UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Analytical results and locality map of of heavy-mineral-concentrate, stream-sediment, soil and big-sagebrush samples from the Lava Creek mining district, within the Idaho Falls 1° x 2° quadrangle, Butte County, Idaho

By

B.M. Adrian,* J.A. Erdman,* J.H. Bullock, Jr.,*

and P.L. Hageman*

Open-File Report 90-545

*U.S. Geological Survey, DFC, Box 25046, MS 973, Denver, CO 80225

1990

CONTENTS

ILLUSTRATIONS

TABLES

STUDIES RELATED TO CUSMAP

This report presents the results of two drainage geochemical surveys in the Lava Creek mining district, Butte County, Idaho. This topical study is one of many studies that have been conducted in the Hailey and Idaho Falls 1° x 2° quadrangles that are part of the Conterminous United States Mineral Appraisal Program (CUSMAP).

INTRODUCTION

In the summer of 1987, Erdman conducted a brief reconnaissance geochemical survey of the Lava Creek mining district, within the Idaho Falls 1° x 2° quadrangle, Butte County, Idaho. A follow-up survey was conducted in May of 1988. The center of the Lava Creek district is about 14 mi (22 km) southwest of Arco (fig. 1) in the southwest corner of Butte County. Access to the study area is provided on the south by a dirt road leading north off of U.S. Highway 93 at Craters of the Moon National Monument and on the north by a dirt road along Antelope Creek from Darlington.

The elevation ranges from about 5,600 ft (~ 1,700 m) at the mouth of Lava Creek, towards the south of the district, to 8,356 ft (~2,550 m) at Timbered Dome, the predominant geographic feature in the study area. The arid environment supports a vegetation type characterized by big-sagebrush (*Artemisia tridentata* Nutt.) but often containing less conspicuous shrubs, such as antelope bitterbrush (*Purshia tridentata* [Pursh] DC.) and rabbitbrush (*Chrysothamnus* sp.). Small stands of mainly douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco) often dominate slopes at higher elevations, primarily on the north exposures. Some of the smaller valleys harbor stands of alder (*Alnus* sp.), aspen (*Populus tremuloides* Michx.), and poplar (*Populus* sp.) along the banks of perennial streams.

The geology of the Lava Creek mining district (Skipp and others, 1990) consists of Paleozoic sedimentary rocks overlain by Eocene Challis Volcanics and intruded by Eocene co-genetic dikes, plutons and domes. Locally, these units are capped by Miocene basalt and rhyolite that are related to the Snake River Plain volcanism. The structure of the Lava Creek district is complex with evidence for both Mesozoic and Cenozoic tectonics. Paleozoic strata were thrust faulted and folded during middle to late Mesozoic compressional tectonics. Early Tertiary structures are characteristically northeast and north-northwest-trending high-angle faults that show evidence of pre- and post-volcanic displacement. North-northeast-trending faults parallel to the margins of the Snake River Plain have only post-Eocene displacement.

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.

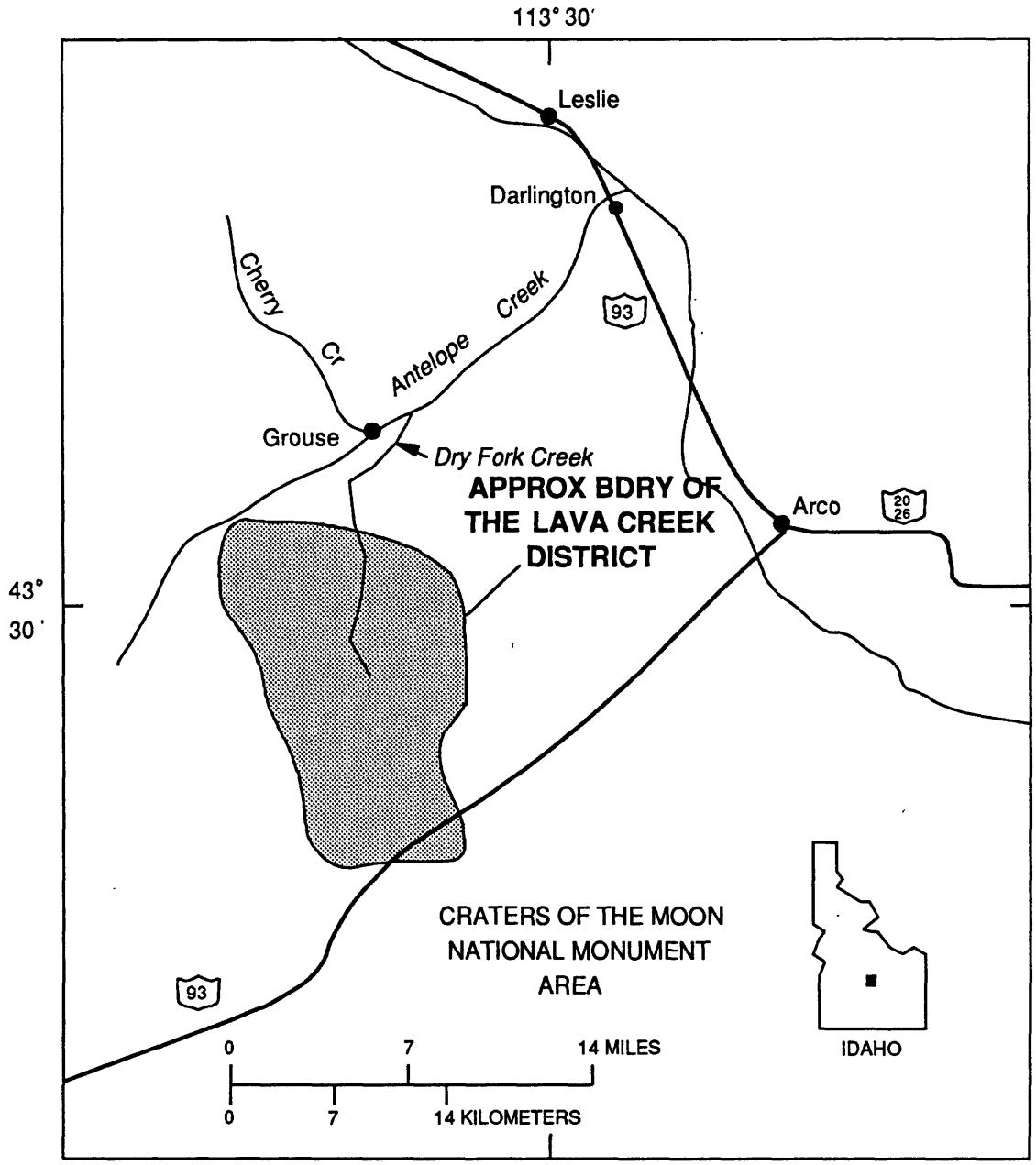

Figure 1. Location of the Lava Creek mining district, Butte County, Idaho.

Under the conditions of this study, plant samples tend to provide information on soluble metals that are transported down the drainage basin and are available at depth. The roots of sagebrush are not known to extend more than several meters (Weaver and Clements, 1938, p. 320). Sturges (1977) reports that big-sagebrush has both a fibrous root system that can feed near the surface and a taproot that can draw moisture and nutrients from deep in the soil profile. Samples of big-sagebrush were analyzed to investigate their ability to selectively remove hydromorphically bound, ore-related elements from the weathering environment. The plant results were compared with those from the more conventional sample media.

Sample Collection

In the initial reconnaissance survey, heavy-mineral-concentrate and sagebrush samples were collected at all 30 localities (fig. 2). In the follow-up survey, there were 54 stream-sediment samples collected along with 58 sagebrush samples at most of the 62 localities shown on figure 3. Two soil samples were collected from localities 2 and 5 in place of stream sediments. In addition, four sagebrush and associated soil samples were collected from four drill-hole sites at the Champagne Mine. No stream sediments were collected from localities 1, 22, 58, 61, and 62 where springs occurred (only sagebrush was sampled); nor was a sediment collected at locality 27, a waste dump beside a prospect adit. In contrast, stream sediments were only collected at localities 34, 35, 39, and 40 (in the upper reaches of Sawmill Canyon) where sagebrush did not grow.

Stream-sediment and soil samples

The stream-sediment samples consisted of active alluvium collected primarily from small first-order (unbranched) streams as shown on advance copies of USGS topographic maps MacKay 4 Southeast and Southwest (scale = 1:24,000) (fig. 3). Each sample was composited from several sites within an area that may extend as much as 20 ft from the site plotted on the map. In the two cases where stream sediments were not available at the locality a surface soil, for example at the Champagne Mine, was collected from a single pit.

Heavy-mineral-concentrate samples

As with the stream-sediment samples, heavy-mineral-concentrate samples were collected from active alluvium. The base used was the USGS Grouse topographic quadrangle (scale 1:62,500). Each bulk sample was screened with a 2.0 mm (10-mesh) screen to remove the coarse material. The minus-2.0 mm fraction was panned until most of the quartz, feldspar, organic material, and clay-sized material were removed.

Big-sagebrush samples

Big-sagebrush samples were a composite of new growth (stems and leaves combined) from several shrubs that grew at the edge of the active channel of small streams or in the dry washes; sagebrush is usually not found in the channel proper where the flow is fairly constant. The samples were composites of clippings from several shrubs within about 5 m of one another; each sample of about 50 gm was placed in a small cloth sampling bag.

For the follow-up survey, leaves were stripped from the new growth and, to some extent, the previous year's growth.

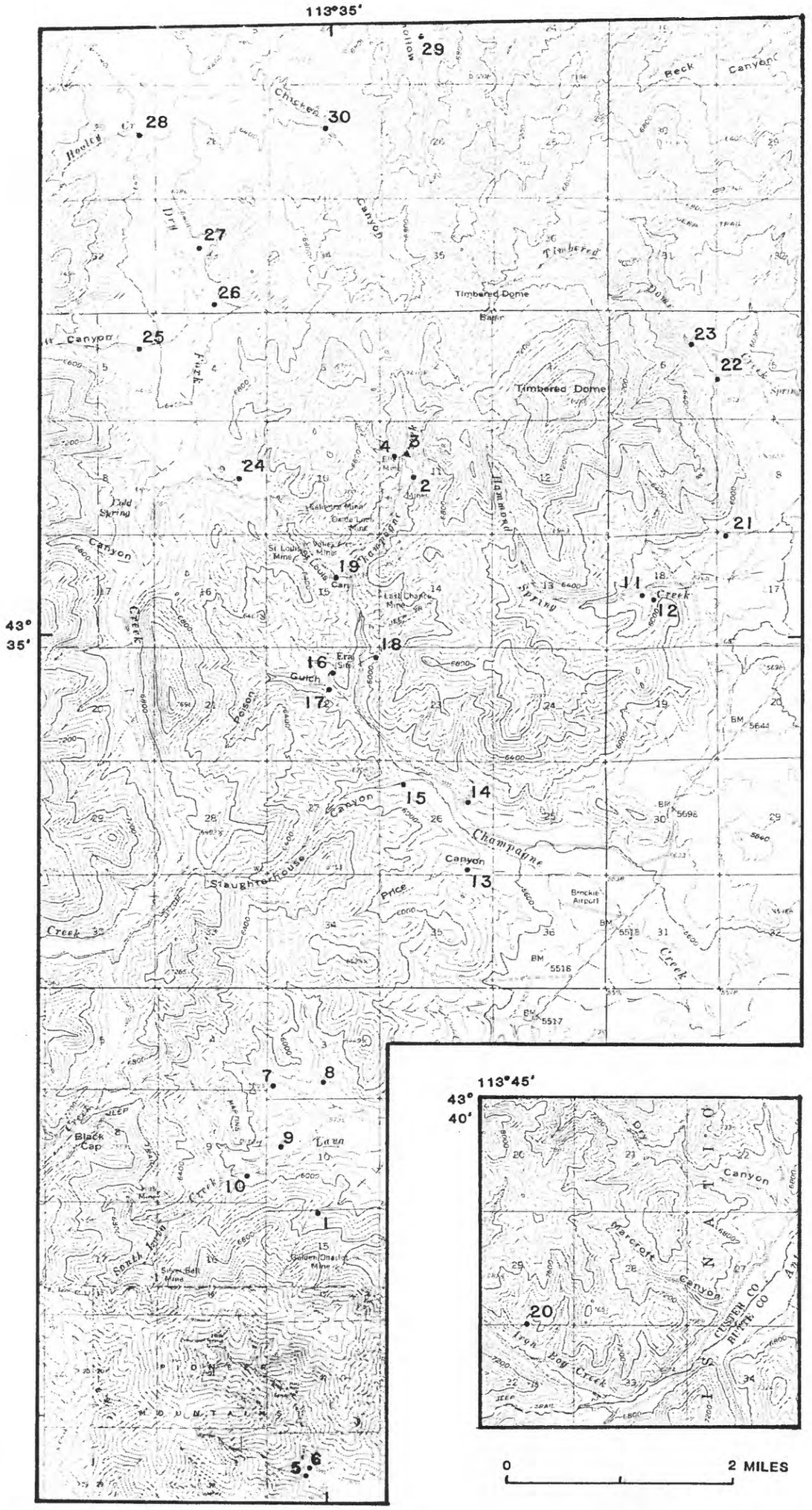

Figure 2. Localities of heavy-mineral-concentrate and big-sagebrush samples from the reconnaissance basin survey of the Lava Creek mining district, Butte County, Idaho.

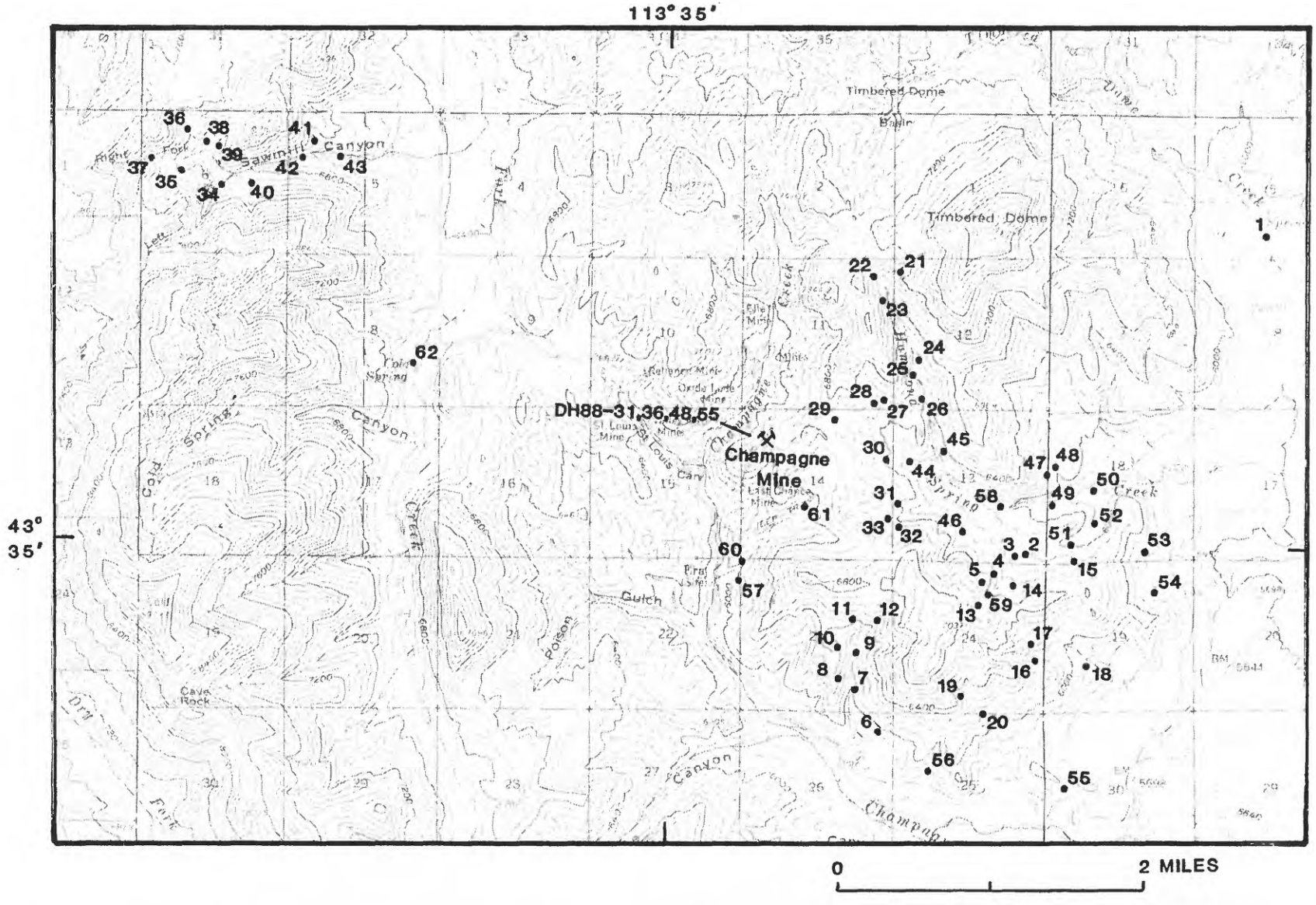

Figure 3. Localities of stream-sediment, soil and big-sagebrush samples from the follow-up survey of the Lava Creek mining district, Butte County, Idaho.

Sample Preparation

The stream-sediment samples were air dried, then sieved using 35-mesh (0.425-mm) stainless-steel sieves. The portion of the sediment passing through the sieve was pulverized and saved for analysis.

Samples that had been panned in the field were air dried and sieved to minus-35 mesh; bromoform (specific gravity 2.85) was used to remove the remaining quartz and feldspar. 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 (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 archival storage. The third fraction (the nonmagnetic 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.)

The big-sagebrush samples were sent to Minerals Exploration Geochemistry in Reno, Nevada, for preparation before analysis. After washing, they were air-dried for a day with a finish drying by microwave for 15 minutes. The dried samples were then ground and homogenized through a 2-mm sieve in a Wiley mill.

Splits of the 30 samples collected during the initial reconnaissance survey were further processed as follows. A 30-gm split of dry plant material was ashed at 480°C for 36 hours and the remaining ash was sent to Geochemical Services Inc. in Rocklin, California, for analysis. An 8-gm aliquot of the second split of unashed dry material was pelletized to a 40-mm-diameter wafer for analysis of at least 13 elements, including Hg, by instrumental neutron activation analysis (INAA) by Nuclear Activation Services (NAS), Ann Arbor, Michagan.

The 62 sagebrush samples from the follow-up survey were prepared by Minerals Exploration Geochemistry (MEG) and the pelletized wafers sent to NAS for analysis by INAA. Analytical splits of six of the samples were also submitted as a check on laboratory analytical precision, which was satisfactory except for Sb. The accuracy of the INAA method was checked by several internal plant standards that MEG included in the sample suite; agreement of the standards with established values was excellent.

Sample Analysis

Spectrographic method

The stream-sediment and soil samples were analyzed for 35 elements and the heavy-mineral-concentrate samples were analyzed for 37 elements using a semiquantitative, direct-current arc emission spectrographic method (modification of Grimes and Marranzino, 1968, and Myers and others, 1961). 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). Six-step emission spectrographic data for samples from the Lava Creek mining district are listed in tables 3 and 5.

Chemical methods

Samples from this study area were also analyzed by other analytical methods. Stream-sediment and soil samples were analyzed at the USGS/Branch of Geochemistry for antimony, arsenic, bismuth, cadmium and zinc using inductively coupled plasma-atomic emission spectroscopy; for mercury using cold vapor atomic absorption spectroscopy and for gold using graphite furnace atomic absorption spectroscopy. The big-sagebrush samples were analyzed by Geochemical Services Inc., Rocklin, for cadmium, copper, gallium, lead, molybdenum, and silver using inductively coupled plasma-atomic emission spectroscopy. The big-sagebrush samples were analyzed by Nuclear Activation Services Inc., Ann Arbor, Michigan, for antimony, arsenic, barium, bromine, chromium, cobalt, gold, iron, mercury, selenium, tungsten, uranium, and zinc using instrumental neutron activation analysis. See table 2 for a more detailed summary of these other chemical methods used.

Analytical results for heavy-mineral-concentrate and big-sagebrush samples from the initial survey are listed in tables 3 and 4, respectively, and stream-sediment, soil and big-sagebrush samples from the follow-up survey are listed in tables 5 and 6, respectively.

DATA STORAGE SYSTEM

Upon completion of all analytical work, the analytical results produced by the USGS/Branch of Geochemistry Laboratory were entered into the Branch of Geochemistry's 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

For the four 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 map (figs. 2 and 3). Columns in which the element headings show the letter "s" below the element symbol are six-step emission spectrographic analyses; "aa" indicates atomic absorption analyses; "faa" indicates graphite furnace atomic absorption analyses; "i" indicates inductively coupled plasma-atomic emission spectroscopic analyses; and "na" indicates instrumental neutron activation 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 six-step emission spectrographic analyses, a letter "L" entered in the tables after the lower limit of determination indicates that an element was observed but was below the lowest reporting value. For AA and ICP analyses, a letter "L" entered in the tables in after 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 letter "G" was entered in the tables after the upper limit of determination.

The six-step emission spectrographic determinations for arsenic, gold, bismuth, cadmium, antimony, and zinc in the stream-sediment samples showed that these elements were not detected at the lower limits of determination shown in table 2; consequently, the columns for these elements are omitted from table 5.

ACKNOWLEDGMENTS

A number of our colleagues also participated in the analyses of the heavy-mineral-concentrate, stream-sediment, and soil samples. They are Rich O'Leary, Tom Peacock, and Karen Slaughter.

REFERENCES CITED

Crock, J.G., Briggs, P.H., Jackson, L.L., and Lichte, F.E., 1987, Analytical methods for the analysis of stream sediments and from wilderness study areas: U.S. Geological Survey Open-File Report 87-84, 35 p.

Grimes, D.J., and Marranzino, A.P., 1968, Direct-current arc and alternating-current spark emission spectrographic field methods for the semiquantitative analysis of geologic materials: U.S. Geological Survey Circular 591, 6 p.

Koirtyohann, S.R., and Khalil, Moheb, 1976, Variables in the determination of mercury by cold vapor atomic absorption: Analytical Chemistry, 48, p. 136-139.

Meier, A.L., 1980, Flameless atomic absorption determination of gold in geological materials: Journal of Geochemical Exploration, v. 13, p. 77-85.

Motooka, J.M., and Grimes, D.J., 1976, Analytical precision of one-sixth order semiquantitative spectrographic analyses: U.S. Geological Survey Circular 738, 25 p.

Myers, A.T., Havens, R.G., and Dunton, P.J., 1961, A spectrochemical method for the semiquantitative analyses of rocks, minerals, and ores: U.S. Geological Survey Bulletin 1084-I, p. 1207-1229.

Skipp, Betty, Kuntz, M.A., and Morgan, L.A., 1990, Geologic map of Mackay 4 (Grouse) SE Quadrangle, Butte County, Idaho: U.S. Geological Open-File Report 89-431.

Sturges, D.L., 1977, Soil water withdrawal and rooting characteristics of individual big-sagebrush plants: American Midland Naturalist, V. 98, p. 257-274.

Weaver, J.E., and Clements, F.E., 1938, Plant Ecology: McGraw-Hill, New York, N.Y., 601 p.

VanTrump, George, Jr., and Miesch, A.T., 1977, The U.S. Geological Survey RASS-STATPAC system for management and statistical reduction of geochemical data: Computers and Geosciences, v. 3, p. 475-488.

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	
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 spectroscopy; I = inductively coupled plasma-atomic emission spectroscopy; and NA = instrumental neutron activation analysis]

Element or constituent determined	Sample type	Method	Determination limit (micrograms/gram or ppm)	Reference
Gold (Au)	sediment	FAA	0.002	Meier, 1980.
Mercury (Hg)	sediment	AA	0.02	Koirtyohann and Khalil, 1976.
Arsenic (As)	sediment	I	5	Crock and others, 1987.
Antimony (Sb)	"	I	2	
Bismuth (Bi)	"	I	2	
Cadmium (Cd)	"	I	0.1	
Zinc (Zn)	"	I	2	
Cadmium (Cd)	sagebrush	I	0.01*	Geochemical Services Inc. Rocklin, CA.
Copper (Cu)	"	I	0.005*	
Gallium (Ga)	"	I	0.025*	
Lead (Pb)	"	I	0.015*	
Molybdenum (Mo)	I	0.005*		
Silver (Ag)	"	I	0.001*	
Arsenic (As)	sagebrush	NA	0.01*	Nuclear Activation Services Inc. Ann Arbor, MI
Barium (Ba)	"	NA	20*	
Bromine (Br)	"	NA	0.01*	
Chromium (Cr)	"	NA	0.3*	
Cobalt (Co)	"	NA	0.3*	
Iron (Fe)	"	NA	0.005 %*	
Gold (Au)	"	NA	0.0001*	
Mercury (Hg)	"	NA	0.050*	
Antimony (Sb)	"	NA	0.01*	
Selenium (Se)	"	NA	0.5*	
Uranium (U)	"	NA	0.02*	
Tungsten (W)	"	NA	0.01*	
Zinc (Zn)	"	NA	2*	

* Data generated on dry-weight basis

Table 3. Results of analyses of heavy-mineral-concentrate samples collected during the initial reconnaissance geochemical survey of the Lava Creek district, Idaho.

["S" below column headings denote six-step semiquantitative, emission spectrographic method. N = not detected at the lower limit of determination (LLD), L = less than the LLD, G = greater than the upper limit of determination.]

	Sample	Latitude	Longitude	Ca-pct S	Fe-pct S	Mg-pct S	Na-pct S	P-pct S	Ti-pct S	Ag-ppm S	As-ppm S
1	LV01H	43 30 38	113 35 00	10.0	.5	.30	.5L	10.0	2.00	200	500N
2	LV02H	43 31 10	113 34 10	30.0	.3	.20	.7	15.0	.50	1N	500N
3	LV03H	43 31 20	113 34 10	30.0	.5	.30	2.0	15.0	.10	1N	500N
4	LV04H	43 31 15	113 34 15	3.0	.2	.10	.7	2.0	.15	1N	500N
5	LV05H	43 28 35	113 35 15	50.0	.5	.50	.5L	20.0G	.70	1N	500N
6	LV06H	43 28 42	113 35 15	10.0	7.0	.20	.5	10.0	1.50	500	20000G
7	LV07H	43 31 35	113 35 35	50.0	.5	.50	.5L	20.0	.50	1N	500N
8	LV08H	43 31 35	113 35 07	20.0	.5	.30	5.0	10.0	.15	1N	500N
9	LV09H	43 31 05	113 35 30	7.0	.3	.20	.5N	5.0	.70	1N	500N
10	LV10H	43 30 52	113 35 45	15.0	.5	.30	.5L	15.0	1.50	200	500N
11	LV11H	43 35 20	113 31 30	20.0	.3	.10	.5N	10.0	.15	1N	500N
12	LV12H	43 35 15	113 31 30	10.0	.3	.20	.5L	10.0	.50	1N	500N
13	LV13H	43 33 10	113 33 15	20.0	.5	.30	2.0	10.0	.30	1N	500N
14	LV14H	43 33 45	113 33 30	5.0	.5	.30	.5	7.0	.70	1N	500N
15	LV15H	43 33 50	113 34 10	30.0	.2	.20	.5L	20.0	.20	1N	500N
16	LV16H	43 34 35	113 35 00	1.5	.2	.05L	.5N	2.0	.20	1N	500N
17	LV17H	43 34 30	113 35 00	10.0	.3	.10	.5L	15.0	.15	300	500N
18	LV18H	43 34 50	113 34 30	.7	.1L	.05L	.5N	1.0	.10	150	500N
19	LV19H	43 35 25	113 35 00	5.0	1.5	.20	.5N	10.0	2.00	70	500N
20	LV20H	43 38 40	113 44 30	.5	.1	.05	.5N	.5	.15	1N	500N
21	LV21H	43 35 45	113 30 40	7.0	.3	.10	.5N	15.0	2.00	1N	500N
22	LV22H	43 36 50	113 31 00	30.0	.3	.20	.5L	20.0	.30	1N	500N
23	LV23H	43 37 15	113 31 10	10.0	.7	.50	1.5	10.0	.70	1N	500N
24	LV24H	43 36 15	113 36 00	2.0	.1	.05	.5N	5.0	.70	1N	500N
25	LV25H	43 37 10	113 37 00	20.0	.5	.70	.5N	20.0	1.50	1N	500N
26	LV26H	43 37 30	113 36 10	2.0	.2	.07	.5L	2.0	.20	1N	500N
27	LV27H	43 38 00	113 36 30	2.0	.5	.10	.5N	3.0	.15	1N	500N
28	LV28H	43 38 45	113 37 00	10.0	.5	.10	7.0	.5	.15	1N	500N
29	LV29H	43 39 35	113 34 05	7.0	.7	.50	7.0	1.5	.10	1N	500N
30	LV30H	43 38 55	113 35 00	7.0	.5	.20	1.0	7.0	.15	1N	500N

Table 3. Results of analyses of heavy-mineral-concentrate samples collected during the initial reconnaissance geochemical survey of the Lava Creek district, Idaho.--(continued)

	Sample	Au-ppm s	B-ppm s	Ba-ppm s	Be-ppm s	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	Ga-ppm s
1	LV01H	150	50	10000G	2L	20N	50N	20N	70	2000	20
2	LV02H	20N	20	10000G	2	20N	50N	20N	50	20	20
3	LV03H	20N	20L	10000G	2L	20N	50N	20N	20L	10	30
4	LV04H	20N	20	10000G	2L	20N	50N	20N	20L	10L	15
5	LV05H	20N	20	7000	2N	30	50N	20N	20L	10L	15
6	LV06H	20N	20	10000	2N	20N	50L	20	20L	30	20
7	LV07H	20N	20	10000G	2N	20N	50N	20N	20	10L	10N
8	LV08H	20N	20	3000	2L	20N	50N	20N	20L	10N	50
9	LV09H	20N	20	10000G	2N	20N	50N	20N	20L	10N	20
10	LV10H	70	20	10000G	2L	20N	50N	20N	30	20	30
11	LV11H	20N	20	10000G	2N	20N	50N	20N	20	10L	10L
12	LV12H	20N	30	10000G	5	20N	50L	20N	30	15	20
13	LV13H	20N	20	2000	2L	20N	50N	20N	20L	10N	50
14	LV14H	20N	70	10000G	2L	20N	50N	20N	70	20	20
15	LV15H	20N	20L	10000G	2L	20N	50N	20N	20L	10L	10N
16	LV16H	20N	20	10000G	2N	20N	50N	20N	20N	10L	10N
17	LV17H	20N	30	10000G	2N	20N	50N	20N	20N	20	10N
18	LV18H	20N	20	10000G	2N	20N	50N	20N	20N	10N	10N
19	LV19H	20N	30	10000G	2N	150	500	20L	100	300	50
20	LV20H	20N	20L	10000G	2N	20N	50N	20N	20N	10N	50
21	LV21H	20N	50	10000G	2	20N	50L	20N	150	10	50
22	LV22H	20N	100	2000	3	20N	50L	20N	100	10L	10
23	LV23H	20N	50	10000G	2L	20N	50N	20N	100	10L	20
24	LV24H	20N	20L	10000G	2N	20N	50N	20N	20L	10L	10N
25	LV25H	20N	200	7000	3	20N	50N	20N	150	10	10N
26	LV26H	20N	20L	10000G	2N	20N	50N	20N	20L	10L	10N
27	LV27H	20N	20L	10000G	2N	20N	50N	20N	30	10	10N
28	LV28H	20N	20	2000	2L	20N	50N	20N	20N	10L	30
29	LV29H	20N	20	1500	2	20N	50N	20N	20	10	30
30	LV30H	20N	30	10000G	2L	20N	50N	20N	20L	15	20

Table 3. Results of analyses of heavy-mineral concentrate samples collected during the initial reconnaissance geochemical survey of the Lava Creek district, Idaho.--(continued)

	Sample	Ge-ppm s	La-ppm s	Mn-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s
1	LV01H	20N	500	500	10N	70	20	100	200N	20	70
2	LV02H	20N	1000	700	10N	50N	10L	30	200N	20	20L
3	LV03H	20N	500	700	10N	50N	10L	20	200N	10L	20N
4	LV04H	20N	150	300	10N	50N	10	20	200N	20	700
5	LV05H	20N	1500	2000	10N	50N	10L	100	200N	20	20N
6	LV06H	20N	300	500	10N	50	10	3000	200L	15	30
7	LV07H	20N	1500	1000	10N	50N	10N	70	300	15	70
8	LV08H	20N	300	700	10N	50N	10N	20	200N	10N	20N
9	LV09H	20N	200	300	10N	50N	10	30	200N	10L	20N
10	LV10H	20N	500	500	10N	50L	10	700	200N	30	30
11	LV11H	20N	300	300	10N	50N	10	1500	200N	10L	20N
12	LV12H	20N	500	300	10N	50N	10N	70	200N	50	20L
13	LV13H	20N	500	500	10N	50N	10	30	200N	10L	20N
14	LV14H	20N	150	150	10N	50L	15	150	200N	10N	20N
15	LV15H	20N	1500	700	10N	50N	10N	20	200N	10N	20N
16	LV16H	20N	150	70	10N	50N	10L	100	200N	10N	20N
17	LV17H	20N	300	500	10N	50N	10L	10000	200	10N	1000G
18	LV18H	20N	100	30	10N	50N	10N	20L	200N	10N	20N
19	LV19H	30	300	700	10N	50	10	3000	200N	10L	100
20	LV20H	20N	100L	50	10N	50N	10N	20	200N	10N	20N
21	LV21H	20N	300	200	10N	50L	70	30	200N	10L	20N
22	LV22H	20N	500	200	10N	50N	10L	30	200N	10N	20N
23	LV23H	20N	200	300	10N	50N	10N	20	200N	10N	20
24	LV24H	20N	150	100	10N	50N	10L	30	200N	10N	20N
25	LV25H	20N	1000	700	10N	50N	10	200	200N	10L	100
26	LV26H	20N	100	300	10N	50N	10N	20L	200N	10N	20N
27	LV27H	20N	100	300	10N	50N	10L	20L	200N	10N	20N
28	LV28H	20N	100L	200	10N	50N	10N	50	200N	10N	30
29	LV29H	20N	150	200	10N	50N	10	30	200N	10N	20N
30	LV30H	20N	200	1000	10N	50N	10L	50	200N	10N	30

Table 3. Results of analyses of heavy-mineral-concentrate samples collected during the initial reconnaissance geochemical survey of the Lava Creek district, Idaho.--(continued)

	Sample	Sr-ppm s	Th-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s
1	LV01H	700	200N	100	50N	200	500N	2000G
2	LV02H	5000	200N	50	50N	700	500N	2000G
3	LV03H	5000	200N	50	50N	500	500N	2000G
4	LV04H	10000	200N	20	50N	300	500N	2000G
5	LV05H	700	200N	50	50N	1000	500N	2000G
6	LV06H	300	200N	50	50N	500	2000	2000G
7	LV07H	5000	200N	70	50N	700	500N	2000G
8	LV08H	7000	200N	20	50N	200	500N	2000G
9	LV09H	10000	200N	20	50N	70	500N	200
10	LV10H	7000	200L	70	50N	300	500N	2000G
11	LV11H	7000	200N	70	50N	300	500N	2000G
12	LV12H	7000	200N	50	50N	1000	500N	2000G
13	LV13H	2000	200N	30	50N	300	500N	2000G
14	LV14H	1000	200N	150	50N	150	500N	2000G
15	LV15H	10000	200N	30	50N	700	500N	2000G
16	LV16H	3000	200N	20	50N	70	500N	2000G
17	LV17H	2000	200N	30	50N	200	500N	2000G
18	LV18H	10000	200N	20L	50N	20	500N	2000G
19	LV19H	3000	200N	150	50N	150	20000G	2000G
20	LV20H	10000	200N	20N	50N	20	500N	2000G
21	LV21H	700	200N	150	100	300	500N	2000G
22	LV22H	2000	200N	100	50N	1000	500N	2000G
23	LV23H	2000	200N	30	50N	150	500N	2000G
24	LV24H	3000	200N	20	50N	50	500N	2000G
25	LV25H	1000	200L	70	50N	1000	500N	2000G
26	LV26H	10000	200N	30	50N	30	500N	2000G
27	LV27H	10000G	200N	30	50N	30	500N	2000G
28	LV28H	5000	200N	20	50N	70	500N	2000G
29	LV29H	5000	200N	20	50N	50	500N	2000G
30	LV30H	10000	200N	30	50N	150	500N	2000G

Table 4. Results of analyses of big-sagebrush samples (new growth) collected during the initial reconnaissance geochemical survey of the Lava Creek district, Idaho.

[Concentrations expressed on dry-weight basis. Letters below the column headings denote analytical methods as follows: i, inductively coupled plasma-atomic emission spectroscopy; na, instrumental neutron activation analysis. L = less than the lower limit of determination.]

	Sample	Latitude	Longitude	Ag-ppb i	As-ppm na	Au-ppb na	Ba-ppm na	Br-ppm na	Cd-ppb i	Co-ppm na	Cr-ppm na
1	LV01A	43 30 38	113 35 00	12.10	.13	.2L	20L	14.0	111.0	.6	.3
2	LV02A	43 31 10	113 34 10	7.12	.03	.2L	20L	2.6	52.5	.3L	.3L
3	LV03A	43 31 20	113 34 10	4.80	.01	.3	20L	3.9	30.9	.3L	.3L
4	LV04A	43 31 15	113 34 15	4.40	.01L	.4	20L	11.0	42.5	.4	.3L
5	LV05A	43 28 35	113 35 15	3.42	.03	.3	20	2.8	37.5	.3L	.3L
6	LV06A	43 28 42	113 35 15	7.90	.04	.2L	20	2.6	38.9	.3L	.3L
7	LV07A	43 31 35	113 35 35	4.36	.10	.2	20L	1.5	23.9	.3L	.3L
8	LV08A	43 31 35	113 35 07	3.44	.03	.2L	20	3.5	27.3	.3L	.3
9	LV09A	43 31 05	113 35 30	3.95	.09	.4	20	5.5	19.3	.3	.3
10	LV10A	43 30 52	113 35 45	5.60	.05	.8	20L	17.0	52.8	.5	.3L
11	LV11A	43 35 20	113 31 30	14.60	.10	.5	20	4.1	93.6	.3	.5
12	LV12A	43 35 15	113 31 30	31.30	.11	.4	20	4.6	114.0	.3L	1.0
13	LV13A	43 33 10	113 33 15	2.75	.02	.2L	20	7.4	71.1	.4	.3
14	LV14A	43 33 45	113 33 30	8.32	.03	1.0	50	2.4	94.3	.3L	.3L
15	LV15A	43 33 50	113 34 10	3.55	.05	.3	20	2.3	36.4	.3L	.4
16	LV16A	43 34 35	113 35 00	3.59	.02	.5	20L	3.7	55.1	.3L	.3L
17	LV17A	43 34 30	113 35 00	10.20	.04	.3	20	1.3	120.0	.3L	.3L
18	LV18A	43 34 50	113 34 30	7.19	.03	.2L	30	11.0	70.2	.5	.3
19	LV19A	43 35 25	113 35 00	18.60	.09	.2L	20L	3.6	298.0	.3	.4
20	LV20A	43 38 40	113 44 30	2.48	.03	.2L	20	13.0	31.8	.4	.3L
21	LV21A	43 35 45	113 30 40	4.84	.04	.3	20	1.5	37.3	.3L	.3L
22	LV22A	43 36 50	113 31 00	1.76	.04	.2	20L	1.2	49.8	.3L	.3L
23	LV23A	43 37 15	113 31 10	3.33	.05	.6	20	3.4	48.0	.3L	.4
24	LV24A	43 36 15	113 36 00	3.23	.05	.3	20L	2.1	40.7	.3L	.4
25	LV25A	43 37 10	113 37 00	2.84	.07	.9	20	9.4	54.9	.4	.7
26	LV26A	43 37 30	113 36 10	2.38	.05	.5	20L	5.3	43.4	.3	.4
27	LV27A	43 38 00	113 36 30	5.65	.07	.2L	20L	8.2	57.4	.3	.5
28	LV28A	43 38 45	113 37 00	1.14	.04	.2L	20	2.1	24.5	.3L	.3L
29	LV29A	43 39 35	113 34 05	2.45	.02	.3	20L	4.0	34.2	.3L	.3L
30	LV30A	43 38 55	113 35 00	3.92	.07	.3	20L	3.3	31.2	.3L	.4

Table 4. Results of analyses of big-sagebrush samples (new growth) collected during the initial reconnaissance geochemical survey of the Lava Creek district, Idaho.--(continued)

	Sample	Cu-ppb i	Fe-pct na	Ga-ppb i	Hg-ppb na	Mo-ppb i	Pb-ppb i	Sb-ppm na	Se-ppm na	U-ppm na	W-ppm na	Zn-ppm na
1	LV01A	13000	.020	28.3	50L	436.0	261	.05	.5L	.03	.07L	35
2	LV02A	15000	.009	27.7L	50L	661.0	622	.06	.5L	.02L	.05L	42
3	LV03A	11000	.006	27.7L	50L	178.0	212	.08	.5L	.02L	.05L	27
4	LV04A	13000	.006	27.7L	50L	65.0	226	.06	.5L	.02L	.06L	29
5	LV05A	5385	.010	27.7L	50L	266.0	186	.05	.5L	.02L	.04L	45
6	LV06A	10000	.009	27.7L	50L	397.0	189	.04	.5L	.02L	.04L	39
7	LV07A	8265	.011	27.7L	50L	157.0	168	.05	.5L	.02L	.04L	27
8	LV08A	8486	.009	27.9L	50L	443.0	172	.05	.5L	.02L	.04L	26
9	LV09A	6376	.023	28.8	50L	63.9	194	.06	.5L	.02L	.05L	32
10	LV10A	5029	.011	27.7L	50L	187.0	294	.06	.5L	.05	.07L	31
11	LV11A	14000	.017	29.7	60	368.0	287	.07	1.8	.03	.05L	38
12	LV12A	11000	.023	48.0	50L	384.0	2399	.07	.9	.02	.06	23
13	LV13A	9141	.017	27.7L	50L	200.0	233	.05	.5L	.03	.08	42
14	LV14A	13000	.010	27.7L	50L	514.0	138	.05	.5L	.02L	.04L	41
15	LV15A	9323	.011	27.7L	50L	495.0	236	.06	.5L	.02L	.04L	28
16	LV16A	14000	.008	27.7L	50L	241.0	193	.17	.5L	.02L	.05L	35
17	LV17A	17000	.009	27.7L	50L	145.0	183	.06	.5L	.02L	.04L	42
18	LV18A	15000	.011	27.7L	50L	365.0	162	.05	.5L	.02L	.06L	43
19	LV19A	21000	.017	29.8	50L	146.0	375	.06	.5L	.02L	.05L	65
20	LV20A	6850	.008	27.7L	50L	138.0	195	.05	.5L	.02L	.06L	25
21	LV21A	14000	.008	27.7L	50L	354.0	214	.05	.5L	.02L	.04L	36
22	LV22A	3271	.008	27.7L	50L	459.0	204	.06	.5L	.02L	.04	41
23	LV23A	13000	.016	27.7L	50L	261.0	172	.06	.5L	.02	.05	30
24	LV24A	8974	.013	27.7L	50L	114.0	217	.05	.5L	.02L	.04L	27
25	LV25A	4375	.016	27.7L	60	253.0	182	.36	.9	.02L	.06L	31
26	LV26A	8840	.014	27.7L	50L	115.0	233	.05	.5L	.02	.05L	25
27	LV27A	16000	.014	27.7L	50L	147.0	279	.05	.5L	.02	.06L	26
28	LV28A	5011	.012	27.7L	50L	230.0	140	.04	.5L	.02	.10	23
29	LV29A	9162	.012	27.7L	50L	145.0	167	.06	.5L	.02	.05L	26
30	LV30A	15000	.015	27.7L	50L	541.0	209	.07	.5L	.02L	.07	26

Table 5. Results of analyses of stream-sediment and soil samples collected during the follow-up geochemical survey of the Lava Creek district, Idaho.

[N = not detected at the given lower limit of determination, L = less than the LLD. Letters below the column headings denote analytical methods as follows: s, 6-step semi-quantitative emission spectrography; i, inductively coupled plasma-atomic emission spectrometry; faa, graphite furnace atomic absorption spectroscopy; aa, atomic absorption spectroscopy.]

	Sample	Latitude	Longitude	Ag-ppm s	As-ppm i	Au-ppm faa	B-ppm s	Ba-ppm s	Be-ppm s	Bi-ppm i	Ca-pct s
1	88LC02S	43 34 57	113 32 13	1.0	19	.002	200	1500	1.5	2L	.15
2	88LC03S	43 34 55	113 32 20	.5	22	.002N	150	1500	1.5	2L	.50
3	88LC04S	43 34 50	113 32 28	.5	27	.002N	150	1000	2.0	2L	.30
4	88LC05S	43 34 46	113 32 35	3.0	40	.002N	300	1500	1.0	2L	.15
5	88LC06S	43 33 55	113 33 22	.5N	34	.002	50	2000	1.5	2L	.50
6	88LC07S	43 34 11	113 33 29	.5N	33	.002N	30	1000	1.5	2L	.50
7	88LC08S	43 34 14	113 33 38	.5N	22	.002N	70	1000	2.0	2L	.50
8	88LC09S	43 34 24	113 33 26	.5L	45	.002	100	1000	1.5	2L	.30
9	88LC10S	43 34 27	113 33 40	.5	32	.002N	70	1000	1.5	2L	.20
10	88LC11S	43 34 34	113 33 33	.5	30	.002N	100	1000	2.0	2L	.30
11	88LC12S	43 34 34	113 33 20	.5N	14	.002N	15	1000	1.5	2L	.30
12	88LC13S	43 34 39	113 32 42	1.0	32	.002N	100	1500	1.0	2L	.20
13	88LC14S	43 34 46	113 32 18	1.5	39	.002N	100	1000	1.5	2L	.20
14	88LC15S	43 34 54	113 31 51	.5L	17	.002N	20	1000	1.5	2L	.50
15	88LC16S	43 34 22	113 32 04	.5N	32	.002N	150	700	1.0	2L	.15
16	88LC17S	43 34 27	113 32 06	1.0	32	.002N	150	1500	2.0	2L	.20
17	88LC18S	43 34 19	113 31 45	.5L	20	.002	100	1000	1.5	2L	.30
18	88LC19S	43 34 06	113 32 41	.5N	38	.002N	70	500	1.0	2L	.15
19	88LC20S	43 34 01	113 32 33	.5N	32	.002N	50	1000	2.0	2L	.50
20	88LC21S	43 36 34	113 44 30	.5N	16	.002N	10	1500	1.0	2L	2.00
21	88LC23S	43 36 23	113 33 20	.5N	7	.002N	10L	1000	1.0	2L	1.00
22	88LC24S	43 36 05	113 33 04	.7	32	.002	200	1500	1.0	2L	.30
23	88LC25S	43 35 59	113 33 06	.5N	22	.002N	70	2000	1.5	2L	1.00
24	88LC26S	43 35 50	113 33 03	.5	21	.002N	50	1500	1.0	2L	.70
25	88LC28S	43 35 50	113 33 25	1.0	38	.002N	200	2000	1.5	2L	.70
26	88LC29S	43 35 44	113 33 40	.5N	25	.002N	50	1500	1.5	2L	.70
27	88LC30S	43 35 30	113 33 17	.5N	12	.002N	10	1500	1.0	2L	2.00
28	88LC31S	43 35 14	113 33 11	.5N	12	.002N	30	2000	1.0	2L	1.00
29	88LC32S	43 35 06	113 33 13	.5N	14	.002N	20	1000	1.0	2L	.50
30	88LC33S	43 35 11	113 33 17	.5N	8	.002N	15	1500	1.0	2L	.70
31	88LC34S	43 37 02	113 38 35	.5L	29	.002N	30	700	1.0L	2L	.50
32	88LC35S	43 37 06	113 38 54	.5N	17	.002N	15	2000	1.0	2L	2.00
33	88LC36S	43 37 19	113 38 51	.5N	5L	.002N	15	1500	1.5	2L	2.00
34	88LC37S	43 37 11	113 39 08	.5N	5L	.002N	15	2000	2.0	2L	3.00
35	88LC38S	43 37 17	113 38 42	.5N	5L	.002N	15	1500	1.0	2L	2.00
36	88LC39S	43 37 16	113 38 34	.5N	14	.002N	20	1500	1.0	2L	2.00
37	88LC40S	43 37 03	113 38 22	.5N	16	.002N	150	700	1.0	2L	1.50
38	88LC41S	43 37 16	113 37 50	.5L	20	.002N	150	1000	1.0	2L	.50
39	88LC42S	43 37 12	113 37 56	.5N	15	.002N	30	2000	1.5	2L	3.00
40	88LC43S	43 37 12	113 37 40	.5N	9	.002N	20	1500	1.0L	2L	2.00

Table 5. Results of analyses of stream-sediment and soil samples collected during the follow-up geochemical survey of the Lava Creek district, Idaho.--(continued)

	Sample	Cd-ppm i	Co-ppm s	Cr-ppm s	Cu-ppm s	Fe-pct s	Ga-ppm s	Ge-ppm s	Hg-ppm aa	La-ppm s	Mg-pct s
1	88LC02S	1.1	10N	100	50	2.0	20	10N	.08	50	.7
2	88LC03S	1.0	10	150	30	3.0	30	10N	.08	50	1.0
3	88LC04S	.4	10L	70	30	2.0	50	10N	.08	50	1.0
4	88LC05S	.1	10N	200	30	5.0	30	10N	.46	70	1.0
5	88LC06S	.5	10	20	30	2.0	30	10N	.44	50L	1.0
6	88LC07S	.5	15	30	30	3.0	20	10N	.14	50L	.7
7	88LC08S	.7	15	30	30	5.0	20	10N	.06	50	.7
8	88LC09S	.5	10	70	50	5.0	30	10N	.30	70	.7
9	88LC10S	.8	15	100	30	3.0	30	10N	.08	70	1.0
10	88LC11S	.8	15	100	50	5.0	50	10N	.12	70	.7
11	88LC12S	.7	30	70	30	5.0	20	10N	.04	50L	.7
12	88LC13S	3.1	15	200	100	5.0	30	10N	.24	50L	.7
13	88LC14S	2.1	10	300	50	5.0	30	10N	.06	50	.7
14	88LC15S	.6	15	70	30	5.0	70	10N	.02	50	1.0
15	88LC16S	.6	10L	100	50	3.0	15	10N	.08	50L	.5
16	88LC17S	2.4	10L	300	50	5.0	20	10N	.14	100	.7
17	88LC18S	.7	10L	70	50	3.0	20	10N	.08	50	.7
18	88LC19S	.2	10N	30	50	2.0	10	10N	.10	50N	.7
19	88LC20S	.5	10	30	50	3.0	20	10N	.06	50L	.7
20	88LC21S	.4	20	50	20	3.0	50	10N	.02	100	1.0
21	88LC23S	.4	20	700	20	3.0	30	10N	.02	50L	1.0
22	88LC24S	1.5	10L	200	70	3.0	30	10N	.08	70	.7
23	88LC25S	.9	20	700	30	5.0	30	10N	.04	50	1.0
24	88LC26S	.9	20	500	30	3.0	30	10N	.06	50L	1.0
25	88LC28S	1.8	10	200	50	3.0	20	10N	.14	50	.7
26	88LC29S	1.1	20	70	30	5.0	30	10N	.04	100	.7
27	88LC30S	.6	30	200	30	5.0	50	10N	.02N	70	1.0
28	88LC31S	.5	20	100	30	5.0	30	10N	.04	100	1.0
29	88LC32S	.8	10	50	20	3.0	20	10N	.02	50	.5
30	88LC33S	.6	10	30	20	3.0	30	10N	.02	70	.7
31	88LC34S	1.3	10L	50	10	3.0	20	10N	.04	50L	.5
32	88LC35S	.3	10L	30	7	3.0	50	10N	.02	70	.5
33	88LC36S	.3	20	50	15	5.0	50	10N	.04	70	2.0
34	88LC37S	.2	10	30	7	3.0	50	10N	.02N	70	1.5
35	88LC38S	.3	10	20	10	3.0	30	10N	.02N	50	1.0
36	88LC39S	1.3	15	100	30	5.0	30	10N	.10	50L	1.5
37	88LC40S	1.8	10L	20	20	2.0	10	10N	.06	50N	.7
38	88LC41S	1.4	10L	20	30	1.5	10	10N	.06	50N	.5
39	88LC42S	.4	10	50	7	2.0	50	10N	.04	70	1.5
40	88LC43S	.4	15	100	7	3.0	50	10N	.02	50L	2.0

Table 5. Results of analyses of stream-sediment and soil samples collected during the follow-up geochemical survey of the Lava Creek district, Idaho.--(continued)

	Sample	Mn-ppm s	Mo-ppm s	Na-pct s	Nb-ppm s	Ni-ppm s	P-pct s	Pb-ppm s	Sb-ppm i	Sc-ppm s	Sn-ppm s
1	88LC02S	100	5L	.5	20N	30	.2L	10	3	5L	10N
2	88LC03S	300	5L	.7	20L	70	.2N	10L	2L	7	10N
3	88LC04S	500	5N	.5	20L	30	.2N	20	3	5	10N
4	88LC05S	70	7	.3	20L	30	.2L	10	2L	10	10N
5	88LC06S	700	5N	.7	20N	15	.2N	15	4	5L	10N
6	88LC07S	500	5N	1.0	20L	20	.2N	10	4	7	10N
7	88LC08S	300	5N	.7	20	30	.2N	10	3	7	10N
8	88LC09S	300	5N	1.0	20L	30	.2N	10	7	5	10N
9	88LC10S	500	5L	1.0	20L	50	.2N	15	3	5	10N
10	88LC11S	300	5N	1.0	20L	70	.2N	20	2	5	10N
11	88LC12S	500	5L	1.5	20L	30	.2N	10	2L	5	10N
12	88LC13S	300	5	.3	20N	200	.2N	15	3	5	10N
13	88LC14S	300	10	.7	20L	100	.2N	10L	3	5	10N
14	88LC15S	500	5L	2.0	20	30	.2N	20	2L	5	10N
15	88LC16S	150	5L	.2	20L	50	.2N	10L	3	5	10N
16	88LC17S	100	10	.3	20N	100	.2N	10L	5	5	10N
17	88LC18S	500	5N	.7	20N	30	.2N	10	2	5L	10N
18	88LC19S	150	5L	.3	20N	15	.2N	10L	4	5L	10N
19	88LC20S	500	5L	.5	20L	20	.2N	10L	3	5	10N
20	88LC21S	1000	5N	2.0	20N	20	.2N	20	2L	7	10N
21	88LC23S	700	5N	2.0	20N	30	.2N	10	2L	7	10N
22	88LC24S	200	5	.2	20L	100	.2N	10	3	7	10N
23	88LC25S	700	5L	1.5	20L	100	.2N	10	2L	7	10N
24	88LC26S	500	5L	1.5	20N	70	.2N	15	2L	5	10N
25	88LC28S	300	5	.2	20N	200	.2N	10L	6	5	10N
26	88LC29S	1000	5L	1.0	20L	30	.2N	10	2L	7	10N
27	88LC30S	700	5N	2.0	20L	30	.2N	15	2L	7	10N
28	88LC31S	700	5L	1.5	20L	30	.2N	15	2L	7	10N
29	88LC32S	500	5N	1.5	20N	20	.2N	10	2L	5	10N
30	88LC33S	700	5N	1.5	20L	15	.2N	20	2L	5	10N
31	88LC34S	700	5N	1.5	20N	30	.2N	15	3	5L	10N
32	88LC35S	200	5L	3.0	20L	20	.2N	15	2L	5L	10N
33	88LC36S	500	5N	3.0	20N	15	.2N	20	2L	5	10N
34	88LC37S	500	5N	3.0	20L	7	.2N	15	2L	7	10N
35	88LC38S	500	5N	2.0	20L	7	.2N	10L	2L	5	10N
36	88LC39S	700	5N	1.5	20L	30	.2N	15	2L	7	10N
37	88LC40S	700	5N	1.0	20N	30	.2N	10	2L	5L	10N
38	88LC41S	300	5N	.7	20N	30	.2N	10L	2L	5L	10N
39	88LC42S	500	5N	3.0	20L	20	.2N	20	2L	5	10N
40	88LC43S	300	5N	3.0	20N	20	.2N	15	2L	7	10N

Table 5. Results of analyses of stream-sediment and soil samples collected during the follow-up geochemical survey of the Lava Creek district, Idaho.--(continued)

	Sample	Sr-ppm s	Ti-pct s	Th-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm i	Zr-ppm s
1	88LC02S	100L	.2	100N	150	20N	15	100	70
2	88LC03S	100N	.5	100N	200	20N	15	220	150
3	88LC04S	100N	.3	100N	200	20N	10	100	100
4	88LC05S	100L	.5	100N	500	20N	10L	21	150
5	88LC06S	100N	.5	100N	150	20N	10	67	150
6	88LC07S	100N	.7	100N	100	20N	15	90	300
7	88LC08S	100L	.7	100N	150	20N	15	93	200
8	88LC09S	100L	.5	100N	150	20N	15	59	200
9	88LC10S	100N	.5	100N	200	20N	15	140	200
10	88LC11S	100L	.5	100N	200	20N	15	100	200
11	88LC12S	100N	.5	100N	70	20N	10	94	150
12	88LC13S	100N	.3	100N	300	20N	15	460	50
13	88LC14S	100N	.5	100N	500	20N	20	270	150
14	88LC15S	100N	.5	100N	70	20N	20	110	300
15	88LC16S	100L	.5	100N	500	20N	15	91	150
16	88LC17S	100N	.5	100N	500	20N	15	190	70
17	88LC18S	100N	.5	100N	150	20N	10	95	150
18	88LC19S	100N	.5	100N	200	20N	10L	32	150
19	88LC20S	100L	.5	100N	150	20N	15	65	200
20	88LC21S	300	.7	100N	100	20N	10	55	100
21	88LC23S	200	.5	100N	100	20N	15	62	100
22	88LC24S	100L	.5	100N	500	20N	30	240	150
23	88LC25S	300	.7	100N	200	20N	20	150	150
24	88LC26S	100	.5	100N	150	20N	15	150	100
25	88LC28S	100L	.5	100N	500	20N	30	490	100
26	88LC29S	150	.7	100N	150	20N	20	120	200
27	88LC30S	300	1.0	100N	100	20N	15	74	150
28	88LC31S	200	1.0	100N	150	20N	15	67	200
29	88LC32S	100L	.5	100N	100	20N	10	95	150
30	88LC33S	150	.7	100N	70	20N	15	84	200
31	88LC34S	100N	.5	100N	100	20N	15	160	70
32	88LC35S	300	.5	100N	100	20N	10	55	150
33	88LC36S	300	.5	100N	70	20N	30	48	70
34	88LC37S	500	.7	100N	70	20N	15	37	100
35	88LC38S	300	.7	100N	70	20N	10	57	100
36	88LC39S	100	.7	100N	100	20N	15	130	150
37	88LC40S	100L	.3	100N	70	20N	20	170	150
38	88LC41S	100N	.2	100N	100	20N	15	170	70
39	88LC42S	500	.5	100N	100	20N	15	66	150
40	88LC43S	200	.5	100N	70	20N	10	65	100

Table 5. Results of analyses of stream-sediment and soil samples collected during the follow-up geochemical survey of the Lava Creek district, Idaho.--(continued)

	Sample	Latitude	Longitude	Ag-ppm s	As-ppm i	Au-ppm faa	B-ppm s	Ba-ppm s	Be-ppm s	Bi-ppm i	Ca-pct s
41	88LC44S	43 35 29	113 33 06	.5L	17	.002N	70	5000	1.5	2L	1.50
42	88LC45S	43 35 30	113 32 51	.5N	14	.002N	50	1000	1.0L	2L	.50
43	88LC46S	43 35 05	113 32 41	.7	34	.002N	200	1500	1.0	2L	.30
44	88LC47S	43 35 25	113 32 02	.7	11	.002N	100	700	1.0L	2L	.30
45	88LC48S	43 35 25	113 31 56	.5	12	.002N	100	500	1.0L	2L	.20
46	88LC49S	43 35 14	113 31 59	.7	23	.002N	100	1500	1.0	2L	.70
47	88LC50S	43 35 20	113 31 42	.5	21	.002N	150	2000	1.0	2L	.70
48	88LC51S	43 35 00	113 31 49	.7	15	.002N	150	1500	1.0L	2L	.30
49	88LC52S	43 35 08	113 31 38	.7	21	.002N	150	1000	1.0	2L	.20
50	88LC53S	43 34 58	113 31 15	.5N	19	.002N	30	1000	1.5	2L	.50
51	88LC54S	43 34 45	113 31 11	.5N	10	.002N	20	1000	1.5	2L	.70
52	88LC55S	43 33 26	113 31 54	.5N	9	.002N	30	1000	1.0	2L	.70
53	88LC56S	43 33 40	113 32 56	.5N	6	.002N	10	1000	1.5	2L	.50
54	88LC57S	43 34 48	113 34 30	.5N	13	.002N	20	1500	1.5	2L	1.00
55	88LC59S	43 34 42	113 32 35	.5	22	.002N	150	1500	1.0L	2L	.20
56	88LC60S	43 34 56	113 34 23	.5N	6	.002N	20	3000	1.5	2L	1.00

	Sample	Cd-ppm i	Co-ppm s	Cr-ppm s	Cu-ppm s	Fe-pct s	Ga-ppm s	Ge-ppm s	Hg-ppm aa	La-ppm s	Mg-pct s
41	88LC44S	.5	20	200	30	5	30	10N	.08	100	1.5
42	88LC45S	.8	15	50	30	3	30	10N	.04	50L	1.0
43	88LC46S	.4	10L	150	70	3	70	10N	.12	150	1.0
44	88LC47S	.8	10	100	30	5	30	10N	.02N	50L	1.0
45	88LC48S	.7	10L	50	20	2	10	10N	.04	50N	.5
46	88LC49S	.6	10	150	50	5	30	10N	.10	50	.7
47	88LC50S	.6	15	300	30	5	30	10N	.06	100	.7
48	88LC51S	.8	10L	300	50	5	30	10N	.10	70	.7
49	88LC52S	1.3	10L	200	50	5	50	10N	.08	100	.7
50	88LC53S	.9	10	30	20	5	15	10N	.08	50	.7
51	88LC54S	.8	20	50	30	7	20	10N	1.20	50	1.0
52	88LC55S	.8	15	50	30	5	30	10N	.04	50N	1.0
53	88LC56S	.5	10	20	20	3	50	10N	.08	50N	.7
54	88LC57S	.6	20	100	30	5	50	10N	.10	100	1.0
55	88LC59S	1.2	10L	200	50	5	30	10N	.12	50	.7
56	88LC60S	.4	30	30	50	10	70	10N	.08	150	1.0

Table 5. Results of analyses of stream-sediment and soil samples collected during the follow-up geochemical survey of the Lava Creek district, Idaho.--(continued)

	Sample	Mn-ppm s	Mo-ppm s	Na-pct s	Nb-ppm s	Ni-ppm s	P-pct s	Pb-ppm s	Sb-ppm i	Sc-ppm s	Sn-ppm s
41	88LC44S	1000	5L	1.5	20	70	.2N	10	3	10	10N
42	88LC45S	500	5N	1.5	20L	30	.2N	10	2	5	10N
43	88LC46S	200	5	.5	20L	50	.2N	20	6	5	10N
44	88LC47S	500	5L	1.0	20L	30	.2N	10	2	5	10N
45	88LC48S	300	5N	.7	20N	20	.2N	10	2L	5L	10N
46	88LC49S	700	5L	1.0	20L	70	.2N	15	4	5	10N
47	88LC50S	700	5L	1.0	20L	100	.2N	10	4	7	10N
48	88LC51S	200	7	.7	20L	70	.2N	15	2	7	10N
49	88LC52S	300	5	.5	20N	70	.2N	20	2	5	10N
50	88LC53S	700	5N	.7	20L	30	.2N	10	3	7	10N
51	88LC54S	1000	5N	1.0	20	30	.2N	15	2L	7	10N
52	88LC55S	700	5L	1.0	20L	20	.2N	10	2L	7	10N
53	88LC56S	500	5N	2.0	20L	10	.2N	30	2L	5L	10N
54	88LC57S	1000	5N	.7	20L	50	.2N	20	3	10	10N
55	88LC59S	150	5	.3	20L	70	.2N	15	3	10	10N
56	88LC60S	700	5N	2.0	20	30	.2N	30	2L	7	10N

	Sample	Sr-ppm s	Ti-pct s	Th-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm i	Zr-ppm s
41	88LC44S	200	1.0	100N	200	20N	20	160	200
42	88LC45S	100L	.5	100N	100	20N	15	120	200
43	88LC46S	100L	.5	100N	500	20N	15	71	300
44	88LC47S	100L	.7	100N	150	20N	15	83	150
45	88LC48S	100N	.5	100N	100	20N	10L	75	150
46	88LC49S	100	.5	100N	300	20N	10	160	100
47	88LC50S	100	.7	100N	500	20N	15	160	150
48	88LC51S	100N	.7	100N	700	20N	15	120	200
49	88LC52S	100N	.5	100N	500	20N	15	160	100
50	88LC53S	100L	.5	100N	150	20N	20	89	200
51	88LC54S	100L	.7	100N	100	20N	20	94	500
52	88LC55S	100L	.7	100N	100	20N	15	96	300
53	88LC56S	100N	.5	100N	70	20N	10	69	150
54	88LC57S	100L	.5	100N	150	20N	15	75	200
55	88LC59S	100L	.5	100N	700	20N	15	140	150
56	88LC60S	200	.7	100N	150	20N	20	50	300

Table 5. Results of analyses of stream-sediment and soil samples collected during the follow-up geochemical survey of the Lava Creek district, Idaho.--(continued)

	Sample	Latitude	Longitude	Ag-ppm s	As-ppm i	Au-ppm faa	B-ppm s	Ba-ppm s	Be-ppm s	Bi-ppm i	Ca-pct s
Champagne Mine drill-hole localities											
57	DH88-31S	~43 35 30	~113 34 20	.5	48	.040	20	1500	2.0	4	.30
58	DH88-36S	~43 35 30	~113 34 20	5.0	40	.070	20	1000	1.0	6	.50
59	DH88-48S	~43 35 30	~113 34 20	.5L	25	.002N	20	2000	1.5	2L	.50
60	DH88-55S	~43 35 30	~113 34 20	2.0	21	.010	10	1000	1.0	2L	.50

	Sample	Cd-ppm i	Co-ppm s	Cr-ppm s	Cu-ppm s	Fe-pct s	Ga-ppm s	Ge-ppm s	Hg-ppm aa	La-ppm s	Mg-pct s
Champagne Mine drill-hole localities											
57	DH88-31S	.5	10L	20	30	5	30	10N	.30	100	.5
58	DH88-36S	.7	10	15	30	3	50	10N	.52	50N	1.0
59	DH88-48S	.7	30	200	70	10	100	10N	.04	70	1.5
60	DH88-55S	.7	30	150	50	10	70	10N	.34	50	1.5

	Sample	Mn-ppm s	Mo-ppm s	Na-pct s	Nb-ppm s	Ni-ppm s	P-pct s	Pb-ppm s	Sb-ppm i	Sc-ppm s	Sn-ppm s
Champagne Mine drill-hole localities											
57	DH88-31S	300	5N	1.5	20L	5	.2N	70	3	5	10N
58	DH88-36S	700	5N	1.0	20N	7	.2N	100	9	5L	10N
59	DH88-48S	700	5N	2.0	20L	50	.2N	30	2L	15	10N
60	DH88-55S	1500	5N	1.5	20N	50	.2N	150	3	10	10N

	Sample	Sr-ppm s	Ti-pct s	Th-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm i	Zr-ppm s
Champagne Mine drill-hole localities									
57	DH88-31S	200	.7	100N	150	20N	10	34	150
58	DH88-36S	100	.5	100N	100	20N	10	84	200
59	DH88-48S	100	1.0	100N	200	20N	15	81	300
60	DH88-55S	100L	.7	100N	150	20N	15	92	100

Table 6. Results of analyses of big-sagebrush samples (leaves only) collected during the follow-up geochemical survey of the Lava Creek district, Idaho.

[Concentrations expressed on dry-weight basis; L = less than the lower limit of determination. Letters below the column headings denote analytical methods as follows: na, instrumental neutron activation analysis.]

	Sample	Latitude	Longtitude	As-ppm na	Au-ppb na	Ba-ppm na	Br-ppm na	Co-ppm na	Cr-ppm na	Fe-pct na	Hg-ppb na
1	88LC01	43 36 47	113 30 15	.02	.2L	20	3.10	.3L	.3L	.008	50L
2	88LC02	43 34 57	113 32 13	.03	.1L	40	.87	.3L	.3L	.005	50
3	88LC03	43 34 55	113 32 20	.02	.2L	50	.94	.3L	.3	.005	50
4	88LC04	43 34 50	113 32 28	.05	.3	40	1.00	.3L	.3	.005	50L
5	88LC05	43 34 46	113 32 35	.04	.2	20L	2.80	.3L	.3L	.006	50L
6	88LC06	43 33 55	113 33 22	.03	.1L	100	.80	.3L	.3	.007	50L
7	88LC07	43 34 11	113 33 29	.03	.2L	40	1.10	.3L	.3L	.008	50L
8	88LC08	43 34 14	113 33 38	.01	.2L	30	.84	.3	.7	.005	50L
9	88LC09	43 34 24	113 33 26	.12	.5	30	2.40	.3	.5	.011	50L
10	88LC10	43 34 27	113 33 40	.06	.3	40	2.30	.4	.7	.012	50L
11	88LC11	43 34 34	113 33 33	.05	.2	40	2.50	.3L	.5	.007	50L
12	88LC12	43 34 34	113 33 20	.05	.2L	90	1.80	.3L	.6	.009	50L
13	88LC13	43 34 39	113 32 42	.05	.3	40	2.50	.3	.6	.010	50L
14	88LC14	43 34 46	113 32 18	.02	.2L	30	3.20	.3L	.4	.009	50L
15	88LC15	43 34 54	113 31 51	.04	.2	50	1.00	.3L	.6	.007	50L
16	88LC16	43 34 22	113 32 04	.05	.2	30	2.90	.3L	.6	.007	50L
17	88LC17	43 34 27	113 32 06	.02	.1L	30	1.00	.3L	.3	.009	50L
18	88LC18	43 34 19	113 31 45	.03	.2	20	1.30	.3L	.5	.007	50L
19	88LC19	43 34 06	113 32 41	.09	.2L	40	1.40	.3L	.6	.011	50L
20	88LC20	43 34 01	113 32 33	.02	.3	30	1.00	.3L	.4	.008	50L
21	88LC21	43 36 34	113 33 17	.02	.3	30	2.00	.3L	.5	.008	50L
22	88LC22	43 36 33	113 33 25	.03	.1L	20	.84	.3L	.4	.007	50L
23	88LC23	43 36 23	113 33 20	.03	.1L	20	1.70	.3L	.3	.006	50L
24	88LC24	43 36 05	113 33 04	.04	.2	70	.72	.3L	.5	.008	50L
25	88LC25	43 35 59	113 33 06	.03	.1L	40	1.60	.3L	.4	.007	50L
26	88LC26	43 35 50	113 33 03	.04	.2	40	1.30	.3L	.6	.007	50L
27	88LC27	43 35 50	113 33 19	.02	.1L	30	3.50	.3L	.3L	.006	50
28	88LC28	43 35 50	113 33 25	.02	.2L	20L	.78	.3L	.3L	.006	50L
29	88LC29	43 35 44	113 33 40	.04	.1L	50	2.00	.3L	.4	.009	50L
30	88LC30	43 35 30	113 33 17	.03	.1L	20	2.10	.3L	.3	.006	50L
31	88LC31	43 35 14	113 33 11	.03	.1L	30	3.40	.3L	.4	.005L	50L
32	88LC32	43 35 06	113 33 13	.02	.2L	50	1.40	.3L	.3L	.006	50L
33	88LC33	43 35 11	113 33 17	.01L	.2L	40	1.20	.3L	.3L	.005L	50L
34	88LC36	43 37 19	113 38 51	.03	.4	30	1.20	.3L	.5	.008	50L
35	88LC37	43 37 11	113 39 08	.01L	.1L	50	1.00	.3L	.3L	.007	50L
36	88LC38	43 37 17	113 38 42	.02	.1L	20	2.80	.3L	.5	.005L	50L
37	88LC41	43 37 16	113 37 50	.02	.1L	110	.69	.3L	.4	.007	50L
38	88LC42	43 37 12	113 37 56	.02	.2L	20L	1.10	.3L	.4	.006	50L
39	88LC43	43 37 12	113 37 40	.02	.2	20	3.90	.3L	.6	.008	50L
40	88LC44	43 35 29	113 33 06	.03	.3	20	1.40	.3L	.7	.009	50L
41	88LC45	43 35 30	113 32 51	.02	.5	40	4.00	.3L	.9	.005L	50L
42	88LC46	43 35 05	113 32 41	.02	.3	20	1.10	.3L	.5	.008	50L
43	88LC47	43 35 25	113 32 02	.02	.2	40	.88	.3L	.5	.007	50L
44	88LC48	43 35 25	113 31 56	.03	.3	30	.99	.3L	.5	.008	50L
45	88LC49	43 35 14	113 31 59	.09	.2L	20	14.00	.5	.9	.012	50L
46	88LC50	43 35 20	113 31 42	.05	.1L	30	6.30	.4	.9	.013	50L
47	88LC51	43 34 60	113 31 49	.06	.2L	20	3.00	.3L	.6	.009	50L
48	88LC52	43 35 08	113 31 38	.04	.3	50	4.00	.3L	.5	.005	50L
49	88LC53	43 34 58	113 31 15	.02	.2L	60	2.30	.3L	.6	.008	50L
50	88LC54	43 34 45	113 31 11	.03	.3	40	1.80	.3L	.6	.006	50L

Table 6. Results of analyses of big-sagebrush samples (leaves only) collected during the follow-up geochemical survey of the Lava Creek district, Idaho.--(continued)

	Sample	Mo-ppm na	Sb-ppm na	Se-ppm na	U-ppm na	W-ppm na	Zn-ppm na
1	88LC01	1.00	.03	.5L	.02L	.24	46
2	88LC02	1.00	.03	3.7	.02L	.60	85
3	88LC03	.42	.04	1.6	.02L	.49	59
4	88LC04	.66	.04	1.1	.02L	.45	57
5	88LC05	.56	.03	4.4	.02L	.09	34
6	88LC06	.38	.04	.5L	.02L	.63	33
7	88LC07	.38	.06	.5L	.02L	.86	45
8	88LC08	.35	.03	.7	.02L	1.30	57
9	88LC09	.50	.05	1.9	.02L	2.00	39
10	88LC10	.51	.13	.5L	.02L	1.60	51
11	88LC11	.76	.04	.5L	.02L	1.10	39
12	88LC12	.67	.03	.5L	.02L	1.20	50
13	88LC13	.23	.08	3.4	.02L	.25	87
14	88LC14	.72	.03	1.7	.03	.57	91
15	88LC15	.97	.04	.5L	.02L	.88	33
16	88LC16	.82	.04	3.7	.02L	.81	44
17	88LC17	.81	.04	6.1	.02L	.57	73
18	88LC18	1.10	.03	.5L	.02L	.57	48
19	88LC19	.32	.12	.5L	.03	1.40	32
20	88LC20	.74	.04	.5L	.02L	.44	42
21	88LC21	.45	.03	.5L	.02	.50	31
22	88LC22	.44	.04	.5L	.02L	.35	38
23	88LC23	.57	.04	.5L	.02L	.26	46
24	88LC24	.40	.05	1.6	.02L	.66	56
25	88LC25	.36	.04	1.6	.02L	.24	53
26	88LC26	.45	.04	1.3	.02	1.10	55
27	88LC27	1.40	.10	5.9	.02L	.56	82
28	88LC28	.25	.04	2.5	.02L	.22	70
29	88LC29	.50	.03	.5L	.02L	.15	65
30	88LC30	.44	.05	.5L	.02L	.16	50
31	88LC31	.38	.04	.5L	.02	.40	46
32	88LC32	1.00	.04	.5L	.02L	.16	51
33	88LC33	.19	.05	.5L	.02L	.32	43
34	88LC36	.49	.04	.5L	.02L	.96	32
35	88LC37	.49	.04	.5L	.02L	.77	47
36	88LC38	.48	.03	.7	.02L	.57	42
37	88LC41	.60	.05	1.8	.02L	.49	100
38	88LC42	.19	.05	.5L	.02L	.15	35
39	88LC43	.33	.04	1.0	.02L	.31	44
40	88LC44	.35	.05	.9	.02L	.88	55
41	88LC45	.56	.05	.5L	.02L	.59	53
42	88LC46	1.10	.05	2.6	.02L	.29	59
43	88LC47	1.20	.04	.5	.02L	.56	60
44	88LC48	.95	.04	.5L	.02L	.46	40
45	88LC49	.37	.12	.7	.02L	.48	54
46	88LC50	1.10	.06	2.5	.07	.49	59
47	88LC51	.65	.07	2.0	.02L	.21	51
48	88LC52	.66	.05	2.6	.02L	.24	52
49	88LC53	.46	.07	.5L	.02L	.46	32
50	88LC54	.49	.05	.5L	.02L	.44	50

Table 6. Results of analyses of big-sagebrush samples (leaves only) collected during the follow-up geochemical survey of the Lava Creek distric, Idaho.--(contintued)

	Sample	Latitude	Longtitude	As-ppm na	Au-ppb na	Ba-ppm na	Br-ppm na	Co-ppm na	Cr-ppm na	Fe-pct na	Hg-ppb na
51	88LC55	43 33 26	113 31 54	.02L	.1L	30	1.20	.3L	.5	.017	50L
52	88LC56	43 33 40	113 32 56	.02	.2L	30	1.20	.3L	.5	.010	50L
53	88LC57	43 34 48	113 34 27	.03	.2L	40	2.70	.3L	.5	.006	50
54	88LC58	43 35 12	113 32 25	.03	.2	20	1.50	.3L	.3	.010	50L
55	88LC59	43 34 42	113 32 35	.06	.1L	60	1.40	.3L	.3	.009	50L
56	88LC60	43 34 56	113 34 23	.04	.5	30	6.70	.3L	.6	.009	50L
57	88LC61	43 35 14	113 33 53	.05	.2	20	2.50	.3L	.5	.005	50L
58	88LC62	43 35 57	113 37 04	.04	.1L	30	3.10	.3L	.5	.012	50L
	Champagne Mine drill-hole localities										
59	DH88-31	~43 35 30	~113 34 20	.08	.8	130	1.80	.3L	.6	.012	50L
60	DH88-36	~43 35 30	~113 34 20	.08	.4	60	4.30	.3L	.8	.009	50L
61	DH88-48	~43 35 30	~113 34 20	.04	.4	90	1.30	.3L	.3	.005	50L
62	DH88-55	~43 35 30	~113 34 20	.04	1.0	30	1.30	.3L	.3L	.006	50L

	Sample	Mo-ppm na	Sb-ppm na	Se-ppm na	U-ppm na	W-ppm na	Zn-ppm na
51	88LC55	.55	.05	.5L	.02L	.42	70
52	88LC56	.85	.06	.5L	.02L	.19	72
53	88LC57	.90	.05	.5L	.02L	.23	49
54	88LC58	.42	.05	1.9	.02L	.23	85
55	88LC59	.33	.15	4.2	.02L	.31	83
56	88LC60	.18	.06	.5L	.02L	.17	42
57	88LC61	.36	.05	.5L	.02	.34	46
58	88LC62	.50	.07	.5L	.02L	.33	59
	Champagne Mine drill-hole localities						
59	DH88-31	.23	.07	.5L	.02L	.51	36
60	DH88-36	.86	.07	.5L	.02L	.56	54
61	DH88-48	.30	.08	.5L	.02L	.18	45
62	DH88-55	.48	.04	.5L	.02L	.14	39