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COPY

REPORT ON THE MCCLEARY GROUP OF CLAIMS

NOW OWNED BY THE PARBER BROTHERS

I hand you herewith my report upon the property of the Old Hickory Company, situated eight miles east of Morales station of the Southern Pacific of Mexico, in Old Baldy Mining district, Pima County, Arizona. This report is the result of an examination made on April 4th and 5th, 1914. The examination made was brief, as it was only intended to make plans for the proper development, of the property and to state whether or not it was worthy of development.

The formations in which the ore deposits lie are in diorites and rhyolites. The details of geology will shortly be published by Schrader & Hill in the United States Geological Survey publication, making it unnecessary to go into these details in repetition.

ON THE JACKSON CLAIM I WAS AGREEABLY SURPRISED AT THE PROSPECTS. The Jackson vein is a prominent fissure, outcropping on the surface in an immense iron cap for a very considerable distance. The vein filling is similar to that of all the other veins and is a magnetite and quartz. It has a width of 20 feet on the surface and, although no chalcopyrite or pyrite is shown on the outcrop, it comes in at a depth of about 80 feet, and at that depth seems to be considerably scattered throughout the whole of the exposure.

The Iron Mask which was also closely examined, is very similar, although chalcopyrite comes in closer to the surface, and generally persistent, but not as concentrated as in the Jackson. The Grand Central vein was also examined, and while it proved to be quite similar in outcrop to the other veins, it did not promise of such quick returns as the veins lower down on the hill. The Grand Central is a development proposition for the future, for several reasons; first, that the best prospects are lower down on the hill; second, it is the least accessible; and third, that its mineralization seems to evident that, should ore be found it will develop into a proposition that will require immense milling facilities to be profitable.

The whole proposition was viewed with the idea of methods of development and operation, and little examination was made of places where no development had been started. It is certainly a proposition worthy of development, and on which I believe, early results will be obtained. The plan of development which I shall outline will be with the idea of using as little money as possible, of working safe, and of sacrificing time in preference to money.

DEVELOPMENT. I would first recommend the installation of either a Trops or gasoline hoist at the Jackson shaft. Although wood is cheap the original cost of installation of trops will be less, and if any camp is made there, as is expected for the future, There will be only sufficient wood for domestic purposes. The cost of operation of the hoist with gasoline would be very little different than that using wood. I would also suggest the installation of a compressor, and drills to facilitate further development work. Machine drilling does not lower the cost of sinking or drifting, but greatly increases the speed. But there is an increasing difficulty in obtaining good hand drillers, and decreasing difficulty in obtaining satisfactory machine men. The total cost of such installation should not exceed $3500. for a 15 H.P. hoist capable of sinking 600 feet, and a compressor of sufficient size to operate four lightweight drills.

Sinking should then be commenced on the Jackson with drifting at 100 foot intervals, to a depth of at least 600 feet, at which depth a crosscut could be made connecting the Iron Mask and the development of the Iron Mask continued from that point. The cost of the sinking to the 600 foot level should not exceed $7,500. and there should be to prove

the permanency of the deposit on the Jackson, at least 1000 feet of drifts, costing $10,000.

Should the above outlined work on the Jackson prove sufficient, satisfactory and promising the work on the Iron Mask should start. There is sufficient similarity in the entire series of the east-veins in their manner of deposition, method of deposition, and period of deposition, to expect that what is encountered in one may be encountered in the others, and the development completely of one vein, with satisfactory results, would mean that further development could take place with a minimum of risk.

I would therefore suggest that plans be made for the raising and expenditure of $25,000 for the development of the Jackson and the Iron Mask, the first to prove the permanency of the ore bodies, and the second to prove the similarity of the deposits, with this development, the property should be in a condition to maintain its own further development, which further development would be the further work on the Jackson and Iron Mask, some exploitation on the Grand Central, and the other veins in the series.

The advisability of the lower adit at the base of the hill, depends entirely upon the development of the claims above, not so much as to the quantity of the ore, but as to the character of the ore. Should the work above prove the ore bodies to direct shipping or smelting ore, the adit would be of doubtful value, as the saving in the cost of transportation and drainage would not be sufficient to pay the interest on the necessary investment unless the daily capacity were over 500 tons.

However, should the proposition develop into a milling proposition, it would be doubtful it it could be profitably operated without the lower adit. This adit would be an expensive piece of development, and should not be undertaken until a satisfactory exploration of the upper vein has been concluded. Prospecting of the other veins of the series could be satisfactorily accomplished by systematic horizontal diamond drilling from the lower levels of the Jackson after development of the same. Such diamond drilling would be the better way of proving the other veins in case of milling deposits, but should it prove to be a smelting or shipping proposition, the development should be by crosscut tunnels. I do not anticipate any great trouble with water, there being sufficient country to drain to make any large flow. Mr. McCleary seems to have the situation well in hand, and I believe, understands what is needed and is capable of carrying out the work.

In conclusion, I wish to say that I believe the deposits to be very promising prospects, and that the development of the Jackson and Iron Mask will prove the existence of large ore bodies. It would be fallacy to plunge, however, for the vital importance of the deposit and its method of development lies in the distinction between milling and smelting ore, and I would not recommend that any further plans be made at the present time beyond the development of the Jackson and Iron Mask. Concentrated efforts in one place is the only way to satisfactorily develop a large proposition with little capital.

Respectfully submitted,

(SIGNED)

CHAS. P. WILLIS,
Mining Engineer & Geologish Director
Bureau of Mines, University of Arizona.

INTRODUCTION: The following report and maps are the result of observations made during two trips to these claims. The first was a pleasure trip the purpose of which was to make myself acquainted with the geology and ore deposits on the west slope of the Santa Ritas, so that no detailed examinations were made at that time. A second trip was made December 27 - 29, 1906, and unfortunately rain and a snow storm prevented careful examination of the claims high up in the mountains.

These claims are located on the accompanying map from description of Mr. McCleary as we went over the ground. The topograph contours are drawn from an enlargement of the small scale government map of the district, and are only approximately correct.

In the short time and on account of the unfavorable weather accurate geological mapping was out of the question; therefore the accompanying sketch map represents the main features of the geology in an approximate manner. I shall adhere to my custom of only mentioning those facts in regard to the geology that bear directly upon the value of the mineral deposits, referring those who may have a further interest in the subject to the map, which is of course a far more accurate compilation of geological facts than any description can be. The gist of the report is summed up in the following paragraph for the benefit of those who may not be interested in the details which follow.

SUMMARY OF IMPORTANT POINTS AND CONCLUSIONS: The McCleary claims cover a number of fissure veins in an intrusive dioritic rock. The vein filling is magnetite and quartz. Some of these veins have been traced for distances exceeding 3000 feet, the Jackson in particular, approximately 5000 feet, and this latter extent allows the inference of continuity with depth. The extension development of the magnetite not only filling the fissure but extensively impregnating and replacing the country rock of the mineralized area, indicated the intensity of the action of the mineralizing solutions. The fact that in almost every cut this magnetite is more or less disseminated with chalcopyrite shows that the ore solution were copper, as well as iron bearing. The fact that the deepest working develops a high grade ore shoot gives a perspective value to all the similar magnetite veins. These facts then suggest a mine of the first order of magnitude below the great deposit of magnetite on the Great Central and Western claims. A thorough development opment of the Jackson claim is advised before attempting the upper group of veins or the more formidable task at the Great Central.

GENERAL INFORMATION

SITUATION: As shown on the Tucson and Patagonia sheets of the U.S.G.S. topographical map, these properties are 33 miles southeast of Tucson, and about 38 miles by the wagon road. They are seven miles southeast of the mining town of Helvetia, and 12 miles east of the Twin Buttes mine. The Twin Buttes Railroad is 11 miles distant, the nearest shipping point being Brown's Ranch.

ROADS AND FREIGHT: There is a first class road to Tucson, and freighters haul goods and machinery to the camp for $8.00 per ton, and return freight on ore should be about $5.00. With any considerable amount of business these charges should be cut in two by shipping from the Twin Buttes Railroad.

ELEVATION AND CLIMATE: A glance at the contour lines on the accompanying map shows that the camp is situated at an elevation of 4000 feet, and the Alta (the southernmost claim) reaches an altitude of 8000 feet. At such heights the heat is never oppressive, and the efficiency of both American and Mexican labor is at a maximum. The slope of the mountains makes it possible to work the deposits to great depth by tunneling, as will appear later.

WATER: Water runs in the main gulleys during most of the wet season, and water for domestic purposes can be developed by wells in the arroyo bottoms. Water has been struck in the main shaft in the Jackson; the flow, however, was not great, as it could be handled with difficulty with the windlass. As these claims have the whole northern slope of the Santa Rita Mountains from Mount Baldy down for a collecting area, it is evident that water will be struck in sufficient quantity for all possible mining requirements during the contemplated development work, and further the formations do not lie in troughs or structural basins, and the rock does not consist of soluble or permeable sedimentary strata, but of slightly pourous igneous rocks; therefore the flow will probably be steady and moderate in amount.

TIMBER: The pine forests of the Santa Ritas immediately at hand and extending over the upper claims form a source of supply of fuel and timber unexcelled in this part of Arizona. Time was not available to permit any accurate estimation of the amount of timber at hand. It is safe to say, however, that it is sufficient for all the needs of these mines for a number of years to come. This timber is within the Santa Rita Forest Reserve, but permission can be obtained from the government to cut what is necessary for mining uses. A small saw milllocated at the upper end of the claim will furnish timber for the cost of saving and cutting alone.

LABOR: The labor situation is in no wise different from that confronted by the rest of southern Arizona. The supply is not equal to the demand. American miners get from $3.00 to $4.00 per day, and Mexicans from $2.00 to $2.50. When properly handled, and if the contract system is adopted, the Mexican labor compares favorably and often excels the higher priced American article. With Mexican labor the company store is a necessity and properly managed will reduce the labor bill twenty-five to thirty per cent. The best results have been obtained either by using American labor alone, or Mexican labor with a few American bosses. These two classes have seldom been worked side by side with success.

GEOLOGY AND ORE DEPOSITS: Reference to the maps and sections will show that the rock in the center of the map is an intrusive mass belonging to the diorit-andesite family. The center of this mass approaches a completely crystalline diorite, while the margins show andesitic characteristic. The country rock to the north of the diorite was not examined carefully. It is apparently an andesitic rock in the main, but whether it is the margin of the dioritic intrusive mass, or belongs to another series into which the diorite has been intruded, I did not determine. In the southern group of claims the veins branch out from and are related to a basic porphyry dike, as shown on the map.

To the east of the diorite is a rhylite flow with pronounced banded and flow structure. On the eastern margin of this flow the rhyolite shows some variation in composition, approaching a variety known technically as dacite. That the diorite is intrusive into the rhyolite is indicated by the development of a large amount of magnetite

in the latter at the one place where the contact was examined. To the east lies a slate injected by the rhyolite, and further east again is a thoroughly fractured and faulted series of Palaeosoic sedimentaries of slate, quartzite, and limestone. These formations are all cut by a prominent rhyolite-porphyry dike, and they all disappear towards the north under the debris washed down from the mountains.

The fragmentary and incomplete history which can be deciphered from these rocks and their relations to each other is as follows:

(1) A period of quiet sedimentation during which the shales, (now slates), sand stones, (now quartzite), and limestones were deposited in an ancient sea.

(2) At a far later period an injection and overflow of rhyolitic lava.

(3) An injection of diorite, which tilted therhyolite and surrounding rock, and was probably accompanied by faulting.

(4) The development of mineral veins in the diorite, to a less extent in the marginal rhyolite.

(5) An injection of the Rhyolite-porphyry dike, which cuts both formations and veins and has no connection with the mineralization.

As just stated the mineralization is limited to the intrusive diorite and its margin; no ore deposits of value appearing in the sedimentary rocks towards the north. Within these limits the most striking feature is the development of immense amounts of magnetite. The vein filling is a solid mass of magnetite and quartz, and from the veins and extending hundreds of feet away the minerals of the diorite are replaced by magnetite. This development is the most extensive where the veins cross, for instance, in the vicinity of the Jackson shaft, and reaches a maximum of the Great Central and Western claims, where the country for four or five hundred feet is replaced by massive magnetite and quartz.

The veins or fissures, even the smaller ones, are remarkably continuous, and some of them can be traced on the surface two or three thousand feet almost without a break.

There are three especially interesting groups of veins to which especial attention was given during the examination: (1) the group centering near the Jackson Shaft, (2) the great magnetite deposits on the Great Central and Western Claims, (3) the upper group of veins in the vicinity of the basic porphyry dike on the Alta Midst, Old Ironsides, Constitution, and General Funston Claims.

(1) The most important veins of the Jackson group are the Jackson main vein, the Jackson parallel vein, the Decatur vein, and the X vein; besides these there is one cross vein shown on the map and several smaller veins to which no attention has yet been paid. The Jackson vein is an east-west fissure easily traceable on the surface, perhaps five thousand feet. The filling here as everywhere else on the property is magnetite and quartz, with no showing of pyrite or chalcopyrite at the surface. The mineralization is most extensive in the vicinity of the shaft, doubtless caused by the convergence of several fissures towards that point. Here the magnetite has a width of 20 feet on the outcrop. Forty-five feet down the shaft, which is 80 feet deep with 20 feet of water, a shoot of very high grade chalcopyrite (see assays) develops, which has a width of 3½ to 4 feet. This shoot dips across and out of the shaft, but was caught in a cross cut from the bottom of the shaft and is reported to show 18 inches of solid metal. A cross cut is also

driven from the bottom a distance of 50 feet towards the parallel vein to the south, but has not yet reached it. This parallel vein about 75 feet to the south shows a similar outcrop of magnetite and quartz, but is as yet without any development. The Decatur vein is well exposed in the Decatur cut about 2,000 feet to the northwest of the Jackson shaft. The massive magnetite and quartz vein stuff is four to five feet in width with disseminations and segregations of chalcopyrite showing at the surface. There is nothing deeper than an open cut on this vein. The X vein two and one half to five feet in width is opened only by a 10 feet shaft, but shows all the characteristics of the other vein.

The excessive amounts of magnetite deposited beyond question by hot water ascending along these prominent fissures may be taken as a measure of the great activity of the mineralizing solutions. The distance which these fissures have been traced along the surface allows the legitimate inference that they will prove to have depth. That chalcopyrite has been found disseminated in the magnetite right at the surface, and that at a depth of 50 feet a high grade shoot of chalcopyrite has been encountered gives a perspective value to every one of the magnetite veins in the diorite. The Jackson shaft therefore is one of the critical points and should be the first place at which development work ought to be pushed in order to determine the size and richness of this ore shoot, as well as to decide whether or not the shoots will be of sufficient size and frequency to make the venture a commercial success.

(2) The magnetite deposit in the Great Central and Western:- This deposit for a width of almost 500 feet is largely a mass of magnetite and quartz. Unfortunately the snow forbade making as careful an examination as the deposit deserves, and Mr. McCleary informs me that it extends further to the south than appears on the map. Disseminations of chalcopyrite appear wherever the magnetite has been cut. The Birthday vein can be traced directly into this deposit. The short tunnel started on the Birthday fissure is, according to the contour map, 800 to 1200 feet below the highest outcrop of the Great Central vein, and the distance necessary to drive under and through it is about 3000 feet. Such a tunnel has advantages over the one marked 2-b on the map to be described later.

The development on the Jackson shaft in similar vein stuff suggests possibilities of a mine of first magnitude, here. It would seem advisable, however, to develop the Jackson thoroughly before starting the more onerous task of opening up the Great Central. Diamond drilling has been suggested as a method of attack, but but I estimate that five such holes would cost as much as one shaft and as cross cuts and drifts will certainly be necessary in a vein of this size, the proposition seems to be of doubtful value. A second plan has been suggested; namely, to run the tunnel a-b starting at a point 100 to 150 feet below the Jackson shaft and cross cut all the other veins on the way to the Great Central. This tunnel, according to the map, is approximately 5000 feet long, and will gain a depth of about 1800 feet. It is evident that this tunnel should not be attempted until the value of the Jackson and Great Central has thoroughly determined by workings from the surface.

(3) The upper group of veins;-- These consist of three main veins all of which run into a porphyry dike which is shown on the midst claim, and a vein further down the hill on the General Funston. These are strong veins, three to eight feet in width with the usual filling and with disseminations of pyrite and chalcopyrite showing almost at the surface. No work deeper than open cuts has been done on these veins; therefore the value is presumptive, as in the case of the deposits described in the preceding paragraph. The Jackson development makes them the most logical first development project.

In regard to the method of opening these deposits I suggest that tunnel c-d in the porphyry dike (which is very easy working ground) starting on the west of the slope somewhere between a 7200 and 7300 foot level. From here it is about 1000 feet to the apex of the hill, and the tunnel will gain a maximum depth of about 700 feet. Shafts might also be sunk in or near the porphyry dike at the intersection of these three veins to insure that they would not be overlooked in driving the tunnel and to develop the deposits from the surface down.

DEVELOPMENT, INSTALLATION, ETC.: The development should take place in the following order:

(1) Development from the Jackson shaft to a depth of at least 500 feet. If this proves satisfactory, then

(2) Development of the upper claims by a tunnel with surface development through two shafts:

(3) Several shafts and tunnels along the Great Central Vein to a depth of two to three hundred feet wherever there seems to be the best chance of ore shoots as determined by a number of surface cuts:

(4) Assuming that the developments have all proved the worth of the deposit, a 3000 foot tunnel along the Birthday vein, which will gain a maximum depth of 1200 feet;

(5) Finally, if the mines have all proven of sufficient value, a cross cut tunnel starting below the Jackson shaft and gaining a depth of 1800 to 2200 feet, according to the location of the mouth of the tunnel at a length of 5500 to 7000 feet. (Only the shorter tunnel is shown on the map.)

Details of cost and installations are hardly necessary here. In the rough, a 15 h.p. hoist and a 30 h.p. vertical boiler will cost in place at the Jackson shaft about $2500.00. This will be sufficient for a depth of 500 feet with necessary drifts. The water may possibly be handled with the bucket, obviating the necessity of a pump. The indication of a steady flow of a small volume of water obviates the necessity of large boiler capacity. When this plant has accomplished its work on the Jackson, it can be moved to the Great Central and used for the testing of that deposit. With this equipment the sinking should not cost $15.00 a foot, and drifting $10.00 a foot, as the ground stands excellently, and breaks well. $25,000.00 should open the mine fairly well to the 500 foot level.

The tunnel on the upper claims should be run for $10.00 a foot. The total cost of development as suggested should not reach $20,000.00. Not less than $50,000.00 should be spent prospecting the Great Central vein before the tunnel from the Birthday is driven. This tunnel will cost from $30,000 to $50,000, and should the ore deposit prove of sufficient value, the work will then have been carried on to the point necessary to open up a great mine. Estimates on the cross cut tunnels are hardly in place, as there is much to be done before that can be undertaken with propriety, and much more accurate figure will be on hand at that time.

ASSAYS:- One assay was taken by me across the ore shoot in the Jackson at a depth of about 50 feet. It shows the following values: gold trace; silver 9.0 oz.; copper 30.6%.

I am informed that other assays taken by Mr. McCleary show a similar grade copper carrying in addition $2.00 to $5.00 in gold. This shows that the ore when it occurs has a gratifying value. The amount can only be determined by development.

C. F. Tolman, Dean of College of Mines,
University of Arizona

REPORT ON THE MC CLEARY GROUP OF CLAIMS

OLD HICKORY

SITUATION. These claims (30) are located upon the western slope of the Santa Rita Mountains, Pima County, Arizona, and somewhat east of south of the city of Tucson. The distance from Tucson is 36 miles.

ROADS, ETC. The road from Tucson is excellent and an automobile can be driven at an ordinary rate of travel, the entire distance. Tucson is the best available railroad point at present, although the R. R. depot at Vail is some ten miles nearer. The extension of the El Paso and Southwestern R. R. has, however, been surveyed to pass within eight miles of the property, passing from Fairbanks through the Box Canon of the Santa Ritas and thence to the Pacific Coast.

DESCRIPTION. The camp is situated in the northwest foothills of the section of the range and has an elevation of 4,000 feet above sea level. It is pleasantly placed among heavy timber on the banks of an arroyo, and a well furnished ample and excellent water. Here are the houses, stable, stores, etc., and the general equipment for the work as at present prosecuted. From here the main claims run a little east of south up the slope of the spur and reach an elevation of 8,000 feet at the highest peak shown by the accompanying photograph. The upper portions of these hills are covered with heavy pine timber and frequent small springs, even at this dry season, give sufficient water. All the working are wet and continued work will develop water everywhere.

HOLDINGS. The 30 claims are grouped and cover over 600 acres running south by east, from the camp, for 9,000 feet to and past the high peak; the last being in the southeast section of the block. The claims run over the saddle and cover workings on the other side of the ridge.

FORMATION. The country is a regularly stratified quartzite and quartose formation which has been, apparently, lifted from the southeast. The strike of same is northeast and southwest, with a general dip of 45% to the northwest. This stratification is crossed by pronounced dykes of porphyry and rhyolite, whilst numerous quartz fissure veins form the ore bodies and have a heavy mineral showing. These run either with, or cut the stratified rock. To the south and west the country is more granitic, and north and east show lime and metamorphosed rock. The quartz reefs are capped with strong gossan and a considerable amount of demonstrative work has been done upon them. Wherever the reefs have been uncovered good copper values have been disclosed. The slope of the hill is very steep and erosion has been correspondingly rapid. There is comparatively little carbonate therefore, the sulphides coming to the actual surface. As stated, moreover, the ground is practically permanently damp. The higher the elevation, the nearer to the surface the sulphide show, and any reef rock broken exhibits at once iron and copper sulphides. Prospecting has been carried on up to 7,800 feet of elevation revealing an unaltered condition with respect to mineralization.

DEVELOPMENT. East of the camp, and about 2,000 feet distant, an 80 foot perpendicular shaft, in quartz, between porphyrite and slate, follows two rich stringers of ore 6 and 12 inches wide, whilst the whole shaft is in good ore. A little further east a 30 foot shaft (5 ft. by 6 ft.) is all in strong azurite. Again east from this the country is intersected by quartz and porphyry dykes.

South from the camp, 5,400 feet, and up the slope of the hill, an 80 ft. shaft has been sunk upon rich ore of a reef which contains even heavier stringers and pockets of metal. This is at an elevation of 4,824 ft. From here, south 1,700 ft. and at 5,282 elevation, a 30 ft. shaft,

on another ledge, discloses the same condition, viz. solid copper sulphide, cuprite, bornite, tetrahedrite, etc. The steep creek running between these two shafts is crossed by other two ledges showing copper sulphide at surface and running with the country stratification, whilst in crevices of the hard and worn quartzite bed of the creek itself, chalcopyrite, cuprite and garnet show along its courses for a considerable distance. Above this at many points upon the hillside, up to 7,800 feet of elevation, numberous veins, striking in different directions have been tested and make the same showing. At the highest point there is copper sulphide at the surface.

Between the two dykes shown on blue print, there is a cropping over 400 ft. in width of heavily armed quartzite with copper sulphide throughout. It is evidently the capping of an immense copper deposition and is proved by a large number of surface cuts. Across the saddle, and on the other slope of the spur, a granite country is approached and here a 75 ft. tunnel has been driven to reach a strong ledge which is traceable for more than a thousand feet and upon which surface breakings give copper and iron sulphide. Stringers of heavy sulphide and bornite show already in the tunnel. The general trend of this ledge is toward the apex of the hill. The elevation of the tunnel is 5,450 feet.

The geological and surface conditions point conclusively to an immense mineralization which can be easily and inexpensively proved beyond all doubt. The manifest upheaval, the net work of fissure veins (indicative of depth) carrying high values, the strong intrusive dykes, etc., are convincing in this respect.

VALUES. No attempt has been made to estimate the values of the ores at present. Those recovered so far (outside of mere surface cuts) are altogether too high to be the basis of computation; the lowest return, after carefully eliminating the yellow sulphide from the crushed ore, being 14 3/4% copper and to all appearances low grade of tetrahedrite. So far the ores carry from $1.00 to $6.00 in gold.

PROPOSED WORK. It is proposed to drive a tunnel from a point about 4,400 ft. elevation and marked with a cross on the photograph toward the highest peak. To reach the perpendicular of this peak the tunnel would be somewhere about 7,000 ft. in length and, at the terminal point, have a vertical depth of 3,500 feet, less the allowance the grade of the tunnel. This tunnel would, unquestionably, tap a large number of veins in its course and expeditiously open up an immense reserve of ore, "Making ground" at the rate of nearly a foot for each of two feet driven, besides providing a complete drainage for all subsequent workings.

In a somewhat lesser driving distance a similar tunnel could be continued from the drift on the south side of the spur (the 75 ft. drift) effecting a junction, by a winze, with a longer tunnel from the northwest. I know of no area that could be more speedily and effectively put into working shape.

The entrance to either tunnel is well above the valley and there is dumping ground for all time, splendid smelter and work sites and a beautifully situated and healthful town site. With every facility on the spot, the installation of a few electric drills now and a careful and systematic development hereafter, would speedily demonstrate the great value of the property and put it, early, upon a productive basis.

There is sufficient iron for smelter purposes and two claims, to the north of the camp, have been reserved for the lime thereon. There are also two or three claims reserved on the summit of the hills (all outside of the 30 claims) for the sake of timber. These lime and timber claims are included in the purchase. It is extremely unlikely that the mine will call for much heavy timbering.

In conclusion I may say that the holdings, taken together, cover quite a considerable area of mineral ground and that it would be difficult to find a group more favorably situated with a view to location and facilities for development and operation; or one that would equal its practical certainty of immense value in the near future. Apart from the developed and producing mines, it is the most favorable copper proposal that I have seen in the southwest.

(Signed) Fred Swinney M. E.

P. S. Since this report was made there has been considerable development on the property, including a 210 ft. shaft sunk on the Jackson View from which about 200 tons of high grade sulphide ore was taken. There is now a very good road 9 miles from the railroad to the mines.

STATEMENT

OF

ASSAYS

Assays of Sample & Mill runs of Ore taken from the upper workings of the Florida group of Claims, between the Surface outcrop and Thirty feet in depth.

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ASSAYER	GOLD $	SILVER oz.	COPPER %
O. J. Frost, Denver, Colo.	2.00	56.60	17.74
	trace	26.00	12.08
	trace	86.60	18.20
	1.50	32.00	12.50
Omaha & Grant Smelting & Ref. Co.	15.00	59.00	26.00
E. Williamson, F.C.S.	1.00	51.27	12.00
	2.20	18.70	12.50
	trace	31.60	13.00
	trace	21.00	8.00
	1.75	32.25	12.00
J. A. Snedakerm, M. E. Denver,Colo.	4.00	57.44	14.45
O. J. Frost, M. E. Denver, Colo.	trace	17.70	13.14
	trace	24.50	9.32
	1.25	36.70	11.60
	trace	21.60	8.62
Selby Smelting & Refining Co., San Francisco, Calif.	no report	22.32	9.70
El Paso Smelting & Refining Co., El Paso, Texas. (American Mining & Smelting Co.)	no report	22.40	10.50
Helvetia Smelting & Refining Co., Helvetia, Arizona	no report	(2500 lbs. 21.00	10.00
* Prof. Richard, of United States Geological Survey, Geologist & Assayer, Arizona	no report	118.00	36.00
Average yield per ton	1.435	40.54	14.00
Average value per ton	71.96		

* (This sample was taken at a point 500 ft. from the other samples. They are grab samples.)

. . . . . .

Mines, Pima County Arizona. Right in the Great Copper Mining Belt of Arizona.

COPY

REPORT ON THE MCCLEARY GROUP OF CLAIMS

NOW OWNED BY THE PARBER BROTHERS

I hand you herewith my report upon the property of the Old Hickory Company, situated eight miles east of Morales station of the Southern Pacific of Mexico, in Old Baldy Mining district, Pima County, Arizona. This report is the result of an examination made on April 4th and 5th, 1914. The examination made was brief, as it was only intended to make plans for the proper development, of the property and to state whether or not it was worthy of development.

The formations in which the ore deposits lie are in diorites and rhyolites. The details of geology will shortly be published by Schrader & Hill in the United States Geological Survey publication, making it unnecessary to go into these details in repetition.

ON THE JACKSON CLAIM I WAS AGREEABLY SURPRISED AT THE PROSPECTS. The Jackson vein is a prominent fissure, outcropping on the surface in an immense iron cap for a very considerable distance. The vein filling is similar to that of all the other veins and is a magnetite and quartz. It has a width of 20 feet on the surface and, although no chalcopyrite or pyrite is shown on the outcrop, it comes in at a depth of about 80 feet, and at that depth seems to be considerably scattered throughout the whole of the exposure.

The Iron Mask which was also closely examined, is very similar, although chalcopyrite comes in closer to the surface, and generally persistent, but not as concentrated as in the Jackson. The Grand Central vein was also examined, and while it proved to be quite similar in outcrop to the other veins, it did not promise of such quick returns as the veins lower down on the hill. The Grand Central is a development proposition for the future, for several reasons; first, that the best prospects are ~~XXXXXXXXXX~~lower down on the hill; second, it is the least accessible; and third, that its mineralization seems to evident that, should ore be found it will develop into a proposition that will require immense milling facilities to be profitable.

The whole proposition was viewed with the idea of methods of development and operation, and little examination was made of places where no development had been started. It is certainly a proposition worthy of development, and on which I believe, early results will be obtained. The plan of development which I shall outline will be with the idea of using as little money as possible, of working safe, and of sacrificing time in preference to money.

DEVELOPMENT. I would first recommend the installation of either a Trops or gasoline hoist at the Jackson shaft. Although wood is cheap the original cost of installation of trops will be less, and if any camp is made there, as is expected for the future, There will be only sufficient wood for domestic purposes. The cost of operation of the hoist with gasoline would be very little different than that using wood. I would also suggest the installation of a compressor, and drills to facilitate further development work. Machine drilling does not lower the cost of sinking or drifting, but greatly increases the speed. But there is an increasing difficulty in obtaining good hand drillers, and decreasing difficulty in obtaining satisfactory machine men. The total cost of such installation should not exceed $3500. for a 15 H.P. hoist capable of sinking 600 feet, and a compressor of sufficient size to operate four lightweight drills.

Sinking should then be commenced on the Jackson with drifting at 100 foot intervals, to a depth of at least 600 feet, at which depth a crosscut could be made connecting the Iron Mask and the development of the Iron Mask continued from that point. The cost of the sinking to the 600 foot level should not exceed $7,500. and there should be to prove

the permanency of the deposit on the Jackson, at least 1000 feet of drifts, costing $10,000.

Should the above outlined work on the Jackson prove sufficient, satisfactory and promising the work on the Iron Mask should start. There is sufficient similarity in the entire series of the east-veins in their manner of deposition, method of deposition, and period of deposition, to expect that what is encountered in one may be encountered in the others, and the development completely of one vein, with satisfactory results, would mean that further development could take place with a minimum of risk.

I would therefore suggest that plans be made for the raising and expenditure of $25,000 for the development of the Jackson and the Iron Mask, the first to prove the permanency of the ore bodies, and the second to prove the similarity of the deposits, with this development, the property should be in a condition to maintain its own further development, which further development would be the further work on the Jackson and Iron Mask, some exploitation on the Grand Central, and the other veins in the series.

The advisability of the lower adit at the base of the hill, depends entirely upon the development of the claims above, not so much as to the quantity of the ore, but as to the character of the ore. Should the work above prove the ore bodies to direct shipping or smelting ore, the adit would be of doubtful value, as the saving in the cost of transportation and drainage would not be sufficient to pay the interest on the necessary investment unless the daily capacity were over 500 tons.

However, should the proposition develop into a milling proposition, it would be doubtful it it could be profitably operated without the lower adit. This adit would be an expensive piece of development, and should not be undertaken until a satisfactory exploration of the upper vein has been concluded. Prospecting of the other veins of the series could be satisfactorily accomplished by systematic horizontal diamond drilling from the lower levels of the Jackson after development of the same. Such diamond drilling would be the better way of proving the other veins in case of milling deposits, but should it prove to be a smelting or shipping proposition, the development should be by crosscut tunnels. I do not anticipate any great trouble with water, there being sufficient country to drain to make any large flow. Mr. McCleary seems to have the situation well in hand, and I believe, understands what is needed and is capable of carrying out the work.

In conclusion, I wish to say that I believe the deposits to be very promising prospects, and that the development of the Jackson and Iron Mask will prove the existence of large ore bodies. It would be fallacy to plunge, however, for the vital importance of the deposit and its method of development lies in the distinction between milling and smelting ore, and I would not recommend that any further plans be made at the present time beyond the development of the Jackson and Iron Mask. Concentrated efforts in one place is the only way to satisfactorily develop a large proposition with little capital.

Respectfully submitted,

(SIGNED)

CHAS. F. WILLIS,
Mining Engineer & Geologish Director
Bureau of Mines, University of Arizona.

STATEMENT

OF

ASSAYS

Assays of Sample & Mill runs of Ore taken from the upper workings of the Florida group of Claims, between the Surface outcrop and Thirty feet in depth.

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ASSAYER	GOLD $	SILVER oz.	COPPER %
O. J. Frost, Denver, Colo.	2.00	56.60	17.74
	trace	26.00	12.08
	trace	86.60	18.20
	1.50	32.00	12.50
Omaha & Grant Smelting & Ref. Co.	15.00	59.00	26.00
E. Williamson, F.G.S.	1.00	51.27	12.00
	2.20	18.70	12.50
	trace	31.60	13.00
	trace	21.00	8.00
	1.75	32.25	12.00
J. A. Snedakerm, M. E. Denver,Colo.	4.00	57.44	14.45
O. J. Frost, M. E. Denver, Colo.	trace	17.70	13.14
	trace	24.50	9.32
	1.25	36.70	11.60
	trace	21.60	8.62
Selby Smelting & Refining Co., San Francisco, Calif.	no report	22.32	9.70
El Paso Smelting & Refining Co., El Paso, Texas. (American Mining & Smelting Co.)	no report	22.40	10.50
Helvetia Smelting & Refining Co., Helvetia, Arizona	no report (2500 lbs.	21.00	10.00
* Prof. Richard, of United States Geological Survey, Geologist & Assayer, Arizona	no report	118.00	36.00
Average yield per ton	1.435	40.54	14.00
Average value per ton	71.96		

* (This sample was taken at a point 500 ft. from the other samples. They are grab samples.)

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Mines, Pima County Arizona. Right in the Great Copper Mining Belt of Arizona.

INTRODUCTION: The following report and maps are the result of observations made during two trips to these claims. The first was a pleasure trip the purpose of which was to make myself acquainted with the geology and ore deposits on the west slope of the Santa Ritas, so that no detailed examinations were made at that time. A second trip was made December 27 - 29, 1906, and unfortunately rain and a snow storm prevented careful examination of the claims high up in the mountains.

These claims are located on the accompanying map from description of Mr. McCleary as we went over the ground. The topograph contours are drawn from an enlargement of the small scale government map of the district, and are only approximately correct.

In the short time and on account of the unfavorable weather accurate geological mapping was out of the question; therefore the accompanying sketch map represents the main features of the geology in an approximate manner. I shall adhere to my custom of only mentioning those facts in regard to the geology that bear directly upon the value of the mineral deposits, referring those who may have a further interest in the subject to the map, which is of course a far more accurate compilation of geological facts than any description can be. The gist of the report is summed up in the following paragraph for the benefit of those who may not be interested in the details which follow.

SUMMARY OF IMPORTANT POINTS AND CONCLUSIONS: The McCleary claims cover a number of fissure veins in an intrusive dioritic rock. The vein filling is magnetite and quartz. Some of these veins have been traced for distances exceeding 3000 feet, the Jackson in particular, approximately 5000 feet, and this latter extent allows the inference of continuity with depth. The extension development of the magnetite not only filling the fissure but extensively impregnating and replacing the country rock of the mineralized area, indicated the intensity of the action of the mineralizing solutions. The fact that in almost every cut this magnetite is more or less disseminated with chalcopyrite shows that the ore solution were copper, as well as iron bearing. The fact that the deepest working develops a high grade ore shoot gives a perspective value to all the similar magnetite veins. These facts then suggest a mine of the first order of magnitude below the great deposit of magnetite on the Great Central and Western claims. A thorough development opment of the Jackson claim is advised before attempting the upper group of veins or the more formidable task at the Great Central.

GENERAL INFORMATION

SITUATION: As shown on the Tucson and Patagonia sheets of the U.S.G.S. topographical map, these properties are 33 miles southeast of Tucson, and about 38 miles by the wagon road. They are seven miles southeast of the mining town of Helvetia, and 12 miles east of the Twin Buttes mine. The Twin Buttes Railroad is 11 miles distant, the nearest shipping point being Brown's Ranch.

ROADS AND FREIGHT: There is a first class road to Tucson, and freighters haul goods and machinery to the camp for $8.00 per ton, and return freight on ore should be about $5.00. With any considerable amount of business these charges should be cut in two by shipping from the Twin Buttes Railroad.

ELEVATION AND CLIMATE: A glance at the contour lines on the accompanying map shows that the camp is situated at an elevation of 4000 feet, and the Alta (the southernmost claim) reaches an altitude of 8000 feet. At such heights the heat is never oppressive, and the efficiency of both American and Mexican labor is at a maximum. The slope of the mountains makes it possible to work the deposits to great depth by tunneling, as will appear later.

WATER: Water runs in the main gulleys during most of the wet season, and water for domestic purposes can be developed by wells in the arroyo bottoms. Water has been struck in the main shaft in the Jackson; the flow, however, was not great, as it could be handled with difficulty with the windlass. As these claims have the whole northern slope of the Santa Rita Mountains from Mount Baldy down for a collecting area, it is evident that water will be struck in sufficient quantity for all possible mining requirements during the contemplated development work, and further the formations do not lie in troughs or structural basins, and the rock does not consist of soluble or permeable sedimentary strata, but of slightly pourous igneous rocks; therefore the flow will probably be steady and moderate in amount.

TIMBER: The pine forests of the Santa Ritas immediately at hand and extending over the upper claims form a source of supply of fuel and timber unexcelled in this part of Arizona. Time was not available to permit any accurate estimation of the amount of timber at hand. It is safe to say, however, that it is sufficient for all the needs of these mines for a number of years to come. This timber is within the Santa Rita Forest Reserve, but permission can be obtained from the government to cut what is necessary for mining uses. A small saw milllocated at the upper end of the claim will furnish timber for the cost of saving and cutting alone.

LABOR: The labor situation is in no wise different from that confronted by the rest of southern Arizona. The supply is not equal to the demand. American miners get from $3.00 to $4.00 per day, and Mexicans from $2.00 to $2.50. When properly handled, and if the contract system is adopted, the Mexican labor compares favorably and often excels the higher priced American article. With Mexican labor the company store is a necessity and properly managed will reduce the labor bill twenty-five to thirty per cent. The best results have been obtained either by using American labor alone, or Mexican labor with a few American bosses. These two classes have seldom been worked side by side with success.

GEOLOGY AND ORE DEPOSITS: Reference to the maps and sections will show that the rock in the center of the map is an intrusive mass belonging to the diorit-andesite family. The center of this mass approaches a completely crystalline diorite, while the margins show andesitic characteristic. The country rock to the north of the diorite was not examined carefully. It is apparently an andesitic rock in the main, but whether it is the margin of the dioritic intrusive mass, or belongs to another series into which the diorite has been intruded, I did not determine. In the southern group of claims the veins branch out from and are related to a basic porphyry dike, as shown on the map.

To the east of the diorite is a rhylite flow with pronounced banded and flow structure. On the eastern margin of this flow the rhyolite shows some variation in composition, approaching a variety known technically as dacite. That the diorite is intrusive into the rhyolite is indicated by the development of a large amount of magnetite

in the latter at the one place where the contact was examined. To the east lies a slate injected by the rhyolite, and further east again is a thoroughly fractured and faulted series of Palaeosoic sedimentaries of slate, quartzite, and limestone. These formations are all cut by a prominent rhyolite-porphyry dike, and they all disappear towards the north under the debris washed down from the mountains.

The fragmentary and incomplete history which can be deciphered from these rocks and their relations to each other is as follows:

(1) A period of quiet sedimentation during which the shales, (now slates), sand stones, (now quartzite), and limestones were deposited in an ancient sea.

(2) At a far later period an injection and overflow of rhyolitic lava.

(3) An injection of diorite, which tilted therhyolite and surrounding rock, and was probably accompanied by faulting.

(4) The development of mineral veins in the diorite, to a less extent in the marginal rhyolite.

(5) An injection of the Rhyolite-porphyry dike, which cuts both formations and veins and has no connection with the mineralization.

As just stated the mineralization is limited to the intrusive diorite and its margin; no ore deposits of value appearing in the sedimentary rocks towards the north. Within these limits the most striking feature is the development of immense amounts of magnetite. The vein filling is a solid mass of magnetite and quartz, and from the veins and extending hundreds of feet away the minerals of the diorite are replaced by magnetite. This development is the most extensive where the veins cross, for instance, in the vicinity of the Jackson shaft, and reaches a maximum of the Great Central and Western claims, where the country for four or five hundred feet is replaced by massive magnetite and quartz.

The veins or fissures, even the smaller ones, are remarkably continuous, and some of them can be traced on the surface two or three thousand feet almost without a break.

There are three especially interesting groups of veins to which especial attention was given during the examination: (1) the group centering near the Jackson Shaft, (2) the great magnetite deposits on the Great Central and Western Claims, (3) the upper group of veins in the vicinity of the basic porphyry dike on the Alta Midst, Old Ironsides, Constitution, and General Funston Claims.

(1) The most important veins of the Jackson group are the Jackson main vein, the Jackson parallel vein, the Decatur vein, and the X vein; besides these there is one cross vein shown on the map and several smaller veins to which no attention has yet been paid. The Jackson vein is an east-west fissure easily traceable on the surface, perhaps five thousand feet. The filling here as everywhere else on the property is magnetite and quartz, with no showing of pyrite or chalcopyrite at the surface. The mineralization is most extensive in the vicinity of the shaft, doubtless caused by the convergence of several fissures towards that point. Here the magnetite has a width of 20 feet on the outcrop. Forty-five feet down the shaft, which is 80 feet deep with 20 feet of water, a shoot of very high grade chalcopyrite (see assays) develops, which has a width of 3½ to 4 feet. This shoot dips across and out of the shaft, but was caught in a cross cut from the bottom of the shaft and is reported to show 18 inches of solid metal. A cross cut is also

driven from the bottom a distance of 50 feet towards the parallel vein to the south, but has not yet reached it. This parallel vein about 75 feet to the south shows a similar outcrop of magnetite and quartz, but is as yet without any development. The Decatur vein is well exposed in the Decatur cut about 2,000 feet to the northwest of the Jackson shaft. The massive magnetite and quartz vein stuff is four to five feet in width with disseminations and segregations of chalcopyrite showing at the surface. There is nothing deeper than an open cut on this vein. The X vein two and one half to five feet in width is opened only by a 10 feet shaft, but shows all the characteristics of the other vein.

The excessive amounts of magnetite deposited beyond question by hot water ascending along these prominent fissures may be taken as a measure of the great activity of the mineralizing solutions. The distance which these fissures have been traced along the surface allows the legitimate inference that they will prove to have depth. That chalcopyrite has been found disseminated in the magnetite right at the surface, and that at a depth of 50 feet a high grade shoot of chalcopyrite has been encountered gives a perspective value to every one of the magnetite veins in the diorite. The Jackson shaft therefore is one of the critical points and should be the first place at which development work ought to be pushed in order to determine the size and richness of this ore shoot, as well as to decide whether or not the shoots will be of sufficient size and frequency to make the venture a commercial success.

(2) The magnetite deposit in the Great Central and Western:- This deposit for a width of almost 500 feet is largely a mass of magnetite and quartz. Unfortunately the snow forbade making as careful an examination as the deposit deserves, and Mr. McCleary informs me that it extends further to the south than appears on the map. Disseminations of chalcopyrite appear wherever the magnetite has been cut. The Birthday vein can be traced directly into this deposit. The short tunnel started on the Birthday fissure is, according to the contour map, 600 to 1200 feet below the highest outcrop of the Great Central vein, and the distance necessary to drive under and through it is about 3000 feet. Such a tunnel has advantages over the one marked 2-b on the map to be described later.

The development on the Jackson shaft in similar vein stuff suggests possibilities of a mine of first magnitude, here. It would seem advisable, however, to develop the Jackson thoroughly before starting the more onerous task of opening up the Great Central. Diamond drilling has been suggested as a method of attack, but but I estimate that five such holes would cost as much as one shaft and as cross cuts and drifts will certainly be necessary in a vein of this size, the proposition seems to be of doubtful value. A second plan has been suggested; namely, to run the tunnel a-b starting at a point 100 to 150 feet below the Jackson shaft and cross cut all the other veins on the way to the Great Central. This tunnel, according to the map, is approximately 5000 feet long, and will gain a depth of about 1800 feet. It is evident that this tunnel should not be attempted until the value of the Jackson and Great Central has thoroughly determined by workings from the surface.

(3) The upper group of veins;-- These consist of three main veins all of which run into a porphyry dike which is shown on the midst claim, and a vein further down the hill on the General Funston. These are strong veins, three to eight feet in width with the usual filling and with disseminations of pyrite and chalcopyrite showing almost at the surface. No work deeper than open cuts has been done on these veins; therefore the value is presumptive, as in the case of the deposits described in the preceding paragraph. The Jackson development makes them the most logical first development project.

In regard to the method of opening these deposits I suggest that tunnel c-d in the porphyry dike (which is very easy working ground) starting on the west of the slope somewhere between a 7200 and 7300 foot level. From here it is about 1000 feet to the apex of the hill, and the tunnel will gain a maximum depth of about 700 feet. Shafts might also be sunk in or near the porphyry dike at the intersection of these three veins to insure that they would not be overlooked in driving the tunnel and to develop the deposits from the surface down.

DEVELOPMENT, INSTALLATION, ETC.: The development should take place in the following order:

(1) Development from the Jackson shaft to a depth of at least 500 feet. If this proves satisfactory, then

(2) Development of the upper claims by a tunnel with surface development through two shafts:

(3) Several shafts and tunnels along the Great Central Vein to a depth of two to three hundred feet wherever there seems to be the best chance of ore shoots as determined by a number of surface cuts:

(4) Assuming that the developments have all proved the worth of the deposit, a 3000 foot tunnel along the Birthday vein, which will gain a maximum depth of 1200 feet;

(5) Finally, if the mines have all proven of sufficient value, a cross cut tunnel starting below the Jackson shaft and gaining a depth of 1800 to 2200 feet, according to the location of the mouth of the tunnel at a length of 5500 to 7000 feet. (Only the shorter tunnel is shown on the map.)

Details of cost and installations are hardly necessary here. In the rough, a 15 h.p. hoist and a 30 h.p. vertical boiler will cost in place at the Jackson shaft about $2500.00. This will be sufficient for a depth of 500 feet with necessary drifts. The water may possibly be handled with the bucket, obviating the necessity of a pump. The indication of a steady flow of a small volume of water obviates the necessity of large boiler capacity. When this plant has accomplished its work on the Jackson, it can be moved to the Great Central and used for the testing of that deposit. With this equipment the sinking should not cost $15.00 a foot, and drifting $10.00 a foot, as the ground stands excellently, and breaks well. $25,000.00 should open the mine fairly well to the 500 foot level.

The tunnel on the upper claims should be run for $10.00 a foot. The total cost of development as suggested should not reach $20,000.00. Not less than $50,000.00 should be spent prospecting the Great Central vein before the tunnel from the Birthday is driven. This tunnel will cost from $30,000 to $50,000, and should the ore deposit prove of sufficient value, the work will then have been carried on to the point necessary to open up a great mine. Estimates on the cross cut tunnels are hardly in place, as there is much to be done before that can be undertaken with propriety, and much more accurate figure will be on hand at that time.

ASSAYS:- One assay was taken by me across the ore shoot in the Jackson at a depth of about 50 feet. It shows the following values: gold trace; silver 9.0 oz.; copper 30.6%.

I am informed that other assays taken by Mr. McCleary show a similar grade copper carrying in addition $2.00 to $5.00 in gold. This shows that the ore when it occurs has a gratifying value. The amount can only be determined by development.

C. F. Tolman, Dean of College of Mines,
University of Arizona

REPORT ON THE MC CLEARY GROUP OF CLAIMS

OLD HICKORY

SITUATION. These claims (30) are located upon the western slope of the Santa Rita Mountains, Pima County, Arizona, and somewhat east of south of the city of Tucson, The distance from Tucson is 36 miles.

ROADS, ETC. The road from Tucson is excellent and an automobile can be driven at an ordinary rate of travel, the entire distance. Tucson is the best available railroad point at present, although the R. R. depot at Vail is some ten miles nearer. The extension of the El Paso and Southwestern R. R. has, however, been surveyed to pass within eight miles of the property, passing from Fairbanks through the Box Canon of the Santa Ritas and thence to the Pacific Coast.

DESCRIPTION. The camp is situated in the northwest foothills of the section of the range and has an elevation of 4,000 feet above sea level. It is pleasantly placed among heavy timber on the banks of an arroyo, and a well furnished ample and excellent water. Here are the houses, stable, stores, etc., and the general equipment for the work as at present prosecuted. From here the main claims run a little east of south up the slope of the spur and reach an elevation of 8,000 feet at the highest peak shown by the accompanying photograph. The upper portions of these hills are covered with heavy pine timber and frequent small springs, even at this dry season, give sufficient water. All the working are wet and continued work will develop water everywhere.

HOLDINGS. The 30 claims are grouped and cover over 600 acres running south by east, from the camp, for 9,000 feet to and past the high peak; the last being in the southeast section of the block. The claims run over the saddle and cover workings on the other side of the ridge.

FORMATION. The country is a regularly stratified quartzite and quartose formation which has been, apparently, lifted from the southeast. The strike of same is northeast and southwest, with a general dip of 45% to the northwest. This stratification is crossed by pronounced dykes of porphyry and rhyolite, whilst numerous quartz fissure veins form the ore bodies and have a heavy mineral showing. These run either with, or cut the stratified rock. To the south and west the country is more granitic, and north and east show lime and metamorphosed rock. The quartz reefs are capped with strong gossan and a considerable amount of demonstrative work has been done upon them. Wherever the reefs have been uncovered good copper values have been disclosed. The slope of the hill is very steep and erosion has been correspondingly rapid. There is comparatively little carbonate therefore, the sulphides coming to the actual surface. As stated, moreover, the ground is practically permanently damp. The higher the elevation, the nearer to the surface the sulphide show, and any reef rock broken exhibits at once iron and copper sulphides. Prospecting has been carried on up to 7,800 feet of elevation revealing an unaltered condition with respect to mineralization.

DEVELOPMENT. East of the camp, and about 2,000 feet distant, an 80 foot perpendicular shaft, in quartz, between porphyrite and slate, follows two rich stringers of ore 6 and 12 inches wide, whilst the whole shaft is in good ore. A little further east a 30 foot shaft (5 ft. by 6 ft.) is all in strong azurite. Again east from this the country is intersected by quartz and porphyry dykes.

South from the camp, 5,400 feet, and up the slope of the hill, an 80 ft. shaft has been sunk upon rich ore of a reef which contains even heavier stringers and pockets of metal. This is at an elevation of 4,824 ft. From here, south 1,700 ft. and at 5,282 elevation, a 30 ft. shaft,

on another ledge, discloses the same condition, viz. solid copper sulphide, cuprite, bornite, tetrahedrite, etc. The steep creek running between these two shafts is crossed by other two ledges showing copper sulphide at surface and running with the country stratification, whilst in crevices of the hard and worn quartzite bed of the creek itself, chalcopyrite, cuprite and garnet show along its courses for a considerable distance. Above this at many points upon the hillside, up to 7,800 feet of elevation, numberous veins, striking in different directions have been tested and make the same showing. At the highest point there is copper sulphide at the surface.

Between the two dykes shown on blue print, there is a cropping over 400 ft. in width of heavily armed quartzite with copper sulphide throughout. It is evidently the capping of an immense copper deposition and is proved by a large number of surface cuts. Across the saddle, and on the other slope of the spur, a granite country is approached and here a 75 ft. tunnel has been driven to reach a strong ledge which is traceable for more than a thousand feet and upon which surface breakings give copper and iron sulphide. Stringers of heavy sulphide and bornite show already in the tunnel. The general trend of this ledge is toward the apex of the hill. The elevation of the tunnel is 5,450 feet.

The geological and surface conditions point conclusively to an immense mineralization which can be easily and inexpensively proved beyond all doubt. The manifest upheaval, the net work of fissure veins (indicative of depth) carrying high values, the strong intrusive dykes, etc., are convincing in this respect.

VALUES. No attempt has been made to estimate the values of the ores at present. Those recovered so far (outside of mere surface cuts) are altogether too high to be the basis of computation; the lowest return, after carefully eliminating the yellow sulphide from the crushed ore, being 14 3/4% copper and to all appearances low grade of tetrahedrite. So far the ores carry from $1.00 to $6.00 in gold.

PROPOSED WORK. It is proposed to drive a tunnel from a point about 4,400 ft. elevation and marked with a cross on the photograph toward the highest peak. To reach the perpendicular of this peak the tunnel would be somewhere about 7,000 ft. in length and, at the terminal point, have a vertical depth of 3,500 feet, less the allowance the grade of the tunnel. This tunnel would, unquestionably, tap a large number of veins in its course and expeditiously open up an immense reserve of ore, "Making ground" at the rate of nearly a foot for each of two feet driven, besides providing a complete drainage for all subsequent workings.

In a somewhat lesser driving distance a similar tunnel could be continued from the drift on the south side of the spur (the 75 ft. drift) effecting a junction, by a winze, with a longer tunnel from the northwest. I know of no area that could be more speedily and effectively put into working shape.

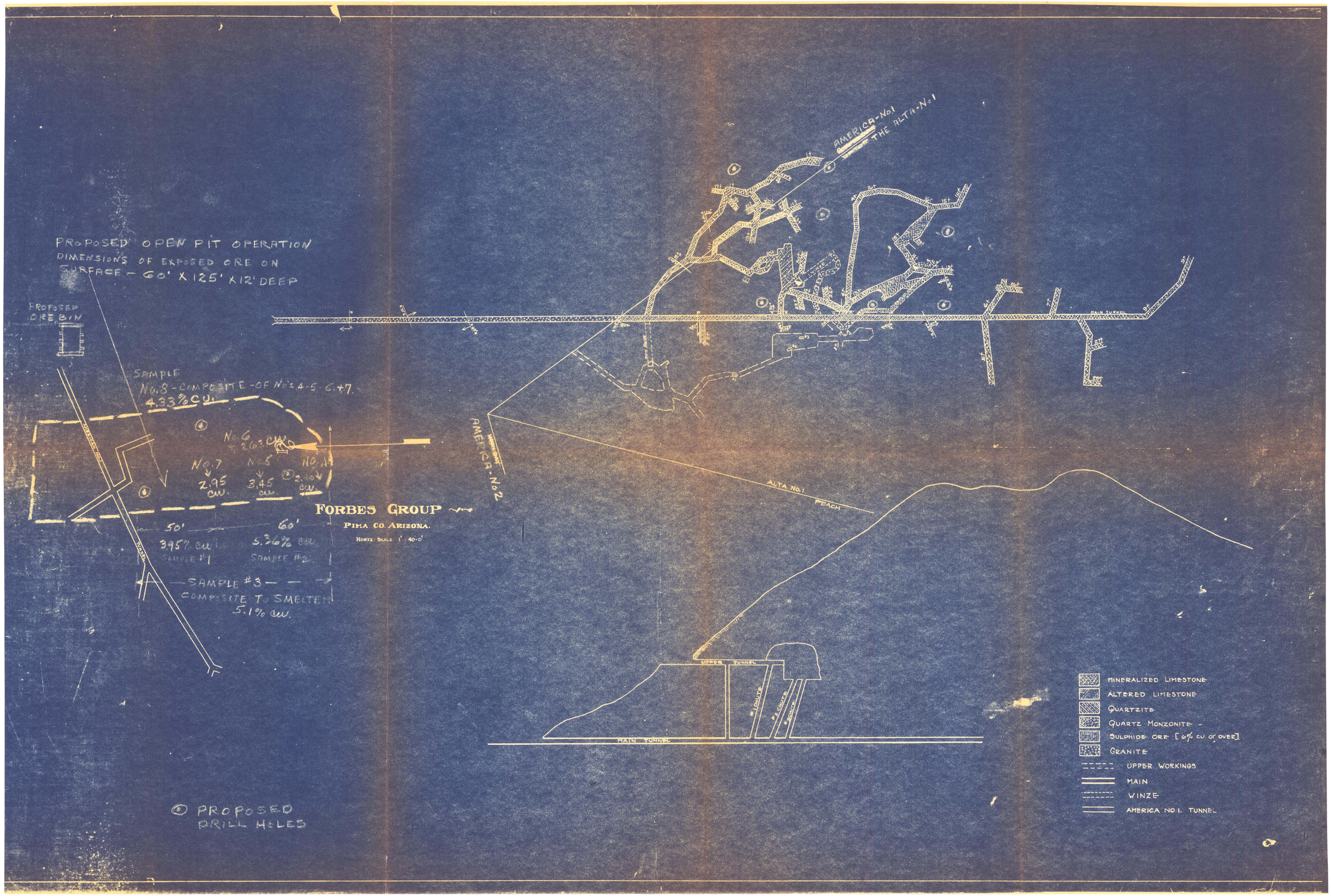
The entrance to either tunnel is well above the valley and there is dumping ground for all time, splendid smelter and work sites and a beautifully situated and healthful town site. With every facility on the spot, the installation of a few electric drills now and a careful and systematic development hereafter, would speedily demonstrate the great value of the property and put it, early, upon a productive basis.

There is sufficient iron for smelter purposes and two claims, to the north of the camp, have been reserved for the lime thereon. There are also two or three claims reserved on the summit of the hills (all outside of the 30 claims) for the sake of timber. These lime and timber claims are included in the purchase. It is extremely unlikely that the mine will call for much heavy timbering.

In conclusion I may say that the holdings, taken together, cover quite a considerable area of mineral ground and that it would be difficult to find a group more favorably situated with a view to location and facilities for development and operation; or one that would equal its practical certainty of immense value in the near future. Apart from the developed and producing mines, it is the most favorable copper proposal that I have seen in the southwest.

(Signed) Fred Swinney M. E.

P. C. Since this report was made there has been considerable development on the property, including a 210 ft. shaft sunk on the Jackson View from which about 200 tons of high grade sulphide ore was taken. There is now a very good road 9 miles from the railroad to the mines.


PROPOSED OPEN PIT OPERATION
DIMENSIONS OF EXPOSED ORE ON SURFACE - 60' X 125' X 12' DEEP
PROPOSED ORE BIN
SAMPLE No. 8 - COMPOSITE - OF No's 4-5-6 + 7.
4.33% CU.
No. 6 2.63 CU.
No. 7 2.95 CU.
No. 5 3.45 CU.
No. 4 2.90 CU.
50'
3.95% CU.
SAMPLE #1
60'
5.36% CU.
SAMPLE #2
SAMPLE #3
COMPOSITE TO SMELTER
5.1% CU.
FORBES GROUP
PIMA CO. ARIZONA.
HORIZ. SCALE 1" = 40'-0"
PROPOSED DRILL HOLES
AMERICA-No. 1
THE ALTA-No. 1
AMERICA-No. 2
ALTA No. 1
PEACH
UPPER TUNNEL
MAIN TUNNEL
MINERALIZED LIMESTONE
ALTERED LIMESTONE
QUARTZITE
QUARTZ MONZONITE
SULPHIDE ORE [6% CU. OR OVER]
GRANITE
UPPER WORKINGS
MAIN
WINZE
AMERICA NO. 1. TUNNEL

COPY

TIP TOP REPORT

GROUP OF CLAIMS

LOCATION:

The Tip Top Group of Claims is located in the foothills of the Santa Rita Mountains, Helvetia Mining District, Pima County, Arizona. It is connected by good wagon roads with Tucson and Vail, on the Southern Pacific RR., being 28 miles S. E. of Tucson, and 15 miles S.W. from Vail. The Tip Top Group is joined on the south by the Helvetia group of claims and in the S.W. by the Rosemont Group. On the east it adjoins a homestead owned by the Tip Top interests.

AREA AND SURFACE IMPROVEMENTS:

This group comprises one full-sized patented claim, 21 full-sized unpatented claims and 7 fractions. The claims cover an area of over 500 acres, largely mountainous. Included in this property is a homestead containing 148 acres. On the homestead are seven buildings with four to six rooms which have been used as dwellings, office, store and assay laboratory. There are also corrals, barns, and valuable water rights on the homestead.

GEOLOGY:

The oldest formation exposed on these claims is a coarsely crystalline granite with very prominent feldspar crystals. Carboniferous limestone forms the only sedimentary upon the granite in this locality. Between the granite and the limestone, there is a flat, irregular mass of fine-grained quartz porphyry which is found underlying the limestone in the Tip Top hill. In the Copper Duke hill the limestone has been entirely eroded away, exposing a large area of this quartz porphyry which has a maximum thickness of 200 feet. This porphyry is mineralized to some extent with native copper. It assays about 1.5% Cu. with small amounts of silver and gold. Besides this intrusion there have been later intrusions of aplite, mica diotite and quartz monzonite, the latter showing small values in copper. The quartz porphyry was responsible for a large amount of fissuring and faulting and also for ascending mineral solutions. The orebodies in the limestone have formed in the fissures along the contacts of the limestone and porphyry, and the limestone and granite. In the Tip Top Claim the main ore chute is a fissure vein, almost vertical, which has been displaced horizontally from 2 to 15 ft. by faulting later than the ore formation. On top of the porphyry this ore body spreads out for some distance along the contact. The northern part of this orebody has been faulted to the east and forms what is called the northeast orebody. The footwall of this orebody at the eastern end is the granite, as the quartz porphyry plays out to the east. In the Copper Duke working an orebody was found in a fissure in the porphyry which dipped below the tunnel level at a small angle. On the Mormon Queen and Queen of Sheba fissure veins were found in the porphyry with almost a vertical

dip. In the Bulldozer claim the ore occurs in the limestone near the contact with the granite. The workings on the Noon Day cut a large fault dipping almost vertically and showed quantities of sulphides in the crushed area adjacent to the fault. The dip of the contact of limestone and granite on the Bulldozer claim is at a slight angle to the southwest.

DEVELOPMENT WORK:

The Tip Top claim is the most thoroughly developed claim in the group. It is developed by three levels called the upper, main and winze levels. In the upper level the Big Stope orebody was first discovered and was developed by a drift on the orebody. This orebody has a dip of about 70 degrees to the east. The outcrop of this orebody extended for over 300 feet but on the upper level was only partially stoped out. The main tunnel on the main level was run south for about 950 feet and raises were put up about 40 feet to strike the orebody. The inclined distance between these levels is about 110 feet and the ore was stoped out to the upper level for about 150 feet at its northern end. About 6000 tons of ore were shipped to the American S. & R. Co. at El Paso during the years 1904 to 1907. The average of this total shipment was about 6.6% cu., 0.9 oz. Ag., 27.0 % Fe., 25% S. and 35% SiO. This ore being so high in sulphides was smelted for a dollar a ton. The southern part of the orebody has not been mined and is about 350 ft. below the surface at the southern extremity. The northeast orebody has been fully developed on the main level and was about sixty feet long and twenty to forty feet wide.

CLARENCE L. AMEN, E. M.

A raise was put up about 20 ft. in the orebody and showed higher values. On the main level this orebody was greatly broken up but in the raise the ore is more solid and uniform. On the main level the orebody averages about 5.0% cu. and 5 oz. Ag. being similar otherwise to the ore in the Big Stope. In the raise, however, the ore assayed a little over 6% Cu. and a little higher in silver. To the south of this orebody there is a very large area of limestone mineralized with sulphides, partially developed, which assays a little better than 3% Cu. Forty below the main level the winze level has partially developed this low grade area showing a little higher values in copper and about $2.00 in gold and silver. In the upper workings there is over 500 feet of development work, in the main level over 3000 ft., and in the winze level about 350 ft. Between levels there are about 700 feet of raises, winzes and subdrifts. In the Copper Duke Claim there has been about 700 feet of work done. This showed up a vein of malachite varying from one to four feet in width and assaying 15% Cu. or better. The vein dipped under the level at a slight degree and into the hill. The ore above the level has been stoped out. On the southeast end of the Copper Duke claim there are two promising outcrops of iron gosson, heavily stained with copper which have not been prospected and there are similar ones on the Arctic and Four Aces which have not been developed. A drift was driven on the Mormon Queen on a fissure vein in the porphyry which assayed 7.2% Cu. and 0.36 oz. Ag. It is about two feet wide and seems to be widening out and looking richer.

On the Queen of Sheba and Copper Belt there are large areas of copper stained porphyry which indicate other fissure veins in the porphyry. A crosscut is being run to strike these veins about 150 ft. below the surface but at present the crosscut has not been advanced far enough to do this. On the Bulldozer claim the contact of the limestone and granite outcrops and the limestone near the contact has been partly replaced by silica and copper carbonates. Quite a large quantity of this ore has been quarried and still remains on the dumps. To the southeast of the Bulldozer hill, shafts have been put down on this claim and on the America which have cut from 5 to 15 ft. of this oxide ore. An assay of the ore on the Bulldozer dumps assayed 8.8% Cu. and 2.96 oz. Ag. Most of the work on this claim was done 15 or 20 years ago and as a result very little is known about what was encountered. It is reported that sulphide ore encountered in the lower workings caused their abandonment, due to the difficulty of smelting sulphide ore at that time. The strike of the limestone and granite is covered by wash to the northwest, so the probable extent of this ore on the Bulldozer is not known. The total amount of development work on the entire group is about 7000 feet.

FUTURE DEVELOPMENT WORK:

The Big Stope orebody to the south narrows to about a foot in width but as that has been the character of the orebody to narrow and then widen out, a drift should be driven south and then raises put up on the vein at about fifty foot intervals. From the length of outcrop to this orebody on the surface, the orebody should continue for from 1 to 100 ft. further south. This southern extremity would be about 350 ft. below the surface. The northeast orebody on the main level is 200 ft. below the surface and ought to be further developed by raises. The low grade orebody to the south should also be further prospected by raising. An incline shaft would be the most advisable way of further developing the vein of malachite on the Copper Duke claim. The showing on the Bulldozer and America is really the largest on the group and the old shafts ought to be retimbered or new ones sunk to determine the extent of this orebody and the character of the ore in depth. In all the old shafts the ore was cut in considerable quantities as evidenced by the amount on the dumps.

CONCLUSIONS:

The previous method of shipping ore to El Paso cost $5.00 a ton for hauling and freighting; so in order to reduce this cost, some method of reduction or concentration should be adopted. With very little development work, enough additional ore could be blocked out to warrant the erection of a fifty ton smelter. This would be the ideal way of reduction as the character of the different ores is such that an ideal mixture could be gotten. The disadvantage to this method is the distance which the coke and smelter supplies would have to be hauled. In the lower workings of the Tip Top and in the shafts on the Juniper and Bulldozer, sufficient water could be gotten for smelter and boiler purposes.

A more economical method of treating the sulphide ore would be perhaps to use concentrating tables, roasters and magnetic separators. This sulphide ore is coarsely crystalline and ought to lend itself very well to this treatment.

The principal disadvantages to this method is the inability to treat the oxide ores in this manner. However this large amount of low grade sulphide ore could hardly be treated economically in the smelter. On the Tip Top dump, there are about two hundred tons of 5.5% sulphide ore and about two thousand tons of sulphide ore better than 3%.

There is a small amount of oxide and sulphide ore on the Noon Day dumps, the oxide assaying about 4% and the sulphide about 3.3% Cu. Taken altogether the ore on the different dumps and that partially developed, there is enough known ore to warrant the furthering of plans for a reduction works.

By the use of a traction engine the hauling charges for coke and mat or concentrates could be greatly reduced.

By either means of reduction a very large per cent of the total costs of handling the ore will be cut out and will admit of a very substantial profit on the ore.

Finally with a small expenditure for reduction works, I am firmly convinced that, even at this present low price of copper the conditions at the property are such that very satisfactory profits may be expected from any money expended in its further progress.

(signed) CLARENCE L. AMAN E. M.

SYNOPSIS OF GEOLOGY OF HIP TOP WORKINGS
(See Blue Print)

MAIN TUNNEL:
935 ft. long, comprised of 80 ft. of quartz monzonite - 285 ft. of granite, slightly copper stained - 330 ft. of quartzite and 240 ft. of limestone with small stringers of pyrite and chalcopyrite.

1 x: - 285 ft. long, 125 ft. being much shattered quartzite and 160 ft. altered limestone with bunches and stringers of pyrite and chalcopyrite. About 60 ft. of this altered limestone will assay from 2 to 4% copper; at the end of this crosscut there is a small open stope which indicated that further development might be advisable here in the form of an incline raise.

2 x: - 28 ft. long. This crosscut went through quartzite from its entire length.

3 x: - 80 ft. long. This cut 5 ft. of quartzite and 75 ft. of mineralized limestone. At the top of the winze there are bunches of sulphide ore averaging 3 to 8% Cu. This crosscut includes the engine room which is 40 ft. x 15 ft.

4 x: - 135 ft. long. 5 ft. of quartzite, 60 ft. of mineralized limestone, averaging about 3.5% Cu. and 70 ft. of altered limestone with stringers of pyrite and chalcopyrite which were cut.

5 x: - 75 ft. total length. This crosscut went through altered limestone.

6 x: - 45 ft. long. This cut slightly altered limestone throughout its length.

7 x: - 30 ft. long. Altered limestone with small stringers of pyrite was cut through.

8 x: - 75 ft. long. The material cut was altered limestone, 40 ft. of it being slightly mineralized with chalcopyrite and pyrite.

9 x: - 80 ft. long. Altered limestone with occasional pyrite stringers was crosscut.

10x: - 108 ft. long. This drift penetrated 40 ft. of quartzite, 68 ft. of mineralized limestone averaging 4 to 6% Cu.

11x: - 115 ft. long. This cut through 15 ft. of quartzite, 30 ft. of mineralized limestone, 40 ft. of sulphide ore averaging 4.5% Cu., and 30 ft. of mineralized limestone.

12 x: - 65 ft. total length. This advanced through 50 ft. of mineralized limestone and 15 ft. of sulphide ore averaging 5 to 8% Cu.

13 x: - 125 ft. total length. This material cut was 115 ft. of mineralized limestone averaging 3.5% Cu. and 10 ft. of badly broken quartzite.

14 x: - 30 ft. in length. This cut 30 ft. of mineralized limestone assaying 3.5% Cu.

15 x: - 105 ft. long. The total advance shows 55 ft. of mineralized limestone going 3.5% Cu., and 50 ft. of altered limestone.

16 x: - 80 ft. long. For its total length it contained altered limestone slightly mineralized.

17 x: - 15 ft. total advance. 10 ft. was mineralized limestone and 5 ft. of much altered granite.

18 x: - 15 ft. long. This cut 10 ft. of mineralized limestone and 5 ft. of sulphide ore averaging 4% Cu.

19 x: - 60 ft. long. This cut sulphide ore averaging 5.5% Cu. through its entire length.

20 x: - 14 ft. long, 12 ft. of sulphide ore going 5% Cu. was shown and 3 ft. of mineralized limestone.

21 x: - 12 ft. in length. This cut sulphide ore carrying 5% Cu. throughout its entire length.

22 x: - 15 ft. long. This cut mineralized limestone.

23 x: - 25 ft. long. This cut mineralized limestone.

24 x: - 15 ft. long. The advance shows 15 ft. of mineralized limestone.

25 x: - 15 ft. in length. Mineralized limestone showing 3% Cu. was cut.

26 x: - 20 ft. long. The material passed through was altered limestone, showing stringers of pyrite.

27 x: - 15 ft. long. This showed mineralized limestone throughout.

28 x: - 15 ft. advance. This was driven in altered limestone slightly mineralized.

29 x: - 15 ft. long. This showed mineralized limestone averaging 3.5% Cu.

30 x: - 35 ft. long. This exposed bunches of sulphide ore averaging 3% to 8% Cu. in an altered limestone.

#NOTE PERTAINING TO SULPHIDE ORE IN 19X, 20X, 21X and 11X

The ore is bunchy and if a little care be taken in sorting the ore assays as high as 6% and 9% will be gotten.

#1 Winze: - 40 ft. vertically, 65 ft. on incline: - this shows 15 ft. of bunchy sulphide ore averaging 6 to 8% Cu., 10 ft. of very much altered limestone or quartzite and 15 ft. of granite.

#2 Winze: - 40 ft. vertically. This shows mineralised limestone going 3 to 3½% Cu. for 20 ft. and altered limestone and quartzite, the other 20 ft.

Winze x cut - 125 ft. long. This cut granite in its entire length. #1

Winze x cut - 180 ft. long. This crosscut 20 ft. of granite, 140 ft. of badly broken quartzite and 20 ft. of altered limestone with small bunches and stringers of pyrite and chalcopyrite.

(signed) CLARENCE L. AMAN, E. M.

C O P Y

Tucson, I. T. August 6th, 1906

Mr. H. R. Simpson
Asst. Gen'l Manager
A. S. & R. Co.

Dear Sir:

I beg to submit herewith condensed report, showing measurements of ore bodies, map, shipments of ore and values of same on the Tip Top Mines, located in Helvetia Mining Camp, Pima County, Arizona, sixteen miles Southwest by wagon road from Vaile Station on the S. P. R. R.

1. Property consists of 31 mining claims, dimensions 1500' x 600'.
2. One patented claim and 30 held by right of possession; all work holding same regularly complied with in accordance with the mining laws of the District and the United States.
3. DEVELOPMENT WORK consists of some 7,000 feet of levels, drifts, raises and winzes. Trend of vein and ore bodies Northwest and Southeast.
4. HANGING WALL side of vein, country rock, quartzite.
5. FOOT WALL side of vein, country rock, granite.
6. DIP OF VEIN and ore bodies south of west, standing nearly vertical.
7. VEIN OR DYKE appears to be an altered porphyry with lime and shale disturbances, bounded on the northwest by the granite and southeast by quartzite.

8. CHARACTER OF SURFACE ORE in shallow workings, silicious carbonates, malachites and azurites.

9. CHARACTER OF SMELTING ORES sulphides, yellow copper, chalcopyrite and bornite.

10. CHARACTER OF CONCENTRATING ORES, silicious sulphides.

11. AVAILABLE SMELTING ORES in Tip Top Claim estimated at 25,000 tons; Assays_____ oz. Au., _____ oz. Ag. 6.5% Cu.

12. AVAILABLE CONCENTRATING ORES in Tip Top Mine - estimated dimensions 400x100x140'- allowing 15 Cu. Ft. to the ton - would yield 373,000 tons; average assay_____ oz. Au., _____ oz. Ag. 2.5% cu. wet.

13. COST OF MINING SMELTER ORES, $1.50 per ton.

14. COST OF WAGON HAUL SMELTING ORES, mine to Vail, $2.50 per ton.

15. COST OF MINING CONCENTRATING ORES, $1.00 per ton.

16. COST OF MILLING and concentrating ores locally(approximately $.60 per ton)

17. TOTAL SHIPMENTS to smelter, El Paso, 310 cars.

18. TOTAL SULPHIDE ORE SHIPMENTS, 9,300 tons.

19. TOTAL NET SMELTER RETURNS on sulphide shipments, $93,000.00.

20. TOTAL NET MINE RETURN on sulphide smelting ores, $55,000.00.

21. NET AVAILABLE SULPHIDE smelting ores in mine, value $150,000.00.

22. NET AVAILABLE CONCENTRATING ORES in mine, value $373,000.00.

23. NET VALUE PER TON at mines, smelting ores, as per past shipments, $6.00 per ton.

24. NET VALUE PER TON estimated on raw concentrating ore, 2.5% cu., $1.00 per ton in mine.

E X H I B I T "A"

Verification of ore tonnage and computed values

By - Tip Top Mine car samples, Month of May, 1906.

By - El Paso Smelting Wks. Shipments, Month of May, 1906.

By - Grey check hand sampling(in Aug.) " " " "

MINE CAR SAMPLES RECORD

Date, 1906	No. of Mine Cars	Assay Cu. %
1	20	3.5
2	24	6.2
3	28	7.0
4	21	6.3
5	24	6.6
6	26	6.5
7	23	6.7
8	30	6.8
9	28	5.0
10	20	6.0
11	25	6.1
12	34	6.5
13	19	6.8
14	26	7.0
15	30	6.5
16	38	6.7
17	30	6.5
18	8	7.3
19	10	8.5
20	14	7.1
21	20	7.7
22	18	8.0
23	36	7.3
24	46	7.0
25	21	6.1
26	30	7.1
27	28	6.5
28	37	6.0
29	34	6.1
30	29	6.2
31	26	6.0

allowing 1200 lbs. to car - 478.8 tons
average assay - 6.2% Cu.

Grey's check samples, shown on map, Nos. 1, 2, 6 composite assay 8.2% Cu. -

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El Paso Smelter 17 cars, 510 tons wet. Average assay 6.3% Cu.

E X H I B I T "B"

Verification of ore tonnage and computed values

By - Tip Top Mine car samples - Month of June, 1906

By - El Paso smelting Wks. shipments " " " "

By - Grey Check hand sampling(in Aug.) " " "

MINE CAR SAMPLES RECORD

Date, 1906	No. of Mine Cars	Assay Cu.%
1	18	6.1
2	17	6.7
3	16	7.0
4	28	6.6
5	14	6.6
6	12	6.5
7	16	6.6
8	13	6.3
9	14	6.7
10	10	6.5
11	19	6.8
12	21	6.5
13	8	6.2
14	13	6.3
15	14	6.1
16	18	6.4
17	11	6.8
18	19	7.0
19	18	6.9
20	20	6.8
21	16	6.3
22	11	6.7
23	21	7.0
24	13	7.1
25	11	7.0
26	9	6.8
27	8	6.7
28	11	6.7
29	13	6.8
30	14	6.7

Allowing 1200 lbs. to car - 267.6 tons
average assay 6.6% Cu.

Grey's check samples, shown on map, Nos. 1, 2, 3, 4 and 5, composite assay 6.8% Cu.

El Paso Smelter, 5 cars, 150 tons wet, average assay 6.9% Cu.

E X H I B I T "C"

Verification of ore tonnage and computed values

By - Tip Top Mine car samples - Month of July, 1906

By - El Paso Smelting Wks. shipments " " " "

By - Grey check hand sampling(in Aug.) " " "

MINE CAR SAMPLES RECORD

Date, July, 1906	No. of Mine Cars	Assay Cu.%
1	18	6.3
2	20	6.5
3	14	6.7
4	16	7.0
5	14	6.7
6	25	6.9
7	16	7.0
8	14	6.5
9	20	6.7
10	13	7.0
11	16	6.7
12	17	6.5
13	11	6.3
14	20	6.2
15	14	6.0
16	30	6.1
17	35	6.5
18	23	6.7
19	24	7.0
20	31	6.7
21	18	6.7
22	45	7.0
23	38	6.3
24	36	6.3
25	40	6.0
26	27	7.0
27	26	6.5
28	31	6.4
29	36	6.5
30	23	6.0
31	24	6.2

Allowing 1200 lbs. to car - 440.4 tons
average assay 6.5% Cu.

Grey's check samples, shown on map, Nos. 7, 7, 8, and 9, composite assay 8.2%

El Paso Smelter, 8 cars, 270 tons wet, average assay 6.9% Cu.

Tip Top Mine, Available Smelting Ores, 25,000 Tons

Mine Hand Samples by Grey
Mine Car Samples by Foreman
Smelter Car Returns

Position of samples marked on map, Plan A, in red ink

Samples	ag. oz.	au. oz.	cu. %	insol. %	Si02 %	fe. %	mn. %	cao. %	S. %
MINE 1			11.7						
2			8.7						
3			3.4						
4			5.3						
5			3.0						
AVERAGE									
Composite sample #1, 2, 3, 4 and 5			6.5 6.6						
MINE 6			9.6						
7			10.6						
8			6.3						
9			18.2						
10			6.6						
11			11.3						
12			23.8						
XX			4.8						
XXX			11.8						
Composite sample #1 to 9, inc.			8.2						
Mine Car Samples									
May			6.2						
June			6.6						
July			6.5						
Smelter Car Returns									
May			6.3						
June			6.9						
July			6.9						

Tip Top Mine Available Concentrating Ore, 375,000 tons

Mine Hand Samples by Grey

Position of samples marked on map, Plan A, in red ink

Samples	ag. oz.	au. oz.	cu. %	insol. %	Sio2 %	fe. %	mn. %	CaO %	S. %
MINE A			3.4						
B			2.7						
C			1.8						
D			2.5						
E			2.7						
F			2.2						
Average			2.5						
Composite Samples A to F inc.			2.1 2.5						

Concentration test composite samples A to F inclusive.

Raw ore assay

Percentage 6.13 tons into one
Concentrate assay
Tailings assay

Low Grade Dumps

Sample "I"
6,000 tons

Sample "J"
4,000 tons

R E M A R K S

Mine has been self supporting under dreadful disadvantages.

I can see no reason, from all the facts presented, why the Tip Top Mine cannot be made one of the very good copper producing properties of Arizona. It certainly has the good features and ear marks of a good pay copper sulphide Zone.

I unhesitatingly recommend it to your company.

Yours truly,

Douglas Gray
Ore Purchasing Agent

KEY TO MAP

AND

DESCRIPTION OF SAMPLES

Key to Map and Description of Samples

A - 11 numbers in red ink shown on map of plan "A"

Sample #1 - Big stope above tunnel level from which May and June shipments were made.

Sample #2 - Big Stope extension, south ore chute, shipments made to smelter from this point in May and June.

Sample #3 - North drift under north stope winze(30 mine cars taken from this point). Shipments made to smelter from this point in May, June and July.

Sample #4 - Southern slip, shipping ore, 25 mine cars taken out of this winze and raise.

Sample #5 - West Drift, 25 mine cars taken from this place, 900 ft. from mouth of tunnel, 300 ft. deep, and put in smelter shipments.

Sample #6 - Big stope, July shipments.

Sample #7 - Upper workings and stope in main raise. This sample represents grade and character of the good ore mined above, and went in recent shipments.

Sample #8 - From No. 6 raise, ore shipped to smelter from this point in July.

Sample #9 - From winze, shipment from this point put in July smelter shipments.

Sample #10- Silver streak, 400 ft. from mouth of tunnel - a very promising point for a productive ore chute. No ore from this point ever shipped and is in an undeveloped part of mine.

Sample #11- Special sample winze, below tunnel 20'.

Sample #12- Special sample out of raise above tunnel level, and in strong and good smelting ore.

Sample #XX- Represents native copper in the quartz and shale. Tonnage not estimated or considered.

Sample#XXX- Represents a series of samples taken, selected sulphides ores along the course of tunnel, 600 ft. from mouth.

Nos. A, B, C, C, E and F - Low grade concentrating ore on tunnel level, single block.

"I" - Represents 6,000 tons dump ore, low grade concentrating sulphides.

"J" - Represents 4,000 tons low grade sulphides on waste dumps - could be concentrated.

FOR REFERENCES

0 - Granite foot wall.

00 - Quartzite hanging wall.

000 - Shales or vein matter.

0000- Black lime with manganese, occurs as a disturbing element in vein as horse at times.

00000- Lime vein capping on mountainside.

DOUGLAS GRAY

EWALD A. HAGLUND SALES AGENCY
TELEPHONE AMBASSADOR 2-9445
1434 W. GRANVILLE AVE - CHICAGO 26, ILL. - U.S.A.

FEBRUARY 13, 1955

DEAR JIM:

RECEIVED YOUR PAPERS AND GLAD TO HEAR FROM YOU.

I KNOW THAT YOU HAVE BEEN VERY BUSY, SO HAVE NOT PRESSED YOU FOR THE MILL DATA, IN FACT, I HAVE A MINING ENGINEER WHO IS ANXIOUS TO LEAVE FOR ARIZONA. HE IS WILLING TO RELIEVE YOU OF ALL OF THE WORK PERTAINING TO ESTIMATES, TEST WORK, CONSTRUCTION, ETC., SO WE CAN GET INTO PRODUCTION, QUICKLY.

OUR THIRD PARTY IS STILL INTERESTED IN MATCHING DOLLARS WITH ME AND PUTTING UP A 100 TON MILL, WHICH MEANS WE COULD EACH HAVE A ONE THIRD INTEREST. THIS IS ENTIRELY UP TO YOU.

AS TO SELLING OUT, FRANKLY, I CAN'T SEE WHERE WE WOULD BE BETTER OFF, HOWEVER, IF YOU WANT IT THAT WAY AND PROVIDING YOU CAN GET A BETTER DEAL, I WILL NOT STAND IN THE WAY.

THEIR OFFER, WITH CAPITAL GAINS TAX, WOULD ONLY NET US ABOUT $36,000 EACH OVER A PERIOD OF 3 OR 4 YEARS. JIM, THAT IS PEANUTS COMPARED WITH WHAT WE COULD MAKE OURSELVES, OVER THE SAME PERIOD OF TIME AND STILL HAVE AN OPERATION THAT WE COULD SELL AT ANY TIME. IF THEY WOULD PAY US $150,000 AND PAY DOWN $5,000 UPON SIGNING UP AND $5,000 IN 90 DAYS, THE BALANCE AS PER SCHEDULE, I WILL GO ALONG.

SHOULD YOUR PARTY TURN IT DOWN, LET'S GET GOING OURSELVES AND LET ME KNOW SOON, WHAT YOUR REACTION IS TO THE ABOVE PROPOSITIONS.

AS EVER, YOUR FRIEND AND PARTNER,

/s/ EWALD A. HAGLUND
EWALD A. HAGLUND

HPS:

BOND AND LEASE BETWEEN

1. MINERALS EXPLORATION COMPANY — 1ST PARTY

2. JAMES R. MATTINGLY, EVANSTON, ILLINOIS) — 2ND PARTY
EWALD A. HAGLAND, CHICAGO, ILLINOIS)

1. PURCHASE PRICE TO BE FIFTY FIVE THOUSAND DOLLARS ($55,000.00), IF AFTER EIGHTEEN (18) MONTHS OF CONTINOUS DEVELOPMENT, A TOTAL OF ONE HUNDRED MILLION (100,000,000) POUNDS OF RECOVERABLE COPPER IS BLOCKED OUT AS POSITIVE OR PROBABLE ORE. ON THIS BASIS, FIVE THOUSAND DOLLARS ($5,000.00) IS PAYABLE AS ADVANCE ROYALTY TWELVE (12) MONTHS FOLLOWING THE SIGNING OF THIS AGREEMENT, OR IF MORE THAN ONE HUNDRED MILLION (100,000,000) POUNDS OF RECOVERABLE COPPER IS BLOCKED OUT TWELVE (12) MONTHS FOLLOWING THE SIGNING OF THIS AGREEMENT A PORTION OF THIS AMOUNT OF FIVE THOUSAND DOLLARS ($5,000.00) WILL BE PAID AS ADVANCE ROYALTY, IF THE TOTAL AMOUNT OF RECOVERABLE COPPER BLOCKED OUT AS POSITIVE OR PROBABLE ORE IS TWO HUNDRED MILLION (200,000,000) POUNDS OR MORE, THE PURCHASE PRICE WILL BE ONE HUNDRED THOUSAND ($100,000.00) DOLLARS. ON THIS BASIS, TEN THOUSAND DOLLARS ($10,000.00) IS PAYABLE AS ADVANCE ROYALTY TWELVE (12) MONTHS FOLLOWING THE SIGNING OF THIS AGREEMENT. THE PAYMENT OF THE FIRST FIVE THOUSAND DOLLARS ($5,000.00) WILL BE SO PAID IF AFTER TWELVE (12) MONTHS THE AMOUNT OF RECOVERABLE COPPER HAS NOT REACHED TWO HUNDRED MILLION (200,000,000) POUNDS, BUT IF AFTER EIGHTEEN (18) MONTHS OF CONTINOUS DEVELOPMENT THE AMOUNT OF RECOVERABLE COPPER EXCEEDS ONE HUNDRED MILLION (100,000,000) POUNDS, THE SECOND PAYMENT WHICH WILL BE DUE TWENTY FOUR (24) MONTHS FOLLOWING THE SIGNING OF THIS AGREEMENT, WILL BE ON THE BASIS OF ORE RESERVES CALCULATED AFTER THE EIGHTEEN (18) MONTH PERIOD.

2. ROYALTY PAYMENTS WILL BE TWO AND ONE-HALF PERCENT (2½%) OF NET SMELTER RETURNS, BUT SHALL NOT BE LESS THAN TEN THOUSAND DOLLARS ($10,000.00) A YEAR. THESE PAYMENTS WILL BE PAID AT THE MINIMUM RATE EITHER AS AN ADVANCE ROYALTY EACH TWELVE (12) MONTHS FOLLOWING THE SIGNING OF THIS AGREEMENT OR ON THE BASIS OF TWO AND ONE-HALF PERCENT (2½%) OF NET SMELTER RETURNS AFTER THE COMMENCEMENT OF PRODUCTION.

3. IF ORE RESERVES FALL BETWEEN ONE HUNDRED MILLION (100,000,000) AND TWO HUNDRED MILLION (200,000,000) POUNDS OF RECOVERABLE COPPER, TOTAL PURCHASE PRICE WILL BE CALCULATED ON A PROPORTIONATE AMOUNT ABOVE ONE HUNDRED MILLION (100,000,000) POUNDS. ALL ORE DEVELOPED MUST EITHER BE CLASSED AS POSITIVE OR PROBABLE ORE.

4. A FEE OF ONE HUNDRED DOLLARS ($100.00) PER MONTH WILL BE PAID AS ADVANCE ROYALTY UNTIL THE INITIAL PAYMENT OF FIVE THOUSAND DOLLARS ($5,000.00) OR MORE IS MADE.

5. ACTUAL DEVELOPMENT WILL COMMENCE WITHIN ONE HUNDRED AND TWENTY (120) DAYS FOLLOWING THE SIGNING OF THIS AGREEMENT.

6. THE SECOND PARTY WILL BE ALLOWED TO CONTINUE MINING OPERATIONS UNTIL THE INITIAL PAYMENT OF FIVE THOUSAND DOLLARS ($5,000.00) OR MORE.

7. IF HE SO DESIRES, JAMES R. MATTINGLY, OF THE SECOND PARTY, WILL BE EMPLOYED BY MINERALS EXPLORATION IN ANY CAPACITY MINERALS EXPLORATION DEEMS HIM QUALIFIED. THIS EMPLOYMENT CAN COMMENCE ANY TIME FOLLOWING THE BEGINNING ACTUAL EXPLORATION AND DEVELOPMENT.

8. SECOND PARTY WILL HAVE THE RIGHT AND PROVILEDGE TO EMPLOY A COMPETENT ENGINEER TO EXAMINE THE PROPERTY FOR THE PURPOSE OF ESTIMATING THE ORE RESERVES. IN THE EVENT THERE IS A MAJOR DISCREPANCY BETWEEN THE FIRST PARTY AND THE ENGINEER OF THE SECOND PARTY, AN UMPIRE ENGINEER, AGREEABLE TO BOTH PARTIES, CAN BE EMPLOYED BY

THE SECOND PARTY TO RESOLVE THE ORE RESERVE ESTIMATE. THE RESULTS OF HIS EXAMINATION WILL BE AGREEDED UPON AS A BASIS FOR THE PURCHASE PRICE OF THE PROPERTY.

9. IF THE OPTION IS NOT TAKEN AND THE PROPERTY IS RETURNED TO THE SECOND PARTY, ALL DATA INCLUDING DRILL CORES, WILL BE HANDED TO THE SECOND PARTY. THE FIRST PARTY RESERVES THE RIGHT TO REMOVE ALL MINING EQUIPMENT AND ANY OTHER EQUIPMENT USED IN THE EXPLORATION OF THE PROPERTY, EXCEPT TIMBER PLACED UNDERGROUND UNLESS THE SECOND PARTY COMPENSATES THE FIRST PARTY AT COST OF INSTALLATION.

8. CHARACTER OF SURFACE ORE in shallow workings, silicious carbonates, malachites and azurites.

9. CHARACTER OF SMELTING ORES sulphides, yellow copper, chalcopyrite and bornite.

10. CHARACTER OF CONCENTRATING ORES, silicious sulphides.

11. AVAILABLE SMELTING ORES in Tip Top Claim estimated at 25,000 tons; Assays_____ oz. Au., _____ oz. Ag. 6.5% Cu.

12. AVAILABLE CONCENTRATING ORES in Tip Top Mine - estimated dimensions 400x100x140'- allowing 15 Cu. Ft. to the ton - would yield 373,000 tons; average assay_____ oz. Au., _____ oz. Ag. 2.5% cu. wet.

13. COST OF MINING SMELTER ORES, $1.50 per ton.

14. COST OF WAGON HAUL SMELTING ORES, mine to Vail, $2.50 per ton.

15. COST OF MINING CONCENTRATING ORES, $1.00 per ton.

16. COST OF MILLING and concentrating ores locally(approximately $.60 per ton)

17. TOTAL SHIPMENTS to smelter, El Paso, 310 cars.

18. TOTAL SULPHIDE ORE SHIPMENTS, 9,300 tons.

19. TOTAL NET SMELTER RETURNS on sulphide shipments, $93,000.00.

20. TOTAL NET MINE RETURN on sulphide smelting ores, $55,000.00.

21. NET AVAILABLE SULPHIDE smelting ores in mine, value $150,000.00.

22. NET AVAILABLE CONCENTRATING ORES in mine, value $373,000.00.

23. NET VALUE PER TON at mines, smelting ores, as per past shipments, $6.00 per ton.

24. NET VALUE PER TON estimated on raw concentrating ore, 2.5% cu., $1.00 per ton in mine.

E X H I B I T "A"

Verification of ore tonnage and computed values

By - Tip Top Mine car samples, Month of May, 1906.

By - El Paso Smelting Wks. Shipments, Month of May, 1906.

By - Grey check hand sampling(in Aug.) " " " "

MINE CAR SAMPLES RECORD

Date, 1906	No. of Mine Cars	Assay Cu. %
1	20	3.5
2	24	6.2
3	28	7.0
4	21	6.3
5	24	6.8
6	26	6.5
7	23	6.7
8	30	6.8
9	28	5.0
10	20	6.0
11	25	6.1
12	34	6.5
13	19	6.8
14	26	7.0
15	30	6.5
16	38	6.7
17	30	6.5
18	8	7.3
19	10	8.5
20	14	7.1
21	20	7.7
22	18	8.0
23	36	7.3
24	46	7.0
25	21	6.1
26	30	7.1
27	28	6.5
28	37	6.0
29	34	6.1
30	29	6.2
31	26	6.0

allowing 1200 lbs. to car - 478.8 tons
average assay - 6.2% Cu.

Grey's check samples, shown on map, Nos. 1, 2, 6 composite assay 8.2% Cu.

El Paso Smelter 17 cars, 510 tons wet. Average assay 6.3% Cu.

E X H I B I T "B"

Verification of ore tonnage and computed values

By - Tip Top Mine car samples - Month of June, 1906

By - El Paso smelting Wks. shipments " " " "

By - Grey Check hand sampling(in Aug.) " " "

MINE CAR SAMPLES RECORD

Date, 1906	No. of Mine Cars	Assay Cu.%
1	18	6.1
2	17	6.7
3	16	7.0
4	28	6.6
5	14	6.6
6	12	6.5
7	16	6.6
8	13	6.3
9	14	6.7
10	10	6.5
11	19	6.8
12	21	6.5
13	8	6.2
14	13	6.3
15	14	6.1
16	18	6.4
17	11	6.8
18	19	7.0
19	18	6.9
20	20	6.8
21	16	6.3
22	11	6.7
23	21	7.0
24	13	7.1
25	11	7.0
26	9	6.8
27	8	6.7
28	11	6.7
29	13	6.8
30	14	6.7

Allowing 1200 lbs. to car - 267.6 tons
average assay 6.6% Cu.

Grey's check samples, shown on map, Nos. 1, 2, 3, 4 and 5, composite assay 6.8% Cu.

El Paso Smelter, 5 cars, 150 tons wet, average assay 6.9% Cu.

E X H I B I T "C"

Verification of ore tonnage and computed values

By - Tip Top Mine car samples - Month of July, 1906

By - El Paso Smelting Wks. shipments " " " "

By - Grey check hand sampling(in Aug.) " " "

MINE CAR SAMPLES RECORD

Date, July, 1906	No. of Mine Cars	Assay Cu.%
1	18	6.3
2	20	6.5
3	14	6.7
4	16	7.0
5	14	6.7
6	25	6.9
7	16	7.0
8	14	6.5
9	20	6.7
10	13	7.0
11	16	6.7
12	17	6.5
13	11	6.3
14	20	6.2
15	14	6.0
16	30	6.1
17	35	6.5
18	23	6.7
19	24	7.0
20	31	6.7
21	18	6.7
22	45	7.0
23	38	6.3
24	36	6.3
25	40	6.0
26	27	7.0
27	26	6.5
28	31	6.4
29	36	6.5
30	23	6.0
31	24	6.2

Allowing 1200 lbs. to car - 440.4 tons
average assay 6.5% Cu.

Grey's check samples, shown on map, Nos. 7, 7, 8, and 9, composite assay 8.2%

El Paso Smelter, 8 cars, 270 tons wet, average assay 6.9% Cu.

Tip Top Mine, Available Smelting Ores, 25,000 Tons

Mine Hand Samples by Grey
Mine Car Samples by Foreman
Smelter Car Returns

Position of samples marked on map, Plan A, in red ink

Samples		ag. oz.	au. oz.	cu. %	insol. %	SiO2 %	fe. %	mn. %	cao. %	S. %
MINE	1			11.7						
	2			8.7						
	3			3.4						
	4			5.3						
	5			3.0						
AVERAGE										
Composite sample #1, 2, 3, 4 and 5				6.5 6.6						
MINE	6			9.6						
	7			10.6						
	8			6.3						
	9			18.2						
	10			6.6						
	11			11.3						
	12			23.8						
	XX			4.8						
	XXX			11.8						
Composite sample #1 to 9, inc.				8.2						
Mine Car Samples										
	May			6.2						
	June			6.6						
	July			6.5						
Smelter Car Returns										
	May			6.3						
	June			6.9						
	July			6.9						

Tip Top Mine Available Concentrating Ore, 375,000 tons

Mine Hand Samples by Grey

Position of samples marked on map, Plan A, in red ink

Samples	ag. oz.	au. oz.	cu. %	insol. %	SIo2 %	fe. %	mn. %	CaO %	S. %
MINE A			3.4						
B			2.7						
C			1.8						
D			2.5						
E			2.7						
F			2.2						
Average			2.5						
Composite Samples A to F inc.			2.1 2.5						

Concentration test composite samples A to F inclusive.

Raw ore assay

Percentage 6.13 tons into one
Concentrate assay
Tailings assay

Low Grade Dumps

Sample "I"
6,000 tons

Sample "J"
4,000 tons

R E M A R K S

Mine has been self supporting under dreadful disadvantages.

I can see no reason, from all the facts presented, why the Tip Top Mine cannot be made one of the very good copper producing properties of Arizona. It certainly has the good features and ear marks of a good pay copper sulphide Zone.

I unhesitatingly recommend it to your company.

Yours truly,

Douglas Gray
Ore Purchasing Agent

KEY TO MAP

AND

DESCRIPTION OF SAMPLES

Key to Map and Description of Samples

A - 11 numbers in red ink shown on map of plan "A"

Sample #1 - Big stope above tunnel level from which May and June shipments were made.

Sample #2 - Big Stope extension, south ore chute, shipments made to smelter from this point in May and June.

Sample #3 - North drift under north stope winze(30 mine cars taken from this point). Shipments made to smelter from this point in May, June and July.

Sample #4 - Southern slip, shipping ore, 25 mine cars taken out of this winze and raise.

Sample #5 - West Drift, 25 mine cars taken from this place, 900 ft. from mouth of tunnel, 300 ft. deep, and put in smelter shipments.

Sample #6 - Big stope, July shipments.

Sample #7 - Upper workings and stope in main raise. This sample represents grade and character of the good ore mined above, and went in recent shipments.

Sample #8 - From No. 6 raise, ore shipped to smelter from this point in July.

Sample #9 - From winze, shipment from this point put in July smelter shipments.

Sample #10- Silver streak, 400 ft. from mouth of tunnel - a very promising point for a productive ore chute. No ore from this point ever shipped and is in an undeveloped part of mine.

Sample #11- Special sample winze, below tunnel 20'.

Sample #12- Special sample out of raise above tunnel level, and in strong and good smelting ore.

Sample #XX- Represents native copper in the quartz and shale. Tonnage not estimated or considered.

Sample#XXX- Represents a series of samples taken, selected sulphides ores along the course of tunnel, 600 ft. from mouth.

Nos. A, B, C, C, E and F - Low grade concentrating ore on tunnel level, single block.

"I" - Represents 6,000 tons dump ore, low grade concentrating sulphides.

"J" - Represents 4,000 tons low grade sulphides on waste dumps - could be concentrated.

FOR REFERENCES

0 - Granite foot wall.

00 - Quartzite hanging wall.

000 - Shales or vein matter.

0000- Black lime with manganese, occurs as a disturbing element in vein as horse at times.

00000- Lime vein capping on mountainside.

DOUGLAS GRAY

COPY

TIP TOP REPORT

GROUP OF CLAIMS

LOCATION:

The Tip Top Group of Claims is located in the foothills of the Santa Rita Mountains, Helvetia Mining District, Pima County, Arizona. It is connected by good wagon roads with Tucson and Vail, on the Southern Pacific RR, being 28 miles S. E. of Tucson, and 15 miles S.W. from Vail. The Tip Top Group is joined on the south by the Helvetia group of claims and in the S.W. by the Rosemont Group. On the east it adjoins a homestead owned by the Tip Top interests.

AREA AND SURFACE IMPROVEMENTS:

This group comprises one full-sized patented claim, 21 full-sized unpatented claims and 7 fractions. The claims cover an area of over 500 acres, largely mountainous. Included in this property is a homestead containing 148 acres. On the homestead are seven buildings with four to six rooms which have been used as dwellings, office, store and assay laboratory. There are also corrals, barns, and valuable water rights on the homestead.

GEOLOGY:

The oldest formation exposed on these claims is a coarsely crystalline granite with very prominent feldspar crystals. Carboniferous limestone forms the only sedimentary upon the granite in this locality. Between the granite and the limestone, there is a flat, irregular mass of fine-grained quartz porphyry which is found underlying the limestone in the Tip Top hill. In the Copper Duke hill the limestone has been entirely eroded away, exposing a large area of this quartz porphyry which has a maximum thickness of 200 feet. This porphyry is mineralized to some extent with native copper. It assays about 1.5% Cu. with small amounts of silver and gold. Besides this intrusion there have been later intrusions of aplite, mica diotite and quartz monzonite, the latter showing small values in copper. The quartz porphyry was responsible for a large amount of fissuring and faulting and also for ascending mineral solutions. The orebodies in the limestone have formed in the fissures along the contacts of the limestone and porphyry, and the limestone and granite. In the Tip Top Claim the main ore chute is a fissure vein, almost vertical, which has been displaced horizontally from 2 to 15 ft. by faulting later than the ore formation. On top of the porphyry this ore body spreads out for some distance along the contact. The northern part of this orebody has been faulted to the east and forms what is called the northeast orebody. The footwall of this orebody at the eastern end is the granite, as the quartz porphyry plays out to the east. In the Copper Duke working an orebody was found in a fissure in the porphyry which dipped below the tunnel level at a small angle. On the Mormon Queen and Queen of Sheba fissure veins were found in the porphyry with almost a vertical

dip. In the Bulldozer claim the ore occurs in the limestone near the contact with the granite. The workings on the Noon Day cut a large fault dipping almost vertically and showed quantities of sulphides in the crushed area adjacent to the fault. The dip of the contact of limestone and granite on the Bulldozer claim is at a slight angle to the southwest.

DEVELOPMENT WORK:

The Tip Top claim is the most thoroughly developed claim in the group. It is developed by three levels called the upper, main and winze levels. In the upper level the Big Stope orebody was first discovered and was developed by a drift on the orebody. This orebody has a dip of about 70 degrees to the east. The outcrop of this orebody extended for over 300 feet but on the upper level was only partially stoped out. The main tunnel on the main level was run south for about 950 feet and raises were put up about 40 feet to strike the orebody. The inclined distance between these levels is about 110 feet and the ore was stoped out to the upper level for about 150 feet at its northern end. About 6000 tons of ore were shipped to the American S. & R. Co. at El Paso during the years 1904 to 1907. The average of this total shipment was about 6.6% cu., 0.9 oz. Ag., 27.0 % Fe., 25% S. and 35% SiO. This ore being so high in sulphides was smelted for a dollar a ton. The southern part of the orebody has not been mined and is about 350 ft. below the surface at the southern extremity. The northeast orebody has been fully developed on the main level and was about sixty feet long and twenty to forty feet wide.

CLARENCE L. AMEN, E. M.

A raise was put up about 20 ft. in the orebody and showed higher values. On the main level this orebody was greatly broken up but in the raise the ore is more solid and uniform. On the main level the orebody averages about 5.0% cu. and 5 oz. Ag. being similar otherwise to the ore in the Big Stope. In the raise, however, the ore assayed a little over 6% Cu. and a little higher in silver. To the south of this orebody there is a very large area of limestone mineralized with sulphides, partially developed, which assays a little better than 3% Cu. Forty below the main level the winze level has partially developed this low grade area showing a little higher values in copper and about $2.00 in gold and silver. In the upper workings there is over 500 feet of development work, in the main level over 3000 ft., and in the winze level about 350 ft. Between levels there are about 700 feet of raises, winzes and subdrifts. In the Copper Duke Claim there has been about 700 feet of work done. This showed up a vein of malachite varying from one to four feet in width and assaying 15% Cu. or better. The vein dipped under the level at a slight degree and into the hill. The ore above the level has been stoped out. On the southeast end of the Copper Duke claim there are two promising outcrops of iron gosson, heavily stained with copper which have not been prospected and there are similar ones on the Arctic and Four Aces which have not been developed. A drift was driven on the Mormon Queen on a fissure vein in the porphyry which assayed 7.2% Cu. and 0.36 oz. Ag. It is about two feet wide and seems to be widening out and looking richer.

On the Queen of Sheba and Copper Belt there are large areas of copper stained porphyry which indicate other fissure veins in the porphyry. A crosscut is being run to strike these veins about 150 ft. below the surface but at present the crosscut has not been advanced far enough to do this. On the Bulldozer claim the contact of the limestone and granite outcrops and the limestone near the contact has been partly replaced by silica and copper carbonates. Quite a large quantity of this ore has been quarried and still remains on the dumps. To the southeast of the Bulldozer hill, shafts have been put down on this claim and on the America which have cut from 5 to 15 ft. of this oxide ore. An assay of the ore on the Bulldozer dumps assayed 8.8% Cu. and 2.96 oz. Ag. Most of the work on this claim was done 15 or 20 years ago and as a result very little is known about what was encountered. It is reported that sulphide ore encountered in the lower workings caused their abandonment, due to the difficulty of smelting sulphide ore at that time. The strike of the limestone and granite is covered by wash to the northwest, so the probable extent of this ore on the Bulldozer is not known. The total amount of development work on the entire group is about 7000 feet.

FUTURE DEVELOPMENT WORK:

The Big Stope orebody to the south narrows to about a foot in width but as that has been the character of the orebody to narrow and then widen out, a drift should be driven south and then raises put up on the vein at about fifty foot intervals. From the length of outcrop to this orebody on the surface, the orebody should continue for from 1 to 100 ft. further south. This southern extremity would be about 350 ft. below the surface. The northeast orebody on the main level is 200 ft. below the surface and ought to be further developed by raises. The low grade orebody to the south should also be further prospected by raising. An incline shaft would be the most advisable way of further developing the vein of malachite on the Copper Duke claim. The showing on the Bulldozer and America is really the largest on the group and the old shafts ought to be retimbered or new ones sunk to determine the extent of this orebody and the character of the ore in depth. In all the old shafts the ore was cut in considerable quantities as evidenced by the amount on the dumps.

CONCLUSIONS:

The previous method of shipping ore to El Paso cost $5.00 a ton for hauling and freighting; so in order to reduce this cost, some method of reduction or concentration should be adopted. With very little development work, enough additional ore could be blocked out to warrant the erection of a fifty ton smelter. This would be the ideal way of reduction as the character of the different ores is such that an ideal mixture could be gotten. The disadvantage to this method is the distance which the coke and smelter supplies would have to be hauled. In the lower workings of the Tip Top and in the shafts on the Juniper and Bulldozer, sufficient water could be gotten for smelter and boiler purposes.

A more economical method of treating the sulphide ore would be perhaps to use concentrating tables, roasters and magnetic separators. This sulphide ore is coarsely crystalline and ought to lend itself very well to this treatment.

The principal disadvantages to this method is the inability to treat the oxide ores in this manner. However this large amount of low grade sulphide ore could hardly be treated economically in the smelter. On the Tip Top dump, there are about two hundred tons of 5.5% sulphide ore and about two thousand tons of sulphide ore better than 3%.

There is a small amount of oxide and sulphide ore on the Noon Day dumps, the oxide assaying about 4% and the sulphide about 3.3% Cu. Taken altogether the ore on the different dumps and that partially developed, there is enough known ore to warrant the furthering of plans for a reduction works.

By the use of a traction engine the hauling charges for coke and mat or concentrates could be greatly reduced.

By either means of reduction a very large per cent of the total costs of handling the ore will be cut out and will admit of a very substantial profit on the ore.

Finally with a small expenditure for reduction works, I am firmly convinced that, even at this present low price of copper the conditions at the property are such that very satisfactory profits may be expected from any money expended in its further progress.

(signed) CLARENCE L. AMAN E. M.

SYNOPSIS OF GEOLOGY OF TIP TOP WORKINGS
(See Blue Print)

MAIN TUNNEL:

935 ft. long, comprised of 80 ft. of quartz monzonite - 285 ft. of granite, slightly copper stained - 330 ft. of quartzite and 240 ft. of limestone with small stringers of pyrite and chalcopyrite.

1 x: - 285 ft. long, 125 ft. being much shattered quartzite and 160 ft. altered limestone with bunches and stringers of pyrite and chalcopyrite. About 60 ft. of this altered limestone will assay from 2 to 4% copper; at the end of this crosscut there is a small open stope which indicated that further development might be advisable here in the form of an incline raise.

2 x: - 28 ft. long. This crosscut went through quartzite from its entire length.

3 x: - 80 ft. long. This cut 5 ft. of quartzite and 75 ft. of mineralized limestone. At the top of the winze there are bunches of sulphide ore averaging 3 to 8% Cu. This crosscut includes the engine room which is 40 ft. x 15 ft.

4 x: - 135 ft. long. 5 ft. of quartzite, 60 ft. of mineralized limestone, averaging about 3.5% Cu. and 70 ft. of altered limestone with stringers of pyrite and chalcopyrite which were cut.

5 x: - 75 ft. total length. This crosscut went through altered limestone.

6 x: - 45 ft. long. This cut slightly altered limestone throughout its length.

7 x: - 30 ft. long. Altered limestone with small stringers of pyrite was cut through.

8 x: - 75 ft. long. The material cut was altered limestone, 40 ft. of it being slightly mineralized with chalcopyrite and pyrite.

9 x: - 80 ft. long. Altered limestone with occasional pyrite stringers was crosscut.

10x: - 108 ft. long. This drift penetrated 40 ft. of quartzite, 68 ft. of mineralized limestone averaging 4 to 6% Cu.

11x: - 115 ft. long. This cut through 15 ft. of quartzite, 30 ft. of mineralized limestone, 40 ft. of sulphide ore averaging 4.5% Cu., and 30 ft. of mineralized limestone.

12 x: - 65 ft. total length. This advanced through 50 ft. of mineralized limestone and 15 ft. of sulphide ore averaging 5 to 8% Cu.

13 x: - 125 ft. total length. This material cut was 115 ft. of mineralized limestone averaging 3.5% Cu. and 10 ft. of badly broken quartzite.

14 x: - 30 ft. in length. This cut 30 ft. of mineralized limestone assaying 3.5% Cu.

15 x: - 105 ft. long. The total advance shows 55 ft. of mineralized limestone going 3.5% Cu., and 50 ft. of altered limestone.

16 x: - 80 ft. long. For its total length it contained altered limestone slightly mineralized.

17 x: - 15 ft. total advance. 10 ft. was mineralized limestone and 5 ft. of much altered granite.

18 x: - 15 ft. long. This cut 10 ft. of mineralized limestone and 5 ft. of sulphide ore averaging 4% Cu.

19 x: - 60 ft. long. This cut sulphide ore averaging 5.5% Cu. through its entire length.

20 x: - 14 ft. long, 12 ft. of sulphide ore going 5% Cu. was shown and 3 ft. of mineralized limestone.

21 x: - 12 ft. in length. This cut sulphide ore carrying 5% Cu. throughout its entire length.

22 x: - 15 ft. long. This cut mineralized limestone.

23 x: - 25 ft. long. This cut mineralized limestone.

24 x: - 15 ft. long. The advance shows 15 ft. of mineralized limestone.

25 x: - 15 ft. in length. Mineralized limestone showing 3% Cu. was cut.

26 x: - 20 ft. long. The material passed through was altered limestone, showing stringers of pyrite.

27 x: - 15 ft. long. This showed mineralized limestone throughout.

28 x: - 15 ft. advance. This was driven in altered limestone slightly mineralized.

29 x: - 15 ft. long. This showed mineralized limestone averaging 3.5% Cu.

30 x: - 35 ft. long. This exposed bunches of sulphide ore averaging 3% to 8% Cu. in an altered limestone.

#NOTEPERTAINING TO SULPHIDE ORE IN 19X, 20X, 21X and 11X

The ore is bunchy and if a little care be taken in sorting the ore assays as high as 8% and 9% will be gotten.

#1 Winze: - 40 ft. vertically, 65 ft. on incline: - this shows 15 ft. of bunchy sulphide ore averaging 6 to 8% Cu., 10 ft. of very much altered limestone or quartzite and 15 ft. of granite.

#2 Winze: - 40 ft. vertically. This shows mineralized limestone going 3 to 3½% Cu. for 20 ft. and altered limestone and quartzite, the other 20 ft.

Winze x cut - 125 ft. long. This cut granite in its entire length. #1

Winze x cut - 180 ft. long. This crosscut 20 ft. of granite, 140 ft. of badly broken quartzite and 20 ft. of altered limestone with small bunches and stringers of pyrite and chalcopyrite.

(signed) CLARENCE L. AMAN, E. M.

COPY

Tucson, I. T. August 6th, 1906

Mr. H. R. Simpson
Asst. Gen'l Manager
A. S. & R. Co.

Dear Sir:

I beg to submit herewith condensed report, showing measurements of ore bodies, map, shipments of ore and values of same on the Tip Top Mines, located in Helvetia Mining Camp, Pima County, Arizona, sixteen miles Southwest by wagon road from Vaile Station on the S. P. R. R.

1. Property consists of 31 mining claims, dimensions 1500' x 600'.
2. One patented claim and 30 held by right of possession; all work holding same regularly complied with in accordance with the mining laws of the District and the United States.
3. DEVELOPMENT WORK consists of some 7,000 feet of levels, drifts, raises and winzes. Trend of vein and ore bodies Northwest and Southeast.
4. HANGING WALL side of vein, country rock, quartzite.
5. FOOT WALL side of vein, country rock, granite.
6. DIP OF VEIN and ore bodies south of west, standing nearly vertical.
7. VEIN OR DYKE appears to be an altered porphyry with lime and shale disturbances, bounded on the northwest by the granite and southeast by quartzite.

4/9/

Jim Mattingly in.

Sold Tip Top to

Chilson ← still drilling

Mrs. Denver's Lawyer

Ken Tannebaum

2 claims w/any dev.

I worked out many yrs. ago.

Val. of dev. one - very nominal rept.

Walt's Map shows.

15 claims some fract. Named Sunset

besides 3 fractions ⅓ ½ A pat. grand

in Helvetia Prop. Denver owned

Mrs. Denver stands to get 3000/ton that

" " " to get 25,000/for 15

claims Mat. has lease

on. to be pd in $3,000

$4,000 already pd. $2000 w/title clear - now probate.

$25,000 to be pd over 6 yrs per.

Started Dec 26, 57 to get $200/mo. until end of 2nd yr. Then get 500/yr. until total of $25,000

2 claims Dev.

Tip Top – Main Tun.

American #1 Tun. below shack.

Dual