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WALTER J. HICKEL, *Secretary*

GEOLOGICAL SURVEY

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Distribution of Gold and Other Metals in the Cripple Creek District Colorado

By GARLAND B. GOTT, J. HOWARD McCARTHY, JR.,
GORDON H. VAN SICKLE, *and* JOHN B. McHUGH

SHORTER CONTRIBUTIONS TO ECONOMIC GEOLOGY

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Northwest-trending geochemical anomalies in the surface rocks of the Cripple Creek district are favorable areas for exploration for large low-grade gold deposits

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DISTRIBUTION OF GOLD AND OTHER METALS IN THE CRIPPLE CREEK DISTRICT, COLORADO

By Garland B. Gott, J. Howard McCarthy, Jr., Gordon H. VanSickle, and John B. McHugh

ABSTRACT

Analyses of surface samples from rocks throughout the Cripple Creek district show that several extensive gold-silver-tellurium anomalies exist. These anomalies are coextensive or partly coextensive with anomalies of iron, lanthanum, lead, mercury, antimony, arsenic, and vanadium. Manganese seems to be most concentrated in a zone peripheral to the highest gold concentrations. Hydrothermal alteration has resulted in the replacement of sodium in the sodium-rich minerals by potassium. The highest concentrations of gold, silver, tellurium, and iron conform well with the areas of greatest potassic alteration. In general, the abundance of the metals is in inverse proportion to their abundance in the crust of the earth. The largest gold anomalies are suggested as exploration targets for large low-grade gold deposits.

INTRODUCTION AND ACKNOWLEDGMENTS

The Cripple Creek mining district, 20 miles southwest of Colorado Springs, Colo. (fig. 1), has produced about 21 million ounces of gold since its discovery in 1891. The value of this gold exceeds the value of the total combined output from all other mining districts in the Front Range (Lovering and Goddard, 1950, p. 7). In 1962, however, the last major mill and the last of the active mines were closed, thereby threatening an end to the productive life of the district. As a result, the U.S. Geological Survey started geochemical studies in the district in 1964 to test for possible extensions of known deposits or low-grade deposits that could be mined from the surface.

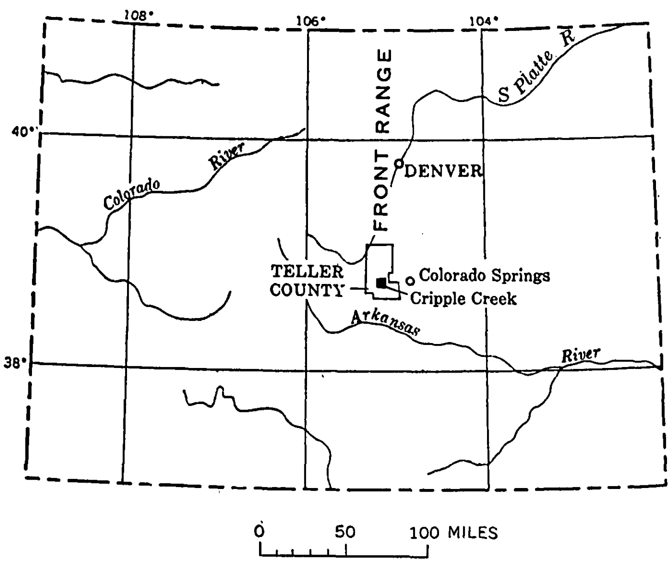

Figure 1.—Index map of Colorado, showing area of this report.

The investigation consisted principally of a study of the distribution of gold, silver, and tellurium, but it also included some study of several other metals (table 1). The geochemical distribution of the mobile elements mercury, antimony, and arsenic was studied to determine whether they were useful indicators of gold and silver. Also, analyses were made of several other elements to determine whether other metals were imported by the mineralizing solutions.

We express our thanks for the warm cooperation of the late Max Bowen, President, and Charles Carlton, Manager of Mines, of the Golden Cycle Corp. We also thank Prof. Günther Friedrich, University of Aachen, West Germany, for his assistance during the field investigations. The technical assistance of the following analysts is gratefully acknowledged: Gary C. Curtin, Thelma Harms, Henriette McCarthy, Harry M. Nakagawa, Uteana Oda, James H. Turner, and R. L. Turner.

OCCURRENCE OF THE DEPOSITS

The gold deposits at Cripple Creek have been described by Cross and Penrose (1895), Lindgren and Ransome (1906), Loughlin (1927), Loughlin and Koschmann (1935), Koschmann (1949), Lovering and Goddard (1950), and Koschmann and Bergendahl (1968). The gold deposits are largely confined to a roughly elliptical volcanic subsidence basin about 4 miles long and 2 miles wide that is surrounded by Precambrian granite, gneiss, and schist. The basin is filled with fractured and brecciated fragmental volcanic rocks and clastic nonvolcanic rocks of Miocene age. Rocks of the basin are mainly volcanic near the surface but include increasing amounts of nonvolcanic material at depth. The volcanic rocks are locally termed "breccia," although some of them have the texture of tuff. Phonolite and latite-phonolite are the most abundant constituents of the breccia. Brecciation and fracturing were caused by mild deformation and by subsidence of the consolidated breccia in the basin and the recurrence of explosive eruptions. The fragmental rocks of the basin have been intruded by dikes and irregular masses of latite-phonolite, syenite, phonolite, trachydolorite, and basalt.

A ridge of Precambrian granite and schist is partly exposed and partly buried at shallow depth in the north-central part of the district. This ridge divides the Composite Crater into a main crater on the south and a minor crater, known as the Globe Hill Crater, on the north. The main crater separates downward into several subcraters corresponding to the local sources of ore-forming solutions, shown on plate 2, *Q*. Mineral Hill, Copper Mountain, Rhyolite Mountain, and Beacon Hill are also minor eruptive centers.

Subsidence of the area occurred along old planes of weakness during and after the Laramide revolution (Koschmann, 1949, p. 22; Lovering and Goddard, 1950, p. 295). The basin thus formed was filled with detrital material from the surrounding highlands. Formation of this basin was followed by intermittent volcanic eruption and subsidence, during which time volcanic material filled the throat of the volcano. Most of this volcanic material was tuff-breccia, but some of it probably was lava flows that poured into the subsiding basin and were later covered by more breccia. As volcanic activity, subsidence, and reworking of the volcanic material by rainwater continued, this material became reworked into a relatively uniform breccia. Subsidence apparently was most pronounced along northwest-trending fissures, but it also occurred to some degree along northeast-trending fissures.

Gold and silver are the only metals that occur in sufficient concentrations to be of economic significance in the Cripple Creek ores. The average proportion of the two metals in the ores that have been mined was about 1 ounce of silver for 10 ounces of gold. Lindgren and Ransome (1906) estimated that the ore mined before 1906 contained 1.5–2 ounces of gold per ton, and production figures quoted by Henderson (1926) show that the ore mined from 1909 to 1923, inclusive, averaged about one-half ounce per ton. Ores mined in more recent years may have averaged somewhat less than one-half ounce per ton.

Gold in the unoxidized deposits occurs in the form of tellurides, principally as calaverite ($AuTe_2$), but also as sylvanite $(Au,Ag)Te_2$, krennerite ($AuTe_2$), petzite (Ag_3AuTe_2), and hessite (Ag_2Te). Native gold occurs in the oxidized ores, but little if any occurs in the unoxidized ores. Sparse tetrahedrite and galena probably contain some silver.

Quartz, the most abundant mineral in the veins, is generally associated with dolomite and finely crystalline purple fluorite. Pyrite occurs in all the veins and is disseminated through the country rock. Sphalerite, galena, chalcopyrite, stibnite, and molybdenite occur with the ore minerals in some mines, but they are in such low concentrations that they are of no economic significance.

The gold occurs in narrow, nearly parallel fissures. Most of the mined deposits consisted of a zone of these gold-bearing fissures ranging from a few inches to, rarely, 100 feet in width. The veins are normally discontinuous laterally and vertically; however, groups of closely adjacent veins are commonly found, and these contain the ore-forming minerals. The ore-bearing parts of the veins are generally en echelon and form a succession of imbricated bodies on adjoining planes. Most of the veins are steeply inclined and have an average dip of about 75°. However, some are relatively flat and dips range from horizontal to 45° and probably average about 20° (Lindgren and Ransome, 1906, p. 156).

Localization of the gold seems to have been controlled by relatively few deep-seated primary fissure zones that served as the principal channelways through which mineralizing solutions entered the roots of the crater. As these solutions ascended through the main fissure zones, they spread outward in a more complicated and extensive fissure system. This probably is the principal reason that more deposits have been found in the first 1,000 feet below the surface than at greater depths.

Three stages of mineralization were recognized; during all three stages quartz, fluorite, and pyrite were deposited, but only during the second stage were the gold tellurides formed. The minerals of the third stage—quartz, fine-grained pyrite, calcite, fluorite, and, locally, cinnabar—tend to coat and conceal the gold tellurides.

GEOCHEMICAL INVESTIGATIONS

Several hundred rock samples were collected from the Cripple Creek district to determine the abundance and distribution of gold and other metals. Of these samples, 325 were collected from the volcanic breccia and associated dike rocks, and 193 were collected from the granitic rocks. The sample localities are shown on plate 1. Bedrock sampling at regular intervals would give the best data to evaluate the gold content of the rocks, but because of the scarcity of natural exposures this could not be done. Bedrock sampling was approximated by collecting rock samples from shallow prospect pits, of which there are hundreds in the district. These pits were dug through the overburden during the early days of development of the district so that the bedrock could be examined for evidence of mineralization. During the many years since these prospect pits were dug, the pits have been partly refilled with surficial material, and the bedrock which they once exposed is again covered. Most of the rock samples are dump material from these shallow pits. From one to five samples were collected at each locality.

Gold and tellurium were determined by a wet chemical method using atomic absorption (Thompson and others, 1968; and Nakagawa and Thompson, 1968). Silver was determined by a similar method described by Huffman, Mensik, and Rader (1966). Mercury was determined instrumentally by an atomic-absorption technique (Vaughn and McCarthy, 1965). Arsenic, antimony, and zinc were determined by wet chemical methods described by Ward, Lakin, Canney, and others (1963). Sodium and potassium were determined by standard flame-emission techniques. The rest of the elements were determined by a semiquantitative spectrographic method (Myers and others, 1956).

The analytical data from these investigations are tabulated in table 1, and the distribution of those elements that best correlate with the gold are shown on plate 2, *A–P* inclusive. Although contour lines on the distribution maps connect points of equal concentration of the individual elements, they are used only to portray the general geochemical patterns and are not intended to show the precise concentrations of the metals in the bedrock, especially between sample localities. To determine the economic potential of the area, trenching or drilling will be necessary to obtain samples of the bedrock.

The principal unoxidized ore minerals are gold and silver tellurides, which near the surface are oxidized and yield tellurites, native gold, and an unidentified compound of silver. Thus, the close geochemical relation between gold, silver, and tellurium shown on plate 2, (*A*, *B*, *C*) is not surprising. The high concentration of silver compared with that of gold, however, is unexpected. The ratio of gold to silver recovered from the Cripple Creek ores is about 10:1. In contrast, the geochemical maps and the data shown in table 2 indicate that there is more silver than gold in the rocks that were sampled. This may mean that some of the silver occurs outside the gold veins, possibly in the form of tetrahedrite and argentiferous galena or that some of the silver is tied up with the manganese oxide and was not recovered from the ores by the cyanide process (F. A. Hildebrand, oral commun., 1968). Nevertheless, the anomalous concentrations of gold, silver, and tellurium are remarkably coextensive (pl. 2, *A*, *B*, *C*).

The most extensive of the gold-silver-tellurium anomalies extends northwestward from near the center of sec. 29, T. 15 S., R. 69 W., through the Cresson and Mollie Kathleen mines, and beyond, for a total of about 4 miles. The apparent continuity and linearity of the anomaly suggest that it may be controlled by a deep, continuous fissure zone, although no such feature has yet been recognized. Throughout this area the average gold concentration, as shown by analysis of the samples collected, is more than 0.1 ppm (part per million) (40 times its crustal abundance). The strongest part of the anomaly is in and near the Cresson mine—in an area about 3,800 feet long and 500 feet wide—in the SE¼ sec. 19, SW¼ sec. 20, and NE¼ sec. 29. In 49 samples from this area the gold content ranged from 1 to 14.5 ppm and averaged 2.5 ppm, the tellurium content averaged 10.7 ppm, and the silver content averaged 3.1 ppm.

Two other gold-silver-tellurium anomalies occur but are weaker and less extensive than the one just described. One of these anomalies extends northwestward from the vicinity of the Golden Cycle mine through the abandoned settlements of Independence and Altman. The area is about 1 mile long and a few hundred feet wide and contains 0.1 ppm or more gold. Anomalous concentrations of silver and tellurium occur in part of this area. The geochemical limits of the anomaly are poorly defined because extensive mine dumps and tailings limited the bedrock sampling. The other anomaly is in the Beacon Hill area, where a few scattered samples were collected along the granite–volcanic-rock contact. Most of these samples contained 1–3 ppm gold, and one sample contained 7 ppm gold.

Several other elements are associated with the gold, tellurium, and silver. Mercury, antimony, and arsenic (pl. 2, *D–F*), all relatively mobile elements, occur with the principal gold anomalies, although mercury and arsenic are less extensive than the gold, and antimony is more extensive.

Iron (pl. 2, *G*) is more concentrated in the volcanic rocks than it is in the granite. Most rocks in the principal gold anomaly and some rocks along the west side of the volcanic complex contain 10–20 percent iron.

Lanthanum (pl. 2, *H*), normally not abundant in deposits of the Cripple Creek type, is present in concentrations of greater than 100 ppm in most of the volcanic rocks and has a distribution pattern somewhat similar to that of antimony. It is most concentrated in rocks defined by the principal gold anomaly, where its concentration ranges from 300 ppm to more than 1,000 ppm.

The molybdenum content of most rocks in the area of the largest gold anomaly ranges from 100 to 1,000 ppm or more (pl. 2, *I*). In most samples collected elsewhere in the district, the molybdenum content of the bedrock is less than 10 ppm.

Lead occurs principally near the granite contact along the west side of the district and over the gold-producing fissure zones throughout the district. Within these areas the lead content ranges from 100 to 2,000 ppm; elsewhere in the district it ranges from 10 to 100 ppm (pl. 2, *J*).

The vanadium content of rocks over the gold anomaly near the Cresson mine is as much as 1,500 ppm (pl. 2, *K*), and the content of a few other isolated samples is about 1,000 ppm, but elsewhere in the district it is 100–300 ppm.

The manganese content of most samples collected in the district is 30–700 ppm. It is 3,000–5,000 ppm, however, in samples from an area of about 2 square miles bordering the granite contact on the east side of the district. The lack of past mining activity in this part of the district suggests that it is relatively barren of gold deposits. The general pattern of manganese distribution suggests that a manganese halo surrounds the area of greatest gold production (pl. 2, *L*).

Zirconium seems to be associated with all the anomalous metals, and it is widely distributed throughout the district. It is present in amounts of as much as 1,000 ppm (pl. 2, *P*).

Mild hydrothermal alteration is extensive in the volcanic rocks. One of the principal effects of the alteration was the replacement of sodium-rich minerals, such as analcite, sodalite, and nepheline, by sericite. The replacement of sodium by potassium is almost complete within the strongest gold anomalies. As shown on plate 2 (*M, N, O*), potassium has increased from about 4 percent in the least altered volcanic rocks to about 12 percent in the most altered rocks. As sodium shows an inverse relation, it is apparent that potassium has been enriched at the expense of sodium. The highest concentrations of gold, silver, tellurium, and iron conform well with the areas of greatest potassic alteration.

The total volume of metals introduced into the Cripple Creek district is low compared with the introduced metals in most large mining districts. Table 2 compares the concentration of various metals in the volcanic and granitic rocks in the district with their average concentration in all igneous rocks. For ease of comparison, an enrichment factor (column 2÷column 5) is also given (column 4) to show their relative enrichment in the volcanic rocks of the Cripple Creek district as compared with their concentration in all igneous rocks of the earth's crust. Tellurium, gold, and silver are enriched to the greatest degree; the degree of enrichment of the sulfide-forming metals progressively decreases from molybdenum, antimony, arsenic, lead, and mercury. When these elements are arranged in order of their decreasing enrichment, as in table 2, the data show that the metals are generally enriched in inverse proportion to their average concentration in all igneous rocks; molybdenum and mercury are exceptions.

The elements listed in table 2 are also enriched in the granite surrounding the volcanic rocks, and although the degree of enrichment is less, the order of enrichment is about the same. This indicates that the mineralizing solution that emplaced the gold in the volcanic rocks was the same solution that migrated into and mineralized the granite. That the granite adjacent to the volcanic complex was the source of the metals in the ore deposits is an alternate but unlikely possibility.

The reason for the enrichment of the metals in inverse proportion to their crustal abundance is not completely apparent. A possible explanation is provided by the law of mass action, which shows that "the rate of a chemical reaction is directly proportional to the concentrations of the reacting materials" (Daniels and Alberty, 1955, p. 236). Thus the elements that are least concentrated should have the slowest reaction rates and would tend to be enriched in residual solutions. This would result in the order of enrichment found in the rocks at Cripple Creek.

A corollary is found in the paragenesis and zoning observed in many ore deposits of the world. The order in which the elements are listed in table 2 is roughly the same order found in paragenetic sequence of many ore deposits (Lindgren, 1933), including those at Cripple Creek. For example, copper is generally nearer the center of hypogene ore deposits than is gold, silver, or tellurium. Taylor (1963, p. 267) made a similar observation in examining the paragenetic sequence of chalcophile elements in 550 ore deposits of the world. He found a direct correlation between the order of deposition of sulfide minerals and their abundance and demonstrated the validity of the mass-action effect.

If the order of enrichment of trace elements in rocks around hypogene ore deposits is determined by the law of mass action, many applications to geochemical exploration are possible.

EXPLORATION TARGETS

The Cripple Creek district has produced gold valued at nearly one-half billion dollars at the time of sale and worth nearly three-quarters of a billion dollars at the present price. It seems unlikely that all the gold in the district has been found, but exploration and mining of veins similar to those mined in the past probably would be prohibitively expensive. Because of this, and because there are more shallow deposits than deep ones, the best possibility for the discovery and development of additional gold reserves in the district appears to be large low-grade reserves that are minable by low-cost surface methods.

The most attractive exploration target resulting from these studies is the extensive gold anomaly in the west-central part of the district (pl. 2, *B*). The shape and linearity of this anomaly suggest that it reflects underlying gold deposits in a deep-seated continuous fissure zone. As the grade of the ore throughout the district is dependent largely on the density of the fracturing, the presence of such a zone would greatly enhance the probability of the presence of a low-grade ore body.

Two additional gold anomalies—one in the vicinity of the abandoned town of Independence and the other in the Beacon Hill area (pl. 2 *B*)—seem to be favorable for additional prospecting for low-grade deposits. The Independence area, however, is almost entirely covered by mine dumps, and angle-hole drilling would probably be required to obtain additional geochemical samples. The Beacon Hill area can be sampled by collecting samples of dump material derived from shallow prospect pits and from strategically placed trenches.

The average gold content in 282 samples of volcanic rocks within the district is 0.6 ppm. If all volcanic rocks in the district have a similar gold content, the volume of such mineralized rock amounts to several cubic miles. Inasmuch as most, if not all, of the gold is within the fracture system, where it is accessible to leach solutions, the area seems to be ideally suited for inplace leaching, provided that a practical solvent can be found.

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TABLES 1, 2

TABLE 1.—*Analyses of rock samples from Cripple Creek gold district, Colorado*

[Rock type: B, breccia (undifferentiated volcanic rocks within the Cripple Creek basin); Ba, altered breccia; G, granite; Ga, altered granite; Gos, gossan; Qtz, secondary quartz; T, tailings. Analysts: Ag, H. W. Lakin, H. M. Nakagawa, and J. B. McHugh; Te, J. B. McHugh, Au, G. H. VanSickle; Hg, Henriette McCarthy; As, G. H. VanSickle and J. H. Turner; Sb, J. B. McHugh and G. H. VanSickle; Zn; Thelma F. Harms; Na and K by R. L. Turner and J. H. Turner; semiquantitative spectrographic analyses by Uteana Oda and G. C. Curtin]

Field No.	Lab. No.	Rock type	Chemical analyses (parts per million)							Semiquantitative spectrographic analyses — Parts per million											Semiquantitative spectrographic analyses — Percent			Chemical analyses (percent)		K_2O/Na_2O
			Ag	Te	Au	Hg	As	Sb	Zn	Zr	Pb	Ga	Ba	Sr	Y	Mo	Mn	V	La	Cu	Fe	Mg	Ca	Na	K	
CC -81	64-6222	G	0.4	<1	<0.1	<0.01	10	0.5	25	100	50	30	300	<50	150	<2	200	10	50	7	2	0.03	0.7	3.0	4.5	1.3
81A	6223	G	.2	<1	<.1	.01	10	.5	25	70	70	30	300	70	150	<2	300	10	50	7	1.5	.05	.7	2.7	5.5	1.9
83	6224	G	.4	<1	<.1	<.01	10	.5	75	200	50	50	700	150	200	<2	700	15	200	10	5	.7	.3	1.6	5.1	2.3
83A	6225	Qtz	1.2	<1	<.1	<.01	10	<.5	<25	<5	15	<10	100	<50	5	<2	300	<10	<20	2	.2	.01	.2	.11	.4	3.0
84	6226	G	.2	1	<.1	<.01	<10	<.5	25	150	50	30	700	300	150	<2	500	15	100	5	2	.1	.5	2.7	4.7	1.6
86	6227	Ga	.4	<1	<.1	<.01	10	1	750	150	300	30	500	200	70	<2	150	10	100	7	1.5	.3	.2	2.0	4.7	2.1
87	6228	Ga	.6	<1	<.1	<.01	10	<.5	50	150	30	20	700	200	50	5	100	10	70	2	2	.2	.3	2.3	4.9	1.9
87A	6229	Ga	.4	<1	.2	<.01	10	<.5	100	20	50	20	300	200	50	3	300	10	150	5	5	.1	.2	1.7	4.9	2.6
89	6230	B	.4	<1	<.1	.02	120	10	300	70	500	50	150	300	5	2	50	70	100	15	5	.7	.01	.22	11.4	45.6
89A	6231	Ga	.4	.4	<.1	.01	20	10	125	150	150	50	500	200	70	7	700	50	100	15	7	.05	.05	1.4	6.2	3.9
90	6232	G	.2	<.1	<.1	<.01	10	<.5	25	150	30	15	700	200	30	<2	700	10	150	2	1.5	.2	.7	2.3	4.0	1.5
90A	6233	B	.4	<.1	.2	.02	80	2	100	100	50	50	200	500	5	<2	50	70	70	10	3	.5	.05	--------	--------	--------
91	6234	G	<.2	<.1	<.1	<.01	10	.5	100	200	30	20	500	200	70	<2	300	10	70	3	2	.2	.1	2.1	4.7	2.0
92	6235	G	.8	<.1	.4	.03	30	1	50	150	150	15	300	150	50	15	100	15	70	7	5	.02	.05	2.4	4.2	1.6
93	6236	Ba	.6	<.1	<.1	.07	20	1	50	700	70	>100	100	50	50	7	70	70	70	30	7	1.5	.1	3.3	.2	.06
93A	6237	G	.4	<.1	.3	<.01	20	1	50	150	50	30	500	200	70	2	150	15	70	10	3	.3	.07	2.4	3.5	1.3
94	6238	G	.6	2	<.1	<.01	10	1	25	300	200	50	700	300	100	<2	200	15	70	5	3	.3	.05	2.5	5.0	1.8
95	6239	Ga	.2	<.1	<.1	<.01	10	1	<25	150	50	50	1,000	700	70	<2	150	20	70	30	3	.7	.02	.8	6.4	7.0
96	6240	B	2.4	<1	<.1	<.01	10	1	25	100	50	70	700	700	5	7	70	150	70	20	5	.7	.02	3.6	5.1	1.2
97	6241	Ga	2	<.1	.2	<.01	10	1	75	50	100	50	700	700	30	<2	200	50	70	20	3	1	.02	3.2	6.6	1.8
98	6242	B	2	1	.2	.01	10	.5	300	100	5	70	1,000	2,000	10	2	200	100	100	20	5	.7	.03	2.9	6.2	1.9
100	6243	B	.6	.2	<.1	<.01	10	8	50	70	100	30	700	2,000	5	7	150	70	50	20	5	.7	.01	.19	9.5	45.6
CCF-101	6244	Ga	.4	<.1	.2	.04	20	<.5	<25	50	70	15	500	200	10	<2	300	30	70	5	.5	.3	.02	3.6	5.8	1.4
102	6245	B	.6	<.4	<.1	.02	10	3	75	150	15	30	1,500	1,500	10	<2	300	70	150	7	7	1.5	.1	1.8	8.1	4.0
CC -103	6246	B	.2	<.1	<.1	<.01	10	1	75	150	30	30	700	1,000	15	<2	1,500	70	150	30	7	.7	.5	3.8	5.1	1.2
104	6247	Ba	<.2	<.1	<.1	<.01	10	2	25	150	30	50	300	300	20	<2	3,000	50	100	15	5	.3	.1	4.6	5.0	1.0
105	6248	B	.2	<.1	<.1	.02	20	1.5	300	100	20	20	1,500	500	20	10	>5,000	100	100	50	15	.5	.3	3.7	3.2	.8
106	6249	Ga	.2	<.1	.2	.04	10	1.5	<25	20	30	10	500	300	30	<2	200	10	20	7	1	.1	.1	1.1	7.1	6.6
107	6250	G	<.2	<.1	<.1	<.01	20	<.5	<25	50	30	15	500	150	30	<2	200	30	70	5	3	.1	.05	2.4	4.9	1.8
108	6251	G	<.2	.1	<.1	.01	10	<.5	25	300	30	20	700	700	50	<2	700	50	<20	10	3	1	.7	2.2	5.1	2.1
109	6252	G	<.2	<.1	<.1	<.01	10	<.5	<25	5	50	10	500	300	5	<2	150	<10	100	2	.5	.3	.05	1.3	8.2	5.8
110	6253	G	.2	<.1	<.1	<.01	10	.5	50	150	30	10	700	500	70	<2	700	50	20	70	7	1	1	1.3	4.0	1.6
111	6254	G	.2	<.1	<.1	<.01	10	<.5	50	100	20	10	700	700	20	<2	700	50	20	10	7	1	1	2.3	3.8	1.5
112	6255	G	<.2	<.1	<.1	.01	10	.5	<25	70	20	10	500	150	20	<2	200	30	20	7	1	.2	.1	2.0	5.5	2.4
113	6256	G	.4	<.1	<.1	<.01	10	.5	50	300	30	20	500	1,000	20	<2	500	70	70	5	3	1	.1	2.9	2.4	.8
114	6257	G	.2	<.1	<.1	<.01	10	<.5	25	150	20	15	700	500	30	<2	1,000	50	50	15	5	1	.7	2.2	4.0	1.6
115	6258	G	<.2	<.1	<.1	<.01	10	<.5	25	100	30	15	300	150	50	5	300	30	70	5	2	.5	.3	1.8	4.4	2.2
116	6259	Ga	.4	<.1	<.1	--------	10	1	50	100	70	20	700	200	30	3	150	15	100	5	7	.5	.1	2.4	4.6	1.8
119	6260	Ba	1	<.1	<.1	--------	10	<.5	<25	100	20	15	700	200	5	<2	20	30	100	15	2	.3	.05	.2	3.8	18.4
119A	6261	Ba	5	4.5	--------	6	20	2	25	30	50	10	500	1,000	50	7	30	30	150	70	20	.05	.05	.1	1.1	16.2
120	6262	G	<.2	<.1	.4	<.01	10	<.5	25	200	20	10	200	100	50	<2	300	10	150	7	2	.05	.1	1.9	1.7	.8
121	6263	Ga	.2	<.1	.1	.03	20	.5	<25	150	30	15	700	150	70	<2	50	15	20	7	2	.1	.2	2.2	4.6	1.9
122	6264	B	.2	<.1	.2	--------	20	1.5	75	500	100	100	150	300	10	<2	2,000	50	150	10	5	.5	.5	5.8	4.4	.7
123	6265	B	.4	<.1	<.1	.24	10	1.5	75	300	100	>100	150	300	15	<2	2,000	50	150	15	5	.7	.5	6.4	4.4	.6
124	6266	B	.2	<.1	--------	--------	10	1	50	70	20	15	700	700	15	2	2,000	150	20	7	10	.3	1	2.2	3.8	1.5
125	6267	B	.2	<.1	.1	<.01	10	1.5	100	500	100	>100	100	700	20	3	2,000	70	150	15	5	.7	.5	6.6	4.4	.6
126	6268	B	.4	<.1	<.1	.01	10	<.5	50	50	20	20	700	1,000	20	<2	1,500	100	30	20	7	5	1.5	2.0	3.4	1.5
126A	6269	B	.6	<.1	<.1	<.01	10	.5	75	50	30	30	3,000	1,500	20	2	2,000	150	30	7	7	5	2	1.9	2.5	1.2
127	6270	Gos	1	<.1	<.1	.02	40	1	1,100	50	30	10	700	<50	50	5	5,000	20	70	15	10	5	.2	.4	.7	1.7
127A	6271	Ga	.2	<.1	<.1	.01	20	.5	75	100	50	15	500	300	50	<2	150	15	50	7	3	.1	.3	------	4.1	1.8
128	6272	Ga	.2	<.1	<.1	<.01	10	.5	300	100	50	15	500	200	50	<2	70	10	70	3	3	.2	.1	2.4	5.0	1.9
129	6273	Ga	.6	.1	.2	.01	40	.5	25	100	100	20	700	700	30	10	70	20	100	20	5	5	.05	1.2	6.5	5.0
129A	6274	Ga	1.8	.1	<.1	.01	<10	2	<25	70	30	15	500	<50	10	<2	300	10	70	15	5	.7	.01	.1	3.0	45.0
131	6275	Ga	.4	<.1	<.1	<.01	<10	<.5	250	150	300	20	500	300	70	<2	2,000	15	70	5	5	.5	.7	2.2	3.7	1.5
131A	6276	Ba	.2	<.1	<.1	<.01	20	1	750	100	200	30	200	200	10	<2	200	70	70	5	2	.7	.2	2.5	6.8	2.4
132	6277	G	-------	<.1	--------	<.01	10	.5	25	100	30	10	700	100	50	<2	300	10	70	3	3	.05	.2	--------	--------	--------
133	6278	Ga	<.2	.1	.1	.02	10	.5	50	10	50	20	150	50	20	<2	200	<10	<20	7	3	.05	.05	4.0	2.8	1.6
134	6279	G	<.2	<.1	<.1	<.01	10	<.5	50	100	50	30	700	100	70	<2	700	15	70	7	3	.3	.1	1.8	5.7	2.9
135	6280	G	.4	<.1	<.1	<.01	10	<.5	50	100	30	10	500	200	50	<2	500	10	100	5	2	.2	.5	2.5	3.7	1.3
136	6281	G	<.2	.1	<.1	.01	10	<.5	25	70	50	20	300	200	30	<2	300	10	50	2	2	.2	.2	2.3	4.4	1.7

TABLE 1.—*Analyses of rock samples from Cripple Creek gold district, Colorado*—Continued

Field No.	Lab. No.	Rock type	Chemical analyses (parts per million)							Semiquantitative spectrographic analyses														Chemical analyses (percent)		K_2O/Na_2O
										Parts per million											Percent					
			Ag	Te	Au	Hg	As	Sb	Zn	Zr	Pb	Ga	Ba	Sr	Y	Mo	Mn	V	La	Cu	Fe	Mg	Ca	Na	K	
CC -137	6282	G	<0.2	<0.1	<0.1	<0.01	10	<0.5	50	100	20	15	500	200	50	<2	300	15	150	3	3	0.3	0.7	2.2	3.7	1.5
138	6283	G	<.2	<.1	<.1	<.01	10	<.5	25	70	50	20	300	100	70	<2	300	15	150	3	2	.2	.1	2.5	4.6	1.7
139	6284	G	.2	<.1	<.1	<.01	<10	.5	75	500	30	20	700	1,000	30	<2	700	70	150	20	5	1.5	.7	2.4	3.2	1.2
140	6285	G	.4	<.1	<.1	<.01	<10	<.5	75	100	30	15	500	200	30	<2	700	15	150	5	5	.7	.5	2.3	4.6	1.8
141	6286	G	.3	<.1	<.1	<.01	<10	<.5	100	200	30	15	500	200	100	2	1,000	20	150	7	7	.5	.7	2.2	4.2	1.7
142	6287	Ga	.2	<.1	<.1	<.01	10	<.5	100	150	30	20	500	100	30	2	1,000	15	70	15	10	.1	.7	3.3	3.5	.9
143	6288	Ga	.2	<.1	<.1	<.01	10	<.5	300	150	50	50	500	200	50	2	1,500	15	70	15	15	.3	1	3.3	3.5	1.0
144	6289	G	.4	<.1	<.1	.02	10	.5	100	100	15	30	700	1,000	30	2	700	150	100	30	10	3	1	1.9	3.0	1.4
CCF-145	6290	Ba	<.2	<.1	<.1	.12	20	1.5	50	150	50	30	100	100	15	<2	700	70	70	7	3	.2	.05	2.9	5.6	1.7
146	6357	Ba	<.2	<.1	<.1	<.01	10	1	25	1,000	150	100	500	300	25	<2	100	150	200	30	3	2	.1	3.4	6.2	1.6
CC -147	6358	G	.8	<.1	<.1	<.01	<10	1	50	>1,000	20	20	3,000	2,000	50	<2	1,000	150	100	50	10	1.5	5	2.3	3.2	1.2
148	6359	Ga	<.2	<.1	<.1	<.01	<10	<1	<25	200	70	20	500	150	30	20	150	20	100	7	1	.2	.3	2.0	5.2	2.3
149	6360	G	<.2	<.1	<.1	<.01	<10	<1	<25	200	50	20	300	700	50	<20	200	15	70	5	1	.2	.2	2.5	4.2	1.5
150	6361	Ga	.6	<.1	.2	.15	60	3	1,250	300	300	20	3,000	700	50	15	>5,000	70	700	70	7	.2	.1	1.1	5.1	4.0
151	6362	B	.4	1	.4	<.01	10	1	<25	>1,000	20	30	200	70	15	<2	200	30	150	7	3	.3	1.5	.1	3.3	26.6
151A	6363	G	.6	2.5	.3	<.01	10	<1	25	700	30	20	2,000	700	100	<2	700	70	150	70	5	.7	.7	2.1	4.4	1.9
152	6364	G	.4	2	<.1	<.01	20	1	25	700	50	20	3,000	700	30	20	100	100	150	10	7	.3	.1	2.4	5.0	1.9
152A	6365	B	.6	.1	<.1	.25	10	3	25	700	150	50	3,000	2,000	20	150	100	300	150	15	7	.3	.1	.3	9.1	29.0
153	6366	Ba	.8	<.1	.9	<.01	10	1	50	>1,000	70	70	1,000	700	20	20	70	200	200	7	3	.5	.3	2.0	4.0	1.8
154	6367	Ga	<.2	.8	<.1	.02	40	1	<25	1,000	50	50	1,000	100	15	<2	70	20	70	30	5	.3	.1	.7	5.9	7.4
155	6368	G	.2	<.1	<.1	<.01	10	<1	25	>1,000	30	30	1,000	200	200	<2	100	30	100	20	7	.7	1.5	2.8	2.3	.7
155A	6369	B	.6	.8	<.1	.5	<10	2	<25	1,000	30	10	700	100	30	10	100	50	150	10	5	.3	.1	.2	4.1	10.6
156	6370	Ga	.4	.2	<.1	<.01	10	1	25	>1,000	50	20	2,000	200	50	<2	100	70	<20	30	10	.5	2	2.4	3.7	1.4
156A	6371	B	.6	<.1	<.1	<.01	<10	1	25	150	10	20	3,000	>5,000	20	<2	3,000	700	100	100	20	10	15	1.7	1.7	.9
157	6372	G	1	.4	.4	<.01	10	1	25	500	1,500	30	2,000	700	15	150	300	100	150	50	5	1	.3	2.4	5.3	2.0
157A	6373	B	.4	<.1	.2	.02	10	<1	<25	150	70	50	3,000	>5,000	15	100	100	150	300	70	3	.1	.1	1.1	10.0	8.0
157B	6374	Ba	1	.4	1.1	.02	40	2	50	150	300	50	3,000	5,000	20	200	300	150	1,000	150	20	.7	.2	.4	7.1	17.9
158	6375	G	.2	<.1	<.1	.01	<10	<1	25	200	30	30	2,000	700	50	<2	700	70	150	10	7	1.5	1	2.0	4.7	2.1
159	6376	G	.2	<.1	<.1	<.01	<10	<1	25	>1,000	50	30	3,000	500	70	<2	1,500	150	100	30	15	.2	2	1.8	5.3	2.7
160	6377	Ba	.2	<.1	<.1	.04	20	2	25	>1,000	70	100	100	50	20	2	200	70	50	15	3	.2	.1	.3	11.0	34.8
161	6378	G	.2	<.1	<.1	<.01	<10	<1	<25	200	30	30	2,000	700	70	<2	1,000	70	70	15	7	.7	3	2.2	4.4	1.8
162	6379	B	.2	.8	.1	.3	60	6	75	150	70	50	1,000	2,000	30	20	1,500	150	150	20	7	.7	.2	2.4	7.9	3.0
163	6380	G	.2	<.1	<.1	.03	<10	1	75	300	50	70	3,000	700	15	<2	100	100	150	10	5	.2	.2	4.5	4.6	.9
164	6381	B	4.6	10	.1	.01	20	2	75	300	70	50	>5,000	3,000	10	<2	300	150	150	70	5	.7	.1	.9	6.4	6.4
165	6382	Ba	1	10	.3	<.01	10	2	<25	100	15	70	1,000	700	30	5	70	200	100	15	7	1	.1	.3	.7	2.0
166	6383	Ba	.8	<.1	.2	.09	10	2	<25	200	50	50	1,000	5,000	20	30	100	100	150	15	20	1.5	.1	.3	6.6	17.6
167	6384	B	.2	<.1	<.1	.01	10	<1	75	100	50	70	3,000	>5,000	30	2	1,000	300	150	30	10	1.5	3	1.7	4.1	2.1
168	6385	B	.2	<.1	.4	.02	20	<1	50	300	30	50	2,000	700	20	2	300	200	150	20	3	.3	.5	5.0	3.4	.6
169	6386	B	<.2	<.1	<.1	.03	10	<1	50	500	70	50	3,000	500	20	15	5,000	200	150	30	7	.3	.5	4.7	4.0	.75
170	6387	Ba	.6	.1	<.1	.10	<10	1	450	100	100	70	2,000	5,000	20	20	70	100	100	15	7	.02	.1	1.9	4.0	1.8
171	6388	Ba	.2	.8	<.1	.01	10	1	75	300	150	70	2,000	2,000	30	2	150	200	200	20	7	.7	.1	3.9	3.8	.9
173	6389	B	.8	.8	1.0	.01	10	1	75	300	700	70	2,000	5,000	20	20	300	300	150	30	7	.1	.2	5.0	2.9	20.5
173A	6390	B	.4	<.1	<.1	<.01	10	1	600	200	50	70	1,500	>5,000	20	2	>5,000	200	150	20	20	1	1	4.7	1.9	10.4
174	6391	G	.2	<.1	<.1	.01	<10	<1	<25	100	20	100	1,500	200	70	<2	200	300	100	2	10	1	.1	.6	6.4	10.4
175	6392	Ba	.4	<.1	<.1	.03	<10	2	75	500	30	70	2,000	700	20	15	>5,000	150	100	20	7	2	.5	4.3	4.9	1.0
176	6393	B	.2	1.5	<.1	.01	<10	1	25	300	100	70	3,000	3,000	50	10	300	200	700	30	7	.1	.2	3.2	5.3	1.5
180	6000	Ba	.4	.2	<.1	.01	<10	.5	25	200	70	30	700	200	70	<2	70	100	200	10	2	.7	1	2.2	4.7	2.0
181	6001	G	.2	<.1	<.1	<.01	<10	.5	50	700	50	20	1,500	300	50	<2	700	70	100	30	7	.5	.1	2.5	4.2	1.5
182	6002	G	.4	.8	<.1	<.01	<10	.5	50	500	70	20	1,000	300	50	<2	150	70	70	5	7	.7	1.5	2.7	4.6	1.5
183	6003	Ba	.2	.1	<.1	.01	20	1	125	300	100	30	3,000	700	15	30	>5,000	200	150	70	10	.7	.7	2.9	5.6	1.7
184	6004	Ba	.2	.2	<.1	.03	20	1	150	200	70	30	3,000	700	15	15	3,000	200	100	30	5	.3	.3	3.0	6.2	1.9
184A	6005	Ba	-------	<.1	.1	.08	40	4	125	200	70	20	3,000	1,000	20	30	>5,000	150	>1,000	5	7	.3	.2	.5	9.3	15.5
185	6006	Ba	.4	.4	.5	.03	80	150	125	300	20	50	3,000	300	20	700	>5,000	500	700	70	10	.5	.02	.2	9.4	47.0
186	6007	Ba	.2	<.1	.1	.01	40	3	50	500	50	50	5,000	1,500	20	50	700	100	500	30	7	.5	.1	2.4	7.0	2.6
187	6008	B	.2	<.1	<.1	.02	<10	2	125	300	70	50	2,000	1,000	30	5	1,500	200	200	30	7	.7	.1	3.9	4.9	11.1
188	6009	Ba	.2	.5	<.1	<.01	120	2	<25	300	70	30	3,000	>5,000	70	30	1,500	200	500	30	7	1	.7	3.8	5.3	1.3
189	6010	Ba	.2	<.1	<.1	.01	10	1	100	300	70	30	3,000	700	30	30	500	200	200	30	7	.7	.1	3.8	5.3	1.3
190	6011	Ga	<.2	<.1	<.1	<.01	60	1	75	500	50	50	2,000	200	20	50	200	150	20	70	10	.5	.5	3.8	5.6	1.3
191	6012	Ga	.8	.5	--------	.7	20	8	<25	300	70	30	>5,000	1,000	100	20	100	50	>1,000	15	5	.5	.3	.4	8.3	16.0
192	6013	G	<.2	.2	<.1	.01	<10	<.5	<25	150	70	50	1,000	500	30	<2	100	150	200	5	1	.7	.02	1.3	6.2	4.4
192A	6014	B	.8	1.5	7.0	.12	400	110	25	200	700	20	3,000	1,500	15	200	200	500	200	50	10	.5	.15	------	------	------
193	6015	Ba	.4	<.1	<.1	.01	<10	1	125	300	50	30	>5,000	500	15	50	>5,000	200	100	70	15	.5	.05	3.7	4.2	1.0
194	6016	Ba	.2	<.1	<.1	.05	<10	<.5	125	300	50	20	2,000	1,000	15	20	>5,000	150	150	15	7	.7	.5	4.7	4.2	.8

195	6017	Ba	.2	.4	.1	.10	<10	.5	50	300	50	30	1,000	>5,000	15	15	100	150	300	20	7	.7	.5	1.9	6.1	2.8
196	6018	Ba	2	1	<.1	.04	10	1	75	300	70	30	3,000	>5,000	70	15	100	150	300	10	5	.1	.15	3.2	6.1	1.7
197	6019	B	2	.8	.8	<.01	<10	.5	75	150	50	30	2,000	3,000	20	15	100	200	150	10	3	.5	.1	2.5	8.0	2.9
198	6020	Ba	.6	1	.8	.08	30	15	50	100	100	30	1,500	700	15	70	300	500	700	20	7	.3	.15	.6	11.1	17.0
199	6021	B	.2	<.1	<.1	.01	10	1	<25	150	50	20	2,000	700	10	30	50	100	100	10	3	.7	.1	4.0	4.8	1.1
207	6022	Ga	<.2	.1	<.1	<.01	<10	<.5	<25	300	30	20	1,500	200	20	<2	150	30	150	5	15	.2	.3	1.7	5.7	3.0
207A	6023	Qtz	<.2	<.1	<.1	<.01	<10	<.5	<25	200	10	10	500	50	15	<2	300	30	20	7	1	.3	.2	.9	2.5	2.5
CCF-207	6024	Qtz	.2	<.1	-------	<.01	<10	.5	50	700	50	50	3,000	1,000	100	5	3,000	20	50	20	20	3	7	2.4	2.9	1.1
CC-211	6026	B	<.2	<.1	.2	<.01	<10	<.5	<25	100	<10	15	700	50	7	<2	700	20	20	5	1	.5	.7	.6	1.9	2.7
213	6027	B	.2	<.1	<.1	<.01	<10	.5	<25	700	70	30	1,000	500	30	<2	700	70	<20	30	5	1	2	1.6	4.5	2.6
215	6028	Ga	<.2	<.1	<.1	<.01	20	.5	25	150	70	50	700	1,500	20	10	500	100	70	15	7	.2	.2	1.1	9.1	7.3
215A	6029	B	<.2	<.1	<.1	<.01	<10	1	<25	50	<10	<10	300	<50	50	<2	300	10	30	7	.5	.2	.1	.7	.9	1.0
216	6030	Ga	.6	<.1	<.1	.02	30	<.5	<25	700	70	50	200	1,000	20	<2	1,000	150	300	70	7	1	5	2.7	6.6	2.2
216A	6031	Ga	.2	<.1	<.1	.01	<10	.5	<25	700	50	30	1,500	5,000	30	10	700	200	200	30	7	1	3	4.0	3.0	.7
216B	6032	Ba	<.2	<.1	<.1	<.01	10	1	75	1,000	70	70	1,500	>5,000	50	7	700	300	200	2	7	1	2	4.6	2.3	.5
220	6033	G	<.2	<.1	<.1	.01	<10	<.5	<25	700	70	20	1,000	700	15	<2	200	10	<20	10	3	.1	.2	2.2	3.6	1.5
221	6034	Qtz	<.2	<.1	<.1	<.01	<10	.5	<25	300	70	20	2,000	1,000	100	5	700	200	150	70	7	1.5	1.5	1.7	6.2	3.3
222	6035	B	.2	<.1	<.1	<.01	<10	<.5	<25	20	10	<20	700	70	5	<2	200	10	<20	7	5	.05	.5	.8	2.1	2.3
225	6036	B	.2	<.1	<.1	<.01	<10	<.5	50	1,000	30	50	500	100	150	<2	1,000	70	150	5	7	1.5	3	2.8	2.6	.8
229	6037	Ba	1	.2	<.1	<.01	10	1	<25	200	70	70	5,000	5,000	200	70	100	700	>1,000	2	5	.3	.02	.4	11.0	22.3
230	6038	B	1.2	1.8	.4	.22	<10	2	75	150	100	70	3,000	3,000	20	70	150	500	200	50	10	.7	.01	.5	10.0	19.0
231	6039	B	.6	1	<.1	.01	30	1.5	25	150	1,000	30	2,000	1,500	15	10	300	200	100	15	7	1.5	.1	2.2	6.7	2.7
232	6040	B	.2	<.1	<.1	.01	10	1	125	200	30	70	3,000	200	20	70	>5,000	200	150	30	10	1.5	.5	3.9	4.1	.9
233	6041	B	2	<.1	<.1	.02	80	15	50	200	1,000	20	5,000	3,000	100	1,000	3,000	150	>1,000	30	7	1	.05	.4	8.7	21.9
234	6042	Ga	.2	1.5	<.1	.01	80	2	<25	1,000	100	50	700	300	20	50	100	20	100	50	10	1	.02	.5	7.2	13.8
235	6043	G	.2	.2	<.1	<.01	<10	1	<25	200	20	30	1,500	700	20	<2	100	200	150	5	3	1.5	.05	3.3	4.0	1.0
235A	6044	G	.8	3	<.1	.01	80	1.5	<25	700	100	50	1,500	700	30	<2	100	70	200	30	7	.5	.1	2.0	4.8	2.1
236	6045	Ga	<.2	1	<.1	.01	<10	.5	<25	700	70	50	200	5,000	100	30	70	70	500	7	3	.7	.1	1.4	6.4	4.0
236A	6046	Ga	<.2	.8	<.1	<.01	<10	.5	<25	300	70	50	500	300	50	<2	100	20	70	7	1	.2	.1	2.0	4.7	2.1
237	6047	B	.2	15	<.1	<.01	120	4	50	700	100	70	3,000	1,000	30	70	200	200	200	30	15	1	.2	2.7	4.6	1.5
237A	6048	G	<.2	.5	<.1	<.01	<10	.5	25	100	300	70	700	700	50	15	700	50	100	5	2	.7	.15	1.9	4.8	2.2
238	6049	Ba	.2	.1	<.1	.01	40	2	125	500	70	100	1,500	700	50	200	500	150	150	70	15	.7	.2	3.1	4.1	1.2
238A	6050	Ba	.2	<.1	.3	<.01	<10	2	125	700	50	70	1,500	1,000	150	10	200	300	100	20	10	.5	.7	4.3	3.2	.7
239	6051	Ga	.2	.2	<.1	.01	10	1	50	>1,000	100	70	300	2,000	150	2	200	300	300	10	5	1.5	.2	2.2	3.3	1.4
239A	6052	B	<.2	.5	<.1	.35	<10	1	25	300	50	70	3,000	3,000	30	5	70	200	200	30	5	1.5	.05	.4	9.4	21.7
240	6053	Ga	.8	<.1	<.1	.5	30	1.5	50	1,000	>5,000	50	3,000	7,000	50	15	70	70	1,000	150	10	.5	.15	1.3	4.5	3.0
241	6054	B	<.2	<.1	<.1	<.01	40	1	50	500	100	100	150	500	20	<2	100	100	150	2	5	.7	.01	4	8.6	20.6
242	6055	Ga	<.2	1.5	1.1	.08	120	2	50	500	50	70	1,000	500	20	3	3,000	70	150	2	5	.5	.2	3.5	5.6	1.4
243	6056	B	.2	<.1	<.1	.01	40	1.5	25	>1,000	70	100	500	300	30	<2	100	70	300	15	3	.5	.1	.5	11.0	21.1
244	6057	B	.2	<.1	.2	.02	60	1	25	700	70	100	300	700	30	<2	200	150	200	2	5	.7	.15	3.5	5.4	1.4
245	6058	Ba	.6	1	.2	.03	<10	1.5	<25	500	70	70	1,000	1,000	20	10	300	150	300	5	3	1	.15	1.6	8.0	4.5
245A	6059	G	1.6	.5	-------	.85	40	20	<25	300	300	70	1,000	700	20	500	100	200	300	7	7	.5	.01	-------	-------	-------
246	6060	G	.2	<.1	<.1	.03	10	4	50	150	500	>100	700	1,000	50	200	100	150	700	2	5	.3	.1	.4	12.0	29.4
246A	6061	Ga	.2	<.1	<.1	5	<10	2	25	200	10	70	1,000	500	10	20	1,500	150	70	2	5	.5	.02	.3	11.0	30.4
247	6062	B	.6	.5	.3	.13	<10	3	25	700	200	>100	5,000	700	50	20	3,000	100	300	3	5	.7	.02	.3	12.0	36.7
248	6063	Ga	.4	<.1	<.1	.03	120	2	400	300	>1,000	100	5,000	2,000	30	100	>5,000	200	200	15	7	1	.1	.2	10.0	49.0
248A	6064	Ga	.2	.1	<.1	.03	120	1.5	25	300	1,000	100	2,000	3,000	30	15	300	150	300	3	5	1	.5	.3	11.0	38.8
249	6065	B	.2	<.1	<.1	<.01	<10	<.5	25	150	50	70	3,000	>5,000	30	10	2,000	300	300	20	7	3	5	5.5	3.8	.6
249A	6066	B	1	.2	.2	.01	10	2	500	300	300	50	3,000	500	30	150	>5,000	70	300	10	1.5	7	2	1.5	8.3	5.0
258	6080	B	.2	<.1	.3	.3	10	2	400	150	300	50	3,000	3,000	30	100	>5,000	150	300	7	.7	7	.5	.1	8.2	49.5
259	6081	Ba	1.8	1	.4	.01	20	1	50	150	50	50	2,000	>5,000	50	<2	2,000	300	200	30	1.5	7	2	2.9	4.5	1.4
259A	6082	B	.2	.1	1.0	.02	20	1	500	300	70	30	2,000	1,000	20	50	3,000	100	100	30	.5	7	.2	3.6	5.5	1.4
260	6083	B	.4	.5	<.1	.01	20	3	<25	150	200	20	>10,000	700	5	150	100	100	300	5	.5	7	.1	3.3	8.8	2.4
261	6084	B	.2	1	<.1	.25	20	2	25	200	200	70	3,000	1,000	30	15	150	100	300	5	.7	7	.2	1.2	7.5	5.6
262	6085	Ba	.2	.4	<.1	.02	10	1	<25	500	70	50	700	700	20	<2	200	70	200	2	.7	3	.1	4.4	4.3	.9
263	6086	B	.4	.5	<.1	.02	20	1	25	150	300	70	3,000	5,000	30	50	200	200	200	20	.7	7	.1	1.8	7.0	3.5
264	6087	B	.2	5	<.1	.01	40	1.5	<25	150	50	50	2,000	2,000	20	<2	150	300	150	10	1	7	.1	3.6	5.1	1.3
265	6088	B	<.2	.1	<.1	<.01	10	2	50	1,000	30	50	3,000	3,000	7	10	100	100	200	15	3	.3	.1	3.5	5.7	1.5
266	6089	B	.2	1	<.1	.42	10	6	25	300	300	100	2,000	3,000	20	20	70	300	300	7	5	.7	.1	1.5	8.3	5.0
267	6090	B	<.2	.2	.2	.03	<10	1	<25	700	200	100	1,000	1,000	30	30	100	200	300	15	5	.7	.1	.8	9.6	10.5
268	6091	B	<.2	.1	.1	.03	<10	.5	25	500	70	100	2,000	300	30	15	200	200	200	70	10	.7	.5	3.9	4.5	1.0
269	6092	B	<.2	.1	<.1	.03	.06	1.5	<25	700	100	100	700	100	15	2	70	100	300	7	7	.3	.1	.3	11.0	34.5
270	6093	B	1	.4	9.1	.4	.02	75	50	200	300	>100	5,000	3,000	30	500	70	1,000	700	50	15	.7	.2	.1	11.1	.7
271	6094	B	<.2	<.1	<.1	.13	---------	4	25	300	70	100	>5,000	5,000	20	10	50	500	150	30	5	.7	.2	3.6	6.2	1.6
272	6095	B	1	1	.2	.04	1	2	500	700	1,500	>100	700	500	20	10	100	150	150	30	3	1	.2	2.2	7.1	2.8
273	6096	B	37	20	------	.65	10	300	500	1,000	>5,000	30	>5,000	5,000	150	150	70	150	700	100	10	1	.1	1.1	4.3	3.5
273A	6097	G	.2	<.1	<.1	<.01	2	2	25	>1,000	70	30	1,500	200	150	<2	700	100	150	15	7	1.5	3	1.9	3.3	1.6
274	6098	B	.2	.8	<.1	.01	.02	2	25	>1,000	100	100	200	100	20	2	200	30	70	10	3	.5	.2	3.3	6.9	1.9

TABLE 1.—*Analyses of rock samples from Cripple Creek gold district, Colorado*—Continued

Field No.	Lab. No.	Rock type	Chemical analyses (parts per million)							Semiquantitative spectrographic analyses														Chemical analyses (percent)		K_2O/Na_2O
										Parts per million											Percent					
			Ag	Te	Au	Hg	As	Sb	Zn	Zr	Pb	Ga	Ba	Sr	Y	Mo	Mn	V	La	Cu	Fe	Mg	Ca	Na	K	
CC-274A	6099	B	0.4	0.4	<0.1	0.15	0.8	60	25	>1,000	150	70	300	50	15	2	300	20	200	20	7	0.5	0.02	2.3	7.6	3.0
275	6100	Ga	<.2	.1	<.1	<.01	.02	8	125	700	50	50	1,000	500	50	<2	200	50	200	7	5	.7	.2	2.2	2.9	1.2
275A	6101	B	2	1	1.2	.22	2	11	<25	700	200	70	2,000	3,000	70	2	200	150	>1,000	30	15	.5	.1	.7	8.9	11.3
276	6102	G	.6	1	.5	.03	.8	11	<25	700	70	70	200	70	20	30	150	20	50	10	2	.01	.01	.2	9.5	38.0
276A	6103	Ba	.4	.8	2.2	.05	.4	11	<25	>1,000	70	70	50	100	15	<2	50	50	70	15	5	.02	<.01	.3	11.4	34.5
277	6104	G	<.2	<.1	<.1	<.01	.06	.05	<25	300	50	50	5,000	1,500	50	<2	1,500	100	100	20	7	2	2	2.1	4.4	1.9
278	6105	T	.6	20	.9	.25	.4	11	100	700	70	20	2,000	500	70	30	2,000	300	100	30	10	1.5	1.5	1.7	5.6	3.0
279	6106	G	<.2	.1	<.1	.01	.02	1	<25	300	30	70	2,000	1,500	20	<2	2,000	100	100	7	3	1	.2	3.9	5.6	1.3
279A	6107	Ga	<.2	<.1	<.1	<.01	.02	.05	25	300	20	50	2,000	700	50	<2	1,500	100	100	20	7	2	1.5	2.2	3.3	1.4
280	6108	Ga	.4	.1	<.1	.07	.02	1.5	125	200	700	50	3,000	1,500	150	20	3,000	150	150	70	20	2	.5	1.0	6.8	6.0
281	6109	G	<.2	1	<.1	.02	.02	1	<25	1,000	50	50	1,000	700	150	2	700	150	150	30	10	2	.2	2.2	3.7	1.5
282	6110	B	.2	<.1	<.1	.19	<10	2	25	150	50	50	2,000	2,000	20	15	70	200	150	2	3	.5	.15	3.2	9.8	2.7
283	6111	Ba	<.2	.2	<.1	.01	30	1.5	25	200	70	70	3,000	3,000	50	15	100	200	150	10	5	1	.1	1.6	7.3	4.0
284	6112	B	.4	.1	<.1	<.01	10	1.5	<25	200	70	70	2,000	1,500	10	30	70	300	200	20	10	.2	.1	3.1	5.7	1.7
285	6113	Ba	<.2	.2	.2	.02	<10	.5	25	200	70	70	2,000	3,000	15	7	1,000	200	70	50	7	2	.7	3.6	9.7	2.4
285A	6114	G	.2	.1	<.1	<.01	<10	1	25	300	20	70	2,000	>5,000	30	<2	2,000	300	150	70	15	3	7	2.8	2.4	1.3
286	6115	B	1.2	.5	<.1	.01	20	1.5	<25	150	15	70	2,000	1,000	20	7	700	300	200	10	15	.5	.1	2.2	7.3	2.9
287	6116	B	<.2	.2	<.1	.11	60	4	50	200	20	50	700	500	20	7	300	100	200	10	10	.3	.2	1.0	8.3	7.2
288	6117	B	<.2	.1	<.1	<.01	<10	.5	25	700	20	50	2,000	>5,000	20	2	1,500	200	150	15	15	2	7	3.6	2.8	.7
289	6118	B	.4	.5	.6	.03	160	8	25	100	30	70	3,000	2,000	20	7	50	200	200	10	10	.2	.05	.2	12.2	50.7
290	6119	B	.2	<.1	.2	<.01	10	1	25	150	30	70	1,500	1,000	20	2	3,000	70	200	<2	10	.3	.2	2.2	8.0	3.2
291	6120	B	.2	<.1	<.1	<.01	20	<.5	25	150	70	70	70	50	15	<2	3,000	20	200	5	2	.2	.5	5.9	4.7	1.4
291A	6121	B	.4	<.1	<.1	.03	10	<.5	25	300	100	100	100	700	20	<2	3,000	30	300	5	2	.2	.7	4.9	4.8	1.1
292	6122	B	.2	.1	.1	<.01	10	<.5	25	700	70	100	50	150	20	<2	3,000	50	300	5	3	.15	.7	5.9	4.5	1.5
293	6123	B	.6	.1	<.1	.01	20	<.5	25	700	100	>100	70	50	20	<2	3,000	70	300	3	3	.3	.7	5.0	3.8	.7
293A	6124	B	.2	.2	<.1	.01	20	1	<25	700	70	70	1,000	1,500	15	<2	200	100	100	5	3	.5	.07	1.9	8.3	3.8
294	6125	Ba	<.2	.8	<.1	<.01	40	1.5	25	500	70	70	700	150	20	<2	500	100	<20	5	7	.2	.01	.1	12.0	110.0
294A	6126	Ba	1.6	<.1	<.1	.55	60	4	<25	500	300	70	700	700	20	<2	70	150	300	20	5	.15	.07	.1	8.5	78.4
295	6127	Ba	1.2	<.1	<.1	.08	20	<.05	25	1,000	50	70	1,000	1,500	20	<2	100	150	70	10	7	.5	.1	4.9	4.8	.9
295A	6128	Ba	1.8	--------	<.1	.04	20	.5	<25	700	50	70	1,500	3,000	20	<2	100	150	500	7	5	.5	.1	3.7	6.6	1.6
296	6129	B	.2	.1	<.1	<.01	10	<.05	25	300	100	>100	200	70	30	<2	3,000	70	300	5	7	.3	.7	6.2	4.8	.7
297	6130	B	.8	<.1	<.1	<.01	10	.5	50	200	50	50	700	700	20	2	2,000	300	200	10	15	.7	1	1.8	8.5	4.3
297A	6131	B	.8	<.1	<.1	.01	400	11	25	300	70	70	150	700	20	<2	3,000	10	300	2	5	.5	.3	.7	3.0	3.7
298	6132	B	.2	.2	<.1	.06	20	15	25	700	100	50	>5,000	500	30	5	2,000	500	100	50	7	.3	.7	1.5	9.8	5.9
298A	6133	B	.4	.2	<.1	<.01	10	1	25	200	50	50	>5,000	500	30	<2	5,000	300	200	50	7	.3	7	.6	10.6	1.7
299	6134	G	1.2	.5	<.1	.01	10	.5	<25	20	30	30	300	200	70	<2	100	10	<20	2	1	.5	.2	3.5	1.7	.4
300	6135	G	1	1.5	<.1	.03	20	1.5	50	1,000	500	70	1,000	700	150	<2	500	200	700	10	3	.7	.1	1.9	14.0	6.5
301	6136	B	.4	.5	<.1	<.01	10	.5	<25	500	50	50	1,500	1,000	20	7	50	300	150	10	2	.5	.1	4.7	4.8	.9
302	6137	Ga	.8	.5	.2	.02	10	.5	<25	700	200	70	3,000	2,000	>200	10	100	20	>1,000	15	10	1.5	.1	.4	4.7	11.0
303	6138	Ga	.2	.1	<.1	<.01	20	.5	<25	700	100	20	>5,000	3,000	70	<2	70	20	1,000	50	7	.2	.1	.1	2.3	21.5
303A	6139	Ga	.6	<.1	.4	.06	20	2	<25	50	10	50	200	100	10	30	70	30	<20	20	>20	.3	.1	.1	1.1	10.0
304	6040	Ga	1	<.1	1.1	.01	20	2	<25	300	500	70	5,000	500	100	20	50	20	>1,000	100	>20	.2	.1	.1	1.5	1.4
304A	6141	Ga	1.2	.1	.1	<.01	10	.5	<25	700	10	30	5,000	150	20	<2	50	10	300	70	2	.5	.2	.1	2.0	19.0
305	6142	G	.4	.8	<.1	<.01	20	<.5	<25	1,000	50	50	>5,000	1,500	30	10	50	20	100	7	5	.1	.2	1.8	5.6	2.8
306	6143	G	.4	<.1	<.1	<.01	20	<.5	25	300	70	70	3,000	700	50	5	70	20	100	30	5	.5	.2	1.6	4.7	2.5
307	6144	Ga	.4	.2	.3	<.01	20	1	<25	300	50	50	3,000	2,000	30	15	70	100	70	30	15	1.5	.2	.1	3.4	2.1
308	6145	B	.4	.1	<.1	<.01	10	<.5	<25	500	50	50	700	50	30	<2	70	10	70	70	1.5	.5	.02	.9	4.2	4.2
309	6146	G	.4	.4	<.1	<.01	10	1.5	<25	300	20	70	1,000	150	50	<2	70	300	100	7	10	1.5	.05	.7	4.7	5.9
309A	6147	G	.6	.4	<.1	<.01	20	2	<25	100	70	30	2,000	500	50	10	50	150	150	20	7	1	<.01	.3	5.2	16.6
310	6148	B	<.2	.8	<.1	<.01	20	1	<25	200	10	70	2,000	150	70	5	50	300	70	15	10	1	<.01	.3	5.6	17.9
310A	6149	Ba	.4	.2	<.1	<.01	20	.5	25	700	10	20	5,000	700	150	<2	50	20	200	7	7	.7	.03	2.2	1.2	.5
311	6150	Ba	.4	2	<.1	<.01	40	6	100	300	20	20	700	500	20	15	>5,000	500	<20	150	20	.2	.7	4.8	1.0	.2
312	6151	B	<.2	<.1	.1	.02	10	.5	<25	300	20	50	2,000	3,000	20	<2	200	700	50	7	10	1.5	.7	1.5	2.9	1.7
312A	6152	Ba	.4	<.1	<.1	.03	10	1	<25	200	10	70	>5,000	2,000	20	7	70	500	20	30	20	1	.15	1.4	2.7	1.7
313	6153	Ba	.4	.1	.2	<.01	20	1	<25	200	30	70	3,000	1,000	50	<2	50	700	100	30	10	1.5	.1	.4	5.6	13.4
314	6154	G	.4	<.1	<.1	<.01	10	.5	50	300	70	50	500	700	100	<2	150	10	200	15	2	.5	.1	1.3	5.2	3.7
315	6394	B	.4	.4	<.1	.03	10	1	25	700	50	70	3,000	3,000	30	2	100	150	150	30	7	1.5	.2	.6	7.0	10.1
316	6395	G	.2	<.1	<.1	.01	<10	.5	25	100	70	50	2,000	700	100	2	500	50	150	30	3	.3	.5	1.6	6.6	3.8
316A	6396	Ga	.2	.1	<.1	.02	10	.5	25	200	70	50	1,500	700	70	<2	300	50	100	15	3	.3	.2	1.6	5.7	3.3
316B	6397	Ga	.4	1	.2	.04	10	1	<25	100	50	70	1,500	300	70	5	200	300	70	20	15	1.5	.1	.3	5.1	14.2
316C	6398	B	<.2	.2	.3	.05	<10	.5	<25	70	20	70	1,500	200	50	2	150	300	50	20	7	1.5	<.01	.3	5.7	18.2
316D	6399	G	<.2	.8	<.1	.01	10	1	<25	150	100	50	1,500	2,000	150	<2	150	70	100	20	2	1	.2	1.6	5.5	3.1
317	6400	B	.4	<.1	<.1	.01	10	1	500	200	50	50	2,000	3,000	20	2	>5,000	200	70	30	7	1.5	1	3.4	5.0	1.3

317A	6401	B	.2	.1	<.1	<.01	20	1	350	200	300	70	2,000	3,000	20	15	5,000	200	200	70	15	.3	.2	3.2	8.8	2.5
318	6402	Ba	<.2	.4	<.1	.01	<10	.5	25	300	500	50	5,000	5,000	50	10	100	300	300	15	3	1	.2	3.9	2.6	.6
319	6403	Ba	.2	.1	<.1	.03	20	1	50	200	70	50	5,000	3,000	50	2	150	300	150	30	5	1.5	.1	1.6	8.6	4.7
320	6404	Ba	.2	.1	<.1	.02	<10	.5	50	200	100	100	3,000	3,000	30	2	300	300	300	30	5	1.5	.1	2.4	7.9	3.0
321	6405	B	<.2	1	.2	.02	20	1	25	200	300	70	3,000	5,000	20	2	200	200	150	50	7	1	.1	1.4	6.0	3.8
322	6406	Ba	.2	1	.4	.04	40	2	25	200	70	>100	5,000	>5,000	30	20	100	300	150	20	7	1	.1	.4	8.5	21.2
323	6407	Ba	.8	.1	.2	.01	10	.5	50	500	50	>100	3,000	>5,000	30	30	100	300	300	50	7	1	.1	1.5	6.9	4.1
323A	6408	Ba	2	.2	<.1	.02	10	.5	25	150	700	>100	>5,000	>5,000	30	100	300	300	500	30	7	1	.1	.4	9.9	21.6
324	6409	B	<.2	.2	<.1	<.01	10	.5	50	300	200	100	>5,000	>5,000	20	150	100	150	1,000	20	7	.7	.1	.7	7.9	9.4
325	6410	B	.6	.5	.1	<.01	20	1.5	25	500	1,000	100	>5,000	>5,000	30	>2,000	100	150	700	30	5	.3	.1	.4	10.3	22.4
325A	6411	B	1	.5	.2	.01	10	1.5	50	300	2,000	70	>5,000	>5,000	50	>2,000	300	100	>1,000	30	7	.5	.2	.3	7.6	20.4
326	6412	G	.2	<.1	<.1	<.01	<10	.5	<25	700	15	100	5,000	300	200	15	1,500	50	100	<2	7	2	7	1.3	1.0	.7
327	6413	B	<.2	<.1	<.1	<.01	10	1.5	50	500	30	70	2,000	300	50	10	200	70	100	2	3	.7	.2	.3	11.6	31.1
328	6414	Ga	<.2	<.1	.2	<.01	200	1.5	25	300	50	100	1,500	500	70	10	100	70	70	10	2	.7	.1	.4	6.6	14.6
329	6415	Ga	<.2	<.1	<.1	.02	10	1	50	150	50	70	2,000	700	30	<2	200	70	70	7	3	.3	.7	2.0	4.7	2.1
330	6416	Ga	1	<.1	<.1	.02	40	6	25	70	100	<10	1,500	700	30	15	500	50	<20	5	2	.2	.5	1.9	5.2	2.4
331	6417	G	.2	<.1	<.1	.15	10	.5	50	150	70	100	3,000	1,000	70	<2	700	100	70	30	7	1.5	1.5	1.7	5.1	2.7
332	6418	Ga	<.2	<.1	.8	.03	100	8	<25	70	50	100	1,500	700	70	2	100	70	<20	2	2	.5	.7	1.5	5.4	3.2
333	6419	Ga	<.2	<.1	<.1	.03	<10	.5	25	70	50	70	2,000	700	50	<2	500	50	70	5	5	1	1	1.9	4.9	2.3
333A	6420	Ga	.8	<.1	.9	.03	200	20	125	1,000	300	70	1,000	700	>200	20	500	150	200	70	20	.3	.1	.6	4.6	7.6
334	6421	G	<.2	<.1	<.1	.90	<10	.5	25	<5	50	<10	300	200	5	<2	300	10	<20	2	1	.2	.7	2.2	4.2	1.7
335	6422	Ga	<.2	<.1	<.1	.09	40	1.5	25	50	50	10	1,500	300	30	<2	150	30	<20	15	2	.3	.2	.9	5.2	5.2
336	6423	Ga	<.2	<.1	<.1	.02	<10	.5	25	100	30	50	700	300	20	<2	100	30	70	15	3	.3	1.5	1.7	3.2	1.6
337	6424	B	<.2	<.1	<.1	.02	20	2	125	200	200	>100	700	5,000	150	5	1,500	700	150	30	7	.7	1	1.2	9.9	7.4
337A	6425	G	<.2	<.1	<.1	.16	10	1	50	150	70	5	1,000	700	50	<2	700	50	<20	2	3	.7	1	2.1	5.2	2.2
338	6426	B	.8	<.1	<.1	.12	<10	4	100	300	1,500	>100	3,000	1,500	30	10	50	100	200	7	3	.7	.7	.9	9.6	9.6
338A	6427	G	.2	<.1	<.1	.03	<10	.5	25	150	50	>100	3,000	1,000	150	3	1,500	100	200	15	7	2	2	2.1	5.1	2.2
339	6428	G	.2	<.1	<.1	.02	<10	.5	25	150	70	70	3,000	1,500	50	<2	700	700	70	15	5	.7	1	2.1	6.0	2.6
340	6429	G	.2	<.1	<.1	<.01	<10	.5	50	300	50	50	1,500	300	30	<2	700	700	50	5	5	1	1	1.8	5.7	2.9
341	6430	G	.2	<.1	.1	.02	<10	.5	50	700	30	50	2,000	500	50	<2	1,000	1,000	50	10	7	1.5	2	2.1	4.0	1.7
CCF-342	6431	G	<.2	<.1	<.1	<.01	<10	.5	25	70	50	30	500	70	5	<2	150	150	20	2	1	.2	.5	2.0	5.1	2.3
CC -343	6432	G	<.2	<.1	<.1	.01	10	.5	50	200	50	50	1,000	700	150	<2	700	700	100	15	7	1.5	3	2.5	3.4	1.2
344	6433	G	<.2	<.1	.2	.02	<10	.5	50	150	50	50	1,000	500	70	<2	700	700	70	15	7	.7	1.5	2.2	4.7	1.9
345	6434	G	<.2	<.1	<.1	.01	<10	<.5	25	150	70	30	700	300	20	5	300	300	70	<2	3	.3	1	2.0	5.7	2.5
346	6435	B	.2	<.1	<.1	.01	<10	<.5	50	500	70	100	150	300	30	<2	3,000	3,000	300	15	5	.2	1	6.3	4.7	.7
346A	6436	G	<.2	<.1	--------	.01	<10	<.5	25	100	50	30	700	500	10	3	300	300	<20	<2	1	.2	1	2.2	4.9	2.0
347	6437	B	<.2	<.1	<.1	<.01	<10	<.5	75	300	70	100	200	300	30	10	3,000	3,000	300	2	5	.3	1	5.9	5.0	.7
348	6438	B	.2	<.1	<.1	.02	<10	<.5	75	700	70	>100	300	300	30	3	5,000	5,000	300	5	5	.3	1.5	6.3	5.0	.7
349	6439	B	<.2	<.1	<.1	.01	<10	<.5	50	150	70	>100	200	700	20	2	3,000	3,000	200	2	5	.3	1	6.0	5.1	.7
350	6440	B	.2	<.1	<.1	.01	<10	<.5	50	200	50	70	3,000	>5,000	50	2	1,000	1,000	200	15	7	1	7	3.9	3.6	.8
351	6441	B	<.2	<.1	<.1	.02	<10	3	50	200	50	70	2,000	1,500	30	<2	700	700	150	15	7	.2	.7	2.0	8.3	3.7
352	6442	G	<.2	<.1	<.1	<.01	<10	.5	25	200	20	70	2,000	200	100	<2	700	700	50	30	5	.7	.5	1.4	5.0	3.1
353	6443	G	<.2	<.1	<.1	.01	<10	<.5	<25	70	70	50	700	200	5	<2	150	150	20	2	1	.2	.7	1.7	5.6	2.9
354	6444	Ga	<.2	<.1	.1	.02	<10	.5	<25	300	30	50	1,000	100	70	<2	1,500	1,500	70	5	3	.5	.3	1.8	4.1	2.0
CCF-355	6445	G	<.2	<.1	<.1	.02	<10	<.5	25	30	70	50	1,000	150	30	<2	300	300	70	5	3	.7	.7	1.9	5.6	2.6
CC -356	6446	G	<.2	<.1	<.1	.01	<10	<.5	25	10	50	50	700	150	5	<2	200	200	<20	3	1	.2	.3	1.8	5.3	2.7
CCF-357	6447	B	.4	<.1	.2	.01	10	<.5	75	70	70	100	300	300	30	<2	3,000	3,000	200	2	5	.3	.5	5.6	4.8	.8
358	6448	B	.3	<.1	.1	.02	10	.5	75	>1,000	70	>100	700	200	50	3	5,000	5,000	500	5	3	.2	1	6.3	4.4	.6
CC -359	6449	B	.4	<.1	<.1	.01	10	.5	100	>1,000	150	>100	100	150	30	7	5,000	5,000	500	2	3	.2	.7	6.0	4.6	.7
360	6450	B	.4	<.1	.2	.01	10	.5	75	700	150	>100	300	150	30	7	5,000	5,000	700	<2	3	.2	1	6.2	4.7	.7
360A	6451	G	.2	<.1	<.1	.01	<10	<.5	25	50	30	20	1,500	200	10	<2	150	150	20	<2	1	.1	.2	1.8	4.2	2.1
CCF-361	6452	B	.4	<.1	<.1	.01	10	.5	75	700	100	>100	200	300	30	5	3,000	3,000	500	2	5	.2	1	5.4	4.8	.8
361A	6453	G	.2	<.1	<.1	.01	<10	.5	25	500	50	30	1,000	500	30	2	1,500	1,500	70	15	5	1.5	2	2.3	4.1	1.6
CC -362	6454	G	<.2	<.1	<.1	.01	<10	<.5	<25	50	70	30	300	150	30	<2	300	300	20	7	1.5	.5	.5	2.0	5.0	2.2
362A	6455	B	<.2	<.1	<.1	.02	10	1.5	75	500	70	100	100	200	50	<2	5,000	5,000	150	30	5	.1	.2	2.9	8.1	2.5
CCF-363	6456	G	<.2	<.1	<.1	.01	<10	<.5	<25	100	70	30	700	200	20	<2	300	300	30	2	2	.3	.2	1.5	4.5	2.7
CC -364	6457	B	<.2	<.1	<.1	.01	10	1	50	1,000	100	<100	300	50	20	<2	3,000	3,000	150	20	7	.2	.2	2.7	8.1	2.5
364A	6458	G	<.2	<.1	--------	<.01	10	<.5	25	100	70	50	700	500	30	<2	500	500	<20	7	3	.2	.5	1.9	5.2	2.5
365	6459	G	<.2	<.1	<.1	.03	<10	<.5	<25	10	50	50	1,000	700	15	<2	300	300	<20	2	1.5	.2	.2	1.7	6.9	3.6
CCF-366	6460	B	.4	<.1	<.1	<.01	<10	.5	75	700	70	>100	70	100	30	5	5,000	5,000	20	5	3	.2	.7	6.8	4.6	.6
CC -367	6461	G	<.2	<.1	<.1	.01	<10	.5	25	200	70	70	1,500	300	50	7	700	700	20	5	5	.3	.5	1.7	6.1	3.2
367A	6462	B	.4	<.1	<.1	.01	10	.5	75	300	70	>100	300	300	30	<2	3,000	3,000	300	2	5	.3	.5	5.4	4.6	.6
367B	6463	G	<.2	<.1	<.1	.02	10	1	<25	300	70	70	200	300	50	2	300	300	100	150	1.5	.5	.15	1.0	10.0	8.6
368	6464	G	<.2	<.1	.2	.01	10	1	25	150	50	50	1,500	700	150	2	1,000	1,000	100	30	7	2	3	1.9	2.7	1.2
369	6465	G	<.2	<.1	<.1	.01	10	<.5	25	50	70	20	2,000	700	20	5	700	20	<20	70	2	.1	.5	1.3	6.2	4.4
369A	6466	B	.4	<.1	<.1	.01	10	<.5	75	1,000	70	100	100	200	30	2	5,000	50	300	5	5	.2	.7	5.9	4.5	.7
370	6467	G	.2	<.1	<.1	.02	10	<.5	75	700	50	50	2,000	700	70	2	2,000	150	100	50	7	2	5	2.2	3.2	1.3
370A	6770	B	<.2	<.1	<.1	.05	20	.5	50	100	70	70	5,000	500	10	5	50	70	70	2	3	.5	.05	3.3	6.3	1.7
371	6468	Ba	1	.4	.2	.01	10	1	<25	300	100	70	3,000	1,500	100	15	50	70	200	20	10	.2	.05	1.5	7.5	4.5
372	6469	B	.4	<.1	<.1	<.01	10	3	25	150	1,000	100	2,000	>5,000	20	<2	500	150	100	10	7	1	.1	2.4	7.3	2.7
373	6470	B	1.6	<.1	.2	.01	10	1.5	25	500	1,500	50	>5,000	3,000	30	15	20	100	700	10	3	.3	.02	1.5	9.5	5.7
374	6471	Ga	.2	.2	<.1	<.01	<10	1	25	100	50	30	100	500	30	<2	100	50	70	5	1.5	.3	.05	1.3	5.5	3.9
374A	6472	B	.2	<.1	<.1	<.01	<10	.5	25	150	70	50	>5,000	3,000	15	7	50	70	500	15	7	.5	.02	1.6	6.3	3.5

TABLE 1.—*Analyses of rock samples from Cripple Creek gold district, Colorado*—Continued

Field No.	Lab. No.	Rock type	Chemical analyses (parts per million)							Semiquantitative spectrographic analyses														Chemical analyses (percent)		K_2O/Na_2O
										Parts per million											Percent					
			Ag	Te	Au	Hg	As	Sb	Zn	Zr	Pb	Ga	Ba	Sr	Y	Mo	Mn	V	La	Cu	Fe	Mg	Ca	Na	K	
CC-375	6473	Ga	1	1.5	1.5	0.02	60	3	50	200	700	100	3,000	5,000	100	70	100	200	>1,000	70	10	0.7	0.02	1.3	8.9	6.3
376	6474	Ga	<.2	.8	.8	.02	<10	.5	25	300	50	50	2,000	300	70	<2	100	10	70	5	1.5	.2	.15	2.2	5.2	2.1
377	6475	Ga	.2	<.1	<.1	<.01	<10	.5	75	200	200	70	2,000	300	70	5	200	10	200	3	3	.3	.3	2.3	4.7	1.8
378	6476	G	.2	.2	<.1	.01	<10	<.5	25	150	50	30	700	100	50	<2	200	10	100	3	2	.2	.15	2.4	5.0	1.9
379	6477	B	3.8	1	.1	.01	<10	2	75	150	70	100	1,500	5,000	15	10	300	200	200	30	3	1	.1	3.0	4.6	1.4
380	6478	G	.2	.2	<.1	.01	<10	.5	50	50	20	70	200	200	20	7	150	300	<20	20	5	.5	.2	3.4	1.7	.4
381	6479	Ba	<.2	.4	<.1	.07	10	1.5	25	300	150	100	3,000	300	15	2	700	70	100	10	5	.5	<.01	.2	11.8	47.0
382	6480	Ga	.4	.4	<.1	.02	10	1	<25	300	70	50	1,500	3,000	70	2	100	50	300	7	3	.2	.05	1.8	5.9	3.0
383	6481	G	.4	.1	<.1	.01	<10	1	25	70	200	50	2,000	3,000	50	2	70	30	100	7	1.5	.2	.02	.4	11.0	25.0
384	6482	Ga	.2	.8	.3	.05	20	4	<25	70	150	70	700	500	50	300	70	150	100	5	5	.2	.01	.4	9.1	23.0
385	6483	B	.8	.8	<.1	.14	10	2	25	1,000	200	70	1,500	700	30	7	300	70	200	10	3	.5	.01	.2	11.5	42.5
386	6484	B	.4	<.1	<.1	.02	20	2	25	700	70	70	1,500	1,000	30	5	200	100	200	5	3	.5	.05	.6	10.3	14.4
387	6485	B	<.2	<.1	<.1	.03	10	.5	75	200	70	70	2,000	3,000	30	5	3,000	150	200	20	10	.7	.7	3.3	4.5	1.2
388	6486	B	<.2	<.1	<.1	.01	10	.5	75	150	20	50	3,000	500	30	2	3,000	200	150	15	7	.5	.7	5.1	3.2	.6
389	6487	Ba	.2	3	<.1	.01	20	1	25	150	100	50	3,000	5,000	15	2	150	200	200	15	10	1	.1	2.7	5.7	1.9
390	6488	B	.2	<.1	<.1	.02	20	.5	50	150	20	100	1,500	1,000	20	<2	300	200	150	15	7	1	.3	3.7	5.2	1.3
391	6489	B	.2	.2	.1	.03	20	2	25	100	300	170	2,000	3,000	30	30	300	70	300	15	7	.7	.1	.3	10.5	29.0
412	66-402	G	.2	<.05	<.1	<.01	10	<.05	25	>1,000	50	10	1,500	300	100	2	1,000	50	50	150	7	1.5	1	2.7	1.7	.6
413	403	G	<.2	.05	<.1	<.01	20	<.05	<25	200	100	10	1,500	500	70	<2	300	20	50	30	3	.7	1	1.8	6.2	3.0
414	404	Ga	.2	.2	<.1	<.01	10	<.05	<25	150	100	15	1,000	700	30	7	300	15	30	200	3	.5	1.5	3.0	3.1	.9
414A	405	G	.2	<.05	<.1	<.01	10	.5	<25	150	100	10	1,500	500	20	<2	300	30	50	30	3	.5	.7	2.1	5.6	2.3
415	406	Ga	.2	<.05	<.1	<.01	10	<.5	<25	100	150	10	1,500	700	20	<2	300	20	30	20	1.5	.3	.7	2.2	4.7	1.9
416	407	G	<.2	.05	<.1	.02	10	<.5	<25	300	100	10	1,000	500	30	<2	200	20	300	30	2	.3	.3	1.9	5.5	2.6
417	408	G	<.2	<.05	<.1	<.01	10	.5	<25	300	70	10	1,500	300	30	<2	200	20	70	30	1.5	.1	.2	1.8	5.8	2.9
417A	409	Qtz	<.2	<.05	<.1	<.01	10	.5	<25	300	30	<10	500	100	20	<2	100	30	70	20	2	.07	.2	1.2	1.7	1.3
419	410	G	<.2	2	<.1	<.01	20	.5	<25	300	70	10	1,000	300	50	<2	30	10	150	70	1.5	.1	.05	1.2	4.9	3.8
420	411	G	<.2	<.05	<.1	<.01	10	<.5	<25	300	70	10	1,500	300	70	<2	70	10	150	20	1.5	.15	.07	2.2	4.7	1.9
421	412	Ga	.4	.4	<.1	<.01	10	.5	<25	300	70	10	5,000	500	70	<2	30	7	200	30	2	.15	.05	1.2	4.6	3.4
422	413	Ga	.2	.1	<.1	<.01	20	.5	<25	300	70	15	2,000	500	30	<2	30	20	100	30	1	.2	.05	1.4	5.6	3.6
423	414	Ga	<.2	.1	.2	<.01	10	.5	25	200	100	10	1,000	700	50	<2	50	20	150	50	1.5	.2	.07	1.7	5.1	2.7
424	415	B	<.2	.2	<.1	<.01	10	.5	<25	300	70	10	1,000	200	70	<2	50	5	150	30	1.5	.1	.07	1.8	4.7	2.3
425	416	Ba	.2	<.05	<.1	<.01	10	.5	<25	150	30	15	700	200	70	<2	30	50	100	30	3	.5	.05	1.8	3.1	1.5
425A	417	Ba	.4	.5	.2	<.01	20	2	<25	200	70	10	1,500	700	50	<2	30	30	70	100	2	.2	.05	.8	5.6	6.0
426	418	B	.4	1	<.1	<.01	10	.5	<25	700	50	15	1,000	100	30	<2	50	30	70	30	3	.3	.05	.07	3.4	41.5
CCF-426	419	Ba	.2	.3	<.1	<.01	20	.5	75	150	70	20	1,000	700	30	10	200	70	200	150	15	1	.07	2.8	4.6	1.5
CC -427	420	B	<.2	.1	<.1	<.01	10	<.5	<25	200	100	15	1,500	300	30	2	70	20	70	30	2	.2	.05	1.2	5.9	2.3
428	421	B	.6	1.2	.5	<.01	10	.5	<25	300	70	15	1,500	300	30	2	50	30	70	100	7	.2	.07	.9	5.2	5.0
429	422	G	.2	.6	<.1	<.01	10	.5	<25	300	70	15	1,500	300	70	<2	50	15	100	30	1.5	.1	.1	2.1	5.0	2.1
431	423	B	1.6	2.5	.2	<.01	40	6	25	150	500	20	700	500	200	<2	70	70	1,000	300	10	.2	.05	.2	10.9	47.0
432	424	B	<.2	.05	<.1	<.01	10	<.5	<25	300	70	10	1,500	300	70	<2	70	10	70	20	3	.15	.3	2.1	4.6	1.9
433	425	G	<.2	.3	<.1	<.01	10	.5	<25	700	10	15	100	<50	50	2	30	10	70	50	3	.3	.1	.03	3.5	105.0
434	426	G	<.2	1	<.1	<.01	20	1	<25	700	50	15	1,000	200	150	<2	70	15	100	30	2	.2	.1	1.1	4.7	4.0
435	427	B	2.4	.1	<.1	<.01	10	2	<25	500	1,000	30	700	1,000	70	<2	1,500	70	200	150	5	1.5	.1	4.1	3.8	.8
436	428	B	.4	.3	<.1	<.01	10	3	<25	150	200	20	1,000	1,000	20	2	50	50	70	150	7	.5	.1	.2	3.7	15.9
437	429	B	.4	.6	<.1	<.01	10	3	<25	300	70	30	1,500	2,000	30	7	30	50	300	150	3	.7	.1	1.5	6.1	3.5
438	430	B	.2	.5	<.1	<.01	10	.5	<25	200	50	15	700	200	30	2	30	30	70	70	3	.3	.07	.5	4.2	8.3
439	431	B	.6	1.5	<.1	<.01	40	6	<25	300	70	20	1,500	1,500	20	5	30	50	200	50	5	.5	.07	3.1	6.4	1.8
440	432	Ga	.4	.2	<.1	.01	10	8	25	300	50	20	1,500	500	70	<2	100	100	300	100	5	1.5	.07	3.1	3.3	.9
441	433	B	1	5	<.1	<.01	40	8	25	200	150	30	1,500	1,000	30	15	30	30	150	30	7	.1	.05	2.1	6.9	2.9
441A	434	Ga	.2	.05	<.1	<.01	10	.5	<25	300	100	15	1,500	300	20	<2	30	10	100	50	3	.1	.05	.6	6.4	9.2
442	435	B	1.4	.05	.8	.02	60	12	75	300	700	50	3,000	3,000	50	15	1,000	70	>1,000	100	15	.3	.07	.3	8.8	26.5
443	436	B	.4	1	<.1	<.01	10	2	<25	300	150	50	3,000	3,000	30	5	70	50	300	70	5	.5	.07	3.5	6.2	1.6
444	437	B	4	.05	<.1	<.01	10	2	<25	300	2,000	30	2,000	2,000	20	10	30	50	150	50	7	.3	.05	2.8	6.8	2.2
445	438	B	.4	.05	<.1	<.01	20	3	50	300	100	30	3,000	1,500	15	20	100	50	150	50	7	.5	.1	2.4	7.6	2.9
446	439	B	1	.2	<.1	<.01	20	3	25	300	150	50	3,000	2,000	30	50	70	50	200	70	7	.5	.15	3.4	5.4	1.4
447	440	B	.4	.05	<.1	<.01	20	1	<25	300	20	50	2,000	1,500	15	<2	30	30	200	30	2	.2	.1	3.2	6.6	1.9
448	441	B	.4	1	.4	<.01	20	2	<25	300	150	100	3,000	3,000	30	7	50	70	200	150	10	.7	.1	2.3	6.8	2.6
449	442	Ba	.6	<.05	.3	.01	10	3	<25	300	100	50	>5,000	3,000	30	70	30	30	300	700	15	.15	.07	.7	2.9	3.5
450	443	Ba	.8	<.05	.5	<.01	10	1	<25	20	30	30	500	70	30	30	50	50	50	700	20	.2	.1	.1	2.2	21.6
451	444	Ba	.6	.1	.1	<.01	20	.5	<25	150	100	30	2,000	700	50	20	70	100	100	70	7	.7	<.05	.3	5.9	20.4

452	445	Ba	<.2	.4	<.1	.01	10	2	<25	200	50	70	1,000	500	50	2	30	100	200	70	10	1	.05	.5	7.1	13.0
500	7475S	B	-------	8	2.2	.12	90	15	25	200	30	30	2,000	200	20	200	100	500	200	20	15	.5	.1	.3	9.2	31.7
500A	7476S	Gos	.5	<.05	1.5	.11	40	30	50	150	100	30	1,500	100	10	200	200	200	200	30	20	.3	.05	.2	5.4	32.8
501	7477S	B	6	13	.7	.20	40	22	75	200	300	30	3,000	200	20	300	>5,000	200	200	100	20	.5	.1	.2	9.5	45.6
501A	7478S	B	4.2	19	.6	.24	40	45	25	200	500	15	1,500	300	70	200	1,500	150	700	70	7	.5	5	.1	4.3	73.0
501B	7479S	Ba	.8	.5	.5	.04	20	12	<25	<10	100	<10	200	200	20	50	500	10	500	5	.5	.02	15	.1	.1	1.0
502	7480S	B	10	19	2	.13	110	12	<25	200	100	50	>5,000	700	30	50	300	500	200	20	5	.1	.1	.2	11.8	47.3
502A	7481S	Ba	1.6	13	.8	.14	40	22	<25	300	70	50	5,000	500	20	20	700	300	150	50	7	.7	.05	.2	10.4	40.0
502B	7482S	Ba	4.4	9	1.1	1	60	4	<25	200	70	50	2,000	700	30	50	100	150	150	30	7	.1	.07	.3	12.3	40.0
503	7483S	Ba	-------	<.05	.1	.03	20	.5	<25	500	50	70	200	<100	30	5	50	100	200	5	5	.5	<.05	.3	11.8	36.3
503A	7484S	B	.4	.1	.4	.02	10	2	<25	700	50	70	300	<100	30	<5	150	70	200	5	3	.5	.05	.4	11.8	30.0
504	7485S	Ba	2.8	6	2	.15	160	3	<25	300	100	70	3,000	300	30	10	50	300	200	20	5	.7	<.05	.8	10.8	11.8
504A	7486S	Ba	1.6	4	1.1	.05	300	1	<25	300	30	70	3,000	700	30	20	20	300	200	20	5	.3	<.05	.2	12.6	47.2
504B	7487S	Ba	1.2	5	.7	.02	80	2	<25	200	50	50	2,000	500	30	20	1,500	200	150	20	5	.5	<.05	.2	11.6	48.0
504C	7488S	Ba	.6	5	1.1	.02	40	8	25	300	200	70	5,000	500	30	50	5,000	300	200	50	10	.7	.05	1.1	9.5	7.7
505	7489S	B	1	9	.7	.15	60	12	25	300	70	70	2,000	200	30	100	1,500	300	200	50	7	.5	.05	.6	10.9	16.0
505A	7490S	B	.2	1	1.1	.01	90	3	25	300	30	50	5,000	200	20	50	200	300	150	30	10	.7	.1	2.1	7.8	3.4
505B	7491S	B	.2	.1	.2	<.01	10	1	<25	500	15	50	2,000	300	30	15	3,000	200	150	20	5	.7	.2	3.6	6.1	1.5
506	7492S	B	.2	.2	.1	<.01	30	1	25	500	10	70	2,000	300	30	30	1,500	300	150	20	10	.7	<.05	3.3	6.2	1.7
506A	7493S	Ba	10	13	3.3	.02	130	6	25	300	15	70	2,000	200	30	50	1,500	500	150	50	7	.5	<.05	.2	11.5	46.3
506B	7494S	Ba	10	3	2.4	.05	40	4	<25	500	30	70	3,000	500	30	30	50	300	200	10	5	.7	.05	2.4	8.9	3.3
507	7495S	B	.2	.1	<.1	.02	10	<.5	<25	500	15	70	1,000	300	30	7	50	300	200	20	5	.7	.3	3.7	6.0	1.5
507A	7496S	Ba	.2	5	1.7	.10	60	8	25	500	50	70	2,000	300	30	50	500	1,000	200	30	7	.7	.3	.7	11.0	14.2
508	7497S	B	5	38	14.6	.06	200	2	<25	500	50	50	5,000	500	30	20	700	500	200	50	7	.7	.05	.3	11.9	38.0
508A	7498S	Ba	.2	.5	.9	.01	30	.5	<25	500	20	70	5,000	300	30	10	50	500	200	10	5	.7	.05	1.4	10.4	6.6
508B	7499S	Ba	1	13	1.6	.03	80	22	<25	500	20	50	3,000	300	30	50	200	300	200	30	7	.2	.05	.2	10.7	47.1
508C	7500S	Ba	.8	13	1.9	.40	100	12	<25	300	150	70	2,000	500	30	50	1,000	700	150	30	7	.5	<.05	.3	11.5	31.4
508D	7501S	Ba	.4	.5	.6	.02	60	6	25	500	30	70	3,000	300	30	20	2,000	500	200	50	7	1	<.05	1.5	9.2	5.6
509	7502S	Ba	.2	13	2.2	<.01	300	3	25	500	20	100	3,000	200	30	20	1,000	700	200	50	7	.7	<.05	.3	11.6	36.0
509A	7503S	Ba	.2	<.05	<.1	.02	10	1	50	500	20	70	2,000	500	30	<5	2,000	200	200	20	7	.7	.1	4.1	5.4	1.2
510	7504S	Ba	.6	13	.6	.44	40	3	<25	300	50	70	3,000	1,000	20	70	50	300	200	10	5	1	<.05	1.7	8.0	4.2
510A	7505S	B	.4	1	.3	.02	20	.5	<25	300	20	50	3,000	700	15	<5	70	200	150	5	1	.7	<.05	2.8	7.0	2.2
511	7506S	B	.8	13	.5	.02	30	3	<25	150	30	50	3,000	200	20	10	50	300	200	15	5	.7	<.05	2.2	8.7	3.4
512	7507S	Ba	4	60	6.2	1	500	30	75	500	70	30	>5,000	1,000	30	100	>5,000	1,000	150	150	15	.7	.2	.2	9.8	45.4
512A	7508S	Ba	1.8	9	1.9	.18	90	30	40	500	100	50	>5,000	200	30	200	5,000	2,000	150	50	10	1	.1	.1	6.7	11.5
513	7509S	Ba	1.8	13	.7	.07	40	6	<25	500	70	70	5,000	300	30	100	100	200	200	10	5	.5	<.05	.1	10.2	76.9
513A	7510S	Ba	.4	3	1.1	.11	80	8	<25	700	30	70	2,000	1,000	30	50	500	500	200	15	7	1	.05	.1	9.1	58.0
513B	7511S	Ba	.2	3	.9	.07	90	8	25	200	30	100	2,000	300	30	70	150	700	150	30	7	.7	<.05	.4	11.2	23.3
513C	7512S	Ba	.4	3	1.7	.55	200	30	25	300	150	20	1,000	100	30	150	5,000	1,000	1,000	50	7	.5	.07	.1	6.2	93.7
514	7513S	B	.2	<.05	.4	.04	40	2	<25	500	20	70	2,000	500	30	10	100	500	200	15	3	1	.05	2.6	7.4	2.7
514A	7514S	Ba	.2	1	1.1	.02	80	6	25	300	30	70	2,000	200	30	20	200	500	200	20	5	.5	<.05	.5	11.2	20.8
514B	7515S	Ba	.2	50	7.5	.03	200	22	50	300	70	30	>5,000	500	30	100	>5,000	500	100	50	20	.5	.07	.7	8.8	10.9
514C	7516S	B	1	<.05	.5	<.01	20	4	25	300	50	70	2,000	200	30	20	5,000	1,000	100	50	15	2	.05	.2	8.3	50.0
514D	7517S	Ba	1	.7	4.6	.01	100	30	75	300	70	50	5,000	1,000	30	50	5,000	700	500	70	15	1	.1	1.0	7.6	6.9
515	7518S	Ba	2	3	.1	.70	40	3	<25	500	70	70	5,000	300	30	200	100	500	200	30	10	.5	<.05	.4	10.6	22.6
515A	7519S	B	.2	1	.8	.02	60	2	<25	300	100	100	2,000	300	20	50	70	500	150	50	3	.7	.05	.2	11.6	45.2
515B	7520S	Ba	.2	.5	.8	<.01	40	22	<25	500	150	50	1,500	200	20	200	200	300	150	30	7	.5	<.05	.2	11.1	4.8
515C	7521S	Ba	1	1	.8	.02	60	15	<25	200	200	70	3,000	300	20	150	2,000	500	150	20	5	.2	<.05	.2	11.5	41.8
516	7522S	Ba	8.6	19	5.7	.11	200	4	<25	500	50	50	5,000	300	20	20	50	700	100	20	3	.3	.05	.2	9.9	59.5
516A	7523S	Ba	.6	<.05	<.1	<.01	10	3	60	200	50	50	3,000	300	20	5	5,000	200	100	50	20	.5	.2	2.6	4.8	1.4
516B	7524S	Ba	.2	<.05	<.1	<.01	10	<.5	<25	200	20	50	2,000	200	30	<5	1,500	300	100	20	7	2	2	3.1	4.0	1.1
516C	7525S	Ba	.2	<.05	.2	.01	20	1	40	500	50	70	700	150	30	10	1,500	200	150	10	5	.3	.1	1.0	6.5	5.6
517	7526S	Ba	.2	<.05	<.1	< 01	20	2	25	300	20	70	3,000	1,000	30	20	3,000	500	150	20	5	1	.2	3.2	6.3	1.8
517A	7527S	Ba	.6	6	2.5	.06	200	8	25	300	30	70	2,000	200	30	50	500	700	150	30	7	1	.2	.2	10.1	44.0
517B	7528S	Qtz	1.4	9	3.8	.06	20	8	25	150	20	50	1,500	100	20	50	2,000	1,500	100	20	3	.5	.1	------	------	------
518	7529S	B	.2	.1	<.1	.03	60	2	25	1,000	100	100	700	100	30	10	2,000	200	300	10	3	1	.07	.7	10.5	12.7
518A	7530S	B	1.2	6	1	.08	80	6	<25	1,000	70	100	1,500	<100	30	15	70	300	200	10	3	.3	<.05	.3	11.7	41.5
518B	7531S	Ba	1.2	25	6.6	.90	60	8	40	300	150	70	3,000	500	30	70	2,000	700	150	20	5	.7	.2	.9	8.9	8.4
518C	7532S	Ba	1	5	1.6	.03	60	6	50	1,000	200	100	3,000	300	30	50	5,000	1,000	200	30	7	1	.15	.7	7.5	10.3
519	7533S	Ba	.2	.2	.2	.02	40	12	25	500	30	70	700	300	30	20	500	500	150	30	5	1	.2	2.0	8.4	3.8
519A	7534S	Ba	.8	.6	7.4	.36	130	30	60	300	200	50	>5,000	300	50	200	>5,000	1,000	1,000	30	5	1	3	.2	9.9	50.0
519B	7535S	Ba	1.2	.7	1.8	.18	40	45	<25	20	70	<10	150	300	200	50	100	100	>1,000	5	1	.03	20	.1	.1	1.0
519C	7536S	Ba	1.4	.3	6.2	.22	60	22	25	300	300	50	3,000	300	100	100	2,000	500	>1,000	20	3	.7	10	.2	7.4	28.0
520	7537S	Ba	5.4	125	1.5	29	60	22	<25	300	200	30	2,000	500	20	100	100	300	500	50	3	.2	.1	.2	6.7	36.8
520A	7538S	Ba	.6	13	2.3	.26	200	30	60	200	30	50	3,000	500	30	70	>5,000	500	150	70	10	.7	.07	1.4	8.3	5.1
520B	7539S	Ba	.8	8	3.4	.28	130	22	<25	200	30	50	2,000	300	30	30	100	1,000	150	20	7	.7	.1	.3	9.9	31.3
521	7540S	Ba	1	.2	.4	.08	30	15	<25	200	50	70	1,500	100	20	100	100	700	200	20	15	.5	<.05	.2	10.6	51.2
521A	7541S	Ba	.8	3	.6	.03	60	8	<25	300	100	50	1,500	200	30	200	100	700	150	30	10	.3	.05	.2	11.1	53.6

TABLE 1.—*Analyses of rock samples from Cripple Creek gold district, Colorado*—Continued

Field No.	Lab. No.	Rock type	Chemical analyses (parts per million)							Semiquantitative spectrographic analyses														Chemical analyses (percent)		K_2O/Na_2O
										Parts per million											Percent					
			Ag	Te	Au	Hg	As	Sb	Zn	Zr	Pb	Ga	Ba	Sr	Y	Mo	Mn	V	La	Cu	Fe	Mg	Ca	Na	K	
CC-521B	7542S	Ba	1.6	13	0.8	0.03	80	8	<25	200	100	50	1,500	300	30	150	150	500	200	30	20	0.3	<0.05	0.2	4.7	25.8
521C	7543S	B	.6	.3	.2	<.01	30	8	<25	200	100	50	1,500	300	20	30	100	200	200	10	20	.5	.05	.6	7.9	10.6
522	7544S	Ba	.2	.3	.7	.01	40	.5	25	300	50	50	2,000	300	30	20	3,000	300	150	30	10	.5	.2	3.5	6.0	1.6
522A	7545S	Ba	.2	.2	.3	.01	40	2	25	200	70	70	2,000	300	30	20	2,000	300	200	20	7	.7	.2	3.9	5.2	1.2
522B	7546S	Ba	.4	4	.4	.02	40	1	25	500	50	70	1,000	300	30	<5	500	300	150	30	10	1	.3	4.2	4.5	1.0
523	7547S	Ba	.4	1	<.1	.06	20	2	25	500	100	70	700	200	30	15	300	200	200	10	5	.5	<.05	.3	12.4	4.4
523A	7548S	Ba	.4	1	<.1	.03	20	4	<25	300	200	50	>5,000	1,000	30	150	150	300	100	20	10	.5	.05	.3	11.3	38.3
523B	7549S	Ba	.4	3	<.1	.05	30	6	25	500	500	70	500	100	30	20	200	150	150	10	5	.3	<.05	.3	12.0	42.7
523C	7550S	Ba	.2	4	.3	.05	20	4	50	200	150	70	2,000	300	30	50	5,000	300	200	20	10	.7	.05	.3	10.1	32.2
524	67-573	Ba	.2	<.05	<.02	.03	<10	.5	25	700	20	....	2,000	300	30	<5	1,000	200	150	20	5	.5	1	4.4	4.6	.9
525	574	Ba	.3	<.05	<.02	.01	<10	<.5	25	700	30	....	2,000	700	50	<5	2,000	300	200	20	10	.7	3	4.7	4.2	.8
526	575	Ba	.6	.1	<.02	.30	20	.5	25	500	150	....	>5,000	3,000	100	100	50	150	500	20	7	.2	.07	.3	11.4	32.7
526A	576	Ba	1.0	.6	.07	.40	20	10	<25	300	1,500	....	1,000	700	20	300	200	200	1,000	50	7	.2	.07	.3	9.2	30.0
526B	577	Ba	1.4	5.0	.2	.40	30	15	25	300	5,000	....	1,500	1,000	30	200	150	500	>1,000	100	10	.2	.07	.4	11.3	26.2
526C	578	Ba	.3	<.05	.1	.20	10	.5	<25	1,000	30	....	1,500	3,000	100	70	30	100	>1,000	20	7	.07	.07	.9	10.1	10.0
526D	579	Qtz	1.0	1.3	.06	.50	10	25	<25	20	150	....	>5,000	1,000	20	100	150	10	1,000	20	.7	.02	<.05	.1	.4	6.0
527	580	Ba	.9	8	.6	.30	100	3	50	700	50	....	2,000	700	50	70	200	300	200	20	10	1	.07	1.0	8.9	7.6
527A	581	Ba	2.2	8	.03	.03	30	4	<25	500	50	....	2,000	1,500	30	50	50	200	100	20	3	1	.05	1.7	7.9	4.2
528	582	Ba	3.4	40	5.5	.26	60	200	<25	70	2,000	....	>5,000	2,000	50	2,000	5,000	150	>1,000	10	3	.05	<.05	.1	.4	6.0
528A	583	Ba	.9	1.3	.3	.20	30	6	<25	500	30	....	3,000	500	30	10	50	5	200	50	7	.7	<.05	.2	12.1	52.2
529	584	Ba	.6	40	6.0	.40	100	4	<25	300	200	....	1,500	150	30	20	200	1,500	100	20	10	.15	<.05	.2	11.7	50.4
529A	585	Ba	1.0	2.5	1.3	.20	40	2	<25	300	20	....	3,000	100	30	7	20	300	100	20	7	.7	<.05	.2	12.8	51.3
530	586	Ba	<.2	.6	<.02	.02	10	1	25	300	50	....	1,000	700	20	5	50	200	100	20	3	.07	.05	3.3	5.7	1.5
531	587	Ba	1.0	3.8	.06	.26	10	6	<25	500	50	....	2,000	300	20	50	50	200	100	20	5	.2	<.05	.3	11.8	37.4
531A	588	Ba	1.8	13	2.6	.10	40	10	150	150	300	....	3,000	500	100	150	300	100	>1,000	20	10	.07	.05	.1	2.6	28.2
531B	589	Ba	5.3	2.0	.4	.60	20	35	<25	300	100	....	2,000	300	70	500	100	200	1,000	20	7	.1	<.05	.2	9.6	37.4
531C	590	Ba	2.3	2.0	<.02	.09	<10	2	<25	700	150	....	2,000	500	100	70	150	200	150	50	5	.2	.05	.3	11.5	30.2
532	591	Ba	2.0	7.5	.1	.09	30	2	50	300	150	....	2,000	2,000	70	5	150	150	1,000	30	5	.5	.1	1.9	9.1	4.4
532A	592	Ba	1.2	1.3	.1	.10	<10	2	25	300	100	....	2,000	500	30	<5	100	200	150	20	7	.7	.05	3.1	6.0	1.7
533	593	Ba	1.0	2.5	.7	.10	40	6	<25	500	100	....	2,000	1,500	30	7	100	300	150	20	5	1	<.05	.3	11.0	38.0
533A	594	Ba	1.6	6.3	.6	.10	30	4	<25	300	20	....	2,000	1,500	30	<5	200	200	200	10	7	.3	<.05	.3	10.3	31.8
534	595	Ba	2.0	7.5	1.3	.04	30	2	<25	200	70	....	3,000	2,000	100	70	50	200	>1,000	50	10	.7	.07	.2	8.9	33.4
535	596	Ba	.4	2.5	<.02	.11	<10	1	<25	500	200	....	5,000	3,000	70	300	100	300	>1,000	10	10	.3	.07	.2	9.3	31.1
536	597	Ba	.3	1.3	.03	.08	<10	6	<25	150	20	....	2,000	150	10	100	100	100	300	20	2	.5	<.05	.3	9.3	32.0
537	598	Ba	.2	.9	.1	.09	<10	.5	25	1,000	30	....	3,000	700	50	100	150	150	1,000	20	5	.5	.1	.5	11.0	18.1
537A	599	Ba	.2	.2	<.02	.08	<10	.5	<25	>1,000	150	....	2,000	500	20	70	200	100	200	20	5	.5	.1	.7	10.5	12.6
538	600	Ba	.6	.05	<.02	.09	<10	<.5	25	>1,000	100	....	300	100	20	<5	200	100	100	10	2	.3	<.05	3.2	6.2	1.7
538A	601	Ba	.2	.1	<.02	.03	<10	1	<25	>1,000	20	....	500	<100	10	<5	200	50	70	<5	3	1	<.05	1.8	7.6	3.8
539	602	Ba	15	8.3	.3	.15	30	3	<25	1,000	1,000	....	5,000	5,000	100	15	500	500	500	20	10	1	.1	.3	9.6	27.0
539A	603	Ba	2.5	9.4	.3	.15	10	4	<25	300	1,500	....	3,000	3,000	70	20	500	300	150	20	10	<.02	.1	.3	9.6	27.0
540	604	Qtz	1.9	1.3	.5	.65	30	50	<25	30	150	....	>5,000	1,000	<10	50	30	10	1,000	10	.2	.5	<.05	.1	.8	9.2
540A	605	Ba	10	2.0	.3	.20	80	35	<25	500	2,000	....	5,000	1,500	20	300	150	>1,000	>1,000	20	5	.5	<.05	.1	10.5	79.4
541	606	Ba	.6	2.5	1.3	.09	100	6	175	500	150	....	>5,000	1,000	50	150	300	150	>1,000	50	15	.2	.07	.3	9.3	25.5
542	607	Ba	1.2	.6	<.02	.04	10	.5	<25	300	200	....	>5,000	1,500	30	30	150	150	1,000	10	5	1	<.05	.3	11.0	29.3
543	608	Ba	1.2	.6	.03	.04	30	2	<25	>1,000	100	....	5,000	5,000	50	70	300	300	700	30	7	.5	.1	.3	8.1	27.0
543B	609	Ba	1.5	.4	<.02	.04	<10	1	50	300	150	....	2,000	700	30	30	200	200	150	5	5	.7	.05	1.0	5.1	4.4
544	610	Ba	.4	1.3	.02	.01	20	1	25	500	20	....	>5,000	500	20	150	200	200	200	10	10	.2	<.05	.3	10.7	28.7
545	611	Ba	1.4	1.9	.08	.05	10	2	25	200	200	....	>5,000	>5,000	30	1,500	300	50	>1,000	20	3	.3	.1	.1	3.6	3.1
545A	612	Ba	.5	.6	.1	.02	<10	.5	<25	500	1,000	....	>5,000	2,000	50	1,000	200	200	700	15	5	.5	<.05	.4	10.3	21.4
545B	613	B	<.2	.6	.2	.03	20	1	<25	1,000	50	....	>5,000	1,500	30	100	200	150	500	20	3	1	.05	2.7	7.1	2.4
546	614	Ba	.6	.05	<.02	.01	<10	2	700	500	200	....	2,000	300	30	10	>5,000	200	150	10	10	.7	.15	4.2	4.6	1.0
546A	615	Ba	.7	.1	.02	.01	<10	1	125	300	500	....	2,000	200	20	10	300	200	150	10	5	2	.1	4.4	4.8	1.0
547	616	Ba	.2	.05	<.02	.04	<10	.5	<25	700	20	....	2,000	700	30	10	2,000	200	150	30	10	2	1.5	4.2	4.9	1.0
547A	617	Ba	.3	<.05	<.02	.03	<10	1	<25	500	30	....	2,000	700	30	20	2,000	200	150	30	10	2	1.5	3.9	4.4	1.0
547B	618	Ba	.3	<.05	<.02	.02	<10	1	<25	700	30	....	1,500	500	30	10	2,000	200	150	30	10	.5	1	4.1	4.6	1.0
548	619	Ba	.3	<.05	<.02	.02	<10	.5	<25	500	<10	....	700	500	10	10	30	100	70	15	5	.5	<.05	.1	4.2	28.3
548A	620	Ba	.3	<.05	<.02	.02	<10	.5	<25	500	70	....	>5,000	1,500	50	1,000	50	200	700	30	7	.7	.1	1.4	8.2	5.2
549	621	Ba	<.2	.05	.09	.02	<10	.5	<25	300	20	....	5,000	200	10	10	10	200	20	5	3	.5	<.05	.1	4.2	30.0
549A	622	Ba	.2	<.05	<.02	.01	<10	.5	>25	300	50	....	5,000	1,500	<10	<5	20	150	100	5	7	1	<.05	1.3	4.0	2.8
550	623	Ba	1.0	1.3	.2	.04	<10	.5	<25	500	20	....	2,000	700	20	15	20	500	100	100	10	.7	.07	.1	4.9	32.7
550A	624	Ba	.2	.05	<.02	.04	<10	1	<25	300	20	....	1,000	1,000	20	10	20	150	150	70	5	.5	.07	.1	3.9	27.6
550B	625	Ba	.8	<.05	.2	.05	<10	1	<25	200	10	....	1,000	1,000	10	15	20	150	300	70	10	.7	.1	.2	3.8	20.0

TABLE 2.—*Comparison of concentration of the telluride- and sulfide-forming metals in the rocks of the Cripple Creek district with their average concentration in the igneous rocks of the earth's crust*

(1) Element	(2) Average concentration in volcanic rocks of the Cripple Creek district (282 samples) (ppm)	(3) Average concentration in granitic rocks sampled in the Cripple Creek district (169 samples) (ppm)	(4) Enrichment in volcanic rocks in the Cripple Creek district above crustal abundance (clarkes [1])	(5) Abundance in igneous rocks of the earth's crust (ppm)
Te	2.7	0.37	1,346	[3] 0.002
Au	.6	.12	240	[2] .0025
Ag	.92	.61	45.8	[3] .02
Mo	51.2	13.3	30	[4] 1.7
Sb	7.7	1.3	26	[4] .3
As	40.1	19.4	20	[4] 2.0
Pb	153.0	142.0	10	[3] 16
Hg	.19	.08	3.1	[4] .06
Zn	58.9	44.3	.75	[3] 80
Cu	35	23	.5	[3] 70

[1] One clarke is the average concentration of an element in the crust of the earth.
[2] From DeGrazia and Haskin (1964).
[3] From Goldschmidt (1958).
[4] From Green (1959).

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