

Identification and Characterization of Gold Mineralization in a Fault Controlled Breccia

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Gold (Au) is a metallic element and mineral that has been used for thousands of years and is one of the foremost mediums of exchange in most countries. Besides its monetary purposes, gold is used for a variety of practical purposes due to its unique optical and electrical properties [1]. Gold can be found in a variety of forms which can vary in chemical composition and be deformed after crystallization and during transportation. Detrital gold particles in paleo-placer deposits develop recrystallized rims, with associated expulsion of Ag, leading to the formation of Ag-poor rims which have been recognized in most placer gold particles around the world [2]. With the advent of micro-analytical techniques, the alloy composition of gold is providing information about provenance and genesis [3].

In this research we will be focusing upon improving the current level of understanding around the fundamental processes that control the concentration, deposition and growth of gold in the Liberty area, Washington. The Liberty area presents a unique field site for studying the controls on gold mineralization, preservation, and weathering, as the area displays a variety of gold textures including nuggets, wire gold, placer grains and crystalline lode gold (Fig. 1). Gold was first discovered in the Liberty area in 1868 along the Swauk Creek [4]. In 1881, primary lode gold was found in the Swauk Creek district and usually occurs in “pods” or “pockets” and continuous veins are the exception rather than the rule [5]. This research will work on the 20-acre Gold Reserve (GR) mining claim located directly south-east of the Liberty townsite.

Preliminary samples have been acquired from a section of the GR mining claim called the Cut. The Cut is a 15m by 5m incision into the hillside on the GR claim where a strike slip fault has offset units of arkose sandstone, brecciated and un-brecciated mudstone, and basalt. Mudstone is present on either side of the fault, however brecciation is mainly confined to the west side of the fault (Fig. 2). The mineralization along the fault and within the brecciation could contain in-situ gold. Areas that contain gold will be identified using a gold metal detector and meter scale mapping will be used to record the mineralization structures, local faulting, contacts and other important geological features. To determine suitable locations for sampling, within the previously identified gold rich area, a non-destructive, Bruker S1 Titan, portable X-ray fluorescence spectrometer (pXRF) will be used to measure the elemental signature to identify areas containing gold within quartz/carbonate mineralization of the GR claim.

Orientated samples will be extracted and prepared into slabs, powders, thin-sections and 25mm diameter resin pucks for analytical investigation. We will characterize the chemistry and crystallography of the various gold forms to infer the processes that controlled their formation. It is unclear how much of the placer gold found in the Liberty area is sourced from the local primary crystalline gold found in hard rock mineralization. If in-situ gold can be acquired and its chemistry and crystallography characterized, a comparison can be made between the two to determine if the placer deposits could have been sourced from the local in-situ gold. The results will allow us to understand the overall evolution from initial crystallization, growth, preservation, weathering, and transportation of the gold within the Liberty area. Future research will work on if there is a link between the hydrothermal fluids that may have deposited

the gold with the formation of the Ellensburg Blue semi-precious quartz gemstones.

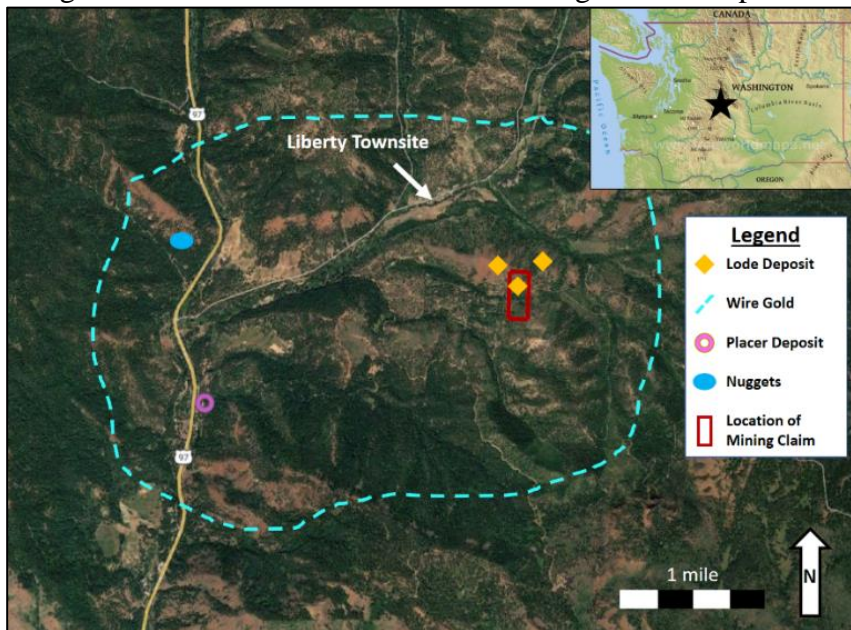


Figure 1: Google Earth map displaying the townsite of Liberty within Washington State, USA. Locations of discovered nuggets, placer gold, crystalline lode gold and wire gold are marked. The red box shows the location of the Gold Reserve (GR) mine claim that is the focus of this research.



Figure 2: Photo of the west side of the fault in the Cut from the Gold Reserve (GR) mine claim showing the mudstone brecciation and the quartz/carbonate mineralization which is expected to host the in-situ gold.

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