

most important mines, however, are to be found in Calaveras, at the towns of Copperopolis and Campo Seco.

For many years after the settlement of the country, the nomadic prospecting population gave no attention to copper indications—the belief prevailing that only the precious metals could be mined remuneratively; and hence it was that the very valuable deposits of the Union and Keystone claims remained so long untouched. In the Summer of 1860, Mr. W. K. Reed located what has since proved to be one of the most extensive copper lodes of the world. So rich were the developments in this claim, that a furore of prospecting was inaugurated, which, in the following year, brought to light very many localities where traces of copper may be found, but nowhere a deposit comparable to that of the Union. Of the three hundred to four hundred locations made in the county, it is improbable that more than a dozen have paid expenses and declared dividends.

The copper ores of California consist, in the main, of the yellow sulphuret or chalcopryrite; this is found of various degrees of purity, being contaminated with a greater or less per centage of mundie (iron pyrites). Near the surface may be found, in different parts of the State, copper glance, red and black oxides, green and blue carbonates, and silicates. These, however, give place to the yellow ores, as soon as a sufficient depth has been reached to shut off the decomposing action of the atmosphere. Ores yielding less than twelve per cent. of copper cannot, under present conditions, be shipped with profit; and, in order to obviate the transporting of large amounts of useless gangue, concentration both by fire and water has been inaugurated.

The fire process has been moderately successful, although the chief object of the smelters seems to have been a search after some refractory furnace lining capable of withstanding a molten mass either basic or acid, instead of endeavoring to form a slag of such composition as shall have but a slight tendency to eat out the furnace material. The system of concentration by water, with shaking tables, round buddles and jigs, does not seem as yet to have met with any degree of success.

A few lines of description of the Union and Keystone mines of Copperopolis may not be uninteresting. These mines are situated in the county of Calaveras, some thirty-eight miles east of the city of Stockton. Both claims were located, at the same time, in the year 1860; the former consists of 1,950 feet, and the latter of 3,300 feet. The general direction of the vein is northwest and southeast, with a slight dip to the east. The country rock is chloritic slate and serpentine. The Union has been opened by a shaft five hundred feet deep, which discloses a mass of pay ore varying in width, in the different levels, from eight to forty feet. At the northern end of the claim the ore divides into two portions, and continues thus into the Keystone.

The Keystone has a shaft some three hundred and sixty feet in depth; the ore of the western vein contains but little copper as disclosed from the lower shaft, while the eastern lode carries a valuable pay chimney from one to six feet wide. In the upper shaft the conditions are reversed, the western vein being the richer.

There are several other claims of prominence in the county, amongst which may be enumerated the Campo Seco, in the neighborhood of which smelting works have been erected—the Napoleon, Empire, and Table Mountain—from each of which shipments have been made.

The export of copper ore from the town of Copperopolis amounted, in 1863, to 5,900 tons; and had increased, for 1864, to 14,300 tons. The total amount shipped from the Union mine, up to June 1st, 1866, was 46,373 tons; and from the Keystone, up to the same date, 5,163 tons.

From Campo Seco there were shipped, in 1865, some 950 tons. Some few tons of black copper, regulus, and ore have been shipped from the Chowchilla mines, in Mariposa and Fresno counties.

The value of the copper ore received in San Francisco for shipment to the East during the year ending December 31st, 1866, was \$1,800,000. Amount shipped in 1865 was 25,000 tons, valued at \$2,000,000; in 1864, 13,300 tons, valued at \$1,094,600, and in 1863, 5,900 tons, valued at \$512,000.