

FRED J. ROSENBERG

REPORT  
ON  
WALDO COPPER MINE  
JOSEPHINE COUNTY, OREGON

for

MR. ANTHONY BRANDENTHALER  
PORTLAND, OREGON

by

FRED J. ROSENBERG, E. M.  
POSTAL BUILDING  
PORTLAND, OREGON

PAGE

GEOGRAPHY:

This property is situated in the S.W. 1/4, Sec. 36, T 40 S., R 8 W, Willamette Meridian, Waldo Mining District Josephine County, 38 miles southwest of Grants Pass, Oregon and 2.3 miles from the town of Takilma. The mean elevation at the property is about 2400 feet above sea level. The location and environs of the property can be better understood by reference to the accompanying index map.

TOPOGRAPHY:

The relief near Takilma is moderate - the ridge tops to the Southwest rise about 1400 feet above the valley floor, and Mt. Hope, to the Southeast, is the most prominent topographic feature within the immediate horizon rising 2750 feet above the valley. The area is drained by the east fork of the Illinois River which flows north through a broad, flat valley joining with the west fork to form the Illinois River.

CLIMATIC CONDITIONS:

The Takilma district has a mild, pleasant climate characterized by warm, dry summers and cooler winters with considerable rainfall. Light snows in the valleys soon disappear; heavier snows in the higher elevations lie for longer periods. Climatic conditions are most

favorable for all year round mining operations.

TABLE I

Weather Observations at Waldo, Oregon  
(10-year average)

| <u>Month</u> | <u>Av. Mean Temp.<br/>Fahrenheit</u> | <u>Total Prec.<br/>Inches</u> |
|--------------|--------------------------------------|-------------------------------|
| Jan.         | 36.3                                 | 6.55                          |
| Feb.         | 40.6                                 | 5.84                          |
| Mar.         | 44.2                                 | 4.93                          |
| Apr.         | 48.1                                 | 3.52                          |
| May          | 54.9                                 | 2.07                          |
| June         | 62.5                                 | .83                           |
| July         | 68.2                                 | .02                           |
| Aug.         | 67.6                                 | .20                           |
| Sept.        | 60.5                                 | 1.38                          |
| Oct.         | 50.7                                 | 5.78                          |
| Nov.         | 43.5                                 | 7.60                          |
| Dec.         | 37.8                                 | 9.54                          |
| Mean Annual  | 51.24                                | Annual 48.26                  |

ACCESSIBILITY:

Supply point for the district is Grants Pass, Oregon, from which the mine may be reached by U.S. primary highway #199 to Cave Junction, Oregon, a distance of 29 miles; thence over 2 miles of Oregon Primary #46 and 5 miles of improved secondary road to Takilma and thence over 2.3 miles of good graded mountain road to the mine, a total of 38 miles.

Mail, local and long distance telephone services are available at Takilma.

TRANSPORTATION:

Common carrier truck lines serve Cave Junction

daily, where L.C.L. shipments can be picked up by mine truck. For carlot shipments contract truckcarriers are available at moderate rates.

The nearest rail transportation is at Grants Pass, Oregon, which is served by the Southern Pacific Railway.

Rail rates on carlot shipments of raw ore from Grants Pass, Oregon to the Tacoma, Washington smelter are as follows:

| <u>Ore Values</u> | <u>30-Ton Min.</u><br>Per ton | <u>50-Ton Min.</u><br>Per ton |
|-------------------|-------------------------------|-------------------------------|
| \$15.00 - \$20.00 | 5.78                          | 4.49                          |
| \$25.00 - 30.00   | 6.17                          | 4.78                          |
| \$40.00           | 6.56                          | 5.08                          |
| \$50.00           | 6.69                          | 5.25                          |
| \$60.00           | 7.35                          | 5.25                          |
| \$70.00           | 7.48                          | 5.25                          |
| \$100.00          | 8.75                          | 5.25                          |

GENERAL DESCRIPTION OF PROPERTY:

The property embraces all of the SW $\frac{1}{4}$ , Sec. 36, Twp. 40 S., Range 8 W., Josephine County, Oregon containing 160 acres of deeded land. Mr. Garfield Voget of Hubbard, Oregon is the Trustee for the owners.

Improvements:-

There are two small single story frame structures on the ground, both of which could be rehabilitated at little expense. One of these would be suitable as a

mess house and the other could provide quarters for four men. For the small crew which would be required for the operations recommended herein, some additional temporary housing will have to be provided if the men are to be quartered at the mine; however, since the majority of the crew would most likely be recruited from residents of Takilma and vicinity, there is a probability that additional camp structures would not be needed or that arrangements could be made at Takilma for messing and housing of the entire crew.

There are also several sheds and an old mill structure, whose only utilization, under the contemplated program, would be for storage purposes.

Mining Equipment:-

There are no mining tools, machinery or equipment on the property.

Timber:-

There is an abundance of timber on the property for all mining and domestic purposes.

Water Supply:-

Adequate water supply for mining and domestic purposes is attainable from a small all-year creek which traverses the property as shown on Dwg. 279-1.

Labor:-

A sufficient number of experienced miners can be procured locally from Takilma and vicinity to conduct the proposed operations.

HISTORY:

The Takilma copper belt is confined to a narrow zone extending north and south for over three miles on the east side of the east fork of the Illinois River.

Copper was first discovered here in 1860 but development lagged until 1903 when C. L. Tutt and associates, of Colorado Springs, Colorado, acquired several of the properties, started development work and in 1904 erected a 100- ton semipyrritic type custom smelter at Takilma which operated more or less continuously until 1910.

The Queen of Bronze, which adjoins the Waldo on the North, is estimated to have produced 35,000 tons of ore valued at \$1,350,000.00.

Of the mines south of the Waldo, the Lilly is reported to have produced about 300 tons of copper ore containing from 16% to 28% copper.

The Lytle mine is said to have produced 1500 tons and the Cowboy is credited with a production of 5000 tons valued at \$300,000.00.

The Waldo was one of the first discoveries with development starting as early as 1896. No complete records of production are known to be available; however, it is reputed to have been the second largest producer in the district. Considerable of its ore was treated at the Takilma smelter with shipments from the mine continuing through Grants Pass after the smelter ceased operating.

In 1918 No. 3 adit was driven and a mill erected, designed to produce a jig concentrate which was not successful. This marked the cessation of direct activities on the part of the Waldo Copper Company, although subsequent lessors carried on desultory operations resulting in the production of a small tonnage of shipping grade ore. In January 1940 the present ownership acquired title to the property, cleaned out and retimbered the #3 adit and installed a small, crude flotation concentrating plant to treat raw ore and to salvage the copper and gold metal in the mine dumps. These dumps are supposed to consist largely of the low grade residual ores after sorting - they contain both sulphides and oxides of copper and a composite sample of 22 tons shipped to the smelter ran 2.67% in copper and \$2.10 gold to the ton.

According to Mr. M. E. Hughes, who was the manager during this time, the flow sheet was designed without benefit of prior laboratory testing. This, coupled with poor equipment and lack of funds, precluded competent results.

Most of the production from the district came during 1904 to 1910, during which time the smelter was in operation. World War I was responsible for a resumption in activities and between 1916-1919 ore was produced for shipment to the smelter at Tacoma, Washington. Copper prices in 1928-1929 also stimulated shipment in this period. Subsequent to 1930, until World War II, the demand for copper did not justify operations.

From the above, it is evidenced that a copper production ranging between two-three million dollars in total value is creditable to the district and that it was largely confined to three eras during which the copper demand created a price sufficiently high to warrant mining.

It is the opinion of the writer, in considering the economic factors involved in the mining for shipping grade ores during the periods aforementioned, that -

- (a) Shipping ore with a 10% copper content was economically attainable.



- (b) And production was justified only so long as price paid would support operations on ore of that copper tenor.

GEOLOGY:

District - The major geological features of the district are relatively simple in that the surface is occupied by only three important rock types:

- (a) Greenstones, after basalt and gabbros
- (b) Serpentine, altered from intrusive peridotites
- (c) Conglomerate, quartzite, argillite and limestone lentils.

According to Shenon<sup>(1)</sup>, such information as is available indicates that the geologic structure is very complex. Deformation has affected the older rocks during several periods, although only a few faults of measurable displacement have been noted

Mine - As relates to the topography within the immediate geological horizon, as viewed from the mine, the workings are on the westerly flank of a prominent ridge whose gently curving slope pitches rather steeply to merge with the broad flat valley of the east fork of the Illinois River. The portal of the #3 adit is in a sharply incised depression striking almost South

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(1) Shenon, Philip J., U.S.G.S. Bull. 846-B

that is believed to be the topographic expression of an arc of the peripheral intrusive contact which completely surrounds and isolates an elliptically shaped roof pendant of greenstone with a major axis of about 800 feet and a minor axis of about 500 feet. According to Shenon (2), numerous smaller isolated blocks of greenstone occur in the serpentine near the contact. Several of these occurrences are manifest along the contact boundary defined by the creek and a single occurrence was noted in the lower adit.

In the other mines in greenstone the ore minerals do not form solid bodies within the limits of the deposits but are interspersed with bands and irregular areas of altered rock, much after the manner of mineralized shear zones. At the Waldo, however, and judging solely upon the showing revealed in the surface cuts and trenches, the ore occurrence suggests a single fracture zone striking east and dipping steeply to the south, with the enclosing greenstone rocks in various stages of alteration. While the lack of data limits any attempt to classify the form of the deposit to mere conjecture, nevertheless, if the above interpretation

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(2) Shenon, Phillip J. op. cited pg. 167.

is not correct, then irrespective of the structural shape, at least the criteria is deemed sufficient to suggest the projection of a substantial tabular ore body as occurring between the easterly limits of the old workings as shown on the map and the serpentine intrusive which apparently cuts off the deposit at the collar of the raise from #3 level.

The chief sulphide ore minerals noted were - pyrite, chalcopyrite, pyrrhotite and cubanite. Oxidation products were iron oxides, malachite, azurite, chrysocolla, and chalcocite.

Gangue was for the most part altered wall rock and its altered product, mainly chlorite, quartz and calcite.

Gouge clays were chiefly chlorite with some clay minerals, sericite and comminuted rock and vein matter.

Oxidation and enrichment have occurred to a noteworthy extent near the surface and is reported to extend to the #3 level, a depth of over two hundred feet.

Elsewhere in the district sulphide enrichment is stated to be lacking below a depth of one hundred feet.

Where the deposit was exposed in the main open cut the ore material had a width of 10 feet, the footwall half being marked by completely oxidized ore minerals while in the hanging wall half conversion had only been

partially effected as primary sulphides still remained.

PRESENT DEVELOPMENT:

The development work on the Waldo, as shown on Dwg. 279-1, aggregates about 2000 feet, consisting of approximately 1620 feet of crosscuts, 150 feet of drifts and 230 feet of raises; and explores the area to a depth of about 300 feet and a longitudinal distance of 800 feet.

The mine is opened by 3 adit levels, as follows:

|            | <u>Elevation</u> |
|------------|------------------|
| Adit No. 1 | 2376             |
| " No. 2    | 2320             |
| " No.3     | 2200             |

The #3, or lowest level, consists of a main crosscut 560 feet in length and a 220 foot branch which reaches the mineralized shear zone 629 feet from the portal, from which point an incline raise of 170 feet reaches to the surface. A cave in the branch crosscut 55 feet from the main tunnel junction precluded examination beyond that point; however, all the accessible portions were in serpentine, except the single instance of greenstone noted on the drawing. These workings are tightly lagged, except for the main tunnel extension beyond the crosscut junction and wherein the ground is caving and in very bad shape.

The timbered portion is in fairly good condition, new sets having been installed within the past few years.

The extent of the cave in the crosscut leading to the raise, of course, could not be determined, however, it is the opinion of Mr. J. L. Eggers, of Takilma, who did the retimbering and knows this ground and who accompanied the writer during the examination, that it does not extend more than several sets in length. Both Mr. Eggers and Mr. Hughes were of the opinion that the raise should be fairly open also, despite the fact that we found the collar at the surface solidly filled.

In my opinion, the heavy nature of the ground in both the crosscut and shear zone areas, would enhance the probability of extensive sloughing and caving having occurred in the inaccessible portions and that the possibilities of high costs for reopening preclude consideration of this avenue of approach to the probable ore zone defined later on herein.

All the data pertaining to Levels 1 and 2 are from old records. Both adits were caved. As far as I could ascertain, no work has been done in these openings since about 1910 and in all probability they have been closed to ingress for an estimated 30 years.

Level #2 is an adit opening, which, according to old maps, is 740 feet in length and crosscuts the shear zone about 150 feet from the portal. At this point the zone has been drifted on for 40 or 50 feet and stoped to the floor pillar of No. 1 level. It is connected with this level by a raise.

Level #1 is also an adit opening aggregating 167 feet of workings which crosscut the shear zone at about 60 feet from the portal, at which point drifting to the limits of the lens or shoot defined by the No. 2 level was performed and the ore stoped to the roof pillars.

The #2 level would lend itself admirably for an attack on the probable ore zone, if it could be opened with the certainty of cost and time factors that would prevail in driving a wholly new adit. After 30 years, it is only logical to presume that the old stopes and that portion of the entry through the serpentine are filled by caving thus presenting conditions on which cost factors for reopening would be most uncertain.

SAMPLING & ASSAYS:

The "open cut" shown on drawing 279-1 was made by bulldozer at the time of this examination. Where the vein was crosscut it was 10 feet in width measured at

right angles to its strike, and faced to a depth of three feet.

In order to reduce bulk of sample, this exposure was divided into two sections and across each section three lines of deep channels were cut in such a manner as to most accurately represent the content of the section sampled.

The results were as follows:

TABLE II

| <u>Sample No.</u>  | <u>Width of Cut</u> | <u>Copper %</u> | <u>Gold oz.</u> | <u>Foot % Cu.</u> |
|--------------------|---------------------|-----------------|-----------------|-------------------|
| 620                | 4.0                 | 6.9             | Tr.             | 27.6              |
| 621                | <u>6.0</u>          | 11.8            | .06             | <u>70.8</u>       |
| Width of vein 10.0 |                     |                 |                 | 98.4              |
| Av. Cu. Cont.      |                     | 9.84%           |                 |                   |

As an index to sorting possibilities, head size and larger pieces were cobbled and resolved into three samples with the following results:

| <u>Sample No.</u> | <u>Cu. %</u> | <u>Gold oz.</u> |
|-------------------|--------------|-----------------|
| 621 A             | 20.1         | Tr              |
| 621 B             | 34.1         | Tr              |
| 621 C             | 30.0         | Tr              |

About 7 feet of vein matter on the footwall side is exposed where Cut #1 branches the raise cut. A

weighted sample here gives the following results:

TABLE III

| <u>Sample No.</u> | <u>Width</u> | <u>Cu.<br/>%</u> | <u>Gold<br/>oz.</u> |
|-------------------|--------------|------------------|---------------------|
| 621 D *           | 7.0          | 13.6             | Tr.                 |

\*Hanging wall not exposed.

Calculation of width and value from Tables II & III is shown in Table IV as follows:

TABLE IV

|          | <u>Width</u> | <u>Cu.<br/>%</u> | <u>Foot<br/>\$</u> |
|----------|--------------|------------------|--------------------|
| Table II | 10.0         | 9.84             | 98.4               |
| " III    | <u>7.0</u>   | 13.60            | <u>95.2</u>        |
|          | 8.5          |                  | 193.6              |
| Average  |              | 11.4             |                    |

The footwall outline of the deposit in this unexplored section is delineated by Cuts 1, 2 and 3. Cut 1, as previously stated, extends into the vein matter. Cut 2 just broaches the footwall and Cut 3 penetrates the ore for about three feet. The ore here was so obviously high grade that sampling was omitted.



ORE RESERVES:

Since the extension of the ore bodies is largely a matter of geologic probability the reserves shown in Plate IV are classified as "Possible Ore". This term, as used herein, is defined as ore reasonably assumed to exist, but not sampled on more than one side, or no side, and whose calculation includes a study of the geological and artificial limitations and the determination to what extent these factors might preclude the possibility of further development of values in depth or horizontal extent.

The two areas, designated as Block A & B respectively, have the stope as a common partition and each is limited on its opposite end by serpentine.

Their base is a projection on the horizontal plane of the 2nd level, below which elevation, as has been previously stated, sulfide enrichment is not believed to extend.

To further qualify as "Possible Ore", the metallic copper content must approximate 9 - 10%, which is the minimum for shipping grade under present price and production factors. In view of this qualification, no reserves are projected below the 2nd level on the

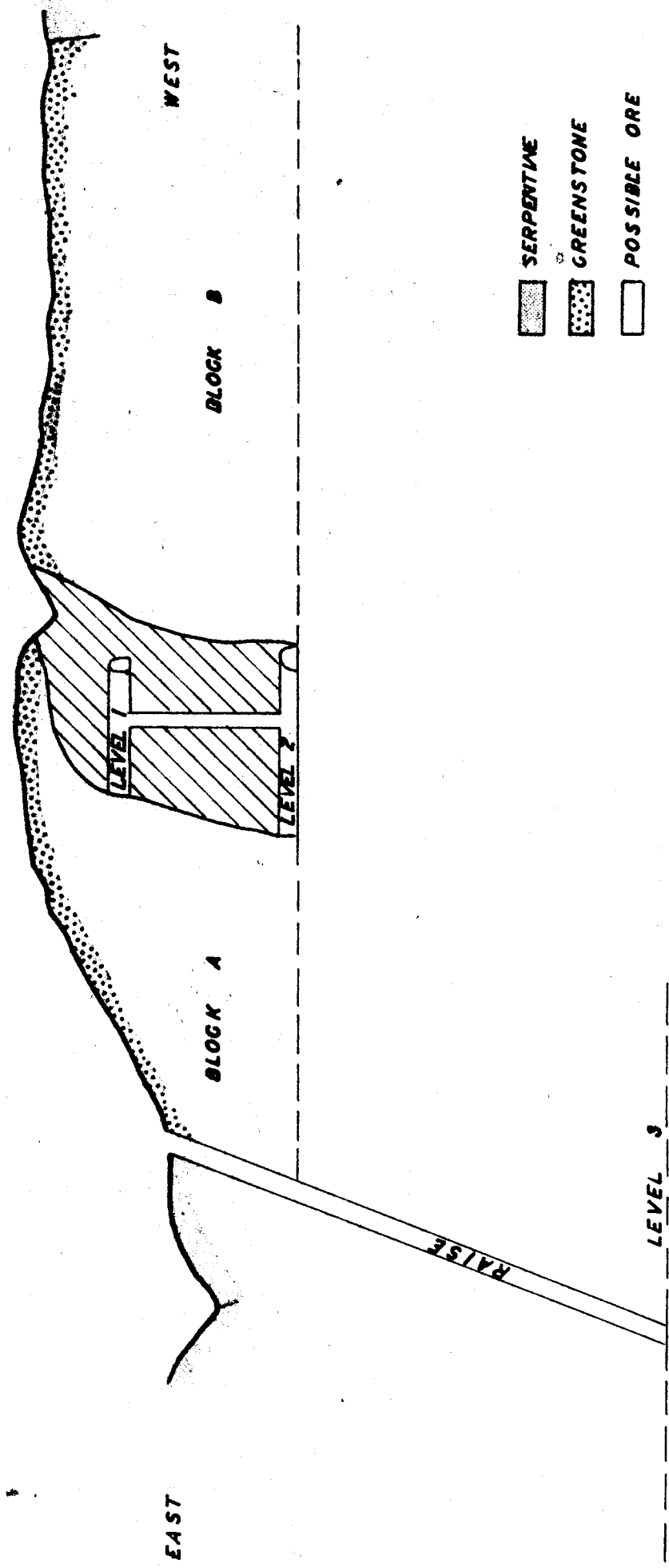
premise that this elevation, as aforesaid, marks what is assumed to be the limits of oxidation and sulfide enrichment and, as a consequence, below this level it is not likely that the primary ores would meet the requirements of minimum copper tenor.

In calculating volume the average width of 8.5 feet, shown in Table IV, was employed together with a factor of 13 cubic feet per ton for ore in place.

If the form of the deposit has been correctly interpreted, namely as a well defined fissure, then the volume calculations shown in Table V should, in my opinion, be reasonable approximations, since with this type opening, close postulate sections thereof are generally regarded as having more or less the same fashion and characteristics as the corresponding exposed sections.

TABLE V  
CALCULATION OF VOLUME OF POSSIBLE  
ORE SHOWN ON PLATE 4

| <u>BLOCK</u> | <u>AREA</u> | <u>WIDTH FACTOR</u> | <u>CU.FT.</u> | <u>TONS</u>  |
|--------------|-------------|---------------------|---------------|--------------|
| A            | 7700        | 8.5                 | 65,450        | 5000         |
| B            | 16000       | 8.5                 | 136,000       | <u>10000</u> |
| Total        |             |                     |               | 15000        |



LONGITUDINAL SECTION ALONG STRIKE OF VEIN



CONCLUSION AND RECOMMENDATION:

In conclusion, this property considered from the standpoint of a small shipping operation possesses considerable merit; and I am led to believe, from the facts herein that the following program is justified and will result in the development of sufficient shipping grade ore to make operations profitable under the existing price ceiling for copper.

I would therefor recommend that Block A be opened up by adit from the second level, entailing approximately 150 feet of cross cut and 50 feet of drifts. The plan should provide for a small bunker as it is thought likely that shipping ore will result from the development work. Block A is favored for the initial work because most of the factual data attaches to this area. If the results in Block A are favorable, then a later program for development of Block B can be initiated and carried on with funds from a development reserve account to be set up from the proceeds of shipments from Block A.

The capital requirements for the initial program is set up in exhibit A in the addenda to this report.

As a matter of information, particularly as an

an index for the evaluation of the ore reserves, Schedule B in the addenda shows the estimated net value per ton of ore after smelting and production costs.

Respectfully submitted,

Fred J. Rosenberg, EM  
Consulting Engineer.

Dated at Portland, Oregon  
April 30, 1943.

This report contains 19 pages.

**A D D E N D A  
TO  
WALDO MINE REPORT**

EXHIBIT A

CAPITAL REQUIRED FOR RECOMMENDED  
RECOMMENDED EXPLORATION AND DEVELOP-  
MENT PROGRAM.

1st Phase

|                                      |  |                |
|--------------------------------------|--|----------------|
| Establishment of Camp                |  | 250.00         |
| Moving and setting up equipment      |  | 200.00         |
| Grading road from Takilma to mine    |  | 100.00         |
| 200 feet crosscuts and drifts @15.00 |  | <u>3000.00</u> |
|                                      |  | 3550.00        |
| Plus 15% for contingencies           |  | <u>530.00</u>  |
|                                      |  | <u>4080.00</u> |

2nd Phase

|                            |               |                |
|----------------------------|---------------|----------------|
| 50 Ton Bunker              | 500.00        |                |
| 300 feet of road extension | <u>200.00</u> |                |
|                            | 700.00        |                |
| Plus 15% for contingencies | <u>105.00</u> | 805.00         |
| Total                      |               | <u>4865.00</u> |

NOTE:-

This estimate is exclusive of the supplies and equipment listed on the attached inventory and which is to be available for use on this project.

**EXHIBIT B**

**ESTIMATE OF VALUE PER TON, TEN PER  
CENT COPPER ORE AFTER SMELTING AND  
PRODUCTION COSTS**

Smelter settlement per ton ore  
based on 10% Copper at 0.17¢  
per lb., 8% Moisture and no  
penalties as per probable sched-  
ule Tacoma smelter, letter  
dated March 18, 1943. 19.41

**Less-**

**Mining costs:**

|  |             |              |
|--|-------------|--------------|
| Direct mining costs                                  | 4.00        |              |
| Capital costs  | <u>1.00</u> | 5.00         |
| Truck haul - Mine to<br>Grants Pass.                 |             | 3.00         |
| Rail freight - Grants<br>Pass to Tacoma.             |             | 5.00         |
| Royalty - 10% on smelter<br>return less rail freight | <u>1.43</u> | <u>14.51</u> |
| Net Value per ton                                    |             | 4.90         |

**NOTE:**

Mining costs are based on artificially supported  
slope methods with a conservative production  
rate per shift, at current wage schedules  
including accident compensation, unemployment  
insurance and kindred charges, and such other  
items as are properly chargeable to mining  
operations.



*See U.S. G.S. vol 846 B p 167*

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& MINERAL INDS.

STATE DEPARTMENT OF GEOLOGY AND  
MINERAL INDUSTRIES

STATE ASSAY LABORATORY  
802 EAST H STREET  
GRANTS PASS, OREGON

REPORT ON SAMPLE OF ORE FROM THE WALDO COPPER MINE

Source and Description of Sample

The Waldo Copper Mine is located in Sec. 36, T. 40 S., R. 8 W., near the west quarter corner. The sample was submitted to the State Assay Laboratory by Mr. Huges, Jr.

The total weight of the sample was seventy pounds. This was separated into two lots, each containing a distinctly different type of material. One lot, weighing thirty pounds, consisted entirely of secondary minerals of copper and iron. The minerals predominating in this lot were malachite (copper carbonates), cuprite (copper oxide) and limonite (iron oxide). The other lot weighed forty pounds and consisted entirely of primary minerals of copper and iron with quartz as gangue mineral. The minerals predominating in the lot were, pyrite (iron sulphide), pyrrhotite, (iron sulphide) chalcopyrite (copper, iron sulphide) and quartz (silica).

The primary ore was in course pieces, measuring six inches by six inches by four inches and less. This material was tough and very hard to break. The secondary ore was smaller in size and very easily broken.

Procedure followed in the Investigation.

The two lots of ore were crushed to minus 1/4 inch in a laboratory size jaw crusher. After mixing thoroughly, 3.75 pounds was cut from the total amount for a head sample, and ground to minus 40--mesh in a

*X*

Waldo Copper Mine--2

laboratory size disc-pulverizer. A rough gravity separation was attempted on 500 grams of this material, using a standard gold pan. The results, as shown in the following table, were very unsatisfactory.

| PRODUCT  | Weight<br>grams | GOLD    |        | Silver  |        | Copper  |        | Total<br>Value |
|----------|-----------------|---------|--------|---------|--------|---------|--------|----------------|
|          |                 | oz./ton | \$/ton | oz./ton | \$/ton | percent | \$/ton |                |
| Heads    | 500             | 0.13    | 4.55   | Trace   |        | 9.6     | 19.20  | \$ 23.75       |
| Cone't-1 | 123             | 0.14    | 4.90   | Trace   |        | 13.5    | 27.00  | 31.90          |
| Cone't-2 | 75              | 0.10    | 3.50   | Trace   |        | 8.6     | 17.20  | 20.70          |
| Tailings | 90              | 0.09    | 3.15   | Trace   |        | 6.0     | 12.00  | 15.15          |
| Slimes   | 212             |         |        |         |        |         |        |                |

Concentrate No. 1 contained mostly pyrite, pyrrhotite and chalcopyrite with a small amount of malachite and cuprite.

Concentrate No. 2 contained mostly limonite, malachite and cuprite with a small amount of pyrite and chalcopyrite.

The tailing contained a considerable amount of malachite and limonite along with the quartz.

SUMMARY

The attempt to produce a satisfactory concentrate with a high recovery by simple gravity concentration was unsuccessful. The presence of copper minerals having widely varying specific gravities makes gravity concentration unsatisfactory for this type of ore.

Copper ores containing sulphides, oxides and carbonates can be successfully concentrated by the flotation process producing a concentrate that can be smelted. This type of ore can also be treated successfully by direct smelting and by leaching followed by electrolytic precipitation.

Signed..... *Albert R. Lewis* .....  
Assayer

Waldo Copper Mine

T. 35S, R 8W, Sec 21 STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

Galice District

BG-421 & 420

ASSAY REPORT

Grants Pass, Oregon

~~Haker, Oregon~~

May 16

19 41

Sample submitted by J. W. Hughes, Takilma, Oregon

Sample description: Several pieces of massive chalcopryrite and pyrite.

No. 4 Heavy sulfides in light colored matrix.

The assay results recorded below are made without charge as provided by Chapter 176, Section 10, Oregon Laws 1937, the sender having complied with the provisions thereof.

NOTICE: The assay results recorded below are from a sample furnished by the above named person. This Department had no part in the taking of the sample and assumes no responsibility, other than the accuracy of the assay of the material as furnished it by the sender.

| Sample Number | GOLD           |        | SILVER         |       | Copper  |         |         | Total Value |
|---------------|----------------|--------|----------------|-------|---------|---------|---------|-------------|
|               | Ounces per ton | Value  | Ounces per ton | Value | Percent | Value   | Percent |             |
|               | 0.02           | \$0.70 | Trace          |       | 12.9    | \$28.38 |         | \$29.08     |
|               | 0.07           | \$2.45 | Trace          |       | 5.6     | \$12.32 |         | \$14.77     |

Market Quotations:

Gold        \$ 35.00 per oz.  
Silver       \$ .70 per oz.  
Copper       \$ .11 per lb.  
              \$     per lb.

STATE ASSAY LABORATORY

*Albert C. Lewis*  
Assayer

STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

ASSAY REPORT

Grants Pass, Oregon  
Baker, Oregon

January 30, 1942

Sample submitted by Ray C. Treasher  
Sherman S. Smith, 108 1/2 S. 6th St., Grants Pass, Oreg.

Sample description: Small piece of sulphide-bearing rock.

The assay results recorded below are made without charge as provided by Chapter 176, Section 10, Oregon Laws 1937, the sender having complied with the provisions thereof.

NOTICE: The assay results recorded below are from a sample furnished by the above named person. This Department had no part in the taking of the sample and assumes no responsibility, other than the accuracy of the assay of the material as furnished it by the sender.

| Sample Number | GOLD           |        | SILVER         |       | Copper                 |       |         | Total Value |
|---------------|----------------|--------|----------------|-------|------------------------|-------|---------|-------------|
|               | Ounces per ton | Value  | Ounces per ton | Value | Percent                | Value | Percent |             |
| 1             | 0.09           | \$3.15 | Trace          |       | 2.28 (Heavy sulphides) |       |         | \$3.15      |
| Oxidized      | 0.03           | 1.05   | Trace          |       | 0.04 (Red colored)     |       |         | 1.05        |
| 2             | 0.18           | 6.30   | Trace          |       | 0.06                   |       |         | 6.30        |

Market Quotations:

Gold \$35.00 per oz.  
Silver .70 per oz.  
per lb.  
per lb.

STATE ASSAY LABORATORY

Robert G. Bassett  
Assayer

RECORD 02765

## CRIB MINERAL RESOURCES FILE 12

## RECORD IDENTIFICATION

RECORD NO..... MO13239  
 RECORD TYPE..... XIM  
 COUNTRY/ORGANIZATION. USGS  
 FILE LINK ID..... CONSV  
 DEPOSIT NO..... DDGMI 100-420  
 MAP CODE NO. DF REC..

## REPORTER

NAME..... LEE, W  
 DATE..... 74 01  
 UPDATED..... 81 04  
 BY..... FERNS, MARK L. (BROOKS, HOWARD C.)

## NAME AND LOCATION

DEPOSIT NAME..... WALDO COPPER MINE

MINING DISTRICT/AREA/SUBDIST. WALDO

COUNTRY CODE..... JS

COUNTRY NAME: UNITED STATES

STATE CODE..... OR

STATE NAME: OREGON

COUNTY..... JOSEPHINE

DRAINAGE AREA..... 17100311 PACIFIC NORTHWEST

PHYSIOGRAPHIC PRDV..... 13 KLAMATH MOUNTAINS

LAND CLASSIFICATION..... 01

QUAD SCALE

1: 62500

QUAD NO OR NAME

CAVE JUNCTION

LATITUDE

42-02-26N

LONGITUDE

123-35-53W

UTM NORTHING

4654250.

UTM EASTING

450500.

UTM ZONE NO

+10

TWP..... 40S

RANGE..... 08W

SECTION.. 36

MERCIDIAN

ORE MATERIALS (MINERALS, ROCKS, ETC.):  
CHALCOPYRITE, PYRITE; PYRRHOTITE, CUBANITE; AZURITE, MALACHITE

COMMODITY COMMENTS:  
PROBABLY ALSO INCLUDED AG AND ZN AS COMMODITIES.

EXPLORATION AND DEVELOPMENT  
STATUS OF EXPLOR. OR DEV. B

DESCRIPTION OF DEPOSIT

DEPOSIT TYPES:  
MASSIVE SULFIDE  
FORM/SHAPE OF DEPOSIT: LENS

SIZE/DIRECTIONAL DATA  
SIZE OF DEPOSIT..... SMALL  
MAX LENGTH..... 30 FT  
MAX WIDTH..... 25 FT  
STRIKE OF OREBODY.... N60-75E  
DIP OF OREBODY..... 45SE-50SW

COMMENTS(DESCRIPTION OF DEPOSIT):  
CYPRUS TYPE

DESCRIPTION OF WORKINGS

COMMENTS(DESCRIP. OF WORKINGS):  
2000 FEET OF UNDERGROUND WORKINGS

PRODUCTION  
YES

CUMULATIVE PRODUCTION (ORE, COMMOD., CONC., OVERBUR.)

| ITEM   | ACC | AMOUNT | THOUS. UNITS | YEAR      | GRADE, REMARKS |
|--------|-----|--------|--------------|-----------|----------------|
| 15 ORE |     | SMALL? |              | 1896-1910 | CU             |

PRODUCTION COMMENTS.... TOTAL UNKNOWN. PROPERTY IS SAID TO HAVE BEEN THE SECOND LARGEST PRODUCER IN THE WALDO DISTRICT.

GEOLOGY AND MINERALOGY

AGE OF HOST ROCKS..... PERM-TRI  
HOST ROCK TYPES..... GREENSTONE SERPENTINE

## REPORT ON SAMPLE OF ORE FROM THE WALDO COPPER MINE

### Source and Description of Sample

The Waldo Copper Mine is located in Sec. 36, T. 40 S., R. 8 W., near the west quarter corner. The sample was submitted to the State Assay Laboratory by Mr. Huges, Jr.

The total weight of the sample was seventy pounds. This was separated into two lots, each containing a distinctly different type of material. One lot, weighing thirty pounds, consisted entirely of secondary minerals of copper and iron. The minerals predominating in this lot were malachite (copper carbonates), cuprite (copper oxide) and limonite (iron oxide). The other lot weighed forty pounds and consisted entirely of primary minerals of copper and iron with quartz as gangue mineral. The minerals predominating in the lot were, pyrite (iron sulphide), pyrrhotite, (iron sulphide) chalcopyrite (copper, iron sulphide) and quartz (silica).

The primary ore was in coarse pieces, measuring six inches by six inches by four inches and less. This material was tough and very hard to break. The secondary ore was smaller in size and very easily broken.

### Procedure followed in the Investigation.

The two lots of ore were crushed to minus 1/4 inch in a laboratory size jaw crusher. After mixing thoroughly, 3.75 pounds was cut from the total amount for a head sample, and ground to minus 40--mesh in a

Waldo Copper Mine--2

laboratory size disc-pulverizer. A rough gravity separation was attempted on 500 grams of this material, using a standard gold pan. The results, as shown in the following table, were very unsatisfactory.

| PRODUCT  | Weight<br>grams | GOLD    |        | Silver  |        | Copper  |        | Total<br>Value |
|----------|-----------------|---------|--------|---------|--------|---------|--------|----------------|
|          |                 | oz./ton | \$/ton | oz./ton | \$/ton | percent | \$/ton |                |
| Heads    | 500             | 0.13    | 4.55   | Trace   |        | 9.6     | 19.20  | \$ 23.75       |
| Conc't-1 | 123             | 0.14    | 4.90   | Trace   |        | 13.5    | 27.00  | 31.90          |
| Conc't-2 | 75              | 0.10    | 3.50   | Trace   |        | 8.6     | 17.20  | 20.70          |
| Tailings | 90              | 0.09    | 3.15   | Trace   |        | 6.0     | 12.00  | 15.15          |
| Slimes   | 212             |         |        |         |        |         |        |                |

Concentrate No. 1 contained mostly pyrite, pyrrhotite and chalcopyrite with a small amount of malachite and cuprite.

Concentrate No. 2 contained mostly limonite, malachite and cuprite with a small amount of pyrite and chalcopyrite.

The tailing contained a considerable amount of malachite and limonite along with the quartz.

SUMMARY

The attempt to produce a satisfactory concentrate with a high recovery by simple gravity concentration was unsuccessful. The presence of copper minerals having widely varying specific gravities makes gravity concentration unsatisfactory for this type of ore.

Copper ores containing sulphides, oxides and carbonates can be successfully concentrated by the flotation process producing a concentrate that can be smelted. This type of ore can also be treated successfully by direct smelting and by leaching followed by electrolytic precipitation.

Signed.....

Assayer