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INTRODUCTORY

The Copper Canyon Mining Company owns two separate and entirely distinct copper properties:-

First- The large active Copper Basin district, or series of mines located seven miles South-west of Battle Mountain;

Second- The temporarily dormant Copper Canyon Mine, located eighteen miles South-west of Battle Mountain.

Both these properties were bought from the Glasgow Western Exploration Company.

The Copper Basin district, with its past history of carbonate ore shipments, having recently entered the list of disseminated "porphyries", constitutes the more important asset of the Company.

The Copper Canyon vein mine with its shipments of \$530,000 under the present ownership, and its 100,000 tons of 2.5% copper milling ore in the form of stope fills and pillars, together with further excellent possibilities, is an asset that can be handled to better advantage when the Basin mill is built. For this sole reason this property is dormant.

SUMMARY

COPPER BASIN DISTRICT

Location:-

Seven miles south-west of Battle Mountain, Lander County, Nevada.

Property:-

One hundred sixty mining claims, approximately 5,000 acres.

1 square mile patented land for camp site and in Reese River Valley.

Five water rights.

History:-

Among oldest claims in the state, operated in the Sixties.

1897-Acquired by Glasgow Western Exploration Company.

1901-Glasgow Western drilled eight churn drill holes.

1914-W. P. Harmon, under an option, drilled seven more holes. Churn drilling reveals discouraging data.

1916-Frank Paul, under option, ships 5,000 tons 6.2% Copper carbonate ore.

1917-August, Copper Canyon Mining Company purchases property outright for \$25,000 cash

Policy of developing sulfide through underground workings inaugurated and continued to date, proving existence commercial bodies disseminated sulfide ore.

SUMMARY-Cont.

Copper Basin District

History-Cont.

Shipments to date by present company.

Geology:-

Series paleozoic sediments intruded by net work innumerable monsonite dikes, with primary disseminated mineralisation on enormous scale of sediments and porphyry dikes.

Monsonite intrusion and associated igneous activity, the source of the primary ore.

Problem of finding commercial ore is understanding manifestations of alterations facilitating secondary enrichment.

Primary ore-cupriferous pyrite.

Secondary ore- chalcocite.

Variations in sedimentary beds cause fluctuation in primary and secondary ore.

Ore identical in appearance with other porphyry ores, due complete alteration of formations.

Occasional higher grade ores, from 4% to 6% on certain beds, permit of separate mining.

No gold value. Silver 0.1 ounce per ton.

Ore bodies have a characteristic surface gossan, which have yielded sulfides wherever tested in depth.

SUMMARY-Cont.

Copper Basin District

Workings:-

The present company has done the following development work:-

Drifts-----2,855 feet
Cross-cuts---2,913 feet
Shafts----- 680 feet
Winses----- 50 feet
Raises----- 427 feet

Ore Development:-

The tonnage is developed by accessible underground workings.

Sweet Marie(Glory Hole):-

417,600 tons 2.58% copper Partially developed

Chase:-

256,400 tons 1.82% " " "

674,000 tons 2.29% " " "

These ore bodies are being daily augmented.

Contention:-

Development started on an ore body- 50 feet thick, averaging 2.8% copper. No tonnage allowable

Queen :-

Continual shipments of 12% copper ore, simultaneous development of 6% copper milling ore, width at present 20 feet, undoubtedly important ore body.

SUMMARY-Cont.

Copper Basin District

Future Possibilities:-

Successful interpretation of geological data in past, gives confidence of continuance in future. On this assumption, not unreasonable to expect 8,000,000 tons of 2% copper ore of character similar to noted "porphyries".

The ore should be easily saved and milled.

Easily accessible mines with no pumping, bad air or heat, in a setting of unusually favorable economic conditions such as topography, climate, water, railroads, smelters.

The future of the project looks bright.

Location of Properties

This district is seven miles south-west of Battle Mountain, a station on the main line of the Southern Pacific Railroad, in the Battle Mountain Mining District, Lander County, Nevada. It is in the foot-hills of the Battle Mountain Range of mountains.

The properties are in Sections 19, 20, 27, 28, 29, 30, 31, 32, 33, 34, Township 30 North, Range 44 East, N. P. M.

The properties are connected by good wagon roads with Battle Mountain, the shipping point.

The Nevada Central Railroad, running through Reese River Valley from Battle Mountain to Austin, Nevada, is five miles from the properties.

The location is most fortunate for the economical operation of a mining property, as concerns topography, climate, and proximity to power and water.

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B A S I N

Property

The company owns:-

27 patented lode mining claims;

64 un-patented lode mining claims;

3 un-patented placer mining claims;

and holds by option, 66 un-patented lode mining claims.

Total 160 claims

The area thus covered is approximately 3.5 miles long by 1.5 miles wide, approximately 3,000 acres.

This area covers the promising ore-bearing possibilities of the district.

In addition to the above, the company owns:-

$\frac{1}{2}$ square mile agricultural State patent Camp site;

$\frac{1}{2}$ square mile U. S. Patent Railroad land for mill site;

$\frac{1}{2}$ " " " " " " land in Reese River

Valley for water and ranching.

The company also owns the following water rights in the Battle Mountain Range:- Long Creek (two rights), Magnolia Springs and also an option on Crystal Springs and Caledonia Springs.

The total amount of money still due on mining property is as follows:-

May and June, 1920---\$28,040

" " " 1921---\$47,900

There is little doubt that all options will be exercised.

The amount due on Reese River Valley land is \$3,744, in ten annual installments.

EQUITY TRUST BOND

BASINHistory of the property

The claims are among the oldest in the state. The surface carbonate ores were mined in the sixties, through numerous shallow diggings scattered generally over the hills. These have served well our present day desire for geological data. This desultory "shoe-string" business lasted until 1897, when the Glasgow Western Exploration Company consolidated and patented a group of twenty-seven claims, which formed the nucleus of the present company's holdings in the district.

From 1897 to about 1901, the Glasgow Western Company confined their operations mainly to assessment work with the production, however, of about 550 tons of shipping ore.

In 1901 the Glasgow Western Company, having conceived the idea of the possibility of large bodies of ore, drilled eight churn drill holes. Not sufficient geological data was available at that time to properly locate these holes and the results were discouraging.

In 1914, the Battle Mountain Exploration Company, controlled by W. P. Hannon of California, drilled seven more holes on this property, all of which is within the Copper Canyon Company's holdings. The same lack of geological data again caused the abandonment of an idea, well justified by the surface, but not executed with due regard for the geological habits of the country.

The next operator to play a part in the history of the property was Frank Paul, who in 1916, with high prices in copper, shipped easily available surface carbonate ores. This operation yielded 5,000 tons of 6.2% copper carbonate ore, bringing smelter returns of \$95,000. The profits were absorbed by the Glasgow

History of the property-Cont.

Western Company in the form of royalties. This work revealed in one locality the presence of a small amount of sulfides. The property lapsed to the Glasgow Western Company again, and the present company made an outright cash purchase of the Glasgow Western holdings for \$25,000, in August, 1917.

In purchasing this property the present company believed that in spite of the two discouraging drilling campaigns, that large bodies of disseminated sulfide ore could be developed and considered that the "handfull" of such ore exposed in the Frank Paul Glory Hole workings on the Sweet Marie claim, was a fore-runner of such tonnage, and if the ore occurrence were properly studied, through geological data, and the indications followed by underground workings, that such commercial tonnage could be found.

This is apparently correct and the present management feels very thankful for the work of predecessors, who played such an important part in pointing out the only feasible plan to date for the development of these ore bodies.

The present company began its operations with the conservative policy of endeavoring to ship carbonate surface ore at the prevailing high price of copper, either through its own operations or the stimulation of leasing.

The revenue derived in this way almost entirely supported the operations for the first eighteen months. The work was directed downward as rapidly as possible, and with the workings on the 120 foot level exposing a large body of 3% copper disseminated

History of property-Cont.

sulfides, the policy was rapidly changed to a strictly development campaign, in which carbonate ore revenue was considered a very subsidiary consideration.

In this manner the original plans have been worked out with a minimum risk and outlay. It is interesting to note that the actual revenues from production returned more than the purchase price, though these revenues were consumed in the development expenditures.

Geology

As is usual in mining districts, the broader features of the geology are simple, though the complexities of the details are sufficient to baffle operators.

A series of paleozoic sedimentaries, consisting of limestones, claystones and quartzites, in descending order, have been intruded by monzonite dikes, which are of the same formation and age as the Ely monzonite.

The term claystone is used to include a series of varying thin beds of argillaceous sandstones.

In the North-east part of the property, the recent tertiary rhyolite covers the older formations, presenting a characteristic, prominent "malpais" surface.

The dikes are innumerable, varying in size from inches to hundreds of feet, having every possible strike and dip. They are the source of the ore, and while the relationship is not indicated in the carbonate ores, due to the migration and precipitation of the solutions, the genetic relationship is well marked in the secondary enrichment sulfide zone, where the precipitation has followed more orderly lines.

The deposition of the primary cupriferous pyrite is remarkably wide-spread, due to the profusion of dikes and the consequent "cross-firing" between them. The district probably constitutes one of the largest bodies of primary disseminated ore ever discovered.

The deposition of primary ore varies with the character of the sedimentary beds, producing a continual variation as different

Geology-Cont:

beds are intersected.

This is further accentuated as secondary enrichment is similarly affected through the varying facilities afforded descending solutions by different beds. This variation in beddings forms an interesting and financially important feature of this ore body. The average is composed of three beds of 1.5% copper and one bed of 5% copper, this making it possible to mine a certain high grade tonnage separately operate on a small scale, should the present large project ultimately fail.

The deposition of primary ore is also at times more marked in the porphyry dikes themselves, than in the sedimentaries, and in such cases, is more uniform.

There are evidences of contact metamorphism, but the deposit is by no means a contact metamorphic deposit. There is no commercial primary ore. The secondary ore is chalcocite.

The values are in the copper, together with an average of 0.1 ounce silver per ton with no gold.

The problem of commercial ore discovery is mostly a question of locating favorable conditions for secondary enrichment. The primary mineralization can be assumed almost anywhere in the district.

Faulting, local porosity of certain beds, alteration of sediments by the dikes are the favorable conditions that facilitate secondary enrichment.

Carbonate ores do not necessarily immediately overlie the ore, nor is the amount of carbonate ore proportional in any way to the amount of primary or secondary ore.

Geology-Cont.

The carbonate ore very rarely outcrops. It is usually leached below the surface, but there is an impressive and wide-spread showing of carbonate ores throughout the property, due to the numerous surface cuts.

The district is largely covered by float, making surface geological detail difficult.

The croppings of the ore bodies are a characteristic gossan that have thus far never failed to reveal the sulfide below.

Secondary enrichment begins at a depth of 100 feet and has a thickness of 100 feet.

The present stage of development indicates that there will be several large areas in which the commercial ore tonnage can be developed and that one of the points of difference between this project and the noted porphyries, consists in this "island" nature of the ore bodies, of which there may ultimately be between six and ten.

The average grade of ore developed to date is 2.3% copper and there is no reason to believe that this should be decreased by future developments, unless it be decided in the future to recast all figures and base the tonnage and costs and scale of operations on a 1.25% copper basis.

The average analysis of the ore is :-

Copper-----	2.3%
Iron-----	10.0%
Aluminum-----	19.0%
Insol.-----	55.0%
Sulphur-----	12.0%
Total-----	98.3%

Geology-Cont.

The present ore reserves are mainly developed in the Sweet Marie (Glory Hole) mine, and Chase, and the ideas as to future possibilities are largely derived from applying the practical experience gained at these points. It is interesting to note that the Chase ore-body has been developed by sinking on the goossan at that locality and finding the sulfides as calculated. This has again been done at the Contention, where work has just been started in the sulfide ore. It has also been done at the Queen.

Workings

The workings on the property consist of:-

First- innumerable shallow surface diggings by prospectors, dating back for decades, almost all of which show some carbonate ore and have yielded shipping ore.

Second - a series of workings driven by the Glasgow Western Company for assessment work and most of which have not been productive. Among them are:-

Surprise Tunnel---600 feet long

Elvira Tunnel---550 feet long

Raven Tunnel---300 feet long

Third- the workings of the present company which were in accordance with the preconceived theories and planned to test these theories. Among these are:-

Sweet Marie(Glory Hole)

835 feet of drifts
250 feet of shafts
50 feet " winzes
1852 " " Cross-cuts

Chase

779 feet of drifts
909 feet " cross-cuts
150 feet " raises
200 feet shafts

Contention

572 feet of drifts
150 feet shafts
277 feet of raises
579 feet of cross-cuts

Queen

580 feet of drifts
373 " " cross-cuts

Workings-Cont.Hawkeye No. 3 Tunnel

259 feet of drifts

Widow Shaft

50 feet

Henrietta

50 feet

Total:-

2855 feet of drifts

2915 feet of cross-cuts

660 feet of shafts

50 feet of winze

427 feet " raises

The average cost per foot of running drifts and cross-cuts is \$10.00.

The average cost per foot of shafts is \$16.00

The average progress is two feet per shift or four feet per day.

The power at present in use is gasoline.

About 50% of the underground workings are timbered.

Production

First- The company has maintained continuous shipments from the date of purchase until the United States Smelting Company plant at Kennett, California, shut down in the fall of 1919. This smelter found these aluminous ores suitable for converter lining and accordingly allowed rates far lower than if smelting had been necessary. The result was that, at times, 4½% ores could be shipped at a profit.

The production was derived from the mining of carbonate ore through shallow workings by lessors.

Second- The mining of carbonate ores by the company for revenue purposes as the first step in the company's plans.

Third- The shipment of such ores as were extracted in the driving of the under-ground workings for development of the low grade ore bodies, with their occasional higher grade beddings or porphyries.

Ores over 8% copper were shipped to the American Smelting and Refining Company, Garfield, Utah and ores between 4.5% copper and 8% copper to the Kennett Plant of the United States Smelting Company.

Lessors paid royalties of 20%. They were encouraged by every device and concession and accommodation. Their work has furnished considerable data and in one instance, Coff lease exposed disseminated sulfides.

The total shipments to date are:-

<u>Company work</u>	<u>Tonnage</u>	<u>Smelter checks</u>
	5,701	\$42,985
<u>Lessors</u>	<u>2,846</u>	<u>\$71,687</u>
Total	6,547	\$ 114,672

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Production-Cont.

Royalties received-----\$14,337.40

Average grade of ore for total shipments---8.2%

EXCHANGE BOND

Ore Development

The method of developing ore is entirely by under-ground accessible workings.

The only ore considered as developed is in the Sweet Marie and Chase, where the ore is partly blocked out in drifts and cross-cuts. This ore is technically "partly developed" as the vertical dimension is still undetermined.

The Sweet Marie ore body to date:-

The 120 foot level is 600 feet long, 87 feet average width. The 170 foot level just started, and the 70 foot level above indicate 100 feet in thickness, giving a tonnage-partially developed- of 417,600 tons, average grade, 2.58% copper. There is no reason to believe that this ore body is limited by the above figures. At present writing the workings are being continued in commercial ore.

The Chase ore body, like the Sweet Marie, is being blocked by drifts and cross-cuts. The area of the 150 foot level is 41,500 square feet. The area of the 185 foot level is 22,900 square feet. Allowing a thickness of 100 feet, as indicated by the shaft and raises, gives:- 256,400 tons-partially developed- 1.98% copper.

It is to be understood that these ore bodies are being daily augmented.

In addition to the above, an ore body has been intersected at the Contentien having a thickness of 50 feet, averaging 2.8% copper, but as the development of this ore body has just been started, no tonnage can be claimed for it at present.

Ore Development- Cont.

At the Copper Queen, an ore body is being developed that is steadily producing shipping ore of 12% copper, while milling ore of 6% copper is being simultaneously developed. No tonnage can be figured. The last crosscut exposed a width of 30 feet of 6% copper ore and there is no doubt that something of importance will be definitely divulged here soon and go into the column of developed tonnage.

Future Possibilities

In every instance where indorground working has tested the surface indications, the results have checked our pre-conceived ideas. Armed with this data the future outlook can be approached with some degree of confidence. Nothing but a freakish development in depth of the well understood gossans can ultimately deprive the company of the right to expect at least 8,000,000 tons of 2% copper ore or possibly much greater tonnage on a 1.25% basis.

Whether the widespread remaining gossans that have not been developed below the carbonate zone will run true to form or not, cannot be foretold with engineering accuracy, but feeling called upon to express myself definitely for the guidance of others on this point, I commit myself to the above figures.

These orebodies would probably not be steam shovel-
ed but can be caved cheaply. The ground is well adapted to
caving.

The economic conditions are excellent. Railroad
surveys show a distance of ten miles from an excellent mill
site to Battle Mountain on the Southern Pacific. Distance from
mines to mill site, maximum four miles, grades being very reason-
able in both cases. Distance from Battle Mountain to Salt Lake
is 300 miles

There is ample water either in the Battle Mountain
range or Reese River Valley or both. The climate is excellent.
The labor situation, thanks to unusual working and living conditions,
is excellent.

Future Possibilities-Cont.

There is no detailed data concerning the metallurgy. The ore is a typical disseminated porphyry ore, that crushes readily and, as indicated by crude tests, and should give results equal to the usual porphyry ores. This matter has remained subservient to ore development, until the present time when arrangements are being made to run large scale tests.

No pumping will have to be done in any of the mines.

The Nevada Valleys Hydro-electric Power Company's line will almost cross the property on its way from Rochester to Battle Mountain.

It is too early to make any definite estimates of costs but there is no reason to suppose that with the ultimate tonnage blocked out, the costs should be any different from those usually obtained at the large porphyry mines.

There are no difficulties known at present that should in any way handicap the final consummation of this project, other than that due the regular routine of all large low grade copper properties.

There is one advantage possessed by this property over the classic low grade projects, that from the standpoint of the company stock-holders, is of great importance. Should it be impossible to ultimately develop the large tonnage at present expected, the higher grade ores of 4% to 6% copper, which fortify the present averages, could be mined separately and milled on a scale of 500 to 500 tons per day.

Future Possibilities-Cont.

This would be a feasible and profitable operation in the nature of a last resource, to be used only in the event that all present indications of tonnage fail; it is a very substantial resource, however, but the execution of the idea spells the ruination of the lower grade ores which if found in sufficient quantity associated will yield vastly greater returns.

SummaryLocation

In Copper Canyon, eighteen miles South-west of Battle Mountain, Lander County. Nine miles from Dillon station on the Nevada Central Railroad.

Property

Nineteen patented, and two unpatented lode claims. 150 acres, patented land. One water right.

History

First patented claim in the state. operation dates back to 1866.

1870-1880- Battle Mountain Mining Company, an English Corporation, shipped 40,000 tons of 20% copper ore to Swansea, by sailing vessels from San Francisco.

1880- Attained depth 470 feet. Water level- installed Cornish pump and concentrating mill, which operated on 155 heads, making 3% tailings, using jigs.

1897- Glasgow Western Exploration Company bought property, shipped several hundred tons 11% ore to its Colorado Smelter.

1915- Unsuccessful leaching plant.

1916- April, bought by Copper Canyon Mining Company. Earned 1/3 purchase price in nine months, from shipments which continued until 1919, February. Closed down due price of copper, also a probability of mill at the Basin property that could treat these ores.

Geology

Three main veins, Virgin, Superior, and Estes in quartzite country rock with menziesite laccolith the source of the mineralization of the fissures. Same menziesite formation as Ely. No disseminated ore. Massive chalcocite and cuprite with carbonates and native copper. Ore famous for its beauty and high grade. Primary and secondary mineralization shallow. Deepest ore, 470 feet in Virgin vein; 155 feet in Superior and 188 feet in Estes vein. Virgin and Superior veins worked by predecessors. Estes was operated and opened by the company, having a shoot 100 feet long, average width ~~thru~~ ten feet to 30 feet.

Workings

The work done by this company consisted of:-

First- Production from Estes vein (stoped).

Second- Exploring Estes vein, Virgin and Superior veins in depth, 188 and 260 feet levels.

Third- Exploring for additional shoot on Virgin vein, 1000 feet north of Virgin shaft by means of Farren tunnel.

Summary-Cont.Production

This company shipped:-

22,487 tons--average 9% copper, yielding \$834,699

This includes Willow Creek tailings:-

5,000 tons --average 4.5% copper " \$ 16,000

Ore Development

No ore developed but stope fills made by this company carefully sampled and measured. The Virgin stope fills and pillars are estimated, accurate data not available, but estimate based on familiarity with the mine.

Total--100,000 tons-----2.5% copper

Future Possibilities

There are not very great, deprived of hopes of deeper or additional ore bodies. Future is question of milling the easily mined stope fills and Virgin pillars. This can be done:- First, by shipping to Copper Basin; Second, treatment at Hickles Company mill; Third, erecting mill in Copper Canyon. Problem of future consists in liquidating the ore figured above with a minimum of outlay, and if possible shipping on a contract to the Hickles Mill in Galena Canyon when this mill is built. In any case there is a profit indicated in this property but it would be subsidiary to the Basin project in importance.

EXCHANGE BOND

Location

In Copper Canyon, eighteen miles Southwest of Battle Mountain, in the Battle Mountain Mining District, Lander County, Nevada.

The properties are in sections, 33 and 34, Township 31 north, Range 45 East, N. P. M.

The mine is nine miles from Dillon station on the Nevada Central (which connects Battle Mountain and Austin). Dillon is fifteen miles from Battle Mountain and was the shipping point for the company's production.

CANYON

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Property

The company owns:

19 patented lode claims-----270 acres
2 unpatented " " ----- 2 acres
U. S. Patented land-----100 acres
Copper Canyon springs water right.

History

The property is one of the oldest in the state, operations dating back to 1866. One of the claims is the first patented claim in the State of Nevada.

Between 1870 and 1890, the Battle Mountain Mining Company an English company, shipped over 40,000 tons of 20% copper ore to Swansea, Wales, via San Francisco, around the Horn. The interesting records of some of these shipments are in the company's possession.

This ore was obtained from the Virgin and Superior veins. The policy consisted solely in extracting the high grade ore wherever it was disclosed.

By 1890 a depth of 470 feet on a 65 degree dip was obtained on the Virgin vein. A Cornish pump enabled them to sink to the 590 foot level with a station at the 530 foot level. No ore was found below the 470 level. A concentrating mill operated in 1890 on 15% copper heads making a 5% tailings, using jigs, operated by Chinamen.

In 1897, the Glasgow Western Mining Company bought the property as a feed for its Coltona, Nevada smelter. This resulted in shipping several hundred tons of 11% copper ore, obtained from old stope fills. No development work was done.

In 1915, an unsuccessful attempt was made to operate a leaching plant on the old mine fills and dumps.

Beginning with April, 1916, the property was operated by the present company under lease and option. Within nine months the purchase price of \$90,000 was earned by shipments made from the newly opened Bates vein and Willow Creek mill tailings.

History-Cont.

This Ester vein continued production until February, 1919 when the slump in the price of copper and the prospects of a mill at the Basin property made it advisable to temporarily close down.

Geology

The ore occurs in three strong fracture/ zones, in an altered paleozoic quartzite which has been intruded by a monzonite laccolith and dikes. The fracturing and primary mineralization is due to the monzonite. The zones of fracture or veins, namely the Virgin, Superior and Estee, vary in width from ten feet to thirty feet.

The primary mineralization consisted of magnetite and pyrite, galena and sphalerite and finally the copper replacing the iron and lead, forming primary chalcocite. This is quite massive at times, presenting a rather sensational appearance.

Secondary enrichment was facilitated by the decomposed condition of the quartzite and movements subsequent to ore deposition, forming an ore which contained primary chalcocite, secondary chalcocite, cuprite, native copper, malachite and chrysocolla. The ore is noted for its characteristic appearance and beauty. Unusually large specimens of native copper have given the mine a reputation with specimen hunters. The values in gold and silver were negligible.

An average analysis of the ore as shipped:-

Copper-----	9.0%
Iron-----	3.5%
Insol.-----	65.0%
Sulphur-----	3.0%
CO ₂ -----	2.0%
O-----	<u>98.5%</u>

Geology-Cont.

There is a marked tendency for the ore to string out on narrow fissures and bedding planes considerable distance for the main veins.

The ore is never disseminated, but always, solid, even though in small fragments.

The outstanding and unfortunate feature of the ore body is the shallow depth of primary copper deposition. The maximum depth of ore in the Virgin is 470 feet on a dip of sixty-five degrees west; in the Superior, 135 feet on a dip of 65 degrees west; and in the Estes, 158 feet on a dip of sixty degrees east. The greater depth in the Virgin is due to the greater porosity.

The Virgin and Superior veins were parallel, while the Estes is a cross-fissure connecting them. The character of the ore in all three veins was practically identical.

The length of ore shoot on the Virgin was at times 500 feet; in the Superior and Estes, 100 feet.

The original miners left little ore in either the Virgin or Superior for the present company, but evidently had not discovered the possibilities of the Estes, though its presence was known to them.

The monsonite is the same formation as that at Copper Basin and Elip.

The ore in the Estes vein consisted of alternate masses of high grade ore and waste, in such manner that by sorting and screening, a 10% copper product could be shipped and a 2.5% copper waste fill left in the mine for future milling.

Workings

The first work done by this company consisted of:-
First- Developing and mining the Bates vein; Second- Exploring in depth of the Bates, Virgin, and Superior; Third- Exploration 1000 feet north of the Virgin shaft to test theory of a second shoot.

First- A crosscut was driven on the 115 level from the Virgin toward the Bates vein, a distance of thirty feet and then drifting on the Bates vein and stopping to the surface, on the shoot of ore 110 feet long and from twelve to thirty feet wide. The crosscut on the 135 foot level was driven from the Virgin to the Bates vein approximately 300 feet long and the stoping of the ore above this 135 foot level was begun.

Second- The development in depth of the Virgin consisted in unwatering the shaft to the bottom or 530 foot level and drifting under the ore shoot on the 530 foot level. Pumping at the rate of 550 gallons per minute was continued for weeks. The results showed only a lean primary mineralization in the Virgin vein. A 500 foot crosscut was driven on this 530 foot level which intersected the Superior vein but likewise revealed lean primary mineralization in lead and zinc veins. The development in depth of the Superior and Bates, by means of a crosscut, on the 530 foot level showed considerable lead and zinc with very low copper values. There was likewise considerable leaching and iron oxide indicating that this test was not conclusive because of the possibilities of the copper values having been leached. The appearance of lead and zinc has been interpreted as indicating a lack of copper mineralization.

Workings-Cont.

Third- A further development of the veins was carried on through the Barron tunnel, 500 feet North of the Virgin workings, which was driven through the Virgin vein and then drifting thereon.

This failed to show the existence of the additional shoot that had been partly suggested by the surface.

These unsuccessful attempts to disclose ore in depth or in an additional shoot, confined future hopes to a more intensive development of the ground already proven to be productive.

Production

Between August, 1916 and December 1918, the present company shipped 22,487 tons, average 9% copper, yielding \$536,600 or a gross profit per ton of \$23.90

This production was made from the Estes vein between the 100 foot level and the surface and from the Willow creek mill tailings, of which 3,000 tons were shipped averaging 4.5% yielding \$18,000.

This ore was all shipped to the American Smelting and Refining Company plant at Garfield, Utah.

VALLEY CONGRESS LINE

Ore Development

There is no ore developed. There are Estes stope fills as a result of this company's work, which were regularly sampled. These records show 25,000 tons average 2.5% copper. There are also stope fills in the old Virgin stopes which yielded the Glasgow Eastern Exploration Company several hundred tons of 11% ore. These fills probably amount to 25,000 tons of 2.5% copper. There are also pillars in the old Virgin stopes which were not left because of their ability to hold the ground but because they were considered too low grade to mine in the old days. These pillars probably represent 50,000 tons of 2.5% copper ore. From the experience this company had with these pillars, it is more than likely that these pillars would average 2.5% copper if broken down en masse. This is not engineering data, no money having been spent in securing this data, but it is an opinion and belief based on two years study and operation of the mine.

Putting these different resources together:

Estes stope fills-----	25,000 tons	2.5% copper
Virgin stope fills-- ----	25,000 "	2.5% copper
Virgin pillars-----	50,000 "	2.5% copper

Total-----100,000 tons 2.5% copper

The stope fills can be easily drawn and the balance is in the form of readily mined or caved pillars.

Future Possibilities

The future possibilities of the Canyon mine are not great. Since the possibilities of depth have been disposed of, there are no evidences of this property being anything more than a minor subsidiary to the prevailing Basin property. Considered as an adjunct to the Basin, with a mill and metallurgical staff, the treatment of these Canyon ores might be accomplished:

First- By shipment to the Basin

Second- Nickles Company mill

Third- A Copper Canyon mill.

The Nickles mining Company in Galena Canyon contemplates the erection of a mill in the near future at a distance of 3.5 miles from the Canyon mine on the opposite side of the Galena summit. It is likely that some arrangement can be made with them for the treatment of these ores. Transportation could be accomplished by aerial tramway.

The Canyon ores are not easily amenable to concentration. Numerous tests have been made and while 75% extraction seems reasonable to expect, the process is quite complicated, involving many treatments. With a price of copper near 50¢ there are no insuperable obstacles to erecting a mill of our own and translating the tonnage into profits, but this can be most efficiently done when we have built up our own Basin milling organization with its equipment for experimenting.

In any case there is no great profit here, nor one that requires immediate attention. It had best remain dormant in accordance with present plans.

Respectfully submitted,