MOLYBDENUM POTENTIAL OF THE BC PROJECT AREA NYE COUNTY, NEVADA

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SUMMARY

The BC molybdenum project area is located in Nye County, Nevada about 8 miles southeast of the town of Gabbs. Exploration on the property started in 1969 and continued at an active pace until 1983. The exploration included the drilling of about 66 rotary and diamond drill holes. The discovery hole, BC-15, was drilled in 1970 and included an ore intersection of 81.5 feet that assayed 0.303% molybdenum. Subsequent drilling outlined an indicated resource of 33,641,000 tons averaging 0.08 % molybdenum. A U. S. Bureau of Mines study indicated the potential total resource might reach 75,591,000 tons of the same grade.

Preliminary economic studies indicate that a pit designed to recover the entire resource would result in a cost of about $15.00 per pound for each pound of molybdenum produced. A smaller pit with a more favorable stripping would appear to be a more cost effective option.

An examination of the higher grade ore intersections that might be mined underground indicates there may be good continuity between drill holes. The ore bands appear to be striking to the northeast and dipping at about 20 degrees to the southeast. A preliminary underground mine resource estimate indicates the presence of about 5,200,000 tons at 0.20% molybdenum. There is a reasonable chance of adding to this resource.

The most favorable option for development, provided that the resources are confirmed by additional exploration and the configuration of the ore zones is as anticipated, would probably be to develop a small pit in combination with an underground mine accessed through the pit wall. The pit would produce about 14,000,000 tons of ore at 0.08 % molybdenum and the underground would add about 3,200,000 tons at about 0.20 % molybdenum. Cost per pound is indicated to be in the area of $10.00 to $11.00.

Environmental considerations for development of the property appear to be favorable.

ACKNOWLEDGMENTS

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I would also like to thank Mike Mapa, a very good geologist who did excellent work on the project. Appreciation is also extended to Morrow Elias, Pat Ryan, Paul Glavinovich and Silvia Goltz for their significant contributions to the development of the project.

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An examination was made of the data related to the BC Project area located near Paradise Peak in Nye County Nevada. The object of the examination was to review all of the geologic data of USSRAM Exploration Company related to the project area and determine what the potential for mining might be. Particular attention was focused on high grade ore intersections. This was done to determine if there was any evidence of continuity of good ore grade intersections from drill hole to drill hole. If such continuity was indicated, it would increase the probability of being able to develop the deeper parts and better grades of the deposit by underground mining methods. Attention was also focused on the near surface portions of the deposit to review the potential for open pit mining. The results of this examination are being discussed in this report.

LOCATION

The BC Project area is located south of Paradise Peak in the Atwood Mining District, Nye County, Nevada. The principal area of interest is in Section 34, Township 11 N. and Range 37 E., Mount Diablo Meridian. The property is located in the Toyiabe National Forest along the crest of a gentle ridge at an elevation of approximately 7,200 feet. The climate in the area is temperate. Summer temperatures may reach near 100 degrees and winter temperatures may occasionally fall below zero. Rainfall will average 5 to 6 inches per year.

The property is reached by traveling 4 miles south from Gabbs on Nevada Highway 23, then 8.5 miles southeast on the Pole-line road to the BC Well road turnoff, then 11 miles northeast to the project area.

A plan map showing the location of the drill holes on the property, pit outline, and sections, has been included as Figure 1 with this report.

HISTORY AND PRODUCTION

Prospects and small mines within a few miles of the project area have produced gold, copper, molybdenum, tungsten and mercury. The Paradise Peak mine, a significant gold and silver open

pit mine that was operated by FMC Gold Corporation, is located about 10 miles to the west. Old shafts, pits and adits that date from various times from 1905 to 1940 may be seen in the project area.

Exploration in the project area by USSRAM Exploration Company began in 1969 with the location of 52 contiguous lode claims. The claims were located in an area where an air magnetic survey showed a magnetic low and where molybdenite had been found on old mine dumps and in rock outcrops. Exploration and claim staking continued over the years until the size of the property was expanded to include 1,113 claims in 1980. Exploration during this period identified encouraging values in molybdenum, copper and gold. Approximately 66 rotary and diamond drill holes totaling about 44,000 feet were subsequently drilled on the property.

In 1983 the property was leased to FMC Gold Corporation. FMC conducted an extensive exploration program on the western part of the property but showed little interest in the BC claim area where the molybdenum occurrences had been discovered. The property was returned to USSRAM Exploration Co. in the mid 1990's. Little interest could be generated in the property during these later years because of the depressed molybdenum market. The claim group was gradually reduced in size until only one claim, the BC-66 claim was retained.

The discovery hole, BC-15, for the molybdenum occurrence, was drilled in 1970. This hole intersected 81.5 feet of 0.303 molybdenum between 832 and 913 feet.

GEOLOGY

The BC molybdenum- copper deposit is hosted by moderately metamorphosed Triassic-Jurassic sediments of the Luning Formation and is overlain by a thrust with an upper plate of Permian greenstone. The greenstone is composed of altered lavas and volcanic breccia. The thrust fault, known as the South thrust, and the greenstone upper plate are exposed in the area of the deposit and cover a block of ground approximately one mile wide in an east to west direction and three-fourths mile in a north to south direction. The greenstone, which may be part of the Pablo Formation, locally reaches a thickness of over 600 feet. The South thrust at the base of the greenstone appears to have a dip of about 20 degrees to the southeast and a strike to the northeast.

The underlying Luning Formation also appears to have a dip of about 20 degrees to the southeast and strike to the northeast. The Luning Formation may be locally faulted and folded as well. A geologic section which gives a good illustration of the geology of the BC Project area is shown in Figure 3. This section was drawn by Mike Mapa in 1971. Mike is a very good geologist who worked on the BC Project for several years during its early stages of exploration. The section is drawn looking northerly through drill hole BC-15, the discovery hole, and extending to the west through hole BC-2. The section shows the greenstone in green where it is exposed on the surface and dips off to the southeast. The base of the greenstone is the South thrust fault zone. The upper part of the Luning Formation, which is shown in pink, is the next unit below the greenstone. This unit is the major host rock of the known molybdenum and copper occurrences. This formation, which is composed of thin bedded limestone and dolomite, has been metamorphosed into recrystallized limestone marble and locally contains well developed garnet, serpentine and chlorite altered zones. Below the limestone is a shale bed approximately 100 feet thick that has been altered into hornfels. This unit has been shown in yellow on the section. Another limestone unit, shown in blue, is located below the shale. This limestone unit is

much less metamorphosed than the units above and, where drilled, has not shown any significant molybdenum mineralization.

Some of the deeper drill holes in the project passed through the Luning Formation and entered quartz monzonite intrusive at depth. This may be related to the porphyritic granite Buzzard Peak stock located approximately 1.5 miles to the northeast. The quartz monzonite is separated from the Luning Formation by a strongly shattered zone and it may be that the Luning Formation sediments themselves have been pushed over the quartz monzonite by a thrust fault.

Several igneous rocks described as siliceous tuffs and tuff breccias have been encountered in drilling in the area of the molybdenum deposit and some of these rocks have been associated with fairly good grades of molybdenum. The exact composition and configuration of these rocks is unknown.

Molybdenite is the primary ore mineral within the deposit and it occurs disseminated in recrystallized limestone and garnet, as smears on fractures, and in quartz veins. Pyrite, chalcopyrite, tetrahedrite, sphalerite and covellite occur as accessory minerals. Areas showing strong garnet alteration, chlorite alteration, and development of stockwork quartz veins tend to contain better grade. Areas showing the best molybdenum values are often separate from the areas showing the highest copper values. The best silver values, which will average about 0.2 ounces per ton of ore, are usually associated with the better copper values. Total sulfide content within the system tends to be quite low.

U. S. BUREAU OF MINES EVALUATION

In 1982 David Lindsey of the U. S. Bureau of Mines evaluated the BC property resource as part of a mineral inventory program. The evaluation included both a resource estimate in tons and grade and an economic evaluation including capital cost estimate, operating costs, milling and marketing.

Resources at the BC project using a cut off grade of 0.04% molybdenum had been estimated at 33,641,000 tons containing 0.08% molybdenum, 0.18% copper and 6.84 grams of silver per ton. This calculation had been made by the section method. Mr. Lindsey constructed an isopach map of the area showing the thickness and extent of the projected ore zone. Using this method an identified resource was calculated at 75,591,000 tons at the same grade. The stripping ratio for the resource was estimated at 6.48 tons of waste per ton of ore.

The Bureau of Mines study envisioned a mine that would produce 6,242 tons of ore per day. Mine capital costs were estimate at $84,395,000 and mill capitol costs at $44,770,000. Mine operating costs were estimated at $7.24 per ton and mill operating costs at $5.25 per ton. Although the details of the estimate will not be described here, the net result of the estimate was that it would require a molybdenum price of about $15.00 per pound in order to break even. The price of molybdenum was approximately $7.90 per pound at the time of the study. The total amount of molybdenum produced by this pit would be somewhere between 50,000,000 pounds and 113,000,000 pounds.

KASTELIC PIT

In 1978 William Kastelic, Vice President in charge of mining for UV Industries, parent company of USSRAM Exploration at that time, calculated an estimate for a much smaller pit. The pit was designed to extract a much smaller reserve from the near surface north end of the deposit. The sections used to calculate this estimate have been shown in Figure 2. The design by Mr. Kastelic would recover an estimated 14,000,000 tons of ore at an average grade of 0.08% molybdenum and 0.20% copper per ton. The stripping ratio was estimated to be 2.4 tons of waste to one ton of ore. The pit is centered on drill hole BC-55 which cut 285 feet of 0.126% molybdenum. In general the pit design shows that it is well within the range of possibilities to develop a smaller pit with a reasonable stripping ratio and fairly good copper and molybdenum grades. Another 12 to 15 drill holes averaging at least 600 feet deep each would be required to fill in the gaps in the design and confirm the reserve. This would provide sufficient information to construct a block model and final detailed pit design. The stripping ratio might be expected to increase slightly in the final design.

It is likely that a pit of this design would produce molybdenum in concentrates at a cost of $11.00 to $12.00 per pound. Total molybdenum produced would be about 16.8 million pounds at a recovery rate projected at 86%.

UNDERGROUND ORE CONTINUITY

One of the objectives in reviewing the data on the BC Project was to review the drill information to determine if there was sufficient data to define a higher grade molybdenum resource that might be minable by underground methods. While the cost per ton for underground mining may be significantly higher, selective mining of higher grade material often results in a lower cost per pound of the metal being produced. In a competitive market it is often the producer operating at the lowest cost per pound of metal sold that will be the survivor and not necessarily the largest producer.

Since molybdenite often occurs in an irregular and spotty pattern, it was necessary to review the information to determine if there was evidence of continuity between the higher grade drill hole intersections. A lack of continuity would mean that it would be difficult to follow the ore from one pocket to the next. Evidence of continuity was of critical importance. If continuity was evident, it would then be possible to estimate a resource potential that would encourage a more detailed evaluation. A search was made of all of the drill hole assays within the deposit. All ore intersections of 10 feet or more in thickness and averaging 0.10% molybdenum or more were identified and their elevations noted. Holes showing these anomalously high assays were looked at in a plan view. A plot of the holes showing the better values identified an area measuring 3,000 feet in a north south direction and 1,000 feet in an east west direction that was located in the center of the known mineralized area. A number of drill holes around the perimeter of the higher grade mineralized area failed to show significant mineralization. The full extent of the higher grade ore bands, however, has by no means been fully defined.

A total of 21 drill holes had been completed within the 3,000 foot by 1,000 foot block. Spacing was on a 300 foot grid, but a much wider spacing existed between many of the holes. Of the 21 holes within the block, 16 showed one or more mineral intersections that were better than the minimum grade and thickness. Five of the holes failed to cut the minimum values and

thickness, but all of them did show low grade mineralization. The 16 holes which did meet the minimum requirement contained a total of 25 intersections of underground ore grade molybdenum values. The average thickness of these 25 intersections was 31 feet and the average grade was 0.200% molybdenum.

Sections were drawn between the holes in both northeasterly and northwesterly directions and mineralized intervals were plotted by elevation. Sections through 13 of these holes have been plotted and shown in Figure 4. Sections 1, 2 and 3 across the top of the sheet are drawn looking to the northwest and are approximately along strike. Mineral zones of underground grade have been outlined and filled in with red dots. Ore grades and thicknesses have been marked for each intersection. Sections 1, 2 and 3 in Figure 4 show a persistent high grade band of ore that is nearly flat lying. This band can be followed through 12 of 13 holes in the immediate area. Only hole BC-39 failed to intersect this ore band at the expected location.

Sections 4 and 5 in the lower half of Figure 4 are dip sections looking to the northeast. These sections also show good correlation and indicate that the ore is dipping to the southeast at about 20 degrees. Ore bands above and below the main band appear to be sub-parallel to the main band, but the persistence on strike is not as great. An examination of these strike and dip sections indicates that the ore bands may be continuous over strike lengths of up to 1,400 feet and dip lengths of up to 1,000 feet. A few well placed drill holes located near the center of the 300 foot grid squares would go a long way towards final confirmation of the ore continuity,

A look at the section by Mike Mapa in Figure 3 shows some interesting information that seems to confirm the strike and dip of the ore bands. Several thrust faults shown as black lines passing through the pink colored section of the Luning Formation correlate closely with the ore bands in holes BC-15 and BC-17. These thrust fault shear zones have a strike and dip that correlate closely with the strike and dip of the ore bands. The hornfels band shown in yellow has a similar configuration through much of its length. Information on the Mike Mapa section indicates that there is a good correlation between these low angle fractures and/or bedding and the higher grade ore bands.

UNDERGROUND ORE ESTIMATE AND COSTS

A quick calculation was made of the indicated ore as shown by the 25 drill hole ore intersections. It was assumed that the ore would extend for 150 feet from each drill intersection. This would be half the distance of the average spacing between drill holes. The calculation indicated a total of 5,200,000 tons of ore at an average grade of 0.20% molybdenum weighted by tons. The ore bands are open for extension in a number of directions and the drill hole grid within the 1,000 foot by 3,000 foot block contains a number of gaps. There is a good probability of developing 6.5 to 7.0 million tons of ore within the indicated area by completing a grid drilling program.

Underground mining would be by the room and pillar method. Ground conditions would have to be good enough to provide safe support during the extraction process. Skarn hosted deposits, such as the molybdenum deposit in the BC Project area, often have fairly good ground conditions. It would be important in drilling future holes within the area to log the rock quality in great detail in order to confirm that room and pillar mining is feasible. Ore left in pillars for support using this mining method would amount to about 25 to 30% of the total reserve. While some pillar robbing might be possible, it cannot be counted on.

It is difficult to estimate the mining costs for an underground operation without some specific information on the amount of development required per ton of ore developed. Only a rough estimate is possible, but if rock conditions prove adequate and development is as expected, it is likely that the cost per ton can be held below $20.00. Milling costs are likely to be in the $6.00 per ton range and recovery would be approximately 86% according to the results of some preliminary metallurgy tests conducted by Hazen Research. Total operating costs would, therefore, be in the $26.00 per ton range, excluding marketing and shipping. Cost per pound of molybdenum produced should be in the range of $8.00 to $9.00 dollars. An underground mining operation should, after adjusting for ore left in pillars and mill recovery, have the potential for producing about 13.5 million pounds of molybdenum. Indicated ore resources may be sufficient to maintain a production rate of 2,000 tons per day for a period of about 5 years.

COMBINATION OF OPEN PIT AND UNDERGROUND

If the smaller pit design, envisioned by Bill Kastelic, and the underground design described above were combined, it would produce a larger resource of recoverable molybdenum and improve the overall efficiency of the mining process. The pit design would remove about one third to one half of the ore resource that the underground mine would have developed. The remaining underground resource would be exposed in the south wall of the pit and could be easily accessed by driving headings directly in from the pit bottom. Total pounds recoverable from the small open pit have been estimated at 16,800,000. Underground resources outside of the pit and accessible from it would amount to about 3,200,000 tons which should produce about 7,700,000 pounds of molybdenum when allowances for pillar loss and mill recovery are factored in. Total production from a combined operation would be around 24,500,000 pounds. Mining costs per pound of molybdenum produced should be in the range of $10.00 to $11.00 dollars per ton.

LARGE BLOCKS NOT MINED

Figure 4, which shows sections through some of the holes that contained high grade ore intersections, also shows the six largest low grade blocks of ore located outside of the Kastelic pit area. Smaller blocks of ore surround these six blocks, but they have not been shown in order to keep the illustration simple. The six blocks contain an indicated resource of about 13,900,000 tons of 0.072% molybdenum and have an average thickness of 266 feet. Any attempt to mine these blocks by open pit would involve a waste to ore ratio of over 6 to 1. The blocks have been shown on Figure 4 because they show several interesting features.

A plan view of the blocks is shown in the bottom right corner of Figure 4. The plan map shows that the blocks form a strong northeasterly trend that is still open on both ends. Section 3, above the plan view, is drawn along the trend and shows that the blocks are relatively flat and rise only slightly as they trend to the southwest (left). This section also shows that the high grade ore bands are aligned along the top and bottom of the large ore blocks. Sections 4 and 5 are drawn at right angles to the trend and also show the relationship of the high grade ore bands to the top and bottom of the low grade blocks. Section 5 is of particular interest because it shows the high grade intersections in drill holes BC-15 and BC-17 trending down to the southeast. One interpretation of this section would be that the mineralizing solutions were moving up dip along fractures or bedding through drill hole areas BC-15 and BC-17 to BC-38. At this point the solutions may

have encountered favorable alteration or fracturing that allow them to migrate upward resulting in a 250 foot thick block of ore averaging 0.076% molybdenum. Understanding these trends, following them, and deciphering what controls them, should lead to the discovery of additional ore.

There is some question as to whether these low grade blocks can ever be mined profitably because of the high stripping ratio and low grade. They would be located on the south side of the Kastelic Pit and could be partially mined if prices are favorable when and if the pit were to approach this area. There is also the possibility that other types of mining, such as an underground vertical retreat mining plan, might be applicable to this kind of mineral block.

ENVIRONMENTAL IMPACT OF OPERATION

Fortunately, the BC Project area is located in a state that still reacts favorably to mining. While permitting may take some time, it is quite likely that all necessary permits could be obtained. Several factors about the property are moderately favorable in terms of the impact of mining in the area. The property is located on a ridge where groundwater should not be any real problem. Mine tunnels and most shafts that have been seen in the area are dry and it is unlikely that there would be any significant water discharge from open pit or underground workings. The water that is encountered should be non acidic because of its association with a limestone formation. Total sulfide content of the ore is low and the high limestone content of mine stockpiles would make it unlikely that there would ever be any acid generation problem. The property is also located in an out of the way area, not visible from any significant highway and out of sight from all towns and small communities. Total surface disturbance from the relatively small pit that is envisioned would be relatively modest and should not be difficult to reclaim if it is built into the plan of the mining process.

EXPLORATION

The purpose of further exploration within the area would be to define and prove the indicated resource. It is anticipated that the work would begin in the area of potential mining with the filling in of the grid and the study of the ore controls within the known area. With time and a little success, it would be possible to move out along the trends and into areas that show favorable characteristics based upon a firm understanding of the ore controls. To try and jump ahead and search for the "big one" could be a serious mistake, especially if it causes you to miss what is profitable now.

CONCLUSIONS

In reviewing the information on the BC Project I have come to the following conclusions and present them for your consideration.

1. The large open pit described in the U. S. Bureau of Mines study would be a high risk venture. With an estimated mining cost of $15.00 per pound of molybdenum produced, this kind of project would find itself in serious financial trouble in a falling molybdenum market.

2. The smaller pit envisioned by Bill Kastelic would have a much higher chance at success due to lower operating costs per pound of molybdenum produced. The cost of completing the exploration and evaluation of this type of project would be relatively modest and would have a high probability of success.

3. An examination of the higher grade ore bands for evidence of continuity proved to be encouraging. A few well placed drill holes located at the center points of the 300 foot grid would certainly help to confirm the continuity.

4. Indicated underground resources appear sufficient to support an underground mine at a rate of 2,000 tons per day for about 5 years. There is a good probability that additional resources will be found.

5. Underground mining costs are projected to be quite favorable at about $8.00 to $9.00 per pound of produced molybdenum.

6. If drilling confirms sufficient reserves for both the Kastelic pit design and an underground mine, the resulting combination of the two could result in a fairly low cost mine that has the potential of producing 24,500,000 pounds of molybdenum.

7. Information available in regard to the potential environmental impact of the operation appears favorable.

REFERENCES

Gathje, J., Hazen Research, Inc, 1978, Flotation of Molybdenum-Copper Ore: Private Report, 8p.

Kleinhample, F. J., and Ziony, J. L., 1984 Mineral Resources of Northern Nye Co., Nevada: Nevada Bur. Mines and Geology Bull. 99B, 243p.

Lindsey, Davis S., 1982, Property Evaluation, B&C Springs: U. S. Bureau of Mines unpublished report, 31p.

Vitaliano, C. J., and Callaghan, E., 1963, Geology of the Paradise Peak Quad., Nevada: U. S. Geol. Survey Geol. Quad. Map GQ-250, Scale 1:62,000.

Wallace, S. R., 1978, Review of BC Mo-Cu-Ag Prospect, Nye County, Nevada: Private Report, 10p.