

Iron Dyke

Copper

NAME

OLD NAMES

PRINCIPAL ORE

MINOR MINERALS

65 48 E 201

T

R

S

PUBLISHED REFERENCES

Ludgren 01:749  
Swartley 19:107  
Parks + Swartley 16:124, 130  
Loggins 19A

MISCELLANEOUS RECORDS

Baker

COUNTY

Homestead

AREA

ELEVATION

ROAD OR HIGHWAY

DISTANCE TO SHIPPING POINT

PRESENT LEGAL OWNER (S)

Cooley Butcher

Address

OPERATOR

none

Name of claims

Area

Pat.

Unpat.

Name of claims

Area

Pat.

Unpat.

EQUIPMENT ON PROPERTY

REPORTS

Recon-Survey of the Homestead (Zen Tech.) District JEF 6/1/39	X		X
PORTION OF LETTER FROM THAYER LINDSLEY, GIVES RECORD OF PRODUCTION 1916-20, 1922-24	X		
<del>Several clippings from Mining Journal, Phoenix, Ariz.</del>	<del>X</del>		
<del>Clipping from Baker Democrat Herald, March 12, 1942</del>	<del>X</del>		

SHIPMENT AND ASSAY RECORDS



MAPS

Plan Map W.F.F. Dec 1915	X		
Assay Plan No 700 level G.L.W. March 1, 1919	X		
Longitudinal (longitudinal what says I?)	X		
Section, 1915	X		

MONTHLY REPORT OF PURCHASES  
MACHINERY, SUPPLIES, MAINTENANCE ITEMS AND REPAIRS UNDER  
PREFERENCE RATING ORDER P-56.

NAME OF MINE OPERATOR COOLEY BUTLER (IRON DYKE MINE- HOMESTEAD, OREGON)  
ADDRESS: 745 Rowan Building, Los Angeles, California MINE SERIAL NO. 33-70.  
PURCHASES MADE IN THE MONTH OF SEPTEMBER 1942.

1. PURCHASES TO WHICH RATING A-8 HAS BEEN APPLIED DURING MONTH.

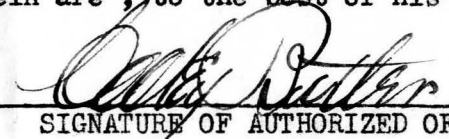
	<u>MATERIAL</u>	<u>QUANTITY</u>	<u>SUPPLIER</u>	
	Crankshaft Bearings	3	Vernon Tool Co.Ltd.	Los Angeles.
	Drill Parts	34 (Small Parts)	Ingersoll-Rand Co.	"
	Guage	1	Stuart Oxygen Co.	"
	Fuel Nozzle & Gaskets (For Deisel Engine)	30	Vernon Tool Co.Ltd.	"
	Smooth On	5 Lbs.	Harper & Reynolds	"
	Cap Screws	1 Doz.	Do.	"
11.	PURCHASES TO WHICH RATING A-3 HAS BEEN APPLIED DURING THE MONTH			NONE.
111.	" " " " A-1-c " " " " " " "			NONE.
1V.	" " " " A-1-a " " " " " " "			NONE.

The undersigned hereby certifies to the War Production Board, that

- (1) he executed the foregoing statement on behalf of and by authority of the above named Mine Operator;
- (2) the above named Operator has, during the period covered by this report, complied with all the provisions of Preference Rating Order P-56 and has applied ratings only in accordance therewith;
- (3) during such period the Mine Operator's inventory of operating supplies and other material has not been greater than the minimum necessity for the efficient operation of his business, and the ratio of inventory (quantity) to average production for the years 1938, 1939 and 1940;
- (4) the facts stated herein are, to the best of his knowlege and belief, true and correct.

OCT 22 1942

Date



SIGNATURE OF AUTHORIZED OFFICIAL

TITLE

PD-119  
(Rev-12-1-41)

MONTHLY REPORT OF PURCHASES  
MACHINERY, SUPPLIES, MAINTENANCE ITEMS AND REPAIRS UNDER  
PREFERENCE RATING ORDER P-56.

NAME OF MINE OPERATOR COOLEY BUTLER (IRON DYKE MINE--HOMESTEAD, OREGON)  
ADDRESS: 745 Rowan Building, Los Angeles, California- MINE SERIAL NO. 33-70.  
PURCHASES MADE IN THE MONTH OF OCTOBER-1942.

1. PURCHASES TO WHICH RATING A--8 HAS BEEN APPLIED DURING MONTH.

<u>MATERIAL</u>	<u>QUANTITY</u>	<u>SUPPLIER</u>	
Shim Steel	10 Ft.	Ducommon Metals & Supply Co.	Los Angeles, California
Smooth On Iron Cement	5 Lbs.	Harper & Reynolds Corp.	Do.
Cap Screws	12	Do.	Do.
Zerk Fittings	36	Do.	Do.
Parts For Drifter ( Springs-Pawls-Pistons Chuck-Bushings-Chuck Jaws)	20	Ingersoll-Rand Co.	Do.
Vit. Bay State Wheel	1	Pacific Metals Co.Ltd.	Do.
Batteries for Ford & Grahame Trucks	2	United Battery Mnfg. Co.	Do.
Oil Stove Burner	1	T.E.Potts Stove & Burner Works	Do.
11. PURCHASES TO WHICH RATING A-3 HAS BEEN APPLIED DURING THE MONTH			NONE.
111. " " " " A-1-c " " " " " "			NONE.
1v. " " " " A-1-a " " " " " "			NONE.

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- (2) the above named Operator has, during the period covered by this report, complied with all the provisions of Preference Rating Order P-56 and has applied ratings only in accordance therewith;
- (3) during such period the Mine Operator's inventory of operating supplies and other material has not been greater than the minimum necessary for the efficient operation of his business, and the ratio of inventory (quantity) to average production for the years 1938, 1939 and 1940;
- (4) the facts stated herein are, to the best of his knowledge and belief, true and correct.

NOV 6 - 1942

Date

  
SIGNATURE OF AUTHORIZED OFFICIAL

OWNER.  
TITLE

RECEIVED  
NOV 9 1942  
STATE DEPT OF GEOLOGY  
& MINERAL INDS.

PD-119  
(Rev-12-1-41)

MONTHLY REPORT OF PURCHASES  
MACHINERY, SUPPLIES, MAINTENANCE ITEMS AND REPAIRS UNDER  
PREFERENCE RATING ORDER P-56.

RECEIVED  
DEC 12 1942  
STATE DEPT OF GEOLOGY  
& MINERAL INDS.

NAME OF MINE OPERATOR: COOLEY BUTLER (IRON DYKE MINE, HOMESTEAD, OREGON.)  
ADDRESS: 745 Rowan Building, Los Angeles, California. MINE SERIAL NO. 33-70

PURCHASES MADE IN THE MONTH OF NOVEMBER-1942

1. PURCHASES TO WHICH RATING AA-2X HAS BEEN APPLIED DURING MONTH.

<u>MATERIAL</u>	<u>\$ VALUE</u>	<u>SUPPLIER</u>	<u>ADDRESS</u>
Worm gear, worm wheel & key for Diesel engine	39.75	Vernon Tool Company	Alhambra, California
2 Valve seats (Fordson)	5.00	S. C. Carter Co.	Los Angeles, "
Set rins, valve & valve guide	4.58	Montgomery Ward Co.	Portland, Oregon
Set 4" Casing dies for Toledo threader		Ducommun Metals & Supplies	Los Angeles, California
2 Welding tips for torch	9.50	Linde Air Products Co.	Vernon, California
Parts for drifter (10)	116.70	Ingersoll-Rand Co.	Los Angeles, Calif. & Salt Lake City


II. PURCHASES TO WHICH RATING A-3 HAS BEEN APPLIED DURING THE MONTH: NONE  
III. " " " " A-1-C " " " " " " NONE  
IV. " " " " A-1-A " " " " " " NONE

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- (1) he executed the foregoing statement on behalf of and by the authority of the above named Mine Operator
- (2) the above named Operator has, during the period covered by this report, complied with all the provisions of Preference Rating Order P-56 and has applied ratings only in accordance therewith;
- (3) during such period the Mine Operator's inventory of operating supplies and other material has not been greater than the minimum necessary for the efficient operation of his business, and the ratio of inventory (quantity) to average production for the years 1938, 1939, and 1940;
- (4) the facts stated herein are, to the best of his knowledge and belief, true and correct.

DEC 9 - 1942

Date

  
Signature of Authorized Official

Owner  
Title



WALLOWA  
RANGE  
SNAKE RAY  
HOMESTEAD  
COPPER  
DISTRICT

# IRON DIKE DEPOSIT

(1)

## COPPER PROPERTIES

The discovery of and activity in this district has taken place within the last 20 years. Copper indications at the surface are evident to some degree almost everywhere in the exposed greenstones. Much of this territory is held by location, besides many claims are patented.

There is no production from the Oregon side, and the camp is more quiet than at any time since its discovery. The majority of the owners, however, in spite of discouragement, retain their faith in the district. Out of the large number of groups a few of those easiest of access, or those toward which our attention had been directed are discussed below.

*Iron Dike.*—This is a copper deposit discovered in 1897, situated about 2,000 feet from the railroad at Homestead. The lower tunnel is about 300 feet above the town. The main croppings are about 375 feet above the lower tunnel and 70 feet below the croppings is the upper tunnel. Down 50 feet farther is an intermediate crosscut, and midway between the latter and the lower tunnel is a fourth crosscut.

The lower tunnel is in some 1,300 feet, cutting the ore body about 800 feet in and, passing through it, continues on without discoveries. A zigzag raise connects this tunnel with the three tunnels above. Unfortunately this raise was started a hundred feet beyond the ore in the lower tunnel, and much other development could have been placed to better advantage. The opportunity here to block out the ore and to determine its limits were excellent.

The series of trachytic or perhaps rhyolitic flows here have been so badly altered and silicified that they are now a chloritic indefinite

Frank Lauzon of Homestead, Oregon, is reported to be in charge of operations at the Iron Dike mine near Homestead, owned by Cooley Butler, 745 Rowan Building, Los Angeles, California. The proposed 1,500-foot tunnel is now in over 400 feet. 3/30/38

## IRON DIKE DEPOSIT

(2)

fied feldspars in a groundmass of abundant sericite with some chlorite and a few crystals of secondary quartz. Minute faulted quartz veinlets are revealed throughout this altered greenstone. No thin sections were made of the meta-andesite to determine exactly its present character.

Although the character of some of these flows due to a variation in their composition and structure might be much more favorable to concentration than other flows, nevertheless the factor of most importance here is the opportunity for ore concentration through fault planes and shear zones.

A considerable amount of shearing and faulting has taken place in this immediate vicinity. Several pronounced slips were noted all having a strike of N. 20° E. and dipping at rather high angles eastward. For a considerable width a shear zone, many feet wide, has the same general direction. The best ore in the lower tunnel is massive chalcopyrite and pyrite with but little quartz as a gangue in a lens-shaped body dipping 60° E. with a maximum width of about six feet which is said to extend from the lower to the upper tunnel.

On the west side of the lens in a short crosscut from the lower level the ore seems to be cut off rather sharply by a fault. On either side of this high grade ore, which is said to average 15 to 20 per cent copper, is a much larger body of disseminated pyrite and chalcopyrite in the chloritic greenstone, in which are abundant quartz seams, veinlets, and nodules that contain pyrite. There is often a silicification of the rock itself. Statements are made that it contains about \$2.00 in gold, and 6 to 30 ounces in silver, regardless of the per cent of cop-

greenstone. Intercalated with the flows is a body of dark-brown altered andesite which may have been an intruded sill.

The greenstone in the hand specimen is in color light green and quite dense. Under the microscope thin sections vary from very fine-grained to considerably coarser, but contain very poorly formed silic-

WALLOWA R.  
HOMESTEAD  
SNAKE R. DIST.

# IRON DIKE PROPERTY

(3)

WALLOWA R.  
HOMESTEAD  
(SMAKER.) D.

per present. This deposit, both high and low grade, is in a zone of crushing in which copper bearing solutions have deposited their contents largely by replacement.

This series of rocks has suffered severely and has become badly altered. This of course creates the best conditions for the concentration of metallic minerals whenever opportunity offers whether it be in great or small fractures, shear zones, or in amygdules. In this particular property a study of thin sections has shown the formation of minute veins which were afterwards broken. The field evidence clearly shows the faulting and shearing that have taken place. All of these conditions are favorable to the deposition of copper minerals that have been dissolved from the greenstone series which practically always contain some copper.

However, as noted before, the presence of such an amount of highly silicified rock and the fact that the gold and silver values are considerable and independent of the copper content seems to indicate an impregnation of this shear zone from sources connected with the granodiorite. The gold and silver and possibly some of the copper impregnated the shear zone which at a later time, having been re-sheared, has permitted a re-concentration of copper from the shear zone along principal planes assisted by a deposition of copper brought in from the greenstone walls from which it had been dissolved by circulating waters of moderate depth and temperature.



Portion of letter of Thayer Lindsley, the owner of the Iron Dyke Mine, of December, 1924:

OPERATIONS.

	<u>Tons</u>	<u>Gross Value</u>	<u>Net Operating Profit</u>
1916-1920 (incl.)	164,577	\$2,725,352.61	\$468,267.96
1922-1924 (incl.) (Approx.)	50,000	600,000.00	35,000.00

FUTURE POSSIBILITIES.

Two drill holes have intersected respectively 37 ft. and 16 ft. wide of medium grade ore below the lowest level (800'). The indications are that a substantial new ore body will be developed in this area.

The large ore body on the 7th level contained 125,000 tons averaging 3.6% Cu. .25 Au. 1 oz. Ag, and the new ore body should show similar size and value. To determine the possible profit from such an ore body under present conditions we have the actual results of a recent month when ore of nearly the same grade was treated.

In September, 1922, 2363 tons of ore averaging 3.6% Cu. .22 Au. and 1 oz. Ag were produced, from which the net smelter returns amounted to \$20,206.00. When operating at this rate of production we have found our monthly expenses running from \$10,000 to \$15,000 per month, or roughly an average of \$13,000.

With these actual results as a basis we can estimate that 125,000 tons averaging 3.6% Cu., .25 Au. 1 oz. Ag will produce a net operating profit of around \$500,000.

Developments have shown increasing gold values with depth and also increased amounts of primary chalcocite and bornite.

STATE OF OREGON  
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

Portland, Oregon

**G M I SHORT PAPER**  
No. 12

A GEOLOGIC RECONNAISSANCE MAP  
of the area around the  
IRON DYKE MINE, OREGON  
at  
Homestead, Baker County, Oregon  
by  
John Eliot Allen



STATE GOVERNING BOARD

W. H. STRAYER, CHAIRMAN . . . . . BAKER  
ALBERT BURCH . . . . . MEDFORD  
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EARL K. NIXON  
DIRECTOR

PRICE 10 CENTS

A Geologic Reconnaissance of the Area around the Iron Dyke Mine

Baker County, Oregon

by

John Eliot Allen

INTRODUCTION

The Iron Dyke mine was discovered in 1897, and was active in 1916, when about 50 carloads of 6 percent copper ore was being shipped monthly. A mill was constructed in the latter part of 1916, and operated for some years. The ore consists of massive chalcopyrite and pyrite in irregular bodies in greenstone, and has been mined to a depth of over 700 feet by shaft; the ore above shaft level having been mined by a series of four tunnels over a vertical distance of over 700 feet.

No geologic survey of the surface rocks has been made public, and the department considered that such a survey would be of value in the future possible development of the property.

The accompanying topographic and geologic map was made during April and May, 1939. The base line and primary triangulation was run with a transit; a small plane table, alidade and stadia was used for most of the topography and about half of the geologic traverses; and a brunton and aneroid was used for the remaining half. Topography along the west and north edges of the map is of sketch accuracy.

Insufficient time was spent on the survey to definitely determine the relationships between the various members of the complicated Permian series of rocks, although the surface distribution has been plotted upon the accompanying map, and inferred relationship is given in the text. The structure

is complex, faulting has broken the area into a series of blocks, and later intrusions of rhyolite have further obscured the picture. It is believed, however, that there is clear enough surface evidence available, were detailed work to be done, to permit an accurate summary of geologic conditions.

### GEOLOGY

Andesite porphyry: The oldest rock in the area consists of red to purplish porphyritic andesite at least 500 feet thick, which outcrops across Middle Ridge (between Iron Dyke and Homestead Creeks) near the center of the map.

The andesite contains numerous small white tabular plagioclase patches of this rock appear to the north of Homestead Creek and to the south of Iron Dyke Creek, but they do not outcrop far above the creek levels.

phenocrysts up to 3mm in an  
Small aphanitic dark  
red groundmass

The andesite area varies in width up to 1000 feet, and apparently represents an uplifted block, being bounded on the west by the normal Reservoir fault, and on the east by two other normal step faults. It is overlain by tuff-breccia in Middle Ridge.

Greenstone Series: The bulk of the rocks in the Homestead area have been mapped under the name Greenstone Series, as it was impossible to map the contacts between the various members of the series in the time available. These altered volcanic and pyroclastic rocks are, on the evidence of fossils contained in thin limestone beds, of Permian (Phosphoria) age, according the R. L. Lupper.<sup>1</sup> They have a minimum thickness of at least 4800 feet, and appear to have a stratigraphic continuity within the area examined.

All rocks of the Greenstone series are more or less highly metamorphised,

---

1. Pers. Communication

with advanced saussuritization of both the phenocryst and groundmass feldspars. Towards the north and west the alteration has been less severe while the rocks near the ore mine have been intensely altered.

The oldest member of the Greenstone series outcrops just east of the Iron Dyke fault, and consists of a southeast dipping lens at least 500 feet thick of dark green porphyry, containing 20 percent large tabular euhedral plagioclase phenocrysts or porphyroblasts from 2 to 8 mm long, and 25 percent dark green anhedral pyroxene phenocrysts from 2 to 3 mm in size, in a dense aphanitic dark green groundmass. This rock is amygdaloidal in a few places, and elsewhere may contain a generation of lath-shaped feldspars smaller than the large phenocrysts. All the feldspars are highly saussuritized.

Immediately overlying the porphyry is a discontinuous east-dipping lens up to 200 feet thick of schistose conglomerate, which outcrops between the two creeks just west of Homestead, and in the low spur just south of Iron Dyke mine. The conglomerate is made up of water-worn pebbles, predominately rhyolitic in composition, in a fine fine-grained tuffaceous matrix. The pebbles, except for a few more resistant quartzites, have been sheared, elongated, and broken, and the rocks appear as a knobby schist.

Above the porphyry and conglomerate at least 600 feet of medium to coarse grained green tuff-breccia appears to comprise the next stratigraphic unit. East of the Iron Dyke fault towards the southern edge of the map the breccia is interbedded with two thick rhyolite flows. West of the fault in Middle Ridge and north of Homestead Creek the breccia is intruded by several rhyolite dikes, and grades into coarse agglomeratic facies. The tuff-breccia is composed of angular fragments



of rhyolite varying from a few to 100 mm in size, in a matrix of fine to medium grained tuff. In some places the matrix appears to consist of rhyolite containing quartz crystals.

Although originally mapped as a separate series, the rhyolite dikes and flows are now believed to be an integral part of the Greenstone Series. Banded and massive flows with a total thickness of at least 500 feet are exposed in a wide zone west of the Iron Dyke fault and around the mine workings. The zone narrows to the north on Middle Ridge, where the flows are cut off by faults on both sides. Everywhere the rhyolites appear to be interbedded with or to overlie tuff-breccias. The rhyolites are green to gray in color, in places reddish. Quartz phenocrysts are not always in evidence, so that they were at first mistaken for banded cherts. The banding is well developed at places, particularly just south of the Iron Dyke shaft. In the gossan zone to the west they are so broken and iron stained that the structure is not evident.

Light colored rhyolite dikes from 5 to 50 feet thick have been intruded into the lower portion of the Greenstone Series in the eastern part of the area mapped. They do not occur in the bedded tuffs in the west part of area. With the exception of three dikes in the ridge east of the Iron Dyke shaft, which strike northwest, they all have north-easterly trends. They can usually be distinguished from the rhyolite flows by their lighter color. A slightly altered and well-bedded section at least 2000 feet thick of medium to fine grained tuffs with interbedded limestones outcrops on upper Homestead Creek. These tuffs dip with varying angles towards the southeast, only being upturned to form a syncline near the Reservoir Fault contact with the older andesites on the southwest. They vary in coarseness from

a very fine-grained to a relatively coarse tuff, and water action is evident in the bedding, cross-bedding, and in the intercalation of small shale and limestone lenses. These limestones vary in thickness from 5 to 25 feet, and are fairly continuous in outcrop, forming marker horizons within the tuffs. Two such horizons about 500 feet apart appear in the section in the west half of the area. The limestone weathers to a buff color, and a fauna consisting of abundant Spirifers, a few Productids, one Tetracoral, and what may be Pentacrinus has been collected from localities north of Homestead Creek and on the upper reaches of Iron Dyke Creek.

#### Columbia River basalt

The Permian rocks of the Homestead area are unconformably overlain by Columbia River basalt several thousand feet in thickness. The contact mapped lies at about 3000 feet, but outside the area it can be seen to slope gently to the southwest.

The basalt varies considerably in texture, from a fine-grained dense aphanitic to a coarse open-textured lava containing large tabular plagioclase phenocrysts up to 20 mm. Scoriaceous and agglomeratic phases were noted in a few places. The nearly horizontal attitude of the flows indicates that in this area there has been little post-Miocene deformation.

#### Structure

The greenstones making up the northwest third of the area are folded into a gentle syncline <sup>striking</sup> east-north-east, which is faulted off on the southwest by the "Reservoir-fault" and on the east by a north-south fault system.

A GEOLOGIC RECONNAISSANCE MAP  
of the area around the  
IRON DYKE MINE, HOMESTEAD,  
BAKER COUNTY, OREGON

by  
John Eliot Allen

*This is original  
report. Revised  
Oct, 1946  
JEA.*

*The field work on*

INTRODUCTION

The reconnaissance geology of the Homestead district occupied **only** 7 man-days at various times during April and May, 1939. The primary triangulation <sup>occupied</sup> took 15 man-days, and the topography 7 man-days. About half of the geologic traverses <sup>the work connected with</sup> were made with plane-table control and stadia, <sup>was done</sup> about half with <sup>13</sup> brunton and aneroid. Topography of the west and north edges of the map is only of sketch accuracy. ?

Formations in the area

Only four formations could be mapped in the field in the time available, although at least two more should be differentiated with more detailed work.

Basalt: Several thousand feet of basalt (correlated with the Columbia River series) overlies the older (Permian) rocks of the Homestead area, which have been exposed by erosion of the Snake River and its tributaries. The lower contact of the basalt varies in elevation, being successively lower from 3050 feet on the east to 2600 feet on the west and south of the area mapped. The Homestead district lies on the southwest slope of a mature hill or range of Miocene age.

The basalt varies considerably from a fine-grained dense aphanitic <sup>type</sup> to coarse open-textured rock with large tabular plagioclase phenocrysts. Scoriaceous and <sup>These variations are considerable</sup>

agglomerate phases are not uncommon. The nearly horizontal attitude of the flows indicate that there has been little post-Miocene deformation.

Rhyolite dikes: Light colored rhyolite dikes from 5 to 50 feet in thickness have been intruded into the rocks of the greenstone series, especially in the eastern portion of the area mapped, where they are quite abundant. They can usually be distinguished from the other rhyolites by their lighter color. In all cases noted the dikes have a northeasterly trend.

*These dikes are numerous*

*flows*

Rhyolite Flows: More or less banded rhyolite flows with a total thickness of at least 500 feet are exposed in a wide zone around the Iron Dyke Mine. The zone narrows to the north on Middle Ridge, where they are cut off by faults on both sides. The rhyolite on Middle Ridge overlies greenstone tuff. Rhyolite southeast of Homestead dips to the east, and also overlying greenstone tuffs.

The rhyolites are green to grey in color; in places they are reddish. Quartz phenocrysts are not always in evidence, so that they were at first mistaken for banded cherts. The banding is well developed in places, especially above the Iron Dyke shaft, but in the gossan zone to the west the rocks they are so broken and iron-stained that the structure is not evident.



Greenstone Series: The bulk of the rocks of the Homestead area have been mapped as a unit under the name of the greenstone series, which has a minimum thickness of at least 2000 feet, and as far as can be <sup>ascertained they have</sup> told, a stratigraphic uniformity within the area examined.

*making up a large part*

This series contains rocks which originally were tuffs, both massive and structureless <sup>as well as</sup> stratified and cross-bedded; tuff-breccias and agglomerates; conglomerates; and a few altered lavas of a spilitic appearance which may have been dikes or flows of gabbroid or basaltic nature.

*distinct?*  
The medium to fine grained tuffs make up a large part of the series, but they are subordinate in amount to the bedded tuffs and breccias. The bedded tuffs vary in coarseness from a very fine grained tuff to a very coarse tuff. Water action is evident in the bedding, cross-bedding, and by the intercalation of small shale and limestone lenses.

The limestones vary from 5 to 25 feet in thickness and are fairly continuous, acting as marker beds within the more uniform tuffs. Two definite horizons 500 feet apart in the section appear in the west half of the area. They are fossiliferous, containing a Permian (Phosphoria) fauna of Spirifers with a few Productids, and one Tetracoral and what may be Pentacrinus. Spirifers are also found in limey



tuffs at several places north of Homestead Creek.

A large part of the greenstone series is made up of a medium to coarse textured breccia composed of angular fragments of rhyolite varying from a few millimeters to about 10 centimeters in maximum dimension, in a matrix of fine to medium grained tuff. In some places the matrix is rhyolitic with quartz crystals. It is probably <sup>e</sup> that these rocks are in part agglomeratic in origin, in part tuffaceous. *distinction?*

All the rocks of the greenstone series are more or less highly metamorphosed, with advanced saussuritization of both the phenocryst and groundmass feldspars. Towards the north and west the alteration has been less severe, and a well bedded and only slightly altered section appears <sup>on upper</sup> up Homestead Creek.

Metamorphism reaches a maximum in the greenstone conglomerate, which <sup>occurs</sup> appears along the mountain front just west of the river. These rocks have been rendered schistose. They apparently lie in a north-south band about 200 feet thick, above tuffs and breccias, and possibly below the rhyolites. The relationships are rather vague and may be due to faulting. This conglomerate is made up of water worn pebbles, predominantly rhyolitic in composition in a fine gray-green tuffaceous matrix. Occasional quartzitic pebbles stand out, but for the most part the pebbles have been <sup>mass has been</sup> sheared, elongated, and broken, and the whole reduced to a knobby schist.

The greenstone porphyries are perhaps the least common of the rocks of the series. They are composed of 55% dense fine-grained, dark green groundmass; 20% phenocrysts (or porphyroblasts ?) of large euhedral tabular feldspars from 2 to 8 mm. long; and 25% dark green anhedral pyroxene phenocrysts from 2 to 3 mm. in diameter. In places this rock also shows amygdaloids, or a generation of lath-shaped feldspars smaller than the large phenocrysts. All the feldspars are highly saussuritized.

Andesite Porphyry: A band of red to purplish porphyritic andesite strikes northeasterly across Middle Ridge near the center of the area. A small amount of it appears south of Iron Dyke and north of Homestead Creeks, but it does not rise far above the creek levels there. The band varies in width up to about 1000 feet.

The rock is composed of an aphanitic dark red groundmass in which numerous small whitish tabular plagioclases <sup>crystals</sup> (up to 3 mm. long) appear as phenocrysts. Structures <sup>in the andesite porphyry</sup> are obscure, and contacts on both sides appear to be faults, with the rocks on both sides of the mass being downfaulted in relationship to it. It is probably the oldest rock within the area.

### Structure

The greenstones making up the northwest third of the area are folded into a gentle syncline striking east-north-east, which is faulted off on the southwest by the "Reservoir Fault" and on the east by the north-south fault system.

The greenstones in the southeast corner of the area form the south-east dipping limb of an anticline which would be the continuation of the northwest syncline, but whose center has been downfaulted and distorted.

The Iron Dyke rhyolites appear in the center of this broken anticline, with the "Iron Dyke Fault" separating them from the greenstones on the southeast, and another fault (probably east-west) separating them from the Andesites on the north and west. A small synclinal fold in the rhyolites is caused by the drag of the Iron Dyke fault against them.

The "Reservoir Fault" is the contact between the andesite and the greenstones to the north and west. The andesite appears to be uplifted in relation to the adjacent formations, while the rhyolite has been downfaulted on both sides.

On Middle Ridge and north of Homestead Creek a north-south fault system appears. North of the creek the greenstone series is broken by three normal north-south faults, with segments between them down-dropped successively to the east, as shown by key beds of banded tuffs and limestones.

It is possible that there is a major fault in Iron Dyke canyon striking N 75° E which divides these two structural areas. Such a fault if present might help to explain an apparently anomalous occurrence of andesite overlying rhyolite to the east of the old mill building, and would also more or less parallel the mineralized zone of the Iron Dyke.

Faulting is less intense to the west than near the river, and well bedded and relatively undisturbed strata are found in the upper reaches of both Iron Dyke and Homestead Creeks.

Most of these relationships are shown on the accompanying map.

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