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Dredging at Natoma, California.

By M. W. VON BERNEWITZ

In Sacramento county, the work of the Natomas Consolidated of California is well known, and much of its operations has been dealt with in the technical press from time to time, so the following notes cover certain details not usually considered, though of great importance.

Scattered over a length of about twelve miles, the Company has 10 large dredges at work on the south



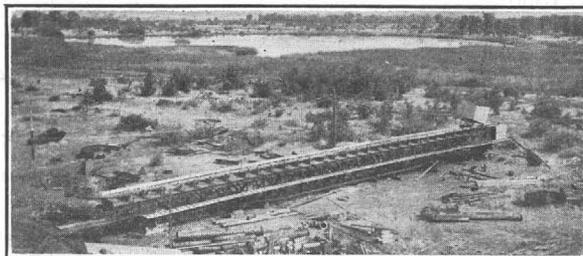
NATOMA NO. 7 DIGGING INTO THE PAY.

bank of the American river. Some time before the visitor to Natoma reaches there, are seen large piles of tailing consisting of gravel of all sizes, and here and there among them is the gantry of some dredge just visible above the waste. At Fair Oaks is a large rock-crushing plant,* producing several sizes of stone from the tailing, which is shipped to all parts of the state for ballast and road construction. The crushing plant which the Company has maintained at Natoma is temporarily shut down. The ground attacked by the dredges differs considerably from time to time, but during one month's operation the performance of the dredges was as follows:

1, 2, 3, 6, 7, 8, 9, and 10 boats was for October; by No. 4 during September, and by No. 5 during May, the latter having capsized during that period, but has since been righted, overhauled, and is in full working condition again. A study of the yardage against the power consumed, the latter being in the same months as given, shows at once the physical character of the gravel being attacked. In the case of No. 2 the power used is only 0.62 kw., against 2.4 kw. per cubic yard by No. 8 dredge.

Boat No. 10

A day's study of No. 10 boat, the hull of which is of steel, under full operating conditions, shows what a powerful machine it is. On the ladder is a bucket-line of 82, 15-cu. ft. buckets, each weighing 4200 lb. This is driven by a 400-hp. General Electric motor, belted to a countershaft by a 32-in. leather belt, in turn driving the gear of the top tumbler by a 32-in. rubber belt. The 9-ft. revolving screen is driven by



STACKER OF NATOMA NO. 8 DURING RECONSTRUCTION.

a 75-hp. motor of the same make. For keeping the buckets against the gravel bank or stepping ahead are two steel-plate, box-construction spuds, weighing 45 tons each. A 50-hp. motor drives the 42-in. rubber stacker-belt, being placed right at the discharge end; while a 50-hp. variable-speed motor drives the winches for lateral movement of the boat. The following centrifugal pumps are used: a 14-in. high-pressure for the revolving screen; a 14-in. low-pressure for the gold-saving tables; a 12-in. for two giants which wash down the bank, and a 6-in. for general work. The dredge complete weighs 750 tons. At the time of my visit the dredge-men were engaged in building a dam of mud and gravel at the back of the boat, in order to prevent water flowing away through the tailing, and to deepen the pond, as it was found that bedrock was rising rather rapidly. This work takes time and is done by skillful manipulation of the buckets and stacker.

At Natoma, a large and complete machine-shop is

DREDGES

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Bucket capacity, cubic feet.....	13.5	8.5	8.5	13.5	9	9	9	15	15	15
Height of bank being dredged:										
Above water, feet.....	4	3	6	2	12	6	20	10	3	16
Below water, feet.....	16	23	20	18	44	54	42	53	58	21
Daily operating time, hours.....	19	20	19	21	21	21	20	19	20.5	19
Gravel dredged, cubic yards...	232,014	232,644	124,440	205,274	159,294	150,553	170,690	142,529	238,004	253,376
Power consumed, kilowatts.....	221,440	143,520	137,600	192,600	238,800	219,600	272,000	346,800	362,400	282,000

It will be seen that the banks being dredged vary from 20 to 63 ft. in height, but the operating time is fairly even throughout. The gravel handled by No.

*Described in *Mining and Scientific Press*, November 6, 1909.

maintained, where new buckets are assembled and old ones repaired, tumblers are relined, and all necessary repairs are effected for the 10 dredges. During September, the Company's boats yielded gold worth \$198,621, the profit being \$94,864.

Mining and Milling at the Vulture Property

By W. M. Wood

The property of the Vulture Mines Co. is about 15 miles southwest of Wickenburg, Arizona. The holdings consist of twenty claims, a well equipped mill, and all the necessary paraphernalia for operating a modern mine. About 500 people make their homes at the mines, and approximately 200 men are on the payroll of the Company. The original location was made about 1863 by John Wickenburg, who founded the town of Wickenburg and gave it his name. Mr. Wickenburg and others mined the rich oxidized ore from near the surface and hauled it to mills on the Hassayampa river where the gold was extracted to the satisfaction and enrichment of the owners. This kind of work was continued until 1880.

The Mill

In 1881 an 80-stamp mill was built on the property by George B. Treadwell and associates. The stamps weighed about 750 lb. each. All the machinery for this mill was hauled to the mine from Ehrenburg, on the Colorado river, a distance of about 100 miles. The treatment was by amalgamation. A large tonnage of tailing was produced, about 30,000 tons of which was leached by a succeeding management at a supposedly good profit. The present management acquired the property in September 1908. Twenty stamps in the old mill were put into commission and run for about a year, in order to arrive at definite conclusions as to the proper treatment for the ore and the kind of mill to erect. The new mill was erected in 1910 and placed in operation in September of that year, the use of the old mill being totally discontinued. The new mill consists of twenty stamps of 1650 lb. each, with a capacity of 100 tons per 24 hours when crushing to 40 mesh. Amalgamation is effected inside the mortars, the ore being crushed in a cyanide solution. Both sand and slime are concentrated, 4 Wilfley and 3 Deister tables being used. The tailing from the tables is sent to the cyanide tanks, consisting of 4 large Dorr thickeners. The gold is precipitated by the Merrill zinc-dust process. The concentrate is shipped to the El Paso smelter for final treatment. The regular mill feed will average about \$20 per ton in gold, and the saving is effected approximately as follows: amalgamation, 60%; concentration, 20%, and cyanidation, 20%. The greater portion of the fuel used is crude oil and distillate. Six-ton motor-trucks are used to haul the fuel oils, and are loaded with concentrate on the return trip. Haulage expense has been reduced about 50% by the use of the truck in place of teams. The trucks use distillate for power. The main working shaft is 750 ft. deep on a 40° incline. It is a single compartment with two skip tracks. Because of faulting of the orebody, the present workings are about 400 ft. east of the main working shaft. There are about three miles of underground work. The main working shaft is timbered throughout with 8 by 8-in.

square sets, being 5½ by 10 ft. in the clear. The ground is good and easily held, no trouble having been experienced in the shaft for several years. The hoisting equipment consists of an Ottumwa double-drum steam hoist, handling skips of one-ton capacity, which dump automatically into bins. The ore is then trammed by hand to the crusher bins, about 150 ft. distant. From there it goes through a No. 5 Gates crusher which reduces it to 2-in. size. It is then elevated on a Robbins belt conveyor to the fine ore bin, from which it is sent by a four-ton rope skip to mill-bins, from which it is fed by gravity to the stamps. Development work is being pushed eastward and vertically below the 1000-ft. level, keeping the ore reserves well in advance of mill requirements. The ore is principally white quartz, carrying galena, and iron pyrites. The method of mining consists of breast stoping and back-filling. The power-plant consists of two 500-ft. Sullivan power compressors, driven by two 150-hp. Nash gas-engines, using distillate as fuel, and two 300-ft. Sullivan steam compressors. The power for operating the stamp-mill is also supplied by two 150-hp. Nash gas-engines. The water-supply for camp purposes and the boilers comes from a 1000-ft. well, while water for the mill is pumped from the mine, which furnishes an adequate supply.

The total value of the mineral production of Alabama, exclusive of the value of the pig iron, but including the value of the iron ores, was \$30,641,983 in 1912 and \$28,005,785 in 1911, approximately two-thirds of which is represented by the output of the coal mines and one-fifth by the output of iron ore. The iron ores of Alabama, while inferior in quality to those of Lake Superior, have the advantage of being near deposits of good coking coal and of the limestone requisite for fluxing, so that Birmingham, the Pittsburgh of the South, can manufacture pig iron cheaper than any other district of the world.

Gold, silver, lead, and copper output of Charters Towers, Queensland, in October was worth \$115,000. The Deep Sinking Commission has finished its work and furnished a report. Briefly the report recommends a reduction in the diameter and depth of the proposed shaft, and an increase in the capital to be provided. It remains to be seen how this recommendation will be dealt with by the Queensland Government and Mr. Mills.

After a lapse of eight months, the British Australian Oil Co.'s shale mines at Murrurundi, New South Wales, Australia, and works at Newcastle, are resuming operations. A new company has been registered in London, with a capital of £300,000, and it is proposed to recommence at once the manufacture of crude and refined oils, sulphate of ammonia, candles, and all products of coal shale oil and petroleum.

During September the Mt. Bischoff Tin Mining Co., Waratah, Tasmania, produced 100 tons of tin oxide, from the treatment of 20,806 tons of crude ore by the concentration plant. All the open-cuts are producing average-grade ore.

VULTURE MINE

(note by G. M. Colvocoresses - Dec. 1937)

This mine is located about 15 miles Southwest of Wickenburg, Arizona. The property consists of 20 patented claims which were first located in 1863 and from that date until about 1880 very rich oxidized gold ore was produced and hauled to mills on the Hassayampa River.

An amalgamation mill with 20 stamp was erected at the mine in 1881 and operated until 1908 and in 1910 a new 20 stamp mill was erected and cyanide was used on the sulphide ore and for the retreatment of the old tailings. Mining on a large scale was discontinued about 1918 since the high grade vein had been lost at a fault.

From 1918 until about 1932 various parties operated in a small way working over the tailings and such pockets of high grade ore as they could find in the upper levels.

Meantime a new company had been organized and exploration with a diamond drill seemed to have found the lost vein beyond the fault and one core showed a width of some 8' of vein matter which ran well over one ounce in gold to the ton. On the strength of this discovery, the United Verde Extension Mining Co. took an option on the controlling interest and proceeded to sink a new shaft and to look for the ore with drifts and crosscuts, spending altogether over \$100,000.

Their search for the faulted vein was a complete failure, and was abandoned but since that time portions of the mine also the tailings and dumps have been worked in a small way by lessees and such work is still in progress.

The old mine was opened to the 1500' level with two inclined and one vertical shaft and the total value of the production is reputed to have been in the order of \$18,000,000.

The geology is very complicated with numerous intrusions and faults and there has been much disagreement among engineers and geologists some of whom are convinced that the work of the U. V. X and others was not properly located and that there is still an excellent

chance of finding another large body of high grade ore, but from what I can learn this would involve a gamble of from \$100,000 to \$250,000.

The notes made by my engineers who visited this mine at intervals from 1916 to 1926 are of no present value since they refer entirely to the small operations which were then in progress and the chance of obtaining custom shipments.

There is a recent and very complete report on the property by Fred Searls of which I had been promised a copy together with the maps but the mine is at present under option and this and other data will not be obtainable until after January 1st when these are to be sent to me and will be forwarded to you in case the present option is not exercised or extended.

Searls conclusions are in the main rather discouraging and influenced the U. V. X. to discontinue their explorations.

C

Vulture

DISTRICT Wickenburg
PROPERTY Vulture
LOCATION 15 Miles SW of Wickenburg.
OWNERS A.P. Irvine and associates. Property was bought for \$25,000 payable in 5 instalments of \$5000 at 6 months intervals. First payment made in August 1921.
DATE VISITED October 18 & 19, 1921. H. R. Banks.
CLAIMS 40

NOTES Geology- Values occur near the footwall and the hanging wall of an irregular Quartz-Quartzite vein approximately 50 to 60 feet wide, striking N 85 E and dipping 37 Degs. The gold is apparently associated with sulphides of Pb, Fe and small traces of Cu. The vein occurs in a schist but on the footwall of the south incline shaft at the 600 ft level an occurrence of what appeared to be Diorite might account for the presence of a certain amount of Quartzite in the vein. Some 300 feet north of the North incline shaft is a cross vein or dyke of Quartz. Between the two incline shafts the vein appears to have faulted laterally and to have left a considerable amount of drag material resulting in the appearance of a bend in the vein. Apparently this weakened portion was most susceptible to enrichment and the workings would indicate that the greater part of the ore mined was drawn from this vicinity. The vein itself is traceable for several thousand feet and is marked by the workings of leasers who have taken out pockets of ore varying from a few tons to several hundred tons.

WORKINGS The north incline shaft is approximately 600 ft deep and the south incline shaft is in one plane for 700 feet while the remaining portion to the 1200 ft level has been sunk in three sections due to either a series of step-faults or a flattening of the vein. The workings below the 600 ft level are under water so that my information was gained from Mr. Irvine who has been acquainted with the property for several years. A considerable amount of drifting has been done underground and the stopes show that immense bodies of ore have been mined. It would appear from my inspection that the upper workings, from about the 350 to the surface accounted for most of the ore. The stopes as one goes down the mine become smaller and there seems to have been a considerable amount of drifting done in the nature of prospecting. However I was informed that it was the intention of Mr McKay, who was apparently a part owner in the mine besides holding the position of General Manager for several years, to sink a vertical shaft 1000' in depth and to thus avoid the necessity of handling the ore so many times. Mr McKay died before his plan could be commenced. Between the two shafts is an immense cave-in resulting from the ground having been opened up too much in the upper workings. It was reported that several lives were lost. The cave-in exposes the upper portion of the vein and it is here that the present owners hope to do most of their mining for the time being. By clearing away the overburden and a certain amount of the hangingwall it will be possible to quarry the pillars and that portion of the vein left in the mining operations. What values are left would have to be determined by a thorough sampling but Mr Irvine feels confident of his ability to judge the grade of ore from his previous experience in the mine.
There are certain portions of the underground workings which still have ore remaining and these would also be mined.

CONCLUSIONS

Without doing a considerable amount of sampling it would be impossible to form anyworth-while opinion of the present value of the Vulture Mine. If Mr Irvine is correct in his assumption of the value of the ore which he contemplates mining his project would appear feasible and there is always the possibility of opening new ore bodies in the lower workings. The tailings dumps, which I understand have been thoroughly sampled and on which satisfactory tests have been made, might be worked at a profit in conjunction with the milling ore available and this might prove an additional source of revenue. The dumps approximate \$2.50 in value and showed a concentrate in the tests of about \$100. A reworking of these tailings should be sufficiently economical to allow a margin of profit.

The policy outlined to me was that the present owners would offer certain portions of the ground to leasers (some 20 applications are already in) and that they, (the owners) would at the same time commence taking out ore which would stand shipping direct to the smelter. The profits accruing from these operations would be diverted to the erection of a flotation mill and the lower grade ore would then be milled in conjunction with the tailings dumps.

Mr Irvine feels confident that the operations outlined should yield at least 4 cars per month in addition to what the leasers would ship.

The surface plant was recently junked so that all machinery, piping etc has been taken off the property and it will therefor be necessary to install new equipment for all future operations.

HRB

District	Property	Location	Owners & Operators	Date Visited	Notes
Wickenburg (Cont'd.)	Vulture	12.9 mi. SW Wickenburg	Vulture Mining Co. Angus Mackay, Mgr. Few men working for lessee. Ricksecker in charge.	March 17 1917	Quartz vein in schist, strike N 85 E, dip 37°. Shaft about 1200'. Two inclines 765' and 595'. Water to 700' level. Italians now taking out small block of ground on 700' level on which a hoist stood. No other work going on. Reported that property will be abandoned at termination of this lease. Ore being sent to Arizona Sampling & Reduction Co. Runs 1½ oz. gold; 80% Insol; No copper, but I have observed some chalcopyrite in small piles of ore at mouth of shaft. Large piles of tailing, one of which, from old mill, I was informed had not been cyanided. My sample from surface of this assayed Au. Tr; Ag. 0.32; Pb. 0.4%; Cu. 0.22, but unlikely to be representative. Several pumps, hoists and other equipment around. Old 80 Stamp Mill junk. "New" Mill contains 20 stamps, Dorr Classifier, 4 Wilfley Tables, 2-150 HP Nash, Gas Engines (2 more at Compressor), 4 Chilean Mills, 4-40' Cyanide Tanks, 6 Canvas Slimes Tables, Filter Press, etc. Although the present Company has treated \$20.00 ore, their operations have not been profitable.

Holland (?)

NOTE RE VULTURE

12/30/38

The Vulture Mine is still under option to Dickey and John C. Lincoln. Dickey believes that he has developed enough low grade ore near the surface and around the old workings to justify the erection of a 250 or 300 ton mill.

Lincoln is shortly expected back in Arizona and will then decide whether or not he will exercise the option, make a further payment on the property and proceed with the construction of the mill. If Lincoln should drop out of the picture, the United Verde Extension Company are disposed to give Dickey an extension of the option in order to give him time to try to interest some other parties with whom he is in contact.

According to Peach who knows the mine very intimately, the low grade ore which Dickey has developed will not average better than \$4.00 per ton and the margin of profit will be small or negligible.

When Fred Searles examined the Vulture some 5 or 6 years ago, he advised the United Verde Extension that if they would spend about \$100,000 in additional exploration and development, he believed that they would pretty surely prove up a faulted section of the old vein which, although limited in area, would yield enough profit to repay this expense and leave some margin for further exploration. Similar advice was given by other geologists but United Verde Extension decided not to take this venture.

Peach is of the opinion that the chances of finding any large body of high grade ore are poor and apparently J. S. Douglas and George Kingdon agree with him.

G.M. Colvocoresses

VULTURE MINE

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NOTE RE VULTURE MINE

2/28/39

Mine now under three or five year lease to Dickey and Lincoln who contro the Vulture Mines Operating Co. of which Stanley Smith, c/o U.V.X. at Jerome is Secretary.

They also have option on the U.V.X. stock in the Old Vulture Mining Co. of which Finlayson was the President.

Lessess ~~are~~ obligated to promptly build and put in operation a 100 ton mill and may enlarge this later.

Finlayson says that near the surface of the old workings they can mine ore that will run about \$2.50 per ton on which there will be little or no profit but they may get some higher grade ore around the McKay workings.

They are now moving over the power plant from the Diamond Joe.

G. M. C.

VULTURE MINE

March, 1938.

Now under option from United Verde Extension to Dickey backed by John C. Lincoln.

Two main incline shafts worked to the 1500' level. A lot of development. Mine last opened and surveyed in 1913-1916.

Dickey seems to think that he can keep going by working out ends of high grade ore shoots left in upper workings and also has a chance to develop a big body of low grade gold ore averaging \$5.00 or better per ton which would pay to mill.

To thoroughly explore the property in search of the old vein which was lost at the fault would probably cost from \$100,000 to \$200,000 and it is a long shot.

GMC.