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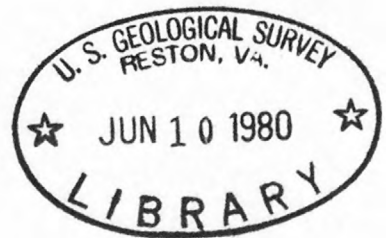
Spectrographic and chemical analyses
of whole-rock and insoluble-residue samples,
Rolla 1° x 2° quadrangle, Missouri:
Drill hole no. 22

by

win VGS
E. L. Mosier, J. G. Viets, M. S. Erickson, and S. K. McDanaI

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Introduction

Geochemical studies of the Rolla, Mo., 1° x 2° quadrangle were begun in 1977 as part of a joint multidisciplinary study of the quadrangle by the U.S. Geological Survey and the Division of Geology and Land Survey, Missouri Department of Natural Resources. The study is to assess the mineral-resource potential of the area by integrated geologic, geochemical, and geophysical studies.

The geochemical work to date has been directed at the characterization of the sedimentary and igneous rocks in the quadrangle through spectrographic and chemical analyses of whole-rock samples and dilute-hydrochloric-acid insoluble-residue samples of whole rock from widely spaced drill holes. Sixty-two drill holes have been selected for study from the sample library of the Missouri Division of Geology and Land Survey. None of the holes are company confidential, none intersect economically significant mineralized ground, and only a few are located in known ore-bearing trends.

The analytical results for drill hole no. 22 (Missouri log number 21908) are given in this report. Drill hole no. 22 is located in sec. 14, T. 27 N., R. 3 W., in Shannon County.

Data for the insoluble-residue samples for drill hole no. 22 are listed in table 1, and data for the insoluble-residue samples for drill hole no. 22 are listed in table 2. Missouri log number, county, and location allow correlation with the stratigraphic logs on file at the Missouri Division of Geology and Land Survey in Rolla, Mo.

Preparation and analysis of samples

The samples were pulverized to minus 140 mesh (0.105 mm in a vertical grinder with ceramic plates. Some insoluble-residue samples contained only a few milligrams of material, and these were hand ground in an agate mortar and pestle. A hand magnet was passed over the insoluble residue samples before grinding to remove filings or chips of drill bit that might be present.

Each sample was analyzed semiquantitatively for 31 elements using a six-step, D.C.-arc, optical-emission spectrographic method (Grimes and Marranzino, 1968). In addition, where sufficient sample was available, each sample was analyzed for zinc by an atomic-absorption technique using deuterium background correction (Ward and others, 1969, p. 33).

The semiquantitative spectrographic values are reported as six steps per order of magnitude (1, 0.7, 0.5, 0.3, 0.2, 0.15, and multiples of 10 of these numbers) and are approximate geometric midpoints of the concentration ranges. The precision is shown to be within one adjoining reporting interval on each side of the reported values 83 percent of the time and within two adjoining intervals on each side of the reported value 96 percent of the time (Motooka and Grimes, 1976).

The visual lower limits of determination for the 31 elements that were determined spectrographically and are included in this report are as follows:

For those given in percent:

Calcium	0.05
Iron	0.05
Magnesium	0.02
Titanium	0.002

For those given in ppm:

Antimony	100	Molybdenum	5
Arsenic	200	Nickel	5
Barium	20	Niobium	20
Beryllium	1	Scandium	5
Bismuth	10	Silver	0.5
Boron	10	Strontium	100
Cadmium	20	Thorium	100
Chromium	10	Tin	10
Cobalt	5	Tungsten	50
Copper	5	Vanadium	10
Gold	10	Yttrium	10
Lanthanum	20	Zinc	200
Lead	10	Zirconium	10
Manganese	10		

Description of samples

Each sample is identified by an eight-character code. The first three numbers signify the USGS hole number (for example, 001=hole 1, 002=hole 2, and so forth). These three numbers are followed by a capital letter (W, U, or I), which indicates washed (W) or unwashed (U) whole rock in table 1 and insoluble residue (I) in table 2. The last four digits identify the depth of the sample from the drill-hole collar. Each sample is a composite of 10 feet of drill core from above the depth indicated.

The stratigraphic unit of the sample is identified by a coded number in the first column (tables 1 and 2) following the sample number. The code and formation names are as follows:

<u>code</u>	<u>formation</u>
11	Precambrian rocks
12	Lamotte Sandstone
13	Bonneterre Formation
14	Davis Formation
15	Derby-Doe Run* Formation
16	Potosi Dolomite
17	Eminence Dolomite
18	Gunter Sandstone Member of Gasconade Dolomite
19	Gasconade Dolomite (part)
20	Roubidoux Formation
21	Residuum
23	Basal conglomerate
24	Derby-Doe Run and Davis Formations, undifferentiated
26	Van Buren Formation

*As used by McCracken and others, 1961.

Explanation of data

The columns in tables 1 and 2 have headings of sample, formation, and elements. Columns in which the element heading is preceded by an S contain the emission-spectrographic data. The prefix AA in the zinc column heading indicates that the results were determined by atomic absorption.

Iron, magnesium, calcium, and titanium are reported in percent (%); all other elements are in parts per million. Other symbols shown on the tables are:

N = Not detected at the level of detection;

-- = Not determined;

< = Detected, but below the lowest limit of detection, which is value shown; and

> = Greater than value shown.

Elements that were not detected in any of the samples of a sample set (whole rock or insoluble residue) are not reported in the tables.

References cited

- Grimes, D. J., and Marranzino, A. P., 1968, Direct-current arc and alternating-current spark emission spectrographic field methods for the semiquantitative analyses of geologic materials: U.S. Geological Survey Circular 591, 6 p.
- McCracken, M. H., comp., and others, 1961, Geologic map of Missouri: Missouri Division of Geological Survey and Water Resources, scale 1:500,000.
- Motooka, J. M., and Grimes, D. J., 1976, Analytical precision of one-sixth order semiquantitative spectrographic analyses: U.S. Geological Survey Circular 738, 25 p.
- Ward, F. N., Nakagawa, H. M., Harms, T. F., and Van Sickle, G. H., 1969, Atomic absorption methods of analysis useful in geochemical exploration: U.S. Geological Survey Bulletin 1289, 45 p.

TABLE 1.--Spectrographic and atomic-absorption analyses of whole-rock samples from drill hole no. 22, Rolla 1° x 2° quadrangle, Missouri

sample	FORM	S-FEX	S-MG%	S-CA%	S-TI%	S-MN	S-B	S-BA	S-BE	S-CO	S-CR	S-CU
022u0050	21	1.00	.20	.2	.100	150	50	50	N	N	N	15
022u0060	19	.30	5.00	7.0	.005	150	20	<20	N	N	N	<5
022u0070	19	.20	5.00	10.0	.005	200	15	<20	N	N	N	<5
022u0080	19	.10	7.00	10.0	.003	200	15	N	N	N	N	N
022u0090	19	.07	7.00	15.0	.002	150	15	N	N	N	N	<5
022u0100	19	.10	5.00	15.0	.005	150	10	<20	N	N	N	<5
022u0110	19	.10	7.00	20.0	.002	100	15	30	N	N	N	N
022u0120	19	.10	5.00	15.0	<.002	50	10	N	N	N	N	N
022u0130	19	.07	5.00	15.0	.002	70	10	N	N	N	N	N
022u0140	19	.15	7.00	15.0	.003	150	15	N	N	N	N	N
022u0150	19	.20	7.00	15.0	.005	150	10	N	N	N	N	<5
022u0160	19	.10	7.00	15.0	.005	100	15	N	N	N	N	N
022u0170	19	.15	5.00	15.0	.003	150	<10	<20	N	N	N	N
022u0180	19	.15	5.00	15.0	.005	150	20	50	N	N	N	<5
022u0190	19	.15	5.00	15.0	.007	100	30	70	N	N	N	20
022u0200	19	.20	7.00	20.0	.005	100	20	20	N	N	N	15
022u0210	19	.10	7.00	15.0	.002	100	<10	N	N	N	N	10
022u0220	19	.20	5.00	15.0	.005	100	10	N	N	N	N	10
022u0230	19	.30	7.00	15.0	.007	150	<10	N	N	N	N	10
022u0240	19	.20	5.00	10.0	.005	100	<10	N	N	N	N	7
022u0250	19	.30	5.00	15.0	.007	100	10	20	N	N	N	300
022u0260	19	.30	7.00	15.0	.010	100	20	<20	N	N	N	10
022u0270	19	.50	7.00	15.0	.010	100	10	100	N	N	N	50
022u0280	19	.70	5.00	15.0	.030	150	20	<20	N	N	N	20
022u0290	19	.30	5.00	15.0	.015	100	20	<20	N	N	N	10
022u0300	19	.30	5.00	15.0	.020	100	50	<20	N	N	N	10
022u0310	19	.20	3.00	10.0	.030	150	50	<20	N	N	N	<5
022u0320	19	.20	3.00	15.0	.010	150	20	<20	N	N	N	<5
022u0330	18	.30	3.00	15.0	.020	150	15	<20	N	N	N	<5
022u0340	18	.20	3.00	15.0	.015	150	15	20	N	N	N	50
022u0350	18	.30	3.00	15.0	.020	100	10	<20	N	N	N	100
022u0360	18	.70	7.00	15.0	.030	150	50	20	1.5	N	N	20
022u0370	17	.15	7.00	10.0	.002	50	20	N	<1.0	N	N	200
022u0380	17	.10	5.00	10.0	.002	50	15	N	<1.0	N	N	<5
022u0390	17	.15	7.00	15.0	.005	150	20	N	1.0	N	N	50
022u0400	17	.20	5.00	15.0	.015	200	30	<20	N	N	N	<5
022u0410	17	.30	5.00	10.0	.010	200	50	<20	1.0	N	N	20
022u0420	17	.20	5.00	15.0	.050	200	30	<20	1.0	N	N	<5
022u0430	17	.20	5.00	15.0	.003	150	20	N	1.0	N	N	<5
022u0440	17	.07	5.00	10.0	<.002	30	10	N	N	N	N	<5
022u0450	17	.15	5.00	15.0	.002	70	15	N	N	N	N	<5
022u0460	17	.07	5.00	7.0	<.002	30	<10	N	N	N	N	5
022u0470	17	.05	5.00	10.0	<.002	50	<10	N	N	N	N	<5
022u0480	17	.07	7.00	10.0	<.002	50	10	N	N	N	N	<5
022u0490	17	.15	7.00	15.0	.002	150	20	N	N	5	N	5

TABLE 1.--Spectrographic and atomic-absorption analyses of whole-rock samples from drill hole no. 22, Rolla 1° x 2° quadrangle, Missouri--Continued.

sample	S-LA	S-MO	S-NB	S-NI	S-PB	S-SC	S-SR	S-V	S-Y	S-ZR	AA-ZN-P
022U0050	N	N	N	15	N	N	N	50	N	30	5
022U0060	N	N	N	N	N	N	N	<10	N	N	<5
022U0070	N	N	N	N	N	N	N	20	N	N	<5
022U0080	N	N	N	N	N	N	N	<10	N	N	N
022U0090	N	N	N	N	N	N	N	20	N	N	N
022U0100	N	N	N	N	N	N	N	20	N	N	N
022U0110	N	N	N	N	N	N	N	30	N	N	N
022U0120	N	N	N	N	N	N	N	30	N	N	N
022U0130	N	N	N	N	N	N	N	20	N	N	N
022U0140	N	N	N	N	N	N	N	30	N	N	N
022U0150	N	N	N	N	N	N	N	20	N	N	N
022U0160	N	N	N	N	N	N	N	30	N	N	N
022U0170	N	N	N	N	N	N	N	30	N	N	N
022U0180	N	N	N	N	N	N	N	30	N	N	N
022U0190	N	N	N	N	N	N	N	30	N	N	N
022U0200	N	N	N	N	<10	N	N	50	N	N	N
022U0210	N	N	N	N	N	N	N	50	N	N	N
022U0220	N	N	N	N	<10	N	N	50	N	N	<5
022U0230	N	N	N	N	N	N	N	30	N	N	N
022U0240	N	N	N	N	N	N	N	50	N	N	N
022U0250	N	N	N	N	<10	N	N	30	N	N	25
022U0260	N	N	N	N	<10	N	N	50	N	N	<5
022U0270	N	N	N	N	<10	N	N	50	N	N	20
022U0280	N	N	N	N	N	N	N	50	N	20	<5
022U0290	N	N	N	N	N	N	N	30	N	10	N
022U0300	N	N	N	N	N	N	N	30	N	10	N
022U0310	N	N	N	N	N	N	N	20	N	10	<5
022U0320	N	N	N	N	N	N	N	30	N	10	N
022U0330	N	N	N	N	N	N	N	30	N	<10	N
022U0340	N	N	N	N	N	N	N	10	N	<10	15
022U0350	N	N	N	N	N	N	N	15	N	<10	30
022U0360	N	N	N	N	10	N	N	50	N	10	<5
022U0370	N	N	N	N	N	N	N	50	N	<10	15
022U0380	N	N	N	N	10	N	N	50	N	N	N
022U0390	N	N	N	N	N	N	N	30	N	N	10
022U0400	N	N	N	N	N	N	N	50	N	<10	<5
022U0410	N	N	N	N	N	N	N	30	N	<10	<5
022U0420	N	N	N	N	N	N	N	30	N	15	<5
022U0430	N	N	N	N	N	N	N	30	N	N	5
022U0440	N	N	N	N	<10	N	N	30	N	N	<5
022U0450	N	N	N	N	10	N	N	30	N	N	<5
022U0460	N	N	N	N	10	N	N	20	N	N	<5
022U0470	N	N	N	N	70	N	N	50	N	<10	<5
022U0480	N	N	N	N	<10	N	N	50	N	N	<5
022U0490	N	N	N	N	N	N	N	30	N	N	<5

TABLE 1.--Spectrographic and atomic-absorption analyses of whole-rock samples from drill hole no. 22, Rolla 1° x 2° quadrangle, Missouri--Continued.

sample	FORM	S-FEX	S-MGX	S-CAZ	S-TI%	S-MN	S-B	S-BA	S-BE	S-CO	S-CR	S-CU
022U0500	17	.10	7.00	10.0	<.002	100	15	N	N	5	N	10
022U0510	17	.10	3.00	10.0	<.002	70	<10	N	N	N	N	5
022U0520	17	.15	3.00	10.0	<.002	100	<10	N	N	N	N	5
022U0530	17	.20	3.00	15.0	<.002	100	20	N	N	N	N	<5
022U0540	17	.15	2.00	10.0	<.002	50	10	N	N	N	N	<5
022U0550	17	.15	3.00	10.0	<.002	70	15	N	N	N	N	20
022U0560	17	.10	2.00	10.0	<.002	100	10	N	N	N	N	<5
022U0570	17	.15	3.00	15.0	.002	100	10	N	N	N	N	10
022U0580	17	.15	3.00	15.0	.002	150	15	<20	N	N	N	10
022U0590	17	.15	3.00	10.0	<.002	70	10	N	N	N	N	7
022U0595	17	.07	2.00	10.0	N	30	N	N	N	N	N	5
022U0600	17	.15	10.00	>20.0	.007	100	10	<20	N	N	N	15
022U0610	17	.10	10.00	20.0	.003	70	10	<20	N	N	N	<5
022U0620	17	.20	10.00	20.0	.007	100	15	<20	N	N	N	5
022U0630	17	.10	7.00	15.0	.005	100	10	<20	N	N	N	<5
022U0640	17	.10	10.00	20.0	.005	100	10	<20	N	N	N	5
022U0650	17	.15	>10.00	>20.0	.010	150	15	<20	N	N	N	7
022U0660	17	.10	>10.00	20.0	.005	100	10	<20	N	N	N	<5
022U0670	17	.20	10.00	20.0	.005	200	10	<20	N	N	N	15
022U0680	17	.15	10.00	20.0	.007	100	10	20	N	N	N	15
022U0690	17	.15	10.00	20.0	.007	150	10	20	N	N	N	<5
022U0700	17	.30	7.00	15.0	.010	200	15	20	N	N	N	7
022U0710	17	.15	10.00	20.0	.010	150	20	<20	N	N	N	10
022U0720	17	.20	10.00	20.0	.010	200	15	50	N	N	N	<5
022U0730	17	.10	10.00	20.0	.005	100	10	<20	N	N	N	<5
022U0740	16	.15	10.00	20.0	.010	200	20	<20	N	N	N	<5
022U0750	16	.15	10.00	20.0	.005	150	15	<20	N	N	N	<5
022U0760	16	.15	10.00	20.0	.015	100	20	30	N	N	N	100
022U0770	16	.10	10.00	15.0	.007	100	20	20	N	N	N	<5
022U0780	16	.10	>10.00	20.0	.010	100	30	<20	N	N	N	10
022U0790	16	.10	10.00	20.0	.005	100	10	<20	N	N	N	<5
022U0800	16	.10	>10.00	20.0	.005	100	20	<20	N	N	N	<5
022U0810	16	.10	>10.00	20.0	.005	100	10	<20	N	N	N	5
022U0820	16	.15	>10.00	20.0	.007	150	10	<20	N	N	N	5
022U0830	16	.15	>10.00	20.0	.015	150	10	<20	N	N	N	<5
022U0840	16	.20	10.00	>20.0	.003	200	10	<20	N	N	N	<5
022U0850	16	.10	>10.00	20.0	.007	100	10	<20	N	N	N	<5
022U0860	16	.20	10.00	20.0	.010	150	15	<20	N	N	10	5
022U0870	16	.20	>10.00	20.0	.010	200	10	<20	N	N	N	<5
022U0880	16	.15	>10.00	>20.0	.007	150	<10	<20	N	N	N	<5
022U0890	16	.50	10.00	>20.0	.005	500	N	<20	N	N	N	<5
022U0900	16	.20	>10.00	20.0	.007	150	<10	<20	N	N	N	<5
022U0910	16	.50	>10.00	20.0	.015	200	10	<20	N	N	N	<5
022U0920	16	.15	>10.00	>20.0	.005	150	<10	<20	N	N	N	<5
022U0930	16	.10	10.00	20.0	.005	100	<10	<20	N	N	N	<5

TABLE 1.--Spectrographic and atomic-absorption analyses of whole-rock samples from drill hole no. 22, Rolla 1° x 2° quadrangle, Missouri--Continued.

sample	S-LA	S-MO	S-NB	S-NI	S-PB	S-SC	S-SR	S-V	S-Y	S-ZR	AA-ZN-P
02200500	N	N	N	N	N	N	N	30	N	N	<5
02200510	N	N	N	N	N	N	N	<10	N	<10	<5
02200520	N	N	N	N	N	N	N	30	N	<10	<5
02200530	N	N	N	N	N	N	N	30	N	<10	<5
02200540	N	N	N	N	N	N	N	10	N	<10	<5
02200550	N	N	N	N	N	N	N	<10	N	<10	<5
02200560	N	N	N	N	N	N	N	10	N	<10	<5
02200570	N	N	N	N	N	N	N	<10	N	<10	<5
02200580	N	N	N	N	N	N	N	15	N	<10	<5
02200590	N	N	N	N	N	N	N	10	N	<10	N
02200595	N	N	N	N	N	N	N	15	N	<10	<5
02200600	N	20	N	N	10	N	100	20	N	N	N
02200610	N	20	N	N	10	N	100	10	N	N	<5
02200620	N	20	N	N	15	N	100	20	N	N	<5
02200630	N	5	N	N	10	N	N	15	N	N	<5
02200640	N	15	N	N	10	N	N	15	N	N	<5
02200650	N	7	N	N	N	N	N	20	N	N	<5
02200660	N	7	N	N	N	N	N	15	N	N	N
02200670	N	5	N	N	10	N	N	30	N	N	<5
02200680	N	N	N	N	10	N	N	50	N	N	<5
02200690	N	50	N	N	10	N	100	30	N	N	5
02200700	N	15	N	N	10	N	100	100	N	N	10
02200710	N	20	N	N	15	N	100	70	N	N	<5
02200720	N	5	N	N	10	N	100	30	N	N	5
02200730	N	N	N	N	10	N	N	20	N	N	<5
02200740	N	N	N	N	10	N	100	20	N	N	<5
02200750	N	N	N	N	10	N	N	15	N	N	<5
02200760	N	N	N	N	10	N	100	20	N	N	10
02200770	N	N	N	N	10	N	100	10	N	N	<5
02200780	N	N	N	N	10	N	100	15	N	N	<5
02200790	N	N	N	N	10	N	100	10	N	N	<5
02200800	N	N	N	N	10	N	100	10	N	N	<5
02200810	N	N	N	N	10	N	100	15	N	N	<5
02200820	N	N	N	N	N	N	N	20	N	N	<5
02200830	N	N	N	N	N	N	150	30	N	N	5
02200840	N	N	N	N	10	N	100	15	N	N	5
02200850	N	N	N	N	N	N	N	15	N	N	<5
02200860	N	N	N	N	N	N	N	20	N	N	5
02200870	N	N	N	N	N	N	100	20	N	N	5
02200880	N	N	N	N	N	N	N	20	N	N	5
02200890	N	N	N	N	N	N	150	15	N	N	<5
02200900	N	N	N	N	N	N	N	20	N	N	N
02200910	N	N	N	N	N	N	N	20	N	N	10
02200920	N	N	N	N	N	N	N	20	N	N	N
02200930	N	N	N	N	N	N	N	20	N	10	N

TABLE 1.--Spectrographic and atomic-absorption analyses of whole-rock samples from drill hole no. 22, Rolla 2° x 2° quadrangle, Missouri--Continued.

sample	FORM	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-B	S-BA	S-BE	S-CO	S-CR	S-CU
022U0940	16	.20	10.00	>20.0	.010	150	10	<20	N	N	10	<5
022U0950	16	.15	>10.00	>20.0	.007	100	<10	<20	N	N	N	5
022U0960	16	.10	10.00	20.0	.005	100	<10	<20	N	N	N	<5
022U0970	16	.20	>10.00	>20.0	.010	150	10	<20	N	N	N	<5
022U0980	16	.15	>10.00	20.0	.010	150	<10	<20	N	N	N	<5
022U0990	16	.20	>10.00	20.0	.010	150	<10	<20	N	N	N	<5
022U1000	16	.20	10.00	>20.0	.010	200	<10	<20	N	N	N	5
022U1010	16	.20	>10.00	20.0	.010	200	<10	<20	N	N	N	5
022U1020	16	.20	>10.00	>20.0	.010	150	<10	20	N	N	N	<5
022U1030	16	.70	10.00	>20.0	.010	200	<10	<20	N	N	N	5
022U1040	16	.15	10.00	20.0	.002	150	N	N	N	N	N	5
022U1050	16	.20	>10.00	>20.0	.007	150	<10	N	N	N	N	5
022U1060	16	.20	10.00	20.0	.005	200	<10	N	N	N	N	<5
022U1070	16	.20	>10.00	20.0	.005	200	<10	N	N	N	N	5
022U1080	16	.10	10.00	20.0	<.002	70	N	N	N	N	N	<5
022U1090	16	.50	>10.00	20.0	.010	300	10	<20	N	N	10	10
022U1100	16	.30	10.00	20.0	.002	200	<10	<20	N	N	10	<5
022U1110	16	.15	>10.00	20.0	.010	200	<10	<20	N	N	N	5
022U1120	16	.20	10.00	20.0	.015	150	10	<20	N	N	10	7
022U1130	16	.15	>10.00	20.0	.010	150	<10	<20	N	N	N	5
022U1140	16	.20	>10.00	20.0	.003	150	<10	<20	N	N	N	<5
022U1150	16	.30	>10.00	20.0	.010	150	15	<20	N	N	10	5
022U1160	16	.20	>10.00	>20.0	.015	150	20	<20	N	N	10	5
022U1170	16	.20	10.00	20.0	.015	200	15	<20	N	N	10	<5
022U1180	15	.50	10.00	20.0	.020	200	20	20	N	N	15	5
022U1190	15	.30	10.00	20.0	.020	200	20	<20	N	N	10	<5
022U1200	15	.20	10.00	20.0	.015	150	20	<20	N	N	10	<5
022U1210	15	.50	10.00	20.0	.020	300	30	<20	N	N	15	<5
022U1220	15	.30	10.00	20.0	.020	100	30	<20	N	N	15	<5
022U1230	15	.70	10.00	20.0	.050	200	50	<20	N	N	10	<5
022U1240	15	.20	10.00	20.0	.015	100	50	<20	N	N	15	7
022U1250	15	.70	>10.00	>20.0	.050	150	30	<20	N	N	15	<5
022U1260	15	.70	>10.00	>20.0	.020	150	15	30	N	N	20	5
022U1270	15	.70	>10.00	20.0	.030	150	15	20	N	N	15	<5
022U1280	15	.50	10.00	20.0	.015	150	10	<20	N	N	10	7
022U1290	15	.70	>10.00	>20.0	.015	200	10	20	N	N	20	5
022U1300	15	.70	10.00	>20.0	.020	150	15	70	N	N	20	5
022U1310	15	.70	10.00	20.0	.020	150	15	50	N	N	20	5
022U1320	15	1.00	>10.00	20.0	.020	200	15	30	N	N	20	5
022U1330	15	1.00	>10.00	>20.0	.020	200	10	30	N	N	20	5
022U1340	14	.50	10.00	>20.0	.010	150	10	<20	N	N	10	<5
022U1350	14	.50	10.00	20.0	.020	200	15	<20	N	N	15	<5
022U1360	14	.30	10.00	20.0	.010	200	20	<20	N	N	10	<5
022U1370	14	.50	>10.00	>20.0	.015	300	30	<20	N	N	10	<5
022U1380	14	.70	10.00	20.0	.020	200	50	<20	1.0	N	15	5

TABLE 1.--Spectrographic and atomic-absorption analyses of whole-rock samples from drill hole no. 22, Rolla 1° x 2° quadrangle, Missouri--Continued.

sample	S-LA	S-MO	S-NB	S-NI	S-PB	S-SC	S-SR	S-V	S-Y	S-ZR	AA-ZN-P
022U0940	N	N	N	N	N	N	N	20	N	N	5
022U0950	N	N	N	N	N	N	100	20	N	N	5
022U0960	N	N	N	N	N	N	N	20	N	N	N
022U0970	N	N	N	N	N	N	100	15	N	N	<5
022U0980	N	N	N	N	N	N	N	15	N	N	N
022U0990	N	N	N	N	N	N	N	20	N	N	5
022U1000	N	N	N	N	N	N	100	20	N	N	5
022U1010	N	N	N	N	10	N	N	20	N	N	5
022U1020	N	7	N	N	N	N	100	15	N	N	10
022U1030	N	N	N	N	N	N	100	15	N	N	5
022U1040	N	N	N	N	N	N	N	N	N	N	N
022U1050	N	N	N	N	N	N	100	N	N	N	10
022U1060	N	N	N	N	N	N	100	N	N	N	30
022U1070	N	N	N	N	N	N	100	N	N	N	10
022U1080	N	N	N	N	N	N	N	N	N	N	N
022U1090	N	N	N	N	10	N	100	N	N	N	10
022U1100	N	N	N	N	10	N	N	N	N	N	15
022U1110	N	N	N	N	N	N	N	N	N	N	<5
022U1120	N	N	N	N	N	N	N	N	N	N	<5
022U1130	N	N	N	N	N	N	100	N	N	N	5
022U1140	N	N	N	N	10	N	N	N	N	N	N
022U1150	N	N	N	N	10	N	N	N	N	N	N
022U1160	N	N	N	N	10	N	100	N	N	N	<5
022U1170	N	N	N	N	10	N	100	N	N	N	<5
022U1180	N	N	N	7	20	N	100	10	N	N	15
022U1190	N	N	N	N	10	N	100	N	N	10	10
022U1200	N	N	N	N	N	N	100	N	N	10	N
022U1210	N	N	N	N	N	N	100	10	N	10	<5
022U1220	N	N	N	N	15	N	N	N	N	10	N
022U1230	N	N	N	N	15	N	100	10	N	10	N
022U1240	N	N	N	N	20	N	N	N	N	N	10
022U1250	N	N	N	N	20	N	100	10	N	10	<5
022U1260	N	N	N	5	20	N	100	10	N	10	<5
022U1270	N	11	N	5	20	N	100	15	N	10	<5
022U1280	N	N	N	5	30	N	N	N	N	10	5
022U1290	N	10	N	5	30	N	N	N	N	10	<5
022U1300	N	5	N	5	30	N	N	10	N	15	N
022U1310	N	5	N	7	50	N	N	10	N	15	N
022U1320	N	5	N	5	30	N	N	10	N	20	<5
022U1330	N	N	N	5	30	N	100	10	N	15	<5
022U1340	N	N	N	N	10	N	100	N	N	10	<5
022U1350	N	N	N	N	10	N	100	N	N	10	<5
022U1360	N	N	N	N	10	N	N	N	N	10	5
022U1370	N	N	N	N	15	N	100	N	N	15	10
022U1380	N	N	N	N	20	N	N	N	N	20	20

TABLE 1.--Spectrographic and atomic-absorption analyses of whole-rock samples from drill hole no. 22, Rolla 1° x 2° quadrangle, Missouri--Continued.

sample	FORM	S-FEX	S-MG%	S-CA%	S-TI%	S-MN	S-B	S-BA	S-BE	S-CO	S-CR	S-CU
022U1390	14	.70	>10.00	>20.0	.015	300	20	<20	<1.0	N	10	<5
022U1400	14	.70	10.00	20.0	.015	500	30	<20	N	N	20	5
022U1410	14	.50	5.00	>20.0	.030	150	20	<20	N	N	10	<5
022U1420	14	.70	7.00	>20.0	.070	200	50	<20	N	N	20	<5
022U1430	14	.70	>10.00	>20.0	.020	700	30	<20	N	N	15	<5
022U1440	14	.50	10.00	20.0	.020	300	30	<20	N	N	10	<5
022U1450	14	.50	10.00	20.0	.015	300	20	<20	N	N	10	<5
022U1460	14	.70	>10.00	20.0	.030	300	20	20	N	N	10	<5
022U1470	14	1.00	>10.00	20.0	.070	200	50	20	N	N	20	5
022U1480	14	.50	10.00	20.0	.015	300	15	<20	N	N	N	<5
022U1490	14	.50	10.00	20.0	.020	300	20	<20	N	N	N	<5
022U1500	13	.50	10.00	20.0	.020	200	10	20	N	N	N	<5
022U1510	13	.70	10.00	20.0	.020	200	10	20	N	N	10	<5
022U1520	13	.70	10.00	20.0	.070	200	20	50	N	N	15	7
022U1530	13	.70	10.00	20.0	.030	300	15	30	N	N	<10	5
022U1540	13	1.00	10.00	20.0	.100	300	30	70	N	5	30	5
022U1550	13	1.50	7.00	15.0	.100	700	50	100	<1.0	5	30	10
022U1560	13	3.00	7.00	15.0	.200	1,000	100	150	1.0	20	100	20
022U1570	13	2.00	5.00	10.0	.200	700	70	300	1.0	20	70	30
022U1580	13	3.00	7.00	15.0	.200	700	70	300	1.0	20	100	20
022U1590	13	1.50	10.00	20.0	.100	300	50	50	<1.0	N	20	7
022U1600	13	1.00	>10.00	>20.0	.070	300	50	30	<1.0	N	20	5
022U1610	13	1.00	10.00	20.0	.050	700	50	<20	N	N	10	<5
022U1620	13	1.50	10.00	20.0	.070	1,500	70	20	<1.0	N	10	5
022U1630	13	1.50	10.00	20.0	.030	2,000	50	<20	N	N	N	<5
022U1640	13	3.00	10.00	20.0	.050	5,000	50	<20	<1.0	N	N	<5
022U1650	13	1.50	10.00	20.0	.050	3,000	70	<20	<1.0	N	N	<5
022U1660	13	1.50	10.00	>20.0	.050	2,000	100	<20	<1.0	N	N	<5
022U1670	13	.70	10.00	>20.0	.050	700	50	<20	<1.0	N	N	<5
022U1680	13	1.00	10.00	20.0	.050	1,500	20	30	N	N	N	<5
022U1690	13	1.50	10.00	20.0	.050	1,500	10	50	N	N	N	<5
022U1700	13	1.50	10.00	20.0	.070	1,500	15	70	N	N	N	5
022U1710	13	1.50	10.00	20.0	.070	1,000	20	70	N	N	N	7
022U1720	13	1.00	10.00	20.0	.070	700	10	50	N	N	N	<5
022U1730	13	1.50	10.00	20.0	.100	1,000	30	70	N	N	N	5
022U1740	13	1.00	10.00	20.0	.050	1,500	15	70	N	N	N	<5
022U1750	13	1.50	10.00	20.0	.100	3,000	20	150	N	N	N	5
022U1760	13	1.50	10.00	15.0	.100	1,500	20	150	<1.0	7	N	7
022U1770	13	1.00	7.00	15.0	.100	1,500	15	200	<1.0	5	N	<5
022U1780	13	1.00	7.00	15.0	.150	1,500	20	300	<1.0	5	N	5
022U1790	13	1.50	7.00	15.0	.100	2,000	20	150	<1.0	5	N	5
022U1800	13	2.00	7.00	15.0	.100	3,000	50	150	1.0	5	10	10
022U1810	13	2.00	7.00	15.0	.200	2,000	50	200	1.0	5	30	5
022U1820	13	2.00	7.00	15.0	.150	3,000	30	200	1.0	5	20	10
022U1830	13	2.00	7.00	15.0	.100	2,000	30	200	1.0	7	20	10

TABLE 1.--Spectrographic and atomic-absorption analyses of whole-rock samples from drill hole no. 22, Rolla 1° x 2° quadrangle, Missouri--Continued.

sample	S-LA	S-MO	S-NB	S-NI	S-PB	S-SC	S-SR	S-V	S-Y	S-ZR	AA-ZN-P
022U1390	N	N	N	N	20	N	N	N	N	10	N
022U1400	N	N	N	N	15	N	N	N	N	15	N
022U1410	N	N	N	N	10	N	150	N	N	15	N
022U1420	N	N	N	N	10	N	200	10	N	20	N
022U1430	N	N	N	N	10	N	N	10	N	15	N
022U1440	N	N	N	N	10	N	N	N	N	10	N
022U1450	N	N	N	N	10	N	N	N	N	10	N
022U1460	N	N	N	N	15	N	100	N	N	15	<5
022U1470	N	N	N	7	15	N	100	10	N	20	<5
022U1480	N	N	N	N	N	N	100	N	N	10	5
022U1490	N	N	N	N	10	N	100	N	N	20	<5
022U1500	N	N	N	N	10	N	N	N	N	15	<5
022U1510	N	N	N	N	20	N	N	N	N	20	<5
022U1520	N	N	N	5	20	N	N	10	N	20	<5
022U1530	N	N	N	N	15	N	N	10	N	10	<5
022U1540	N	N	N	15	20	5	N	20	10	20	<5
022U1550	20	N	N	15	20	7	N	20	15	20	N
022U1560	30	N	N	20	15	7	100	50	20	50	5
022U1570	50	N	N	30	15	7	100	50	20	150	20
022U1580	50	N	N	30	30	10	100	70	20	100	5
022U1590	N	N	N	10	30	5	100	15	10	30	<5
022U1600	N	N	N	7	20	5	100	10	10	30	N
022U1610	N	N	N	N	15	N	100	10	10	20	<5
022U1620	N	N	N	5	20	N	100	10	10	20	N
022U1630	N	N	N	N	10	N	100	N	10	15	<5
022U1640	N	N	N	N	10	N	100	N	10	15	<5
022U1650	N	N	N	N	10	N	N	N	10	20	<5
022U1660	N	N	N	N	10	N	100	N	15	20	<5
022U1670	N	N	N	N	15	N	100	N	10	15	N
022U1680	N	N	N	N	15	N	N	N	15	20	<5
022U1690	N	N	N	N	15	N	N	N	10	20	N
022U1700	N	N	N	5	30	N	100	N	15	70	<5
022U1710	N	N	N	5	30	N	100	10	15	30	15
022U1720	N	N	N	N	15	N	N	N	15	20	<5
022U1730	N	N	N	5	20	N	100	10	15	20	<5
022U1740	N	N	N	N	20	N	N	N	10	20	5
022U1750	N	N	N	5	20	N	100	N	20	30	<5
022U1760	N	N	N	7	30	N	100	15	30	300	<5
022U1770	N	N	N	5	20	N	100	10	20	200	N
022U1780	20	N	N	5	30	5	100	15	20	200	N
022U1790	20	N	N	5	30	<5	100	15	20	100	N
022U1800	30	5	N	7	70	5	100	15	20	70	N
022U1810	30	5	N	7	50	7	100	20	20	150	N
022U1820	20	N	N	7	50	5	100	20	30	100	<5
022U1830	30	N	N	10	50	7	100	30	30	100	<5

TABLE 1.--Spectrographic and atomic-absorption analyses of whole-rock samples from drill hole no. 22, Rolla 1° x 2° quadrangle, Missouri--Continued.

sample	FORM	S-FEX	S-MGX	S-CAZ	S-TIX	S-MN	S-B	S-BA	S-BE	S-CO	S-CR	S-CU
022U1840	13	1.50	7.00	15.0	.150	2,000	30	500	<1.0	7	20	15
022U1850	13	1.00	7.00	15.0	.100	2,000	10	200	<1.0	N	N	<5
022U1860	13	3.00	7.00	15.0	.200	5,000	100	200	1.0	N	20	<5
022U1870	13	3.00	7.00	15.0	.300	3,000	200	150	3.0	N	20	<5
022U1880	13	3.00	10.00	20.0	.100	>5,000	100	70	1.0	N	10	<5
022U1890	13	3.00	7.00	15.0	.200	1,500	70	300	1.5	N	10	<5
022U1900	13	1.50	3.00	7.0	.300	1,000	10	500	1.5	N	N	<5
022U1910	12	1.50	3.00	5.0	.200	1,000	10	700	1.0	N	N	<5
022U1920	12	.20	.10	.2	.200	10	10	500	N	N	N	<5
022U1930	12	1.00	.30	.5	.300	50	20	500	1.0	N	10	<5
022U1940	12	.05	.07	.3	.070	10	10	150	N	N	N	<5
022U1950	12	.30	.10	.2	.100	20	10	200	N	N	N	<5
022U1955	12	.50	.10	1.5	.150	150	10	500	<1.0	N	N	<5
022U1960	12	2.00	.50	.5	1.000	100	20	700	1.5	5	15	7
022U1970	12	2.00	.70	2.0	.500	150	50	700	1.5	5	20	<5
022U1976	11	5.00	1.00	.7	.700	200	70	700	1.5	5	30	5

TABLE 1.--Spectrographic and atomic-absorption analyses of whole-rock samples from drill hole no. 22, Rolla 1° x 2° quadrangle, Missouri--Continued.

sample	S-LA	S-MO	S-NB	S-NI	S-PB	S-SC	S-SR	S-V	S-Y	S-ZR	AA-ZN-P
022U1840	30	N	N	10	30	5	100	20	20	100	<5
022U1850	20	N	N	5	15	<5	100	10	20	70	N
022U1860	30	N	N	10	15	7	100	30	30	200	30
022U1870	30	N	N	15	15	7	100	20	30	100	40
022U1880	20	N	N	7	10	5	100	15	30	50	25
022U1890	20	N	N	7	15	5	100	20	20	70	30
022U1900	N	N	N	5	10	5	100	20	15	200	10
022U1910	20	N	N	5	15	<5	100	15	30	200	5
022U1920	20	N	N	N	N	N	N	N	20	500	N
022U1930	20	N	N	N	N	N	N	15	20	500	5
022U1940	N	N	N	5	N	N	N	N	10	50	N
022U1950	N	N	N	5	N	N	N	10	15	150	5
022U1955	20	N	N	5	N	N	N	10	15	150	5
022U1960	70	N	20	5	15	10	100	50	70	1,000	10
022U1970	70	N	<20	5	10	10	100	50	50	500	15
022U1976	70	N	20	5	20	15	150	50	70	700	20

TABLE 2.--Spectrographic and atomic-absorption analyses of insoluble-residue samples from drill hole no. 22, Rolla 1° x 2° quadrangle, Missouri

sample	FORM	S-FEX	S-MG%	S-CA%	S-TIX	S-MN	S-AG	S-B	S-BA	S-BE	S-CD	S-CO	S-CR	S-CU
02210050	19	.50	.05	<.05	.070	30	N	10	70	N	N	N	20	<5
02210060	19	.07	.03	.10	.005	N	N	10	70	N	N	N	N	N
02210070	19	.20	.03	.10	.002	N	N	10	100	N	N	N	20	N
02210080	19	.07	.02	.10	.002	N	N	10	50	1.0	N	N	N	N
02210090	19	.50	.03	.10	.002	N	N	15	70	N	N	N	N	5
02210100	19	.07	.02	.10	.005	20	N	20	50	1.0	N	N	N	N
02210110	19	.15	.02	.07	.003	20	N	20	50	N	N	N	N	N
02210120	19	.15	.02	<.05	.002	N	N	10	N	N	N	N	N	<5
02210130	19	<.05	.03	.10	.005	20	N	10	50	N	N	N	N	N
02210140	19	<.05	.02	.07	<.002	20	N	N	50	N	N	N	N	N
02210150	19	.10	.02	.07	.003	20	N	10	30	N	N	N	N	N
02210160	19	<.05	.02	.05	.003	20	N	10	50	N	N	N	N	N
02210170	19	.07	.02	.07	<.002	N	N	10	50	N	N	N	N	N
02210180	19	.07	.03	.07	.020	N	N	N	100	2.0	N	N	N	<5
02210190	19	.05	.03	.07	.010	20	N	N	70	N	N	N	N	5
02210200	19	.20	.02	.07	.010	N	N	N	50	N	N	N	N	7
02210210	19	.20	.07	.10	.010	20	N	N	100	1.0	N	N	N	10
02210220	19	.15	.02	.07	.010	N	N	N	50	1.0	N	5	N	7
02210230	19	.10	.03	.07	.015	N	N	20	20	1.0	N	N	N	7
02210240	19	.10	.02	.07	.005	N	N	10	30	1.5	N	5	N	5
02210250	19	.10	.05	.07	.030	N	N	N	50	1.0	N	5	N	7
02210260	19	.10	.05	.10	.020	20	N	15	50	1.0	N	N	N	10
02210270	19	.10	.03	.07	.015	N	N	N	50	N	N	N	N	5
02210280	19	.50	.05	.07	.020	100	N	50	70	N	N	N	N	10
02210290	19	.07	.05	.05	.020	N	N	50	30	N	N	N	N	<5
02210300	19	.07	.05	.05	.015	N	N	50	30	N	N	N	N	<5
02210310	19	.15	.05	.05	.020	N	N	50	30	N	N	N	N	<5
02210320	19	.15	.03	.05	.015	10	N	50	20	N	N	N	N	N
02210330	18	.20	.07	.05	.020	20	N	50	20	N	N	N	N	<5
02210340	18	.10	.02	<.05	.007	N	N	20	30	N	N	N	N	<5
02210350	18	.07	.05	.07	.010	N	N	50	20	N	N	N	N	7
02210360	18	.10	.05	.05	.015	20	N	50	30	N	N	N	N	5
02210370	17	.50	.07	.10	.030	50	N	70	50	N	N	N	20	5
02210380	17	.50	.07	.07	.020	30	N	50	50	N	N	N	15	7
02210390	17	.15	.03	.07	.010	<10	N	70	50	N	N	N	10	5
02210400	17	.10	.03	.05	.007	20	N	50	50	N	N	N	N	<5
02210410	17	.07	.03	.05	.005	N	N	100	50	N	N	N	N	<5
02210420	17	.05	.05	.07	.005	N	N	100	50	N	N	N	N	<5
02210430	17	.15	.03	.07	.005	10	N	100	20	N	N	N	N	<5
02210440	17	.15	.05	.10	.010	N	N	100	50	N	N	N	N	20
02210450	17	.10	.02	.05	.005	N	N	50	<20	N	N	N	N	<5
02210460	17	.20	.02	.05	.020	N	N	70	30	N	N	N	N	5
02210470	17	.30	.02	.10	.007	15	N	50	50	N	N	N	N	5
02210480	17	.10	.05	.10	.010	N	N	50	30	N	N	N	N	100
02210490	17	.15	.02	.05	.005	N	N	20	20	N	N	N	N	5

TABLE 2.--Spectrographic and atomic-absorption analyses of insoluble-residue samples from drill hole no. 22, Rolla 1° x 2° quadrangle, Missouri--Continued

sample	S-LA	S-MO	S-NB	S-NI	S-PB	S-SC	S-SR	S-V	S-Y	S-ZN	S-ZR	AA-ZN-P
02210050	N	N	20	N	N	N	N	N	N	N	30	<5
02210060	N	N	20	N	N	N	N	N	N	N	N	N
02210070	N	N	20	N	N	N	N	N	N	N	N	N
02210080	N	N	N	N	N	N	N	N	N	N	N	N
02210090	N	N	N	N	N	N	N	N	N	N	10	N
02210100	N	N	N	N	N	N	N	N	N	N	10	N
02210110	N	N	N	N	N	N	N	N	N	N	10	N
02210120	N	N	N	N	N	N	N	N	N	N	N	N
02210130	N	N	N	N	N	N	N	N	N	N	10	N
02210140	N	N	N	N	N	N	N	N	N	N	N	N
02210150	N	N	N	N	N	N	N	N	N	N	N	N
02210160	N	N	N	N	N	N	N	N	N	N	N	N
02210170	N	N	N	N	N	N	N	N	N	N	N	N
02210180	N	N	N	N	N	N	N	N	N	N	N	N
02210190	N	N	20	N	N	N	N	N	N	N	N	N
02210200	N	N	20	N	N	N	N	N	N	N	10	N
02210210	N	N	N	N	N	N	N	N	N	N	10	N
02210220	N	N	N	N	N	N	N	N	N	N	N	N
02210230	N	N	N	N	N	N	N	N	N	N	10	N
02210240	N	N	20	N	N	N	N	N	N	N	10	N
02210250	N	N	N	N	N	N	N	N	N	N	N	100
02210260	N	N	N	N	N	N	N	N	N	N	10	N
02210270	N	N	N	N	N	N	N	N	N	N	10	N
02210280	N	N	N	N	N	N	N	N	N	N	15	N
02210290	N	N	N	N	N	N	N	N	N	N	10	<5
02210300	N	N	N	N	N	N	N	N	N	N	10	N
02210310	N	N	N	N	N	N	N	N	N	N	10	N
02210320	N	N	N	N	N	N	N	N	N	N	10	N
02210330	N	N	N	N	N	N	N	N	N	N	10	N
02210340	N	N	N	N	N	N	N	N	N	N	20	45
02210350	N	N	N	N	N	N	N	N	N	N	20	120
02210360	N	N	N	N	N	N	N	N	N	N	100	55
02210370	N	N	N	N	N	N	N	15	N	N	20	25
02210380	N	N	N	N	N	N	N	10	N	N	15	15
02210390	N	N	N	N	N	N	N	N	N	N	10	N
02210400	N	N	N	N	N	N	N	N	N	N	10	N
02210410	N	N	N	N	N	N	N	N	N	N	N	N
02210420	N	N	N	N	N	N	N	N	N	N	N	N
02210430	N	N	N	N	N	N	N	N	N	N	10	N
02210440	N	N	N	N	N	N	N	N	N	N	10	5
02210450	N	N	N	N	N	N	N	N	N	N	N	N
02210460	N	N	N	N	N	N	N	N	N	N	15	N
02210470	N	N	N	N	N	N	N	N	N	N	10	N
02210480	N	N	N	N	N	N	N	N	N	N	10	N
02210490	N	N	N	N	N	N	N	N	N	N	15	N

TABLE 2.--Spectrographic and atomic-absorption analyses of insoluble-residue samples from drill hole no. 22, Rolla 1° x 2° quadrangle, Missouri--Continued.

sample	FORM	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-AG	S-B	S-BA	S-BE	S-CD	S-CO	S-CR	S-CU
02210500	17	.05	.02	<.05	.005	N	N	15	20	N	N	N	N	<5
02210510	17	<.05	<.02	.07	.002	N	N	15	<20	N	N	N	N	N
02210520	17	.05	<.02	<.05	.003	N	N	20	<20	N	N	N	N	5
02210530	17	.07	.02	.07	.020	N	N	10	20	1.5	N	N	N	N
02210540	17	.15	<.02	.05	.010	N	N	15	30	N	N	N	N	N
02210545	17	.30	.05	.10	.015	N	N	15	20	1.0	N	N	N	10
02210560	17	.30	.02	.05	.015	N	N	20	<20	1.0	N	N	N	10
02210570	17	.30	.03	.05	.030	N	N	30	30	1.0	N	N	N	15
02210580	17	1.00	.10	.10	.050	300	N	30	<20	2.0	N	N	N	30
02210590	17	1.50	.05	.10	.030	300	N	30	20	2.0	N	N	N	50
02210600	17	.50	.02	.05	.015	70	N	30	<20	1.0	N	N	N	10
02210600	17	1.00	.15	.15	.030	150	.7	20	30	<1.0	N	N	N	20
02210620	17	1.50	2.00	.20	.500	70	N	200	100	1.5	N	<5	100	5
02210650	17	2.00	1.00	.30	.500	150	1.0	100	150	1.5	N	5	70	10
02210670	17	.15	.30	.20	.100	20	1.0	50	30	<1.0	N	<5	N	5
02210680	17	.70	.70	.70	.100	30	5.0	100	50	1.5	N	5	N	10
02210690	17	<.05	.30	.70	.020	30	N	15	50	<1.0	N	N	N	<5
02210695	17	<.05	.10	.70	.015	10	N	10	50	<1.0	N	N	N	<5
02210700	17	.10	.30	.70	.015	20	N	50	70	N	N	N	N	<5
02210710	17	<.05	.50	1.00	.030	20	N	50	50	<1.0	N	N	N	7
20 02210720	17	<.05	.05	.07	.010	10	N	50	50	<1.0	N	N	N	N
02210740	16	<.05	.50	1.00	.002	30	N	50	30	<1.0	N	N	N	<5
02210750	16	<.05	.20	.50	.020	10	N	50	50	<1.0	N	N	N	<5
02210760	16	<.05	.50	1.00	.010	30	N	50	30	<1.0	N	N	N	<5
02210770	16	<.05	.30	.50	.015	10	N	30	30	N	N	N	N	N
02210780	16	<.05	.50	1.50	.010	20	N	50	30	N	N	N	N	<5
02210790	16	<.05	.50	1.50	.010	30	N	20	50	N	N	N	N	<5
02210800	16	<.05	.50	1.00	.007	15	N	50	50	N	N	N	N	10
02210810	16	<.05	.20	.30	.005	15	N	50	100	N	N	N	N	7
02210815	16	<.05	.10	.20	.005	20	N	50	100	N	N	N	N	<5
02210820	16	.05	1.50	2.00	.010	20	N	20	70	N	N	N	N	<5
02210830	16	.05	.50	1.00	.030	20	N	50	50	N	N	N	N	<5
02210835	16	<.05	.50	1.00	.010	20	N	30	100	N	N	N	N	15
02210840	16	<.05	.10	.30	.010	N	N	50	30	N	N	N	N	<5
02210850	16	<.05	.10	.20	.007	N	N	50	70	N	N	N	N	<5
02210860	16	<.05	.30	.50	.010	30	N	50	30	N	N	N	N	<5
02210865	16	.05	.30	.50	.010	30	N	20	70	N	N	N	N	<5
02210880	16	.15	.10	.20	.020	30	N	20	20	N	N	N	N	10
02210890	16	.10	.10	.15	.020	20	N	30	20	N	N	N	N	30
02210900	16	.07	.30	.50	.010	20	N	15	20	N	N	N	N	<5
02210910	16	.50	.05	.07	.020	30	.5	20	500	N	N	N	N	5
02210920	16	<.05	.05	.10	.005	10	1.0	20	30	N	N	N	N	20
02210930	16	.30	.30	.50	.050	30	1.0	20	100	N	N	N	N	15
02210940	16	.50	1.00	.10	.300	100	.7	70	150	<1.0	N	N	50	7
02210950	16	.30	.20	.50	.050	30	1.0	20	70	N	N	N	N	5

TABLE 2.--Spectrographic and atomic-absorption analyses of insoluble-residue samples from drill hole no. 22, Rolla 1° x 2° quadrangle, Missouri--Continued.

sample	S-LA	S-MO	S-NB	S-NI	S-PB	S-SC	S-SR	S-V	S-Y	S-ZN	S-ZR	AA-ZN-P
02210500	N	N	N	N	N	N	N	N	N	N	20	N
02210510	N	N	N	N	N	N	N	N	N	N	N	N
02210520	N	N	N	N	N	N	N	N	N	N	N	5
02210530	N	N	N	N	N	N	N	N	N	N	30	<5
02210540	N	N	N	N	N	N	N	N	N	N	N	N
02210545	N	N	N	N	N	N	N	N	N	N	10	<20
02210560	N	N	N	N	N	N	N	N	N	N	N	<5
02210570	N	N	N	N	10	N	N	N	N	N	N	N
02210580	N	N	N	N	N	N	N	N	N	N	10	60
02210590	N	N	N	N	N	N	N	N	N	N	N	10
02210600	N	N	N	N	10	N	N	N	N	N	10	5
02210600	20	N	<20	5	<10	N	N	30	<10	N	10	N
02210620	<20	N	<20	15	N	7	N	300	<10	N	20	N
02210650	<20	N	<20	15	15	7	N	200	15	N	200	--
02210670	N	N	<20	5	N	N	N	70	<10	N	15	--
02210680	<20	N	<20	10	<10	N	N	100	N	N	15	--
02210690	N	7	N	5	<10	N	N	10	N	N	<10	N
02210695	N	N	N	5	<10	N	N	10	N	N	<10	N
02210700	N	N	N	5	10	N	N	200	N	N	<10	N
02210710	N	N	N	5	10	N	N	30	N	N	N	N
02210720	<20	N	N	<5	<10	N	N	10	N	N	N	N
02210740	N	N	N	<5	<10	N	N	15	N	N	N	N
02210750	N	N	<20	<5	<10	N	N	15	N	N	<10	N
02210760	N	N	<20	<5	N	N	N	10	N	N	<10	N
02210770	N	N	<20	<5	N	N	N	15	N	N	<10	15
02210780	N	N	<20	<5	<10	N	N	10	N	N	<10	N
02210790	N	N	<20	<5	N	N	N	10	N	N	<10	N
02210800	N	N	<20	<5	N	N	N	10	N	N	<10	5
02210810	<20	N	<20	<5	N	N	N	10	N	N	<10	N
02210815	N	N	<20	<5	N	N	N	10	N	N	<10	N
02210820	N	N	<20	<5	N	N	N	15	N	N	N	N
02210830	<20	N	<20	<5	<10	N	N	15	N	N	<10	N
02210835	<20	N	<20	<5	<10	N	N	20	N	N	N	N
02210840	N	N	N	5	N	N	N	15	N	N	N	N
02210850	N	N	N	5	N	N	N	10	N	N	N	N
02210860	N	N	N	<5	N	N	N	15	N	N	N	N
02210865	N	N	N	<5	<10	N	N	15	N	N	N	N
02210880	N	N	N	5	<10	N	N	15	N	N	20	N
02210890	N	N	N	<5	N	N	N	15	N	N	10	--
02210900	N	N	N	<5	<10	N	N	15	N	N	<10	N
02210910	N	N	N	5	<10	N	N	15	N	500	N	--
02210920	N	N	N	<5	N	N	N	15	N	N	N	--
02210930	N	N	N	7	10	N	N	20	N	N	15	--
02210940	N	N	<20	7	10	N	N	100	N	N	200	--
02210950	N	N	N	5	<10	N	N	20	N	N	15	--

TABLE 2.--Spectrographic and atomic-absorption analyses of insoluble-residue samples from drill hole no. 22, Rolla 1° x 2° quadrangle, Missouri--Continued.

sample	FORM	S-FEX	S-MG% S-MG	S-CA% S-CA	S-TI% S-TI	S-MN	S-AG	S-B	S-BA	S-BE	S-CD	S-CO	S-CR	S-CU
02210960	16	.07	.20	.50	.010	20	.7	20	50	N	N	N	N	<5
02210970	16	.50	.15	.15	.020	30	<.5	20	50	<1.0	N	N	N	20
02210990	16	.15	.15	.30	.030	20	.5	20	50	N	N	N	N	10
02211000	16	.70	.20	.70	.015	30	<.5	15	50	N	N	N	N	10
02211020	16	.50	.30	1.00	.020	50	<.5	20	50	N	N	N	N	10
02211030	16	1.00	.20	.50	.050	150	.5	20	30	1.0	N	N	N	20
02211050	16	.05	.15	.50	.010	10	N	15	20	N	N	N	N	<5
02211080	16	1.00	.50	1.00	.100	70	1.0	30	70	1.5	N	N	20	1,000
02211090	16	7.00	3.00	.50	.500	100	.5	200	150	2.0	N	N	100	20
02211120	16	5.00	3.00	.70	1.000	50	N	200	200	1.0	N	N	150	200
02211145	16	.15	.50	1.00	.020	70	N	20	50	N	N	N	N	5
02211150	16	3.00	2.00	.30	.700	100	N	300	100	1.5	N	7	150	7
02211160	16	1.00	1.00	.30	.500	30	N	100	100	1.0	N	N	100	5
02211170	16	2.00	1.50	.50	.500	50	N	150	100	1.0	N	10	100	10
02211180	15	5.00	1.50	.30	.700	100	N	150	150	1.0	N	50	150	50
02211190	15	3.00	2.00	.70	.700	150	N	150	200	1.5	N	10	150	15
02211200	15	2.00	2.00	.30	.500	50	N	150	100	1.0	N	5	150	<5
02211210	15	2.00	2.00	.30	.700	70	N	200	100	1.5	N	5	200	5
02211220	15	5.00	2.00	.20	.500	70	N	200	70	1.0	N	30	150	30
02211230	15	5.00	2.00	.15	.500	100	N	200	100	1.0	N	20	150	30
02211240	15	3.00	1.00	.20	.300	70	N	200	50	1.5	N	15	50	15
02211250	15	7.00	2.00	.50	.700	100	N	200	150	1.5	N	20	150	50
02211260	15	7.00	1.00	.20	.700	50	N	150	200	<1.0	N	30	150	50
02211270	15	5.00	1.00	.20	.300	50	N	100	150	<1.0	N	15	50	30
02211280	15	7.00	.50	.20	.500	50	1.0	100	200	<1.0	N	20	70	50
02211290	15	1.00	.20	.30	.100	<10	N	50	70	N	N	5	N	10
02211300	15	5.00	.30	.20	.300	20	N	50	300	<1.0	N	7	20	20
02211310	15	5.00	.50	.20	.500	30	N	70	300	<1.0	N	20	100	30
02211320	15	3.00	.50	.15	.500	30	N	50	300	<1.0	N	10	30	20
02211330	15	3.00	.20	.20	.200	10	N	30	150	1.0	N	10	10	20
02211340	14	2.00	1.00	.10	.500	70	N	100	300	1.0	N	7	100	10
02211350	14	5.00	1.50	.20	.700	50	N	200	100	1.0	N	20	150	30
02211360	14	5.00	1.50	.20	.500	70	N	300	100	1.5	N	20	100	30
02211370	14	7.00	.70	.20	.300	70	N	200	150	1.5	N	15	30	30
02211380	14	7.00	2.00	.20	.500	100	N	200	100	3.0	N	15	100	30
02211390	14	7.00	2.00	.30	.500	100	N	300	100	2.0	300	20	150	50
02211400	14	5.00	2.00	.20	.500	100	N	200	100	1.5	N	15	150	30
02211410	14	5.00	2.00	.50	.500	100	N	200	70	1.0	N	15	100	30
02211420	14	3.00	2.00	.20	.500	70	N	200	70	1.0	N	15	100	50
02211430	14	5.00	2.00	.20	.500	70	N	300	70	1.5	N	15	150	20
02211440	14	5.00	1.50	.15	.500	70	N	200	100	2.0	N	15	100	30
02211450	14	3.00	2.00	.20	.500	100	N	200	150	1.5	N	15	150	30
02211460	14	2.00	1.00	.15	.500	70	N	100	500	1.5	N	15	70	30
02211470	14	3.00	2.00	.30	.700	100	N	300	200	2.0	N	15	150	30
02211480	14	3.00	1.50	.20	.500	100	N	150	200	1.0	N	15	150	30

TABLE 2.--Spectrographic and atomic-absorption analyses of insoluble-residue samples from drill hole no. 22, Rolla 1° x 2° quadrangle, Missouri--Continued.

sample	S-LA	S-MO	S-NB	S-NI	S-PB	S-SC	S-SR	S-V	S-Y	S-ZN	S-ZR	AA-ZN-P
022I0960	N	N	N	5	N	N	N	15	N	N	10	N
022I0970	N	N	N	15	<10	N	N	15	N	N	10	--
022I0990	N	N	N	5	<10	N	N	15	N	N	15	--
022I1000	N	N	N	7	<10	N	N	10	N	N	30	N
022I1020	N	N	N	5	10	N	N	10	N	N	15	<25
022I1030	N	N	N	5	<10	N	N	15	N	N	20	--
022I1050	N	N	N	<5	N	N	N	10	N	N	N	N
022I1080	N	N	N	7	20	N	N	30	N	N	20	--
022I1090	N	N	<20	30	100	10	N	150	10	N	200	N
022I1120	N	N	<20	20	30	7	N	150	15	N	200	N
022I1145	N	N	<20	5	10	N	N	15	N	N	100	N
022I1150	N	N	<20	20	10	10	N	100	10	N	150	N
022I1160	N	N	<20	5	N	5	N	50	N	N	70	N
022I1170	N	N	<20	20	50	7	N	70	10	N	70	N
022I1180	N	20	<20	100	200	7	N	70	10	N	150	<5
022I1190	30	N	20	30	20	10	N	100	15	N	150	<5
022I1200	N	N	<20	15	<10	7	N	70	<10	N	100	N
022I1210	N	N	<20	20	<10	7	N	70	10	N	100	N
022I1220	N	N	<20	70	200	7	N	50	10	N	100	<10
022I1230	N	N	<20	50	200	5	N	50	<10	N	100	<10
23 022I1240	30	N	<20	30	70	5	N	50	<10	N	30	N
022I1250	N	5	<20	70	150	7	N	70	10	N	100	5
022I1260	N	7	<20	70	200	5	N	70	10	N	100	10
022I1270	N	5	<20	50	200	<5	N	50	<10	N	70	<50
022I1280	30	20	<20	70	200	5	N	50	15	N	100	10
022I1290	N	15	<20	15	15	N	N	10	N	N	20	<10
022I1300	N	10	<20	30	70	N	N	20	<10	N	100	<10
022I1310	N	30	<20	100	100	<5	N	50	15	N	300	5
022I1320	N	10	<20	30	70	N	N	20	<10	N	200	<10
022I1330	N	10	<20	30	100	N	N	20	N	N	70	<10
022I1340	30	N	<20	20	30	7	N	100	15	N	200	<10
022I1350	N	5	<20	70	100	7	N	100	10	N	150	<10
022I1360	20	N	<20	50	150	7	N	100	10	N	200	<10
022I1370	<20	N	<20	50	700	5	N	50	<10	N	200	<25
022I1380	30	N	<20	50	100	7	N	70	10	N	200	5
022I1390	20	5	<20	100	300	7	N	100	10	N	200	10
022I1400	30	N	<20	70	70	10	N	100	15	N	200	10
022I1410	30	N	<20	50	70	7	N	70	10	N	200	N
022I1420	<20	N	<20	50	50	7	N	100	10	N	150	N
022I1430	20	N	<20	50	50	7	N	70	10	N	200	N
022I1440	20	N	<20	50	50	7	N	70	10	N	200	N
022I1450	30	N	<20	50	50	7	N	70	15	N	200	--
022I1460	20	N	<20	30	100	7	N	50	15	N	200	N
022I1470	50	N	20	50	70	15	N	70	20	N	300	5
022I1480	N	N	20	50	70	7	N	70	10	N	150	N

TABLE 2.--Spectrographic and atomic-absorption analyses of insoluble-residue samples from drill hole no. 22, Rolla 1° x 2° quadrangle, Missouri--Continued

sample	FORM	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-AG	S-B	S-BA	S-BE	S-CD	S-CO	S-CR	S-CU
02211490	14	7.00	2.00	.70	.700	100	N	200	200	2.0	N	20	150	70
02211500	13	2.00	1.00	.70	.500	100	N	100	700	1.0	N	15	100	20
02211510	13	3.00	1.00	.30	.700	70	N	100	500	1.0	N	20	200	30
02211520	13	5.00	1.00	.70	.500	70	N	70	700	1.0	N	20	70	70
02211530	13	2.00	2.00	1.50	.500	150	N	100	500	1.0	N	15	100	30
02211540	13	3.00	1.00	1.00	.700	70	N	70	300	<1.0	N	15	70	30
02211550	13	2.00	3.00	3.00	.500	200	N	70	300	<1.0	N	15	150	20
02211560	13	5.00	3.00	2.00	.500	300	N	150	500	1.0	N	30	150	70
02211570	13	3.00	3.00	3.00	.500	500	N	100	500	<1.0	N	20	150	20
02211580	13	2.00	2.00	2.00	.500	200	N	70	500	1.0	N	20	100	20
02211590	13	5.00	2.00	1.00	.700	100	<.5	500	150	5.0	N	15	70	20
02211600	13	5.00	1.50	.30	.500	100	<.5	500	150	2.0	N	20	100	30
02211610	13	7.00	2.00	.20	.700	100	<.5	1,000	100	3.0	N	15	100	20
02211620	13	5.00	2.00	.50	.700	100	N	700	150	2.0	N	15	100	20
02211630	13	3.00	2.00	.15	1.000	100	N	1,000	100	2.0	N	10	100	20
02211640	13	3.00	2.00	.20	.700	100	N	1,000	150	2.0	N	10	100	20
02211650	13	5.00	2.00	.20	1.000	100	N	1,000	150	2.0	N	10	100	20
02211660	13	5.00	2.00	.20	1.000	100	N	700	150	3.0	N	15	70	20
02211670	13	3.00	2.00	.20	.700	100	<.5	700	150	3.0	N	10	100	30
02211680	13	2.00	1.00	.10	.700	100	.7	150	700	2.0	N	15	70	20
02211690	13	2.00	.50	.30	.500	100	.7	50	700	1.0	N	10	30	20
02211700	13	2.00	.30	.15	.700	70	1.0	50	700	1.0	N	10	30	20
02211710	13	2.00	.70	.20	.700	100	2.0	50	700	<1.0	N	15	30	30
02211720	13	2.00	.30	.10	1.000	70	1.0	50	700	<1.0	N	10	20	20
02211730	13	1.50	.70	.50	.500	100	<.5	70	500	1.0	N	15	30	20
02211740	13	1.00	.20	.10	.500	50	<.5	50	700	<1.0	N	10	<10	20
02211750	13	1.00	.20	.10	.700	70	<.5	50	700	1.0	N	15	10	20
02211760	13	2.00	.30	.10	1.000	100	1.0	50	700	<1.0	N	20	15	30
02211770	13	1.00	.20	.10	.500	70	.5	30	700	<1.0	N	7	10	10
02211780	13	1.50	.30	.15	.700	70	<.5	30	700	<1.0	N	10	10	15
02211790	13	1.50	.70	.70	.500	150	.5	50	700	1.0	N	15	30	20
02211800	13	5.00	2.00	1.00	.700	200	.5	100	500	1.5	N	15	50	30
02211810	13	2.00	2.00	1.50	.500	200	N	70	700	2.0	N	10	30	20
02211820	13	3.00	2.00	1.50	.700	200	N	70	700	1.0	N	10	30	20
02211830	13	3.00	2.00	1.00	.500	200	.7	70	700	1.5	N	20	50	30
02211840	13	1.50	.50	.50	.300	100	.7	30	700	1.0	N	7	10	20
02211850	13	.50	.20	.15	.500	70	.5	20	700	<1.0	N	5	<10	10
02211860	13	1.50	2.00	1.00	.700	200	N	200	500	1.5	N	7	70	10
02211870	13	3.00	1.50	1.00	.700	200	N	300	300	3.0	N	10	70	5
02211880	13	3.00	1.50	.20	.700	150	N	500	200	2.0	N	10	70	<5
02211890	13	1.50	.50	.50	.700	150	N	70	500	1.0	N	N	10	<5
02211895	13	1.50	.70	.50	1.000	150	N	30	500	<1.0	N	N	10	<5
02211900	13	.70	.70	.20	.700	100	<.5	20	500	<1.0	N	N	<10	N
02211910	12	.50	.70	.30	.700	100	N	15	700	<1.0	N	N	10	<5
02211920	12	.15	.10	.10	.200	30	N	10	300	<1.0	N	N	N	7

TABLE 2.--Spectrographic and atomic-absorption analyses of insoluble-residue samples from drill hole no. 22, Rolla 1° x 2° quadrangle, Missouri--Continued.

sample	S-LA	S-MO	S-NB	S-NI	S-PB	S-SC	S-SR	S-V	S-Y	S-ZN	S-ZR	AA-ZN-P
02211490	20	N	20	100	300	10	N	70	15	N	200	N
02211500	20	N	<20	50	70	7	N	50	15	N	200	N
02211510	<20	5	<20	70	100	7	N	70	15	N	300	N
02211520	<20	15	<20	70	100	5	N	50	15	N	300	N
02211530	20	5	<20	50	70	7	<100	70	10	N	300	N
02211540	20	15	<20	30	70	5	N	50	10	N	200	N
02211550	30	N	<20	30	50	10	100	70	15	N	150	N
02211560	50	N	<20	50	20	15	100	100	20	N	150	10
02211570	50	N	<20	30	20	10	100	70	20	N	200	10
02211580	50	5	<20	50	50	10	100	70	20	N	150	5
02211590	70	7	30	50	150	10	100	100	15	N	200	5
02211600	50	5	20	50	100	7	N	70	15	N	200	<25
02211610	50	N	20	30	100	10	<100	100	15	N	200	N
02211620	70	N	20	30	100	15	<100	100	20	N	200	<10
02211630	70	N	20	30	50	10	<100	70	20	N	200	<50
02211640	70	N	20	30	70	10	<100	70	15	N	200	N
02211650	100	<5	20	30	70	10	<100	70	20	N	200	5
02211660	100	N	30	30	70	10	<100	70	30	N	300	5
02211670	70	N	20	30	100	10	<100	70	20	N	300	N
02211680	70	7	20	20	150	7	<100	50	20	N	200	<5
02211690	50	7	<20	20	70	5	<100	20	15	N	200	N
02211700	70	15	20	20	70	5	<100	30	30	N	200	40
02211710	50	15	20	30	100	<5	N	30	15	N	200	15
02211720	50	5	30	10	100	<5	<100	20	20	N	200	5
02211730	70	5	20	20	100	5	<100	30	20	N	200	N
02211740	30	5	<20	15	100	N	N	20	15	N	150	5
02211750	100	5	30	10	70	5	<100	20	30	N	300	N
02211760	70	7	30	15	100	7	<100	20	50	N	1,000	N
02211770	50	N	20	10	50	5	<100	20	30	N	200	N
02211780	50	5	30	10	50	5	N	20	20	N	300	N
02211790	50	5	20	10	100	7	100	30	30	N	200	N
02211800	70	15	20	20	70	7	100	50	20	N	300	<5
02211810	70	7	<20	15	50	7	100	50	20	N	300	N
02211820	70	15	20	15	100	7	100	50	20	N	300	N
02211830	70	15	20	20	70	7	100	50	20	N	200	N
02211840	30	N	<20	10	70	<5	N	30	15	N	200	N
02211850	20	N	<20	5	30	<5	N	30	15	N	300	N
02211860	70	N	<20	15	30	7	100	50	20	N	200	60
02211870	70	N	20	30	50	10	100	50	30	N	300	65
02211880	70	N	20	15	15	7	N	70	20	N	300	50
02211890	30	N	20	7	30	5	N	50	20	N	300	10
02211895	20	N	20	5	10	<5	N	50	15	N	300	10
02211900	<20	N	<20	5	15	N	N	30	10	N	200	<5
02211910	20	N	<20	<5	10	<5	N	30	20	N	300	N
02211920	<20	N	<20	5	10	<5	N	15	10	N	200	N

TABLE 2.--Spectrographic and atomic-absorption analyses of insoluble-residue samples from drill hole no. 22, Rolla 1° x 2° quadrangle, Missouri--Continued.

sample	FORM	S-FEX	S-MGX	S-CAX	S-TIX	S-MN	S-AG	S-B	S-BA	S-BE	S-CD	S-CO	S-CR	S-CU
02211930	12	1.00	.30	.15	.500	50	N	30	500	1.0	N	N	15	<5
02211940	12	<.05	.05	.10	.100	20	N	<10	200	<1.0	N	N	<10	<5
02211945	12	.05	.05	.05	.070	20	N	N	150	<1.0	N	N	N	N
02211950	12	2.00	.30	.20	.500	150	.7	20	500	<1.0	N	10	20	5
02211955	12	.20	.10	.10	.150	30	.7	10	500	<1.0	N	N	<10	<5

TABLE 2.--Spectrographic and atomic-absorption analyses of insoluble-residue samples from drill hole no. 22, Rolla 1° x 2° quadrangle, Missouri--Continued.

sample	S-LA	S-MO	S-NB	S-NI	S-PB	S-SC	S-SR	S-V	S-Y	S-ZN	S-ZR	AA-ZN-P
02211930	20	N	<20	<5	10	5	N	50	20	N	700	<5
02211940	20	N	<20	5	10	N	N	10	10	N	150	N
02211945	20	N	<20	5	<10	N	N	10	<10	N	30	N
02211950	20	N	<20	5	20	7	N	70	20	N	200	20
02211955	20	N	<20	5	10	<5	N	15	10	N	200	N

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