REPORT ON
WATER SUPPLY,
YUCCA TUNGSTEN MINING CO.
MOHAVE CO., AZ.
WATER SUPPLY
of
TUHEA TUNGSTEN MINING COMPANY
MOHAVE COUNTY, ARIZONA.
1916

Report by J. H. Marks,
509 Empire Bldg.,
Denver, Colo.

John H. Marks
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Denver, Colorado.
October 1916
Mr. Geo. Marlow,
Yucca Tungsten Mining Company,
York, Pa.

Dear Sir:

Herewith please find report on water supply for your mine near Yucca, Arizona, confirming in detail my preliminary report of September 29, 1916.

The object of this report is to determine the most feasible plan for a water supply for milling use in reduction and concentration of the ore from your mine.

We do not find a sufficient quantity of water for milling purposes at the mine, but do find that by construction of a tramway about 2½ miles in length, an abundant supply can be obtained for continuous operation of a 30 ton mill, an excellent site for a mill being found at above mentioned location.

The manner of examination and methods employed in arriving at this conclusion are given in detail herein.

Very truly yours,

John H. Marks

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GENERAL DESCRIPTION

The Tuscon Tungsten Mining Company of York, Pa., is operating a tungsten mine in Mohave County, Arizona.

The town nearest the mine is Tuscon, Arizona, a station on the main line of the A.T.&S.F. Railway (population 70).

Tuscon is 1,894 feet above sea level and the mine is probably 2,000 to 3,000 feet higher.

The property is located in the Mohalai Mountains 15 to 20 miles easterly or northeast into Tuscon.

A good wagon road connects the mine with railroad at Tuscon. This road has a gradual rise from the railroad, the greater portion being comparatively level, except the last 3 miles nearest the mine where the grades are steep. Hauling is done by an automobile truck to within ½ of a mile from the mill, the remaining haul being made by team. About 3 hours time is required to make the trip from the railroad to the mine.

The climate is warm and dry, though the altitude of the mine is such the heat should not be excessive in summer season. Work can be prosecuted every day in the year.

WATER EXAMINATION:

The object of this detailed report is to describe conditions as found on the ground with reference to a supply of water for milling operations.

There is an insufficient quantity of water at the mine for a wet concentrating mill.

At a point about ½ mile distant and approximately 1,400 feet lower in elevation a good mill site is found and also enough water by storing and

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re-use to continuously operate a 50 ton wet process mill during the dry season.

**WATER SUPPLY:**

Quoting from Government records, U. S. Weather Bureau with reference to climatological data for this region:

"There are two sources of water supply in Arizona. In the mountain regions the streams are fed mainly from the melting snows in winter. A slow run-off occurs which swells the streams to good depths, the supply of water usually lasting until the seasonal summer rains begin between the first and tenth of July, although in June an occasional small shortage does occur. During July, August and the first ten days of September the supply of water is greatly replenished by the numerous thunder-showers that fill the river beds to moderate proportions. Another dry period intervenes until about November 15th, when the winter rains and snow set in, lasting until about March 15th, and the slowly decreasing volume of water is again replenished."

The above described conditions apparently obtain at your tungsten mine.

Summer rainstorms are evidently torrential and of a cloudburst nature as shown by the large amount of heavy rock moved by flood water into the gulches which are filled with heavy wash and have grades too steep to admit of reservoir storage. The grades are so steep that large expensive dams would store but a negligible quantity of water, and cloudbursts would be liable to fill or destroy them. About the only advantage they would give would be a temporary obstruction to the flow and a consequent prolonging of the supply, but the value of water thus secured would be more than offset by the excessive cost besides it does not appear necessary in the view of obtainable water supply hereinafter described.

Government records at Kingman, Arizona show an average annual precipitation of about 12 inches. Kingman is the nearest station that could be fairly compared with your conditions at the mine and it is probable there is more, rather than less rain and snowfall at your property than at Kingman.

For probably 8 or 9 months per year, there will be, according to best available information, an ample supply of water for continuous operation of a
50 ton mill.

For the dry season, water if not found in sufficient quantity can be conserved by storage and re-use.

The method of calculating the quantity and of measuring the flow of water was as follows:

Water weighs 62 1/2 lbs. per cu. ft.

= 8-1/3 lbs. per gallon.

A ton of ore weighs 2000 lbs.

It is estimated that 6 1/2 tons of water is required to mill 1 ton of ore.

A small dam was put in the stream and water taken therefrom through a V shaped trough about 6 feet long (see Photo No. 5, or a 2 inch pipe 16 feet long, see Photos. Nos. 6 and 7) and emptied into a box of measured dimensions (12 x 11 x 16 inches inside, containing 1351 cubic inches.) By a watch the time required to fill the box was determined, the result being figured in cubic feet per minute.

At a point about 1/4 mile above proposed mill the flow was found to be 24 cu. ft. per minute, or 24 x 60 = 1500 cu. ft. per hour, or 3600 cu. ft. in 24 hours. 3600 x 62.5 = 225000 lbs. of water per day, or 112 1/2 tons daily; sufficient, at 6 1/2 tons of water to 1 ton of ore to mill 25 tons per day by direct flow, and if this water was stored it would probably be enough for a 50 ton mill, as Mr. Eggars estimates that 80% of water used in the mill can be conserved by storage and re-use.

We could thus store water for 50% of 25 tons, or 12 tons daily, which would give a capacity of 45 tons of ore per day. Allowing for delays and stoppage, the water flowing continuously, we would have approximately enough water for continuous operation; this water being brought by direct gravity flow into the mill.

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Water measurements were made in a similar manner at two other places, one at a spring near an old house about ½ mile southwesterly from proposed mill site, (See Photo No. 5) and one in the main stream about ½ mile below proposed mill site. (See Photos, Nos. 6 and 7.)

At the spring we found a flow of possibly 10 cu. ft. per hour. Evidently this could be increased by concentrating the water from several places near at hand that gave evidence of seepage, the water coming out in a sort of block schist rock.

Levels show this water could be taken to mill site sump by gravity and possibly by gravity to tank above proposed mill.

At a point in main stream about ½ mile below proposed mill site we found a flow of 3.6 cu. ft. per minute, equal to 216 cu. ft. per hour; adding to this the spring water above described gives a total of 226 cu. ft. per hour, equal to 5444 cu. ft. per day, or at 63.5 lbs. per cu. ft. 339000 lbs. of water daily, or 16½ tons; sufficient, at 4½ tons of water to 1 ton of ore to mill 30 tons by direct flow, and by storage of water, but a small quantity would be needed as we would thus store water for 60% of 30 tons, or 18 tons daily, which would give a capacity of 68 tons of ore per day; hence we conclude we are safe in saying there is water available for a 50 ton mill.

TRAMWAY LINE:

Distance was measured approximately by Henry Eggars and J. H. Harke, using steel tape 600 feet long. The ground is covered with underbrush and accurate chaining was impossible without having line cleared.

The distance measured was about 2½ miles from upper tunnel to proposed new mill. This distance should not be materially changed when line is located, cleared and carefully chained.

At upper end the tramway line will be much steeper than at lower end near mill; the average fall or grade approximates 1½ or 11 feet per hundred.

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The lower ½ mile of tram line has about 6½ grade or 6 feet per hundred.

Accurate location will probably show the tramway can be operated by gravity alone, but should it be necessary to use power a small amount only would be required and this might be advisable in any event on account of having better control of tram.

Photos 1 to 4 show general views in the vicinity of mine and proposed tramway line and mill site.

Very respectfully submitted,

John H. Marks

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