DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-1267-B
WRIGHT—RECONNAISSANCE GEOCHEMISTRY,
OTTER CREEK WILDERNESS, W. VA.

EXPLANATION

114• Stream-sediment sample locality

202× Rock sample locality

The following symbols are for the geologic base map used here, which is from Warlow (1981).

QUATERNARY

Qal — Alluvium

PENNSYLVANIAN

Pas / Pn K — Allegheny Formation
Pas, sandstone
K, Kittanning coal zone

Pkr C-2 C-1 S-r S — Kanawha and New River Formations, undivided
Pkr, Roaring Creek sandstone member of White(1903)
C-1, coal bed; C-2, coal zone
S-r, Sewell(?) rider coal bed
S, Sewell(?) coal bed

MISSISSIPPIAN

Mm — Mauch Chunk Formation

Mg — Greenbrier Limestone

Mp — Pocono Sandstone

Contact--Dashed where approximately located

Coal bed--Dashed where approximately located; dotted where concealed

Caved adit

Prospect or outcrop

Corehole

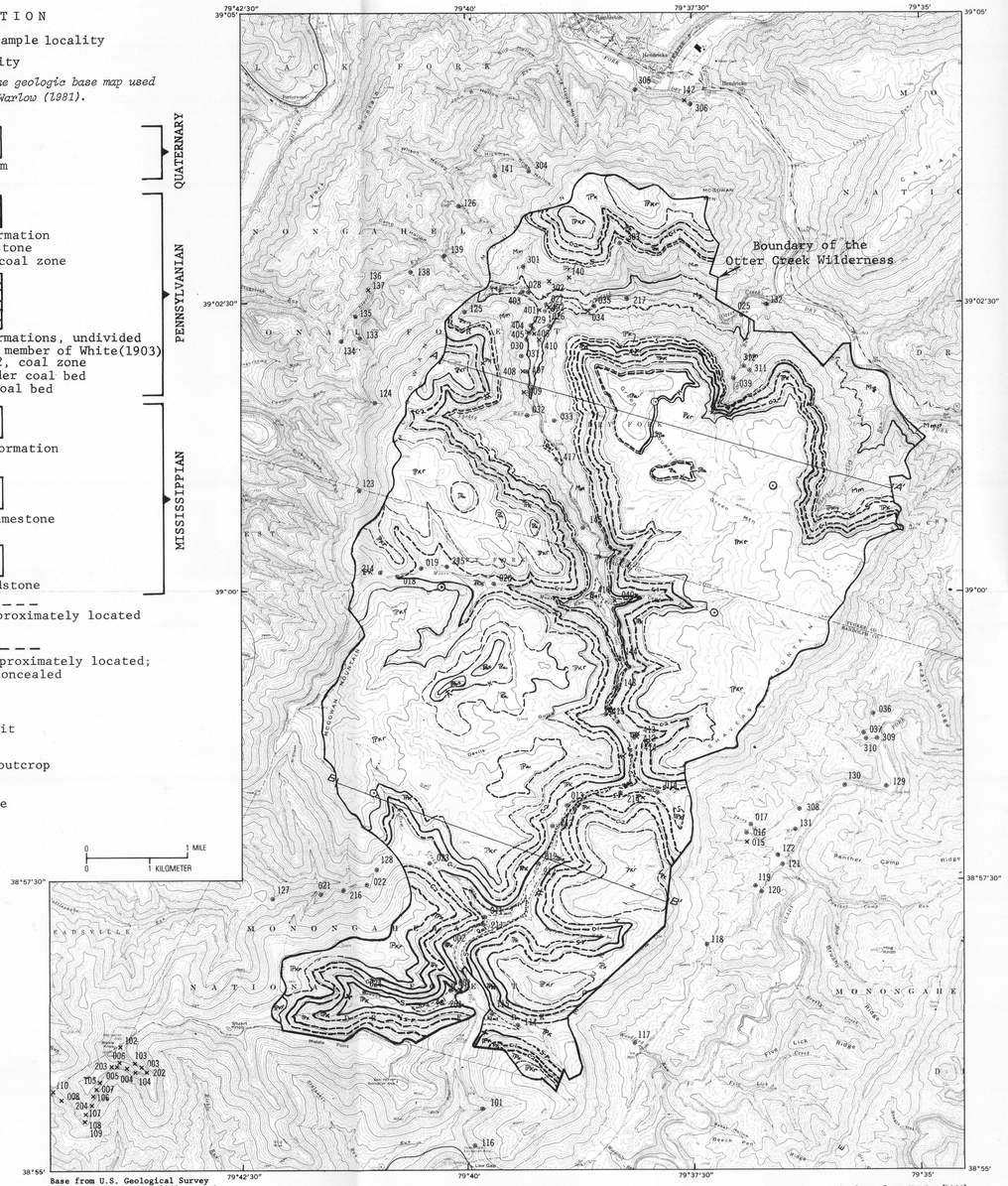


Figure 1.--Localities of stream-sediment and rock samples.

EXPLANATION

- 10-150 ppm Cr
- 200-500 ppm Cr
- 1500 ppm Cr

× Rock sample locality

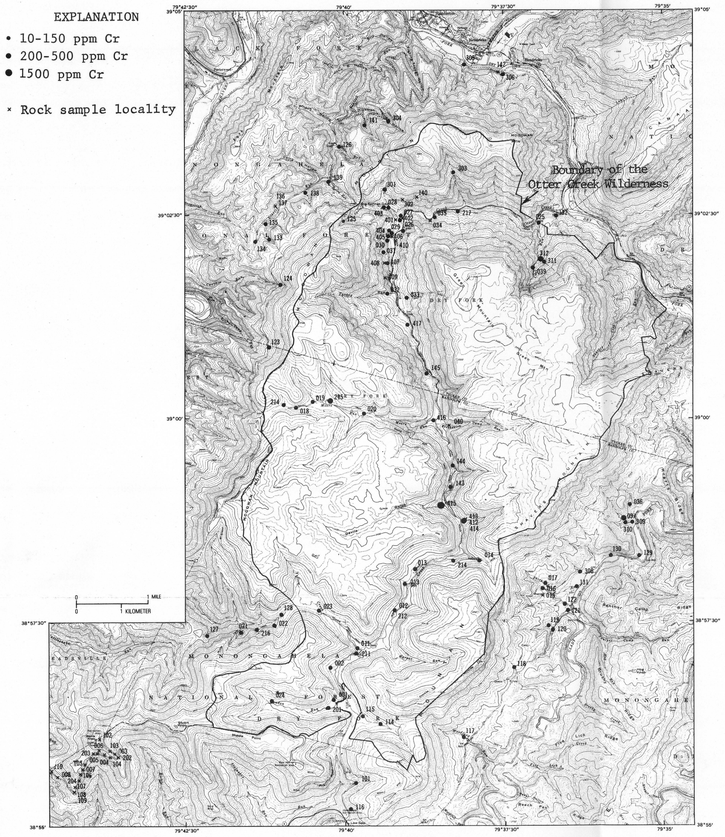


Figure 3.--Location of stream-sediment samples containing 10 ppm or more chromium. Sample containing 1500 ppm Cr also contains 700 ppm Cu.

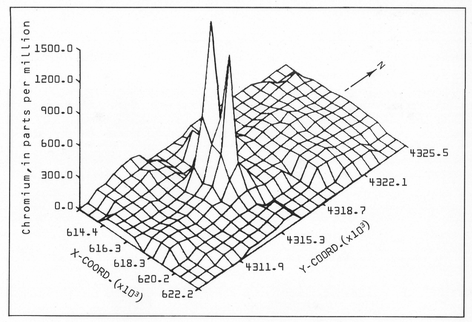


Figure 4.--Generalized three-dimensional gridded view of chromium distribution in stream-sediment samples.

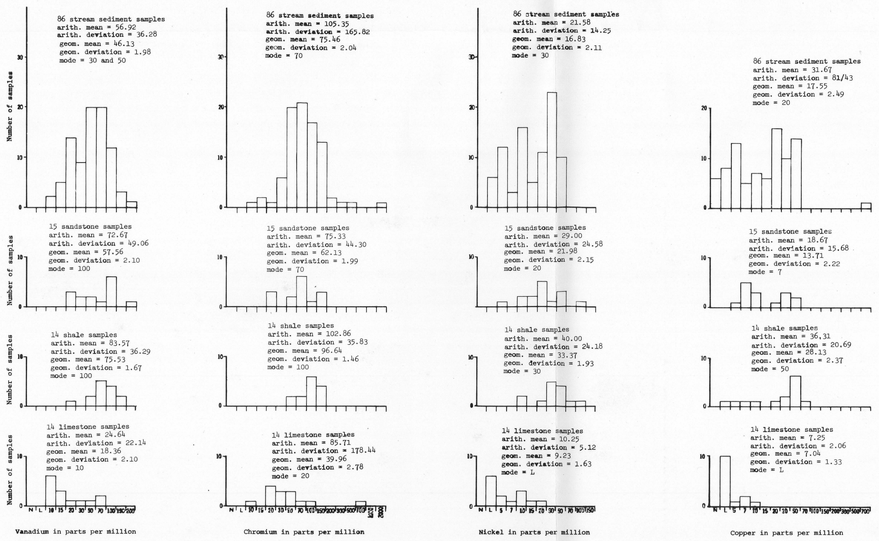


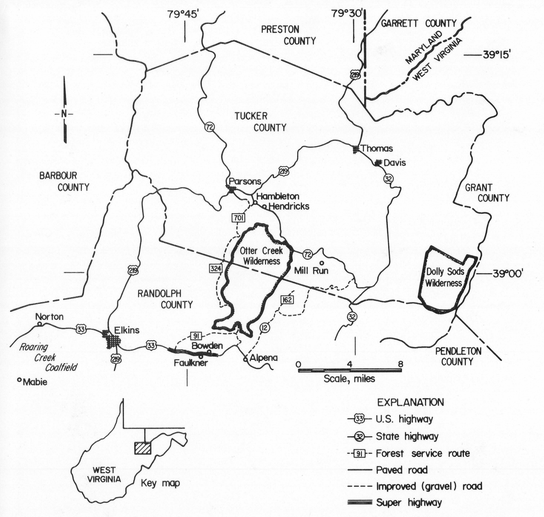
Figure 2.--Distribution of vanadium, chromium, nickel, and copper in stream-sediment and rock samples.

Table 1.--*Ranges and median concentrations of 23 elements in rock and stream-sediment samples from the Otter Creek Wilderness*

All elements were analyzed by means of semiquantitative spectrographic methods except for zinc which was analyzed by means of atomic absorption. Spectrographic analyses are reported to the nearest number in the series 1, 1.5, 2, 3, 5, 7, 10, which represents the approximate midpoints of group data on a geometric scale. The assigned groups for the series will include the quantitative values about 30 percent of the time. L, detected but below the limit of determination (value in parentheses after element); N, not detected; G, greater than. Elements looked for but not found, and their lower limits of determination: Ag (0.5), As (200), Au (10), Bi (10), Cd (20), Sb (100), Th (100), Zn (100).

Element	Sandstone (15 samples) Low	High	Median	Average in sandstone[1,2]	Shale (14 samples) Low	High	Median	Average in shale[2]	Limestone (14 samples) Low	High	Median	Average in limestone[2]	Stream-sediment samples (86 samples) Low	High	Median
							Percent								
Ca (0.005)	L	15	0.3	3.9	N	3.0	0.175	2.21	7	G(20)	20	30	0.05	1.5	0.3
Fe (0.05)	0.7	7.0	2.0	.98	N	5.0	3.0	4.72	0.05	2	0.4	0.38	.2	7.0	2.0
Mg (0.02)	.05	1.5	.7	.7	0.5	1.5	.85	1.50	.5	1.5	1.0	4.7	.02	1.0	.5
Ti (0.002)	.05	.5	.3	.15	.15	.5	.3	.46	.007	.3	.07	.04	.15	.5	.3
							Parts per million								
B (10)	10	200	50	20-30	20	150	70	100	N	200	10	20	10	100	30
Ba (20)	20	1500	300	300	L	700	300	300	N	500	150	10	20	1500	200
Be (1)	N	1.5	L	2	N	2	1	3	N	1	L	3 0.X	N	1.5	L
Co (5)	N	30	10	0.3	L	30	17.5	19	N	30	7	.1	L	50	10
Cr (10)	20	150	70	10-20	50	150	100	90	10	700	30	11	10	1500	70
Cu (5)	5	50	10	10-20	L	70	40	45	L	10	L	4	N	700	15
La (20)	N	100	30	30	N	70	50	92	N	50	20	3 X.	N	70	20
Mn (10)	20	2000	300	500	50	1000	250	850	70	700	200	1100	L	3000	300
Mo (5)	N	15	N	.2	N	N	N	2.6	N	N	N	.4	N	5	N
Nb (20)	N	20	L	3 .0X	N	20	L	11	N	L	N	.3	N	20	L
Ni (5)	5	100	20	2	10	100	30	68	L	20	5	20	L	50	20
Pb (10)	L	50	15	9	10	70	15	20	L	150	10	9	L	100	20
Sc (5)	N	30	5	1	N	20	10	13	N	20	5	1	N	20	5
Sn (10)	N	L	N	3 X	N	150	L	6	N	N	N	3 .X	N	30	N
Sr (100)	N	500	100	20	N	150	L	300	L	500	150	610	N	100	N
V (10)	20	200	70	10-20	20	150	70	130	10	70	15	20	10	200	50
Y (10)	L	70	20	40	N	50	25	30	N	30	12.5	30	L	70	15
Zn (5)	10	100	50	16	35	130	70	95	10	50	20	19	N	180	60
Zr (10)	10	500	200	200-250	L	500	250	160	10	500	40	20	50	G(1000)	300

1 Pettijohn (1963, p. 511)
2 Turekian and Wedepohl (1961, p. 175-192)
3 Order of magnitude estimated by Turekian and Wedepohl (1961)



Index map showing location of Otter Creek Wilderness.

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 Administration and the Congress. This report presents the results of a geochemical survey of the Otter Creek Wilderness in the Monongahela National Forest, Randolph and Tucker Counties, West Virginia, which was established as a wilderness by PL 93-622 January 3, 1975.

Discussion

The reconnaissance geochemical survey of the Otter Creek Wilderness included collecting 86 bulk stream-sediment samples and 43 rock samples (fig. 1). These samples were analyzed for 31 elements including common metals that potentially could occur in economic concentrations in the wilderness. No well-defined anomalous areas are apparent from the analytical results.

Samples were collected in October and November, 1977, by N. A. Wright, K. M. Kozey, C. L. Neeley, E. E. Good, and C. M. Shifflett.

All streams in the wilderness that were accessible on foot were sampled. The stream-sediment samples consisted of a few handfuls of the finest sediment present in the stream or along the bank. After air drying in the laboratory, the samples were sieved and the minus 80-mesh fraction was used for analysis. The rock samples were taken from measured sections along roads and from natural outcrops. In most places, a rock sample consisted of several chips taken from a known thickness of one lithology.

The samples were prepared and analyzed by the U.S. Geological Survey. David F. Siems made the semiquantitative spectrographic analyses for 31 elements, and A. L. Meier made the atomic absorption analyses for zinc. Complete analytical results are given in Siems and others (unpublished data, 1980).

The sandstone samples have only slightly higher than average median concentrations of iron, boron, cobalt, chromium, nickel, lead, scandium, strontium, vanadium, and zinc (see table 1). The shale samples have slightly higher than average median concentrations of zirconium. The limestone samples have slightly higher than average median concentrations of magnesium, barium, cobalt, chromium, scandium, and zirconium. The sample populations for this study are quite small, only 14 to 15 samples per rock type, and are being compared with averages reported for each rock type in general. The results might differ somewhat if larger populations were used.

The stream-sediment analyses do not show any anomalous values other than sample WVO-415, which contains 1500 parts per million (ppm) Cr and 700 ppm Cu. Figure 2 shows histograms comparing the concentration of four elements in stream sediments and three rock types. A few stream-sediment samples have higher chromium concentrations (200 ppm or more) than average for sedimentary rocks exposed in the area (fig. 3). Figure 4 shows a generalized three-dimensional gridded view of chromium distribution. The few high values are concentrated, for an unexplained reason, in one area at the center of the diagram (fig. 2), which is also near the center of the wilderness.

The analytical data for stream sediments in the Otter Creek Wilderness are quite similar to those from three other wilderness study areas in West Virginia in which the exposed rocks are from the same part of the stratigraphic column. A comparison of the median concentrations of 25 elements in samples from the Otter Creek Wilderness with the median concentrations of the same elements in samples from the Dolly Sods Wilderness (Lesure, 1980), Cranberry Wilderness Study Area (Lesure, 1978), and the New River Gorge area (Lesure and Whitlow, 1977) revealed that ten of the elements (Fe, Ag, As, Cu, Mo, Nb, Ni, Sn, Sr, and Zr) occur in essentially the same median concentrations in all four areas. The samples from the Otter Creek Wilderness have somewhat lower median concentrations of 11 elements (B, Ba, Be, Co, La, Mn, Sc, Ti, V, Y, and Zn) than the other areas. The median concentrations of four elements (Ca, Mg, Cr, and Pb) are slightly higher in the samples from the Otter Creek Wilderness than in the samples from the other three areas.

Metallic minerals were not observed in the wilderness during the study, and none have been reported in the literature. The lithologic units exposed in the wilderness do not normally host metallic deposits in this region, and the potential for such deposits appears low. No major chemical anomalies were located as a result of the geochemical survey. The analytical data suggest the expected distribution for the elements looked for.

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RECONNAISSANCE GEOCHEMISTRY OF THE OTTER CREEK WILDERNESS, RANDOLPH AND TUCKER COUNTIES, WEST VIRGINIA

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