

Gold Deposits of Puerto Rico

by

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Gold in Puerto Rico is known to occur in at least five different **mineral deposit types**: gold placers, polymetallic veins, gold-copper skarns, porphyry copper-gold deposits, and acid-sulfate precious-metal deposits. Potential for undiscovered gold-bearing deposits exist in Puerto Rico in off-shore placer deposits, gold-copper skarns surrounding Tertiary intrusions and, polymetallic veins throughout the Commonwealth. There is also potential for large bulk concentrations within intensively acid sulfate altered areas. While there is no direct evidence for their existence, it is possible that Puerto Rico contains both sediment-hosted and laterite gold deposits. Modern prospecting for gold in Puerto Rico has not been exhaustive.

Placer gold deposits (USGS model #39A, Cox and Singer, 1986) were perhaps the first gold deposits worked in Puerto Rico. These were best developed along many of the major rivers draining north from the central mountains (Cordova, 1920). While not individually large, the aggregate of these deposits is thought to have contained as much as 1 million ounces (25,000 kg) of gold. These deposits, first worked by the Spanish in the 1500's (Cardona, 1974), are best developed along the Rio Fajardo, Rio Mameyes, Rio Humacao, Rio Maville, Rio Cibuco, Rio Daguao, Rio Grande de Loiza, Rio Sibuco, Rio Anasco, and Rio Grande de Manati drainage systems. Gold in small placer deposits is also known in the vicinity of several of the porphyry copper-gold deposits in the Utuado District and in small drainage basins surrounding the intrusion hosted gold occurrences at Barranquitas. Prospecting for on-shore gold placer deposits appears

to have been extensive and perhaps nearly exhaustive. However, potential may exist in the narrow, shallow off-shore shelf along the north shore of the island, especially down stream from the previously productive placer deposits. It is also possible that several of the underground rivers developed in the extensive karst environment along the north slope of the island could host small placer deposits.

Gold occurs along with copper, zinc, lead, arsenic, and silver in veins and fissures developed in several host rock settings throughout the Commonwealth. The best developed are the small veins and metamorphic veins in the serpentinite terrane in the Bermeja Complex at the Minillas deposits (Mattson, 1960). Quartz veins, developed in many places within east-west shear zones, vary in width from 10 cm to 1.5 meters, and have strike lengths of as much as 1,000 meters. Past production is small: 180 tons of 0.74 oz/ton. Mineralization is not continuous throughout these veins, and appears best developed along intersecting structures and within the widest portions of the veins. Several polymetallic vein deposits are known within the outer halo zones of major intrusive related deposits. While not extensive, these deposits contain gold concentrations of as much as 50 g/tonne gold (USGS model #22, Cox and Singer, 1986).

Gold bearing skarn deposits, especially surrounding the **Rio Blanco stock** in the Sierra de Luquillo, were discovered and first worked by the Spanish in the early 1600's (Cardona, 1984). While the production appears to have been limited to several small adits, the zone of alteration is an extensive 2- to 4-kilometer-wide zone surrounding the entire Rio Blanco stock. Placer gold deposits persist for nearly the entire distance of 10 km to the Atlantic Ocean. Garnet, epidote, chlorite, pyrite, and chalcopyrite are the predominant minerals within the best known occurrences.

Gold occurs within the porphyry copper deposits in the **Utuaado area** of west-central Puerto Rico (Cox, 1985). While resource estimations of the gold tenor within these deposits are not available, limited analyses of gold from these copper deposits indicate the grade of gold to be as high as 0.015 oz/ton (0.5 g/tonne)(Cox, 1985). These occurrences are described by USGS model #20d (Cox, 1991). Gold would be a significant by-product should these deposits ever be mined.

Gold also occurs in large advanced argillic alteration systems, occasionally associated with Eocene intrusions. Gold has been determined to exist in the intensely altered quartz-diorite intrusion at **Barranquitas** (Flint, 1965) and in silica- and alunite-rich breccias and structural zones in the **Cerro Avispa area** (Cardona, 1982 and Cox and Briggs, 1973). While not previously described as a separate mineral deposit type, these systems are consistent with the acid-sulfate precious-metal deposit type of Kesler and others (1990). Alternatively, the data are consistent with these deposits being a high level end-member of the porphyry gold model described by Cox (1991).

Large areas of advanced argillic alteration are developed along northwest-trending structures in Puerto Rico. These zones are hosted by Eocene andesitic volcanics and volcanoclastic formations. Extensive zones of argillic, alunitic, and silica/scinter alteration are hosts to several gold occurrences. Gold is also hosted by breccia pipes, linear zones of stockwork quartz veins, and areas of intense fracturing. Gold persists in concentrations of one to ten times higher than silver. Arsenic is present, and copper is anomalous in most areas of gold mineralization. Silicification, where present, is in open spaces and vuggy in appearance, although massive silica is present at a few localities. Rare quartz-porphyry dikes are the only direct evidence of the possibility of underlying intrusions.