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Ans. 12/28/40

GEORGE C. MACKAY
ATTORNEY AND COUNSELLOR AT LAW
SECURITY BUILDING
ST. LOUIS, MISSOURI

December 26, 1940

Mr. Edward H. Wisser
c/o Geological Department
#3 B Latrobe Hall
Johns Hopkins University
Baltimore, Maryland

Dear Mr. Wisser:--

Mr. K. B. Baumgarten is in the office with me at the present time. We have just been renewing old times together. K. B. has furnished me with your address.

I thought you might be interested in a report to the effect that the properties that you examined for us in Grant County, Oregon, known as the Standard Mines, in 1926, have recently been optioned to the United States Vanadium Corporation, which is a subsidiary of the Union Carbide Company. It is the plan of the parties to thoroughly prospect the properties and they have asked for a copy of your report, which we have furnished them.

I thought you might be interested in the above information and we will be only too glad to advise you of their findings. It might be some consolation to a good mining expert to know that his hunches or suggestions of what is or should be in the ground are correct.

Mrs. Mackay and I will probably be down in Baltimore some time next month. She wants to have Walsh look over her eyes. If we do come to Baltimore, I shall look you up and renew my acquaintance.

K. B. joins me in wishing you the compliments of the season.

Sincerely yours,

Geo. C. Mackay

GCM:BB

REPORT

on the

STANDARD MINING PROPERTY

Grant County Oregon

By

Edward Wisser

October, 1926.

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SUMMARY

The Standard mine, formerly a producer of gold, copper, and cobalt ore, is located in Grant County, Oregon, six miles from the nearest supply and rail point, and forty miles from a copper smelter at Sumpter, Oregon, which will probably start operations by the first of January, 1927. The property consists of thirty-four claims, one of which is patented; sufficient work has been done on the others to secure patent.

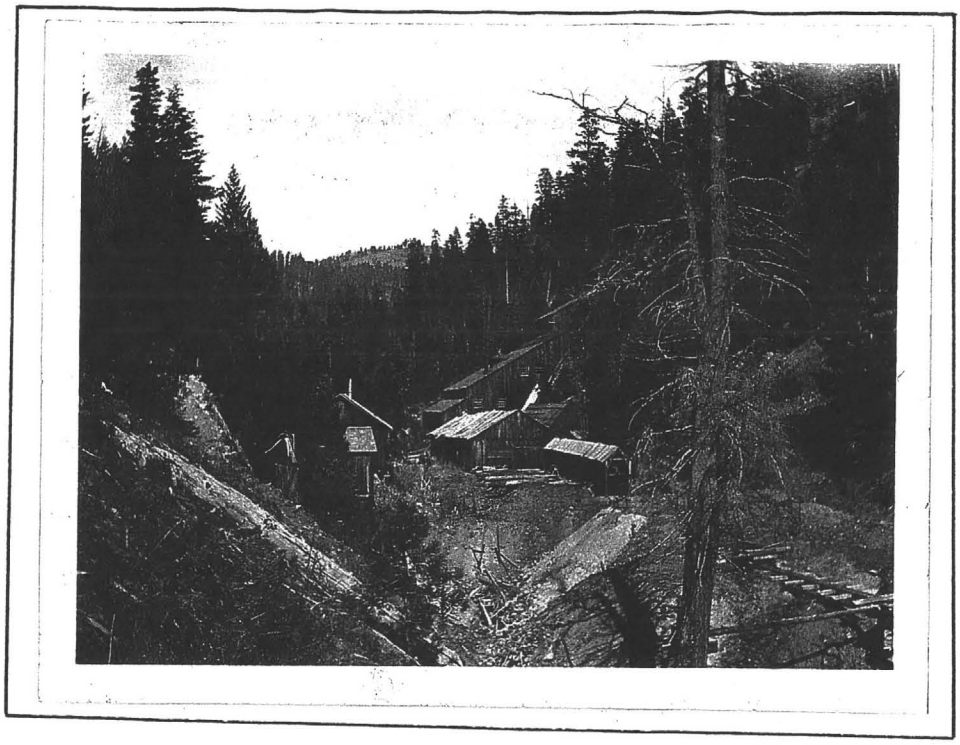
Two veins, the Standard and the Juniper, parallel and about 900 feet apart, carry the ore; both are cut by a third, transverse vein, the Cleveland vein, which carries little ore itself but has localized an orebody at its intersection with the Standard vein. The Standard vein carries principally gold and cobalt, the Juniper principally copper, so far as opened up to date. The dip of all the veins is steep.

The ore occurs in small, narrow lenses, and there is a question whether the grade of the ore combined with its narrowness, will permit of profitable mining. Practically no ore is at present exposed in the mine, but at several places, both on the Standard and Juniper veins, occurs vein-matter which just falls short of being minable ore, and which might open up into ore with a reasonable amount of work expended in exploration.

It is recommended that about $10,000 be spent on these most promising places in the mine in an attempt to open up some measurable ore and thereby render the property attractive to a prospective buyer. At the same time, efforts may start at any time to interest a buyer, with the possibility that a sale may be effected before the whole of the $10,000.00 is expended. A study should be made of the possibilities in marketing the cobalt contained in the Standard ore. At present nothing is paid for cobalt by Western smelters, and a penalty is exacted for any cobalt over 5%. Cobalt is a valuable metal, and if any considerable tonnage of cobalt ore is discovered in the course of development, efforts should be made to interest one of the refineries of cobalt in the United States in either handling the cobalt concentrates or acquiring the mine. Provision must in this case be made for receiving payment for contained gold, because the cobalt arsenide (smaltite) contains nearly all the gold in the Standard mine. The 32 unpatented claims on the property should be patented at once, thereby eliminating for all time the annual $3200.00 assessment work now necessary to hold the claims.

There is a fifty ton concentrating mill on the property, in good condition but of out-of-date design. The crushing and grindigg machinery, orebins, shafts, etc., could be worked into the design of a modern mill, thereby effecting an appreciable saving over the cost of a new mill.

Accommodations exist on the property for an ample crewof men; water is abundant for milling, and sufficient timber is growing on the property to supply the mine for many years.



Mill, Timber Shed, Assay Office, Main Dump.

Juniper Tunnel

LOCATION, TOPOGRAPHY AND WORKING CONDITIONS.

The Standard mining property, formerly a producer of gold, copper and cobalt ores, lies in Grant County, Oregon, in the Quartzburg mining district. The nearest town is Prairie City, where food and ordinary supplies may be purchased, situated seven miles south of the mine, in the valley of the John Day River. Prairie City is connected by a narrow gauge railroad, the Sumpter Valley Railroad, with Baker, Oregon, eighty miles northeast. The claims comprising the Standard property are situated along and east of Dixie Creek, a small stream flowing south and joining the John Day River at Prairie City.

The relief in the vicinity of the mine is rugged; (refer to Plate I) the streams flow in narrow canyons with steep sides, and the intervening ridges are high and narrow. A good growth of yellow pine, sugar pine and fir covers the property. As the average elevation on the property is about 5000 feet above sea-level, the summers are short and cool, the winters somewhat severe, and the snow slow in melting in the spring. Mining operations however can be conducted the year round.

A rather poor road at present connects the mine with the shipping point at Prairie City, but it is now being improved to permit hauling from a granite quarry in operation about one and one-half miles south of the mine, and getting the road in shape from the quarry to the mine would involve only a minor expenditure.

The Standard property consists of one patented claim, the Grover Cleveland, and 33 unpatented claims; the necessary

labor has however been done upon the latter to secure patents.

HISTORY.

The Standard vein, the principal vein on the property, was discovered in the nineties, by local prospectors. In 1904 or 1905 the property was acquired by the Standard Consolidated Mines Co., a local concern; development was pushed on the Standard vein; surface buildings and a fifty ton mill were completed by the summer of 1906 and production started at this time, the concentrates being shipped to the newly opened smelter of the Oregon Smelting and Refining Co., at Sumpter, 40 miles from Prairie City, involving haulage by team for 18 miles, the remaining haul being by rail. During 1906 several shipments of cobalt concentrate were made, and, in fact a separate cobalt concentrate was produced apparently throughout that year, but after the beginning of 1907 no records exist of any separation of cobalt in the mill. Operations continued until the end of September, 1907, possibly a little longer; the mine was then closed down, the company defaulting in its labor payments, and probably in its supply payments also. In November of the same year the Standard Company was taken over by the Comer Mines Co., with headquarters in Chicago (actual sale in August). This company did nothing with the property, and the latter was bought in at a sheriff's sale in 1914 by the late owner. Actual work on the property since 1907 has been limited to the necessary assessment work

($100.00 per unpatented claim per year, or $3300.00 annually).

GENERAL GEOLOGY AND ORE OCCURRENCE.

COUNTRY ROCK:

The prevailing rock exposed on the property is dark and very fine-grained, probably basalt or andesite, and if so, represents a series of old volcanic flows. This series is cut by several porphyry dikes, and about a mile and a half south of the mine, a large mass of granodiorite is clearly intrusive into the flows.

VEIN SYSTEM AND ORE OCCURRENCE:

There are two systems of veins on the property, one striking roughly east-west, the other roughly north-south. (Refer to Plate II) The east-west system is to date the more important from the standpoint of ore occurrence; its veins differ strikingly from those of the north-south system, in structure and mineral content.

The East-West Vein System.

The evidence of movement along fault planes is scarce in the veins of this system; the veins are properly sheeted zones, i.e., groups of close-lying parallel fractures or "walls" with little or no fault breccia or slickensides to indicate movement along them. The two principal veins of the system are the Standard and the Juniper.

Standard Vein:

The Standard vein, which strikes approximately North 75° East and dips from vertically to 70° South, has carried most of the ore produced on the property, and is a typical zone of sheeting, a group of parallel fractures which join and leave each other at frequent intervals. (See Plates III, IV, and V.) The orebodies on this vein occur as lenses along certain of the fractures making up the vein. An ore-lens frequently starts as a mere stringer or veinlet of ore along one fracture, and swells out rapidly as one passes along its strike, either by thickening of the stringer itself, or by the spread of the ore to adjacent fractures, forming many small parallel stringers of ore, separated from each other by narrow bands of country rock. Irregular bunches of ore may form between the stringers. The ore lens thins out in all directions from its center, where it is thickest, and thus has the shape of a double convex lens.

The ore minerals carried by the Standard vein are smaltite ($CoAs_2$, cobalt arsenide), chalcopyrite, and pyrite, with probably other sulphides of iron and copper. The smaltite predominates over the other sulphides in the only orebody sampled, and it carries nearly all of the gold contained in the vein. A typical specimen of impure smaltite assayed $73.59 in gold; smaltite concentrates produced in the mill assayed $150.00 to $200.00 in gold, while the chalcopyrite concentrate assayed only about $10.00 in gold. The amount of silver is so low as

to be negligible.

The principal gangue minerals are quartz and calcite; part of the quartz was deposited contemporaneously with the ore; much of the calcite, and possibly all of it, came later.

Ore and gangue occur along the fractures, mainly as replacements, over a narrow width, of the country rock adjacent to the fractures. While some of the ore is banded and might suggest the filling of an open cavity, inspection shows bands of country rock alternating with veinlets of quartz and sulphides, indicating replacement of the rock by the ore along closely spaced parallel tight fractures. Some true banding and comb-structure occurs, but veinlets showing this are always very narrow, and there is no escape from the conclusion that the Standard vein was at no time an open fissure during ore deposition, except very locally. It was in most places too tight for any extensive deposition of ore. A dense, igneous country rock is not readily replaced by mineralizing solutions, and such replacement is dependent on fracturing to permit passage of the solutions. The orebodies on this vein were clearly localized at points of more intense fracturing, either by an increase in the number of parallel fractures, especially branching fractures, or, as with the orebody at the intersection of the Cleveland and Standard veins, by the shattering of the rock at such intersections.

Juniper Vein:

The Juniper vein, parallel to the Standard and about 900 feet south of it, dips roughly 65° south, but is

locally vertical (Refer to Plate VI). It closely resembles in structure the Standard vein, i.e., it is a zone of sheeting, but instead of carrying principally cobalt and gold, it carries (so far as opened up), principally copper. The ore minerals are chalcopyrite, covellite and bornite; massive pyrite also occurs. The gangue, like that of the Standard, is quartz and calcite, and bears the same time relations to the ore as described above for the Standard vein. The description of the ore occurrence, shape of the ore-lenses, etc., given for the Standard vein, applies as well to the Juniper vein.

Side Issue Vein:

A third vein of the system, the Side Issue Vein, lies about 120 feet south of the Standard vein and strikes parallel to it. It is a complicated zone of fractures and appears to be primarily a copper vein. (Plate VIII).

Other Veins:

Cross-cut 101-2 from No.1 Tunnel exposes at least seven veins parallel to the Standard vein; all show some mineralization, one carrying $9.71 in gold over a width of 4 inches. Heavy deposition of iron sulphate and limonite on two of these veins points to the presence of bodies of pyrite and possibly ore, on these veins, above the level of 101-2 cross-cut. (See Plates II, III)

The North-South Vein System.

The north-south system of veins differs strikingly

from the east-west, both in structure and mineralization. Intense crushing and brecciation characterizes these veins, indicating movement along them; instead of being zones of sheeting, they are generally persistent, well-defined single fissures. Like the veins of the other system, however, they show little evidence of having been open during ore-mineralization. The most prominent vein of the system is the Cleveland.

Cleveland Vein:

The Cleveland vein, striking roughly north-south and dipping from vertically to 60° east, is exposed in the Willie Boy, Johnson No.2 and main Standard tunnels, and probably is the same vein as that cutting the Juniper 275 feet in from the portal of the lower Juniper tunnel. This vein has been followed for a total distance of 800', has a known horizontal length of 1100', and a probable length of 2600'. (Plate II).

The vein generally appears as a narrow zone of crushing, sometimes between definite walls, often with ill-defined boundaries. Alteration of the wall-rock has been intense along the vein; mineralization, on the contrary, is characteristically sparse, consisting principally of scattered pyrite cubes in the matrix of the breccia, which forms the vein. Occasionally the pyrite, and some chalcopyrite, occurs as veinlets in unbroken andesite between the walls of the vein. No smaltite was observed. The vein locally carries considerable gold, as in the Willie Boy tunnel; at only one place

was any noteworthy copper observed along it, namely, at its intersection with the Standard vein, and here actually on a stringer diverging from the Cleveland.

One small gold orebody occurred on the Cleveland vein, stoped from the Johnson No.2 tunnel; (Plate VII) another is said to have occurred between this tunnel and the Standard vein; but for the most part the Cleveland carries values too low to make ore. It seems certain that the Cleveland vein helped localize the ore on the Standard vein at their intersection, and the principal promise of the Cleveland appears to lie in the possibility of further ore localization with one or other of the veins of the more productive East-West System.

Two other north-south veins are cut by the Juniper tunnel; they closely resemble the Cleveland vein.

OXIDATION.

Sulphides occur on all the veins within a foot or so of the surface; some oxidation, principally of pyrite, occurs down to the lowest level reached by mining (nowhere over 300 feet beneath a vein outcrop). Most of the ore is quite unoxidized.

EXPOSURES OF POSSIBLE ORE.

Before an extimate can be made of the amount of ore existent in the mine, the probable cost of production must be determined, in order to arrive at the minimum metal content in the ore which would permit of its being mined at a profit. All vein matter assaying above this metal content would be ore.

PROBABLE COST OF PRODUCTION.

An estimate of probable production cost is little better than a guess where we are dealing with a property long idle and with no neighbouring producing mines upon which to base a comparison. In this case, based on costs at similar mines elsewhere and upon the known wage scale of the district with estimated performance figures, a producing cost of $8.00 per ton is predicted (See Appendix 2). This is based on a daily production of 100 tons of ore. This is approximately the cost of production during operations 20 years ago; since then labor has increased in cost 50% and supplies 60%; but since the production upon which the cost estimate is based is over three times the former rate of production, and since machine drills have greatly improved since then, it is thought that these factors will counterbalance the increased cost of labor and supplies. One item which has served to keep the estimated cost high is the extreme toughness and poor breaking quality of the rock. (Note:- The contemplated reopening of the Sumpter Smelter, 40 miles from Prairie City, on the Sumpter

Valley R.R., by the North Western Smelting & Refining Co., will make possible the shipping of concentrates to Sumpter, and their treatment at the cost included in this estimate.)

A producing cost of $8.00 means that vein matter to be minable ore must have a recoverable value higher than $8.00 per ton. The gross value in an ore is subject to several losses. First, dilution with waste rock during stoping reduces the grade below that shown by a sample. Sorting, either underground or on the surface, may eliminate this loss in the present case, since some of this ore is amenable to sorting. Second, concentration of ore entails losses, and lastly, further losses occur in smelting. It is impossible even approximately to estimate the percentage of the ore contents which is recoverable, without careful tests made on the ore. For the purpose of this discussion, it has been assumed that 70% of the value in the ore is recoverable. This is probably too low for gold and too high for copper, but will serve as a working average.** From this it follows that ore with a recoverable value of $8.00 per ton must have a gross value of 8/.7 or $11.41 per ton. Therefore gold ores must run at least $11.41 in gold per ton to be commercial, and copper ores carrying no gold must carry 81.5 lbs. of copper per ton (4.07% copper), with copper at 14 cents per lb. If the recoverable gold values total $1.50 in the copper ore, the latter must carry 70.5 lbs. copper per ton (3.52%) to be commercial. This gives a rough basis for estimating possible ore. Note:- The cobalt content has been ignored since no information is at hand regarding a market

**See Appendix 4.

for this metal; further, no penalties for arsenic have been considered; they would lower the returns on the ore through reduced payments by the Smelter.

POSSIBLE ORE IN THE STANDARD MINE.

No ore was seen above any of the tunnel levels; many of the upper workings on the Standard vein are now inaccessible because of caving ground and rotting timber; but several of the old stopes were examined, and in no case was any ore left in them or in their backs. To examine these old workings properly would entail a heavy expense in retimbering and cleaning out, and this was not judged to be warranted in view of what could be seen of these workings.

Standard Vein:

As shown on the map of the No.1 Tunnel (Plate III) and on the Section along the Standard Vein (Plate V) samples indicating possible ore occur along the Standard vein over a distance of 70 feet east of a caved portion of the tunnel, and 10 feet west of this cave. (Samples 116 to 130). The caved portion of the tunnel is directly beneath a large stope; the timbers have failed here, filling the tunnel with much muck and debris; to remove this in order to permit of sampling the floor would involve retimbering of the tunnel here to avoid the danger of falls of rock from the stope, and also the removal of several of the other equally bad caves between this cave and the portal; in other words, practically the retimber-

ing of a large part of the No.1 Tunnel. This would involve an expense of a thousand dollars or more and was not attempted.

While a number of the samples run well in gold and cobalt, the average width of vein carrying the values is small; it is doubtful whether underground sorting would be practicable here, due to the mode of occurrence of the ore, in small bunches and stringers. It becomes necessary therefore to reduce the values of the samples to those which would be obtained in carrying a stope on this orebody the necessary width, 3 feet. (Involving the mining of waste rock lying on either side of the ore). As shown in the table below, this limits the possibility of an orebody here to the immediate vicinity of the cave, the two samples on either side of the cave (127 and 128, and 129 and 130) approaching commercial ore.

Sample No.	Width of Sample, Inches	Gold Content Dollars per Ton:		Copper %		Cobalt %	
		Over Sampled Width	Over 3 feet	Over Sampled Width	Over 3 feet	Over Sampled width	Over 3 Feet
116	13	21.49	7.76	0.02	-		
117	14	11.57	4.49	0.53	0.21		
118	4	2.27	0.25	1.09	0.12	0.06	0.01
119	20	0.62	0.34	0.17	0.09		
120	6	2.89	0.48	0.41	0.07	0.15	0.02
121	9	2.48	0.62	0.15	0.06		
122	12	0.82	0.27	0.19	0.06		
123	8	9.09	2.02	0.72	0.16		
124	7	10.53	2.01	0.53	0.10		
125	9	5.78	1.44	1.07	0.27		
126	9	5.58	1.30	1.36	0.34	0.55	0.14
127	25	13.00	9.04	0.36	0.25	2.16	1.50
128	22	20.87	12.79	0.80	0.49	1.45	0.89
Ave. (Caved)	12.2"	9.79	3.30	0.44	0.17	0.94	0.24
129	8	31.42	7.00	0.09	0.02	2.08	0.46
130	7	57.87	11.25	4.97	0.97	1.84	0.36
Ave		43.80	9.14	2.36	0.49	1.97	0.41

Obviously only samples 127-130 show possible ore. The first two, 127 and 128 are separated from the last two, 128 and 129, by the caved stope. It appears probable that the ore is continuous under this stope; evidently it occurred above the tunnel at this place, since it was stoped out; the samples on either side of the stope show consistent values, both in gold and cobalt. It is assumed that the ore is continuous, although quite probably it is not. This gives a body of possible ore exposed on one side for a distance of 100 feet. Averaging the four samples, we have, for the gross value of this ore,

Gold	$10.01
Copper	1.20
Total	$11.21

We have then 100 feet of material here which is just below the limit for commercial ore. (See Appendix 4).

Juniper Vein:

Two bodies of possible ore are exposed in the Juniper Tunnel: one near the present face and the other 140 feet in from the portal. (See Plate VI) Here also the values shown by the sampling must be reduced to those accompanying a stoping width.

POSSIBLE ORE NEAR PRESENT FACE OF LOWER JUNIPER TUNNEL:

Sample No.	Width of sample, inches.	Gold Content, Dollars per Ton		Copper Content % Copper	
		Over Sampled width	Over 5 feet	Over Sampled width	Over 3 feet
J6	24	1.65	1.10	1.60	1.07
J7	11	0.62	0.19	1.36	0.41
J8	20	0.00	0.00	0.26	0.14
J9	27	1.03	0.77	4.98	3.74
J10	34	0.41	0.39	0.43	0.41
J11	34	0.62	0.59	6.53	6.17
J12	25	1.03	0.71	2.96	2.06
J13	26	0.62	0.45	5.00	3.61
J14	24	0.41	0.27	1.60	1.07
Ave.		0.72	0.50	2.98	2.07

This body then is not commercial ore.

POSSIBLE OREBODY, ACOUT 145 FEET IN FROM PORTAL

J21	24	0.41	0.27	3.33	2.22
J22	26	0.41	0.27	6.19	4.47
J23	20	0.20	0.11	1.45	0.81
Ave.		0.51	0.24	3.95	2.59

Allowing an average value for silver of $1.00 based on one assay, the gross value of this material is $8.50, and it is not commercial ore. There is then in all probability, no ore in sight at present in the Standard mine.

TABLE SHOWING TONS MILLED, GROSS VALUE OF ORE, MARGIN OF PROFIT OR LOSS, RECOVERABLE VALUE, COST OF PRODUCTION & STANDARD MINE, 1907.

1907-Month	Tons Milled	Assay Value per Ton Gold $	Copper %	Gross Value in Ore, in dollars Gold	Copper at 20¢ lb.	Total Value in Ore, Dollars	Recoverable Value at 60% recovery	Total Cost, Mining, Milling, Hauling & Smelting	Operating Loss, Dollars.
Jan.	729	2.02	1.30	1471.00	3790.00	5261.00	3159.00	5104.00	1945.00
Feb.	627	1.86	1.36	1168.00	3420.00	4588.00	2759.00	6912.00	4153.00
Mar.	1178	2.45	0.41	2885.00	1931.00	4816.00	2890.00	7218.00	4328.00
April	670	3.16	0.90	2119.00	2415.00	4534.00	2780.00	5884.00	3104.00
May	749	2.32	0.93	1738.00	2782.00	4520.00	2710.00	5935.00	3225.00
June	589	2.38	1.14	1403.00	2683.00	4086.00	2450.00	5526.00	3076.00
July	643	1.98	1.12	1272.00	2880.00	4152.00	2495.00	4614.00	2119.00
August	910	2.12	1.39	1930.00	5050.00	6980.00	4190.00	5148.00	958.00
Sept.	520	1.84	1.09	957.00	2265.00	3222.00	1935.00	4140.00	2205.00
						$25,368.00	$50,481.00	$25,113.00	

SUMMARY OF FORMER OPERATIONS.

The table on the opposite page gives a picture of the results of about 9 months operation of the mine in 1907, all of the ore presumably coming from the Standard vein. It is of course only an estimate; but the assays of the mill heads and tails run so consistently from day to day in the records that I am inclined to believe that the sampling and assaying were good. The tonnage milled is accurate, or at least relatively so, as it is based on actual cars of ore trammed to the mill. Costs also are fairly good, as they are based on an actual count of the labor shifts, together with frequent statements of the cost of supplies found in the original mine and mill reports. Cost of haulage and smelting is based on a report on the mine written in 1907. The most uncertain factor is the percentage of the total value in the ore recovered. See Appendix 4. This table does not cover operations in 1906 as cobalt concentrates were made in that year and nothing is known of the payment received for them. The column of smelting costs also does not cover possible smelter penalties, nor does the column of total value recovered cover these. If there were any, as seems probable, it would only make the operations appear worse. Payment for cobalt by the Sumpter smelter seems very improbable, much more so than a penalty for arsenic. In the absence of smelter settlement sheets we can only speculate on these matters.

A study of this table suggests the possibility that the ore as mined by the old company would not be profitable, even at the present day. The total cost is over twice the total recovered value, and it is doubtful whether present practice could cut the cost in half. Judging by the low value in gold of the mill heads, it is doubtful whether this ore carried a high percentage of cobalt; no assays are at hand to prove this, but the cobalt concentrates indicate a cobalt content of the original ore of about 1%. This amount would not assist materially the grade of ore shown in the table, even were a market found for the cobalt.

PROSPECTS AND LIMITATIONS.

Both the observed mode of occurrence of the ore and the record of past production serve to cast doubt upon the possibility of making this a paying mine. The trouble lies principally in the small width of the orebodies, necessitating the mining of the adjacent wall rock to provide working room in the stopes, with consequent dilution of the ore with waste. This narrowness seems to be a definite habit of the ore, judging from the old stopes which are accessible. The ore-lenses are small in extent, as well as being narrow, but they are quite close together and easily found, and their small size would not be very unfavorable in itself, although it would increase the cost of mining, but the grade of the ore is hardly commercial unless the ore can be mined free from waste, and this is seldom possible because of the meager width of the lenses.

Balanced against the above considerations, we have the fact that results of driving the Juniper tunnel, for the most part a new development, are distinctly encouraging: the Juniper vein is well mineralized and lacks little of carrying profitable ore at several places in the tunnel. A short raise or winze may open up good copper ore at any of these places. In addition, great care is needed in analyzing old records; persistent mismanagement, such as unnecessary dilution of ore with waste, faulty operation of the mill, etc., might produce results such as the old Standard company obtained, from a

narrow orebody which could be mined at a profit with the proper care. Further, occasional gold values are so high on the Standard vein that an attractive possibility exists of opening up lenses which would pay to mine even with dilution. At any rate, the unfavorable past record does not apply to the Juniper vein, since this is practically virgin ground, and merits prospecting strictly on its own merits. Lastly, a series of half a dozen veins close to and parallel with the Standard vein have been exposed by one cross-cut; these veins are all mineralized but no work whatever has been done along them; it appears certain that the Cleveland vein helped localize one of the largest orebodies on the Standard vein, and the advisability of prospecting these parallel veins at their intersection with the Cleveland is apparent.

To summarize, the Standard mine has no commercial ore in sight to show to a prospective buyer; it has however several localities which give promise of being connected with orebodies. A comparatively small expenditure would tell whether or not this was the case.

There are then, two things which may be done by the owners. First, to endeavour to interest possible buyers at once; no particular valuation can be set upon a property with no developed ore, other than an arbitrary valuation, with nothing definite to back it up; and there is no assurance that a sale can be made at all under such conditions. Second, to risk a moderate sum of money in an endeavour to open up some ore: with ore actually measurable on the property, the chances

for a sale, and the price obtainable would be greatly increased.

RECOMMENDATIONS.

It is recommended that the second alternative be adopted, namely that a sum of money be expended in order to prove or disprove the most favorable showings upon the property, with the object of finding enough ore with a minimum of work to make the mine attractive to a possible buyer. It is recognized that those at present in control of the property are anxious to dispose of it, with very good reason; but the great difficulty attendent on selling a mining property even under the best of conditions must likewise be understood. It is true that the large sum now being expended annually on the property can be greatly cut down, by patenting the claims, thereby eliminating the necessity of doing assessment work to hold them; but a caretaker will always be necessary on the property, and taxes must be paid, so that the mine will continue to be a drain upon the estate as long as it is held. There is in my mind not the slightest chance that any real proportion of the money put into the mine can be recovered without the expenditure of the sum recommended; of course there is no guarantee that it will be recovered even by spending this money, but at any rate the doing of this exploratory work should go far toward settling the matter of what to do with the property, whether to go on putting into it the neces-

sary money to hold it, or to abandon it altogether, if no sale can be made during a reasonable time. Of course, even if this mode of action were adopted, no efforts should be spared at all times to interest a possible buyer; a good offer may come along at any stage. In this connection, a study should be made of the possibility of marketing the cobalt from the Standard vein: if a good price can be obtained for this, it would greatly increase the value of any orebodies discovered on that vein; and cobalt may appear in commercial quantities at any time on the Juniper vein. The present situation with regard to cobalt is that no smelter within reaching distance of the Standard mine pays anything for it, and all penalize for the arsenic contained in the smaltite; by discovering some way to market the cobalt, a marked handicap upon the mine may be turned into an asset. If a sizable cobalt orebody were discovered during the recommended development work, it is possible that one of the eastern refiners of cobalt, such as the Electro-Metallurgical Co. of Niagara Falls or the Nichols Copper Co. of New York might be interested in acquiring it. As a matter of fact, the mine is frequently mentioned in geological literature as one of the very few producers of cobalt in the United States.

The amount of work recommended to be done at once may be summarized as follows:

	Cost
A. Preliminary: Clean out caved portion of Standard tunnel between samples 128 and 129, and retimber No.1 Tunnel where necessary	$1000.00
1. Sink 50' winze in ore shoot at this place	1000.00
2. Drive 50' raise in ore shoot near face of Juniper Tunnel	750.00
3. Sink 50' winze in body of 2.6% copper ore exposed in Juniper Tunnel 140 feet in from the portal	1000.00
4. Continue Juniper Tunnel 100 feet	1500.00
Total	$5250.00
Possible Additional work	1000.00
Grand Total	$6250.00

There is a 10x10 power driven compressor on the property; it needs an engine of about 35 or 40 horse power to drive it; allowing for this engine and other incidentals, the probable expenditure to do the proposed work would amount to about $10,000.00, a maximum figure.

It is recommended in addition that all of the unpatented claims of the Standard property be patented at once, in order that the assessment work be done away with, thus enabling the money on development work to be expended without any legal restrictions, and eliminating the necessity of doing any work in the future to hold these claims. The expense of patenting these claims will be about $1000.00.

It will be noted that the total expense of following the above recommendations is about $11,000.00, or less than 4 years assessment work. By patenting the claims at once, the proposed development work would pay for itself in less than 4 years, through elimination of the assessment work.

APPENDIX I.

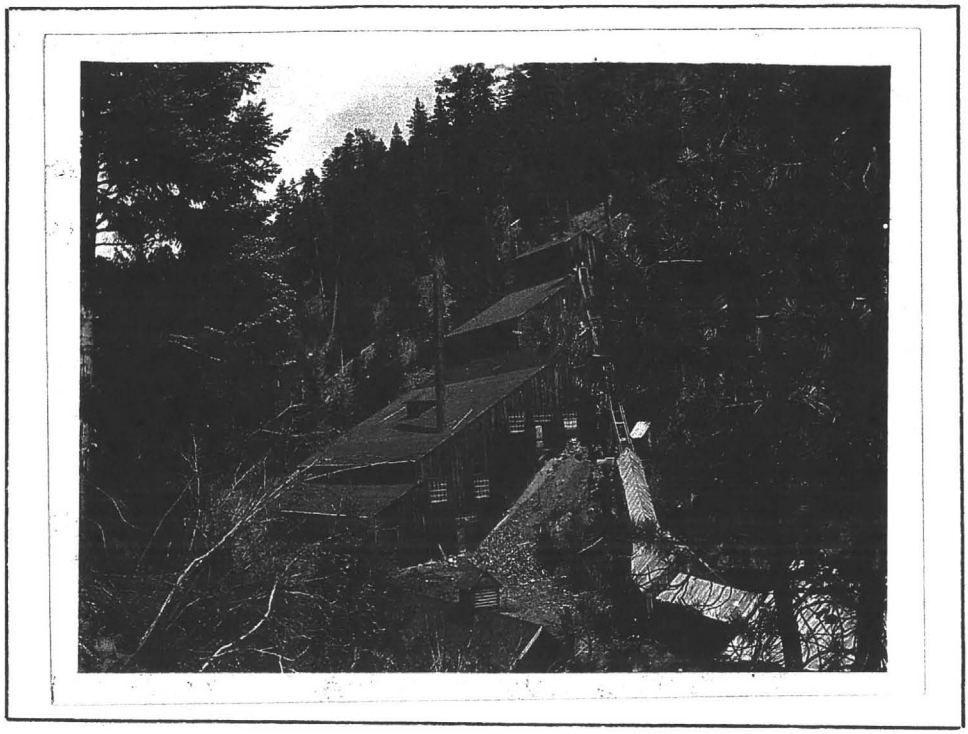
PHYSICAL CONDITION OF THE PROPERTY

UNDERGROUND WORKINGS & MINE EQUIPMENT.

The total footage of underground workings is about 5850', tunnels, (drifts and crosscuts) and 600', raises; of the tunnels, about 3300 feet are in good condition, and 4500' inaccessible for examination. Few if any of the raises are at present in shape.

12 lb. mine rails, for the most part in good condition, are laid in the Standard No. 1, No.2, and No.3 Tunnels, and in the Juniper Tunnel, a total track length of 3450'. There are eight mine cars of various makes, of 12.5 cubic feet capacity, all serviceable. For air compression, there is a 10x10 Laidlaw-Dunn-Gordon Compressor in good shape; also one small Imperial compressor. Some air pipe, quantity unknown. For ventilation a #5 blower, 20" diameter, made by the Champion Blower and Torch Co., driven by a 5 horse power Fairbanks Morse gasoline engine. This is set up and in operation at the Juniper Tunnel. About 700 feet of ventilation pipe is on hand.

A timber shed and blacksmith shop, and compressor room are situated at the portal of No.1 Tunnel; the track from the portal to the dump is covered to permit of tramming in the winter.



Mill

Surface Buildings; Milling Equipment:

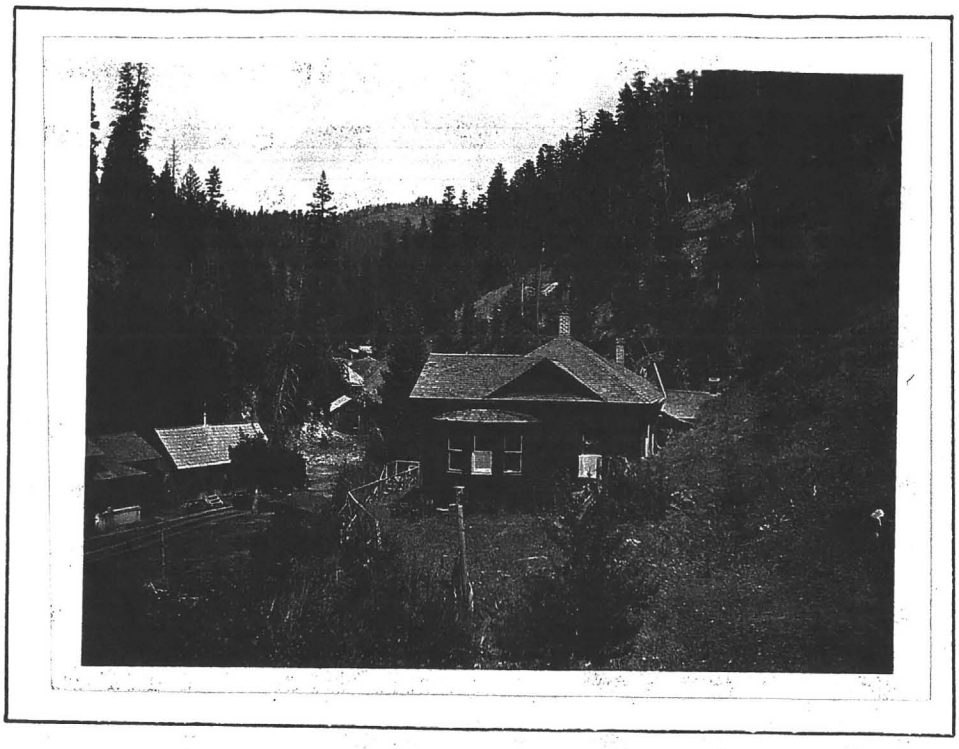
The bottom of the mill is at the same elevation as the No.1 Tunnel, so that the ore from that tunnel was hoisted in a skip of 16 cu. ft. capacity to the mill bins; for this a Union Iron Works Steam Hoist, with two cylinders, 6" x 12" and 12" x 24" drum was used. The hoist is on hand.

Ore was trammed from the No.2 Tunnel direct to the bins.

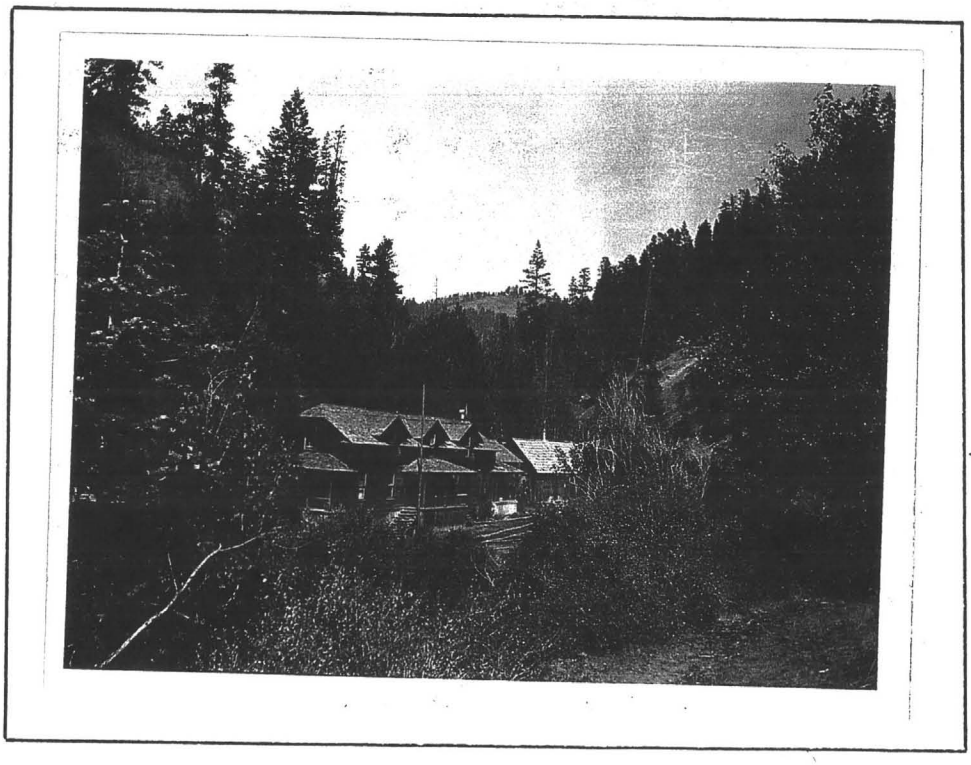
The mill is a frame building, well constructed, and in good condition; it is built in a series of steps on the side of Dixie Creek Canyon (See Photo), permitting the movement of the mill feed by gravity. It contains the following equipment:

1 - Samson Rock Breaker, 22" x 8"
1 - Blake Crusher, 10 x 7, Shaft missing
3 - Sets Allis Chalmers Rolls, 10 x 30"
1 - Bucket Elevator, 8" x 13" buckets
6 - Traylor Jigs
2 - Centrifugal pumps Traylor No.108, Type 35
4 - Wilfley Concentrating Tables 5' x 16'
2 - No.2 Wilfley Slimers
1 - Simplex Table
2 - Callow Settling tanks, 100 diameter
1 - 60" x 16' Half arch point tubular boiler
1 - 70 HP Erie City Steam Engine (furnished power for mill)
1 - Crocker-Wheeler, D.C. Generator, Size 75 F, Type CCP 6½ k.w., 1375 r.p.m. 250 volts at 33 amperes.
2 - Switch boards, with volt meters & ammeters.
1 - 62" Turning lathe; no accessories.
1 - Houston, Stanwood & Gamble Engine. Broken governor, 10 x 12.

(In machine shop - 1 Drill Press).



Superintendant's House. Mill in Background



Boarding House

There is a boarding house and a number of small bunkhouses; a superintendent's house, office, and a well-equipped assay office, all in good condition.

Water Available:

Dixie Creek, which flows through the property was formerly the source of milling water. A rough estimate of its flow in August, presumably its lowest flow, gave 105 gallons per minute; the water measured was not over 75% of the flow at the time. Figuring it at 75% would give a probable flow of 140 gallons a minute. A flow of 100 gallons per minute is equal to 100 x 1440 or 144,000 gallons per 24 hours. For concentration by flotation, 50 tons of water are introduced into the current for every 100 tons of ore milled. With a mill capacity of 100 tons per 24 hours, 50 tons of water would be required per day. 50 tons = 100,000 lbs. of water. 1 gallon weighs 8.36 lbs. 100,000 lbs. = 11,950 gallons, so that ample water is available for milling purposes. The right to use this water formerly possessed by the mine is at present subject to a decision of the State authorities, due this fall, on all tributaries of the John Day River. This matter should be carefully watched, and the necessary proofs of former use advanced when necessary.

Power:

An electric power plant exists in Prairie City; a power line is to be built as far as the granite quarry, 1½ miles South of the mine. Electric power can therefore be introduced at the mine at a reasonable expense.

APPENDIX 2.

ESTIMATE OF PROBABLE COST OF PRODUCTION.

In predicting the probable cost of production, performance figures were estimated, on the basis of a production of 100 tons a day; the mining was assumed to be all above the level of the mill (no hoisting item figured). Labor costs are based on the known wage scale of the district, but supply cost was simply taken as 40% of the total labor cost. The mining method was assumed to be shrinkage stoping, and the tramming by hand over an average distance of about 1000 feet.

Cost for a Daily Production of 100 Tons:

Mining Labor			Total	Per Ton
Breaking Ground,	20 shifts at	4.50	90.00	0.90
Tramming	8 "	" 4.00	32.00	0.32
Timbering	5 "	" 4.50	22.50	0.23
Track & pipe, etc.,	4 "	" 4.50	18.00	0.18
Tool nipper & sanitation,	2 "	" 4.00	8.00	0.08
Blacksmith	1 "	" 5.00	5.00	0.05
" Helper	1 "	" 4.00	4.00	0.04
Foreman	1 "	" 6.00	6.00	0.06
Shaft Bosses	2 "	" 5.00	10.00	0.10
Compressor	2 "	"12.50	25.00	0.25
Assaying, etc.,	1/2 "	" 5.00	2.50	0.02
Superintendent	1/2 "	"10.00	5.00	0.05
Total Mining			228.00	2.28

	Total	Per Ton
Mining Supplies - $228.00 x .4 = 91.00		
Total Mining,	319.00	3.19
Development	100.00	1.00
Grand Total, mining & development,	$ 419.00	$ 4.19
Milling cost (flotation) estimated at $1.50 per Ton,		1.50
Haulage & Smelting (based on data furnished by Northwestern Smelting & Refining Company, & on an assumed ratio of concentration in the mill of 1:10)		1.31
General Expense (Home office, taxes, Workmans Compensation, maintenance & repairs, etc.,)		1.00
Total Production Expense,		$ 8.00

Haulage:

Smelting Data.

The following figures are based on estimates furnished by the Northwestern Smelting & Refining Co., Title & Trust Bldg., Portland, Oregon, who plan to reopen the Sumpter Smelter by the beginning of 1927. This is not a tariff of charges, but an estimate.

Haulage of Concentrates:

Trucking & Loading, mine to Prairie City,	4.00 per ton
Freight via Sumpter Valley R.R., Prairie City to Sumpter,	1.10 " "
Total Hauling,	$ 5.10 per ton.

Treatment Charges:

Ore under $20.00	gross value,	$ 7.50 per ton
20.35	" "	8.00 " "
35-50	" "	8.50 " "
50-75	" "	9.00 " "
75-100	" "	9.50 " "
over 100.00	" "	10.00 " "

No data is on hand concerning the attitude of the Sumpter Smelter regarding cobalt and arsenic, but the Tacoma Smelter of the American Smelting & Refining Company charges a penalty of 25 cents a unit (one per cent) on arsenic; it penalizes a cobalt content greater than 5% at a rate of $3.50 per unit. The cobalt concentrate formerly produced ran about 9% cobalt and 30% arsenic; this would at present be penalized $14.00 per ton for cobalt and $7.50 for arsenic, a total of $21.50.

Suitably mixing the concentrates shipped, the cobalt and arsenic content could probably be kept well below this figure; however, penalties would certainly increase the cost of production above that figures unless a market was found for the cobalt, and this fact should be kept in mind in considering the probable cost of production.

APPENDIX 3.

SAMPLE LIST.

NOTE:- (1) Under "Remarks," the words "lean," "good," etc., refer to the estimate of the probable values in the sample made before assaying. (2) Where no value for a metal is given in the columns, no assay was made for that metal. (3) Abbreviations: Quartz - qtz., Chalcopyrite - ccpy., Pyrite - py., Smaltite, - smal., Andesite - and.

No.	Location	Width inches	Gold $/Ton	Silver Oz/Ton	Copper %	Cobalt %	Remarks
201	#2 Tunnel	11	1.86	1.11	1.50		Qtz.,ccpy.,py.
202	" "	7	1.55	.93	3.08		" " "
203	Cleve.Vein #2 Tunnel,	22	0.20				Disseminated py. in broken and.
10001	#1 Tunnel, Cleve.Vein	18	Trace				
10002	#1 Tunnel, Cleve.Vein	6	"				Pyrite in crushed Zone.
10003	" " "	14	0.20				" " " "
10004	Branch from Cleve.#1 Tun.	10	19.43		1.77		Ccpy.,Py. Good.
10005	4" Sulphide in 10004	4	18.19	6.72	6.19		Ccpy. Good.
110	Branch in No. 1 Tunnel	7	0.41				Py.in crushed And. & Qtz.
111	No.1 Tunnel Junc.with main Vein	16"	3.92				Crushed & Iron-stained. Lean
112	No.1 Tunnel Standard Vn.	4	0.62		0.24		In Floor; Lean.
113	" " " "	15	Trace		0.02	0.07	Back; Fair
114	" " " "	11	1.24				Floor; Lean.
115	" " " "	12	0.20		0.35		Floor; Fair
116	" " " "	13	21.49	0.06	0.02		" "
117	" " " "	17	11.57		0.53		" "
118	" " " "	4	2.27	.49	1.09	0.06	" stringer ccpy.,smal.,& py.

SAMPLE LIST -- Continued.

No.	Location	Width inches	Gold $/Ton	Silver Oz/Ton	Copper %	Cobalt %	Remarks
119	#1 Tunnel, Standard Vn.	20	0.62		0.17		Floor; Lean.
120	" " "	6	2.89	0.06	0.41	0.15	" Good
121	" " "	9	2.48		0.25		" Rather lean Cal. in gangre chalcopy.
122	" " "	12	0.82		0.19		Floor; Lean
123	" " "	8	9.09	0.62	0.72		" Good
124	" " "	7	10.33		0.53		" Fair
125	" " "	9	5.78		1.07		" Fair, partly oxidized
126	" " "	9	5.58		1.36	0.55	Floor Fair, ccpy.,py. & smal. in strgr.
127	" " "	25	92.61	0.20	0.36	2.16	Floor; Good.
128	" " "	22	20.87		0.80	1.45	Floor; Lean.
129	" " "	8	31.42	0.12	0.09	2.08	Back Good. Vein may be wider.
130	" " "	7	57.87	0.40	4.97	1.84	Back Good, Smal.
131	" " "	16	87.03		0.07	2.35	Floor Fair, some Smal. & qtz.
132	" " "	9	1.44		0.02		Floor; Lean.
133	" " "	15	0.82		0.04		" Fair
134	Vein in cross-cut, No.1 T.	6	0.20		0.46		" Lean
135	" " " "	4	9.71		0.43		Fair.
136	Std. Vein, No.1 Tunnel	9	0.82		0.43		Lean.
137	" " "	20	0.20		1.16	0.18	Fair
138	" " "	18	Trace		0.68		Fair
100I1	Intermediate 40' above #1 Tunnel	17	0.20				Pyrite in crushed zone.
W1	Cleveland vein Willie Boy Tunnel	26	3.92	0.41	0.14		Veinlets of chalo. Py., Py., & qtz.
W2	" " "	5	10.74	0.28	0.09		" " " " "
J1	Lower Juniper Tun. Cross-vn.	10	Trace	0.20			Py. in crushed zone
J2	" " "	7	0.20	Trace			Breccia with qtz. & Pyrite.
J3	" " "	12	0.20	"			Scattered pyrite.

SAMPLE LIST -- Continued.

No.	Location	Width Inches	Gold $/Ton	Silver Oz/Ton	Copper %	Cobalt %	Remarks
J5	Lower Juniper Tun. Juniper Vn.	12	Trace				Lean.
J6	" " "	24	1.65	0.38	1.60		Fair Chalcopy
J7	" " "	11	0.62		1.36		Lean
J8	" " "	20	Trace		0.26		Lean
J9	" " "	27	1.03	1.75	4.98		Good chalcopy
J10	" " "	34	0.41		0.43		Good
J11	" " "	34	0.62		6.53		"
J12	" " "	25	1.03	0.53	2.96		"
J13	" " "	26	0.62		5.00		Fair
J14	" " "	24	0.41		1.60		Good
J15	" " "	5	Trace		0.07		Fair. Qtz., Copy. & py.
J16	" " "	4	0.41		0.77		Fair
J17	" " "	6	Trace		0.07		Fair
J18	" " "	9	Trace				Lean
J19	On a parallel vein.	11	0.20		1.36		Good
J20	" "	7	3.30	0.84	3.10	0.36	Good; copy., & pyrite.
J21	" "	24	0.41		3.33		" " "
J22	" "	26	0.41	2.43	6.19		Good; copy., covellite
J23	" "	20	0.20		1.45		" " "
LS 1	Face of small ~~of~~ tunnel, N. end of property	12	0.20				Oxidzed vein matter.
X 1	Johnson Tunnel No.2	12	3.72		0.12		Fair.
X 2	" " "	4	4.54		0.04		Fair.
G 1	Cropping NE of Juneau Shaft	1.5	Trace				Qtz. Limonite stringer.
G 2	" "	10	Trace				Copy. & py. scattered.
SI 1	Side Issue Tun.	2	1.03		1.50		Copy. & cel-cite.
SI 2	" " "	9	Trace				Lean.
SI 3	" " "	1.5	1.65		11.21		Good

APPENDIX 3 -- Continued.

Calculation of average values of samples; where the distances between the samples were uniform, the ordinary method of averaging by the assay-inch method was used.

Example:--

	Juniper Vein		Copper Averages	
No.	Width (Inches)	% Copper as cut	% Copper over 3' stoping width	Width x % Copper (Assay-inches)
J 6	24	1.60	1.07	38.40
J 7	11	1.36	0.41	14.96
J 8	20	0.26	0.14	5.10
J 9	27	4.98	3.74	134.50
J10	34	0.43	0.41	14.63
J11	34	6.53	6.17	222.00
J12	25	2.96	2.06	74.00
J13	26	5.00	3.61	130.00
J14	24	1.60	1.07	38.40
	225	2.98 (Average)	2.07 (Average)	671.99

To get the value reduced to a 3 foot stoping width (Column 4), divide the width X % copper by 36" instead of the actual width cut by the sample.

Where the distances between samples were not uniform, the samples were weighted by volumes instead of widths.

Example:--

Juniper Vein Small Orebody Copper.

No.	Width Feet.	Dist. represented.	Width x Dist.	% Copper	WxD%	3' stoping width			
						Width	Dist.	WxD	% Copper
J21	2.00	12	24.00	3.33	80.0	3	12	36	2.22
J22	2.16	10	21.60	6.19	133.8	3	10	30	4.47
J23	1.67	8	13.33	1.45	19.4	3	8	24	0.81
J			58.93	3.95 (ave.)	233.2			90	2.59 (ave.)

Analysis of Cobalt Ore:

No.1

Mineral Resources, U.S., 1904:

	%	
SiO	47.81	
S2	4.43	
As	20.18	
Fe_2O_3	17.28	
Al_2O_3	0.12	
CaO	2.88	
CO_2	1.94	
Cobalt	6.34	
Nickel	0.75	
Gold	0.17	($81.60 per ton)
Silver	0.0028	
	101.7498	

No.2

Mineral Industry, Vol.XIV 1905, p. 461:

SiO	---	
S2	---	
As	42.66	
Iron		
Al_2O_3	14.93	
(Cal.carb)	6.8	
	9.91	
	0.57	
	1.62 oz.	($33.60 per ton)
	5.2 oz.	

APPENDIX 4.

SUMMARY OF GROSS PRODUCTION, 1906-1907.

Month	Tons Milled	Gross Value in Gold, Dollars	Total Pounds Copper
June, 1906	115	$ 474.00	7230
July, 1906	560	1540.00	18720
Aug. 1906	528	1550.00	18500
Sept.	120	433.00	3600 (?)
Dec.	218	1015.00	4840
Jan. 1907	729	1471.00	18950
Feb.	627	1168.00	17100
March	1178	2885.00	9660
April	670	2119.00	12060
May	749	1738.00	13910
June	589	1403.00	13430
July	643	1272.00	14400
Aug.	910	1930.00	25230
Sept.	520	957	11330
Total	8156	$19,955.00	188960
		= 2.44 in gold per ton	= 23.2 lb. copper per ton. = 1.16% copper.

2.

DETERMINATION OF THE PROBABLE PERCENTAGE OF THE GROSS VALUE IN THE ORE, RECOVERED BY THE OPERATIONS OF 1907.

A. Determination of Ratio of Concentration.

This was possible only in the following isolated cases, where records were complete:

Date	Tons Milled	Concentrates Produced	Ratio, Ore: Concentrates
June 26, 1906,	12	2.27	1:5.29
month of Jan., 1907	729	51.5	1:14
month of June, 1907,	589	66.35	1:8.9
month of August, 1907,	910	67.9	1:13.4

Arithmetical average gives 1:10.4.

Taken as 1:10.

NOTE:--The first date, June 26th, although one day only, was given equal weight with the others, because the records give specifically the pounds concentrate produced on that day, while the concentrates used with the other dates are simply those shipped during the month

B. Percentage of Extraction by Milling (Ore to Concentrates)

Ratio of Concentration 1:10. This means that 1 ton of ore makes 0.1 ton concentrates, and 0.9 ton tailings. The tailing assays are multiplied by 0.9, since they represent only 90% of the tonnage which the mill-head assays represent. This gives the values shown in parentheses in column 3. Assays for gold are given in dollars per ton; copper in % copper.

Date	Heads	Tails	Recovered	%Recovery
6-23-06	Gold 3.20	0.80 (0.72)	2.48	77.4
	Copper 2.20	1.1 (0.99)	1.21	55.0
6-24-06	Gold 3.40	1.00 (0.90)	2.50	73.2
	Copper 2.60	1.3 (1.17)	1.43	55.0
6-26-06	Gold 2.80	1.00 (0.90)	1.90	68.0
	Copper 2.80	1.3 (1.17)	1.63	58.2
Average, June	Gold			72.83
	Copper			56.1
7- 9-06	Gold 4.00	0.60 (0.54)	3.46	86.5
	Copper 2.56	0.82 (0.73)	1.83	71.2
7-13-06	Gold 2.40	0.40 (0.36)	2.04	85.0
	Copper 2.11	0.31 (0.28)	1.83	86.6
7-17-06	Gold 3.60	1.60 (1.44)	2.16	60.0
	Copper 2.10	0.71 (0.64)	1.46	69.5
7-29-06	Gold 4.00	0.40 (0.36)	3.64	91.0
	Copper 3.10	0.75 (0.67)	2.43	78.1
Average, July.	Gold			80.6
	Copper			76.3
1- 8-07	Gold 2.07	0.41 (0.37)	1.70	82.0
	Copper 0.70	0.28 (0.25)	0.45	64.1
Ave. June	Gold			82.0
	Copper			64.1
6-11-07	Gold 2.90	0.62 (0.56)	2.34	80.6
	Copper 1.68	0.70 (0.63)	1.05	62.5

Date	Heads		Tails		Recovered	%Recovery
6-12-07	Gold	2.07	0.83	(0.75)	1.32	63.6
	Copper	0.82	0.43	(0.39)	0.43	52.5
6-14-07	Gold	2.90	1.03	(0.93)	1.97	68.0
	Copper	2.67	0.51	(0.46)	2.21	82.8
Ave.June	Gold					70.7
	Copper					65.9
7-10-07	Gold	2.07	0.41	(0.37)	1.70	82.2
	Copper	0.62	0.21	(0.19)	0.43	69.3
7-17-07	Gold	2.07	0.61	(0.55)	1.52	73.4
	Copper	1.22	0.60	(0.54)	0.68	55.6
7-21-07	Gold	4.14	0.61	(0.55)	3.59	86.8
	Copper	1.82	0.43	(0.39)	1.43	78.6
7-30-07	Gold	2.48	0.21	(0.19)	2.29	92.4
	Copper	1.69	0.29	(0.26)	1.43	84.6
Ave.July,	Gold					83.7
	Copper					72.0
8- 7-07	Gold	5.80	0.61	(0.55)	5.25	90.5
	Copper	0.89	0.47	(0.42)	0.47	52.8
8-15-07	Gold	1.45	0.41	(0.37)	1.08	74.5
	Copper	1.45	0.68	(0.61)	0.84	57.9
8-25-07	Gold	2.48	0.41	(0.37)	2.11	85.0
	Copper	1.31	0.33	(0.30)	1.01	77.1
Ave.Aug.	Gold					83.3
	Copper					65.6
9- 9-07	Gold	1.46	0.41	(0.37)	1.09	74.6
	Copper	1.02	0.64	(0.58)	0.44	43.1
9-19-07	Gold	1.24	0.41	(0.37)	0.87	70.2
	Copper	1.30	0.49	(0.44)	0.86	66.3
Ave.Sept.,	Gold					72.4
	Copper					54.7

Summary, % Extraction of Mill (Ore to Concentrates)

	% Gold Recovered	% Copper Recovered
June, 1906,	72.8	56.1
July 1906,	80.6	76.3
Jan., 1907,	82.0	64.1
June, "	70.7	65.9
July, "	83.7	72.0
Aug., "	83.3	62.6
Sept., "	72.4	54.7
Average,	77.9	64.5

C. Percentage recovered of the gross value in the Ore, 1907. Based on 78% gold recovery in the concentrates, and 64% copper recovery. Ratio of Concentration, 1:10.

Total Tons Milled, 1907,..... 6615 Tons.

Gold per Ton, 2.26,

Total Gold Value, $14,943.00

Copper 1.03%,

Total Copper Value, 136,070 lbs. at 20¢ per lb., 27,214.00

Total Gross Value, $42,157.00

Recovered in Concentrates:

Gold, $14943 x .78 $11,650.00

Copper, 136,070 x .64 = 87,100 - lbs.

Payment Received for above:

Gold, full assay value at 20.00 an ounce,	$11,250.00
Copper, 1 unit deducted from % copper in concentrates, 1:10 concentration gives 661.5 Tons concentrates assaying	
6.6 % cu.	
- 1.0	
5.6 % or 112 lb. Ton	
661.5 x 112 = 74,000 lbs.,	
Payment at 17¢ lb., × =	12,600.00
Total Payment,	$23,850.00
% Recovered, $\frac{23850}{42157}$ = 56.7%	

As the actual concentrates of which assays are rendered (about half the probable total) ran higher than 6.6% copper in 1907, (9.4%) 60% has been taken as the percentage recovered of the gross value in the ores.

3. Probable Percentage Recovered of the Gross Value in the Ore, in future milling (Concentration)

There are two ways of determining the probable percentage of the gross value of the ore recovered in future milling: One is to assume that future ore will have about the relative amounts of gold and copper as that milled in the past. This implies that the Juniper vein, on an average, will have about the same relative metal content as the Standard, and the metal content of both will be similar to that of the ore hitherto milled. The Juniper ore contained no cobalt and the Standard ore no copper, so there seems some basis for this idea.

× Market price less 3¢. 20-3 = 17¢

The probable percentage recovered figured this way is arrived at in Example 1 below, and this has been used for both veins in the text of the report. Another method is to assume that the average assays in gold and copper of the Standard and Juniper veins represent the relative proportion of these metals in future ore. The percentage recovered from either vein figured on this basis is shown in Examples 2 and 3; the resulting minimum assays for ore differ somewhat from those reached by the first method, and some of the material in the Standard Vein becomes commercial ore, but the net value of this ore is inconsiderable and does not alter the conclusion arrived at in the text of the report.

Example 1: In the following example, the ore has been taken as running $5.00 in gold and 3% copper. While this is a much higher percentage of copper than the ore sampled on the Standard Vein carried, it is based on the average ratio of copper to gold of the former mine production. Assume a recovery in the concentrate of 90% of the gold and 75% of the copper; ratio of concentration 1:10. Market price of copper 14¢ per lb.

Assume 10 Tons milled,

Gold per Ton, $5.00	
Total gold value,	$50.00
Copper, 3%,	
Total Copper value, 600 lbs. at 14¢	84.00
Total value in Ore,	$134.00

Recovered in Concentrates:

Gold	50.00 x .9	45.00
Copper, 600# x .75	-	450 lbs.

Payment received for above,

Gold at $20.00 per ounce,	$43.50
Copper, 1 unit deducted from percentage copper in concentrates. 1 Ton concentrate carrying 450 lbs. = 22.5% cu. - 1.0 = 21.5% = 430Lbs. Copper.	
430 lbs. at 11¢	$ 47.30
Total Payment,	$ 90.80

% of Gross Value Recovered,

$$\frac{90.80}{134.00} = 67.7\%$$

Taken as 70%.

NOTE:--No allowance is made here for possible penalties for arsenic nor is the cobalt content of the ore considered. The gold occurs in the smaltite, which is more easily concentrated than the chalcopyrite, so that a higher percentage of extraction is allowed for the gold than for the copper. This checks with past experience on the property.

Example 2: For an ore of the composition of the orebody sampled on the Standard veim, considering gold and copper only, we have

10 Tons milled.	
Gold per ton. $10.01	
Total Gold Value,	$100.10
Copper .43%	
Total Copper Value 10 x 8.6 lbs. at 0.14¢	10.20
Total value in Ore,	$110.30

Recovered in Concentrates:

Gold 100.10 x .9	90.09
Copper, 86 lbs. x .75 =	645 lbs.

Payment received for above:

Gold at $20.00 per ounce,	87.00
Copper, 1 unit deducted from percentage copper in concentrates, 1 Ton Concentrates carrying 64.5 lbs. = 3.27% copper 1.0	
2.27% = 45 lbs. at 11¢	4.95
	91.95

% of Gross Value Recovered,

$$\frac{91.95}{110.30} = 83.3\%$$

D. Example 3: For an orebody of the composition of those on the Juniper vein, the following figures hold:

10 Tons Milled.

Gold per Ton, $2.07

Total Gold Value,	$20.70
Copper. 2.07%	
Total Copper Value at 14¢ per lb., 10x41.4 lb. x .14 -	58.09
Total value in Ore	$78.79

Recovered in Concentrates:

Gold, $20.70 x .9	$18.63
Copper, 10x41.4 x .75 -	305 lbs.

Payment received for above:

Gold at $20.00 per ounce,	$18.00
Copper: 1 Ton concentrate carrying 305 lbs. = 15.2% -1.0 14.2 - 284 lbs. at 11¢ per lb., ...	31.25
Total	$49.25

% of Gross Value Recovered =

$$\frac{49.25}{78.70} = 62.4\%$$

SUMMARY

Example 1: With ore averaging $5.00 in gold and 3% copper, the percentage recovered of the gross value in the ore is 67.7, or roughly, 70%.

Example 2: With ore having the composition of that sampled on the Standard vein, the percentage recovered is 83.3%

Example 3: With ore having the composition of that sampled in the Juniper vein, the percentage recovered is 62.4%.

The percentage arrived at in (1) has been used for both veins in this report.

Using the percentage of Example 2 for the Standard ore, we get the following results:

This ore to have a net value of $8.00 per ton must have a gross value of $\frac{8}{83.3}$ of 9.64 per ton. The gross value of the ore sampled on the Standard vein, not considering either payment for cobalt or penalties for arsenic, is $11.21 per ton, or a net value of $9.34 per ton. This would give a profit of $1.34 per ton. Allowing a length of 100 feet, and assuming that the orebody has the shape of an inverted triangle with an altitude of 50', we have 625 tons at 1.44 per ton, or a net value of $837.00 on this ore. This is of course inconsequential.

For the ore on the Juniper vein, with a percentage recovered of only 62.4, ore to be commercial must have a gross value of $12.81 per ton, or greater than that figured by the first method, so that none of the material in the Juniper Tunnel is ore, and the conclusions in the report are not altered.

APPENDIX 5.

PROSPECTS RECOMMENDED FOR DEVELOPING THE MINE.

The following prospects are divided into 3 groups. Group A covers those offering the least risk, i.e., those showing most promise in developing ore. They form the group recommended to be undertaken in order to make the property attractive to a prospective purchaser. Group B comprises prospects less favorable, but offering good chances for developing ore at small expense. Group C covers more expensive prospects, with less probability of finding ore, but necessary eventually in order fully to develop the tunnel. All of these prospects are intended to be run before sinking a shaft below the level of the No.1 Tunnel; they will about exhaust the possibilities above and just below that level.

GROUP A:

Prospect 1.

(1) Location:-- Standard vein, No.1 Tunnel. At a point whose coördinates are Latitude 5195, Departure 5795, sink a winze down the vein.

(2) Object:-- To explore below the tunnel level, the shoot approaching commercial ore exposed in the floor of the tunnel.

(3) Probable Cost:--50' at $20.00 per foot, $1,000.00.

(4) Remarks:--This prospect is contingent upon the clearing out of the caved area, here disclosing that this shoot of ore is continuous from samples 127 to 130.

(5) Map Reference:-- Plates III. and V.

Prospect 2.

(1) Location:--(Lower) Juniper Tunnel, at a point whose coordinates are Latitude 4140, Departure 5388 (173' E. of cross-cut to the north) drive a raise on the Juniper vein.

(2) Object:--To explore above the tunnel level the shoot approaching commercial ore exposed at this place.

(3) Probable Cost 50' at $15.00 = $750.00.

(4) Remarks:-- The height of this raise will depend upon the ore-showings disclosed. Should the ore pinch out within 50', a winze should be sunk below the tunnel level at this point.

(5) Map Reference:-- Plate VI.

Prospect 3.

(1) Location:--(Lower) Juniper Tunnel, at a point whose coddinates are Latitude 4070, Departure 5060, sink a winze on the Juniper vein.

(2) Object:--To explore beneath the tunnel level the body approaching commercial ore exposed in the floor of the tunnel. The shape of this body is stoped above the tunnel, suggests an increase in size below the Tunnel.

(3) Probable Cost:--50' at $20.00 = $1000.00.

(4) Map Reference:--Plate VI.

Prospect 4.

(1) Location:--(Lower) Juniper Tunnel. Continue ~~through~~ tunnel along the Juniper vein for about 100'.

(2) Object:--To explore the Juniper vein on the Tunnel level.

(3) Probable Cost:-- 100' at $15.00 $1500.00.

(4) Remarks:--When last seen the face of the Juniper Tunnel looked favorable for improvement. Length of prospect depends on ore showing.

(5) Map Reference:--Plate VI.

The following groups are described more briefly; they are merely suggestive for the development of the property.

GROUP B:

Prospect 5.

In the No.1 Tunnel, Cleveland draft, Coördinates Latitude 5105, Departure 5290, sink a winze on high-grade gold-copper stringer.

Map Reference:-- Plate III.

Prospect 6:

In the Juniper Tunnel, at a point where coordinates are Lat. 4105, Dep. 5220, drive a vertical raise.

The book shows ore here.

If this ore pinches above the tunnel, sink a winze from this point down the Cleveland vein.

Map Reference:-- Plate III.

GROUP C:

Prospect 7.

From the No.1 Tunnel drive South about 250' along the Cleveland vein from the present face of the short South drift along that vein. This would reach the intersection of the Cleveland vein with the different veins parallel to the Standard exposed in 101.2 cross-cut.

Map Reference:-- Plate III.

Prospect 10.

From the main No.1 Tunnel, at a point whose

coördinates are Lat. 5250, Dep. 6000, drive South along the 6000 N.S. coördinate, following the steep dipping N-S fracture shown on the map. This may pick up a possible faulted segment of the Standard vein. Map Reference:-- Plate III.

Prospect 8.

From the face of the 1st short drift to the East from 101-2 cross-cut, coördinates Lat. 5090, Dep. 5535, drive a raise, with the object of following upwards the flow of iron sulphate and limonite seen in the drift to a possible oxidizing orebody, above. Map Reference:-- Plate III.

Prospect 9.

From the short drift to the East, 15' back from the face of 101-2 cross-cut, (Lat.4845, Dep.5660) drivea raise with a similar object.

Map Reference:--Plate III.

Prospect 10.

From the location of Prospect 1, in the No.1 Tunnel, Standard Vein, drive a cross-cut to the South, about 50', perpendicularly to the Standard vein.

Object: To explore possible orebody parallel veins. At the intersection of the Cleveland and Standard veins, above the No.1 Tunnel, two parallel ore shoots occurred on prallel fractures. Map Reference:--Plate III.

APPENDIX 6.

LIST OF CLAIMS:

Patented Claim: Grover Cleveland.

List of claims recorded at Canyon City, the County Seat: (From Proof of Labor, 1925).

Standard group:

Willie Boy
Smuggley
Last Chance
Hobo
IXL
Ruby

Copper Ridge group:

Side Issue
Spotted Horse
Black Horse
Morning Glory
Standard

Miscellaneous

John Low
Old Hickory
Pardy
Pinkerton
Baby Loome
Michigan
Copper Ridge No.2
Vidi
Ohio
Ella
Mahogany
Lady of the Hills
Jupiter

Lone Star:

Royal Blue No.1
" " No.2
" " No.3
Redell
Pinkerton Extension
Ohio Extension
Ella Extension.

Other claims shown in the Company map, not in this list:

New Star

Copper Ridge

Pinkerton Extension No.2

Virtue No.2.

I understood from the superintendent that work was being done in 1926 to hold 33 claims, and have given in the report the total number of unpatented claims as 33; apparently work on only 32 was done in 1925.

PLATE III

GEOLOGIC MAP of No 1 TUNNEL
STANDARD MINE
Grant County, Ore.
Scale: 1" = 50'
LEGEND
Vein:
Quartz:
Calcite:
Sulphides:
Limonite + Iron-staining:
Leaching, kaolinization, etc.:
Sample:
No Width Au Ag Cu Co
(2) 12" 21.14 ($) 1.5 (oz) 1.3 (%) 2.2 (%)
To accompany report of E.W.
Sept. 1926
True North
GROVER CLEVELAND CLAIM
Intermediate 40' above floor of No 1 Tunnel.
No 1 Tunnel
STANDARD VEIN
CLEVELAND VEIN
Line of Section
Inaccessible
To Intermediate
Prospect 5 winze
Prospect 7 Continue Cleveland Drift South
Prospect 8 Raise
Prospect 9 Raise
Prospect 10 Drive south along fractures
Prospect 11 Cross-cut
Prospect 1 winze on vein
caved
Bunch of sulphide ore
Replacement veinlets of ccpy
Dense grey Fe-stained fracture faces
Barren
Black, fine-porphyritic
Black fine-grained
Sulphide veinlets Leached rock
Strong walls Vein quartz
Vein strong quartz, sulph
Fe-sulphate depositing
No sulphides found in bottom
Thin sheeting
Quartz, sulphides iron-stain
crshd, leached iron-stain
1" quartz
8" Bull quartz
Narrow, lean, crushing, & leaching
STANDARD VEIN ?
5000
5500
6000
3500

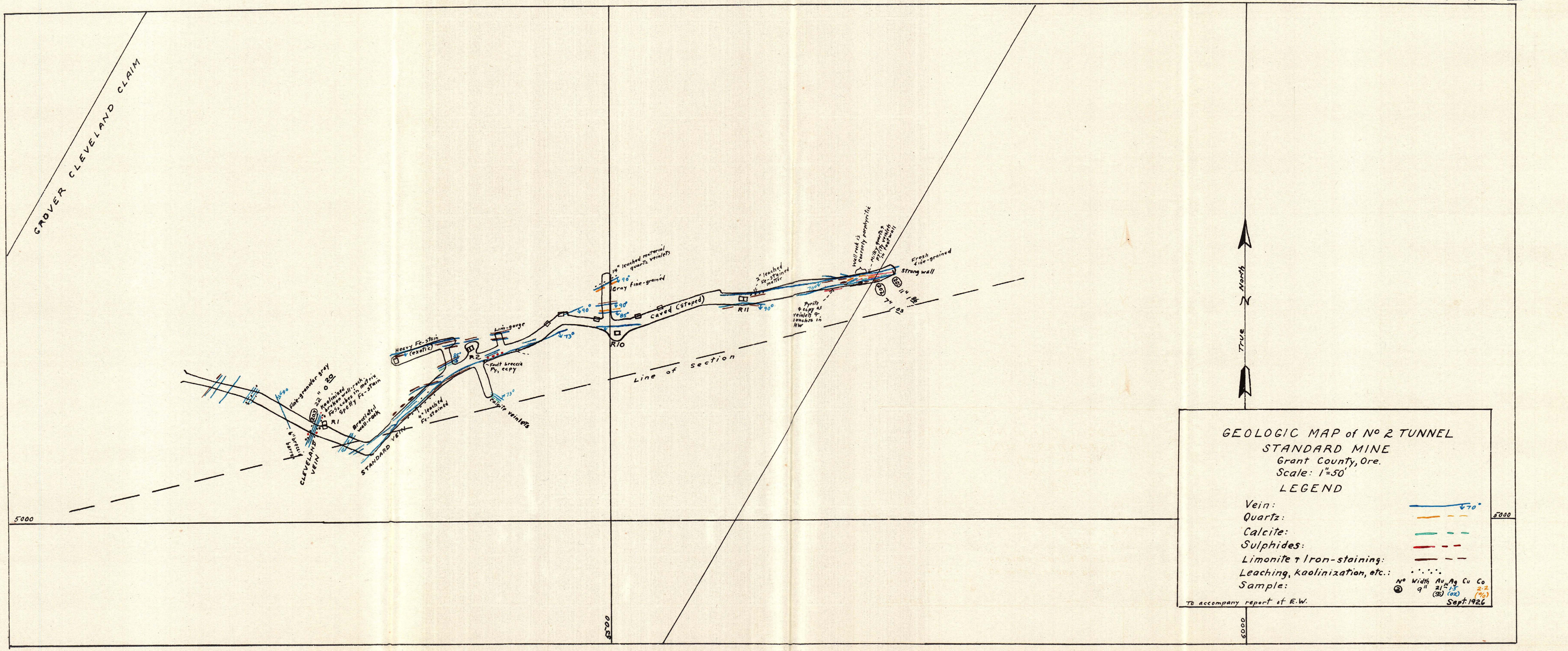
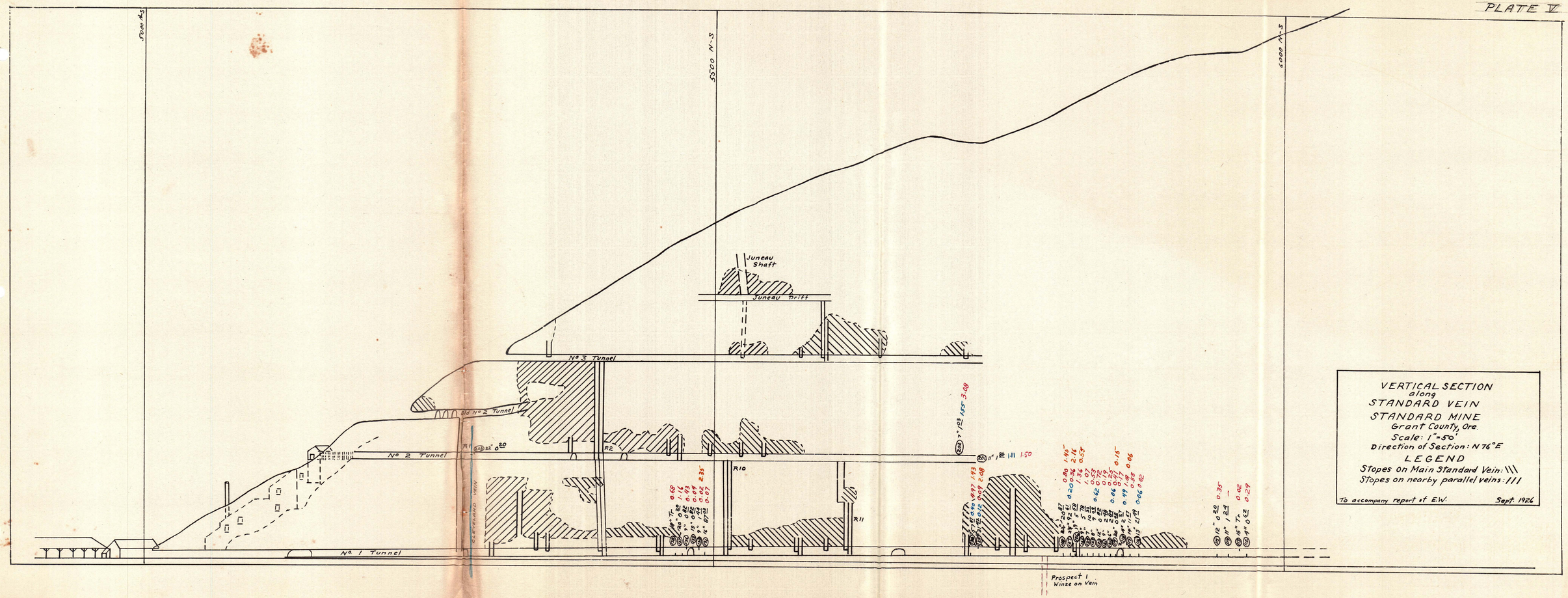

GROVER CLEVELAND CLAIM
Fine-granular grey
22" 0 20
203
Kaolinized broken wall-rock. Fe S2 cubes in matrix Spotty Fe-stain
6" breccia barren
R1
CLEVELAND VEIN
Brecciated wall-rock
STANDARD VEIN
4" leached Fe-stained
Heavy Fe-stain (exotic)
R2
Lim-gouge
Fault breccia Py., ccpy
calcite veinlets
14" leached material quartz veinlets
Gray fine-grained
Caved (Stoped)
R10
R11
2" leached Fe-stained matter
Pyrite & ccpy as veinlets & bunches in HW
Wall rock is coarsely porphyritic
Milky quartz & pyrite veinlets in footwall
Fresh fine-grained
Strong wall
201
202
Line of Section
True North
5000
GEOLOGIC MAP of No 2 TUNNEL
STANDARD MINE
Grant County, Ore.
Scale: 1" = 50'
LEGEND
Vein:
Quartz:
Calcite:
Sulphides:
Limonite & Iron-staining:
Leaching, kaolinization, etc.:
Sample:
No Width Au Ag Cu Co
9" 21 1.5 2.2
($) (oz) (%)
To accompany report of E.W.
Sept. 1926

PLATE V

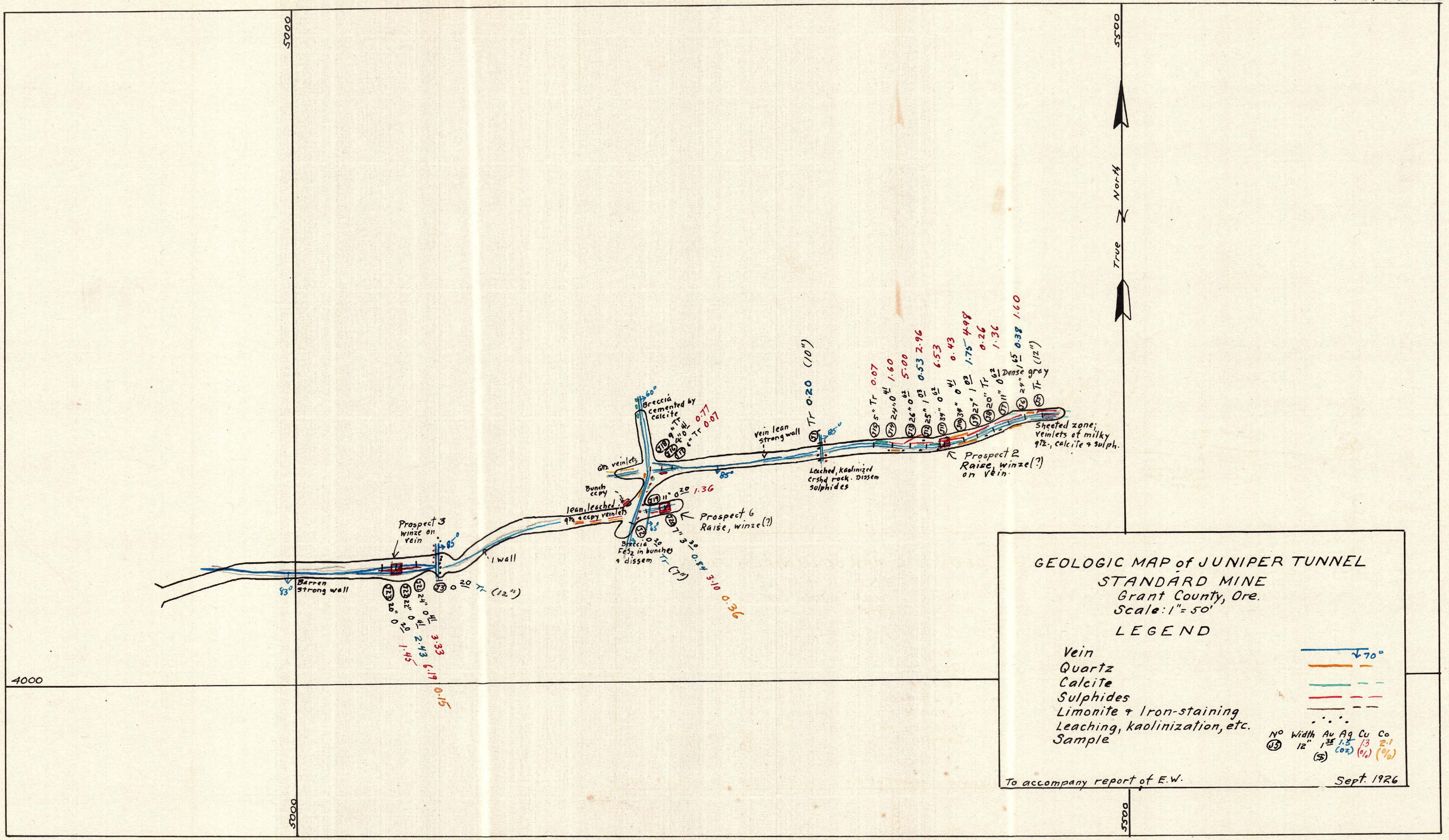


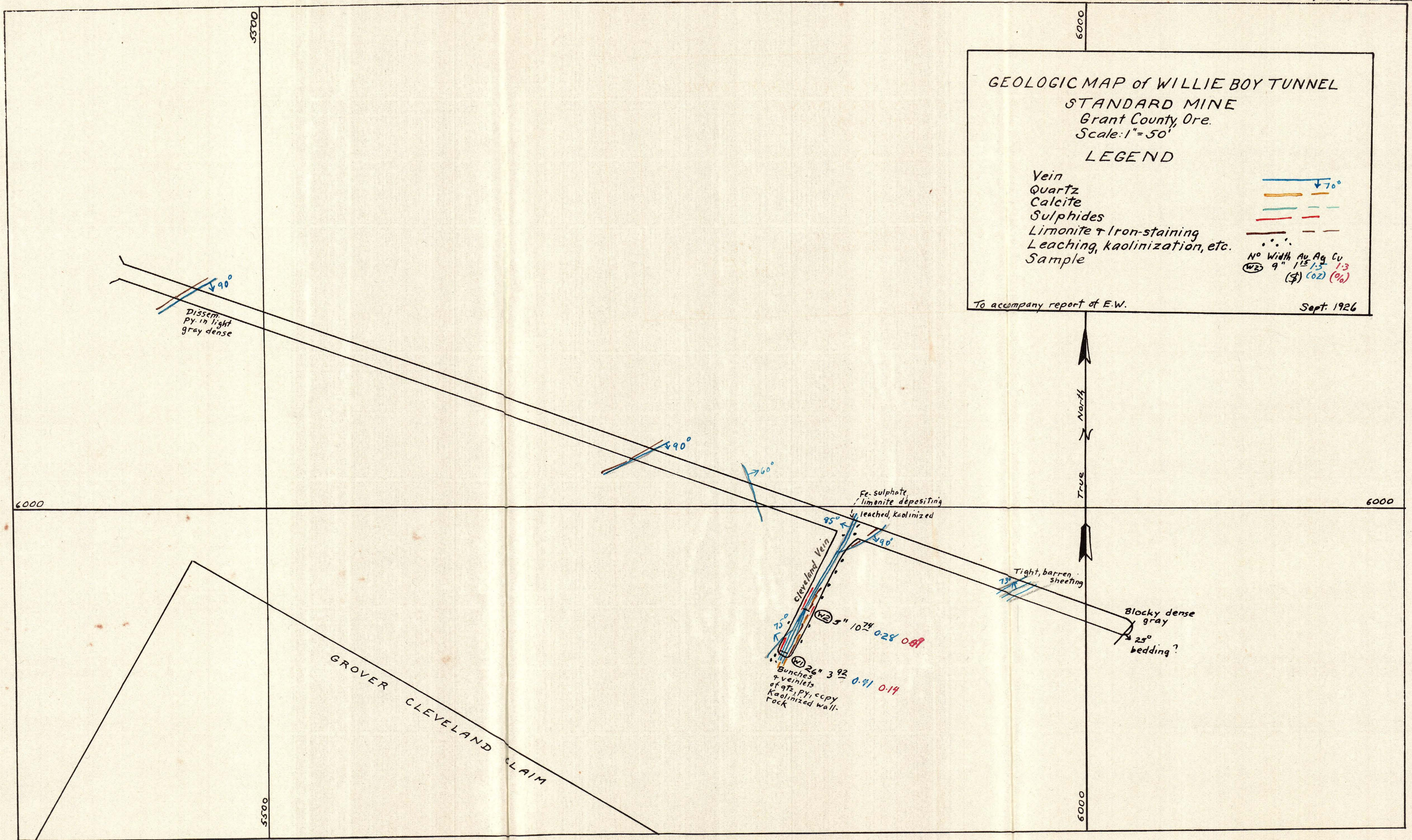
VERTICAL SECTION
along
STANDARD VEIN
STANDARD MINE
Grant County, Ore.
Scale: 1"=50'
Direction of Section: N 76° E

LEGEND
Stopes on Main Standard Vein: \\\
Stopes on nearby parallel veins: ///

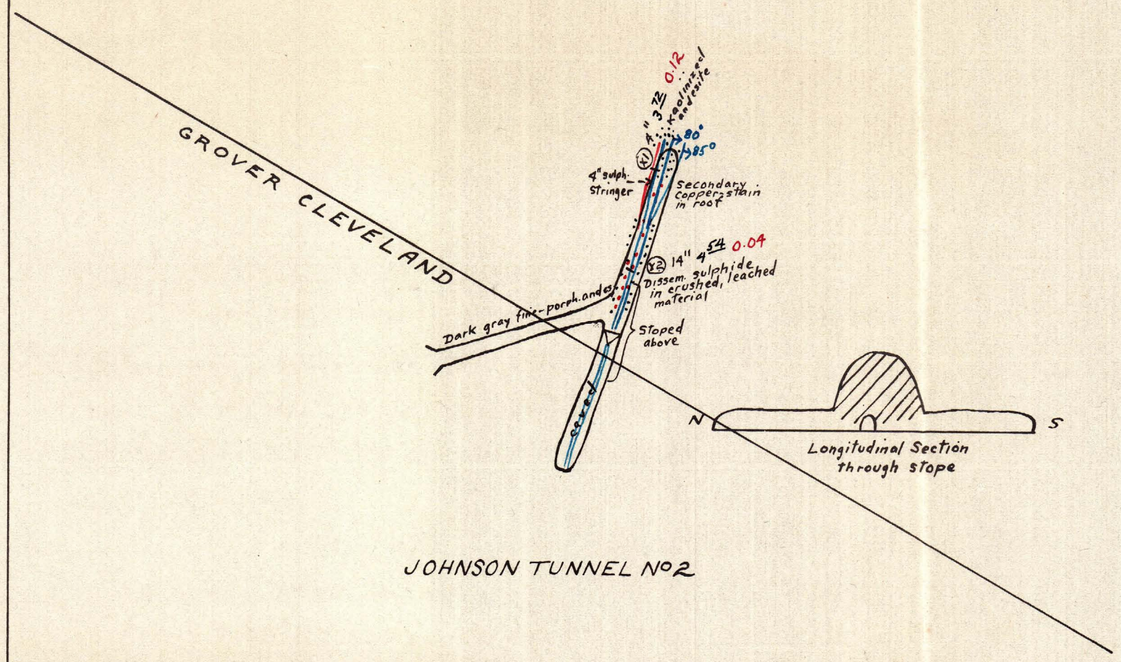
To accompany report of E.W. Sept. 1926

PLATE VI

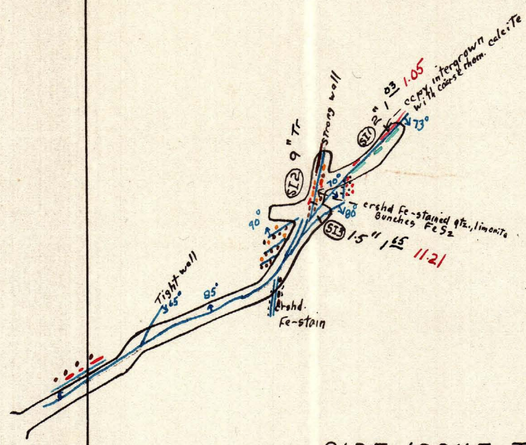

GEOLOGIC MAP of JUNIPER TUNNEL
STANDARD MINE
Grant County, Ore.
Scale: 1" = 50'
LEGEND
Vein
Quartz
Calcite
Sulphides
Limonite & Iron-staining
Leaching, kaolinization, etc.
Sample
No Width Au Ag Cu Co
12" 1.35 1.5 13 2.1
($) (oz) (%) (%)
To accompany report of E.W.
Sept. 1926
True North
5000
5500
4000
Prospect 3
winze on vein
Barren
strong wall
1 wall
lean, leached
qtz & ccpy veinlets
Bunch ccpy
Qtz veinlets
Breccia cemented by calcite
Breccia
FeS2 in bunches & dissem
Prospect 6
Raise, winze(?)
Vein lean
strong wall
Leached, kaolinized crshd rock. Dissem sulphides
Prospect 2
Raise, winze(?) on vein.
Dense gray
Sheeted zone; veinlets of milky qtz., calcite & sulph.



GEOLOGIC MAP of WILLIE BOY TUNNEL
STANDARD MINE
Grant County, Ore.
Scale: 1" = 50'
LEGEND
Vein
Quartz
Calcite
Sulphides
Limonite & Iron-staining
Leaching, kaolinization, etc.
Sample
70°
No Width Au Ag Cu
W2 9" 1.15 1.5 1.3
($) (oz) (%)
To accompany report of E.W.
Sept. 1926
5500
6000
6000
6000
5500
6000
True North
90°
Dissem. Py. in light gray dense
90°
60°
Fe-sulphate, limonite depositing
leached, kaolinized
85°
90°
Cleveland Vein
75°
W2 5" 10.74 0.28 0.89
W1 26" 3.92 0.41 0.14
Bunches & veinlets of qtz, py, ccpy
Kaolinized wall-rock
73°
Tight, barren sheeting
Blocky dense gray
25° bedding?
GROVER CLEVELAND CLAIM



JOHNSON TUNNEL NO 2



SIDE ISSUE TUNNEL

UPPER JUNIPER TUNNEL

5000

True North

GEOLOGIC MAPS of SMALLER TUNNELS
STANDARD MINE
Grant County, Ore.
Scale: 1"=50'

LEGEND

Vein: 70°
Quartz:
Calcite:
Sulphide:
Limonite & Iron-staining:
Leaching, kaolinization, etc.:
Sample:

No	Width	Au	Ag	Cu
②	14"	2.15	1.3	1.5
		($)	(oz)	(%)

To accompany report of E.W.

Sept. 1926

PLATE I

LAST CHANCE
SMUGGLER
WILLIE BOY
NEW STAR
RUBY
MICHIGAN
HOBO
COPPER RIDGE
VIDI
IXL
SPOTTED HORSE
LADY OF THE HILLS
STANDARD
LONE STAR
MORNING GLORY
CROVER CLEVELAND (patented)
PINKERTON EXT. No 2
TALISMAN
PINKERTON
PURDY
JUNIPER
JOHN CROW
BLACK HORSE
BABY FROOME
ROYAL BLUE No 1
VIRTUE No 2
ROYAL BLUE No 2
ROYAL BLUE No 3

Tunnel
Willie Boy Tunnel
Johnson Tunnels
Juneau Shaft
No 2 Tunnel
No 3 Tunnel
No 1 Tunnel
Assay Office
Timber Shed
Side Issue Tunnel
Boarding House
Office
Upper Juniper Tunnel
Juniper Tunnel
Ella Creek
Road to Prairie City
Dixie Creek (East Fork)

TOPOGRAPHIC MAP OF SURFACE
STANDARD MINE
Grant County, Ore.
Scale: 1" = 300' Contour Interval: 100'
Portal of Tunnel:
Vein exposed on surface:
Prospect Cuts:
To accompany report of E.W. Sept. 1926

True North

PLATE II

COMPOSITE MAP
of the
UNDERGROUND WORKINGS
STANDARD MINE
Grant County, Ore.
Scale: 1" = 100'
LEGEND
No 1 Tunnel, & Outlying Tunnels:
No 2 Tunnel:
No 3 Tunnel:
Juneau Workings:
Stoped Ground:
Vein:
Sample:
No
Width
Au
Ag
Cu
Co
21
18"
21
1.5
1.3
2.5
($)
(oz)
(%)
(%)
To accompany report of E.W.
Sept. 1926
True North
Willie Boy Tunnel
Elev. 4465
Johnson Tunnel No 1
Elev. 4564
Johnson Tunnel No 2
Johnson Tunnel No 3
CLEVELAND VEIN
Elev. 4801
CLEVELAND VEIN ?
Elev. 5041
Croppings
Elev. 4669
Juneau Shaft
Elev. 4487
No 2 Tunnel
STANDARD VEIN
STANDARD VEIN ?
Line of Section
No 1 Tunnel
Elev. 4400
SIDE ISSUE VEIN
Side Issue Tunnel
Elev. 4490
GROVER CLEVELAND
JUNIPER VEIN
Upper Juniper Tunnel
Elev. 4871
JUNIPER VEIN
Juniper Tunnel
Elev. 4475
6500
6000
5500
5000
4500
4000