E. E. CARPENTER
GENERAL SUPERINTENDENT

0930 0002

(195) Item 2

CANDELARIA MINES COMPANY

POST OFFICE AND TELEGRAPH
MINA, NEVADA

CANDELARIA, NEVADA Feb.18th 1921.

Mr. Blackburn Gen. Sup't.,
Tonopah Mining Company,
Tonopah, Nev.

Dear Mr. Blackburn;

I have assembled for your consideration as much data as I could get in the office here, and will send it to you by registered mail or Parcel post from Mina. It consists of the following files;

1. Surface Plan.
2. Vertical Section all mines combined.
3. Mt. Diablo Assay Plans, 12 sheets. (13 urs)
4. Copy of Ore Reserve Estimates.
5. Vert. sect. ore blocks Lucky Hill Mine (2 sheets.)
6. Vert. sect. old stopes showing assays (7 sheets Argentum; 4 sheets Diablo.)
7. Tracing Plan Lucky Hill Mine workings.
8. Assay Plan Lucky Hill Mine,(2 sheets.)
9. Copy of Contracts, (3 contracts.)
10. File. Sketch Assay Plan of Dumps, inc. sampling of workings on General Jackson Group, east of and adjoining Mt. Diablo.
11. File of daily assay sheet, last 2 months.
12. File of assays taken from Dumps and lower levels Argentum Mine.
13. Estimate of Operating Costs.
14. Estimate of Construction Costs.
15. Balance sheet showing expenditures.
16. Digest of tests on treatment of ores. (Will be sent from S.F.)
17. Sketch Assay Plan Lucky Hill showing edges of Jarmuth stope.

Commenting on the above I would say that NO.4 will be sent on later, as I wish to bring it up to date with the results of the last work in I-6 and A-3-7 raise. No.11 is sent as a matter of interest only; these daily samples were taken of every heading, regardless of whether it was in waste or ore, and is partly shift bosses samples and partly the engineers channel samples. Nothing but the channel samples were used in our computations of ore reserves. No. 12 is sent for the same reason; I have the entire lot of detailed sheets in my office in San Francisco

totalling over 10,000 samples, but this recent duplicate file was here so I sent it on. We sampled everything, shafts, raises, drifts and cross-cuts, regardless whether they were in waste or vein matter, solely for information. The results of the stope sampling in Argentum lower levels will be found on the seven sheets, file No.6. The same work for the upper levels shows many payable fills, but not so much ore left in place; we have all of this work done, but didnot make the vertical section maps and plot the samples yet. No. 15 I will have to send you from the San Francisco office also.

If I have overlooked anything that you wish to look over, please advise me and I will send it on to you. I will be in Reno Sunday, care Manson, and then go to Rochester, and later back to San Francisco.

With kind regards, I am

Sincerely yours,

C. W. Kaeding

CANDELARIA MINES COMPANY
Vice-president.

San Francisco Office
648 Mills Building.

CANDELARIA MINES COMPANY
MILLS BUILDING
SAN FRANCISCO, CALIF.

OFFICE OF THE
VICE-PRESIDENT & GENERAL MANAGER

March 9, 1921

Mr. W. H. Blackburn, Manager
Tonopah Mining Company
Tonopah, Nevada

Dear Mr. Blackburn:

I am sending you herewith the report on ore reserves for the Candelaria Mines Company. I regret the delay in getting this out for you but I desired to have it brought up to the date of our last development work and put in proper order, and it was necessary for me to get in touch with our mine engineer, Mr. K. G. Schwegler, who did all of this work formerly. Mr. Schwegler came to my office and completed the calculations for the latest development work and these have been added and a summary made leaving the matter in good shape.

This work has been done in an extremely conventional way and for operating results we would call all of this tonnage reasonably assured ore. It should be noted also that many of the headings were left in fine ore and I believe another sixty days' development would have given us 75,000 tons reasonably assured. You should also make note that there is practically $1.00 per ton of gold values

in this grade of ore so that I consider approximately 60,000 tons of $15. ore to start our mill with from the Lucky Hill mine.

In addition to this ore, there is one dump on the Argentum containing 8,000 tons of 12 ounce silver which can be brought to a millsite at not to exceed 50¢ per ton, and then we have approximately 40,000 tons to be screened from the low grade ore dumps which will average $10. This gives us well over two years ore for a plant of a capacity of 150 tons a day.

I believe this covers the matter completely and I shall be glad to submit anything further which you may find you desire to have.

Hoping that your principals may become interested in this situation which I consider to be of great merit, I am

Very truly yours,

C. W. Kaeding

Vice President & General Manager.

THE TONOPAH MINING COMPANY OF NEVADA

February 21, 1921.

Mr. C. D. Kaeding, Vice-President
Candelaria Mines Company,
648 Mills Building, San Francisco, Cal.

Dear Mr. Kaeding:

COPY

Yours of February 18th, also enclosure under separate cover of data on the Candelaria Mines, received.

The list in your letter is short the following, some of which you say will be forwarded from San Francisco:

No. 4 Copy of Ore Reserve Estimates

No. 5 Vertical Section ore blocks Lucky Hill Mine (2 sheets)

No. 6 Vertical Section old stopes showing assays (7 sheets Argentum; 4 sheets Diablo)

No. 7 Tracing Plan Lucky Hill Mine Workings

No.15 Balance sheet showing expenditures

No.16 Digest of tests on treatment of ores.

The above sound as tho they would be useful and I would be pleased to get them. It will be necessary to pick out the information most easily understood to send to Mr. Whiteman.

I would also suggest that you give me the name and address of parties in the East with whom Mr. Whiteman

THE TONOPAH MINING COMPANY OF NEVADA

will deal, also write such parties that I am giving Mr. Whiteman my impressions of the layout, so that he may be able to discuss a possible working agreement subject to a check examination at the Mine, in case anything comes of their discussion.

The contracts on the Esmeralda Water Company, Diablo and Argentum are costing $1000.00 per month, which will continue until a reduction plant is in operation. Have you ever considered dropping the two old properties and combining the Lucky Hill, Simon Claims and Esmeralda Water Company? That is a deal based on that holding. What style of contract on the Lucky Hill? Have you a past production record on the Mt. Diablo so that one might guess at production of the Lucky Hill vein?

Yours very truly,

General Superintendent.

WHB-HB

Rent Mr Whiteman

Block Maps Lucky Baldwin
" " Main Vein Lucky Hill

Assay plan Lucky Hill 20 scale May 1920
" " 2 sheets 10 scale Lucky Hill
Claim map showing Argentum, Mt Diablo & Luckyh.
3 contracts - Esmeralda, Argentum & Mt Diablo
1 Castings Letter 27th Feb
" " 23 "
Expenditure sheet
1 Castings per ton estimate.
" construction estimate
Mill test letter Jan 24-21 to R.C. Warriner
Dump sampling data.

Analysis Candelaria Ores.
2/ 25/21.

Mine	In Sol.	Fe.	CaO.	MgO.	Zn,	Mn.	H_2O	S.	Gold.	Silver.
Argentum	48.4	9.2	9.60	2.56	4.6	1.72	1.01	Tr.	.01	11.31
Lucky Hill	66.1	7.4	5.10	1.65	3.08	3.11		Tr.	.02	16.2
"	44.8	9.0	10;75	4.79	8.32	3.48	1.02		.04	25.6
Diablo	70.4	8.5	4.0	0.74	2.27	2.03		.22	.02	8.8

By Jay Carpenter

Extraction on Argentum in mill practice would not drop below 70% and might exceed 75%. Cyanide consumption about 1.5#. CaO consumption 6.5 or double that amount in commercial lime.

Lucky Hill ores gave 83 to 85% extraction with not unusual cyanide consumption.

Mt Diablo gave 60% extraction.

Analysis Candelaria Ores.
2/ 25/21.

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Lucky Hill	66.1	7.4	5.10	1.65	3.08	3.11		Tr.	.02	16.2
"	44.8	9.0	10;75	4.79	8.32	3.48	1.02		.04	25.6
Diablo	70.4	8.5	4.0	0.74	2.27	2.03		.22	.02	8.8

By Jay Carpenter

Extraction on Argentum in mill practice would not drop below 70% and might exceed 75%. Cyanide consumption about 1.5#. CaO consumption 6.5 or double that amount in commercial lime.

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ROCHESTER SILVER CORPORATION

GENERAL OFFICES
310-308 RENO NATIONAL BANK BLDG.
RENO, NEVADA

RENO, NEVADA

EXECUTIVE OFFICE
F. M. MANSON, VICE-PRESIDENT
FRED A. SAWYER, SECRETARY

February 23rd 1921.

Dear Mr. Blackburn;

I am enclosing some statements re Candelaria for your information. The "Expenditure Statement" will show that we have spent upwards of $182,000 and all of this was after we took hold and does not contain any of the business of the Company under the Jarmuth administration.

The other sheets will give you a digest of the ore testing done for us by Jay Carpenter.

I have been very busy since I saw you and have not had time to do the ore reserve statement which I will send along later.

Yours truly,

C. D. Kaeding.

ROCHESTER SILVER CORPORATION

GENERAL OFFICES
308-310 RENO NATIONAL BANK BLDG.
RENO, NEVADA

MINES AND MINE OFFICE
ROCHESTER, NEVADA

ROCHESTER, NEVADA,

February 27th 1921.

Dear Mr. Blackburn;

I have your letter of the 21st inst. and would say that the missing sets 5, 6, and 7 were contained in a roll, which I left for fowarding to you from the Mine office of the Simon Silver Lead Mines Company at the same time I left the large envelope which you received. I am writing the chief-clerk a letter today asking him to have the roll traced. I sent you 15, and 16 the other day from Reno, and will make up and send 4 in a few days now.

Mr. Whiteman should get in touch with Mr. R. C. Warriner, 43 Exchange Place, New York City, who is one of our Directors and will act for the Company.

With regard to the two old mines, I have arranged for an extension of the payments on Mt. Diablo, but we are paying the other two. On account of the dumps, fills and good blocks in Argentum, and its accessibility to a plant, I am sure we will make a good deal of profit out of this mine. We were able to get better extractions from its ores that we were with Diablo also. With regard to the Simon, I can make a contract with him I believe, as I have discussed it with him from time to time; with regard to the Lucky Hill we own that property in fee, as I have marked on the surface map sent you. My investigation of past production indicated that approximately $22,000,000 had been produced from the two mines and I believe that the Argentum ground accounted for over $12,000,000 so that Mt. Diablo should be credited with from $8 to $10,000,000. This was produced from 38 to 40 ounce grade, the ore having been all hand sorted as it was broken down, and the daily production rate was small only about 35 to 40 tons, as they had no mill and were obliged to send the ore to the mills of the Argentum Company at Belleville.

Yours very truly,

O. W. Kaeding

ANNUAL REPORT

CANDELARIA MINES COMPANY

For the Year Ending December 31, 1921

HEAD OFFICE
43 Exchange Place, New York City

EXECUTIVE OFFICE
648 Mills Building, San Francisco, California

PROPERTIES AT
CANDELARIA, NEVADA

REGISTRAR OF TRANSFERS
The Corporation Trust Company
37 Wall Street, New York City

TRANSFER AGENTS
The Equitable Trust Company
37 Wall Street, New York City

DIRECTORS

C. D. KAEDING.....*San Francisco, California*

S. ROSSITER.....*New York City, New York*

F. M. MANSON.....*Reno, Nevada*

O. W. JONES.....*Chicago, Illinois*

J. C. PEEBLES.....*Reno, Nevada*

ANNUAL REPORT

CANDELARIA MINES COMPANY

GENERAL OFFICES

Candelaria, via Mina, Nevada

EXECUTIVE OFFICERS

C. D. KAEDING.....*President*

S. ROSSITER.....*Vice-President*

C. D. KAEDING.....*Treasurer*

V. WIMBERLY.....*Secretary and Assistant Treasurer*

J. C. PEEBLES.....*Assistant Secretary and Assistant Treasurer*

EXECUTIVE COMMITTEE

C. D. KAEDING.....*Chairman*

F. M. MANSON.....*Member*

J. C. PEEBLES.....*Member*

CANDELARIA MINES COMPANY

ASSETS

CURRENT ASSETS		
Cash on Hand and in Banks	$ 16,182.32	
Accounts Receivable	203.61	
Construction & Boarding House Supplies	2,134.61	
		$ 48,820.54
PREPAID CHARGES		
Prepaid Insurance	217.38	
Miscellaneous Prepayments	10.65	
		228.03
DEFERRED CHARGES		
Discount on Note Payable	50,000.00	50,000.00
CAPITAL ASSETS		
Mining Properties, Claims & Leases	2,028,473.09	
Plant & Equipment $59,577.68		
Office Furnishings 1,086.78		
	60,664.46	
Less Depreciation 9,592.14		
	51,072.32	
Mill Construction, Commenced Dec., 1921	1,863.93	
Mine Development, Mine Sampling, Metallurgical Experiments; Administrative & General Expenses, including Organization Expense	260,913.93	
		2,342,323.27
		$2,441,371.84

BALANCE SHEET, December 31, 1921

LIABILITIES

Current Liabilities			
Wages Payable		$ 357.33	
Accounts Payable		9,194.12	
Operating Funds Advanced		1,529.39	
Note Payable, Due Nov. 1, 1922		23,700.00	
			$ 34,980.84
Accrued Items			
Interest on Note due Nov. 1, 1922		237.00	237.00
Deferred Credits			
Suspense		265.00	265.00
Fixed Liabilities			
Note Payable, Due November, 1924		100,000.00	100,000.00
Capital Stock Authorized, 3,000,000 shares, par $1.00	$3,000,000.00		
Less Unissued Stock of which 369,111 shares of a value of $1.00 are under option at $1.00 per share for 3 years to the Rochester Silver Corporation	694,111.00		
			2,305,889.00
			$2,441,371.84

REPORT OF THE DIRECTORS

OF

CANDELARIA MINES COMPANY

For the Year Ending December 31, 1921

San Francisco, California,
April 1, 1922

To the Shareholders:

Your Board of Directors wishes to advise you that the contemplated plans for financing the Company's treasury, for which your sanction was granted at a Special Meeting of the Shareholders held in July, 1921, in order to build a reduction works at the Company's mines in Candelaria, Nevada, and bring the property to production, have been successfully consummated.

Satisfactory completion of the development and sampling campaign begun in May, 1920, came at a time when the severe financial and business readjustment was well under way, at the end of 1920. It found your Company without adequate funds to carry on plant construction and bring the property to production, and in spite of the excellent situation as to ore developed and ready for milling, it was impossible to interest capital in the enterprise.

During the summer of 1921, interests closely associated with the Rochester Silver Corporation were requested to review the situation with our executives, with the result that an arrangement was completed, whereby that Company undertook to supply the necessary money, machinery and equipment to put the Candelaria property into production. The total cost to Candelaria Mines Company will be $400,000 payable in three years from November 15, 1921, with no interest for the first eighteen months, and thereafter at the rate of 6% per annum. In addition, the Candelaria Mines Company gives the Rochester Company an option on four hundred thousand (400,000) shares of its Treasury Stock at One Dollar per share for three years. Since in November, 1920, our engineers estimated the total cost of plant to bring the property to production at $350,000, we feel that we have been extremely fortunate in accomplishing the financing along the above lines, and the Rochester Silver Corporation is well satisfied since they are enabled to turn into cash a milling plant which was not serviceable to them.

Plans for the construction of a 300 ton milling plant, air compressors, ore transport system, electric power installation, et cetera, have been perfected, and work was started on December 1. A competent staff of engineers is in charge, and excellent progress has been made, so that we expect to start the plant operating in July, 1922.

Your property has been developed to a point where the engineers estimate 610,000 tons of ore to be reasonably assured for a milling plant. This gives a life of nearly six years on a basis of 300 tons milled daily, and it is estimated that the profit in sight is approximately One Million Six Hundred Thousand Dollars.

The report of the General Manager attached hereto is submitted for your careful consideration, as it deals with all details of the Company's business and progress since the present administration became identified with the Company.

Detailed reports of operations have not heretofore been sent to the Shareholders, but it will be the policy of the present Directorate to see that you are kept fully and correctly informed of all matters connected with the operations at frequent intervals.

Respectfully submitted,

BOARD OF DIRECTORS.

INTERIM REPORT

CANDELARIA MINES COMPANY

July, 1922

HEAD OFFICE
43 Exchange Place, New York City

EXECUTIVE OFFICE
648 Mills Building, San Francisco, California

PROPERTIES AT
CANDELARIA, NEVADA

REGISTRAR OF TRANSFERS
The Corporation Trust Company
37 Wall Street, New York City

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37 Wall Street, New York City

INTERIM REPORT

CANDELARIA MINES COMPANY

July, 1922

GENERAL OFFICES

Candelaria, via Mina, Nevada

EXECUTIVE OFFICERS

C. D. KAEDING ..... *President*
S. ROSSITER ..... *Vice-President*
C. D. KAEDING ..... *Treasurer*
V. WIMBERLY ..... *Secretary and Assistant Treasurer*
J. C. PEEBLES ..... *Assistant Secretary and Assistant Treasurer*

EXECUTIVE COMMITTEE

C. D. KAEDING ..... *Chairman*
F. M. MANSON ..... *Member*
J. C. PEEBLES ..... *Member*

DIRECTORS

C. D. KAEDING ..... *San Francisco, California*
S. ROSSITER ..... *New York City, New York*
F. M. MANSON ..... *Reno, Nevada*
O. W. JONES ..... *Chicago, Illinois*
J. C. PEEBLES ..... *Reno, Nevada*

REPORT OF THE DIRECTORS
OF
CANDELARIA MINES COMPANY
July, 1922

San Francisco, California,
July 20, 1922

TO THE SHAREHOLDERS:

In accordance with our pledge to keep you fully informed of the progress of operations at your property, we herewith hand you an Interim Report, which gives in considerable detail all that has been accomplished since our last advice to you dated April 1, 1922,—and the outlook for the future.

PLANT CONSTRUCTION

The designing and construction of the 300-ton milling plant, which was commenced in January has been carried ahead with rapidity and most satisfactory results, to the end that this plant will be started in September. Had it not been for the loss of our hotel by fire, April 27, we should have completed the work at least six weeks earlier. As the work progressed, having in mind the very large tonnage of ore which is developed in the mines ready for the mill, we have expanded our original program, putting in larger machinery, tanks, motors, pipe lines and pumps so that with very slight additional equipment this mill will treat over 400 tons daily.

This plant should prove a very efficient one, and will treat ores at a lower cost per ton than the usual cyanide mills by 50 to 75 per cent. It is designed to be nearly automatic, requiring a minimum of labor and power. We expect, after the plant is operating smoothly, to be able to report a much higher recovery of the silver values than the figure used in our estimates. At another of our silver mills in Nevada the recovery has been increased 7 per cent at practically no additional costs by methods which we will avail ourselves of in the Candelaria plant. We expect to be able to report to you from 7 to 10 per cent better recovery than the figure we have conservatively used for estimating purposes, which would increase the profit $140,000 annually.

ELECTRIC POWER

After considerable negotiations with the officials of Mineral County, which operates the electric power system of our county, it was arranged that the mining company should construct seventeen miles of high tension transmission line and the transformer station at Candelaria for the account of the power company. The County advanced $15,000 toward the cost of the complete system and the mining company furnished the balance of the money. This will amount to about $18,000 and will be rebated back to the mining company at the rate of 25% of the monthly power bills. It will require about sixteen months to receive back all the money advanced. The line and trans-

former station is capable of giving us in excess of 1000 horsepower which is 25% larger than we first figured on.

WATER SUPPLY

During the extraordinary cold of the past winter our water supply line was partially frozen. Repairs of a temporary nature were made, but it was considered advisable to undertake an extensive renewal and improvement campaign to assure a greater delivery of water to the reservoirs and eliminate danger of interrupted service. To this end work of opening out new sources of supply at the head of the line has been under way, and in excess of four miles of new pipe has been purchased and distributed, and will be put into the line during August. We feel confident of having ample water for all requirements.

MINES

Work in the mines has been nominal since most of the development and work preparatory to ore extraction had previously been done. Air lines and tracks have been laid where required, main haulage ways widened and connected up and ore passes driven, to facilitate ready handling and transport of the ore from the several mines and the many levels. An outside haulageway 3000 feet long from the Lucky Hill Mine has been completed. Cars, rails and locomotives are on hand, and all will be in readiness to serve when the mill is finished.

In our previous report we described in some detail the ore development in Lucky Hill Mine. This mine was opened out during 1920 by some 6000 feet of development work which proved two parallel veins each from eight to thirty feet wide, and over four hundred feet long. Within these limits we "blocked out" approximately one million dollars of ore of $15 grade and have reason to expect that further mining operations will double this amount in the ground above the Adit or 200 level. Below this level we have done scarcely any work, and in this part of the mine we have every reason to believe development work will produce ore for a considerably greater depth and extent.

A great amount of engineering work has been done in the Northern Belle and Holmes mines. A complete transit survey of the many miles of underground workings has been made and mapped by Mr. E. L. Stenger, and the general geology, together with the lower levels of the Northern Belle and Holmes mines has been studied in great detail by Mr. J. A. Burgess, who last year did the same work at Lucky Hill Mine for us. The results of this work, including 1000 new samples taken and assayed in the country opened by the 13th, 14th and 15th levels of the Northern Belle have been very encouraging and make us feel that our estimates of the grade of ore to be won from these mines are too low. In our last report to you we used the following figures in reference to the Northern Belle and Holmes mines:

Daily Production to the Mill

1.	Tonnage from fills	150	@	$ 8.50
2.	" " stopes	50	@	12.00
3.	" " new work	10	@	20.00

In the last set of samples the fills average $9.70. However, for the reasons mentioned in our last report, we do not feel like estimating any more than 8 ounces silver and 50 cents gold as an average grade for fills, although we think we may do better. There are such a great many samples from the pillars and margins of stopes averaging over 20 ounces, running from 10 ounces to 80 ounces, that we now believe the ore from these sources and new work amounting to approximately 60 tons daily will average nearer 18 ounces than 13 ounces. If we are quite correct in this revised estimate, there would be a further increase in annual profits of $100,000.

It is quite probable that we may decide to take a larger tonnage from our Lucky Hill Mine, in place of the fills, and this would mean $15 ore replacing $8.50 ore. We can readily do this, and it will be our policy to produce as much silver as we can without sacrificing efficiency.

Mr. Burgess has still to complete his geological mapping of the first nine levels of these mines, and also the twelfth. This will require another month of his time, but he has written us a "brief" advance report from which we quote a few interesting excerpts relating particularly to the veins and ore-bodies, for your information.

Excerpts from Burgess' Report on Northern Belle and Holmes Mines, July, 1922.

"In the report now submitted, you will note that the description of the veins is brief and general. The reason for this is that the unfinished work will have a bearing on this subject, and I prefer not to write on it until I have all the data in hand. At the same time, my work below the 9th level is sufficiently advanced, so that I can now outline a good deal of development work, and express an opinion as to probable results.

MINERAL VEINS

The productive ore-bodies of the Candelaria district occur in the Candelaria shale, most of them near its lower border. This is the case at the Potosi, Northern Belle, Lucky Hill, and Diablo mines, and in other prospects farther to the east.

The vein system consists of a zone of fissuring 100 feet to 150 feet wide, with a general east-west strike, and roughly parallel to the bedding of the shale. The main productive zone extends through the Northern Belle Mine; and then, south of its interruption by the Alpha fault, it continues eastward through the Lucky Hill Mine and the Diablo Mine. While the main zone is long and continuous, the fissures within it, as exemplified in the Northern Belle Mine, were less continuous. They were rather in the nature of an overlapping, more or less parallel, system of sheeting, and frequently their disposition was across the zone or at random. This resulted in the formation of parallel, overlapping orebodies; in cross-veins; and sometimes, as in parts of the Yankee stope, in streaks of ore in a complex system of fractures.

In the Northern Belle Mine, the shale strata and the vein system have a southeasterly strike and dip about 45° northwest. This variation from the

general easterly strike of the shale formation is due to local disturbance caused primarily by the injection of the Pickhandle Gulch intrusives.

The most productive mines are in the vicinity of the large intrusive masses of igneous rock which are undoubtedly connected with the origin of the orebodies. Some veins are found in the serpentine, but they have not proved profitable to work.

Within the vein-system, channels were opened that permitted the circulation of mineralizing solutions. The effect of these was to replace much of the shale with dolomite, and eventually to deposit large bodies of silver-bearing sulphide ore. Dolomite not only forms the gangue of much of the ore, but also is found replacing the wall-rocks throughout considerable widths; as for example, at the Lucky Hill Mine, where the shale between the Main vein and the Baldwin vein, a distance of 200 feet, is so completely altered to quartz and dolomite that there is no internal evidence of its original character. It is thought that most of this dolomitization occurred before the deposition of the ore, and that the ore was deposited largely as a replacement of the dolomite veins.

The primary ore consisted principally of iron sulphide, with minor amounts of the sulphides of lead, copper and zinc. The form in which silver originally existed is uncertain, but it was probably a constituent of the baser sulphides. Knopf identified jamesonite in remnants of unoxidized ore. Silver formed a far less percentage of the total weight of the primary ore than it does of the oxidized ore, the difference being due to the oxidation of the sulphides and to the removal by leaching of many of its base constituents.

The principal ore-bodies are from 10 to 20 feet wide, and stopes of these widths are common. Narrow veins also occur, but the bulk of the ore came from wide veins. Within the wider veins, there appear to have been streaks and bunches of the highgrade ore that was required by early-day operations, and mining was directed toward recovering these streaks, leaving the intervening lower grade ore in the stope as filling. It is this rejected ore of 10 or 12 ounce silver content, that will furnish a very considerable tonnage for the new mill.

In its present condition, the ore consists of the thoroughly oxidized residue of the original sulphide minerals. Limonite, oxides of manganese, dolomite and a minor amount of quartz form the bulk of the ore. No silver minerals such as the sulphides or horn-silver can be detected in the oxidized ore, even in that assaying 75 ounces per ton. The silver content appears to be finely divided and probably is combined with other minerals in an unknown form. Knopf recognized bindheimite in the oxidized ore.

Whether secondary enrichment was of importance in forming the ore-shoots is a point not yet determined.

The ore is completely oxidized in the upper levels, but while oxidation extends to the bottom of the mine, remnants of low grade sulphide ore are plentiful on the 18th, 19th and 20th levels. Some stoping was done on

the oxidized ore of these lower levels, but the sulphide ore appears to have been unprofitable. There are exposures of ore above the 15th level, from which ore of 15 ounce or better, average grade can be produced by lessees, and in some instances by company work. I have inspected these exposures with a sample record in hand, and feel quite satisfied that a very considerable tonnage of profitable ore can be taken from the ground within the range of the old workings. The most favorable areas for highgrade ore are in the Yankee stopes below the 11th level, and in the various workings of the 14th level. In these workings, there are exposures of ore 12 to 18 inches wide, which range in assay value from 20 to 50 ounces silver, and there are also good chances on the other levels. Naturally, prospecting has been most intensive in the most easily accessible places, and it is on the less accessible levels, and in the old stopes, where the most favorable points of attack will be found.

DEVELOPMENT PLANS, NORTHERN BELLE MINE

These plans are confined to the levels that have been studied to date; namely from the 10th to the 20th levels, inclusive, with the exception of the 12th level. The most favorable ground for immediate work is from the 15th level upward. Below the 15th level, comparatively small amounts of ore were found by the early operators, and the prospect of finding profitable ore is less favorable for the immediate future. However, it must be recognized that the Candelaria veins are of a deep seated type, entirely different from the comparatively shallow seated veins so common in the Tertiary lavas of Nevada, and they may be expected to continue to a great depth. It is practically certain that the continuation of the veins could be found north of the Candelaria fault; but the depth at which it might be necessary to work, the unknown character of the ore as regards oxidation and value, and the expense of finding them, makes it inadvisable to do anything in this direction now. However, while results of mining below the 15th level were not encouraging, there is still a possibility that profitable ore exists at a greater depth.

It is noticeable that no ore-bodies of first importance have been found north of the Belle fault, and that practically no exploratory work was done on the vein system in this direction above the 15th level. There are, however, some indications that point to the possibility of ore in this area. They are: the existence of three small stopes in D 1503 on the 15th level, in which there was evidently some workable ore; the presence north of the fault on the 14th level of 14, 18 and 22 ounce ore as shown by samples in x-c 1404 and D 1405; the existence of a fairly strong vein in the Mule Stable drift on the 13th level, from which specimens from a streak a few inches wide assayed 7.52 ounces silver. These data, together with the known tendency of the ore to be richer in the upper levels will justify further exploration of the vein north of the Belle fault, on the 13th and 14th levels, and work for this purpose will be advised. The old surface outcrop of this part of the vein, where it is now covered by basalt, is at the 11th level."

FINANCIAL

The Balance Sheet, June 30, 1922, showed the following position of Current Assets and Current Liabilities:

Current Assets		
Cash on hand and in banks	$ 7,573.74	
U. S. Treasury Notes $50,000 par, at cost	50,493.75	
Accounts & Interest Receivable	1,026.05	
Construction & Miscellaneous Supplies	11,709.00	
Construction Material Prepaid	12,760.00	$ 83,562.54
Prepaid Charges		
Construction Power Line for Mineral County	20,711.09	
Less funds advanced by County	5,000.00	
Net advance to date by Candelaria Mines Company	$15,711.09	
Prepaid Insurance	448.90	
Miscellaneous Payments	687.17	16,847.16
TOTAL		$100,409.70
Current Liabilities		
Wages Payable	2,817.05	
Accounts Payable	30,606.41	$ 33,423.46
Accrued Items		
Interest on Note due Nov. 1922	948.00	
Accrued County Taxes	300.00	1,248.00
		$ 34,671.46
BALANCE OF CURRENT ASSETS		$ 65,738.24

An additional amount of $55,000 has been subscribed for treasury shares, but is not shown on this statement. This will enable us to lay in a suitable stock of cyanide, zinedust, dynamite, tools, et cetera, and have working capital until returns are had from bullion sales.

C A Bennett

GENERAL

The work is in the hands of very competent engineers, and an operating staff of the highest calibre is being built up. Mr. C. A. Bennett took direct charge as General Superintendent July first. Mr. William Dunn, our Resident Mechanical Engineer, is rapidly completing his work of plant construction having designed and supervised the entire job with the able help of W. Seulland, Superintendent of Construction. We gratefully acknowledge the help these men have been to us and the pleasure it has been to work with them.

We expect to have important information to give our shareholders from time to time and to make certain that they receive it, we suggest that all shareholders have their stock transferred into their own names and their addresses properly recorded with the Secretary of the Company.

For the Board of Directors,

Respectfully submitted,

C. D. KAEDING,
President.

All of the foregoing certified correct.
C Kaeding Pres - Gen Mgr

REPORT OF THE GENERAL MANAGER

Candelaria, Nevada

March 31, 1922

The Directors
Candelaria Mines Company
648 Mills Building
San Francisco, California

GENTLEMEN:

The following report will cover in detail the operations at your property, since the formation of the present company, but more particularly since the present administration became actively associated with its operation in the latter part of 1919.

Your Company has fee title to the mining property known as the Lucky Hill Mine, which, together with extensions and other valuable property acquired later, totals twenty claims with an area of 325 acres, and in addition has a lease and bond on all of the mining property of the Mt. Diablo Mill & Mining Company, Holmes Mining Company, Northern Belle Mining Company, Esmeralda Water & Milling Company. This embraces practically all of the known productive area of the Columbus Mining District, Candelaria, Nevada,- together with the water supply for the mines and town.

Operations were carried on in a modest way at the Lucky Hill Mine, partly by lessees and partly on Company account, resulting in the shipment of high grade silver ore to smelters, over ten thousand tons averaging twenty-six ounces per ton was mined and shipped. During July, 1919, New York mining interests were invited to become associated with the enterprise and subscribe money for a very extensive development campaign. This was accomplished and in the following pages we will detail the work undertaken and the results achieved.

LOCATION:

The properties are located at the camp of Candelaria in the Columbus Mining District, Mineral County, Nevada.

HISTORY:

The camp of Candelaria flourished in the late sixties and through the seventies and eighties and was productive until the year 1891. The principal production came from the Northern Belle Mining Company, Holmes Mining Company and Mt. Diablo Mill and Mining Company. In the earliest days, ore was shipped by ox teams to Reno and thence to the Selby Smelting Works in California. Later, a mill was built at Columbus Marsh, nine miles from the mines, and still later two mills were built at Belleville, one at Sodaville and one in the camp, and the ore was hauled by team and wagon to these milling plants.

There is no record available of the production for the first five or six years, but it is known that the ore was very rich. Some old books commencing September, 1875, are at the Company's office in Candelaria, which give the actual tonnage of ore hauled to the Belleville Mills until 1886 and the bullion shipments. They show that one mill treated about forty tons per day until August, 1876, then a

second mill commenced operating and treated another forty tons per day. The ore hauling record ends December, 1883, when the railroad probably commenced operations, and during eight years and four months a total of 190,000 tons were hauled to these two plants. The average bullion value of this ore was $46 per ton, and since we know the tailings, when retreated showed an average of eight oz. silver and the chloridizing losses were heavy with the then crude methods, it is certain that the ore averaged in value over $60 per ton. The bullion record for ten years (September, 1875 to August, 1886, with 1884 not shown) shows over nine and one-half million dollars sold.

Incidentally, these records show that the hauling was paid for at the rate of $3.625 per ton, and that the Mt. Diablo Mine was charged $15 a ton for milling.

It is interesting to know the situation obtaining in the metal market during these years. In 1875, silver averaged $1.246 in New York and 56:8 pence in London. It dropped steadily and with regularity to $1.11 and 50:7 pence in 1884, and in 1885 to $1.06 and 48 pence. This was the year of demoralization for silver mines and marks the practical ending of profitable operations at Candelaria, although the mines operated another six years and produced a large amount of thirty ounce ore.

The ore deposits were worked for a minimum grade of approximately forty ounces silver, and in order to maintain this grade, and higher, selective mining was resorted to. The work was very skillfully done—the veins were broken down and sorted in the stopes, the low grade material being left as stope filling and the higher grade ore was dropped through chutes, hoisted to the surface and hauled to the mills. A total production of thirty to forty million dollars is indicated from available data and records,—600,000 to 800,000 tons of ore which averaged about fifty dollars in gold and silver, was reduced in the mills and about twenty million was profit.

The milling process used was to crush the ore dry in stamp batteries, roast it with about 8% salt in Stetefelt furnaces and pan amalgamate the roasted ore with mercury and bluestone. The saving effected was about 88% but the operating expenses were very high due to the process of selective mining, the long wagon haul, and the complicated reduction process. Our investigations indicate that costs must have averaged over twenty-two dollars per ton.

In 1875 the Northern Belle Mine had exposed such a large body of ore that it was found necessary to build a second stamp mill with Stetefelt furnaces. During this year, this company made returns to the county assessor of $840,950.00 produced from 10,730 tons of ore.

LUCKY HILL MINE:

This property was slightly developed in the early days but no ore of importance was discovered and no production made. An adit tunnel was driven into the mountain a distance of 400 feet and a shaft was sunk 200 feet deep with long cross-cuts to the 100 and 200-foot levels. It so happened that this work was practically all driven in a barren zone. The first discovery of ore was made by parties who relocated the claims in 1914 whilst doing their assessment work on the top of a hill. Lessees followed up the discovery and made a most promising devel-

opment in shipping a total of 10,000 tons which averaged twenty-six ounces silver and $1.10 in gold. This work proved the probable existence of a mine of considerable proportions. It was on the basis of this position that the present administration became identified with the Candelaria Mines Company and subscribed funds for a development campaign which has been carried to a very successful conclusion.

DEVELOPMENT CAMPAIGN:

It was necessary to build a complete camp as well as a mining plant before any work in the mines could be satisfactorily undertaken. A number of old houses were purchased and put in good order. An operating office was built, together with a sample crushing plant and assay office capable of turning out 150 samples per day. An oil-driven engine and compressor was installed together with air, water and oil pipe lines, and all necessary accessories. At the mine a complete hoisting works was erected and all necessary mining equipment including a power drill sharpener, cars, rail and pipe installed. This equipment was large enough to admit of upwards of fifty feet per day of development work being done and to carry on the great amount of sampling necessary to appraise the many miles of openings in the old mines.

A total of over 6,000 feet of development work was performed in the Lucky Hill Mine, and all together over 15,000 samples were cut and assayed from the Lucky Hill, Mt. Diablo and Northern Belle and Holmes Mines and ore dumps. This work has been accurately recorded and summarized.

Development in Lucky Hill Mine disclosed the existence of two large veins called the Baldwin and Main Veins. These veins have been proven to be large and strong and to have very important ore shoots contained within them. The widths vary from eight to thirty feet, and they have been proven for a length of over four hundred feet each. When development work was discontinued in November, 1920, the showing in both veins was excellent. For example, in the Main Vein at the Intermediate Level, the 1-6 drift was progressing with the full width in ore averaging better than thirty ounces. (The face assayed forty-two ounces when work was stopped.) The drift being driven from A-7-7 raise was averaging twenty-five ounces. Several cross-cuts at the Adit level were showing fourteen and fifteen ounce ore. On the Baldwin Vein cross-cutting from A-3-7 raise was disclosing a width of over twenty-five feet averaging fifteen to twenty ounces. The 1-7 raise had just entered ore below the Adit level showing twelve to thirteen ounces of undetermined width or extent. The 1-6 raise had just touched the ore below the Adit level to the east when we stopped.

It is quite impossible, in a deposit of this nature, to do justice to the ore bodies in making conservative calculation of ore in sight—nevertheless, for our own guidance, this has been most painstakingly done and is submitted as follows:

ORE RESERVES:

We have blocked out, ready to mill, 60,000 tons assaying 14.0 ounces silver and $1.00 gold in the Lucky Hill Mine from the surface to the Adit level, a distance of only 220 feet on the dip of the veins. We believe that stoping operations in the blocks above considered will give nearly double this tonnage, for the reason that

we have not completely developed this territory by any means. (See report by J. A. Burgess.) When stoping and milling operations are being carried forward, and additional development work can be more economically done, we feel certain the above expectation will be fulfilled.

With regard to lateral and deeper development beyond the boundaries considered in the ore reserve, the chance of finding more ore is excellent. We have already exposed both veins 100 feet vertically below the Adit level and we feel that since the ore bodies at Lucky Hill are a part of the same vein system which produced the great ore shoots of the Northern Belle and Mt. Diablo Mines, we should find profitable ore bodies down to twelve or fourteen hundred feet as they did. Some of the best ore bodies in both mines were found at a horizon five hundred feet deeper than our present ore reserve blocks.

12E 1400'

OTHER MINES:

In the Northern Belle, Holmes and Mt. Diablo properties, sampling has shown that a large tonnage of ore assaying from twelve to twenty ounces has been left unstoped. This was not payable during the time of former operations. We have not attempted to calculate accurately the tonnage which can be profitably mined and recovered from this source, but it seems reasonable to estimate it at not less than 50,000 tons, averaging twelve ounces silver and sixty cents gold, with no development required. This does not consider blocks of ground where development will disclose new ore, and there are some excellent possibilities of this sort. We believe that another 50,000 tons, averaging twelve ounces silver and sixty cents gold could be considered as "possible" ore from this source at this time.

Careful sampling of the old stope fills indicates a very large payable tonnage can be recovered by drawing down the stopes. For example, 530 samples of the stope fills from the Northern Belle Mine taken from the surface to the thirteenth level stopes averaged eight ounces silver and forty cents gold per ton. This is a representative lot of the entire fill sampling of old mines. There may be some of the poorer sections of the mines where the fills will be found unpayable, but this does not seem probable. The tonnage available has not been accurately calculated, as it would not be possible to get all three dimensions, the center of the individual mass cannot be reached. However, we have reached a general conclusion that for each ton of ore produced and milled there were two tons broken, and one left behind as stope filling, and there should be some 400,000 tons of fill in the old mines. Probably 300,000 tons remain in the Northern Belle and Holmes with a gross value of $2,500,000 which can be readily reconciled with the performance of ore bodies that yielded some twenty-five million in bullion, from the selected grade. It is our belief that the average value of the fills will be higher than our sampling, as we were obliged to take the top of the pile where stoping had been discontinued because the stope was below grade,— or the sides where rock walling had been done with the coarse waste rock to hold the fill back from a manway, and the richer fines which would increase the average are all in the inaccessible part of the pack. It is physically possible to draw the stopes without caving the workings as the limestone walls stand remarkably well.

We do not know of any mining situation similar to this in this country, where mines were worked on a selective system and the rejects from hand sorting left in the stopes as filling to be subsequently removed and treated by modern milling methods. In Mexico, however, there are several comparable cases. At the Minas del Tajo, the veins had been worked for 300 years by natives for highgrade ore and rejects left in the fills. In 1905 American engineers estimated 200,000 tons of available fills and 100,000 tons of ore in place, and a milling plant was built and started operating in 1906 at the rate of 75,000 tons per annum. This plant operated continuously until 1914 when it was increased to treat 90,000 tons per annum. There has been profitably treated therefore some 1,300,000 tons of ore and the property is still operating very successfully.

At Pachuca, the Santa Gertrudis and other companies have made a great success under almost parallel conditions. At Guanajuato the Guanajuato Reduction & Mines Company have made a notable success producing at the rate of 650 tons daily from dumps and mine fills. Some of the fills in these mines were worked over three times by the Mexicans, sorting out highgrade - the final reject assaying over eight ounces silver. This ore was a sulphide and much more readily sorted than the oxidized ores of Candelaria. This Company has already produced four million tons and is quite prosperous today.

DUMPS:

There are a number of surface dumps on the old mines which we have carefully sampled and tested. One of these on the Northern Belle contains 8,000 tons averaging twelve ounces silver and sixty cents gold. Tests made on the other dumps indicate that by screening, 100,000 tons can be graded up to 82,000 tons, averaging $7.50 with a gross value of $625,000, or by finer screening the 100,000 tons can be graded to 40,000 tons averaging $10.00 with a gross value of $400,000.

Recapitulating the tonnages above considered, we have a total of reasonably assured ore for a milling plant, as follows:

Lucky Hill Mine	120,000 tons
*Older Mines	100,000 "
Ore Dump Northern Belle	8,000 "
Other Dumps	82,000 "
*Stope Fills	300,000 "
TOTAL	610,000 tons

*Only Northern Belle and Holmes Mines in above figures.)

This indicates over five and a-half years ore ahead of requirements for a 300-ton per day milling plant, and it is our belief that development in Lucky Hill will supply highgrade milling ore, and operations in the older mines will supply medium grade ore sufficient to enable this scope of milling to go on for a considerably longer period.

METALLURGICAL TESTS:

Mr. J. A. Carpenter, for the Company, conducted a long series of tests to determine the most efficient method of extracting the values from these ores. The results indicate that an extraction of eighty-three to eighty-five per cent can be made by fine grinding followed by cyanidation and filtration from Lucky Hill ores, and a five per cent lower extraction by the same method on the Northern Belle and Holmes ores. Three carloads, averaging thirty tons each, shipped to a Custom Mill at Millers, Nevada, were settled for on a basis of 83.75%, 84.45% and 84.25% respectively.

In order to ascertain if any preliminary treatment would improve the extraction of the silver, an extensive series of roasting experiments followed by cyanidation were conducted. These tests demonstrated conclusively that chloridizing with salt did have a most helpful reaction. This was to be expected since the former operators used the chloridizing roast as a preliminary to extraction processes, whereby they were enabled to recover the large quantities of silver produced from the old mines.

It has been demonstrated that sixty per cent, or more, of the silver in the ore is in the form of chloride or very finely divided sulphide and cyanidation tests on the raw ore, when ground to pass only twelve mesh, show that this silver is extracted very rapidly with small consumption of cyanide. Having in view the above very important facts, we have worked out a flow sheet for the reduction works, as follows:

The ore will be brought from the mine in electrically hauled trains to a double crusher bin keeping separate the highgrade from the medium grade ore. It will be crushed dry to one-half inch using gyratory crusher, screens and rolls, and will be conveyed by belt to a double compartment mill bin. The mill bin feeders will deliver it to 2 6'x5' Union Iron Works Ball Mills operating in closed circuit with Dorr Classifiers and crushing in cyanide solution. The ore will be ground to all pass thirty mesh, and separated into two products by means of Dorr Bowl Classifiers. The slime which should not be more than thirty-three per cent by volume, will be agitated, decanted, and filtered, using standard Dorr and Oliver equipment. The sand will be leached in vats. All highgrade ore will receive a chloridizing roast after cyaniding, and be re-cyanided whilst the medium grade ore will be sent to waste after the first cyanide treatment. The entire plan is based upon accepting a comparatively low recovery of silver from the medium grade of ore such as dumps and fills, but having a process so low in cost that the net result will be as great as though we used the more expensive process and secured a higher recovery of silver, and at the same time to have a mill designed so elastically that highgrade ore can receive a further treatment if necessary.

The plant as being constructed will have a capacity of not less than 300 tons per day and with very little additional equipment could treat 500 tons. All of the larger machines, together with conveying and transmission machinery, pipe lines, pumps and slime plant will be able to take care of the larger tonnage.

ESTIMATED UNIT OPERATING COSTS:

Basis 108,000 tons per annum.

1.	Mining including timbering	$1.75
2.	Tramming to ore passes	.20
3.	Mucking and drawing	.34
4.	Mule haulage	.07
5.	Electric haulage	.05
6.	Reduction including refining	2.00
7.	Marketing bullion	.05
8.	Office, Superintendent and General Expense	.28
9.	Taxes, Insurance, Administration Expense	.23
10.	Royalties	.75 and .37
11.	Development	.20 to 1.25
12.	Roasting	1.50
13.	Recyanidation	.60

Note: That the development on proven ore is all done, and an allowance on 20 cents per ton for raises to facilitate stoping would be sufficient when considering the profit to be won from 60,000 tons of the Lucky Hill ore and 50,000 tons of old mines ore.

ESTIMATED COSTS, GRADES, RECOVERIES AND PROFITS

	Lucky Hill		Northern Belle and Holmes		
	Developed	Probable	In Place	Fills and Dumps	Probable
Mining inc. Timbering	$1.75	$1.75	$1.75	- -	$1.75
Tramming to Ore Passes	.20	.20	.20	.20	.20
Mucking and Drawing	- -	- -	- -	.34	- -
Mule Haulage	.07	.07	- -	- -	- -
Electric Haulage	.05	.05	.05	.05	.05
Reduction Including Refining	2.00	2.00	2.00	2.00	2.00
Marketing Bullion	.05	.05	.05	.05	.05
Office, Superintendence and Gen. Exp.	.28	.28	.28	.28	.28
Taxes, Ins. and Administration	.23	.23	.23	.23	.23
Royalties	- -	- -	.75	.37	.75
Development	.20	1.25	.20	- -	1.00
Total Operating Cost	$4.83	$5.88	$5.51	$3.52	$6.31
Proportion to Mill	80 tons	20 tons	40 tons	150 tons	10 tons
Est. Grade of Ore	$14.00	$14.00	$12.00	$8.50	$20.00
Est. Recovery	75%	75%	70%	60%	70%

Note: Using the above estimates the average head would be $11.20, average recovery 66.66%, average operating cost $4.40 per ton, and the operating profit $350,000 per annum.

ESTIMATED PROFIT

1.	60,000	tons	@	$5.60	$ 336,000.00
2.	60,000	"	@	1.62	227,200.00
3.	50,000	"	@	2.15	107,500.00
4.	50,000	"	@	2.15	107,500.00
5.	390,000	"	@	2.04	795,600.00
					$1,623,800.00

The profits to be won as estimated can be very greatly increased in several ways. First, by improving the recovery of silver without any increase of operating costs. We have used from five to eight per cent lower extraction figures than shown by test work in calculating metal recoveries. Second, by increased grade of fills which we confidently expect will happen when mining commences, due to the centers of the packs carrying all the fines; and, third, the development of highgrade ore bodies. In the above calculation, no allowance has been made for the profit to be won by chloridizing and recyaniding the higher grade ores, simply because the treatment plant for this section has not been fully designed at this time. There should be approximately another $50,000 per annum won from this source.

The preliminary Geological Report of Mr. J. A. Burgess is appended for your information. Mr. Burgess will spend some weeks at the mine this spring, completing his examination and the completed report will be submitted to you.

All work at the property is now progressing rapidly and satisfactorily. We have ample labor and material, and all equipment is being delivered rapidly to the mill site. Mine work will be under way by May first, preparing tracks, chutes, ore passes and other necessary facilities to deliver ore to the mill.

Respectfully submitted,

C. D. KAEDING,

President and General Manager.

GEOLOGY OF THE CANDELARIA MINES

J. A. Burgess

Summary

The camp of Candelaria made a large production of silver in the '70s and '80s. The principal mines were the Northern Belle and Holmes and the Mt. Diablo, which together produced in the neighborhood of $30,000,000 in silver.

The ore consists of limonite carrying silver, formed by the oxidation of pyrite. It was deposited by replacement, in calcareous strata of sedimentary rock. The ore bodies, as shown by the old stopes, were in the form of shoots, lenses and irregular bodies which, taken together in each mine, formed large ore-shoots dipping at 45° to the north and northeast. The principal developed ore-reserves are in the Lucky Hill Mine, mostly above the Adit level. These have been estimated by your engineers at 120,000 tons of fourteen ounce silver ore. The estimate seems reasonable. The Lucky Hill vein is cut off by several small faults (Beta and Gamma) and one large main fault (Alpha). Between these three faults there should be two large segments of the vein which can be found by cross-cutting from the Lucky Hill workings.

The Alpha fault separates the Lucky Hill Mine from the Northern Belle Mine by a distance of 1,800 feet. The old Northern Belle and Holmes workings do not extend to the fault on the lower levels, and have left unexplored a large area of ground favorable for development. The downward extension of the Lucky Hill should be looked for below the fault.

The extension of the vein system, or the existence of another large ore-shoot, is possible north of the Northern Belle and Holmes workings. This is a very attractive possibility and the geology of that part of the mine should be carefully studied.

Ore of considerable importance has been found by sampling in the Northern Belle and Holmes and Mt. Diablo Mines. It consists of ore that was of too low grade to work by the old time processes.

August 1, 1921

Mr. C. D. Kaeding
President and General Manager
Candelaria Mines Company
Candelaria, via Mina, Nevada

Dear Sir:

I spent the period from June 25 to July 14, 1921, in studying the geology at your property at Candelaria, Nevada. The greater part of the time was occupied in detailed mapping of the Lucky Hill Mine, and the balance in reconnaissance of the surface, and of the Northern Belle and Holmes Mine. My work, as you know, is not finished, so that I cannot now give you a complete report on the property, but it has progressed far enough so that I can give you a fairly complete report on the underground geology of the Lucky Hill Mine, and a provisional outline of the general geology of the camp.

The immediate requirement of information for mining purposes made it desirable to concentrate my first work on the Lucky Hill Mine; otherwise, it would have been a more logical method of procedure to map the surface and general structural features before proceeding to the detail of underground work. For this reason, additional work will be required to show definitely the relation of the Lucky Hill Mine to the Northern Belle and Holmes and Diablo Mines. As hereafter stated, there is very good reason, at this stage of the work, for suggesting the probability that the Lucky Hill vein is the continuation of the Diablo vein, and that these two were once continuous with the Northern Belle and Holmes vein; and that the separation has been caused by a throw on the Alpha fault with a horizontal component of something like 1,800 feet. It is probable that the motion on the fault was more horizontal than downward. I shall, therefore, make this statement, as a working hypothesis, subject to revision if further study should prove it to be doubtful or incorrect. I think, however, that the probable existence of this situation is of sufficient importance to require its mention at this time.

GENERAL GEOLOGY:

The rocks of which the region is composed are sedimentary, metamorphic and igneous. The sedimentary rocks consist of sandy, calcareous and argillaceous shales; impure limestone; flinty chert in thin beds interleaved with partings of shale; and massive quartzite composed of coarse chert sand cemented into a flinty rock. The metamorphic rocks are serpentine and silicified limestone. The igneous rocks are rhyolite, andesite, diabase and basalt.

The general structure is that of sedimentary formation, upturned so that the strata dip 45° to 60° to the north with an easterly strike, and eroded in pre-tertiary times into mountainous relief. The basic intrusion which by alteration resulted in the formation of the serpentine, was prior to the pre-tertiary erosion. The age of the sedimentary formations is not definitely known, but Mr. H. W. Turner, formerly of the U. S. Geological Survey, told me that fossils from that region had been determined as Carboniferous. The existence of a small area of rounded, water-worn, river boulders, on a hill between the Mt. Diablo and Lucky Hill Mines, testifies to the former existence of a considerable stream at this elevation, the bed of which has been almost entirely removed by erosion.

In tertiary time the country was subjected to intrusion and overflow by rhyolitic and basalt lavas. These probably once covered the greater part of the country in the vicinity of Candelaria, but subsequent erosion has left only patches and denuded volcanic necks of rhyolite, and remnants of former extensive basalt flows. To the west and south of Candelaria large areas of the underlying sedimentaries are exposed. To the north, the surface is composed of an extensive tilted mesa of basalt. The top of Candelaria Mountain was probably never completely covered with basalt.

ORE FORMATION:

The ore bodies were formed before the period of erosion that preceded the lava flows. They outcrop on the top of Candelaria Mountain but do not penetrate the basalt. The lode-system consists of shoots, lenses and irregular bodies of ore. These are formed in a zone of silicified limestone and calcareous shale that lies above the footwall of bedded chert and chert-quartzite. The maximum thickness

of this ore-bearing series, as far as determined, is in the neighborhood of 400 or 500 feet. In the Lucky Hill Mine the ore bodies take the form of two irregular veins known as the Baldwin vein and the Main vein, separated by a distance of about 200 feet. A somewhat similar situation exists on the 11th level of the Northern Belle Mine, where a "front" and "back" line of ore bodies are found, although with much irregularity and lack of continuity. A stope plan of this mine shows that there was a series of lenticular ore bodies extending from the surface to the 19th level, and forming as a whole an ore-shoot with a distinct downward pitch to the southeast. The importance of the lode is attested by the U. S. Mint Report of 1883 (Burchard) in which it is stated that the Northern Belle Mine had produced previous to that time $10,000,000, and had paid dividends of $5,000,000. The production for 1883 is reported as $764,000. The price of silver at that time was about $1.00 per ounce. Work under the earlier managements continued until 1893.

The Mt. Diablo Mine was comparable in size and importance with the Northern Belle Mine. The maps show that stoping was done on a strong series of ore bodies which, as in the Northern Belle formed a broad ore-shoot extending to about the same depth as that of the Northern Belle Mine.

The Lucky Hill Mine lies 1,800 feet westerly from the Mt. Diablo shaft, and as far as has been determined, on the same lode. The entire mineralized lode, including the Northern Belle, Lucky Hill and Mt. Diablo veins, and eliminating the gap caused by the Alpha fault, is over 3,800 feet long.

The ore consists principally of massive iron oxide with the value almost entirely in silver. The gold is usually less than $1.00 to the ton. It was formed by the oxidation of a primary argentiferous pyrite, accompanied by a small amount of copper minerals. There were probably also the sulphides of antimony and arsenic, and possibly of lead and zinc, in small proportion.

Although there was undoubtedly some secondary enrichment of outcropping ore bodies, this could not have affected the lode as a whole. The lense-like distribution and isolation of numerous good ore bodies show that their silver content was primary, and not caused by secondary enrichment. This fact encourages the search for the deeper ore bodies wherever they may be found.

The primary ore was deposited as a replacement of impure limestone and calcareous shale, and to a large degree as a replacement of irregular pre-existing calcite veins. The presence of considerable calcite in most of the shales and other wall-rocks can readily be determined by the acid test. In the Lucky Hill Mine, the calcite of the irregular veins can be recognized by its crystallization, although it is stained brown by limonite, and merges by gradual replacement into ore.

The gangue of the ore is an intimate but variable mixture of quartz, calcite, limonite and gothite (a hydrous iron oxide), with some manganese oxide. It varies from very hard, to soft and sooty. The ore and the walls are hard enough to stand well, and the old workings are rarely caved except in the neighborhood of serpentine rock or faults. The mines are dry and there is no standing water.

In the early history of the mines rich ore was produced. Shipments that assayed over $125 per ton are mentioned in the Raymond reports. At present

writing. I have no record at hand of the grade of the general early production, but it must have been well over forty ounces to the ton to overcome mining and milling costs. I understand that twenty-four ounce ore and higher was shipped from the Lucky Hill and Mt. Diablo Mines during the war.

I have looked over the estimate of ore based on recent extensive sampling done by your Company, and can say that it is entirely reasonable. The sample-cuts in the mine show that careful work was done.

LUCKY HILL MINE:

This mine was opened by shallow workings from the surface, by an adit level, and by an inclined shaft on the Baldwin vein. Four levels have been driven approximately 100 feet apart. The extent of development work and the nature of the vein-system is shown on the accompanying maps. The vertical section through A-A shows the disposition of the vein at depth.

The Baldwin vein extends to the 100-foot level, but is not found on the 200-foot level. The explanation of this is that the vein is cut off by the Gamma and Beta faults, which are parallel to the larger Alpha fault. The position of two faulted segments is suggestion in Section A-A, and development work should be done in search of them. On the hillside just north of Pickhandle Gulch, a short distance below the Lucky Hill Mine, there are several short tunnels, which I have not inspected, but which appear to be on vein material. Ore in this situation would probably represent blocks of "drag-ore" in the hanging-wall side of the Alpha fault. The intersection of the vein with the Alpha fault should get deeper toward the east.

The Main vein is found of good strength on the Adit level, but it has not been developed on the 100-foot level, except by driving the main south cross-cut through it. Where it is encountered by this cross-cut, the vein lies in the chert-quartzite and is not highly mineralized. It consists of irregular quartz veinlets and silicified rock, stained brown with iron oxide. On the 200-foot level, the vein is represented by only a two foot quartz vein, and streaks of iron oxides. The interruption of the vein between the Adit level and the 100-foot level is probably due to the main fissure entering the flint-like chert-quartzite, which, on account of its insoluble nature, is highly unfavorable for ore deposition. The interruption may be only local and the ore should be looked for on the 100-foot level farther to the east.

This tendency of the ore to avoid the harder rocks, and to follow the softer and more soluble ones is well shown by the main vein on the Adit level, where its strands have followed an intricately curved and involved pattern. The Baldwin vein is more regular but it also has a tendency to split into branches. It is this characteristic of the veins that calls for an unusual amount of work in their development.

The ore in this mine is of the type common to the district, consisting mostly of massive limonite and gothite in a gangue of calcite and quartz, all stained a dark blackish brown. The richer ore, mined for shipment by lessees, was taken from gloryholes and stopes, mostly above the Adit level. In the gloryholes the vein was thirty-five feet wide.

The country rocks are shown in Section A-A and will not here be discussed in detail. The silicified limestone shows, under the microscope, principally quartz and calcite, with disseminated pyrite crystals. Together with the softer and more calcareous shales, it formed the principal locus for ore deposition. All of the intrusive rocks are so decomposed that their accurate determination is impossible. The rock marked "rhyolite" at the entrance of the Adit tunnel shows rounded quartz phenocrysts, altered biotite and completely decomposed feldspars, but its original crystalline structure was so well developed that it may be a fine-grained granodiorite. A fine-grained white kaolinic rock is found commonly throughout the mine closely resembles an altered felsitic rhyolite, but specimens examined under the microscope show angular fragmental quartz grains, and it is therefore classed as shale. A rhyolite dike on the 200 foot level shows quartz-phenocrysts, and is probably connected with a similar rhyolite on the surface west of the mine. The andesites in the dikes on the 200-foot level are in a highly altered condition, and hardly recognizable.

Post-mineral faulting is not an important feature of the Lucky Hill Mine, except as regards the Alpha, Beta and Gamma faults. A great many small faults are found, as shown on the maps, but their movement has not been large. The vertical, or steeply inclined, open fissures that occur with some frequency, are shrinkage cracks, and have caused but little fault movement. There has undoubtedly been some movement on the numerous flatly inclined faults, but, in no instance that I have observed, does it seem to be over twenty or thirty feet, and usually is much less. These faults occurred prior to the oxidation of the ore, and in some places they acted as a dam to the downward migration of surface waters. In this way, they had the effect, locally, of stopping the secondary enrichment that took place in the upper parts of the vein. It is for this reason that the vein is sometimes of good grade above one of these faults and poorer below.

Because the Lucky Hill vein is cut off by the Alpha fault, its continuation below the fault should be sought for. The old Northern Belle Mine maps do not show any workings near the fault, and this leaves a very favorable area for further exploration.

CORRELATION OF THE NORTHERN BELLE AND LUCKY HILL-DIABLO VEINS:

The reasons for suggesting the identity of these two veins are:

1. The presence of the Alpha fault is shown on the 200-foot level of the Lucky Hill Mine, at the surface north of the portal of the Adit tunnel, at the south end of the Northern Belle 600-foot level. It should show in the Lower Holmes tunnel, but the tunnel is blocked by a cave outside of where the fault should be. However, an old map shows a strong fault in the position that the Alpha fault should occupy. There is also strong faulting in the general direction of the Alpha fault in the Upper Holmes tunnel. The fault probably stops against the serpentine near the bottom of Pickhandle Gulch.

2. The occurrence of both veins in a belt of silicified limestone and soft shales, with bedded chert on or near the foot-wall.

3. The presence of serpentine on the hanging-wall side of both veins, though not forming the immediate hanging-wall. The serpentine is not found directly north of the Lucky Hill Mine because of its having been cut off by the fault, but it is found a short distance to the east. In the Northern Belle Mine the portal of No. 11 tunnel is in serpentine.

4. The general strike of both veins is not identical, but the difference is not sufficient to deny their correlation.

5. The dip and general character of both veins is almost identical.

GENERAL POSSIBILITIES:

Aside from ore now developed, and from small blocks throughout the old workings, I believe that the district offers excellent opportunities for opening entirely new ore bodies. The ground to the north and northwest of the Northern Belle Mine has big possibilities, if the geological situation is what my preliminary work indicates.

Respectfully submitted,

"JOHN A. BURGESS."

195
item 2

5585

VERTICAL & LONGITUDINAL SEC

THROUGH

PROPERTIES

OF THE

CANDELARIA MINES

Candelaria — Nevada.

34

183

March 1920

Scale 1 in.

GLORY HOLE

6376 1st Level

2nd Level 6356

3rd Level 6335

4th Level 6264

6206 5th Level

6th Level 6141

6085 7th Level

8th Level 6

9th Level 5971

10th Level

11th Level

12th Level

13th Level

2+06
5097
1903

CTION

CO.

=100 Feet.

6400

6200

11

6000

1800' North to the GREY DAWN CLAIM IS WHERE to find the faulted N.B. Vein I.C John Burgess.

5920

5871

5851

5800

5775

SHAFT

5668

NORTH BELLE

5600

14th Level 5543

15th Level 5464

5400

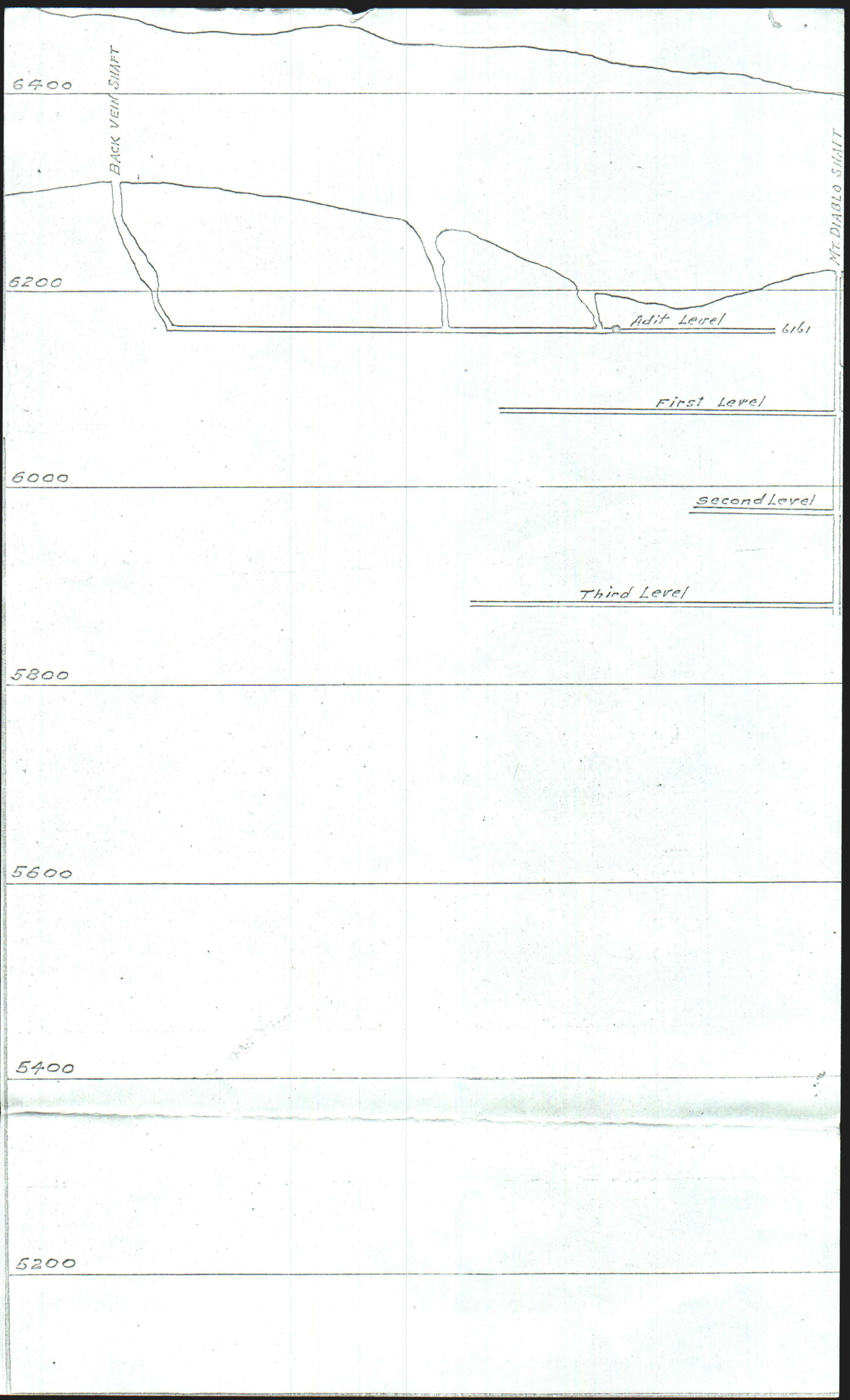
16th Level 5364

17th Level 5292

18th Level 5192

5200

19th Level 5097


6400
BACK VEIN SHAFT
MT. DIABLO SHAFT
6200
Adit Level
6161
First Level
6000
second Level
Third Level
5800
5600
5400
5200

Lucky Baldwin Shaft

5224

LUCKY Hill Tunnel

6211

1st Shaft Level

6103

6080

5980

5884

4th Level.

5791

5th Level

5683

6th Level

7th Level

5485

8th Level.

5386

9th Level

5284

10th Level

518

0930 0002

NORTHERN BELLE MINE
CANDELARIA, NEVADA

COMPOSITE MAP
AND
ASSAY PLAN

SCALE 1 INCH = 100 FEET

AUGUST 1930 GEOLOGY BY JOHN A BURGESS

ORIGINALLY MAPPED 1922. NEW WORK MAPPED 1930.

NOTE: Samples underlined in red ink taken by J. A. Burgess, 1930. Others are from older records.

SECTION A

SECTION B

NORTHERN BELLE SHAFT

19TH LEVEL

17TH LEVEL

18TH LEVEL

16TH LEVEL

15TH LEVEL

Work started by Grube in 1929

16th Level does not enter this area.

All driven in 1925 and 1926 by Gordon.

RAISE No. 1

RAISE No. 2

RAISE No. 3

RAISE No. 4

RAISE No. 5

Q RAISE

16TH LEVEL No connection

Most of the ore west of this 2000 coordinate is oxidized

NEW WORK COLORED

N

2200

2400

2600

1400

2800

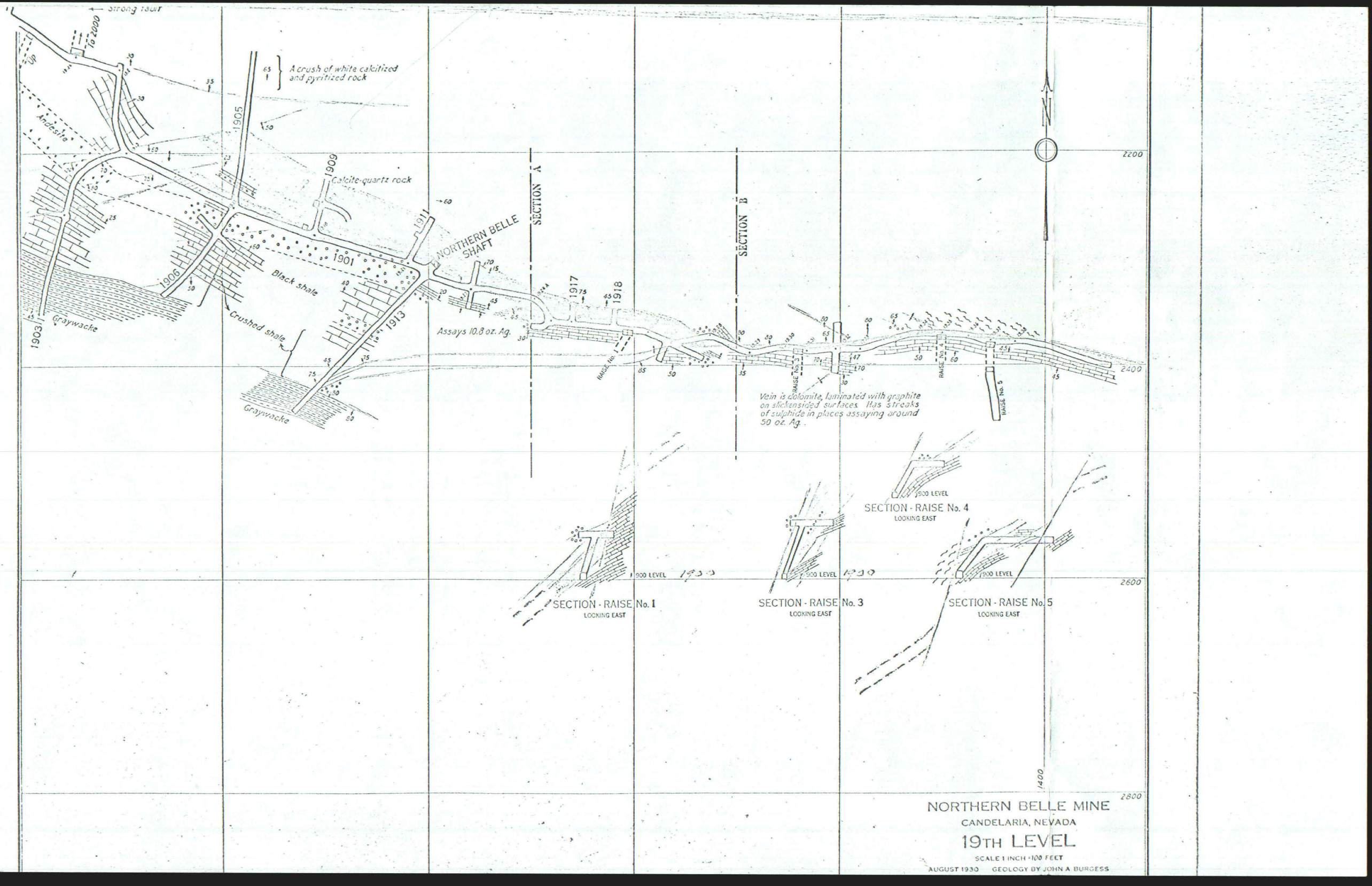
2000

1900

1800

1700

1600



NORTHERN BELLE MINE

CANDELARIA, NEVADA

19TH LEVEL

SCALE 1 INCH = 100 FEET

AUGUST 1930 GEOLOGY BY JOHN A. BURGESS

SECTION A

SECTION B

19TH LEVEL

NORTHERN BELLE SHAFT

Work started by Grube in 1929

All driven in 1929 and 1930 by Scruby

15TH LEVEL

17TH LEVEL

18TH LEVEL

16th Level does not enter this area.

All driven in 1925 and 1926 by Gordon

1702

16TH LEVEL

16TH LEVEL No connection

17TH LEVEL

Q RAISE

15TH LEVEL

14th Drift to Level

To Shaft

1300 LEVEL

To 1300 Level

NEW WORK COLORED

Proposed Exts. 18th Level 700'

Proposed Exts. 17th Level 300'

Proposed Exts. of 16th Level 700'

Proposed Exts. of 1500 Level 500'

Proposed Exts 300' 1300 LEVEL

2200

2400

2600

2800

1500

1300 Coordinate Line

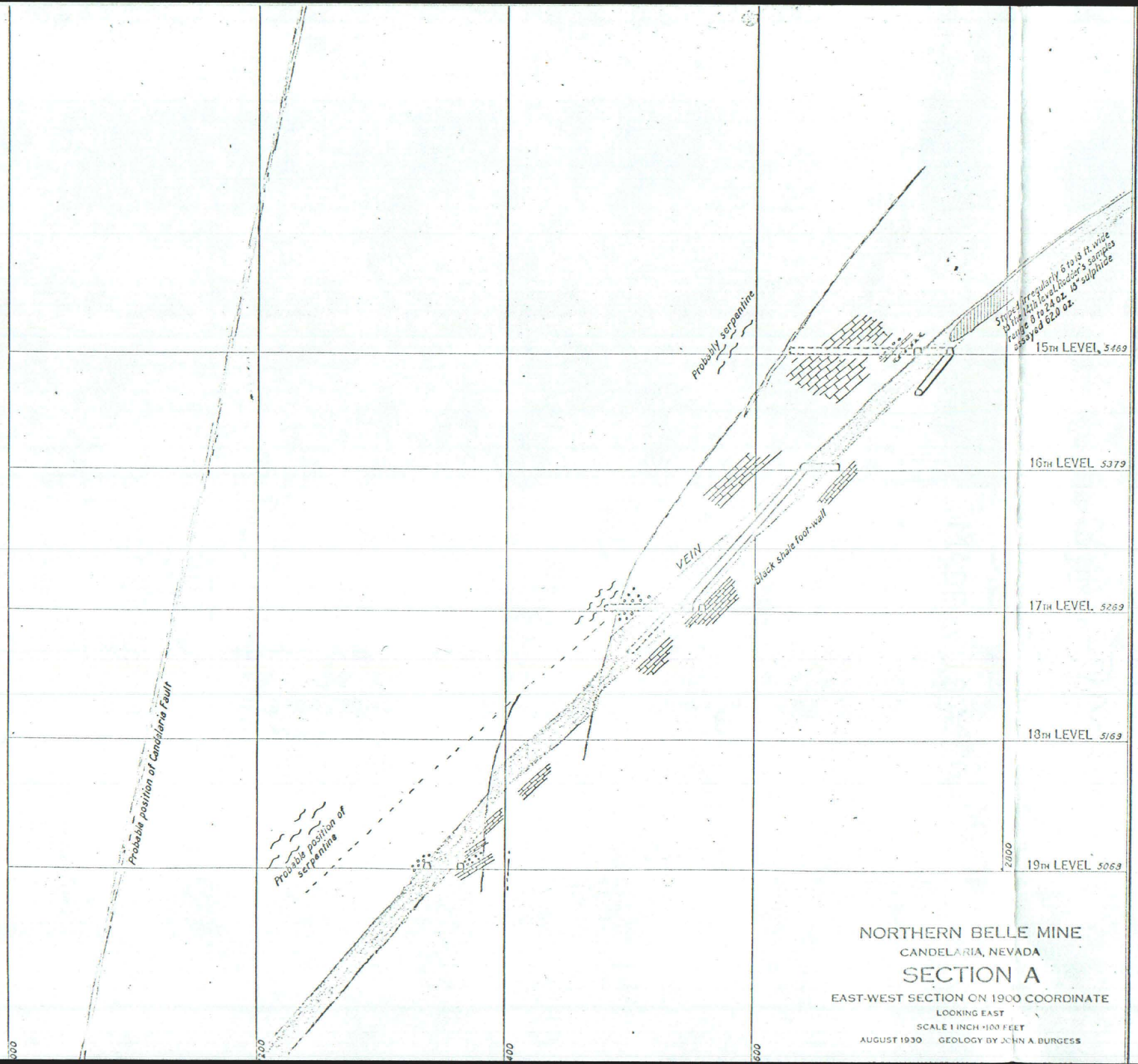
NORTHERN BELLE MINE

CANDELARIA, NEVADA

COMPOSITE MAP AND ASSAY PLAN

SCALE 1 INCH = 100 FEET

AUGUST 1930 GEOLOGY BY JOHN A. BURGESS



NORTHERN BELLE MINE

CANDELARIA, NEVADA

SECTION A

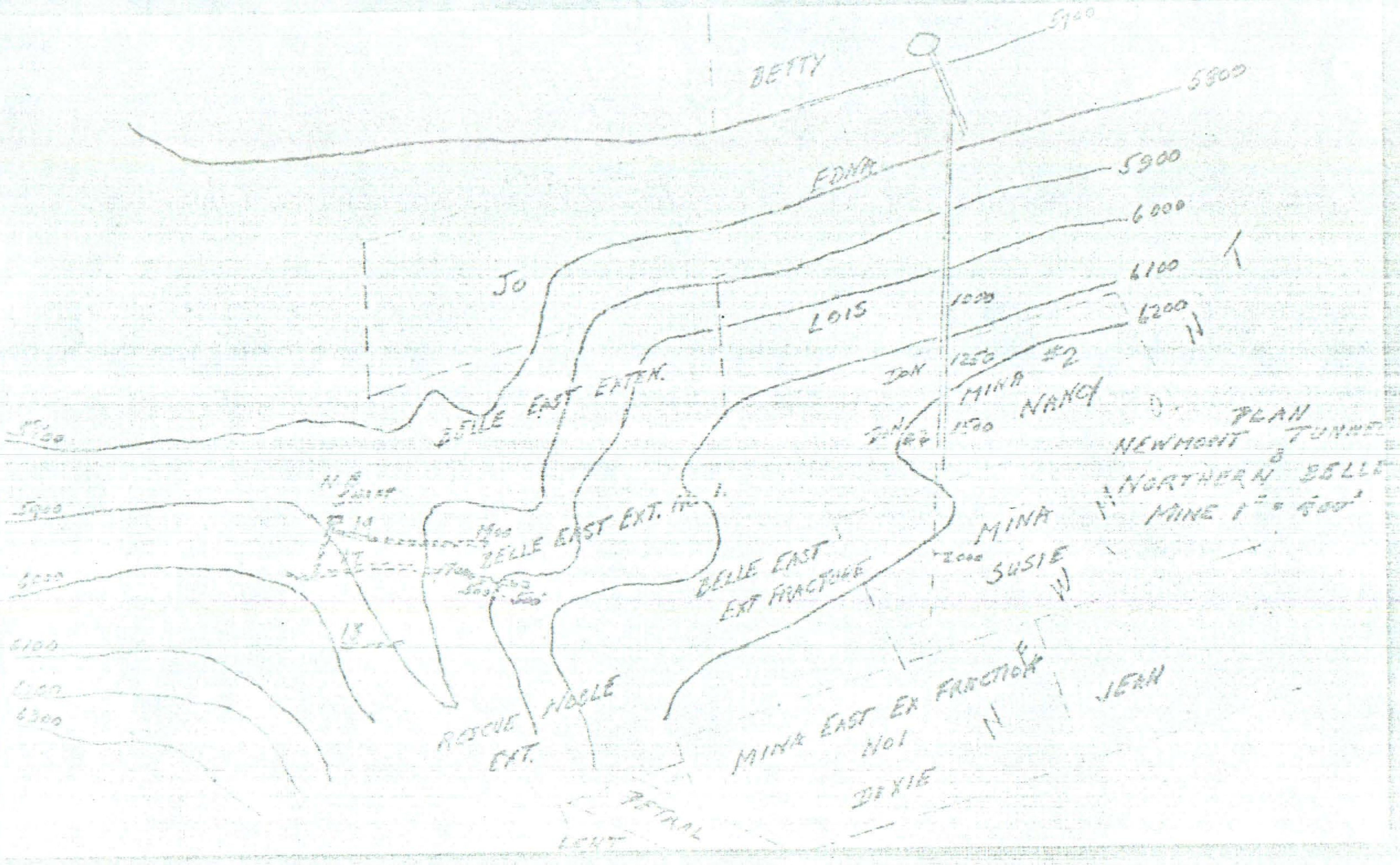
EAST-WEST SECTION ON 1900 COORDINATE

LOOKING EAST

SCALE 1 INCH =100 FEET

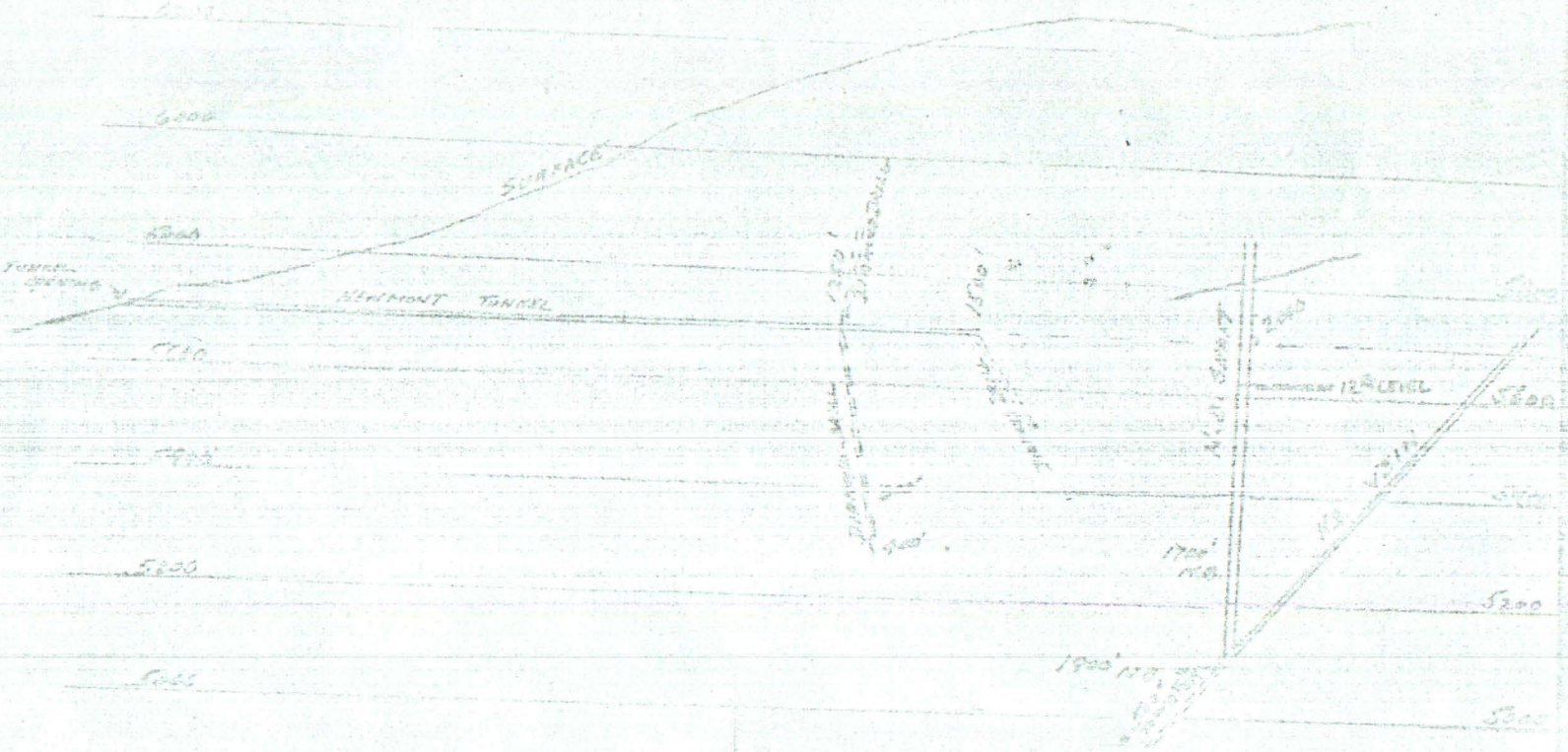
AUGUST 1930 GEOLOGY BY JOHN A. BURGESS

Candelaria

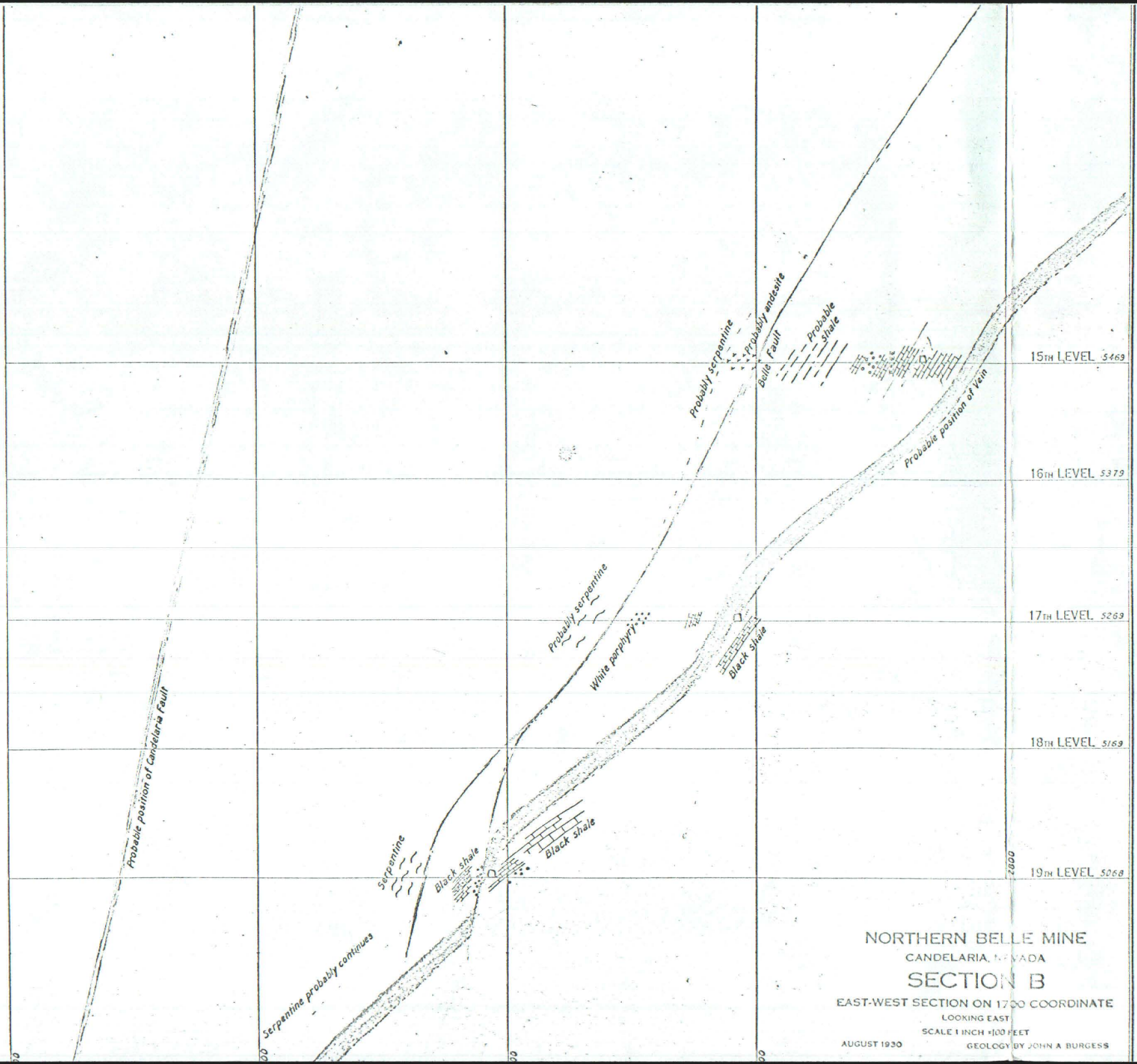


BETTY
EDNA
JO
LOIS
BELLE EAST EXTEN.
BELLE EAST EXT. No 1.
BELLE EAST
EXT FRACTURE
RESCUE
EXT.
NOBLE
MINA
NANCY
MINA
SUSIE
MINA EAST EX FRACTION
No1
DIXIE
JEAN
NEWMONT
PLAN
TUNNEL
NORTHERN BELLE
MINE 1" = 800'
5900
5800
5900
6000
6100
6200
5900
6000
6100
6200
6300
1000
1250
1500

Candelaria



SECTION THRU HEWMONT TUNNEL
1" = 200' TRACE OUTLINE
BY [illegible]



NORTHERN BELLE MINE

CANDELARIA, NEVADA

SECTION B

EAST-WEST SECTION ON 1700 COORDINATE

LOOKING EAST

SCALE 1 INCH =100 FEET

AUGUST 1930

GEOLOGY BY JOHN A BURGESS

GEOLOGICAL AND SAMPLE MAPS

OF THE EASTERN PART OF THE

NORTHERN BELLE MINE

OF THE

ARGENTUM MINING CO. OF NEVADA

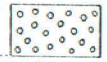
CANDELARIA, NEVADA

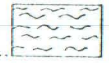
BY JOHN A. BURGESS
648 MILLS BUILDING, SAN FRANCISCO
CALIFORNIA

AUGUST 1930

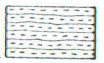
LEGEND

ANDESITE 

PORPHYRY DIKES 

SERPENTINE 

CANDELARIA SHALE 

GRAYWACKE 

VEINS 

FAULTS, FISSURES, GOUGES 

195
Item 1
(extra copy)

CANDELARIA FAULT

NORTHERN BELLE SHAFT

Dark basic rock. Alters to serpentine.

Brown oxide, not ore

Area of highly altered rock of doubtful origin. Probably andesite.

Dam to 1502

2 oz. Ag.

10.0 oz Ag.

Assays 36.0, 11.2, 8.4 oz Ag.

Prevailing color is brown.

Schistose zone

NEW STOPE
Extends to 1400 level
Av. val. about 12 oz with some 60 oz. sulphide.

Vein is of dolomitic material streaked with black slickensided surfaces of graphite, has occasional bands of 50 oz. sulphide ore. Much contorted by strike-faulting.

Winze 40 ft. deep @ 60° N. 50 ft. drift at bottom
Vein wide. Has sulphide streak 8 inches wide.
50 oz. silver.

1501 1502 1510 1520 1528 1529 1530

SECTION A

SECTION B

N

2200 2400 2600 2800

2400 2200 2000 1800 1600 1400

NORTHERN BELLE MINE
CANDELARIA, NEVADA
15TH LEVEL
SCALE 1 INCH = 100 FEET
AUGUST 1930 GEOLOGY BY JOHN A. BURGESS
ORIGINALLY MAPPED 1922. NEW WORK MAPPED 1930.

CANDELARIA FAULT

2200

NORTHERN BELLE SHAFT

3 ft. gouge

Serpentine

Calcitized gouge with sulphide of iron and copper.

Dark basic rock with blotches of iron sulphide. Alters to serpentine.

Talcy and limey rock. Much calcitized.

Dense serpentine rock.

1701

2400

Talcy gouge

1707

1702

Calcitized serpentine

White porphyry

Dolomite-graphite vein

Gray streaked shale with concretions.

Vein partly oxidized

Typical dolomite-graphite vein has considerable sulphide ore in streaks.

Gray shale

Black shale

Raise to vein

Vein 12 ft. wide

Shale lightly mineralized said to assay 17-20 oz. Ag

1600

SECTION A

SECTION B

L

P

Q

R

2500

1400

2600

NORTHERN BELLE MINE

CANDELARIA, NEVADA

17TH LEVEL

SCALE 1 INCH =100 FEET

AUGUST 1930 GEOLOGY BY JOHN A. BURGESS

195
item 2

0930 0002

ANNUAL REPORT

CANDELARIA MINES COMPANY

For the Year Ending December 31, 1921

HEAD OFFICE
43 Exchange Place, New York City

EXECUTIVE OFFICE
648 Mills Building, San Francisco, California

PROPERTIES AT
CANDELARIA, NEVADA

REGISTRAR OF TRANSFERS
The Corporation Trust Company
37 Wall Street, New York City

TRANSFER AGENTS
The Equitable Trust Company
37 Wall Street, New York City

DIRECTORS

C. D. KAEDING ..... *San Francisco, California*

S. ROSSITER ..... *New York City, New York*

F. M. MANSON ..... *Reno, Nevada*

O. W. JONES ..... *Chicago, Illinois*

J. C. PEEBLES ..... *Reno, Nevada*

ANNUAL REPORT

CANDELARIA MINES COMPANY

GENERAL OFFICES

Candelaria, via Mina, Nevada

EXECUTIVE OFFICERS

C. D. KAEDING.....*President*

S. ROSSITER.....*Vice-President*

C. D. KAEDING.....*Treasurer*

V. WIMBERLY.....*Secretary and Assistant Treasurer*

J. C. PEEBLES.....*Assistant Secretary and Assistant Treasurer*

EXECUTIVE COMMITTEE

C. D. KAEDING.....*Chairman*

F. M. MANSON.....*Member*

J. C. PEEBLES.....*Member*

CANDELARIA MINES COMPANY

ASSETS

CURRENT ASSETS			
Cash on Hand and in Banks		$ 46,482.32	
Accounts Receivable		203.61	
Construction & Boarding House Supplies		2,134.61	
			$ 48,820.54
PREPAID CHARGES			
Prepaid Insurance		217.38	
Miscellaneous Prepayments		10.65	
			228.03
DEFERRED CHARGES			
Discount on Note Payable		50,000.00	50,000.00
CAPITAL ASSETS			
Mining Properties, Claims & Leases		2,028,473.09	
Plant & Equipment	$59,577.68		
Office Furnishings	1,086.78		
	60,664.46		
Less Depreciation	9,592.14		
		51,072.32	
Mill Construction, Commenced Dec., 1921		1,863.93	
Mine Development, Mine Sampling, Metallurgical Experiments; Administrative & General Expenses, including Organization Expense		260,913.93	
			2,342,323.27
			$2,441,371.84

BALANCE SHEET, December 31, 1921

LIABILITIES

Current Liabilities

Wages Payable	$ 557.33	
Accounts Payable	9,194.12	
Operating Funds Advanced	1,529.39	
Note Payable, Due Nov. 1, 1922	23,700.00	
		$ 34,980.84

Accrued Items

Interest on Note due Nov. 1, 1922	237.00	237.00

Deferred Credits

Suspense	265.00	265.00

Fixed Liabilities

Note Payable, Due November, 1924	100,000.00	100,000.00
Capital Stock Authorized, 3,000,000 shares, par $1.00	$3,000,000.00	
Less Unissued Stock of which 369,111 shares of a value of $1.00 are under option at $1.00 per share for 3 years to the Rochester Silver Corporation	694,111.00	
		2,305,889.00
		$2,441,371.84

REPORT OF THE DIRECTORS

OF

CANDELARIA MINES COMPANY

For the Year Ending December 31, 1921

San Francisco, California,
April 1, 1922

To the Shareholders:

Your Board of Directors wishes to advise you that the contemplated plans for financing the Company's treasury, for which your sanction was granted at a Special Meeting of the Shareholders held in July, 1921, in order to build a reduction works at the Company's mines in Candelaria, Nevada, and bring the property to production, have been successfully consummated.

Satisfactory completion of the development and sampling campaign begun in May, 1920, came at a time when the severe financial and business readjustment was well under way, at the end of 1920. It found your Company without adequate funds to carry on plant construction and bring the property to production, and in spite of the excellent situation as to ore developed and ready for milling, it was impossible to interest capital in the enterprise.

During the summer of 1921, interests closely associated with the Rochester Silver Corporation were requested to review the situation with our executives, with the result that an arrangement was completed, whereby that Company undertook to supply the necessary money, machinery and equipment to put the Candelaria property into production. The total cost to Candelaria Mines Company will be $400,000 payable in three years from November 15, 1921, with no interest for the first eighteen months, and thereafter at the rate of 6% per annum. In addition, the Candelaria Mines Company gives the Rochester Company an option on four hundred thousand (400,000) shares of its Treasury Stock at One Dollar per share for three years. Since in November, 1920, our engineers estimated the total cost of plant to bring the property to production at $350,000, we feel that we have been extremely fortunate in accomplishing the financing along the above lines, and the Rochester Silver Corporation is well satisfied since they are enabled to turn into cash a milling plant which was not serviceable to them.

Plans for the construction of a 300 ton milling plant, air compressors, ore transport system, electric power installation, et cetera, have been perfected, and work was started on December 1. A competent staff of engineers is in charge, and excellent progress has been made, so that we expect to start the plant operating in July, 1922.

Your property has been developed to a point where the engineers estimate 610,000 tons of ore to be reasonably assured for a milling plant. This gives a life of nearly six years on a basis of 300 tons milled daily, and it is estimated that the profit in sight is approximately One Million Six Hundred Thousand Dollars.

The report of the General Manager attached hereto is submitted for your careful consideration, as it deals with all details of the Company's business and progress since the present administration became identified with the Company.

Detailed reports of operations have not heretofore been sent to the Shareholders, but it will be the policy of the present Directorate to see that you are kept fully and correctly informed of all matters connected with the operations at frequent intervals.

Respectfully submitted,

BOARD OF DIRECTORS.

REPORT OF THE GENERAL MANAGER

Candelaria, Nevada

March 31, 1922

The Directors
Candelaria Mines Company
648 Mills Building
San Francisco, California

GENTLEMEN:

The following report will cover in detail the operations at your property, since the formation of the present company, but more particularly since the present administration became actively associated with its operation in the latter part of 1919.

Your Company has fee title to the mining property known as the Lucky Hill Mine, which, together with extensions and other valuable property acquired later, totals twenty claims with an area of 325 acres, and in addition has a lease and bond on all of the mining property of the Mt. Diablo Mill & Mining Company, Holmes Mining Company, Northern Belle Mining Company, Esmeralda Water & Milling Company. This embraces practically all of the known productive area of the Columbus Mining District, Candelaria, Nevada,—together with the water supply for the mines and town.

Operations were carried on in a modest way at the Lucky Hill Mine, partly by lessees and partly on Company account, resulting in the shipment of high grade silver ore to smelters, over ten thousand tons averaging twenty-six ounces per ton was mined and shipped. During July, 1919, New York mining interests were invited to become associated with the enterprise and subscribe money for a very extensive development campaign. This was accomplished and in the following pages we will detail the work undertaken and the results achieved.

LOCATION:

The properties are located at the camp of Candelaria in the Columbus Mining District, Mineral County, Nevada.

HISTORY:

The camp of Candelaria flourished in the late sixties and through the seventies and eighties and was productive until the year 1891. The principal production came from the Northern Belle Mining Company, Holmes Mining Company and Mt. Diablo Mill and Mining Company. In the earliest days, ore was shipped by ox teams to Reno and thence to the Selby Smelting Works in California. Later, a mill was built at Columbus Marsh, nine miles from the mines, and still later two mills were built at Belleville, one at Sodaville and one in the camp, and the ore was hauled by team and wagon to these milling plants.

There is no record available of the production for the first five or six years, but it is known that the ore was very rich. Some old books commencing September, 1875, are at the Company's office in Candelaria, which give the actual tonnage of ore hauled to the Belleville Mills until 1886 and the bullion shipments. They show that one mill treated about forty tons per day until August, 1876, then a

second mill commenced operating and treated another forty tons per day. The ore hauling record ends December, 1883, when the railroad probably commenced operations, and during eight years and four months a total of 190,000 tons were hauled to these two plants. The average bullion value of this ore was $46 per ton, and since we know the tailings, when retreated showed an average of eight oz. silver and the chloridizing losses were heavy with the then crude methods, it is certain that the ore averaged in value over $60 per ton. The bullion record for ten years (September, 1875 to August, 1886, with 1884 not shown) shows over nine and one-half million dollars sold.

Incidentally, these records show that the hauling was paid for at the rate of $3.625 per ton, and that the Mt. Diablo Mine was charged $15 a ton for milling.

It is interesting to know the situation obtaining in the metal market during these years. In 1875, silver averaged $1.246 in New York and 56:8 pence in London. It dropped steadily and with regularity to $1.11 and 50:7 pence in 1884, and in 1885 to $1.06 and 48 pence. This was the year of demoralization for silver mines and marks the practical ending of profitable operations at Candelaria, although the mines operated another six years and produced a large amount of thirty ounce ore.

The ore deposits were worked for a minimum grade of approximately forty ounces silver, and in order to maintain this grade, and higher, selective mining was resorted to. The work was very skillfully done—the veins were broken down and sorted in the stopes, the low grade material being left as stope filling and the higher grade ore was dropped through chutes, hoisted to the surface and hauled to the mills. A total production of thirty to forty million dollars is indicated from available data and records,—600,000 to 800,000 tons of ore which averaged about fifty dollars in gold and silver, was reduced in the mills and about twenty million was profit.

The milling process used was to crush the ore dry in stamp batteries, roast it with about 8% salt in Stetefelt furnaces and pan amalgamate the roasted ore with mercury and bluestone. The saving effected was about 88% but the operating expenses were very high due to the process of selective mining, the logg wagon haul, and the complicated reduction process. Our investigations indicate that costs must have averaged over twenty-two dollars per ton.

In 1875 the Northern Belle Mine had exposed such a large body of ore that it was found necessary to build a second stamp mill with Stetefelt furnaces. During this year, this company made returns to the county assessor of $840,950.00 produced from 10,730 tons of ore.

LUCKY HILL MINE:

This property was slightly developed in the early days but no ore of importance was discovered and no production made. An adit tunnel was driven into the mountain a distance of 400 feet and a shaft was sunk 200 feet deep with long cross-cuts to the 100 and 200-foot levels. It so happened that this work was practically all driven in a barren zone. The first discovery of ore was made by parties who relocated the claims in 1914 whilst doing their assessment work on the top of a hill. Lessees followed up the discovery and made a most promising devel-

opment in shipping a total of 10,000 tons which averaged twenty-six ounces silver and $1.10 in gold. This work proved the probable existence of a mine of considerable proportions. It was on the basis of this position that the present administration became identified with the Candelaria Mines Company and subscribed funds for a development campaign which has been carried to a very successful conclusion.

DEVELOPMENT CAMPAIGN:

It was necessary to build a complete camp as well as a mining plant before any work in the mines could be satisfactorily undertaken. A number of old houses were purchased and put in good order. An operating office was built, together with a sample crushing plant and assay office capable of turning out 150 samples per day. An oil-driven engine and compressor was installed together with air, water and oil pipe lines, and all necessary accessories. At the mine a complete hoisting works was erected and all necessary mining equipment including a power drill sharpener, cars, rail and pipe installed. This equipment was large enough to admit of upwards of fifty feet per day of development work being done and to carry on the great amount of sampling necessary to appraise the many miles of openings in the old mines.

A total of over 6,000 feet of development work was performed in the Lucky Hill Mine, and all together over 15,000 samples were cut and assayed from the Lucky Hill, Mt. Diablo and Northern Belle and Holmes Mines and ore dumps. This work has been accurately recorded and summarized.

Development in Lucky Hill Mine disclosed the existence of two large veins called the Baldwin and Main Veins. These veins have been proven to be large and strong and to have very important ore shoots contained within them. The widths vary from eight to thirty feet, and they have been proven for a length of over four hundred feet each. When development work was discontinued in November, 1920, the showing in both veins was excellent. For example, in the Main Vein at the Intermediate Level, the 1-6 drift was progressing with the full width in ore averaging better than thirty ounces. (The face assayed forty-two ounces when work was stopped.) The drift being driven from A-7-7 raise was averaging twenty-five ounces. Several cross-cuts at the Adit level were showing fourteen and fifteen ounce ore. On the Baldwin Vein cross-cutting from A-3-7 raise was disclosing a width of over twenty-five feet averaging fifteen to twenty ounces. The 1-7 raise had just entered ore below the Adit level showing twelve to thirteen ounces of undetermined width or extent. The 1-6 raise had just touched the ore below the Adit level to the east when we stopped.

It is quite impossible, in a deposit of this nature, to do justice to the ore bodies in making conservative calculation of ore in sight—nevertheless, for our own guidance, this has been most painstakingly done and is submitted as follows:

ORE RESERVES:

We have blocked out, ready to mill, 60,000 tons assaying 14.0 ounces silver and $1.00 gold in the Lucky Hill Mine from the surface to the Adit level, a distance of only 220 feet on the dip of the veins. We believe that stoping operations in the blocks above considered will give nearly double this tonnage, for the reason that

we have not completely developed this territory by any means. (See report by J. A. Burgess.) When stoping and milling operations are being carried forward, and additional development work can be more economically done, we feel certain the above expectation will be fulfilled.

With regard to lateral and deeper development beyond the boundaries considered in the ore reserve, the chance of finding more ore is excellent. We have already exposed both veins 100 feet vertically below the Adit level and we feel that since the ore bodies at Lucky Hill are a part of the same vein system which produced the great ore shoots of the Northern Belle and Mt. Diablo Mines, we should find profitable ore bodies down to twelve or fourteen hundred feet as they did. Some of the best ore bodies in both mines were found at a horizon five hundred feet deeper than our present ore reserve blocks.

OTHER MINES:

In the Northern Belle, Holmes and Mt. Diablo properties, sampling has shown that a large tonnage of ore assaying from twelve to twenty ounces has been left unstoped. This was not payable during the time of former operations. We have not attempted to calculate accurately the tonnage which can be profitably mined and recovered from this source, but it seems reasonable to estimate it at not less than 50,000 tons, averaging twelve ounces silver and sixty cents gold, with no development required. This does not consider blocks of ground where development will disclose new ore, and there are some excellent possibilities of this sort. We believe that another 50,000 tons, averaging twelve ounces silver and sixty cents gold could be considered as "possible" ore from this source at this time.

Careful sampling of the old stope fills indicates a very large payable tonnage can be recovered by drawing down the stopes. For example, 530 samples of the stope fills from the Northern Belle Mine taken from the surface to the thirteenth level stopes averaged eight ounces silver and forty cents gold per ton. This is a representative lot of the entire fill sampling of old mines. There may be some of the poorer sections of the mines where the fills will be found unpayable, but this does not seem probable. The tonnage available has not been accurately calculated, as it would not be possible to get all three dimensions, the center of the individual mass cannot be reached. However, we have reached a general conclusion that for each ton of ore produced and milled there were two tons broken, and one left behind as stope filling, and there should be some 400,000 tons of fill in the old mines. Probably 300,000 tons remain in the Northern Belle and Holmes with a gross value of $2,500,000 which can be readily reconciled with the performance of ore bodies that yielded some twenty-five million in bullion, from the selected grade. It is our belief that the average value of the fills will be higher than our sampling, as we were obliged to take the top of the pile where stoping had been discontinued because the stope was below grade,— or the sides where rock walling had been done with the coarse waste rock to hold the fill back from a manway, and the richer fines which would increase the average are all in the inaccessible part of the pack. It is physically possible to draw the stopes without caving the workings as the limestone walls stand remarkably well.

We do not know of any mining situation similar to this in this country, where mines were worked on a selective system and the rejects from hand sorting left in the stopes as filling to be subsequently removed and treated by modern milling methods. In Mexico, however, there are several comparable cases. At the Minas del Tajo, the veins had been worked for 300 years by natives for highgrade ore and rejects left in the fills. In 1905 American engineers estimated 200,000 tons of available fills and 100,000 tons of ore in place, and a milling plant was built and started operating in 1906 at the rate of 75,000 tons per annum. This plant operated continuously until 1914 when it was increased to treat 90,000 tons per annum. There has been profitably treated therefore some 1,300,000 tons of ore and the property is still operating very successfully.

At Pachuca, the Santa Gertrudis and other companies have made a great success under almost parallel conditions. At Guanajuato the Guanajuato Reduction & Mines Company have made a notable success producing at the rate of 650 tons daily from dumps and mine fills. Some of the fills in these mines were worked over three times by the Mexicans, sorting out highgrade - the final reject assaying over eight ounces silver. This ore was a sulphide and much more readily sorted than the oxidized ores of Candelaria. This Company has already produced four million tons and is quite prosperous today.

DUMPS:

There are a number of surface dumps on the old mines which we have carefully sampled and tested. One of these on the Northern Belle contains 8,000 tons averaging twelve ounces silver and sixty cents gold. Tests made on the other dumps indicate that by screening, 100,000 tons can be graded up to 82,000 tons, averaging $7.50 with a gross value of $625,000, or by finer screening the 100,000 tons can be graded to 40,000 tons averaging $10.00 with a gross value of $400,000.

Recapitulating the tonnages above considered, we have a total of reasonably assured ore for a milling plant, as follows:

Lucky Hill Mine	120,000 tons
*Older Mines	100,000 "
Ore Dump Northern Belle	8,000 "
Other Dumps	82,000 "
*Stope Fills	300,000 "
TOTAL	610,000 tons

*(Only Northern Belle and Holmes Mines in above figures.)

This indicates over five and a-half years ore ahead of requirements for a 300-ton per day milling plant, and it is our belief that development in Lucky Hill will supply highgrade milling ore, and operations in the older mines will supply medium grade ore sufficient to enable this scope of milling to go on for a considerably longer period.

METALLURGICAL TESTS:

Mr. J. A. Carpenter, for the Company, conducted a long series of tests to determine the most efficient method of extracting the values from these ores. The results indicate that an extraction of eighty-three to eighty-five per cent can be made by fine grinding followed by cyanidation and filtration from Lucky Hill ores, and a five per cent lower extraction by the same method on the Northern Belle and Holmes ores. Three carloads, averaging thirty tons each, shipped to a Custom Mill at Millers, Nevada, were settled for on a basis of 83.75%, 84.45% and 84.25% respectively.

In order to ascertain if any preliminary treatment would improve the extraction of the silver, an extensive series of roasting experiments followed by cyanidation were conducted. These tests demonstrated conclusively that chloridizing with salt did have a most helpful reaction. This was to be expected since the former operators used the chloridizing roast as a preliminary to extraction processes, whereby they were enabled to recover the large quantities of silver produced from the old mines.

It has been demonstrated that sixty per cent, or more, of the silver in the ore is in the form of chloride or very finely divided sulphide and cyanidation tests on the raw ore, when ground to pass only twelve mesh, show that this silver is extracted very rapidly with small consumption of cyanide. Having in view the above very important facts, we have worked out a flow sheet for the reduction works, as follows:

The ore will be brought from the mine in electrically hauled trains to a double crusher bin keeping separate the highgrade from the medium grade ore. It will be crushed dry to one-half inch using gyratory crusher, screens and rolls, and will be conveyed by belt to a double compartment mill bin. The mill bin feeders will deliver it to 2 6'x5' Union Iron Works Ball Mills operating in closed circuit with Dorr Classifiers and crushing in cyanide solution. The ore will be ground to all pass thirty mesh, and separated into two products by means of Dorr Bowl Classifiers. The slime which should not be more than thirty-three per cent by volume, will be agitated, decanted, and filtered, using standard Dorr and Oliver equipment. The sand will be leached in vats. All highgrade ore will receive a chloridizing roast after cyaniding, and be re-cyanided whilst the medium grade ore will be sent to waste after the first cyanide treatment. The entire plan is based upon accepting a comparatively low recovery of silver from the medium grade of ore such as dumps and fills, but having a process so low in cost that the net result will be as great as though we used the more expensive process and secured a higher recovery of silver, and at the same time to have a mill designed so elastically that highgrade ore can receive a further treatment if necessary.

The plant as being constructed will have a capacity of not less than 300 tons per day and with very little additional equipment could treat 500 tons. All of the larger machines, together with conveying and transmission machinery, pipe lines, pumps and slime plant will be able to take care of the larger tonnage.

ESTIMATED UNIT OPERATING COSTS:

Basis 108,000 tons per annum.

1.	Mining including timbering	$1.75
2.	Tramming to ore passes	.20
3.	Mucking and drawing	.34
4.	Mule haulage	.07
5.	Electric haulage	.05
6.	Reduction including refining	2.00
7.	Marketing bullion	.05
8.	Office, Superintendent and General Expense	.28
9.	Taxes, Insurance, Administration Expense	.23
10.	Royalties	.75 and .37
11.	Development	.20 to 1.25
12.	Roasting	1.50
13.	Recyanidation	.60

Note: That the development on proven ore is all done, and an allowance on 20 cents per ton for raises to facilitate stoping would be sufficient when considering the profit to be won from 60,000 tons of the Lucky Hill ore and 50,000 tons of old mines ore.

ESTIMATED COSTS, GRADES, RECOVERIES AND PROFITS

	Lucky Hill		Northern Belle and Holmes		
	Developed	Probable	In Place	Fills and Dumps	Probable
Mining inc. Timbering	$1.75	$1.75	$1.75	—	$1.75
Tramming to Ore Passes	.20	.20	.20	.20	.20
Mucking and Drawing	—	—	—	.34	—
Mule Haulage	.07	.07	—	—	—
Electric Haulage	.05	.05	.05	.05	.05
Reduction Including Refining	2.00	2.00	2.00	2.00	2.00
Marketing Bullion	.05	.05	.05	.05	.05
Office, Superintendence and Gen. Exp.	.28	.28	.28	.28	.28
Taxes, Ins. and Administration	.23	.23	.23	.23	.23
Royalties	—	—	.75	.37	.75
Development	.20	1.25	.20	—	1.00
TOTAL OPERATING COST	$4.83	$5.88	$5.51	$3.52	$6.31
PROPORTION TO MILL	80 tons	20 tons	40 tons	150 tons	10 tons
EST. GRADE OF ORE	$14.00	$14.00	$12.00	$8.50	$20.00
EST. RECOVERY	75%	75%	70%	60%	70%

Note: Using the above estimates the average head would be $11.20, average recovery 66.66%, average operating cost $4.40 per ton, and the operating profit $350,000 per annum.

ESTIMATED PROFIT

1.	60,000 tons	*@*	$5.60	.....	$ 336,000.00
2.	60,000 "	*@*	4.62	.....	227,200.00
3.	50,000 "	*@*	2.15	.....	107,500.00
4.	50,000 "	*@*	2.15	.....	107,500.00
5.	390,000 "	*@*	2.04	.....	795,600.00
					$1,623,800.00

The profits to be won as estimated can be very greatly increased in several ways. First, by improving the recovery of silver without any increase of operating costs. We have used from five to eight per cent lower extraction figures than shown by test work in calculating metal recoveries. Second, by increased grade of fills which we confidently expect will happen when mining commences, due to the centers of the packs carrying all the fines; and, third, the development of highgrade ore bodies. In the above calculation, no allowance has been made for the profit to be won by chloridizing and recyaniding the higher grade ores, simply because the treatment plant for this section has not been fully designed at this time. There should be approximately another $50,000 per annum won from this source.

The preliminary Geological Report of Mr. J. A. Burgess is appended for your information. Mr. Burgess will spend some weeks at the mine this spring, completing his examination and the completed report will be submitted to you.

All work at the property is now progressing rapidly and satisfactorily. We have ample labor and material, and all equipment is being delivered rapidly to the mill site. Mine work will be under way by May first, preparing tracks, chutes, ore passes and other necessary facilities to deliver ore to the mill.

Respectfully submitted,

C. D. KAEDING,

President and General Manager.

GEOLOGY OF THE CANDELARIA MINES

J. A. Burgess

Summary

The camp of Candelaria made a large production of silver in the '70s and '80s. The principal mines were the Northern Belle and Holmes and the Mt. Diablo, which together produced in the neighborhood of $30,000,000 in silver.

The ore consists of limonite carrying silver, formed by the oxidation of pyrite. It was deposited by replacement, in calcareous strata of sedimentary rock. The ore bodies, as shown by the old stopes, were in the form of shoots, lenses and irregular bodies which, taken together in each mine, formed large ore-shoots dipping at 45° to the north and northeast. The principal developed ore-reserves are in the Lucky Hill Mine, mostly above the Adit level. These have been estimated by your engineers at 120,000 tons of fourteen ounce silver ore. The estimate seems reasonable. The Lucky Hill vein is cut off by several small faults (Beta and Gamma) and one large main fault (Alpha). Between these three faults there should be two large segments of the vein which can be found by cross-cutting from the Lucky Hill workings.

The Alpha fault separates the Lucky Hill Mine from the Northern Belle Mine by a distance of 1,800 feet. The old Northern Belle and Holmes workings do not extend to the fault on the lower levels, and have left unexplored a large area of ground favorable for development. The downward extension of the Lucky Hill should be looked for below the fault.

The extension of the vein system, or the existence of another large ore-shoot, is possible north of the Northern Belle and Holmes workings. This is a very attractive possibility and the geology of that part of the mine should be carefully studied.

Ore of considerable importance has been found by sampling in the Northern Belle and Holmes and Mt. Diablo Mines. It consists of ore that was of too low grade to work by the old time processes.

August 1, 1921

Mr. C. D. Kaeding
President and General Manager
Candelaria Mines Company
Candelaria, via Mina, Nevada

Dear Sir:

I spent the period from June 25 to July 14, 1921, in studying the geology at your property at Candelaria, Nevada. The greater part of the time was occupied in detailed mapping of the Lucky Hill Mine, and the balance in reconnaissance of the surface, and of the Northern Belle and Holmes Mine. My work, as you know, is not finished, so that I cannot now give you a complete report on the property, but it has progressed far enough so that I can give you a fairly complete report on the underground geology of the Lucky Hill Mine, and a provisional outline of the general geology of the camp.

The immediate requirement of information for mining purposes made it desirable to concentrate my first work on the Lucky Hill Mine; otherwise, it would have been a more logical method of procedure to map the surface and general structural features before proceeding to the detail of underground work. For this reason, additional work will be required to show definitely the relation of the Lucky Hill Mine to the Northern Belle and Holmes and Diablo Mines. As hereafter stated, there is very good reason, at this stage of the work, for suggesting the probability that the Lucky Hill vein is the continuation of the Diablo vein, and that these two were once continuous with the Northern Belle and Holmes vein; and that the separation has been caused by a throw on the Alpha fault with a horizontal component of something like 1,800 feet. It is probable that the motion on the fault was more horizontal than downward. I shall, therefore, make this statement, as a working hypothesis, subject to revision if further study should prove it to be doubtful or incorrect. I think, however, that the probable existence of this situation is of sufficient importance to require its mention at this time.

GENERAL GEOLOGY:

The rocks of which the region is composed are sedimentary, metamorphic and igneous. The sedimentary rocks consist of sandy, calcareous and argillaceous shales; impure limestone; flinty chert in thin beds interleaved with partings of shale; and massive quartzite composed of coarse chert sand cemented into a flinty rock. The metamorphic rocks are serpentine and silicified limestone. The igneous rocks are rhyolite, andesite, diabase and basalt.

The general structure is that of sedimentary formation, upturned so that the strata dip 45° to 60° to the north with an easterly strike, and eroded in pre-tertiary times into mountainous relief. The basic intrusion which by alteration resulted in the formation of the serpentine, was prior to the pre-tertiary erosion. The age of the sedimentary formations is not definitely known, but Mr. H. W. Turner, formerly of the U. S. Geological Survey, told me that fossils from that region had been determined as Carboniferous. The existence of a small area of rounded, water-worn, river boulders, on a hill between the Mt. Diablo and Lucky Hill Mines, testifies to the former existence of a considerable stream at this elevation, the bed of which has been almost entirely removed by erosion.

In tertiary time the country was subjected to intrusion and overflow by rhyolitic and basalt lavas. These probably once covered the greater part of the country in the vicinity of Candelaria, but subsequent erosion has left only patches and denuded volcanic necks of rhyolite, and remnants of former extensive basalt flows. To the west and south of Candelaria large areas of the underlying sedimentaries are exposed. To the north, the surface is composed of an extensive tilted mesa of basalt. The top of Candelaria Mountain was probably never completely covered with basalt.

ORE FORMATION:

The ore bodies were formed before the period of erosion that preceded the lava flows. They outcrop on the top of Candelaria Mountain but do not penetrate the basalt. The lode-system consists of shoots, lenses and irregular bodies of ore. These are formed in a zone of silicified limestone and calcareous shale that lies above the footwall of bedded chert and chert-quartzite. The maximum thickness

of this ore-bearing series, as far as determined, is in the neighborhood of 400 or 500 feet. In the Lucky Hill Mine the ore bodies take the form of two irregular veins known as the Baldwin vein and the Main vein, separated by a distance of about 200 feet. A somewhat similar situation exists on the 11th level of the Northern Belle Mine, where a "front" and "back" line of ore bodies are found, although with much irregularity and lack of continuity. A stope plan of this mine shows that there was a series of lenticular ore bodies extending from the surface to the 19th level, and forming as a whole an ore-shoot with a distinct downward pitch to the southeast. The importance of the lode is attested by the U. S. Mint Report of 1883 (Burchard) in which it is stated that the Northern Belle Mine had produced previous to that time $10,000,000, and had paid dividends of $5,000,000. The production for 1883 is reported as $764,000. The price of silver at that time was about $1.00 per ounce. Work under the earlier managements continued until 1893.

The Mt. Diablo Mine was comparable in size and importance with the Northern Belle Mine. The maps show that stoping was done on a strong series of ore bodies which, as in the Northern Belle formed a broad ore-shoot extending to about the same depth as that of the Northern Belle Mine.

The Lucky Hill Mine lies 1,800 feet westerly from the Mt. Diablo shaft, and as far as has been determined, on the same lode. The entire mineralized lode, including the Northern Belle, Lucky Hill and Mt. Diablo veins, and eliminating the gap caused by the Alpha fault, is over 3,800 feet long.

The ore consists principally of massive iron oxide with the value almost entirely in silver. The gold is usually less than $1.00 to the ton. It was formed by the oxidation of a primary argentiferous pyrite, accompanied by a small amount of copper minerals. There were probably also the sulphides of antimony and arsenic, and possibly of lead and zinc, in small proportion.

Although there was undoubtedly some secondary enrichment of outcropping ore bodies, this could not have affected the lode as a whole. The lense-like distribution and isolation of numerous good ore bodies show that their silver content was primary, and not caused by secondary enrichment. This fact encourages the search for the deeper ore bodies wherever they may be found.

The primary ore was deposited as a replacement of impure limestone and calcareous shale, and to a large degree as a replacement of irregular pre-existing calcite veins. The presence of considerable calcite in most of the shales and other wall-rocks can readily be determined by the acid test. In the Lucky Hill Mine, the calcite of the irregular veins can be recognized by its crystallization, although it is stained brown by limonite, and merges by gradual replacement into ore.

The gangue of the ore is an intimate but variable mixture of quartz, calcite, limonite and gothite (a hydrous iron oxide), with some manganese oxide. It varies from very hard, to soft and sooty. The ore and the walls are hard enough to stand well, and the old workings are rarely caved except in the neighborhood of serpentine rock or faults. The mines are dry and there is no standing water.

In the early history of the mines rich ore was produced. Shipments that assayed over $125 per ton are mentioned in the Raymond reports. At present

writing, I have no record at hand of the grade of the general early production, but it must have been well over forty ounces to the ton to overcome mining and milling costs. I understand that twenty-four ounce ore and higher was shipped from the Lucky Hill and Mt. Diablo Mines during the war.

I have looked over the estimate of ore based on recent extensive sampling done by your Company, and can say that it is entirely reasonable. The sample-cuts in the mine show that careful work was done.

LUCKY HILL MINE:

This mine was opened by shallow workings from the surface, by an adit level, and by an inclined shaft on the Baldwin vein. Four levels have been driven approximately 100 feet apart. The extent of development work and the nature of the vein-system is shown on the accompanying maps. The vertical section through A-A shows the disposition of the vein at depth.

The Baldwin vein extends to the 100-foot level, but is not found on the 200-foot level. The explanation of this is that the vein is cut off by the Gamma and Beta faults, which are parallel to the larger Alpha fault. The position of two faulted segments is suggestion in Section A-A, and development work should be done in search of them. On the hillside just north of Pickhandle Gulch, a short distance below the Lucky Hill Mine, there are several short tunnels, which I have not inspected, but which appear to be on vein material. Ore in this situation would probably represent blocks of "drag-ore" in the hanging-wall side of the Alpha fault. The intersection of the vein with the Alpha fault should get deeper toward the east.

The Main vein is found of good strength on the Adit level, but it has not been developed on the 100-foot level, except by driving the main south cross-cut through it. Where it is encountered by this cross-cut, the vein lies in the chert-quartzite and is not highly mineralized. It consists of irregular quartz veinlets and silicified rock, stained brown with iron oxide. On the 200-foot level, the vein is represented by only a two foot quartz vein, and streaks of iron oxides. The interruption of the vein between the Adit level and the 100-foot level is probably due to the main fissure entering the flint-like chert-quartzite, which, on account of its insoluble nature, is highly unfavorable for ore deposition. The interruption may be only local and the ore should be looked for on the 100-foot level farther to the east.

This tendency of the ore to avoid the harder rocks, and to follow the softer and more soluble ones is well shown by the main vein on the Adit level, where its strands have followed an intricately curved and involved pattern. The Baldwin vein is more regular but it also has a tendency to split into branches. It is this characteristic of the veins that calls for an unusual amount of work in their development.

The ore in this mine is of the type common to the district, consisting mostly of massive limonite and gothite in a gangue of calcite and quartz, all stained a dark blackish brown. The richer ore, mined for shipment by lessees, was taken from gloryholes and stopes, mostly above the Adit level. In the gloryholes the vein was thirty-five feet wide.

The country rocks are shown in Section A-A and will not here be discussed in detail. The silicified limestone shows, under the microscope, principally quartz and calcite, with disseminated pyrite crystals. Together with the softer and more calcareous shales, it formed the principal locus for ore deposition. All of the intrusive rocks are so decomposed that their accurate determination is impossible. The rock marked "rhyolite" at the entrance of the Adit tunnel shows rounded quartz phenocrysts, altered biotite and completely decomposed feldspars, but its original crystalline structure was so well developed that it may be a fine-grained granodiorite. A fine-grained white kaolinic rock is found commonly throughout the mine closely resembles an altered felsitic rhyolite, but specimens examined under the microscope show angular fragmental quartz grains, and it is therefore classed as shale. A rhyolite dike on the 200-foot level shows quartz-phenocrysts, and is probably connected with a similar rhyolite on the surface west of the mine. The andesites in the dikes on the 200-foot level are in a highly altered condition, and hardly recognizable.

Post-mineral faulting is not an important feature of the Lucky Hill Mine, except as regards the Alpha, Beta and Gamma faults. A great many small faults are found, as shown on the maps, but their movement has not been large. The vertical, or steeply inclined, open fissures that occur with some frequency, are shrinkage cracks, and have caused but little fault movement. There has undoubtedly been some movement on the numerous flatly inclined faults, but, in no instance that I have observed, does it seem to be over twenty or thirty feet, and usually is much less. These faults occurred prior to the oxidation of the ore, and in some places they acted as a dam to the downward migration of surface waters. In this way, they had the effect locally of stopping the secondary enrichment that took place in the upper parts of the vein. It is for this reason that the vein is sometimes of good grade above one of these faults and poorer below.

Because the Lucky Hill vein is cut off by the Alpha fault, its continuation below the fault should be sought for. The old Northern Belle Mine maps do not show any workings near the fault, and this leaves a very favorable area for further exploration.

Correlation of the Northern Belle and Lucky Hill-Diablo Veins:

The reasons for suggesting the identity of these two veins are:

1. The presence of the Alpha fault is shown on the 200-foot level of the Lucky Hill Mine, at the surface north of the portal of the Adit tunnel, at the south end of the Northern Belle 600-foot level. It should show in the Lower Holmes tunnel, but the tunnel is blocked by a cave outside of where the fault should be. However, an old map shows a strong fault in the position that the Alpha fault should occupy. There is also strong faulting in the general direction of the Alpha fault in the Upper Holmes tunnel. The fault probably stops against the serpentine near the bottom of Pickhandle Gulch.

2. The occurrence of both veins in a belt of silicified limestone and soft shales, with bedded chert on or near the foot-wall.

3. The presence of serpentine on the hanging-wall side of both veins, though not forming the immediate hanging-wall. The serpentine is not found directly north of the Lucky Hill Mine because of its having been cut off by the fault, but it is found a short distance to the east. In the Northern Belle Mine the portal of No. 11 tunnel is in serpentine.

4. The general strike of both veins is not identical, but the difference is not sufficient to deny their correlation.

5. The dip and general character of both veins is almost identical.

General Possibilities:

Aside from ore now developed, and from small blocks throughout the old workings, I believe that the district offers excellent opportunities for opening entirely new ore bodies. The ground to the north and northwest of the Northern Belle Mine has big possibilities, if the geological situation is what my preliminary work indicates.

Respectfully submitted,

"JOHN A. BURGESS."

All of the foregoing [illegible]

[illegible]

INTERIM REPORT

CANDELARIA MINES COMPANY

July, 1922

HEAD OFFICE
43 Exchange Place, New York City

EXECUTIVE OFFICE
648 Mills Building, San Francisco, California

PROPERTIES AT
CANDELARIA, NEVADA

REGISTRAR OF TRANSFERS
The Corporation Trust Company
37 Wall Street, New York City

TRANSFER AGENTS
The Equitable Trust Company
37 Wall Street, New York City

INTERIM REPORT

CANDELARIA MINES COMPANY

July, 1922

GENERAL OFFICES

Candelaria, via Mina, Nevada

EXECUTIVE OFFICERS

C. D. KAEDING ..... *President*
S. ROSSITER ..... *Vice-President*
C. D. KAEDING ..... *Treasurer*
V. WIMBERLY ..... *Secretary and Assistant Treasurer*
J. C. PEEBLES ..... *Assistant Secretary and Assistant Treasurer*

EXECUTIVE COMMITTEE

C. D. KAEDING ..... *Chairman*
F. M. MANSON ..... *Member*
J. C. PEEBLES ..... *Member*

DIRECTORS

C. D. KAEDING ..... *San Francisco, California*
S. ROSSITER ..... *New York City, New York*
F. M. MANSON ..... *Reno, Nevada*
O. W. JONES ..... *Chicago, Illinois*
J. C. PEEBLES ..... *Reno, Nevada*

REPORT OF THE DIRECTORS
OF
CANDELARIA MINES COMPANY
July, 1922

San Francisco, California,
July 20, 1922

TO THE SHAREHOLDERS:

In accordance with our pledge to keep you fully informed of the progress of operations at your property, we herewith hand you an Interim Report, which gives in considerable detail all that has been accomplished since our last advice to you dated April 1, 1922,—and the outlook for the future.

PLANT CONSTRUCTION

The designing and construction of the 300-ton milling plant, which was commenced in January has been carried ahead with rapidity and most satisfactory results, to the end that this plant will be started in September. Had it not been for the loss of our hotel by fire, April 27, we should have completed the work at least six weeks earlier. As the work progressed, having in mind the very large tonnage of ore which is developed in the mines ready for the mill, we have expanded our original program, putting in larger machinery, tanks, motors, pipe lines and pumps so that with very slight additional equipment this mill will treat over 400 tons daily.

This plant should prove a very efficient one, and will treat ores at a lower cost per ton than the usual cyanide mills by 50 to 75 per cent. It is designed to be nearly automatic, requiring a minimum of labor and power. We expect, after the plant is operating smoothly, to be able to report a much higher recovery of the silver values than the figure used in our estimates. At another of our silver mills in Nevada the recovery has been increased 7 per cent at practically no additional costs by methods which we will avail ourselves of in the Candelaria plant. We expect to be able to report to you from 7 to 10 per cent better recovery than the figure we have conservatively used for estimating purposes, which would increase the profit $140,000 annually.

ELECTRIC POWER

After considerable negotiations with the officials of Mineral County, which operates the electric power system of our county, it was arranged that the mining company should construct seventeen miles of high tension transmission line and the transformer station at Candelaria for the account of the power company. The County advanced $15,000 toward the cost of the complete system and the mining company furnished the balance of the money. This will amount to about $18,000 and will be rebated back to the mining company at the rate of 25% of the monthly power bills. It will require about sixteen months to receive back all the money advanced. The line and trans-

former station is capable of giving us in excess of 1000 horsepower which is 25% larger than we first figured on.

WATER SUPPLY

During the extraordinary cold of the past winter our water supply line was partially frozen. Repairs of a temporary nature were made, but it was considered advisable to undertake an extensive renewal and improvement campaign to assure a greater delivery of water to the reservoirs and eliminate danger of interrupted service. To this end work of opening out new sources of supply at the head of the line has been under way, and in excess of four miles of new pipe has been purchased and distributed, and will be put into the line during August. We feel confident of having ample water for all requirements.

MINES

Work in the mines has been nominal since most of the development and work preparatory to ore extraction had previously been done. Air lines and tracks have been laid where required, main haulage ways widened and connected up and ore passes driven, to facilitate ready handling and transport of the ore from the several mines and the many levels. An outside haulage-way 3000 feet long from the Lucky Hill Mine has been completed. Cars, rails and locomotives are on hand, and all will be in readiness to serve when the mill is finished.

In our previous report we described in some detail the ore development in Lucky Hill Mine. This mine was opened out during 1920 by some 6000 feet of development work which proved two parallel veins each from eight to thirty feet wide, and over four hundred feet long. Within these limits we "blocked out" approximately one million dollars of ore of $15 grade and have reason to expect that further mining operations will double this amount in the ground above the Adit or 200 level. Below this level we have done scarcely any work, and in this part of the mine we have every reason to believe development work will produce ore for a considerably greater depth and extent.

A great amount of engineering work has been done in the Northern Belle and Holmes mines. A complete transit survey of the many miles of underground workings has been made and mapped by Mr. E. L. Stenger, and the general geology, together with the lower levels of the Northern Belle and Holmes mines has been studied in great detail by Mr. J. A. Burgess, who last year did the same work at Lucky Hill Mine for us. The results of this work, including 1000 new samples taken and assayed in the country opened by the 13th, 14th and 15th levels of the Northern Belle have been very encouraging and make us feel that our estimates of the grade of ore to be won from these mines are too low. In our last report to you we used the following figures in reference to the Northern Belle and Holmes mines:

Daily Production to the Mill

1.	Tonnage from fills	150 @	$ 8.50
2.	" " stopes	50 @	12.00
3.	" " new work	10 @	20.00

In the last set of samples the fills average $9.70. However, for the reasons mentioned in our last report, we do not feel like estimating any more than 8 ounces silver and 50 cents gold as an average grade for fills, although we think we may do better. There are such a great many samples from the pillars and margins of stopes averaging over 20 ounces, running from 10 ounces to 80 ounces, that we now believe the ore from these sources and new work amounting to approximately 60 tons daily will average nearer 18 ounces than 13 ounces. If we are quite correct in this revised estimate, there would be a further increase in annual profits of $100,000.

It is quite probable that we may decide to take a larger tonnage from our Lucky Hill Mine, in place of the fills, and this would mean $15 ore replacing $8.50 ore. We can readily do this, and it will be our policy to produce as much silver as we can without sacrificing efficiency.

Mr. Burgess has still to complete his geological mapping of the first nine levels of these mines, and also the twelfth. This will require another month of his time, but he has written us a "brief" advance report from which we quote a few interesting excerpts relating particularly to the veins and ore-bodies, for your information.

Excerpts from Burgess' Report on Northern Belle and Holmes Mines, July, 1922.

"In the report now submitted, you will note that the description of the veins is brief and general. The reason for this is that the unfinished work will have a bearing on this subject, and I prefer not to write on it until I have all the data in hand. At the same time, my work below the 9th level is sufficiently advanced, so that I can now outline a good deal of development work, and express an opinion as to probable results.

MINERAL VEINS

The productive ore-bodies of the Candelaria district occur in the Candelaria shale, most of them near its lower border. This is the case at the Potosi, Northern Belle, Lucky Hill, and Diablo mines, and in other prospects farther to the east.

The vein system consists of a zone of fissuring 100 feet to 150 feet wide, with a general east-west strike, and roughly parallel to the bedding of the shale. The main productive zone extends through the Northern Belle Mine; and then, south of its interruption by the Alpha fault, it continues eastward through the Lucky Hill Mine and the Diablo Mine. While the main zone is long and continuous, the fissures within it, as exemplified in the Northern Belle Mine, were less continuous. They were rather in the nature of an overlapping, more or less parallel, system of sheeting, and frequently their disposition was across the zone or at random. This resulted in the formation of parallel, overlapping orebodies; in cross-veins; and sometimes, as in parts of the Yankee stope, in streaks of ore in a complex system of fractures.

In the Northern Belle Mine, the shale strata and the vein system have a southeasterly strike and dip about 45° northwest. This variation from the

general easterly strike of the shale formation is due to local disturbance caused primarily by the injection of the Pickhandle Gulch intrusives.

The most productive mines are in the vicinity of the large intrusive masses of igneous rock which are undoubtedly connected with the origin of the orebodies. Some veins are found in the serpentine, but they have not proved profitable to work.

Within the vein-system, channels were opened that permitted the circulation of mineralizing solutions. The effect of these was to replace much of the shale with dolomite, and eventually to deposit large bodies of silver-bearing sulphide ore. Dolomite not only forms the gangue of much of the ore, but also is found replacing the wall-rocks throughout considerable widths; as for example, at the Lucky Hill Mine, where the shale between the Main vein and the Baldwin vein, a distance of 200 feet, is so completely altered to quartz and dolomite that there is no internal evidence of its original character. It is thought that most of this dolomitization occurred before the deposition of the ore, and that the ore was deposited largely as a replacement of the dolomite veins.

The primary ore consisted principally of iron sulphide, with minor amounts of the sulphides of lead, copper and zinc. The form in which silver originally existed is uncertain, but it was probably a constituent of the baser sulphides. Knopf identified jamesonite in remnants of unoxidized ore. Silver formed a far less percentage of the total weight of the primary ore than it does of the oxidized ore, the difference being due to the oxidation of the sulphides and to the removal by leaching of many of its base constituents.

The principal ore-bodies are from 10 to 20 feet wide, and stopes of these widths are common. Narrow veins also occur, but the bulk of the ore came from wide veins. Within the wider veins, there appear to have been streaks and bunches of the highgrade ore that was required by early-day operations, and mining was directed toward recovering these streaks, leaving the intervening lower grade ore in the stope as filling. It is this rejected ore of 10 or 12 ounce silver content, that will furnish a very considerable tonnage for the new mill.

In its present condition, the ore consists of the thoroughly oxidized residue of the original sulphide minerals. Limonite, oxides of manganese, dolomite and a minor amount of quartz form the bulk of the ore. No silver minerals such as the sulphides or horn-silver can be detected in the oxidized ore, even in that assaying 75 ounces per ton. The silver content appears to be finely divided and probably is combined with other minerals in an unknown form. Knopf recognized bindheimite in the oxidized ore.

Whether secondary enrichment was of importance in forming the ore-shoots is a point not yet determined.

The ore is completely oxidized in the upper levels, but while oxidation extends to the bottom of the mine, remnants of low grade sulphide ore are plentiful on the 18th, 19th and 20th levels. Some stoping was done on

the oxidized ore of these lower levels, but the sulphide ore appears to have been unprofitable. There are exposures of ore above the 15th level, from which ore of 15 ounce or better, average grade can be produced by lessees, and in some instances by company work. I have inspected these exposures with a sample record in hand, and feel quite satisfied that a very considerable tonnage of profitable ore can be taken from the ground within the range of the old workings. The most favorable areas for highgrade ore are in the Yankee stopes below the 11th level, and in the various workings of the 14th level. In these workings, there are exposures of ore 12 to 18 inches wide, which range in assay value from 20 to 50 ounces silver, and there are also good chances on the other levels. Naturally, prospecting has been most intensive in the most easily accessible places, and it is on the less accessible levels, and in the old stopes, where the most favorable points of attack will be found.

DEVELOPMENT PLANS, NORTHERN BELLE MINE

These plans are confined to the levels that have been studied to date; namely from the 10th to the 20th levels, inclusive, with the exception of the 12th level. The most favorable ground for immediate work is from the 15th level upward. Below the 15th level, comparatively small amounts of ore were found by the early operators, and the prospect of finding profitable ore is less favorable for the immediate future. However, it must be recognized that the Candelaria veins are of a deep seated type, entirely different from the comparatively shallow seated veins so common in the Tertiary lavas of Nevada, and they may be expected to continue to a great depth. It is practically certain that the continuation of the veins could be found north of the Candelaria fault; but the depth at which it might be necessary to work, the unknown character of the ore as regards oxidation and value, and the expense of finding them, makes it inadvisable to do anything in this direction now. However, while results of mining below the 15th level were not encouraging, there is still a possibility that profitable ore exists at a greater depth.

It is noticeable that no ore-bodies of first importance have been found north of the Belle fault, and that practically no exploratory work was done on the vein system in this direction above the 15th level. There are, however, some indications that point to the possibility of ore in this area. They are: the existence of three small stopes in D 1503 on the 15th level, in which there was evidently some workable ore; the presence north of the fault on the 14th level of 14, 18 and 22 ounce ore as shown by samples in x-c 1404 and D 1405; the existence of a fairly strong vein in the Mule Stable drift on the 13th level, from which specimens from a streak a few inches wide assayed 7.52 ounces silver. These data, together with the known tendency of the ore to be richer in the upper levels will justify further exploration of the vein north of the Belle fault, on the 13th and 14th levels, and work for this purpose will be advised. The old surface outcrop of this part of the vein, where it is now covered by basalt, is at the 11th level."

FINANCIAL

The Balance Sheet, June 30, 1922, showed the following position of Current Assets and Current Liabilities:

Current Assets		
Cash on hand and in banks	$ 7,573.74	
U. S. Treasury Notes $50,000 par, at cost	50,493.75	
Accounts & Interest Receivable	1,026.05	
Construction & Miscellaneous Supplies	11,709.00	
Construction Material Prepaid	12,760.00	$ 83,562.54
Prepaid Charges		
Construction Power Line for Mineral County	20,711.09	
Less funds advanced by County	5,000.00	
Net advance to date by Candelaria Mines Company	$15,711.09	
Prepaid Insurance	448.90	
Miscellaneous Payments	687.17	16,847.16
TOTAL		$100,409.70
Current Liabilities		
Wages Payable	2,817.05	
Accounts Payable	30,606.41	$ 33,423.46
Accrued Items		
Interest on Note due Nov. 1922	948.00	
Accrued County Taxes	300.00	1,248.00
		$ 34,671.46
BALANCE OF CURRENT ASSETS		$ 65,738.24

An additional amount of $55,000 has been subscribed for treasury shares, but is not shown on this statement. This will enable us to lay in a suitable stock of cyanide, zinedust, dynamite, tools, et cetera, and have working capital until returns are had from bullion sales.

GENERAL

The work is in the hands of very competent engineers, and an operating staff of the highest calibre is being built up. Mr. C. A. Bennett took direct charge as General Superintendent July first. Mr. William Dunn, our Resident Mechanical Engineer, is rapidly completing his work of plant construction having designed and supervised the entire job with the able help of W. Sculland, Superintendent of Construction. We gratefully acknowledge the help these men have been to us and the pleasure it has been to work with them.

We expect to have important information to give our shareholders from time to time and to make certain that they receive it, we suggest that all shareholders have their stock transferred into their own names and their addresses properly recorded with the Secretary of the Company.

For the Board of Directors,

Respectfully submitted,

C. D. KAEDING,
President.

All of the foregoing certified correct.
C D Kaeding Pres & Gen Mgr