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**Spectrographic analyses of insoluble-residue samples,
Joplin 1° x 2° quadrangle, Kansas and Missouri:
Drill hole nos. 13, 14, and 15**

By

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This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature. Any use of trade names is for descriptive purposes only and does not imply endorsement by the U.S. Geological Survey.

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INTRODUCTION

Geochemical studies of the Joplin 1° x 2° quadrangle, Missouri and Kansas, were begun in 1983 as part of a multidisciplinary study of the quadrangle by the U.S. Geological Survey, the Missouri Division of Geology and Land Survey, and the Kansas Geological Survey. The purpose of the study was to assess the mineral resource potential of the area by integrated geologic, geochemical, and geophysical studies.

The geochemical work has been directed at the characterization of the sedimentary rocks in the quadrangle through spectrographic analyses of dilute-hydrochloric-acid insoluble-residue samples of whole rock from widely-spaced drill holes. Drill holes have been selected for study from the sample libraries of the Missouri Division of Geology and Land Survey and the Kansas Geological Survey (KGS). None of the holes are company confidential and none intersect economically significant mineralized ground.

The analytical results for drill hole no. 13 (#1 - 33 Fee - KGS), drill hole no. 14 (#1 Uitts - KGS), and drill hole no. 15 (#1 Showers - KGS) are given in this report. Drill hole no. 13 is located in sec. 33, T. 27 S., R. 13 E. in Greenwood County, Kansas; drill hole no. 14 is located in sec. 18, T. 32 S., R. 16 E. in Montgomery County, Kansas; drill hole no. 15 is located in sec. 16, T. 30 S., R. 15 E. in Wilson County, Kansas (fig.1). Data for the insoluble-residue samples from drill holes 13, 14, and 15 are listed in tables 1, 2, and 3 respectively. Well name, well number, township, range, and county allow for identification and location of files at the Kansas Geological Survey.

PREPARATION AND ANALYSIS OF SAMPLES

Insoluble residues were prepared by dissolving approximately 80 grams of crushed carbonate rock in repeated applications of 1:5 hydrochloric acid until the carbonate was removed. The samples were then filtered and dried overnight at 50 °C.

The samples were pulverized to minus 140 mesh (0.105 mm) in a vertical grinder equipped 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 have been present.

Each sample was analyzed semiquantitatively for 31 elements using a six-step D.C.-arc optical-emission spectrographic method (Grimes and Marranzino, 1968).

The semiquantitative spectrographic values are reported as six steps per order of magnitude (1, 0.7, 0.5, 0.3, 0.2, and 0.15) 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 value 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 for this report are as follows:

For those given in percent:

Calcium	0.05
Iron	0.05
Magnesium	0.02
Titanium	0.002

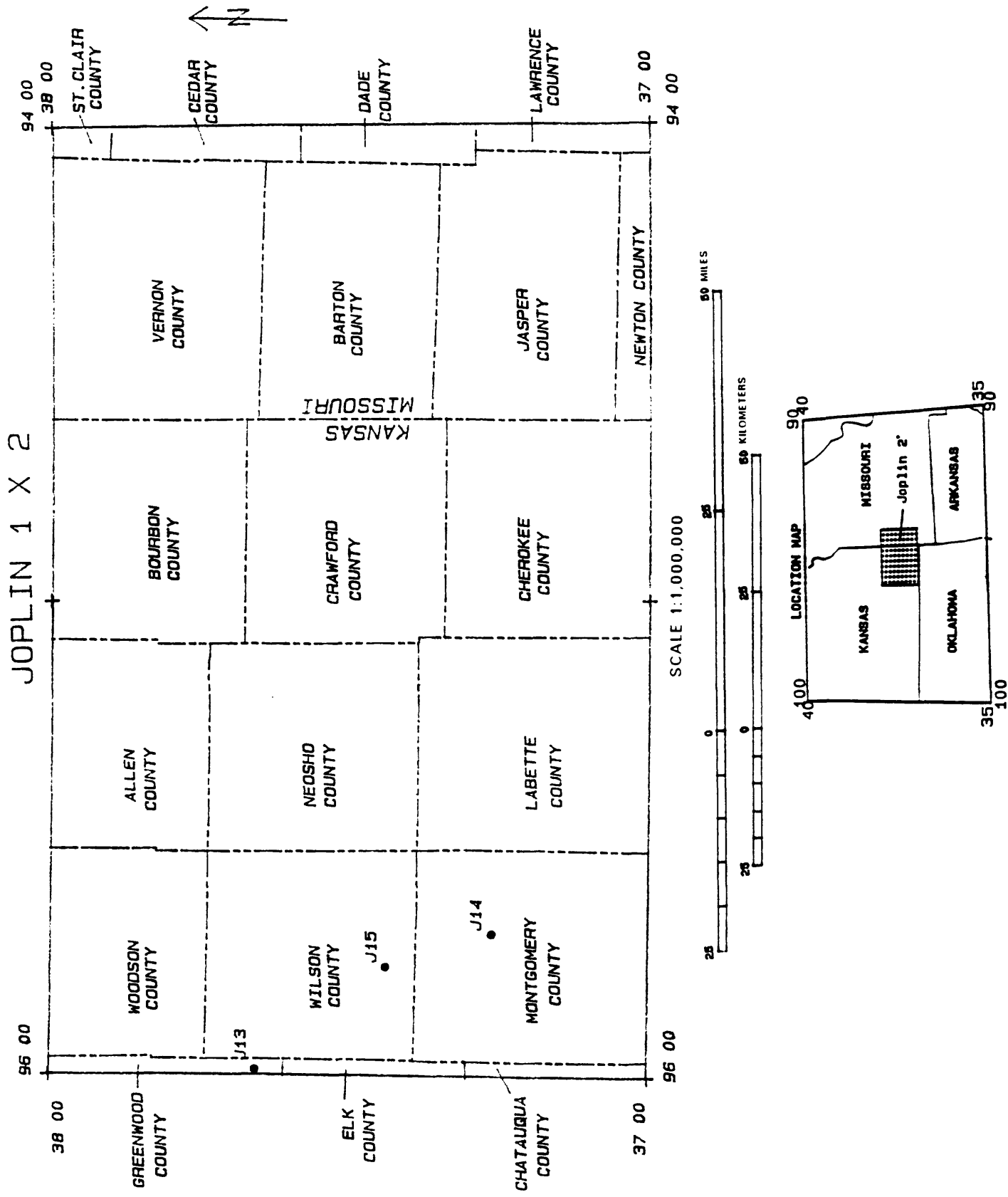


Figure 1. Locations of drill holes 13, 14, and 15, Joplin 1° x 2° quadrangle, Missouri and Kansas

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 DATA TABLES

Each sample is identified by an eight-character code beginning with the letter J, signifying Joplin. The next number signifies the USGS drill-hole number. The letter R appears after the drill hole number and signifies insoluble residue. The next four digits identify the depth of the sample from the drill-hole collar. Most samples are composites of approximate 10-foot intervals, dependent upon the original sample intervals and upon the amount of sample material available for analysis.

The stratigraphic unit of the sample is identified by a coded number in the last column of tables 1 through 3. The code and formation names are as follows:

<u>Code</u>	<u>Formation</u>
20	Pennsylvanian Undifferentiated
31	Chattanooga Shale
40	Mississippian Undifferentiated
60	Ordovician Undifferentiated
78	Cambro - Ordovician Undifferentiated
85	Cambrian - Lamotte Sandstone
90	Precambrian Undifferentiated

EXPLANATION OF DATA

The columns in tables 1 through 3 have headings of sample, elements, and formation. The letter S over the columns signifies emission-spectrographic data.

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

- N = Not detected at the limit of determination;
- < = Detected, but below the limit of determination shown; and
- > = Greater than the limit of determination shown.

Because of the formatting used in the computer program that produced tables 1-3, some of the elements listed in these tables (Fe, Mg, Ca, Ti, Ag, and Be) carry one or more nonsignificant zeros to the right of the significant digits. The analyst did not determine these elements to the accuracy suggested by the extra zeros.

RASS

Upon completion of all analytical work, the information from the samples is entered into a computer-based file called RASS (Rock Analysis Storage System). This RASS file contains both descriptive geological information and analytical data. Any or all of this information may be retrieved and placed in a standard form (STATPAC) for computerized statistical manipulation or publication (VanTrump and Miesch, 1977).

ACKNOWLEDGMENTS

The authors wish to thank the Missouri Division of Geology and Land Survey--Dr. Wallace B. Howe, former Director, and Dr. J. Hadley Williams, Director--and the Kansas Geological Survey, Dr. Lee C. Gerhart, State Geologist, and their staffs, for making these drill-hole samples available from their sample libraries.

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- 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.
- VanTrump, George, Jr., and Miesch, A.T., 1977, The U.S. Geological Survey RASS-STATPAC system for management and statistical reduction of geochemical data: Computers and Geosciences, v. 3, p. 475-488.

TABLE 1--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 13, JOPLIN 1 x 2 QUADRANGLE,
 MISSOURI AND KANSAS.

[N, not detected; <, detected but below the limit of determination shown; >, determined to be greater than the value shown.]

Sample	Latitude	Longitude	Fe-ppt. S	Mg-ppt. S	Ca-ppt. S	Ti-pct. S	Mn-ppt. S	Ag-ppt. S	As-ppt. S	Au-ppt. S
J13R0280	37 39 13	95 59 17	2.00	.70	<.05	.700	100	N	N	N
J13R0340	37 39 13	95 59 17	2.00	1.00	<.05	.500	100	N	N	N
J13R0380	37 39 13	95 59 17	3.00	1.00	<.05	.500	100	N	N	N
J13R0460	37 39 13	95 59 17	3.00	1.00	<.05	.500	100	N	N	N
J13R0580	37 39 13	95 59 17	5.00	1.50	<.05	.500	150	N	N	N
J13R0640	37 39 13	95 59 17	2.00	.50	<.05	.500	70	N	N	N
J13R0680	37 39 13	95 59 17	3.00	1.00	<.05	.500	100	N	N	N
J13R0720	37 39 13	95 59 17	7.00	1.50	<.05	.500	150	N	N	N
J13R0760	37 39 13	95 59 17	3.00	1.00	.05	.300	100	N	N	N
J13R0800	37 39 13	95 59 17	3.00	1.00	.05	.300	100	.5	N	N
J13R0840	37 39 13	95 59 17	5.00	1.00	.05	.500	200	1.0	N	N
J13R0880	37 39 13	95 59 17	5.00	1.50	.05	.500	200	2.0	N	N
J13R0920	37 39 13	95 59 17	3.00	1.00	<.05	.300	150	N	N	N
J13R0960	37 39 13	95 59 17	7.00	2.00	<.05	1.000	200	.5	N	N
J13R1000	37 39 13	95 59 17	3.00	1.50	<.05	.500	100	N	N	N
J13R1040	37 39 13	95 59 17	2.00	1.00	<.05	.700	100	N	N	N
J13R1080	37 39 13	95 59 17	3.00	1.50	<.05	.700	200	N	N	N
J13R1120	37 39 13	95 59 17	3.00	1.50	<.05	.500	150	N	N	N
J13R1160	37 39 13	95 59 17	3.00	1.00	<.05	.500	100	N	N	N
J13R1200	37 39 13	95 59 17	5.00	1.00	<.05	.700	150	N	N	N
J13R1240	37 39 13	95 59 17	3.00	1.00	<.05	.500	100	N	N	N
J13R1280	37 39 13	95 59 17	3.00	1.00	<.05	.500	100	N	N	N
J13R1320	37 39 13	95 59 17	5.00	1.00	<.05	.500	70	N	N	N
J13R1360	37 39 13	95 59 17	3.00	1.00	<.05	.700	100	N	N	N
J13R1400	37 39 13	95 59 17	2.00	1.00	<.05	.700	70	N	N	N
J13R1440	37 39 13	95 59 17	3.00	1.00	<.05	.500	100	N	N	N
J13R1470	37 39 13	95 59 17	3.00	.70	<.05	.300	70	N	N	N
J13R1520	37 39 13	95 59 17	.50	.05	<.05	.100	10	N	N	N
J13R1560	37 39 13	95 59 17	.70	.10	.15	.150	20	N	N	N
J13R1600	37 39 13	95 59 17	.50	.10	.05	.100	20	N	N	N
J13R1640	37 39 13	95 59 17	.50	.10	.10	.100	20	N	N	N
J13R1680	37 39 13	95 59 17	5.00	1.50	<.05	.500	100	N	N	N
J13R1720	37 39 13	95 59 17	5.00	1.50	<.05	.300	150	N	N	N
J13R1760	37 39 13	95 59 17	1.50	.30	<.05	.300	30	N	N	N
J13R1800	37 39 13	95 59 17	1.00	.15	<.05	.100	10	N	N	N
J13R1840	37 39 13	95 59 17	.50	.30	.15	.150	10	1.0	N	N
J13R1880	37 39 13	95 59 17	.70	.20	.10	.150	15	N	N	N
J13R1920	37 39 13	95 59 17	.70	.15	<.05	.200	15	N	N	N
J13R1960	37 39 13	95 59 17	2.00	.50	<.05	.500	50	N	N	N
J13R2000	37 39 13	95 59 17	2.00	.50	<.05	.300	50	N	N	N
J13R2040	37 39 13	95 59 17	.50	.10	<.05	.070	<10	N	N	N
J13R2080	37 39 13	95 59 17	.20	.10	.05	.030	<10	N	N	N
J13R2120	37 39 13	95 59 17	1.00	.20	<.05	.200	50	1.0	N	N
J13R2160	37 39 13	95 59 17	1.00	.10	.05	.050	15	N	N	N
J13R2200	37 39 13	95 59 17	.15	.05	<.05	.015	<10	N	N	N

TABLE 1--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 13, JOPLIN 1 x 2 QUADRANGLE,
MISSOURI AND KANSAS.--Continued

Sample	B-ppm S	Ba-ppm S	Be-ppm S	Bi-ppm S	Cd-ppm S	Co-ppm S	Cr-ppm S	Cu-ppm S	La-ppm S	Mo-ppm S	Nb-ppm S	Ni-ppm S
J13R0280	200	500	2.0	N	N	10	100	15	50	N	<20	30
J13R0340	200	500	2.0	N	N	15	100	20	50	N	<20	50
J13R0380	200	3,000	2.0	N	N	20	100	30	50	N	<20	70
J13R0460	200	1,000	2.0	N	N	15	150	20	50	N	<20	50
J13R0580	200	500	2.0	N	N	30	150	30	50	N	<20	70
J13R0640	100	700	1.0	N	N	10	100	30	30	N	<20	30
J13R0680	200	300	2.0	N	N	20	200	200	50	N	<20	70
J13R0720	200	500	1.5	N	N	30	150	100	70	N	<20	70
J13R0760	150	300	1.5	N	N	15	100	20	20	N	<20	50
J13R0800	200	200	1.0	N	N	15	150	30	20	10	<20	70
J13R0840	200	300	1.5	N	20	20	200	50	50	30	<20	100
J13R0880	200	200	2.0	N	20	20	500	70	30	50	<20	150
J13R0920	150	200	1.5	N	N	10	150	30	30	N	<20	50
J13R0960	200	300	1.5	N	N	30	200	70	30	10	<20	100
J13R1000	200	200	2.0	N	N	20	200	20	50	N	<20	70
J13R1040	150	300	1.5	N	N	20	100	15	50	N	<20	50
J13R1080	150	300	1.5	N	N	20	150	20	50	N	<20	50
J13R1120	150	500	1.5	N	N	20	150	15	30	N	<20	100
J13R1160	200	200	2.0	N	N	20	200	30	50	15	<20	100
J13R1200	200	500	1.5	N	N	20	150	15	50	N	<20	50
J13R1240	200	500	2.0	N	N	15	150	70	50	N	<20	50
J13R1280	150	500	2.0	N	N	20	100	20	50	N	<20	70
J13R1320	200	700	1.5	N	N	20	150	15	50	N	<20	50
J13R1360	200	300	1.5	N	N	30	200	30	50	7	<20	100
J13R1400	200	300	2.0	N	N	20	200	20	100	N	<20	70
J13R1440	200	300	1.5	N	N	20	150	20	50	N	<20	100
J13R1470	150	300	1.5	N	N	20	100	15	50	N	<20	70
J13R1520	150	30	<1.0	N	N	N	10	<5	N	N	N	5
J13R1560	100	50	1.0	N	N	N	15	5	N	N	N	30
J13R1600	100	50	<1.0	N	N	N	15	<5	N	N	N	15
J13R1640	70	70	<1.0	N	N	10	20	5	N	N	N	50
J13R1680	150	300	2.0	N	N	20	100	20	20	N	<20	50
J13R1720	150	300	2.0	N	N	30	100	70	20	50	<20	70
J13R1760	100	200	1.5	N	20	7	70	15	N	N	<20	30
J13R1800	70	100	<1.0	N	N	N	15	15	N	N	N	10
J13R1840	50	150	<1.0	N	N	N	15	7	N	N	N	5
J13R1880	70	100	1.0	N	N	N	20	5	N	N	N	10
J13R1920	100	70	<1.0	N	N	N	30	<5	N	N	N	10
J13R1960	150	300	2.0	N	N	15	100	20	30	N	N	50
J13R2000	150	200	1.5	N	N	10	70	10	30	N	N	30
J13R2040	70	70	<1.0	N	N	5	N	<5	N	N	N	7
J13R2080	50	200	<1.0	N	N	N	N	<5	N	N	N	5
J13R2120	70	100	1.0	N	N	5	30	7	N	N	N	20
J13R2160	50	3,000	<1.0	N	N	N	N	<5	N	N	N	N
J13R2200	30	500	N	N	N	N	N	<5	N	N	N	N

TABLE 1--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 13, JOPLIN 1 x 2 QUADRANGLE,
MISSOURI AND KANSAS.--Continued

Sample	Pb-ppm S	Sb-ppm S	Sc-ppm S	Sn-ppm S	Si-ppm S	V-ppm S	W-ppm S	Y-ppm S	Zn-ppm S	Zr-ppm S	Th-ppm S	Form.#
J13R0280	10	N	15	N	150	150	N	50	N	300	N	20
J13R0340	10	N	20	N	200	200	N	50	N	300	N	20
J13R0380	10	N	20	N	150	200	N	30	<200	200	N	20
J13R0460	15	N	20	N	200	200	N	20	500	200	N	20
J13R0580	10	N	20	N	200	200	N	50	N	200	N	20
J13R0640	10	N	7	N	100	100	N	30	N	300	N	20
J13R0680	10	N	15	N	100	200	N	20	N	200	N	20
J13R0720	15	N	20	N	100	200	N	30	N	150	N	20
J13R0760	10	N	15	N	100	150	N	15	N	100	N	20
J13R0800	20	N	10	N	150	150	N	10	<200	100	N	20
J13R0840	20	N	15	N	100	300	N	20	200	200	N	20
J13R0880	30	N	15	N	100	500	N	15	500	150	N	20
J13R0920	20	N	10	N	100	100	N	15	N	70	N	20
J13R0960	30	N	15	N	N	200	N	20	N	200	N	20
J13R1000	15	N	15	N	N	200	N	20	N	200	N	20
J13R1040	<10	N	10	N	100	150	N	50	N	300	N	20
J13R1080	10	N	20	N	100	200	N	50	N	200	N	20
J13R1120	50	N	15	N	100	200	N	20	200	200	N	20
J13R1160	20	N	20	N	N	200	N	30	N	200	N	20
J13R1200	<10	N	15	N	100	200	N	50	<200	300	N	20
J13R1240	10	N	20	N	100	200	N	30	N	150	N	20
J13R1280	20	N	20	N	300	200	N	50	<200	200	N	20
J13R1320	<10	N	20	N	200	200	N	50	N	200	N	20
J13R1360	30	N	20	N	200	200	N	30	N	200	N	20
J13R1400	15	N	20	N	300	200	N	50	N	150	N	20
J13R1440	30	N	20	N	200	200	N	50	N	150	N	20
J13R1470	10	N	15	N	100	100	N	50	N	100	N	60
J13R1520	N	N	N	N	N	N	N	N	N	20	N	60
J13R1560	N	N	N	N	N	20	N	N	N	50	N	60
J13R1600	N	N	N	N	N	15	N	N	N	30	N	60
J13R1640	N	N	N	N	N	30	N	N	N	50	N	60
J13R1680	10	N	10	N	N	200	N	30	N	200	N	31
J13R1720	50	N	15	N	N	200	N	30	N	150	N	78
J13R1760	<10	N	7	N	100	100	N	15	2,000	150	N	78
J13R1800	N	N	N	N	N	20	N	N	N	50	N	78
J13R1840	N	N	N	N	N	30	N	N	N	100	N	78
J13R1880	N	N	N	N	100	20	N	N	N	70	N	78
J13R1920	N	N	5	N	N	30	N	10	N	100	N	78
J13R1960	15	N	15	N	150	150	N	50	N	150	N	78
J13R2000	<10	N	10	N	300	150	N	20	N	150	N	78
J13R2040	N	N	N	N	100	N	N	N	N	50	N	78
J13R2080	N	N	N	N	3,000	N	N	N	N	10	N	78
J13R2120	N	N	5	N	200	50	N	10	N	70	N	78
J13R2160	N	N	N	N	5,000	10	N	N	N	30	N	78
J13R2200	N	N	N	N	500	N	N	N	N	N	N	78

TABLE 1--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 13, JOPLIN 1 x 2 QUADRANGLE,
MISSOURI AND KANSAS.--Continued

Sample	Latitude	Longitude	Fe-pct. S	Hg-pct. S	Cu-pct. S	Ti-pct. S	Mn-ppm S	Ag-ppm S	As-ppm S	Au-ppm S
J13R2240	37 39 13	95 59 17	.05	.02	<.05	.005	<10	N	N	N
J13R2280	37 39 13	95 59 17	.20	.05	.05	.020	<10	N	N	N
J13R2300	37 39 13	95 59 17	7.00	.07	<.05	.030	50	N	N	N
J13R2320	37 39 13	95 59 17	5.00	.10	<.05	.050	100	N	N	N
J13R2325	37 39 13	95 59 17	.70	.10	<.05	.050	70	N	N	N

Sample	R-ppm S	Ra-ppm S	Be-ppm S	Bi-ppm S	Cd-ppm S	Co-ppm S	Cr-ppm S	Cu-ppm S	La-ppm S	Mo-ppm S	Nb-ppm S	Ni-ppm S
J13R2240	50	150	N	N	N	N	N	<5	N	N	N	N
J13R2280	70	200	N	N	N	N	N	<5	N	N	N	N
J13R2300	10	200	2.0	N	N	N	N	10	N	N	<20	N
J13R2320	N	300	2.0	N	N	N	N	5	N	N	<20	5
J13R2325	N	200	3.0	N	N	N	N	5	N	N	<20	N

Sample	Pb-ppm S	Sb-ppm S	Sc-ppm S	Sn-ppm S	St-ppm S	V-ppm S	V-ppm S	Y-ppm S	Zn-ppm S	Zr-ppm S	Th-ppm S	Form.#
J13R2240	N	N	N	N	150	N	N	N	N	N	N	78
J13R2280	N	N	N	N	1,500	N	N	N	N	N	N	78
J13R2300	<10	N	N	N	1,000	N	N	30	N	50	N	90
J13R2320	10	N	5	N	500	N	N	70	N	100	N	90
J13R2325	<10	N	N	N	N	N	N	20	N	30	N	90

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 14, JOPLIN 1 x 2 QUADRANGLE,
 MISSOURI AND KANSAS.
 (N, not detected; <, detected but below the limit of determination shown; >, determined to be greater than the value shown.)

Sample	Latitude	Longitude	Fe-pct. %	Hg-pct. %	Ca-pct. %	Ti-pct. %	Mn-ppm S	Ag-ppm S	As-ppm S	Au-ppm S
J14R1414	37 15 30	95 42 0	.70	.07	<.05	.020	10	N	N	N
J14R1504	37 15 30	95 42 0	.15	.07	<.05	.020	<10	N	N	N
J14R1576	37 15 30	95 42 0	.30	.10	.05	.015	<10	N	N	N
J14R1630	37 15 30	95 42 0	.10	.02	<.05	.005	N	N	N	N
J14R1980	37 15 30	95 42 0	.70	<.02	<.05	.002	N	N	N	N
J14R2000	37 15 30	95 42 0	1.00	.02	<.05	.003	<10	.7	N	N
J14R2015	37 15 30	95 42 0	.70	.02	<.05	.003	<10	N	N	N
J14R2050	37 15 30	95 42 0	2.00	.15	.20	.010	50	N	N	N
J14R2070	37 15 30	95 42 0	2.00	.02	<.05	.005	20	N	N	N
J14R2083	37 15 30	95 42 0	1.50	.02	<.05	.005	15	N	N	N
J14R2092	37 15 30	95 42 0	1.00	.03	<.05	.003	<10	N	N	N
J14R2102	37 15 30	95 42 0	.70	.10	.05	.020	<10	N	N	N
J14R2110	37 15 30	95 42 0	.50	.03	<.05	.007	<10	N	N	N
J14R2123	37 15 30	95 42 0	.70	.05	.05	.005	<10	N	N	N
J14R2140	37 15 30	95 42 0	2.00	.30	.30	.015	70	N	N	N
J14R2158	37 15 30	95 42 0	3.00	.07	.05	.020	70	.5	N	N
J14R2170	37 15 30	95 42 0	15.00	.10	.07	.020	200	1.5	N	N
J14R2188	37 15 30	95 42 0	7.00	.10	.07	.010	100	1.0	<200	N
J14R2200	37 15 30	95 42 0	20.00	.15	<.05	.050	300	3.0	300	N
J14R2220	37 15 30	95 42 0	15.00	.10	<.05	.070	200	2.0	500	N
J14R2242	37 15 30	95 42 0	15.00	.15	.05	.100	150	2.0	300	N
J14R2262	37 15 30	95 42 0	2.00	.15	<.05	.150	50	.5	N	N
J14R2280	37 15 30	95 42 0	1.00	.10	<.05	.070	15	N	N	N
J14R2301	37 15 30	95 42 0	.15	.03	<.05	.050	<10	N	N	N
J14R2308	37 15 30	95 42 0	.15	.03	<.05	.050	<10	N	N	N
J14R2318	37 15 30	95 42 0	1.50	.50	.20	.100	70	N	N	N
J14R2337	37 15 30	95 42 0	2.00	.70	.50	.150	300	N	N	N
J14R2350	37 15 30	95 42 0	1.50	1.00	1.00	.100	300	N	N	N
J14R2410	37 15 30	95 42 0	3.00	.70	.50	.100	500	N	N	N
J14R2425	37 15 30	95 42 0	3.00	.70	.50	.100	500	N	N	N
J14R2463	37 15 30	95 42 0	2.00	1.50	1.00	.150	300	N	N	N

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 14, JOPLIN 1 x 2 QUADRANGLE,
MISSOURI AND KANSAS.--Continued

Sample	B-ppm S	Ba-ppm S	Be-ppm S	Bi-ppm S	Cd-ppm S	Co-ppm S	Cr-ppm S	Cu-ppm S	La-ppm S	Mo-ppm S	Nb-ppm S	Ni-ppm S
J14R1414	30	300	N	N	N	N	N	20	N	N	N	N
J14R1504	70	50	N	N	N	N	N	<5	N	N	N	N
J14R1576	20	1,500	N	N	N	N	N	<5	N	N	N	N
J14R1630	100	20	N	N	N	N	N	<5	N	N	N	N
J14R1980	50	100	N	N	N	N	N	20	N	N	N	N
J14R2000	50	500	N	N	N	N	N	5	N	N	N	N
J14R2015	50	200	N	N	N	N	N	<5	N	N	N	N
J14R2050	50	>5,000	N	N	N	N	N	1,000	N	N	N	10
J14R2070	30	3,000	N	N	N	N	N	10	N	N	N	7
J14R2083	30	2,000	N	N	N	N	N	15	N	N	N	N
J14R2092	30	3,000	N	N	N	N	N	100	N	N	N	N
J14R2102	50	2,000	N	N	N	N	N	70	N	N	N	5
J14R2110	30	1,500	N	N	N	N	N	30	N	N	N	N
J14R2123	30	1,500	N	N	N	N	N	100	N	N	N	N
J14R2140	30	>5,000	N	N	N	N	N	500	N	N	N	5
J14R2158	30	>5,000	<1.0	N	N	N	N	500	N	5	N	15
J14R2170	30	>5,000	N	N	N	5	N	700	N	15	N	20
J14R2188	50	>5,000	N	N	N	N	N	150	N	10	N	15
J14R2200	50	>5,000	1.0	N	N	20	70	500	N	50	N	70
J14R2220	20	>5,000	1.0	N	N	15	20	300	N	30	N	50
J14R2242	30	>5,000	1.5	N	N	10	10	300	N	30	N	30
J14R2262	30	3,000	1.5	N	N	N	N	20	20	N	N	7
J14R2280	20	3,000	1.0	N	N	N	N	10	N	N	N	N
J14R2301	15	2,000	<1.0	N	N	N	N	<5	N	N	N	N
J14R2308	15	2,000	N	N	N	N	N	<5	N	N	N	N
J14R2318	30	3,000	1.0	N	N	N	N	5	30	N	N	5
J14R2337	50	1,500	2.0	N	N	N	15	15	70	N	N	10
J14R2350	30	2,000	2.0	N	N	N	10	20	50	N	N	7
J14R2410	30	2,000	2.0	N	N	5	10	10	20	N	N	10
J14R2425	30	2,000	2.0	N	N	10	20	15	70	N	N	20
J14R2463	30	3,000	2.0	N	N	N	15	15	70	N	N	15

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 14, JOPLIN 1 x 2 QUADRANGLE,
MISSOURI AND KANSAS.--Continued

Sample	Pb-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s	Si-ppm s	V-ppm s	H-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Th-ppm s	Form.#
J14R1414	N	N	N	N	N	N	N	N	N	150	N	60
J14R1504	N	N	N	N	N	N	N	N	N	20	N	60
J14R1576	N	N	N	N	100	N	N	N	N	15	N	60
J14R1630	N	N	N	N	N	N	N	N	N	N	N	60
J14R1980	N	N	N	N	N	N	N	N	N	N	N	60
J14R2000	N	N	N	N	N	N	N	N	N	N	N	60
J14R2015	N	N	N	N	N	N	N	N	N	N	N	60
J14R2050	N	N	N	N	5,000	N	N	N	200	N	N	60
J14R2070	N	N	N	N	300	N	N	N	N	N	N	60
J14R2083	N	N	N	N	150	N	N	N	N	N	N	60
J14R2092	N	N	N	N	100	N	N	N	N	N	N	60
J14R2102	N	N	N	N	100	20	N	N	N	20	N	60
J14R2110	N	N	N	N	N	N	N	N	N	10	N	60
J14R2123	N	N	N	N	N	N	N	N	N	15	N	60
J14R2140	N	N	N	N	5,000	N	N	N	N	15	N	85
J14R2158	10	N	N	N	1,500	N	N	N	200	10	N	85
J14R2170	50	N	N	N	>5,000	N	N	N	N	N	N	85
J14R2188	50	N	N	N	1,000	N	N	N	N	10	N	85
J14R2200	200	N	N	N	3,000	20	N	N	N	150	N	85
J14R2220	150	N	N	N	700	20	N	N	N	50	N	85
J14R2242	200	N	N	N	500	15	N	20	N	200	N	85
J14R2262	70	N	N	N	150	15	N	30	N	200	N	85
J14R2280	30	N	N	N	100	10	N	N	N	200	N	85
J14R2301	N	N	N	N	200	N	N	N	N	200	N	85
J14R2308	N	N	N	N	100	N	N	N	N	200	N	85
J14R2318	20	N	N	N	200	15	N	20	N	100	N	90
J14R2337	30	N	N	N	300	30	100	50	N	150	N	90
J14R2350	50	N	N	N	300	20	300	30	N	200	N	90
J14R2410	50	N	N	N	300	20	70	50	N	150	N	90
J14R2425	70	N	5	N	300	30	50	50	N	100	N	90
J14R2463	30	N	5	N	500	20	1,000	50	N	100	N	90

TABLE 3--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 15, JOPLIN 1 x 2 QUADRANGLE,
 MISSOURI AND KANSAS.

[N, not detected; <, detected but below the limit of determination shown; >, determined to be greater than the value shown.]

Sample	Latitude	Longitude	Fe-pct. S	Mg-pct. S	Ca-pct. S	Ti-pct. S	Mn-dpm S	Ag-dpm S	As-dpm S	Au-dpm S
J15R2119	37 26 10	95 46 8	.05	<.02	<.05	.005	<10	N	N	N
J15R2130	37 26 10	95 46 8	.10	.02	<.05	.005	<10	N	N	N
J15R2140	37 26 10	95 46 8	.50	.05	.05	.010	<10	N	N	N
J15R2161	37 26 10	95 46 8	1.50	.15	.05	.150	30	N	N	N
J15R2180	37 26 10	95 46 8	.10	.02	.05	.015	<10	N	N	N
J15R2201	37 26 10	95 46 8	.20	.05	<.05	.050	<10	N	N	N
J15R2219	37 26 10	95 46 8	2.00	.20	.05	.150	50	N	N	N
J15R2238	37 26 10	95 46 8	7.00	.30	.20	.200	70	N	N	N
J15R2260	37 26 10	95 46 8	3.00	.30	.30	.200	100	N	N	N
J15R2282	37 26 10	95 46 8	5.00	2.00	2.00	.070	100	N	N	N
J15R2300	37 26 10	95 46 8	2.00	.20	.20	.050	50	N	N	N
J15R2320	37 26 10	95 46 8	20.00	.30	3.00	.100	70	.5	N	N
J15R2340	37 26 10	95 46 8	>20.00	.03	<.05	.010	1,000	5.0	<200	N
J15R2359	37 26 10	95 46 8	>20.00	.10	<.05	.050	700	3.0	<200	N
J15R2369	37 26 10	95 46 8	20.00	.15	.05	.150	500	3.0	N	N
J15R2389	37 26 10	95 46 8	20.00	.10	<.05	.100	200	5.0	200	N
J15R2408	37 26 10	95 46 8	20.00	.10	.05	.100	100	1.5	200	N
J15R2430	37 26 10	95 46 8	3.00	.05	<.05	.070	50	1.0	N	N
J15R2453	37 26 10	95 46 8	15.00	1.00	2.00	.100	300	10.0	<200	N
J15R2475	37 26 10	95 46 8	.70	.03	<.05	.030	15	N	N	N
J15R2495	37 26 10	95 46 8	1.00	.05	<.05	.020	30	<.5	N	N
J15R2505	37 26 10	95 46 8	2.00	.10	.05	.100	50	<.5	N	N

TABLE 3--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 15, JOPLIN 1 x 2 QUADRANGLE,
MISSOURI AND KANSAS.--Continued

Sample	B-ppm S	Ba-ppm S	Be-ppm S	Bi-ppm S	Cd-ppm S	Co-ppm S	Cr-ppm S	Cu-ppm S	La-ppm S	Mo-ppm S	Nb-ppm S	Ni-ppm S
J15R2119	10	20	N	N	N	N	N	<5	N	N	N	N
J15R2130	20	30	N	N	N	N	N	<5	N	N	N	N
J15R2140	20	20	N	N	N	N	N	5	N	N	N	N
J15R2161	50	70	1.0	N	N	N	30	15	N	N	N	15
J15R2180	30	20	N	N	N	N	N	<5	N	N	N	N
J15R2201	20	20	<1.0	N	N	N	N	<5	N	N	N	N
J15R2219	50	50	1.0	N	N	N	20	30	N	15	N	30
J15R2238	50	50	1.0	N	N	10	50	50	N	30	N	50
J15R2260	50	70	<1.0	N	N	N	30	30	N	10	N	20
J15R2282	30	300	N	N	N	N	N	30	N	7	N	15
J15R2300	20	100	N	N	N	N	N	30	N	5	N	15
J15R2320	20	50	<1.0	N	N	15	20	500	N	20	N	100
J15R2340	N	50	N	N	N	15	N	200	N	50	N	200
J15R2359	N	30	<1.0	N	N	15	N	200	N	70	N	150
J15R2369	15	50	<1.0	N	N	20	10	700	N	50	N	70
J15R2389	10	70	1.5	N	N	30	N	300	N	20	N	70
J15R2408	10	200	1.0	N	N	7	N	50	N	30	N	15
J15R2430	10	150	1.0	N	N	N	N	20	N	7	N	7
J15R2453	15	200	<1.0	N	N	50	N	150	N	20	N	100
J15R2475	N	200	<1.0	N	N	N	N	<5	N	N	N	N
J15R2495	15	700	N	<10	N	N	N	5	N	N	N	N
J15R2505	20	700	2.0	10	N	N	N	10	N	N	N	N

TABLE 3--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 15, JOPLIN 1 x 2 QUADRANGLE,
MISSOURI AND KANSAS.--Continued

Sample	Pb-ppm S	Sb-ppm S	Sc-ppm S	Sn-ppm S	Si-ppm S	V-ppm S	W-ppm S	Y-ppm S	Zn-ppm S	Zr-ppm S	Th-ppm S	Form.#
J15R2119	N	N	N	N	N	N	N	N	N	50	N	78
J15R2130	N	N	N	N	N	N	N	N	N	N	N	78
J15R2140	N	N	N	N	N	N	N	N	N	N	N	78
J15R2161	N	N	N	N	N	20	N	N	N	70	N	78
J15R2180	N	N	N	N	100	N	N	N	N	N	N	78
J15R2201	N	N	N	N	N	N	N	N	N	10	N	78
J15R2219	15	N	N	N	100	N	N	N	2,000	70	N	78
J15R2238	20	N	5	N	50	N	N	20	N	70	N	78
J15R2260	20	N	N	N	30	N	N	10	N	70	N	78
J15R2282	50	N	N	N	1,000	15	N	N	N	20	N	78
J15R2300	10	N	N	N	N	N	N	N	N	100	N	78
J15R2320	50	N	N	N	N	30	N	10	N	70	N	78
J15R2340	50	N	N	N	N	N	N	N	N	N	N	78
J15R2359	50	N	N	N	N	N	N	10	N	N	N	78
J15R2369	150	N	N	N	N	10	N	N	N	300	N	78
J15R2389	1,000	N	N	N	N	<10	N	N	N	50	N	78
J15R2408	100	N	N	N	N	N	N	10	N	50	N	78
J15R2430	100	N	N	N	N	N	N	N	N	300	N	78
J15R2453	10,000	N	20	N	300	10	N	100	N	>1,000	N	78
J15R2475	30	N	N	N	N	N	N	N	N	200	N	78
J15R2495	20	N	N	N	N	N	N	10	N	20	N	78
J15R2505	30	N	N	N	N	N	N	20	N	70	N	78