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**Title:** CHARACTERISTICS OF PHYLIC ALTERATION AND MINERALIZATION IN LATE-STAGE PORPHYRY DIKES IN THE NORTH SILVER BELL DEPOSIT, PIMA COUNTY, AZ

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**Abstract:** The North Silver Bell orebody is a sub-horizontal supergene chalcocite-enrichment blanket developed principally in highly-fractured dacite porphyry. Dacite porphyry ore consists of multiple intersecting pyritic fractures and quartz+pyrite veinlets that are weakly enriched and dacite porphyry ore typically grades 0.2-0.4% copper through much of the deposit. Mining on three bench levels (2590, 2550, 2510) in the east-central part of the North Silver Bell pit exposed relatively high-grade ore (0.6->1%Cu) associated with two distinctive quartz latite porphyry intrusions (qlp-1 and qlp-2). The qlp dikes exhibit intense phyllic alteration, display unusual styles of hypogene sulfide mineralization, and control the distribution of higher grade mineralization. Integration of bench mapping, blast-hole assays, and petrographic studies of mineralized dikes document that strong mineralization is related to hypogene sericite+quartz+pyrite+chalcopyrite assemblages where increased sulfide content was an important factor for higher enrichment grades. Altered qlp dikes are characterized by low fracture densities, a notable absence of veining in some dikes, and multiple sericite types. The sericite-dominant alteration overprints earlier potassic assemblages in qlp-hosted ore, but some high-grade ore zones are associated with texturally-destructive alteration that has no relict hydrothermal K-feldspar.

The qlp dikes primarily intrude dacite porphyry in the pit, but map relations indicate they post-date quartz monzonite porphyry dikes and stocks at North Silver Bell. Thick qlp-1 dikes (>40 m) display pink-grey plagioclase crystals in a tan-buff groundmass and irregular stock-like bodies are widely exposed on the 2590 and 2550 benches. Less common qlp-2 dikes contain white plagioclase phenocrysts in a grey groundmass. Cross-cutting relationships on the 2550 bench document a qlp-2 dike cutting a larger body of qlp-1.

Phyllic alteration of qlp-1 dikes includes variable phenocryst and groundmass replacement by sericite, late vein phases with fine-grained sericite, quartz, and chalcopyrite, and coarse-grained sulfide deposition in vugs. Sericite+pyrite veinlets cutting sulfide grains are common and some chalcopyrite contains inclusions of coarsely-crystalline sericite. Pervasive sericite+pyrite alteration localized along qlp-1 contacts

produced zones of >1% copper with complete replacement of dike rock and adjacent dacite porphyry by pale-green sericite with 1-10 cm veins and intergrown masses of euhedral pyrite rimmed by chalcocite. Sericitized qlp-2 dikes host disseminated mineralization that is not veinlet-controlled. The ore consists of 3->5% pyrite and chalcopyrite grains widely-dispersed throughout the groundmass with no secondary micro-fractures or veinlets. In pervasively altered qlp-2 dikes the groundmass is a bright white finely-crystalline assemblage of intergrown sericite+quartz+pyrite and enriched sulfide grains are enveloped by groundmass sericite.