LIST OF MAPS OF NORTH POLE-COLUMBIA LODE
AND MINE REPORT OWNED BY REX ELLIS

Engineers' Report of Ellis Mining Company, Baker, Oregon. By E. T. Knight and J. B. Porter.

(3) Map of Property Columbia Gold Mining Company, 1899. (Orig.)

(4) Map of Property Columbia Gold Mining Company, 1903. (Orig.)

(8) Map of Sample Locations - Excelsior #1 Tunnel Intermediate into North Pole. (Print)

(10) Map of Hanging Wall Samples, Eureka Tunnel, Campbell Oregon Gold Mining Corp. (Print)

(11) Map of North Pole Mine #1 Tunnel Level. (Print)

(12) Map of Sectional Elevation of Columbia Mine Foot Wall. (Orig.)

(14) Map No. 8-A - Longitudinal Section Columbia Center Vein. (Print)

(15) Map No. 8 - Longitudinal Section and Part Plan, Columbia Hanging Wall. (Print)

(15-A) Map No. 8 - Longitudinal Section and Part Plan, Columbia Hanging Wall. (Print)

(16) Map No. 7 - Plan and Longitudinal Section Eureka and Tabor Fr. (Print)

(17) Map No. 6 - Plan and Longitudinal Section Excelsior Mine. (Print)

(18) Map No. 5 - Longitudinal Section North Pole, South Half. (Print)

(19) Map No. 4 - Longitudinal Section Columbia-North Pole Lode. (Print)

C O P Y

TABLE OF CONTENTS

Page

Location and road map of Bourne-Cracker Creek vein

Longitudinal section of claims from North Pole to Golconda, inclusive

Foreword

HISTORY - including production, extraction, and costs . . . . 1 - 5

GEOLOGY - including excerpts from reports by Lindgren, Swartley, Pardee, Hershey . . . . . 6 - 19

SYNOPSES of previous engineering reports and comments on them by J. B. Porter and E. T. Knight . . . . . 20 - 39

(a) H. W. Turner - 1907 20
(b) T. H. France - assay map only - 1916 22
(c) John Thomas and William T. Dumbleton - 1921 . . . 22
(d) Oscar H. Hershey - 1922 23
(e) Arthur W. Jenks - 1922 28
(f) Bunker Hill and Sullivan Metallurgical Tests - 1922 29
(g) Emil Melzer - 1925 34
(h) William W. Elmer - 1930 35
(i) Basil Prescott - 1933 36
(j) Raymond E. Wimber - 1935 36
(k) Campbell - Oregon Mining Co. - 1939 37
(l) John Arthur - 1941 39

REPORT on examination made by Knight and Porter during October, November, and December 1940, and January 1941. . . . . 40 -

(a) Geography and physical conditions 40
(b) Labor situation 41
(c) Titles - including claim map of district 41
(d) The John Arthur Lease 51
(e) Ore reserves with maps, showing location and values 52
(f) Metallurgy 61
(g) Suggested 75-ton per day operation 62
(h) A suggested project for exploration and development at depth 63
(i) Recapitulation and conclusion . . . . . 64 (?)

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FOREWORD

The attached report on the Bourne-Cracker Creek vein, also known as the Oregon Mother Lode, is based on a thorough study of a voluminous mass of reports, maps, operating records and correspondence files pertaining to the productive mines of the vein, namely: North Pole, Eureka and Excelsior, Tabor Fraction, Columbia, and Golconda, plus information gathered during the past four months through an actual examination of the mines.

Fortunately, geological and engineering reports representing not less than $100,000 spent on examinations alone were still available to a diligent searcher, even though some of them were written 25 to 40 years ago.

The last major operation on the vein (Columbia) shut down in 1916; others, e.g., Golconda, as early as 1904. However, several engineers, assayers, foremen and miners who were working in the mines at or about the time they shut down are still living in the area and much pertinent information was supplied by them.

The actual examination of the mines was considerably expedited and its value enhanced by the work of four small groups of lessees, who have cleaned out many caved drifts and raises during the past year, thereby opening up for measurement and check-sampling several large blocks of ore that have been inaccessible to examining engineers for many years.

The title search was done and all legal advice rendered by the firm of Hallock, Donald, & Banta, of Baker. These attorneys are well known in Eastern Oregon as authorities on mining law.

All maps, reports, and files used in preparing this report are in the possession of the authors and may be examined by responsible persons interested in developing the properties.

/s/ E. T. Knight
Edward T. Knight

/s/ J. B. Porter

Baker, Oregon
February 15, 1941

CONDENSED HISTORY OF THE NORTH POLE, EXCELSIOR AND EUREKA, TABOR FRACTION, COLUMBIA AND GOLCONDA MINES, DERIVED FROM A LARGE COLLECTION OF REPORTS AND CORRESPONDENCE FILES, AND FROM STATEMENTS BY INFORMED AND RELIABLE PERSONS.

Pages 1 to 5, inclusive.

HISTORY

Note: Unless otherwise specified, all gold values noted in this section are based on the old price of $20. per ounce.

According to Waldemar Lindgren (22d Ann. Rep. U.S.G.S.) that portion of the Bourne vein known as the Eureka and Excelsior mine was discovered in 1873. Shortly thereafter the first exploitation was attempted in the form of a 20 ton pan-amalgamation mill, which recovered only 10 percent of the values. Later treatment of the tailings from this mill by cyanide recovered $21. per ton, with a 93 percent extraction. From that time until the Columbia shut-down in 1916, extraction from all ore milled never exceeded about 75 percent, as at the North Pole; averaged about 55 percent at the E. and E., and about 65 percent at the Columbia. The Tabor Fraction ores were treated at the Columbia plant, so the average of 65 percent extraction is applicable. Extraction records of the Golconda Mill are not available. However, Mr. John Arthur, who was assayer there for several months, states that recovery averaged about 75 percent.

Since extraction at all the mills averaged about 68 percent, and mining, milling, and development costs averaged about $7.50 per ton, it is obvious that mill heads averaging from $11. upward were prerequisite to an operating profit.

The reasons for shutting down the old mines were various. Beginning at the north end of the most productive portion of the vein, the North Pole mine operated continuously from 1895 to 1908. Its production for that period is as follows:

North Pole

Total dry tons ore treated	Ounces recovered Gold	Silver	Melting	Charges deducted Express	Freight	Net return
158,917	100,045	103,616	$3,939.	$1,999.	$19,896.	$2,022,705.

Milling ore extraction averaged 75 percent. 1,116 tons high-grade ore were shipped to smelter. Average gold value of all ore mined was $15.63 per ton. Milling ore averaged $12.21. (Old price)

From 1908 to the present time, the only mining done in North Pole was by Mr. John C. Lewis, of Portland, Oregon, who operated under lease and bond at various times between 1911 and 1915. No report on the Lewis lease has been found, so exact tonnage and grade is unknown, but it is said that about 20,000 tons of plus $10 ore was taken out.

According to a report dated November 30, 1925, by Emil Melzer, Manager of the North Pole during most of its operating life, the mine shut down in 1908, because: During that year the gold value per ton of ore milled had dropped to $7.76 a ton; the owners had diverted practically the entire

operating reserve of approximately $220,000 into developing a mine in Mexico which proved a failure; Melzer was left with an obsolete and high-cost plant and without funds either to modernize the plant or to develop what he considered an ample body of $9. ore.

It is worthy of note that during the last year of operation, the mine was working in ore which, at the present price of gold and silver would assay about $14.28 per ton.

Exact operating costs at the North Pole are not shown in Melzer's report, but he does state that of the $2,022,705 net returns $872,705 were disbursed in dividends, purchase of additional claims, construction, and held in reserve. It is inferred that the balance represented operating costs.

$$\frac{\$\ 1,150,000}{\text{Tons } 158,917} = \frac{\$\ 7.23}{\text{per ton.}}$$

Some time after the shutdown, Mr. Melzer acquired title to the North Pole. After his death in 1927, his widow sold it to E. W. Backus of Minneapolis, Minnesota, for $30,000 cash. From the Backus Estate the mine was acquired by the Cracker Creek Gold Mining Co., the present owner.

Eureka and Excelsior

Adjoining the North Pole Mine on the south is the Eureka and Excelsior. The owners of this mine are not and have never been mining operators. From time to time they leased the property to various groups, some of whom appear to have been competent miners, others definitely incompetent.

The known record of production is as follows:

Date and name of lessee	Tons	Class	Gross Value Recovered
1891 - Unknown	Unknown	U.S. Mint Report	$ 135,000.00
1894-98 - Longmaid	80,282.00	Conc. ore	469,278.89
	221.18	Shipping ore	25,324.60
	1,369.84	Cyanide ore	29,920.50
1903-05-Wyatt	818.70	Concentrates	67,976.77
	1,086.02	Shipping ore	44,247.37
1920-22 - Oreg. Idaho Co.	Unknown	Unknown	14,528.41
	3,132.00	Milling	22,242.11
	5,926.00	"	82,173.17
	5,505.00	"	51,197.20
	21,355.00	"	122,944.55
			$ 1,064,833.57

This record of production is not complete but is believed to be reliable as shown.

It is common knowledge that the Longmaid operation resulted in a substantial profit to the lessee, although it is believed that most of the profit came from small lenses of high-grade shipping ore rather than the milling operation which saved only 62.9 percent of the values.

Of the other leases it is said that none made a profit excepting the Oregon-Idaho Co., which from June, 1920, to June, 1921, under the management of Mr. John Arthur, milled about 14,500 tons of $12. ore, saving about 81 percent of the gold value and 85 percent of the silver.

In June of 1921, Mr. Arthur sold his lease, and the new operators, by all accounts incompetent, reduced the recovery to about 60 percent and shut down after milling 21,355 tons at a loss. Mr. Arthur seems to be the only operator or manager who ever achieved an extraction of over 80 percent from the milling ores in this lode. Arthur states that had his plant been equipped to cyanide flotation tails he could have recovered 95 percent of the combined values.

In general, the history of the E. and E. is one of relatively low-grade ore, poor extraction, and incompetent management.

The average heads value of the Longmaid ore was $9.28, the Wyatt Ore $7.15, the Oregon-Idaho $11.45. It is apparent that a profit could have been made with high extraction and good management, but not otherwise.

After passing through several ownerships, the mine was finally acquired by the Cracker Creek Gold Mining Company, the present owner.

Tabor Fraction

This property adjoins the Eureka and Excelsior Mine on the south and has a length of only 288 feet along the lode. It was extensively worked, particularly in the upper levels, which produced considerable shipping ore of very high grade.

Only incomplete records on the mine are at hand. It is known that a small tonnage of high-grade ore was shipped soon after the original location by Clark Tabor. This was mined from surface cuts and tunnels. Later, Bishop took the property on a lease and bond, but did not do any appreciable amount of work. About the year 1900, the Geiser-Hendryx Investment Co. bought the property from Tabor. Geiser-Hendryx made a contract with the Columbia Mine to treat fraction ore, and they proceeded to mine a small tonnage through a shaft from the surface. This contract led to a law suit between Geiser-Hendryx and the Columbia over royalties. About 1903, the Columbia Mine leased the Fraction and mined out most of the ore lying between the Columbia No. 1 Tunnel level and 100 foot shaft level. From 1903 to 1905, 24,910 tons of Fraction ore were milled, assaying $11.88 per ton.

In 1916 and 1917, Mr. John Arthur worked the property in a small way as lessee. He states: "4,400 tons of ore were shipped, averaging $33. to the Tacoma Smelter. While mining this ore, about 12,000 tons of milling grade was left in the stopes, assaying $12. per ton, and 6,000 tons averaging $16. per ton can be mined from the block of ground near the surface."

The Fraction was a consistently good producer during its entire operating life. It is now owned by the Cracker Creek Gold Mining Co.

Columbia Mine

The Columbia Mine adjoins the Tabor Fraction on the south. Columbia paid comfortable dividends during its entire operating life from 1897 to 1916. The records up to and including 1914 were well kept and show a total gross output of $3,638,959.60. Mill heads ran from $12. to $13. per ton, operating costs from $7. to $8. 2107 tons of shipping ore averaged $217. per ton.

Between January, 1933, and July, 1934, John Arthur and a small crew working on a series of 60-day leases, mined 3150 tons of shipping ore from Columbia and Tabor Fraction, which averaged 1.1 ounces gold and 3.4 ounces silver per ton at the smelter.

In 1915, the owner, Mr. E. W. Backus, and the manager, Mr. Frank S. Baillie, became involved in a complex controversy, which led both to criminal and civil actions, and finally resulted in shutting down the mine. This report will not attempt to give the details since they are all of record in the local courts.

Essentially, the manager advised the owner that the mining and milling machinery was completely worn out, and that the hoist would not lift ore to the mill from the deeper levels which were just being opened up. The owner refused to authorize rehabilitation of the plant and the purchase of a new hoist. After further complications had set in, the manager left, and the owner sent an engineer of his own selection, Mr. T. H. France, to report on the property. After examination France reported to the owner that conditions were as claimed by the ex-manager, and that about $100,000 would have to be spent to prolong the profitable life of the mine. The owner thereupon ordered France to shut down. A tracing of the France assay map of Columbia contained in this report shows the ore bodies upon which he based his recommendations for the rehabilitation program.

It is reliably reported that the owner of the Columbia customarily converted all profits into dividends and had never allowed the usual operating reserve to accumulate. While the owner was undoubtedly a man of very substantial means, it may be that when depreciation caught up with him he was in no position to withdraw funds from other businesses to maintain the Columbia. In any event, he refused to do so and operations ceased. Practically all ore mined at Columbia was taken from above the 700 level. The 800 level was just being opened up when the plant shut down. The average breaking width was 44 inches and no waste was culled from ore broken. The Columbia was always an excellent property and as shown later in this report probably is now.

Title to the mine was retained by Backus for many years after the shutdown. After his death, ownership passed through his estate, and finally into the Cracker Creek Gold Mining Company.

Mr. Frank S. Baillie, Manager of the Columbia from about 1897 to 1915, undoubtedly knows more about it than any living person. Baillie lives in Sacramento, California, and while well along in years is said to have a very clear recollection of the mine as it was when he left. It is suggested that interested persons get in touch with him direct.

Golconda Mine

The Golconda mine adjoins Columbia on the south. Golconda operating records, if not lost or destroyed, are at least not available to the authors of this report.

According to Lindgren (22 Ann. Rep. U.S.G.S.): "This part of the North Pole vein was located as the Golconda claim in 1887, and sold for a reported sum of $24,000 in 1897, there being at that time only 250 feet of development. . . . . In the fall of 1899, a rich ore chimney was struck, 20 tons of which yielded $10,000 in the mill. Still richer ore was shipped to smelting works. In September, 1900, 15 stamps were running. At present (1901) there are 2,500 feet of developments, including a 400 foot double compartment perpendicular shaft and four levels, the opening of the fourth having just begun; also a 650 foot tunnel running southwest on the ledge. . . . ."

"The ore carries but little quartz and is largely a replacement of argillite and some porphyry by finely divided pyrite, marcasite, and arsenopyrite, and a very little chalcopyrite and zinc blende. The average value is believed to be from $8. to $15. per ton. . . . ."

"The pay streak is from 2 to 3 feet wide."

In a report by R. J. King, mining engineer, dated December 21, 1912, to Tonopah-Belmont Co, the statement is made that the output from Golconda mine in 1903-04 was 23,672 tons, total value $147,949.54, average $6.25 per ton. There have been no operations at the mine since 1904. Obviously a recovery of $6.25 per ton left no margin for profit so the mine shut down. Assuming that the $6.25 recovery represented 75 percent of the value, at the present price of gold the same ore would assay about $14.50 per ton.

The Golconda is now owned by the Jackson family of Portland, publishers of the "Oregon Journal," and is the only mine discussed in this report not owned by the Cracker Creek Gold Mining Company.

GEOLOGY BY E. T. KNIGHT AND

EXCERPTS FROM REPORTS BY

WALDEMAR LINDGREN
ARTHUR M. SWARTLEY
J. T. PARDEE
OSCAR H. HERSHEY

Pages 6 to 19 inclusive

GEOLOGY

The North Pole-Columbia lode is the name given to part of a fractured zone over six miles long occurring in Paleozoic argillites. The fracture is probably related in origin to a Mesozoic intrusive of quartz diorite lying about two miles to the north and west.

The most productive part of the lode extends from the Golconda Mine to the North Pole, a distance of 2.5 miles. The zone varies in width from a few feet to over 150. The filling has been described in detail by Lindgren, Pardee, Hewett, and others, and consists of shattered argillite cemented and replaced by quartz. Within the zone, one or more compact bodies of quartz, having the character of separate veins, commonly exist. Some of these have been recognized as being of different periods of mineralization. Former mining operations have disclosed that the mineralization occurs in the quartz, while the breccia itself is usually low in value.

The ore is generally hard quartz, containing arsenopyrite, marcasite, and pyrite with native gold. Accessory minerals noted in small quantities are stibnite, tetrahedrite, and chrome mica. Chalcopyrite, galena, sphalerite, and tellurides occur but only in rare instances. Higher values are apt to be associated with the arsenopyrite and to a lesser extent the pyrite. The marcasite is said to be barren and occurs in quantity bordering the ore, rather than intermingled with it.

In the North Pole, the sulphides associated with the gold are very fine grained. Moving south along the lode through the E. and E. to the Columbia, the proportion of free gold increases and the sulphides become coarser. This zonal arrangement has been described by Hewett[1] in which the mines of the district are classified by the percentage of free gold in the ore and by the nature and quantity of sulphides present. In the hanging-wall vein of the Columbia, the ore was at times as high as 80 percent free milling, while in the Golconda, at the south, Lindgren states the proportion of free gold to be 40 to 50 percent.

Cross faults are rare and in only one case - in the North Pole - is the displacement as much as 40 feet. Strike faulting, however, has taken place to a high degree.

Some pre-mineral dikes have been observed parallel to the lode in the North Pole, Columbia, and Golconda mines. These are so highly altered that it is hard to tell what their original nature was. Their relation, if any, to the mineralization is obscure.

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[1] D. F. Hewett, Zonal Relations of the Lodes of the Sumpter Quadrangle, Trs. A.I.M.M.E. 1931.

Ore shoots:

The lode is a composite vein, and the ore occurs in one or more of the veins contained within the fractured zone. These contained veins are not entirely continuous but may split into minor branches or pass over to the opposite wall. One vein, on the footwall, appears to be continuous from the North Pole to the Columbia, and it is this branch which is the most persistent at depth. A foot-wall and a hanging-wall vein have been observed in the North Pole, E. and E., and Tabor Fraction. In the Columbia and Golconda, center veins occur as well.

The bonanza ore encountered during mining in the North Pole, Fraction, and Columbia for the most part occurred in a hanging-wall vein of later mineralization. The Columbia hanging-wall vein appears absolutely continuous from the upper Eureka, through the Fraction to the south of the Columbia shaft. A considerable part of this vein is still unstoped in the Columbia, and a smaller part in the Fraction. It is this vein which shows the larger proportion of free gold, chrome mica, and stibnite, and, so far as is known, is the only vein where tellurides have been observed.

Most ore shoots rake down and to the southwest but there appear to be exceptions. In the North Pole and E. and E., the rake angle is flat - 30 to 40 degrees. In the Columbia, the angle is about 60 degrees and appears to be both to the southwest and the northeast.

Within the course of a major shoot, the richer ore is generally found in elliptical lenses of particularly hard quartz with axes aligned with the direction of the shoot. These lenses may measure thirty or forty feet in their short dimension and a hundred in their other. There is usually only a few feet of the lower grade material between lenses. At some points, the lessees have started from a low-grade face and brought it into shipping ore within five or ten feet.

Guides to ore:

While the better grade ore is usually readily picked out by eye, there are enough exceptions to warrant very close assay control, particularly in the case of milling as against shipping ore.

The commercial material is almost always harder than the lower grade rock and samples should be cut with a moil because pick samples are inclined to be low. In a given sample the fines are commonly lower grade than the coarse pieces.

The gouge is usually non-commercial, though at times it carries high values when the neighboring ore is rich.

Sulfides are nearly always a sign of value, although only certain kinds. The marcasite is barren, the coarse pyrite nearly so, and the best values occur with the very fine-grained arsenopyrite and pyrite. The lessees regard a particular kind of banded hard quartz laced with threads of fine sulphides as an infallible guide.

At several places in the old workings, heavy deposits of sulphuric acid stain have been built up. Often these can be followed up to ore if the ground is intact.

Expectation of values at greater depth:

Lindgren noted many years ago a similarity between the vein and the California Mother Lode. He further observed that the vein would probably extend to great depth and there was no reason to believe that the values would not do so as well.

Since the Lindgren report, the mines have been carried down several hundred feet. In the case of the Columbia, the best information available to the writers is that there was no marked change in grade down to and including the bottom level. This statement does not apply to the bonanza ore found in the hanging-wall vein, which apparently was not found below the 200. Of the E. and E. bottom level nothing is known, although Turner shows a block of quite good ore on the level above and a number of high assays scattered all along. The lowest level in the North Pole shows a considerable length of ore and enough high samples besides to warrant exploration.

In general, there appears to be every reason to expect the continuation of profitable shoots at least several hundred feet below the present bottom levels. The best prospects for continuation seem to lie at the Columbia-Colconda end of the lode, for here, on the bottom level of the Columbia, some 700 feet of ore is shown.

The single diamond-drill hole put down by the Campbell-Oregon Co. penetrated the vein at about the Columbia 850 feet level and showed 17 inches of 0.50 ore. This obviously proved nothing beyond the fact that ore does exist at this level.

Excerpts from Lindgren Report, 22nd Annual Report,
U.S. Geological Survey. Part II.

"Wherever extensive vein systems were formed they have the character of linked veins -- that is, the fissures are not absolutely continuous, but branches are thrown off at frequent intervals. The most important veins die out at some point and are replaced by other parallel fissures. A very excellent illustration is furnished by the vein system of Elkhorn, Cracker Creek, and Cable Cove, shown on the map. Beginning at the Baisley-Elkhorn with northeasterly strike, the veins continue across Rock Creek with east-west strike; on the divide between Rock Creek and Cracker Creek the direction again turns sharply northeast and the powerful North Pole vein begins. Continuing through the Columbia and Golconda veins, the direction again gradually turns east-west and the fissure gradually splits west of the Bunker Hill claim. But a short vein appears and continues without interruption for 2 or 3 miles. Again, parallel east-west veins appear a short distance north of Rock Creek and connect with the extensive fissure system of Cable Cove, which gradually swings around until near its westerly end it closely approaches the Ibex vein ..... .

"The fifth type, and the most interesting, includes the gold and gold-silver veins in the argillite series. Among them are found the richest and strongest of the veins of eastern Oregon; they are chiefly developed in the Sumpter, Cracker Creek, Granite, Alamo, and Bonanza districts. Their peculiarities are due to the action of a strong, dislocating force on the brittle, siliceous argillites, so extensively developed in these districts. In their simplest type, as in the Monarch and Red Boy veins, they form strong and continuous fissures, with well defined walls 2 to 5 feet apart. The vein filling is, however, not exclusively quartz, but a shattered mass of argillite, cemented by single filling, often showing comb structure. Though altered and impregnated with pyrite, the slate does not often carry the pay, which is usually concentrated in the quartz seams..... .

"This type attains its extreme development in the North Pole vein, upon which some of the most celebrated mines of the Blue Mountains are located. It is a crushed zone, absolutely continuous for at least 4 miles and having a width of from a few feet up to 200 feet, averaging, perhaps, 25 feet. In very few places the walls approach each other within a few feet; no places were seen in which the fissure had locally closed down so as to contain no quartz. The normal developments show two well, or fairly well-defined

walls, but no extensive system of parallel sheeting or shear planes. Between these walls lies a mass of quartz-argillite breccia; either of the constituents may locally prevail. Sometimes large bodies of pure, coarse, vein quartz appear, 10 feet to 20 feet in width, with only a few intermixed argillite fragments. Near the North Pole, Golconda, and the Bunker Hill mines enormous quartz croppings appear, measuring 100 and even 200 feet across. Very likely, however, this excessive thickness is deceptive and is caused in part by sliding or settling of the outcrops. At the Golconda mine the vein loses some of its distinctive features, and appears locally as a crushed zone, 200 feet wide, penetrated by irregular seams and veins ..... .

"The great similarity of ores and processes of alteration to the gold-quartz vein of California and of central Idaho, described elsewhere, is extremely striking and forms one of the most important generalizations to be drawn. The gold veins in the three States certainly owe their origin to extremely similar processes. The only difference between the California veins and those of eastern Oregon, as far as contents and alteration are concerned, is that the latter on the whole contain less free gold and more sulphurets than the former. Characteristic for both is the total absence of barite, fluorite, and tourmaline, as well as of garnet, ferromagnesian silicates, epidote, and iron oxides.

"The interrelations of the vein systems prove almost conclusively that the veins in argillite are of the same age and of the same genesis as those in granular rocks, and yet in the more or less siliceous and carbonaceous argillite the metasomatic processes are of a different character. Extensive alteration has not ordinarily taken place, but very frequently the argillite is filled with sharply developed crystals of pyrite and also a little sericite. Where the alteration is intense a silicification has usually occurred, though the process is not widespread and does not affect any rocks outside of the walls, even in the largest veins. Some of the very richest shipping ore in the Columbia and the Golconda is probably a siliceous replacement of argillite .... .

"In the pay shoots of wide, composite veins in argillite other and more complicated conditions prevail. Out of a total width of quartz and quartz-argillite breccia of from 7 to 40 feet, or even more, the pay is usually confined to a streak from 1 to 4 feet in width. This streak may lie on either wall, and sometimes crosses diagonally from one wall to another or it may break up into several stringers of pay ore. The pay streak is often adjoined on both sides by normal quartz, sometimes differing but little in appearance from the ore.

Ordinarily, however, to the practiced eye there is a difference consisting in a looser or more crumbling condition, or in the occurrence of finely distributed pyrite and arsenopyrite in the ore. This suggests at once that the pay streaks may be secondary breaks and fissures enriched by concentration from a great width of lean ore. This should not be understood as meaning concentration under the influence of oxidizing waters or a concentration in any way dependent on surface conditions. If these streaks really are secondary enrichments, they have been effected under the influence of the same kind of solutions that formed the vein as a whole, and may be relied upon to continue in depth. But the question is by no means simple, and much more extended observations than those which could be made on a rapid reconnaissance are necessary to settle the question. In some cases there seems to be no difference in the character of the quartz outside and inside of the pay streaks except in the content of gold in the latter. On the other hand, it is often found, as, for instance, in the North Pole vein, that extensive crushing and brecciating has taken place in the pay streaks and the fragments are recemented by calcite and secondary sulphurets. The cemented fragments are not barren quartz but contain arsenopyrite in unquestionable primary deposition. The argument for secondary concentration is further weakened by the fact that in many places the barren quartz shows a similar brecciation and calcitic cement. The difficulty is to account for deposition of ore in certain streaks which occasionally cross the vein, while the whole space was filled with metalliferous solutions and deposition of quartz went on throughout. The theory of a secondary concentration is very attractive, but the occurrence of well-defined and parallel pitching ore shoots on the plane of the vein remains to be explained as well on this supposition as on the theory of their direct formation from original deposition ..... .

"Within the great ore shoots it is not uncommon to find smaller bodies of extremely rich ore. Pockets of gold and argentite occur in the Connor Creek mine and similar bunches of coarse, high-grade gold in the Virtue Mine. Similar bodies are found in the North Pole, E. and E., Columbia, and Golconda mines, here containing pyrite, chalcopyrite, tetrahedrite, native gold, and sometimes telluride in a gangue of quartz and roscoelite. These rich pockets are small and irregular masses or narrow chimneys. An unusually large mass of this kind in the Golconda mine was 70 feet long and 14 feet wide and pitched flat in a southeasterly direction across the general trend of the vein, which is here a broad crushed argillite zone with quartz stringers rather than a well-defined fissure. Most cases of this kind are not, I believe, due to a secondary concentration, but bear the earmarks of original deposition ..... .

"Regarding the permanency of the veins, there are very good reasons for believing that the strong, well-defined veins upon which most of the important mines are located will continue to the greatest depths yet attained in gold mining. Judging from analogy with other regions, it is also probable that the pay shoots will continue in depth, though the unbroken continuation of one and the same ore shoot should not be relied upon with confidence. It has been the experience of most deep gold-mining enterprises that barren levels will occasionally interrupt the richest and most extensive ore shoots. Smaller fissure veins, members of a great number of veins in close contiguity and which have no great length, are not to be relied upon with as much certainty. But, taken as a whole, the strength of the vein systems and the mineralizing action are important factors in favor of the future of this mining region.

"The amount of free gold varies from a few per cent up to about 40 per cent. The sulphurets consist chiefly of arsenopyrite and marcasite. Chalcopyrite, galena, and blende are uncommon. Accessory minerals are cinnabar, tetrahedrite, mercurial tetrahedrite, stibnite, and tellurides. The principal gangue is quartz; on secondary seams calcite appears. Chromium mica and roscoelite (vanadium mica) also occur. The ore is usually normal filling, more rarely replaced country rock. The alteration of the slate comprises chiefly a pyritization, occasionally also a silicification; porphyry dikes contained in the argillite are sericitized and partly also carbonatized.

"In the North Pole mine the normal ore is a coarse, typical quartz with strong tendency to comb structure. The large crystals show concentric lines of growth upon which the new individuals develop with the same orientation as in the underlying crystals. The comb quartz contains in fine distribution idiomorphic arsenopyrite and less well-developed pyrite. Sometimes the arsenopyrite appears in several sharply defined thin crusts of primary deposition, each generation again covered by comb quartz. Acqueous inclusions of irregular form are common in the quartz. The only difference between barren quartz and ore is in the sulphides contained in the latter.

"The country rock is siliceous and consists of closely packed, minute, allotriomorphic quartz grains. Between them lie a few fibers of sericite. The planes of the sedimentation are marked by streaks of black carbonaceous material. The principal alteration consists in the development of pyrite in small cubes. This pyrite may in places form larger aggregates, but the latter are always poor in gold and silver.

"Secondary changes are frequent in the ore. In many places the quartz shows undulous extinction and is traversed by crushed zones. Whole masses of primary quartz with arsenopyrite in concentric depositions are crushed and recemented by quartz. This produces the peculiar brecciated appearance shown in Pl. IXVIII, A with concentric streaks of arsenopyrite running in many directions and frequently sharply interrupted. In the secondary quartz are scattered sharply defined pentagonal dodecahedrons of pyrite. A third and latest phase of the vein formation is the introduction of calcite among narrow cracks throughout the barren as well as the rich quartz. With the calcite, pyrite, and arsenopyrite again recrystallize.

"A thin section of rich telluride ore from the North Pole is shown on Pl. LXIX, B. The principal mineral is hessite, which is lined with native gold and also contains small masses of another pale-yellow telluride. These minerals occur in apparently primary quartz.

"In the Columbia mine similar relations prevail. The ore is prevailingly a quartz filling showing comb-quartz structure. The argillite is a very fine-grained but clear quartz mosaic, containing abundant streaks of organic matter. Cubes of pyrite are often inclosed in this carbonaceous substance. A slight silicification may have taken place. The argillite is cut by well-defined quartz veinlets, which again show a late infiltration of calcite. Dikes of a very altered igneous rock of doubtful original character are also cut by the vein. A specimen of altered porphyry from the lowest tunnel level consists of sericite fibers, calcite, and a few anhedrons of pyrite.

"The rich shipping ore, ordinary specimens of which assayed 245 ounces gold and 166 ounces silver per ton is a greenish-gray quartz of varying grain. Much of it is very fine-grained and almost flinty, and darkened by finely distributed sulphurets. In some places fragments of a greenish-gray altered rock are included in quartz, the color being due to the finely divided roscoelite. Fibers of this mineral are also scattered through the whole rock. The sulphurets consist of pyrite, chalcopyrite, zinc blende, and a black mercurial tetrahedrite, besides much native gold. The latter occurs in intergrowth with the colorless or brownish zinc blende and the tetrahedrite, but not with the pyrite. It also is found intergrown with roscoelite wherever that mineral is abundant. In the prevailing mass of quartz lie small, well-defined inclusions, probably of argillite; these consist of microcrystalline quartz with a little sericite.

"The prevailing mineral is a partly idiomorphic normal vein quartz, the grain of which varies considerably. The roscoelite is distributed throughout the quartz in fine aggregates of greenish fibers of strong double refraction. The specimens show no evidence of secondary crushing or deposition..... .

"The rich shipping ore found in the Golconda is similar to that from the Columbia. It consists of a dull-greenish rock of extremely fine-grained quartz, colored by films of roscoelite, and containing pyrite, as well as abundant star-shaped marcasite crystals. This rock, which probably is an altered and silicified argillite, contains vugs and veinlets filled with coarser quartz, with native gold, chalcopyrite, pale brown zinc blende, and probably tetrahedrite. Fine-grained chalcedonic veinlets also cut the rock. Altogether, the ore seems to be a crushed and greatly altered argillite. ....."

(Plates referred to by Lindgren will be found in his report but are not shown in this report.)

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EXCERPTS FROM REPORT OF ARTHUR M. SWARTLEY, OREGON BUREAU OF MINES AND GEOLOGY - December 1914.

THE NORTH POLE-COLUMBIA LODE

"The North Pole-Columbia lode, roughly paralleling the Ibex, Bald Mountain, and Mammoth veins, and approximately a mile and a half southeast of them is the most extensive gold lode in northeastern Oregon. It can be traced from near McCully's fork northeast to Rock Creek, a distance of about 6 miles, by its frequent and oftentimes prominent outcrops of brecciated argillite cemented together with quartz. Considerable development has been done upon many claims between McCully's fork and Silver Creek, among which are the Bunker Hill, Annalula, Amazon, Mayflower, and Mountain Belle, located upon the two branches of the vein which splits upon the Golconda. .....

"The properties which have a record of considerable production beginning with the one farthest southwest , are the Golconda, the Columbia, the Tabor Fraction, the Eureka and Excelsior, and the North Pole. The South Pole, upon the same lode and adjoining the North Pole on the northeast, has but a small record of production.

"In tunnels 5 and 3 of the North Pole Mine, in the face of the Excelsior adit north on North Pole ground, in the Columbia, and in the Bonanza, is found a greenish-white rock which is probably a porphyry that has suffered extreme alteration and has been impregnated with pyrite. In thin sections of this dike material the feldspars are so badly altered as to be indeterminable. It is simply an aggregate of sericite, kaolin, secondary quartz, feldspar, and chlorite. Field evidences, together with the examination of hand specimens and thin sections, indicate that this intrusion found at various points in the vein over a distance of more than 3 miles, in which the various specimens are strikingly similar, was originally a granodiorite-porphyry. Its extreme alteration indicates that it came into the plane of

the vein, although probably not in a continuous sheet, at a time previous to the formation of the vein.

"The lode is easily traced by its croppings of silicified argillite wherever rock in place comes to the surface. The most prominent outcrops are those upon the Golconda, which projects at least 20 feet above the adjoining country rock and upon North Pole Ground, where an exposure of quartz is some 300 feet wide.

"The width of the lode in the Golconda as determined in the workings is about 175 feet in the upper levels, and about 100 in the lower. In the Columbia it is shown upon the surface to be about 75 feet wide, and averages about 28 feet on the 900-foot level. In the E. and E. the vein is as much as 30 feet wide. In the North Pole, although it has the wide exposure of white quartz above referred to, underground the lode shows from 7 to 40 feet wide except one crosscut in No. 2 tunnel, which, according to the maps, is in quartz for more than 150 feet, indicating that the large exposure upon the surface above the portal of No. 4 tunnel may extend downward indefinitely in a sort of quartz chimney.

"J. T. Pardee, in his description of the faulting and vein structure of the Cracker Creek district, states:

"'That this wide zone is a normal fault, which has a vertical displacement of at least 400 feet, and a horizontal displacement of approximately 1,800 feet.'

"A casual examination of the underground workings, together with an inspection of the plans of the five mines locate upon the developed portion of this lode, brings out the fact that with the exception of the Columbia, but little systematic cross-cutting has been done on the various levels of the several properties.

"While the ore shoots are more often located upon or in close proximity to the footwall they are not all so located. In the Golconda the lode is very wide and some crosscutting has been done which disclosed shoots upon both walls and an intermediate one cutting diagonally across from the foot to the hanging wall with a dip of 30°. In the Columbia a shoot is found not only on the footwall of the vein but also on the hanging wall, and in one instance in an intermediate streak. Below the shaft the only shoots are found upon the footwall. In the North Pole they lie occasionally upon the footwall, but more frequently away from it, and occasionally upon the hanging wall. In the South Pole the development is practically confined to the hanging wall.

"It will also be noted that there are 2,500 feet on the North Pole hill between tunnel No. 5, on the North Pole, and No. 3, on the South Pole, which has had no drifting in the lode.

It will also be seen that No. 1 tunnel on North Pole ground, which has no crosscuts, does not extend underneath the full length of the shoot above. Between the E. and E. shaft and the apex of the ridge, and above its 7th level, there is a million square feet of lode without development, above which there has been over a greater part of the distance ore extracted or evidences of it discovered as the result of widely separated prospect holes.

"There is a very incomplete development between the walls by means of crosscuts where drifting has been done along the strike. Considerable lengths have not even a single drift, while beneath the known shoots of ore development has not been done in much of the ground to determine whether barren levels occur between bodies or ore, such as is found to occur in the Columbia on the 300-foot level north, where the wall is a carbonaceous argillite.

"The total production from the entire lode, estimated to January 1, 1915, is somewhat in excess of $8,000,000. The smallest production from anyone of the properties amounts to more than $400,000. The recovery of $8,000,000 was secured from the several properties, whose combined efficiency from beginning to end does not exceed 67 per cent. The losses, therefore, in the tailings from these mills was $4,000,000. The lowest acceptable percentage of recovery in present practice is 90 per cent, which signifies that $2,800,000 could have been saved in modern mills.

"These statements might, at first thought, appear to be a reflection upon the persons who have operated these properties but it must be borne in mind that their plants, though possible of improvement from time to time, were nevertheless installed before recent developments in cyaniding complex ores or concentration by means of flotation had become available.

"The improvements in these processes have been accomplished within the last two or three years, while the Golconda, Tabor Fraction, and E. and E. mines ceased operations 9 years ago, and the North Pole mine 6 years ago, which leaves the Columbia as the only steady producer since the North Pole closed down in 1908.

"The Columbia mine is owned by four persons, with one of their number, Frank S. Baillie, as manager of the property. Under the efficient management of Mr. Baillie, who has been in charge of the property for 18 years, this company has never delayed a pay day for a single day; it was for some time during this period the only steady producing quartz mine in Oregon. The owners naturally feel that a property that has eclipsed all others in the state in steadiness of operation and production, in conservative and successful management, should hesitate to make radical changes in methods which have been and are now

sucessful. They realize that to effect a 90 per cent or more extraction at this mine would require extensive alterations in and additions to the present mill, which would involve the expenditure of considerable sums and would absorb their dividends for some time. The above reasons doubtless have had much to do with the failure of the stockholders to authorize the manager to make such extensive improvements.

"A proper consolidation of these properties is an economic necessity for most of them and would be highly beneficial to all. Attempts to consolidate the leading properties have been made by some of the owners as well as by outside interests, but for one cause or another have been unsuccessful. The usual difficulties have arisen when consolidation of properties is attempted where parties at interest attempt to set prices and make terms each upon his own.

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"The ore actually blocked out in the Golconda and North Pole mine is small. The actual number of tons and value per ton fairly well blocked out in the E. and E. mine is not available, but a statement from the office of the company states that there is $500,000 worth of ore blocked out. This estimate probably refers to ore which could be treated at a profit in their present plant. There may be a much greater tonnage of ore averaging $5 or $6 which could probably be treated at a profit in the mill of the consolidated company. It is officially stated that there is 100,000 tons of $10 ore blocked out on three or more sides in the Columbia mine, and that the conditions with reference to ore on the 900-foot level are identical with those on the 600, 700, and 800-foot levels. * No official statement is made as to the tonnage of ore blocked out which would be available in a new mill, but a reference to the sectional elevation of the mine, together with statements from persons not connected with the company, leads one to believe that this tonnage is large."

* Note: Since there is no development on the 900 level, it is inferred that Swartley meant to say "800-level..... 500, 600 and 700-foot levels."

EXCERPTS FROM
"REPORT ON EUREKA AND EXCELSIOR MINES"

BY
OSCAR H. HERSHEY

"Hailey, Idaho
May 27, 1922

"Bourne Gold Mining Company
705 Chamber of Commerce Bldg.
Portland, Oregon

"Gentlemen:

"My study of the Eureka and Excelsior Mines at Bourne, Baker County, Oregon, has been made under difficulties. I had the benefit of the guidance of the information from Mr. John Thomas, who has been connected with the operation of the mines practically from the beginning and who doubtless knows more about them than anybody else; but documentary evidence is largely lacking. From Miss Ida M. Arneson, the Secretary, I received a longitudinal section which shows the levels and the areas stoped at various periods. This it appears is the work largely of Mr. Thomas and will be referred to as the 'Thomas Section.' Miss Arneson also furnished me with a claim map on a scale of 500 feet to one inch; a statement by Mr. J. Henry Longmaid of the results of the operation of the property under the 'Longmaid' lease from 1894 to June 20, 1898; of the costs of mining and milling, value of heads and tails, and smelter returns for the period in 1904 and 1905 during which your company operated the mine; and with a statement of the tons mined and their contents from 1919 to April 1, 1922, under lease by the E. and E. Gold Mines Company and Blue Mountain Mines Company. From Mr. Thomas I received assay returns from samples taken by him at the backs of the Excelsior Nos. 1 and 2 stopes. But certain reports such as that of Mr. H. W. Turner, were not available to me and even the old assay and mine working maps have disappeared. In the Portland office I found tracings of fairly complete level sketches on a scale of 40 feet to the inch. With these, and accompanied by Mr. Thomas, I went through the levels and accessible stopes on and above the No. 1 Adit tunnels and I believe acquired a fairly complete knowledge of the distribution of the ore reserves above that level. All portions of the mines below the No. 1 levels are inaccessible because of water, and aside from some statements made by Mr. Thomas, I have no means of determining the tonnage and grade of ore they have developed.

"I also made a reconnaissance along the lines of the lode at the surface, but snow prevented me from going far on the adjoining North Pole claim and beyond the Golconda Shaft in the opposite direction. Mr. Thomas says that the lode can be traced for fifteen miles, though a State report mentions only six miles, but my remarks will be confined to less than two miles of it. It crosses your property in the Eureka and Excelsior claims a distance of 3,000 feet, with Cracker Creek in the center. The lode has a course about N. 30° E. The surface rises on the Excelsior claim to about 600 feet above the creek at the endline. Beyond the line the surface continues to rise into a high mountain. This is on the North Pole property and Mr. Thomas says that the lode has been extensively stoped in it for a distance of over 3,000 feet and that large bodies of ore remain above the level of the Excelsior No. 1 level. So far as I know this mine is practically inaccessible from caving.

"The footwall rock is black and gray argillite and thin-bedded quartzite, usually dipping at low angles and doubtless part of a very thick series of Paleozoic sediments. Mr. Thomas says that granite appears about two miles northwest of the lode.

"The hanging-wall rock on the Excelsior claim appears to be the same sedimentary series as the footwall. On the Eureka claim, however, an altered igneous rock appears locally in the hanging-wall and it forms the hanging-wall across the Columbia claim. Seen at the surface it is a metagabbro, an altered basic igneous rock that was intruded into the sediments in the form of a huge dyke. This metagabbro belt I can trace across the property and on to the North Pole property as far as snow will permit; also in the opposite direction as far as glacial debris and snow will permit, and I suspect that the lode is everywhere associated with it though not everywhere adjoining it. The contact between the metagabbro and the sedimentary series was a line of weakness along which a breaking stress was relieved and this great lode formed. I consider this a favorable feature, assuring great depth to the lode."

SYNOPSES

OF

PREVIOUS ENGINEERING REPORTS ON GOLD MINES

OF

THE BOURNE-CRACKER CREEK VEIN

WITH COMMENTS ON THEM

BY

J. B. PORTER AND E. T. KNIGHT

Pages 20 to 39 inclusive

(a) Synopsis of Report on Eureka and Excelsior Mine Written in 1907 by Mr. H. W. Turner, Consulting Mining Engineer for the Hon. Jonathan Bourne, Jr., U. S. Senator, then owner of the mine.

(H. W. Turner was for many years one of the ranking members of the mining engineering profession.)

The first and second sections of Mr. Turner's report deal with history and geology. Since his findings are essentially the same as those contained in the Historical and Geological sections of this report they are omitted here.

The third section deals with the sampling of the mine and ore reserves. Mr. Turner took 446 samples. In each case a strip approximately 6 inches wide and 2 inches deep was taken directly across the vein at the point sampled. Altogether the samples weighed 18.44 tons, or an average of 82.7 pounds each. They were assayed by Chas. M. Fassett of Spokane, Washington, and the Oregon Smelting and Refining Company at Sumpter, Oregon.

Mr. Turner states that since "the gold is not evenly distributed in the vein, the values given in the assays are lower than would be obtained in actual mining in many cases, as the foreman, assisted by the assayer, could select only the better grade of the material."

All vein material averaging $6. or more in gold was regarded as ore. Turner did not include silver in his estimates.

There are pages and pages devoted to assay data in detail, which sum up as follows:

EUREKA MINE

Tons		Value per Ton
40,400		$8.38
	EXCELSIOR MINE	
23,500		$7.15
	Total	
63,900		$7.93

The report states: "The above estimate of the ore reserves of the E. and E. mine is probably far below the actual amount", because shipping ore was not included in the above estimate, but does exist as shown by three samples.

			Value	Width
Sample	No. 38	500 level, south drift	$55.40	5 ft.
"	No.195-6	Eureka Adit No. 1	93.43	2 ft.
"	No.331	Eureka Adit No. 2	41.34	6 ft.

Turner also notes that milling ore disclosed by specific samples was not included in the estimates because immediately adjoining samples were below mill grade, but recommends that more work be done at those points as considerable ore might be developed.

He stresses the point that, while the property was fairly well opened up, the value in several large blocks of vein matter is unknown, e.g., one lying between Eureka Adit No. 1 and the 400 level, south drift. He also points out that in several places the drifts were not run in the pay ore and that short crosscuts are likely to develop ore shoots.

Turner calculated that the ore included in his estimates could be milled and mined at a profit of $83,720.

Since the date of Turner's examination, lessees have mined about 38,000 tons from the E. and E., about 15,000 tons of which came from blocks included in Turner's estimates. Of the 48,900 tons remaining, 19,100 lie below water level. It is known positively that these blocks in the drowned levels have not been touched since Turner's report. The lowest level sampled by Turner was the 500. The level below this, the 700, was drowned prior to 1907. Turner, however, states: "Some good ore is said to have been found on this level."

The report finally advises more development. Specifically, the following raises and cross-cuts:

> "A raise should be made from Eureka Adit No. 1, to Eureka Adit No. 2, starting at a point near sample No. 196, near the face of the south drift.
>
> "A raise should be made from 400 level, near sample No. 38, to the 300 level. This may open up a shoot of shipping ore.
>
> "A raise should be made from the 500 level, south drift, to Eureka Adit No. 1, and a good point to start this raise is perhaps 80 feet north of the face."

The last section of the report deals with treatment of the ore and is obsolete.

The essence of the Turner report is that the E. and E. still has substantial tonnage of good ore in the old workings, large blocks of possible ore exposed on at least one face and excellent prospects for a large tonnage at depth.

(b) Comment on Tracing of Columbia Assay Map made by T. H. France in 1916 for E. W. Backus, then Owner of the Mine.

(Ira Joralemon says T. H. France is now dead. He worked for U.S.S.&R. Co., and was o.k.
/s/ E.K.)

The authenticity of this map is not questioned by the writers of this report but cannot be guaranteed because the original is either lost or destroyed. The ore blocks and values shown on the France tracing are reproduced on our Map no. 4. France states on the map that the values shown are the averages of samples taken at five foot intervals, on four sides of the blocks.

The top exposure of one of the blocks is accessible for sampling. It was inspected and found to have about the dimensions shown on the France map.

Competent mining operators who knew Mr. France personally state that he is or was a capable and conscientious engineer. It is known that he spent four months examining the Columbia, and since it is common knowledge that he recommended large expenditures on plant modernization, it is obvious that he anticipated a long and profitable life for the mine.

(c) Synopsis of report on E. and E. Mine, dated April 28, 1921, by John Thomas and William F. Dumbleton to Dr. Charles R. Sowder, 408 Penway Bldg., Indianapolis, Ind., then lessee.

John Thomas was Mine Superintendent at the E. and E. for all of the principal lessees, namely, Longmaid, Wyatt, and Sowder, or Blue Mountain. William F. Dumbleton was a consulting mining engineer.

The first sections of the report deal with the condition of the mill, history, and geology. The mill has long since been gutted; only the building remains. The history and geology sections simply confirm what has already been set forth in this report.

In the sections entitled: "Ore below collar of shaft," and "Ore in sight," the report states that: "The water is within 66 feet of the collar of the shaft, there being an adit level for drainage to that point. Mr. John Thomas spent $425,000 in developing the ore in the various levels of this shaft. This work was done between 1903 and 1906.

"The shaft is 730 feet deep vertical, then is opened up ready for stoping on the several levels, 300,000 tons of ore average value $12. per ton = $3,600.00."

As ore in sight the report lists five blocks above the Eureka No. 1 tunnel, totalling 91,884 tons with an average value of $16. per ton and five blocks above the Excelsior No. 1 tunnel, totalling 80,569 tons, with an average value of $11. per ton.

The balance of the report deals with the Sowder operation and recommendations for consolidation of all the mines into one 1,000-ton per-day plant. None of this material is deemed pertinent to the present conditions.

While Thomas spent many years in the mines and must have been very well acquainted with them, the authors of this report concur in the general belief that his estimates of ore in sight are somewhat on the optimistic side. He used an average thickness of 4 feet, whereas all operating records indicate an average of 3 feet 6 inches as about correct; he computed his tonnage on 14 cubic feet of vein material per ton of ore with no deduction for low grade between the milling lenses; his values do not check with assay maps believed to be reliable, nor with assays of ore which he mined himself, although in 1921-22 he did mine 21,355 tons from Eureka that assayed $10.85 per ton. The mill recovered only 60 percent of the value. Mr. Thomas died several years ago and cannot defend himself, but it seems likely that he indulged in a certain amount of wishful thinking.

Recomputing the five blocks of Eureka ore mentioned above, using Thomas' horizontal and vertical dimensions, thickness 3 feet 6 inches, deducting 25 percent for below mill grade between ore lenses, and allowing 14 cubic feet of vein per ton, a more reasonable estimate would have been about 60,000 tons of $10.85 ore.

The estimate of the five blocks in Excelsior should perhaps have read about 52,000 tons of $7.50 ore. (0.35 oz. Au. at $20 per ounce and 1.0 oz. Ag at 50 cents per ounce, see assay maps).

(d) Synopsis of Report on Eureka and Excelsior Mine in 1922 by Oscar H. Hershey, Consulting Geologist and Mining Engineer, to the Bourne Gold Mining Company of Portland, Oregon, then owner.

Excerpts from Mr. Hershey's covering letter and geologic findings are contained in the geology section of this report.

The significant portions of his report on the "Ore Reserves" and "General Discussion," are quoted herewith:

"Heads 0.18 Oz. Au. 0.8 Oz. Ag.
"Tails 0.03 " " 0.2 " "
"Extraction gold 83.3 %
"Extraction silver 75.0 %
"1.2 lbs. cyanide consumed to one ton of ore
"1.2 lbs. lime consumed to one ton of ore
"Total extraction by flotation and cyanide on gold 93.4% on silver 88.1%.
"Roasted mixture of equal parts of oxidized and sulphide ore with salt and leached with analite solution from Sweeny experimental plant. To 100 gms, calcine added 300 c.c. acified analite sol. and agitated in bottle 44 hours.
"Calcine (heads) 0.34 Oz. Au.
"Tails 0.22 " " 1.50 Oz. Ag.
Extraction of gold 35.3 %

"B. H. & S. M. & C. Co. - - MILL TESTS

"Description of Test made on Bourne ore.

Tested by E. H. Dated 5/22

"Flotation and cyanide test; ground sulphide ore wet to pass 200 mesh. Added G.N.S. #26 oil and 5 lbs. sodium sulphide per ton.

	Wgt.	Oz. Au.	Oz. Ag.	% Au.	% Ag.
"B-82 Conc.	140.0	4.32	18.00	90.4	88.7
"B-83 Tails	1605.0	0.04	.20tr	9.6	11.3
	1745.0			100.0	100.0

"Cyanide test on concentrates (B-82). Washed with permanganate solution followed by water wash. To 100 gms. concentrates added 200 c.c. 4 lb. cyanide solution and 3/4 lb. to ton CaO. After agitating in bottle 24 hours filtered and put in 200 c.c. fresh KCN. solution and agitated 48 hours. Filtered and put in 200 c.c. fresh KCN. solution and agitated 48 hours longer. B-84 tailings assayed 2.96 Oz. Au. extraction 31.5 %.

"Agitated 42 hours longer in 4 lb. KCN solution
"B-85 Tailings assayed 2.92 oz. Au. 1.3 % extraction
"Total extraction 32.6 %
"Time agitated 114 hours
"Total cyanide consumed 16 lbs. to ton of conc.
"Total lime 8 lbs. per ton."

"Based on the experience gained in the operation of the property in the years 1896 to 1908, the writer feels confident that the large amount of unexplored ground at the North end of the property, the various ore showings in the different parts of the mine, the disentangling of the various fault problems will make it remunerative to reopen this mine and in a short while will lead to satisfactory financial results."

"Ore should be found in the upper levels after comparatively short crosscutting, quite apart from the results to be expected from deep level mining."....

"The average grade of ore that the writer expects is $9.00 per ton."

Melzer undoubtedly knew more about the North Pole Mine than any other person. He is said to have been a very able and honest man. His opinions are probably worthy of careful consideration.

(h) Synopsis of a 58-page report on E. and E., North Pole, Tabor Fraction, Columbia, and Golconda mines, dated June 30, 1930, by William W. Elmer, Consulting Mining Engineer, to Paul C. Murphy, President, Ladd Estate Company, Public Service Building, Portland, Oregon.

Mr. Elmer is a mining engineer who did engineering work for Columbia, Tabor Fraction, and North Pole at various times from 1903 to 1907. Mr. Murphy's company formerly owned the E. and E. Mines.

Mr. Elmer states in his covering letter that he had no interest, actual or provisional, in any of the properties treated upon in his report.

The historical and geological sections of the report are omitted here. In effect they agree with what has already been said in this report.

Mr. Elmer did no sampling. For his estimate of ore reserves he relied on the findings of Lindgren, Swartley, Turner, Hershey, and Melzer, and finally arrived at an approximation of 2,000,000 tons of $9.00 ore to a depth of 1,000 feet below Cracker Creek.

The Elmer report concludes by recommending construction of a 150-ton mill to process E. and E., and North Pole ores above water. The profits from this operation to go into construction of an exploration-haulage-drainage tunnel 5,600 feet long and other development therefrom. Elmer assumed that this work would open up sufficient ore to justify construction of a 500-ton mill at the portal of the drainage tunnel.

The authors of this report agree with Elmer in principle, but believe that his proposed project calls for an unduly large capital expenditure.

(i)

In 1933, Mr. Basil Prescott, a mining engineer, examined the North Pole, E. and E., Tabor Fraction, and Columbia mines for Mr. William Hay, the well known Los Angeles and Canadian capitalist. Before making the examination, Prescott had gone to Minneapolis and gotten a verbal option on the properties from E. W. Backus, then owner. The terms of the option were, essentially, outright purchase for $500,000, payable in ten equal annual installments.

On the strength of the verbal option, Prescott spent between $40,000 and $50,000 on a thorough examination of the mines. Several hundred samples were cut and assayed and several thousand dollars were spent on metallurgical tests. Prescott even went so far as to spend a good deal of money cleaning out the old E. and E. mill to ready it for installation of new machinery.

Upon completion of the sampling program and metallurgical tests, Prescott returned to Minneapolis to make the $50,000 down-payment and close the deal. To his consternation, Mr. Backus refused to go through with it, insisting that in addition to the $500,000 he would have to get a 25 percent interest in the operating company. Prescott returned to the mines, paid off his men and left the country.

The above information was supplied for this report by the attorneys who handled the negotiations and is believed to be absolutely reliable.

Prescott's report to Mr. Hay is not available, but it seems highly probable that he found a large tonnage and good values or he would not have acted as he did.

(j)

In 1935, Mr. Raymond E. Wimber, mining engineer and formerly manager of a mine in this area, did considerable sampling in several of the mines, but mainly in the E. and E. Wimber's complete report is not available but in part it states that he found 3 blocks of ore in the E. and E. averaging 3,191 tons per block, or a total of 9,573 tons above water, average value $21.33 per ton. (Present price.)

Mr. Wimber is now practising his profession in Ely, Nevada, and it is understood that his information is for sale, but the price is not known.

(k)

In 1938, the Campbell-Oregon Mining Corporation, a subsidiary or affiliate of the Campbell Mining Company, Inc., of 84 William Street, New York City, secured a lease on the North Pole, E. and E., Tabor Fraction, and Columbia mines from the Cracker Creek Gold Mining Company, owner.

In 1939, the Campbell-Oregon Corporation spent about $45,000 rehabilitating the old E. and E. camp, re-opening caved drifts and raises, sampling and assaying, and sinking one diamond drill hole about 1,300 feet long into the Columbia vein at a point about 900 feet south of the north end line of the claim. This drill hole intersected the vein about 900 feet below the surface, or at about the 850 level, and showed 17 inches of $17.00 ore. About 250 samples were cut and assayed. The Campbell Oregon assay maps show 5 blocks of ore, totalling about 18,000 tons, average gold value .367, in the E. and E. and North Pole.

At this point the Campbell-Oregon Corporation ran out of money, its backers refused to put up more, so the corporation was dissolved and the lease cancelled. Had more of the funds been spent on sampling and less on dead work, it seems likely that enough ore would have been disclosed to justify an operation.

From the field records of the examination, it appears that about $8,000 was spent rehabilitating the old camp and at least $11,000 on the one diamond-drill hole. Most of the balance must have been spent opening up caved workings, because, as noted above, only about 250 samples were cut and assayed.

Dey, Hampson, and Nelson, attorneys of Portland, handled legal matters for the Campbell-Oregon corporation in the west. In a letter dated August 8, 1939, addressed to Mr. Paul C. Murphy, Frank C. McColloch, a member of the Dey firm, made the following statements:

> "At a meeting of the directors of the Campbell-Oregon Company held in New York on August 2d, Dr. McKinstry, Consulting Engineer, who has been supervising the operations at Bourne, reported that sampling and reopening of the upper levels of the mine have disclosed several blocks of ore of quite good grade principally in the Eureka section, and that subject to some additional development work to prove the extent of these blocks, it seemed safe to assume that there were at least 10,000 tons averaging about $14.00 with certain additional sections of $10.00 to $11.00 ore, but that the profit on this ore would hardly be more than enough to pay for a small mill and that hence installation of a small mill could not be recommended.
>
> "The preliminary impression that the ore zones rake to the southward and that possibilities of a future ore supply lie at depth to the south seem to have been confirmed by the reopening work which was started early last

winter. It was hoped that this possibility could be tested quickly and at reasonable expense by the diamond drilling, with which you are familiar, but the ground proved to be very badly fractured and drilling was slow and expensive. Only one hole has been completed, cutting a section of vein assaying $17.00 but very narrow in width (less than one and one-half feet). He reported that a single hole is insufficient to give reliable results, and that a minimum of three was necessary. Unfortunately the slowness of the drilling operations has exhausted the funds available and although Dr. McKinstry is still of the opinion that ore remains to be found in the property at depth, the expense of deep exploration would require funds at a minimum of $125,000.

"Colonel Campbell interested the present group upon the basis that there was reasonable opportunity of encountering sufficient ore in the old workings to justify immediate erection of a mill and his stockholders have been much disappointed to date that such was not the case.

"None of the financing contemplated the additional expenditure of $125,000 for the exploration at depth which now seems to be necessary in order to ascertain whether or not there is a mine at Bourne.

"As a result it seems to have finally come to a point where only two or three in the group are willing to go ahead at this time and none of them were willing to put up approximately $50,000 each....."

"Whether or not the venture proceeds further under Colonel Campbell's direction depends upon whether your company is willing to consent to a reassignment of the lease from the Campbell-Oregon Company back to the original Campbell Mining Company, coupled with a moratorium for one year, during which time Colonel Campbell can seek the additional financing."

The Cracker Creek Company refused to reassign the lease or grant the moratorium.

The records of the Campbell-Oregon operation have been carefully studied and seem to indicate that the management had a very slight notion of what it wanted to do, or how to go about it.

It is noted in concluding the discussion of the Campbell-Oregon lease that the mines were not open then to the extent which they are now. Many of the blocks of ore shown in this report were therefore inaccessible for sampling by Campbell.

(1)

At the present time the North Pole, E. and E., Tabor Fraction, and Columbia mines are under lease to Mr. John Arthur. Arthur has worked in these mines off and on for the past 43 years as assayer, engineer, geologist, lessee, and manager. His knowledge of them is encyclopedic. For the past year he has kept four small groups of sub-leasers working in shipping ore averaging about $22.00 per ton.

Arthur states that he can block out approximately 100,000 tons of ore averaging 0.34 oz. gold and 1.25 oz. silver (about $12.75 per ton - new price) in the upper workings of the mines with very little additional development work. There is no apparent reason whatever for doubting this statement.

REPORT ON EXAMINATION OF MINES

OF

THE BOURNE-CRACKER CREEK VEIN

MADE BY

EDWARD T. KNIGHT AND J. B. PORTER

DURING

OCTOBER, NOVEMBER, AND DECEMBER 1940, AND JANUARY 1941

Pages 40 to___inclusive

GEOGRAPHY AND GENERAL CONDITIONS

(a)

The mines are located about 35 miles northwest of Baker, Baker County, Oregon. Baker is a town of about 10,000 population, the commercial center of east central Oregon. The town is on the main line of the Union Pacific System between Pocatello, Idaho, and Portland, Oregon, and is well supplied with wholesale and retail hardware stores and machine shops. Since mining is active in this district, the merchants are usually well stocked with mine materials, equipment, and supplies.

A narrow gauge railway, the Sumpter Valley, runs from Baker, through the village of Sumpter, seven miles from the mine.

There is a good highway from Baker to Sumpter, paved for eight miles out of Baker, graded and graveled the remaining 20 miles. It is seven miles from Sumpter to the mines over a fair road up the water grade of Cracker Creek. At present this road is maintained by the lessees, but if a large scale operation is started, it is very likely that the County will take over its repair and maintenance.

The usual routing of shipping ore from mine to smelter is by truck to Sumpter Valley, Sumpter Valley Railway Company to Baker, Union Pacific Railroad to Tacoma.

The mines are about 5,500 feet above sea level, in a mountainous, heavily timbered country. There is a heavy snowfall from about mid-December until late February, or early March but the temperature rarely, if ever, falls below zero. The summers and falls are pleasant.

Cracker Creek flows between the Excelsior and Eureka mines and can be depended upon for an ample supply of industrial and domestic water the year round. The stream is not polluted above the mine and no treatment for domestic use is necessary. We are advised by counsel that mill tailings may have to be impounded, although simply dirtying the stream will not be criticised. The State Fish and Game Commission is apparently unconcerned. This may be because Cracker Creek empties into Powder River, which is already polluted and muddied by several dredges and doodle bugs.

There is enough timber standing on the claims of the Cracker Creek Company to supply an operation for years. A 23,000-volt power line runs through the property. A transformer station is already in place and functioning. The Eastern Oregon Light and Power Company owns the line and will supply power for about one and one-third cents per kilowatt hour in quantity.

In general, the old mine and mill buildings are not worth repairing, but at E. and E. there is a new frame house suitable for a manager's residence and office combined, a change room, blacksmith shop and compressor house, all in good condition.

There is a good domestic water system in working order.

Probably most of the men would live in Bourne or Sumpter, so we assume that with a little repair work on the old bunk house and mess hall these buildings will accommodate the remainder.

The old E. and E. mill building is sound structurally and is large enough to house several modern 75-ton plants. With a new roof, sash and doors, a false ceiling to cut down heating area and miscellaneous patching, it will serve the purpose as well as a new building.

There is a large accumulation of old rails, cars, mining and milling machinery, etc. - mainly junk.

A new telephone line would have to be run in to Sumpter, about seven miles.

LABOR SITUATION

(b)

The current wage scale is as follows:

Miners	-	$ 5.00 for 7 hours
Muckers	-	4.50 " 7 "
Millmen	-	0.60 per hour
Skilled mechanics	-	0.75 to $1.00 per hour

The manager of the Cougar-Independence Mine, employing about 70 men, states that there is an ample supply of mine labor available and that, with the single exception of Cornucopia, all mines in this area are open shop. Cornucopia employs about 250 men, and has an A. F. of L. local.

He states further that the general attitude of the men toward unionism ranges from indifference to mild hostility and that very few of the local men carry union cards.

TITLES AND CLAIM MAP OF DISTRICT

(c)

The Report on Titles and the outline of a proposed lease were prepared by Mr. Harold Banta, of the law firm of Hallock, Donald, & Banta, and are quoted verbatim herewith:

HALLOCK, DONALD & BANTA
Suite 201 Sommer Building
Baker, Oregon

January 17, 1941

"Messrs. Edward T. Knight and J. B. Porter,
Baker, Oregon

Re: Titles - Cracker Creek Gold Mining Company Properties. (Bourne Group)

"Gentlemen:

"In preparing this report for you, we are frankly a little at a loss as to how far we should go into detail. There are a large number of properties included in this group and a great deal of title work has been performed by our firm during the past two years in putting these titles in thoroughly merchantable shape. We could accordingly write a report many pages in length but we do not understand that anything of that kind is required. We will, therefore, say that the properties in the Bourne Group, which are situated in the Cracker Creek Mining District (unorganized) in Baker County, State of Oregon, comprise what are commonly known as the Columbia, Tabor Fraction, North Pole, E. and E. Mines and the Glisan-Davenport holdings, plus the Hanover Group and certain miscellaneous unpatented claims which have been located for the purpose of filling in the gaps between the several properties and to make the entire holdings constitute one contiguous group.

"The greater portion and all of the important claims in the group are patented. The unpatented claims cover as stated gaps of vacant ground left between various of the properties arising in the making of the earlier surveys of the patented claims. The unpatented claims serve three purposes. First, to join the whole group together into one contiguous whole; and thereby to keep any other prospectors, etc., from locating claims in the vicinity of the holdings, which might possibly embarrass operations in connection with building roads, running tunnels, etc. Second, the Hanover quartz claims particularly lie along the line of the prospected long development tunnel and are valuable principally for the purpose of protecting the tunnel site. The other claims, such as the Hanover, Fool Creek, Hardy, etc., lying down Cracker Creek bottom are largely to provide an ample tailings dump if the long development tunnel is run and a milling plant is constructed at or near the portal.

"Hailey, Idaho
May 27, 1922

"Ore Reserves

"The Thomas section is not accurate in detail but needs little modification for my purpose. From the stopes representing the 1894-98 period of operation, by taking off a strip that is manifestly debris and shortening the stopes between the Excelsior upper Nos. 2 and 3 levels, I find that the ore mined may have had an average thickness of 2.95 feet. The apparent grade of the milling ore was $9.28 per ton. The tonnage produced in 1904-5 distributed over the area stoped gives an average thickness of 2.69 feet. The ore produced from 1919 to 1922 distributed over the area stoped gives an average thickness of 5.10 feet. Mr. Thomas usually gave the average width of stopes as 4.5 feet, apparently based largely upon the idea that this is the reputed average width of the ore in all the mines. However, Mr. Melzer stated that the ore produced in the North Pole Mine distributed over the area stoped must have had an average width of 44 inches. In the Mineral Resources of Oregon, Vol. 1, No. 8, page 151, Mr. Arthur E. Swartley says that the Columbia ore reserves at that time averaged 47 inches wide. I think, therefore, that I will have to discount Mr. Thomas's estimate of thickness somewhat. It is difficult to get the thickness of the ore from an inspection of the stopes because they are broken wider than the ore and a considerable quantity of quartz left in them as waste filling. I fear Mr. Thomas under-estimated the amount thus rejected.

"First I will give an estimate of the ore in reserve above the No. 1 tunnels, based largely upon Mr. Thomas' estimates of thicknesses and average contents:

Block A:							
Hangingwall	160 x 90 x 8	feet	- $15.00 =	8,861	tons = $	132,915.
Footwall	160 x 130 x 7	"	- 15.00 =	11,200	" =	168,000
Block B - - - - -	180 x 100 x 4.5	"	- 20.00 =	6,230	" =	124,600
Block C - - - - -	170 x 200 x 3	"	- 7.00 =	7,846	" =	54,920
Block D - - - - -	300 x 170 x 4.5	"	- 11.00 =	17,653	" =	194,183
Block E - - - - -	400 x 50 x 3	"	- 12.00 =	4,615	" =	55,380
Block F - - - - -	450 x 100 x 3.8	"	- 10.70 =	13,153	" =	140,737
Block G - - - - -	500 x 80 x 4.5	"	- 10.00 =	13,846	" =	138,460
Block H - - - - -	80 x 190 x 4.5	"	- 7.00 =	5,261	" =	36,827
				88,665		$ 1,046,022.

Average content per ton $11.79.

"With the foregoing explanation, we will now list briefly the specific patented properties within the group with the names of these claims or property and the acreage:

NAME OF CLAIM OR PROPERTY	ACRES
Columbia quartz	20.66
Appomattox quartz	19.23
Cyclone Consolidated quartz	25.45
Old Middleman quartz and Tin Horn quartz	32.65
Tin Horn mill site	1.75
Lieu selection #3521 (The Dalles 026766)	120.00
# 817 (The Dalles 023714)	159.24
Consolidated Fraction (Tabor Fraction)	2.30
North Pole quartz	20.35
Williams quartz	3.06
Raging Roland quartz	11.59
Louise Consolidated placer	36.25
Central placer	39.95
North Star quartz	20.36
Baring Consolidated placer	205.00
More or Less quartz	18.98
Blue Mountain quartz	7.55
Villard quartz	20.66
Bear Consolidated quartz	47.75
Majestic quartz	19.58
Hydraulic placer	59.95
South Pole and Evans quartz	37.53
The Yankee Jack and the south 358.6 feet of the Yankee Jim quartz	5.50
Bismark Consolidated quartz	42.72
North Star No. 2 quartz	19.91
Gold Dollar quartz	0.89
Anniversary Consolidated quartz	52.73
Homestake and Golden Gate quartz	26.01
Eureka quartz	20.66
Eureka mill site	4.99
Excelsior quartz	20.66
Afterthought quartz	20.06
Shyster Consolidated (Shyster and Blackmailer quartz and Shyster mill site)	26.32
Tamarack placer	160.00
Excelsior No. 2 quartz	17.38
Webfoot placer	16.70
Willamette placer	6.56
Small Hope placer	20.00
Northern Consolidated placer	44.38
Cracker and Oregon Consolidated quartz	41.16
Sampson Consolidated quartz	59.14

The total acreage contained in the patented properties is 1535.58 acres according to the official survey.

"The unpatented claims included in the group, with the names of the claims and the volumes and pages of the Records of Quartz or Placer Locations of Baker County, Oregon, where the location or amended location notices thereof are recorded, are as follows:

"NAME OF CLAIM	BOOK	PAGE
Hanover No. 1 quartz	37 (Quartz)	497
Hanover No. 2 "	37 "	499
Hanover No. 3 "	37 "	500
Hanover No. 4 "	37 "	501
Hanover No. 5 "	37 "	503
Hanover No. 6 "	37 "	504
Hanover No. 7 "	37 "	505
Hanover No. 8 "	37 "	507
Hanover No.10 "	38 "	220
Hanover placer	E (Placer)	90
Fool Creek placer - original location	F (Placer)	369
amended location	L "	455
Hardy placer	L "	280
Cracker Creek No. 1 placer	L "	278
Cracker Creek No. 2 "	L "	277
Cracker Creek No. 3 "	L "	276

"I would be unable without doing a great deal of work to give you the acreage in the unpatented claims. This is for the reason that in a number of instances in the case of the quartz claims they are located over patented property so as to preserve extra-lateral rights, etc., excluding the surface conflicts, so that while the location notices call for full-sized claims, 600 x 1500 feet under their exterior boundaries, the actual acreage not within the boundaries of other locations might be relatively small. Offhand I would say, however, that there is probably between two or 300 acres of new ground within the boundaries of the unpatented locations. These unpatented locations, from the standpoint of an operator, are valuable principally for the reasons above set forth. All of the claims along the main lode, excepting for one very small fraction are covered by the patented locations.

"Title to all of these properties stands in the name of Cracker Creek Gold Mining Company, a Delaware corporation. The properties are free from encumbrances, excepting for the Arthur lease and the grazing privileges of F. C. Vaughan, which are mentioned in more detail in a letter regarding terms, etc., addressed to you this date.

"With regard to the titles, I will say that during the year 1939 and the early months of 1940, at the time when the properties were set up and turned into the consolidation, and in connection with the lease held by Colonel Campbell,

a great deal of title work was done by our firm upon these various properties. The titles were passed, first, by our firm, for the purposes of the consolidation and conveyance to the Cracker Creek Company, and then at the time of Campbell's lease our work was gone over by Mr. Frank C. McColloch, of the firm of Dey, Hampson and Nelson, 800 Pacific Building, Portland, Oregon, and the titles were approved by him on behalf of Colonel Campbell.

"As regards the unpatented locations, you will of course appreciate that these are held merely by mining locations, subject to paramount title in the United States. At the time of the title work mentioned, we investigated the matter rather carefully and determined that there were no adverse or conflicting locations. Since that time the property has been in continuous possession, first, of Colonel Campbell and then of Mr. Arthur, who have performed a great deal of development work in connection with the main group, which in our opinion would, under the general program of development, which is being adopted for the properties, inure to the benefit of the unpatented claims under the assessment work law, and proper and timely proofs of labor have been filed.

"While I have not attempted to make any check recently, I know of no adverse locations made during the interval or any adverse rights claimed as to any of the properties in our group and I am quite well satisfied that if there were any such we, or our lessee Mr. Arthur and his men would have heard of it.

"Respectfully submitted:

"HALLOCK, DONALD & BANTA,

(SIGNED) By Harold Banta."

HALLOCK, DONALD & BANTA
Suite 201 Sommer Building
Baker, Oregon

"January 17, 1941

"Messrs. Edward T. Knight and J. B. Porter,
Baker, Oregon.

Re: Proposed Lease of Cracker Creek Gold Mining Company Property in the Bourne District.

"Gentlemen:

"This letter is to confirm the subject of our several conversations in connection with the above matter.

"The properties in question comprise the Columbia, Tabor Fraction, E. and E., North Pole, et al, Mines, commonly known as the Bourne Group, are owned by the Cracker Creek Gold Mining Company, a Delaware corporation, and the officers of this company are situated in Portland and Minneapolis. However, our firm has acted as local attorneys for the company ever since its organization, our Mr. Donald is a director and the members of our firm are minority stockholders, and we have been more or less entrusted with the local handling of its affairs.

"As regards your own status and the proposed leasing of the property to parties whom you may interest, we will say that while the final leases will have to be executed by the proper officers of the Cracker Creek Gold Mining Company, and the details of the deal worked out with them, we know the company's policies in a general way and are familiar with what may be required and with the general terms upon which they will deal.

"With regard to the present work which you are doing upon the property, in the way of sampling, etc., I will say that we have already notified the officers of the Cracker Creek Company of your activities and are in a position to assure you that during such reasonable time as will be consumed by your present sampling and the preparation and submission of a report to your principals, we will not undertake to deal or negotiate with any other party for a prospective sale or leasing of the mine.

"With regard to the terms upon which the property could be leased, we will say at the outset that as you are aware all of the surface and upper workings are now under lease to Mr. John Arthur for a term of four years, or until May 30, 1944.

We could, if we desired, terminate Mr. Arthur's lease in the event we desired to make other disposition of the property at any time after November 15, 1942, upon giving him notice and making appropriate arrangements for the development work which he has done, etc., but we have no right of termination prior to that time, and the writer, frankly, would not feel like terminating it even then unless satisfactory arrangements were made by the prospective operator to take care of Mr. Arthur's interest. Accordingly any lease and option which we might give to your principals would be conditioned at the outset upon your making satisfactory arrangements with Mr. Arthur to take care of his lease. I understand you have already discussed this phase of the matter with him.

"The property is also subject to a grazing lease in favor of one of our clients, Mr. F. C. Vaughan, who is a sheep operator. He has had the grazing rights upon the property for a great many years, and these are very valuable to him because of their relation to the adjacent public domain and his other holdings. His grazing lease provides that the grazing privileges shall not be conducted in such a manner as to interfere with mining operations being conducted thereon, and that he will keep his sheep away from and will not contaminate any stream, etc., which may be used for drinking purposes. Accordingly these grazing privileges would not in any way, we believe, interfere with or embarrass any mining operations, but we desire to mention them at the outset in order that you and your principals would be informed of their existence.

"Except for these two matters the property is entirely free from encumbrances or outstanding commitments.

"At the outset, in dealing with this property our company has taken the position that it would only deal with the ultimate principals who were financing the venture, and would not give contracts to any engineer or promoter, and accordingly in dealing with your parties you would, when you are ready to deal, have to furnish us with the names of the principals who were backing you in the venture, and the lease would run directly to them, after our company's officials had had an opportunity to investigate and satisfy themselves as to the experience and financial responsibility etc., of the proposed lessees.

"The present Arthur lease provides for royalties upon a sliding scale, the rate being ten percent upon ore containing values of less than $15.00 per ton; 12½ percent upon ore containing values from $15.00 to $30.00 per ton; and 15 percent containing values of more than $30.00. The royalties are based upon the net smelter returns after treatment charges and the

railroad freight from the point of shipment (either Baker or Sumpter) have been deducted.

"As stated to you here in the office, we realize that after milling operations are undertaken the ore milled will be principally the lower grade in any event, and to simplify the accounting, we believe that our people will agree, in executing a new lease to parties who will put in a milling plant, to a straight royalty of ten percent regardless of the value of the ore.

"The type of contract which would prove most acceptable to them would be a long term lease for 99 years, if desired, so as to give the operators full time to completely work out the mineral resources of the properties, with no purchase price fixed, and the royalties to continue throughout the life of the operation. Under this type of deal there would be no periodic or minimum payments fixed but the owners would take their returns entirely from production. The only requirements on the part of the purchasers would be that they install a milling plant within a reasonable specified period, to be agreed upon, and agree to operate the property upon a substantial basis thereafter.

"The foregoing covers the more essential terms. Other details of course will be worked out by negotiations at the time the lease is executed.

"Trusting that the foregoing will answer your requirements, we remain,

"Yours very truly,

"HALLOCK, DONALD & BANTA

"(SIGNED) By Harold Banta.

In our opinion the owner's terms as stated in Mr. Banta's letter are reasonable. The owners will probably allow the 10 percent royalty to apply on a purchase price, but we are not able to say just what that price would be

THE JOHN ARTHUR LEASE

(d)

As stated in Mr. Banta's letter, all of the mines with which we are concerned, excepting Golconda, are under lease to John Arthur until May 30, 1944.

During the past year Mr. Arthur and four small groups of sub-lessees have done a very substantial amount of dead work, cleaning out caved drifts and raises, re-timbering main haulage drifts, patching up buildings, etc., and had shipped, as of January 1, 1941, about 2,200 tons of old tailings, mill cleanings, and dumps, averaging about $15.00 per ton, and about 3,150 tons of newly mined ore averaging about $22.00 per ton (these new prices) at the smelter.

Mr. Arthur offers to sell his lease on the following terms:

> "$12,000 payable $3,000 at time lease is assigned, balance in eighteen monthly installments of $500.00 each; 10 percent of the net proceeds of the operation until $10,000 has been paid." *

In our opinion Arthur must have spent most of $12,000 putting the mines in shape to work and has done a great deal of work directly beneficial to anyone who may install a mining and milling operation.

We consider his terms reasonable.

The subleases can be canceled on 30 days notice, providing the sub-lessees are compensated for their time and trouble. We estimate that $10,000 will cover that cost if it is decided to cancel. However, it should be remembered that the sub-lessees are in a position to produce considerable high-grade ore during the next few months and that some royalties would accrue to the assignee of the Arthur lease.

Note: Copies of the Arthur lease and a typical sub-lease are enclosed under separate cover.

* After capital has been returned.

ORE RESERVES

(e)

Ore Reserves are divided into Ore In Sight, Probable Ore, and Possible Ore. Only Ore In Sight is considered in this report as the basis for the proposed capital structure.

Values were derived from assay maps prepared by the several engineers who have examined the mines in times past. Random check samples taken by ourselves are shown on Maps 5 to 8 A inclusive.

Ore In Sight: (Blocks 1 to 17, inclusive, see Map # 4.)

This is defined as ore:

1. Remaining within the present workings above water level.
2. Now accessible for sampling.
3. Projected not more than 50 feet from a sampled face.
4. With exposures personally seen and measured by the writers.

Summary, Ore In Sight:

Tons	63,400	
Grade	0.36	oz. per ton gold
	1.0	" " " silver
Gross Value	$844,500	(gold @ 35.00; silver @ 70¢)

Block 1 :

Tons	1,800
Grade	0.34
Dimensions	125' x 50' x 3.6'.

Description:

The block is located immediately below the North Pole No. 1 Tunnel, 700 feet north of the Excelsior north end line. Three separate sets of interval channel sampling are available for the exposure, all of which check closely. No ore can be shown above the level because sampling the back of the cutting-out stope disclosed erratic values. It is very unlikely, however, that further development would fail to expose ore, probably in the footwall.

Unless the block were mined underhand, it would have to be exploited from a raise from an extension of the drift below.

Block 2:

Tons	3,000
Grade	0.30
Dimensions	100' x 100' x 3.9'.

"On the Upper No. 3 level of the Excelsior mine the ore is relatively narrow and largely unoxidized. It lies along the footwall gouge. Mr. Thomas thinks that an average thickness will carry about $12 per ton. In April, 1905, he took fifteen samples at the back of the No. 2 stope below the level. They show an average thickness of 30 inches, and average content of $12.65. On their basis I will reduce the thickness of Block E, which extends from No. 3 tunnel to the presumed base of the glacial debris, to 30 inches. At the northeast end of the ore-shoot the vein narrows, the pay-streak leaves the footwall side of the quartz, becomes reduced to $7 per ton, and then becomes non-commercial. The same structural feature occurs on the Nos. 2 and 1 levels, but further northeast, making a definite northeast rake to the edge of the ore shoot.

"Block E - 400 x 50 x 2.5 feet - $12.00 = 3,846 tons = $46,152.

"Block F lies under the No. 3 tunnel and the back of No. 2 stope. Based upon Mr. Thomas' sampling it may be estimated as follows:

"Block F - 450 x 100 x 2.5 feet - $12.00 = 8,653 tons = $103,836.

"Block G. lies between the Excelsior Upper No. 2 tunnel level and the back of No. 1 stope. In April, 1905, Mr. Thomas took nineteen samples from the back of this stope. They show an average thickness of 41 inches and average content of $9.79. On their basis I will reduce Block G to the following:

"Block G - 500 x 80 x 3.3 feet - $9.75 = 10,153 tons = $98,991.

"Block H represents the low grade material at the end of the stope over Excelsior No. 1 level and I will reduce the thickness to 3 feet, making it as follows:

"Block H - 80 x 190 x 3 feet - $7.00 = 3,507 tons = $24,549.

"This gives a total of ore in reserve in the Excelsior mine above the No. 1 level of 26,159 tons, which may contain $273,528, or about $10.45 per ton. It is rather difficult to understand why stoping in this portion of the mine (with very little from elsewhere) in 1904-5 yielded a mill feed of only $7.15. I might be inclined to cut the average content down, but the $10.45 is in line with the results of stoping in general, in the property, and also as pointed out by Mr. Thomas, if I think that intelligent sampling would require his aid, here are the results of his sampling at the back of the two stopes and why not accept the results?

Description:

This block extends above and below the Clark Drift about 80 feet from the Excelsior north end line. The sampling taken is that of the Campbell-Oregon Co., which seems to have been done with care. Probably somewhat higher results for a longer distance could be obtained by sampling the drift floor. According to A. F. Woodwell of Sumpter, who sampled the first 150 feet of the drift while it was being run about the year 1915, the average value for this distance was 0.68 across 18 to 20 inches.

Some 70 percent of the block would presumably be mined by extending the Excelsior No. 1 Tunnel, the face of which is said to be in ore.

Block 3:

Tons	2,300
Grade	0.28
Dimensions	100' x 50' x 5.8'

Description:

The location of this block is 425 feet in from the entrance to the Excelsior No. 2 Tunnel and the ore is the projection of the back of an old stope. The width and value are the average of the 11 samples taken by the Campbell-Oregon Co., computed by the width times value method.

This ore could easily be dropped down to the Excelsior No. 1 Tunnel through one of the open raises.

Block 4:

Tons	5,400
Grade	0.30
Dimensions	333' x 40' x 5.3'

Description:

Block 4 consists of the back of the most northerly of the Excelsior stopes above the No. 1 Tunnel. The sampling of this exposure by H. W. Turner in 1907, by Jenks in 1922, and by the Campbell-Oregon Co. in 1938 agree with 0.01 Oz. That of Turner is the lowest and is the one taken.

No problems are offered in the mining of this block. The ore could be dropped down the recently re-cribbed raise in the middle of the block, or through a new raise into the unstoped ground immediately adjoining the block on the south. John Arthur says this area will average about 0.28 - however, it was not examined by the writers.

Block 5:

Tons	1200
Grade	0.27
Dimensions	100' x 40' x 4.0'

Description:

This block is located in the Excelsior No. 1 Tunnel 830 feet in from the entrance. It lies below the drift and would presumably be mined from a 150-foot extension of the 68-foot level. The sampling taken, and the only one available, was that of Jenks. The drift floor in this region was sampled more extensively by Basil Prescott in 1934 but his results are not at hand. Since the vein has been stoped above the level very intensively for several hundred feet to the north and south, it seems likely that considerably more ore would be shown by further sampling.

Block 6:

Tons	2100
Grade	0.35
Dimensions	150' x 60' x 3.5'

Description:

The block lies below the Eureka No. 2 Tunnel at the top of the inclined raise now used by the lessees as an ore pass. The stoped out part has been subtracted. Sampling is that of Hal Bradley, the lessee. H. W. Turner's sampling of the same block gave a value of 0.44, but the last figure was discarded by the writers because some 300 tons of high-grade ore has been shipped from the block by Bradley. The ore could be mined without further development and brought out through the incline raise, which is fitted with a 50-ton pocket at the bottom.

Block 7:

Tons	6000
Grade	0.35
Dimensions	360' x 40' x 5.4'

Description:

Block 4 lies below the Eureka No. 1 Tunnel and extends from the Eureka south end line north for 360 feet. The widths and values are those of Turner, who took thirty 80-lb. samples. This ore would probably best be mined by extending one of the levels below and coming up with a raise. The unexplored ground below the block is very attractive for finding additional ore, since it lies in the line of two shoots.

Block 8:

Tons	5600
Grade	0.35
Dimensions	360' x 50' x 4.0

Description:

This block lies above an old rill stope and is vertically above Block 7, with the same horizontal length. Jenks' sampling of the rill stope back was taken. The mined out portion was stoped by Thomas some years after Turner made his examination. It is interesting to note that Jenks' figures closely approximate Turner's drift sampling in the level below. The block is ready for immediate mining.

Block 9:

Tons	2500
Grade	0.40
Dimensions	135' x 60' x 4.0'

Description:

Block 9 rests on top of the south end of Block 8, and extends through to the Eureka No. 2 Tunnel Level. The values used were obtained by Jenks from 16 samples cut in the drift floor. Jenks cut no samples north of the north end of the block and it is possible that additional sampling would disclose another 100 feet of ore. The block would be mined from below as the upward continuation of Block 8.

Block 10:

Tons	2000
Grade	0.44
Dimensions	150' x 40' x 4.2'

Description:

The block lies below the Eureka No. 3 Tunnel and extends for 1500 feet north of a raise which is about 220 feet north of the south end line of the claim. Turner's sampling is used.

Block 11:

Tons	1000
Grade	0.34
Dimensions	70' x 35' x 5.4'

Description:

Block 11 adjoins Block 10 on the south and is the continuation of an old stope. Turner sampled this stope back for an additional 80 feet,

obtaining some high values in the southerly portion. Thomas, however, mined out some of this ore and no proper sampling of the present back is at hand. Turner's sampling is used for the intact part of the block and only this part considered ore. Both Block 10 and Block 11 are ready for mining.

Block 12:

Tons	4900
Grade	0.37
Dimensions	160' x 50' x 8.0'

Description:

This block begins 55 feet above the Eureka No. 4 Tunnel and extends north from the south end line of the claim. It is at present under lease to C. Ingle and is being worked with one machine. Two parallel shoots are being mined, separated by 6 to 8 feet of lower grade quartz. The average of the back all the way across is about 0.40. The full width of the ore is disclosed in the north part of the block only. Because of this, the sampling by the Campbell-Oregon Co. is too narrow, although the values obtained check closely with the present mining.

At present shipping ore of about 10-oz. grade is sorted and dropped down to the No. 1 Tunnel level, while the balance is left as fill. The lessee maintains an excellent shop, timber, and tool shed with a small gasoline compressor at the entrance to No. 3 Tunnel. In his mining, he leaves three tons as fill for every one he ships. The block could be made to yield a large daily tonnage for a mill but it might be advisable to widen the raise now used and to connect it with a raise put up through blocks 8 and 9. This would eliminate three transfers.

Block 13:

Tons	1800
Grade	0.40
Dimensions	160' x 50' x 3.0'

Description:

The two shoots described in Block 12 diverge slightly going toward the south. Blocks 13 and 13A are the continuation of these shoots estimated separately. The hanging-wall shoot connects with the Columbia hanging-wall vein and for the above distance is estimated as Block 13. The sampling is that of the Campbell-Oregon Co.

Block 13A:

Tons	3100
Grade	0.40
Dimensions	160' x 50' x 5.0'

Description:

Block 13 A is parallel to Block 13 but on the footwall shoot. This shoot is unstoped for a greater area than shown but insufficient evidence is at hand to warrant extending the block.

Block 14:

Tons	2400
Grade	0.33
Dimensions	127' x 60' x 4.0'

Description:

This block lies just below the Eureka No. 2 Tunnel Level and adjoins Blocks 8 and 9 on the south. The sampling is that of Jenks. Hal Bradley, one of the lessees, is at present mining on the lower part of the block with one machine. His shipments run between 0.50 and 0.70 oz. and he leaves one ton of fill for every two tons shipped. In the last few days he has opened a face of very promising ore about 5.0 feet wide. The block would be mined from below in conjunction with Blocks 8 and 9.

Block 15:

Tons	8500
Grade	0.40
Dimensions	200' x 165' x 3.3'

Description:

This block, on the hanging-wall vein, begins 73 ft. above the Columbia No. 2 Tunnel Level and extends upward for 50 feet above the present back of the lessee's (Myers) stope. It is a continuation of the shoot included in Block 13. In the upper half of the block the vein is intact, but in the lower, the ore is exposed by five short crosscuts into the footwall of an old stope.

The part lying in the Fraction is largely inaccessible and John Arthur's statements concerning it are taken for lack of other evidence. According to Arthur, the back of his stope when leasing here some years ago assayed 0.60 across 20.0 feet when the stope was abandoned, the values being fairly evenly distributed across the full width, whereas below they had been confined to a narrower, richer streak lying on the hanging wall. This figure is not used in arriving at an estimate for the block because it is out of line with the widths and values in the accessible faces. However, there appears to be no reason to question the statement.

Block 15 could be mined from the Columbia side and the ore trucked to the mill, but a more attractive program would be to re-open the Columbia 100 level from the Eureka side and come up under the block through one of the raises in the Columbia. There is a probability that several hundred tons of ore in the form of fills would be encountered on the way. Myers has just shipped two cars of old fill coming from the lower part of the block which averaged about 1.0 oz. in value. This was mined with very little sorting.

Block 16:

Tons	5000
Grade	0.35
Dimensions	230' x 50' x 5.6'

Description:

Block 16 is defined as the portion of the center vein (Columbia) remaining unstoped above the Columbia No. 3 Tunnel level and extending north about 400 feet from the entrance to the Columbia No. 2 Tunnel. Parts of the block were not measured and the lessee's (Guyer) estimate of the tonnage is taken. The value is based on the lessee's sampling reduced for extra width. Guyer is working on the face exposed just below the No. 2 Tunnel with one machine.

Block 16 A:

Tons	2000
Grade	0.35
Dimensions	215' x 40' x 3.0'

Description:

This block lies on the footwall vein just west of the entrance to Columbia No. 2 Tunnel. The top of the block is exposed by a drift above which the vein has been stoped out to the surface. The exposure has been arbitrarily projected below for 40 feet only, since the extension below this depth is uncertain. Guyer is mining here underhand with one machine and shipping all the ore broken without sorting. His shipments are running about 0.60 and his stoping width averages 2.0 feet.

Block 17:

Tons	3800
Grade	0.32
Dimensions	275' x 40' x 4.5'

Description:

Block 17 lies between the Columbia No. 3 Tunnel and the 100 shaft level. Only the top exposure was seen, although the block could probably be sampled on four sides by repairing the ladders between the No. 3 Tunnel and 100 levels. The statistics for the block were taken from the France assay map.

This ore, together with that in Blocks 16 and 16A, could be mined and brought to the proposed mill through the Eureka No. 1 Tunnel and the Columbia 100 level. The Eureka No. 1 Tunnel is open back to the Columbia north end line and the Columbia 100 level is open for part of the remaining 800 feet. The exact extent of the caved portion is not known, but according to the lessees it is not extensive.

Probable Ore:

The ore blocks in this category differ from those in the Ore In Sight category in only two respects:

1. They were not inspected by the writers.
2. They lie in parts of the mine now under water or in workings blocked by caves.

The ore blocks will not be described in detail but are all listed on the 200-scale longitudinal section map where they are marked Not Now Accessible.

In addition to the ore blocks above, the following is considered as Probable Ore:

1. Old mill tailings from the former operations, which were not visited because of the snow. The figures for tonnage and value are those of John Arthur, who says he has sampled them extensively. The tailings which he shipped to the smelter came from parts of the piles which he remembered to be of particularly high grade and are not indicative of the tailings as a whole.

2. 1500 tons of 0.50 ore which was dropped down a raise between the Columbia No. 2 and No. 3 Tunnels. John Arthur, who mined the ore, is also authority for the statements of tonnage and grade. C. Ingle, who was working for Arthur at the time, confirmed Arthur's statement. This ore was seen in part by the writers. It could be mined in the course of cleaning out the Columbia 100 level.

Summary - Probable Ore: (Blocks P1 to P20, inclusive. See Map No. 4)

	Tons	Grade	Gross Value
Ore Blocks	65,500	0.36	$ 825,000
Tailings	10,000	0.21	75,000
Broken Ore	1,500	0.50	26,000
Total	77,000	0.34	$ 926,000

Possible Ore:

This is defined as ore within the present workings of the mine which it appears likely would be obtained by extending the known ore blocks in the ore shoots further than the 50-foot limit arbitrarily set in the estimates of Ore In Sight and Probable Ore. No exact figure can be derived, but it seems likely that 100,000 tons of 0.30 ore could be mined within the confines of the upper and lower levels. It does not appear likely that this ore would amount to more than 200,000 tons nor be of much higher grade.

In addition to the above, some fills are believed to be certainly ore. From the evidence at hand, it is not possible to arrive at an accurate figure for tonnage and value. However, Arthur states that in his lease on the Fraction he shipped 4550 dry tons and left about 5000 tons of 0.40 grade as fill. The present work by the lessees seems to bear out this figure. It is likely that at least another 5000 tons would be found elsewhere in the workings.

No allowance was made under Possible Ore for any ore that might be found below the present workings. This could only be shown by prospecting and is discussed under Expectations of Ore At Greater Depth.

Summary- Possible Ore:

	Tons	Grade	Gross Value
Ore in Place	100,000	0.30	$ 1, 050,000
Fills	10,000	0.35	122,000
Total	110,000	0.30	$ 1, 172,000

Recapitulation - Ore Reserves:

	Tons	Grade	Gross Value
Ore in Sight	63,400 -	0.36	$ 844,500
Probable Ore	77,000	0.34	926,000
Possible Ore	110,000	0.30	1,172,000
Total	250,400	0.34	$ 2,942,500

It will be noted that no mention has been made of shipping ore which is known to exist. Shipping ore occurs in all the places where the lessees are now working. Most of this would of course be mined as milling ore, but there would be some which it would undoubtedly pay to sack and ship. Longmaid, during his lease on the E. and E. in 1897, reportedly had several men constantly sacking ore in his stopes.

Turner reports shipping ore on the 500 level south of the E. and E. There is also reported to be a shipping streak left in the North Pole No. 3 Tunnel North.

METALLURGY

(f)

No metallurgical tests were performed by the writers, and the data given below are largely from John Arthur and A. F. Woodwell. Both these men are familiar with the ores, have performed repeated tests on them and have at times been in charge of milling operations at the E. and E. and North Pole mines. The tests of Basil Prescott, made during 1933-34, were not available. It is understood that these were made by The American Cyanimid Company and cost about $5000.

The ore is base and is not amenable to direct cyanidation. With flotation alone a recovery of 94% can be obtained, making a 4-oz. concentrate with a concentration ratio of about 12 to 1. Grinding to 85% minus 150 mesh is necessary for the above extraction. These figures are based on samples of what would be typical feed for the proposed mill, the ores coming from several parts of the lode. On the North Pole ores alone, a higher concentration ratio could be obtained. Hewett[1] says the North Pole ore has a ratio of gangue to sulphides of 20 to 1 to 40 to 1.

In the case of the North Pole, there seems to be a greater amount of barren marcasite bordering the ore lenses, but this is not likely to dilute the concentrate provided clean mining is practiced.

The amount of free gold in the Eureka, Tabor Fraction and Columbia ore would probably warrant the installation of a jig, table, or unit cell at the head of the flotation circuit.

The marketing cost given is based on shipping a concentrate with a 6% moisture content. To obtain this a drier would be necessary. The marketing cost comes to $1.76 per ton. This based on prevailing freight rates and smelter charges and gold at $33.50.

The obvious solution to the high marketing cost lies in cyaniding the flotation concentrates and making bullion on the ground. According to Arthur, the ores roast readily and cyanide without re-grinding. After an initial experimental period, it would probably pay to put in such a plant.

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[1] Hewett, D. F., op. cit.

PROPOSED 75-TON PER DAY OPERATION

(g)

Assuming 95 percent running time, or 347 operating days, a 75-ton mill will treat about 26,000 tons of ore per year. Therefore, the 63,400 tons of ore in sight would create an operating life of $2\frac{1}{2}$ years. In selecting the 75-ton plant as the economic size for treating ore in sight, due consideration was given to operating costs per ton and return of capital also expressed as a cost per ton. Treatment of the ores in a smaller mill would cost more per ton; on the other hand the capital investment in a larger plant would be greater than seems warranted by the tonnage in sight.

In our opinion there is good reason to expect that the probable and possible ore bodies will prolong the operating life of the plant far beyond the $2\frac{1}{2}$-year period, but we do not consider that expectation a sound foundation for a larger capital structure.

This report will not attempt to discuss management, but two errors of the past should be noted:

1. Failure to crosscut the vein at reasonably frequent intervals.
2. Failure to employ locally experienced men as mine foremen and superintendents who could readily distinguish between ore and waste.

The estimated cost of engineering the project, acquiring the 99-year lease, rehabilitating the camp, erecting a 75-ton flotation mill, and equipping the mine ready to operate is itemized herewith:

Capital Cost Estimate:

Clean out, repair old buildings, and install new 75-ton flotation mill	$ 38,800
Clean out, repair, and equip mine	18,380
Six-ton truck (for both mine and mill use)	2,000
Telephone line to Sumpter	1,200
Freight	1,000
Main switch board, electrical fixtures, and wiring outside of mine and mill	2,000
Legal fees	1,500
Check sampling, 250 samples cut and assayed	1,500
Metallurgical tests (6 flotation tests)	1,500
Repair Assayer's office and buy equipment	1,000
John Arthur lease($3,000 down and six payments of $500 each)	6,000
Subleases (if cancelled)	10,000
Design of mill	2,500
Option, examination, and report by Knight and Porter	4,650
	$ 92,030
Overall contingencies - ten percent	9,203
Estimated Total Cost	$101,233

"If there were no workings below the No. 1 level, I would say that from the character of the vein and ore and general structural relations there is no reason why large quantities of $10 ore should not extend to great depths on vein; but in view of the fact that the ground has been extensively explored and somewhere there may be an assay map showing what the explored ground actually contains, it would be foolish for me to engage in any speculation as to what has been developed.

"I secured a little collateral evidence. Mr. Melzer gave it as his opinion that if the North Pole Mine were explored at depth, it would be found that in place of ore carrying $12.216 per ton as that mined, it would average $7 or $8 per ton. On the other hand, Mr. Swartley states, in the State Report cited above, that it is 'officially stated that there is 100,000 tons of $10 ore blocked out at three or more sides in the Columbia Mine, and that the conditions with reference to ore on the 900 feet level are identical with those on the 600, 700, and 800 foot levels.' This I infer to imply that in that portion of the lode at least there is no material decrease in grade of ore with depth, after the comparatively shallow zone that has been somewhat affected by oxidation is passed. On the whole, however, I must disclaim any knowledge of what is in the lower levels of the Eureka and Excelsior mines, except that it is obvious that a considerable tonnage of such ore as has been stoped immediately above the No. 1 level must exist immediately below that level. It ought to be comparatively easy to unwater the mine to the Lower No. 2 level.

"I have gained the impression that it is the general opinion that if the three principal properties, the North Pole, E. and E., and Columbia and intervening fractions were combined under one ownership and the metallurgical problem solved, a long and profitable life would be ahead for mining on this great lode. So far as all the information I can get goes, this is probably true. It seems, therefore, that the whole proposition hinges upon the metallurgical problem. It seems obvious that the first move to make is to make another effort to solve that problem. With 85% or 90% saving assured, it is probable that there would be no difficulty in either leasing the mines or working them profitably on company account."

Note: In our opinion the cut and fill method of mining should be used; therefore, no allowance was made in the capital cost estimate for preliminary stoping, because the mine would be ready to produce ore as soon as cleaned out and equipped.

Note: All costs of materials, equipment, and supplies are based on current quotations by local machinery and supply merchants.

Assuming treatment of 63,400 tons of ore over a period of two and one-half years, operating costs per ton are estimated as follows:

Mining	$ 2.75
Milling	1.12
Marketing	1.78
Development, upper workings only	0.75
Administration, including insurance and taxes	0.70
Balance of payment on Arthur lease	0.06
Royalty to owner	1.20
Return of capital - no interest	1.60
	$ 9.96
Estimated average assay value per ton	$ 13.30
Estimated Treatment loss - 7 percent	0.93
Estimated average recovery	$ 12.37
Estimated total cost (first 2½ years)	9.96
Estimated profit per ton before depreciation and income tax	$ 2.41

A SUGGESTED PROJECT FOR EXPLORATION AND DEVELOPMENT AT DEPTH

(h)

We recommend that most, if not all, of the anticipated profits from the 63,400-ton operation be used in exploring the submerged levels and below them.

Two plans are outlined herewith:

(1) Unwater Columbia and E. and E. by reopening the caved portion of Columbia and 200 level and draining south into Fruit Creek; from 200 to 800 level unwater by means of pumps. Approximately 250 feet of drift will connect Columbia 700 and Eureka 500 levels, thus draining E. and E. above the 500 level to the Columbia pump sump.

Raise into blocks of ore left between

(e) Synopsis of Report on Eureka and Excelsior Mine dated November 10, 1922, by Arthur W. Jenks, Mining Engineer, to Mr. James J. Godfrey, President, Mother Lode Mines Co., 29 Broadway, New York City.

From the text of Mr. Jenks' report it is inferred that Mr. Godfrey was considering the purchase of Dr. Snowder's lease on the E. and E., and his option on the North Pole. Presumably, Jenks was employed by Godfrey to examine the mines and report on their worth. Mr. Jenks took 231 samples in the E. and E. workings.

The sense of his report can best be given by quoting the following excerpts:

> "...; by no method of reasoning can the conclusion be avoided that the ore remaining above the tunnel level in the E. and E. property is too low-grade to be worked profitably on a business-like scale. The southern part of the Eureka claim has more ore above $8 than any other portion of the property; but no large operation can be made even there at a profit. In other words Dr. Sowder's proposition is entirely unacceptable in its present form."

> "As the above statement of the mine will probably be vigorously attacked, I will go into certain details. Samples 1 to 34, inclusive, taken by the Salt Lake samplers, average a total value of $6.38, with gold at $20.67, and silver at .60 (Hanks valuation of $1.00 is not justified, as the Pitman Act will soon expire). The gold amounts to $5.84 and the silver to $0.54. The same stope (the southern stope, Eureka level) was check sampled by the Butte men, samples Nos. 129-162 inclusive; these samples averaged $5.93 gold. The widths sampled by the Salt Lake men averaged 45", the widths sampled by the Butte men averaged 46".

> "Mr. John Thomas, Senator Bourne's representative ... repeatedly stated that the ore would run $10 if properly mined, and that the ore would average four feet in width; actually in the Eureka the widths average about 41", and the contents $6."

> "Where possible the samples were taken at ten-foot intervals;..."

> "In ounces the weight of the silver in the assays averages 3.8 times the weight of the gold; that is, every ounce of gold carries with it 3 8/10 ounces of silver."

Of the 231 Jenks samples only 42 were taken on the Excelsior side as follows:

Av. Width	Gold	Silver	Total	No. of Samples
37"	$3.58	$0.24	$3.82	10
44"	4.64	----	----	8
47"	6.01	0.67	6.68	15
27"	5.53	----	----	9

Note: So far as is known the Jenks' samples show the lowest average values of any taken in the E. and E. However, it is observed that at present prices of gold and silver his assays average over $10 per ton.

The text of the report goes on to remark that:

"It is undeniable that properties which have produced up into the millions of dollars are attractive as prospects in depth, when the owners condescend to treat them as prospects. Whether Ladd and Tilton are sufficiently tired to so consider the E. and E., I don't know; there is certainly no tonnage of pay ore in the mine above their tunnel level...."

"In the present state of affairs, Dr. Sowder, as I take it, has no legal standing in the matter; he and Judge Watson have sunk $60,000 and have nothing to show for it except the good will of Ladd and Tilton and of Senator Bourne, who are permitting him time to effect a sale...."

"If the North Pole and E. and E. could be joined in a development company, on reasonable terms, those properties could be resurrected into life, if the ores developed in depth should prove of grade sufficiently high to stand a recovery as low as 85%."

The Jenks' report gives the impression of being written more from the view point of a prospective buyer than that of the examining engineer.

(f) Copy of Report on Metallurgical Tests of E. and E. Ore made in 1922 at the Bunker Hill and Sullivan Mill, Kellogg, Idaho.

These tests were made under the supervision of Mr. Roy Handy, Mill Superintendent at Bunker Hill & Sullivan:

"Kellogg, Idaho
"June 14th, 1922

"Hon. Jonathan Bourne, Jr.,
Washington, D. C.

"Dear Senator Bourne:

"Here are reports from our testing department upon a sample of 200 pounds each of oxidized and sulfide ores sent us by Mr. John Thomas from the Bourne Gold Mines Company, under date of May 2nd, last. These results speak for themselves and you will note indicate rather favorable results; extractions are high and the resulting product of good grade. The milling process is, however, not a simple one or a cheap one and would have to be in the hands of skilled metallurgists well provided with necessary equipment as the work involves both cyanide and flotation treatment. The results are given in rather complete detail and Mr. Handy's remarks or conclusions thereon appear on the first sheet. I trust that you will find everything quite clear and if there is a further detail which you would like to have, I will see that it is promptly furnished.

"I trust that you are enjoying your usual good health. I may have the pleasure of seeing you at Washington later in the year as I will probably be in Washington and New York for a short visit sometime before the Holidays.

Cordially yours,

(SIGNED) Stanley A. Easton."

"B. H. & S. M. & C. CO. - MILL TESTS

"Description of Test on sample of ore from Bourne, Oregon.

Tested by E. H. Date - 5/22

"Remarks and Conclusions: The tests indicate that 80% is the highest recovery that could be possibly expected from flotation and it is doubtful whether this could be maintained in practice. The concentrates from flotation will assay about 4.50 oz. gold and 18.00 oz. silver.

"The cyanide tests indicate that a high recovery can not be made on the raw ore. By roasting the ore first no doubt a high recovery can be made; this should also apply to the flotation concentrates.

"By a combination of flotation and cyaniding the flotation tails an extraction of 95% can be expected.

"The best results obtained from flotation were by using about 4 lbs. per ton of sodium sulphide; general Naval Store #26 oil to which a very small quantity of pine oil was added.

"The tests are given in detail on the following pages:

B. H. & S. M. & C. CO. - MILL TESTS

"Description of test made on samples of gold ore from Bourne, Oregon; Samples by John Thomas, supt.

Tested by E. H. Date 5/22

"Sample No. 1 Oxidized ore assayed 0.46 Oz. Au & 2.00 Oz. Ag
Sample No. 2 Sulphide ore assayed 0.42 " " " 2.20 " "

"Flotation test on sulphide ore after grinding to pass 200 mesh. Added about 8 lbs. per ton sodium sulphide, pine oil and Ex. Sol. creosote.

									%Au	%Ag
"B 12	Concentrates	36.0	gms @	4.00	Oz.	Au.	18.4	Oz Ag	78.2	83.4
"B 13	Tailings	400.00	"	0.10	"	"	0.6	" "	21.8	26.6
									100.00	100.00

"Preliminary cyanide test on mixture of equal parts of Sample No. 1 and No. 2.

"To 100 gms. added 200 c.c. of 27/100% KCN solution and in bottle 36 hours.

"Heads assaying 0.43 Oz. Au.
"Tails " 0.28 " "

Extraction 34.8%"

B. H. & S. M. & C. Co. - - MILL TESTS

"Description of Test on ore from Bourne, Oregon, continued.

Tested by E. H. Dated 5/22

"Flotation test on oxidized ore (sample #1). Ground to pass 150 mesh. Added crude pine oil and sodium sulphide. Concentrate was clean but voluminous.

"B-42 Conc. lost
"B-43 Tails 490.0 gms @ 0.18 Oz. Au.

"Flotation test on sulphide ore; ground to pass 150 mesh with 5 lbs. sodium sulphide per ton, pine oil and very small amount pine tar oil.

				% of Au in Products	% of Silver Products
"B-52 Conc.	42. - @	3.13 and	16.2	74.45	79.1
"B-53 Tails	450. - "	.10 "	0.4	25.55	20.9
	492.0	.36	1.75	100.00	100.00

"Cyanide test on flotation tails (B-53). To 100 gms. tailings added 200 c.c. 5.4 lb. cyanide solution. Agitated in bottle for 36 hours.

"B-53 Heads 0/10 Oz. Au. & 0.4 Oz. Ag.
"B-54 Tails 0.06 " " " 0.08 " "

"Extraction of gold 40%. Extraction of silver 80%. 6/10 lb. cyanide consumed to one ton ore."

"B. H. & S. M. & C. CO. - MILL TESTS

"Description of Test on ore from Bourne, Oregon.

Tested by E. H. Dated 5/22

"Combined flotation and cyanide test on oxidized ore. Ground to pass 150 mesh with 3 drops pine oil, 1 drop pine tar oil and 5 lbs. sodium sulphide per ton. Floated about 15 minutes not attempting to make a low tailing.

	Gms.	Oz. Aug.	Oz. Ag.	% of Au in Products	% of Ag in Products
"B-62 Conc.	15.0	4.18	8.36	46.3	
"B-63 Tails	455.0	0.16		43.7	
	470.0			100.0	

"Cyanide test on flotation tails (B-63) to 100 gms. tails added 200 C.C. 5.4 lb. cyanide solution.

"	Oz. Aug.	
"Heads	0.16	
"Tails	0.02	Extraction of gold by cyanide 87.5%
		Total " " " " flotation and cyanide 95.6%.

"Flotation and cyanide test on mixture of equal parts of sulphide and oxidized ore. Ground to pass 100 mesh with 4 lbs. per ton of sodium sulphide, G.D. s#26 and a little Pine oil. Time 15 minutes.

		Oz. Aug.	Oz. Ag.	% Au.	% Au.
"B-72 Conc.	35.0	4.04	17.04	63.4	62.2
"B-73 Tails	452.0	0.18	0.80	36.6	37.8
				100.0	100.0

"Cyanide test on flotation tailings (B-73) to 100 gms. tailings added 200 c.c. 5.4 lbs. cyanide solution. Agitated in bottle 44 hours.

"This estimate may be considered the maximum possible, as it is not likely that Mr. Thomas has underestimated in general.

"Block A lies from the Eureka Upper No. 4 tunnel to the outcrop at the top of the hill. In this region the vein is unusually thick and has a hanging-wall and footwall ore streak, each unusually strong. In a stope over the No. 4 tunnel there is an impressive showing of ore. In a width of 20 or more feet there are two strong but irregular bands of ore that may aggregate a thickness of 15 feet as claimed by Mr. Thomas. Furthermore, the ore is unusually rich in arsenopyrite, so I do not feel qualified to question his estimate that it carries $15.00 per ton.

"Block B comprises a height of 100 feet over the southwesternmost 180 feet of a stope that has been carried up about 100 feet above the Eureka No. 1 level. At the upper edge of the block on the No. 2 level, it appears to me that the stope was rather narrow, scarcely 4.5 feet that Thomas claims. He says, however, that it was unusually good grade ore; say $30 ore. At the back of the stope below he claims 4.5 feet that will average $11 per ton. From these figures I derive an average thickness of 4.5 feet of about $20 ore. I do not at present see any specific reason for discounting these figures. For the remainder of the stope, over which and an extension not stoped I have Block C, he claims only 3 feet of $7 ore, and I am not inclined to question this estimate.

"Northeast of Block C there is a section in which the vein is thin, largely crushed by post-mineral strike faulting and not ore. It is about 100 feet long on the No. 3 level, 160 feet long on the No. 2 level and 380 feet long on the No. 1 level. Thus in general it has a northeastward rake. Beyond it the vein is at first too thin to count as ore, but it soon thickens into my Block D. At the top of that block, there is a stope which yielded 4.5 feet of $12 ore per Mr. Thomas, and at the bottom are stopes for which he claims 4.5 feet of $10 ore. I do not know any particular reason for discounting these figures.

"We have, therefore, for the Eureka mine 5.40 feet thickness of ore aggregating 51,790 tons that may contain $674,618 or about $13 per ton. But as the recent operations have been on the same sections of the mine and the ore averaged only 5.10 feet wide and $11.13 per ton, I will substitute these figures in my ore reserve estimate, getting 48,912 tons that may contain $544,390.

ELLIS MINING COMPANY

Ture and Lizzy -

I have all the new wire I needed and so I put you to a lot of trouble for me when should not have done so,

I got scared and you were the first ones that come to my mind, as you had pulled me out of the ~~whole~~ hole before - Thanks for all the trouble I put you to - Tell you when I see you how I got the new wire with out the Red Tape -

Rex

FORM PD-542 (6-9-42)
REDESIGNED (9-2)

UNITED STATES OF AMERICA
WAR PRODUCTION BOARD

METAL MINES:

APPLICATION FOR SERIAL NUMBER UNDER PREFERENCE RATING ORDER NO. P-56

DATE

NAME OF COMPANY: Ellis Mining Co

ADDRESS: Baker Ore

NAME OF MINE: Bourne Mine, Sumpter

ADDRESS

TO: War Production Board, Washington, D. C.
ATTN: *Mining Branch*

INSTRUCTIONS

To be filled out for each metal mining unit for which assistance under Preference Rating Order P-56 is desired.

1. PRODUCTION OF ORE

	MINE	MILL
CURRENT DAILY TONNAGE	15	
ANNUAL TONNAGE		
1941	7000	
1942 *(Estimated)*	3000	

2. AVERAGE ANALYSIS ORE AND CONCENTRATES DURING LAST 12 MONTHS

CONTENT		CU %	PB %	ZN %	AU. OZ	AG OZ	SIO2%	FE %			
ORE					0.5	2.0	77	3.5			
CONCENTRATES[1]	PB CONCS.										
	ZN CONCS.										
	CU CONCS.										
	OTHER CONCS.										

[1] *If more than one concentrate made, show analysis of each on reverse side of this sheet.*

3. NET DOLLAR VALUE OF MATERIALS SHIPPED IN 1941 *(Dollars)*	4. NUMBER OF YEARS IN PRODUCTION *(Number)*	5. HOW IS MINE DEVELOPED?	6. ORE RESERVES	
		Old mine extensive development	POSITIVE *(Tons)*	PROBABLE *(Tons)*
$ 66,500	3	____ LIN. FT. OF SHAFTS ____ LIN. FT. OF DRIFTS ____ LIN. FT. OF TUNNELS	110,000	

7. IN 1941 WHAT PRODUCTS WERE SHIPPED AND TO WHOM?

A. ☐ ORE
7000 tons siliceous gold ore
Tacoma Smelter, Tacoma, Wash.

B. ☐ CONCENTRATES

C. ☐ METAL

D. ☐ OTHER

8. NUMBER OF EMPLOYEES AT PRESENT 10

9. NUMBER OF SHIFTS OPERATED AT PRESENT PER DAY 1

CERTIFICATION

THE UNDERSIGNED CERTIFIES THAT THE INFORMATION CONTAINED IN THIS REPORT IS CORRECT AND COMPLETE TO THE BEST OF HIS KNOWLEDGE AND BELIEF.

NAME OF COMPANY _____ SIGNATURE OF AUTHORIZED OFFICIAL _____

DATE _____ TITLE _____

SECTION 35(A) OF THE UNITED STATES CRIMINAL CODE, 18 U.S.C. SEC. 80, MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.