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I VERY MUCH ENJOYED OUR VISIT AT YOUR HOTEL AND HOPE THAT NEXT TIME YOU COME TO LOS ANGELES YOU WILL HAVE TIME AVAILABLE TO AFFORD MAJORIE AND ME THE OPPORTUNITY OF SEEING YOU.

VERY KINDEST REGARDS.

YOURS VERY TRULY,

BORIANA MINING COMPANY

BY F. F. Hood

F. F. HOOD, OFFICE MGR.

FFH:CS

BORIANA MINING COMPANY

108 W. WHITTIER BLVD.
WHITTIER, CALIF.

J. F. SIEVERS
VICE PRESIDENT

PHONE
WHITTIER 420-04

BORIANA MINING COMPANY

HISTORY & REPORTS

BORIANA MINING COMPANY

HISTORY

JUNE 1933 TO MAY 1936

DURING THE YEAR 1933, FROM JANUARY 1ST TO SEPTEMBER 1ST, THE BORIANA PROPERTY WAS NOT OPERATED EXCEPT FOR A SMALL MAINTENANCE CREW, WHO DID A SMALL AMOUNT OF DEVELOPMENT WORK AS THEIR TIME PERMITTED. DURING THIS PERIOD, THE TUNGSTEN MARKET WAS NOT ACTIVE ENOUGH TO WARRANT COMMENCEMENT OF OPERATIONS.

IN SPETEMBER, 1933, A PORTION OF THE UNDERGROUND WAS PREPARED FOR STOPING OPERATIONS AND WORK WAS COMMENCED ON MILL REHABILITATION AND GENERAL PREPARATION FOR PRODUCTION. ADDITIONAL SOURCES OF WATER WERE DEVELOPED ASSURING THE OPERATION OF AN AMPLE WATER SUPPLY AND, DURING THE BALANCE OF THE YEAR, A SMALL AMOUNT OF ORE WAS TAKEN OUT AND MILLED AS AN INCIDENTAL OPERATION TO REHABILITATION AND PREPARATION. ONE CAR OF CONCENTRATES WAS PRODUCED DURING THIS PERIOD AND SHIPPED TO THE CONSUMER ON DECEMBER 18, 1933.

IN 1934 THE COMPANY OPERATED ON PRODUCTION BASIS DURING THE ENTIRE YEAR AND PRODUCED ABOUT 18,000 UNITS OF TUNGSTEN CONCENTRATES.

DURING 1935 THE COMPANY ALSO OPERATED ON A PRODUCTION BASIS AND PRODUCED ABOUT 20,000 UNITS, AND IN 1936, TO DATE, HAS PRODUCED OVER 12,000 UNITS, MAKING A TOTAL PRODUCED SINCE OPERATIONS COMMENCED IN 1934, OF 50,000 UNITS OF TUNGSTEN CONCENTRATES, WHICH MOVED READILY INTO THE MARKET FOR A TOTAL PRICE OF APPROXIMATELY $700,000.00.

DURING 1934 TWO WINZES WERE SUNK BELOW THE 5TH LEVEL TO A DEPTH OF 150 FEET EACH, AND IN 1935 AND EARLY 1936, ONE OF THESE WAS SUNK AN ADDITIONAL 150 FEET TO WHAT IS KNOWN AS THE 7TH LEVEL, BUT THIS WORK IS SO RECENT THAT SUFFICIENT WORK HAS NOT YET BEEN DONE TO GIVE ANY DEFINITE INDICATION OF VALUES TO BE FOUND THERE. VALUES AT THIS POINT WILL BE IN WHAT IS KNOWN AS THE "L" ZONE, WHICH IS THE SHORTER OF THE TWO MAJOR ORE SHUTES THAT HAVE BEEN PARTIALLY EXPLOITED TO DATE.

THE LONGER OF THE TWO ORE SHUTES, KNOWN AS THE "M" ZONE ON THE 5TH LEVEL, IS IN EXCESS OF 700 FEET IN LENGTH WITH TOTAL AVERAGE BACKS OF 900'. HOWEVER, ORE ABOVE THE 5TH LEVEL IN ONE OF THE 3 VEINS HAS BEEN STOPED. AT A DISTANCE OF 700 FEET NORTH OF THE BEGINNING OF THIS ZONE, THERE ARE STILL GOOD SHOWINGS ON THE FACE WITH THE WIDTHS AND VALUES APPARENTLY INCREASING. IN ADDITION TO THIS, THERE IS VEIN MATTER COMMONLY KNOWN AS THE WEST VEIN, WHICH HAS NOT BEEN EXPLOITED ABOVE THE 5TH LEVEL, WITH THE EXCEPTION OF A SECTION ON THE 3RD LEVEL, AND IT PROMISES CONSIDERABLE PRODUCTION. A NEWLY DISCOVERED VEIN, LYING EAST OF THE MAIN VEIN, KNOWN AS 54H ORE IS NOW BEING SUB-LEVELED, AND APPEARS TO BE NOT ONLY FAIRLY WIDE BUT TO CARRY HIGH MINERAL VALUES. IN EXCESS OF 100 FEET OF WORK HAS BEEN DONE ON THIS SUB-LEVEL, THE BACKS ALL SHOWING GOOD VALUES.

THIS NEWLY DISCOVERED VEIN ALSO APPEARS TO BE COMING INTO THE DRIFT 150 FEET BELOW ON THE 6TH LEVEL.

THE 6TH LEVEL IN THE "M" ZONE HAS BEEN STOPED OUT TO WITHIN 300 FEET OF THE NORTH FACE AND PRESENT INDICATIONS ARE THAT THE LENGTH OF THE SHUTE ON THIS LEVEL IS LONGER THAN IT WAS ON THE 5TH LEVEL ABOVE.

PREPARATION IS BEING MADE FOR THE SINKING OF AN ADDITIONAL WINZE IN THE "M" ZONE, WHICH WILL BE KNOWN AS NO. 40 WINZE, TO A POINT 100 TO 150 FEET BELOW THE 6TH LEVEL, AND THE WINZE IS SO LOCATED THAT IT SHOULD BE IN THE ORE WHEN THE DESIRED POINT IS REACHED BELOW THE 6TH LEVEL. INDICATIONS ON THE 6TH LEVEL ARE EXTREMELY FAVORABLE FOR A HIGHLY PRODUCTIVE ZONE BELOW AND, IF THE PRODUCTIVITY OF THE 6TH LEVEL IS ANY INDICATION OF THE PROPOSED 7TH LEVEL, IT CAN BE EXPECTED TO PRODUCE IN EXCESS OF $300,000.00 AS A MINIMUM.

PRODUCTION COSTS

PRODUCTION COSTS ARE CONTROLLED, OF COURSE, BY A NUMBER OF FACTORS, INCLUD NG THE ACCESSIBILITY, WIDTH OF THE ORE, EQUIPMENT ETC.

THE BORIANA NOW HAS SUFFICIENT EQUIPMENT TO PRODUCE FROM 3000 TO 4000 UNITS PER MONTH, TOGETHER WITH ALL OF THE FACILITIES NECESSARY TO ACCOMMODATE SUFFICIENT MEN FOR THIS AMOUNT OF PRODUCTION. IT HAS ONLY BEEN WITHIN THE LAST TWO MONTHS THAT THE LAST OF THE EQUIPMENT FACILITIES HAVE BEEN INSTALLED. FROM EXPERIENCE IN THE PAST, AN AVERAGE MINING COST PER TON OF ORE WILL NOT EXCEED $5.00 PER TON AND AVERAGE MILLING COSTS WILL NOT EXCEED $1.00 PER TON. MILL HEADS CAN BE CONTROLLED WITHIN A CLOSE RANGE BECAUSE OF THE EXTREME UNIFORMITY OF THE MINERALIZATION IN THE ORE. EXPERIENCE HAS ALSO INDICATED THAT AN AVERAGE MILL HEAD OF .90% WO_3 CAN BE MAINTAINED. THE COST FIGURE WOULD THEN BE AS FOLLOWS:

MILL HEADS ---------- .90%
RECOVERY IN MILL----------90%
RECOVERY OF NET UNITS PER TON---.81 UNITS
COST OF MINING $5.00 PER TON--$6.17 PER UNIT
COST OF MILLING $1.00 PER TON-$1.25 PER UNIT
TOTAL COST $6.00 PER TON -----$7.42 PER UNIT

IN ADDITION TO THE ABOVE EXPENSES, ADMINISTRATION AND OVERHEAD CHARGES SUCH AS TAXES, INSURANCE, ACCOUNTING EXPENSE ETC. AMOUNT TO AN AVERAGE OF ABOUT $1.00 PER UNIT ON THE BASIS OF 3000 UNITS PER MONTH. THEREFORE, TOTAL COST SHOULD SHOW A FIGURE OF $8.50 OR $9.00 AS A VERY MAXIMUM--ALL FIGURES ON THE BASIS OF NORMAL ORE WIDTHS. ANYTHING RUNNING IN GREATER WIDTHS WOULD MATERIALLY REDUCE THIS COST.

THE AVERAGE PRICE RECEIVED FOR THE 50,000 UNITS SO FAR PRODUCED HAS BEEN $14.00 PER UNIT. INDICATIONS ARE THAT THE PRICE WILL TEND TO RISE AND SO FAR HAS RISEN TO ABOUT $14.50. THIS RISE IS IN FACE OF CONTRACTS MADE SEVERAL MONTHS AGO. ALL NEW CONTRACTS ARE BEING MADE AT A HIGHER FIGURE.

ON THE BASIS OF 3000 UNITS PER MONTH A NET MAY BE EXPECTED AT $14.00 A UNIT OF $15,000 PER MONTH.

THE MARKET WILL EASILY ABSORB 4000 UNITS FOR AN INDEFINITE PERIOD AND, SHOULD BORIANA PRODUCTION BE INCREASED TO THIS FIGURE AND THE AVERAGE PRICE OVER THAT PERIOD BE $15.00, WHICH WE HAVE EVERY REASON TO EXPECT, THEN THE NET SHOULD BE FROM $24,000.00 TO $25,000.00 PER MONTH, OR A TOTAL OF $300,000.00 PER YEAR.

REMARKS

THE INTERESTING THING ABOUT THE BORIANA OPERATION IS THE FACT THAT AT THE PRESENT TIME UNDERGROUND CONDITIONS LOOK BETTER THAN THEY HAVE AT ANY TIME DURING THE HISTORY OF THE COMPANY. INDICATIONS ARE VERY STRONG AND INDISPUTABLE THAT THE WORKINGS PROGRESS NORTHWARD AND DOWNWARD AND WE MIGHT EXPECT FURTHER ENLARGEMENT AND INCREASED ENRICHMENT AND, NOT ONLY THIS, BUT A SERIES OF PARALLEL VEINS, WHICH MATERIALLY REDUCE THE COST ESPECIALLY OF THE DEVELOPMENT WORK, WHICH, IN THE ABOVE FIGURE, IS COMPUTED ON THE BASIS OF $1.25 PER TON. THIS CAN MATERIALLY REDUCE THE COST PER TON OF MINING AND, TOGETHER WITH OTHER IMPROVEMENTS AND EFFICIENCY, CAN READILY TEND TO INCREASE THE MARGIN OF PROFIT TO A VERY LUCRATIVE FIGURE.

ATTENTION IS CALLED TO THE FACT THAT THE CAMP WITH ALL OF ITS EQUIPMENT IS EXTREMELY WELL CONSTRUCTED AND AMPLE, THAT THE BIGGEST PART OF THE DEVELOPMENT AND EXPLORATION HAS BEEN DONE AND THAT BY FOLLOWING THE KNOWN AND PROVEN ORE ZONES DEVELOPMENT OF MATERIAL AHEAD OF PRODUCTION SHOULD BE DONE AT A MINIMUM COST. THE UNDERGROUND INDICATIONS ARE THAT THE MINE HAS A POSSIBILITY OF AN EXTREMELY LONG, PRODUCTIVE LIFE.

ATTENTION IS CALLED TO THE FACT THAT THE ABOVE FIGURES ARE ESTIMATES AND AS SUCH CANNOT BE GUARANTEED, BUT THEY ARE BASED ON RECORD OF EXPERIENCE OVER A SUFFICIENT PERIOD OF TIME TO BE INDICATIVE AND ALL SUCH RECORDS CAN BE SUBSTANTIATED BY THE BOOKS OF THE COMPANY. IN VIEW OF THIS FACT, IT IS BELIEVED THAT SUCH ESTIMATES ARE IN ALL RESPECTS CONSERVATIVE.

BORIANA MINING COMPANY

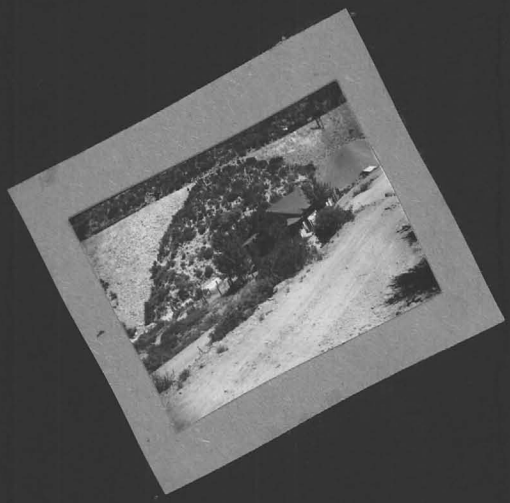
BY _____
J. P. SIEVERS, VICE PRES.

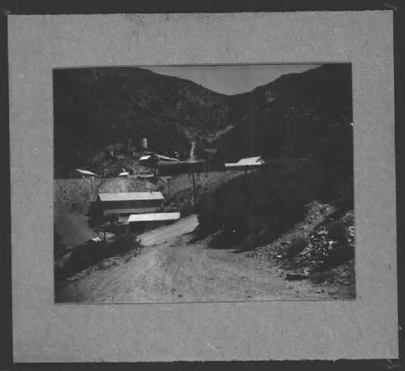
PHOTOGRAPH NOTATIONS

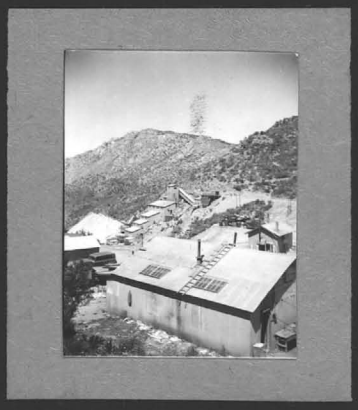
1. SUPERINTENDENT'S HOUSE.
2. PARTIAL VIEW OF CAMP.
3. INTERIOR OF OFFICE.
4. TIMBER FRAMING SHET AND PORTION OF LUMBER STOCK.
5. CHANGE HOUSE WITH MILL IN DISTANCE.
6. A FEW OF THE 4-MEN BUNK HOUSES CONSTRUCTED IN 1935.
7. ASSAY OFFICE AND MACHINE SHOP.
8. FRONT VIEW OF THE MILL.
9. GENERAL VIEW OF CAMP SHOWING ASSAY OFFICE, BLACKSMITH SHOP, GENERAL OFFICE AND WAREHOUSE, TIMBER FRAMING SHED, POWER HOUSE, BOARDING HOUSE AND PORTION OF COMMISSARY BUILDING.

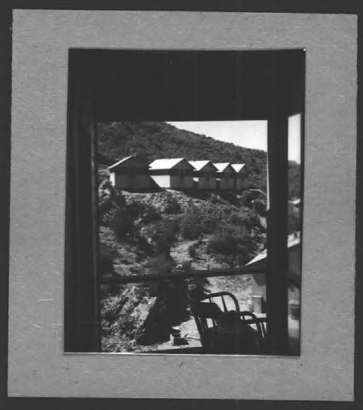
   BUILDINGS OMITTED FROM THIS VIEW ARE STAFF HOUSE, ALL OF THE BUNK HOUSES, SUPERINTENDENT'S HOUSE AND MILL.

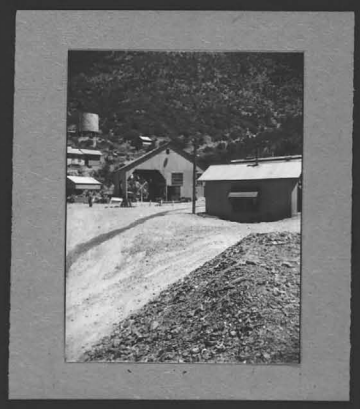
10. NORTH SIDE VIEW OF MILL.











BORIANA MINING COMPANY

SCHEDULE

MINE PLANT & EQUIPMENT

Power House Building	3,616.38
Diesel Electric Plant	39,668.86
Air Compressor Plant	16,655.26
Mill Building	35,053.19
Mill Machinery & Equipment	54,671.37
Water Works & Well	31,850.73
Dwellings & Bunkhouses & Camp Improvements	23,919.50
Warehouses	439.54
Mine Trackage & Pipe Lines	11,810.37
Winze Hoist in Mine	700.38
Mine Equipment	19,395.58
Shops & Shop Equipment	7,428.49
Oil Storage at Railhead	364.80
Power Lines	1,730.93
Roads & Trails	6,726.07
Camp Furniture & Fixtures	6,618.67
Office Furniture & Fixtures	584.92
Laboratory Equipment	278.31
Automotive Equipment	7,648.88
Mules	1,475.37
	270,637.60

SUPPLEMENTAL COMMENT

In January, 1932, Mr. Granville Moore submitted his first report on the Boriana property after an intensive survey lasting several weeks. During the time of his survey, several hundred samples were taken and assayed by an independent assayer and, from such samples, the figures shown in Mr. Moore's report were derived.

Mr. Moore's original report formed the basis upon which the present management purchased the controlling interest in the property and was made as a "Buyer's Report".

In his original report, Mr. Moore made several recommendations on development and his recommendations were carried out during the year 1932. The latter part of that year, Mr. Moore made another survey of the property and supplemental report.

The report following dated June 27, 1933, is a consolidation of the two previous reports made after a third trip by Mr. Moore to the property.

J. P. Sievers

REPORT OF

GRANVILLE MOORE

JUNE 27, 1933

JUNE 27, 1933

BORIANA MINING COMPANY
WHITTIER
CALIFORNIA

GENTLEMEN:

SUMMARY BORIANA MINE, JUNE 27, 1933.

PROPERTY CONSISTS OF 16 LODE MINING CLAIMS, WATER RIGHTS AND IMPROVEMENTS.

ELEVATION 5000 FEET ABOVE SEA-LEVEL---CLIMATE EXCELLENT.

TITLES ARE PERFECT.

CHEAP POWER--DEISEL ENGINES.

A MODERN, COMPLETELY EQUIPPED 150 TON MILL, STEEL STRUCTURE.

MACHINE SHOPS, BLACKSMITH SHOP, STOREHOUSE, ASSAY SHOP, ALL NECESSARY BUILDINGS (EXCEPTIONALLY COMPLETE IN ALL DETAILS) INCLUDING SUPERINTENDENT'S RESIDENCE, BOARDING HOUSE, BUNK HOUSES, ETC., ALL EQUIPPED WITH RUNNING WATER AND ELECTRIC LIGHT.

MINE IN BEST OF CONDITION FOR EXPLOITATION, WITH GREAT PROMISE FOR ADDITIONAL ORE TONNAGE WITH DEVELOPMENT NOW UNDER WAY.

FIFTEEN THOUSAND FIVE HUNDRED FORTY-NINE (15,549) TONS OF POSITIVE ORE HAVING A VALUE AFTER MINING AND MILLING LOSSES OF $237,137.09, AND SIXTEEN THOUSAND ONE HUNDRED FORTY-SIX TONS (16,146) PROBABLE OR REASONABLY ASSURED ORE HAVING A VALUE AFTER MINING AND MILLING LOSSES OF $215,887.62. POSSIBLE ORE SOLELY ABOVE THE LOWEST LEVEL COULD BE ESTIMATED AT SEVERAL TIMES THE POSITIVE AND PROBABLE ORE TONNAGE QUOTED AND THIS CAN RAPIDLY AND RELATIVELY INEXPENSIVELY BE PROVED OR DISPROVED.

MINE DEVELOPMENT--TUNNEL WORKINGS, FIVE LEVELS CONNECTED BY RAISES AND WINZES, OVER 8000 FEET OF DRIFTS, OVER 1500 FEET OF LADDER RAISES AS WELL AS NUMEROUS ORE RAISES AND CROSS-CUTS. IN EXCESS OF 8000 FEET AVERAGE HEIGHT OF BACKS ABOVE THE LOWEST LEVEL, OR TRAVELS BY GRAVITY TO LOWEST LEVEL NO. 5.

OPERATIONS COST, INCLUDING MINING, DEVELOPMENT, MILLING AND CITY OFFICE EXPENSE, SEVEN (7) DOLLARS PER TON.

AMPLE WATER FOR MILL OPERATIONS AND CAMP.

YOURS VERY TRULY,

GRANVILLE MOORE

JUNE 27, 1933

BORIANA MINING COMPANY
WHITTIER
CALIFORNIA

GENTLEMEN:

ACTING UPON YOUR REQUEST, I AM NOW SUBMITTING THE FOLLOWING REPORT, WHICH CONDENSES THE INFORMATION AND DATA RESULTING FROM MY SEPARATE EXAMINATIONS MADE IN JANUARY, 1932, AND NOVEMBER, 1932. IN BOTH INSTANCES, I SPENT SEVERAL WEEKS, WITH MY ASSISTANTS, IN STUDYING, SURVEYING AND SAMPLING THE BORIANA DEPOSITS.

PROPERTIES

THE BORIANA MINING COMPANY'S PROPERTIES ARE SITUATED 18 MILES IN A NORTHEASTERLY DIRECTION FROM THE TOWN OF YUCCA, IN THE WALAPAI MINING DISTRICT, MOJAVE COUNTY, ARIZONA.

THE PROPERTIES CONSIST OF FIFTEEN (15) CONTINGUOUS LODE MINING CLAIMS, AND ONE SEPARATED LODE MINING CLAIM, NOT PATENTED, BUT TITLE HELD UNDER THE LAWS OF THE UNITED STATES GOVERNMENT BY VIRTUE OF DISCOVERY AND LOCATION, TOGETHER WITH ANNUAL ASSESSMENT WORK, WHICH HAS BEEN PERFORMED AND RECORDED FOR THE YEAR ENDING JULY 1, 1933. THE NAMES OF THE RECORDED LODE MINING CLAIMS ARE FRANCIS, FRANCIS NO. 1, FRANCIS NO. 2, FRANCIS NO. 6, FRANCIS NO. 3, FRANCIS NO. 5, SADIE NO. 1, SADIE NO. 2, SADIE NO. 3, SADIE, SADIE NO. 5, SADIE NO. 6, MARCH WIND, MARCH WIND NO. 5, MARCH WIND NO. 1 AND HELEN RUTH. THE WATER SUPPLY IS OBTAINED FROM A WELL SUNK UPON THE HELEN RUTH, WHICH CLAIM WAS TAKEN UP FOR THE WATER RIGHTS.

ALL THE IMPROVEMENTS, CONSISTING OF MILL, POWER HOIST, BLACKSMITH SHOP, BOARDING HOUSE, ASSAY SHOP, BUNK HOUSES AND MANAGER'S HOME ARE, TOGETHER WITH THE EQUIPMENT, LOCATED UPON THE FRANCIS AND FRANCIS NO. 1 CLAIMS, WITH THE EXCEPTION OF THE PUMPING PLANT WHICH IS UPON THE HELEN RUTH.

ACCESSIBILITY

YUCCA, A TOWN IN MOJAVE COUNTY, ARIZONA, AT AN ELEVATION OF 1,805 FEET ABOVE SEA-LEVEL, IS SITUATED UPON THE MAIN LINE OF THE A.T. & S.F. RR., 350 MILES EASTERLY OF LOS ANGELES AND 25 MILES SOUTH OF KINGMAN, (THE COUNTY SEAT OF MOJAVE COUNTY) ARIZONA. THERE IS A GOOD MOUNTAIN AUTOMOBILE ROAD FROM YUCCA TO THE MINE WHERE THE ELEVATION, AT THE NO. 5 OR MAIN WORKING TUNNEL, IS 5000 FEET. THE DIFFERENCE IN ELEVATION BETWEEN THE RAILROAD STATION AND THE MINE WORKINGS IS 3,200 FEET.

GEOLOGY

THE COUNTRY ROCK, OF HILLS SURROUNDING THE COMPANY'S LODE MINING CLAIMS, WHICH COVER A NARROW AREA OF SHALE, IS GRANITE. THE METAMORPHIC ROCK IN IMMEDIATE CONTACT WITH THE SHALE IS GNEISS. EIGHTY PER CENT OF THIS COARSE GRAINED GNEISS, APPROXIMATELY, IS COMPOSED OF NEW METAMORPHIC MINERALS, THE REMAINING TWENTY PER CENT REPRESENTING RELIC MINERALS ANTEDATING THE METAMORPHISM. THE ROCK IS MODERATELY COARSE GRAINED AND POSSESSES A PRONOUNCED GNEISSIC TEXTURE DUE CHIEFLY TO THE PARALLEL ORIENTATIONS OF THE MICA FLAKES, BUT PART AT LEAST TO A TABULAR HABIT OF THE FELSPARE PARALLEL TO THE BANDING AND TO A STRINGING OUT OF THE QUARTZ GRAINS IN THE SAME PLANE. THE QUARTZ AND ALBITE TEND TO FORM AN INTERLOCKING GRANULAR MOSAIC. BOTH MINERALS ARE QUITE CLEAR, SHOW NO CRYSTALLINE OUTLINES AND QUITE CERTAINLY REPRESENT PRODUCTS OF

RECRYSTALLIZATION. THE MICAS, BIOTITE AND MUSCOVITE, ARE CONSPICUOUS AND OCCUR AS WELL ORIENTATED PLATES LYING IN PLANE OF GNEISSIC BANDING.

THE ENCASING ROCK, WITHIN WHICH EXISTS THE DEPOSITS OF QUARTZ, TUNGSTEN AND COPPER OCCUR IN LETICULAR VEINLETS, IS WITHOUT QUESTION A CLAY SHALE RECRYSTALLIZED UNDER INFLUENCE OF DYNAMIC METAMORPHISM, HEAT AND PRESSURE RESULTING IN A RECRYSTALLIZATION OF THE ORIGINAL SHALE PARTICLES. THE ROCK IS COMPLETELY CRYSTALLINE, BEING COMPOSED OF A VERY FINE GRAINED INTERLOCKING AGGREGATE OF QUARTZ, AND CORDIERITE CRYSTALS OF IRREGULAR SHAPE, BUT SHARP IN OUTLINE. BIOTITE AND MUSCOVITE ARE ABUNDANT IN SMALL ORIENTATED FLAKES WHICH OCCUR SCATTERED UNIFORMLY THROUGHOUT THE ROCK. THE ROCK IS OBVIOUSLY RICH IN ALUMINA, WITH MODERATE SILICA, MAGNESIA AND IRON, AND LOW IN ALKALIES.

THE SHALE ROCK, AS COVERED BY THE LODE MINING CLAIMS OF THIS COMPANY, HAS A WIDTH OF APPROXIMATELY A HALF OF A MILE, AND IS THE REMNANT EXTENSION OF THE GREATER BODY OF SHALE WHICH IS OBSERVABLE FOR SEVERAL MILES AS THE MINE IS APPROACHED FROM THE VALLEY AT THE SOUTH.

THE SHALES, SEDIMENTARY ROCKS, WERE ORIGINALLY LAID DOWN HORIZONTALLY, OR NEARLY SO, BUT WITHIN THE AREA COVERED BY THE COMPANY'S CLAIMS DUE TO PRESSURE, HEAT AND TORSION FROM BENEATH, WERE RAISED AND ARCHED INTO NEARLY A VERTICAL ANTICLINAL FOLD. ALONG THE STRIKE OF THIS FOLD, THE POINT OF GREATEST STRESS, WHERE THE SHALE DIPS IN ONE DIRECTION EASTERLY AND IN THE OTHER IN A WESTERLY DIRECTION, THE STRUCTURE WAS WEAKENED, LOOSENED AND DISTINCTLY STRATIFIED WHEN COMPARED WITH THE REMAINING MASSIVE SHALE. WITHIN THIS LINE, OR ZONE OF STRATIFICATION, WHICH HAS A WIDTH VARYING FROM FORTY TO SIXTY FEET OR MORE, A STRIKE OF NORTH 30° EAST AND A DIP AVERAGING 80° EASTERLY, WERE CREATED OPENINGS OR CREVICES SUITABLE FOR THE DEPOSITION FROM THE HIGHLY MINERAL SOLUTIONS EMANATING FROM BELOW AND WITHIN WHICH WERE

DEPOSITED, AMONG OTHER METALS, WOLFRAMITE, SCHEELITE, CHALCOPYRITE AND MINUTE QUANTITIES OF THE PRECIOUS METALS GOLD AND SILVER.

WHILE THIS STRATIFIED ZONE, WITHIN WHICH THE DEPOSITS OCCUR, HAS A GENERAL DIP TO THE EAST, THIS DIP IS NOT CONSTANT AND REGULAR BUT, UPON THE CONTRARY, IT IS BILLOWY AND VARIABLE IN DIFFERENT PARTS OF THE MINE OPENINGS AS ILLUSTRATED PARTICULARLY UPON THE NO. 5 LEVEL WHERE THE DIP IS WESTERLY.

TWO PRONOUNCED POST MINERAL FAULTS HAVE CUT AND THROWN THE VEIN AT DIFFERENT ELEVATIONS, BUT NEITHER OF THESE HAD ANY BEARING UPON THE MINERALTZATION OF THE VEINS, ALTHOUGH THEY WILL HAVE AN ECONOMIC BEARING IN THE MINING OPERATIONS, AT LEAST IN THE AREA NEAR THEM, WHERE THEY HAVE SHATTERED AND CRUSHED THE FORMATIONS THEREBY MAKING THE GROUND HEAVY AND DIFFICULT TO HOLD IN PLACE. THE FAULTS ARE SHOWN UPON "EXHIBIT NO. 1". THE LOWER FAULT IS SHOWN ON THE NO. 5 LEVEL WHERE IT HAS A STRIKE NEARLY THE SAME AS THE VEIN WITH A PRONOUNCED DIP TO THE WEST AND THE UPPER FAULT IS SHOWN AT THE TOP OF THE UPRAISE ON THE NO. 4 LEVEL WHERE IT ALSO HAS A PRONOUNCED DIP, BUT TOWARDS THE EAST.

THERE ARE NO DISTINCT DEMARCATIONS SEPARATING THE STRATIFIED ROCK ZONE FROM THE MASSIVE SHALE, BUT RATHER A GRADUAL FADING OUT OF THE STRATIFICATION INTO THE SOLID MASS; THEREFORE, THERE EXISTS NO TRUE WALLS, EITHER HANGING OR FOOT WALLS WHICH HAVE INFLUENCED MINERAL DEPOSITION ALTHOUGH INVARIABLY THE DEPOSITION WHICH HAS OCCURRED HAS BEEN CLOSE TO THE WESTERN LIMIT OF THE STRATIFICATIONS.

THE ORE DEPOSITION WITHIN THE VEINS OCCURS AS LENTICULAR VEINLETS OF WHICH, IN MANY INSTANCES, THERE ARE SEVERAL PARALLEL ONE TO ANOTHER WITHIN A FEW FEET OF WIDTH AND SEPARATED BY BANDS OF SHALE. IT MIGHT HAVE BEEN EXBECTED THAT AT SOME FAVORABLE PLACE WITHIN THE VEIN SYSTEM, THESE SMALL VEINS WOULD HAVE

JOINED INTO ONE AND HAVE MADE AN IMPRESSIVE WIDTH, BUT SUCH HAS NOT BEEN THE CASE; IN INSTANCES WHERE THEY HAVE JOINED, THE WIDTH OF EITHER HAS NOT INCREASED.

WATER

WATER IS OBTAINED FROM A WELL DRILLED UPON THE HELEN RUTH LODE MINING CLAIMS, WHICH IS LOCATED ABOUT 6,000 FEET SOUTH OF THE MINE AT AN ELEVATION OF 4,350 FEET ABOVE SEA-LEVEL. PUMPING TESTS, DURING THE DRYEST PERIOD OF THE YEAR, HAVE DEMONSTRATED THAT THE CAPACITY OF THE WELL CAN BE RATED AT 25 GALLONS OF WATER A MINUTE OR ABOUT 145 TONS PER 24 HOURS. THIS QUANTITY, WITH THE USE OF DORR THICKENERS, AND THE CONSERVATION OF WATER, IS SUFFICIENT FOR MILL TREATMENT OF ONE TO ONE HUNDRED TWENTY-FIVE TONS OF ORE PER DAY OF THE CHARACTER PRODUCED FROM THIS DEPOSIT. SUFFICIENT TANK STORAGE HAS BEEN INSTALLED TO PROVIDE FOR THE REQUIREMENTS OF THE OPERATIONS. DUE TO THE DIFFERENCE IN ELEVATIONS BETWEEN THE WELL AND THE MILL, IT IS NECESSARY TO RAISE, BY PUMPING, THE WATER TO THE STORAGE TANKS AGAINST A HEAD OF 650 FEET.

ABOUT ONE AND ONE HALF MILES NORTH OF THE MINE, THERE IS ANOTHER SOURCE OF WATER SUPPLY WHICH IS LOCATED UPON 320 ACRES OF LAND HELD UNDER LEASE BY YOUR COMPANY. A GROUP OF SMALL SPRINGS EXIST THERE FROM WHICH WATER CONTINUALLY FLOWS, AND THESE SPRINGS CAN PROBABLY BE DEVELOPED INTO AN IMPORTANT WATER SUPPLY IF IT SHOULD EVER BE REQUIRED. IN ADDITION, THE MINE ITSELF IS MAKING A SMALL QUANTITY OF WATER, ABOUT 25 GALLONS PER MINUTE, FROM A FAULT NEAR THE ENTRANCE OF THE MAIN WORKING ADIT AT THE 5,000 FOOT LEVEL.

MILL AND MINE EQUIPMENT

THE MILLING PLANT, HAVING A RATED CAPACITY FOR TREATING 150 TONS OF ORE IN 24 HOURS, IS MODERN AND UP TO DATE IN EVERY RESPECT AND ALL MACHINERY

AND EQUIPMENT IS IN EXCELLENT CONDITION, WITH THE EXCEPTION OF THE DRIER HANDLING THE FLOTATION CONCENTRATES, WHICH DID NOT GIVE SATISFACTION. PROBABLY NO OTHER IMPROVEMENTS, IN THE IMMEDIATE FUTURE, WILL BE FOUND NECESSARY.

AS YOUR FILES CONTAIN A DETAILED DESCRIPTION OF EQUIPMENT AND MACHINERY IN THE MILL, IT SEEMS SUPERFLUOUS TO INCLUDE THIS MATTER IN THIS REPORT.

THE MINE IS WELL PROVIDED WITH ALL NECESSARY EQUIPMENT, MACHINERY AND TOOLS FOR THE MAGNITUDE OF PAST OPERATIONS, BUT WITH ANY MARKED INCREASE IN PRODUCTION, ADDITIONAL COMPRESSOR CAPACITY WILL HAVE TO BE OBTAINED. THE INGERSOLL-RAND COMPRESSOR, WHICH IS NOW INSTALLED, IS GIVING 268 CU. FT. OF AIR AND THE CHICAGO PNEUMATIC IS GIVING APPROXIMATELY 102 CU. FT. THE PRACTICE IN THE PAST HAS BEEN TO USE THIS HIGH PRESSURE AIR FOR CIRCULATION OF AIR IN THE STOPE AND DRIFT FACE, AS WELL AS FOR RUNNING THE DRILL. BY USING ELECTRICALLY DRIVEN FANS, WHICH ARE NOW AT THE MINE, A SAVING OF AIR FOR THE LATTER PURPOSE WILL RESULT.

THE PROPERTY IS ESPECIALLY WELL EQUIPPED WITH ALL OF THE NECESSARY FACILITIES WHICH GO TOWARDS AN ECONOMICAL MINE OPERATION. THE POWER AND COMPRESSOR HOUSE IS AMPLE IN SIZE AND EQUIPMENT. THE BLACKSMITH HOUSE HAS ALL OF THE MODERN AND NECESSARY MACHINERY AND EQUIPMENT. THESE, TOGETHER WITH ASSAY SHOP, BOARDING HOUSE, BUNK HOUSES, SUPERINTENDENT'S DWELLING, LEAVE LITTLE TO BE DESIRED. ELECTRIC LIGHTS AND RUNNING WATER ARE FURNISHED TO ALL OF THE BUILDINGS, WHICH ARE ALL A GOOD SUBSTANTIAL CONSTRUCTION.

DEVELOPMENT

I HAVE NO RELIABLE INFORMATION AS TO THE EXACT TIME MINING WORK WAS ORIGINALLY STARTED UPON THE DEPOSITS, BUT IT WAS SOMETIME DURING THE WORLD WAR PERIOD WHEN TUNNEL WORK WAS FIRST BEGUN, PROBABLY AT LEVEL NO. 1, AT AN ELEVATION OF 5,527 FEET ABOVE SEA-LEVEL AND NEAR THE SUMMIT OF THE MOUNTAIN WHERE THE VEIN

OUT-CROPS PROMINENTLY. AT THIS PLACE, THE VEIN WAS SPLIT AND TWO ADITS WERE DRIVEN NEARLY PARALLEL. A DRIFT 372 FEET LONG WAS RUN TO THE NORTH ON THE EARTERLY SPLIT OF THE VEIN WHERE THE ORE HAD AN AVERAGE WIDTH OF 11". THE FIRST 150 FEET OF THE VEIN, FROM THE PORTAL, WAS STOPED TO THE SURFACE AND IT IS EVIDENT THAT THE ORE AT THE FACE WAS FOUND OF TOO LOW GRADE TO BE PROFITABLE. HOWEVER, SURFACE OUT-CROPPINGS OF THE VEIN NORTH OF THIS FACE INDICATE THE EXISTENCE OF ANOTHER ORE SHOOT, WHICH SHOULD BE INVESTIGATED BY CONTINUING THIS DRIFT. AN ADIT TUNNEL WAS ALSO RUN ON THE WESTERLY SPLIT OF THE VEIN FOR A DISTANCE OF 70 FEET, BUT NO COMMERCIAL ORE WAS FOUND. THIS LATTER SPLIT SECTION OF THE VEIN OUT-CROPS 10 FEET FROM THE MAIN BODY AND JOINS IT IN THE DRIFT 250 FEET FROM THE PORTAL.

AT AN ELEVATION 5,418 FEET ABOVE SEA-LEVEL, THE LEVEL NO. 2 CROSS-CUT TUNNEL WAS DRIVEN 40 FEET TO WHERE IT CUT THE VEIN, AND FROM WHICH POINT A DRIFT NORTHERLY WAS DRIVEN 543 FEET. THE CROSS-CUT TUNNEL WAS CONTINUED BEYOND THE VEIN, THE ENTIRE LENGTH OF THE CROSS-CUT BEING 217 FEET. AT 193 FEET, A DRIFT WAS RUN NORTHERLY FOR 132 FEET ON WHAT IS CALLED THE COPPER VEIN, BUT NO ORE WAS FOUND AND THE WORK WAS ABANDONED. UPON THE MAIN DRIFT, NO COMMERCIAL ORE WAS FOUND FOR THE FIRST 40 FEET, BUT FROM HERE, FOR 400 FEET, ALL ORE BETWEEN THIS LEVEL AND LEVEL NO. 1 HAS BEEN STOPED. BEYOND THIS POINT, THE QUARTZ SEAMS PINCHED SEPARATE INTO SEVERAL VEINLETS AND THE FACE SHOWS NO VALUES. AT SOME FUTURE TIME, THIS DRIFT SHOULD BE EXTENDED NORTHERLY WITH THE EXPECTATION OF FINDING ORE WHICH SHOWS ON THE SURFACE ABOVE. BECAUSE OF THE DANGEROUS CONDITION EXISTING ABOVE THIS LEVEL, WHICH IS CAVED IN SEVERAL PLACES, AND THE FACT THAT TIMBERING PREVENTS ANY ATTEMPT AT SYSTEMATIC SAMPLING WITHOUT GOING TO GREAT COST, NO ACCURATE STATEMENT CAN BE MADE OF THE WIDTH OF THE ORE PREVIOUSLY MINED FROM THIS STOPE BUT FROM WHAT CAN BE SEEN, IT IS EVIDENT THAT THE ORE WIDTH WAS NOT TO EXCEED 15".

At elevation 5312, cross-cut tunnel level No. 3 was run 452 feet; at 425 feet from the portal, it cuts the vein and drifts both north and south were advanced a total distance of 743 feet (566 feet northerly and 177 feet southerly). Beginning at station 303, where the northerly drift starts from the cross-tunnel, all backs of ore above this level have been stoped for a distance of 190 feet on this level to the No. 2 level above. From this point, 35 feet north of station 309, continuing towards the north, the backs have been stoped for an additional distance of 180 feet to within a few feet of the No. 2 level; the Block of ore remaining standing in this stope has an average depth of 25 feet and an average thickness of 14", which would amount to about 600 tons.

Beginning at a point 45 feet south of the winze, the ore is irregular as to both widths and values to the south face. The workings at this point are very close to the surface. The northern-most 120 feet of this drift has been carried through a barren stretch of the vein. There is strong probability that by continuing this north drift, a second ore shoot will be encountered for the same reasons that apply on Levels Nos. 1 and 2; namely, the out-croppings, which showed on the surface to the north of these faces.

A two compartment winze was sunk from No. 3 level at a point 45 feet southerly from the connection of the cross-cut tunnel with the vein. The bottom of this winze has an elevation of 5,200 feet above sea-level, (Level No. 4).

4TH LEVEL

At the time of my first examination in January, 1932, the short drift north of survey station 410 was inaccessible because of fallen

TIMBERS WHICH CLOSED IT, AND THE STUDY OF THIS LEVEL COULD ONLY BE MADE OF THE GROUND BETWEEN THE THREE COMPARTMENT RAISE TO THE 4TH LEVEL AND THE TWO COMPARTMENT WINZE FROM THE 3RD LEVEL. THIS INACCESSIBLE GROUND HAS SINCE BEEN "CAUGHT UP" AND RETIMBERED, AND IN NOVEMBER, 1932, THE DRIFT HAD ADVANCED 294 FEET TO THE NORTH. SINCE MY LAST VISIT TO THE MINE, THE DRIFT HAS PROGRESSED NORTHERLY 260 FEET AND CONNECTION WAS MADE WITH RAISE NO. 20 CONNECTING THIS LEVEL WITH LEVELS NO. 3 AND 5. THIS ENTIRE DRIFT, FROM STATION NO. 406 TO STATION 411 FOR A DISTANCE OF 274 FEET, WAS DRIVEN AT THE POINT OF CONTACT AND IN THE THROW OF AN EAST DIPPING REVERSE STRIKE FAULT WHERE THE ORE IN THE FOOT WALL OF THE FAULT IS TO BE FOUND ON THE WEST SIDE OF THE DRIFT. THE HANGING WALL ORE, AT SURVEY STATION NO. 410 IN THE RAISE, IS FOUND IN PLACE 10 FEET ABOVE THE FLOOR OF THE LEVEL OVER 14 FEET TO THE WEST.

IT MAY BE MENTIONED HERE THAT FAULTS SO FAR ENCOUNTERED IN THIS PROPERTY ARE POST MINERAL AND THRUST FAULTS AND IN EACH INSTANCE, WHERE THE VEIN HAS BEEN DISPLACED, THE HANGING WALL SECTION HAS, OF COURSE, BEEN THRUST UPWARD, BUT IN NO INSTANCE HAS CONTINUITY AND VALUE OF THE ORE BEEN EFFECTED EXCEPT, NATURALLY, AT THE POINT WHERE THE FAULT CUTS THROUGH THE VEIN. THIS FAULT HAS ALSO A NORTHERN DIP AS PROVEN BY ITS POSITION AT RAISE NO. 20 WHERE IT IS FOUND 10 FEET BENEATH THE FLOOR ON LEVEL NO. 4. IT IS APPARENTLY FADING OUT AND IN ALL EVENTS IT HAS NO BEARING OR EFFECT UPON THE ORE EXCEPT THAT OF LEVEL NO. 4, AS BEFORE MENTIONED. DUE TO THIS NORTHERN DIP OF THE FAULT, THE DRIFT ADVANCING TOWARD THE NORTH FROM STATION 411 SHOULD, WITHIN A FEW FEET, PASS ABOVE THIS FAULT LINE INTO THE VEIN, AND CONTINUE IN ORE FROM THEREON. THE WIDTH OF THE ORE ON THIS LEVEL NO. 4, AS SHOWN IN RAISE AT STATION 410 AND IN THE DRIFT AT RAISE NO. 20, AVERAGES MORE THAN 20" WITH AVERAGE VALUES OF 1.7% WO3.

THE WORKINGS WITHIN THE VEIN ON THIS LEVEL, AND IN UPRAISE NO. 20, WILL NATURALLY EFFECT AND IMPROVE MY PREVIOUS CALCULATIONS MADE IN JANUARY, 1932, OF ORE BLOCK "F", WHICH CALCULATION MUST STILL STAND AS THE SAMPLING SINCE THAT DATE IS THAT OF YOUR SUPERINTENDENT AND NOT MINE, BUT NEVERTHELESS BOTH THE WIDTHS OF THE ORE AND VALUES, AS REPORTED, CONSIDERABLY EXCEED THOSE I WAS ABLE TO RECORD SOLELY FROM THE TOP OF THIS ORE BODY ON LEVEL NO. 3.

AT THE TIME OF MY LAST EXAMINATION IN NOVEMBER, 1932, THE NO. 4 LEVEL HAD PROGRESSED TO SURVEY STATION 415 BUT CONNECTIONS HAD NOT BEEN MADE WITH RAISE NO. 20, NOR WERE THE RAISES THEMSELVES CARRIED THROUGH FROM LEVEL NO. 5 TO LEVEL NO. 3. I AM, HOWEVER, MENTIONING THIS AT THIS TIME TO SHOW THAT THESE OPERATIONS, WHICH PREVIOUSLY HAD BEEN PLANNED, HAVE BEEN COMPLETED.

LEVEL NO. 5

UP TO MAY 1ST, 1932, THE NO. 5 LEVEL, WHICH HAD BEEN STARTED AS AN ADIT, HAD PROGRESSED NORTHERLY TO THE FACE A DISTANCE OF 2855 FEET. THE PORTAL OF THIS ADIT HAS AN ELEVATION OF 5000 FEET ABOVE SEA-LEVEL AND THE WORK STARTED ON THE VEIN OUT-CROP. THE FIRST 1354 FEET OF WORKINGS WERE CARRIED THROUGH BARREN GROUND BEFORE INDICATIONS OF ORE WERE ENCOUNTERED. (MY SAMPLE NO. 1 WAS CUT AT THIS POINT.) FOURTEEN HUNDRED TWENTY FEET FROM THE PORTAL, THE FIRST AND SHORTEST ORE SHOOT ON THIS LEVEL WAS ENCOUNTERED AND CONTINUED FOR 150 FEET WHERE TUNGSTEN VALUES BECAME UNIMPORTANT. THIS ORE SHOOT DOES NOT APPEAR IN THE NO. 3 LEVEL ABOVE AND AS THE ORE VALUES, AS SAMPLED IN THE STOPE 90 FEET ABOVE, HAVE BECOME IRREGULAR AND LOW, IT WOULD APPEAR THAT WHATEVER FUTURE IMPORTANCE THIS ORE SHOOT MAY HAVE MUST NECESSARILY BE EXPECTED FROM BENEATH THE FLOOR ON NO. 5 LEVEL.

AT A POINT 2145 FEET FROM THE PORTAL OF SURVEY STATION 527, A CROSS-CUT HAVING A COURSE NORTH 71° 41 MINUTES EAST WAS DRIVEN 25 FEET, WHERE IT ENCOUNTERED A PARALLEL VEIN WHICH WAS FIRST EXPOSED IN A CROSS CUT AT UPRAISE ORE CHUTE No. 16. BEGINNING AT SURVEY STATION 528, A DRIFT WAS DRIVEN NORTH, ABOVE WHICH A SMALL TONNAGE OF ORE HAD BEEN STOPED BY YOUR PREDECESSORS. BECAUSE OF THE QUESTIONABLE MANNER OF TIMBERING AND HOLDING THIS STOPED AREA, THE GROUND CAVED AND COMPLETELY FILLED THE DRIFT SO THAT NO EXAMINATION OF IT, OR THE STOPE ABOVE, COULD BE MADE AND, THEREFORE, NO POSITIVE STATEMENT REGARDING THE WIDTH AND VALUES IS POSSIBLE. YOUR PREDECESSORS' MAP SHOWS THIS DRIFT TO HAVE BEEN 174 FEET LONG AND THAT THE GROUND ABOVE HAD BEEN STOPED TO A HEIGHT OF 90 FEET ABOVE FLOOR LEVEL.

A FAULT DIPPING 30° TO THE WEST WITH A STRIKE NORTH 30° 41 MINUTES EAST (VEIN STRIKE NORTH 30° 45 MINUTES EAST), IS FIRST NOTICED ON THIS LEVEL IN THE WEST CROSS-CUT 1170 FEET FROM THE PORTAL WHERE THE VEIN IS THROWN 6 FEET TO THE WEST. THE GROUND ALONG THIS STRIKE OF FAULTING HAS BEEN FRACTURED AND WEAKENED MAKING IT HEAVY AND DIFFICULT TO HOLD IN BOTH DRIFTING AND STOPING. THIS ACCOUNTS FOR THE CAVING IN THE DRIFT ABOVE MENTIONED STARTING AT STATION No. 528.

AS PURELY AN ECONOMIC MATTER, IT WAS DECIDED TO DRIVE THE MAIN WORKING DRIFT FROM SURVEY STATION 527 IN THE HANGING WALL OF THE VEIN RATHER THAN TO "CATCH UP" AND HOLD THE CAVED GROUND NORTH OF STATION 528. THE DRIFT WAS CARRIED NORTHERLY TO STATION 531 WHERE THE VEIN WAS AGAIN RECOVERED, AND IT WAS FOLLOWED CONSTANTLY IN ORE FROM THAT POINT TO THE FACE 10 FEET NORTH OF STATION 542.

IT IS NOT POSSIBLE AS YET TO DEFINITELY STATE THE ENTIRE LENGTH OF THIS PARTICULAR ORE SHOOT, THE SECOND SO FAR ENCOUNTERED ON THIS LEVEL, AS ORE IS STILL CONTINUING IN THE NORTH FACE, BUT AS OF MAY 1ST, 1932, IT HAD A LENGTH OF 703 FEET. THIS IS A REMARKABLY GOOD SHOWING WITH QUARTZ BEARING VALUES CONFINED WITHIN A WIDTH OF 3½ TO 4 FEET WHICH, IN THIS PROPERTY, IS AN IDEAL MINING WIDTH. IN ADDITION TO THE DRIFTING PERFORMED ON THIS LEVEL, A PROSPECTING CROSS-CUT WAS DRIVEN WESTERLY FROM A POINT 10 FEET SOUTH OF SURVEY STATION 527 FOR A DISTANCE OF 95 FEET TO EXPLORE FOR PARALLEL ORE BODIES IN THAT DIRECTION, BUT NONE WERE ENCOUNTERED.

NO. 20 RAISE FROM 5TH LEVEL

THIS TWO COMPARTMENT RAISE HAS BEEN CARRIED UPWARD FROM LEVEL NO. 5 A DISTANCE OF 307 FEET, CONNECTIONS HAVING BEEN MADE WITH THE 4TH LEVEL AT STATION 419, AND WITH LEVEL NO. 3 AT A POINT FIVE FEET NORTH OF STATION 312. THE RAISE AT THE TIME OF MY LAST EXAMINATION, IN NOVEMBER 1932, HAD NOT MADE CONNECTIONS WITH NO. 4 LEVEL, AND IN MY CALCULATIONS DEALING WITH THE TONNAGE AND VALUES, I, THEREFORE, HAVE LIMITED MY RESULTS AS OF THE DATE OF MY WORK. THIS PERPENDICULAR RAISE DOES NOT CONTINUALLY FOLLOW THE VEIN BECAUSE THE LATTER HAD A VARIABLE DIP WHICH AVERAGED, HOWEVER, ABOUT 20° TO THE EAST, BUT IMPORTANT ORE VALUES WERE FOLLOWED UPWARD ABOUT 70 FEET FROM LEVEL NO. 5, WHERE THE ORE CONTINUED TO THE WEST OF THE RAISE. IT WAS AGAIN ENCOUNTERED IN THE CROSS-CUT 30 FEET WEST OF THE RAISE ON LEVEL NO. 4. IT WAS FOUND THROWN A LITTLE FURTHER TO THE WEST AT THIS ELEVATION DUE TO AN EAST DIPPING REVERSE STRIKE FAULT, WHICH CUT ACROSS THE VEIN 10 FEET BELOW LEVEL NO. 4. REPORTS HAVE BEEN SUBMITTED TO ME TO YOUR MINE SUPERINTENDENT STATING THAT THE WIDTH OF THE VEIN AND THE VALUES WERE ECONOMICALLY CONSISTENT UP TO THE POINT OF CONTACT WITH THE 3RD LEVEL.

NO. 31 RAISE FROM 5TH LEVEL

Two hundred ninety feet north of raise No. 20 is being carried upward raise No. 31 to the elevation of Level No. 4, where drifting to the south will connect it with raise No. 20, thus completely blocking out all four sides of this important body of ore. The advance in this raise, as of November 1932, was 104 feet above level No. 5, with ore averaging 1½ feet wide of slightly over 3% WO3 values.

NO. 35 RAISE FROM 5TH LEVEL

At a point 222 feet north of raise No. 31, raise No. 35 has been started since my examination, and has advanced upward 55 feet with favorable reports from your superintendent as to values and widths which, however, I have not seen.

NO. 25 RAISE FROM 5TH LEVEL

Thirty feet south of station No. 529, between raises No. 20 and 31, and 130 feet north of raise No. 20, is located raise 25. This raise was started from the northern limit of the abandoned drift before referred to running north from station 528. It was reached by a cross-cut running east from station 528 "A" in the main drift. It has a height of 93 feet above the floor level and has been retimbered and put into good working condition since my last visit. Reports by your Superintendent are also favorable as to widths and values.

SURFACE OUT-CROPPINGS--VIRGIN GROUND NORTH

Desiring to get information of the surface outcroppings of the

VEIN NORTH AND BEYOND THE FACES OF THE UNDERGROUND WORKINGS, I CAUSED SEVERAL SURFACE TENCHES, WHICH ARE SHOWN UPON THE MAP, TO BE DUG ACROSS THE VEIN EXPOSURE WITHIN THE AREA UNDER CONSIDERATION. THE POSITIONS OF THESE TRENCHES WERE SELECTED LARGELY BECAUSE OF ACCESSIBILITY AND THE RAPIDITY WITH WHICH THE WORK COULD BE ACCOMPLISHED. BECAUSE IT WAS CLEARLY DETERMINED BY THE OUT-CROPPINGS ABOVE THE OLD DEVELOPED SECTIONS OF THE MINE, IT WAS NOT ANTICIPATED OR EXPECTED THAT WIDTHS OF THE VEIN ON THE SURFACE, ON ITS NORTHERN EXTENSION UNDER CONSIDERATION, WOULD CORRESPOND WITH THE VEIN WIDTHS AS DEPTH WAS OBTAINED, BUT IT WAS HOPED THAT THE VALUES OF THE ORE WOULD BE FOUND CONTINUOUS AND THIS PROVED TO BE THE FACT FOR THE RESULTS OF THE TRENCH SAMPLES TAKEN WERE GRATIFYING FOR A DISTANCE OF 590 FEET BETWEEN TRENCHES No. 3 AND No. 7, WHERE ORE OUT-CROPPINGS CARRIED AN AVERAGE VALUE OF 4.9% WO3. TRENCH No. 3 IS ALMOST DIRECTLY ABOVE SURVEY STATION 528 "A" ON THE No. 5 LEVEL, FROM WHICH IT IS SEPARATED VIRTICALLY BY OVER 800 FEET. NONE OF THE WORKINGS HAS, AS YET, EXTENDED INTO THE UNPROVEN SECTION OF GROUND EXCEPT FOR 480 FEET ON LEVEL No. 5 WHERE THE ORE SHOWING IS IMPORTANT IN REGARD TO BOTH WIDTH AND VALUE AND IT IS REASONABLE, THEREFORE, TO CREDIT ORE EXPECTANCY, FROM THIS SOURCE, UNDER THE HEADING OF "POSSIBLE ORE".

SAMPLING

ALTHOUGH YOUR PREDECESSORS HAD SUBMITTED MAPS, WHICH WERE THOUGHT TO BE ACCURATE, I CAUSED A THOROUGH INDEPENDENT SURVEY TO BE MADE OF ALL OF THE OPENINGS AND THE NEW PLANS, LONGITUDINAL AND VERTICAL, ARE USED IN COMPLETING THIS REPORT.

THE ORE OCCURS IN A NARROW VEIN, OR PARALLEL SEAMS OR VEINLETS, WITHIN THE SHALE, AND IS LARGELY MADE UP OF SILICA, ALUMINA, IRON PYRITE, ARSENICAL PYRITES, IRON OXIDES, MANGANESE OXIDES, CHALCOPYRITE, BORNITE AND INTRUDED SHALE.

THE VEINS EXPOSED IN THE UNDERGROUND WORKINGS WERE SAMPLED SYSTEMATICALLY AT REGULAR INTERVALS OF FIVE OR TEN FEET DEPENDING UPON THE CONDITIONS GOVERNING THE WORK. ALL NECESSARY PRECAUTIONS TO ASSURE ACCURACY AND CERTAINTY OF FREEDOM FROM OUTSIDE INTERFERENCE IN THE SAMPLING, AND IN THE VARIOUS CHECKS, GIVE ME PERFECT CONFIDENCE IN THE TRUSTWORTHINESS OF THIS WORK.

BECAUSE OF THE MANNER OF THE ORE DEPOSITION, USUALLY IN NARROW PARALLEL SEAMS SEPARATED BY BANDS OF SHALE AND THE SELECTIVE METHOD OF ORE SORTING UNDERGROUND, WHICH WILL HAVE TO BE USED, CHANNEL SAMPLES ACROSS THE WIDTH OF THE DRIFTS OR STOPES SOLELY INCLUDED THE ORE SEAMS AND THE SHALE BANDS WERE OMITTED. THE METALLIC VALUES ARE CONTAINED WITHIN THE QUARTZ AND NOT WITHIN THE SHALE. IT MUST DISTINCTLY BE KEPT IN MIND THAT THE ORE WIDTHS AND VALUES ATTRIBUTED TO EACH INDIVIDUAL SAMPLE ARE THE TOTALS OF THE SEVERAL SEAMS OF ORE WHICH FELL WITHIN THE SCOPE OF THE SAMPLES AS CUT, AND THAT IN MAKING CALCULATIONS OF THE TONNAGE RECOVERABLE FROM THE ORE RESERVES, DUE ALLOWANCE WILL BE MADE FOR MINING TO THE NECESSARY WIDTHS TO RECOVER THE ORE CREDITED TO THE SCOPE OF THE SAMPLE AND ALSO FOR THE INEVITABLE LOSS OF METALLIC CONTENTS, THE RESULTS OF SHOOTING, BREAKING AND HANDLING THE ORE TO THE ORE CHUTE FROM WHERE IT GOES TO THE MILL.

THE ACCURATE CHEMICAL DETERMINATION OF THE TUNGSTEN VALUES WITHIN THE ORE IS DIFFICULT, AND ONLY WELL EXPERIENCED AND CAPABLE CHEMISTS CAN BE RELIED UPON TO DO THE WORK. FORTUNATELY, A VERY CAPABLE CHEMIST, WHO HAD HAD EXTENSIVE EXPERIENCE IN TUNGSTEN DETERMINATIONS, WAS AVAILABLE TO DO THE ASSAYING IN CONNECTION WITH THIS WORK, AND HIS WORK IN TURN WAS FREQUENTLY CHECKED BY SMITH EMERY CHEMICAL COMPANY., AND WAS FOUND ACCURATE AND SATISFACTORY. ALL SAMPLES WERE ALSO RUN FOR COPPER, AND ENOUGH WERE RUN TO DETERMINE GOLD AND SILVER CONTENT.

PRESENTED HEREWITH AS "EXHIBIT I" IS A GENERAL PLAN AND PROFILE, SHOWING ALL WORKINGS EXCEPT THE FIRST SEVEN HUNDRED AND THIRTY-FIVE FEET OF THE MAIN LOWER TUNNEL (No.5). THIS IS ON A SCALE OF 40 FEET TO THE INCH, AND ON THIS MAP ARE SHOWN ALL SAMPLES OF THE UNDERGROUND WORKINGS WITH THE LOCATIONS AND WIDTH OF EACH SAMPLE AND THE PERCENTAGE OF WO_3 AND COPPER. "EXHIBIT No. 2" IS A REDUCTION OF THE ABOVE MAP TO A SCALE OF 80 FEET TO THE INCH FOR THE PURPOSE OF BINDING IN THIS REPORT. "EXHIBIT NO. 3" IS A GENERAL PLAN OF ALL UNDERGROUND WORKINGS, WHICH ALSO SHOWS LOCATION OF MILL AND OTHER BUILDINGS; THIS IS ON A SCALE OF 100 FEET TO THE INCH AND ALSO SHOWS GEOLOGY. "EXHIBIT No. 4" IS A LONGITUDINAL SECTION SHOWING ALL MINE WORKINGS ACCESSIBLE ON A SCALE OF 100 FEET TO THE INCH. "EXHIBIT No. 5" IS A CROSS SECTION AT "A-A" ON A SCALE OF 100 FEET TO THE INCH TAKEN AT RIGHT ANGLES TO THE VEINS AND ACROSS THE MAIN WORKINGS, AND PROJECTED ACROSS THE SHALE BELT TO THE GNEISS ON EITHER SIDE.

ORE RESERVE

BY REFERRING TO "EXHIBIT No. 1" TO THE PROFILE SECTION, YOU WILL NOTE THAT THE BLOCKS OF ORE ARE LETTERED AND SET FORTH IN COLORS. THE RED COLORED BLOCKS REPRESENT "POSITIVE ORE" AND THE GREEN BLOCKS "PROBABLE ORE". BECAUSE OF THE HEAVY SPECIFIC GRAVITY OF THIS TUNGSTEN BEARING QUARTZ, 11 CU. FT. WERE CALCULATED TO THE TON OF ORE IN PLACE. THE VALUE OF TUNGSTEN CONCENTRATES IS PLACED AT $10.00 PER UNIT, A UNIT CONSISTING OF 20 POUNDS. IN DETERMINING ORE VALUE AND TUNGSTEN CONCENTRATE VALUES, AN ESTIMATED LOSS OF 20% IN THE MINE OPERATIONS AND MILL RECOVERY OF 80% WO_3 VALUES CONTAINED IN THAT ORE HAS BEEN ESTIMATED AND CALCULATED.

POSITIVE ORE

Block	Tons	WO3%	Ore Width	Total Width Lbs. Per Ton	WO3 Val. @ $10 per Unit
A	570	2.53	11 inches	50.6	$25.30 Per Ton
B	265	2.53	11 "	50.60	25.30 " "
C	200				
D	400	2.44	17 "	48.80	24.40 " "
E	170	4.58	8 "	91.60	45.80 " "
F	5500	1.56	16 "	31.20	15.60 " "
G	430	3.32	15 "	66.40	33.20 " "
H	900	2.52	20 "	50.40	25.20 " "
I	410	3.00	17 "	60.00	30.00 " "
J	600	4.20	10 "	84.00	42.00 " "
K	800	2.84	17 "	56.80	28.40 " "
R	500	2.22	16 "	44.40	22.20 " "
X	2194	2.88	16 "	57.60	28.80 " "
Y	1390	2.88	16 "	57.60	28.80 " "
Z	1420	2.40	15 "	48.00	24.00 " "
	15549				

Block	Gross Tons	Net Tons	Gross Val. Per Ton	Gross Value Ore in Place	20% Mining Loss	20% Milling Loss	Net Val. Per Ton	Net Value Ore
A	570	456	$25.30	$14,421.00	$2,884.20	$2,307.36	$20.24	$9,229.44
B	265	212	25.30	6,704.50	1,340.90	1,072.72	20.24	4,290.88
D	400	320	24.40	9,760.00	1,952.00	1,561.60	19.52	6,246.40
E	170	136	45.80	7,786.00	1,557.20	1,245.76	30.64	4,983.04
F	5500	4400	15.60	85,800.00	17,160.00	13,728.00	12.84	54,912.00
G	430	344	36.20	14,276.00	2,855.20	2,284.16	26.56	9,136.64
H	900	720	25.20	22,680.00	4,536.00	3,628.80	20.27	14,515.20
I	410	328	30.00	12,300.00	2,460.00	1,968.00	24.00	7,872.00
J	600	480	42.80	25,680.00	5,136.00	4,108.80	34.20	16,435.20
K	800	640	28.40	22,720.00	4,544.00	3,635.20	22.73	14,540.80
R	500	400	22.20	11,100.00	2,220.00	1,776.00	17.76	7,104.00
X	2194	1755	28.80	63,187.20	12,637.44	10,109.95	23.04	40.439.81
Y	1390	1112	28.80	40,032.00	8,006.40	6,405.12	23.04	25,620.48
Z	1420	1136	24.00	34,080.00	6,816.00	5,452.80	19.20	21,811.20
	15549	12439	23.83	370,526.70	74,105.34	59,284.27	19.07	237,137.09

PROBABLE ORE

OR REASONABLY ASSURED ORE

BLOCK	TONS	WO3	ORE WIDTH	TOTAL WO3 LBS. PER TON	WO3 VAL. @ $10 PER TON
L	1300	1.80	1.20 FT.	36 LBS.	$18.00
M	1000	2.50	1.25	50	25.00
N	2124	1.56	1.50	31.20	15.60
O	1772	2.00	1.25	40	20.00
P	1500	2.00	1.50	40	20.00
Q	750	2.50	1.00	50	25.00
T	2877	2.50	1.33	50	25.00
Z1					
Z2	1420	2.00	1.30	40	20.00
S	2480	2.00	1.30	40	20.00
S1	1423	2.00	1.20	40	20.00
	16646				

BLOCK	GROSS TONS	NET TONS	GROSS VAL. PER TON	GROSS VALUE ORE IN PLACE	20% MINING LOSS	20% MILLING LOSS	NET VAL. PER TON	NET VALUE ORE
L	1300	1040	$20.00	$26,000.00	$5,200.00	$4,160.00	$16.00	$16,640.00
M	1000	800	25.00	25,000.00	5,000.00	4,000.00	20.00	16,000.00
N	2124	1699	15.60	33,134.40	6,626.88	5,301.50	12.48	21,206.02
O	1772	1418	20.00	35,440.00	7,088.00	5,670.40	16.00	22,681.60
P	1500	1200	20.00	30,000.00	6,000.00	4,800.00	16.00	19,200.00
Q	750	600	25.00	18,750.00	3,750.00	3,000.00	20.00	12,000.00
T	2877	1901.6	25.00	59,415.00	11,883.00	9,506.40	20.00	38,025.60
Z1) Z2)	1420	1136	20.00	28,400.00	5,680.00	4,544.00	16.00	18,176.00
S	2480	1984	20.00	49,600.00	9,920.00	7,936.00	16.00	31,744.00
S1	1423	1138	20.00	28,460.00	5,692.00	4,553.60	16.00	18,214.00
	16146	12916.6	20.70	334,199.40	66,839.88	53,471.90	16.56	213,887.62

POSSIBLE ORE

SOME EXPLORATION WORK, INCLUDING SHAFTS AND SHALLOW SHAFTS, SHOWS THE VEIN SYSTEM ON THE SURFACE IS KNOWN TO CONTINUE TO THE NORTH LIMIT OF YOUR PROPERTY, THIS FOR A DISTANCE OF WELL OVER A 1000 FEET NORTH OF ANY OF THE UNDERGROUND OPENINGS OR FACES. AS BEFORE NOTED, RESULTS OF SAMPLES TAKEN FROM THESE WORKINGS IN ORE ACROSS THE SURFACE OUT-CROPPINGS, GAVE HIGH RESULTS, VIZ: TUNGSTEN AVERAGE VALUES 4.9%, AND THERE IS A REASONABLE PROBABILITY THAT THE

ORE BENEATH THESE CROPPINGS WILL CONTINUE FROM THE SURFACE TO THE No. 5 LEVEL OVER 800 FEET BELOW. THERE IS ALSO EVERY REASON TO BELIEVE THAT THE ORE, WHICH SHOWS ON THE 5TH LEVEL, THE BEST SHOWING IN THE MINE, WILL CONTINUE DOWNWARD--BUT FOR HOW FAR, OF COURSE, IT IS IMPOSSIBLE TO STATE, BUT FROM ALL THE DEVELOPMENT SHOWINGS ALREADY PROVED, I CONSIDER THERE IS JUSTIFICATION FOR ESTIMATING THE TONNAGE AND VALUES OF THE POSSIBLE ORE AS EQUAL TO THE "POSITIVE" AND "PROBABLE" ORE, OR A TOTAL OF 31,695 TONS.

MINING COSTS & METHODS

THE "CUT AND FILL" METHOD OF MINING HAS BEEN EMPLOYED IN ALL OF THE STOPING OF ORE FROM THE MINE ALTHOUGH PROBABLY, IN THE STOPES ABOVE THE NOS. 1 AND 2 LEVELS, THE "SHRINKAGE METHOD" WOULD HAVE BEEN PRACTICABLE AND MORE ECONOMICAL AS THE ROCK ON EITHER SIDE OF THE VEIN STANDS SOLIDLY AND WELL. THE "CUT AND FILL" METHOD NECESSITATES THE CRIBBING OF THE ORE PASSAGES OR CHUTES AT FREQUENT INTERVALS THROUGH THE FILLINGS OR WASTE AS THE STOPE IS CARRIED UPWARD. THESE CRIBBINGS ARE USUALLY SPACED 20 TO 25 FEET APART TO PERMIT THE SHOVELLING OF THE ORE AS IT IS MINED AND FALLS UPON THE WASTE (OR FILLING FLOOR) INTO THE CHUTES; THE WASTE ACTS TOWARDS HOLDING THE VEIN WALLS IN PLACE AND TO PREVENT CAVING. THIS METHOD IS AVOIDED WHEN POSSIBLE BECAUSE OF THE COST OF THE TIMBER CONSTRUCTION OF THE CHUTES AND LOSS OF ORE, BUT IN THE HEAVY, SLIPPERY AND DIFFICULT CONDITIONS EXISTING IN THE SHALE WALLS OF THIS VEIN, PARTICULARLY WHERE IT IS IN CLOSE PROXIMITY TO FAULTS, IT PROBABLY IS THE BEST METHOD THAT CAN BE CARRIED OUT.

THIS METHOD OF MINING WILL HAVE TO, THEREFORE, BE CONTINUED IN ALL OF THE LOWER EXISTING WORKINGS, AT LEAST UNTIL FIRMER AND MORE SOLID WALL FORMATION IS ENCOUNTERED AS THE FAULT FRACTURES ZONES ARE DEPARTED FROM.

ALL OF THE ORE YET TO BE GAINED FROM STOPES ON NO. 5 LEVEL, AS WELL AS THE ORE BETWEEN THAT LEVEL AND NO. 3, IS EFFECTED BY THE TWO FAULTS BEFORE MENTIONED.

IN ORDER TO GAIN THE ORE WITH THE MINIMUM COST, ESPECIAL CARE MUST BE TAKEN IN KEEPING THE WIDTHS OF THE STOPES AT AS NEAR THE ACTUAL WIDTHS OF THE QUARTZ VEINS AS POSSIBLE, AND WITH AS LITTLE MIXTURE OF WALL ROCK AS POSSIBLE; THE WIDTHS SHOULD RARELY EXCEED THREE AND A HALF FEET AND USUALLY CAN BE KEPT WELL WITHIN THAT WIDTH. IN MANY PLACED WITHIN THE OLD STOPES THE WIDTHS HAVE EXCEEDED TEN FEET, WHICH WAS UNNECESSARY AND EXPENSIVE. AS THE QUARTZ ORE SEAMS HOLD QUITE FIRMLY TOGETHER, THE FOREMAN CAN INSIST UPON MINERS FIRST SHOOTING THE SHALE BAND TO THE SIDE OF THE QUARTZ AND THEN BAR DOWN THE LATTER, RATHER THAN SHOOT DOWN THE WHOLE MASS AND INCREASE THE MIXTURE OF ORE WITH WASTE. IT IS ONLY BY USING CARE IN DOING THIS THAT THE LOSS OF ORE CAN BE KEPT DOWN TO TWENTY PER CENT IN ACCORDANCE WITH MY ESTIMATES AND THIS RESULT WILL DEPEND GREATLY UPON THE FOREMAN'S ABILITY AND WATCHFULNESS. UNDER ANY CIRCUMSTANCES, SOME LOSS OF ORE UNDERGROUND CANNOT BE AVOIDED BECAUSE OF A CERTAIN PERCENTAGE OF SHATTERED SMALL QUARTZ WHICH FALLS AND BECOMES MIXED WITH THE WASTE IN SUCH A MANNER AS TO BE IMPOSSIBLE TO RECOVER.

DUE TO THE GENERAL NARROW WIDTHS OF THE ORE, THE TONNAGE OF ORE PER FOOT OF DRIFTING AND RAISING (DEVELOPMENT) IS SMALL AND THIS IS, OF COURSE, REFLECTED IN THE COST OF MINING. THESE COSTS NATURALLY ARE ALSO EFFECTED BY THE AVERAGE DAILY ORE TONNAGE PRODUCTION OF WHICH THE MINE IS CAPABLE.

THE PROPERTY HAS NOW A TONNAGE OF ORE DEVELOPED BEYOND ANY QUESTION OF DOUBT TO WARRANT AN EXPLOITATION AT THE RATE OF 50 TONS PER DAY

WITHOUT INTERRUPTION FOR MORE THAN A YEAR ANY TIME IT MAY BE DECIDED UPON TO MARKET TUNGSTEN CONCENTRATES. IN SO DOING, ORE EXTRACTION MAY BE OBTAINED FROM SIX OR MORE STOPES OR POINTS OF ATTACK. THE LATTER IS MENTIONED MERELY TO EMPHASIZE THE RESTRICTED LIMITATIONS WHICH CONFRONTED YOUR PREDECESSORS, WHO AT NO TIME HAD MORE THAN TWO STOPES AVAILABLE.

IT IS OF IMPORTANCE, OF COURSE, TO KEEP THE DEVELOPMENT OF AN ADDITIONAL ORE RESERVE WELL AHEAD OF TONNAGE CURRENTLY EXTRACTED AND IN THIS RESPECT, CONSIDERING THE FAVORABLE CONDITIONS AND POSITIONS OF DEVELOPED AND PROVED ORE BODIES ON THE VARIOUS LEVELS, THERE IS EVERY REASON TO BELIEVE THAT THIS CAN BE ECONOMICALLY ATTAINED IN REGIONS ABOVE THE No. 5 LEVEL FOR AN INDEFINITE FUTURE, NOT TO MENTION THE POSITIVE ORES KNOWN TO EXIST BENEATH THE ORE SHOOTS EXISTING UPON No. 5 LEVEL.

IN ORDER TO INCREASE AND DEFINE THE ORE SHOOTS BEYOND THE LIMITATIONS NOW PLACED BY ACTUAL MINE OPENINGS, ADDITIONAL DEVELOPMENT WORK MAY BE DIRECTED WITH CONFIDENCE, FROM ANY OF THE FIVE LEVELS, NORTHERLY AS THE SURFACE ORE CROPPINGS OF THE VEIN ARE INDICATIVE OF CONTINUED ORE EXPECTANCIES IN THAT DIRECTION. THIS HAS ALREADY PARTIALLY BEEN ESTABLISHED AS A FACT AS FAR AS THE WORK HAS GONE IN THE No. 5 LEVEL.

PROBABLY THE QUICKEST EXPLORATION RESULTS MAY BE ACHIEVED BY CONTINUING THE No. 5 LEVEL NORTH DRIFT. THIS ALREADY HAS PROVED A VERY LONG CONSISTENT ORE SHOOT WITH IMPORTANT VALUES STILL CONTINUING IN THE FACE. IF THIS WORK IS UNDERTAKEN, THE No. 4 LEVEL SHOULD BE EXTENDED NORTHERLY MORE OR LESS IN UNISON WITH THAT OF No. 5 SO THAT WHEN THE TWO LEVELS ARE CONNECTED BY ADDITIONAL RAISES, THE ORE WILL BE BLOCKED OUT ON FOUR SIDES AND, OF COURSE, THIS WILL BE IMPORTANT FOR THE PURPOSE OF AIR CIRCULATION.

UPPER LEVELS EXTENSION CAN BE EXTENDED NORTHWARD AT ANY FUTURE TIME WHEN THE NECESSITY DEMANDS.

WITH THE MINE PREPARED FOR STOPING AS IT IS AT PRESENT, I HAVE FIGURED MINING AND TRAMMING COSTS, INCLUDING FOREMAN, ENGINEER, BLACKSMITH, TIMBER FRAMER, FOURTEEN MINERS, MUCKERS, TRAMMERS AND JIGGERS, TOGETHER WITH THEIR INSURANCE AND ALSO STEEL, TOOLS AND EXPLOSIVES AND TIMBER, BUT NOT INCLUDING CITY OFFICE OVERHEAD EXPENSES, AT $4.55 PER TON OF ORE BASED UPON A PRODUCTION OF 50 TONS OF ORE PER DAY, WAGES AT TODAY'S PREVAILING SCALE. THIS COST CANNOT BE IMPROVED UPON TO ANY EFFECTIVE EXTENT UPON THE MENTIONED DAILY TONNAGE AND EVENTUALLY IT WILL BE INCREASED WHEN ORE MUST BE WON FROM LEVELS WHICH, IN THE FUTURE, WILL BE DRIVEN FROM WINZES SUNK BELOW THE MAIN WORKING LEVEL NO. 5 AS THAT ORE WILL HAVE TO BE HOISTED BY POWER AND THE PUMPING OF WATER MAY BECOME A FACTOR.

MILLING

THE MILLING PLANT UPON THE PROPERTY WAS CONSTRUCTED AND EQUIPPED TO TREAT 150 TONS OF ORE PER 24 HOUR DAY, BUT DURING ITS OPERATION WAS NOT CALLED UPON TO TREAT ONE HALF OF THAT TONNAGE. IT WAS PLANNED FOR TABLE CONCENTRATION AND FLOTATION SEPARATION, AND IS COMPLETELY AND MODERNLY EQUIPPED WITH THE EXCEPTION OF AN EFFICIENT DRIER FOR THE CONCENTRATES.

THE FOLLOWING IS THE MILL FLOW SHEET: AFTER REDUCTION IN A ROLL CRUSHER, THE ORE IS SCREENED AND OVERSIZE IS RETURNED TO FINISHING ROLLS. THE UNDERSIZE GOES TO TWO OTHER SCREENS, FROM WHICH THE OVERSIZE IS SENT TO THE DEISTER TABLES. UNDERSIZE, WHICH IS MINUS 40 MESH, FROM THE LAST SCREEN, GOES THROUGH A SERIES OF ALLEN CONES. UNDERFLOW FROM THE CONES IS PUT OVER DEISTER-

OVERSTROM DIAGONAL DECK SLIME TABLES. OVERFLOW FROM THE CONES GOES TO A GROCH COPPER-FLOTATION MACHINE. THE TAILINGS FROM THIS MACHINE GO TO THE WASTE DUMP.

THE TABLE CONCENTRATE CONTAINS ABOUT ONE-THIRD CHALCOPYRITE, ONE-THIRD PYRITE AND THE REMAINDER TUNGSTEN MINERALS. IT IS DE-WATERED IN AN ALLEN CONE AND REGROUND TO A 200 MESH IN A BALL MILL, OPERATING IN CLOSE CIRCUIT WITH A DORR CLASSIFIER. OVERFLOW FROM THIS CLASSIFIER IS CONDITIONED WITH FLOTATION REAGENTS IN A GROCH CONDITIONER, BEFORE FLOWING TO THE FLOTATION MACHINES. CONCENTRATES ARE FILTERED IN AN AMERICAN FILTER AND THEN THROUGH A DRIER TO THE FINISHED MATERIAL BIN.

THE MINIMUM LABOR FOR OPERATING THIS MILL PER SHIFT LIMITS THE MINIMUM COSTS IRRESPECTIVE OF THE TONNAGE VARIATIONS FROM THE LOW TO THE MAXIMUM CAPACITY OF THE MILL, AND IT WILL COST LITTLE MORE TO TREAT 50 TONS PER SHIFT (THE RATED CAPACITY OF THE MILL) THAN ANY LOWER QUANTITY; THE ONLY DIFFERENCE WOULD BE THAT OF POWER CONSUMPTION AND CHEMICALS; THE COST OF WATER PUMPING AND DELIVERY TO THE MINE IS, OF COURSE, ALMOST ENTIRELY CHARGEABLE TO MILLING ACCOUNT.

THE MILL CANNOT BE OPERATED SUCCESSFULLY UPON AN EIGHT HOUR BASIS WITHOUT A FOREMAN, TABLE OPERATOR, FLOTATION MAN, MECHANIC, AND ONE CRUSHER AND ORE SORTER, TOTAL OF FIVE MEN. THE LABOR COST TOGETHER WITH POWER, SUPPLIES, INSURANCE, CHEMICALS, WATER COSTS, REPAIRS, LABORATORY EXPENSES AND A PROPER PRORATION OF THE SURFACE OPERATION EXPENSES, WILL AMOUNT TO $3,000 A MONTH.

UPON A BASIS OF TREATING 50 TONS ON A ONE SHIFT DAY, THE MILLING COSTS WILL AMOUNT TO $2.00 PER TON AND ANY REDUCTION IN TONNAGE WILL, OF COURSE,

INCREASE THE COST PER TON.

WE HAVE, THEN FROM THE PRECEDING, UPON A 50 TON PER DAY OUTPUT FROM THE MINE TO THE MILL, A MINING COST OF $4.55 PER TON, A MILLING COST OF $2.00 A TON, TO WHICH MUST BE ADDED 45¢ A TON FOR MANAGEMENT AND OFFICE EXPENSES, MAKING A TOTAL OF $7.00.

POSITIVE ORE	15,549 TONS	VALUE	370,526.70	370,526.70
PROBABLE ORE	16,146 "	"	334,199.40	334,199.40
POSSIBLE ORE	31,695 "	"		633,900.00
			704,726.10	1,338,626.10
MINE & MILL COSTS AT $7.00 x 31,695 TONS SHOWS ------			221,865.00	
			482,861.10	

FUTURE MINE DEVELOPMENTS

COMMENT HAS BEEN MADE IN THE ABOVE AS TO THE PLAN OF ADVANCING THE DRIFT NORTHERLY UPON THE 5TH LEVEL, FIRST CONTINUING THE WORK NOW UNDER WAY ON THE NORTH FACE OF LEVEL NO. 5, AND TAKING UP CONCURRENTLY THE DRIFTING OF THE NO. 4 LEVEL TOGETHER WITH DOUBLE COMPARTMENT (LADDER WAY AND ORE CHUTE) UPRAISES SPACED 220 TO 240 FEET APART FOR SAFETY OF MEN AND AIR CIRCULATION.

AS THE POLICY YOU HAVE ADOPTED SIMPLY PLANS THE MILL TREATMENT OF 50 TONS OF ORE PER DAY, OPERATING ONE SHIFT, AND TAKING INTO CONSIDERATION THAT THE TONNAGE OF "POSITIVE ORE" ONLY IS SUFFICIENT TO SUPPLY THE MILL WITH ORE FOR ONE YEAR, THE DEVELOPMENT OF FUTURE TONNAGE OF "POSITIVE ORE", CAN PROCEED SYSTEMATICALLY, ECONOMICALLY AND WITH NO UNDUE HASTE.

WHEN CONVENIENT, ATTENTION SHOULD BE DIRECTED TO EXPLORING THE VEIN ON THE 4TH LEVEL JUST SOUTH OF THE 3 COMPARTMENT RAISE. THERE IS A HIGH GRADE 6" SEAM OF 7% WO_3 ORE IN THE FACE WHICH JUSTIFIES FURTHER EXPLORATION.

DEPENDENT UPON RESULTS OF THE DEVELOPMENT AND EXPLORATION ABOVE OUTLINED, WILL BE THE NECESSITY, AT SOME FUTURE TIME, OF OBTAINING ORE FROM DEPTHS BELOW THE NO. 5 LEVEL. EXTRACTION OF ORE BELOW THIS LEVEL WILL HAVE TO BE HOISTED AND, OF COURSE, THERE IS THE POSIBILITY THAT WATER MAY BE ENCOUNTERED, WHICH WOULD HAVE TO BE RAISED BY PUMPING, BUT THIS LATTER CONTINGENCY MAY BE CONSIDERED WHEN AND IF ENCOUNTERED. DOUBLE COMPARTMENT WINZES, CAPABLE OF HANDLING THE ORE AS ESTIMATED IN BLOCKS K, P, O, X, T, Z AND Z2, LARGE ENOUGH IN SIZE TO GO TO CONSIDERABLE DEPTH IF NECESSARY, WINZES NOT LESS THAN 4 FEET BY 7 FEET IN THE CLEAR, SHOULD BE SUNK FROM POINTS YET TO BE DETERMINED, UPON THE NO. 5 LEVEL. THESE WINZES SHOULD BE SUNK TO DEPTHS OF 120 FEET AND A DRIFT RUN FROM 100 FEET IN DEPTH IN BOTH DIRECTIONS TO THE LIMITS OF THE ORE. AS ORE EXTRACTING PROGRESSES, THE WINZES CAN BE DEEPENED AND NEW DRIFTS DRIVEN AT EACH 100 FEET OF DEPTH.

CONSIDERATION MUST, OF COURSE, BE GIVEN TO THE ORE IN AND BENEATH BLOCK "J", WHICH IS IMMEDIATELY BELOW STOPE "L". WHILE THE VALUES IN THE ROOF OF THE "L" STOPE ARE OF NEGLIGIBLE IMPORTANCE, AND NO CREDIT HAS BEEN GIVEN FOR THE POSSIBILITY OF FINDING MORE ORE ABOVE, THE VALUES FOUND ON THE NO. 5 LEVEL JUSTIFY THE CONTINUANCE OF THE ORE CHUTE, WHICH IS 150 FEET LONG, TO GREAT DEPTH. BECAUSE OF THE RESULTS IN THE STOPE ABOVE, I HAVE ONLY ALLOWED, IN MY CALCULATIONS, 50 FEET OF DEPTH FOR POSITIVE ORE AND 50 FEET FOR PROBABLE ORE IN BLOCKS J AND Q. EVENTUALLY, THE ORE WITHIN THESE BLOCKS WILL HAVE TO BE WON THROUGH WINZES SUNK FROM THE 5TH LEVEL.

FOR THE DEVELOPMENT WORK PROPOSED IN DRIVING THE TWO INTERMEDIARY LEVELS BETWEEN NOS. 3 AND 4 LEVELS AND UPRAISE NO. 31, TO CONNECT THESE LEVELS AND TO CONTINUE THE NO. 5 DRIFT TO THE NORTH, THERE IS SUFFICIENT COM-

JE-81-J
3-8

PRESSED AIR AVAILABLE FROM THE PRESENT INSTALLATION AND ADDITIONAL DEISEL ENGINE AND COMPRESSOR NEED NOT BE CONSIDERED, BUT FOR VENTILATION PURPOSES, ELECTRIC FANS SHOULD BE INSTALLED TO REDUCE THE DEMANDS FOR COMPRESSED AIR FOR THAT PURPOSE.

FIVE DRILLS WILL HANDLE THE WORK OUTLINED. THE DRILLS NOW IN USE AT THE MINE REQUIRE FROM 55 CU. FT. FOR THE SMALLEST JACK HAMMER TO 100 CU. FT. FOR THE LARGER SIZE STOPING HAMMER, AND IN ADDITION THE DRILL SHARPENER REQUIRES 80 CU. FT. WHEN IN USE. WHEN STOPING IS RESUMED, SEVERAL NEW DRILLS MUST BE PROVIDED.

I HAVE PURPOSELY OMITTED CREDITING THE COPPER CONTENTS OF THE ORE WHICH AVERAGE 1%. I HAVE PREVIOUSLY ESTIMATED THE COST OF RECOVERING THE ORE IN BLOCKS ABOVE NO. 3 LEVEL IN THE SAME MANNER AS THE ORE BLOCKS BELOW THAT LEVEL, ALTHOUGH THE TONNAGE IN THE UPPER BLOCKS IS SMALL, AND THE ADDED EXPENSE OF PLACING IT IN THE MILL WILL JUST ABOUT OFFSET THE NET RECEIPT FROM THE RECOVERED COPPER CONCENTRATES, AT PRESENT PRICES OF REFINED COPPER, WHEN THE COST OF THE NECESSARY PREPARATION OF THE ORE PASSAGE IS CONSIDERED AS WELL AS THE REHANDLING OR TRAMMING OF THE ORE AT THE 3 COMPARTMENT UPRAISE.

NO REFERENCE HEREIN HAS BEEN MADE TO CAPITAL INVESTMENT OR INTEREST THEREON, BUT THIS WILL BE TAKEN UP IN A SEPARATE LETTER. IN CONCLUSION, I BELIEVE ALL MATERIAL PARTS HAVE BEEN COVERED IN THE FOREGOING REPORT, WHICH IS RESPECTFULLY SUBMITTED.

YOURS VERY TRULY,

GRANVILLE MOORE

PHONE WHITTIER 420-04

MINE AND MILL
YUCCA, ARIZONA

BORIANA MINING COMPANY

TUNGSTEN

108 WEST WHITTIER BOULEVARD
WHITTIER, CALIFORNIA

JULY
3
1936

7/6/36

MR. G. M. COLVOCORESSES
1108 LUHRS TOWER BUILDING
PHOENIX, ARIZONA

DEAR MR. COLVOCORESSES:

I WISH TO THANK YOU FOR YOUR LETTER IN REGARDS THE BORIANA AND YOUR COMMENT CONTAINED THEREIN.

THE NEXT DAY AFTER SEEING YOU IN LOS ANGELES, I WROTE THE MINE TO FURNISH THIS OFFICE WITH ADDITIONAL MAPS SIMILAR TO THE ONE I HAD WITH ME AND ONE OF THESE MAPS IS BEING MAILED TO YOU TODAY UNDER SEPARATE COVER.

SINCE THIS MAP WAS PRINTED, WE HAVE DONE ADDITIONAL WORK NOT SHOWN THEREON AS FOLLOWS: 54I SECTION STOPE WAS EXTENDED TO ACCOMMODATE TWO MORE RAISES TO THE NORTH AND STOPING WAS CARRIED ON THEREIN TO A FAULT, WHICH EXISTS ABOUT 50 FT. ABOVE THE 5TH LEVEL DRIFT. AT THIS POINT WE TURNED OVER THE STOPE SLIGHTLY TO THE EAST WHERE WE ENCOUNTERED A NEW EAST VEIN AND ARE NOW STOPING ON THIS NEW TERRITORY, ACQUIRING SOME VERY NICE ORE FROM GOOD WIDTHS IN THIS GROUND. THEN ON THE 6TH LEVEL, WE HAVE PUT IN WHAT IS KNOWN AS STOPE 65K BEING 100 FT. IN LENGTH AND ADJACENT OR CONTIGUOUS WITH 65J. IN THIS AREA WE HAVE ACTUALLY ENCOUNTERED TWO DISTINCT VEIN SYSTEMS ABOUT 10 FT. APART AND ARE OPERATING TWO STOPES IN THIS 65K LOCATION. THIS 65K AREA HAS JUST COME ON TO PRODUCTION THE LAST FEW DAYS AND WE ARE GETTING SOME OF THE NICEST ORE FROM THIS WORKING THAT WE HAVE HAD NORMALLY FROM ANY OTHER STOPES IN SOME TIME; FOR EXAMPLE THE MILL HEAD CONTROL ASSAYS FROM THIS STOPE FOR THREE DAYS UP TO JULY 1ST INCLUSIVE WERE WO3 2.43%; 2.76%: AND 3.16%. ALSO, WE HAVE EXTENDED THE 5TH LEVEL DRIFT APPROXIMATELY 50 FT. BEYOND THE POINT SHOWN ON THE MAP, THE FACE OF THIS DRIFT SHOWING GOOD ORE VALUES WITH EACH ROUND. WE ARE PRESSING FORWARD THIS DRIFT WITH ALL POSSIBLE SPEED. FURTHERMORE, WE HAVE RAISED 100 FT. FROM THE CROSS-CUT EAST FROM THE 5TH LEVEL, AND ARE NOW IN THE PROCESS OF RUNNING A LEVEL FROM THE TOP OF THIS RAISE PREPARATORY TO TAKING OUT TWO BLOCKS OF ORE KNOWN TO EXIST AT THAT POINT, ONE IN THE NEWLY DISCOVERED EAST VEIN AND THE OTHER IN THE WEST VEIN, FROM WHICH WEST VEIN THE BORIANA HAS HAD SOME HEAVY PRODUCTION.

I TRUST THAT THE MINE MAP REACHES YOU WITHOUT DELAY, AND THAT IT, TOGETHER WITH THE FEW COMMENTS IN MY LETTER, PROVE INTERESTING TO YOU.

BORIANA MINING COMPANY

HISTORY & REPORTS

BORIANA MINING COMPANY

HISTORY

JUNE 1933 TO MAY 1936

During the year 1933, from January 1st to September 1st, the Boriana property was not operated except for a small maintenance crew, who did a small amount of development work as their time permitted. During this period, the Tungsten market was not active enough to warrant commencement of operations.

In September, 1933, a portion of the underground was prepared for stoping operations and work was commenced on mill rehabilitation and general preparation for production. Additional sources of water were developed assuring the operation of an ample water supply and, during the balance of the year, a small amount of ore was taken out and milled as an incidental operation to rehabilitation and preparation. One car of concentrates was produced during this period and shipped to the consumer on December 18, 1933.

In 1934 the Company operated on production basis during the entire year and produced about 18,000 units of Tungsten concentrates.

During 1935 the Company also operated on a production basis and produced about 20,000 units, and in 1936, to date, has produced over 12,000 units, making a total produced since operations commenced in 1934, of 50,000 units of Tungsten concentrates, which moved readily into the market for a total price of approximately $700,000.00.

During 1934 two winzes were sunk below the 5th level to a depth of 150 feet each, and in 1935 and early 1936, one of these was sunk an additional 150 feet to what is known as the 7th level, but this work is so recent that sufficient work has not yet been done to give any definite indication of values to be found there. Values at this point will be in what is known as the "L" zone, which is the shorter of the two major ore shutes that have been partially exploited

to date.

The longer of the two ore shutes, known as the "M" zone on the 5th level, in in excess of 700 feet in length with total average backs of 900'. However, ore above the 5th level in one of the 3 veins has been stoped, At a distance of 700 feet north of the beginning of this zone, there are still good showings on the face with the widths and values apparently increasing. In addition to this, there is vein matter commonly known as the west vein, which has not been exploited above the 5th level, with the exception of a section on the 3rd level, and it promises considerable production. A newly discovered vein, lying east of the main vein, known as 54H ore is now being sub-leveled, and appears to be not only fairly wide but to carry high mineral values. In excess of 100 feet of work has been done on this sub-level, the backs all showing good values.

This newly discovered vein also appears to be coming into the drift 150 feet below on the 6th level.

The 6th level in the "M" zone has been stoped out to within 300 feet of the north face and present indications are that the length of the shute on this level is longer than it was on the 5th level above.

Preparation is being made for the sinking of an additional winze in the "M" zone, which will be known as No. 40 winze, to a point 100 to 150 feet below the 6th level, and the winze is so located that it should be in the ore when the desired point is reached below the 6th level. Indications on the 6th level are extremely favorable for a highly productive zone below and, if the productivity of the 6th level is any indication of the proposed 7th level, it can be expected to produce in excess of $300,000.00 as a minimum.

PRODUCTION COSTS

Production costs are controlled, of course, by a number of factors, including the accessibility, width of the ore, equipment etc.

The Boriana now has sufficient equipment to produce from 3000 to 4000 units per month, together with all of the facilities necessary to accommodate sufficient men for this amount of production. It has only been within the last two months that the last of the equipment facilities have been installed. From experience in the past, an average mining cost per ton of ore will not exceed $5.00 per ton and average milling costs will not exceed $1.00 per ton. Mill heads can be controlled within a close range because of the extreme uniformity of the mineralization in the ore. Experience has also indicated that an average mill head of .90% WO3 can be maintained. The cost figure would then be as follows:

Mill Heads----------.90%
Recovery in Mill----------90%
Recovery of net units per ton--------.81 units
Cost of Mining $5.00 per ton---------$6.17 per unit
Cost of Milling $1.00 per ton--------$1.25 per unit
Total cost $6.00 per ton----------$7.42 per unit

In addition to the above expenses, administration and overhead charges such as taxes, insurance, accounting expense etc. amount to an average of about $1.00 per unit on the basis of 3000 units per month. Therefore, total cost should show a figure of $8.50 or $9.00 as a very maximum--all figures on the basis of normal ore widths. Anything running in greater widths would materially reduce this cost.

The average price received for the 50,000 units so far produced has been $14.00 per unit. Indications are that the price will tend to rise and so far has risen to about $14.50. This rise is in face of contracts made several months ago. All new contracts are being made at a higher figure.

On the basis of 3000 units per month a net may be expected at $14.00 a unit of $15,000 per month.

The market will easily absorb 4000 units for an indefinite period and, should Boriana production be increased to this figure and the average price over that period be $15.00, which we have every

reason to expect, then the net should be from $24,000.00 to $25,000.00 per month, or a total of $300,000.00 per year.

REMARKS

The interesting thing about the Boriana operation is the fact that at the present time underground conditions look better than they have at any time during the history of the Company. Indications are very strong and indisputable that the workings progress northward and downward and we might expect further enlargement and increased enrichment and, not only this, but a series of parallel veins, which materially reduce the cost especially of the development work, which, in the above figure, is computed on the basis of $1.25 per ton. This can materially reduce the cost per ton of mining and, together with other improvements and efficiency, can readily tend to increase the margin of profit to a very lucrative figure.

Attention is called to the fact that the camp with all of its equipment is extremely well constructed and ample, that the biggest part of the development and exploration has been done and that by following the known and proven ore zones development of material ahead of production should be done at a minimum cost. The underground indications are that the mine has a possibility of an extremely long, productive life.

Attention is called to the fact that the above figures are estimates and as such cannot be guaranteed, but they are based on record of experience over a sufficient period of time to be indicative and all such records can be substantiated by the books of the Company. In view of this fact, it is believed that such estimates are in all respects conservative.

Boriana Mining Company

by_____
J. P. Sievers, Vice Pres.

BORIANA MINING COMPANY

SCHEDULE

MINE PLANT & EQUIPMENT

Power House Building	3,616.38
Diesel Electric Plant	39,668.86
Air Compressor Plant	16,655.26
Mill Building	35,053.19
Mill Machinery & Equipment	54,671.37
Water Works & Well	31,850.73
Dwellings & Bunkhouses & Camp improvements	23,919.50
Warhouses	439.54
Mine Trackage & Pipe Lines	11,810.37
Winze Hoist in Mine	700.38
Mine Equipment	19,395.58
Shops & Shop Equipment	7,428.49
Oil Storage at Railhead	364.80
Power Lines	1,730.93
Roads & Trails	6,726.07
Camp Furniture & Fixtures	6,618.67
Office Furniture & Fixtures	584.92
Laboratory Equipment	278.31
Automotive Equipment	7,648.88
Mules	1,475.37
	270,637.60

SUPPLEMENTAL COMMENT

In January, 1932, Mr. Granville Moore submitted his first report on the Boriana property after an intensive survey lasting several weeks. During the time of his survey, several hundred samples were taken and assayed by an independent assayer and, from such samples, the figures shown in Mr. Moore's report were derived.

Mr. Moore's original report formed the basis upon which the present management purchased the controlling interest in the property and was made as a "Buyer's Report".

In his original report, Mr. Moore made several recommendations on development and his recommendations were carried out during the year 1932. The latter part of that year, Mr. Moore made another survey of the property and supplemental report.

The report following dated June 27, 1933, is a consolidation of the two previous reports made after a third trip by Mr. Moore to the property.

J. P. Sievers

REPORT OF

GRANVILLE MOORE

JUNE 27, 1933

Boriana Mining Company
Whittier
California

Gentlemen:

SUMMARY BORIANA MINE, June 27, 1933

Property consists of 16 Lode Mining Claims, water rights and improvements.

Elevation 5000 feet above sea-level---climate excellent.

Titles are perfect.

Cheap power--Deisel Engines.

A modern, completely equipped 150 ton mill, steel structure.

Machine, Shops, Blacksmith Shop, Storehouse, Assay Shop, all necessary buildings (exceptionally complete in all details) including Superintendent's Residence, Boarding House, Bunk Houses, etc., all equipped with running water and electric light.

Mine in best of condition for exploitation, with great promise for additional ore tonnage with development now under way.

Fifteen thousand five hundred forty-nine (15,549) tons of positive ore having a value after mining and milling losses of $237,137.09, and sixteen thousand one hundred forty-six tons (16,146) probable or reasonably assured ore having a value after mining and milling losses of $215,887.62. Possible ore solely above the lowest level could be estimated at several times the positive and probable ore tonnage quoted and this can rapidly and relatively inexpensively be proved or disproved.

Mine development--Tunnel workings, five levels connected by raises and winzes, over 8000 feet of drifts, over 1500 feet of ladder raises as well as numerous ore raises and cross-cuts. In excess of 8000 feet average height of backs above the lowest level, or travels by gravity to lowest level No. 5.

Operations cost, including mining, development, milling and city office expense, seven (7) dollars per ton.

Ample water for mill operations and camp.

Yours very truly,

GRANVILLE MOORE

Boriana Mining Company
Whittier
California

Gentlemen:

Acting upon your request, I am now submitting the following report, which condenses the information and data resulting from my separate examinations made in January, 1932, and November, 1932, In both instances, I spent several weeks, with my assistants, in studying, surveying and sampling the Boriana deposits.

PROPERTIES

The Boriana Mining Company's properties are situated 18 miles in a northeasterly direction from the town of Yucca, in the Walapai Mining District, Mojave County, Arizona.

The properties consist of fifteen (15) continguous lode mining claims, and one separated lode mining claim, not patented, but title held under the laws of the United States Government by virtue of discovery and location, together with annual assessment work, which has been performed and recorded for the year ending July 1, 1933. The names of the recorded lode mining claims are Francis, Francis No. 1, Francis No. 2, Francis No. 6, Francis No. 3, Francis No. 5, Sadie No. 1, Sadie No. 2, Sadie No. 3, Sadie, Sadie No. 5, Sadie No. 6, March Wind, March Wind No. 5, March Wind No. 1 and Helen Ruth. The water supply is obtained from a well sunk upon the Helen Ruth, which claim was taken up for the water rights.

All the improvements, consisting of mill, power hoist, blacksmith shop, boarding house, assay shop, bunk houses and Manager's home are, together with the equipment, located upon the Francis and Francis No. 1 claims, with the exception of the pumping plant which is upon the Helen Ruth.

ACCESSIBILITY

Yucca, a town in Mojave County, Arizona, at an elevation of 1,805 feet above the sea-level, is situated upon the main line of the A.T. & S.F. RR., 350 miles easterly of Los Angeles and 25 miles south of Kingman, (the County seat of Mojave County) Arizona. There is a good mountain automobile road from Yucca to the mine where the elevation, at the No. 5 or main working tunnel, is 5000 feet. The difference in elevation between the railroad station and the mine workings is 3,200 feet.

GEOLOGY

The country rock, of hills surrounding the Company's lode mining claims, which cover a narrow area of shale, is granite. The metamorphic rock in immediate contact with the shale is gneiss. Eighty per cent of this coarse grained gneiss, approximately, is composed of new metamorphic minerals, the remaining twenty per cent representing relic minerals antedating the metamorphism. The rock is moderately coarse grained and possesses a pronounced gneissic texture due chiefly to the parallel orientations of the mica flakes, but part at least to a tabular habit of the felspare parallel to the banding and to a stringing out of the quartz grains in the same plane. The quartz and albite tend to form an interlocking granular mosaic. Both minerals are quite clear, show no crystalline outlines and quite certainly represent products of recrystallization. The micas, biotite and muscovite, are conspicuous and occur as well orientated plates lying in plane of gneissic banding.

The encasing rock, within which exists the deposits of quartz, Tungsten and Copper occur in leticular veinlets, is without question a clay shale recrystallized under influence of dynamic metamorphism, heat and pressure resulting in a recrystallization of the original shale particles. The rock is completely crystalline, being composed of a very fine grained interlocking aggregate of quartz, and cordierite crystals of irregular shape, but sharp in outline. Biotite and muscovite are abundant in small orientated flakes which occur scattered uniformly throughout the rock. The rock is obviously rich in alumina, with moderate silica, magnesia and iron, and low in alkalies.

The shale rock, as covered by the lode mining claims of this company, has a width of approximately a half of a mile, and is the remnant extension of the greater body of shale which is observable for several miles as the mine is approached from the valley at the south.

The shales, sedimentary rocks, were originally laid down horizontally, or nearly so, but within the area covered by the Company's claims due to pressure, heat and torsion from beneath, were raised and arched into nearly a vertical anticlinal fold. Along the strike of this fold, the point of greatest stress, where the shale dips in one direction easterly and in the other in a westerly direction, the structure was weakened, loosened and distinctly stratified when compared with the remaining massive shale. Within this line, or zone of stratification, which has a width varying from forty to sixty feet or more, a strike of north 30° east and a dip averaging 80° easterly, were created openings or crevices suitable for the deposition from the highly mineral solutions emanating from below and within which were deposited, among other metals, wolframite, scheelite, chalcopyrite and minute quantities of the precious metals gold and silver.

While this stratified zone, within which the deposits occur, has a general dip to the east, this dip is not constant and regular but, upon the contrary, it is billowy and variable in different parts of the mine openings as illustrated particularly upon the No. 5 level where the dip is westerly.

Two pronounced post mineral faults have cut and thrown the vein at different elevations, but neither of these had any bearing upon the mineralization of the veins, although they will have an economic bearing in the mining operations, at least in the area near them, where they have shattered and crushed the formations thereby making the ground heavy and difficult to hold in place. The faults are shown upon "Exhibit No. 1". The lower fault is shown on the No. 5 level where it has a strike nearly the same as the vein with a pronounced dip to the west and the upper fault is shown at the top of the upraise on the No. 4 level where it also has a pronounced dip, but towards the east.

There are not distinct demarcations separating the stratified rock zone from the massive shale, but rather a gradual fading out of the stratification into the solid mass; therefore, there exists no true walls, either hanging or foot walls which have influenced

mineral deposition although invariably the deposition which has occurred has been close to the western limit of the stratifications.

The ore deposition within the veins occurs as lenticular veinlets of which, in many instances, there are several parallel one to another within a few feet of width and separated by bands of shale. It might have been expected that at some favorable place within the vein system, these small veins would have joined into one and have made an impressive width, but such has not been the case; in instances where they have joined, the width of either has not increased.

WATER

Water is obtained from a well drilled upon the Helen Ruth lode mining claims, which is located about 6,000 feet south of the mine at an elevation of 4,350 feet above sea-level. Pumping tests, during the dryest period of the year, have demonstrated that the capacity of the well can be rated at 25 gallons of water a minute or about 145 tons per 24 hours. This quantity, with the use of Dorr Thickeners, and the conservation of water, is sufficient for mill treatment of one to one hundred twenty-five tons of ore per day of the character produced from this deposit. Sufficient tank storage has been installed to provide for the requirements of the operations. Due to the difference in elevations between the well and the mill, it is necessary to raise, by pumping, the water to the storage tanks against a head of 650 feet.

About one and one half miles north of the mine, there is another source of water supply which is located upon 320 acres of land held under lease by your Company. A group of small springs exist there from which water continually flows, and these springs can probably be developed into an important water supply if it should ever be required. In addition, the mine itself is making a small quantity of water, about 25 gallons per minute, from a fault near the entrance of the main working adit at the 5,000 foot level.

MILL AND MINE EQUIPMENT

The milling plant, having a rated capacity for treating 150 tons of ore in 24 hours, is modern and up to date in every respect and all machinery and equipment is in excellent condition, with the exception of the drier handling the flotation concentrates, which did not give satisfaction. Probably no other imporvements, in the immediate future, will be found necessary.

As your files contain a detailed description of equipment and machinery in the mill, it seems superfluous to include this matter in this report.

The mine is well provided with all necessary equipment, machinery and tools for the magnitude of past operations, but with any marked increase in production, additional compressor capacity will have to be obtained. The Ingersoll-Rand compressor, which is now installed, is giving 268 cu. ft. or air and the Chicago Pneumatic is giving approximately 102 Cu. Ft. The practice in the past has been to use this high pressure air for circulation of air in the stope and drift face, as well as for running the drill. By using electrically driven fans, which are now at the mine, a saving of air for the latter purpose will result.

The property is especially well equipped with all of the necessary facilities which to towards an economical mine operation. The power and compressor house is ample in size and equipment. The blacksmith house has all of the modern and necessary machinery and equipment. These, together with assay shop, boarding house, bunk houses, Superintendent's dwelling, leave little to be desired. Electric lights and running water are funnished to all of the buildings, which are all a good substantial construction.

DEVELOPMENT

I have no reliable information as to the exact time mining work was originally started upon the deposits, but it was sometime during the World War period when tunnel work was first begun, probably at Level No. 1, at an elevation of 5,527 feet above sea-level and near the summit of the mountain where the vein out-crops prominently.

At this place, the vein was split and two adits were driven nearly parallel. A drift 372 feet long was run to the north on the easterly split of the vein where the ore had an average width of 11". The first 150 feet of the vein, from the portal, was stoped to the surface and it is evident that the ore at the face was found of too low grade to be profitable. However, surface out-croppings of the vein north of this face indicate the existence of another ore shoot, which should be investigated by continuing this drift. An adit tunnel was also run on the westerly split of the vein for a distance of 70 feet, but no commercial ore was found. This latter split section of the vein out-crops 10 feet from the main body and joins it in the drift 250 feet from the portal.

At an elevation 5,418 feet above sea-level, the Level No. 2 cross-cut tunnel was driven 40 feet to where it cut the vein, and from which point a drift northerly was driven 543 feet. The cross-cut tunnel was continued beyond the vein, the entire length of the cross-cut being 217 feet. At 193 feet, a drift was run northerly for 132 feet on what is called the Copper vein, but no ore was found and the work was abandoned. Upon the main drift, no commercial ore was found for the first 40 feet, but from here, for 400 feet, all ore between this level and Level No 1 has been stoped. Beyond this point, the quartz seams pinched separate into several veinlets and the face shows no values. At some future time, this drift should be extended northerly with the expectation of finding ore which shows on the surface above. Because of the dangerous condition existing above this level, which is caved in several places, and the fact that timbering prevents any attempt at systematic sampling without going to great cost, no accurate statement can be made of the width of the ore previously mined from this stope but from what can be seen, it is evident that the ore width was not to exceed 15".

At elevation 5312, cross-cut tunnel level No. 3 was run 452 feet; at 425 feet from the portal, it cuts the vein and drifts both north and south were advanced a total distance of 743 feet (566 feet northerly and 177 feet southerly). Beginning at station 303, where

the northerly drift starts from the cross-tunnel, all backs of ore above this level have been stoped for a distance of 190 feet on this level to the No. 2 level above. From this point, 35 feet north of station 309, continuing towards the north, the backs have been stoped for an additional distance of 180 feet to within a few feet of the No. 2 level; the block of ore remaining standing in this stope has an average depth of 25 feet and an average thickness of 14", which would amount to about 600 tons.

Beginning at a point 45 feet south of the winze, the ore is irregular as to both widths and values to the south face. The workings at this point are very close to the surface. The northern-most 120 feet of this drift has been carried through a barren stretch of the vein. There is strong probability that by continuing this north drift, a second ore shoot will be encountered for the same reasons that apply on Levels Nos. 1 and 2; namely, the out-croppings, which showed on the surface to the north of these faces.

A two compartment winze was sunk from No. 3 level at a point 45 feet southerly from the connection of the cross-cut tunnel with the vein. The bottom of this winze has an elevation of 5,200 feet above sea-level, (Level No. 4).

4th LEVEL

At the time of my first examination in January, 1932, the short drift north of survey station 410 was inaccessible because of fallen timbers which closed it, and the study of this level could only be made of the ground between the three compartment raise to the 4th level and the two compartment winze from the 3rd level. This inaccessible ground has since been "caught up" and retimbered, and in November, 1932, the drift had advanced 294 feet to the north. Since my last visit to the mine, the drift has progressed northerly 260 feet and connection was made with raise No. 20 connecting this level with Levels No. 3 and 5. This entire drift, from station No. 406 to station 411 for a distance of 274 feet, was driven at the point of contact and in the throw of an east dipping reverse strike fault where the ore in the foot wall of the fault is to be found on the west side of the

drift. The hanging wall ore, at survey station No. 410 in the raise , is found in place 10 feet above the floor of the level over 14 feet to the west.

It may be mentioned here that faults so far encountered in this property are post mineral and thrust faults and in each instance, where the vein has been displaced, the hanging wall section has, of course, been thrust upward, but in no instance has continuity and value of the ore been effected except, naturally, at the point where the fault cuts through the vein. This fault has also a northern dip as proven by its position at raise No. 20 where it is found 10 feet beneath the floor on Level No. 4. It is apparently fading out and in all events it has no bearing or effect upon the ore except that of Level No. 4, as before mentioned. Due to this Northern Dip of the fault, the drift advancing toward the north from station 411 should, within a few feet, pass above this fault line into the vein, and continue in ore from thereon. The width of the ore on this level No. 4, as shown in raise at station 410 and in the drift at raise No. 20, averages more than 20" with average values of 1.7% WO3.

The workings within the vein on this level, and in upraise No. 20, will naturally effect and improve my previous calculations made in January, 1932, of ore block "F", which calculation must still stand as the sampling since that date is that of your Superintendent and not mine, but nevertheless both the widths of the ore and values, as reported, considerably exceed those I was able to record solely from the top of this ore body on Level No. 3.

At the time of my last examination in November, 1932, the No. 4 Level had progressed to suvery station 415 but connections had not been made with raise No. 20, nor were the raises themselves carried through from Level No. 5 to Level No. 3. I am, however, mentioning this at this time to show that these operations, which previously had been planned, have been completed.

LEVEL NO. 5

Up to May 1st, 1932, the No. 5 Level, which had been started as an adit, had progressed northerly to the face a distance of 2855 feet. The portal of this adit has an elevation of 5000 feet above sea-level and the work started on the vein out-crop. The first 1354 feet of workings were carried through barren ground before indications of ore were encountered. (My sample No. 1 was cut at this point.) Fourteen hundred twenty feet from the portal, the first and shortest ore shoot on this level was encountered and continued for 150 feet where Tungsten values became unimportant. This ore shoot does not appear in the No. 3 Level above and as the ore values, as sampled in the stope 90 feet above, have become irregular and low, it would appear that whatever future importance this ore shoot may have must necessarily be expected from beneath the floor on No. 5 level.

At a point 2145 feet from the portal of survey station 527, a cross-cut having a course north 71°41 minutes east was driven 25 feet, where it encountered a parallel vein which was first exposed in a cross cut at upraise ore chute No. 16. Beginning at survey station 528, a drift was driven north, above which a small tonnage of ore had been stoped by your predecessors. Because of the questionable manner of timbering and holding this stoped area, the ground caved and completely filled the drift so that no examination of it, or the stope above, could be made and, therefore, no positive statement regarding the width and values is possible. Your predecessors' map shows this drift to have been 174 feet long and that the ground above had been stoped to a height of 90 feet above floor level.

A fault dipping 30° to the west with a strike north 30°41 minutes east (vein strike north 30°45 minutes east), is first noticed on this level in the west cross-cut 1170 feet from the portal where the vein is thrown 6 feet to the west. The ground along this strike of faulting has been fractured and weakened making it heavy and difficult to ~~hold~~ in both drifting and stoping. This accounts for the

caving in the drift above mentioned starting at Station No. 528.

As purely an economic matter, it was decided to drive the main working drift from survey station 527 in the hanging wall of the vein rather than to "catch up" and hold the caved ground north of station 528. The drift was carried northerly to station 531 where the vein was again recovered, and it was followed constantly in ore from that point to the face 10 feet north of station 542.

It is not possible as yet to definitely state the entire length of this particular ore shoot, the second so far encountered on this level, as ore is still continuing in the north face, but as of May 1st, 1932, it had a length of 703 feet. This is a remarkably good showing with quartz bearing values confined within a width of 3½ to 4 feet which, in this property, is an ideal mining width. In addition to the drifting performed on this level, a prospecting cross-cut was driven westerly from a point 10 feet south of survey station 527 for a distance of 95 feet to explore for parallel ore bodies in that direction, but none were encountered.

NO. 20 RAISE FROM 5TH LEVEL

This two compartment raise has been carried upward from Level No. 5 a distance of 307 feet, connections having been made with the 4th level at station 419, and with Level No. 3 at a point five feet north at station 312. The raise at the time of my last examination, in November 1932, had not made connections with No. 4 level, and in my calculations dealing with the tonnage and values, I, therefore, have limited my results as of the date of my work. This perpendicular raise does not continually follow the vein because the latter had a variable dip which averaged, however, about 20° to the east, but important ore values were followed upward about 70 feet from level No. 5, where the ore continued to the west of the raise. It was again encountered in the cross-cut 30 feet west of the raise on Level No.4. It was found thrown a little further to the west at this elevation due to an east dipping reverse strike fault, which cut across the vein 10 feet below Level No. 4. Reports have been submitted to me to your mine Superintendent stating that the width of the vein and

the values were economically consistent up to the point of contact with the 3rd level.

NO. 31 RAISE FROM 5TH LEVEL

Two hundred ninety feet north of raise No. 20 is being carried upward raise No. 31 to the elevation of Level No. 4, where drifting to the south will connect it with raise No. 20, thus completely blocking out all four sides of this important body of ore. The advance in this raise, as of November, 1932, was 104 feet above level No. 5, with ore averaging 1½ feet wide of slightly over 3% WO3 values.

NO. 35 RAISE FROM 5TH LEVEL

At a point 222 feet north of raise No. 31, raise No. 35 has been started since my examination, and has advanced upward 55 feet with favorable reports from your superintendent as to values and widths which, however, I have not seen.

NO. 25 RAISE FROM 5TH LEVEL

Thirty feet south of station No. 529, between raises No. 20 and 31, and 130 feet north of raise No. 20, is located raise 25. This raise was started from the northern limit of the abandoned drift before referred to running north from station 528. It was reached by a cross-cut running east from station 528 "A" in the main drift. It has a height of 93 feet above the floor level and has been retimbered and put into good working condition since my last visit. Reports by your Superintendent are also favorable as to widths and values.

SURFACE OUTCROPPINGS--VIRGIN GROUND NORTH

Desiring to get information of the surface outcroppings of the vein north and beyond the faces of the underground workings, I caused several surface tenches, which are shown upon the map, to be dug across the vein exposure within the area under consideration. The positions of these trenches were selected largely because of accessibility and the rapidity with which the work could be accomplished. Because it was clearly determined by the out-croppings above the old developed sections of the mine, it was not anticipated or expected that widths of the vein on the surface, on its northern extension under consideration, would correspond with the vein widths as depth

was obtained, but it was hoped that the values of the ore would be found continuous and this proved to be the fact for the results of the trench samples taken were gratifying for a distance of 590 feet between trenches No. 3 and No. 7, where ore out-croppings carried an average value of 4.9% WO3. Trench No. 3 is almost directly above survey station 528 "A" on the No. 5 level, from which it is separated virtically by over 800 feet. None of the workings has, as yet, extended into the unproven section of ground except for 480 feet on Level No. 5 where the ore showing is important in regard to both width and value and it is reasonable, therefore, to credit ore expectancy, from this source, under the heading of "Possible Ore".

SAMPLING

Although your predecessors had submitted maps, which were thought to be accurate, I caused a thorough independent survey to be made of all of the openings and the new plans, longitudinal and vertical, are used in completing this report.

The ore occurs in a narrow vein, or parallel seams or veinlets, within the shale, and is largely made up of silica, alumina, iron pyrite, arsenical pyrites, iron oxides, manganese oxides, chalcopyrite, bornite and intruded shale.

The veins exposed in the underground workings were sampled systematically at regular intervals of five or ten feet depending upon the conditions governing the work. All necessary precautions to assure accuracy and certainty of freedom from outside interference in the sampling, and in the various checks, give me perfect confidence in the trustworthiness of this work.

Because of the manner of the ore deposition, usually in narrow parallel seams separated by bands of shale and the selective method of ore sorting underground, which will have to be used, channel samples across the width of the drifts or stopes solely included the ore seams and the shale bands were omitted. The metallic values are contained within the quartz and not within the shale. It must distinctly be kept in mind that the ore widths and values attributed to each individual sample are the totals of the several seams of ore

which fell within the scope of the samples as cut, and that in making calculations of the tonnage recoverable from the ore reserves, due allowance will be made for mining to the necessary widths to recover the ore credited to the scope of the sample and also for the inevitable loss of metallic contents, the results of shooting, breaking and handling the ore to the ore chute from where it goes to the mill.

The accurate chemical determination of the tungsten values within the ore is difficult, and only well experienced and capable chemists can be relied upon to do the work. Fortunately, a very capable chemist, who had had extensive experience in tugsten determinations, was available to do the assaying in connection with this work, and his work in turn was frequently checked by Smith Emery Chemical Company, and was found accurate and satisfactory. All samples were also run for copper, and enough were run to determine gold and silver content.

Presented herewith as "Exhibit 1" is a general plan and profile, showing all workings except the first seven hundred and thirty-five feet of the main lower tunnel (No. 5). This is on a scale of 40 feet to the inch, and on this map are shown all samples of the underground workings with the locations and width of each sample and the percentage of WO3 and copper. "Exhibit No. 2" is a reduction of the above map to a scale of 80 feet to the inch for the purpose of binding this report. "Exhibit No. 3" is a general plan of all underground workings, which also shows location of mill and other buildings; this is on a scale of 100 feet to the inch and also shows geology. "Exhibit No. 4" is a longitudinal section showing all mine workings accessible on a scale of 100 feet to the inch. "Exhibit No. 5" is a cross section at "A-A" on a scale of 100 feet to the inch taken at right angles to the veins and across the main workings, and projected across the shale belt to the gneiss on either side.

ORE RESERVE

By referring to "Exhibit No. 1" to the profile sectinn, you will note that the blocks of ore are lettered and set forth in colors. The red colored blocks represent "positive ore" and the green blocks

"probable ore". Because of the heavy specific gravity of this tungsten bearing quartz, 11 cu. ft. were calculated to the ton of ore in place. The value of tungsten concentrates is placed at $10.00 per unit, a unit consisting of 20 pounds. In determining ore value and tungsten concentrate values, an estimated loss of 20% in the mine operations and mill recovery of 80% WO3 values contained in that ore has been estimated and calculated.

POSITIVE ORE

Block	Tons	WO3%	Ore Width	Total Width Lbs. Per Ton	WO3 Val. @ $10 per Unit
A	570	2.53	11 inches	50.6	$25.30 Per Ton
B	265	2.53	11 "	50.60	25.30 " "
C	200				
D	400	2.44	17 "	48.80	24.40 " "
E	170	4.58	8 "	91.60	45.80 " "
F	5500	1.56	16 "	31.20	15.60 " "
G	430	3.32	15 "	66.40	33.20 " "
H	900	2.52	20 "	50.40	25.20 " "
I	410	3.00	17 "	60.00	30.00 " "
J	600	4.20	10 "	84.00	42.00 " "
K	800	2.84	17 "	56.80	28.40 " "
R	500	2.22	16 "	44.40	22.20 " "
X	2194	2.88	16 "	57.60	28.80 " "
Y	1390	2.88	16 "	57.60	28.80 " "
Z	1420	2.40	15 "	48.00	24.00 " "
	15549				

Block	Gross Tons	Net Tons	Gross Val. Per Ton	Gross Value Ore in Place	20% Mining Loss	20% Milling Loss	Net Val. Per Ton	Net Val. Ore
A	570	456	$25.30	$14,421.00	$2,884.20	$2,307.36	$20.24	$ 9,229.44
B	265	212	25.30	6,704.50	1,340.90	1,072.72	20.24	4,290.88
D	400	320	24.40	9,760.00	1,952.00	1,561.60	19.52	6.246.40
E	170	136	45.80	7,786.00	1,557.20	1,245.76	30.64	4,983.04
F	5500	4400	15.60	85,800.00	17,160.00	13,728.00	12.84	54,912.00
G	430	344	36.20	14,276.00	2,855.20	2,284.16	26.56	9,136.64
H	900	720	25.20	22,680.00	4,536.00	3,628.80	20.27	14,515.20
I	410	328	30.00	12,300.00	2,460.00	1,968.00	24.00	7,872.00
J	600	480	42.80	25,680.00	5,136.00	4,108.80	34.20	16,435.20
K	800	640	28.40	22,720.00	4.544.00	3.635.20	22.73	14,540.80
R	500	400	22.20	11,100.00	2,220.00	1,776.00	17.76	7,104.00
X	2194	1755	28.80	63,187.20	12,637.44	10,109.95	23.04	40,439.81
Y	1390	1112	28.80	40,032.00	8,006.40	6,405.12	23.04	25,620.48
Z	1420	1136	24.00	34,080.00	6.816.00	5,452.80	19.20	21,811.20
	15549	12439	23.83	370,526.70	74,105.34	59,284.27	19.07	237,137.09

PROBABLE ORE

Or Reasonably Assured Ore

Block	Tons	WO3	Ore Width	Total WO3 Lbs. Per Ton	WO3 Val. @ $10 Per Ton
L	1300	1.80	1.20 Ft.	36 lbs.	$18.00
M	1000	2.50	1.25	50	25.00
N	2124	1.56	1.50	31.20	15.60
O	1772	2.00	1.25	40	20.00
P	1500	2.00	1.50	40	20.00
Q	750	2.50	1.00	50	25.00
T	2877	2.50	1.33	50	25.00
Z1					
Z2	1420	2.00	1.30	40	20.00
S	2480	2.00	1.30	40	20.00
S1	1423	2.00	1.20	40	20.00
	16646				

Block	Gross Tons	Net Tons	Gross Val. Per Ton	Gross Value Ore in Place	20% Mining Loss	20% Milling Loss	Net Val. Per Ton	Net Val. Ore
L	1300	1040	$20.00	$26,000.00	$5,200.00	$4,160.00	$16.00	$16,640.00
M	1000	800	25.00	25,000.00	5,000.00	4,000.00	20.00	16,000.00
N	2124	1699	15.60	33,134.40	6,626.88	5.301.50	12.48	21,206.02
O	1772	1418	20.00	35,440.00	7,088.00	5,670.40	16.00	22,681.60
P	1500	1200	20.00	30,000.00	6,000.00	4,800.00	16.00	19,200.00
Q	750	600	25.00	18,750.00	3,750.00	3,000.00	20.00	12,000.00
T	2877	1901.6	25.00	59,415.00	11,883.00	9,506.40	20.00	38,025.00
Z1) Z2)	1420	1136	20.00	28,400.00	5,680.00	4,544.00	16.00	18,176.00
S	2480	1984	20.00	49,600.00	9,920.00	7,936.00	16.00	31,744.00
S1	1423	1138	20.00	28,460.00	5,692.00	4,533.60	16.00	18,214.00
	16146	12916.6	20.70	334,199.40	66,839.88	53,471.90	16.56	213,887.62

POSSIBLE ORE

Some exploration work, including shafts and shallow shafts, shows the vein system on the surface is known to continue to the north limit of your property, this for a distance of well over a 1000 feet north of any of the underground openings or faces. As before noted, results of samples taken from these workings in ore across the surface out-croppings, gave high results, viz: tungsten average values 4.9%, and there is a reasonable probability that the ore beneath these croppings will continue from the surface to the No. 5 level over 800 feet below.

There is also every reason to believe that the ore, which shows on the 5th level, the best showing in the mine, will continue downward--but for how far, of course, it is impossible to state, but from all the development showings already proved, I consider there is justification for estimating the tonnage and values of the possible ore as equal to the "Positive" and "Probable" ore, or a Total of 31,695 tons.

MINING COSTS & METHODS

The "Cut and Fill" method of mining has been employed in all of the stoping of ore from the mine although probably, in the stopes above the Nos. 1 and 2 levels, the "Shrinkage Method" would have been practicable and more economical as the rock on either side of the vein stands solidly and well. The "Cut and Fill" method necessitates the cribbing of the ore passages or chutes at frequent intervals through the fillings or waste as the stope is carried upward. These cribbings are usually spaced 20 to 25 feet apart to permit the shovelling of the ore as it is mined and falls upon the waste (or filling floor) into the chutes; the waste acts towards holding the vein walls in place and to prevent caving. This method is avoided when possible because of the cost of the timber construction of the chutes and loss of ore, but in the heavy, slippery and difficult conditions existing in the shale walls of this vein, particularly where it is in close proximity to faults, it probably is the best method that can be carried out.

This method of mining will have to, therefore, be continued in all of the lower existing workings, at least until firmer and more solid wall formation is encountered as the fault fractures zones are departed from. All of the ore yet to be gained from stopes on No. 5 level, as well as the ore between that level and No. 3, is effected by the two faults before mentioned.

In order to gain the ore with the minimum cost, especial care must be taken in keeping the widths of the stopes at as near the actual widths of the quartz veins as possible, and with as little mixture of wall rock as possible; the widths should rarely exceed three and a half feet and usually can be kept well within that width. In many placed within the old stopes the widths have exceeded ten feet, which was unnecessary and expensive. As the quartz ore seams hold quite firm-

ly together, the foreman can insist upon miners first shooting the shale band to the side of the quartz and then bar down the latter, rather than shoot down the whole mass and increase the mixture of ore with waste. It is only by using care in doing this that the loss of ore can be kept down to twenty per cent in accordance with my estimates and this result will depend greatly upon the foreman's ability and watchfulness. Under any circumstances, some loss of ore underground cannot be avoided because of a certain percentage of shattered small quartz which falls and becomes mixed with the waste in such a manner as to be impossible to recover.

Due to the General Narrow widths of the ore, the tonnage of ore per foot of drifting and raising (Development) is small and this is, of course, reflected in the cost of mining. These costs naturally are also effected by the average daily ore tonnage production of which the mine is capable.

The property has now a tonnage of ore developed beyond any question of doubt to warrant an exploitation at the rate of 50 tons per day without interruption for more than a year any time it may be decided upon to market tungsten concentrates. In so doing, ore extraction may be obtained from six or more stopes or points of attack. The latter is mentioned merely to emphasize the restricted limitations which confronted your predecessors, who at no time had more than two stopes available.

It is of importance, of course, to keep the development of an additional ore reserve well ahead of tonnage currently extracted and in this respect, considering the favorable conditions and positions of developed and proved ore bodies on the various levels, there is every reason to believe that this can be economically attained in regions above the No. 5 level for an indefinite future, not to mention the positive ores known to exist beneath the ore shoots existing upon No. 5 level.

In order to increase and define the ore shoots beyond the limitations now placed by actual mine openings, additional development work may be directed with confidence, from any of the five levels, northerly as the surface ore croppings of the vein are indicative of continued ore expectancies in that direction. This has already partially been

established as a fact as far as the work has gone in the No. 5 level.

Probably the quickest exploration results may be achieved by continuing the No. 5 level north drift. This already has proved a very long consistent ore shoot with important values still continuing in the face. If this work is undertaken, the No. 4 level should be extended northerly more or less in unison with that of No. 5 so that when the two levels are connected by additional raises, the ore will be blocked out on four sides and, of course, this will be important for the purpose of air circulation.

Upper levels extension can be extended northward at any future time when the necessity demands.

With the mine prepared for stoping as it is at present, I have figured mining and tramming costs, including foreman, engineer, blacksmith, timber framer, fourteen miners, muckers, trammers and jiggers, together with their insurance and also steel, tools and explosives and timber, but not including city office overhead expenses, at $4.55 per ton of ore based upon a production of 50 tons of ore per day, wages at today's prevailing scale. This cost cannot be improved upon to any effective extent upon the mentioned daily tonnage and eventually it will be increased when ore must be won from levels which, in the future, will be driven from winzes sunk below the main working Level No. 5 as that ore will have to be hoisted by power and the pumping of water may become a factor.

MILLING

The milling plant upon the property was constructed and equipped to treat 150 tons of ore per 24 hour day, but during its operation was not called upon to treat one half of that tonnage. It was planned for table concentration and flotation separation, and is completely and modernly equipped with the exception of an efficient drier for the concentrates.

The following is the mill flow sheet: After reduction in a roll crusher, the ore is screened and oversize is returned to finishing rolls. The undersize goes to two other screens, from which the oversize

is sent to the Deister Tables. Undersize, which is minus 40 mesh, from the last screen, goes through a series of Allen cones. Underflow from the cones is put over Deister-Overstrom diagonal deck slime tables. Overflow from the cones goes to a Groch copper-flotation machine. The tailings from this machine go to the waste dump.

The table concentrate contains about one-third chalcopyrite, one-third pyrite and the remainder tungsten minerals. It is de-watered in an Allen cone and reground to a 200 mesh in a ball mill, operating in close circuit with a Dorr classifier. Overflow from this classifier is conditioned with flotation reagents in a Groch conditioner, before flowing to the flotation machines. Concentrates are filtered in an American filter and then through a drier to the finished material bin.

The minimum labor for operating this mill per shift limits the minimum costs irrespective of the tonnage variations from the low to the maximum capacity of the mill, and it will cost little more to treat 50 tons per shift (the rated capacity of the Mill) than any lower quantity; the only difference would be that of power consumption and chemicals; the cost of water pumping and delivery to the mine is, of course, almost entirely chargeable to milling account.

The mill cannot be operated successfully upon an eight hour basis without a foreman, table operator, flotation man, mechanic, and one crusher and ore sorter, total of five men. The labor cost together with power, supplies, insurance, chemicals, water costs, repairs, laboratory expenses and a proper proration of the surface operation expenses, will amount to $3,000 a month.

Upon a basis of treating 50 tons on a one shift day, the milling costs will amount to $2.00 per ton and any reduction in tonnage will, of course, increase the cost per ton.

We have, then from the preceding, upon a 50 ton per day output from the mine to the mill, a mining cost of $4.55 per ton, a milling cost of $2.00 a ton, to which must be added 45¢ a ton for management and office expenses, making a total of $7.00.

Positive Ore	15,549 Tons	Value	370,526.70	370,526.70
Probably Ore	16,146 "	"	334,199.40	334,199.40
Possible Ore	31,695 "	"		633,900.00
			704,726.10	1,338,626.10
Mine & Mill Costs at $7.00 x 31,695 tons shows		.....	221,865.00	
			482,861.10	

FUTURE MINE DEVELOPMENTS

Comment has been made in the above as to the plan of advancing the drift northerly upon the 5th level, first continuing the work now under way on the north face of Level No. 5, and taking up concurrently the drifting of the No. 4 level together with double compartment (ladder way and ore chute) upraises spaced 220 to 240 feet apart for safety of men and air circulation.

As the policy you have adopted simply plans the mill treatment of 50 tons of ore per day, operating one shift, and taking into consideration that the tonnage of "Positive Ore" only is sufficient to supply the mill with ore for one year, the development of future tonnage of "Positive Ore", can proceed systematically, economically and with no undue haste.

When convenient, attention should be directed to exploring the vein on the 4th level just south of the 3 compartment raise. There is a high grade 6" seam of 7% WO3 ore in the face which justifies further exploration.

Dependent upon results of the development and exploration above outlined, will be the necessity, at some future time, of obtaining ore from depths below the No. 5 level. Extraction of ore below this level will have to be hoisted and, of course, there is the possibility that water may be encounterrd, which would have to be raised by pumping, but this latter contingency may be considered when and if encountered. Double compartment winzes, capable of handling the ore as estimated in blocks K, P. O. X, T, Z and Z2, large enough in size to go to considerable

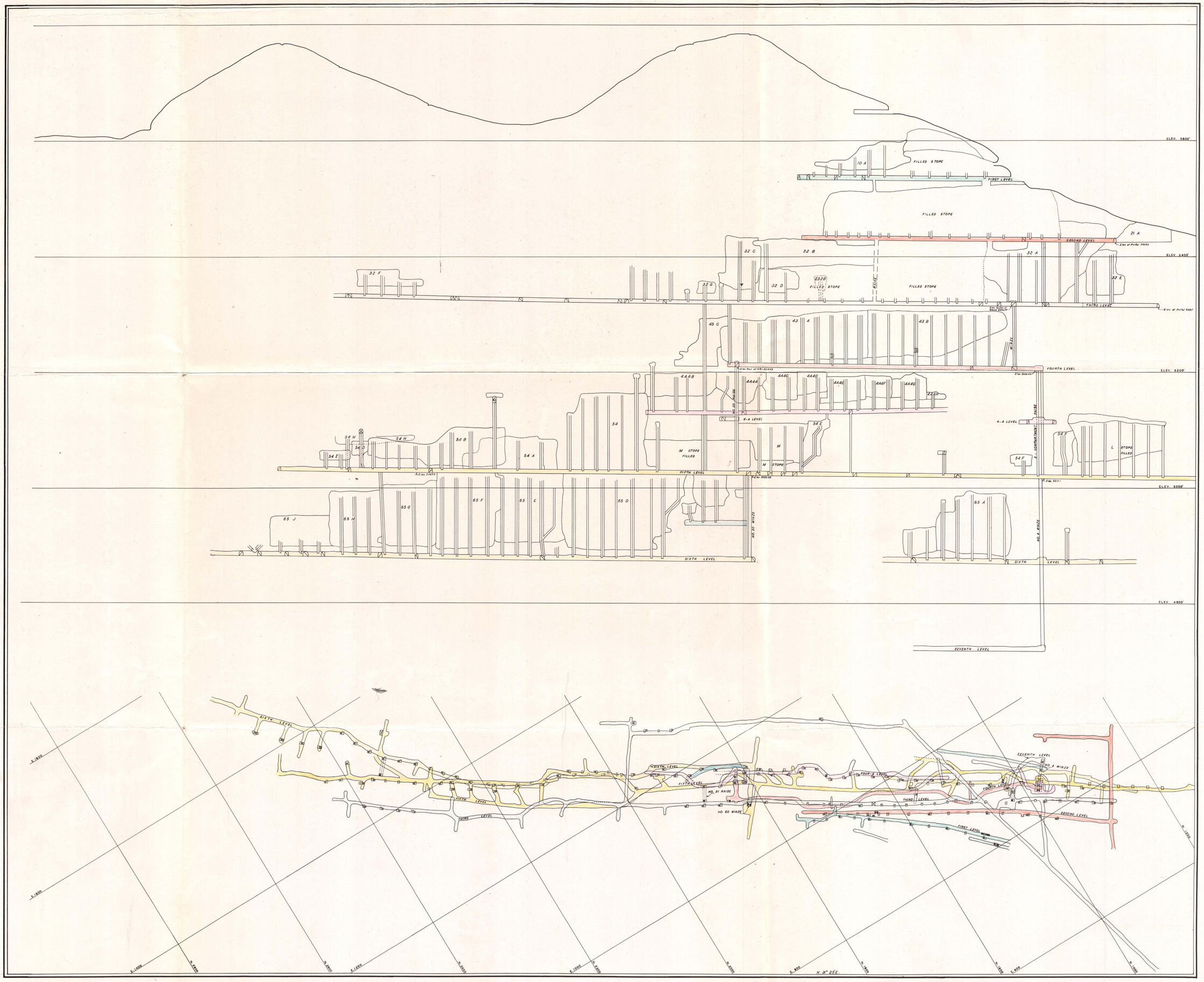
depth if necessary, winzes not less than 4 feet by 7 feet in the clear, should be sunk from points yet to be determined, upon the No. 5 level. These winzes should be sunk to depths of 120 feet and a drift run from 100 feet in depth in both directions to the limits of the ore. As ore extracting progresses, the winzes can be deepened and new drifts driven at each 100 feet of depth.

Consideration must, of course, be given to the ore in and beneath block "J", which is immediately below stope "L". While the values in the roof of the "L" stope are of negligible importance, and no credit has been given for the possibility of finding more ore above, the values found on the No. 5 level justify the continuance of the ore chute, which is 150 feet long, to great depth. Because of the results in the stope above, I have only allowed, in my calculations, 50 feet of depth for positive ore and 50 feet for probable ore in blocks J and Q. Eventually, the ore within these blocks will have to be won through winzes sunk from the 5th level.

For the development work proposed in driving the two intermediary levels between Nos. 3 and 4 levels and upraise No. 31, to connect these levels and to continue the No. 5 drift to the north, there is sufficient compressed air available from the present installation and additional Deisel Engine and compressor need not be considered, but for ventilation purposes, electric fans should be installed to reduce the demands for compressed air for that purpose.

Five drills will handle the work outlined. The drills now in use at the mine require from 55 cu. ft. for the smallest Jack Hammer to 100 cu. ft. for the larger size Stoping Hammer, and in addition the drill sharpener requires 80 cu. ft. when in use. When stoping is resumed, several new drills must be provided.

I have purposely omitted crediting the copper contents of the ore which average 1%. I have previously estimated the cost of recovering the ore in blocks above No. 3 level in the same manner as the ore blocks below that level, although the tonnage in the upper blocks is small, and



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