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 Soda Mountain Wilderness Study Area, Jackson 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 values, if any. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a geochemical survey of the Soda Mountain Wilderness Study Area (OR-011-017), Jackson County, Oregon.

INTRODUCTION

In July, 1988, the U.S. Geological Survey conducted a reconnaissance geochemical survey of the Soda Mountain Wilderness Study Area, Jackson County, Oregon.

The Soda Mountain Wilderness Study Area comprises about 9 mi^2 (24 km^2) (6,000 acres) in the north-central part of Jackson County, Oregon, and lies about 17 mi southeast of Ashland. Access to the study area is provided by an improved BLM dirt road, south from Oregon state highway 66 at Green Springs. Access is also possible by dirt roads and jeep trails leading eastward from U.S. Interstate 5 near Mount Ashland and northward from the Irongate Reservoir in northern California.

The topographic relief in the study area is about 3000 ft on Salt Creek, with a maximum elevation of 5,760 ft on the flank of Soda Mountain (fig. 1). Approximately 75 percent of the densely vegetated study area is comprised of ridges and canyons forming the southern face of Soda Mountain. Much of the slope faces and stream valleys are covered by dense brush, and the higher ridges by pine and fir. Open grasslands are present on the gentle slopes in the eastern study area. The climate is arid to semiarid.

The Soda Mountain Wilderness Study Area consists of volcanic and volcaniclastic rocks of the Cascade Volcanic Arc. These rocks were erupted during the Oligocene and Early Miocene (Smith and others, 1986). This sequence is collectively called the volcanic rocks of the western Cascade Range. In southern Oregon, the volcanic rocks of the western Cascade Range are structurally simple, forming a homoclinal sequence that dips gently to the north northeast. The study area lies entirely within a single volcanic unit mapped by Smith and others (1982) as Oligocene basalt, basaltic andesite, and andesite. Individual rock units have varying appearance due to textural changes rather than compositional changes and thus were not mapped separately.

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.

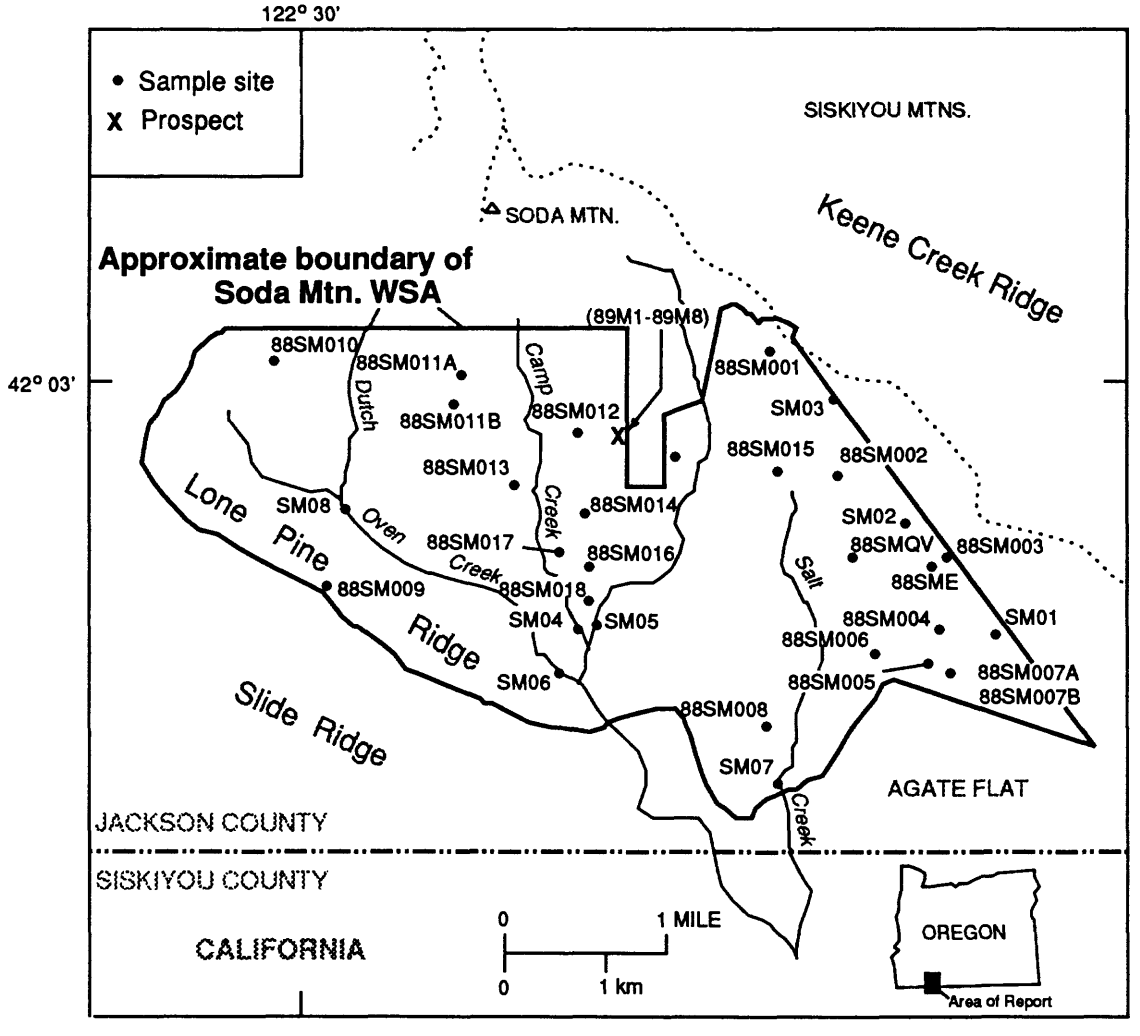

Figure 1. Localities of stream-sediment, heavy-mineral-concentrate, mineralized, and unmineralized rock samples from the Soda Mountain Wilderness Study Area, Jackson County, Oregon.

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

Stream-sediment and heavy-mineral-concentrate samples were collected at eight sites. Altered rock samples were collected at one prospect site and unaltered rock samples were collected at 23 sites. Sample localities with the prefix "sm" indicate sample sites of stream-sediment and heavy-mineral-concentrate samples, localities with the prefix "88" indicate sample sites of unaltered rock samples, and localities with the prefix "89" indicate sample sites of altered rock samples (fig. 1). Average sampling density was about one sample site per 1 mi^2 for the stream sediments and heavy-mineral concentrates. The area of the drainage basins sampled ranges up to about 2 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 = 1:62,500). Each sample was composited from several localities within an area that may extend as much as 10 ft from the 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 altered or mineralized rocks.

Sample Preparation

The stream-sediment samples were oven dried, then sieved using 80-mesh (0.17-mm) stainless-steel sieves. The portion of the sediment passing through the sieve was pulverized to 100 mesh (0.15 mm) and saved for analysis.

After oven drying (at 60°C) and sieving to -35 mesh, bromoform (specific gravity 2.85) 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) by placing the sample in contact with the face of the magnet. The most magnetic material (removed at a setting of 0.25 ampere), primarily magnetite, was not analyzed. The second fraction (removed at a setting of 1.75 ampere) largely ferromagnesian silicates and iron oxides, was saved for analysis/archival

storage. The third fraction (the nonmagnetic material which may include the nonmagnetic ore minerals, zircon, sphene, etc.) was split using a Jones splitter for analysis. One split was hand ground for spectrographic analysis; the other split was saved for mineralogical analysis.

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

Sample Analysis

Spectrographic method

The stream-sediment and rock samples were analyzed for 35 elements using a semiquantitative, direct-current arc emission spectrographic method (Grimes and Marranzino, 1968). The heavy-mineral-concentrate samples were analyzed for 37 elements using the same method. 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). Analytical data for samples from the Soda Mountain wilderness area are listed in tables 4-7.

Chemical methods

Samples from this study area were also analyzed by other analytical methods. Stream sediments, altered, and unaltered rocks were analyzed for Au using atomic absorption spectroscopy, altered and unaltered rocks were analyzed for Hg also using atomic absorption, and stream sediments and altered rocks were analyzed for As, Bi, Cd, Sb, and Zn using inductively coupled plasma spectroscopy. See table 2 for a more detailed summary of these chemical methods.

Analytical results for stream-sediment, heavy-mineral-concentrate, unaltered rock, and altered rock samples are listed in tables 4, 5, 6, and 7, respectively.

DATA STORAGE SYSTEM

Upon completion of all analytical work, the analytical results were entered into the Branch of Geochemistry computer data base. 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 4-7 list the results of analyses for all samples collected from the Soda Mountain Wilderness Study Area. For the four tables, the data are arranged so that column 1 contains the submitter-assigned sample numbers.

These numbers correspond to the numbers shown on the site location map (fig. 1). Columns in which the element headings show the letter "s" below the element symbol are emission spectrographic analyses; "aa" indicates atomic absorption analyses; and "icp" indicates inductive coupled plasma 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. If an element was observed but was below the lowest reporting value, a "less than" symbol (<) was entered in the tables in front of the lower limit of determination. Because of the formatting used in the computer program that produced tables 4-7, some of the elements listed in these tables (Fe, Mg, Ca, Na, Ti, Ag, and Hg) 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.

The spectrographic determinations for As, Au, Bi, Cd, Ge, La, Mo, Nb, Sb, Sn, Th, and W in stream-sediment samples, for Be, Cd, Ge, Pd, Pt, Sb, W, and Zn in heavy-mineral-concentrate samples, for Au, Bi, Cd, La, Nb, Sb, Sn, Th, W, and Zn in unaltered rock samples and for Au, Cd, La, Nb, Th, W, and Zn in the altered rocks were all below the lower limits of determinations shown in table 1; AA determinations for Au in stream sediments, unaltered rocks, and altered rocks as well as ICP determinations for Bi and Sb in stream sediments were also below the lower limits of determinations shown in table 2; consequently, the columns for all these elements have been deleted from tables 4, 5, 6, and 7.

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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 below]

Elements	Lower determination limit	Upper determination limit
	Percent	
Calcium (Ca)	.05	20
Iron (Fe)	0.05	20
Magnesium (Mg)	.02	10
Sodium (Na)	0.2	5
Phosphorus (P)	0.2	10
Titanium (Ti)	.002	1
	Parts per million	
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)	10	2,000
Chromium (Cr)	10	5,000
Copper (Cu)	5	20,000
Gallium (Ga)	5	500
Germanium (Ge)	10	100
Lanthanum (La)	50	1,000
Manganese (Mn)	10	5,000
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
Thorium (Th)	100	2,000
Vanadium (V)	10	10,000
Tungsten (W)	20	10,000
Yttrium (Y)	10	2,000
Zinc (Zn)	200	10,000
Zirconium (Zr)	10	1,000
Palladium (Pd)*	5	1,000
Platinum (Pt)*	20	1,000

*Determined in heavy-mineral-concentrate samples only. Limits are for heavy-mineral-concentrate samples.

TABLE 2.--Chemical methods used

[AA = atomic absorption; ICP = inductively coupled plasma spectroscopy]

Element or constituent determined	Sample type	Method	Determination limit (micrograms/ gram or ppm)	Analyst	Reference
Gold (Au)	Sediments and altered rocks	AA	0.05	B. Roushay	Thompson and others, 1968.
Arsenic (As)	"	ICP	5	J. Motooka	Crock and others, 1987.
Bismuth (Bi)	"	ICP	2	"	Crock and others, 1987.
Cadmium (Cd)	"	ICP	0.1	"	Crock and others, 1987.
Antimony (Sb)	"	ICP	2	"	Crock and others, 1987.
Zinc (Zn)	"	ICP	2	"	Crock and others, 1987.
Mercury (Hg)	Unaltered and altered rocks	AA	0.02	P.H. Briggs B. Roushay P. Hageman	Kennedy and Crock, 1987.
Gold (Au)	Unaltered rocks	AA	0.05	P. Hageman B. Roushay	Thompson and others, 1968.

TABLE 3. Description of altered and unaltered rocks

89SM1	Altered volcanic breccia, base of siliceous tuff
89SM2	Altered mafic volcanic, below siliceous tuff
89SM3	Weakly altered mafic flow, above siliceous tuff
89SM4	Altered ashflow tuff, below siliceous tuff
89SM5	Siliceous tuff
89SM6	Quartz vein, base of siliceous tuff
89SM7	Altered siliceous tuff, bottom
89SM8	Ashflow tuff, above siliceous tuff
88SM012	Altered andesite with copper stain
88SM011A	Dacite
88SM015	Pyritized andesite
88SMQV	Quartz vein
88SM002	Altered andesite
88SME	Jasperoid
88SM009	Dacite
88SM005	Jasperoid
88SM015A	Mineralized dacite dike
88SM013	Basalt
88SM016	Altered andesite
88SM006	Andesite
88SM004	Andesite
88SM007A	Fine-grained andesite
88SM011B	Quartz-veined andesite
88SM017	Basalt
88SM018	Andesite
88SM007D	Dacite dike
88SM008	Basalt
88SM001	Andesite
88SM014	Basalt
88SM010	Andesite
88SM003	Quartz vein

TABLE 4--RESULTS OF THE ANALYSES OF STREAM SEDIMENT SAMPLES FROM THE SODA MOUNTAIN WILDERNESS STUDY AREA, JACKSON COUNTY, OREGON

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

Sample	Latitude	Longitude	Ca %-s	Fe %-s	Mg %-s	Na %-s	P %-s	Ti %-s	Ag ppm-s	B ppm-s
SM 01	42 1 37	122 25 7	1.0	5	.5	1.0	<.2	.3	<.5	15
SM 02	42 2 15	122 25 45	.5	2	.5	.7	<.2	.2	N	50
SM 03	42 2 51	122 26 17	.7	5	1.0	1.0	<.2	.3	N	70
SM 04	42 1 37	122 28 12	.7	5	1.0	.7	<.2	.5	<.5	100
SM 05	42 1 37	122 28 2	.5	5	1.0	1.0	<.2	.5	<.5	100
SM 06	42 1 22	122 28 16	.7	7	1.0	1.0	N	.5	N	70
SM 07	42 0 50	122 26 40	1.0	5	.7	1.0	N	.5	N	15
SM 08	42 2 51	122 26 17	.7	7	1.0	.7	N	.5	N	10

Sample	Ba ppm-s	Be ppm-s	Co ppm-s	Cr ppm-s	Cu ppm-s	Ga ppm-s	Mn ppm-s	Ni ppm-s	Pb ppm-s
SM 01	200	<1	20	50	20	50	500	20	30
SM 02	300	<1	15	10	20	20	500	10	20
SM 03	300	<1	20	30	50	50	1,000	30	20
SM 04	300	<1	20	50	30	30	700	15	20
SM 05	300	N	30	50	30	50	500	20	50
SM 06	200	N	30	100	30	50	700	20	20
SM 07	300	N	20	50	30	50	500	15	15
SM 08	300	N	50	70	30	50	700	15	15

Sample	Sc ppm-s	Sr ppm-s	V ppm-s	Y ppm-s	Zn ppm-s	Zr ppm-s	As ppm icp	Cd ppm icp	Zn ppm icp
SM 01	10	300	100	20	N	70	8	.4	65
SM 02	10	200	70	15	N	100	20	.6	63
SM 03	15	150	150	50	200	100	22	1.8	220
SM 04	15	200	200	30	<200	100	27	.8	100
SM 05	15	200	150	15	<200	70	24	.8	120
SM 06	15	300	300	15	N	50	14	1.1	150
SM 07	15	300	200	20	N	100	8	.6	100
SM 08	20	300	300	20	<200	70	<5	1.3	160

TABLE 5--RESULTS OF THE ANALYSES OF NONMAGNETIC HEAVY-MINERAL-CONCENTRATE SAMPLES FROM THE SODA MOUNTAIN WILDERNESS STUDY AREA, JACKSON COUNTY, OREGON

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

Sample	Latitude	Longitude	Ca %-s	Fe %-s	Mg %-s	Na %-s	P %-s	Ti %-s	Ag ppm-s	As ppm-s	Au ppm-s
SM 01	42 1 37	122 25 7	1.0	3.0	.5	N	2.0	.5	N	N	N
SM 02	42 2 15	122 25 45	2.0	2.0	.2	.5	2.0	1.5	<1	N	N
SM 03	42 2 51	122 26 17	2.0	1.5	.3	1.0	5.0	1.5	N	N	N
SM 04	42 1 37	122 28 12	1.5	1.0	.5	.7	2.0	2.0	3	N	<20
SM 05	42 1 37	122 28 2	1.0	1.5	.7	.5	1.0	2.0	N	N	N
SM 06	42 1 22	122 28 16	2.0	2.0	1.0	.5	2.0	1.5	2	1,500	N
SM 07	42 0 50	122 26 40	3.0	1.0	1.0	1.0	1.5	1.5	N	N	N
SM 08	42 2 51	122 26 17	3.0	.5	.5	1.5	1.0	.2	N	N	N

Sample	B ppm-s	Ba ppm-s	Bi ppm-s	Co ppm-s	Cr ppm-s	Cu ppm-s	Ga ppm-s	La ppm-s	Mn ppm-s	Mo ppm-s
SM 01	N	70	N	<20	<20	10	N	200	500	N
SM 02	70	5,000	30	<20	70	20	10	100	300	15
SM 03	1,000	300	N	N	100	15	20	150	300	20
SM 04	500	200	N	<20	200	10	20	100	200	10
SM 05	1,500	2,000	N	<20	200	<10	15	<100	200	<10
SM 06	700	3,000	N	70	500	15	20	150	200	10
SM 07	100	700	N	<20	300	10	30	100	200	N
SM 08	20	150	N	N	200	<10	30	N	100	<10

Sample	Nb ppm-s	Ni ppm-s	Pb ppm-s	Sc ppm-s	Sn ppm-s	Sr ppm-s	Th ppm-s	V ppm-s	Y ppm-s	Zr ppm-s
SM 01	100	N	N	10	N	N	500	150	200	>2,000
SM 02	<50	50	<20	15	100	500	N	100	100	500
SM 03	<50	30	<20	20	<20	300	N	100	150	500
SM 04	<50	20	<20	20	<20	500	N	100	100	2,000
SM 05	50	N	500	10	N	300	N	150	100	>2,000
SM 06	<50	50	500	20	N	500	N	100	100	>2,000
SM 07	<50	20	<20	15	N	1,000	N	100	100	>2,000
SM 08	N	N	N	<10	N	1,000	N	50	30	1,500

TABLE 6--RESULTS OF THE ANALYSES OF ROCK SAMPLES FROM THE SODA MOUNTAIN WILDERNESS STUDY AREA, JACKSON COUNTY, OREGON

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

Sample	Latitude	Longitude	Ca %-s	Fe %-s	Mg %-s	Na %-s	P %-s	Ti %-s	Ag ppm-s	As ppm-s
88SM001	42 3 15	122 26 50	1.50	2.00	1.00	1.0	N	.200	N	N
88SM002	42 2 30	122 26 0	.05	2.00	N	N	.2	.005	<.5	300
88SM003	42 2 0	122 25 30	.50	1.00	.10	.5	N	.150	N	N
88SM004	42 1 40	122 25 35	1.00	2.00	.70	1.0	N	.300	N	N
88SM005	42 1 35	122 25 45	<.05	3.00	<.02	N	N	<.002	N	N
88SM006	42 1 35	122 26 10	1.00	2.00	.70	1.5	N	.300	N	N
88SM007A	42 1 25	122 25 35	1.00	2.00	.70	1.5	N	.200	N	N
88SM007B	42 1 25	122 25 35	1.00	1.50	1.00	1.5	N	.150	N	N
88SM008	42 1 15	122 27 15	1.00	2.00	.50	1.5	<.2	.200	N	N
88SM009	42 1 50	122 30 10	.30	1.00	.20	2.0	N	.150	N	N
88SM010	42 3 0	122 30 30	1.00	2.00	.15	1.0	<.2	.200	N	N
88SM011A	42 3 5	122 29 10	1.00	3.00	.70	1.5	N	.200	N	N
88SM011B	42 2 55	122 29 0	.70	2.00	.50	2.0	N	.300	N	N
88SM012	42 2 40	122 28 0	1.00	3.00	.50	1.0	N	.300	N	N
88SM013	42 2 30	122 28 30	1.00	2.00	1.00	1.0	N	.300	N	N
88SM014	42 2 20	122 28 0	1.00	2.00	1.00	1.5	N	.200	N	N
88SM015	42 2 30	122 27 30	1.00	3.00	1.00	<.2	N	.300	N	N
88SM015A	42 2 30	122 27 30	1.00	2.00	1.00	1.0	N	.200	.5	N
88SM016	42 2 0	122 28 0	.15	1.50	.50	1.5	N	.200	N	N
88SM017	42 2 0	122 28 0	1.00	3.00	1.00	1.0	N	.300	N	N
88SM018	42 1 40	122 28 0	1.00	1.50	1.00	1.5	N	.150	N	N
88SME	42 2 0	122 25 30	.70	1.50	.10	1.5	<.2	.200	N	N
88SMQV	42 2 0	122 26 0	<.05	<.05	<.02	N	N	<.002	N	N

Sample	B ppm-s	Ba ppm-s	Be ppm-s	Co ppm-s	Cr ppm-s	Cu ppm-s	Ga ppm-s	Ge ppm-s	Mn ppm-s
88SM001	10	150	N	20	10	15	30	N	500
88SM002	10	70	1	N	N	10	N	N	20
88SM003	30	300	1	N	N	<5	5	<10	300
88SM004	10	300	<1	15	N	<5	30	N	500
88SM005	10	70	N	N	N	<5	<5	<10	700
88SM006	10	500	<1	20	N	7	50	N	700
88SM007A	<10	300	N	15	N	<5	30	N	700
88SM007B	<10	150	N	30	10	20	20	N	300
88SM008	20	300	<1	15	N	10	20	N	500
88SM009	15	300	<1	<10	N	7	30	N	300
88SM010	15	300	<1	<10	N	<5	20	N	1,000
88SM011A	20	500	<1	20	N	10	20	N	700
88SM011B	10	500	N	20	N	15	20	N	500
88SM012	20	300	N	20	N	<5	20	N	500
88SM013	<10	200	N	20	N	15	30	N	700
88SM014	15	200	N	30	N	20	30	N	700
88SM015	15	500	<1	20	N	7	20	N	700
88SM015A	200	300	N	20	N	50	20	N	500
88SM016	15	300	N	10	N	10	20	N	300
88SM017	15	200	N	50	20	20	50	N	500
88SM018	<10	300	N	20	15	15	20	N	500
88SME	<10	300	N	10	N	10	20	N	300
88SMQV	30	150	N	N	<10	N	<5	10	10

TABLE 6--RESULTS OF THE ANALYSES OF ROCK SAMPLES FROM THE SODA MOUNTAIN WILDERNESS STUDY AREA, JACKSON COUNTY, OREGON--*Continued*

Sample	Mo ppm-s	Ni ppm-s	Pb ppm-s	Sc ppm-s	Sr ppm-s	V ppm-s	Y ppm-s	Zr ppm-s	Hg ppm-aa
88SM001	N	10	N	20	500	100	10	30	N
88SM002	15	<5	N	N	N	100	N	N	.08
88SM003	N	10	N	5	100	30	N	30	.02
88SM004	N	<5	N	15	500	70	15	50	N
88SM005	N	<5	N	N	N	30	<10	N	.02
88SM006	N	<5	N	15	500	50	15	70	.02
88SM007A	N	N	N	15	300	50	15	50	N
88SM007B	N	20	N	20	700	70	10	30	.06
88SM008	N	<5	N	20	500	50	15	70	.02
88SM009	N	<5	10	10	200	10	15	50	.04
88SM010	N	<5	10	10	200	20	20	70	N
88SM011A	N	7	15	20	500	70	15	70	N
88SM011B	<5	<5	15	20	500	70	15	70	N
88SM012	N	7	20	20	200	70	15	70	N
88SM013	N	5	N	30	500	100	10	50	.04
88SM014	5	7	30	20	500	70	10	30	.02
88SM015	15	5	N	15	500	70	20	100	.02
88SM015A	N	7	30	20	500	70	10	70	.20
88SM016	5	5	<10	15	150	50	10	70	.08
88SM017	N	15	10	30	500	100	20	50	.04
88SM018	N	10	<10	20	300	70	10	30	.04
88SME	N	5	N	20	300	70	20	50	.02
88SMQV	N	N	N	N	N	N	N	N	.12

TABLE 7--RESULTS OF THE ANALYSES OF ALTERED ROCK SAMPLES COLLECTED FROM THE SODA MOUNTAIN PROSPECT, SODA MOUNTAIN WILDERNESS STUDY AREA, JACKSON COUNTY, OREGON (LATITUDE=42 02 45, LONGITUDE=122 27 52)

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

Sample	Ca %-s	Fe %-s	Mg %-s	Na %-s	P %-s	Ti %-s	Ag ppm-s	As ppm-s	B ppm-s	Ba ppm-s	Be ppm-s	Bi ppm-s
89SM1	.05	2	1.00	.3	<.2	.150	1.5	<200	2,000	200	<1	10
89SM2	.05	2	1.00	.5	N	.150	.5	N	>2,000	300	<1	N
89SM3	3.00	3	1.00	1.5	N	.200	N	N	30	500	N	N
89SM4	.05	5	1.00	.2	N	.050	1.0	N	2,000	200	1	10
89SM5	<.05	2	.70	.2	N	.100	N	N	700	1,500	<1	<10
89SM6	<.05	1	<.02	N	N	.002	<.5	N	20	150	N	N
89SM7	.05	3	1.00	.3	N	.200	.7	N	2,000	300	N	10
89SM8	.07	2	2.00	.5	N	.200	.5	N	>2,000	100	<1	N

Sample	Co ppm-s	Cr ppm-s	Cu ppm-s	Ga ppm-s	Ge ppm-s	Mn ppm-s	Mo ppm-s	Ni ppm-s	Pb ppm-s	Sb ppm-s
89SM1	N	20	20	20	N	200	N	<5	100	N
89SM2	N	15	10	15	N	700	5	N	50	N
89SM3	15	20	20	20	N	1,000	N	7	15	N
89SM4	N	N	70	15	10	200	20	N	<10	<100
89SM5	N	<10	<5	20	N	100	<5	N	10	N
89SM6	N	N	10	N	10	100	7	N	N	N
89SM7	<10	20	15	20	N	300	<5	5	70	N
89SM8	10	15	<5	20	N	70	<5	10	20	N

Sample	Sc ppm-s	Sn ppm-s	Sr ppm-s	V ppm-s	Y ppm-s	Zr ppm-s	As ppm icp	Bi ppm icp	Cd ppm icp	Sb ppm icp	Zn ppm icp	Hg ppm aa
89SM1	10	<10	N	100	15	100	127	10	.3	4	28	2.90
89SM2	7	<10	N	70	15	100	61	<2	.2	4	4	.30
89SM3	10	N	300	150	20	100	<5	<2	.6	<2	44	.24
89SM4	5	<10	N	50	10	70	37	9	.9	28	6	1.00
89SM5	5	N	N	50	15	100	40	<2	.1	<2	<2	.64
89SM6	N	N	N	10	N	N	9	<2	<.1	<2	<2	N
89SM7	10	N	N	70	15	100	46	6	.2	<2	27	.02
89SM8	15	10	N	70	20	100	5	<2	<.1	<2	<2	N