DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-1380-C
PAMPHLET ACCOMPANIES MAP

Base from U.S. Geological Survey, 1:100,000
Skykomish River, 1973; Sauk River, 1978

SCALE 1:50 000

Geology generalized from Tabor and others, 1982b

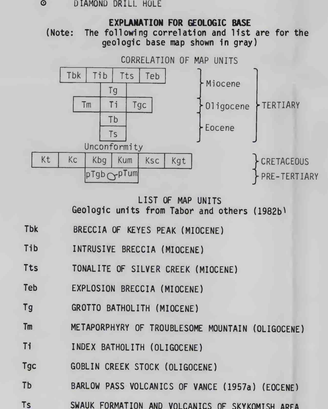
EXPLANATION OF RESOURCE POTENTIAL

- 68 PROPERTY HAVING IDENTIFIED MINERAL RESOURCES OR POSSIBLE UNDISCOVERED RESOURCES--See accompanying list of mines and prospects for name of property
- BOUNDARY OF GEOLOGIC TERRANE HAVING HIGH POTENTIAL FOR MINERAL RESOURCES
- BOUNDARY OF GEOLOGIC TERRANE HAVING MODERATE POTENTIAL FOR MINERAL RESOURCES
- BOUNDARY OF ZONE OF HIGH POTENTIAL FOR PORPHYRY-COPPER DEPOSITS
- BOUNDARY OF ZONE OF PROVEN RESERVES FOR BASE AND PRECIOUS METALS
- BOUNDARY OF MINING DISTRICT
- SYMBOL INDICATES RESOURCES OR POSSIBLE UNDISCOVERED RESOURCES FOR THAT COMMODITY
  - Au--gold
  - Ag--silver
  - Cu--copper
  - Pb--lead
  - Zn--zinc
- ADIT
- CAVED ADIT
- SHAFT
- PROSPECT PIT, TRENCH, OR OPENCUT
- CLAIM--No workings
- DIAMOND DRILL HOLE

EXPLANATION FOR GEOLOGIC BASE

(Note: The following correlation and list are for the geologic base map shown in gray)

CORRELATION OF MAP UNITS



LIST OF MAP UNITS

Geologic units from Tabor and others (1982b)

- Tbk BRECCIA OF KEYES PEAK (MIOCENE)
- Ttb INTRUSIVE BRECCIA (MIOCENE)
- Tts TONALITE OF SILVER CREEK (MIOCENE)
- Teb EXPLOSION BRECCIA (MIOCENE)
- Tg GROTTO BATHOLITH (MIOCENE)
- Tm METAPORPHYRY OF TROUBLESOME MOUNTAIN (OLIGOCENE)
- Tl INDEX BATHOLITH (OLIGOCENE)
- Tgc GOBLIN CREEK STOCK (OLIGOCENE)
- Tb BARLOW PASS VOLCANICS OF VANCE (1957a) (EOCENE)
- Ts SWAUK FORMATION AND VOLCANICS OF SKYKOMISH AREA (EOCENE)
- Kt DARRINGTON PHYLLITE OF MISCH (1966) AND TONGA FORMATION OF YEATS (1958) (CRETACEOUS)
- Kc CHIWAUKUM SCHIST (CRETACEOUS)
- Kbg BANDED GNEISS (CRETACEOUS)
- Kum ULTRAMAFIC ROCK (CRETACEOUS)
- Ksc SLOAN CREEK PLUTON (CRETACEOUS)
- Kgt GNEISSIC TONALITE OF EXCELSIOR MOUNTAIN (CRETACEOUS)
- pTgb GUNN PEAK AND BARCLAY CREEK FORMATIONS OF YEATS (1964) (PRE-TERTIARY)
- pTum MIGMATITIC GNEISS AND ASSOCIATED ULTRAMAFIC ROCKS (PRE-TERTIARY)

CONTACT--Dashed where covered; dotted where uncertain

FAULT--Bar and ball on downthrown side; dashed where approximately located; dotted where concealed

STUDIES RELATED TO WILDERNESS

The Wilderness Act (Public Law 88-577, September 3, 1964) and related acts require the U.S. Geological Survey and the U.S. Bureau of Mines to survey certain areas on Federal lands to determine their mineral resource potential. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a mineral survey of the Glacier Peak Roadless Area (L6031) in the Mount Baker-Snoqualmie National Forest, Snohomish County, Wash. The Glacier Peak Roadless Area was classified as a further planning area during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979.

MINERAL RESOURCE POTENTIAL SUMMARY STATEMENT

A multidisciplinary team of geoscientists from the U.S. Geological Survey and the U.S. Bureau of Mines has evaluated the potential for the occurrence of mineral resources in the Glacier Peak Roadless Area. The area includes all or parts of four mining districts; past production records are poor, but an estimated 200,000 tons of high-grade gold-silver-copper-lead-zinc ore was produced from sulfide veins at the turn of the century. Forty-seven million tons of restricted marginal reserves and 6 million tons of subeconomic resources have been identified at 16 properties in the Glacier Peak Roadless Area. The reserves are classified as "restricted marginal" because of current environmental regulations on the production and disposal of arsenic-bearing materials. New ore-processing methods currently under development, however, may make these marginal reserves economically viable.

The sulfide veins are distributed along shears and joints in a northeast-trending zone, mostly where it intersects north-trending tonalite intrusions presumed to have intruded along the trace of the Straight Creek fault. Geologic and geochemical data indicate a high potential for the occurrence of base- and precious-metal resources for much of the belt; a moderate potential, however, is assigned to this trend in the Goat Lake mining district.

Geologic and geochemical data suggest a porphyry-copper deposit near the headwaters of Silver Creek. Examination of mines and drill hole data indicate a resource of 110 million tons of disseminated copper sulfide ranging from 0.14-0.37 percent copper with gold as a coproduct in a volcanic porphyry deposit. Geologic data suggest that this deposit extends into the Troublesome Creek mining district within the Glacier Peak Roadless Area. The area at the headwaters of Silver Creek has high potential for the occurrence of base metals in a disseminated porphyry-copper deposit. Further drilling will be needed to define this deposit.

INTRODUCTION

The Glacier Peak Roadless Area, in Mount Baker-Snoqualmie National Forest, in Snohomish County, is near, but not quite contiguous with the Glacier Peak Wilderness. The Eagle Rock Roadless Area lies just to the south. The 57,020 acres (89.5 mi²) of the Glacier Peak Roadless Area include very rugged mountainous terrain north of the North Fork of the Skykomish River and between the North and South Forks of the Sauk River. Relief is great; elevations range from about 1600 feet near the confluence of the North and South Forks of the Sauk River to about 7800 feet at the summit of Glacier Peak. Located on the west side of the Cascade crest, the area receives heavy precipitation. Glacier-clad peaks rise abruptly 4000-4500 feet above the site of the old mining towns of Monte Cristo. Roads from Monte Cristo, more or less in the center of the area, lead 35 mi west over Barlow Pass to Granite Falls and 30 mi north down the Sauk River to Darrington.

Present and previous studies

This report summarizes studies by the U.S. Geological Survey and the U.S. Bureau of Mines, designed to evaluate the mineral potential of the Glacier Peak Roadless Area. Investigations by the U.S. Geological Survey included geologic mapping (Tabor and others, 1982b), geochemical reconnaissance (Church and others, 1983) and aeromagnetic surveys (Flanigan and others, in press) conducted from 1978-1982. We also briefly studied the terrain in drainages having geochemical anomalies, and sampled altered zones identified during the geologic mapping (Church and others, 1983). We also detailed investigations by the U.S. Bureau of Mines of the mining activity, production, and field studies of mines and prospects were made during the 1976-1981 field seasons (Johnson and others, 1983). We examined 162 underground and 43 surface workings, and collected and analyzed samples from the mine workings, stockpiles, and dumps. Complete sample analyses are on file at the U.S. Bureau of Mines, Western Field Operations Center, Spokane, Wash.

In addition to this study, the U.S. Bureau of Mines examined many of the mines and prospects in the Silver Creek mining district (Huntting and others, 1943 and Schalagel, 1962). J. E. Spurr (1901) of the U.S. Geological Survey examined the Monte Cristo mining district.

GEOLOGY

The Glacier Peak Roadless Area is roughly divided into two geologic terranes by the north-trending Straight Creek fault, a high-angle fault. Northwest structure which may have had considerable strike-slip movement prior to the last episode of uplift (Faul1 1981). The fault separates the low-grade, metamorphic Darrington Phyllite of Misch (1966) on the west, from higher grade metamorphic rocks of the North Cascades crystalline core, mostly the metamorphosed rocks of the Chiwaukum Schist, banded gneiss derived from the schist, and granitic Sloan Creek plutons to the east.

Through most of the roadless area, the Straight Creek fault zone has been intruded by tonalite and granodiorite of the Miocene Grotto batholith (25 m.y. old), which contains the major high-grade metamorphic rocks on the east from relatively unmetamorphosed marine sandstone, shale, basalt, and chert as well as ultramafic rocks of the Easton high-angle wedge belt, on the west. The constituents of the melange range in age from Permian to Triassic and possibly Jurassic (Tabor and others, 1982a; 1982b). The melange is overlain by strongly folded fluviatile, feldspathic sandstone of the Swauk Formation, the principal host for the sulfide vein-type mineralization in the Silver Creek mining district.

The melange rocks, the Swauk Formation, the Darrington Phyllite, and the metamorphic rocks east of the Straight Creek fault are all intruded unconformably by the Barlow Pass volcanic rocks of Vance (1957b). In the roadless area the volcanic rocks are highly altered and locally recrystallized to hornfels by the Tertiary plutons. In the Monte Cristo mining district, Barlow Pass volcanic rocks are a principal host for the ores.

The youngest tonalite intrusions crop out in the upper reaches of Silver Creek. The small tonalite intrusions are part of a linear array of small stocks and plugs extending northeastward to the 23 m.y. old Cloudy Pass batholith on the Glacier Peak Wilderness. This linear array is also reflected in geochemical anomalies and is more or less coincident with the northeast trending Glacier Peak transverse structural belt of Grant (1969, p. 40-41).

Mineral resources in the roadless area occur in northeast-trending quartz vein-type and shear zones associated with the tonalitic intrusions. Mineral deposits may be controlled by the intersection of the northwest-trending Straight Creek fault system with the Glacier Peak transverse structural belt. The structural belt is characterized by an en echelon, northeast-trending zone of the Glacier Peak system traceable from the west edge of the Index mining district, located south of the roadless area, into the Glacier Peak Wilderness.

GEOCHEMISTRY

We divided geochemical investigations of the roadless area into three parts, each having a specific objective: (1) bedrock geochemistry, (2) stream-sediment geochemistry, and (3) analysis and investigation of altered zones indicated by geologic studies, mining activity, and geochemical reconnaissance of drainage basins. Analytical results from the bedrock geochemical studies (Church and others, 1983) define the background and threshold values for the rock units; Church and others (in press) present a geologic interpretation of the geochemical reconnaissance studies of the Glacier Peak Roadless Area.

We collected 148 stream-sediment samples from the roadless area in conjunction with the geologic mapping. Sampled stream basins had areas as large as 3 mi². In addition, we collected 40 heavy-mineral concentrates panned from stream sediments from larger, second-order drainage basins. All analytical results (Church and others, 1982) were obtained using direct-current emission spectrography (Grimes and Marranzino, 1968). Numerous geochemical anomalies occur in the roadless area (Church and others, in press); anomalies are large, many exceeding ten times the value defined for the threshold value from the bedrock geochemistry, and are typical of the precious-metal and base-metal suites of both porphyry and associated hydrothermal vein deposits (Pilcher and McDougall, 1976; Chaffee, 1982; Berger and Eimon, 1983), and reflect the mineralogy of the veins found in the Monte Cristo and Silver Creek mining districts.

GEOPHYSICS

Magnetic data from the roadless area were examined in conjunction with a aeromagnetic survey of the Glacier Peak Wilderness (Flanigan and others, in press). The data were compiled from several aeromagnetic surveys; flight directions for the aeromagnetic surveys were generally northeast-southwest, transverse to the regional structure. No diagnostic magnetic signature could be discerned when compared with the distribution of known deposits in the roadless area except that a magnetic low may be associated with the northeast-trending "Glacier Peak" belt containing the major mineralization (fig. 2).

MINING DISTRICTS AND MINERALIZATION

Exploration in the Glacier Peak Roadless Area began in the 1870's in the Silver Creek mining district and spread to the Monte Cristo mining district in 1889. Nearly all ore production has been from polymineralic sulfide-bearing quartz veins of the Monte Cristo mining district. Mining activity was greatest during the late 1800's and early 1900's. Exploration activity in the Goat Lake and Troublesome Creek mining districts has been moderate, but there is no recorded production from either district.

Over 4,000 mining claims had been located in or near the Glacier Peak Roadless Area by summer 1979, and 196 patented claims are in or within 1 mi of the roadless area. A few placer claims have been located along drainage bottoms, mainly Glacier Creek, Silver Creek, Troublesome Creek, Illiott Creek, and the South Fork Sauk River. Of the total number of claims, over 2,000 were in the Silver Creek mining district, 1,130 in the Monte Cristo mining district, 180 in the Troublesome Creek mining district, 179 in the Goat Lake mining district, and about 100 in outlying portions of the roadless area.

Production from the roadless area has been restricted to high-grade polymineralic sulfide veins. The most significant mineral deposits in the Monte Cristo mining district lies along a northeast-trending, northwest-dipping zone and is developed by the Justice, Golden Cord, Mystery, Pride of the Woods, New Discovery, and Pride of the Mountains mines (see table 1). Production records for the district are sketchy, but production is estimated to be at least 280,000 tons of sulfide ore. Production in the Silver Creek mining district was short lived because the ores of the district were not free-milling and gravity concentration was unsuccessful. Exploration activity in the roadless area started again in the late 1950's when major companies began exploring for porphyry-copper deposits. The only mineral production from the Silver Creek mining district came from the New York-Seattle mine (no. 72 on map). Exploration and development in the Troublesome Creek mining district was greatest between 1890 and 1899; no production has been recorded. Prospecting in the Goat Lake mining district began in July 1891; at the Foggy mine (no. 5 on map) extensive mine development is evident. When the mine was shut down, seven levels with about 10,000 ft of drifts and crosscuts had been developed. No production has been recorded from the Foggy mine or elsewhere in the Goat Lake mining district. Many mining companies were active in the roadless area from the early 1890's through the 1930's (Woodhouse, 1970). More recently, Teasquif, Inc., Exxon Minerals Co., Cities Service Co., Duval Corp., Nord Resources Corp., Tanda Exploration, Burlington Northern, Inc., Spar Creek Mining Co., Green Mac Mines Ltd., Bethex Corp., and others have been exploring in the area. Development work was in progress at the Shamrock prospect in the Troublesome Creek mining district during the summer of 1981.

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

Resource evaluation of the Glacier Peak Roadless Area is based on previous studies of mineral deposits as well as our concept of ore genesis. Both nonmetallic and metallic resources have been examined; no energy resources were identified.

The classification of mineral resources for known deposits found in the roadless area was made according to the terminology of U.S. Bureau of Mines and U.S. Geological Survey (1980). The classification of mineral potential of an area, however, represents an integration of measurable data and the subjective evaluation of the degree to which those data, and the interpretation of the geologic conditions inferred, represents a known mineral deposit type. We use three terms, "high", "moderate", and "low", to define the mineral potential within the Glacier Peak Roadless Area.

In evaluating the mineral potential of the roadless area, we summarize our previous studies of the geology, geochemistry, geophysics, and mines and prospect evaluations. Two basic, but genetically related hydrothermal deposit types are present in the area: (1) epithermal base- and precious-metal veins associated with intrusive rocks, and (2) a concealed porphyry system. The general features of base- and precious-metal epithermal vein deposits are described by Berger (1982). They commonly occur as deposits peripheral to porphyry deposits. The deposits found in the Monte Cristo mining district, first studied by Spurr (1901), are an excellent example of epithermal veins.

Porphyry deposits are associated with calc-alkalic intrusive rocks that passively intrude regional zones of structural weakness caused by crustal extension or strike-slip faulting. Numerous examples are found in the Canadian cordillera (A. S. Brown, 1976). Hollister (1978) has briefly summarized the distribution of known porphyry-type deposits from the Canadian cordillera south into the Cascade Mountains of Washington and Oregon. General features of volcanic-porphyry deposits are described by Pilcher and McDougall (1976); A. S. Brown (1976); Titley and Jeanne (1981); Beane and Titley (1981); Lowell and Guilbert (1970); Grant (1969); and Chaffee (1982). Investigations of the extensive mine workings in the roadless area are covered in Johnson and others (1983). Of the more than 100 prospects examined, 20 properties have identified resources. An additional 6 properties may have possible undiscovered base- and precious-metal resources in vein deposits and three may have possible undiscovered base-metal resources in disseminated deposits (Johnson and others, 1983).

In the Monte Cristo mining district, the total indicated and inferred gold-silver-copper-lead-zinc resources and restricted reserves are estimated at nearly 51 million tons. Of this total, about 50 million tons are in the large shear zone developed by the Justice (no. 35), Golden Cord (no. 36), Mystery (no. 33), New Discovery (no. 22), and Pride of the Mountains mines (no. 23, see enlarged map of Monte Cristo mining district). The zone is exposed either underground or on the surface over a strike length of 5,800 ft. It ranges in width from less than 1 ft to over 20 ft and contains polymineralic sulfides and sulfosalts in quartz veins and lenses that pinch and swell sporadically along both strike and dip. The quartz veins contains disseminated sulfide minerals, but metal values are much lower than in the veins. Most of the other deposits in the district resemble this deposit and are different only in scale. Stream-sediment anomalies of copper, cobalt, molybdenum, tungsten, antimony, arsenic, gold, lead, silver, and zinc are widespread (Church and others, in press). On the basis of our sampling of mineralized structures, Johnson and others (1983) concluded that many of the mines in the district have possible undiscovered resources and that the structural and geologic conditions (Tabor and others, 1982b) are favorable for the occurrence of additional resources. Investigations of the Foggy mine (no. 5) to the north in the Goat Lake mining district and additional mines outside the roadless area to the northwest suggest that the potential for the occurrence of base- and precious-metal resources is less favorable to the northwest of this major shear zone. We classify the bulk of the Monte Cristo mining district as an area of high potential for the occurrence of base- and precious-metal resources in vein deposits and classify the remainder as having a moderate potential. We extend the area of moderate potential northeast into the Goat Lake mining district on the basis of geochemical surveys (Church and others, in press) and mine evaluations (Johnson and others, 1983).

Hydrothermal veins similar to those of the Monte Cristo district occur throughout the Silver Creek mining district. However, vein-type resources in the roadless area were identified only at the Blue Canyon mine (no. 84). On the west side of the Troublesome Creek mining district, the Daisy mine (no. 103) also contains base- and precious-metal resources.

In addition to the polymineralic base- and precious-metal sulfide vein deposits, two breccia pipes and a porphyry-stockwork associated with the tonalitic intrusions exposed near the headwaters of Silver Creek were carefully examined. The westernmost breccia pipe is characterized by extensive shearing, alteration, and sulfide mineralization that fills voids in the breccia (Beam, 1972, p. 10). The second breccia was never found in outcrop, but boulders of an intrusive breccia as much as 10 ft in diameter occur along Silver Creek for a distance of about 300 feet. This locality was immediately below the Seacrest prospect (no. 79) where more than 4000 feet of drill core have intersected a low-grade porphyry-copper deposit. Exploration of this prospect has been vigorous since the original drilling in 1967-68 with at least ten major exploration companies showing an active interest. The New York-Seattle mine (no. 80) immediately south and west of the drill holes, explores part of a quartz stockwork in tonalite. The tonalite intrudes metasedimentary rock and is exposed only near Silver Creek and in an east-trending drainage where the sedimentary rock has been metamorphosed to hornfels. Sulfide minerals and sulfide-bearing quartz veins and veinlets occur in the tonalite along a K, 2Ø²K, and K, 6Ø² K, pattern. The sulfide minerals include chalcopyrite, pyrite, arsenopyrite, and lesser amounts of sphalerite. The deposit appears to be very large and may extend into the roadless area. Copper and gold resources at the New York-Seattle mine (no. 80) are on the order of 100 million tons, but the grade is low, ranging from 0.14-0.37 percent copper. Resources at the Seacrest prospect (no. 79) are calculated only for the areas delineated by drilling (4 million tons at 0.27 percent copper and 5 million tons at 0.2 percent copper); actual resources may be much larger. Drilling also intersected an ultramafic body at this location and resources of chromium and nickel from the ultramafic body are 5 million tons at 0.24 percent nickel and 0.24 percent chromium. Hydrothermal alteration and mineralization indicative of a porphyry deposit were also observed at the Red Mountain prospect (no. 101) due east in the Troublesome Creek mining district and may reflect an extension of this porphyry deposit into the roadless area. Geochemical anomalies were also found south of Blanca Lake (Church and others, 1982).

Many of the features observed in the field are characteristic of the volcanic-porphyry deposits described earlier. The presence of breccia pipes containing rounded clasts of volcanic rock having sulfide cement, alteration of overlying rocks, particularly sericitic and phyllic alteration, as indicated in the quartz stockwork observed in the New York-Seattle mine (no. 80), zoned base- and precious-metal hydrothermal veins peripheral to the deposits are all primary features of the volcanic-porphyry deposits. The Silver Creek and the western part of the Troublesome Creek mining districts have a high potential for the occurrence of base- and precious-metal resources in hydrothermal veins and for the occurrence of copper and gold resources in large, disseminated porphyry-type deposits.

Sand and gravel deposits occur in the roadless area but larger deposits outside the roadless area are closer to local markets. Traces of gold occur in the gravels in the Troublesome and Elliott Creek drainages; there is a low potential for the occurrence of placer gold resources in the roadless area.

Mineral resources identified at 16 properties in the Glacier Peak Roadless Area total nearly 53 million tons. Of this total, nearly 47 million tons are classified as restricted marginal reserves (U.S. Bureau of Mines and U.S. Geological Survey, 1980); these resources are restricted because of current environmental regulations on production and disposal of arsenic-bearing materials. Another 110 million tons of resources, mostly in low-grade porphyry-copper stockworks, occur in four deposits adjacent to the roadless area and may extend into it.

All of the resources in the roadless area occur in shear zones ranging from less than 1 ft to as much as 20 ft thick. Although the zones pinch and swell, they appear to be persistent along strike. One major zone is exposed for over a mile along strike. Quartz veins and lenses in the shear zones contain most of the metal values, and also pinch and swell sporadically along strike and dip. Furthermore, gold and silver values in the quartz differ greatly along strike and dip; locally high values occur in one shoots. Most of the stopes in the mines represent those areas that formerly contained high-grade shoots. The resources in the large zone developed by the Justice (no. 35), Golden Cord (no. 36), Mystery (no. 33), Pride of the Woods (no. 28), New Discovery (no. 22), and Pride of the Mountains mines (no. 23) are divided into lower and upper blocks. For the purposes of calculation of ore reserves, this mineralized zone (see map) has been divided into an upper and a lower block. The lower block is relatively deep in the deposit and has been less thoroughly explored. The level of confidence of the resource estimate for the lower block is not as high as that for the upper block which has been developed by previous mining activity.

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LIST OF MINES AND PROSPECTS SHOWN ON MAP

[Symbols indicate metals present; mines and prospects having identified mineral resources in and near the Glacier Peak Roadless Area (Johnson and others, 1983) are underlined]

1. Phoenix Asbestos prospect
2. Washington Claim--Au, Ag, Cu, Pb, Zn
3. East Standard prospect--Au, Ag, Cu
4. Ida prospect--Au, Ag, Zn
5. Foggy mine--Au, Ag
6. Snowbird prospect
7. Tobique prospect
8. Marmot No. 1 prospect--Au, Ag, Cu, Zn
9. Marmot No. 2 prospect
10. Montrose prospect--Au
11. Shakespeare prospect--Au, Ag, Cu, Pb, Zn
12. Pion prospect
13. Whistler prospect--Au, Ag, Cu, Pb, Zn
14. UTTAG prospect--Au, Ag, Cu, Pb, Zn
15. Eureka prospect--Au, Ag, Cu, Zn
16. Pica prospect--Au, Ag, Cu, Pb, Zn
17. Hydra No. 2 prospect--Au, Ag, Cu, Pb, Zn
18. Tuscola prospect--Au, Ag, Cu, Pb, Zn
19. Phila prospect--Au, Ag, Cu, Pb, Zn
20. Portland No. 2 prospect--Au, Ag, Cu, Pb, Zn
21. Washington prospect--Au, Ag, Cu, Pb, Zn
22. New Discovery mine--Au, Ag, Cu, Pb, Zn
23. Pride of the Mountains mine--Au, Ag, Cu, Pb, Zn
24. Side Line prospect
25. Ptarmigan prospect--Au, Ag, Cu, Pb, Zn
26. Meridian prospect--Au, Ag, Cu, Pb, Zn
27. Potomac prospect--Au, Ag, Cu, Pb, Zn
28. Pride of the Woods mine
29. I.N. prospect--Au, Ag
30. Pusher prospect
31. Portland No. 1 prospect--Au, Ag, Cu, Pb, Zn
32. Clara prospect--Au, Ag, Pb
33. Mystery mine--Au, Ag, Cu, Pb, Zn
34. Army mine--Au, Ag, Cu, Pb, Zn
35. Justice mine--Au, Ag, Cu, Pb, Zn
36. Golden Cord mine--Au, Ag, Cu, Pb, Zn
37. American prospect
38. Monte Cristo prospect
39. Quilda prospect--Au, Ag, Cu, Pb, Zn
40. Comet mine--Au, Ag, Pb, Zn
41. Nelson prospect
42. Ranger prospect--Au, Ag, Cu, Pb, Zn
43. Glacier prospect
44. Seventy-Six mine--Au, Ag, Cu, Zn
45. Ibex No. 1 prospect
46. Iron Dale prospect
47. Iron Mask prospect--Au, Pb, Zn
48. Lincoln mine--Au, Ag, Cu, Pb
49. Liberty prospect--Au, Ag
50. Sidney mine--Au, Ag
51. Sheridan mine--Au
52. Mountain Maid prospect--Au, Ag, Cu, Pb, Zn
53. Hannah prospect--Au, Ag, Pb, Zn
54. Emma Moore prospect--Au, Ag, Cu, Pb, Zn
55. Seventy-Four prospect--Au, Ag, Cu, Pb, Zn
56. Congress prospect--Au, Ag, Cu, Pb, Zn
57. Boston-American mine--Au, Ag
58. Oliver and Birney mine--Au, Ag, Cu
59. Zeta mine--Au, Ag, Cu
60. Jenny D. prospect--Au, Ag
61. W. Danseau prospect--Ag
62. Sue Kay prospect
63. Bonita prospect--Au, Ag
64. Cheryl Lee prospect--Au, Ag
65. F.G. Davis prospect--Au, Ag, Cu, Zn
66. Seattle-Aurora prospect--Au, Ag
67. Stockton prospect--Au, Ag, Cu
68. Orphan Boy mine--Au, Ag, Zn
69. C.T. prospect--Au, Ag, Cu, Zn
70. Minehaha prospect--Au, Ag, Cu
71. Smuggler mine--Au, Ag, Cu
72. Ajax prospect
73. Evening Star mine--Au, Ag, Cu
74. Good Hope mine--Au, Ag, Cu
75. Lucky Boy mine
76. Starlight prospect--Au, Ag, Cu, Pb, Zn
77. Moly Gulch prospect
78. Mountain Queen prospect--Au, Ag, Cu
79. Seacrest prospect--Cu, Mo
80. New York-Seattle mine--Au, Ag, Cu
81. Walk prospect--Cu, Mo
82. Donkey prospect--Au
83. Crown Point prospect--Cu
84. Blue Canyon prospect--Au, Ag, Zn
85. Oscar Todd prospect
86. Kotzebue prospect--Au, Ag, Cu
87. Siberia prospect--Au, Ag
88. High Level prospect--Au, Ag, Cu
89. Helen No. 7 prospect
90. Helen May No. 6 prospect--Au, Cu
91. Helen May No. 1 prospect--Au, Ag, Cu
92. Spencer prospect--Au, Ag, Cu
93. Ruby claim--Au, Ag, Cu, Pb, Zn
94. Dreadnot prospect--Au, Ag
95. Cascade prospect--Au, Ag, Cu, Pb, Zn
96. Texas prospect--Au
97. BG 1-8 claims--Au, Ag, Cu
98. Everett prospect--Au, Cu, Zn
99. Morning Glory prospect--Au, Ag, Cu
100. Jane prospect--Ag, Cu
101. Red Mountain prospect--Au, Ag, Cu
102. Corona prospect
103. Daisy mine--Au, Ag, Cu, Pb, Zn
104. Shamrock prospect--Ag, Cu
105. Good Luck prospect--Au, Cu
106. Great Scott claim--Au, Cu
107. Remontle claim--Au, Ag, Cu, Pb, Zn
108. Quartz Creek claim--Au, Ag
109. Goblin Creek claim

MINERAL RESOURCE POTENTIAL MAP OF THE GLACIER PEAK ROADLESS AREA, SNOHOMISH COUNTY, WASHINGTON

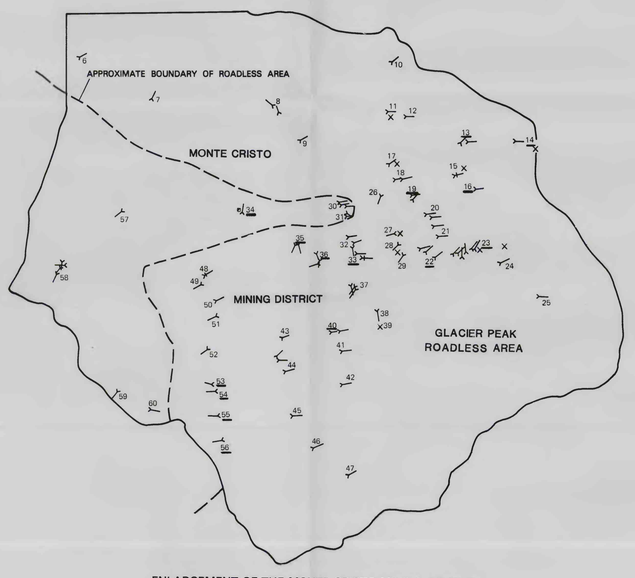
By

S.E. Church and R.W. Tabor, U.S. Geological Survey

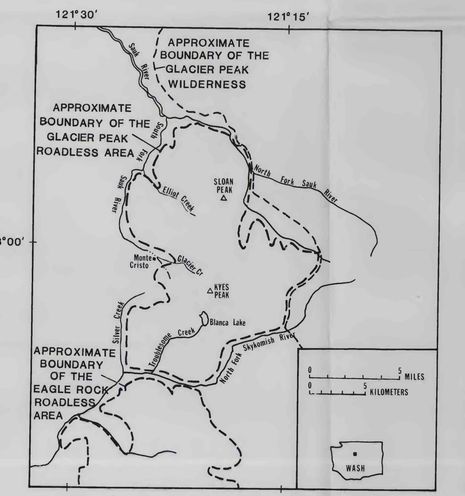
and

F.L. Johnson, U.S. Bureau of Mines

1983



ENLARGEMENT OF THE MONTE CRISTO MINING DISTRICT


121°30'
121°15'
48°00'
APPROXIMATE BOUNDARY OF THE GLACIER PEAK WILDERNESS
APPROXIMATE BOUNDARY OF THE GLACIER PEAK ROADLESS AREA
APPROXIMATE BOUNDARY OF THE EAGLE ROCK ROADLESS AREA
SLOAN PEAK
KYES PEAK
Monte Cristo
Blanca Lake
Silver Creek
Illiott Creek
North Fork Sauk River
South Fork Sauk River
Suiattle River
Napeequa River
Chiwaukum Creek
Tumwater Canyon
Icicle Creek
Entiat River
Stehekin River
Lake Chelan
Twisp River
Chewuch River
Methow River
Wenatchee River
Chiwawa River
Nason Creek
Little Wenatchee River
Icicle Creek
Peshastin Creek
Mission Creek
Tronsdal Lake
Leavenworth
Cashmere
Dryden
Peshastin
Monitor
Plain
Chiwaukum Creek
Stevens Pass
Skykomish River
Tye River
Foss River
Miller River
Tonga Ridge
Deception Creek
Beckler River
Rapid River
Icicle Creek
Jack Creek
Eagle Creek
Chiwaukum Creek
Tumwater Canyon
Leavenworth
Cashmere
Dryden
Peshastin
Monitor
Plain
Chiwaukum