Introduction

The Jewett Mine is a hard rock mine located on the southern flank of Mount Baldy, approximately 1.5 km from Grants Pass in Josephine County, Oregon on the Grants Pass mining district (Garces, 1996). The Jewett Group contains 7 separate claims (Oregon Department of Geology and Mineral Industries, 1992) totaling approximately 1.42 km² and consists of several workings including an open pit and approximately 300 m of underground workings following a series of thin hydrothermal quartz-calcite breccia veins containing fine gold and tellurides (Garces, 1996).

History of the Jewett Mine

The Jewett mine was discovered in 1860 by Thomas Jewett. By 1862, the mine was actively producing with a stamp mill. By 1872, the mine produced 1,084 troy ounces of gold. The mine went out of business sometime before April 29th, 1877 when it was re-opened under new ownership with a 5 stamp mill until December 2nd of the same year a full workforce was operating the mill on a 24-hour rotational Schedule (Oaks, 1998-B). The mine remained operational until 1915 producing thousands of ounces of gold before operation ceased (Garces, 1996). In 1922 the mine was sold but never again operated on a full production (Oaks, 1998-A). Little information is available from 1922 to present except that the Oregon Metal Mines Handbook (1952) reported that the mine remained idle from 1922 to 1967 with the exception of a brief period only the occasional leasing of the property for small scale resource exploration by the American Mining Company.

Geologic Background

The Klammath Mountain geologic province consists of a series of accretionary episodes that began in the Lower Devonian and continue for approximately 260-284 Ma. There are eight separate episodes that make up the terranes of the Klammath Mountains (Finn, 1998).

The Jewett Mine is located just southeast of the known boundary of the Grants Pass pluton, situated in the Applegate Group metasedimentary and metavolcanic rocks of the Hayfork Terrane. The Applegate Group is an Early Permian to Late Triassic (Hotz, 1971) formation on the Western Paleozoic and Triassic Belt of the Klamath Mountains. The Jewett Group contains 7 separate claims (Oregon Department of Geology and Mineral Industries, 1992) totaling approximately 1.42 km² and consists of several workings including an open pit and approximately 300 m of underground workings following a series of thin hydrothermal quartz-calcite breccia veins containing fine gold and tellurides (Garces, 1996).

Objectives and Methods

The purpose of this project is to describe the mineralogy and petrography of the Jewett Mine and study the hydrothermal system in order to better understand the paragenesis of the Au-Te ores. I propose that the system responsible for the deposit at Jewett is a hydrothermal system that created the neighboring Grants Pass Pluton, in which the hydrothermal fluid, carrying the gold and tellurides, was fractionated from the magma body and forced into the country rock in zones of weakness, such as faults and fractures. Several methods may be used to test this hypothesis, by observing chemical compositions of minerals and chemical compositions and lithologies of associated rocks including visual observations and descriptions of thin sections collected from the Jewett Mine.

• The scanning electron microscope (SEM) was used to obtain photographs of the telluride minerals (Fig. 1) for the purpose of describing their crystallography for identification.
• The SEM energy dispersive x-ray spectrometer (SEM-EDS) was used to identify the presence of specific elements in the tellurides in order to focus standardization on the electron microprobe analyzer (EMPA).
• The EMPA was used to measure the chemical composition of the telluride minerals within the quartz vein.
• Hydrothermal mica within the quartz vein was used for Au analysis using the OSU Argon mass spectrometry lab in order to associate the timing of mineralization with the proposed source of fluid.

Observations

This section from rock units around the current workings of the Jewett Mine show that the country rock (sample RBC-2) is a gabbro that is spatially and genetically related to the Coffin Vein showing quartz diorite cut portions of the host rock on the north side of the pit. The most prominent of these is a 10 cm thick brown dike (sample RBC-5) on the north wall of the pit being cut and displaced approximately 20 cm by the brown dike and cut and displaced approximately 0.5 cm by a normal fault approximately 1.5 m northeast of the brown dike. The surface exposure is approximately 8 m in length terminating approximately 1.5 m southwest of the brown dike and approximately 2 m northeast of the fault. A quartz diorite body (sample RBC-1) can be seen in the southeast corner of the pit approximately 2 m from the Coffin Vein.

The largest and most obvious of the intrusions is a late steeply dipping brown dike locally known as the “Brown Dike” (sample RBC-4). It intrudes upon the country gabbro, cross-cutting several small dikes and sill including the Coffin Vein, itself only being cut by a fault on the south end of the pit. The Coffin Vein is a brecciated zone approximately 20-50 cm thick consisting of a 15 cm thick breccia veinlet that swell and pinch following fractures within the gabbroic host rock. The vein exposure is approximately 20 m in length crossing the center of the fault terrane and brown dike. Two other veinlet systems occur parallel to the Coffin Vein and have an average south-southeast 50° angle to the north and run approximately 2-3 meters above the Coffin Vein. Visible native gold and tellurides are irregularly distributed within the quartz veins (0.2-0.5 vol%).

• Images obtained with the SEM show the tellurides displaying an isotropic crystalline form with basal cleavage in the rare case that the tellurides are in nature.
• Energy peaks from the SEM-EDS indicate the presence of Sn, Te, Ag, Bi, and Cu associated with these minerals in the crystallography.
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Discussion

The mineralization at the Jewett Mine occurred as some fluids (hydrothermal or metamorphic) moved through faults and joints carrying the Au-Te as a migmatic source, an assimilated source or some combination of each. SEM photos, SEM-EDS, EMPA, EMPA identify a bismuth telluride which is considered to result from a low-temperature (100°C) fluid (Cook et. al., 2009). The source of the heat was previously hypothesized to be from the nearby Grants Pass pluton. According to 40Ar/39Ar radiometric dating, the deposit is approximately 14 m.y. older than the pluton, making the prediction unlikely. Instead, the heat is from some other source likely of similar age such as the Jacksonville pluton, approximately 20 km away. The distance away from the deposit, however, is still compared to the G.F. plate, making this a questionable yet possible source. The age of this pluton is similar to that of the mineralization at the Jewett but further investigation is needed in order to confirm or deny its involvement in the mineralization.

Conclusion

• The ore minerals at the Jewett Mine are hosted in a series of stacked south-southeast dipping fault controlled hydrothermal quartz veins.
• Ore minerals consist of gold, tetradymite and tellurobismuthite.
• The age of mineralization is 153.67 ± 0.46 Ma, approximately 14 m.y. older than the previously proposed fluid source, the Grants Pass pluton.

Possible Questions to Ask
• Is there another unknown pluton nearby that could be the source of fluids?
• Is the Jacksonville pluton the source?
• Or is the fluid from some metamorphic origin brought on by one of the accretionary episodes that created the Klamath Mountains?

References

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