THE GEOLOGY OF THE STIPEC LAKE-WALKER LAKE AREA, CENTRAL MINERAL BELT, LABRADOR

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INTRODUCTION

Helicopter supported geological mapping in the 1976 field season covered the poorly exposed region of the Central Mineral Belt between the Bruce River Group to the west and the upper Aillik Group to the east in the Michelin mine area. The object of this work was to establish the relationship between the two groups and to define the western limit of rocks favorable for uranium mineralization.

REGIONAL SETTING, PREVIOUS WORK, AND MAJOR RESULTS

The Proterozoic Aillik Group (King, 1963; Stevenson, 1970) unconformably overlies Archean basement and consists of a lower division of metamorphosed pillow lavas and sedimentary rocks and an upper division of silicic volcanic rocks, conglomerates and minor mafic flows (B.E. Marten, unpublished and personal communication).

The Kitts uranium mine and four major showings are located in a meta-argillite unit of the lower Aillik Group; the Michelin deposit and approximately forty uranium occurrences are associated with silicic volcanic rocks of the upper Aillik Group. Lower Aillik Group lithologies have been traced inland from the coast in a narrow southwest trending belt along the south shore of Kaipokok Bay for about 50 km where they are truncated by granitic plutons (Gandhi, 1969). Upper Aillik Group lithologies form a 25 km wide belt that can be traced southwestwards from the coast to Walker Lake (approximately 100 km) where they are cut by a large granite pluton. The upper Aillik Group was intruded by a number of syntectonic granitic intrusions that yield an approximate 1600 m.y. age (Gandhi et al., 1969).

West of the Aillik Group and the intervening largely granitic terrane in the Stipec Lake-Walker Lake area, two Proterozoic Groups, the Moran Group and the unconformably overlying Bruce River Group, outcrop (Smyth et al., 1975; Ryan, this report). The Moran Group, consisting of mafic volcanic rocks, slates, and argillites, unconformably overlies Archean basement and can be correlated lithologically and stratigraphically with the lower Aillik Group (Sutton et al., 1972; B.E. Marten, unpublished), although it appears to have largely escaped the intense Hudsonian deformation and metamorphism typical of the lower Aillik Group.

The Bruce River Group, consisting of basal conglomerate, tuffaceous sandstone, and a bimodal volcanic suite, unconformably overlies the Moran Group. It has been affected by Grenville deformation but volcanic rocks yielded a Rb/Sr isochron age of 1474 ± 42 m.y. that is believed to be a reasonable estimate of the true age (Wanless and Loveridge, 1972). The Bruce River Group lithologically resembles the upper Aillik Group with which it has been correlated in the past (Beavan, 1958; Sutton et al., 1972). However, the recently described unconformity at the base of the Group and the Post-Hudsonian age seem to preclude correlation.

This summer's work discovered a disjointed belt of mafic volcanic and metasedimentary rocks south of the Bruce River syncline that are correlatable with the Moran Group on the northern

limb of the syncline and lie on strike with the lower Aillik Group to the east. In addition, two outliers of tuffaceous sandstone were delineated within the largely granitic terrane south of this belt of Moran Group rocks. These sandstones unconformably overlie foliated granites and resemble rocks of the basal Bruce River Group and also a sandstone unit within the upper Aillik Group at Walker Lake.

These findings once again suggest that the Bruce River Group and the upper Aillik Group in the Michelin mine area can be correlated and raise the possibility of an unconformity separating the lower and upper Aillik Groups.

ARCHEAN BASEMENT

Archean gneisses, migmatites and greenstones outcrop in the Kaipokok River Valley in the northeast of the area. The rocks are described by Ryan (this report).

MORAN GROUP

Mafic volcanic rocks, slates, argillites, psammites and semipelites correlated with the Moran Group outcrop in a discontinuous NE-SW trending belt from Oscar Lake to near Yvon Lake (Fig. 1). Numerous pyrite and pyrrhotite gossans characterize this belt. North of the belt near the Bruce River two fault bounded wedges of Moran rocks occur within the Bruce River Group.

The Moran rocks are poorly exposed, contacts were rarely observed, and a stratigraphy could not be determined. An apparent sequence (tops unknown) of mafic volcanic rocks overlain by semipelitic and mafic schists, overlain in turn by psammitic and semipelitic schists with minor mafic volcanic rocks was observed on a large hill southwest of Stipec Lake. A pretectonic gabbro cuts the mafic volcanic rocks near the base of the hill.

Screens of mafic volcanic rocks and slates in a leucogranite outcrop in the Gravelly River, northwest of Stipec Lake. West of Oscar Lake rare outcrops of mafic volcanic rocks, quartzites, and tuffaceous sandstones were observed. Pyritic gossans in quartzites and mafic volcanic rocks are similar to those elsewhere in the Moran Group; however, cross-bedding in the sandstones suggests that these rocks may be correlated with the Bruce River Group.

A pretectonic, medium grained, leucogranite cuts Moran Group rocks in the Gravelly River and post-tectonic granitic dykes cut semipelitic and psammitic schists southeast of Stipec Lake. A medium grained granite cuts the northeast boundary of the sedimentary rocks east of Oscar Lake; cordierite porphyroblasts are present in nearby tuffaceous units in the contact aureole.

The Moran Group rocks show effects of two periods of deformation. The first period produced a strong schistosity with concomitant greenschist facies metamorphism. The second is expressed as steeply plunging open to close folds of the earlier schistosity.

JUNIOR LAKE GRANITE

The Junior Lake granite, a massive, homogeneous hornblende-biotite granite, cuts the Archean basement rocks and is unconformably overlain by conglomerates of the Bruce River Group (Smyth et al., 1975).

UNDIFFERENTIATED GRANITE

A large area between Stipec Lake and Oscar Lake in the center of the map-area (Fig. 1) is shown as undifferentiated granite. It consists dominantly of foliated and generally strongly lineated, medium to coarse grained hornblende-biotite (chlorite) granite with abundant pegmatites. Post-tectonic granites (unit 12) are abundant within the foliated granites; however, in most places they could not be distinguished on the scale of mapping.

LEUCOGRANITE

A medium grained, weakly to strongly foliated leucogranite cuts rusty argillites, slates and mafic volcanics of the Moran Group. Contacts are well exposed in the Gravelly River and on the hilltop east of the river. The granite was deformed with the Moran Group and is considered to be Aphebian in age.

The leucogranite is in contact with sandstones of the Bruce River Group along its northern boundary. The contact parallels bedding in the sandstones and was previously interpreted as intrusive (Smyth et al., 1975). However, since re-examination of the contact showed that the granite and underlying sandstones are strongly mylonitized and that hornfelsing and intrusive relationships are absent, the contact is re-interpreted as a thrust.

BRUCE RIVER GROUP

All three divisions of the Bruce River Group are represented in the map-area. The basal division, the Heggart Lake conglomerate (Smyth et al., 1974), forms an east-west trending belt (also see Williams, 1970) that unconformably overlies Archean basement, Junior Lake Granite, and the Moran Group. The conglomerate is red to grey, massive, polymictic cobble conglomerate containing subrounded clasts of granodiorite, gneiss, greenstone, quartzite, argillite and mafic volcanic rocks. To the east it is more strongly deformed where it is pinched out by a fault.

The middle division consists of medium to fine grained, typically cross-bedded, tuffaceous sandstones. An outlier of tuffaceous sandstone (Williams, 1970) displaying sedimentary structures typical of the middle division is preserved northwest of Del Rizzo Lake. A thin basal breccia along its northern margin unconformably overlies foliated granite of unit 5. These sediments are cut by thin granite dykes; hornfelsing is common.

The upper division consists of a bimodal volcanic sequence of alternating ignimbrite and minor basalt flows, with lesser intercalated tuff and conglomerate (Smyth et al., 1975).

AILLIK GROUP

Banded tuffaceous sandstones, conglomerates, rhyolites and quartz-feldspar porphyries assigned to the Aillik Group outcrop east of Walker Lake and extend northeastwards to the Atlantic Coast (Gandhi, 1969; Stevenson, 1970). At Walker Lake the Aillik Group rocks are truncated by the Walker Lake granite.

Distinctive, fine grained, purple to green, banded sandstones and tuffaceous sandstones outcrop along the east shore of Walker Lake. The sandstones are cut by dykes of Walker Lake granite; contact metamorphism has given rise to growth of biotite and tourmaline. A boulder conglomerate unit is interbedded with sandstones about 2 km east of Walker Lake. It consists of

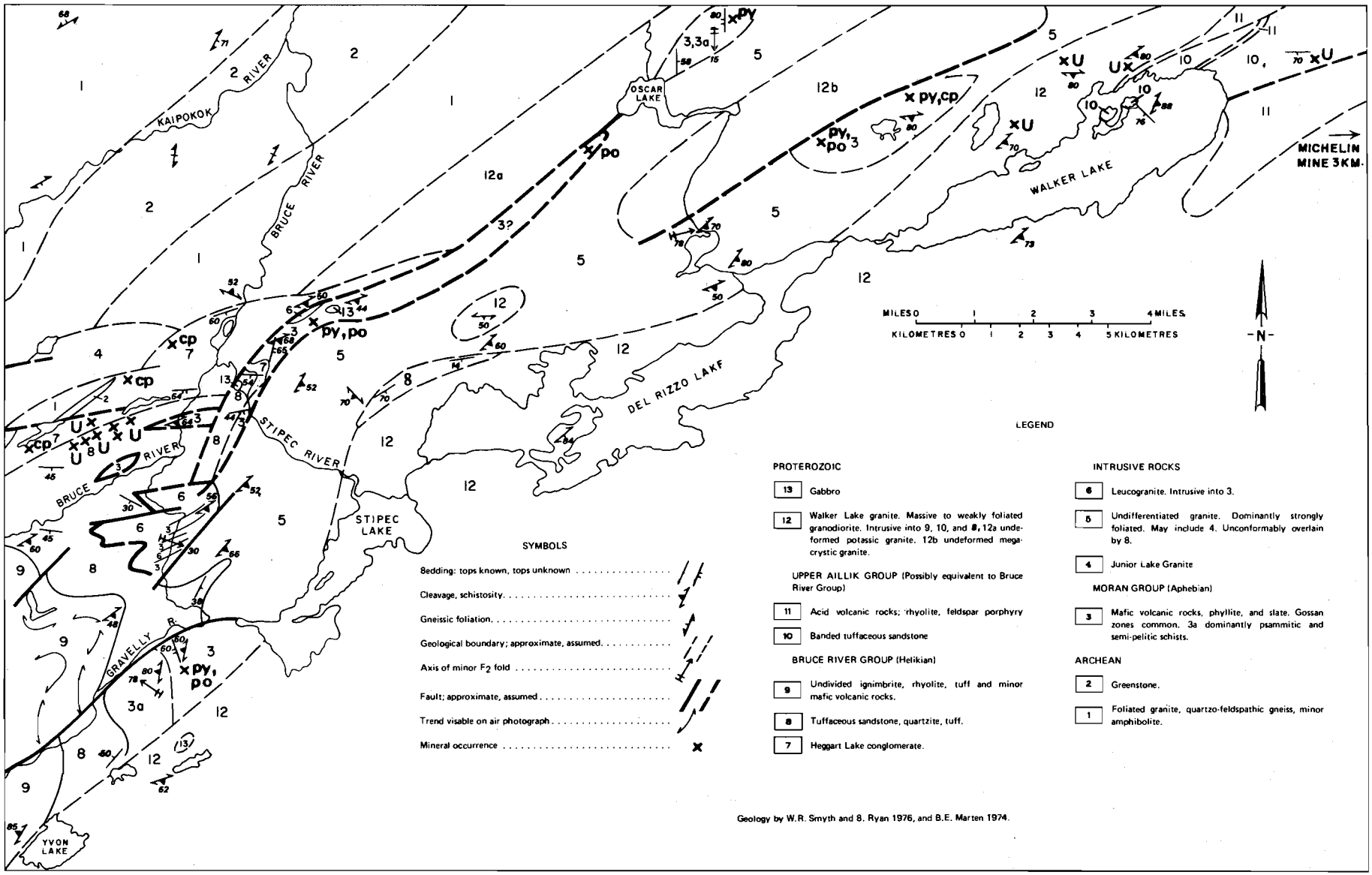
KAIPOKOK RIVER
BRUCE RIVER
STIPEC RIVER
BRUCE RIVER
GRAVELLY R.
OSCAR LAKE
STIPEC LAKE
DEL RIZZO LAKE
WALKER LAKE
YVON LAKE
MICHELIN MINE 3KM.
MILES 0 1 2 3 4 MILES
KILOMETRES 0 1 2 3 4 5 KILOMETRES
N
LEGEND
SYMBOLS
Bedding: tops known, tops unknown
Cleavage, schistosity
Gneissic foliation
Geological boundary; approximate, assumed
Axis of minor F2 fold
Fault; approximate, assumed
Trend visable on air photograph
Mineral occurrence
PROTEROZOIC
13 Gabbro
12 Walker Lake granite. Massive to weakly foliated granodiorite. Intrusive into 9, 10, and 8, 12a undeformed potassic granite. 12b undeformed megacrystic granite.
UPPER AILLIK GROUP (Possibly equivalent to Bruce River Group)
11 Acid volcanic rocks; rhyolite, feldspar porphyry
10 Banded tuffaceous sandstone
BRUCE RIVER GROUP (Helikian)
9 Undivided ignimbrite, rhyolite, tuff and minor mafic volcanic rocks.
8 Tuffaceous sandstone, quartzite, tuff.
7 Heggart Lake conglomerate.
INTRUSIVE ROCKS
6 Leucogranite. Intrusive into 3.
5 Undifferentiated granite. Dominantly strongly foliated. May include 4. Unconformably overlain by 8.
4 Junior Lake Granite
MORAN GROUP (Aphebian)
3 Mafic volcanic rocks, phyllite, and slate. Gossan zones common. 3a dominantly psammitic and semi-pelitic schists.
ARCHEAN
2 Greenstone.
1 Foliated granite, quartzo-feldspathic gneiss, minor amphibolite.
Geology by W.R. Smyth and 8. Ryan 1976, and B.E. Marten 1974.

Figure 1.

angular and subrounded clasts up to 60 cm across of quartzite, rhyolite porphyry and granite in a green chloritic matrix. Porphyritic rhyolites are interlayered with the sediments and are well exposed on the ridge southeast of Walker Lake. The rhyolites are typically pink to grey and contain feldspar and quartz phenocrysts up to 5 mm in length. These porphyritic rhyolites are lithologically similar to, and probably part of, the sequence that contains the Michelin uranium deposit 3 km east of Walker Lake.

WALKER LAKE GRANITE

Walker Lake granite is an informal name applied by Brinex geologists to a large granitic to granodioritic batholith centered on Walker Lake.

It is a pink to grey rock containing up to 10-15 percent hornblende and biotite and varies from undeformed to strongly foliated, generally being most strongly deformed close to its northern margin. Outcrops of similar granite have been identified as far west as Yron Lake.

Amphibolite and tuffaceous sandstone xenoliths are present and intrusive contact with Aillik Group sandstones is exposed on the island in the northeast part of Walker Lake. Locally, the granite grades into coarse quartz-feldspar porphyry.

K-Ar dates determined from samples of the granite 0.5 km northwest of Del Rizzo Lake indicate a 1437 $\pm$ 36 m.y. biotite age and a 1645 $\pm$ 46 m.y. hornblende age (Wanless et al., 1974).

UNDEFORMED POTASSIC GRANITE

This unit outcrops north of the Oscar Lake belt of Moran Group rocks. The granite is pink to red, medium to coarse grained with up to 20 percent mafic mineral content. It may be equivalent to the Walker Lake granite to the south.

MEGACRYSTIC GRANITE

Much of the highland southeast of Oscar Lake is underlain by an undeformed to weakly foliated megacrystic granite. It consists of euhedral K-feldspar phenocrysts up to 6 cm long (70%), quartz (10%), and biotite and hornblende (20%). Its relationship to the Walker Lake granite is not known.

GABBRO

A number of small, undeformed, gabbro plugs cut the Moran Group, the Bruce River Group, and the Walker Lake granite. Most are medium grained and unaltered.

STRUCTURE

Smyth et al. (1975) showed that the Bruce River Group unconformably overlies the Moran Group and occupies a large, open, southwest plunging syncline. This work has shown that the Moran Group is repeated along the southern limb of the Bruce River syncline by a combination of reverse faults and folding. The Moran-Bruce unconformity is also preserved in the southern belt northwest of Stipec River, confirming Hudsonian age for deformation of the Moran Group. Ryan (this volume) has shown that Hudsonian deformation in the Kaipokok Valley area produced north-east trending shear zones (reverse faults?) that preserve thin linear belts of Moran Group rocks.

The Bruce River Group was deformed in the Grenville orogeny (Smyth et al., 1975) and displays structures typical of foreland-type deformation. A sequence of events of early reverse faults followed by open, upright to inclined folds with concomitant shear zones has been recognized along the Bruce and Gravelly Rivers. The deformation zones in the Walker Lake granite, the major reverse fault along the northern margin of the Oscar Lake belt of Moran Group, and the reactivated shear zones in the Kaipokok Valley area (Ryan, this volume) are also considered to be of Grenvillian age.

MINERALIZATION

Numerous pyrrhotite-pyrite gossans characterize the inliers of Moran Group. Most of the gossans were located as a result of an airborne survey conducted for Brinex (1971). Moderate to strong EM conductors, up to 8 km long, coincide with the outcrop pattern of the Moran rocks. In the case of the Stipec River belt a consistent magnetic correlation is present.

The mineralization occurs in mafic volcanic rocks and, locally, in interbedded psammites. Grab samples from a showing 4 km northwest of Walker Lake gave low values of copper and nickel (written communication from Dr. P. Beavan, Brinex, 1976).

The Heggart Lake conglomerate hosts uranium and copper showings north of Bruce River (the Ferguson and Brown showings, Beavan, 1958). The showings were investigated by Brinex (Collins, 1958) and Mokta (Bernazeaud, 1965). At Brown Lake the uranium occurs in narrow shear zones in conglomerates and fine grained tuffaceous sandstones. Mineralization in the conglomerates is confined to a 1 m wide zone associated with quartz-carbonate veins, hematite, and minor malachite and azurite. Grab samples gave 106 ppm U_3O_8. Mineralization in the sandstones occurs in rusty, steeply dipping, shear zones at right angles to bedding. A thin, cleaved, rusty mafic dyke cuts the sandstones in the vicinity of the mineralized areas. Grab samples from old trenches gave 1392 ppm U_3O_8.

A number of uranium showings have been discovered by Brinex (1971-75) in the eastern part of the area in rocks of the Walker Lake granite and the Aillik Group. The occurrences in the Walker Lake granite are restricted to narrow shear zones up to 1 m wide developed in porphyritic granite or quartz feldspar porphyry. The prophyry appears to be a phase of the granite.

A zone of radioactive boulders of fine grained sandstone occurs in the valley east of Walker Lake. The sandstones are pink to grey, banded over 6 to 10 cm, and contain uranium and visible chalcopyrite mineralization along bedding planes and in cross fractures.

ACKNOWLEDGEMENTS

Many useful discussions were held with B. Ryan in the field. Dr. S. Gandhi is thanked for a tour of the Aillik Group. Ralph Skinner and Gerry Squires ably assisted with the field work and Wayne Tuttle provided excellent logistical support.

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