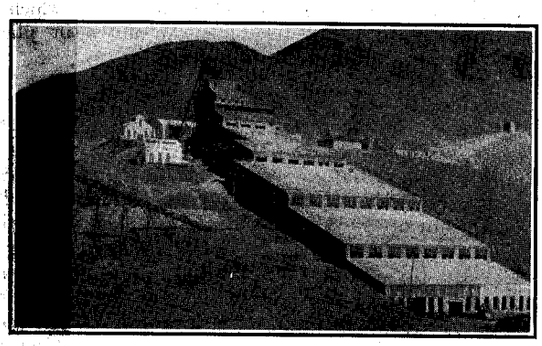
The Nevada Hills Mill

By W. A. Scott

The new concentrating mill and cyanide plant of the Nevada Hills M. Co., at Fairview, Nevada, was put in operation September 15, 1911. It has a rated capacity of 150 tons per day and is gradually being brought up to that tonnage. There is a descent of 120 ft. from the crusher floor to the sump floor, there being eight levels, occupied as follows: (1) crusher and elevator; (2) mill-bin and stamp batteries; (3) classifiers and concentrators; (4) tube-mills; (5) collecting and thickening tanks; (6) dilution and decantation tanks; (7) treatment tanks and filters; (8) heating plant and sump. The building, set on foundation and retaining walls of reinforced concrete, is constructed of steel, and has a covering of asbestos-lined corrugated iron, making it practically fireproof. The ore is drawn from the mine-bins over grizzlies to a 12 by 20-in. Hercules crusher, by which a sufficient tonnage is crushed in 8 hours to supply the mill for 24 hours. The crushed ore is raised to the top of the mill by a 12-in. bucket elevator, and it passes thence by gravity through an automatic sampling plant and automatic weigher into a 600-ton steel-frame ore-bin immediately above the stamp batteries. It is drawn from the bin through four Hutchinson automatic feeders, by which it is fed to the four 5-stamp batteries of 1250-lb. stamps, and these are operated in two 10-stamp sections,



NEVADA HILLS MILL.

each driven by a 35-hp. motor, belted to a cam-pulley at the centre of the section. The four mortars, weighing 12,000 lb. each, are made with narrow boxes, and designed for rapid discharge. Each mortar is anchored to a concrete foundation by seven 1¾-in. bolts of Norway iron. Each battery as a unit is designed for heavy duty, the pulp being discharged through 20-mesh screens. The present method is to pass the crushed ore from the batteries to classifiers, the fine going to 14 Deister tables, and the coarse to two 18-ft. tube-mills, 5 ft. diam.; but it is now understood that a Chilean mill is to be provided for regrinding the coarse from the classifiers, and the product of the Chilean mills is to pass through an Akins classifier, the fine from which is to be concentrated over Deister slime-tables, the coarse to be reground in the tube-mills. The tube-mill product is then to be classified by an Akins machine, the slime from which is to pass to two Dorr thickening tanks, the sand to be returned to the tube-mills for further pulverization, making a closed circuit that will permit no material to pass to the thickening tanks till it has been reduced to the requisite degree of fineness. The thickening tanks, which are 34 ft. diam., 12 ft. high, are supplied with overflow launders and heavy Dorr thickeners; the thickened pulp flows to a mixing-box, where lime-water is added, and it passes thence to nine agitating treatment tanks, each 12 ft. diam. and 32 ft. high, the clear overflow from the thickening tanks being returned by a 6 by 8-in. triplex pump to a 50,000-gal. tank near the mill. The standardized solution is put in the first treatment tank, the nine tanks being arranged in series for continuous agitation. The pulp undergoes 42 hours treatment from the time it enters the first tank until it is discharged from the last one. A 10 by 13-in. duplex low-pressure Ingersoll-Rand air-compressor is in use for supplying air for agitation and aeration. The pulp passes from the last treatment tank through three dilution tanks, 34 ft. diam. and 12 ft. high; these are provided with overflow launders and Dorr thickeners, so arranged that the overflow from one tank passes into the next tank below it. Barren solution from the zinc presses is added in the first tank and mixed through it by the Dorr thickeners, by which the solution is diluted. The overflow, after passing to the succeeding tank, is given treatment similar to that in the first, the treatment being automatic and continuous through the three tanks; the thickened pulp is drawn off at the bottom of the last tank and transferred to the stock tank, 30 ft. diam. and 12 ft. high, equipped with a Trent agitator.

The rich solution overflowing from the last tank is passed through two 36-in. 40-frame Perrin clarifying presses to three precipitating tanks, into which zinc-dust is added by a Merrill zinc-dust feeder; the solution is then delivered by two triplex pumps to two Merrill precipitating presses, each of 300 tons capacity, situated in the refinery building. The barren solution from these presses flows to two solution tanks, from which it is drawn off and standardized.

The pulp in the stock tank, above mentioned, is drawn to two Oliver continuous filters, each 11 ft. 6 in. diam. and 12-ft. face, the filtered and washed residues discharging upon a 14-in. belt tailing-stacker 200 ft. long, running at an inclination of 20°. Vacuum for the filters is maintained by two 14 by 14-in. belt-driven vacuum pumps.

The late John B. Fleming, who designed and directed the construction of the plant, made the following statement in his report to the company: "Inasmuch as concentration, when preceding cyanidation of silver ores, is being abandoned in many cases, it should be stated that there is in this mine a large tonnage of oxidized ore containing manganese dioxide so combined with silver as to make a combination that does not yield to cyanide treatment, and concentration must be adopted to remove this mineral. When the oxidized ore is exhausted concentration probably can be abandoned."

The water supplied for mill work is pumped from the mine by two Gould's triplex pumps, each having the capacity of 100 gal. per minute, and each of which is driven by a 40-hp. electric motor. The property is being operated under the management of E. A. Julian, with J. W. Hutchinson as consulting engineer.

Paragenesis of Zeolites

By J. Volney Lewis

*Zeolites and other secondary minerals occur in the Newark igneous rocks of New Jersey: (1) in cavernous spaces in the ropy pahoehoe of the extrusive Watchung basalts; (2) in fault fissures and fault-breccia of both the basalts and the great intrusive sill (Palisades, Rocky Hill, and Sourland mountains); (3) less commonly in the ordinary joint cracks of both the extrusive and the intrusive types. The rocks are practically the same in both chemical and mineral composition, consisting essentially of pyroxene and plagioclase feldspars, with quartz-bearing and olivine-bearing facies. The zeolites and related silicates are essentially combinations of the feldspathic elements and water, with the addition of fluorine in apophyllite and boron in datolite; the accompanying amphibolite, biotite, chlorite, epidote, serpentine, and talc are derivatives of the pyroxenes. Hypotheses of origin dependent on the action of meteoric waters are inapplicable on account of difficulties of circulation, deoxygenation, and sources of fluorine and boron; on the other hand, contact metamorphism by the intrusives has produced in the adjacent shales minerals into which fluorine and boron enter, presumably by emanation from the magma. Hence magmatic waters are regarded as the most probable agent in the formation of the zeolites and accompanying minerals.

*Abstract of paper read before the Geological Society of America.