

Fraser Lakes Zones A and B, Way Lake Project, Saskatchewan: Geological, Geophysical, and Geochemical Characteristics of Basement-hosted Uranium Mineralization

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ABSTRACT: The Fraser Lakes uranium showings (Fraser Lakes Zones A and B) were identified in 2008 by ground prospecting of airborne geophysical targets in the southern half of JNR Resources Inc.'s Way Lake property in northern Saskatchewan, Canada. The mineralized zones are proximal to a 5-kilometre-long folded electroromagnetic (EM) conductor comprised of Wollaston Group graphitic pelitic gneisses and uraniferous granitic pegmatites; some five kilometres east of the main Walker Lake EM conductive trend. Outcrop grab samples returned from 0.038 to 0.453% U₃O₈ and drill core samples returned mineralized sections with values from 0.012 to 0.552% U₃O₈.

KEYWORDS: *U-Th-REE mineralization, basement-hosted, unconformity-type, Hudsonian granitoids, Fraser Lakes*

INTRODUCTION

The Fraser Lakes uranium showings, part of JNR's Way Lake Project, are situated circa 25 km southeast of the southeastern margin of the Athabasca Basin, northern Saskatchewan, Canada (Fig. 1). These uranium showings (Fraser Lakes Zones A and B) were identified recently in 2008 by ground prospecting of airborne geophysical targets within the southern half of the Way Lake property. An ongoing drilling program is focusing on the widespread outcrops of uranium mineralization, referred to as the Fraser Lakes uranium showings.

The purpose of this paper is to document the occurrence, geology, geophysics, and geochemistry of the Fraser Lakes uranium showings.

GEOLOGICAL SETTING

Regional Geology

The Fraser Lakes uranium showings are located SE of the Athabasca Basin in the eastern Wollaston Domain, part of the

eastern sub-Athabasca basement complex (Fig. 1).

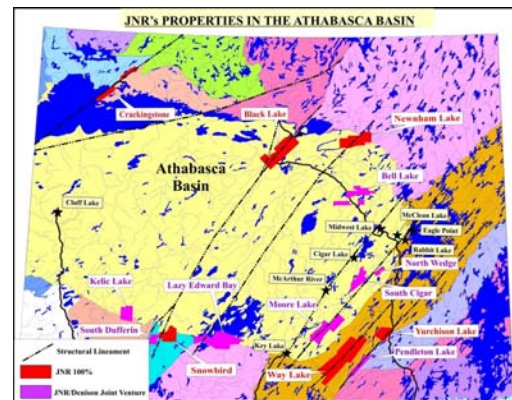


Fig. 1. Location of JNR's properties in the Athabasca Basin, including its Way Lake property on the SE margin (courtesy of JNR Resources Inc. Home Page).

The Athabasca Basin occurs within the southwestern part of the Churchill Structural Province of the Canadian Shield. The 100,000 km² basin is filled by an unmetamorphosed clastic sequence of the Mesoproterozoic (Helikian) Athabasca

Group. The basin is underlain by an Archean/Paleoproterozoic basement complex that was strongly deformed and metamorphosed during the Hudsonian Orogeny (Lewry & Sibbald 1977, 1980; Annesley *et al.* 1997, 1999, 2005).

The Wollaston and Mudjatik domains form two of the major subdivisions of the Cree Lake Zone (Lewry & Sibbald 1977), and also the eastern part of the western foreland of the Paleoproterozoic Trans-Hudson Orogen (i.e., part of the Hearne Province; Hoffman 1989, 1990; Bickford *et al.* 1990; Lewry & Collerson 1990). The present tectonic configuration resulted from the oblique collision of the Superior Province into the accreted Reindeer Zone and Hearne Province during the Hudsonian Orogeny (Fig. 2).

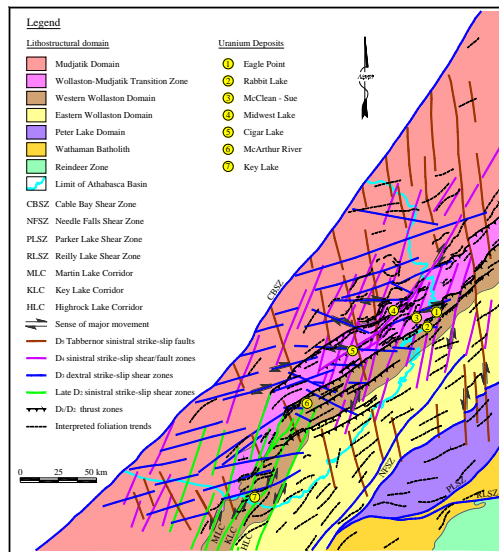


Fig. 2. Geological framework of the basement to the eastern Athabasca Basin, including the location of the major unconformity-type uranium deposits, from Annesley *et al.* (2005).

Local Geology

The Way Lake uranium project of JNR Resources Inc. is located 55 kilometres east of the Key Lake uranium mine in the Athabasca Basin of northern Saskatchewan. The property is underlain by a steeply-dipping, northeast-trending, highly folded sequence of intercalated Paleoproterozoic Wollaston Group

metasediments and underlying Archean orthogneisses. In 2006, high-grade uranium mineralization was obtained from a previously identified massive pitchblende vein, now called the Hook Lake showing (Fig. 3), where two grab samples yielded 40.1% and 48% U₃O₈ with significant Pb, REE, and Th enrichment, and anomalous B, Co, and V.

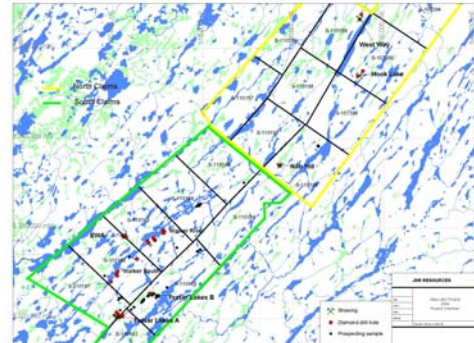


Fig. 3. The major uranium showings within the northern and southern parts of the Way Lake property, including the newly discovered Fraser Lakes zones A and B.

Within the Walker Lake area (Fig. 3, south-western part of the property), two major uranium showings (now called Fraser Lakes Zones A and B) were identified by airborne geophysics and ground prospecting. These mineralized zones are proximal to a 5-kilometre-long, folded EM conductor comprised of Wollaston Group graphitic pelitic gneisses and uraniumiferous granitic pegmatites and leucogranites.

A major prospecting campaign during the summer of 2008 identified significant uranium, thorium, and REE mineralization in several outcrops of granitic pegmatites and leucogranites, coincident with this conductive EM trend. These outcrops are estimated to be ~200-250 meters below a glacially eroded Athabasca/basement unconformity. The radioactive granitic pegmatites and leucogranites occur within a highly tectonized contact zone between Archean granitoids and basal Wollaston Group metasediments. This crustal melt shear zone (decollement) is folded around Archean granitic domes and is thickest within NE-plunging synformal and

antiformal noses. These fold noses are interpreted to have been dilation zones with potential for brittle reactivation and associated fluid flow, alteration, and mineralization after deposition of the Athabasca sandstones. The radioactive quartz-feldspar-biotite granitic pegmatites and leucogranites contain minor to trace amounts of uraninite, U-Th-REE-rich monazite, molybdenite, chalcopyrite, pyrite, and ilmenite. Locally, dark smoky quartz segregations and veins are noted.

The Fraser Lakes Zone B (Figs. 4 & 5) comprises numerous outcrop showings along the northern extent of this folded EM conductor, and is currently the more prospective of the two mineralized zones. Nearly 70 individual mineralized outcrop sites were identified over a 500-metre-wide by 1.5-kilometre-long area within an antiformal fold nose cut by an E-W dextral ductile-brittle cross-structure and younger NNW- and NNE-trending brittle faults. Over 70% of the grab samples taken from these sites assayed from 0.038 to 0.453% U_3O_8 .

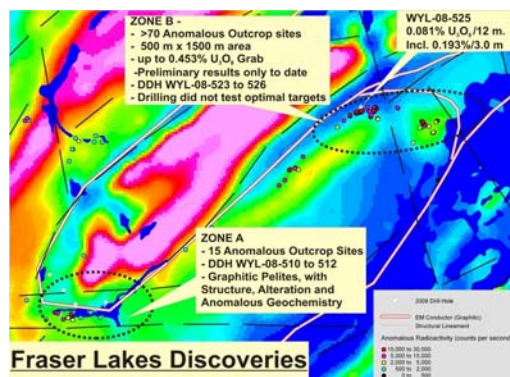


Fig. 4. Some highlights and details of the Fraser Lakes discoveries shown superimposed on the total field aeromagnetic image and a surface trace of the complexly folded EM conductor.

The B zone was tested by three drill holes (WYL-08-524 to 526) at the end of the 2008 program (Figures 4 and 5). Although they could not test the optimum target, namely the graphitic pelitic gneiss/granitic pegmatite contact that occurs beneath muskeg, all three

intersected uranium and thorium mineralization, accompanied by rare-earth element enrichment and anomalous levels of pathfinder elements. The best results were from drill hole WYL-08-525, which intersected numerous uraniferous intervals, mainly within granitic pegmatite. Of particular note was a 12.0-metre intersection from 77.50 to 89.50 metres down hole that returned 0.081% U_3O_8 ; including a 3.0-metre intercept of 0.193% U_3O_8 (true widths cannot be reliably estimated at this time).

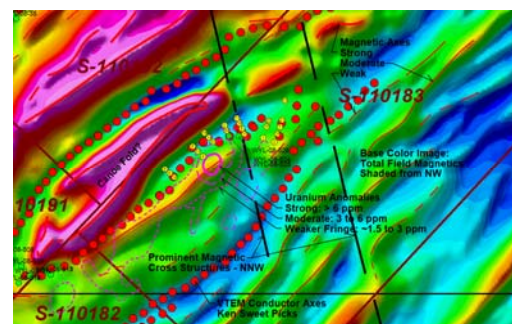


Fig. 5. Location of Zone B 2008 and 2009 drill holes (numbered dots) superimposed on the total field aeromagnetic image, airborne radiometric anomalies (contoured), and EM conductor picks (dark dots). Note the highly disrupted nature of the EM conductor picks in the vicinity of Zone B.

Fraser Lakes Zone A uranium showings occur within a reactivated NE-plunging synformal fold nose, associated with Wollaston Group graphitic pelitic gneisses and leucogranites at the southern end of the EM conductor (Figs. 3 & 4). Seven holes (WYL-08-508 to 514) were drilled in this area, three of which intersected broad zones of significantly altered and structurally disrupted graphitic pelitic gneisses accompanied by anomalous levels of pathfinder elements, particularly copper, nickel, vanadium, bismuth, and zinc. Outcrop samples in the area contained up to 0.042% U_3O_8 .

DISCUSSION AND CONCLUSIONS

The main results of this contribution can be summarized as follows:

(1) The Fraser Lakes uranium showings (Fraser Lakes Zones A and B) were identified in 2008 by ground prospecting of airborne geophysical targets, and show characteristics typical of basement-hosted uranium deposits.

(2) Outcrop radiometrics of the granitic pegmatites and leucogranites correlate well with a high-resolution magnetic /radiometric survey over the Fraser Lakes and surrounding area.

(3) The large aerial extent of the airborne anomalies and the presence of U and Th in outcrop and within several boreholes clearly show that the Fraser Lakes area has a very high potential and likelihood of further uranium discoveries, including high-grade root zones.

In summary, the Fraser Lakes district has numerous similarities to nearby basement-hosted uranium deposits, such as Eagle Point and Millennium, and to U-Th-REE deposits found in the Grenville Province (Lentz 1991) and the Erzgebirge -Fichtelgebirge region, Germany (Förster 1998).

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