

GEOLOGIC EVALUATION  
of the  
CLAY COUNTY MINE  
Gilpin County, Colorado

Prepared for  
GOLD RIDGE MINING, BLACK HAWK LTD.

by  
Norman L. Bennett  
Consulting Geologist - Mining Engineer

November 1981

## INTRODUCTION

The Clay County Mine has been in operation since August, 1979. During the past two years Houston Mining and Resources, INC. (HMR) via Gold Ridge Mining Company, has developed the Clay County Mine to the present point which will be presented later in this report. Development of the mine has progressed extremely well considering the building of a complete mill during these two years.

The development work has provided HMR with a much greater picture of reserves and ore values which were only inferred at the inception of the program. For example, only one major vein system was believed to be present in the old workings. We have now developed reserves on three separate vein systems which has increased the estimated reserve potential at least two-fold.

The purpose of this report will be to update the ore reserve picture presenting proven and potential reserves and looking at ore values as they relate to the three vein systems. The current and future development of the mine will also be discussed relating economic potential verses mine development over the next year.

## MINE DEVELOPMENT

As of September, 1981 there has been approximately 2000 feet of 8 foot by 8 foot tunnel driven in the mine. This 2000 feet includes approximately 1200 feet on the main haulage de-

cline and over 800 feet for stope development. One stope has been completed which produced approximately 3000 tons of ore. The major portion of development work was done on the what we call the "Middle Vein". This middle vein is the vein believed to be mined on in the past by the original discoverers.

Development of the mine at the present time is concentrating on three main points. The first point is the continued driving of the main haulage tunnel at a  $12\frac{1}{2}$  degree decline. The second point is the development of what we call the "West Vein". This vein was first encountered very early in our program when we drove our main haulage decline into it at about 150 feet. This was our first indication that we had more than one vein system in the mine. We continued driving our decline paralleling this vein and crosscutting over to it every 50 feet in order to sample and observe mineralogic and geologic changes that might aid us when we gained enough depth on the vein to economically mine it. The third point is the development of the "Middle Vein". This vein is one which produced our first 3000 tons and is believed to be the vein originally mined in the old Clay County Mine.

Our main haulage decline is presently being driven directly between the Middle and West Veins which lie some 20 to 25 feet on either side of the decline. By driving the decline between the two vein systems, we will be able to actively develop both veins at the same time. This will just double our daily tonnage output allowing for a much greater and quicker

cash flow. We presently have approximately 200 more feet of decline to drive before reaching the depth of the old 3rd level of the Clay County Mine. When we reach this depth we will drive a crosscut tunnel to intersect the old workings and then be able to evaluate mine conditions and ore grade present in the old workings.

Development of the first stope on the West Vein will take approximately three months. After three months we will begin producing approximately 25 tons of ore per day from the West Vein. Two additional months will be required to develop the Middle Vein stope which will then double our daily output. From this point forward, we will constantly be developing stopes and will be able to maintain a 50 ton per day output. When the stopes are developed fully, tonnage output will increase rapidly. We hope to be mining and milling 100 tons of ore per day after 12 more months of development.

#### STRUCTURAL GEOLOGIC EVALUATION

The development work previously discussed has enabled us to now have an almost complete picture of the structural continuity of the Clay County vein systems. The only question still unanswered is which vein system was mined on during early development of the Clay County Mine. Vein continuity has now been proven on one vein for a strike length of approximately 1200 feet. This vein system has a strike of from N 30° E to N 55° E and dips sharply 75 to 85 degrees northwesterly.

A second vein system has a proven continuity of over 600

feet. This vein system, referred to as our "West Vein," trends from N 35° E to N 45° E and also dips steeply northwesterly. This vein system subparallels the "Middle Vein" some 40 to 50 feet to the northwest.

A third vein system subparallels the "Middle Vein" some 30 feet to the southeast. This vein referred to as the "East Vein" trends from N 40° E to N 55° E. The "East Vein" has been the least mineralized of the three, however, with the addition of a complete milling operation at the mine site, all three vein systems are economically feasible to mine.

The presence of three competent vein systems and their close proximity to one another indicates the good possibility of a very large and rich source area some depth below the 500 foot level. The dips of the three vein systems are somewhat comparable and indicate a potential source area to the northwest at a depth of at least 1500 feet. It is very difficult to estimate the depth where all vein systems might come together. However, vein systems in the district have reached depths of over 2000 feet indicating very deep seated source areas.

The presence of a good bostonite porphyry has been confirmed. Throughout the district these large igneous intrusives are associated with the major producing veins.

#### MINERALIZATION

The vein systems in the Clay County Mine belong to the quartz-pyrite-gold group. The Middle and East veins are richly pyritized and have shown very little accessory mineralization with the exception of minor galena sphalerite, and chalcopyrite. The West Vein is by far the richest and most complex of

the three vein systems. It is a pyritic vein consisting of massive and disseminated pyrite, enargite, chalcocite, tetrahedrite, tennantite, covellite, argentite, sphalerite, chalcopyrite, and galena. This makes it a vein of very complex sulfides, but richly mineralized in gold, silver, and copper with minor amounts of lead and zinc.

Values taken across intervals of one foot on the West Vein have ranged from a low of 0.12 to a high of 7.90 ounces per ton gold and silver values from 1.8 to 35.7 ounces per ton. The next stope from this vein should average values of at least 0.50 ounces per ton gold and 5 ounces per ton silver.

The Middle Vein which was first stoped and milled by us averaged 0.32 ounces per ton gold and 2-3 ounces per ton silver. This follows very closely with the averages presented in the initial evaluation of the property and were very consistent with the historical production from the mine.

The East Vein is the most weakly mineralized of the three but still offers economically mineable ore values with the presence of a milling operation on site. I believe gaining more depth on this vein will provide ore values comparable with those found on the other two vein systems.

#### RESERVE ESTIMATES

At project startup the reserve estimates presented were 175,000 tons containing an average grade of 0.30 ounces per ton gold and 3 ounces of silver per ton. These estimates were mostly placed in the "inferred" reserves category based only on his-

torical data. The development work completed over the past two years has placed almost 60,000 tons of the 175,000 tons into a proven category. The proven reserves, however, come from combining 3 vein systems rather than only one vein system known at project inception. The following breakdown is given on reserves proven during the past two years:

WEST VEIN- 300 foot length, 3 foot width, (15,000 tons)  
200 foot depth.

MIDDLE VEIN- 600 foot length, 3 foot width, (30,000 tons)  
200 foot depth.

EAST VEIN- 300 foot length, 3 foot width, (15,000 tons)  
200 foot depth.

Stope development is presently underway on the West and Middle vein systems. Following a 3 month development program, production will begin from the West Vein at a rate of 25 tons per day. After 6 months an additional 25 tons per day will come from the Middle Vein. The combined 50 tons per day will hold for the year 1982. Beginning in 1983 production will increase to 100 tons per day. This 100 tons per day will continue until such a time that the entire hillside is developed to such an extent that production can be coming from several different levels and several veins within a 2500 foot radius of the Clay County vein systems.

### PROBABLE RESERVES

We can now realistically place 75,000 tons in the probable reserves category. This 75,000 tons comes from projecting our known ore shoots down to the old 470 foot level of the Clay County Mine. The limited amount of work done on this level in the past showed ore values to be better than the overall mine average of the upper levels.

Development work performed during October, 1981 has proven the existence of a 340 foot long ore shoot on the "West Vein". This is the longest consistent ore shoot I have observed in the Front Range mining district. Normally ore shoots average 100 - 150 feet in length.

The reserves discussed in this section and the proven reserves are those reserves determined from Gold Ridge Mining's work over the past two years. All reserve estimates presented at project inception are still quite valid, but represent reserves calculated from old mine development records.

### MINE SURVEY

An updated mine survey was completed November 5, 1981. The results from this survey have confirmed several items listed below:

- 1) Main haulage development of approximately 1400 feet.
- 2) Projected tunnel location at projects inception is less than 25 feet off, which represents a deviation of less than 2%.
- 3) Almost a constant 12 degree decline with only minute variations. (Projected at  $12\frac{1}{2}^{\circ}$ )



- 4) Only one magnetic deviation is present in work performed to date making underground mapping less costly and results more quickly obtained.

Underground brunton compass surveying will be used for the next three stopes being developed. This will enable the geologist and mining engineer to quickly lay out drawpoints and plot the access raises and slusher stations with nominal delay.

We have encountered very nominal subsurface water to date which makes the trackless mining technique by far the most feasible mining method.

#### SUMMARY

The Clay County Mine now offers one of the best investment programs available. Two years have been spent proving the potential of this mine. We have proven reserves amounting to 60,000 tons of ore valued at \$250 per ton using \$450 gold and \$10 silver. This is a gross proven value of \$15,000,000.00 . Probable reserves established from our work only total approximately 75,000 tons tons or an additional \$18,750,000.00. Two years development work showing a \$33,750,000 gross body of ore blocked out is one good mining property. Potential reserves have now been increased from the originally projected 175,000 tons to over 350,000 tons tons due to the discovery of 2 additional vein systems.

"Proven" and "probable" ore is that ore still in the ground. The only true value of that ore is "product in kind"

after milling and refining. There is always the possibility that values may increase or decrease during the production phase of the mining program. The tonnage figures are definitely "proven and probable" figures but the values may fluctuate according to market variation and actual ore values.

A handwritten signature in cursive script, reading "Norman L. Bennett". The signature is written in dark ink and is positioned above the typed name.

Norman L. Bennett  
Consulting Geologist - Mining Engineer