STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
1005 STATE OFFICE BUILDING
PORTLAND, OREGON 97201

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RECONNAISSANCE GEOCHEMICAL STUDY OF THE QUARTZVILLE MINING DISTRICT, LINN COUNTY, OREGON

by

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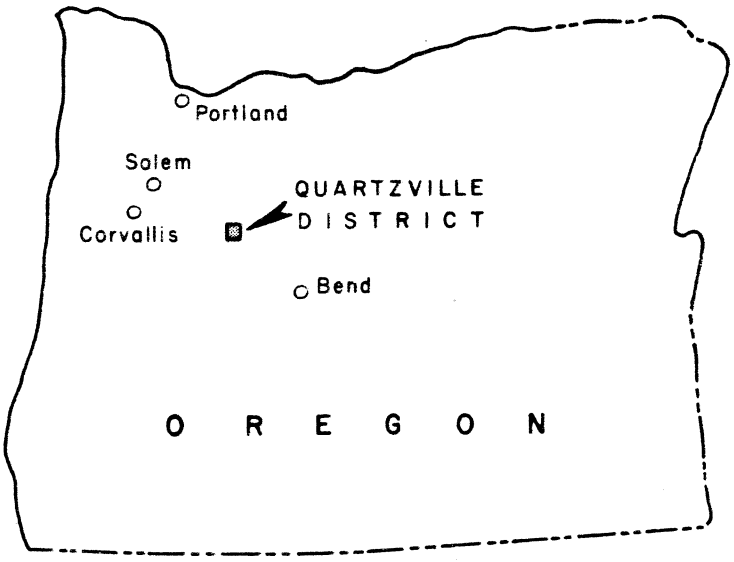
INTRODUCTION

Location

The Quartzville Mining District is in Oregon's Western Cascades, approximately 35 miles (56 km) northeast of Sweet Home, Linn County. Access is by paved logging road 26 miles (41 km) east from U.S. Highway 20 past Green Peter Reservoir, and along Quartzville Creek. Dry Gulch, a tributary of Quartzville Creek, drains the area in which the greatest mining activity has taken place.

Sampling Procedures

Standard sampling procedures were utilized. Stream sediment samples consisted of 150 to 200 cc of sand and silt. They were gathered from the upstream ends of gravel bars in the centers of active streams and creeks. All soil samples were collected from the "B" soil horizon; sample volumes were also 150 to 200 cc. Roots, organic debris, and rocks greater than 1 cm in diameter were removed from the sample in the field. Rock samples were chipped from rock outcrops and represented a 5 m to 8 m rectangular surface area. Chips were from unweathered rock; they varied from 0.5 cm to 3.0 cm in diameter, averaging 2 cm. Visible veins were excluded.



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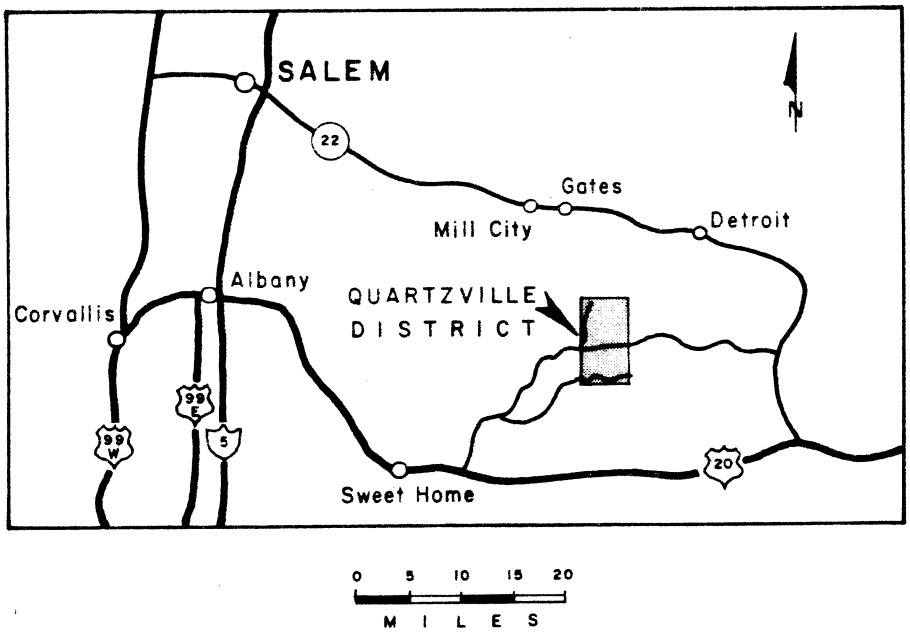

Figure 1. Index maps showing location of Quartzville Mining District area, nearby towns, and access.

Acknowledgements

I wish to gratefully acknowledge the strong support of the Oregon Department of Geology and Mineral Industries, especially the extensive analytical work performed by Mr. Garry Baxter, chemist. This project received monetary support from Dr. Cyrus Field, Department of Geology, Oregon State University. These funds financed analytical work conducted by Rocky Mountain Geochemical Corporation.

This article was technically reviewed by Mr. M. K. Ferguson and Mr. Richard Gaps.

The following tables contain analytical data obtained in this study and are arranged by sample type (rock, soil, and sediment).

TABLE 1. Geochemical analyses of altered volcanic host rocks in parts per million (ppm). Analyses performed by Rocky Mountain Geochemical Corporation.

Sample No.	Cu	Pb	Zn	Mo	Ag	Rock Type
2	20	20	60	49	1	Tuff
4	10	10	55	8	-1	Tuff
5	10	20	35	-1	-1	Tuff
1548	10	10	45	-1	-1	Lapilli Tuff
1557	190	10	75	-1	-1	Lapilli Tuff
1560	35	-10	95	-1	-1	Lapilli Tuff
1562	25	-10	55	-1	-1	Andesite
1564 A	10	-10	45	1	-1	Tuff
1616	55	30	100	-1	1	Lapilli Tuff
1627	50	10	570	-1	-1	Tuff
1628	15	20	25	-1	-1	Andesite
1628 B	10	10	55	1	-1	Andesite
1629	10	10	30	-1	-1	Lapilli Tuff
1631	5	-10	45	-1	-1	Basalt
1857	10	-10	25	9	-1	Basalt Dike
1869	50	10	50	-1	-1	Lapilli Tuff
1876	10	-10	50	-1	-1	Lapilli Tuff
1889	40	10	65	-1	-1	Andesite
1890	40	50	90	-1	-1	Basalt
1891	10	-10	40	1	-1	Basalt
1898	35	10	85	-1	-1	Lapilli Tuff
1899	60	750	120	-1	-1	Lapilli Tuff
1901	5	10	35	1	-1	Basalt
2032	5	10	45	-1	-1	Andesite
2062	5	10	20	1	-1	Basalt
2066	20	-10	25	-1	1	Basalt
3093	70	20	210	-1	1	Basalt
4062	10	-10	15	1	1	Rhyodacite

Table 1 continued

Sample No.	Cu	Pb	Zn	Mo	Ag	Rock Type
A	20	10	30	-1	1	Rhyolite
B	5	10	15	-1	-1	Rhyolite
E	15	-10	45	-1	-1	Rhyolite
F	15	-10	50	-1	-1	Rhyolite
G	15	10	65	-1	1	Rhyolite
H	20	60	125	9	1	Rhyolite
I	15	50	60	2	1	Rhyolite
J	5	10	220	-1	-1	Lapilli Tuff
K	25	10	60	1	1	Lapilli Tuff
L	5	50	40	15	1	Lapilli Tuff
M	15	1010	95	12	1	Lapilli Tuff
N	20	10	60	-1	1	Lapilli Tuff
O	20	10	70	-1	1	Lapilli Tuff
P	15	20	90	-1	1	Lapilli Tuff
Q	15	10	80	1	1	Lapilli Tuff
R	20	10	70	-1	-1	Lapilli Tuff
9004	160	1040	140	-1	2	Andesite
9005	10	10	30	34	-1	Andesite
9006	10	10	20	1	-1	Quartz Latite

TABLE 2. Geochemical analyses of granitic intrusive rocks in parts per million (ppm). Analyses performed by Rocky Mountain Geochemical Corporation.

Sample No.	Cu	Pb	Zn	Mo	Ag
440	90	10	90	1	1
1084	25	10	30	1	-1
1118	30	-10	35	-1	-1
1198	75	20	115	-1	1
1315	55	20	75	-1	-1
1330	160	40	120	-1	-1
1350	200	30	115	1	-1
1357	80	10	80	-1	-1
1401	45	480	840	1	-1
1424	40	20	65	-1	-1
1558	35	10	100	-1	-1
1564 B	10	-10	50	-1	-1
1704	5	-10	50	-1	-1
1816	30	10	70	1	-1
1860	15	-10	20	1	-1
1866	10	-10	10	1	-1
1871	50	10	35	1	-1
1895	65	30	190	-1	-1
2000	25	10	55	-1	-1
1247	10	20	80	-1	-1
2077 A	15	10	20	-1	-1
2077 B	15	-10	10	-1	1
3074	40	10	70	14	-1
9000	45	10	75	-1	-1
9001	10	10	90	-1	-1
9002	5	-10	30	-1	-1
9003	50	30	170	-1	1

TABLE 3. Analytical results for lead (Pb), zinc (Zn), and copper (Cu) for soils and sediments in parts per million (ppm). Soils marked by *; (-) no data. Samples analyzed by Oregon Department of Geology and Mineral Industries.

Sample No.	Pb	Zn	Cu
54	22	101	37
55	22	101	36
58	40	155	34
89	52	215	40
95	25	145	32
96	33	168	31
99	11	100	29
117	16	100	28
*129	18	85	33
152	42	121	36
156	263	286	55
157	34	160	39
158	74	370	44
170	51	163	37
179	73	434	51
180	90	229	37
*301	30	148	36
*302	16	118	30
311	19	100	35
*335	5	30	25
339	30	126	33
*345	910	1210	103
*346	24	168	43
*348	12	121	23
359	20	19	46
360	14	113	56
375	310	643	52
382	350	507	58
387	103	427	56
397	31	121	35
398	28	116	39
400	17	142	40
404	11	84	39
411	56	105	27
*416	82	163	46
423	181	400	58
427	37	111	31
435	35	126	58
439	22	105	44
446	14	79	17
447	13	76	12
449	16	95	26
451	29	131	30
453	182	231	40
454	171	315	39
470	2720	271	136
*474	28	160	38
*546	24	168	15
*548	134	165	26
*549	71	135	34
*550	67	147	35
*553	115	352	80
*554	26	299	34
*555	550	408	128
557	90	176	44
*558	48	147	30

TABLE 3, continued

Sample No.	Pb	Zn	Cu
573	142	458	45
596	80	90	46
*604	32	91	30
633	76	177	34
634	62	184	34
645	40	116	46
654	41	168	37
656	14	58	27
663	110	382	56
666	24	105	33
667	28	79	36
727	58	164	52
728	42	111	43
*730	18	100	39
*732	22	100	33
734	31	118	40
*738	6000	525	229
*745	165	305	50
*750	20	134	44
*757	42	87	35
802	28	110	39
809	173	410	46
842	715	-	112
848	88	184	79
860	199	389	68
866	25	78	31
980	19	78	48
984	25	83	40
985	25	102	32
986	13	79	37

Sample No.	Pb	Zn	Cu
*988	21	100	40
*994	23	124	29
*997	16	89	30
*998	11	102	16
1008	7	89	43
1012	970	575	113
1013	135	270	55
1019	28	173	27
1047	5	92	16
*1053	27	126	48
*1055	27	128	45
1064	260	524	59
1068	2060	924	137
1075	92	240	42
1104	170	676	50
1110	28	145	32
1119	28	142	39
1123	23	166	38
1128	19	116	28
1130	17	82	31
1136	20	132	27
1137	19	140	31
1138	25	134	32
1140	39	173	38
1145	16	121	28
1147	20	121	30
1152	46	278	34
1155	16	108	32
1157	28	126	34
*1161	20	80	27

TABLE 3, continued

Sample No.	Pb	Zn	Cu	Sample No.	Pb	Zn	Cu
*1164	15	86	27	*1192	15	385	72
*1169	15	60	32	1194	145	178	47
*1170	15	52	20	1208	26	142	39
*1172	20	47	16	1209	28	134	34
*1177	30	112	28	1211	30	122	34
*1180	25	97	14	1212	300	121	37
1182	15	75	38	1213	105	137	37
1183	15	66	16	1214	99	179	35
1185	30	103	14	1219	120	368	46

References

Ward, F. N., Nakagawa, H. M., Harms, T. F., and Van Sickle, G. H., 1969, Atomic absorption methods of analyses useful in geochemical exploration: U.S. Geological Survey Bulletin 1289, 45 p.

Appendix 1

Rocky Mountain Geochemical Corporation's Analytical Methods.

These methods use a partial digestion procedure.

DIGESTION METHODS

"$HClO_4$ Digestion

The following digestion technique is for the determination of Cu, Pb, Zn, Ni, Co, Cd, Bi, Mo, As, Cr and U_3O_8. This digestion is for routine geochemical analysis with $\pm$ 10 % analytical precision.

1. Weigh 0.500 gr -80 mesh or pulp into 25 ml calibrated tube.

2. Add 5 ml reagent grade $HClO_4$ and mix.

3. Place tubes in rack on thermolyne hot plate at 250° setting. Increase temperature every 30 minutes in 50 *increments to 450° setting and allow $HClO_4$ to fume for at least one hour at 190-195°C.

*Note: for samples with organic material increase temperature cautiously until dark organic color has been replaced with straw yellow color.

4. Remove samples, allow to cool and add approximately 5 mls H_2O, swirl to mix and allow to cool.

5. Dilute to 25 ml volume.

6. Cap and shake and allow to settle.

**Note: if samples are 0.50% or higher a total digestion technique is recommended. (For sample of 0.50% Pb or Zn the use of the acetate digestion is recommended.)" (Cardwell, 1980, written communication)

MOLYBDENUM

"(by atomic absorption)

Pipet blank, 2-100 std, 2-300, 1-500 & 1-1000 ppm std. into separate 18 x 150 mm tubes and place in 50 tube rack for shaking.

Pipet 5 mls sample solution into 18 x 150 mm tube placed in 50 tube rack for shaking.

Add 3 mls Moly Reagent.

Add 3 mls 10% $SNCl_2$.

Add 5 mls Amyl Acetate.

Stopper in shaker for 2 minutes.

Remove caps.

Read on A.A... aspirating saturated amyl acetate as a blank and using a N_2O flame.

Wavelength	3133
Slit	4
Current	20 mo

Set 300 std. to read 300 ppm - should be linear down to 1 ppm.

For above 300 set 500 ppm std.

Over 500 ppm turn burner to cut path length; set 1000 ppm to read 200.

STANDARDS

100 ppm std. - 20 mls 1 mg/ml Mo - add 200 ml $HClO_4$, dilute to 1L, shake.

300 ppm std. - 6 mls 1 mg/ml Mo " " " " " " " "

500 ppm std. - 10 mls 1 mg/ml Mo " " " " " " " "

1000 ppm std. - 20 mls 1 mg/ml Mo " " " " " " " "

REAGENTS:

$HClO_4$: 70% conc. reagent grade perchloric acid.

Iron Solution: 1% Fe, 10 grams iron wire weighed and digest in 500 mls HCl. When solution is cool dilute to 1 liter. Final is 1:1 HCl." (Cardwell, 1980, written communication)

Molybdenum
a.a. cont'd

"REAGENTS

Moly Reagent: Dissolve 100 grams NaF (sodium fluoride) in 2,000 ml distilled water, allow to settle and decant into a 5 liter beaker or polyethylene bottle, discarding settlings. Dissolve 300 grams NaCNs (sodium thiocyanate) in 3,000 ml distilled water in a large beaker. Add this solution to the 5 liter container and mix with NaF solution, shake well.

10% $SnCl_2$ Weigh 200 grams stannous chloride into 1 liter size beaker. Dissolve in 165 ml conc. HCl. Fill beaker up to 800-ml line with distilled water while stirring to mix. Transfer solution to a 2-liter glass jug calibrated to 2 liters and dilute to volume. DO NOT RINSE BEAKER WITH DISTILLED WATER AND ADD TO BOTTLE. (It may cause solution to become cloudy.) The beaker used to make $SnCl_2$ must not be used for anything else. Wash it immediately and set aside for future use. Store $SnCl_2$ in refrigerator.

Reagents: Same as previous except Amyl Acetate; industrial grade."
(Cardwell, 1980, written communication)

Appendix 2

Summary of Oregon DOGAMI analytical procedures.

The Oregon DOGAMI analyzed all soil and sediment samples in this project. The analytical procedure used in this work is described in detail by Ward and others (1969). For this suite of samples, one gram of the minus 80-mesh fraction of each sample was dissolved in a hot concentrated nitric acid solution. This solution was cooled, filtered and analyzed by a Perkin-Elmer 290B Atomic Absorption instrument; data were obtained and recorded on a strip chart recorder.

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DONALD A. HULL, STATE GEOLOGIST

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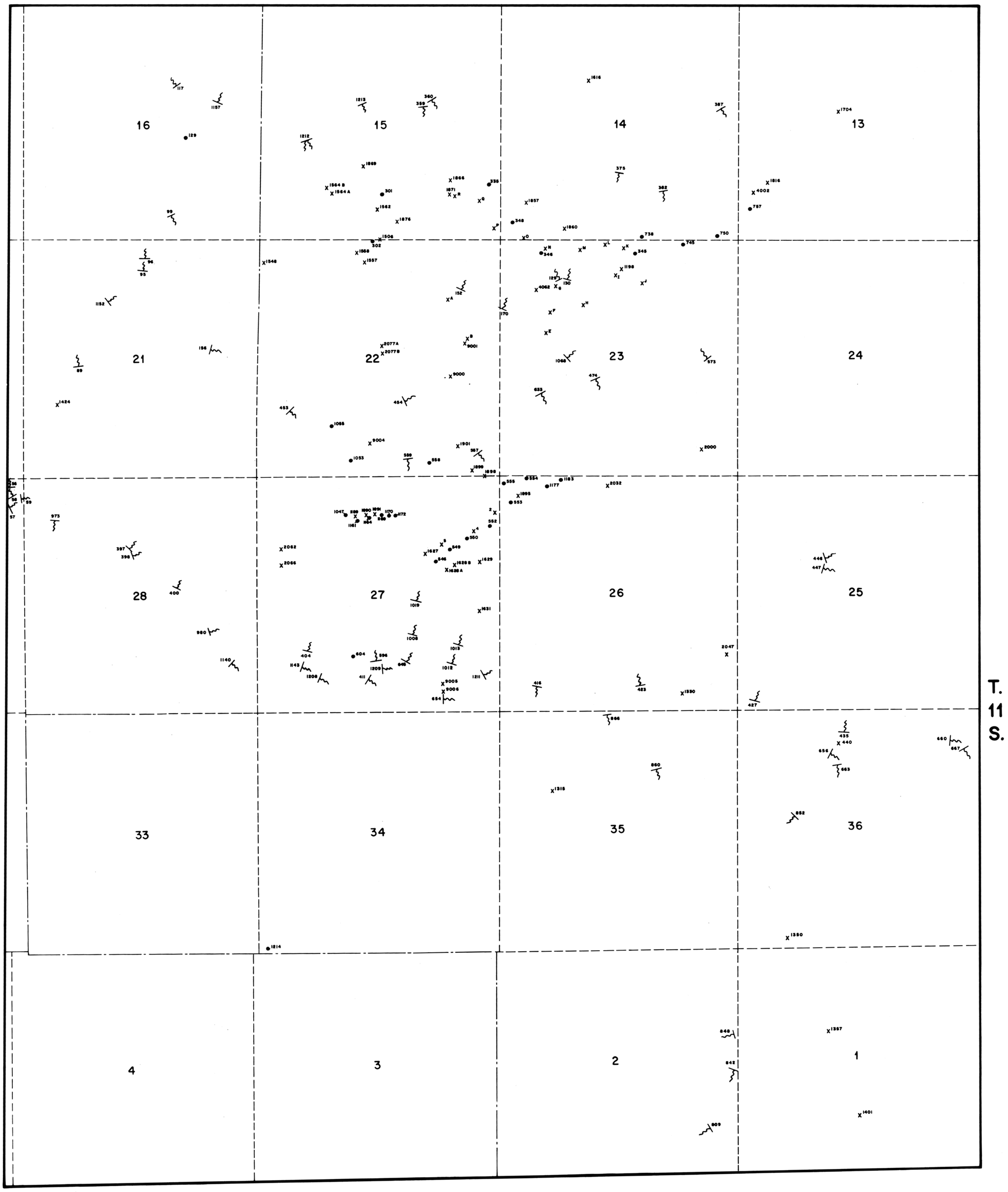
Quartzville Mining District, Oregon

R.4 E.



Geochemical Sample Location Map

SCALE 1 : 12,000

SYMBOLS WITH SAMPLE NUMBERS: ●604 SOIL X1315 ROCK ⩚609 STREAM SEDIMENT

Drafted by R.C.D., May 1977.