

## **Controls on Mineralisation at Courageous Lake's FAT Deposit**

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### **Abstract**

Seabridge Gold's FAT deposit, within the Courageous Lake Greenstone Belt represents the rare possibility of economic, well-preserved epithermal gold deposit in the Archean. The deposit is within the Yellowknife Supergroup of the Central Slave province, NWT; a fertile gold producing district known principally for the Giant and Con mines. The Courageous Lake Greenstone Belt lies unconformably above a sodic granite pluton within a rift basin; episodic volcanism is preserved because it is overlain by conformable sedimentary rocks, implying rapid burial. The package then underwent deformation, was tilted vertically and metamorphosed to greenschist to lower amphibolite facies. The latter is likely the same province-wide orogenic event which resulted in the formation of the Con and Giant mines. Gold mineralisation at FAT occurs as 8 stratabound domains within a rhyolite to dacite volcanic tuff sequence, overlain by shallow-water, fine-grained turbidites. Sub-aerial, principally lithic and ash tuffs are usually well preserved and generally interbedded with aqueously reworked tuffs. The bulk of the reserve tonnage is contained within 3 adjacent, central domains each with distinct and unique textural styles. Deformation is present, but the domains are sheared to different extents. Within these domains, refractory gold is present, mainly within acicular arsenopyrite and is broadly associated with sericite and silica alteration proximal to and within quartz veins. Mineralised textures range from sulphide-filled, undeformed, rounded and ellipsoid lithic fragments in primary volcanics to disseminated sulphides within foliated and sheared tuffs. Thin sections show that the sulphide habit and distribution varies in each domain. Geothermal processes associated with volcanic activity, and late-stage shearing congruent with regional metamorphism may have both contributed to the endowment and distribution of gold.