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"Sullivan Camp" Exploration Activity Overview

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The "Sullivan Camp" encompasses an area of southeastern British Columbia, northern Idaho and Montana underlain by the Purcell Supergroup, which is a thick sequence of terrigenous clastic, carbonate, and minor volcanic rocks of Middle Proterozoic age. The Purcell Supergroup rocks host a variety of metal deposit types including: **1)** Stratabound clastic-hosted (sedex) Pb-Zn-Ag (Sullivan, Kootenay King), Cu-Co (Sheep Creek, Mont., Blackbird, Idaho), sedimentary Cu (Spar Lake, Mont.), and Fe (Iron Range) deposits; **2)** stratabound silica-hosted deposits (York, Mont.); **3)** stratabound carbonate-hosted Pb-Zn (Mineral King) deposits; **4)** vein Cu (Bull River), Pb-Zn (St. Eugene, Estella, Stenwinder), and Au (Perry Creek area, Midway) deposits; and **5)** shear-hosted Au deposits (David-Lew) (Hoy, 1993). Mineral exploration in the "Sullivan Camp" was launched in the 1860s with the rush to Wild Horse Creek, near Fort Steele, for placer gold. In the 1880s the focus shifted to Pb, Cu, and Ag, and the North Star deposit, located on the Kimberley ski hill, was one of the first of the sediment-hosted Pb-Zn-Ag occurrences to be discovered in the "Camp". Shortly afterwards, in 1892, the Sullivan deposit was discovered, followed in 1893 by the St. Eugene deposit on the shore of Moyie Lake. The Sullivan commenced mining in 1900 and was acquired by Consolidated Mining and Smelting Company of Canada (Cominco) in 1910. The Sullivan deposit is the longest-lived, continuous mining operation in Canadian history and one of the largest Zn-Pb-Ag deposits in the world, originally containing more than 160 million tonnes grading 6.5% Pb, 5.6% Zn, and 67 g/t Ag.

By the early 1940s the enormous size and main geological and geochemical aspects of the Sullivan deposit were recognized. From 1945 through to the 1990s Cominco carried out regional exploration covering the Aldridge Formation in Canada and the equivalent Pritchard Formation in the northwestern United States. Significant milestones in the evolution of exploration for Sullivan-type deposits in the "Camp" include: **1)** development in the early 1940s of a detailed hangingwall and ore-layer stratigraphy from comprehensive examination of archival drill core; **2)** recognition in the early 1940s of the association between the ore deposit and tourmaline and albite alteration, the presence of a localized sedimentary basin, and discordant diorite/gabbro sills and faults; **3)** about 1949, the Aldridge Formation was subdivided into Lower, Middle, and Upper divisions and it was observed that the Sullivan deposit was located at the contact between the Lower and Middle Aldridge (LMC); **4)** in the late 1950s and early 1960s the concept that the ore was predominantly exhalative rather than replacement in origin was developed; and, **5)** in the 1960s it was recognized, by two separate parties, that light and dark laminated argillite "markers" could be correlated bed-for-bed across hundreds of kilometres. This provided a tool to accurately estimate the stratigraphic distance to "Sullivan time" at the LMC, from anywhere in the 3000m thick monotonous Middle Aldridge turbidites (Hamilton et al., 2000). This last accomplishment proved extremely important in the implementation of deep-penetrating electromagnetic surveys to evaluate the LMC over large areas and was also invaluable in locating and interpreting drillholes for stratigraphic studies.

Cominco dominated exploration in the "Camp" until the 1980s. Since the early 1980s several senior mining companies and a large number of junior exploration companies have explored for Sullivan-type sedex deposits in the "Camp". Flow through share financing facilitated increased exploration in the "Sullivan Camp" during the late 1980s by the junior company sector. Since 1988 more than \$20 million has been spent on sedex exploration in the British Columbia sector of the "Sullivan Camp". In 1996 the Government of British Columbia and the Geological Survey of Canada funded a \$600,000 state-of-the-art airborne geophysical survey that covered three areas of high potential Aldridge stratigraphy. The release of the survey resulted in increased mineral exploration in these areas.

Increased exploration spending in the "Camp" over the last decade has resulted in the discovery of a number of new alteration zones, hydrothermal vents and mineralized systems within the Aldridge Formation. Despite these successes, an economic discovery has remained elusive. Some of the exploration highlights from this period include: 1) intersection in 1992 of 1m of massive sulphides grading 9.35% Pb, 16.4% Zn, 0.09% Cd, and 98 g/t Ag on the **Fors** property, west of Moyie Lake, by Consolidated Ramrod Gold Corporation (Britton and Pighin, 1995); 2) intersection in 1997 of 2.6m of massive to semi-massive sulphides grading 9.65% Zn, 5.82% Pb, and 49.4 g/t Ag at a depth of 505m by Kennecott on the **Irishman/Lewis** property in the upper Moyie River area (Wilton, 1997); 3) the discovery in 1997 of a stratabound sulphide breccia within Lower Aldridge siltstones on the **Greenland Creek** property, located in upper Skookumchuck Creek, by Eagle Plains Resources. Drilling intersected up to 6.06% Zn over 0.33m (Wilton, 1997); 4) identification of large zones of geochemically anomalous tourmalinization and fragmental rocks on the **Findlay** property northwest of Kimberley by Eagle Plains Resources; and 5) the discovery of three new showings on the **Pakk** property, west of Kimberley, by prospectors for Supergroup Holdings Inc.. Cominco's exploration in the "Camp" in later years focused on pursuing the fault-displaced extension of the Sullivan deposit with deep drilling north of the Kimberley Fault. In 1988 a drillhole, located 4.3km northwest of Sullivan on **Mark Creek**, intersected a short interval of deformed laminated sulphides containing 5% combined Pb-Zn, believed to be the extension of the Sullivan orebody, at 2600m depth, before entering a thick gabbro sill and granophyre.

Exploration for Sullivan-type and other targets in the "Camp" has decreased significantly over the past two years. This is due in large part to the difficulty that the mining sector is having in attracting financing, the impacts of low metal prices internationally, the ramifications of corporate consolidation, and strong off-shore competition for exploration dollars, combined with a poor resource development environment in the Province during the past decade. Although many properties have had significant amounts of surface exploration and drilling, the "Camp" continues to be an attractive place to explore for large sedex deposits due to excellent access, infrastructure, a continually growing base of geological knowledge, and an abundance of untested targets.

References:

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Hello Helen:

Here is the abstract Tom Schroeter and I are submitting for the Sullivan Geological Meeting. Let me know if you have any trouble opening the document.

Regards,

David Terry



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