REPORT

To

THE ACO MINING COMPANY

On The

WARRIOR'S MARK, SEVEN-THIRTY, and HICKS-DETROIT

SUMMIT COUNTY 1923

By

BERGER AND SAYRE

Report furnished by George Robinson.

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Mining Engineers.

I. INTRODUCTION: The Warrior's Mark and Seven-thirty groups adjoin one another and are located ten miles southeast of Breckenridge. The Hicks-Detroit is two miles northeast of Breckenridge so that we must consider the properties as two separate mines, geologically. For administrative purposes they are not so far apart, however, as to present any serious difficulties for the local management.

The Warrior's Mark has been full of water to the first level ever since the examining engineers have been acquainted with the property. Our conclusions, therefore, have, of necessity, been drawn from surface geology and the inspection of a very limited extent of the upper workings.

The Seven-thirty also does not present an opportunity for underground sampling. The various shallow pits and tunnels are caved in but the vein is accessible in one or two places and all of the dumps.

In spite of these conditions it has been possible to make a thorough study of the surface geology and this, in conjunction with historical data and samples from the dumps and available parts of the underground workings, was sufficient to enable us to form conclusions as to the possibilities of the mine.

The Warrior's Mark is a mine which has produced very high grade silver ore from the surface workings. The character of the ore, the geology, and samples fromthe available surface workings, coupled with the easy and cheap development rendered possible by the topography warrant systematic exploration.

The Seven-thirty is still a prospect but has a remarkable surface showing for a long distance on the vein. This showing for an undeveloped property would be hard to duplicate in Colorado today and warrants not only a recommendation of development but a reasonable expectation that it will develop into a large and profitable mine.

The Hicks-Detroit is an operating, producing property and bids fair to become one of the most important producers of the district.

II. LIST OF CLAIMS:: The claims in the McBarnes and Minnesota Mining Districts, Summit County, Colorado, are as follows:

WARRIOR'S MARK:

	PATENTED.
Warrior's Mark	U. S. Mineral Survey No. 2138
Warrior's Mark, No. 2	U. S. Mineral Survey No. 2139
Casandra No. I	U. S. Mineral Survey No. 2143
Casandra No. 2	U. S. Mineral Survey No. 2144
Casandra No. 3	U. S. Mineral Survey No. 2145
Casandra No. 4	U. S. Mineral Survey No. 2146
Casandra No. 5	U. S. Mineral Survey No. 2147
Aetna	U. S. Mineral Survey No.2142
Mary B	U. S. Mineral Survey No. 2230

Queer Name No. I	U. S. Mineral Survey No. 2140
Queer Name No. 2	U. S. Mineral Survey No. 2141
Ridge No. 1	U. S. Mineral Survey No. 2231
Snow Drift	U. S. Mineral Survey No. 2152
Snow Drift Placer	U. S. Mineral Survey No. 2331

UNPATENTED

Warrior's Mark numbers one, three, four and five and the Warrior's Mark Placer.

This group has an irregular outline but covers approximately 3600 feet square. The only claim shown on the consolidated claim map, herewith, which does not belong to the Company is the Sunnyside No. 9580.

SEVEN-THIRTY:

PATENTED.

Silver Queen	U. S. Mineral Survey No 2222
Seven-Thirty	U. S. Mineral Survey No. 5578

UNPATENTED.

Boston Millsite and the Boston Claims, numbers one to eight inclusive. In all this covers a strip six thousant feet long by twelve hundred feet wide.

HICKS-DETROIT:

HICKS CLAIMS

Franklyn	U. S. Mineral Survey No. 9591
Kensington Placer	U. S. Mineral Survey No. 8271

Thistle)
Volunteer)
Intrepid)----------U. S. Mineral Survey 8271
B. B.)
Ethelena)
Mahant)

Chantilly)
Wicklow)
Alace A.)---------- U. S. Mineral Survey 8352 A
Roslyn)
Mineola)
Wynetta)

Alace A. M. S. U. S. Mineral Survey 8352 B

DETROIT CLAIMS

Portion of Detroit Placer 600 feet by 600 feet.

III. Location: The mines are all in Summit County, Colorado, and within a few miles of Breckenridge, the county seat. By automobile, Breckenridge is reached from Denver in six hours, up Platte Canyon, through South Park, and across the continental divide at Hoosier Pass. By train, one leaves Denver at eight in the morning and may get off directly above and about a quarter of a mile away from the Warrior's Mark camp at 2:45 in the afternoon or may proceed to Breckenridge, arriving at 3:25.

GENERAL GEOLOGY: Starting in southwestern Colorado all of the most important mineral districts, with a few exceptions, follow a belt extending northeast almost to the northern end of the state. The San Juan Mountains, including Silverton, Telluride, Ouray, and Lake City are followed by Pitkin, Leadville, Breckenridge, Georgetown, Central City, and finally the mines of Boulder County. This belt is characterized by very diverse deposits not only in regard to ore itself but in the formations where the deposits occur. At Leadville, southwest of Breckenridge, the ore occurs in Paleozoic limestones. To the northeast the Montezuma and Georgetown districts are entirely in the pre-Cambrian granites, gneisses, and schists.

At Breckenridge, the ore occurs in Jurassic and Cretaceous sandstones and shales in connection with intrusions of Tertiary porphyry. Except in the southern end of the district the Triassic is not represented and in only one place has erosion uncovered pre-Cambrian rocks. Throughout the district the character of the ore deposits is much influenced by the particular formation in which they occur. In the pre-Cambrian crystalline rocks, narrow fissure veins carry auriferous pyrite. The monzonite porphyry contains probably the strongest deposits like the Wellington carrying values of zinc, lead, silver and gold in the respective quantities indicated by the sequence. The Dakota quartzite carries gold-silver deposits and the shale, close to porphyry intrusions, contains little fissures from which remarkable specimens of metallic gold have been obtained. In the very small area of red sandstone which belongs to the Breckenridge district proper, no important deposits have been found. The sequence of the formations in the Breckenridge district is as follows: At the bottom, pre-Cambrian granites, gneisses, and schists. Resting directly on the pre-Cambrian, but thinning out to the north so that it is absent from most of the district, is the Triassic "Wyoming" formation of red micaceous sandstones. Resting with apparent conformity on the "Wyoming" is the Dakota sandstone of the upper Cretaceous. This sandstone is uniformly metamorphosed into quartzite. Above the Dakota and also in upper Cretaceous is a bed of dark fissile shales. With bewildering irregularity this series is cut and intruded by tremendous sills, dykes, and irregular intrusions of porphyry. In the northern part of the district the porphyry is a quartz monzonite and in the southern part a monzonite porphyry. To further complicate the geology, a series of faults cut through the district in irregular lines bringing unlike formations together and often resulting in an apparent reversal of the series.

V. HISTORY: The Breckenridge district was discovered in 1859 or 1860. Continuous mining operations, with various ups and downs, have been carried on from that day to this. During the sixties, most of the mining consisted of placer work and it was not until the late seventies that any great amount of lode mining was undertaken. Late in the seventies the Warrior's Mark was discovered and the unusually rich silver ore taken out right at the surface probably furnished the first bonanza find in place in the district. From an open cut still to be seen near the present shaft house ninety or one hundred thousand dollars worth of very rich ore was taken out in a short period. The district as a whole has furnished many examples of successful mining operations although of late years the Wellington with its consistant lead and zinc production and the large placer dredges on the Blue River and its tributaries have been the only continuous operations.

The Warrior's Mark has made an intermittent production for many years although the examining engineers have had no opportunity of obtaining reliable statistics as to this production. The hill is dotted with pits and tunnels, most of them apparently located in a haphazard manner and it has been impossible even to ascertain the depth of the Warrior's Mark shaft. No attempt at milling ores under modern metallurgical conditions has been attempted. There still remains a ruined stamp-mill put up in the early days. One can easily imagine the less than worthless result of stamp-mill amalgamation on the Warrior's Mark silver ore.

On the Seven-thirty the various shafts and tunnels have a reputed production of around one hundred thousand dollars. All of this came from workings high up on the very steep mountain where every pound had to be sacked and packed to the road on donkeys.

VI. UPPER MINES:

ACCESSIBILITY: The upper mines, as we will designate the Warrior's Mark and Seven-thirty, are connected with Breckenridge by a wagon road about seven miles long. This road is in a bad state of repair at present but could eventually be drained and fixed with no very great expense for a permanent automobile and truck road.

TOPOGRAPHY: The claims cover an unusually rugged territory ranging from an altitude of 10,500 feet at the lower end of the Warrior's Mark to 13,200 feet at the upper end of the Seven-thirty. The Warrior's Mark is on a ridge which divides two forks of Pennsylvania Gulch which in turn flows into the Blue River not far above the town of Breckenridge. At the head of the east fork is Boreas Pass over the continental divide which is used by the railroad. The the east of the railroad again the Seven-thirty claims extend up to the ridge of Bald Mountain, a lofty peak of porphyry which at its highest point is over 14,000 feet above sea level. At the head of the west fork of Pennsylvania Gulch another high peak is known as Red Mountain.

WATER: The two forks of Pennsylvaina Gulch furnish an ample supply of pure water for domestic purposes and at their junction, where would be located the mill for both properties, more than enough for concentration purposes.

CLIMATE: At this altitude, near timber line, the summer is short but exceptionally beautiful and the winter is long, cold, and snowy. With the railroad running directly across the property, however, the mines, when once properly equipped, will run throughout the year and in fact are much more favorably located than a majority of Colorado's great mines in the San Juan region.

TIMBER: A thick forest of large Engelmann spruce covers the claims up to timber line at about 11,500 feet and furnishes a more than adequate supply of timber for all mining and construction purposes.

GEOLOGY: The Warrior's Mark and Seven-thirty are two or three miles south of the Breckenridge district proper and here the geology has changed to mark a transition between the Breckenridge formation and the Leadville formation still further to the south. The prevailing rock is now the Triassic "Wyoming" red sandstone which has here obtained the thickness of several thousand feet. Vestiges of the over-lying quartzite and shale are still seen and tremendous sills of monzonite porphyry are interbedded conformably with the sandstone. All of the formations dip to the northeast at about thirty-five degrees and strike north twenty degrees west. It is quite apparent that they were pushed up along the axis of the great Ten Mile range three miles to the west across the Blue River. The Warrior's Mark hill is red sandstone with interbedded porphyry. The the west and across the west fork of Pennsylvania Gulch the mountain ridge is composed entirely of porphyry dipping under the Warrior's Mark Hill. The high ridge of Bald Mountain to the east is monzoniteporphry. Near the base of the mountain and showing through the heavy wash occasionally are patches of quartzite and shale which are remnants of the formations over-lying the "Wyoming".

The Seven-thirty and Warrior's Mark veins have the north-east-southwest strike characteristic of the strongest veins from the San Juan Mountains to Boulder County and after a study of the geology it is quite apparent that they represent a single shear zone. On Bald Mountain the vein is accompanied by a vertical fault displacement of nearly five hundred feet and where this fault goes into the soft sedimentary formations, particularly the red sandstones, the shearing movement has resulted in several parrallel veins of which the Columbine and Warrior's Mark are examples. Were it not for the intense fissuring and the strength added by the interbedded porphyry, the red sandstone, ordinarily a poor locus for ore deposits, would not make a mine.

The identity of the stron Seven-thirty and Warrior's Mark veins is an important factor in drawing conslusions as to the permanency and future possibilities of the Warrior's Mark. In going up from the Warrior's Mark camp to the Seven-thirty there are only a few isolated outcrops of bed rock but these indicate a series of north and south faults which would interfere with the exploration of the veins in this territory. Near the railroad track with the quartzite below and shale above, we have evidence of the logical sequence of the formations. On the Boston Number Six lode tunnel driven through the wash encounters quartzite. Again, the lower tunnels on the Silver Queen and the New Tunnel in the corner of Boston Number Three lode encounter red sandstone. It is quite apparent that faulting has disturbed the normas sequence of the beds. Again, on Warrior's Mark Hill the projected apex of both the Columbine and Warrior's Mark veins to the west fails to correspond with the surface showings where the veins are disclosed on the slope over-looking the west fork.

In general, it is possible to summarize the geological conditions as follows:

(1) The vein formation of the two groups was contemporaneous resulting in one vein system although the regular Seven-thirty vein may be broken up into smaller and more irregular veins in the sedimentaries.

(2) It is probable that the character of ore will be influenced to a large extent by the country rock and that as the Seven-thirty carries an argentiferous galena and the Warrior's Mark a unique combination of copper and silver in a lime and sandstone gangue so in the quartzite and shale the character of our ore deposit will vary.

(3) Exploration of the veins in the sedimentaries will be rendered difficult by faults.

(4) The ore on the Seven-thirty is of primary origin and should continue in depth. The Warior's Mark ore should continue in depth but its quantity and perhaps its value will be largely influenced by the irregularity of the fissures.

ORES: The vein filling on the Warrior's Mark consists of calcite, brecciated sandstone cemented with calcite, and, in subordinate quantities, quartz. In general there are three types of ore, one consisting of chalcocite accompanied by secondary copper minerals and carrying high silver values which occurs in small seams through the red sandstone; another, where the silver accompanies a larger proportion of lead in a quartz and lime gangue and a third which is a clayey gouge carrying silver. The high ratio of concentration possible with this ore and the amenability of its valuable constituents to concentration by the flotation process should make it a very valuable milling ore under modern metallurgical conditions.

The Seven-thirty ore occurring in the porphyry is quite different as might be expected. Here the gangue shows much more quartz although calcite is still an important constituent in the vein filling. The values are almost entirely in argentiferous galena. Samples from the lowest exposure on the Seven-thirty and probably close to the contact between the porphyry and the under-lying sedimentaries would seem to indicate that a third class of ore carrying good values in gold associated with pyrite will be encountered in depth. In the absence of zinc from all of these ores there is no reason to anticipate difficulty in devising an efficient concentration system.

WARRIOR'S MARK:

GEOLOGY: The Warrior's Mark Hill and the ridge following up to the continental divide from it is composed of beds of red sandstone lying between a large porphyry sill to the west which dips under it and the still larger porphyry of Bald Mountain to the east which is geologically and topographically above it. Interbedded conformably with the sandstone are small porphyry sills. Starting from the open cut on the Warrior's Mark vein and running thence along its course for seven hundred feet, development has proved up the course and dip of the vein.

Projecting this course to the south above the west fork there is no evidence of the vein in this location but prospect holes one hundred and fifty feet to the southeast do show mineral and would indicate the possible continuation of the vein at this point. On the Columbine vein the same procedure would bring the computed apex above the Keogh tunnel but no vein has yet been intercepted in that cross-cut. Here again in the Rochester Queen shaft one hundred and fifty feet to the southeast, a vein has been developed and thus we have the basis for a theory that somewhere a fault has displaced the veins to the southeast at least one hundred and fifty feet.

DEVELOPMENT: The Warrior's Mark shaft is vertical to the first level at a depth of sixty-five feet and from here follows down the dip of the vein to an unknown depth. The first level is supposed to extend fifty feet to the southwest and thirty-five feet to the northeast but was caved in both directions so as to preclude examination beyond a few feet. On the northeast side a sample of soft gougey material from the vein eight inches wide ran 36.80 ounces silver. Six feet from the shaft in the floor a sample of soft material six inches wide ran 343.8 ounces silver and a paying amount of copper. In the first level southwest and thirty-five feet from the shaft about fifty tons of ore was caved into the level. A grab sample of this ran 14.90 ounces silver and pay copper. Above the cave a streak at the back four inches wide ran 455.50 ounces silver. This was the extent of underground sampling possible on the Warrior's Mark.

A second level at a depth of 115 feet from the surface and a third level 165 feet deep are both said by Saures, the superintendent, to show pay ore.

A cross-cut starting on the Mary B. Claim is known as the Shaffer tunnel. This tunnel is connected with the old Snow Drift workings which show but little ore. Without further development it is impossible to state whether the Snow Drift is the same vein as Warrior's Mark displaced by a fault or whether it is a different vein.

Starting at the level of the west fork of Indiana Creek on the Warrior's Mark No. 1 lode a cross-cut 347 feet long is known as the Keogh tunnel.

EQUIPMENT: At the Warrior's Mark shaft there is a twenty-five horse-power steam boiler, a hoist with three hundred feet of cable, one ore bucket of about one-half ton capacity, two bailers and one number five Cameron sinking pump. Above the shaft house is one cabin and down in the gulch of Indiana Creek, in a very beautiful location, is a boarding house well equipped with running hot and cold water and a comfortable guest room, a three-room cabin now under construction and designed as a home for the manager and his wife and the Company office at the mine, stables, several smaller cabins and a log bunkhouse, all of which will furnish comfortable accommodations for a crew of twenty to twenty-five men.

OPERATIONS: As the present equipment on the Warrior's Mark shaft will not handle the water and permit of any mining at the same time, work is now progressing on the extension of the Rodgers drift from the Columbine shaft to connect with the Warrior's Mark workings. This drift will open up and drain the Warrior's Mark to a depth of 165 feet or practically the third level. A chute fifteen feet long will drop material mined in this level to the cars in the Shaffer tunnel. This drift will therefore render available all of the Warrior's Mark ore at present opened up without further capital expenditure for equipment and without the onerous charges for pumping heretofore necessary.

The Columbine vein has every surface indication of strength and values comparable to the Warrior's Mark but without the enriched net-work of stringers which resulted in the open cut on the latter vein. The Annis shaft is being sunk to exploit this vein near the surface and the float and surface indications would lead us to anticipate a profitable production within a short time.

Should either or both of these operations develop a large quantity of paying ore, the Keogh tunnel furnished a logical and remarkably effective means of cheaply exploring both veins in depth, draining Warrior's Mark

hill and an avenue for the transportation of ore direct to the logical mill-site at the forks of Pennsylvania Gulch.

SEVEN-THIRTY

GEOLOGY: As is often the case where a strong vein system crosses a mountain ridge the vein has a marked influence on the topography. The softer vein material weathers more easily than the enclosing porphyry and results in a pronounced trough. Where the Seven-thirty vein cuts the ridge of Bald Mountain there is a deep sag and trough descends from here to the foot of the mountain. To the north of the vein and over half way to the top of Bald Mountain a prominent bed of jasperoid of metamorphosed and silicified limestone is very apparently cut off and faulted by the vein. The Clarke and Hanly tunnels are driven into the vein close to this contact. Such a contact is a very likely place for valuable enrichment. It would seem that the Seven-thirty vein accompanies a reverse fault with a strong displacement. To the southwest and across Hoosier Pass the famous London Mine with a production of several Million dollars to its credit has a similar geological history.

DEVELOPMENT: The tunnels and open cuts near the line between the Silver Queen and Seven-thirty claims are on the vein and in every case show ore. The lower tunnel of the two is caved in completely but the size of dump shows that it must extend several hundred feet. Undoubtedly in former operations the ore was sorted as carefully as possible and the high grade picked out for shipment. Surface float from this point showning quarts, galena, limonite, and altered porphyry went gold 0.16 ounces, silver 4.92 ounces, and lead 8.75 percent. Although it is impossible to sample a dump in such a way as to get an accurate estimate of conditions as they will be encountered underground, there is every evidence of a strong vein of rich lead-silver ore. This dump, and all the others on the vein, are full of such a large proportion of ore that it seems quite possible that eventually they will all be shipped by aerial tram to a mill and profitably treated. The upper tunnel is said to be two or three hundred feet long but is only accessible for the first fifty feet. Here, representative samples of the best ore on the dump ran gold 0.18 ounces, silver 18.16 ounces, and lead 55.80 percent, or a total value of around $55.00 a ton. In the tunnel there is only one place where the main vein is accessible on account of close timbering. About fifteen feet from the mouth a streak eight to ten inches wide and exposed for five or six feet in length ran gold 0.08 ounces, silveR 17.82 ounces and lead 34.40 percent or approximately $40.00 per ton. Much of the float occurs in pieces which would indicate a vein several feet wide so that the width of the samples taken from the upper tunnels would not seem a fair representation of the average mining width. Many of the boulders of float consisting of nearly pure lead and lead carbonate are so big that a man could not lift them. Above the upper tunnel several open cuts and pits show ore continuing up towards the ridge although the surface is soon covered with deep wash which gives no indication of the upper limit of the ore shoot. The thirty foot shaft in porphyry near the middle of the Silver Queen is the next opening below on the vein. Here again the dump is filled with honeycomb float but apparently the character of the ore has changed largely to an auriferous pyrite. A sample of this float ran gold 2.60 ozs., silver 1.90 ounces, lead 1.25 percent, or a value of $52.00 per ton in gold. Another sample went gold 0.44 ounces, silver 1.06 ounces, that showed very little value.

The lower tunnel was cleaned out a year or two ago by Sauers, the present superintendent, and he states that the ore averages $110.00 a ton in gold, silver, and lead. In the heavy blanket of boulders and debris which fills the gulch below the New Tunnel down to a point opposite the lake on the Boston millsite there are also a number of chunks of float, some of them weighing one hundred pounds or more. If the ore shoot is continuous from the upper showing on the Seven-thirty to the porphyry shaft on the ridge, and this would be indicated by the float, it has a length of at least one thousant feet and in the absence of further development no one knows how much longer.

EQUIPMENT: The Seven-thirty camp is located close to the little lake on the Boston millsite. This is a sheltered location where there is ample water for domestic purposes and is out of the path of snowslides. A comfortable cabin furnishes accommodations for a crew of six or eight men. At the June tunnel there is a completely equipped blacksmith shop and down at the Flanders spur a steam boiler and compressor is now being installed, and this machinery will be housed properly before winter. To transport supplies up and ore down between the Evans and June tunnels, it is hoped to install a cable-way before snow flies.

OPERATIONS: The upper tunnels on the Seven-thirty are very inaccessible in winter. There is a good showing of ore but this will only be available commercially when it can be transported cheaply to the railroad. For permanent operations and the development of the property into a big and successful mining enterprise, it is necessary to attach the vein from a lower level. Accordingly, the June tunnel has been located at the base of the steep part of Bald Mountain not far from the camp site at the lake and on the ridge to one side out of the gulch. At this point the wind keeps the ground almost bare from snow throughout the winter and the tunnel is out of the path of the disastrous snow slides which come down the gulch nearly every winter.

Construction work is now being completed on a road to connect the June tunnel with the Flanders spur. With the completion of this road and the installation of the air pipe so that power drills may be used in driving the tunnel, development should move quickly on these claims and we have every reason to expect a satisfactory production from the Evans tunnel also.

VII. HICKS-DETROIT:

LOATION: The Hicks-Detroit is one and one-half miles due northeast of Breckenridge and is reached by a wagon road two and one-quatrer miles long. The claims cover a considerable acreage near the top of Gibson Hill.

TOPOGRAPHY: The summit of Gibson Hill is 10,472 feet above sea level and the claims have an average elevation of 10,200 feet. The topography is not characterized by the great changes in elavation of the Warrior's Mark country. The road is in bad repair but could be improved for automobile or truck use without much expense.

CLIMATE: Being several thousand feet lower than the seven-thirty results in milder winters and less snowfall. The proximity to Breckenridge eliminates the necessity of a camp at the mine and the better climatical conditions make the mine accessible every day in the year.

WATER: A difficult feature which will have to be overcome with operations on a larger scale is the water supply. There is no water on GIBSON Hill and that pumped from the mine is barely sufficient for boiler purposes under present conditions. For two shifts or for diamond drill operations, it will be necessary to haul water from French Gulch on the return trip of the empty ore wagons and eventually to install pumping equipment in French Gulch or in Gold Run Gulch to the north.

TIMBER: There is plenty of timber for mining purposes for some time to come.

HISTORY: Operation on the Standard property, which adjoins the Hicks-Detroit, were responsible for a considerable production of oxidized gold ore in former years. In 1922 the continuation of the Standard ore shoot was developed in the Detroit property and has been responsible for an increasingly important production ever since. After re-timbering and re-equipping the property xxx production on a commercial scale was inaugurated about March 1923.

Since July 19, 1923, the total production has been about 475 tons, a very satisfactory record for an operating period of only forty days.

This production was mined by a crew of twelve men working one shift. Two shifts a day are now being put on and the next forty days we anticipate nearly twice as heavy a production.

The total production of the Hicks-Detroit mine to date has been 1311 tons with net smelter returns of about $33,672.00. No record of the past production of the Standard workings are available but it is said to be in the neighborhood of $160,000.00.

DEVELOPMENT: The Hicks-Detroit shaft is 190 feet deep and the production has come entirely from the stopes shown on the map herewith.

EQUIPMENT: The property is now equipped with a forty horsepower steam boiler, a small steam friction hoist, a complete blacksmith shop and steam pump, besides ore bins, cars, buckets, etc.

GEOLOGY: The deposit is in Jurassic and Cretaceous quartzite and shales which here occur in alternate beds close to a great intrusion of Tertiary porphyry. The beds strike about north-fifty-east and dip to the southeast from ten to forty degrees. Crossing this bedding a series of fissures whos strike is parrallel to the strike of the bedding but whose dip is from vertical to diametrically across the beds, probably furnish the channels through which the ore-bearing solutions were injected. (On map see B - B') The fissures themselves are not mineralized and the deposit consists of lenses where the shale has been replaced by ore in the immediate vicinity of the fissures. The result is an important body of lead and zinc sulphides carrying high silver values occurring in nearly horizontal sheets from five to eight feet in thickness and following a general trend parallel to the fissures already mentioned.

Close to the Hicks-Detroit shaft a fault, A-A' has dislocated the beds and although it has no apparent relation to ore genesis it has a very decided effect upon the exploration and development of the deposit. The main mineralized bed which was opened up in the Standard ground and worked out nearly to the present working shaft, encounters, this fault and is cut off by it. This stope produced mostly an oxidized gold ore. Beyond and east of the fault the stopes which are not being worked are in a stratum twenty-five feet deeper. The ore from the latter stopes is a primary sulphide and without further development work it is impossible to tell whether this stratum is identical with the stope on the other side of the fault and faulted to its new location or whether it is quite another stratum entirely.

The most important conclusions which we may draw from a preliminary study of the geology are as follows:

(1) Exploration should follow the trend of the ore shoot along the strike of the fissures.

(2) It is quite possible that scientific prospecting would develop other series of parallel fissures which would result in new and similar ore shoots.

(3) Exploration <u>below</u> the oxide stope might develop beds carrying important sulphide deposits. Exploration <u>above</u> the sulphide stopes might encounter gold-oxide strata similar to that worked out between the fault A - A' and the Standard. Exploration <u>below</u> the sulphide stope might disclose additional beds carrying valuable sulphides.

SAMPLING RESULTS: Refer to map for location of samples by number.

Number	Width Feet	Gold Ozs.	Silver Ozs.	Wet Lead Percent	Zinc Percent	Remarks
1	7.5	0.04	5.60	0.40	0.90)	In raise away
2	4.0		9.40	1.80	2.90)	
3	7.0		11.40	1.90	2.50)	from ore body

Number	Width Feet.	Gold Ozs.	Silver Ozs.	Wet Lead Percent	Zinc Percent	Remarks
4	5.0		4.00	0.80	2.00)	
5	7.0		4.20	0.50	2.80)	In Old sulphide
6	6.0		6.60	1.00	1.20)	stope southeast
7	7.0		11.20	1.20	7.30)	of shaft.
9	4.5		58.10	12.20	14.20)	In old
10	3.0		2.40	0.40	1.90)	sulphide
11	4.0	0.04	18.50	7.00	1.70)	
12	3.0		21.10	8.80	3.30)	stope southeast
13	4.0		13.90	1.90	5.60)	of
14	1.5		3.80	0.80	5.80)	
15	3.0		13.00	1.00	7.40)	shaft.
16	2.5		17.40	3.70	6.80)	
17	5.0		0.80	0.70	1.20)	
Average 4 - 17 inc.	4.5		15.40	3.40	4.90	
"18	3.5		1.10	0.30	0.30)	Breast of drift
"19	10.5		4.00	0.30	5.50)	south of shaft
					)	not in ore body
					)	In raise in above
					)	drift. Not in ore
					)	body.
20	7.0		9.90	0.30	3.60)	
21	6.0	0.44	19.20	5.20	9.40)	
22	2.5		13.50	11.90	30.90)	
23	3.5		0.80	0.50	4.80)	
24	2.0		17.80	20.70	26.00)	
25	3.0		1.00	5.30	3.20)	
26	1.5		5.00	1.30	9.10)	
27	4.5		0.90	0.30	5.90)	
28	3.0		6.10	0.90	11.80)	
29	2.0		1.20	0.40	6.70)	In new sulphide
30	5.0		11.70	10.00	20.60)	stope.
31	3.0	0.08	5.90	3.10	27.10)	
32	2.0		2.90	0.30	32.20)	
33	3.5		1.00	0.00	1.30)	
34	2.5		16.50	6.20	36.00)	
35	2.5		7.30	4.50	27.20)	
36	2.5		30.80	19.30	15.30)	
37	3.0	0.80	46.50	14.10	15.00)	
38	4.0	trace	1.30	0.30	1.40)	
~~42~~	~~8x28~~	~~28x82~~	~~28x58~~	~~22228~~		
39	1.5	0.20	73.00	29.50	22.90)	
40	3.0	0.10	5.50	2.10	7.30)	
41	1.5	5.52	64.50	24.90	14.40)	
42	2.0	7.60	10.60	2.50	4.00)	
43	2.5	0.12	28.50	10.00	7.10)	
44	5.5	0.10	38.10	16.10	1.20)	
45	5.5	0.10	3.00	2.30	5.30)	
46	7.0		12.10	11.80	3.20)	
47	4.5		61.60	30.40	5.40)	
48	3.0		65.50	70.50	4.70)	
Average 20-48 inc.	4.13	0.20	19.70	10.60	12.20)	

The new or sulphide stopes of the mine have been sampled as follows:

Samples were taken every ten feet along both working faces and other portions of the mine away from the ore bodies but which showed mineralisation.

The results are tabulated in detail on a separate page and the accompanying map of the mine gives location and number of each sample taken.

The average for the stope marked "Sulphide Stope" was width 4.5 feet, silver 15.4 ounces, lead 3.4 percent, and zinc 4.9 percent. This stope is not being worked at present but would make excellent mill ore.

The samples taken in the stope which is furnishing the present production and which is marked "Stope-Sulphide Ore-Lead-Zinc-Silver" averaged as follows: Width 4.15 feet, silver 19.7 ounces, lead 10.5 percent, zinc 12.20 percent, and gold 0.20 ounces. Although this ore would ship at a profit without sorting, yet it is more profitable to mine it selectively and maintain a high grade lead and a low grade lead and zinc product as is being done at present.

The samples were taken with a view of ascertaining what the whole ore body would average for a milling operation and the results are indeed very gratifying.

In regard to the tonnage at present developed, it is rather hard to estimate what the development campaign will show after it is gotten under way but it can be safely estimated at, at least, 5,000 tons of ores of a grade as indicated above. This is an excellent showing especially when it is considered that practically no development work has been done. This tonnage will in all probability be materially increased by the proposed development scheme.

In connection with the sampling results it is interesting to note the high gold assays in the samples taken in the vicinity of the fissure B-B'.

No. 31	Gold	0.08 ounces
No. 37	Gold	0.80 ounces
No. 39	Gold	0.20 ounces
No. 41	Gold	5.52 ounces
No. 42	Gold	7.60 ounces
No. 43	Gold	0.12 ounces
No. 44	Gold	0.10 ounces

This will be investigated.

OPERATIONS: The expiration of the Pittman Act and the consequent drop of the price in silver from one dollar to sixty-two or sixtythree cents an ounce has resulted in the abandonment of several stopes. In places there is a face of ore bounding complete chambers in the mine which will average from six to eight feet in height just too low grade to mine and ship direct to the smelter. This same ore would be extremely valuable could it be concentrated. Befor planning a mill or concentrator, however, it is the wisest policy to be sure of a great tonnage of ore. To explore, and if possible delimit the Hicks-Detroit ore bodies so as to gain some general conclusion as to the potential amount and grade of ore available from the mine, is the next big problem before the management. The first class ore which will average about 55 percent lead, 55 ounces silver, and.06 ounces gold, nets over and above freight and smelting charges, in the neighborhood of $75.00 a ton.

Second class ore which carries about 9 percent lead, 24 ounces silver, and .17 ounces gold nets about $15.00 a ton.

A third class of ore principally valuable for its zinc is occasionally encountered.

On the present one-shift basis the mine has been producing fifty tons of first class and three hundred tons of second class ore per month which altogether gives returns of close to $7,000.00. Present costs per month will average about $2,000.00 with a very satisfactory net profit for thirty days of about $5,000. With two shifts costs will be somewhat lowered in proportion and production nearly doubled so that we feel safe in predicting a profit of nearly $10,000.00 a month providing the ore holds out. The present appearance of the mine is very encouraging and would lead us to anticipate a satisfactory production for several months to come.

VIII. RECOMMENDATIONS:

(a) Warrior's Mark:

1. Exploration of the Columbine vein near the surface at the Annice shaft. If this exploration results in the disclosure of pay ore, drifting from the Shaffer tunnel 200 feet to block this ore out to a depth of about 70 feet, thus making it available for cheap and profitable exploitation.

2. Driving the lower level from the Snow Drift shaft 250 feet to tap the Warrior's Mark shaft at a depth of about 60 feet vertically below the third level or about 130 feet below on the dip. This prospects the ground between the two mines and when completed makes available all ore already opened in the Warrior's Mark without further costs for pumping or hoisting.

(b) SEVEN-THIRTY:

1. Prosecution of the development work in the June tunnel encounter and develop the vein at that level.

2. Development of the vein at the Evans tunnel 350 feet vertically above the June tunnel.

3. The installation of a temporary tram or cable-way to hoist supplies up and ore down from the Evans to the June tunnel.

4. The completion of the present program of construction and equipment; namely, the Flanders spur from the railroad, together with ore bins, boiler, compressor, and air-line to the June and Evans tunnels; the construction of a house over the boiler and compressor and a cabin for the engineer; and a water pipe-line for the boiler.

(c) HICKS-DETROIT:

1. Push a long drift ahead of the present workings along the trend of the ore shoot together with side drifts as warranted to block out the ore. This should result in a much more stable operation as under the present system of combined mining and development there is no assurance as to the continuity of the ore shoot.

2. A campaign of diamond-drilling carefully devised so as to prospect our entire property on Gibson Hill for similar ore shoots and the continuation of the present one.

3. The installation of electric power at the mine by bringing the power line in French Gulch, a distance of not to exceed a mile, and the subsequent installation of compressor, power drills etc.

4. As a result of the development and prospecting work above outlined and dependent on its successful conclusion, a mill.

IX. CONCLUSION: The Hicks-Detroit is a producing mine which is a profitable enterprise at present but which, as a result of the program of prospecting and development outlined above, may become the largest and most successful enterprise in the district. The Warrior's Mark and Seven-thirty are in the process of exploration and development and are both prospects of unusual merit. The examining engineers can not with certainty forecast the tonnage, the costs, or the profits which may result from their operation but believe from a most careful consideration of the evidence available that the present program of exploration is an unusually attractive mining speculation.

Respectfully submitted,

(Signed) Berger & Sayre

(s) Seal of Robert H. Sayre,
Licensed Engineer.

Denver,
Colorado, August 25, 1923.