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Keith H. Miller - Governor

DEPARTMENT OF NATURAL RESOURCES

Thomas E. Kelly - Commissioner

DIVISION OF MINES AND GEOLOGY

James A. Williams - Director

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Geological and Geochemical Study, Solomon C-5 Quadrangle, Seward Peninsula, Alaska

By

R. R. Asher

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GEOLOGICAL AND GEOCHEMICAL STUDY, SOLOMON C-5 QUADRANGLE, SEWARD PENINSULA, ALASKA

By

R. R. Asher

ABSTRACT

The Solomon C-5 quadrangle is about 25 miles east of Nome on the Seward Peninsula in the Solomon River drainage. Geologic mapping and stream sediment geochemical sampling show that mineralization is concentrated along northwest fractures that cross the entire quadrangle.

About $3,000,000 worth of placer gold has been dredged from the auriferous gravels in the Solomon River basin. The Big Hurrah lode gold mine was in production from 1903 until 1907. It is the only lode gold mine on the Seward Peninsula with a production record.

Metamorphosed sedimentary rocks are the most abundant lithologies in the quadrangle. They are probably equivalent to the Nome group of Paleozoic age. Formations include the Solomon schist and the Sowik limestone. The Solomon schist includes a calcareous schist member, an interbedded limestone member and the Hurrah slate member. Greenstone bodies and a basalt dike have intruded the metamorphic rocks. The rocks are folded and overturned, thrust faulted and broken by several sets of high angle normal faults.

All of the major rock types show indications of hydrothermal mineralization. The Hurrah slate is cut by numerous quartz veins, but gold is sparse. Only the veins on Trilby Hill are considered potentially economic. Minor amounts of copper are associated with silicified zones at the base of the Sowik limestone where it is in thrust contact with the Solomon schist.

Analyses of geochemical stream sediment samples reveals several parallel lineaments that are mineralized. These structures trend northwest across the quadrangle. Trend surface analysis of zinc content confirms their presence.

No definite ore bodies are pointed out. Further investigation might lead to the discovery of lode deposits of copper, lead, zinc, molybdenum, gold, or silver along the indicated northwest structural trends.

INTRODUCTION

PURPOSE AND SCOPE

When miners first arrived on the Seward Peninsula in the late 1890's, rich placer gold deposits were found in many of the streams. That condition leads to the conclusion that lode deposits of valuable minerals are abundant as well. To date few lode deposits of sufficient grade and tonnage to warrant development have been found. The purpose of this investigation was to learn if a combination of applied geology and geochemistry would be an effective exploration method in the region.

The Big Hurrah mine in the Solomon (C-5) quadrangle is the only lode gold mine on the Seward Peninsula with a production record. The southern part of a belt of limestone that extends south from Iron Creek (fig 1) is in the Solomon (C-5) quadrangle. Copper and gold occurrences are known within this belt where the limestone is in contact with schist. An antimony vein occurs west of the Big Hurrah mine on Big Hurrah Creek. Because of the known mineral deposits, that are for the most part undeveloped, the Solomon C-5 quadrangle was selected for study.

This report includes the results of geologic mapping in the northwest part of the quadrangle, the results of stream sediment sampling of all drainages in the quadrangle and preliminary results of soil and rock sample traverses across a selected lithologic unit. Approximately six weeks were spent in the area in July and August, 1968. Two field assistants aided in the work part of the time; at other times only one assistant was employed.

LOCATION, ACCESS, AND POPULATION

The area studied is on the Seward Peninsula that is surrounded by the Bering Sea on the north, west and south. The Solomon C-5 quadrangle is about 25 miles east of Nome, Alaska, in the Solomon River drainage. The quadrangle is between 64° 30' and 64° 45'N latitude and 164° 00' and 164° 30'W longitude. The area is accessible from Nome by the well-graded gravel road that extends from Nome to Council (fig 1).

There are no permanent residents in the region. During the summer a road maintenance crew stays at the Big Hurrah road camp that is located at the mouth of Big Hurrah Creek (fig 1). Radio communication with Nome is possible from the road camp. Lee's camp, on the lower Solomon River, and a reindeer station near the Big Hurrah road camp are occupied part of the summer.

Because much of the region is tundra-covered, off-road travel by standard vehicle is seldom practical. Tracked vehicles and four-wheel drive vehicles can be used in parts of the area.

CLIMATE AND VEGETATION

Climate and vegetation are typically arctic. Summer storms are frequent with much wind, rain, and fog, but during periods of good weather summer days are warm and pleasant. Winters are severe with sub-zero temperatures, heavy snow, and frequent high winds. The Bering Sea is frozen for approximately six months of the year. The area is treeless and barren of vegetation except for extensive, undulating tracts of grassy tundra and stands of willows along creeks and gullies. Frost-riven rubble mantles most of the steeper slopes.

TOPOGRAPHY AND DRAINAGE

The Seward Peninsula is at the western end of an intermontane plateau that forms a major physiographic division of the North American Continent. The plateau lies between the Rocky Mountain system to the north and Pacific Mountain system to the south.

The major land forms on the Seward Peninsula consist of isolated mountain ranges 20-60 miles long and 10 miles wide, extensive uplands of broad convex hills and broad, flat divides and coastal lowlands and interior basins (Wahrhaftig, 1965, p 31).

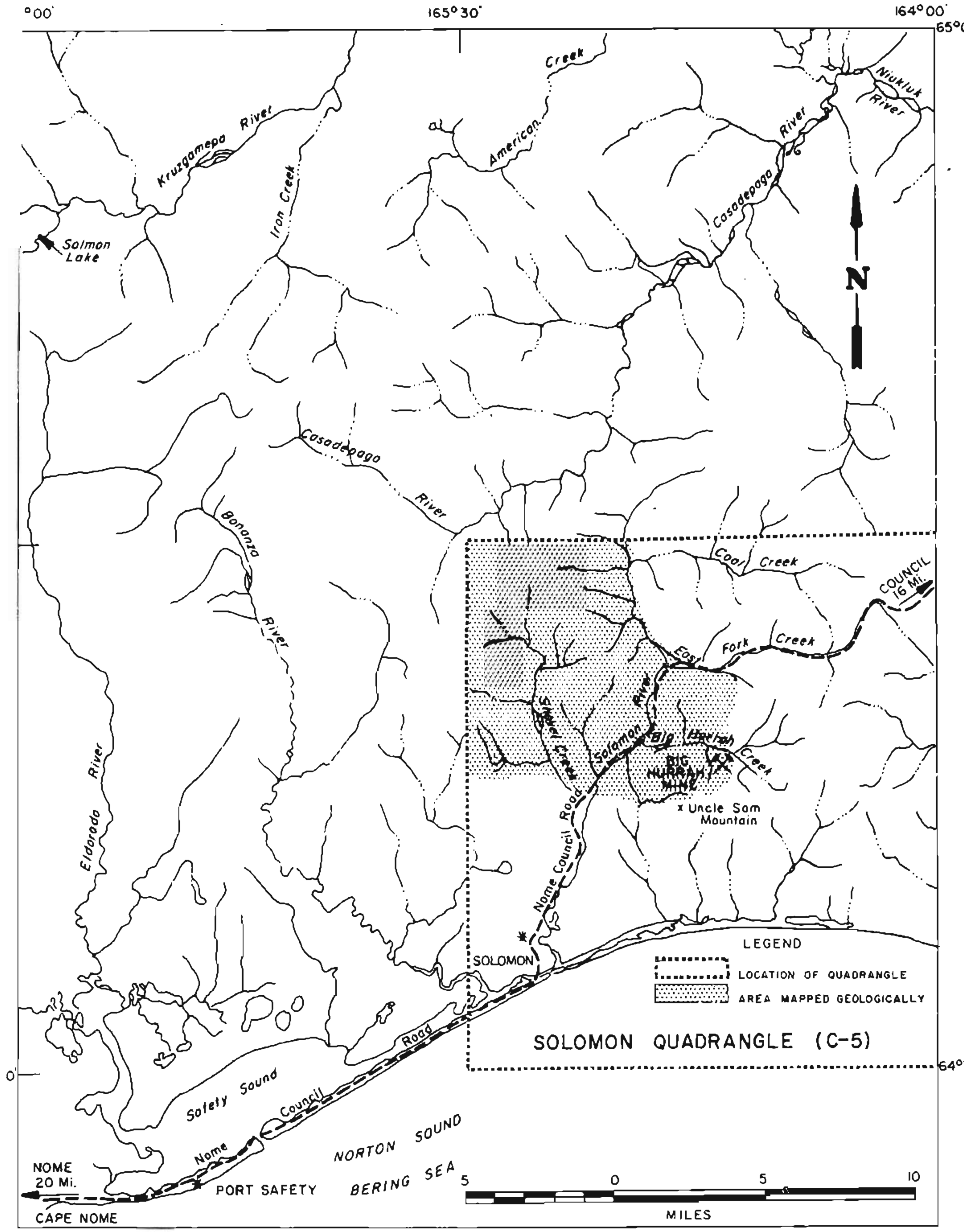

Figure 1
LOCATION MAP, SOLOMON (C-5) QUADRANGLE, ALASKA

In the Solomon C-5 quadrangle there are coastal lowlands and uplands. The coastal lowlands are characterized by extensive grass-covered flats across which flow sluggish meandering streams that discharge into Norton Sound (fig 1). The coastal lowlands extend northward from the sea and merge with the southern slopes of the more extensive uplands at an elevation of about 250 feet. The lowlands slope seaward at about 75 feet per mile.

Lithology has a marked effect on topography in the uplands in the Solomon C-5 quadrangle (fig 2). Areas underlain by schist are characterized by rounded tundra-covered slopes and broad flat divides. At places erosional remnants of schist stand as isolated outcrops on ridge tops. Where massive limestone crops out, precipitous cliffs and steep slopes of bare bedrock are encountered. The Hurrah slate is a black, siliceous graphitic rock and topographic forms developed in it are intermediate between the rounded slopes of areas underlain by schist and the steep rugged topography developed in limestone terrain.

Streams in the uplands flow in broad flat valleys, with gentle slopes and less commonly in steep rock walled canyons. The valleys of some streams, such as Big Hurrah Creek, are incised below a former base level as evidenced by remnants of terraces along the stream course.

The master stream in the Solomon C-5 quadrangle is the Solomon River. The Solomon River has a general southerly course, but in detail its course is broken into distinct sections or segments that trend southeast and southwest (fig 2). Each segment is five to six miles long in the upland portion of the quadrangle.

Shovel Creek is a major tributary on the west; it flows generally southeastward but its course is also composed of segments of the same orientation as those on the Solomon River. Other major tributaries are Big Hurrah Creek, East Fork, and Coal Creek. These streams all enter Solomon River from the east. They flow west and are fairly straight (fig 1). Stream valleys are probably structurally controlled and reflect major joint trends oriented northeast, northwest, and east-west. The map also indicates that the upper part of Quartz Creek has been captured by Uncle Sam Creek. This accounts for the sharp bend to the south made by Uncle Sam Creek on the west side of Uncle Sam Mountain (fig 2).

The highest point in the Solomon C-5 quadrangle is on the ridge near the head of Coal Creek in the northeast corner of the map area on the divide separating the Solomon River drainage on the west from the Fish River drainage on the east (fig 2). This point, at an elevation of 1,778 feet, is outside the area mapped geologically, but within the area of geochemical study. The Solomon River is at an elevation of 250 feet, thus maximum local relief is 1,528 feet. Other ridges and high points are at elevations of 1,200 to 1,500 feet. Uncle Sam Mountain is a prominent landmark on the south edge of the uplands with steep slopes and a broad summit at an elevation of 1,297 feet. It rises abruptly from the coastal lowlands to the south and is about four miles from the beach at Norton Sound.

HISTORY

Placer Mining

Placer gold was first discovered on the Solomon River by Pierce Thomas in June, 1899 (Collier and others, 1908, p 223). Active mining did not get underway until 1900; in that year approximately $10,000 was extracted from placer gravels on the Solomon River.

Hydraulic and shovel-in operations began on tributary streams shortly after the initial discovery in 1899. By 1901 a small dredge was operating on the Solomon River (Collier and others, 1908, p 30). Brooks (1913, p 292) remarks that successful dredging began in 1905 when the Three Friends dredge was installed on Solomon River. The dredge is described as the Bucyrus type with a capacity of 3,700 yards per day. A second dredge of similar capacity was also installed in 1905 (Collier, 1913, p 294).

According to Cathcart (1922, p 197) placer gold is widely distributed in the Solomon River basin, but there is little very rich placer ground. Consequently, the auriferous gravels were worked most successfully by dredges.

Lu and others, (1968, p 28) give the cumulative total of placer gold extracted from the Solomon River as $2,424,797. Production periods are given as 1907, 1912-1917, 1920-1923, 1926-1932, 1934-1960. Shovel Creek, a major tributary of Solomon River, is credited with a production of $408,006. Production periods are 1912-1915, 1917-1921, 1923-1927, (Lu and others, 1968, p 28). Big Hurrah Creek is the only other major tributary of Solomon River that has produced more than $10,000 in placer gold. According to Lu and others (1968, p 24), $120,606 worth of gold was extracted from Big Hurrah Creek in the years 1912, 1916-1924, 1933, 1935, 1937, 1939, 1940-1941.

Small hand operations have been active on West Creek, Mystery Creek, Kasson Creek, Lion Creek and other streams in the Solomon drainage at various times from 1900 until fairly recently. In the early 1900's drift mining during the winter was also practiced in the Solomon River basin. Ditches to divert water from one place to another for early placer operations are abundant in the area.

Lode Mining

The history of lode mining in the region involves the story of only one mine -- The Big Hurrah mine at the confluence of Big Hurrah and Little Hurrah Creeks (fig 1). Prospect pits, trenches and short underground workings are in existence at several other places, but production on a sustained basis was never attained at these localities.

The following information is taken from a report by Saunders (1964). The Big Hurrah lode was discovered in 1900 but mining did not get underway until 1903. Between 1900 and 1903 a stamp mill consisting of four batteries of five stamps each was installed. The Hurrah Quartz Mining Company operated the mine and mill continuously from 1903 until July, 1907 when difficulties in administration forced a closure. The mine has not been in production since that time, although several attempts have been made to reopen it. Lu and others (1968, p 15) estimate that in the three year period, 1903-1905 inclusive, $100,000 in gold was recovered from the operation.

Sometime prior to 1951 the mine was leased to permit placer mining on the creeks controlled by the mine owners. At that time the top of the lode was excavated and washed through sluice boxes. The resulting trench, about 20 feet deep, is dangerously close to the mine shaft.

In 1951 and 1952 a cyanide plant was installed, and Travis P. Lane cyanided the mill tailings from previous operations. In 1953 and 1954 the underground workings were unwatered, mapping and sampling were done, the shaft was rehabilitated, new underground workings were driven, and a new mill built. In the spring of 1954 a fire destroyed some of the new equipment, and in the fall of that year serious ground movements in and around the shaft took place. For safety reasons the mine was closed and never reopened.

Underground workings consist of an inclined shaft 250 feet deep on a 60 degree incline and 1800 feet of drifts and crosscuts. The workings are filled with water at the present time.

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The assistance rendered by the residents of Nome during the course of this study are gratefully acknowledged. Special thanks are due to Pearse Walsh of Nome for aid and advice; Richard Lee of Nome for use of his cabin on Solomon River; and personnel of the Alaska Highway Department at Big Hurrah camp and Nome for invaluable aid in solving transportation problems.

Thanks are also expressed to field assistants John Hedden and Roger Baer. They aided the writer in mapping and collected all of the geochemical samples. Lawrence Heiner, Mining Engineer, University of Alaska, provided invaluable assistance in programming geochemical data for the computer. The field laboratory of the U. S. Geological Survey aided the project materially by providing analytical data on all the geochemical samples.

PREVIOUS WORK

Brief reports on mining developments and gold resources of the Solomon River and its tributaries are mentioned in the early reports of the U. S. Geological Survey. Among these are Smith (1907) and Collier and others (1908). The most detailed account of the area is by Smith (1910) in U. S. Geological Survey Bulletin 433 -- The Geology and Mineral Resources of the Solomon and Casadepaga Quadrangles, Seward Peninsula, Alaska. This report includes a geological map showing the major rock types and the locations of lode and placer deposits as well as a detailed discussion of the general geology and economic geology. Cathcart (1922) includes a discussion of the lode deposits of the Solomon River area in Bulletin 722-F.

GEOLOGIC SETTING

METASEDIMENTARY ROCKS

Stratigraphy, Seward Peninsula

According to Collier and others (1908, p 61) Brooks (1901) differentiated the metamorphosed sedimentary rocks of the Seward Peninsula into three units. In ascending order these are: 1) the Kigluaik series, 2) the Kuzitrin series, and 3) the Nome series. Brooks described the Kigluaik and Kuzitrin series as well-defined stratigraphic units, but he noted that the Nome series is a complex of metamorphic rocks (Collier and others, 1908, p 61). The Nome series consists principally of limestone and schist. All of these rocks are thought to be Paleozoic in age.

In 1904 Collier differentiated a massive limestone unit within the Nome series that contains Ordovician fossils. He named it the Port Clarence limestone (Collier and others, 1908, p 61). The Port Clarence limestone overlies a basal schist unit. Similar limestones near Nome were found to contain Silurian fossils, hence the Port Clarence limestone may contain either Silurian or Ordovician fossils.

In the northeastern part of the peninsula, schists were found that overlie the Port Clarence limestone (Collier and others, 1908, p 62). Consequently, the Nome series contains the following units; an upper formation of schists, a middle formation of massive limestone, and a lower formation of schists with interbedded limestone. The lower schist has been intruded by igneous rocks represented by greenstone masses.

Collier (1904, p 13-14) describes slates from the York region, in the northwestern part of the Seward Peninsula, as graphitic, arenaceous, and calcareous rocks. Brooks was not certain of age relations because of thrust faulting in the vicinity, but he was of the opinion that the slates underlie the Port Clarence limestone.

Stratigraphy, Solomon River Area

Collier and others (1908, p 72) remark that schists of the Nome region (the basal schist of the Nome series) extend in a wide belt across the Solomon River, but along the upper Casadepaga River they overlie limestone that was correlated with the Port Clarence limestone near the Solomon River. Collier and others (1908, p 72) offer three possible explanations; 1) the schist is in part equivalent to the upper schist unit of the Nome series, 2) the limestone on Solomon River is not equivalent to the Port Clarence limestone, or 3) the schists are thrust over the Port Clarence.

In 1910 Smith mapped the Solomon quadrangle. He did not correlate the rocks with the stratigraphic units previously used on the Seward Peninsula. The stratigraphic units that Smith used are given below in ascending order:

1) The Solomon schist, including interbedded limestones
2) The Sowik limestone
3) The Hurrah slate
4) The Casadepaga schist of igneous origin

Smith (1910, p 54) remarked that the Sowik limestone was previously correlated with the Port Clarence limestone but there was not enough evidence to support the correlation. Smith also notes that the limestone is extensively thrust-faulted and silicified near the base (p 56, 58).

Based on descriptions given by earlier workers it is likely that the rocks in the Solomon River area are part of the Nome series. However, for consistency and ease of reference the nomenclature used by Smith is retained in this report.

Smith considered the Hurrah slate to be younger than the Sowik limestone, although he expressed some uncertainty on the point. He notes (p 128):

> "Apparently conformably overlying the Sowik limestone, although the evidence is not entirely conclusive, the Hurrah slate was laid down."

Smith also notes (p 128) that the Hurrah slate resembles the slates near York and the upper part of the Kuzitrin formation that Collier included in the lower part of the Nome group (Collier and others, 1908, p 65). The true stratigraphic position of the slates near York and the Kuzitrin formation was never definitely established, however.

Because the Sowik limestone and Hurrah slate are not in contact in the area mapped for this report, the relative ages of the two units could not be definitely determined. In my opinion the Hurrah slate is older than the Sowik limestone and it is an interbed in the Solomon schist because:

1) At places the Hurrah slate grades into schist and the contact between the two becomes indefinite. One such place is the contact around the tongue of schist that extends westward from the upper part of Little Hurrah Creek to Linda Vista Creek (fig 2).

2) The Hurrah slate is associated with limestone similar to the limestone interbedded in the Solomon schist.

3) On Shovel Creek and West Creek are small exposures of rocks lithologically similar to the Hurrah slate that are interbedded in the Solomon schist.

Smith (1910, pl. VI) mapped the Casadepaga schist on several dome-like topographic features that are within the area mapped for this report. Smith differentiated the Casadepaga schist from the Solomon schist on the basis of less than 25 percent quartz and abundant feldspar crystals (Smith 1910, p 70). During this study I was unable to differentiate the Solomon and Casadepaga schists, and these are not separated on the geologic map included with this report (fig 2).

Solomon schist -- The Solomon schist is probably early Paleozoic in age. There are several varieties of schist included in the formation; all are more or less siliceous. The varietites are muscovite-quartz schist, chlorite schist, biotite schist, and graphitic schist. Calcareous schist, interbedded limestone, and the Hurrah slate were mapped separately, but they are approximately equivalent in age to the Solomon schist and are members of the formation.

The Solomon schist is the most abundant rock in the area mapped for this report. Over much of the area the schist is poorly exposed. It tends to form rounded hills well mantled by tundra. In such areas the presence of schist must be determined from float fragments and widely-spaced poorly-exposed outcrops. Slumping and frost heaving makes determinations of attitudes unreliable. Stream banks offer the best exposures.

On the ridge tops the more siliceous varieties stand as pinnacles and castellated forms above the surrounding terrain. These outcrop forms are well developed on the ridge between East Fork Creek and Big Hurrah Creek (fig 2). The most abundant variety of the Solomon schist is muscovite-quartz schist. The rock has a silvery gray to light tan color. Sericite, quartz, and minor biotite are the principal minerals.

Chlorite schist predominates in some outcrops. It is green in color and characterized by a smooth soapy feel. Quartz, muscovite, and biotite are associated with the chlorite.

Biotite schist is abundant east of the Solomon River in the vicinity of Big Hurrah Creek. This rock is composed of biotite and quartz; it weathers dark brown. The biotite schist grades into graphitic schist, phyllite and dark slate.

Quartz knots and stringers are common in the Solomon schist. Many of these quartz inclusions show pyrite or other sulphide minerals. The quartz lenses are generally intricately folded and contorted and of limited size, generally less than six inches in size. One mineralized quartz knot at the mouth of Johns Creek is one foot by five feet.

Calcareous schist member -- Calcareous schist is most abundant in the Shovel Creek drainage. It appears to be interbedded near the upper contact of the Solomon schist and associated with interbedded limestone. The change from schist to limestone at places is evidently gradational; the amount of calcium carbonate increases until the rock is more accurately described as a schistose limestone. On Shovel Creek, in the vicinity of West Creek, the member was traced by intermittent outcrops for several miles and it appears as a distinct bed. At other places outcrops of calcareous schist are too small and discontinuous to distinguish on the map.

In appearance the rocks of the calcareous schist member resembles the silvery gray schist described previously. They are light gray in color, and they have a schistose texture.

Limestone member -- Throughout the area mapped irregular outcrops and exposures of limestone are interbedded in the schist. The largest outcrops are in the Shovel Creek drainage, but the limestone is exposed here and there throughout the outcrop area of the Solomon schist. Stratigraphically it appears to be near the top of the formation.

At places it is difficult to differentiate the interbedded limestone from the Sowik limestone that overlies the Solomon schist. The interbedded limestone, however, tends to be schistose in character, it weathers into slabby thin fragments. Outcrops are much more subdued and rounded than in the cliff-forming Sowik limestone. The interbedded limestone and the Sowik limestone are both recrystallized but they differ in color. The interbedded limestone is darker gray.

Hurrah slate member -- The Hurrah slate crops out continuously from just south of the mouth of East Fork Creek to Uncle Sam Mountain in a triangular-shaped area of about seven square miles (fig 2). Elsewhere in the area mapped, outcrops of Hurrah slate are sparse. On Doverspike Creek in the northwest corner of the map area, float fragments of Hurrah slate are abundant, but it was not found in place. Just south of the mouth of West Fork Creek on Shovel Creek, Hurrah slate occurs in an outcrop showing Solomon schist and interbedded limestone. A small outcrop of Hurrah slate also occurs along the fault that crosses the upper part of West Creek.

The most common rock type included in the Hurrah slate is a siliceous, black, dense, fine-grained variety that is not schistose. It is resistant to weathering, but because of slaty partings in the rock it breaks into flaggy pieces one to two feet across and several inches thick. These fragments form long talus slopes. Quartz stringers and veinlets are common in the Hurrah slate and are most abundant in the nonschistose variety. The quartz occurs as numerous interlacing veinlets and stringers. At some places, such as near the head of Little Hurrah Creek, the head of Linda Vista Creek, or near the mouth of Big Hurrah Creek, the Hurrah slate becomes schistose, the amount of biotite increases and it grades into a phyllite or graphitic schist. At such places it is difficult to distinguish from Solomon schist.

Because of differences in lithologic character the Hurrah slate reacts in various ways to weathering processes. Where the dense, hard slate is the major rock type, there are prominent, talus covered slopes surmounted by well exposed outcrops. Slopes developed are steep. The best example of this type of topography is Uncle Sam Mountain. Where the Hurrah slate is more schistose, topography is more subdued and rounded; and outcrops are not as abundant.

On a hill west of Trilby Creek, limestone and slate are mixed. A number of prospect trenches have been dug at this locality and limestone fragments are abundant in the resulting debris. The relation between the two rock types was not established, but evidently the Hurrah slate contains interbedded limestone much like the Solomon schist. On the south bank of Big Hurrah Creek, about midway between Little Hurrah and Linda Vista Creeks, a small highly folded outcrop of limestone is surrounded by Hurrah slate.

Sowik limestone -- No definite age has been assigned to any of the rocks in the Solomon C-5 quadrangle. It is thought that the rocks are Paleozoic in age; the Sowik limestone overlies the Solomon schist and is relatively younger.

In the area mapped the Sowik limestone crops out in a discontinuous belt from north to south across the entire area. The largest continuous exposure of Sowik limestone is in the northwest part of the map area and forms part of the divide between Shovel Creek on the west and Solomon River on the east. The limestone forms a north-trending ridge about five miles long and a mile wide.

The Sowik limestone is white to light blue in color. It is finely crystalline in character and it has a sugary texture. The limestone is resistant to erosion and forms rugged topography.

Calcite veins are numerous in the limestone; they range from a fraction of an inch to several feet in width and can be traced for several hundred feet along strike. The calcite in the veins is in large, well formed, brown to white crystals. The veins examined are barren of metallic minerals.

The irregular outcrop pattern of the Sowik limestone is related to thrust faults, and the base of many limestone exposures are silicified for 10 to 15 feet above schist contacts. Copper minerals are associated with the silicified zones at places.

IGNEOUS ROCKS

Most of the outcrops in the mapped area are metamorphosed sedimentary rocks. Other rocks include small greenstone masses and a basalt dike.

Smith (1910) mapped rocks in the region that he named the Casadepaga schist. The unit was differentiated because the rocks contain abundant feldspar (p 70, 71). Smith (p 74, 75) presents evidence to show that outcrops of Casadepaga schist represent altered intrusive rocks. As noted earlier, the Casadepaga schist was not differentiated during field mapping for this report because it was not recognized in the field. Consequently, there may be more metamorphosed intrusive rocks in the area than are shown on figure 2.

Greenstone

The greenstone in the report area crops out in the Shovel Creek drainage. Two small elliptical-shaped bodies of greenstone are exposed on Shovel Creek near the mouth of Harlem Creek. Several other exposures are west of Doverspike Creek and Johnson Creek at the west margin of the quadrangle; these exposures are approximately aligned in a northerly direction. The exposures may represent the exposed part of a larger intrusive mass.

The greenstone is a grayish green, fine-grained rock. In hand speciman it appears to be composed of biotite and quartz. The biotite is aligned and imparts a crude foliation to the rocks. Small garnets and sulphide minerals, mostly pyrite, are associated as accessory minerals. At places pyrite is fairly abundant in the greenstone.

Basalt Dike

In the northwest part of the map area a basalt dike crops out on the limestone ridge east of Johnson Creek. The dike is about 25 feet wide and can be traced for about 1 1/4 miles. It strikes N20°E and dips steeply west. The basalt is not metamorphosed and is younger than the latest episode of metamorphism in the region. The basalt is dark blue, fine-grained, and vesicular.

UNCONSOLIDATED DEPOSITS

The wide river valleys in the quadrangle are mantled by recent gravels, most of which are auriferous. Glacial silt is in the bank of the Solomon River near Quigley's camp (fig 2). Scil, frozen a few inches below the surface, mantles the hillslopes.

This report is concerned primarily with bedrock geology. The unconsolidated deposits were not studied.

STRUCTURAL GEOLOGY

As in most parts of the Seward Peninsula, the bedrock exposures in the Solomon C-5 quadrangle indicate a complex structural history. Difficulties of interpretation are further complicated by the lack of a firmly established regional stratigraphic sequence.

The rocks in the area mapped are folded and faulted. Attitudes are locally variable, but in general the rocks strike north to northeast and dip 20 to 30 degrees west.

Fold axes trend north to northeast in the Shovel Creek drainage as indicated on the map and cross-section in figure 2. At the west side of the map area the outcrop pattern and attitudes of bedding and foliation indicate a syncline that has been overturned to the east. The fold plunges southerly; the axis strikes northeast. A reverse fault borders the eastern limb of the structure; because of eastward displacement along the fault the calcareous member of the Solomon schist overlies the Sowik limestone in part of the Shovel Creek drainage. Further east, dips in the Sowik limestone indicate a broad anticlinal structure that is terminated on its eastern flank by a low-angle normal fault (fig 2). The axis of the fold is poorly defined, but it appears to trend northwest in its southern part; further north it trends northerly (fig 2). There are probably other folds in the map area but mapping was not done in sufficient detail to detect them.

Many of the contacts between the Sowik limestone and the Solomon schist mark the surface traces of thrust faults. The evidence for their presence is the outcrop patterns of the Sowik limestone and features in the limestone at the contacts including silicifications, copper mineralization, brecciations, and at places, dolomitization. Generally exposures are too poor to determine the attitudes of the faults in question, but cross-sections indicate that dips are westerly and range from 25 to 50 degrees. The faults strike north to northeast.

A high angle normal fault that trends north lies along the Solomon River; it brings the Hurrah slate (member of Solomon schist) into juxtaposition with biotite schist between East Fork Creek and Quartz Creek.

A subordinate set of fractures trends northwest. Most of these were noted in the eastern part of the mapped area. They appear to be high angle normal faults. The vein at the Big Hurrah mine is evidently localized in a fracture of this set. East of the Solomon River quartz-filled stringers represent other northwest-trending fractures. Faults of this system can be followed for only a short distance on the surface, but at places, like in the Hurrah slate near Big Hurrah Creek, they are abundant. By projection along strike, fractures of this set intersect the north-trending normal fault that parallels Solomon River. Geochemical data indicate that northwest fractures in the area are mineralized.

ECONOMIC GEOLOGY

Lode deposits containing copper, gold, and antimony are in the area mapped. Because both lithology and structure controlled the localization of mineralization the deposits can be classified as follows:

1) Vein deposits in the Hurrah slate
2) Vein deposits and disseminated deposits in the Solomon schist
3) Disseminated deposits in limestone
4) Disseminated deposits in greenstone

VEINS IN HURRAH SLATE

Smith (1910, p 149) remarks that the Hurrah slate is the most highly mineralized rock in the Solomon-Casadepaga region. Smith (p 147) also notes the widespread evidence of mineralization in the Hurrah slate. The evidence is the great number of quartz veins and veinlets in the rocks.

Two types of structures can be recognized; these are definite quartz veins and so-called "ribbon rock" (Cathcart, 1922, p 203). The "ribbon rock" consists of alternating parallel laminae of slate and quartz, or slate that is traversed in all directions by numerous quartz veinlets. Quartz that is in well defined veins is coarsely crystalline, vitreous and white, with cavities lined by well terminated quartz crystals.

Most of the veins and zones of "ribbon rock" in the Hurrah slate strike northwest, but one strikes north. Vein exposures are poor and no underground workings are accessible. The veins probably represent filled fissures, or shear zones.

Big Hurrah Mine (1)*

The underground workings of the Big Hurrah Mine are inaccessible, and little could be learned about the character of the mineralization from the scanty surface exposures. The following information is taken from Smith (1910), Cathcart (1922), and Hellerich (1954).

There are three veins in the Big Hurrah mine. All three structures strike northwest; the south and middle veins dip southwest, the north vein dips northeast. The middle vein was worked most extensively. According to Smith (p 144) the veins are more or less crushed and crumpled, but not so greatly deformed as to lose their continuity.

*Numbers in parentheses following headings refer to map locations on figure 2.

The ore consists of bunches of quartz and ribbon rock. The "ribbon rock" is the better grade ore. The hanging walls and footwalls of the veins are marked by slickensides. Smith notes (p 146) that faults do not persist uninterruptedly through the mine, but movement took place along a number of parallel planes.

Smith (p 144) states that sulphides are absent in the veins. Quartz with good values in gold looks barren to the unaided eye. However, a private report by Hellerich (1954), the engineer in charge when the mine was reopened in 1953 and 1954, notes that the high sulphide content of the ore in depth hampered certain aspects of the milling operation.

The mine was opened by an inclined shaft about 250 feet deep. The shaft is inclined about 60 degrees southwest. Three levels extend from the shaft: the 70 foot level, the 150 foot level, and the 250 foot level. There are about 1800 feet of lateral workings in the mine. During 1954 a sublevel was driven between two raises for 105 feet, 20 feet below the 150 level east, and stoping was begun at the raise on the east end. About 300 tons of ore were extracted, but work was stopped because of caving ground and poor values. In the sublevel the ore averaged about $15.81 across 45 inches (Hellerich, 1954). Another 200 tons of ore were extracted from the 250 foot level west, but because of ground subsidence and low grade ore, the work was stopped.

Some long-hole percussion drilling was done from the 150 foot level in 1954. Two of three holes drilled from the face of the north drift intersected the downward extension of the north vein which consisted of a small series of quartz stringers about 12 inches wide that averaged $6.80 per ton. Hellerich (1954) concluded that the ore shoot raked and the holes were drilled either east or west of the ore shoot.

Sample results from the 70 foot level of the mine follow in Table 1. No widths were included with the sample data. Evidently high-grade values are randomly distributed along the vein, but the overall average is low. The ore carries values in silver as well as gold. The ratio is about one ounce of gold to six ounces of silver.

Table 1
Assay Data, Big Hurrah Mine
(From files, Alaska Division Mines and Geology, Samples taken in 1952)

	Description		Gold	Silver
#1	70 foot level		2.0	1.4
#2	70 foot level	(center)	0.08	0.5
#3	70 foot level	(NW face)	5.2	17.2
#4	70 foot level	(SE face)	0.16	1.25
#5	70 foot level	(SE face)	0.08	0.60
#6	70 foot level	(SE face)	0.42	1.1
#7	Tailing pile		0.18	0.6
#8	Ore bin		0.40	0.6

Evidence of prospecting for extensions of the Big Hurrah veins can be seen southeast of the mine, north of Big Hurrah Creek, and west of Little Hurrah Creek (fig 2). All of these efforts were unsuccessful.

Cathcart (1922, p 202) points out that the slate on the east side of Little Hurrah Creek is highly fractured, but little folded. Very complex jointing is the common structure. On the west side of Little Hurrah Creek the Hurrah slate is folded rather than jointed. Two fold systems are evident; the axes of one set of open folds trend east, the axes of close folds and faults trend north parallel to Little Hurrah Creek. Quartz veins on the west side are conformable with the bedding of the folds, which demonstrates the irregularity of veins not controlled by joints. Cathcart (p 202) detected drag folds on the west side of the creek. He concludes that Little Hurrah Creek follows the trend of a north striking fault and the west side is relatively downthrown. Failure to find an extension of the Big Hurrah vein system west of Little Hurrah Creek may be because of this supposed fault.

South of the Big Hurrah mine the Hurrah slate extends for about a mile before its continuity is interrupted by a wedge of Solomon schist (fig 2). The slate extends eastward for about a quarter of a mile where it is in contact with the Solomon schist. Cathcart (1922, p 203) thinks the relations indicate a fault contact. If the faulting occurred after the veins were formed, the Hurrah slate and the veins were probably uplifted east of the fault and have since been removed by erosion. If the faulting was earlier than the mineralization, deposition of ore minerals probably did not take place in the Solomon schist as it is not as good a host rock as the Hurrah slate. The Hurrah slate is brittle, and open fractures are more likely to form in it, in response to faulting, than in the micaceous Solomon schist.

Veins Near Mouth of Linda Vista Creek (2)

Near the mouth of Linda Vista Creek quartz veins with sulphides have been exposed by two short drifts; the one furthest north is caved and inaccessible. According to Smith (1910, p 147) the adit exposed a vertical quartz vein seven to eight feet wide that is faulted twice. The vein strikes northwest. Limonite stains are the only evidence of metallic mineralization in the quartz.

The second adit is a few hundred feet south of the first one. This vein is about 12 inches wide. It is poorly exposed, but it appears to strike to the northwest and dip about 70° south. Quartz with sparse sulphides composed of pyrite, arsenopyrite, and possibly marcasite are in the quartz. A grab sample from the vein assayed 0.003 ounces of gold per ton. By projection the continuation of the veins is a fracture zone on the north side of Big Hurrah Creek (fig 2).

Antimony on Big Hurrah Creek (3)

About a mile above the mouth of Big Hurrah Creek on the north bank of the stream, stibnite is exposed in a silicified, brecciated zone in Hurrah slate that appears to strike N12E and dip 44W. A north-trending fault cuts off the zone at its south end. The silicified zone is about 10 feet wide and contains disseminated sulphides, mostly pyrite. Within the zone, on the footwall side, there is stibnite in blades two to three inches long and as fine disseminated material. The stibnite band is one foot to 18 inches wide. On the bench above the stream valley a trench was dug sometime in the past. The sides of the trench have sloughed in and covered the rock exposures, but material on the dump contains abundant stibnite. Antimony values in samples taken across the 10-foot zone are not available, but gold assayed 0.07 ounces.

At this locality a small lens of limestone is exposed along the creek and a narrow six-inch band of black limestone is in the Hurrah slate. There is a massive quartz vein slightly upstream that trends west to northwest; it contains minor pyrite.

R. W. Silver Prospect, Trilby Hill (4)

Northwest of the mouth of Trilby Creek and east of the Solomon River northeast of the mouth of Big Hurrah Creek, is a north-trending saddle with a rounded peak at its south end (fig 2). This peak is referred to locally as Trilby Hill. On the east side of Trilby Hill are a number of old workings including several shafts. Pits and trenches extend northwest along the north base of the hill (figs 3 and 4). This prospect is on several patented claims including the Shamrock, Hot Air, and Goode (fig 3). The workings are referred to as the R. W. Silver property.

Much of the following information is taken from Steward (1935) and from a map by Shallit (1938) that is reproduced in figures 3 and 4. The property was originally discovered in 1903 by W. R. Goode. It was later acquired by E. H. Flynn of St. Michael who made many surface cuts and sunk and timbered the inclined Goode shaft (fig 4). R. W. Silver eventually acquired the property and he sunk several other shafts. Sometime after 1938 a small mill was erected, the remnants of which can be seen on the property. The results of the milling operation are unknown.

There are five shafts on the claims, some of which were accessible when Shallit and Stewart investigated the property. Assay information, vein relationships, and other information given below is taken from their work.

The Goode Shaft (fig 4) was inaccessible when Stewart investigated the property; it is reported to be 40 feet deep and inclined S60W at 26 degrees. About 800 feet of workings are thought to extend northerly from the bottom of the shaft.

The Shamrock Shaft (No. 1, fig 4) was sunk in 1904 on a vein exposed at the surface. The shaft is inclined 71 degrees west and is 45 feet deep. Judging from surface pits and exposures the vein extends from the shaft for several hundred feet N55W and S37E (Stewart, 1935).

The Hot Air Shaft (No. 2, fig 4) was 11 feet deep in September 1934. It is an 8 x 10 foot shaft. According to Stewart a three foot vein that is exposed in the shaft strikes N42W and dips 56SW. The Hot Air Shaft is probably on the same vein as the Goode Shaft. Shafts No. 3 and No. 4 (fig 4) are near the Goode Shaft.

The vein material on the dump at the Shamrock Shaft is light green in color. Disintegrated lumps and particles are loosely held together in a gouge clay. The larger fragments are arsenopyrite and the light green color is imparted by surface coatings on the arsenopyrite. Cathcart (1922, p 204) refers to the prospect as the Flynn property and remarks that this green ore with very little quartz is similar to the lodes at Bluff.

The vein is six inches wide at the top of the Shamrock Shaft and 18 inches at 45 feet (Stewart, 1935). Gold values range from 0.5 to 1.0 ounces of gold (Shallit, 1938).

Stewart reports that the three-foot vein exposed on the north and south walls of the Hot Air Shaft strikes N42W and dips 56SW. The vein consists of bands of bluish gray and whitish gray qyartz, some of the quartz resembles porcelain. There are liberal amounts of free gold in the quartz. The vein resembles the Big Hurrah vein but looks richer (Stewart, 1935). Shallit (1938) sampled the vein in the shaft; he notes the vein is 12 inches wide at 10 feet and 8 inches wide at 20 feet. However, in his tabulation of sample results (fig 4) he reports 0.78 ounces of gold across 38 inches at a depth of 10 feet.

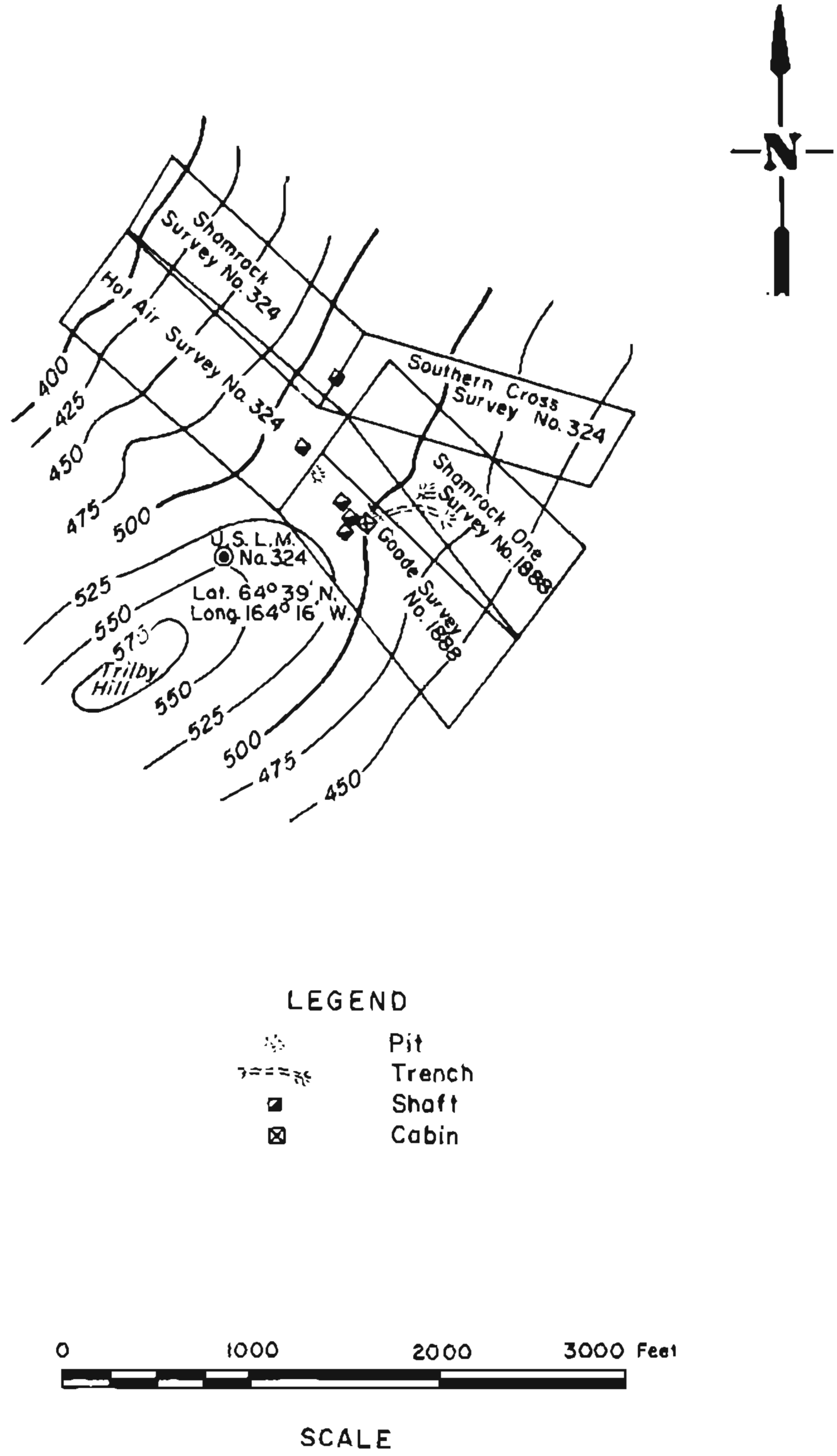
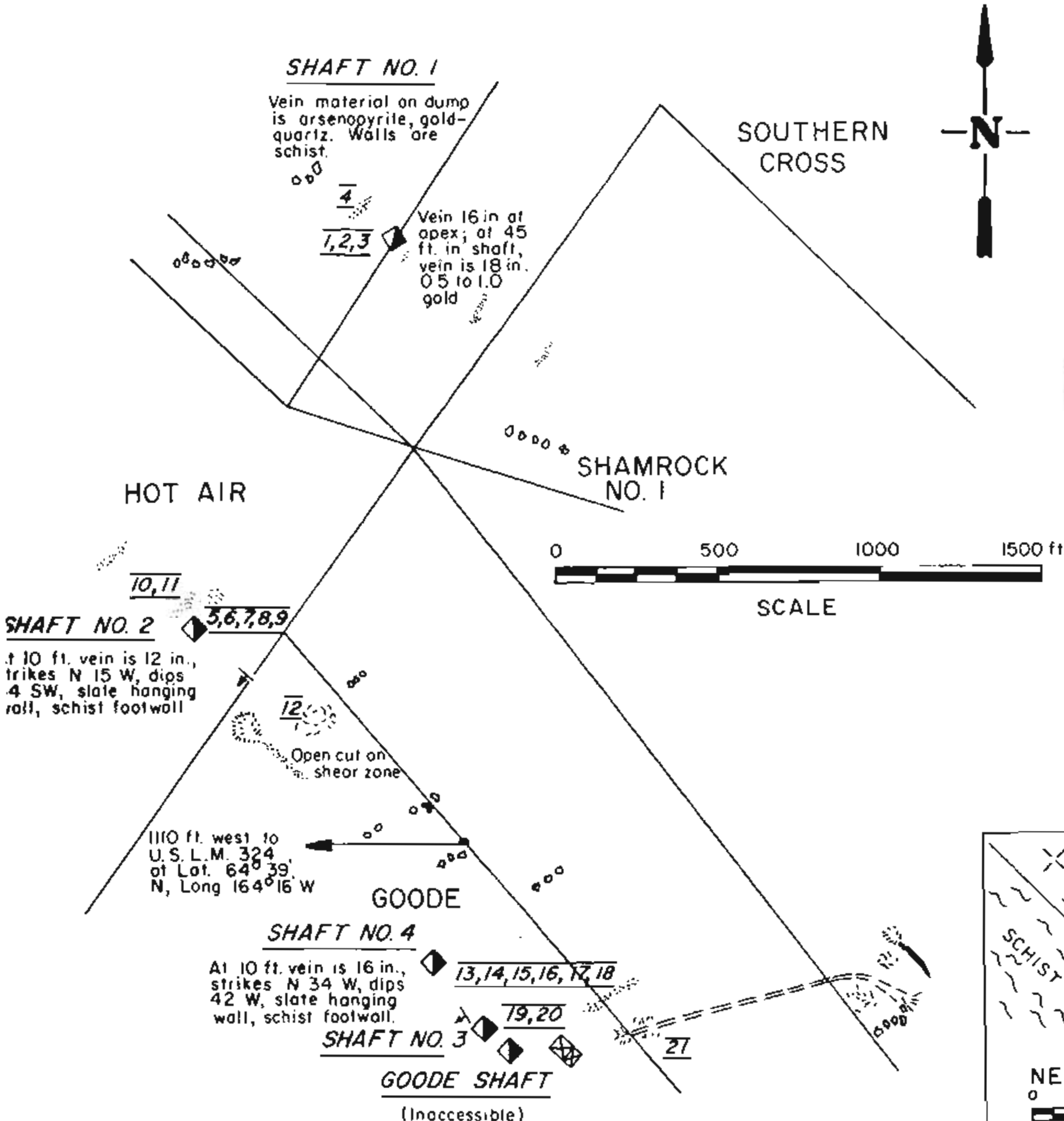


Figure 3

PATENTED LODE CLAIMS

R.W. SILVER MINE - SOLOMON QUADRANGLE, ALASKA

DATA FROM SHALLIT, 1938



SAMPLE INFORMATION

NO.	LOCATION AND DESCRIPTION	Width Inches	Oz. Au.	Oz. Ag.
1	Shaft No. 1, dump specimen, sulfides		0.80	0.10
2	Shaft No. 1, dump specimen, sulfides		0.68	Tr.
3	Shaft No. 1, dump specimen, oxidized ore		1.48	0.10
4	Dump, sulfide speciman		0.68	Tr.
5	Shaft No 2, schist footwall	10	Tr	Tr.
6	Shaft No. 2, shattered part of vein, SE side shaft at 10 feet	6	0.20	Tr.
7	Shaft No. 2, solid part of vein, SE side shaft at 10 feet	6	0.40	0.10
8	Shaft No. 2, slate hanging wall	8	Tr.	0.20
9	Shattered and solid vein, NW side shaft at 10 feet	38	0.78	0.70
10	Sorted ore dump, grab sample		1.32	0.10
11	Sorted ore dump, grab sample		1.42	0.10
12	Picked specimens, shear zone dump		0.10	0.40
13	Shaft No. 4, vein, SE side shaft at 10 feet	16	0.31	0.03
14	Shaft No 4, schist footwall at 10 feet	4	0.30	0.02
15	Shaft No 4, grey quartz vein at 10 feet	6 1/2	0.81	0.07
16	Shaft No 4, slate between veins	3	0.01	—
17	Shaft No 4, oxidized quartz vein	7	0.16	0.03
18	Shaft No 4, slate hanging wall	4	—	—
19	Shaft No 3, grey quartz vein at 10 feet	12	1.44	0.11
20	Shaft No 3, oxidized quartz vein at 10 feet	6	0.67	0.04
21	Grab sample, dump, sorted float		1.53	0.40

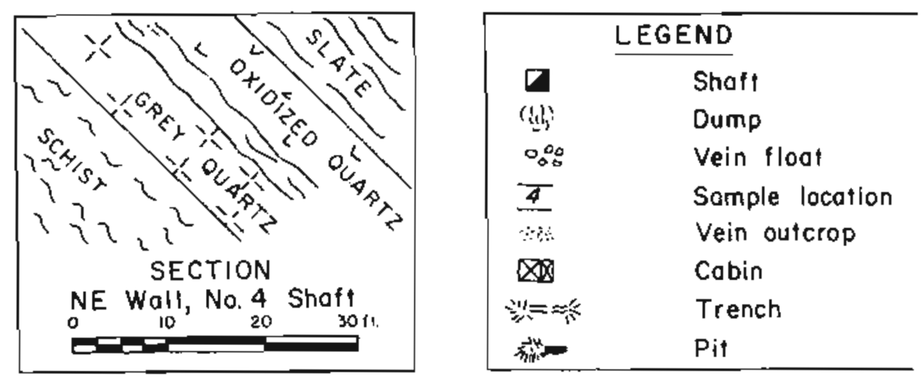


Figure 4
WORKINGS AND SAMPLES
R.W. SILVER MINE - SOLOMON QUADRANGLE, ALASKA
DATA FROM SHALLIT, 1938

Shaft No. 4 (fig 4) is about 350 feet northwest of the Goode Shaft and probably on the same vein structure. According to Shallit the vein is 16 inches wide at 10 feet and strikes N34W and dips 42W. A section (fig 4) shows a band of gray quartz six and one half inches wide on the footwall of the vein that assays 0.81 gold. The gray quartz is separated from a band of oxidized quartz by a three-inch band of slate that assayed only 0.01 in gold. The oxidized quartz on the hanging wall is seven inches wide and it assays 0.16 gold. The country rocks on the foot and hanging walls are not mineralized.

From the data collected by previous workers and from my own observations it is safe to conclude that there are at least two veins on Trilby Hill, and they represent two distinct types of mineralization; one is free gold in quartz, the other is arsenopyrite with free gold. The veins range in strike from N30W to N60W and dip SW; they are continuous for several hundred feet at least. Vein widths are variable, as are gold values. A grab sample I collected from the dump of the Goode Shaft gave 2.2 ounces of gold per ton.

The veins are in Hurrah slate that grades from hard quartzitic black slate to micaceous schist or phyllite. The Goode vein appears to be localized along the contact between a schistose micaceous facies and quartzitic slate. The Shamrock vein is localized in the schistose facies according to Shallit (1938). Stewart mentions similar variations in the Hurrah slate in the Big Hurrah Mine.

North side Big Hurrah Creek, Mouth of Little Hurrah Creek to Mouth of Trilby Creek (5)

The ridge that slopes southward from the divide between East Fork Creek and Big Hurrah Creek east of Trilby Creek (fig 2) is made up of Hurrah slate that is traversed by numerous quartz veins and veinlets. The number of prospect pits in the slate are a good indication of how thoroughly the area has been prospected.

Samples of vein matter were collected from a number of localities on the ridge. None carried appreciable amounts of gold, copper, lead, or zinc. The quarts is crystalline to massive.

North side Big Hurrah Creek, Unnamed Creek West of Mouth of Little Hurrah Creek (6)

About a mile above the mouth of a stream that enters Big Hurrah Creek from the north are several prospect pits and trenches. The stream is unnamed; it is between Hutt Creek and Trilby Creek (fig 2).

Vein material on the dumps consists of quartz and pyrite. Some of the quartz is crystalline; there are well terminated crystals up to two inches in length. Analyses for gold, copper, lead, and zinc detected little of value in grab samples and sorted samples from the dumps. The highest value was 0.17 ounces of gold and 0.04 percent copper. No veins were seen in place, but judging from the alignment of the workings the vein or veins strike north to northeast.

Cathcart (1922, p 199-200) included the following remarks concerning this prospect. The workings are so caved and slumped that no veins can be seen. Quartz on the dump at the main shaft is of open texture and coarsely crystalline. There is considerable sulphide in the quartz as well-defined veins which in places swells to nests. Pyrite and pyrrhotite are the principal sulphides. There is some arsenopyrite, and chalcopyrite is recognizable microscopically. The vein is structurally different from others in the area in the absence of "ribbon rock", and it is mineralogically different from most sulphide-bearing gold lodes, because of the preponderance of pyrrhotite over arsenopyrite and the presence of chalcopyrite.

Mineralization South of Big Hurrah Creek (7)

On the south side of Big Hurrah Creek the Hurrah slate contains quartz veinlets that fill the numerous fractures in the rocks. A number of ribbon rock and quartz vein samples were taken but significant amounts of gold, copper, lead, or zinc were not detected. Prospect pits, trenches, adits, and shafts, long abandoned, are plentiful throughout the area.

Other Prospects

Smith (1910) and Cathcart (1922) mention several prospects in the vicinity of Uncle Sam Mountain. Reportedly, none of these contained economic amounts of gold or other minerals and they were not visited by the writer during this investigation.

VEIN AND DISSEMINATED DEPOSITS IN THE SOLOMON SCHIST

Head of West Creek (8)

About two miles above the mouth of West Creek at the western edge of the area mapped there are several prospects in the Solomon schist. The veins bear no apparent relation to contacts, but they are along the axis of an overturned syncline.

At the present time all that can be seen at the prospect is the portal of a caved adit and a dump containing quartz heavily impregnated with pyrite. The adit trends about S10E into the hill on the south bank of West Creek. A grab sample from the dump assayed 0.04 ounces of gold. A zone of quartz float trends S30W up the hillslope from the portal. The zone is about 250 feet long and 50 feet wide. A composite sample of quartz fragments from this zone assayed 0.11 ounces of gold and 0.01 ounces of silver.

In 1910 Smith (p 148) noted that there were 600 or 700 feet of underground workings at the prospect. An adit was driven about 350 feet along the vein. Both walls are in chloritic schist. At places slickensides are evident on both walls. A crosscut follows a small cross stringer of quartz from the main adit. About 350 feet west of the first adit a second vein of the same character was opened by an adit 300 feet long.

The quartz in the veins is white and shattered, but not sheared or folded. Chlorite is abundant; pyrite and marcasite occur in vugs in the quartz. According to Smith (1910, p 148) the wall rocks as well as the quartz are mineralized and carry about half an ounce of gold per ton.

According to Cathcart (1922, p 198), who refers to the locality as the Alden prospect, arsenopyrite is abundant and impregnates the wall rocks in an association common in the vicinity of Nome.

Head Kasson Creek (9)

Near the head of Kasson Creek, a tributary of Shovel Creek, a short, steep tributary enters from the south. About one-quarter mile above the mouth of the draw, float consisting of limonite and fine disseminated sulphides in calcareous schist are in the loose debris of the stream bed. The source of the float was not found. A sample of the sulphide material assayed 0.07 ounces of gold.

Mouth of Johns Creek (10)

At the north end of the mapped area near the confluence of Johns Creek and the Solomon River, outcrops of Solomon schist are broken, shattered, and highly jointed. The rocks are siliceous; quartz lenses are abundant and quartz stringers fill fractures. Pyrite and minor chalcopyrite are associated with the quartz. Analyses of samples show that mineralization in economic quantities is wanting, however. The best sample obtained was from a lens of quartz one foot by five feet that assayed 0.18 percent copper with traces of lead, zinc, and gold.

DISSEMINATED DEPOSITS IN LIMESTONE

Fault contacts between the Sowik limestone and the Solomon schist are sites for the localization of disseminated copper mineralization. Although concentrations in economic quantities were not found, the mineralization is widespread.

Gold is associated with the copper at most places. Smith (1910, p 215) points out a distinct relation between areas of rich placer ground and contacts between limestone and schist at several places on the Seward Peninsula.

A few disseminated copper minerals can be found along limestone-schist contacts almost anywhere in the area mapped. A few localities where the minerals can be most readily observed, are mentioned below; only one locality is discussed in detail. Localities include the head of Penny Creek (11, fig 2), near the head of Johns Creek as float (12, fig 2), on Nobhill Creek, a tributary of Kasson Creek (13, fig 2), and the limestone hill on the west side of the Solomon River just north of the mouth of Big Hurrah Creek (area A, fig 2).

The base of the limestone is commonly silicified for 10 to 15 feet above the contact. At places the replacement of calcium carbonate has been almost complete and little limestone remains. Within the zone of silicification secondary copper minerals, mostly malachite, are disseminated. Rarely small sulphide blebs can be seen in the silicified zones. Values of grab samples of float and samples chipped from outcrops range from 0.13 to 0.78 percent copper. Over a large area a deposit would probably average only 0.2 to 0.3 percent copper. Gold was detected in only trace amounts in the samples at most places. Samples from near the head of Penny Creek contain from 0.02 to 0.08 ounces of gold and 0.02 to 0.04 ounces of silver.

Detailed mapping of one occurrence was done to better understand this type of deposit in the quadrangle. The limestone hill west of the Solomon River and north of the mouth of Big Hurrah Creek was selected for study (area A, fig 2).

Disseminated Copper Deposit West of Solomon River

Area A on figure 2 is shown in detail in figure 5. An alidade and plane table were used to locate points by stadia measurement. The purpose of the study was to learn what factors influence the localization of the copper minerals in the vicinity.

The limestone outcrop pattern indicates a thrust fault in the northwest part of the area; the fault trends north to northeasterly and separates the area into blocks of limestone separated by bands of schist.

Along the east margin of the area, high angle faults offset the thrust plate. Three prominent high-angle fracture trends are present, these are northwest, northeast, and east-west.

Two cross-sections were prepared and represent an interpretation of the data. Other interpretations are possible, but the interpretation presented seems to fit the observed data best.

Silica has replaced the limestone along the high angle faults and along the thrust plate. Near the trace of the thrust fault in the north central part of the area a zone of silicification 10 to 15 feet wide can be traced intermittently for about 1500 feet. At the west contact between the limestone and schist, in the upper thrust plate, silicification is also present, but it is less intense than in the limestone on the lower thrust plate.

Silicification along high angle faults is irregular. At places it appears to have been pervasive on both sides of the fracture and moved as an irregular front into the limestone; it decreases in intensity away from the fault. At other places irregular lenses of silica in contorted shapes are in slightly altered limestone. The replacement phenomena are related to faults of one kind or another; the faults provided channelways for the altering solutions.

Copper minerals, generally in the form of carbonates, such as malachite and less commonly azurite are in the silicified zones. Sulphides are present at some places, but they are sparse. The copper is widely disseminated, but it is not concentrated in significant amounts at any given locality. Gold is also sparse. No attempt is made to estimate the overall grade because sampling was inadequate.

The mineralization would probably follow the thrust fault downdip; it is not known if the grade would improve away from the influences of surface leaching and oxidation. The mineralization along the high-angle faults would probably persist in depth to the base of the limestone. The thickness of the limestone is unknown. Only subsurface exploration would provide answers to the above questions.

MINERALIZATION IN GREENSTONE

In that part of the Solomon quadrangle mapped geologically, small metamorphosed intrusive bodies are represented by greenstone in the northwest part of the area, along Shovel, Doverspike, and Johnson Creeks. According to Smith (1910, pl VI) other greenstone bodies are larger and more plentiful outside of the area mapped in the eastern part of the quadrangle.

Sulphide minerals are sparsely disseminated through greenstone samples, but analyses reveal only trace amounts of gold, copper, lead, or zinc.

SUMMARY OF ECONOMIC GEOLOGY

The following points are significant in regard to mineral deposits in the region:

1. Gold-bearing veins and veinlets are most abundant in the Hurrah slate, but only at the Big Hurrah Mine and on Trilby Hill is gold known to be present in economic quantities.

2. The R. W. Silver prospect should be investigated further because there are at least two vein systems, there are economic amounts of gold in the veins, and the veins are continuous. This is the most promising deposit seen in the area mapped.

3. Lode mineral deposits are in the Solomon schist, but in general they are sparse and low grade.

4. Copper-gold mineralization accompanies silicification at schist-limestone contacts in zones of thrust faulting. No deposits containing economic amounts of copper minerals were found in the area mapped.

5. Greenstone bodies carry sulphides, but values are poor.

G E O C H E M I S T R Y

Geochemical sampling in the Solomon C-5 quadrangle resulted in two sets of data. One set represents analyses of stream sediment samples from all of the streams in the upland portion of the quadrangle (fig 2). The other set of data is made up of analyses of soil and rock samples from the Hurrah slate. Samples were collected throughout the outcrop area of the Hurrah slate shown on figure 2 (area B). Data from the Hurrah slate are still being analyzed and only preliminary conclusions can be drawn. A detailed report on this phase of the project is contemplated for the future.

STREAM SEDIMENT SAMPLING

Sampling and Analytical Methods

Samples were collected at one-quarter mile intervals from the active bed of each stream in the upland portion of the quadrangle. Sample sites are shown on figure 2. Fine sand or silt, rather than coarse material, was collected where possible and stored in plastic bags. Care was taken to exclude organic material from the samples. The samples were analyzed in camp by dithizone field tests described by Hawkes (1963) before being sent to the laboratory at College for analysis. Appendix I shows the results of the field tests as compared to laboratory analyses for gold, copper, lead, and zinc, in addition to notes concerning the various sample sites.

The samples were dried in the College laboratory of the Division of Mines and Geology and then forwarded to the U. S. Geological Survey Field Laboratory in Anchorage for analyses.

The U. S. Geological Survey analyzed each sample for gold, copper, lead, and zinc by atomic absorption. A 30-element semiquantitative spectrographic analysis was also performed on each sample. Analytical limits and ranges of detection are shown in Appendix II. Apprndix III-A and III-B are lists showing the results of the laboratory analyses for each sample.

A computer program to tabulate the samples and calculate statistical characteristics of the analytical data was written by L. E. Heiner, Mining Engineer, University of Alaska. The IBM 360 computer at the University of Alaska performed the computations.

Samples were assigned map numbers before they were fed into the computer. The computer tabulated a list of samples and analytical data in numerical order according to map number. For each element the mean and the standard deviation were calculated. From these measures of central tendency the threshold value, or upper limit of normal background fluctuation, and anomalous values were determined for each element. The computer also plotted histograms of frequency distribution for selected elements. As a special project, a zinc trend surface map was plotted and residuals determined.

The threshold and anomalous values for each element were computed by methods described in Hawkes and Webb (1962, p 30). The threshold value is taken as the mean plus twice the standard deviation; anomalous values are taken as the mean plus three standard deviations. These values are meaningful for a normal distribution; the further the data departs from normalcy the less reliable is the computed threshold and anomalous value. Frequency distribution histograms for copper and zinc as determined by atomic absorption and lead as determined by spectrograph are shown in Appendix IV. Table 2 shows the threshold and anomalous values for each element detected.

Table 2 - Threshold and Anomalous Values, Stream Sediment Samples, Solomon Quadrangle, Alaska (Values in parts per million unless indicated otherwise; (1) = Atomic Absorption)

Element	Threshold Value	Anomalous Value	Element	Threshold Value	Anomalous Value
Gold (1)	0.78	1.15	Titanium (%)	1.27	1.58
Copper (1)	65.96	83.51	Iron (%)	15.62	19.34
Lead (1)	28.66	35.57	Magnesium (%)	3.98	44.97
Zinc (1)	159.40	200.28	Calcium (%)	4.48	6.09
Copper	151.16	202.12	Barium	1986.99	2578.17
Lead	50.75	64.65	Strontium	462.78	646.24
Zinc	238.83	299.53	Boron	251.85	326.88
Molybdenum	9.32	12.40	Beryllium	4.55	6.04
Silver	8.66	12.46	Zirconium	536.94	683.80
Cobalt	30.13	37.00	Lanthanum	76.06	94.45
Chromium	270.49	335.84	Niobium	18.46	22.48
Nickel	151.70	187.02	Scandium	30.99	37.17
Manganese	2360.54	3066.27	Yttrium	51.59	62.51
			Vanadium	374.25	469.56

The concentration of an element in a given sample is either in the background range, between the threshold value and anomalous value or greater than the anomalous value. Samples are considered possibly anomalous if the concentration is between the threshold value and the anomalous value and probably anomalous if the concentration of an element is above the anomalous value. Samples containing concentrations of copper, lead, zinc, or gold in the possibly anomalous and probably anomalous ranges are indicated on figure 2. Samples containing anomalous amounts of cobalt, molybdenum, and silver are also shown.

Discussion of Anomalies

A study of Appendix III, that shows the results of laboratory analyses of stream sediment samples, reveals that results of analyses for copper and lead by atomic absorption cannot be correlated with the results of analyses for copper and lead by spectrographic methods. For example where the spectrographic analysis shows anomalous copper in a sample, atomic absorption may show only low background, and vice-versa. The same is true for lead. Zinc analyses by the two methods show some variation, but the correlation is better. No explanation is offered for the discrepancy. Possibly and probably anomalous samples indicated on figure 2 are based on results from either method.

There are several copper anomalies in the part of the quadrangle that was mapped geologically. None were judged to be of economic significance. The copper anomalies occur below contacts of limestone and schist that are known to contain sparse amounts of copper, such as on Penny Creek and Minnesota Creek. Copper anomalies are in the northwest corner of the area near Johnson and Doverspike Creeks where greenstone is abundant. Some of the samples that are anomalous in copper are also weakly anomalous in cobalt in areas where greenstone crops out. Anomalous copper is found below the trace of a fault that trends northeast and crosses the upper part of West Creek. Soil and rock samples from the vicinity of this fault are weakly anomalous in gold and silver. Sample 91, slightly further east on West Creek, shows anomalous molybdenum on a fracture of parallel orientation. The anomalous samples indicate hydrothermal activity and mineralization along these fault structures. Indications of mineralization were not detected by geologic observations.

There is a minor copper anomaly in the Hurrah slate below the antimony vein described previously. The quartz-sulphide float in the first tributary to Big Hurrah Creek from the south contains enough copper to be detectable in stream sediments.

Outside the mapped area copper anomalies occur at the east edge of the quadrangle on the Kocheblok River and O'Brien Creek. According to Smith (1910, pl. VI) greenstone intrusive bodies are abundant in the vicinity, and these probably contribute copper to the anomalous samples. Lead anomalies, discussed below, indicate that fracture trends cross the high ridge west of the anomalies. These also may be the source of the anomalous copper.

Samples anomalous in lead form the most distinct pattern. East of the Solomon River, and west of the Solomon River southwest of the mouth of Shovel Creek, the upper portions of streams containing samples anomalous in lead form a series of parallel lineaments that trend northwest across the map area. In several places zinc is associated with the lead, and near Uncle Sam Mountain there is anomalous molybdenum. These trends most likely mark the traces of mineralized fractures that cross the region. It is noteable that one of these lineaments can be traced northwest from the east side of Uncle Sam Mountain, through Linda Vista Creek, across Trilby Hill to the Solomon River. Its northwest extension appears to be cut off by the north-trending fault just below the mouth of East Fork Creek. Mineralization is known at several places along the trend.

It is doubtful that the anomalies are derived from lode deposits of lead, but they do delineate mineralized fracture zones. Investigation of these zones might lead to lode gold deposits. Closely spaced soil samples transverse to the trends indicated is one recommended method. Other methods might work as well.

At places, as in upper Shovel Creek, samples anomalous in lead and calcium occur in the Sowik limestone. These appear to be associated with calcite veins that cut the limestone and are of little significance.

Samples anomalous in zinc only are not common in the quadrangle. Samples that contain abnormal concentrations of zinc are usually anomalous in copper or lead as well. In general the distribution pattern of anomalous zinc samples is similar to that described for lead.

Sample 21 is near the head of Ball Creek; it contains 20 parts per million silver. This is the only stream sediment sample in the quadrangle that contained anomalous silver.

Trend Surface Analysis of Zinc

First through sixth degree trend surface maps and residuals were prepared for zinc. Values as determined by atomic absorption were used. L. E. Heiner of the University of Alaska Mineral Industry Research Laboratory programmed the data for the IBM 360 computer. A brief discussion of trend surface analysis is given below.

In order to outline area trends and point to the best possible target areas for future mineral exploration, the computer can be called upon to make a statistical analysis of geochemical data in terms of location and concentration of an element. For trend surface analysis, the method of least squares has the best general application for surface fitting (Crow and others, 1960, p 151). By using this technique a planar surface is established for geochemical data such that positive and negative measurements from the surface are at a minimum.

Multiple regression trend surface analyses of geochemical data have been examined in a number of the known mineral deposits in the United States (Nackowski and others, 1967, p 1077). Known mineralized areas can be outlined, petrologic contacts, faults, and folds can be pointed out, and topographic relationships can be indicated.

Trend surfaces applied to geological and geochemical data are described by arithmetic equations. The data represent dependent variables stated as a function of two independent variables which establish the areal sample locations. The mathematical operations of trend-surface fitting consist of finding the constants to the arithmetic equations such that the least-squares criterion is satisfied. In fitting a trend surface to geochemical data, the dependent variable, z, represents the quantity of indicator element in each sample and the independent variables, x and y, represent the planar sample location coordinates. These equations for linear, quadratic and cubic components are shown in table 3. Trend surfaces classified according to degree are more complex as the number of components in the equations describing them increases......The first degree surface is a plane and contains only linear terms, whereas the generalized second degree surfaces, which contain both quadratic and linear terms, are either positive or negative bowl-shaped paraboloids. Third degree surfaces include an inflection, are more complex and contain cubic, quadratic, and linear terms.

Table 3 - Classification of Trend Surface Equations Illustrating Three Components and Three Degrees (from Nackowski and others, 1967, p 1078)

Trend Surface Classification	Dependent Variable	Linear Component	Quadratic Component	Cubic Component
First degree plane surface	z=	$A+B_x+C_y$		
Second degree paraboloid	z=	$A+B_x+C_y+$	$D_x{}^2+E_{xy}+F_y{}^2$	
Three degree surface	z=	$A+B_x+C_y+$	$D_x{}^2+E_{xy}+F_y{}^2+$	$G_x{}^3 x H_x{}^2 y+I_{xy}{}^2+J_y{}^3$

Letters A through J represent constants.

Each increasing degree adds another inflection in the trend surface and each equation representing the surface becomes more complex; the independent variables, x and y, are increased in power and new constants are fitted into the equation; the new equation is simply added on to the lower power equations, following the pattern shown in table 3.

Figure 6 shows generalized trend surfaces for the first three degrees and variables.

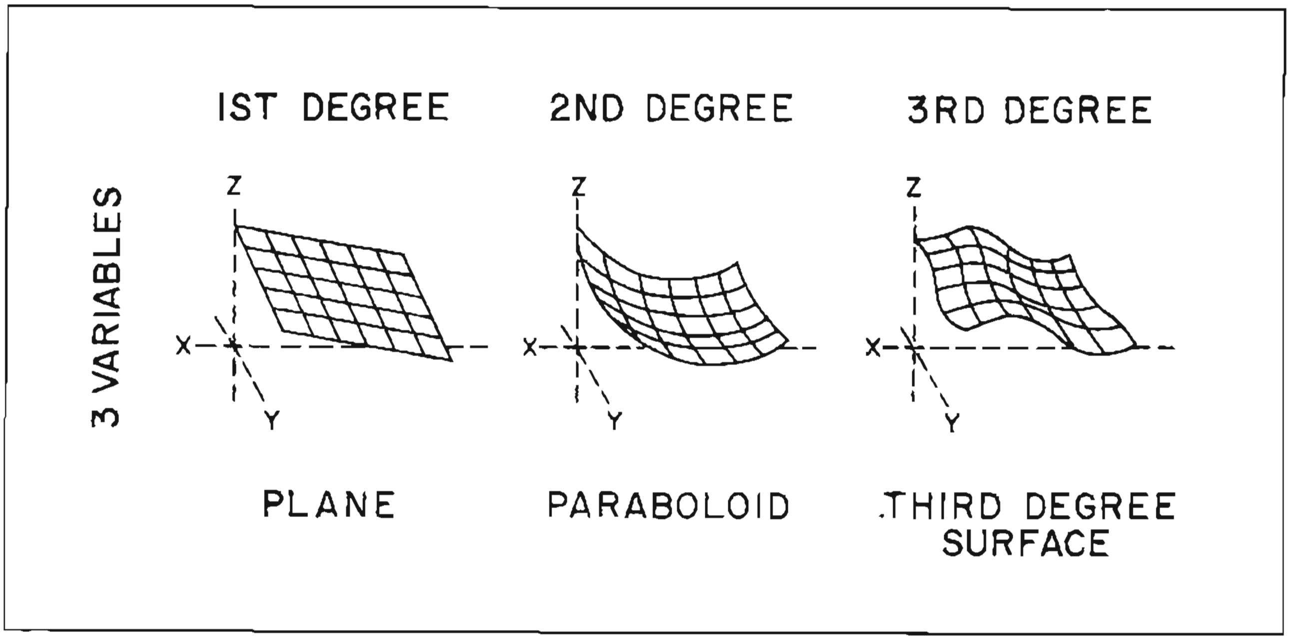


Figure 6

Generalized trend surfaces for three surfaces for three degrees and three variables. (After Nackowski and others, 1967.)

> "The trend surface itself represents the regional component or geochemical trend. This surface, or the value of any point on the surface, represents a threshold value which is variable across the map area." (L. Heiner, personal communication, 3-25-69)

Values which fall above or below the trend surface in any degree are termed residuals. Each advancing trend surface degree will generally cover some of the residuals from the degree below it. Residuals that persist through increasing trend surface degrees are considered possible target areas for future prospecting and mineral exploration.

Figure 7 is a map of the sixth degree trend for zinc with residual values.

The trend map indicates a northwest regional trend of the geochemical data. The residuals, which represent anomalies are also aligned northwest. The trend surface study confirms the conclusion that there are mineralized structures in the quadrangle that trend northwest. The trend surface also indicates that the structures extend across the entire quadrangle and include the head of Topnotch Creek where an anomalous silver value was found.

The residuals indicate a clustering of anomalies on the border of the quadrangle near the head of Topkok River and O'Brien Creek. The clustering of residuals is probably related to a northwest trending structure that crosses the ridge west of the heads of the above streams. The area of clustering is a possible exploration target.

Summary, Stream Sediment Sampling

Stream sediment sampling in the quadrangle brings out the following points:

1) Stream sediment geochemical sampling indicates that mineralization in the quadrangle is localized along structures that trend northwest.

2) Lead is apparently the best indicator of the structures, although copper and zinc are associated at places.

3) The linear mineralized trends are not significantly affected by lithology, but further study might reveal that some rock types are more highly mineralized than others.

4) There are copper anomalies below a northeast fault in upper West Creek.

5) Molybdenum, cobalt, and silver are in the region. Molybdenum anomalies are most abundant on the flanks of Uncle Sam Mountain; silver occurs near the head of Topnotch Creek.

6) Atomic absorption analyses and spectrographic analyses are not correlatable; particularly for copper and lead. The reason for the discrepancy is unknown.

7) Geochemistry in the region is a valuable tool; geologic observations alone would lead to the conclusion that mineralized structures are very sparse in the quadrangle. The geochemical data does not outline an orebody, but it does indicate the locations of mineralized structures. To determine the intensity of mineralization further investigation will be required. Other approaches to analyzing the data presented might lead to more definitive conclusions. For this reason the appendices include all pertinent sample data and analyses for the convenience of anyone who cares to pursue the matter further.

TRACE ELEMENT STUDY OF THE HURRAH SLATE

Surface observations indicate that the Hurrah slate is the most mineralized rock unit in the area. A sampling program was designed to sample the entire unit in the mapped area west of the Solomon River (area B, fig 2). North-south traverse lines were established at one-quarter mile intervals. Samples were taken at stations approximately 1,000 feet apart along the traverse lines. Where possible a rock-chip sample was taken; if this could not be done a soil sample was substituted. Four soil sample traverses were also made in the Hurrah slate; sampling interval was 50 or 100 feet.

Rock samples were analyzed in the Division of Mines and Geology laboratory for copper, lead, zinc, gold, and silver. Soil samples were analyzed by the U. S. Geological Survey by the procedures described previously for stream sediment samples.

In the course of the sampling program it became apparent that the Hurrah slate is highly variable in texture and composition. Black, hard, graphitic slate, micaceous slate or phyllite, limestone, and Solomon schist were all encountered along the traverses. Because of the variability in lithology and soil types, the analytical data from the

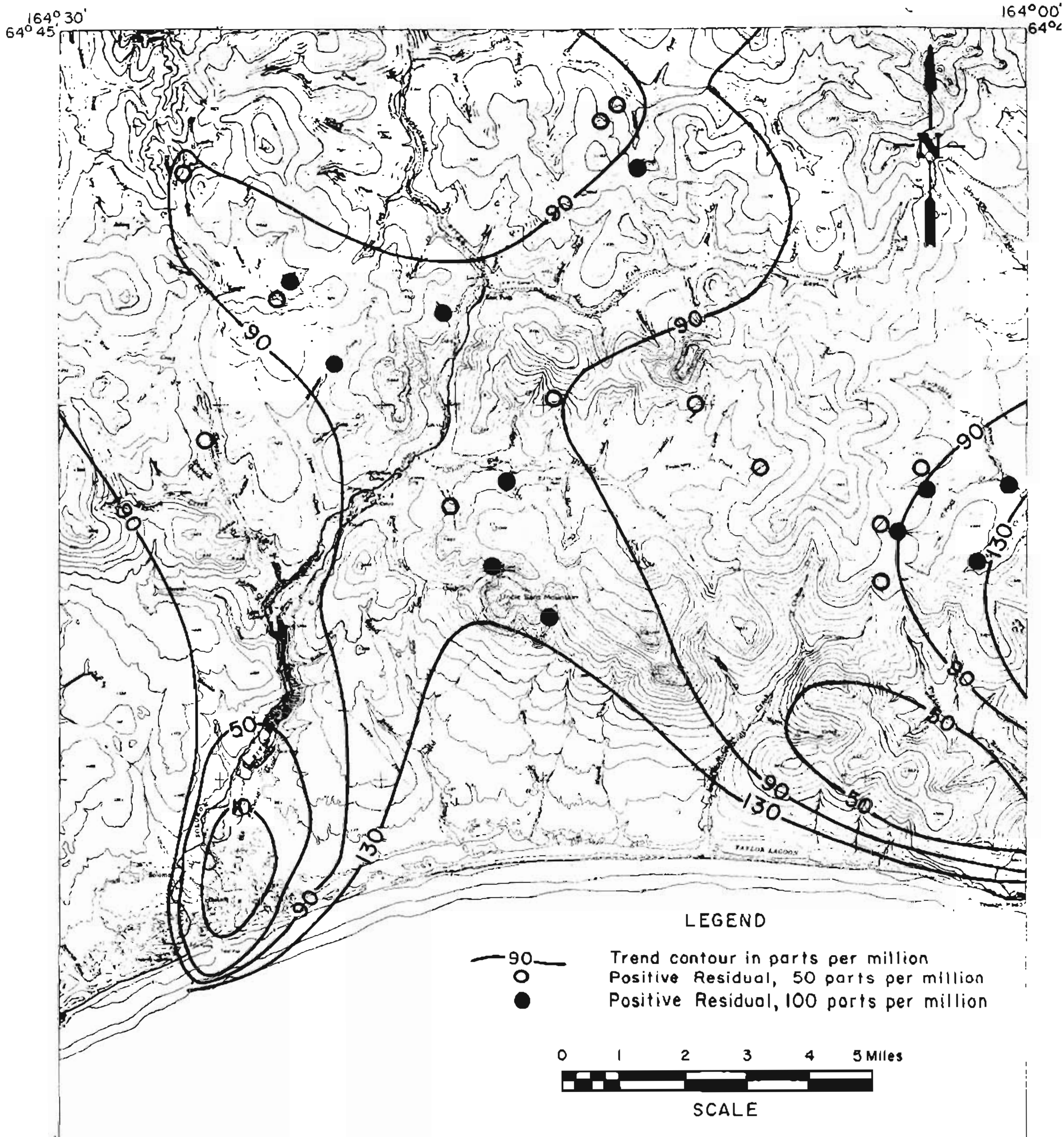


Figure 7

IXTH DEGREE ZINC TREND SURFACE MAP & RESIDUALS

SOLOMON C-5 QUADRANGLE, ALASKA

various rock types should be treated independently in order to establish meaningful figures for threshold and anomalous values. Spectrographic analyses should be made of the rock samples so that results can be compared to soil samples. This work is contemplated for the future. A separate report with complete details of the results of sample analyses and conclusions will be prepared.

Preliminary work shows that the Hurrah slate does not contain disseminated gold in commercial quantities. Throughout most of the outcrop area, gold occurs in only trace amounts. Copper, lead, or zinc in soil and rock samples are not reliable pathfinder elements for gold deposits in the Hurrah slate. These elements did not indicate the presence of the Big Hurrah Mine.

Further research will point out which elements are reliable indicators and the elemental variation in the differing lithologies.

S U M M A R Y

CONCLUSIONS

As a result of this study the following conclusions have been reached:

1) A combination of applied geology and geochemistry is effective for locating mineralized structures in the region.

2) The rocks in the Solomon C-5 quadrangle are probably Paleozoic in age and equivalent to the Nome group that is recognized elsewhere on the Seward Peninsula. The Hurrah slate is probably an interbed in the Solomon schist and is older than the Sowik limestone.

3) The structural history of the region is highly complex. Structures include overturned folds, thrust faults, high angle normal faults, and a subordinate set of northwest fractures. All of these have had an influence on the location of lode deposits, but the northwest fracture system is the most important.

4) The Hurrah slate appears to be the most highly mineralized rock unit in the region, but geochemical data indicate that lithologic control of lode deposits is less important than structural control.

5) The Big Hurrah vein system is of limited extent. Neither past prospecting nor the geochemical work done during the course of this project revealed vein extensions to the northwest or southeast. The veins may be terminated by faults northwest and southeast of the mine.

6) Except for the gold deposits on Trilby Hill no lode deposits were observed that are of economic interest in the Hurrah slate.

7) There are at least two veins on the R. W. Silver property on Trilby Hill. The veins strike northwest and are continuous on the surface for several hundred feet. Gold values range from 0.5 to 1.0 ounce per ton.

8) In the Solomon schist sulphide deposits are sparse and of little consequence. The old prospect on upper West Creek may have some potential. Two quartz veins with pyrite and arsenopyrite are opened by drifts and the wall rocks are mineralized.

9) Copper mineralization is widespread in the Sowik limestone where the unit is in contact with the Solomon schist. Detailed study shows that silica replaces limestone along thrust faults and high angle faults; sparse copper carbonates are associated with the silicification.

10) Greenstone bodies contain disseminated sulphides, but apparently not in economic quantities.

11) Lead in stream sediment samples is a reliable indicator element. A number of northwest-trending fractures were outlined by lead anomalies. Zinc, molybdenum, and silver are associated with the lead at places. Further exploration will be required to learn if mineralization is concentrated along the fractures in economic quantities. A zinc trend surface map supports the conclusion that northwest trending fractures are mineralized.

12) Copper anomalies point out limestone-schist contacts, verify the presence of a fault, and indicate areas where greenstone crops out. Minor cobalt is also associated with the greenstone.

13) Residuals from the trend map show a cluster of anomalies near the head of O'Brien Creek. This may be a target area.

14) The results of a sampling program across the outcrop area of the Hurrah slate are still being studied. A preliminary conclusion is that the Hurrah slate apparently does not contain disseminated gold in economic amounts.

15) The potential of the area as a whole seems low. Northwest fractures are mineralized, but the deposits are not exposed on the surface, and the concentration of metals in them is not known.

SUGGESTIONS TO PROSPECTORS

The work done in the Solomon quadrangle failed to define any exploration targets with well defined boundaries. There are indications of mineralization, however, and anyone prospecting in the area should consider the following points:

1) There are mineralized structures in the region that trend northwest. The structures can be detected by geochemical means. Lead in stream sediment samples is a reliable indicator element.

2) Because mineralized zones are indicated by geochemical anomalies rather than conventional prospecting techniques no estimation of the quality or quantity of mineralization is possible. Further investigation of these zones may reveal economic deposits beneath the tundra. Ore minerals in the area contain copper, lead, zinc, gold, silver, and molybdenum.

3) Geochemistry is an invaluable prospecting tool in the region because the ore zones do not crop out.

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APPENDIX I

Geochemical Field data,
results of cold extractable metals test,
and comparison to laboratory analyses for gold, copper, lead, and zinc

Map No.	Sample No.	Concentration (ppm)(1) Au	Cu	Pb	Zn	Field Test(2)	App. Stream Width	Bed-Rock(3)	Float at sample site(3, 4)
1	141	.01	35	15	80	1	6'		ls-50, s-30, gs-15, qtz-5
2	140	.01	25	15	70	2	6'	sh	ls-40, sh-50, qtz-10
3	139	.01	130	15	40	4	6'	ls	ls-50, sh-30, gs-10, qtz & cc-10
4	232	.01	35	50	140	3	6'	sh	sh-78, gs-20, qtz-2
5	231	.01	35	30	70	2	6'	sh	sh-78, gs-20, qtz-2
6	230	.01	45	150	60	1	6'	sh	sh-78, gs-20, qtz-2
7	229	.01	40	15	80	1	6'	sh	sh-78, gs-20, qtz-2
8	228	.01	40	15	80	3	6'	sh	sh-78, gs-20, qtz-2
9	227	.01	35	30	70	1	6'	sh	sh-98, qtz-2
10	226	.01	25	2	50	1	6'	sh	sh-98, qtz-2
11	225	.01	25	2	60	1	6'	sh	sh-98, qtz-2
12	224	.01	30	30	60	2	6'	sh	sh-98, qtz-2
13	223	.01	40	10	60	2	14'	sh	sh - qtz
14	222	.01	40	10	60	2	14'	sh	sh - qtz
15	219	.01	25	15	50	2	6'	sh	sh-98, qtz-2
16	220	.01	25	30	30	3	6'	sh	sh-98, qtz-2
17	221	.01	20	15	30	2	6'	sh	sh-98, qtz-2
18	136	.01	40	50	90	1	6'	sh	sh-45, ls-30, cc-10, qtz-15

(1) Gold, copper, lead, and zinc analyses by U.S.G.S. Field Laboratory, Anchorage; values in parts per million (atomic absorption for gold, copper, zinc; spectrographic values for lead) 150 = anomalous value; 135* = threshold value.
(2) Field test measured in milliliters of dithizone, cold extractable metals test (Hawkes, 1963).
(3) Symbols for rock types are as follows: cc = calcite, gs = greenstone, ls = limestone, qtz = quarts, sh = schist, sl = slate
(4) Percent of rock types at each sample station shown in figures after the symbol.

Map No.	Sample No.	Concentration (ppm)(1) Au	Cu	Pb	Zn	Field Test(2)	App. Stream Width	Bed Rock(3)	Float at sample site(3, 4)
19	138	.01	45	30	80	2	6'	sh	ls-50, sh-30, cc & qtz-20
20	137	.01	45	15	100	2	6'	ls	sh-60, ls-20, gs-20
21	135	.01	40	30	120	2	6'	sh	sh w/qtz, qtz boulders
22	160	.01	20	15	60	3	6'		
23	161	.01	20	15	70	2	2'		
24	162	.01	25	30	70	1	6'		sh-95, qtz-5
25	133	.01	50	<u>100</u>	<u>190</u>*	1	14'	ls	sh-55, ls-45
26	134	.01	20	30	50		6'	ls	ls-100
27	212	.01	20	10	70	2	6'		sh-98, qtz-2
28	213	.01	25	15	80	3	6'	sh	sh-98, qtz-2
29	237	.01	25	20	70	1	14'		sh-78, gs-20, qtz-2
30	236	.01	30	15	60	1	6'		sh-95, qtz-5
31	217	.01	25	5	70	5	6'		ls-94, sh-4, qtz-2
32	218	.01	25	15	50	2	14'		sh-97, qtz-3
33	215	.01	40	30	70	2	6'	sh	sh-98, qtz-2
34	214	.01	30	15	50	3	6'	sh	sh-98, qtz-2
35	128	.01	20	30	75				
36	131	.01	15	15	40	2	14'	ls	ls-80, sh-20
37	132	.01	20	20	40	1	6'	ls	ls-100
38	163	.01	20	5	60	1	14'		sh-74, gs-25, qtz-1
39	159	.01	30	15	80	1	6'		sh-99, qtz-1
40	158	.01	20	15	40	1	6'		sh-99, qtz-1
41	157	.01	35	20	70	1	14'		sh-60, gs-35, qtz-5
42	151	.01	30	30	50	1	6'		gs-40, sh-30, ls-20, qtz-10
43	152	.01	35	20	80	1	14'	sh	sh-50, gs-25, ls-20, qtz-5
44	150	.01	35	30	90	1	6'	sh	sh w/qtz

Map No.	Sample No.	Concentration (ppm)(1) Au	Cu	Pb	Zn	Field Test(2)	App. Stream Width	Bed Rock(3)	Float at sample site(3, 4)
45	153	.01	30	50	60	1	6'		sh-60, qtz-40
46	149	.01	35	50	60	1	6'		sh-60, qtz-40
47	154	.01	30	15	50		14'	sh	sh w/qtz
48	155	.01	25	15	50		14'	sh	sh-70, gs-20, qtz-10
49	156	.01	45	50	110	3	6'	ls-sh	ls-50, sh-45, qtz-5
50	148	.01	30	30	60	1	6'		sh-70, qtz-30
51	130	.06	35	15	70	1	14'	ls	ls-60, sh-40
52	127	.01	35	30	80	1	6'	ls	ls-40, sh-60
53	125	.01	15	5	40	1	6'	ls	ls-85, sh-15
54	216	.01	30	50	60	2	6'		ls-94, sh-4, qtz-2
55	243	.01	35	30	85	1	6'		sh-87, gs-10, qtz-3
56	244	.01	40	30	100	1	6'		sh-98, qtz-2
57	245	.01	25	70	90	1	6'		sh-98, qtz-2
58	249	.01	30	15	70	2	14'		sh-88, gs-5, ls-5, qtz-2
59	445	.01	77*	15	280	2	2'	sl-sh	sh w/qtz-100
60	446	.01	34	20	140	3	6'	sl-ls	sl-50, sh-40, ls-10
61	447	.01	46	20	110	3	2'		ls-50, sh-30, qtz-20
62	122	.01	25	20	120	2	6'		sh-100
63	120	.01	40	30	210	1	6'		sh w/qtz
64	121	.01	20	30	200	1	-2'		sh w/qtz
65	118	.01	50	30	170*	1	-2'	ls	ls-50, sh-50
66	123	.01	35	50	100	1	6'		sh, trace gs
67	124	.01	30	20	60	1	6'		sh-80, ls-20, sm. amt. qtz
68	126	.01	40	70	100	2	14'	ls	ls-60, sh-30, qtz-10
69	117	.01	30	30	150	3	-2'	ls	ls & sm. amt. sh
70	129	.01	30	30	70	2	14'	ls	ls-80, sh-20, sm. amt. qtz

Map No.	Sample No.	Concentration (ppm)(1) Au	Cu	Pb	Zn	Field Test(2)	App. Stream Width	Bed Rock(3)	Float at sample site(3, 4)
71	142	.01	30	20	80	1	-2'	ls	ls-95, sh-5, sm. amt. qtz
72	143	.5	30	20	80	1	-2'	ls	ls-60, sh-35, qtz-5
73	144	.01	25	30	60	3	6'	ls	
74	145	.01	25	10	60	1	6'		brush
75	146	.01	30	30	90	1	-2'		ls-sh
76	147	.01	35	30	110	8	-2'		sh-100
77	211	.01	25	15	50	2	14'		ls-30, sh-65, qtz-5
78	119	.01	55	70	130	1	-2'	ls	ls-70, sh-20, qtz-10
79	210	.01	25	30	60	2	14'		ls-30, sh-65, qtz-5
80	209	.01	35	30	70	2	14'		ls-30, sh-65, qtz-5
81	171	.01	20	15	50	1	6'		sh-95, gs-5
82	172	.01	20	20	60	2	6'		sh-95, gs-5
83	173	.01	45	10	80	3	6'		gs-60, sh-38, qtz-2
84	170	.01	25	15	40	2	6'		gs-23, sh-75, qtz-2
85	169	.01	25	15	40	1	6'		gs-23, sh-75, qtz-2
86	168	.01	25	15	40	1	6'		gs-20, sh-79, qtz-1
87	167			30		1	6'		sh-98, qtz-2
88	166	.01	30	15	90	2	14'		sh-64, gs-30, qtz-4, sl-2
89	165	.01	30	15	90	2	14'		sh-50, ls-30, gs-17, qtz-3
90	164	.01	20	5	80	2	14'		sh-48, ls-40, gs-10, qtz-2
91	206	.01	45	30	80	2	6'		sh-98, qtz-2
92	207	.01	25	15	50	2	6'		sh-68, ls-30, qtz-2
93	208	.01	20	5	40	2	14'		sh-63, ls-30, marble-5, qtz-2
94	186	.01	25	15	70	1	6'		sh-98, qtz-2
95	187	.01	45	10	100	1	6'		sh-98, qtz-2
96	188	.01	40	15	60	3	6'		sh-99, qtz-1

Map No.	Sample No.	Concentration (ppm)(1) Au	Cu	Pb	Zn	Field Test(2)	App. Stream Width	Bed Rock(3)	Float at sample site(3, 4)
97	189	.01	65	70	200	2	6'		sh-99, qtz-1
98	449	.01	24	15	80	2	-2'		brush
99	448	.01	35	10	110	1	6'	sl-sh	sh-70, sl-20, qtz-10
100	450	.01	46	25	80	2	6'	ls-sh	sh-60, ls-30, qtz-10
101	451	.01	22	10	54	1	6'		ls-sh
102	205	.01	20	5	50	1	6'	sh	sh-98, qtz-2
103	204	.01	40	30	80	2	6'		sh-99, qtz-1
104	203	.01	25	5	60	3	14'		sh-78, ls-20, qtz-2
105	179	.01	30	10	50	2	6'		sh-79, ls-10, marble-10
106	184	.01	30	15	70	1	6'	sh	sh-96, gs-1, sl-2, qtz-1
107	185	.01	35	50	80	3	6'		sh-98, qtz-2
108	183	.01	40	20	70	2	6'		sh-77, qtz-3, sl-20
109	180	.01	30	30	60	2	14'		sh-83, qtz-2, sl-15
110	181	.01	20	5	70	2	6'		sh-86, sl-10, gs-2, qtz-2
111	182	.01	45	30	90	2	6'		sh-86, sl-10, gs-2, qtz-2
112	201	.01	30	5	70	1	14'		qtz-96, sh-2, ls-2
113	202	.01	60	30	80	2	-2'		sh-100
114	174	.01	15	30	50	1	-2'		sh-82, ls-15, qtz-3
115	200	.01	40	50	140	5	-2'		sh-100
116	199	.01	25	5	50	2	-2'		sh-93, gs-5, qtz-2
117	192	.01	35	5	60	2	6'	sh	sh-96, gs-2, qtz-2
118	191	.01	60	20	130	2	6'	sh	sh-96, gs-2, qtz-2
119	190	.01	30	5	40	2	6'	ls	sh-96, gs-2, qtz-2
120	193	.01	35	30	80	5	6'	sh	sh-96, gs-2, qtz-2
121	233	.01	30	20	70	1	6'	ls	sh-72, ls-25, qtz-3
122	234	.01	40	10	70	2	6'	ls	sh-78, ls-20, qtz-2

Map No.	Sample No.	Concentration (ppm)(1) Au	Cu	Pb	Zn	Field Test(2)	App. Stream Width	Bed Rock(3)	Float at sample site(3, 4)
123	235	.01	40	30	90	2	6'	sh	sh-78, ls-20, qtz-2
124	195	.01	25	5	50	2	14'		sh-94, ls-3, sl-2, qtz-1
125	196	.01	25	5	40	1	14'		sh-94, ls-3, sl-2, qtz-1
126	198	.01	35	5	60	1	6'		sh-96, ls-2, qtz-2
127	197	.01	30	5	50	2	14'		sh-94, ls-3, sl-2, qtz-1
128	178	.01	30	30	60	1	14'		sh-64, gs-30, qtz-4, sl-2
129	177	.01	35	30	70	1	-2'		sh-82, ls-15, qtz-3
130	176	.01	20	15	50	2	-2'		sh-82, ls-15, qtz-3
131	175	.01	15	20	40	2	-2'		sh-82, ls-15, qtz-3
133	194	.01	30	15	60	1	14'		sh-94, ls-3, sl-2, qtz-1
134	470	.01	28	30	130	2	-2'		sh-80, sl-20
135	469	.01	15	20	70	1	6'		sh w/qtz-70, sl-30
136	468	.01	17	15	84	1	-2'		sand
137	466	.01	20	20	100	2	dry		sand
138	465	.01	28	30	120	1	dry		ls-100
139	467	.01	23	20	74	2	-2'		sh-80, sl-20
140	462	.01	16	30	58	1	dry		sh-60, sl-40
141	463	.01	18	30	60	1	dry		sh-60, sl-40
142	464	.01	26	30	80	2	dry		sh-70, sl-20, gs-10
143	461	.01	45	30	52	1	-2'		sh-100
144	460	.01	15	30	40	1	dry		ls-90, sh-10
145	459	.01	13	10	50	1	6'		sh-40, qtz-30, ls-30
146	347	.01	30	30	70	1	14'	sh	sh-99, qtz-1
147	348	.01	25	15	60	1	6'		sh-99, qtz-1
148	349	.01	30	20	60	2	6'		sh-99, qtz-1
149	350	.01	50	30	70	6	6'		sh-99, qtz-1

Map No.	Sample No.	Concentration (ppm)(1) Au	Cu	Pb	Zn	Field Test(2)	App. Stream Width	Bed Rock(3)	Float at sample site(3, 4)
150	346	.01	5	15	12	1	14'	sh	sh-99, qtz-1
151	345	.01	20	5	50	1	6'		sh-98, qtz-2
152	342	.01	25	15	60	1	6'		sh-82, gs-15, qtz-3
153	343	.01	20	10	60	1	6'		sh-82, gs-15, qtz-3
154	344	.01	25	20	40	2	6'		sh-82, gs-15, qtz-3
155	340	.01	30	15	85	2	6'		sh-88, sl-10, qtz-2
156	341	.01	30	5	100	1	14'		sh-88, sl-10, qtz-2
157	316	.01	15	5	40	2	6'	sh	sh-95, qtz-5
158	317	.01	25	30	100	2	6'	sh	sh-95, qtz-5
159	318	.01	20	20	55	2	6'	sh	sh-85, qtz-15
160	319	.01	40	50	70	1	6'		sh-85, qtz-15
161	320	.01	75*	30	100	3	6'	sh	sh-90, qtz-10
162	321	.01	45	50	70	2	6'	sh	sh-90, qtz-10
163	322	.01	30	30	70	1	6'	sh	sh-90, qtz-10
164	323	.01	25	30	60	2	6'	sh	sh-90, qtz-10
165	315	.01	30	30	60	2	6'	sh	sh-95, qtz-5
166	314	.01	50	30	90	1	14'	sh	sh-88, gs-10, qtz-2
167	313	.01	35	30	100	2	6'	ls	ls-60, sh-38, qtz-2
168	312	.01	40	30	130	1	6'		sh-97, qtz-3
169	311	.01	35	50	140	2	6'		sh-97, qtz-3
170	308	.01	25	15	55	2	6'		sh-98, qtz-2
171	309	.01	5	15	12	2	6'		sh-98, qtz-2
172	310	.01	25	30	50	2	6'		sh-98, qtz-2
173	292	.01	45	50	180*	5	6'		sh-98, qtz-2
174	293	.01	45	50	100	3	6'	sh	sh-97, qtz-3
175	294	.01	50	30	120	8	6'	sh	sh-97, qtz-3

Map No.	Sample No.	Concentration (ppm)(1) Au	Cu	Pb	Zn	Field Test(2)	App. Stream Width	Bed Rock(3)	Float at sample site(3, 4)
176	295	.01	50	50	90	4	6'	sh	sh-97, qtz-3
177	296	.01	40	20	110	2	6'	sh	sh-97, qtz-3
178	302	.01	80	30	210	7	6'		sh-98, qtz-2
179	291	.01	40	30	60	1	14'	sh	sh-94, qtz-1, gs-5
180	290	.01	30	15	70	2	14'	sh	sh-94, qtz-1, gs-5
181	286	.01	25	30	60	9	6'	sh	sh-79, gs-20, qtz-1
182	287	.01	30	20	70	1	6'		sh-68, gs-30, qtz-2
183	288	.01	70*	30	110	2	6'		sh-79, gs-20, qtz-1
184	289	.01	30	20	60	1	6'		sh-79, gs-20, qtz-1
185	285	.01	40	50	100	3	6'		sh-100
186	278	.01	25	20	55	2	6'		sh-89, gs-10, qtz-1
187	279	.01	20	20	45	2	6'		sh-78, gs-20, qtz-2
188	280	.01	40	30	60	2	6'		sh-78, gs-20, qtz-2
189	281	.01	20	15	55	2	6'		sh-78, gs-20, qtz-2
190	282	.01	30	30	70	1	6'		sh-75, gs-20, ls-5
191	284	.01	30	30	70	2	6'		sh-75, gs-20, ls-5
192	283	.01	25	50	80	3	6'		sh-75, gs-20, ls-5
193	277	.01	25	30	55	2	6'		sh-98, qtz-2
194	276	.01	45	30	70	3	6'		sh-98, qtz-2
195	273	.01	50	30	60	2	6'		sh-78, gs-20, qtz-2
196	272	.01	50	20	50	1	14'		sh-73, gs-25, qtz-2
197	271	.01	20	30	50	2	14'		sh-73, gs-25, qtz-2
198	270	.01	30	15	65	2	14'		sh-79, gs-20, qtz-1
199	269	.01	30	30	60	3	14'		sh-79, gs-20, qtz-1
200	268	.01	20	20	50	2	14'		sh-79, gs-20, qtz-1
201	267	.01	35	30	70	6	14'		sh-58, gs-40, qtz-2

Map No.	Sample No.	Concentration (ppm)(1) Au	Cu	Pb	Zn	Field Test(2)	App. Stream Width	Bed Rock(3)	Float at sample site(3, 4)
202	266	.01	25	10	50	4	6'		sh-75, gs-25
203	265	.01	20	30	60	3	-2'	sh	sh-50, gs-50
204	264	.01	20	15	60	2	6'		sh-79, gs-20, qtz-1
205	513	.01	36	15	72	1	6'		sh-98, qtz-2
206	514	.01	37	30	74	1	6'	sh	sh-83, gs-10, ls-5, qtz-2
207	515	.01	41	30	86	2	6'		sh-45, gs-50, ls-3, qtz-2
208	240	.01	30	50	80	2	6'	ls	ls-60, sh-37, qtz-3
209	238	.01	40	15	80	1	6'		sh-62, gs-30, ls-5, qtz-3
210	239	.01	60	30	120	2	6'	sh	sh-78, gs-10, ls-10, qtz-2
211	241			30		1	6'		sh-92, gs-5, qtz-3
212	242	.01	30	30	80	3	14'		sh-96, qtz-4
213	246	.01	25	20	70	1	14'		sh-87, gs-10, qtz-3
214	247	.01	25	30	50	1	6'		sh-98, qtz-2
215	326	.01	15	20	40	1	6'		sh-90, qtz-10
216	325	.01	30	30	90	2	6'		sh-90, qtz-10
217	324	.01	35	50	65	2	6'		sh-90, qtz-10
218	328	.01	25	10	65	2	6'		sh w/qtz-100
219	327	.01	20	15	50	2	6'		sh w/qtz-100
220	248	.01	15	15	40	1	14'		sh-88, ls-5, gs-5, qtz-2
221	298	.01	30	30	80	1	6'		sh-96, qtz-4
222	299	.01	30	30	120	2	6'		sh-97, qtz-3
223	300	.01	30	30	85	3	6'	sh	sh-98, qtz-2
224	301	.01	30	30	110	2	6'		sh-98, qtz-2
225	297	.01	30	30	90	2	6'		sh-99, qtz-1
226	540	.01	30	15	85	3	6'		sh-85, qtz-10, ls-5
227	538	.01	35	30	60	2	6'		sh-53, sl-45, qtz-2

Map No.	Sample No.	Concentration (ppm)(1) Au	Cu	Pb	Zn	Field Test(2)	App. Stream Width	Bed Rock(3)	Float at sample site(3, 4)
228	536	.01	30	15	95	2	6'		sh-78, sl-20, qtz-2
229	535	.01	35	20	135	4	6'		sh-78, sl-20, qtz-2
230	537	.01	45	15	150	3	6'		sh-53, sl-45, qtz-2
231	534	.01	35	15	90	1	6'		sh-48, sl-40, ls-10, qtz-2
232	99	.8*	27	15	55	2	6'		sl-60, sh-10, ls-30
233	533	.01	45	15	190	7	6'		sh-48, sl-40, gs-10, qtz-2
34	532	.01	40	15	140	3	6'		sh-48, sl-40, gs-10, qtz-2
35	529	.01	44	15	120	2	6'	ls-sh	sh-72, ls-25, qtz-3
36	530	.01	60	20	140	8	6'	ls-sh	sh-94, ls-5, qtz-1
237	531	.01	60	30	100	1	6'	ls-sh	sh-94, ls-5, qtz-1
238	528	.01	95	30	210	1	6'	ls-sh	ls-65, sh-33, qtz-2
239	527	.01	58	20	160*	3	6'	sh	sh-98, qtz-2
240	525	.01	32	20	56	1	6'		sh-89, gs-10, qtz-1
241	526	.01	35	30	64	1	6'		sh-88, gs-10, qtz-2
242	524	.01	38	20	78	3	6'		sh-99, qtz-1
243	83	.01	19	20	30	1	6'		sh-100
244	523	.01	45	30	80	2	6'		sh-99, qtz-1
245	522	.01	44	10	110	3	6'	ls-sh	sh-73, ls-25, qtz-2
246	521	.01	48	50	100	1	6'	sl-sh	sh-99, qtz-1
247	520	.01	39	15	80	1	6'	sl-sh	sh-99, qtz-1
248	517	.01	30	15	66	2	6'	sh	sh-98, qtz-2
249	518	.01	30	30	60	1	6'		sh-99, qtz-1
250	82	.01	41	5	90	1	6'		sh-100 w/qtz
251	80		23	10	60	1	14'		gs-60, sh-30, qtz-10
252	79	.01	22	30	150	1	-2'		sh-100 w/qtz
253	519	.01	30	20	90	3	6'		sh-98, qtz-2

Map No.	Sample No.	Concentration (ppm)(1) Au	Cu	Pb	Zn	Field Test(2)	App. Stream Width	Bed Rock(3)	Float at sample site(3, 4)
254	78	.01	27	30	70	1	-2'		brush
255	81	.01	20	30	65	1	14'	sh	sh-95, qtz-5
256	76	.01	35	15	50	1	-2'	sh	sh-90, qtz-10
257	77	.2	33	50	65	1	6'	sh	sh-97, qtz-3
258	516	.01	25	20	52	1	6'	sh	sh-98, qtz-2
259	512	.01	32	30	58	1	6'		sh-99, qtz-1
260	511	.01	25	20	60	1	6'		sh-99, qtz-1
261	510	.01	27	20	58	2	6'		sh-99, qtz-1
262	509	.01	28	15	62		6'		sh-99, qtz-1
263	508	.01	29	30	60	2	6'		sh-98, qtz-2
264	507	.01	23	30	56	1	6'		sh-98, qtz-2
265	506	.01	22	20	66	2	6'		sh-99, qtz-1
266	505	.01	17	30	60	1	6'		sh-99, qtz-1
267	504	.01	12	10	44	1	6'		sh-99, qtz-1
268	503	.01	20	30	62	1	6'		sh-99, qtz-1
269	386	.01	21	15	40	4	14'		sh-88, gs-10, qtz-2
270	387	.01	17	30	32	1	14'		sh-88, gs-10, qtz-2
271	501	.01	33	30	74	3	6'		sh-73, gs-25, qtz-2
272	500	.01	37	30	74	1	6'		sh-73, gs-25, qtz-2
273	385	.01	23	20	44	4	6'		sh-88, gs-10, qtz-2
274	384	.01	28	20	50	5	6'		sh-88, gs-10, qtz-2
275	383	.01	30	10	40	3	-2'		sh-88, gs-10, qtz-2
276	502	.01	24	30	60	1	6'		sh-99, qtz-1
277	382	.01	28	15	50	3	6'		sh-83, gs-15, qtz-2
278	73	.01	46	20	180*	2	-2'		sl-50, sh-50
279	539	.01	45	15	180*	4	6'		sh-85, ls-5, qtz-10

Map No.	Sample No.	Concentration (ppm)(1) Au	Cu	Pb	Zn	Field Test(2)	App. Stream Width	Bed Rock(3)	Float at sample site(3, 4)
280	72	.01	24	30	38	1	6'		sh-95, qtz-5
281	69	.01	24	50	55	2	6'		sh-95, qtz-5
282	68	.01	22	10	58	3	-2'		sh-98, qtz-2
283	70	.01	24	30	48	1	-2'		sh-95, qtz-5
284	71	.01	43	30	70	2	6'		sh-100
285	75	.01	54	50	100	2	-2'		sh-100
286	63	.01	22	30	100		-2'		brush
287	96	.01	50	28	83	1	6'	sh	sh-100
288	97	.01	40	30	65	3	dry		sh-100
289	98	.01	25	10	40	1	6'		sh-100
290	64	.01	15	30	60	6	6'		sh-80, qtz-20
291	50	.01	11	10	66	1	-2'		sh-80, qtz-10, sl-10
292	51	.08	39	20	80	12	-2'		brush
293	49	.01	25	10	70	10	6'		sh-50, ls-30, sl-10, qtz-10
294	48	.01	22	10	110	2	6'		sh-50, ls-30, sl-10, qtz-10
295	52	.01	30	20	140	18	6'	sh	sh-70, ls-15, sl-10, qtz-5
296	65		36	5	150	1	6'		sh-90, qtz-10
297	66	.01	21	30	80	1	-2'		sh-90, qtz-10
298	67	.01	20	30	95	1	-2'		sh-100
299	53	.01	17	15	92	2	6'		sh-85, qtz-15
300	62	.01	20	15	68	4	6'		sh-70, ls-10, sl-10, qtz-10
301	54	.01	20	5	88	1	14'		sh-50, sl-50
302	55	.01	20	5	110	2	6'		sl-80, sh-15, qtz-5
303	56	.01	35	20	130	3	6'	sl	sl-85, sh-15
304	57	.01	25	15	150	1	-2'	sl	sl-95, sh-5
305	58	.01	15	10	66	1	6'		sl-50, sh-50

Map No.	Sample No.	Concentration (ppm)(1) Au	Cu	Pb	Zn	Field Test(2)	App. Stream Width	Bed Rock(3)	Float at sample site(3, 4)
306	59	.01	18	5	78	1	6'		brush
307	60	.01	16	10	70	1	14'		sh-75, sl-20, qtz-5
308	444	.01	34	10	86	1	14'	sl	sl-50, sh-30, gs-20
309	443	.01	31	30	74	1	14'	sh	gs-60, sh-40
310	442	.01	25	20	140	1	6'		gs-50, sh-50
311	391	.01	30	30	54	6	6'		sh-84, gs-15, qtz-1
312	389	.01	25	30	52	1	14'		sh-88, gs-10, qtz-2
313	390	.01	25	15		3	14'		sh-88, gs-10, qtz-2
314	388	.01	25	15	46	4	14'		sh-88, gs-10, qtz-2
315	399	.02	130	30	340	3	14'		sh-99, qtz-1
316	398	.01	29	30	60	5	6'		sh-98, qtz-2
317	397	.01	22	20	46	3	6'		sh-98, qtz-2
318	396	.01	250	30	320	3	6'		sh-98, qtz-2
319	394	.01	22	15	50	1	6'		sh-84, gs-15, qtz-1
320	393	.01	20	20	42	3	6'		sh-84, gs-15, qtz-1
321	392	.01	20	30	40	2	6'		sh-84, gs-15, qtz-1
322	395	.1	23	15	52	3	6'		sh-84, gs-15, qtz-1
323	423	.01	40	20	150	20	6'	ls	sh-50, ls-50
324	419	.01	20	15	74	2	6'		sh-100
325	420	.01	20	20	60	2	6'		sh-100
326	421	.01	28	30	86	2	6'		sh-100
327	422	.01	32	15	74	6	dry		sand
328	416	.01	20	30	62	5	-2'		sh-45, ls-45, gs-10
329	417	.01	16	20	62	2	6'		gs-50, sh-50
330	418	.01	18	30	56	4	6'		sh-100
331	311	.01	31	30	90	3	6'	sh	sh w/qtz-100

Map No.	Sample No.	Concentration (ppm)(1) Au	Cu	Pb	Zn	Field Test(2)	App. Stream Width	Bed Rock(3)	Float at sample site(3, 4)
332	412	.01	28	15	78	1	14'		sh-60, ls-40
333	413	.01	16	30	44	3	-2'		silt
334	414	.01	21	30	56	1	6'		silt
335	415	.01	32	20	80	2	6'	sh	sh-100
336	404	.01	33	30	44	1	6'		gs-60, sh-40
337	403	.01	23	15	36	1	6'		gs-60, sh w/qtz-40
338	402	.01	24	30	36	1	6'		gs-40, sh-60
339	401	.01	23	30	36	1	6'		gs-10, sh-90
340	400	.01	28	20	70	1	6'	ls-sh	sh-90, gs-3, sl-7
341	440	.01	30	20	80	2	14'		sh-90, sl-10
342	441	.01	31	15	86	2	14'	sh	sh-100
343	439	.01	20	5	60	6	6'		sand
344	438	.01	19	15	54	1	6'	sh	sh w/qtz
345	405	.01	32	30	60	1	-2'		brush
346	437	.01	21	30	90	6	6'		brush
347	436	.01	32	26	66	2	-2'	ls	sh-100
348	435	.01	21	15	60	1	6'		sh w/qtz-100
349	434	.01	35	20	66	1	14'		sh-80, ls-20
350	433	.01	35	15	88	3	-2'		sh w/qtz-100
351	110	.01	23	15	70	3	6		sh-90, sl-10
352	432	.01	25	15	60	2	6'	sh	sh-100
353	431	.01	52	30	100	2	6'		sh-90, ls-10
354	430	.01	37	20	80	3	6'		sh-90, ls-10
355	108	.01	30	10	75	10	6'		sh-90, ls-10
356	109	.01	27	20	60	1			brush
357	111	.01	33	10	72	2	6'		sh w/qtz-100

Map No.	Sample No.	Concentration (ppm)(1) Au	Cu	Pb	Zn	Field Test(2)	App. Stream Width	Bed Rock(3)	Float at sample site(3, 4)
358	61	.01	22	5	94	2	14'		sl-40, sh-60
359	47	.01	23	15	86	2	14'		sh-40, g-25, sl-15, ls-20
360	112	.01	5	20	50	1	-2'		sh w/qtz-100
361	429	.01	37	20	80	2	6'		sh-100
362	107	.01	42	20	140	3	-2'		sh-100
363	106	.01	26	15	80	8	-2'		sand
364	105	.01	27	15	100	2	6'		sl-60, sh-38, qtz-2
365	104	.01	45	50	70	2	-2'		sand
366	103	.01	49	20	250	20	-2'	sh	sh-70, qtz-30
367	102	.01	42	30	100	4	6'		sh-100
368	101	.06	34	10	50	1	-2'		sh-100
369	100	.01	31	5	80	3	14'	sl-ls	sl-70, ls-20, sh-10
370	46	1.5	34	20	120	3	6'	sl-sh	sh-55, sl-30, gs-10, qtz-5
371	95	.01	36	5	70	2	14'		sh-90, sl-8, qtz-2
372	94	.01	32	5	80	1	-2'		sl w/qtz-100
373	93	.01	93	30	170*	10	-2'		sands
374	87	.01	27	30	62	1	-2'		sands
375	86	.01	15	5	58	2	6'		ls-100
376	85	.01	37	30	95	3	6'		ls-70, sl-15, sh-15
377	84	7.5	32	5	70	1	30'		sh-50, qtz-30, sl-20
378	45	.4	29	15	120	3	6'	ls-sl	sh-50, sl-25, ls-15, qtz-10
379	88			5		6	dry		sl-100
380	89	.01	61	15	120	4	-2'		silt
381	92	.01	43	30	60	1	-2'		sand
382	91	.01	63	30	200	3	-2'		sand
383	90	.01	60	30	120	2	-2'		sl-100%

Map No.	Sample No.	Concentration (ppm)(1) Au	Cu	Pb	Zn	Field Test(2)	App. Stream Width	Bed Rock(3)	Float at sample site(3, 4)
384	116	.01	30	32	80	2	-2'		sl-100%
385	115	.01	58	30	300	10	6'		sl-55, sh-45
386	114	.01	19	10	120	2	6'		sl-100
387	113	.01	32	30	70	2	-2'		sl-100
388	410	.01	25	30	110	7	6'		sh w/qtz-100
389	409	.01	24	30	100	9	6'		sh w/qtz-100
390	408	.01	20	20	70	1	6'		sh w/qtz-100
391	407	.01	25	30	94	2	-2'		sh-100
392	406	.01	33	50	64	2	6'	sh	sh-90, gs-5, qtz-5
393	368	.01	27	20	68	3	6'		sh-94, gs-3, qtz-2, sl-1
394	367	.01	13	15	40	2	6'		sh-94, gs-3, qtz-2, sl-1
395	366	.01	21	20	56	4	6'		sh-73, ls-25, qtz-2
396	365	.01	18	30	52	3	6'		sh-99, qtz-1
397	362	.01	16	15	44	3	6'		sh-99, qtz-1
398	363	.01	21	15	46	4	6'		sh-99, qtz-1
399	364	.01	13	20	30	2	6'		sh-99, qtz-1
400	369	.01	32	30	40	7	-2'		sh-98, qtz-2
401	370	.01	25	50	80	18	-2'		sh-98, qtz-2
402	373	.01	17	20	54	2	6'		sh-97, qtz-3
403	374	.01	13	15	28	2	6'		sh-97, qtz-3
404	371	.01	22	15	58	2	6'		sh-98, qtz-2
405	372	.01	25	30	42	3	6'		sh-98, qtz-2
406	428	.01	27	15	60	1	6'		sh-100
407	427	.01	23	15	84	3	6'		silt
408	424	.01	30	20	80	3			silt slump
409	425	.01	18	5	66	2	14'		sh-100

Map No.	Sample No.	Concentration (ppm)(1) Au	Cu	Pb	Zn	Field Test(2)	App. Stream Width	Bed Rock(3)	Float at sample site(3, 4)
410	426	.01	22	15	92	3	6'		
411	378	.01	20	30	58	2	14'		sh-98, qtz-2
412	377	.01	16	30	50	5	6'		sh-97, qtz-3
413	376	.01	18	20	50	3	6'		sh-97, qtz-3
414	375	.01	19	20	44	2	6'		sh-97, qtz-3
415	381	.01	12	10	38	2	6'		sh-97, qtz-3
416	380	.01	12	10	38	1	6'		sh-97, qtz-3
417	379	.01	10	10	34	2	6'		sh-97, qtz-3
418	354	.01	20	20	40	3	-2'		
419	353	.01	22	20	64	3	14'		
420	355	.01	13	15	46	3	6'		sh-98, qtz-2
421	356	.01	14	30	40	3	6'		sh-98, qtz-2
422	359	.01	14	20	44	3	6'		sh-98, qtz-2
423	358	.01	14	15	56	3	6'		sh-98, qtz-2
424	357	.01	17	10	50	4	6'		sh-98, qtz-2
425	360	.01	15	20	30	3	-2'		
426	361	.01	18	30	46	3	14'		sh-98, qtz-2
427	351	.01	26	15	74	4	14'		sh-98, qtz-2
428	352	.01	18	10	60	2	14'		sh-98, qtz-2
429	454	.01	13	15	50	1	6'	sh	sh-70, qtz-30
430	453	.01	24	15	86	2	dry		sh-70, sl-30
431	452	.01	15	5	46	1	-2'		sand
432	456	.01	31	30	100	2	6'		sh-100
433	455	.01	14	10	50	1	-2'		sh-100
434	457	.01	10	15	62	1	-2'		sand
435	458	.01	22	15	64	1	2-8'		sand

APPENDIX II

Intervals of estimation and detection limits
semiquantitative spectrographic analyses

Copper ppm*	Lead ppm	Zinc ppm	Molybdenum ppm	Silver ppm	Cobalt ppm	Chromium ppm	Nickel ppm	Manganese ppm	Titanium (%)	Iron (%)	Magnesium (%)
20,000	20,000	10,000	2,000	5,000	2,000	5,000	5,000	5,000	1.0	20	10
10,000	10,000	5,000	1,000	2,000	1,000	2,000	2,000	2,000	0.5	10	5
5,000	5,000	2,000	500	1,000	500	1,000	1,000	1,000	0.2	5	2
2,000	2,000	1,000	200	500	200	500	500	500	0.1	2	1
1,000	1,000	500	100	200	100	200	100	200	0.05	1	0.5
500	500	200	50	100	50	100	50	100	0.02	0.5	0.2
200	200	L	20	50	20	50	20	50	0.01	0.2	0.1
100	100		10	20	10	20	10	20	0.005	0.1	0.05
50	50		5	10	5	10	5	L	0.002	0.05	0.02
20	20		L	5	L	5	L		0.001	L	
10	10			2		L			L		
5	L			1							
2				0.5							
L**											

Calcium (%)	Barium ppm	Strontium ppm	Boron ppm	Beryllium ppm	Tin ppm	Tungsten ppm	Zirconium ppm	Lanthanum ppm	Niobium ppm	Scandium ppm	Yttrium ppm	Vanadium ppm
20	5,000	5,000	2,000	1,000	1,000	10,000	1,000	1,000	2,000	100	200	10,000
10	2,000	2,000	1,000	500	500	5,000	500	500	1,000	50	100	5,000
5	1,000	1,000	500	200	200	2,000	200	200	500	20	50	1,000
2	500	500	200	100	100	1,000	100	100	200	10	20	500
1	200	200	100	50	50	500	50	50	100	5	10	200
0.5	100	100	50	20	20	200	20	20	50	L	5	100
0.2	50	50	20	10	10	100	10	L	20		L	50
0.1	20	L	10	5	5	50	L		10			20
0.05	L		L	2		L			L			10
0.02				1								L
L				L								

* ppm indicates parts per million
** L = Lowest limit of detection

Appendix III A

Atomic Absorption and Semi-quantitative Emission Spectrograph Analytical Data; Stream Sediment Samples, Solomon C-5 Quadrangle, Alaska; (1=Atomic Absorption; all values in parts per million unless indicated otherwise).

Map No.	Sample No.	Gold (1)	Copper (1)	Lead (1)	Zinc (1)	Copper	Lead	Zinc	Molybdenum	Silver	Cobalt	Chromium	Nickel	Manganese	Titanium (%)
1	141	0.01	35.00	12.00	80.00	150.00	15.00	100.00	0.0	0.0	20.00	300.00	150.00	2000.00	0.70
2	140	0.01	25.00	12.00	70.00	70.00	15.00	100.00	0.0	0.0	15.00	150.00	70.00	2000.00	0.70
3	139	0.01	130.00	12.00	40.00	150.00	15.00	100.00	0.0	0.0	15.00	150.00	70.00	1500.00	0.50
4	232	0.01	35.00	12.00	140.00	100.00	50.00	300.00	10.00	0.50	50.00	300.00	150.00	2000.00	0.70
5	231	0.01	15.00	12.00	70.00	70.00	30.00	100.00	2.00	0.0	50.00	300.00	150.00	2000.00	0.70
6	230	0.01	45.00	12.00	60.00	70.00	150.00	100.00	2.00	0.0	30.00	150.00	150.00	5000.00	1.00
7	229	0.01	40.00	12.00	80.00	70.00	15.00	100.00	7.00	0.0	30.00	300.00	150.00	3000.00	0.70
8	228	0.01	30.00	12.00	70.00	50.00	15.00	0.0	2.00	0.0	20.00	300.00	150.00	2000.00	1.00
9	227	0.02	35.00	12.00	70.00	50.00	30.00	0.0	2.00	0.0	20.00	300.00	150.00	1500.00	0.70
10	226	0.01	25.00	12.00	50.00	15.00	5.00	100.00	0.0	0.0	15.00	150.00	100.00	1000.00	0.70
11	225	0.01	25.00	12.00	60.00	15.00	5.00	100.00	0.0	0.0	10.00	150.00	70.00	700.00	0.70
12	224	0.02	10.00	12.00	60.00	10.00	10.00	100.00	2.00	0.0	20.00	150.00	100.00	1500.00	0.70
13	223	0.01	40.00	12.00	60.00	20.00	10.00	0.0	0.0	0.0	15.00	100.00	100.00	700.00	0.50
14	222	0.01	25.00	12.00	50.00	50.00	15.00	100.00	2.00	0.0	20.00	150.00	100.00	1000.00	0.70
15	219	0.01	25.00	12.00	50.00	10.00	15.00	100.00	0.0	0.0	15.00	100.00	70.00	1000.00	0.50
16	220	0.01	25.00	12.00	30.00	100.00	10.00	100.00	2.00	0.0	20.00	200.00	70.00	700.00	0.70
17	221	0.01	20.00	12.00	30.00	20.00	15.00	100.00	2.00	0.0	20.00	150.00	70.00	1000.00	0.70
18	136	0.01	45.00	12.00	90.00	70.00	50.00	100.00	0.0	0.0	20.00	300.00	150.00	1500.00	1.00
19	138	0.01	45.00	12.00	80.00	70.00	10.00	100.00	0.0	0.0	15.00	300.00	150.00	2000.00	1.00
20	137	0.01	45.00	12.00	100.00	10.00	15.00	0.0	0.0	0.0	10.00	150.00	100.00	700.00	0.70
21	135	0.01	40.00	12.00	120.00	100.00	30.00	100.00	2.00	20.00	20.00	300.00	150.00	3000.00	0.70
22	160	0.02	20.00	12.00	60.00	100.00	10.00	100.00	0.0	0.0	15.00	150.00	70.00	5000.00	1.00
23	161	0.02	20.00	12.00	70.00	150.00	15.00	100.00	2.00	0.0	15.00	150.00	100.00	2000.00	1.00
24	162	0.01	25.00	12.00	70.00	50.00	30.00	100.00	2.00	0.0	15.00	150.00	70.00	1000.00	0.50
25	133	0.01	50.00	12.00	190.00	100.00	100.00	100.00	0.0	0.0	20.00	300.00	150.00	1500.00	1.00
26	134	0.01	10.00	12.00	50.00	15.00	30.00	100.00	0.0	0.0	10.00	150.00	50.00	1500.00	0.70
27	212	0.01	20.00	12.00	70.00	15.00	10.00	100.00	0.0	0.0	15.00	150.00	70.00	700.00	0.70
28	213	0.02	25.00	12.00	80.00	20.00	15.00	100.00	0.0	0.0	20.00	150.00	70.00	700.00	0.50
29	237	0.05	25.00	12.00	70.00	70.00	20.00	100.00	0.0	0.0	15.00	200.00	150.00	1000.00	1.00
30	236	0.01	10.00	12.00	60.00	30.00	15.00	100.00	0.0	0.0	15.00	150.00	100.00	1000.00	1.00
31	217	0.01	25.00	12.00	70.00	10.00	5.00	100.00	0.0	0.0	20.00	100.00	100.00	700.00	0.70
32	218	0.01	25.00	12.00	50.00	20.00	15.00	100.00	0.0	0.0	15.00	150.00	70.00	700.00	1.00
33	215	0.01	40.00	12.00	70.00	20.00	30.00	100.00	2.00	0.0	20.00	150.00	70.00	700.00	0.70
34	214	0.01	10.00	12.00	50.00	30.00	15.00	100.00	0.0	0.0	20.00	150.00	50.00	700.00	0.50
35	128	0.01	10.00	12.00	75.00	15.00	10.00	200.00	2.00	0.0	15.00	150.00	70.00	700.00	0.70
36	131	0.01	15.00	12.00	40.00	40.00	15.00	100.00	2.00	0.0	15.00	150.00	80.00	1000.00	1.00
37	132	0.01	20.00	12.00	40.00	30.00	20.00	0.0	0.0	0.0	15.00	150.00	100.00	1000.00	0.50
38	163	0.01	20.00	12.00	60.00	20.00	5.00	0.0	2.00	0.0	15.00	100.00	70.00	700.00	0.50
39	159	0.01	30.00	12.00	80.00	100.00	15.00	100.00	2.00	0.0	20.00	200.00	150.00	5000.00	1.00
40	158	0.01	20.00	12.00	40.00	100.00	15.00	100.00	2.00	0.0	30.00	150.00	100.00	3000.00	2.00
41	157	0.01	35.00	12.00	70.00	150.00	20.00	100.00	2.00	0.0	20.00	200.00	150.00	1500.00	1.00
42	151	0.05	30.00	12.00	50.00	70.00	30.00	100.00	2.00	0.0	20.00	150.00	100.00	700.00	2.00
43	152	0.01	35.00	12.00	80.00	70.00	20.00	100.00	2.00	0.0	15.00	100.00	70.00	700.00	0.50
44	150	0.01	15.00	12.00	90.00	150.00	30.00	100.00	2.00	0.0	15.00	100.00	100.00	700.00	1.00
45	153	0.01	30.00	12.00	60.00	70.00	50.00	100.00	2.00	0.0	30.00	300.00	100.00	700.00	1.00
46	149	0.01	35.00	12.00	60.00	70.00	50.00	100.00	0.0	0.0	50.00	300.00	150.00	1000.00	1.00
47	154	0.01	30.00	12.00	50.00	100.00	15.00	100.00	0.0	0.0	50.00	300.00	150.00	1000.00	2.00
48	155	0.01	25.00	12.00	50.00	150.00	15.00	100.00	0.0	0.0	50.00	200.00	150.00	1000.00	2.00
49	156	0.01	45.00	12.00	110.00	70.00	50.00	100.00	5.00	0.0	30.00	150.00	100.00	1000.00	1.00
50	148	0.01	10.00	12.00	60.00	100.00	30.00	100.00	0.0	0.0	50.00	150.00	100.00	1500.00	1.00
51	130	0.06	35.00	12.00	70.00	10.00	15.00	100.00	0.0	0.0	15.00	150.00	100.00	1000.00	1.00
52	127	0.01	15.00	12.00	80.00	150.00	30.00	100.00	0.0	0.0	15.00	300.00	150.00	1500.00	1.00
53	125	0.01	15.00	12.00	40.00	20.00	12.00	100.00	0.0	0.0	15.00	70.00	70.00	700.00	1.00
54	216	0.01	30.00	12.00	60.00	50.00	50.00	100.00	2.00	0.0	20.00	150.00	70.00	700.00	0.70
55	243	0.01	35.00	12.00	85.00	50.00	30.00	100.00	2.00	0.0	15.00	150.00	100.00	1000.00	0.70
56	244	0.01	40.00	12.00	100.00	70.00	30.00	100.00	2.00	0.0	15.00	200.00	100.00	1500.00	1.00
57	245	0.01	25.00	25.00	90.00	70.00	70.00	100.00	2.00	0.0	20.00	200.00	150.00	2000.00	0.70
58	247	0.01	30.00	12.00	70.00	50.00	15.00	100.00	2.00	0.0	15.00	200.00	150.00	1500.00	0.70

Map No.	Sample No.	Gold (1)	Copper (1)	Lead (1)	Zinc (1)	Copper	Lead	Zinc	Molybdenum	Silver	Cobalt	Chromium	Nickel	Manganese	Titanium (%)
59	445	0.01	77.00	28.00	280.00	100.00	15.00	300.00	7.00	0.0	15.00	100.00	100.00	700.00	0.70
60	446	0.01	34.00	28.00	140.00	70.00	20.00	100.00	0.0	0.0	15.00	150.00	70.00	1000.00	0.70
61	447	0.01	46.00	30.00	110.00	50.00	20.00	100.00	2.00	0.0	15.00	150.00	100.00	700.00	0.70
62	122	0.01	25.00	12.00	120.00	15.00	20.00	100.00	0.0	0.0	15.00	150.00	70.00	1500.00	0.70
63	120	0.01	40.00	12.00	210.00	70.00	30.00	100.00	0.0	0.0	30.00	700.00	150.00	1000.00	0.70
64	121	0.01	20.00	12.00	200.00	15.00	10.00	200.00	0.0	0.0	15.00	150.00	50.00	700.00	0.70
65	118	0.01	50.00	12.00	170.00	100.00	10.00	300.00	2.00	0.0	20.00	300.00	200.00	1500.00	1.00
66	123	0.01	35.00	12.00	100.00	70.00	50.00	100.00	0.0	0.0	30.00	300.00	150.00	2000.00	0.70
67	124	0.01	30.00	12.00	60.00	15.00	20.00	100.00	0.0	0.0	15.00	150.00	70.00	700.00	1.00
68	126	0.01	40.00	12.00	100.00	70.00	70.00	100.00	0.0	0.0	15.00	500.00	150.00	1500.00	1.00
69	117	0.01	30.00	12.00	150.00	70.00	30.00	200.00	0.0	0.0	15.00	150.00	100.00	2000.00	0.50
70	129	0.01	30.00	12.00	70.00	70.00	30.00	100.00	2.00	0.0	15.00	150.00	70.00	1500.00	1.00
71	142	0.01	30.00	12.00	80.00	100.00	20.00	100.00	0.0	0.0	10.00	200.00	150.00	1000.00	0.70
72	143	0.50	30.00	12.00	80.00	150.00	20.00	100.00	0.0	0.0	30.00	300.00	150.00	2000.00	1.00
73	144	0.01	25.00	12.00	60.00	100.00	10.00	100.00	5.00	0.0	30.00	150.00	70.00	1000.00	0.70
74	145	0.01	25.00	12.00	60.00	200.00	10.00	100.00	2.00	0.0	5.00	100.00	50.00	1500.00	0.70
75	146	0.01	30.00	12.00	90.00	70.00	30.00	100.00	0.0	0.0	15.00	150.00	100.00	1000.00	1.00
76	147	0.02	35.00	12.00	110.00	15.00	30.00	100.00	2.00	0.0	20.00	100.00	50.00	1500.00	0.70
77	211	0.01	25.00	12.00	50.00	15.00	15.00	100.00	0.0	0.0	15.00	70.00	70.00	700.00	0.50
78	119	0.01	55.00	12.00	130.00	100.00	70.00	100.00	5.00	0.0	15.00	100.00	150.00	1000.00	0.70
79	210	0.02	25.00	12.00	60.00	15.00	30.00	100.00	2.00	0.0	20.00	150.00	70.00	700.00	0.50
80	209	0.01	35.00	12.00	70.00	70.00	10.00	100.00	2.00	0.0	20.00	150.00	70.00	700.00	0.50
81	171	0.01	20.00	12.00	50.00	100.00	15.00	100.00	0.0	0.0	15.00	150.00	100.00	1000.00	1.00
82	172	0.01	20.00	12.00	60.00	100.00	20.00	100.00	2.00	0.0	15.00	100.00	70.00	700.00	1.00
83	173	0.01	45.00	12.00	80.00	70.00	10.00	200.00	2.00	0.0	15.00	150.00	70.00	700.00	0.70
84	170	0.01	25.00	12.00	40.00	10.00	15.00	0.0	2.00	0.0	20.00	100.00	70.00	500.00	0.70
85	169	0.01	25.00	12.00	40.00	100.00	15.00	100.00	0.0	0.0	30.00	150.00	100.00	2000.00	1.00
86	168	0.01	25.00	12.00	40.00	100.00	15.00	100.00	2.00	0.0	20.00	150.00	100.00	1000.00	0.70
87	167	0.01	30.00	12.00	40.00	50.00	10.00	100.00	2.00	0.0	50.00	150.00	150.00	700.00	0.50
88	166	0.01	30.00	12.00	90.00	50.00	15.00	0.0	0.0	0.0	70.00	200.00	150.00	1500.00	1.00
89	165	0.05	30.00	12.00	90.30	200.00	10.00	0.0	0.0	0.0	15.00	200.00	150.00	1000.00	0.70
90	164	0.01	20.00	12.00	80.00	100.00	5.00	0.0	2.00	0.0	15.00	150.00	70.00	700.00	0.70
91	206	0.01	45.00	12.00	80.00	70.00	30.00	0.0	15.00	0.0	15.00	150.00	100.00	1500.00	0.50
92	207	0.01	25.00	12.00	50.00	30.00	15.00	100.00	2.00	0.0	15.00	150.00	100.00	1000.00	1.00
93	208	0.01	20.00	12.00	40.00	30.00	5.00	100.00	2.00	0.0	10.00	70.00	30.00	300.00	0.30
94	186	0.02	25.00	12.00	70.00	20.00	15.00	100.00	7.00	0.0	20.00	150.00	70.00	1000.00	1.00
95	187	0.01	45.00	12.00	100.00	30.00	10.00	200.00	7.00	0.0	20.00	100.00	70.00	1000.00	0.50
96	188	0.01	40.00	12.00	60.00	50.00	15.00	100.00	0.0	0.0	15.00	150.00	70.00	1000.00	1.00
97	189	0.02	65.00	25.00	200.00	150.00	70.00	300.00	30.00	0.20	15.00	100.00	100.00	700.00	0.50
98	449	0.01	24.00	25.00	80.00	15.00	15.00	100.00	2.00	0.0	15.00	150.00	50.00	700.00	0.70
99	448	0.01	35.00	26.00	110.00	10.00	10.00	100.00	0.0	0.0	10.00	100.00	70.00	700.00	0.70
100	450	0.01	46.00	25.00	80.00	30.00	15.00	100.00	0.0	0.0	15.00	150.00	70.00	500.00	0.50
101	451	0.01	22.00	12.00	54.00	15.00	10.00	100.00	0.0	0.0	10.00	70.00	50.00	500.00	0.50
102	205	0.01	20.00	12.00	50.00	20.00	5.00	0.0	0.0	0.0	10.00	100.00	50.00	1000.00	0.30
103	204	0.01	40.00	12.00	80.00	70.00	30.00	0.0	2.00	0.0	15.00	70.00	100.00	3000.00	0.50
104	203	0.01	25.00	12.00	60.00	15.00	5.00	100.00	0.0	0.0	15.00	100.00	100.00	1000.00	1.00
105	179	0.01	30.00	12.00	50.00	500.00	10.00	0.0	0.0	0.0	15.00	70.00	100.00	1500.00	0.70
106	184	0.01	30.00	12.00	70.00	100.00	15.00	100.00	2.00	0.0	15.00	70.00	150.00	2000.00	0.50
107	185	0.02	35.00	12.00	80.00	50.00	50.00	200.00	5.00	0.0	20.00	150.00	70.00	1000.00	0.70
108	183	0.02	40.00	12.00	70.00	200.00	20.00	100.00	0.0	0.0	15.00	100.00	150.00	2000.00	0.70
109	180	0.01	30.00	12.00	60.00	500.00	30.00	200.00	2.00	0.0	15.00	150.00	150.00	3000.00	0.70
110	181	0.02	20.00	12.00	70.00	150.00	5.00	0.0	0.0	0.0	15.00	70.00	100.00	1000.00	0.50
111	182	0.01	45.00	12.00	90.00	150.00	30.00	100.00	2.00	0.0	20.00	150.00	150.00	2000.00	0.50
112	201	0.01	30.00	12.00	70.00	10.00	5.00	100.00	0.0	0.0	15.00	100.00	70.00	700.00	0.50
113	202	0.01	60.00	12.00	80.00	100.00	30.00	100.00	7.00	0.0	20.00	150.00	100.00	5100.00	0.70
114	174	0.05	15.00	12.00	50.00	200.00	30.00	100.00	2.00	0.0	15.00	150.00	100.00	2000.00	1.00
115	200	0.01	40.00	12.00	140.00	100.00	50.00	100.00	0.0	0.0	20.00	200.00	150.00	1500.00	1.00
116	199	0.01	25.00	12.00	50.00	30.00	5.00	0.0	0.0	0.0	15.00	100.00	70.00	1000.00	1.00
117	192	0.01	35.00	12.00	60.00	30.00	5.00	0.0	0.0	0.0	15.00	50.00	30.00	700.00	0.20
118	191	0.01	40.00	12.00	130.00	50.00	20.00	100.00	2.00	0.0	20.00	100.00	70.00	2000.00	0.50
119	190	0.01	30.00	12.00	40.00	10.00	5.00	0.0	0.0	0.0	15.00	70.00	50.00	700.00	0.50
120	193	0.02	35.00	12.00	80.00	30.00	30.00	100.00	5.00	0.0	20.00	100.00	70.00	1000.00	0.70
121	233	0.01	30.00	12.00	70.00	30.00	20.00	100.00	10.00	0.0	20.00	100.00	100.00	700.00	0.50
122	234	0.01	40.00	12.00	70.00	30.00	10.00	100.00	5.00	0.0	15.00	70.00	70.00	700.00	0.50
123	235	0.01	40.00	12.00	90.00	100.00	30.00	100.00	7.00	0.0	20.00	300.00	150.00	1000.00	0.70
124	195	0.01	25.00	12.00	50.00	20.00	5.00	0.0	2.00	0.0	20.00	100.00	70.00	1000.00	1.00

Map No.	Sample No.	Gold (1)	Copper (1)	Lead (1)	Zinc (1)	Copper	Lead	Zinc	Molybdenum	Silver	Cobalt	Chromium	Nickel	Manganese	Titanium
125	196	0.01	25.00	12.00	40.00	20.00	5.00	0.0	0.0	0.0	15.00	50.00	50.00	1500.00	0.50
126	198	0.01	35.00	12.00	60.00	10.00	5.00	100.00	2.00	0.0	15.00	70.00	70.00	1500.00	1.00
127	197	0.02	10.00	12.00	50.00	10.00	5.00	100.00	2.00	0.0	15.00	150.00	50.00	700.00	1.00
128	178	0.01	30.00	12.00	60.00	150.00	30.00	100.00	2.00	0.0	15.00	150.00	100.00	1500.00	1.00
129	177	0.01	35.00	12.00	70.00	150.00	30.00	100.00	2.00	0.0	20.00	200.00	150.00	2000.00	1.00
130	176	0.01	20.00	12.00	50.00	100.00	15.00	100.00	0.0	0.0	20.00	150.00	150.00	3000.00	1.00
131	175	0.01	15.00	12.00	40.00	150.00	20.00	100.00	2.00	0.0	20.00	100.00	70.00	5000.00	0.50
133	194	0.01	30.00	12.00	60.00	20.00	15.00	0.0	2.00	0.0	20.00	150.00	70.00	700.00	0.50
134	470	0.01	28.00	34.00	130.00	15.00	30.00	100.00	0.0	0.0	20.00	100.00	70.00	1500.00	0.30
135	469	0.01	15.00	25.00	70.00	5.00	20.00	0.0	2.00	0.0	15.00	70.00	50.00	700.00	0.20
136	468	0.01	17.00	26.00	84.00	5.00	15.00	100.00	2.00	0.0	15.00	70.00	30.00	700.00	0.20
137	466	0.01	20.00	32.00	100.00	5.00	20.00	100.00	0.0	0.0	10.00	70.00	50.00	500.00	0.30
138	465	0.01	28.00	32.00	120.00	15.00	10.00	100.00	2.00	0.0	15.00	100.00	50.00	1000.00	0.30
139	467	0.01	23.00	12.00	74.00	7.00	20.00	100.00	2.00	0.0	15.00	70.00	50.00	700.00	0.20
140	462	0.01	16.00	12.00	48.00	7.00	30.00	100.00	2.00	0.0	15.00	100.00	50.00	500.00	0.20
141	463	0.01	18.00	26.00	60.00	5.00	30.00	100.00	2.00	0.0	10.00	70.00	50.00	500.00	0.30
142	464	0.01	26.00	30.00	80.00	15.00	30.00	100.00	2.00	0.0	15.00	100.00	50.00	700.00	0.20
143	461	0.01	45.00	56.00	52.00	10.00	20.00	0.0	2.00	0.0	20.00	50.00	50.00	300.00	0.15
144	460	0.01	15.00	26.00	40.00	7.00	10.00	100.00	2.00	0.0	10.00	70.00	30.00	200.00	0.20
145	459	0.01	13.00	12.00	50.00	10.00	10.00	100.00	0.0	0.0	7.00	50.00	50.00	500.00	0.30
146	347	0.01	30.00	12.00	70.00	100.00	10.00	100.00	5.00	0.20	15.00	150.00	70.00	700.00	0.50
147	348	0.01	25.00	12.00	60.00	30.00	15.00	100.00	2.00	0.0	15.00	100.00	50.00	700.00	0.30
148	349	0.01	30.00	12.00	60.00	20.00	20.00	100.00	2.00	0.0	15.00	150.00	50.00	700.00	0.30
149	350	0.01	50.00	12.00	70.00	70.00	30.00	100.00	2.00	0.20	20.00	200.00	100.00	700.00	0.10
150	346	0.01	5.00	12.00	17.00	50.00	15.00	100.00	0.0	0.0	15.00	100.00	70.00	700.00	0.50
151	345	0.01	20.00	12.00	50.00	30.00	5.00	100.00	2.00	0.0	15.00	150.00	70.00	700.00	0.70
152	342	0.01	25.00	12.00	60.00	70.00	15.00	100.00	2.00	0.0	15.00	100.00	70.00	700.00	0.70
153	343	0.01	20.00	12.00	50.00	70.00	10.00	100.00	2.00	0.20	15.00	150.00	70.00	700.00	0.70
154	344	0.01	25.00	12.00	40.00	70.00	20.00	100.00	2.00	0.20	10.00	150.00	30.00	700.00	0.50
155	340	0.01	30.00	12.00	85.00	30.00	15.00	100.00	2.00	0.0	15.00	70.00	70.00	700.00	0.50
156	341	0.01	30.00	12.00	100.00	15.00	5.00	100.00	2.00	0.0	15.00	70.00	50.00	300.00	0.50
157	316	0.01	15.00	12.00	40.00	15.00	5.00	0.0	0.0	0.0	15.00	70.00	30.00	700.00	0.20
158	317	0.01	25.00	12.00	100.00	20.00	30.00	0.0	0.0	0.0	20.00	150.00	70.00	500.00	0.50
159	318	0.01	30.00	12.00	55.00	20.00	20.00	0.0	0.0	0.0	20.00	100.00	70.00	500.00	0.50
160	319	0.01	40.00	12.00	70.00	20.00	50.00	0.0	0.0	0.0	15.00	150.00	70.00	700.00	0.50
161	320	0.01	75.00	25.00	100.00	70.00	10.00	100.00	0.0	0.0	20.00	150.00	70.00	1000.00	0.30
162	321	0.01	45.00	12.00	70.00	70.00	50.00	100.00	0.0	0.0	20.00	150.00	70.00	700.00	0.50
163	322	0.01	30.00	12.00	70.00	30.00	10.00	0.0	0.0	0.0	20.00	150.00	70.00	700.00	0.50
164	323	0.01	25.00	12.00	60.00	30.00	30.00	100.00	2.00	0.0	15.00	150.00	70.00	700.00	0.70
165	315	0.01	30.00	12.00	60.00	50.00	30.00	0.0	0.0	0.0	15.00	150.00	70.00	700.00	0.70
167	313	0.01	35.00	12.00	100.00	50.00	30.00	100.00	0.0	0.0	15.00	150.00	70.00	700.00	0.50
168	317	0.02	40.00	12.00	130.00	70.00	30.00	100.00	2.00	0.0	15.00	100.00	70.00	500.00	0.30
169	311	0.01	35.00	12.00	140.00	70.00	50.00	200.00	2.00	0.0	20.00	150.00	70.00	500.00	0.30
170	308	0.02	25.00	12.00	55.00	10.00	15.00	100.00	0.0	0.0	15.00	100.00	50.00	700.00	0.30
171	309	0.02	5.00	12.00	12.00	50.00	15.00	100.00	0.0	0.0	20.00	150.00	70.00	700.00	0.30
172	310	0.02	25.00	12.00	50.00	50.00	30.00	100.00	0.0	0.0	20.00	150.00	70.00	500.00	0.50
173	292	0.01	45.00	12.00	180.00	50.00	50.00	300.00	10.00	0.0	20.00	150.00	150.00	500.00	0.70
174	293	0.01	45.00	12.00	100.00	100.00	50.00	100.00	5.00	0.0	20.00	150.00	70.00	500.00	0.70
175	294	0.01	50.00	12.00	120.00	50.00	30.00	0.0	2.00	0.0	15.00	100.00	70.00	1000.00	0.50
176	295	0.01	50.00	12.00	90.00	70.00	50.00	300.00	5.00	0.0	20.00	200.00	100.00	300.00	0.70
177	296	0.01	40.00	12.00	110.00	30.00	20.00	100.00	5.00	0.0	15.00	70.00	100.00	300.00	0.50
178	302	0.01	80.00	12.00	210.00	70.00	30.00	300.00	7.00	0.0	20.00	150.00	100.00	700.00	0.50
179	291	0.01	40.00	12.00	60.00	50.00	30.00	0.0	0.0	0.0	20.00	100.00	70.00	700.00	0.50
180	290	0.02	30.00	12.00	70.00	50.00	15.00	100.00	0.0	0.0	15.00	150.00	70.00	700.00	0.50
181	286	0.01	25.00	12.00	60.00	30.00	30.00	0.0	0.0	0.0	15.00	100.00	50.00	700.00	0.30
182	287	0.01	30.00	12.00	70.00	70.00	20.00	0.0	2.00	0.0	15.00	100.00	50.00	500.00	0.30
183	288	0.01	70.00	12.00	110.00	70.00	30.00	0.0	2.00	0.0	20.00	150.00	70.00	700.00	0.50
184	289	0.01	30.00	12.00	60.00	70.00	20.00	100.00	2.00	0.0	20.00	150.00	70.00	700.00	0.50
185	285	0.02	40.00	12.00	100.00	20.00	30.00	0.0	0.0	0.0	15.00	70.00	50.00	700.00	0.50
186	278	0.01	25.00	12.00	55.00	50.00	20.00	100.00	10.00	0.0	20.00	150.00	70.00	700.00	0.20
187	279	0.01	20.00	12.00	45.00	100.00	20.00	100.00	2.00	0.0	15.00	100.00	50.00	700.00	0.50
188	280	0.02	40.00	12.00	60.00	30.00	30.00	0.0	10.00	0.0	20.00	150.00	100.00	700.00	0.50
189	281	0.01	20.00	12.00	55.00	70.00	15.00	100.00	0.0	0.0	20.00	100.00	70.00	1000.00	0.50
190	282	0.01	30.00	12.00	70.00	50.00	30.00	100.00	2.00	0.0	20.00	100.00	70.00	700.00	0.30
191	284	0.01	30.00	12.00	70.00	20.00	10.00	0.0	2.00	0.0	15.00	100.00	50.00	700.00	0.50
192	283	0.05	25.00	12.00	80.00	30.00	50.00	0.0	2.00	0.0	20.00	100.00	50.00	700.00	0.20

Map No.	Sample No.	Gold (1)	Copper (1)	Lead (1)	Zinc (1)	Copper	Lead	Zinc	Molybdenum	Silver	Cobalt	Chromium	Nickel	Manganese	Titanium
193	277	0.01	25.00	12.00	55.00	50.00	30.00	0.0	2.00	0.0	20.00	150.00	70.00	700.00	0.50
194	276	0.01	45.00	12.00	70.00	30.00	10.00	100.00	0.0	0.0	15.00	100.00	70.00	700.00	0.50
195	273	0.01	50.00	12.00	60.00	50.00	10.00	0.0	0.0	0.0	15.00	150.00	100.00	500.00	0.70
196	272	0.01	50.00	12.00	50.00	50.00	20.00	100.00	0.0	0.0	20.00	200.00	100.00	700.00	1.00
197	271	0.01	20.00	12.00	50.00	15.00	30.00	100.00	0.0	0.0	15.00	100.00	70.00	1000.00	1.00
198	270	0.01	30.00	12.00	65.00	15.00	15.00	100.00	0.0	0.0	20.00	150.00	100.00	700.00	1.00
199	269	0.01	30.00	12.00	60.00	30.00	30.00	100.00	0.0	0.0	20.00	150.00	70.00	1000.00	1.00
200	268	0.02	20.00	12.00	50.00	20.00	20.00	0.0	0.0	0.0	15.00	70.00	50.00	1000.00	0.70
201	267	0.01	35.00	12.00	70.00	50.00	30.00	0.0	0.0	0.0	20.00	150.00	100.00	1000.00	0.70
202	266	0.01	25.00	12.00	50.00	10.00	10.00	100.00	0.0	0.0	20.00	100.00	50.00	2000.00	0.50
203	265	0.01	20.00	12.00	60.00	10.00	30.00	100.00	0.0	0.0	15.00	70.00	50.00	1000.00	0.50
204	264	0.01	20.00	12.00	60.00	10.00	15.00	100.00	0.0	0.0	15.00	100.00	50.00	700.00	0.30
205	513	0.01	36.00	28.00	72.00	15.00	15.00	100.00	0.0	0.0	15.00	100.00	50.00	500.00	0.20
206	514	0.01	17.00	25.00	74.00	30.00	30.00	100.00	2.00	0.0	15.00	150.00	70.00	500.00	0.20
207	515	0.01	41.00	26.00	86.00	20.00	30.00	100.00	2.00	0.0	15.00	150.00	50.00	500.00	0.30
208	240	0.01	30.00	12.00	80.00	50.00	50.00	100.00	2.00	0.0	20.00	300.00	150.00	700.00	0.50
209	238	0.01	40.00	12.00	80.00	70.00	15.00	100.00	0.0	0.0	20.00	300.00	150.00	2000.00	1.00
210	239	0.01	60.00	15.00	120.00	70.00	30.00	100.00	2.00	0.0	15.00	100.00	100.00	700.00	1.00
211	241	0.01	10.00	12.00	40.00	70.00	30.00	100.00	2.00	0.0	15.00	150.00	100.00	1500.00	0.70
212	242	0.01	10.00	12.00	40.00	70.00	30.00	100.00	2.00	0.0	20.00	100.00	150.00	2000.00	0.70
213	246	0.01	25.00	12.00	70.00	100.00	20.00	100.00	2.00	0.0	15.00	200.00	150.00	1000.00	1.00
214	247	0.01	25.00	12.00	50.00	70.00	30.00	100.00	2.00	0.0	15.00	200.00	100.00	1500.00	0.70
215	326	0.01	15.00	12.00	40.00	30.00	20.00	100.00	2.00	0.0	15.00	150.00	70.00	700.00	0.30
216	325	0.01	30.00	12.00	90.00	20.00	10.00	100.00	2.00	0.0	15.00	150.00	70.00	300.00	0.50
217	324	0.01	35.00	12.00	65.00	50.00	50.00	100.00	2.00	0.0	15.00	150.00	70.00	700.00	0.30
218	328	0.01	25.00	12.00	65.00	20.00	10.00	100.00	2.00	0.0	15.00	70.00	70.00	700.00	0.30
219	327	0.01	20.00	12.00	50.00	20.00	15.00	100.00	2.00	0.0	15.00	150.00	70.00	500.00	0.50
220	248	0.02	15.00	12.00	40.00	50.00	15.00	100.00	0.0	0.0	15.00	200.00	150.00	2000.00	1.00
221	298	0.01	30.00	12.00	80.00	70.00	30.00	200.00	2.00	0.0	15.00	150.00	70.00	300.00	0.70
222	299	0.01	30.00	12.00	120.00	50.00	30.00	100.00	2.00	0.0	20.00	100.00	70.00	500.00	0.50
223	300	0.01	30.00	12.00	85.00	30.00	30.00	100.00	0.0	0.0	15.00	150.00	70.00	700.00	0.50
224	301	0.02	30.00	12.00	110.00	30.00	30.00	100.00	2.00	0.20	15.00	150.00	100.00	500.00	0.50
225	297	0.01	30.00	12.00	90.00	100.00	30.00	100.00	5.00	0.0	20.00	150.00	100.00	300.00	0.50
226	540	0.02	30.00	12.00	85.00	20.00	15.00	100.00	2.00	0.0	15.00	70.00	100.00	300.00	0.30
227	538	0.01	15.00	12.00	60.00	70.00	30.00	100.00	2.00	0.0	20.00	150.00	150.00	700.00	0.70
228	536	0.02	30.00	12.00	95.00	20.00	15.00	100.00	2.00	0.0	15.00	150.00	100.00	300.00	0.50
229	535	0.01	35.00	12.00	135.00	30.00	20.00	100.00	2.00	0.0	15.00	150.00	100.00	500.00	0.50
230	537	0.02	45.00	12.00	150.00	20.00	15.00	100.00	2.00	0.0	15.00	150.00	100.00	300.00	0.50
231	534	0.02	35.00	12.00	90.00	50.00	15.00	100.00	5.00	0.20	15.00	70.00	70.00	500.00	0.30
232	99	0.80	27.00	12.00	55.00	30.00	15.00	100.00	2.00	0.0	10.00	70.00	70.00	700.00	0.70
233	533	0.01	45.00	12.00	190.00	70.00	15.00	200.00	5.00	0.0	15.00	100.00	100.00	700.00	0.50
234	532	0.01	40.00	12.00	140.00	30.00	15.00	200.00	7.00	0.20	15.00	70.00	70.00	700.00	0.30
235	529	0.01	44.00	25.00	120.00	30.00	15.00	200.00	2.00	0.0	15.00	100.00	100.00	500.00	0.50
236	530	0.01	60.00	40.00	140.00	30.00	20.00	100.00	7.00	0.0	15.00	100.00	100.00	500.00	0.30
237	531	0.01	60.00	25.00	100.00	70.00	30.00	100.00	5.00	0.0	15.00	150.00	100.00	700.00	0.50
238	528	0.01	95.00	46.00	210.00	100.00	30.00	300.00	15.00	0.0	15.00	100.00	100.00	500.00	0.20
239	527	0.01	58.00	36.00	160.00	20.00	20.00	300.00	5.00	0.0	15.00	70.00	70.00	500.00	0.20
240	525	0.01	32.00	12.00	56.00	20.00	20.00	0.0	2.00	0.0	10.00	100.00	50.00	300.00	0.30
241	526	0.01	35.00	12.00	64.00	20.00	30.00	100.00	2.00	0.0	10.00	150.00	50.00	700.00	0.20
242	524	0.01	18.00	12.00	78.00	15.00	20.00	0.0	0.0	0.0	15.00	150.00	70.00	300.00	0.30
243	83	0.01	19.00	12.00	30.00	70.00	20.00	100.00	0.0	0.0	15.00	150.00	100.00	700.00	1.00
244	523	0.01	65.00	17.00	80.00	20.00	30.00	0.0	2.00	0.0	10.00	100.00	70.00	500.00	0.30
245	522	0.01	44.00	30.00	110.00	30.00	10.00	100.00	2.00	0.0	15.00	150.00	100.00	700.00	0.50
246	521	0.01	48.00	48.00	100.00	30.00	50.00	100.00	2.00	0.0	15.00	100.00	50.00	700.00	0.50
247	520	0.01	39.00	32.00	80.00	20.00	15.00	100.00	0.0	0.0	15.00	100.00	50.00	500.00	0.20
248	517	0.01	30.00	26.00	66.00	10.00	15.00	0.0	0.0	0.0	15.00	100.00	50.00	300.00	0.15
249	518	0.01	30.00	12.00	60.00	30.00	30.00	100.00	0.0	0.0	15.00	100.00	70.00	500.00	0.20
250	82	0.02	41.00	12.00	90.00	30.00	5.00	0.0	0.0	0.0	15.00	150.00	100.00	700.00	0.70
251	80	0.01	23.00	12.00	60.00	15.00	10.00	0.0	0.0	0.0	15.00	150.00	100.00	1000.00	0.70
252	79	0.02	27.00	12.00	150.00	10.00	30.00	0.0	0.0	0.0	15.00	70.00	30.00	700.00	0.30
253	519	0.01	30.00	12.00	90.00	15.00	20.00	100.00	2.00	0.0	15.00	100.00	50.00	700.00	0.20
254	78	0.04	27.00	12.00	70.00	30.00	30.00	100.00	2.00	0.0	15.00	100.00	50.00	700.00	0.70
255	81	0.05	20.00	12.00	65.00	70.00	30.00	0.0	0.0	0.0	20.00	300.00	150.00	1000.00	1.00
256	76	0.01	15.00	12.00	50.00	70.00	15.00	0.0	0.0	0.0	15.00	300.00	150.00	1000.00	1.00
257	77	0.20	33.00	12.00	65.00	100.00	50.00	100.00	2.00	0.0	15.00	200.00	70.00	700.00	0.70
258	516	0.01	25.00	12.00	52.00	10.00	20.00	100.00	2.00	0.0	15.00	150.00	50.00	500.00	0.20

Map No.	Sample No.	Gold (1)	Copper (1)	Lead (1)	Zinc (1)	Copper	Lead	Zinc	Molybdenum	Silver	Cobalt	Chromium	Nickel	Manganese	Titanium
259	512	0.01	32.00	28.00	58.00	30.00	30.00	100.00	2.00	0.0	15.00	150.00	70.00	500.00	0.30
260	511	0.01	25.00	12.00	60.00	15.00	20.00	100.00	0.0	0.0	15.00	150.00	70.00	700.00	0.30
261	510	0.01	27.00	25.00	58.00	15.00	20.00	100.00	0.0	0.0	15.00	150.00	70.00	700.00	0.30
262	509	0.01	28.00	25.00	62.00	7.00	15.00	100.00	2.00	0.0	10.00	150.00	50.00	700.00	0.20
263	508	0.01	29.00	12.00	60.00	10.00	30.00	0.0	0.0	0.0	10.00	100.00	50.00	200.00	0.20
264	507	0.01	23.00	12.00	56.00	7.00	30.00	100.00	0.0	0.0	15.00	150.00	70.00	500.00	0.50
265	506	0.01	22.00	12.00	66.00	5.00	20.00	100.00	0.0	0.0	10.00	70.00	50.00	700.00	0.50
266	505	0.01	17.00	12.00	60.00	10.00	30.00	100.00	0.0	0.0	15.00	100.00	70.00	700.00	0.70
267	504	0.01	12.00	12.00	44.00	1.00	10.00	100.00	0.0	0.0	10.00	70.00	50.00	500.00	0.70
268	503	0.01	20.00	12.00	62.00	10.00	30.00	100.00	2.00	0.0	15.00	70.00	50.00	700.00	0.30
269	386	0.01	21.00	12.00	40.00	30.00	15.00	0.0	0.0	0.0	15.00	150.00	70.00	1500.00	1.00
270	387	0.01	17.00	12.00	32.00	30.00	30.00	100.00	0.0	0.0	15.00	200.00	100.00	1500.00	1.00
271	501	0.01	13.00	25.00	74.00	20.00	30.00	100.00	2.00	0.0	15.00	100.00	50.00	700.00	0.30
272	500	0.01	37.00	26.00	74.00	20.00	30.00	0.0	0.0	0.0	15.00	150.00	70.00	700.00	0.50
273	385	0.02	23.00	12.00	44.00	30.00	20.00	100.00	0.0	0.0	20.00	200.00	100.00	1000.00	1.00
274	384	0.01	28.00	12.00	50.00	50.00	20.00	100.00	0.0	0.0	20.00	200.00	100.00	3000.00	1.00
275	383	0.01	30.00	12.00	44.00	30.00	10.00	100.00	0.0	0.0	20.00	200.00	100.00	2000.00	1.00
276	502	0.01	24.00	28.00	60.00	20.00	30.00	100.00	0.0	0.0	15.00	70.00	50.00	1000.00	0.70
277	382	0.01	28.00	12.00	50.00	20.00	15.00	0.0	0.0	0.0	15.00	100.00	50.00	1500.00	1.00
278	73	0.02	46.00	12.00	180.00	50.00	20.00	300.00	7.00	0.20	15.00	70.00	70.00	700.00	0.70
279	539	0.01	45.00	12.00	180.00	20.00	15.00	100.00	2.00	0.0	15.00	70.00	100.00	300.00	0.30
280	72	0.10	24.00	12.00	38.00	15.00	30.00	100.00	2.00	0.0	15.00	150.00	50.00	300.00	0.30
281	69	0.05	24.00	12.00	55.00	30.00	50.00	100.00	2.00	0.0	15.00	150.00	50.00	300.00	0.50
282	68	0.01	22.00	12.00	58.00	30.00	10.00	100.00	2.00	0.0	15.00	150.00	70.00	300.00	0.70
283	70	0.01	24.00	12.00	48.00	20.00	30.00	100.00	0.0	0.0	15.00	150.00	70.00	700.00	0.50
284	71	0.05	43.00	26.00	70.00	30.00	30.00	100.00	2.00	0.0	15.00	150.00	70.00	700.00	0.50
285	75	0.01	54.00	42.00	100.00	70.00	50.00	100.00	0.0	0.0	15.00	100.00	150.00	2000.00	1.00
286	63	0.05	22.00	12.00	100.00	15.00	30.00	100.00	2.00	0.0	20.00	150.00	50.00	1000.00	0.50
287	96	0.02	52.00	28.00	83.00	100.00	50.00	200.00	5.00	0.0	20.00	150.00	150.00	700.00	0.50
288	97	0.01	45.00	30.00	65.00	50.00	50.00	100.00	2.00	0.20	15.00	150.00	100.00	1000.00	0.70
289	98	0.01	25.00	12.00	40.00	50.00	10.00	100.00	2.00	0.0	15.00	150.00	100.00	1000.00	1.00
290	64	0.02	15.00	12.00	60.00	15.00	10.00	100.00	0.0	0.0	15.00	100.00	50.00	1000.00	0.15
291	50	0.02	11.00	12.00	66.00	30.00	10.00	100.00	0.0	0.0	25.00	100.00	150.00	700.00	1.00
292	51	0.08	39.00	26.00	80.00	100.00	20.00	100.00	0.0	0.0	20.00	700.00	150.00	1500.00	2.00
293	49	0.02	25.00	12.00	70.00	50.00	10.00	100.00	0.0	0.0	15.00	100.00	150.00	1500.00	1.00
294	48	0.02	22.00	12.00	110.00	70.00	10.00	100.00	0.0	0.0	15.00	150.00	150.00	700.00	1.00
295	52	0.02	30.00	12.00	140.00	100.00	20.00	100.00	0.0	0.0	20.00	200.00	150.00	3000.00	1.00
296	65	0.01	36.00	34.00	150.00	15.00	5.00	100.00	2.00	0.0	10.00	70.00	30.00	500.00	0.20
297	66	0.02	21.00	12.00	80.00	20.00	30.00	100.00	2.00	0.0	15.00	150.00	50.00	300.00	0.30
298	67	0.02	20.00	12.00	95.00	30.00	30.00	100.00	2.00	0.20	15.00	100.00	50.00	300.00	0.10
299	53	0.05	17.00	12.00	92.00	50.00	15.00	100.00	0.0	0.0	15.00	150.00	150.00	2000.00	1.00
300	62	0.02	20.00	12.00	68.00	70.00	15.00	100.00	0.0	0.0	15.00	150.00	150.00	1500.00	0.70
301	54	0.02	20.00	12.00	88.00	30.00	5.00	100.00	0.0	0.0	15.00	70.00	100.00	700.00	1.00
302	55	0.02	20.00	12.00	110.00	30.00	5.00	100.00	0.0	0.0	15.00	70.00	100.00	700.00	0.70
303	56	0.05	15.00	12.00	130.00	100.00	20.00	100.00	0.0	0.0	15.00	150.00	150.00	700.00	1.00
304	57	0.05	25.00	12.00	150.00	70.00	15.00	100.00	0.0	0.0	70.00	100.00	150.00	5000.00	0.70
305	58	0.02	15.00	12.00	56.00	70.00	10.00	100.00	0.0	0.0	15.00	150.00	70.00	1500.00	0.70
306	59	0.02	18.00	12.00	78.00	70.00	5.00	100.00	0.0	0.0	20.00	150.00	70.00	700.00	0.70
307	60	0.02	16.00	12.00	70.00	30.00	10.00	100.00	0.0	0.0	15.00	100.00	70.00	700.00	0.70
308	444	0.01	14.00	12.00	86.00	10.00	10.00	100.00	0.0	0.0	10.00	30.00	30.00	1000.00	0.70
309	443	0.01	31.00	12.00	74.00	15.00	30.00	100.00	0.0	0.0	15.00	150.00	50.00	700.00	0.50
310	442	0.01	25.00	12.00	140.00	15.00	20.00	100.00	0.0	0.0	15.00	100.00	50.00	700.00	0.50
311	391	0.02	30.00	12.00	54.00	50.00	30.00	100.00	2.00	0.0	20.00	200.00	100.00	1000.00	0.70
312	389	0.01	25.00	12.00	52.00	50.00	30.00	100.00	2.00	0.0	15.00	300.00	100.00	1500.00	1.00
313	390	0.01	25.00	12.00	50.00	15.00	15.00	100.00	2.00	0.0	15.00	150.00	70.00	1000.00	0.70
314	388	0.01	25.00	12.00	46.00	30.00	15.00	100.00	0.0	0.0	15.00	300.00	100.00	1500.00	2.00
315	399	0.02	130.00	12.00	340.00	150.00	30.00	100.00	2.00	0.0	20.00	150.00	70.00	1000.00	0.70
316	398	0.01	29.00	12.00	60.00	50.00	30.00	100.00	0.0	0.0	15.00	150.00	70.00	700.00	0.70
317	397	0.01	22.00	12.00	46.00	30.00	20.00	0.0	0.0	0.20	10.00	70.00	30.00	300.00	0.50
318	396	0.01	250.00	12.00	320.00	150.00	30.00	100.00	0.0	0.0	15.00	150.00	70.00	300.00	1.00
319	394	0.01	22.00	12.00	50.00	15.00	15.00	100.00	0.0	0.0	15.00	150.00	50.00	700.00	1.00
320	393	0.02	20.00	12.00	42.00	15.00	20.00	100.00	0.0	0.0	15.00	150.00	70.00	1000.00	0.70
321	392	0.01	20.00	12.00	40.00	20.00	30.00	100.00	0.0	0.0	15.00	150.00	70.00	700.00	0.70
322	395	0.10	23.00	12.00	52.00	30.00	15.00	100.00	0.0	0.0	10.00	100.00	50.00	1000.00	1.00
323	423	0.01	40.00	25.00	150.00	30.00	20.00	200.00	2.00	0.0	15.00	70.00	50.00	700.00	0.50
324	419	0.01	20.00	12.00	74.00	10.00	15.00	100.00	0.0	0.0	7.00	100.00	50.00	300.00	0.70

Map No.	Sample No.	Gold (1)	Copper (1)	Lead (1)	Zinc (1)	Copper	Lead	Zinc	Molybdenum	Silver	Cobalt	Chromium	Nickel	Manganese	Titanium
325	420	0.01	20.00	17.00	60.00	20.00	20.00	100.00	0.0	0.0	15.00	150.00	70.00	700.00	0.70
326	421	0.01	28.00	12.00	86.00	15.00	30.00	100.00	2.00	0.0	15.00	150.00	50.00	700.00	0.70
327	422	0.01	32.00	12.00	74.00	15.00	15.00	100.00	2.00	0.0	15.00	100.00	50.00	500.00	0.70
328	416	0.01	20.00	12.00	67.00	10.00	30.00	0.0	0.0	0.0	20.00	150.00	50.00	700.00	0.50
329	417	0.01	16.00	12.00	62.00	10.00	20.00	100.00	0.0	0.0	15.00	150.00	50.00	500.00	0.70
330	418	0.01	18.00	12.00	56.00	10.00	30.00	100.00	0.0	0.0	10.00	100.00	50.00	700.00	0.70
331	411	0.01	31.00	12.00	90.00	20.00	30.00	200.00	2.00	0.0	15.00	150.00	50.00	700.00	0.50
332	412	0.01	28.00	12.00	78.00	10.00	15.00	100.00	2.00	0.0	15.00	100.00	50.00	700.00	0.50
333	413	0.01	16.00	12.00	44.00	7.00	30.00	0.0	0.0	0.0	10.00	70.00	30.00	300.00	0.30
334	414	0.01	21.00	12.00	56.00	7.00	30.00	100.00	2.00	0.0	15.00	150.00	50.00	700.00	0.70
335	415	0.01	32.00	12.00	80.00	10.00	20.00	100.00	0.0	0.0	15.00	100.00	50.00	1000.00	0.30
336	404	0.02	33.00	12.00	44.00	100.00	30.00	100.00	2.00	0.0	15.00	200.00	70.00	700.00	0.70
337	403	0.01	23.00	12.00	36.00	70.00	15.00	0.0	2.00	0.0	10.00	100.00	30.00	700.00	0.70
338	402	0.01	24.00	12.00	36.00	70.00	30.00	100.00	2.00	0.0	15.00	150.00	50.00	700.00	0.70
339	401	0.01	23.00	12.00	16.00	70.00	30.00	100.00	2.00	0.0	15.00	150.00	70.00	500.00	0.70
340	400	0.01	28.00	12.00	70.00	70.00	20.00	100.00	5.00	0.0	15.00	150.00	70.00	700.00	0.70
341	440	0.01	30.00	12.00	80.00	7.00	20.00	0.0	2.00	0.0	15.00	150.00	70.00	700.00	0.30
342	441	0.01	31.00	12.00	86.00	15.00	15.00	200.00	2.00	0.0	15.00	100.00	70.00	1000.00	0.50
343	439	0.01	20.00	12.00	60.00	7.00	5.00	100.00	0.0	0.0	10.00	70.00	50.00	700.00	0.50
344	380	0.01	19.00	12.00	54.00	10.00	15.00	100.00	0.0	0.0	15.00	150.00	70.00	500.00	0.50
345	405	0.01	32.00	12.00	60.00	70.00	30.00	100.00	5.00	0.0	10.00	70.00	30.00	500.00	0.70
346	437	0.01	21.00	28.00	90.00	10.00	30.00	100.00	2.00	0.0	15.00	100.00	50.00	2000.00	0.50
347	436	0.01	32.00	26.00	66.00	20.00	30.00	100.00	5.00	0.0	15.00	150.00	70.00	700.00	0.50
348	435	0.01	21.00	12.00	60.00	10.00	15.00	100.00	2.00	0.0	15.00	70.00	50.00	1000.00	0.50
349	434	0.01	35.00	30.00	66.00	10.00	20.00	100.00	0.0	0.0	15.00	70.00	50.00	700.00	0.30
350	433	0.01	15.00	25.00	88.00	20.00	15.00	200.00	2.00	0.0	10.00	70.00	70.00	500.00	0.50
351	110	0.01	23.00	12.00	70.00	50.00	15.00	100.00	0.0	0.0	15.00	150.00	70.00	700.00	0.70
352	432	0.01	25.00	12.00	60.00	30.00	15.00	100.00	2.00	0.0	20.00	200.00	150.00	700.00	1.00
353	431	0.01	52.00	40.00	100.00	150.00	30.00	100.00	2.00	0.0	15.00	150.00	150.00	1500.00	0.70
354	430	0.01	37.00	28.00	80.00	70.00	20.00	100.00	2.00	0.0	15.00	100.00	70.00	1500.00	0.70
355	108	0.05	30.00	12.00	75.00	30.00	10.00	100.00	0.0	0.0	15.00	150.00	150.00	1000.00	0.70
356	109	0.01	27.00	12.00	60.00	50.00	20.00	100.00	0.0	0.0	15.00	150.00	100.00	500.00	0.50
357	111	0.02	33.00	12.00	72.00	30.00	10.00	100.00	0.0	0.0	15.00	100.00	70.00	700.00	0.50
358	61	0.02	22.00	12.00	94.00	50.00	5.00	100.00	0.0	0.0	15.00	70.00	150.00	700.00	0.70
359	47	0.02	23.00	12.00	86.00	70.00	15.00	100.00	0.0	0.0	10.00	70.00	150.00	700.00	1.00
360	112	0.01	5.00	12.00	50.00	50.00	20.00	100.00	2.00	0.0	15.00	100.00	70.00	1000.00	0.50
361	429	0.01	37.00	25.00	80.00	70.00	20.00	100.00	2.00	0.0	15.00	150.00	70.00	1500.00	0.70
362	107	0.01	42.00	26.00	140.00	50.00	20.00	100.00	0.0	0.0	15.00	150.00	150.00	700.00	0.70
363	106	0.01	26.00	12.00	80.00	50.00	15.00	100.00	0.0	0.0	10.00	100.00	100.00	700.00	0.70
364	105	0.02	27.00	12.00	100.00	70.00	15.00	100.00	0.0	0.0	15.00	150.00	150.00	700.00	0.70
365	104	0.01	45.00	26.00	70.00	50.00	50.00	100.00	2.00	0.20	15.00	70.00	70.00	700.00	0.70
366	103	0.10	49.00	28.00	250.00	20.00	20.00	500.00	5.00	0.70	10.00	70.00	100.00	300.00	0.50
367	102	0.01	42.00	12.00	100.00	50.00	30.00	100.00	5.00	0.0	10.00	70.00	70.00	700.00	0.70
368	101	0.06	34.00	26.00	50.00	15.00	10.00	100.00	2.00	0.0	10.00	100.00	70.00	500.00	0.70
369	100	0.01	31.00	12.00	80.00	30.00	5.00	100.00	2.00	0.0	10.00	70.00	100.00	700.00	0.70
370	46	1.50	34.00	12.00	120.00	150.00	20.00	200.00	0.0	0.0	15.00	150.00	150.00	1000.00	0.70
371	95	0.01	36.00	12.00	70.00	70.00	5.00	100.00	2.00	0.0	10.00	70.00	70.00	700.00	0.70
372	94	0.02	32.00	12.00	80.00	150.00	5.00	100.00	2.00	0.70	10.00	100.00	70.00	700.00	0.50
373	93	0.01	93.00	40.00	170.00	1.00	30.00	300.00	7.00	0.70	20.00	150.00	70.00	1000.00	0.50
374	87	0.02	27.00	12.00	62.00	50.00	30.00	100.00	2.00	0.20	15.00	100.00	50.00	700.00	0.70
375	86	0.01	15.00	12.00	58.00	15.00	5.00	100.00	2.00	0.0	15.00	70.00	50.00	700.00	0.30
376	85	0.01	37.00	12.00	95.00	70.00	30.00	100.00	2.00	0.20	20.00	150.00	100.00	200.00	0.30
377	84	7.50	32.00	12.00	70.00	15.00	5.00	100.00	0.0	0.0	10.00	70.00	70.00	300.00	0.50
378	45	0.40	29.00	12.00	120.00	100.00	15.00	200.00	0.0	0.0	15.00	100.00	150.00	700.00	0.70
379	88	0.01	30.00	12.00	40.00	70.00	5.00	700.00	7.00	0.20	15.00	70.00	50.00	700.00	0.70
380	89	0.01	61.00	12.00	120.00	100.00	15.00	200.00	15.00	1.50	10.00	70.00	50.00	200.00	0.50
381	92	0.01	43.00	12.00	60.00	50.00	30.00	100.00	2.00	0.20	20.00	150.00	70.00	1000.00	0.70
382	91	0.01	63.00	12.00	200.00	100.00	30.00	300.00	15.00	0.70	10.00	100.00	70.00	200.00	3.00
383	90	0.01	60.00	12.00	120.00	70.00	30.00	100.00	15.00	0.70	7.00	70.00	30.00	200.00	0.30
384	116	0.01	30.00	32.00	80.00	7.00	20.00	100.00	0.0	0.0	10.00	70.00	30.00	300.00	0.50
385	115	0.01	58.00	32.00	300.00	70.00	30.00	500.00	2.00	0.50	15.00	150.00	100.00	700.00	0.70
386	114	0.01	19.00	12.00	120.00	10.00	10.00	300.00	2.00	0.0	10.00	100.00	50.00	300.00	0.50
387	113	0.01	32.00	30.00	70.00	30.00	30.00	100.00	7.00	0.20	7.00	70.00	30.00	150.00	0.30
388	410	0.01	25.00	30.00	110.00	20.00	30.00	200.00	0.0	0.0	15.00	150.00	50.00	700.00	0.50
389	409	0.01	24.00	28.00	100.00	70.00	30.00	300.00	0.0	0.0	15.00	150.00	70.00	700.00	1.00
390	408	0.01	20.00	12.00	70.00	50.00	20.00	100.00	2.00	0.0	15.00	100.00	50.00	700.00	0.70

Map No.	Sample No.	Gold (1)	Copper (1)	Lead (1)	Zinc (1)	Copper	Lead	Zinc	Molybdenum	Silver	Cobalt	Chromium	Nickel	Manganese	Titanium
391	407	0.01	25.00	12.00	94.00	70.00	30.00	100.00	2.00	0.0	20.00	150.00	70.00	700.00	1.00
392	406	0.02	33.00	12.00	64.00	100.00	50.00	200.00	2.00	0.0	15.00	150.00	70.00	700.00	0.70
393	368	0.01	27.00	12.00	68.00	100.00	20.00	100.00	5.00	0.0	15.00	150.00	70.00	700.00	0.50
394	367	0.01	13.00	12.00	40.00	5.00	15.00	100.00	0.0	0.0	10.00	100.00	50.00	700.00	0.30
395	366	0.01	21.00	12.00	56.00	15.00	20.00	100.00	2.00	0.0	15.00	150.00	50.00	700.00	0.30
396	365	0.01	18.00	12.00	52.00	15.00	30.00	100.00	2.00	0.0	10.00	150.00	50.00	700.00	0.30
397	362	0.02	16.00	12.00	44.00	20.00	15.00	0.0	2.00	0.0	15.00	150.00	50.00	1000.00	0.70
398	363	0.02	21.00	12.00	46.00	30.00	15.00	0.0	0.0	0.0	15.00	150.00	70.00	700.00	0.70
399	364	0.02	13.00	12.00	30.00	15.00	20.00	100.00	2.00	0.0	10.00	100.00	50.00	700.00	0.30
400	369	0.01	32.00	25.00	40.00	30.00	30.00	0.0	2.00	0.0	15.00	200.00	50.00	500.00	0.50
401	370	0.04	25.00	25.00	80.00	20.00	50.00	100.00	2.00	0.0	15.00	150.00	50.00	1000.00	0.30
402	373	0.01	17.00	12.00	54.00	20.00	20.00	100.00	2.00	0.0	15.00	150.00	30.00	700.00	0.70
403	374	0.02	13.00	12.00	28.00	10.00	15.00	100.00	0.0	0.0	10.00	150.00	50.00	700.00	1.00
404	371	0.01	22.00	12.00	58.00	20.00	15.00	100.00	0.0	0.0	15.00	150.00	70.00	700.00	0.70
405	372	0.01	25.00	12.00	42.00	30.00	30.00	100.00	2.00	0.0	15.00	200.00	50.00	500.00	0.50
406	428	0.01	27.00	12.00	60.00	30.00	15.00	100.00	0.0	0.0	10.00	150.00	70.00	300.00	0.50
407	427	0.01	23.00	12.00	84.00	30.00	15.00	100.00	0.0	0.0	15.00	150.00	70.00	2000.00	0.70
408	424	0.01	30.00	34.00	80.00	15.00	20.00	100.00	0.0	0.0	7.00	150.00	30.00	300.00	0.70
409	425	0.01	18.00	12.00	66.00	10.00	5.00	100.00	0.0	0.0	10.00	70.00	70.00	700.00	0.70
410	426	0.01	22.00	12.00	92.00	20.00	15.00	100.00	0.0	0.0	10.00	100.00	70.00	700.00	0.70
411	378	0.01	20.00	12.00	58.00	30.00	30.00	100.00	0.0	0.0	15.00	200.00	70.00	1000.00	0.70
412	377	0.01	16.00	12.00	50.00	30.00	30.00	100.00	0.0	0.0	15.00	150.00	50.00	1000.00	1.00
413	376	0.01	18.00	12.00	50.00	15.00	20.00	100.00	0.0	0.0	15.00	200.00	70.00	500.00	1.00
414	375	0.01	19.00	12.00	44.00	10.00	20.00	100.00	0.0	0.0	10.00	100.00	50.00	700.00	0.70
415	381	0.01	17.00	12.00	38.00	15.00	10.00	0.0	0.0	0.0	15.00	150.00	70.00	2000.00	1.00
416	380	0.01	12.00	12.00	38.00	20.00	10.00	100.00	0.0	0.0	10.00	100.00	50.00	700.00	1.00
417	379	0.01	10.00	12.00	34.00	20.00	10.00	0.0	0.0	0.0	10.00	100.00	50.00	1000.00	0.70
418	354	0.01	20.00	12.00	40.00	10.00	20.00	100.00	0.0	0.0	7.00	100.00	30.00	500.00	0.50
419	353	0.01	22.00	25.00	64.00	20.00	20.00	100.00	0.0	0.0	15.00	150.00	70.00	1000.00	0.50
420	355	0.01	13.00	12.00	46.00	5.00	15.00	100.00	0.0	0.0	10.00	100.00	50.00	500.00	0.50
421	356	0.02	14.00	12.00	50.00	15.00	30.00	100.00	0.0	0.0	10.00	150.00	50.00	700.00	0.50
422	359	0.01	14.00	12.00	44.00	15.00	20.00	0.0	2.00	0.0	15.00	150.00	70.00	700.00	0.50
423	358	0.01	14.00	12.00	56.00	50.00	15.00	100.00	0.0	0.0	15.00	100.00	50.00	700.00	0.50
424	357	0.01	17.00	12.00	50.00	10.00	10.00	100.00	0.0	0.0	15.00	150.00	50.00	700.00	0.70
425	360	0.01	15.00	12.00	30.00	20.00	20.00	100.00	0.0	0.0	10.00	150.00	50.00	500.00	0.50
426	361	0.01	18.00	12.00	46.00	15.00	30.00	100.00	0.0	0.0	10.00	150.00	50.00	700.00	0.70
427	351	0.01	26.00	12.00	74.00	30.00	15.00	100.00	2.00	0.0	15.00	150.00	70.00	700.00	0.70
428	352	0.02	18.00	12.00	60.00	10.00	10.00	100.00	0.0	0.0	15.00	100.00	70.00	700.00	0.50
429	454	0.01	13.00	12.00	50.00	10.00	15.00	100.00	0.0	0.0	7.00	70.00	30.00	500.00	0.70
430	453	0.01	24.00	30.00	86.00	10.00	15.00	100.00	0.0	0.0	10.00	70.00	50.00	500.00	0.50
431	452	0.01	15.00	12.00	46.00	10.00	5.00	100.00	0.0	0.0	10.00	70.00	30.00	700.00	0.70
432	456	0.01	31.00	36.00	100.00	10.00	30.00	100.00	0.0	0.0	15.00	100.00	50.00	700.00	0.20
433	455	0.01	14.00	25.00	50.00	7.00	10.00	100.00	0.0	0.0	10.00	70.00	30.00	700.00	0.70
434	457	0.01	10.00	28.00	62.00	1.00	15.00	100.00	2.00	0.0	10.00	50.00	30.00	500.00	0.20
435	458	0.01	22.00	25.00	64.00	10.00	15.00	100.00	2.00	0.0	15.00	100.00	50.00	300.00	0.20

Appendix III B

Atomic Absorption and Semi-quantitative Emission Spectrograph Analytical Data; Stream Sediment Samples, Solomon C-5 Quadrangle, Alaska. (All values in parts per million unless indicated otherwise.)

Map No.	Sample No.	Iron (%)	Magnesium (%)	Calcium (%)	Barium	Strontium	Boron	Beryllium	Tin	Tungsten	Zirconium	Lanthanum	Niobium	Scandium	Yttrium	Vanadium
1	141	15.00	3.00	3.00	1500.00	25.00	200.00	0.50	0.0	0.0	700.00	30.00	5.00	20.00	30.00	500.00
2	140	15.00	2.00	1.00	1000.00	25.00	70.00	1.00	0.0	0.0	500.00	50.00	5.00	15.00	10.00	150.00
3	139	7.00	1.50	15.00	200.00	1000.00	70.00	0.50	0.0	0.0	150.00	20.00	10.00	10.00	20.00	150.00
4	232	10.00	1.50	1.50	1500.00	200.00	100.00	2.00	0.0	0.0	200.00	70.00	15.00	30.00	50.00	300.00
5	231	10.00	2.00	2.00	1500.00	25.00	100.00	1.50	0.0	0.0	300.00	30.00	15.00	20.00	30.00	300.00
6	230	10.00	2.00	0.50	700.00	25.00	100.00	1.00	0.0	0.0	500.00	30.00	15.00	20.00	30.00	150.00
7	229	15.00	3.00	2.00	1500.00	25.00	150.00	1.00	0.0	0.0	500.00	20.00	15.00	30.00	30.00	300.00
8	228	15.00	3.00	0.70	700.00	25.00	150.00	1.00	0.0	0.0	500.00	70.00	15.00	30.00	30.00	300.00
9	227	15.00	3.00	0.30	700.00	25.00	150.00	1.50	0.0	0.0	300.00	30.00	5.00	30.00	30.00	300.00
10	276	15.00	2.00	0.15	700.00	25.00	150.00	1.00	0.0	0.0	300.00	30.00	10.00	20.00	20.00	200.00
11	225	7.00	2.00	0.20	700.00	100.00	100.00	1.00	0.0	0.0	150.00	20.00	5.00	15.00	15.00	150.00
12	224	15.00	2.00	0.50	700.00	25.00	150.00	1.50	0.0	0.0	300.00	50.00	5.00	20.00	30.00	150.00
13	223	7.00	1.50	0.15	300.00	25.00	70.00	1.00	0.0	0.0	300.00	20.00	5.00	15.00	15.00	150.00
14	222	10.00	1.50	0.15	300.00	25.00	100.00	1.50	0.0	0.0	300.00	30.00	15.00	20.00	30.00	150.00
15	219	7.00	2.00	1.00	700.00	100.00	100.00	2.00	0.0	0.0	200.00	20.00	5.00	15.00	20.00	150.00
16	220	15.00	3.00	0.70	700.00	25.00	150.00	3.00	0.0	0.0	300.00	30.00	10.00	20.00	30.00	150.00
17	221	10.00	3.00	0.20	300.00	25.00	70.00	2.00	0.0	0.0	300.00	20.00	15.00	20.00	20.00	150.00
18	136	15.00	3.00	0.70	1500.00	25.00	200.00	2.00	0.0	0.0	700.00	50.00	15.00	50.00	50.00	500.00
19	138	15.00	3.00	3.00	700.00	100.00	150.00	1.50	0.0	0.0	700.00	30.00	10.00	30.00	30.00	200.00
20	137	7.00	1.50	2.00	700.00	100.00	150.00	1.00	0.0	0.0	200.00	20.00	15.00	15.00	20.00	200.00
21	135	15.00	3.00	1.50	1000.00	25.00	150.00	1.50	0.0	0.0	300.00	30.00	5.00	20.00	30.00	300.00
22	160	15.00	2.00	3.00	700.00	100.00	50.00	0.50	0.0	0.0	200.00	20.00	10.00	20.00	30.00	200.00
23	161	15.00	3.00	2.00	1500.00	100.00	150.00	1.00	0.0	0.0	300.00	30.00	10.00	20.00	30.00	200.00
24	162	5.00	1.50	0.70	700.00	25.00	100.00	1.00	0.0	0.0	200.00	50.00	15.00	15.00	30.00	150.00
25	133	15.00	3.00	3.00	1000.00	300.00	150.00	1.50	0.0	0.0	300.00	50.00	5.00	20.00	30.00	300.00
26	134	7.00	2.00	15.00	700.00	1000.00	50.00	0.50	0.0	0.0	200.00	20.00	15.00	10.00	30.00	150.00
27	212	7.00	1.50	0.15	700.00	25.00	70.00	2.00	0.0	0.0	200.00	20.00	5.00	20.00	20.00	150.00
28	213	7.00	2.00	0.20	300.00	25.00	70.00	3.00	0.0	0.0	150.00	30.00	10.00	15.00	20.00	150.00
29	237	10.00	2.00	1.50	1000.00	25.00	150.00	1.50	0.0	0.0	300.00	30.00	10.00	30.00	30.00	200.00
30	236	10.00	1.50	1.50	700.00	25.00	150.00	1.00	0.0	0.0	300.00	20.00	5.00	20.00	30.00	150.00
31	217	10.00	1.50	1.50	700.00	25.00	100.00	1.50	0.0	0.0	300.00	20.00	5.00	20.00	30.00	200.00
32	219	10.00	1.50	0.20	500.00	25.00	150.00	2.00	0.0	0.0	300.00	30.00	10.00	20.00	30.00	150.00
33	215	10.00	1.50	0.10	700.00	25.00	100.00	2.00	0.0	0.0	200.00	50.00	10.00	20.00	30.00	150.00
34	214	7.00	2.00	0.15	500.00	25.00	70.00	2.00	0.0	0.0	150.00	30.00	10.00	20.00	30.00	150.00
35	128	7.00	1.50	0.70	700.00	25.00	150.00	1.50	0.0	0.0	150.00	30.00	10.00	15.00	30.00	150.00
36	131	10.00	2.00	2.00	1000.00	25.00	100.00	1.00	0.0	0.0	150.00	30.00	10.00	15.00	30.00	200.00
37	132	10.00	2.00	15.00	700.00	700.00	70.00	1.00	15.00	0.0	300.00	30.00	10.00	15.00	30.00	150.00
38	163	5.00	1.00	0.50	500.00	100.00	30.00	1.00	0.0	0.0	150.00	30.00	10.00	10.00	30.00	150.00
39	159	15.00	3.00	2.00	700.00	200.00	70.00	0.50	0.0	0.0	500.00	30.00	10.00	30.00	30.00	150.00
40	158	20.00	5.00	7.00	2000.00	100.00	70.00	0.50	0.0	0.0	300.00	30.00	15.00	50.00	30.00	300.00
41	157	15.00	5.00	2.00	1500.00	200.00	70.00	1.00	0.0	0.0	300.00	30.00	10.00	30.00	30.00	300.00
42	151	10.00	3.00	1.00	700.00	150.00	100.00	1.00	0.0	0.0	300.00	20.00	15.00	20.00	30.00	150.00
43	152	7.00	2.00	1.00	1000.00	25.00	70.00	1.50	0.0	0.0	200.00	20.00	10.00	20.00	20.00	150.00
44	150	10.00	3.00	0.30	1500.00	25.00	150.00	1.00	0.0	0.0	200.00	30.00	15.00	15.00	20.00	150.00
45	153	15.00	3.00	0.20	1000.00	25.00	150.00	1.50	0.0	0.0	300.00	50.00	20.00	30.00	30.00	150.00
46	149	15.00	5.00	0.50	1500.00	25.00	200.00	1.00	0.0	0.0	300.00	30.00	15.00	30.00	30.00	150.00
47	154	15.00	5.00	3.00	1500.00	300.00	200.00	1.00	0.0	0.0	300.00	30.00	10.00	50.00	30.00	300.00
48	155	15.00	5.00	2.00	1500.00	100.00	150.00	0.50	0.0	0.0	500.00	30.00	15.00	30.00	30.00	200.00
49	156	10.00	3.00	0.70	1500.00	25.00	200.00	1.50	0.0	0.0	300.00	50.00	20.00	30.00	30.00	150.00
50	148	15.00	3.00	0.30	700.00	25.00	150.00	0.50	0.0	0.0	500.00	20.00	20.00	30.00	50.00	150.00
51	130	10.00	2.00	2.00	1500.00	100.00	150.00	1.00	0.0	0.0	100.00	30.00	10.00	20.00	30.00	200.00
52	127	15.00	2.00	0.70	1500.00	25.00	300.00	1.50	0.0	0.0	500.00	30.00	10.00	30.00	30.00	500.00
53	125	7.00	1.50	0.15	300.00	25.00	70.00	1.50	0.0	0.0	700.00	30.00	15.00	15.00	30.00	150.00
54	216	10.00	2.00	0.15	700.00	25.00	150.00	3.00	0.0	0.0	300.00	20.00	10.00	20.00	20.00	150.00
55	243	15.00	2.00	2.00	700.00	100.00	100.00	1.50	0.0	0.0	300.00	50.00	15.00	20.00	50.00	150.00
56	244	10.00	1.50	1.00	1000.00	25.00	100.00	1.50	0.0	0.0	300.00	50.00	10.00	20.00	30.00	200.00
57	245	15.00	2.00	0.70	1000.00	25.00	150.00	1.00	0.0	0.0	300.00	50.00	10.00	20.00	30.00	200.00
58	249	15.00	3.00	1.50	700.00	25.00	150.00	1.00	0.0	0.0	700.00	30.00	10.00	15.00	30.00	200.00
59	445	7.00	1.50	0.30	1500.00	25.00	50.00	3.00	0.0	0.0	200.00	50.00	10.00	15.00	30.00	150.00
60	446	10.00	1.50	0.20	700.00	25.00	70.00	2.00	0.0	0.0	300.00	20.00	5.00	15.00	20.00	200.00

Map No.	Sample No.	Iron (%)	Magnesium (%)	Calcium (%)	Barium	Strontium	Boron	Beryllium	Tin	Tungsten	Zirconium	Lanthanum	Niobium	Scandium	Yttrium	Vanadium
61	447	10.00	1.50	0.30	1500.00	25.00	100.00	3.00	0.0	0.0	100.00	50.00	5.00	20.00	30.00	200.00
62	122	10.00	1.50	0.15	700.00	25.00	100.00	2.00	0.0	0.0	200.00	10.00	10.00	20.00	30.00	150.00
63	120	20.00	2.00	0.15	1500.00	25.00	200.00	1.50	0.0	0.0	500.00	70.00	5.00	70.00	70.00	500.00
64	121	7.00	1.50	0.20	500.00	25.00	50.00	2.00	0.0	0.0	200.00	50.00	15.00	20.00	30.00	150.00
65	118	15.00	1.00	1.50	1500.00	25.00	150.00	1.00	0.0	0.0	500.00	30.00	10.00	20.00	30.00	300.00
66	123	15.00	2.00	1.50	700.00	100.00	150.00	1.50	0.0	0.0	500.00	50.00	10.00	20.00	30.00	300.00
67	124	10.00	1.50	0.20	300.00	25.00	100.00	2.00	0.0	0.0	300.00	30.00	10.00	20.00	30.00	150.00
68	126	15.00	3.00	0.70	1500.00	25.00	300.00	1.00	0.0	0.0	700.00	30.00	10.00	30.00	50.00	500.00
69	117	7.00	1.50	5.00	700.00	25.00	150.00	15.00	0.0	0.0	300.00	30.00	10.00	15.00	30.00	300.00
70	129	10.00	2.00	7.00	1500.00	200.00	100.00	1.50	0.0	0.0	300.00	30.00	15.00	20.00	50.00	150.00
71	142	15.00	1.50	7.00	1500.00	1000.00	150.00	1.00	0.0	0.0	700.00	30.00	5.00	15.00	30.00	300.00
72	143	15.00	3.00	2.00	1500.00	100.00	200.00	1.00	0.0	0.0	1000.00	30.00	10.00	30.00	30.00	300.00
73	144	10.00	1.50	0.70	1500.00	25.00	150.00	1.50	0.0	0.0	300.00	30.00	15.00	30.00	30.00	150.00
74	145	7.00	1.50	0.70	1500.00	25.00	150.00	1.00	0.0	0.0	100.00	20.00	10.00	20.00	30.00	150.00
75	146	10.00	2.00	1.50	1500.00	25.00	200.00	1.00	0.0	0.0	700.00	30.00	10.00	30.00	30.00	200.00
76	147	3.00	1.00	0.30	1500.00	25.00	70.00	1.00	0.0	0.0	150.00	30.00	10.00	15.00	20.00	150.00
77	211	5.00	1.50	3.00	700.00	150.00	70.00	1.50	0.0	0.0	150.00	20.00	5.00	15.00	20.00	150.00
78	119	10.00	1.50	2.00	1500.00	25.00	100.00	2.00	0.0	0.0	300.00	50.00	10.00	20.00	30.00	300.00
79	210	5.00	1.50	2.00	700.00	200.00	30.00	1.50	0.0	0.0	150.00	30.00	10.00	20.00	30.00	150.00
80	209	5.00	1.50	2.00	700.00	300.00	70.00	2.00	0.0	0.0	200.00	100.00	15.00	20.00	30.00	150.00
81	171	10.00	3.00	2.00	500.00	200.00	100.00	0.50	0.0	0.0	300.00	30.00	10.00	30.00	50.00	200.00
82	172	5.00	2.00	2.00	1000.00	200.00	50.00	0.50	0.0	0.0	200.00	50.00	10.00	20.00	30.00	150.00
83	173	10.00	2.00	2.00	700.00	100.00	100.00	1.00	0.0	0.0	300.00	50.00	10.00	20.00	30.00	200.00
84	170	5.00	1.50	1.00	700.00	25.00	50.00	1.00	0.0	0.0	100.00	30.00	15.00	15.00	30.00	100.00
85	169	15.00	3.00	1.50	700.00	25.00	700.00	0.50	0.0	0.0	500.00	20.00	5.00	30.00	50.00	300.00
86	168	10.00	3.00	1.00	700.00	100.00	150.00	0.50	0.0	0.0	300.00	50.00	15.00	20.00	30.00	200.00
87	167	10.00	2.00	0.50	500.00	25.00	200.00	1.50	0.0	0.0	300.00	70.00	20.00	20.00	50.00	150.00
88	166	15.00	3.00	2.00	1000.00	150.00	200.00	0.50	0.0	0.0	500.00	50.00	10.00	30.00	50.00	300.00
89	165	15.00	3.00	1.50	1000.00	100.00	700.00	1.00	0.0	0.0	500.00	50.00	15.00	20.00	30.00	500.00
90	164	5.00	1.50	1.00	500.00	25.00	50.00	1.50	0.0	0.0	300.00	30.00	20.00	15.00	30.00	150.00
91	206	7.00	1.50	2.00	1500.00	100.00	100.00	2.00	0.0	0.0	300.00	50.00	10.00	20.00	30.00	300.00
92	207	10.00	2.00	1.50	1000.00	150.00	150.00	0.50	0.0	0.0	500.00	30.00	15.00	20.00	30.00	300.00
93	208	3.00	0.70	7.00	300.00	500.00	30.00	1.50	0.0	0.0	150.00	70.00	10.00	10.00	20.00	150.00
94	186	7.00	1.50	0.30	700.00	100.00	70.00	3.00	0.0	0.0	200.00	50.00	15.00	15.00	20.00	150.00
95	187	7.00	2.00	0.30	700.00	100.00	50.00	3.00	0.0	0.0	200.00	20.00	10.00	15.00	20.00	200.00
96	188	10.00	2.00	0.70	700.00	100.00	150.00	2.00	0.0	0.0	500.00	30.00	10.00	15.00	30.00	100.00
97	189	7.00	1.50	1.00	1000.00	25.00	200.00	5.00	0.0	0.0	300.00	50.00	10.00	15.00	30.00	1000.00
98	449	7.00	1.50	0.15	500.00	25.00	70.00	1.50	0.0	0.0	150.00	30.00	10.00	15.00	20.00	150.00
99	448	7.00	1.50	1.00	700.00	25.00	70.00	1.50	0.0	0.0	300.00	30.00	5.00	15.00	20.00	150.00
100	450	5.00	0.70	3.00	700.00	25.00	70.00	2.00	0.0	0.0	200.00	30.00	10.00	15.00	30.00	150.00
101	451	3.00	0.30	3.00	300.00	25.00	50.00	1.00	0.0	0.0	300.00	50.00	5.00	15.00	30.00	150.00
102	205	7.00	1.00	1.00	500.00	25.00	30.00	1.00	0.0	0.0	200.00	20.00	10.00	15.00	15.00	150.00
103	204	7.00	1.50	0.50	700.00	25.00	70.00	1.00	0.0	0.0	300.00	20.00	5.00	15.00	15.00	200.00
104	203	10.00	3.00	2.00	1000.00	25.00	150.00	0.50	0.0	0.0	500.00	30.00	5.00	20.00	30.00	300.00
105	179	5.00	1.50	3.00	500.00	25.00	50.00	0.50	0.0	0.0	300.00	30.00	5.00	15.00	10.00	200.00
106	184	5.00	1.00	1.00	700.00	25.00	150.00	0.50	0.0	0.0	500.00	30.00	15.00	15.00	15.00	200.00
107	185	10.00	2.00	0.30	700.00	150.00	150.00	3.00	0.0	0.0	300.00	70.00	15.00	20.00	30.00	200.00
108	183	7.00	1.50	2.00	1500.00	25.00	100.00	0.50	0.0	0.0	300.00	30.00	5.00	15.00	15.00	200.00
109	180	7.00	2.00	2.00	1000.00	25.00	200.00	0.50	0.0	0.0	500.00	30.00	5.00	30.00	30.00	300.00
110	191	5.00	1.00	1.50	3000.00	25.00	150.00	0.50	0.0	0.0	500.00	30.00	10.00	15.00	15.00	300.00
111	182	5.00	1.50	5.00	1500.00	25.00	100.00	0.50	0.0	0.0	300.00	30.00	10.00	30.00	70.00	300.00
112	201	5.00	3.00	2.00	1000.00	25.00	100.00	1.00	0.0	0.0	300.00	30.00	5.00	15.00	20.00	200.00
113	202	10.00	2.00	1.00	1000.00	25.00	150.00	1.00	0.0	0.0	300.00	20.00	5.00	20.00	100.00	300.00
114	174	10.00	2.00	1.00	700.00	100.00	150.00	1.00	0.0	0.0	500.00	30.00	15.00	20.00	30.00	200.00
115	200	15.00	3.00	1.50	2000.00	25.00	200.00	0.50	0.0	0.0	1000.00	50.00	5.00	30.00	50.00	300.00
116	199	10.00	1.50	3.00	1000.00	25.00	150.00	0.50	0.0	0.0	300.00	30.00	10.00	20.00	15.00	200.00
117	197	3.00	0.30	0.15	300.00	25.00	30.00	2.00	0.0	0.0	100.00	30.00	10.00	15.00	20.00	100.00
118	191	7.00	0.70	2.00	700.00	25.00	70.00	3.00	0.0	0.0	300.00	70.00	5.00	20.00	30.00	150.00
119	190	5.00	0.50	0.50	300.00	25.00	50.00	3.00	0.0	0.0	300.00	20.00	5.00	15.00	30.00	150.00
120	193	5.00	1.50	2.00	2000.00	100.00	200.00	3.00	0.0	0.0	300.00	150.00	10.00	15.00	30.00	200.00
121	233	3.00	1.00	1.50	1500.00	25.00	70.00	2.00	0.0	0.0	200.00	30.00	10.00	15.00	30.00	200.00
122	234	5.00	1.00	3.00	1000.00	25.00	150.00	1.50	0.0	0.0	150.00	30.00	10.00	15.00	30.00	150.00
123	235	15.00	1.50	2.00	1500.00	100.00	100.00	1.00	0.0	0.0	700.00	30.00	10.00	20.00	30.00	300.00
124	195	7.00	2.00	3.00	700.00	25.00	200.00	2.00	0.0	0.0	300.00	30.00	15.00	20.00	30.00	200.00
125	196	5.00	0.70	5.00	1000.00	25.00	50.00	1.50	0.0	0.0	200.00	20.00	10.00	10.00	15.00	150.00
126	198	5.00	1.50	3.00	1000.00	25.00	50.00	1.50	0.0	0.0	300.00	20.00	15.00	20.00	30.00	150.00

Map No.	Sample No.	Iron (%)	Magnesium (%)	Calcium (%)	Barium	Strontium	Boron	Beryllium	Tin	Tungsten	Zirconium	Lanthanum	Niobium	Scandium	Yttrium	Vanadium
127	197	7.00	1.50	5.00	500.00	200.00	70.00	1.50	0.0	0.0	200.00	20.00	15.00	20.00	30.00	100.00
128	178	5.00	2.00	1.50	700.00	25.00	150.00	0.50	0.0	0.0	300.00	20.00	15.00	20.00	50.00	300.00
129	177	10.00	3.00	2.00	1500.00	25.00	200.00	0.50	0.0	0.0	500.00	30.00	5.00	30.00	30.00	500.00
130	176	10.00	3.00	2.00	700.00	25.00	150.00	0.50	0.0	0.0	700.00	20.00	5.00	30.00	20.00	300.00
131	175	7.00	2.00	1.00	700.00	25.00	100.00	1.50	0.0	0.0	150.00	50.00	15.00	20.00	30.00	150.00
133	194	10.00	2.00	2.00	700.00	200.00	200.00	2.00	0.0	0.0	300.00	30.00	15.00	15.00	20.00	200.00
134	470	7.00	1.00	1.00	500.00	25.00	50.00	0.50	0.0	0.0	200.00	30.00	15.00	20.00	30.00	100.00
135	469	3.00	0.70	0.70	300.00	0.0	20.00	0.50	0.0	0.0	70.00	20.00	10.00	10.00	15.00	100.00
136	468	3.00	0.70	0.50	300.00	0.0	30.00	0.50	0.0	0.0	70.00	20.00	10.00	15.00	15.00	70.00
137	466	5.00	0.70	0.10	300.00	0.0	50.00	0.50	0.0	0.0	100.00	30.00	10.00	15.00	15.00	100.00
138	465	5.00	1.00	1.00	500.00	0.0	50.00	1.00	0.0	0.0	150.00	30.00	10.00	15.00	20.00	100.00
139	467	3.00	0.50	0.50	500.00	0.0	30.00	1.00	0.0	0.0	70.00	30.00	15.00	15.00	30.00	100.00
140	462	5.00	1.00	0.50	700.00	25.00	70.00	1.50	0.0	0.0	100.00	50.00	15.00	20.00	30.00	100.00
141	463	5.00	1.00	0.50	700.00	25.00	50.00	1.50	0.0	0.0	150.00	50.00	15.00	20.00	30.00	100.00
142	464	5.00	1.50	0.20	500.00	0.0	50.00	1.00	0.0	0.0	100.00	30.00	15.00	15.00	20.00	100.00
143	461	7.00	0.50	0.07	300.00	0.0	50.00	2.00	0.0	0.0	70.00	50.00	10.00	10.00	20.00	70.00
144	460	5.00	0.50	0.20	500.00	25.00	50.00	2.00	0.0	0.0	150.00	50.00	15.00	20.00	30.00	100.00
145	459	5.00	2.00	3.00	300.00	100.00	50.00	0.0	0.0	0.0	100.00	10.00	10.00	10.00	10.00	100.00
146	347	5.00	1.50	0.50	700.00	25.00	50.00	3.00	0.0	0.0	150.00	50.00	15.00	15.00	20.00	200.00
147	348	5.00	1.50	0.30	500.00	25.00	30.00	1.50	0.0	0.0	150.00	50.00	10.00	15.00	30.00	150.00
148	349	5.00	1.50	0.15	500.00	25.00	50.00	1.50	0.0	0.0	100.00	10.00	10.00	15.00	20.00	150.00
149	350	7.00	1.50	0.20	700.00	25.00	70.00	2.00	0.0	0.0	200.00	70.00	15.00	20.00	30.00	200.00
150	346	7.00	1.50	1.00	500.00	25.00	30.00	1.00	0.0	0.0	100.00	30.00	10.00	15.00	15.00	150.00
151	345	10.00	1.50	1.50	300.00	100.00	50.00	1.50	0.0	0.0	200.00	30.00	15.00	15.00	70.00	150.00
152	342	5.00	1.50	0.30	700.00	25.00	100.00	1.00	0.0	0.0	150.00	30.00	15.00	15.00	30.00	150.00
153	343	5.00	1.50	0.15	700.00	25.00	70.00	1.50	0.0	0.0	150.00	20.00	15.00	15.00	20.00	150.00
154	344	3.00	1.50	0.30	1500.00	25.00	70.00	1.50	0.0	0.0	150.00	30.00	15.00	15.00	15.00	150.00
155	340	5.00	1.50	0.70	1000.00	100.00	100.00	1.50	0.0	0.0	150.00	50.00	15.00	15.00	30.00	150.00
156	341	5.00	1.50	0.70	700.00	25.00	7.00	1.00	0.0	0.0	150.00	30.00	10.00	15.00	30.00	150.00
157	316	5.00	2.00	1.00	300.00	25.00	100.00	2.00	0.0	0.0	100.00	20.00	5.00	15.00	20.00	150.00
158	317	10.00	2.00	0.50	300.00	25.00	150.00	1.50	0.0	0.0	200.00	50.00	10.00	15.00	30.00	150.00
159	318	7.00	1.50	0.50	300.00	25.00	200.00	1.50	0.0	0.0	200.00	50.00	5.00	15.00	30.00	150.00
160	319	5.00	1.50	0.50	700.00	25.00	150.00	5.00	0.0	0.0	200.00	70.00	5.00	20.00	20.00	150.00
161	320	10.00	2.00	0.30	500.00	25.00	150.00	2.00	0.0	0.0	150.00	70.00	5.00	30.00	50.00	150.00
162	321	10.00	2.00	0.30	500.00	25.00	200.00	3.00	0.0	0.0	300.00	70.00	10.00	30.00	30.00	200.00
163	322	10.00	2.00	0.20	500.00	25.00	100.00	1.50	0.0	0.0	200.00	70.00	10.00	20.00	30.00	150.00
164	323	7.00	1.50	0.15	500.00	25.00	150.00	3.00	0.0	0.0	300.00	150.00	15.00	30.00	50.00	150.00
165	315	7.00	2.00	0.30	300.00	25.00	100.00	2.00	0.0	0.0	200.00	20.00	10.00	15.00	30.00	150.00
167	313	7.00	2.00	2.00	500.00	300.00	50.00	2.00	0.0	0.0	100.00	70.00	10.00	20.00	30.00	150.00
168	312	5.00	1.50	0.20	1000.00	25.00	150.00	2.00	0.0	0.0	100.00	70.00	15.00	15.00	30.00	150.00
169	311	5.00	2.00	0.50	1000.00	100.00	200.00	2.00	0.0	0.0	100.00	70.00	10.00	15.00	20.00	100.00
170	308	10.00	2.00	2.00	300.00	150.00	30.00	1.00	0.0	0.0	70.00	50.00	5.00	15.00	30.00	100.00
171	309	10.00	2.00	2.00	500.00	25.00	30.00	1.00	0.0	0.0	100.00	20.00	5.00	20.00	20.00	150.00
172	310	7.00	2.00	2.00	300.00	200.00	30.00	1.00	0.0	0.0	70.00	30.00	10.00	20.00	20.00	100.00
173	292	10.00	2.00	0.70	2000.00	25.00	500.00	1.50	0.0	0.0	300.00	70.00	15.00	20.00	30.00	150.00
174	293	5.00	2.00	0.10	700.00	200.00	500.00	2.00	0.0	0.0	300.00	70.00	15.00	20.00	30.00	200.00
175	294	5.00	2.00	1.00	700.00	100.00	70.00	1.50	0.0	0.0	100.00	50.00	5.00	20.00	20.00	140.00
176	295	10.00	2.00	0.10	700.00	100.00	200.00	1.50	0.0	0.0	200.00	70.00	10.00	30.00	30.00	200.00
177	296	5.00	1.00	0.20	700.00	25.00	200.00	2.00	0.0	0.0	300.00	50.00	10.00	15.00	30.00	200.00
178	302	10.00	2.00	0.50	1500.00	100.00	100.00	1.50	0.0	0.0	200.00	70.00	10.00	20.00	30.00	200.00
179	291	10.00	3.00	2.00	500.00	200.00	100.00	1.00	0.0	0.0	200.00	70.00	5.00	20.00	30.00	150.00
180	290	10.00	3.00	2.00	300.00	200.00	30.00	1.00	0.0	0.0	150.00	50.00	10.00	20.00	30.00	150.00
181	286	5.00	1.50	1.50	500.00	300.00	30.00	2.00	0.0	0.0	100.00	50.00	10.00	15.00	30.00	100.00
182	287	5.00	2.00	1.50	300.00	200.00	30.00	1.00	0.0	0.0	150.00	70.00	10.00	15.00	30.00	100.00
183	288	7.00	3.00	1.50	500.00	150.00	50.00	1.50	0.0	0.0	100.00	70.00	15.00	20.00	30.00	100.00
184	289	7.00	3.00	1.00	500.00	200.00	50.00	1.00	0.0	0.0	100.00	70.00	10.00	20.00	[illegible]	[illegible]
185	285	3.00	1.50	0.50	300.00	25.00	30.00	2.00	0.0	0.0	100.00	70.00	5.00	15.00	20.00	100.00
186	278	5.00	2.00	2.00	300.00	200.00	30.00	1.50	0.0	0.0	100.00	50.00	10.00	20.00	20.00	100.00
187	279	7.00	1.50	2.00	200.00	150.00	30.00	1.50	0.0	0.0	200.00	50.00	15.00	20.00	30.00	100.00
188	280	10.00	3.00	1.50	500.00	100.00	50.00	1.50	0.0	0.0	300.00	30.00	5.00	20.00	30.00	150.00
189	281	10.00	2.00	1.50	300.00	100.00	50.00	1.00	0.0	0.0	300.00	30.00	5.00	20.00	20.00	150.00
190	282	7.00	2.00	1.00	300.00	25.00	100.00	2.00	0.0	0.0	150.00	70.00	10.00	15.00	30.00	100.00
191	284	7.00	2.00	1.50	300.00	200.00	100.00	1.50	0.0	0.0	300.00	50.00	15.00	20.00	30.00	100.00
192	283	7.00	2.00	0.70	500.00	25.00	100.00	3.00	0.0	0.0	200.00	30.00	15.00	20.00	30.00	100.00
193	277	5.00	1.50	1.50	300.00	200.00	30.00	0.50	0.0	0.0	150.00	50.00	10.00	20.00	30.00	100.00
194	276	5.00	2.00	1.00	300.00	25.00	50.00	1.50	0.0	0.0	200.00	70.00	5.00	15.00	50.00	150.00

Map No.	Sample No.	Iron (%)	Magnesium (%)	Calcium (%)	Barium	Strontium	Boron	Beryllium	Tin	Tungsten	Zirconium	Lanthanum	Niobium	Scandium	Yttrium	Vanadium
195	273	10.00	2.00	1.50	500.00	150.00	50.00	1.50	0.0	0.0	300.00	70.00	15.00	20.00	30.00	150.00
196	272	15.00	3.00	3.00	500.00	500.00	70.00	0.50	0.0	0.0	200.00	50.00	5.00	30.00	50.00	200.00
197	271	7.00	2.00	3.00	300.00	500.00	100.00	0.50	0.0	0.0	200.00	30.00	10.00	20.00	50.00	150.00
198	270	10.00	3.00	2.00	500.00	150.00	70.00	1.00	0.0	0.0	300.00	30.00	10.00	20.00	30.00	200.00
199	269	10.00	3.00	3.00	500.00	300.00	50.00	1.00	0.0	0.0	300.00	20.00	10.00	20.00	30.00	200.00
200	268	7.00	2.00	2.00	300.00	300.00	30.00	1.00	0.0	0.0	150.00	20.00	15.00	20.00	50.00	150.00
201	267	10.00	3.00	3.00	500.00	300.00	200.00	1.00	0.0	0.0	300.00	50.00	10.00	30.00	50.00	200.00
202	266	10.00	3.00	2.00	300.00	150.00	50.00	1.00	0.0	0.0	200.00	30.00	10.00	15.00	30.00	150.00
203	265	5.00	3.00	2.00	300.00	200.00	30.00	1.00	0.0	0.0	100.00	30.00	10.00	20.00	30.00	150.00
204	264	5.00	2.00	1.50	300.00	200.00	50.00	1.50	0.0	25.00	100.00	20.00	15.00	20.00	30.00	100.00
205	513	5.00	3.00	3.00	300.00	200.00	50.00	15.00	0.0	0.0	100.00	50.00	5.00	20.00	30.00	100.00
206	514	7.00	2.00	2.00	700.00	200.00	50.00	2.00	0.0	0.0	100.00	70.00	15.00	20.00	30.00	150.00
207	515	7.00	2.00	3.00	500.00	200.00	70.00	1.00	0.0	0.0	200.00	50.00	10.00	20.00	30.00	150.00
208	240	15.00	3.00	0.30	1500.00	25.00	300.00	1.50	0.0	0.0	500.00	50.00	15.00	30.00	50.00	300.00
209	238	15.00	3.00	3.00	1000.00	100.00	200.00	1.00	0.0	0.0	500.00	30.00	5.00	30.00	50.00	300.00
210	239	10.00	2.00	0.15	1000.00	25.00	200.00	1.50	0.0	0.0	300.00	50.00	10.00	30.00	30.00	200.00
211	241	10.00	1.50	1.50	700.00	25.00	100.00	1.00	0.0	0.0	300.00	30.00	5.00	15.00	30.00	150.00
212	242	10.00	3.00	3.00	700.00	100.00	150.00	1.00	0.0	0.0	300.00	30.00	15.00	30.00	50.00	150.00
213	246	15.00	3.00	1.50	700.00	25.00	100.00	1.00	0.0	0.0	300.00	30.00	15.00	20.00	30.00	300.00
214	247	10.00	2.00	0.70	1000.00	25.00	150.00	1.00	0.0	0.0	500.00	30.00	10.00	20.00	30.00	200.00
215	326	5.00	1.50	0.30	300.00	25.00	70.00	1.50	0.0	0.0	300.00	30.00	10.00	15.00	30.00	150.00
216	325	5.00	1.50	0.20	500.00	25.00	100.00	2.00	0.0	0.0	200.00	50.00	15.00	15.00	30.00	150.00
217	324	5.00	1.50	0.30	300.00	25.00	100.00	2.00	0.0	0.0	300.00	30.00	15.00	15.00	30.00	150.00
218	328	3.00	1.50	0.15	700.00	25.00	50.00	1.50	0.0	0.0	100.00	20.00	15.00	15.00	30.00	150.00
219	327	5.00	1.50	0.30	700.00	25.00	100.00	2.00	0.0	0.0	300.00	50.00	15.00	15.00	30.00	150.00
220	248	15.00	3.00	1.50	1000.00	25.00	150.00	1.50	0.0	0.0	300.00	20.00	10.00	20.00	30.00	200.00
221	298	5.00	1.50	0.10	300.00	25.00	150.00	1.00	0.0	0.0	300.00	70.00	10.00	15.00	30.00	150.00
222	299	7.00	1.50	0.20	500.00	25.00	150.00	2.00	0.0	0.0	300.00	70.00	15.00	15.00	30.00	150.00
223	300	7.00	1.50	0.20	300.00	25.00	50.00	1.50	0.0	0.0	300.00	50.00	5.00	20.00	10.00	150.00
224	301	7.00	2.00	1.50	700.00	25.00	50.00	3.00	0.0	0.0	300.00	70.00	5.00	20.00	30.00	150.00
225	297	5.00	2.00	0.15	500.00	25.00	200.00	2.00	0.0	0.0	300.00	70.00	10.00	20.00	30.00	150.00
226	540	3.00	1.50	0.10	200.00	0.0	30.00	1.00	0.0	0.0	150.00	20.00	5.00	15.00	30.00	100.00
227	538	15.00	3.00	0.30	700.00	25.00	200.00	1.50	0.0	0.0	500.00	50.00	15.00	30.00	30.00	300.00
228	536	7.00	1.50	0.15	500.00	0.0	300.00	0.0	0.0	0.0	300.00	20.00	5.00	15.00	20.00	150.00
229	535	5.00	1.50	0.10	700.00	0.0	70.00	1.00	0.0	0.0	300.00	30.00	10.00	15.00	30.00	150.00
230	537	7.00	1.50	0.15	500.00	0.0	30.00	0.0	0.0	0.0	300.00	20.00	5.00	15.00	20.00	150.00
231	534	3.00	2.00	0.70	1500.00	0.0	70.00	1.50	0.0	0.0	150.00	50.00	20.00	15.00	30.00	150.00
232	99	7.00	2.00	0.70	1500.00	25.00	70.00	1.50	0.0	0.0	300.00	20.00	20.00	15.00	30.00	150.00
233	533	7.00	2.00	0.70	1500.00	0.0	100.00	1.50	0.0	0.0	300.00	70.00	20.00	15.00	30.00	150.00
234	532	5.00	1.50	0.70	1500.00	0.0	50.00	1.50	0.0	0.0	300.00	70.00	20.00	15.00	30.00	150.00
235	529	5.00	1.50	1.00	700.00	25.00	50.00	1.50	0.0	0.0	100.00	30.00	10.00	15.00	20.00	150.00
236	530	5.00	1.50	0.30	1000.00	25.00	70.00	2.00	0.0	0.0	200.00	70.00	15.00	15.00	30.00	200.00
237	531	5.00	2.00	1.00	700.00	150.00	100.00	3.00	0.0	0.0	150.00	50.00	10.00	20.00	30.00	150.00
238	528	10.00	2.00	0.10	1500.00	25.00	100.00	1.50	0.0	0.0	200.00	70.00	10.00	15.00	30.00	150.00
239	527	7.00	1.00	0.15	500.00	25.00	30.00	1.50	0.0	0.0	100.00	30.00	10.00	10.00	30.00	100.00
240	525	5.00	1.00	0.70	300.00	25.00	20.00	0.50	0.0	0.0	70.00	30.00	5.00	15.00	20.00	100.00
241	526	5.00	1.50	1.00	300.00	100.00	50.00	1.00	0.0	0.0	70.00	30.00	10.00	15.00	30.00	150.00
242	524	7.00	2.00	1.00	500.00	100.00	50.00	0.50	0.0	0.0	100.00	50.00	10.00	15.00	20.00	150.00
243	83	15.00	3.00	1.50	500.00	200.00	50.00	1.00	0.0	0.0	200.00	30.00	15.00	20.00	30.00	100.00
244	523	5.00	1.50	1.50	300.00	150.00	50.00	2.00	0.0	0.0	100.00	50.00	10.00	20.00	30.00	150.00
245	522	10.00	2.00	2.00	700.00	25.00	50.00	0.50	0.0	0.0	300.00	30.00	10.00	20.00	30.00	150.00
246	521	10.00	2.00	2.00	500.00	25.00	30.00	1.50	0.0	0.0	150.00	30.00	10.00	20.00	30.00	150.00
247	520	5.00	1.50	0.70	300.00	25.00	20.00	1.00	0.0	0.0	150.00	50.00	10.00	15.00	30.00	100.00
248	517	5.00	1.50	0.30	200.00	0.0	20.00	0.0	0.0	0.0	100.00	30.00	5.00	15.00	20.00	100.00
249	518	5.00	2.00	1.00	500.00	25.00	30.00	1.50	0.0	0.0	200.00	50.00	5.00	15.00	30.00	150.00
250	82	10.00	2.00	1.50	300.00	200.00	30.00	1.50	0.0	0.0	150.00	30.00	10.00	15.00	30.00	150.00
251	80	10.00	3.00	1.50	300.00	25.00	50.00	1.50	0.0	0.0	150.00	20.00	10.00	15.00	15.00	150.00
252	79	3.00	0.70	1.00	300.00	100.00	100.00	2.00	0.0	0.0	70.00	50.00	15.00	15.00	30.00	100.00
253	519	5.00	1.50	1.50	300.00	200.00	30.00	1.50	0.0	0.0	100.00	50.00	5.00	15.00	20.00	100.00
254	78	5.00	3.00	2.00	700.00	100.00	100.00	3.00	0.0	0.0	200.00	50.00	15.00	20.00	30.00	150.00
255	81	15.00	5.00	1.50	700.00	300.00	70.00	1.00	0.0	0.0	200.00	30.00	10.00	30.00	30.00	200.00
256	76	20.00	3.00	2.00	700.00	100.00	150.00	1.00	0.0	0.0	500.00	30.00	10.00	30.00	30.00	300.00
257	77	7.00	3.00	1.50	700.00	300.00	100.00	2.00	0.0	0.0	200.00	30.00	15.00	20.00	30.00	150.00
258	516	7.00	1.50	1.50	300.00	150.00	50.00	1.00	0.0	0.0	100.00	70.00	15.00	15.00	15.00	100.00
259	512	7.00	3.00	2.00	700.00	150.00	50.00	2.00	0.0	0.0	100.00	50.00	10.00	20.00	30.00	150.00
260	511	10.00	2.00	3.00	300.00	200.00	30.00	1.00	0.0	0.0	100.00	30.00	5.00	20.00	30.00	150.00

Map No.	Sample No.	Iron (%)	Magnesium (%)	Calcium (%)	Barium	Strontium	Boron	Beryllium	Tin	Tungsten	Zirconium	Lanthanum	Niobium	Scandium	Yttrium	Vanadium
261	510	7.00	2.00	3.00	300.00	200.00	50.00	1.00	0.0	0.0	150.00	50.00	5.00	20.00	30.00	100.00
262	509	5.00	2.00	2.00	300.00	300.00	30.00	2.00	0.0	0.0	100.00	50.00	5.00	20.00	30.00	100.00
263	508	3.00	1.50	0.50	300.00	150.00	30.00	1.50	0.0	0.0	70.00	30.00	5.00	15.00	20.00	100.00
264	507	7.00	2.00	1.50	300.00	150.00	70.00	0.50	0.0	0.0	200.00	50.00	10.00	20.00	30.00	100.00
265	506	5.00	1.50	0.70	300.00	25.00	50.00	1.00	0.0	0.0	100.00	30.00	10.00	15.00	20.00	70.00
266	505	7.00	2.00	2.00	500.00	150.00	150.00	0.50	0.0	0.0	150.00	50.00	15.00	20.00	30.00	100.00
267	504	7.00	1.50	1.50	200.00	25.00	30.00	0.0	0.0	0.0	70.00	30.00	15.00	15.00	30.00	100.00
268	503	5.00	1.00	1.00	500.00	25.00	100.00	1.00	0.0	0.0	100.00	50.00	10.00	15.00	30.00	100.00
269	386	10.00	2.00	5.00	300.00	150.00	70.00	0.0	0.0	0.0	500.00	50.00	5.00	30.00	50.00	200.00
270	387	15.00	3.00	3.00	700.00	200.00	300.00	1.50	0.0	0.0	300.00	70.00	15.00	30.00	70.00	200.00
271	501	5.00	1.50	1.50	300.00	150.00	70.00	0.50	0.0	0.0	70.00	30.00	10.00	15.00	20.00	100.00
272	500	10.00	2.00	2.00	200.00	200.00	70.00	0.0	0.0	0.0	200.00	20.00	5.00	20.00	30.00	150.00
273	385	15.00	3.00	3.00	700.00	150.00	70.00	0.0	0.0	0.0	200.00	50.00	5.00	30.00	50.00	200.00
274	384	15.00	3.00	3.00	1000.00	100.00	150.00	0.50	0.0	0.0	200.00	30.00	5.00	30.00	50.00	200.00
275	383	10.00	3.00	3.00	700.00	100.00	200.00	0.0	0.0	0.0	300.00	30.00	5.00	30.00	30.00	200.00
276	502	5.00	2.00	1.50	500.00	100.00	50.00	1.50	0.0	0.0	100.00	50.00	10.00	15.00	30.00	100.00
277	382	7.00	3.00	2.00	300.00	0.0	200.00	0.0	0.0	0.0	200.00	30.00	5.00	20.00	30.00	150.00
278	73	5.00	1.50	0.15	1500.00	25.00	100.00	1.50	0.0	0.0	150.00	30.00	15.00	15.00	30.00	150.00
279	539	3.00	1.50	0.10	200.00	0.0	30.00	1.00	0.0	0.0	150.00	20.00	5.00	15.00	30.00	100.00
280	72	5.00	2.00	0.15	500.00	25.00	70.00	2.00	0.0	0.0	100.00	20.00	15.00	15.00	20.00	150.00
281	69	5.00	2.00	0.15	700.00	25.00	150.00	3.00	0.0	0.0	200.00	30.00	15.00	20.00	30.00	150.00
282	68	7.00	1.50	0.15	500.00	25.00	100.00	2.00	0.0	0.0	300.00	30.00	20.00	20.00	30.00	150.00
283	70	5.00	1.50	0.15	300.00	25.00	50.00	2.00	0.0	0.0	100.00	30.00	15.00	15.00	20.00	100.00
284	71	5.00	1.50	0.15	500.00	25.00	100.00	3.00	0.0	0.0	100.00	30.00	15.00	15.00	30.00	150.00
285	75	15.00	2.00	0.30	700.00	25.00	150.00	1.50	0.0	0.0	300.00	30.00	10.00	30.00	30.00	300.00
286	63	10.00	0.70	0.20	500.00	25.00	100.00	2.00	0.0	25.00	150.00	50.00	15.00	15.00	30.00	150.00
287	96	10.00	2.00	0.15	1000.00	25.00	70.00	2.00	0.0	0.0	200.00	20.00	15.00	15.00	30.00	200.00
288	97	10.00	0.20	0.15	1500.00	25.00	70.00	1.50	0.0	0.0	300.00	20.00	10.00	15.00	15.00	300.00
289	98	10.00	1.50	0.30	700.00	25.00	100.00	1.50	0.0	0.0	500.00	30.00	15.00	20.00	30.00	200.00
290	64	3.00	0.70	0.20	300.00	25.00	50.00	2.00	0.0	25.00	150.00	50.00	10.00	15.00	30.00	150.00
291	50	15.00	3.00	0.15	700.00	25.00	100.00	1.00	0.0	0.0	500.00	20.00	5.00	10.00	20.00	300.00
292	51	15.00	3.00	0.20	2000.00	25.00	200.00	1.00	0.0	0.0	500.00	20.00	5.00	30.00	50.00	700.00
293	49	15.00	2.00	0.20	1500.00	25.00	150.00	1.00	0.0	0.0	500.00	20.00	5.00	10.00	30.00	500.00
294	48	15.00	3.00	0.15	1500.00	25.00	200.00	1.00	0.0	0.0	500.00	20.00	10.00	15.00	30.00	300.00
295	52	15.00	3.00	0.50	2000.00	25.00	200.00	1.00	0.0	0.0	500.00	20.00	5.00	15.00	50.00	700.00
296	65	3.00	1.00	0.15	200.00	25.00	50.00	1.50	0.0	0.0	100.00	30.00	10.00	15.00	30.00	100.00
297	66	3.00	1.50	0.15	300.00	25.00	70.00	3.00	0.0	0.0	150.00	30.00	10.00	20.00	20.00	150.00
298	67	3.00	1.50	0.15	1000.00	25.00	70.00	1.50	0.0	25.00	150.00	20.00	15.00	15.00	20.00	150.00
299	53	15.00	3.00	0.30	1000.00	25.00	150.00	1.00	0.0	0.0	700.00	20.00	10.00	15.00	20.00	500.00
300	62	10.00	3.00	0.50	700.00	25.00	150.00	1.50	0.0	0.0	300.00	30.00	5.00	10.00	15.00	300.00
301	54	10.00	15.00	1.00	1500.00	25.00	200.00	1.00	0.0	0.0	300.00	30.00	5.00	10.00	15.00	300.00
302	55	7.00	1.50	0.30	3000.00	25.00	150.00	1.00	0.0	0.0	200.00	20.00	5.00	7.00	15.00	300.00
303	56	15.00	3.00	0.70	5000.00	25.00	200.00	2.00	0.0	0.0	300.00	20.00	10.00	15.00	30.00	500.00
304	57	15.00	3.00	0.70	3000.00	25.00	200.00	1.50	0.0	0.0	300.00	20.00	10.00	10.00	20.00	300.00
305	58	15.00	3.00	1.50	700.00	25.00	150.00	1.50	0.0	0.0	150.00	20.00	5.00	10.00	20.00	150.00
306	59	10.00	2.00	0.70	700.00	100.00	70.00	1.00	0.0	0.0	300.00	10.00	5.00	15.00	15.00	150.00
307	60	10.00	2.00	0.50	1000.00	25.00	70.00	1.50	0.0	0.0	300.00	20.00	10.00	15.00	15.00	200.00
308	444	3.00	1.50	1.50	300.00	200.00	30.00	1.00	0.0	0.0	100.00	30.00	10.00	15.00	20.00	100.00
309	443	5.00	2.00	1.00	700.00	150.00	50.00	1.50	0.0	0.0	100.00	30.00	10.00	15.00	20.00	150.00
310	442	3.00	1.50	1.50	300.00	150.00	30.00	1.00	0.0	0.0	100.00	30.00	5.00	15.00	15.00	100.00
311	391	10.00	3.00	2.00	700.00	200.00	150.00	2.00	0.0	0.0	200.00	70.00	10.00	20.00	30.00	150.00
312	389	15.00	3.00	5.00	700.00	300.00	150.00	2.00	0.0	0.0	300.00	70.00	15.00	30.00	70.00	150.00
313	390	10.00	3.00	2.00	700.00	300.00	70.00	1.50	0.0	0.0	150.00	50.00	10.00	20.00	30.00	150.00
314	388	15.00	3.00	3.00	700.00	300.00	100.00	1.50	0.0	0.0	200.00	70.00	15.00	30.00	50.00	150.00
315	399	7.00	3.00	2.00	700.00	200.00	50.00	2.00	0.0	0.0	200.00	30.00	15.00	20.00	30.00	150.00
316	398	7.00	3.00	3.00	700.00	300.00	70.00	2.00	0.0	0.0	200.00	50.00	10.00	15.00	30.00	150.00
317	397	3.00	1.50	1.00	300.00	150.00	50.00	1.00	0.0	0.0	100.00	30.00	5.00	15.00	15.00	150.00
318	396	7.00	2.00	2.00	300.00	200.00	100.00	1.50	0.0	0.0	200.00	50.00	15.00	20.00	30.00	150.00
319	394	7.00	2.00	2.00	300.00	200.00	30.00	1.00	0.0	0.0	70.00	50.00	10.00	15.00	30.00	150.00
320	393	10.00	2.00	1.50	300.00	200.00	50.00	1.50	0.0	0.0	100.00	50.00	10.00	20.00	30.00	150.00
321	392	10.00	2.00	2.00	300.00	200.00	70.00	1.50	0.0	0.0	300.00	50.00	10.00	15.00	30.00	150.00
322	395	5.00	2.00	1.50	300.00	150.00	50.00	1.50	0.0	0.0	100.00	30.00	15.00	15.00	30.00	150.00
323	423	3.00	1.50	1.00	700.00	100.00	50.00	2.00	0.0	0.0	100.00	50.00	10.00	15.00	30.00	150.00
324	419	5.00	2.00	1.50	300.00	100.00	100.00	1.00	0.0	0.0	300.00	30.00	5.00	15.00	20.00	150.00
325	420	7.00	3.00	2.00	500.00	300.00	70.00	1.50	0.0	0.0	200.00	50.00	10.00	20.00	30.00	150.00
326	421	7.00	3.00	1.50	700.00	200.00	30.00	1.50	0.0	0.0	100.00	50.00	15.00	20.00	30.00	150.00

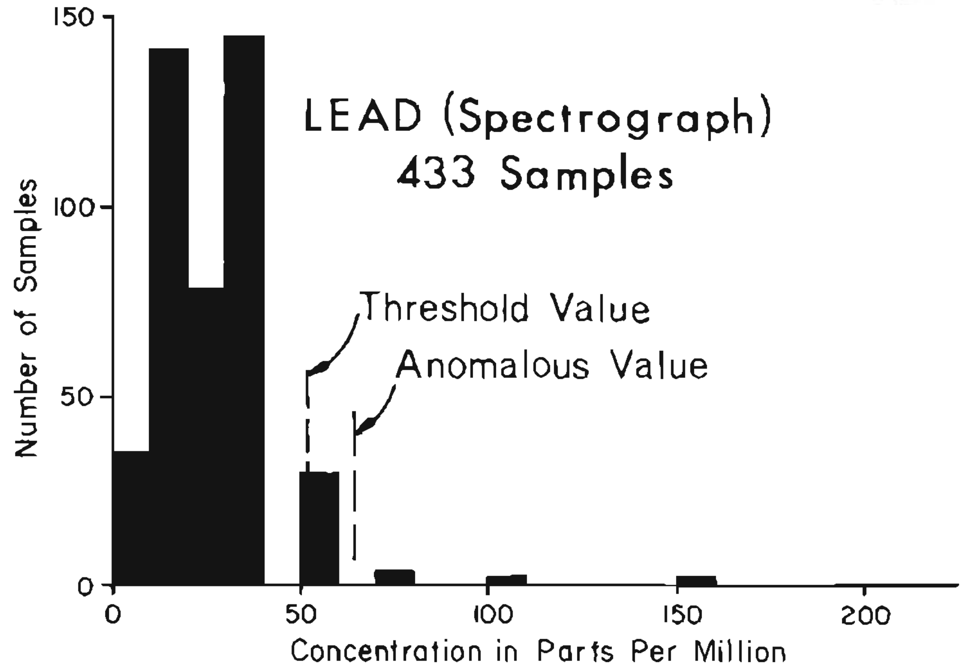
Map No.	Sample No.	Iron (%)	Magnesium (%)	Calcium (%)	Barium	Strontium	Boron	Beryllium	Tin	Tungsten	Zirconium	Lanthanum	Niobium	Scandium	Yttrium	Vanadium
327	422	5.00	2.00	1.50	500.00	150.00	30.00	1.50	0.0	0.0	150.00	50.00	10.00	15.00	30.00	150.00
328	416	7.00	1.50	1.50	300.00	300.00	30.00	1.00	0.0	0.0	100.00	30.00	10.00	15.00	30.00	150.00
329	417	7.00	2.00	2.00	300.00	300.00	50.00	1.50	0.0	0.0	100.00	50.00	15.00	20.00	30.00	150.00
330	418	7.00	2.00	2.00	300.00	300.00	70.00	1.50	0.0	0.0	100.00	50.00	15.00	20.00	30.00	150.00
331	411	5.00	1.50	1.00	700.00	100.00	50.00	2.00	0.0	0.0	150.00	70.00	10.00	20.00	30.00	150.00
332	412	5.00	1.50	1.00	700.00	100.00	50.00	1.50	0.0	0.0	100.00	30.00	10.00	15.00	30.00	150.00
333	413	3.00	1.00	0.70	300.00	150.00	30.00	1.00	0.0	0.0	100.00	30.00	5.00	15.00	20.00	100.00
334	414	7.00	1.50	1.50	300.00	200.00	30.00	1.50	0.0	0.0	100.00	50.00	10.00	20.00	30.00	150.00
335	415	5.00	1.50	1.00	300.00	200.00	30.00	1.50	0.0	0.0	100.00	30.00	10.00	15.00	30.00	150.00
336	404	7.00	3.00	1.50	700.00	100.00	30.00	1.50	0.0	0.0	150.00	50.00	15.00	15.00	30.00	150.00
337	403	5.00	1.50	1.50	300.00	200.00	30.00	1.50	0.0	0.0	150.00	50.00	10.00	20.00	30.00	100.00
338	402	10.00	2.00	2.00	500.00	300.00	100.00	1.50	0.0	0.0	100.00	30.00	10.00	15.00	30.00	150.00
339	401	7.00	2.00	2.00	500.00	300.00	70.00	1.50	0.0	0.0	200.00	50.00	15.00	20.00	30.00	150.00
340	400	5.00	1.50	2.00	700.00	300.00	50.00	1.50	0.0	0.0	100.00	50.00	15.00	15.00	30.00	150.00
341	440	5.00	1.50	0.70	700.00	100.00	30.00	1.00	0.0	0.0	100.00	20.00	5.00	15.00	20.00	150.00
342	441	5.00	1.50	1.50	700.00	100.00	70.00	1.50	0.0	0.0	150.00	50.00	10.00	15.00	30.00	150.00
343	439	5.00	1.50	0.30	700.00	25.00	70.00	1.50	0.0	0.0	100.00	30.00	5.00	15.00	15.00	150.00
344	380	7.00	1.50	1.50	700.00	150.00	70.00	2.00	0.0	0.0	200.00	50.00	5.00	20.00	30.00	150.00
345	405	5.00	0.70	0.20	300.00	25.00	50.00	1.50	0.0	0.0	200.00	50.00	10.00	15.00	20.00	150.00
346	437	10.00	1.50	1.00	700.00	100.00	70.00	2.00	0.0	0.0	100.00	50.00	10.00	15.00	20.00	150.00
347	436	5.00	2.00	0.20	1500.00	150.00	70.00	2.00	0.0	0.0	150.00	50.00	10.00	20.00	20.00	200.00
348	435	3.00	1.50	0.70	700.00	100.00	70.00	1.50	0.0	0.0	150.00	50.00	10.00	15.00	20.00	150.00
349	434	3.00	1.50	0.15	300.00	25.00	30.00	1.50	0.0	0.0	100.00	50.00	10.00	15.00	20.00	150.00
350	433	5.00	1.50	0.50	700.00	25.00	70.00	2.00	0.0	0.0	150.00	50.00	5.00	15.00	30.00	150.00
351	110	7.00	2.00	0.70	700.00	25.00	150.00	1.50	0.0	0.0	200.00	30.00	10.00	15.00	30.00	150.00
352	432	20.00	3.00	0.20	700.00	25.00	200.00	3.00	0.0	0.0	700.00	70.00	15.00	30.00	30.00	300.00
353	431	15.00	3.00	0.30	1000.00	25.00	100.00	3.00	0.0	0.0	300.00	50.00	10.00	20.00	30.00	200.00
354	430	10.00	1.50	0.15	700.00	25.00	150.00	3.00	0.0	0.0	200.00	50.00	15.00	15.00	30.00	150.00
355	108	10.00	2.00	0.30	700.00	25.00	150.00	1.00	0.0	0.0	300.00	20.00	5.00	15.00	50.00	200.00
356	109	7.00	1.50	0.15	1500.00	25.00	100.00	1.00	0.0	0.0	150.00	30.00	5.00	15.00	20.00	150.00
357	111	7.00	2.00	0.10	700.00	25.00	70.00	1.00	0.0	0.0	200.00	20.00	5.00	15.00	20.00	150.00
358	61	15.00	3.00	0.70	1500.00	25.00	150.00	1.00	0.0	0.0	300.00	30.00	5.00	10.00	20.00	300.00
359	47	10.00	2.00	1.00	1000.00	25.00	150.00	1.00	0.0	0.0	300.00	10.00	5.00	10.00	30.00	500.00
360	112	7.00	2.00	0.70	1500.00	25.00	100.00	1.50	0.0	0.0	200.00	50.00	10.00	15.00	30.00	150.00
361	429	10.00	2.00	0.70	1000.00	25.00	100.00	3.00	0.0	0.0	300.00	50.00	10.00	15.00	30.00	150.00
362	107	10.00	1.50	0.30	1500.00	25.00	100.00	1.50	0.0	0.0	200.00	30.00	5.00	15.00	30.00	300.00
363	106	10.00	1.50	0.30	700.00	25.00	100.00	1.50	0.0	0.0	500.00	30.00	5.00	15.00	30.00	200.00
364	105	10.00	2.00	0.30	1500.00	25.00	150.00	1.50	0.0	0.0	500.00	50.00	5.00	15.00	30.00	300.00
365	104	7.00	2.00	0.15	700.00	25.00	50.00	2.00	0.0	0.0	150.00	50.00	20.00	20.00	20.00	200.00
366	103	1.00	1.50	0.15	700.00	25.00	30.00	1.00	0.0	0.0	70.00	30.00	10.00	15.00	20.00	150.00
367	102	7.00	2.00	0.30	700.00	25.00	30.00	1.50	0.0	0.0	200.00	20.00	15.00	15.00	20.00	150.00
368	101	10.00	3.00	0.15	1000.00	25.00	50.00	1.50	0.0	0.0	300.00	20.00	15.00	20.00	20.00	200.00
369	100	10.00	2.00	0.30	1000.00	25.00	50.00	0.50	0.0	0.0	200.00	20.00	10.00	15.00	50.00	200.00
370	46	10.00	3.00	1.00	2000.00	25.00	150.00	1.00	0.0	0.0	500.00	20.00	5.00	15.00	30.00	500.00
371	95	7.00	1.50	0.30	1500.00	25.00	70.00	1.00	0.0	0.0	150.00	10.00	15.00	15.00	20.00	200.00
372	94	7.00	1.50	0.15	3000.00	25.00	50.00	1.00	0.0	0.0	200.00	20.00	10.00	15.00	15.00	300.00
373	93	10.00	2.00	0.15	5000.00	25.00	30.00	1.00	0.0	0.0	150.00	30.00	15.00	20.00	30.00	300.00
374	87	7.00	1.50	0.50	700.00	25.00	70.00	1.50	0.0	0.0	200.00	100.00	15.00	20.00	50.00	200.00
375	86	5.00	1.00	0.70	700.00	25.00	70.00	1.50	0.0	0.0	300.00	50.00	10.00	15.00	30.00	150.00
376	85	10.00	2.00	0.70	1000.00	25.00	70.00	2.00	0.0	0.0	300.00	70.00	10.00	20.00	30.00	200.00
377	84	7.00	1.50	0.15	700.00	25.00	50.00	1.00	0.0	0.0	70.00	10.00	10.00	7.00	15.00	150.00
378	45	10.00	2.00	5.00	2000.00	100.00	200.00	1.50	0.0	0.0	300.00	20.00	10.00	15.00	50.00	500.00
379	88	3.00	1.00	0.10	3000.00	25.00	30.00	2.00	0.0	0.0	70.00	20.00	15.00	15.00	20.00	200.00
380	89	3.00	0.70	0.10	5000.00	25.00	30.00	1.00	0.0	0.0	200.00	50.00	20.00	15.00	50.00	300.00
381	92	10.00	2.00	0.10	1000.00	25.00	70.00	15.00	0.0	0.0	300.00	50.00	15.00	20.00	30.00	150.00
382	91	3.00	1.00	0.15	2000.00	25.00	50.00	15.00	0.0	0.0	100.00	30.00	15.00	15.00	30.00	250.00
383	90	3.00	1.00	0.15	1500.00	25.00	50.00	1.00	0.0	0.0	150.00	20.00	10.00	15.00	30.00	200.00
384	116	3.00	1.50	0.10	700.00	25.00	70.00	3.00	0.0	0.0	200.00	50.00	15.00	15.00	30.00	150.00
385	115	5.00	1.50	0.50	1500.00	25.00	100.00	3.00	0.0	0.0	300.00	50.00	15.00	20.00	30.00	200.00
386	114	3.00	1.50	0.07	700.00	25.00	70.00	1.00	0.0	0.0	70.00	50.00	10.00	15.00	30.00	150.00
387	113	1.00	0.50	0.07	1500.00	25.00	30.00	1.00	0.0	0.0	70.00	30.00	10.00	15.00	20.00	150.00
388	410	7.00	1.50	0.30	700.00	25.00	70.00	2.00	0.0	0.0	200.00	70.00	10.00	15.00	30.00	150.00
389	409	10.00	1.50	0.30	700.00	25.00	150.00	2.00	0.0	0.0	300.00	70.00	20.00	15.00	30.00	150.00
390	408	7.00	1.50	0.20	700.00	25.00	70.00	2.00	0.0	0.0	200.00	50.00	15.00	15.00	30.00	150.00
391	407	10.00	3.00	0.15	700.00	25.00	100.00	2.00	0.0	0.0	300.00	70.00	20.00	20.00	30.00	150.00
392	406	10.00	2.00	0.20	1000.00	25.00	150.00	2.00	0.0	0.0	300.00	70.00	20.00	20.00	30.00	150.00

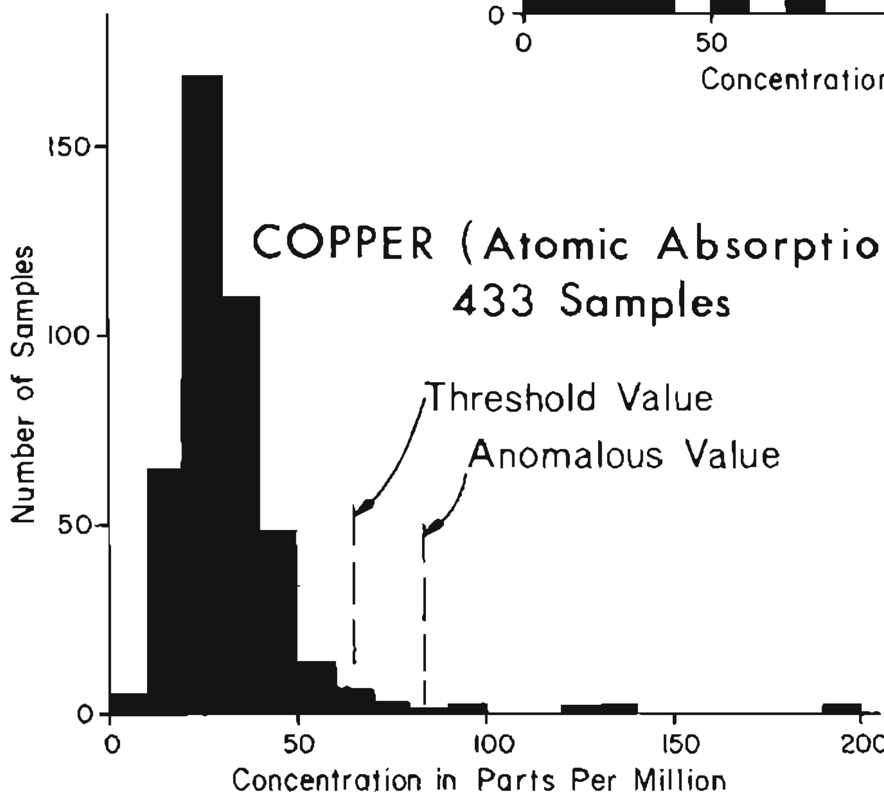
Map No.	Sample No.	Iron (%)	Magnesium (%)	Calcium (%)	Barium	Strontium	Boron	Beryllium	Tin	Tungsten	Zirconium	Lanthanum	Niobium	Scandium	Yttrium	Vanadium
393	368	7.00	2.00	1.00	1000.00	100.00	100.00	3.00	0.0	0.0	150.00	70.00	10.00	20.00	50.00	150.00
394	367	5.00	2.00	0.70	500.00	25.00	70.00	3.00	0.0	0.0	100.00	30.00	5.00	15.00	30.00	150.00
395	366	7.00	2.00	1.00	700.00	150.00	100.00	3.00	0.0	0.0	150.00	50.00	10.00	20.00	30.00	150.00
396	365	7.00	1.50	1.00	700.00	25.00	150.00	3.00	0.0	0.0	200.00	70.00	15.00	20.00	50.00	150.00
397	362	10.00	3.00	0.30	1000.00	0.0	100.00	0.50	0.0	0.0	300.00	50.00	5.00	15.00	30.00	150.00
398	363	10.00	3.00	0.70	500.00	0.0	150.00	0.50	0.0	0.0	300.00	50.00	5.00	15.00	50.00	200.00
399	364	5.00	1.50	1.00	1000.00	0.0	150.00	1.50	0.0	0.0	200.00	50.00	10.00	15.00	50.00	150.00
400	369	7.00	2.00	0.20	700.00	25.00	100.00	1.50	0.0	0.0	200.00	70.00	10.00	20.00	50.00	150.00
401	370	7.00	2.00	1.00	1000.00	0.0	100.00	1.50	0.0	0.0	200.00	70.00	10.00	20.00	50.00	150.00
402	373	10.00	1.50	1.00	700.00	25.00	150.00	1.50	0.0	0.0	200.00	30.00	10.00	15.00	50.00	100.00
403	374	10.00	2.00	0.70	700.00	25.00	200.00	0.50	0.0	0.0	200.00	20.00	5.00	15.00	30.00	200.00
404	371	10.00	3.00	2.00	700.00	25.00	150.00	0.50	0.0	0.0	150.00	30.00	5.00	20.00	20.00	200.00
405	372	7.00	2.00	0.50	700.00	150.00	100.00	2.00	0.0	0.0	100.00	50.00	10.00	20.00	30.00	150.00
406	428	5.00	2.00	0.70	700.00	25.00	100.00	2.00	0.0	0.0	200.00	30.00	10.00	15.00	20.00	150.00
407	427	7.00	3.00	2.00	700.00	100.00	70.00	1.50	0.0	0.0	150.00	50.00	10.00	15.00	30.00	150.00
408	424	5.00	1.50	0.70	1000.00	100.00	70.00	2.00	0.0	0.0	300.00	50.00	15.00	20.00	30.00	150.00
409	425	7.00	2.00	1.50	700.00	100.00	70.00	1.50	0.0	0.0	300.00	30.00	10.00	15.00	30.00	150.00
410	426	7.00	3.00	1.00	700.00	100.00	70.00	1.50	0.0	0.0	150.00	50.00	10.00	15.00	30.00	150.00
411	378	10.00	3.00	1.50	1000.00	25.00	200.00	0.50	0.0	0.0	300.00	30.00	5.00	20.00	30.00	200.00
412	377	7.00	2.00	1.00	700.00	25.00	150.00	1.00	0.0	0.0	100.00	30.00	10.00	20.00	30.00	100.00
413	376	10.00	3.00	0.50	1000.00	25.00	200.00	0.50	0.0	0.0	300.00	50.00	5.00	20.00	100.00	200.00
414	375	5.00	2.00	1.00	500.00	25.00	100.00	1.00	0.0	0.0	200.00	20.00	5.00	20.00	20.00	150.00
415	381	7.00	3.00	1.00	500.00	0.0	150.00	0.0	0.0	0.0	200.00	20.00	5.00	15.00	20.00	150.00
416	380	5.00	2.00	1.00	500.00	0.0	100.00	0.0	0.0	0.0	200.00	20.00	5.00	15.00	15.00	150.00
417	379	5.00	2.00	2.00	500.00	0.0	70.00	0.50	0.0	0.0	200.00	20.00	5.00	10.00	15.00	150.00
418	354	3.00	1.50	0.20	700.00	0.0	70.00	1.00	0.0	0.0	100.00	30.00	10.00	15.00	30.00	150.00
419	353	7.00	3.00	1.00	1000.00	25.00	100.00	1.00	0.0	0.0	300.00	30.00	10.00	20.00	50.00	200.00
420	355	5.00	2.00	0.20	300.00	25.00	100.00	0.50	0.0	0.0	150.00	20.00	10.00	15.00	30.00	100.00
421	356	7.00	2.00	0.30	500.00	25.00	150.00	0.50	0.0	0.0	150.00	20.00	10.00	15.00	50.00	150.00
422	359	10.00	3.00	0.50	700.00	25.00	150.00	0.0	0.0	0.0	300.00	70.00	5.00	15.00	30.00	150.00
423	358	7.00	3.00	0.30	700.00	0.0	100.00	0.0	0.0	0.0	200.00	20.00	10.00	15.00	30.00	100.00
424	357	10.00	2.00	0.50	700.00	25.00	150.00	0.50	0.0	0.0	300.00	30.00	10.00	20.00	50.00	150.00
425	360	7.00	3.00	0.50	1000.00	25.00	150.00	0.50	0.0	0.0	300.00	30.00	10.00	15.00	30.00	150.00
426	361	10.00	3.00	1.50	700.00	100.00	200.00	1.50	0.0	0.0	300.00	70.00	5.00	20.00	50.00	150.00
427	351	10.00	2.00	1.50	700.00	100.00	150.00	0.50	0.0	0.0	300.00	50.00	10.00	20.00	30.00	150.00
428	352	5.00	2.00	0.50	500.00	0.0	70.00	0.50	0.0	0.0	200.00	20.00	10.00	15.00	30.00	150.00
429	454	3.00	1.00	0.70	500.00	25.00	30.00	1.00	0.0	0.0	100.00	20.00	10.00	15.00	15.00	150.00
430	453	5.00	1.00	0.70	700.00	25.00	30.00	1.50	0.0	0.0	100.00	30.00	5.00	15.00	20.00	150.00
431	452	3.00	1.50	0.50	300.00	25.00	50.00	1.00	0.0	0.0	150.00	20.00	10.00	15.00	20.00	100.00
432	456	5.00	0.70	0.30	500.00	25.00	50.00	1.50	0.0	0.0	100.00	50.00	5.00	15.00	30.00	150.00
433	455	5.00	1.00	0.70	500.00	25.00	30.00	1.50	0.0	0.0	150.00	20.00	10.00	15.00	30.00	150.00
434	457	7.00	0.70	0.50	300.00	100.00	70.00	1.00	0.0	0.0	100.00	30.00	10.00	15.00	30.00	100.00
435	458	5.00	1.00	0.30	500.00	0.0	30.00	0.0	0.0	0.0	100.00	20.00	10.00	15.00	20.00	100.00

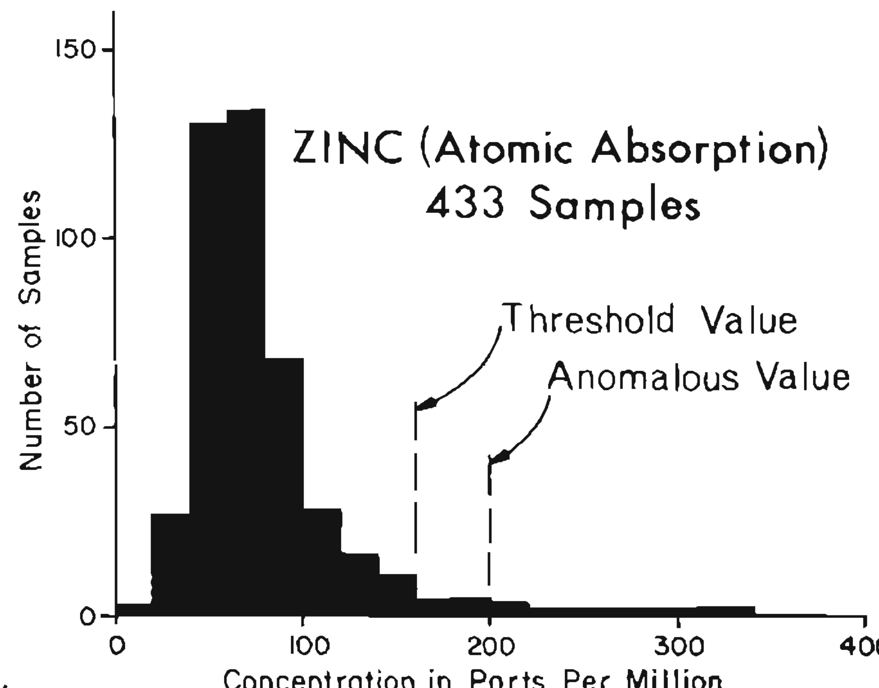
APPENDIX III C

Averages and standard deviations of results of analyses
stream sediment samples, Solomon C-5 quadrangle, Alaska
(1=Atomic Absorption; values in parts per million, unless indicated otherwise)

ELEMENT	AVERAGE	STANDARD DEVIATION
Gold (1)	0.04	0.37
Copper (1)	30.86	17.55
Lead (1)	14.83	6.91
Zinc (1)	77.64	40.88
Copper	49.24	50.96
Lead	22.96	13.90
Zinc	117.44	60.70
Molybdenum	3.15	3.08
Silver	1.08	3.79
Cobalt	16.37	6.88
Chromium	139.77	65.36
Nickel	81.06	35.32
Manganese	949.08	705.73
Titanium (%)	0.64	0.31
Iron (%)	8.17	3.72
Magnesium (%)	2.00	0.09
Calcium (%)	1.27	1.61
Barium	804.62	591.18
Strontium	95.86	183.46
Boron	101.79	75.03
Beryllium	1.58	1.49
Tin	0.00	0.00
Tungsten	0.00	0.00
Zirconium	243.21	146.87
Lanthanum	39.28	18.39
Niobium	10.40	4.03
Scandium	18.62	6.18
Yttrium	29.75	10.92
Vanadium	183.63	95.31







Appendix IV

FREQUENCY DISTRIBUTION HISTOGRAMS OF COPPER, LEAD AND ZINC IN STREAM SEDIMENT SAMPLES
SOLOMON C-5 QUADRANGLE, ALASKA