

Thank you to our lecture sponsor



## Location, Location, Location: Long-Lived Lineaments Provided Prime Real Estate for BC's Cu-Au Porphyries

---

JoAnne Nelson, KEG Lecture Series, March 25 2021

Geological lineaments score the earth's surface as linear depressions that are in some cases visible from space. They coincide with clusters of faults – literally, flaws in the bedrock structure that can extend to great depths in the earth's crust. Because they are zones of weakness, lineaments tend to focus repeated displacements on individual faults. Repeated jostling in turn promotes development of open spaces and areas of broken rock (“damage zones”). Such persistent structural weaknesses, which are most undesirable in human-built structures(!), in nature can provide the matrix of large mineral deposits. Most types of mineral deposits form as a result of focused upward flow of hydrothermal fluids and magmas. Because they create zones of weak, permeable rock, lineament corridors provide ideal conduits that can channel both fluids and magmas. This talk is about the lineaments that concentrate copper-gold-rich porphyries in British Columbia. While gold veins like Bralorne have long been known to be controlled by faults, the key importance of zones of long-lived faulting as locators for porphyries in this province is just being recognized. Large copper-gold porphyries occur in two regions of BC: the “Golden Triangle” in the northwest, and the Copper Mountain – Afton porphyry trend between Princeton and Kamloops. Recent detailed work on Cu-Au porphyries in the Golden Triangle has revealed structural control at all scales, from regional lineaments to elongate, fault-controlled host intrusions to sheeted ore vein arrays that formed in response to local stress fields. The KSM porphyry trend is aligned along a north-south lineament corridor that later broke open as a rift zone, where the Eskay Creek volcanogenic massive sulphide deposit formed nearby in a setting identical to that of modern seabed massive sulphide chimney-mound complexes. These two mineralizing events happened 15 million years apart, but they were both focussed within the same structurally-controlled zone. The KSM porphyry intrusions were probably emplaced during an episode of low-displacement strike-slip displacement on some of the faults. The Eskay rift was opened by east-west extension operating on other faults in the corridor. This

two-part mineralization story shows how a pre-existing zone of weakness tends to absorb strain and deform further with every new tectonic “crunch”, and how it provides a free pass for any magmas and/or hot fluids that come along. Location. The Iskut area near the northern edge of the Golden Triangle is an exciting emerging exploration play, also involving structural control of magmas and mineralization. The Red Chris mine started production in 2015, and exploration from 2017 to present has transformed the Tatogga property from an interesting geochemical anomaly to a full-blown advanced prospect, home of the now-famous Saddle North porphyry. Both Red Chris and Saddle show the unmistakable signs of lineament control. The Red stock and the Saddle-Castle porphyry body are elongated with easterly trends. Parallel bounding faults show later motion: the South Boundary fault at Red Chris and the Poelzer fault at Tatogga. Location, location. Copper-gold porphyries of south-central BC lie within a northerly trend between Copper Mountain and Afton/Ajax, with a number of interesting prospects in between. Vic Preto showed in a 1979 map that this area is cut by a set of intersecting northerly faults. Displacement on these faults is much younger than the porphyries, due to reactivation along a long-lived structural corridor. It turns out that this corridor has held (and perhaps still holds) some juicy surprises. Kodiak Resources made a grass-roots discovery within it in 2019 (MPD), and current operator Teck reports a 2021 hole of 535 m 0.49% Cu, 0.29 g/t Au. Geochemical and geophysical surveys show northerly trends, parallel to the regional lineament corridor. Location, location, location. Bottom line: if you want to find a copper-gold porphyry, using your shiny exploration tools to scour lineaments in known mineral districts is probably your best bet.