UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MINERAL RESOURCE POTENTIAL OF THE GRANITE PEAK ROADLESS AREA, TRINITY COUNTY, CALIFORNIA

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STUDIES RELATED TO WILDERNESS

Under the provisions of the Wilderness Act (Public Law 88-577, September 3, 1964) and related acts, the U.S. Geological Survey and the U.S. Bureau of Mines have been conducting mineral surveys of wilderness and primitive areas. Areas officially designated as "wilderness," "wild," or "canoe" when the act was passed were incorporated into the National Wilderness Preservation System, and some of them are presently being studied. The act provided that areas under consideration for wilderness designation should be studied for suitability for incorporation into the Wilderness System. The mineral surveys constitute one aspect of the suitability studies. The act directs that the results of such surveys are to be made available to the public and be submitted to the President and the Congress. This report discusses the results of a mineral survey of the Granite Peak Roadless Area (5806), Shasta-Trinity National Forest, Trinity County, California. The Granite 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.

SUMMARY

On the basis of investigations by Hotz and others (1972), and herein, there is no evidence of a potential for metallic, nonmetallic or energy resources in the Granite Peak Roadless Area. The study by Hotz and others (1972) consisted of geologic, geochemical, and geophysical surveys by the U.S. Geological Survey of an area that includes most of the Granite Peak Roadless Area, and mining and production surveys by the U.S. Bureau of Mines of an area that includes the entire roadless area. The present study mainly involved additional geophysical, and mining and production surveys of an area that includes most of geochemical studies of the area that were not included in the 1972 study by Holtz and others. There is no history of mining activity within the roadless area and geochemical analyses of rock and stream-sediment samples indicate that there are probably no surficial or concealed metallic-mineral deposits within the roadless area.

INTRODUCTION

The Granite Peak Roadless Area is located in the Klamath Mountains geologic province about 12 mi north-northeast of Weaverville, Trinity County, California (fig. 1). The area encompasses 3,200 acres of the southern part of the Trinity Alps. Elevations above sea level range from 2,900 ft on the southwest at the Stuart Fork of the Trinity River to 8,091 ft on Granite Peak near the center of the roadless area. The north boundary is shared by the proposed Salmon-Trinity Alps Wilderness Area. Access to the south border of the roadless area is by foot trails leading off of various dirt roads that lead from paved California State Highway 3.

Most of the roadless area is included on the geologic map of the Salmon-Trinity Alps Primitive Area (Hotz and others, 1972). The remainder of the roadless area is included on the geologic map by Strand (1962). In June of 1980 and 1981 this study included stream-sediment sampling, but no additional mapping was done. The placer samples were analyzed for gold and other elements. No further work was done in the Granite Peak Roadless Area by the U.S. Bureau of Mines because the entire roadless area was covered in a previous investigation (Hotz and others, 1972).

GEOLOGY AND GEOCHEMISTRY PERTAINING TO MINERAL RESOURCE ASSESSMENT

GEOLOGY

The Granite Peak Roadless Area straddles parts of the eastern Klamath belt, the central metamorphic belt, and the western Paleozoic and Triassic belt of the Klamath Mountains geologic province (fig. 2). These imbricate arcuate lithic belts (convex side facing west) are thought to represent east-dipping thrust slices of oceanic crust and island arcs that were accreted to the continental margin by plate-tectonic processes during Mesozoic time (Irwin, 1977).

Three quarters of the Granite Peak Roadless Area is within the eastern Klamath belt (fig. 3) and is underlain by the Trinity ultramafic sheet and by the Granite Peak pluton. The Trinity ultramafic sheet is the structurally lowest, westernmost part of the eastern Klamath belt and consists predominately of partially serpentinized peridotite that is thought to be part of an ophiolite sequence (Irwin, 1977). The Granite Peak pluton intrudes the Trinity ultramafic sheet and is predominately quartz diorite (Davis and others, 1965; Hotz and others, 1972).

The western one quarter of the Granite Peak Roadless Area is within the central metamorphic belt and the western Paleozoic and Triassic belt. The part of the central metamorphic belt that underlies the roadless area is narrow (0.2) mi and underthrusts the Trinity ultramafic sheet on the east and is underthrust by the western Paleozoic and Triassic belt on the west. The age of the Trinity ultramafic sheet underthrusting is possibly Devonian, which is the age of the central metamorphic belt metamorphism. The central metamorphic belt in this part of the roadless area is composed of Salmon Hornblende Schist and Abrams Mica Schist. The Salmon is structurally below the Abrams and the contact between the two units is gradational except in the vicinity of Sunday Creek where the Abrams pinches out. The base of the Salmon is phyllonitic, retrograde, and similar in appearance to the underthrust metavolcanic rocks of the western Paleozoic and Triassic belt. Above the base is a fine-grained generally grading upward to medium-grained lineated well-foliated hornblende-epidote-albite schist that grades upward into a continuous band of hornblende gneiss adjacent to the Trinity ultramafic sheet. The Abrams consists mainly of metasedimentary rocks such as quartz-mica schist, amphibolite, calcareous schist, and impure marble. The Abrams also occurs in the north-central part of the roadless area (Davis and others, 1965; Irwin, 1977).

The rocks of the western Paleozoic and Triassic belt that underlie the westernmost part of the roadless area consist of interlayered metasedimentary and metavolcanic rocks of the Stuart Fork Formation. The bottom of the Stuart Fork is not exposed, and the top is thrust beneath the Salmon Hornblende Schist of the central metamorphic belt. The age of underthrusting by the Stuart Fork Formation may be Late Jurassic. The metasedimentary rocks consist mostly of micaceous quartzite and phyllite, and in the roadless area they form the core of a southward-plunging antiform. The metavolcanic rocks occur primarily in the upper part of the Stuart Fork and consist mainly of massive greenstone, actinolite schist, and phyllonite. The schist and phyllonite probably were formed by shearing of the massive greenstone unit (Davis and others, 1965; Irwin, 1977).

Unconsolidated Quaternary surficial deposits, mapped only where they are thick enough to obscure the bedrock geology, occur below Granite Peak, and along the upper reaches of Sunday Creek. These deposits are Pleistocene and Holocene in age and consist mainly of glacial detritus with recent alluvium and talus (Hotz and others, 1972).

GEOCHEMISTRY

Six streams drain the Granite Peak Roadless Area from Sunday Creek on the west to the two forks of Mule Creek on the east. The creeks are 0.2 to 2 mi in length within the roadless area. Five of the six creeks were sampled by the U.S. Geological Survey during the two investigations of the region.

Seven reconnaissance stream-sediment and five rock samples were collected by Hotz and others (1972). The rock and stream-sediment samples were analyzed for 30 elements (thorium not tested for in the 1972 study by Hotz and others) using a six-step semiquantitative spectrographic method. Stream sediments were also analyzed for copper and zinc using atomic-absorption methods and for citrate-soluble copper and heavy metals using colorimetric methods. The rock samples were also analyzed for gold by atomic-absorption methods and for mercury by instrumental methods (table 1). Pan concentrates of stream sediments were analyzed for platinum but none was found at the lower limit of detection (Hotz and others, 1972). Geochemical data from these samples are reproduced in table 1.

Three additional stream-sediment samples (1,2, and 3, table 1) were collected for this study from streams that drain the roadless area. The sediments were analyzed for 31 elements using six-step semiquantitative emission spectrography (table 1). One stream-sediment sample was also analyzed by fire assay for gold, platinum, palladium, rhodium, ruthenium, and iridium but none was found at the lower limits of detection.

Hotz and others' (1972) threshold values for gold, silver, copper, zinc, lead, mercury, and molybdenum in stream sediments were selected by plotting cumulative frequency curves of the analytical data on log-normal probability paper to determine the range and geometric median of the values. Threshold values for rock samples are highly subjective because of the selective sampling techniques and small number of samples. Only three samples in table 1 show anomalous values and two of these are at the threshold or only slightly above. Rock sample 22 shows an anomalous value of 500 parts per million (ppm) copper. However, sample 22 is the only sample with anomalous copper and is probably the result of the selective sampling techniques used.

Background levels for chromium, nickel, and cobalt are fairly high throughout the study area because chromite is a common accessory mineral and nickel and cobalt are common minor elements in ultramafic rocks. Stream-sediment values are far above background levels, but in themselves are not significant because chromite, nickel, and cobalt are highly resistant to and concentrated by weathering and erosion processes. There are no significant laterites to serve as a source for nickel and cobalt, nor are there any significant concentrations of chromite in the study area (Hotz and others, 1972). Stream-sediment samples 1, 2, and 3 for this study show no anomalies for mineralized-related elements and are geochemically similar to those examined by Hotz and others (1972; see table 1).

MINING DISTRICTS AND MINERALIZATION

During a previous study of the area (Hotz and others, 1972), the U.S. Bureau of Mines searched published literature as well as records of the U.S. Bureau of Mines, Trinity County, and the U.S. Forest Service for data concerning mineral deposits, claims, leases, and mining and production activity in the Trinity Alps area. No record of mining activity in the Granite Peak Roadless Area was found.

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

On the basis of an investigation by Hotz and others (1972), and herein, there is no evidence of a potential for metallic, nonmetallic, and energy resources in the Granite Peak Roadless Area. There is no history of mining activity within the roadless area, although the area has been extensively prospected since the 1850's, when mining began in the Trinity Alps area. Geochemical analyses of rock and stream-sediment samples indicated that there are probably no surficial or concealed metallic-mineral deposits within the roadless area.

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Strand, R. G., compiler, 1962, Geologic map of California, Redding sheet--Olaf P. Jenkins edition: California Division of Mines and Geology, Geologic Atlas of California, scale 1:250,000.

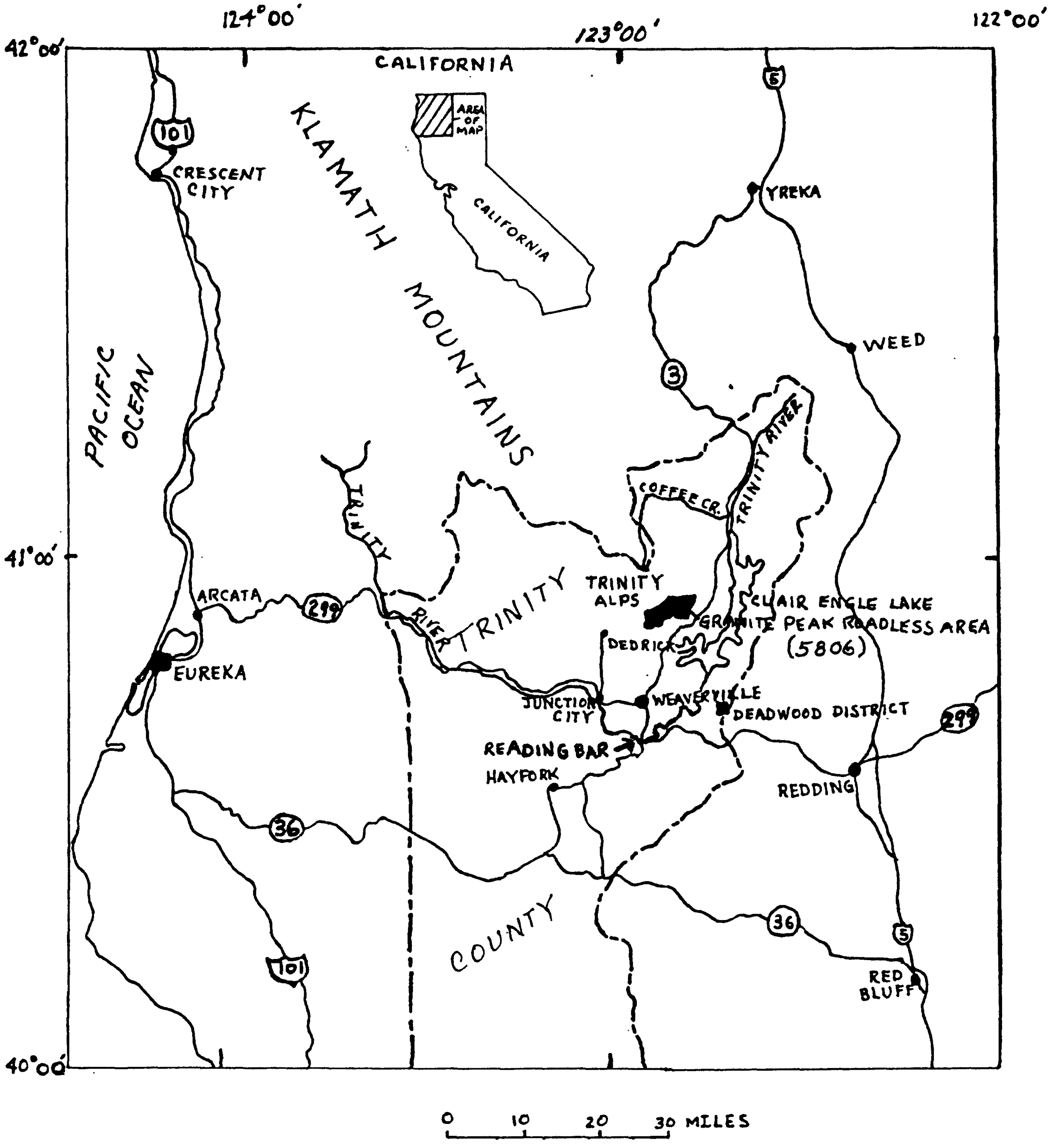

Figure 1.--Location of the Granite Peak Roadless Area, Klamath Mountains, Trinity County, California.

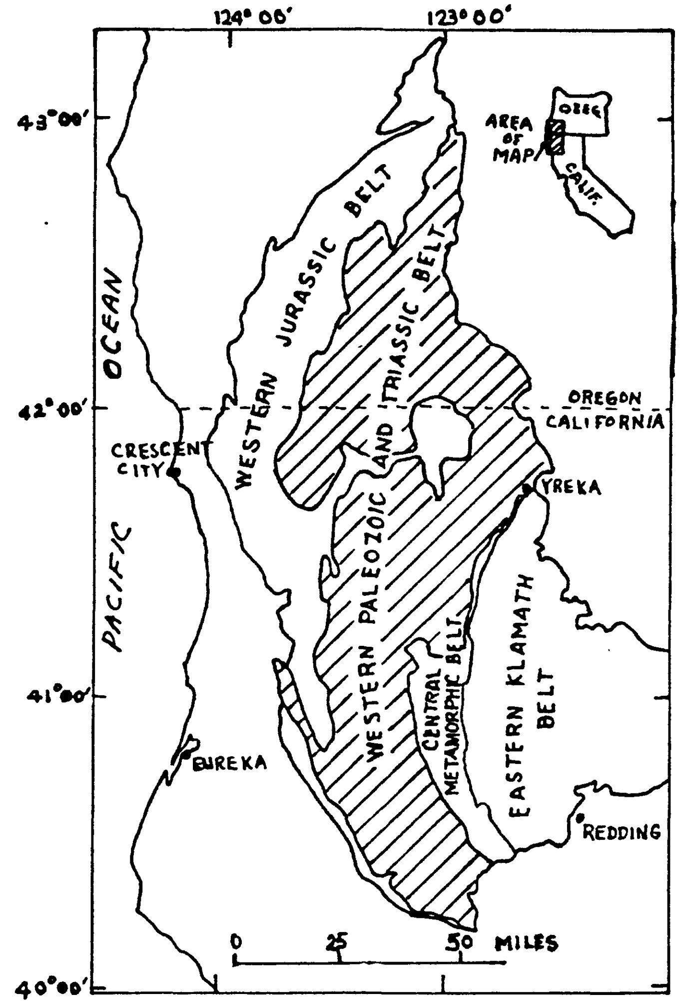

Figure 2.--Generalized map showing the lithic belts of the Klamath Mountains geologic province, California and Oregon (after Irwin, 1977).

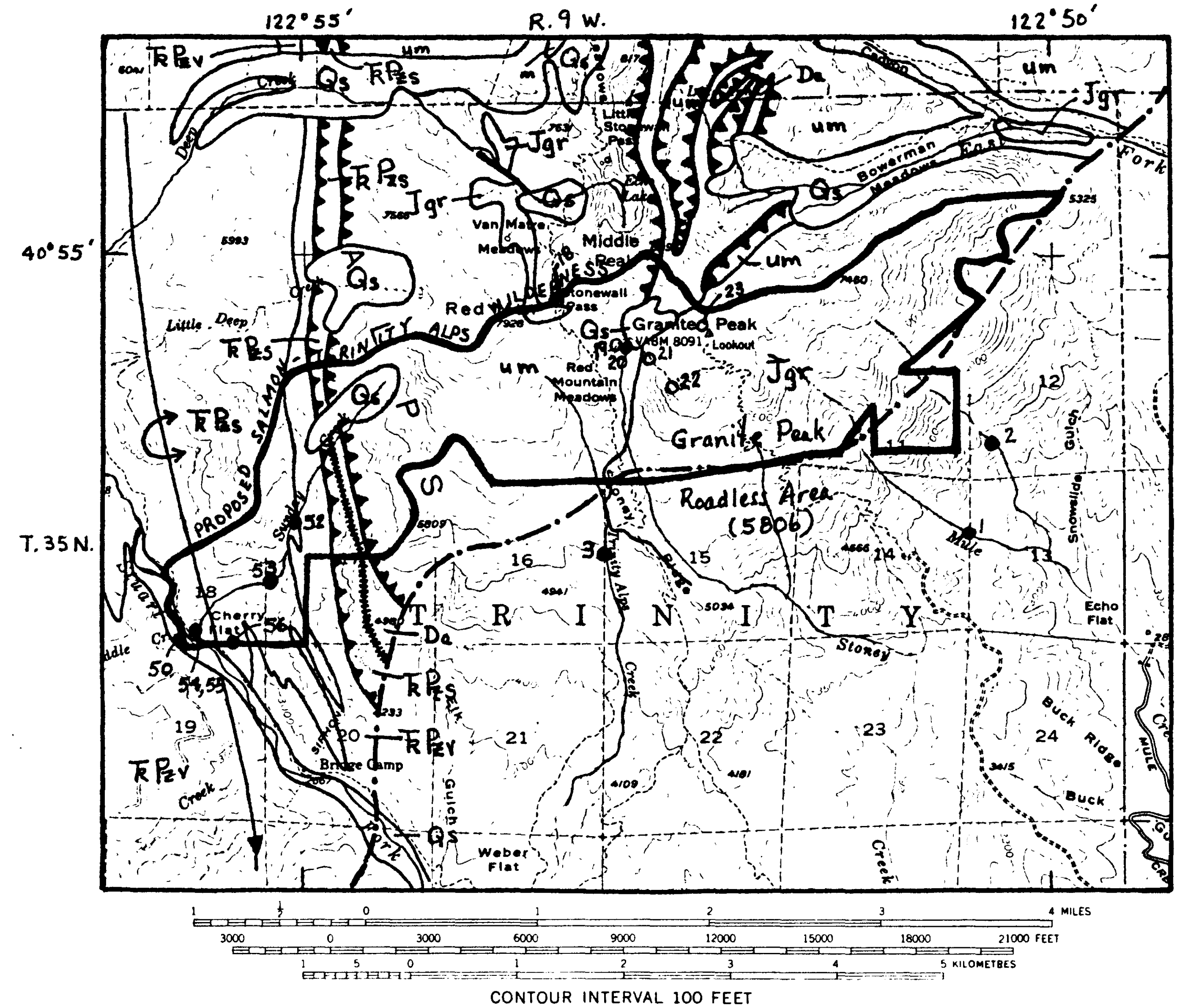

Figure 3.--Geologic map of the Granite Peak Roadless Area. Geology after Hotz and others (1972). Base from U.S. Geological Survey, Trinity Dam, California, 15-minute quadrangle, 1950. Land grid shown is not accurate and was not used to locate the roadless area boundary.

EXPLANATION FOR FIGURE 3

Qs — SURFICIAL DEPOSITS (QUATERNARY)

EASTERN KLAMATH BELT

Jgr — GRANITIC ROCKS (JURASSIC)

um — ULTRAMAFIC ROCKS (JURASSIC OR OLDER)

WESTERN PALEOZOIC AND TRIASSIC BELT

TRPzs TRPzv — METASEDIMENTARY AND METAVOLCANIC ROCKS (TRIASSIC AND UPPER AND MIDDLE PALEOZOIC)

CENTRAL METAMORPHIC BELT

Da — ABRAMS MICA SCHIST (DEVONIAN)

APPROXIMATE BOUNDARY OF ROADLESS AREA

CONTACT--Approximately located; hachured where gradational

FAULT

THRUST FAULT--Approximately located; sawteeth on upper plate

OVERTURNED ANTIFORM--Showing direction of plunge

BOUNDARY OF STUDY AREA, HOTZ AND OTHERS (1972)

19 ROCK SAMPLE--Station number, refer to table 1

3 STREAM-SEDIMENT SAMPLE--Station number, refer to table 1

Table 1.--Analyses of rock and stream-sediment samples from the Granite Peak Roadless Area, Trinity County, California (modified, with additions, from Hotz and others, 1972; see figure 3 for sample localities).

METHOD	SEMIQUANTITATIVE SPECTROGRAPHIC ANALYSIS																														ATOMIC ABSORBTION			COLORI-METRIC		INSTRU-MENTAL
UNITS	percent				parts per million (ppm)																										ppm			ppm		ppm
ELEMENTS	Fe	Mg	Ca	Ti	Mn	Ag	As	Au	B	Ba	Be	Bi	Cd	Co	Cr	Cu	La	Mo	Nb	Ni	Pb	Sb	Sc	Sn	Sr	Th	V	W	Y	Zn	Zr	Au	Cu	Zn	CxHm	CxCu	Hg
Lower limit of determination	.05	.02	.05	.002	10	.5	200	10	10	20	1	10	20	5	10	5	20	5	20	5	10	100	5	10	100	100	10	50	10	200	10	.02	10	25	.05	1	.01
ROCKS Threshold[1]						.5										150		5			15									200		.02					.75
SAMPLE No.																																					
18 Serp. (U)	7	A	A	.3	1500	N	N	N	10	500	N	N	N	70	1000	20	B	N	B	1000	L	N	B	N	500	-	100	N	B	N	70	.02	-	-	-	-	.12
19 Serp. (U)	7	A	A	.03	1000	N	N	N	10	N	N	N	N	100	200	20	B	N	B	2000	N	N	B	N	L	-	20	N	B	N	N	L	-	-	-	-	.18
21 Qd. (U)	7	A	A	.7	1000	N	N	N	15	300	N	N	N	50	100	10	B	N	B	50	L	N	B	N	500	-	200	N	B	N	150	L	-	-	-	-	.06
22 Amph. (U)	10	A	A	.5	2000	N	N	N	15	100	N	N	N	50	200	500	B	N	B	70	L	N	B	N	200	-	200	N	B	N	70	L	-	-	-	-	L
23 Qd. (U)	10	A	A	G(1)	1000	N	N	N	20	200	N	N	N	50	150	50	B	N	B	70	L	N	B	N	700	-	300	N	B	N	100	L	-	-	-	-	.05
STREAM SEDIMENTS Threshold[1]						.5												5			20									200						2	
SAMPLE No.																																					
1*	5	2	2	.5	700	N	N	N	20	500	1	N	N	20	500	20	N	N	N	100	20	N	30	N	300	N	150	N	50	N	70	-	-	-	-	-	-
2*	3	2	3	.5	700	N	N	N	20	500	1	N	N	20	500	30	N	N	N	100	20	N	30	N	200	N	150	N	30	N	100	-	-	-	-	-	-
3*	10	7	1	.3	1000	N	N	N[2]	10	100	N	N	N	50	5000	20	N	N	N	1500	10	N	15	N	200	N	100	N	10	N	30	-	-	-	-	-	-
20 (U)	7	A	A	.15	1000	N	N	N	10	70	N	N	N	150	2000	15	B	N	B	2000	10	N	B	N	L	-	50	N	B	N	15	-	22	82	10	1	-
50 (T)	10	A	A	G(1)	1500	N	N	N	30	500	N	N	N	70	700	200	B	N	B	1000	10	N	B	N	200	-	500	N	B	N	200	-	68	60	5	6	-
52 (T)	7	A	A	.3	1500	N	N	N	50	150	N	N	N	70	1000	50	B	N	B	1500	L	N	B	N	L	-	70		B	N	70	-	30	60	4	2	-
53 (T)	10	A	A	.5	1500	N	N	N	100	200	N	N	N	100	1500	50	B	N	B	2000	10	N	B	N	L	-	100	N	B	N	70	-	29	64	7	1	-
54 (T)	3	A	A	.3	1000	N	N	N	30	150	N	N	N	70	700	20	B	N	B	1000	10	N	B	N	L	-	150	N	B	N	70	-	57	68	8	1	-
55 (T)	5	A	A	.5	1000	N	N	N	20	200	N	N	N	70	1000	70	B	N	B	1000	10	N	B	N	100	-	150	N	B	N	100	-	56	62	5	1	-
56 (T)	10	A	A	G(1)	2000	N	N	N	100	500	N	N	N	50	200	100	B	N	B	20	10	N	B	N	L	-	500	N	B	N	150	-	65	90	5	1	-

1 = Only those elements of possible resource potential or their usefulness as indicators of mineral deposits (Hotz and others, 1972).
2 = Fire-assay method. Lower limit of detection is .002 ppm.
Serp. = Serpentine
Qd. = Quartz diorite
Amph. = Iron oxide-stained amphibolite.
Hm = Heavy metals
T = Hotz and others (1972) Area T
U = Hotz and others (1972) Area U

N = Not detected at limit of determination.
L = Detected, but below limit of determination.
G = Greater than upper limit of determination.
\- = Not looked for.
A = Analyzed, values not given.
B = Below 100-ppm threshold value.
* = Collected during this study.