

Pebble Discovery History

by Phil St. George, 2018

The discovery of Pebble took place through a progression of events and a series of exploration programs managed by Cominco Alaska. Several people discussed below were critical to the discovery as without their efforts we wouldn't have progressed into the exploration of that area.

The earliest exploration in the Southwest Alaska was a short sampling program recommended by Joe Piekenbrock in 1982. The first program was to scout out potential for tin and gold within a short 1 week helicopter program based out of Dillingham and included Joe Piekenbrock, Roy McMichael, Phil St. George and Helen Farnstom Robertson. Exploring north of Koliganek, in the Taylor Mountain USGS 1:25000 quadrangle. Tin was found at Sleitat Mountain, and other tin occurrences were found on hills south of the King Salmon River, a tributary to the Nushagak River.

In late 1982 and early 1983, Roy McMichael, a senior geologist at Cominco created a joint venture with Enstar Natural Gas Company to do further exploration in the Taylor Mountain, Sleetmute, Iditarod and Lime Hills quadrangles, an area stretching from Koliganek to Flat, Lime Village and up to McGrath. An Area of Interest was signed in the Joint Venture agreement. Joe Piekenbrock managed this program and the discovery of a gold deposit on the south side of the Shotgun Hills was made by Joe and called Mose initially and then Shotgun by later workers. Rock sampling for tin at Sleitat Mountain indicated a potential ore deposit.

In 1984, drilling was initiated at Sleitat Mountain, and then later at Mose. Meanwhile grass-roots exploration continued throughout the region, with additional mineral occurrences found to the east of the Area of interest so that the Area of Interest was enlarged into the Iliamna and Lake Clark quadrangles. Visible gold was found at Sharp Mountain, but that was outside of the area of interest and geologists were told to make no further landings outside of the Area of Interest. During this work in the Iliamna area iron stained hilltops were noted from the helicopter in the Pebble area on fueling flight to Iliamna. Phil St. George managed this program. Drilling intersected interesting quantities of tin at Sleitat and interesting gold values at Mose, but not sufficient grades to justify further work on those prospects.

In 1985, exploration funding was cancelled by Enstar, and Cominco had very limited budgets that year. Cominco could only fund a short fly camp program at Sharp Mountain to define the size and grades of gold-bearing veins at Sharp Mountain.

In 1986, Phil St. George conducted a short placer gold evaluation of the Sharp Mountain area with his own funding. Tim LaPorte flew him in and out of Sharp Lake in a float plane, and deviated to the north to point out the iron stained hills in the Pebble area, a great reminder that further work should be done there.

In 1987, Lorne Young put together a gold and copper exploration program to explore a belt of rocks stretching from the Lake Clark quadrangle, as well as in the Talkeetna Mountains, Healy and Mount Hayes quadrangles. Phil St. George was asked to manage this program which included John Robinson

and Laura Gould. Early in the exploration of the Lake Clark quadrangle low clouds and fog in that area, gave Phil a chance to sample the iron stained hill tops in the Pebble area. Laura Gould sampled an iron oxide-rich gold vein that contained 0.75 ounces per ton gold on the first visit to the Pebble area and none of the rock samples contained less than 100 parts per million gold over a 7 square mile area. This is a low value of gold but indicated there was an enormous quantity of gold in the area. The prospect was named Pebble Beach, for its golf course-like pot and kettle topography. High-grade gold veins were also discovered on that same day, on Kaskanek Mountain and that prospect was named Sill. Follow-up work later in the season included detailed sampling of the veins at Sill and a soil sample grid (100 foot by 200 foot spaced samples).

In 1988, Phil St. George proposed and received funding approval for about 15 holes at Sill and two holes at Pebble plus more geological mapping and sampling at both properties. Drilling was initiated at Sill with some high-grade intercepts. Detailed mapping of the area by John Robinson revealed the nature and extent of the veining there. Roger Burleigh mapped at Pebble and recognized it as a Cu/Mo/Au porphyry with only very limited talus and sub-cropping exposures of rocks. Prior to the start of drilling at Pebble, Senior management stated that they were no longer interested in drilling Pebble and would not support St. George if he took a drill to Pebble. Fortunately, St. George was young and single and preferred to drill at Pebble over keeping a permanent job. Luckily for St. George, the first two holes both intercepted gold veins containing 0.1 oz/ton over 5 feet in drill core. These intercepts turned out to be located in the outer gold halo of the copper porphyry but allowed management to support further work there.

In 1989 the fourth drill hole (hole number 6) intercepted the first copper porphyry mineralization in a drill hole, which turned out to be the highest-grade hole Cominco drilled on the copper porphyry. A second copper porphyry deposit was intercepted in the seventh and eighth holes that summer, which contained up to 1 ounce per ton gold. St. George managed the drill programs in 1989, 1990 and 1991. By the end of 1991 a total of 500 million tons of 0.35% Copper and 0.012 ounces per ton had been drilled off (delineated). During those years engineering, metallurgical, access, environmental, weather, and biological studies were conducted as well as financial analysis of potential mining operations.

Pebble was never loved by Cominco management, as Red Dog started mining operations in 1989. Red Dog had higher value ore than Pebble and the company really struggled during the early years of production and didn't make a profit for the first 10 years. Cominco reasoned that if Red Dog couldn't make money with more valuable ore, how could Pebble become profitable. St. George struggled in budget meetings every year of drilling at Pebble, and had to bang on the tabletops to squeak out any money at all. In 1991 St. George was given two weeks of drill funding at a time and had to fight for additional money every other week throughout the summer.

The eventual sale of the property to Northern Dynasty was very unusual transaction that happened after St. George left the company but it was strange in its low price and lack of any royalties on the property.

A short drill program was managed by Paul Weatherbee in 1992 that tested areas away from the known deposit. A drill program in 1998 was managed by Kent Turner a Teck employee at the time, since

Cominco had been bought out by Teck. That program doubled the size of Pebble to 1 billion tons at a similar grade to the initial resource.

All the early years of work at Pebble work operated from Myrtle and Elia Anelon's housing complex. St. George and the other Pebble workers came to know Myrtle's and Elia's children and grandchildren. The grandchildren had the impression that St. George's name was Cominco, as they probably heard Cominco was coming to town and they knew he was the project manager. The people of Iliamna, Newhalen and Nondalton were always helpful and pleasant and many friends were created between locals and Cominco employees. The LaPorte's and all their employees at Iliamna Air Taxi were extremely helpful with all manners of logistics and air support.

Loren Young is one of the unrecognized people at Pebble, but Rich Moses, the project manager for Northern Dynasty in the early 2000's (2004- 2005?) is also an unrecognized for his critical role on the property. He recognized, as others had that the grade of the deposit was increasing on the east side of the deposit as it dove below barren volcanic rocks and had recommended drilling deeper to the east but was never given permission by senior management at Northern Dynasty. When a geotechnical engineer was sent to the property to drill the theoretical pit walls of the deposit, for pit slope stability studies, Rich designed two holes that angled out of the deposit, through the theoretical eastern pit wall and down into what is now known as the East Zone. He wisely drilled it deeper than necessary getting increasing grade with depth. Without these two holes the East Zone would probably never have been discovered.

Pebble's name evolved over the years. Cominco Senior management never liked the name Pebble Beach and was changed in 1991 to Pebble Copper, at one point early on after the Northern Dynasty purchased the property they named it Pebble Gold but eventually it just became Pebble.

St. George received a \$10,000 drill bonus for proposing and managing the programs at Pebble. Two professional papers credit St. George with the discovery of Pebble:

Bouley, B.A., St. George, P., Wetherbee, P.K., 1995, Geology and Discovery at Pebble Copper, A Potassic Copper-Gold Porphyry System in Southwest Alaska, CIM Special Volume 46, Porphyry Deposits of the Northwestern Cordillera of North America, pp. 422-435

Young, L.E., St. George, P., Bouley, B., A., 1997, Porphyry Copper Deposits in Relation to the Magmatic History and Palinspastic Restoration of Alaska, Economic Geology Monography 9, pp. 306-333