

[illegible][illegible][illegible]

—	Contact — Approximately located
—	— Fault — Dashed where approximately located, ball and bar on downthrown side
---	Quartz veins and shear zones
—	Strike and dip of beds
—	Strike and dip of foliation
+	Strike of vertical foliation
10	Mine and prospect location — Numbers correspond to numbers in Table 1
82	Rock sample site — Chemical data are given in Table 2
142.6	K-Ar age and sample location
x	Fossil locality
F	Silicification zone with disseminated urtite

of gold, silver, and copper mined in the quadrangle is estimated at about \$880,000, of which about \$700,000 was from lode mines between 1903 and 1910, when gold was valued at \$20.67 per oz. Historical information and data on lode mines are largely from Lindgren (1901), Giluly and others (1933), and Brooks and Raper (1968).

Types of lode deposits are known in the quadrangle, which encompasses the Quartzburg mining district: (1) generally north- to northeast-trending gold-quartz veins; and (2) copper-gold-cobalt veins and stringers in irregularly shaped, occasionally tourmaline. Chalcopyrite and glaucodot are the main ore minerals (Vhay, 1960). Sulfurite, cobaltite, arsenopyrite, bismuthinite, native bismuth, galena, and sphalerite have also been reported (Giluly and others, 1933; Vhay, 1960).

Incomplete records indicate that about 1,041 oz of gold and 224,741 lb of copper were produced from 8,256 tons of ore during the periods 1906 to 1907 and 1964-1965. Vhay (1960) estimates that about 10,000 tons of ore had been removed from ships in the Standard Mine prior to 1960. An unknown additional amount of gold was produced prior to 1967 from cobalt-gold shipments.

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Map	Name or Location	Quarter	Section	Township	Range	East	Geologic Formation	Geologic description	Surface and/or underground workings	Past production	References
1	Name unknown	NW	14	11	34	E920	KJ	Zone of bleached quartz dionite with quartz stringers and thin pyrite lenses	Shallow cuts and trenches	None	—
2	Big Butte	SE	18	11	34	E520	JP	Crystalline schists in massive serpentine	Surface outcrops	None	9
3	Name unknown	NW	20	11	34	E900	Thpb	Iron ore, 40' to 75' NW	Short adits	—	—
4	Name unknown	NW	24	11	34	E920	Thpb	Zone of quartz veins in argillite and ser. Crystalline schists in massive serpentine	Cuts and prospect pits	—	—
5	Diave Meadows	NE	23	11	34	E920	Thpb	Zone of quartz veins in argillite and ser. Crystalline schists in massive serpentine	Over 7,200 ft of drifts, crosscuts, and raises	Less than \$100,000 prior to 1936	2,3,4,5,6,7,9
7	Little Chino	NW	24	11	34	E920	Thpb	3-4' wide shear zone with quartz and carbonate along line of 45° SE	None	500' W. of workings	—
8	Name unknown	SE	23	11	34	E920	Thpb	Limonite-shear zone	Prospect pit	None	—
9	Kaynes	SW	23	11	34	E920	Thpb	Northeast striking shear zone up to 20 ft wide	Shallow shaft	None	—
10	Name unknown	SW	23	11	34	E920	Thpb	3-4' wide shear zone with quartz and carbonate along line of 45° SE	None	500' W. of workings	—
11	Diave Meadows Group	NE	27	11	34	E920	Thpb	Thin, irregularly bedded zone of quartz and carbonate	Small adit	None	—
12	Name unknown	SW	25	11	34	E920	Thpb	Limonite-shear zone	Large short adit	None	—
13	Name unknown	SW	25	11	34	E920	Thpb	Limonite-shear zone	Prospect pits	None	—
14	Black Pines	SW	29	11	34	E920	Thpb	Quartz-dominant replacement zone containing pyrite, arsenopyrite, chloritophane, sphalerite, and hematite	Over 800 ft of workings in three adits	None	4,5
15	Name unknown	SE	29	11	34	E920	Tas	Limonite-shear zone	Shallow shafts and pits	None	7
16	Name unknown	SE	29	11	34	E920	Tas	Quartz-dominant replacement zone containing pyrite, arsenopyrite, chloritophane, sphalerite, and hematite	Shallow shafts and pits	None	7
17	Washburn	NE	31	11	34	E920	JP, Thpb	Black, zone with pyrite, hematite, chloritophane, and hematite	Two short adits and numerous prospect cuts	Small amount of silver	8
18	Name unknown	SE	31	11	34	E920	Thpb	Quartz, limonite, pyrite, hematite, and chloritophane along line of 30° SE	200-ft adit and prospect pits	None	7
20	Name unknown	NW	31	11	34	E920	Thpb	Pyrite and hematite in quartzite and serotized zone of 10° SE	Short adits	None	8
21	Name unknown	NW	36	11	34	E920	Thpb	Pyrite and hematite in quartzite and serotized zone of 10° SE	Short adits	None	8
22	Name unknown	SE	2	12	33	E600	J	Pyrite and hematite in quartzite and serotized zone of 10° SE	Over 700 ft of workings in two adits	—	10,11,14,20
23	Chango (Chango)	SE	2	12	33	E600	J	Pyrite and hematite in quartzite and serotized zone of 10° SE	Over 1,000 ft of workings on three levels	Estimated \$600,000-\$600,000	2,3,4,5,7,10
24	Keystone	SE	2	12	33	E600	J	Four-wide shear zone with quartz, calcite, pyrite, and hematite	Over 1,000 ft of workings on seven levels	Small, fragmentary records show \$100,000 produced during 1882-1883	1,2,3,4,5,7,10
25	Yates Dry	SE	2	12	33	E600	JP, Thpb	Four-wide shear zone with quartz, calcite, pyrite, and hematite	Over 700 ft in three adits	None	11,21
26	Name unknown	SE	2	12	33	E120	Thpb	Two quartz and quartz seams in W. side strike NE	Short adits	None	—
27	Andrew Jackson	NE	2	12	33	E700	Thpb	Pyrite and hematite in quartz-dominant replacement zone	Two short adits	None	—
28	Cooperopolis	NE	1	12	33	E900	Thpb	Pyrite and hematite in quartz-dominant replacement zone	Over 400 ft of underground workings	None	4,5
29	Name unknown	NW	6	12	34	E300	Thpb, J	Small-scale quartz-dominant replacement zone	Under 500 ft of workings	Small?	1,2,3,4,5,7
30	Wooden Camp	SW	4	12	34	E600	Thpb	Varities of quartz, calcite, and sulfides in a wide, east-south-south zone of silicification contact with arsenopyrite, chloritophane, sphalerite, pyrrhotite, and hematite	Under 1,000 ft of workings on two levels	None	4,5
31	Name unknown	SE	12	13	33	E800	Thpb	Limonite-shear zone	200-ft adit	None	—
32	Wooden Camp	SW	12	13	33	E800	Thpb	Limonite-shear zone	200-ft adit	None	—
33	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
34	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
35	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
36	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
37	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
38	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
39	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
40	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
41	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
42	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
43	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
44	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
45	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
46	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
47	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
48	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
49	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
50	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
51	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
52	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
53	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
54	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
55	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
56	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
57	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
58	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
59	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
60	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
61	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
62	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
63	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
64	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
65	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
66	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
67	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
68	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
69	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
70	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
71	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
72	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
73	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
74	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
75	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
76	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
77	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
78	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
79	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
80	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
81	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
82	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
83	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
84	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
85	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
86	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
87	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
88	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
89	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
90	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
91	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
92	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
93	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
94	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
95	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
96	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
97	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
98	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
99	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—
100	Standard Group	NE	12	13	33	E600	Thpb	Limonite-shear zone	200-ft adit	None	—

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Sample	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	TiO <sub>2</sub>	Fe <sub>2</sub> O <sub>3</sub>	FeO	MnO	CaO	MgO	K <sub>2</sub> O	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	14	Sec.	T (S)	R (E)	Rock type	Map unit
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A	72.50	12.00	0.24	1.20	137	0.30	2.49	0.11	1.84	4.06	0.11	EW	17	34	Dacite	Tol
C	69.12	15.40	0.42	1.08	137	0.40	2.11	0.37	2.02	3.10	0.10	SW	12	33	Diorite	Tr
D	68.88	15.40	0.46	1.08	206	0.07	4.17	1.37	1.76	3.47	0.12	SW	23	31	Granodiorite	Ki
E	67.94	17.94	0.36	1.08	137	0.07	2.11	0.37	2.02	3.10	0.10	SW	12	33	Diorite	Tr
G	55.49	16.85	1.40	4.08	4.08	1.14	8.96	4.22	0.79	3.03	0.35	NE	25	31	Andesite	Tas
H	50.17	17.97	0.42	1.08	137	0.07	2.11	0.37	2.02	3.10	0.10	SW	12	33	Diorite	Tr
Q	33.18	16.02	0.85	3.76	4.31	0.15	10.23	8.89	0.74	2.15	0.14	NW	35	33	Granodiorite	MPd
R	65.17	16.02	0.85	3.76	4.31	0.15	10.23	8.89	0.74	2.15	0.14	NW	35	33	Granodiorite	MPd
S	65.17	16.02	0.85	3.76	4.31	0.15	10.23	8.89	0.74	2.15	0.14	NW	35	33	Granodiorite	MPd
T	65.17	16.02	0.85	3.76	4.31	0.15	10.23	8.89	0.74	2.15	0.14	NW	35	33	Granodiorite	MPd
K	72.07	16.07	0.21	1.19	1.36	0.07	0.18	0.19	1.28	5.09	0.10	NE	33	31	Dacite	Tas
L	50.25	16.07	0.31	1.36	0.44	0.14	0.79	3.30	0.21	3.73	0.30	NE	33	31	Dacite	Tas
M	54.13	16.50	0.51	3.96	4.31	0.15	8.23	3.21	0.82	1.02	0.12	SW	12	33	Granodiorite	MPd
N	67.58	16.59	0.59	2.62	2.77	0.10	3.76	0.47	2.12	3.22	0.07	SW	4	12	Dacite	Tas
O	71.17	16.58	0.67	2.92	3.07	0.11	2.91	0.43	2.38	3.43	0.10	SW	12	33	Granodiorite	MPd
P	70.79	17.59	0.82	3.43	3.83	0.14	6.63	1.96	1.17	3.82	0.35	SE	16	12	Andesite	Tas
Q	71.17	17.57	0.61	2.92	3.07	0.11	2.91	0.43	2.38	3.43	0.10	SW	12	33	Granodiorite	MPd
R	73.73	13.02	0.11	0.99	1.13	0.02	1.37	0.09	2.58	3.34	0.04	NE	17	12	Dacite	Tas
S	73.73	13.02	0.11	0.99	1.13	0.02	1.37	0.09	2.58	3.34	0.04	NE	17	12	Dacite	Tas
T	73.73	13.02	0.11	0.99	1.13	0.02	1.37	0.09	2.58	3.34	0.04	NE	17	12	Dacite	Tas
U	73.73	13.02	0.11	0.99	1.13	0.02	1.37	0.09	2.58	3.34	0.04	NE	17	12	Dacite	Tas
V	73.73	13.02	0.11	0.99	1.13	0.02	1.37	0.09	2.58	3.34	0.04	NE	17	12	Dacite	Tas
W	73.73	13.02	0.11	0.99	1.13	0.02	1.37	0.09	2.58	3.34	0.04	NE	17	12	Dacite	Tas
X	73.73	13.02	0.11	0.99	1.13	0.02	1.37	0.09	2.58	3.34	0.04	NE	17	12	Dacite	Tas
Y	73.73	13.02	0.11	0.99	1.13	0.02	1.37	0.09	2.58	3.34	0.04	NE	17	12	Dacite	Tas
Z	73.73	13.02	0.11	0.99	1.13	0.02	1.37	0.09	2.58	3.34	0.04	NE	17	12	Dacite	Tas

All analyses by X-ray fluorescence at Washington State University under the direction of Peter Hooper. Analyses are normalized on a volatile-free basis, and total Fe is expressed as  $\text{Fe}_2\text{O}_3/\text{FeO}$  at an arbitrarily fixed ratio. All numbers are in weight percent.

## Geologic Cross Sections

