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Geochemical signatures of ore deposits and mineralized rocks from the Pilot Mountains, Mineral County, Nevada

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ABSTRACT

The Pilot Mountains contain known deposits of mercury and copper-molybdenum-tungsten that have distinctive chemical signatures by multi-element chemical analysis. These signatures are suitable for recognition of the deposits in regional lithogeochemical surveys. The mercury deposits tend to be enriched in many elements, but Ba, Hg, Sb, Te, and Tl are probably most diagnostic. The Cu-Mo-W deposits in granitic rocks and adjacent skarns are characterized by high concentrations of Ag, As, Bi, Cu, Mo, W, and Zn. A zone of sedimentary rocks near Troy Springs contains vague color alteration, some argillization, and numerous turquoise prospects. The chemistry of rock samples from this zone is not similar to that of nearby known deposits, possibly due to the secondary effect of acid leaching of many metals. The prospects and alteration near Troy Springs may be related to an underlying base-metal system, but the chemical and geologic evidence is not very strong for the existence of a deposit at depth.

INTRODUCTION

The Pilot Mountains of eastern Mineral County, Nevada, are the site of a famous old mercury mining district and also of some sporadic mining of tungsten and copper (fig. 1). About $600,000 worth of mercury was produced up to 1948, and $670,000 in tungsten was produced from 1952-1956 (Ross, 1961). The diverse geology of the Pilot Mountains and its known mineral prospects suggest the range has high potential for additional mineral resources.

The Pilot Mountains are a prominent range with elevations ranging from 2,799 m at Pilot Peak to 1386 m in Soda Spring Valley at Mina. The western range front is particularly spectacular. Elevations above about 2,100 m are generally covered with pinyon and juniper trees, but outcrops are excellent.

This study was undertaken in 1982 and 1983 as part of the Conterminous United States Mineral Appraisal Program (CUSMAP) in the Tonopah 1° x 2° AMS quadrangle to provide modern geochemical description and interpretation of some known mineralized areas and historic mines. We collected 106 samples from outcrops, mine openings, prospect pits, and mine dumps. Similar reconnaissance rock geochemistry studies are underway at most known districts in the Tonopah quadrangle to provide geochemical criteria for recognizing and characterizing mineral-deposit types, and to aid in the interpretation of regional stream-sediment geochemistry data. Analytical results for stream-sediment and panned-concentrate samples from the area are given in a report by Siems and others (1984).

GEOCHEMICAL STUDIES

Sample Preparation and Analysis

All samples were crushed and then pulverized between ceramic plates to attain a grain size smaller than 100 mesh (0.15 mm). All samples were analyzed for 31 elements using a semiquantitative, direct-current arc emission spectrographic method (Grimes and Marranzino, 1968). Limits of determination are summarized in Table 1. Spectrographic results are obtained by visual comparison of spectra derived from the sample against spectra obtained from standards made of 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

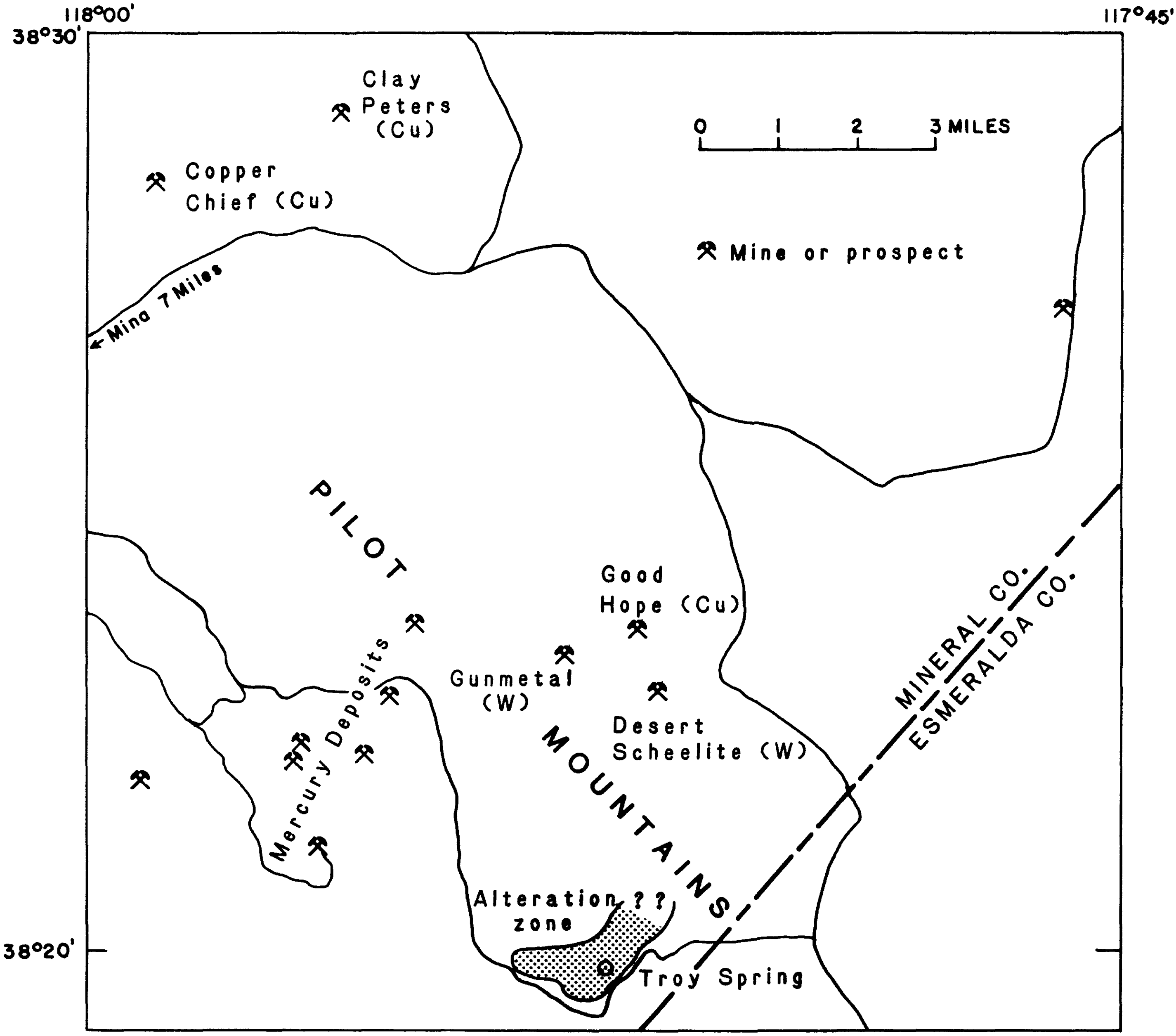

Figure 1. Map of Pilot Mountains showing the location of major mines and prospects.

estimated to fall between those values are assigned values of 70, 30, 15, and so forth. The precision of the 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 reported in weight percent of the element; all other elements are reported in parts per million (micrograms per gram) (Table 1).

Most samples were also analyzed by a wet chemical procedure for determination of elements of special interest or elements which have high limits of determination by emission spectrography (such as As, Sb, Zn, or Hg). The wet chemical methods are explained in Table 2.

Upon completion of the analytical work, results were entered into a computer-based system called Rock Analysis Storage System (RASS) that contains both the analytical data and descriptive geologic and geographic information for each sample. Parts of the RASS data were retrieved under a slightly different format and manipulated using routines of the STATPAC system (VanTrump and Miesch, 1976).

Results

Analytical results and locations for 106 samples are given in Table 3. Thirty-six elements are reported in Table 3; the samples were also analyzed by the emission spectrograph for Au, Nb, and Th, but none contained detectable amounts, thus these elements are not reported. Some elements are reported twice (both spectrographic and atomic-absorption values) because of the different ranges of determination of the methods. Sample localities are shown on Plate 1 at a scale of 1:50,000.

GEOLOGY AND MINERAL DEPOSITS

The geology and mineral deposits of the Pilot Mountains are described by Vanderburg (1937), Ferguson and Muller (1949), Phoenix and Cathcart (1951), Ross (1961), Neilsen (1963), Oldow (1981), Grabher (1984), and others. Details of stratigraphy and structure can be found in these references, but only generalized relations will be described here. Oldest rocks are Permian to Triassic clastic and volcaniclastic rocks commonly termed the Mina Formation. These strata have features indicating formation in turbidite, shallow water, and subaerial environments (Oldow, 1981). The Triassic Luning Formation unconformably overlies these rocks. The Luning Formation is most conspicuous in outcrop as dark limestone, but abundant terrigenous clastic strata (conglomerate to shale) are also present and are most clearly seen in drill core. The Luning Formation was deposited in a shallow marine to deltaic environment. Additional clastic and carbonate strata are assigned to the Upper Triassic to Lower Jurassic Sunrise (or Gabbs) and Dunlop Formations. Several Jurassic to Cretaceous stocks of granite to granodiorite intrude the sedimentary rocks and represent the eastern part of the Sierra Nevada batholith (Ross, 1961). Scattered remnants of Tertiary volcanic rocks of felsic to intermediate composition cap the pre-Teriary rocks.

Three periods of folding and thrusting are deduced from the complex structural geology (Oldow, 1981). At least one thrust fault is believed to be regional in extent and exhibits tens of kilometers of displacement to the southeast. The age of the thrusting is roughly bracketed between about 175 and 90 mybp (Oldow, 1981). Basin and Range faults are not as evident in the Pilot Mountains as are right-lateral strike-slip faults related to the "Walker Lane."

Mineral deposits of the Pilot Mountains have been described in detail by Foshag (1927), Vanderburg (1937), Phoenix and Cathcart (1951), and Grabher (1984). Past mining has yielded chiefly mercury and tungsten. Some Cu-Mo and turquoise deposits have also been mined on a small scale. Nonmetallic deposits of bentonite and diatomite in the area will not be described here.

Mercury deposits were discovered in 1913 and worked intermittently through World War II. Mercury as cinnabar occurs in all of the pre-Tertiary sedimentary formations of the area, and Foshag (1927) reports that some cinnabar has been found in Tertiary volcanic rocks. There is a strong structural control of mercury deposits by thrust faults, as well as by normal faults with small displacement, that probably are related to the thrusts (Phoenix and Cathcart, 1951). Cinnabar is the only important ore mineral, but stibnite (Sb_2S_3) is fairly common in some deposits, and traces of oxidized copper minerals are present. Calcite is the most abundant gangue mineral, and quartz and barite are fairly common. Total production from 1914 to 1948 was about 5,000 flasks of mercury worth about $600,000 (Phoenix and Cathcart, 1951).

Copper and tungsten have been prospected and mined at many places near granitic stocks on the east side of the Pilot Mountains (Grabher, 1984). Scheelite-bearing skarns (or tactites) were discovered in 1916, and several small operations attempted to mine them in the 1920's-1930's. The only significant production was in the period 1952-1956 when about 308,000 lbs. WO_3 was produced, mostly from the Gunmetal mine (fig. 1). In recent years drilling by Union Carbide Corporation has defined several tungsten skarn zones adjacent to formerly known deposits at the Gunmetal and Desert Scheelite mines (fig. 1). This is a significant tungsten resource that will be developed, if prices improve from those of 1985. Several Cu-Mo targets of the general "porphyry-copper" type occur in the Pilot Mountains. At the Good Hope mine (fig. 1), chalcocite and other secondary copper minerals occur in what appears to be a secondary enrichment blanket along the flat intrusive contact between granodiorite and limestone of the Luning Formation. The underlying stock is highly pyritic and sericitized, as seen in drill core and dump samples, but does not seem to contain significant primary disseminated copper sulfide. A Cu-Mo target 2 km south of the Good Hope mine was drilled in the mid-1970's (Grabher, 1984). A cluster of prospects about 11 km northeast of the Good Hope mine (fig. 1) exposes oxidized copper minerals in contact metamorphosed Luning Formation. The Copper Chief and Clay Peters mines and many nearby prospects about 14 km north-northwest of the Good Hope mine expose copper minerals, and the Copper Chief also contains scheelite and some powellite ($CaMoO_4$) (Doucette, 1981). These prospects are in calc-silicate skarn and silicified zones adjacent to small granitic stocks.

Geochemical Suites

The known geology of mineral deposits in the Pilot Mountains indicates there were varied physical and chemical conditions during deposit formation. Also host rock lithologies are known to be quite different among the various deposits sampled. Thus, it is not surprising that there is a wide range in composition represented by the samples from the Pilot Mountains (Tables 3 and 4). The extreme sample compositions will not be discussed here, nor will there be a discussion of "threshold" or "anomalous" values because all of the samples analyzed were selected in the field as being anomalous in some geologic or chemical aspect. Also, it is emphasized that the samples were picked as composites of chips or chunks that contain visible minerals of interest, particularly sulfides or oxides, in a deliberate attempt to magnify or "high-grade" the anomaly; none of these samples is a reliable assay. The following discussion will focus on suites of elements and relations among elements in several deposit types.

Skarn suite

The copper- and tungsten-bearing skarn deposit samples are characterized by generally high contents of Fe, Ca, Mn, Ag, As, Bi, Cd, Cu, Mo, Sb, W, Zn, and Hg. Relative to other mineralized samples in the Tonopah region, and to the Pilot Mountains mercury deposits in particular, the skarn suite is notably enriched in Ag, As, Bi, Cu, W, Zn, and to a lesser extent in Mo. Bismuth is particularly diagnostic of deposits in or near plutonic rocks. In a set of 35 samples from the skarn environment Cu has a low correlation with Mo and W, but has a strong association with Mn, Ag, Co, and Y. In this dataset Mo and W are highly correlated and both correlate strongly with the same elements: Zn, Cd, V, Te, Hg, Fe, and Mn. The elemental associations suggest the presence of two types or stages of skarn formations: Cu and Mo-W. Possibly the influence of a secondary process, such as oxidation, produced the distinct associations for copper.

Mercury deposit suite

The set of 18 samples from mercury deposits is rich in Mg, Ca, Ba, Cu, Sb, Zn, Te, Tl, and Hg. Compared to the skarn suite, Ba, Hg, Tl, Te, and Sb tend to be higher in the mercury deposit samples. Although the mercury deposit samples are rich in other elements such as As, Cu, Mo, Pb, and Zn, these elements may not be reliable indicators of mercury deposits relative to other base-metal deposits. Many of the mercury deposit samples have a high ratio of Sb to As, about 1 or more, whereas the skarn deposits tend to have much more As than Sb. For the set of 18 samples from mercury deposits, Hg has high positive correlation with only Sb, Cd, and Zn.

Copper prospects

The southeast foothills of the Pilot Mountains near Troy Springs (fig. 1) are underlain by fine-grained siltite or sandstone of the Mina Formation that in this area has unusual pale yellow to pale orange color. This alteration extends north about 3 km to the northern faulted boundary of the Mina Formation. Within a radius of about 2 km of Troy Springs there are numerous prospect pits and small mines that have extracted "turquoise" (mineralogy not defined). A few highly altered porphyritic dikes were observed at localities 559 and 564-566. Just north of Troy Springs is an interesting zone of stockwork veins and disseminated pyrite (now mostly iron oxides) in fine sandstone. Seventeen samples from this broad zone of alteration and from turquoise prospects have compositions that are not very similar to those of either the mercury deposits or the skarn deposits. Concentrations of Ba, Cu, and Mo are fairly high (mean values 1090, 1975, and 38 ppm, respectively), but the concentrations of other base metals are low and the contents of Mg and Ca are especially low. Thallium concentrations are in the range 0.2 to 2.2 ppm and tellurium concentrates range from 0.2 to 1.3 ppm. The primary chemical signature of these rocks is complicated by the acid alteration that is probably caused by weathering of sulfide minerals. However, the acid alteration could possibly have occurred in the upper, oxidizing part of a hydrothermal system. Copper in this suite of samples correlates positively with Ca, Ag, As, Be, Bi, Pb, Sb, W, and Zn--a different suite of elements from hose with which Cu is associated in the Cu-W skarn and mercury deposits.

Multivariate Statistical Analysis

Multivariate statistical analyses provide useful insights into complex multi-element datasets, often by simplifying relations between elements or between geochemical suites to highlight aspects that are not apparent in the tabulated data. Factor and discriminant function analyses (Davis, 1973) were made of the Pilot Mountains geochemical data to identify patterns in the data that might provide a basis for geologic or geochemical interpretations of the mineral deposits, and to test these methods on data from relatively well-known deposits prior to application to larger regional datasets in which many of the samples are from poorly understood deposits.

Relations between elements

Factor analysis in the R-mode is useful for finding simplifying relations between variables (Davis, 1973). An example of one computation is a six-factor model that extracts 66 percent of the total variance and more than 70 percent of the information for many elements. The six factors and elements with high loadings on them are listed in Table 5. Factor 1 is mostly rock-forming elements in non-carbonate rocks. Factor 2 is a suite of elements that probably reside in sulfide minerals. Factor 3 is a suite of elements in carbonate rocks with little or no ore, but which are altered near ore. Factor 4 carries a group of elements enriched in skarns. Factor 5 is a group of elements contained in sulfide minerals, chiefly those in mercury deposits. Factor 6 is a group of elements interpreted to be enriched or depleted in weathered or leached rocks characteristic of turquoise prospects; this is inferred from other studies of these data and is not evident in the factor analysis alone. The negative loadings shown in Table 5 indicate inverse relations, such as would be produced by hydrothermal leaching. Some elements such as Fe, Cu, Cd, and Zn project nearly equally on two or three factors, behavior that suggests enrichment in more than one environment. The geologic interpretations offered here are not proof that the elemental relations are valid, but we consider these groupings useful for further inquiry into mechanisms of deposit formation or application to geochemical exploration.

Relations between samples

Factor analysis can also yield useful information on relations between samples and can suggest classification of samples into groups such as ore-deposit types. In this example, six samples (for six factors) were identified as having extreme compositions: numbers 526, 626, 524, 567, 527, and 549. Group 1 (compared to sample 526) consists of skarn samples in which Cu is the only ore metal. Group 2 contains skarn samples rich in Ag, Bi, Cd, Cu, and Zn. Group 3 consists of granitic rock and skarn samples rich in Cu-Mo-W-Zn. Group 4 consists of altered and weathered rocks rich in Tl and Te and depleted in most elements. Group 5 (compared to sample 527) consists of altered carbonate rocks with moderate amounts of As, Cu, Sb, and Hg. Group 6 consists of samples rich in Ag, As, Pb, Sb, Zn, Tl, and Hg (characteristic of the mercury ores). The factor analysis sample scores are useful for both highlighting extreme samples, that might be characteristic of ore types, and also for classifying samples. Most of the sample scores suggest groups that are consistent with previously known geology. Samples from the turquoise prospects and adjacent altered zone have low projections onto the factors representing known ore types in the Pilot Mountains, thus are either a different type of mineralization or reflect a different process such as weathering.

Classification by discriminant function analysis (DFA)

Significant differences between groups of samples are computed by DFA and unknown samples can be assigned to previously determined "training groups" with varying degrees of certainty (Davis, 1973; Koch and Link, 1980; Connor and Gerild, 1971). DFA demonstrates that there are significant compositional differences between samples classified a priori as Cu-W skarn (n = 35), Hg deposits (18), and copper prospects (17). The following elements (in order of significance) discriminate between these three groups: Ag, Mn, Cu, Be, As, Sb, Fe, Y, and Bi. Four variables (Ag, Mn, Be, Cu) were able to place 58 of 70 samples in their "correct" groups as defined a priori and nine variables properly classified all but four samples. This test confirms other computations suggesting that the copper prospects are chemically distinct from both the Cu-W skarn and Hg deposits in the Pilot Mountains. DFA provides useful information on how much information is required to distinguish deposit types. This is evident in the results described above, and especially in a DFA test made using input data consisting of only 27 elements determined by semiquantitative emission spectrography for the three groups used in the previous example. Results of this DFA were very similar to those of the first example that utilized all available data. The first four elements in the discriminant were the same (Ag, Mn, Cu, and Be) and the next variables selected were somewhat different: Bi, Sr, Ba, Cr, Pb, Sb, As, and Y. This test indicates that semiquantitative data from emission spectrography can be used to discriminate between these deposits, if "high-graded" rock samples of the type collected in this study are used.

CONCLUSIONS

The known mercury and Cu-Mo-W skarn deposits of the Pilot Mountains have distinctive compositions that permit their identification by multi-element chemical analyses. The mercury deposits are relatively rich in Mn, Ca, Ba, Cu, Sb, Zn, Te, Tl, as well as Hg. The Cu-Mo-W skarns are rich in Fe, Ca, Mn, Ag, As, Bi, Cd, Cu, Mo, Sb, W, Zn, and Hg. Although it is possible to distinguish between these two deposit types in the relatively simple context of the Pilot Mountains, identification of these deposits relative to many other types of deposits in a larger region would not be a simple matter because many deposit types in the Tonopah 1° x 2° quadrangle are enriched in these elements. Bismuth is typically enriched in deposits in or near plutonic rocks, thus would seem to be diagnostic of that environment, but that generalization is contradicted by the presence of Bi in some epithermal precious-metal systems in the area (Nash and Siems, unpub. data, 1984). Generalizations on the behavior of other elements, such as As and Sb, or Cu and Zn, are even more subject to error. Turquoise prospects and adjacent altered rocks near Troy Springs contain a suite of elements that is distinct from the known productive deposits in the Pilot Mountains, differences possibly caused by acidic leaching. The zone of prospects and alteration near Troy Springs possibly represents a very high level of mineralization related to an underlying "porphyry-type" base-metal system, but the geochemical evidence for this relation is not compelling.

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

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.--Description of chemical methods used for analysis of rock samples from the Pilot Mountains, Nevada

Element determined	Analytical method	Determination limit (ppm)[1]	Reference
Au	Atomic absorption	0.05	Thompson and others, 1968
As	Atomic absorption	5.0	Modification of Viets, 1978
Bi	-----do----------	1.0	------do------------
Cd	-----do----------	0.1	------do------------
Sb	-----do----------	2.0	------do------------
Zn	-----do----------	5.0	------do------------
Te	-----do----------	0.2	Modification of Hubert and Lakin, 1972
Tl	-----do----------	0.2	------do------------

[1]The determination limit is dependent upon sample weight. Stated limits imply use of optimum sample weight; higher limits of determination result from use of smaller sample weights.

TABLE 3.--ANALYTICAL DATA FOR ROCK SAMPLES FROM THE PILOT MOUNTAINS, MINERAL 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	B-ppm s	Ba-ppm s	Be-ppm s	Bi-ppm s
TZR00035	38 23 44	117 53 33	7.0	5.00	7.00	.500	1,000	N	N	10	1,000	1.5	N
TZR00040	38 23 21	117 53 5	3.0	7.00	20.00	.200	700	N	N	150	1,000	1.0	N
TZR00042	38 23 9	117 53 15	2.0	.70	2.00	.300	700	1.0	N	30	2,000	3.0	N
TZR00046	38 22 57	117 52 58	.7	3.00	>20.00	.070	300	<.5	N	50	300	N	N
TZR00047	38 22 46	117 52 57	5.0	2.00	2.00	.200	1,500	N	N	200	2,000	1.0	N
TZR00048	38 22 11	117 53 3	5.0	.10	.10	.200	200	N	<200	300	1,000	1.0	N
TZR00069	38 22 15	117 52 53	3.0	.10	.10	.200	50	<.5	<200	150	5,000	1.0	N
TZR00112	38 25 23	117 54 38	2.0	.30	1.00	.200	500	N	N	50	1,500	2.0	N
TZR00122	38 20 13	117 52 22	5.0	3.00	10.00	.100	1,000	N	N	200	150	<1.0	N
TZR00130	38 23 14	117 56 10	7.0	1.00	.70	.300	1,000	2.0	200	200	500	1.5	N
TZR00131	38 23 34	117 55 20	5.0	.70	>20.00	.050	1,000	.5	<200	20	700	N	N
TZR00132	38 23 30	117 56 3	3.0	1.00	.07	.300	300	.5	N	150	1,500	2.0	N
TZR00138	38 22 43	117 56 16	2.0	5.00	10.00	.070	1,500	15.0	N	150	5,000	N	N
TZR00139	38 22 7	117 56 56	3.0	3.00	15.00	.100	1,500	.7	N	150	700	1.0	N
TZR00140	38 22 7	117 56 45	1.0	2.00	20.00	.050	700	N	N	30	200	N	N
TZR00142	38 22 47	117 56 38	3.0	.30	.20	.200	100	1.0	200	50	1,000	3.0	N
TZR00143	38 22 47	117 56 38	5.0	.70	.10	.300	200	<.5	N	200	1,000	2.0	N
TZR00144	38 22 52	117 55 38	2.0	.20	.20	.100	150	3.0	<200	70	2,000	N	N
TZR00145	38 21 39	117 54 48	.7	.10	.15	.200	20	N	N	100	200	<1.0	N
TZR00151	38 26 39	117 56 56	1.0	.70	>20.00	.050	500	N	N	<10	20	N	N
TZR00153	38 26 36	117 58 29	5.0	1.50	5.00	.300	700	N	N	30	1,000	1.5	N
TZR00155	38 21 13	117 55 25	3.0	.10	.10	.200	700	N	N	100	2,000	3.0	N
TZR00156	38 21 5	117 55 22	.7	.05	.10	.200	100	<.5	N	100	700	<1.0	N
TZR00157	38 19 13	117 58 4	5.0	1.00	20.00	.100	>5,000	30.0	N	10	300	<1.0	N
TZR00160	38 20 36	117 58 22	2.0	.20	.20	.200	150	.5	N	150	300	1.0	<10
TZR00167	38 17 35	117 58 12	5.0	.10	.20	.200	100	.5	500	150	700	2.0	N
TZR00169	38 20 58	117 55 58	1.0	.15	.30	.200	100	N	N	200	1,500	N	N
TNR00520	38 23 29	117 52 11	15.0	.15	2.00	.150	2,000	5.0	200	100	300	5.0	N
TNH00521	38 23 27	117 52 12	7.0	1.00	3.00	.200	1,000	.7	N	70	1,000	1.5	N
TND00523	38 23 30	117 52 12	5.0	.30	2.00	.050	>5,000	2.0	N	50	700	5.0	N
TND00524	38 23 33	117 52 12	20.0	.10	1.50	.070	2,000	7.0	300	15	150	1.5	50
TND00525	38 23 31	117 52 12	3.0	.50	3.00	.100	700	1.0	N	200	2,000	1.5	N
TND00526	38 27 6	117 46 5	10.0	.30	1.00	.300	>5,000	10.0	2,000	500	>5,000	1.0	30
TNR00527	38 27 19	117 46 9	10.0	5.00	>20.00	.050	5,000	.5	500	70	700	<1.0	N
TNR00528	38 27 17	117 46 13	10.0	1.50	>20.00	.100	5,000	2.0	500	70	700	<1.0	N
TNR00529	38 27 27	117 46 20	3.0	2.00	20.00	.200	2,000	7.0	2,000	200	700	<1.0	<10
TNH00530	38 23 30	117 52 13	2.0	.70	3.00	.300	500	<.5	N	150	1,000	5.0	N
TNH00531	38 23 30	117 52 13	3.0	.30	3.00	.150	300	1.0	N	200	700	2.0	N
TNH00532	38 23 30	117 52 13	5.0	.70	3.00	.300	700	N	N	30	1,500	2.0	N
TNR00533	38 22 24	117 52 59	20.0	.70	1.50	.100	300	5.0	700	50	150	5.0	N
TNR00534	38 22 16	117 52 54	3.0	.07	.10	.300	15	<.5	N	300	1,000	1.0	N
TNR00535	38 22 17	117 52 42	1.5	.20	.15	.200	30	N	<200	700	5,000	1.0	N
TNR00536	38 22 25	117 52 32	2.0	.30	.10	.300	30	N	N	100	2,000	1.0	N
TNR00538	38 21 13	117 54 52	7.0	.30	.15	.500	15	N	300	200	1,000	3.0	N
TNR00539	38 21 38	117 54 48	1.0	.20	.20	.500	20	N	N	150	700	2.0	N

TABLE 3.--ANALYTICAL DATA FOR ROCK SAMPLES FROM THE PILOT MOUNTAINS, MINERAL COUNTY, NEVADA--Continued

Sample	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Ni-ppm s	Pb-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	V-ppm s
TZR00035	N	50	500	100	20	5	100	20	N	20	N	1,000	200
TZR00040	N	15	70	30	30	N	20	20	N	7	N	1,000	70
TZR00042	N	7	<10	100	30	10	5	30	N	5	N	1,000	70
TZR00046	N	5	30	15	<20	N	5	15	N	5	N	2,000	50
TZR00047	N	15	100	30	<20	N	30	20	N	10	N	500	150
TZR00048	N	10	150	200	20	5	20	N	N	10	N	700	150
TZR00069	N	10	150	5,000	30	15	10	N	N	10	N	700	200
TZR00112	N	5	<10	<5	50	N	<5	30	N	5	N	500	30
TZR00122	N	10	100	70	<20	N	15	10	N	7	N	100	100
TZR00130	N	15	200	150	50	N	100	700	N	15	N	200	150
TZR00131	N	15	50	20	N	N	20	20	<100	5	N	500	70
TZR00132	N	20	100	100	50	N	50	10	N	10	N	100	150
TZR00138	20	5	30	30	<20	N	10	500	300	7	N	300	50
TZR00139	20	10	50	100	30	N	20	300	>10,000	7	N	300	70
TZR00140	N	10	30	30	N	20	20	200	3,000	5	N	200	50
TZR00142	N	N	<10	20	70	5	<5	50	N	5	N	500	70
TZR00143	N	15	150	100	50	N	50	15	N	15	N	100	150
TZR00144	50	5	20	150	N	10	7	1,500	1,500	5	N	200	50
TZR00145	N	7	100	200	50	N	5	N	N	5	N	300	70
TZR00151	N	N	20	10	N	N	5	20	N	<5	N	2,000	30
TZR00153	N	15	70	20	30	N	15	20	N	15	N	700	100
TZR00155	N	30	150	10,000	20	N	50	N	N	30	N	200	200
TZR00156	50	N	70	200	20	N	7	N	N	15	N	100	200
TZR00157	30	10	10	150	20	5	5	2,000	N	5	N	200	150
TZR00160	N	5	100	1,000	30	N	15	20	N	10	N	150	100
TZR00167	N	7	100	150	20	7	30	10	<100	10	N	100	300
TZR00169	N	10	70	10	50	N	7	10	N	5	N	150	50
TNR00520	200	N	50	7,000	50	100	5	100	N	10	N	200	500
TNH00521	N	15	15	700	50	70	5	20	N	5	N	700	100
TND00523	300	15	15	>20,000	20	N	15	<10	N	<5	N	100	200
TND00524	100	7	30	7,000	20	500	10	200	N	5	N	100	500
TND00525	N	N	<10	500	<20	5	<5	30	N	<5	N	1,000	50
TND00526	50	300	100	>20,000	70	N	150	20	200	15	N	3,000	100
TNR00527	N	100	30	2,000	N	30	100	10	N	5	N	500	100
TNR00528	N	100	70	3,000	<20	20	70	15	<100	10	N	1,500	150
TNR00529	30	70	100	20,000	100	N	50	30	300	10	N	3,000	100
TNH00530	N	5	<10	300	50	50	<5	10	N	5	N	1,000	100
TNH00531	N	N	<10	50	30	30	<5	100	N	<5	N	500	30
TNH00532	N	7	15	70	30	10	<5	10	N	5	N	1,000	100
TNR00533	20	50	50	15,000	70	15	50	15	200	7	N	<100	200
TNR00534	N	7	150	1,500	50	N	7	N	N	10	N	300	150
TNR00535	N	7	70	3,000	20	10	10	N	N	<5	N	300	200
TNR00536	N	5	100	300	30	500	15	<10	N	5	N	200	200
TNR00538	N	5	70	500	30	10	30	<10	<100	20	N	100	500
TNR00539	<20	5	700	1,000	30	N	50	<10	200	20	N	150	200

TABLE 3.--ANALYTICAL DATA FOR ROCK SAMPLES FROM THE PILOT MOUNTAINS, MINERAL COUNTY, NEVADA--Continued

Sample	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Te-ppm aa	As-ppm aa	Cd-ppm aa	Zn-ppm aa	Bi-ppm aa	Sb-ppm aa	Tl-ppm aa	Hg-ppm aa
TZR00035	N	20	N	100	--	--	--	--	--	--	--	--
TZR00040	N	20	N	70	--	--	--	--	--	--	--	--
TZR00042	200	10	<200	150	--	--	--	--	--	--	--	--
TZR00046	N	10	N	20	--	--	--	--	--	--	--	--
TZR00047	N	20	N	150	--	--	--	--	--	--	--	--
TZR00048	N	30	N	100	--	--	--	--	--	--	--	--
TZR00069	N	30	N	100	--	--	--	--	--	--	--	--
TZR00112	N	15	N	150	--	--	--	--	--	--	--	--
TZR00122	N	15	N	50	--	--	--	--	--	--	--	--
TZR00130	N	20	N	200	--	--	--	--	--	--	--	--
TZR00131	N	15	N	20	--	--	--	--	--	--	--	--
TZR00132	N	30	N	200	--	--	--	--	--	--	--	--
TZR00138	N	10	700	15	--	--	--	--	--	--	--	--
TZR00139	N	20	1,000	100	--	--	--	--	--	--	--	--
TZR00140	N	15	1,000	30	--	--	--	--	--	--	--	--
TZR00142	N	15	N	200	--	--	--	--	--	--	--	--
TZR00143	N	20	N	300	--	--	--	--	--	--	--	--
TZR00144	N	<10	5,000	50	--	--	--	--	--	--	--	--
TZR00145	N	20	N	200	--	--	--	--	--	--	--	--
TZR00151	N	<10	N	10	--	--	--	--	--	--	--	--
TZR00153	N	20	N	150	--	--	--	--	--	--	--	--
TZR00155	N	20	N	50	--	--	--	--	--	--	--	--
TZR00156	N	20	N	100	--	--	--	--	--	--	--	--
TZR00157	N	30	1,000	15	--	--	--	--	--	--	--	--
TZR00160	N	20	N	100	--	--	--	--	--	--	--	--
TZR00167	N	50	N	300	--	--	--	--	--	--	--	--
TZR00169	N	20	N	200	--	--	--	--	--	--	--	--
TNR00520	700	10	7,000	50	<.2	240	--	--	9.0	12	N	N
TNH00521	100	15	1,000	100	N	--	--	--	--	--	.8	N
TND00523	1,000	50	10,000	20	.3	60	--	--	N	1	.6	N
TND00524	3,000	<10	10,000	10	N	--	--	--	--	--	<.2	N
TND00525	N	<10	300	70	N	--	--	--	--	--	1.7	N
TND00526	N	70	700	70	N	--	--	--	--	--	.2	10
TNR00527	N	30	N	10	N	--	--	--	--	--	.4	N
TNR00528	N	20	N	20	N	--	--	--	--	--	.3	N
TNR00529	N	20	300	70	N	--	--	--	--	--	.2	15
TNH00530	<50	10	N	100	.2	N	N	110	N	3	.6	N
TNH00531	N	10	N	100	.2	N	N	40	<2.0	4	.6	N
TNH00532	N	15	N	100	N	--	--	--	--	--	.7	N
TNR00533	100	50	500	50	N	--	--	--	--	--	.4	N
TNR00534	N	70	N	200	.3	30	N	10	N	2	.4	N
TNR00535	N	20	N	200	N	--	--	--	--	--	.7	N
TNR00536	N	30	N	200	.2	N	N	10	N	2	.4	N
TNR00538	N	70	N	100	<.2	--	N	35	N	22	.2	N
TNR00539	N	20	N	150	.3	10	.2	45	N	--	.6	N

TABLE 3.--ANALYTICAL DATA FOR ROCK SAMPLES FROM THE PILOT MOUNTAINS, MINERAL COUNTY, NEVADA--Continued

Sample	Latitude	Longitude	Fe-pct. s	Mg-pct. s	Ca-pct. s	Ti-pct. s	Mn-ppm s	Ag-ppm s	As-ppm s	B-ppm s	Ba-ppm s	Be-ppm s	Bi-ppm s
TNR00540	38 21 56	117 55 3	2.0	.10	.10	.300	20	1.0	200	100	1,500	1.5	N
TND00541	38 22 52	117 55 36	7.0	7.00	20.00	.070	1,500	15.0	1,000	50	5,000	<1.0	N
TND00542	38 22 50	117 55 43	15.0	1.00	2.00	.070	1,500	1.0	700	50	>5,000	<1.0	N
TNR00543	38 22 5	117 56 0	5.0	.07	.10	.200	200	N	N	150	2,000	1.0	N
TNR00544	38 22 43	117 56 16	5.0	7.00	15.00	.150	1,000	N	N	300	700	1.0	N
TNR00545	38 22 36	117 56 44	.7	5.00	15.00	.050	700	.5	N	20	300	N	N
TNR00546	38 22 36	117 56 44	15.0	1.00	2.00	.070	1,000	.7	2,000	50	500	<1.0	N
TNR00547	38 22 41	117 56 52	7.0	.50	.10	.300	150	2.0	N	500	1,000	1.5	N
TND00548	38 22 13	117 57 3	1.5	2.00	20.00	.100	500	.5	N	100	300	N	N
TND00549	38 22 25	117 56 53	.5	1.50	5.00	.100	1,000	1.5	N	70	200	N	N
TND00550	38 22 25	117 56 53	1.0	5.00	10.00	.070	1,500	1.0	N	50	300	N	N
TND00551	38 23 34	117 55 20	7.0	.70	>20.00	.050	2,000	.7	N	<10	300	N	N
TND00552	38 23 32	117 55 19	2.0	.30	20.00	.100	700	1.0	N	70	1,000	N	N
TNR00553	38 21 22	117 56 24	10.0	.07	2.00	.070	500	.5	N	50	700	2.0	N
TNR00554	38 21 22	117 56 24	2.0	.05	.20	.200	50	N	N	200	500	1.0	N
TNR00555	38 21 22	117 56 24	3.0	.05	.05	.200	30	.5	N	200	1,000	<1.0	N
TNR00556	38 19 30	117 52 20	1.0	.30	.70	.050	30	N	N	30	>5,000	<1.0	N
TNR00557	38 20 9	117 51 59	.7	.05	.50	.100	<10	N	N	100	300	1.0	N
TNR00558	38 20 11	117 52 1	5.0	.15	.30	.150	70	N	N	200	300	1.0	N
TNR00559	38 20 6	117 52 2	.5	.30	.20	.300	10	N	N	200	500	1.0	N
TNR00560	38 19 47	117 52 23	15.0	.30	.50	.100	50	N	N	50	200	1.0	N
TNR00561	38 19 41	117 52 40	10.0	.15	<.05	.200	100	N	N	70	500	1.0	N
TND00562	38 19 39	117 52 37	5.0	.20	.20	.200	20	N	N	50	700	1.0	N
TND00563	38 19 40	117 52 34	5.0	.70	.10	.200	30	N	N	50	500	1.0	N
TNR00564	38 19 53	117 53 0	1.5	.30	.15	.200	15	.5	N	200	700	1.5	N
TNR00565	38 19 53	117 53 0	10.0	.20	.07	.200	15	N	<200	150	700	1.5	N
TNR00566	38 19 53	117 53 0	15.0	.10	.50	.150	30	.5	N	100	300	1.5	N
TNR00567	38 19 44	117 53 1	15.0	.20	.30	.300	500	N	N	200	500	2.0	N
TNR00568	38 19 41	117 53 3	5.0	.20	.20	.200	150	N	N	100	200	2.0	N
TND00614	38 28 51	117 55 32	15.0	1.00	15.00	.200	2,000	3.0	700	20	100	1.5	N
TND00615	38 28 45	117 55 16	10.0	.15	10.00	.070	1,000	10.0	1,000	50	20	1.0	20
TND00616	38 28 44	117 55 12	3.0	1.00	20.00	.100	1,000	.5	300	50	70	1.0	N
TNR00617	38 28 53	117 55 33	7.0	.30	5.00	.050	300	30.0	500	20	150	1.5	200
TND00618	38 28 53	117 55 33	10.0	.15	7.00	.050	500	10.0	700	15	70	1.0	200
TNH00619	38 29 9	117 55 43	2.0	.70	2.00	.300	300	<.5	N	200	500	3.0	N
TNH00620	38 29 2	117 55 50	2.0	1.00	20.00	.150	300	<.5	N	70	300	1.5	N
TNR00621	38 29 3	117 56 32	10.0	.10	2.00	.005	700	5.0	5,000	20	200	1.0	N
TNR00622	38 29 5	117 56 30	10.0	.05	.50	.010	200	3.0	3,000	20	70	N	70
TNR00624	38 29 10	117 56 32	15.0	.70	.70	.050	1,000	3.0	5,000	70	150	1.0	N
TND00625	38 29 5	117 56 20	15.0	.05	.50	.007	300	5.0	1,000	50	50	10.0	70
TND00626	38 29 10	117 56 21	10.0	.03	1.50	.015	300	200.0	500	30	50	3.0	1,000
TND00627	38 29 10	117 56 21	15.0	.07	.07	.002	150	15.0	1,000	50	<20	2.0	700
TND00628	38 29 12	117 56 18	15.0	.50	1.00	.030	300	2.0	1,500	70	100	3.0	100
TNR00629	38 29 13	117 56 19	20.0	.07	.50	.007	300	3.0	10,000	15	100	1.0	50
TNR00630	38 29 15	117 56 19	7.0	.50	.30	.200	70	1.0	>10,000	150	500	1.5	50

TABLE 3.--ANALYTICAL DATA FOR ROCK SAMPLES FROM THE PILOT MOUNTAINS, MINERAL COUNTY, NEVADA--Continued

Sample	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Ni-ppm s	Pb-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	V-ppm s
TNR00540	N	5	100	150	50	N	10	<10	<100	10	N	2,000	200
TND00541	20	100	30	>20,000	N	N	100	150	7,000	5	N	200	30
TND00542	30	10	15	300	30	10	20	2,000	1,500	<5	N	300	100
TNR00543	N	5	100	20	20	N	30	<10	N	15	N	500	200
TNR00544	N	15	70	50	30	N	20	20	N	10	N	200	100
TNR00545	N	N	10	150	<20	N	5	70	<100	<5	N	300	10
TNR00546	50	15	20	150	N	150	70	100	1,500	<5	N	150	50
TNR00547	100	10	70	150	30	15	20	2,000	100	10	N	200	150
TND00548	N	10	30	150	<20	N	20	30	<100	5	N	500	50
TND00549	200	15	30	200	70	15	20	200	>10,000	5	N	200	50
TND00550	70	5	20	50	N	N	5	700	2,000	5	N	300	30
TND00551	N	7	20	150	N	20	15	15	<100	7	N	200	30
TND00552	N	20	70	100	20	20	30	15	<100	10	N	500	100
TNR00553	N	N	300	10	100	7	20	10	100	10	N	1,500	500
TNR00554	N	N	150	5	30	N	10	N	N	10	N	200	150
TNR00555	N	N	100	10	50	N	5	N	N	7	N	500	150
TNR00556	N	5	50	100	30	N	10	N	N	5	N	500	70
TNR00557	N	<5	150	5,000	20	N	20	N	<100	7	N	500	30
TNR00558	N	15	100	5,000	<20	N	5	N	100	10	N	<100	100
TNR00559	N	N	10	15	50	N	<5	N	N	10	N	<100	150
TNR00560	N	5	20	30	<20	N	5	N	N	7	N	100	70
TNR00561	N	10	15	200	50	N	7	N	N	10	N	N	150
TND00562	N	15	10	15	30	N	5	N	N	10	N	100	100
TND00563	N	15	150	50	20	N	20	N	<100	15	N	<100	200
TNR00564	N	N	10	70	30	N	30	N	N	15	N	<100	100
TNR00565	N	<5	20	2,000	20	50	15	N	N	20	N	100	100
TNR00566	N	5	50	500	N	5	70	N	N	20	N	200	200
TNR00567	N	30	10	500	20	10	20	10	N	15	N	<100	200
TNR00568	N	15	100	300	20	N	30	N	N	7	N	150	70
TND00614	N	100	50	20,000	<20	15	50	150	N	10	N	100	100
TND00615	N	70	30	20,000	<20	N	20	100	<100	5	N	100	50
TND00616	N	15	70	300	<20	20	30	70	<100	7	N	500	50
TNR00617	N	20	20	20,000	<20	10	20	50	100	5	N	<100	100
TND00618	N	30	20	20,000	<20	N	20	70	<100	5	N	150	100
TNH00619	N	15	100	150	30	N	30	30	N	10	N	300	100
TNH00620	N	10	50	100	20	N	15	50	N	7	N	1,000	50
TNR00621	50	5	20	200	20	N	5	5,000	5,000	N	N	200	70
TNR00622	N	5	15	200	<20	N	10	700	500	<5	N	<100	70
TNR00624	N	20	70	300	20	N	15	200	300	5	N	300	100
TND00625	N	15	15	1,000	<20	15	10	70	1,000	<5	N	100	150
TND00626	N	20	20	>20,000	<20	N	70	50	300	5	N	<100	50
TND00627	N	20	20	5,000	20	N	50	50	500	<5	N	<100	70
TND00628	20	70	20	1,500	50	10	200	50	150	5	N	150	100
TNR00629	N	5	<10	300	30	15	<5	70	200	<5	N	200	10
TNR00630	N	<5	<10	200	30	N	5	150	150	5	10	500	50

TABLE 3.--ANALYTICAL DATA FOR ROCK SAMPLES FROM THE PILOT MOUNTAINS, MINERAL COUNTY, NEVADA--Continued

Sample	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Te-ppm aa	As-ppm aa	Cd-ppm aa	Zn-ppm aa	Bi-ppm aa	Sb-ppm aa	Tl-ppm aa	Hg-ppm aa
TNR00540	N	20	N	200	<.2	120	--	25	N	34	.3	N
TND00541	N	10	500	30	N	--	--	--	--	--	2.0	140
TND00542	N	10	>10,000	20	.2	--	--	--	N	--	1.9	10
TNR00543	N	30	200	150	.2	N	.3	70	N	4	.3	25
TNR00544	N	20	N	70	<.2	40	26.0	100	N	20	.4	N
TNR00545	N	<10	N	70	N	--	--	--	--	--	.3	15
TNR00546	N	10	2,000	30	N	--	--	--	--	--	23.7	10
TNR00547	N	15	3,000	100	<.2	20	--	--	N	--	1.5	70
TND00548	N	10	N	70	N	--	--	--	--	--	.3	N
TND00549	N	N	7,000	70	<.2	20	--	--	N	--	3.2	1,300
TND00550	N	<10	3,000	50	N	--	--	--	--	--	.2	300
TND00551	N	10	N	<10	<.2	60	<.1	50	N	50	.3	N
TND00552	N	10	N	30	N	--	--	--	--	--	.3	N
TNR00553	N	500	N	100	N	--	--	--	--	--	N	10
TNR00554	N	50	N	150	N	--	--	--	--	--	.2	<10
TNR00555	N	10	N	150	<.2	10	.2	--	N	7	.3	50
TNR00556	N	10	N	70	N	--	--	--	--	--	<.2	<10
TNR00557	N	30	N	70	N	--	--	--	--	--	.4	N
TNR00558	N	15	N	70	.4	70	<.1	20	2.0	--	.8	N
TNR00559	N	10	N	200	.2	N	.2	110	N	2	.9	N
TNR00560	N	<10	N	50	N	--	--	--	--	--	.4	N
TNR00561	N	10	N	70	.2	N	<.1	10	N	2	1.1	N
TND00562	N	10	N	50	N	--	--	--	--	--	.6	N
TND00563	N	20	N	70	<.2	N	N	20	N	1	.5	N
TNR00564	N	10	N	50	.6	10	<.1	35	N	3	2.2	N
TNR00565	N	15	N	70	1.3	50	N	25	N	4	1.6	N
TNR00566	N	20	N	30	.3	70	N	25	<2.0	10	1.2	N
TNR00567	N	20	N	150	.5	<10	<.1	110	3.0	1	1.0	N
TNR00568	N	30	N	200	.3	N	.3	95	<2.0	3	.6	N
TND00614	N	20	300	50	--	>200	3.1	>200	N	25	--	--
TND00615	N	15	500	20	--	>200	11.5	>200	15.0	85	--	--
TND00616	N	10	500	20	--	>200	.7	>200	N	75	--	--
TNR00617	100	<10	300	15	--	>200	1.5	>200	>100.0	>100	--	--
TND00618	70	<10	300	10	--	>200	2.3	>200	>100.0	75	--	--
TNH00619	N	20	700	150	--	160	1.8	>200	115.0	100	--	--
TNH00620	N	10	<200	50	--	180	1.0	190	110.0	100	--	--
TNR00621	N	10	3,000	N	--	>200	>10.0	>200	80.0	>100	--	--
TNR00622	N	<10	300	N	--	>200	3.1	>200	40.0	>100	--	--
TNR00624	50	20	700	50	--	>200	1.7	>200	90.0	>100	--	--
TND00625	N	15	1,500	<10	--	>200	2.0	>200	60.0	>100	--	--
TND00626	70	<10	500	10	--	>200	.2	>200	>100.0	>100	--	--
TND00627	200	10	3,000	N	--	>200	1.2	>200	>100.0	>100	--	--
TND00628	100	30	1,000	10	--	>200	>10.0	>200	>100.0	>100	--	--
TNR00629	N	10	N	N	--	>200	.4	180	30.0	>100	--	--
TNR00630	N	<10	N	70	--	>200	3.4	160	40.0	>100	--	--

TABLE 3.--ANALYTICAL DATA FOR ROCK SAMPLES FROM THE PILOT MOUNTAINS, MINERAL COUNTY, NEVADA--Continued

Sample	Latitude	Longitude	Fe-pct. s	Mg-pct. s	Ca-pct. s	Ti-pct. s	Mn-ppm s	Ag-ppm s	As-ppm s	B-ppm s	Ba-ppm s	Be-ppm s	Bi-ppm s
TND00631	38 29 15	117 56 20	20.0	.10	.30	.010	150	30.0	2,000	30	300	1.0	200
TND00632	38 29 17	117 56 21	10.0	.15	20.00	.030	1,000	50.0	500	15	100	2.0	200
TND00633	38 29 19	117 56 23	15.0	.10	5.00	.020	300	20.0	1,500	30	30	2.0	150
TNR00634	38 29 21	117 56 25	7.0	.15	.70	.100	20	30.0	>10,000	50	500	1.0	>1,000
TND00635	38 29 17	117 56 7	10.0	.15	2.00	.050	300	300.0	1,000	70	200	3.0	20
TNR00636	38 29 14	117 55 56	20.0	.10	.20	.030	200	30.0	1,000	70	<20	1.5	10
TNH00637	38 28 57	117 56 10	5.0	2.00	15.00	.300	1,000	2.0	N	50	500	2.0	30
NT44A	38 22 46	117 51 58	7.0	1.50	15.00	.100	>5,000	30.0	N	20	1,000	10.0	70
NT44B	38 22 46	117 51 58	2.0	1.50	7.00	.300	700	1.5	N	70	700	10.0	<10
NT44C	38 22 46	117 51 58	10.0	1.00	20.00	.100	>5,000	10.0	N	20	500	7.0	N
NT44D	38 22 46	117 51 58	5.0	1.50	10.00	.200	2,000	.5	N	20	2,000	3.0	N
NT72A	38 29 3	117 56 30	20.0	.30	1.00	.070	500	15.0	5,000	300	500	10.0	50
NT72B	38 29 3	117 56 30	20.0	.20	1.00	.020	700	10.0	>10,000	500	500	<1.0	70
NT72C	38 29 3	117 56 30	20.0	.20	1.50	.010	700	7.0	>10,000	500	300	<1.0	50
NT73A	38 28 17	117 59 16	15.0	1.50	10.00	.150	1,500	20.0	200	200	1,000	1.0	70
NT73B	38 28 17	117 59 16	20.0	.07	.50	.070	300	5.0	300	300	200	<1.0	15

TABLE 3.--ANALYTICAL DATA FOR ROCK SAMPLES FROM THE PILOT MOUNTAINS, MINERAL COUNTY, NEVADA--Continued

Sample	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Ni-ppm s	Pb-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	V-ppm s
TND00631	N	7	10	2,000	20	10	15	500	2,000	5	N	500	30
TND00632	N	30	30	>20,000	<20	N	15	150	500	<5	N	<100	70
TND00633	N	10	20	7,000	20	10	10	1,500	1,500	<5	N	100	50
TNR00634	N	N	<10	700	30	15	5	2,000	1,500	5	N	1,000	30
TND00635	N	20	20	>20,000	<20	N	50	70	200	5	N	200	50
TNR00636	N	10	70	2,000	20	10	20	200	500	<5	N	<100	70
TNH00637	N	10	100	500	30	15	30	50	N	10	N	1,500	100
NT44A	300	10	20	700	20	200	7	1,500	N	5	20	150	200
NT44B	N	7	10	300	50	20	<5	50	N	7	N	300	100
NT44C	50	20	30	1,000	20	200	15	70	N	7	20	150	200
NT44D	N	15	50	100	50	<5	20	20	N	10	N	200	150
NT72A	20	5	20	300	20	10	5	1,500	3,000	<5	N	200	100
NT72B	30	7	50	300	20	7	5	3,000	5,000	<5	N	200	70
NT72C	<20	7	100	300	30	<5	5	3,000	3,000	<5	N	200	100
NT73A	50	30	20	7,000	50	20	20	150	300	7	N	200	100
NT73B	N	20	100	500	20	50	15	150	200	5	N	300	150

TABLE 3.--ANALYTICAL DATA FOR ROCK SAMPLES FROM THE PILOT MOUNTAINS, MINERAL COUNTY, NEVADA--Continued

Sample	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Te-ppm aa	As-ppm aa	Cd-ppm aa	Zn-ppm aa	Bi-ppm aa	Sb-ppm aa	Tl-ppm aa	Hg-ppm aa
TND00631	N	<10	1,000	N	--	>200	5.8	>200	>100.0	>100	--	--
TND00632	70	15	2,000	15	--	>200	.4	>200	>100.0	>100	--	--
TND00633	100	10	700	10	--	>200	2.2	>200	>100.0	>100	--	--
TNR00634	N	<10	N	20	--	>200	1.0	110	>100.0	>100	--	--
TND00635	200	10	200	20	--	>200	7.0	>200	14.5	>100	--	--
TNR00636	200	N	700	20	--	>200	2.0	>200	4.5	>100	--	--
TNH00637	N	20	700	70	--	30	1.8	>200	21.0	5	--	--
NT44A	100	15	500	100	N	--	--	--	--	--	--	--
NT44B	150	15	500	150	N	--	--	--	--	--	--	--
NT44C	150	20	1,000	100	N	--	--	--	--	--	--	--
NT44D	N	50	N	200	N	--	--	--	--	--	--	--
NT72A	70	<10	1,500	50	N	--	--	--	--	--	--	--
NT72B	<50	<10	1,000	20	N	--	--	--	--	--	--	--
NT72C	N	<10	700	<10	N	--	--	--	--	--	--	--
NT73A	N	20	5,000	70	N	--	--	--	--	--	--	--
NT73B	70	<10	200	15	N	--	--	--	--	--	--	--

TABLE 4.--Summary of analytical data for rock samples from the Pilot Mountains, Mineral County, Nevada

[S (as in S-Fe), determined by emission spectrography; AA (as in AA-As) determined by atomic absorption. Valid means analytical data are not qualified (L, N, G). L, less than limit of determination (see Tables 1 and 2); N, not detected; G, greater than upper limit of determination. No samples contained detectable amounts of Au, Nb, or Th by emission spectrography. Major elements reported as weight percent; all other elements reported in parts per million]

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Element	Minimum	Maximum	Geom. Mean	Geom. Deviation	Valid	B	L	N	G
S-Fe%	.50	20.0	4.74	2.71	106	0	0	0	0
S-Mg%	.03	7.0	.39	3.90	106	0	0	0	0
S-Ca%	.05	20.0	1.19	6.52	99	0	1	0	6
S-Ti%	.002	.50	.10	2.87	106	0	0	0	0
S-Mn	10.0	5000.0	289.0	4.52	100	0	1	0	5
S-Ag	.50	300.0	3.18	4.97	67	0	8	31	0
S-As	200.0	10000.0	831.0	2.81	36	0	6	60	4
S-B	10.0	700.0	79.7	2.62	104	0	2	0	0
S-Ba	20.0	5000.0	475.0	3.13	101	0	2	0	3
S-Be	1.0	10.0	1.76	1.89	77	0	15	14	0
S-Bi	10.0	1000.0	72.7	3.06	24	0	3	78	1
S-Cd	20.0	300.0	51.1	2.39	24	0	2	80	0
S-Co	5.0	300.0	13.0	2.38	90	0	3	13	0
S-Cr	10.0	700.0	45.2	2.56	97	0	9	0	0
S-Cu	5.0	20000.0	290.0	7.72	99	0	1	0	6
S-La	20.0	100.0	31.5	1.56	76	0	20	10	0
S-Mo	5.0	500.0	18.6	3.13	50	0	2	54	0
S-Ni	5.0	200.0	17.1	2.52	97	0	9	0	0
S-Pb	10.0	5000.0	82.2	5.63	79	0	6	21	0
S-Sb	100.0	7000.0	571.0	3.63	35	0	14	55	2
S-Sc	5.0	30.0	7.95	1.59	87	0	18	1	0
S-Sn	10.0	20.0	15.9	1.49	3	0	0	103	0
S-Sr	100.0	3000.0	314.0	2.44	93	0	12	1	0
S-V	10.0	500.0	93.8	2.06	106	0	0	0	0
S-W	50.0	3000.0	152.0	2.74	21	0	2	83	0
S-Y	10.0	500.0	18.6	1.88	86	0	18	2	0
S-Zn	200.0	10000.0	968.0	2.88	46	0	2	57	1
S-Zr	10.0	300.0	60.4	2.54	98	0	3	5	0
AA-Te	.20	1.3	.30	1.69	16	50	9	31	0
AA-As	10.0	240.0	44.5	2.74	17	60	1	8	20
AA-Cd	.20	26.0	1.30	3.68	27	64	5	8	2
AA-Zn	10.0	190.0	47.5	2.56	23	64	0	0	19
AA-Bi	2.0	115.0	23.1	3.7	15	58	3	21	9
AA-Sb	1.0	100.0	8.44	4.70	27	63	0	0	16
AA-Tl	.20	23.7	.61	2.53	43	59	2	2	0
AA-Hg	10.0	1300.0	38.5	4.92	12	59	2	33	0

Table 5.--Factor loadings for some elements in a six factor R-mode factor analysis of the Pilot Mountains geochemical data

[Oblique projection using the extreme elements as reference vectors]

1	2	3	4	5	6
La 1.0	Ni 1.0	Mg 1.0	W 1.0	Sb 1.0	Te 1.0
B .98	Cr .92	Cd .81	Mo .68	Pb .93	Tl .80
Zr .92	Co .91	Ti .61	Be .59	Hg .92	
Ti .86	Cu .55	Mn .56	Mn .59	As .78	
V .86	Fe .50	Ba .51	Cu .56	Ag .72	
Ba .76		Zn .49	Fe .53	Zn .64	
Cd .76		Ca .42		Bi .61	
Sc .66				Tl .54	
Cr .65				Cd .49	Ca -.67
Y .55					Bi -.70
Ca -.54		Bi -.75		Sc -.51	Sr -.74