UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

GEOCHEMICAL ANALYSES OF ROCK AND STREAM-SEDIMENT SAMPLES FROM THE NORTH FORK SMITH RIVER ROADLESS AREA, DEL NORTE COUNTY, CALIFORNIA, AND CURRY COUNTY, OREGON

By Floyd Gray, Jocelyn A. Peterson, Robert R. Carlson, P. Briggs, Joseph Haffty, E. F. Cooley, and Norman J Page

U.S. Geological Survey
Open-File Report 82-976
1982

Table of Contents

List of Tables

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 analytical results of a geochemical sampling survey of the North Fork Smith River Roadless Area in the Siskiyu National Forest, Del Norte County, California, and Curry County, Oregon. The North Fork Smith River Roadless Area was classified as a further planning area (05707) during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January, 1979.

INTRODUCTION

The North Fork Smith River Roadless Area is located in Del Norte County, northern California, and Curry County, Oreg., and covers parts of the Gasquet and Crescent City 15-minute quadrangles in California and the southern part of Curry County, Oreg. It includes approximately 39,400 acres of the Six Rivers National Forest and extends from just north the Oregon border to the town of Gasquet, Calif., about 6 mi (10 km) to the south.

The North Fork Smith River Roadless Area is underlain predominantly by ultramafic tectonite, layered ultramafic and gabbroic cumulate rocks, massive gabbro, and associated mafic to silicic intrusive rocks that are part of the western Jurassic belt of the Klamath Mountains province of California and Oregon (Irwin, 1966, 1981). Early investigation of the area included general reconnaissance studies by Diller (1902), Hershey (1911), and Maxson (1933). Several studies associated with the U.S. Geological Survey's World War II Strategic Minerals Investigations program concentrated largely on mapping chromite deposits and studying the economically significant features associated with these deposits in the peridotite body (see Wells and others, 1946). Cater and Wells (1953) published a detailed account of the relation between major rock units, structure, and mineral resources that included the North Fork Smith River Roadless Area. Recent literature significant to the study area includes Dick (1976), Vail (1977), and Harper (1980). Each of these studies contains recent petrologic and plate-tectonic concepts involving the Josephine Mountain Peridotite and associated rocks.

GEOLOGY

The major rock units found in the roadless area have been ascribed to the Josephine ophiolite by Harper (1980). The igneous age of the Josephine ophiolite is constrained by radiometric and paleontologic dates. A plagiogranite in the upper portion of the ophiolite has yielded a concordant U-Pb age of 157 m.y. (Harper and Saleeby, 1980), and fossils identified as Buchia concentrica (late Jurassic) were collected from a pebble conglomerate bed overlying the ophiolite (D. L. Jones, 1979, oral commun.).

The North Fork Smith River Roadless Area contains all the components of an ophiolite sequence (GSA Penrose Conference, 1972; Coleman, 1977), however, faulting between units precludes any estimate of thicknesses. The Josephine Mountain Peridotite, harzburgite-dunite tectonite mass, is the lowermost unit exposed in the North Fork Smith River Roadless Area and covers approximately 310 mi^2 (800 km^2) traversing southwestern Oregon and northern California. The peridotite commonly displays compositional banding defined by variations in

the ratio of pyroxene to olivine. Layering, generally with a shallow eastward dip, is exposed on the banks of the North Fork Smith River.

Cumulate ultramafic and gabbroic rocks are present in a number of localities near the eastern edge of the roadless area. A massive serpentinite shear zone everywhere marks the contact between these cumulate rocks and the tectonite peridotite. Dunite lenses that contain podiform chromite ranging from several inches to tens of feet in length are abundant in this region and may be found on both the tectonite and cumulate ultramafic side of the shear zone. Most of the chromite mines in the North Fork Smith River area are located in and adjacent to the contact zone between the peridotite tectonite and cumulate rocks. The ultramafic rocks with cumulate textures are mainly wehrlite, clinopyroxenite, and dunite consisting of olivine, clinopyroxene, and ±spinel. Serpentine is ubiquitous secondary mineral replacing olive and/or pyroxene throughout the area. The cumulate ultramafic rocks grade irregularly upward into layered gabbro with plagioclase as an additional cumulus mineral. The layered cumulus (clinopyroxene) gabbro grades upward into a massive gabbro unit characterized by abrupt compositional and textural variations, intrusive breccias, and local diabase dikes.

Minor volcanic rocks and associated diabase dike rocks crop out in the northeastern portion of the roadless area and are considered part of the Josephine ophiolite.

Two separate postemplacement intrusive events are indicated by small stocks and dikes that intrude the Josephine Mountain Peridotite. The older intrusive event consists of rocks of intermediate composition, mainly hornblende diorite, that intruded the peridotite along predominantly north trending shear zones occupied by serpentinite. The largest of these intrusion-injected shear zones lies in the north-central region of the roadless area running from the Oregon border south across the North Fork of Diamond Creek to the area around High Plateau Creek. The second event intruded along the same shear zone and displays crosscutting relations with rocks of the older event. The younger event consists mainly of silicic porphyries. These rocks represent the last major igneous event affecting the Josephine Mountain Peridotite.

Nickeliferous laterites overlie relatively fresh peridotite (mainly harzburgite tectonite) occurring on flat or gently sloping erosion surfaces that probably developed during a protracted period of erosion starting in the Eocene or Oligocene and culminating in the Pliocene.

Small stream terraces formed during the Quaternary are found along the Diamond Creek drainage and scattered along the North Fork Smith River. Landsliding is abundant on steep slopes adjacent to plateau areas.

ANALYTICAL DATA

Rock and stream sediment samples were collected for semiquantitative spectrographic and instrumental mercury (sample locations on map). Fresh bedrock representative of the units was collected and stream sediments were collected from silty material close to the river bank. Samples were collected between the years 1977-1980 by Floyd Gray, N. J Page, H. R. Cornwall, and Donald F. Huber.

SAMPLE PREPARATION AND ANALYTICAL PROCEDURE

Rock samples were crushed to 6 mm (0.25 in.), split, and pulverized prior to analysis by standard semiquantitative emission spectrography for 31 elements (table 1) according to the techniques outlined in Grimes and Marranzino (1968). Stream-sediment samples were dried, sieved to minus-80 mesh, split, and pulverized, then analyzed by standard semiquantitative emission spectrography for 31 elements. Both rock and stream sediment samples were also analyzed by instrumentation methods for mercury (Vaughn and McCarthy, 1964). Analyses were performed by B. Arbogast and D. F. Siems at the U.S. Geological Survey in Denver, Colo.

DATA

All analytical values are reported in parts per million except Ca, Fe, Mg, and Ti which are given as percentages. Table 2a lists the trace elements analyses for 114 rock samples including laterites and altered rocks, table 2b lists the analyses for 75 stream-sediment samples. For these tables, elements with no detectable values at the limit of analytical determination (table 1) were omitted. Semiquantitative spectrographic analyses are reported as the midpoints of a six step geometric interval whose boundaries are 0.12, 0.18, 0.26, 0.38, 0.56, 0.83, 1.2, and so on, and whose midpoints are 0.15, 0.2, 0.3, 0.5, 0.7, 1.0, and so on. The precision of these values is approximately plus or minus one interval at 68-percent confidence or two intervals at 98-percent confidence (D. J. Grimes, oral commun., 1980). Instrumental mercury is quantitative and values are reported as discrete point values. Table 3 lists fire-assay spectrographic analyses of gold and platinum-group elements for rocks in the North Fork Smith River. Table 4 lists the analysis of chromite-rich rocks in the North Fork Smith River, and table 5 lists fire-assay analysis of platinum-group elements from chromite-rich rocks.

Analytical values are stored in the U.S. Geological Survey RASS System (Rock Analysis Storage System) (Van Trump and Miesch, 1976). STATPAC (Statistical Package) files were generated for both rock and stream-sediment data using STATPAC Program CARD ENTRY (d0092). Subsequently the STATPAC Program PUBLST was used to produce tables 2 and 3.

REFERENCES CITED

Cater, F. W., Jr., and Wells, F. G., 1953, Geology and mineral resources of the Gasquet quadrangle, California-Oregon: U.S. Geological Survey Bulletin 995-C, p. 79-133.

Coleman, R. G., 1977, Ophiolites: New York, Springer-Verlag, 229 p.

Dick, H. J. B., 1976, The origin and emplacement of the Josephine peridotite of southwestern Oregon: New Haven, Conn., Yale University, Ph. D. thesis, 409 p.

Diller, J. S., 1902, Topographic development of the Klamath Mountains: U.S. Geological Survey Bulletin 196, 69 p.

Geological Society of America Penrose Conference, 1972, Ophiolites: Geotimes, v. 17, no. 12, p. 24-25.

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

Harper, G. D., 1980, The Josephine Ophiolites--remains of a Late Jurassic marginal basin in northwestern California: Geology, v. 8, p. 333-337.

Hershey, O. H., 1911, Del Norte County (California) geology: Mineral and Science Press, v. 102, p. 468.

Irwin, W. P., 1966 Geology of the Klamath Mountains province, in Bailey, E. H., ed., Geology of northern California: California Division of Mines and Geology Bulletin 190, p. 19-38.

_____1981, Tectonic accretion of the Klamath Mountains, in Ernst, W. G., ed., Geotectonic development of California: Englewood Cliffs, N. J., Prentice-Hall, p. 28-49.

Maxson, J. H., 1933, Economic geology of portions of Del Norte and Siskiyou Counties, northwesternmost California: California Journal of Mines and Geology, v. 29, p. 123-160.

Vail, S. G., 1977, Geology and geochemistry of the Oregon Mountain area, southwestern Oregon and northern California: Corvallis, Oregon State University, Ph. D. thesis, 159 p.

VanTrump, George, Jr., and Miesch, A. T., 1976, The U.S. Geological Survey RASS-STATPAC system for Management and statistical reduction of geochemical data: Computers and Geosciences, v. 3, p. 475-488.

Vaughn, W. W., and McCarthy, J. H., Jr., 1964, An instrumental technique for the determination of submicrogram concentrations of mercury in soils, rocks, and gasses: U.S. Geological Survey Professional Paper 501-D, p. D-123, D-127.

Wells, F. G., Cater, F. W., and Rynearson, G. A., 1946, Chromite deposits of Del Norte County, California: California Division of Mines Bulletin 134, p. 1-76.

Table 1.--Lower limits of analytical detection for rock and stream-sediment samples from the North Fork Smith River Roadless Area

[Limits of detection for elements are given in parts per million (ppm) except where noted. All analyses by spectrographic methods except for instrumentation mercury]

Element	Detection limit	Element	Detection limit
Ca	0.05 percent	Mn	10.
Fe	.05 percent	Mo	5.
Mg	.02 percent	Nb	20.
Ti	.002 percent	Ni	5.
Ag	.5	Pb	10.
As	200.	Sb	100.
Au	10.	Sc	5.
B	10.	Sn	10.
Ba	20.	Sr	100.
Be	1.	V	10.
Bi	10.	W	50.
Cd	20.	Y	10.
Co	5.	Zn	200.
Cr	10.	Zr	10.
Cu	5.	Th	100.
La	20.	Hg	0.02

Table 2a.--Results of rock geochemical analyses for samples from the North Fork Smith River Roadless Area

[Qualifying codes in analytical data are defined as follows: N, not detected at the limit of analytical detection; <, detected but below the limit of analytical determination; >, detected but above the limit of analytical determination; H, error during analysis, --, no analysis performed]

Sample	CA%	FE%	MG%	TI%	AG	AS	AU	B	BA	BE	BI	CO	CR	CU	LA	MN
SR20	<.05	>20.00	.50	.150	N	N	N	N	30	N	N	1,000	>5,000	100	N	2,000
SR21	<.05	>20.00	.20	.100	N	N	N	N	N	N	N	1,000	>5,000	200	N	2,000
SR61	1.00	10.00	1.50	.500	N	N	N	30	70	N	N	50	200	150	N	1,000
002SRP	N	7.00	10.00	<.002	N	N	N	100	N	N	N	100	3,000	70	N	300
003SRP	.30	7.00	10.00	<.002	N	N	N	10	N	N	N	150	5,000	7	N	700
05ASRP	.07	7.00	10.00	<.002	N	N	N	<10	N	N	N	150	5,000	30	N	1,000
009SRP	.20	7.00	10.00	.002	N	N	N	<10	N	N	N	150	5,000	7	N	1,000
012SRP	.20	7.00	10.00	<.002	N	N	N	15	N	N	N	150	5,000	50	N	1,000
014SRP	.20	7.00	10.00	<.002	N	N	N	<10	N	N	N	100	5,000	15	N	1,000
015SRP	.20	7.00	10.00	.002	N	N	N	<10	N	N	N	150	5,000	10	N	1,000
022SRP	5.00	5.00	10.00	.150	N	N	N	10	100	N	N	100	3,000	10	N	1,000
024SRP	.30	7.00	10.00	.002	N	N	N	30	N	N	N	150	5,000	<5	N	700
027SRP	.05	7.00	10.00	.002	1.0	N	N	10	N	N	50	150	5,000	50	N	1,000
030SRP	1.00	7.00	10.00	<.002	N	N	N	150	N	N	N	100	5,000	N	N	700
031SRP	.15	5.00	.50	.500	N	N	N	50	2,000	5	N	10	100	15	200	2,000
033SRP	.10	7.00	.70	.700	N	N	N	70	1,000	5	N	20	30	N	200	1,500
034SRP	.50	7.00	10.00	.003	N	N	N	70	N	N	N	100	2,000	10	N	1,000
035SRP	.15	5.00	.50	.500	1.0	N	N	150	1,500	5	10	N	15	5	150	20
036SRP	5.00	7.00	5.00	.700	N	N	N	<10	N	1	N	30	70	200	N	1,500
037SRP	5.00	10.00	7.00	.500	N	N	N	10	100	N	N	30	300	150	N	1,500
039SRP	.05	7.00	10.00	.002	N	N	N	N	N	N	N	150	>5,000	7	N	1,000
040SRP	.30	7.00	10.00	.002	N	N	N	N	N	N	N	150	3,000	20	N	1,000
042SRP	.30	7.00	>10.00	<.002	N	N	N	10	N	N	N	150	5,000	20	N	1,000
044SRP	N	3.00	10.00	<.002	N	N	N	<10	N	N	N	100	0	15	N	700
045SRP	.10	5.00	10.00	<.002	N	N	N	<10	N	N	N	100	3,000	20	N	1,000
047SRP	.05	5.00	>10.00	<.002	N	N	30	10	N	N	N	100	2,000	20	N	1,000
049SRP	.05	5.00	10.00	<.002	N	N	N	0	N	N	N	150	3,000	5	N	1,000
054SRP	.05	10.00	2.00	.100	N	N	N	N	N	N	N	150	>5,000	15	N	1,000
055SRP	.05	15.00	7.00	.003	N	N	N	<10	N	N	N	150	>5,000	10	N	1,500
059SRP	.30	7.00	10.00	<.002	N	N	N	<10	N	N	N	100	3,000	50	N	1,000
065SRP	<.05	>20.00	2.00	.0	15.0	1,000	N	N	N	N	N	500	3,000	15,000	N	150
067SRP	7.00	7.00	7.00	.200	N	N	N	10	20	N	N	50	1,500	300	N	1,000
068SRP	5.00	10.00	3.00	.500	N	N	N	20	50	N	N	50	300	20	N	1,000
069SRP	3.00	10.00	5.00	.500	N	N	N	10	N	N	N	30	50	10	N	1,000
070SRP	5.00	7.00	5.00	.500	N	N	N	10	N	N	N	150	150	N	N	1,000
071SRP	3.00	5.00	5.00	.200	N	N	N	<10	N	N	N	20	70	500	N	1,500
072SRP	5.00	7.00	7.00	.300	N	N	N	10	<20	N	N	50	500	5	N	1,000
073SRP	.15	7.00	10.00	.002	N	N	N	200	N	N	N	150	3,000	10	N	1,000
074SRP	7.00	7.00	7.00	.150	N	N	N	20	70	N	N	50	500	5	N	1,000
075SRP	7.00	7.00	7.00	.300	N	N	N	<10	N	N	N	30	2,000	150	N	1,500
076SRP	.70	10.00	10.00	.020	N	N	N	30	N	N	N	150	3,000	70	N	1,500
077SRP	.15	7.00	10.00	.020	N	N	N	15	N	N	N	150	3,000	20	N	1,000
079SRP	.30	7.00	10.00	.005	N	N	N	15	N	N	N	150	3,000	10	N	1,500
081SRP	.50	7.00	10.00	.002	N	N	N	<10	N	N	N	150	5,000	30	N	1,000
087SRP	5.00	15.00	7.00	.700	N	N	N	<10	N	N	N	100	700	300	N	3,000

Sample	MO	NB	NI	PB	SC	SN	SR	V	Y	ZN	ZR	HG-V
SR20	N	N	5,000	10	50	N	N	200	15	500	30	.90
SR21	100	N	5,000	10	70	N	N	200	15	500	20	.02
SR61	N	N	150	N	30	N	100	200	20	N	30	(10.00)
002SRP	N	N	3,000	10	5	N	N	30	N	N	N	.24
003SRP	N	N	5,000	10	7	N	N	50	N	N	N	.06
05ASRP	N	N	5,000	10	5	N	N	20	N	N	N	.04
009SRP	N	N	5,000	<10	5	N	N	20	N	N	N	.02
012SRP	N	N	5,000	30	7	N	N	50	N	N	N	.04
014SRP	N	N	5,000	<10	7	N	N	30	N	N	N	.02
015SRP	N	N	5,000	<10	7	N	N	30	N	N	N	.02
022SRP	N	N	2,000	<10	10	N	500	70	<10	N	30	.08
024SRP	N	N	5,000	<10	5	N	N	30	N	N	N	.20
027SRP	N	N	5,000	10	7	N	N	20	N	N	N	.08
030SRP	N	N	5,000	<10	10	N	100	0	N	N	N	.04
031SRP	7	100	200	50	N	N	500	<10	30	N	700	.36
033SRP	10	150	700	30	N	N	300	15	50	N	700	.12
034SRP	N	N	5,000	<10	5	N	<100	10	N	N	N	.10
035SRP	15	100	15	20	N	10	500	<10	20	N	700	1.70
036SRP	N	N	50	<10	30	N	200	500	30	N	100	.04
037SRP	N	N	70	<10	20	N	300	200	15	N	100	.04
039SRP	N	N	5,000	<10	5	N	N	30	N	N	N	.04
040SRP	N	N	5,000	<10	10	N	N	50	N	N	N	.02
042SRP	N	N	5,000	<10	10	N	N	50	N	N	N	.08
044SRP	N	N	5,000	<10	5	N	N	30	N	N	N	.12
045SRP	N	N	5,000	<10	5	N	N	50	N	N	N	.08
047SRP	N	N	5,000	<10	5	N	N	10	N	N	N	.12
049SRP	N	N	5,000	<10	<5	N	N	15	N	N	N	.04
054SRP	N	N	2,000	<10	7	N	N	500	N	N	N	.04
055SRP	N	N	5,000	<10	7	N	N	70	N	N	N	.04
059SRP	N	N	5,000	<10	10	N	N	30	N	N	N	.04
065SRP	15	N	>5,000	10	7	N	N	30	10	500	N	.30
067SRP	N	N	200	<10	50	N	150	200	15	N	20	.04
068SRP	N	N	70	<10	30	N	200	500	20	N	50	.08
069SRP	N	N	50	<10	30	N	100	500	30	N	50	.12
070SRP	N	N	50	<10	30	N	200	500	15	N	50	.06
071SRP	N	N	30	<10	15	N	150	150	<10	N	30	.08
072SRP	N	N	150	<10	30	N	150	300	15	N	50	.08
073SRP	N	N	5,000	<10	10	N	N	30	N	N	N	.04
074SRP	N	N	200	<10	30	N	200	200	10	N	20	.14
075SRP	N	N	200	<10	50	N	<100	300	30	N	50	.04
076SRP	N	N	5,000	<10	10	N	N	50	N	N	N	.04
077SRP	N	N	5,000	<10	7	N	N	50	N	N	N	.04
079SRP	N	N	5,000	<10	7	N	N	50	N	N	N	.08
081SRP	N	N	5,000	10	10	N	N	50	N	N	N	.08
087SRP	N	N	300	<10	50	N	<100	500	30	N	100	.06

Sample	CA%	FE%	MG%	TI%	AG	AS	AU	B	BA	BE	BI	CO	CR	CU	LA	MN
088SRP	1.00	7.00	10.00	.020	N	N	N	150	N	N	N	200	3,000	50	N	1,500
090SRP	.20	7.00	10.00	.010	N	N	N	150	N	N	N	150	2,000	50	N	700
091SRP	7.00	10.00	10.00	.150	N	N	N	<10	N	N	N	150	3,000	1,000	N	2,000
092SRP	.70	7.00	10.00	.020	N	N	N	15	N	N	N	150	3,000	50	N	1,000
096SRP	.05	7.00	10.00	.020	N	N	N	20	N	N	N	150	3,000	30	N	700
097SRP	.05	7.00	10.00	<.002	N	N	N	100	N	N	N	150	2,000	10	N	700
101SRP	.15	7.00	10.00	.002	N	N	N	30	N	N	N	150	3,000	15	N	1,000
103SRP	7.00	10.00	5.00	1.000	N	N	N	15	2,000	N	N	50	200	200	N	2,000
104SRP	1.00	5.00	10.00	.200	N	N	N	20	300	N	N	100	700	20	N	1,500
104BSRP	N	3.00	10.00	<.002	N	N	N	<10	N	N	N	100	3,000	N	N	500
107SRP	.30	7.00	10.00	<.002	N	N	N	10	N	N	N	150	3,000	10	N	1,000
108SRP	<.05	7.00	10.00	<.002	N	N	N	<10	N	N	N	150	5,000	<5	N	1,000
110SRP	<.05	15.00	3.00	.020	N	200	N	N	N	N	N	30	>5,000	7	N	2,000
113SRP	N	7.00	10.00	<.002	N	N	N	70	N	N	N	100	5,000	10	N	700
115SRP	.50	7.00	10.00	.002	N	N	N	10	N	N	N	150	3,000	20	N	100
121SRP	7.00	10.00	7.00	.700	N	N	N	10	50	N	N	70	300	300	N	1,500
122SRP	1.50	5.00	1.00	.100	N	N	N	30	2,000	5	N	N	30	N	200	700
125SRP	.30	5.00	10.00	<.002	N	N	N	200	N	N	N	100	2,000	<5	N	700
126SRP	.30	5.00	10.00	.002	N	N	N	100	N	N	N	100	2,000	7	N	700
129SRP	5.00	7.00	10.00	.030	N	N	N	20	N	N	N	100	2,000	10	N	1,000
130SRP	10.00	3.00	5.00	.150	N	N	N	10	150	N	N	20	500	20	N	0
131SRP	10.00	5.00	10.00	.100	N	N	N	10	N	N	N	50	5,000	5	N	1,500
132SRP	.10	10.00	10.00	.030	N	N	N	20	N	N	N	100	>5,000	<5	N	1,000
133SRP	7.00	5.00	10.00	.050	N	N	N	50	N	N	N	50	3,000	<5	N	1,500
134SRP	10.00	5.00	7.00	.070	N	N	N	N	N	N	N	30	1,000	7	N	700
135SRP	2.00	10.00	3.00	.700	N	N	N	20	50	N	N	30	15	100	N	1,000
136SRP	3.00	7.00	3.00	.500	N	N	N	70	300	1	N	20	10	20	N	2,000
137SRP	.30	3.00	.10	.050	N	N	N	70	700	10	N	N	20	N	200	1,000
139SRP	<.05	7.00	10.00	<.002	N	N	N	<10	N	N	N	150	3,000	7	N	1,000
140SRP	.15	7.00	10.00	.002	N	N	N	10	N	N	N	150	3,000	5	N	1,000
141SRP	.20	5.00	10.00	<.002	N	N	N	10	N	N	N	100	5,000	<5	N	1,000
142SRP	N	7.00	10.00	<.002	N	N	N	100	N	N	N	150	3,000	N	N	700
143SRP	.15	7.00	10.00	<.002	N	N	N	50	N	N	N	150	5,000	50	N	1,000
144SRP	.10	5.00	10.00	.0	N	N	N	<10	N	N	N	150	5,000	N	N	1,000
145SRP	2.00	7.00	10.00	.050	N	N	N	100	N	N	N	150	5,000	50	N	1,500
148SRP	.20	7.00	10.00	<.002	N	N	N	N	N	N	N	150	5,000	10	N	1,000
149SRP	.15	7.00	10.00	.002	N	N	N	<10	N	N	N	150	5,000	N	N	1,000
150SRP	.10	7.00	10.00	<.002	N	N	N	70	N	N	N	150	5,000	5	N	1,000
151SRP	.20	7.00	10.00	.002	N	N	N	<10	N	N	N	200	5,000	15	N	1,000
152SRP	.20	7.00	10.00	<.002	N	N	N	100	N	N	N	150	5,000	5	N	1,000
153SRP	.30	7.00	10.00	<.002	N	N	N	30	N	N	N	150	5,000	30	N	1,000
154SRP	.30	7.00	10.00	<.002	N	N	N	50	N	N	N	150	5,000	15	N	1,000
155SRP	.50	10.00	10.00	.002	N	N	N	30	N	N	N	200	5,000	20	N	1,000
156SRP	.30	10.00	10.00	<.002	N	N	N	70	N	N	N	200	5,000	20	N	1,000
157SRP	.30	7.00	10.00	<.002	N	N	N	10	N	N	N	150	3,000	50	N	1,000

Sample	MO	NB	NI	PB	SC	SN	SR	V	Y	ZN	ZR	HG-V
088SRP	N	N	5,000	<10	10	N	N	70	N	N	N	.10
090SRP	N	N	5,000	<10	10	N	N	50	N	N	N	.12
091SRP	N	N	2,000	<10	70	N	N	300	N	N	N	.10
092SRP	N	N	>5,000	<10	10	N	N	50	N	N	N	.06
096SRP	N	N	>5,000	<10	7	N	N	70	N	N	N	.16
097SRP	N	N	>5,000	<10	5	N	N	10	N	N	N	.06
101SRP	N	N	5,000	10	5	N	N	30	N	N	N	.04
103SRP	N	N	100	10	50	N	200	300	30	N	100	.08
104SRP	5	N	5,000	50	10	N	100	70	N	N	20	.26
104BSRP	N	N	5,000	<10	N	N	N	<10	N	N	N	.10
107SRP	N	N	5,000	<10	10	N	N	30	N	N	N	.02
108SRP	N	N	5,000	<10	N	N	N	<10	N	N	N	.02
110SRP	N	N	1,500	<10	10	N	N	300	N	500	N	.04
113SRP	N	N	3,000	<10	5	N	N	30	N	N	N	.04
115SRP	N	N	3,000	<10	7	N	N	30	N	N	N	N
121SRP	N	N	100	<10	50	N	200	300	30	N	70	.06
122SRP	15	150	20	15	N	N	500	<10	50	N	700	.06
125SRP	N	N	3,000	<10	5	N	N	30	N	N	N	.02
126SRP	N	N	5,000	<10	5	N	N	20	N	N	N	.04
129SRP	N	N	1,500	<10	20	N	N	100	N	N	N	.02
130SRP	N	N	70	<10	15	N	300	100	N	N	10	N
131SRP	N	N	500	<10	70	N	N	150	<10	N	N	.02
132SRP	N	N	2,000	<10	7	N	N	150	N	N	N	.02
133SRP	N	N	1,000	<10	20	N	N	70	N	N	N	.04
134SRP	N	N	200	<10	50	N	150	100	N	N	N	N
135SRP	N	N	20	<10	20	N	200	500	30	N	100	.02
136SRP	N	N	100	<10	15	N	700	150	30	N	100	.02
137SRP	20	70	70	20	N	N	100	<10	50	N	500	.14
139SRP	N	N	5,000	<10	<5	N	N	15	N	N	N	.02
140SRP	N	N	5,000	<10	5	N	N	20	N	N	N	.02
141SRP	N	N	5,000	<10	5	N	N	30	N	N	N	<.02
142SRP	N	N	5,000	<10	7	N	N	30	N	N	N	<.02
143SRP	N	N	5,000	<10	7	N	N	30	N	N	N	.02
144SRP	N	N	5,000	<10	5	N	N	20	N	N	N	<.02
145SRP	N	N	2,000	<10	15	N	N	100	N	N	N	.02
148SRP	N	N	5,000	<10	7	N	N	30	N	N	N	.02
149SRP	N	N	5,000	<10	7	N	N	30	N	N	N	.02
150SRP	N	N	5,000	<10	10	N	N	30	N	N	N	.02
151SRP	N	N	5,000	<10	10	N	N	30	N	N	N	.04
152SRP	N	N	5,000	<10	10	N	N	30	N	N	N	<.02
153SRP	N	N	5,000	<10	10	N	N	30	N	N	N	.04
154SRP	N	N	5,000	<10	10	N	N	30	N	N	N	.02
155SRP	N	N	5,000	<10	15	N	N	50	N	N	N	.02
156SRP	N	N	5,000	<10	10	N	N	30	N	N	N	N
157SRP	N	N	5,000	<10	10	N	N	30	N	N	N	.04

Sample	CA%	FE%	MG%	TI%	AG	AS	AU	B	BA	BE	BI	CO	CR	CU	LA	MN
158SRP	.30	7.00	10.00	.002	N	N	N	<10	N	N	N	150	3,000	7	N	1,000
159SRP	.50	7.00	10.00	.003	N	N	N	70	N	N	N	150	3,000	30	N	1,000
160SRP	.30	10.00	10.00	.002	N	N	N	10	N	N	N	150	5,000	10	N	1,000
160SRP	.30	10.00	10.00	.002	N	N	N	10	N	N	N	150	5,000	50	N	1,000
162SRP	.20	7.00	10.00	.002	N	N	N	15	N	N	N	150	5,000	5	N	1,000
163SRP	.70	7.00	10.00	.015	N	N	N	100	N	N	N	150	5,000	30	N	1,500
165SRP	1.50	10.00	10.00	.010	N	N	N	20	N	N	N	150	5,000	20	N	1,500
166SRP	<.05	15.00	5.00	.030	N	N	N	N	N	N	N	200	>5,000	7	N	1,000
167SRP	<.05	15.00	5.00	.030	N	N	N	N	N	N	N	200	>5,000	7	N	1,000
168SRP	<.05	10.00	5.00	.030	N	N	N	N	N	N	N	200	>5,000	7	N	700
060BSRP	.50	7.00	10.00	<.002	N	N	N	<10	N	N	N	200	5,000	20	N	1,000
111SRP	.05	5.00	10.00	N	N	N	N	10	N	N	N	150	3,000	30	N	1,000
093SRP	.50	>20.00	5.00	.020	3.0	N	N	N	N	N	N	200	3,000	20,000	N	1,000
147SRP	.70	10.00	10.00	.070	N	N	N	10	N	N	N	150	3,000	150	N	1,500
146SRP	1.50	15.00	5.00	1.000	N	N	N	150	100	N	N	100	0	300	N	2,000
064SRP	N	>20.00	.50	.003	3.0	N	N	N	N	N	N	100	5,000	>20,000	N	300
031-2	2.00	10.00	1.00	.500	N	N	N	30	3,000	5	N	10	50	700	150	2,000
130-3	10.00	10.00	10.00	.200	N	N	N	15	20	N	N	50	500	70	N	1,000

Sample	MO	NB	NI	PB	SC	SN	SR	V	Y	ZN	ZR	MG-V
158SRP	N	N	5,000	<10	7	N	N	20	N	N	N	N
159SRP	N	N	5,000	<10	10	N	N	50	N	N	N	.02
160SRP	N	N	5,000	<10	10	N	N	30	N	N	N	.02
160SRP	N	N	5,000	<10	10	N	N	30	N	N	N	N
162SRP	N	N	5,000	<10	10	N	N	30	N	N	N	N
163SRP	N	N	5,000	10	15	N	N	70	N	N	N	.04
165SRP	N	N	5,000	<10	10	N	N	50	N	N	N	N
166SRP	N	N	2,000	<10	<5	N	N	500	N	500	N	.02
167SRP	N	N	3,000	<10	<5	N	N	700	N	700	N	N
168SRP	N	N	5,000	<10	<5	N	N	200	N	N	N	N
060BSRP	N	N	5,000	N	10	N	N	50	N	N	N	N
111SRP	N	N	5,000	<10	<5	N	N	15	N	N	N	.04
093SRP	N	N	5,000	15	7	N	N	50	50	500	N	1.20
147SRP	N	N	5,000	<10	10	N	N	50	<10	N	N	.36
146SRP	N	N	200	<10	50	N	150	200	50	N	30	8.00
064SRP	N	N	2,000	10	15	N	N	50	N	N	N	.32
031-2	5	50	20	30	5	N	1,000	10	50	N	500	.18
130-3	N	N	200	30	30	N	150	200	15	N	50	.04

Table 2b.--Results of stream-sediment geochemical analyses for samples from the Smith River Roadless Area

[Qualyfying codes in analytical data are defined as follows: N, not detected at the limit of analytical detection; <, detected but below the limit of analytical determination; >, detected but above the limit of analytical determiantion; H, error during analysis; --, no analysis performed]

Sample	CA%	FE%	MG%	TI%	AG	B	BA	BE	CO	CR	CU	LA	MN	MO	NI	PB	SC	SR
SR1	.30	5.00	5.00	.070	N	20	N	N	100	5,000	30	N	500	7	2,000	10	10	N
SR2	.30	7.00	5.00	.150	N	20	100	N	100	5,000	50	N	500	N	2,000	10	10	N
SR3	.30	10.00	5.00	.100	N	20	N	N	100	>5,000	50	N	1,000	N	5,000	20	10	N
SR4	.30	5.00	5.00	.150	N	20	30	N	70	3,000	20	N	1,000	N	2,000	<10	7	N
SR5	.20	7.00	5.00	.150	N	20	50	N	70	>5,000	30	N	1,000	N	3,000	15	10	N
SR6	.0	7.00	5.00	.070	N	20	70	N	100	5,000	20	N	1,000	N	3,000	N	7	N
SR7	.30	7.00	5.00	.050	N	20	N	N	70	5,000	20	N	1,000	N	3,000	N	10	N
1SRP	.10	3.00	7.00	.010	N	10	20	N	30	1,500	10	<20	500	N	1,500	N	5	N
2SRP	.20	5.00	10.00	.050	N	20	20	N	50	2,000	20	<20	700	N	2,000	10	7	N
4SRP	.20	10.00	10.00	.030	N	20	50	N	100	5,000	30	N	1,000	N	5,000	15	15	N
6SRP	.30	10.00	10.00	.050	N	30	30	N	100	>5,000	30	N	1,500	N	5,000	10	15	N
7SRP	.30	10.00	10.00	.030	N	20	<20	N	100	>5,000	30	N	1,500	N	5,000	15	10	N
8SRP	.30	10.00	10.00	.070	N	30	100	N	150	>5,000	50	N	1,500	N	>5,000	10	15	N
10SRP	.50	10.00	10.00	.150	N	30	200	N	100	>5,000	70	N	1,000	N	3,000	15	15	100
11SRP	.50	15.00	10.00	.050	N	10	<20	N	150	>5,000	30	N	2,000	N	>5,000	10	15	N
13SRP	.30	10.00	10.00	.050	N	30	30	N	150	>5,000	50	N	1,500	N	>5,000	20	10	N
16SRP	.10	20.00	10.00	.050	N	15	20	N	200	>5,000	50	N	2,000	N	>5,000	15	20	N
17SRP	.20	15.00	10.00	.030	N	20	20	N	150	>5,000	50	N	0	N	>5,000	10	15	N
18SRP	.30	15.00	10.00	.070	N	20	50	N	150	>5,000	50	N	2,000	N	>5,000	15	15	N
19SRP	.10	15.00	10.00	.050	N	10	<20	N	200	>5,000	50	N	2,000	N	>5,000	15	20	N
20SRP	.20	15.00	10.00	.050	N	20	20	N	200	>5,000	50	N	2,000	N	>5,000	20	20	N
21SRP	.30	7.00	10.00	.050	N	15	<20	N	100	>5,000	30	N	1,500	N	>5,000	10	10	<100
23SRP	.30	15.00	10.00	.070	N	20	<20	N	150	>5,000	30	N	2,000	N	>5,000	10	10	N
25SRP	.50	10.00	10.00	.150	N	10	30	N	150	>5,000	50	N	2,000	N	>5,000	15	10	100
26SRP	.30	10.00	10.00	.100	N	20	20	N	100	>5,000	20	N	1,500	N	>5,000	15	10	N
28SRP	.30	10.00	10.00	.070	N	30	20	N	150	>5,000	30	N	1,500	N	>5,000	15	10	N
29SRP	.30	10.00	10.00	.100	N	20	150	N	150	>5,000	20	<20	1,500	N	>5,000	15	7	N
32SRP	.15	7.00	10.00	.030	N	20	<20	N	100	>5,000	20	N	1,000	N	5,000	10	7	N
38SRP	.50	7.00	10.00	.030	N	20	20	N	100	>5,000	20	N	1,000	N	5,000	10	10	N
41SRP	.70	10.00	.10	.150	N	30	150	N	100	>5,000	50	N	1,500	N	5,000	15	15	100
43SRP	.70	10.00	10.00	.100	N	50	100	N	150	>5,000	50	N	1,500	N	>5,000	10	15	<100
46SRP	.30	.15	10.00	.030	N	10	<20	N	150	>5,000	20	N	2,000	N	>5,000	10	10	N
48SRP	.30	7.00	10.00	.003	N	15	<20	N	100	>5,000	30	N	1,000	N	5,000	10	7	N
50SRP	.30	7.00	10.00	.070	N	20	100	N	100	3,000	70	N	1,000	N	>5,000	15	10	<100
51SRP	.70	10.00	10.00	.100	N	150	100	N	150	>5,000	70	N	2,000	N	>5,000	15	15	<100
52SRP	.50	10.00	10.00	.150	N	70	300	N	100	>5,000	70	N	2,000	N	5,000	20	15	<100
53SRP	.50	10.00	10.00	.070	N	30	70	N	150	>5,000	50	N	2,000	N	>5,000	20	0	N
56SRP	.30	10.00	7.00	.300	N	100	700	2	70	5,000	100	30	1,500	N	1,500	20	20	150
57SRP	.30	10.00	10.00	.020	N	15	<20	N	150	>5,000	30	N	1,500	N	>5,000	10	10	N
58SRP	.10	20.00	7.00	.050	N	<10	30	N	200	>5,000	70	<20	3,000	N	>5,000	15	20	N
59SRP	1.00	10.00	10.00	.150	N	70	<20	N	100	>5,000	50	N	1,500	N	5,000	15	15	100
61SRP	.50	7.00	10.00	.070	N	100	<20	N	100	5,000	70	N	1,000	N	5,000	20	7	N
62SRP	.70	15.00	10.00	.150	N	15	<20	N	150	>5,000	50	N	1,000	N	>5,000	10	15	N
63SRP	.30	10.00	10.00	.050	N	15	<20	N	150	>5,000	30	N	1,000	N	>5,000	15	10	N
66SRP	.20	10.00	10.00	.005	N	20	<20	N	200	2,000	30	N	2,000	N	>5,000	10	10	N

Sample	V	Y	ZN	ZR	HG-V
SR1	50	N	N	15	.10
SR2	100	N	N	20	1.80
SR3	100	N	N	10	.85
SR4	70	10	N	20	.08
SR5	70	10	N	30	.10
SR6	50	N	N	20	.12
SR7	50	N	N	20	.02
1SRP	20	N	N	N	3.00
2SRP	50	N	N	15	.60
4SRP	70	N	N	10	.18
6SRP	100	N	N	15	.16
7SRP	150	N	N	10	.10
8SRP	70	N	N	20	.14
10SRP	200	10	N	150	.62
11SRP	150	N	0	20	.10
13SRP	70	N	N	30	.36
16SRP	200	N	0	15	.0
17SRP	100	N	N	15	.16
18SRP	0	N	N	30	.16
19SRP	150	N	N	10	.08
20SRP	100	N	N	15	.08
21SRP	70	N	N	10	.08
23SRP	200	N	0	15	.08
25SRP	100	N	N	20	.18
26SRP	100	N	N	30	.16
28SRP	100	N	N	70	.16
29SRP	100	N	N	100	.40
32SRP	50	N	N	20	.20
38SRP	70	N	N	10	.10
41SRP	100	<10	N	50	1.20
43SRP	100	N	N	30	.16
46SRP	100	N	N	<10	.0
48SRP	20	N	N	N	.08
50SRP	50	N	N	20	.48
51SRP	100	N	N	20	.18
52SRP	100	<10	N	50	.20
53SRP	100	N	N	120	.82
56SRP	200	20	N	150	.12
57SRP	70	N	N	N	.10
58SRP	150	N	<200	20	.12
59SRP	150	N	N	30	1.10
61SRP	50	N	N	15	1.50
62SRP	200	N	N	15	.12
63SRP	50	N	N	<10	.14
66SRP	30	N	N	N	.08

Sample	CA%	FE%	MG%	TI%	AG	B	BA	BE	CO	CR	CU	LA	MN	MO	NI	PB	SC	SR
78SRP	.30	10.00	7.00	.100	N	15	70	N	150	5,000	20	N	2,000	N	>5,000	15	10	N
80SRP	.30	10.00	10.00	.030	N	1	20	N	150	>5,000	30	N	1,500	N	>5,000	10	10	N
82SRP	.30	10.00	10.00	.030	N	10	20	N	150	>5,000	20	N	1,000	N	>5,000	10	10	N
83SRP	1.00	15.00	10.00	.300	N	30	20	N	150	>5,000	50	N	1,500	N	>5,000	10	10	100
84SRP	1.00	20.00	.10	.300	N	10	20	N	200	>5,000	100	N	3,000	N	>5,000	10	15	100
85SRP	1.00	10.00	10.00	.100	N	50	0	N	0	5,000	70	N	2,000	N	>5,000	10	15	100
86SRP	.50	15.00	10.00	.150	N	50	20	N	200	5,000	70	N	3,000	N	>5,000	10	15	<100
89SRP	.50	10.00	10.00	.070	N	50	20	N	150	5,000	50	N	1,500	N	>5,000	15	7	<100
94SRP	1.00	10.00	10.00	.150	N	150	150	N	150	5,000	50	<20	1,500	N	>5,000	10	10	100
95SRP	.70	10.00	10.00	.050	N	<10	20	N	150	5,000	50	N	1,000	N	>5,000	10	10	N
98SRP	1.50	10.00	10.00	.200	N	50	50	N	100	5,000	70	N	1,500	N	5,000	15	15	100
98SRP	1.00	7.00	10.00	.150	N	20	30	N	100	3,000	50	<20	1,500	N	>5,000	10	10	<100
100SRP	5.00	15.00	7.00	.700	N	N	500	N	70	500	<5	N	2,000	N	500	10	30	500
102SRP	3.00	10.00	10.00	.200	N	10	30	N	100	>5,000	50	N	1,500	N	3,000	10	20	<100
105SRP	.50	10.00	10.00	.100	N	20	50	N	150	>5,000	20	N	1,500	N	5,000	10	10	N
106SRP	.50	15.00	10.00	.200	N	20	30	N	150	>5,000	30	N	2,000	N	>5,000	15	10	N
112SRP	.50	10.00	10.00	.100	N	20	20	N	200	>5,000	30	N	1,500	N	>5,000	10	10	N
114SRP	.70	10.00	10.00	.100	N	20	30	N	200	>5,000	50	N	200	N	>5,000	10	10	N
116SRP	.70	10.00	10.00	.100	N	20	20	N	150	>5,000	50	N	1,500	N	>5,000	10	10	N
117SRP	.70	10.00	10.00	.150	N	15	30	N	150	>5,000	30	N	2,000	N	>5,000	15	10	N
118SRP	.30	20.00	10.00	.050	N	20	20	N	200	>5,000	50	N	2,000	N	>5,000	15	10	N
119SRP	.30	10.00	10.00	.050	N	20	20	N	150	>5,000	30	N	2,000	N	>5,000	10	10	N
120SRP	2.00	10.00	10.00	.200	N	20	20	N	100	>5,000	50	N	1,500	N	>5,000	10	20	100
123SRP	3.00	10.00	10.00	.300	N	20	30	N	100	5,000	70	N	2,000	N	5,000	<10	30	100
124SRP	5.00	10.00	10.00	.200	N	20	20	N	100	>5,000	50	N	2,000	N	5,000	<10	50	<100
127SRP	5.00	10.00	10.00	.200	N	20	20	N	100	>5,000	50	N	2,000	N	5,000	10	50	<100
128SRP	2.00	7.00	7.00	.150	N	15	20	N	70	5,000	70	N	1,500	N	3,000	10	20	<100
1SRG	.50	15.00	10.00	.100	3.0	30	<20	N	150	>5,000	30	N	2,000	N	>5,000	<10	7	N
003SRG	1.00	10.00	10.00	.015	N	100	N	N	150	3,000	100	N	1,000	N	5,000	<10	10	N
164SRP	2.00	15.00	10.00	.200	N	10	100	N	150	5,000	500	N	2,000	N	5,000	15	15	200

Sample	V	Y	ZN	ZR	HG-V
78SRP	70	10	N	20	.16
80SRP	70	N	N	10	.12
82SRP	150	N	N	<10	.24
83SRP	100	<10	N	15	.16
84SRP	300	10	500	30	.88
85SRP	100	10	N	20	.16
86SRP	150	<10	N	20	.42
89SRP	70	N	N	0	.30
94SRP	100	<10	N	30	.22
95SRP	70	N	N	10	.18
98SRP	150	10	N	30	.20
98SRP	70	<10	N	50	.14
100SRP	200	30	N	70	.16
102SRP	200	<10	N	20	.08
105SRP	100	N	N	20	.06
106SRP	100	<10	N	30	.16
112SRP	100	N	N	15	.10
114SRP	100	N	N	15	.18
116SRP	100	N	N	10	.54
117SRP	150	N	N	20	.14
118SRP	150	N	<200	15	.12
119SRP	100	N	N	10	.08
120SRP	200	10	N	20	.18
123SRP	200	10	N	20	5.20
124SRP	200	<10	N	15	.36
127SRP	300	10	N	20	.16
128SRP	150	<10	N	15	.30
1SRG	200	N	N	10	.16
003SRG	50	N	N	N	.32
164SRP	150	<10	N	50	.08

Table 3.--Fire assay-spectrographic analyses of gold and platinum-group elements
[Fire assay by Robert R. Carlson; emission spectrography by E. F. Cooley]

Field number	Au ppm	Pt ppm	Pd ppm	Rh ppm	Ru ppm	Ir ppm
002 SRP 80	0.020	0.020	0.010	N(0.004)	N(0.200)	N(0.100)
003	0.006	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
005a	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
009	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
012	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
014	0.006	0.040	0.010	N(0.004)	N(0.200)	N(0.100)
015	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
022	0.010	0.060	0.004	N(0.004)	N(0.200)	N(0.100)
024	0.010	0.020	0.004	N(0.004)	N(0.200)	N(0.100)
027	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
030	0.006	0.040	0.004	N(0.004)	N(0.200)	N(0.100)
033	N(0.001)	N(0.005)	N(0.001)	N(0.002)	N(0.100)	N(0.050)
034	0.004	0.040	0.002	N(0.004)	N(0.200)	N(0.100)
039	0.004	0.140	0.020	N(0.004)	N(0.200)	N(0.100)
040	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
042	0.004	N(0.010)	0.004	N(0.004)	N(0.200)	N(0.100)
044	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
045	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
047	N(0.002)	N(0.010))	N(0.002)	N(0.004)	N(0.200)	N(0.100)
049	0.010	0.040	0.002	N(0.004)	N(0.200)	N(0.100)
054	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	0.140
055	N(0.002)	(N0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
059	0.014	0.040	0.002	N(0.004)	N(0.200)	N(0.100)
065	1.0	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
067	0.005	N(0.005)	0.005	(N(0.002)	N(0.100)	N(0.050)
069	0.002	N(0.005)	0.005	N(0.002)	N(0.100)	N(0.050)
072	0.002	0.005	0.005	N(0.002)	N(0.100)	N(0.050)
073	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
074	0.002	0.030	0.030	N(0.002)	N(0.100)	N(0.050)
075	0.001	N(0.005)	0.003	N(0.002)	N(0.100)	N(0.050)
076	0.015	0.040	0.010	N(0.004)	N(0.200)	N(0.100)
077	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
079	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
081	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
088	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)

Field number	Au ppm	Pt ppm	Pd ppm	Rh ppm	Ru ppm	Ir ppm
090	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
091	0.010	0.100	0.040	N(0.004)	N(0.200)	N(0.100)
092	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
096	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
097	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
101	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
103	0.005	N(0.005)	N(0.001)	N(0.002)	N(0.100)	N(0.050)
104	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
104b	0.004	0.040	N(0.002)	N(0.004)	N(0.200)	N(0.100)
107	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
108	0.004	0.040	N(0.002)	N(0.004)	N(0.200)	N(0.100)
110	0.004	0.040	0.004	N(0.004)	N(0.200)	N(0.100)
113	0.002	0.030	0.002	N(0.004)	N(0.200)	N(0.100)
115	0.006	0.040	0.020	N(0.004)	N(0.200)	N(0.100)
121	0.002	N(0.005)	N(0.001)	N(0.002)	N(0.100)	N(0.050)
125	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
126	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
129	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
130	N(0.001)	N(0.005)	0.010	N(0.002)	N(0.100)	N(0.050)
131	N(0.002)	N(0.010)	0.004	N(0.004)	N(0.200)	N(0.100)1
132	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
133	N(0.002)	N(0.010)	0.002	N(0.004)	N(0.200)	N(0.100)
134	N(0.001)	N(0.005)	N(0.001)	N(0.002)	N(0.100)	N(0.050)
137	N(0.001)	N(0.005)	N(0.001)	N(0.002)	N(0.100)	N(0.050)
139	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
140	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
141	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
142	0.002	0.040	0.002	N(0.004)	N(0.002)	N(0.100)
143	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
144	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
145	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
148	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
149	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
150	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
151	0.010	0.040	0.010	N(0.004)	N(0.200)	N(0.100)
152	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
154	0.004	0.040	0.010	N(0.004)	N(0.200)	N(0.100)
155	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
156	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
157	N(0.002)	N(0.010)	0.002	N(0.004)	N(0.200)	N(0.100)

Field number	Au ppm	Pt ppm	Pd ppm	Rh ppm	Ru ppm	Ir ppm
158	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
159	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
160	N(0.002)	N(0.010)	0.002)	N(0.004)	N(0.200)	N(0.100)
161	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
162	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
163	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
165	0.006	0.040	0.010	N(0.004)	N(0.200)	0.100
166	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
167	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
168	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
169	N(0.001)	N(0.005)	0.001	N(0.002)	N(0.100)	N(0.050)
170	N(0.001)	N(0.005)	N(0.001)	N(0.002)	N(0.100)	N(0.050)
171	N(0.001)	N(0.005)	N(0.001)	N(0.002)	N(0.100)	N(0.050)
172	N(0.001)	N(0.005)	N(0.001)	N(0.002)	N(0.100)	N(0.050)
173	0.002	N(0.005)	N(0.001)	N(0.002)	N(0.100)	N(0.050)
174	N(0.001)	N(0.005)	N(0.001)	N(0.002)	N(0.100)	N(0.050)
060b	0.006	0.040	N(0.002)	N(0.004)	N(0.200)	N(0.100)
111	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
093	0.060	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
147	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.200)	N(0.100)
146	N(0.001)	N(0.005)	N(0.001)	N(0.002)	N(0.100)	N(0.050)
003	(N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.050)	N(0.100)
064	0.030	0.010	0.006	N(0.004)	N(0.050)	N(0.100)
164	N(0.002)	N(0.010)	N(0.002)	N(0.004)	N(0.050)	N(0.100)

Table 4.--Analysis of chromite-rich rocks in the North Fork Smith River, northern California

Field number	Fe (percent)	Mg (percent)	Ni (percent)	Si (percent)	Cr (ppm)	Al (ppm)
SR-24 -----	9.9	8.9	0.13	2.1	240,000	105,000
SR-26 -----	9.7	10.4	.16	2.8	316,000	56,500
SR-27 -----	10.9	8.8	.11	.7	353,000	69,600
SR-28 -----	10.1	10.3	.15	2.0	279,000	95,600
SR-30 -----	10.1	9.5	.14	2.0	289,000	88,700
SR-31 -----	12.1	8.2	.28	.9	368,000	46,300
SR-32 -----	14.3	7.7	.20	1.6	350,000	44,000
SR-33 -----	13.3	7.7	.29	1.4	353,000	45,100
SR-34 -----	14.5	5.0	.23	1.5	274,000	30,600
SR-35 -----	13.0	8.0	.19	1.3	350,000	49,500
SR-36 -----	10.6	10.0	.14	2.7	307,000	59,400
SR-39 -----	11.1	9.6	.13	2.4	278,000	81,900
SR-41 -----	8.0	11.2	.20	1.6	183,000	178,000
SR-42 -----	9.3	10.2	.14	3.0	214,000	102,000
SR-43 -----	11.6	8.7	.11	1.1	315,000	79,500
SR-44 -----	8.5	12.0	.15	4.2	248,000	73,500
SR-45 -----	10.8	7.5	.08	1.3	330,000	39,800
SR-46 -----	12.8	8.0	.08	1.1	357,000	51,600
SR-47 -----	10.7	9.1	.15	1.9	354,000	42,800
SR-48 -----	15.6	6.5	.05	1.8	322,000	57,300
SR-50 -----	12.6	9.3	.11	3.2	259,000	75,900
SR-51 -----	9.4	10.1	.13	1.9	266,000	109,000
SR-53 -----	10.0	12.4	.16	5.0	269,000	32,000
SR-55 -----	10.8	9.9	.10	3.0	315,000	51,800
SR-56 -----	9.4	14.8	.23	9.6	170,000	25,800
SR-57 -----	12.2	8.8	.11	2.3	313,000	62,000
SR-62 -----	9.9	9.5	.13	1.0	293,000	105,000
SR-63 -----	9.2	11.4	.16	3.4	214,000	115,000

Table 5 --Analysis of platinum-group elements from chromite-rich rocks, North Fork Smith River, northern California
[All number in parts per million]

Field number	Pd	Pt	Rh	Ir	Ru
SR-24 -----	0.012	0.040	1*	1*	1*
SR-26 -----	.004	1*	.009	.040	.11
SR-27 -----	.010	.073	.030	.15	.28
SR-28 -----	1*	1*	1*	1*	1*
SR-30 -----	1*	1*	.006	.058	.19
SR-31 -----	1*	.28	.040	.25	.40
SR-32 -----	1*	.35	.12	.83	1.13
SR-33 -----	1*	.34	.060	.28	.35
SR-34 -----	1*	.39	.076	.28	.41
SR-35 -----	.016	.50	.043	.11	.21
SR-36 -----	.005	.067	.073	.055	.91
SR-39 -----	.005	1*	.006	.029	1*
SR-41 -----	<.004	<.010	18	<.020	1*
SR-42 -----	<.004	1*	1*	<.020	1*
SR-43 -----	<.004	1*	1*	.055	.24
SR-44 -----	<.004	1*	1*	<.020	1*
SR-45 -----	<.004	1*	.018	.055	.21
SR-46 -----	<.004	1*	.019	.19	.29
SR-47 -----	1*	1*	1*	.034	.18
SR-48 -----	1*	1*	1*	.050	.20
SR-50 -----	1*	.011	1*	.027	.16
SR-51 -----	1*	.019	1*	.025	.14
SR-53 -----	1*	1*	.012	.045	1*
SR-55 -----	1*	1*	.012	.045	1*
SR-56 -----	1*	.019	.016	.012	.27
SR-57 -----	.008	.015	.014	.061	.19
SR-62 -----	.011	.028	.012	.055	.020
SR-63 -----	.004	1*	.010	.063	.32

*Element is present but below our routine limit of determiation and too low to assign a value.