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AMERICAN CYANAMID COMPANY
MINERAL DRESSING LABORATORY

INVESTIGATION NO. 58
PROBLEM NO. 3064

July 14, 1950.

Metallurgical Tests on Samples of Gold-Silver Ores from
Dayton Consolidated Mines Company, Silver City, Nevada.

THIS REPORT IS BASED ON METALLURGICAL RESULTS OBTAINED IN THE MINERAL DRESSING LABORATORY OF AMERICAN CYANAMID COMPANY ON A SAMPLE OF MATERIAL SUBMITTED BY THE SUBJECT COMPANY, AND ALL RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN APPLY ONLY TO THE TREATMENT OF MATERIAL CONFORMING TO THE SAMPLE SUBMITTED. NOTHING CONTAINED HEREIN SHALL BE CONSTRUED TO CONSTITUTE A PERMISSION OR RECOMMENDATION TO PRACTICE ANY INVENTION COVERED BY ANY PATENT OWNED BY AMERICAN CYANAMID COMPANY OR BY OTHERS, WITHOUT A LICENSE FROM THE OWNER OF THE PATENT, OR OTHER PARTY ENTITLED TO GRANT SUCH LICENSE.

Introduction:

This report covers the test work conducted on samples representing ores from the Dayton Cut and Consolidated Virginia mines. The test work was done in the laboratory of the subject company in Silver City during February, March and April of 1950.

Present Operations:

The subject company was operating a combination straight-cyanidation and flotation-cyanidation mill on low grade gold-silver ores from the Comstock Lode area. Custom ores were treated hence the tonnage to the plant, as well as the flow scheme employed, varied with different ores.

A flow scheme of the Dayton mill is shown later in this report.

It was stated that the Dayton Cut ore had been put through the Dayton mill at one time but the slime fraction of the ore settled so extremely slowly, no real daily tonnage could be handled. However, the extraction of values was good and except for high lime consumption, resulting from efforts to settle the slime, the chemical consumption was regarded as low.

The Consolidated Virginia ore did not present any real difficulty with slow settling slime but contained a serious amount of

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acidic material and cyanicides, making the chemical consumption fairly high. The values in the primary slime were difficult to recover either by flotation or cyanidation.

Object of Investigation:

The object of the investigation was as follows:

1. On the Dayton Cut ore, it was desired to know what results could be obtained on both the sand and slime fractions by flotation and cyanidation. It was especially important to determine if the "colloid" fraction of the ore could be removed and either treated separately or discarded.
2. On the Consolidated Virginia ore, it was desired to know what results could be expected if a treatment involving washing, scrubbing-aerating, flotation and cyanidation were employed.

Summary:

The test work conducted on samples of gold-silver ores in the laboratory of the Dayton Consolidated Mines Company, Silver City, Nevada, may be summarized as follows:

1. Two samples of ore were treated; the head assays of the ores were:

Sample	Assay Value		
	Oz./Ton		
	Au	Ag	\$
Dayton Cut	.067	0.88	3.19
Consolidated Virginia	.220	3.54	10.89

2. The major problem in the treatment of the Dayton Cut ore was the handling of the primary slime. The ore cyanided readily with a reasonable chemical consumption but inability to settle the slime limited the tonnage that could be put through the Dayton mill.

The problem in connection with the Consolidated Virginia ore was to make a high recovery with a low chemical cost. The ore was highly acid and contained a refractory primary slime fraction.

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3. Tests conducted on the Dayton Cut ore indicated that removal of the "colloid" fraction of the primary slime, but washing and desliming techniques, would greatly improve the settling characteristics of the ore; the average "colloid" discard represented 5.9 % of the weight of ore and contained 1.9 % of the gold and 8.5 % of the silver in the total ore.
4. Some of the values in the "colloid" fraction of the primary slime in the Dayton Cut ore could be recovered by flotation. The flotation concentrates, however, were extremely slimy and difficult to settle and filter.
5. A number of tests were run in which the Dayton Cut ore, after removal of the primary "colloid", was crushed to -40 mesh and then froth floated. After flotation, the tailing was separated into sand and secondary slime fractions, the secondary slime was further floated and the sand was cyanided. In some cases, various granular fractions of the ore were subjected to scrubbing-aeration for improvement in flotation recovery and lowering of cyanidation chemical consumption.

In general, the scrubbing step increased the proportion of secondary slime and introduced the problem of recovering the values from the secondary slime by flotation. In the work done thus far, the recovery from the secondary slime by flotation was not as good as by cyanidation.

6. In Tests DC GR-3 and DC GR-4, the recovery of values from the Dayton Cut ore was from 81 to 84 % of the gold and 54 to 57 % of the silver. The overall recovery was from 74 to 78 %, or from \$1.91 to \$2.07 from a \$3.20 head.
7. In the two tests on the Consolidated Virginia ore, in which the primary slime was discarded and the granular portion was crushed, froth floated and the sand fraction cyanided, the recovery of gold ranged from 95.3 to 96.4 %, the recovery of silver from 75.6 to 78.8 %; the overall recovery was 90 %, or \$8.55 from a head of \$9.45.

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Conclusions:

As a result of our test work on samples of the Dayton Cut ore and Consolidated Virginia ore, the following conclusions have been drawn:

1. In the treatment of the Dayton Cut ore, the primary "colloid" fraction may be isolated and either discarded or subjected to froth flotation. Discard of the "colloid" entails the loss of 5.9 % of the weight of ore, 1.9 % of the gold and 8.5 % of the silver. The tests indicated that removal of the primary "colloid" would greatly facilitate the treatment of the ore by the C.C.D. system of cyanidation.
2. Subsequent treatment of the granular portion of the Dayton Cut ore, after removal of the primary slime, will depend mostly upon the economic factors involved in either using the present Dayton mill flow scheme or in designing a mill especially for the Dayton Cut ore.
3. Ore represented by the Consolidated Virginia sample, readily responded to a treatment involving removal of the primary "colloid" and flotation-cyanidation of the granular fraction.

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