

GEOLOGICAL SURVEY OF WYOMING

REPORT ON THE ARIZONA MINE, LARAMIE COUNTY, WYOMING, BY C. E. JAMISON,

STATE GEOLOGIST, 1912

February 20th, 1912

Otego Mining Company,
Hecla, Wyoming

Gentlemen:-

In accordance with your instructions of recent date, I have made an examination of the Arizona mine and herewith submit my report.

Very respectfully,

C. E. JAMISON
State GeologistTHE ARIZONA MINE

The Arizona mine, owned by the Otego Mining Company is located in Sections 25 and 36, Township 14 North, Range 70 West, in the Silver Crown mining district, Laramie County, Wyoming. It is about eight miles by wagon road from Silver Crown station, on the Colorado & Southern Railway, (see map). Cheyenne, eighteen miles east from the mine, is the nearest town and supply point, both Silver Crown and Granite Canyon being mere railway sidings.

The mine is best reached from Cheyenne by team or automobile, the roads being first class, although the train on the Colorado and Southern Railway may be taken to Silver Crown station, and the trip completed in private conveyance, which should be arranged for in advance.

CLIMATE

The location of the Silver Crown mining district in the Laramie Mountain region, at elevations ranging from 6,500 to 8,000 feet, gives it a semiarid climate. Snow lays on the ground but a short time, and, although the temperature at times drops as low as -25 degrees F., work may be carried on at all seasons of the year.

GENERAL DESCRIPTION

The property of the Otego Mining Company comprises the Arizona, Nevada, Anaconda and Gold Coin lode mining claims, each of about twenty acres in extent. Surface improvements are negligible, being limited to a shaft house and a whim,

while underground development consists of a shaft 157 feet in depth, crosscuts 102 feet in length at the 80-foot level, 260 feet of drifts and crosscuts at the 130-foot level, and a tunnel 100 feet in length, the total underground development amounting to 619 feet.

GEOLOGY

The geological horizon of the Silver Crown district includes granites and schists, cut, at the Arizona mine, by a dyke of diorite, which has been extensively fractured and sheared in the direction of its strike. The fracturing of this dyke has opened the way for mineral bearing solutions, which have deposited, in the shear zone, the minerals borne in solution, forming minute veinlets of quartz impregnated with gold and copper. This mineralized dyke outcrops extensively on the Arizona claim, its width being about two hundred feet. The mineralized zone has not been exposed in its full width in the underground workings, although crosscuts, 102 feet in length on the 80-foot level and 82 feet in length on the 130 foot level, have been driven without encountering either wall.

On the surface the ore is oxidized, the principal mineral being malachite, but at the 130 foot level, copper sulphides and native copper are beginning to be in evidence. As greater depth is attained, probably within the next hundred feet, the copper minerals in the ore will consist almost entirely of copper sulphides with more or less native copper.

ORE DEVELOPMENT

Although the mine is developed by 619 feet of drifts, crosscuts, etc., the work is so slight in comparison with the size of the ore-body that no reliable estimate can be made as to the tonnage of probable ore. There is no doubt, however, that there are, above the 130-foot level, several hundred thousand tons of ore.

In the course of the examination fourteen samples were taken from the ore body. Assays were made by J. W. Richards of Denver, by Ricketts and Banks of New York, by Ledoux and Company of New York, and by the writer. The values of these samples, as determined by averaging the results obtained by the above mentioned assayers are given below.

(Table on next page)

NO.	DESCRIPTION	GOLD		SILVER		COPPER		TOTAL
		OZ.	VALUE	OZ.	VALUE	%	VALUE	VALUE
1.	130 ft. level, north cross-cut, 55 feet	.21	\$4.20	.50	\$0.30	0.66	\$1.82	\$6.32
2.	130 ft. level, north cross-cut, streak containing native copper, 2 feet 1 inch	.12	2.40	.80	0.48	0.99	2.73	5.61
3.	130 ft. level, east drift, face, 8 feet	.06	1.20	.40	0.24	0.22	0.61	2.05
4.	130 ft. level, west drift face, 8 feet 2 inches	.27	5.40	.55	0.33	0.55	1.52	7.25
5.	130 ft. level, northwest crosscut, south side, 28 ft. 8 inches	.12	2.40	.50	0.30	1.11	3.06	5.76
6.	130 ft. level, south cross-cut, 34 feet 4 inches	.06	1.20	.40	0.24	0.88	2.43	3.87
7.	130 ft. level, northwest crosscut, 31 feet 4 inches	.06	1.20	.50	0.30	0.44	1.21	2.71
8.	80 ft. level, north cross cut, 28 feet 2 inches	.18	3.60	.80	0.48	0.44	1.21	5.29
9.	80 ft. level, south cross cut, 74 feet 3 inches	.06	1.20	.50	0.30	0.55	1.52	3.04
10.	Shaft, 20 feet below surface, 4 feet	.42	8.40	.70	0.42	2.43	6.71	15.53
11.	Shaft, 40 feet below surface, 5 feet	.18	3.60	.42	0.25	1.66	4.58	8.43
12.	Shaft, 75 feet below surface, 5 feet	.18	3.60	.42	0.25	0.77	2.13	5.98
13.	Shaft, 100 feet below surface, 5 feet	.21	4.20	.50	0.30	1.22	3.37	7.87
14.	Opencut, 12 feet below surface, 20 feet	.20	4.00	.50	0.30	0.99	2.73	7.03
AVERAGE			\$3.33		\$0.32	12.91	\$2.54	\$6.19

METHOD OF TREATMENT

Although the ore exposed above the 130 foot level in the Arizona mine will yield its gold and silver to simple treatment with potassium cyanide, the presence of relatively large amount of the carbonates and oxides of copper would cause a large consumption of cyanide and thereby increase the cost of treatment. It is believed by the writer that the ore is amenable to leaching with sulphuric acid, for the removal of the copper, followed by cyanidation. It is somewhat difficult to estimate the costs of such treatment, but it is believed that they will not exceed the following:

Mining	Cost per ton
Crushing	\$1.00
Sulphuric acid, 23 lbs. (including 25% loss)	.20
Leaching with acid	.25
Precipitating copper	.40
Marketing copper	.05
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	.05

Total cost of mining and removing copper \$1.95

Leaching with cyanide (including cost of cyanide)	Cost per ton
Precipitating gold and silver	\$0.60
Refining	.05
Marketing	.05
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	.05

Total cost of cyanidation \$0.75

Total cost of mining, acid wash and cyanidation \$2.70

Assuming that an extraction of only 65 per cent of the copper will be made, the figures above for cost of mining and extraction of copper are equivalent to a cost of 16 $\frac{1}{2}$ cents per pound of copper produced. After leaching with sulphuric acid the ore should be in ideal condition for cyanidation and should readily yield 90 per cent of its gold and silver content. Assuming an extraction of 90 per cent of the gold and silver, and 65 per cent of the copper, this ore should yield a profit of \$2.08 per ton, the cost being based on the figures given above.

It is probable that as development is continued to greater depths the metallic minerals in the ore will be found to consist entirely of copper and iron sulphides, when the method of treatment will be somewhat different from that necessary for the oxidized ores.

CONCLUSIONS

Before erecting a plant for the treatment of the ore this mine should be further developed and the character of ore below permanent water level determined. Extractions tests should be made to determine the proper method of treatment, and the mine worked only on a large scale. The ore of the Arizona Mine although low in grade, should yield a handsome profit when properly worked.

The ore exposed above the 130 foot level indicates a large prospective value and fully warrants further development.

Respectfully submitted,

C. E. JAMISON
State Geologist

Cheyenne, Wyoming, February 20, 1912.