# Sediment-Hosted Gold-Quartz Deposits Verkhoyansk-Kolyma Fold Region

Valery Fridovsky*

Federal State Budgetary Institution Diamond and Precious Metal Geology Institute, Siberian Branch Russian Academy of Sciences, Yakutsk, Russia, 677980

*E-mail, 710933@list.ru

Sediment-hosted gold-quartz deposits of the Verkhoyansk-Kolyma fold region were formed in the Late Jurassic-Early Cretaceous during collision of the Kolyma-Omolon superterrane and the Okhotsk terrane with the eastern margin of the North Asian craton. Two types of the deposits in the upper Carboniferous-Triassic terrigenous strata occur: early orogenic gold-sulfide–disseminated and gold-quartz deposits of shear zones, and late orogenic gold-quartz deposits of fracture zones.

Early orogenic disseminated gold-sulfide and gold-quartz deposits hosted in shear zones formed at the beginning of the Oxfordian-Kimmeridgian collision-accretion events on the eastern margin of the North Asian craton before emplacement of large granitoid plutons. The South Verkhoyansk synclinorium is the typical region of development of this type of mineralization. Gold-quartz mineralization is developed in its western part, in the zone width of about 50 km and a length of more than 300 km, and is the source of vastly worked placers (Yursk-Brindakit, Onocholkh ore clusters). There are several horizons of gold-quartz veins conforming with host upper Carboniferous-Lower Permian strata. Ore veins are represented by stratal and substratal bodies in sandstone strata or along their contact with shales and aleurolites. Sometimes the combination of conformable and radially conjugate cross veins is recorded. Structurally, the location of extended stratified veins is controlled by shear zone, which are accompanied by slaty cleavage, shear folds, mullion and boudinage structures, and transposition elements. With metamorphism of sericite-chlorite subfacies of greenschist facies, hydrothermal perivein changes (silicification, sericitization, sulfidization, and carbonation) of low intensity appear. Quartz (95%), with an admixture of albite and carbonates, dominates vein content. Sulfide does not exceed 1% (arsenopyrite, pyrite, galena, sphalerite, chalcopyrite, fahlore, and gold). Formation of early generations of quartz is associated with magmatic-metamorphic fluids, while late veins are associated with formation during magma ascent to a higher crustal level.

The largest deposits of northeastern Russia (e.g., Nezhdaninskoe, Natalka, Drazhnoe, Bazovskoe, Malo-Tarinskoe) belong to the type of late orogenic gold-quartz deposits of fracture zones. Deposits form extended metallogenic belts (Yana-Kolyma, Allakh-Yun). They associate with the Tithonian-Valanginian granitoids of ilmenite series of S- and I-type, forming belts. Mineralization occurred after the intrusion of granitoids and usually is located away from them at a distance of several kilometers. Deposit location is identified by extended thrust faults and lesser strike-slip faults, separating large blocks with different structure and geologic-tectonic development. Shear faults form conjugate paragenesis with thrusts. Ramp crossings (frontal and oblique, frontal and lateral) are determined as major structural-tectonic factor of mineralization location. Structural-morphologic types of ore zones (vein, vein-stringer, stringer-disseminated, mineralized shear zones, and crush zones are developed in different combinations and amounts. Consistent mineral composition of orebodies (quartz – 85-95%, ankerite – 5-15%, ore minerals – about 1%) is typical. Serial sequence of mineral associations (pyrite-arsenopyrite-sericite-quartz-metasomatic, pyrite-arsenopyrite-quartz vein, chalcopyrite-sphalerite-galena and sulfosalt-carbonate associations) occur. Late orogenic gold-quartz deposits of fracture zones are superposed by intrusion-hosted gold-quartz veins, Au-Sb, and Ag-Au mineralization. The combination of different types of mineralization within uniform multistage activated tectonic structures is an important sign of large deposits.