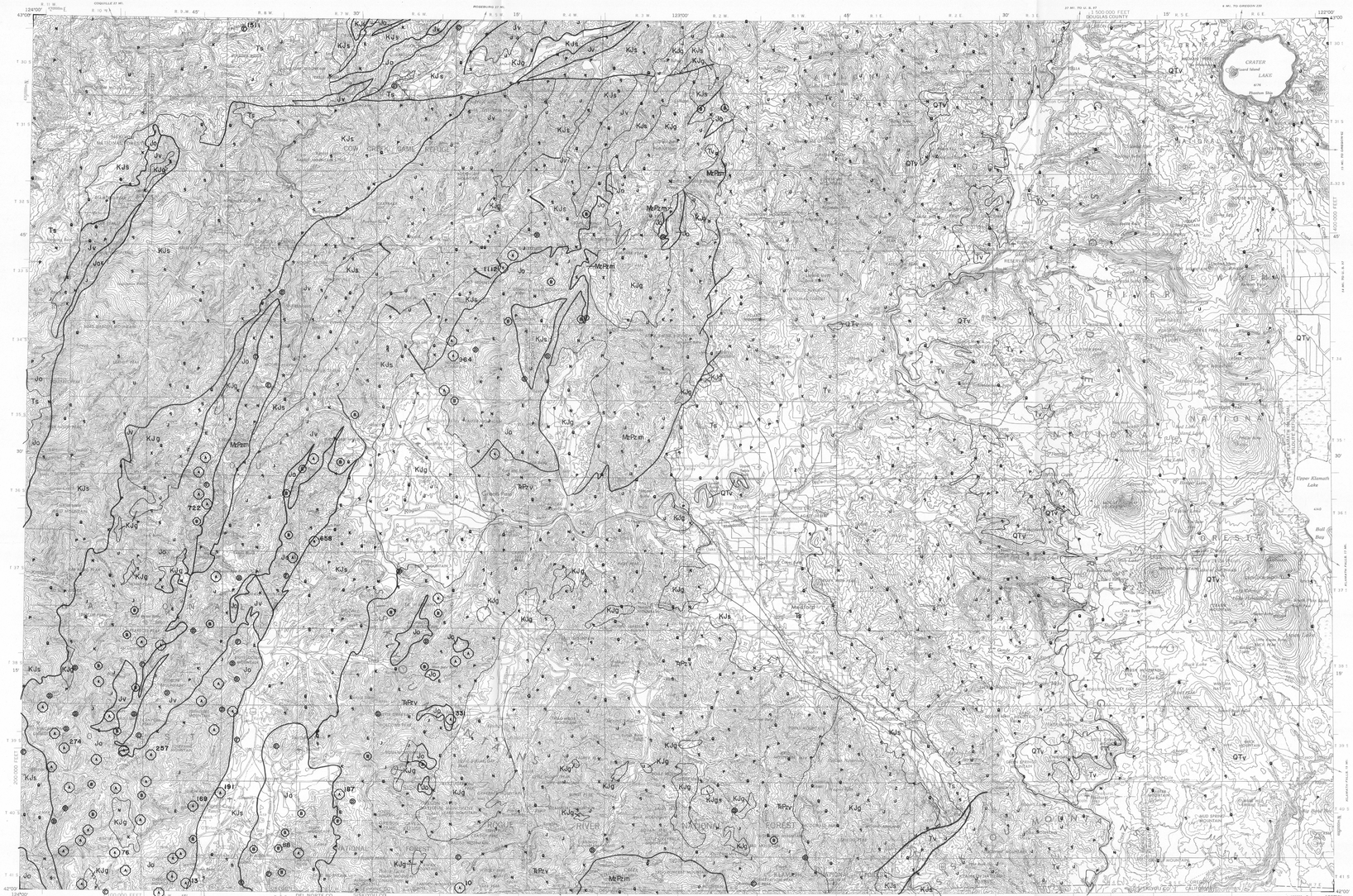
DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-1383-I



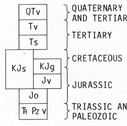
MAP SHOWING ABUNDANCE AND DISTRIBUTION OF CHROMIUM IN STREAM-SEDIMENT SAMPLES, MEDFORD 1° BY 2° QUADRANGLE, OREGON-CALIFORNIA

By

Charles L. Whittington, David J. Grimes, and Reinhard W. Leinz

1985

CORRELATION OF MAP UNITS



LIST OF MAP UNITS

QTv	VOLCANIC ROCKS OF HIGH CASCADE RANGE (QUATERNARY AND TERTIARY)
Tv	VOLCANIC ROCKS OF WESTERN CASCADE RANGE (TERTIARY)
Ts	MARINE AND NONMARINE SEDIMENTARY ROCKS (TERTIARY)
KJs	SEDIMENTARY ROCKS (CRETACEOUS AND JURASSIC)
KJg	GRANITIC ROCKS (CRETACEOUS AND JURASSIC)
Jv	VOLCANIC ROCKS (JURASSIC)
Jo	OPHIOLITE (JURASSIC)
TRPzv	VOLCANIC ROCKS (TRIASSIC AND PALEOZOIC)
MzPzm	REGIONALLY METAMORPHOSED ROCKS (MESOZOIC AND PALEOZOIC)

CONTACT

FAULT

124 SAMPLE LOCALITY NUMBER--Corresponds to number in table 1 and(or) discussion

A SAMPLE LOCALITY--See figure 1 for letter values

ANOMALOUS CHROMIUM CONCENTRATION IN SIEVED STREAM SEDIMENT--See figure 1 for values

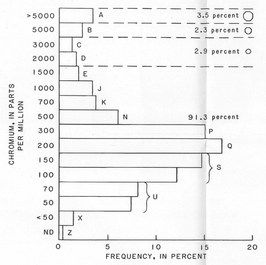


Figure 1.--Histogram showing the concentration of chromium in stream-sediment samples. ND, not detected; <, present but less than determination limit; determination limit, 50 parts per million; >, greater than value shown.

This map is part of a folio of maps of the Medford 1° by 2° quadrangle, Oregon-California, prepared under the Conterminous United States Mineral Assessment Program. Other publications in this folio include Page, Blakely, and Cannon (1983); Page, Johnson, and Peterson (1983); Singer and others (1983); Smith and others (1982); Whittington, Grimes, and Leinz (1985a,b); Whittington, Grimes, and Peterson (1983); Whittington, Leinz, and Grimes (1985a,b); and Whittington, Leinz, and Speckman (1983).

INTRODUCTION

The Medford quadrangle is located in mountainous southwestern Oregon adjacent to the California border and a short distance east of the Pacific coast. Various parts of this area lie in different geologic provinces. Most of the western half of the quadrangle is underlain by pre-tertiary rocks of the Klamath Mountains province. However, the Coast Range province is represented by the Tertiary sedimentary rocks in the northwest corner. Much of the eastern half of the quadrangle lies in the Cascade Range. In Oregon, because of differences in physiographic expression and age of rocks, this province is commonly divided into the more rugged High Cascade Range on the east and the more subdued Western Cascade Range on the west. This division is approximated on the map by the contact between the Quaternary and Tertiary volcanic rocks of the High Cascade Range and the Tertiary volcanic rocks of the Western Cascade Range. The geology shown on the map is generalized from a more detailed compilation by Smith and others (1982).

DISCUSSION

Stream-sediment sampling in the Medford 1° by 2° quadrangle was undertaken to provide data to aid in assessment of the mineral resource potential of the quadrangle. This map presents data on the abundance and distribution of chromium in the minus-0.18-mm sieved fraction of stream sediments collected in the quadrangle.

For the stream-sediment sampling program, the quadrangle was divided on a grid system into about 1,600 cells. Cells 3 km on a side were laid out for the two-thirds of the quadrangle considered geologically favorable for undiscovered metalliferous mineral deposits. The areas considered unfavorable, the volcanic rocks of the late Tertiary and Quaternary age in the east and the sedimentary rocks of Jurassic to Tertiary age in the northwest, were divided into cells 5 km on a side. So far as possible, one site per cell was sampled in all areas containing bedrock exposures. Where possible, samples were taken from the most active part of streams. Preference was given to sampling flowing streams having small drainage basins (5 km² or less), lying mostly or entirely within a single cell. Where such streams could not be found or were not accessible, other streams or dry drainages were sampled. Attempts were made to avoid obvious contamination, but some samples were deliberately taken below mines to determine trace-element signatures reflecting those known occurrences.

The stream-sediment samples were air dried in metal-free paper envelopes and sieved to minus 0.18 mm in stainless-steel sieves. This minus-0.18-mm fraction of the sediments was analyzed for 18 or more elements by an emission spectrographic method (Grimes and Marranzino, 1968). The precision of the method is reported by Motooka and Grimes (1976).

A Honeywell 60/68² computer equipped with Multics operating system and located at the U.S. Geological Survey Computer Center in Denver, Colo., was used to merge and manipulate analytical and location data for the 1,529 sediment samples from the quadrangle. The plot of chromium distribution and abundance was produced on a Calcomp flat-bed plotter from this data. In order to improve the clarity of the plot, it has been modified at eight places by deleting overlapping letter symbols, retaining in each case the symbol reflecting the higher concentration of chromium.

Chromium occurs in most rocks, but commercially valuable deposits of the metal are almost entirely confined to concentrations of the mineral chromite in ultramafic rocks. Historically, Oregon ranks third among the states in chromite production. Nearly all the chromite produced in southwestern Oregon, except that from ancient beach sands, has come from areas within the Medford quadrangle (Ramp, 1961, p. 24-25, pl. 1; Thayer and Ramp, 1969; Ramp and Peterson, 1979, p. 34).

The geochemical map shows the abundance and distribution of chromium in the minus-0.18-mm fraction of stream sediments. Symbols and letters used to represent the concentrations of chromium and the locations sampled are defined in the histogram on figure 1. Concentrations of chromium in the upper 8.7 percent frequency, denoted by octagons, are arbitrarily considered anomalous in terms of the entire sample population, although they are not necessarily anomalous for samples of ultramafic rocks.

Partial analytical results of selected samples containing anomalous amounts of chromium are listed in table 1. Complete analytical data on all stream-sediment samples are tabulated in Whittington, Leinz, and Speckman (1983), wherein sample localities are designated by numbers that increase from 1 to 1,529 with increasing values of the Y-coordinate (northing) in the Universal Transverse Mercator grid system. The selected sample sites referred to on this map are identified by the same series of numbers.

Most of the anomalous occurrences of chromium are inferred to be related predominantly to detrital chromite in sediments of streams draining areas of ultramafic rocks. Ultramafic rocks form a considerable part of the ophiolite sequence of Jurassic age. Smaller areas of ultramafic rocks are widespread in volcanic rocks of Paleozoic and Triassic age and are locally present in other units. Except for sample locality 1511, the data in table 1 are for sediment samples from streams draining areas of ultramafic rocks and were selected to illustrate variations in metal content typical of samples from such terrain.

Table 1.--Partial analytical results of selected stream-sediment samples containing anomalous amounts of chromium, Medford 1° by 2° quadrangle, Oregon-California

[Values in parts per million; number in parentheses (S) indicates lower limit of determination; ND, not detected; <, present but less than determination limit; >, greater than value shown. Emission spectroscopy by D. J. Grimes and R. T. Hopkins]

Sample locality No.	Field No.	Elements				
		Cr (50)	Co (5)	Cu (5)	Ni (5)	Zn (200)
10	78M031S	>5,000	30	30	1,000	300
13	78M759S	>5,000	1,000	100	3,000	500
76	79M815S	>5,000	100	20	2,000	300
88	78M762S	5,000	300	700	3,000	<200
169	79M823S	>5,000	150	15	3,000	200
187	80M1290S	>5,000	70	50	700	ND
191	79M824S	>5,000	100	20	1,500	ND
257	K190SS	>5,000	150	50	5,000	ND
274	K100SS	>5,000	100	20	3,000	300
331	78M060S	>5,000	150	20	5,000	200
658	78M083S	>5,000	50	20	1,000	200
722	79M1200S	>5,000	70	15	2,000	ND
964	78M637S	>5,000	100	30	2,000	<200
1112	78M654S	>5,000	100	70	700	ND
1511	79M32uS	3,000	20	30	100	ND

REFERENCES CITED

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

Motooka, J. M., and Grimes, D. J., 1976, Analytical precision of one-sixth order semiquantitative spectrographic analysis: U.S. Geological Survey Circular 738, 25 p.

Page, N. J., Blakely, R. J., and Cannon, J. K., 1983, Map showing geologic, geophysical, and geochemical characteristics of granitic plutons in the Medford 1° by 2° quadrangle, Oregon-California: U.S. Geological Survey Miscellaneous Field Studies Map MF-1383-E, scale 1:250,000.

Page, N. J., Johnson, M. G., and Peterson, J. A., 1983, Map showing characteristics of lode gold in the Medford 1° by 2° quadrangle, Oregon-California: U.S. Geological Survey Miscellaneous Field Studies Map MF-1383-D, 2 sheets, scale 1:250,000.

Ramp, Len, 1961, Chromite in southwestern Oregon: Oregon Department of Geology and Mineral Industries Bulletin 52, 169 p.

Ramp, Len, and Peterson, N. V., 1979, Geology and mineral resources of Josephine County, Oregon: Oregon Department of Geology and Mineral Industries Bulletin 100, 45 p.

Rose, A. W., Hawkes, H. E., and Webb, J. S., 1979, Geochemistry in mineral exploration (2d ed.): London, Academic Press, 657 p.

Singer, D. A., Page, N. J., Smith, J. G., Blakely, R. J., and Johnson, M. G., 1983, Mineral resource assessment maps of the Medford 1° by 2° quadrangle, Oregon-California: U.S. Geological Survey Miscellaneous Field Studies Map MF-1383-C, 2 sheets, scale 1:250,000.

Smith, J. G., Page, N. J., Johnson, M. G., Moring, B. C., and Gray, Floyd, 1982, Preliminary geologic map of the Medford 1° by 2° quadrangle, Oregon and California: U.S. Geological Survey Open-File Report 82-955, scale 1:250,000.

Thayer, T. P., and Ramp, Len, 1969, Chromite; in Mineral and water resources of Oregon: Oregon Department of Geology and Mineral Industries Bulletin 64, p. 108-116.

Whittington, C. L., Grimes, D. J., and Leinz, R. W., 1985a, Map showing abundance and distribution of copper in oxide residues of stream-sediment samples, Medford 1° by 2° quadrangle, Oregon-California: U.S. Geological Survey Miscellaneous Field Studies Map MF-1383-G, scale 1:250,00.

_____1985b, Map showing abundance and distribution of silver in stream-sediment samples, Medford 1° by 2° quadrangle, Oregon-California: U.S. Geological Survey Miscellaneous Field Studies Map MF-1383-H, scale 1:250,000.

Whittington, C. L., Grimes, D. J., and Peterson, J. A., 1983, Spectrographic and chemical analyses of rock and soil samples from the Medford 1° x 2° quadrangle, Oregon-California: U.S. Geological Survey Open-File Report 83-344, 218 p.

Whittington, C. L., Leinz, R. W., and Grimes, D. J., 1985a, Map showing abundance and distribution of arsenic in oxide residues of stream-sediment samples, Medford 1° by 2° quadrangle, Oregon-California: U.S. Geological Survey Miscellaneous Field Studies Map MF-1383-J, scale 1:250,000.

_____1985b, Map showing abundance and distribution of mercury in rock samples, Medford 1° by 2° quadrangle, Oregon-California: U.S. Geological Survey Miscellaneous Field Studies Map MF-1383-K, scale 1:250,000.

Whittington, C. L., Leinz, R. W., and Speckman, W. S., 1983, Analytical results of stream-sediment samples from the Medford 1° x 2° quadrangle, Oregon-California: U.S. Geological Survey Open-File Report 83-349, 140 p.

[1] Any use of trade names or trademarks in this publication is for descriptive purposes only and does not constitute endorsement by the U.S. Geological Survey.

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA— 1985

For sale by Branch of Distribution, U.S. Geological Survey, Box 25286, Federal Center, Denver, CO 80225