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GEOLOGICAL SURVEY OF WYOMING

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R E P O R T

of

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on the

PROPERTY OF THE FEDERAL GOLD
MINING COMPANY,

at

South Pass City, Wyoming.

GEOLOGICAL SURVEY OF WYOMING

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R E P O R T
of the
FEDERAL GOLD MINING COMPANY'S PROPERTY
at
South Pass City, Wyoming.

TOPOGRAPHICAL:

The Federal Gold Mining Company's property is situated in the midst of a series of broad tablelands and rolling foot-hills, on the Atlantic side of the Continental Divide, near the southern end of the Wind River range of mountains, at South Pass City, in the South Pass Mining District, Fremont County, Wyoming, thirty-five miles south of Lander, the county seat and terminus of the Wyoming Division of the Chicago & Northwestern Railroad, and eighty-seven miles north of Rock Springs, an important town and station on the Union Pacific Railroad, where there are extensive coal mines. Altitude at the mine is about 8000 feet.

There are good roads to the South Pass Mines from both of these points and a daily mail stage from Lander, except Sunday. The Burlington and Northwestern railroads have surveys for further extensions west, and it is almost certain that one, possibly both, of these great lines of traffic and transportation will pass within a few miles of South Pass at an early day.

The City of Lander is situated in a broad and extensive valley with a rich clayey alluvial soil, well adapted to agriculture and produces abundant crops of grain, hay, vegetables and small fruits while the great available waterpowers, vast coal deposits, extensive oil fields and large zones and areas of gold and copper formation in the Lander, South Pass and adjacent districts are now matters of common knowledge.

HISTORY:

The early history of the mine is somewhat legendary, but it is an established fact that this lode was the first discovered and located on the South Pass gold zone and is now the best known and largest developed property and has yielded more gold than any other mine in the district, being credited with having produced gold bullion valued at over \$1,000,000. The mine has never at any period of its history been worked to capacity and always with a small and entirely inadequate equipment.

GEOLOGY:

The auriferous zone of the South Pass, Atlantic and adjacent districts is about thirty miles long and twelve miles wide, its longer axis bearing approximately N.70 degrees E. and has been appropriately described a "Geologic Island." The general formation is composed mostly of hornblende and chloritic schists and slates foliated by pressure and ribboned and banded with secondary intrusions of quartz and intersected by dykes of igneous rocks of a remote age and diverse composition. The northwesterly side of the gold zone is flanked by the ancient granites and diorites of the Wind River mountains, while to the south and east it passes under lime and sandstones of the carboniferous age.

Extreme metamorphism is everywhere in evidence in the rocks of this great zone and the very silicious character of the present auriferous and mineralized schists and eruptives is due to metasomatic replacement during and following a period of great eruptive activity when by immense lateral-pressure the strata of heated and partly plastic rock were bent into great folds, fissured, and tilted in varying degrees of inclination to vertical and tilted in varying degrees of inclination to vertical and the gold and mineralized vein stuffs now filling the fissures, chambers, cavities, seams, cleavages and all specialized formations resulting from earth movements, seems to have been deposited, not all at once, but in successive depositions, from hot alkaline solutions coming up through the fissures from great depths and also circulating

though every sort of passage way and rock formation of suitable porosity, slowly filling the fissures, healing the fractures and enriching the porous rock formations by natural chemical precipitation and deposition of the mineralized and metallized constituents of these solutions.

LODE AND LOCATIONS:

The lode is a complex of auriferous, mineralized fissure and contact veins in a wide shear zone of gold bearing rock composed of metamorphosed hornblende and chlorite schists, saturated with silica and ribboned and banded with fine grained quartz, intersected by dykes of igneous rocks composed mostly of chlorite, serpentine, diorite and diabase; mineralized and usually gold bearing.

The lode proper is from 200 to 400 feet wide, contracting and expanding at points along its strike, which is approximately N.70 degrees E. The northern boundary or hanging wall, is a large green dyke from twenty to thirty feet wide of the character mentioned above, mineralized and auriferous. The south boundary is a dyke-like formation of schists seamed or fractured diorite, somewhat mineralized.

The Federal Gold Mining Company's property consists of the following lode and placer claims connecting, as per map of surface ground which accompanies this report; covering an area approximately 280 acres.

- Mono, Patented.
- Mono No.2, Patented.
- Jeanette, Patented.
- Chas.Dickens, Patented.
- J.C.S.Patented.
- Alpine, Patented.
- Wolverine, Patented.
- Oro Firio, Surveyed for Patent.
- Homestate, Surveyed for Patent.
- Ben Hur, Patented.
- Polly Perkins, Not Patented.
- Eight of Diamonds, Not Patented.
- Lucky Strike Placer, Surveyed for Patent.
- Hermit Placer, Surveyed for patent.
- Carissa Gulch Placer, Surveyed for Patent.

The first six patented claims listed make a continuous line of locations on the main lode for a distance of over 5,000 feet, following the strike thereof. The balance are side locations but are all on mineral ground carrying gold in veins and placer gravel. The Wolverine, a patented claim, embraces within its lines the town site of South Pass City. The entire property is free from encumbrance and the titles are perfect.

ORE OCCURRENCE:

Gold occurs, generally in the free state, in nearly every vein and complex of veins and formations of which the lode is composed. It is found not alone in the veins but in quartz bands and lenses, great and small, and also in the metamorphosed schists, in shoots of varying width and extent, pitching usually toward the east, some of which are over one hundred feet long and from five to twenty feet wide, and in wide areas filled with a net work of veins and small quartz lenses which is practically all pay ore and the entire formation indiscriminately must be broken down to obtain the same commercial working. The veins, shoots and lenses of medium and high grade ore, occur most generally in a wide vein, or central core, which is followed in the most largely developed portion of the mine and of this we have the most certain knowledge, because the ore has been blocked out in measurable diameters and has been thoroughly tested by modern mining and metallurgical processes. In addition to this vein like central core of special enrichment, there are at least two others of similar character with strike like the former, parallel, or nearly so, with the general course of the lode and dykes which bound the same on the north and south, as previously described. One of these lies to the north of the central vein about forty feet, the other to the south of the same, approximately sixty feet distant. The ore in these two veins is disclosed by cross-cuts only and the continuity, width and dependable values of the ores thereof, has not been adequately shown and are matters for future demonstration. Other high grade ores in shoots, lenses, transverse veins, generally small, and in pockets of secondary quartz deposition, and more or less extended zones of same, are exposed in the mine workings, mostly in cross-cuts. The indications are that a considerable amount of medium and high-grade ore may be obtained from these slightly demonstrated ore occurrences and sources of supply, but how much is an unsolved question in the present stage of mine development.

COMMERCIAL LOW GRADE ORE:

Between the specialized and more highly enriched ore shoots of the central core, or vein, and elsewhere in the workings, as heretofore described, are bodies of lower grade ores, as shown by general assay chart herewith of all developed ore in the mine at this time.

These bodies of commercial low-grade, are as broad transversely, usually broader, than the high-grade shoots along the central core, hence the pay ore is practically continuous as developed in the principal drifts, on all levels of the mine, notwithstanding the fact that the drifts diverge, at many points along their course from the true strike and position of the more largely enriched bodies or shoots of ore and these divergencies are sometimes continuous for considerable distances. This has been proven, under my direction, by widening the drifts at several points of divergence and breaking into what appeared to be walls but which proved to be only slips, division planes or seams in the ore formation. These experiments usually resulted in locating better ores. This subject will be dealt with more exhaustively in the following paragraphs under the title of "Mine Development."

MINE DEVELOPMENT:

The principal workings or developed ground are on Carissa locations. The working entrance is a double compartment shaft 400 feet deep, situated a little east of Carissa Gulch, about 1,200 feet from the eastern line of the property. This shaft is sunk on the central vein, and follows its dip, 85 degrees north to the third level, two hundred feet from surface, thence to the bottom it is vertical. Five levels open out from this shaft easterly and westerly on the central vein of the lode, developing the ore for a distance of about 800 feet along the strike thereof.

Between the central workings and the north dyke are a series of veins and ore bodies, some parallel with the main vein, but many branching in all directions, forming a net work of small rich ore bodies with lower grade ore in the intervening mineralized schists, the regular vein stuffs being here mostly quartz.

This intervening ground is partly developed by the following shafts and openings therefrom: Discovery shaft sunk on an ore shoot to a depth of 192 feet and connected with the third level on the central vein by a short incline. Small and irregular shifts and chambers open out into the ore from this shaft and there is much valuable ground that can be developed in this part of the lode; Vertical shaft, double compartment, 200 feet deep and connected with the third level main drift by a cross-cut 125 feet long. Short drifts and small stopes open out near the surface and the ore is stoped from near surface to a depth of about thirty feet. Marshall shaft, ninety-five feet deep, sunk on a body of rich ore lying along the north, or green dyke and following its strike. The ore is stoped between this shaft and the Vertical from near surface to a depth of about forty feet. The two shafts are ninety-five feet apart and both are sunk on ore bodies intersecting the north dyke. Other shafts in this north side ground that reach depths of approximately one-hundred feet, are the Antoine, Picayune, Austin City and Washington. Besides these, there are thirteen other shafts and open cuts of lesser depth now known only by number. All of these old openings are east of the main working shaft and nearly all north of the central vein and present developed portion of the mine. All are out of repair and unsafe for examination, but I examined most of these old openings several years ago and am satisfied that there is a large area of very valuable workable ground partly opened by these old north side workings that will average throughout at least \$6 per ton.

West of the shaft the lode has been thoroughly prospected by shafts, short tunnels and open pits, many of shallow depth the entire length of the property; thus demonstrating that the ore is practically continuous. I shall notice here but two of the most important openings, namely, Young American and Alpine shafts. The Young America is an old shaft sunk on the central vein about 180 feet west of the main working shaft of the mine, and is about eighty feet deep with small stopes opening out east and west. These old openings are in a high grade ore shoot, and the ore taken therefrom milled \$60 per ton. The Alpine shaft is an incline of about 45 degrees north, and is sunk to a depth of about 135 feet, on the incline, in a large body of the auriferous quartz but little mineralized and of a yellowish color merging to a grey blue in some parts of the ore body. This opening is on the Alpine claim, which is the most westerly location of the Carissa property. The outcrop of auriferous quartz here is immense and far greater than at any other point on the Carissa lode. It outcrops laterally for several hundred feet and transversely at intervals in wide bodies nearly across the claim which is 600 feet wide. The shaft and drift east near the bottom some sixty feet long, is nearly all in quartz. The ore is low-grade and my examinations, tests, and assays indicate that much of it is commercial and should mill from \$3 to \$5 per ton. The ground in this part of the lode suggests great possibilities and has never been explored as it should be.

Returning to the main developed part of the property on the central vein. The mine has five levels and a vertical depth of about 400 feet. The two lower levels are about one hundred feet apart and those above from sixty to seventy-five feet, approximately; the distances not being equally divided. The first level is but ninety-five feet long, ore very silicious, mineralized to an extent of from 2-1/2 to 3 per cent, with pyrite and arsenopyrite as elsewhere throughout the mine, but some of the pyrite in the upper levels has been disintegrated and reduced to an oxide. Most of the rich ore on

this level has been worked out and the openings have caved considerably, but there yet remains the wide bodies of good commercial ore intermingled with pipes, pockets and lenses of high grade that can be mined by repairing and extending the openings, or it can be stoped from the second level.

SECOND LEVEL:

This level is 361 feet long; 172 feet east of shaft and 189 feet west. The drift follows the ore with slight deviations from the central core here and there. The ore is the usual mingling of quartz and metamorphosed schist with short shoots of high-grade in one or two places, also with short shoots of high-grade in one or two places, also pipes and lenses of mineralized quartz rich in gold. The ore is nearly all pay full width of the drifts, which average six feet. The face of west drift is in high-grade ore directly under the old workings of the Young America shaft. Face of east drift is in medium and low-grade. This is the known ore on this level. There are no cross-cuts, therefore no proof of wider workable vein stuff, but the indications are that much pay ore exists outside of the developed ground on this level, considered transversely to the strike of the known ore. Longitudinally it extends, no doubt, with few breaks, the entire length of the property, and this remark is applicable to the ore bodies in all parts of the mine, so far as my knowledge goes in this very important matter.

THIRD LEVEL:

This level is 405 feet long, mostly east of shaft, and follows the ore of the central core closely, and the same is virtually continuous save at the east end of the east drift where it breaks up into wide zone of cross-fractures and a sort of net-work of small veins, filled mostly with secondary quartz, some of which is rich, free gold being sprinkled liberally through the matrix. On encountering this formation the drift forks northerly and southerly and runs around a considerable area of this fractured ground and the two arms of the drift connect with a cross-cut extending from the east face of the south branch of the drift, crossing the north branch transversely and continuing on to a connection with the

vertical shaft. These openings are all within the fractured zone, a large part of which is apparently commercial ore of medium and low grade. By commercial ore, I mean here, and whenever the word occurs in this report, ore that will pay to mine and mill with a modern equipment capable of handling a daily output of 100 to 200 tons, minimum capacity.

FOURTH LEVEL:

This level is 775 feet long. The east drift is 415 feet long, west 360 feet. The shoots of high-grade ore in the east drift are larger, longer and richer than on the upper levels and while the ore is a continuation of the shoots downward, improvement in the value of the ore, and increase of tonnage at greater depth is apparent. There is less oxidation of the sulphides but otherwise the general characteristics and mineral constituents of the matrix are unchanged. The same conditions apply to the ores of the west drift save that there is no apparent increase of gold values in ore in this direction. In the east drift there is also a marked increase in the number of small shoots, pipes, lenses and pockets of rich ore and segregations of the same near to, or in conjunction with the large shoots of like formation and degree of enrichment. This tendency to expansion of the higher grades over wider areas transversely to the strike of the lode is a matter of great importance as it indicates permanency and a continuation of the ore bodies downward indefinitely.

There are sections of low-grade ore between the high-grade shoots but here, as above, these occur mostly where the drifts diverge from the true course of greatest segregation of the richer ore shoots and in general these are recoverable simply by widening the drifts or cross-cutting and thus getting on to the true and more highly enriched central core of the lode.

FIFTH LEVEL:

This is the lowest level of the mine; 400 feet vertical depth from the surface. The east drift is 375 feet long and the west 260

feet, a total of 630 feet. For nearly two-thirds of the distances traversed by these drifts the openings are not on the main vein or central core of high-grade ore shoots but follow spur, or branching veins after which deflecting southerly from the main vein, gradually turn and resume the general course of the main system and unite with the same.

In the west drift the veins unite at about one hundred feet east of the face and the drift follows from thence to its terminus, on the main vein. A good shoot of medium and high grade ore is encountered a few feet beyond the point where the upper spur vein unites with the main system. This shoot is about fifty feet long and wider than the drift. Apart from this, the ores of the west drift are mostly commercial low-grades, the average gold value of the same being lower than in any other opening of the mine.

A description of the spur vein as followed in the east drift, would simply be a replication of the conditions already explained in the west, with a difference consisting of a wider divergence south from the main known ore system and a longer and more pronounced sweep northerly to a union with the main vein at a point about 130 feet ~~beyond this point, the drift penetrates one of~~ west of the easterly terminus of the drift. About ten feet beyond this point, the drift penetrates one of the largest and most remarkable high-grade ore shoots now known in the central ore system of the mine, and follows along in this a distance of 120 feet to the east face of drift. This shoot is undoubtedly an outswelling and considerably enlarged continuation downward of the surface. As known through the drift opening and a chamber, or small stope on the north side of the terminal of the east drift and an uprise therefrom to the fourth level, all in ore, and the north side of each of these openings all in a compact body of high-grade ore, which plated when milled, under my direction, at the time of the opening of the small stope and raise through to fourth level from \$8 to over \$19 per ton, the average being about \$15; this ore shoot has approximately the following dimensions: between the fourth and fifth levels; Length, lateral, 120 feet; height, vertical measure-

ment, from fifth to fourth level, 100 feet; breadth, transversely, twenty feet. Inasmuch as the breadth of this shoot is only partly established by openings thereon, if the same is reduced one-half, the following equation of the quantity and milling value of the ore in this shoot alone would seem to be a safe calculation, allowing fourteen cubic feet of ore per ton, which is a fair estimate, $120 \times 100 \times 10$, 120,000 feet, equals 8,571 tons. Milling value \$15 per ton, $8,571 \times \$15$ equals \$128,565. If the indicated breadth of the shoot be accepted, the ore value would be doubled. There is one other high grade ore shoot in the east drift, beginning about twenty-five feet east of shaft and exposed for a distance laterally a long the openings for about forty feet, but as the drift passes mostly south of it the more northerly extension of the ore body is unknown. There are two other small shoots of medium richness occurring between these described and the rest of the drift ores are mostly commercial low grades. There are vertical connections east of the shaft between all levels, this blocking out the ore in that direction for a distance of about 400 feet in four diameters. West of the shaft but three diameters are exposed, there being no vertical connections between levels in that division of the mine. But a small fraction of the developed ore of the mine has been stoped but stands mostly intact, as blocked out, ready for mining and milling. Most of the past gold yield of the mine above referred to was derived from ores broken in developing the mine from the old workings near the surface.

SAMPLING AND ASSAYS:

The value of the hand-sampling and assay method as a means of determination of the commercial value of the ores of the mine, depend more on the taking and preparation of representative samples; which is a very difficult work to accomplish, than upon the fire assay of the same; the latter work being neither difficult nor uncertain if placed in the hands of a skilled metallurgist. No "Rule of Thumb" work, however, is permissible. The essential points of procedure in assaying ores from the Federal Gold Mining Company's property are:

Chemical determination of the constituent elements of the sample of ore and extreme care in the work of cutting down and preparing the same for treatment by the fire process; correct fluxing and the application of the required degree of heat, at the right time, and not too long continued. Correct sampling of the ore bodies of this mine, is as above remarked, difficult for the following reasons: The ore bodies are wide, full of seams and cleavages in and along the planes of which free gold is lodged, very irregularly distributed. Two or more samples taken from across an opening in the exact same place, have been known to vary in value, when assayed, from \$1 to over \$50. One sample may have numerous particles of metallics (flattened grains of gold) in the pulp that will not pass the screen when the sample is being prepared for assay; a second sample taken in the exact same place, may contain no metallics whatever. This is an extreme example, but by no means an uncommon occurrence. The outer surfaces of the openings only are available for hand-sampling, or practically so, as it is very difficult to cut deep grooves in the hard vein-stone and auriferous schists. All of the outer surfaces of the ore bodies have been rent and shaken by violent concussions of blasts when rounds of deep holes made by machine drills were shot, and this rending and shaking, supplemented by the pounding and jar of the drills, has dislodged and shaken out of the seams the easily detachable particles of free gold, hence samples taken from the exposed outer surfaces, are not representative and when the great mass of the ore is broken down and milled, it usually yields better gold values than assays of hand samples indicate. Approximately correct hand samples are possible, however, and may be obtained, at a great expense of time and labor, by chipping wide and deep grooves at close intervals across the exposed outer surfaces of the ore, but according to my experience, samples so taken will still be more or less impoverished, therefore mill runs are always the surest tests of the value of ore from this mine.

OIL RESERVES:

The ore reserves of the mine that are developed and blocked

out in all the drafts and stopes of the central core, or main vein (no cross-cut ores included) are itemized in the exhibit which follows. This exhibit shows the tonnage, average assay value, and gross total value of ten different blocks of ore, which are consecutively numbered in the exhibit. Reference is made to an assay chart which accompanies this report for identification of the location of each block and the average value of all the assays of the ores of the mine grouped in intervals of ten feet on all levels excepting the fifth level east where the intervals are twenty feet. The general average value of all the assays made from samples taken in each interval is given as the true assay value of the ore of each section taken full width of the opening. In many of the intervals from four to six assays are averaged together in this way, and liability to error is thus reduced to a minimum. I can conceive of no more effective or reliable way of determining the average assay value of the ores of the mine and the following exhibit of the tonnage and value of the developed ore divided into blocks is based on the same:

Block No.	Tons.	Av. Assay Value.	Total Value.
1	9,643	\$7.95	\$ 76,661.85
2	7,715	7.66	59,096.90
3	4,114	9.30	38,260.20
4	3,429	6.00	20,574.00
5	19,175	12.64	242,372.00
6	17,286	6.13	105,963.18
7	26,000	15.34	398,840.00
8	12,750.	5.36	68,340.00
9	3,900	6.00	23,400.00
10	<u>5,700</u>	<u>6.00</u>	<u>34,200.00</u>

Total 109,712. Gen. Av. Val. 9.73 Gr. Total. \$1,667,708.13

In Blocks 9 and 10 the assay value of the ore is estimated, as these are the old workings of the mine, therefore not available for sampling at this time, being out of repair, but I examined the openings of the same some years ago and made some samples, but not covering all of the ground, but from this old data I am satisfied my present estimated values are below the real worth of the ore. Computations of tonnage in all cases, are based on fourteen cubic feet, standing ore per ton.

WORKING MILL TESTS:

No reliable record of the early mill work on the ores of this mine

can be obtained. Numerous test runs have been made from time to time, most of them either made by myself, or under my supervision. Following are the results in detail of a number of these operations:

No 1. Ore mined on fourth and fifth levels, mostly on fourth.

Average of ore bodies, 9 feet. Ore not sorted. 276 tons milled.

Gold recovered by plate amalgamation, U.S.Mint return.. \$3,500.00

Gold recovered by plat amalgamation, per ton milled....	12.67
Assay value of concentrates per ton milled.....	4.73
Assay value of tailings.....	<u>3.20</u>

Total value of ore\$ 20.60

No.2. Ore taken from low grade zones, most on fifth level.

252 tons milled.

Gold saved by plate amalgamation, U.S.Mint return..... \$1,233.00

Gold saved by plate amalgamation, per ton milled.....	\$ 4.89
Assay value of concentrates, per ton milled,	1.72
Assay value of tailings	<u>1.60</u>

Total value of ore.....\$ 8.21

No.3 Medium ore from the first and second levels.

100 tons milled.

Gold recovered on plates, U.S. mint return.....\$ 907.35

Gold recovered on plates, per ton of ore treated. 9.07

Assay value of tailings..... 3.70

\$12.77

No 4. Ore taken from medium grade shoots on three lower levels. 300 tons milled.

Gold recovered on plates.....\$2,317.75

Gold recovered on plates, per ton milled, \$ 7.73

Assay of tailings..... 3.10

Total value of ore..... \$10.83

No 5. Ore came from all levels except the first, and ore bodies averaged 8 feet wide.

245 tons milled.

Gold recovered by plat amalgamation..... \$2,034.00

Gold recovered by plat amalgamation, per ton milled, \$ 8.30

Assay value of tailings 2.60

\$10.90

No ore was sorted for any of these mill runs and all ores were broken full width of the openings, some of which were over sixteen feet wide. Hand samples from the areas where the ores were mined, gave average assay values of from 10 to 25 percent, less than the ores milled; due no doubt to defective sampling.

There is existing data of ores milled during recent years to the amount of 5,575 tons taken from different parts of the mine while its development in the progressive stage, which yielded, according to the U.S. mint returns, gold bullion to the value of \$67,000. The gold recovered by plat amalgamation averaged \$12.12 per ton, and in concentrates \$1.50 per ton. The average of tailings assays was \$3. per ton. total average value of the ore, \$16.62 per ton.

LOW GRADE AREAS:

The so-called "low-grade gold areas" of the lode, composed of auriferous and mineralized schists mingled with intrusions of quartz in veins, lenses, pipes and sections of ribboned and banded structure, saturated with silica and in certain limited areas, filled with a net work of small fissures without regularity of strike, but branching out in all directions, and healed mostly with auriferous depositions of secondary quartz; comprise practically all of the lode formations from east to west on the strike of the same, and transversely north and south from the central vein core, to (and including probably) the so-called "boundary dykes." The question is, how much of these areas are pay ore if worked on a broad-gauge plan as are the analogous lowgrade ore areas of the Homestake Mine of Lead, South Dak? That these two ore zones are analogous and closely related, although widely separated by distance, has been remarked and affirmed by more than one mining engineer of note and recognized ability, and in this I concur without a particle of hesitation. I am also satisfied that certain sections of the mine, low-grade formations, exposed in cross-cuts through the of the mine are workable lowgrade ore formations, although the proof of this is not as complete as could be desired and not sufficient to justify any specific estimate of the amount of low-grade ore so exposed. The cross-cut openings are so located and described as follows: Third level east of shaft, 137 feet, cross-cut south, twelve feet same level, 347 feet east of shaft, cross-cut north 130 feet. Fourth level, thirty feet east of shaft, cross-cut north fifty-one feet, sixty feet east, cross-cut north twelve feet; 104 feet east, cross-cut south eleven feet; 346 feet east, cross-cut north 129 ft.

Fourth level, 277 feet west of shaft, cross-cut north, thirty feet. Fifth level, twenty-seven feet east of shaft, cross-cut south fifty-two feet; 100 feet east, cross-cut north fifteen feet; 124 feet east, cross-cut south twenty-eight feet; 135 feet east, cross-cut north fifty feet; 339 feet east, cross-cut south 165 feet. Fifty level west, sixty-nine feet from shaft, cross-cut north seventeen feet. These cross-cuts show to what extent the low-grade formations have been penetrated below the surface. The lode matrix is exposed east of the shaft by two of these openings for a width of 295 feet. At another point east; exposed north only, 129 feet. On the surface there are openings in the low grades for a distance of a mile or more. A little east of the shaft, there is a surface cut, or small "Glory Hole" sixty feet long from ten to twenty feet deep and averaging about thirty feet wide from which ore has been milled.

I pass the short cross-cuts with remark that in nearly all some small shoots and larger segments of good commercial low-grade ore is exposed. The 130 foot cross-cut on second level east has already been explained and the net-work of small veins therein exposed, referred to. The cross-cut north on fourth level east 340 feet from shaft, extends from the main drift to the face of the north or green dyke, a distance of 129 feet. The dyke is mineralized and on the contact at face of cross-cut, outer surface of the dyke, formation, the rock assays from \$2.50 to \$3.67 per ton. Sixty feet in from the drift, in this cross-cut, a high-grade chimney or shoot, of fine ore was encountered which is twenty feet wide, extends unbrokenly upward and downward but in drifts north and south either way the rich ore seems to terminate on slips in the formation.

This is not surprising and the same thing occurs in many of the high-grade ore shoots elsewhere in the mine. There will be short intervals or breaks, in which the intervening ore is low grade, but on breaking through these division planes or slips, the good ore is always immediately again encountered, and such, I believe,

will be the case in this instance. I am satisfied that there is a segment of exposed ore formation at this point, in this north cross-cut, which, when developed, will prove to be a vein, or north side core of good ore shoots, from twenty to forty feet wide with strike conformable to that of the main vein and passing under the old shallow workings of the Discovery and Marshall shafts. The balance of this cross-cut is in the mineralized schists, the gold value of which has never been accurately determined.

The fifty feet cross-cut on fifth level east, 135 feet from shaft, going north toward the green dyke, was run under my direction and close supervision. Twenty-five feet in from the drift, the main vein was encountered, and the ore at this point, for a distance of over eight feet, assayed \$13.50 per ton. The balance of the cut is through veined mineralized schist with quartz intrusions, pans gold more or less all through, and assay samples taken in ten foot intervals when the cut was run, and from all drill holes, during the progress of the work, gave an assay of ore of the main vein all through the cut of \$3.92, excluding the \$13.40 assay of ore of the main vein. I doubt if the outer and shaken up surfaces now exposed in this cut, would show as good average values, and have never made the test, but am sure of the above results obtained as stated, when the cut was run, which is the better test, as the drill hole samples were from unbroken formations and none of the gold could have been shaken out of the seams. The south cross-cut on this same level, 339 feet east of the shaft was also run under my personal supervision and is therefore familiar ground to me. Drill hole samples were taken all the way, supplemented by side and roof sampling in ten foot intervals throughout. The drill hole samples, averages of assays, were practically the same as the average of the low grades in the fifty foot cross-cut as reported above, until within twenty feet of the south terminus of the cut, and from there on to the face, it is practically barren rock.

The general average of all the drill hole samples, was \$3.84
The side and roof samples, cut from grooves across the formation along the whole length of the cross-cut, ran considerably lower, the general average being \$2.06. At a point beginning forty-two feet south of the main drift on the central vein, ore of better grade was encountered, and from thence on for a distance of approximately sixty feet, I mill tested all of the ore broken in this section of the cut, with the following results:

193 tons, S. X-cut ore milled.

Gold recovered by plat. amalgamation		\$826.40
Gold recovered by plate " per ton.	\$4.23	
Average assay value of tailings	<u>1.30</u>	
Total value of ore.	5.53	

A mill test of low grade ore taken from the open surface cut, or "glory hole", gave the following results:

362 tons milled.

Gold recovered on plates		\$1,141.70
Gold recovered on plates per ton,	\$3.18	
Average assay value of tailings.	<u>1.60</u>	
Total value of ore.	\$4.78	

The ore taken from these tests was broken full width of the openings and not sorted and was accurately weighted into the mill ore bins, which were carefully cleaned out, as was also the mill batteries, and there was absolutely no mixture of ~~more~~ from any other part of the mine. The open pit runs show more than the average loss of gold in tailings, but this is ascribed to the fact that there was a large amount of fine surface dirt in the ore, which made a slime, and considerable fine gold floated away with same. From the evidence adduced in the foregoing, I feel that it is not unreasonable to expect that when these large low grade areas of the lode are thoroughly explored and opened up along the strike of the formations, that several segments or divisions, of the wide low grade areas, will be found to consist of commercial ore.

Should this prove to be the case, it will, most assuredly, add considerably to the worth of the property.

ORE TREATMENT:

The ore is free milling to the extent of about 75 percent of its gold contents, therefore the simple method of plate amalgamation, is the best and cheapest. The gold remaining in the tailings, can be recovered to the extent of about 90% cyanidation or concentration. The cost of ore production and treatment may be safely estimated I think, at \$2.50 per ton for the better grades and \$2.00 for the low grades; the latter occurring in much the larger bodies, and therefore could be more cheaply mined.

POWER, WATER, FUEL, ETC.

Cheap power is a matter of importance in mining operations and can be readily obtained here. There are two water powers unappropriated and open for location, either of which will generate from 800 to 1200 H.P. namely: On the Sweetwater River, nine miles distant, or Little Popo Agie River sixteen miles. The latter is the better power. An electric power plant on either of these rivers, will generate ample power for the operation of this property. Power can also be had from the Dallas and Lander Oil fields about twenty miles distant, where there are now some 100 producing wells. A custom power plant is projected by the Wyopo Oil & Power Co, owners and operators of the Dallas fields. This Company offer to deliver electric power at the mine for \$50 per H.P. per year. Wood is used for fuel now and costs \$5 per cord delivered, and mine timbers are procured near at a reasonable price. The ground stands well and requires but little timbering. Water for milling is supplied in sufficient volume from Willow Creek, a good sized stream, which flows along the south side of the property. Labor is readily procured at Colorado standard rates of compensation. Supplies are freighted from Lander at a cost of from 60 cents to 75 cents per 100 lbs. This rate will be greatly reduced, when one or both of the projected extensions of railroad line, reach the vicinity of the mine.

EQUIPMENT :

The present equipment consists of a 10 stamp mill (350 # stamps) 1 Frue vanner, 1 bucket hoist, 1-3 drill Norwalk air compressor, three 1-1/4" air drills, 2 baby air drills, 1 Corliss engine (75 H.P.) two 70 H.P. economic boilers connected, 1 Knowles electric pump, 2 mine pumps, 1 6K.W. dynamo, 1 portable saw mill. The buildings are: mill, shaft house and blacksmith shop, - under one roof, assay office and manager's dwelling house, in one large building, two smaller houses, stable, storehouses, etc., in good repair.

SUMMARY AND CONCLUSION:

The ore exposed and blocked in the developed portion of the mine, computed in ten blocks, gave a total of 109,712 tons. Total gross value of ore, based on average assays, \$1,067,703.13. General Average Value, per tone, is \$9.73

The lode has been developed at east end virtually 400 feet and longitudinally 300 feet with five levels. The lode has been prospected from end to end of the property and shows that the ore is practically continuous, with few breaks or faults. Ore bodies are wide, but irregular and expand and contract in various places. The better, or high and medium grade ores occur in shoots and lenses, more or less closely segregated in and along a central core and in side veins paralleling approximately the main vein of the central core with lower grade, but mostly commercial ore between large areas of auriferous and mineralized low grade ore formations conjoin the main vein on either side, the size of which appear to be limited only by the boundary dykes and these also are gold bearing, but to what extent is not determined. The low grade areas are practically undeveloped but are exposed to a considerable extent in the cross-cuts north and south of the main vein. A very large tonnage of this class of ores, of commercial grade is possible, but the data for dependable estimates as to quantity and value, is insufficient.

The working shaft and its equipment, is small and entirely inadequate to handle daily such a large output as the mine is now prepared to yield. The shaft should be enlarged and made vertical, and a new and much larger hoisting equipment should be provided. It would also be a good plan to sink a new shaft about 300 feet west on the main vein from the present one, which would be on the rich ore shoots of the old workings of the Young American shaft. The west end of the lode is worthy of attention, and in due time a vertical shaft should be sunk on the large bodies of quartz ore on the Alpine claim, near the old incline shaft there. I am satisfied that the ground there is deserving of special attention and development.

A water power should be located on the Little Popoagie River and the same utilized for supplying power for the mine. It is the best and most valuable water power in this vicinity and would be amply sufficient at all seasons. With a water driven power equipment for mine and mill, ores carrying a gold value of \$3 per ton, or possibly less, could be mined and milled with considerable profit. The mill now on the property is of little worth, except as a test plant, and for which purpose it is now used. Its daily capacity is altogether too small for the present needs of the property, if large and steady profit is to be derived from the operation of the same. A new modern, 40 or 60 stamp mill, should be built as a first unit, and so constructed as to admit of building additional units from time to time as required.

The approaches to the mine are easy and rarely surpassed and avenues or outlets, for ores at the east, west and central portions of the lode, are all that could be desired. At either of these points, the ores would pass directly into the mills by gravity.

In conclusion, this property comprises great worth in its large and valuable ore bodies now developed and blocked and in the still larger ones that it is fair to assume will be exposed and made operative and of lasting value and great profit, when the extensive areas of the lode east and west of the present developed part of the same, are developed and explored. It is equally fair to expect and assume that the ore will be permanent downward to a great depth, possibly beyond the limit of profitable mining.

Respectfully submitted,

ALVIN PHILLIPS, E.M.

Couth Pass City, Wyoming, March, 11, 1911.