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AIME Talk -- MINING THE MOHAWK --- 11/12/82
BY STEVE BRUFF

Good afternoon. This talk is primarily a slide presentation so you may want to orient your chairs for a comfortable view of the screen.

ANECDOTE →

~~My thanks go to Paul Noland and AIME for inviting me to speak today~~. One of my first assignments when I returned to Reno was ~~determination of~~ to look at reserves and examination of the mining plans of the Mohawk mine for the ~~owners; the~~ the Veta Grande Companies, ~~Inc. of Northridge, California~~. This assignment was carried out in stages during the latter half of 1981 and during parts of 1982. ~~The programmes~~

ART BAKER AND BILL BAKER, WHO ARE NOT RELATED, CONTRIBUTED TO THE UNDERSTANDING OF THE GEOLOGY.

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Thanks also go to Wayne Carter, Vice-President of Operations of the Veta Grande Companies for release of the information for this talk.

SLIDE 1: STATE ROAD MAP -- LOCATION OF RED MTN. DISTRICT

The Mohawk claim group and mine are located in the Red Mountain mining district in west-central Nevada, about 54 road miles from Tonapah and 127 road miles from Bishop, California.

SLIDE 2: RED MOUNTAIN DISTRICT -- CLOSER VIEW

A closer veiw of the location of the district is afforded in this slide. Tonapah is in the northeast corner of the map, Bishop in the southwest corner, and the district outline about centered in the slide and bordered in red. The district is about 4 miles long and 1.5 miles wide.

SLIDE 3: DISTRICT GEOLOGY, 1" = 2,000' FROM USGS

This slide roughly frames the district and shows the general surface geology at a scale of 1" equals 2,000 feet. This geology is adapted from the USGS work of Robinson and Stewart completed in 1974 and 1976. This map has been generalized to show all pre-latite Tertiary rhyolite flows and tuffs in orange, and the Tertiary latite in green. The yellow is of course Qal. Section A-A' cuts through the ɔic mines in the district.

Note on the slide the three major mines is the district. In the easternmost end of the district is the Nivloc Mine, ← 350,000 .05 11.0 the center of the district hosts the Sixteen-to-One mine now in operation by the Sunshine Mining Company, and on the west end of the district is the Mohawk Mine. The bold dashed outline about center in the slide is the outline of the Silver Peak caldera as placed by USGS geologists. The caldera outline in total is roughly oval, with its long axis west northwesterly, and with dimensions of about 8 by 4 miles.

1.1 million .035 Au 8.0 Ag

Production & Reserves 146,000 T @ 17.2 Ag

The major structural pattern in the district is northeasterly faults. All three of the mines in the district are epithermal veins associated with these structures. These structures are shown in black on the slide, and the vein traces in red. These normal faults have some small displacement in the eastern part of the district, and more pronounced displacement in the region of the Mohawk. The next slide is of Section A-A' which cuts through the mines in the district.

SLIDE 4: DISTRICT GEOLOGY SECTION

In this section, orange is again the pre-latite rocks of the district, including the Tertiary rhyolite and Paleozoic sediments and Mesozoic plutonic rocks as reported at depth in the Nivloc mine. Also, the regional andesite that forms the host for the Sixteen-to-One vein is in this grouping. The green areas are the younger Tertiary latite which is the host of the Mohawk vein. There are small displacements along the normal faults of the Nivloc and Sixteen-to-One veins in the eastern part of the district, and a total of about 1,200 feet of displacement along several faults in the Mohawk area.

SLIDE 6: SURFACE SHOT: MOHAWK

Turning to the Mohawk property, this surface shot shows the surface trace of the Mohawk vein. The view is looking Northwest and the strike of the vein is about north 20 degrees east. The ridge of reddish rock enclosing the vein is latite. More in the foreground is the rhyolite and rhyolitic tuffs of slightly older age than the latite.

SLIDE 7: MOHAWK CLAIM GROUP GEOLOGY MAP

The scale of this slide of the surface geology of the Mohawk claim group is shown in the lower right corner of the slide. Note that north is to the left of the slide. The older Tertiary rhyolites and andesite are in orange and gray and to the south or right side of the slide. The younger Tertiary latite is the lavender instead of green color on this map.

A strong northeaster fault, the Callaghan fault, is a normal fault which roughly divides the surface geology. The Callaghan appears to have a northwesterly dip of from 65 degrees to vertical.

A second major structure is the Lutich fault which is a branch off the Callaghan and which has been inferred to account for the known displacement of the rocks between the Mohawk vein and the Callaghan fault.

Four veins are known on the property. The Peria and Camproad veins are associated with the Callaghan fault, and the Magorian and Mohawk are branches off the Callaghan. The Mohawk is the only vein that has seen production. The other three were discovered in limited exploration work during 1981 and furthur delineation of the veins has not been completed to date.

Note the direction of Section A-A' which will be the next slide.

SLIDE 8: GEOLOGIC SECTION A-A'

This section shows that the Mohawk vein is entirely in the latite. The inferred fault just east of the Mohawk vein accounts for the required displacement to satisfy the known position of the rhyolite at the second vein, the Magorian, shown in red. Furthur to the east, the fault zone of the Callaghan fault encompasses the Peria vein, also marked in red. In total, about 1,000 to 1,200 feet of displacement is known along these normal faults.

SLIDE 9: SURF. GEOLOGY MAP SHOWING LONG SECTION LOCATION

Returning to the surface geology map, note the location of B - B' along the Mohawk vein. B-B' is the longitudinal projection to be shown in the next slide, and the length of the section line is that portion of the Mohawk vein that has seen mining to date. The longitudinal projection is veiwed as if standing at the bottom of the slide.

READ

SLIDE ~~9~~ 10: VERT. LONG. PROJECTION -- MOHAWK MINE

This slide shows the levels of the Mohawk and the two major ore shoots; the Brundage and the Luft. The mined out portions of the vein are outlined in green. Red outlines ~~the~~ both the mined out portions of the shoots, and, the remaining areas of higher grade material, ~~which were placed in the reserves~~, although some of the smaller, peripheral shoots and pockets of ore were deleted from this slide for clarity. A bar scale is provided at the bottom right of the slide.

~~This~~ The mine was first accessed through the single compartment 53° inclined Mohawk shaft. Subsequently, the 200 level adit drift was used for development and production, and with the greater portion of the tonnage coming from the Brundage shoot, the incline was sunk to pull muck from that side of the mine. The mine is essentially dry. All of the development was by drifting. Production from the levels below 200 was hoisted in the shaft to the 200 level and trammed to surface, or, in the case of the Brundage shoot, hoisted to surface via the railed incline.

The Luft shoot was mined exclusively by open stoping with stull and pillar support in an average width of about 5½ feet and on an average dip of about 55°. The vein in the Luft is very regular in strike and dip in the old stoping areas. PAUSE The upper portions of the Brundage were mined by squareset and some inclined sets on the fringes of the shoot. The Brundage ore attained widths of up to 25 feet near the center of the shoot, although an average of 13-17' in width was mined.

The Mohawk vein can be divided into four generalized units as shown in this slide.

SLIDE 11: SKETCH: FOUR GENERALIZED PARTS OF VEIN IN A

On the left side of the slide the hanging wall latite is moderately argillized for up to 2 feet. The hanging wall unit of the vein, termed the barite unit, is often absent but may be present in widths of up to 5 feet. Thes unit is banded barite and calcite which may carry silver to up to 12 ounces per ton, although the norm is much lower in grade. The calcite unit occurs in widths of 2 to 20 feet and is banded dark brown calcite, with some latite, and with silver values to 6 ounces per ton. The banded quartz unit, usually occuring in widths of from 5-10 feet in the shoots, is vuggy, crudely banded quartz, with some calcite and altered included blocks of latite. This is the highest grade unit and is the mined portions of the vein. Assays to 50 ounces per ton have been found in this unit. On the footwall of the vein, the massive quartz unit is 5 to 15 feet of massive silicification which is very irregular from location to location, and which carries low values in silver. Finally, in the footwall latite , some argillization is noted withing 2-5 feet of the vein, although this alteration varies considerably along the vein. The vein is oxidized throughout the mine exposures, and in total, widths of from 12 to 40 feet are seen.

SLIDE 12 : "BARITE UNIT", 400 LEVEL LUFT

This slide shows the "barite unit" at the 400 level Luft shoot. The bands of whitish barite are mixed with bands of calcite and some layers of red and black oxidized vein. Individual bands are regular in width in this unit. An assay of a sample cut across the vein in this slide would run about 5 ounces in silver. The next slide moves to just left of this exposure and into the calcite unit of the vein.

SLIDE 13: CALCITE UNIT: 400 LEVEL LUFT

The upper right of the slide is the beginning of the barite unit of the previous slide. A band of barite is seen in the center of the calcite unit in this slide, but the remainder of the vein material is calcite. Assays from this unit are rarely encouraging with returns running from a sniff of silver to perhaps an ounce or two. When siliceous vein material is found in this unit, however, assays increase.

The major structural controls of the oreshoots are cymoid loop structures.

SLIDE 14: CYMOID LOOP CONTROL: 200 and 500 LEVELS

This slide is of a composite of the 200 and 500 levels of the mine with the 200 level being uppermost in the slide. The loops are shown in blue on the 200 Level, and in green on the 500 level. Ore shoots are labled and outlined in red. These loops, where seen in the mine openings, are defined by breaks and faults and the contacts between the vein material and the host latite. As a series of loops in plan the continuous braided nature of the loops defines the limits of the shoots. Of course these controlling structures were not seen frequently because of the lack of sufficient hanging wall and footwall crosscuts so considerable liberty has been exercised in drawing the solid lines, for clarity.

SLIDE 15: SECTION THROUGH BRUNDAGE: CYMOID LOOP.

This section through the Brundage shoot shows the relationship of the higher grade vein material which is outlined in red, to the limits of the loop structure as outlined in blue. Silver values occur throughout the loop although there is high variability in assays at any set of locations. As a rough guideline, the area enclosed within the red outline is the heart of the Brundage shoot which contained about 20 ounce silver, and the area outside of the red outline and bordered by the loop would average about 3 to 5 ounces in silver.

The silver occurs IN UNKNOWN MINERALS BUT THERE IS THOUGHT ~~acanthite and probably native~~ SOME NATIVE silver. There is no appreciable gold in the vein. Probably some secondary silver minerals have migrated down the vein. Sparse, very fine grained galena occurs in the vein. [redacted]. The vein contains a high level of manganese in oxide form, and the manganese content reaches several percent in parts of the mine. This manganese is known to interfere with flotation.

SLIDE ~~15~~ 16: OPEN STOPE WITH STULL SUPPORT

Mining in the Luft shoot was completed by open stoping with random pillar and stull support. The vein in the Luft shoot is quite regular in strike and dip and the mining width was consistently about 5½ feet. The portion of stope shown in this slide has been open for about 25 years.

SLIDE ~~16~~ 17: SQUARESET: BRUNDAGE SHOOT

The greater width of the Brundage shoot was handled by squarsetting with 6 by 6 sets. From observations of the timbering that is still accessible in the mine, it looks as though the timber was used as much for a staging to work from as for controlling ground. However, too much of the Brundage shoot was opened up without proper support in 1961 when two miners were buried in a cave-in.

This concludes the geology and mining review of the Mohawk. Lets look now at the property as if it were virgin today. Our knowledge, then, is what we see on surface.

SLIDE 18: SURF. VIEW OF PROPERTY WITH OUTCROP OUTLINES

Returning to a surface view of the property, the handful of small outcrops are shown as the black dots on the slide. Neglect, of course, the surface buildings and roads, since this is a virgin property. A few pieces of vein float and a few small outcrops in the heavy scree are the evidence of a vein. Any alteration halo is buried under the hillwash and scree.

SLIDE 19: SMALL SURFACE OUTCROP ABOVE THE LUFT SHOOT

This slide shows one of the more pronounced outcrops on the vein. The exposed width is about two feet of quartz banding with some calcite and manganese stain. A sample at this outcrop would run no more than an ounce of silver. The lavender colored latite footwall is clearly exposed and slightly silicified. No other alteration is noted at the vein/latite contact.

SLIDE 20: OUTCROP AT SHAFT AFTER BEING DUG OUT

One outcrop is more pronounced and some bulldozer work would yield an exposure of about 8 feet carrying 5-10 ounces of silver. Some alteration is seen in the footwall of this exposure. Other trenching work will expose other outcrops as well, but most will carry very low silver values.

Of course the surface geology has been mapped by now, and for the moment lets forget that evidence of other veins has been found on the property. Some geologic reasoning is applied and [redacted] the low silver values at outcrop can be explained by leaching of the silver, or, the surface exposure of the vein is above the zone of boiling.

SLIDE 21:

SLIDE 21: VERT. LONG. SKETCH: OUTCROP INFORMATION

This slide is a vertical longitudinal with information to date. Outcrops are shown as black marks along the plane of the surface. An area of interest has been targeted, the geologist is excited about the prospects for ore at depth, and its decision time. The company wants to go ahead with exploration, but the question now is whether to drill or drift on the vein. Drilling has many advocates; drifting without first drilling has some supporters, and a few die hards will choose one or the other ~~the same~~ method every time. As a comparison,

SLIDE 22: COMPARISON: DRILL VS. DRIFT

there are advantages to both methods. In this comparison under the drilling program, I have used 8 holes for about 4000 feet and the cost would be about 90,000 dollars at 22.50 per foot. The information gained would be width of vein, dip, geology, and some idea of grade. The advantages of a faster, cheaper look are noted. The drilling however, is unlikely to pin down the oreshoots, and if really unlucky, the drilling could miss a shoot. ~~However, the need to have the justification for proceeding to more costly drifting may dictate drilling in any event~~.

Drifing, on the other hand, would require about 1,600 feet of advance, initially, considering that the area of interest is 1,200 feet in length and some crosscutting would be required as well to see the full width of the vein. Very good information is obtained on ore shoot locations, GRADE, geology, and ground conditions. The drift can be used for almost any mining method. The advantages are an excellent look at ore and ground, the availability of a bulk sample, and some of the mine development is completed. However, you purchase this information at 2.5 times the cost of drilling, and your look is limited to one elevation horizon only.

I think most companies would chose drilling. Personally, I would chose drifting for the reasons mentioned. There are [redacted] good contractors available that could complete the drifting in good time, and the terrain is an aid as a 100 foot back can be developed within 300 feet of a portal started just above gully level on the strike of the vein.

However, with the drilling, at least several holes would penetrate good grade silver. Assuming the company is still interested in the project, the drifting would commence and the information would look something like this:

SLIDE 23: VERT. LONG. SECTION: 200 LEVEL DRIFT

Returning to the long section, the 200 level drift is driven and two oreshoots are encountered shown as between the hash marks along the drift. Some inpressive assays come out of the first shoot, named the Brundage, and a smaller, although consistent shoot is named the Luft. Enough tons can be estimated to justify expenditures to date. Nevertheless, a review is needed what the possible mining methods could be that will yield the lowest mining costs before additional development is undertaken. Furthur development cannot be justified if the mining methods will cost more than the value of the contained silver.

Enough information is available from the 200 level work on the vein to tentatively select one or two methods for each shoot. The Luft shoot has a consistent strike, is 5 to 10 feet in width depending on some tentative grade cutoffs, the dip is a mediocre mining dip of 55°, and the ground is good. The grade is not extremely high, so a low cost method is a must. Avoiding timbering is mandatory. Cut and fill is too costly. The dip is [redacted] too shallow for shrink stoping although perhaps a test stope would answer that question. Open stoping with some support is encouraging considering the good ground. Blasthole stoping, despite the fairly narrow vein and the shallow dip, is interesting, but perhaps the overall size of the oreshoot may not justify the drawpoint development and etc. The decision in the Luft is to try a trial open stope.

The Brundage also has a fairly consistent strike, a nice mining dip of 65 degrees, and fair to good ground in the 12-25 foot width depending on grade.

SLIDE 24: 200 LEVEL BRUNDAGE SHOOT

READ

Much of the ground would look like this shot of the higher grade portion of the Brundage shoot. The hanging wall ground looks fair to good. The shoot cannot ~~[illegible]~~ afford the costs of squaresetting, ~~however~~ today. The logical methods are shrinkage stoping or blasthole stoping. The ground must be reasonably good for both methods and not enough openings have been provided to date to make a final determination. However, one or the other of the two methods will be cheap enough. It is decided to proceed with development and get a look at the vein and the ground conditions on the next level. Both methods will require opening up levels for access ~~for the method, and both are cheap enough to be encouraging~~. and Both methods can work effectively in vertical development intervals of 100 feet, so that interval is chosen. Terrain allows another vertical bite of 100 feet for portaling in a trackless ramp, and ~~drifting~~ ramping gets under way ~~in the latite~~. in the host ~~rock~~ latite.

SLIDE 25: BALD DRIFING IN LATITE

The latite requires little or no support as can be seen in this bald drift in the footwall of the vein. Despite the increased width over that seen in this photo, the latite is quite competent and at worst a few rockbolts might be required. Ramp development proceeds with levels established at 100 foot intervals.

SLIDE 26: LONG. SECTION SHOWING RAMPING AND LEVELS IN

The ramp is shown diagrammatically on the slide. The levels are being driven as the ramp advances for reasons of multiple heading productivity and to allow information from each level to guide continued development. After the second level in the mine is driven, the chances of encountering a serious rake to the shoots are discounted. The strike and dip of the shoots remain reasonably consistent. By the time the third level of the mine is completed, the decision is made to mine the Luft by open stoping.

The mining method in the Brundage is still a choice between shrinkage stoping and blasthole stoping. The ground is good enough to carry shrink or blasthole stopes of 60 feet along strike with 30 foot pillars. Blasthole stoping is least expensive and is the choice. A drawpoint level is established at the bottom of the shoot. The surface above the Brundage is cut down for a platform for blasthole drilling.

SLIDE 27: BRUNDAGE BLASTHOLE STOPE

This slide shows the blasthole stope after extraction of the major segments. The reserves is 75% extracted at this point. Extraction at this phase would have been greater without the need for smaller segments and large pillars in support of the ground. There are several ways to pull parts of the pillars by nibbling away at them, but all are expensive and would be increasingly hazardous. The 75% extraction is acceptable in terms of profit, but nobody likes to leave good ore in the ground.

Perhaps there is a safe way to get most of the remaining reserves, if preparations have been made. I suggest that small cross-section footwall laterals would have been driven on the upper two levels, and crosscuts from these laterals punched in to pillars as shown by the circles within the pillars and at the elevation of the levels. These crosscuts will provide access to the pillars after the major segments have been extracted. The pillars would have been drilled out along with the main body of the stoping, and the crosscuts completed before the initial stoping.. . . . .

The footwall lateral provides access to load the holes in the pillars. It's pretty certain that the hanging wall will start to cave when some of the support is gone. You can't afford to have employees working in pillars with a possibility of air blast and caving. The solution, I think, is to have preparations completed to completely bulkhead off all levels except the drawpoint level, leave a sufficient cushion of muck in the drawpoints, and complete the extraction of the pillars in one blast.

Well, I would like to be on the far hill watching this blast. Presuming that the blast is successful, the goodies are on the bottom of the stope and caving material is applying pressure to the column of broken ore. The drawpoints become draw cones similar to sublevel caving drawpoints and dilution will increase with the draw. Drawpoint drawing would have to be regulated as strictly as in block cave and sublevel caving mine.s. In total, perhaps 90% of the reserve ounces are mined before a cutoff grade is reached in this final draw of the stope.

SLIDE 28: FINAL EXTRACTION: MOHAWK VEIN

A fully diluted final extraction from the vein would look something like this. 47,000 tons from the Luft shoot averaging 13.9 ounces. 135,000 tons from the Brundage averaging 14.1 ounces for a total of 182,000 tons at 14.0 ounces. Assuming a mill recovery at 90%, 2,300,000 ounces would be recovered from the project. At $7.00 silver, this is 16 million gross and for $10 silver, the gross is 23 million.

SLIDE 29: ROUGH COST: MOHAWK PROJECT

I have not ~~had a chance to do~~ done a detailed or even semi-detailed feasibility study for this project. However, using horseback numbers and putting in enough for Murphy's law and other contingencies, costs might look something like this. Exploration at about $180,000. Development in drifting with liberal extra footage for exploration and crosscutting at 1.6 million. Raising and other development at about $500,000. Equipment costs at 350,000. Camp and surface equipment at 300,000, and local overhead and other costs at 800,000. Considering an average mining and milling rate of 200 tons per day, the mining phase would be 2.5 years. A mill designed for 2.5 years of service on a no-frills basis I am given to understand can be had for 2.5 million, and a milling cost of about $18 per ton is reasonable.

In total, then, and neglecting costs outside of the mining district, about 13.3 million dollars would be required for the project. Against a 16.1 million dollar gross at 7.00 silver, this is not extremely attractive, but compared with a 23 million dollar gross at $10 silver, the project is a winner.

READ

Well, the project is attractive but certainly too small for most companies. I can't see Exxon spending any time on a property of 182,000 tons, and many of you in the audience have size targets well above this, as well.

SLIDE 30: MOHAWK SURFACE SCENE

READ

However, much of the point I am making today is that some of the smaller properties can be profitable. Maybe as a rule of thumb, I will say that any company with more than one vice president will probably not see enough profit in a project such as this. ~~And for that matter, any company in a position of having to support the costs of high overhead will continue to be forced to look only for the~~

[redacted]. However, of all of the properties visited by mining people in Nevada each year, there are certainly some that could make another Mohawk, and there should be people interested in mining them.

Well, as the saying goes, its deep enough and timbered well. Its about the end of my shift, and Miller time.

SLIDE 31: KIDS AT PORTAL

The Humboldt Mining Services crew knows the way to the bar, for, of course, a soft drink at the end of the shift. As a matter of interest, for those of you who knew Silver Peak from a few years ago, the famous old

SLIDE 32: SHIFTING SANDS

watering hole, the Shifting Sands, is now closed. Now the new joint is ,[redacted],

SLIDE 33: DEAD COON SALOON

the Dead Coon saloon. Thanks for your attention today.

BRIEF COMPARISON

DRILL VS. DRIFT

<u>DRILLING</u> (say; 8 hole program, about <u>$90,000</u>)

Faster information: width of vein, confirm dip, HW/FW rocks, some idea of grade.

Development aid: spot locations of vein, width of vein, dip.

Advantages: faster, cheaper look.

Disadvantages: unlikely to pin down oreshoots, money spent has no further use, could miss oreshoots.

<u>DRIFTING</u> (say; 1,600 feet of drifting and crosscuts @ $150/foot = <u>$240,000</u>)

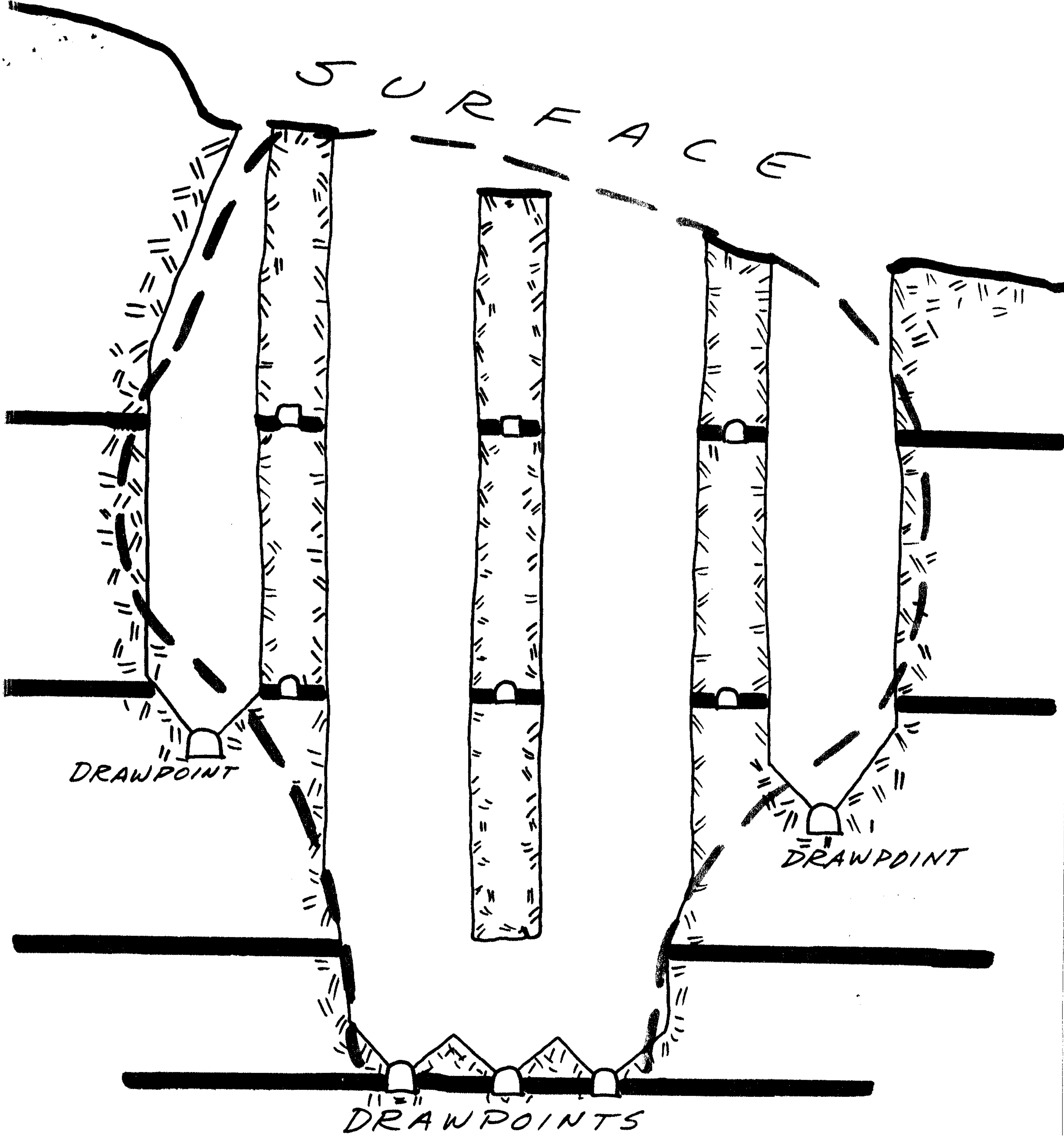
Very good information: ore shoot locations, geology, ground conditions.

Development aid: Drift can be used for almost any mining method.

Advantages: Excellent look at ore and ground, bulk sample, some devel. completed.

Disadvantages: 2.5 times the cost, look at one elevation horizon only.

SLIDE 22



SLIDE 27

DISTRICT PRODUCTION AND RESERVES

RED MOUNTAIN MINING DISTRICT
(short tons, troy ounces)

Mine	Production	Reserves	Total Production and Reserves
NIVLOC	app. 350,000 .05 Au 11.00 Ag		350,000 .05 Au 11.00 Ag
SIXTEEN-TO-ONE		1,100,000 .035 Au 8.0 Ag	1,100,000 .035 Au 8.0 Ag
MOHAWK	app. 106,000 18.7 Ag	40,000 13.3 Ag	146,000 17.2 Ag
		District Total, Production and Reserves	1,596,000 .035 Au 9.5 Ag
			(55,860 oz. Au) (15,162,000 oz. Ag)

NOT USED IN MOHAWK TALK.

FINAL EXTRACTION

M O H A W K   V E I N

LUFT SHOOT (open stoping with pillars and stulls)

47,000 tons   13.9 ounces silver

BRUNDAGE SHOOT (blasthole stoping, 90% extraction)

135,000 tons   14.1 ounces silver

TOTAL

182,000 tons   14.0 ounces silver
(2,550,000 ounces)

At mill recovery of 90%; 2,300,000 ounces recovered

2,300,000 ounces at $7.00 silver = $16,100,000 gross

2,300,000 ounces at $10.00 silver = $23,000,000 gross

SLIDE 28

ROUGH COSTS

MOHAWK VEIN

Exploration, geology, drilling, acquisition	$ 180,000
Development; 9,100 feet drifting, ramp, crosscuts, exploration @ $175/ foot average	1,600,000
Raising, drawpoints, and other	500,000
Mining; 47,000 tons @ $60/ton	2,820,000
135,000 tons @ $13/ton	1,755,000
Equipment @ 50% (salvage rate 50%)	350,000
Camp and surface equipment @ 50% (salvage rate 50%)	300,000
Local overhead and other	800,000
Total	$ 8,305,000

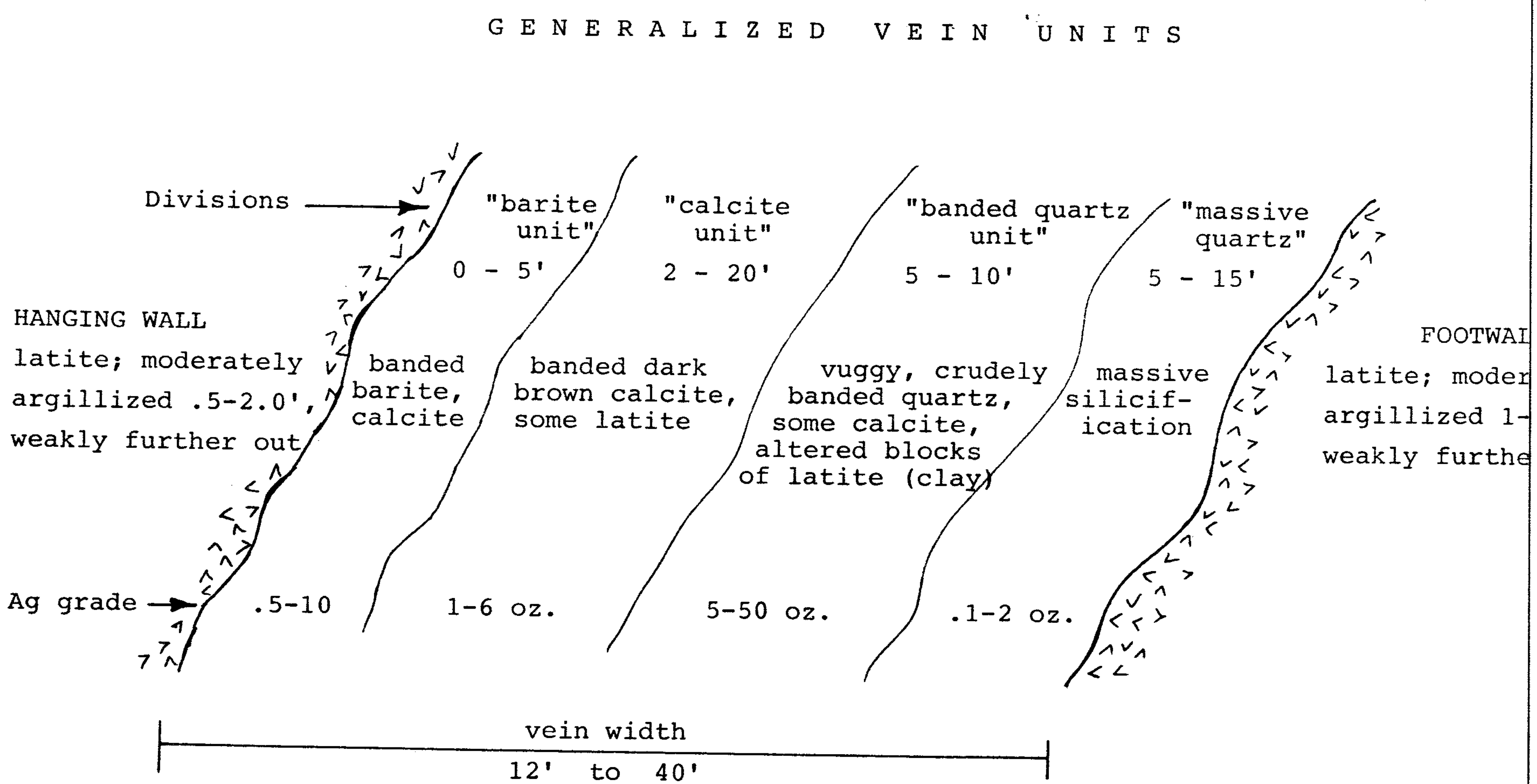
Mining/Milling rate: 200 TPD (2.5 years)

Turnkey mill ($2,500,000 - 800,000 salvage)	1,700,000
Milling 182,000 tons at $18/ton	3,276,000
Project Cost	$13,281,000**

** Neglects corporate overhead, depletion, depreciation, local taxes, etc.

SLIDE 29

SKETCH SECTION OF MOHAWK VEIN



SLIDE 11

HUMBOLDT MINING SERVICES

507 Casazza • Suite B • Reno, Nevada 89502 • Telephone 702 / 322-3158

November 16, 1982

Mr. J. McLaren Forbes
2275 Mueller Drive
Reno, Nevada 89509

Dear Mac:

I was quite honored to have you request a copy of the Mohawk talk after delivery of same last Friday to the AIME group. I thought for awhile that the talk generated so little interest that questions would not be forthcoming, but someone saved the day with a question or two, and you had a specific request.

I'm sorry that the copy is not retyped. I don't really have the time right now, and I think you are probably much more interested in the content than the style and lack of perfect typing.

Again, thanks for your interest and I hope this material is useful to you.

Very truly yours,

Steve Bruff

Steve Bruff