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REPORT OF GROUND EVALUATION
AND MINING CONCEPT
FOR
GRUM JOINT VENTURE
FARO, YUKON TERRITORY.

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REPORT ON GROUND EVALUATION

FOR

GRUM JOINT VENTURE

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An inspection was made on May 10th and 11th, 1976 of the Grum lead, zinc, silver deposit located 10 miles northeast of Faro, Yukon Territory. The deposit is on ground owned 60% by Kerr Addison Mines Ltd. and 40% by Canadian Natural Resources Ltd. It is adjacent on its north and west boundaries to claims of Cypress Mining Company which contain the Anvil high grade zinc operation now producing 8,000 T.P.D. of high grade zinc ore.

FACTUAL DATA

At present, the known mineral inventory at Grum is estimated at 25,000,000 tons of 12% combined lead and zinc plus 2 - 3 oz. of silver per ton or greater tonnage at lower grade. The lead-zinc ratio being roughly 1 part Pb to 2 parts Zn with 1 oz. of Ag for every 4% combined metal quantity. This known mineral deposit is open in all dimensions and can be said to have the potential of containing substantially more high grade tonnage than has been proven to date.

The mineral is contained in metamorphosed shale beds dipping roughly 15° westwardly. These beds show some faulting with apparent small displacement but also show substantial folding which in some areas approach 120°. The high grade mineralization appears to lie in definite horizons in the shale beds following the faulting and folding of the beds. These high grade mineralized layers vary in thickness from several feet to that of reaching a maximum thickness approaching 100 feet. These massive sulfide layers form a rock that is highly competent and requires very little if any ground support in spans under 15 feet in width. The ground between the massive sulfide layers is metamorphosed shales classed as filetic, chloritic and serricitic shists. These rocks which form the hanging and footwall of the mineralized bands do not have the strength or competency of the sulfide layers. They show substantial fracture and joining planes plus heavy foliation in the highly folded areas.

This type of ground has been opened up by 8,000 feet of drifting approximately 14 feet wide and 14 feet high with an arched back. In practically all areas, these large drifts have been driven with very little trouble relative to ground support. In most cases this support is a light ring of 8 foot rock bolts, using 12" x 1/8" steel strap against the ground. These support rings vary from 2 to 5 foot centres. The majority of rings are on 5 foot centres. In a few areas when major faulting has occurred, it has been necessary to use closely spaced rings of rock bolted strapping plus a 4" layer of shotcrete put on a light 4" square reinforcing wire. On several occasions, a small section of this type of support in the faulted areas failed and had to be redone. However, in no areas were drift sets or heavy concrete ground support required. It is correct to say 95% of the ground encountered, whether ore or waste, will support a 15 foot horizontal span with only light or no ground support and a 15 foot vertical span required no ground support.

GROUND EVALUATION

It is my opinion that small individual samples of ground areas such as drill cores may give a misleading impression on the competency of the ground. The ground mass in general appears to be at rest and not subject to internal stresses. Most of the non mineralized ground, although fractured, foliated and showing substantial joining, can not be considered excessively weak. Reasonable sized extraction opening can be readily driven thru most of this ground and requires light minimal ground support to maintain safe development openings.

From what I have seen of the ground, I would estimate that in most areas a form of open or blast hole type stoping could be used with 30 to 40 foot rock bolted strapped roof spans. Vertical wall spans of 60 to 100 ft. could be considered when strapped and rock bolted.

There are local areas which will require heavier support, in the nature of grouted rock bolts lacing the ground together and then applying an ample layer of wire reinforced shotcrete. These areas would be where major structural changes in beds or layers have occurred and at the best would not exceed 5% of the stoping or mining area. It may be desirable to leave permanent pillars in such areas for ground stabilization. Due to the fact a small per centage of mining area would be so effected, ore recovery would not be seriously effected.

It should also be made clear that the ground, although not considered weak and is workable from both a developing and stoping standpoint, is treacherous. By this I mean large pieces of rock can fall from the back or walls with little or no warning. The ground will have to be handled correctly. In most cases it will require proper trimming, immediate light support and frequent inspections, particularly in production stope areas where men and equipment are working. Expertise and vigilance will be required by mine supervision and work force.

MINING

Basicly, the mining method should be chosen to fit the ground that is to be extracted and one that will be in harmony with the capabilities of the people that are to be used to mine the mineral deposit. From what we know of this deposit to date, it appears advisable that an open pit form of extraction be considered for the upper layers of the deposit, possibly reaching in depth an ultimate pit floor at 1100 metre elevation. Such a pit would have roughly a potential of 10 to 12 million tons of ore at approximately 10% combined grade. Open pit mining would allow production to start sooner than if underground mining methods are used. It will require a smaller skilled work force and will give lower operating costs. Open pit mining can be fairly selective and exercise moderate grade control. It will have more dilution and not be as selective as some underground mining methods. The severe winter climate in the area will adversely effect production from mid December to mid February. I recommend that some preliminary pit layouts are made when sufficient exploration work has been completed to present reliable geological sections of the mineral deposit with assurance of mineral continuity between and along the sections used. The layouts should show a mining reserve or the production tonnage and grade of the pit mill feed. In addition, the amount of overburden and waste rock that will have to be removed should be shown together with amount of dilution and metal unit recovery anticipated.

Obviously a substantial portion of this mineral deposit will have to be extracted by some form of an underground selective mining method with the possibility that it may be to its economic advantage to extract the entire deposit by underground mining. The nature of this deposit both in regard to its shape, grade and character of its ground does not lend itself favorably to any form of cave mining.

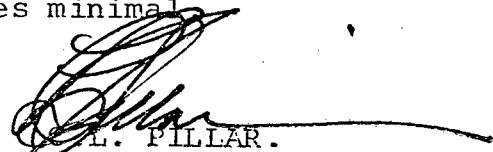
Some form of open or blast hole type stoping appears to be the most favorable to consider at this time.

In my opinion, a form of open stoping using Large Diameter Blast Hole benching would be applicable to this deposit. This type of stoping would be working in slots 30 to 40 feet in width running transverse to the strike of the deposit. A 30 to 40 foot wide pillar would be left between these slots. Open slots would be mined in one continuous operation from hanging to foot wall. This is 10 to 100 feet vertically depending on the thickness of the ore. The mining would start at the top of the ore band and bench down. The 30 to 40 foot back span would be properly supported and secured before benching started underneath it. The open slots could be filled with classified sand from mill tailings with cement added or the possibility of using the Glacial Till overhead as cheap quick fill and be prepared to allow some back subsidence. Pillar removal in this system would be accomplished by a form of sub-level or conventional blast hole stoping. Another alternative for the removal of the pillars would be by a form of sub level caving. In this procedure, the open slots would be filled by induced caving of the back just before pillar removal is started by a modified form of sub level caving.

In these forms of stoping, a track haulage system would be located under the stoping areas. Broken ore from the stoping areas would be loaded and shuttle trammed to ore passes by diesel powered L.H.D. equipment. The haulage system would transport ore in rail cars from ore pass chutes to a production shaft where it would be crushed to minus 8" and hoisted to the secondary crushing plant of the concentrator.

It is my opinion that the Grum Property has strong potential of being a viable mineral deposit at present day metal prices. The major question to be answered in the immediate future is: Does the high grade mineralized bands shown on geological sections of 200 foot spacing have the grade continuity between these sections or are drill inter-sections encountering isolated pods of high grade mineral? Once this grade continuity is proven, a substantial increase in the estimated tonnage of high grade mineral reserves will be assured. This will give the deposit the continuity necessary to provide an efficient mining system.

The problem of obtaining, training and keeping diligent and capable personnel will be the most difficult one to resolve relative to the development and operation of the Grum project. Operational methods for this project should be conceived to keep the number of employees minimal.


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