

# Mud Volcanoes in the Purcell Basin and Their Relevance to Mesoproterozoic Massive-Sulphide Ag-Pb-Zn Deposits, Southeastern British Columbia (NTS 082F/01, /08, /09, 082G/04, /05, /12)

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## Project Summary

The Purcell Basin fragmental project involves the mapping and rock sampling of various sedimentary fragmental units believed to be related to mud volcanism within the Mesoproterozoic synrift Aldridge Formation in southeastern British Columbia (NTS 082F/01, /08, /09, 082G/04, /05, /12; Figure 1). The project is part of the larger Stimulating Exploration in the East Kootenays (SEEK) program developed by Geoscience BC. The Purcell Basin project is focused on several key areas within the Aldridge Formation, with the intention of creating schematic diagrams of the geometry, local setting and character of the fragmental units. Geochemical analyses of selected alteration assemblages will form a database for later comparison of the study areas. The overarching objective of the project is to highlight the potential for undiscovered massive-sulphide mineralization related to fragmental activity and mud volcanism in the Purcell Basin.

The past-producing Sullivan deposit is a sediment-hosted massive-sulphide Fe-Pb-Zn-Ag deposit that formed within a graben or half graben with a north-south dimension of approximately 13 km and an east-west dimension of 3 to 5 km (Turner et al., 2001; Lydon, 2007). The immediate setting of the deposit has been interpreted as a sedimentary caldera formed from mud-volcano activity (Turner et al., 2001; Lydon, 2007). Venting of hydrothermal fluids during mud-volcano formation controlled sulphide deposition at Sullivan and underpins the importance that these structures have from an economic standpoint.

Mud volcanism in the Aldridge Formation is well documented in numerous locations outside of the Sullivan sub-basin. Recent work by industry has shown that this activity continued episodically from Lower Aldridge to at least

Creston Formation time (Anderson, 2014), a stratigraphic interval in excess of 6000 m (Höy, 1993). Mud-volcano complexes throughout this stratigraphic succession show similar characteristics to those at Sullivan, including alteration types, sulphide mineralization and fragmental facies, thus making them prime exploration candidates for massive-sulphide Ag-Pb-Zn deposits.

## Progress To Date

The 2014 program consisted of approximately 15 days of field mapping and sampling focused on mud-volcano complexes in the Cranbrook area, including those within the Sullivan sub-basin (Figure 1). The project is aimed at providing a geological and geochemical fingerprint for mud-volcano complexes, with a particular focus on comparing the geochemistry from those in the Sullivan area (North Star) to others in the region (Pakk, Rise, Ryder, SBA and Vine West). Geological mapping of fragmental bodies within the complexes focused on their size, alteration and structural controls. The results of this program may define the characteristics of mud-volcano complexes that have higher potential to host massive-sulphide Ag-Pb-Zn deposits.

Data including rock-sample analyses and schematic diagrams will be integrated into a poster display for the Mineral Exploration Roundup 2015 conference and will also be included in a final Geoscience BC report in June of 2015.

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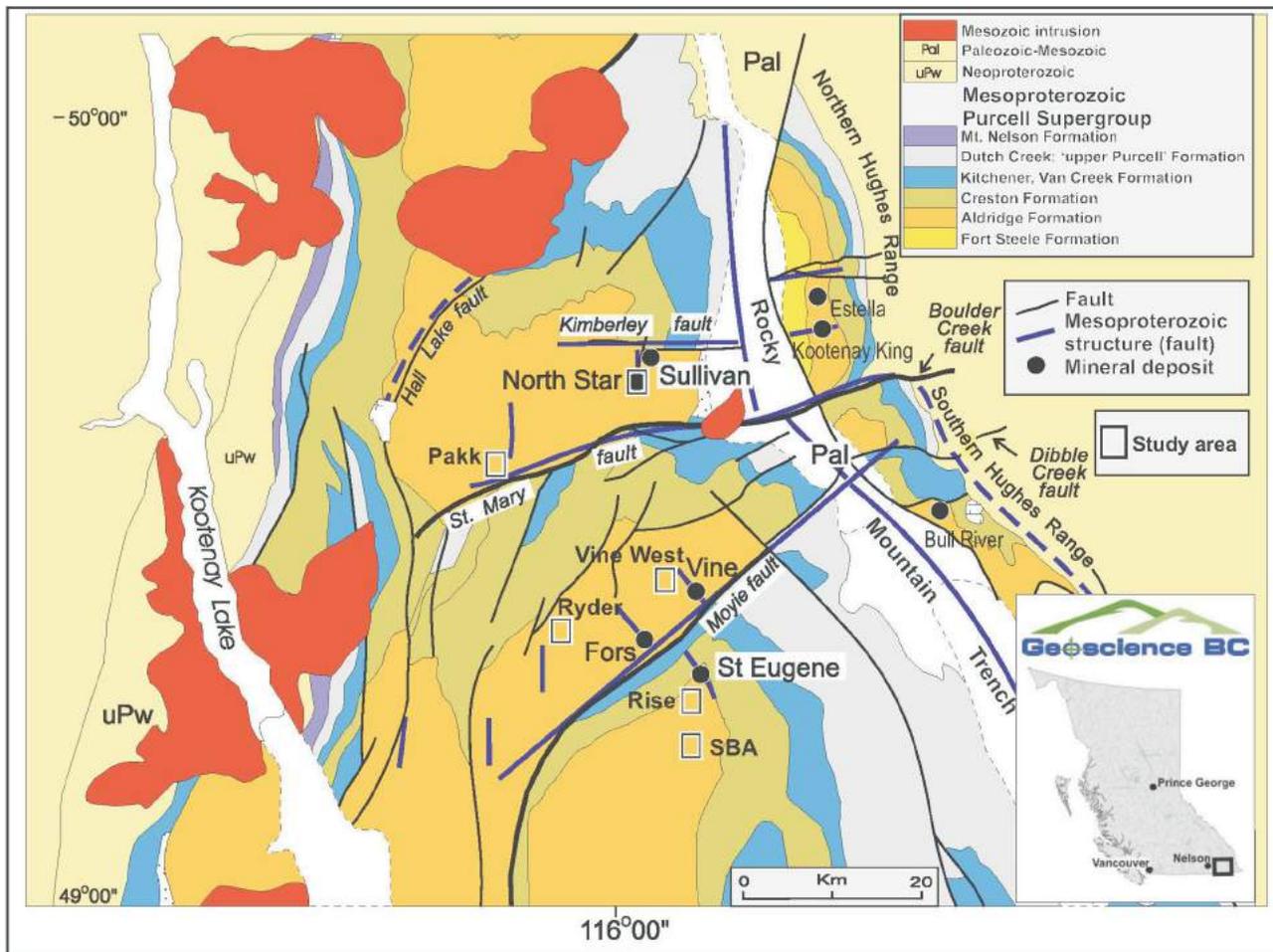
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**Figure 1.** Geology of the Cranbrook area (after Anderson and Höy, 2001), showing major Mesoproterozoic structures, massive-sulphide deposits and 2014 study areas, southeastern British Columbia.

Höy, T. (1993): Geology of the Purcell Supergroup in the Fernie west-half map area, southeastern British Columbia; BC Ministry of Energy and Mines, Bulletin 84, 157 p.

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