Geology of the Joaquin Silver and Gold Project—Santa Cruz, Argentina

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The Joaquin Silver and Gold Project is located in the north-central part of the Santa Cruz Province, Argentina, in the Deseado Massif, an extensive Jurassic-aged, bimodal volcanic field that hosts several precious metal mines, mineral deposits, and mineral occurrences. The Deseado Massif is one of two large-scale volcanic domains within southern Argentina, separated by younger, pericratonic basins that contain the oil fields of southern Argentina.

Large amounts of silicic- to intermediate-composition volcanic rocks were erupted in the area in the Jurassic, in a subaerial cratonic (back-arc), tensional environment superimposed on a basement of Paleozoic-aged sedimentary rocks. The Jurassic volcanic pile is composed mainly of rhyolitic to dacitic-andesitic flows with lesser amounts of basaltic lavas. Several small basins developed after the main volcanic episodes, as a consequence of intense diastrophic block faulting; continental sediments were deposited in those basins in Upper Jurassic to Lower Cretaceous periods. Basaltic plateau volcanism was dominant during the Tertiary, coupled with minor marine transgressions and associated sedimentary deposits. Intrusive rocks are scarce, consisting of rhyolitic porphyries (domes and dikes) that intruded the silicic volcanic units, and of basaltic plugs that pierce the whole sequence.

The rocks exposed in the Joaquin project area, comprising over 28,000 hectares of exploration concessions, are part of a thick pile of acidic volcanic rocks assigned to the Chon Aike Formation, deposited during mid-Jurassic time. The Chon Aike Formation consists of a series of ignimbrite flows locally interbedded with tuffs and volcaniclastic sediments. Several cooling units, which display varying degrees of welding, are recognized in the area. Two main structural patterns are identified, trending northwest and north; the northwest trend hosts the mineralized bodies and the north produced vertical and left-lateral displacements of the earlier features. A large circular feature has been recognized in the center portion of the project area, possibly representing fracture systems related to the margins of a large caldera.

Silver- and gold-bearing outcrops of silicified Chon Aike Formation volcanic rocks were discovered at Joaquin by geologists of Mirasol Resources Inc. Coeur d'Alene Mines Corporation entered into a joint venture option agreement with Mirasol in 2006 and conducted follow-up reconnaissance exploration and sampling and the first drilling on the large Joaquin land package, which led to the discovery of the La Negra and La Morocha mineral deposits. Three precious metal deposits have been defined by drilling to date in Joaquin: La Negra, La Morocha, and La Morena, as well as several other mineral occurrences. Mineral resources defined at La Negra and La Morocha, compliant with Canadian National Instrument 43-101, consist of 13.7 million tonnes (Mt) of measured and indicated mineral resources with average grades of 0.10 grams per tonne (g/t) of Au and 90 g/t of Ag and 8.3 Mt of inferred mineral resources averaging 0.07 g/t of Au and 118 g/t of Ag. The La Negra deposit consists of a subvertical, silicified body, oriented north-northwest, and at least two irregularly shaped, subhorizontal bodies (mantos). La Morocha is a single inclined body, striking north-northwest and dipping moderately to the northeast.

Precious metal mineralization in Joaquin is silver dominant with lesser amounts of gold, as well as lead and zinc. Mineralization is contained in hydrothermal breccias, stockworks, veinlet and stringer zones, fault zones, disseminations, and to a lesser extent in veins. The mineralized structures trend northwest to north-northwest. The mineral deposits are interpreted to be intermediate sulfidation-style, epithermal systems.

Ore mineralogy in the oxide zones is diverse, consisting of native silver, chlorargyrite (AgCl), bromargyrite (AgBr), goethite, braunite, argentojarosite, and pervasive iron oxides with lesser manganese oxides. In the sulfide zones, pyrite, sphalerite, galena, and lesser amounts of chalcopyrite, polybasite ($(Ag,Cu)_6(Sb,As)_2S_7)(Ag_9CuS)_4$, and stephanite ($Ag_5SbS_4$) have been identified.