Revision Bedrock Geological Mapping, Deschambault-Oskikebuk Lakes Area (Parts of NTS 73I-16, 63L-11, -12, -13 and -14)[1]

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Revision mapping at a scale of 1:20 000 was completed this summer for a 390 km^2 southeast-trending strip between Jira Lake and Fisher Bay on Deschambault Lake (Figure 1). This work completes the selective remapping of supracrustal rocks in the Brownell, Wapawekka and Deschambault Lakes area in the southern part of the Glennie Domain (Delaney, 1988, 1989). Companion investigations have included geochronological studies (Delaney *et al.*, 1988, 1990) and a review of gold mineralization in the domain (Delaney, 1990a, b, 1991, in press). Objectives of the 1991 mapping were:

1) To better understand the character of the Oskikebuk Lake Group (Padgham, 1968), a supracrustal assemblage along the southern margin of the Oskikebuk Complex. Petrological, geochemical and geochronological investigations will be used to compare this succession with volcanic assemblages in the Brownell-Wapawekka Lakes area as well as elsewhere in the Glennie Domain and Trans-Hudson Orogen.

2) To document the character and extent of major high strain zones in the supracrustal rocks along the southern margin of the Oskikebuk Lake Complex. Mapping in 1988 and 1989 (Delaney, 1988, 1989) identified high strain zones in greenstones in the Brownell-Wapawekka Lakes area, including the economically significant major Hartley Shear Zone along the northern margin of the Oskikebuk Complex. This work also identified a splay of the Hartley Shear Zone along the southern side of the Oskikebuk Complex at the western, structurally tapered end of the complex. Brief reconnaissance examinations by Macdonald (1975) and Lewry (Lewry and Macdonald, 1988) at Oskikebuk Lake also identified highly strained rocks along the lake.

3) To investigate the economic potential of the area.

This work will lead to an enhanced understanding of the geological history of the southern Glennie Domain as well as aid in developing a model of the geodynamic setting of ore deposits which have formed there.

This report presents, in a preliminary form, the first specific descriptions of the geology of the area. Previously Padgham (1968) grouped together rock descriptions for supracrustal and granitoid rocks from throughout the Deschambault Lake District. The supracrustal rocks as well as some of the granitoids have been metamorphosed to amphibolite facies. For the purposes of simplicity, however, the prefix meta has been omitted in the following descriptions.

1. Previous Work

The first geological investigations were by McInnes (1913). DeLury (1926) completed a 1:126,720 scale geological map of the Wapawekka-Deschambault Lakes area. In 1963, Padgham (1966) mapped the northern half of the Wapawekka Narrows (73I-16) map-area. Between 1963 and 1966 Padgham (1968) mapped the Deschambault Lake District, which included map sheets 63L-13, 63L-14 (W), and parts of 63L-11 and -12, at a scale of 1:63,360. Padgham's 1968 report contains a 1:31,680 map of the Maynard Lake area that includes the northern part of Oskikebuk Lake. The surficial geology of the area south and west of Wapawekka Lake was mapped by Langford (1973).

The westernmost part of the map area is included in the 1:250 000 compilation map of the bedrock geology of the Lac La Ronge area (Map 225A; Lewry and Slimmon, 1985). The eastern part is contained in a preliminary 1:250 000 compilation map for the Amisk Lake and Pelican Narrows areas (Macdonald, 1981).

An extensive reconnaissance lake sediment geochemical survey by the Geological Survey of Canada in 1974 (Hornbrook *et al.*, 1975, 1977, 1985) covered the present area.

Aeromagnetic coverage is provided by Geological Survey of Canada 1:63,360 scale aeromagnetic maps 4592G (73I-16), 4604G (63L-11), 4603G (63L-12), 4593G (63L-13) and 4594G (63L-14) and 1:250 000 scale aeromagnetic maps 7755G (73I) and 7754G (63L).

2. Regional Geology

The map area lies in the southernmost exposed part of the Glennie Domain, Trans-Hudson Orogen (Macdonald, 1987; Lewry and Collerson, 1990). The domain is a collage of narrow arcuate belts of supracrustal

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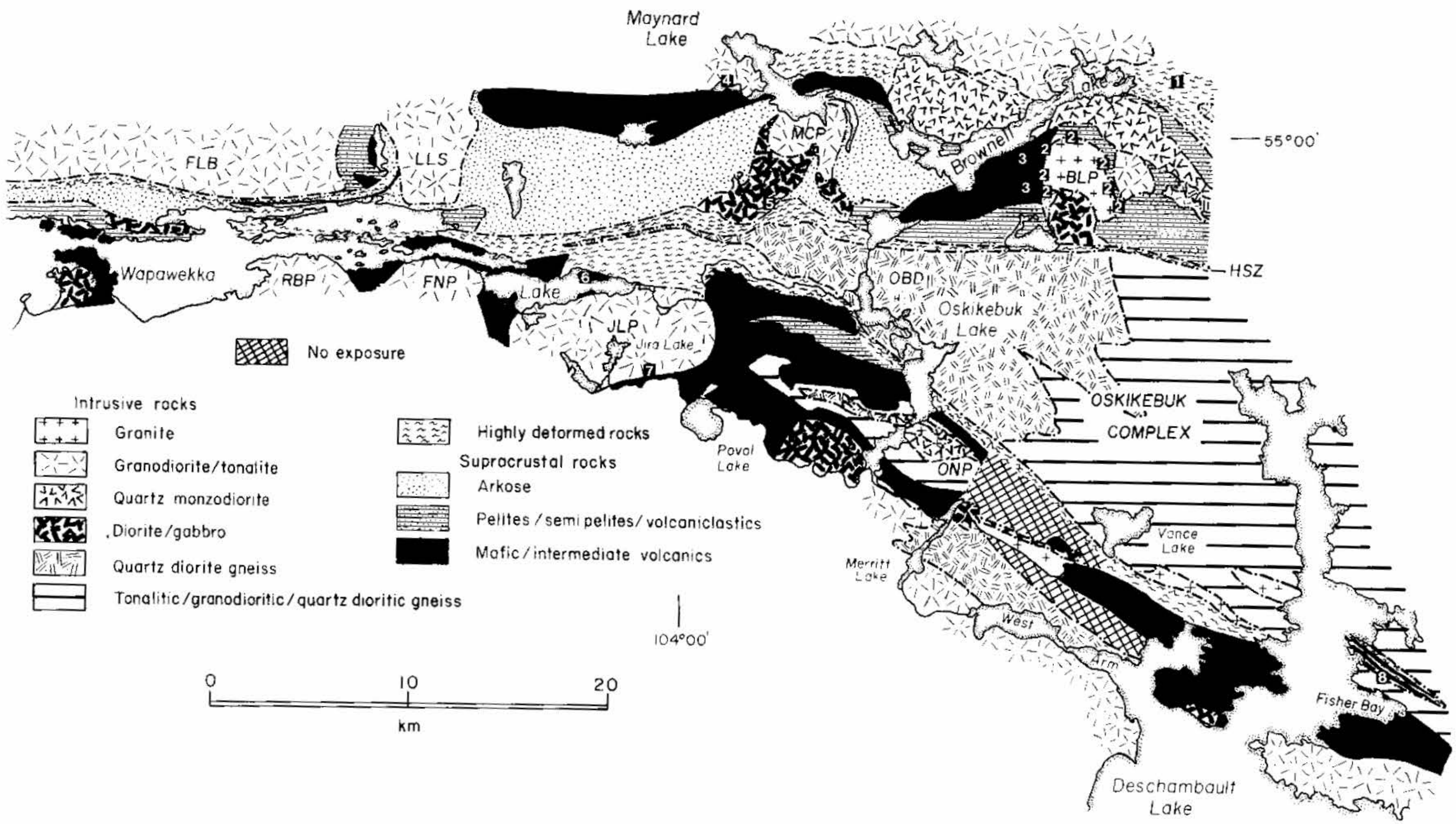

Figure 1 - Geological sketch map of the Brownell, Wapawekka, Oskikebuk and Deschambault Lakes area. BLP, Brownell Lake Pluton; FLB, Folkerson Lake Batholith; FNP, Fisher Narrows Pluton; HSZ, Hartley Shear Zone; JLP, Jira Lake Pluton; LLS, Lacey Lake Stock; MCP, Maynard Creek Pluton; ONP, Oskikebuk Narrows Pluton, OBD, Oskikebuk Quartz Diorite Gneiss; RBP, Radar Bay Pluton. 1, Brownell Lake Property; 2, gold showings associated with the Brownell Lake Pluton; 3, gold showings in shear zones in Brownell Lake volcanics; 4 Alex showing; 5, M-10 Showing; 6, Wapa 13 showing; 7, Jira Lake showing, 8, Des 111 showing.

rocks in granitoids. Lewry (1981) suggested that the Glennie Domain was a remnant Archean microcontinent that collided with the La Ronge volcanic arc. Subsequent mapping and U-Pb dating (Chiarenzelli *et al.*, 1987; Chiarenzelli, 1989) has identified Archean age rocks in the Iskwatikan and Hunter Bay domes near the western margin of the Glennie Domain. As further detailed studies have been completed, the northern part of the domain has been interpreted as a stack of southeastward directed, refolded allochthonous thrust sheets formed during terminal collision in the Trans-Hudson Orogen (Lewry *et al.*, 1990). In order to further refine this model, a detailed geological transect of the southern Glennie Domain was commenced in 1988 (Delaney, 1988, 1989; Slimmon, 1988, 1989; Thomas, 1988). Lewry and Macdonald (1988, p. 40) in a synthesis of the early transect studies noted that "the southern part of the Glennie Domain appears to comprise a broadly homoclinal north-dipping stack of either predominantly supracrustal or plutonic sheets, typified by inhomogeneous strain and soled in some cases at least, by ductile high-strain zones. Upright cross-folding on predominantly northeast-trending axes modifies this pattern only superficially on the regional scale".

3. General Geology

A generally poorly-exposed assemblage of supracrustal rocks, the Oskikebuk Lake Group (Padgham, 1968), occurs in a southeast-trending belt from the east side of the Jira Lake Pluton to Fisher Bay on the west side of Oskikebuk Lake (Figure 1). The Oskikebuk Lake Group consists of variably altered, deformed and metamorphosed mafic to intermediate volcanics, subvolcanic intrusions, volcaniclastics and related immature sediments. Three major intermediate to basic intrusions occur in or adjacent to the supracrustal belt: 1) a serpentinized peridotite containing high nickel and chromium on the northeast side of the West Arm of Deschambault Lake, 2) a highly magnetic, xenolithic diorite between Merritt and Vance Lakes and 3) diorite on the southwest side of Oskikebuk Lake.

Supracrustals of the Oskikebuk Lake Group are bounded on the north by the Oskikebuk Complex - a mixture of granodioritic, tonalitic and quartz dioritic phases which are intruded by migmatitic granites. The Oskikebuk Hornblende Quartz Diorite Gneiss forms the tapered northwest end of the complex. A high strain zone of variable width and intensity, which has experienced multiphased deformations, is developed in supracrustal rocks along the southern side of the Oskikebuk Complex; high strain zones also occur within the complex in zones of lithologic heterogeneity. Along much of the south side the supracrustal belt is bounded by leucocratic tonalite of the Ballantyne Bay Pluton. North of the West Arm of Deschambault Lake, however, there is an older hornblende quartz diorite between the Ballantyne Bay Pluton and the supracrustals. Tonalitic and quartz dioritic gneisses form a major northwest-trending body in the west part of the Oskikebuk Lake Group. At Oskikebuk Lake, within this gneiss, is a small, late-stage zoned intrusion, the Oskikebuk Narrows Pluton.

There is evidence of at least two major episodes of deformation.

Several electromagnetic conductors in the Oskikebuk Lake Group have been drill tested for massive sulphide mineralization. Although none of the drill holes intersected economically significant sulphides, core from one hole contained minor gold mineralization. Gold was recently discovered in quartz veins in shear zones along the southern margin of the Jira Lake Pluton.

4. Description of Lithologic Units

a) Oskikebuk Lake Group

The best exposures of the Oskikebuk Lake Group, and even these are limited, are in two areas: on the west side of Oskikebuk Lake and on the peninsula on the north side of the entrance to the West Arm of Deschambault Lake. Elsewhere exposure typically comprises a few scattered outcrops; in some areas such as on the south side of Vance Lake no outcrop was found. Because outcrop is so variable the following summary description of the Oskikebuk Lake Group is subdivided according to geographic locality.

West of Oskikebuk Lake

West of Oskikebuk Lake, on the north side of the tonalitic gneiss body in the Oskikebuk Lake Group (Figure 1), the group can be broadly subdivided into four main units that trend northwesterly. From north to south these are:

i) **Mafic to intermediate volcanic flows:** This subdivision consists of strongly foliated dark green amphibolite and weakly foliated to massive, medium-grained melanocratic to less commonly mesocratic hornblende granulite. Some of the amphibolitic units contain medium-grained phenocrysts or porphyroblasts of plagioclase. Porphyroblasts of hornblende are less common and amygdales are present only rarely. Small lenticular bodies of hornblendite occur in this sequence.

ii) **Wacke, volcaniclastic and minor intermediate flow rocks:** This unit encompasses a variety of rocks types that include the following: fine to medium-grained, leucocratic to mesocratic, strongly foliated, hornblende-plagioclase gneiss containing clots of fine- to medium-grained hornblende and biotite that compose 15 to 20 percent of the rock; fine-grained, strongly foliated, compositionally layered hornblende-plagioclase schist and gneiss which is locally calcareous; calcareous mesocratic hornblende-plagioclase schist; plagioclase porphyritic mesocratic hornblende-plagioclase schist and in less deformed sequences plagioclase phyric intermediate volcanic; wacke characterized by fine to medium-grained prismatic amphibole, composing 15 to 20 percent of the rock in a fine-grained matrix of quartz and plagioclase; leucocratic hornblende-quartz-plagioclase schist containing abundant pebble-size felsite clasts.

iii) **Mixed metasediments**: This unit comprises a variably altered sequence of quartzofeldspathic sediments and minor intermediate to felsic volcanics and volcaniclastics that include: biotitic quartzofeldspathic schist and gneiss; strong to very strongly foliated quartzofeldspathic schist and gneiss; conglomeratic schists characterized by variable amounts of pebble-sized, fine-grained quartzofeldspathic clasts; amphibole-biotite-quartzofeldspathic schists composed of 5 to 7 percent biotite with minor disseminated amphibole; compositionally layered hornblende-plagioclase gneiss; calc-silicate-bearing quartzofeldspathic schist with porphyroblasts of plagioclase flattened parallel to foliation; siliceous schist.

iv) **Mafic to intermediate volcanics**: This unit comprises: dark grey to dark greenish-grey amphibolite which to the northeast of Wapawekka Lake and along the Deschambault River is very strongly foliated with a well developed fissility; foliated and lineated, calcareous mesocratic hornblende-plagioclase schist; garnet porphyroblastic, leucocratic to mesocratic, hornblende-plagioclase schist; dark green, medium- to coarse-grained hornblendite; melanocratic uralite schist; hornblende porphyroblastic schist to medium-grained melanocratic hornblende diorite.

West of Oskikebuk Lake, south of the tonalitic gneiss is a narrow belt of strongly foliated, mesocratic to melanocratic, hornblende-plagioclase schist and gneiss as well as amphibolite. North of Povol Lake a buff to salmon colored felsite, composed of approximately 50 percent quartz, locally contains abundant fine-grained, grey xenoliths composed of various amounts of amphibole, biotite, quartz and feldspar. Contacts between the felsite and adjacent supracrustals are diffuse; locally there are blotchy patches of biotite that contain abundant coarse-grained porphyroblasts of garnet. North of Povol Lake, near the contact with the Jira Lake Pluton, exposure is poor and there are only a few scattered outcrops of highly fissile amphibolite.

Peninsula, West Arm, Deschambault Lake

Much of the peninsula on the northeast side of the entrance of the West Arm to Deschambault Lake is underlain by dark green and fine-grained mafic to intermediate volcanics. The main varieties are plagioclase phyric intermediate to mafic flows, and amphibolite and hornblende-plagioclase granulite which are less common. Amygdales and in rare cases pillows are preserved in flows. Locally, such as along Deschambault Lake, the flow rocks are intruded by subvolcanic diorite dykes and sills. Rare intermediate flow breccia and volcaniclastic fragmentals are present in the sequence. On the north side of the peninsula fine-to medium-grained leucocratic to mesocratic gneiss are more common; some of these are probably volcaniclastics. Also towards the north side of the peninsula there are lenticular masses of strongly foliated to mylonitized quartzofeldspathic gneiss, some of which are characterized by medium-grained quartz "eyes" in a fine-grained quartz-feldspar matrix.

Other Localities

East of Oskikebuk Lake the Oskikebuk Lake Group is segmented by a composite granitoid that includes quartz porphyroblastic tonalitic gneiss and the Oskikebuk Narrows Pluton. The group here is only exposed in a few scattered outcrops, most of which consist of variably feldspathized and granitized amphibolite. Near the contact with Oskikebuk Lake Complex there are amphibolitic and quartzofeldspathic mylonites.

On the south side of Fisher Bay, where inland exposure is poor, the Oskikebuk Lake Group includes: medium-grained mesocratic hornblende granulite, massive to compositionally layered dioritic gneiss, amygdaloidal mafic volcanic, and amphibolite. Within these rocks are a series of foliation-parallel layers of strong to very strongly foliated, salmon-coloured plagioclase- porphyroblastic granite to granodiorite.

Approximately one kilometre north of Fisher Bay is a highly tectonized and migmatized supracrustal sequence characterized by intervals a few metres to tens of metres thick of compositionally layered, fine-grained rock composed of various proportions of hornblende, quartz and plagioclase. Some of the hornblende-rich layers have been boudinaged. Between the compositionally layered intervals foliation-parallel layers and lenses of light grey, fine- to medium-grained leucocratic granodiorite with a very strong subhorizontal stretching lineation occur.

b) Granitoid Rocks

Diorite and Peridotite

Three significant intermediate to basic intrusions occur in the map area: 1) the diorite lying between Merritt Lake and Vance Lake which includes a highly magnetic xenolithic phase, 2) the diorite on the southwest side of Oskikebuk Lake and 3) the serpentinized peridotite on the northeast side of the entrance to the West Arm of Deschambault Lake.

Diorite - Merritt Lake

The northeast side of Merritt Lake is underlain by a bulbous-shaped, composite basic intrusion approximately 1 km in diameter. On the east side, the intrusion tapers abruptly into a narrow irregular tail that has been traced to the south side of Vance Lake. The main phase is a dark grey, leucocratic to mesocratic diorite to quartz diorite comprising up to 80 percent xenoliths. Xenoliths range in size from a couple of centimetres to 60 cm and consist of a variety of rock types: amphibolite; mesocratic to melanocratic diorite or gabbro; plagioclase phyric intermediate volcanic; fine- to medium-grained, mesocratic to melanocratic hornblende granulites; and fine-grained, compositionally layered, hornblende-plagioclase volcaniclastics. The matrix to the xenoliths contains clots of medium- to coarse-grained hornblende up to one metre wide. The unit as a whole has anomalously high magnetic susceptibility compared to all other rocks in the map-area and is defined by a distinct high magnetic anomaly on Federal-Provincial Aeromagnetic Map 7754G.

A more geographically restricted phase of the basic intrusion between Merritt Lake and the south side of Vance Lake comprises dark green diorite to gabbro containing 20 to 40 percent medium-grained porphyroblasts of hornblende. A minor phase, only observed along the shore of Merritt Lake, comprises a medium- to coarse-grained hornblendite.

Diorite - Southwest of Oskikebuk Lake

A large, generally poorly exposed, but apparently multiphased, basic intrusion underlies the southwest side of Oskikebuk Lake. Phases within this intrusion include: dark grey, massive, medium-grained diorite containing 30 to 40 percent hornblende; buff, massive to foliated, medium-grained diorite to quartz diorite containing approximately 15 percent hornblende and biotite; dark grey, fine-grained, mesocratic tonalite to quartz diorite containing scattered medium-grained porphyroblasts of hornblende; and dark grey, medium-grained, mesocratic hornblende tonalite.

Serpentinized Peridotite

A 1.5 km long by 800 m wide body of serpentinized peridotite occurs in mafic to intermediate volcanics of the Oskikebuk Lake Group on the peninsula on the northeast side of the entrance to the West Arm of Deschambault Lake.

Oskikebuk Complex

The Oskikebuk Complex comprises a mixture of granodioritic, tonalitic and quartz dioritic rocks and later migmatitic felsic granitoids along the north side of supracrustal rocks (Figure 1). Two subunits have been recognized: 1) the Oskikebuk (hornblende) Quartz Diorite Gneiss forming the tapered northwest end of the complex, and 2) the eastern part.

Oskikebuk Quartz Diorite Gneiss

The Oskikebuk Quartz Diorite Gneiss is grey to dark grey, medium grained and composed of 12 to 20 percent hornblende. Much of this unit contains coarse-grained plagioclase porphyroblasts and locally there are coarse-grained porphyroblasts of hornblende. The east-trending Hartley Shear Zone (Delaney, 1988, 1989) lies along the northern side of the quartz diorite gneiss. Along the northern margin of the unit augen-shaped plagioclase porphyroclasts are common. West-northwest of Oskikebuk Lake the unit has been structurally thinned to a 100 to 200 m thick "tail" in outcrop surface which can be traced another 6.5 km to the west. In this area a belt of highly deformed rocks mantle the Oskikebuk Quartz Diorite Gneiss on both the north and south sides.

In the vicinity of Oskikebuk Lake, the southern 3 km of the Oskikebuk Quartz Diorite Gneiss has been intruded by sills, dykes and veins of pink, fine-grained, leucocratic tonalite containing a few percent biotite. These range in thickness from a few centimetres to several metres. Some exhibit microscopic rodding which defines a stretching lineation. Within the leucocratic tonalite phase are medium-to coarse-grained quartz-feldspar veins and veinlets.

Eastern Part of Oskikebuk Complex

The eastern part of the Oskikebuk Complex consists of leucocratic to rare mesocratic tonalite, granodiorite and quartz diorite, all typically plagioclase porphyroblastic. A U-Pb zircon date of 1850 ±4 Ma (Bickford *et al.*, 1986) was obtained for this unit from a tonalite collected along the narrows in Deschambault Lake. The complex is intruded by late stage granitic dykes, sills and veins.

Granitic Migmatites

In addition to numerous late-stage granitic dykes, sills and veins, particularly in rocks of the Oskikebuk Complex, there are three large late-stage granitic bodies of a migmatitic origin. One of these, unit GM-3, located between Vance Lake and the West Arm of Deschambault Lake is a pinkish-buff, medium-grained granite to granodiorite containing between 12 and 20 percent biotite and hornblende. The rock varies from moderately to very strongly foliated. Xenoliths of mesocratic intermediate intrusive rocks are common and rare xenoliths of layered hornblende volcaniclastic also occur. Folded and boudinaged veins of pink quartz-feldspar pegmatite are present in this intrusion.

The other two large granitic migmatite bodies occur east of Vance Lake. The more southerly of these (unit GM-1) is a buff to salmon, fine- to medium-grained granite containing as much as 5 percent biotite, mostly as disseminated fine grains but also in minor medium-to coarse-grained porphyroblasts. The rock also contains minor euhedral, fine- to medium-grained garnet locally. The more northerly of the bodies is a pink, fine- to medium-grained, leucocratic granodiorite to granite containing a few percent disseminated biotite. This rock also occurs as dykes and sills in tonalitic to dioritic rocks that flank the granitic core.

Quartz Porphyroblastic Tonalitic Gneiss

A tonalitic gneiss complex occurs in the Oskikebuk Lake Group between the northeast end of Povol Lake and the north side of Merritt Lake. Much of this body is a fine- to medium-grained tonalite with millimetre-to centimetre-size, lineation-parallel clots of grey quartz and a few percent fine-grained biotite in foliation-parallel clots. Elsewhere, such as on the west side of Oskikebuk Lake and in the mantle of this unit on the north side of the Oskikebuk Narrows Pluton, the most common phase of the tonalitic gneiss contains pink, centimetre-size, oovoid-shaped porphyroblasts of quartz. On the west side of Oskikebuk Lake the unit contains a buff hornblende tonalite to quartz diorite phase that contains between 12 and 20 percent hornblende.

West of Oskikebuk Lake the tonalite gneiss contains lenses of medium-grained, dark green hornblendite. Four of these ultramafic lenses have been mapped; the largest, located about 2 km east of the southern narrows on Oskikebuk Lake, is a tear-shaped body approximately 1000 m long by 300 m wide.

Oskikebuk Narrows Pluton

The Oskikebuk Narrows Pluton (Figure 1; Padgham, 1968) is a small, elliptical-shaped, zoned intrusion. The core is a buff to salmon, leucocratic, microcline porphyritic granite and granodiorite which is quite similar to the microcline porphyritic granite phase of the Brownell Lake Pluton (Padgham, 1968; Delaney, 1988). The external part of the pluton is a dark grey, medium-grained mesocratic hornblende monzodiorite. Although Padgham (1968) noted the similarity of this pluton to the Maynard Creek and Brownell Lake Plutons, the zoned character of the Oskikebuk Narrows Pluton was not previously recognized. U-Pb age determinations on zircons from the felsic phases of the Brownell Lake and Maynard Creek Plutons have yielded dates of 1831 ± 9 Ma and 1832 $+9/-3$ Ma respectively (Delaney *et al.*, 1990).

Ballantyne Bay Pluton

Along much of the south side, the Oskikebuk Lake Group is bounded by leucocratic tonalite of the Ballantyne Bay Pluton. South of Fisher Bay the main phase of the pluton is a buff to salmon, fine- to medium-grained tonalite containing 2 to 3 percent disseminated fine-grained biotite. This phase is cut by felsite and pegmatite veins. Between Deschambault and Oskikebuk Lakes, phases in the Ballantyne Bay Pluton include: pinkish-buff, medium-grained, leucocratic tonalite containing 3 to 5 percent biotite in foliation parallel clots; pinkish-buff, fine- to medium-grained tonalite containing no mafic minerals; and fine- to medium-grained, buff tonalite with 3 percent disseminated fine-grained biotite.

The north side of the West Arm of Deschambault Lake is underlain by grey to buff grey, medium-grained, massive to more commonly plagioclase porphyroblastic, leucocratic hornblende-quartz diorite. This unit, which is similar to some phases in the Oskikebuk Complex, is intruded by the Ballantyne Bay Pluton.

Jira Lake Pluton

The Jira Lake Pluton lies on the southern side of the east end of Wapawekka Lake. The northern margin of the intrusion was mapped in 1989 (Delaney, 1989) and the southeastern part during the current study. Three distinctive phases similar to those mapped by Padghan (1966) are distinguished:

1) The northern margin consists of a buff to buff grey, massive to foliated, leucocratic granodiorite to tonalite that weathers with a distinctive granular texture. Plagioclase ranges from 4 to 7 mm in size, is anhedral to subhedral and set in a finer-grained matrix of quartz, plagioclase and biotite that composes from 7 to 12 percent of this phase. Locally, quartz has a distinctive salmon colour.

2) Much of the rest of the eastern and southern parts of the pluton is a light grey, medium-grained, equigranular to porphyroblastic tonalite containing from 7 to 15 percent biotite and hornblende in various proportions; rare phases contain 17 to 20 percent hornblende.

3) The core of the Jira Lake Pluton is a coarser tonalite containing up to 7 percent biotite.

5. Structure

a) High Strain Zones

Previous mapping (Delaney, 1988, 1989) identified a major structural break, the east-trending Hartley Shear Zone, along the northern side of the Oskikebuk Quartz Diorite Gneiss. At the western end of the structurally tapered tail of the gneiss the Hartley Shear Zone merges with another apparently wide but poorly exposed zone of highly deformed rocks. During the current mapping the continuation of this high strain zone was traced along the southern margin of the Oskikebuk Complex, although a full appreciation of its character and extent was severely hampered by poor exposure. The highly strained rocks along the southern margin of the Oskikebuk Complex include the highly fissile mylonitic amphibolites west of Oskikebuk Lake and the very strongly foliated quartzofeldspathic gneisses and schists north of the West Arm of Deschambault Lake. These are interpreted as derived from a variety of protoliths. West of Oskikebuk Lake high strain zones occur throughout the supracrustal sequence, forming rocks such as very strongly foliated and highly fissile mylonitic amphibolites.

b) Structural History

Preliminary analysis of structural data reveals the presence of two major episodes of deformation as well as other minor events. The first event (D1) formed a pervasive, prominent, southeast-striking foliation that generally dips moderately to steeply north and has a strong subhorizontal mineral lineation. This lineation is coaxial with rare small-scale folds. The first deformation also formed the major ductile shear zone and associated folds along the southern margin of the Oskikebuk Complex, as well as heterogeneous shear zones throughout the supracrustal assemblage.

The second episode of deformation (D2) formed a crenulation cleavage which varies in strike from north-northwesterly to north-northeasterly and generally dips steeply to the east.

Structures attributed to these two events have been previously recognized in the Brownell and Wapawekka Lakes areas. The D1 event is correlated with the event in the Brownell Lake area which formed the overturned Brownell Lake Syncline and the Carroll Lake antiform (Delaney, 1988). Major east-trending high-strain zones such as the Hartley Shear Zone and the unnamed one along the margin of the Folkerson Batholith are also associated with D1.

The D2 event is correlated with the prominent D2 fracture cleavage and locally crenulations or small-scale northeast- to north-trending folds in the Wapawekka Lake area. Farther east in the Maynard and Brownell

Lakes area, deformation attributed to this event formed north- to northwesterly-trending folds including the Maynard Creek Anticline, the Brownell Lake Syncline and the Brownell Lake Anticline.

6. Economic Geology

A review of the Mineral Assessment Files of Saskatchewan Energy and Mines reveals that much of the Oskikebuk Lake Group between Jira Lake and Fisher Bay on Deschambault Lake has been investigated for massive sulphide potential. Airborne and ground electromagnetic surveys have identified a number of conductors of variable strength, commonly parallel to the trend of the belt. Some of these conductors were tested by diamond drilling but no economically significant sulphide intersections have been reported although minor gold mineralization was intersected in one hole (Des 111, Figure 1). More recently, shear zone-hosted gold mineralization was discovered at Jira Lake. The serpentinized peridotite on the north side of the West Arm to Deschambault Lake was reported to have a high nickel content (Padgham, 1968).

a) Gold

i) **Des 111**: Mineralization was intersected in a diamond drill hole, Des 111, collared on the north side of Fisher Bay, Deschambault Lake (UTM co-ordinates 599650 m E, 6068460 m N). Between March 1972 and January 1973 Hudson Bay Exploration and Development Company Ltd. completed horizontal loop EM surveys on a series of grids on the north side and to the southeast of Fisher Bay (SEM Assessment Files 63L11-0002, 63L14-0018). Five of the conductors on the north side of Fisher Bay were subsequently tested with diamond drill holes in 1974 and 1976 (SEM Assessment Files 63L-0014, -0017,-0018). Hole Des 111, which was collared in the highly tectonized and migmatized supracrustal sequence approximately one kilometre north of Fisher Bay, intersected banded hornblende-biotite-quartz granulite between 30.48 and 53.37 m containing several pyrrhotite-bearing siliceous intervals. One of these, between 46.45 and 46.60 m, yielded 75 percent pyrrhotite and assayed 0.7 g/t (0.02 oz/ton) Au and 6.2 g/t (0.18 oz/ton) Ag. Some of the other holes intersected minor amounts of Cu and Zn mineralization but contained no precious metals.

ii) **Jira Lake**: The Jira Lake showing, located approximately one kilometre east-southeast of the south end of Jira Lake (UTM co-ordinates 561120 m E, 6082390 m N), was discovered by D. Partridge in the spring of 1991. The occurrence lies near the southern contact of the Jira Lake Pluton (Padgham, 1966, 1968; Delaney, 1989), a leucocratic to locally mesocratic plagioclase porphyritic tonalite. Gold occurs in narrow, discontinuous, vuggy pyritic quartz veins within at least three narrow west-northwest-trending dextral shear zones that dip moderately to the north. In the most southerly of these shear zones, the only one well exposed, four quartz veins occur in 30 cm of sheared tonalite (Figure 2). Four grab samples from this zone contained 300 to 8700 ppb gold (Table 1).

b) Nickel, Chrome and Platinum Group Elements

As the peridotite body on the north side of the entrance to the West Arm of Deschambault Lake was previously reported to have high nickel contents (Padgham, 1968), a suite of spaced samples was collected along the long axes of the intrusion. Samples were analyzed for 30 common elements as well as gold and platinum group elements (Table 2). These analyses not only confirm the high nickel content but also reveal a high concentration of chromium in the peridotite.

7. Recommendations for Prospecting

1) The discovery of shear-zone hosted gold mineralization near the southern margin of the Jira Lake Pluton invites a thorough evaluation of the rest of this pluton for gold mineralization. This search might also be extended to the west to cover adjacent plutons of a similar age that flank supracrustal rocks along Wapawekka Lake. These include the Radar Bay and Fisher Narrows Plutons on the south side of Wapawekka Lake and the Folkerson Lake Batholith and Lacey Lake Stock on the north side of the lake (Figure 1; Padgham, 1966, 1967; Delaney, 1989). Particularly favorable areas appear to be near the margins of the intrusions.

2) The Oskikebuk Narrows Pluton also warrants a thorough evaluation for gold mineralization. In the Brownell Lake area, the Brownell Lake Pluton and the Maynard Creek Pluton, which are similar to the Oskikebuk Narrows Pluton, contain gold mineralization. In particular, the microcline-porphyritic phase of the Brownell Lake Pluton, which appears to be the same as that in the Oskikebuk Narrows Pluton, hosts several gold occurrences.

3) Another target for gold exploration is high strain zones in supracrustal rocks of the Oskikebuk Lake Group. Because of generally poor exposure, identification of favorable structures will be hampered. Identification of structures can be achieved by completing close-spaced airborne electromagnetic and magnetic surveys and then using image processing techniques to enhance the data. The successful application of these techniques has recently been demonstrated in the Brownell Lake area (Delaney *et al.*, 1991).

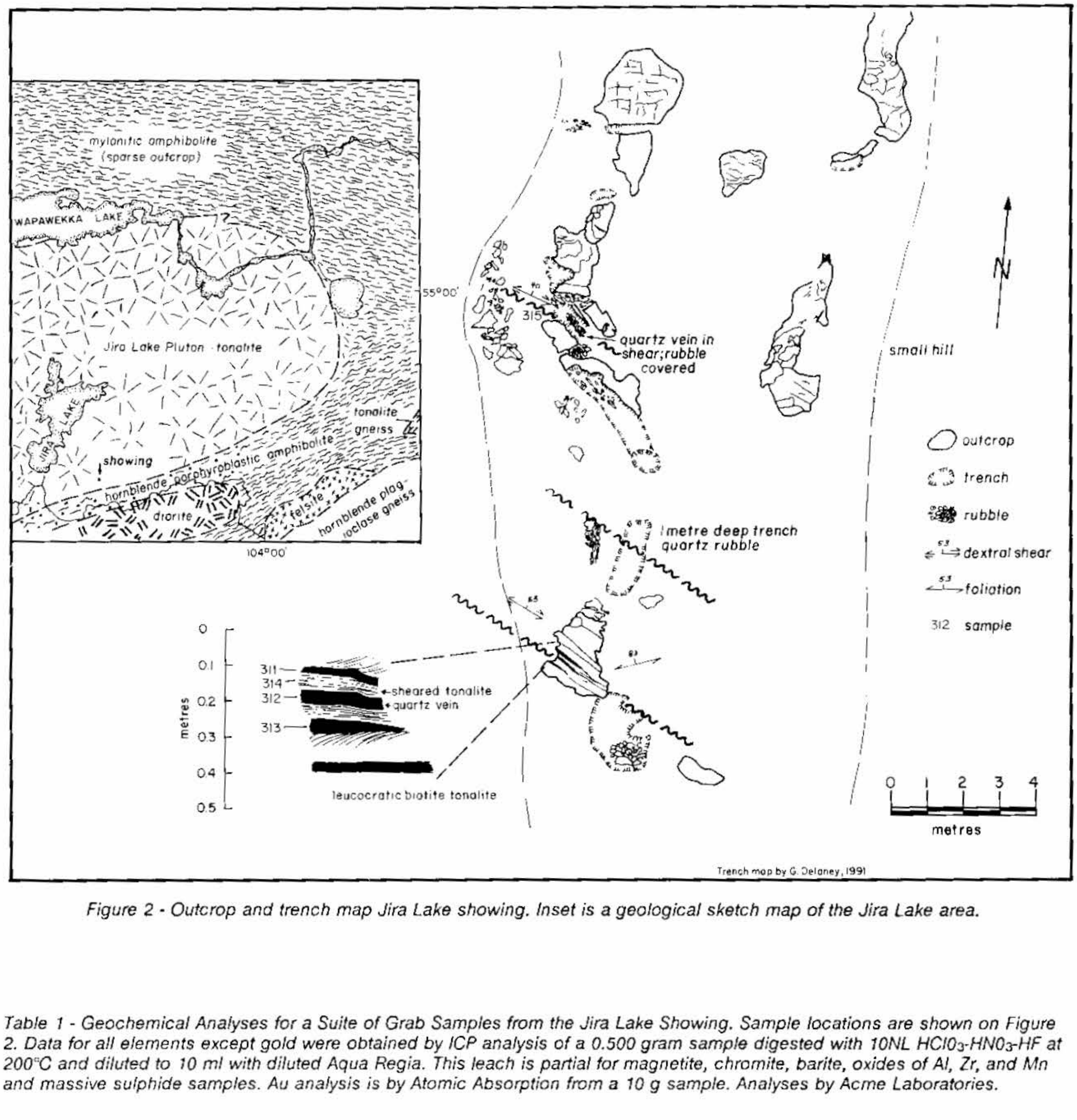

Figure 2 - Outcrop and trench map Jira Lake showing. Inset is a geological sketch map of the Jira Lake area.

Table 1 - Geochemical Analyses for a Suite of Grab Samples from the Jira Lake Showing. Sample locations are shown on Figure 2. Data for all elements except gold were obtained by ICP analysis of a 0.500 gram sample digested with 10NL $HClO_3$-HNO_3-HF at 200°C and diluted to 10 ml with diluted Aqua Regia. This leach is partial for magnetite, chromite, barite, oxides of Al, Zr, and Mn and massive sulphide samples. Au analysis is by Atomic Absorption from a 10 g sample. Analyses by Acme Laboratories.

Element Samples	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Fe %	As ppm	Ba ppm	K %	W ppm	Zr ppm	Sn ppm	Sc ppm	Au* ppb
9122-311	3	160	3	57	0.5	1.71	5	272	1.68	9	21	2	4.4	1630
9122-312	2	108	2	35	0.2	1.11	2	59	0.36	6	3	6	1.1	650
9122-313	4	425	2	31	4.5	1.77	3	342	1.81	9	28	1	4.4	8700
9122-314	3	147	2	88	0.1	2.81	6	480	2.82	12	34	1	10.2	300
9122-315	3	284	4	34	0.4	2.84	2	50	0.28	4	6	7	1.3	480

Table 2 - Geochemical Analyses for a Suite of Grab Samples from Serpentinized Peridotite on the Peninsula on the Northeast Side to the Entrance to the West Arm of Deschambault Lake. Sample locations given as UTM coordinates. Data for all elements except Au, Pt, Pd, and Rh were obtained by ICP analysis of a 0.500 gram sample digested with 10NL $HClO_3$-HNO_3-HF at 200°C and diluted to 10 ml with diluted Aqua Regia. This leach is partial for magnetite, chromite, barite, oxides of Al, Zr, and Mn and massive sulphide samples. Au, Pt, Pd and Rh analysis is by ICP of a 10 g sample fused in a graphite furnace. Analyses by Acme Laboratories.

Element Samples	Cu ppm	Ni ppm	Co ppm	Mn ppm	Fe %	Cd ppm	V ppm	Ca %	P %	La ppm	Cr ppm	Mg %	K %	Sc ppm	Au* ppb	Pt ppb	Pd ppb	Rh ppb
9122-1192	120	409	55	1282	5.3	0.5	238	13.43	0.009	2	1475	8.35	0.2	50.8	13	21	18	1
9122-1193	84	536	68	1098	5.46	0.2	189	12.28	0.015	2	2086	9.52	0.02	48.2	19	31	42	1
9122-1194	1	1825	157	1181	8.29	0.5	72	2.79	0.014	2	3479	15.22	0.02	14.5	5	1	2	1
9122-1195	6	2504	175	1011	9.42	0.6	35	0.25	0.015	2	1717	18.32	0.01	8.9	5	20	4	1
9122-1196	93	1832	146	1181	8.73	0.4	65	2.18	0.009	2	1746	16.08	0.01	18.6	2	10	11	1

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