Original
F. Yeakel.

THE ARABELLA MINING AND LEASING COMPANY.

MONTEZUMA, SUMMIT COUNTY, COLORADO.

By

Frederick Yeakel.

1917.

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FEBRUARY - 1 9 1 7.

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ORIGINATORS AND OBJECTS OF COMPANY.

A statement prepared by Frederick Yeakel, who, with C. M. Stapp, selected, examined and secured the lode mining properties held by the ARABELLA MINING AND LEASING COMPANY.

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The plans of this company were originated in May, 1913, the first purpose being to make a preliminary investigation of the possibilities of practical Silver-Lead Mining in the Montezuma Mining District of Summit County, Colorado.

DISCOVERIES AND MINERAL SHOWINGS OBTAINED.

The field work and prospecting were conducted by C. M. Stapp and the writer in person. Their activities in this matter covered extensive periods of time during each mining season in the years 1913 and 1916.

The valuable group of lode mining claims herein to be described represents their full and satisfactory realization that the Arabella Mining and Leasing Company has in hand substantially every fundamental that enters into the making of a profitable mine of such magnitude as to require a long term of years of diligent, continuous and well-directed mining operations in order to effect a complete exploitation of the property.

The mineral showings obtained where the principal veins or lodes on the claims controlled by this company have been opened and explored, are so uniformly persistent in the presence, extent and richness or ore bodies, - evidenced by numerous assays from careful samplings, statements of former operators, etc., - that in the best judgment of the members of the company, the judicious expenditure of funds necessary for labor, machinery, and such other equipment essential to the opening and development of a mine, is at this time amply warranted.

DISTRICT.

The District in which the holdings of this company are located is known as The Montezuma Mining District of Summit County, Colorado.

The mining town of Montezuma lies in the heart of the region at an altitude of 10,300 feet above sea-level, and about two miles due north from that point on Teller Mountain where the properties of this company are located. (See Plate XII)

TOPOGRAPHY.

The Topography of the Montezuma District is very marked, there being an extreme difference of 3800 feet between the highest and lowest points.

The Continental Divide runs diagonally through the south-eastern part of the district for a distance of six or seven miles, measured along the serpentine course of the crest.

The most conspicuous peak located on the Continental Divide within the district is Sante Fe Peak. The highest peak attains an altitude of 13,483 feet, and is called Landslide Peak because of two massive landslides that buttress its flanks, one to the north, and the other on the west side.

Teller Mountain, upon whose northwestern slope are situated the mining claims of this company, occupies the extreme southern end of the district and reaches an altitude of 12,602 feet.

PLATE XIII. Eleven miles due north from Teller Mountain, and clearly visible from either Star Tunnel at its base, or Sunset Claim at the summit, (Claims held by this company) may be seen the great crest of Gray's Peak, one of the loftiest and most prominent peaks of the Rocky Mountain Range in Colorado (altitude 14,000).

CLIMATE AND VEGETATION. Owing to the high altitude of Montezuma and the surrounding country, the summer climate is most delightful and bracing, and the heavy snows of winter are attested by great drifts that remain until far into the summer upon the upper slopes, and on the shaded mountain sides even at the level of the town.

SCENIC EFFECT. This combination of rugged and lofty mountains with heavily forested bases, and green, grass covered upper slopes and reaches, presents mountain views of entrancing beauty and endless variety. (See PLATE XII)

GENERAL GEOLOGY The Montezuma Mining District lies in the region of Archaen Crystalline rocks that form the Front Range of the Colorado Rockies.

These consist of various schists and gneisses penetrated by numerous igneous rocks of both plutonic and effusive types. The schists and gneisses cover the larger part of the area in question, but in some parts of the field are cut by a profusion of intrusives.

These last are mostly porphyritic rocks in the form of dykes from an inch or less up to one hundred or more feet across. One such very large dyke parallels the Star Lode of this company, and lies in close proximity to it.

The rocks in this area, both schistose and igneous, are undoubtedly closely akin to, and in many cases identical with those of the so-called 'Gerogetown Quadrangle', resembling also to a striking degree the schistose rocks of the Idaho Springs formation, that lies immediately over the range to the east.

ECONOMIC GEOLOGY. In an Economic Geological sense the Montezuma District lies in the midst of a broad zone frequently referred to as the 'sulphide belt' that runs in a northeast to a southwest course, beginning with the mines of Gilpin and Clear Creek counties and continuing past Georgetown and Silver Plume to Breckenridge and Leadville, and beyond.

In all this belt the ores are characterized by a great diversity of mineral contents, yielding gold and silver among the precious metals, with lead, copper, and zinc furnishing the bulk of the product. (See General Map).

MINING HISTORY This region was one of the earliest developed mining districts of the State, dating back to the early sixties, when rich deposits of silver ore were discovered near Chihuahua, in what was then known as the Snake River Mining District.

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For a period of years, at that early time, unusually rich deposits of argentiferous ores continued to be discovered at numerous places on most of the mountains within the district, quite frequently well above timberline. Much of the ore was in the form of ruby silver, while some was native wire silver.

Transportation of ores and supplies was an extremely costly and difficult matter for the pioneer miners and prospectors that came into the isolated Montezuma country. Everything had to be packed on jacks or burros over either the Argentine or Webster Pass, and thus only the most valuable ores ($90 per ton or more) were carried to the distant smelters at Black Hawk, Central City, or Denver,

In subsequent years railroad facilities were extended to Keystone, a shipping point nine miles north of Montezuma. Later, however, the production of silver was largely abandoned with the demonitization of the metal.

More recently, with the revival of silver values, the substantial advance in lead, copper and zinc, much renewed activity has been manifested in this old silver-lead camp. Some of the long abandoned properties have been reopened, and within the past three years shipments of silver, lead, and zinc, and concentrates of these ores, have again been made. In this time also, many mining engineers, mine investors and operators have visited the district and have pronounced it well worthy of their consideration.

The still existing problem of even better transportation advantages has recently been investigated and is likely to be solved shortly through the extension of the railroad now terminating at Keystone on south to the town of Montezuma.

The rapid development of this long isolated but very interesting district is consequently now close at hand.

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From the various sources available, including mining engineers' reports, statements of mine managers, superintendents, foremen, and miners themselves, as interviewed by the writer, pamphlets and prospectuses of mining companies, smelter returns, etc., it may be assumed that the Montezuma Mining District has a record of past production showing upwards of $15,000,000.00

PROFITABLE MINES.

The following properties have in the past been operated at a profit:-

St. John	Chihuahua	Silver Wave
Harrison	Santiago	Montague
Wild Irishman	Pennsylvania	Star of the West
General Teller	Treasure Vault	Radical
St. Elmo	Sarsfield	Cashier and Champion
Bell Group	Waterloo	Whale
Chautauqua	Silver Wing	Paymaster, and others,
Silver Princess	Bullion Group	some of them forgotten
		with the years gone by.

ST. JOHN MINE

The great St. John Mine, on the western slope of Glacier Mountain with seventeen miles of underground workings, originally opened over fifty years ago, and operated intermittently ever since has produced more than a third of the combined output of the district, i.e., more than $5,000,000.00.

British capital opened and developed this famous old mine and has been interested in the property continuously to the present day.

A small smelter was operated in the early days and the equipment for the plant, including a mill, also mining machinery of types and designs then in use in Wales, were brought across the plains from Omaha and into the mountain fastnesses of Montezuma and the St. John's gulch by ox teams.

PRESENT CONDITION OF THESE MINES.

Comparatively few of the properties listed above have been extensively worked and none are entirely exhausted of their mineral contents. In the larger, more accessible mining camps of Colorado the majority of them would be regarded as well-defined prospects of proven ore values.

When the crude methods of pioneer hand mining had become impracticable and unprofitable because of greater depth, refractory ores, and similar mining handicaps, the altitude with its attendant difficulties of storm and wintry conditions for the major portion of the year, the toilsome efforts required to drag mining timbers and building materials from the forests a full thousand feet 'straight below', the transportation of smelting ore on mule back down the precipitous trails to far distant markets, these with the decline of silver, caused the closing down of many mines and hundreds of prospects throughout this promising but inaccessbile district.

During the intervening years the open shafts on these mines have become filled with snow, ice and debris, and thus obliterated. Tunnels have caved in. The timbers at their portals are decayed and crushed down, and to enter one of them, where entrance may still be effected, is to risk life itself, but, where these dangerous old workings are explored it is usually discovered that the veins are wide, extending continuously overhead, and that comparatively little stoping was done. Generally the breast of the tunnel is 'in ore'.

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CONCLUSIONS. Therefore, with these encouraging showings, and with the history of unusually rich ore extraction, evidenced by the good values so readily to be obtained on the dumps, it appears both fair and reasonable to conclude that further renewed development, under modern, well-appointed, and scientifically conducted mining practice, should be profitable.

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HOLDINGS OF THE ARABELLA MINING AND LEASING COMPANY.

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The Lode Mining Claims comprising the property of this company are located in Sections 10 and 11, T.6 So. Range 76, W.6"P.M.

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DESCRIPTION OF CLAIMS. Star No. 1. Lode Mining Claim is located along the strike of the great Star Vein that cleaves Teller Mountain from base to apex. The lower endlines of this claim lies at the foot of the mountain at stream level and at a point 1500 feet southeast from the portal of the Chatauqua Mine Tunnel. The altitude above sea-level at this point is 11,000 feet. The trend of this claim is So. 61 - 32'E. The width is 300 feet; the length 1500. The upper end line is approximately at timberline.

This claim is well covered with splendid saw timber and a characteristic mountain stream flows through its entire length.

Two short tunnels and numerous cuts and openings were made upon the vein by the discoverers of this lode and subsequent owners and leasers.

In each of these openings the strong five foot wide 'Star' lode has been disclosed. From the two tunnels mentioned, which are located at the center of the claim, lessees extracted two carloads of very heavy silver-lead ore. The net returns from the shipment, it is reported, amounted to $2200.

Most of the samples tested by this company were secured from the dump at the mouth of the lower of these tunnels. On the dump of each are still to be found large pieces of ore that have come from the 'pay streak' and indicate a width of solid ore ranging from six to fourteen inches.

The richest ore was removed from a shallow winze sunk into the floor of the lower tunnel. A strong flow of water was encountered in the sinking of the wimze and further work was abaondoned by the lessees.

Under the plan of general development proposed by this company a cross-cut tunnel already driven for over a hundred feet near the lower end of this claim will be extended to the vein and then continued on the vein for a distance of approximately 700 feet. At that point about 600 feet of depth will have been gained and an upraise to the surface would meet the location of the abandoned winze, and a large body of stoping ground will thus have been opened up.

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DRAINAGE THROUGH STAR NO. 1 TUNNEL.

The main tunnel to be driven from the foot of the mountain as described is to be extended to all the properties of this company by means of cross-cuts, etc., and every facility for natural drainage of the entire group will thus be provided, obviating for all time the necessity of unwatering by means of expensive pumping machinery.

STAR NO. 2 FORMERLY THE ARABELLA MINE.

This claim is located to the south of Star No.1 claim and the Arabella Lode, intersects the Star No. 1 Lode at an acute angle at a point approximately 1000 feet north of the portal of the Arabella tunnel.
(See Plat)
A 200 foot tunnel has been driven in upon the Arabella lode at a point 400 feet from the upper end lines of the claim. In this tunnel for a distance of 145 feet there is disclosed pyrite ore varying in width from 8 to 36 inches.

As this large ore body has an average of 40 feet of stoping surface throughout its full length, it may be inferred that there is here, available for convenient extraction, a quantity of valuable ore amounting to 650 or 700 tons.

This lode is a true fissure vein, 4 feet 6 inches in width, with practically the same gangue and ore characteristics that mark Star No. 1 vein. The principal difference in the ore contents is a preponderance of copper-iron (chalcopyrite) also much better gold values than in the Star No. 1 vein.

When this property was opened several carloads of ore were shipped. Mr. E. W. Fairchild of Montezuma has the following statements to offer concerning the character and richness of these shipments: From letters dated February 3" and 18" 1917, respectively the following quotations are taken:-

STATEMENT OF E. W. FAIRCHILD.

"In reply to yours of February 3" will say that for a period of 3 years, between September 1" 1903 to 1906, I was employed as fore-man and superintendent by the Glacier Mountain Mining Company, which Company later organized as the Gold Divide Mining Co. The ore I had sorted at the property (Arabella) ran between $40 to $100 per ton in Silver-Lead and Gold, also showed quantities of Bismuth-Silver and Wire Silver.

"Two selected samples taken by the manager ran 5 and 7 ounces in gold, also 14% in molybdenum.

"The first car I shipped to Denver the manager was offered $90 per ton." (From letter dated February 18" 1917)
"There are no maps or plats or reports of the Arabella Mine. I located the Arabella, did the location work and helped to survey the same for the Glacier Mountain Mining Company."
(Signed) E. W. Fairchild.

LOCAL REPUTATION OF THE ARABELLA MINE.

An examination of the assays made for this company from samplings taken from the vein across its width in the roof of the tunnel, at the breast of the tunnel and from the dump at the portal, substantiates the statement generally heard throughout the Montezuma Camp to the effect that :- "The Old Arabella has the finest showing of ore in Teller Mountain."

THE 'CRATER'.

A somewhat rare geological occurrence is encountered in the Arabella tunnel at a distance of 40 feet from the portal. Here an open chasm,

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or 'crater' intersects the lode at right angles and extending toward the south and down to depths as yet unfathomed. The drainage from the back of the tunnel disappears into the depth of this open fissure, while a strong current of cold air rushes up from this unexplored chasm.

This peculiar and interesting geological feature indicates great eruptive action, and signifies, so certain geologists and mining engineers who have visited this property assert, a strong probability that a large body of rich mineral may be discovered at a lower level at this intersection.

However true this supposition may be, it is the plan of this company to drift across from the main tunnel projected for Star No. 1 lode when the same shall have reached a point opposite the Arabella tunnel, (a distance of about 350 feet) for the purpose of complete development and a thorough exploitation of the fine ore bodies now exposed in the present tunnel.

Such a cross-cut tunnel will open the Arabella ground for stoping at a depth of approximately 750 feet.

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THE ARABELLA MINING AND LEASING COMPANY.

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TITLE TO STAR CLAIMS

When, in May and June, 1913, the representatives of the company first examined these two properties and found them highly meritorious from a mining standpoint, it transpired that title to the same was involved in litigation between the Gold Divide Mining Company and the present owners. (The lessors in the matter of the 'bond and lease' held by the Arabella Mining and Leasing Company).

This legal controversy has now been ended by the courts of Summit County, Colorado, decreeing title to the lessors mentioned. (See opinion of Attorney E. M. Sabin.)

This claim covers the Star No. 1 lode well up on the summit of Teller Mountain. It was discovered and located by the representatives of the Arabella Mining and Leasing Company in July, 1916.

The vein was opened at several points and found in place and true to the characteristics displayed in the Star No. 1 claim at the foot of the mountain with respect to width, (full 5 feet) the nature of the gangue, the width of 'Pay Streaks' and the richness of the same. A fine specimen of antimonial-lead ore was found in the talc and soft gouge matter of the outcrop within 18 inches of the surface.

THE SUNSET CLAIM.

An analysis of the 5 foot width of disintegrated vein matter opened at 'grass roots' shows value in gold and silver that range from $7.20 to $11 per ton. This constitutes a vast tonnage of medium and low-grade free milling ore that can be treated at a good profit whenever reduction facilities are established at stream level at the lower (Star No. 1) workings. The ore bodies in the Sunset Claim can be reached and removed through the main development tunnel now started at the foot of the mountain. Our Company controls at this time, a three-quarter interest in this claim.

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MINES ADJACENT TO THE STAR LODES.

Among old mines that are located on Teller Mountain within the zone of the Star Claims now under bond and lease to this Company, mines whose workings penetrate the identical geological formations and lying along the same lines of eruptive and volcanic disturbances that opened the earth's crust to their rich deposits of gold, silver, lead, copper, zinc, and other minerals, are to be noted:-

The Cashier and Champion Group, accredited production $84,000.00
Montague Group - - - - - - - - - - " " 35,000.00
The Star of the West Mine - - - - " " 24,000.00
Radical Mines - - - - - - - - - - - " " 78,000.00
The Chatauqua mine, on Collier Mt. upwards of 75,000.00
Whale and Paymaster Mines - - - - ----------

These properties are all either at about timber line or at the summit of the mountain, 12,000 feet high.

CHATAUQUA MINE.

None have ever been worked by machinery excepting the Chatauqua Mine, which is located on Glacier Mountain, 1,000 feet distant from Star No. 1 lower tunnel, across Deer Creek gulch.

This mine is one of the oldest producing properties in the entire Montezuma District. It was worked in 1916 when additional large bodies of smelting ore were opened up and shipments made.

CASHIER CHAMPION GROUP.

The Claims comprising this property are located at the summit of Teller Mountain, three-fourths of a mile from the Arabella Mine. Well authenticated reports show that the prospectors who discovered the Cashier Mine extracted 108 tons of ore in the crudest manner within three months after its location. This output was transported across the range for a distance of fifty miles on mule back, and netted the locators the sum of $20,000.00
The ore contents paid for were gold and silver, and there was a heavy copper content for which the smelter made no returns, nor did the lead in the ore have any commercial value at that time.

MONTAGUE GROUP

This group of seven patented claims occupies the summit of the mountain. The endlines of the Richelieu claim are 400 feet from the western side line of the Montague property. The Sunset claim intersects several of the Montague claims transversly at their southeastern end.

STAR OF THE WEST MINE.

This mine was located and patented in the early eighties. It is located along the trend of the great Star lode between the eastern end of the Star No. 1 and the western end of the Sunset claims of this company. (See Plat.)

At the time of its location about two car-loads of very rich gold-silver-lead ore were removed from this mine through two tunnels that are now caved in and inaccessible.

THE RADICAL MINE.

This property is located along the fissure that intersects the Arabella vein as already described. The Radical tunnel is located approximately 2000 feet southwest of the Arabella tunnel portal, and the mine was profitably worked in earlier years. The ore taken out is reported to have come in very large 'chunks' apparently dislodged from the original vein formation by strong eruptive force.
The ore content was largely native silver. The output was transported on pack mules to the smelter at Black Hawk, Colo.

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WHALE AND PAYMASTER MINES.

These mines are mentioned in connection with this report since they are both located upon the extreme southern end of the Plateau forming the summit of Teller Mountain, at the head of Hall Valley towards the Platte (South Platte) River Basin.

The Paymaster is reported to have been a heavy producer at the time of its location.

The Whale Mine is located one mile south from the Star No. 1 lower tunnel. This mine is being worked at a profit at this time.

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COST OF ORE PRODUCTION.

The following statement issued in 1906, is here inserted as pertinent to the description of the Montezuma Mining District presented in this report.

"COST OF MINING, TRANSPORTATION AND TREATMENT OF MONTEZUMA ORES SINCE THE DISCOVERY OF THE MINES."

Cost in	1862 - - -	$90.	Per ton.	Cost in	1895 - -	$17.25	per ton.
"	" 1868 - - -	60.	" "	" "	1900 - -	15.00	" "
"	" 1870 - - -	56.	" "	" "	1902 - -	14.00	" "
"	" 1878 - - -	30.	" "	" "	1904 - -	13.25	" "
"	" 1880 - - -	25.	" "	" "	1905 - -	12.50	" "
"	" 1885 - - -	22.	" "	" "	1906 - -	12.00	" "
"	" 1890 - - -	18.	" "	" "			

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NATURAL RESOURCES STAR CLAIMS.

Both of the claims Star No. 1 and Star No. 2 (The Arabella) are well covered with a splendid growth of fir trees measuring from six to forty-two inches in diameter at the butt. Many of these trees are from 60 to 70 feet tall and absolutely straight.

TIMBER

This Company will consequently have a good supply of mining timber and lumber for building purposes for years to come. Since commercial lumber costs from $40 to $45 per M. shipped in and delivered at the mines of Montezuma, it is obvious that the timber holdings of the company represent an asset worth thousands of dollars.

WATER

In the great basin on Teller Mountain above the Arabella mine there are a number of small lakes fed by the melting snows that perpetually cover the north slopes of the basin walls. These little lakes are the sources of a beautiful stream of water that crosses Star No. 2 Claim from the east at the center of the claim, and following the natural contours of the country, joins a stream descending the length of Star No. 2 Claim near the center of the latter. From this point the stream rushes down a precipitous gulch along the line of the Star lode and becomes available for power and milling purposes.

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ROADS AND TRAILS.

An excellent wagon and automobile road runs from Dillon on the Denver and Rio Grande R. R. to Montezuma. The distance is thirteen miles. There is a daily stage for passengers and mails between these points. Along this road, nine miles north from Montezuma, is the Freight shipping station of Keystone on the Colorado & Southern R. R. To this point ore and concentrates are now delivered by wagon or auto truck from the town of Montezuma and such mines near by as have good roads available.

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ROADS AND TRAILS CONT.

From the town of Montezuma to the lower workings of the Star No. 1 Claim on Deer Creek there is a good road of uniform grade, that is now used for wagon haul from the Chautauqua mine to Montezuma, and which with slight improvements and proper maintenance can readily be used by auto trucks which for the present time will be the logical method for the delivery of ore shipments from the mines of this company to Keystone.

This road will have to be extended and some corduroy and bridge construction effected in order to provide for the delivery of machinery at the mouth of the lower Star No. 1 tunnel where an air compressor plant and ore house, etc., are to be located.

The extension described, and certain repairs to timber roads and trails that lead from point to point on the properties of the company will require a moderate appropriation of funds.

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MINE DEVELOPMENT PROPOSED FOR 1 9 1 7.

It is the plan of this company to extend the 100 foot cross-cut tunnel now started at the western end of Star No. 1 Claim on Deer Creek until the vein is cut, widening and otherwise preparing this tunnel for general transportation service from all parts of the properties.
To this end the tunnel is to be driven forward on the Star vein for the entire length of the Star No. 1 with upraises at proper intervals as ore chutes are as previously suggested in this report.

When this main tunnel reaches a point opposite the Arabella tunnel on Star No. 2 at a depth of approximately 750 feet from the surface, and about 350 feet distant from the Arabella ground it is proposed to cross-cut, thus connecting the two lodes.

THE MAIN TUNNEL.

Free drainage will thus be provided for all parts of the properties, drifts, upraises, levels, slopes, etc., as required in following good mining practice will then be constructed in the ore bodies opened during the progress of development work.

Since practically all the preliminary development work planned will be in vein matter it is expected that a considerable quantity of shipping ore will be removed, the returns from which should form a substantial asset offsetting in part the development costs.

PROPOSED WORK IN ARABELLA TUNNEL 1 9 1 7.

A thorough cleaning out of the 200 foot tunnel on the Star No. 2, this work extending out from portal to breast, and including re-laying the track, a small amount of re-timbering the rebuilding of a frost proof portal, etc., will form part of the preliminary work on this property in the spring of 1917.

In connection with the repairs outlined above it is intended that the floor of this tunnel should be thoroughly explored and one or more winzes sunk at such places where are showings shall warrant such development for examination purposes.

A number of upraises are to be made into the ore in the roof of this tunnel. These special openings in the floor and roof with some extension of the length of the same of the bulk and values of the ore now partially exposed in these workings from which such interesting shipments were made at the time the mine was opened. (See statements of former superintendent E. W. Fairchild.)

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Following the preliminary work intended to be performed early in the spring of this year (1917) in order to begin regular mining operations as outlined it will be necessary to provide the following equipments, supplies, etc:-

Road building and repair implements, Plows, Scrapers, Picks, Shovels, etc.
Saw Mill and accessories. Logging outfit.
Air compressor Plant and Installation.
Air Lines (pipe) Air drills, Ore cars, Trackage, Mining tools.
50 H. P. Electric motor and installation.
Extension of Electric Power line. (Approximately 700 feet).
Installation of electric lighting system in mine and buildings.
Blacksmith shops and equipment.
Additional bunk houses, boarding house, cabins for office and dwellings for manager and superintendent. Stables and corrals.
Shelter over ore and dump tracks, ore house and chutes.
Housing Air Compressor and Motor. (Electric Power).
Motor truck for ore delivery at Shipping Station. (Keystone).

Team, saddle horses, burros, harness, saddles, vehicles.
Supplies and provisions.
Appropriation for surveying and mine engineering services.
Appropriation for working capital (Monthly pay-roll).

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ASSAYS AND ORE TESTS.

Ultimately, when required, a suitable milling and reduction plant.

The following list of assays has been made with particular reference to possible commercial values of ores and ore bodies opened on the lode mining claims held by this company.

The specimens and samplings were taken by Mess. C. M. Stapp and the writer in person, and represent the most conservative selections with a view to securing average estimates of values obtainable under careful mining practice, rather than values secured from pieces of extremely high-grade ore, such as the records of former operators of these properties show to have been encountered.

ASSAYERS.

The assays exhibited were made by Messrs. Leonard and Root, Chemists and Metallurgists, also Control Assayers in Denver. Mr. A. W. Beam, a Metallurgical expert of wide experience. Chemists and Assayers employed by the Ohio and Colorado Smelting and Refining Company. (Assays made by the latter concern were conducted under the directions of the Denver manager, Mr. F. M. Stanger).

Some of the returns from these assayers have been checked, one assayer against another, and in each such comparison the results have been gratifyingly similar.

The original reports of the assays listed are in the hands of the writer, and may be had for examination and verification. They are as follows:-

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ASSAYS. (See Page 12).

ASSAYS.

DATE	DESCRIPTION	GOLD oz. ton.	SILVER per oz. per ton	LEAD per ct.	COPPER per ct.	ZINC per ct.	TOTAL VALUE per ton DOLLARS
1913-							
June 13"	5ft. Star gangue	.36	1.25				7.85
" "	Star average						
" "	upper dump	.58	12.75	14.75			30.95
" "	Star dump	.25	.75				5.25
1916							
July 15"	Sunset cropping						
" "	5ft. wide	.08	10.5				7.90
" "	Sunset select						
" "	antimonial	.3	45.	.52			95.
" "	Sunset brown crop.	.12	2.5				3.90
Oct. 10	Sunset gouge	.26	5.				8.20
" "	Sunset surface						
" "	Quartz	.24	5.25				7.95
" "	Arabella, Breast	.35	12.	8.30	.72	--------	26.52
" "	Arabella, Dump	.52	16.	----------	1.95	--------	31.30
1916							
Dec. 21"	Arabella, breast	.68	12.	----------	1.	------	29.60
" "	Arabella, select						
	sample of dump	.55	35.		1.10		83.60
" "	Star no. 1 dump						
	silver sulphide	.42	3.	60.	----------	10.70	93.05
1917--	L. & R. Assay - - - - - - - - - - - -						
Feb. 22"	(A) Arabella						
	dump collection	.06	30.1	24.75	4.36	----------	66.43 net
	(B) Arabella						
" "	shipping ore	.05	14.3	34.05	3.14	----------	55.86 "
" "	(C) Star no.1						
	ship. ore., dump	.02	6.7	29.56	1.70	----------	39.71 "
" "	(D) Arabella						
	copper-iron	.05	20.4	4.48	7.55	----------	57.16 "
	(E) Arabella						
" "	from breast	.10	22.0	6.90	2.74	----------	37.29 "

Signed, Frederick Yeasel.

A S S A Y S.

Dates.	Samples	Gold oz.	Silver oz.	Lead %	Zinc %	Copper %	Value @ Ton $
~~XXXX~~	Silver.60 Lead 5¢						
1913	5 ft.Star						
June 13	omitting paystreak	.36	1.25	-	-	-	7.85
" "	Star,average upper dump	.58	12.75	14.75	-	-	30.95
" "	Star,dump sel.	.24	.75	+	-	-	5.25
1916	Silver 60¢Lead 5¢ Copper 28¢						
July 15.	Sunset crop. 5 ft.wide	.08	10.5	-	-	-	7.90
" "	Sunset Antimony (antimonial-lead)	.3	45.	.52	-	-	95.00
" 15	Sunset brown crop.	.12	2.5	-	-	-	3.90
Oct.10	Sunset gouge	.26	5.	-	-	-	8.20
" "	Sunset surface quartz	.24	5.25	-	-	-	7.95
" "	Arabella breast omit rich streak	.35	12.	8.30		.72	26.52
Oct.10	Arabella dump	.52	16.	-	-	1.95	31.30
	Silver .75¢Copper 33¢ Zinc 10¢						
Dec.21.	Arabella breast	.68	12.	-	-	1.00	29.60
" "	" sel.sample	.55	85.	-	-	1.10	83.50
Dec.21.	smelting ore in breast.						
	Star No.1 dump Silver sulphide	.42	3.	66.	Zinc 10.70		93.05