MINERALOGY OF THE VICTOR CLAIM, CLEAR CREEK AREA, NEW IDRIA DISTRICT, SAN BENITO COUNTY, CALIFORNIA

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The Victor Claim contains a series of rare barium silicate minerals in albite veins that are of hydrothermal origin. These minerals include benitoite, neptunite, fresnoite, titantaramellite, joaquinite-(Ce), orthojoaquinite-(Ce) and barrio-orthojoaquinite. Associated minerals in the veins include pectolite, crossite, stilpnomelane, albite and rarely anilite, covellite, brochantite, pseudomalachite, strontio-apatite, fluorapatite and calcite.

INTRODUCTION

In 1969 specimens of cinnabar associated with karpatite were found near a small mercury retort that lies a few hundred meters south of the Indian Flat campsite along Clear Creek in the drainage of a small, unnamed tributary. While the area was being examined, neptunite and benitoite were noted in the streambed as waterworn patches on float blocks of crossite schist by the authors (JFC & GED). This material appeared different from that of the benitoite host rock of the Gem mine. The benitoite is colorless to white with a radiating structure while the neptunite crystals are generally stubby terminated crystals. Exploration in the area was conducted by short wave ultraviolet light of the creek bottom and the surface of crossite schist boulders discovered by daylight where their blue green color made them readily apparent. The float was traced back up the tributary to an area where several large schist boulders were found protruding from the eastern bank. An examination of these boulders disclosed many thin albite veins that showed small neptunite and benitoite crystals on fracture surfaces.

Specimens of the albite veins were collected and, when cleaned, revealed pockets containing colorless hexagonal benitoite crystals associated with grains of a yellow fluorescent mineral that was subsequently identified as

fresnoite. Further examination of the area revealed several albite veins exposed on many outcrops of this schist. The mineralogy of the area was found to be more complex than originally thought. In 1972 a concerted effort was made to secure a wider suite of specimens from the area. Craig Stolburg and Ed Oyler, both mineral collectors and members of Bay Area Mineralogists, claimed the area as the Victor Claim in 1974 and a shallow pit was dug on the upper schist contact and several of the float boulders were cracked using explosives to reveal fresh exposures of the albite veins. Samples from the albite veins were collected and some work was done on the mineralogy of the area but nothing was published on the results of this study. After this activity no further assessment work was done on the claim and it was allowed to lapse.

DESCRIPTION OF AREA

The Victor Claim is located about 1½ miles southeast of the Clear Creek mine in one of the side canyons that drains into Clear Creek at the Indian Flat campground. The claim is on the west slope and is located in the NE ¼ section SE ¼ section 7, T.18 S., R. 12 E., M.D.M, at latitude 36^{O} 21' 30" N., and longitude 120^{o} 44' 30" W. The claim is located on a small intermittent stream that is shown on the topographic map of the area. This stream has its headwaters on the north slope of Picacho Peak and flows into Clear Creek. Access to the claim area is by foot up an old dirt road that leads to a long abandoned mercury prospect further up the canyon. This road has been closed by the BLM at the campground and washed out further up the narrow canyon. The area containing the Victor claim is quite brushy and many pine trees grow along the serpentinite-rich slopes. The narrow creek contains many float boulders of serpentinite and blueschist.

There are no landmarks to identify the Victor Claim. The mineralized area contains several large blocks of blueschist that are exposed on the hillside above the creek. A faint trail leads to the left from the canyon floor to the ridge where the pit is located. The workings consist of two shallow pits near the ridgeline and several small pits along the creek.

GEOLOGY AND MINERALOGY

The New Idria serpentine mass is the dominant geologic feature in the area and its emplacement produced the major tectonic forces that have shaped the area. The serpentine body is approximately 12 miles long and 4 miles wide and is elliptical in shape. This body was emplaced as a result of the hydrothermal alteration of deep-seated mafic rocks and its subsequent volume change producing upward movement through weaker sedimentary rocks of the Franciscan Formation. The serpentine body is generally bounded by high angle faults and these are thought to have occurred concurrently with the initial emplacement of the serpentinite. The Franciscan sandstones and shale beds that were intruded by the serpentine body show variable amounts of metamorphism with the most highly metamorphosed beds occurring along the southern margin of the serpentine body where the beds are extensively folded.

The beds on the northern edge are Franciscan and Panoche formation sandstones and shales. These beds were host to the large mercury deposits that were exploited by the New Idria Quicksilver mines for over 100 years and allowed the mine to be one of the major mercury producers in California. These deposits formed as part of the post emplacement hydrothermal activity in the less highly altered rocks.

The southern margin of the serpentine body is composed of a mixture of unaltered graywackes and sandstones, conglomerates and shales that have locally been metamorphosed into blueschists and shales that contain intruded serpentine bodies. In the Victor Claim area, the metamorphic action was not as intense as that which took place at the Gem Mine where a relatively pure crossite body was produced. The blueschists at the Victor Claim derive their color from crossite but are banded by albite. This difference in texture would suggest that the metamorphic activity that produced the blueschist in the area of the Victor Claim was either of lesser intensity or of lesser duration than those at the Gem Mine.

The blueschist is composed primarily of albite, tremolite, stilpnomelane, and crossite in schist-like banded masses that often contain thin discontinuous, relatively pure albite veins. The albite veins frequently show pockets and were formed during the later stages of the hydrothermal alteration of the original rocks. The more highly altered rocks are generally lighter in color with a greater content of crossite and albite and the albite veins and have a more vuggy nature.

The blueschist bodies have been fractured by localized faulting that runs perpendicular to the bedding direction. This fracturing has broken the schist bodies into blocks and has produced many smaller internal fractures. These fractures have acted as channelways for the barium-rich hydrothermal solutions that have produced the unusual minerals found here.

The upper contact between the blueschist and serpentinite is a fault zone with a weathered layer up to a meter thick. Pockets of pectolite and jadeite are occasionally found in this zone and these lenticular bodies may be several meters in length. They are usually composed entirely of fibrous acicular pectolite or jadeite. Locally, masses of prismatic crystals of natrolite have been found in direct association with the pectolite.

MINERALS

Though the Victor Claim shows a geologic similarity to the Gem mine, the mineral suite shows a marked difference both in mineral content and in the crystal habit of the benitoite and neptunite present. The natrolite present at the Gem mine is almost entirely absent at the Victor Claim and albite veins take their place. In addition, well-crystallized fresnoite and several other unusual minerals occur at this locality.

ALBITE $Na[AlSi_3O_8]$

Albite occurs as both as a rock-forming mineral and as pods of coarsely crystalline white material. These albite pods may reach 2 cm in thickness and often contain crystal-lined pockets. The albite crystals are small and tabular,

seldom reaching 2 mm in length, and are simple and untwinned. Albite was the first mineral to form in these veins. These veins are relatively pure and contain various barium silicates and associated minerals. Albite was deposited continuously during the formation of these veins and crystals of benitoite and crossite are often partially covered by it. Chemical analysis of the albite commonly shows small amounts of barium and potassium but no barium or potassium feldspars have been identified.

ANDRADITE $Ca_3Fe_2^{3+}(SiO_4)_3$

Andradite is relatively common in the area and occurs as simple orange to green dodecahedrons. The crystals range in size up to 6 mm.

ANILITE and COVELLITE Cu_7S_4 & CuS

Anilite and covellite are rare minerals and only a few specimens are known. The copper sulfides occur as small black anhedral grains embedded in the massive albite. The massive grains are composed of an outer rim of covellite with an inner core of anilite.

BARIO-ORTHOJOAQUINITE $Ba_4Ti_4(Ba,Sr)_4O_4[Si_4O_{12}]_4.2H_2O$

Bario-orthojoaquinite occurs associated with fresnoite in the blueschist rocks along the creek. Its habit ranges from truncated crystals on (001) to heavily striated prismatic crystal groups to greenish-yellow “bow ties”. Its color can range from a yellowish-brown to dark brown to a yellowish-green. EDS analysis shows no Sr or RE elements. X-ray powder diffraction shows a match for bario-orthojoaquinite. This locality represents the second world occurrence for this rare mineral.

BENITOITE $BaTiSi_3O_9$

Benitoite is relatively abundant at the Victor Claim and occurs as thin hexagonal tabular plates. This material differs considerably from that at the Gem Mine where benitoite commonly occurs as triangular ditrigonal-dipyramidal crystals. These crystals forms include the {0001}, {01$\underline{1}$1}, {10$\underline{1}$1} and rarely {10$\underline{1}$0} and {01$\underline{1}$0} faces. They are generally colorless to white but rare specimens showing a pale blue or yellow tint do occur. The crystals are smaller than those found at the Gem Mine, most being less than 5 mm in size but larger up to 1 cm have been found. The larger crystals often show a pale yellow or blue tint. These crystals often form sheaf-like aggregates in parallel groups or rosettes of platy hexagonal crystals. Untwined crystals are relatively rare though they often are the largest crystals found.

Benitoite was deposited all during the late stage hydrothermal deposition and crystals partially covered by albite have been found as well as crystals deposited on the vuggy albite. It is interesting to note that while the benitoite crystal pinacoid faces may be covered by albite crystals; the prism faces are generally albite free. The benitoite fluoresces a brilliant blue-white under short wave ultraviolet light and schist specimens that show no visible benitoite will show the

characteristic fluorescence. Colorless benitoite at the Gem Mine shows a more vivid fluorescence than the blue material and this holds true with the Victor Claim benitoite.

Figure 1. Coverage of benitoite crystals 3-4 mm across.

BROCHANTITE $Cu_4(SO_4)(OH)_6$

Rare brochantite occurs as thin massive dark green halos that surround the anilite and covellite grains as a direct result of weathering.

CALCITE $CaCO_3$

Calcite is relatively rare and only a few colorless to white crystals are known from the pocket material associated with other minerals. The crystals are minute, rarely reaching 1 mm in size and commonly show the form of an acute scalenohedron. They generally fluoresce red to orange and often show a yellow phosphorescence. Massive crusts of mixed carbonates occur coating thin seams in the weathered crossite rock. These show a similar fluorescence and are composed of a mixture of calcium and magnesium carbonates. Occasional patches of these mixed carbonates have a pale orange color and contain appreciable manganese. A re-examination of this material has proved it to be a manganoan calcite

FLUORAPATITE $Ca_5(PO_4)_3F$

Fluorapatite was one of the last minerals to form and is quite rare. It occurs in two different environments, both as crystals in the albite pods and as individual crystals in the surrounding serpentinites. The fluorapatite in the albite vugs occur as tiny colorless prisms that show simple terminations. In the serpentine, the fluorapatite occurs as barrel-shaped crystals that can reach several cm long that are typically associated with yellow andradite. These crystals consist of rough white prisms that usually show cavernous terminations.

The relationship between the fluorapatite in the albite vugs and the serpentinite is not known. However, the deposition of the fluorapatite took place late in the sequence and it is presumed that the apatite bearing hydrothermal solutions were all derived from the same source.

FRESNOITE $Ba_2TiO[Si_2O_7]$

Fresnoite occurs as small, yellow-orange grains and crystals up to 4 mm across that are commonly associated with benitoite. The fresnoite crystals are relatively simple and the {001} and {110} forms are most common. The larger fresnoite crystals consist of multiple overgrowths. The fresnoite fluoresces lemon yellow under shortwave ultraviolet light.

Figure 2. Fresnoite crystal approximately 5 mm.

GLAUCOPHANE-RIEBECKITE SERIES $Na_2(Mg,Fe)_3(Al,Fe)_2(Si_8O_{22})(OH)_2$

Crossite, an intermediate member of the glaucophane-riebeckite series, is common in the area of the Victor Claim, occurring both as a rock forming mineral, as pure vein-like masses of fine acicular crystals in the schists and as groups of crystals in the albite vugs. The color of the crossite ranges from a greenish blue in the massive schistose material to a pale silvery blue of the acicular crystals that occur in the albite vugs. It occurs as radiating groups of fine acicular crystals. These often coat all the other minerals present though small individual crystals of red-orange stilpnomelane often occur perched on the crossite crystals.

JADEITE $Na(Al,Fe)Si_2O_6$

Jadeite occurs as abundant, pale green, hard masses in contact with the pectolite at the top of the deposit.

JOAQUINITE-(Ce), ORTHOJOAQUINITE-(Ce) $NaBa_2Ce_2Fe(Ti,Nb)_2Si_8O_{26}(F,OH) \cdot H_2O$

Joaquinite-(Ce), and its orthorhombic polymorph, have been identified by microprobe and X-ray single crystal analysis from the blueschist host material. It forms small euhedral crystals (<1.5 mm) with a honey-yellow to brown color associated with neptunite and benitoite. The microprobe analysis of the crystal shows significant and near-equal amounts

of strontium in the RE position. The crystal can best be termed a strontian joaquinite-(Ce) and strontian orthojoaquinite-(Ce). The orthorhombic phase predominates over the monoclinic phase.

NATROLITE $Na_2[Al_2Si_3O_{10}] \cdot 2H_2O$

While natrolite is the dominant mineral at the Gem mine, it is relatively rare at the Victor Claim. In the albite veins natrolite occurs as fibrous mats of acicular crystals. This mineral was one of the to form. Natrolite has also been found associated with the pectolite pockets as prismatic crystals that may reach 2 cm long. The crystals are prisms with simple pyramidal terminations and this occurrence has produced some exceptionally nice specimens. The natrolite occurs associated with the pectolite pods along the upper fault zone near the ridge.

NEPTUNITE $LiNa_2K(Fe,Mg,Mn)_2Ti_2O_2[Si_8O_{22}]$

Neptunite is relatively common at the Victor Claim and occurs as small brilliant black complex crystals in fractures of crossite-albite schist. It commonly shows the {100}, {110}, {001} and {111} faces and rarely shows the {$\underline{1}$11} and {311} forms. The {100} form has not been shown on the Gem mine neptunite crystals. The Victor Claim crystals may reach 1 cm in length and show penetration twinning and a “bow tie” form. Neptunite is relatively common within fractures in the blueschist host rock.

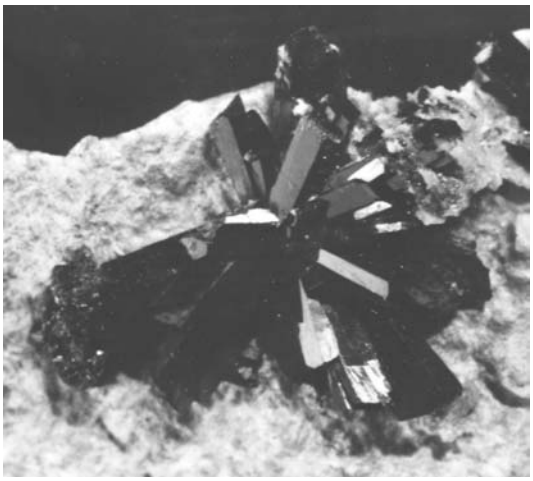

Figure 3. Neptunite crystals showing radiating habit, 25 mm across.

Figure 4. Neptunite crystals showing parallel habit, 12 mm long.

Figure 5. Neptunite crystals showing modified termination, 25 mm across.

Figure 6. Neptunite crystals showing radiating habit, 10 mm long.

PECTOLITE $HNaCa_2[Si_3O_9]$

Pectolite is locally abundant where it occurs as pods and veins in the surrounding metamorphic rock and as delicate acicular crystals in the albite-lined pockets. Pectolite occurs both as a rock-forming mineral and as veins forming white radiating masses of crystals that can reach up to 10 cm. These specimens rarely show terminations and cavities in these veins are rare. In the albite pockets the pectolite occurs as acicular groups of radiating crystals that may reach 1 cm. They often have crystals of stilpnomelane or crossite perched on them.

Figure 7. Pectolite crystal group, 60 mm hand sample.

PYROAURITE $Mg_6Fe_2(CO_3)(OH)_{16} \cdot 4H2O$

Pyroaurite is ubiquitous in the serpentinite surrounding the metamorphic crossite schist outcrops. The slickensided serpentine pebbles are frequently coated with a light yellow talc-like material that has been identified as pyroaurite. It normally occurs as massive material but occasional specimens show minute platy crystals.

REEVESITE $Ni_6Fe_2(CO_3)(OH)_{16} \cdot 4H_2O$

Reevesite is intimately associated with pyroaurite in the serpentine. Reevesite has a similar mode of formation and is the nickel end member of the series. Fractures in the serpentine at the Victor Claim occasionally show bright yellow platy reevesite crystals and massive coverings up to 5 cm across. Reevesite is less abundant than the pyroaurite but locally it can be the predominant mineral.

STEVENSITE $(Ca/2)_{0.3}Mg_2[Si_4O_{10}](OH)_2$

Stevensite is present in the albite pockets as brown claylike masses. This mineral generally formed as an alteration product of pectolite and was one of the last minerals to form and frequently coats other minerals.

STILPNOMELANE $K(Fe^{2+},Mg,Fe^{3+})_8(Si,Al)_{12}(O,OH)_{27}$

Stilpnomelane is a common mineral in the schists and it forms thin veins of blackish brown platy crystals. These veins form parting planes in the schists and good specimens are relatively abundant. The finest stilpnomelane specimens at the Victor Claim occur in the albite pockets where orange platy crystals form crusts of tiny foliated plates and single larger crystals may be found perched on pectolite and crossite crystals. Scanning Electron photographs of these crusts show that they are composed of books of individual crystals stacked on the {001} face. Other faces shown in the SEM photographs include the {010}, and {110} forms. The variation in color is due to variations in ferric and ferrous iron in the stilpnomelane.

STRONTIUM-APATITE $(Sr,Ca)_5(PO_4)_3(OH,F)$

Strontium-apatite has been identified as a rare constituent of the albite pockets at the Victor Claim. It forms white masses of acicular crystals that cover the terminating faces of some of the fluorapatite crystals present. The masses are minute and rarely exceed 0.2 mm across. Richard C. Erd first identified the strontium-apatite.

TITANTARAMELLITE $Ba_4(Ti,Fe^{3+},Fe^{2+},Mg)_4(B_2Si_8O_{27})O_2Cl_x$

A single, dark brown speciman of titantaramellite was identified from the claim by A. Pabst.

OTHER LESS-IMPORTANT MINERALS RECORDED FROM THE AREA

Other minerals reported in the vicinity of the Victor Claim include antigorite, chrysotile, magnetite, aragonite, clinochlore, penninite, chromite, diopside, titanite, uvarovite, actinolite, muscovite, pseudomalachite, prehnite, pumpellyite-Mg, quartz, tremolite, malachite and orthoclase.

COLLECTING IN THE AREA

The last work done on the area was in 1974 and the claim has lapsed. The entire area is under the control of the Bureau of Land Management who maintains several campgrounds. The Indian Flat campground on Clear Creek is the terminus of the canyon that contains the Victor Claim. Entering the area of the Victor Claim requires hiking up the old mining road on foot, a distance of about a mile. While little additional work has been done in the area, benitoite and fresnoite specimens may still be found in the creek below the prospect. The metamorphic rocks that surround the Victor Claim are largely unexplored and other hydrothermal barium silicate bearing deposits are likely in the area.

REFERENCES

Cooper, J.F. Journal entries dated 6/8/74, 6/15/74

Eckel, E.B., & Myers, W.B. (1946) Quicksilver Deposits of the New Idria District, San Benito and Fresno Counties, California. California Journal of Mines and Geology, State Mineralogists Report **42** (1), 81-124.

Millage, Andra H. (1981) Mineralogy of the Victor Claim, New Idria District, San Benito County, California. Unpublished Masters Thesis, Stanford University.

Pabst, Adolf (1951) Minerals in the Serpentine area of San Benito County, California. Rocks and Minerals, **26**, 478-485.

Wise, William S., & Gill, P.H. (1977) Minerals of the Benitoite Gem Mine. Mineralogical Record, **8**, 442-452.