MINERAL INVESTIGATIONS IN THE JUNEAU MINING DISTRICT, ALASKA (EAGLE RIVER AREA).

By Joseph M. Kurtak and Kenneth M. Maas

Townsite of Amalga, Eagle River Mine, (AK. Hist. Lib.).

UNITED STATES DEPARTMENT of the INTERIOR
Donald P. Hodel, Secretary
BUREAU of MINES
T S Ary, Director

OFR 50-88

CONTENTS

TABLES

ILLUSTRATIONS

APPENDIX FIGURES

APPENDIX TABLES

UNIT OF MEASURE ABBREVIATIONS USED IN THIS REPORT

ft	foot
ft^3	cubic foot
gm	gram
in	inch
lb	pound
mm	millimeter
oz	troy ounce
%	percent
ppm	parts per million
ton	short ton
yd^3	cubic yard

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ABSTRACT

The Bureau of Mines conducted a four year (1985-1988) mineral assessment of the Juneau Mining District in southeast Alaska as part of its ongoing statewide mining district evaluation program. Following an extensive literature search, the Bureau investigated mines, prospects, and mineral occurrences in the area. This report describes the results of Bureau work in the Eagle River area of the Juneau gold belt; a component of the Juneau Mining District comprising 87,000 acres between the Mendenhall Glacier and Berners Bay.

Gold and silver have been the only metals having significant production from the area and occur mainly in quartz stringer and fissure type veins hosted by phyllites, greenschists, greenstones, altered diorite dikes and quartz diorite gneiss. Gold also occurs in several small placer deposits. Approximately 21,100 oz of gold and nearly 9,000 oz of silver were produced over a 60 year period. Currently, the only mining activity consists of some exploration and minor placer gold production.

Inferred and indicated lode gold resources having mineral development potential total approximately 796,000 tons with a weighted average grade of 0.22 oz/ton gold.

INTRODUCTION

In 1985, the Bureau of Mines (Bureau) initiated the Juneau Mining District study to evaluate the mineral resources of the northern portion of southeast Alaska (fig. 1). The program was designed to determine the mineral development potential of mines, prospects, and mineral occurrences within the study area. Program objectives were to determine resources, study the application of modern beneficiation technologies to known deposits, evaluate economic mining feasibility, and examine the economic and legislative effects on mineral development.

Because of its large size, the Juneau Mining District was subdivided into several smaller areas and these were studied individually by Bureau personnel. These include: 1) Glacier Bay/Mt. Fairweather, 2) Volcanic (West Lynn Canal, Haines, Porcupine), 3) Juneau gold belt, and 4) Molybdenite area. This report covers the 87,000 acre Eagle River portion of the Juneau gold belt, which extends from Mendenhall Glacier on the south to Berners Bay on the north (16)[3/]. It takes its name from the Eagle River which drains the central portion of the study area. Reports on the other areas will be published separately.

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3/Underlined numbers in parentheses refer to list of references at end of this report.

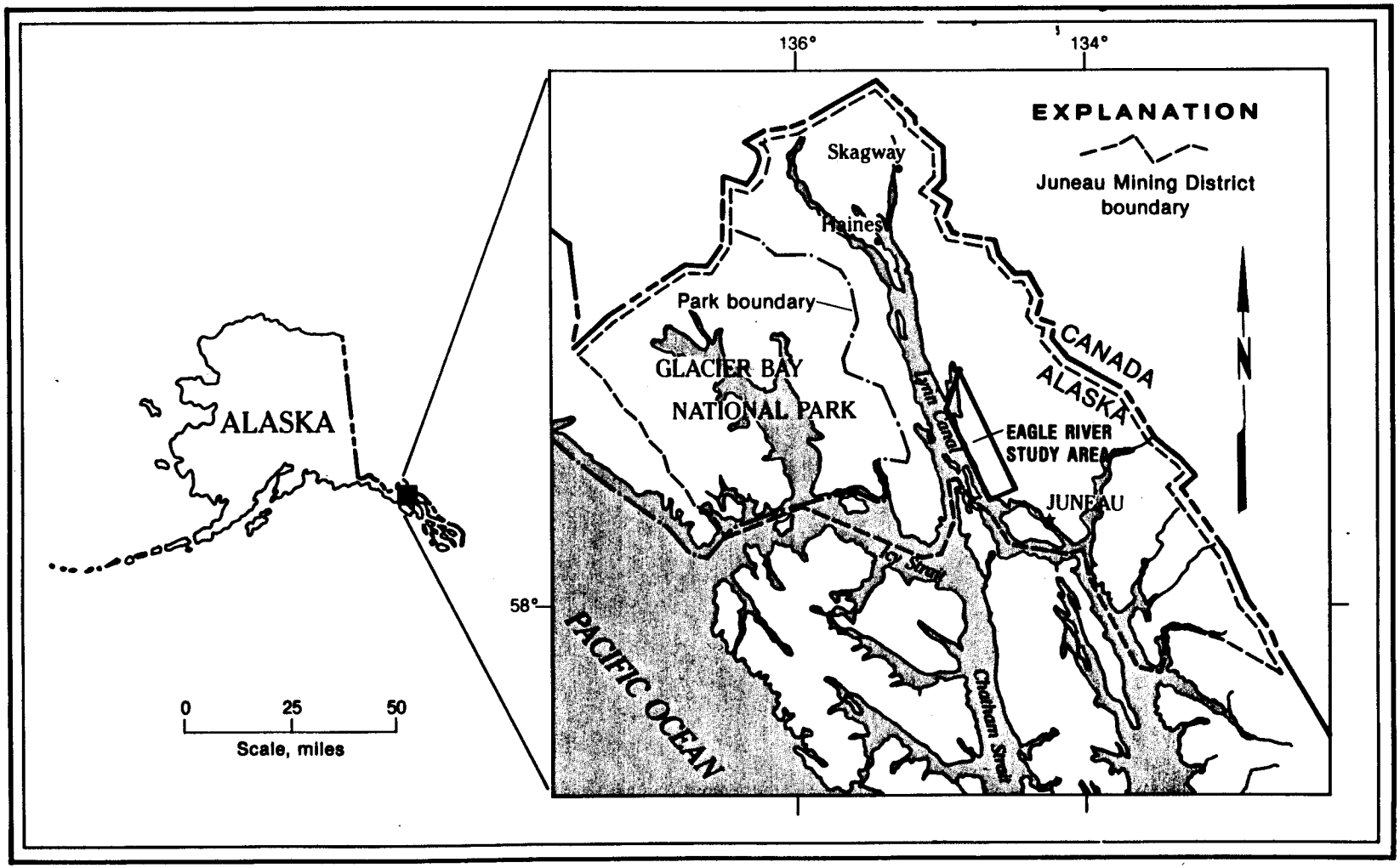

Figure 1.— Location of the Juneau Mining District and the Eagle River study area.

ACKNOWLEDGMENTS

The authors are indebted to Bureau employees Dennis Southworth, Rich Giraud, Lance Miller, Brian Peck, Earl Redman, Bill Roberts, Kevin Weir, and Tony Dunn (deceased),for assistance and interesting discussions concerning their knowledge of the mineral deposits and geology of the area. Local prospectors, including Dale Henkins, John Ritter (deceased), and Roger Eichman acted as guides and provided background information on many of the prospects. George Moerlein, Bruce Hickok, and Steve Teller, all formerly with Houston Oil and Minerals, gladly provided the results of their investigations in the area.

GEOGRAPHY AND CLIMATE

The Eagle River area consists of a 4-5-mile-wide strip of land lying between Lynn Canal on the west and the high glacier enshrouded peaks of the coast range to the east (figure 2). The regional grain of the country is northwest-southeast or generally parallel to the coastline. The west side of the area is accessible by a 35-mile-long road which travels north to Echo Cove from Juneau, the nearest town. A series of old mining trails, some still maintained by the U. S. Forest Service, provides ground access to the interior of the study area.

The area is rugged, with precipitous relief, becoming more so as one travels from west to east. Elevations range from sea level to 3,300 ft. The terrain varies from a series of parallel glaciated ridges on the west to extremely rugged icefields and valley glaciers on the east. Some drainages of the region are structurally controlled in a northwest-southeast orientation, such as Montana, Boulder, Windfall, and Cowee creeks, while others such as the Eagle and Herbert rivers are glacially carved and cut across this trend in an east-west direction.

The climate is maritime in nature, being cool and damp with many cloudy or rainy days. During the winter months strong winds often blow out of the glacial valleys. In Juneau, the nearest weather recording station, 1986 statistics show the average January temperature is 22°F and average July temperature is 56°F. Average annual rainfall is 81 in. with an average snowfall of 111 in. The average number of days with precipitation is 220 per year. Heavy winter snowfalls can cover the higher elevations such as Yankee Basin and Montana Basin until early August.

Figure 2 Looking northeast across Eagle River valley. Eagle Glacier lies on the right side of the photo.

The region is forested mainly by spruce and hemlock up to elevations of 2,500 ft. Lodgepole pine grows in isolated stands. Alder brush, devils club and heather occur along hillslopes and in stream bottoms and at times form an almost impenetrable barrier to travel. A thick layer of moss on the forest floor and soggy muskeg in the clearings can make the search for outcrops difficult.

LAND STATUS

The study area is located mainly within the Tongass National Forest, administered by the U.S. Forest Service. There are conveyances of State and City & Borough of Juneau land within the study area as well. Parcels of Native land owned by the Sealaska Corp. and Goldbelt, Inc. are located in the study area and many private land plots occur on the coastline along the west and south sides of the area. Four groups of patented mining claims are also present.

PREVIOUS STUDIES

The first published geologic studies in the Juneau gold belt commenced in 1903 with the work of A. C. Spencer (41) who made investigations of the immediate vicinity of Juneau. During the same year, with the assistance of C. W. Wright, he made a rapid reconnaissance of the gold belt, including the Eagle River area.

In 1909, A. Knopf began a detailed investigation of the Eagle River area and his published work (16) was the most complete prior to the present study. During the 1930's, J. C. Roehm examined several of the properties in the study area (29-39). In recent years members of the U.S. Geological Survey (USGS) have mapped the geology and examined mineral deposits in portions of the study area (1-3, 8, 17, 20). Many company reports exist concerning evaluations of properties within the area, some of which are available from the Bureau.

MINING HISTORY

The Juneau gold belt had been recognized as a favorably mineralized area for years before actual production commenced. John Muir passed through the area in 1879 during one of his Alaskan explorations and noted the mineralized nature of the country (7). Even earlier, in 1869, gold had been discovered just south of the gold belt at Windham Bay. However, it was not until 1880 that a major discovery was made that later gave rise to the mining developments upon which Juneau was founded.

Major gold discoveries in the belt occurred in 1880 at Gold Creek and Ready Bullion Creek near the present sites of Juneau and Douglas, respectively. These discoveries brought numerous prospectors and capital into the area and exploration expanded between Port Snettisham and Berner's Bay. The most noteworthy finds resulted in the development of the Treadwell and Alaska Juneau mines which were the largest low-grade gold producers in the world during their time. Together these two mines produced over 6.5 million oz of gold, 2.4 million oz of silver and 45 million lb of lead before the Alaska Juneau shut down in 1944. The overflow of prospectors in the Juneau area brought on by the success of these two operations resulted in the

investigations of other areas in the surrounding hills. These prospectors ultimately found their way into Eagle River country.

The first recorded operations in the Eagle River region occurred in 1882 with the discovery of gold-bearing gravels at the heads of Windfall and Montana Creeks. During the same year, lodes were discovered at the Patton and Winn prospects located in upper Montana Basin and near Auke Lake, respectively. Activity subsided until 1889, at which time the Summit/St. Louis prospects were discovered just south of the Herbert Glacier. In 1893, quartz lodes were discovered at the Smith & Heid claims in upper Windfall Basin and tunnelling commenced to open up the deposit. The Bessie and Aurora Borealis deposits were discovered in the fall of 1896 and promising assays from these two prospects led to the discoveries of the Alaska Washington and Mother Lode properties in 1897. Also in 1897, the California/Gold Standard properties were discovered on a tributary of Davies Creek. The Peterson Mine, located near Peterson Lake, was discovered by George Rudd and others during this year (figure 3). Adam Riedlinger discovered placer gold in the valley of McGinnis Creek in 1897, but work did not commence here until 1903. Reidlinger also spent 1897 around the Mendenhall Glacier area but no discoveries were reported.

Work continued on most of these prospects through the turn of the century and up until then, the Smith & Heid was the most successful venture producing nearly 205 oz of gold.

New discoveries were made in the 20th century, beginning in 1901 when the Tacoma prospect was discovered on a tributary of Sawmill Creek, the most northerly development in the study area. The Eagle River lode was discovered in 1902, and this property eventually developed into the largest producer in the area. By the time it ceased operations in 1916, the mine had produced over 19,350 oz of gold. Yankee Basin had been thoroughly explored by the end of 1903, culminating with the discoveries of the Julia, Cascade, Dividend, Noonday, Rex and Puzzler prospects. Of these, only the Rex produced an appreciable amount of gold, with nearly 145 oz recovered from a single high-grade pocket. Later, in 1904, the Mitchell-McPherson prospect was located high on the steep slopes between Herbert and Eagle glaciers.

During 1906, activity picked up just over the divide from Yankee Basin at the head of Canyon Creek as the Black Chief, E Pluribus Unum, Joyce Jensen, Blue Jay and Maude S claims were all located. In 1908, new discoveries were made in the Spaulding Meadows and Eagle River areas including the Dull and Stephens and Treasury Hill properties, and the Oleson prospect, respectively. 1908 was also the best year for production in the Eagle River area as the Eagle River Mine produced over $97,000 worth of gold and concentrates (43). The last discovery in the area occurred prior to 1911 as the Mendenhall prospect was opened up by an adit and trench.

Mining in the area was sporadic after the closure of the Eagle River Mine in 1916 and essentially came to a halt after the last significant production took place at the E Pluribus Unum in 1940 (31). In the 1980's, a rising gold price brought renewed interest in the area by several companies looking for large tonnage deposits. Claim staking and core drilling was carried out in the Yankee Basin area by

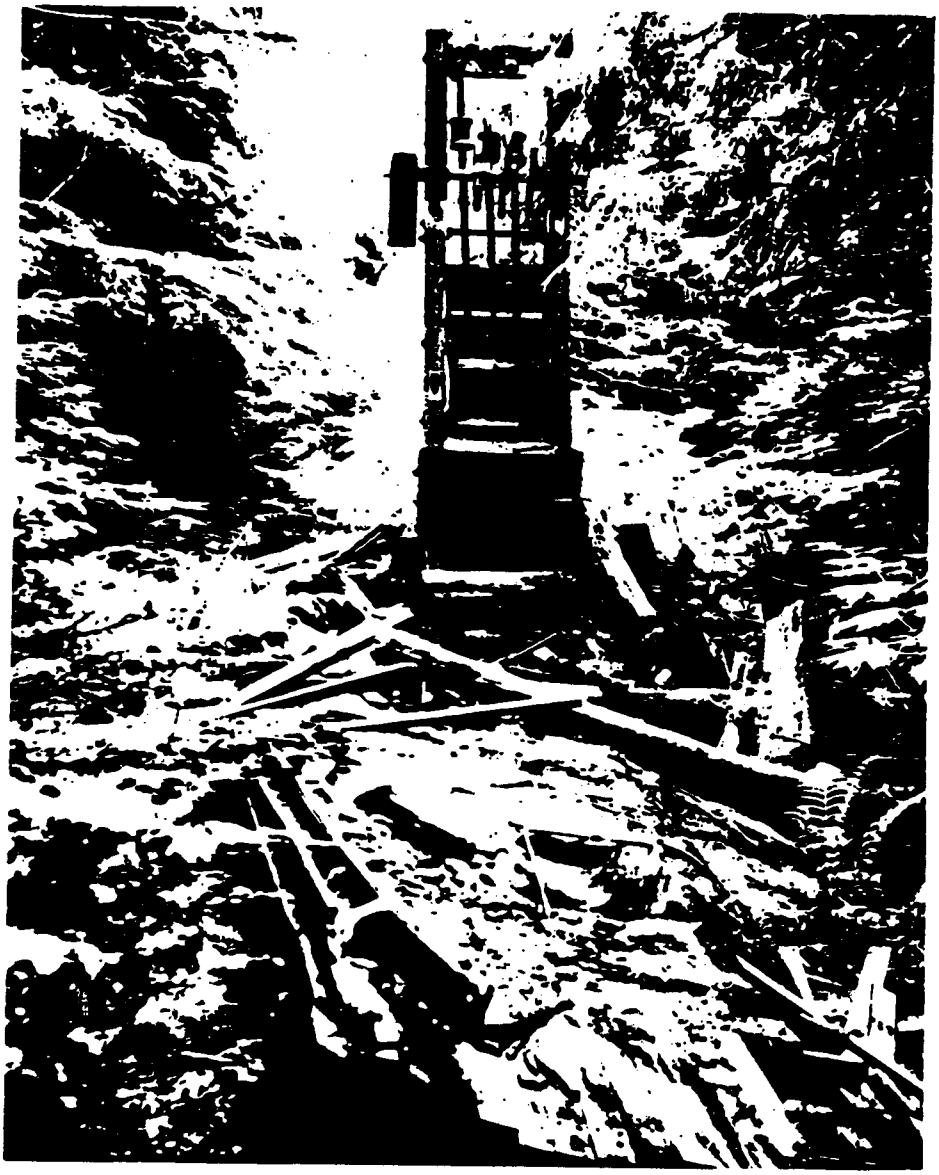

Figure 3 Abandoned three-stamp mill and concentrating table at the Peterson Mine.

companies including Noranda, Whelan Exploration, Placid Oil, and Houston Oil and Minerals. The most recent drilling occurred in 1986 when the Herbert Glacier discovery was evaluated by Houston Oil and Minerals (22). During 1987, the only mining that occurred was some small-scale placer work on leased property in upper Montana Basin (14). Exploration of the Treasury Hill, Bessie Mountain and Yankee Basin areas continued in 1987. A complete history for each prospect is included in the separate property summaries found in Appendix A.

BUREAU INVESTIGATIONS

The Bureau spent approximately 105 days during the summers of 1985-1987, doing mainly helicopter-supported field work, based out of Juneau, Alaska. Prior to field work an exhaustive literature search was done to accumulate background information and history on all the known mines, prospects, and mineral occurrences. The primary goal of the fieldwork was to search out the known deposits and then survey, map, and sample them. The second goal was to prospect in adjacent areas to determine the existence of a common trend or association between mineral occurrences. Then when possible, resources and/or mineral development potential were determined for each property. Metallurgical samples were taken at three localities within the area to assess the beneficiation properties of the ore. A total of 513 rock and placer samples were taken and 6,105 ft of underground mine workings were mapped.

The knowledge level within the study area varies. A high level exists in and around areas of known mineralization on the west and central portions while a lower knowledge level exists in the extremely rugged eastern portion where the least amount of time was spent. Dense vegetation, undergrowth, and rapid deterioration of man-made structures made prospect locating difficult at times, however a cumulative summary of the area shows the existence of 11 mines[3/], 20 prospects[4/], and 4 previously unreported occurrences[5/] discovered by the Bureau.

3/Ore shipments made or production confirmed.
4/Development work done but no ore shipped.
5/Mineralization exists but no signs of development. Includes reconnaissance sampling.

SAMPLING

Rock samples were of seven types including: 1) continuous chip - small rock fragments broken in a continuous line for a measured distance across an exposure; 2) channel - fragments and dust from a channel of uniform width and depth cut across an exposure of mineralized rock; 3) random chip sample - collected at random points from an apparently homogeneous mineralized exposure; 4) spaced chip - collected in a continuous line at designated intervals across an exposure; 5) representative chip - sample volume collected in proportion to volumes of different rock types observed at a specific locality; 6) select - collected from the highest grade portion of a mineralized zone; and 7) grab - collected more or less at random from

outcrop, dump, or float.

Placer samples consisted of approximately 0.1 yd^3 of stream or bank material run through a 10 x 48 in. sluice box and panned down to produce approximately one lb of concentrate. Free gold was recovered from the sample by amalgamation and weighed. The concentrates left over were analyzed for gold not recovered by amalgamation and other heavy metals. Panned concentrates were taken in some areas on a limited basis to determine if a placer sample was warranted.

Metallurgical samples consist of 200-350 lb of representative mineralized material collected from outcrops or dumps at selected deposits. These were run through a variety of tests, including gravity concentration by tabling, cyanide amenability, flotation and cyanide leach with assay screen analysis of the leach residue, to determine the optimum gold recovery techniques (10, 18).

ANALYTICAL WORK

Samples from all three seasons were prepared and analyzed for gold, silver, copper, lead, zinc, arsenic and tungsten by a commercial analytical laboratory.

Rock samples were first crushed to minus 10 mesh and split, then a 250 gm aliquot was pulverized to a nominal minus 150 mesh. All samples were analyzed for silver, copper, lead, and zinc by an atomic absorption spectrophotometer. A sample weight of 0.5 gm was put into solution using a hot extraction HNO_3-HCl technique (26).

The analytical method used for gold depended upon the type of sample and information required. For stream sediment and panned concentrate samples, a 20 gm split was analyzed using a fire assay atomic absorption spectrophotometer technique. Rock samples were routinely analyzed in a similar manner unless a metallic fire assay was specified (26).

The metallic fire assay method was used when coarse gold was suspected to be present in the samples, or basic size distribution of metallic gold was desired. This method required careful crushing and screening of the sample to separate possible metallics in the plus 100 mesh fraction. The entire plus 100 mesh fraction, usually weighing from a few to as much as 100 gm, was then fire assayed. A 20 gm aliquot was fire assayed from the minus 100 mesh fraction, with the final assay value being calculated from the combined data (26).

Detection limits for the various techniques are listed in table 1. When sample determinations exceeded the maximum detection limits of the atomic absorption spectrophotometer technique, a specific wet chemical assay procedure was used to determine metal concentration.

Sample data and analytical results are presented on tables following each prospect description in appendix A. In addition to the sample results, the following information is listed in the tables: map number for sample, field sample number, type of sample, sample length or volume, and sample lithology. Noteworthy sample results are keyed to the prospect map where they occur (fig. A-1 through A-56) and are discussed in the prospect descriptions. Abbreviations used in the tables are defined at the beginning of appendix A.

TABLE 1. - Detection limits by analytical technique

Atomic absorption spectrophotometry		
Element	Minimum, ppm	Maximum, ppm
Ag	0.2	30
As	2.0	1,000
Cu	1	20,000
Pb	2	7,500
W	2	---
Zn	1	20,000
Fire assay/atomic absorption spectrophotometry		
Au	0.005	None
Metallic fire assay		
Au	0.005	None

Note: Maximum and minimum detection limits as reported by Bondar-Clegg, Inc., Lakewood, CO.

GEOLOGICAL SETTING

The Eagle River area is composed of rocks belonging to the Mainland and Gravina Belts as defined by Brew and Ford (3). The high-grade metamorphics of the Mainland Belt and all the members of the Gravina Belt are listed (fig. 4) by the age of the metamorphism as more refined data for these is not available. Ages for the low-grade metamorphic rocks of the Mainland Belt have been assigned from fossils collected in the protoliths, work completed by Gehrels and Brew (8). Surficial deposits and glaciers are also present in the area. A generalized geologic map of the study area is provided in fig. 4.

The geology of the area can be characterized as an interlayered northwest trending sequence of sedimentary, metasedimentary and metavolcanic rocks bounded on the west by Lynn Canal and on the east by high-grade metamorphic and intrusive rocks of the Coast Plutonic-Metamorphic Complex Sill Belt (3). Stratification, cleavage, schistosity, gneissic foliation and the majority of the mineralized zones lie parallel to each other along this pervasive northwest trend. Although dikes are not uniformally distributed in the area, their occurrence in the rocks of the Gravina Belt is noteworthy, especially in the Spaulding Meadows area. The following discussion of the various rock types is adapted mainly from the USGS (3).

QUATERNARY DEPOSITS

Surficial deposits as shown on fig. 4 occupy the valleys of the Mendenhall River, Montana and Windfall creeks, Herbert and Eagle rivers, and the Canyon/Cowee creek drainage. No effort was made to differentiate between alluvium, colluvium, tideland deposits and glaciofluvial deposits. Glacial till was observed in areas other than those listed above, especially in the Spaulding Meadows/Peterson Creek area, and sporadic occurrences were observed up to elevations of 2,500 ft (16). This observation coupled with the rounded nature of mountain tops in the area suggest the presence of a large ice sheet in the past.

Glaciers in the study area are currently retreating as indicated by polished bedrock observed proximal to the snout of Mendenhall, Herbert and Eagle glaciers. Icebergs can be seen calving from Mendenhall Glacier and icefalls were a common occurrence while working near the

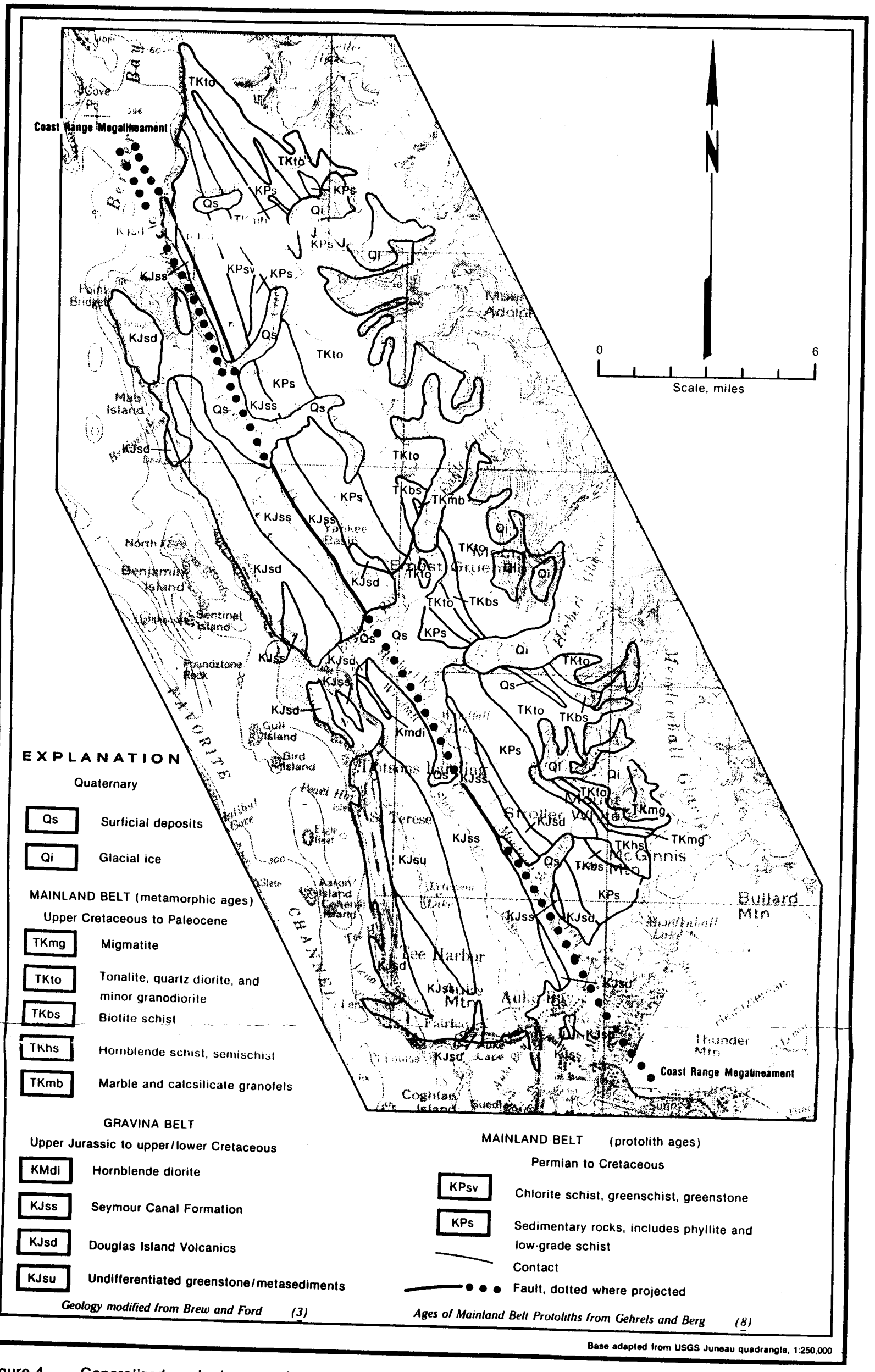

Figure 4. — Generalized geologic map of the Eagle River study area, Juneau Mining District, Alaska

Herbert Glacier. More noteworthy is the occurrence of gold-bearing quartz veins exposed just south of Herbert Glacier which were undoubtedly covered with ice during the early investigations of the area. This fact may lead to more discoveries in glacial valleys in future years.

MAINLAND BELT

This belt contains an assemblage of metamorphic rocks of uncertain origin and the various igneous rocks that intruded them. Ages for the intrusives are currently interpreted to be 62-69 million years old on the basis of Pb-U determinations on zircons found in the study area and in the Sumdum quadrangle to the southeast (3). Fossils found in black phyllites in other parts of the gold belt have helped determine a protolith age for the low-grade metamorphic members of the mainland belt and have been listed separately on Figure 4 for this reason (8). The time interval during which metamorphism occurred is interpreted to be Late Cretaceous and/or Early Tertiary (3). This Mainland Belt is a major component of the Coast Plutonic-Metamorphic Complex and the Eagle River area displays a wide variety of the component members, east of the Coast Range Megalineament, as defined below:

High-Grade Metamorphic Rocks

TKmg--Migmatite consisting of schist and gneiss invaded by tonalite (3). This unit occurs in the upper reaches of the McGinnis Creek drainage.

TKto--Biotite-hornblende and hornblende-biotite tonalite, quartz diorite, and minor granodiorite (3). This unit is widespread along the eastern portion of the study area and is generally well foliated and medium to coarse-grained. This type contains inclusions of diorite and gneiss. This rock hosts the Herbert Glacier gold-tungsten occurrence.

TKbs--Biotite schist (3). This well foliated and lineated unit usually occurs northeast of lower grade metamorphics in the progressive Barrovian sequence occurring between the Coast Range Megalineament and the plutonic sill belt. This unit serves as a marker bed because of its distinctive reddish weathering habit. It occupies a southeast trending belt beginning from the north edge of Eagle Glacier.

TKhs--Hornblende schist and semischist (3). This unit is poorly foliated and in some places indistinguishable from the biotite schist unit occurring in the same amphibolite grade facies. It occurs in the southeast portion of the study area in upper McGinnis valley.

TKmb--Marble and calc-silicate granofels (3). This is a poorly foliated, rarely lineated marble interlayered with variable amounts of biotite schist, phyllite and orthogneiss. This rock was best observed in the Eagle Glacier area.

Low-Grade Metamorphic Rocks

KPsv--Chlorite schist, greenschist and greenstone (8). This unit

contains massive greenstone, foliated greenschist and phyllites as seen in the northcentral portion of the study area. The California/Gold Standard prospect occurs in this rock type near Davies Creek.

KPs---Metasedimentary rocks including phyllite and schist, undivided (8).
Phyllite. This rock is well foliated and commonly lineated, with color ranging from black to grey to green. This variation is probably due to differing protoliths which include fine-grained clastic and volcanic members. In the study area, a nearly continuous belt occurs between the Coast Range Megalineament and the intrusive (TKto) unit.
Schist, undivided. This unit contains a variety of intercalated schistose rocks including chlorite schist, biotite schist, greenschist, hornblende schist, calc-silicate schist and others. It occurs east of the phyllite unit (Tkp) and west of the tonalite unit (Tkto) along almost the entire length of the study area.

GRAVINA BELT

The Gravina Belt contains sedimentary and volcanic rocks of Late Jurassic and Early Cretaceous age and is located mainly west of the Coast Range Megalineament in the study area, although a few occurrences do show up east of this feature. These rocks are part of the Stephens Passage Group defined by a sequence of phyllites, graywacke, conglomerate, and augite-bearing volcanic flow breccias (3). A majority of the mineral deposits in the Eagle River area are hosted in these rocks. Intrusive rocks of the Gravina Belt are assigned to the Admiralty-Revillagigedo Plutonic Belt and Associated Migmatite and are dated as upper Cretaceous (3). These rocks are rarely found in the Eagle River area. The Gravina Belt is well exposed in the study area and component rock types are defined as:

KMdi--Hornblende diorite. This intrusive unit consists of hornblende diorite, quartz diorite and lesser gabbro (3). It is generally altered to epidote and chlorite rich rocks. The only instance of this rock in the Eagle River study area is southwest of Windfall Creek.

KJss--Seymour Canal Formation (3). This unit is well exposed along the entire length of the study area on both sides of the megalineament. Its components include phyllite, graywacke, and volcanic agglomerate. Phyllites of this formation have been correlated with the the Treadwell Slates found on Douglas Island (3). Numerous shear zones and crenulation folding appear in this unit. Prospects in Yankee Basin and near Auke Lake occur in this rock unit, although those in Spaulding Meadows are associated with dikes intruded into the formation.

KJsd--Douglas Island Volcanics. These rocks are predominantly augite-bearing greenstones, breccias, and intercalated tuff, with minor amounts of volcanic graywacke and phyllite (3). This unit is probably over a mile thick and is best exposed near Point Bridget on the NW corner of the study area.

KJsu--Undifferentiated Greenstone, Metapelitic Rocks, and Metasandstone. This unit represents the intertonguing of the Seymour Canal Formation and Douglas Island Volcanics (3) and occurs in the area around Peterson Lake, which includes the Peterson Mine.

STRUCTURE

The northwest trending Coast Range Megalineament, which is physiographically defined by Gastineau Channel in the Juneau area, extends north up Montana Creek, and through the Windfall, Boulder, and S Fork Cowee creek drainages to Berner's Bay (3). Deformation caused by movement along this lineament has resulted in minor folding and shearing in the rocks of the Seymour Canal Formation. Shear zones range from a few in to 100 ft wide and have an average trend of N30°W. They lie approximately parallel to the regional trend of the area and host stringer and fissure-type gold-bearing veins. The shear zones occur mainly in the phyllites and to a lesser extent in the greenstones. These rocks are altered to chlorite and graphitic schists within the shear zones.

A minor set of shears/faults with an average trend of N70°E occurs nearly normal to the shear zones previously mentioned. Slickensides and fault gouge characterize these and they are mainly confined to more brittle rock types such as greenstone, biotite schist, and diorite gneiss. These are of interest as they predominantly host the fissure-type veins which were found to contain the highest gold concentrations in the Eagle River area.

Some of the vein deposits in the area are offset by northwest trending faults. The vein at the Bessie Mine is faulted right laterally for 27 ft and numerous faults in the Eagle River Mine offset the orebody as much as 250 ft (16).

MINERAL DEPOSITS

Gold has been the main metal produced in the Eagle River area. It occurs in quartz stringer and fissure vein lodes within shear zones and faults. Arsenopyrite commonly occurs in the veins and the selvage around vein margins. The lode deposits also carry minor amounts of silver, lead, zinc, copper, and tungsten.

Placer gold deposits, derived from the lodes, occur in several drainages.

LODE GOLD

Stringer Lodes

Stringer quartz veins host most of the gold deposits in the study area and the greatest gold production comes from them. The stringer zones are very irregular ranging from a few in. to 35 ft wide, and contain generally concordant quartz stringers with an average width of 1 in. Locally they can be found to cut across schistosity at a low angle (fig. 5). Quartz vein material can make up to 50% of the rock within the shear zones and individually the veins are anastomosing, very discontinuous and lensy. Some stringer zones will swell up to

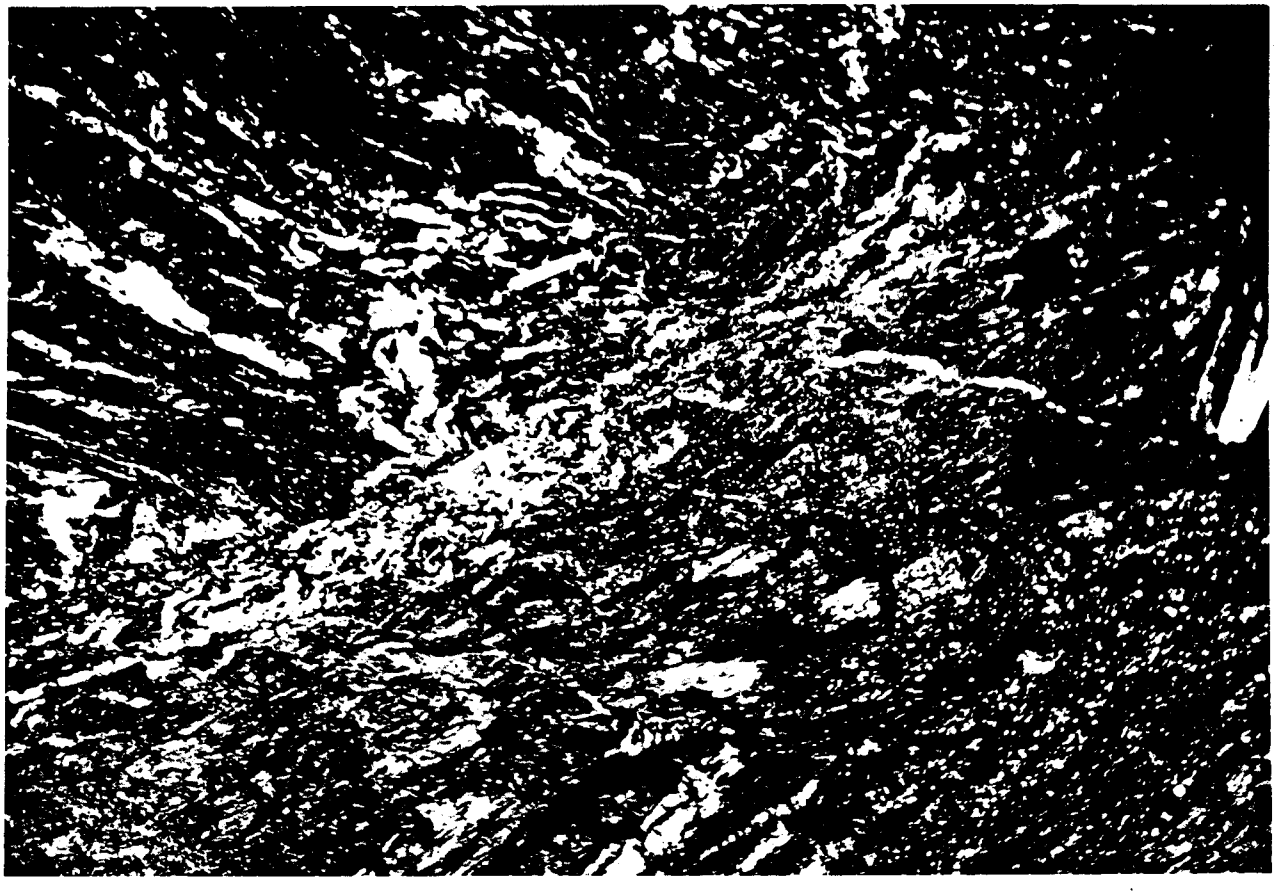

Figure 5 Quartz stringer zone, E Pluribus Unum Mine. Note marker pen in upper photo center for scale.

massive discontinuous fissure type quartz lenses such as at the E Pluribus Unum (fig. 9, No. 9) and the Eagle River Mine (fig. 9, No. 18). The quartz showing at the E Pluribus Unum is concentrated in the nose of a synform, which helps to explain its size. Many of the stringer zones have no definite walls, forming gradational contacts with the surrounding wallrocks. Often they will occur along contacts where weak zones occur and prove more susceptible to shearing and deposition. Stringer zones will concentrate in phyllite with a footwall of graywacke (16) or in phyllite with a greenstone footwall. Examples of the former occur at the Eagle River Mine and the latter occurs at the California/Gold Standard prospect near Echo Cove (fig. 9, No. 4), and the Dull and Stephens (fig. 9, No. 33).

Sulfides are not widespread and consist mainly of arsenopyrite, followed by pyrite, galena, pyrrhotite, and sphalerite in decreasing order of abundance. Sulfides have a tendency to concentrate around the borders of phyllite fragments within the quartz stringer zones as well as the selvage around these veins. Locally, fist-sized clots of arsenopyrite occur, such as at the E Pluribus Unum. Except for a few high-grade ore shoots at this deposit and at the Eagle River Mine, stringer lodes are generally low-grade, averaging approximately 0.20 oz/ton gold and large tonnages would be required to commercially exploit them. The largest inferred resources of this type in the study area are reported to occur at the Eagle River Mine (49).

Fissure Veins

Fissure veins are not as common as the stringer types and range from a few in. to several ft wide and have well-defined walls, many times containing slickensided surfaces and fault gouge (fig. 6). From this evidence it can be surmised that their occurrence is related to faulting. They trend N60-80°E which is approximately normal to the stringer lodes. These veins usually dip steeply, are more indurated than the stringer types and can be traced for up to 1,000 ft along strike.

This vein type is hosted by greenstone conglomerates and quartz diorite gneiss, which are more brittle than the phyllite and susceptible to development of fissure openings during faulting. Fissure veins generally cut across foliation and some are composed solely of white quartz, while others are dark blue-gray and exhibit ribbon texture. This texture indicates recurring movement over a period of time during which the fissures opened in a series of pulses.

Sulfides are more prevalent in these veins than the stringer type, consisting of arsenopyrite, with lesser amounts of pyrite, pyrrhotite, galena, sphalerite, and locally scheelite. The veins and selvage exhibit carbonate alteration, recognized by the presence of calcite and ankerite.

The selvages also display potassic alteration up to several feet out from the vein margin. Alteration assemblages consist of sericite, ankerite, secondary K-spar, chloritized biotite, and silicification. These selvage zones can contain up to 1-2% finely disseminated arsenopyrite.

Sampling showed that gold occurs mainly within the veins themselves and not the alteration selvages. Gold values along with some silver are often highest where associated galena is observed.

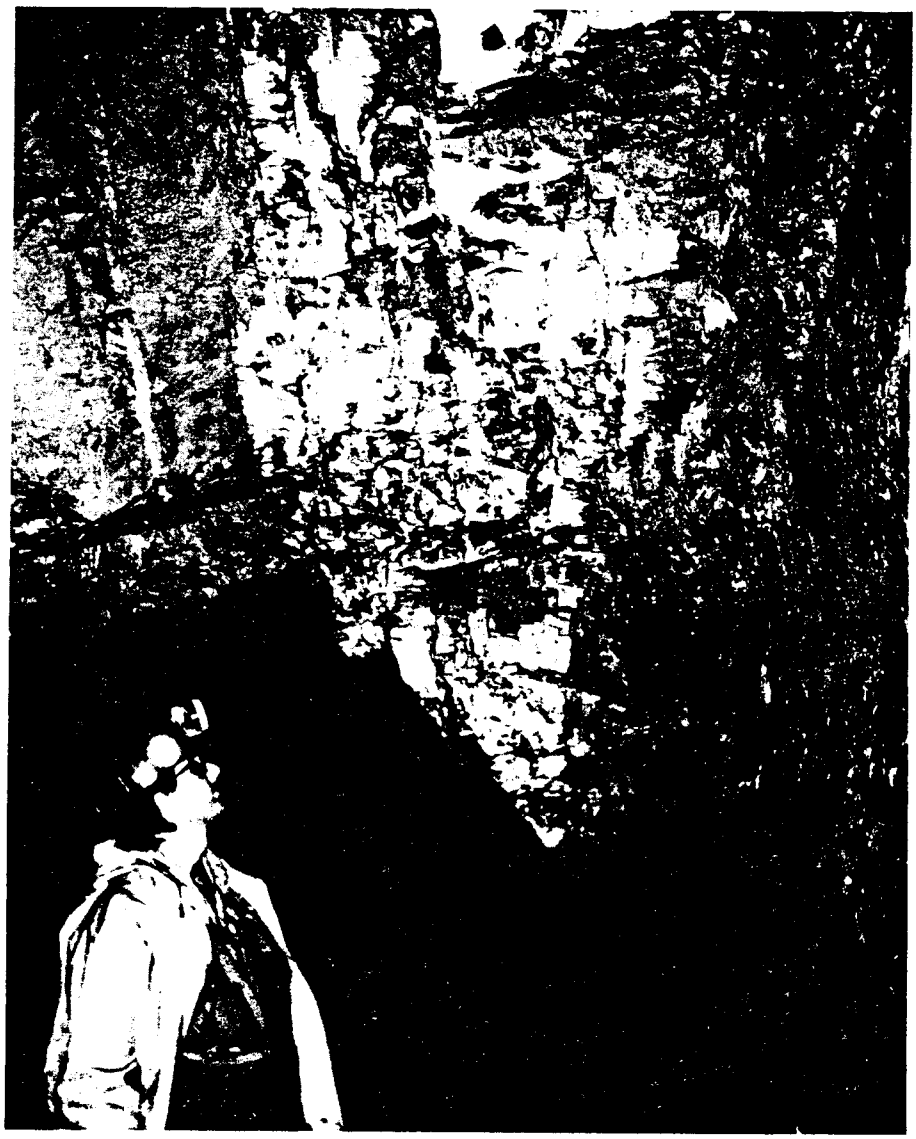

Figure 6 Fissure quartz vein, Bessie Mine, adit # 1.

Examples of this type are the Herbert Glacier occurrence (fig. 7) (fig. 9, No. 21) and the Bessie Mine (fig. 9, No. 14). These veins usually contain small tonnages but are of much higher grade than the stringer type and presently offer the highest potential for small lode mining operations. Samples from the Herbert Glacier occurrence average 1.5 oz/ton gold with one sample containing 7.0 oz/ton gold. Another sample from this property contained over 5.4 oz/ton silver.

Mineralized Dikes

Altered mafic dikes in the Treasury Hill area are cut by quartz veins and veinlets containing gold and coarse arsenopyrite with minor pyrite. The gold concentrations in these areas are usually low and none have been mined extensively. The dike rock is also interlaced with small veinlets of calcite and albite. The dikes have been severely altered in the stockwork areas and saturated with albite (16). The selvage contains sharply crystalline arsenopyrite and pyrrhotite. The quartz is white, contains some carbonate, and has pyrite as the principle sulfide. Arsenopyrite, pyrrhotite, galena, and sphalerite are present in minor amounts. The Treasury Hill (fig. 9, No. 32) property contains this type of mineralization.

The Winn prospect is characterized by veinlets of quartz, albite and ankerite, hosted in an altered albite diorite dike (16). Sulfides present include pyrite, and arsenopyrite. This host rock and mineralization is similar to that exposed on Salmon Creek and lower Gold Creek near the Early Bird prospect and Boston Mine (26).

PLACER GOLD

The first mineral discoveries in the Eagle River area were of placer gold in the gravels of Montana and Windfall Creeks (fig. 8) (fig. 9, Nos. 27 & 24 respectively). These areas were worked sporadically with cumulative production totaling nearly 300 oz. The majority was recovered from lower Windfall Creek by the Alaska-Detroit Mining Co. (25). The gold probably has its source in the quartz veins exposed at the heads of these drainages and particles are small, averaging 0.02 in in size with an occasional piece up to 0.2 in. Gold particle shape varies with the distance from the source, a relationship best seen in upper and lower Montana Creek. In Montana Basin near the source the gold particles are rough textured and nuggety, while on the lower stretches most pieces recovered are flakey and very thin in nature. Analysis of heavy concentrates were found to contain over 1,000 ppm arsenic.

Stream gravels contain at least 30% small-medium sized boulders (10-30 in) and concentrations of 3-4 ft boulders also occur. According to Bureau placer sampling, lower Montana Creek (fig. 9, No. 28) gravels contain values of up to 0.007 oz/yd^3 gold and Windfall Creek gravels contain up to 0.008 oz/yd^3 gold. The highest gold values were found in the previously worked Montana Basin Placer located at the head of Montana Creek (0.032 oz/yd^3).

COPPER

Small amounts of copper-sulfide mineralization were found in the Eagle River area at the Mendenhall Glacier occurrence (fig. 9, No. 31) and Echo Cove (fig. 9, No. 3). It occurs as chalcopyrite in

Figure 7 High grade gold-bearing fissure quartz vein with potassic alteration selvage, Herbert Glacier.

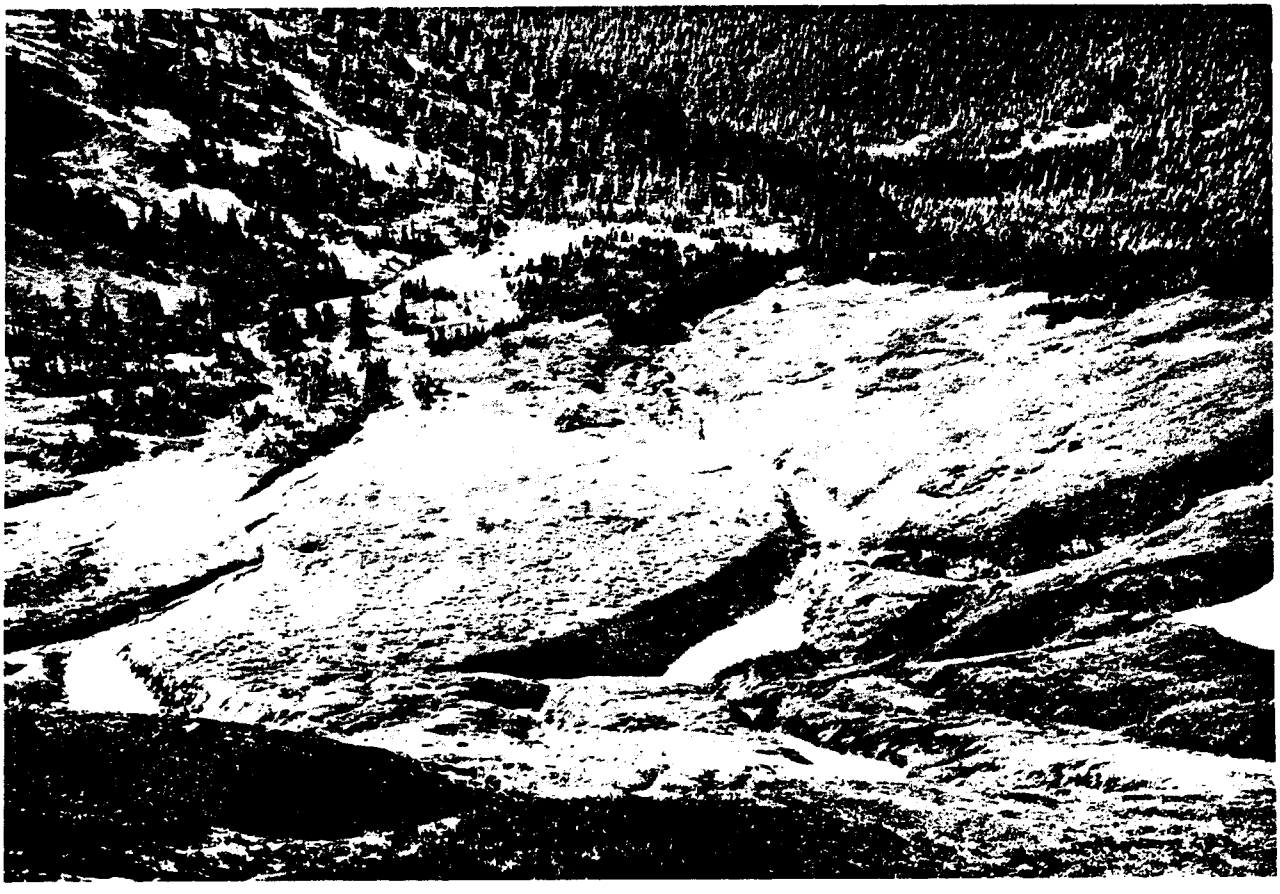

Figure 8 Looking west across Montana Basin. Stream drainage in photo center contains anomalous placer gold.

iron-stained, sheared and silicified greenstones. Samples from Echo Cove contained up to 0.17% copper. The E Pluribus Unum produced 11 lb of copper during 1939-1940.

TUNGSTEN

Previous to this study, no published reports of tungsten existed in the Juneau gold belt. Placer samples from Windfall Creek were found to contain up to 775 ppm tungsten, while lesser amounts were found in Montana, Boulder and McGinnis creeks. The quartz veins at the Herbert Glacier occurrence contain up to 0.18% tungsten in the form of scheelite. This is one of two locations in the gold belt where lode tungsten is known to occur. The other occurrence is at the Silver Queen Mine in Sheep Creek valley (27)

PRODUCTION AND RESOURCES

Production and resource figures for mines and prospects in the Eagle River area are shown in table 2. This information was gathered from a variety of sources, including Bureau permanent individual mine records (46), USGS Bulletins, unpublished company reports, newspapers and personal communications. Resource classifications were based on the following criteria developed by the Bureau and USGS (45):

> "Measured - Quantity is computed from dimensions revealed in outcrops, trenches, workings, or drill holes; grade and/or quality are computed from the results of detailed sampling. The sites for inspection, sampling, and measurement are spaced so closely and the geologic character is so well-defined that size, shape, depth, and mineral content of the resource are well established.
>
> Indicated - Quantity and grade and/or quality are computed from information similar to that used for measured resources, but the sites for inspection, sampling, and measurement are further apart or are otherwise less adequately spaced. The degree of assurance, although lower than that for measured resources, is high enough to assume continuity between points of observations.
>
> Inferred - Estimates are based on an assumed continuity beyond measured and/or indicated resources, for which there is geologic evidence. Inferred resources may or may not be supported by samples or measurements."

Gold is the major metal produced from the area with production totaling 21,088 oz gold. Silver was recovered as a secondary metal during some mining operations and known production totals nearly 9,000 oz, mainly from the Eagle River Mine. The largest production came from the Eagle River Mine on the north side of the Eagle River valley. It produced 19,451 oz from stringer veins with an average grade of 0.26 oz/ton gold. This is significantly greater than any other operation in the area. The next largest producer was at Treasury Hill where 302 oz of gold was produced from an unknown tonnage of ore. Placer production in the area is comparatively minor and totalled nearly 300 oz. It is noteworthy that the initial production from most small producers in the area came from ground sluicing of weathered quartz veins discovered on the surface. These operations usually led to the development of the lodes which were

TABLE 2. - Eagle River Area - Mine Production and Resources

Map No. see fig. 9	Name	Years Operated	Production (tons)	Oz Au	Oz Ag	Average Grade oz/ton		Resources
						Au	Ag	
4.....	California/Gold Standard.	1897-1935						Indicated: 775 tons, 0.17 oz/ton gold.
8.....	Black Chief.....	1906-1908						Inferred: 7,188 tons, 0.39 oz/ton gold.
9.....	E Pluribus Unum.....	1906-1940	106	154	34	1.45	0.32	Indicated: 102 tons, 0.61 oz/ton gold.
12.....	Rex.....	1903-1904		145				No estimate made.
13.....	Aurora Borealis.....	1896-1913	?	* 290				Indicated: 1,500 tons, 0.10 oz/ton gold.
14.....	Bessie Mine.....	1897-1904	?	*				Indicated: 13,000 tons, 0.20 oz/ton gold.
15.....	Alaska Washington.....	1897-1910						Inferred: 13,500 tons, 0.20 oz/ton gold.
18.....	Eagle River.....	1902-1935	74,876	19,451	8,865	0.29	0.12	Inferred: 751,875 tons, 0.21 oz/ton gold.
21.....	Herbert Glacier.....							Indicated: 8,000 tons, 1.5 oz/ton gold.
23.....	Summit/St. Louis.....	1889-1932						Inferred: 45 tons, 0.37 oz/ton gold.
24.....	Windfall Creek.....	1882-1909		249				No estimate made.
25.....	Smith & Heid.....	1893-1937	20	205				No estimate made.
26.....	Patton.....	1882-1935						Indicated: 249 tons, 0.29 oz/ton gold.
27.....	Montana Basin Placer.....	1882-1987						Indicated: 8,100 yd^3, 0.016 oz/yd^3 gold.
28.....	Montana Creek.....	1882-1935		46				No estimate made.
29.....	McGinnis Creek.....	1897-1939		3				No estimate made.
30.....	Peterson.Mine.....	1897-1982	544	211		.39		No estimate made.
32.....	Treasury Hill.....	1908-1937		302				No estimate made.
33.....	Dull and Stephens.....	1908-1919		32				No estimate made.

* Production from the Bessie and Aurora Borealis are combined in the records. No breakdown is available.

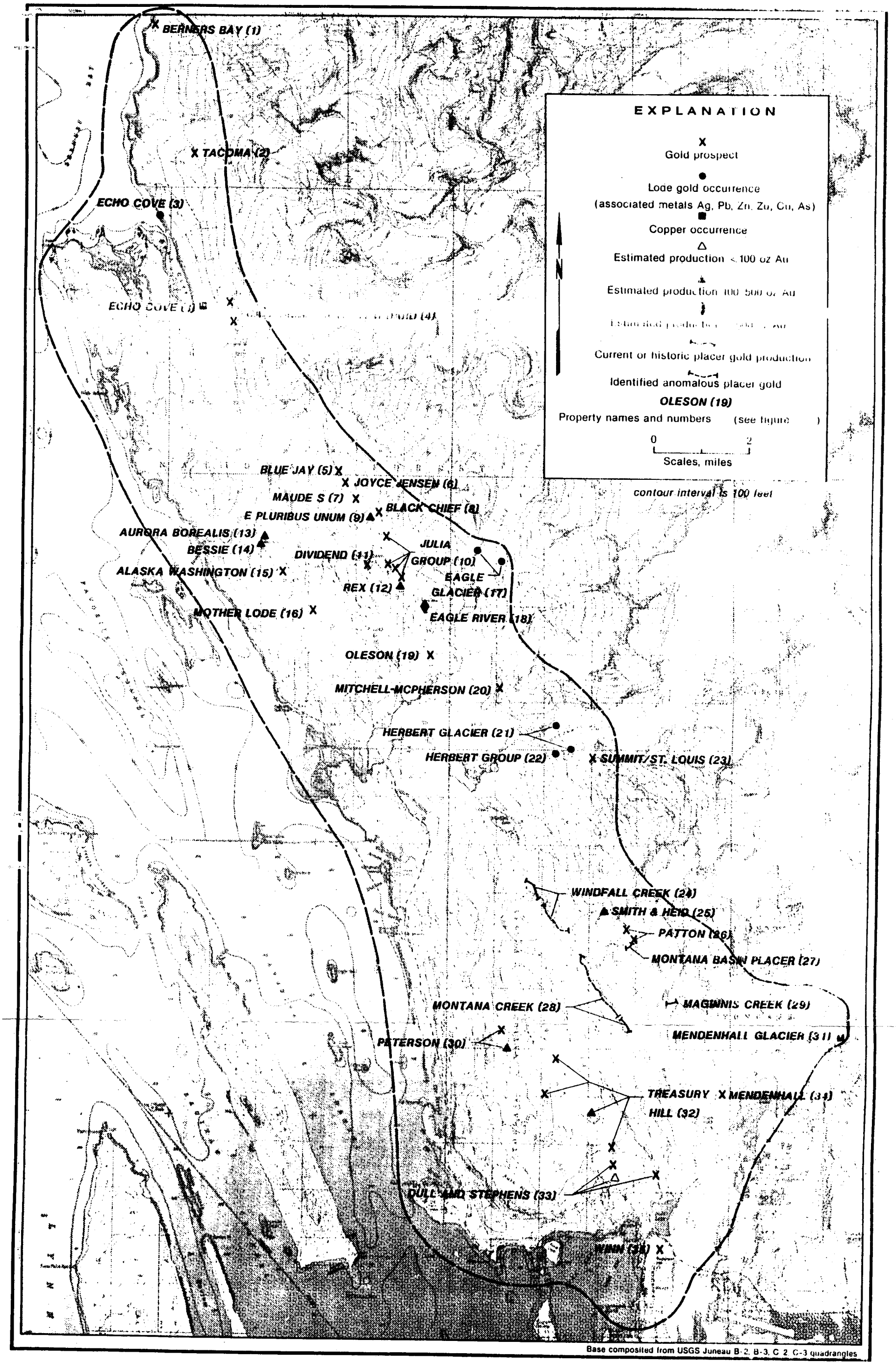

Figure 9. — Mines, prospects, and mineral occurrences — Eagle River area, Juneau Mining District, Alaska

generally not as successful in terms of gold production.

Inferred and indicated resources were determined from both literature and field data collected during the course of this study. Where enough vertical or lateral continuity of mineralization existed at a site, a volume was determined by multiplying the average width of a mineralized zone by its measured or inferred length times a depth or height, if known. If depth or height was unknown, vertical extent was determined from one-half the length of the vein. Tonnages were obtained by dividing the volume by a tonnage factor of 12 ft^3/ton (19).

The largest resources in the area are estimated by private owners to be at the Eagle River Mine. These consist of 751,875 tons of inferred to indicated ore averaging 0.21 oz/ton gold (49). These numbers must be used with caution however, because the Eagle River area is characterized by numerous fault blocks and discontinuous ore-shoots which are not easily traced. Drilling has not identified major new ore targets. However, any large tonnage that may exist in the study area is probably going to occur here. Bureau calculations show the Bessie Mine area as having the next highest tonnage with indicated resources of 13,000 tons and a weighted average grade of 0.20 oz/ton gold. The Herbert Glacier occurrence, discovered during this study, is the property with the highest gold grades. Bureau measurements resulted in an indicated resource of 8,000 tons averaging 1.5 oz/ton gold across an average vein width of 1 ft. Indicated resources of at least 40,000 tons averaging 1.0 oz/ton gold have been developed by other workers (22).

Resources were calculated for the gold-bearing gravels in Montana Basin as they had the highest gold values of any placer gravels evaluated. Totals here show an indicated resource of 8,100 yd^3 at 0.016 oz/yd^3 gold. Anomalous gold values were obtained on other drainages in the area (Windfall Creek) but the data are insufficient for resource calculations.

The copper occurrences located in the area need further evaluation before resource estimates are made. Trenching and/or drilling would be required for a complete evaluation.

The tungsten content in the quartz veins at Herbert Glacier is too low for them to be mined solely for that commodity, however their presence is noteworthy.

MINERAL DEVELOPMENT POTENTIAL

All the mines, prospects, and occurrences, if located, were classified according to the following Bureau criteria, based on resources, and grades of mineralization:

> High Mineral Development Potential - High grades and probable continuity of mineralization exist. The property is likely to have economically mineable resources under current economic conditions. A high potential exists for developing tonnage or volume with reasonable geologic support for continuity of grade.

Moderate Mineral Development Potential - Either a high grade or continuity of mineralization exists, but not both. Mineralization has limited extent as shown by geology, dimensions, and/or grades are low and tend to stay low. The property is not economically mineable (i.e. too low tonnages and grades) at existing conditions (economical, political, technological). It could serve as a material source if economics were not a factor.

Low Mineral Development Potential - The property exhibits uneconomic grades and/or little evidence of continuity of mineralization. There is little or no potential for developing ore resources or it is an insignificant source of the material of interest.

Unevaluated - This category includes all properties not located or visited in the field. Data are only available from previous reports.

Unknown - Insufficient work was done at the prospect for an evaluation.

Mineral development potential ratings for the Eagle River area are summarized in appendix B.

Generally, lode properties having gold values greater than 0.5 oz/ton gold and sufficient tonnage was given a high potential rating. Moderate potential exists at properties having grades ranging from 0.1 to 0.5 oz/ton gold, if sufficient tonnage exists. Properties having gold values less than 0.1 oz/ton gold were given a low rating because their tonnages were usually also low. The Herbert Glacier occurrence is the only lode property to receive a high mineral development potential rating.

Placer samples were rated according to the following classification based on Bureau sampling:

Highly significant - recovered values higher than 0.005 oz/yd^3 gold;

Significant - recovered values from 0.0005-0.005 oz/yd^3 gold;

Background - recovered values less than 0.0005 oz/yd^3 gold.

Highly significant samples were collected in Windfall Creek, Montana Creek, and Montana Basin. The Montana Basin placer was given a high rating because samples from there contained up to 0.035 oz/yd^3 gold.

SUMMARY

Gold has been the main metal produced from the Eagle River area. In addition, appreciable amounts of silver and minor copper were recovered as a byproduct of gold mining. Production totals 21,086 oz gold and nearly 9,000 oz silver. The Eagle River Mine was the largest operation, producing 19,351 oz of gold over a thirteen year period.

Gold is concentrated in both stringer and fissure type quartz veins. Quartz stringers have historically been the largest gold producers originating in low-grade, high-tonnage orebodies. The

fissure veins are less extensive and contain lower tonnages, but on the average are of higher grade. The stringer lodes are concentrated in shear zones hosted mainly by phyllites, graphitic schists and greenschists. Fissure veins occur most commonly in more brittle greenstones and diorite gneiss.

Several small gold placers in the area have been mined to a limited extent with known production totaling approximately 300 oz gold.

Inferred and indicated lode resources in the Eagle River area total approximately 796,000 tons with a weighted average grade of 0.22 oz/ton gold. The largest reported inferred resources occur at the Eagle River Mine and consist of approximately 752,000 tons averaging 0.21 oz/ton gold. Several small higher grade deposits also occur in the area. The most significant of these is the Herbert Glacier occurrence which contains a minimum indicated resource of 8,000 tons averaging 1.5 oz/ton gold. At the Bessie Mine, an indicated resource of 13,000 tons averages 0.2 oz/ton gold. Drilling along strike and down dip will be required to test and develop measured resources on these vein systems.

Lack of time and equipment did not allow for a full placer evaluation in Montana Basin, but an indicated resource of 8,100 yd^3 averaging 0.016 oz/yd^3 gold was determined. Trenching and/or drilling will be required to determine placer resources.

Tungsten in the form of scheelite occurs in the quartz veins at the Herbert Glacier Occurrence. Samples contain up to 0.18% tungsten.

Several small massive sulfide lenses within sheared and silicified greenstones in the study area were found to contain up to 0.17% copper.

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APPENDIX A

MINE, PROSPECT, AND MINERAL OCCURRENCE SUMMARIES

EXPLANATION OF APPENDICES

Location	:	Both geographic and public land survey grid locations are used.
Map Location No.	:	Refer to fig. 9.
M.S. No.	:	U.S. Bureau of Land Management Mineral Survey number.
MAS No.	:	U.S. Bureau of Mines Minerals Availability System sequence number.
KX No.	:	KARDEX. Alaska Mineral Property Reference File.
Quadrangle	:	Refers to USGS quadrangle, scale 1:63,360.

NAME(S): Berners Bay

Map Location No. 1
M.S. No. 318
MAS No. 2TT20058

LOCATION:

Deposit Type: Unknown.
Commodities: Au ?

Quadrangle: Juneau C3 SE 1/4 Sec: 17 T: 36S R: 63E
Geographic: East side Berner's Bay, 6.2 miles north of Echo Cove.
Elevation: Sea level.

HISTORY:

PRODUCTION: None.

The Berners Bay prospect was located in 1885 along the mouth of Boulder Creek, north of Echo Cove. In 1898, the claim owner applied and obtained a mineral survey for the property (M.S. No. 318, certificate 70, 19.98 acres). Prospecting continued in 1905, but this effort was unsuccessful. John Olds currently holds title to the property.

WORKINGS AND FACILITIES:

Unknown.

GEOLOGIC SETTING:

Unknown.

BUREAU INVESTIGATION:

This property lies on a single patented mining claim and is private land. The landowner denied the Bureau permission to visit the claim so an evaluation could not be made.

RESOURCE ESTIMATE:

Unknown.

RECOMMENDATIONS:

None.

REFERENCES:

13, 24, 53.

NAME(S): Tacoma
Bonanza claim group

Map Location No. 2
MAS No. 2TT20059

LOCATION:

Deposit Type: Fissure and stringer vein.
Commodities: Au.

Quadrangle: Juneau C3 NE 1/4 Sec: 33 T: 36S R: 63E
Geographic: South side of Sawmill Creek 1.3 miles southeast from the mouth of Sawmill Creek.
Elevation: 390 to 1,200 ft.

HISTORY:

PRODUCTION: None.

The Tacoma prospect was discovered in 1901 by Wahl and Johnson along a tributary on the south side of Sawmill Creek. Assessment work was performed intermittently until 1914, at which time the six lode claims were abandoned. The property remained idle until 1936, when a small amount of assessment work was done (33). The property is currently unclaimed.

WORKINGS AND FACILITIES:

Three short tunnels and several open cuts reported (33).

GEOLOGIC SETTING:

Chapin (5) and Roehm (33) both give good descriptions of the prospect geology:

> "The Tacoma group of claims is on one of the tributaries of Sawmill Creek 7,000 feet from Sawmill Cove, at an elevation of about 1,000 feet. The developments consist of several short openings on two or more lodes. The country rock is black slate of the Berners formation, which strikes N. 60°W. and dips steeply northeast. A 70-foot adit has been opened to explore a quartz fissure vein striking east and dipping 75°N. The footwall side of the lode is a large vein of quartz strongly mineralized with pyrite. Its thickness was not determinable, as the adit does not expose the footwall and the vein on the surface is covered with slide material. A 2-foot vein of quartz occurs on the hanging wall of the lode and is separated from the footwall vein by a horse of slate. Overlying the hanging wall is a mineralized zone of slate with many stringers of quartz, forming a stringer lode several feet thick, mineralized with disseminated pyrite. Southwest of this lode on the footwall side, but some distance from it, is a similar stringer lode. An opening has also been made on an 8-foot quartz vein. Slate, country rock, and vein all strike N. 45° W., and a short adit shows the vein to be horizontal at the surface. The vein material is rusty brecciated quartz containing much pyrite"(5).

Geology and Showings:

> "The formations of this group consist of black to clay slates, with interbedded sills of augite melaphyre green-

stones. The slates are folded, schisted, and contain stringer zones which contain a small amount of mineralization. The melaphyre sills are fractured, with the fractures extending mainly across at right angles to the strike of the sills. These fractures are filled with silica and occur as stringers and veins. The smaller sills are schisted and contain considerable pyrite mineralization. These sills vary in width from a few feet to 150 feet. The strike of the formation is N. 30 to 40° W., with a steep dip to the northeast. The formations are covered with a thick mantle of moss, glacial overburden, and timber. They are exposed mainly along the banks and in the beds of the creeks.

The lowest showing is along the bed of a small creek, 1,000 feet above its junction with Sawmill Creek, at an elevation of 390 feet. This consists of a cut along the east bank over 200 feet in length across a contact of slate and melaphyre. Small interlaced stringers occur in the highly folded slates, and stringer zones up to 15 feet across were noted. These occur on the hanging wall of the melaphyre in the slates. In the melaphyre several various sized stringers and veins were noted. There has not been sufficient work to determine their extremities. A 10 foot sample across the best looking stringer zone gave only a trace of gold and silver.

Following up the creek to an elevation of 1,020 feet, a distance of over 2,000 feet from the above showing, a tunnel is located on the west bank, 20 feet above the creek level. This tunnel is located on the Bonanza No. 2 claim, 300 feet south of the discovery post. Its length is 72 feet. It was driven in slate and near a band of melaphyre. The tunnel follows the schistosity of the slate, in which numerous bunches of heavily mineralized quartz occur interfolded with the slate. These bunches are irregular, varying from a few inches to four feet in width, and appear to have no definite structure other than interlaced in the schistosity of the folded slates. The foldings appear to have been since the quartz deposition as the quartz bunches are folded, shattered, and contain an irregular schistosity. Massive bunches of sulphides occur in the quartz and this mineralization is decidedly different from all the other showings. It consists of large to fine pyrite, arsenopyrite, galena, sphalerite, with gold values.

The gangue minerals are white quartz, calcite, graphite, and slate pieces. A sample taken across four feet of quartz, along the northeast wall at a point 45 feet in from the portal, gave only a trace of gold and 1.2 ounces of silver per ton.

Following the slope of the mountain to the northwest, a distance of 1,000 feet, and at elevations of 680 and 780 feet, two short tunnels were found. The upper tunnel, at an elevation of 780 feet, cuts across 8 feet of quartz at the portal and turns, following the vein for a distance of 29 feet. This quartz lense has been folded and the quartz is highly fractured. Pyrite appears to be the only mineralization noted. Four channel samples were taken at 10 foot intervals, and only traces of gold were obtained by assay.

The tunnel, vertically 100 feet below the above, has a length of 18 feet and shows a small fault vein 2 to 4 inches in width which contains a gouge only. These tunnels are located on Bonanza claim No. 4.

Other than the above mentioned mineralization in the quartz bunches in the upper tunnel on Bonanza claim No. 2, the general mineralization of the other showings is a yellow pyrite. This no doubt contains traces of gold and silver" (33).

BUREAU INVESTIGATION:

The Bureau did not locate many of the workings described by Chapin and Roehm. A caved adit and two prospect pits were located on the west side of a stream at 1,060 ft elevation (fig. A-1), which appears to match Roehm's description of a 72-ft adit at 1,020 ft elevation. Quartz vein float from the dump contains abundant pyrite along with galena and sphalerite. One sample (No. 3, table A-1) contained 0.03 oz/ton gold, 4.95 oz/ton silver, and 2.7% lead. The gold values are low, but the silver values are significant. A 2-ft-thick pyrite-bearing quartz vein nearby contained no significant gold or silver. The other workings were searched for, but not located.

RESOURCE ESTIMATE:

The low gold values from Bureau samples give the located workings a low mineral production potential. However, a rating cannot be given for the prospect as some workings reported to have gold values could not be found.

RECOMMENDATIONS:

Locate and sample workings described by Chapin and Roehm, although thick vegetation in the area makes this a difficult proposition.

REFERENCES:

5, 26, 27, 33.

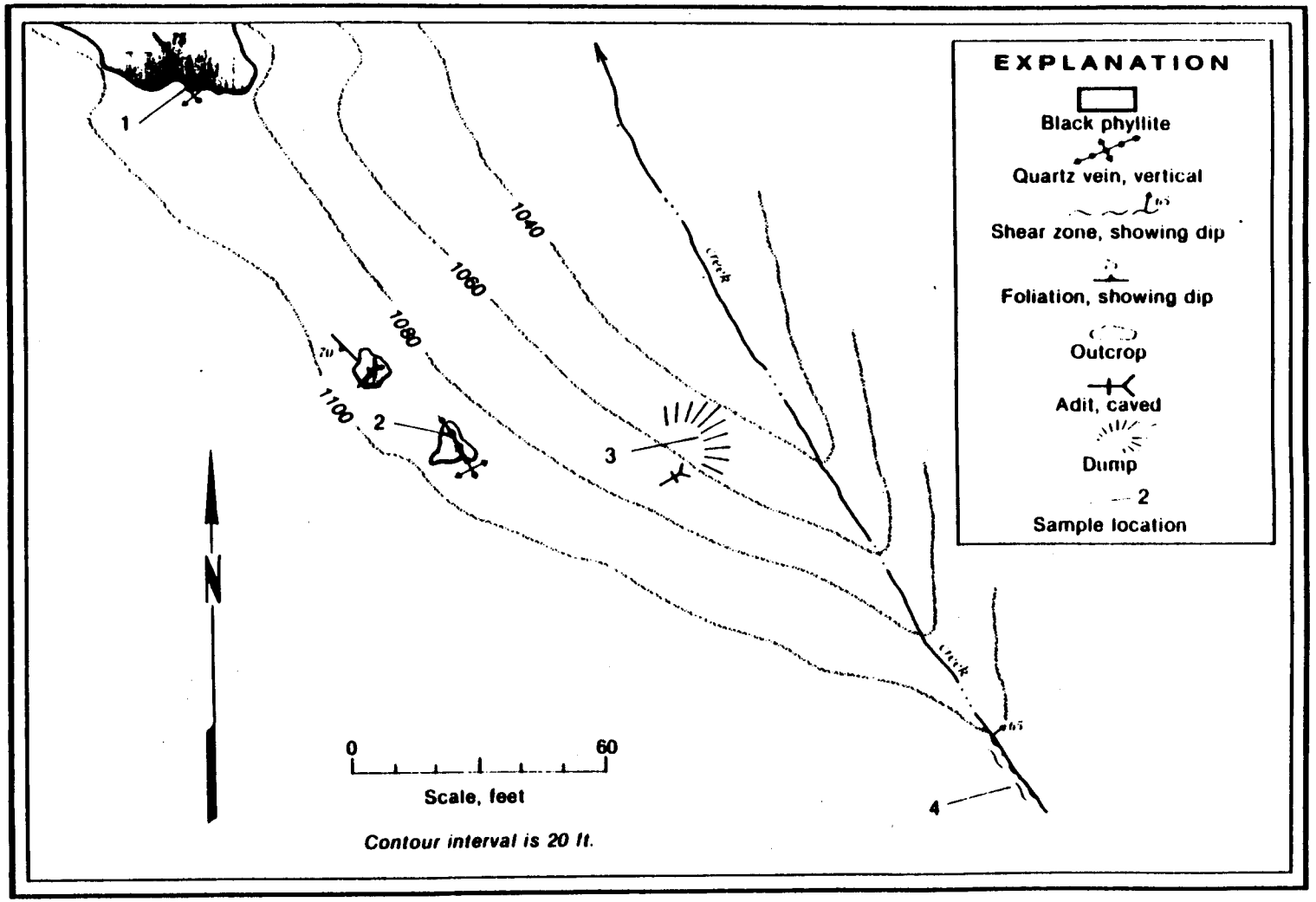


Figure A-1.— Tacoma prospect, showing geology and sample locations.

TABLE A-1. - ANALYTICAL RESULTS - Tacoma (see fig. A-1)

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm					%	Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	As	Pb	
1.....	3755..	Select....	2.0	<0.002		6	<2	6	<0.2	2		Quartz vein.
2.....	7302..	Cont. Chip	2.0	<.002		107	209	229	1.6	18		Quartz vein.
3.....	7301..	Select....		.031	4.95	159	>7500	1960	>30	66	2.7	Up to 30% pyrite.
4.....	7290..	Grab.....		<.002		50	12	152	2.1	15		Quartz/calcite vein.

NAME(S): Echo Cove reconnaissance Map Location No. 3

LOCATION:

Quadrangle: Juneau C3

Geographic: East entrance to Echo Cove, Adjacent to Davies Creek road 0.1 miles east of Echo Cove. Confluence of Davies and Cowee creeks, Bessie Creek near the road.

Deposit Type: Lode, placer.
Commodities: Au, Cu.
Various locations.

HISTORY:

PRODUCTION: None.

A single lode claim was staked on Cowee Creek in 1971 (27). All the other occurrences have no recorded historical activity.

WORKINGS AND FACILITIES:

Pit used for roadfill.

GEOLOGIC SETTING:

A heavily limonitic stained zone, 4 x 15 ft in size, occurs in greenstone exposed in the rock quarry located at the end of Echo Cove road. The greenstone is silicified and heavily sheared, exhibiting numerous slickenside surfaces. This rock type locally contains massive pyrrhotite and chalcopyrite. The country rock exposed near the entrance to Echo Cove is a pyritized greenschist.

BUREAU INVESTIGATION:

Two samples of pyritic greenschist (Nos. 1 & 2, fig. A-2) were taken near the east entrance of Echo Cove. These samples yielded low metal values. Two other samples (Nos. 3 & 4, fig. A-2) were taken from the rock quarry located at the end of the road. The outcrop was located on the upper wall of a large pit dug to obtain roadfill and a representative sample of the pyritized zone was taken as was a select float sample. The float sample contained 0.17% copper and 0.007 oz/ton gold (No. 4, table A-2). The placer sample taken on Cowee Creek yielded 0.0004 oz/yd^3 gold. The placer sample taken from Bessie Creek contained 0.0008 oz/yd^3 gold.

RESOURCE ESTIMATE:

The greenstone exposed at the quarry has low mineral production potential due to low copper and gold values. The reconnaissance nature of the placer sample precludes a full evaluation of the resource.

RECOMMENDATIONS:

None.

REFERENCES:

27.

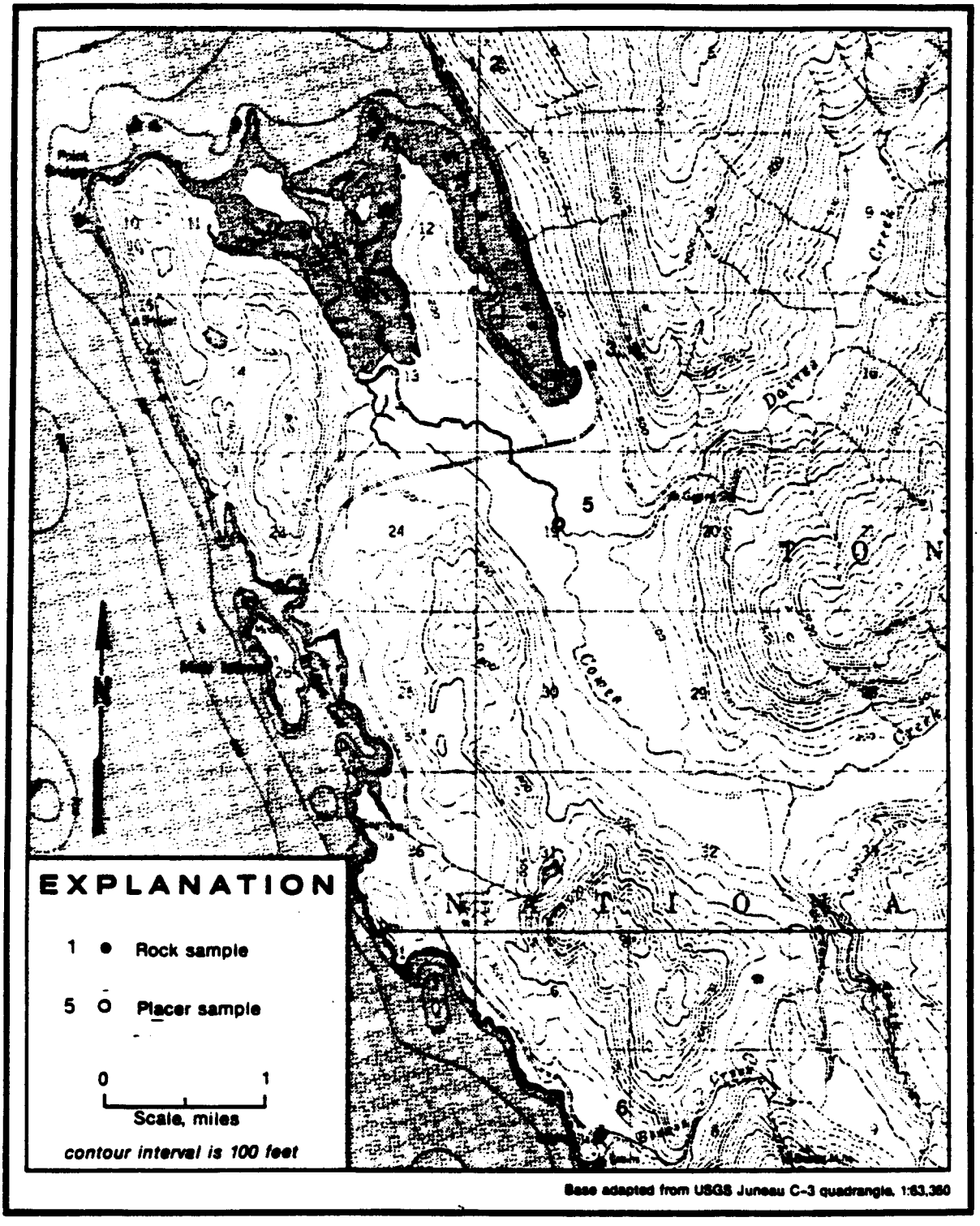


Figure A-2. — Echo Cove reconnaissance samples

TABLE A-2. - ANALYTICAL RESULTS - Echo Cove reconnaissance (see fig. A-2)

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm						Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	As	W	
1.....	3750..	Select....		0.002		254	6	34	0.2	30		Pyritic greenschist.
2.....	3751..	Select....		.002		135	4	12	.3	23		Pyritic greenstone.
3.....	4333..	Rep. Chip.	10.0	.002		158	12	90	.4	30		Altered greenstone, diorite with abundant disseminated sulfides.
4.....	8210..	Select....		.007		1700	30	166	3.2			Abundant sulfides in greenstone.

Map No.	Sample	Type	Sample Volume	Oz/yd3 Fire Assay		Ppm						Description
			yd3	Au	Ag	Cu	Pb	Zn	Ag	As	W	
5.....	3329..	Placer....	0.1	.0004		12	2	36	<.2	5	5	Few colors observed.
6.....	6067..	Placer....	.1	.0008		32	102	58	.9	27		15 vf colors of gold observed.

NAME(S): California/Gold Standard

Map Location No. 4
MAS No. 21120073

LOCATION:

Deposit Type: Fissure and stringer vein.
Commodities: Au.

Quadrangle: Juneau C3 W 1/2 Sec: 17 T: 37S R: 64E
Geographic: 0.7 miles east of Echo Cove.
Elevation: 660-1750 ft.

HISTORY:

PRODUCTION: None.

The California and Gold Standard claims were discovered as separate properties along the same vein system in 1897. E. P. Pond and J. Davies discovered the California prospect and drove the Falls Tunnel by 1898. J. McWilliams, George Stucky, Charles Brown, D. Fraser and Pete Early discovered the Gold Standard property and drove the Contact Tunnel by 1898. The properties were consolidated under Pond and Davies ownership in 1898 and by this time, the Greenstone Tunnel on the upper Gold Standard workings had been started.

The Contact Tunnel was driven below the falls on the California prospect in 1900 and by 1902, the Cabin Tunnel was completed. Assessment work was performed until 1905 and then a lengthy hiatus ensued until 1935. The Knob discoveries were made at this time at the southern end of the property. Whelan Mining and Exploration restaked claims in the area in 1980 and after they dropped the property, Jim Wilson restaked the area in 1986.

WORKINGS AND FACILITIES:

Workings consist of six adits totaling 700-800 ft of underground workings, one inclined shaft and numerous open cuts and trenches occurring between 660-1,750 ft elevation. Two ruined cabins lie along the trail leading between the workings (figs. A-3 to A-6).

GEOLOGIC SETTING:

The quartz veins and stringer zones in this area roughly follow the contact between greenstone volcanics on the west and black phyllites to the east. This is similar to the vein occurrences noticed at the Dull and Stephens property located in lower Spaulding meadows.

The California/Gold Standard veins may all be part of the same system which can be traced for 4,500 ft along strike and 1,150 ft vertically.

Fresh greenstone contained little mineralization, but quartz veins and stringers containing arsenopyrite occur in chlorite schist, its sheared equivalent, and phyllites along the contact hanging wall. Gangue minerals consist of calcite and ankerite. These rocks have undergone considerable shearing and these less competent areas are probably followed somewhat by the present stream drainages. Shears trend in a N15-25°W direction and dip moderately to the east. Individual veins up to 2.0-ft wide occur and locally contain ribbon texture. Most of the mineralization occurs in quartz stringer zones with numerous wallrock (phyllite) partings. These zones are up to 3.5-ft wide and have been traced continuously for up to

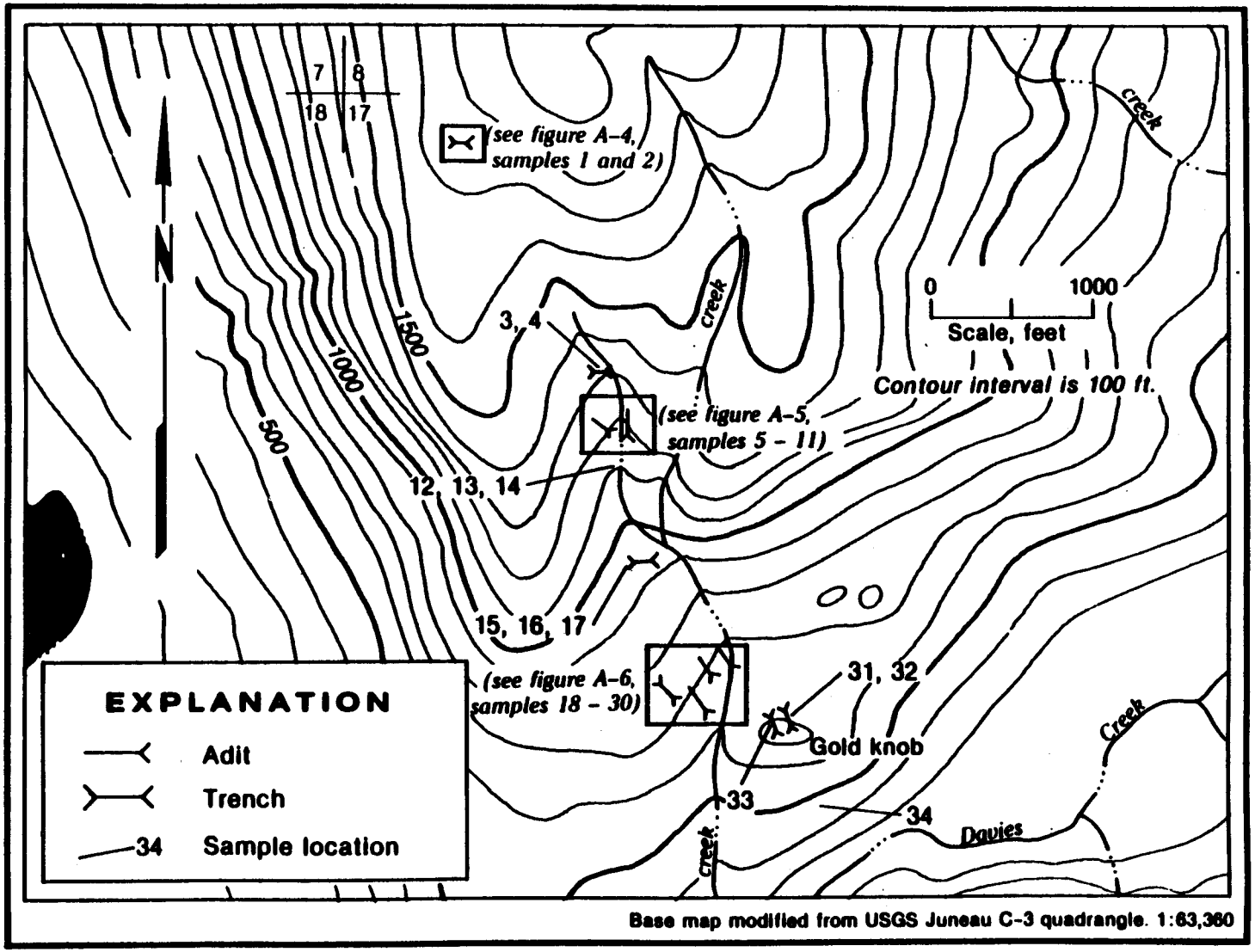


Figure A-3.— California/Gold Standard prospect area, showing sample locations.

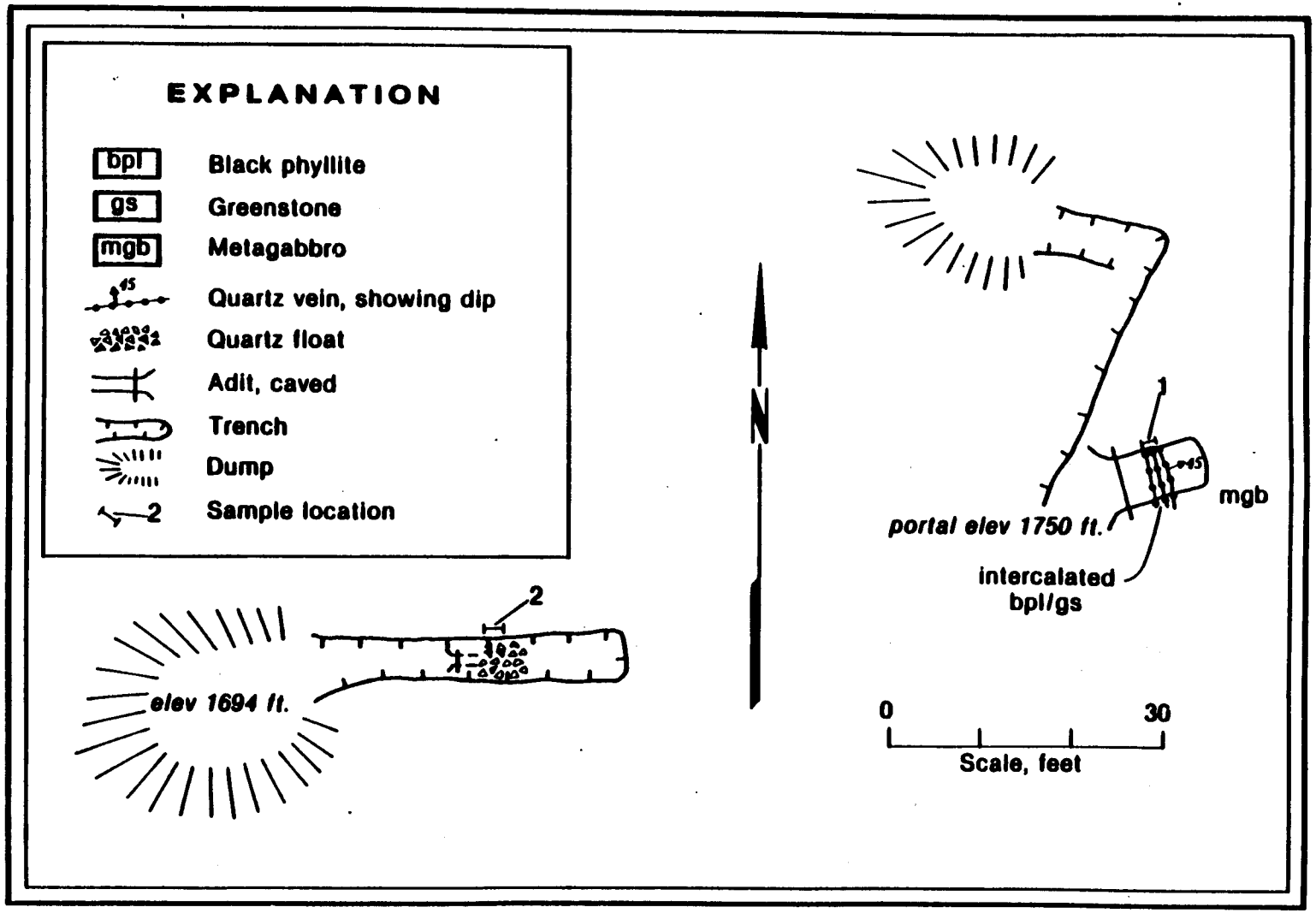


Figure A-4.— Gold Standard property, upper workings, geology and sample locations.

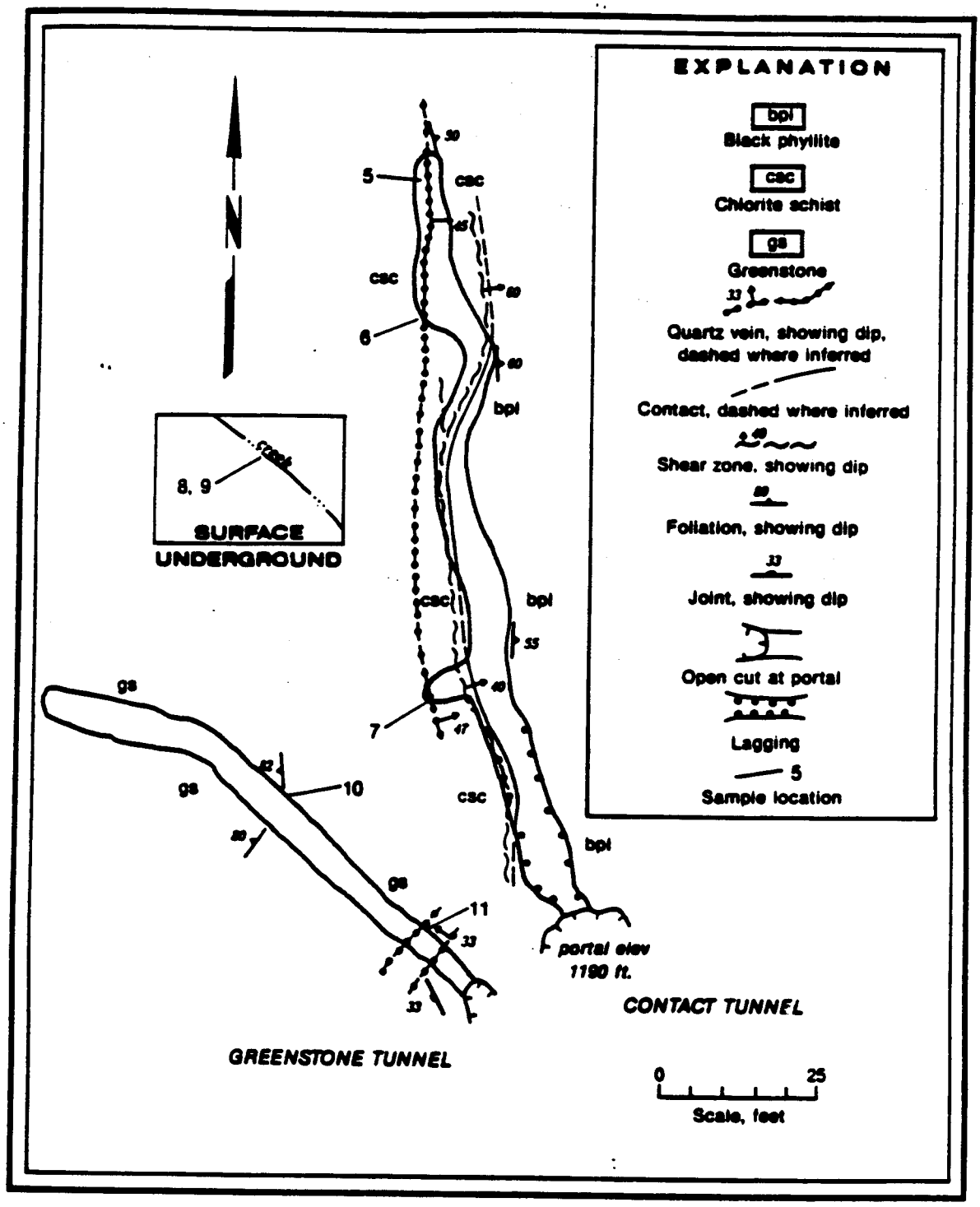


Figure A-5.— Gold Standard property, Greenstone and Contact tunnels, geology and sample locations.

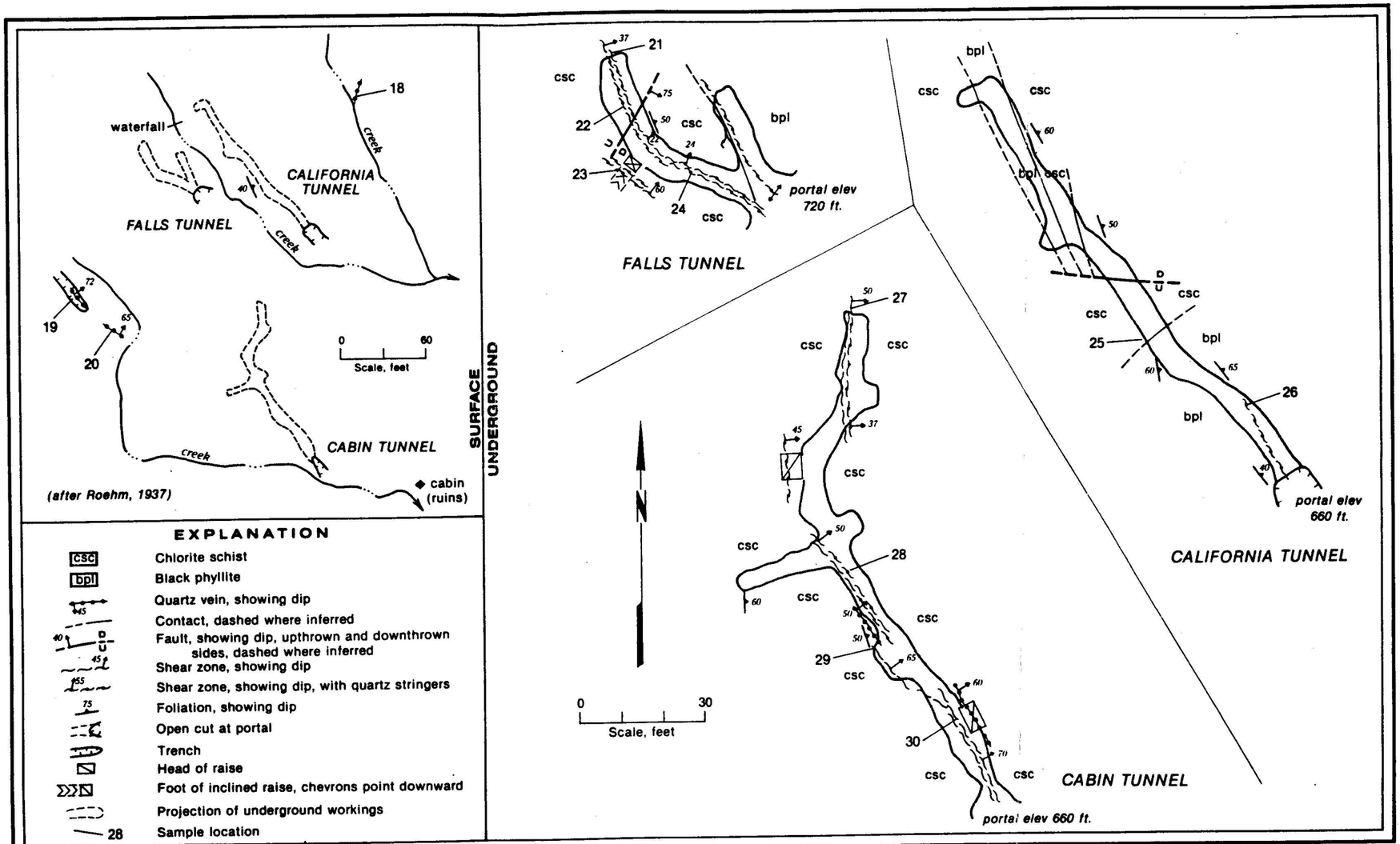


Figure A-6.— California Tunnels, geology and sample locations.

60-ft underground. Sulfides consist of up to 10% pyrite and arsenopyrite. Galena is reported to occur in the quartz (34). Visible gold was noticed at the upper adits. The sulfides are heavily oxidized in many surface exposures.

BUREAU INVESTIGATION:

The Bureau mapped and sampled all workings that could be located (figs. A-3 to A-6, table A-3). The highest gold values, (0.3 oz/ton), came from arsenopyrite-rich quartz float on the northwest side of the Knob workings (No. 33, fig. A-3). A sample previously collected in the same area contained 0.72 oz/ton gold (34). Samples from an average 2.3 ft wide zone of quartz veinlets in chlorite schist in the Gold Standard Contact Adit averaged 0.17 oz/ton gold. Previous sampling reported a value of 0.29 oz/ton gold (34). All other values were less than 0.1 oz/ton gold.

Surface samples collected in the area by unknown parties in 1939 averaged 0.19 oz/ton gold. Grabs of dump material from the Gold Standard Contact Adit contained 0.62 oz/ton gold, and a sample of Gold Standard vein outcrop contained 0.38 oz/ton gold.

Resource Estimate:

The samples from the Gold Standard Contact Adit are the only ones with gold values high enough to be of interest. Indicated resources here consist of 775 tons at 0.17 oz/ton gold. This gives the prospect a moderate mineral development potential.

RECOMMENDATIONS:

Drilling is recommended to check vein presence at depth. The poddy nature and lensing of the quartz veins precludes surface veins continuing at depth. The veins are stringer type, not fissure-type, and occur along a zone similar to Yankee Basin properties. High grade pods may exist, but predicting where they might occur is extremely speculative.

REFERENCES:

11, 16, 24, 26, 27, 34, 49, 51.

TABLE A-3. - ANALYTICAL RESULTS - California/Gold Standard (see figs. A-3 through A-6)

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm					Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	As	
1.....	4308..	Cont. Chip	4.0	0.005		10	4	8	0.2		Quartz vein in greenstone.
2.....	4309..	Select....		<.002		6	<2	3	<.1		Quartz float in trench, 1% arsenopyrite.
3.....	6001..	Rep. Chip.	5.0	<.002		16	3	37	<.2	15	Greenstone with quartz veins.
4.....	7304..	Rep. Chip.	10.0	.022		4	8	4	<.2	280	Quartz vein.
5.....	6003..	Cont. Chip	3.0	.204		66	48	26	.8		Pyrite, arsenopyrite to 10%.
6.....	6004..	Cont. Chip	2.0	.195		136	158	36	3.4		Pyrite to 10% with arsenopyrite.
7.....	6002..	Cont. Chip	2.0	.115		109	224	39	1.0		Quartz veins in graphitic schist.
8.....	6005..	Rep. Chip.	2.0	<.002		4	82	39	.6	68	Quartz vein.
9.....	6006..	Select....		.055		3	35	1	.5		Quartz vein in chlorite schist.
10.....	6023..	Cont. Chip	2.0	<.002		148	12	92	<.2	40	Disseminated pyrite to 1%.
11.....	6022..	Select....		.002		31	31	27	<.2	800	Quartz vein in greenstone.
12.....	6024..	Select....	7.5	<.002		16	4	19	<.2	85	Sheeted quartz veins.
13.....	6025..	Rep. Chip.	7.5	.002		97	22	54	<.2	700	Greenstone.
14.....	6026..	Select....		.099		33	241	11	.9	>1000	Quartz vein float.
15.....	6027..	Rep. Chip.		.007		32	22	19	.2	>1000	Quartz vein.
16.....	6028..	Select....		<.002		5	5	1	<.2	260	Quartz vein.
17.....	6029..	Rep. Chip.	3.0	.022		59	50	35	<.2	>1000	Quartz vein.
18.....	6009..	Rep. Chip.	6.0	.004		14	7	19	<.2	35	Quartz vein in slate.
19.....	3780..	Cont. Chip	1.1	.066		11	17	9	<.2	800	Quartz veins in greenstone.
20.....	3781..	Cont. Chip	1.1	.006		3	<2	1	<.2	300	Quartz vein.
21.....	7305..	Cont. Chip	2.0	.005		63	32	64	.3	400	Quartz vein.
22.....	6102..	Cont. Chip	.9	.036		110	125	76	.8		Quartz vein.
23.....	6101..	Cont. Chip	3.3	<.002		55	99	115	.4	800	Quartz stringer zone in phyllite.
24.....	6100..	Cont. Chip	2.9	.005		131	77	64	.4	900	Quartz stringers in phyllite.
25.....	6008..	Cont. Chip	2.0	<.002		90	9	85	<.2	68	Phyllite/greenstone contact.
26.....	6007..	Rep. Chip.	.1	.031		21	19	33	.2		Quartz-calcite vein.
27.....	6103..	Cont. Chip	2.8	.008		104	23	79	.3	85	Chlorite-sericite schist.
28.....	6104..	Cont. Chip	2.0	.003		181	10	80	.4	450	Chlorite-sericite schist.
29.....	7306..	Cont. Chip	2.0	.044		128	9	49	1.4		Shear zone with quartz veinlets.
30.....	6105..	Cont. Chip	3.9	<.002		61	10	123	.3	600	Chlorite-sericite schist.

TABLE A-3. - ANALYTICAL RESULTS - California/Gold Standard - Continued

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm					Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	As	
31.....	6030..	Cont. Chip	3.7	0.061		3	21	6	0.2	>1000	Quartz vein with up to 2% arsenopyrite.
32.....	6106..	Select....		.012		99	5	9	<.2		Quartz from pit on Knob.
33.....	7307..	Select....		.313		10	5	2	1.3		Quartz float, 5% arsenopyrite.
34.....	6031..	Select....		<.002		14	45	31	<.2	24	Quartz with chlorite partings.

NAME(S): Blue Jay
Yankee Boy
Joyce Jensen

Map Location No. 5
MAS No. 2112008T

LOCATION:

Deposit Type: Stringer vein.
Commodities: Au.

Quadrangle: Juneau C3 SE 1/4 Sec: 34 T: 38S R: 64E
Geographic: 1.0 mile northwest of Canyon Creek.
Elevation: 1,900-2,050 ft.

HISTORY:

PRODUCTION: None.

The Blue Jay prospect occupies the northernmost extension of the Yankee Basin shear-zone-stringer system and was located near the head of Cowee Creek in 1906. The Blue Jay was one of five groups of claims located simultaneously in the area and individually contains the least amount of workings. In 1907, a 25-ft tunnel driven on the property intersected an orebody, however not much additional activity occurred here until 1913.

In October of 1913, Gudmund Jensen made a "big strike" on this property and combined this claim with one of James Joyce's at the very head of Canyon Creek. The combined property, known as the Joyce Jensen is actually south of the original Blue Jay workings as we know it today (25). This confusing summary is typical of the Yankee Basin area as individual claims were often mixed up with adjacent workings. The last reported work on the property was done in 1985 when the area was drilled by Houston Oil and Minerals (21).

WORKINGS AND FACILITIES:

One caved adit and several trenches.

GEOLOGIC SETTING:

The Blue Jay prospect lies in a gully that may be following the same major shear zone that runs in a northwest direction beginning with the Julia Group area located 2 miles southeast. The gully walls are schistose and are composed of phyllites locally cut by quartz stringers and stockworks. Quartz vein float can be found in the gully bottom.

BUREAU INVESTIGATION:

The Bureau located a caved adit on the east side of the gully (fig. A-7) and sampled the quartz float on the slope above it. A quartz float pile was sampled (No. 1, table A-4) yielding 0.11 oz/ton gold, as was a trench downslope from it which assayed 0.15 oz/ton gold. The trench contained a N20°W-trending quartz vein averaging 1.1-ft thick and having up to 8% pyrite.

RESOURCE ESTIMATE:

The low gold values give the area a low mineral production potential.

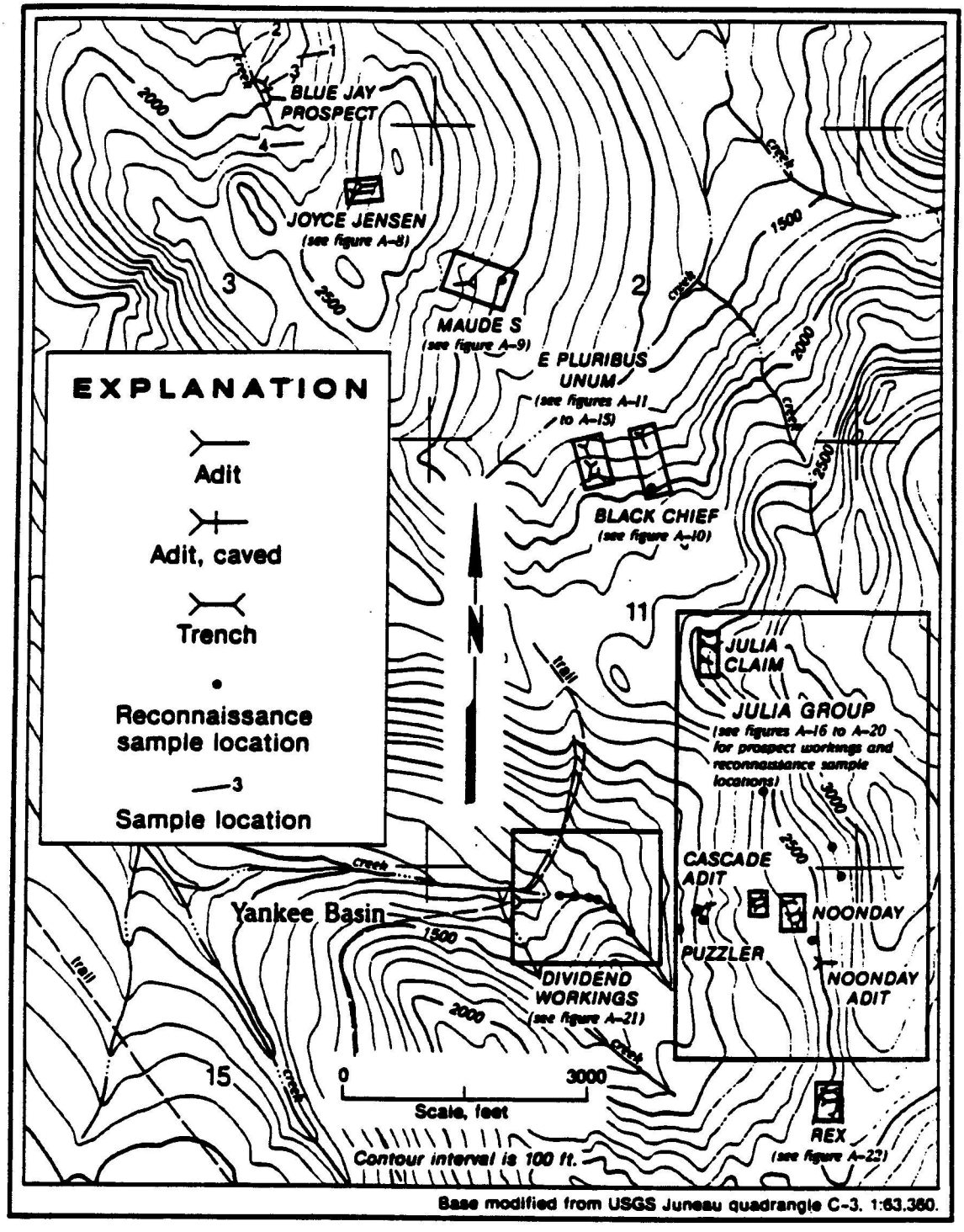


Figure A-7.— Yankee Basin area, showing mines, prospects and reconnaissance sample locations. Includes the Blue Jay (showing sample locations), Joyce Jensen, Maude S, Black Chief, E Pluribus Unum, Dividend, Rex and the Julia Group consisting of the Julia, Noonday, Puzzler and Cascade.

RECOMMENDATIONS:

Trenching between the Blue Jay prospect and the Joyce Jensen property may uncover veins or stringer zones lying along the trend of the shear zone.

REFERENCES:

16, 21, 24, 25, 26, 27, 54.

TABLE A-4. - ANALYTICAL RESULTS - Blue Jay (see fig. A-7)

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm					Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	As	
1.....	7366..	Select....		0.108		134	4230	460	15.0	>1000	Quartz dump, <5% pyrite/arsenopyrite.
2.....	6319..	Select....		.145		415	60	28	6.5	>1000	Quartz vein, pyrite.
3.....	7365..	Select....		<.002		10	16	29	.2	155	Vein quartz float.
4.....	7364..	Rep. Chip.		<.002		5	4	10	<.2	140	Quartz vein, trace pyrite.

NAME(S): Joyce Jensen
Yankee Boy
Blue Jay

Map Location No. 6
MAS No. 2I120081

LOCATION:

Deposit Type: Stringer and fissure vein.
Commodities: Au.

Quadrangle: Juneau C3 NE 1/4 Sec: 3 T: 38S R: 64E
Geographic: 0.7 miles north of the head of Canyon Creek.
Elevation: 2,440 ft.

HISTORY:

PRODUCTION: None.

The property that ultimately became known as the Joyce Jensen was first discovered in 1906 by James Joyce at the head of Canyon Creek. Later, in 1913, these claims were combined with adjacent claims located by Gudmund Jensen, to form the current Joyce Jensen property. A 40-ft adit was driven by Joyce in 1907 and according to the Daily Alaska Dispatch, another 150-ft adit was driven on the property by November of 1908. This story conflicts with an account made by Knopf (15) in 1910, which stated that a 100-ft adit had been completed. Activity ceased in the area until 1980 when Whelan Exploration staked the Canyon Creek area. Houston Oil and Minerals drilled the property in 1985 as part of its Yankee Basin exploration program. The property is currently being looked at by Pangea Resources.

WORKINGS AND FACILITIES:

A 45-ft adit and a 125-ft adit.

GEOLOGIC SETTING:

Surface exposures of intercalated phyllite and graphitic schist enclose quartz lenses trending N40°E up to 3 ft wide. These quartz masses contain no visible sulfides. Adjacent to these lenses are quartz stringer zones with the same orientation (fig. A-8). It appears that two adits were put in at different levels in an attempt to cut these quartz veins underground. The upper adit was driven adjacent to the exposure and cuts through a N35°E-trending quartz stringer zone up to 35-ft wide. The other adit, located 42 ft below the first, cuts through a series of concordant quartz stringer zones, the majority of which trend northwest.

BUREAU INVESTIGATION:

The Bureau mapped and sampled the surface outcrops and underground workings (table A-5). Only one of the samples taken (No. 9, Fig A-8) contained significant metal values consisting of 0.13 oz/ton gold from a 3-ft wide quartz stringer zone.

RESOURCE ESTIMATE:

The low gold values and discontinuous nature of the quartz stringers and pods give this prospect a low mineral production potential.

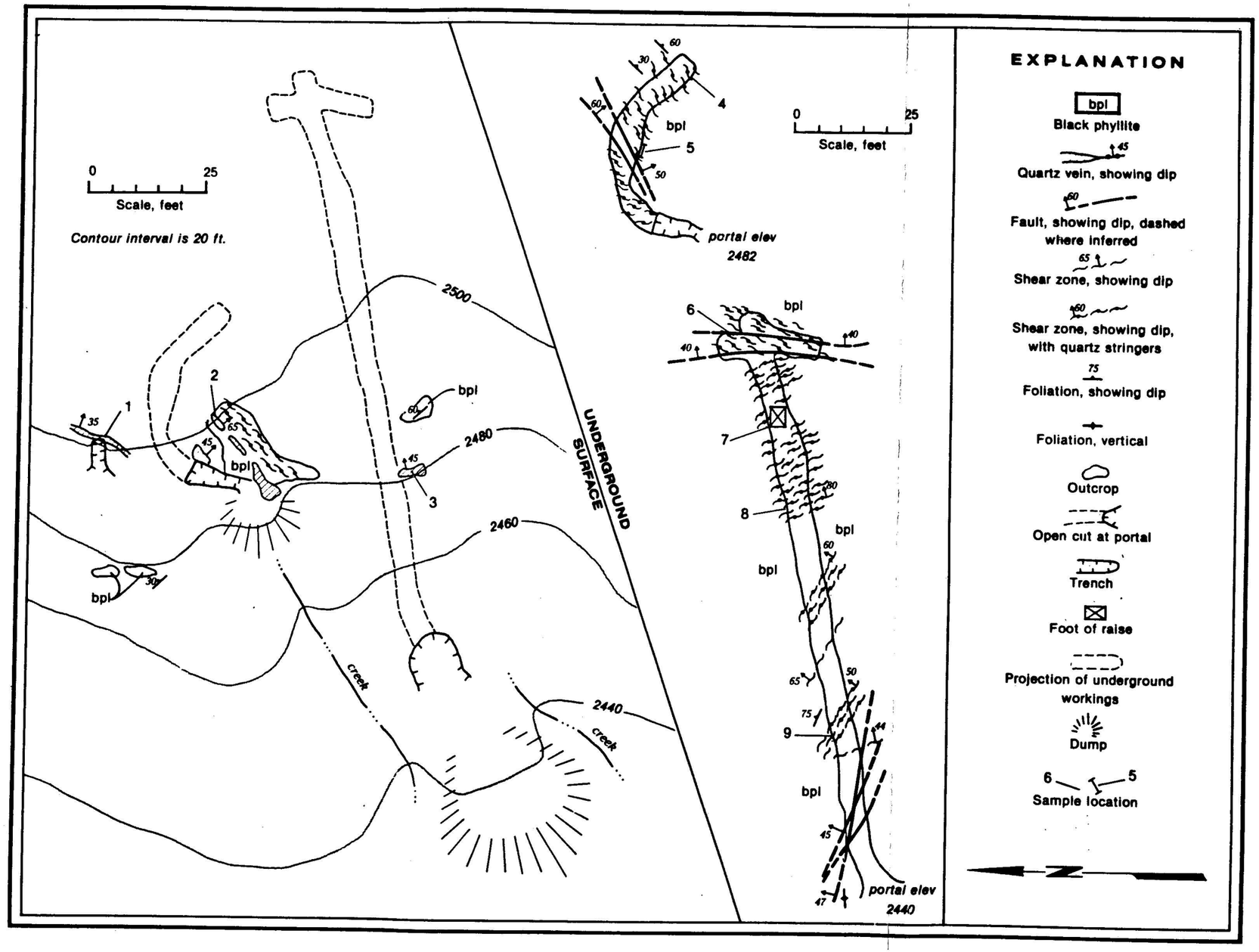


Figure A-8.— Joyce Jensen prospect, showing geology, workings and sample locations.

RECOMMENDATIONS:

None.

REFERENCES:

15, 16, 21, 24, 25, 26, 27, 54.

TABLE A-5. - ANALYTICAL RESULTS - Joyce Jensen (see fig. A-8)

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm					Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	As	
1.....	7358..	Rep. Chip.	2.1	0.058		76	142	90	2.0	800	Quartz vein with up to 2% pyrite.
2.....	7357..	Cont. Chip	4.0	.008		30	70	58	.5	>1000	Quartz vein with minor phyllite.
3.....	7359..	Rep. Chip.		.010		4	92	3	.4	>1000	Quartz vein.
4.....	7356..	Cont. Chip	5.0	.003		39	13	160	.3	>1000	Brecciated quartz vein.
5.....	7355..	Cont. Chip	2.0	.093		33	165	212	2.5	>1000	Brecciated quartz vein.
6.....	7360..	Cont. Chip	3.0	.018		51	77	105	1.2	>1000	Graphitic schist with quartz.
7.....	7362..	Cont. Chip	6.0	<.002		26	12	128	.2	180	Graphitic schist.
8.....	7361..	Cont. Chip	5.0	.002		45	30	149	.6	160	Quartz stringers in graphitic schist.
9.....	7363..	Cont. Chip	3.0	.128		52	247	86	3.4	>1000	Graphitic schist.

NAME(S): Maude S
Joyce Jensen

Map Location No. 7
MAS No. 2TT20081

LOCATION:

Deposit Type: Stringer and fissure vein.
Commodities: Au.

Quadrangle: Juneau C3 SW 1/4 Sec: 2 T: 38S R: 64E
Geographic: 0.5 miles south of the head of Canyon Creek.
Elevation: 2,000-2,200 ft.

HISTORY:

PRODUCTION: None.

The Maude S claims were located during 1906, along with the Black Chief, E Pluribus Unum and Joyce Jensen claims, just over the divide from Yankee Basin at the head of Canyon Creek. During 1907, an 80-ft adit was driven on the property and by 1913 these claims were combined with the Joyce Jensen north workings. An extension to the original adit had been completed prior to the dropping of the property as currently the adit is 220-ft long (27). The area was staked in 1980 by Whelan Exploration and drilled in 1985 by Houston Oil and Minerals.

WORKINGS AND FACILITIES:

A 220-ft long adit, a 10-ft adit and a series of trenches.

GEOLOGIC SETTING:

A surface trench contains a 6-ft wide quartz vein trending N45°W and dipping steeply northeast. The vein contains up to 5% arsenopyrite and pyrrhotite in pods and stringers. Several quartz lenses are exposed in trenches nearby and the wallrocks consist of interbedded slate and phyllite. A 10-ft adit was driven to intersect some of these quartz masses but failed to do so as the quartz pinched out at depth.

A second adit was driven 130 ft downslope from the first adit in an effort to intersect the largest surface exposure of quartz at depth. The adit cuts through or drifts along a series of faults and shear zones containing quartz stringers but, no substantial vein such as that exposed on the surface was intersected. The quartz stringer zones are up to 10-ft wide, trend generally parallel to the northwest foliation of the phyllites, and contain minor amounts of pyrite and pyrrhotite.

BUREAU INVESTIGATION:

The Bureau mapped and sampled all the workings. Samples from the quartz veins in the upper trenches contained up to 0.021 oz/ton gold (No. 1, fig A-9). The shear zones underground contained low gold values. A 1.5-ft wide quartz vein trending N80W is exposed in a trench along the same gully as the lower adit. This vein is below the workings, but contains the highest gold values on the entire property. A sample (No. 3, fig A-9) from a 1.5-ft chip across this vein contained 0.205 oz/ton gold. A select sample of quartz float (No.4, fig. A-9) from the same site contained 0.343 oz/ton gold. Sulfides consist of up to 15% pyrite, galena, and chalcopyrite.

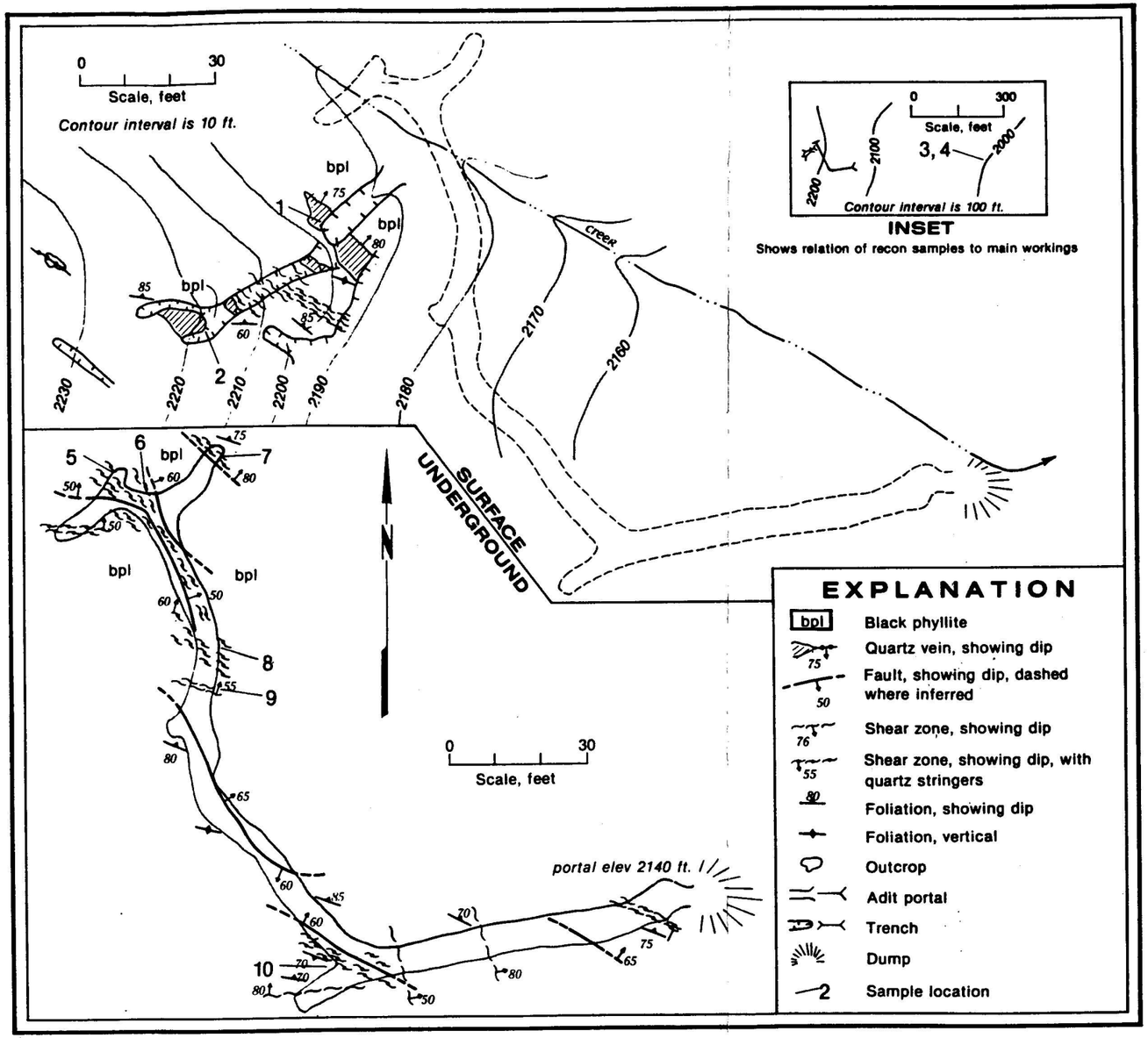


Figure A-9.— Maude S workings, showing geology and sample locations.

RESOURCE ESTIMATE:

The gold values in the upper trenches and adits are extremely low. The samples collected from the lower trenches contained the highest gold values of any collected on the property. The inconsistent nature of the quartz and associated gold gives the prospect a low mineral production potential.

RECOMMENDATIONS:

The quartz vein exposed in the lower trench contains the highest gold values and its extent has not been thoroughly revealed. Continued trenching along the trend of the vein may reveal an extension as well as an estimate of the depth dimension. Drilling may also aid in determining the depth of the vein, but this would be discouraged due to the cost and the lensy nature of the quartz veins in the area.

REFERENCES:

16, 21, 24, 25, 26, 27, 54.

TABLE A-6. - ANALYTICAL RESULTS - Maude S (see fig. A-9)

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm					Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	As	
1.....	7349..	Rep. Chip.		0.021		90	84	10	1.4	>1000	Quartz vein with 3-5% arsenopyrite.
2.....	7350..	Rep. Chip.		.010		10	93	19	0.6	>1000	Quartz vein.
3.....	7351..	Cont. Chip	1.5	.205		378	3600	22	27.0	>1000	Quartz vein.
4.....	7352..	Select....		.343	1.14	1655	5240	71	>30.0	>1000	Quartz float, pyrite/galena/chalcopyrite.
5.....	7343..	Cont. Chip	3.0	.004		44	67	80	.7	190	Quartz stringer zone, trace pyrite, pyrrhotite.
6.....	7344..	Cont. Chip	2.5	.008		63	25	78	.4	325	Quartz stringer zone, trace pyrite, pyrrhotite.
7.....	7345..	Cont. Chip	2.0	.005		62	27	130	.5	400	Quartz stringer zone, trace pyrite, pyrrhotite.
8.....	7346..	Rep. Chip.	3.0	.004		10	17	50	<.2	600	Quartz stringer zone, trace pyrite, pyrrhotite.
9.....	7347..	Cont. Chip	1.5	<.002		16	32	62	.2	75	Quartz stringer zone, trace pyrite, pyrrhotite.
10.....	7348..	Rep. Chip.	7.0	<.002		33	53	73	.2	34	Quartz stringer zone, trace pyrite, pyrrhotite.

NAME(S): Black Chief
Gold Pan Vein
Husky claim group

Map Location No. 8
MAS No. 2TT20204

LOCATION:

Deposit Type: Stringer vein.
Commodities: Au.

Quadrangle: Juneau C3 NE 1/4 Sec: 11 T: 38S R: 64E
Geographic: Head of Canyon Creek, 0.2 miles east of the E Pluribus Unum.
Elevation: 1,690 ft.

HISTORY:

PRODUCTION: None.

The Black Chief was located in 1906, along with the E Pluribus Unum, Joyce Jensen and Maude S claims. The prospect was staked on a 2-ft to 4-ft wide quartz vein (called the Gold Pan Vein) observed in a gulch above the present workings. An adit was commenced in 1907 to undercut the lode and by 1908 it had been completed. The reported length was 180 ft, but Bureau work performed in 1986 showed 320 ft of workings in this adit. The property was described by Roehm in 1936 (31), but the majority of the interest in this property was due to the success achieved at the adjacent E Pluribus Unum Mine. The property is currently staked, but no development work is taking place.

WORKINGS AND FACILITIES:

An adit with 320 ft of workings, a sloughed prospect pit and a caved adit located 100 ft upstream from it occur on the property.

GEOLOGIC SETTING:

A series of N45°W to nearly E-W trending shear zones up to 20-ft wide are exposed in a stream bottom at 1,750 ft elevation in upper Canyon Creek. The shear zones occur in phyllite and graphitic schist and contain numerous quartz stringers averaging 1-in wide which locally contain pyrite, arsenopyrite, and galena. Within the zones the phyllites locally develop into graphitic schists. An adit was driven to undercut these shear zones and associated quartz veins 60 ft below the surface (fig. A-10). The adit cuts shear zones up to 10-ft wide which are probably the same ones seen at the surface. The shear zones branch in many places around masses of more competent rocks (probably silicified phyllites). These smaller shear zones may be included within a larger structure up to 25-ft wide.

BUREAU INVESTIGATION:

The Bureau mapped the surface and underground geology (fig. A-10) and collected 13 samples (table A-7). Samples from the surface quartz stringer zones (No.3, fig A-10) contained up to 0.49 oz/ton gold across a 2-ft wide zone, while none of the underground samples contained significant gold values. Several other shear zones were sampled up the creek but, they also contained low gold values.

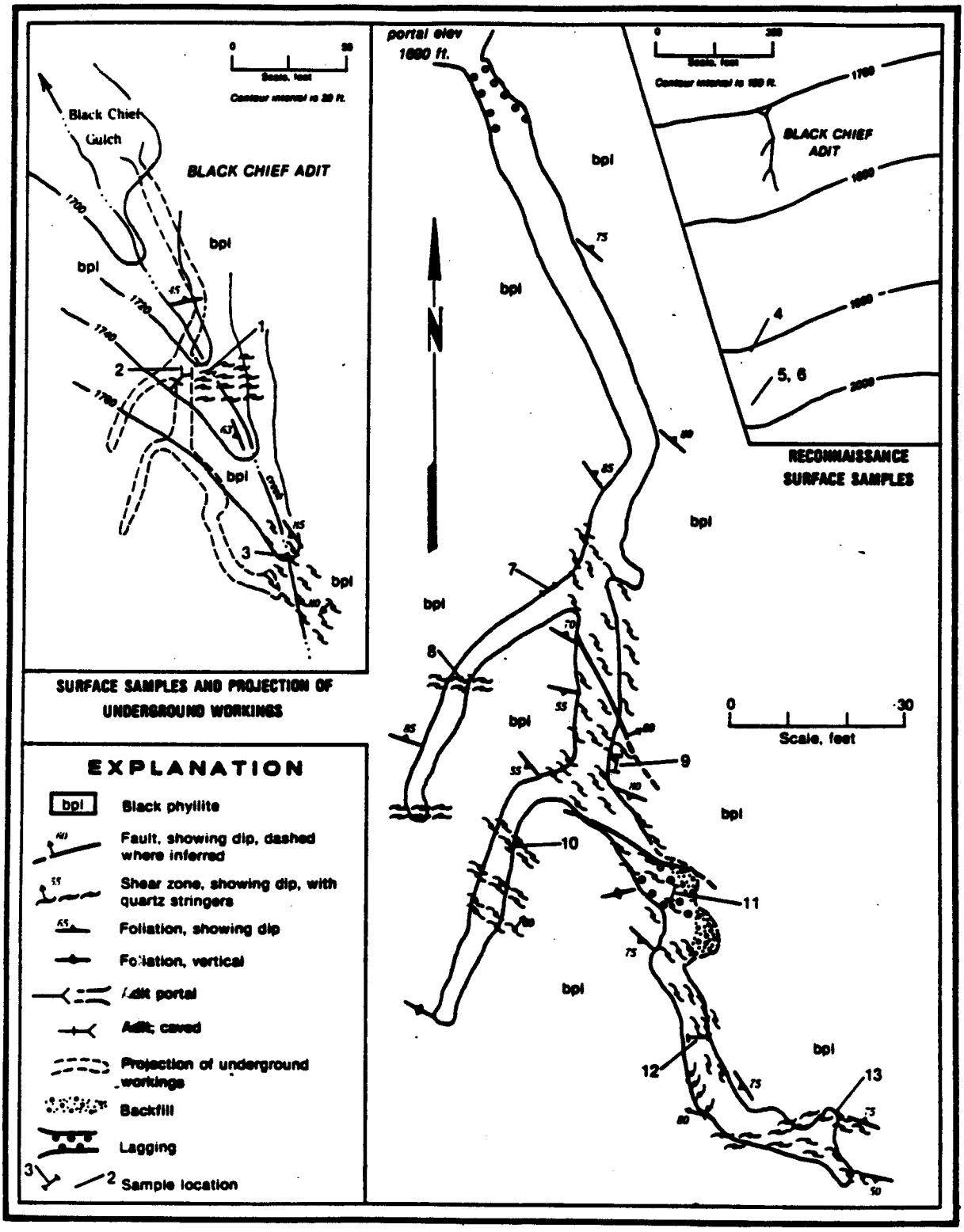


Figure A-10.— Black Chief prospect, showing geology and sample locations.

RESOURCE ESTIMATE:

The large difference in values between surface and underground samples displays the discontinuity of gold mineralization. If the surface gold values are averaged, projected halfway to the adit level, and a minimum 115-ft strike length is used, then an inferred resource of 7,188 tons at 0.39 oz/ton gold could be obtained. This is the best-case scenario. Overall, the property has a low mineral production potential due to the discontinuous nature of the quartz, and the low values obtained underground.

RECOMMENDATIONS:
Trench along the vein in the creek and sample accordingly to determine the gold values present. The vein was not intersected at depth in the adit, so drilling would not be recommended.

REFERENCES:

16, 24, 25, 26, 27, 31, 55.

TABLE A-7. - ANALYTICAL RESULTS - Black Chief (see fig. A-10)

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm						Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	As	Pb %	
1.....	7342..	Select....		0.297	1.37	1510	>7500	810	>30.0	>1000	1.70	Quartz float, galena/pyrite/ arsenopyrite.
2.....	7329..	Rep. Chip.		.010		50	16	55	0.3	110		Quartz stringer zone, chalcopyrite/ pyrite/arsenopyrite.
3.....	7330..	Cont. Chip	2.0	.486	1.22	530	>7500	155	>30.0	1000	1.38	Quartz stringer zone.
4.....	7341..	Select....		.014		46	4	42	.2	130		Quartz stringer zone, trace arsenopyrite/pyrrhotite.
5.....	7339..	Select....		<.002		2	66	51	.2	60		Quartz stringer zone, ankerite, sericite.
6.....	7340..	Select....	7.0	.049		27	25	43	.3	150		Quartz stringer zone, trace pyrite.
7.....	7335..	Cont. Chip	3.0	.002		43	14	81	<.2	120		Quartz stringer zone, trace pyrite.
8.....	7338..	Cont. Chip	2.5	<.002		44	8	72	<.2	62		Quartz stringer zone, trace pyrite.
9.....	7331..	Cont. Chip	5.0	<.002		19	16	46	<.2	100		Quartz stringer zone, minor pyrite.
10.....	7336..	Cont. Chip	3.0	<.002		40	3	80	<.2	150		Quartz stringer zone, trace pyrite.
11.....	7337..	Cont. Chip	3.0	<.002		28	9	68	.2	150		Quartz stringer zone.
12.....	7333..	Cont. Chip	2.0	<.002		7	3	49	<.2	100		Quartz stringer zone, pyrite.
13.....	7332..	Cont. Chip	3.5	.003		30	7	45	<.2	>1000		Quartz stringer zone, pyrite.

NAME(S): E Pluribus Unum
: Cottrell-Spaulding
Husky, Misty

Map Location No. 9
KX No. 112-35
MAS No. 2111120037

LOCATION:

Deposit Type: Stringer and fissure vein.
Commodities: Au.

Quadrangle: Juneau C3 NW 1/4 Sec: 11 T: 38S R: 64E
Geographic: 3.5 miles northeast of Yankee Cove.
Elevation: 1,740-1,900 ft.

HISTORY:

Production: 154 oz gold.
see below

The E Pluribus Unum property was discovered in 1906 by Cottrell and Spaulding about 1-1/2 miles northwest of Yankee Basin in the upper basin of Canyon Creek. A crosscut tunnel was driven 160 ft with a 75-ft drift and a 60-ft raise to intersect the vein. This adit was extended to 200 ft by Jourdan and Cottrell in 1908. A small mill to aid development was brought in during 1909. Production may have occurred in 1909, but actual records are not available.

Exploration continued at the E Pluribus Unum in 1910 as a second adit was driven 40 ft with a 10-ft drift. This work must have been disappointing as additional activity was not reported until Victor Spaulding relocated the claims in 1927-1928. Activity waned again until 1935, when Karl Ashenbrenner and Jack Koby leased the E Pluribus Unum from Spaulding for a five year period. A two-ton Gibson Mill and a three-ton capacity Wilfley Table, both powered by a 1-1/2 horsepower Fairbanks-Morse gasoline engine, were erected at the mouth of the lower adit and mining began. In 1935, over 34 oz of gold were recovered from 1456 lb of concentrates. Mining continued until 1940 when Ashenbrenner and Koby departed. A total of 154 oz of gold, 44 oz of silver, 242 lb of lead and 11 lb of copper were recovered from 106 tons of ore during this five year period.

Core drilling was performed in the area by Houston Oil and Minerals in 1985, but these efforts did not uncover a new orebody. Today, the E Pluribus Unum claims are still valid, although active mining has not resumed.

PRODUCTION: The following table was compiled from Bureau records (46):

Year	Tons	Oz Au	Oz Ag	Oz/ton Au	Oz/ton Ag	lb Pb	lb Cu
1935	35	34	10	0.97	0.29	35	
*1936	1	50	15	50	15	100	
1939	30	34	8	1.13	0.27	23	2
1940	40	36	11	0.9	0.28	84	9
TOTAL	106	154	34			242	11

Average grades: 1.45 oz/ton gold, 0.42 oz/ton silver.
*tonnage probably refers to a concentrate.

WORKINGS AND FACILITIES:

Underground workings total 345 ft on three levels and several surface trenches are also present. Milling equipment consists of a 7 in. jaw crusher, gibson mill, and gravity table.

GEOLOGIC SETTING:

The mineralization at the E Pluribus Unum lies within a zone of sheared phyllite and graphitic schist at least 130-ft wide that can be projected along strike in a N45°W trend for nearly 5000 ft. Rocks within the zone are intensely folded and sheared and are characterized by ubiquitous crenulation folding. Foliation strikes from N30W-N55°W and steeply dips to the northeast. Recumbent folds are present underground and may have developed after crenulation-type cleavage. This type of folding is best developed in the lower or No. 1 adit. In the open cut at the No. 2 adit a broad-limbed synform plunges 33° along a southeast trending fold axis.

A series of faults with an average trend of N60°W and dipping steeply to both the northeast and southwest cut across schistosity.

Two types of quartz veins are found in the area:

1. Quartz stringer zones parallel to schistosity. Individual stringers average 1-in. wide and the stringer zones are up to 6-ft wide. Often they are localized adjacent to fault-gouge zones. The stringer zones contain minor pyrite, arsenopyrite, and a trace of chalcopyrite. Stringer zones are most prevalent in the No. 1 adit (fig. A-13). Samples from these averaged 0.01 oz/ton gold (table A-8). This type also occurs at the Black Chief located 0.2 miles east (fig. A-10).

2. Fissure quartz veins associated with fold noses. This type occurs as fissure fillings in open spaces on the noses and adjacent limbs of folds. These are up to 2.5-ft thick and trend in both NW and NE directions. They contain mainly arsenopyrite with minor sphalerite and galena. Locally the arsenopyrite occurs in massive fist-size clots. Samples from these averaged 0.88 oz/ton gold. These veins are exposed in adits No. 2-3 (figs. A-14,15).

   The fissure veins are of the most interest because of their high gold values. Stibnite is reported to occur in the veins at the E Pluribus Unum, making it the only known occurrence in the Eagle River area.

BUREAU INVESTIGATION:

The Bureau mapped and sampled the mine workings in the area. The Bureau also collected a 300 lb metallurgical test sample of vein quartz from dumps and outcrops at all three adits. The sample was analyzed by the Bureau's Salt Lake City Research Center and the results are shown below (10):

Results of Cyanide Amenability Tests

Sample	Grind	Assay (oz/ton)				Extraction (%)		Reagents lb/ton	
	%-325 mesh	Head Au	Head Ag	Residue Au	Residue Ag	Au	Ag	NaCN	Lime
E Pluribus Unum	82	.124	.12	.01	-.05	92.1	83.4	23	1.1

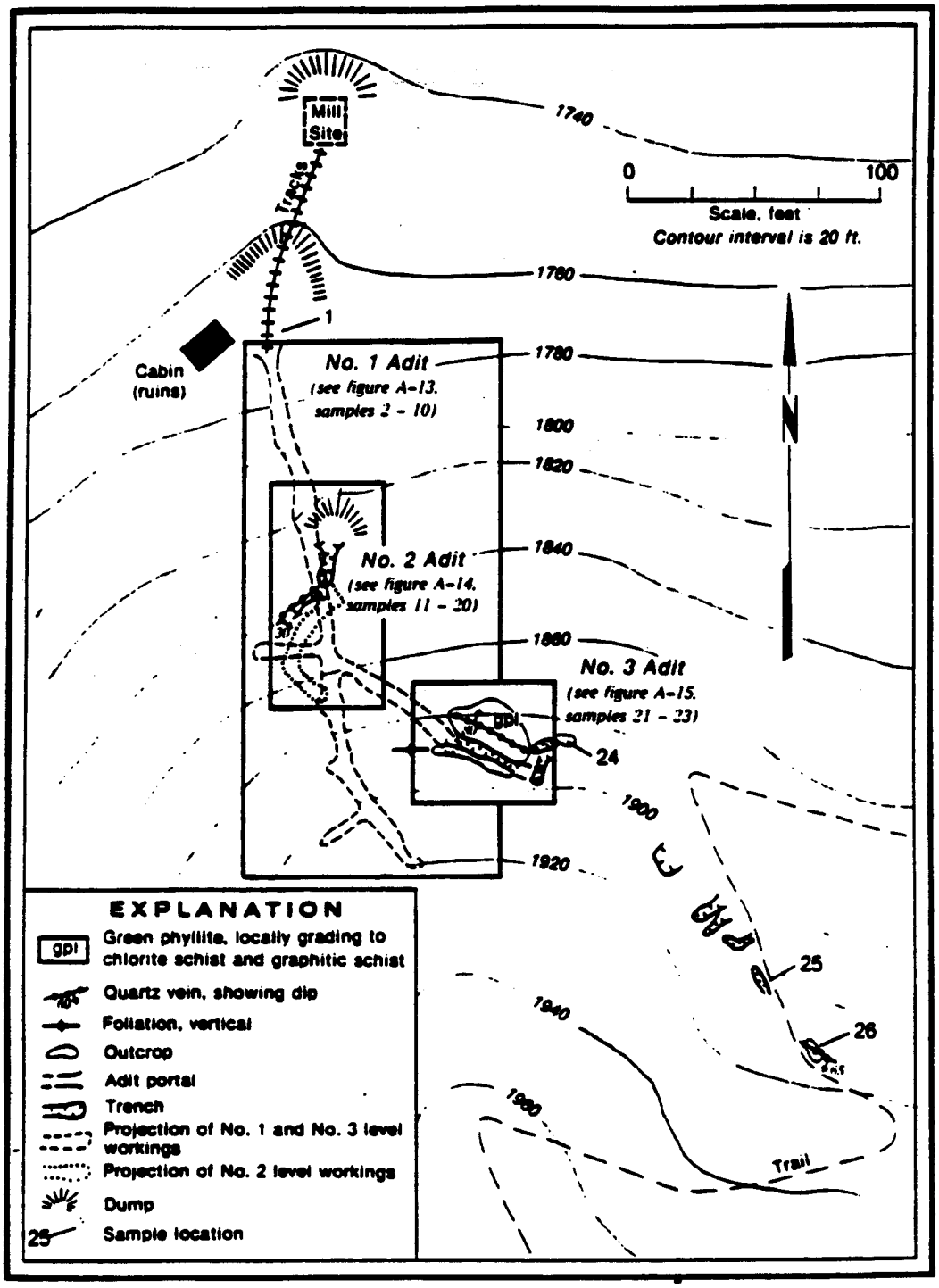


Figure A-11.—E Pluribus Unum, surface geology, workings and sample locations.

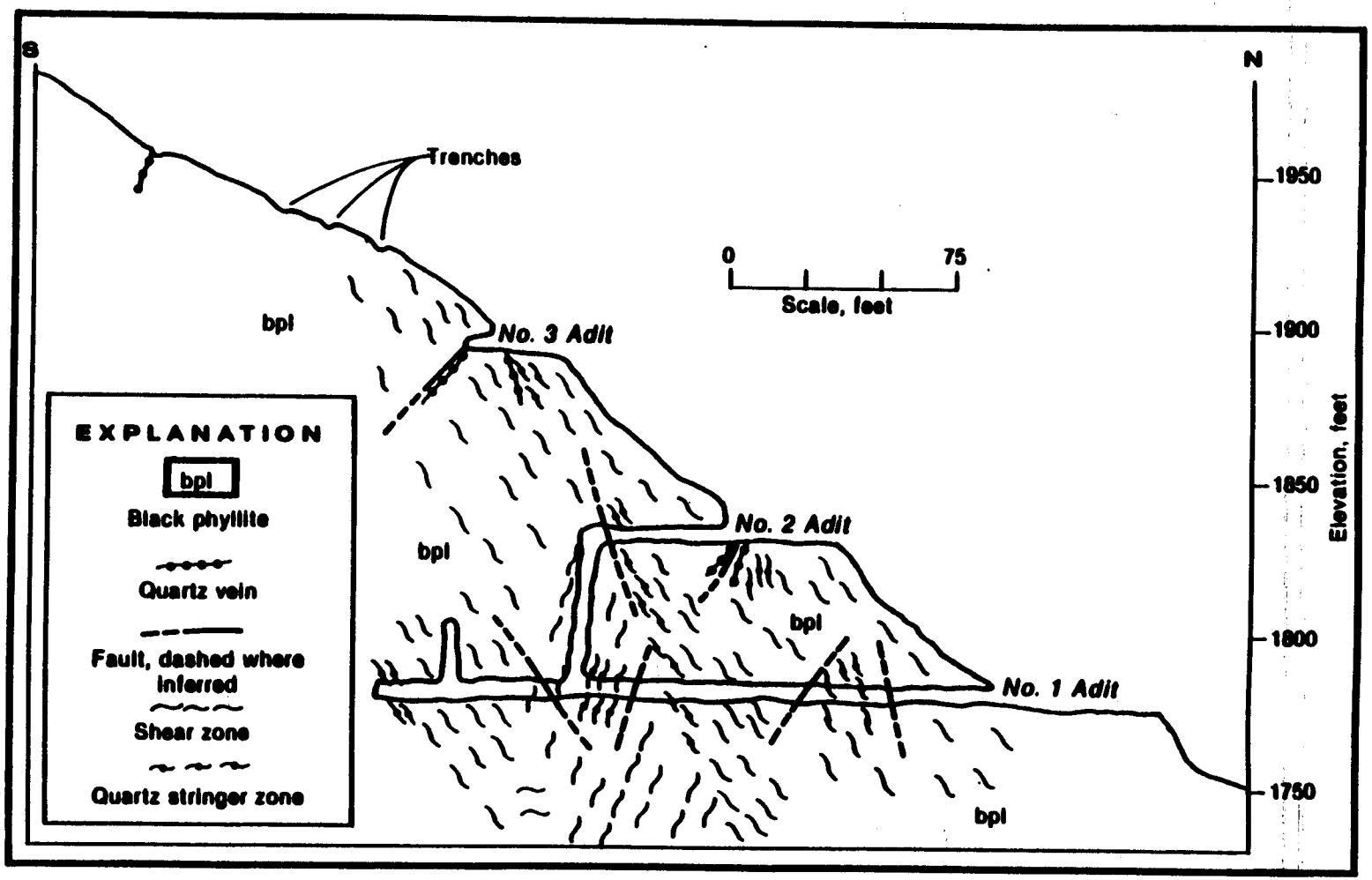


Figure A-12.—E Pluribus Unum longitudinal section, looking west.

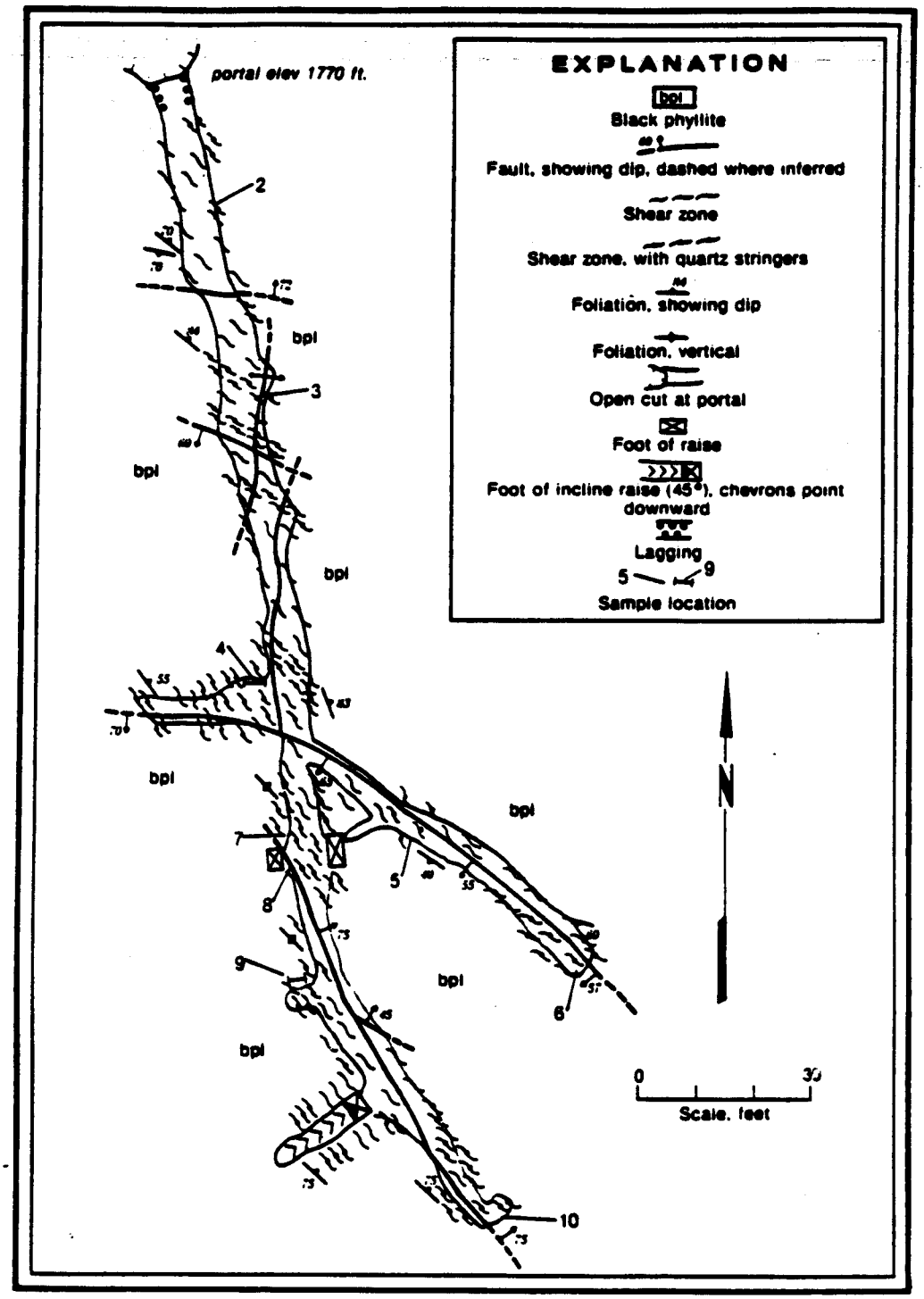


Figure A-13.—E Pluribus Unum - No. 1 Adit, showing geology and sample locations.

The cyanide amenability test results show 92% recovery of the extractable gold, using 23 lb of sodium cyanide reagent.

The highest gold values were obtained from samples collected in adit No. 2. A sample of quartz vein material containing scorodite (No. 13, fig A-14) assayed 3.57 oz/ton gold and another sample of quartz in graphitic schist (No. 14, fig. A-14) contained 1.75 oz/ton gold.

The No. 1 adit was apparently driven to intersect gold-bearing fissure type quartz veins exposed near the surface adjacent to adit No. 2. A high grade vein making up the limbs of a fold exposed in No. 2 was plunging southeast at a 33° angle at the working face. Adit No. 1 was not driven far enough to intersect the projected plunge at its level. A raise was thus driven between the two levels to intersect the vein. Knopf (16) states that the raise reportedly encountered ore. It was entered by the Bureau but no significant quartz veining was seen.

RESOURCE ESTIMATE:

The following estimate is based on Bureau sampling and mapping of the exposed veins

Indicated Resources

Area	Tons	Oz/ton gold	Avg. vein width (ft)
Adit No. 2	65	0.88	1.8
Adit No. 3	37	0.13	2.2
Total	102	0.61	2.0

Average grade 0.61 oz/ton gold.

This area has moderate mineral development potential for gold, but tonnages are small.

RECOMMENDATIONS:

Drill between adit No. 2 and adit No. 3 to determine the continuity of the south limb of the fold which has been mined out in both adits. Continue to trench along the northern limb of the fold seen in adit No. 2. Drill to test downward extension of veins and nose of the synform exposed in adit No. 2.

REFERENCES:

16, 21, 24, 25, 26, 27, 31, 46, 50, 54.

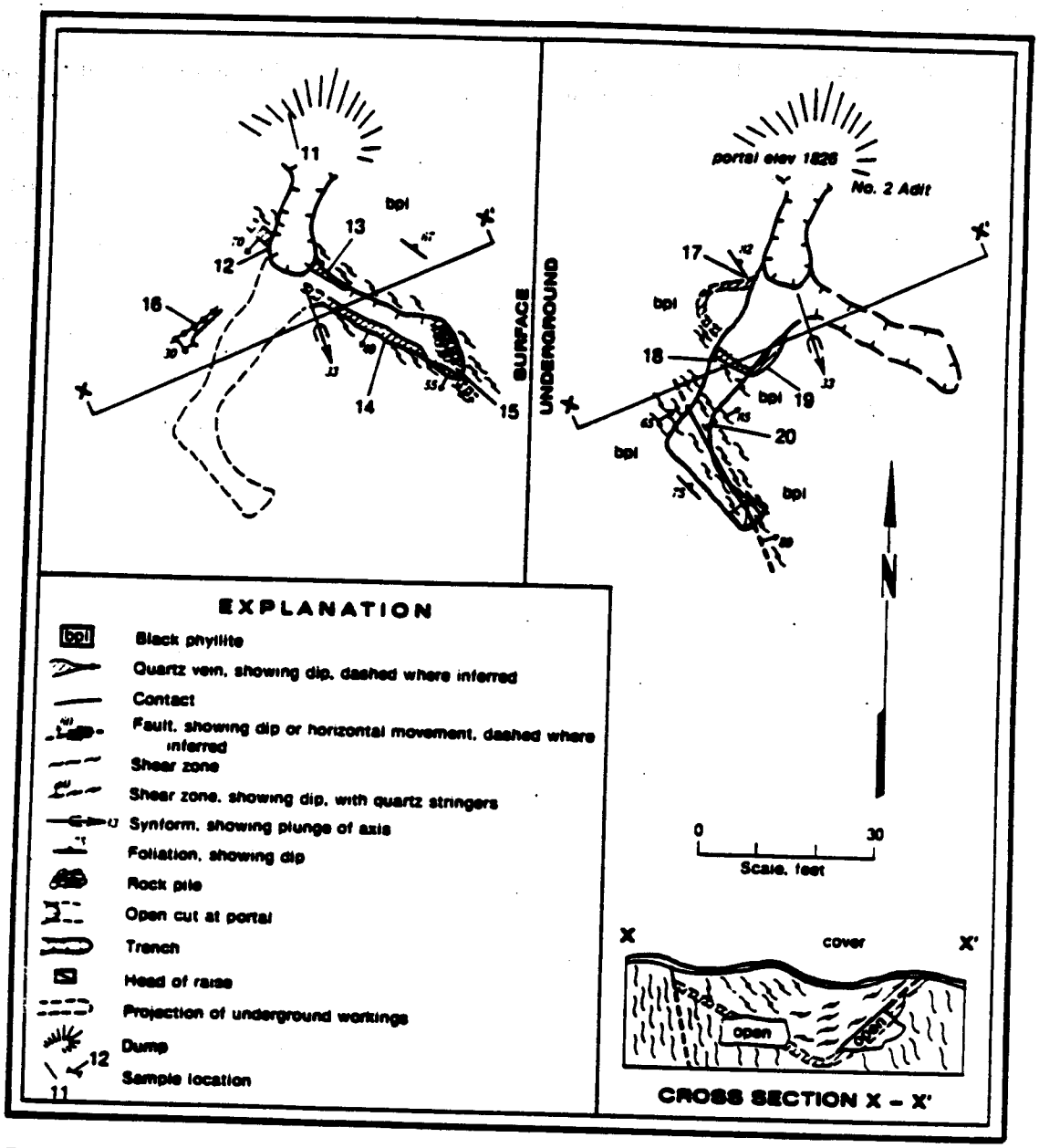


Figure A-14.— E Pluribus Unum - No. 2 Adit, showing geology and sample locations.

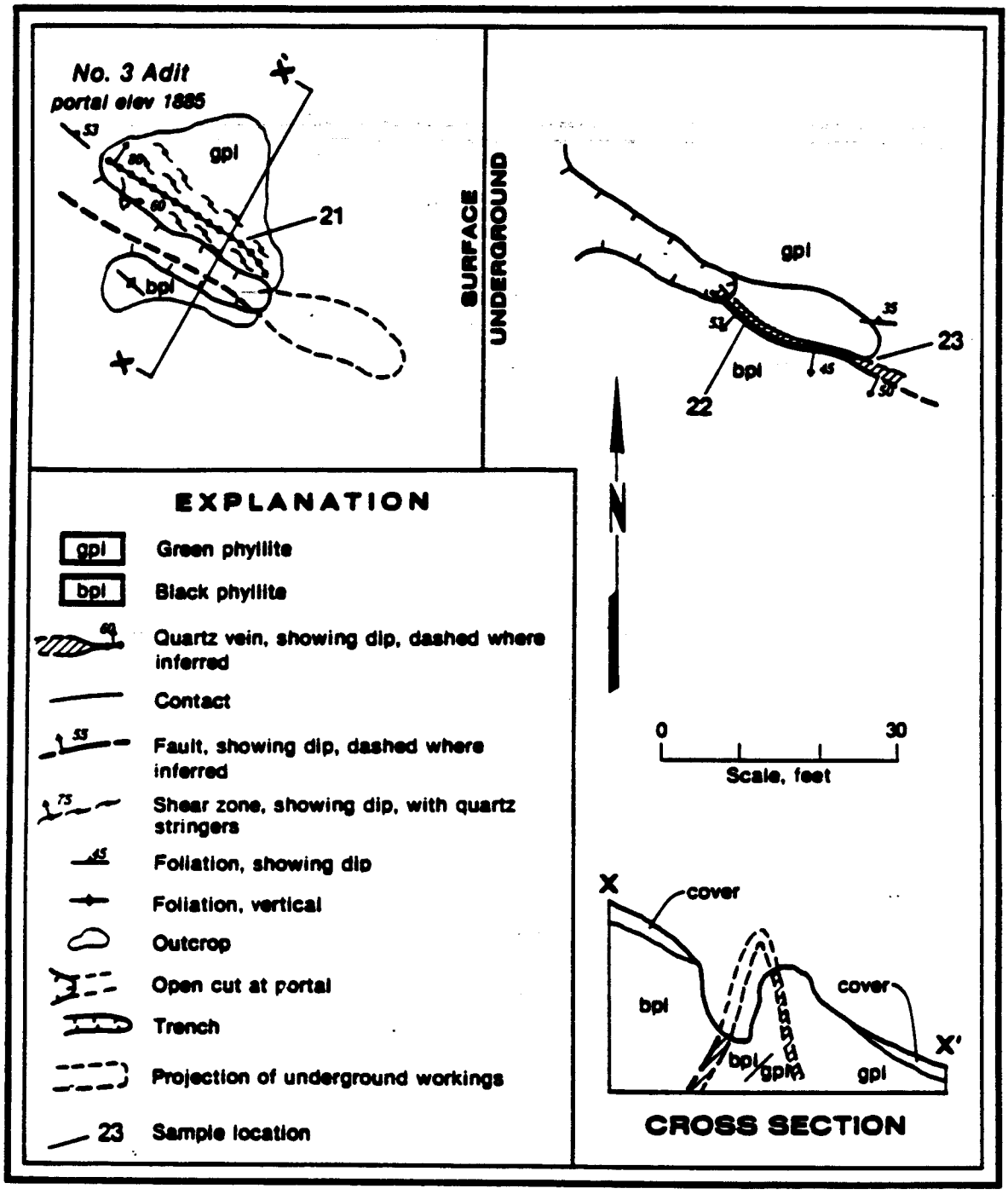


Figure A-15.— E Pluribus Unum - No. 3 Adit, showing geology and sample locations.

TABLE A-8. - ANALYTICAL RESULTS - E Pluribus Unum (see figs. A-11 through A-15)

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm					Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	As.	
1.....	7318..	Select....		0.072		2	7	10	0.3	>1000	Vein quartz from ore pile.
2.....	7309..	Cont. Chip	2.0	<.002		37	5	67	<.2	16	Sheeted quartz veins in phyllite.
3.....	7310..	Cont. Chip	4.0	.002		41	6	58	<.2	24	Quartz stringer zone.
4.....	7316..	Cont. Chip	4.5	.004		42	12	99	<.2	63	Quartz vein, intense folding.
5.....	7313..	Cont. Chip	2.5	.007		57	3	92	<.2	750	Quartz stringer zone.
6.....	7312..	Cont. Chip	2.0	<.002		71	5	110	<.2	80	Quartz stringer zone.
7.....	7311..	Cont. Chip	3.0	.025		21	7	39	.2	35	Up to 4% pyrite stringers.
8.....	7317..	Select....		.869		<1	188	9	1.5	>1000	Vein quartz from ore pile.
9.....	7315..	Rep. Chip.	6.0	.012		37	41	89	.2	250	Quartz stringers in phyllite.
10.....	7314..	Cont. Chip	4.0	<.002		147	10	117	.2	26	Quartz veins in green phyllite.
11.....	3275..	Grab.....		.20		5	1200	16	6.1		Massive arsenopyrite.
12.....	7319..	Cont. Chip	1.5	.168		1	16	13	.4	>1000	Quartz vein.
13.....	7320..	Rep. Chip.		3.573		3	460	22	14.0	>1000	Quartz vein with scorodite.
14.....	7321..	Cont. Chip	2.8	1.747		3	340	138	8.0	>1000	Quartz vein in graphitic schist.
15.....	7325..	Rep. Chip.		.004		11	14	27	<.2	1000	Quartz stringer zone.
16.....	7328..	Cont. Chip	1.0	.063		10	92	22	.4	>1000	Quartz vein, phyllite partings.
17.....	7323..	Cont. Chip	2.0	.418		7	1940	39	7.1	>1000	Quartz vein with arsenopyrite.
18.....	7326..	Select....	0.4	.123	0.93	3	8600	23	>30.0	>1000	Massive arsenopyrite clots in quartz vein.
19.....	7322..	Cont. Chip	2.5	.091		<1	420	36	1.5	>1000	Quartz vein, phyllite partings.
20.....	7324..	Cont. Chip	5.0	.006		65	23	81	<.2	280	Quartz stringer zone.
21.....	3273..	Cont. Chip	1.5	.243		7	540	207	2.5		Quartz vein.
22.....	7327..	Cont. Chip	2.5	.025		18	98	40	.2	>1000	Quartz vein in phyllite.
23.....	3272..	Cont. Chip	2.5	.165		11	56	47	.7		Quartz vein.
24.....	3274..	Cont. Chip	5.0	.002		16	15	78	<.2		Quartz vein.
25.....	7220..	Grab.....		.005		7	7	31	<.2		Quartz vein.
26.....	7219..	Rand. Chip		.00029		10	9	33	<.2		Quartz vein.
27.....	3330..	Grab.....		.124	.12						300 lb metallurgical sample, vein quartz.

NAME(S): Julia Group
Yankee Basin
Cascade
Noonday
Puzzler

Map Location No. 10
MAS No. 2TT20082

LOCATION:

Deposit Type: Stringer and fissure vein.
Commodities: Au.

Quadrangle: Juneau C3 NE 1/4 Sec: 14 T: 38S R: 64E
Geographic: South and east side of Yankee Basin.
Elevation: 2,000-2,500 ft.

HISTORY:

PRODUCTION: None.

Mineralization in Yankee Basin had been found as early as 1887 by William Ripstein and John Riggins. A year later, Archer and Moran located a "very good claim" in Yankee Basin and were doing assessment work. According to the Daily Record Miner, the basin was staked by John Heid and Jim Smith in 1888. Thomas Nowell bought these claims, hauled in a large amount of hydraulic piping and equipment and tried to expose significant quartz veining. Nowell failed and Yankee Basin was idle until 1903 (25).

In 1903, Milo Kelly and Thomas Smith stumbled upon an outcrop "so rich that they were getting $150-$500 worth of gold each day". Where this outcrop actually occurred is not certain but, coupled with another lucrative strike made by Frank Bach and partners, it led to the restaking of Yankee Basin.

Sometime in 1904, John Heid acquired the Julia Group of claims which included the Cascade, Noonday, Puzzler and Dividend (discussed separately). Most of his work focussed on opening the Dividend lode, but exploration and minor development did occur on the other claims during this year. By 1912, an inclined shaft had been driven on the Cascade lode (16). This was the last reported activity in this area until the 1980's.

Whelan Exploration staked the area in 1980 and then Placid Oil, and Houston Oil and Minerals subsequently drilled the area on a lease obtained from Whelan. Houston Oil and Minerals left the area after the 1985 field season and currently Pangea Resources is looking at the area for prospective drilling targets.

WORKINGS AND FACILITIES:

An 18-ft adit is located at 2,490 ft elevation, an 8-ft adit occurs at 2,570 ft elevation, many trenches and prospect pits occur throughout the area, and a caved inclined shaft and prospect pit occur at 2,000 ft elevation.

GEOLOGIC SETTING:

A zone of northwest striking intercalated phyllite, graphitic schist, and felsic phyllite crops out along the east side of Yankee Basin. The felsic phyllite occurs high on the basin walls and can be traced intermittently for 2,000 ft across the basin. Its thickness could not be determined. Numerous quartz stringers and lenses are parallel to foliation in the felsic rocks. The protolith of this felsic phyllite may be a tuffaceous volcanic rock. The rocks in this area have undergone deformation as

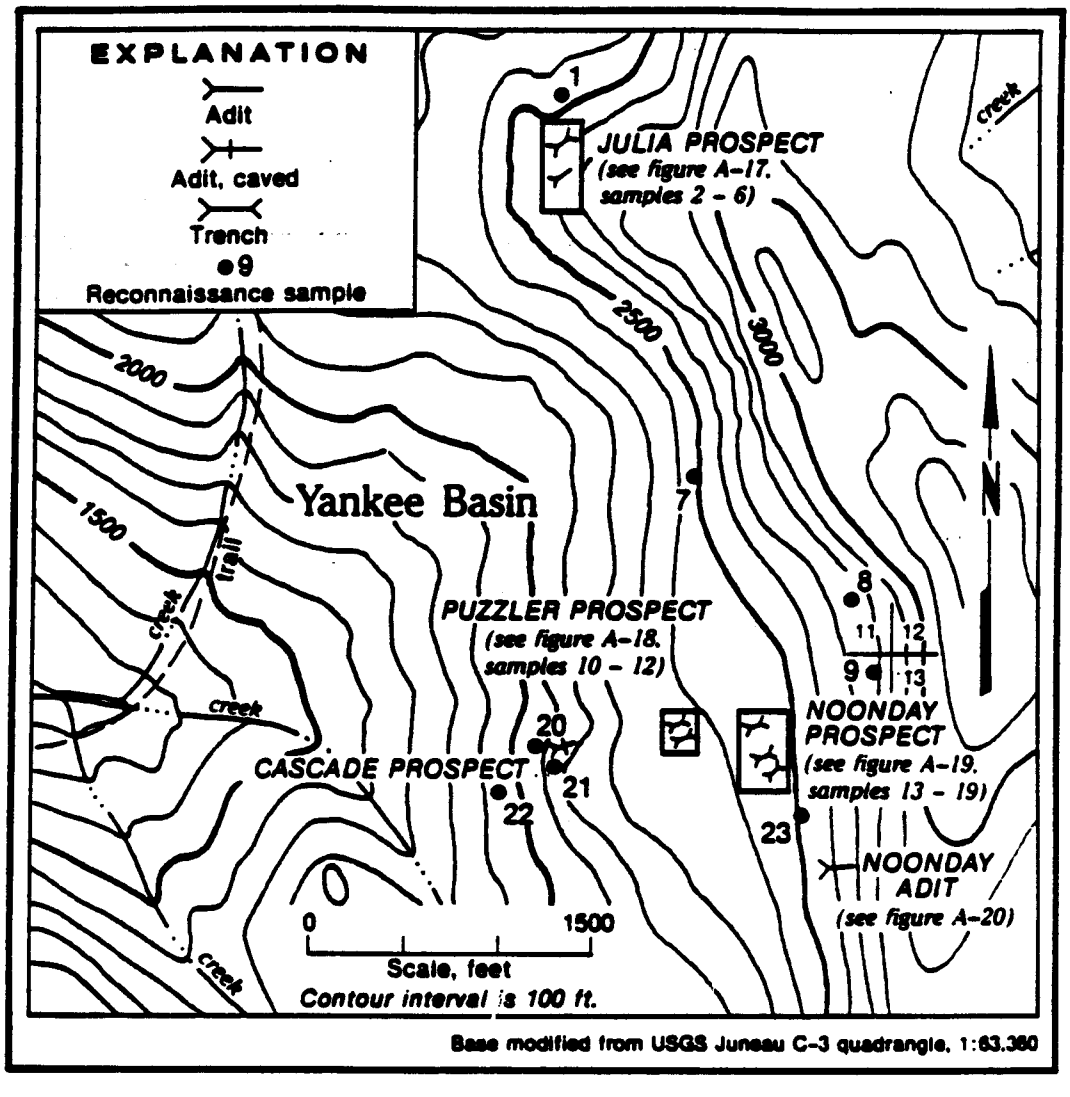


Figure A-16.— Yankee Basin: Julia Group - prospect locations and reconnaissance sample locations.

indicated by the variability in dip directions of the shear zones and crenulation folds.

Samples from this area contain very low gold values. The felsic phyllite is exposed at the portal of the Noonday adit (fig. A-20) at 2,490 ft elevation. Further to the east a series of trenches at 2,450 ft and 2,290 ft elevation, respectively, expose both quartz lenses and stringer zones in phyllite and slate (figs. A-17, 18). The quartz lenses contain minor amounts of pyrite, arsenopyrite, scorodite, and galena and appear to be very discontinuous. The mineralized zones cut by the Noonday adit and the trenching 650 ft to the northwest may be along the same northwest trending shear zone which extends through this area and on to the Canyon Creek workings to the north.

BUREAU INVESTIGATION:

The Bureau mapped and sampled all the workings located in the area. The highest gold value of 1.47 oz/ton was a select sample (No. 19, table A-9) taken from a 10 ft by 25 ft quartz lense at 2,280 feet (fig. A-19). Other samples in this location contained from 0.3-0.5 oz/ton gold. A sample collected from a trench on the upper end of the Cascade claim contained 0.1 oz/ton gold and float taken from a trench on the Puzzler claim near the caved Cascade adit at 2,000 ft elevation contained 0.182 oz/ton gold (No. 10, fig. A-18).

RESOURCE ESTIMATE:

The gold values from the 2,280 ft elevation workings would give that area a moderate mineral production potential, but tonnages are probably quite small. A drill hole put down by Houston Oil and Minerals in the vicinity of the 2,280 ft showings crossed an 18-ft thick zone of sheared phyllites containing quartz stringers and trace pyrite. Assays of this zone are unavailable.

RECOMMENDATIONS:

Previous drilling has shown that surface quartz exposures rarely extend to any appreciable depth. A major trenching program undertaken across strike of the local foliation at various intervals along strike may expose enough quartz veining to merit a detailed sampling program. Drilling is expensive and site specific. A series of 100-ft long trenches spaced 50 ft to 100 ft apart along strike may be more beneficial.

REFERENCES:

5, 16, 21, 24, 25, 26, 27, 53.

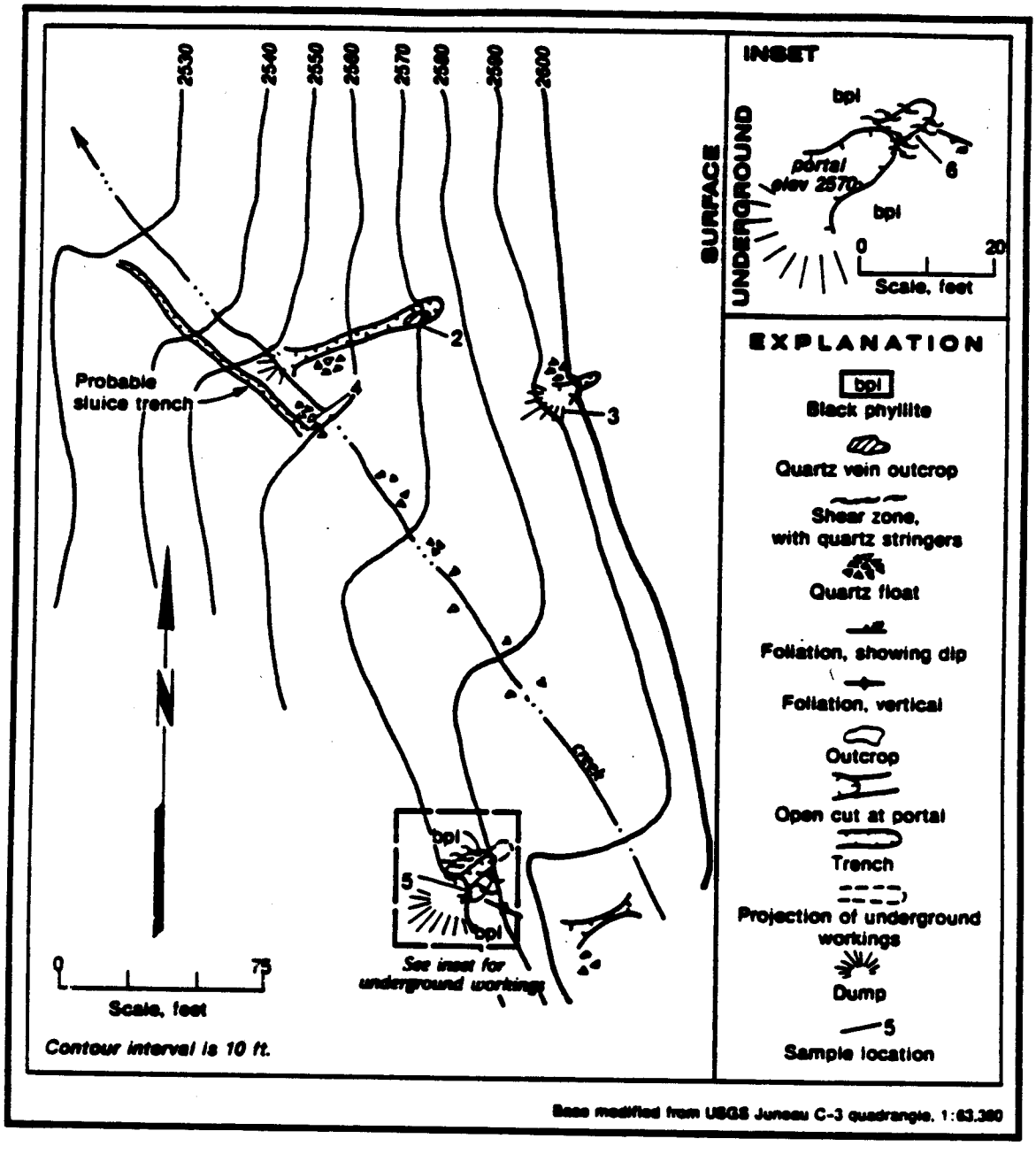


Figure A-17.— Julia prospect, showing geology and sample locations.

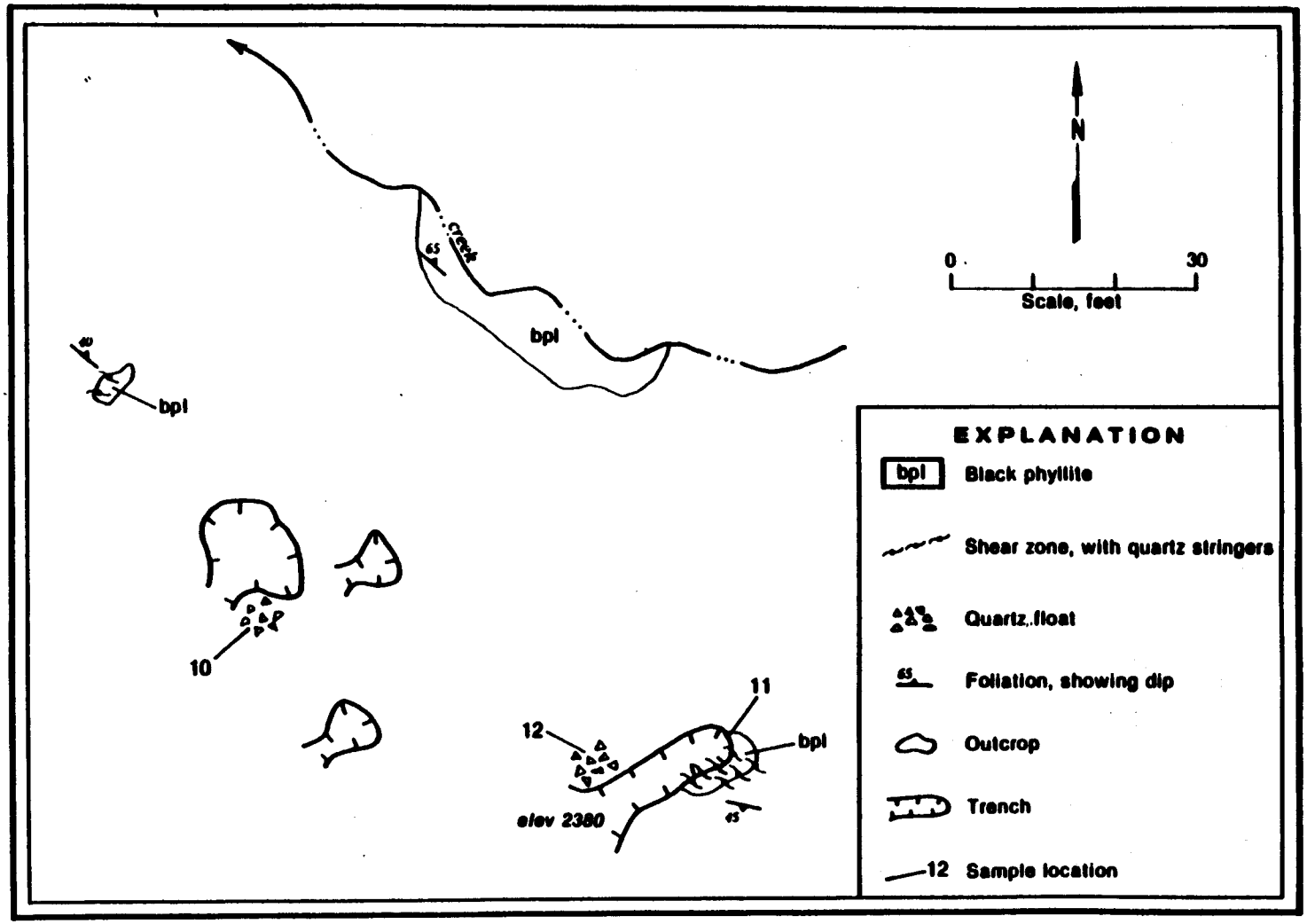


Figure A-18.— Puzzler prospect, showing geology and sample locations.

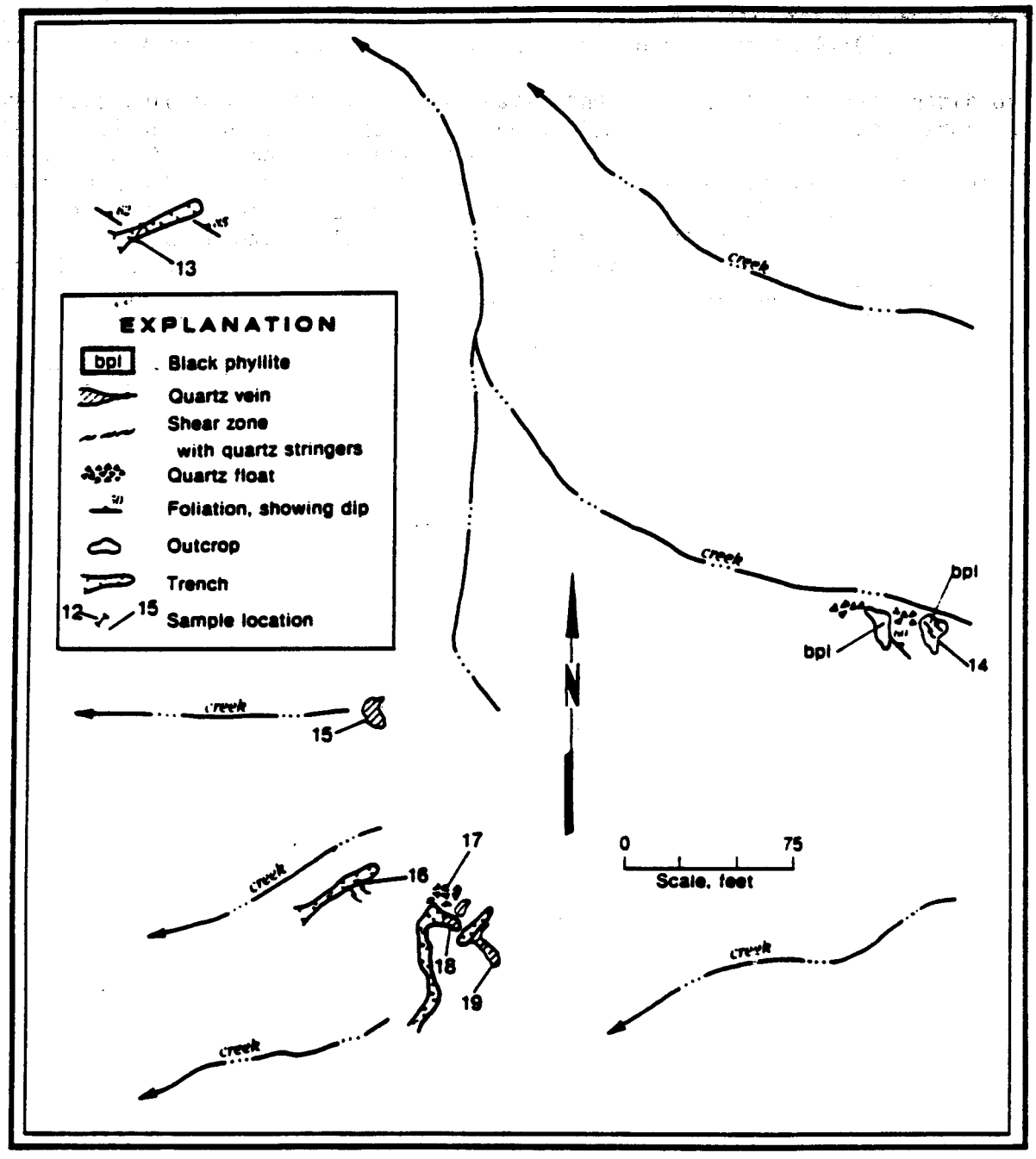


Figure A-19.— Noonday prospect area, showing geology and sample locations.

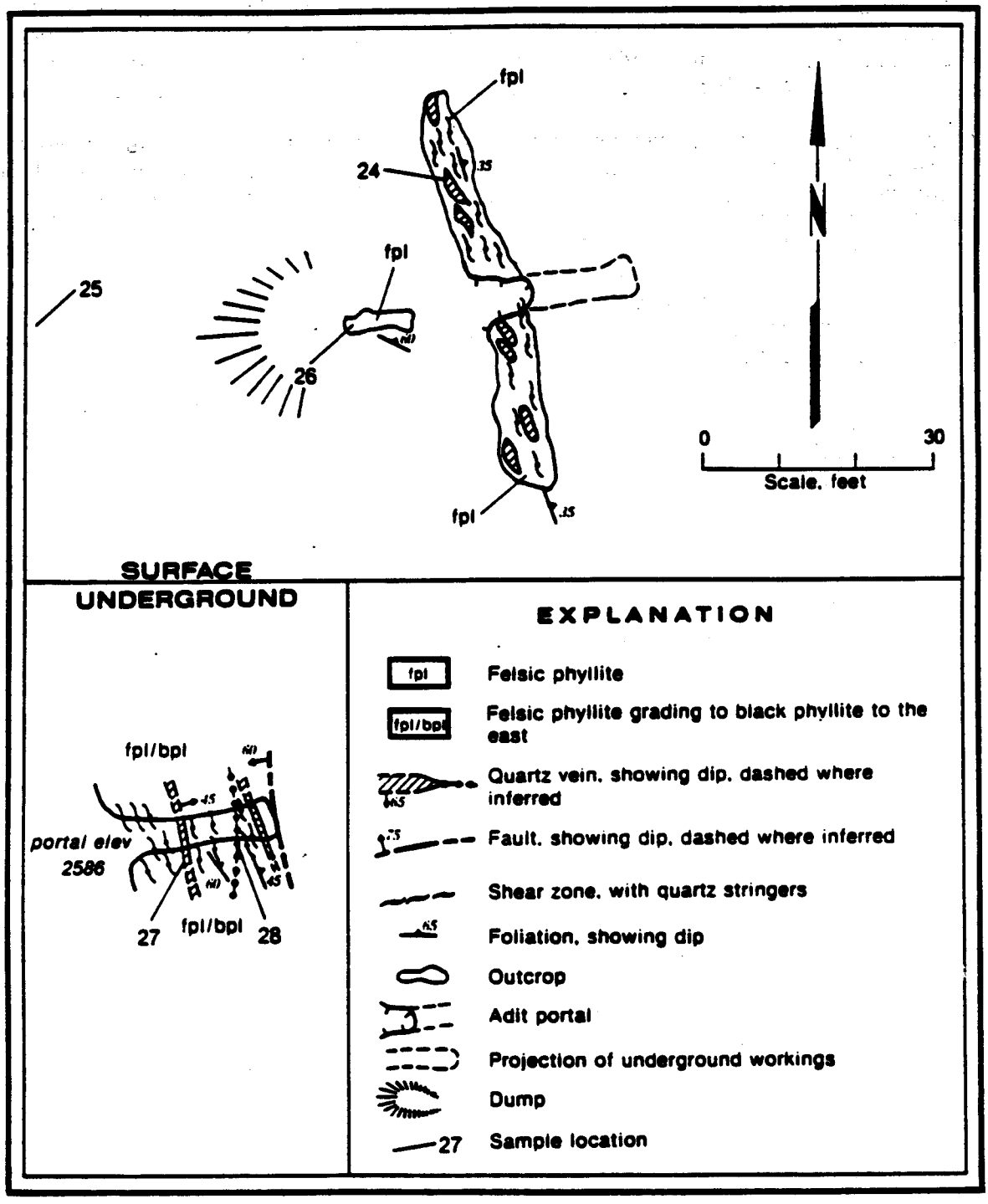


Figure A-20.— Noonday Adit, showing geology and sample locations.

TABLE A-9. - ANALYTICAL RESULTS - Julia Group (see figs. A-16 through A-20)

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm					Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	As	
1.....	6336..	Select....		<0.002		11	14	32	0.2	85	Vein quartz.
2.....	6334..	Select....		<.002		14	8	13	.2	120	Vein quartz.
3.....	6333..	Select....		.005		16	14	40	.7	400	Vein quartz rubble.
4.....	6335..	Rand. Grab		.016		13	1125	22	5.2	300	Vein quartz.
5.....	6337..	Select....		.590		43	1050	370	12.0	700	Quartz vein.
6.....	6332..	Select....		.104		16	102	46	1.0	>1000	Vein quartz.
7.....	6341..	Select....		<.002		16	9	72	.2	25	Quartz vein material.
8.....	6074..	Cont. Chip	3.0	.003		11	8	67	<.2	6	Quartz vein ≤5% pyrite.
9.....	6075..	Rep. Chip.	25.0	<.002		14	<2	19	<.2	3	Quartz vein, phyllite partings, trace pyrite.
10.....	6080..	Grab.....		.182		5	835	8	4.7	>1000	Quartz stringers in phyllite.
11.....	6343..	Select....		.003		34	23	53	1.0	>1000	Quartz stringers in phyllite.
12.....	6344..	Select....		.112		20	540	28	4.0	>1000	Quartz float on dump, trace pyrite/arsenopyrite.
13.....	6342..	Cont. Chip	6.0	<.002		18	5	95	<.2	25	Quartz stringer zone.
14.....	7376..	Select....		.002		4	<2	8	<.2	14	Quartz veins.
15.....	6073..	Select....		.004		25	14	40	.3	19	Quartz vein, phyllite partings.
16.....	7377..	Rep. Chip.		.029		3	25	18	.2	>1000	Quartz veins, trace arsenopyrite.
17.....	7373..	Select....		.538		71	455	6	7.0	>1000	Quartz float.
18.....	7374..	Select....		.303		5	47	18	1.6	>1000	Quartz lense, trace arsenopyrite.
19.....	7375..	Select....		1.466		35	234	4	6.3	>1000	Quartz pod, trace pyrite/arsenopyrite.
20.....	6082..	Grab.....		.002		39	18	65	.2	160	Quartz float, adit portal.
21.....	6081..	Grab.....		.002		7	15	23	<.2	160	Quartz vein, trace arsenopyrite.
22.....	7380..	Select....		.125		4	500	115	4.4	>1000	Vein quartz float below adit.
23.....	6345..	Select....		<.002		12	2	30	<.2	20	Vein quartz material.
24.....	6078..	Rep. Chip.	1.0	<.002		18	5	27	.4	120	Quartz vein in tuffs.
25.....	7388..	Select....		.015		44	4	43	3.8	62	Quartz float ≤5% pyrite/arsenopyrite.
26.....	6079..	Cont. Chip	1.5	<.002		52	12	126	.4	150	Quartz stringer zone in phyllite.
27.....	6076..	Cont. Chip	3.0	.012		33	19	25	4.5	30	Quartz vein ≤5% pyrite locally.
28.....	6077..	Rep. Chip.	3.0	.005		54	9	64	1.8	90	Quartz vein in tuffs.

NAME(S): Dividend
Standard Crosscut
Yankee Basin

Map Location No. 11
MAS No. 2111120082

LOCATION:

Deposit Type: Stringer vein.
Commodities: Au.

Quadrangle: Juneau C3 NW 1/4 Sec: 14 T: 38S R: 64E
Geographic: Lower end of Yankee Basin, 3.5 miles southeast of Yankee Cove.
Elevation: 1,320 ft.

HISTORY:

PRODUCTION: None.

Mineralization had been found in Yankee Basin as early as 1887 by Ripstein and Riggins. Another positive report was made by Archer and Moran in 1888 and this led to claim staking undertaken by Heid and Smith in the same year. After Thomas Nowell's unsuccessful hydraulic operation in the late 1880's, early 1890's, there was no further activity for more than 10 years.

The Dividend was discovered in 1903, simultaneously with the Julia, Cascade, Puzzler, and Noonday showings. John Heid obtained this group of claims in 1904 and had men working to expose the veins. By 1905, Pete Early and John McWilliams were driving the Standard Crosscut on the Dividend property. This effort continued in 1906 and by late November of 1907, the adit had reached a length of 903 ft with 250 ft of drifts.

In 1910, Early reported that drifts from the long adit were in high-grade ore. After this announcement, however, the stories and reports stopped. The crosscut that was supposed to undercut the Dividend, Cascade and Julia lodes was never completed.

WORKINGS AND FACILITIES:

The Standard Crosscut on the Dividend was reopened by the Bureau and contains 1,100 ft of accessible workings. A 6-ft deep water-filled shaft and evidence of hydraulic mining (hydraulic giant and piping) occur 0.2 miles up the creek just north of the tunnel. A short crosscut and shaft reported to be 235 ft above the portal (16) were not located.

GEOLOGIC SETTING:

The geology surrounding the Standard Crosscut area consists of an intercalated sequence of phyllites and greenstone volcanics trending N40°-50°W and dipping 50°-70°NE. The greenstones and phyllites are locally sheared and altered to chlorite schist and graphitic schist, respectively. The shear zones are up to 25-ft wide, trending approximately N30°W and dipping to the NE, which is roughly parallel to foliation.

The shears are of interest as they contain quartz stringer zones which are reported to carry gold values (16). A 200-ft drift was made 915 ft from the portal along the contact between volcanic rocks and sheared phyllites in a southeast direction. The width of this sheared zone is at least 10 ft in places and may be wider as the workings did not expose its full extent. The stringers on average are 1-in wide but, locally lenses up to 1-ft wide occur. They carry minor amounts of pyrite and are reported to also carry arsenopyrite, galena, and free gold (16). Adjacent to the contact, the greenstones are altered to a tan color.

BUREAU INVESTIGATION:

When first located, the Standard Crosscut had been caved for some time. The Bureau, along with the help of several employees from Houston Oil and Minerals, reopened, mapped, and sampled the workings (fig. A-21). Samples were collected from the quartz stringer zones; the highest value obtained was 0.09 oz/ton gold across a 7-ft wide zone (No. 13, table A-10).

Traverses were made along the east-west-trending creek bottom just north of the tunnel as it provided excellent access to bedrock. These rocks are similar to those exposed in the tunnel. An 8-ft wide quartz stringer zone trending N40°W is exposed in the stream adjacent to a flooded shaft. This zone was sampled and values obtained were 0.188 oz/ton gold (No. 6, table A-10). A riveted water pipe and an old hydraulic nozzle were found along a side tributary to the main channel at 1,750 ft elevation. Evidence of ground sluicing could be seen near this location. Panning on the main creek below this site produced several very fine gold colors.

RESOURCE ESTIMATE:

The low gold values obtained from the Standard Crosscut give this property a low mineral production potential. The 8-ft wide exposure in the creek bottom running 0.188 oz/ton gold has enough width to warrant further work, but the continuation of this zone encountered underground contained low gold values when sampled.

RECOMMENDATIONS:

Dig trenches in the area to further expose the creek bottom showings and then sample any quartz showings.

REFERENCES:

16, 24, 25, 26, 27, 53.

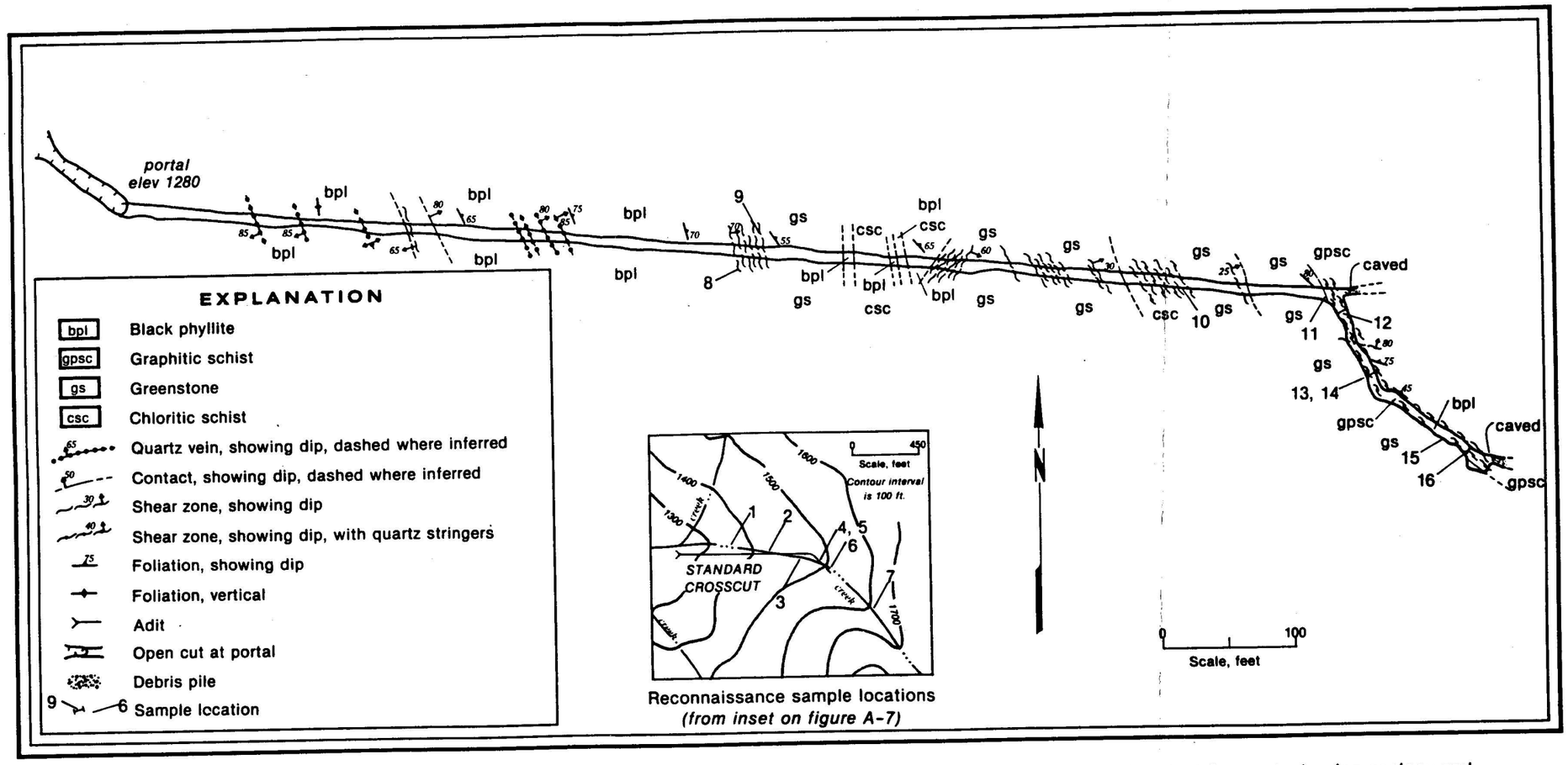


Figure A-21.— Dividend: Standard Crosscut, showing geology and sample locations.

TABLE A-10. - ANALYTICAL RESULTS - Dividend (see fig. A-21)

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm					Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	As	
1.....	6085..	Select....	4.0	0.039		85	18	56	0.4	>1000	Sheared phyllite with quartz stringers.
2.....	7381..	Select....		.075		8	15	7	.8	>1000	Vein stockwork in greenstone.
3.....	7308..	Cont. Chip	4.0	.007		97	4	50	<.2	950	Quartz veins in tuff/greenstone.
4.....	6083..	Cont. Chip	8.0	.002		38	9	81	<.2	32	Quartz stringers in phyllite.
5.....	6084..	Rep. Chip.		.027		34	11	69	<.2	65	Sheared phyllite with quartz stringers.
6.....	7379..	Rep. Chip.	8.0	.188		46	11	96	.4	70	Quartz veinlets.
7.....	7378..	Rep. Chip.		<.002		10	11	55	<.2	11	Quartz stringers in phyllite.
8.....	3189..	Channel...	1.5	.016		21	8	21	.2		Calcite vein, stringer pyrite.
9.....	3188..	Channel...	0.5	.006		30	11	25	.2		Quartz vein in shear zone, trace pyrite.
10.....	7278..	Spaced Chip.		.0001		200	11	70	<.2		Chlorite schist.
11.....	7277..	Rand. Chip		.0016		77	8	53	<.2		Altered greenstone with quartz stringers.
12.....	7275..	Spaced Chip.		.040		41	16	42	.3		Quartz stringer zone in phyllite.
13.....	7273..	Cont. Chip	7.0	.09		46	15	87	1.2		Quartz stringer zone in phyllite, minor pyrite.
14.....	7274..	Rand. Chip		.0007		72	13	67	.3		Altered greenstone.
15.....	7272..	Select....		.015		43	16	35	.3		Quartz stringer zone in phyllite, minor pyrite.
16.....	7276..	Cont. Chip	5.0	.06		120	15	69	.6		Quartz stringers in phyllite.

NAME(S): Rex Mine area

Map Location No. 12
MAS No. 21120082

LOCATION:

Deposit Type: Vein, stringer vein.
Commodities: Au.

Quadrangle: Juneau C3 SE 1/4 Sec. 14 T: 38S R: 64E
Geographic: South end of Yankee Basin.
Elevation: 2600-2800 ft.

HISTORY:

PRODUCTION: 145 oz gold.

Mineralization had been found in Yankee Basin as early as 1887 by Ripstein and Riggins. Another positive report by Archer and Moran in 1888 led to claim staking in Yankee Basin by Heid and Smith in the same year. After Thomas Nowell's effort to uncover significant mineralization failed in the early 1890's, the Yankee Basin area was essentially dormant until 1903.

The Rex deposit was found by Pete Early and some mining had been completed by 1903. Mining continued in 1904 and after a 15-ft adit had been driven to intersect surface showings, a high-grade pocket of ore was encountered. This pocket yielded 145 oz of gold and was the only production reported from the Yankee Basin area. The area was not looked at again until the 1980's, when Houston Oil and Minerals did some sampling in the area as part of their Yankee Basin evaluation.

WORKINGS AND FACILITIES:

A 15-ft adit was reported and at least five trenches occur on the property.

GEOLOGIC SETTING:

According to Spencer (41), the Rex property is located several hundred ft west of a phyllite-greenstone boundary, at an elevation of 2,800 ft. A quartz-calcite lense crosscutting the foliation of the encompassing greenstone was the source of the paying ore. The country rock in the immediate vicinity around this working consists of a N30°W-trending, northeast-dipping sequence of silicified and black phyllites. The silicified phyllite is similar to country rock observed in the area surrounding the Julia Group to the north. These rocks contain quartz veins up to 3.0-ft wide and quartz stringer zones up to 6.0-ft wide. These are exposed in the trenches for only short distances, but the general strike of the veining appears consistent between trenches. In some locations, only quartz float was found (fig. A-22).

BUREAU INVESTIGATION:

The Bureau mapped and sampled the trenches on the property but, was unable to locate the adit where production occurred. A quartz float sample, and a continuous chip along a phyllite/quartz zone contained 0.006 oz/ton gold (Nos. 6, 8, table A-11). The remainder of the samples all contained lesser amounts of gold.

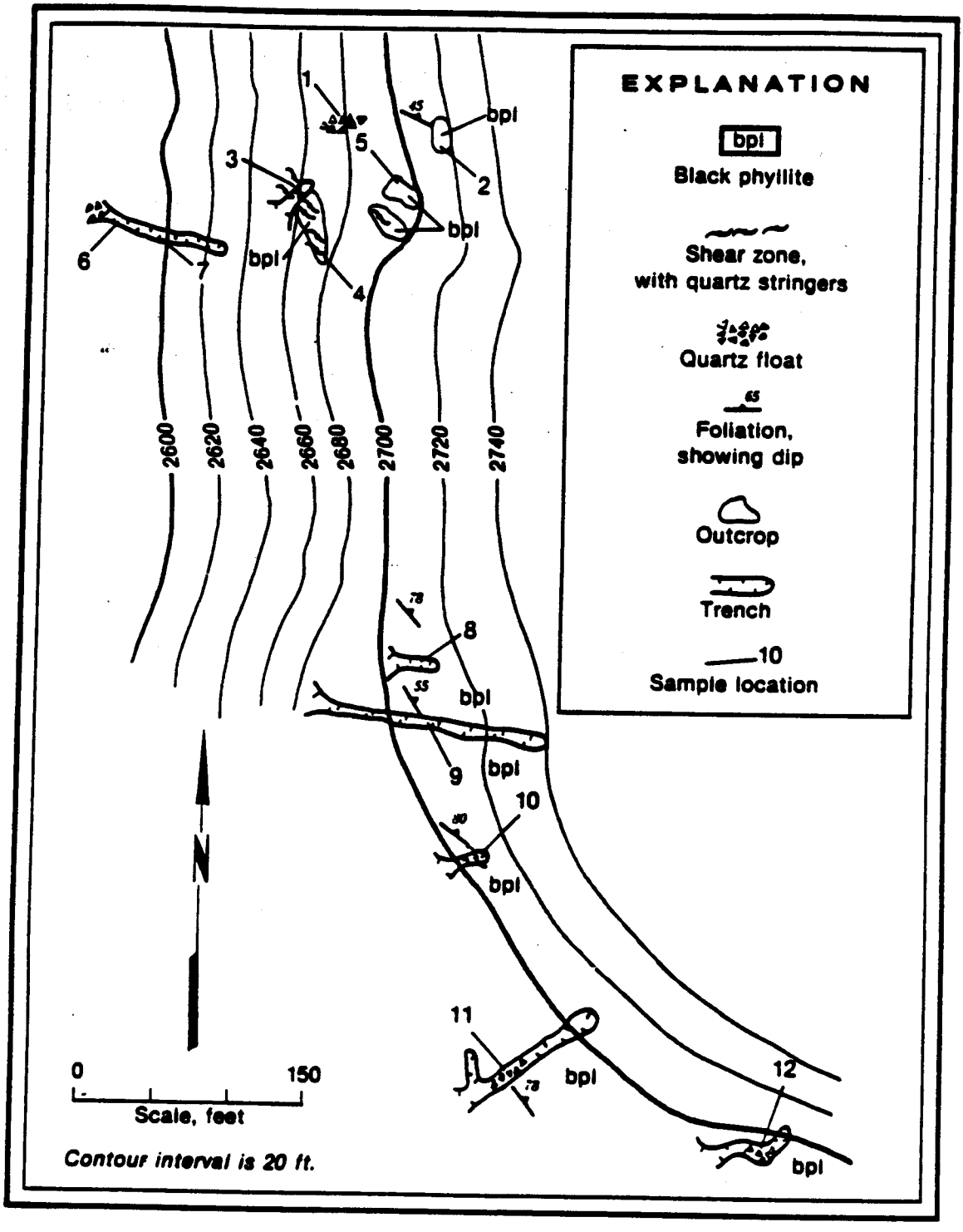


Figure A-22.— Rex Mine area, showing geology and sample locations.

RESOURCE ESTIMATE:

The low gold values from the quartz veins and the silicified phyllite give the property a low mineral production potential.

RECOMMENDATIONS:

The immediate area has been thoroughly trenched and samples taken show low gold values. The best possibility for this area is to continue trenching toward the Noonday and Puzzler showings at regular intervals along strike to determine if sufficient quartz exists to consider a low-grade bulk tonnage surface operation. The Yankee Basin area should be looked at as a whole and not as individual prospects as high-grade pockets may exist, but they can not be relied on to support any significant mining operation.

REFERENCES:

24, 25, 26, 27, 41.

TABLE A-11. - ANALYTICAL RESULTS - Rex Mine area (see fig. A-22)

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm					Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	As	
1	6095	Select		<0.002		8	<2	13	<0.2	4	Vein quartz rubble.
2	6094	Select		<.002		28	<2	90	<.2	21	Phyllite with quartz stringers.
3	6091	Select		.003		135	18	119	.3	30	Silicified phyllite.
4	6092	Select		.004		19	<2	45	<.2	4	Quartz vein in phyllite.
5	6093	Select		<.002		13	<2	6	.3	6	Quartz vein.
6	7386	Grab		.006		30	16	42	.4	19	Quartz float, <4% pyrite.
7	7387	Grab		<.002		20	10	49	.2	22	Quartz float, trace pyrite.
8	6089	Cont. Chip	6.0	.006		42	13	31	1.6	70	Brecciated quartz in phyllite.
9	6090	Cont. Chip	3.0	.003		30	<2	34	1.7	22	Quartz vein, 5% arsenopyrite locally.
10	6086	Select		<.002		5	<2	6	<.2	550	Quartz vein, 2% arsenopyrite.
11	6087	Grab		<.002		11	<2	52	<.2	4	Vein quartz.
12	6088	Grab		<.002		46	<2	128	<.2	30	Vein quartz.

NAME(S): Aurora Borealis
Wanderer Group
AB & B Group

Map Location No. 13
MAS No. 21120076

LOCATION:

Deposit Type: Fissure vein.
Commodities: Au.

Quadrangle: Juneau C3 NW 1/4 Sec: 9 T: 38S R: 64E
Geographic: 2.5 miles via trail from Yankee Cove.
Elevation: 1,000-1,160 ft.

HISTORY:

Production: 145 oz gold.
see below

The Aurora Borealis Mine was discovered late in the fall of 1896 by Pete Early, George Stucky, Dave Conkel, and the McWilliams brothers. The discovery was initially silenced by the locators in the hopes that additional veins could be found. However, after assays of $8 to $464 were obtained, their exuberance could no longer be squelched and in 1897 they announced their find and began development. Early went south to make arrangements for a 5-stamp mill, while the others began on a two-mile road between Yankee Cove and the mine (25).

By January of 1898, the mill building was reported up and the stamps were being emplaced. But, though the mill had been hauled up to the mine, it was never set up or used. The base was hoisted onto a platform but all the parts were stockpiled nearby. Some gold may have been recovered using a crusher and shaker table, but the stamps were never used. Misinformation and half-completed work seem to dominate the history of this mine. An additional 10-stamp mill earmarked for the Bessie property in 1903 was hauled up as far as the Aurora Borealis but was never uncrated.

There were a total of four tunnels driven on the property during its development and gold was produced. When the tunnels were actually driven or how much gold was actually produced is unclear. Between this mine and the Bessie Mine, 290 oz of gold were produced. The gold at the Aurora was recovered by 1897, and the gold from the Bessie by 1902.

John McWilliams bonded the Aurora Borealis in 1913 and intended to reopen the workings but never did. Noranda Exploration staked claims in the area in 1981 and relinquished them after an unsuccessful exploration program. Roger Eichman restaked the area in 1987.

PRODUCTION:

Prior to 1903, several thousand dollars worth of gold production was reported. Further reports give the amount of gold produced as $6,000.00 (16). This would come out to 290 oz Au at the 1903 gold price. However, this production is combined between the Aurora Borealis and the Bessie mines and a breakdown is not available.

WORKINGS AND FACILITIES:

Development of four adits has been reported, but only a 260-ft adit and a 43-ft adit are open. A partially dismantled stampmill, remains of a hydropower plant, and two cabins are on the property. An overgrown planked roadway leads 2.5 miles west from the mine to Yankee Cove.

GEOLOGIC SETTING:

The large quartz vein exposed in the underground workings trends approximately N45°E with an average dip of 20°W. The vein both follows and crosscuts the foliation of folded phyllites lying in contact with volcanic conglomerates. This same contact was previously reported in the now-caved adit No. 3. The contact follows a roughly north-south trend and lies just west of the stream draining the area (fig. A-23). This may be the same contact cut by adit No. 1 at the Bessie Mine, 0.2 miles to the southwest. The mineralized vein at the Aurora Borealis is hosted in phyllites as opposed to a volcanic conglomerate at the Bessie. The vein is exposed in the No. 2 adit for 230 ft along strike and at one point is offset 2-ft by a reverse fault.

The vein width varies along strike from a narrow fissure-type up to 3.6-ft thick, which then branches into many anastomosing quartz veinlets with associated phyllite partings. The vein appears to be following a shear zone or faults in the phyllites. Locally, tension fractures occur in the vein and these are filled with quartz, carbonates, and phyllite partings which impose a ribbon texture on the vein. The quartz contains up to 2% pyrite and arsenopyrite. At some points sulfides are concentrated along vein margins. Galena is reported to also occur in the quartz (16). The phyllites contain ellipsoidal masses resembling footballs in size and shape and appear to be some type of calcareous concretion. These phenomena are most likely the result of shearing as the long axis of these features is subparallel to the foliation of the enclosing rocks.

BUREAU INVESTIGATION:

The Bureau located, mapped, and sampled two open adits (fig. A-23). A third adit was caved, and no evidence could be found of a reported fourth adit. Numerous samples were collected underground from the vein, as no surface exposures were found. Samples contain up to 0.329 oz/ton gold (No. 5, table A-12) over a 2.7-foot vein width. Samples from the vein walls averaged .034 oz/ton gold.

RESOURCE ESTIMATE:

	Indicated		
Area	Tons	oz/ton Au	Avg. vein width (ft)
Adit No. 2	1,500	0.10	2.2

This area has a moderate mineral development potential due to gold grades, resources, and untested extensions of mineralized veins.

RECOMMENDATIONS:

Open and resample caved workings and drill untested vein extensions.

REFERENCES:

16, 24, 25, 26, 30.

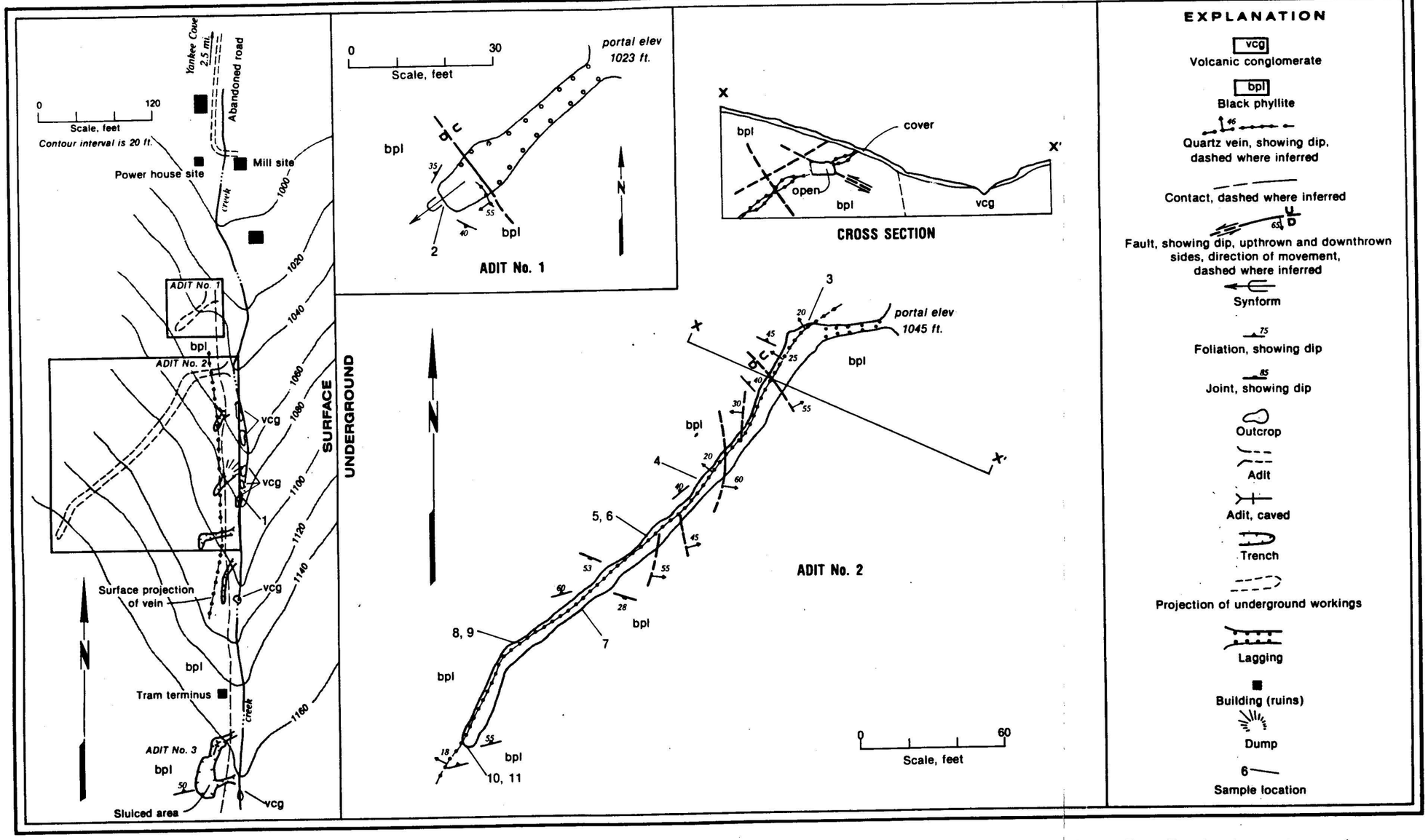


Figure A-23.— Aurora Borealis, showing geology and sample locations.

TABLE A-12. - ANALYTICAL RESULTS - Aurora Borealis (see fig. A-23)

Map No.	Sample	Type	Sample Length Ft	Oz/ton Fire Assay Au	Oz/ton Fire Assay Ag	Ppm Cu	Ppm Pb	Ppm Zn	Ppm Ag	Description
1.....	3123..	Grab.....		0.0009		134	7	116	<0.2	Brecciated altered volcanic.
2.....	7218..	Rand. Chip		.011		75	17	129	.3	Phyllite with quartz veinlets.
3.....	7202..	Cont. Chip	3.0	.013		8	44	13	.2	Quartz vein.
4.....	7203..	Cont. Chip	3.3	.080		19	58	86	.5	Quartz vein.
5.....	7204..	Cont. Chip	2.7	.329		14	52	83	2.1	Quartz with phyllite partings.
6.....	7205..	Rand. Chip		.064		97	16	143	.5	Phyllite with quartz veinlets.
7.....	7213..	Cont. Chip	1.6	.120		59	13	77	.8	Quartz vein with phyllite inclusions.
8.....	7214..	Cont. Chip	1.0	.114		65	9	81	.9	Quartz vein with phyllite inclusions.
9.....	7215..	Rand. Chip	1.0	.003		79	11	127	.2	Phyllite wallrocks.
10.....	7216..	Spaced Chip.	1.2	.095		42	59	104	.4	Quartz vein.
11.....	7217..	Rand. Chip	1.0	.066		70	3	108	.3	Phyllite with quartz veinlets.

NAME(S): Bessie Mine
Wanderer Group
AB & B Group

Map Location No. 14
MAS No. 2TT20077

LOCATION

Deposit Type: Fissure vein.
Commodities: Au.

Quadrangle: Juneau C3 SW 1/4 Sec: 9 T: 38S R: 64E
Geographic: 1.2 miles east of Yankee Cove.
Elevation: 1,770-2,010 ft.

HISTORY:

Production: 145 oz gold.
see below

The Bessie was probably staked by J. Ostrander, H. Robinson, and H. Shepard during the summer of 1897 as prospecting activity expanded out from the initial claims staked at the Aurora Borealis the previous year. Assessment and development work continued for a few years and by 1902, several adits with about 800 ft of workings were completed on the property. Also in 1902, the property had been sold to the Bessie Gold Mining Co. which consisted of Pete Early, Frank Bach and others.

The new company had 24 men at the property extracting ore from the mine. Six hundred tons had been piled up on the dumps. The company planned to build a tram to the beach, enlarge the mill and build a new road to the mine. The mine produced approximately $3000 worth of gold during 1902 using the mill at the Aurora Borealis.

In 1903, a new 10-stamp mill arrived at Yankee Cove. The road up to the mine was being finished and plans were developing nicely. However, this was the last favorable year for the property. The mill was never constructed and after 1904 nothing else occurred for over 40 years.

Joe Green covered the property with the Wanderer Group of claims in 1945 and sampled the old workings briefly. Noranda Exploration looked at the property in 1981 and most recently, Roger Eichman restaked the Bessie Mine area and the Aurora Borealis in 1987.

PRODUCTION:

An unknown amount of ore yielding approximately $3,000 worth of gold may have been run through the Aurora Borealis mill in 1902.

WORKINGS AND FACILITIES:

Two adits totaling 565 ft in length, a caved shaft, and a series of trenches.

GEOLOGIC SETTING:

The Bessie veins are hosted by thoroughly indurated volcanic conglomerates, composed of well-rounded pebbles up to 5-in. in diameter of various lithologies. The conglomerates are in sheared contact with interbedded graywacke and phyllite to the west (fig. A-24). This shear trends approximately N30°W as does a shear/fault mapped underground in the No. 2 adit over the ridge to the east (fig. A-25). The vein is offset by 27 ft of right lateral movement across this structure.

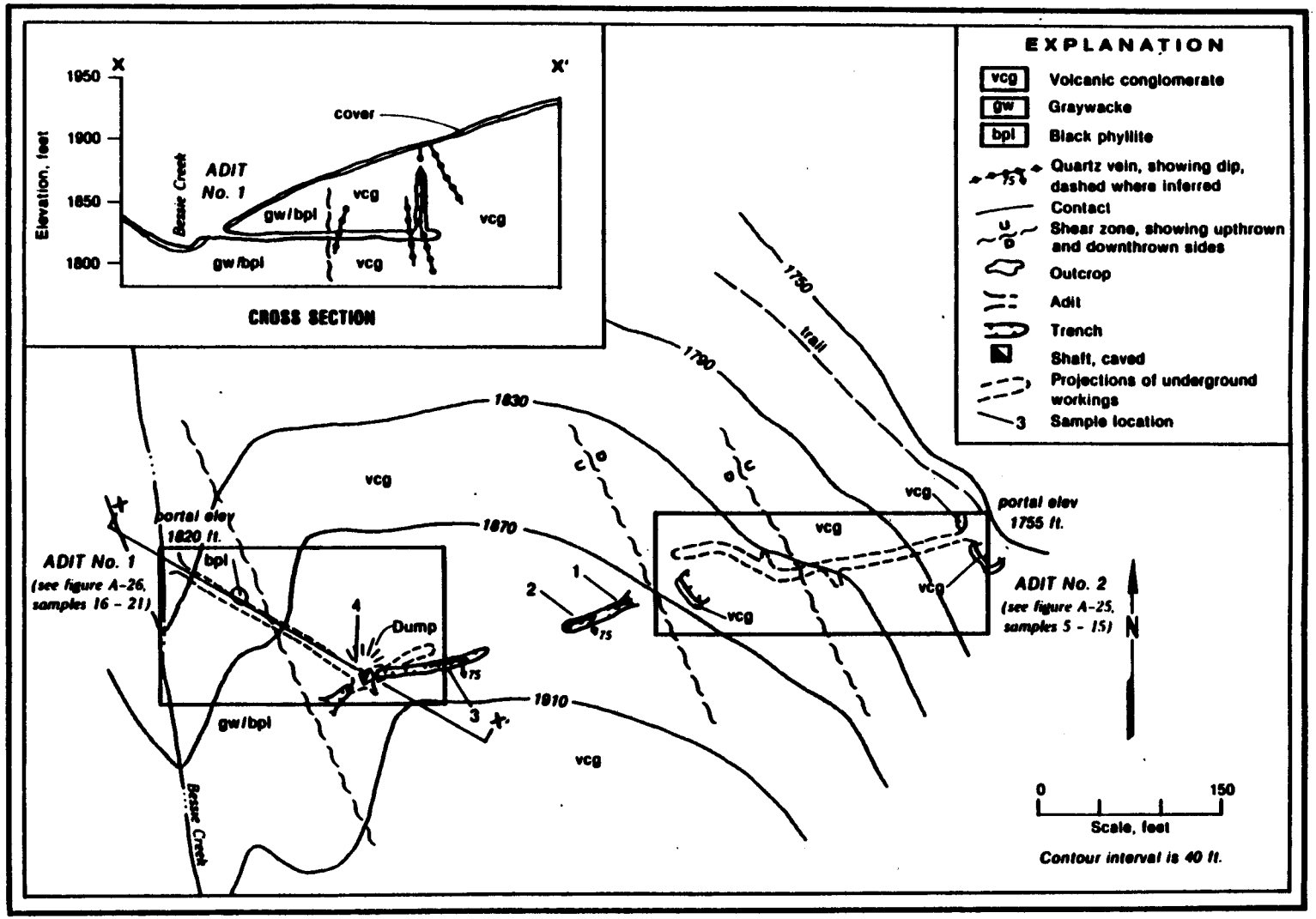


Figure A-24.— Bessie Mine - surface workings showing geology and sample locations.

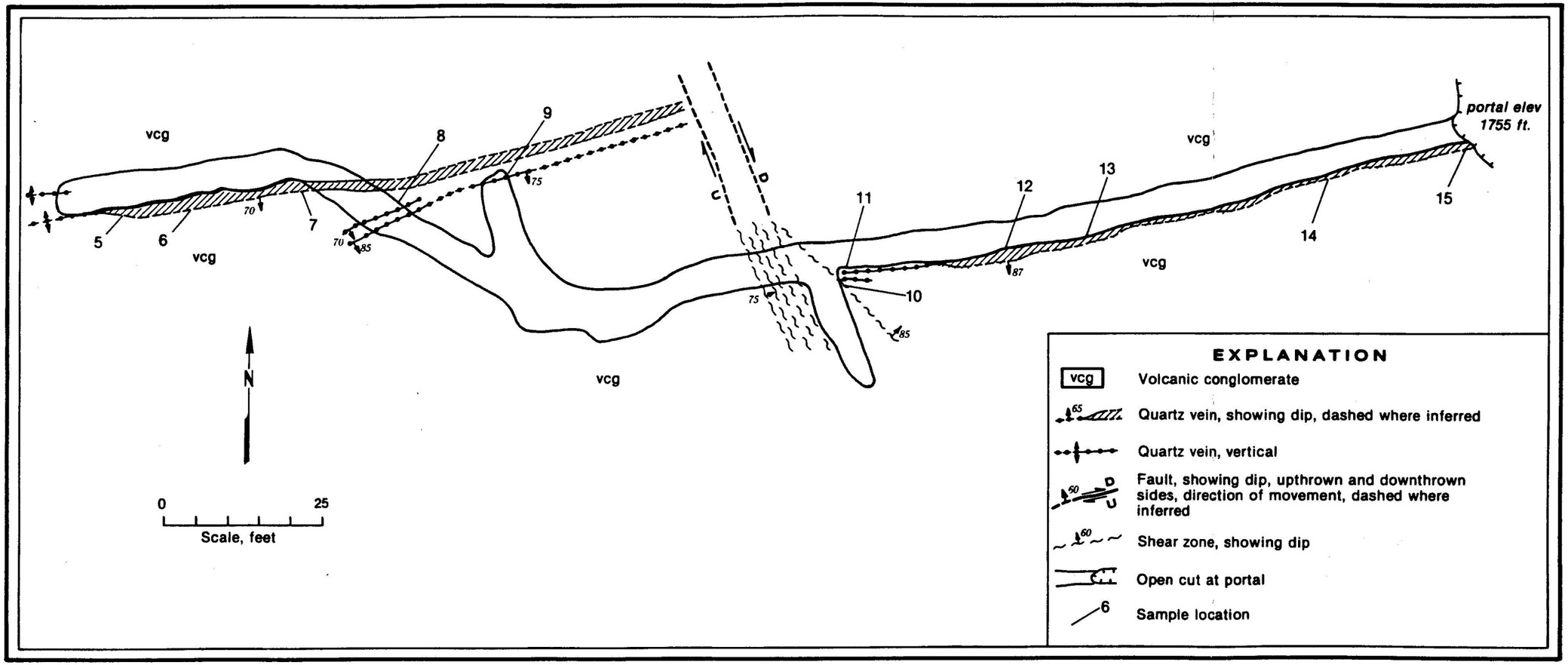


Figure A-25.— Bessie Mine — Adit No. 2, showing geology and sample locations.

Mineralization is confined to fissure-type quartz veins trending approximately N75°E and dipping steeply to the south. This structure is nearly perpendicular to the regional trend of the enclosing rocks. These can be traced intermittently on the surface and underground for a distance of 500 ft along strike and 140 ft vertically. It appears that the workings expose one major vein but surface projections do not indicate this. A second parallel or en echelon vein may exist with a similar strike and dip. A northwest trending fault between the two adits offsets the vein left laterally. The main vein averages 1-ft thick (fig. A-26), but attains widths up to 2-ft wide in adit No. 1 where the vein may have been actually mined. In this same adit a raise followed the vein 45 ft vertically to a point under a caved shaft driven from the surface. It is reported that these two were connected (16), but Bureau mapping does not indicate this. The surface trend of a vein exposed in a trench just east of the shaft is different from that of the vein in the adit, indicating that the vein is not planar between the two spots and may be faulted, folded, or splayed at some point into two separate veins. The vein contains ribbon structures, up to 10% pyrite stringers, arsenopyrite, and a trace of galena. A trace of sphalerite is also reported (16). The selvage shows signs of sericitic alteration and ankerite.

BUREAU INVESTIGATION:

The Bureau mapped and sampled the surface and underground workings. The highest gold values (0.97 oz/ton) came from a grab sample off the shaft dump (No. 4, table A-13). Another significant sample (No. 3) was taken from a trench 65 ft to the east, exposing the same vein opened by the shaft, and contained 0.422 oz/ton gold. The highest-grade underground sample (0.30 oz/ton gold) was collected at the face of the No. 1 adit (No. 20, fig A-26).

RESOURCE ESTIMATE:

The following estimate was derived from Bureau sampling and mapping:

Indicated Resources

Area	Tons	oz/ton Au	Avg. vein width (ft)
Adit No. 1	1,088	0.15	1.5
Adit No. 2	970	0.05	1.2
Adits including projected extensions between them.	13,320	0.20	1.3

These grades and tonnages indicate that the prospect has a moderate mineral production potential for gold.

RECOMMENDATIONS:

Drill vein extensions between adits and test veins below adit levels.

REFERENCES:

16, 24, 25, 26, 27, 30.

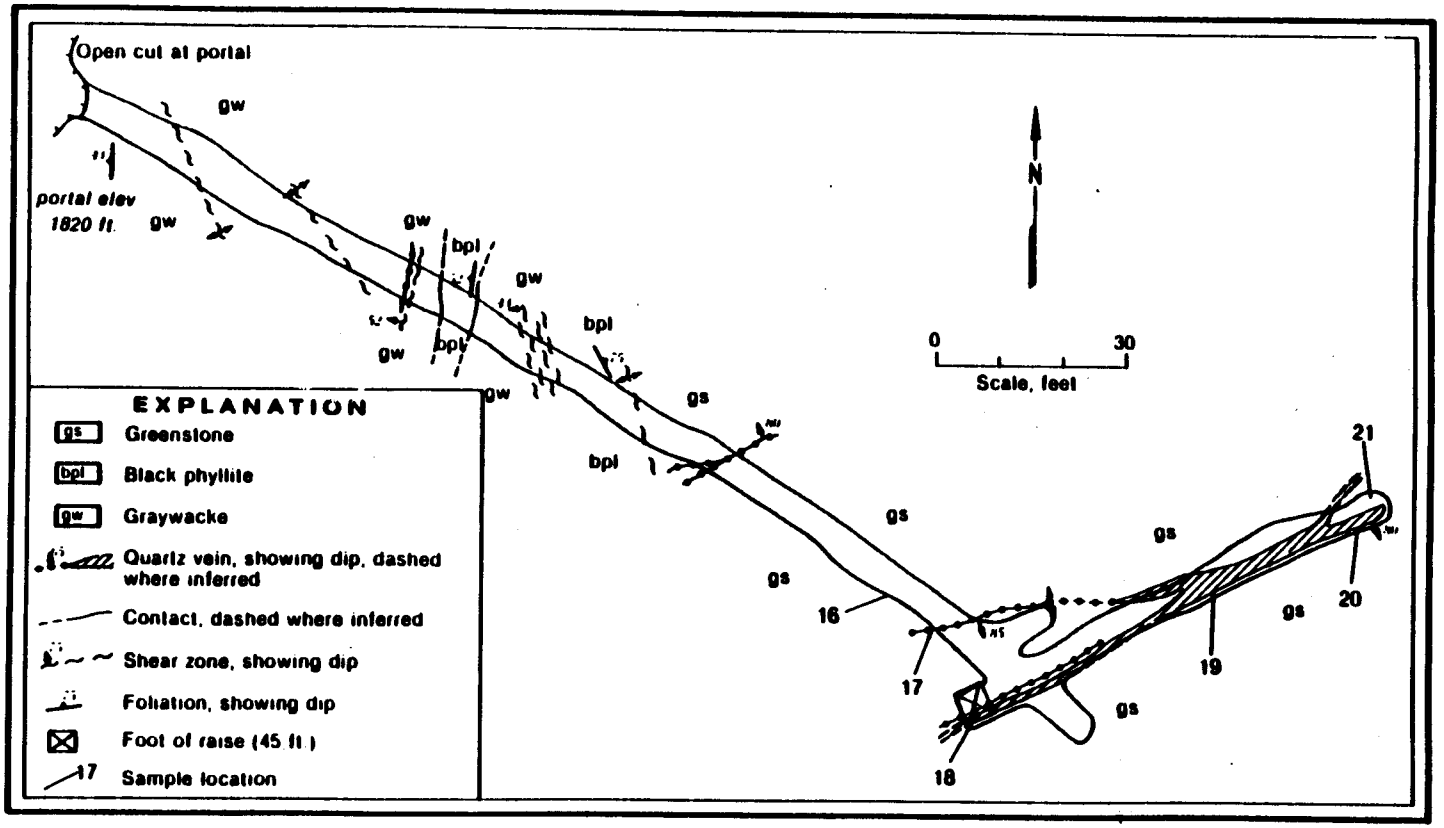


Figure A-26.— Bessie Mine — Adit No. 1, showing geology and sample locations.

TABLE A-13. - ANALYTICAL RESULTS - Bessie Mine (see figs. A-24 through A-26)

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm					Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	As	
1.....	7078..	Cont. Chip	1.1	0.240		15	122	22	0.5	600	Pyrite, trace arsenopyrite.
2.....	7079..	Cont. Chip	1.1	.022		9	91	17	.5		Pyrite <2%.
3.....	7206..	Cont. Chip	1.3	.422		11	117	23	.4		1-2% pyrite, arsenopyrite.
4.....	7077..	Grab.....		.970		98	263	118	2.2		5-10% pyrite, arsenopyrite <3%, trace galena.
5.....	7291..	Chip Channel..	0.9	.045		11	<2	10	.3	>1000	Quartz vein.
6.....	7292..	Chip Channel..	1.4	.003		12	<2	8	.2	300	Quartz vein.
9.....	7293..	Chip Channel..	1.4	.102		47	17	25	.3	>1000	Quartz veins in volcanics.
8.....	7299..	Select....		.006		132	6	100	<.2	600	Volcanic conglomerate.
9.....	7300..	Chip Channel..	.8	.006		64	2	38	<.2	>1000	Quartz vein and selvage zone.
10.....	7303..	Cont. Chip	.4	.042		98	35	98	.6	>1000	Selvage zone.
11.....	7294..	Chip Channel..	1.6	.024		14	9	16	.2	>1000	Quartz vein.
12.....	7295..	Chip Channel..	1.3	.015		3	14	6	.3	>1000	Quartz vein in volcanics.
13.....	7296..	Chip Channel..	.9	.105		20	78	35	.4	>1000	Quartz vein.
14.....	7297..	Chip Channel..	1.0	.006		23	4	39	<.2	900	Quartz vein.
15.....	7298..	Chip Channel.	1.3	.008		8	2	11	<.2	220	Quartz vein.
16.....	7211..	Rep. Chip.		.0009		108	10	102	.7		Meta-conglomerate only.
17.....	7210..	Cont. Chip	.6	.073		80	5	180	.6		Quartz with pyrite.
18.....	7209..	Cont. Chip	.8	.13		16	11	52	1.0		Sheeted quartz vein with pyrite.
19.....	7208..	Cont. Chip	2.8	.080		19	21	22	.5		Sheeted quartz vein with pyrite.
20.....	7207..	Cont. Chip	1.5	.300		41	73	105	.2		Sheeted calcite-quartz vein.
21.....	7212..	Cont. Chip	2.0	.001		171	5	104	<.2		Volcanic conglomerate wallrocks.

NAME(S): Alaska Washington
Wanderer Group
Yankee Cove
Alice

Map Location No. 15
MAS No. 2TT20075

LOCATION:

Deposit Type: Fissure vein.
Commodities: Au.

Quadrangle: Juneau C3 NE 1/4 Sec: 16 T: 38S R: 64E
Geographic: 1.8 miles southeast of Yankee Cove.
Elevation: 1,976-2,400 ft.

HISTORY:

PRODUCTION: None.

The Alaska Washington property was staked during the Bessie Mountain rush in 1897. Ostrander, Robinson and Shepard were responsible for the discovery. A 150-ft long tunnel had been completed by Judge Ostrander and Milo Kelly in 1900 and surface stripping to expose the vein was also accomplished at this time. As activity at the Bessie property increased in 1902, the owners of the Alaska Washington prospect increased their efforts. They drove more tunnels and dug more trenches looking for enough ore to mine.

Activity continued in 1904 as H. H. Hunter began driving yet another tunnel. He expected to cut the vein at an early date and set up a stamp mill. These plans did not materialize and only assessment work was completed through 1910 at which time the property was abandoned. Noranda Exploration restaked the entire Bessie Mountain area in 1981, but their efforts were unrewarded and they dropped the claims. The property is currently idle.

WORKINGS AND FACILITIES:

Four adits with a total of nearly 500 ft of workings, a 70-ft raise and a 30-ft shaft explore the vein between 1,800 ft and 2,500 ft elevation. There are numerous trenches on the property as well.

GEOLOGIC SETTING:

The Alaska Washington veins cut volcanic conglomerate wallrocks similar to those at the Bessie, located 0.6 miles to the northwest. The metasediments lying adjacent to the Bessie vein were not observed at the Alaska Washington though. Surface and underground workings expose what appear to be two parallel veins that trend N75°W and dip steeply to the north. The workings may be following the same vein which has been offset by a northwest trending fault similar to or possibly the same as that which offsets the Bessie vein to the northwest. If this were true, then the vein has been offset 450 ft horizontally. The veins are fissure type and follow faults and shear zones as indicated by shearing and fault gouge along vein margins. Sulfides consist of pyrite and arsenopyrite . The volcanic conglomerate appears bleached and silicified along the vein selvage. Adit No. 2 follows a single distinctive vein along a fault, whereas the No. 1 adit contains a series of semi-parallel veins within a shear up to 5-ft wide. They have been intermittently exposed for 1,500 ft along strike, 500 ft vertically, and average 1.4-ft wide.

BUREAU INVESTIGATION:

The Bureau mapped and sampled the surface showings and two of the four underground workings. The highest gold values (0.53 oz/ton) came from dump float located by a caved shaft at 2,440 ft elevation (No. 3, fig. A-27). A sample of a 2-ft wide vein at the face of adit No. 2 ran 0.15 oz/ton gold (No.7, fig. A-27). All other samples contained low gold values (table A-14).

RESOURCE ESTIMATE:

Indicated Resources

Area	Tons	oz/ton Au	Avg. vein width (ft)
Adit No. 1	469	0.04	3.9
Adit No. 2	458	0.04	1.7

Inferred Resources

Area	Tons	oz/ton Au	Avg. vein width (ft)
Projected shear zone west of Adit No. 1	13,530	0.2	3.9

The low grades of the resources along with low tonnage would give this property a low mineral production potential.

RECOMMENDATIONS:

Drill vein extensions between adits to test for higher gold values.

REFERENCES:

16, 24, 25, 26, 30, 52.

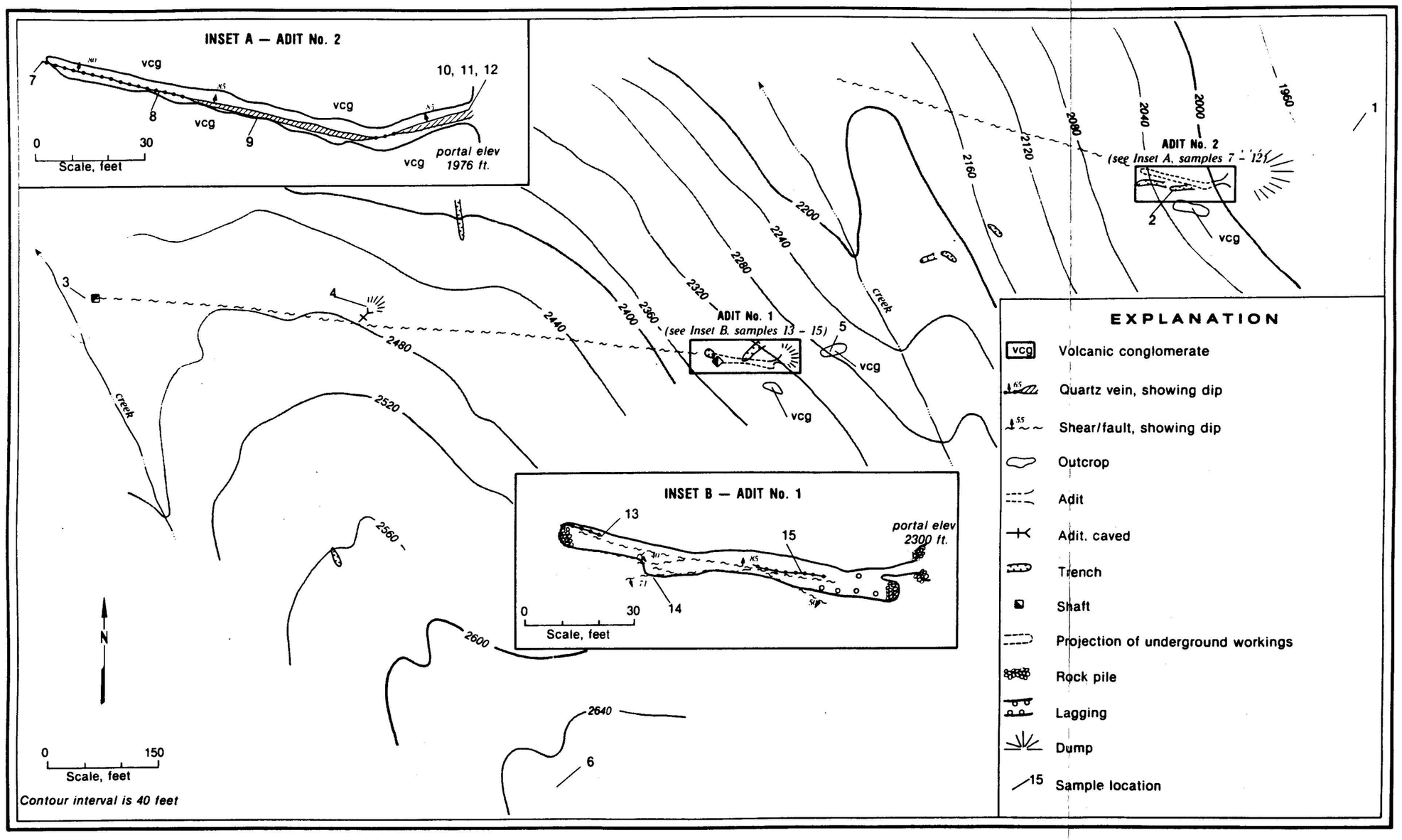


Figure A-27.— Alaska Washington prospect, showing workings, geology, and sample locations.

TABLE A-14. - ANALYTICAL RESULTS - Alaska Washington prospect (see fig. A-27)

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm				Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	
1.....	3276..	Rep. Chip.		0.0003		123	11	88	<0.2	Volcanic conglomerate.
2.....	7200..	Grab.....		.1		15	50	30	.3	Trench dump. Quartz, pyrite.
3.....	7201..	Select....		.533		40	1380	189	4.7	Dump material, up to 10% pyrite, trace sphalerite.
4.....	7222..	Grab.....		.027		6	8	8	.3	Dump material, arsenopyrite.
5.....	7221..	Grab.....		.0003		101	10	89	<.2	Volcanic tuff. Trace pyrite, arsenopyrite.
6.....	7199..	Select....		.006		12	4	5	<.2	Quartz float.
7.....	3278..	Cont. Chip	2.0	.147		38	7	192	<.2	Quartz vein.
8.....	3280..	Cont. Chip	0.5	.083		22	7	47	.3	Quartz vein with trace pyrite, arsenopyrite.
9.....	3279..	Cont. Chip	2.8	.023		9	4	40	<.2	Quartz vein with trace pyrite, arsenopyrite.
10.....	3135..	Select....		.08		44	40	37	.6	Dump float, trace pyrite, arsenopyrite.
11.....	3136..	Cont. Chip	1.0	.009		32	24	17	<.2	Quartz vein. Trace pyrite/arsenopyrite.
12.....	3137..	Rand. Chip	.8	.014		140	57	242	<.2	Quartz vein.
13.....	3138..	Rand. Chip	1.0	.034		37	26	41	.2	Volcanic conglomerate and quartz with disseminated pyrite.
14.....	3139..	Cont. Chip	1.0	.061		83	9	76	.2	Fault gouge in volcanic conglomerate.
15.....	3277..	Cont. Chip	3.0	.010		114	17	78	<.2	Bleached volcanic conglomerate and quartz.

NAME(S): Mother Lode
Yankee Bay

Map Location No. 16
MAS No. 2111120080

LOCATION:

Deposit Type: Fissure vein.
Commodities: Au.

Quadrangle: Juneau C3 NW 1/4 Sec: 22 T: 38S R: 64E
Geographic: On south side of Bessie Mountain, 3.0 miles northwest of Eagle Beach.
Elevation: 1,950 ft.

HISTORY:

PRODUCTION: None.

No direct references have been made to the development of the Mother Lode. Knopf refers to the Mother Lode group in his discussion of the Alaska Washington property (16), and states that in 1910 both sets of claims were under the same ownership. Many opencuts and a caved inclined shaft occur on the property along a phyllite/greenstone conglomerate contact. It is presumed that the work occurred during the Bessie Mountain rush in the late 1890's or early 1900's.

WORKINGS AND FACILITIES:

A 10-ft decline and a trench.

GEOLOGIC SETTING:

This prospect has been described as consisting of quartz masses lying in greenstone conglomerate near its contact with a belt of slates lying to the northeast. The quartz cuts across the general formation (16). The quartz was locally found to contain minor pyrite and arsenopyrite. The only vein found in place is 3-ft thick, trends approximately N10°W and dips 35°W. A red-stained gully trending N15°E, located adjacent to the workings, may be following a concealed fault.

BUREAU INVESTIGATION:

The Bureau located some of the reported workings which appear to follow a vein for 230 ft along strike as opposed to the several thousand feet previously described. Samples were collected from both float and in-place quartz veins. One sample was taken from an orange-weathered silicified zone nearly 100-ft across, located approximately 200-300 yards from the workings (No. 1, fig. A-28). All samples contained low values except for one piece of quartz float that contained 0.26 oz/ton gold (No. 2, fig. A-28 and table A-15).

RESOURCE ESTIMATE:

Spotty gold values and lack of exposed quartz vein give this prospect low mineral production potential.

RECOMMENDATIONS:

None.

REFERENCES:

16, 26, 27.

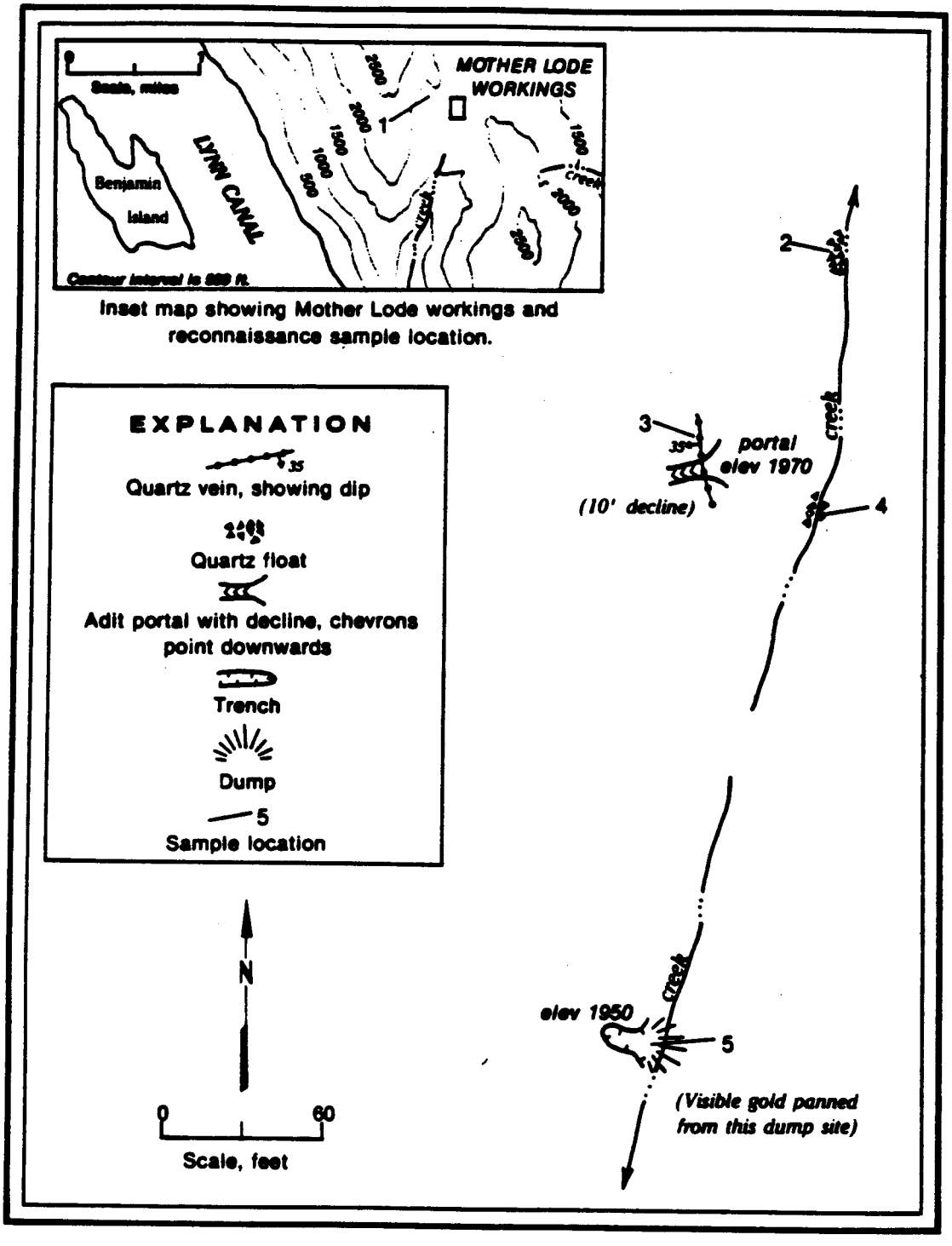


Figure A-28.— Mother Lode workings, showing geology and sample locations.

TABLE A-15. - ANALYTICAL RESULTS - Mother Lode prospect (see fig. A-28)

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm				Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	
1.....	3861..	Rep. Chip.		0.002		100	15	76	<0.2	Altered/pyritic andesite.
2.....	7385..	Select....		.257		22	12	19	1.6	Quartz in greenstone.
3.....	7384..	Cont. Chip	3.0	.005		22	5	20	<.2	Quartz.
4.....	7383..	Select....		.003		7	3	8	<.2	Quartz float.
5.....	7382..	Select....		.044		4	2	4	.3	Quartz vein.

NAME(S): Eagle Glacier reconnaissance Map Location No. 17

LOCATION:

Deposit Type: Fissure vein.
Commodities: Au.

Quadrangle: Juneau C3 S 1/2 Sec: 7 & 8 T: 38S R: 65E
Geographic: 5.0 miles northeast of Eagle Beach, adjacent to Eagle Glacier.
Elevation: 500-1,000 ft

HISTORY:

PRODUCTION: None.

There has been no recorded activity along the margins of Eagle Glacier.

WORKINGS AND FACILITIES:

None.

GEOLOGIC SETTING:

The rocks occurring along the margin of Eagle Glacier consist of a sliver of metasediments, including biotite schist and marble with xenoliths of quartz diorite gneiss, surrounded by a larger body of the gneiss. Quartz/calcite veins crosscut the foliation in these host rocks and it is these veins which are of interest as their trend is similar to those which occur at the Herbert Glacier and Mitchell-McPherson prospect. The veins carry trace amounts of pyrite/pyrrhotite and arsenopyrite. The red-staining that was seen in the metasediments was caused by the weathering of biotite in the schist rather than the leaching of sulfides as was first thought.

BUREAU INVESTIGATION

Five samples were collected from iron-stained biotite schist and diorite gneiss cut by the discordant quartz-calcite veins in cross shears. Trace amounts of pyrrhotite, chalcopyrite, and arsenopyrite were observed in these rocks. The highest gold value was 0.08 oz/ton, obtained from a quartz vein (No. 1, fig. A-29, table A-16) collected on the west side of the glacier in a diorite gneiss pod.

RESOURCE ESTIMATE:

The results from sampling were not encouraging and it appears that the gold-bearing quartz veins seen at the Herbert Glacier do not extend to this area. This area has a low mineral production potential for this reason.

RECOMMENDATIONS

None.

REFERENCES

27.

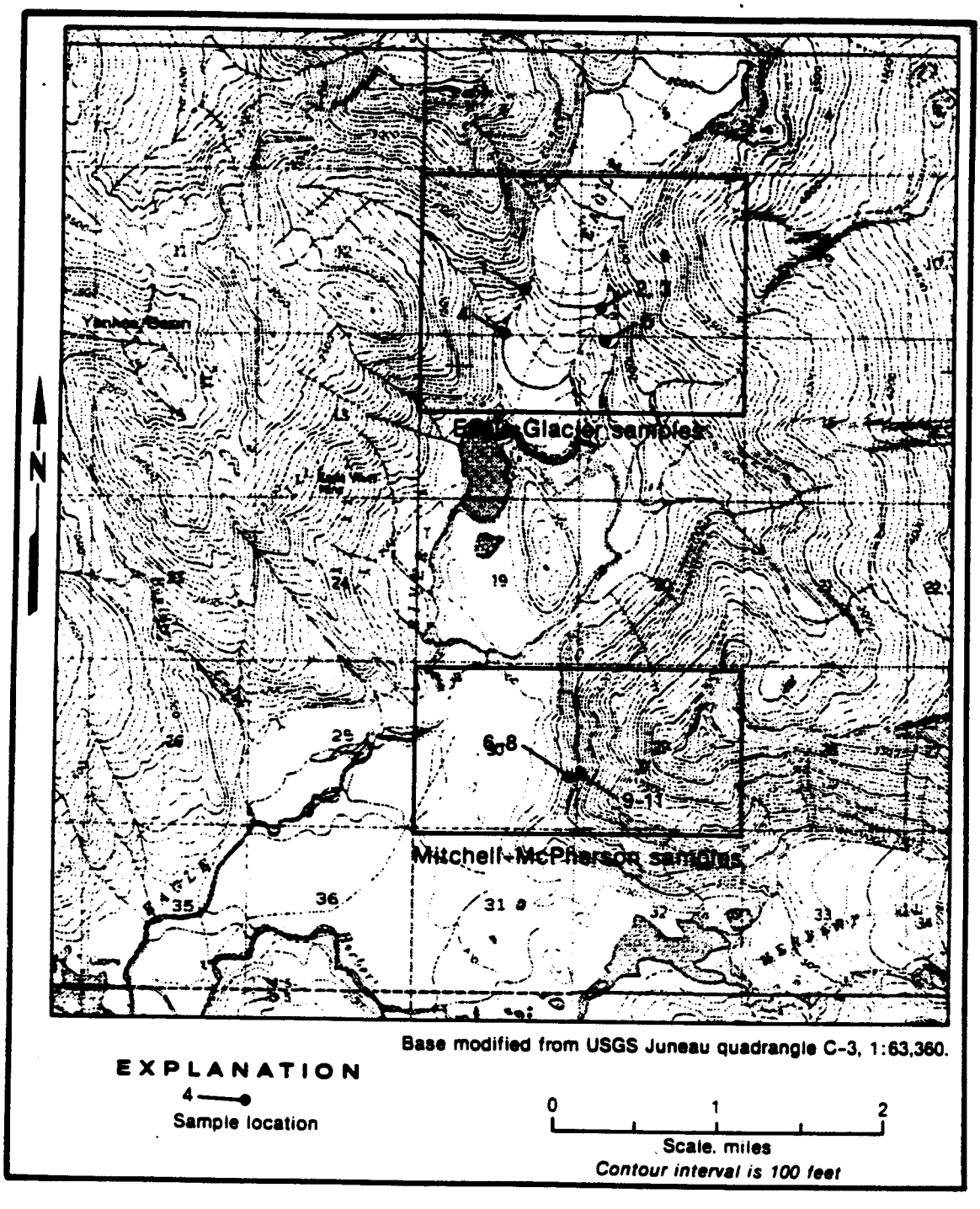


Figure A-29.— Eagle Glacier reconnaissance samples and Mitchell-McPherson sample locations.

TABLE A-16. - ANALYTICAL RESULTS - Eagle Glacier reconnaissance (see fig. A-29)

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm					Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	As	
1.....	3358..	Rep. Chip.	2.0	0.080		51	32	27	2.4	600	Quartz vein with pyrrhotite.
2.....	7438..	Select....	1.5	<.002		88	29	12	0.8	11	Selected quartz material.
3.....	7439..	Rep. Chip.	1.5	.004		46	4	40	<.2	11	Diorite gneiss.
4.....	3359..	Rep. Chip.	0.4	.002		430	8	14	.8	6	Quartz vein in shear zone.
5.....	7437..	Rep. Chip.	7.0	.008		64	13	81	.4	50	Quartz vein in diorite gneiss.

NAME(S): Eagle River Mine
Amalga
Patented Claims:
Mountain Queen Lode
Mountain Queen Lode No. 2
Westover Lode

Map Location No. 18
M.S. No. 702
MAS No. 21120084

LOCATION:

Deposit Type: Stringer vein.
Commodities: Au, Ag.

Quadrangle: Juneau C3 S 1/2 Sec: 13 T: 38S R: 64E
Geographic: 3.5 miles northeast of Eagle Beach.
Elevation: 200-1,600 ft.

HISTORY:

PRODUCTION: 19,451 oz gold.
8,855 oz silver.
see below

The Eagle River Mine was discovered by chance in October of 1902 by Neil Ward and O. L. Sandstone. After systematic prospecting efforts had turned up only interesting cobbles, the two men stumbled onto an uprooted tree containing gold-bearing quartz on their way back to camp. The discovery stirred up enough interest that C. D. Mallory of Macon, Georgia, quickly took an option on the property in late 1902. He sent Bart Thane out to examine the property and upon Thane's positive recommendation, Mallory purchased the property for $150,000 and organized the Eagle River Mining Company.

In 1903, with Thane as superintendent, the company proceeded to build a 7-mile road from the mine to Amalga Harbor, a 10-stamp mill, trams, flumes and a waterpower plant, a boarding house and bunkhouse, general store, assay office, sawmill, a blacksmith and machine shop and a 2-mile horse tramway. By January of 1904, the mill had started producing gold, and under mine foreman Paddy O'Neil and his 50 workers, the company had produced $50,100 worth of the metal by year's end.

The 1905 season was noteworthy because 10 additional stamps were added to the milling operation. Production totalled $47,200 worth of gold and concentrates for this year. A mineral survey was applied for and carried out on June 5, 1906 and patent proceedings culminated on September 6, 1906. Mineral certificate No. 67 was issued for the Mountain Queen Lode, Mountain Queen Lode No. 2 and Westover Lode, to the original locators, Neil Ward and O. L. Sandstone.

The 1500-ft long 'Adit Tunnel' was driven below existing workings during 1906, while the miners above continued to bring rich ore to the mill. During 1906, the mine produced $71,600 worth of precious metals. Other new tunnels and stopes were added to the workings between 1907 and 1909. Production peaked in 1908 when $97,376 worth of bullion and concentrates were recovered, and 1909 was the last big year for the mine when over $50,900 worth of gold and silver was produced.

Thane left the company in 1910 and under the supervision of the new superintendent, James Whipple, mining never quite reached the magnitude it once reached. The years 1910-1912 were spent exploring the workings for new ore shoots. Efforts were not rewarded and in 1912, the mine owner

decided to abandon the old workings. A new approach was needed and Thane, Whipple, and a couple of stockholders agreed to begin the Flume Tunnel, which would intersect the lode 500 ft below the lowest level already worked.

Work began on the Flume Tunnel in 1913 and continued through 1915. While good quality ore had been encountered, and gold was being produced, the enthusiasm generated from these new workings was short-lived. The new adit stretched 3,000 ft into the mountain but, the gold-bearing veins disappeared. When drill holes were driven out from the face of the adit, a new orebody had been located. However, this new orebody presented a completely new problem concerning the nature of the ore. Where ore in the old workings yielded 90% of its gold during milling, the new ore gave up only 56%. The money necessary to adapt the milling facilities for a flotation circuit was not available. Thane tried to sell interests to the property, but was unsuccessful even after combining the offer with other properties in Yankee Basin. Mining at Eagle River had come to a complete halt by 1916 with nearly 19,400 oz of gold and at least 8,850 oz of silver recovered from mining operations during the life of the mine.

In 1935, a group attempted to reopen the Flume Tunnel. This effort was unsuccessful and the mine workings returned to mother nature's grip. In 1940, C. Grohman recovered 100 oz of gold, 5 oz of silver and one lb of lead from tailings at the minesite. In 1980, Whelan Exploration Company reevaluated the property with great optimism. Some drilling was accomplished in 1981 and 1982 and a feasibility report was issued. Two other companies, Cyton Industries and Cumo Resources, have held options on the property, the latest being in 1985. Minimal work was actually accomplished as a result of these options and Whelan has once again resumed control of the property. A heap-leaching test on ore from mine dumps was done in 1987 as part of their assessment work and this information remains proprietary.

PRODUCTION:

Eagle River Mining Company
Ore Production and Milling Data
Eagle River Mine

Years	Gross Tonnage	Gross Value $	$/st Heads	$/st Tails	Receipts from Bullion & Conc.	Remarks
			Old Workings			
1904	8,640	53,135.00	6.15	0.35	50,100.00	
1905	8,128	49,987.20	6.15	.35	47,200.00	
1906	12,395	76,229.25	6.15	.35	71,600.00	
1907	8,426	49,460.62	5.87	.35	46,592.26	
1908	16,368	103,104.38	6.30	.35	97,375.75	
1909	11,620	54,988.49	4.73	.35	50,921.49	
1910	3,815	8,364.48	2.19	.25	7,410.73	Represents isolated ore bodies mined during explor-ation work.
1911	545	1,199.00	2.20	.20	1,089.49	
1912	175	350.00	2.00	.15	322.63	
Total	70,112	396,819.42	5.65	0.33	372,612.35	Not an avg. of typical ore.
			New Workings - Flume Tunnel			
1913	Mill not running this year.					
1914	2,353	36,095.02	15.34	6.75	20,225.35	
1915	2,411	12,223.77	5.07	2.10	7,153.97	
			10.14	4.39		
Total	4,764	48,318.79			27,379.33	Extracted 56.5% of gold
Grand Total	74,876	445,138.21			399,991.68	

The above table was taken from AK Terr. Div of Mines MR 112-5, 1916 (43).

WORKINGS AND FACILITIES:

During the height of activity, the mine boasted a 20-stamp mill with an aerial tramway connected to the upper workings. A horse-drawn rail tram led from Eagle River Landing to Amalga, the mine townsite. At one time, over 30,000 ft of underground workings existed. The underground workings are presently all caved and all the buildings are either dilapidated or gone. Remains of the old aerial tramway and the mill stamps can still be found in the dense vegetation.

GEOLOGIC SETTING:

Knopf (16) gives a good summary of the geology at the Eagle River Mine:

> "The rocks at the mine consist of an interstratified series of clay slates and graywacke slates, with which are associated a few thin intrusive sheets of green augite melaphyre. A few other types are found, but they are exceedingly rare. Near the

end of the 200-foot crosscut into the footwall on level No. 1 a 3-foot bed of light-colored siliceous schist was encountered, which simulates an aphanitic flow-banded rhyolite with small porphyritic crystals. Such rocks that differ greatly from the associated beds may perhaps be of service when attempts are made to relocate ore bodies lost through faulting. This is particularly true of the melaphyre sheet occurring in the footwall of the lode, which may be reasonably expected to possess both regularity and continuity. For example, the melaphyre in the 200-foot footwall crosscut on level No. 1 probably corresponds to the similar rock exposed along the flume line 300 feet south of the aerial tramway and indicates the position of the lode line, which is here covered with slide material.

The rocks, where undisturbed, trend between N. 30° W. and N. 45° W. (true meridian) and dip from 60°NE. to 90°, ranging near 70°. Owning to gravity creep because of the very steep slopes, they generally lie flat or even with reversed dip. In some of the gulches the horizontal slates can be seen partly resting on vertical slates, the zone of crushed slate that separates the slates in normal position from those that have slumped over being well shown. Underground operations show that this creep and landslide action is far more extensive and persists deeper than would be suspected from the surface exposures. Broad zones of broken and ground-up slate were encountered in the mine and when wet formed a running mass of clayey mud. This gave much trouble, necessitating heavy timbering, and in some places it was found impossible to keep the drifts open and hundreds of feet of workings have had to be abandoned. It is reported that in some tunnels 100 feet or more underground logs and dior ite boulders were encountered, proving that the landslide action took place in post-glacial time. This action has broken the continuity of the ore deposit, and as landslides act under the force of gravity, masses of ore torn off from the roots of the deposit in place will have moved out into the hanging wall, because the hanging wall is on the downslope side of the mountain. The writer believes, however, that beyond this general tendency to be displaced to the hanging-wall side, nothing can be postulated as to the probable position of the displaced masses of ore. It is likely that their orientation in both strike and dip will be radically changed.

Level No. 1 undercuts the original Eagle outcrop at a depth of 215 ft, and the ore has been stoped out from this level to the surface. The workings extend more than 1,000 ft northwestward along the trend of the ore zone, but sinking has not been attempted from this level. The ore body in the outcrop was 250-ft long and, as described by Wright (53), consisted of a chain of three ore shoots, elliptical in cross section, striking N. 30° W., dipping 50° NE., and pitching northwestward into the mountain at an angle of 30°. They averaged from 5 to 15-ft in width. At the time of the writer's visit, the old workings were no longer accessible. The different shoots are stated to have carried distinctive ores. High gold values were

generally accompanied by large quantities of metallic sulphides; quartz heavily mineralized with arsenopyrite and galena was especially good ore. In spite of its base character the ore is reported to have been 90 per cent free milling; the arsenopyrite-galena concentrates carried $100 a ton in gold. In places a honeycombed quartz barren of sulphides carried considerable free gold.

Much broken ground was encountered in following the ore zone northwestward. The ore extracted during 1909 and 1910 belonged to the stringer-lode type, with some lenticular masses of quartz. There is a certain tendency for good ore to localize along the contacts of thick graywacke beds with black slate. Commonly the slate resting on the graywacke is intensely crushed and ribboned with quartz. But this is not an invariable rule, for one of the largest lenses of quartz, having maximum dimensions of 100 feet in length, 20 feet in width, and 30 feet in height, possessed no definite walls. The central portion consisted of massive quartz, but toward the periphery the ore body frayed out into irregular veinlets penetrating the surrounding highly polished carbonaceous or graphitic slate. The major axes of the quartz mass corresponded in direction with the strike and dip of the slate. Some of the quartz contained much silvery-white mica; the sulphides, mainly arsenopyrite, were sparse in amount, but the slate was in places highly impregnated with barren arsenopyrite. Toward the center of the quartz body considerable quartz was encountered carrying massive pyrrhotite with some galena scattered through it, and this constituted ore of good grade."

Roehm (29) describes the Flume Tunnel which was driven after Knopf's visit to the mine:

"The Flume Tunnel is located at an elevation of 560 ft on the south slope of the divide between Eagle River and Yankee Basin. The tunnel was driven approximately 3,000 ft in a zig zag northwesterly direction following a somewhat intercalated contact of slaty schistose graywacke and graphitic slate. The slate appears to rest on the graywacke and both dip to the northeast. This contact is a zone of weakness which occurs as a soft crumpled, crushed mass that contains small quartz lenses, stringers and gash veins. Where the quartz stringers are numerous along the zone it constitutes a low grade ore. [Thus this tunnel was driven more or less following this zone and two small lenses or faulted blocks of lenses were encountered as shown by the stoped areas on fig. A-31].

Past the first stope a fault zone was encountered that displaced the zone horizontally. With the aid of a diamond drill the zone was found displaced approximately 250 ft to the west. Since this zone is tightly timbered, movement along the zone could not be seen. Minimum small slip faults or joints were encountered over the entire distance of the tunnel. They vary considerably in dip and strike. Two large normal fault zones were encountered in the tunnel and marked as Nos. 1 and 2

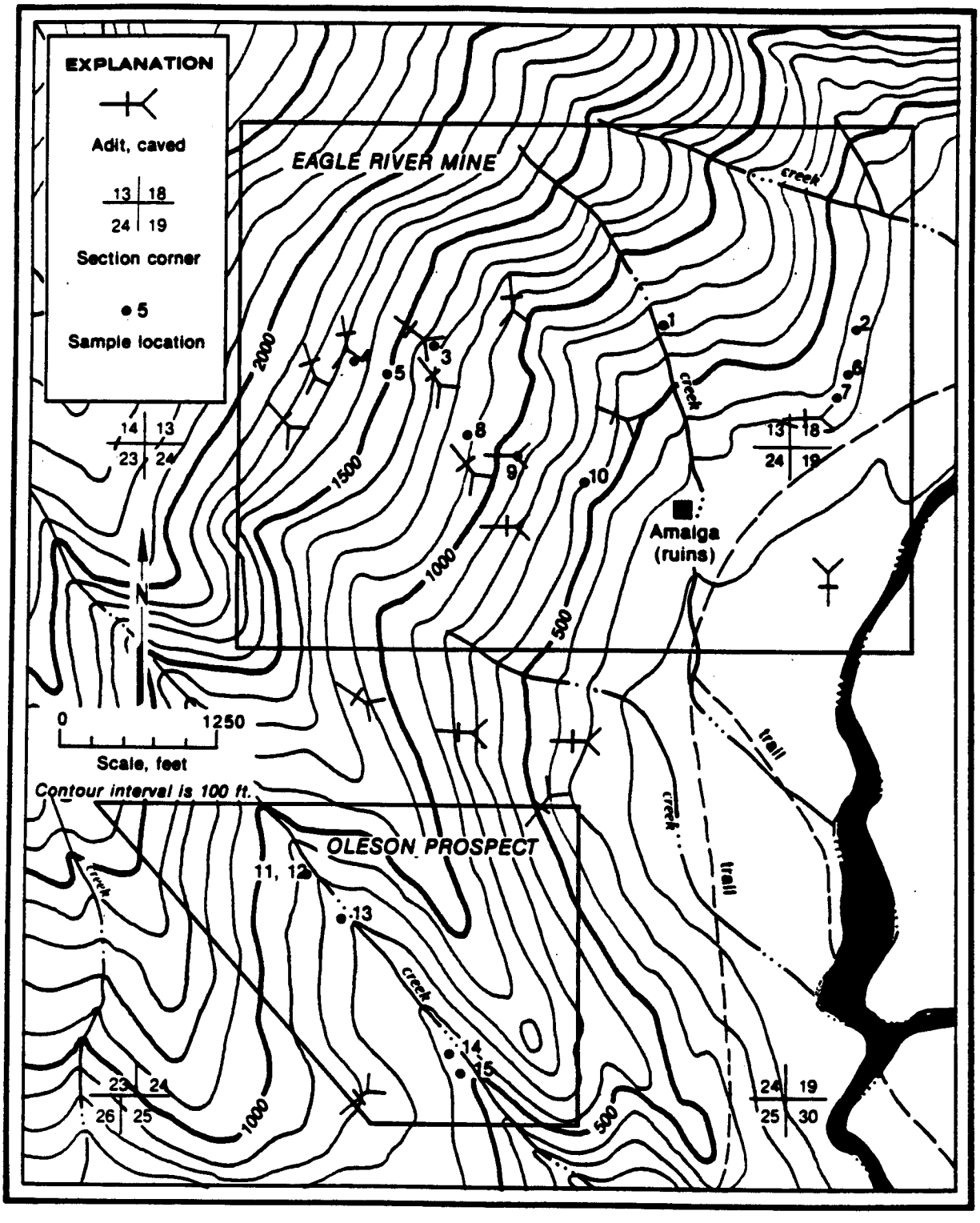


Figure A-30.— Eagle River area, showing sample locations; includes Eagle River Mine and Oleson prospect.

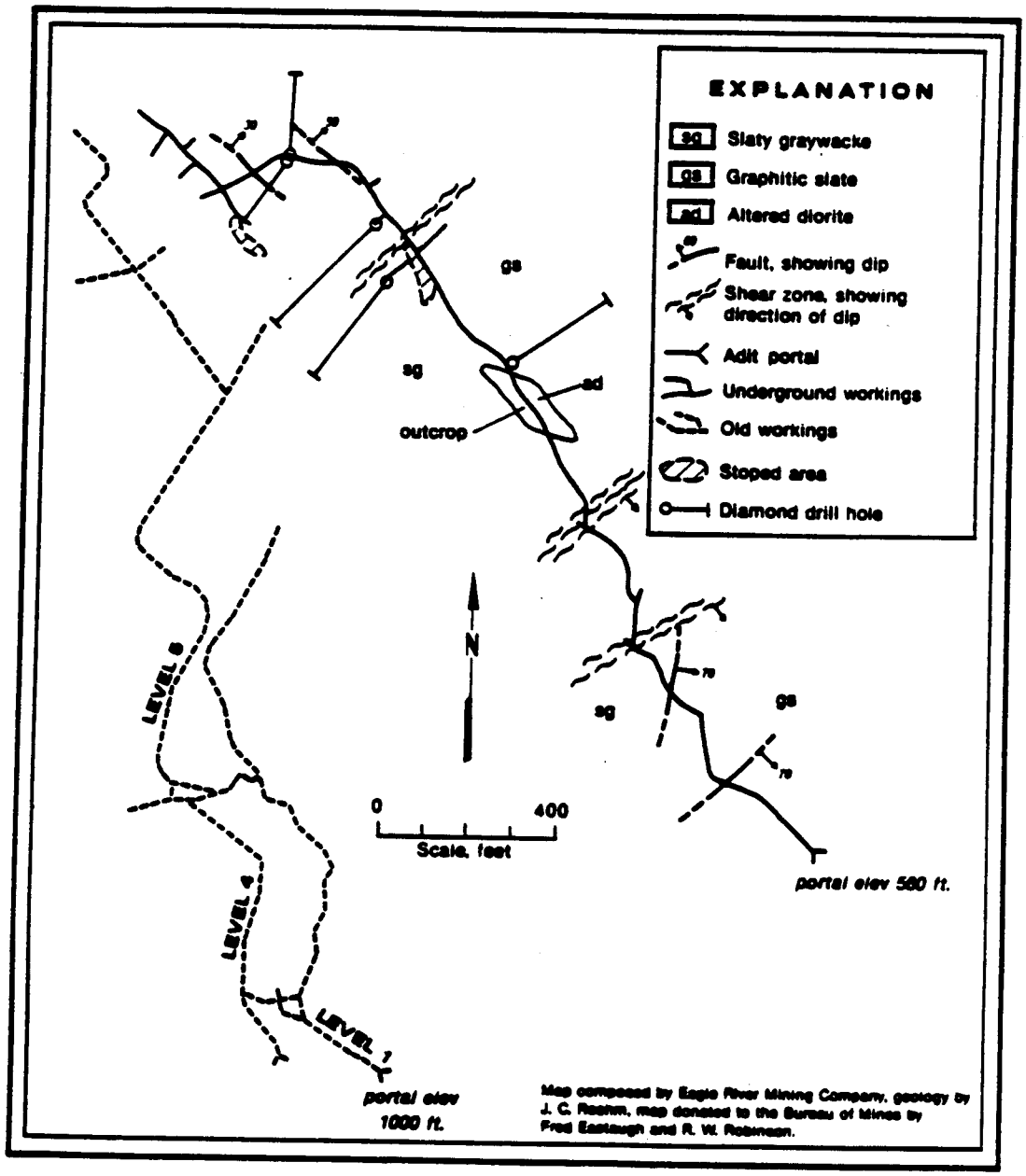


Figure A-31.— Flume Tunnel, Eagle River Mine, showing geology and underground workings in relation to main workings of the mine.

fault zones on the map. These zones are wide crushed areas and very recent. They appear to have been caused by the retreat of Eagle River Glacier, leaving a very steep bluff which later crumbled down and over. These show only vertical movement and only small amounts distributed through the crushed zone. They carry considerable water and necessitate timbering. An altered dike rock occurs over a width of 100 ft located approximately 1300 ft from the portal. This dike has a schistose structure and lies parallel to the foliation of the schistosity. Its color ranges from various shades of green to a yellowish brown, the latter on the outer edges shows considerable alteration. Numerous large to small pieces of this dike material are found in several places occurring in bunches along the drift.

Orebodies:

The orebodies consist of small tabular lenses or faulted blocks distributed along the zone of weakness or apparent contact of the two sediments. Two workable lenses were discovered and mined in this tunnel. These are shown in the stoped areas. These appeared to be faulted blocks of a larger body and contained commercial values. Other small bunches of quartz and ore are evident as shown by the red areas on the map. These were not sampled, but some were reported to contain commercial values. The depth to which the ore below the stope will extend is uncertain. (Short faulted blocks are very uncertain as to depth.).

Diamond drill hole No. 1 was reported as having cut two feet of ore which assayed $5.95 in gold per ton [@ $20.67/oz]. Holes Nos. 2 and 4 no doubt hit the ore as the later development led to the mining of the stope. Holes Nos. 3, 5, 6 and 7 were reported barren. The dips and depths of these holes are not known, but locations and lengths were taken from an old blueprint of the tunnel from which this map was constructed.

Mineralization:

The ore mined in this tunnel, according to the aforementioned mill sheets, shows a much higher per ton value than the ore milled from the old above workings. However, the recovery shows a remarked difference in the amount of free milling gold. Only a 56.5% recovery was made from the ore milled in this tunnel by the processes of amalgamation and concentration. It was reported by Mr. Thane that a 90% recovery was made from flotation tests. This shows that the mineralization contains less free gold and is of a somewhat more complex nature in depth. The ore is a milky white to grayish quartz that is banded with graphitic streaks. It contains sulphides to the extent of 2% by volume and numerous flattened and angular wall rock pieces. It contains free gold, pyrite, galena, arsenopyrite, pyrrhotite and chalcopyrite. This mineralization is well distributed through the quartz. Sulphides of zinc have been reported found in places in the ore. Pyrite and arsenopyrite appear to be the main

mineralization of the stringer zones in both the small veins and country rock. Some sections were reported to have shown assay values up to $3.75 per ton [@ $20.67/oz]. To arrive at a conclusion as to the amount of ore in this tunnel at the present time is undeterminable. To determine this would necessitate considerable sampling and some development work. How far the ore goes in depth below the mined stopes is unknown, whether it extends above is also not known. The small quartz bunches as shown on the accompanying sketch contain some ore, but this amount could not be considered large. Whether or not sections of the stringer zones contain veins to be considered ore is undeterminable without sampling."

BUREAU INVESTIGATION:

The Bureau visited the property and found seven caved adits as well as numerous prospect pits, trenches and dumps. Float samples were collected from all the dumps (fig. A-30) but little else could be done to evaluate the property as all the underground workings are caved and surface exposures are rare. One select float sample (No. 3, table A-17) contained 1.47 oz/ton gold.

RESOURCE ESTIMATE:

A feasibility study done on the property in 1985 resulted in indicated resources totalling 751,875 tons at a weighted average grade of 0.21 oz/ton gold (49). This grade and tonnage, if realistic, gives the property a moderate mineral production potential for gold. A considerable amount of capital would be needed to rehabilitate the old workings and provide access to the ore bodies and bad ground would make underground mining costs high. However, it should be noted that the validity of the resource figure is questionable and should be regarded as an inferred estimate at best. If the potential for development was as high as this estimate purports, a large company would be developing the orebody today. This is not happening. If there is a large orebody in the Eagle River area however, it is likely to occur in this vicinity.

RECOMMENDATIONS:

Drilling is necessary to substantiate inferred resources. The discontinuous nature of the ore shoots and the faulted character of the country rock make drilling targets a matter of guesswork, rather than science. This approach is very expensive. Reopening the Flume Tunnel would access mineralized quartz and beneficiation studies could be done on the ore.

REFERENCES:

16, 24, 25, 26, 27, 29, 42, 43, 46, 48, 49, 53.

TABLE A-17. - ANALYTICAL RESULTS - Eagle River Mine (see fig. A-30)

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm					Pb	Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	As	%	
1.....	6072..	Select....		0.036		126	64	68	0.9	32		Quartz stringer zone, minor arsenopyrite.
2.....	7391..	Select....		0.003		87	22	112	0.6	>1000		Iron-stained phyllite, ≤2% arsenopyrite.
3.....	6070..	Rep. Chip.		1.466	1.24	580	>7500	6620	>30.0	>1000	1.27	Quartz float from dump, ≤20% pyrite/ arsenopyrite/galena.
4.....	7371..	Select....		<0.002		8	15	26	<0.2	24		Quartz float.
5.....	7372..	Select....		0.043		25	11	55	0.4	90		Quartz float.
6.....	7390..	Rand. Chip		0.003		118	<2	80	<0.2	5		Greenstone, ≤5% pyrite.
7.....	7389..	Select....		0.092		8000	<2	36	7.3	6		Quartz vein, 1% pyrite.
8.....	6071..	Select....		0.372		20	175	69	6.2	400		Quartz float.
9.....	7370..	Select....		0.096		42	540	515	1.5	>1000		Quartz float, arsenopyrite/ sphalerite/galena.
10.....	6069..	Select....		0.003		13	14	26	0.3	500		Quartz float, 1% arsenopyrite/ pyrite.

NAME(S): Oleson

Map Location No. 19
MAS No. 2TT20085

LOCATION:

Deposit Type: Stringer vein.
Commodities: Au.

Quadrangle: Juneau C3 SE 1/4 Sec: 24 T: 38S R: 64E
Geographic: 2.5 miles northeast of Eagle Beach.
Elevation: 300 ft.

HISTORY:

PRODUCTION: None.

The Oleson prospect was discovered in September of 1908 according to an article in the Daily Alaska Dispatch (25). Knopf mentions the property in his 1912 report on the Eagle River Region (16), and that is the extent of historical information concerning this prospect.

WORKINGS AND FACILITIES:

Two open cuts and a short adit are reported (16).

GEOLOGIC SETTING:

Country rock in the area consists mainly of phyllites intercalated with greenstones and breccias. The prospect is reported to lie along the contact between these rock types. Some narrow quartz stringer lodes trending N30°W are exposed here and lie parallel to the phyllite-greenstone contact. Arsenopyrite occurs in wallrock fragments enclosed in the quartz (16).

BUREAU INVESTIGATION:

The Bureau did not locate the Oleson workings, but did sample vein quartz float and some pyrrhotite/pyrite-bearing quartz stringer zones in the area. All samples contained 0.002 oz/st gold (Nos. 11-14, fig. A-30, table A-18).

RESOURCE ESTIMATE:

A resource estimate cannot be made because the property was not located. Samples collected in the area by the Bureau were not encouraging.

RECOMMENDATIONS:

Continue search for workings on east side of tributary creek at an elevation between 250 and 400 ft.

REFERENCES:

16, 25, 26, 27.

TABLE A-18. - ANALYTICAL RESULTS - Oleson (see fig. A-30)

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm					Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	As	
11.....	7538..	Rand. Chip		<0.002		70	9	108	<0.2	28	Quartz stringers in phyllite.
12.....	7539..	Rand. Chip		<.002		18	25	32	<.2	6	Quartz stringer float.
13.....	7537..	Rand. Chip		<.002		67	4	120	<.2	14	Quartz stringers in phyllite.
14.....	7536..	Rand. Chip		<.002		86	7	104	<.2	13	Quartz stringers in phyllite.
15.....	3331..	Grab.....		<.002		8	<2	11	<.2	3	Quartz float.

NAME(S): Mitchell-McPherson
Rainbow prospect
Goat Mtn. Group

Map Location No. 20
MS No. 2TT20087

LOCATION:

Deposit Type: Fissure vein.
Commodities: Au.

Quadrangle: Juneau C3 SW 1/4 Sec: 29 T: 38S R: 65E
Geographic: East side Eagle River Valley, 3.5 miles from Eagle Beach.
Elevation: 1,300-1,600 ft.

HISTORY:

PRODUCTION: None.

In 1904, James Mitchell and John McPherson followed quartz fragments high up the steep west slope of Goat Mountain to the outcrops where the quartz was eroding. The two men exposed the veins with opencuts, and samples from the veins carried values between $5 and $12/ton of gold. A high value of $50/ton was also reported. The men attempted to reach the veins by tunneling but their initial efforts (including a 75-ft adit) were thwarted by rock avalanches, snowslides and poor surveying.

A new tunnel was started in 1910 from a protected location. Progress reports were limited and it is not known how far these men got with their effort, although original plans proposed a 600-ft long adit. In 1914, the mayor of Douglas, Mike J. O'Connor, bought a 1/3 interest in the property and activity picked up. O'Connor bought out McPherson in December of 1914 and bonded Mitchell's interest.

In 1915, work began on the Rainbow Tunnel which was intended to cut the vein 200 ft from the portal along its 600-ft course. The vein was reached at 125 ft, assays reported $10.25/ton gold across 3 ft of quartz, and everyone was optimistic about the possibilities. Work continued in 1916, when O'Connor reported $30/ton gold but, later on in the year, the plans fell apart.

Little work was reported during the ensuing years. In 1925, Mitchell went out to do some assessment work on his and O'Connor's claims and that was the full extent of activity for the next 15 years. In 1940, Thomas Gillis reevaluated the property, but this effort was also short-lived. Currently, the property is idle.

WORKINGS AND FACILITIES:

Two adits and several trenches have been described (16), but the Bureau found only a wheel barrow, drill steel, tree stumps, and water pipe on the steep 45° slopes. A possible adit dump was seen.

GEOLOGIC SETTING:

The geology has been described by Knopf (16):

> "The country rock enclosing the lode is a black diorite gneiss, which forms a band about 1,500 feet wide. The foliated structure of the gneiss, which is well marked, trends N. 40° W. and dips 60° NE. The footwall of this band of diorite gneiss is a belt of schists, which comprises a considerable variety of

rocks. That immediately adjoining the gneiss is a garnetiferous biotite schist. The foliation of the schists is parallel to that of the gneiss.

The lode consists of a zone of crushed and mineralized diorite gneiss striking N. 45° E., nearly transverse to the foliation. The dip is probably vertical. The ore body, as exposed in the open cuts, averages 6 feet in thickness and is reported to average from $5 to $12 a ton in value. The surface ore is considerably stained by iron oxide, but the unweathered material is snow white. Sulphides are rare and consist of pyrite and galena. In a few places veinlets of quartz interlace the ore irregularly. The lowest outcrop of the lode lies in the diorite gneiss near the contact with the schists; whether the lode extends into the schist has not been determined.

The ore, when examined microscopically, is found to be composed of dolomite, albite, sericite, and accessory apatite. Minute veinlets of carbonate traverse the older dolomite and albite and indicate a second period of mineralization. The microscopic examination thus confirms the conclusion reached from the appearance of the ore - that intense changes were produced in the diorite gneiss by the solutions which brought in the gold."

The vein/wallrock composition and general trend appear similar to those veins described at the Herbert Glacier (fig. 9, No. 21), 1.5 miles to the southwest, however the veins are considerably narrower.

BUREAU INVESTIGATION:

The Bureau could find no evidence of the trenches, but did find what appears to be a possible dump from one of the adits at 1,275 ft elevation. Quartz float was found in gullies nearby and sampled (No. 10, table A-19). A contact between the metasediments and black diorite gneiss was seen trending N40°W and a series of shears within the gneiss trends N45°-60°E and dips steeply. Iron-stained selvage zones up to 6-ft wide are associated with the shears, but quartz veining is minimal in these zones. Trace pyrite, chalcopyrite, and galena were found in some of the quartz float. The highest gold value obtained was 0.08 oz/ton from altered diorite (No. 11, fig A-29, and table A-19).

RESOURCE ESTIMATE:

In 1939, an inferred resource of 1,500,000 tons at 0.20 oz/ton gold was calculated (9). This would give the deposit a moderate mineral development potential. Due to poor exposures and lack of accessibility to the old workings, the Bureau was unable to fully evaluate the prospect. Low gold values in surface samples do not confirm the inferred resource estimate given above.

RECOMMENDATIONS:

Continue the search for old workings around the 1000-1200 ft elevation as a large amount of suspicious tree stumps occur here.

REFERENCES:

9, 16, 24, 25, 26.

TABLE A-19. - ANALYTICAL RESULTS - Mitchell-McPherson (see fig. A-29)

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm				Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	
6.....	4313..	Rep. Chip.	0.5	<0.002		6	13	24	<0.1	Quartz carbonate vein, minor pyrite.
7.....	4314..	Rep. Chip.	1.0	<.002		18	10	70	.1	Quartz stringer-bearing shear zone, minor pyrite.
8.....	4315..	Select....	.13	<.002		78	8	33	.1	Quartz vein with wallrock partings, ≤5% pyrite stringers.
9.....	4316..	Select....		.004		11	11	85	.2	Altered diorite, ≤2% pyrite.
10.....	4318..	Select....		.003		63	1350	575	39.0	Quartz vein and selvage, trace pyrite/ chalcopyrite/galena.
11.....	4319..	Cont. Chip	2.0	.078		22	13	59	1.2	Altered diorite, trace pyrite.

NAME(S): Herbert Glacier occurrence

Map Location No. 21
MAS No. 2111202112

LOCATION:

Deposit Type: Fissure vein.
Commodities: Au, Ag, W.

Quadrangle: Juneau C3 Sec: 33 T: 38S R: 65E
Geographic: South side Herbert Glacier 4.5 miles northeast of Dotson's Landing.
Elevation: 170-430 ft.

HISTORY:

PRODUCTION: None.

The gold-bearing quartz veins exposed at Herbert Glacier are northwest of the area staked as the Summit/St. Louis claims in years past. Glacial retreat over the last 40-50 years has uncovered quartz fissure veins that were previously concealed. In 1986, a joint discovery was made by the U. S. Bureau of Mines and Houston Oil and Minerals along a series of quartz/calcite fissure veins in quartz diorite gneiss. Fifty unpatented claims were staked by Houston Oil and Minerals and 1,650 ft of core drilling was completed by the end of the summer. A summary report (22) was completed in 1986 and the ownership of the claims shifted to Echo Bay Mines Company by the end of the year. The property was idle in 1987, but valid claims are still held which cover the Herbert Glacier occurrence, the Herbert Group of claims and the old Summit/St. Louis claims.

WORKINGS AND FACILITIES:

Several drill sites are discernable on the property from work done in 1986, but otherwise this is an undeveloped property.

GEOLOGIC SETTING:

Country rock in the area consist of andesitic volcanics (greenstones) to the west and quartz diorite gneiss to the east forming the foliated margin of the Coast Range Plutonic Complex. Cutting across the grain of these rocks are a subparallel or en echelon set of N70-80°E trending quartz veins dipping steeply to the north. A more northerly vein set of much shorter strike length also occurs, and probably fills tension fracture zones formed between the main E-W trending shear zones. The veins vary in thickness from a few inches to 4-ft thick (figs. A-33, 34).

The veins are composed of both white and gray quartz along with calcite, and locally exhibit ribbon texture. Slickenside surfaces occur locally in the vein centers indicating post emplacement movement. The veins appear to have been emplaced along a series of shear zones which are subparallel to the present channel of Goat Creek. Selvage in the host rock occurs on both margins for up to several feet out from the vein, but is definitely more pervasive on the footwall side of the vein. The veins vary considerably in width due to pinching and swelling, and locally only an altered zone, barren of quartz can be found. In some areas veins occur in stream bottoms and could not be sampled. For ease of accessibility it is best to visit the area at times of low stream flows.

Sulfides consist predominantly of arsenopyrite, locally comprising up to 20% of the vein in fist-sized clots, and several percent pyrite, galena, and sphalerite can also be found. Scheelite was also identified. Visible gold occurs locally in both types of quartz but appears to be most

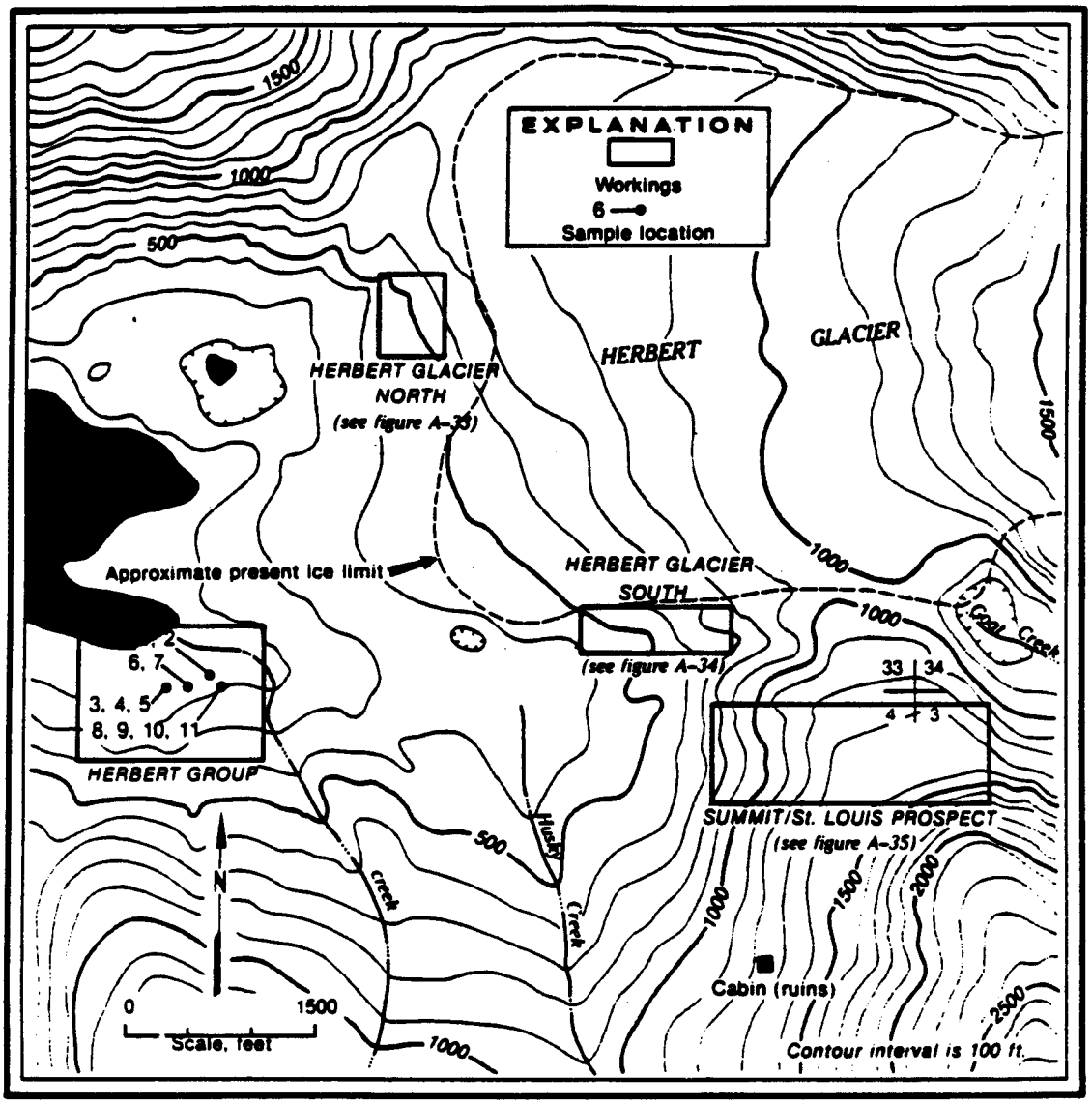


Figure A-32.— Herbert Glacier area, showing sample locations; Herbert Glacier occurrence, Summit/St. Louis prospect and Herbert Group.

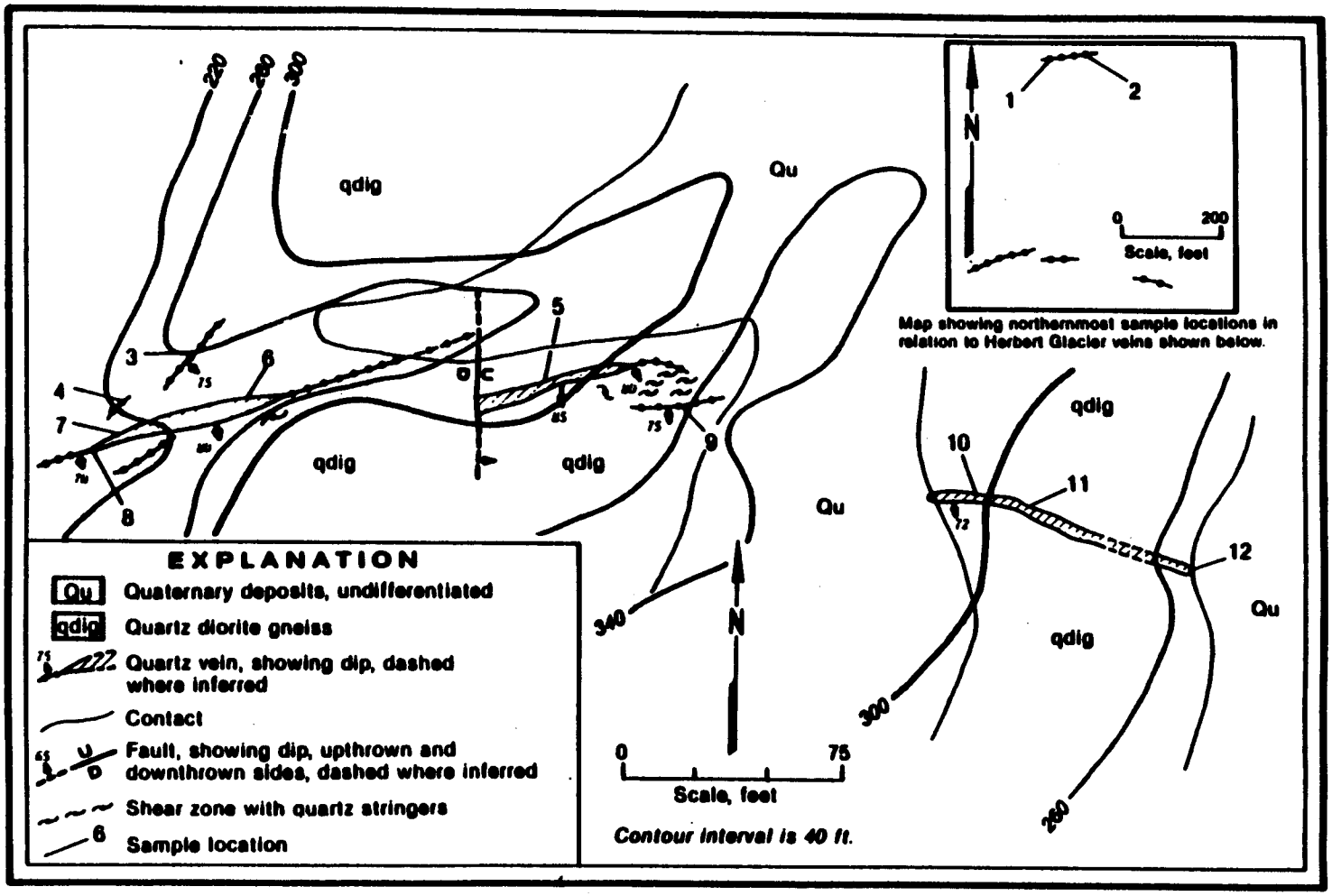


Figure A-33.— Herbert Glacier North, showing geology and sample locations.

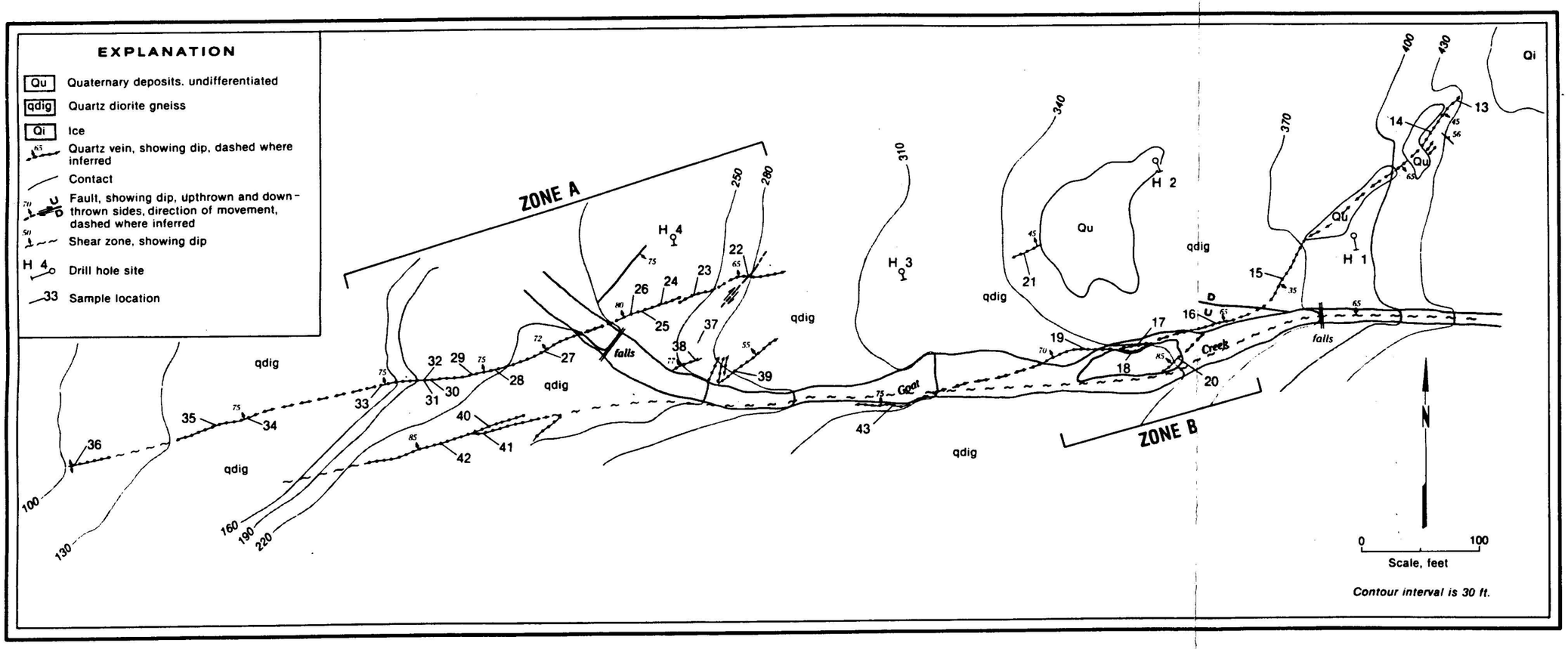


Figure A-34.— Herbert Glacier South, showing geology and sample locations.

prevalent in the galena-bearing white quartz located near the footwall of the vein. The vein margins are characterized by carbonate and potassic alteration as indicated by abundant calcite, sericite, ankerite, secondary potassium feldspar, chloritized biotite, and silicification. The selvage contained up to 1-2% finely disseminated arsenopyrite but carried low gold values.

The veins are concentrated in two areas around the margins of the glacier and for simplicity are called the north and south vein sets (fig. A-33, 34). The south veins can be followed intermittently for 1,200 ft along strike and 320 ft vertically. The north veins are less extensive and sulfide-poor relative to the south set. However, the alteration halos for both sets are very similar. Much narrower, sulfide-poor quartz veins with the same general trend cut the andesitic volcanics to the west.

BUREAU INVESTIGATION:

The Bureau first noticed and sampled the south Herbert Glacier quartz veins while searching for the Summit/St. Louis claims. Simultaneous to the Bureau's investigation, the veins were sampled by geologists representing Houston Oil and Minerals Company (HOM). Their high sample results were returned before the Bureau's and they subsequently staked claims over the area. This company has since been purchased by Echo Bay Mines Company. The high gold values of these previously undiscovered veins prompted the Bureau to continue its sampling and mapping program with permission from the new claim owner. Samples from the south vein set contained up to 7.0 oz/ton gold and 3.7 oz/ton silver (No. 31, fig. A-34, table A-20), which are the highest values from all the samples taken in the Eagle River study area. Gold values vary radically along strike length but the veins still average 1.5-ft wide and 0.9 oz/ton gold. Samples taken exclusively of selvage averaged 0.04 oz/ton gold. The highest gold values are associated with high lead and zinc values. Also, when samples were cut on a rock saw, those containing crystals of galena also contained visible gold separate from the sulfides. There is a relation between gold and galena in this system, but the exact nature of the relationship is difficult to isolate.

The north vein set is subparallel to the south veins and for the most part has much lower gold values, even though galena does occur in the quartz. All samples ran less than 0.08 oz/ton gold except one containing 1.08 oz/ton gold (No. 2, fig. A-33) collected from a 40 ft long vein exposure averaging 1.0 ft wide (table A-20).

A 240 lb metallurgical sample was collected for analysis and beneficiation tests by the Bureau's Salt Lake Research Center. This sample had a mill head of 1.91 oz/ton gold. A gravity separation recovery test yielded a concentrate of 26 oz/ton gold at an 88.8% recovery. The sample was also found to contain scheelite which is one of the first substantiated reports of its occurrence in the Juneau Mining District. The bulk sample had a 0.03% tungsten trioxide (WO_3) mill head and a gravity separation yielded a concentrate of 0.35% tungsten trioxide (WO_3) at 21.7% recovery (10).

RESOURCE ESTIMATE:

The high gold values obtained along an extended strike length give this

area the highest mineral production potential of any property in the Eagle River study area. On the south vein set two areas of high grade resources are outlined in the table below and on figure A-34.

Indicated Resources

Zone	Tons		Oz/ton Au
A	6,370		1.6
B	1,660		.91
Totals	8,030	weighted avg.	1.5

This is not a large tonnage, but the associated grades might make a deposit of this size economically feasible for a small operator.

Lower grade resources with larger tonnages also exist in the area.

Drilling of the south vein set by Houston Oil and Minerals indicates that the veins extend for at least 190 ft down dip from the surface and contain gold values of 0.90 oz/ton gold at that depth. This drilling indicated at least 40,000 tons at 1.0 oz/ton gold (22).

RECOMMENDATIONS:

This property could probably be developed as a small operation with the existing resource data. Closer spaced drilling would further delineate gold values in the veins and trenching would help to test surface gold values between outcrops. The majority of the vein is exposed along strike and as the property is developed the depth dimension will become more fully defined. The strike length suggests at least 600 ft of vertical extent (at a two to one strike length to depth ratio) while current drilling only delineates 190 ft. This knowledge could greatly increase the resource estimate.

REFERENCES:

10, 16, 22, 27, 32.

TABLE A-20. - ANALYTICAL RESULTS - Herbert Glacier occurrence (see figs. A-32 through A-34)

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm						Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	As	W	
1.....	8202..	Rep. Chip.	0.9	0.050		5	3850	182	17.0		3	Quartz vein and altered diorite gneiss, 2% arsenopyrite, 8% galena.
2.....	8204..	Cont. Chip	1.0	1.084	5.47	95	>10000	3600	>50.0		3	Quartz vein, ≤10% arsenopyrite/ galena.
3.....	8200..	Cont. Chip	1.0	.013		6	198	22	1.8		270	Quartz vein, 1-2% arsenopyrite/ galena.
4.....	8201..	Cont. Chip	.7	.017		2	215	9	1.8		4	Quartz vein, 1% arsenopyrite/ galena.
5.....	3671..	Cont. Chip	2.5	.007		2	102	18	0.2		960	Quartz vein, 2% arsenopyrite, trace galena.
6.....	3672..	Cont. Chip	5.0	.008		2	300	9	2.4		540	Quartz vein, 1% galena, 2% arsenopyrite.
7.....	3673..	Cont. Chip	3.0	.005		19	134	25	1.1		630	2% arsenopyrite.
8.....	3674..	Rep. Chip.		.038		10	265	22	5.8		1800	Quartz vein, 2% galena, 5% arsenopyrite.
9.....	3670..	Rep. Chip.		.027		4	136	23	1.3		190	Stockwork quartz veinlets, 1-2% arsenopyrite/galena.
10.....	3669..	Select....		.008		2	4850	5	42.0		19	Galena-rich zone in quartz vein.
11.....	3668..	Cont. Chip	2.5	.083		28	455	23	16.0		540	Quartz vein, 1-2% arsenopyrite/ galena/pyrite.
12.....	3667..	Cont. Chip	2.0	.045		2	935	9	5.6			Quartz vein, 1% galena, ≤7% arsenopyrite.
13.....	7444..	Rand. Chip	1.5	.060		32	38	70	1.4		4	Quartz vein, 1-2% pyrite/ arsenopyrite.
14.....	7443..	Cont. Chip	1.0	.008		32	8	8	.7		315	Quartz vein, 1% pyrite.
15.....	7445..	Select....	.5	.212		11	28	15	9.4		6	Quartz vein, ≤10% arsenopyrite.
16.....	7448..	Rep. Chip.	2.0	.070		20	21	52	.9		6	Quartz vein and selvage, 1-2% arsenopyrite.
17.....	7450..	Cont. Chip	.2	3.101	2.57	65	4400	5000	>50.0		3	Quartz vein, 1-2% arsenopyrite/ galena/sphalerite.

TABLE A-20. - ANALYTICAL RESULTS -Herbert Glacier occurrence - Continued

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm						Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	As	W	
18.....	7447..	Cont. Chip	1.5	0.150		10	126	50	8.8		135	Quartz vein and selvage, ≤80% arsenopyrite.
19.....	7449..	Cont. Chip	2.0	1.056		18	1850	1100	13.0		4	Quartz vein and selvage, 3% arsenopyrite.
20.....	7446..	Cont. Chip	1.6	.018		2	1650	8	7.2		4	Quartz vein, ≤25% arsenopyrite, 2-3% pyrite.
21.....	7451..	Cont. Chip	1.3	.470		8	500	122	3.6		5	Quartz vein, 20% arsenopyrite, 1% galena.
22.....	7452..	Cont. Chip	2.0	1.037		5	4050	750	9.0		405	Quartz vein and selvage, 5% arsenopyrite, ≤5% galena.
23.....	7453..	Rep. Chip.	1.0	.055		4	4350	34	10.0		3	Quartz vein, 3% arsenopyrite, 5% galena.
24.....	7454..	Cont. Chip	0.5	.190		5	>10000	32	28.0		4	Quartz vein, ≤20% arsenopyrite, ≤5% galena.
25.....	3662..	Rep. Chip.	1.0	.190		8	34	48	3.1			Quartz vein, altered gneiss.
26.....	3663..	Grab.....	1.0	1.983		4	3800	2300	19.0		2	Quartz vein, 1-2% galena.
27.....	6049..	Rep. Chip.	2.0	.488		1	4950	7	16.0	>1000	450	Quartz vein, ≤10% galena/ arsenopyrite/pyrite.
28.....	6048..	Cont. Chip	1.8	.266		3	3150	22	5.2	>1000	520	Quartz vein, trace pyrite.
29.....	8213..	Cont. Chip	.4	.755		9	2200	315	9.8			Quartz vein, <1% arsenopyrite.
30.....	7436..	Cont. Chip	2.5	3.4		7	1420	620	38.0	>1000		Quartz vein and 0.5 ft selvage on footwall, galena/pyrite/ arsenopyrite.
31.....	6050..	Cont. Chip	1.8	7.021	3.7	13	4800	1620	>30.0	>1000	360	Quartz vein, <1% pyrite/arsenopyrite/ galena.
32.....	8211..	Rand. Chip		.036		23	22	205	2.3			Quartz vein selvage, 1-2% arsenopyrite.
33.....	8212..	Cont. Chip	.5	1.078		22	700	61	6.4			Quartz vein <1% arsenopyrite.
34.....	8214..	Cont. Chip	.7	.038		4	39	32	1.0			Quartz vein <1% arsenopyrite.
35.....	6051..	Cont. Chip	3.5	.101		8	100	55	2.0	>1000		Quartz vein and selvage, ≤5% arsenopyrite/pyrite.

TABLE A-20. - ANALYTICAL RESULTS -Herbert Glacier occurrence - Continued

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm						Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	As	W	
36.....	8215..	Cont. Chip	1.0	0.046		10	835	325	2.9			Quartz vein 1-2% lead/sphalerite/ arsenopyrite.
37.....	3666..	Rand. Chip	2.5	.035		6	15	92	0.2			Quartz carbonate alteration zone. Disseminated arsenopyrite.
38.....	3664..	Cont. Chip	1.5	.041		2	33	49	.5		12	Quartz vein plus selvage on each side, 2% arsenopyrite.
39.....	3665..	Rep. Chip.	1.0	.040		5	24	34	1.1		4	Quartz vein, 3% arsenopyrite, trace galena.
40.....	7442..	Cont. Chip	4.0	.016		18	13	102	.6			Altered diorite gneiss, selvage.
41.....	6053..	Cont. Chip	7.0	.489		10	1430	67	26.0	>1000		Quartz vein and selvage, ≤3% pyrite/galena.
42.....	6052..	Rep. Chip.	3.0	.065		1	213	20	1.6	>1000		Quartz vein, trace arsenopyrite, pyrite.
43.....	8208..	Cont. Chip	3.0	.726		2	1400	87	6.1			Quartz vein, ≤10% arsenopyrite, 1-2% galena.
44.....	7441..	Rep. Chip.										240 lb metallurgical sample.

NAME(S): Herbert Group
Herbert

Map Location No. 22
MAS No. 2TT2009T

LOCATION:

Deposit Type: Fissure and stringer vein.
Commodities: Au.

Quadrangle: Juneau C3 NW 1/4 Sec: 4 T: 39S R: 65E
Geographic: 4.7 miles northeast of Dotson's Landing.
Elevation: 50-200 ft

HISTORY:

PRODUCTION: None.

The Herbert Group of claims was originally staked in 1931 and 1932 by a Mr. Gelsinger. The property includes the old workings of the Summit/St.Louis prospect originally discovered in 1889, and discussed in the next section. The claims were optioned to J. Holland in 1932 and 1933 during which time he made an attempt to work the glacial sands near the end of the glacier with a centrifugal concentrator. After this, only minor assessment work was completed up to 1936.

J. C. Roehm visited the property in 1936 and reported on the local geology and ore deposit potential for the area (32). The area is currently held by Echo Bay Mines Company who obtained the claims after buying out Houston Oil and Minerals.

WORKINGS AND FACILITIES:

None.

GEOLOGIC SETTING:

The Herbert Group of claims occurs on the south side of Herbert Glacier and the showings include individual quartz veins and swarms both parallel and oblique to the foliation of the enclosing greenschists. Calcite was locally observed in these veins as well. Red-stained areas occur in unvegetated bedrock exposures and draw attention to the area. Individual vein widths range from less than 1 in up to 5 ft wide and vein swarms occur in zones almost 20 ft wide within the enclosing schistose rocks. The host rocks are indurated and hornfelsed, and silicification has occurred. Sulfides present include pyrrhotite, pyrite, and traces of arsenopyrite and lesser chalcopyrite. The showings reported to occur along the contact between the greenschist and phyllite further to the south (32) were not located due to dense ground cover.

BUREAU INVESTIGATION:

The Bureau examined the area and collected 11 samples of the mineralized quartz and silicified greenschist in the area. The highest gold value obtained was 0.004 oz/ton (No. 2, fig. A-32, table A-21). A sample obtained from a mineralized greenschist contained 415 ppm copper (No. 10, table A-21).

RESOURCE ESTIMATE:

The low gold values obtained from samples in the area coupled with the inability to access all the reported showings give this property a low mineral production potential.

RECOMMENDATIONS:

Significant gold mineralization occurs in quartz diorite gneiss rocks at the Herbert Glacier occurrence (fig. 9, No. 21) adjacent to these showings. Any further work in the area should be concentrated around gneissic host rocks, rather than in the greenschists and phyllites.

REFERENCES:

26, 27, 32.

TABLE A-21. - ANALYTICAL RESULTS - Herbert Group (see fig. A-32)

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm					Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	As	
1.....	6041..	Rep. Chip.		0.002		112	6	11	<0.2	>1000	Quartz vein with 2% sulfides.
2.....	6042..	Select....		.004		1	4	10	<.2	>1000	Quartz vein with <1% sulfides.
3.....	6036..	Select....		<.002		26	2	6	<.2	>1000	Quartz vein, trace chalcopyrite.
4.....	6037..	Select....		<.002		270	4	14	<.2	>1000	Quartz vein with greenschist partings.
5.....	6038..	Rep. Chip.	15.0	<.002		55	4	6	<.2	1000	Quartz veins with greenschist partings.
6.....	6039..	Select....	1.0	.003		23	8	19	<.2	>1000	Quartz vein.
7.....	6040..	Rep. Chip.	20.0	.003		137	3	43	<.2	>1000	Quartz material and greenschist.
8.....	6032..	Spaced Chip.	36.0	.002		131	34	58	<.2	14	Quartz lenses in greenschist, trace chalcopyrite.
9.....	6033..	Cont. Chip	5.0	<.002		12	<2	3	<.2	22	Quartz vein.
10.....	6034..	Select....	2.0	.003		415	16	77	.6	7	Silicified greenschist.
11.....	6035..	Cont. Chip	4.0	<.002		199	76	377	<.2	7	Mineralized greenschist.

NAME(S): Summit/St. Louis
Herbert claims

Map Location No. 23
MAS No. 2TT20088

LOCATION:

Deposit Type: Fissure vein.
Commodities: Au.

Quadrangle: Juneau C3 NW 1/4 Sec: 3 T: 39S R: 65E
Geographic: 4.7 miles northeast of Dotson's Landing.
Elevation: 800-1,350 ft.

HISTORY:

PRODUCTION: None.

The original Summit/St. Louis discoveries were made in 1889 by J. Sundof and William Moran near the terminus of Herbert Glacier. They recognized mineralization was present, but did not actually stake the ground. Staking occurred about 1902 or 1903 and the locators, T. Smith and William Hatcher also sunk a 22-ft shaft on the Summit Claim. The claims remained idle until 1931-32 when 42 claims were restaked on the property by Mr. Gelsinger. J. Holland took an option on the Herbert Group (a ten claim portion of the total claim block) during which time he unsuccessfully tried to work the glacial sands at the snout of the glacier (32). The area remained idle after this effort until 1986.

A large claim block was staked in the Herbert Glacier area in 1986, including the old Summit/St. Louis property, by Houston Oil and Minerals Co. The claims were staked to cover previously undiscovered mineralization that is similar in nature to that reported on the original Summit/St. Louis property. The property is currently held by Echo Bay Mines Company.

WORKINGS AND FACILITIES:

A 22-ft shaft and two cabins have been reported on the property.

GEOLOGIC SETTING:

A N65°E-trending quartz vein dipping 75°SE cuts quartz diorite gneiss in the vicinity of the old Summit workings (see fig. A-35). The trend of this vein can be followed for 40 ft along strike by tracing float. The vein averages 0.7-ft thick and contains disseminated arsenopyrite. Earlier examiners reported the vein to extend 150 ft along strike and contain free gold (16).

The showings at the St. Louis claim also occur in diorite gneiss and consist of a 4-ft wide quartz vein in a shear zone trending N75°E. The quartz is mineralized with arsenopyrite and pyrite and is indurated. The host rocks display potassic alteration similar to that seen at the Herbert Glacier occurrence to the northwest.

BUREAU INVESTIGATION:

The Bureau mapped and sampled the workings (fig. A-35 and table A-22). The shaft on the Summit claim was full of water and could not be entered. The quartz vein exposed there contained up to 0.80 oz/ton gold (No. 4, table A-22) and an average of all samples was 0.37 oz/ton gold. A grab sample (No. 3, table A-22) from a nearby dump contained 1.04 oz/ton gold. A sample from the St. Louis claim (No. 1, fig. A-35) contained 0.005 oz/ton gold.

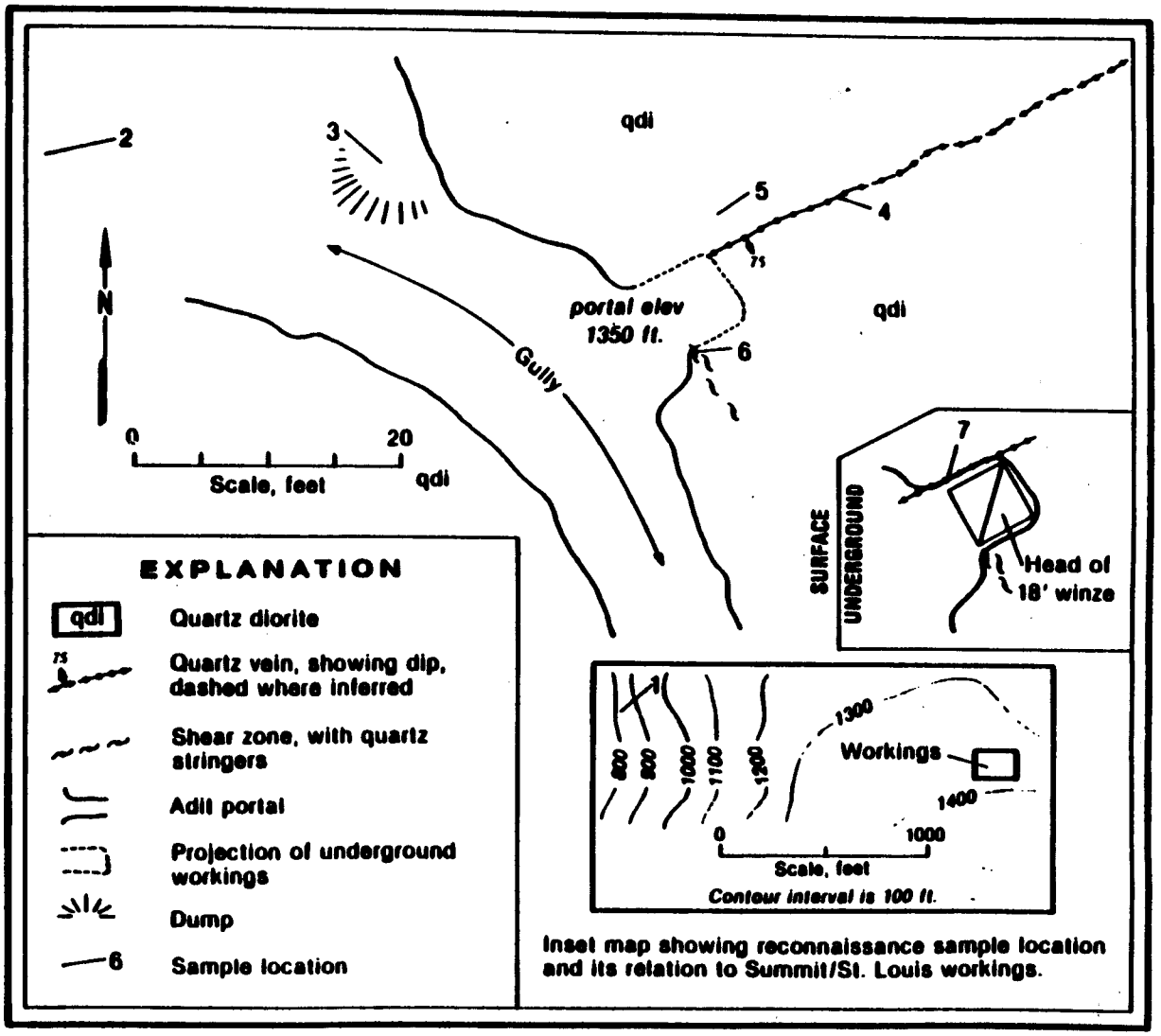


Figure A-35.— Summit/St. Louis prospect, showing geology and sample locations.

RESOURCE ESTIMATE:

Inferred resources consist of 45 tons at 0.37 oz/ton gold. This gold value gives the prospect a moderate mineral production potential, but the tonnage is quite small.

RECOMMENDATIONS:

Trench along soil-covered vein extension to the west to see if any continuity exists between it and the vein exposed on the St. Louis claim.

REFERENCES:

16, 26, 27, 32.

TABLE A-22. - ANALYTICAL RESULTS - Summit/St. Louis (see figs. A-32, A-35)

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm						Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	As	W	
1.....	6054..	Rep. Chip.	5.0	0.005		42	7	9	0.2	200		Quartz vein, 5-8 % arsenopyrite.
2.....	8140..	Select....		.037		4	7	7	.2		4	Quartz float from dump.
3.....	8207..	Grab.....		1.039		32	32	12	3.4			Quartz float from dump.
4.....	8205..	Grab.....		.807		10	44	12	3.6		4	Quartz vein, 1-2% arsenopyrite.
5.....	8206..	Grab.....		.050		10	103	19	2.6		4	Quartz vein, 1-2% arsenopyrite.
6.....	8139..	Cont. Chip	1.5	<.002		580	60	40	.6		2	Siliceous fault gouge.
7.....	8138..	Cont. Chip	0.8	.257		8	72	9	3.2		3	Quartz vein, disseminated arsenopyrite.

NAME(S): Windfall Creek

Map Location No. 24
MAS No. 2T120092

LOCATION:

Deposit Type: Placer.
Commodities: Au.

Quadrangle: Juneau B3 SE 1/4 Sec: 17 T: 39S R: 65E
Geographic: On Windfall Creek 1.2 miles southeast of Windfall Lake.
Elevation: 50-800 ft and 1500-1700 ft.

HISTORY:

PRODUCTION: 249 oz gold.

Placer deposits were discovered in Windfall creek in 1882, about the same time gold was found in Montana Creek. Small-scale attempts to placer mine the creeks during the next few years had mixed results. While Montana Creek was more actively mined during the 1880's, efforts to mine Windfall Creek picked up by 1892 when James Smith and Gus Brown discovered placer gold here again.

Smith was joined by James Patton in 1893 and the two men recovered nearly 35 oz of gold for their efforts. As a result of their sluicing operations, gold-bearing quartz veins were discovered in upper Windfall Basin. The men built an arrastre in 1894, and in 1895 Smith and John Heid crushed nearly 1.5 tons of quartz. Their success in this endeavor converted them from placer miners to hard-rock miners. The placer grounds on Windfall Creek remained idle until a new company arrived in 1902.

The Alaska-Detroit Mining Co. was formed in 1902 and about 300 acres of placer grounds in the lower basin were acquired. Work began in 1903 with the arrival of 20 tons of equipment. A hydraulic plant was installed and a large amount of overburden was removed to prepare the ground for placer operations. Little gold was produced as water was scarce and less gravel was worked than anticipated. There was no production and very little work accomplished in 1904.

Tom Ellis replaced Superintendent Otterson by 1905 and more new equipment was brought to the property. A newspaper article in the Alaska Record Miner (7-23-05) reported 14 oz of gold produced during the year and another article in the Daily Alaska Dispatch states that 200 oz of gold were recovered during their last clean-up in October. 1906 was a busy year as nearly 1,000 yd^3 of gravels were processed, however there was no reported production. In 1907, Tom Smith reported that the mine did well, but, again, no details were given. The final word from Windfall Creek occurred in 1909 when a half interest in the property was sold to a group of Portland men. Although production records are incomplete, as much as 249 oz of gold was probably produced from the Windfall Creek area.

WORKINGS AND FACILITIES:

Old diversion ditches, water pipe, and placer tailings lie along a 400 ft stretch of Windfall Creek.

GEOLOGIC SETTING:

Windfall Creek drains rocks similar to those on Montana Creek, which consist of intercalated black and felsic phyllites, greenschists, and thin bands of greenstone. The phyllites and schists are cut by gold-bearing quartz veins near the head of Windfall Creek on the Smith and Heid property (fig. 9, No. 25). As with lower Montana Creek, the trace of the Coast Range Megalineament follows lower Windfall Creek. The worked placer gravels lie at the upper end of a low angle alluvial fan that is located in the Windfall Creek drainage south of Windfall Lake (fig. A-36). The gravels are terminated by a steep section of waterfalls on bedrock in the stream bottom. It appears that no mining was done above this point except for the unrelated work occurring in the upper basin.

BUREAU INVESTIGATION:

The Bureau collected placer samples along a 1.7-mile stretch of Windfall Creek, which includes the old workings (fig. A-36 and table A-23). Along the lower reaches of the creek, bedrock was not close to the surface, but in the upper portion samples were collected down to bedrock. The stream gravels contain numerous large boulders up to 4-ft in diameter, but most range from 0.5 to 1.0-ft. Samples contained up to 0.008 oz/yd^3 gold (No. 3, fig A-36) and averaged 0.0017 oz/yd^3 gold. The highest values occur 0.6 miles above the old workings between 600 and 700 ft elevation. The gold varies from 0.001 to 0.002 in. in size with occasional pieces up to 0.004 in. The gold is more angular and coarser than that found on Montana Creek. Analysis of heavy concentrates from placer samples show up to 775 ppm tungsten in the form of scheelite.

RESOURCE ESTIMATE:

The upper portions of Windfall Creek above the old placer workings contain relatively high gold values and the area has a moderate mineral development potential for placer gold. The source of the tungsten in unknown, but may be from the quartz veins in the area. Scheelite is known to occur in the quartz veins at Herbert Glacier.

RECOMMENDATIONS:

Trench to bedrock and take placer samples at regular intervals along Windfall Creek, especially between 500 and 700 ft elevation.

REFERENCES:

24, 25, 26, 27, 35, 41, 53.

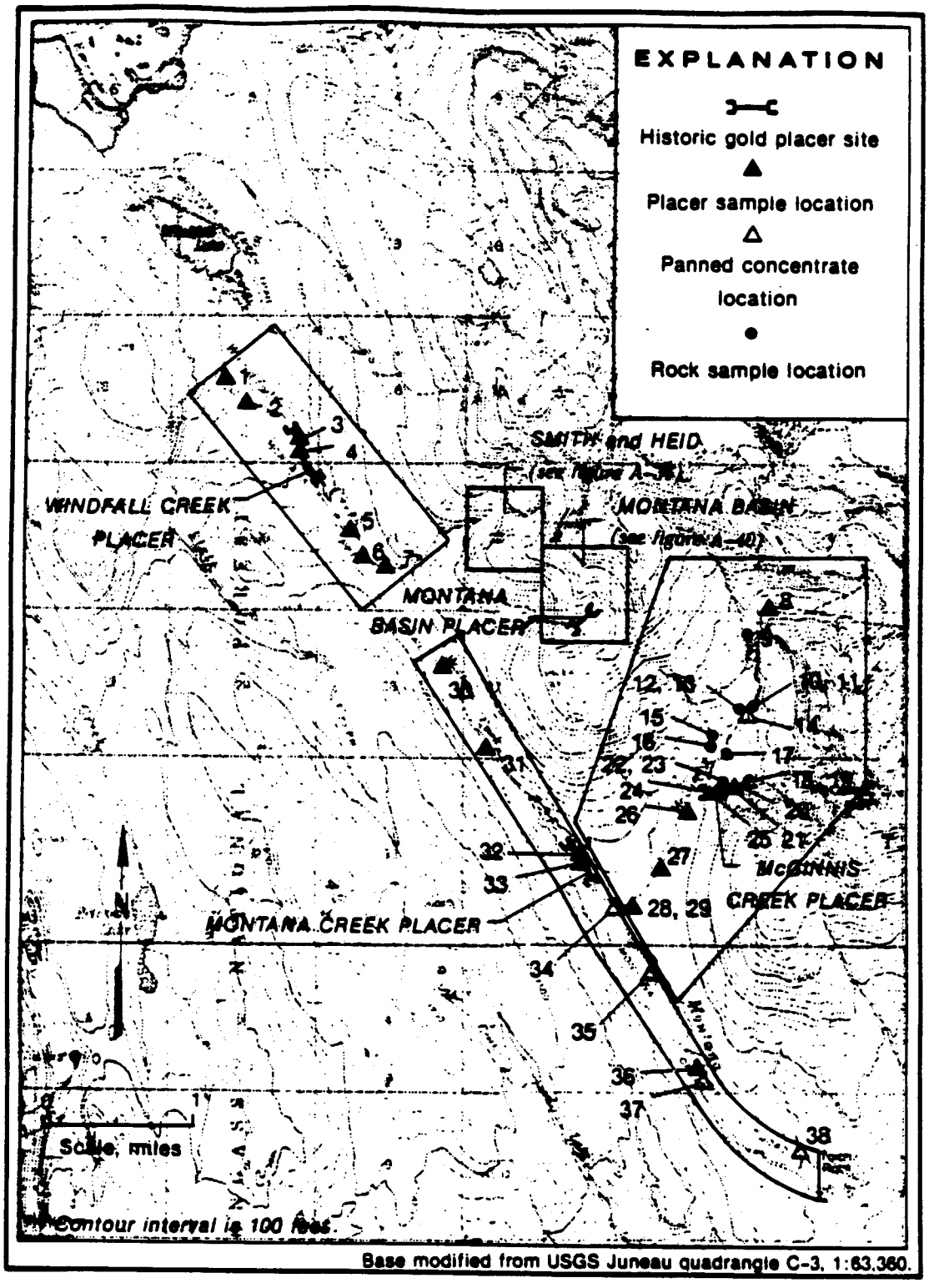


Figure A-36.— Windfall, Montana, and McGinnis basins, showing sample locations.

TABLE A-23. - ANALYTICAL RESULTS - Windfall Creek Placer (see fig. A-36)

Map No.	Sample	Type	Sample Volume	Oz/yd^3 Fire Assay		Ppm						Description
			yd^3	Au	Ag	Cu	Pb	Zn	Ag	As	W	
1.....	6044..	Placer....	0.1	0.0003		45	5	73	1.8	44	33	
2.....	6043..	Placer....	.1	.0006		44	8	59	12.0	400	450	
3.....	3309..	Placer....	.1	.008								
4.....	3310..	Placer....	.1	.0006								
5.....	6045..	Placer....	.1	.0007		56	8	52	1.7	>1000	775	
6.....	6046..	Placer....	.1	.0008		54	18	56	1.5	>1000	700	
7.....	6047..	Placer....	.1	.0012		59	16	55	1.8	>1000	575	

NAME(S): Smith & Heid
Ashby-Toro

Map Location No. 25
MAS No. 21120093

LOCATION:

Deposit Type: Stringer and fissure vein.
Commodities: Au.

Quadrangle: Juneau B3 NW 1/4 Sec: 22 T: 39S R: 65E
Geographic: Head of Windfall Creek 2.8 miles northwest of the end of Montana Creek road.
Elevation: 1,600-1,800 ft.

HISTORY:

Production: 205 oz gold.
see below

James Smith and Gus Brown discovered placer gold in upper Windfall Basin in 1892. Smith was joined by James Patton in 1893 and quartz lodes were discovered at 2,000 ft elevation as a result of sluicing operations. The Falls Tunnel was driven 36 ft at this time. In the fall of 1894, the men built an arrastre to crush gold from the quartz. Many tons of quartz were crushed during 1895 and 193.5 oz of gold were produced by Smith and a new partner, John Heid. This outcome was so pleasing to Smith and Heid, that they planned on sledding in a stamp mill during the winter of 1896. This plan never materialized, but in 1896 they drove two adits 90 and 150 ft, respectively.

Work efforts slowed on the property until 1900 when Tom Smith and French Louis built a second arrastre and milled 20 tons of ore. They recovered 8 oz of gold and 2 tons of concentrates which yielded an additional 3.5 oz of gold. In 1903, the Smith & Heid was purchased by Charlie Lane and J. H. Conrad, but the results of their work are not known. In 1904, the Treadwell Company examined the property and a Mr. Conrad also looked at the property for other interests. Both of these endeavors were unsuccessful.

A report from 1907 stated that Tom Smith had driven a few feet on Tunnel No. 2 and had put in an inclined raise to cut the vein at the face of the tunnel. It was not until 1910 that further development work on the adits was chronicled. By this time, 500 ft of adits existed on the property with 335 ft occurring in Tunnel No. 1. The next activity at the mine did not occur until 1930, when two men named Ashby and Toros restaked the property.

In 1931, the Alaska Juneau Company took an interest in the property, but their effort was shortlived. Two years later, in 1933, Toros and T. H. and C. T. Ashby staked more claims and sluiced the tops of quartz outcrops on the property. A minor amount of gold was recovered from this operation. Some trenching was done on the veins in 1934 and 1937 and then the property was abandoned. An informal appraisal of the property was done in 1986, but little interest was generated and the mine is now vacant.

PRODUCTION: The following figures are taken from Bureau records (46)

Year	Tons	Oz Au
1895	?	193.5
1900	20	11.5
1933	Unknown	a few oz recovered
Total	>20	Total oz >205

WORKINGS AND FACILITIES:

Two open adits totalling 476 ft in length and one caved adit. Numerous trenches occur above the underground workings.

GEOLOGIC SETTING:

The gold-bearing quartz veins and stringer zones lie within an interbedded sequence of black and felsic phyllite, and chlorite schist (foliated greenstone). Graphitic schist occurs in areas of intensely sheared black phyllite. These rocks are cut by a series of northwest trending faults dipping both northeast and southwest. This may indicate that this area lies within a zone of folding. The phyllite and graphitic schist contain quartz stringer zones up to 35-ft wide. These are best exposed in Tunnel No. 1 (fig. A-39). These zones parallel schistosity, trending northwest and dipping from 40-60°NE. The quartz stringers constitute up to 50% of the total volume of rock in the zones. The stringer zones contain up to several percent arsenopyrite and pyrite. Knopf (16) reports that galena occurs with the arsenopyrite. These stringer zones are also exposed in Windfall Creek lying north of the adit. The tan felsic phyllite is exposed in both adits as well as on Windfall Creek. It is rusty, vuggy, and contains pyrrhotite and quartz stringers. Knopf also reports that it contains galena, sphalerite, pyrite, arsenopyrite, and chalcopyrite. Red oxidized portions of this unit were reported to yield gold when panned.

BUREAU INVESTIGATION:

The Bureau mapped and sampled all the known workings and showings in the area, including outcrops in stream bottoms. The highest values (3.14 oz/ton gold) were obtained from a 2-ft wide mixed zone of quartz stringer-bearing graphitic schist and felsic phyllite in a folded and sheared zone in Tunnel No. 1 (No. 15, fig. A-39, table A-24).

A 1.2-ft wide brecciated quartz vein on the footwall side of a sheared graphitic schist zone in Tunnel No. 2 assayed 0.939 oz/ton gold (No. 24, table A-24). Neither the graphitic schist or overlying felsic phyllite contained significant gold. A sample collected in approximately the same location by Roehm contained 0.59 oz/ton gold. Samples were collected from quartz vein and stringer zones in Windfall Creek which are probably northern extensions of similar zones observed underground. These did not contain significant gold.

Some samples of quartz float were collected above the adits from sloughed trenches and then sluiced for gold. These also did not contain significant gold values.

The felsic phyllite zone mentioned as having significant potential by earlier reports did not contain appreciable gold. Nelson (23) states that sampling indicated that the unit had no significant commercial value.

A placer sample collected in Windfall Creek above the upper falls contained 0.0002 oz/yd^3 gold.

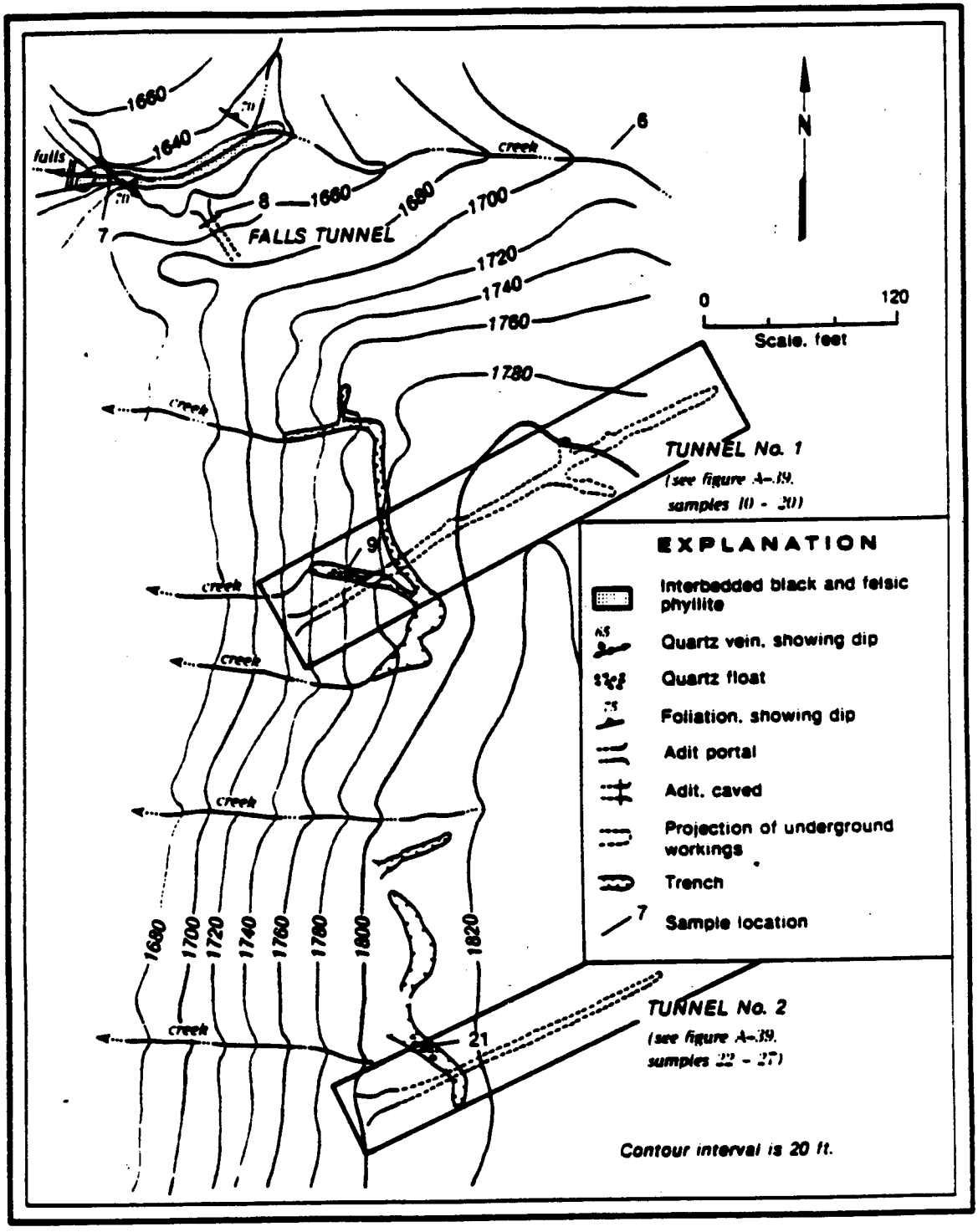
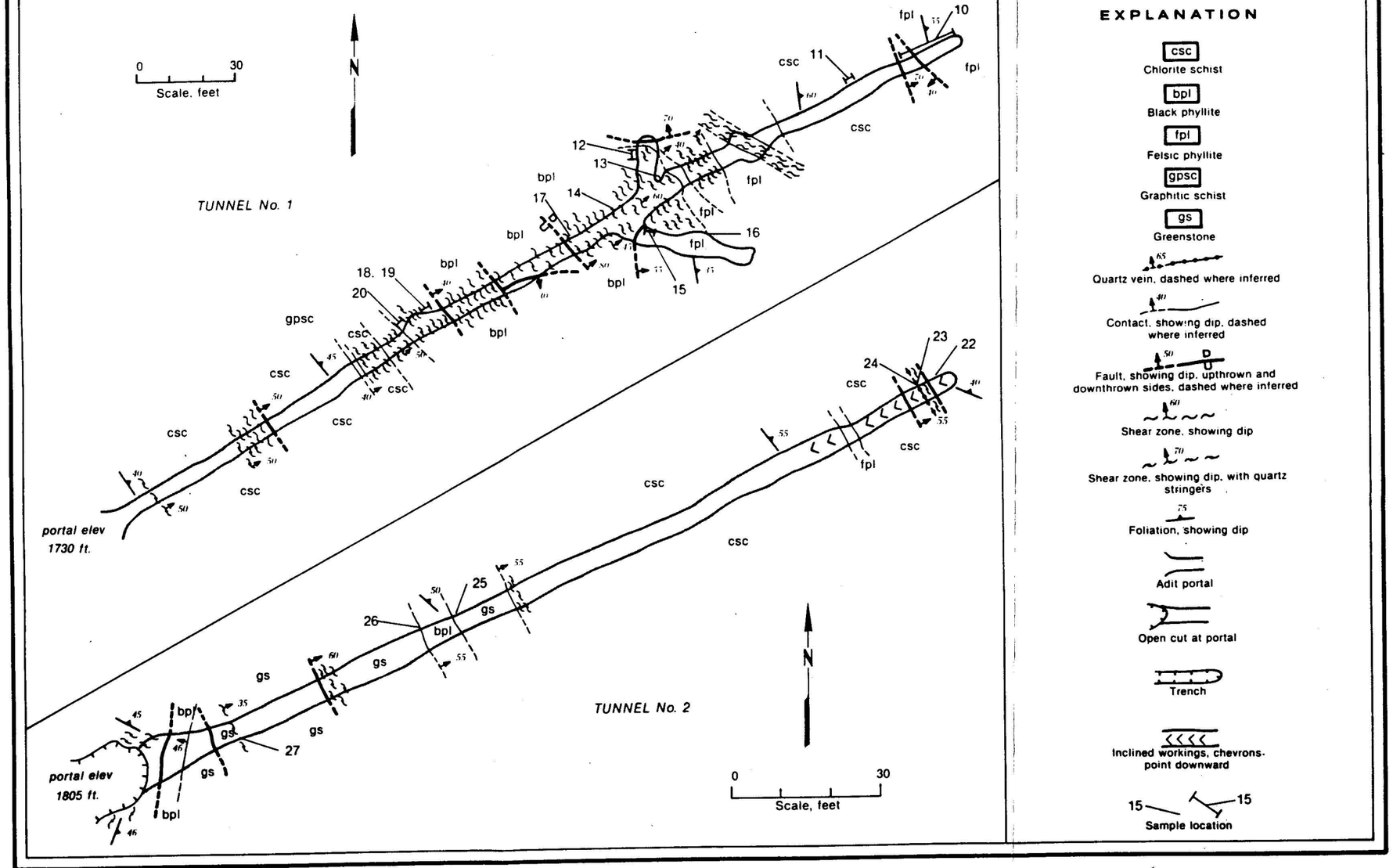


Figure A-38.— Smith & Heid, showing surface geology and sample locations.



EXPLANATION

- csc — Chlorite schist
- bpl — Black phyllite
- fpl — Felsic phyllite
- gpsc — Graphitic schist
- gs — Greenstone
- Quartz vein, dashed where inferred
- Contact, showing dip, dashed where inferred
- Fault, showing dip, upthrown and downthrown sides, dashed where inferred
- Shear zone, showing dip
- Shear zone, showing dip, with quartz stringers
- Foliation, showing dip
- Adit portal
- Open cut at portal
- Trench
- Inclined workings, chevrons-point downward
- 15 — 15 Sample location

Figure A-39.— Smith & Heid, showing underground geology and sample locations.

RESOURCE ESTIMATE:

Bureau sampling indicates that the highest gold values are in the quartz stringer zones hosted in the felsic phyllite and graphitic schist. A brecciated quartz vein exposed in Tunnel No. 2 also contains high gold values.

Since no continuity or strike extension could be determined for any of these zones, no realistic resource estimates can be made. Sporadic high gold values give the area a moderate mineral production potential.

RECOMMENDATIONS:

Drill along the north-south extensions of the veins to determine tonnage and grade. Trenching in a southerly direction from Tunnel No. 2 would help determine the extent of the brecciated quartz vein exposed in the rear of the adit.

REFERENCES:

16, 23, 24, 25, 26, 27, 35.

TABLE A-24. - ANALYTICAL RESULTS - Smith & Heid (see figs. A-37 through A-39)

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm						Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	As	W	
1.....	7414..	Select....	1.0	0.007		47	280	52	3.4	7		Quartz vein, average 1-ft thick.
2.....	3353..	Select....		.028		44	22	35	0.4	>1000		Quartz float in creek bottom.
3.....	3354..	Placer....				44	15	90	14.0	>1000	43	0.1 yd^3sample; 0.0012 oz/yd^3gold.
4.....	3350..	Cont. Chip	2.0	<.002		23	61	33	.4	24		Quartz and felsic phyllite.
5.....	7416..	Rep. Chip.	1.5	<.002		127	8	91	.2	4		Felsic phyllite.
6.....	3351..	Rep. Chip.	2.0	.004		122	9	62	.4	>1000		Quartz veins in chlorite schist.
7.....	7415..	Select....	1.0	.002		16	2	24	<.2	400		Quartz vein.
8.....	3352..	Rep. Chip.	8.0	<.002		21	2	37	<.2	200		Quartz veins in phyllite.
9.....	6014..	Select....		.034		40	5	40	.3	40		Quartz float with arsenopyrite.
10.....	7407..	Spaced Chip.	23.0	.002		23	201	38	1.1	120		Felsic phyllite with quartz stringers.
11.....	7408..	Spaced Chip.	39.0	.002		226	5	88	<.2	18		Chlorite schist with quartz stringers.
12.....	3345..	Cont. Chip	4.0	.006		28	<2	53	<.2	>1000		Phyllite/schist with quartz stringers, arsenopyrite/pyrite.
13.....	7409..	Chip Channel.	5.0	.004		47	3	70	<.2	>1000		Quartz stringers in graphitic schist.
14.....	3348..	Cont. Chip	5.0	.028		37	5	58	<.2	4000		Quartz stringers in graphitic schist, arsenopyrite/pyrite.
15.....	3347..	Cont. Chip	2.0	3.143		9	<2	18	8.6	>1000		Quartz stringer zone in graphitic/felsic schist.
16.....	3346..	Cont. Chip	1.1	.529		47	9	38	3.4	>1000		Quartz stringers at graphitic/felsic schist contact.
17.....	3349..	Cont. Chip	5.0	.015		32	3	31	<.2	>1000		Quartz stringers in graphitic schist, arsenopyrite/pyrite.
18.....	7410..	Cont. Chip	3.8	.025		38	6	78	.3	>1000		Quartz veinlets in graphitic schist.
19.....	7411..	Cont. Chip	1.2	.030		41	7	84	.4	>1000		Quartz veinlets in phyllite.
20.....	7412..	Select....	0.3	.071		2	13	12	1.1	>1000		Quartz vein in graphitic schist.

TABLE A-24. - ANALYTICAL RESULTS - Smith & Heid - Continued

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm						Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	As	W	
21.....	6013..	Grab.....		0.048		7	24	22	0.2			Quartz float with arsenopyrite.
22.....	6010..	Channel...	1.1	.086		55	14	80	1.3	>1000		Quartz stringers in graphitic schist.
23.....	7406..	Cont. Chip	1.0	.011		135	5	76	.3	800		Felsic phyllite.
24.....	6011..	Cont. Chip	1.1	.939		5	211	7	1.7			Brecciated quartz vein.
25.....	3343..	Cont. Chip	3.0	<.002		108	9	76	<.2	40		Felsic phyllite. Disseminated pyrite, arsenopyrite.
26.....	3344..	Cont. Chip	1.7	.003		39	7	74	.2	>1000		Graphitic schist w/quartz stringers.
27.....	6012..	Cont. Chip	1.3	.005		46	10	97	.2	600		Shear zone with quartz stringers, chlorite schist wallrocks.

NAME(S): Montana Basin
Patton
Dewey Lode, Crown Point Lode
May Belle Lode, Montana Lode

Map Location No. 26
M.S. No. 937
MAS No. 2T120097

LOCATION:

Deposit Type: Fissure vein.
Commodities: Au.

Quadrangle: Juneau B2 SE 1/4 Sec: 22 T: 39S R: 65E
Geographic: Head of Montana Basin 2.5 miles north of end of Montana Creek road.
Elevation: 2,475-3,000 ft.

HISTORY:

Production: Unknown.

Lode deposits in upper Montana Basin were first discovered in 1882. During the next 5 years, some men worked their way around the basin looking for more quartz veins. In July of 1888, Sullivan Lewis and his partners owned the Congress First lode mine at the head of Montana Creek. An arrastre was built to mill the quartz but this endeavor was unsuccessful during 1889 and in 1890, Lewis died, halting all operations for the year.

In 1891, Lewis' brother returned to the basin with two other men to renew development of the quartz veins. The men worked on a 1.5-mile long ditch to provide water for the millsite, but progress was thwarted by the steep terrain of the basin. By 1895, new faces had entered the scene at Montana Basin. James Smith and James Patton, both previously working Windfall Creek, had plans to mill the quartz with an arrastre and also build a 4-mile trail from Tee Harbor to the mine. This plan was also a failure.

In 1899, an adit had been started by Mr. Batchelor to undercut the veins and by year's end, 160 ft had been driven. Adjacent to Batchelor's property at the Lewis, Sanders, Garside and Heid property, additional work commenced. A second adit was driven on Batchelor's property at a location below the first one. This flurry of activity abruptly ceased and nothing else happened in the area until 1904 when Tom Drew had a group of men opening up additional quartz veins. Activity ceased until 1910 at which time a group of miners were working the States property to get it ready for an examination by a St. Louis mining expert the next spring.

Apparently the mining expert was unimpressed or simply did not show, because in the fall of 1912, G. A. Irwin sampled the property for some San Francisco investors. Irwin returned in 1913 to prepare for the summer's work, but not much else is known. The States property was patented in 1914. A Tacoma company bonded the Montana Basin claims in 1914 and sampling occurred in 1915. The basin remained quiet until the Alaska Juneau Company took a short-lived interest in the area in 1931. The exact nature of their investigation is not known, but they also dropped the property. By 1934, 2 adits totalling 315 ft of workings were reported on the claims.

The last significant development in Montana Basin occurred during the summer of 1935 when M. L. Ferguson and 4 partners worked the Big Hurrah

Mine (No. 3 adit, see fig. A-43). The men built a cabin and mill site and on June 20-21, Vern Gorst, using his flying boat, airdropped 1,100 lbs of parts for a 5-ton Gibson Prospector's Friend Mill. After a 170 lb gyratory crusher was also dropped in during 1936, the mines in Montana Basin were abandoned. Six patented claims are present in the Basin, although no hard-rock mining has taken place here for 50 years.

WORKINGS AND FACILITIES:

Numerous sloughed trenches and four adits totalling 380 ft of underground workings are reported. Only three of the adits were located (figs. A-41 through A-43). A small concentrating mill lies below adit No. 3 and consists of a Pelton wheel driving a 4 x 8 ft concentrating table.

GEOLOGIC SETTING:

The wallrocks in the area consist of interbedded phyllite and biotite schist. The proximity of the coast range plutonic complex, lying one mile to the northeast, is probably responsible for the higher metamorphic grades present in this area. Foliation averages N35°W with dips ranging from 40-70°NE. The schists contain two sets of quartz veins. The first is parallel to schistosity and consists of both quartz veins and quartz stringer zones. This set contains minor pyrite and no gold. The probable source for these veins is fluids sweated out of the wallrocks during metamorphism. Numerous veins of this type occur in black phyllites exposed in stream bottoms, in adit No. 1 and at the head of Montana Basin (fig. A-43).

A second, less common vein set trends between N80°E and east-west, crosscutting schistosity with dips ranging from 55-65°N. Fault gouge and slickenside surfaces occur along the vein margins. These veins are significant to the area as they contain gold in association with arsenopyrite.

BUREAU INVESTIGATION:

The Bureau located, mapped, and sampled three adits in the area in addition to prospecting the headwaters of Montana Basin. A fourth adit reported to be at 2,475 ft elevation was not located (23). The highest gold values (2.2 oz/ton) were from a sample (No. 21, fig. A-42) collected across a 0.7-ft wide, N80°E trending vein in the No. 2 adit. Another sample (No. 25, fig. A-42) taken from the same vein contained nearly 1.9 oz/ton gold. This vein, averaging 1.3-ft wide, was explored, and mined for 100 ft along strike (fig. A-42).

The No. 3 adit cuts two semi-parallel quartz fissure veins trending nearly east-west and averaging 2.2-ft thick and explored for up to 35 ft along strike. The veins crosscut the foliation of the biotite schist host rocks (N40°W) and gouge is observed on the footwall side of both veins.

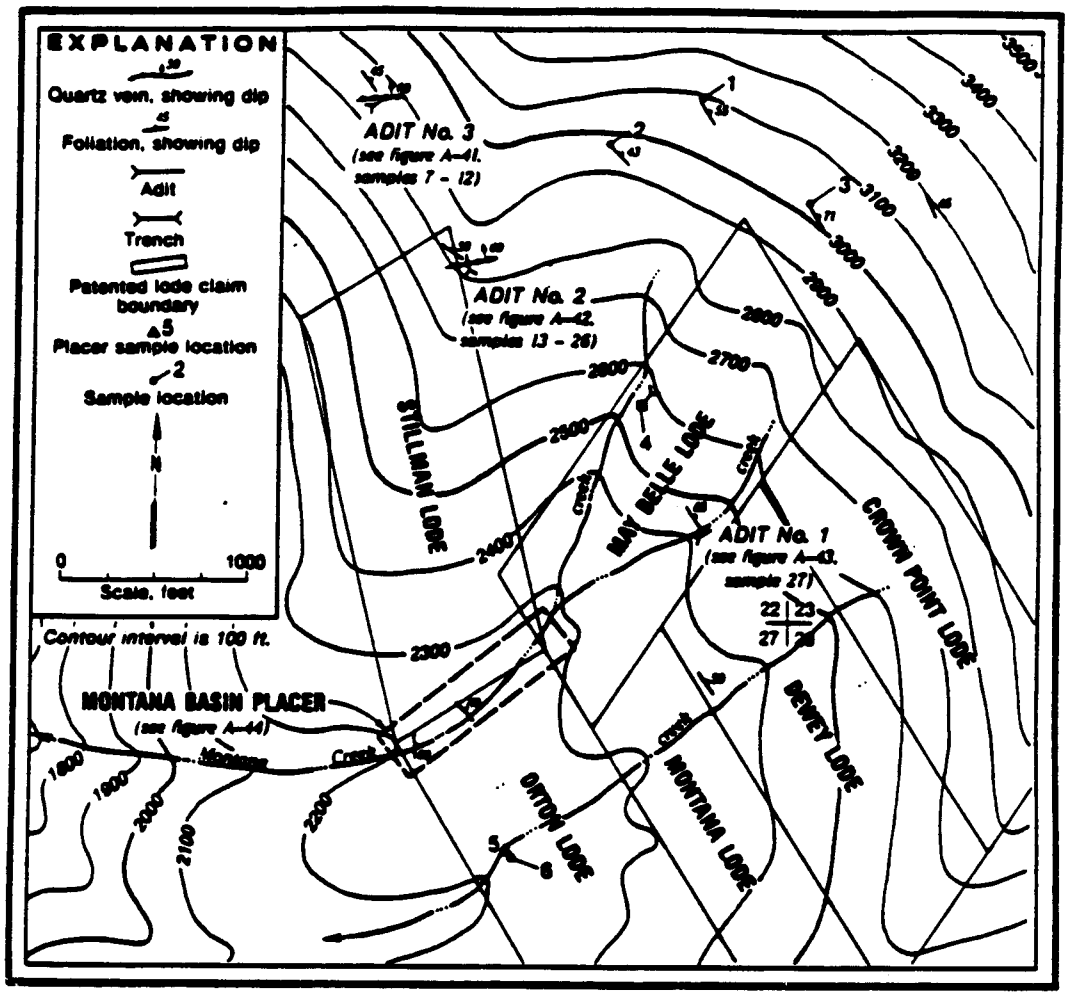


Figure A–40.— Montana Basin, showing geology and sample locations.

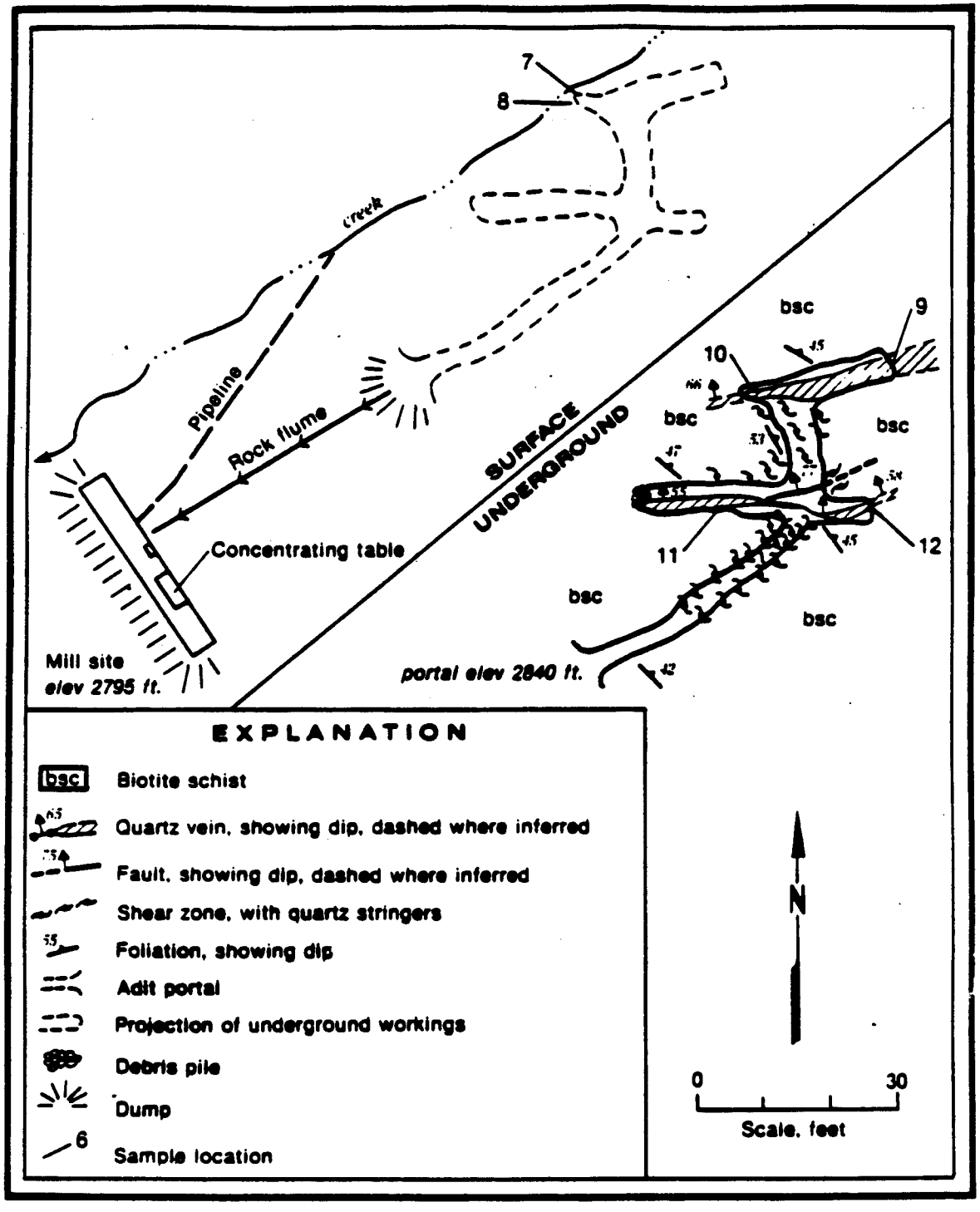


Figure A-41.— Montana Basin, Adit No. 3, showing geology and sample locations.

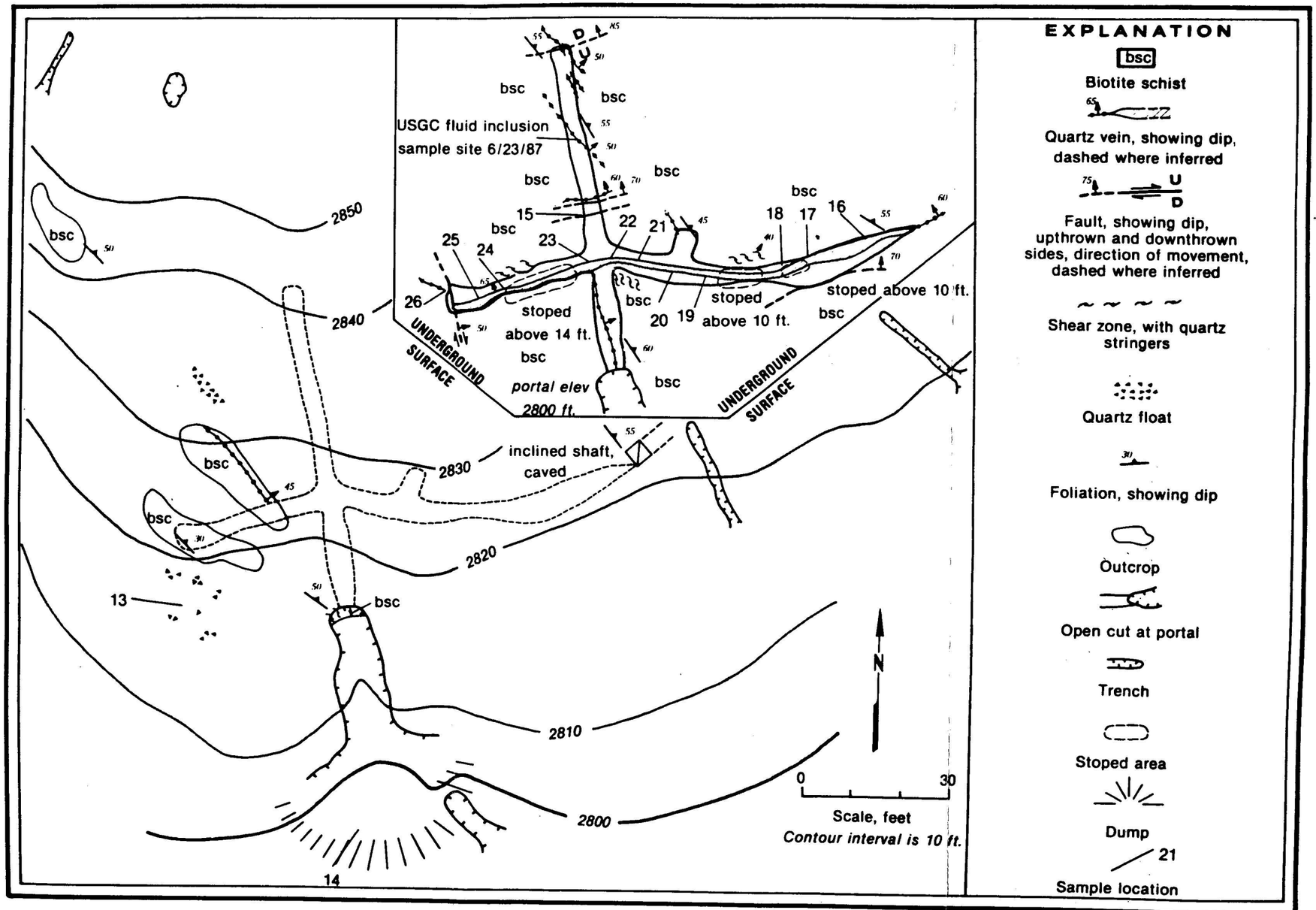


Figure A-42.— Montana Basin, Adit No. 2, showing geology and sample locations.

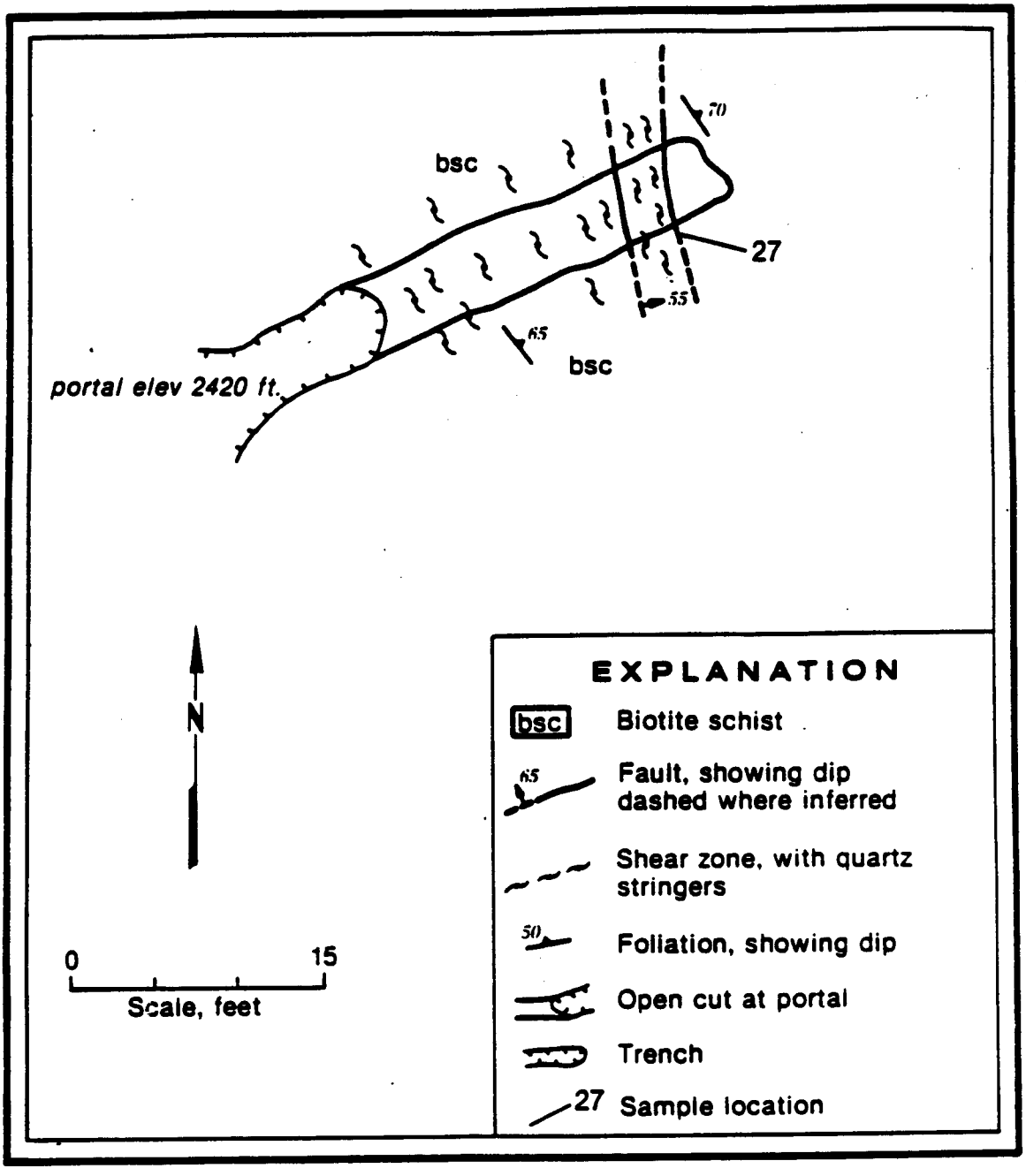


Figure A-43. — Montana Basin, Adit No. 1, showing geology and sample locations.

The quartz veins exposed in adits No. 2 and 3 are similar in orientation and character. Gouge occurs along the margins of both veins, the quartz is crushed and iron-stained, and minimal sulfides are present. Investigation of the workings suggested that the parallel nature of the veins in adit No. 3 initiated a search for a second vein in adit No. 2 after the original work took place. The miner's extended the crosscut in adit No. 2 approximately 60 ft beyond the first vein but did not intersect the suspected second vein.

RESOURCE ESTIMATE:

It appears from measuring old stopes in the workings and sampling of the vein that over 12 oz of gold may have been produced from 35 tons of ore. The following resource estimate was derived from Bureau sampling and mapping of the remaining quartz exposed in the workings.

Indicated Resources

Area	Tons	oz/ton Au	Avg. vein width (ft)
Adit No. 2	165	0.35	1.3
Adit No. 3	84	0.17	2.2
TOTAL	249		

Average grade: 0.29 oz/ton gold.

RECOMMENDATIONS:

Prospect the biotite schist rocks looking for fissure-type veins crosscutting the local foliation. Conduct the search for these occurrences in the upper elevations of the basin in both a northwest and southeast direction towards Windfall and McGinnis basins respectively. Drilling is not recommended until target areas have been delineated by trenching and sampling methods.

REFERENCES:

16, 23, 24, 25, 26, 27, 41.

TABLE A-25. - ANALYTICAL RESULTS - Montana Basin (see figs. A-40 through A-43)

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm						Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	As	W	
1.....	6097..	Rep. Chip.	15.0	<0.002		11	<2	19	<0.2	60		Quartz stringers, trace pyrite.
2.....	6096..	Rep. Chip.	4.0	<.002		23	<2	30	<.2	45		Vuggy quartz veins.
3.....	6098..	Rep. Chip.	1.0	<.002		14	<2	28	<.2	18		Quartz stringers.
4.....	6099..	Rep. Chip.	1.0	<.002		2	<2	4	<.2	9		Quartz vein in trench.
5.....	7404..	Placer....				30	8	81	1.4	190	55	0.1 yd^3; 0.004 oz/yd^3 gold.
6.....	3342..	Rep. Chip.	2.0	<.002		20	209	32	.4	40		Quartz vein, pyrite/arsenopyrite.
7.....	7433..	Cont. Chip	2.0	.029		23	21	24	2.3	>1000		Crushed quartz vein.
8.....	7432..	Cont. Chip	5.0	.063		48	52	100	11.0	>1000		Quartz vein, phyllite partings.
9.....	7428..	Cont. Chip	4.0	.532		34	166	73	2.6	>1000		Brecciated, iron-stained quartz vein, arsenopyrite.
10.....	7429..	Cont. Chip	2.0	.003		7	6	44	<.2	800		Brecciated, iron-stained quartz vein, arsenopyrite.
11.....	7430..	Cont. Chip	2.0	.058		48	47	96	3.4	>1000		Brecciated, iron-stained quartz vein, arsenopyrite.
12.....	7431..	Cont. Chip	1.4	.129		33	69	104	4.4	>1000		Brecciated, iron-stained quartz vein, arsenopyrite.
13.....	7198..	Select....		trace		18	8	16	.2			Float, near dump from No. 14 (3122).
14.....	3122..	Grab.....		.608		4	36	16	1.5			Dump.
15.....	7413..	Cont. Chip	0.1	.034		69	9	80	1.2	>1000		Brecciated quartz.
16.....	7427..	Cont. Chip	1.5	.057		32	12	56	2.0	>1000		Iron-stained quartz vein.
17.....	7426..	Channel...	1.3	.234		18	47	72	3.8	>1000		Quartz vein.
18.....	7425..	Channel...	.5	.111		14	38	45	2.4	>1000		Quartz vein.
19.....	7424..	Channel...	1.1	.302		66	23	101	2.2	>1000		Quartz with fault gouge.
20.....	7423..	Channel...	.9	.836		4	137	60	5.0	>1000		Brecciated quartz.
21.....	7422..	Channel...	.7	2.218		5	445	110	13.0	>1000		Quartz vein.
22.....	7421..	Channel...	.5	.860		15	174	104	3.3	>1000		Quartz vein.
23.....	7420..	Channel...	.3	.244		11	37	69	1.4	>1000		Quartz vein.
24.....	7419..	Channel...	1.9	.243		48	59	236	1.4	>1000		Quartz vein.
25.....	7418..	Channel...	1.4	1.874		24	307	220	5.2	>1000		Quartz vein.
26.....	7417..	Channel...	.9	.396		36	37	61	3.5	>1000		Quartz vein.
27.....	3327..	Cont. Chip	4.0	<.002		48	7	96	<.2	40		Quartz stringer in phyllite, arsenopyrite.

NAME(S): Montana Basin Placer
Orton & Stillman Lode Claims

Map Location No. 27
M.S. No. 373
MAS No. 2T120225

LOCATION:

Deposit Type: Placer.
Commodities: Au.

Quadrangle: Juneau B2 NE 1/4 Sec: 27 T: 39S R: 65E
Geographic: Head of Montana Creek 4 miles northwest of Mendenhall Lake.
Elevation: 2,200 ft.

HISTORY:

PRODUCTION: Trace gold.

The gravels in Montana Basin were discovered in 1882 by John Olds. Early records do not differentiate between the work done in upper Montana Basin and along the lower stretches of the creek, so references can be confusing. Placer mining continued on a small scale for several seasons after this discovery. In 1890, John Wilson and Joe Woods were working the creek in search of gold-bearing gravels. Activity crept along for nearly a decade until 1899 when a patent survey was applied for and obtained for the Orton and Stillman claims (M.S. No. 373) in the lower part of the basin. Not much else is known about this property until the 1986 and 1987 seasons, when Sonny Hogan leased the property from the patent holder and extracted a small amount of gold from over 61 yd^3 of gravel (14).

WORKINGS AND FACILITIES:

Some placer tailings were located along the margins of the present stream channels, and quartz boulders are stacked adjacent to the south bank of the main channel. Remains of an arrastre and sluice boxes are present. Several ditches presumably dug to divert water for gravel washing are still discernible.

GEOLOGIC SETTING:

Bedrock underlying the gold-bearing gravels consists of northwest-trending, northeast dipping interbedded phyllite, chlorite schist and minor greenstone. Quartz stringer zones up to 4-ft wide and individual quartz veins up to 1-ft wide roughly parallel schistosity. Quartz locally contains up to 1% arsenopyrite, pyrrhotite, and a trace of chalcopyrite. The present stream channel flows on or near bedrock in the area and cuts across schistosity which provides natural riffles for the accumulation of placer gold. A thin discontinuous layer of clay locally occurs on top of bedrock and sampling proved it is also a good trap for gold. Stream gravels contain at least 30% small-medium size boulders (10 to 30-in. diameter).

BUREAU INVESTIGATION:

The Bureau collected seven 0.1 yd^3 placer samples from the placer grounds situated along Montana Creek. The highest gold value (0.035 oz/yd^3) was obtained from previously worked gravels on the north side of the basin (No. 8, table A-26). A map delineating the extent of potential gold-bearing

gravels in the immediate vicinity of the sample sites is included as figure A-44. In addition to the samples collected, an estimate of the volume of potentially mineable gravels was made.

Gravel depths vary from 1 to 6 ft with an average depth of 3 ft. Old tailings piles indicate that some of the gravels had been previously mined using hand methods. The gold recovered during sampling is rough, indicating a short transport distance and particle sizes averaged 0.02 in. Infrequently, gold pieces up to 0.2 in were found and several contained quartz. Mercury coatings appear on some pieces suggesting that previous operations used amalgamation plates in their sluice boxes in an attempt to recover the fine gold. Bureau samples averaged 0.018 oz/yd^3 gold. Five of the seven samples showed high concentrations of silver with assays greater than 30 ppm. Three rock samples taken of quartz veins exposed in the stream bottom and float from the old tailings piles contained only traces of gold (Nos. 1,5 and 7, table A-26).

The placer gold in Montana Basin probably has its source in the numerous quartz veins and stringers occurring in the higher-grade schists at the head of the basin. Several quartz veins have been previously prospected and samples contain up to 2.0 oz/ton gold (fig A-42, table A-25). The arrastre near the placer tailings was probably used to crush gold-bearing quartz float.

RESOURCE ESTIMATE:

The high gold content of numerous placer samples indicates a high mineral development potential for an initially small scale placer mining operation. An indicated resource of 8,100 yd^3 with a weighted average of 0.016 oz/yd^3 gold was calculated for this area.

RECOMMENDATIONS:

Trenching is recommended to further test the gold-bearing gravels as outlined by the Bureau. In addition, the terrace gravel deposits to the southeast should be sampled to determine possible resources.

REFERENCES:

14, 16, 25, 26, 27, 41.

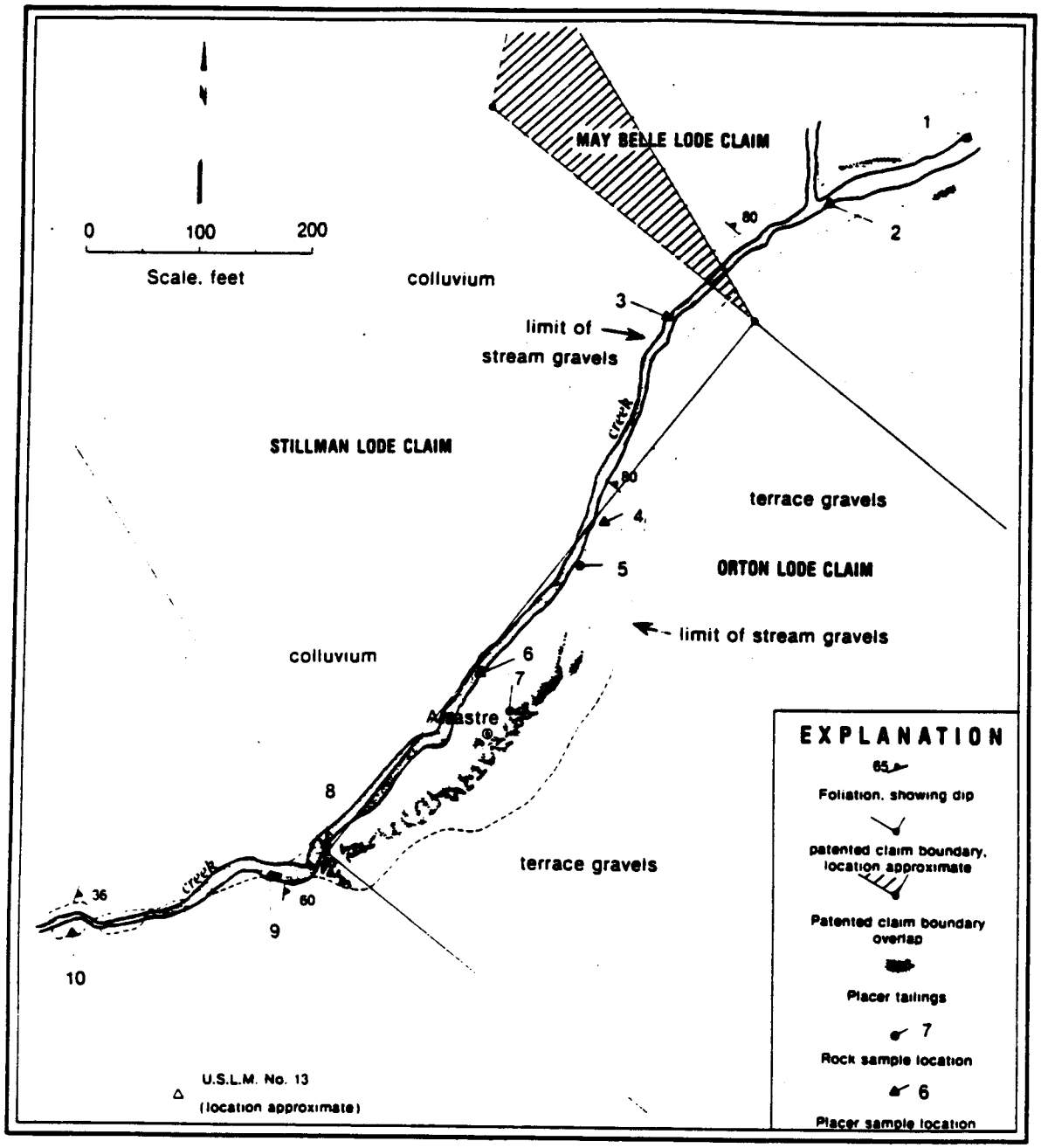


Figure A-44. — Montana Basin Placer, showing sample location

TABLE A-26. - ANALYTICAL RESULTS - Montana Basin placer (see fig. A-44)

Map No.	Sample	Type	Sample Length Ft	Oz/ton Fire Assay Au	Oz/ton Fire Assay Ag	Ppm Cu	Ppm Pb	Ppm Zn	Ppm Ag	Ppm As	Description
1.....	3341..	Rep. Chip	10.0	<0.002		12	15	36	0.2	60	Quartz and black phyllite zone.
5.....	7403..	Rep. Chip.	4.0	<.002		40	32	43	.3	22	Quartz vein.
7.....	3328..	Select....		<.002		17	31	20	<.2	12	Quartz float.

Map No.	Sample	Type	Sample Volume yd^3	Oz/yd^3 Fire Assay Au	Oz/yd^3 Fire Assay Ag	Ppm Cu	Ppm Pb	Ppm Zn	Ppm Ag	Ppm As	Ppm W
2.....	7398..	Placer....	0.1	.007		37	35	55	>30.0	>1000	33
3.....	7397..	Placer....	.1	.011		38	52	60	>30.0	>1000	73
4.....	7395..	Placer....	.1	.003		50	53	102	6.4	>1000	4
6.....	7396..	Placer....	.1	.017		56	42	68	>30.0	>1000	63
8.....	7393..	Placer....	.1	.035		38	28	78	26.0	>1000	185
9.....	7394..	Placer....	.1	.025		36	22	74	>30.0	>1000	87
10.....	7400..	Placer....	.1	.025		47	37	90	>30.0	>1000	105

NAME(S): Montana Creek

Map Location No. 28
MAS No. 2T120096

LOCATION:

Deposit Type: Placer.
Commodities: Au.

Quadrangle: Juneau B2 Sec: 27, 28, 34 T: 39S R: 65E
Geographic: Along and above Montana Creek Road.
Elevation: 350-800 ft.

HISTORY:

Production: 46.9 oz gold.

The first recorded activity occurring along Montana Creek was done by John Olds in 1882. He eventually located claims in the upper basin but, undoubtedly followed colors up lower Montana Creek to reach the upper basin. Additional activity along the lower stretch of the creek resumed in 1900 when placer miners working the creek reported good results. Their success sparked a small rush to mine the benches along the creek. Further reports were scarce after this event until 1927.

At this time, a group of 4 men staked most of Montana Creek with placer claims. Harry Watson bought a large interest in these claims and in 1928 he began mining. He built a bridge over the creek, moved in a tractor and dragline and with the help of the U. S. Bureau of Public Roads and the Forest Service, a road was built to access the creek. Watson worked the placer intermittently between 1928 and 1935, recovering a total of 46 oz of gold from at least 1,650 yd^3 of gravel. U. S. Mint records shows that Don Graves recovered 0.85 oz of gold from prospecting efforts in 1940 (46). The creek is currently used for recreational mining and salmon spawning.

WORKINGS AND FACILITIES:

Signs of historic suction dredging along the creek are evident.

GEOLOGIC SETTING:

Bedrock in the area consists of interlayered northwest-trending east-dipping phyllite, chlorite schist and greenstone. The Coast Range Megalineament is projected along the trend of lower Montana Creek (3). Foliation of the country rock roughly parallels the drainage direction. One foot diameter boulders are common in the stream gravels and boulders up to 3-ft long are also present.

BUREAU INVESTIGATION:

The Bureau collected five 0.1 yd^3 reconnaissance placer samples along a 1.7 mile stretch of Montana Creek (fig. A-36 and table A-27). The highest-grade sample contained 0.0009 oz/yd^3 gold (Nos. 32 and 36) with an average of 0.0007 oz/yd^3 gold. The stream flows on bedrock in only a few places along the stretch sampled. The gold ranges from 0.001 to 0.002 in. in size with an occasional flake up to 0.012 in. The particle nature is somewhat smooth and flakey indicating a longer transport distance relative to the gold found in upper Montana Basin (fig. 9, No. 27). This observation supports the conclusion that the gold in lower Montana Creek

may have its source in the upper basin. The area where the highest grade sample was collected appears to have been previously worked with a suction dredge.

RESOURCE ESTIMATE:

Placer gold collected from gravels in Montana Creek both upstream and within 0.5 miles from the end of the Montana Creek road give the area moderate potential for placer gold. An estimate of the volume of material present was not done for this area.

RECOMMENDATIONS:

Closer-spaced placer sampling in the vicinity of the higher value samples and additional trenching (to bedrock) would produce a better determination of available gravel volumes.

REFERENCES:

3, 24, 25, 26, 27, 40, 41, 46.

TABLE A-27. - ANALYTICAL RESULTS - Montana Creek (see fig. A-36)

Map No.	Sample	Type	Sample Volume	Oz/yd^3 Fire Assay		Ppm						Description
			yd^3	Au	Ag	Cu	Pb	Zn	Ag	As	W	
30.....	6055..	Placer....	0.1	0.0008		50	7	70	2.0	290	58	
31.....	6056..	Placer....	.1	.0004		42	5	69	1.0	350	40	
32.....	7353..	Placer....	.1	.0009		46	130	85	1.9	105	15	
33.....	7354..	Placer....	.1	.0005		30	11	57	15.0	58	40	
36.....	6066..	Placer....	.1	.0009		38	3000	66	1.1	160	38	

Map No.	Sample	Type	Sample Size	Oz/ton Fire Assay		Ppm					
			Volume	Au	Ag	Cu	Pb	Zn	Ag	As	W
34.....	3949..	Pan. Conc.	2 pans	.00135							
35.....	3947..	Pan. Conc.	1 pan	.0327							
37.....	3948..	Pan. Conc.	2 pans	<.00015							
38.....	3946..	Pan. Conc.	2 pans	<.00015							

NAME(S): McGinnis Creek
Mansfield Gold Mining
Patented Claims:
Maine Lode No. 1-2,
Handy Lode, Rough Rider
Lode, Ohio No. 1-2 Lode
Eureka Lode, Black Bear Lode

Map Location No. 29
M.S. No. 939
MAS No. 2T120104

LOCATION:

Deposit Type: Placer.
Commodities: Au.

Quadrangle: Juneau B2 Sec: 25 & 26 T: 39S R: 65E
Geographic: McGinnis Creek 1.8 miles above mouth.
Elevation: 375-1,100 ft.

HISTORY:

PRODUCTION: 3 oz gold.

The placer grounds on McGinnis Creek were first staked by Adam Reidlinger in 1897. Undoubtedly, the initial discovery occurred much earlier, probably contemporaneous with the discoveries on Montana Creek in 1882, although this is not documented. The Mansfield Gold Mining Company acquired these placer claims along with other lode claims in the basin in 1903.

Ralph B. Day was superintendent of the company during this time and installed hydraulic machinery and a 1,000-ft long flume by the end of July, 1903. In July of 1904, the flume was operating and the company was using high-pressure water nozzles (giants) to sluice the grounds. Two shifts worked these grounds each day and results were encouraging, so much so that the company planned to open up a number of pits on the quartz lodes. However, the stockholders were getting impatient.

George Otterson took charge of Mansfield's operations in 1905 to set things right, and new equipment including a small compressor, drill and a 1,500 lb cable tram was brought in. Facilities were readied for handling oversize quartz boulders, sluicing gravels and housing workers. By May, a 500-ft tunnel had been driven to undercut the lode occurrence and 5,000 lb of quartz boulders had been stockpiled during sluicing operations. Unfortunately, in June, Otterson suddenly closed down the operation because of poor results. He left the company and McGinnis Creek returned to dormancy.

In September of 1906, George Kyrage took a crew to the mine and stayed there until January of 1907 at which time legal squabbles kept the operation closed down for the remainder of the year. Minor work was accomplished during 1908 under the supervision of Ralph Day. In 1909, Thomas Knudson managed the unsuccessful operations of the Mansfield Gold Mining Company. Minor work occurred on the property between 1912 and 1917. The highlight occurred in 1914 when Mansfield Mining and Power acquired a patent to the claims in the valley.

The property was idle until 1939 at which time new claims were staked in the area and 3 oz of gold were recovered from 220 yd^3 of material obtained from 2 placer cuts (39). These unpatented claims were subsequently abandoned and the property is currently idle, although the patents are still valid.

WORKINGS AND FACILITIES:

In 1910, several buildings, flumes, ditches, and an open cut were still present on the property. Now only the remains of several placer ditches and some hydraulic pipe can be found in amongst the thick alder.

GEOLOGIC SETTING:

Bedrock in the area consists of northwest-trending north-dipping interbedded phyllite and biotite schist. The phyllites contain quartz stringers both parallel and oblique to foliation. These quartz showings are reported to locally contain pyrite and up to 0.04 oz/ton gold (39).

Placer gold occurs in colluvium derived from the ridges on the east side of McGinnis Creek at 750 ft elevation. The colluvium forms a series of talus cones whose lower portions coalesce with each other and merge with the gravel bed of the creek. This material was prospected by test pits, some of which went down to bedrock. A tunnel was driven into the colluvium for 50 ft and creek water was diverted for hydraulicing by a flume nearly a mile long. Further work by the owners proved the property uneconomic at the time. The gold was reported to occur mostly as fine rough grains derived from the numerous quartz stringers occurring in the phyllites (41).

Several trenches were also cut in the colluvium on the west side of McGinnis Creek at 535 ft elevation. One of these reportedly produced 3 oz of gold. The gold was reported to be rough and fine to flaky. The concentrates were mainly black sands, with pyrite, galena, and limonite (39).

BUREAU INVESTIGATION:

The Bureau located the hydraulic workings described above the east side of McGinnis Creek (fig. A-36). They consisted of an approximately 60 x 300 ft hydraulic open cut in colluvial gravel presently overgrown with abundant vegetation. Pan concentrates contained visible gold and two placer samples were collected in gravels along the present stream drainage just south of the pit. These averaged 0.0017 oz/yd^3 gold (Nos. 21 and 24, fig. A-36 and table A-28). This tributary stream contains abundant quartz float which locally makes up to 10% of the stream gravels. The quartz locally contains up to 1% pyrrhotite, pyrite, chalcopyrite, and arsenopyrite. Two samples of this quartz (Nos. 22 and 23, fig A-36) contained 0.002 oz/ton gold.

Two tunnels are reported to occur 800 ft southeast of the hydraulic cut on M.S. 939. A search of this area located no workings, but abundant quartz float was found. One float sample (No. 18, table A-28) contained 0.032 oz/ton gold.

A series of placer samples were collected along the main McGinnis Creek drainage with the highest value of 0.0013 oz/ton gold obtained at the creek mouth where it drains into Montana Creek (No. 28, fig. A-36).

A branch of McGinnis Creek draining in from the west, one mile above the McGinnis placer, was examined as placer gold was previously reported there. The drainage was very steep and no gold was found by panning.

A sample of quartz float (No. 10, table A-28) collected from a trench on the west side of McGinnis Creek, 0.6 miles above the hydraulic open cut, contained 2,860 ppm lead.

RESOURCE ESTIMATE:

This area has low mineral production potential for placer gold due to the low gold values in placer samples.

RECOMMENDATIONS:

Search for the source of the abundant float in the area and locate the underground workings.

REFERENCES:

24, 25, 26, 27, 39, 41, 52.

TABLE A-28. - ANALYTICAL RESULTS - McGinnis Creek (see fig. A-36)

Map No.	Sample	Type	Sample Volume	Oz/yd3 Fire Assay		Ppm						Description
			yd3	Au	Ag	Cu	Pb	Zn	Ag	As	W	
8.....	6059..	Placer....	0.1	0.0001		24	<2	34	<0.2	8	5	
14.....	3311..	Placer....	.1	trace								
21.....	8216..	Placer....	.1	.0018		78	12	133	1.0	250	5	
24.....	8218..	Placer....	.1	.0016			18	141		175	5	
26.....	6057..	Placer....	.1	.0008		33	2	82	.4	110	5	
27.....	6058..	Placer....	.1	.0002		30	3	80	.6	58	21	
28.....	6065..	Placer....	.1	.0013		135	4600	52	18.0	100	340	
29.....	3950..	Pan. Conc.										2 pans; 0.0003 oz/ton gold.

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm					Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	As	
9.....	8219..	Select....		<.002		45	8	72	.2		Quartz float in McGinnis Creek tributary.
10.....	3312..	Select....		.009		11	6	2860	.4		Trench near McGinnis Creek.
11.....	3113..	Float.....		.001		11	4	33	.3		Trench near McGinnis Creek.
12.....	7434..	Float.....		<.002		19	2	12	.4		Trench near McGinnis Creek.
13.....	7435..	Cont. Chip	1.0	<.002		41	9	80	.2	40	Quartz vein material.
15.....	3355..	Rep. Chip.		<.002		7	<2	20	<.2	22	Quartz float.
16.....	3356..	Rep. Chip.		<.002		8	<2	32	<.2	38	Quartz float.
17.....	3357..	Select....		.005		30	4	216	.3	18	Pyritic phyllite float.
18.....	3697..	Select....		.032		28	10	33	.1		Quartz float.
19.....	8220..	Select....		<.002		40	9	40	.1		Quartz float.
20.....	8217..	Select....		<.002		34	16	90	.1		Quartz float.
22.....	8033..	Float.....		.002		37	8	29	.1		Quartz float in McGinnis Creek tributary.
23.....	8034..	Float.....		.002		14	5	16	<.1		Quartz float in McGinnis Creek tributary.
25.....	8209..	Grab.....		.005		10	126	40	<.1		Quartz float.

NAME(S): Peterson Mine
Jessie, Cannon Ball,
Lost Soldier, Pilgrim,
Olson, Jensen

Map Location No. 30
MAS No. 21120094

LOCATION:

Deposit Type: Fissure vein.
Commodities: Au.

Quadrangle: Juneau B3 SW 1/4 Sec: 32 T: 39S R: 65E
Geographic: 1.6 miles northeast of Tee Harbor.
Elevation: 850-980 ft.

HISTORY:

Production: 211 oz gold.
see below

After an initial discovery made by George Rudd and others in 1897, John Peterson acquired the Peterson property later in the year and began a small placer operation in 1900. At first, he successfully sluiced the ground, but when he added an arrastre to crush the quartz lode already present his success decreased substantially.

During 1903, Tom Drew purchased the mine from Peterson and began development. Drew's men built a road connecting the mine to Pearl harbor, sunk shafts, excavated open cuts, and stockpiled 5,000 tons of ore. He tried to mill the ore with an arrastre but, was unsuccessful. In 1904, Drew leased the Davies Mill and assay office in an effort to better evaluate the commercial value of his ore. W. R. Bentley was the assayer in charge. Results of this effort must not have been encouraging as Drew did not return to the mine in 1905.

Peterson returned to the property in 1905 having purchased the 3-stamp mill and assay laboratory from J. G. Davies for the sum of $450. In 1907, he mined a small amount of ore but, production figures were not released. In 1909, J. Milligan, of the Southern Alaska Consolidated Mines Company, leased the property. The company worked the claims in 1910 under A. T. Holman and began to renovate the existing workings. Drilling began in October as did the driving of the Prairie Tunnel. A few hundred tons of ore were mined, but negative results forced the company to return the property to Peterson.

Peterson did some work on the property in 1911 and by the end of the year there were 11 tunnels totalling 625 ft of workings, 4 shafts with 163 ft of workings and 16 trenches. Bart Thane and Herman Tripp optioned the property in 1912 and 1913 and sunk a 135-ft shaft which cut a large vein 70 ft down. They explored the vein but, insufficient gold values forced them to drop the property. The mine again reverted to Peterson and his family and this time they decided to make a go of it themselves.

John Peterson operated the property with the help of his wife and two daughters in 1914, after learning of his imminent death from stomach cancer. The family worked the Cannon Ball claim and processed 10 tons of ore each week, making a sufficient amount to pay expenses. Peterson died in 1916 after recovering 61 oz of gold and driving another 50 ft of tunnels.

The 3 Peterson women continued to work the mine until 1923, producing ore in all but the last 2 years. The total production for this period was 209 oz of gold and 8 oz of silver from over 550 tons of ore. The success of the mine gained national recognition for the Peterson women who became known as the "girl gold miners of Alaska". The Petersons continued mining on a part-time basis for a few more years and finally optioned the property to J. Holland in 1935. He tried to put the mine back into operation after gold prices rose to $35/oz but, he too, was unsuccessful.

The next attempt to mine the Peterson property occurred in 1982 when a local prospector reworked the old mine dumps with an impact mill and gravity table. After producing 2 oz of gold from 13 tons of material, he also called it quits. The current claim holders have worked out a lease arrangement with a large company that is planning to reevaluating the property.

PRODUCTION:

Year	Tons Milled	Oz Au
*1916	25	61
1917	134	39
1918	82	24
1919	90	26
1920	100	29
1921	100	30
1982	13	2
Total	544	211

Average grade: 0.39 oz/st gold, 0.29 oz/st gold without 1916 production.
* These figures probably refer to concentrates as the grade is nearly 8 times as high as in other years.

WORKINGS AND FACILITIES:

Four shafts, 11 adits, and numerous trenches. All underground workings, except for the adit on the Jessie claim, are presently inaccessible. A three stamp mill, gravity table, and steam driven hoist are still present. as are several ruined and one habitable cabin.

GEOLOGIC SETTING:

The geology of the area is best described by Knopf (16) and Roehm (36). At the time of their visits many workings exposing the bedrock geology were still accessible. Northwest-trending phyllites dipping at low angles to the east is the major rock type in the area. Four types of greenstone are described in the area. A chloritized, 80-100 ft thick diorite dike/sill lies on the footwall of the lode (fig. A-46) . The phyllite is impregnated with fine pyrrhotite and pyrite along the contact between the two rock units. An augite lamprophyre is exposed in the dike footwall. Augite diorite is also exposed on the west side of a ridge lying to the east of the Peterson Mine, while breccias and lavas of augite melaphyre form the ridge top. As with the diorite dike in the mine vicinity, these units gently dip to the east.

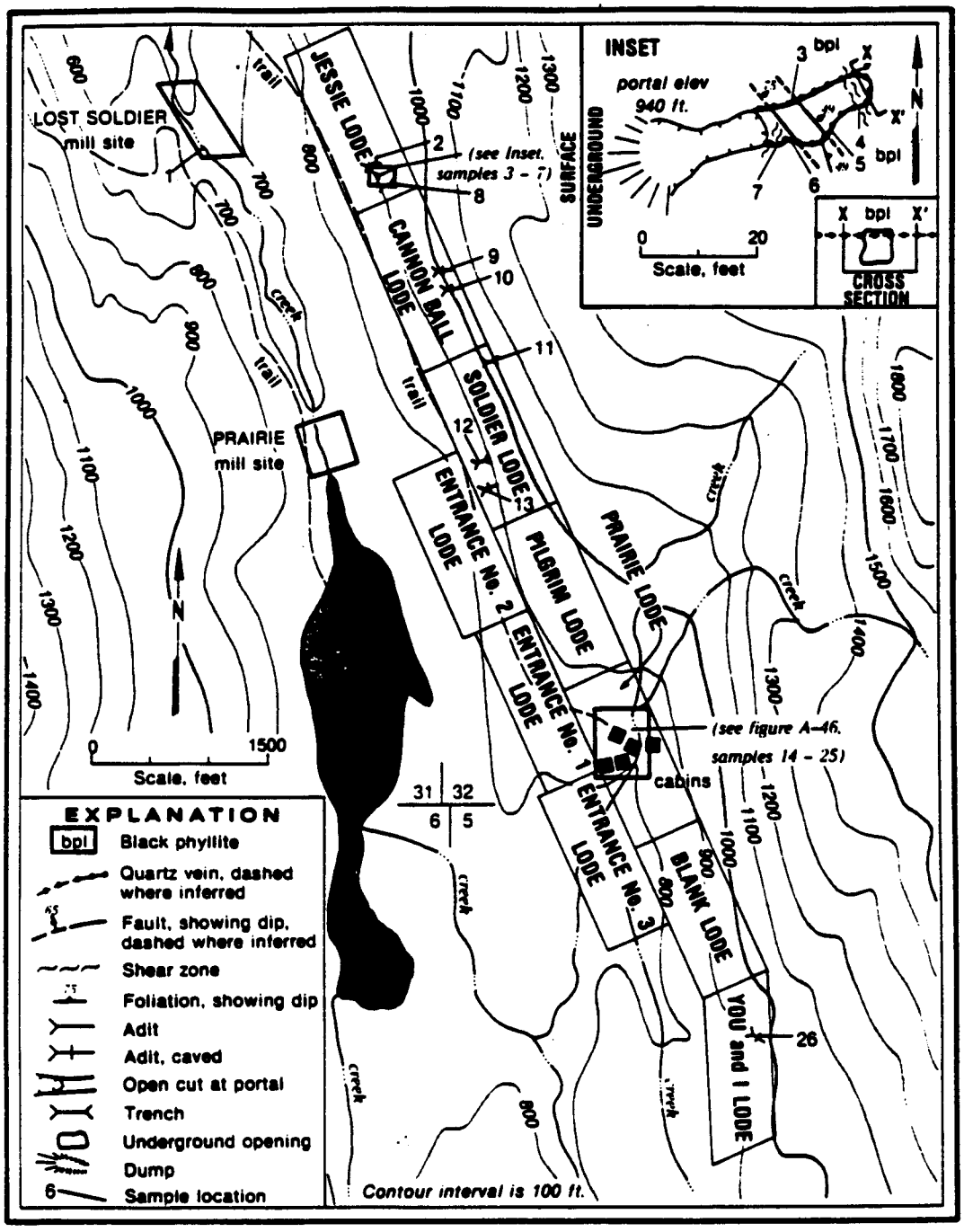


Figure A-45.— Peterson Mine area, showing historic claim boundaries, surface workings and sample locations.

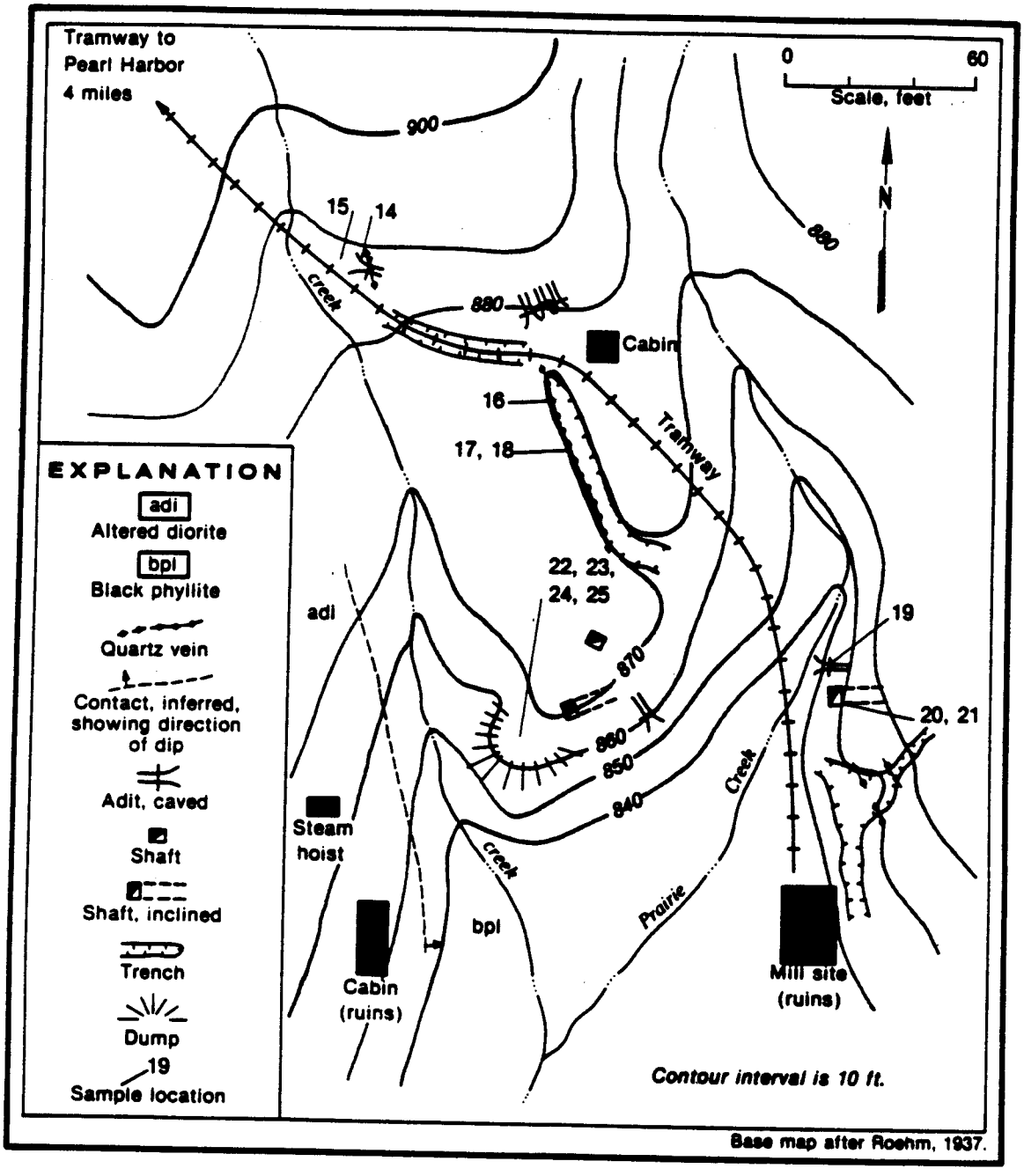


Figure A-46.— Peterson Mine, Prairie Lode claim, showing geology and sample locations.

On the Prairie claims, masses of quartz up to 30-ft in surface width have been exposed for a length of 350 ft along a N30°W trend. As shown in one of the adits (now caved), some of the quartz masses form flat irregular bodies from which stringers penetrate the surrounding phyllite, crosscutting the foliation.

Arsenopyrite was the only sulfide found in the ore and free gold was occasionally seen. The ore was free milling and could be divided into two classes: one of white quartz and the other contained banded quartz. Assays show that gold values are concentrated in the banded quartz (4).

Roehm (36) mentions that the rock units found in the Peterson area represent a northern extension of the same series associated with the Gold Knob and Treasury Hill prospects. Quartz veins appear to be concentrated along unit contacts. The quartz veins are mainly confined to a narrow zone of phyllite on the east side of the altered dike. At this location the phyllites show intense folding and gold-bearing quartz veins appear concentrated near an anticlinal fold crest that plunges to the southeast.

BUREAU INVESTIGATION:

The poor condition of the workings coupled with poor rock exposure made examination of the property difficult. The Bureau located and sampled old workings (mainly caved adits and associated dumps) along a 7,500-ft trend within the Peterson claim block (figs. A-45, 46). The results are shown in table A-29. A 350-lb metallurgical sample, collected from two separate mine dumps on the Prairie claim, was shipped to the Bureau research center in Salt Lake City, Utah, for gold beneficiation tests. Three tests were completed on the ore including cyanide amenability, flotation and cyanide leach with assay screen analysis of the leach residue. The results of the tests are presented below (18).

Cyanide Amenability Test Results

Product	Weight Gm	Assay oz/ton		Distribution %	
		Au	Ag	Au	Ag
Leach Solution	817	8.0	1.3	96.9	38.1
Leach Residue	1008	0.006	0.1	3.1	61.9
Head (Calculated)	1008	.195	0.08	100	100

Bulk Sulfide Flotation Results

Product	Weight %	Assay oz/ton		Distribution %	
		Au	Ag	Au	Ag
Concentrate	1.9	2.126	.43	90.8	44.4
Tail	98.1	.010	.05	9.2	55.6
Head (Calculated)	100	.107	.04	100	100

Cyanide Leach and Assay Screen Analysis

Product	Weight Gm	Assay oz/ton Au	Assay oz/ton Ag	Distribution % Au	Distribution % Ag
Leach Solution	3529	.120	.06	92.3	30.3
Leach Residue	3842	.007	.13	7.7	69.7
Head (Calculated)	3842	.119	.18	100	100
	Weight %	Assay oz/ton Au	Assay oz/ton Ag	Distribution % Au	Distribution % Ag
Leach residue size fractions, mesh					
+20	40.24	.005	.19	21.95	60.44
-20:+35	24.93	.011	.15	29.93	29.57
-35:+65	14.21	.008	.05	12.41	2.81
-65:+100	5.93	.010	.05	6.48	1.17
-100:+150	3.90	.028	.06	11.93	1.85
-150:+200	1.56	.010	.19	1.71	2.35
-200:+325	1.56	.018	.05	3.07	0.31
-325	7.65	.065	.05	12.53	1.51
Residue (Calculated)	100	.007	.13	100	100

The highest gold values obtained from Bureau sampling were obtained on the Cannonball and Jessie claims (fig. A-45). One sample (No. 8, table A-29) from vein quartz exposed in a trench on the Jessie claim contained 0.44 oz/ton gold. A sample of float (No. 10, fig. A-45) from arsenopyrite-bearing quartz found in a trench on the Cannonball claim contained 0.28 oz/ton gold. The veins in this area are subhorizontal fissure veins and may be a northern extension of the vein system mined on the Prairie claim. A seemingly continuous vein was opened up for over 50 ft along strike and averaged 0.04 oz/ton gold (Nos. 16-18, fig. A-46). An inclined shaft near the mill on the Prairie claim cuts a 5-ft wide sheeted quartz vein in phyllite. Panned fines from the vein produced free gold, but chip samples (Nos. 20 and 21) averaged only 0.04 oz/ton gold. Grab samples from all the dumps averaged 0.04 oz/ton gold.

A select sample of ore from the Lost Soldier Millsite claim (No. 1, fig A-45), located to the northwest of the Prairie claim, contained 0.43 oz/ton gold. The highest gold values from the entire property were obtained from quartz float recovered in a trench on the Jessie claim (0.44 oz/ton, No. 8, fig. A-45)

RESOURCE ESTIMATE:

It is reported that ore from the Prairie claim milled by Peterson averaged 0.29-0.39 oz/ton gold (36). Samples collected by the Bureau give average values of less than 0.1 oz/ton. It appears from an appraisal of accessible surface showings that the higher grade ore has been mined out. Shafts sunk over 100 ft through the flatlying near surface veins and drill holes did not appear to intercept higher grades of ore at depth.

Low assays obtained from samples at the Prairie claim give this portion of the Peterson property a low mineral development potential. The flatlying near-surface nature of the veins is promising however. Samples from the Cannonball and Jessie claims average 0.16 oz/ton gold, but the low tonnage exposed gives this area a low potential for gold.

RECOMMENDATIONS:

Continue to trench between the caved workings on the Prairie claim and sink a few more drill holes to intersect parallel veins at depth. Continue trenching north and south on the Jessie claim until the vein is no longer found.

REFERENCES:

4, 6, 12, 16, 18, 24, 25, 26, 27, 28, 36, 41, 46.

TABLE A-29. - ANALYTICAL RESULTS - Peterson Mine (see figs. A-45 and A-46)

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm					Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	As	
1	3691	Select		0.428		45	51	36	1.3		Quartz dump near mill.
2	3689	Grab		.095		5	3	4	0.1		Quartz vein with phyllite partings.
3	3679	Channel	0.7	.168		12	15	56	1.3		Quartz vein in adit, Jessie claim.
4	3675	Cont. Chip	3.0	.006		46	13	78	.2		Quartz stringers in adit, Jessie claim.
5	3676	Channel	2.0	.209		10	7	14	.1		Quartz vein in adit, Jessie claim.
6	3677	Cont. Chip	1.4	.160		10	11	18	.2		Quartz vein in adit, Jessie claim.
7	3678	Cont. Chip	2.0	.011		32	11	53	.2		Quartz stringers in adit, Jessie claim.
8	3690	Grab		.444		2	2	4	<.1		Quartz float.
9	6062	Select		.014		<1	3	2	<.2	>1000	Quartz float.
10	6061	Select		.276		7	9	5	2.0	>1000	Quartz float.
11	6060	Rep. Chip.	4.0	.002		6	13	10	<.2	45	Iron-stained brecciated quartz vein.
12	6321	Grab		<.002		4	<2	2	<.2	73	Dump, quartz float.
13	6320	Grab		.013		3	3	4	<.2	>1000	Dump.
14	6063	Cont. Chip	2.0	.098		1	30	3	.2	>1000	Quartz vein with phyllite partings, 2% arsenopyrite.
15	3204	Rand. Chip		.134		6	43	20	2.3		Dump.
16	3203	Cont. Chip	4.0	.043		3	15	5	.3		Iron-stained quartz vein.
17	3102	Cont. Chip	1.0	.016		3	22	15	.2		Panning showed visible gold.
18	3103	Cont. Chip	.3	.054		63	36	73	.3		Graphitic oxidized quartz vein.
19	6322	Select		.034		2	11	2	.2	>1000	Quartz vein float.
20	6323	Cont. Chip	1.7	.004		16	10	16	<.2	>1000	Quartz veins, phyllite partings.
21	6324	Select		.068		2	8	2	.3	>1000	Vein quartz with arsenopyrite.
22	3101	Grab		.004		171	14	174	.3		Dump.
23	3201	Rand. Chip		.120		33	29	18	1.3		Dump.
24	3202	Rand. Chip		.025		91	25	86	1.7		Dump.
25	7369	Grab									Metallurgical test sample, 350 lb.
26	7367	Grab		<.002		15	26	4	<.2	450	Dump from caved adit reported 20 ft long.

NAME(S): Mendenhall Glacier occurrence

Map Location No. 31
MAS No. 2IT20226

LOCATION:

Deposit Type: Massive sulfide, vein.
Commodities: Cu, Zn.

Quadrangle: Juneau B2 SW 1/4 Sec: 33 T: 39S R: 66E
Geographic: East side Mendenhall Glacier, 2 miles northeast of Visitors Center.
Elevation: 1,040-1,660 ft.

HISTORY:

PRODUCTION: None.

This is a new occurrence and no prospecting has been reported from the area.

WORKINGS AND FACILITIES:

None.

GEOLOGIC SETTING:

Reddish-brown iron oxide stains observed on the rocks along the east margin of the Mendenhall Glacier were investigated during this study (fig. A-47). These stains are predominantly caused by the weathering of biotite from a biotite schist host; however this occurrence is a result of leaching from a massive pyrrhotite zone up to 10-ft wide within siliceous greenstone wallrocks that also contains small amounts of chalcopyrite.

There were occurrences of quartz shear veins hosted in a garnet amphibolite located adjacent to this sulfide zone. The veins were between 6 and 24-in wide and their trend was oblique to the foliation of the country rock. Sulfides were more prevalent in the selvage rather than the quartz veins and consisted of pyrite and pyrrhotite.

A garnet biotite aplite sill occurred in the biotite schist host rock northeast from these two occurrences. No sulfides were associated with this siliceous intrusion, but a sample was taken to test for the presence of gold.

BUREAU INVESTIGATION:

The Bureau sampled the iron-stained zones (No. 7, table A-30) and found the massive sulfides to contain up to 820 ppm copper and 905 ppm zinc. Samples were also taken of the quartz veins and the aplite sill discussed above and assays confirmed low metal values for these sulfide-poor rocks.

RESOURCE ESTIMATE:

The low copper and zinc values give the area a low mineral development potential.

RECOMMENDATIONS:

Further exploration along the trend of the sulfide zones is recommended as additional red-stained zones were observed across the valley along the same

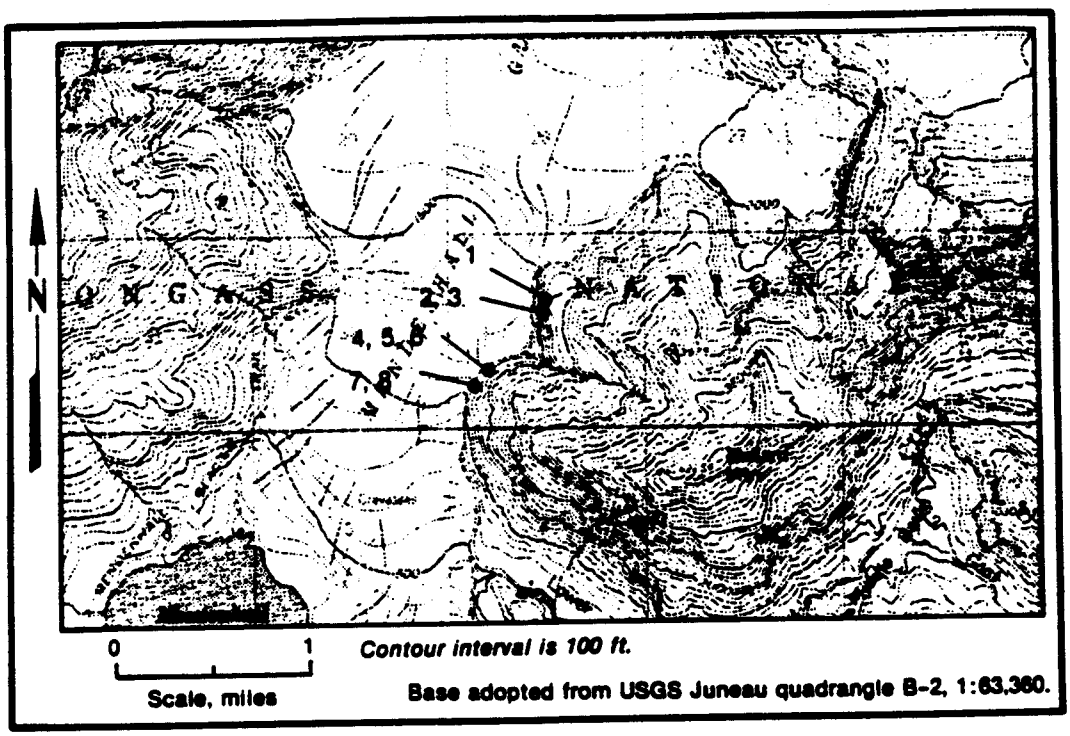


Figure A-47.— Mendenhall Glacier occurrence, showing sample locations.

trend. Also, the search should continue for crosscutting quartz fissure veins (similar to the Herbert Glacier occurrence) in the higher-grade metamorphic rocks and the intrusive rocks to the east.

REFERENCES:

None.

TABLE A-30. - ANALYTICAL RESULTS - Mendenhall Glacier occurrence (see fig. A-47)

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm				Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	
1.....	3698..	Cont. Chip	2.0	0.003		8	10	19	<0.1	Garnet aplite sill.
2.....	8221..	Select....	6.0	<.002		106	7	62	.5	Biotite schist.
3.....	8222..	Select....	3.0	<.002		40	8	123	1.8	Biotite schist.
4.....	3699..	Rep. Chip.	0.5	<.002		24	13	11	1.6	Quartz vein, 5% pyrite/pyrrhotite.
5.....	4301..	Rep. Chip.	1.0	<.002		70	<2	11	<.1	Quartz vein, ≤3% pyrite/pyrrhotite.
6.....	4302..	Cont. Chip	1.0	<.002		113	3	48	.2	Quartz stringers in shear zone, 2% pyrite/ pyrrhotite.
7.....	8223..	Select....		<.002		820	20	905	2.4	Massive pyrrhotite with trace chalcopyrite.
8.....	8224..	Cont. Chip	.3	<.002		88	15	152	1.1	Quartz vein on margin of massive pyrrhotite zone.

NAME(S): Treasury Hill
Gold Knob
Wiley and Spaulding
Auke Group
Paradise Peek

Map Location No. 32
MAS No. 21120098

LOCATION:

Deposit Type: Fissure vein.
Commodities: Au.

Quadrangle: Juneau B2 and B3 Sec: 4, 10 T: 40S R: 65E
Geographic: 2.5 miles northwest of Spaulding Point, Auke Bay.
Elevation: 1,100-1,800 ft.

HISTORY:

PRODUCTION: 302 oz gold.

The Treasury Hill area was discovered in 1908 by Victor Spaulding, Perry Wiley and Saltwater Jack Childs. The prospectors returned to town with nearly $500 worth of gold, rousing interest in the area, and then went back to Auke bay to build a trail and cabin and perform considerable stripping on the property. In early February, 1909, the three men started driving an adit and continued trenching to open up the vein. The majority of the early work concentrated on placer operations and sluicing and reports of nearly $5,000 in total production have been given (44). A 2-stamp mill was acquired to work the quartz lodes being developed, but the mill was carried about half-way up to the claims and then abandoned (42). A clean-up from placer activity in 1909 was also reported and $1,250 worth of gold was recovered.

Outside companies got involved in 1910, when J. A. Stewart, representing the Canadian Exploration Company, bonded the property for nearly $10,000 per claim. Unfortunately, this event did not substantially increase the mining effort in the area, actually very little work was done other than starting a tunnel on the Gold Knob claim.

In 1911, Henry Bratnober and the London Exploration Company picked up the lease on Treasury Hill, promising to spend $1,000 each month on development. By the end of the summer of 1912, the London company had extended the Gold Knob tunnel to 600 ft in length and were in the process of assaying the property. In late December, however, orders came to shut down everything and the property was ready to change hands again. This occurred in 1913, when J. B. Hammond optioned the property for the Hammond interest.

In April, 1914, H. R. Plate had 50 men working the property and a contract for driving an additional 100 ft on the Gold Knob was let. Unfortunately, this idea did not satisfy the lessees and the property changed hands again during the same year. The Guggenheims had the property examined and Senator Frank Aldrich also sampled the property. Both interests backed out the same year and the claims on Treasury Hill were allowed to lapse until 1930.

During 1930, A. Zenger and D. L. Dutton restaked the area. Their endeavors were fruitless and the claims lapsed again until 1935 when the original owner, Vic Spaulding, restaked the area. Old trenches and tunnels were cleared out, but Spaulding died in 1937 and the property was again abandoned.

Over 40 years passed before activity resumed on Treasury Hill. Occidental Minerals drilled the property in 1979. John Ritter staked the area and renamed it Paradise Peek. He stayed on the property until his death in 1985. FMC Corp. has renewed interest in the property and worked the claims in 1987.

WORKINGS AND FACILITIES:

Numerous trenches and open cuts occur on the property in addition to a water-filled adit and a 655-ft tunnel (see figs. A-48 and A-49).

GEOLOGIC SETTING:

The Treasury Hill-Gold Knob area is underlain by a northwest trending albite-rich dike whose footwall consists of phyllite and hanging wall is greenstone and greenschist. The dike is cut by numerous quartz veins trending N25°W to N45°E, or generally transverse to the dike, in a stockwork pattern. The extensive muskeg cover in the area makes exposures difficult to find. The quartz veins are exposed in old prospect pits for up to 500-feet along strike. The veins are up to 4.5-ft wide with an average width of 2-ft. Prospect pits along the dike indicate that the dimensions of this mineralization may be as much as 150-ft wide and may extend for 2,000 ft along strike. The quartz veins locally contain appreciable amounts of arsenopyrite, some pyrite, and visible gold can also be found. Prospecting has been concentrated along the trend of this dike as the quartz veins are mostly concentrated within it. This is probably due to the fact that the dike is more brittle than the surrounding schists and phyllites and during deformation it fractured, opening up spaces for the emplacement of mineralizing solutions.

BUREAU INVESTIGATION:

This prospect has extensive muskeg cover with little bedrock exposure. Scattered trenches containing quartz veins indicate that the altered dike and greenstone underlying the area is cut by a stockwork of veins within a 0.5 square mile area.

The Bureau mapped and sampled all the known workings in the area. The highest-grade sample (No. 21, table A-31) contained 0.124 oz/ton gold and was taken from a 1-ft wide vein exposed in a trench (fig. A-50). Most of the other samples contained only minor gold. An examination was made of the 655-ft long Gold Knob Tunnel driven in an attempt to undercut the entire property (fig. A-51). The tunnel cuts mainly phyllite with some intercalated greenstone and altered dike rock near the portal. Some barren quartz veins and up to 20-ft wide quartz-calcite-filled shear zones were found underground. No sulfides were observed and the shear zones did not contain significant gold values. It appears that this tunnel did not adequately test the greenstone zone.

Thirteen core holes were spaced over a 2.5-mile stretch along the trend of the greenstone mass in the area. It is reported that no significant gold mineralization was encountered (21).

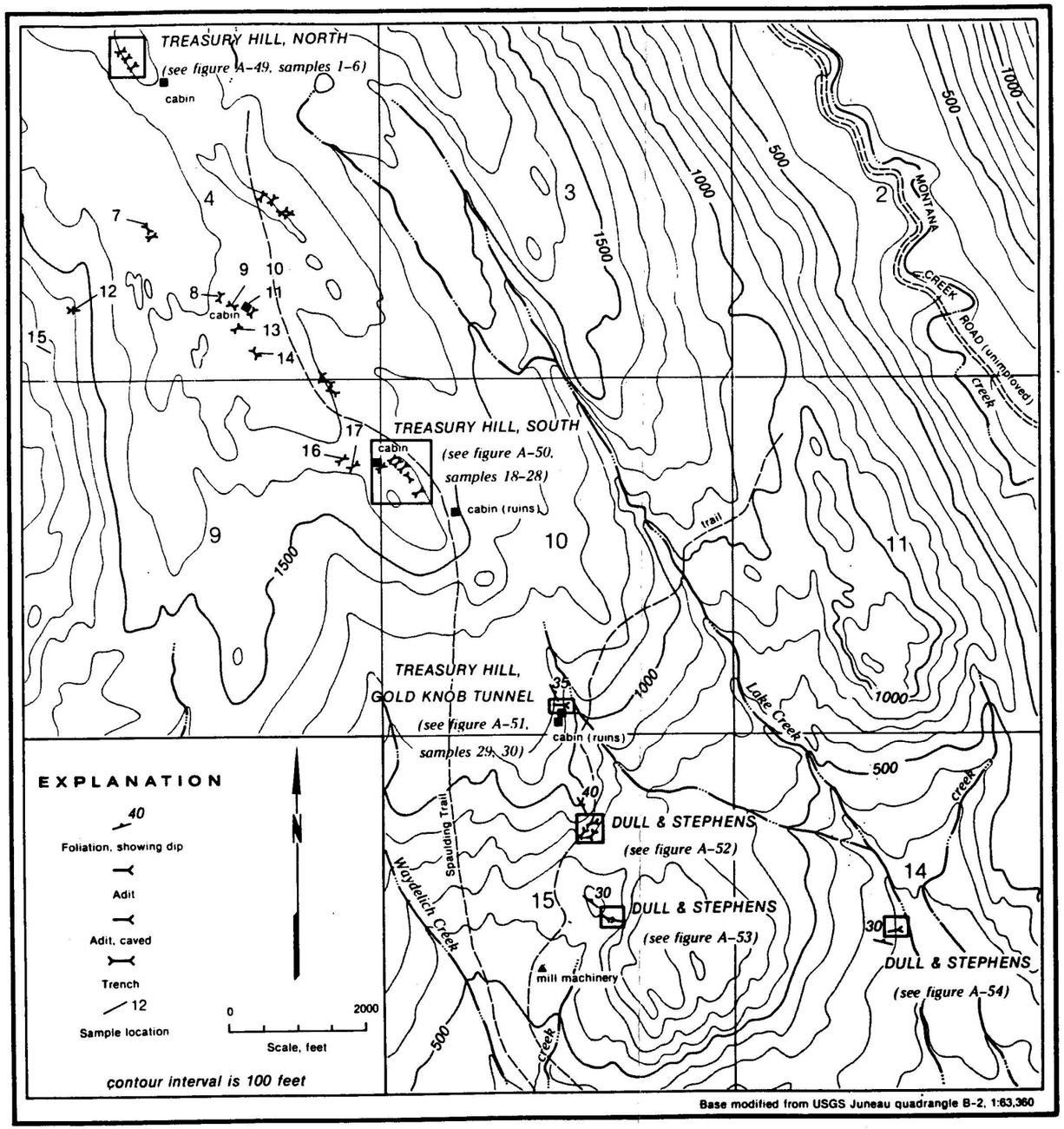


Figure A-48. — Spaulding Meadows area, showing Treasury Hill workings, sample locations, and Dull & Stephens workings.

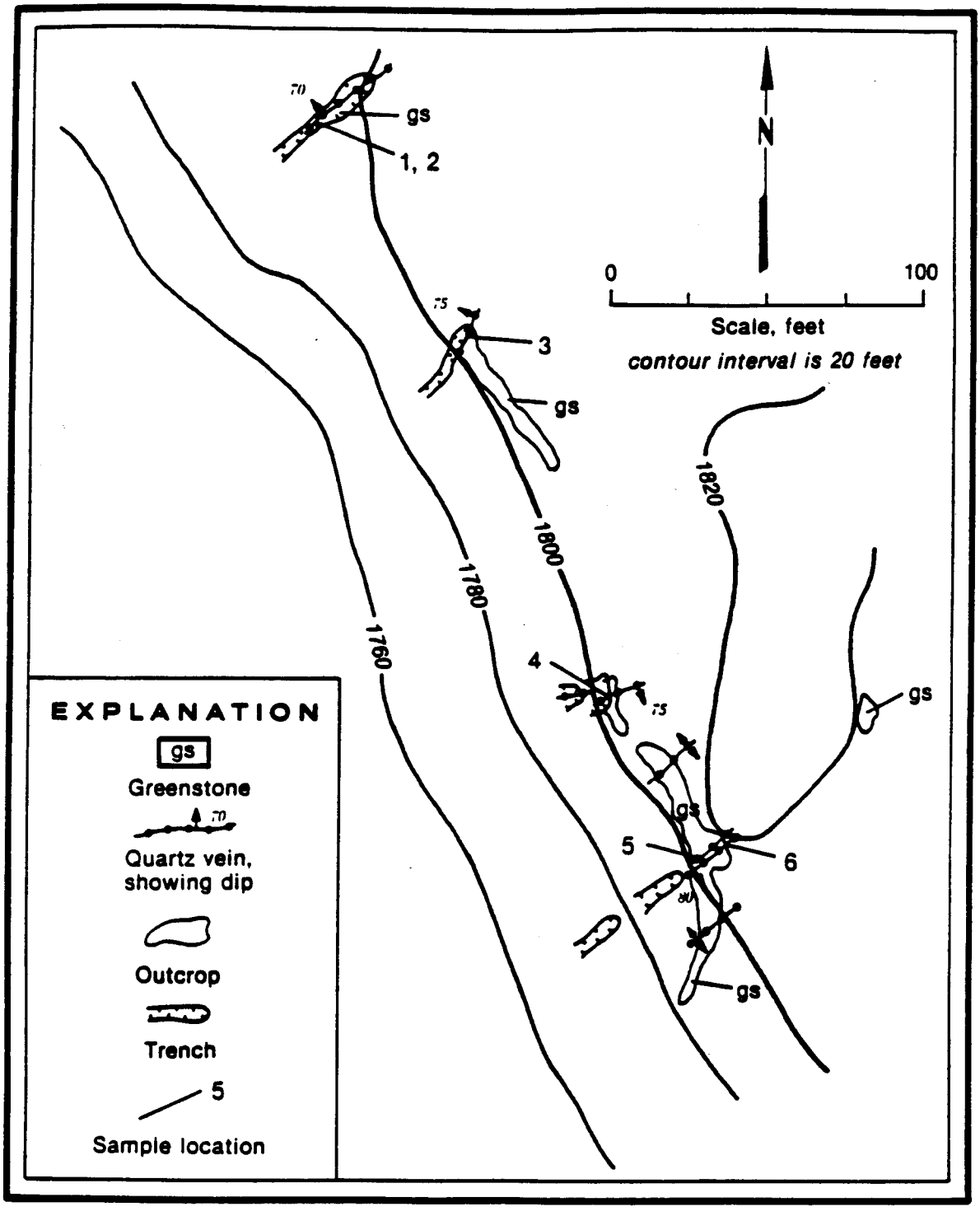


Figure A-49.— Treasury Hill, north, showing geology and sample locations.

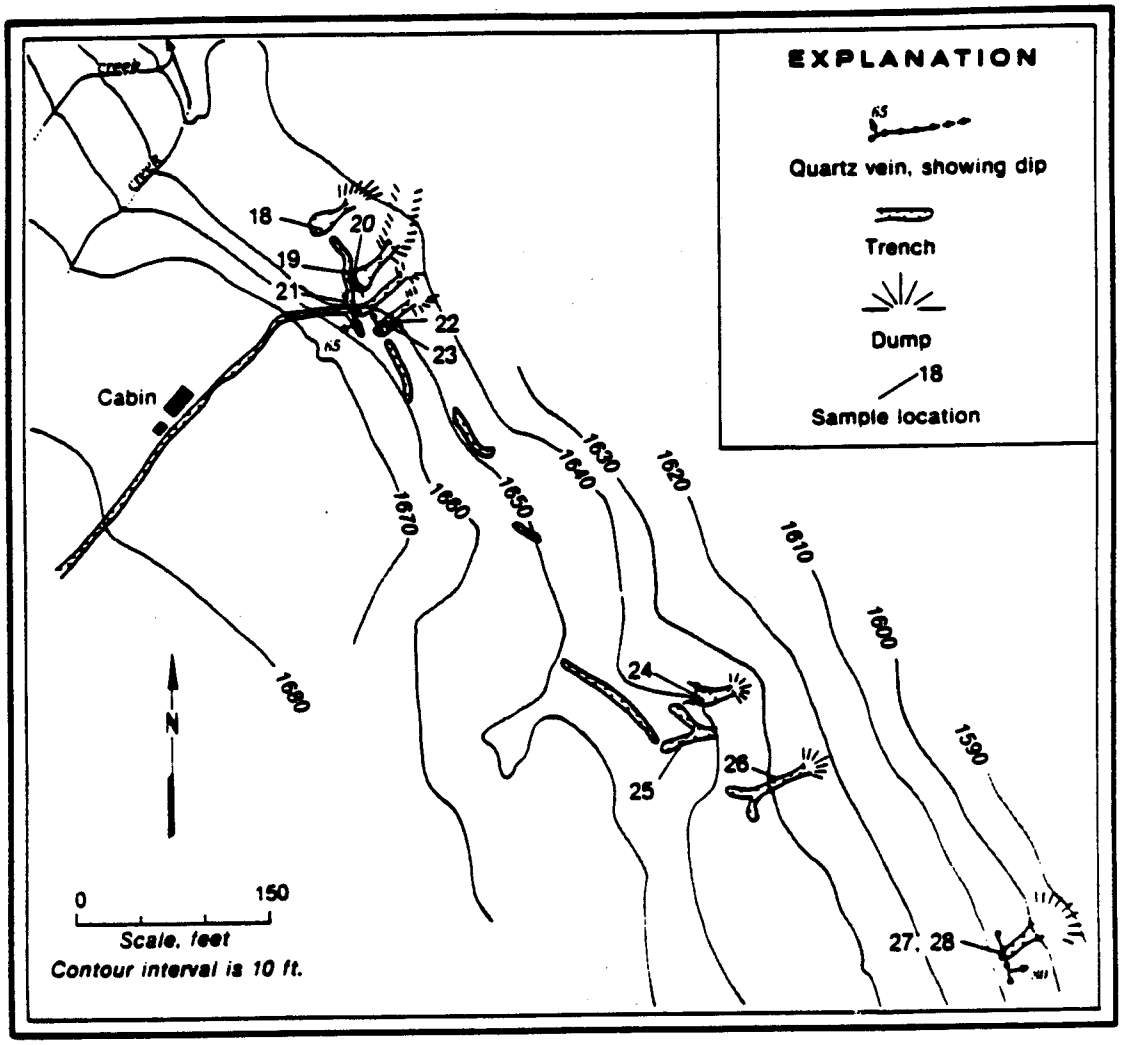
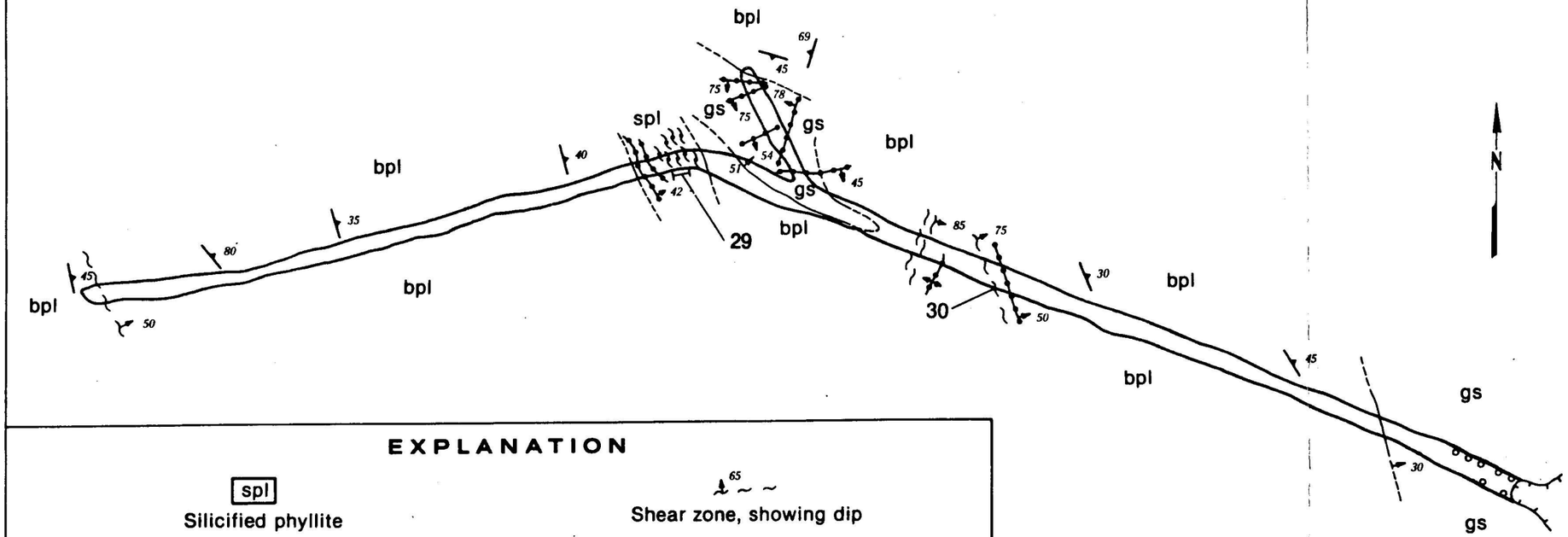


Figure A-50.— Treasury Hill, south, showing surface geology and sample locations.



EXPLANATION

spl
Silicified phyllite

bpl
Black phyllite

gs
Greenstone

46
Quartz vein, showing dip

75
Contact, showing dip, dashed where inferred

65
Shear zone, showing dip

Shear zone, with quartz stringers

40
Foliation, showing dip

Open cut at portal

Lagging

30 29
Sample location

0 90
Scale, feet

Figure A-51.— Treasury Hill, Gold Knob Tunnel, showing geology and sample locations.

RESOURCE ESTIMATE:

This area has been prospected for many years as it has potential for vein stockwork type mineralization in altered greenstones. Surface and drill hole assays are not encouraging though. The 655-ft Gold Knob Tunnel did not appear to adequately test the greenstone as surface samples contained higher values than those obtained underground.

Overall, the low gold values in Bureau samples and poor drill hole results indicate that this property has a low mineral development potential for gold.

RECOMMENDATIONS:

None.

REFERENCES:

15, 16, 21, 24, 25, 26, 37, 38, 42, 44.

TABLE A-31. - ANALYTICAL RESULTS - Treasury Hill (see figs. A-48 through A-51)

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm				Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	
1.....	3226..	Rep. Chip.	1.4	<0.00015		10	9	11	<0.2	Altered greenstone.
2.....	3227..	Rand. Chip		.00015		57	14	68	<.2	Near sample site 3226
3.....	7192..	Cont. Chip	6.0	.0003		14	11	12	<.2	Quartz vein.
4.....	3225..	Cont. Chip	2.1	.0003		28	19	6	<.2	Quartz vein.
5.....	3224..	Cont. Chip		.00015		50	10	3	<.2	Quartz vein.
6.....	3271..	Cont. Chip	3.0	.0022		17	6	22	.2	Quartz vein, no sulfides seen.
7.....	3228..	Select....		.0004		30	35	15	<.2	Quartz vein.
8.....	3231..	Rand. Chip		.028		89	21	40	.3	From trench near cabin.
9.....	3229..	Rep. Chip.		.0125		189	46	69	.3	Vuggy quartz vein.
10.....	3230..	Grab.....		.013		53	20	13	.2	Dump material.
11.....	3322..	Select....		.545		208	103	91	1.0	Quartz concentrates from trench.
12.....	3320..	Select....		.185		4	125	5	1.2	Quartz float in stream bottom, 1-2% arsenopyrite.
13.....	3319..	Select....		.0033		11	8	15	<.2	Dump float.
14.....	3323..	Cont. Chip	1.2	.0074		5	6	5	<.2	Massive arsenopyrite clots.
15.....	3321..	Select....		.012		32	6	18	.3	Quartz float with arsenopyrite.
16.....	3210..	Grab.....		.044		3	10	4	<.2	Vuggy quartz with calcite.
17.....	3211..	Grab.....		.0006		23	12	12	.2	Vein width not totally exposed.
18.....	3215..	Rep. Chip.	5.0	.043		11	16	5	<.2	Trench float.
19.....	3213..	Cont. Chip	3.0	.025		226	9	105	.3	Shear zone, greenstone.
20.....	3214..	Cont. Chip		.013		135	9	56	<.2	Quartz vein.
21.....	3212..	Grab.....		.124		5	20	1	<.2	Quartz contains arsenopyrite.
22.....	3315..	Grab.....		.055		3	2	12	.5	Quartz rubble with manganese stain.
23.....	3316..	Cont. Chip		.0007		21	5	27	.2	Quartz vein, vuggy.
24.....	3317..	Rep. Chip.		.0045		4	2	4	.2	1% arsenopyrite.
25.....	3216..	Grab.....		.009		2	12	3	<.2	Dump float, quartz.
26.....	3318..	Select....		.067		3	10	2	.3	Up to 5% arsenopyrite.
27.....	3324..	Rand. Chip		.066		118	47	47	.2	Quartz.
28.....	3325..	Rand. Chip		.0074		204	11	27	<.2	Greenstone.
29.....	3326..	Spac. Chip	7.0	.001		107	14	93	<.2	Quartz stringers, phyllite.
30.....	7191	Spac. Chip	5.0	<.00015		64	14	68	<.2	Quartz/calcite with phyllite.

NAME(S): Dull and Stephens
Gold King

Map Location No. 33
MAS No. 1200101

LOCATION:

Deposit Type: Fissure vein.
Commodities: Au.

Quadrangle: Juneau B2 Sec: 14, 15 T: 40S R: 65E
Geographic: 1.0 mile NE of Spaulding Point, Auke Bay.
Elevation: 200-630 ft.

HISTORY:

PRODUCTION: 32 oz gold.

The Dull and Stephens prospect was discovered in 1908 by Tom Dull and Tim Stephens about one week prior to the discovery of Treasury Hill. Initial work on the property consisted of some open cuts and sluicing over the discovery. One newspaper account reports that Dull and Stephens recovered about 18 oz of gold from their first placer clean-up (25). Work continued on the claims until 1910 when William Ebner and M. F. Howe bonded the property for examination. Minimal work resulted from this lease, however.

The property was optioned to the Treadwell Company in 1917 and by this time about 1,000 ft of trenches and a 20-ft tunnel had been completed on the property. The Treadwell Company drove 2 tunnels totaling 500 ft of workings at the head of Waydelich Creek. By March of 1918, the property reverted back to the original group of claimholders who drove 2 additional tunnels, one next to Lake Creek and the other on lower Gold Knob. A high-grade pocket of ore was found near the tunnel on Lake Creek, and 14 oz of gold were recovered by panning in 1919. Very little occurred after this year until 1933, when John Berg, A. Zenger, and C. Tripp restaked the prospect. The Territorial Department of Mines examined the property in 1937 and after this effort the property has remained idle.

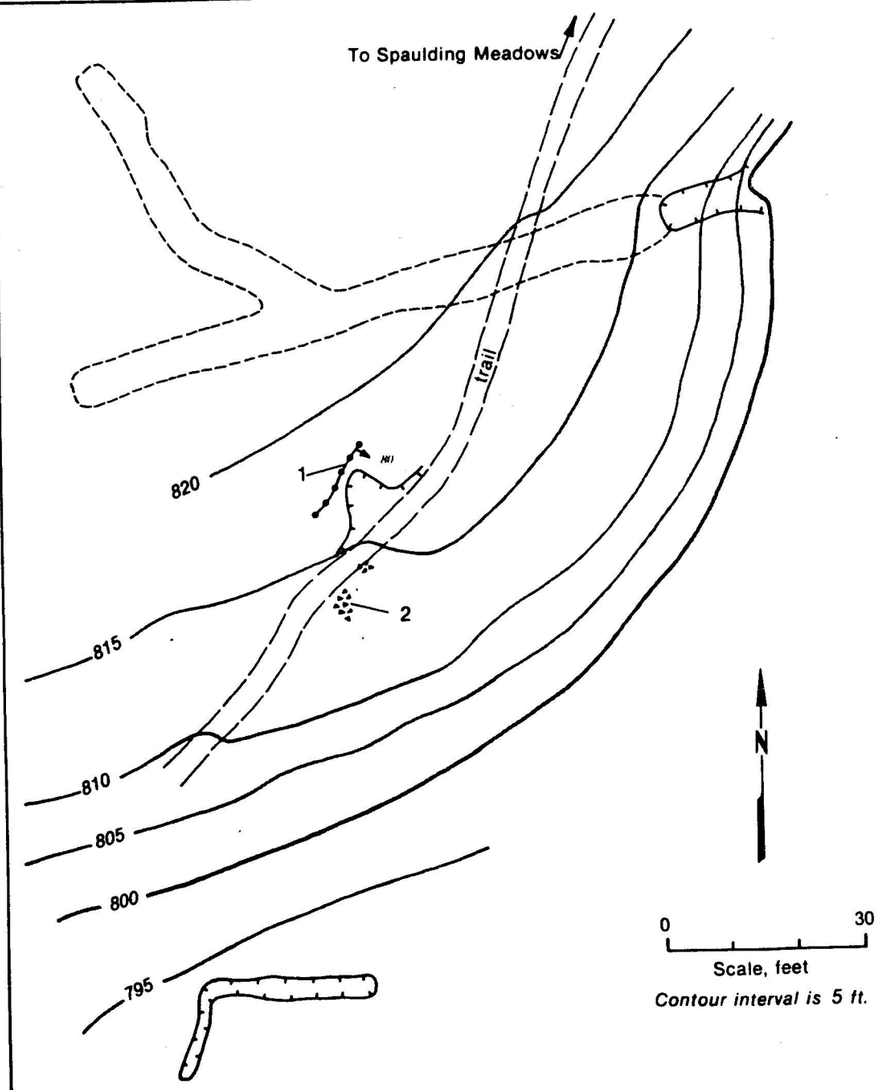
WORKINGS AND FACILITIES:

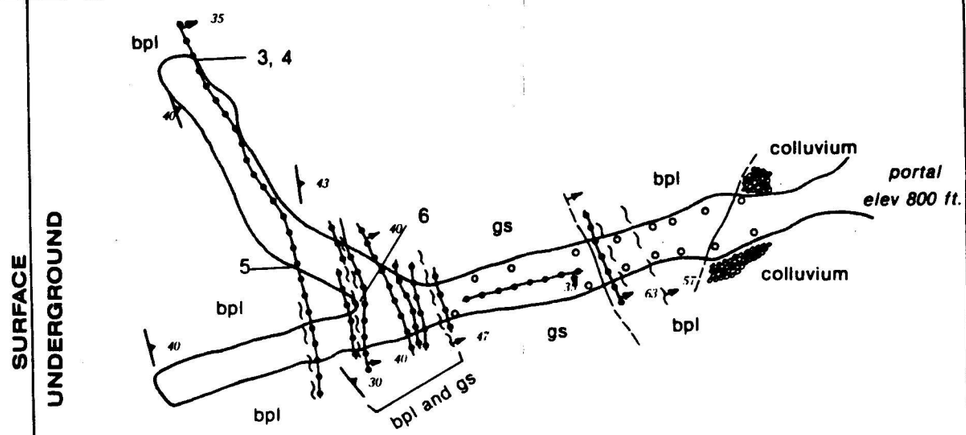
Four adits totalling 799 ft of workings and numerous trenches exist on the property.

GEOLOGIC SETTING:

Quartz veins occur along a phyllite/greenstone contact which trends N30°-70°W. Other veins exposed on the property occur entirely within the greenstone and trend N50°-60°E, and dip steeply north. Widths vary from a few inches to 3-ft and a branching vein averaging 6-in wide was followed underground for 80 ft along strike in adit No. 2 (fig. A-53). Vein widths here are irregular, ranging from 4 to 14 in. Northwest trending faults offset the quartz veins a few inches.

An adit at the southeast end of the property (fig. A-54) drifts along a quartz vein located along the contact between greenstone and phyllite. The vein walls contain sericite and fuchsite and sulfides consist of minor arsenopyrite and pyrite. Phyllite and greenstone partings occur within the vein. The vein terminates against the hanging wall side of a fault with a felsic dike on the footwall side. The dike is in contact with greenstone on its footwall side.





EXPLANATION

- bpl — Black phyllite
- gs — Greenstone
- Quartz vein, showing dip
- Contact, showing dip, dashed where inferred
- Shear zone, showing dip
- Quartz float
- Foliation, showing dip
- Open cut at portal
- Trench
- Projection of underground workings
- Lagging
- 3 — Sample location

Figure A-52.— Dull and Stephens, Lower Gold Knob Adit, showing geology and sample locations.

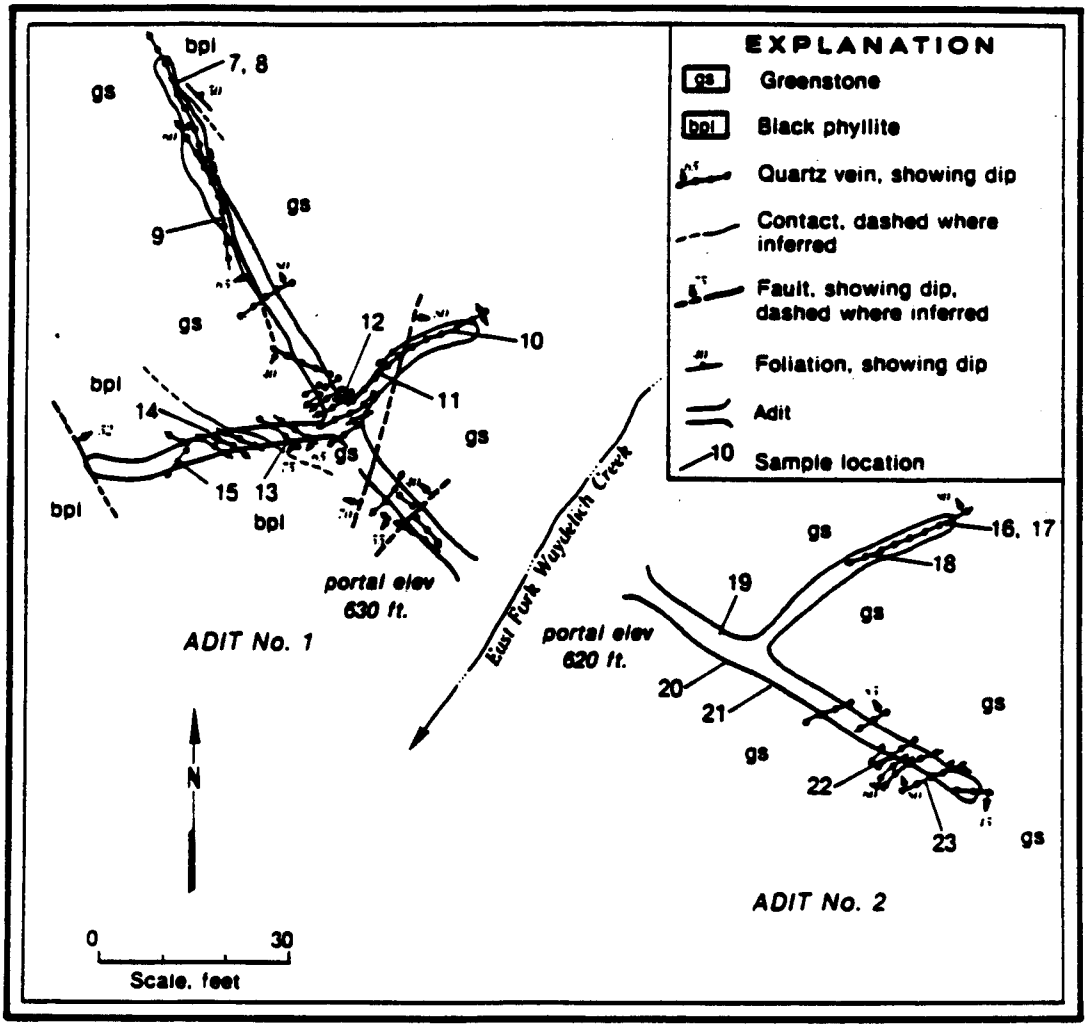


Figure A-53.— Dull and Stephens, Waydelich Creek adits, showing geology and sample locations.

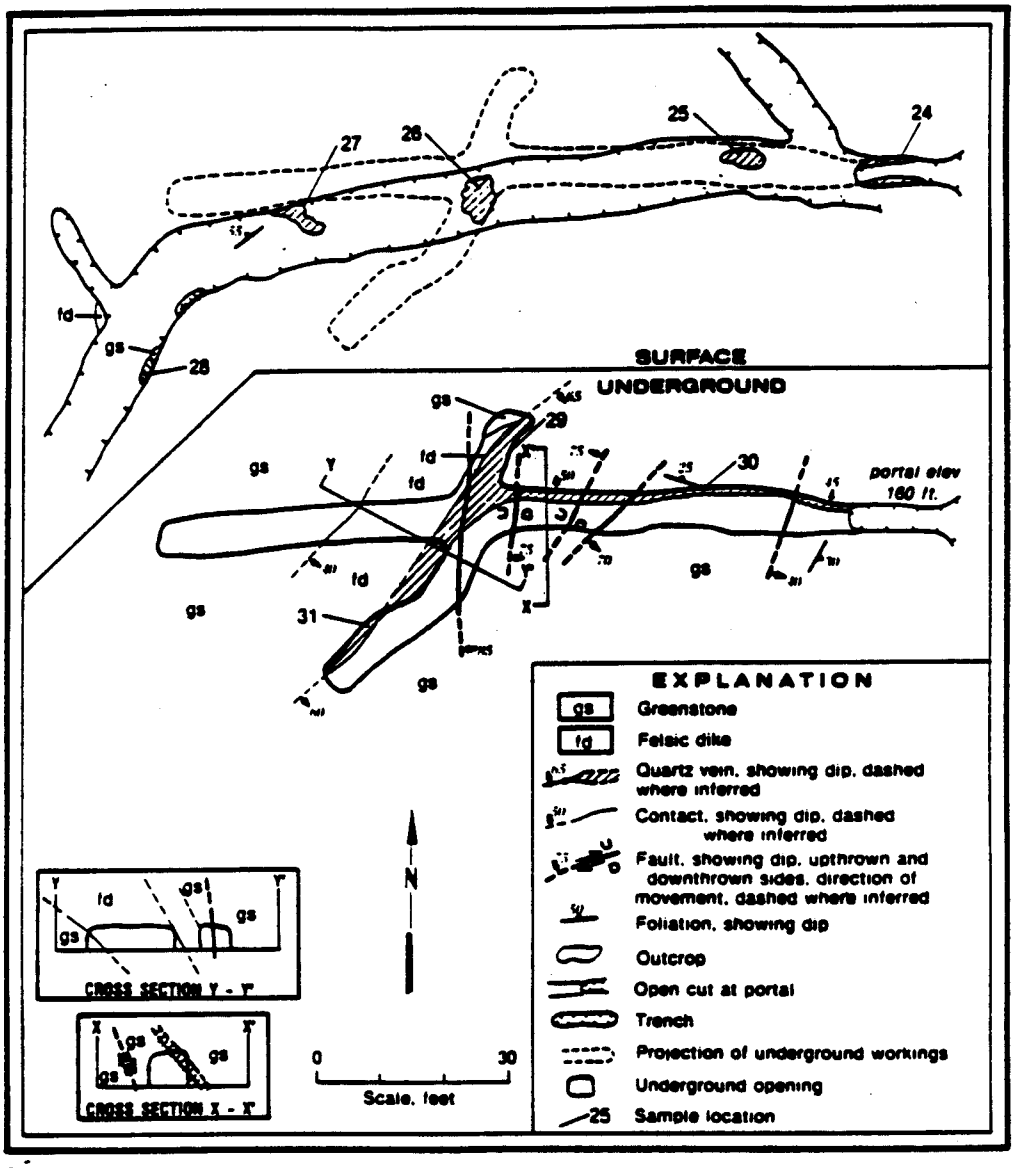


Figure A-54.— Dull and Stephens, Adit No. 4, showing geology and sample locations.

BUREAU INVESTIGATION:

The Bureau mapped and sampled all the located workings. Of the 31 samples taken on the property, 2 were noteworthy. A sample (No. 14, fig. A-53) from a 3.0-ft wide quartz vein cutting phyllites contained 0.094 oz/ton gold (table A-32). Another sample from a 1.0-ft wide vein contained 0.095 oz/ton gold (No. 15, fig. A-53).

RESOURCE ESTIMATE:

The low gold values and low tonnage give this property a low mineral development potential.

RECOMMENDATIONS:

None.

REFERENCES:

15, 16, 24, 25, 26, 27, 38.

TABLE A-32. - ANALYTICAL RESULTS - Dull and Stephens (see figs. A-48, A-52 through A-54)

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm					Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	As	
1.....	3241..	Rand. Chip		0.0003		<1	15	5	<0.2		Quartz vein.
2.....	7197..	Grab.....		.0003		4	6	3	<.2		Quartz float boulders.
3.....	7194..	Cont. Chip	1.1	.027		50	33	39	<.2		Quartz veins, brecciated.
4.....	7195..	Cont. Chip	2.0	.043		146	15	89	<.2		Quartz stringer zone, pyrite.
5.....	7193..	Cont. Chip	1.6	.094		26	13	35	.2		Quartz vein, coarse arsenopyrite.
6.....	7196..	Cont. Chip	3.0	.039		156	35	65	<.2		Quartz stringers, pyrrhotite.
7.....	7281..	Cont. Chip	3.0	.071		77	12	56	.4		Pyrite clots on vein margins.
8.....	7282..	Cont. Chip	0.8	.022		85	10	92	.3		Vein margins, minor pyrite.
9.....	7283..	Cont. Chip	1.9	.003		44	5	21	<.2		Quartz vein on fault margin.
10.....	7279..	Cont. Chip	.6	.016		61	20	41	<.2		Up to 10% arsenopyrite.
11.....	7280..	Cont. Chip	2.1	.029		21	5	26	<.2		Quartz, no sulfides.
12.....	3199..	Chip Channel.	1.1	.005		17	6	6	.2		Minor pyrite blebs.
13.....	7284..	Cont. Chip	.9	.002		27	7	29	<.2		Pyrite clots.
14.....	7285..	Cont. Chip	3.0	.094		109	153	19	.7		Quartz vein, minor pyrite.
15.....	3198..	Chip Channel.	1.0	.095		57	26	60	1.7		Minor pyrite, arsenopyrite.
16.....	3194..	Chip Channel..	1.0	.002		19	13	15	.2		Trace pyrite. Most sulfide in vein selvage.
17.....	3195..	Rand. Chip	1.0	.001		109	7	107	<.2		Wallrocks on vein margins.
18.....	3193..	Rep. Chip.	4.0	.082		15	13	18	.2		Trace pyrite.
19.....	3190..	Chip Channel..	1.5	.024		98	12	75	.2		Milky quartz with pyrite blebs.
20.....	3191..	Rep. Chip.	1.0	.051		10	68	10	.6		Vein, ankerite and calcite.
21.....	3192..	Rep. Chip.	1.3	.077		12	6	12	.4		Trace arsenopyrite, pyrite.
22.....	3196..	Select....		.002		16	15	31	<.2		Calcite veins with minor quartz.
23.....	3197..	Chip Channel	.9	.001		22	3	16	<.2		Trace pyrite.
24.....	6327..	Cont. Chip	2.5	<.002		10	84	23	.3	>1000	1.5-2% pyrite/arsenopyrite, phyllite partings.
25.....	6068..	Cont. Chip	2.0	.008		26	35	24	.3	800	3% pyrite/arsenopyrite sericite.
26.....	6340..	Select....		<.002		3	5	4	<.2	61	Barren quartz.
27.....	6339..	Select....		.002		2	8	4	<.2	90	Barren quartz.

TABLE A-32. - ANALYTICAL RESULTS - Dull and Stephens - Continued

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm					Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	As	
28.....	6338..	Rep. Chip.	2.0	0.005		22	42	17	0.4	130	Quartz with trace pyrite.
29.....	6329..	Select....		<.002		2	4	8	<.2	148	Sericitic alteration.
30.....	6331..	Cont. Chip		.003		43	14	53	<.2	>1000	Quartz with greenstone.
31.....	6330..	Select....		.002		9	10	21	<.2	175	Taken across contact with dike.

NAME(S): Mendenhall
Iron Chief
Ashby & Jones

Map Location No. 34
MAS No. 21120102

LOCATION:

Deposit Type: Stringer vein.
Commodities: Au.

Quadrangle: Juneau B2 SE 1/4 Sec: 1 T: 40S R: 65E
Geographic: 0.2 miles east of Mendenhall Lake.
Elevation: 290-295 ft.

HISTORY:

PRODUCTION: None.

The development and history of the Mendenhall is not entirely clear. Adam Reidlinger showed an interest in the property after locating the McGinnis Creek properties in 1897. Knopf made a visit to the area in 1909 and 1910, and in his 1912 report (16) states that development on the property consisted of an open cut 30-ft wide and a crosscut tunnel 85-ft long that cuts an outcrop 30 ft below ground. Our current assessment of the property shows that an additional adit had been driven for 25 ft. It is not known when this working was developed.

WORKINGS AND FACILITIES:

A 90-ft adit located at 290 feet elevation, a 25-ft adit located at 295 feet elevation, a 30-ft trench and several open cuts are present on the property.

GEOLOGIC SETTING:

A series of N20°-40°W-trending quartz veins and shear zones containing quartz stringers are exposed in the workings. Individual quartz veins are up to 3-ft wide and extend for 55 ft along strike. Quartz stringer zones are up to 5-ft wide. Wallrocks consist of phyllites which host the concordant quartz veins. A massive amphibolite dike is reported in the area and reports state that free gold could be panned from it (16). This dike was not located by the Bureau.

BUREAU INVESTIGATION:

The workings were mapped and sampled (fig. A-55 and table A-33). Gold values were very low, averaging 0.002 oz/ton gold, but one sample (No. 6) assayed 0.013 oz/ton gold.

Two reconnaissance samples (Nos. 1 and 2, inset-fig. A-55) were taken from mineralized quartz veins located northeast of the workings near the glacier. Both of these samples contain low amounts of gold.

RESOURCE ESTIMATE:

The low gold values give this prospect a low mineral production potential.

RECOMMENDATIONS:

None.

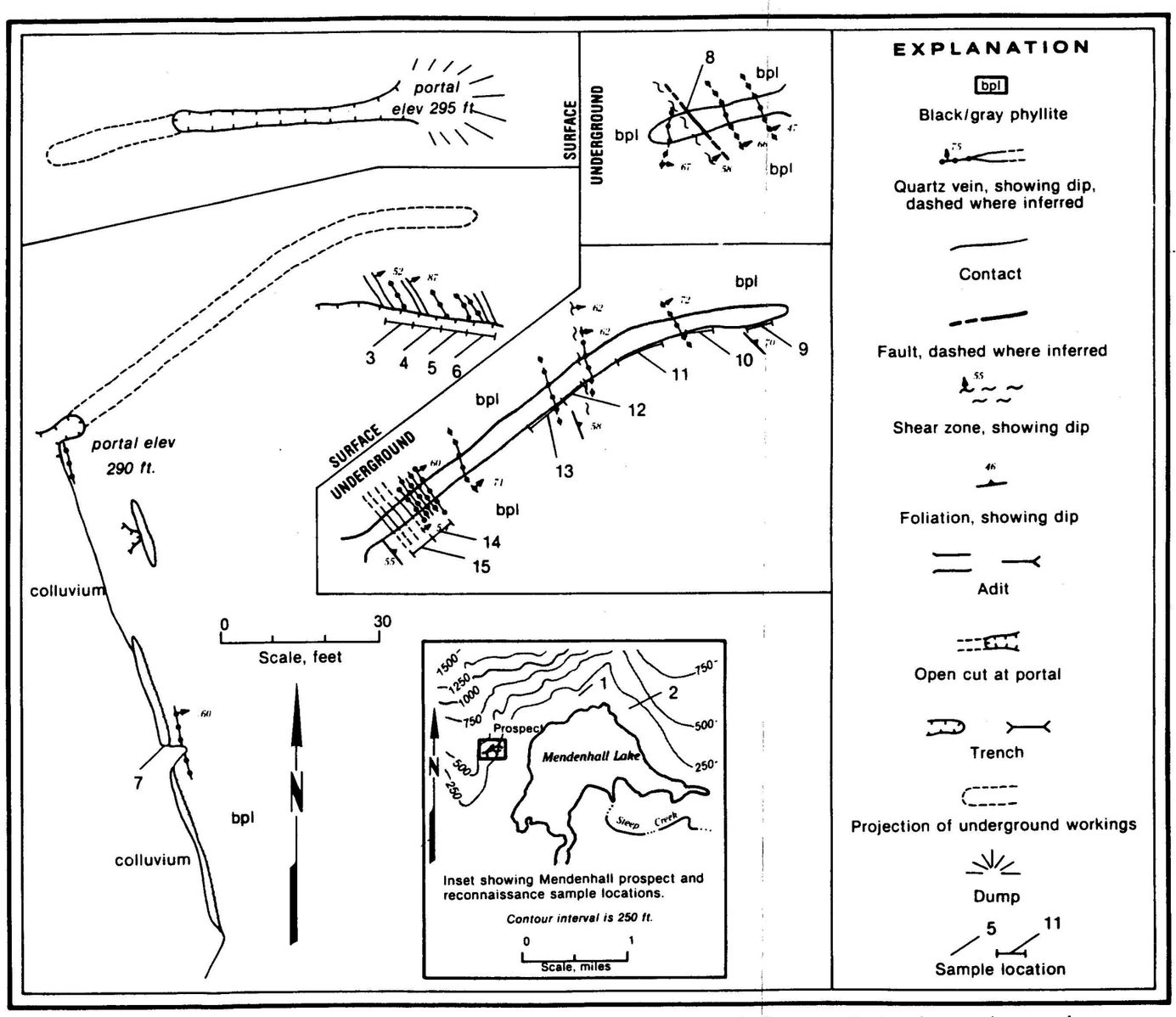


Figure A-55.— Mendenhall prospect, showing geology and sample locations.

REFERENCES:

16, 24, 25, 26, 27.

TABLE A-33. - ANALYTICAL RESULTS - Mendenhall (see fig. A-55)

Map No.	Sample	Type	Sample Length	Oz/ton Fire Assay		Ppm					Description
			Ft	Au	Ag	Cu	Pb	Zn	Ag	As	
1.....	6064..	Select....		0.008		33	12	130	0.2	600	Quartz vein near glacier.
2.....	7402..	Rep. Chip.	5.0	<.002		23	<2	16	<0.2	19	Quartz vein.
3.....	4020..	Cont. Chip	5.0	<.002		47	30	60	0.3	>1000	Gray phyllite and quartz.
4.....	4019..	Cont. Chip	5.0	<.002		37	22	54	0.2	300	Gray phyllite and quartz.
5.....	4018..	Cont. Chip	5.0	<.002		39	9	60	0.2	>1000	Gray phyllite and quartz.
6.....	4017..	Cont. Chip	5.0	<.002		22	65	63	0.3	>1000	Gray phyllite and quartz.
7.....	4043..	Cont. Chip	3.0	.005		31	36	34	0.2		Quartz vein.
8.....	4016..	Cont. Chip	2.3	<.002		101	11	71	<0.2	54	Gray phyllite and quartz.
9.....	4023..	Cont. Chip	5.0	<.002		53	16	40	<0.2	110	Gray phyllite and quartz.
10.....	4143..	Spaced Chip.	8.0	<.002		41	12	81	0.4		Silicified phyllite, minor pyrrhotite/arsenopyrite.
11.....	4144..	Spaced Chip.	10.0	.013		40	26	60	0.4		Silicified phyllite, minor pyrrhotite/arsenopyrite.
12.....	4042..	Cont. Chip	5.0	.003		37	29	55	0.4		Phyllite with quartz stringers.
13.....	4041..	Spaced Chip.	8.0	.002		17	2	59	0.2		Phyllite with quartz stringers.
14.....	4022..	Cont. Chip	6.0	<.002		37	17	70	<0.2	800	Gray phyllite and quartz.
15.....	4021..	Cont. Chip	5.0	<.002		29	102	61	0.4	1000	Gray phyllite and quartz.

NAME(S): Winn

Map Location No. 35
MAS No. 2I120107

LOCATION:

Deposit Type: Vein.
Commodities: Au.

Quadrangle: Juneau B2 NE 1/4 Sec: 26 T: 40S R: 65E
Geographic: 0.3 miles southeast of the Auke Lake outlet.
Elevation: 175-220 ft.

HISTORY:

Production: None.

The Winn was located in 1882, making it one of the oldest lode discoveries in the Eagle River area. There is a large gap in the records for this prospect and the next recorded event occurred in 1909 when Colonel Winn and his son John began working 10 men on their claims. By the time Knopf visited the prospect in 1909 and 1910, a 20-ft adit existed on the property. Little else is known about the property. A questionable production figure of 290 oz of gold and 102 oz of silver has been attributed to this prospect for 1924 work. No other reports substantiate this production and it is here noted that production attributed to this prospect in the Bureau's 1985 preliminary report (26) is incorrect.

WORKINGS AND FACILITIES:

A partially caved adit reported to be 20-ft long and several trenches occur on the property.

GEOLOGIC SETTING:

The poor physical condition of the trenches and adit make bedrock examination difficult so Knopf's geologic description will be used here (16):

> "The ore consists of dike rock irregularly cut by veinlets of quartz, albite, and ferriferous carbonate. In the vicinity of these stringers the rock is much impregnated with cubical pyrite and arsenopyrite and contains much albite and carbonate, which on weathering imparts a strong red color to the ore. The most unaltered-looking rock is found under the microscope to consist of carbonate, albite, chlorite, muscovite, pyrite, and accessory apatite which is fairly abundant in characteristic jointed prisms. On account of the great abundance of albite in the veinlets and dike as a whole, it is believed that the dike originally consists of albite diorite, like that on Salmon Creek and at the Boston mine, Juneau.
>
> The extension of this dike apparently outcrops at the outlet of Auke Lake, about 2,000 ft northwest of the tunnel. It is soft, rotten, and ocherous. The exposure here shows that green augite melaphyres, somewhat schistose, form the footwall of the dike."

BUREAU INVESTIGATION:

The Bureau mapped and sampled the albite diorite exposed in a trench wall and the greenstones. The underground workings were not accessible so quartz float from the adit and trenches was sampled (fig. A-56 and table A-34). No bedrock was exposed outside the immediate vicinity of the workings. None of the samples contain appreciable amounts of gold.

RESOURCE ESTIMATE:

The low gold values in the Bureau samples give the prospect a low mineral production potential.

RECOMMENDATIONS:

Reopen caved adit and resample underground workings. Search for other workings in area.

REFERENCES:

16, 24, 25.

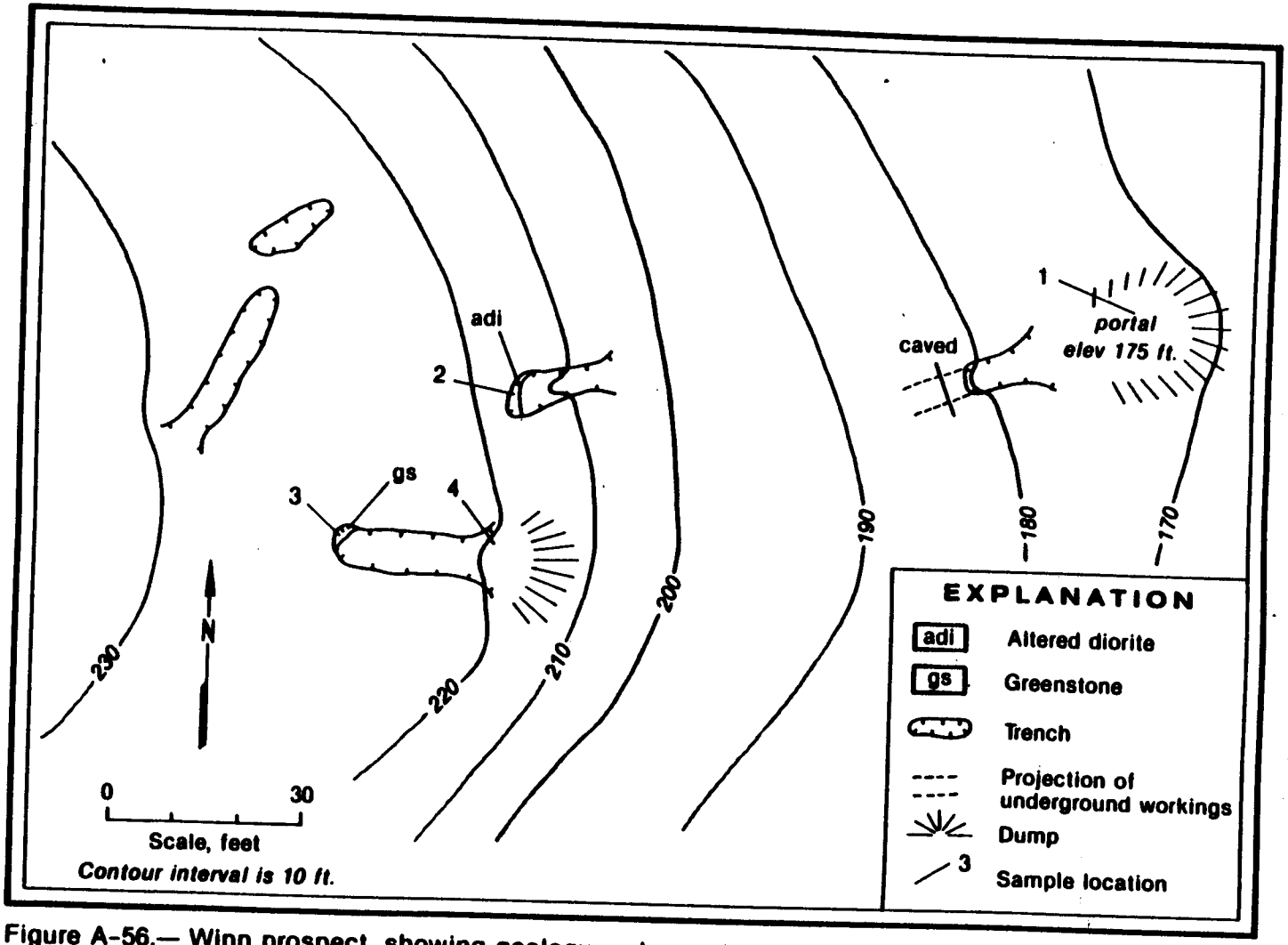


Figure A-56.— Winn prospect, showing geology and sample locations.

TABLE A-34. - ANALYTICAL RESULTS - Winn (see fig. A-56)

Map No.	Sample	Type	Sample Length Ft	Oz/ton Fire Assay Au	Oz/ton Fire Assay Ag	Ppm Cu	Ppm Pb	Ppm Zn	Ppm Ag	Ppm As	Description
1.....	6326..	Rand. Chip		<0.002		174	7	92	<0.2	85	Greenstone slump block.
2.....	7399..	Select....		<.002		5	2	8	<.2	150	Barren vein quartz float.
3.....	6325..	Rand. Chip		.002		14	5	28	<.2	95	Albite diorite bedrock.
4.....	7368..	Select....		.002		15	25	28	.2	160	Iron-stained, vuggy albite diorite. Adit dump.

APPENDIX B

NUMERICAL LISTING OF MINES, PROSPECTS, AND MINERAL OCCURRENCES

APPENDIX B. - Numerical listing of mines, prospects, and occurrences

Map No. see fig. 9	Name	Production oz Au	Mineralization Type	Associated Sulfides	Host Rocks	Mineral Development Potential
1.....	Berners Bay.....		?	?	?	Unknown
2.....	Tacoma.....		Fissure and stringer vein.	Pyrite, galena, sphalerite.	Phyllite.	Low
3.....	Echo Cove.....		Lode and placer.	Pyrrhotite, chalcopyrite.	Greenstone.	Low
4.....	California/Gold Standard		Fissure and stringer vein.	Pyrite, arsenopyrite, galena.	Phyllite, schist.	Moderate
5.....	Blue Jay.....		Stringer vein.	Pyrite.	Phyllite.	Low
6.....	Joyce Jensen.....		Fissure and stringer vein.	Pyrite.	Black phyllite.	Low
7.....	Maude S.....		Stringer and fissure vein.	Pyrrhotite, arsenopyrite.	Black phyllite.	Low
8.....	Black Chief.....		Stringer vein.	Pyrite, arsenopyrite.	Phyllite, graphitic schist.	Low
9.....	E Pluribus Unum.....	154	Stringer and fissure vein.	Arsenopyrite, pyrite, chalcopyrite.	Phyllite, graphitic schist.	Moderate
10.....	Julia Group.....		Stringer and fissure vein.	Pyrite, arsenopyrite, galena.	Black phyllite, graphitic schist.	Moderate
11.....	Dividend.....		Stringer vein.	Pyrite, arsenopyrite, galena.	Phyllite, graphitic schist.	Low
12.....	Rex Mine area.....	145	Vein, stringer vein.	Arsenopyrite, pyrite.	Black phyllite, felsic phyllite.	Low
13.....	Aurora Borealis.....	290	Fissure vein.	Pyrite, arsenopyrite.	Black phyllite.	Moderate
14.....	Bessie Mine.....	*	Fissure vein.	Pyrite, aresneopyrite, galena.	Greenstone conglomerate.	Moderate
15.....	Alaska Washington.....		Fissure vein.	Pyrite, arsenopyrite.	Greenstone conglomerate.	Low
16.....	Mother Lode.....		Fissure vein.	Pyrite, arsenopyrite.	Greenstone conglomerate.	Low
17.....	Eagle Glacier recon.....		Fissure vein.	Pyrite, pyrrhotite,	Diorite gneiss.	Low
18.....	Eagle River Mine.....	19,451	Stringer vein.	Pyrite, pyrrhotite, galena.	Phyllite, greywacke.	Moderate

* Production combined with Aurora Borealis figure.

APPENDIX B. - Numerical listing of mines, prospects, and occurrences - Continued

Map No. see fig. 9	Name	Production oz Au	Mineralization Type	Associated Sulfides	Host Rocks	Mineral Development Potential
19.....	Oleson.....		Stringer veins.	Arsenopyrite.	Slate and greenstone.	Unknown
20.....	Mitchell-McPherson.....		Fissure vein.	Pyrite, galena.	Diorite gneiss.	Unevaluated
21.....	Herbert Glacier.....		Fissure vein.	Galena, arsenopyrite, pyrite, sphalerite.	Gneissic diorite.	High
22.....	Herbert Group.....		Fissure, stringer vein.	Arsenopyrite.	Greenstone, greenschist.	Low
23.....	Summit/St. Louis.....		Fissure vein.	Arsenopyrite.	Gneissic diorite.	Moderate
24.....	Windfall Creek.....	249	Placer deposit.		Black phyllite, greenstone, greenschist.	Moderate
25.....	Smith & Heid.....	205	Stringer and fissure vein.	Arsenopyrite, pyrite, galena, sphalerite, chalcopyrite.	Black, felsic phyllite, graphitic schist	Moderate
26.....	Montana Basin.....		Fissure vein.	Pyrite.	Biotite schist, phyllite.	Moderate
27.....	Montana Basin.Placer....	?	Placer deposit.		Phyllite, biotite schist.	High
28.....	Montana Creek.....	46	Placer deposit.		Black phyllite, greenstone.	Moderate
29.....	McGinnis Creek.....	3	Placer deposit.		Black phyllite, biotite schist.	Moderate
30.....	Peterson.....	211	Fissure veins.	Arsenopyrite.	Phyllite, greenstone.	Moderate
31.....	Mendenhall Glacier.....		Volcanogenic massive sulfide, fissure vein.	Pyrrhotite, chalcopyrite.	Greenstone, amphibolite.	Low
32.....	Treasury Hill.....	302	Fissure vein.	Arsenopyrite, pyrite.	Greenstone, dike.	Low
33.....	Dull and Stephens.....	32	Fissure vein.	Pyrite, arsenopyrite.	Phyllite, greenstone	Low
34.....	Mendenhall.....		Stringer vein.	Pyrrhotite, arsenopyrite.	Phyllite.	Low
35.....	Winn.....		Stringer vein.,	Pyrite, arsenopyrite.	Altered diorite.	Low