

Western Inter-University Geosciences Conference Abstract

Petrological and geochemical comparison of the Eisler and Laonil Lake Intrusive Complexes, Glennie Domain, northern Saskatchewan

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The Seabee Gold Operation, located in northern Saskatchewan, ~125 km northeast of La Ronge, has been in continuous operation since 1991. The host rocks for the gold mineralization are the volcanic and plutonic rocks of the Pine Lake greenstone belt, which represent a volcanic island arc terrane that was accreted onto proto-North America and was metamorphosed during the Trans-Hudson orogen ~1.8 billion years ago. An older volcanic package ("A") is separated from a younger volcanic package ("B") by a regional unconformity. The Laonil Lake Intrusive Complex, which hosts the Seabee gold deposit, and the Eisler Intrusive Complex are thought to be part of Assemblage A, based on an imprecise age determination of the Laonil Lake Intrusive Complex and by initial comparative observation of the Laonil and Eisler Intrusive Complexes. This study aims to better understand the age and tectonic setting of the Laonil Lake Intrusive Complex and its relationship to the nearby Eisler Intrusive Complex—which might represent the same igneous event, and therefore be of interest as an exploration target. Methods to test their correlation include whole rock geochemistry, petrography, Sm-Nd isotopes, and U-Pb geochronology. Preliminary modal mineralogy of samples was used to derive rock names (using pre-metamorphic names); the Laonil Lake Intrusive Complex samples are quartz gabbro and tonalite, whereas the Eisler Intrusive Complex samples are tonalite, quartz gabbro, gabbro, and pyroxenite. The preliminary age determinations of the Laonil Lake and Eisler Intrusive Complexes are ~1877 Ma and 1884 Ma, respectively. The geochemical signatures of all samples suggest derivation in a volcanic arc setting. The

samples exhibit a slight LREE enrichment and epsilon Nd values (+3.61 to +4.65) that suggest a depleted mantle source for the magmas. The ages of Laonil Lake and Eisler Intrusive Complexes suggest that both are part of Assemblage A (Delaney and Cutler 1992). The results of this research will provide constraints on the correlation between the Pine Lake greenstone belt and other volcanic belts in the Trans-Hudson orogeny.

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