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GEOLOGICAL SURVEY

Geochemical Signature of the Divide Silver-Gold District, Esmeralda County, Nevada

by

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ABSTRACT

The Divide District was an important producer of gold and silver between 1911 and 1940 from epithermal veins near a 16-m.y.-old rhyolite dome. The vein deposits are associated with silicification and potassic alteration of volcanic rocks. The content of pyrite and base-metal sulfides is relatively low except for some zones with abundant molydenite. Data for 34 elements in 109 samples of rocks are reported here. Two types of deposits are the focus of this study: gold-quartz veins close to the rhyolite dome, and gold-silver-quartz veins lower on Gold Mountain and Hasbrouck Peak. Gold is generally associated with As, Mo, Sb, and Ag. Although silver is generally associated with gold, it tends to have somewhat different distribution in association with Cu and Sb, generally farther from the dome and probably deeper in the system. Molybdenum is abundant, particularly close to the dome; much of the Mo seems to be earlier than the precious metals in quartz-molybdenite stockworks. Mercury and thallium are enriched in the district, but not in the Ag-Au veins. Zoning in the district is best characterized by relative enrichments of Au-As-Mo close to the rhyolite dome, and Ag-Sb-base metals relatively richer away from the dome or deeper in the system.

INTRODUCTION

The Divide District, located about 9 km south of Tonopah, Nevada, in Esmeralda County (fig. 1), was an important producer of gold and silver between 1911 and 1940 with recorded production of more than 32,000 oz. gold and 3 million oz. silver (Bonham and Garside, 1979). Geology and ore deposits of the Divide District are similar to the more famous Tonopah District to the north, but recent K/Ar dating demonstrates that the Divide deposits must be a few million years younger than those at Tonopah. Vein or lode deposits of silver and gold occur in a rhyolite dome and in adjacent silicified Tertiary tuffs. The Divide District was idle for many years, but the rise in precious-metal prices in the 1970's prompted renewed exploration activity for deposits that might be amenable to bulk-mining techniques. Falcon Exploration Co. has been mining silver-gold ore from an open pit on the site of the former underground Tonopah Divide mine. The former Hasbrouck Divide Mine under Hasbrouck Peak (fig. 1) has been drilled as a potential bulk-minable Au-Ag deposit by Cordex Exploration. Good natural exposures supplemented by new excavations for exploration and mining make the Divide District much more favorable for study and sampling than the virtually inaccessible Tonopah District.

This study was undertaken in 1982 as part of the Conterminous United States Mineral Appraisal Program (CUSMAP) in the Tonopah 1 x 2 degree quadrangle to provide modern geochemical description and interpretation of an important historic district. This pilot study will provide standards for assessment of precious-metal resource potential in other parts of the Tonopah quadrangle, and will be useful as a guide for mineral exploration in the region. One hundred nine samples were collected from outcrops, mine excavations, and dumps and were analyzed for 34 elements. Fifteen samples were studied under the petrographic microscope. Reconnaissance geochemical studies are in progress on 42 other precious-metal deposits and prospects in the Tonopah quadrangle.

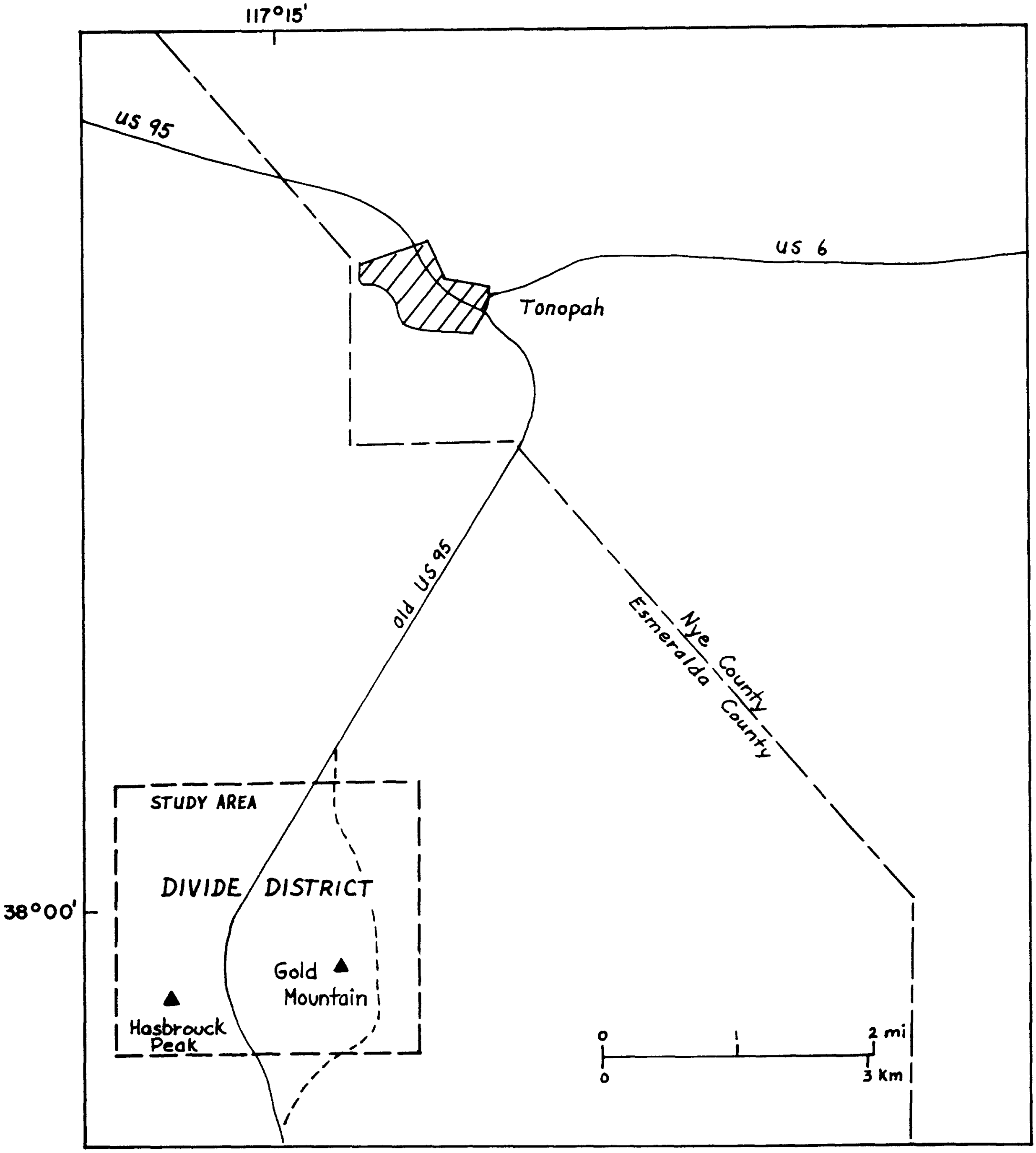

Figure 1. Location of the Divide District.

SAMPLING AND ANALYTICAL PROCEDURES

Sampling procedures and analytical methods used are rapid and cost-effective, suitable for use in Government mineral assessment programs or industry exploration. Sampling was done in May 1982. All samples collected for chemical analysis were composite rock samples collected from 1 meter or more of outcrop, or from mine exposures, dumps, or rotary drill holes. In most cases "high grade" material was selected according to visual criteria such as quartz veins, alteration, or iron oxides in an effort to accentuate geochemical anomalies. No samples were collected of "unaltered" rocks because we were not interested in establishing background values. In our experience, samples with visible sulfide or oxide minerals contain enhanced elemental signatures that are useful in characterizing the occurrence; assaying is not an intent of these studies. Notes on lithology, alteration, and structure were made at all sites, and a generalized geologic map was made while sampling. Brief descriptions of analyzed samples are in Appendix 1.

All samples were crushed and then pulverized between ceramic plates to attain a grain size smaller than 100 mesh (0.15 mm). No other preparation was required for these rock samples. 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 concentrations 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 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).

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

Upon completion of the analytical work results were entered into a computer-based system called RASS (Rock Analysis Storage System) 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 are listed in Table 3, and a statistical summary of the analytical data is in Table 4.

GEOLOGIC SETTING

Tertiary rocks and precious-metal deposits of the Divide District (Fig. 1) are well described by Knopf (1921), who studied the District during the peak of activity, and by Bonham and Garside (1979), who applied modern methods and concepts. Four Tertiary formations are exposed in the study area: the Miocene Fraction Tuff, Miocene Siebert Formation, the Miocene Divide Andesite, and the intrusive Oddie Rhyolite of Miocene age (16 m.y.; Bonham and Garside, 1979). The extrusive rocks were deposited between about 20 m.y.b.p. and 16 m.y.b.p. according to K/Ar age studies and fossil determinations presented and interpreted by Bonham and Garside (1979). The Fraction Tuff (Tonopah Summit Member of Bonham and Garside, 1979), the oldest unit in the study area, is typically a poorly welded vitric-lithic tuff with coarse clasts of pumice and lithic fragments up to 20 cm in size. The base of the Fraction Tuff is not exposed nor cut in mine shafts. The Siebert Formation is a heterogenous mixture of fine- to coarse-grained sedimentary and pyroclastic rocks. In the study area, typical lithologies are unconsolidated tuffaceous shale, bedded tuffaceous sandstone and lapillistone, conglomerate, and lithic tuff. The probable lithic tuff beds are present in a few small areas of the Tonopah Divide mine; they measure less than 2 m thick and less than 100 m on strike, and are distinguished by coarse, angular clasts of volcanic rocks, black chert and black siliceous shale. The clasts of sedimentary rocks are from pre-Tertiary formations not exposed in the Divide District. Alternatively, the "lithic tuff" might be a hydrothermal breccia, if explosive emplacement could explain the mixing of diverse lithic fragments. These beds are favored hosts for disseminated mineralization within the Siebert. The Divide Andesite occurs chiefly to the east of the study area; it is faintly layered with distinct phenocrysts of feldspar, biotite, and hornblende. The layered rocks in the district generally have low dip but are rotated to steep dips near intrusive contacts. The Oddie Rhyolite occurs chiefly as a domal intrusion that forms the core of Gold Mountain, and there are some small satellitic intrusions. It is white to pinkish gray, and porphyritic with sparse quartz or K-feldspar phenocrysts set in an aphanitic matrix. Vertical flow banding is well developed along the intrusive contact. Where Tertiary rocks are bleached and silicified near the intrusive contact, distinction of white, siliceous, argillized rocks derived from Siebert Tuff and Oddie Rhyolite can be difficult. Normal faults with relatively minor displacement cut the Tertiary rocks. A zone of closely spaced, north-south trending fractures cuts the rocks between the Tonopah Divide mine and the saddle at the top of Gold Mountain; several old gold mines are in this fracture zone suggesting that the fractures controlled those gold deposits.

Two types of ore have been mined in the Divide District (Knopf, 1921; Bonham and Garside, 1979). Gold veins were first discovered in 1902, and silver lodes were encountered a few years later. The gold deposits occur as thin veins in Oddie Rhyolite and adjacent Siebert Formation on the flanks of Gold Mountain. These veins contain native gold and sparse pyrite (where unoxidized) in very fine-grained quartz. Silver sulfides are sparse and base-metal sulfides are absent. Adjacent wall rocks are silicified and argillized. The silver deposits were encountered by accident while crosscutting toward gold veins (Knopf, 1921). They occur chiefly in the Fraction Tuff and account for most of the production in the district. Two varieties of silver ores are present: silver chlorides and silver sulfides, both probably formed by oxidation and supergene enrichment (Knopf, 1921). Silver values are very low in outcropping veins. The lodes are aggregates of many small veins of quartz that also contain sericite and adularia. The upper 30 m of the lodes contain low silver values, but notable yellow-orange oxides of iron and molybdenum (limonite and molybdite) are present. Limonite gives way at depth to pyrite, molybdite to powellite (calcium molybdate), and argentite (Ag_2S) and cerargyrite ($AgCl$) are encountered. Most of the shafts did not reach the water table, thus were in the oxidized zone. The Tonopah Divide shaft went to a depth of 420 m in 1923 and encountered primary sulfides, but the minerals were never described (Bonham and Garside, 1979).

The Tonopah Hasbrouck mine has extensive workings under Hasbrouck Peak, about 2 km west of Gold Mountain (fig. 1). This area was studied very briefly by us because more detailed studies are in progress by B. R. Berger (U.S. Geological Survey) and J. Graney (Cordex Exploration). Rocks on Hasbrouck Peak are welded tuffs and volcaniclastic sediments of the Siebert Formation that are cut by many high-angle faults that served as conduits for abundant silicification. Some of the faults contain breccia interpreted to be of hydrothermal origin. Zones of siliceous sinter occur within the bedded Siebert sequence, opaline silica occurs at the top of the peak, and features indicating hot spring discharge occur at the surface (Silberman, 1982).

Mineralization drilled in the 1970's is reported to extend to depths greater than 300 m, and sixteen samples from silicified zones contain an average of 0.06 oz. Au per ton and 1.26 oz. Ag per ton (Bonham and Garside, 1979). Our brief sampling on Hasbrouck Peak likewise indicates that highest Ag-Au values are in samples with abundant fine-grained silica.

Hydrothermal alteration is widespread in the Divide District (Bonham and Garside, 1979). The alteration generally is zoned around fractures and veins and consists of a central zone of very fine quartz or chalcedony with minor adularia, and in places barite, surrounded by an envelope of quartz-sericite with minor pyrite. The quartz-sericite grades outward into a broad zone of propylitic alteration characterized by chlorite, montmorillonite, and calcite, particularly in the Fraction Tuff.

Tuffaceous rocks of the Siebert Formation commonly contain silica-rich streaks or fragments up to about 5 cm wide and generally less than a centimeter thick; the material is chalcedonic silica and has angular to rounded form and some pieces seem to be bent or folded. This material has the appearance of ripped-up pieces of siliceous sinter; it does not seem to be related to precious metals, but suggests that during Siebert time silica was rich and mobile, probably associated with hydrothermal activity. A different type of silica occurs in a zone hundreds of meters wide astride the Oddie Rhyolite intrusive contact on Gold Mountain that is pervasively silicified and bleached. In thin sections this alteration is seen to be very fine-grained quartz flooding with relatively minor amounts of sericite; feldspars generally survive but volcanic fragments are highly altered. Thin veinlets of molybdenite are common in this type of silica flooding, and some samples contain gold (according to chemical analyses). Small amounts of a highly birefringent, fine-grained mineral that resembles alunite were observed in several thin sections. However, there does not seem to be much, if any, acid alteration of the alunite type at Divide. Most of the alteration is of the neutral to alkaline pH type that is characteristic of the upper zones of an intermittently boiling hot spring system.

A very shallow depth of formation of primary ores has been advocated by Knopf (1921) and Bonham and Garside (1979). Knopf noted the presence of very fine-grained quartz, chalcedony, and opal in the veins, and the glassy selvage along the contact of the Oddie Rhyolite. Bonham and Garside (1979) used stratigraphic evidence to define the depth regime. Geologic and K/Ar ages indicate that the ores formed between 16.4 and 15.3 m.y. ago, shortly after deposition of the Siebert Formation and intrusion of the Oddie Rhyolite. Bonham and Garside (1979, p. 125) deduce that the youngest tuff sequence was not much thicker than now exposed and that "the silicification and low-grade mineralization in the Siebert Formation and associated gold-bearing veins in and adjacent to the Oddie Rhyolite represent the conduits of old hot springs which vented onto the Tertiary land surface." Siliceous sinter deposits at the top of Hasbrouck Peak (elevation 1,913 m) testify to surface discharge during at least one period. Stockwork veins of quartz with MoS_2 in the Oddie Rhyolite at the top of Gold Mountain (elevation 2,018 m) must have had some cover during their formation. Mineralization extends to depths of at least 300 m at Hasbrouck Peak (Bonham and Garside, 1979). The base of economic mineralization at the Tonopah Divide mine was at 300 m depth (about 1,550 m elevation), and sulfide minerals are found below that level. Thus the vertical range of mineralization is quite large.

In summary, for approximately one million years in the Miocene there was a rapid sequence of multiple stages of extrusion, intrusion, brecciation, and hot spring activity. In many locations, these processes overlapped in time and space. Pressure or temperature may have effected the distribution of gold and silver deposits. Most of the gold veins occur at high elevations close to or in the Oddie Rhyolite dome. The silver lodes occur below about 1,860 m elevation, and chiefly in permeable Fraction Tuff. The details of this pattern and measurements of temperatures (as from fluid inclusions) are not available, but the general pattern is that recognized for epithermal Au-Ag systems by White (1981) in which the "Au-dominated" zone occurs at shallowest levels, and the "Ag-dominated" zone occurs deeper in a hot spring system.

GEOCHEMICAL RESULTS

The metals of economic interest in the Divide District, Ag and Au, tend to be associated with Cu-Pb-As-Sb, and there are some interesting enrichments in Mo, Hg, and Tl that probably are related to the precious-metals system but occur outside of the ore zones. In general, altered rocks and ores in the district contain relatively low concentrations of base metals (Cu, Co, Ni, Pb, and Zn), possibly because this seems to be a low-sulfide system as suggested by the sparse occurrence of pyrite and other sulfide minerals and of iron oxides. Examination of the total data set for 109 samples utilizing tools such as correlation analysis and scatterplots reveals few strong inter-element relations and no simple zoning relations. In the total data set, Ag is most strongly associated with Cu; highest correlations of Ag include Cu ($r = .59$), Sb (.52), Au (.51), As (.49), and Mo (.46). Gold is most closely associated with As; highest correlations of Au include: As (.62), Sb (.58), Ag (.51), Mo (.49), and Cu (.40). Lead and zinc are highly correlated but show weak correlation with Ag and Au. However, Pb and Ag are highly associated in most Ag-rich deposits of the Tonopah area (Nash, unpublished data, 1984). More coherent trends are apparent in subsets of the data defined by geologic relations discussed previously. Much of the scatter in the total data set is produced by samples representing different types and different stages of mineralization.

Q-mode factor analysis (Davis, 1973) was used in an attempt to classify samples into groups and to determine if chemical attributes are sufficiently distinct to distinguish between Au vein samples and Ag-Au lode samples. Q-mode analysis produced some interesting sample groupings, but could not identify a set equivalent to gold veins. A simple three-factor varimax model explains 90 percent of the chemical terms of three sample types:

1. sample TNR237--barren clay-rich Siebert Formation
2. sample TNR281--silver-gold vein wallrock (and other Ag-rich samples of Fraction Tuff)
3. sample TNR206--altered but barren Oddie Rhyolite.

R-mode factor analysis (Davis, 1973), useful for summarizing relations between variables, suggests several groups of associated elements. A six-factor model explains 68 percent of the chemical variance and shows the following six groups of associated elements:

1. Rock-forming elements: Ti (end member), Mg, Ba, La, V, Y, Zr.
2. Gold suite: Au (end member), As, Mo, Sb, Ag, Sr, and Cu.
3. Base-metal suite: Zn (end member), Pb, Cu, Cd, Fe, As (and weak loadings of Mo, Sb, and Ag).
4. Metasomatic or geothermal suite: B (end member), Ca, Be.
5. Barren sulfide suite: Ni (end member), Cr, Mn, and Co.
6. Oxidation enrichment: Tl(end member), Mn.

The names of the groups given above are possible explanations for the elemental groups. More useful information on chemical relations can be extracted from two subsets defined a priori by geology. One is a "gold subset" of samples from higher elevations on Gold Mountain that consists of altered Oddie Rhyolite and some samples of altered Siebert Formation within 20 m of the rhyolite dome. This subset of 32 samples consists of rocks collected near known gold-vein occurrences. A second "silver-gold subset" of 18 samples is from lower elevations and consists of Fraction Tuff in or near known silver-gold lodes. The subsets were not determined by chemistry and possibly should include some additional samples, the status of which is not certain. Summary statistics and correlation coefficients for the two subsets are in Table 5. These limited data suggest that the upper part of the system is somewhat different from the lower part. In the upper part ("gold subset"), which is closest to the rhyolite dome, Ag is associated with Cu, Pb, As, Sb, and Mo, whereas Au is associated with Ca, Ag, Cu, Pb, As, and Sb. Most of these associations are statistically significant at the 95 percent level of confidence. In the lower level subset ("silver-gold subset"), Ag is associated with Cu and Sb, whereas Au is associated with Be, Mo, As, and Sb.

Application of discriminant function analysis (Davis, 1973) to the gold and silver-gold subsets indicates that Cu, Mg, Ca, Tl, Mo, and V, as well as Ag and Au, are significantly different between the two groups and properly classify all of the samples in those groups. Of these elements, Cu, Mg, Mo, and V are higher in the silver-gold subset, and Ca and Tl higher in the gold subset. Using the group means for the gold and silver-gold environments as defined from Gold Mountain, discriminant function analysis classified five of eight samples from the Tonopah Hasbrouck mine and outcrops on Hasbrouck Peak as most similar to the silver-gold-type deposit. The three samples from Hasbrouck Peak classified as similar to the gold-type deposits (numbers 266, 267, and 269) are highly silicified rocks from the upper part of the Peak. These results for Hasbrouck Peak seem reasonable, but are based on too few samples to be a rigorous test of how the Hasbrouck mineralization compares in detail with that in Gold Mountain.

Some speculative conclusions can be offered regarding the distribution of some elements in the Divide District. (1) Silver and gold are not consistently associated throughout the District, as is also known from their variable mineralogy and distribution in deposits. (2) Molybdenum is abundant in the upper part of the system, especially as quartz-molybdenite stockwork veins at the top of Gold Mountain, but gold is not in this stage of deposition. (3) Silver seems to occur chiefly with Cu, possibly as a sulfosalt in the primary ore, and to a lesser extent with Pb and Au.

(4) There is no clear indication of gangue element association with Ag and Au, although the Au-Ca association in the "gold subset" suggests the possibility of calcite in the gold-bearing veins, which is not evident in the field. Some statistical tests indicate a strong Ba-Mn association, such as would be produced by barite plus Mn-oxides in an oxidized assemblage; Ag does not correlate with Ba-Mn as it does in some deposits.

Bonham and Garside (1982) present data for 13 elements in more than 600 samples collected from a large area surrounding the Divide District. Data for 224 samples from the Divide District are summarized in Table 6, along with a table of correlation coefficients. The data from Bonham and Garside (1982) are generally similar to ours but show a wider range of values because of differences in samples collected. Comments on this additional data from Bonham and Garside (1982) will be made in the next section.

DISCUSSION

Elements enriched in the Divide District are characteristic of those observed in many epithermal deposits (Berger and Eimon, 1982; Silberman, 1982; White, 1981). The observed enrichments of Ag and Au with As-Sb-Cu-Pb are notably the same as observed in some modern hot spring systems (e.g., Weissberg, 1969; Ewers and Keays, 1977). In the Divide District, As is the best guide for Au, and Sb for Ag, although both As and Sb are useful guides for the precious metals. The ratio As:Sb does not show systematic lateral variation, but the ratio is somewhat higher in samples from higher elevations.

The low content of base metals observed in the Divide District is characteristic of many epithermal Au-Ag deposits (White, 1981), and is particularly characteristic of deposits in volcanic rocks elsewhere in the Tonopah quadrangle (Nash and Siems, unpub. data). Although elements such as Cu, Pb, and Zn show variability and some useful associations with Au or Ag, the content is much lower than in most other ore environments. Using the same technique of "high grade" sampling that emphasizes selection of iron-oxide and sulfide-bearing samples, as used here, yields base-metal values an order of magnitude higher for most interesting gossans and prospects in other districts in the Tonopah quadrangle.

Mercury often is a pathfinder for Ag-Au deposits as an outer halo. Bonham and Garside (1982) report anomalous Hg values in excess of 1 ppm with maximum values occurring in zones above gold deposits under Gold Mountain and Hasbrouck Peak. For 224 samples in the Divide District, the mean Hg value is 2.00 ppm, with a maximum of 137 ppm. Correlation coefficients of Hg with Ag and Au are -.03 and -.02, respectively, and in this data set Hg shows no significant positive correlations with other elements.

Thallium also is proposed as a pathfinder for epithermal systems (Ewers and Keays, 1977). Thallium is enriched in the Divide samples; the mean concentration of 2.36 ppm Tl is higher than that reported for altered volcanic rocks of the Republic, Washington, Au-Ag epithermal deposits with a mean content of 1.84 ppm (Ikramuddin and others, 1983). Studies of hot spring systems (Weissberg, 1969; Ewers and Keays, 1977) suggest that thallium is concentrated in the uppermost zone of hot springs, apparently by cooling below 200°C. The highest value observed here, 9.5 ppm in sample TNR261, comes from a silicified zone in Fraction Tuff north of Hasbrouck Peak. Much higher Tl contents are observed at the Carlin gold deposit (Radtke and others, 1980) and in silicified zones at the Round Mountain gold deposit (Berger and Eimon, 1982). In the Divide District, thallium does not show a direct correlation with Ag or Au, as shown by low correlation coefficients for sample pairs, but like Hg, may be a useful pathfinder.

Tungsten is enriched in many epithermal systems (B. R. Berger, oral commun., 1983) and is enriched in the Divide District (Bonham and Garside, 1982). Spectrographic analyses, with a limit of detection of 50 ppm, could detect W in only 3 of 109 samples. The W values of 70 to 150 ppm occur in silicified zones with no consistent spatial distribution. The data of Bonham and Garside (1982) for 224 samples from the Divide District show W values range up to 64 ppm and average 2.3 ppm. In the 224 samples, W is independent of Ag and Au (correlation coefficients are .00 and .04, respectively), but W does have significant association with Zn and As. Analytical methods that are reliable to 1 ppm or less are required to document the distribution of tungsten.

Bismuth is useful for distinguishing some types of ore environments (Nash, unpub. data), but appears to have limited utility within the Divide system. Our analyses show that Bi is consistently below 2 ppm in the Divide District. Bonham and Garside (1982) report Bi values to less than 100 parts per billion (ppb), with a mean of 209 ppb Bi and a maximum value of 5.73 ppm for the 224 samples from Divide. A zone with Bi values in the 200-500 ppb range occurs on the south side of Gold Mountain and Hasbrouck Peak, and a cluster of values greater than 1 ppm occurs on the southwest flank of Gold Mountain, displaced from the gold or silver lodes.

Molybdenum is enriched in several environments in the Divide District. Contents as high as 0.77 percent Mo were recorded in the upper levels of the Tonopah Divide mine (Bonham and Garside, 1979), apparently the result of supergene enrichment. An intriguing occurrence of Mo is in stockwork quartz veinlets at the top of Gold Mountain that yield values in excess of 100 ppm. Mo correlates highly with Ag and Au in some subsets of the data, but overall does not correlate significantly with the precious metals, suggesting that Mo was introduced during a separate stage. Bonham and Garside (1982) report the mean Mo content of 224 samples is 336 ppm and a maximum value is 10,780 ppm; in this data set, Mo correlates significantly with Ba but not with other elements. Bonham and Garside (1982, p. 29) speculated that the "Mo leakage halos suggest to us that porphyry mineralization may be present at depth in the Divide District." Molybdenum is a trace metal in most Ag-Au deposits in the Tonopah area, both in sedimentary and volcanic host rocks (Nash and Siems, unpub. data, 1984). The Mo at Divide seems to fit the general pattern of enrichment in Ag-Au systems, but some probably was emplaced prior to the precious metals.

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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 Divide District, Nevada

Element determined	Analytical method	Determination limit (ppm)[1]	Reference
Au	Atomic absorption	0.05	Thompson and others, 1968
As	-----do----------	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.

EXPLANATION FOR TABLE 3

Explanation of sample number coding: the first digit represents the project (T=Tonopah CUSMAP); the second character represents the sampler (N=Nash); the third character represents sample media (R, rock in place; D, picked from dump; H, cuttings from rotary drill hole).

Additional chemical data not reported in Appendix 1:

S-As: arsenic determined by emission spectrography with a limit of detection of 200 ppm: samples 281, 295, and 299, 200 ppm; samples 218, 230, 252, 263, 264, 265, and 268, detected at 200 ppm; all other samples As not detected.

S-Au: gold determined by emission spectrography with a limit of detection of 10 ppm; samples 263, 15 ppm, 295, 10 ppm, 299, 10 ppm; samples 218, 238, and 257, detected at 10 ppm; all other samples Au not detected.

S-Bi: bismuth by emission spectrography with a limit of determination of 10 ppm; sample 297, 50 ppm; all other samples no detectable Bi.

S-Cd: cadmium by emission spectrography; no Cd detected at 20 ppm limit of determination.

S-Sb: antimony by emission spectrography with a limit of determination of 100 ppm; sample 263, 100 ppm, samples 10, 13B, 259, 265, 266, 270, < 100 ppm; all others not detected.

S-Sn: tin by emission spectrography; none detected at 10 ppm limit of determination.

S-W: tungsten by emission spectrography with a limit of determination of 50 ppm; sample 297, 150 ppm; 287, 100 ppm, 271, 70 ppm, samples 9C, 10, and 286, <50 ppm.

S-Zn: zinc by emission spectrography with a limit of determination of 200 ppm; sample 297, 2000 ppm, 246 and 279, 200 ppm; all others not detected.

S-Th: thorium by emission spectrography with a limit of determination of 100 ppm; none detected.

TABLE 3.--ANALYTICAL DATA FOR ROCK SAMPLES FROM THE DIVIDE DISTRICT, 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	B-ppm s	Ba-ppm s	Be-ppm s	Co-ppm s
TNR00252	37 59 43	117 14 40	1.5	.03	.20	.070	150	100.0	20	700	7	<5
TNR00253	37 59 43	117 14 42	.3	.03	.20	.070	150	10.0	20	500	10	N
TNR00254	37 59 43	117 14 42	1.0	.30	.20	.200	150	15.0	30	1,500	5	N
TNR00255	37 59 43	117 14 44	1.0	.30	.30	.200	100	10.0	15	1,000	5	N
TNR00256	37 59 43	117 14 49	.7	.15	.15	.150	150	15.0	20	1,000	5	<5
TNR00257	37 59 43	117 14 51	1.0	.15	.20	.100	500	50.0	20	700	5	<5
TNR00258	37 59 47	117 14 42	1.0	.05	.15	.100	200	50.0	20	700	5	N
TND00259	37 59 44	117 15 31	1.5	.10	1.00	.070	700	2.0	30	2,000	15	5
TND00260	37 59 44	117 15 31	2.0	.70	.20	.300	1,000	2.0	30	2,000	7	7
TNR00261	37 59 50	117 15 59	1.0	.20	.10	.150	300	50.0	15	1,500	2	7
TND00262	37 59 35	117 15 59	1.0	.30	.15	.150	150	20.0	20	1,000	3	5
TND00263	37 59 29	117 15 53	1.5	.02	.05	.100	30	1,500.0	15	1,000	5	N
TND00264	37 59 37	117 15 57	1.0	.15	.05	.100	70	10.0	50	1,000	3	N
TNR00265	37 59 30	117 15 50	1.0	.05	.30	.050	30	500.0	30	700	7	N
TNR00266	37 59 28	117 15 46	.7	.07	.70	.100	50	10.0	20	700	5	N
TNR00267	37 59 29	117 15 47	.2	.30	1.50	.200	100	7.0	150	150	5	N
TNR00268	37 59 33	117 15 51	1.5	.10	.15	.100	200	15.0	20	1,000	3	5
TNR00269	37 59 34	117 15 50	1.5	.07	.15	.100	150	20.0	30	1,000	5	N
TNR00270	37 59 19	117 15 32	.7	.05	.10	.070	50	20.0	30	700	7	N
TNR00271	37 59 24	117 15 37	2.0	.15	.10	.150	500	20.0	30	1,000	3	7
TNR00272	37 59 21	117 15 34	.7	.10	.20	.100	70	15.0	50	1,000	5	N
TNR00273	37 59 21	117 15 34	1.0	.30	.10	.150	150	3.0	500	700	5	N
TND00274	38 0 10	117 15 37	3.0	.30	.15	.200	500	500.0	20	1,500	3	5
TNR00275	37 59 48	117 14 42	1.0	.15	.10	.070	500	10.0	20	1,000	5	5
TNR00276	37 59 48	117 14 41	2.0	.10	.05	.070	200	15.0	20	500	7	N
TNR00277	37 59 52	117 14 36	.7	.10	.10	.150	50	30.0	50	700	5	N
TNR00278	37 59 50	117 14 32	1.5	.15	.20	.100	1,000	50.0	30	700	5	<5
TNR00279	37 59 48	117 14 38	2.0	.15	1.00	.070	700	50.0	30	300	10	7
TNR00280	37 59 49	117 14 30	.3	.03	.15	.050	100	70.0	10	300	5	N
TNR00281	37 59 49	117 14 30	2.0	.03	2.00	.015	300	30.0	15	70	10	N
TNR00282	37 59 36	117 14 36	.5	.10	<.05	.100	100	20.0	15	700	3	N
TNR00283	37 59 36	117 14 36	.5	.15	<.05	.150	300	20.0	30	700	5	<5
TNR00284	37 59 35	117 14 36	.2	.15	<.05	.070	50	15.0	20	700	5	N
TNR00285	37 59 36	117 14 36	.2	.05	.05	.070	50	15.0	15	500	5	N
TNR00286	37 59 36	117 14 36	1.5	.20	.10	.200	1,000	5.0	20	1,000	5	5
TNR00287	37 59 36	117 14 33	.5	.10	.07	.100	5,000	30.0	20	2,000	5	20
TNR00288	37 59 36	117 14 33	1.5	.50	.20	.200	150	20.0	10	700	3	7
TNR00289	37 59 36	117 14 33	2.0	.30	.15	.200	100	15.0	30	700	3	5
TNR00290	37 59 36	117 14 33	2.0	.50	.10	.200	150	50.0	30	1,000	7	<5
TNR00291	37 59 36	117 14 32	2.0	.70	.20	.200	300	1.0	30	1,000	7	10
TNR00292	37 59 36	117 14 32	.7	.10	.05	.070	300	3.0	20	300	5	N
TNR00293	37 59 36	117 14 32	.7	.10	.10	.070	>5,000	1.0	15	2,000	5	5
TND00294	37 59 34	117 14 41	1.5	.20	.20	.200	200	15.0	20	700	5	5
TND00295	37 59 45	117 14 57	3.0	.20	.15	.200	100	150.0	20	1,000	7	N
TND00296	37 59 48	117 14 53	1.5	.20	.10	.200	150	10.0	20	1,000	5	<5

TABLE 3.--ANALYTICAL DATA FOR ROCK SAMPLES FROM THE DIVIDE DISTRICT, NEVADA--Continued

Sample	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sc-ppm s	Sr-ppm s	V-ppm s	Y-ppm s
TNR00252	<10	30	20	20	N	5	100	<5	100	20	10
TNR00253	<10	<5	30	N	<20	5	15	<5	150	15	<10
TNR00254	<10	7	50	N	N	5	10	5	200	70	10
TNR00255	10	7	50	7	N	5	10	<5	200	50	<10
TNR00256	10	5	50	N	N	5	10	<5	200	20	10
TNR00257	<10	15	50	N	<20	7	30	<5	150	30	10
TNR00258	<10	15	30	100	<20	5	150	<5	150	15	10
TND00259	20	10	30	10	N	10	10	N	300	20	<10
TND00260	10	7	70	10	N	5	20	5	200	70	10
TNR00261	10	15	20	N	N	5	20	<5	200	20	10
TND00262	15	10	20	N	<20	10	15	5	200	30	10
TND00263	10	100	20	30	N	5	20	<5	200	15	10
TND00264	<10	5	50	15	N	7	10	<5	150	50	<10
TNR00265	<10	20	30	20	N	7	20	N	300	20	<10
TNR00266	10	5	20	20	N	7	15	<5	200	30	10
TNR00267	15	5	30	N	N	5	10	5	200	70	<10
TNR00268	10	7	30	N	N	7	20	<5	200	20	10
TNR00269	15	10	50	10	N	5	15	5	200	50	10
TNR00270	10	5	20	10	N	5	15	<5	300	20	<10
TNR00271	30	15	50	20	N	30	1,000	<5	200	30	10
TNR00272	<10	7	30	30	N	5	15	5	200	50	<10
TNR00273	<10	5	70	5	<20	<5	20	<5	150	70	10
TND00274	10	50	50	20	N	5	200	5	500	70	15
TNR00275	<10	15	30	10	<20	7	50	<5	200	20	10
TNR00276	<10	5	20	150	<20	5	70	<5	<100	30	10
TNR00277	<10	7	30	50	<20	5	30	<5	300	50	10
TNR00278	10	20	20	100	N	5	30	<5	200	30	<10
TNR00279	<10	20	20	70	N	5	100	5	200	30	10
TNR00280	<10	7	20	5	N	5	20	N	N	10	<10
TNR00281	<10	15	20	150	N	5	30	<5	300	20	10
TNR00282	<10	5	20	N	N	5	50	<5	100	20	<10
TNR00283	<10	5	30	N	<20	5	70	<5	100	20	<10
TNR00284	<10	N	30	N	N	5	10	<5	150	20	<10
TNR00285	<10	N	30	7	N	5	20	<5	200	15	<10
TNR00286	10	7	50	10	20	5	100	5	200	50	10
TNR00287	<10	15	50	15	<20	5	500	5	150	20	10
TNR00288	30	5	70	N	N	7	10	7	100	50	10
TNR00289	15	20	50	7	N	7	20	5	150	70	10
TNR00290	10	20	70	1,500	N	5	70	7	700	200	10
TNR00291	10	10	70	5	20	5	50	5	150	70	15
TNR00292	<10	<5	50	N	20	5	70	<5	100	15	10
TNR00293	<10	5	30	N	N	5	100	<5	150	30	<10
TND00294	<10	15	50	15	N	5	15	5	100	70	10
TND00295	10	20	30	50	N	5	150	5	200	150	10
TND00296	<10	5	50	N	N	5	15	5	200	70	10

TABLE 3.--ANALYTICAL DATA FOR ROCK SAMPLES FROM THE DIVIDE DISTRICT, NEVADA--Continued

Sample	Zn-ppm s	Zr-ppm s	Au-ppm aa	Te-ppm aa	As-ppm aa	Zn-ppm aa	Cd-ppm aa	Bi-ppm aa	Sb-ppm aa	Tl-ppm aa
TNR00252	N	70	3.30	N	70	25	.2	N	10	4.4
TNR00253	N	70	.27	N	40	20	.3	N	5	3.8
TNR00254	N	150	.10	N	30	40	.3	<2	1	6.2
TNR00255	N	70	.06	N	30	45	.3	N	<1	5.5
TNR00256	N	100	.25	N	20	40	.2	N	N	1.5
TNR00257	N	100	1.80	N	50	40	.4	N	9	2.8
TNR00258	N	50	1.80	N	50	20	.4	N	4	4.6
TND00259	N	70	1.25	N	40	5	.4	N	<1	2.3
TND00260	N	200	.08	N	30	50	.4	N	<1	3.1
TNR00261	N	70	.06	N	30	45	.2	N	2	9.5
TND00262	N	100	.96	N	20	35	.3	N	3	2.0
TND00263	N	50	.90	<.2	90	15	.3	N	45	2.1
TND00264	N	100	10.30	N	70	15	.2	N	5	2.5
TNR00265	N	70	5.70	N	80	15	.3	N	22	2.5
TNR00266	N	70	.40	N	90	15	.2	N	19	.6
TNR00267	N	70	.55	<.2	10	10	.3	N	5	2.5
TNR00268	N	200	.60	N	80	20	.2	N	2	2.7
TNR00269	N	100	1.16	N	70	10	.3	N	13	3.5
TNR00270	N	70	.83	N	70	15	.2	N	15	2.7
TNR00271	N	150	.46	N	70	75	.4	N	22	1.2
TNR00272	N	150	.85	N	60	10	.3	N	8	2.1
TNR00273	N	150	.45	N	50	10	.3	N	3	2.7
TND00274	N	150	2.35	<.2	60	70	.6	N	20	2.4
TNR00275	N	100	.08	N	20	75	.4	N	3	2.4
TNR00276	N	70	.40	N	100	75	.3	N	8	2.1
TNR00277	N	100	.46	N	20	30	.3	N	1	2.2
TNR00278	N	100	.49	N	90	50	.3	N	4	3.2
TNR00279	200	70	6.75	N	220	150	.4	N	13	2.0
TNR00280	N	50	.52	N	40	25	.4	N	2	5.0
TNR00281	N	15	1.45	N	200	60	.3	N	7	.2
TNR00282	N	50	.48	N	20	10	.2	N	2	2.6
TNR00283	N	70	.68	<.2	10	15	.2	N	2	2.7
TNR00284	N	50	.17	<.2	<10	10	.3	N	1	2.6
TNR00285	N	50	<.05	<.2	10	10	.2	N	N	2.3
TNR00286	N	100	.19	N	70	40	.3	N	3	3.4
TNR00287	N	70	.08	<.2	30	30	.5	N	10	4.3
TNR00288	N	100	.26	.2	30	50	.3	N	N	2.0
TNR00289	N	100	<.05	N	40	40	.2	N	1	2.0
TNR00290	N	150	1.75	<.2	50	35	.4	N	3	2.1
TNR00291	N	150	<.05	N	<10	45	.4	N	N	1.8
TNR00292	N	70	.35	N	20	20	N	N	1	2.9
TNR00293	N	150	<.05	N	40	20	.2	N	20	2.1
TND00294	N	100	.20	N	70	40	.2	N	6	1.6
TND00295	N	100	7.00	N	100	75	.6	N	20	2.4
TND00296	N	150	.45	N	30	35	<.2	N	3	2.7

TABLE 3.--ANALYTICAL DATA FOR ROCK SAMPLES FROM THE DIVIDE DISTRICT, NEVADA--Continued

Sample	Latitude	Longitude	Fe-pct. s	Mg-pct. s	Ca-pct. s	Ti-pct. s	Mn-ppm s	Ag-ppm s	B-ppm s	Ba-ppm s	Be-ppm s	Co-ppm s
TND00297	37 59 48	117 14 53	1.0	.20	.10	.100	300	50.0	20	700	5	N
TNR00298	37 59 46	117 14 53	1.0	.20	.10	.100	100	20.0	20	700	3	N
TND00299	37 59 46	117 14 53	1.5	.30	.10	.150	200	50.0	30	500	5	5
TND00308	37 59 52	117 14 43	3.0	1.00	.20	.300	300	10.0	20	1,000	3	7
TNR00201	37 59 47	117 14 38	.7	.05	.20	.050	100	20.0	20	500	5	N
TNR00202	37 59 47	117 14 38	1.5	.30	.07	.200	300	1.5	50	300	5	N
TNR00203	37 59 47	117 14 36	1.0	.15	.05	.100	150	10.0	50	500	5	N
TNR00204	37 59 48	117 14 32	.7	.10	.05	.070	70	7.0	30	500	3	N
TNR00205	37 59 48	117 14 32	.7	.10	.07	.050	100	7.0	20	200	7	N
TNR00206	37 59 48	117 14 31	.5	.10	.50	.050	100	20.0	70	200	10	N
TNR00207	37 59 48	117 14 31	1.0	.07	.10	.050	300	70.0	15	300	7	5
TNR00208	37 59 48	117 14 30	.7	.10	.10	.050	150	15.0	30	150	5	N
TNR00209	37 59 48	117 14 30	1.5	.50	1.50	.070	1,000	10.0	150	200	10	N
TNR00210	37 59 47	117 14 27	.7	.20	.20	.070	300	10.0	30	300	20	N
TNR00211	37 59 47	117 14 27	2.0	.30	.10	.200	700	3.0	50	500	5	<5
TNR00212	37 59 47	117 14 26	3.0	.70	.70	.200	500	N	100	700	5	<5
TNR00213	37 59 52	117 14 31	2.0	.20	.15	.150	300	20.0	20	700	3	N
TNR00214	37 59 53	117 14 34	.7	.15	.10	.070	200	5.0	30	150	10	N
TNR00215	37 59 50	117 14 37	.5	.10	.05	.050	100	5.0	70	100	7	N
TNR00216	37 59 50	117 14 37	1.0	.20	.50	.070	200	10.0	50	300	7	N
TNR00217	37 59 52	117 14 39	1.0	.20	.30	.100	150	20.0	30	300	7	N
TNR00218	37 59 52	117 14 36	3.0	.02	1.50	.020	300	300.0	10	500	7	<5
TNR00219	37 59 52	117 14 35	2.0	.30	.15	.150	150	10.0	30	700	2	N
TNR00220	37 59 55	117 14 31	.7	.05	.05	.070	50	10.0	15	1,000	3	N
TNR00221	37 59 55	117 14 30	3.0	.70	.50	.200	700	15.0	200	500	5	15
TNR00222	37 59 55	117 14 30	2.0	.30	2.00	.150	1,000	7.0	50	700	7	15
TNR00223	37 59 55	117 14 30	2.0	.20	.50	.150	1,000	20.0	30	700	3	10
TNR00224	37 59 57	117 14 38	.7	.15	.15	.070	150	10.0	30	200	7	N
TNR00225	37 59 57	117 14 38	.7	.10	.15	.070	150	10.0	30	700	5	N
TNR00226	37 59 57	117 14 39	2.0	.20	.15	.100	150	7.0	70	1,000	7	<5
TNR00227	37 59 57	117 14 39	2.0	.30	.10	.200	100	5.0	50	700	5	N
TNR00228	37 59 56	117 14 28	2.0	.50	.30	.200	200	15.0	100	700	7	5
TNR00229	37 59 56	117 14 28	1.0	.10	.07	.070	100	7.0	30	300	5	N
TNR00230	37 59 57	117 14 27	1.5	.30	.07	.150	150	20.0	70	1,000	5	N
TNR00231	37 59 57	117 14 27	.5	.10	<.05	.070	100	30.0	20	300	3	N
TNR00232	37 59 57	117 14 27	2.0	.20	.10	.200	1,500	50.0	30	1,000	3	15
TNR00233	37 59 57	117 14 27	1.5	.30	.07	.150	150	15.0	20	700	5	5
TNR00234	37 59 57	117 14 27	3.0	.50	.10	.200	100	20.0	50	200	5	5
TNR00235	37 59 58	117 14 27	1.0	.10	<.05	.070	150	15.0	20	200	7	N
TNR00236	37 59 57	117 14 26	2.0	.30	.07	.200	700	20.0	30	700	7	10
TNR00237	37 59 57	117 14 25	2.0	.70	.05	.200	300	1.0	30	500	5	7
TNR00238	37 59 57	117 14 25	3.0	.10	.05	.150	150	100.0	20	500	7	N
TNR00239	37 59 55	117 14 24	3.0	.50	.15	.300	300	20.0	30	700	5	15
TNR00240	37 59 55	117 14 23	1.0	.20	.05	.070	300	50.0	30	2,000	5	N
TNR00241	37 59 55	117 14 23	2.0	.30	.30	.200	200	30.0	30	1,000	5	N

TABLE 3.--ANALYTICAL DATA FOR ROCK SAMPLES FROM THE DIVIDE DISTRICT, NEVADA--Continued

Sample	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sc-ppm s	Sr-ppm s	V-ppm s	Y-ppm s
TND00297	10	15	30	10	N	7	7,000	<5	200	50	10
TNR00298	<10	7	20	10	N	5	30	<5	100	100	<10
TND00299	10	20	30	10	N	5	50	5	100	200	10
TND00308	15	20	70	20	N	7	50	7	150	150	10
TNR00201	<10	5	20	10	N	5	15	<5	100	20	10
TNR00202	10	<5	50	N	<20	5	20	5	150	30	10
TNR00203	<10	<5	30	N	N	5	15	5	<100	20	10
TNR00204	<10	N	30	N	<20	<5	10	<5	100	10	<10
TNR00205	N	N	30	N	20	<5	20	<5	100	10	<10
TNR00206	N	N	20	N	<20	<5	20	<5	100	10	<10
TNR00207	<10	10	20	7	<20	5	100	<5	150	10	<10
TNR00208	N	<5	20	N	20	<5	20	<5	100	10	<10
TNR00209	N	<5	30	20	<20	5	70	<5	150	10	10
TNR00210	<10	N	20	N	20	<5	20	<5	<100	200	<10
TNR00211	10	7	50	N	<20	5	20	<5	<100	20	10
TNR00212	50	<5	50	N	<20	5	15	<5	200	30	10
TNR00213	10	7	20	N	N	5	15	<5	100	20	10
TNR00214	<10	N	30	N	20	5	15	<5	100	10	10
TNR00215	<10	<5	30	N	20	<5	50	<5	<100	<10	<10
TNR00216	<10	10	30	N	20	5	150	<5	100	10	<10
TNR00217	<10	50	50	<5	<20	7	1,000	<5	100	30	<10
TNR00218	<10	20	20	300	N	5	70	<5	100	10	<10
TNR00219	15	7	50	<5	20	5	15	<5	200	30	10
TNR00220	<10	N	50	<5	<20	<5	50	<5	150	15	10
TNR00221	10	20	50	7	20	10	150	5	150	50	10
TNR00222	10	15	50	5	<20	10	70	5	300	70	10
TNR00223	10	15	50	30	<20	7	70	5	150	50	10
TNR00224	<10	5	50	N	20	5	100	<5	<100	15	10
TNR00225	<10	N	50	N	20	<5	10	<5	200	10	10
TNR00226	<10	5	50	10	N	5	10	5	150	50	10
TNR00227	10	5	50	20	N	5	20	5	100	30	10
TNR00228	10	15	50	20	N	7	50	5	150	70	10
TNR00229	<10	<5	30	N	20	5	15	<5	100	15	10
TNR00230	<10	5	50	N	<20	<5	20	5	100	50	10
TNR00231	<10	5	30	N	20	<5	20	<5	100	10	<10
TNR00232	15	20	30	5	<20	10	50	5	150	50	10
TNR00233	<10	7	50	N	N	<5	15	5	100	50	10
TNR00234	10	20	50	N	N	5	10	5	<100	70	10
TNR00235	<10	7	30	N	20	5	30	<5	100	15	<10
TNR00236	10	20	50	5	N	5	200	5	100	70	10
TNR00237	<10	5	70	N	<20	5	30	5	<100	20	10
TNR00238	10	30	30	70	N	5	100	5	150	50	10
TNR00239	10	20	70	<5	<20	5	50	5	100	100	10
TNR00240	<10	5	50	N	20	5	100	5	<100	<10	<10
TNR00241	10	20	50	5	N	5	50	5	100	50	<10

TABLE 3.--ANALYTICAL DATA FOR ROCK SAMPLES FROM THE DIVIDE DISTRICT, NEVADA--Continued

Sample	Zn-ppm s	Zr-ppm s	Au-ppm aa	Te-ppm aa	As-ppm aa	Zn-ppm aa	Cd-ppm aa	Bi-ppm aa	Sb-ppm aa	Tl-ppm aa
TND00297	2,000	70	1.10	N	110	1,160	.2	24	8	1.4
TNR00298	N	70	.50	<.2	40	20	.3	N	8	1.9
TND00299	N	100	1.58	N	90	30	.3	N	9	1.9
TND00308	N	200	.10	<.2	40	70	.3	N	N	1.5
TNR00201	N	30	1.30	N	40	30	.3	<2	9	2.4
TNR00202	N	100	<.05	N	N	40	.2	N	N	1.9
TNR00203	N	100	.14	N	30	30	.3	N	5	2.5
TNR00204	N	50	N	N	10	15	.3	N	N	3.0
TNR00205	N	70	N	N	10	15	.2	N	2	2.8
TNR00206	N	50	<.05	N	10	15	.3	N	3	3.2
TNR00207	N	70	.12	N	60	40	.5	N	4	4.9
TNR00208	N	70	.05	N	20	25	.4	N	2	5.4
TNR00209	N	100	.08	N	50	75	.2	N	2	3.6
TNR00210	N	100	<.05	N	10	55	.3	N	1	3.6
TNR00211	N	150	<.05	N	20	35	.5	N	1	1.7
TNR00212	N	100	<.05	N	10	45	.4	N	N	1.2
TNR00213	N	100	N	N	30	60	.4	N	2	3.0
TNR00214	N	70	N	N	N	15	.3	N	N	2.1
TNR00215	N	70	<.05	N	10	15	.3	N	2	3.2
TNR00216	N	70	<.05	N	10	35	.5	N	1	2.4
TNR00217	N	70	.10	N	20	35	.3	N	4	2.2
TNR00218	N	20	1.06	N	180	120	.5	N	7	2.0
TNR00219	N	100	11.80	N	N	<5	.2	N	N	2.7
TNR00220	N	70	.08	N	10	10	.3	N	4	3.0
TNR00221	N	100	.16	N	20	80	.5	N	2	1.9
TNR00222	N	70	.10	N	50	70	.6	N	4	3.2
TNR00223	N	150	.22	N	50	45	.5	N	6	2.7
TNR00224	N	70	.10	N	<10	20	.5	N	1	1.8
TNR00225	N	70	.09	N	<10	25	.4	N	N	2.1
TNR00226	N	70	.64	N	50	40	.5	N	10	2.2
TNR00227	N	150	<.05	N	20	35	.5	N	1	1.4
TNR00228	N	150	<.05	N	30	60	.6	N	1	1.6
TNR00229	N	70	<.05	N	<10	15	.2	N	N	2.1
TNR00230	N	100	N	N	N	25	.2	N	N	2.2
TNR00231	N	70	<.05	N	N	15	.2	N	N	2.1
TNR00232	N	150	.05	<.2	30	65	.4	N	1	3.0
TNR00233	N	200	.08	N	20	35	.3	N	4	1.9
TNR00234	N	100	.08	N	30	40	.3	N	N	1.5
TNR00235	N	70	.17	N	10	25	<.2	N	1	1.7
TNR00236	N	100	.05	N	40	40	.3	N	5	1.6
TNR00237	N	100	N	N	N	45	.2	N	N	1.6
TNR00238	N	50	4.56	N	130	70	.6	N	13	2.3
TNR00239	N	100	.58	N	50	65	.3	N	1	1.8
TNR00240	N	70	N	N	N	30	.2	N	N	2.2
TNR00241	N	100	.40	N	30	50	.4	N	4	2.3

TABLE 3.--ANALYTICAL DATA FOR ROCK SAMPLES FROM THE DIVIDE DISTRICT, NEVADA--Continued

Sample	Latitude	Longitude	Fe-pct. s	Mg-pct. s	Ca-pct. s	Ti-pct. s	Mn-ppm s	Ag-ppm s	B-ppm s	Ba-ppm s	Be-ppm s	Co-ppm s
TNR00242	37 59 54	117 14 22	2.0	.30	.30	.150	150	15.0	30	500	3	7
TNR00243	37 59 54	117 14 23	3.0	.30	.15	.200	700	20.0	30	700	5	10
TNR00244	37 59 58	117 14 27	2.0	.30	.10	.150	200	50.0	30	1,000	5	<5
TNR00245	37 59 45	117 14 44	2.0	.70	.20	.150	200	7.0	20	500	3	N
TNR00246	37 59 44	117 14 35	1.5	.30	.07	.150	300	3.0	20	500	5	N
TNR00247	37 59 44	117 14 35	2.0	.07	.30	.100	100	70.0	15	500	5	N
TNR00248	37 59 44	117 14 35	1.0	.15	.05	.100	300	7.0	50	200	7	N
TNR00249	37 59 44	117 14 35	1.5	.15	.20	.300	100	15.0	20	700	3	5
TNR00250	37 59 44	117 14 35	3.0	.05	.20	.150	150	50.0	10	700	5	N
NT7B	38 0 15	117 15 6	5.0	1.00	.50	.300	500	5.0	20	1,500	2	10
NT8A	38 0 16	117 14 59	3.0	.50	.30	.200	300	2.0	15	700	3	7
NT8B	38 0 16	117 14 59	10.0	.30	.50	.200	300	5.0	30	500	5	7
NT9B	38 0 10	117 15 25	5.0	1.00	.70	.300	1,000	20.0	20	1,500	3	15
NT9C	38 0 10	117 15 25	3.0	.70	.70	.200	300	150.0	15	1,500	2	10
NT10	38 0 0	117 15 18	2.0	1.00	.30	.150	500	70.0	20	1,500	3	7
NT11A	38 0 6	117 15 13	5.0	1.50	.50	.200	700	20.0	30	2,000	2	15
NT12	38 0 3	117 15 4	5.0	1.50	1.00	.300	1,000	20.0	20	2,000	2	15
NT13A	38 0 0	117 15 1	5.0	.70	.20	.300	500	100.0	20	2,000	2	10
NT13B	38 0 0	117 15 1	7.0	.70	.20	.200	700	200.0	30	1,500	2	15

TABLE 3.--ANALYTICAL DATA FOR ROCK SAMPLES FROM THE DIVIDE DISTRICT, NEVADA--Continued

Sample	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sc-ppm s	Sr-ppm s	V-ppm s	Y-ppm s
TNR00242	10	10	50	N	N	5	30	5	100	50	10
TNR00243	15	15	30	<5	N	7	50	5	100	50	10
TNR00244	10	20	50	15	<20	5	70	5	100	70	10
TNR00245	10	10	50	N	N	7	20	5	200	20	10
TNR00246	<10	20	30	5	N	<5	70	5	150	30	10
TNR00247	10	15	50	500	<20	7	50	5	150	20	10
TNR00248	<10	<5	50	N	20	5	20	5	100	15	10
TNR00249	10	5	50	20	<20	5	15	5	200	50	10
TNR00250	10	10	30	200	N	5	20	<5	150	30	10
NT7B	20	50	100	20	20	<5	50	10	200	150	20
NT8A	50	20	50	50	30	<5	70	7	200	150	30
NT8B	50	30	20	50	20	5	50	7	200	150	30
NT9B	30	50	100	15	20	5	150	10	300	100	30
NT9C	20	100	70	30	<20	<5	200	10	300	100	30
NT10	20	50	70	30	<20	5	500	7	200	150	50
NT11A	20	50	70	15	20	5	70	10	300	150	20
NT12	50	50	100	15	20	5	100	15	500	150	30
NT13A	30	70	100	70	20	5	200	15	300	200	30
NT13B	30	50	70	300	<20	10	300	10	300	150	20

TABLE 3.--ANALYTICAL DATA FOR ROCK SAMPLES FROM THE DIVIDE DISTRICT, NEVADA--Continued

Sample	Zn-ppm s	Zr-ppm s	Au-ppm aa	Te-ppm aa	As-ppm aa	Zn-ppm aa	Cd-ppm aa	Bi-ppm aa	Sb-ppm aa	Tl-ppm aa
TNR00242	N	100	.08	<.2	10	45	.3	N	4	1.9
TNR00243	N	100	.05	N	30	80	.3	N	3	3.1
TNR00244	N	150	.33	N	30	70	.4	N	3	2.3
TNR00245	N	100	N	N	<10	55	.3	N	N	2.2
TNR00246	200	100	.05	N	30	150	.3	N	1	2.0
TNR00247	N	70	.33	N	70	20	.3	N	2	2.6
TNR00248	N	70	N	N	N	35	.2	N	2	3.3
TNR00249	N	70	.05	N	30	30	.2	N	4	2.7
TNR00250	N	50	.18	N	110	40	.3	N	7	1.9
NT7B	N	200	--	--	--	--	--	--	--	--
NT8A	N	200	--	--	--	--	--	--	--	--
NT8B	N	200	--	--	--	--	--	--	--	--
NT9B	N	200	--	--	--	--	--	--	--	--
NT9C	N	500	--	--	--	--	--	--	--	--
NT10	N	100	--	--	--	--	--	--	--	--
NT11A	N	200	--	--	--	--	--	--	--	--
NT12	N	300	--	--	--	--	--	--	--	--
NT13A	N	500	--	--	--	--	--	--	--	--
NT13B	N	200	--	--	--	--	--	--	--	--

TABLE 4. Summary of analytical data for rock samples from the Divide District, 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 (Tables 1 and 2); N, not detected; G, greater than upper limit of determination. ***, not computed. Major elements reported as weight percent; all other elements reported in parts per million.]

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Column	Minimum	Maximum	Geom. Mean	Geom. Deviation	Valid	B	L	N	G
S-Fe%	.20	10.0	1.36	2.08	109	0	0	0	0
S-Mg%	.02	1.50	.18	2.65	109	0	0	0	0
S-Ca%	.05	2.0	.17	2.5	104	0	5	0	0
S-Ti%	.015	.30	.12	1.8	109	0	0	0	0
S-Mn	30.0	5000.0	219.0	2.48	108	0	0	0	1
S-Ag	1.0	1500.0	17.4	3.60	108	0	0	1	0
S-As	200.0	200.0	200.0	***	3	0	9	97	0
S-Au	10.0	15.0	11.4	1.26	3	0	4	102	0
S-B	10.0	500.0	27.9	1.85	109	0	0	0	0
S-Ba	70.0	2000.0	641.6	1.99	109	0	0	0	0
S-Be	2.0	20.0	4.79	1.55	109	0	0	0	0
S-Bi	50.0	50.0	50.0	***	1	0	0	108	0
S-Cd	***	***	***	***	0	0	0	109	0
S-Co	5.0	20.0	7.8	1.5	42	0	12	55	0
S-Cr	10.0	50.0	13.9	1.65	57	0	48	4	0
S-Cu	5.0	100.0	12.7	2.22	90	0	10	9	0
S-La	20.0	100.0	38.6	1.56	109	0	0	0	0
S-Mo	5.0	1500.0	21.9	3.50	63	0	5	41	0
S-Nb	20.0	30.0	20.3	1.08	25	0	31	53	0
S-Ni	5.0	30.0	5.6	1.3	93	0	16	0	0
S-Pb	10.0	7000.0	39.9	3.19	109	0	0	0	0
S-Sb	100.0	100.0	100.0	***	1	0	6	102	0
S-Sc	5.0	15.0	5.74	1.33	55	0	51	3	0
S-Sn	***	***	***	***	0	0	0	109	0
S-Sr	100.0	700.0	162.0	1.53	99	0	9	1	0
S-V	10.0	200.0	36.2	2.35	107	0	2	0	0
S-W	70.0	150.0	101.0	1.46	3	0	3	103	0
S-Y	10.0	50.0	11.5	1.43	79	0	30	0	0
S-Zn	200.0	2000.0	431.0	3.78	3	0	0	106	0
S-Zr	15.0	500.0	93.9	1.69	109	0	0	0	0
S-Th	***	***	***	***	0	0	0	109	0
AA-Au	.05	11.8	.37	4.17	75	10	15	9	0
AA-Te	.20	.20	.20	***	1	10	12	86	0
AA-As	10.0	220.0	35.9	2.18	85	10	6	8	0
AA-Zn	5.0	1160.0	33.1	2.14	98	10	1	0	0
AA-Cd	.20	.60	.31	1.39	96	10	2	1	0
AA-Bi	24.0	24.0	24.0	***	1	10	12	86	0
AA-Sb	1.0	45.0	3.81	2.62	78	10	3	18	0
AA-Tl	.20	9.5	2.36	1.58	99	10	0	0	0

TABLE 5. Summary of geochemical differences between samples of gold- and silver-gold-veins in the Divide District, Nevada

[Values are mean contents expressed in parts per million]

	Gold-zone	Silver-gold zone
Elevation	High	Lower
Rock type	Oddie Ryholite	Fraction
Number of samples	32	18
S-Mn	247	301
S-Ag	22	176
AA-Au	0.51	1.41
S-B	35	24
S-Ba	50	944
S-Be	6.5	4.6
S-Cu	8.3	23
S-Mo	41	17
S-Pb	34	446
S-Sr	147	169
S-V	28	69
AA-Zn	43	110
AA-As	43	56
AA-Sb	3.4	9.6
AA-Tl	3.0	2.6
Au/Ag	8.2×10^{-3}	1.3×10^{-2}
As/Sb	3.2	2.7
Au/As	0.155	0.115
	Selected correlations	
Cu-Ag	.64*	.93*
Mo-Ag	.43	.27
Pb-Ag	.54	-.09
Au-Ag	.49*	.20
As-Ag	.47*	.33
Sb-Ag	.49*	.93*
Zn-Ag	-.01	-.12
Ca-Au	.37*	.11
Ag-Au	.49*	.20
CO-Au	.87	-.30
Cu-Au	.63	.13
Mo-Au	.10	.74
Pb-Au	.55	-.02
As-Au	.73*	.68
Sb-Au	.78*	.50*

*Significant at 95-percent confidence level. Depends on number of sample pairs in correlation, thus, is not the same for all sample pairs.

TABLE 6. Statistical summary of analytical data for rock samples from the Divide District reported by Bonham and Garside (1982)

[Data from Bonham and Garside, 1982; values are in parts per million]

Element	Minimum	Maximum	Mean	Standard Deviation	Number
Ag	0.00	1810.0	36.6	143.1	217
Au	0.00	31.0	0.70	2.39	215
As	0.00	502.0	41.6	58.3	222
Ba	0.00	14200.0	1362.0	2143.0	223
Bi	0.00	5.7	0.21	0.42	221
Cu	0.00	3200.0	31.6	214.3	221
Hg	0.00	137.0	2.00	10.0	222
Mn	0.00	11100.0	545.0	1181.0	222
Mo	1.00	10780.0	335.0	1512.0	224
Pb	0.00	1066.0	33.6	76.4	221
Sb	0.01	249.0	4.51	17.8	224
W	0.00	64.0	2.29	5.97	223
Zn	0.00	730.0	35.7	58.4	222

Matrix of Correlation Coefficients

	Au 1	Ag 2	Pb 3	Bi 4	Sb 5	Cu 6	W 7	Zn 8	Hg 9	As 10	Mo 11	Ba 12	Mn 13	
1	1.00	.31	.12	.10	.11	.06	.04	-.01	-.02	.19	-.03	-.06	-.04	Au
2	.31	1.00	.15	.04	.82	.13	.00	.00	-.03	.27	.00	-.06	-.02	Ag
3	.12	.15	1.00	.07	.13	.12	.07	.36	-.02	.21	-.01	-.07	.00	Pb
4	.10	.04	.07	1.00	.04	.10	-.04	.01	.00	.22	-.07	-.08	-.03	Bi
5	.11	.82	.13	.04	1.00	.15	.10	.01	-.01	.33	.08	.00	-.04	Sb
6	.06	.13	.12	.10	.15	1.00	.02	.12	-.01	.23	.05	-.02	-.02	Cu
7	.04	.00	.07	-.04	.10	.02	1.00	.43	-.02	.14	.01	-.05	-.06	W
8	-.01	.00	.36	.01	.01	.12	.43	1.00	-.02	.03	-.01	-.08	.11	Zn
9	-.02	-.03	-.02	.00	-.01	-.01	-.02	-.02	1.00	-.04	-.04	-.02	-.01	Hg
10	.19	.27	.21	.22	.33	.23	.14	.03	-.04	1.00	-.05	-.12	-.02	As
11	-.03	.00	-.01	-.07	.08	.05	.01	-.01	-.04	-.05	1.00	.55	.01	Mo
12	-.06	-.06	-.07	-.08	.00	-.02	-.05	-.08	-.02	-.12	.55	1.00	.06	Ba
13	-.04	-.02	.00	-.03	-.04	-.02	-.06	.11	-.01	-.02	.01	.06	1.00	Mn

APPENDIX 1. DESCRIPTION OF ANALYZED ROCK SAMPLES

[The third coding character indicates the source of the samples: R, rock sample from outcrop, in place; H, cuttings from drill hole; D, picked from mine or prospect dump.]

TNR201--Silicified Oddie Rhyolite porphyry (To); thin section shows flooding by very fine quartz and pyrite, chalcedony-barite veins, and late jarosite.
TNR202--White tuff bed in Siebert Fm (Ts)
TNR203--Siliceous altered rhyolite with red iron oxides (To)
TNR204--Brecciated rhyolite porphyry, moderate argillic alteration (To)
TNR205--Flow banded rhyolite porphyry, highly argillic (To); thin section shows flow banding in extremely fine-grained matrix, sericite in matrix, and only quartz phenocrysts.
TNR206--Altered rhyolite porphyry, moderate orange FeOx in joints (To)
TNR207--Altered rhyolite porphyry with moderate FeOx coatings (To)
TNR208--Argillized rhyolite porphyry, minor FeOx (To)
TNR209--White argillized rhyolite porphyry (To)
TNR210--White argillized rhyolite at eastern edge of dome (To)
TNR211--Argillized and silicified Siebert tuff (Ts)
TNR212--White altered sandy tuff and mudstone (Ts)
TNR213--Punky argillized rhyolite porphyry, moderate FeOx coatings, at edge of gold shear zone (To)
TNR214--White argillized Oddie rhyolite (To); thin section shows very fine quartz-sericite replacing feldspar phenocrysts and matrix, and 10 micron-wide fractures filled with chalcedony.
TNR215--Yellow-orange altered rhyolite (To), portal
TNH216--Cuttings, probably argillized Oddie Rhyolite
TNH217--Cuttings, argillized rhyolite?
TNR218--Pyritic breccia, rhyolite and black lithic fragments; thin section shows fragments of resorbed quartz phenocrysts and chert, cemented by chalcedonic quartz and pyrite
TNR219--Yellow oxidized breccia, similar to 218; thin section shows angular quartz and rock fragments, abundant jarosite in matrix and replacing volcanic fragments
TNR220--Fine-grained silica veined Oddie Rhyolite
TNR221--Fault breccia or intrusion breccia, inside adit
TNR222--Silicified breccia or possibly lithic tuff at west contact To-Ts
TNH224--Cuttings, Siebert tuff
TNR225--Silicified Oddie Rhyolite at west contact
TNR226--Siebert mudstone and fine sandstone with quartz veinlets
TNR227--Siebert sandy tuff
TNR228--Siebert sandy tuff
TNR229--White and gray Siebert tuff
TNR230--Silicified and argillized tuff (Ts)
TNR231--Silicified tuff (Ts) at lower portal
TNR232--Breccia or lithic tuff
TNR233--Green Siebert mudstone and sandy tuff
TNR234--Pink silicified tuff (Ts)
TNH235--Cuttings white argillized tuff (Ts)
TNR236--Siebert tuff with FeOx on joints, argillized
TNR237--Highly argillized tuff (Ts)
TNR238--Lithic tuff in Siebert; thin section shows many types of volcanic rock fragments, siliceous matrix, and sericite replacing volcanic fragments, with possible alunite

TNR239--Orange clay and oxides in fault gauge
TNH240--Cuttings Siebert tuff
TNH241--Cuttings Siebert tuff
TNH242--Cuttings Siebert tuff and lithic tuff
TNH243--Cuttings dark brown lithic tuff
TNR244--Siebert tuff
TNR245--Brecciated Oddie Rhyolite; thin section shows feldspar phenocrysts relatively fresh, matrix flooded with very fine silica, and veins of chalcedony with fine-grained adularia
TNH246--Cuttings silicified Oddie Rhyolite, top of Gold Mtn
TNR247--Quartz-MoS_2 stockwork veins in altered To; thin section shows resorbed quartz phenocrysts, matrix flooded by 10 micron-sized silica, and veins of chalcedony-pyrite-barite with some alunite
TNR248--Argillized Oddie Rhyolite
TNR249--Argillized, fine-quartz veined Oddie Rhyolite
TNR250--Quartz-moly veined rhyolite (To)
TNR251--Quartz-moly stockwork veins in rhyolite (To); thin section shows xenoliths of volcanic rock fragments and chert, matrix flooded by very fine silica with traces of clay and possible alunite
TNR252--Gray quartz veins in rhyolite (To)
TNR253--Silicified and microveined rhyolite (To)
TNR254--Silicified Siebert tuff with quartz veins, FeOx
TNR255--Brecciated, silicified Siebert tuff
TNR256--White argillized Siebert tuff
TNR257--Sealey workings, silicified Siebert tuff on fault
TNR258--Silicified and veined Siebert tuff, wall of mined vein
TND259--Green chloritic Fraction tuff, some FeOx
TND260--Red and green altered Fraction tuff, pervasive propylitic
TNR261--Siliceous rib with FeOx in Fraction tuff
TND262--Fine-grained quartz coatings on Fraction tuff breccia
TND263--Hasbrouck mine dump, fine silica rinds on tuff breccia
TNR264--Silicified Siebert tuff with FeOx in fractures
TNR265--Fault or hydrothermal breccia, siliceous
TNR266--Silicified breccia in Siebert tuff
TNR267--White clay alteration in fault zone
TNR268--Chips of fine silicified Siebert tuff
TNR269--Chalcedonic quartz in brecciated Siebert tuff
TNR270--Silicified breccia in fault
TNR271--Chips silicified Siebert tuff with FeOx
TNR272--Siliceous zone in Siebert tuff
TNR273--Clay zone in Siebert, altered tuff?
TNR274--Silicified Fraction tuff
TNR275--Fractured Oddie rhyolite with FeOx and silica films
TNR276--Oddie rhyolite with brown-weathering joints
TNR277--Silicified lithic tuff at intrusive contact
TNR278--Lithic tuff in Siebert
TNR279--Chips across mined vein, west lateral, upper adit
TNR280--Chips across mined vein, east lateral, upper adit
TNR281--Chips of very fine grained chalcedonic quartz veining
TNR282--Brecciated and silicified Oddie Rhyolite, South adit
TNR283--Argillized Oddie Rhyolite, South adit
TNR284--Tan altered rhyolite (To)
TNR285--Argillized rhyolite (To), South adit
TNR286--Fractured and argillized rhyolite, South adit

TNR287--Fractured rhyolite with quartz veinlets and FeOx
TNR288--Argillized Siebert lithic tuff
TNR289--Fractured and argillized Siebert tuff
TNR290--Fractured Siebert tuff
TNR291--Clay-rich Siebert tuff
TNR292--Clay-rich Siebert tuff, minor FeOx, South adit
TNR293--Silicified Siebert tuff with moderate FeOx
TND294--Silicified Fraction tuff with clay and FeOx
TND295--Fraction tuff with fine silica crustification
TND296--Fraction tuff, average dump material
TND297--Fraction tuff with fine silica crustification
TNR298--Fraction tuff with silica coatings
TNR299--Fraction tuff breccia with more clay and FeOx
TND308--Fraction tuff, relatively rich in clay and FeOx
NT7B----Fraction tuff with chlorite, minor FeOx
NT8A----White altered Siebert tuff, average dump sample
NT8B----Altered tuff, picked dump chips with FeOxides
NT9B----Altered Fraction tuff, average dump material
NT9C----Altered tuff, picked pieces richest in FeOx
NT10----Victory mine dump, silicified Fraction tuff
NT11A---Propylitic altered Fraction tuff
NT12----Propylitic altered Fraction tuff
NT13A---Combination shaft dump, propylitic altered Fraction tuff
NT13B---Altered tuff richest in brown and yellow FeOx