

REPORT ON KIMBERLY MINE

KOKOMO, COLO.

by

Kirby Thomas

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Report on Kimberly Mine, Kokomo, Colo.

by Kirby Thomas

New York, Jan. 9, 1907

Mr. Wick O'Connell,  
Houghton, Michigan.

Dear Sir:

In reply to your request for a report upon the Kimberly Consolidated Mines at Kokomo, Colo., I submit the following: I spent three days, Dec. 8th, 9th and 10th, at Kokomo, and examined as closely as possible, the Kimberly, Wilfley and other smaller mines and also the Mills of the Wilfley and Breene Mines now running.

Location: These mines are all located on Elk Mt. near the village of Kokomo, Summit County, Colo., with the famous "Ten Mile District" which is adjacent to Leadville.

Incorporation: The Kimberly Consolidated Mines Company was incorporated Jan. 22nd, 1906, under the mining laws of the State of Wisconsin, with offices at Milwaukee. It derives its name from the combination of a number of patented mining claims or rather from the combination of two sets of consolidated claims which have been idle for some years. These are the original Kimberly claims which were purchased from the estate of Mr. P. L. Kimberly and those of The Connors Bonanza Mining and Reduction Company. The accompanying map shows these properties and also the Wilfley and Breene holdings.

At the present time, the Company is not producing but expending its energies in erecting a new 500 ton mill, described later in this report. The first unit of this (250 tons) is to be finished Mar. 1st, 1907. If the question is asked why these mines have been shut down for so many years, the answer is that new discoveries in ore separation has made it possible to reopen on the basis of large profits. This will be explained at length farther on.

Formation: The original Kimberly property which embraces claims amounting to 85 acres and the Wilfley and Breene Mines are all upon the same contact vein, which yields the ore. This contact is a vein of limestone called locally, the Quail limestone, of thickness varying from five to twenty-five feet, average eight feet, lying upon a bed of fine grained hornblende-diorite-porphry, locally known as the Quail Porphyry. Above the contact lies white sandstone, separated by beds of black shale. The strike of the contact is about northwest and southeast with a dip of about 25 degrees to the northeast. This contact has been very thoroughly mineralized, especially in the Kimberly property, with ore containing gold, silver, iron, lead, and zinc, in varying amounts. The ore is principally in the sulphide form known commercially as iron pyrites (containing the gold and silver values), galena and zinc blende or black jack.

The Connor's property over the apex of the mountain, embracing claims to the extent of 125 acres, is upon another contact vein (hereinafter called the second contact) of the same general nature as the first contact, but outcropping lower on the mountain. There is also a fault or vertical fissure vein upon this property, outcropping upon the surface with a general northeast and southwest trend and a dip of 80 degrees to the southeast. The first contact outcrops upon the Wilfley and Breene properties as indicated upon the map before striking the Connor's property and was the first indication of ore on this mountain. A second contact underlying the first passes thru the Wilfley and Breene properties and into the Kimberly. I will show this more in detail later on.

Market: The market for the Company's products, namely the concentrates of zinc sulphide, lead sulphide, and iron sulphide (carrying the gold and silver values), are the smelters located in Denver and Pueblo, Colo. and the ones in Iola and Kansas City, Kansas. Here the sulphides are converted into the metallic metals and one has only to consider the numerous uses to which these metals are put to see the continuity of the market.

Transportation: The railroad facilities are excellent. The Colo. and Southern R.R. having a side track at the mill below the concentrate bins and the Denver & Rio Grande R.R. is only a few hundred feet distant and will no doubt place a siding upon request. This competition of railroads is an advantage.

Development: The map indicates the tunnels and drifting already done upon the Kimberly and Connor's property. The Kimberly or Evans Tunnel runs upon a very slight grade (enough for drainage), cutting the sandstone and black shale beds for about 1500 feet before striking the contact. Upon striking the contact, drifts in both directions follow the strike approximately, while the main tunnel goes upon the contact vein a few hundred feet. Some minor drifting upon the vein and stepping has been done in the north drift. This represents all the work done on the Kimberly property and the material taken out years ago, and much of this material, high in zinc, lies in the large stock pile at the mouth of the tunnel. I entered and examined this tunnel and drifts and took samples of the ore at random as I proceeded. The tunnel has all been newly retimbered and is straight and of uniform size and is a good piece of workmanship throughout. I made no attempt to sample the zinc to any minute degree, because the time would not warrant it, but to simply gain a general knowledge of the contents of the ore. Anyone entering the mine will be overwhelmed when looking upon the walls and breast of the drifts, noting the hanging and footwalls, to observe the quantity of ore absolutely opened out and in sight. Furthermore, by going through the Wilfley and Breene Mines, this contact is very thoroughly explored being honeycombed by tunnels in these latter mines, which having been worked for some time with the new milling processes. I should say that fully 30% of the contact where mineralized, contains mineral values and that mining experience would indicate higher percentages of the individual metals lower on the contact. However, there is sufficient ore in the contact above the Kimberly Tunnel to continue mining for several years to come. If the reason for the seeming crooked system of drifts should be asked, the answer would be that years ago when this mine was worked for gold and silver values, zinc was a great source of annoyance to the miners and they would run around sections high in this metal because they could not dispose of it at a profit. Their iron and lead, they could dispose of, with the gold and silver, the smelters needing these metals for a flux in the extraction of the gold and silver but they were penalized fifty cents a ton for every per cent of zinc over ten. Similarly the zinc smelters would penalize them for every per cent of iron over three. They could not separate their iron and zinc on jigs as they could their iron and lead or zinc and lead because the specific gravity of iron and zinc is nearly the same. Hence, they avoided zinc and ceased mining entirely when the price and yield in silver fell off increasing correspondingly in zinc. It remained for recent years to discover that iron pyrites becomes magnetic upon roasting and this property is made use of in the magnetic separator, which very nicely picked out the iron from the zinc and lead. The process will be described in detail later on.

In the Connor's property, you will also note a tunnel indicated on the map. This tunnel runs upon a slight grade for 2550 feet, passing through alternate layers of sandstone, porphyry, shale and limestone.

Up to this point (except for a small amount of mineralized porphyry about 400 feet from its mouth) no ore was encountered. The strata here is analagous to the Kimberly property, having the same general strike and dip. At 2550 feet, the fault fissure vein or dyke previously mentioned was encountered. This was found to be 30 feet wide at this point and 80 feet wide at the breast of a drift running southeast, 240 feet from the tunnel. Considerable upraising and stopping was done in the fault and mineral value was realized. No contact vein with richer values was encountered, however, as was the expectation when putting in the tunnel and so operations were suspended and diamond drill holes sunk at various points in the tunnel to locate the contact. This contact was found 115 feet below the tunnel at its breast, containing the same general character of ore, being the same general character or mineralized vein of limestone as the first contact and with similar strike and dip. Its continuity is unquestioned and by calculation it is found to pass through the Kimberly property under the first contact there. This second contact then, the vertical fault, and the first contact, constitute the ore bearing veins so far as at present explored, of the Kimberly consolidated Mines Company.

Mining: The ores of the Kimberly are readily crushed and easy to mine, everything being taken out by gravity through the tunnel and dumped into the ore bin of the mill before crushing. Great vigilance must be kept by the mining foreman and the chemist in the proper sorting of the ore. When zinc predominates, it should be subjected to the process of the new mill later described, but where lead and iron predominates, it should merely be crushed and rolled and passed to the Wilfley tables. When rich shoots of gold and silver occur, and these are frequent, the ore may be shipped direct to the smelters without any milling whatever as in former times. In mentioning rich shoots, I may say, that this is a recognized peculiarity of this vicinity and one of the samples which I took bears out this fact, analyzing forty ounces of gold and one hundred and eighty eight ounces of silver per ton of gross value \$872.80 per ton. About eight cubic feet of ore weighs a ton. When the ore above the tunnel has all been stopped out, the Kimberly or Evans Tunnel can be extended, approximately level through the Breene and Wilfley properties and strike the second contact in the Connor's property, thus prolonging the gravity mining for several more years. I may say that this is entirely possible, to enter the Breene and Wilfley properties under the mining laws of Colorado. Thus it will be seen that it will be sometime before any hoisting or shaft appliances will be necessary. The value of mining by gravity is incalculable as the original cost for appliances and the maintenance and repair of same together with the constant pumping of water is done away with. The cost of mining per ton, of eight cubic feet, should not exceed \$3.00, this to include timbering and development work.

Milling: The general method of separating these sulphide ores high in zinc and the one that will be employed in the new Kimberly Mill is as follows: This is also the method now employed in the Wilfley and Breene Mills now running. The ore is crushed through a crusher and rolled through rolls and screened upon screens of about 14 inch mesh. The ore then is roasted in a special roasting furnace and after passing through a water-jacketed conveyor for cooling, it goes on to the magnetic separator. Here the iron is picked out and sent to the bin of iron concentrates, ready for shipment to the smelter. The pulp containing the zinc and lead then proceeds to an agitator and then upon the Wilfley tables where they are easily separated and the silica eliminated. After being dried, each

pass to their respective concentrate bins ready for shipment to smelter. The new mill is being located between the portal of the Kimberly Tunnel and the C. & S. R.R. track below and the slope of the mountain is sufficient to permit the use of gravity, elevators being required in two places only. The arrangement is so automatic that a force of five men is all that will be required to operate it at an output of 250 tons per day. The design of the mill and also the machinery is being furnished by the Chalmers-Williams Company of Chicago, which assures the best upon the market today. The water supply comes from Searl's Creek only fifty feet distant from the mill and insures sufficient supply for all purposes. This can be arranged to be furnished by gravity.

The following represents the analysis of concentrates taken by me personally from the tables and concentrates of the Wilfley Mill.

#### ZINC CONCENTRATES

Gold	Silver	Iron	Lead	Zinc	Silica	Sulphur
none	none	4.5 %	1.7 %	48.48%	2.28 %	14.13 %

#### IRON CONCENTRATES

0.42	12.9 oz	50.5		5.5		
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#### LEAD CONCENTRATES

0.4 oz	12.2 oz	3.46	63.3	7.22	.24	13.04
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The average of six samples of crude ore taken at random by myself in the Kimberly drifts shows the following:

0.03	.94	17.74	0.36	20.60	2.88	19.5
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I have not the analysis of the ore that yielded these concentrates but from all information that I can gather from assays of the Wilfley Mine and mill practice, I should place this original crude ore about as follows:

0.15	4.5	29.0	0.3	18.0		
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Mill practice shows an average concentration of 3 to 1 for zinc and 3 to  $1\frac{1}{2}$  for iron. That is, three tons of crude ore will yield one ton of zinc concentrates and one and one half tons of iron concentrates, with also a small lead concentrate. Now to examine and see what this means: Consider the zinc concentrate. Three tons of crude ore of 18% zinc and 29% iron concentrates into one ton of 48.48% zinc and 4.5% iron; or the zinc is raised from 18 to 48.48% and iron cut down from 29% to 4.5%. Take the iron concentrates: three tons of crude ore of 29% iron and 18% zinc, concentrates into one and one half tons of 50.5% iron and 5.5% zinc. This, you will note, is a fair separation. The concentration of lead is very successful also but this is done simply to raise the unit price and get larger smelter returns, there being no necessity as far as the smelter is concerned to separate iron and lead. These are facts that can be supported at any mill of this description now running. The milling charges should not exceed \$1.00 per ton of crude ore.

Earning Capacity: The value of this mine must rather be based upon its earning capacity than upon an estimate of its ore quantity, because these are unquestioned and so enormous that they are nigh inexhaustable, at least for years to come. Basing an estimate on the average ore as I found it in the Kimberly Mine, the zinc concentrates will be at least 50% zinc and stand at present prices \$33.42 F.O.B. at the mine or dividing by three, \$11.14 F.O.B. mine per ton of crude ore. The lead and iron concentrates,

containing the gold and silver, valued on the basis of 50% iron and 40% lead concentrate will together stand \$2.50 per ton F.O.B. mine or 83 cents per ton of crude ore. This will give \$11.97 per ton crude ore F.O.B. mine. Deducting mining and milling charges to the extent of \$4.00 there is left \$7.97 per ton net value. This estimate is to my best belief the very lowest because the gold and silver values considered are at their minimum and no account is made for rich ore shoots. On the basis of an output of 250 tons per day, this will give \$1992.50 net profit per day. This can undoubtedly be increased by the shipment of crude ore not needing the mill concentration.

In closing, I wish to state that the opportunities of this mine are phenomenal and with careful competent management it can be made a wonderful dividend payer.

Respectfully submitted,

Kirby Thomas, Mining Engineer

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The above report was written by Kirby Thomas in 1907. Due to litigation and other reasons the new mill on the Kimberly property which he mentions, was completed but never operated. The Wilfley and Breene Mills and properties operated for many years thereafter, and successfully, in so far as the metallurgy of the ore was concerned for that period. Now, in 1935, milling practice of this type of ore has been much simplified. Costly roasting and magnetic separation plants have been scrapped for the much more simple and modern selective flotation methods which separates the various metal contents of the ore by the use of chemical reagents. The old and expensive methods have been discarded in favor of the new which was also the case at the time of Kirby Thomas' visit to the property in 1907.

Due to the causes listed above, the ore bodies of the Kimberly which are large and valuable, have not been mined. Very little work is needed to make these developed ore bodies accessible. They will be mined and milled in our proposed new Wilson Plant of the Kokomo Consolidated Milling Corporation.

Signed Geo. W. Danahy, E. M. 1935

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