UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Analytical results and sample locality map of stream-sediment, heavy-mineral-concentrate, and rock samples from the Orejana Canyon (OR-1-78) Wilderness Study Area, Harney County, Oregon

By

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STUDIES RELATED TO WILDERNESS

Bureau of Land Management Wilderness Study Areas

The Federal Land Policy and Management Act (Public Law 94-579, October 21, 1976) requires the U.S. Geological Survey and the U.S. Bureau of Mines to conduct mineral surveys on certain areas to determine their mineral resource potential. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of geochemical survey of the Orejana Canyon (OR-1-78) Wilderness Study Area, Harney County, Oregon.

INTRODUCTION

In August 1986, the U.S. Geological Survey conducted a reconnaissance geochemical survey of the Orejana Canyon (OR-1-78) Wilderness Study Area, Harney County, Oregon (fig. 1).

The Orejana Canyon Wilderness Study Area comprises about 23.1 mi^2 (60.1 km^2) in western Harney County, Oregon, about 50 mi (80 km) southwest of Burns, Oregon, and about 27 mi (43 km) west of Frenchglen, Oregon. Access to the study area is provided on all sides by unimproved dirt roads which connect to improved gravel roads leading off of Oregon State Highway 205 on the east and U.S. Highway 395 on the west.

The study area is underlain by a sequence of Miocene age basaltic to andesitic lava flows and interbedded tuffaceous sedimentary rocks that are capped by a rhyolitic welded tuff. These rocks have been cut by faulting related to regional basin and range extension, the largest of these producing the uplift along Orejana Rim. The study area is included in reconnaissance scale geologic maps at a scale of 1:250,000 (Walker and Repenning, 1965) and 1:500,000 (Walker, 1977).

Elevations in the study area ranges from a low of 4,525 ft (1,379 m) at the mouth of Orejana Canyon up to 5,368 ft (1,636 m) in the northeast part of the study area giving a topographic relief of 843 ft (257 m).

Most of the study area is situated on a plateau with gentle topography of low, rolling hills and isolated ridges along minor faults. Orejana Rim forms a steep escarpment about 500 ft (152 m) high along the west side of the area at the east edge of Warner Valley. Orejana Canyon extends north-south through much of the length of the study area and is generally about 200 ft (61 m) deep with steep sides. The climate is semiarid.

METHODS OF STUDY

Sample Media

Analyses of the stream-sediment samples represent the chemistry of the rock material eroded from the drainage basin upstream from each sample site. Such information is useful in identifying those basins which contain concentrations of elements that may be related to mineral deposits. Heavy-mineral-concentrate samples provide information about the chemistry of certain minerals in rock material eroded from the drainage basin upstream from each sample site. The selective concentration of minerals, many of which may be ore related, permits determination of some elements that are not easily detected in stream-sediment samples.

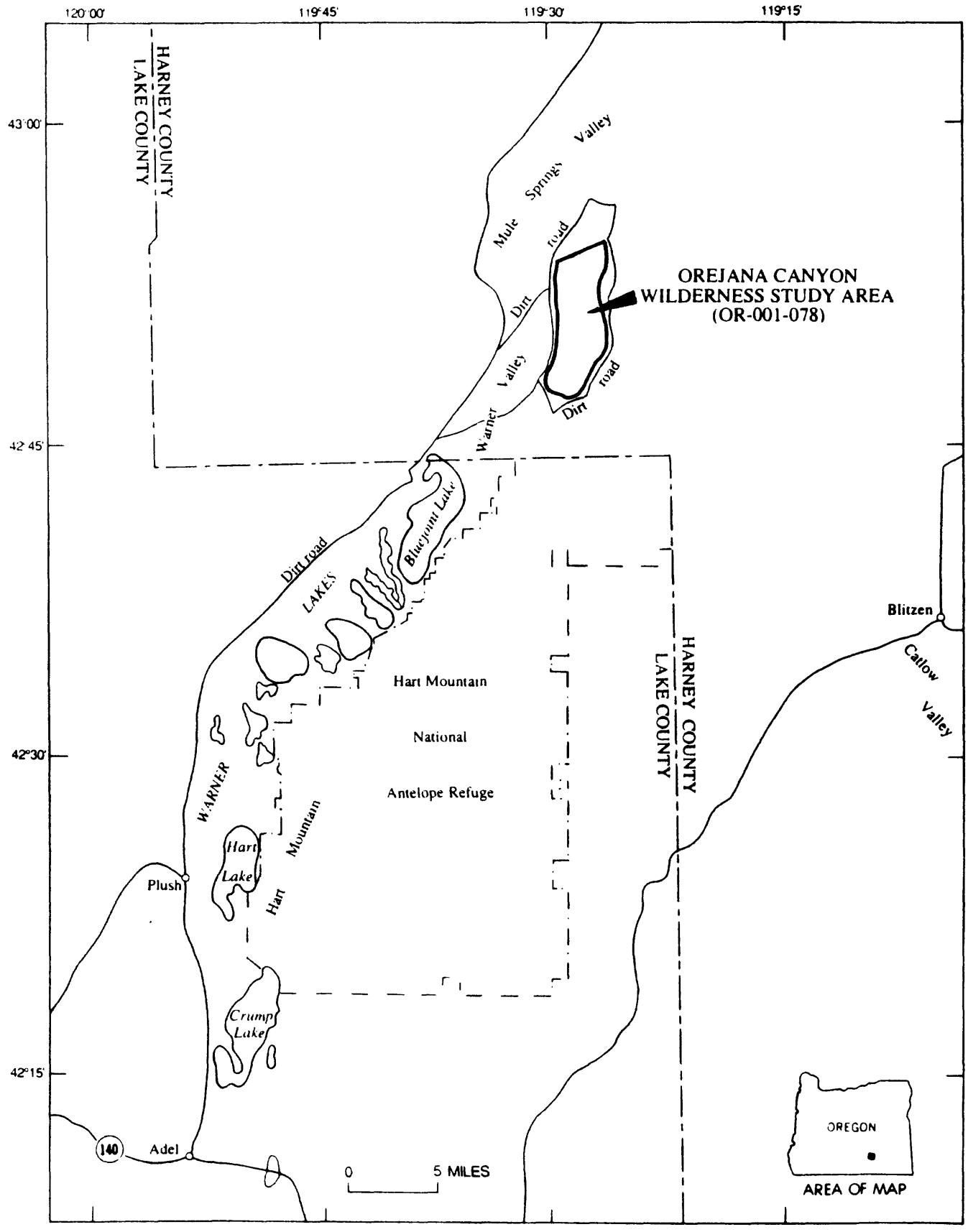

Figure 1. Index map showing location of the Orejana Canyon Wilderness Study Area, Harney County, Oregon.

Analyses of unaltered or unmineralized rock samples provide background geochemical data for individual rock units. On the other hand, analyses of altered or mineralized rocks, where present, may provide useful geochemical information about the major- and trace-element assemblages associated with a mineralizing system.

Sample Collection

Heavy-mineral-concentrate and stream-sediment samples were collected at 22 sites (plate 1). Rock samples were collected at 2 sites. Sampling density was about one sample site per 1.33 mi^2 for the stream sediments and heavy-mineral concentrates. The area of the drainage basins sampled ranged from .25 mi^2 to 4 mi^2.

Stream-sediment samples

The stream-sediment samples consisted of active alluvium collected primarily from first-order (unbranched) and second-order (below the junction of two first-order) streams as shown on USGS topographic maps (scale = 1:24,000). Each sample was composited from several localities within an area that may extend as much as 30 ft from the center of the symbol site plotted on the map.

Heavy-mineral-concentrate samples

Heavy-mineral-concentrate samples were collected from the same active alluvium as the stream-sediment samples. Each bulk sample was screened with a 2.0-mm (10-mesh) screen to remove the coarse material. The less than 2.0-mm fraction was panned until most of the quartz, feldspar, organic material, and clay-sized material were removed.

Rock samples

Rock samples were collected from outcrops or exposures in the vicinity of the plotted site location. Samples were collected from unaltered and/or altered and/or mineralized rocks.

Sample Preparation

The stream-sediment samples were air dried, then sieved using 80-mesh (0.17-mm) stainless-steel sieves. The portion of the sediment passing through the sieve was saved for analysis.

After the samples were air dried, bromoform (specific gravity 2.8) was used to remove the remaining quartz and feldspar from the heavy-mineral-concentrate samples that had been panned in the field. The resultant heavy-mineral sample was separated into three fractions using a large electromagnet (in this case a modified Frantz Isodynamic Separator). The most magnetic material, primarily magnetite, was not analyzed. The second fraction, largely ferromagnesian silicates and iron oxides, was saved for archival storage. The third fraction (the least magnetic material which may include the nonmagnetic ore minerals, zircon, sphene, etc.) was split using a Jones splitter. One split was hand ground for spectrographic analysis; the other split was saved for mineralogical analysis. These magnetic separates are the same separates that would be produced by using a Frantz Isodynamic Separator set at a slope

of 15° and a tilt of 10° with a current of 0.2 ampere to remove the magnetite and ilmenite, and a current of 0.6 ampere to split the remainder of the sample into paramagnetic and nonmagnetic fractions.

Rock samples were crushed and then pulverized to minus 0.15 mm with ceramic plates.

Sample Analysis

Spectrographic method

The stream-sediment, heavy-mineral-concentrate, and rock samples were analyzed for 31 elements using semiquantitative, direct-current arc emission spectrographic methods (Grimes and Marranzino, 1968). The elements analyzed and their lower limits of determination are listed in table 1. Spectrographic results were obtained by visual comparison of spectra derived from the sample against spectra obtained from standards made from pure oxides and carbonates. Standard concentrations are geometrically spaced over any given order of magnitude of concentration as follows: 100, 50, 20, 10, and so forth. Samples whose concentrations are estimated to fall between those values are assigned values of 70, 30, 15, and so forth. The precision of the analytical method is approximately plus or minus one reporting interval at the 83 percent confidence level and plus or minus two reporting intervals at the 96 percent confidence level (Motooka and Grimes, 1976). Values determined for the major elements (iron, magnesium, calcium, and titanium) are given in weight percent; all others are given in parts per million (micrograms/gram). Analytical data for samples from the Orejana Canyon Wilderness Study Area are listed in tables 3-5

Chemical methods

Other analytical methods used on samples from the Orejana Canyon Wilderness Study Area are summarized in table 2.

DATA STORAGE SYSTEM

Upon completion of all analytical work, the analytical results were entered into a computer-based file called Rock Analysis Storage System (RASS). This data base contains both descriptive geological information and analytical data. Any or all of this information may be retrieved and converted to a binary form (STATPAC) for computerized statistical analysis or publication (VanTrump and Miesch, 1977).

DESCRIPTION OF DATA TABLES

Tables 3-5 list the results of analyses for the stream-sediment, heavy-mineral-concentrate, and rock samples, respectively. For the three tables, the data are arranged so that column 1 contains the USGS-assigned sample numbers. These numbers correspond to the numbers shown on the site location maps (plate 1). Columns in which the element headings show the letter "s" below the element symbol indicates emission spectrographic analyses and "aa" indicates atomic absorption analyses. A letter "N" in the tables indicates that a given element was looked for but not detected at the lower limit of determination shown for that element in table 1. For emission spectrographic analyses, a "less than" symbol (<) entered in the tables in

front of the lower limit of determination indicates that an element was observed but was below the lowest reporting value. For AA analyses, a "less than" symbol (<) entered in the tables in front of the lower limit of determination indicates that an element was below the lowest reporting value. If an element was observed but was above the highest reporting value, a "greater than" symbol (>) was entered in the tables in front of the upper limit of determination. If an element was not looked for in a sample, two dashes (--) are entered in table 3-5 in place of an analytical value. Because of the formatting used in the computer program that produced tables 3-5, some of the elements listed in these tables (Fe, Mg, Ca, Ti, Ag, and Be) carry one or more nonsignificant digits to the right of the significant digits. The analysts did not determine these elements to the accuracy suggested by the extra zeros.

ACKNOWLEDGMENTS

A number of our colleagues also participated in the preparation and analysis of these samples: Eric Welsch, Carol Gent, B. Anderson, and Kay Kennedy.

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TABLE 1.--Limits of determination for the spectrographic analysis of rocks and stream sediments, based on a 10-mg sample

[The spectrographic limits of determination for heavy-mineral-concentrate samples are based on a 5-mg sample, and are therefore two reporting intervals higher than the limits given for rocks and stream sediments.]

Elements	Lower determination limit	Upper determination limit
	Percent	
Iron (Fe)	0.05	20
Magnesium (Mg)	.02	10
Calcium (Ca)	.05	20
Titanium (Ti)	.002	1
	Parts per million	
Manganese (Mn)	10	5,000
Silver (Ag)	0.5	5,000
Arsenic (As)	200	10,000
Gold (Au)	10	500
Boron (B)	10	2,000
Barium (Ba)	20	5,000
Beryllium (Be)	1	1,000
Bismuth (Bi)	10	1,000
Cadmium (Cd)	20	500
Cobalt (Co)	5	2,000
Chromium (Cr)	10	5,000
Copper (Cu)	5	20,000
Lanthanum (La)	20	1,000
Molybdenum (Mo)	5	2,000
Niobium (Nb)	20	2,000
Nickel (Ni)	5	5,000
Lead (Pb)	10	20,000
Antimony (Sb)	100	10,000
Scandium (Sc)	5	100
Tin (Sn)	10	1,000
Strontium (Sr)	100	5,000
Vanadium (V)	10	10,000
Tungsten (W)	50	10,000
Yttrium (Y)	10	2,000
Zinc (Zn)	200	10,000
Zirconium (Zr)	10	1,000
Thorium (Th)	100	2,000

TABLE 2.--Chemical methods used

[AA = atomic absorption]

Element or constituent determined	Sample type	Method	Determination limit (micrograms/ gram or ppm)	Reference
Gold (Au)		AA	0.05	Modification of Thompson and others, 1968.
Mercury (Hg)		AA	.02	Koirtyohann and Khalil, 1976.
Arsenic (As)		AA	10	O'Leary and Viets, 1986.
Antimony (Sb)		AA	2	
Zinc (Zn)		AA	5	
Bismuth (Bi)		AA	1	
Cadmium (Cd)		AA	.1	

Table 3. Results of analyses of stream-sediment samples from the Orejana Canyon Wilderness Study Area, Harney County, Oregon

Sample	Latitude	Longitude	Fe-pct. s	Mg-pct. s	Ca-pct. s	Ti-pct. s	Mn-ppm s	Ag-ppm s	As-ppm s	Au-ppm s	B-ppm s	Ba-ppm s
OR001SS	42 48 39	119 30 14	5	1.5	3.0	>1.0	700	N	N	N	20	500
OR002SS	42 48 4	119 28 45	5	1.5	3.0	>1.0	1,500	N	N	N	20	500
OR003HS	42 48 16	119 28 44	5	1.0	2.0	>1.0	1,000	N	N	N	15	500
OR004HS	42 48 15	119 28 38	5	1.5	3.0	>1.0	1,000	N	N	N	20	500
OR005SS	42 49 21	119 28 57	7	1.5	3.0	>1.0	1,000	N	N	N	50	500
OR006SS	42 49 21	119 28 50	5	1.0	2.0	.5	700	N	N	N	50	500
OR007HS	42 49 28	119 27 32	3	1.0	2.0	.7	500	N	N	N	30	500
OR008HS	42 49 32	119 27 23	7	1.5	2.0	>1.0	1,000	N	N	N	20	500
OR009HS	42 49 58	119 27 6	5	1.0	3.0	>1.0	700	N	N	N	50	300
OR010SS	42 51 53	119 27 36	5	1.5	3.0	>1.0	1,000	N	N	N	30	500
OR011SS	42 51 56	119 27 33	5	1.5	3.0	>1.0	1,000	N	N	N	30	500
OR012HS	42 51 56	119 27 28	3	1.0	1.5	.7	700	N	N	N	50	500
OR013SS	42 52 57	119 28 15	5	1.5	3.0	>1.0	700	N	N	N	50	500
OR014HS	42 54 49	119 27 51	5	1.5	2.0	1.0	700	N	N	N	100	300
OR015SS	42 54 39	119 27 35	5	1.5	3.0	>1.0	1,000	N	N	N	30	500
OR016HS	42 26 41	119 26 41	5	1.5	2.0	1.0	1,000	N	N	N	50	500
OR017SS	42 55 57	119 26 58	3	1.0	2.0	1.0	700	N	N	N	50	500
OR018SS	42 57 26	119 27 4	3	1.0	2.0	1.0	1,000	N	N	N	50	500
OR019HS	42 57 22	119 27 48	3	1.0	1.5	1.0	1,000	N	N	N	30	300
OR020HS	42 55 41	119 30 37	5	1.5	2.0	1.0	1,500	N	N	N	50	500
OR021SS	42 55 43	119 30 32	5	1.0	2.0	.7	1,000	N	N	N	50	500
OR022SS	42 54 41	119 29 48	7	1.5	2.0	>1.0	1,500	N	N	N	30	500

Table 3. Results of analyses of stream-sediment samples from the Orejana Canyon Wilderness Study Area, Harney County, Oregon--Continued

Sample	Be-ppm s	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s
OR001SS	1.0	N	N	20	100	70	50	N	<20	30	30	N	30	N
OR002SS	1.0	N	N	20	100	50	50	N	N	20	20	N	30	N
OR003HS	1.0	N	N	20	50	70	N	N	N	20	30	N	30	N
OR004HS	1.0	N	N	20	150	50	50	N	<20	20	30	N	30	N
OR005SS	1.0	N	N	30	150	50	30	N	<20	20	30	N	20	N
OR006SS	1.0	N	N	20	100	30	50	N	N	15	50	N	15	N
OR007HS	1.0	N	N	20	70	20	30	N	<20	15	30	N	15	N
OR008HS	1.0	N	N	30	100	50	100	N	<20	15	20	N	30	N
OR009HS	<1.0	N	N	20	100	50	N	N	20	15	30	N	20	N
OR010SS	1.0	N	N	20	100	50	N	N	<20	15	30	N	20	N
OR011SS	1.0	N	N	20	100	20	100	N	N	15	20	N	20	N
OR012HS	1.0	N	N	20	100	30	50	N	<20	15	20	N	15	N
OR013SS	1.0	N	N	20	70	30	70	N	<20	20	30	N	20	N
OR014HS	<1.0	N	N	20	50	30	N	N	N	20	30	N	20	N
OR015SS	<1.0	N	N	30	100	30	N	N	N	20	30	N	20	N
OR016HS	1.0	N	N	20	50	50	30	N	<20	20	30	N	20	N
OR017SS	1.0	N	N	20	50	30	30	N	N	15	30	N	15	N
OR018SS	1.0	N	N	30	50	30	30	N	N	15	30	N	15	N
OR019HS	1.0	N	N	30	30	20	N	N	N	15	30	N	15	N
OR020HS	1.0	N	N	20	50	50	30	N	<20	15	30	N	20	N
OR021SS	1.0	N	N	20	30	20	30	N	N	20	30	N	15	N
OR022SS	1.5	N	N	20	50	20	N	N	20	30	15	N	20	N

Table 3. Results of analyses of stream-sediment samples from the Orejana Canyon Wilderness Study Area, Harney County, Oregon--Continued

Sample	Sr-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Th-ppm s	Au-ppm aa	Hg-ppm aa	As-ppm aa	Bi-ppm aa	Cd-ppm aa	Sb-ppm aa	Zn-ppm aa
OR001SS	700	150	N	50	<200	150	N	<.1	.32	N	N	.2	N	70
OR002SS	500	100	N	50	<200	100	N	<.1	.38	N	N	.2	N	60
OR003HS	500	100	N	30	<200	100	N	<.1	.18	N	N	.3	N	50
OR004HS	500	150	N	50	<200	100	N	<.1	.06	N	N	.2	N	55
OR005SS	700	150	N	30	<200	100	N	<.1	.12	N	N	.2	N	60
OR006SS	500	100	N	30	<200	100	N	<.1	.02	N	N	.2	N	40
OR007HS	500	100	N	30	<200	100	N	<.1	N	N	N	.2	N	50
OR008HS	700	150	N	30	<200	100	N	<.1	N	N	N	.2	N	50
OR009HS	500	150	N	30	<200	100	N	<.1	N	N	N	.2	N	65
OR010SS	700	150	N	30	<200	100	N	<.1	N	N	N	.2	N	60
OR011SS	500	100	N	30	<200	100	N	<.1	N	N	N	.2	N	45
OR012HS	500	100	N	30	<200	100	N	<.1	.04	N	N	.2	N	70
OR013SS	700	100	N	50	<200	200	N	<.1	N	N	N	.3	N	55
OR014HS	500	100	N	30	<200	150	N	<.1	.04	N	N	.2	N	70
OR015SS	500	150	N	50	<200	150	N	<.1	N	N	N	.2	N	55
OR016HS	500	150	N	50	<200	150	N	<.1	.02	N	N	.3	N	60
OR017SS	500	100	N	30	<200	150	N	<.1	N	N	N	.2	N	45
OR018SS	500	100	N	30	<200	100	N	<.1	.02	N	N	.4	N	55
OR019HS	300	100	N	30	<200	100	N	<.1	.08	N	N	.3	N	65
OR020HS	700	100	N	50	<200	150	N	<.1	.28	N	N	.3	N	65
OR021SS	500	100	N	30	<200	100	N	<.1	.04	N	N	.2	N	65
OR022SS	500	150	N	50	<200	100	N	<.1	.06	N	N	.2	N	95

Table 4. Results of analyses of heavy-mineral-concentrate samples from the Orejana Canyon Wilderness Study Area, Harney County, Oregon

[N, not detected; <, detected but below the limit of determination shown; >, determined to be greater than the value shown.]

Sample	Latitude	Longitude	Fe-pct. s	Mg-pct. s	Ca-pct. s	Ti-pct. s	Mn-ppm s	Ag-ppm s	As-ppm s	Au-ppm s
OC001SC3	42 48 39	119 30 14	.7	.70	15	1.50	200	N	N	N
OC002SC3	42 48 4	119 28 45	1.0	1.00	15	1.00	500	N	N	N
OC003HC3	42 48 16	119 28 44	1.0	1.00	15	.70	500	N	N	N
OC004HC3	42 48 15	119 28 38	.7	.70	10	1.00	300	N	N	N
OC005SC3	42 49 21	119 28 57	.7	.30	10	.20	200	N	N	N
OC006SC3	42 49 21	119 28 50	.7	.30	10	.30	200	N	N	N
OC007HC3	42 49 28	119 27 32	.7	.50	7	.30	200	N	N	N
OC008HC3	42 49 32	119 27 23	.5	.30	7	.50	300	N	N	N
OC009HC3	42 49 58	119 27 6	.5	.20	7	.15	150	N	N	N
OC010SC3	42 51 53	119 27 36	.7	.20	7	.20	200	N	N	N
OC011SC3	42 51 56	119 27 33	.7	.50	10	.70	200	N	N	N
OC012HC3	42 51 56	119 27 28	.7	.20	10	.10	150	N	N	N
OC013SC3	42 52 57	119 28 15	.7	.50	15	1.00	200	N	N	N
OC014HC3	42 54 49	119 27 51	1.0	.50	7	.20	200	N	N	N
OC015SC3	42 54 39	119 27 35	.5	.30	15	.20	200	N	N	N
OC016HC3	42 55 35	119 26 41	.5	.10	7	.15	150	N	N	N
OC017SC3	42 55 57	119 26 58	.7	.20	10	.15	100	N	N	N
OC018SC3	42 57 26	119 27 4	1.0	.70	20	2.00	500	N	N	N
OC019HC3	42 57 22	119 27 48	.5	.50	15	1.00	200	N	N	N
OC020HC3	42 55 41	119 30 37	.5	.70	20	.30	200	N	N	N
OC021SC3	42 55 43	119 30 32	.7	.15	10	.20	200	N	N	N
OC022SC3	42 54 41	119 29 48	.7	.50	15	.15	200	N	N	N

Table 4. Results of analyses of heavy-mineral-concentrate samples from the Orejana Canyon Wilderness Study Area, Harney County, Oregon--Continued

Sample	B-ppm s	Ba-ppm s	Be-ppm s	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s
OC001SC3	20	700	<2	N	N	<10	150	15	200	N	N
OC002SC3	20	500	<2	N	N	<10	200	15	200	N	N
OC003HC3	20	500	<2	N	N	<10	100	15	100	N	N
OC004HC3	20	500	<2	N	N	<10	100	10	150	N	N
OC005SC3	20	500	<2	N	N	<10	20	15	50	N	N
OC006SC3	20	700	<2	N	N	<10	20	15	70	N	N
OC007HC3	20	500	<2	N	N	<10	50	15	100	N	N
OC008HC3	20	500	3	N	N	<10	20	<10	150	N	N
OC009HC3	20	700	<2	N	N	<10	20	10	N	N	N
OC010SC3	20	700	<2	N	N	<10	20	10	50	N	N
OC011SC3	20	500	<2	N	N	<10	50	15	100	N	N
OC012HC3	20	700	<2	N	N	<10	20	10	N	N	N
OC013SC3	20	500	<2	N	N	<10	50	10	150	N	N
OC014HC3	20	700	<2	N	N	<10	70	15	N	N	N
OC015SC3	20	500	<2	N	N	<10	30	10	50	N	N
OC016HC3	20	500	<2	N	N	<10	20	<10	N	N	N
OC017SC3	20	500	<2	N	N	<10	20	10	N	N	N
OC018SC3	30	300	<2	N	N	<10	70	15	200	N	N
OC019HC3	20	500	<2	N	N	<10	20	15	50	N	N
OC020HC3	20	500	<2	N	N	<10	20	15	100	N	N
OC021SC3	20	700	<2	N	N	<10	20	10	70	N	N
OC022SC3	30	500	<2	N	N	<10	30	10	N	N	N

Table 4. Results of analyses of heavy-mineral-concentrate samples from the Orejana Canyon Wilderness Study Area, Harney County, Oregon--Continued

Sample	Ni-ppm s	Pb-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Th-ppm s
OC001SC3	20	N	N	N	100	3,000	70	<100	500	N	>2,000	N
OC002SC3	30	N	N	N	N	3,000	100	<100	700	N	>2,000	N
OC003HC3	20	N	N	N	N	2,000	100	<100	500	N	>2,000	N
OC004HC3	20	N	N	N	50	2,000	70	<100	500	N	>2,000	N
OC005SC3	15	N	N	N	N	2,000	20	<100	200	N	>2,000	N
OC006SC3	15	N	N	N	N	3,000	30	<100	200	N	>2,000	N
OC007HC3	15	N	N	N	N	2,000	20	<100	300	N	>2,000	N
OC008HC3	30	N	N	N	100	2,000	30	<100	700	N	>2,000	N
OC009HC3	10	N	N	N	N	2,000	20	<100	150	N	>2,000	N
OC010SC3	10	N	N	N	150	2,000	30	<100	500	N	>2,000	N
OC011SC3	15	N	N	N	30	2,000	70	<100	500	N	>2,000	N
OC012HC3	<10	N	N	N	N	2,000	20	<100	150	N	>2,000	N
OC013SC3	10	N	N	N	200	2,000	50	<100	500	N	>2,000	N
OC014HC3	20	N	N	N	300	2,000	30	<100	150	N	>2,000	N
OC015SC3	15	N	N	N	300	2,000	30	<100	200	N	>2,000	N
OC016HC3	15	N	N	N	N	2,000	20	<100	200	N	>2,000	N
OC017SC3	<10	N	N	N	200	2,000	<20	<100	100	N	>2,000	N
OC018SC3	15	N	N	N	>2,000	3,000	100	<100	500	N	>2,000	N
OC019HC3	15	N	N	N	>2,000	2,000	50	<100	150	N	>2,000	N
OC020HC3	15	N	N	N	2,000	2,000	70	<100	200	N	>2,000	N
OC021SC3	15	N	N	N	1,000	3,000	50	<100	150	N	>2,000	N
OC022SC3	15	N	N	N	700	2,000	20	<100	100	N	>2,000	N

Table 5. Results of analyses of rock samples from the Orejana Canyon Wilderness Study Area, Harney County, Oregon

Sample	Latitude	Longitude	Fe-pct. s	Mg-pct. s	Ca-pct. s	Ti-pct. s	Mn-ppm s	Ag-ppm s	As-ppm s	Au-ppm s	B-ppm s	Ba-ppm s
OC019HR	42 16 6	118 53 1	1	.10	.20	.07	500	N	N	N	50	500
OC020HR	42 15 2	118 53 12	1	.15	.15	.07	700	N	N	N	50	150

Sample	Be-ppm s	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s
OC019HR	1.5	N	N	N	<10	<5	50	N	20	<5	50	N	5	10
OC020HR	2.0	N	N	N	<10	5	30	N	20	<5	20	N	5	N

Sample	Sr-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Th-ppm s	Au-ppm aa	Hg-ppm aa	As-ppm aa	Bi-ppm aa	Cd-ppm aa	Sb-ppm aa	Zn-ppm aa
OC019HR	<100	<10	<50	70	N	200	N	N	<.02	N	N	.1	N	25
OC020HR	<100	15	<50	50	N	200	N	N	<.02	N	N	.1	N	55