STATE OF OREGON

DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

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G M I SHORT PAPER

NO. 11

Notes on

SOME MINERAL DEPOSITS IN THE AREA SURROUNDING THE JUNCTION of the SNAKE AND IMNAHA RIVERS IN OREGON

by

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FOREWORD

The mineral deposits of the area surrounding the junction of the Imnaha and Snake Rivers were investigated because, although no report on the mineral deposits of the area had ever been published, the preliminary geologic evidence available indicated that conditions were favorable for the occurrence of tungsten. In addition owners of mining claims who had requested an investigation of their holdings believed that certain of their deposits contained economic amounts of copper. The Department wishes to investigate all possible new sources of such metals because of their urgent need for war uses.

The reconnaissance of this area failed to show the presence of economic minerals in amounts sufficient to encourage further development. In fact it is apparent that much more exploration work has been done than would seem to have been warranted.

The Snake River has carved a deep canyon in this little-known region. From various places along the rim one may look down four or five thousand feet. Short stretches of the seemingly narrow river appear only here and there in the depths. Beyond the gorge to the east is the vast, mountainous Salmon River country in Idaho. The great distances and mountain grandeur convey an impression of the immeasurable power of natural forces and the immensity of geologic time.

Earl K. Nixon, Director
April 15, 1943

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ILLUSTRATIONS

View of Snake River looking downstream at junction with the Imnaha River, shown at lower left. Foundations of old mill at left center.

ABSTRACT

Tabular deposits containing mixtures in varying amounts of magnetite, hematite, pyrite, chalcopyrite, and minor quartz occur as fracture fillings in a granitic intrusive mass in an area occupying roughly five square miles surrounding the junction of the Imnaha and Snake Rivers in Oregon in T. 4 N., Rs. 48 and 49 E. The width of the deposits or veins would be measured in inches rather than feet. They are fairly persistent along the strike (the main system of fracturing trends northeasterly-southwesterly), but in those cases observed, the copper-enriched portions appear to be in relatively small shoots. Gold and silver values are negligible; total iron in vein-material is high; sulphur is also relatively high. The area is bare, rugged, and mountainous; relief of the mineralized section is about 2000 feet. Development consists of tunnels, and is relatively extensive, considering the non-commercial character of the ore in general. Specimens and underground workings were examined for scheelite but none was found. Laboratory tests using mercury-vapor lamp and a willemite screen showed the presence of very small amounts of mercury in certain samples. Spectrographic analyses showed only extremely small quantities of rarer metals. The area is relatively inaccessible, and there seems to be little hope that any commercial mining operation would be warranted.

INTRODUCTION

Field work

Persistent reports of the occurrence of high-grade ore bodies in the area immediately surrounding the junction of the Imnaha and Snake Rivers have repeatedly come to the Department. Since no published reports on the area were available, it was decided that a field investigation was required. In May, 1942, the writer, accompanied by Hugh K. Lancaster, Department field engineer, went up the Snake River to the locality on the river-boat "Idaho" which makes weekly trips from Lewiston, Idaho, up to Johnson's Bar - a distance of approximately 93 miles. The mouth of the Imnaha River is approximately 50 miles from Lewiston. Included in the party were Lester P. Burns and Julius Hanson, officials of the Opportunity Land Company, owner of the Fargo group of patented mining claims. Mr. Bruce Lancaster who acted as helper in field work was also a member of the party.

Camp was set up on the Snake River shore on the upstream side of the Imnaha River in order to examine that part of the Fargo group located east of the Imnaha. The rivers were in flood so that the Imnaha could not be forded. Therefore, in order to cover the ground on the west side of the Imnaha, arrangements were made with the captain of the Idaho to return in midweek to move the camp to the down-stream side. Due to engine trouble the Idaho did not return as planned so that examination of the area west of the Imnaha was necessarily postponed.

In September, 1942, a party consisting of Earl K. Nixon, Director of the Department, Mr. Hugh K. Lancaster, and the writer went into the area from Enterprise, Oregon, for the purpose of investigating some of the mineral deposits on the west side of the Imnaha. The party went by automobile to the upper Dobbins camp near Buckhorn Springs, located on the rim above the Snake River canyon, and about six miles by road and trail from Eureka Landing on the Snake River. Pack horses were obtained at this upper camp, and used in the reconnaissance of some of the properties, located for the most part between the Imnaha River and the lower part of the old Eureka trail. The party was in the area from September 22 to September 26.

Time did not permit examination of all development work, but there is a close similarity in characteristics of all of the veins seen, and it seems reasonably certain that those deposits not examined would differ little, particularly from an economic standpoint.

An ultraviolet light was carried into the field and all underground openings were examined for scheelite fluorescence. In addition, some of the granodiorite country rock was examined at night for fluorescence.

Aneroid elevations were recorded. Unsettled weather conditions prevailed when the party was camped east of the mouth of the Imnaha, and aneroid readings varied considerably; therefore these records are subject to a rather large degree of error.

Because of the large proportion of magnetite in the veins on which tunnels were driven, the compass proved unreliable in making surveys. The maps of tunnels shown in this report are sketches except insofar as information was obtained from small scale patent maps.

Acknowledgements

The writer wishes to express appreciation to members of the departmental staff as follows: to Mr. Earl K. Nixon and Mr. Hugh K. Lancaster for assistance in the field; to Mr. John Eliot Allen and Mr. Wallace Lowry for help in preparing the manuscript; to Dr. H. C. Harrison for spectrographic analysis; and to Mr. Paul Fitzsimmons and Mr. Wesley Paulsen for petrographic work.

Messrs. Lester E. Burns and Julius Hanson rendered helpful service as guides on the Fargo group. Mr. Jay H. Dobbin, owner of camps and horses in part of the area studied was most generous in placing facilities at the disposal of the field party. Mr. Lloyd Ruff, geologist with the U. S. Army Engineers, Portland, Oregon, kindly supplied a reconnaissance geologic map of the Lower Snake River Canyon.

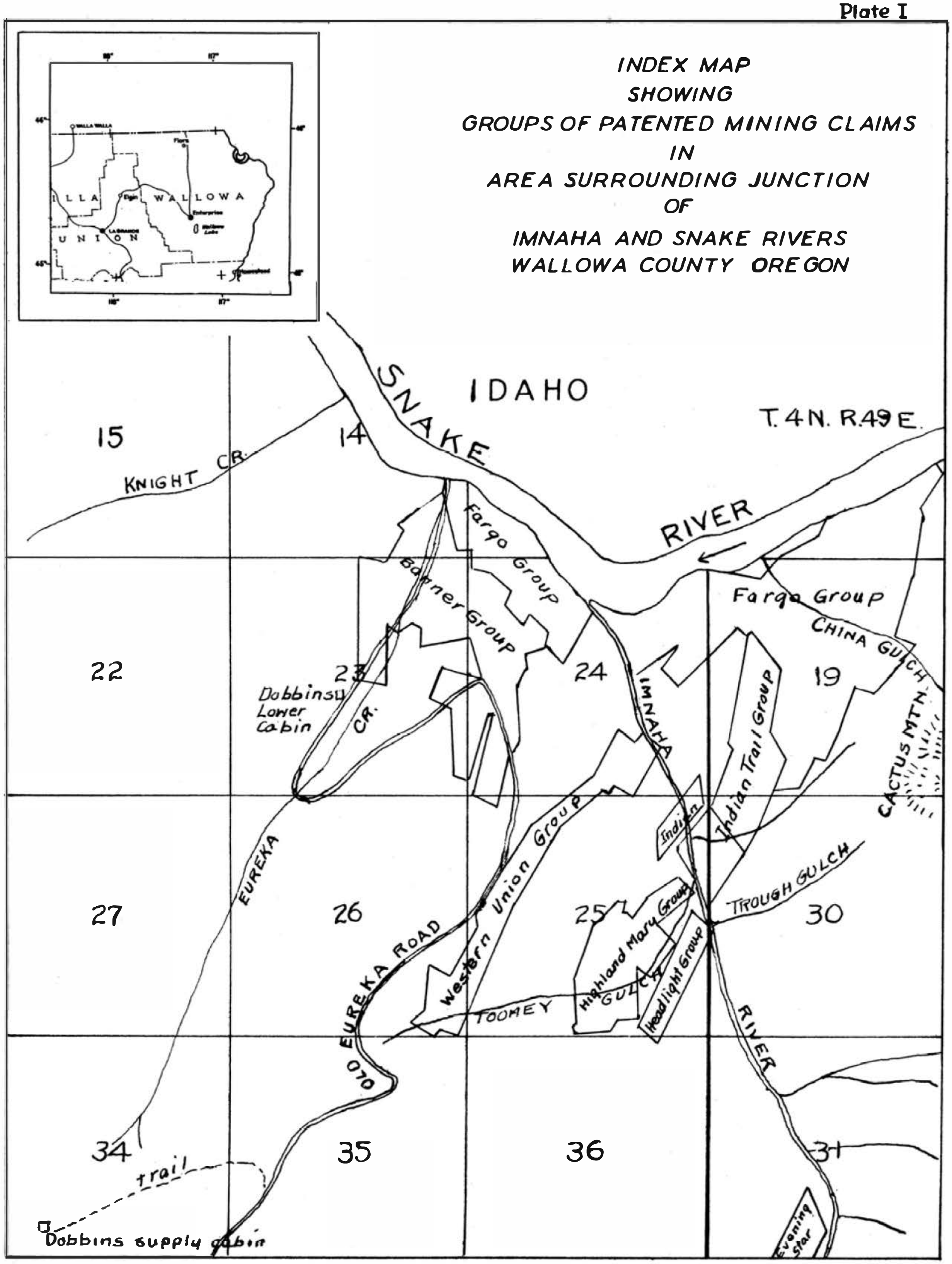
Geography

The area, approximately five square miles in extent, with which this report is concerned lies on the Oregon side of the Snake River and on both sides of the lower Imnaha River, in T. 4 N., Rs. 48 and 49 E., about 50 miles south of Lewiston, Idaho. The simplest way of reaching the lower Imnaha is by boat. The "Idaho", a specially constructed river boat owned by Captain Kyle McGrady of Lewiston makes weekly trips up the Snake River to Johnson's Bar - a distance of 93 miles. McGrady delivers mail and stops on signal at various places along the river. The boat usually leaves Lewiston at daylight Friday morning and returns to Lewiston Saturday afternoon.

The lower Imnaha may also be reached from Enterprise in Wallowa County. Except when snow conditions are bad, a good automobile road about 40 miles long connects Enterprise and Buckhorn Springs, which is on the rim of the Snake River canyon. From Buckhorn Springs a trail, 6 miles long, following the old Eureka Road, leads down to Eureka Landing on the river, 4000 feet below. A second route from the west is by the way of a paved road, 22 miles long, from Joseph northwest to the town of Imnaha. From Imnaha, a dirt road extends down the Imnaha River for 6 miles. From the end of this trail the Imnaha Trail follows the river to its mouth - a distance of approximately 20 miles. Parts of this trail are under water when the Imnaha is in flood.

The region is rugged, deeply incised, and bare of timber except on the north slopes of the higher elevations. The canyon floors have some scrub timber and thick brush. Where the slopes flatten out at and above 5000 feet there are extensive forests of pine. Excepting the precipitous sides of gulches and canyons, most of the slopes are grassy, particularly after a rainy season, and this general locality is noted as a sheep and cattle range.

The section of the area examined lying east of the mouth of the Imnaha is especially inaccessible except by boat. When the Imnaha River is high its lower reaches may not be crossed except on bridges at Cow Creek and Lightning Creek. The bridge nearest the mouth of the Imnaha is at Cow Creek, about 3½ miles from the Snake. There is no trail from the Snake River up the east side of the Imnaha River to the bridge at Cow Creek.


INDEX MAP
SHOWING
GROUPS OF PATENTED MINING CLAIMS
IN
AREA SURROUNDING JUNCTION
OF
IMNAHA AND SNAKE RIVERS
WALLOWA COUNTY OREGON
IDAHO
SNAKE
RIVER
T. 4 N. R. 49 E.
KNIGHT CR.
15
14
22
23
24
19
27
26
25
30
34
35
36
31
Fargo Group
Banner Group
Fargo Group
CHINA GULCH
CACTUS MTN.
IMNAHA
Indian Trail Group
Indian
Dobbins Lower Cabin
CR.
EUREKA
Western Union Group
OLD EUREKA ROAD
Highland Mary Group
Headlight Group
TROUGH GULCH
TOOMEY GULCH
RIVER
trail
Dobbins supply cabin
Evening Star

Climate

The region of the lower Imnaha River has the typical semi-arid climate of the plateau country of northeastern Oregon. There is a high relief and consequently a considerable variation in temperature. Winter temperatures at the highest elevations may be severe at times. Midsummer temperatures are frequently high, especially in the Snake River canyon. Average annual precipitation is around 17 or 18 inches.

GEOLOGY

The area containing the mineral deposits examined is composed of granitic rocks, most of which range in classification from diorite to granodiorite. The canyon of the Snake River, from about a mile and a half east of the mouth of the Imnaha River, is cut in the granitics for approximately 2.5 miles to a point near the mouth of Eureka Creek. The Imnaha River cuts into the same mass starting at a point approximately three miles south of the Snake. On the Oregon side of the river the granitic boss or intrusion is irregular in outline and is approximately 5 square miles in extent. The areal extent on the Idaho side is not known to the writer. The granitic mass is intrusive into old metasediments.

Bordering the river on the Snake River Chief claim the rock is whitish and contrasts with a much darker-colored phase farther back from the river as represented by rock in the discovery tunnel of the Snake River Chief claim. This whitish rock appears to be of considerable extent along the river.

> A thin section shows that quartz and plagioclase feldspar make up about 95 percent of the rock; they occur in approximately equal amounts. From 3 to 4 percent of the rock is composed of a light green amphibole, actinolite. The plagioclase is badly weathered to sericite and kaolin and it is difficult to obtain its exact composition, but it appears to be andesine. Grains of magnetite are scattered throughout the rock, usually associated with the feldspar and amphibole, but no definite relationship is apparent. The principal texture is cataclastic. The quartz is strained and shows sutured borders. Minor fracture planes are abundant and are often lined with zoisite. In composition this rock would probably be classed as a granodiorite.

A dioritic phase of the intrusive mass occurs in quantity on the Fargo group. Near the discovery tunnel of the Snake River Chief claim the rock appears rusty-brown on the weathered surfaces, but is fresh when broken. It is medium-grained, granitic in texture, composed mainly of feldspars and hornblende, without visible quartz.

> Under the microscope, the rock is holocrystalline, hypidiomorphic, inequigranular, composed of 65 percent subhedral to anhedral andesine from 0.1 to 4 mm. in diameter, and 18 percent hornblende from 1 to 2 mm. in diameter. Less than 5 percent microcline and 1 percent magnetite occur as accessory primary minerals. There has been some secondary hydrothermal action, with development of magnetite, chlorite, and limonite from the hornblende, and sericite and kaolin from the andesine. Secondary quartz (3 percent) fills interstices and makes up small veinlets.
>
> The rock is a normal diorite which has been somewhat affected by hydrothermal alteration.

Another specimen of the country rock (No. 1) from the Edna (?) tunnel of the Highland Mary group is a medium-grained, gray, dioritic appearing rock, with reddish-brown iron stain on the weathered surface. This weathering is from an eighth to a quarter of an inch deep, but penetrates much farther along fractures and joints.

> Under the microscope, the texture is seen to be hypidiomorphic granular. Fifty percent of the rock is andesine, considerably altered and showing marked

zoning. A pale green amphibole, badly altered to chlorite, makes up about 35 percent of the rock. Magnetite and zoisite (or clinozoisite), in about equal proportion, make up the remainder. The former is almost universally associated with the amphibole, and in the weathered zone is altered to limonite. The zoisite occurs in veinlets and is probably a released mineral from alteration of the amphibole, with chlorite as the other product. The rock is a diorite.

A specimen of country rock from the Mable L claim of the Western Union Group (plate V) was classified as diorite.

This rock is dark greenish-gray and medium-grained, about half plagioclase and the remainder mostly augite. Minor amounts of magnetite are also present. In thin section the plagioclase was found to be labradorite. The augite is much altered to chlorite and secondary hornblende. Magnetite makes up probably 3 or 4 percent of the rock. No quartz was found. The rock is diorite.

Old metasediments appear both on the east and west sides of the granitic area. A specimen of metasediment from the Iowa claim at the east end of the Fargo group is a dark gray-blue aphanitic rock which breaks with an irregular fracture, and is traversed by minute, closely-spaced quartz and epidote veinlets. Fine-grained magnetite and a few white crystals are dispersed through the rock.

Under the microscope, the rock is holocrystalline, inequigranular, with porphyroblasts of euhedral quartz, epidote, and magnetite (10 percent) from 0.5 to 1 mm. in diameter, in a groundmass (80 percent) composed of microcrystalline quartz (70 percent) and epidote (10 percent) from 0.01 to 0.1 mm. in size. Up to 10 percent magnetite is dispersed through the groundmass. A few pyrite crystals appear to be in part replaced by magnetite.

The veinlets are of three types, early quartz veinlets, later epidote veinlets, and quartz-epidote veinlets, all intersecting at acute angles.

The rock is a hornfels, derived by contact metamorphism and intense silicification from a clay sediment. Later hydrothermal action produced, successively, quartz veinlets, epidote veinlets, pyritization, and replacement of the pyrite in large part by magnetite.

Thick flows of basalt cap these older rocks, and occasionally cut them as dikes. A specimen from the dike in the river-to-river tunnel of the Snake River Chief claim of the Fargo group has fine-grained intersertal texture and is quite fresh. Almost half the rock is labradorite. The bulk of the remainder is a pale-green augite. Some olivine occurs and magnetite is common. This latter is often found in skeletal crystals, similar to ilmenite, but heavier and more bulky. The rock is an olivine basalt.

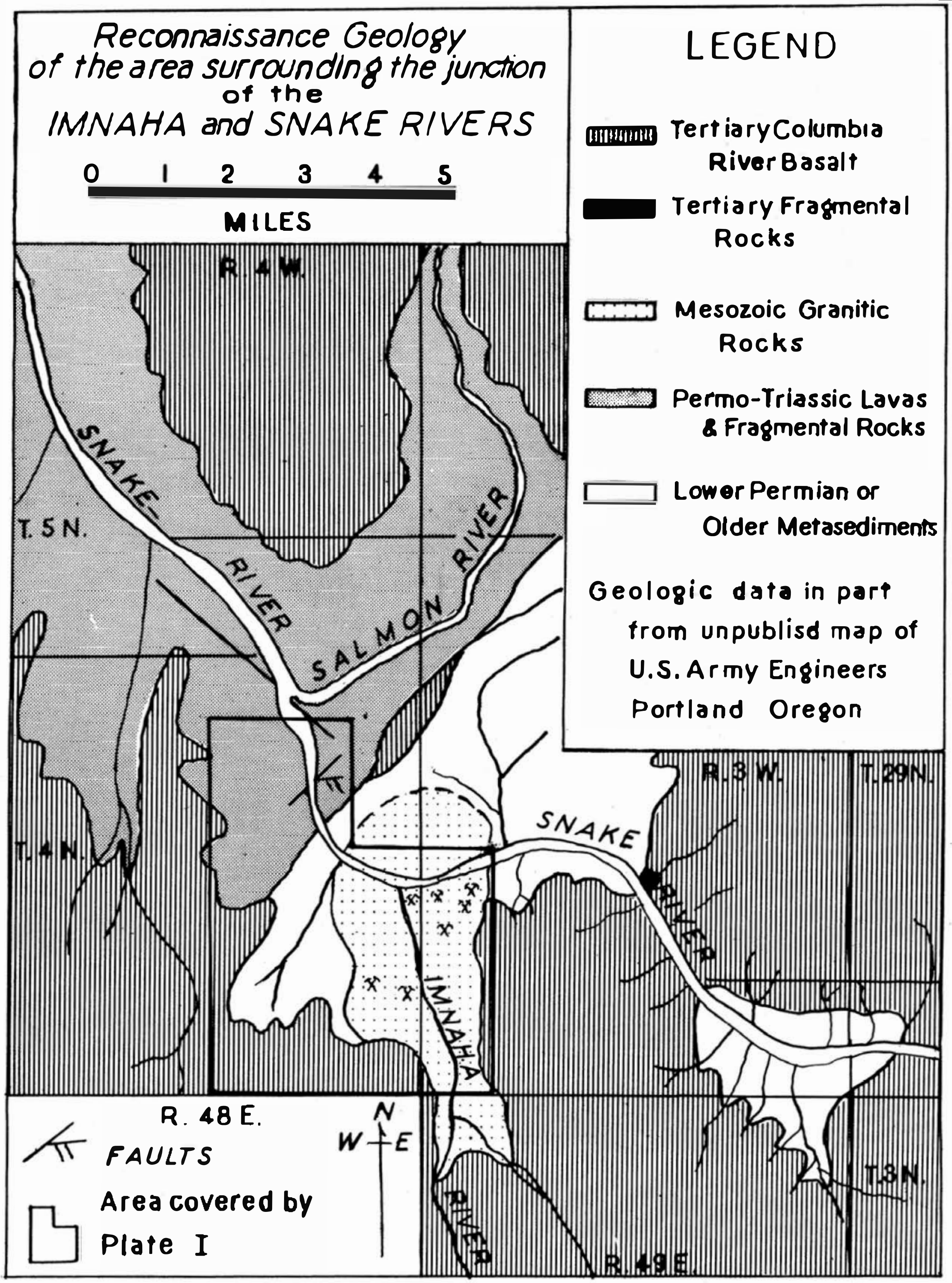
The mineral deposits occur as fissure fillings in the granite, forming veins several inches in width. Characteristically vein material is mainly magnetite, often also containing hematite (specularite), pyrite and chalcopyrite. Only insignificant quantities of oxidized copper minerals and no secondary copper sulphides were seen.

Specularite replacing magnetite is common in certain veins, particularly on the Fargo group. Specimens of supposed specularite from the Western Union group, however, proved to be magnetite. In this case the magnetite occurs as black, shiny, foliated masses like specularite.

Individual veins or seame exposed in the various tunnels and in outcrops, although narrow, are fairly persistent. In outcrops at three tunnels the seams are separated by country rock which has been strongly altered by hydrothermal action and are sufficiently close together so that the appearance of a deposit measurable in feet rather than inches is given. Commercial valuee, however, are lacking in all such deposits seen.

The veins were evidently deposited under relatively high-temperature conditions. Polished sections of vein specimens indicate that the minerals in some of the veins at least

PLATE II



Reconnaissance Geology
of the area surrounding the junction
of the
IMNAHA and SNAKE RIVERS
0 1 2 3 4 5
MILES
LEGEND
Tertiary Columbia River Basalt
Tertiary Fragmental Rocks
Mesozoic Granitic Rocks
Permo-Triassic Lavas & Fragmental Rocks
Lower Permian or Older Metasediments
Geologic data in part from unpublisd map of U.S. Army Engineers Portland Oregon
R. 4 W.
T. 5 N.
SNAKE RIVER
SALMON RIVER
R. 3 W.
T. 29 N.
SNAKE RIVER
T. 4 N.
IMNAHA RIVER
R. 48 E.
FAULTS
Area covered by Plate I
N
W
E
T. 3 N.
R. 49 E.

were deposited in the following sequence: pyrite, magnetite, hematite, chalcopyrite and quartz. In one specimen, there was evidence of late pyrite along with chalcopyrite.

Laboratory tests on certain samples of both granitic rocks and vein material showed the presence of small amounts of mercury. The testing technique used was the well-known method of heating the sample between a quartz mercury vapor light source and a willemite screen. Results are given under analytical data.

More details of the economic geology of the area are given in the following descriptions of individual properties.

THE MINES

FARGO GROUP

Owner: Opportunity Land Co., Lester E. Burns, Sec.-Treas., Clarkston, Wash.

Location: On the Snake River at and near its junction with the Imnaha River in secs. 13, 14, 23, and 24, T. 4 N., R. 48 E. and secs. 18 and 19, T. 4 N., R. 49 E. Part of the property is on the up-stream side of the Imnaha, and part on the downstream side. The claims east of the Imnaha may be reached by boat from Lewiston, Idaho; the claims west of the Imnaha may be reached either by boat or by trail from Buckhorn Springs in eastern Wallowa County. The lower Imnaha may not be forded in periods of high water.

Area: 41 patented lode claims containing a total of 488 acres.

History: Early in the present century, a considerable amount of exploration was carried on in the Fargo group. The company which explored this ground built a concentrating mill close to the Snake River, a short distance below the Imnaha. Foundations of the mill are all that remain. It is reported that a steam boat costing $65,000 was built and was wrecked on its first trip up the river from Lewiston. This wreck, in addition to other unfavorable factors, is said to have stopped all work at the property. It seems doubtful that any commercial ore was shipped, although there are reports that such shipments were made.

Development work: In addition to location work consisting of various cuts, several exploration tunnels have been driven. Two of the latter on the Mother Lode and Mountainside claims were driven a total of about 150 feet in barren granitic rock. The other tunnels inspected were driven on veins, with the exception of the cross-cut tunnel at point of discovery on the Snake River Chief claim.

Descriptions of the individual tunnels follow under "Geology," and sketches of seven tunnels visited are included.

Geology: Granitic rocks cover that portion of the Fargo ground lying along the Snake River on the upstream side of the Imnaha and on the downstream side at least as far as Eureka Creek. Metamorphosed sediments are exposed on Eureka Creek about a quarter mile south of the Snake. Toward the east end of the property on the Iowa claim, there is an exposure of a fine-grained contact metamorphic rock showing transition between granitic intrusive rocks on the west and older metasediments on the east. Farther west on the Snake River Chief claim, as exposed in the discovery tunnel, the rock is deficient in quartz and is classed as diorite.

Metallic mineral deposits of this locality are relatively small, tabular fissure fillings, characteristically containing a large proportion of magnetite and hematite, together with a smaller proportion of chalcopyrite and pyrite. The hematite is usually in the form of specularite. In some of the veins massive chalcopyrite occurs in bunches so that samples over widths of 1 to 2 feet might give returns of the order of 6 to 10 percent copper. Insofar as observed, however, these copper-enriched portions of the veins are fairly short in length and would yield only small tonnages. Insufficient development work has been done to indicate persistence of the veins in depth. Gold and silver values appear to be negligible. Spectrographic analysis of samples taken shows only minute amounts of tungsten. Owners of the property had been led to believe that nickel might be present, and certain of the samples, some of which showed sulphides and green stain (copper) were examined spectrographically for nickel and cobalt. Maximum amounts of nickel as well as cobalt were less than one-half of one percent.

There appear to be two systems of steeply-dipping fractures. One, probably the major system in point of number and persistence of fractures, trends northeasterly; the second northwesterly. The first system of veins is characterized by presence of massive magnetite and specular hematite, with minor amounts of pyrite and chalcopyrite. Although insufficient evidence was obtained on which to base conclusive proof, it seems likely that the second northwesterly system contains the larger percentages of copper, although the veins of this system also contain high iron as magnetite and hematite.

The Snake River Chief discovery tunnel, (Plate IV, fig.1) a little more than half a mile east of the mouth of the Imnaha, starts about 400 feet south of and about 70 feet above the river. The tunnel was driven due south for about 70 feet and then runs from S. 30° E. to S. 35° E. for 220 feet to the face.

At a point 145 feet from the portal a vein was cut which carries mainly magnetite together with hematite and small amounts of pyrite and chalcopyrite. The footwall is well defined; the hanging wall is not distinct. Drifts were driven on the vein N. 68° E. for 83 feet and N. 72° W. for 80 feet. The vein is of greatest width in the east drift where it varies from 8 inches to 36 inches. Some unreplaced country rock is included in the vein filling especially where it is widest.

South of this vein the cross-cut tunnel exposes two small stringers carrying some copper. The face of the tunnel is in barren country rock.

Samples of country rock from the face and from the walls of the tunnel contained strong traces of quicksilver - of the order of small fractions of a pound to the ton. No quicksilver could be detected in vein material from this tunnel.

A few pin points of an orange fluorescence were seen under the ultra-violet light.

Samples were taken as indicated on Plate IV. The most favorable parts of the vein showed a high iron content - from 38.6 percent to 48.5 percent - but contained negligible amounts of gold, silver, and copper.

A tunnel near the east end of the Snake River Chief claim (Plate IV, fig.2), about 1000 feet east of the discovery tunnel, was driven southeasterly for about 230 feet. The portal is approximately 270 feet above the river. The tunnel follows a vein containing magnetite and specularite, together with chalcopyrite and pyrite. In places the chalcopyrite occurs in massive bunches so that copper content is considerably higher than the average in the veins of the group.

At a point approximately 100 feet from the portal, two samples (No. 7 and No. 8) representing hanging and footwall sections were taken across the vein which occupied the full width of the tunnel at this point. The hanging wall section with a width of 4 feet returned 4.6 percent copper and 35.5 percent iron. The footwall section, 4 feet in width, was very low in copper (0.2 percent); iron was 50.1 percent.

The vein in this tunnel was made up of several parallel fissure fillings separated by thin bands of country rock. The total width of all these parallel fissures was probably at least twice as great as the width of the tunnel. Assays, however, indicate that the ore is in relatively small bunches. This tunnel showed more chalcanthite than any other opening seen on the property. Only a few pin points of fluorescent minerals, probably either calcite or fluorite, were seen. It was not possible to use a compass in this tunnel because of the high percentage of magnetite. Angles as shown on the accompanying sketch were estimated.

Near the east end of the Snake River Chief claim and north of the tunnel previously described there is an outcrop of iron-stained material trending N. 60° E. up the mountainside

Plate III

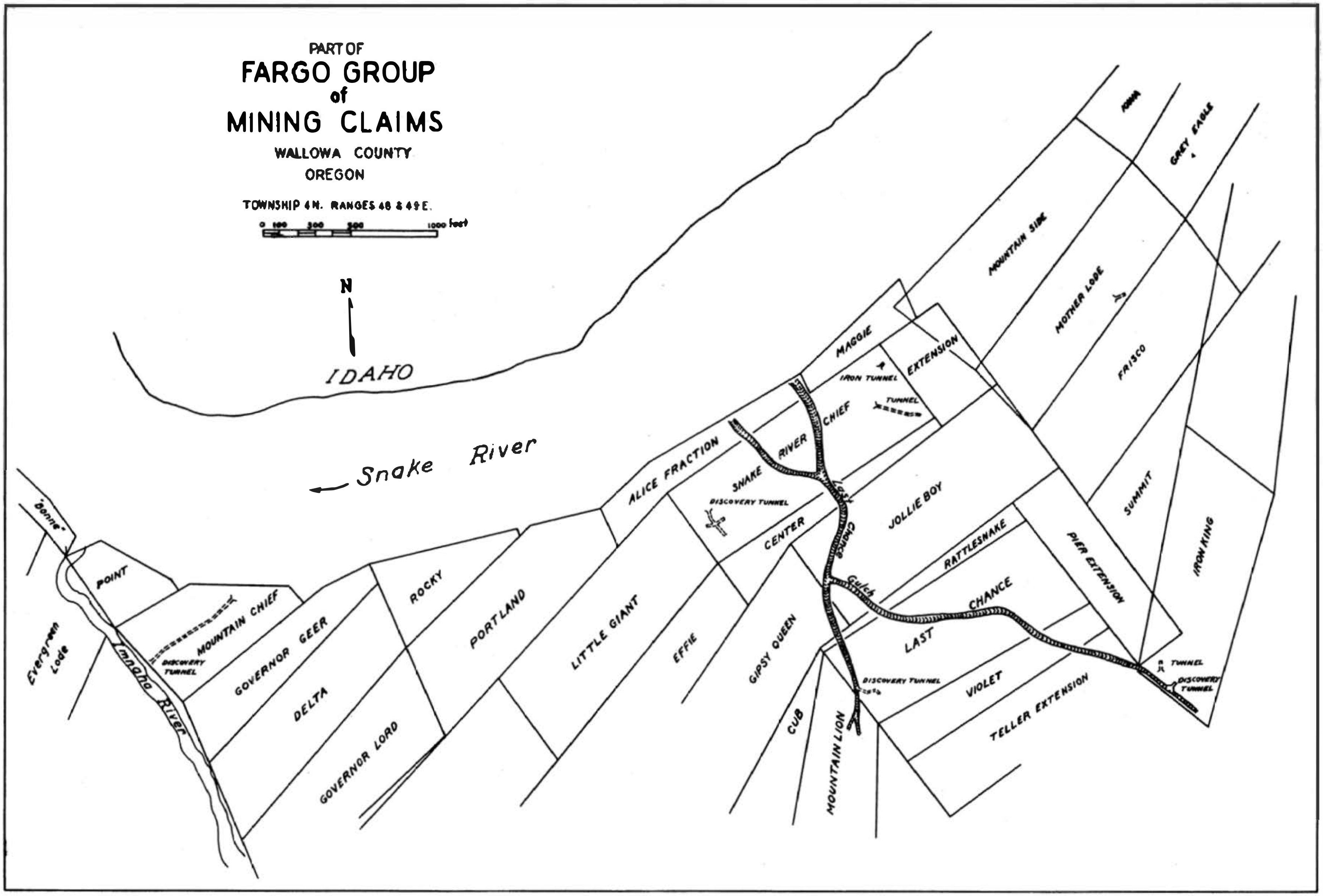
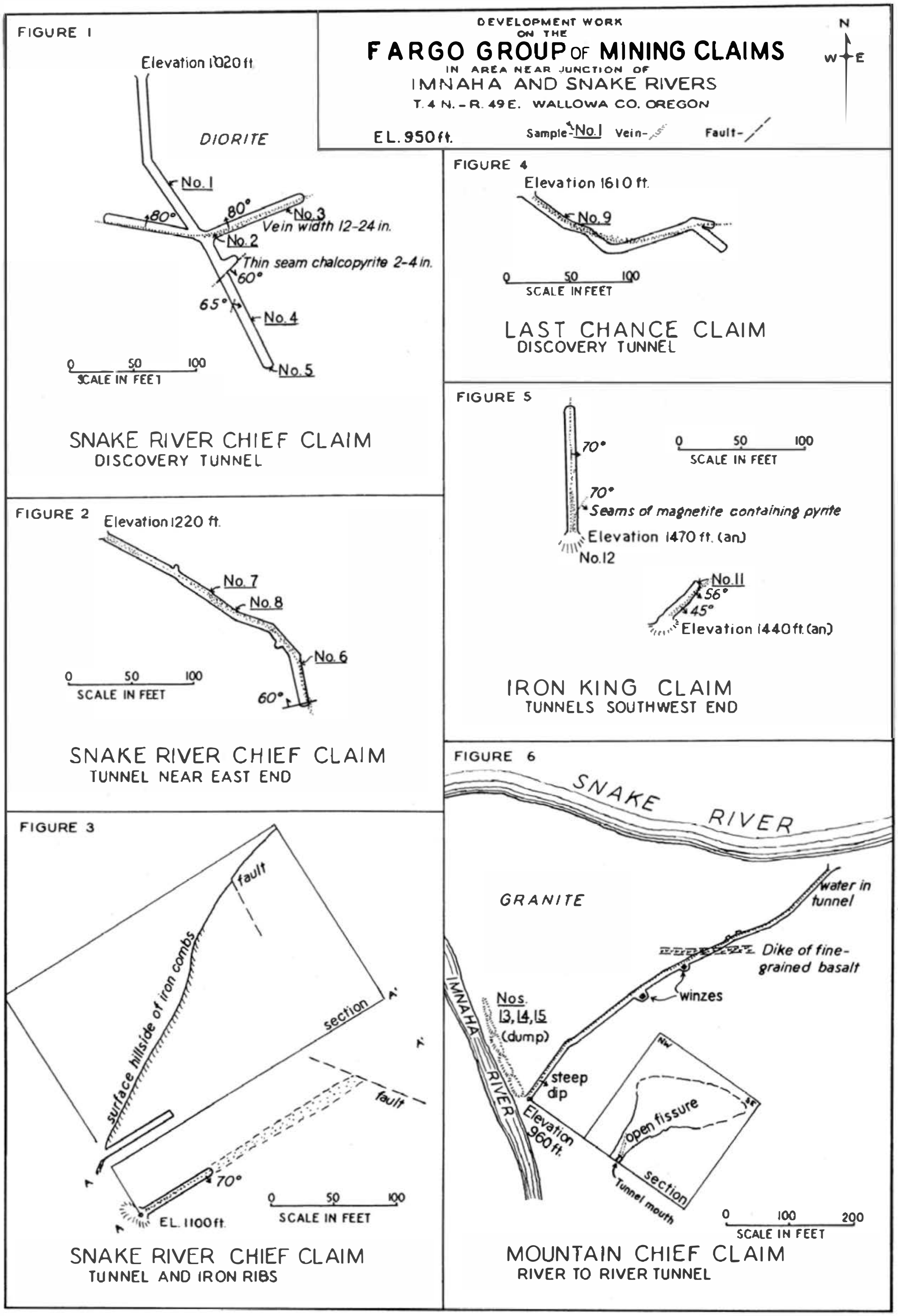

PART OF
FARGO GROUP
of
MINING CLAIMS
WALLOWA COUNTY
OREGON
TOWNSHIP 4N. RANGES 48 & 49 E.
0 100 300 500 1000 feet
N
IDAHO
Snake River
"Bonne"
POINT
Evergreen Lode
Imnaha River
MOUNTAIN CHIEF
DISCOVERY TUNNEL
GOVERNOR GEER
DELTA
ROCKY
GOVERNOR LORD
PORTLAND
LITTLE GIANT
ALICE FRACTION
EFFIE
SNAKE RIVER CHIEF
DISCOVERY TUNNEL
MAGGIE
IRON TUNNEL
TUNNEL
EXTENSION
CENTER
GIPSY QUEEN
JOLLIE BOY
Last Chance Gulch
RATTLESNAKE
LAST CHANCE
CUB
MOUNTAIN LION
DISCOVERY TUNNEL
VIOLET
TELLER EXTENSION
PIER EXTENSION
MOUNTAIN SIDE
MOTHER LODE
FRISCO
SUMMIT
IRON KING
GREY EAGLE
TUNNEL
DISCOVERY TUNNEL

Plate IV


DEVELOPMENT WORK
ON THE
FARGO GROUP OF MINING CLAIMS
IN AREA NEAR JUNCTION OF
IMNAHA AND SNAKE RIVERS
T. 4 N. - R. 49 E. WALLOWA CO. OREGON
EL. 950 ft.
Sample-No. 1 Vein- Fault-
N
W
E
FIGURE 1
Elevation 1020 ft.
DIORITE
No. 1
80°
80°
No. 3
Vein width 12-24 in.
No. 2
Thin seam chalcopyrite 2-4 in.
60°
65°
No. 4
No. 5
0 50 100
SCALE IN FEET
SNAKE RIVER CHIEF CLAIM
DISCOVERY TUNNEL
FIGURE 2
Elevation 1220 ft.
No. 7
No. 8
No. 6
60°
0 50 100
SCALE IN FEET
SNAKE RIVER CHIEF CLAIM
TUNNEL NEAR EAST END
FIGURE 3
fault
surface hillside of iron combs
section
A'
A'
fault
70°
A
A
EL. 1100 ft.
0 50 100
SCALE IN FEET
SNAKE RIVER CHIEF CLAIM
TUNNEL AND IRON RIBS
FIGURE 4
Elevation 1610 ft.
No. 9
0 50 100
SCALE IN FEET
LAST CHANCE CLAIM
DISCOVERY TUNNEL
FIGURE 5
70°
0 50 100
SCALE IN FEET
70°
Seams of magnetite containing pyrite
Elevation 1470 ft. (an)
No. 12
No. 11
56°
45°
Elevation 1440 ft. (an)
IRON KING CLAIM
TUNNELS SOUTHWEST END
FIGURE 6
SNAKE RIVER
GRANITE
water in tunnel
Dike of fine-grained basalt
winzes
IMNAHA RIVER
Nos. 13, 14, 15 (dump)
steep dip
Elevation 960 ft.
open fissure
section
Tunnel mouth
0 100 200
SCALE IN FEET
MOUNTAIN CHIEF CLAIM
RIVER TO RIVER TUNNEL

on a slope of about 30 degrees for over 200 feet in length. This outcrop shows a prominent comb of magnetite and hematite, for the most part in two ribs, each about 12 inches wide, separated by bands of altered granite and iron oxides. The widest part of the comb is about 10 feet and is at a point where the separate ribs come together. A small amount of copper stain was seen.

Near the lowest part of the outcrop a tunnel about 60 feet long (Plate IV, fig. 3) was driven N. 60° E. on this fracture zone which dips 70° south. Fissure filling is magnetite in seams and bunches containing also some pyrite. Some seams of ferromagnesian minerals were seen.

The discovery tunnel of the Last Chance claim (Plate IV, fig. 4) is reached by climbing nearly to the head of the south branch of Last Chance Gulch. This tunnel, with the portal on the west end line of the claim, shows an elevation (aneroid) of about 660 feet above the river. The tunnel, first driven about 80 feet southeasterly, was turned in order to follow the vein and was driven 125 feet N. 73° E. to the face. Near the face a cross-cut was turned off S. 52° E. and driven for 32 feet. The vein exposure in this tunnel, especially for the first 60 or 70 feet, shows the highest proportion of chalcopyrite of any of the veins seen. The width of the vein in this tunnel for the first 60 feet varies from 12 to 24 inches. For the rest of the distance to the face, the vein is irregular in width but usually less than 8 inches. In the face the vein shows only a few inches of a mixture of country rock and magnetite. In several places chalcanthite shows on the surface of the vein. Water standing in the tunnel was green. A very few small spots (as big as the head of a small pin) of an orange-colored fluorescent mineral were seen. About ten tons of ore is piled on the dump. Many of these pieces are made up of massive sulphides.

A sample taken across the vein in the roof of the tunnel about 35 feet in from the portal gave a return of 6.1% copper and 37.7% iron over a width of 26 inches.

About 400 feet south of the Last Chance Discovery Tunnel and about 100 feet higher, the discovery tunnel of the Mountain Lion claim was driven about 10 feet in a direction S. 35° W. Magnetite and specularite together with some country rock occupies the full width of the tunnel. Some pieces on the dump had copper stain, but a grab from the pile on the dump (2 or 3 tons) gave no copper and 62 percent iron.

The discovery tunnel on the Iron King claim (Plate IV, fig. 5) is close to the south end line of the claim and on the steep northeast side of Last Chance Gulch, approximately 2000 feet east of the discovery tunnel of the Last Chance claim. Elevation is about 600 feet above the river. This tunnel was driven northeasterly for a distance of about 30 feet on seams containing magnetite and specularite. Some pink alum was formed at the portal. The vein is from 6 inches to 14 inches wide and formed in bands separated by country rock. There is about a ton of magnetite and specularite in a pile on the dump. A sample across 8 inches in the face of the tunnel returned a trace of copper and 58.5 percent iron.

About 100 feet northwest of the discovery tunnel and about 30 feet higher in elevation, a tunnel was driven due north for a distance of a little over 100 feet. The compass was useless here because of magnetite present. There is considerable pyrite disseminated in the magnetite; otherwise, the mineralization is about the same as in the other high-magnetite veins.

Near the portal a seam about 6 inches wide containing a very black, relatively soft material cuts across the magnetite vein at about a 30° angle and penetrates the east wall of the tunnel. A grab from the ore pile on the dump returned 50.8 percent iron with no copper, gold, or silver.

On the Mountain Chief claim, which is a fractional claim near the junction of the Imnaha River and the Snake, a long tunnel has been driven northeasterly through the mountain so that there are portals both on the Imnaha and Snake River sides (Plate IV, fig. 6). The length of the tunnel is about 600 feet. Elevation of the portal is about 10 feet above the river. Here as in various other tunnels magnetite prevented the use of the compass. The tunnel followed a typical magnetite-hematite vein except where a basalt dike was encountered about 250 feet from the Snake River end of the tunnel. Two winzes of undetermined depth, now full of water, were sunk about a hundred feet apart near the central portion of the tunnel. Two small stopes were started, one south and one north of the dike.

On the Imnaha side, the tunnel started on the hanging wall side of a shear zone consisting of parallel fissures striking northeasterly and dipping steeply to the west. This shear zone is expressed in the topography at this point. The mountain is sheared so that where the tunnel was started a steep gulch has been formed.

Strong hydrothermal action in this shear zone, has altered the rocks intensely. The tunnel starts on seams of magnetite and hematite having an over-all width of 3 feet. The width of the vein in the tunnel varies from several inches up to two or three feet. Apparently most of the ore recovered by the tunnel work has been piled on the dump on the Imnaha side. It was estimated that this pile, which is strung out for a distance of 100 yards or so, contains about 400 tons. Three samples of dump material were taken, two representing magnetite and specularite, and the third representing material consisting mainly of quartz. The magnetite-hematite material returned about 1 percent copper and from 49.8 to 54.5 percent iron, with no gold or silver. The quartz material returned no gold, silver or copper; the iron was not determined.

A specimen of vein material from the dump is mainly specular hematite enclosing small masses of fine granular magnetite 2 to 3 centimeters in greater dimension. The mineral assemblage, with estimated percentages given in order of paragenesis is as follows:

Massive quartz	1 percent
Pyrite	3 percent
Magnetite	25 percent
Specular hematite	65 percent
Chalcopyrite	5 percent
Late euhedral quartz	1 percent

At no place in the tünnel did the ore in the vein appear to be of commercial grade.

It is reported that more than a carload of commercial copper ore taken from this tunnel is piled at Eureka Landing, just west of the junction of Eureka Creek with the Snake.

HIGHLAND MARY GROUP

Owner: Jay H. Dobbin and Hamilton Vance, Joseph, Oregon.

Area: 10 lode claims containing 103 acres net and one mill site of 5 acres, all patented.

Location: In sec. 25, T. 4 N., R. 48 E., and sec. 7, T. 3 N., R. 49 E. The ground lies west of the Imnaha River and is cut into two nearly equal parts by lower Toomey Gulch. The most northeasterly claim has one corner close to the west bank of the Imnaha, about 200 feet northwesterly from the junction of Toomey Gulch and the Imnaha River. The mill site, Silver Bell, (5 acres) is located on the west side of the Imnaha River about ¼-mile north of the mouth of Lightning Creek.

The southwesterly lode claims are reached by means of a trail which leaves the old Eureka Road at Dobbin's lower granary, and leads down across Toomey Gulch. The tunnel examined is reached by the way of an old poorly-outlined trail down the south branch of Toomey Gulch to its junction with the main gulch where there is a cabin. The tunnel mouth is about 60 feet N. 75° E. from the cabin.

History: The claims were located in 1899; patent was issued in 1914. There has been no production.

Topography: As described under the Fargo group, topography is rugged. Mountain sides are steep, rocky and bare. The bottoms of canyons have thick brush. In this group of claims the relief is about 1500 feet.

Geology: Country rock is granitic, probably largely quartz diorite. The veins have the same characteristics as those described under the Fargo group, except that very little copper was seen. The metallic minerals are mainly magnetite, with some hematite and pyrite.

Edna claim tunnel: On the Edna claim on lower Toomey Gulch where the south branch joins the main gulch, a tunnel has been driven northerly for about 55 feet in a fracture zone in altered quartz diorite. The fractures dip steeply to the east. Mineralization consists of disseminated pyrite, some of which is in small cubes, and iron oxides, mainly magnetite. The entire face of the tunnel is in altered material containing magnetite and pyrite. No fluorescent minerals were seen. A magnetite vein about 10 inches wide outcrops 10 feet to the west of the portal and trends parallel to the tunnel. The vein filling is essentially magnetite with some limonite on exposed faces. A polished section of this vein material showed it to be 90 percent magnetite, with interstices in the magnetite and with fractures filled with about 4 percent quartz. Alteration of the magnetite along the fractures has resulted in 4 percent limonite. Pyrite and chalcopyrite, about 1 percent each, fill cavities and interstices.

A sample of the magnetite west of the tunnel returned - gold, nil; silver, nil; copper, trace; iron, 58.8

A sample across the face of the tunnel returned no copper, gold or silver.

Bonnie Doone No. 1 tunnel: A short distance north of the junction of Toomey Gulch and the Imnaha River, and about 30 feet above the Imnaha Trail on the Bonnie Doone No. 1 claim, a tunnel was driven due south, all in granite, along the wall of a dike of black rock (basalt). No sign of metallic mineral deposition was seen.

WESTERN UNION GROUP

Owner: I. E. Dill, P. O. Box 2102, Seattle, Washington.

Area: 133.4 acres, 8 mining claims, all patented.

Location: This group makes up a relatively narrow, strip-like area extending northeasterly from upper Toomey Gulch to and across the Imnaha River, a distance of about 9000 feet. The strip is two claims wide at each end and one claim wide, or a little less than 600 feet, for 4 claim-lengths in the middle of the strip. The group extends through parts of secs. 24, 25, 26, and 35, T. 4 N., R. 48 E., and may be reached by trail leaving the old Eureka Road at Dobbin's lower granary. The high trail, seen plainly on the mountain slope south of the granary, leads to the workings described below, located near the end of the trail on the Rustler and Mabel L. claims.

History: Dates of location range between 1899 and 1902. Patent was issued in 1909. It seems likely that the development work was done concurrently with the work on the Fargo group and was stopped when work on the Fargo was stopped.

Topography: Elevations range from about 3100 at the southwestern end of the group to about 1200 feet at the northeastern end on the Imnaha River. Topography in general is similar to that described under Fargo group.

Development: Aside from discovery cuts, development consists of several tunnels and at least one shaft. Most of the work has been done on the Mabel L. and Rustler claims on the southwestern end of the property. Lineal footage of underground development work totals in excess of 1000 feet. A description of the tunnels is given under geology.

Geology: The country rock is granitic and a part of the same intrusive described under the Fargo group.

Veins are similar to those described in the other groups. Copper content is apparently low in all the veins seen. Vein filling is made up of magnetite, hematite, pyrite and, in places, a little chalcopyrite; vein widths are generally 8 to 12 inches.

The Rustler Claim tunnel No. 1 (as numbered on the patent map) is located near the center of the claim, with portal close to the old wagon road, and trends approximately due north for about 140 feet. It follows one of the typical iron veins. Some copper stain was seen in the material piled on the dump. About 300 feet south of this tunnel and on the opposite side of the gulch at a lower elevation, the Rustler claim tunnel No. 2 (as numbered on the patent map) has been driven a little west of south for about 60 feet. The vein drifted on is probably an extension of the one in No. 1 tunnel. Above the No. 2 tunnel, the outcrop of the vein extends up the mountain side in a prominent reddish brown comb for several hundred feet.

The Mabel L. Development Work consists of several tunnels, mostly caved, and a shallow shaft. The old wagon road ends on the Mabel L. claim about 500 feet westerly from No. 1 tunnel on the Rustler claim. Here a relatively large amount of underground work has been done, most of which is caved or unsafe for inspection.

On the south side and near the bottom of Spring Branch gulch, there is a caved shaft and tunnel. About 50 feet east and down the gulch a cross-cut tunnel starting S. 45° W. was driven to a vein. According to the patent map about 300 feet of drifting was done and a connection made with the shaft. This work was all inaccessible.

A picked sample of ore on the dump near the shaft returned -- gold, nil; silver, nil; copper, 3.7%; iron, 59.3%. A polished section of this ore (CBF83) shows it to be composed of 90% platy, specular-appearing magnetite, with interstices between the plates. These are filled with quartz (5%), chlorite (7%) and sulfides, which are 5% pyrite and 4% chalcopyrite. There is about 1% secondary limonite. The chlorite appears to make up a border-facies or alteration zone between the granitic country rock and the magnetite.

On the north side of the gulch opposite the shaft a tunnel has been driven northerly about thirty feet on a small vein of typical iron minerals. A polished section of this vein material (CBF85) shows it to be composed of 95% magnetite, which is peculiar in that it has all the appearances of specular hematite, but it is magnetic with a black streak. It is micaceous-appearing, consisting of interlocking "books", and is somewhat crumbly on this account. About 3% sulfide (pyrite and chalcopyrite) occurs as cavity fillings, and there is 2% secondary limonite.

A picked sample of magnetite and pyrite from the vein material on the dump returned no gold and silver; copper, 1.9%; iron, 59.7%.

A grab sample from ore piled on the dump near the caved collar of the shaft returned no gold and silver; copper, 2.0%; iron, 56.0%. A polished section of this ore (CBF85) shows it to be composed of 90% magnetite, 3% quartz, 3% pyrite, 4% chalcopyrite, and a little secondary limonite. Some of the magnetite has a specular appearance.

A tunnel on the Dutchey claim near the center of the group was not visited because of lack of time. It is located near the bottom of the dry ravine about a quarter mile south of lower Dobbin's granary on the Eureka Road. According to the patent map, this tunnel extends about S. 20° W. for a little over 400 feet.

EVENING STAR GROUP

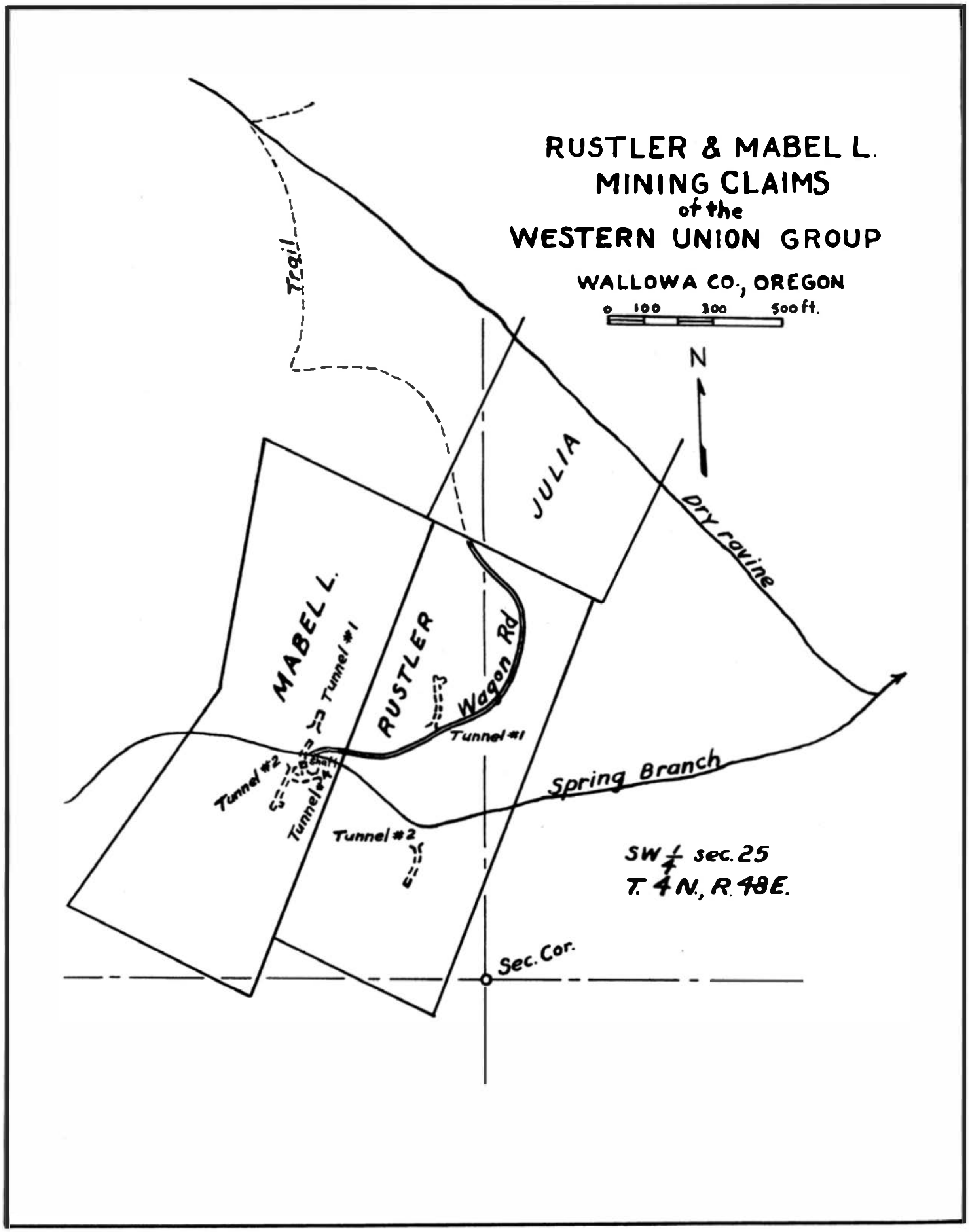
Area: 3 patented claims, approximately 60 acres.

Location: On the Imnaha River about 3 miles from the Snake in sec. 31, T. 4 N., R. 49 E. and sec. 6, T. 3 N., R. 49 E. Two of the claims, the Evening Star and Standard, lie in line a little east of north on both sides of the Imnaha River. The third claim, the Monarch, with center line extending due west, adjoins the Evening Star claim on the south. The claims may be reached by the way of the Imnaha trail.

Topography: (As described for other groups). Maximum relief for the group is about 500 feet.

Development: Several cuts, two tunnels and one shallow shaft.

Plate V



RUSTLER & MABEL L.
MINING CLAIMS
of the
WESTERN UNION GROUP
WALLOWA CO., OREGON
0 100 300 500 ft.
N
Trail
JULIA
Dry ravine
MABEL L.
RUSTLER
Wagon Rd
Tunnel #1
Tunnel #1
Tunnel #2
Tunnel #2
Shaft
Spring Branch
SW 1/4 sec. 25
T. 4 N., R. 48E.
Sec. Cor.

Geology: Country rock is granitic and in general is the same as that of the other groups in the area.

Only one tunnel was visited. This is located a short distance above the Imnaha trail, near the river and close to the township line. A short cross-cut tunnel about 15 feet long was driven westerly and cut a small vein 6 to 8 inches wide near the portal. A drift on this vein was driven southerly for about 35 feet. The vein filling is partly quartz and partly altered country rock, both containing pyrite and chalcopyrite, sparsely disseminated. A sample of the vein about half way to the face returned gold, trace; silver, nil; copper, trace.

APPENDIX

Samples taken in the Imnaha - Snake river area were analyzed both chemically and spectrographically. In addition, most of them were tested qualitatively for mercury by the absorption method using a willemite screen and mercury vapor light. The following tables give complete analytical results.

* * * * * * * * * * *

ASSAY REPORT

FARGO GROUP OF CLAIMS

Sample No.	Description	Gold Ounces	Silver Ounces	Copper Percent	Total Iron Percent
CBF 42 (1)	Snake River Chief tunnel. Wall rock (diorite) pin points of fluorescent mineral.				
CBF 43 (2)	Snake River Chief tunnel. Sample width 10 inches. Chiefly magnetite.	Nil	Nil	Nil	48.5
CBF 44 (3)	Snake River Chief tunnel. Widest part of vein. Width 36 inches. Magnetite, pyrite, and chalcopyrite.	Nil	Nil	Trace	38.6
CBF 45 (4)	Snake River Chief Discovery tunnel. Diorite, for spectrographic analysis.				
CBF 46 (5)	Snake River Chief Discovery tunnel. Face, diorite, for spectrographic analysis.				
CBF 47 (6)	Tunnel at east end of Snake River Chief claim. Hematite, specularite, and minor amounts of chalcopyrite. Sample width 4 feet.	Nil	Nil	Trace	50.5
CBF 48 (7)	Tunnel at east end of Snake River Chief claim; N.W.Section, 24 inches in width. Magnetite & chalcopyrite.	Nil	Nil	4.6	35.5
CBF 49 (8)	Ditto; F.W.Section, 4 feet wide, chiefly magnetite.	Nil	Nil	0.2	50.1
CBF 50 (9)	Last Chance claim. Magnetite, chalcopyrite, and minor amounts of specularite. Width 26 inches.	0.04	Trace	.1	37.7
CBF 51 (10)	Iron King claim Discovery tunnel. Grab from dump. Magnetite.	Nil	Nil	Nil	62.3
CBF 52 (11)	Mother Lode claim. 8 inches at face. First tunnel. Magnetite and specularite.	Nil	Nil	Trace	58.5

Sample No.	Description	Gold Ounces	Silver Ounces	Copper Percent	Total Iron Percent
CBF 53 (12)	Mother Lode claim. Second (higher) tunnel. Grab from dump. Magnetite and pyrite.	Nil	Nil	Nil	50.8
CBF 54 (13)	Mountain Chief claim. Grab from dump nearest portal. Magnetite and specularite.	Nil	Nil	1.0	49.8
CBF 55 (14)	Mountain Chief claim. Grab from second dump from portal. Magnetite, pyrite, and chalcopyrite.	Nil	Nil	0.8	54.5
CBF 56 (15)	Mountain Chief claim. Quartz grab sample from dump. Quartz with minor amounts of specularite and chalcopyrite.	Nil	Nil	Nil	
CBF 56a	Mountain Chief claim. Fluorescent mineral coating covering granite wall. Spectrographic analysis.				
WESTERN UNION GROUP					
CBF 83	Specimen from dump at old shaft end of old road on Mabel L claim, south side of gulch.	Nil	Nil	3.7	59.3
CBF 85	Grab from one pile at old shaft, end of old road on Mabel L claim, south side of gulch.	Nil	Nil	2.0	56.0
CBF 84	Sample of ore dump at tunnel north side of gulch, opposite old shaft.	Nil	Nil	1.9	59.7
HIGHLAND MARY GROUP					
CBF 82	10-inch magnetite vein just west of tunnel near shack, Toomey Gulch, Edna claim.	Nil	Nil	Trace	58.8
CBF 83	Across face of tunnel near shack, Toomey Gulch, Edna Claim	Nil	Nil	Nil	
EVENING STAR GROUP					
CB 495	Sample of 60-inch vein quartz breccia; small quantity of sulphides	Trace	Nil	Trace	

QUALITATIVE SPECTROGRAPHIC ANALYSIS
(Quantities estimated to nearest power of ten)

<u>Sample No.</u>

<u>Elements present in concentrations over 10%</u>

CBF 42	Silicon (Si); Aluminum (Al); Iron (Fe); Calcium (Ca).
CBF 44	Silicon (Si); Iron (Fe).
CBF 45	Silicon (Si); Aluminum (Al); Iron (Fe); Calcium (Ca).
CBF 46	Silicon (Si); Aluminum (Al); Iron (Fe); Calcium (Ca).
CBF 48	Silicon (Si); Iron (Fe).
CBF 50	Silicon (Si); Iron (Fe).
CBF 55	Silicon (Si); Iron (Fe).
CBF 56a	Silicon (Si); Aluminum (Al); Iron (Fe); Calcium (Ca).
CBF 82	Silicon (Si); Iron (Fe).
CBF 85	Silicon (Si); Iron (Fe).

<u>Elements present in concentrations 10% - 1%</u>

CBF 42	Magnesium (Mg); Sodium (Na); Manganese (Mn); Chromium (Cr).
CBF 44	Aluminum (Al); Magnesium (Mg); Calcium (Ca); Manganese (Mn).
CBF 45	Magnesium (Mg); Sodium (Na); Manganese (Mn).
CBF 46	Magnesium (Mg); Sodium (Na); Manganese (Mn).
CBF 48	Copper (Cu).
CBF 50	Aluminum (Al); Manganese (Mn); Copper (Cu).
CBF 55	Aluminum (Al); Copper (Cu).
CBF 56a	Magnesium (Mg); Sodium (Na); Manganese (Mn).
CBF 82	Manganese (Mn).
CBF 85	Magnesium (Mg); Manganese (Mn); Copper (Cu).

<u>Elements present in concentrations 1% - 0.1%</u>

CBF 42	Potassium (K); Titanium (Ti).
CBF 44	Sodium (Na); Titanium (Ti); Copper (Cu); Arsenic (As).
CBF 45	Potassium (K); Titanium (Ti); Chromium (Cr).
CBF 46	Potassium (K); Titanium (Ti); Chromium (Cr).
CBF 48	Aluminum (Al); Magnesium (Mg); Calcium (Ca); Manganese (Mn); Cobalt (Co); Nickel (Ni); Arsenic (As).
CBF 50	Magnesium (Mg); Calcium (Ca); Sodium (Na).
CBF 55	Magnesium (Mg); Calcium (Ca); Manganese (Mn).
CBF 56a	Potassium (K); Titanium (Ti); Chromium (Cr).
CBF 82	Aluminum (Al); Magnesium (Mg); Calcium (Ca); Copper (Cu); Zinc (Zn); Arsenic (As).
CBF 85	Aluminum (Al); Calcium (Ca); Sodium (Na); Zinc (Zn).

<u>Elements present in concentrations 0.1% - .01%</u>

CBF 42	Zirconium (Zr); Vanadium (V); Copper (Cu); Barium (Ba); Cobalt (Co); Arsenic (As).
CBF 44	Potassium (K); Zirconium (Zr); Chromium (Cr); Vanadium (V); Cobalt (Co); Nickel (Ni).
CBF 45	Zirconium (Zr); Vanadium (V); Copper (Cu); Barium (Ba); Arsenic (As).
CBF 46	Zirconium (Zr); Vanadium (V); Copper (Cu); Barium (Ba); Arsenic (As).
CBF 48	Sodium (Na); Zirconium (Zr); Chromium (Cr); Vanadium (V).
CBF 50	Potassium (K); Titanium (Ti); Zirconium (Zr); Chromium (Cr); Vanadium (V); Cobalt (Co); Nickel (Ni); Arsenic (As).
CBF 55	Sodium (Na); Titanium (Ti); Zirconium (Zr); Chromium (Cr); Vanadium (V); Cobalt (Co); Nickel (Ni); Arsenic (As).

Sample No.

Elements present in concentrations 0.1% - .01% (Cont.)

CBF 56a	Zirconium (Zr); Vanadium (V); Copper (Cu); Barium (Ba); Arsenic (As).
CBF 82	Sodium (Na); Zirconium (Zr); Chromium (Cr); Nickel (Ni).
CBF 85	Zirconium (Zr); Chromium (Cr); Cobalt (Co); Nickel (Ni); Arsenic (As).

Elements present in concentrations .01% - .001%

CBF 42	Tin (Sn); Nickel (Ni); Boron (B).
CBF 44	Molybdenum (Mo); Barium (Ba); Boron (B).
CBF 45	Tin (Sn); Cobalt (Co); Nickel (Ni); Boron (B).
CBF 46	Tin (Sn); Cobalt (Co); Nickel (Ni); Boron (B).
CBF 48	Potassium (K); Titanium (Ti); Molybdenum (Mo); Barium (Ba); Boron (B).
CBF 50	Molybdenum (Mo); Barium (Ba); Boron (B).
CBF 55	Potassium (K); Molybdenum (Mo); Barium (Ba); Boron (B).
CBF 56a	Lead (Pb); Tin (Sn); Molybdenum (Mo); Cobalt (Co); Nickel (Ni); Boron (B).
CBF 82	Potassium (K); Titanium (Ti); Molybdenum (Mo); Vanadium (V); Barium (Ba); Beryllium (Be); Cobalt (Co).
CBF 85	Potassium (K); Titanium (Ti); Molybdenum (Mo); Vanadium (V); Barium (Ba); Beryllium (Be).

Elements present in concentrations below .001%

CBF 42	Silver (Ag).
CBF 44	Silver (Ag).
CBF 45	Silver (Ag).
CBF 46	Silver (Ag).
CBF 48	Silver (Ag).
CBF 50	Silver (Ag).
CBF 55	Silver (Ag).
CBF 56a	Silver (Ag).
CBF 82	Silver (Ag).
CBF 85	Silver (Ag).

RESULTS OF QUALITATIVE TESTS FOR MERCURY
(Using willemite screen)

Sample No.	
CBF 42	Strong trace
CBF 43	Trace
CBF 44	Trace
CBF 45	Strong trace
CBF 46	Very strong trace (Quantitative returns from 0.2 pound to 0.5 pound of Hg to ton)
CBF 47	Slight trace
CBF 48	Trace
CBF 49	Nil
CBF 50	Nil
CBF 51	Nil
CBF 52	Nil
CBF 53	Trace
CBF 54	Trace
CBF 55	Slight trace
CBF 56	Very faint trace
CBF 56a	Extremely faint trace
CBF 82	Faint trace
CBF 83	Nil
CBF 84	Very faint trace
CBF 85	Nil
CBF 86	Trace
CBF 82 No. 1	Faint trace
CBF 83 No. 3	Nil
CBF 84 No. 4	Extremely faint trace
CBF 85 No. 5	Nil
CBF 86 No. 8	Trace

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State Department of Geology and Mineral Industries, 702 Woodlark Building, Portland, Oregon.

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3. Geology of Part of the Wallowa Mountains, 1938: C.P.Ross.	0.50
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3. Geologic Map and Geology of Round Mountain Quad., 1940: W.D.Wilkinson & others.	0.25
4. Geologic Map of the Butte Falls Quad., 1941: W.D.Wilkinson & others (also in Bull.22). .	0.45
6. Preliminary Geologic Map of the Sumpter Quad., 1941: J.T.Pardee & others	0.40

NOTE: Sale of maps nos. 2,5, and 7 are restricted for the duration.

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Sampling of small Prospects and New Discoveries	Free
The Spectrographic Laboratory of the State Dept. of Geology & Mineral Industries, 1942	Free
Oregon Mineral Localities Map	0.05
Landforms of Oregon; a physiographic sketch--(17 by 22 inches) 1941	0.10