URANIUM MINERALIZATION IN THE BAY DU NORD GROUP, SOUTHWEST NEWFOUNDLAND: A BRIEF NOTE

by

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ABSTRACT

Recently discovered radioactive zones within the mid-Ordovician Bay du Nord Group have yielded assays up to 4,330 g/t U. The main uranium phase is uraninite; it is concentrated in fine grained pelitic bands in staurolite schist and also in coarse grained, porous layers in an unwelded epiclastic volcanic rock. These new discoveries of syngenetic uranium mineralization, coupled with the existence of stratiform uranium occurrences elsewhere in group, indicate that the Bay du Nord Group and the southwestern Newfoundland Hermitage Flexure form a potentially significant, previously unrecognized, uranium province.

INTRODUCTION

Uranium mineralization in the mid-Ordovician Bay du Nord Group of southwestern Newfoundland was discovered during 1:50,000 regional mapping of the White Bear River (11P/14) map area (O'Brien and Tomlin, 1984). Outcrops of radioactive staurolite schist and a zone of radioactive boulders and suboutcrop of tuffaceous sediment, which locally yielded in excess of 10,000 c.p.s. (BGS-1 scintillometer), were discovered at two localities (grid references 770122 and 731131 respectively). At that time, the origin of the mineralization was uncertain. The authors assumed that the mineralization at that locality was genetically related to granitoid rocks, as the mineralized schists were spatially associated with nearby two-mica leucogranite dikes.

REGIONAL GEOLOGY

The Bay du Nord Group (Dorf and Cooper, 1943; Cooper, 1954) is a thick and extensive succession of Mid-Ordovician, polydeformed, amphibolite facies metasedimentary and metavolcanic rocks, whose regional exposure pattern defines the west-central part of the Hermitage Flexure (Williams et al., 1970) of the Newfoundland Dunnage Zone (Figure 1). In the central parts of the Hermitage Flexure, the Bay du Nord Group is either bounded by faults or intruded by two major synkinematic to post-tectonic granitoid plutons, the Burgeo and North Bay Granites. The group is also intruded by a suite of smaller late to post tectonic granitoids, which are areally confined within the boundaries of the volcano-sedimentary belt. The Bay du Nord Group consists of dominantly silicic flows and volcaniclastic rocks in its lower stratigraphic levels, overlain by a dominantly metasedimentary succession, within which occurs distinct felsic volcanic units of variable thickness (O'Brien, 1983; O'Brien and Tomlin, 1984; Blackwood, 1984).

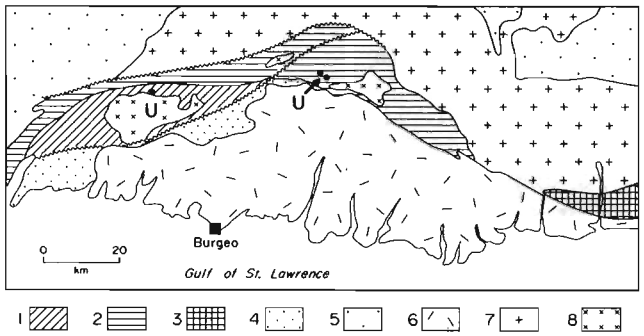
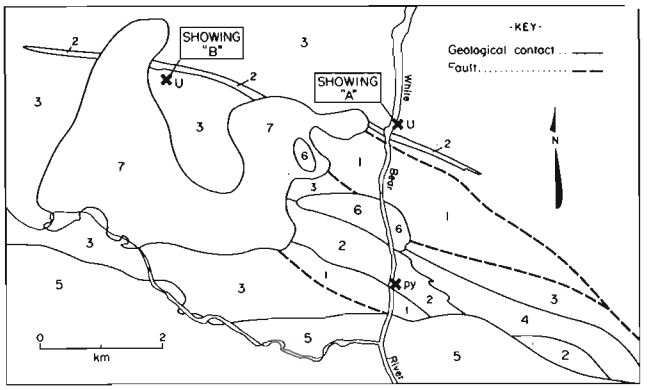


Figure 1: *Major geological elements of the Hermitage Flexure: 1: Bay du Nord Group - dominantly volcanic rocks, 2: Bay du Nord Group - dominantly sedimentary rocks, 3: Baie d'Espoir Group, 4: La Poile Group, 5: Undivided Paleozoic rocks, 6: Burgeo granite, 7: North Bay granite, 8: Post-tectonic granitoids.*

GEOLOGY OF THE SHOWINGS

Showing "A" (Figure 2) consists of radioactive staurolite bearing light to dark gray and black semi-pelitic schist of the Bay du Nord Group, exposed on the eastern shore of White Bear River. The radioactivity occurs over a width of approximately 30 cm, being concentrated in a zone of schist cut by quartz veins. The mineralized schists have a pronounced fabric defined by biotite and muscovite; quartzofeldspathic bands in the schist are granoblastically recrystallized. Staurolite porphyroblasts, up to 10 mm in length, overgrow the main fabric, but are affected by second generation folds and later quartz veining.

Showing "B" consists of large, tabular, radioactive boulders and radioactive suboutcrop located approximately four kilometres west-northwest of Showing "A". Several isolated radioactive boulders



LEGEND

7	*Pink felsite and fine grained granite; minor muscovite bearing leucogranite.*
6	*Fine to medium grained equigranular to medium grained porphyritic granite.*
5	*Coarse grained K-feldspar porphyritic granite and granodiorite.*
4	*Black slate, graphitic schist, phyllite and minor semipelite.*
3	*Thickly to thinly bedded gray psammite, semipelite, phyllite, sandstone, siltstone and shale.*
2	*Rhyolite flows, massive and banded felsic tuff; 3a, bedded tuffs and tuffaceous sedimentary rocks.*
1	*Mafic tuff and tuffaceous sediment; amphibolite.*

Figure 2: *Geology of the north-central White Bear River map area.*

were discovered over an area of a hundred or more square metres; the area of the main zone of boulders and suboutcrop is approximately 10 square metres. The mineralization occurs in fine to medium grained nonwelded quartz phyric tuffs which are either massive or display a crude primary layering of apparent epiclastic origin. They are dark gray on fresh surface, but previously buried boulders, when exposed for a period of a few months, have weathered yellow due to uranophane formation. The tuffs are recrystallized, and a granoblastic texture is developed. Subhedral, recrystallized quartz phenocrysts, from 1 to 2 mm in diameter, comprise up to 10% of the tuffs. The tuffs are biotite rich and fine grained biotite defines a weak foliation; coarser grained porphyroblasts are widespread.

The same tuffs, although not mineralized, are exposed approximately 1 km to the west of Showing "B". There, they form a distinct band, several tens of metres thick, associated with other rhyolitic tuffs. These volcanics are bounded stratigraphically by semipelitic schist of the Bay du Nord Group. The volcanic unit is exposed immediately north of Showing "B" and several tens of metres south of Showing "A" on White Bear River. The unit is very poorly exposed, but has been traced along strike for approximately 7 kilometres.

MINERALIZATION

Autoradiographs of mineralized samples from both showings indicate that the uranium mineralization is stratiform and strata-bound. In Showing "A", the uranium is concentrated in the finest grained pelitic bands of the staurolite schist (Figure 3a). Some remobilization of the uranium into quartz veins occurred during the deformation and accompanying metamorphism is evident. Uraninite is the main uranium phase; development of secondary uranophane is extensive. A grab sample of staurolite schist assayed 669 g/t U (Table 1).

In Showing "B", the uranium, although disseminated throughout much of the rock, is concentrated in the most porous zones of the tuff (Figure 3b). Further concentrations are parallel to primary banding in the tuff. The most radioactive boulders assayed 4330 g/t uranium (Table 1). No pitchblende was seen in hand specimen; x-ray diffraction studies, presently in progress, indicate that uraninite is probably the main uraniferous phase. Allanite is obvious in thin sections of the tuffs. As mentioned above, uranophane is also present.

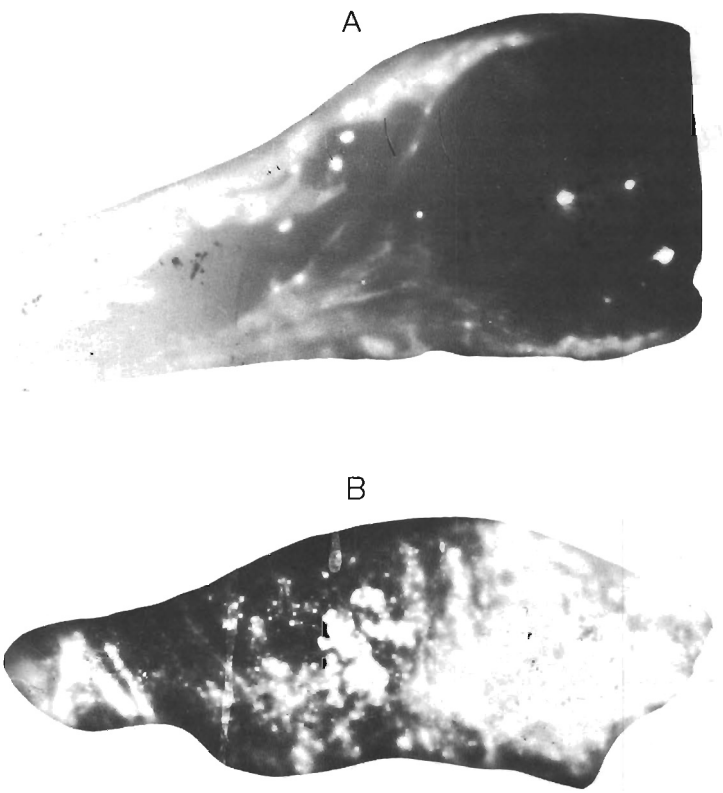


Figure 3(a+b): *Autoradiographs of mineralized samples of the Bay du Nord Group, White Bear River map area. A: staurolite schist with quartz veins, B: nonwelded tuff.*

SAMPLE NO.	ROCK TYPE	SHOWING	U g/t
1940601	nonwelded tuff	"B"	3,990
1940602	staurolite schist	"A"	669
1940603	nonwelded tuff	"B"	4,290
1940604	nonwelded tuff	"B"	4,240
1940605	nonwelded tuff	"B"	4,330
1940606	nonwelded tuff	"B"	4,240

Table 1: *Uranium assays (N.A.A.) of grab samples from radioactive zones in the Bay du Nord Group, White Bear River map area.*

SUMMARY AND CONCLUSIONS

Recently discovered uranium mineralization in the mid-Ordovician Bay du Nord Group is stratiform in nature and is interpreted to be essentially syngenetic. The mineralization is present, locally, where felsic volcaniclastic rocks are interbedded with fine grained pelitic metasediments. The source of the uranium may lie within the volcanic rocks, possibly related to the liberation of U during devitrification of volcanic glasses (e.g. Rosholt et al., 1971). Locally, the uranium appears to have been remobilized from the volcanics into the overlying pelitic sediments. Within the unwelded tuffs, uranium is concentrated in the coarser grained, more porous zones. Some of the uranium has been remobilized during subsequent deformation and metamorphism of the pelitic rocks. It is possible that some remobilization of uranium has occurred during intrusion of the nearby granites.

Uranium mineralization is present in the Bay du Nord Group elsewhere in the Hermitage Flexure. Approximately 40 km to the west, in the Peter Snout map area, Shell Canada Resources discovered several showings of uranium in the late 1970's. The recorded mineralization occurs in numerous boulders and outcrop of fine grained metasediment and feldspathic schist of the Bay du Nord Group, and also in the Baggs Hill granite, an Ordovician, subvolcanic intrusion (Wells, 1981). Shell Canada Resources has reported up to 30,000 c.p.s. (Urtec UG-130) radioactivity from the Bay du Nord Group in that area. Several samples containing greater than 2,000 g/t U and one sample with greater than 5,000 g/t U have been reported (Wells, 1981). It was thought that the uranium mineralization was related to the intrusion of the Devonian Peter Snout Granite, and that U was remobilized from originally uraniferous sediments by heat associated with that intrusion (Wells, 1981). On the basis of investigations by one of us (S.J. O'Brien), it appears that while the above model may be partially applicable, not all the mineralization at Peter Snout is related to the granite. At least some of the observed mineralization is strata-bound and originally syngenetic, and is concentrated in zones where schistose tuff and pelitic schist are intercalated. It is possible that the granite intrusion results only in minor remobilization. Together with the strata-bound occurrences in the White Bear River area, these showings - regardless of their uncertain origin - serve to further demonstrate the obvious uranium potential of the entire Hermitage Flexure belt.

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