 4%, and locally as much as 6%, and the abundance is somewhat more variable. From 223 m to the bottom of the unit, overall pyrite abundance increases to 5 to 10%, and distribution is still variable. In the lowermost 1 m of the unit, there are more subparallel quartz + mafic mineral + pyrite veinlets that are as much as 1 cm wide and contain 25 to 75% pyrite. At 232.6 m, there is a <2-mm-wide, lenticular, chalcopyrite + pyrite vein.

204.5 to 206.0 m: 21 ppb Au; 1 g/t Ag; 0.1287% Cu

232.7-233.4 m **Metagabbro**

This unit has a primary grain size of 2 mm, although primary textures are poorly preserved. Most of the interval is well foliated at 40° to core axis. The interval is calcite rich with calcite pods and veinlets occurring throughout the unit.

Mineralization

The unit contains 20 to 25%, 0.5- to 2-mm pyrite that varies in habit as a function of structure in the metagabbro. In well-foliated intervals, pyrite occurs in <2-mm-wide, discontinuous, concordant veins and elongated aggregates. In more massive parts of the unit, pyrite forms a crude network in which 5- to 10-mm-wide, interconnected zones of higher disseminated pyrite content surround 5- to 15-mm-wide rounded areas that contain less pyrite. Rarely chalcopyrite is associated with pyrite.

233.0 to 233.8 m: 62 ppb Au; 30 g/t Ag; 0.4033% Cu; 0.0436% Zn

233.4-234.6 m **Quartz- + plagioclase-phyric, felsic dike**

This is a grey unit that contains 2 to 3%, 2- to 5-mm, spherical to elongated and aligned, quartz phenocrysts that define a poor foliation. The upper 10 to 20 cm of the unit is well foliated. In the dike, there are rare brownish patches, several centimetres wide, that contain 10 to 15%, 2- to 4-mm, equant to tabular to lenticular, altered plagioclase phenocrysts.

The upper contact is sharp and parallel to foliation in both the felsic unit and adjacent metagabbro; foliation in the adjacent metagabbro is best developed at the contact, which may be a fault. The lower contact is sharp, chilled, and slightly undulating, and it is discordant to foliation in adjacent metagabbro.

Mineralization

The dike contains about 5%, 0.5- to 2-mm, disseminated pyrite that is relatively uniformly distributed through the unit.

234.6-242.5 m **Metagabbro**

This is a non-magnetic unit in which 1- to 2-mm, primary texture is variably preserved. The unit varies from massive to foliated; foliation is 45° to core axis.

Mineralization

Sulphide-mineral abundance is very variable in this unit. Much of the unit contains only 1 to 2%, 0.5- to 2-mm, disseminated pyrite, but there are concordant intervals as much as 30 cm wide (true width) that contain as much as 50% pyrite in disseminated, but touching grains. The interval of highest pyrite abundance is 237.7 to 238.2 m; this interval, and also the interval from 237.0 to 237.2 m, contain minor chalcopyrite. In intervals where foliation is best developed, there are semi-concordant, discontinuous, <1-mm-wide, pyrite veins and elongated aggregates; in these intervals, overall pyrite abundance is 3 to 5%.

234.6 to 236.0 m; 26 ppb Au; 5 g/t Ag; 0.1692% Cu
236.0 to 237.5 m; 26 ppb Au; 8 g/t Ag; 0.3710% Cu
237.5 to 239.0 m: 21 ppb Au; 4 g/t Ag; 0.1465% Cu
240.5 to 241.5 m: 19 ppb Au; 3 g/t Ag; 0.125% Cu
241.5 to 242.5 m: 27 ppb Au; 14.5 g/t Ag; 0.171% Cu

242.5-247.5 m **Quartz- + plagioclase-phyric, felsic dike**

This is a grey unit that contains 2 to 3%, 2- to 5-mm, rounded, bluish, quartz phenocrysts and 15 to 20%, 2- to 5-mm, altered, rounded, white areas that are probably deformed, altered, plagioclase phenocrysts. The unit is massive to weakly foliated.

The upper contact is sharp and concordant, and it may be chilled. The lower contact is sharp and undulating, and it is 20° to the core axis; the contact is discordant to foliation in the underlying metagabbro unit.

Mineralization

This unit contains about 5% disseminated pyrite.

247.5-247.8 m **Metagabbro**

Primary grain size of this unit is 1 to 2 m, but primary textures are generally poorly preserved.

Mineralization

The unit contains 5 to 10%, disseminated pyrite and rare chalcopyrite; locally pyrite also occurs in aligned, elongated aggregates.

247.8-248.6 m **Quartz- + plagioclase-phyric, felsic dike**

This unit is similar to that intersected at 242.5 to 247.5 m.

The upper contact is sharp, undulating, discordant, and apparently chilled; contact is 30° to core axis. The lower contact is sharp and straight at 45° to core axis; it is 10° discordant to foliation in adjacent metagabbro, and it also appears to be chilled.

Mineralization

The unit contains about 5% disseminated pyrite.

247.5 to 248.55 m: 26 ppb Au; 0.1177% Cu

248.6-259.3 m **Metagabbro**

Degree of preservation of primary textures is variable, but, locally, 1- to 2-mm, primary textures are well preserved by leucoxene grains. Unit is massive to locally foliated.

Mineralization

Sulphide-mineral abundance is variable from place to place. Most of the unit contains 1 to 3%, disseminated pyrite, but local, 2- to 10-cm-wide zones contain 10 to 20% pyrite that is, in places, associated with quartz and calcite veins and pods as much as 1 cm wide. In areas of higher pyrite abundances, pyrite habit is variable ranging from disseminated to veins to vein networks. Where foliation is present, pyrite veins, which are <2-m-wide, are concordant. Rare chalcopyrite and possibly rare sphalerite were observed.

259.3-263.5 m **Quartz- + plagioclase-phyric, felsic dike**

This unit varies in colour from grey to pale grey reflecting variable alteration. There are sparse, 2- to 5-mm, rounded, quartz phenocrysts and 5 to 8%, vaguely defined, 2- to 4-mm, white spots that are probably altered plagioclase phenocrysts. Unit is weakly foliated.

Both contacts are sharp and straight. The upper contact is 60° to core axis, whereas the lower contact is 45° to core axis.

Mineralization
Most of the unit contains 2 to 4% disseminated pyrite, but there are local, 3-mm- to 1-cm-wide, pyrite concentrations that contain 30 to 35% pyrite. Some of the pyrite concentrations are in distinct quartz + calcite veins, but others are in more mafic zones that may represent narrow metagabbro septa or xenoliths. Some of the more mafic zones, as exposed on cut core, are misleading because the zones have a very low angle to core axis.

251.0 to 252.5 m: 31 ppb Au; 0.1321% Cu
257.0 to 258.0 m: 12 ppb Au; 5 g/t Ag; 0.3886% Cu

263.5 – 302.0 m **Metagabbro**
Primary grain size is 1 to 2 mm, and primary textures are generally well preserved. The unit is non-magnetic and is massive to locally foliated.

From 282.8 to 287.5 m, there are numerous, slightly bluish, 5-mm- to 3-cm-wide, straight to slightly irregular, quartz veins, some of which contain pyrite. There are also sparse, white quartz ± calcite ± epidote ± chlorite veins that are as much as 10 cm wide; these veins have irregular margins.

Grey, quartz- ± plagioclase-phyric, felsic dikes occur at 283.3 to 283.6, and 291.3 to 291.5 m. Dike contacts with metagabbro are sharp and straight to slightly undulating; contact orientation is about 45° to core axis.

Mineralization
Pyrite abundance decreases downward. Above 280 m, overall pyrite abundance is 1 to 2% with the pyrite disseminated and in <1-mm-wide veins. In the interval above 280 m, that are numerous 5-mm to 10-cm-wide, diversely oriented zones that contain as much as 50% disseminated pyrite; pyrite also occurs in discontinuous, straight to somewhat irregular veins that are as much as 5 mm wide. Rare chalcopyrite occurs in zones of high pyrite abundance. Below 280 m, there are only trace amounts of disseminated pyrite, and pyrite concentrations are less abundant and narrower, and maximum pyrite content is 25%. The sparse felsic dikes in the metagabbro contain 3 to 5% disseminated pyrite.

273.9 to 275.0 m: 26 ppb Au; 4 g/t Ag; 014% Cu

302.2 m End of hole

Note: In several core boxes, core interval lengths marked on wooden blocks inserted in core boxes are no longer legible. Also, on most core boxes, drill hole and core box numbers are badly faded or illegible. Core boxes should be marked with permanent labels.

Drill Hole: OL07-01 **Relogged by: L. D. Ayres** **Date: October 3, 2007**
East: 440322 **North: 5418966** **Azimuth: 150°(?)** **Inclination: -50°**

Notes: 1) Starting azimuth was not recorded on drill logs made available to me. The azimuth of 150° is based on a compass reading made at drill collar.

2) This hole was drilled to test the Will showing discovered on surface immediately south of Highway 615. The well mineralized interval between 86.0 and 112.3 m may correspond with the Will showing.

3) As noted in the drill log, some additional sampling should be done in the drill core.

0-13.4 m Casing

13.4-26.0 m **Metagabbro**
A green to pale green to locally dark green or grey unit that has variable, but generally poor textural preservation; where preserved, original grain size is 1 to 2 mm. The unit is non-magnetic except where it contains visible pyrrhotite. Unit is massive to weakly foliated with foliation mostly in discrete zones that are several centimeters wide and are, in places, related to veins; folation is 15° to core axis. Pale green intervals have a patchy distribution and appear to be more epidote rich than darker green intervals.

Within the unit there are local brecciated zones that range in width from 1 to 75 cm wide, as measured along the core axis, but true width of the widest brecciated zones is probably <30 cm. Colour variation is particularly evident in the brecciated intervals where the colour of adjacent fragments varies from dark green to grey. The brecciated zones contain as much as 30% calcite that forms interconnected veins filling fractures as much as 3 cm wide; the wider veins pinch and swell and contain <2-cm-long, flattened fragments of metagabbro. The wider calcite veins are locally bent, probably as a result of deformation. One of the wider brecciated zones is at 18.5 to 19.1 m. Colour variation within the breccia is most pronounced in the lowermost 30 cm where the matrix includes both calcite and quartz. Degree of brecciation is greatest in the lowermost 10 cm.

In addition to calcite in the breccias, <5-mm-wide, calcite veins occur throughout the interval, but they form <1% of the unit. There are also sparse, <1-cm-wide, relatively straight and continuous quartz veins that are at an angle of 15 to 45° to the core axis. These are younger than the calcite veins that occur in the brecciated intervals.

Mineralization
The metagabbro contains 1 to 10% pyrrhotite that occurs as both disseminated single grains and aggregates that are as much as 2 mm wide, and as patches as much as 2 cm wide that contain 15 to 75% pyrrhotite that forms networks as much as 2 cm wide. Minor pyrite and sparse chalcopyrite are associated with the pyrrhotite. Locally there is 10 to 40% pyrite and minor associated pyrrhotite in zones as much as 2 cm wide; these are commonly spatially associated with <1-cm-wide, quartz veins.

MINERALIZATION IN THE METAGABBRO WAS NOT SAMPLED.

26.0-27.2 m **Quartz-phyric felsic unit, probably a dike**
This is a grey unit that contains 2 to 5%, 2- to 5-mm, rounded quartz phenocrysts that appear to vary in abundance from place to place, although this apparent variation may only reflect problems in phenocryst recognition because of variable recrystallization. The upper 30 cm of the interval is blotchy with colour varying from pale grey to medium grey, and it is more strongly foliated; foliation is 15° to core axis. Lower 10 cm of unit contains 5%, 1- to 3-mm garnet.

The upper contact is sharp and is defined by a fracture with slip surfaces and a 1-mm-wide, calcite vein at 45° to core axis; this is probably a fault contact. Lower contact is a 4-cm-wide (true width) calcite vein at 40° to the core axis; this vein has somewhat irregular boundaries and host rock at margins of vein, particularly metagabbro, is brecciated . Lower contact is probably also a fault.

Mineralization
This unit contains minor disseminated, fine-grained pyrite. There are also sparse, straight calcite veins that are 0.5 to 5 mm wide, have diverse orientations, and contain as much as 15%, 1- to 2-mm pyrite. At, or near, the upper boundary of the unit, there is a 1- to 5-mm-wide, sphalerite + pyrite vein that contains 25 to 60% sulphide minerals in an interconnected network of veinlets. **THIS SPALERITE VEIN WAS NOT SAMPLED.** However, the lower part of the unit was sampled and had only minor metal values.

27.2-34.5 m **Metagabbro**
This is a continuation of the unit from 13.4 to 26.0 m, and it is characterized by variably developed brcciation, colour variations, and calcite veining. There is locally as much as 5%, 2- to 4-mm garnet, but garnet is most obvious in a 50-cm-long interval (as measured along the core axis). Magnetite was observed rarely, and, where present, it forms 5% of the metagabbro as 1- to 2-mm grains.

Mineralization
The metagabbro contains trace to 10% pyrrhotite as 1- to 5-mm grains and aggregates; the pyrrhotite occurs disseminated and in <3-cm-wide, networks of interconnected veinlets. Pyrite is generally sparse, although there are intervals as much as 5 cm wide where there is 10 to 15% pyrite as networks of interconnected veinlets. There is sparse sphalerite that, where present, occurs both in disseminations and in discontinuous, <1-mm-wide veinlets. Two samples collected from this unit contain only minor metal values; the highest values in this unit are 259 ppb Au, 0.0853% Zn, 0.0157% Cu, and 0.0662% Pb. **HOWEVER, SOME OF THE INTERVALS OF HIGHEST SULPHIDE MINERAL ABUNDANCE WERE NOT SAMPLED.**

34.5-40.7 m **Quartz-phyric, felsic unit, probably a dike**
This is a grey unit that contains 2%, 2- to 5-mm, rounded quartz phenocrysts. Ease of phenocryst recognition is variable across the interval because of variable recrystallization, but phenocryst abundance appears to be uniform across the interval. The unit is weakly foliated at 45° to core axis.

Upper contact is offset slightly by a fault at 70° to core axis. This contact is sharp and trends 15° to core axis. Upper 20 cm of felsic unit, as measured along the core axis, is more altered as defined by blotchy colour variations, and, in a 3-cm-wide zone adjacent to contact, there is 3%, 1- to 3-mm garnet; garnet is sparse elsewhere. The lower contact is sharp and trends 40° to core axis. No obvious chilling was observed at this contact, and the contact is marked by a 0.1- to 2-cm-wide zone of concordant calcite veining; individual calcite veins here are <2 mm wide. This contact is a possible fault.

The unit contains minor, diversely oriented, calcite veins that are as much as 5 mm wide. Locally, the felsic rock is bleached aldjcent to these veins with the zone of bleaching as much as several millimeters wide. There are rare breccias zones that are as much as 10 cm wide and contain 10 to 20% calcite matrix. At 37.2 to 37.7 m, there is a white quartz vein the trends 45° to core axis. Within the vein there are minor, irregular chlorite veinlets; no sulphide minerals were observed in this vein.

Mineralization
The unit contains 1%, and locally as much as 5%, pyrite that occurs in disseminated grains and aggregates as much as 2 mm wide. Zones of higher sulphide-mineral abundance are <5 cm wide and are associated with calcite in zones of brecciation.

40.7-107.0 m **Metagabbro**

This is a continuation of the metagabbro unit first encountered at 13.4 to 26.0 m. Grain size ranges from 1 to 3 mm, and it is variable across the unit. Magnetite grains, 1 to 2 mm in diameter, were identified in zones several centimetres wide; magnetite forms 5 to 8% of these zones. The unit is massive to weakly foliated, and the degree of foliation is greatest in the lower 10 m of the unit. In places, there are seemingly finer grained intervals as much as 2 m long (along the core axis), but these intervals, which have a paler green colour and increased content of garnet, are just patches of increased epidotic alteration rather than different primary grain size. Garnet content in the metagabbro ranges from 0 to 10%, and the garnet ranges in diameter from 2 to 5 mm.

Brecciation and associated calcite veining are less abundant than in preceding metagabbro intervals, but there are local zones of brecciation that are as much as 20 cm wide; the breccia has calcite cement, and there are also discrete calcite veins as much as 2 cm wide in the breccias. The calcite veins vary from straight to irregular, and some occur in diversely oriented, intersecting fractures. At 98.0 to 98.2 m, a breccia zone contains about 50% quartz + calcite cement in veins as much as 5 cm wide.

89.5 to 89.6 m **Quartz-phyric, felsic dike**

This is a pale-grey, sharply bounded unit that has a true width of about 5 cm; contacts are 45° to core axis, and they parallel foliation in the metagabbro. The dike contains 5%, 2- to 5-mm, quartz phenocrysts that, in places, are difficult to identify because they are fractured and probably recrystallized.

Mineralization

Sulphide-mineral abundance is very variable across this interval. In most of the unit, there is less than 1% pyrrhotite + pyrite with pyrrhotite more abundant than pyrite. However, there are local, 0.5- to 10-cm wide intervals where there are as much as 25% sulphide minerals. These intervals contain almost massive sulphide-mineral veins as much as 2 cm wide. The higher sulphide-mineral abundances are associated with increased abundances of calcite, and, in places, increased abundances of quartz. The intervals of higher sulphide-mineral abundances contain pyrrhotite, less abundant pyrite, and local sphalerite and chalcopyrite. The best looking sulphide mineralization is at 87.4 m (see assays below) where there is a 2-cm-wide vein of sphalerite that contains rounded quartz inclusions as much as 5 mm in diameter. This vein is part of a 10-cm-wide zone of higher sulphide-mineral abundances. Marginal to the main vein, there are networks of sphalerite veinlets that have associated pyrite and pyrrhotite. This zone appears to be a breccia with calcite and sulphide-mineral cement. Within the metagabbro there is local chalcopyrite that occurs in disseminated aggregates and discontinuous veinlets as much as 2 mm wide. There are also sparse, 2- to 10-cm-wide, white quartz veins, some of which contain as much as 5% pyrite.

The felsic dike at 89.5 to 89.6 m contains 5 to 10% pyrrhotite + pyrite in a network of <1-mm-wide, discontinuous, interconnected veinlets. Metagabbro adjacent to felsic dike is also sulphide mineral rich in a 10 to 20 cm wide zone; this zone contains 5 to 10% pyrrhotite and minor pyrite and sphalerite.

Within the lower 10 m of the unit, there are several 10 to 50-cm-wide intervals that contain veins of sphalerite + calcite + pyrite + pyrrhotite; these veins are discontinuous, and 0.5 to 5 mm wide, and they are subparallel to foliation. The overall sulphide-mineral content of the lower 10 m is also higher than elsewhere in the metagabbro unit, and it averages 5%. The mineralization here is a mixture of pyrrhotite, pyrite, and sphalerite with the ratio of these three minerals varying from place to place. The habit of the sulphide minerals varies from disseminated to aggregates to discontinuous veins. The veins are generally concordant, and most have associated calcite.

The metagabbro was sampled below 44.5 m. Assayed intervals were not separately examined, but the better results are given below.
57.5 to 59.0 m: 64 ppb Au; 16 g/t Ag; 0.5119% Pb; 0.4548% Zn; 0.061% Cu.
59.0 to 60.5 m: 2.5 ppb Au; 15 g/t Ag; 0.530% Pb; 0. 4487% Zn; 0.0567% Cu
66.5 to 68.0 m: 63 ppb Au; 13 g/t Ag; 0.1379% Pb; 0.1608% Zn; 0.0504% Cu

75.5 to 77.0 m: 12 ppb Au; 5 g/t Au; 0.0975% Pb; 0.2267% Zn; 0.0248% Cu
77.0 to 78.5 m: 64 ppb Au; 15 g/t Ag; 0.1608% Pb; 0.3613% Zn; 0.0532% Cu
86.0 to 87.5 m: 2.218 g/t Au; 42 g/t Ag; 0.5396% Pb; 2.205% Zn; 0.2304% Cu
87.5 to 89.0 m: 135 ppb Au; 8 g/t Ag; 0.1277 % Pb; 0.5585% Zn; 0.0519% Cu
89.0 to 90.5 m: 589 ppb Au; 14 g/t Ag; 0.1374% Pb; 0.5511% Zn; 0.055% Cu
101.0 to 102.5 m: 105 ppb Au; 16 g/t Ag; 0.1641 Pb; 0.99% Zn; 0.0459% Cu
102.5 to 104.0 m: 52 ppb Au; 9 g/t Ag; 0.0911% Pb; 0.6192% Zn; 0.0321% Cu
104.0 to 105.5 m: 481 ppb Au; 44 g/t Ag; 0.4879% Pb; 1.4906% Zn; 0.0664% Cu

107.0-108.3 m **Quartz- + plagioclase-phyric, felsic dike**

This unit varies in colour from grey to brownish grey; the brownish colour dominates, and it appears to be the result of alteration. The unit contains 1 to 2%, 2- to 4-mm, rounded quartz phenocrysts that are, in places, difficult to identify. The unit also contains 5%, 2- to 5-mm, plagioclase phenocrysts; these were mostly identified in the brownish-grey, more altered parts of the unit, but they were also locally identified in the less altered grey parts of the unit. The brownish alteration is fracture controlled, and it is best developed adjacent to calcite- + chlorite-filled fractures that are generally <1 mm wide. The grey part of unit is adjacent to the upper contact, which is sharp and 60° to core axis. This contact is discordant to foliation in the adjacent metagabbro , which is 45° to core axis. The lower contact is 45° to core axis, and it is marked by a 1-cm-wide, deformed and contorted quartz vein.

Mineralization

The dike contains rare disseminated pyrite. A single, 1-cm-wide, calcite + sphalerite + pyrite + chalcopyrite vein was observed. In the felsic dike adjacent to the quartz vein that forms the lower contact, there are irregular, subparallel aggregates of pyrrhotite + chalcopyrite + pyrite that are as much as 5 mm wide. The contact quartz vein is cut by a discontinuous, calcite + pyrrhotite + pyrite + minor chalcopyrite vein that is as much as 8 mm wide. The unit has been sampled but metal values are much lower than in adjacent metagabbro.

108.3- 112.2 m **Metagabbro**

This unit varies from massive, with a preserved primary grain size of 1 mm, to strongly foliated at 45° to core axis; the foliation is locally contorted.

Mineralization

In the foliated part of the unit there are several zones, 10 to 60 cm wide, that contain 5 to 10% sphalerite and variable amounts of pyrrhotite, pyrite, and chalcopyrite. Most of the sphalerite and chalcopyrite is associated with calcite in discontinuous, pinch- and swell veins that are as much as 2 cm wide and contain as much as 80% sulphide minerals. These veins are concordant to as much as 25° discordant, and, in places, they are interconnected to form networks as much as 10 cm wide. The best sulphide minerals were observed at 110.3 to 111.0 m and 111.7 to 111.8 m; possible galena was observed in the latter zone, which is adjacent to a 3-cm-wide, white, concordant, quartz vein. There are several other concordant quartz + calcite veins and vein zones that are as much as 10 cm wide and contain minor sphalerite.

109.5 to 110.8 m: 280 ppb Au; 13 g/t Ag; 0.2225% Pb; 1.4248% Zn; 0.0388% Cu
110.8 to 112.3 m: 36 ppb Au; 18 g/t Ag; 0.46% Pb; 1.0538% Zn; 0.0634% Cu

112.2-119.0 m **Quartz-phyric, felsic unit, probably a dike**

This is a pale-grey to grey unit that contains 1 to 2%, 2- to 4-mm, quartz phenocrysts; the phenocrysts are difficult to identify because they are the same colour as the fine-grained groundmass. No internal contacts were observed although there are colour variations; paler grey alteration commonly occurs in patches 1 to 10 cm wide and in more discrete, <2-cm-wide zones, most of which are spatially associated with 0.5- to 2-mm-wide quartz veins although a few are associated with <1-mm-wide calcite veins. The upper contact is a 2- to 4-cm-wide, quartz vein that is 70° to core axis. The lower contact is a 1-cm-wide schistose zone that trends 15° to core axis; this zone contains thin concordant calcite + pyrite veinlets. The unit is massive except for a

10-cm-wide interval adjacent to a 15-cm-wide quartz vein that has an orientation of 60° to core axis.

Mineralization
The unit contains rare pyrite except along contacts. The quartz vein that forms the upper contact contains 10 to 20% pyrrhotite and chalcopyrite as concordant pods along the margins of the quartz vein and as discordant pods that are perpendicular to vein margins and cross the vein. As noted above, the lower contact zone also contains pyrite.

Only a single sample was taken from this unit (112.3 to 113.0 m). Metal values are low.

119.0-123.2 m **Metagabbro**
This is a massive to foliated unit with foliation at 20° to core axis. Primary grain size is 1 to 1.5 m, but degree of textural preservation is variable from place to place.

119.3 to 119.6 m **Aphyric(?), felsic dike**
This is a sharply bounded grey unit. No phenocrysts were observed, although they may be hidden by alteration. The unit contains about 10% mafic minerals, which is considerably higher than that in other felsic units intersected in this drill hole (trace to 5%). The upper contact is 45° to core axis, and the lower contact is 30° to core axis.

Mineralization
The metagabbro contains trace to locally as much as 5%, disseminated pyrrhotite and pyrite. At 122.7 m, there is a more schistose zone adjacent to a 2- to 4-cm-wide quartz vein; foliation and vein are both 45° to core axis. The schistose zone contains 5 to 15% sphalerite + pyrrhotite + pyrite associated with calcite. **THIS SULPHIDE-MINERAL-RICH INTERVAL WAS NOT SAMPLED.** There are other, sparse, quartz and calcite ± quartz veins as much as 3 cm wide; some of the calcite veins contain as much as 10% pyrrhotite + pyrite.

123.2-132.6 m **Quartz-phyric, felsic unit, probably a dike**
This is a grey to pale-grey to brownish-grey unit; the colour variations are a result of variable degrees of alteration. The most altered parts of the unit are brownish grey and this material occurs in intervals as much as 1 m wide; contacts between brownish-grey and grey, less altered parts of the unit are sharp. The brownish-grey material is, in places, associated with <1-mm-wide epidote(?) + chlorite(?) veinlets. The unit contains 1 to 2%, 1- to 3-mm, quartz phenocrysts that, in many places, are difficult to identify. The unit is massive to weakly foliated with sparse, well foliated zones, several centimeters wide; these well foliated zones may be faults.

The upper contact is sharp and is 45° to core axis; it is marked by a 1- to 3-cm-wide, calcite vein. The lower contact is 30° to core axis and is marked by a 5-mm-wide calcite vein.

Mineralization
The unit contains trace to 1%, and rarely as much as 5%, disseminated, 1- to 2-mm pyrite. Sparse calcite veins that are as much as 5 mm wide contain 5 to locally 25% pyrite ± chalcopyrite.
CHALCOPYRITE-BEARING INTERVALS WERE NOT SAMPLED.

132.6-203.0 m **Metagabbro**
This is a massive to weakly foliated unit that has a variable degree of textural preservation. Where primary texture is preserved, grain size ranges from 1 to 5 mm. There are variably developed, but relatively minor, diversely oriented, calcite and calcite + quartz veins. Most of these veins are <5 mm wide, but there are local veins as much as 2 cm wide. Minor bleaching is spatially associated with calcite veins, some of which occupy hairline fractures.

At 184.3 to 184.5 m, there is a white quartz vein that is oriented at 80° to core axis.

Mineralization

The unit contains trace to 10%, but mostly <1%, disseminated pyrrhotite and minor pyrite. The abundance of sulphide minerals is very variable through the unit, and there are local blebs that are as much as 2 cm wide and contain as much as 50% pyrrhotite. The abundance of sulphide minerals decreases downward and below 152 m there is generally only trace amounts of sulphide minerals; however, there are still sparse, 1- to 10-cm-wide zones that contain 5 to 10% pyrrhotite. Rarely, calcite veins contain pyrite.

At 177.8 to 179.0 m, there is a rapid increase in abundance of sulphide minerals, and, in this interval, there is about 10% disseminated pyrrhotite + pyrite + minor chalcopyrite. Below 180.2 m, sulphide-mineral abundance rapidly decreases to trace to 1%. Three samples collected from this interval contained 9 to 42 ppb Au, 0.0199 to 0.0601% Cu, and 0.0335 to 0.0527 % Zn.

203.0 m End of hole.

Drill Hole: OL07-03 Relogged by: L. D. Ayres Date: October 5, 6, 2007
East: 440222 North: 5418922 Azimuth: 060°(?) Inclination: -50°

Notes: 1) The original drill logs made available to me did not give azimuth of drill hole. The azimuth given here is from a compass reading made over the casing at drill site.
2) UTM coordinates given on the original drill logs are the same as those given for drill hole OL07-1, which is about 100 m away from this hole. Coordinates given above are readings made by LDA at the drill site.
3) Good mineralization occurs only 3 m above the bottom of the hole, and the hole should have been drilled deeper.

0-3.7 m Casing

3.7- 178.6 m **Quartz- ± plagioclase- phyric, felsic dike complex**

This is a dark-grey to pale-grey unit in which the pale-grey rock, which is apparently the result of alteration, is variable in abundance and ranges from minor to dominant. The unit contains 1 to 5%, 1- to 5-mm, quartz phenocrysts that vary from bluish to white and spheroidal to ovoid; white phenocrysts appear to be recrystallized. Ease of phenocryst recognition is variable across the unit, and, in places, phenocrysts are difficult to identify. In places, particularly in darker-grey intervals, there are 10 to 20%, 1- to 4-mm, recrystallized white spots that are generally rounded but are locally tabular; these are probably recrystallized plagioclase phenocrysts. Mafic mineral abundance, probably biotite, ranges from trace in bleached intervals to 5% in dark-grey areas.

The unit is generally massive to weakly foliated with foliation defined by elongated white aggregates that are probably recrystallized plagioclase phenocrysts. Foliation is generally 50 to 60° to the core axis, but there are local, sharply bounded intervals as much as 20 cm long that are well foliated at 30° to core axis; these latter intervals may be minor faults. A well foliated zone occurs at 17.8 m; foliation here is a result of sericite alignment.

Within the unit, local, sharp, chilled, intrusive contacts representing phase boundaries were observed. The contacts are defined by changes in groundmass texture, and in degree of alteration and fracturing; at some contacts, there are also changes in abundance of quartz phenocrysts. Sharp contacts were observed at 46.3, 51.1, and 96.4 m. Boundary orientation typically ranges from 30 to 70° to core axis. The contact at 96.4 m is marked by a 1-mm-wide, quartz vein or silicified zone. At 81.5 m, there is a narrow, quartz-phyric, felsic dike that has sharp, undulating, chilled contacts; only one contact was observed in the core, and this contact is subparallel to the core axis. The width of this dike could not be determined. At 125.4 to 125.8 m, a weakly foliated, quartz-phyric, felsic dike, oriented at 30° to core axis, was intruded into a more strongly foliated and more altered quartz-phyric, felsic unit. This relationship indicates the complexity of the intrusive events and overlapping of intrusion, alteration, and deformation.

Throughout the unit, fracture intensity and bleaching associated with fractures have a very variable distribution, and the degree of bleaching does not appear to have any spatial or genetic relationship with mineralization. In the uppermost part of the unit, for example, there are sparse, diversely oriented fractures filled by 1- to 5-mm-wide, and locally as much as 10-mm-wide, quartz veins. Below 36 m, however, where the abundance of mineralization has increased, fracture intensity increases and fractures are filled by <2-mm-wide, quartz ± calcite veins, and by <1-mm-wide chlorite ± pyrite veins. Where fracture intensity is highest, the rock unit is bleached to a paler grey colour over intervals as much as 1 m long. Some fractures also have more localized, paler, more bleached marginal zones as much as 5 mm wide.

The habit of the bleaching is variable through the unit. The habit includes 1) bleaching related to fractures, as described above; some of this type occurs in the same area as mottled bleaching; 2) 1- to 10-mm-wide, intersecting zones that form a network; this alteration is controlled by intersecting fractures, and, in these areas, bleaching forms 15 to 20% of the rock; in places, this type of alteration has been flattened producing a foliation, but, in other places, the network is not deformed and bleached zones have diverse orientations; 3) mottled with rounded mottles several centimetres wide; the mottles are not obviously related to fractures; and 4) areas as much as several metres long where bleaching forms 80 to 90% of the unit and surrounds unaltered dark-grey, residual areas. Changes in bleaching habit from type 1 to type 4 appear to be a progression in degree of alteration, although, in drill core, one never sees the full sequence of alteration because the different habits occur in discrete patches separated from a different degree of bleaching by intervals that lack bleaching. In the lower several tens of metres, the unit is generally dark grey with only localized bleaching; plagioclase phenocrysts are now much more evident forming 15 to 20% of the unit.

From 55.5 to 59.0 m, there is as much as 5%, 1- to 3-mm garnet. Elsewhere in the unit, garnet was observed only locally in intervals several metres long that contain as much as 5% garnet.

At 142.1 m, there is a 5-cm-wide interval of brecciation. This interval is sharply bounded with contacts 45° to core axis. Fragments are tabular to lenticular and possibly flattened with index of elongation of 3:1; ends of fragments vary from rounded to angular. The matrix forms 30% of the breccia, and it is a mixture of epidote, quartz, calcite, and 1 to 3% pyrite.

The lower contact is sharp and 30° to core axis.

Mineralization
From 3.7 to 33.5 m, there are only trace amounts of disseminated, fine-grained pyrite and rare pyrite aggregates that are as much as 5 by 10 mm in size. Pyrite abundance increases below 33.5 m, where sampling began. Here, there is 1 to 3% pyrite as disseminated grains and rounded aggregates that are as much as 5 mm wide and contain 30 to 40% pyrite. There are also sparse, 1- to 3-cm-wide intervals that contain 5 to 10% pyrite. Rare, <1-mm-wide, sphalerite + pyrite veinlets and <5-mm-wide, vein networks were observed; one such veinlet occurs at 51.1 m, and others between 55.5 and 59.0 m.

Below 60.8 m, pyrite abundance decreases to trace to 1%, and concentrations of <1% pyrite are rare. At 177.0 m, pyrite content again increases to about 1%, and it is fine-grained. In the lowermost part of the unit, there is 1 to 2% pyrite.

35.0 to 36.5 m: <5 ppb Au; <1 g/t Ag; 0.1047% Zn
36.5 to 38.0 m: <5 ppb Au; <1 g/t Ag; 0.1347% Zn
57.5 to 58.5 m: 219 ppb Au; 5 g/t Ag; 0.0818% Pb; 0.2708% Zn

178.6-182.4 m **Metagabbro**
This is a non-magnetic, massive unit with a preserved, primary grain size of 1 mm. The unit contains variably developed and diversely oriented, calcite-filled fractures that are as much as 3 mm wide.

Mineralization
The unit generally contains only trace to 1%, disseminated pyrite, and there are local, rounded, <3-mm-wide, pyrite + calcite aggregates.

182.4-184.1 m **Quartz-phyric, felsic dike**
This is a dark-grey, massive to locally foliated, unit that contains 1 to 2%, 2- to 5-mm, rounded, white to bluish, quartz phenocrysts. It contains sparse, diversely oriented, calcite + quartz veins; most veins are <2 mm wide, but are locally as much as 7 mm wide. Local bleaching is associated with the veins.

The upper contact is a 1- to 2-mm-wide calcite vein at 45° to core axis; this is possibly a fault. The lower contact at 40° to core axis is broken, but it is a 5-mm-wide zone of calcite enrichment, possibly a vein.

Mineralization
This unit contains 3 to 5% disseminated pyrite.

184.1-186.6 m **Metagabbro**
This is a massive, non-magnetic, fine- to medium-grained unit with a primary grain size of 1 mm. It contains diversely oriented, calcite- ± quartz-filled fractures; most of these veins are <2 mm wide, but vein width is locally as much as 7 mm.

Mineralization
The unit contains trace amounts of disseminated pyrite.

186.6-202.5 m **Quartz- ± plagioclase-phyric, felsic dike**
This is a grey, massive unit that contains 1 to 5%, 2- to 5-mm, rounded, quartz phenocrysts that vary from white and recrystallized to bluish and not recrystallized. Where phenocrysts are white, identification of phenocrysts is difficult. There appear to be variations in phenocryst abundance across the unit, but difficulties in phenocryst recognition hamper verification of such variations; no phase boundaries were identified. Rarely, there are rounded, vaguely defined, white aggregates that are generally <5 mm long, but are locally as much as 8 mm long; these are probably recrystallized plagioclase phenocrysts.

There is local bleaching in the unit that varies from narrow, straight, intersecting zones related to fractures to larger mottles and patches. Locally, bleaching forms more than 50% of the unit, in intervals several tens of centimetres long, although abundance is generally much less than this. There are sparse, diversely oriented, calcite ± epidote ± pyrite veins and pods that are as much as 1 cm wide. There are also rare, 1-cm-wide, quartz veins.

The upper contact of the unit is 30° to core axis and is defined by a 5-cm-wide, quartz + calcite + epidote + pyrite vein. The lower contact is 70° to core axis, and it is sharp, chilled, and irregular with 1- to 2-cm-high undulations. At 202.2 m, there is a 3-cm-wide, rounded, mafic xenolith; length of the xenolith could not be determined in the core.

Mineralization
Most of the unit contains trace to 1%, fine-grained, disseminated pyrite, but at 187.5 m, there is a 10- to 15-cm-long interval that contains about 10% pyrite; some of the pyrite is disseminated, but most occurs in calcite veins and patches, and as discontinuous, <1-mm-wide, subparallel veinlets. **THE INTERVAL WITH HIGHEST PYRITE CONTENT WAS NOT SAMPLED.** The mafic xenolith contains about 10% pyrite and some pyrrhotite.

202.5-208.7 m **Metagabbro**
Primary grain size increases downward from 1 to 3 mm, and there is a corresponding decrease in sulphide-mineral abundance. The grain size increase is relatively abrupt and occurs at 205.8 m; it is marked by a 1-mm-wide calcite vein, and the boundary may be a fault. The unit contains as much as 5%, 1- to 2-mm garnet, but garnet abundance is very variable. The unit is non-magnetic and contains rare quartz.

The finer part of the unit contains straight to irregular, pinch and swell, calcite veins as much as 3 cm wide. Veins are rare in the coarser part of the unit.

Mineralization
The finer part of the unit contains 5 to 15% pyrite and minor sphalerite. Sulphide-mineral abundance decreases downward through the finer-grained interval. Pyrite occurs both as disseminations and as veins. Most veins are <1 mm wide, but locally veins are as much as 3 mm wide. The veins are diversely oriented, straight to slightly irregular, and interconnected; they commonly have associated calcite. Adjacent to the overlying quartz-phyric, felsic unit, a 5-mm-

wide zone contains 15% finely disseminated pyrite. The coarser-grained, lower part of the unit contains 1 to 3% disseminated pyrite and local, <1-mm-wide, pyrite veins.

208.7-211.0 m **Quartz- + plagioclase-phyric, felsic dike**

This is a dark-grey, massive unit that contains 1 to 2%, 2- to 5-mm, rounded, bluish, quartz phenocrysts and 10 to 15%, 2- to 5-mm, equant to tabular (1.5:1), recrystallized, plagioclase phenocrysts, many of which retain primary shapes. Minor calcite veins are present.

The upper contact is sharp and undulating and the average attitude is 30° to core axis. The lower contact is sharp and straight, and it is 45° to the core axis.

Mineralization

The unit contains trace to 2% pyrite, and pyrite abundance decreases downward.

211.0-215.5 m **Metagabbro**

Primary textures are well preserved and primary grain size is 2 to 3 mm. The unit is massive to locally foliated; foliation is best developed adjacent to the contact with overlying, quartz- + plagioclase-phyric, felsic dike, and this contact could be a fault. There are sparse, diversely oriented, <1-mm-wide, calcite veins.

Mineralization

The unit contains trace to 2%, pyrite and pyrrhotite; pyrrhotite is more abundant than pyrite.

215.5-220.1 m **Quartz- + plagioclase-phyric, felsic dike**

This is a grey, massive unit that contains 1 to 2%, 2- to 5-mm, quartz phenocrysts; in places, identification of the quartz phenocrysts is difficult because of recrystallization. There are sparse. <5-mm-wide, calcite veins.

The upper contact is sharp, slightly undulating, and the contact orientation is 80° to the core axis. In the uppermost 5 cm, which is possibly a chilled margin, there is 10 to 15%, 2- to 4-mm, white, elongated aggregates that are probably recrystallized plagioclase phenocrysts. Unit contains as much as 5%, 1- to 2-mm garnet. The lower contact is 30° to the core axis, and it is marked by a 1-mm-wide, calcite vein; this might be a fault contact.

Mineralization

The unit contains only trace amounts of pyrite.

220.1-233.3 m **Metagabbro**

This is a massive to locally foliated unit; the most intense foliation is in distinct zones, several centimetres wide, that might be faults. Local garnet was observed. There are sparse, diversely oriented, straight, calcite veins that are as much as 1 cm wide. Some veins are irregular, and pinch and swell, and they occur locally in <1-cm-wide breccia zones. There are rare quartz veins as much as 5 cm wide.

From 227.9 to 228.9 m, there is a grey, quartz-phyric, felsic dike of undetermined width; the dike is subparallel to the core axis.

Mineralization

The metagabbro contains trace to 2% pyrite + pyrrhotite. The sulphide minerals occur as disseminations and in <2-mm-wide veins. Many veins have associated calcite. The felsic dike that occurs in this interval contains 1 to 5%, disseminated grains and aggregates of pyrite and pyrrhotite; aggregates are <5 mm wide. Sulphide-mineral abundance in this dike is very variable.

233.3-234.9 m **Quartz- + plagioclase-phyric, felsic dike**

This is a grey unit that contains 1 to 3%, 1- to 3-mm, quartz phenocrysts and 10 to 15%, 2- to 4-mm, poorly defined, recrystallized, plagioclase phenocrysts.

The upper contact is sharp, slightly undulating, and 60° to the core axis. The lower contact is sharp, straight, and 30° to the core axis.

Mineralization
The unit contains rare, fine-grained pyrite and pyrrhotite.

234.9-251.0 m **Metagabbro**
Primary texture is poorly preserved in much of the unit, but, where preserved, primary grain size is about 2 mm. Textural preservation is worst where sulphide mineralization is present, and these areas seem to be more mafic and altered than other parts of the unit. Unit is mostly non-magnetic, but some intervals are magnetic. There is trace to 5%, 1- to 3-mm garnet; garnet abundance is highest in more altered intervals where textural preservation is poor. There are local veins of calcite, calcite + quartz, and quartz + tourmaline; quartz veins are as much as 5 cm wide. Unit has variable alteration.

Mineralization
Sulphide-mineral abundance is variable ranging from trace amounts of pyrrhotite to 30% pyrite + sphalerite over intervals as much as 20 cm wide (true width). Mineralization consists of disseminated pyrrhotite and pyrrhotite + chalcopyrite that occur as single grains and <3-mm-wide aggregates. These vary from isolated grains to concentrated in discrete zones that are several centimetres wide and contain 10 to 15% sulphide minerals. Pyrrhotite + pyrite also occur in discontinuous, <3-mm-wide veins associated with calcite.

Sphalerite was first observed at 241.7 to 242.4 m where it is associated with pyrite in several calcite + mafic mineral veins that are as much as 3 cm wide. The veins pinch and swell, and they have spiky protuberances that extend several centimetres into host rock. Sphalerite forms as much as 30% of the veins as interconnected networks of fine veinlets. The veins are 10 to 20° to the core axis and the true width of the vein zone is 15 to 20 cm. Minor chalcopyrite is associated with the sphalerite and rarely occurs elsewhere.

Other sphalerite-containing intervals occur at 244.8 to 245.4 and 247.5 to 248.0 m. In these two intervals the host rock is paler green and more strongly foliated than elsewhere; the foliation is locally bent. The veins contain minor calcite, but calcite is not ubiquitous. Sphalerite here has the same habit as in the previously described vein zone, and it is associated with pyrite.

Between the sphalerite-bearing intervals, the metagabbro is darker green and there is better textural preservation. In these sphalerite-free intervals, there is generally trace to 3% pyrrhotite, minor pyrite, and rare chalcopyrite.

Most pyrrhotite and pyrite in this unit occur outside of the intervals that contain sphalerite. In places, there is as much as 20% pyrrhotite in intervals as much as 5 cm wide. The pyrrhotite in these intervals occurs as networks of veinlets, but the veinlets are as much as 1.5 mm wide, much wider than those in sphalerite networks. In some pyrrhotite concentrations there is as much as 1% chalcopyrite; for example at 246.2 m. Pyrite is less abundant than pyrrhotite and occurs in aggregates with pyrrhotite and as networks as much as 1 cm wide associated with pyrrhotite. However, much of the pyrrhotite lacks associated pyrite. There are local, <2-mm-wide, pyrrhotite + pyrite veins.

The host rock is less altered in intervals that contain abundant pyrrhotite than in intervals that contain abundant sphalerite, but it is more altered than intervals that have low abundances of pyrrhotite.

241.0 to 242.0 m: 86 ppb Au; 4 g/t Ag; 0.7024% Zn
244.0 to 245.0 m: 123 ppb Au; 14 g/t Ag; 0.1054% Zn
245.0 to 246.0 m: 375 ppb Au; 13 g/t Ag; 0.3409% Pb; 1.35% Zn
247.0 to 248.0 m: 111 ppb Au: 26 g/t Ag; >0.5% Pb

251.0 m End of hole.

APPENDIX III - PROPERTY DISCRIPTION AND CLAIM MAP

January, 2007

PROPERTY DESCRIPTION

LOCATION AND ACCESS

The Off Lake properties occur as two separate blocks located about fifty kilometres northwest of Fort Frances, Ontario, within the Kenora Mining Division (Figure 1). The properties lie within the Ministry of Natural Resources Administrative District of Fort Frances, and are situated within N.T.S. Map Area 52 C/13. The geographic centre of the Off lake claim block is located at approximately 438300mE and 5419600mN. The 3 claim Pinewood block is located 4 south of the Off Lake block centered about 436350mE and 5409200mN. The figure below shows the boundaries of the property in relation to township boundary lines and significant bodies of water.

Access to both properties is obtained via the Off Lake Road, provincial Highway 615, which departs from Highway71 about 18.5 km north of provincial Highway 11. The Off Lake Road crosses nearly the entire property in a north-south direction, and all portions of the property are readily accessible from it or boat access from Off Lake .

Access onto the Pinewood Lake claim block is obtained via a gravel access road to a gravel pit going west from Off lake Road 1.6 kilometres north of the Potts/Mather township boundary. A disused forestry haul road leads south from the pit into the middle of the Pinewood Lake block.

PROPRTY DESCRIPTION

The Off Lake property is composed of two claim blocks totaling 670 unit covering 10 704 hectares over portions of Flemimg, Menary, Potts and Senn townships. The Off Lake block consists of 50 claims surrounding three additional claims optioned from Clinton Barr of Stares Contract of Thunder Bay.

The Pinewood Lake block consists of 3 claims covering 384 hectares straddling the Potts-Mather township boundary. The claims are 100% owned by Rainy River Resources.

(Off Lake Block as of March 21, 2007)

Township/ Area	Claim Number	Recording Date	Claim Due Date	Status	Percent Option	Work Required	Total Applied	Total Reserve	Claim Bank
FLEMING	4208907	2005-Aug-17	2008-Aug-17	A	100%	$6,400	$6,400	$0	$0
FLEMING	4208908	2005-Aug-17	2008-Aug-17	A	100%	$3,200	$3,200	$0	$0
FLEMING	4211671	2006-Jun-26	2008-Jun-26	A	100%	$400	$0	$0	$0
MATHER	4215472	2006-Oct-27	2008-Oct-27	A	100%	$3,200	$0	$0	$0
MENARY	4208866	2005-Oct-26	2007-Oct-26	A	100%	$6,400	$0	$3,777	$0
MENARY	4208867	2005-Oct-26	2007-Oct-26	A	100%	$4,800	$0	$2,583	$0
MENARY	4208868	2005-Oct-26	2007-Oct-26	A	100%	$6,400	$0	$3,711	$0
MENARY	4208869	2005-Oct-26	2007-Oct-26	A	100%	$6,400	$0	$2,777	$0
MENARY	4208870	2005-Oct-26	2007-Oct-26	A	100%	$6,400	$0	$2,777	$0
MENARY	4208871	2005-Oct-26	2007-Oct-26	A	100%	$6,000	$0	$2,479	$0
MENARY	4208872	2005-Oct-26	2007-Oct-26	A	100%	$6,400	$0	$2,777	$0
MENARY	4208873	2005-Oct-26	2007-Oct-26	A	100%	$6,400	$0	$2,777	$0
MENARY	4208874	2005-Oct-26	2007-Oct-26	A	100%	$6,400	$0	$2,777	$0
MENARY	4208875	2005-Oct-26	2007-Oct-26	A	100%	$6,400	$0	$2,777	$0
MENARY	4208876	2005-Oct-26	2007-Oct-26	A	100%	$5,600	$0	$2,180	$0
MENARY	4208910	2005-Aug-17	2008-Aug-17	A	100%	$6,400	$6,400	$0	$0
MENARY	4208911	2005-Aug-17	2008-Aug-17	A	100%	$6,400	$6,400	$0	$0
MENARY	4208912	2005-Aug-17	2008-Aug-17	A	100%	$4,800	$4,800	$0	$0

MENARY	4208914	2005-Aug-17	2008-Aug-17	A	100%	$4,800	$4,800	$0	$0
POTTS	1161279	1992-Apr-10	2008-Apr-10	A	100 % Y	$1,600	$22,400	$0	$0
POTTS	1161280	1992-Apr-10	2008-Apr-10	A	100 % Y	$6,400	$89,600	$0	$0
POTTS	1161304	1992-Apr-10	2008-Apr-10	A	100 % Y	$800	$11,200	$0	$0
POTTS	1161328	1992-Apr-10	2008-Apr-10	A	100 % Y	$3,200	$44,800	$0	$0
POTTS	4207826	2006-Feb-20	2008-Feb-20	A	100%	$1,600	$0	$1,194	$0
POTTS	4207827	2006-Feb-20	2008-Feb-20	A	100%	$1,600	$0	$1,193	$0
POTTS	4208900	2005-Aug-17	2008-Aug-17	A	100%	$3,200	$3,200	$0	$0
POTTS	4208901	2005-Aug-17	2008-Aug-17	A	100%	$1,600	$1,600	$0	$0
POTTS	4208902	2005-Aug-17	2008-Aug-17	A	100%	$3,200	$3,200	$0	$0
POTTS	4208903	2005-Aug-17	2008-Aug-17	A	100%	$2,400	$2,400	$0	$0
POTTS	4208904	2005-Aug-17	2008-Aug-17	A	100%	$3,600	$3,600	$0	$0
POTTS	4208905	2005-Aug-17	2008-Aug-17	A	100%	$3,600	$3,600	$0	$0
POTTS	4208906	2005-Aug-17	2008-Aug-17	A	100%	$2,400	$2,400	$0	$0
POTTS	4211670	2006-Jun-26	2008-Jun-26	A	100%	$1,600	$0	$0	$0
POTTS	4211672	2006-Jun-26	2008-Jun-26	A	100%	$2,000	$0	$0	$0
POTTS	4215470	2006-Oct-27	2008-Oct-27	A	100%	$1,600	$0	$0	$0
POTTS	4215471	2006-Oct-27	2008-Oct-27	A	100%	$4,800	$0	$0	$0
SENN	3012521	2006-Feb-13	2008-Feb-13	A	100%	$6,400	$0	$0	$0
SENN	3012522	2006-Feb-13	2008-Feb-13	A	100%	$6,400	$0	$0	$0
SENN	3012523	2006-Feb-13	2008-Feb-13	A	100%	$6,400	$0	$0	$0
SENN	3012524	2006-Feb-13	2008-Feb-13	A	100%	$6,400	$0	$0	$0
SENN	3012525	2006-Feb-13	2008-Feb-13	A	100%	$6,400	$0	$0	$0
SENN	3012526	2006-Feb-13	2008-Feb-13	A	100%	$6,400	$0	$0	$0
SENN	3012527	2006-Feb-13	2008-Feb-13	A	100%	$6,400	$0	$0	$0
SENN	3012528	2006-Feb-13	2008-Feb-13	A	100%	$6,400	$0	$0	$0
SENN	3012529	2006-Feb-13	2008-Feb-13	A	100%	$6,400	$0	$0	$0
SENN	3012530	2006-Feb-13	2008-Feb-13	A	100%	$6,400	$0	$0	$0
SENN	3016066	2006-Feb-13	2008-Feb-13	A	100%	$6,400	$0	$0	$0
SENN	3016067	2006-Feb-13	2008-Feb-13	A	100%	$6,400	$0	$0	$0
SENN	3016068	2006-Feb-13	2008-Feb-13	A	100%	$6,400	$0	$0	$0
SENN	3016069	2006-Feb-13	2008-Feb-13	A	100%	$6,400	$0	$0	$0
SENN	3016070	2006-Feb-13	2008-Feb-13	A	100%	$6,400	$0	$0	$0
SENN	4208909	2005-Aug-17	2008-Aug-17	A	100%	$6,400	$6,400	$0	$0
SENN	4208915	2005-Aug-17	2008-Aug-17	A	100%	$4,800	$4,800	$0	$0
FLEMING*	3019809	2004-May-17	2007-May-17	A	100%	$4,800	$4,800	$0	$0
SENN*	3008455	2004-Jun-21	2007-Jun-21	A	100%	$5,600	$5,600	$0	$0
SENN*	3008456	2004-Jun-21	2007-Jun-21	A	100%	$1,600	$1,600	$0	$0

* Starse Option

(Pinewood Lake Block as of March 21, 2007)

Township/ Area	Claim Number	Recording Date	Claim Due Date	Status	Percent Option	Work Required	Total Applie d	Total Reserv e	Clai m Bank
POTTS	4215470	2006-Oct-27	2008-Oct-27	A	100%	$1,600	$0	$0	$0
POTTS	4215471	2006-Oct-27	2008-Oct-27	A	100%	$4,800	$0	$0	$0
MATHER	4215472	2006-Oct-27	2008-Oct-27	A	100%	$3,200	$0	$0	$0

PHYSIOGRAPHY

The Rainy River region is located within the Severn Upland of the Canadian Shield. Generally the Precambrian surface and the overlying Paleozoic and Mesozoic strata to the west, dip at a very low angle to the southwest into the Williston Basin. Physiographically the Rainy River claim groups are situated in typical Precambrian highland and are only sparsely covered by glacial drift. The Pinewood Lake claim block is 5 km to the south of Off Lake in the vicinity of the northwest-southeast trending Rainy Lake -Lake of the Woods Moraine and has subsequently less outcrop. Overall this area has been subjected to only one of the most recent glacial advances (the Whiteshell - from the northeast) because of the elevated topography which prevented the advance of other glacial lobes from the west. Glacial drift attains significant thickness only in very local areas. It displays few signs of intense weathering. Relief is controlled by bedrock geology with the supracrustal sequences displaying positive relief relative to the batholithic complexes; relief can attain 90 meter. The area has been subdivided by Bajc (1991b) into two regions. Region 2a contains 10-40% outcrop by area, and may attain significant relief which is related to bedrock topography; areas separating outcrops are sites of extensive drift accumulation. In region 2b southwest of the Rainy Lake -Lake of the Woods Moraine outcrop density is less than 5% of the surface area, topography is low and undulating, drainage is poor, and peatland is common.

EXPLORATION HISTORY

Although exploration activity in the area by individual prospectors dates back to the 1930's, the documented exploration in the Ministry of Natural Resources assessment files commences in 1967. Additional exploration programs are known to have taken place on private land, however a record of assessment has not been filed for this work.

Off Lake Block

In 1967 copper was recorded from a water well hole on the western shore of Off Lake. Consequently Noranda Exploration Company registered claims around the original discovery and performed mapping, geophysics, and diamond drilling. This activity met with limited success and the claims were allowed to lapse. In 1971 International Nickel Company of Canada Limited conducted airborne and follow-up ground geophysics in the region as a whole.

In the mid 1980's exploration programs were mounted in Menary Township and the Off Lake area by several companies. Agassiz Resources examined the potential for both base metal and gold in both area's with a program of mapping, stripping, sampling, and geophysics over two field seasons. In the process they discovered numerous showings of both gold and copper-zinc and discovered what came to be termed the Agassiz Showing in Menary Township. In 1984 Lacana Mining Corporation undertook a single field season of mapping and sampling over an extensive area adjacent to Off Lake and Burditt Lake. No significant areas of mineralization were reported.

Spartan Resources conducted an I.P. survey over a grid adjacent to the eastern shore of Off Lake in 1988. Anomalous responses were obtained from the survey but no further assessment is recorded, although unreported trenching, stripping and sampling was conducted at the site of the survey.

In 1989 Western Troy Capital Resources began a mapping and sampling program on claims staked in Menary Township which partly encompass the lapsed properties of Agassiz and HBED. Both gold and base metal occurrences were discovered during these programs. Following initial exploration for base metals Western Troy discovered "several" native gold bearing, quartz veins late in 1991. The veins are at present interpreted to be the folded and boudinaged fragments of a single original vein. When sampled, this zone returned an average of 1.4 oz/ton gold.

Subsequently, additional showings were discovered later in 1991 and during the 1992 season. Interestingly most of these veins are situated in the lowermost unit of the mafic stratigraphic succession of the area in close proximity to the contact of the Sabaskong Batholith. A 250 ton bulk sample of the veins discovered in 1991 was taken during the 1992 program. Sampling was later expanded to a reported 500 tons and was completed in September of 1993. An additional more ambitious extraction was conducted throughout the 1994 field season (to December, 1994).

Nuinsco Resources began to assemble a land position in the region in 1991, initially centered on the Richardson Township -Menary Township area. Nuinsco completed two drill holes in 1994 on base metal showings along the Ontario Hydro power on either side of highway 615.

Rainy River Resources re-established the Off Lake property and completed a VTEM survey over the central portion of the block in February 2006. A geological mapping project was carried out during the summer of 2006 by Lorne Ayers for Rainy River Resources.

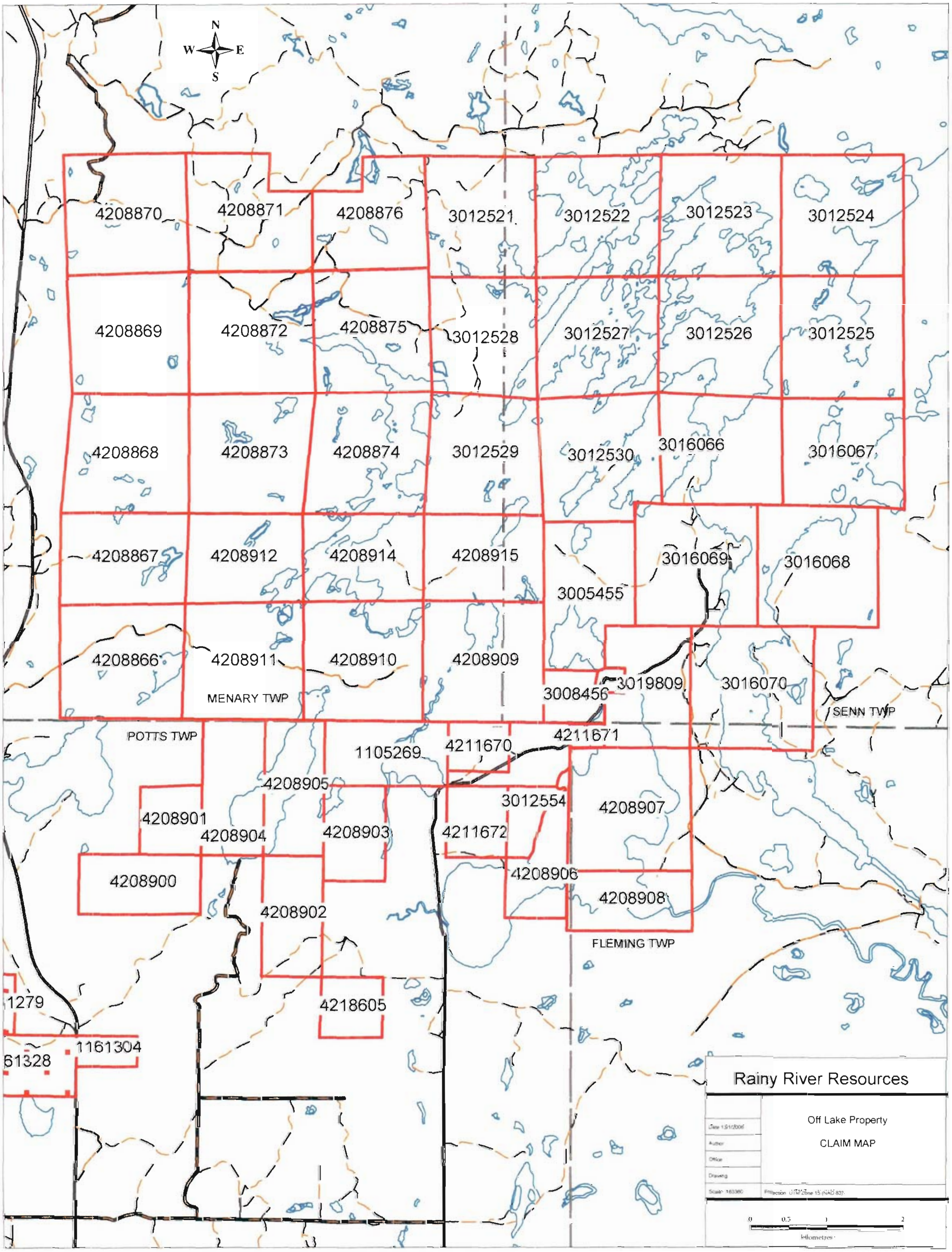
Pinewood Lake Block

Noranda staked the central portion of the Pinewood Lake property in 1968 and completed a grid with a baseline at 45°N. The subsequent magnetic and ground electromagnetic surveys failed to identify any drill targets. Inco completed restaked the property and completed magnetic and electromagnetic surveys in 1972 to ground proof airborne conductors. Inco completed two drill holes in 1972 and returned in 1973 to complete a third follow-up hole.

Walter Cummings staked the area of the Inco conductors in 1988 undertaking prospecting, biogeochemical sampling [plus magnetic and self potential surveys. During 1989 a grid was cut and magnetic and electromagnetic survey completed over the majority of the property.

Noranda restaked the Pinewood property in 1993 and established four separate grids. A total of 23.5 km of magnetic and 13.2 km of Max-Min surveys were completed. The Noranda claims were allowed to lapse and were subsequently restaked by Glenn Allen who drill four BW thin wall diamond drill holes totaling 310 m.

The Pinewood Lake block was staked and a grid established in 2006. A Max-Min survey was completed in January of 2007 to locate the airborne conductors.



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Rainy River Resources
Off Lake Property
CLAIM MAP
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