Overview of the Pebble Cu-Au-Mo Porphyry System, Southwest Alaska  
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The Pebble deposit, an undeveloped Cu-Au-Mo porphyry system in southwest Alaska, is one of the largest ore deposits in the world. Advanced exploration and prefeasibility studies by the Pebble Partnership (Northern Dynasty Minerals Ltd/Anglo American Corporation) are currently underway but the deposit remains open on several sides. Pebble already ranks among the largest porphyry deposits in the world in terms of metal resources (measured, indicated and inferred), with ~7.5 billion tons of ore (4.1 billion tons at 0.30% CuEq cutoff and 2.4 billion tons at 0.60% CuEq cutoff). It is the second largest copper-gold porphyry in the world next to the Grasberg deposit in Papua New Guinea. Now known to comprise a shallow, low-grade orebody, Pebble West, and a deeper, higher grade orebody known as Pebble East, it contains a variety of alteration mineral assemblages in a zoning pattern similar to other porphyries; these are associated with different ore minerals and appear to be correlated with grade and Cu/Au ratio. Alteration types include central potassium-silicate-constructive, local advanced argillic, peripheral and deep propylitic, and several varieties of “phyllic” alteration. Chalcopyrite is the main ore mineral, with other sulfides present including pyrite, bornite, molybdenite, covellite, digenite, chalcocite, tennantite/tetrahedrite, enargite, and pyrrhotite. Gold is present as micron-scale particles on the edges of sulfide grains. Because of its spectacular size and potential to become one of the world’s most important sources of copper and other metals, a description of Pebble’s alteration and ore assemblages as well as zoning patterns will be of obvious interest to industry as well as researchers. Though Pebble West was first discovered in 1988 by Cominco (now Teck Cominco), only one article on the deposit has been published to date.

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