UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Lithology and Geochemistry of Core From U.S. Geological Survey Deep Drill Hole at Indian Creek and Discussion of Core From a Drill Hole Near Gold Acres, Shoshone Range, Nevada

By

Chester T. Wrucke[1] and David M. Cole[2]

1991

Open File Report 91-585

1. Menlo Park, California 94025

2. 814 6th Street, Golden, Colorado 80403. Formerly of Newmont Exploration Limited

TABLE OF CONTENTS

Abstract **4**

Introduction **6**

Acknowledgements **9**

Stratigraphic framework **9**

Structural framework **11**

Geology of USGS No. 1 drill site **12**

Lithology of USGS No. 1 **17**

Age and correlation of rocks drilled in USGS No. 1 **20**

Geology of USGS No. 4 drill site **20**

Lithologic log and correlation of rocks drilled in USGS No. 4 **21**

Character and distribution of mineralized rocks at the surface
in the vicinity of the drill holes **23**

Age of mineralization **25**

Chemical analyses **27**

Geochemistry of USGS No. 1 **27**

Gold **28**

Copper, chromium, molybdenum, and nickel **34**

Antimony, arsenic, copper, lead, mercury, and zinc **35**

References **37**

Tables (At end of text)

1. Lithologic log of USGS No. 1 **42**
2. Chemical analyses made in 1967 of core samples from USGS No. 1 **55**
3. Chemical analyses made in 1989 of core samples from USGS No. 1 **99**
4. Spearman correlation coefficients for 17 element pairs from USGS No. 1 calculated from analyses in table 2 after substitution of numerical values for"less than" and "greater than" values as discussed in text **108**
5. Spearman correlation coefficients for 17 element pairs from UGSG No. 1 calculated from analyses in table 7 **109**
6. Summary statistics for 11 elements in 93 samples from USGS No. 1 using analyses in table 7 **110**
7. Chemical analyses modified from table 3 by substitution of numerical values for "less than" and "greater than" values as discussed in the text **111**

ILLUSTRATIONS

Figures

1. Map showing location of USGS drill holes 1 and 4 **7**
2. Geologic map of the Indian Creek area **14**
3. Generalized lithology of USGS No. 1 **18**
4. Generalized lithology of USGS No. 1 and gold concentrations from the drill core **29**
5. Frequency distribution of arsenic, gold, and silver in samples from USGS No. 1 based on the log of analyses in table 1 transformed to base 10 **32**
6. Frequency distribution of arsenic, gold, and silver in samples from USGS No. 1 based on the log of analyses in tables 2 and 6 transformed to base 10 **33**
7. Frequency distribution of Cu, Cr, Mo, and Ni in samples from USGS No. 1 based on the log of analyses in table 7 transformed to base 10 **36**

LITHOLOGY AND GEOCHEMISTRY OF CORE FROM U.S. GEOLOGICAL SURVEY DEEP DRILL HOLE AT INDIAN CREEK AND DISCUSSION OF CORE FROM A DRILL HOLE NEAR GOLD ACRES, SHOSHONE RANGE, NEVADA

By

Chester T. Wrucke and David M. Cole

ABSTRACT

The U.S. Geological Survey drilled and cored four holes on the east flank of the Shoshone Range in 1968 to determine the depth to the Roberts Mountains thrust and to obtain information on the lithology and chemistry of the rocks in the upper and lower plates of the thrust. Two of the holes are discussed here, USGS No. 1 at Indian Creek, 2.5 mi (4.0 km) northwest of Tenabo, and USGS No. 4, 1.3 mi (2.1 km) west of Gold Acres. These holes were drilled to depths of 3,996 ft (1,217.9 m) and 1,916 ft (584.0 m), respectively. USGS No. 1 penetrated the thrust at a depth of 2,938 ft (895.5 m), and at USGS No. 4 the thrust was cut at a depth of 890 ft (271.3 m).

Rocks in the upper plate of the Roberts Mountains thrust in the vicinity of the drill holes consist of chert and siliceous mudstone (argillite) with lesser amounts of quartzite, siltstone, sandstone, greenstone, barite, and limestone. They range in age from Cambrian to Devonian. Most of the chert and mudstone in the area have been considered previously as belonging to the Valmy Formation of Ordovician age but now are known to be in the Slaven Chert of Devonian age. During the Devonian and Mississippian Antler orogeny, these rocks overrode lower plate rocks that are mainly limestone and calcareous siltstone of Silurian and Devonian age. A concealed granitic pluton of Cretaceous age underlies Gold Acres and areas to the west, including altered rocks adjacent to USGS No 4. Granitic stocks and dikes of Oligocene age are exposed at Tenabo and areas northwest of USGS No. 1. Rhyolite dikes of Oligocene age, younger than the Oligocene granitic rocks, intrude upper plate rocks at Gold Acres and Tenabo and are thought to be related to the prinicpal episodes of gold mineralization in these areas.

Upper plate rocks penetrated at USGS No. 1 consist mainly of chert and siliceous, variably calcareous, mudstone and less abundant limestone and siltstone. These rocks are

thought to belong to the Slaven Chert. Rocks in the lower plate are mostly silty and nonsilty limestone of unknown age. Rock below 3,930 ft (1,197.9 m) is intensely deformed siliceous mudstone similar to mudstone of the upper plate, but its age also is unknown. Numerous dikes of felsic igneous rock and lamprophyre presumably of Tertiary age cut upper and lower plate strata. Metamorphic rocks, principally skarn from calcareous beds and hornfels from mudstone, are present as high as about 580 ft (176.8 m) in the hole but are abundant only at much lower depths.

Chert and siliceous mudstone in the upper plate of the Roberts Mountains thrust at USGS No. 4 also are mostly in the Slaven Chert. Some upper plate strata probably belong to the Elder Sandstone of Silurian age. Lower plate rocks are carbonaceous limestone and calc-silicate hornfels probably of the Roberts Mountains Formation of Silurian and Devonian age.

Gold in the core of USGS No. 1 is concentrated in four zones identified from quantitative and semiquantitative analyses. The zone thickest and richest in gold is 425 ft (129.5 m) thick in the interval 770-1,955 ft (234.7-364.2 m) and has gold values as high as 657 ppb. This zone and two deeper ones having maximum gold concentrations of 486 ppb and about 200 ppb are in the upper plate of the Roberts Mountains thrust. One gold-rich zone below the thrust has a gold content as high as about 110 ppb. The quantitative chemical data show a positive correlation at greater than the 95 percent confidence level of Au with Ag, As, Cu, and Zn. These data together with the observations that the distribution of gold at the surface in the vicinity of the hole is similar to that of silver and base metals and that gold in the core is found in sulfide-bearing intervals indicate that the gold originated during conditions of silver-base-metal mineralization.

The chemical data from core samples from USGS No. 1 also reveal a positive association between numerous pairs of Cu, Cr, Mo, and Ni. These elements were concentrated in the mudstones during deposition, but at USGS No. 1 they also were introduced as part of the base-metal suite associated with gold.

INTRODUCTION

In 1968 the U.S. Geological Survey drilled five holes on the east flank of the Shoshone Range in north-central Nevada. This report discusses two of these holes. One hole, USGS No. 1, was drilled to a depth of 3,996 ft (1217.9 m) in Indian Creek, 2.5 mi (4.0 km) northwest of Tenabo, and the other hole, USGS No. 4, was drilled 1.3 mi (2.1 km) west of Gold Acres (fig. 1). Information from USGS No. 1 was used in the construction of cross sections for a preliminary geologic map of the Gold Acres-Tenabo area (Wrucke, 1974), but detailed information on the core recovered from the hole was never published. The log and chemical analyses of samples from USGS No. 4, however, were released (Wrucke, 1975). During exploration activity in the Shoshone Range in the late 1980s, Newmont Exploration Limited established mining claims that included both drill sites and requested that a study of the core and cuttings from the drill holes be conducted jointly by the company and the U.S. Geological Survey. The two organizations made that study in 1989. The investigations consisted of logging and sampling core from USGS No. 1, obtaining quantitative chemical analyses of the core samples from that hole, and examining, in somewhat more detail than previously, core from USGS No. 4. The results of those investigations are given here along with previously unpublished information obtained during earlier studies by the U.S. Geological Survey of core from USGS No. 1.

Drilling of the deep hole in Indian Creek and the hole west of Gold Acres was conducted as part of the Heavy Metals Program of the U.S. Geological Survey. This program was initiated in the mid- to late-1960s to obtain information on the stratigraphic, structural, and geochemical setting of gold deposits in areas promising for gold deposits in various parts of the United States. Drilling in the Shoshone Range was undertaken as part of that program, especially to learn the depth to the Roberts Mountains thrust and obtain geologic information potentially useful in the search for ore. In northern Nevada at that time, the principal known gold deposits were in the lower plate of the Roberts Mountains thrust or in lower parts of the upper plate of the thrust, and exploration was largely confined to exposures of lower plate rock and the sole of the thrust. Only relatively small ore bodies were known in upper plate rocks. The Tenabo and Gold Acres areas were selected for drilling because they were in or near mineral belts thought to have potential for ore, and the depth to the thrust could not easily be determined from surface geology but from structural considerations was thought to be reachable by drilling. At the time of the drilling, Tenabo had numerous mines and prospects and was being explored by mining companies but had no active mines, and the Gold Acres area was under exploration at the

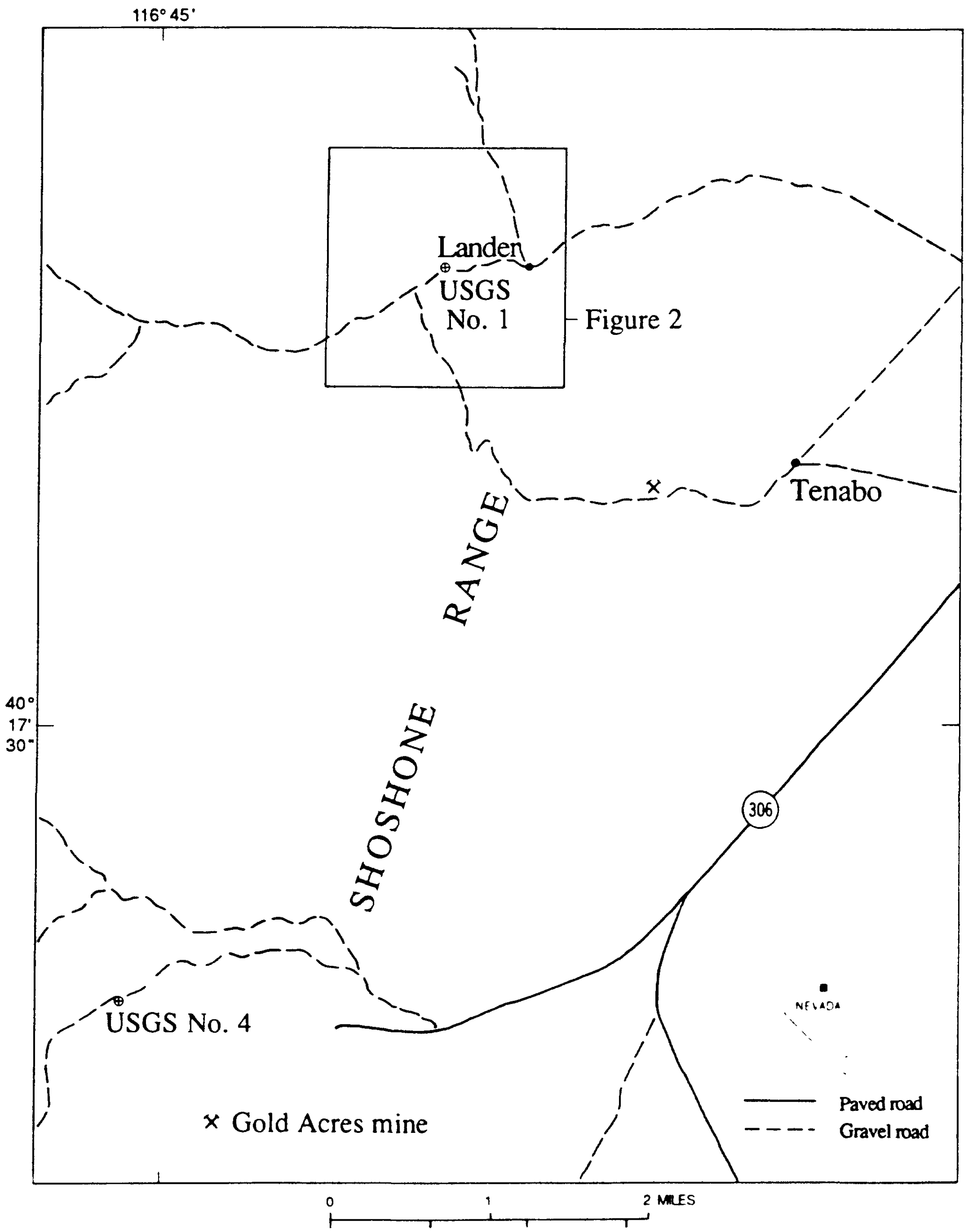


Figure l. Map showing location of USGS drill holes l and 4.

site of former underground and open pit gold mines. Deep drilling as part of the Heavy Metal Program also was underway at Iron Canyon near Battle Mountain (Theodore and Roberts, 1971).

The general geology and tectonic history of the the Gold Acres and Tenabo areas was first discussed in the pioneering report on the northern Shoshone Range by Gilluly and Gates (1965). Regional relations of rocks in the Roberts Mountains allochthon are given by Madrid and others (1991). Hays and Foo (1991) and Wrucke and Armbrustmacher (1974) reported on the geology and geochemistry of the Gold Acres area, and a preliminary geologic map of the Gold Acres-Tenabo area was made by Wrucke (1974). The distribution of gold, silver, and other metals at the surface near Gold Acres and Tenabo was reported by Wrucke and others (1968), and the geochemical analyses on which that study was based are given in Wrucke and Armbrustmacher (1973). The disseminated gold deposit at Gold Acres is included in discussions of the geologic settings and characteristics of gold deposits in the Great Basin (Seedorf, 1991; Thorman and Christensen, 1991; Bagby and Berger, 1985; Tooker, 1985; and many others).

Selection of the drill site in Indian Creek was based mainly on structural considerations. The site was chosen because it was at a topographically low position on the crest of an anticline shown by Gilluly and Gates (1965) in upper plate rocks near Tenabo. Moreover, the site was about midway between exposed granitic rocks on Altenburg Hill in the Tenabo area to the southeast and at Granite Mountain to the northwest. For this reason, the drilling was thought to have a reasonable chance of avoiding extensively altered or highly contact-metamorphosed rocks that might have made interpretation of the original protoliths difficult, yet was sufficiently close to mineralized ground at Tenabo to show that potentially attractive targets for mineralized rock might exist should lower plate rocks be found at shallow depth.

The site for the hole west of Gold Acres was selected to determine the depth to the thrust west of the steep fault that had been found on the west side of the Gold Acres window (Wrucke, 1974). The amount of offset on this steep fault could not be estimated accurately from geologic mapping. The drill site was sufficiently north of a buried pluton interpreted as extending northwesterly from Gold Acres (Wrucke, 1974) to avoid intense alteration or metamorphism that might obscure identification of the lithology or stratigraphic units of the penetrated rocks.

Core and cuttings from the drill holes were logged and sampled for chemical analysis during and shortly after the drilling. In the present study, the core from the hole in Indian Creek was relogged using new information made available on the stratigraphy and structural features of upper and lower plate rocks since the hole was first logged. During the present study, part of the drill core was resampled for new chemical analyses reported here (table 3). The types of samples collected and the analyses performed on them are described below.

ACKNOWLEDGMENTS

Drafting support for this paper was provided by Deborah Fazzary of Newmont Exploration Limited and Diana Mangan of the U.S. Geological Survey. Ted G. Theodore of the U.S. Geological Survey reviewed the manuscript. Their work is gratefully acknowledged.

STRATIGRAPHIC FRAMEWORK

The east flank of the Shoshone Range from north of Indian Creek to south of Gold Acres has extensive exposures of strata in the upper plate of the Roberts Mountains thrust. In this area, rocks in the upper plate range in age from Cambrian to Devonian. They consist of unnamed sandy limestone and quartzite of Cambrian age; siltstone, sandstone, and chert of the Elder Sandstone of Silurian age; siliceous mudstone (argillite), chert, quartzite, and minor barite of the Valmy Formation of Ordovician age; and chert, siliceous mudstone, greenstone, siltstone, sandstone, limestone, barite-chert conglomerate, and bedded barite of the Slaven Chert of Devonian age. By far the most extensively exposed rocks in this area are chert and siliceous mudstone of the Slaven Chert. The drill holes in Indian Creek and west of Gold Acres are collared in rocks of the Slaven Chert.

Sparse fossils and similar rock types in stratigraphic units of different ages have complicated the identification of formations and the age of strata in individual outcrops, and in some entire thrust sheets. Field studies by Wrucke in the Gold Acres-Tenabo area in the late 1970s revealed that the age of many rock units shown by Gilluly and Gates (1965) and Wrucke (1974) are incorrect. Relatively few fossil localities had been identified at the time of these earlier studies compared to those known today. In particular, the use of radiolarians, which became generally available for determining the age of chert in the late 1970s (Jones and others, 1978), together with newly discovered conodont and megafossil localities, yielded much new information on the age of rocks in the area. Most of the extensive areas of chert and argillite shown by Wrucke (1974) as belonging to the Valmy Formation were found to be of Devonian age, and all of the greenstone in the Gold Acres and Tenabo areas, considered by Gilluly and Gates (1965) as well as by Wrucke (1974) to be Ordovician in age, now are interpreted to be Devonian. In addition, some siltstone, identified earlier as Elder Sandstone, is part of the Devonian Slaven Chert, as is the chert-barite conglomerate northwest of Tenabo. Some sandy limestone and interbedded fine-grained quartzite adjacent to the north end of the Gold Acres window and once considered to be Ordovician in age now is known from fossil evidence to be Cambrian and earliest Ordovician and possibly in part correlative with the Preble Formation (Madden-McGuire, 1990; Madden-McGuire and Marsh, 1991). In general, rocks of the Devonian Slaven Chert are much more abundant than previously thought, and rocks of the Ordovician Valmy Formation are considerably less abundant.

Strata in the lower plate of the Roberts Mountains thrust are exposed in the Gold Acres window, centered about 5 mi (8 km) south of USGS No. 1 and 1.4 mi (2.3 km) southeast of USGS No. 4. They consist mostly of limestone and silty limestone of the Wenban Formation of Devonian age, but also included, at the north end of the window, are fissile calcareous siltstone of the Pilot Shale of Devonian and Mississippian age. Silty limestone of the Roberts Mountains Formation of Silurian and Devonian age, common as the mineralized host in gold-bearing areas of north-central Nevada, are exposed in the Gold Acres window only as thrust lenses at the sole of the Roberts Mountains thrust. However, a thick stratigraphic section of calcareous rock possibly belonging to the Roberts Mountains Formation has been found immediately beneath the sole of the thrust in USGS No. 4, as discussed later. How close to the Gold Acres window strata of the Roberts Mountains Formation(?) come in the subsurface is uncertain, though USGS No. 4 is only 0.7 mi (1.1 km) from the nearest exposures of lower plate rocks in the window.

Intrusive rocks in the Gold Acres-Tenabo area consist of a Cretaceous pluton at Gold Acres and Tertiary bodies at Gold Acres and near Tenabo. The pluton at Gold acres is not exposed. It has been penetrated by drill holes in and near the Gold Acres Mine and is interpreted to be buried beneath an area of bleached hydrothermally-altered and weakly metamorphosed rocks about a mile (1.6 km) wide and 2 mi (3.2 km) long that extends west from the mine (Wrucke, 1975; Wrucke and Armbrustmacher, 1975). An aeromagnetic anomaly is centered over the area of altered rocks (Wrucke and others, 1968). The rock is granitic, but its exact composition is not well known. Granodiorite porphyry having an age of 37.5 Ma is exposed at Tenabo as close as 1.8 mi (2.9 km) southeast of the drill hole at Indian Creek, and a granitic pluton of similar age crops out at Granite Mountain as near as 2.5 mi (4.0 km) northwest of the drill hole. Dikes of the granodiorite porphyry and of rhyolite porphyry (34.8 Ma) also are present in the Tenabo area. Some dikes of both lithologic types are found as close as 0.4 mi (0.6 km) south of the drill hole on Indian Creek. Rhyolite porphyry dikes thought to related to the 32.5±2 Ma Caetano Tuff and caldera of the Cortez area also are present at Gold Acres (Rytuba, 1985).

STRUCTURAL FRAMEWORK

The upper plate of the Roberts Mountains thrust on the east side of the Shoshone Range is a complex stack of thrust plates containing shattered and locally folded lithologic units that have been shuffled out of their original stratigraphic order during the thrusting. The thrusting took place during the Antler orogeny of Late Devonian and Early Mississippian age , when rocks now found in the upper plate were accreted to the continent by obduction from an oceanic plate (Speed and Sleep, 1982) and subsequently moved eastward. According to the widely accepted model postulated by Speed and Sleep, the Roberts Mountains allochthon is an accretionary prism of pelagic and terrigenous materials scraped from a slab of oceanic lithosphere as the continental margin collided with and descended westward beneath an island arc system. During the arc-continent closure, the accretionary prism was underthrust by the continental plate and translated over strata of the continental shelf. The accretionary prism became the Roberts Mountains allochthon, and the basal decollement became the Roberts Mountains thrust.

In a more recent version of the thrusting, based on modern analogues in the Mediterranean region, Burchfiel and Royden (1991) proposed a scheme that accounts for the absence of abundant volcanic rocks in the allochthon and the absence of volcanic debris in the foredeep clastic section east of the allochthon. According to Burchfiel and Royden, an island arc never collided with the continent and remained far to the west. Thrusting began in the oceanic or marginal sea behind (east of) an arc outboard of the continent. Eastward migration of the the hinge-zone of the subducting slab at the leading edge of the thrust caused the thrust belt to move toward the continent. Arc volcanic rocks developed in a region of extension and subsidence in the overriding plate behind the subducting slab and far to the west of the leading edge of the thrust. Because the amount of extension in the island arc region may have been nearly as large as the amount of lithosphere subducted, volcanic rocks did not impinge on the continental crust when the accretionary prism eventually overrode the continental margin.

Deformation in the allochthon must have taken place as the accretionary prism piled up before and during emplacement on the continental shelf. We considered the possibility that during accretionary emplacement some rock masses in the presumably thick Antler plate could have moved by underwater sliding from high places and from the leading edge of the original obducted mass to produce some of the shuffling of thrust sheets seen today in the allochthon. This possibility seems reasonable because the Antler prism likely would have been a highly unstable mass if it accumulated to a thickness of many kilometers at its structural high during transport, as Speed and Sleep suggest. However, no firm evidence for the idea has been found in the Indian Creek or surrounding areas. Major thrust sheets on the east flank of the Shoshone Range extend for tens of kilometers as would be expected of products of regional tectonics. These sheets and minor thrust slices in them show no clear indications of cross-cutting relations suggestive of downslope transport by sliding across ancient topography

In the Gold Acres-Tenabo area, the allochthon of the Roberts Mountains thrust consists of two major plates. The lower of these plates is by far the most extensive of the two and is found from the Gold Acres window to all but the western and northern parts of the Gold Acres and Tenabo areas. It is defined at its base by the sole of the Roberts Mountains thrust and at its top by the overlying Lander thrust (Wrucke, 1974). Although composed of many smaller plates consisting of rocks ranging in age from Cambrian to Devonian, it comprises, where exposed, dominantly chert and argillite that are considered to belong to the Slaven Chert of Devonian age. The thickness of the plate ranges from possibly a little over 200 ft (61 m) near Gold Acres to more than 3,000 ft (914 m) in the vicinity of Indian Creek.

The upper of the two major plates of the Roberts Mountains allochthon in the Gold Acres-Tenabo area lies on the Lander thrust. Remnants of this thrust sheet are found along the west side of the Gold Acres and Tenabo areas and in places north of Indian Creek. Nowhere in the area is it completely exposed, and its thickness outside the area is not known but could be very thick. Erosional remnants in the area have a maximum thickness of about 400 ft (365 m). The plate consists mostly of quartzite and chert of the Valmy Chert of Ordovician age but also contains smaller amounts of argillite of the Valmy and sandstone of the Elder Sandstone of Silurian age. Prior to erosion to the present level, rocks in the upper plate of the Lander thrust were widely distributed on the east side of the Shoshone Range and likely extended across the drill sites and the nearby mineralized areas at Gold Acres and Tenabo.

GEOLOGY OF USGS NO. 1 DRILL SITE

USGS No. 1 is collared in a part of the upper plate of the Roberts Mountains allochthon that is cut by subhorizontal to gently dipping thrust faults and steep normal and possible wrench faults (fig. 2). Most of the rock types and formations found in the upper plate throughout the Gold Acres and Tenabo areas are present within a short distance of the drill hole. The stratigraphic and geographic relations of the map units during or after deposition are largely unknown because of the profound disruption caused by thrust faulting during the Antler orogeny. However, the age of the units exposed in the vicinity of the drill site and their stratigraphic identification now are well documented. As noted earlier, the drill hole is located in a belt of mineralized rock that trends northwesterly across the Shoshone Range from Tenabo.

The oldest rocks in the area of the drill hole belong to the Valmy Formation of Ordovician age. They consist of quartzite, siliceous mudstone (or argillite), and minor limestone and chert and are exposed west, northwest, and northeast of the drill hole (fig. 2). Quartzite is the most conspicuous of these rocks because of the prominence and continuity of its exposures in steep slopes and in protruding isolated phacoidal masses that are tens of feet to a few hundred feet long set in a matrix of less resistant siliceous mudstone. Most of the quartzite is light to medium gray, medium grained, and massive, with little or no hint of original bedding. The siliceous mudstone is one of the most abundant rock types in the Valmy in the Indian Creek area. Locally this unit weathers to a shaly rock, but in good exposures it is seen to be a distinctive greenish-black-weathering, thin-bedded rock that is thoroughly bioturbated and contains abundant evidence of worm borings. The greenish-black color and highly bioturbated character of this rock, which is sufficiently indurated to have been called argillite (Wrucke, 1974; Wrucke and Armbrustmacher, 1975) and to give it a superficial resemblance to chert in some outcrops, serve to distinguish it from all units in the Slaven Chert or other formations in the upper plate of the Roberts Mountains thrust in the Gold Acres and Tenabo areas. In the area of figure 2, black chert and interlayered medium-gray limestone of the Valmy are found only in a small exposure near the northeast corner. The Ordovician age of the Valmy in the Indian Creek area has been confirmed from graptolites in the mudstone (Gilluly and Gates, 1965; W.B.N. Berry, written commun, 1972; R.R. Ross, written commun., 1975) and conodonts in the limestone (A.G. Harris, written commun, 1978).

A few exposures of the Elder Sandstone of Silurian age are found in thin thrust slices near the southwest and northeast corners of the area of figure 2. The rock is a light-brown calcareous siltstsone with subordinate amounts of grayish-brown sandy and silty limestone that has yielded age-diagnostic conodonts (A.G. Harris, written commun., 1978).

The Slaven Chert of Devonian age is widespread in the Gold Acres and Tenabo areas and is abundant in the vicinity of USGS No. 1. It consists mostly of ribbon chert with thin mudstone interbeds, greenstone, small amounts of sandstone, and a locally conspicuous unit of chert-barite conglomerate (fig.2) . The greenstone is stratigraphically interlayered with the chert and consists of spilitic basalt flows, a few of which contain

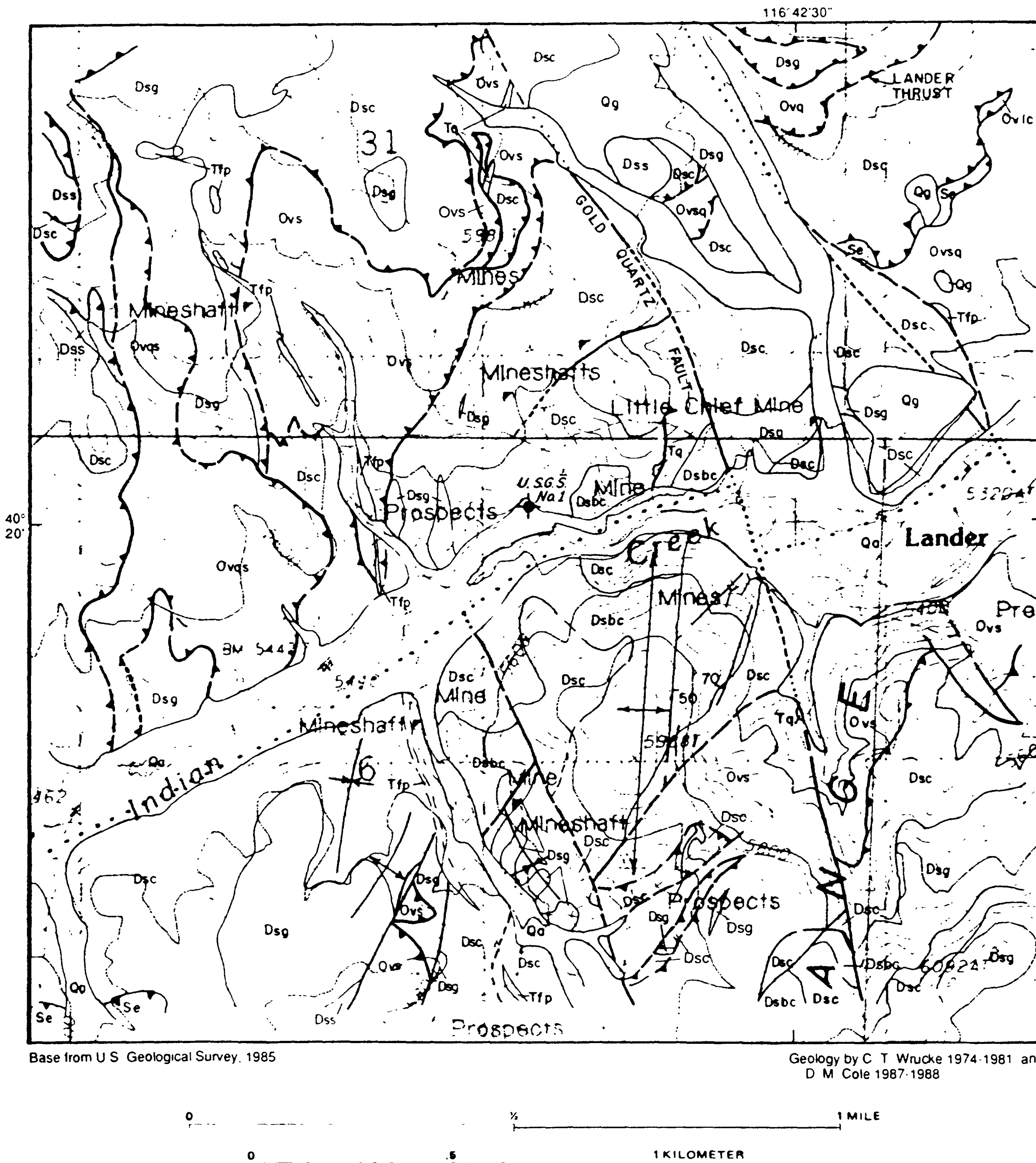


Figure 2. Geologic map of the Indian Creek area.

EXPLANATION

Qa	Alluvium (Quaternary)
Qg	Gravel (Quaternary)
Tq	Quartz porphyry (Tertiary)
Tfp	Feldspar porphyry (Tertiary)
	Slaven Chert (Devonian)
Dsbc	Barite-Chert conglomerate
Dsc	Chert
Dsg	Greenstone
Dss	Sandstone
Se	Elder Sandstone (Silurian)
	Valmy Formation (Ordovician)
Ovlc	Limestone and chert
Ovq	Quartzite
Ovqs	Quartzite, siliceous mudstone, and chert
Ovs	Siliceous mudstone
Ovsq	Siliceous mudstone and quartzite

The order in which units in the Ordovician and Devonian formations are listed does not reflect relative age.

Contact—Long dashes where approximately located, short dashes where inferred

Fault—Long dashes where approximately located, short dashes where inferred, dotted where concealed. Tick mark and number show direction and amount of dips

Thrust fault—Sawteeth on upper plate. Long dashes where approximately located

Anticline showing direction of plunge

Syncline

Prospect

Adit

Shaft

Drill hole

abundant pillows (Wrucke and others, 1978). Though some of the chert and all of the greenstone in this area have been mapped as part of the Valmy Formation (Gilluly and Gates, 1965; Wrucke, 1974), these rocks, as mentioned earlier, now are known to be of Devonian age. Sandstone considered here to belong to the Slaven resembles some of the Elder Sandstone but commonly weathers brownish-red and appears to be interbedded with chert of the Slaven. The chert-barite conglomerate exposed a short distance east of the drill hole and on the hill to the south is distinctive for being a tightly packed clast-supported mass of pebbles, mostly of pale-brown chert but locally with as much as 30 percent rosettes of gray barite. The Devonian age of the conglomerate is assumed from its apparent interbedding with typical black chert of the Slaven. The age of the Slaven on the eastern side of the Shoshone Range has been determined from conodonts (Gilluly and Gates, 1965; A.G. Harris, written commun, 1978) and radiolarians (C.T. Wrucke, unpub. data; Jones and others, 1978).

Tertiary rocks in the vicinity of the drill hole are feldspar porphyry and quartz porphyry in dikes. The feldspar porphyry is thought to be related to the Oligocene granodiorite at Granite Mountain exposed as close as 2.1 mi (3.4 km) northwest of the drill hole or to the granodiorite porphyry stock at Tenabo 1.9 mi (3.1 km) southeast of the hole. Quartz porphyry dikes are sparse near the dill hole, and those exposed are only a few meters in length. They may be important to the economic geology of the area because similar dikes closer to Tenabo are related to gold mineralization of Oligocene age.

The structural position of the drill hole is high in the lowest of the two main plates discussed earlier as comprising the Roberts Mountains allochthon in the Gold Acres and Tenabo areas. The Lander thrust, which marks the sole of the next higher main plate at the base of a thick sequence of strata of the Valmy Formation, is exposed as close as 0.3 mi (0.5 km) west of the drill hole and, prior to erosion, extended only a short distance above the collar of the hole. This thrust can be followed south from the area of the drill hole to the Gold Acres area and north and northeast to the mountain front. North-northwest-trending steep faults offset the Lander thrust and underlying rocks down to the east. They are considered to be mostly normal faults, but some of them conceivably could have had a strike-slip component of offset. The most prominent of the steep faults in the vicinity of the drill hole is the Gold Quartz fault (fig. 2), 0.25 mi (0.4 km) east of the hole and traceable southward to the mining area at Tenabo. Vertical offset down to the east across the Gold Quartz fault appears to increase northward from the Tenabo area. Northeast-striking steep faults cut as well as merge with faults of the north-northwesterly set (fig. 2; Wrucke, 1974), indicating that both sets probably are approximately contemporaneous. Northerly trending anticlines and synclines also are found in the vicinity of the drill hole (fig. 2). The entire area shown in figure 2 is part of a broad, poorly defined north-northwest-trending anticlinal hinge discussed earlier as important in siting USGS No. 1. The hinge line of this fold lies between the hole and the Gold Quartz fault, extends an unknown distance to the north, and continues south to the Gold Acres area. The hinge passes about 0.4 mi (0.6 km) west of the Gold Quartz Mine at Tenabo (Wrucke, 1974).

Mineral deposits in the vicinity of USGS No. 1 are in the Lander subdistrict of the Bullion mining district (Stager, 1977, p. 74). Lander (fig. 2) is the site of the oldest mining camp in the Bullion district on the eastern slope of the northern Shoshone Range and was active in the 1870s and 1880s (Emmons, 1910). The Silver Sides Mine, locally known as the Lander Mine, is 0.33 mi (0.53 km) southeast of USGS No. 1. It was a silver-lead mine active in this early period (Emmons, 1910; Stager, 1977) and had production valued when sold at $5,000-$100,000 (Stager, 1977). The Bonnie Jean (Lovie) Mine, 1.4 mi (2.3 km) north-northwest of the drill hole, produced $300,000 in silver in the early days of mining in the Lander area (Lincoln, 1923; Stager, 1977). A number of turquoise mines are east of the area of figure 2 (Stager, 1977; Morrissey, 1968). The nearest mine in the Tenabo area is the Little Gem, 1.4 mi (2.3 km) southeast of USGS No. 1. This mine has produced copper, silver, and arsenic (Vanderburg, 1939; Emmons, 1910; Stager, 1977). Many of the old mines in the Tenabo area were obliterated by mining activity in the 1970s and 1980s.

LITHOLOGY OF USGS NO. 1

Rocks in the upper and lower plates of the Roberts Mountains thrust were penetrated in USGS No. 1. Upper plate rocks are mostly siliceous and similar to those exposed in the vicinity of the drill hole, but calcareous rocks also are present, and some of the siliceous rocks are variably calcareous. The Roberts Mountains thrust was cut at a depth of 2,938 ft (895.5 m). Rocks in the lower plate are mostly calcareous, though siliceous lithologies are present at the bottom of the hole. Although rocks clearly identified as metamorphic are found as high as about 580 ft (176.8 m) below the collar, abundant metamorphic rocks begin at much lower depths. Felsic igneous rocks and lamprophyre, probably representing dikes, were penetrated at numerous intervals in the upper and lower plates.

A detailed lithologic log of the rocks drilled at the Indian Creek hole is given in table 1, and a generalized graphic depiction of the rocks penetrated is given in figure 3. The log was made from cuttings recovered from the surface to a depth of 170 ft (51.8 m) and from core obtained below 170 ft (51.8 m) to the bottom of the hole at 3,996 ft (1,218.0 m). No

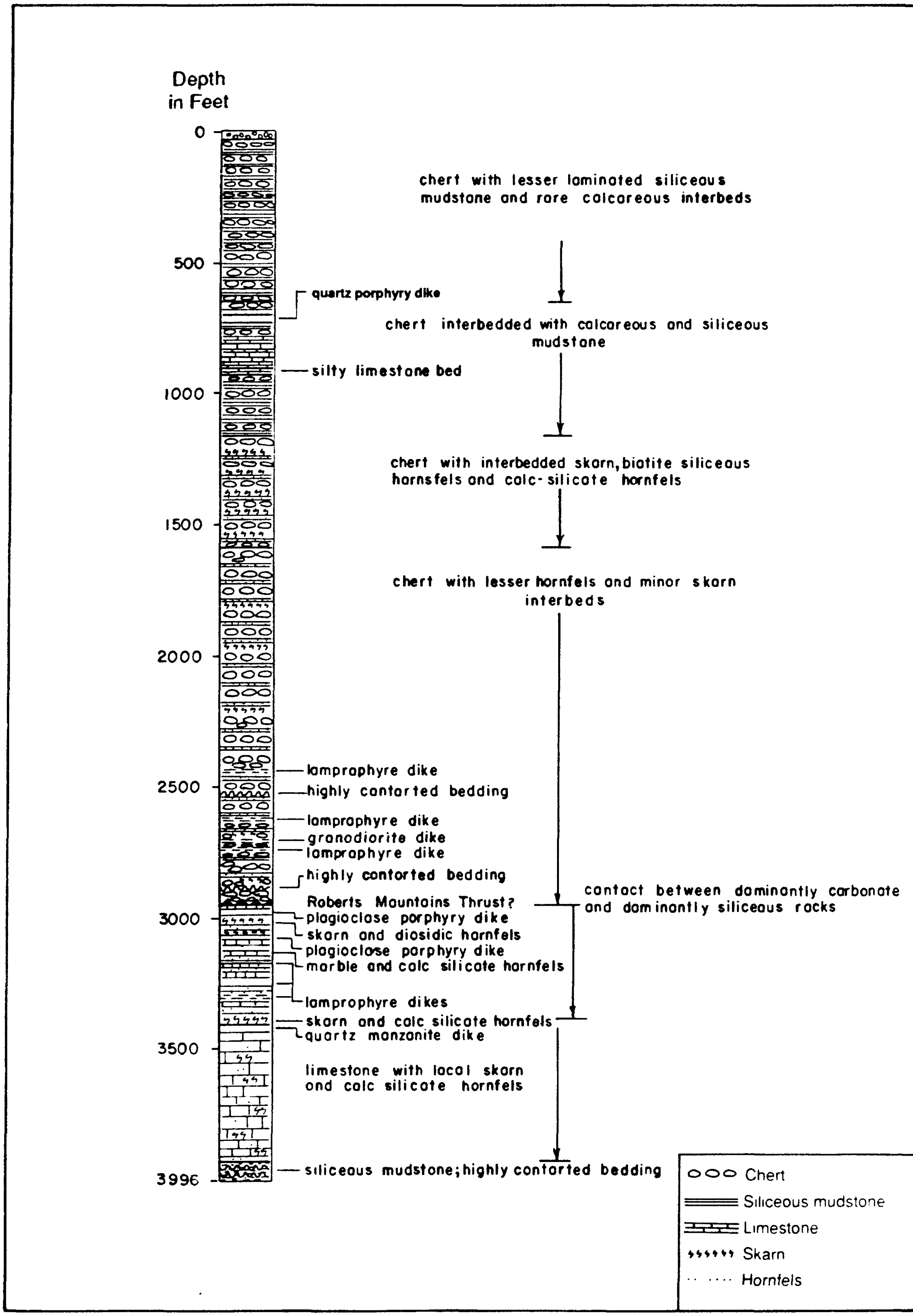


Figure 3. Generalized lithologic description of USGS No. 1

calculation of the percentage of core recovered was made, but below 170 ft (51.8 m) recovery was excellent for most cored intervals and is estimated generally to have been considerably greater than 50 percent. The log gives the most common rock cored in a given interval. For some intervals, significant variations from the common rock type are noted, as are breccia zones, quartz veins, sulfide-bearing veins, and other features considered to be of unusual interest.

Depth to the bottom of the alluvium at the top of the hole was difficult to determine during drilling because the alluvium and the bedrock to a depth of 100+ ft (30 m) consist of broken chert, but the alluvium is estimated to be about 30 ft (9.1 m) thick.

Rocks in the upper plate of the Roberts Mountains thrust extend to a depth of 2,938 ft (895.5 m). Chert with interbedded siliceous mudstone and their metamorphic equivalents are the most abundant lithologies in the upper plate. Chert in beds commonly a few inches (5 cm) or more thick are found in sequences as thick as tens of feet (6 m or more). Commonly mudstone interbeds are in layers less than an inch (2.5 cm) to about l ft (0.3 m) thick, but mudstone sequences 10 ft (3.0 m) thick are not rare, and a few are as thick as 30 ft (9.1 m). Some of the mudstone is calcareous but most is noncalcareous. The interval 785-909 ft (239.3-277.1 m) is distinctive and unusual in consisting of about 60 percent laminated to thin-bedded rock that varies from calcareous siltstone to silty limestone with 40 percent black thin-bedded mudstone.

Lower plate rocks extend from a depth of 2,938 ft (895.5 m) to the bottom of the hole at 3,996 ft (1,218.0 m). Where least metamorphosed, rock in the interval 2,938-3,930 ft (895.5-1,197.9 m) is a recrystallized medium-light- to medium-dark-gray laminated limestone, silty in some intervals and nonsilty in others. Rock below 3,930 ft (1,197.9 m) is a dark-gray to black, highly deformed siliceous mudstone consisting of intricately stacked lenticular masses, or phacoids, about an inch (2.54cm) long that might have formed in a fluidized debris flow. However, the abundant carbon-rich seams that separate phacoidal domains are continuous and anastomosing and more suggestive of penetrative slip surfaces and intense deformation after deposition than of a coarsely clastic debris flow. This unit closely resembles upper plate rock. The stratigraphic identification of this rock is unknown.

Much of the core consists of metamorphosed rock, though the metamorphic grade varies widely. Light-gray chert as high in the core as the interval 171-174 ft (52.1-53.0 m) contains conodonts (discussed in the next section) that have a Conodont Alteration Index (CAI) of 6-1/2, indicating that the host rock reached temperatures of 400°-500°C (A.G. Harris, written commun., 1977). Harris found that light-gray chert in the intervals 619-634 ft (188.7-193.2 m) and 668-693 ft (203.6-211.2 m) has a lower CAI (5-1/2), indicative of temperatures of about 350°C. The highest position of hornfels, developed from metamorphosed siliceous mudstone, is at 580.2 ft (176.8 m), and the highest skarn is at 1,091 ft (332.2 m). Yet, down to 1,169.5 ft (356.5 m), most of the rocks are not obviously metamorphosed, whereas below that depth all of the siliceous mudstone is purplish-brown calcareous or noncalcareous phlogopite-bearing hornfels, and most of the rock that was limestone is now skarn or marble.

The felsic igneous rocks consist of quartz-bearing and feldspar-rich (granodiorite) porphyries. These are highly altered rocks that have textures that are microaplitic. Lamprophyre dikes are found in upper plate and lower plate rocks in the core as are felsic dikes. All of the lamprophyre dikes are unmetamorphosed and relatively unaltered.

AGE AND CORRELATION OF ROCKS DRILLED IN USGS NO. 1

The unmetamorphosed rocks cored in the upper plate of the Roberts Mountains thrust at Indian Creek closely resemble rocks of the Slaven Chert that crops out widely in the Gold Acres-Tenabo area. Metamorphosed upper plate rocks in the core are similar to hornfels of the Slaven on Altenburg Hill south of Tenabo. Conodonts found in the intervals 171-174 ft (52.1-53.0 m), 619-634 ft (188.7-193.2 m), and 668-693 ft (203.6-211.2 m) are consistent with this interpretation. Anita G. Harris of the U.S. Geological Survey (written commun., 1977, 1978) identified *Palmatolepis* sp. in each of these zones. Palmatolipids are restricted to the Late Devonian. No fossils were found in core from lower plate rocks, and the stratigraphic identification of these rocks is uncertain.

GEOLOGY OF USGS NO. 4 DRILL SITE

Rocks exposed in the vicinity of USGS No. 4 belong principally to the Slaven Chert and the Elder Sandstone and are in the lower of the two main thrust sheets, described earlier, as making up the Roberts Mountains allochthon in the Gold Acres area. Quaternary deposits in the area consist of older alluvium on some ridges and Holocene alluvium in stream channels. The ribbon chert that crops out widely near the drill site was shown by Gilluly and Gates (1965) to be in the Slaven Chert. Wrucke (1974, 1975) reinterpreted the chert as belonging to the Valmy Formation, based on observations that the chert is in sedimentary and igneous contact with greenstone, rather than thrust contact as shown by Gilluly and Gates for the area around Gold Acres and Tenabo. In the 1960s and 1970s, the age of the greenstone in those areas was considered to be Ordovician (Gilluly and Gates 1965; Wrucke and others 1978). However, radiolarians from the Gold Acres and Tenabo areas clearly show that the chert is of Devonian age and, therefore, is part of the Slaven Chert (C.T. Wrucke, umpub. data). Greenstone interlayered with the chert also must belong to the Slaven. Bodies shown by Gilluly and Gates as quartz porphyry in the area just south of the drill hole are bleached, but they lack evidence of quartz. Petrographic examination shows that they originally had textures of greenstone and therefore were shown by Wrucke (1974) to be altered greenstone, now considered to belong to the Slaven. Alteration that modified the greenstone also affected the host chert and is the result of emplacement of the buried Cretaceous granitic intrusive discussed previously as underlying an area that trends northwest from Gold Acres. The area of altered rocks begins about 1,000 ft (305 m) south of the drill hole. USGS No. 4 was drilled as close as considered reasonable to the area of altered and metamorphosed rock in hopes of cutting the Roberts Mountains thrust without penetrating the buried pluton.

USGS No. 4 is collared in a part of the upper plate of the Roberts Mountains thrust that appears to be relatively uncomplicated structurally.compared to upper plate rocks in most parts of the Gold Acres area. Map patterns of chert and greenstone in the Slaven Chert suggest relatively flat-lying rocks and few mappable steep faults. Northerly dips of the base of the greenstone on the steep north-facing slope of the ridge south of the drill hole suggests that rocks in that area may be arched over the Cretaceous pluton buried beneath the ridge, though other evidence of the arch is sparse. The Roberts Mountains thrust is thought to rise gradually eastward from its 890 ft (271.3 m) depth in the drill hole. The thrust may rise more steeply as it approaches the steep Gold Acres fault that bounds the northwest side of the Gold Acres window (Wrucke, 1974) because near the window greenstone bodies in the upper plate crop out parallel to the Gold Acres fault as narrow bands, suggestive of steeply dipping bodies.

LITHOLOGIC LOG AND CORRELATION OF ROCKS DRILLED IN USGS NO. 4

A summary of the rocks drilled in USGS No. 4 is discussed here along with new information on the formations penetrated in the hole. A detailed log is given by Wrucke (1975). Alluvial sand and gravel are present from the surface to a depth of 28 ft (0-8.5 m). Cuttings were the only materials recovered from the surface to a depth of 1,200 ft (366 m), but core was obtained from that depth to the bottom of the hole at 1,916 ft (584.0 m).

Rocks in the upper plate of the Roberts Mountains thrust were penetrated from a depth of 28.0 ft (8.5 m) to 890 ft (271.3 m). In the interval 28-255 ft (8.5-77.7 m), the rocks are medium-gray chert and siliceous mudstone (or argillite), with pale brown to pale-brownish-gray calcareous siltstone in the interval 55-75 ft (16.8-22.9 m). Siliceous mudstone is about equal in volume to chert above the sandstone but greatly dominates over chert below the siltstone. This sequence of chert, siliceous mudstone, and siltsone down to a depth of 255 ft (77.7 m) was interpreted by Wrucke (1975) as belonging to the Valmy Formation but here is considered to be in the Slaven Chert. No greenstone, present in the Slaven at the surface near the drill hole, was found in the core. From 255 to 380 ft (77.7-115.8 m), the rock is light-gray calcareous siltstone with subordinate siliceous mudstone and chert. Rocks in this interval probably belong to the Elder Sandstone, as indicated by Wrucke (1975), but no unequivocal criteria have been found to distinguish siltstones of the Elder and Slaven. Rocks in the interval 380-890 ft (115.8-271.3 m) consist of 90 percent chert and 10 percent siliceous mudstone. Both rock types are light to medium gray and contain minor disseminated pyrite. They are considered here to belong to the Slaven.

Rocks drilled in the lower plate of the Roberts Mountains thrust consist of limestone and calc-silicate hornfels. Medium-gray to very dark-gray laminated to thin-bedded carbonaceous limestone containing minor tremolite and abundant pyrite is present in the interval 890-1,300 ft (271.3-396.2 m). A composite sample from core from the interval 1,209-1,299 ft (368.5-395.9 m) yielded conodonts considered by Anita G. Harris (written commun., 1978) as indicating conodont zone *Icriodus woschmidti* , which she stated extends from latest Silurian to earliest Early Devonian. According to Harris, this zone is found in a 200-ft (61.0 m) interval near the top of the Roberts Mountains Formation in its type area in the Roberts Mountains. She also reported that the conodonts have a CAI of 6, indicating the host rock reached at least 400°C. From 1,300 ft (396.2 m) to the bottom of the hole, the rocks are calc-silicate hornfels with a few sequences of dark-bluish-gray limestone as thick as 120 ft (36.6 m). The hornfels is pale green to pale greenish gray, fine grained, and calcareous and in a few intervals is folded. Correlation of the hornfels and interlayered limestone with a known formation has not been established firmly, but these rocks could belong to the Roberts Mountains Formation. Galena veins 2 in. (5 cm) and 3 in. (8 cm) wide are at depths of 1,849 ft (563.6 m) and 1,856 ft (565.8 m). Strata of the Roberts Mountains Formation(?) in the vicinity of the drill hole could be the source of thrust slices picked up during thrusting and transported eastward beneath the sole of the Roberts Mountains thrust to the Gold Acres Mine (Wrucke and Armbrustmacher, 1969, 1975) .

CHARACTER AND DISTRIBUTION OF MINERALIZED ROCKS AT THE SURFACE IN THE VICINITY OF THE DRILL HOLES

Mineralized rocks on the east side of the Shoshone Range in the area of the USGS drill holes are found in two northwest-trending belts (Wrucke and others, 1968; Wrucke and Armbrustmacher, 1975, 1973). One belt extends from the mountain front at Gold Acres northwest about 6 mi (9.7 km). The other belt can be traced from Tenabo across the Shoshone Range and is part of the Battle Mountain-Eureka mineral belt (Roberts, 1966). Both belts are defined by anomalous concentrations of many elements and by nunmerous prospects and a few mines. USGS No. 1 is in the northern belt; USGS No. 4 is in the southern belt. The large disseminated gold deposit at Gold Acres is at the eastern end of the southern belt.

The northern belt, for a distance of about 4 mi (6.4 km) northwest from the mountain front, was studied by Wrucke and others (1968), who found that this part of the belt is well defined by the distribution of arsenic, antimony, copper, gold, lead, mercury, silver, and tin, and less well by the distribution of cadium, molybdenum, and zinc. All of the metals mentioned here, except tungsten, are greatly enriched around the Tertiary granodiorite stock at Tenabo. Tungsten is found in anomalous concentrations at the stock only at a few localities. High concentrations of bismuth are restricted to the immediate vicinity of the stock, whereas mercury and silver are distributed in high concentrations fairly evenly. Copper and load and placer gold have been produced from each of three mines at the southeastern end of the northern belt, and silver and lead have been mined at two groups of mines centered approximately 2 mi (3.2 km) and 4 mi (6.4 km) northwest of the mountain front at Tenabo (Stager, 1977). USGS Drill Hole No. 1 lies between the two groups of silver-lead mines. Silver mines are abundant in the northern belt in the central and northwestern parts of the Shoshone Range northwest of the drill hole, and a few gold properties are present in the mineral belt in the central part of the range (Stager, 1977). Gold, silver, and base metals have been found in altered chert associated with a weak porphyry copper-molybdenum deposit in the northern belt at Hilltop, 11.5 mi (18.5 km) northwest of USGS No. 1 (Desrochers, 1984). The precious-metal system at Hilltop has been classified as a sedimentary rock-hosted distal disseminated silver-gold deposit (Cox and Singer, 1990). Turquoise, mentioned earlier, is found in numerous deposits in the southeastern part of the belt and has been one of the principal commodities produced in the eastern part of the range (Stager, 1977; Morrissey, 1968). In recent years, the Tenabo area has been explored extensively for disseminated gold.

The southern belt is well defined by arsenic, bismuth, copper, lead, mercury, silver, tin, and zinc and to a lesser degree by antimony (Wrucke and others, 1968). Cadmium and molybdenum are weakly distributed along the belt, whereas mercury and silver, as in the northern belt, are the best delineators of the northwesterly trend of mineralized rocks. Antimony, lead, silver, and tin are concentrated more in the northwestern than in the southeastern part of the belt. Tungsten follows the pattern that it has in the northern belt in being restricted in distribution to one area, in this case to the vicinity of Gold Acres, close to known occurrences of a buried granitic pluton. Gold, though shown by Wrucke and others (1968) as concentrated only around Gold Acres, in recent years also has been produced at the Elder Ridge Mine (sec. 18, T.28N., R.16E.), which is in the northwest-central part of the belt east of the Utah Mine. Mines in the southern belt have similarities to the northern belt in that silver and lead have been produced northwest of the areas of gold production, and turquoise deposits are known, though they are less abundant than farther north (Stager, 1977).

The distribution of elements in the mineralized belts is suggestive of at least three suites of elements, a base metal suite, a molybdenum-tungsten suite, and a gold suite. The relative abundance of elements in each suite differs in the two mineralized belts as indicated by the size of the areas where various concentrations are found for any specific element. Most elements show a wide range of concentrations to as much as several orders of magnitude above crustal abundance.

The base metal suite almost certainly reflects an assemblage of sulfide minerals containing bismuth, cadium, copper, lead, mercury, silver, and zinc. Galena, sphalerite, pyrite, and pyrrhotite are present in core from USGS No. 1, and galena and pyrite are present in USGS No. 4. Copper ore has been reported at Tenabo (Stager, 1977), and chalcopyrite has been identified at Gold Acres (Armbrustmacher and Wrucke, 1978). A more detailed study of the base metal suite at Gold Acres is given by Wrucke and Armbrustmacher (1975) and Armbrustmacher and Wrucke (1978).

The molybdenum-tungsten suite is defined by anomalous concentrations of molybdenum and tungsten in contact metamorphic rocks adjacent to granitic rocks at Tenabo and Gold Acres (Wrucke and others, 1968) together with molybdenite and scheelite in skarn and granitic rock at Gold Acres. Although these minerals have not been found in the northern belt, the similarities in distribution of molybdenum and tungsten in the belt, despite the relatively weak concentrations of tungsten, are permissive of a geochemical association. High concentrations of both metals rarely are found distant from granitic rocks in these areas. The strong association of these elements with contact metamorphosed rocks implies an origin related to the Oligocene granodiorite stock at Tenabo in the northern belt and to the Cretaceous pluton at Gold Acres in the southern belt.

The most recent determination of the elements associated with gold in the southern belt is by Hays and Foo (1991), who concluded that at Gold Acres the gold suite includes gold, antimony, arsenic, mercury, and thallium. These elements belong to the well known suite commonly found in carbonate-hosted disseminated gold deposits (Berger, 1986). Romberger (1986) lists high concentrations of antimony, arsenic, mercury, and thallium as common to disseminated gold deposits regardless of host. Of the elements considered by Berger (1986) and Romberger (1986) as occurring with gold in disseminated deposits, Hays and Foo (1991) found that antimony, arsenic, mercury, and thallium have a geochemical association with gold at Gold Acres and that the strongest association is with thallium. They also found that gold correlates poorly with copper and zinc of the base-metal suite.

A gold suite of gold, antimony, arsenic, mercury, and possibly tungsten has been considered as present in the northern belt, though it was recognized that gold in this belt also coexists with other elements (Wrucke and others, 1968). Elements that make up the suite are found in large parts of the northern belt, but a geochemical association between them, as discussed later, was not found in samples from core at USGS No. 1. However, the possibility remains that elements of the gold suite around the granitic stock at Tenabo are associated geochemically.

AGE OF MINERALIZATION

The wide distribution of the base-metal suite along the northern and southern mineralized belts of the eastern Shoshone Range is strongly suggestive of an association with granitic rocks that underlie significant parts of both belts. The molybdenum-tungsten suite in the southern belt, as discussed earlier, also clearly is associated with granitic bodies. In the southern belt, introduction of the base-metal suite followed deposition of the molybdenum-tungsten suite after emplacement of the large Cretaceous pluton buried beneath the Gold Acres Mine and areas to the northwest beneath the 3-mi (4.8 km)-long zone of altered rocks (Wrucke and Armbrustmacher, 1975). This pluton has an age of 98.8±2.0 Ma (Silberman and McKee, 1971). In the northern belt, granitic rocks crop out in two bodies, a small stock of granodiorite porphyry at Tenabo (Wrucke, 1974) and a granodiorite pluton at Granite Mountain 5 mi (8 km) northwest of Tenabo (Gilluly and Gates, 1965). A porphyry type copper-molybdenum deposit in the northern belt at Hilltop, 9.7 mi (15.5 km) northwest of Tenabo is considered to be related to emplacement of the host granitic stock (Desrochers, 1984), which may be part of the body at Granite Mountain. This deposit should not be confused with the gold deposit, discussed later, that is farther east at Hilltop. Ages obtained from the granodiorite at Granite Mountain range from 38.0 to 36.0 Ma. Evidence that granitic rock may exist beneath significant parts of the northern belt is provided by metamorphosed rock at depth in core from USGS Drill Hole No. 1 located between these bodies. Additional evidence is from the irregular northwestern margin of the stock at Tenabo, which is suggestive that the body has a relatively gentle dip to the northwest toward the drill hole and could project beneath the hole. The two granitic bodies may be higher parts of a single intrusive mass. The average of five ages from the stock at Tenabo is 37.6 Ma (McKee and Silberman, 1970), about the same as the granitic rock at Granite Mountain. If the mineralization between Tenabo and Hilltop is related to the granitic bodies just discussed as assumed, it would be, therefore, in the range of 38-36 Ma.

Desrochers (1984) speculated that the gold-silver-base-metal deposit at Hilltop may be related to caldera collapse interpreted as occurring at Mount Lewis in the Oligocene, probably shortly after 33.2 Ma (Wrucke and Silberman, 1975, 1977). However, the absence of clear evidence of intrusive rocks younger than about 33 Ma in the Hilltop area leads us to suggest that the precious metal-base-metal deposit more likely is associated with emplacement of the granitic rocks in the northern belt.

The largest gold deposits in the northern and southern belts are associated with rhyolite dikes. In the northern belt, the highest concentrations of gold at the surface are localized near rhyolite dikes that intruded the granodiorite porphyry stock and its host rocks at Tenabo. Ages from one of the dikes have a range of 35.3-34.4 Ma (McKee and Silberman, 1970). Scattered concentrations of gold in the parts per million range also are found along the belt northwest of the rhyolite dikes (Wrucke and others, 1968) and may be related to emplacement of the granitic plutons. In the southern belt, the greatest concentration of gold-bearing rock is in the Gold Acres area. Wrucke and Armbrustmacher (1975) concluded that the gold suite at Gold Acres developed after deposition of molybdenum, tungsten, and the base-metal suite during waning stages of hydrothermal activity associated with the buried Cretaceous pluton. Berger and Bagby (1991, p. 239) in a review of the Carlin-type gold deposits, infer that there may be a genetic link between tungsten skarn-producing magmas, as at Gold Acres, and Carlin-type mineralization. However, Rytuba (1985) has shown that the gold at Gold Acres is associated with altered rhyolite porphyry dikes now widely exposed at the mine. These dikes are related to the Caetano Tuff and provided heat for the hydrothermal event during gold deposition. According to Rytuba, whose conclusions have been incorporated in an ore-occurrence model for Gold Acres (Tooker, 1985, p. 120-123), the hydrothermal mineralization took place at 32.5±2 Ma after eruption of the tuff at the Cortez caldera, centered approximately 10 mi. (16 km) south-southeast of Gold Acres. Possibly some gold was deposited at Gold Acres as a result of emplacement of the Cretaceous pluton, but the location of the disseminated gold deposits at Cortez and Horse Canyon, approximately 8 mi (13 km) and 13 mi (21 Km), respectively, southeast of Gold Acres, as well as at Gold Acres subparallel to and within a few kilometers of the margin of the Cortez caldera and close to rhyolite dikes similar to those in the Caetano Tuff (Rytuba, 1985) strongly suggests that the principal episode of gold deposition at Gold Acres is genetically associated with Oligocene volcanic activity.

CHEMICAL ANALYSES

Chemical analyses of core from USGS No. 1 are given in tables 2 and 3. Analyses of core samples from USGS No. 4 are given by Wrucke (1975) and are not repeated here. Table 2 gives data from analyses performed by the U.S. Geological Survey during and shortly after the drilling. Table 3 presents data from analyses performed by Bondar-Clegg of Sparks, Nevada, from samples collected during the present study. Samples submitted for the chemical analyses in both tables consisted of representative chips collected systematically from broken core in the intervals indicated.

For table 2, analytical determinations were made for 27 elements by a semiquantitative spectrographic method (Ward and others, 1963; Grimes and Marranzino, 1968). Gold was determined by a wet chemical method using atomic absorption spectrophotometry (Thompson and others, 1968). Mercury was analyzed instrumentally by an atomic absorption technique outlined by Vaughn and McCarthy (1964). No analyses were obtained for the interval 0-169.5 ft (0-51.7 m). Analytical data in table 3 are for 17 elements made by quantitative methods. Gold was analyzed by fire assay-atomic absorbtion techniques, barium by x-ray fluorescence, selenium by plasma emission spectroscopy, and all other elements by inductively coupled plasma-atomic emission spectroscopy.

GEOCHEMISTRY OF USGS NO. 1

Chemical analyses of core from USGS No. 1 were examined to determine the variation of elements with lithology and the geochemical association of the elements.

Analyses used in this examination are those obtained in 1967 (table 2) and 1989 (table 3). Table 2 gives data from semiquantitative analysis for 27 elements (Au, Ag, As, B, Ba, Be, Bi, Cd, Co, Cr, Cu, Hg, La, Mn, Mo, Nb, Ni, Pb, Sb, Sc, Sn, Sr, V, W, Y, Zn, and Zr) from 531 core samples. Table 3 gives data from quantitative analysis for 17 elements (Au, Ag, As, Bi, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, W, Zn, Hg, and Ba) from 93 core samples. Both data sets were obtained from samples collected from core intervals commonly 10 ft (3.0 m) long. A summary of statistics for 11 elements in samples from USGS No. 1 calculated from analyses in table 7 (modified from table 3) are provided in table 6.

Strengths of association between elements reported in tables 2 and 7 were determined by Spearman's correlation test and reported in tables 4 and 5, respectively. The Spearman method was used because it its based on nonparametric rank-correlation tests that make no assumptions about the population distribution and, therefore, can be used for elements whose distributions are nonnormal (fig. 5, 6). In order to provide as complete a data matrix as possible for the strength-of-association calculations for tables 3 and 4, concentrations reported as "less than" and "more than" were replaced by numerical values. Substitutes for "less than" determinations are 50 percent of the detection limit, rounded to the next highest whole number where concentrations for an element are reported only as whole numbers, and "greater than" determinations are replaced with the value for the upper limit reported. Table 7, based on the quantitative data in table 3, gives the substituted values and all other values used in determining the Spearman correlations for table 5. For purposes of this report, low correlations determined by the spearman rank calculations are those whose values are below 0.3, moderate correlations have values between 0.3 and 0.5, and high correlations have values greater than 0.5. This ranking is based on the fact that for 30 observations using the Spearman rank test a correlation of 0.3 is significant at the 95 percent confidence level, and a correlation of 0.5 is significant at a confidence level greater than 99.5 percent but less than 99.9 percent (Davis, 1986, p. 100). Davis does not present confidence limits for more than 30 observations, but, clearly, the 93 observations used to calculate correlation coefficients of table 5 would provide greater confidence limits in the moderate and high classifications than those based on 30 observations.

Gold

Data on gold in tables 2 and 3 are presented graphically in figure 4. The data show that gold in samples from USGS No. 1 is concentrated through a thicker zone and reaches higher concentrations in the 425-ft (129.5 m)-thick depth interval of 770-1,195 ft (234.7-

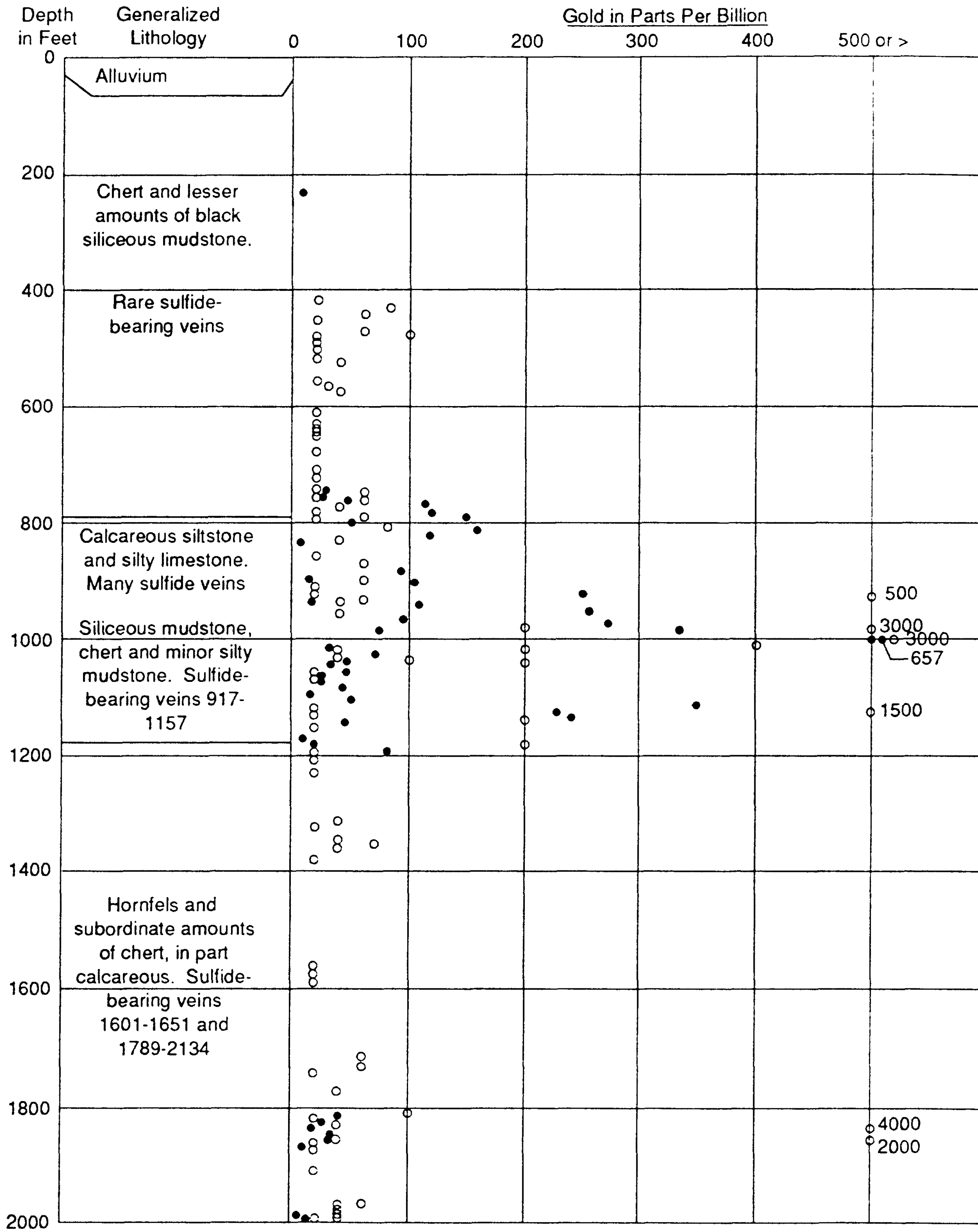
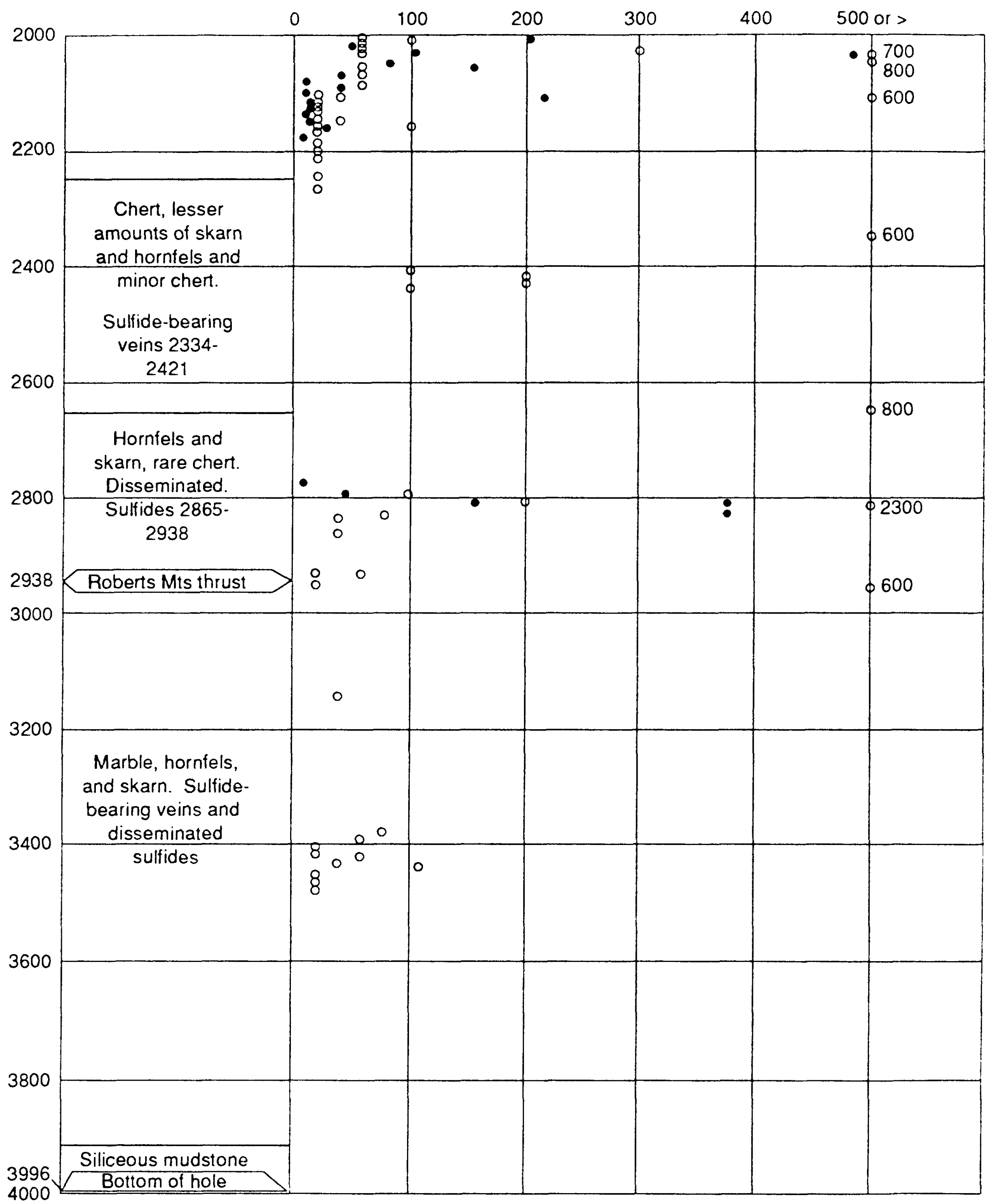


Figure 4. Generalized lithology of USGS No. 1 and gold concentrations from the drill core. Open circles represent gold concentrations from table 2, solid circles represent gold concentrations from table 3. Contents shown are those at or above lower limit of detection.

Figure 4


0
100
200
300
400
500 or >
2000
2200
2400
2600
2800
2938
3000
3200
3400
3600
3800
3996
4000
700
800
600
600
800
2300
600
Chert, lesser amounts of skarn and hornfels and minor chert.
Sulfide-bearing veins 2334-2421
Hornfels and skarn, rare chert. Disseminated. Sulfides 2865-2938
Roberts Mts thrust
Marble, hornfels, and skarn. Sulfide-bearing veins and disseminated sulfides
Siliceous mudstone
Bottom of hole

364.2 m) than elsewhere in the core. The highest gold content from quantitative analysis in this interval is 657 ppb, found in the sample from 995-1,005 ft (303.3-306.3 m). The next thickest interval of high gold concentrations is 170 ft (51.8 m) thick, from about 1,985 ft to 2,155 ft (605.0-656.8 m), where the highest value from quantitative analysis is 486 ppb. This value was from a sample from 2,030-2,040 ft (618.7-621.8 m). These gold-rich zones are well defined by the semiquantitative and the quantitative analyses. A few additional intervals with high concentrations of gold are shown in figure 4. Quantitative analyses (table 3) are available for all depth intervals identified by semiquantitative analyses (table 2) as having high concentrations of gold, but not necessarily from other depth intervals. Quartz porphyry or feldspar porphyry dikes are found in or near some zones of high gold values but not others. The data show that concentrations of gold are more abundant above than below the Roberts Mountains thrust. Visual inspection of figure 4 suggests that high gold contents are not strongly associated with any single rock type but instead tend to be associated with zones of sulfide veins or with sulfide-bearing skarn zones. High concentrations of silver, arsenic, copper, and zinc and in some cases of lead, mercury, and antimony are found in zones of high gold contents, though not necessarily in the same samples as those with high concentrations of gold. Spearman rank correlation coefficients given in table 5 for the quantitative data show that gold has a high correlation with silver and arsenic and a moderate correlation with copper and zinc. Correlation coefficients based on the quantitative analyses are considered more useful than those from the semiquantitative data for showing associations with gold because of lower detection limits for some elements and less truncation of analytical data for others. Figure 5 shows the highly truncated distribution of gold, arsenic, and silver concentrations of the old data (table 2) and is to be compared with figure 6, which shows a more complete but decidedly skewed distribution of the newer data (table 3). The high association of gold with silver in the core samples would be expected from the fact that concentrations of gold are found in sulfide-rich zones. This association supports the findings from geochemical samples collected at the surface in and near the Indian Creek area northwest of the Tenabo area (fig. 1, 2), where surface samples show that gold and numerous base metals are distributed in the vicinity of silver mines.

The geochemical association of gold with silver and several base metals in the core indicates an origin different from that of the Gold Acres deposit. Low values for correlations of gold with mercury and antimony together with high and moderate correlation values of gold with silver, arsenic, copper, and zinc at USGS No. 1 indicate that gold deposition originated not under conditions commonly found at disseminated gold deposits, which involve the gold suite of arsenic, antimony, mercury, and thallium, but

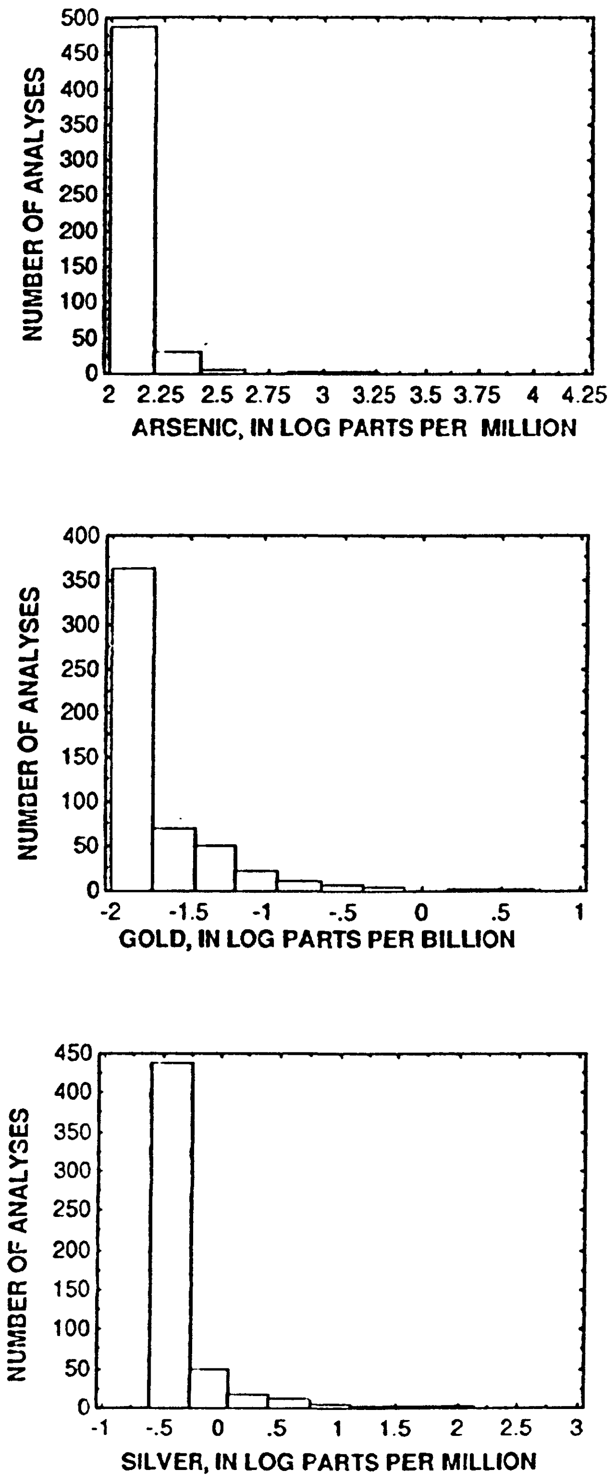


Figure 5. Frequency distribution of arsenic, gold, and silver in samples from USGS No. 1 based on the log of data of table 2 transformed to base 10. Concentrations reported as "less than" and "greater than" were replaced by numerical values before calculating the log of the data, as discussed in the text.

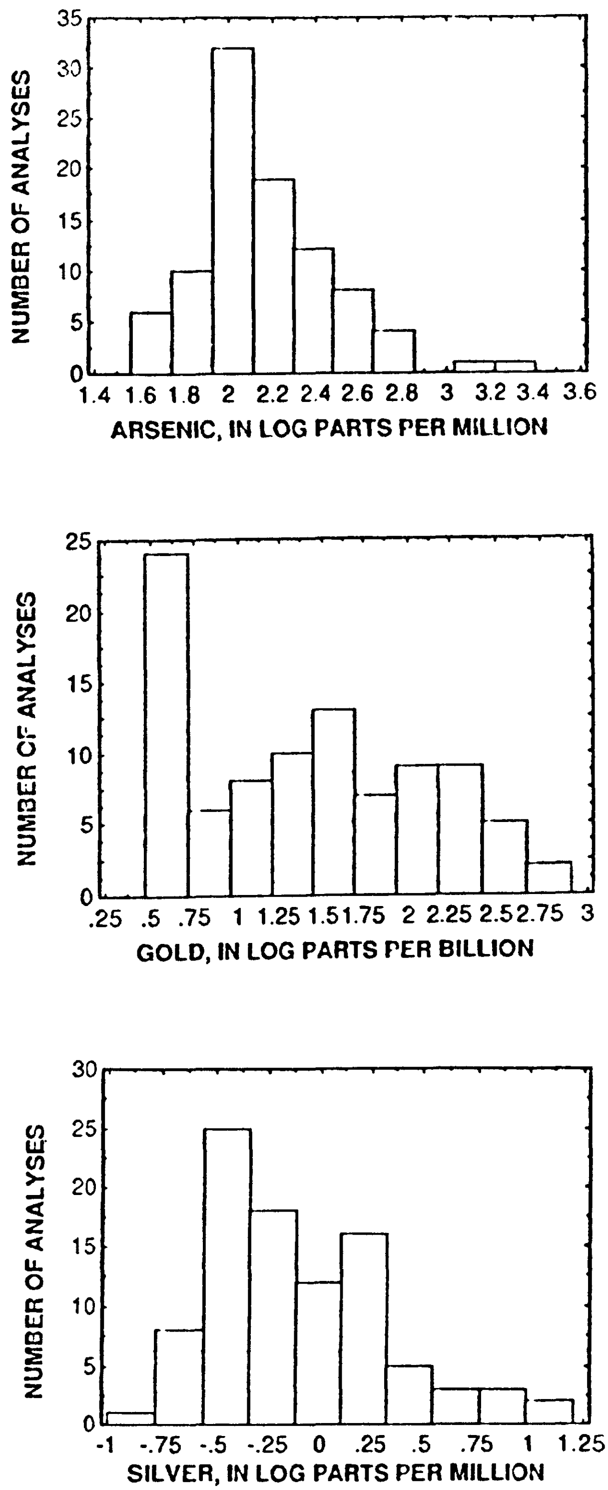


Figure 6. Frequency distribution of arsenic, gold, and silver in samples from USGS No. 1 based on the log of data of table 7 transformed to base 10.

instead was the result of silver-base-metal mineralization. Geochemically and lithologically the gold-bearing rocks at USGS No. 1 closely resemble intrusion-related distal skarn deposits of Sillitoe (1991).

The concentration of gold in core from USGS No. 1 generally is low compared to that of bulk-minable precious metal deposits in the western U.S. As mentioned earlier, gold contents reported in table 3 are from samples collected mainly in parts of the core known from data obtained earlier and reported in table 2 to have concentrations of gold. Statistical calculations performed on the data for gold in table 3 and summarized in table 6 show that despite a maximum value of 657 ppb, the median value is only 27 ppb and the geometric mean is about 25 ppb. For comparison, Bohnam (1985) reported that economic recovery of gold using heap-leaching techniques required ores containing gold contents of at least 2,000 ppb (0.06 troy oz/ton). Ore grade at the relatively high-grade bulk-minable ore body at Carlin, Nevada, is 18,000 ppb (Bonham, 1985). However, USGS No. 1 was drilled for geologic information at a site choosen not for the abundance of elements or the search for ore but, as discussed earlier, for its structural setting.

Copper, Chromium, Molybdenum, and Nickel

Data in table 5 show that chromium, copper, molybdenum , and nickel have moderate to strong correlation with one another. Stong correlation is shown between the pairs chromium-molybdenum, copper-chromium, copper-molybdenum, and molybdenum-nickel. The strongest correlation is of molybdenum-nickel at 0.75. Data from table 4 suggest that vanadium, not reported in table 5, is geochemically associated with this suite because it has moderate to strong correlations with all elements in it. The strongest correlations shown in table 4 are 0.611 for molybdenum-nickel, 0.692 for molybdenum-vanadium, and 0.767 for nickel-vanadium. Data in table 4 also suggest a moderate to strong correlation of cobalt with the copper-chromium-molybdenum-nickel suite, but this association is not confirmed in table 5, possibly because of the smaller data set than that used for table 4.

The elements in the chromium-copper-molybdenum-nickel suite are those enriched in black shales (Vine and Tourtelot, 1970; Huyck, 1990) and, with the exception of chromium, in deep-sea clays (Turekian and Wedepohl, 1961), as are many other trace elements, probably as a result of ionic substitution in clays and adsorption in organic matter (Krauskopf, 1979, p. 482). The abundance of black siliceous mudstone and its metamorphic equivalent in the core likely is one reason for the presence of this suite in samples from Drill Hole No 1. These elements also are enriched in basalt compared to crustal averages (Taylor, 1964). Studies have shown that deep-sea clays in the equatorial Pacific contain abundant products of oceanic volcanism, andesitic and basaltic (Heath, 1969); therefore, mudstone such as that in the Roberts Mountains allochthon would be expected to contain a significant component of basaltic origin. Moreover, basalt flows and pillows are present in the allochthon.

Another reason for the association of chromium, copper, molybdenum, and nickel in material from USGS No. 1 is that, as discussed earlier, they correlate with elements found with gold or elements associated with gold. Each element in the chromium-copper-molybdenum-nickel suite correlates with silver, and copper, molybdenum, and nickel also correlate with arsenic. The nonormal distribution of chromium, copper, molybdenum, and nickel and the hint of a dual population of copper and molybdenum (fig. 7) further suggest a multiple origin for elements of the suite.

Antimony, Arsenic, Copper,Lead, Mercury, and Zinc

Spearman rank correlations reveal that antimony, arsenic, copper, mercury, and zinc do not all have moderate to strong correlation coefficients with one another (table. 5), but the moderate to strong association of many pairs of these elements is suggestive that the suite is linked gechemically. Most show strong to moderate associations with silver, and some, as noted earlier, correlate with gold. Chromium, molybdenum, and nickel could be considered part of this suite as they have moderate correlation with silver, and some correlate with other elements in the antimony-arsenic-copper-mercury-zinc suite. Probably, most of the elements in the suite are found in sulfide minerals, though no special study of the sulfides was conducted in the examination of the drill core. The principal sulfide minerals, mentioned earlier, identified in the core are pyrite, galena, and sphalerite, and also present are secondary green copper stains.

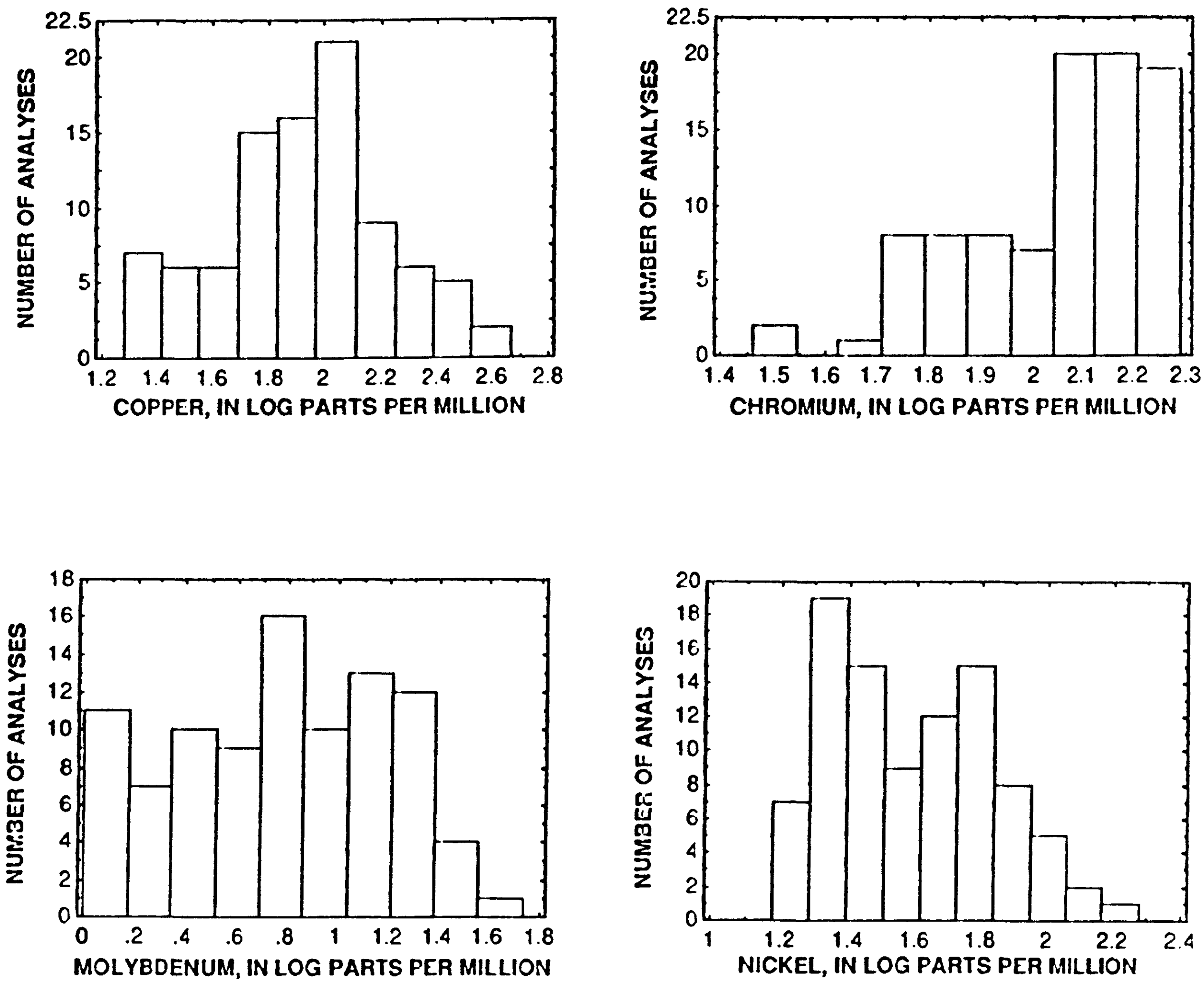


Figure 7. Frequence distribution of copper, chromium, molybdenum, and nickel in samples from USGS No. 1 based on the log of data of table 7 transformed to base 10.

REFERENCES

Armbrustmacher, T. J., and Wrucke, C.T., 1978, The disseminated gold deposit at Gold Acres, Lander County Nevada, *in*, Lovering, T.G., and McCarthy, J.H., Jr., eds, Conceptual models in exploration geochemistry: Journal of Geochemical Exploration, v. 9, p. 195-203.

Bagby, W.C., and Berger, B.R., 1985, Geologic characteristics of sediment-hosted, disseminated precious-metal deposits in the western United States, *in*, Berger, B.R., and Bethke, P.M., eds., Geology and geochemistry of epithermal systems: Society of Economic Geologists, Reviews in Economic Geology, vol. 2, p. 169-202.

Berger, B.R., 1986, Descriptive model of carbonate-hosted Au-Ag, *in*, Cox, D.P, and Singer, D.A., eds., Mineral deposit models: U.S. Geological Survey Bulletin 1693, p.175.

Berger, B.R., and Bagby, W.C., 1991, The geology and origin of Carlin-type gold deposits, *in*, Foster, R.P., ed., Gold metallogeny and exploration: Glasgow, Blackie, p. 210-248.

Bonham, H.F., Jr., 1985, Characteristics of bulk-minable gold-silver deposits in Cordilleran and island-arc settings, *in*, Tooker, E.W., Geologic characteristics of sediment- and volcanic-hosted disseminated gold deposits--Search for an occurrence model: U.S. Geological Survey Bulletin 1649, p. 71-77.

Burchfiel, B.C., and Royden, L.H., 1991, Antler orogeny: A Mediterranean-type orogeny: Geology, v. 19, p. 66-69.

Cox, D.P., and Singer, D.A., 1990, Descriptive and grade-tonnage models for distal disseminated Ag-Au deposits: A supplement to U.S. Geological Survey Bulletin 1693: U.S. Geological Survey Open-File Report 90-282, 7 p.

Davis, J.C., 1986, Statistics and data analysis in geology: New York, John Wiley, 646 p.

Desrochers, G.J., 1984, Geology of part of the Hilltop district, Lander County, Nevada: Reno, University of Nevada M.S. thesis, 96 p.

Emmons, W.H., 1910, A reconnaissance of some mining camps in Elko, Lander, and Eureka Counties, Nevada: U.S. Geological Survey Bulletin 408, 130 p.

Gilluly, James, and Gates, Olcott, 1965, Tectonic and igneous geology of the northern Shoshone Range, Nevada: U.S. Geological Survey Professional Paper 465, 153 p.

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

Hays, R.C., Jr., and Foo, S.T., 1991, Geology and mineralization of the Gold Acres deposit, Lander County, Nevada, *in*, Raines, G.L., Lisle, R.E., Schafer, R.W., and Wilkinson, W.H., eds., Geology and ore deposits of the Great Basin, vol. 2: Geological Society of Nevada, p. 677-685.

Heath, G.R., 1969, Mineralogy of Cenozoic deep-sea sediments from the equatorial Pacific Ocean: Geological Society of America, v. 80, p, 1997-2018.

Huyck, H.L.O., 1990, When is a metalliferous black shale not a black shale? *in*, Grauch, R.I., and Huyck, H.L.O., Metalliferous black shales and related ore deposits--Proceedings, 1989 United States Working Group Meeting, International Geological Correlation Program Project 254: U.S. Geological Survey Circular 1058, p. 42-56.

Jones, D.L., Wrucke, C.T., Holdsworth, Brian, and Suczek, C.A. 1978, Revised ages of chert in the Roberts Mountains allochthon, northern Nevada [abs.]: Geological Society of America Abstracts with Programs, v. 10, no. 3, p. 111.

Krauskopf, K.B., 1979, Introduction to geochemistry, Second edition: New York, McGraw-Hill, 617 p.

Lincoln, F.C., 1923, Mining districts and mineral resources of Nevada: Reno, Nevada Newsletter Publishing Company, 295 p.

Madden-McGuire, D.J., 1990, Stratigraphy of the limestone-bearing part of the Lower Cambrian to Lower Ordovician Preble Formation near its type locality, Humbolt County, north-central Nevada: *in*, Raines, G.L., Lisle, R.E., Schafer, R.W., and Wilkinson, W.H., eds., Geology and ore deposits of the Great Basin, v 2: Geological Society of Nevada, p. 875-893.

Madden-McGuire, D.J., and Marsh, S.P., 1991, Lower Paleozoic host rocks in the Getchell gold belt: Several distinct allochthons or a sequence of continuous sedimentation?: Geology, v. 19, p. 489-492.

Madrid, R.J., Poole, F.G., and Wrucke, C.T., (1991), Rocks of the Antler orogen--the Roberts Mountains allochthon, in, Chapter 3, Latest Precambrian to latest Devonian time: Development of a continental margin, *in*, Burchfiel, B.C., and Lipman, P.W., eds., Cordilleran orogen: Conterminous U.S.: Geological Society of America Geology of North America Synthesis Volume G3 (in press).

McKee, E.H., and Silberman, M.L., 1970, Geochronology of Tertiary igneous rocks in central Nevada: Geological Society of America Bulletin, v. 81, p. 2317-2328.

Morrissey, F.R., 1968, Turquoise deposits of Nevada: Nevada Bureau of Mines Report 17, 30 p.

Roberts, R.J., 1966, Metallogenic provinces and mineral belts in Nevada: Nevada Bureau of Mines Report 13, Part A, p. 47-72.

Romberger, S.B., 1986, Ore deposits; No. 9, Disseminated Gold deposits: Geoscience Canada, v. 13, p. 23-31.

Rytuba, J.J., 1985, Development of disseminated gold deposits of Cortez, Horse Canyon, and Gold Acres, Nevada, at the end stage of caldera-related volcanism [abs.], *in* , Kraft, Kathleen, ed., USGS research on mineral resources--1985, Program and abstracts: U.S. Geological Survey Circular 949, p. 47.

Seedorff, Eric, 1991, Magmatism, extension, and ore deposits of Eocene to Holocene age in the Great Basin--Mutual effects and preliminary proposed genetic relationships, *in*, Raines, G.L., Lisle, R.E., and Wilkinson, W.H., Geology and ore deposits in the Great Basin, v. 1: Geological Society of Nevada, p. 133-178.

Silberman, M.L., and McKee, E.H., 1971, K-Ar ages of granitic plutons in north-central Nevada: Isochron/West, no. 71-1, p. 15-32.

Sillitoe, R.H., 1991, Intrusion-related gold deposits, *in*, Foster, R.P., ed., Gold metallogeny and exploration; Glascow, Blackie, p. 165-209.

Speed, R.C., and Sleep, N.H., 1982, Antler orogeny and foreland basin: A model: Geological Society of America Bulletin,v. 93, p. 815-828.

Stager, H.K., 1977, Mineral Deposits, *in*, Geology and mineral deposits of Lander County, Nevada: Nevada Bureau of Mines and Geology Bulletin 88, p. 60-99.

Taylor, S.R., 1964, Abundance of chemical elements in the continental crust: a new table: Geochim et Cosmochim Acta, v. 29, p. 1273-1285.

Theodore, T.G., and Roberts, R.J., 1971, Geochemistry and geology of deep drill holes at Iron Canyon, Lander County, Nevada: U.S. Geological Survey Bulletin 1318, 32 p.

Tooker, E.W., 1985, Discussion of the disseminated-gold-ore-occurrence model, *in*, Tooker, E.W., ed., Geologic characteristics of sediment-and volcanic-hosted disseminated gold deposits--search for an occurrence model: U.S. Geological Survey Bulletin 1646, p. 107-149.

Thompson, C.E., Nakagawa, H.M., and VanSickle, G.H., 1968, Rapid analysis for gold in geologic materials, *in* , Geological Survey Research 1968: U.S. Geological Survey Professional Paper 600-B, p. B130-B132.

Thorman, C.H., and Christensen, O.D., 1991, Geologic settings of gold deposits in the Great Basin, western United States, in Ladeira, E.A., ed., Brazil Gold '91, The economics, geology, geochemistry, and genesis of gold deposits: Rotterdam, Balkema, p.65-75.

Tooker, E.W., 1985, Geologic characteristics of sediment- and volcanic-hosted disseminated gold deposits--Search for an occurrence model: U.S. Geological Survey Bulletin 1646, 150 p.

Turekian, K.K., and Wedepohl, K.H., 1961, Distribution of the elements in some major units of the earth's crust: Geological Society of America, v. 72, p. 175-192.

Vanderburg, W.O., 1939, Reconnaissance of mining districts in Lander County, Nevada: U.S., Bureau of Miners Information Circular IC-7043, 83 p.

Vaughn, W.W., and McCarthy, J.H., Jr., 1964, An instrumental technique for the determination of submicrogram concentrations of mercury in soils, rocks, and gas, *in* , Geological Survey Research 1964: U.S. Geological Survey Professional Paper 501-D, p. D123-127.

Vine, J.D., and Tourtelot, D.B., 1970, Geochemistry of black shales--A summary report: Economic Geology, v. 65, p. 253-272.

Ward, F.N., Lakin, H.W., Canney, F.C., and others, 1963, Analytical methods used in geochemical exploration by the U.S. Geological Survey: U.S. Geological Survey Bulletin 1152, 100 p.

Wrucke, C.T., 1974, Geologic map of the Gold Acres-Tenabo area, Shoshone Range, Lander County, Nevada: U.S. Geological Survey Miscellaneous Field Studies Map MF-647, Scale 1:15,840.

_____, 1975, Lithology and chemical analyses of core and cuttings from USGS drill hole near Gold Acres, Lander County, Nevada: U.S. Geological Survey Open-File Report 75-363, 28 p.

Wrucke , C.T., and Armbrustmacher, T.J., 1969, Structural controls of the gold deposit at the open-pit mine, Gold Acres, Lander County, Nevada [abs.]: Geological Society of America Abstracts with Programs, pt. 3, p. 62.

_____, 1973, Geochemical analyses of bedrock samples collected in the Gold Acres and Tenabo areas, northern Shoshone Range, Nevada: National Technical Information Service, PB-220645, 132 p.

_____, 1975, Geochemical and geologic relations of gold and other elements at the Gold Acres Open-Pit Mine, Lander County, Nevada: U.S. Geological Survey Professional Paper 860, 27 p.

Wrucke, C.T., Armbrustmacher, T.J., and Hessin, T.D., 1968, Distribution of gold, silver, and other metals near Gold Acres and Tenabo, Lander County, Nevada: U.S. Geological Survey Circular 589, 19 p.

Wrucke, C.T., Churkin, Michael, Jr., and Heropoulos, Chris, 1978, Deep-sea origin of Ordovician pillow basalt and associated sedimentary rocks, northern Nevada: Geological Society of America Bulletin, v. 89, p. 1272-1280.

Wrucke, C.T., and Silberman, 1975, Cauldron subsidence of Oligocene age at Mount Lewis, northern Shoshone Range, Nevada: U.S. Geological Survey Professional Paper 876, 20 p.

_____, 1977, Cauldron subsidence of Oligocene age at Mount Lewis, Shoshone Range, Nevada--A reasonable interpretation: U.S. Geological Survey Journal of Research, v. 5, no. 3, p. 331-335.

Table 1. Lithologic Log of USGS No. 1 drill hole.

[Log by D.M. Cole, C.T. Wrucke, and Charles Zimmerman, July 1989, using some information from unpublished log made by T.J. Armbrustmacher and C.T. Wrucke, July-August, 1967]

DEPTH IN FEET	LITHOLOGY	
0-30	Alluvium	
30-127	Chert, black, brecciated	
127-169.5	Chert, light gray and medium dark gray. Local abundant pyrite	
	127-139.5	Abundant carbon on fracture surfaces. Abundant disseminated pyrite
169.5-187	Chert, light gray with chlorite on fracture surfaces. Black sulfides locally oxidized to hematite in fine veinlets. Coarse-grained pyrite in a few fractures. Jarosite abundant in microfractures and abundant chlorite(?) on slip surfaces	
187-207.5	Siliceous mudstone and siltstone, both black. Abundant very fine grained pyrite disseminated and in numerous vienlets. Coarse-grained (diagenetic?) pyrite along bedding planes	
207.5-212.8	Chert, dark gray to black, locally brecciated. Pyrite is disseminated and in veinlets. Fracture surfaces coated with carbon	
212.8-257.8	Siliceous mudstone, light gray and black, partly calcareous in interval 226.4-232.9. Calcareous zones tend to be light gray. Contains abundant disseminated pyrite and pyrite in veinlets	
	245	Quartz-adularia-calcite vein 1 in wide
	252-257.8	Calcareous hydrothermal breccia containing sulfides in cross-cutting veins; associated argillic alteration
257.8-261.1	No core	

261.1-277.5	Siliceous mudstone, medium dark gray to black, laminated; approaches chert in hardness. Shows possible soft sedimentary deformation. Has en echelon step fractures. Abundant disseminated pyrite
277.5-302.7	Chert and siliceous mudstone. Chert is light gray and considerably more abundant than the mudstone, which is black. Some chert has abundant fine-grained disseminated pyrite. Pyrite and quartz-pyrite veinlets less than 1 mm wide in some chert beds. 281 Barite-quartz vugs containing sparse pyrite 288.7-292.6 Brecciated chert 292.6-302.7 Quartz-pyrite-adularia veins
302.7-399.7	Chert, light gray. Abundant disseminated pyrite and quartz-pyrite veinlets. Dark-blue-gray fracture coatings and greenish-gray (chlorite?) slip surfaces
399.7-428.7	Black siliceous mudstone and subordinate amounts of light-gray chert. Most of the chert is in the interval 400.3-406.2. Fine-grained disseminated pyrite abundant in some mudstone beds, rare in chert, but pyrite veins are abundant in chert. Carbon-rich slip surfaces abundant in mudstone, greenish-gray (chlorite?) slip surfaces in chert
428.7-486.4	Chert, light-gray with light-grayish-brown silty argillite beds about 1/2 in. thick. Locally brecciated. Pyrite locally abundant in veinlets. Some beds dip 40°-50° to core axis
486.4-496.1	Interbedded medium-gray chert and dark-gray to black siliceous mudstone. Beds average about 1 in. thick
496.1-500	Siltstone, dark grayish brown, interbedded with light-gray chert, both in beds about 1 in. thick

500-544.2	Dominantly light-grey chert but includes lesser amounts of dark-gray siliceous mudstone below 525.4. Pyrite generally sparse but a few veinlets present. Many carbon-rich slip surfaces
	522 Thin quartz-calcite-adularia vein
	524.4-540 A few quartz-adularia veins
544.2-606	Interbedded chert and siliceous mudstone. Chert is light to dark gray, mudstone is black. Chert-rich intervals commonly 9.2-16.3 ft thick, whereas mudstone generally dominant in intervals 1.5-10 ft thick. Disseminated pyrite abundant in some mudstone intervals. Carbon and clay on slip surfaces
	548 Quartz-galena-sphlarerite-pyrite-calcite veins 1 in. thick
	581-593 Beds 25°-60° to core axis
600-634	Chert, light gray, and minor siliceous argillite. Pyrite locally abundant in fractures, also calcite and clay. Some beds dip 30° or more to core axis
634-688	Interbedded chert and siliceous mudstone in which chert is slightly more abundant than mudstone. Chert is dominantly light gray, mudstone is black. Chert dominant in intervals as thick as 13 ft. Thickest mudstone intervals are 3 ft thick. Some mudstone in lower parts of the interval are slightly calcareous. Disseminated pyrite abundant in some intervals. Pyrite also locally abundant in veinlets. Some beds dip 30°-70° to core axis.
688-704	Interbedded siliceous mudstone and chert, with mudstone dominant. Mudstone is dark gray to black and mostly calcareous. Chert is light to medium gray. Lower 4 ft brecciated
704-735.3	Quartz porphyry, pale greenish pink to pale red, composed of quartz, potassium feldspar, sericitized plagioclase, and partly chloritized biotite phenocrysts in a fine-grained chalky to weakly propylitized matrix
735.3-737	Chert, dark gray with black carbonaceous laminations and pyrite veinlets

737-785.2	Siliceous mudstone, black, carbonaceous, laminated. Contains a few quartz-pyrite-calcite veinlets, some with adularia. Unit is calcareous in interval 766.8-777 and weakly calcareous below 784.5 ft	
	744-744.5	Calcareous siltstone
	745-746	Several quartz-sphalerite-galena-pyrite veins 3 in. thick
	778	Galena-sphalerite-pyrite veinlets, some containing adularia
785.2-927	Calcareous siltstone and silty limestone, medium to dark gray, laminated to thin bedded, in part noncalcareous. Contains 40 percent black, laminated siliceous mudstone in laminations and beds to 7 in. thick. Disseminated fine-grained pyrite abundant in some intervals. Dull greenish-gray to bluish-gray coatings on some slip surfaces. Carbon-coated slip planes abundant. Below 909 ft, a minor percentage of beds is medium dark brownish gray from metamorphism to hornfels	
927-947.5	Siliceous mudstone, medium dark gray, laminated. Brecciated in part; breccia is pyrite bearing and lacks carbon found in higher strata	
947.5-1,014.3	Chert, light gray, intensely fractured, pyrite bearing	
	963-963.1	Quartz-pyrite veinlets
	995	Sphalerite-arsenopyrite-chalcopyrite lenses as large as 0.3-1.5 in.
1,014.3-1,140	Chert, medium gray, laminated, interbedded with minor amounts of dark-gray to brownish- and greenish-gray hornfelsed siliceous mudstone. Hornfels is quartz-phlogopite-calcite rock	
	1073.5	Quartz-pyrite vein, 3 in. wide. Contains unidentified black sulfides and adularia. Has open spaces lined with quartz
	1080	Silicified hydrothermal breccia
1,157-1,169.5	Interbedded medium-gray to black laminated siliceous mudstone (60 percent), medium-gray laminated chert (30 percent), and dark-gray to black	

	laminated calcareous mudstone (10 percent). Calcareous mudstone at base of unit. Pyrite and marcasite in some fractures. Strata dip 45° to 70° to core axis
1,169.5-1,170	Light-gray to pale greenish-gray tremolite-calcite skarn (containing sphalerite) and fine-grained hornfels
1,170-1,176	Chert, light gray, interbedded with minor amounts of medium-gray siliceous mudstone and hornfels. Contains a few 1 in.-thick beds of skarns
1,176-1,202	Hornfels, medium gray to pale brownish gray, interbedded with minor light-gray chert and 10-20 percent medium-gray to pale-greenish-gray skarn. Pyrite generally sparsed but conspicuous in a few fracture planes, some with sphalerite
1,202-1,292	Hornfels, pinkish-gray to brown, coarse grained, in part silty and calcareous. Slip surfaces are dark waxy green
1,292-1,338.2	Hornfels, pale brownish and pinkish gray, interbedded with 10-15 percent greenish-gray skarn. Contains a few quartz-sphalerite-pyrite veins, some with minor jarosite. Dull greenish-blue coatings on slip planes
1,338-1,397	Chert, light gray, interbedded with siliceous, locally calcareous hornfels that is light gray near top of the unit, becoming purplish down section. Unit contains minor greenish-gray skarn. Contains minor amounts of disseminated pyrite that locally is conspicuous. Dull blue-green coating on fracture surfaces
1,397-1,444	Hornfels, pale greenish gray to purplish brownish gray and 10 percent greenish-gray skarn, which decreases in abundance down section. Skarn beds are as much as 4 in. thick. Pyrite generally sparse but abundant in some skarn beds

1,444-1,506	Chert, light to medium gray, with 3-5 percent purplish-brown hornfels and minor grayish-green skarn. Pyrite and marcasite common on some waxy green slip surfaces. Dull greenish-blue coating on many fractures		
1,506-1,591	Hornfels and chert as above but about equal amounts of each rock type. Minor amounts of skarn locally. Chert beds commonly 1/2-2 in. thick, hornfels 1/8-1 in. thick. Dull greenish-blue coatings on fracture surfaces. Pyrite sparse		
		1,533	Quartz vein 2 in. thick
		1,553-1,555	Pyrite-bearing laminations, breccia zones, and stockworks of micro veins
		1,563	Adularia vein
1,591-1,787	Chert, light gray, interbedded with 5 percent purplish-brown hornfels and a few thin beds of grayish-green skarn		
		1,601-1,651	Local stockwork of black micro veins
		1,671-1,684	Stockwork as above. Some pyrite-bearing breccia zones
		1,695-1,696	Black hornfels, very fine grained. Contains disseminated pyrite and pyrite in veinlets
		1,702-1,727	Local micro stockwork and conspicuous blue coating on fracture surfaces
1,787-1,841	Hornfels, pinkish purplish brown (80-85 percent); chert, light gray 15-20 percent); and skarn, pale brownish-gray to pale greenish gray (5 percent)		
		1,789	White quartz vein 2 in. thick containing small amounts of sulfides
		1,792	Quartz vein as above
1,841-1,886	Chert, light gray, containing a few beds of skarn about 2 in. thick. Some with sulfides and some with adularia		

	1,845.2-1,849	Zone of fractures, some containing pyrite, galena, and possibly other sulfides
	1,883-1,886	Weakly argillized and bleached along fractures
1,886-1,948	Chert, light gray, interlayered with 5-10 percent purplish-brown hornfels and a few layers of skarn 1-2 in. thick. Dark-green coating on some slip surfaces	
	1,911-1,911.5	Spotted hornfels
	1,931-1,933	Light-green vuggy calcite vein and brecciated skarn
	1,943-1948	Mostly hornfels
1,948-1,959	Hornfels, pinkish purple (50 percent), and skarn, grayish green (50 percent)	
1,959-1,979	Chert, light gray, with 5 percent or less pinkish-purple hornfels	
1,979-1,985	Hornfels, pinkish purple, and minor amounts of skarn	
1,985-2,102	Chert, light gray (95 percent) and hornfels, pinkish purple (5 percent)	
	1,994-2,007	Sulfides, including pyrite and sphalerite, abundant in numerous veins
	2,024-2,025	Spotted hornfels
	2,029-2,038	Chert breccia containing pyrite
	2,073-2,081	Brecciated chert and hornfels containing pyrite and sphalerite
2,102-2,209	Interlayered chert, hornfels, and minor amounts of skarn. Chert is light gray and is the dominant rock in intervals as thick as 40 ft. Hornfels, pinkish purple, is the major rock in intervals commonly 7-10 ft thick	
	2,130-2,134	Brecciated chert containing abundant pyrite in stockwork
	2,170-2,172	Stockwork of sulfides in microveins
	2,175	Quartz vein 6 in. wide
	2,180-2,195	Stockwork of black sulfides in microveins

2,209-2,242	Hornfels, pinkish purple (50 percent), interlayered with skarn, grayish green (50 percent)
2,242-2,450.5	Mostly chert, light gray, with a few intervals 4-15 ft thick dominantly of pinkish-purple hornfels and sparse intervals 2-4 in. thick of greenish-gray skarn. Greenish-blue coating on fractures locally conspicuous
	2,345 Sphalerite-pyrite vein 2 in. thick
	2,422 Quartz-sphalerite-pyrite vein 6 in. thick
2,450.5-2,455	Lamprophyre, dark greenish black, fine grained
2,455-2,484.5	Chert and hornfels as above. Interval is 90 percent chert, 10 percent hornfels
2,484.5-2,518.5	Skarn, greenish gray, calcareous, diopside(?)-bearing, and 20 percent interlayered pinkish-purple skarn. Pyrrhotite and pyrite on fracture surfaces and disseminated thoughout interval. Dark-blue coating on slip surfaces
2518.5-2622.5	Hornfels, dominantly pinkish purple or deep reddish brown but some is medium dark gray. Has strong deformational fabric from unit having been crushed into phacoids commonly 0.1-0.5 in thick and later brecciated. Abundant pyrite and marcasite(?) in fractures that are coated with a dark-green waxy mineral
	2,586.5-2,587 Green skarn containing 20 percent pyrite
	2,610 Grayish-blue coating on fracture surfaces
2,622.5-2,626.5	Chert, light gray with abundant pyrite
2,626.5-2,628	Lamprophyre as above
2,628-2,653	Chert, light gray with grayish-purple hornfels in minor amounts but increasing in abundance toward bottom of interval
	2,649-2,651 Tremolite skarn, coarse grained

2,653-2,706	Hornfels, grayish purple and minor amounts of interlayered greenish-gray skarn
	2,667-2,669 Abundant disseminated and fracture-controlled pyrrhotite
	2,669.5-2,673.5 Dark-gray spotted hornfels
2,707-2,710	Granodiorite, medium gray to white with feldspar phenocrysts several millimeters across in fine-grained matrix. Groundmass weakly propylitized. May be endoskarn. Much fine-grained pyrite in the groundmass and in veinlets
2,710-2,731	Hornfels, pinkish purple, green and chloritic near intrusive rocks above and below
2,731-2,734	Lamprophyre, dark gray to black, very fine grained, with calcite clots and pyroxene phenocrysts
2,734-2,766.8	Hornfels, greenish purple to medium gray, mostly brecciated. Chloritic and serpentinized in part
	2,762.5-2,766.8 Intensely brecciated skarn
2,766.8-2,776	Chert and hornfels in about equal amounts. Chert is light gray, hornfels is light grayish green to pale brownish gray and calcareous. Intensely deformed into phacoids and locally brecciated.
2,776-2,938	Hornfels, light gray, dark purplish gray, light brown, and dark grayish green. Greenish variety is calcareous and grades into skarn present in minor amounts. Locally intensely deformed into phacoids and brecciated
	2,862-2,874 Quartz-diopside-tremolite skarn containing minor amounts of pyrite
	2,865-2898.5 Sulfide blebs 2 mm across in calcareous hornfels
	2,924 Skarn zone 5 in. thick with abundant pyrrhotite and pyrite
2,938	Roberts Mountains thrust. Contact is sharp. Overlying rocks extensively deformed as noted above

2,938-2,961	Marble, light to dark gray, containing greenish-gray diopside-rich skarn in upper part and minor amounts of deep pinkish-purple hornfels in lower part 2,946 Abundant disseminated pyrrhotite
2,961-2,979	Quartz-plagioclase (granodiorite?) porphyry, medium gray consisting of quartz and intensely altered plagioclase phenocrysts in a microgranitic groundmass. Most groundmass feldspar is altered to white mica and clay(?). Converted to tremolite- and vesuvianite-bearing endoskarn near contacts. Contains pyrrhotite, disseminated and in thin veins
2,979-2,986	Skarn, light to medum gray and greenish gray. Contains abundant pyrrhotite, disseminated and in veins
2,986-2,990	Quartz-plagioclase porphyry as above
2,990-2,996	Skarn, gray to brownish green, diopside rich, containing minor amounts of quartz and calcite. Some varieties contain minor amounts of red-brown garnet. Fine to very fine grained. Pyrite-bearing
2,996-3,017	Hornfels and interlayered skarn. Hornfels in pale pinkish gray, fine-grained diopside-bearing quartz-rich rock that is weakly laminated and possibly cross laminated. Protolith was calcareous, partly dolomitic siltstone. Skarn is diopsidic and is dominant in unit above 3,009 ft. Contains disseminated pyrite
3,017-3,021.5	Endoskarn formed from quartz-feldspar porphyry. Feldspar phenocrysts are intensely altered. Some were plagioclase. Some former phenocrysts and the quartz-rich groundmass contain abundant zoisite and vesuvianite and less abundant calcite
3,021.5-3,041	Interbedded hornfels and skarn as in interval 2,996-3,017. Some hornfels is tremolite-bearing former calcareous siltstone

3,041-3,074.5	Marble, dark gray, fine grained. Contains a few zones of diopside and tremolite-rich skarn, some garnet bearing, as much as 2 ft thick. Has small percentage of pyrrhotite, disseminated and in veins
	3,059.5-3,063 Cataclastic zone containing a few 1-in.-thick zones of quartz-plagioclase porphyry
3,074.5-3,155.5	Limestone largely converted to tremolite-diopside skarn, light to dark gray. Dark-gray hues are carbon-rich zones
3,155.5-3,173.4	Lamprophyre, dark grayish green to black, fine grained, fairly fresh rock consisting of plagioclase, brown hornblende, augite, and minor chlorite
3,173.4-3,225.5	Marble and tremolitic limestone, light to medium bluish gray, laminated. Fine laminations contorted from possible soft-sediment deformation below 3,200 ft. Some bleached zones as much as 2 ft thick. Metamorphic effects appear to decrease downunit, but, as suggested by thin sections of rocks from lower intervals, much of the unit probably contains fine-grained tremolite. Contains undeformed to highly deformed calcite veins as wide as 2 in. Carbon-rich slip surfaces commonly parallel to bedding
3,225.5-3,244	Lamprophyre as above
3,244-3,247	Marble as above
3,247-3,250.5	Lamprophyre as above
3,250.5-3,289	Marble, medium to dark gray, fine grained, silty. Laminations suggest soft-sediment deformation
3,289-3,292	Lamprophyre as above
3,292-3,355	Tremolitic limestone and skarn, medium to dark bluish gray, laminated. Contains abundant calcite veinlets
	3,329 Folded limestone
	3,340 Calcareous hornfels 6 in. thick

3,355-3,397	Recrystallized limestone and skarn. Limestone is medium bluish gray and fine grained. Skarn is light gray, fine grained diopside rock locally containing garnets and sulfides. Skarn is concentrated above 3,364 ft and below 3,377-ft
3,397-3,407	Granodiorite(?) porphyry partly converted to endoskarn, light gray, with abundant seriate euhedral plagioclase phenocrysts 0.5-1 mm across partly converted to tremolite and vesuvianite in an argillically altered fine-grained matrix. Contains abundant disseminated pyrrhotite and tremolite from endoskarn
3,407-3,471	Recrystallized limestone and skarn as above. Some skarn is very fine grained quartz-calcite-tremolite rock
3,471-3,476	Granodiorite porphyry, medium to light gray, hornblende bearing, partly converted to endoskarn in which original plagioclase phenocrysts are replaced in part by vesuvianite and the partly argillized groundmass contains small amounts of calcite. Contains 3-5 percent disseminated pyrrhotite
3,476-3,491	Metalimestone and skarn similar to rock in interval 3,355-3,397. Metalimestone is medium to dark gray and laminated. Skarn is light gray and variable in abundance in intervals 6 ft thick or less. Contains abundant calcite veins less than 2 mm thick. Disseminated pyrrhotite not abundant. Laminations locally parallel axis of core
3,491-3,879	Metalimestone and small amounts of marble. Metalimestone is medium to dark gray, fine grained and rich in carbon. Contains fine-grained tremolite and possibly diopside. Small amounts of scapolite identified at 3,572. Marble is medium gray and medium to coarse grained
3,879-3,893	Skarn, light to medium gray. Consists of medium-grained tremolite in matrix of fine-grained recrystallized calcite

3,893-3,930	Metalimestone, medium to dark gray and black, fine grained, laminated to medium bedded, contains abundant carbon. Some beds are silty. Contains abundant tremolite. Only small amounts of calcite remain. Has minor amounts of disseminated pyrrhotite.
3,930-3,996	Metasiliceous mudstone and silty mudstone, medium dark gray, laminated, containing a few beds of medium-gray metalimestone commonly 2-3 in. thick but as thick as 2 ft. Mudstone consists of very fine grained phlogopite, with local concentrations of tremolite. Scattered silt grains in some layers. Some mudstone is calcareous. Unit is highly deformed into phacoids that measure a few millimeters to several inches in length. Shear zones between phacoids are black from carbon. Could be a fluidized mudflow or, more likely, tectonically deformed mudstone. Contains minor amounts of disseminated pyrrhotite. Marcasite in shear zones and in tremolite-rich zones
3,996	Bottom of hole

Table 2. Chemical analyses made in 1967 of core samples from USGS drill hole no. 1.

[Analyses by U.S. Geological Survey. Gold determined by atomic absorption spectrophotometry (Thompson and others, 1968), mercury by an atomic absorption technique outlined by Vaugh and McCarthy (1964), and all other elements by a semiquantitative spectrographic method (Ward and others, 1963; Grimes and Marranzino, 1968). Results of semiquantative analysis reported in the series 1,0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. Parts-per-million detection limits shown in parantheses: Au (0.02), Ag (.5), As (200), B (10), Ba (5), Be (1), Bi (10), Cd (20), Co (5), Cr (5), Cu (2), Hg (0.01), La (20), Mn (10), Mo (5), Nb (10), Ni (5), Pb (10), Sb (100), Sc (5), Sn (10), Sr (100), V (10), W (50), Y (10), Zn (200), Zr (10). -- not determined. * duplicate analysis.]

	Analyses (parts per million)													
Depth Interval (feet)	Au	Ag	As	B	Ba	Be	Bi	Cd	Co	Cr	Cu	Hg	La	Mn
169.5-171	<0.02	<0.5	<200	10	1000	1	<10	<20	<5	15	20	0.1	<20	200
171-173	<0.02	<0.5	<200	10	300	<1	<10	<20	<5	<10	10	0.1	<20	100
174-177	<0.02	<0.5	<200	10	1500	<1	<10	<20	5	20	15	0.04	<20	100
178-180	<0.02	<0.5	<200	10	300	<1	<10	<20	<5	10	15	<0.01	<20	300
180-187	<0.02	<0.5	<200	<10	1000	<1	<10	<20	5	50	15	0.02	<20	100
187-188	<0.02	<0.5	<200	10	1000	<1	<10	<20	5	50	30	0.03	<20	100
189-191	<0.02	<0.5	<200	100	1500	1	<10	<20	5	30	50	<0.01	<20	200
191-196	<0.02	<0.5	<200	20	700	<1	<10	<20	5	20	50	0.03	20	1000
197-199	<0.02	0.5	<200	100	1500	1.5	<10	<20	10	50	100	<0.01	20	300
199-202	<0.02	<0.5	<200	50	1000	<1	<10	<20	5	50	20	0.58	<20	200
202-205	<0.02	<0.5	<200	150	3000	<1	<10	<20	5	100	100	0.04	20	1000
205-207	<0.02	<0.5	<200	15	2000	<1	<10	<20	5	100	50	<0.01	<20	3000
207-209	<0.02	<0.5	<200	20	1000	<1	<10	<20	<5	15	10	0.03	<20	100
209-212	<0.02	<0.5	<200	20	1000	<1	<10	<20	5	15	50	<0.01	<20	300
213-214	<0.02	<0.5	<200	50	1000	<1	<10	<20	5	50	70	0.03	20	1000

Depth Interval (feet)	Au	Ag	As	B	Ba	Be	Bi	Cd	Co	Cr	Cu	Hg	La	Mn
215-217	<0.02	<0.5	<200	100	2000	1	<10	<20	10	100	70	0.02	20	300
217-219	<0.02	<0.5	<200	100	2000	1.5	<10	<20	5	70	70	0.03	30	300
219-226	<0.02	<0.5	<200	150	2000	2	<10	<20	10	100	100	<0.01	50	500
226-232	<0.02	<0.5	<200	50	1000	1	<10	<20	5	100	70	0.13	20	1000
233-235	<0.02	<0.5	<200	100	1500	1	<10	<20	20	150	70	0.03	20	500
236-239	<0.02	<0.5	<200	70	2000	1.5	<10	<20	5	100	70	0.10	20	300
240-241	<0.02	<0.5	<200	100	2000	1	<10	<20	5	100	70	0.17	20	500
242-244	<0.02	<0.5	<200	300	1500	<1	<10	<20	5	100	70	0.10	<20	700
245-247	<0.02	<0.5	<200	100	1500	<1	<10	<20	5	150	50	0.03	20	1000
248-257	<0.02	<0.5	<200	10	3000	<1	<10	<20	<5	30	100	0.03	<20	1000
261-275	<0.02	<0.5	<200	50	2000	1	<10	<20	5	150	70	0.06	<20	200
275-277	<0.02	<0.5	<200	70	3000	1	<10	<20	5	50	50	0.01	<20	100
278-282	<0.02	<0.5	<200	<10	1500	<1	<10	<20	<5	<10	20	0.01	<20	1000
282-284	<0.02	<0.5	<200	20	2000	<1	<10	<20	<5	50	70	0.02	<20	1000
284-288	<0.02	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	0.12	- -	- -
289-292	<0.02	<0.5	<200	20	1500	1	<10	<20	7	30	30	0.09	<20	1500
292-295	<0.02	<0.5	<200	15	1000	<1	<10	<20	<5	20	10	0.01	<20	1000
296-298	<0.02	<0.5	<200	10	1500	<1	<10	<20	5	15	20	0.02	<20	1000
296-298*	- -	<0.5	<200	50	3000	2	<10	<20	15	100	20	- -	20	300
298-302	<0.02	<0.5	<200	20	1500	1	<10	<20	10	70	20	0.30	<20	300
303-307	<0.02	<0.5	<200	10	1500	<1	<10	<20	<5	20	15	0.06	<20	1000
307-311	<0.02	<0.5	<200	10	700	<1	<10	<20	<5	15	10	0.06	<20	200
312-314	<0.02	<0.5	<200	<10	700	<1	<10	<20	<5	15	15	0.11	<20	300
314-316	<0.02	<0.5	<200	10	500	<1	<10	<20	<5	10	15	0.03	<20	150
316-322	<0.02	<0.5	<200	<10	200	<1	<10	<20	<5	<10	7	0.08	<20	70

Depth Interval (feet)	Au	Ag	As	B	Ba	Be	Bi	Cd	Co	Cr	Cu	Hg	La	Mn
325-327	<0.02	<0.5	<200	10	1000	<1	<10	<20	<5	10	20	0.06	<20	100
327-329	<0.02	<0.5	200	15	700	<1	<10	<20	5	20	15	0.05	<20	200
330-334	<0.02	<0.5	200	20	1000	1	<10	<20	5	20	10	0.08	20	500
334-336	<0.02	<0.5	<200	10	700	<1	<10	<20	5	20	15	0.04	<20	70
336-338	<0.02	<0.5	200	20	1000	1	<10	<20	5	30	20	0.02	<20	150
338-341	<0.02	<0.5	200	15	700	<1	<10	<20	5	20	15	0.07	<20	150
341-345	<0.02	<0.5	200	10	500	<1	<10	<20	7	15	15	0.05	<20	200
345-347	<0.02	<0.5	200	15	700	<1	<10	<20	5	15	10	0.07	<20	150
347-351	<0.02	<0.5	<200	20	1000	<1	<10	<20	5	20	50	0.28	<20	200
351-353	<0.02	<0.5	<200	10	700	<1	<10	<20	5	10	30	0.23	<20	150
353-355	<0.02	<0.5	<200	10	700	<1	<10	<20	5	15	15	0.10	<20	200
356-362	<0.02	<0.5	200	15	700	<1	<10	<20	5	20	15	0.09	20	150
363-367	<0.02	<0.5	200	15	1000	<1	<10	<20	5	30	20	0.02	<20	200
367-369	<0.02	<0.5	200	15	1000	<1	<10	<20	5	10	10	0.04	<20	100
369-374	<0.02	<0.5	<200	10	700	<1	<10	<20	5	15	15	0.02	<20	100
374-378	<0.02	<0.5	<200	10	300	<1	<10	<20	5	10	15	0.02	20	100
380-385	<0.02	<0.5	200	20	700	<1	<10	<20	5	30	50	0.06	<20	300
385-390	<0.02	<0.5	<200	50	1000	<1	<10	<20	7	30	20	0.02	<20	300
390-396	<0.02	<0.5	<200	70	1500	1	<10	<20	7	30	30	0.17	20	200
396-399	<0.02	<0.5	<200	20	700	<1	<10	<20	10	30	15	0.02	<20	300
399-400	<0.02	0.7	<200	30	700	<1	<10	<20	15	30	200	0.35	<20	200
400-405	<0.02	<0.5	200	10	700	<1	<10	<20	5	15	15	0.02	<20	150
405-408	<0.02	<0.5	200	20	1000	1	<10	<20	5	15	20	0.08	<20	150
408-410	<0.02	0.7	200	50	1000	2	<10	<20	7	50	70	0.19	70	300
410-411	<0.02	0.7	<200	20	700	<1	<10	<20	7	30	150	0.04	<20	100

Depth Interval (feet)	Au	Ag	As	B	Ba	Be	Bi	Cd	Co	Cr	Cu	Hg	La	Mn
411-415	0.02	0.5	200	10	500	<1	<10	<20	7	30	50	0.28	<20	300
415-421	<0.02	<0.5	<200	15	700	<1	<10	<20	7	20	20	0.07	20	200
421-425	0.08	<0.5	<200	20	1000	<1	<10	<20	5	20	10	0.04	20	200
425-429	<0.02	<0.5	<200	30	1000	<1	<10	<20	7	30	30	0.05	<20	200
429-436	<0.02	<0.5	200	30	1000	<1	<10	<20	7	30	20	0.05	<20	150
436-440	0.06	<0.5	200	50	1000	<1	<10	<20	7	30	20	0.08	20	300
440-445	<0.02	<0.5	<200	20	500	<1	<10	<20	5	15	20	0.06	<20	200
445-451	0.02	<0.5	<200	20	500	<1	<10	<20	10	30	70	0.28	<20	200
451-460	0.04	<0.5	<200	15	500	<1	<10	<20	5	20	15	0.13	<20	150
460-470	0.06	<0.5	<200	15	500	<1	<10	<20	5	15	15	0.10	<20	300
470-475	0.1	<0.5	<200	<10	700	<1	<10	<20	5	10	20	0.03	<20	300
475-480	0.02	<0.5	<200	<10	200	<1	<10	<20	5	5	7	0.10	<20	100
480-489	0.02	<0.5	<200	20	300	<1	<10	<20	5	20	15	0.26	<20	300
489-503	0.02	<0.5	<200	10	500	<1	<10	<20	7	30	10	0.08	<20	300
503-510	<0.02	<0.5	<200	<10	300	<1	<10	<20	5	10	10	0.03	<20	150
510-516	0.02	<0.5	<200	10	500	<1	<10	<20	7	20	15	0.08	<20	200
516-525	0.04	<0.5	<200	<10	300	<1	<10	<20	7	10	15	0.16	<20	100
525-526	<0.02	0.5	<200	<10	500	<1	<10	<20	10	15	70	0.14	<20	500
526-532	<0.02	<0.5	<200	<10	300	<1	<10	<20	5	10	10	0.11	<20	150
532-532.4	<0.02	<0.5	<200	<10	300	<1	<10	<20	5	15	15	0.09	<20	150
532.4-535	<0.02	<0.5	<200	<10	300	<1	<10	<20	5	10	10	0.09	<20	150
535-543	<0.02	<0.5	<200	<10	300	<1	<10	<20	5	20	50	0.09	<20	500
543-553	0.02	0.7	<200	<10	700	<1	<10	<20	5	10	70	0.14	<20	300
553-557	<0.02	7	<200	<10	300	<1	<10	<20	5	20	1000	0.11	<20	70
557-564	0.3	2	<200	10	500	<1	<10	<20	7	15	100	0.13	<20	500

Depth Interval (feet)	Au	Ag	As	B	Ba	Be	Bi	Cd	Co	Cr	Cu	Hg	La	Mn
564-565	<0.02	0.5	<200	20	700	<1	<10	<20	5	50	20	0.05	<20	200
565-571	0.04	<0.5	<200	15	500	<1	<10	<20	10	30	20	0.13	<20	500
571-574	<0.02	30	<200	10	500	<1	<10	150	10	50	200	- -	<20	1500
574-581	<0.02	1	<200	10	500	<1	<10	<20	7	30	20	0.18	<20	2000
581-593	<0.02	<0.5	<200	30	700	<1	<10	<20	5	30	20	0.10	<20	200
593-598	<0.02	<0.5	<200	15	500	<1	<10	<20	5	30	70	0.05	<20	150
598-602	<0.02	1	<200	100	500	1	<10	<20	7	50	70	0.03	<20	150
602-604	<0.02	<0.5	<200	50	500	<1	<10	<20	7	30	70	0.03	<20	150
604-612	0.02	<0.5	<200	20	300	<1	<10	<20	5	30	50	0.14	<20	200
612-615	<0.02	0.5	<200	20	500	<1	<10	<20	5	50	70	0.06	<20	300
615-630	0.02	<0.5	<200	<10	300	<1	<10	<20	5	30	20	0.15	<20	100
630-632	0.02	0.7	<200	30	500	<1	<10	<20	7	50	150	0.17	<20	70
632-640	0.02	<0.5	<200	10	300	<1	<10	<20	5	10	15	0.06	<20	100
640-646	0.02	0.5	<200	70	1000	1	<10	<20	10	30	50	0.06	20	300
646-647	0.02	<0.5	<200	10	500	<1	<10	<20	7	30	30	0.13	<20	150
647-652	0.02	<0.5	<200	20	500	<1	<10	<20	5	20	30	0.06	<20	150
652-655	<0.02	0.5	<200	70	500	<1	<10	<20	10	30	20	0.09	20	200
655-670	<0.02	<0.5	<200	20	500	<1	<10	<20	<5	20	15	0.03	<20	150
670-673	<0.02	<0.5	<200	30	500	<1	<10	<20	7	30	15	0.05	<20	150
673-676	<0.02	0.5	<200	20	500	<1	<10	<20	10	30	20	0.08	<20	500
676-681	0.02	<0.5	<200	50	700	1	<10	<20	5	20	30	0.08	20	150
681-685	<0.02	0.5	<200	20	300	<1	<10	<20	7	50	20	0.06	<20	70
685-689	<0.02	<0.5	<200	10	300	<1	<10	<20	5	20	10	0.03	<20	50
689-695	<0.02	<0.5	<200	20	500	<1	<10	<20	10	50	20	0.40	<20	300
695-704	<0.02	0.5	<200	70	700	1	<10	<20	5	30	20	0.11	20	300

Depth Interval (feet)	Au	Ag	As	B	Ba	Be	Bi	Cd	Co	Cr	Cu	Hg	La	Mn
704-705	0.02	<0.5	<200	<10	300	<1	<10	<20	5	15	30	0.05	<20	50
705-735	0.02	<0.5	<200	<10	3000	2	<10	<20	<5	<5	7	0.15	<20	1500
735-745	0.02	<0.5	200	<10	300	<1	<10	<20	<5	30	15	0.10	<20	100
747	0.06	70	<200	<10	150	<1	<10	200	<5	7	2000	3.2	<20	300
745-755	0.02	20	200	10	200	<1	<10	50	5	30	500	0.62	<20	300
755-763	0.06	2	200	15	200	<1	<10	<20	5	30	70	0.40	<20	200
763-770	0.04	1	200	70	500	1	<10	<20	7	70	100	0.23	20	150
770-782	0.2	70	<200	10	200	<1	<10	<20	7	30	300	0.60	<20	500
782-783	0.02	7	<200	10	300	<1	<10	<20	7	150	150	0.42	20	300
783-785	0.1	0.5	<200	15	300	<1	<10	<20	7	30	150	0.60	<20	150
785	0.06	<0.5	<200	100	500	1	<10	<20	7	50	70	0.16	20	500
785-793	0.02	<0.5	<200	70	500	<1	<10	<20	7	70	20	0.44	20	300
793-796	0.02	<0.5	<200	30	300	<1	<10	<20	5	50	20	0.40	20	200
796-800	0.02	<0.5	<200	50	1000	<1	<10	<20	7	50	20	0.22	<20	500
800-810	0.08	<0.5	<200	50	500	<1	<10	<20	7	30	15	0.20	20	300
810-820	0.04	<0.5	<200	70	500	<1	<10	<20	7	50	20	0.23	<20	300
820-829	<0.02	<0.5	<200	30	700	<1	<10	<20	5	30	7	0.03	<20	70
829-830	<0.02	<0.5	<200	70	1000	<1	<10	<20	5	30	7	0.09	20	300
830-840	<0.02	<0.5	<200	10	1500	<1	<10	<20	5	50	7	0.08	<20	150
840-850	<0.02	<0.5	<200	70	1500	<1	<10	<20	5	50	5	0.03	<20	200
850-860	0.02	<0.5	<200	<10	500	<1	<10	<20	5	30	10	0.05	<20	100
860-870	0.06	<0.5	<200	70	1500	<1	<10	<20	5	70	20	0.06	<20	200
870-880	0.1	<0.5	<200	30	2000	<1	<10	<20	5	100	15	0.10	<20	150
880-890	0.1	<0.5	<200	20	1500	<1	<10	<20	7	70	100	0.03	20	200
894	<0.02	<0.5	<200	20	1500	<1	<10	<20	7	30	50	0.05	20	300

Depth Interval (feet)	Au	Ag	As	B	Ba	Be	Bi	Cd	Co	Cr	Cu	Hg	La	Mn
890-900	0.06	<0.5	<200	30	1500	<1	<10	<20	7	100	10	0.05	<20	200
900-903	0.02	<0.5	<200	15	700	<1	<10	<20	5	50	15	0.03	<20	300
903-904	<0.02	<0.5	<200	10	200	<1	<10	<20	5	20	15	0.18	<20	300
904	0.02	0.5	<200	20	30	<1	<10	<20	5	50	50	0.13	20	200
904-914	0.02	<0.5	<200	20	300	<1	<10	<20	7	70	20	0.16	<20	300
915-919	0.1	<0.5	<200	20	300	<1	<10	<20	7	30	7	0.08	20	300
919-923	0.5	<0.5	<200	15	500	<1	<10	<20	7	30	30	0.05	<20	200
923-930	0.06	<0.5	<200	10	300	<1	<10	<20	7	30	10	0.09	<20	300
930-932	0.04	<0.5	<200	50	1000	1	<10	<20	7	50	20	0.05	<20	150
932-935	0.06	<0.5	<200	30	1000	<1	<10	<20	7	30	30	0.18	<20	100
944-955	0.04	1.0	1500	20	300	1	<10	<20	5	30	100	1.10	20	200
955-965	<0.02	0.5	700	<10	150	<1	<10	<20	5	50	20	1.90	<20	100
965-974	<0.02	3.0	<200	<10	150	<1	20	<20	<5	50	300	0.65	<20	70
974-981	0.2	0.7	<200	<10	200	<1	<10	<20	5	70	50	0.6	<20	150
981-984	3.0	2.0	200	<10	100	<1	<10	<20	5	50	150	0.26	<20	200
984-999	0.3	1.0	300	<10	200	<1	<10	<20	5	50	100	1.70	<20	100
999.5	0.3	5.0	<200	<10	100	<1	30	30	5	50	300	1.90	<20	150
999-1008	0.4	7.0	<200	<10	200	<1	<10	<20	7	30	700	1.70	<20	150
1008-1014	0.2	3.0	<200	<10	150	<1	<10	<20	7	20	200	0.65	<20	70
1014-1020	0.04	0.5	<200	<10	300	<1	<10	<20	5	50	70	0.70	<20	150
								<20						
1020-1030	0.04	0.7	<200	<10	500	<1	<10	<20	7	70	20	0.65	<20	70
1032-1032.5	0.1	1.5	<200	<10	100	<1	<10	<20	7	20	150	2.30	<20	300
1030-1045	0.2	1.5	<200	<10	300	<1	<10	<20	5	30	70	3.60	<20	100
1045-1055	0.02	<0.5	<200	<10	300	<1	<10	<20	5	30	15	0.18	<20	100
1055-1065	0.2	2.0	<200	<10	300	<1	<10	<20	7	50	50	0.11	<20	100

Depth Interval (feet)	Au	Ag	As	B	Ba	Be	Bi	Cd	Co	Cr	Cu	Hg	La	Mn
1065-1065.5	<0.02	0.5	<200	<10	200	<1	<10	<30	<5	50	50	0.36	<20	100
1065.5-1081	- -	0.5	<200	<10	200	<1	<10	<30	5	50	20	- -	<20	100
1081-1089.5	<0.02	0.5	<200	<10	200	<1	<10	<30	5	30	20	0.24	<20	70
1089.5-1105	<0.02	0.7	<200	<10	300	<1	<10	<30	5	30	70	0.03	<20	150
1105-1121	0.02	<0.5	<200	<10	300	<1	<10	<30	5	50	15	0.15	<20	70
1121-1131.5	1.5	0.7	<200	<10	200	<1	<10	<30	7	50	100	1.60	<20	70
1121-1131.5*	0.02	0.5	<200	<10	200	<1	<10	<20	<5	50	15	0.07	<20	100
1131.5-1140	0.2	<0.5	<200	<10	300	<1	<10	<20	5	50	20	0.12	<20	200
1131.5-1140*	0.04	0.7	<200	<10	300	<1	<10	<20	5	70	70	0.09	<20	70
1140-1154.7	0.02	0.5	<200	<10	200	<1	<10	<20	7	50	100	0.30	<20	150
1149.1	0.02	0.5	<200	<10	50	<1	<10	<20	15	30	300	2.30	<20	300
1154.7-1158.2	<0.02	<0.5	<200	<10	300	<1	<10	<20	5	30	15	0.46	<20	50
1158.2-1177.7	<0.02	0.5	<200	<10	300	<1	<10	<20	5	30	20	0.55	<20	150
1177.6	0.2	30	<200	<10	300	<1	100	500	10	30	300	1.10	<20	300
1177.7-1185.9	0.02	2	<200	<10	500	<1	<10	<20	7	100	100	0.60	<20	150
1186-1196	0.02	0.7	<200	<10	500	<1	<10	<20	5	50	70	0.30	<20	100
1196-1207	0.02	0.7	<200	<10	300	<1	<10	<20	7	30	20	0.15	<20	70
1207-1224.2	<0.02	0.5	<200	<10	700	1	<10	<20	10	100	150	0.20	20	200
1227.3	0.02	70	<200	<10	150	<1	150	200	<5	10	500	0.90	<20	200
1224.2-1233.5	<0.02	1	<200	10	200	<1	<10	<20	10	50	20	1.00	<20	100
1223.5-1242.2	<0.02	<0.5	<200	<10	300	<1	<10	<20	10	30	100	0.20	<20	150
1242.2-1250.7	<0.02	<0.5	<200	<10	200	<1	<10	<20	7	30	15	0.15	<20	100
1250.7-1258.3	<0.02	<0.5	<200	<10	200	<1	<10	<20	10	30	20	0.20	<20	150
1258.3-1268	<0.02	<0.5	<200	<10	200	<1	<10	<20	10	30	100	0.08	<20	200
1268-1276.5	<0.02	<0.5	<200	<10	300	<1	<10	<20	10	30	70	0.10	<20	100

Depth Interval (feet)	Au	Ag	As	B	Ba	Be	Bi	Cd	Co	Cr	Cu	Hg	La	Mn
1276.5-1284.6	<0.02	<0.5	<200	<10	300	<1	<10	<20	5	30	15	- -	<20	70
1284.6-1292.3	- -	<0.5	<200	<10	300	<1	<10	<20	<5	30	15	- -	<20	70
1292.3-1300.3	<0.02	<0.5	<200	<10	500	<1	<10	<20	10	30	300	1.80	<20	200
1300.3-1309	0.04	<0.5	<200	<10	300	<1	<10	<20	5	20	70	0.09	<20	100
1309-1318.2	<0.02	<0.5	<200	<10	1000	<1	<10	<20	10	50	150	0.90	<20	200
1318.2-1322	<0.02	<0.5	<200	<10	1500	<1	<10	<20	5	100	150	0.85	<20	150
1322-1327.4	<0.02	<0.5	<200	10	1500	1	<10	<20	15	50	150	0.20	20	150
1317-1323	0.02	<0.5	<200	<10	1500	<1	<10	<20	<5	150	100	1.10	<20	100
1323-1333	<0.02	1	<200	<10	1500	<1	<10	<20	5	50	100	0.65	20	100
1333-1336	<0.02	<0.5	<200	<10	700	<1	<10	<20	5	30	100	1.20	<20	70
1336-1344	0.04	1	<200	<10	1500	<1	<10	<20	7	70	300	2.20	<20	300
1344-1350	0.07	0.5	<200	<10	1000	<1	<10	<20	5	30	100	0.75	<20	200
1350-1360	0.04	0.5	<200	<10	1500	<1	<10	<20	<5	70	100	0.70	<20	200
1360-1367	<0.02	<0.5	<200	<10	1500	<1	<10	<20	<5	70	20	0.35	<20	100
1367-1373	<0.02	<0.5	<200	<10	500	<1	<10	<20	<5	20	10	0.65	<20	200
1373-1380	0.02	<0.5	<200	<10	500	<1	<10	<20	7	20	20	0.85	<20	50
1380-1390	<0.02	<0.5	<200	<10	1500	<1	<10	<20	7	30	20	0.40	<20	200
1390-1396	<0.02	<0.5	<200	<10	300	<1	<10	<20	15	30	100	0.40	<20	100
1396-1406.5	<0.02	<0.5	<200	<10	2000	<1	<10	<20	5	150	150	0.70	20	150
1406.5-1423	<0.02	<0.5	<200	<10	500	<1	<10	<20	5	30	70	0.09	<20	100
1423-1433	<0.02	<0.5	<200	<10	300	<1	<10	<20	5	30	150	0.28	<20	50
1433-1443	<0.02	<0.5	<200	<10	500	<1	<10	<20	5	20	15	0.30	<20	50
1443-1454	<0.02	<0.5	<200	<10	1000	<1	<10	<20	<5	10	10	0.38	<20	50
1454-1466	<0.02	<0.5	<200	<10	3000	<1	<10	<20	5	20	150	0.95	<20	100
1466-1477	<0.02	<0.5	<200	<10	1500	<1	<10	<20	<5	15	10	0.40	<20	50

Depth Interval (feet)	Au	Ag	As	B	Ba	Be	Bi	Cd	Co	Cr	Cu	Hg	La	Mn
1477-1488	<0.02	<0.5	<200	<10	3000	<1	<10	<20	5	30	50	0.65	<20	100
1488-1499	<0.02	<0.5	<200	<10	2000	<1	<10	<20	<5	10	20	0.45	<20	30
1499-1507	<0.02	<0.5	<200	<10	2000	<1	<10	<20	5	30	50	0.65	<20	200
1507-1521	<0.02	<0.5	<200	<10	1500	<1	<10	<20	7	20	15	0.45	<20	70
1521-1533	<0.02	<0.5	<200	<10	500	<1	<10	<20	7	20	50	0.85	<20	150
1533-1544	<0.02	<0.5	<200	<10	2000	1.5	<10	<20	7	30	20	0.40	20	200
1544-1556	<0.02	<0.5	<200	<10	1000	<1	<10	<20	5	30	10	0.30	<20	200
1556-1567	0.02	<0.5	<200	<10	500	<1	<10	<20	5	20	15	0.55	<20	150
1567-1578	0.02	<0.5	<200	<10	700	<1	<10	<20	7	20	15	0.12	<20	200
1578-1590	0.02	<0.5	<200	<10	1000	1	<10	<20	7	30	15	0.60	<20	300
1590-1601	<0.02	<0.5	<200	<10	300	<1	<10	<20	7	20	15	0.30	<20	70
1601-1612	<0.02	<0.5	<200	<10	1500	<1	<10	<20	7	30	20	0.40	<20	200
1612-1623	<0.02	<0.5	<200	<10	700	<1	<10	<20	5	10	7	0.20	<20	50
1623-1634	<0.02	<0.5	<200	<10	700	<1	<10	<20	5	20	10	0.50	<20	150
1634-1645	<0.02	<0.5	<200	<10	1000	<1	<10	<20	5	20	15	0.60	<20	150
1645-1655	<0.02	<0.5	<200	<10	1000	<1	<10	<20	5	30	15	0.40	<20	100
1655-1667	<0.02	0.5	<200	<10	500	<1	<10	<20	7	30	30	0.65	<20	100
1667-1678	<0.02	<0.5	<200	<10	700	<1	<10	<20	10	30	30	1.80	<20	150
1678-1685	<0.02	<0.5	<200	<10	300	<1	<10	<20	5	15	15	0.38	<20	70
1685-1687	<0.02	<0.5	<200	<10	500	<1	<10	<20	7	50	200	0.65	<20	200
1687-1701	<0.02	<0.5	<200	<10	1000	<1	<10	<20	5	30	30	1.20	<20	200
1701-1712	<0.02	<0.5	<200	<10	500	<1	<10	<20	7	20	20	1.00	<20	100
1712-1723	0.06	<0.5	<200	10	300	<1	<10	<20	5	30	20	0.80	<20	200
1723-1734	0.06	1	<200	<10	500	<1	<10	<20	7	30	150	0.70	<20	100
1734-1745	0.02	0.5	<200	<10	1000	<1	<10	<20	7	30	30	1.20	<20	50

Depth Interval (feet)	Au	Ag	As	B	Ba	Be	Bi	Cd	Co	Cr	Cu	Hg	La	Mn
1745-1756	<0.02	<0.5	<200	<10	300	<1	<10	<20	5	15	50	0.40	<20	50
1756-1762	<0.02	<0.5	<200	<10	700	<1	<10	<20	5	30	30	0.20	<20	70
1762-1778	0.04	0.5	<200	10	700	<1	<10	<20	7	20	100	0.26	<20	70
1778.4-1786.5	<0.02	0.5	200	10	1500	2	<10	<20	5	30	100	<0.01	20	2000
1786.5-1790.2	<0.02	0.7	<200	<10	5000	1.5	<10	<20	10	70	500	0.06	20	700
1790.2-1796.8	<0.02	1.0	<200	10	2000	1.5	<10	<20	30	70	700	0.07	30	500
1796.8-1801.1	<0.02	0.5	<200	<10	1500	1.5	<10	<20	7	50	150	<0.01	<20	1000
1801.1-1807.2	<0.02	<0.5	200	<10	2000	1	<10	<20	10	70	150	0.02	20	700
1807.2-1813.6	0.1	0.7	300	<10	500	1	<10	<20	10	50	150	0.02	20	150
1813.6-1819.4	0.04	<0.5	200	10	1000	1	<10	<20	5	50	70	0.03	<20	200
1819.4-1824.5	0.02	0.5	300	20	1000	1	<10	<20	7	70	150	<0.01	20	300
1824.5-1830.0	0.04	0.5	<200	15	1000	1	<10	<20	7	50	70	<0.01	20	100
1830.0-1835.9	<0.02	<0.5	<200	10	500	1	<10	<20	<5	30	30	<0.01	<20	700
1835.9-1840.2	<0.02	1.5	1500	10	1000	1	<10	<20	10	50	100	0.02	<20	300
1840.2-1844.7	<0.02	0.7	200	15	1000	1	<10	<20	5	50	50	<0.01	20	300
1844.7-1845.2	4.0	500.0	>10000	<10	200	<1	100	100	100	50	5000	0.38	<20	100
1845.2-1850.0	2.0	20.0	5000	30	500	1	20	30	5	70	300	0.28	<20	150
1850.0-1855.1	0.04	1.0	700	10	500	1	<10	<20	5	70	150	0.04	<20	200
1855.1-1860.0	0.02	0.5	<200	<10	1000	1	<10	20	7	50	200	0.04	<20	700
1860.0-1865.0	<0.02	1.0	200	<10	2000	1.5	<10	20	5	50	150	0.02	<20	200
1865.3-1870.2	<0.02	<0.5	<200	15	1500	1	<10	<20	5	50	70	0.02	20	300
1870.2-1875.4	0.02	1.0	<200	10	1500	1	15	<20	10	50	500	<0.01	<20	700
1875.4-1880.1	<0.02	<0.5	<200	10	1000	1	<10	<20	5	50	50	<0.01	<20	150
1880.1-1885.9	<0.02	0.7	200	15	1500	1.5	<10	<20	10	70	200	0.04	20	70
1885.9-1894.5	<0.02	1.0	500	15	1000	1.5	<10	<20	10	70	300	0.10	20	150

Depth Interval (feet)	Au	Ag	As	B	Ba	Be	Bi	Cd	Co	Cr	Cu	Hg	La	Mn
1894.5-1899.7	<0.02	0.7	1000	10	1500	1	<10	<20	7	50	200	0.10	<20	700
1899.7-1905.0	<0.02	<0.5	<200	10	2000	1.5	<10	<20	20	70	500	<0.01	20	500
1905.0-1910.9	0.02	<0.5	<200	<10	2000	1	<10	<20	5	50	100	<0.01	20	300
1910.9-1918.5	<0.02	<0.5	<200	10	1000	1	<10	<20	5	50	70	<0.01	<20	500
1918.5-1929.2	<0.02	<0.5	<200	<10	1000	<1	<10	<20	5	20	70	<0.01	<20	700
1929.2-1935.0	<0.02	0.7	200	<10	3000	2	<10	<20	10	70	200	<0.01	20	700
1935.0-1941.5	<0.02	<0.5	<200	<10	1500	1	<10	<20	5	50	70	0.02	20	700
1941.5-1946.7	<0.02	<0.5	<200	<10	1000	1	<10	<20	5	50	50	<0.01	<20	200
1946.7-1951.8	<0.02	0.5	<200	<10	2000	1.5	<10	<20	7	50	150	0.03	20	500
1951.8-1957.3	<0.02	<0.5	<200	<10	1500	2	<10	<20	10	70	150	0.04	30	300
1957.3-1962.7	<0.02	<0.5	<200	<10	2000	2	<10	<20	7	50	150	<0.01	30	200
1963-1968	0.06	<0.5	<200	10	2000	1	<10	<20	7	70	100	<0.01	<20	150
1968-1974	0.04	<0.5	<200	15	2000	1	<10	<20	7	150	100	<0.01	20	100
1974-1978	0.04	<0.5	<200	10	2000	1	<10	<20	7	70	150	0.01	<20	70
1978-1984	0.04	<0.5	<200	<10	3000	1	<10	<20	7	150	150	0.01	20	150
1984-1991	0.04	0.7	<200	10	5000	1	<10	30	10	100	500	0.01	50	500
1991-1996	<0.02	3	<200	15	1000	1	<10	<20	5	70	70	0.01	<20	300
1996-1998	0.02	3	<200	15	1000	1	<10	<20	5	50	150	0.02	<20	300
1998-2004	0.06	3	<200	<15	1000	<1	10	<20	7	30	150	0.13	<20	150
2004-2010	0.06	2	<200	10	700	<1	<10	<20	10	30	500	0.13	<20	70
2010-2015	0.1	0.5	<200	15	1500	1	<10	<20	7	70	150	0.02	30	150
2015-2019	0.06	<0.5	<200	15	1500	1	<10	<20	7	70	100	0.02	<20	70
2019-2024	0.06	<0.5	<200	15	1000	1	<10	<20	7	70	70	0.02	<20	70
2024-2029	0.3	0.7	<200	20	1500	1	<10	<20	5	100	70	0.06	<20	70
2029-2033	0.7	<0.5	<200	20	700	1	<10	<20	5	50	70	0.03	<20	100

Depth Interval (feet)	Au	Ag	As	B	Ba	Be	Bi	Cd	Co	Cr	Cu	Hg	La	Mn
2033-2044	0.8	0.5	200	10	700	<1	<10	<20	7	70	300	0.22	20	100
2044-2053	0.06	<0.5	<200	15	1500	<1	<10	<20	7	70	50	0.03	<20	70
2053-2064	0.06	<0.5	<200	10	1000	<1	<10	<20	5	50	100	<0.01	<20	100
2064-2067	0.04	<0.5	<200	10	700	<1	<10	<20	5	70	100	0.01	<20	100
2067-2073	<0.02	<0.5	<200	<10	1000	<1	<10	<20	5	50	150	<0.01	<20	70
2073-2077	<0.02	1.5	<200	<10	700	<1	<10	20	10	20	200	0.04	<20	50
2077-2086	0.06	1.5	<200	10	700	1	<10	<20	10	50	200	0.03	30	150
2086-2092	<0.02	2	<200	15	1500	1	<10	<20	15	70	300	0.02	20	150
2092-2096	0.02	0.7	<200	10	2000	1.5	<10	<20	10	70	100	0.01	20	150
2096-2103	0.04	3	<200	10	1000	1	15	70	15	70	200	0.01	20	150
2103-2109	0.6	3	<200	<10	1500	1.5	10	70	15	70	500	0.03	20	300
2109-2114	0.02	<0.5	<200	10	1500	1.5	<10	<20	15	100	100	0.02	30	200
2114-2119	0.02	0.5	<200	10	1000	1	<10	<20	10	70	300	0.01	30	150
2119-2125	<0.02	<0.5	<200	10	1500	1	<10	<20	5	30	150	0.02	20	100
2125-2130	0.02	<0.5	<200	<10	1500	1	<10	<20	10	70	150	0.02	20	100
2130-2136	<0.02	1	<200	15	1000	<1	15	<20	5	50	50	0.02	<20	50
2136-2142	0.02	1	<200	10	1500	1	<10	<20	20	70	200	0.09	<20	100
2142-2148	0.04	10.0	<200	10	1500	1	70	<20	10	70	200	0.09	<20	200
2148-2153	0.02	0.7	<200	10	5000	1.5	<10	<20	10	100	100	0.02	30	300
2153-2159	0.1	0.5	<200	15	2000	1	<10	<20	7	70	100	0.03	50	100
2159-2164	0.02	<0.5	<200	<10	5000	1.5	<10	<20	10	150	70	0.03	30	300
2164-2168	0.02	0.5	<200	10	5000	1	<10	<20	7	70	100	0.02	30	150
2168-2174	<0.02	<0.5	<200	<10	1500	<1	<10	<20	5	30	50	0.01	30	30
2174-2180	<0.02	<0.5	<200	10	1000	<1	<10	<20	5	50	70	0.02	<20	70
2180-2186	0.02	<0.5	<200	15	1500	<1	<10	<20	5	70	70	0.02	30	150

Depth Interval (feet)	Au	Ag	As	B	Ba	Be	Bi	Cd	Co	Cr	Cu	Hg	La	Mn
2186-2191	<0.02	<0.5	<200	10	1500	1	<10	<20	7	70	150	0.03	30	70
2191-2198	<0.02	<0.5	<200	<10	2000	1	<10	<20	10	50	100	0.02	20	70
2198-2203	0.02	0.5	<200	<10	2000	1.5	<10	<20	20	150	300	0.01	50	200
2203-2216	0.02	2	<200	<10	>5000	1	<10	<20	10	50	200	0.01	20	700
2216-2222	<0.02	1	<200	15	2000	1	<10	<20	7	70	150	0.01	30	150
2222-2227	<0.02	<0.5	<200	<10	>5000	1	<10	<20	7	100	150	0.01	50	700
2227-2233	<0.02	<0.5	<200	<10	>5000	1.5	<10	<20	15	150	150	0.01	70	300
2233-2238	<0.02	<0.5	<200	<10	3000	1.5	<10	<20	10	70	150	0.02	50	100
2238-2245	0.02	5	<200	<10	5000	1.5	50	<20	10	100	100	0.01	50	150
2245-2250	0.02	2	<200	10	1500	1	<10	<20	10	100	150	0.01	30	150
2250-2256	<0.02	<0.5	<200	10	2000	1.5	<10	<20	10	150	100	<0.01	30	150
2256-2261	<0.02	<0.5	<200	<10	3000	1.5	<10	<20	7	150	70	<0.01	<20	200
2261-2266	0.02	<0.5	200	<10	2000	<1	<10	<20	10	70	150	0.02	<20	150
2266-2271	<0.02	<0.5	<200	10	1500	<1	<10	<20	5	30	70	0.01	<20	150
2271-2277	<0.02	<0.5	<200	<10	5000	1	<10	<20	15	70	150	0.02	<20	200
2277-2282	<0.02	<0.5	<200	<10	1500	3	<10	<20	15	150	150	0.01	20	150
2282-2288	<0.02	<0.5	<200	10	1500	3	<10	<20	15	150	150	0.01	50	150
2288-2294	<0.02	<0.5	<200	<10	1000	1	<10	<20	15	70	100	0.01	<20	100
2294-2300	<0.02	<0.5	300	<10	1500	1.5	<10	<20	10	70	150	0.02	20	150
2300-2306	<0.02	<0.5	<200	10	1500	1	<10	<20	10	70	100	0.01	<20	150
2306-2311	<0.02	<0.5	<200	10	1500	1.5	<10	<20	15	70	150	<0.01	<20	150
2311-2315	<0.02	<0.5	<200	10	1500	1	<10	<20	7	50	70	<0.01	20	100
2315-2321	<0.02	<0.5	<200	10	1500	1.5	<10	<20	7	50	70	<0.01	30	150
2321-2332	<0.02	<0.5	<200	10	2000	1	<10	<20	10	70	70	0.40	<20	100
2332-2343	<0.02	0.5	<200	<10	700	<1	<10	<20	10	30	70	0.35	<20	150

Depth Interval (feet)	Au	Ag	As	B	Ba	Be	Bi	Cd	Co	Cr	Cu	Hg	La	Mn
2344	0.6	50	<200	<10	700	1	100	500	20	15	500	0.50	<20	300
2343-2354	<0.02	<0.5	<200	<10	1500	<1	<10	<20	5	20	70	0.45	<20	50
2354-2365	<0.02	<0.5	<200	<10	1500	<1	<10	<20	10	30	100	0.65	<20	150
2365-2377	<0.02	<0.5	<200	10	1500	<1	<10	<20	10	30	100	0.65	<20	70
2377-2388	<0.02	<0.5	<200	<10	1500	<1	<10	<20	10	30	100	0.55	<20	70
2388-2399	<0.02	<0.5	<200	<10	1500	<1	<10	<20	7	30	100	0.60	<20	150
2399-2410	0.1	<0.5	<200	<10	1500	1	<10	<20	10	50	70	0.10	<20	150
2410-2421	0.2	3	<200	<10	5000	1	20	70	10	70	150	0.26	<20	300
2421-2433	0.2	0.5	<200	<10	>5000	1	<10	<20	7	70	100	0.18	20	150
2433-2443	0.1	<0.5	<200	10	>5000	2	<10	<20	5	70	100	0.15	<20	200
2443-2450	<0.02	<0.5	<200	<10	>5000	1	<10	<20	7	70	100	0.22	<20	300
2450-2455	<0.02	<0.5	<200	<10	2000	<1	<10	<20	30	300	70	0.22	20	700
2455-2465	<0.02	<0.5	<200	<10	>5000	1	<10	<20	7	70	70	0.22	<20	700
2465-2476	<0.02	<0.5	<200	<10	>5000	1	<10	<20	7	70	70	0.22	<20	200
2476-2484	<0.02	<0.5	<200	<10	3000	<1	<10	<20	10	70	100	0.22	<20	300
2497	<0.02	3	<200	15	150	<1	<10	<20	150	50	1500	0.10	<20	500
2484-2499	<0.02	0.5	<200	<10	300	<1	<10	<20	50	200	500	0.22	<20	700
2499-2510	<0.02	<0.5	<200	<10	200	<1	<10	<20	30	300	500	0.26	<20	700
2510-2518	<0.02	1.5	<200	<10	500	<1	<10	<20	50	200	700	0.18	<20	500
2518-2533	<0.02	<0.5	<200	<10	2000	<1	<10	<20	15	70	150	0.13	30	150
2533-2542	<0.02	<0.5	<200	<10	1000	<1	<10	<20	15	70	100	0.26	20	150
2542-2553	<0.02	<0.5	<200	<10	1500	1	<10	<20	10	100	150	0.55	<20	300
2553-2563	<0.02	<0.5	<200	<10	2000	1	<10	<20	15	100	150	0.38	20	200
2563-2576	<0.02	<0.5	<200	<10	1500	1	<10	<20	15	150	150	0.13	<20	300
2576-2578	<0.02	<0.5	<200	<10	1500	1	<10	<20	30	100	300	0.10	30	300

Depth Interval (feet)	Au	Ag	As	B	Ba	Be	Bi	Cd	Co	Cr	Cu	Hg	La	Mn
2578-2586	<0.02	<0.5	<200	<10	1500	1	<10	<20	15	100	200	0.13	<20	150
2586-2587	<0.02	<0.5	<200	<10	15	<1	<10	<20	150	20	700	0.15	<20	700
2587-2595	<0.02	<0.5	<200	<10	2000	1	<10	<20	15	100	100	0.35	<20	200
2595-2605	<0.02	<0.5	<200	<10	1500	1	<10	<20	15	70	100	0.18	<20	200
2605-2615	<0.02	2	<200	<10	2000	2	<10	<20	20	150	200	0.18	50	300
2615-2626	<0.02	0.5	<200	<10	1500	1	<10	<20	10	70	70	0.18	30	150
2626-2628	<0.02	<0.5	<200	<10	700	<1	<10	<20	30	200	30	0.10	<20	700
2628-2636	<0.02	<0.5	<200	<10	1500	1	<10	<20	10	70	70	0.13	<20	150
2636-2646	<0.02	<0.5	<200	<10	1000	1	<10	<20	5	50	100	0.13	<20	150
2650	0.08	<0.5	<200	<10	150	1	<10	<20	20	70	500	0.15	<20	700
2646-2656	<0.02	<0.5	<200	<10	1000	1	<10	<20	15	70	150	0.13	<20	300
2656-2667	<0.02	<0.5	<200	<10	1000	1	<10	<20	15	150	200	0.18	<20	300
2667-2678	<0.02	<0.5	<200	<10	1500	1	<10	<20	15	100	200	0.35	30	200
2678-2690	<0.02	<0.5	<200	<10	1500	1	<10	<20	15	100	150	0.22	<20	300
2690-2700	<0.02	<0.5	<200	<10	1500	1	<10	<20	10	70	100	0.13	30	300
2700-2707	<0.02	<0.5	<200	<10	1500	1	<10	<20	15	70	70	0.10	20	300
2707-2711	<0.02	<0.5	<200	<10	2000	1	<10	<20	10	15	100	0.22	30	300
2711-2722	<0.02	<0.5	<200	<10	1500	1	<10	<20	10	70	70	0.35	30	300
2722-2731	<0.02	<0.5	<200	<10	2000	<1	<10	<20	15	100	150	0.22	<20	500
2731-2735	<0.02	<0.5	<200	<10	700	<1	<10	<20	30	300	30	0.26	50	700
2735-2737	<0.02	<0.5	<200	<10	1500	<1	<10	<20	30	150	150	0.22	<20	700
2737-2749	<0.02	15	<200	<10	2000	1	20	<20	20	70	100	0.35	70	300
2749-2760	<0.02	<0.5	<200	<10	1500	1	<10	<20	20	70	100	0.10	30	200
2760-2767	<0.02	<0.5	<200	<10	1500	1	<10	<20	15	100	100	0.26	30	500
2767-2779	<0.02	<0.5	<200	<10	700	<1	<10	<20	7	150	30	0.18	50	700

Depth Interval (feet)	Au	Ag	As	B	Ba	Be	Bi	Cd	Co	Cr	Cu	Hg	La	Mn
2779-2789	<0.02	<0.5	<200	<10	1500	1	<10	<20	15	50	70	0.21	20	700
2789-2798	0.1	0.7	<200	<10	1500	<1	<10	<20	10	150	50	0.21	20	700
2798-2808	0.2	<0.5	<200	<10	300	<1	<10	<20	<5	70	50	0.50	<20	500
2808-2819	2.3	0.7	700	10	1000	<1	<10	<20	20	200	70	0.26	100	1000
2819-2828	0.08	<0.5	<200	15	3000	<1	<10	<20	15	150	300	0.04	30	1500
2828-2837	0.4	0.5	300	15	3000	1.5	<10	<20	15	150	70	0.04	30	700
2837-2847	<0.02	<0.5	<200	<10	700	<1	<10	<20	15	200	150	0.03	30	1500
2847-2856	<0.02	0.5	<200	10	1500	<1	<10	<20	30	300	300	0.07	30	700
2853	0.04	3	<200	150	70	<1	<10	<20	150	15	1500	0.08	<20	150
2856-2869	<0.02	<0.5	<200	<10	3000	<1	<10	<20	30	300	300	0.05	30	1500
2869-2880	<0.02	0.7	<200	<10	1500	<1	<10	<20	30	700	500	0.07	<20	1500
2880-2890	<0.02	<0.5	<200	<10	3000	<1	<10	<20	15	300	150	0.05	30	1500
2890-2902	<0.02	<0.5	<200	<10	1500	<1	<10	<20	20	300	200	0.04	50	1500
2902-2913	<0.02	<0.5	<200	<10	1500	<1	<10	<20	30	200	300	0.04	70	1000
2913-2924	<0.02	<0.5	<200	<10	3000	1	<10	<20	30	300	150	0.02	50	1500
2924-2934	0.06	1.5	<200	10	5000	1.5	<10	<20	30	300	300	0.02	50	2000
2925	0.02	1	<200	30	3000	<1	<10	<20	150	70	1000	0.38	30	5000
2934-2944	<0.02	1	<200	<10	1500	<1	<10	<20	20	200	500	<0.01	<20	5000
2944-2951	<0.02	<0.5	<200	<10	700	<1	<10	<20	10	70	70	<0.01	20	3000
2946-2947	0.02	3	<200	70	1500	<1	<10	>500	70	70	1500	0.20	<20	5000
2951-2962	<0.02	<0.5	<200	<10	1500	<1	<10	<20	<5	150	30	0.02	20	5000
2958	0.6	<0.5	<200	<10	300	<1	<10	<20	<5	150	30	<0.01	<20	>5000
2962-2967	<0.02	<0.5	<200	15	1500	1.5	<10	<20	<5	5	70	<0.01	70	1500
2967-2978	<0.02	<0.5	<200	10	2000	<1	<10	<20	10	70	150	<0.01	70	>5000
2978-2986	<0.02	0.7	<200	<10	300	<1	<10	<20	20	150	300	0.04	20	>5000

Depth Interval (feet)	Au	Ag	As	B	Ba	Be	Bi	Cd	Co	Cr	Cu	Hg	La	Mn
2986-2988	<0.02	<0.5	<200	<10	3000	<1	<10	<20	<5	<5	300	<0.01	30	1500
2988-2996	<0.02	<0.5	<200	10	500	<1	<10	50	30	300	500	0.03	50	>5000
2996-3009	<0.02	0.7	<200	<10	500	<1	<10	<20	15	500	300	<0.01	30	>5000
3009-3017	<0.02	<0.5	<200	<10	1500	1	<10	<20	10	150	30	<0.01	20	>5000
3017-3022	<0.02	<0.5	<200	20	300	1	<10	<20	<5	<5	50	<0.01	70	1500
3022-3032	<0.02	0.7	<200	<10	1000	<1	<10	<20	10	150	300	<0.01	30	5000
3032-3036	<0.02	<0.5	<200	<10	300	<1	<10	<20	10	150	200	0.12	30	>5000
3036-3041	<0.02	<0.5	<200	<10	500	<1	<10	<20	<5	200	70	<0.01	30	3000
3041-3050	<0.02	<0.5	<200	20	700	<1	<10	<20	<5	50	5	0.02	<20	1500
3050-3060	<0.02	<0.5	<200	50	700	<1	<10	<20	<5	50	30	0.02	<20	3000
3060-3061	<0.02	<0.5	<200	10	>5000	1.5	<10	<20	<5	5	150	<0.01	70	1500
3061-3062	<0.02	0.5	<200	<10	1000	<1	<10	<20	15	70	150	<0.01	50	2000
3062-3063	<0.02	<0.5	<200	20	1500	1.5	<10	<20	<5	<5	30	<0.01	70	1500
3063-3071	<0.02	<0.5	<200	<10	700	<1	<10	<20	10	150	30	<0.01	30	1500
3071-3074	<0.02	<0.5	<200	<10	1500	<1	<10	<20	15	300	30	0.03	50	700
3074-3084	<0.02	<0.5	<200	<10	300	<1	<10	<20	<5	70	30	0.02	<20	3000
3084-3094	<0.02	<0.5	<200	<10	300	<1	<10	<20	15	150	200	<0.01	20	>5000
3094-3107	0.06	<0.5	<200	<10	150	<1	<10	<20	<5	100	20	0.04	20	1500
3107-3111	<0.02	<0.5	<200	<10	150	<1	<10	<20	<5	50	<2	0.03	<20	500
3111-3115	<0.02	<0.5	<200	<10	50	<1	<10	<20	<5	20	<2	0.04	20	300
3115-3117	<0.02	<0.5	<200	<10	<5	<1	<10	<20	<5	30	<2	0.03	<20	1000
3117-3119	<0.02	<0.5	<200	<10	200	<1	<10	<20	<5	100	50	0.04	<20	1500
3119-3126	<0.02	<0.5	<200	<10	70	<1	<10	<20	<5	100	20	0.03	20	1500
3126-3131	<0.02	<0.5	<200	<10	70	<1	<10	<20	<5	30	<2	0.03	20	700
3131-3135	<0.02	<0.5	<200	<10	100	<1	<10	<20	<5	100	15	0.03	20	1000

Depth Interval (feet)	Au	Ag	As	B	Ba	Be	Bi	Cd	Co	Cr	Cu	Hg	La	Mn
3135-3140	<0.02	<0.5	<200	<10	150	<1	<10	<20	<5	150	10	0.07	30	300
3140-3151	0.04	<0.5	<200	<10	150	<1	<10	<20	<5	100	10	0.03	20	500
3151-3155	<0.02	<0.5	<200	<10	100	<1	<10	<20	<5	100	15	0.03	20	500
3155-3165	<0.02	<0.5	<200	<10	500	<1	<10	<20	15	150	30	0.07	20	700
3165-3166	<0.02	<0.5	<200	<10	300	<1	<10	<20	<5	100	10	0.03	20	500
3166-3170	<0.02	<0.5	<200	<10	700	<1	<10	<20	20	100	20	0.07	20	700
3170-3172	<0.02	<0.5	<200	<10	200	<1	<10	<20	<5	100	5	0.02	20	500
3172-3173	<0.02	<0.5	<200	<10	700	<1	<10	<20	20	200	20	0.05	20	700
3173-3184	<0.02	<0.5	<200	<10	300	<1	<10	<20	<5	50	10	0.03	20	200
3184-3196	<0.02	<0.5	<200	10	300	<1	<10	<20	<5	70	5	0.02	20	200
3196-3208	<0.02	<0.5	<200	15	200	<1	<10	<20	<5	50	5	0.05	20	200
3208-3219	<0.02	<0.5	<200	<10	300	<1	<10	<20	<5	50	5	0.03	20	150
3219-3227	<0.02	<0.5	<200	10	100	<1	<10	<20	<5	30	<2	0.05	<20	50
3227-3241	<0.02	<0.5	<200	10	700	<1	<10	<20	20	150	20	0.04	20	1000
3241-3245	<0.02	<0.5	<200	10	300	<1	<10	<20	<5	100	5	0.02	30	300
3245-3251	<0.02	<0.5	<200	<10	700	<1	<10	<20	20	200	30	0.02	20	700
3251-3264	<0.02	<0.5	<200	<10	500	<1	<10	<20	<5	100	5	0.02	20	200
3264-3275	<0.02	1	<200	<10	500	<1	<10	<20	<5	100	5	0.02	20	300
3275-3284	0.08	<0.5	<200	10	300	<1	<10	<20	<5	100	5	<0.01	20	300
3284-3288	<0.02	<0.5	<200	<10	500	<1	<10	<20	<5	150	15	0.03	20	300
3288-3291	<0.02	<0.5	<200	10	700	<1	<10	<20	20	200	20	0.05	30	500
3291-3296	<0.02	<0.5	<200	<10	500	<1	<10	<20	5	150	10	<0.01	30	300
3296-3306	<0.02	<0.5	<200	<10	500	<1	<10	<20	<5	100	7	<0.01	20	300
3306-3318	<0.02	<0.5	<200	<10	300	<1	<10	<20	<5	100	10	0.02	20	100
3318-3330	<0.02	<0.5	<200	<10	700	<1	<10	<20	<5	150	15	<0.01	20	100

Depth Interval (feet)	Au	Ag	As	B	Ba	Be	Bi	Cd	Co	Cr	Cu	Hg	La	Mn
3330-3342	<0.02	<0.5	<200	<10	500	<1	<10	<20	<5	150	15	<0.01	50	200
3342-3355	<0.02	<0.5	<200	<10	200	<1	<10	<20	<5	100	5	<0.01	20	100
3355-3359	<0.02	<0.5	<200	<10	500	<1	<10	<20	<5	100	10	<0.01	20	500
3359-3364	<0.02	<0.5	<200	<10	200	<1	<10	<20	<5	50	5	0.02	30	200
3364-3375	<0.02	<0.5	<200	<10	200	<1	<10	<20	<5	30	<2	<0.01	30	100
3375-3384	0.08	<0.5	<200	<10	300	<1	<10	<20	5	100	15	0.02	20	500
3384-3394	0.06	<0.5	<200	<10	700	1	20	<20	5	5	30	0.10	50	50
3394-3405	0.02	<0.5	<200	<10	50	<1	<10	<20	7	<5	50	0.10	20	30
3405-3414	0.02	<0.5	<200	10	700	1	<10	<20	5	70	30	0.05	20	30
3414-3421	0.06	<0.5	<200	<10	200	<1	<10	<20	<5	30	<2	0.05	20	200
3421-3432	0.04	<0.5	<200	<10	30	<1	<10	<20	<5	50	<2	0.05	<20	300
3432-3443	0.11	<0.5	<200	<10	300	<1	<10	<20	5	50	<2	0.05	<20	300
3443-3454	0.02	<0.5	<200	<10	200	<1	<10	<20	5	70	<2	0.10	50	500
3454-3465	0.02	<0.5	<200	<10	150	<1	<10	<20	5	70	<2	0.10	<20	300
3465-3472	0.02	<0.5	<200	<10	30	<1	<10	<20	10	70	<2	<0.01	20	500
3472-3476	0.02	<0.5	<200	<10	1000	1	<10	<20	7	<5	10	0.05	50	100
3476-3481	<0.02	<0.5	<200	<10	100	<1	<10	<20	5	70	<2	0.04	20	700
3481-3491	<0.02	<0.5	<200	<10	200	<1	<10	<20	<5	50	<2	0.07	20	200
3491-3500	<0.02	<0.5	<200	<10	150	<1	<10	<20	<5	50	<2	0.07	<20	50
3500-3511	0.02	<0.5	<200	<10	200	<1	<10	<20	<5	50	<2	0.03	20	50
3511-3523	<0.02	<0.5	<200	10	200	<1	<10	<20	5	50	<2	0.07	<20	50
3523-3533	<0.02	<0.5	<200	15	100	<1	<10	<20	5	50	<2	0.05	50	50
3533-3545	<0.02	<0.5	<200	20	150	<1	<10	<20	<5	50	<2	0.09	20	50
3545-3556	<0.02	<0.5	<200	10	150	<1	<10	<20	<5	30	<2	0.03	<20	50
3556-3567	<0.02	<0.5	<200	20	150	<1	<10	<20	5	50	<2	0.04	20	100

Depth Interval (feet)	Au	Ag	As	B	Ba	Be	Bi	Cd	Co	Cr	Cu	Hg	La	Mn
3567-3578	<0.02	<0.5	<200	20	300	<1	<10	<20	5	50	<2	<0.01	30	50
3578-3590	<0.02	<0.5	<200	20	200	<1	<10	<20	<5	100	<2	0.03	30	100
3590-3602	0.08	<0.5	<200	15	100	<1	<10	<20	<5	50	<2	0.03	<20	100
3602-3613	<0.02	<0.5	<200	15	300	<1	<10	<20	5	100	<2	0.02	20	70
3613-3624	<0.02	<0.5	<200	20	300	1	<10	<20	<5	100	<2	0.02	20	100
3624-2636	<0.02	<0.5	<200	15	300	<1	<10	<20	5	70	<2	0.03	20	50
3636-3647	<0.02	<0.5	<200	15	150	<1	<10	<20	<5	50	<2	0.05	30	50
3647-3658	<0.02	<0.5	<200	15	200	<1	<10	<20	<5	70	<2	0.02	50	50
3658-3670	<0.02	<0.5	<200	30	300	<1	<10	<20	<5	70	<2	0.02	20	50
3670-3681	<0.02	<0.5	<200	15	200	<1	<10	<20	<5	50	<2	0.02	50	50
3681-3693	<0.02	<0.5	<200	20	300	<1	<10	<20	5	70	<2	0.02	30	50
3693-3707	<0.02	<0.5	<200	50	200	<1	<10	<20	<5	100	<2	0.02	30	50
3707-3716	<0.02	<0.5	<200	10	150	<1	<10	<20	<5	30	<2	0.03	20	50
3716-3728	<0.02	<0.5	<200	10	200	<1	<10	<20	<5	70	<2	0.02	20	70
3728-3740	<0.02	<0.5	<200	10	200	<1	<10	<20	<5	50	<2	0.03	20	50
3740-3751	<0.02	<0.5	<200	10	300	<1	<10	<20	<5	70	<2	0.02	20	50
3751-3762	<0.02	<0.5	<200	20	200	<1	<10	<20	5	50	<2	0.05	30	70
3762-3774	<0.02	<0.5	<200	10	200	<1	<10	<20	5	50	5	0.02	30	100
3774-3786	<0.02	<0.5	<200	20	300	1	<10	<20	<5	50	<2	0.02	30	50
3786-3897	<0.02	<0.5	<200	30	200	1	<10	<20	5	70	<2	0.02	50	100
3797-3808	<0.02	<0.5	<200	10	300	<1	<10	<20	5	70	<2	0.02	30	70
3808-3819	<0.02	<0.5	<200	20	300	<1	<10	<20	5	70	7	0.03	50	50
3819-3831	<0.02	<0.5	<200	20	300	<1	<10	<20	<5	70	<2	<0.01	30	50
3831-3843	<0.02	<0.5	<200	30	300	<1	<10	<20	<5	50	<2	0.03	20	50
3843-3454	<0.02	<0.5	<200	30	300	1	<10	<20	5	100	<2	0.03	30	70

Depth Interval (feet)	Au	Ag	As	B	Ba	Be	Bi	Cd	Co	Cr	Cu	Hg	La	Mn
3854-3866	<0.02	<0.5	<200	30	500	<1	<10	<20	5	100	<2	0.03	30	100
3866-3876	<0.02	<0.5	<200	20	300	<1	<10	<20	<5	50	<2	0.02	20	200
3876-3879	<0.02	<0.5	<200	<10	300	<1	<10	<20	5	50	<2	0.02	30	200
3879-3887	<0.02	<0.5	<200	<10	200	<1	<10	<20	5	50	5	0.02	20	300
3887-3894	<0.02	<0.5	<200	<10	300	<1	<10	<20	<5	100	5	0.03	20	500
3894-3899	<0.02	<0.5	<200	<10	150	<1	<10	<20	<5	100	5	0.04	20	100
3899-3910	<0.02	<0.5	<200	<10	300	<1	<10	<20	<5	150	5	0.04	20	100
3910-3922	<0.02	<0.5	<200	20	200	<1	<10	20	<5	150	20	0.04	20	100
3922-3930	<0.02	1.0	<200	15	100	<1	<10	20	<5	100	15	0.09	20	300
3930-3937	<0.02	0.5	<200	50	1000	<1	<10	<20	10	100	30	0.04	50	100
3937-3944	<0.02	<0.5	<200	30	700	<1	<10	<20	10	100	20	0.04	50	150
3944-3955	<0.02	<0.5	<200	20	1000	<1	<10	<20	7	100	30	0.04	70	200
3955-3966	<0.02	<0.5	<200	20	1000	<1	<10	<20	10	70	20	0.04	30	200
3966-3977	<0.02	<0.5	<200	15	700	<1	<10	<20	5	100	30	0.04	20	300
3977-3988	<0.02	<0.5	<200	20	700	<1	<10	<20	15	100	20	0.03	50	200
		<0.5												
3988-3996	<0.02	<0.5	<200	<10	500	<1	<10	<20	10	100	20	0.04	20	500

Depth Interval (feet)	Mo	Nb	Ni	Pb	Sb	Sc	Sn	Sr	V	W	Y	Zn	Zr
169.5-171	<5	<10	10	<10	<100	5	<10	<100	50	<50	<10	<200	50
171-173	<5	<10	5	<10	<100	<5	<10	<100	20	<50	<10	<200	<10
174-177	<5	10	15	<10	<100	<5	<10	<100	20	<50	<10	<200	50
178-180	<5	<10	10	10	<100	<5	<10	<100	20	<50	<10	<200	10
180-187	<5	<10	30	10	<100	5	<10	<100	70	<50	10	<200	70
187-188	<5	<10	30	10	<100	5	<10	<100	70	<50	<10	<200	70
189-191	<5	<10	50	<10	<100	<5	<10	<100	70	<50	20	<200	100
191-196	<5	<10	30	20	<100	<5	<10	<100	50	<50	20	<200	50
197-199	5	<10	100	20	<100	<5	<10	<100	300	<50	15	300	100
199-202	<5	<10	50	20	<100	<5	<10	<100	100	<50	10	200	70
202-205	5	<10	150	30	<100	10	<10	<100	700	<50	15	700	150
205-207	<5	<10	100	<10	<100	<5	<10	100	50	<50	<10	300	50
207-209	<5	<10	30	<10	<100	<5	<10	<100	20	<50	<10	500	70
209-212	<5	<10	30	<10	<100	<5	<10	<100	50	<50	<10	200	50
213-214	<5	10	50	30	<100	<5	<10	<100	70	<50	10	<200	100

Depth Interval (feet)	Mo	Nb	Ni	Pb	Sb	Sc	Sn	Sr	V	W	Y	Zn	Zr
215-217	<5	10	100	10	<100	10	<10	<100	150	<50	20	<200	100
217-219	<5	10	100	20	<100	10	<10	<100	200	<50	15	<200	300
219-226	<5	15	100	15	<100	20	<10	<100	200	<50	20	<200	300
226-232	5	10	100	20	<100	10	<10	<100	200	<50	10	<200	100
233-235	7	15	100	70	<100	15	<10	<100	500	<50	20	500	200
236-239	<5	10	50	30	<100	15	<10	<100	200	<50	15	200	100
240-241	7	15	50	30	<100	15	<10	<100	500	<50	20	300	300
242-244	<5	<10	50	30	<100	10	<10	<100	200	<50	15	200	100
245-247	5	15	50	50	<100	15	<10	<100	200	<50	15	<200	200
248-257	<5	10	50	100	<100	5	<10	<100	50	<50	10	<200	50
261-275	<5	15	70	20	<100	10	<10	<100	200	<50	10	<200	200
275-277	<5	15	50	20	<100	10	<10	<100	70	<50	10	<200	150
278-282	<5	<10	5	<10	<100	<5	<10	<100	20	<50	<10	<200	20
282-284	<5	<10	50	<10	<100	5	<10	<100	70	<50	10	<200	50
284-288	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
289-292	<5	<10	30	10	<100	7	<10	<100	70	<50	10	<200	70
292-295	<5	<10	20	<10	<100	<5	<10	<100	50	<50	<10	<200	20
296-298	<5	<10	20	<10	<100	5	<10	<100	50	<50	<10	<200	50
296-298*	5	10	70	30	<100	15	<10	<100	200	<50	15	<200	200
298-302	30	<10	50	300	<100	10	<10	<100	100	<50	10	<200	200
303-307	<5	<10	20	<10	<100	5	<10	<100	20	<50	10	<200	50
307-311	<5	<10	10	<10	<100	<5	<10	<100	20	<50	<10	<200	10
312-314	<5	<10	10	<10	<100	<5	<10	<100	30	<50	<10	<200	10
314-316	<5	<10	5	<10	<100	<5	<10	<100	10	<50	<10	<200	10
316-322	<5	<10	<5	<10	<100	<5	<10	<100	<10	<50	<10	<200	<10

Depth Interval (feet)	Mo	Nb	Ni	Pb	Sb	Sc	Sn	Sr	V	W	Y	Zn	Zr
325-327	<5	<10	10	<10	<100	<5	<10	<100	70	<50	<10	<200	<10
327-329	<5	10	10	10	<100	<5	<10	<100	30	<50	<10	<200	30
330-334	<5	10	20	10	<100	5	<10	<100	30	<50	10	<200	50
334-336	<5	<10	15	<10	<100	<5	<10	<100	30	<50	<10	<200	30
336-338	<5	10	20	30	<100	5	30	<100	30	<50	<10	200	70
338-341	<5	<10	20	10	<100	<5	<10	<100	30	<50	<10	<200	30
341-345	<5	<10	20	10	<100	<5	<10	<100	20	<50	<10	<200	20
345-347	<5	10	15	<10	<100	<5	<10	<100	30	<50	<10	<200	30
347-351	<5	<10	20	10	<100	<5	<10	<100	30	<50	<10	<200	30
351-353	<5	<10	7	<10	<100	<5	<10	<100	15	<50	<10	<200	20
353-355	<5	<10	10	<10	<100	<5	<10	<100	20	<50	<10	<200	20
356-362	<5	10	10	10	<100	<5	<10	<100	30	<50	<10	<200	30
363-367	<5	10	20	10	<100	5	<10	<100	30	<50	<10	<200	50
367-369	<5	<10	5	<10	<100	5	<10	<100	15	<50	<10	<200	20
369-374	<5	<10	7	<10	<100	<5	<10	<100	20	<50	<10	<200	20
374-378	<5	<10	10	<10	<100	<5	<10	<100	20	<50	<10	<200	10
380-385	<5	10	20	10	<100	<5	<10	<100	30	<50	<10	<200	30
385-390	<5	<10	15	10	<100	5	<10	<100	50	<50	10	<200	70
390-396	<5	10	10	10	<100	5	<10	<100	50	<50	<10	<200	70
396-399	5	<10	20	10	<100	<5	<10	<100	30	<50	<10	<200	30
399-400	50	10	70	10	<100	<5	<10	<100	100	<50	<10	<200	30
400-405	<5	<10	7	10	<100	<5	<10	<100	70	<50	<10	<200	10
405-408	<5	<10	10	10	<100	<5	<10	<100	50	<50	<10	<200	30
408-410	7	<10	50	15	<100	7	<10	<100	200	<50	15	300	100
410-411	10	<10	50	<10	<100	5	<10	150	200	<50	15	<200	30

Depth Interval (feet)	Mo	Nb	Ni	Pb	Sb	Sc	Sn	Sr	V	W	Y	Zn	Zr
411-415	5	<10	50	20	<100	5	<10	200	150	<50	15	500	30
415-421	10	<10	30	10	<100	<5	<10	<100	70	<50	<10	300	30
421-425	<5	<10	10	<10	<100	5	<10	<100	30	<50	<10	<200	50
425-429	<5	<10	20	<10	<100	5	<10	<100	50	<50	<10	<200	70
429-436	<5	<10	30	<10	<100	7	<10	<100	70	<50	<10	<200	50
436-440	<5	<10	30	<10	<100	7	<10	<100	50	<50	10	<200	70
440-445	<5	<10	20	<10	<100	5	<10	<100	30	<50	<10	<200	30
445-451	<5	<10	30	<10	<100	<5	<10	<100	50	<50	<10	<200	50
451-460	<5	<10	30	<10	<100	<5	<10	<100	50	<50	<10	<200	50
460-470	<5	<10	30	<10	<100	<5	<10	<100	30	<50	<10	300	20
470-475	<5	<10	20	10	<100	<5	<10	<100	15	<50	<10	200	10
475-480	<5	<10	7	<10	<100	<5	<10	<100	10	<50	<10	<200	<10
480-489	<5	<10	20	<10	<100	<5	<10	<100	20	<50	<10	<200	10
489-503	<5	<10	30	<10	<100	<5	<10	<100	70	<50	<10	<200	10
503-510	<5	<10	7	<10	<100	<5	<10	<100	15	<50	<10	<200	<10
510-516	<5	<10	30	<10	<100	<5	<10	<100	20	<50	<10	<200	15
516-525	<5	<10	20	50	<100	<5	<10	<100	15	<50	<10	<200	10
525-526	<5	<10	30	30	<100	5	<10	<100	30	<50	10	<200	20
526-532	<5	<10	10	<10	<100	<5	<10	<100	20	<50	<10	<200	15
532-532.4	<5	<10	10	<10	<100	<5	<10	<100	20	<50	<10	<200	10
532.4-535	<5	<10	10	<10	<100	<5	<10	<100	15	<50	<10	<200	10
535-543	<5	<10	30	<10	<100	<5	<10	<100	50	<50	10	<200	10
543-553	<5	<10	5	30	<100	<5	<10	<100	20	<50	<10	300	10
553-557	<5	<10	30	100	<100	<5	<10	<100	100	<50	<10	200	10
557-564	<5	<10	20	30	<100	<5	<10	<100	20	<50	<10	3000	30

Depth Interval (feet)	Mo	Nb	Ni	Pb	Sb	Sc	Sn	Sr	V	W	Y	Zn	Zr
564-565	<5	<10	30	<10	<100	5	<10	<100	150	<50	10	<200	100
565-571	<5	<10	30	<10	<100	7	<10	<100	50	<50	10	<200	100
571-574	<5	<10	70	2000	<100	7	15	<100	150	<50	10	>10000	100
574-581	<5	<10	30	100	<100	7	<10	<100	70	<50	<10	500	70
581-593	<5	<10	20	<10	<100	5	<10	<100	70	<50	<10	<200	70
593-598	<5	<10	30	<10	<100	5	<10	<100	50	<50	10	<200	100
598-602	30	<10	70	30	<100	7	<10	<100	300	<50	30	300	200
602-604	<5	<10	30	<10	<100	5	<10	<100	70	<50	<10	<200	100
604-612	5	<10	30	<10	<100	5	<10	<100	100	<50	<10	200	50
612-615	5	<10	70	<10	<100	5	<10	150	200	<50	20	300	30
615-630	<5	<10	30	<10	<100	<5	<10	<100	70	<50	<10	<200	15
630-632	30	<10	70	10	<100	5	<10	<100	200	<50	10	<200	70
632-640	<5	<10	10	<10	<100	7	<10	<100	30	<50	<10	<200	20
640-646	5	<10	50	10	<100	<5	<10	<100	200	<50	20	<200	70
646-647	5	<10	50	<10	<100	5	<10	<100	150	<50	<10	<200	100
647-652	<5	<10	10	<10	<100	5	<10	<100	50	<50	<10	<200	50
652-655	7	<10	50	<10	<100	7	<10	<100	200	<50	20	200	70
655-670	<5	<10	10	<10	<100	<5	<10	<100	70	<50	<10	<200	20
670-673	5	<10	20	<10	<100	5	<10	<100	150	<50	10	<200	30
673-676	5	<10	50	20	<100	5	<10	<100	100	<50	10	<200	50
676-681	<5	<10	20	<10	<100	7	<10	<100	70	<50	15	<200	70
681-685	5	<10	50	15	<100	<5	<10	<100	200	<50	10	<200	70
685-689	<5	<10	20	<10	<100	<5	<10	<100	30	<50	<10	<200	50
689-695	30	<10	70	<10	<100	<5	<10	<100	200	<50	10	<200	30
695-704	<5	<10	50	10	<100	7	<10	<100	100	<50	20	<200	50

Depth Interval (feet)	Mo	Nb	Ni	Pb	Sb	Sc	Sn	Sr	V	W	Y	Zn	Zr
704-705	<5	<10	20	<10	<100	<5	<10	<100	50	<50	<10	<200	15
705-735	<5	<10	<5	30	<100	<5	<10	150	<10	<50	10	<200	20
735-745	5	<10	20	20	<100	<5	<10	<100	100	<50	<10	200	15
747	10	<10	20	20000	700	<5	500	<100	50	<50	<10	>10000	<10
745-755	10	<10	70	5000	<100	<5	200	<100	200	<50	<10	7000	20
755-763	<5	<10	70	200	<100	<5	10	<100	200	<50	<10	1000	20
763-770	10	<10	70	30	<100	5	<10	<100	200	<50	20	<200	70
770-782	<10	<10	50	15000	200	5	100	<100	150	<50	<10	2000	30
782-783	50	<10	150	500	<100	5	<10	100	1000	<50	70	700	70
783-785	<50	<10	50	30	<100	5	<10	<100	200	<50	<10	<200	50
785	<5	<10	50	<10	<100	10	<10	<100	100	<50	15	<200	300
785-793	<5	<10	50	50	<100	7	<10	<100	100	<50	10	<200	100
793-796	<5	<10	20	70	<100	5	<10	<100	100	<50	10	<200	100
796-800	<5	<10	50	30	<100	5	<10	<100	150	<50	20	<200	70
800-810	<5	<10	20	30	<100	5	<10	<100	150	<50	30	<200	150
810-820	<5	<10	20	10	<100	5	<10	<100	200	<50	<10	<200	50
820-829	<5	<10	20	<10	<100	5	<10	<100	100	<50	<10	<200	70
829-830	<5	<10	30	<10	<100	7	<10	<100	100	<50	10	<200	200
830-840	<5	<10	20	100	<100	5	<10	<100	70	<50	<10	<200	70
840-850	<5	<10	20	30	<100	7	<10	<100	100	<50	<10	<200	200
850-860	<5	<10	20	<10	<100	<5	<10	<100	100	<50	<10	<200	30
860-870	<5	<10	30	50	<100	5	<10	100	200	<50	10	<200	200
870-880	<5	<10	20	20	<100	5	<10	100	300	<50	<10	<200	100
880-890	<5	<10	50	70	<100	5	<10	100	200	<50	10	<200	200
894	<5	<10	30	10	<100	5	<10	<100	200	<50	15	<200	70

Depth Interval (feet)	Mo	Nb	Ni	Pb	Sb	Sc	Sn	Sr	V	W	Y	Zn	Zr
890-900	<5	<10	30	50	<100	5	<10	100	300	<50	<10	<200	100
900-903	<5	<10	20	30	<100	5	<10	100	200	<50	10	<200	100
903-904	<5	<10	20	15	<100	<5	<10	100	150	<50	10	<200	70
904	<5	<10	30	50	<100	5	<10	<100	200	<50	10	200	70
904-914	<5	<10	30	20	<100	5	<10	100	200	<50	10	<200	100
915-919	<5	<10	20	10	<100	5	<10	100	70	<50	10	<200	200
919-923	<5	<10	30	<10	<100	5	<10	100	100	<50	10	<200	100
923-930	<5	<10	20	<10	<100	5	<10	100	100	<50	10	<200	300
930-932	5	<10	30	<10	<100	7	<10	100	150	<50	10	<200	200
932-935	<5	<10	50	<10	<100	7	<10	100	200	<50	10	<200	200
944-955	7	<10	20	20	<100	7	<10	<100	150	<50	20	<200	100
955-965	7	<10	30	<10	<100	<5	<10	<100	200	<50	10	<200	30
965-974	<5	<10	50	20	<100	<5	<10	<100	100	<50	10	<200	10
974-981	5	<10	70	<10	<100	<5	<10	<100	200	<50	20	200	20
981-984	<5	<10	50	20	<100	<5	<10	<100	150	<50	<10	<200	10
984-999	7	<10	30	<10	<100	<5	<10	<100	300	<50	10	300	15
999.5	<5	<10	30	30	<100	<5	<10	<100	100	<50	<10	3000	10
999-1008	5	<10	50	<10	<100	<5	<10	<100	150	<50	10	300	20
1008-1014	10	<10	30	30	<100	<5	<10	100	150	<50	<10	700	15
1014-1020	20	<10	50	<10	<100	5	<10	<100	300	<50	15	<200	30
1020-1030	50	<10	70	<10	<100	5	<10	<100	500	<50	10	<200	50
1032-1032.5	5	<10	30	<10	<100	5	<10	<100	300	<50	10	<200	10
1030-1045	20	<10	70	<10	<100	<5	<10	<100	200	<50	<10	<200	50
1045-1055	20	<10	50	<10	<100	<5	<10	<100	200	<50	<10	<200	50
1055-1065	7	<10	70	<10	<100	<5	<10	<100	200	<50	10	500	30

Depth Interval (feet)	Mo	Nb	Ni	Pb	Sb	Sc	Sn	Sr	V	W	Y	Zn	Zr
1065-1065.5	30	<10	50	<10	<100	<5	<10	<100	200	<50	<10	<200	30
1065.5-1081	15	<10	70	<10	200	<5	<10	<100	200	<50	<10	<200	50
1081-1089.5	<5	<10	30	<10	<100	<5	<10	<100	150	<50	<10	200	30
1089.5-1105	5	<10	30	<10	<100	<5	<10	<100	150	<50	<10	700	30
1105-1121	10	<10	50	<10	<100	5	<10	<100	200	<50	<10	<200	30
1121-1131.5	5	<10	50	<10	<100	5	<10	<100	200	<50	<10	<200	50
1121-1131.5*	7	<10	50	<10	<100	<5	<10	<100	200	<50	<10	<200	50
1131.5-1140	<5	<10	30	<10	<100	<5	<10	<100	150	<50	<10	<200	20
1131.5-1140*	5	<10	50	20	<100	5	<10	<100	200	<50	<10	<200	70
1140-1154.7	7	<10	50	10	<100	5	<10	<100	300	<50	10	<200	50
1149.1	5	<10	70	30	<100	5	<10	<100	300	<50	15	<200	50
1154.7-1158.2	5	<10	30	<10	<100	<5	<10	<100	200	<50	<10	<200	20
1158.2-1177.7	7	<10	70	<10	<100	<5	<10	<100	200	<50	10	200	30
1177.6	7	<10	50	200	<100	<5	<10	<100	200	<50	15	>10000	20
1177.7-1185.9	50	<10	100	10	<100	5	<10	<100	700	<50	20	700	50
1186-1196	30	<10	70	<10	<100	<5	<10	<100	200	<50	15	500	70
1196-1207	5	<10	50	<10	<100	5	<10	<100	200	<50	<10	<200	50
1207-1224.2	70	<10	150	<10	<100	7	<10	<100	700	<50	50	500	100
1227.3	<5	<10	10	1500	<100	<5	<10	<100	50	<50	<10	>10000	20
1224.2-1233.5	<5	<10	50	30	<100	7	<10	<100	200	<50	10	300	100
1223.5-1242.2	<5	<10	30	10	<100	5	<10	<100	150	<50	10	<200	70
1242.2-1250.7	<5	<10	20	<10	<100	<5	<10	<100	50	<50	<10	<200	30
1250.7-1258.3	<5	<10	30	<10	<100	5	<10	<100	100	<50	10	<200	50
1258.3-1268	<5	<10	30	<10	<100	5	<10	<100	70	<50	10	<200	50
1268-1276.5	<5	<10	30	<10	<100	5	<10	<100	70	<50	10	<200	70

Depth Interval (feet)	Mo	Nb	Ni	Pb	Sb	Sc	Sn	Sr	V	W	Y	Zn	Zr
1276.5-1284.6	<5	<10	20	<10	<100	<5	<10	<100	50	<50	<10	<200	70
1284.6-1292.3	<5	<10	20	<10	<100	<5	<10	<100	50	<50	<10	<200	70
1292.3-1300.3	<5	<10	30	<10	<100	5	<10	<100	200	<50	<10	<200	50
1300.3-1309	<5	<10	20	<10	<100	<5	<10	<100	70	<50	<10	<200	30
1309-1318.2	10	<10	70	<10	<100	5	<10	<100	500	<50	15	<200	100
1318.2-1322	100	<10	150	<10	<100	<5	<10	<100	1500	<50	30	<200	100
1322-1327.4	5	<10	70	<10	<100	7	<10	<100	300	<50	20	<200	200
1317-1323	50	<10	150	<10	<100	5	<10	<100	3000	<50	20	<200	100
1323-1333	5	<10	50	20	<100	7	<10	<100	300	<50	10	<200	150
1333-1336	<5	<10	20	<10	<100	5	<10	<100	50	<50	<10	<200	50
1336-1344	50	<10	100	<10	<100	5	<10	<100	1000	<50	15	<200	50
1344-1350	70	<10	150	<10	<100	<5	<10	<100	500	<50	10	<200	30
1350-1360	20	<10	100	<10	<100	<5	<10	<100	300	<50	10	300	20
1360-1367	50	<10	70	<10	<100	<5	<10	<100	500	<50	10	<300	30
1367-1373	15	<10	30	<10	<100	<5	<10	<100	200	<50	<10	<200	20
1373-1380	<5	<10	30	<10	<100	5	<10	<100	30	<50	<10	<200	50
1380-1390	<5	<10	20	<10	<100	5	<10	<100	200	<50	<10	<200	70
1390-1396	<5	<10	50	<10	<100	7	<10	<100	150	<50	<10	<200	50
1396-1406.5	70	<10	100	<10	<100	7	<10	<100	700	<50	50	<200	100
1406.5-1423	7	<10	50	<10	<100	5	<10	<100	300	<50	<10	200	70
1423-1433	<5	<10	50	<10	<100	<5	<10	<100	150	<50	<10	<200	20
1433-1443	<5	<10	30	<10	<100	<5	<10	<100	70	<50	<10	<200	20
1443-1454	<5	<10	5	<10	<100	<5	<10	<100	15	<50	<10	<200	10
1454-1466	<5	<10	50	<10	<100	<5	<10	<100	70	<50	<10	500	15
1466-1477	<5	<10	5	<10	<100	<5	<10	<100	30	<50	<10	<200	10

Depth Interval (feet)	Mo	Nb	Ni	Pb	Sb	Sc	Sn	Sr	V	W	Y	Zn	Zr
1477-1488	<5	<10	30	<10	<100	<5	<10	<100	50	<50	<10	<200	15
1488-1499	5	<10	10	<10	<100	<5	<10	<100	15	<50	<10	<200	10
1499-1507	7	<10	30	<10	<100	<5	<10	<100	30	<50	<10	<200	15
1507-1521	<5	<10	20	<10	<100	<5	<10	<100	50	<50	<10	<200	15
1521-1533	<5	<10	20	<10	<100	<5	<10	<100	30	<50	<10	<200	20
1533-1544	<5	<10	30	<10	<100	10	<10	<100	70	<50	10	<200	50
1544-1556	<5	<10	10	<10	<100	<5	<10	<100	20	<50	<10	<200	15
1556-1567	<5	<10	20	<10	<100	<5	<10	<100	30	<50	<10	<200	20
1567-1578	<5	<10	20	<10	<100	<5	<10	<100	30	<50	<10	<200	15
1578-1590	<5	<10	30	<10	<100	5	<10	<100	70	<50	10	<200	30
1590-1601	<5	<10	15	<10	<100	<5	<10	<100	20	<50	<10	<200	10
1601-1612	<5	<10	30	<10	<100	5	<10	<100	50	<50	10	<200	30
1612-1623	<5	<10	7	<10	<100	<5	<10	<100	15	<50	<10	<200	15
1623-1634	<5	<10	10	<10	<100	<5	<10	<100	20	<50	<10	<200	20
1634-1645	<5	<10	30	<10	<100	5	<10	<100	100	<50	10	<200	30
1645-1655	<5	<10	10	<10	<100	<5	<10	<100	100	<50	<10	<200	20
1655-1667	<5	<10	15	<10	<100	<5	<10	<100	50	<50	10	<200	30
1667-1678	7	<10	30	<10	<100	5	<10	<100	200	<50	20	<200	50
1678-1685	<5	<10	5	<10	<100	<5	<10	<100	20	<50	<10	<200	15
1685-1687	30	<10	50	<10	<100	5	<10	<100	300	<50	30	<200	70
1687-1701	<5	<10	20	<10	<100	5	<10	<100	150	<50	10	<200	50
1701-1712	<5	<10	20	<10	<100	<5	<10	<100	70	<50	10	<200	30
1712-1723	<5	<10	20	<10	<100	<5	<10	<100	70	<50	<10	<200	30
1723-1734	<5	<10	30	<10	<100	7	<10	<100	150	<50	10	300	50
1734-1745	20	<10	50	<10	<100	<5	<10	<100	200	<50	<10	<200	30

Depth Interval (feet)	Mo	Nb	Ni	Pb	Sb	Sc	Sn	Sr	V	W	Y	Zn	Zr
1745-1756	<5	<10	5	<10	<100	<5	<10	<100	30	<50	<10	<200	30
1756-1762	<5	<10	30	<10	<100	5	<10	<100	70	<50	<10	<200	70
1762-1778	<5	<10	10	<10	<100	5	<10	<100	70	<50	20	200	50
1778.4-1786.5	<5	<10	20	20	<100	7	<10	<100	100	<50	15	<200	150
1786.5-1790.2	10	<10	50	20	<100	10	<10	150	200	50	20	<200	200
1790.2-1796.8	10	<10	70	20	<100	15	<10	150	200	<50	20	200	150
1796.8-1801.1	<5	<10	30	10	<100	7	<10	<100	200	100	10	<200	100
1801.1-1807.2	15	<10	30	30	<100	10	<10	150	200	<50	30	1000	150
1807.2-1813.6	7	<10	50	20	<100	7	<10	<100	150	<50	20	<200	100
1813.6-1819.4	7	<10	30	10	<100	7	<10	<100	100	<50	20	<200	150
1819.4-1824.5	<5	<10	70	10	<100	10	<10	100	700	<50	30	<200	150
1824.5-1830.0	<5	<10	20	10	<100	10	<10	<100	100	<50	15	<200	150
1830.0-1835.9	<5	<10	15	10	<100	5	<10	<100	100	<50	10	<200	70
1835.9-1840.2	<5	<10	30	100	<100	10	<10	<100	150	<50	15	<200	150
1840.2-1844.7	<5	<10	15	100	<100	10	<10	<100	70	<50	15	200	150
1844.7-1845.2	<5	<10	70	>20000	1000	7	100	<100	100	50	<10	>10000	50
1845.2-1850.0	7	<10	70	2000	100	10	20	<100	200	<50	20	3000	200
1850.0-1855.1	30	<10	50	100	<100	7	<10	<100	300	<50	30	<200	150
1855.1-1860.0	5	<10	20	20	<100	10	<10	<100	200	<50	30	3000	150
1860.0-1865.0	<5	<10	30	10	100	10	<10	<100	200	<50	30	2000	150
1865.3-1870.2	<5	<10	20	20	<100	7	<10	<100	150	<50	15	<200	150
1870.2-1875.4	<5	<10	50	30	<100	15	<10	<100	200	<50	20	<200	150
1875.4-1880.1	<5	<10	20	10	<100	10	<10	<100	100	<50	30	<200	150
1880.1-1885.9	<5	<10	50	15	<100	10	<10	<100	200	<50	30	<200	200
1885.9-1894.5	15	<10	70	10	<100	7	<10	<100	200	<50	30	200	200

Depth Interval (feet)	Mo	Nb	Ni	Pb	Sb	Sc	Sn	Sr	V	W	Y	Zn	Zr
1894.5-1899.7	30	<10	70	10	300	7	<10	<100	200	<50	30	<200	100
1899.7-1905.0	50	<10	100	10	<100	10	<10	<100	500	<50	30	<200	150
1905.0-1910.9	5	<10	20	10	<100	10	<10	<100	100	<50	20	<200	150
1910.9-1918.5	7	<10	20	10	<100	7	<10	<100	100	<50	15	<200	150
1918.5-1929.2	5	<10	15	10	<100	5	<10	<100	50	<50	10	<200	70
1929.2-1935.0	15	<10	30	10	<100	10	<10	100	200	<50	30	<200	200
1935.0-1941.5	20	<10	30	10	<100	7	<10	<100	200	<50	15	<200	150
1941.5-1946.7	30	<10	30	10	<100	7	<10	<100	500	<50	20	<200	150
1946.7-1951.8	15	<10	70	15	<100	10	<10	<100	200	<50	20	300	150
1951.8-1957.3	10	<10	70	10	<100	15	<10	<100	200	<50	30	<200	200
1957.3-1962.7	10	<10	50	10	<100	10	<10	<100	200	<50	20	<200	200
1963-1968	<5	<10	30	<10	<100	7	<10	<100	70	<50	15	200	150
1968-1974	15	<10	30	<10	<100	10	<10	<100	150	<50	20	<200	200
1974-1978	<5	10	30	<10	<100	10	<10	<100	150	<50	20	<200	200
1978-1984	5	<10	50	<10	<100	10	<10	100	100	<50	20	300	200
1984-1991	<5	10	50	150	<100	15	<10	200	100	<50	20	5000	150
1991-1996	<5	<10	30	300	<100	7	<10	<100	50	<50	15	<200	100
1996-1998	<5	<10	30	300	<100	7	<10	<100	70	<50	15	1000	100
1998-2004	<5	<10	30	30	<100	7	<10	<100	70	<50	15	300	100
2004-2010	<5	<10	30	<10	<100	7	<10	<100	70	<50	15	2000	100
2010-2015	15	10	30	<10	<100	10	<10	<100	100	<50	30	200	150
2015-2019	<5	10	30	<10	<100	15	<10	<100	70	<50	20	<200	150
2019-2024	<5	<10	20	<10	<100	10	<10	<100	70	<50	20	<200	150
2024-2029	<5	15	30	<10	<100	10	<10	<100	100	<50	30	<200	200
2029-2033	<5	<10	30	10	<100	10	<10	<100	70	<50	20	<200	150

Depth Interval (feet)	Mo	Nb	Ni	Pb	Sb	Sc	Sn	Sr	V	W	Y	Zn	Zr
2033-2044	<5	<10	30	<10	<100	10	<10	<100	150	<50	20	<200	150
2044-2053	<5	<10	30	<10	<100	10	<10	<100	70	<50	20	<200	200
2053-2064	<5	<10	30	<10	<100	7	<10	<100	150	<50	20	<200	150
2064-2067	<5	<10	30	<10	<100	7	<10	<100	100	<50	20	<200	150
2067-2073	<5	<10	20	<10	<100	7	<10	<100	70	<50	15	<200	150
2073-2077	<5	<10	20	<10	<100	<5	<10	<100	70	<50	10	5000	100
2077-2086	<5	<10	20	<10	<100	7	<10	<100	50	<50	15	500	150
2086-2092	<5	10	50	<10	<100	15	<10	<100	100	50	30	700	300
2092-2096	<5	10	30	<10	<100	10	<10	<100	100	<50	20	1500	300
2096-2103	<5	10	30	<10	<100	10	<10	<100	100	<50	20	7000	150
2103-2109	15	<10	50	10	<100	10	<10	<100	200	<50	30	7000	150
2109-2114	7	<10	70	<10	<100	15	<10	<100	200	<50	30	300	150
2114-2119	10	10	30	10	<100	10	<10	<100	150	<50	20	200	150
2119-2125	<5	15	30	<10	<100	7	<10	<100	70	50	15	500	150
2125-2130	15	10	30	<10	<100	10	<10	<100	150	<50	70	<200	150
2130-2136	15	<10	30	30	<100	7	<10	<100	100	<50	15	<200	100
2136-2142	5	10	30	10	<100	10	<10	<100	100	<50	20	1500	150
2142-2148	<5	10	30	30	<100	10	<10	<100	70	<50	30	200	150
2148-2153	7	15	50	10	<100	15	<10	100	100	<50	20	300	150
2153-2159	<5	10	30	<10	<100	10	<10	<100	70	<50	20	<200	150
2159-2164	15	10	50	<10	<100	15	<10	<100	200	70	30	300	200
2164-2168	15	10	30	<10	<100	10	<10	<100	70	<50	30	1000	150
2168-2174	<5	<10	30	<10	<100	7	<10	<100	70	<50	15	<200	100
2174-2180	<5	<10	30	<10	<100	7	<10	<100	70	<50	15	<200	100
2180-2186	<5	10	30	<10	<100	10	<10	<100	70	<50	20	<200	150

Depth Interval (feet)	Mo	Nb	Ni	Pb	Sb	Sc	Sn	Sr	V	W	Y	Zn	Zr
2186-2191	<5	<10	30	<10	<100	7	<10	<100	70	<50	15	<200	150
2191-2198	10	10	30	<10	<100	7	<10	<100	150	<50	20	<200	150
2198-2203	30	10	70	<10	<100	15	<10	150	100	70	30	<200	300
2203-2216	<5	<10	30	10	<100	7	<10	<100	70	<50	15	<200	150
2216-2222	<5	10	30	<10	<100	10	<10	<100	70	<50	15	<200	150
2222-2227	15	10	50	<10	<100	15	<10	300	100	<50	30	<200	200
2227-2233	30	10	70	<10	<100	20	<10	300	150	<50	30	<200	200
2233-2238	5	10	70	<10	<100	15	<10	<100	300	<50	30	<200	150
2238-2245	5	10	50	<10	<100	15	<10	100	150	<50	30	<200	300
2245-2250	5	10	50	<10	<100	15	<10	<100	100	<50	30	<200	300
2250-2256	50	10	70	<10	<100	15	<10	<100	300	<50	30	<200	150
2256-2261	10	10	50	<10	<100	15	<10	300	200	<50	20	<200	200
2261-2266	70	<10	70	10	<100	10	<10	<100	200	<50	20	<200	150
2266-2271	<5	<10	30	<10	<100	7	<10	<100	70	<50	10	<200	100
2271-2277	15	10	30	<10	<100	10	<10	100	150	<50	20	300	150
2277-2282	20	10	70	<10	<100	15	<10	<100	500	<50	30	<200	300
2282-2288	15	15	70	<10	<100	15	<10	<100	200	<50	20	<200	300
2288-2294	<5	10	50	<10	<100	7	<10	<100	100	<50	15	<200	150
2294-2300	<5	10	30	20	<100	10	<10	<100	70	<50	15	<200	150
2300-2306	<5	10	30	<10	<100	10	<10	<100	70	<50	20	<200	150
2306-2311	<5	10	30	<10	<100	10	<10	<100	70	<50	15	<200	200
2311-2315	<5	10	30	<10	<100	10	<10	<100	70	<50	15	<200	150
2315-2321	<5	10	30	<10	<100	10	<10	<100	70	<50	15	<200	150
2321-2332	5	<10	30	<10	<100	7	<10	<100	100	<50	20	<200	150
2332-2343	15	<10	30	10	<100	5	<10	<100	70	<50	15	<200	70

Depth Interval (feet)	Mo	Nb	Ni	Pb	Sb	Sc	Sn	Sr	V	W	Y	Zn	Zr
2344	<5	<10	20	500	<100	5	<10	<100	30	<50	10	>10000	30
2343-2354	7	<10	30	<10	<100	5	<10	<100	50	<50	15	200	70
2354-2365	<5	<10	30	<10	<100	7	<10	<100	50	<50	15	<200	150
2365-2377	<5	<10	20	<10	<100	7	<10	<100	30	<50	10	200	70
2377-2388	<5	<10	30	<10	<100	7	<10	50	50	<50	15	<200	100
2388-2399	<5	<10	30	<10	<100	7	<10	<100	50	<50	10	<200	70
2399-2410	<5	<10	50	<10	<100	7	<10	50	100	<50	15	<200	70
2410-2421	15	<10	100	30	<100	10	<10	100	300	<50	30	5000	100
2421-2433	50	10	70	<10	<100	7	<10	300	500	<50	20	1500	100
2433-2443	20	<10	50	<10	<100	7	<10	200	300	<50	20	<200	150
2443-2450	10	<10	50	<10	<100	10	<10	300	300	<50	20	<200	150
2450-2455	<5	10	100	<10	<100	20	<10	1500	100	<50	20	<200	150
2455-2465	50	<10	100	<10	<100	5	<10	300	500	<50	20	<200	100
2465-2476	20	10	30	<10	<100	10	<10	300	150	<50	20	300	150
2476-2484	<5	<10	30	<10	<100	10	<10	100	70	<50	15	1000	150
2497	<5	<10	500	<10	<100	7	<10	150	30	<50	<10	<200	20
2484-2499	<5	<10	150	<10	<100	15	<10	300	70	<50	20	<200	100
2499-2510	<5	<10	150	<10	<100	20	<10	700	100	<50	20	<200	100
2510-2518	<5	<10	150	<10	<100	30	<10	500	100	<50	30	<200	150
2518-2533	7	<10	50	<10	<100	10	<10	200	100	<50	15	<200	150
2533-2542	5	<10	30	<10	<100	15	<10	70	100	<50	20	<200	200
2542-2553	<5	<10	30	<10	<100	10	<10	100	70	<50	15	<200	150
2553-2563	7	<10	70	<10	<100	15	<10	150	150	<50	30	<200	150
2563-2576	5	<10	70	<10	<100	15	<10	200	200	<50	20	<200	150
2576-2578	15	<10	100	<10	<100	15	<10	150	200	<50	30	<200	150

Depth Interval (feet)	Mo	Nb	Ni	Pb	Sb	Sc	Sn	Sr	V	W	Y	Zn	Zr
2578-2586	7	<10	50	<10	<100	15	<10	300	200	<50	20	<200	150
2586-2587	7	<10	70	<10	<100	15	<10	50	100	<50	15	200	30
2587-2595	<5	10	50	<10	<100	15	<10	300	150	<50	15	<200	150
2595-2605	10	<10	50	<10	<100	10	<10	150	150	<50	20	<200	150
2605-2615	15	10	70	<10	<100	15	<10	300	150	<50	30	<200	150
2615-2626	<5	<10	50	<10	<100	10	<10	200	150	<50	15	<200	150
2626-2628	<5	10	70	<10	<100	15	<10	1500	100	<50	15	<200	150
2628-2636	15	10	50	<10	<100	7	<10	70	300	<50	30	<200	150
2636-2646	7	10	30	<10	<100	7	<10	50	200	<50	30	<200	150
2650	15	<10	50	<10	<100	10	<10	100	200	<50	30	200	70
2646-2656	15	<10	70	<10	<100	7	<10	150	300	<50	50	<200	100
2656-2667	20	<10	70	<10	<100	7	<10	200	300	<50	30	<200	150
2667-2678	20	10	70	<10	<100	10	<10	150	150	<50	30	<200	150
2678-2690	10	<10	70	<10	<100	10	<10	200	200	<50	30	<200	150
2690-2700	<5	<10	30	<10	<100	10	<10	150	70	<50	20	<200	150
2700-2707	<5	<10	30	<10	<100	7	<10	70	100	<50	30	<200	200
2707-2711	<5	<10	5	10	<100	10	<10	700	30	<50	30	<200	150
2711-2722	<5	<10	30	<10	<100	10	<10	70	100	<50	20	<200	200
2722-2731	10	<10	30	<10	<100	30	<10	200	150	<50	30	<200	150
2731-2735	<5	<10	100	<10	<100	15	<10	1000	100	<50	20	<200	150
2735-2737	<5	<10	30	<10	<100	20	<10	300	200	<50	20	<200	100
2737-2749	7	10	30	<10	<100	10	<10	300	150	<50	30	<200	150
2749-2760	<5	<10	30	<10	<100	10	<10	300	150	<50	20	<200	150
2760-2767	10	<10	30	<10	<100	10	<10	200	300	<50	20	<200	150
2767-2779	30	<10	70	<10	<100	5	<10	50	300	<50	30	<200	70

Depth Interval (feet)	Mo	Nb	Ni	Pb	Sb	Sc	Sn	Sr	V	W	Y	Zn	Zr
2779-2789	20	<10	30	10	<100	10	<10	200	100	<50	20	<200	150
2789-2798	20	10	50	30	<100	10	<10	200	300	<50	20	<200	100
2798-2808	15	<10	30	<10	<100	5	<10	50	200	<50	15	<200	70
2808-2819	20	<10	70	15	<100	10	<10	500	300	<50	50	<200	70
2819-2828	30	10	100	30	<100	15	<10	150	1000	<50	50	<200	200
2828-2837	20	15	70	30	<100	15	<10	150	500	<50	30	<200	300
2837-2847	15	10	150	<10	<100	15	<10	300	2000	<50	30	<200	300
2847-2856	10	<10	150	10	<100	30	<10	200	700	<50	50	<200	200
2853	<5	<10	300	10	<100	<5	<10	<100	20	<50	<10	<200	<10
2856-2869	30	<10	150	10	<100	50	<10	300	1000	<50	70	<200	300
2869-2880	5	<10	150	50	<100	70	<10	500	700	<50	30	300	100
2880-2890	15	10	150	10	<100	20	<10	300	700	<50	30	1000	150
2890-2902	7	10	150	15	<100	20	<10	300	700	<50	30	<200	150
2902-2913	30	10	100	<10	<100	20	<10	200	150	<50	30	<200	150
2913-2924	50	15	100	<10	<100	30	<10	300	300	<50	50	<200	200
2924-2934	30	20	150	30	<100	30	<10	300	300	<50	30	700	150
2925	70	20	150	30	<100	10	<10	200	200	<50	50	<200	70
2934-2944	15	15	150	30	<100	7	<10	150	300	<50	20	200	150
2944-2951	30	<10	150	<10	<100	<5	<10	700	500	<50	30	1500	70
2946-2947	<5	15	150	10	<100	5	<10	<100	1000	<50	<10	>10000	20
2951-2962	30	10	150	<10	<100	5	<10	300	1500	<50	20	700	70
2958	50	<10	150	15	<100	<5	<10	150	3000	<50	30	300	70
2962-2967	70	30	15	10	<100	7	<10	700	500	<50	30	<200	700
2967-2978	7	20	150	15	<100	7	<10	700	2000	<50	50	<200	300
2978-2986	300	15	500	15	<100	7	<10	<100	5000	<50	70	200	300

Depth Interval (feet)	Mo	Nb	Ni	Pb	Sb	Sc	Sn	Sr	V	W	Y	Zn	Zr
2986-2988	7	10	10	10	<100	7	<10	500	700	<50	20	<200	300
2988-2996	700	20	700	10	<100	15	<10	200	7000	<50	150	200	700
2996-3009	100	<10	150	10	<100	10	<10	300	1500	<50	70	<200	200
3009-3017	150	10	150	50	<100	15	<10	500	300	<50	30	200	500
3017-3022	<5	10	5	10	<100	7	<10	700	150	<50	20	<200	500
3022-3032	15	<10	150	10	<100	10	<10	200	700	<50	30	<200	300
3032-3036	70	<10	15	<10	<100	<5	<10	700	100	<50	20	<200	70
3036-3041	<5	10	15	<10	<100	5	<10	700	150	<50	30	<200	200
3041-3050	<5	<10	15	<10	<100	<5	<10	1500	30	<50	<10	<200	20
3050-3060	<5	<10	15	10	<100	5	<10	300	70	<50	10	<200	30
3060-3061	<5	15	5	10	<100	7	<10	1000	200	<50	30	<200	700
3061-3062	<5	<10	20	20	<100	5	<10	3000	100	<50	15	<200	70
3062-3063	<5	10	5	<10	<100	7	<10	1500	200	<50	30	<200	500
3063-3071	30	<10	150	<10	<100	<5	<10	700	700	<50	20	<200	70
3071-3074	70	10	150	<10	<100	15	<10	500	700	<50	70	200	200
3074-3084	1500	<10	50	30	<100	<5	<10	<100	300	<50	10	<200	150
3084-3094	300	<10	300	<10	<100	<5	<10	300	3000	<50	70	700	150
3094-3107	10	<10	50	<10	<100	7	<10	500	500	<50	30	<200	100
3107-3111	<5	<10	<5	<10	<100	<5	<10	700	30	<50	15	<200	70
3111-3115	<5	<10	<5	<10	<100	<5	<10	1000	50	<50	15	<200	50
3115-3117	5	<10	<5	<10	<100	<5	<10	1000	70	<50	10	<200	50
3117-3119	5	10	20	10	<100	10	<10	700	300	<50	20	<200	70
3119-3126	15	<10	70	<10	<100	7	<10	500	500	<50	50	<200	70
3126-3131	<5	<10	10	<10	<100	<5	<10	1000	200	<50	20	<200	20
3131-3135	30	<10	100	<10	<100	5	<10	500	1000	<50	50	<200	100

Depth Interval (feet)	Mo	Nb	Ni	Pb	Sb	Sc	Sn	Sr	V	W	Y	Zn	Zr
3135-3140	20	<10	100	<10	<100	5	<10	500	1500	<50	30	<200	100
3140-3151	<5	<10	50	<10	<100	5	<10	500	200	<50	30	<200	50
3151-3155	<5	<10	20	<10	<100	5	<10	500	150	<50	30	<200	70
3155-3165	5	10	70	<10	<100	20	<10	500	200	<50	30	<200	100
3165-3166	<5	<10	10	<10	<100	7	<10	1000	50	<50	20	<200	70
3166-3170	5	10	50	10	<100	15	<10	700	200	<50	20	<200	100
3170-3172	<5	<10	10	<10	<100	5	<10	500	100	<50	20	<200	70
3172-3173	5	10	100	10	<100	20	<10	700	200	<50	20	<200	100
3173-3184	5	<10	10	<10	<100	5	<10	700	100	<50	20	<200	70
3184-3196	<5	<10	10	<10	<100	5	<10	700	100	<50	20	<200	50
3196-3208	5	<10	10	<10	<100	<5	<10	500	100	<50	20	<200	50
3208-3219	<5	<10	10	<10	<100	5	<10	500	100	<50	20	<200	70
3219-3227	<5	<10	5	<10	<100	<5	<10	700	70	<50	15	<200	30
3227-3241	5	10	100	<10	<100	20	<10	700	150	<50	20	<200	100
3241-3245	<5	<10	20	<10	<100	7	<10	500	70	<50	20	<200	50
3245-3251	5	10	100	10	<100	20	<10	1000	200	<50	20	<200	150
3251-3264	<5	<10	15	<10	<100	5	<10	700	200	<50	20	<200	70
3264-3275	<5	<10	15	10	<100	5	<10	700	70	<50	15	<200	70
3275-3284	<5	<10	15	<10	<100	7	<10	700	70	<50	15	<200	100
3284-3288	<5	<10	20	<10	<100	7	<10	500	70	<50	20	<200	100
3288-3291	5	10	100	<10	<100	15	<10	1000	200	<50	15	<200	150
3291-3296	<5	<10	30	<10	<100	10	<10	500	100	<50	15	<200	100
3296-3306	<5	<10	20	<10	<100	5	<10	700	70	<50	20	<200	70
3306-3318	<5	<10	20	<10	<100	5	<10	500	70	<50	20	<200	70
3318-3330	<5	<10	50	<10	<100	7	<10	500	70	<50	20	<200	100

Depth Interval (feet)	Mo	Nb	Ni	Pb	Sb	Sc	Sn	Sr	V	W	Y	Zn	Zr
3330-3342	7	<10	50	<10	<100	7	<10	700	70	<50	20	<200	100
3342-3355	<5	<10	15	<10	<100	5	<10	500	50	<50	15	<200	70
3355-3359	5	<10	15	10	<100	5	<10	500	50	<50	20	<200	100
3359-3364	<5	<10	7	<10	<100	<5	<10	500	30	<50	15	<200	50
3364-3375	<5	<10	5	<10	<100	<5	<10	700	20	<50	15	<200	50
3375-3384	<5	<10	10	<10	<100	7	<10	500	20	<50	15	700	70
3384-3394	<5	10	5	15	<100	5	<10	300	15	<50	15	<200	150
3394-3405	<5	10	5	10	<100	7	<10	300	20	<50	10	<200	100
3405-3414	<5	10	20	10	<100	5	<10	300	10	<50	10	<200	150
3414-3421	<5	<10	7	<10	<100	<5	<10	500	15	<50	15	<200	50
3421-3432	<5	<10	7	<10	<100	<5	<10	700	15	<50	15	<200	50
3432-3443	<5	<10	7	<10	<100	5	<10	700	20	<50	15	<200	70
3443-3454	<5	<10	10	<10	<100	5	<10	500	20	<50	20	1000	70
3454-3465	<5	<10	7	<10	<100	5	<10	500	10	<50	15	<200	70
3465-3472	<5	<10	7	<10	<100	5	<10	700	15	<50	15	<200	70
3472-3476	5	10	<5	10	<100	7	<10	700	50	<50	15	<200	150
3476-3481	5	<10	7	<10	<100	5	<10	500	20	<50	20	<200	100
3481-3491	<5	<10	7	<10	<100	<5	<10	500	20	<50	15	<200	70
3491-3500	<5	<10	5	<10	<100	<5	<10	300	10	<50	10	<200	30
3500-3511	<5	<10	7	<10	<100	<5	<10	500	15	<50	15	<200	70
3511-3523	<5	<10	7	10	<100	<5	<10	500	15	<50	15	<200	70
3523-3533	<5	<10	7	<10	<100	<5	<10	500	20	<50	20	<200	50
3533-3545	<5	<10	7	<10	<100	5	<10	500	20	<50	20	<200	70
3545-3556	<5	<10	5	<10	<100	5	<10	700	15	<50	15	<200	70
3556-3567	<5	<10	10	<10	<100	5	<10	500	20	<50	15	<200	70

Depth Interval (feet)	Mo	Nb	Ni	Pb	Sb	Sc	Sn	Sr	V	W	Y	Zn	Zr
3567-3578	<5	<10	10	<10	<100	5	<10	500	20	<50	15	<200	100
3578-3590	<5	<10	7	<10	<100	5	<10	500	15	<50	15	<200	50
3590-3602	<5	<10	7	<10	<100	5	<10	500	20	<50	15	<200	70
3602-3613	<5	<10	10	<10	<100	5	<10	700	20	<50	15	<200	70
3613-3624	<5	<10	7	<10	<100	5	<10	700	15	<50	15	<200	70
3624-2636	<5	<10	7	<10	<100	5	<10	500	15	<50	15	<200	70
3636-3647	<5	<10	5	<10	<100	5	<10	700	15	<50	15	<200	70
3647-3658	<5	<10	7	<10	<100	5	<10	500	20	<50	15	<200	70
3658-3670	<5	<10	7	<10	<100	<5	<10	500	20	<50	20	<200	70
3670-3681	<5	<10	7	<10	<100	<5	<10	500	15	<50	15	<200	70
3681-3693	<5	<10	10	<10	<100	5	<10	500	20	<50	20	<200	70
3693-3707	<5	<10	10	<10	<100	5	<10	500	30	<50	20	<200	70
3707-3716	<5	<10	7	<10	<100	<5	<10	700	15	<50	15	<200	50
3716-3728	<5	<10	7	<10	<100	5	<10	500	15	<50	15	<200	70
3728-3740	<5	<10	5	<10	<100	5	<10	500	15	<50	15	<200	70
3740-3751	<5	<10	7	<10	<100	<5	<10	700	15	<50	15	<200	70
3751-3762	<5	<10	10	<10	<100	5	<10	500	20	<50	15	<200	70
3762-3774	<5	<10	10	<10	<100	5	<10	500	20	<50	15	<200	70
3774-3786	<5	<10	7	<10	<100	5	<10	700	15	<50	15	<200	50
3786-3897	<5	<10	10	<10	<100	5	<10	500	30	<50	20	<200	70
3797-3808	<5	<10	7	<10	<100	5	<10	500	20	<50	15	<200	70
3808-3819	<5	<10	7	<10	<100	7	<10	300	30	<50	15	<200	70
3819-3831	<5	<10	7	<10	<100	5	<10	500	20	<50	15	<200	70
3831-3843	<5	<10	7	<10	<100	5	<10	500	20	<50	15	<200	70
3843-3454	<5	<10	10	<10	<100	7	<10	500	30	<50	15	<200	70

Depth Interval (feet)	Mo	Nb	Ni	Pb	Sb	Sc	Sn	Sr	V	W	Y	Zn	Zr
3854-3866	<5	<10	10	<10	<100	7	<10	500	30	<50	20	<200	100
3866-3876	<5	<10	7	<10	<100	5	<10	700	15	<50	15	<200	70
3876-3879	<5	<10	10	10	<100	5	<10	700	20	<50	15	<200	70
3879-3887	<5	<10	10	15	<100	5	<10	700	20	<50	15	<200	70
3887-3894	5	<10	20	10	<100	5	<10	1000	70	<50	20	<200	100
3894-3899	10	<10	50	<10	<100	5	<10	500	500	<50	20	<200	70
3899-3910	<5	<10	20	10	<100	5	<10	500	100	<50	20	<200	100
3910-3922	50	<10	150	20	<100	7	<10	500	1500	<50	50	300	100
3922-3930	50	<10	150	15	<100	5	<10	500	2000	<50	50	300	200
3930-3937	<5	10	20	<10	<100	10	<10	300	100	<50	20	<200	100
3937-3944	<5	10	30	10	<100	10	<10	300	100	<50	20	<200	100
3944-3955	<5	10	20	10	<100	10	<10	500	200	<50	20	<200	70
3955-3966	5	<10	30	<10	<100	7	<10	300	200	<50	20	<200	70
3966-3977	5	10	50	<10	<100	10	<10	300	200	<50	20	<200	70
3977-3988	<5	10	50	<10	<100	10	<10	300	100	<50	20	<200	100
3988-3996	5	10	70	<10	<100	10	<10	500	200	<50	20	<200	70

Table 3. Chemical analyses made in 1989 of core samples from USGS No. 1.

[Analyses by Bondar-Clegg, Sparks, Nevada]

Detection limits and analytical procedures			
Element	Lower Detection limit	Extraction Procedure	Analytical Method
Au	5 ppb	Fire Assay of 30 gram sample	Fire assay, AA
Ag	0.2 ppm	HNO3-HCl, hot extraction	Induction coupled plasma
As	5 ppm	do	do
Ba	20 ppm	do	X-ray fluorescence
Bi	2 ppm	do	Induction coupled plasma
Co	1 ppm	do	do
Cr	1 ppm	do	do
Cu	1 ppm	do	do
Hg	5 ppm	do	Cold vapor AA
Mn	1 ppm	do	Induction coupled plasma
Mo	1 ppm	do	do
Ni	1 ppm	do	do
Pb	2 ppm	do	do
Sb	5 ppm	do	do
Se	5 ppm	do	Plasma emission spectroscopy
W	10 ppm	do	Induction coupled plasma
Zn	1 ppm	do	do

Table 3

Analyses

Depth Interval	Ag ppm	As ppm	Au ppb	Ba ppm	Bi ppm	Co ppm	Cr ppm	Cu ppm	Hg ppm
226-232	0.3	107	5	950	8	7	29	34	0.15
288.7-292.6	0.4	36	<5	920	2	6	151	41	0.1
701-704	0.4	43	<5	1000	<2	6	113	40	0.1
735-745	1.4	113	28	930	<2	6	175	74	0.2
745-755	1.4	116	27	960	2	6	136	81	0.25
755-765	7.5	227	45	550	3	5	161	164	1
765-775	2.1	338	113	690	<2	6	149	87	0.2
775-785	1.9	206	119	530	<2	7	179	109	0.15
785-795	1.9	402	148	640	3	6	139	99	0.25
795-805	0.4	158	50	1000	<2	8	64	53	<0.05
805-815	0.5	502	157	730	3	8	53	25	0.05
815-825	0.3	236	117	1100	<2	6	63	24	0.05
825-835	0.3	59	7	1400	2	8	53	29	<0.05
835-845	0.3	45	<5	2000	3	7	78	19	<0.05
845-855	0.4	45	<5	1500	4	7	59	22	<0.05
855-865	0.3	42	<5	2000	<2	7	83	22	<0.05
865-875	0.5	58	<5	1300	3	7	61	31	<0.05
875-885	0.5	147	97	2100	3	7	61	34	<0.05
885-895	0.3	106	15	1400	3	8	69	24	<0.05
895-905	3.4	64	103	1300	6	9	72	82	0.1
905-915	0.3	50	<5	810	4	7	65	29	0.1
915-925	0.3	180	252	620	2	5	67	38	<0.05
925-935	0.2	69	17	1200	3	6	52	37	<0.05
935-945	0.3	418	107	1200	<2	11	81	59	<0.05
945-955	5	1203	257	700	21	12	87	214	0.1
955-965	10.9	630	95	220	66	3	164	140	0.05
965-975	7.6	193	271	350	39	3	141	272	0.4
975-985	1.7	302	332	310	4	2	169	141	0.05
985-995	2.1	185	74	250	8	2	175	112	0.1

Table 3

Depth Interval	Ag ppm	As ppm	Au ppb	Ba ppm	Bi ppm	Co ppm	Cr ppm	Cu ppm	Hg ppm
995-1005	9.6	361	657	640	40	6	126	241	0.2
1005-1015	3.1	99	33	750	3	7	172	276	0.05
1015-1025	2	216	71	1300	<2	8	146	140	0.05
1025-1035	1.9	125	47	2700	<2	8	118	121	0.05
1035-1045	1	87	32	1900	<2	6	114	88	0.05
1045-1055	1.2	121	46	1200	2	4	121	63	<0.05
1055-1065	1.5	111	24	1100	3	6	143	101	<0.05
1065-1075	1	228	25	490	19	8	119	135	0.25
1075-1085	0.6	574	44	490	11	3	141	68	0.25
1085-1095	0.6	128	17	820	14	5	117	90	0.1
1095-1105	1.6	211	51	1200	20	6	139	94	0.05
1105-1115	2.8	216	349	730	21	7	144	103	0.05
1115-1125	0.8	215	224	900	17	6	139	102	<0.05
1125-1135	3.4	186	244	1100	27	6	133	128	<0.05
1135-1145	1.5	92	44	1200	16	7	137	128	<0.05
1145-1155	0.4	103	<5	1100	21	7	135	106	<0.05
1155-1165	0.2	78	<5	1200	12	4	167	66	<0.05
1165-1175	0.7	130	8	1900	24	7	175	136	<0.05
1175-1185	1.8	163	20	1100	35	8	191	183	<0.05
1185-1195	5.5	282	80	1200	44	10	167	347	0.05
1810-1820	0.3	151	39	1400	12	6	152	67	<0.05
1820-1830	0.5	116	26	1100	11	4	135	55	<0.05
1830-1840	0.8	257	18	860	11	4	165	76	<0.05
1840-1850	12.8	>2000	37	890	19	9	118	331	0.15
1850-1860	1	359	34	1000	17	7	171	179	0.05
1860-1870	0.4	147	10	1300	9	5	136	97	<0.05
1950-1960	0.3	126	<5	1700	22	8	106	64	<0.05
1960-1970	0.3	164	<5	2000	22	7	118	88	<0.05
1970-1980	0.6	127	<5	1100	17	8	130	128	<0.05
1980-1990	1.3	114	6	1700	23	8	109	135	<0.05
1990-2000	2.7	130	16	550	17	6	172	91	<0.05

Table 3

Depth Interval	Ag ppm	As ppm	Au ppb	Ba ppm	Bi ppm	Co ppm	Cr ppm	Cu ppm	Hg ppm
2000-2010	4.4	100	203	540	49	7	155	223	0.15
2010-2020	0.9	102	50	620	14	8	164	124	0.1
2020-2030	1.6	153	106	880	21	10	119	113	0.15
2030-2040	0.7	206	486	410	9	6	130	88	0.15
2040-2050	0.9	123	82	820	18	9	90	65	<0.05
2050-2060	0.5	66	157	560	9	7	146	71	<0.05
2060-2070	0.7	208	39	750	19	8	122	105	<0.05
2070-2080	0.8	97	10	580	11	7	145	97	<0.05
2080-2090	0.8	104	39	950	16	8	127	113	0.05
2090-2100	1.1	118	9	1500	25	8	125	114	<0.05
2100-2110	1.1	147	216	1400	35	13	99	207	0.1
2110-2120	1.6	140	16	1000	39	16	169	371	<0.05
2120-2130	0.5	91	11	730	27	10	60	46	<0.05
2130-2140	0.4	59	9	670	10	6	89	95	0.15
2140-2150	0.6	93	13	1100	13	7	90	92	0.15
2150-2160	0.6	162	23	1400	29	10	66	132	0.05
2160-2170	0.3	80	<5	3000	14	6	97	71	0.1
2170-2180	0.4	76	7	910	13	5	172	61	<0.05
2760-2770	0.2	124	<5	1100	28	12	114	145	0.2
2770-2780	0.2	117	10	630	9	10	163	55	0.15
2780-2790	0.4	109	<5	1100	26	11	113	77	0.05
2790-2800	0.3	151	45	930	16	7	189	123	0.05
2800-2810	0.6	343	159	320	11	5	130	56	<0.05
2810-2820	0.7	617	378	1200	25	13	101	338	0.05
2820-2830	0.2	396	376	1200	16	3	169	49	<0.05
3275	<0.2	58	<5	450	13	2	34	19	0.15
3930-3940	0.5	102	<5	1200	32	11	68	50	<0.05
3940-3950	0.5	100	<5	1700	28	13	49	60	<0.05
3950-3960	0.4	104	<5	1400	26	14	79	274	0.05
3960-3970	0.2	125	<5	1100	18	11	60	70	0.05
3970-3980	0.3	191	<5	1600	43	15	117	126	<0.05

Table 3

Depth Interval	Ag ppm	As ppm	Au ppb	Ba ppm	Bi ppm	Co ppm	Cr ppm	Cu ppm	Hg ppm
3980-3990	0.2	138	<5	1400	48	12	106	36	<0.05
3990-3996	0.2	100	<5	700	31	10	109	55	<0.05

Depth Interval	Mn ppm	Mo ppm	Ni ppm	Pb ppm	Sb ppm	Se ppm	W ppm	Zn ppm
226-232	2104	9	52	68	11	17	<10	424
288.7-292.6	479	5	21	5	8	<5	<10	100
701-704	412	3	19	6	10	<5	<10	94
735-745	244	20	63	39	11	13	<10	535
745-755	251	19	62	56	9	19	<10	703
755-765	453	23	58	1339	26	11	51	4566
765-775	251	3	73	40	14	37	<10	323
775-785	308	8	47	34	12	22	<10	539
785-795	648	13	56	239	17	6	<10	669
795-805	601	2	26	32	8	<5	<10	65
805-815	1189	<1	23	28	13	6	<10	55
815-825	545	1	23	25	14	<5	<10	171
825-835	519	<1	25	20	8	<5	<10	56
835-845	361	1	23	20	<5	8	<10	76
845-855	395	<1	24	42	7	<5	<10	66
855-865	273	2	24	64	<5	<5	<10	70
865-875	379	<1	28	15	<5	<5	<10	36
875-885	394	<1	23	57	6	<5	<10	79
885-895	425	1	22	40	7	<5	<10	97
895-905	533	<1	24	55	20	<5	41	4313
905-915	598	<1	20	13	6	<5	<10	78
915-925	536	1	17	10	8	<5	<10	81
925-935	412	2	22	<2	10	<5	<10	44
935-945	170	8	38	<2	21	<5	<10	40
945-955	238	6	44	43	27	14	<10	61
955-965	135	14	62	67	23	14	<10	131
965-975	78	8	89	86	40	17	<10	532
975-985	109	10	80	22	28	<5	<10	152

Table 3

Depth Interval	Mn ppm	Mo ppm	Ni ppm	Pb ppm	Sb ppm	Se ppm	W ppm	Zn ppm
985-995	80	15	61	16	19	10	<10	1029
995-1005	139	12	68	56	48	12	17	1787
1005-1015	117	25	62	6	8	5	<10	267
1015-1025	182	19	93	<2	12	8	<10	85
1025-1035	183	43	113	11	23	8	<10	620
1035-1045	91	21	89	2	18	7	<10	835
1045-1055	54	24	89	5	7	6	<10	110
1055-1065	98	12	82	<2	<5	11	<10	266
1065-1075	179	19	85	15	297	<5	<10	115
1075-1085	124	10	52	9	297	<5	<10	115
1085-1095	112	5	51	6	37	14	<10	255
1095-1105	55	11	78	6	28	18	<10	952
1105-1115	119	8	47	10	36	<5	<10	552
1115-1125	139	6	44	4	35	9	<10	355
1125-1135	126	7	72	16	40	7	<10	244
1135-1145	69	11	87	16	30	36	<10	77
1145-1155	137	10	81	16	27	41	<10	41
1155-1165	117	9	45	3	32	<5	<10	39
1165-1175	352	21	118	13	44	14	<10	630
1175-1185	395	31	144	19	51	21	<10	2002
1185-1195	209	35	151	21	41	27	<10	960
1810-1820	81	4	23	3	22	9	<10	115
1820-1830	104	2	23	12	21	11	<10	325
1830-1840	110	4	18	71	16	5	<10	81
1840-1850	116	13	40	2327	49	11	<10	4428
1850-1860	152	12	34	28	29	5	<10	521
1860-1870	71	2	21	8	36	11	<10	120
1950-1960	92	6	34	<2	37	25	<10	34
1960-1970	100	17	38	7	35	<5	<10	72
1970-1980	74	5	24	7	26	7	<10	345
1980-1990	205	4	32	127	35	5	<10	888

Table 3

Depth Interval	Mn ppm	Mo ppm	Ni ppm	Pb ppm	Sb ppm	Se ppm	W ppm	Zn ppm
1990-2000	198	4	19	157	23	<5	<10	663
2000-2010	125	4	20	35	32	7	<10	865
2010-2020	65	5	20	4	26	<5	<10	388
2020-2030	83	3	30	19	30	9	<10	307
2030-2040	61	5	19	4	25	<5	<10	64
2040-2050	77	3	28	11	20	<5	<10	73
2050-2060	86	12	28	<2	15	<5	<10	91
2060-2070	89	5	30	<2	21	5	<10	118
2070-2080	24	4	15	<2	27	<5	<10	454
2080-2090	175	2	25	3	24	18	<10	610
2090-2100	91	4	23	<2	31	<5	<10	1035
2100-2110	94	7	41	<2	49	<5	<10	3533
2110-2120	106	7	28	8	36	8	12	348
2120-2130	281	3	25	7	33	7	<10	47
2130-2140	48	5	17	3	12	<5	<10	99
2140-2150	84	3	20	6	21	<5	<10	390
2150-2160	119	3	35	4	45	13	<10	505
2160-2170	101	7	32	6	20	<5	<10	55
2170-2180	41	6	26	3	17	<5	<10	48
2760-2770	190	12	64	3	43	7	<10	60
2770-2780	160	19	57	15	20	<5	<10	52
2780-2790	332	8	42	28	38	7	<10	95
2790-2800	229	24	67	23	39	<5	<10	114
2800-2810	299	18	51	18	40	<5	<10	75
2810-2820	355	12	54	57	65	5	<10	101
2820-2830	195	25	38	18	34	8	<10	51
3275	119	4	28	<2	31	<5	<10	52
3930-3940	316	3	25	11	42	15	<10	54
3940-3950	172	5	42	9	38	<5	<10	49
3950-3960	156	4	48	52	47	<5	<10	125
3960-3970	96	12	57	12	27	5	<10	48

Table 3

Depth Interval	Mn ppm	Mo ppm	Ni ppm	Pb ppm	Sb ppm	Se ppm	W ppm	Zn ppm
3970-3980	201	3	57	16	55	<5	<10	72
3980-3990	288	2	39	7	57	24	<10	111
3990-3996	222	3	56	3	39	<5	<10	72

Table 4. Spearman rank correlation coeffficients for 17 element pairs from USGS No. 1 calculated from chemical analyses in table 2 after substitution of numerical values for "less than" and "greater than" values as discussed in text.
[The elements listed are the same as those in table 5 except that Se is not included here and V is. N is 530 for all coefficients]

	Log Ag	Log As	Log Au	Log Ba	Log Bi	Log Co	Log Cr	Log Cu	Log Hg	Log Mn	Log Mo	Log Ni	Log Pb	Log Sb	Log V	Log W	Log Zn
Log Ag	1.0																
Log As	.214	1.0															
Log Au	.359	.099	1.0														
Log Ba	-.257	.020	-.095	1.0													
Log Bi	.351	.030	.229	.011	1.0												
Log Co	.264	.021	.078	.408	.085	1.0											
Log Cr	.048	-.079	-.043	.234	-.023	.325	1.0										
Log Cu	.504	.100	.187	.463	.218	.630	.245	1.0									
Log Hg	.186	.013	.192	-.146	.088	.144	-.258	.122	1.0								
Log Mn	.038	.034	-.057	.228	-.033	.247	.299	.258	-.145	1.0							
Log Mo	.224	.028	.047	.211	-.002	.301	.408	.406	.085	.226	1.0						
Log Ni	.377	.022	.098	.334	.041	.569	.531	.633	.145	.345	.611	1.0					
Log Pb	.383	.290	.160	.129	.224	.128	.034	.281	-.036	.333	.101	.200	1.0				
Log Sb	.222	.216	.095	-.062	.168	-.007	-.036	.139	.080	.010	.047	.078	.149	1.0			
Log V	.286	.045	.101	.278	.013	.374	.509	.533	.090	.376	.692	.767	.248	.052	1.0		
Log W	.117	.030	.025	.103	.074	.108	.053	.146	-.069	.017	.019	.074	.022	.132	.037	1.0	
Log Zn	.464	.069	.256	.060	.233	.150	.057	.356	.078	.177	.204	.272	.274	.176	.212	.113	1.0

Table 5. Spearman rank correlation coeffficients for 17 element pairs from USGS No. 1 calculated from chemical analyses in table 7.
[The elements listed are the same as those in table 4 except that V is not included here and Se is. N. is 93 for all coefficients]

	Log Ag	Log As	Log Au	Log Ba	Log Bi	Log Co	Log Cr	Log Cu	Log Hg	Log Mn	Log Mo	Log Ni	Log Pb	Log Sb	Log Se	Log W	Log Zn
Log Ag	1.0																
Log As	.401	1.0															
Log Au	.574	.643	1.0														
Log Ba	-.327	-.287	-.421	1.0													
Log Bi	.129	.190	-.082	.014	1.0												
Log Co	-.093	-.049	-.220	.349	.391	1.0											
Log Cr	.461	.298	.288	-.358	.076	-.359	1.0										
Log Cu	.679	.429	.334	-.161	.491	.187	.507	1.0									
Log Hg	.326	.187	.257	-.460	-.084	-.115	.110	.298	1.0								
Log Mn	-.189	-.009	-.070	.107	-.265	.168	-.320	-.349	.032	1.0							
Log Mo	.364	.359	.238	-.164	.112	-.138	.591	.525	.280	-.232	1.0						
Log Ni	.355	.354	.189	.005	.175	.012	.337	.468	.216	-.040	.750	1.0					
Log Pb	.321	.303	.203	-.117	-.007	-.030	.037	.114	.232	.480	.011	.125	1.0				
Log Sb	.122	.394	.048	-.020	.806	.297	.158	.535	.063	-.211	.294	.346	-.026	1.0			
Log Se	.389	.284	.123	.018	.228	-.020	.283	.348	.126	-.047	.303	.461	.184	.203	1.0		
Log W	.293	.067	.144	-.080	.070	.035	.070	.221	.176	.108	.049	.036	.201	.087	.076	1.0	
Log Zn	.714	.261	.364	-.147	.113	-.091	.419	.580	.377	-.103	.271	.218	.248	.182	.338	.292	1.0

Table 6. Summary statistics for 11 elements in 93 samples from USGS No. 1 using analyses in table 7.
[Data are in ppm except Au is in ppb]

	Minimum	Maximum	Median	Mean	Geometric Mean	Standard Deviation
Ag	0.1	12.8	0.6	1.48	0.78	2.77
As	36	2,000	127	199.97	145.24	249.12
Au	3	647	27	76.89	24.96	118.11
Co	2	16	7	7.41	6.86	2.81
Cr	29	191	122	119.04	110.74	40.68
Cu	19	371	90	106.28	84.21	77.08
Hg	0.03	1	0.05	0.09	0.06	0.12
Mo	1	43	6	8.98	5.82	8.35
Ni	15	151	38	46.16	39.34	28.17
Pb	1	2,327	13	62.99	12.26	275.90
Zn	34	4,566	115	465	186.30	878.89

Table 7. Chemical analyses modified from table 3 by substitution of numerical values for "less than" and "greater than" values as discussed in text.

Depth Interval	Ag ppm	As ppm	Au ppb	Ba ppm	Bi ppm	Co ppm	Cr ppm	Cu ppm	Hg ppm
226-232	0.3	107	5	950	8	7	29	34	0.15
288.7-292.6	0.4	36	3	920	2	6	151	41	0.1
701-704	0.4	43	3	1000	1	6	113	40	0.1
735-745	1.4	113	28	930	1	6	175	74	0.2
745-755	1.4	116	27	960	2	6	136	81	0.25
755-765	7.5	227	45	550	3	5	161	164	1
765-775	2.1	338	113	690	1	6	149	87	0.2
775-785	1.9	206	119	530	1	7	179	109	0.15
785-795	1.9	402	148	640	3	6	139	99	0.25
795-805	0.4	158	50	1000	1	8	64	53	0.03
805-815	0.5	502	157	730	3	8	53	25	0.05
815-825	0.3	236	117	1100	1	6	63	24	0.05
825-835	0.3	59	7	1400	2	8	53	29	0.03
835-845	0.3	45	3	2000	3	7	78	19	0.03
845-855	0.4	45	3	1500	4	7	59	22	0.03
855-865	0.3	42	3	2000	1	7	83	22	0.03
865-875	0.5	58	3	1300	3	7	61	31	0.03
875-885	0.5	147	97	2100	3	7	61	34	0.03
885-895	0.3	106	15	1400	3	8	69	24	0.03
895-905	3.4	64	103	1300	6	9	72	82	0.1
905-915	0.3	50	3	810	4	7	65	29	0.1
915-925	0.3	180	252	620	2	5	67	38	0.03
925-935	0.2	69	17	1200	3	6	52	37	0.03
935-945	0.3	418	107	1200	1	11	81	59	0.03
945-955	5	1203	257	700	21	12	87	214	0.1
955-965	10.9	630	95	220	66	3	164	140	0.05
965-975	7.6	193	271	350	39	3	141	272	0.4
975-985	1.7	302	332	310	4	2	169	141	0.05

Depth Interval	Ag ppm	As ppm	Au ppb	Ba ppm	Bi ppm	Co ppm	Cr ppm	Cu ppm	Hg ppm
985-995	2.1	185	74	250	8	2	175	112	0.1
995-1005	9.6	361	657	640	40	6	126	241	0.2
1005-1015	3.1	99	33	750	3	7	172	276	0.05
1015-1025	2	216	71	1300	1	8	146	140	0.05
1025-1035	1.9	125	47	2700	1	8	118	121	0.05
1035-1045	1	87	32	1900	1	6	114	88	0.05
1045-1055	1.2	121	46	1200	2	4	121	63	0.03
1055-1065	1.5	111	24	1100	3	6	143	101	0.03
1065-1075	1	228	25	490	19	8	119	135	0.25
1075-1085	0.6	574	44	490	11	3	141	68	0.25
1085-1095	0.6	128	17	820	14	5	117	90	0.1
1095-1105	1.6	211	51	1200	20	6	139	94	0.05
1105-1115	2.8	216	349	730	21	7	144	103	0.05
1115-1125	0.8	215	224	900	17	6	139	102	0.03
1125-1135	3.4	186	244	1100	27	6	133	128	0.03
1135-1145	1.5	92	44	1200	16	7	137	128	0.03
1145-1155	0.4	103	3	1100	21	7	135	106	0.03
1155-1165	0.2	78	3	1200	12	4	167	66	0.03
1165-1175	0.7	130	8	1900	24	7	175	136	0.03
1175-1185	1.8	163	20	1100	35	8	191	183	0.03
1185-1195	5.5	282	80	1200	44	10	167	347	0.05
1810-1820	0.3	151	39	1400	12	6	152	67	0.03
1820-1830	0.5	116	26	1100	11	4	135	55	0.03
1830-1840	0.8	257	18	860	11	4	165	76	0.03
1840-1850	12.8	2000	37	890	19	9	118	331	0.15
1850-1860	1	359	34	1000	17	7	171	179	0.05
1860-1870	0.4	147	10	1300	9	5	136	97	0.03
1950-1960	0.3	126	3	1700	22	8	106	64	0.03
1960-1970	0.3	164	3	2000	22	7	118	88	0.03
1970-1980	0.6	127	3	1100	17	8	130	128	0.03
1980-1990	1.3	114	6	1700	23	8	109	135	0.03

Depth Interval	Ag ppm	As ppm	Au ppb	Ba ppm	Bi ppm	Co ppm	Cr ppm	Cu ppm	Hg ppm
1990-2000	2.7	130	16	550	17	6	172	91	0.03
2000-2010	4.4	100	203	540	49	7	155	223	0.15
2010-2020	0.9	102	50	620	14	8	164	124	0.1
2020-2030	1.6	153	106	880	21	10	119	113	0.15
2030-2040	0.7	206	486	410	9	6	130	88	0.15
2040-2050	0.9	123	82	820	18	9	90	65	0.03
2050-2060	0.5	66	157	560	9	7	146	71	0.03
2060-2070	0.7	208	39	750	19	8	122	105	0.03
2070-2080	0.8	97	10	580	11	7	145	97	0.03
2080-2090	0.8	104	39	950	16	8	127	113	0.05
2090-2100	1.1	118	9	1500	25	8	125	114	0.03
2100-2110	1.1	147	216	1400	35	13	99	207	0.1
2110-2120	1.6	140	16	1000	39	16	169	371	0.03
2120-2130	0.5	91	11	730	27	10	60	46	0.03
2130-2140	0.4	59	9	670	10	6	89	95	0.15
2140-2150	0.6	93	13	1100	13	7	90	92	0.15
2150-2160	0.6	162	23	1400	29	10	66	132	0.05
2160-2170	0.3	80	3	3000	14	6	97	71	0.1
2170-2180	0.4	76	7	910	13	5	172	61	0.03
2760-2770	0.2	124	3	1100	28	12	114	145	0.2
2770-2780	0.2	117	10	630	9	10	163	55	0.15
2780-2790	0.4	109	3	1100	26	11	113	77	0.05
2790-2800	0.3	151	45	930	16	7	189	123	0.05
2800-2810	0.6	343	159	320	11	5	130	56	0.03
2810-2820	0.7	617	378	1200	25	13	101	338	0.05
2820-2830	0.2	396	376	1200	16	3	169	49	0.03
3275	0.1	58	3	450	13	2	34	19	0.15
3930-3940	0.5	102	3	1200	32	11	68	50	0.03
3940-3950	0.5	100	3	1700	28	13	49	60	0.03
3950-3960	0.4	104	3	1400	26	14	79	274	0.05

Depth Interval	Ag ppm	As ppm	Au ppb	Ba ppm	Bi ppm	Co ppm	Cr ppm	Cu ppm	Hg ppm
3960-3970	0.2	125	3	1100	18	11	60	70	0.05
3970-3980	0.3	191	3	1600	43	15	117	126	0.03
3980-3990	0.2	138	3	1400	48	12	106	36	0.03
3990-3996	0.2	100	3	700	31	10	109	55	0.03

Depth Interval	Mn ppm	Mo ppm	Ni ppm	Pb ppm	Sb ppm	Se ppm	W ppm	Zn ppm
226-232	2104	9	52	68	11	17	5	424
288.7-292.6	479	5	21	5	8	3	5	100
701-704	412	3	19	6	10	3	5	94
735-745	244	20	63	39	11	13	5	535
745-755	251	19	62	56	9	19	5	703
755-765	453	23	58	1339	26	11	51	4566
765-775	251	3	73	40	14	37	5	323
775-785	308	8	47	34	12	22	5	539
785-795	648	13	56	239	17	6	5	669
795-805	601	2	26	32	8	3	5	65
805-815	1189	1	23	28	13	6	5	55
815-825	545	1	23	25	14	3	5	171
825-835	519	1	25	20	8	3	5	56
835-845	361	1	23	20	3	8	5	76
845-855	395	1	24	42	7	3	5	66
855-865	273	2	24	64	3	3	5	70
865-875	379	1	28	15	3	3	5	36
875-885	394	1	23	57	6	3	5	79
885-895	425	1	22	40	7	3	5	97
895-905	533	1	24	55	20	3	41	4313
905-915	598	1	20	13	6	3	5	78
915-925	536	1	17	10	8	3	5	81
925-935	412	2	22	1	10	3	5	44
935-945	170	8	38	1	21	3	5	40
945-955	238	6	44	43	27	14	5	61
955-965	135	14	62	67	23	14	5	131
965-975	78	8	89	86	40	17	5	532
975-985	109	10	80	22	28	3	5	152

Depth Interval	Mn ppm	Mo ppm	Ni ppm	Pb ppm	Sb ppm	Se ppm	W ppm	Zn ppm
985-995	80	15	61	16	19	10	5	1029
995-1005	139	12	68	56	48	12	17	1787
1005-1015	117	25	62	6	8	5	5	267
1015-1025	182	19	93	1	12	8	5	85
1025-1035	183	43	113	11	23	8	5	620
1035-1045	91	21	89	2	18	7	5	835
1045-1055	54	24	89	5	7	6	5	110
1055-1065	98	12	82	1	3	11	5	266
1065-1075	179	19	85	15	297	3	5	115
1075-1085	124	10	52	9	297	3	5	115
1085-1095	112	5	51	6	37	14	5	255
1095-1105	55	11	78	6	28	18	5	952
1105-1115	119	8	47	10	36	3	5	552
1115-1125	139	6	44	4	35	9	5	355
1125-1135	126	7	72	16	40	7	5	244
1135-1145	69	11	87	16	30	36	5	77
1145-1155	137	10	81	16	27	41	5	41
1155-1165	117	9	45	3	32	3	5	39
1165-1175	352	21	118	13	44	14	5	630
1175-1185	395	31	144	19	51	21	5	2002
1185-1195	209	35	151	21	41	27	5	960
1810-1820	81	4	23	3	22	9	5	115
1820-1830	104	2	23	12	21	11	5	325
1830-1840	110	4	18	71	16	5	5	81
1840-1850	116	13	40	2327	49	11	5	4428
1850-1860	152	12	34	28	29	5	5	521
1860-1870	71	2	21	8	36	11	5	120
1950-1960	92	6	34	1	37	25	5	34
1960-1970	100	17	38	7	35	3	5	72
1970-1980	74	5	24	7	26	7	5	345
1980-1990	205	4	32	127	35	5	5	888

Depth Interval	Mn ppm	Mo ppm	Ni ppm	Pb ppm	Sb ppm	Se ppm	W ppm	Zn ppm
1990-2000	198	4	19	157	23	3	5	663
2000-2010	125	4	20	35	32	7	5	865
2010-2020	65	5	20	4	26	3	5	388
2020-2030	83	3	30	19	30	9	5	307
2030-2040	61	5	19	4	25	3	5	64
2040-2050	77	3	28	11	20	3	5	73
2050-2060	86	12	28	1	15	3	5	91
2060-2070	89	5	30	1	21	5	5	118
2070-2080	24	4	15	1	27	3	5	454
2080-2090	175	2	25	3	24	18	5	610
2090-2100	91	4	23	1	31	3	5	1035
2100-2110	94	7	41	1	49	3	5	3533
2110-2120	106	7	28	8	36	8	12	348
2120-2130	281	3	25	7	33	7	5	47
2130-2140	48	5	17	3	12	3	5	99
2140-2150	84	3	20	6	21	3	5	390
2150-2160	119	3	35	4	45	13	5	505
2160-2170	101	7	32	6	20	3	5	55
2170-2180	41	6	26	3	17	3	5	48
2760-2770	190	12	64	3	43	7	5	60
2770-2780	160	19	57	15	20	3	5	52
2780-2790	332	8	42	28	38	7	5	95
2790-2800	229	24	67	23	39	3	5	114
2800-2810	299	18	51	18	40	3	5	75
2810-2820	355	12	54	57	65	5	5	101
2820-2830	195	25	38	18	34	8	5	51
3275	119	4	28	1	31	3	5	52
3930-3940	316	3	25	11	42	15	5	54
3940-3950	172	5	42	9	38	3	5	49
3950-3960	156	4	48	52	47	3	5	125

Depth Interval	Mn ppm	Mo ppm	Ni ppm	Pb ppm	Sb ppm	Se ppm	W ppm	Zn ppm
3960-3970	96	12	57	12	27	5	5	48
3970-3980	201	3	57	16	55	3	5	72
3980-3990	288	2	39	7	57	24	5	111
3990-3996	222	3	56	3	39	3	5	72