

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

**Analytical results and sample locality map
of heavy-mineral-concentrate samples
from the Pahute Peak Wilderness Study Area (NV-020-621),
Humboldt County, Nevada**

By

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This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature. Any use of trade names is for descriptive purposes only and does not imply endorsement by the USGS.

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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 Pahute Peak Wilderness Study Area, Humboldt County, Nevada.

INTRODUCTION

In May 1984, the U.S. Geological Survey conducted a reconnaissance geochemical survey of the Pahute Peak Wilderness Study Area (NV-020-621), Humboldt County, Nevada.

The Pahute Peak Wilderness Study Area comprises 57,529 acres, about 90 mi² (233 km²) in the southwestern part of Humboldt County, Nevada, and lies about 8 mi (13 km) southeast of Soldier Meadow Ranch (see fig. 1) and about 40 mi (64 km) north of Gerlach, Nevada. The USGS was requested to study 25,200 acres, about 39 mi² (101 km²) of the 57,529 acres. Throughout this report, "Wilderness Study Area" and "study area" refer only to the smaller area, which the U.S. Geological Survey studied. Access to the study area is provided on the west by a dirt road which branches from County Road 217, and on the north and west by jeep trails.

The study area is underlain by Oligocene and Miocene volcanic rocks of rhyolitic to basaltic composition. Plutonic rocks of Mesozoic age and metamorphosed sedimentary rocks of Mesozoic and/or Paleozoic age are exposed locally beneath the volcanic rocks in the northwestern part of the study area. A major active fault extends along the western boundary of the Pahute Peak Wilderness Study Area.

The topographic relief in the study area is about 4,600 ft (1,400 m), with a maximum elevation of 8,594 ft (2,619 m) at the summit of Pahute Peak. The ground surface is rugged with cliffs and steep canyons over much of the study area. The climate is arid to semiarid.

METHODS OF STUDY

Sample Media

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.

Sample Collection

Twenty-five samples were collected at 23 sites (fig. 2). Duplicate samples were collected at two sites as part of a general study to determine analytical and sampling variation. The duplicate samples are shown by a slashed line (/) between the sample numbers on figure 2. The average sampling

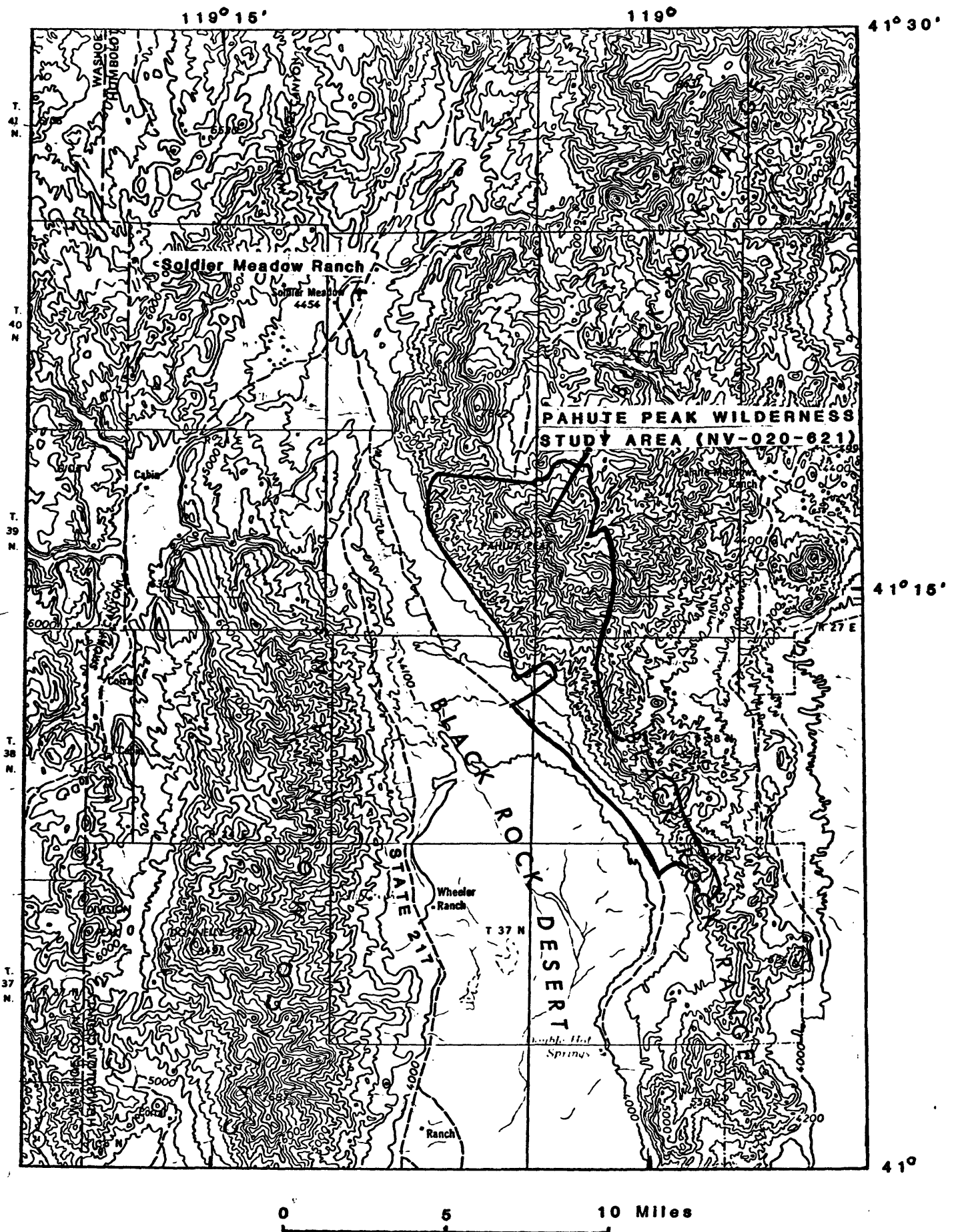


Figure 1. Location of the Pahute Peak Wilderness Study Area (NV-020-621),
Humboldt County, Nevada

119°07'30"

119°05'

119°02'30"

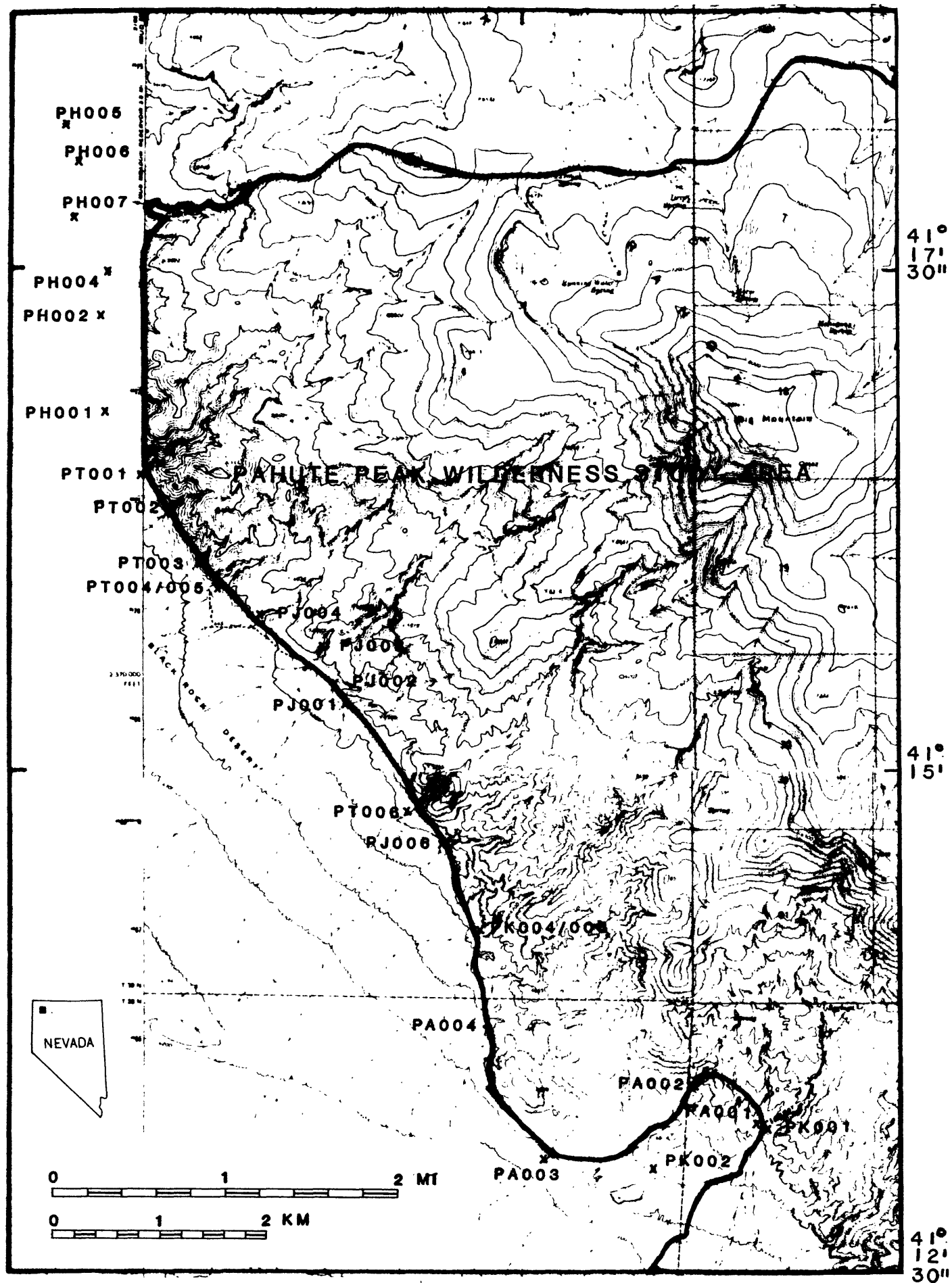


FIGURE 2.-Localities of heavy-mineral-concentrate sample sites, Pahute Peak Wilderness Study Area (NV-020-621), Humboldt County, Nevada

density was about one sample site per 1.7 mi². The area of the drainage basins sampled ranged from 0.3 mi² to 1.5 mi².

Heavy-mineral-concentrate samples

Heavy-mineral-concentrate samples were collected from active alluvium 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 100 ft from the site plotted on the map. 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.

Sample Preparation

After air drying, 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 analysis/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 0.1 ampere to remove the magnetite and ilmenite, and a current of 1.0 ampere to split the remainder of the sample into paramagnetic and nonmagnetic fractions.

Sample Analysis

Spectrographic method

The heavy-mineral-concentrate samples were analyzed for 31 elements using a semiquantitative, direct-current arc emission spectrographic method (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. 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 Pahute Peak Wilderness Study Area are listed in table 2.

ROCK ANALYSIS 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 TABLE

Table 2 lists the analyses of the heavy-mineral concentrate samples. 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 (fig. 2). Columns in which the element headings show the letter "s" below the element symbol are emission spectrographic 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. 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. Because of the formatting used in the computer program that produced the table, some of the elements listed in the table (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.

REFERENCES CITED

- 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.
- 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 heavy-mineral-concentrates, based on a 5-mg sample

| Elements | Lower determination limit | Upper determination limit |
|-------------------|---------------------------|---------------------------|
| Percent | | |
| Iron (Fe) | 0.1 | 50 |
| Magnesium (Mg) | .05 | 20 |
| Calcium (Ca) | .1 | 50 |
| Titanium (Ti) | .005 | 2 |
| Parts per million | | |
| Manganese (Mn) | 20 | 10,000 |
| Silver (Ag) | 1.0 | 10,000 |
| Arsenic (As) | 500 | 20,000 |
| Gold (Au) | 20 | 1,000 |
| Boron (B) | 20 | 5,000 |
| Barium (Ba) | 50 | 10,000 |
| Beryllium (Be) | 2 | 2,000 |
| Bismuth (Bi) | 20 | 2,000 |
| Cadmium (Cd) | 50 | 1,000 |
| Cobalt (Co) | 10 | 5,000 |
| Chromium (Cr) | 20 | 10,000 |
| Copper (Cu) | 10 | 50,000 |
| Lanthanum (La) | 50 | 2,000 |
| Molybdenum (Mo) | 10 | 5,000 |
| Niobium (Nb) | 50 | 5,000 |
| Nickel (Ni) | 10 | 10,000 |
| Lead (Pb) | 20 | 50,000 |
| Antimony (Sb) | 200 | 20,000 |
| Scandium (Sc) | 10 | 200 |
| Tin (Sn) | 20 | 2,000 |
| Strontium (Sr) | 200 | 10,000 |
| Vanadium (V) | 20 | 20,000 |
| Tungsten (W) | 100 | 20,000 |
| Yttrium (Y) | 20 | 5,000 |
| Zinc (Zn) | 500 | 20,000 |
| Zirconium (Zr) | 20 | 2,000 |
| Thorium (Th) | 200 | 5,000 |

TABLE 2.--Spectrographic analyses of heavy-mineral-concentrate samples from the Pahute Peak Wilderness Study Area, Humboldt County, Nevada
[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 | B-ppm S | Ba-ppm S | Be-ppm S |
|--------|----------|-----------|--------------|--------------|--------------|--------------|-------------|-------------|-------------|-------------|------------|-------------|-------------|
| PA001H | 41 13 15 | 119 3 27 | .15 | .10 | 10.0 | .020 | 300 | N | N | N | 20 | >10,000 | N |
| PA002H | 41 13 25 | 119 3 53 | .20 | .10 | 10.0 | .050 | 200 | N | N | N | <20 | >10,000 | N |
| PA003H | 41 13 4 | 119 4 51 | .20 | .07 | 7.0 | .070 | 100 | N | N | N | <20 | >10,000 | N |
| PA004H | 41 13 44 | 119 5 15 | .20 | .05 | 2.0 | .150 | 300 | N | N | N | <20 | >10,000 | N |
| PH001H | 41 16 47 | 119 7 45 | .20 | .05 | 10.0 | .030 | 150 | N | N | N | <20 | >10,000 | N |
| PH002H | 41 17 16 | 119 7 47 | .30 | .20 | 7.0 | .200 | 150 | N | N | N | <20 | >10,000 | N |
| PH004H | 41 17 29 | 119 7 44 | 2.00 | .20 | 20.0 | .050 | 500 | N | 2,000 | N | 500 | >10,000 | N |
| PH005H | 41 18 13 | 119 8 1 | .20 | .10 | 20.0 | .500 | 200 | N | N | N | <20 | >10,000 | N |
| PH006H | 41 18 2 | 119 7 56 | 1.00 | .50 | 10.0 | 2.000 | 150 | N | N | N | 30 | >10,000 | N |
| PH007H | 41 17 46 | 119 7 58 | .30 | .05 | 10.0 | 1.000 | 150 | 70 | N | N | <20 | >10,000 | N |
| PJ001H | 41 15 20 | 119 6 9 | .20 | 1.00 | 20.0 | .050 | 200 | N | N | N | <20 | >10,000 | N |
| PJ002H | 41 15 26 | 119 6 14 | .20 | .10 | 10.0 | .100 | 100 | N | N | N | <20 | >10,000 | N |
| PJ003H | 41 15 37 | 119 6 19 | .10 | .20 | 20.0 | .005 | 200 | N | N | N | <20 | >10,000 | N |
| PJ004H | 41 15 47 | 119 6 43 | .50 | .50 | 20.0 | .100 | 1,000 | N | N | N | <20 | >10,000 | N |
| PJ006H | 41 14 39 | 119 5 32 | .30 | .50 | 10.0 | .030 | 150 | N | N | N | <20 | >10,000 | N |
| PK001H | 41 13 13 | 119 3 23 | .50 | .07 | 7.0 | .050 | 150 | N | N | N | <20 | >10,000 | N |
| PK002H | 41 13 1 | 119 4 8 | .30 | .15 | 7.0 | .050 | 200 | N | N | N | <20 | 7,000 | N |
| PK004H | 41 14 12 | 119 5 17 | .15 | .05 | 5.0 | .020 | 70 | N | N | N | <20 | >10,000 | N |
| PK005H | 41 14 12 | 119 5 17 | .20 | .07 | 10.0 | .010 | 100 | N | N | N | <20 | >10,000 | N |
| PT001H | 41 16 28 | 119 7 31 | .10 | .05 | 5.0 | .005 | 150 | N | N | N | <20 | >10,000 | N |
| PT002H | 41 16 17 | 119 7 20 | .20 | .50 | 10.0 | .050 | 200 | N | N | N | <20 | >10,000 | N |
| PT003H | 41 16 2 | 119 7 8 | .20 | .10 | 2.0 | .020 | 50 | N | N | N | <20 | >10,000 | N |
| PT004H | 41 15 55 | 119 7 0 | .20 | .20 | 1.0 | .020 | 100 | N | N | N | <20 | >10,000 | N |
| PT005H | 41 15 55 | 119 7 0 | .15 | .20 | .5 | .010 | 150 | N | N | N | <20 | >10,000 | N |
| PT006H | 41 14 48 | 119 5 45 | .10 | .05 | 5.0 | <.005 | 150 | N | N | N | <20 | >10,000 | N |

TABLE 2.--Continued

| Sample | 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 | Sr-ppm S |
|--------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| PA001H | N | N | N | 50 | <10 | 150 | N | N | N | N | N | 30 | N | 2,000 |
| PA002H | N | N | N | N | <10 | 150 | N | N | N | N | N | 10 | N | 2,000 |
| PA003H | N | N | N | N | <10 | 100 | N | N | N | 50 | N | 15 | N | 700 |
| PA004H | N | N | N | N | <10 | <50 | N | N | N | N | N | <10 | N | 7,000 |
| PH001H | N | N | N | N | <10 | 70 | 50 | N | N | 5,000 | N | N | N | 1,000 |
| PH002H | N | N | N | N | <10 | 50 | N | N | N | N | N | N | N | 1,500 |
| PH004H | N | N | 30 | 100 | 15 | 100 | N | N | 30 | 15,000 | 500 | 10 | N | 1,000 |
| PH005H | N | N | N | N | <10 | 200 | N | N | N | N | N | 10 | N | 2,000 |
| PH006H | N | N | N | 100 | 10 | 150 | N | <50 | N | 500 | N | 10 | N | 1,000 |
| PH007H | N | N | N | N | 10 | 50 | N | N | N | 500 | N | N | N | 2,000 |
| PJ001H | N | N | N | 100 | <10 | 70 | N | N | N | N | N | 10 | N | 7,000 |
| PJ002H | N | N | N | N | <10 | 100 | N | N | N | N | N | 10 | N | 5,000 |
| PJ003H | N | N | N | N | <10 | 150 | N | N | N | N | N | 15 | N | 1,000 |
| PJ004H | N | N | N | N | 10 | 200 | N | N | N | <20 | N | N | N | 5,000 |
| PJ006H | N | N | N | N | <10 | 50 | N | N | N | N | N | 15 | N | 3,000 |
| PK001H | N | N | N | N | <10 | 70 | N | N | N | N | N | N | N | 1,000 |
| PK002H | N | N | N | N | <10 | 100 | N | N | N | 20 | N | 70 | N | 700 |
| PK004H | N | N | N | N | <10 | 50 | N | N | N | 20 | N | 10 | N | 2,000 |
| PK005H | N | N | N | N | <10 | 100 | N | N | N | N | N | N | N | 5,000 |
| PT001H | N | N | N | N | <10 | 100 | N | N | N | N | N | 10 | N | 5,000 |
| PT002H | N | N | N | N | <10 | 50 | N | N | N | N | N | N | N | 5,000 |
| PT003H | N | N | 10 | N | <10 | 50 | 50 | N | N | N | N | 10 | N | 2,000 |
| PT004H | N | N | N | 50 | 10 | 50 | N | N | N | N | N | N | N | 5,000 |
| PT005H | N | N | N | N | 15 | <50 | N | N | N | N | N | <10 | N | 2,000 |
| PT006H | 20 | N | N | N | <10 | 70 | N | N | N | N | N | N | N | 2,000 |

TABLE 2.--Continued

| Sample | V-ppm S | W-ppm S | Y-ppm S | Zn-ppm S | Zr-ppm S | Th-ppm S |
|--------|------------|------------|------------|-------------|-------------|-------------|
| PA001H | <20 | N | 150 | N | >2,000 | N |
| PA002H | 20 | N | 500 | N | >2,000 | N |
| PA003H | 20 | N | 150 | N | >2,000 | N |
| PA004H | <20 | N | 30 | N | 2,000 | N |
| PH001H | 20 | 200 | 70 | N | 500 | N |
| PH002H | <20 | N | 20 | N | 200 | N |
| PH004H | 20 | N | 70 | >20,000 | 2,000 | N |
| PH005H | 20 | N | 700 | N | >2,000 | N |
| PH006H | 100 | N | 200 | N | >2,000 | N |
| PH007H | <20 | N | 100 | N | 2,000 | N |
| PJ001H | 20 | N | 200 | N | >2,000 | N |
| PJ002H | 20 | 100 | 700 | N | >2,000 | N |
| PJ003H | <20 | N | 150 | N | >2,000 | N |
| PJ004H | 20 | N | 100 | N | 2,000 | N |
| PJ006H | <20 | N | 70 | N | >2,000 | N |
| PK001H | <20 | N | 200 | N | >2,000 | N |
| PK002H | <20 | N | 700 | N | >2,000 | N |
| PK004H | <20 | N | 50 | N | >2,000 | N |
| PK005H | 20 | N | 150 | N | >2,000 | N |
| PT001H | <20 | N | 70 | N | 2,000 | N |
| PT002H | 20 | 700 | 70 | N | >2,000 | N |
| PT003H | 20 | 2,000 | 20 | N | 500 | N |
| PT004H | 20 | N | 20 | N | 1,500 | N |
| PT005H | <20 | N | <20 | N | 700 | N |
| PT006H | 20 | N | 100 | N | >2,000 | N |