

UNITED STATES DEPARTMENT OF THE INTERIOR
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**Spectrographic analyses of insoluble-residue samples,
Joplin 1° x 2° quadrangle, Kansas and Missouri:
Drill hole nos. 10, 11, and 12**

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 is 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. 10 (#1 Neely - KGS), drill hole no. 11 (#1 Solomon - KGS), and drill hole no. 12 (#2 R.C. Wetzel - KGS) are given in this report. Drill hole no. 10 is located in sec. 34, T. 30 S., R. 18 E. in Neosho County, Kansas; drill hole no. 11 is located in sec. 29, T. 26 S., R. 13 E. in Woodson County, Kansas; drill hole no. 12 is located in sec. 23, T. 33 S., R. 13 E. in Chataqua County, Kansas (fig.1). Data for the insoluble-residue samples from drill holes 10, 11, and 12 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 with 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

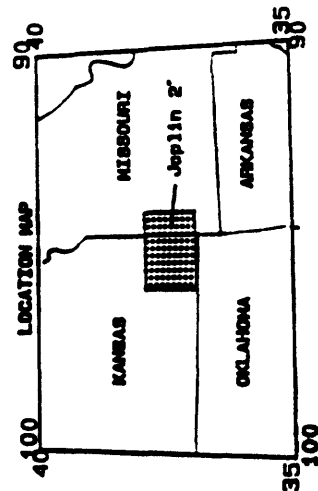
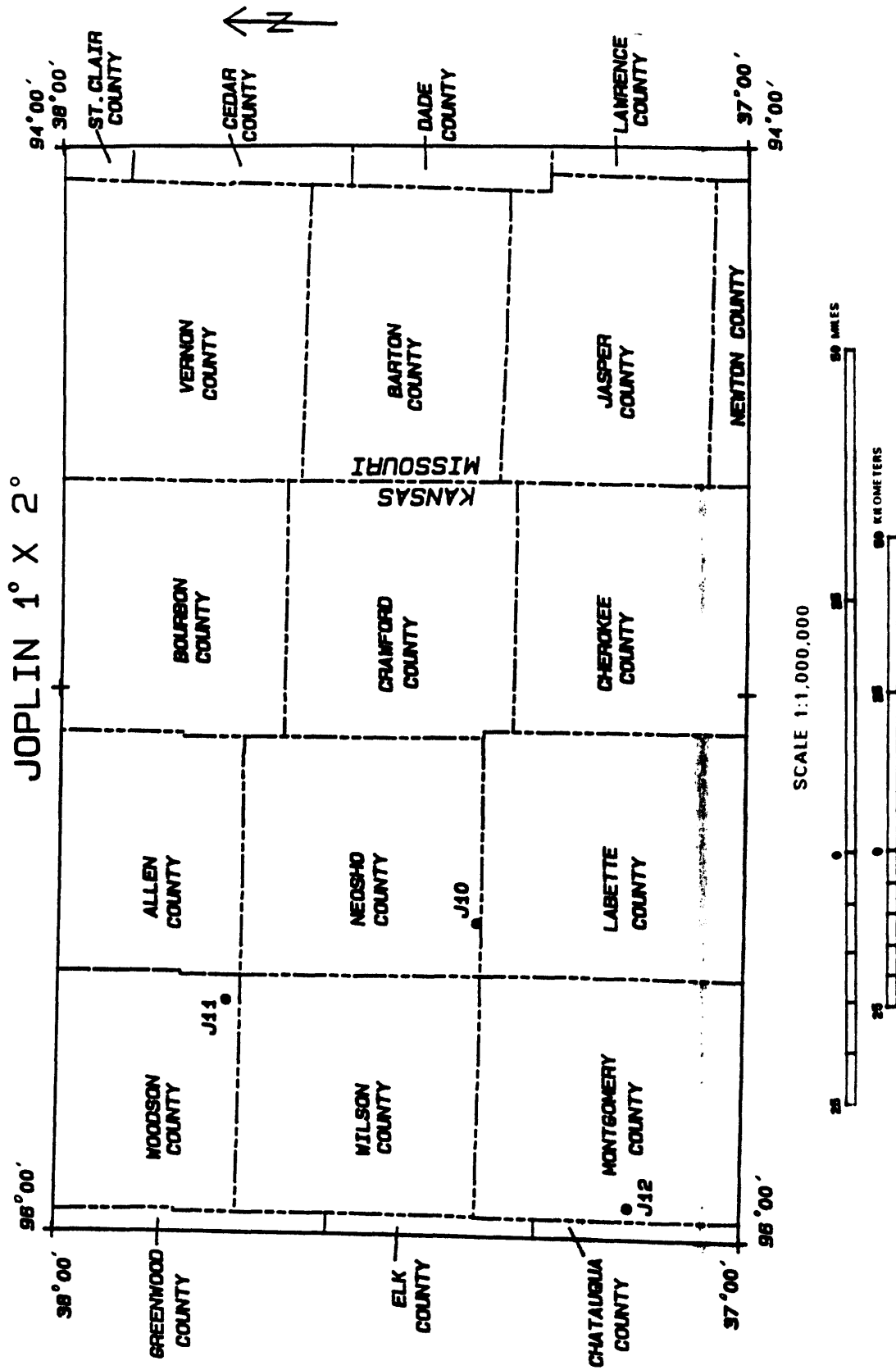


Figure 1. Locations of drill holes 10, 11, and 12, Joplin 1° x 2° quadrangle, Missouri and Kansas.

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
80	Cambrian Undifferentiated
85	Cambrian - Lamotte Sandstone
87	Post - Bonneterre Cambrian
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 Kansas Geological Survey, Dr. Lee C. Gerhart, State Geologist, and his staff, for making the drill-hole samples available from their sample libraries.

REFERENCES

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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. 10, 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-pptm S	Ag-pptm S	As-pptm S	Au-pptm S
J10R1190	37 23 20	95 25 30	1.5	.30	<.05	.3	70	N	N	N
J10R1210	37 23 20	95 25 30	1.5	.20	.05	.2	50	N	N	N
J10R1230	37 23 20	95 25 30	1.5	.20	.05	.2	50	N	N	N
J10R1250	37 23 20	95 25 30	1.5	.20	<.05	.2	50	N	N	N
J10R1270	37 23 20	95 25 30	1.5	.20	<.05	.2	70	.5	N	N
J10R1290	37 23 20	95 25 30	3.0	.70	<.05	.5	100	N	N	N
J10R1310	37 23 20	95 25 30	7.0	1.00	<.05	.5	100	N	N	N
J10R1330	37 23 20	95 25 30	20.0	.15	<.05	.5	100	.7	N	N
J10R1350	37 23 20	95 25 30	2.0	.20	<.05	.2	50	.5	N	N
J10R1370	37 23 20	95 25 30	3.0	.30	<.05	.2	70	N	N	N
J10R1390	37 23 20	95 25 30	5.0	.50	<.05	.3	70	N	N	N
J10R1410	37 23 20	95 25 30	2.0	.30	<.05	.3	50	5.0	N	N
J10R1430	37 23 20	95 25 30	2.0	.30	<.05	.3	70	N	N	N
J10R1450	37 23 20	95 25 30	2.0	.30	<.05	.3	100	N	N	N
J10R1470	37 23 20	95 25 30	2.0	.30	<.05	.3	100	N	N	N
J10R1490	37 23 20	95 25 30	2.0	.30	<.05	.3	70	N	N	N
J10R1510	37 23 20	95 25 30	3.0	.50	<.05	.5	100	N	N	N
J10R1530	37 23 20	95 25 30	2.0	.50	<.05	.3	50	N	N	N
J10R1550	37 23 20	95 25 30	2.0	.50	<.05	.5	70	N	N	N
J10R1570	37 23 20	95 25 30	3.0	.70	<.05	.5	100	N	N	N
J10R1590	37 23 20	95 25 30	2.0	.70	<.05	.3	100	N	N	N
J10R1610	37 23 20	95 25 30	2.0	.70	<.05	.5	100	N	N	N
J10R1630	37 23 20	95 25 30	2.0	.70	<.05	.3	100	N	N	N
J10R1650	37 23 20	95 25 30	2.0	.50	<.05	.3	70	N	N	N
J10R1670	37 23 20	95 25 30	2.0	.50	<.05	.5	100	N	N	N
J10R1690	37 23 20	95 25 30	2.0	.50	<.05	.5	100	N	N	N
J10R1710	37 23 20	95 25 30	3.0	.70	<.05	.5	100	N	N	N
J10R1730	37 23 20	95 25 30	3.0	1.00	<.05	.5	100	N	N	N
J10R1750	37 23 20	95 25 30	2.0	.70	<.05	.5	100	N	N	N
J10R1770	37 23 20	95 25 30	2.0	.50	.05	.5	100	N	N	N
J10R1790	37 23 20	95 25 30	1.5	.50	<.05	.5	70	N	N	N
J10R1810	37 23 20	95 25 30	1.5	.50	<.05	.3	70	N	N	N
J10R1830	37 23 20	95 25 30	2.0	.50	.05	.3	100	N	N	N
J10R1850	37 23 20	95 25 30	1.5	.20	.05	.3	50	N	N	N
J10R1870	37 23 20	95 25 30	1.0	.20	.05	.2	30	N	N	N
J10R1890	37 23 20	95 25 30	1.5	.20	<.05	.3	70	N	N	N
J10R1910	37 23 20	95 25 30	1.5	.30	<.05	.3	70	N	N	N
J10R1930	37 23 20	95 25 30	1.5	.30	<.05	.3	70	N	N	N
J10R1950	37 23 20	95 25 30	1.5	.30	<.05	.3	70	N	N	N
J10R1970	37 23 20	95 25 30	2.0	.50	.05	.3	70	N	N	N
J10R1990	37 23 20	95 25 30	2.0	.50	<.05	.3	70	N	N	N
J10R2010	37 23 20	95 25 30	2.0	.70	<.05	.5	100	7.0	N	N
J10R2030	37 23 20	95 25 30	2.0	.70	<.05	.3	100	N	N	N
J10R2050	37 23 20	95 25 30	2.0	.70	<.05	.5	70	N	N	N
J10R2070	37 23 20	95 25 30	2.0	.50	<.05	.5	100	N	N	N

TABLE 1--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 10, JOPLIN 1 x 2 QUADRANGLE,
MISSOURI AND KANSAS.--Continued

Sample	P-ppm S	Ra-ppm S	Re-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
J10R1190	200	200	1.5	N	N	30	100	15	20	N	N	50
J10R1210	100	300	1.0	N	N	7	50	10	20	5	N	50
J10R1230	100	200	1.0	N	N	10	50	10	20	5	N	70
J10R1250	150	100	1.0	N	N	7	50	7	20	N	N	50
J10R1270	100	100	1.0	N	N	10	50	10	20	N	N	100
J10R1290	200	200	1.5	N	N	20	150	30	30	N	N	100
J10R1310	200	300	1.5	N	N	50	150	30	20	N	N	100
J10R1330	50	300	1.0	N	N	70	50	100	N	7	N	150
J10R1350	100	200	1.0	N	N	5	50	10	20	N	N	50
J10R1370	100	500	1.0	N	N	15	50	100	20	5	N	70
J10R1390	150	300	1.5	N	N	20	100	30	30	7	N	100
J10R1410	100	300	1.5	N	N	15	70	15	30	N	N	50
J10R1430	100	200	1.5	N	N	15	70	15	20	10	N	70
J10R1450	100	150	1.5	N	N	20	100	30	20	5	N	70
J10R1470	100	500	1.5	N	N	20	100	20	30	5	N	70
J10R1490	100	200	1.5	N	N	7	70	15	20	10	N	50
J10R1510	100	200	1.5	N	N	10	100	30	20	10	N	100
J10R1530	100	150	1.0	N	N	10	70	20	20	10	N	50
J10R1550	100	200	1.0	N	N	10	100	20	20	5	N	50
J10R1570	150	300	1.5	N	N	15	100	20	20	7	N	100
J10R1590	100	300	1.5	N	N	15	100	20	20	10	N	70
J10R1610	150	200	1.5	N	N	20	100	70	20	5	N	100
J10R1630	150	200	2.0	N	N	20	100	50	20	7	N	50
J10R1650	150	150	1.5	N	N	20	70	20	20	N	N	70
J10R1670	150	150	2.0	N	N	15	100	20	30	N	N	70
J10R1690	150	200	2.0	N	N	15	100	20	50	N	N	70
J10R1710	150	200	2.0	N	N	30	100	50	30	N	N	100
J10R1730	200	500	2.0	N	N	20	150	50	50	N	N	100
J10R1750	150	200	2.0	N	N	20	150	100	50	7	N	100
J10R1770	150	200	2.0	N	N	15	150	30	50	N	N	70
J10R1790	150	300	2.0	N	N	15	100	20	50	N	N	70
J10R1810	150	200	2.0	N	N	10	100	20	50	N	N	50
J10R1830	150	300	2.0	N	N	30	100	150	50	10	N	100
J10R1850	100	200	1.5	N	N	20	70	50	30	N	N	50
J10R1870	100	100	1.0	N	N	5	50	7	20	N	N	30
J10R1890	100	100	1.5	N	N	30	50	15	20	N	N	70
J10R1910	150	150	1.5	N	N	20	70	10	20	N	N	70
J10R1930	100	150	2.0	N	N	15	70	15	20	N	N	50
J10R1950	100	100	1.5	N	N	15	100	15	20	N	N	50
J10R1970	100	200	2.0	N	N	15	100	15	30	N	N	70
J10R1990	100	5,000	2.0	N	N	20	100	200	30	N	N	70
J10R2010	150	200	2.0	N	N	20	150	150	30	N	N	70
J10R2030	150	200	2.0	N	N	20	150	3,000	30	N	N	70
J10R2050	150	300	2.0	N	N	20	200	1,000	50	N	N	70
J10R2070	150	200	2.0	N	N	15	150	100	50	N	N	50

TABLE 1--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 10, 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.#
J10R1190	15	N	7	N	N	100	N	15	300	100	N	40
J10R1210	20	N	5	N	N	70	50	10	200	100	N	40
J10R1230	30	N	5	N	N	70	100	10	<200	70	N	40
J10R1250	10	N	5	N	N	70	<50	10	200	70	N	40
J10R1270	10	N	5	N	N	70	70	10	N	70	N	40
J10R1290	30	N	10	N	N	150	70	20	N	300	N	40
J10R1310	50	N	10	N	N	150	70	30	200	200	N	40
J10R1330	50	N	7	N	N	50	70	20	500	100	N	60
J10R1350	<10	N	5	N	N	70	<50	N	N	100	N	60
J10R1370	20	N	5	N	N	50	100	10	<200	100	N	60
J10R1390	30	N	10	N	N	100	200	20	<200	200	N	60
J10R1410	30	N	10	N	N	70	N	20	N	150	N	60
J10R1430	50	N	10	N	N	70	50	15	200	150	N	60
J10R1450	200	N	10	N	N	70	300	20	N	150	N	60
J10R1470	700	N	10	N	N	100	70	20	500	150	N	60
J10R1490	20	N	10	N	N	70	N	15	N	150	N	60
J10R1510	500	N	10	N	N	100	<50	20	<200	200	N	60
J10R1530	10	N	7	N	N	100	70	10	N	100	N	60
J10R1550	15	N	10	N	N	100	N	20	N	200	N	60
J10R1570	50	N	10	N	N	150	50	15	N	150	N	60
J10R1590	150	N	15	N	100	100	500	20	200	150	N	60
J10R1610	300	N	15	N	100	100	100	20	N	150	N	60
J10R1630	50	N	15	N	100	100	50	20	N	150	N	60
J10R1650	150	N	10	N	100	100	N	20	N	200	N	60
J10R1670	700	N	15	N	100	100	70	30	N	200	N	60
J10R1690	100	N	20	N	100	150	<50	50	N	200	N	60
J10R1710	500	N	20	N	100	100	150	30	N	200	N	60
J10R1730	70	N	20	N	100	150	100	50	N	200	N	60
J10R1750	200	N	20	N	100	150	100	30	<200	200	N	60
J10R1770	100	N	20	N	100	150	70	50	N	200	N	60
J10R1790	50	N	20	N	100	150	N	50	<200	20	N	60
J10R1810	150	N	15	N	100	100	70	30	N	150	N	60
J10R1830	70	N	15	N	100	100	200	30	200	150	N	60
J10R1850	30	N	10	N	100	100	200	20	N	150	N	60
J10R1870	100	N	7	N	100	50	150	10	N	100	N	60
J10R1890	30	N	10	N	100	70	50	10	N	100	N	60
J10R1910	15	N	10	N	100	100	300	15	N	150	N	80
J10R1930	500	N	10	N	100	100	100	20	N	150	N	80
J10R1950	20	N	15	N	100	100	N	20	N	150	N	80
J10R1970	20	N	15	N	100	150	N	20	N	150	N	80
J10R1990	30	N	15	N	200	100	N	20	300	150	N	80
J10R2010	2,000	N	20	N	100	150	N	30	150	150	N	80
J10R2030	1,000	N	20	N	100	100	N	30	N	200	N	80
J10R2050	50	N	20	N	100	150	N	30	N	200	N	80
J10R2070	100	N	20	N	100	150	N	30	N	150	N	80

TABLE 1--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 10, JOPLIN 1 X 2 QUADRANGLE,
MISSOURI AND KANSAS.--Continued

Sample	Latitude	Longitude	Fe-ppt. S	Hg-pct. S	Ca-pct. S	Ti-pct. S	Nb-ppm S	Ag-ppm S	As-ppm S	Au-ppm S
J10R2090	37 23 20	95 25 30	2.0	.50	<.05	.5	100	N	N	N
J10R2110	37 23 20	95 25 30	3.0	.70	<.05	.5	100	N	N	N
J10R2130	37 23 20	95 25 30	3.0	.50	<.05	.3	200	.5	N	N
J10R2150	37 23 20	95 25 30	3.0	.70	<.05	.5	100	N	N	N
J10R2170	37 23 20	95 25 30	3.0	.70	<.05	.5	70	N	N	N
J10R2190	37 23 20	95 25 30	2.0	.50	<.05	.3	70	N	N	N
J10R2200	37 23 20	95 25 30	1.0	.20	<.05	.3	20	N	N	N

Sample	R-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
J10R2090	150	300	2.0	N	N	20	150	100	50	N	N	70
J10R2110	150	300	2.0	N	N	20	150	70	50	N	N	70
J10R2130	150	300	2.0	N	N	30	100	100	50	N	N	70
J10R2150	150	500	2.0	N	N	15	150	50	50	N	N	70
J10R2170	200	300	2.0	N	N	15	150	500	50	N	N	70
J10R2190	150	300	2.0	N	N	10	100	150	30	N	N	70
J10R2200	50	700	1.5	N	N	15	20	15	20	N	N	7

Sample	Pb-ppm S	Sb-ppm S	Sc-ppm S	Sn-ppm S	Sr-ppm S	V-ppm S	W-ppm S	Y-ppm S	Zn-ppm S	Zr-ppm S	Th-ppm S	Form.#
J10R2090	200	N	20	N	150	100	N	50	N	200	N	80
J10R2110	1,000	N	20	N	100	150	N	30	N	200	N	80
J10R2130	500	N	15	N	150	100	N	50	N	200	N	80
J10R2150	20	N	15	N	100	150	N	20	200	200	N	80
J10R2170	70	N	15	15	100	150	50	30	N	200	N	80
J10R2190	10	N	10	N	100	100	N	30	N	300	N	80
J10R2200	15	N	N	N	100	30	N	20	N	500	N	80

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 11, JOPLIN 1 x 2 QUADRANGLE,
MISSOURI AND KANSAS,
[IN, 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	Ce-pct. S	Ti-pct. S	Mn-pptm S	Ag-pptm S	As-pptm S	Au-pptm S
J11R0540	37 45 10	95 33 13	2.00	.70	<.05	.500	100	N	N	N
J11R0580	37 45 10	95 33 13	3.00	1.00	<.05	.500	100	N	N	N
J11R0620	37 45 10	95 33 13	5.00	1.50	<.05	1.000	200	N	N	N
J11R0660	37 45 10	95 33 13	3.00	1.00	<.05	.500	150	N	N	N
J11R0700	37 45 10	95 33 13	5.00	1.50	<.05	.700	100	N	N	N
J11R0740	37 45 10	95 33 13	3.00	1.00	<.05	.500	150	N	N	N
J11R0780	37 45 10	95 33 13	3.00	1.00	<.05	.500	150	N	N	N
J11R0820	37 45 10	95 33 13	5.00	1.50	.05	.500	150	1.0	N	N
J11R0860	37 45 10	95 33 13	3.00	1.00	<.05	.300	150	.7	N	N
J11R0900	37 45 10	95 33 13	3.00	1.00	<.05	.500	150	N	N	N
J11R0940	37 45 10	95 33 13	3.00	1.00	<.05	.500	150	N	N	N
J11R0980	37 45 10	95 33 13	3.00	1.00	<.05	.500	100	N	N	N
J11R1020	37 45 10	95 33 13	3.00	1.00	<.05	.500	100	N	N	N
J11R1060	37 45 10	95 33 13	3.00	1.00	<.05	.700	100	N	N	N
J11R1100	37 45 10	95 33 13	1.50	.50	<.05	.700	30	N	N	N
J11R1140	37 45 10	95 33 13	2.00	1.00	<.05	.500	70	N	N	N
J11R1180	37 45 10	95 33 13	3.00	.70	<.05	.700	70	N	N	N
J11R1220	37 45 10	95 33 13	3.00	.70	<.05	.500	70	N	N	N
J11R1260	37 45 10	95 33 13	5.00	.50	<.05	.500	50	N	N	N
J11R1300	37 45 10	95 33 13	2.00	.30	<.05	.300	30	N	N	N
J11R1340	37 45 10	95 33 13	1.50	.20	<.05	.300	30	N	N	N
J11R1380	37 45 10	95 33 13	1.50	.15	<.05	.200	20	N	N	N
J11R1420	37 45 10	95 33 13	2.00	.70	<.05	.500	50	N	N	N
J11R1460	37 45 10	95 33 13	3.00	.70	<.05	.500	70	N	N	N
J11R1500	37 45 10	95 33 13	3.00	1.00	<.05	.500	100	N	N	N
J11R1540	37 45 10	95 33 13	3.00	1.00	<.05	.700	100	N	N	N
J11R1580	37 45 10	95 33 13	5.00	1.00	<.05	.500	70	N	N	N
J11R1620	37 45 10	95 33 13	2.00	.50	<.05	.500	30	N	N	N
J11R1660	37 45 10	95 33 13	1.00	.20	<.05	.300	20	N	N	N
J11R1700	37 45 10	95 33 13	1.50	.30	<.05	.300	70	N	N	N
J11R1740	37 45 10	95 33 13	.70	.20	.05	.300	10	N	N	N
J11R1780	37 45 10	95 33 13	1.50	.20	<.05	.300	50	N	N	N
J11R1820	37 45 10	95 33 13	.30	.15	.05	.100	<10	N	N	N
J11R1860	37 45 10	95 33 13	1.00	.20	.07	.100	10	N	N	N
J11R1900	37 45 10	95 33 13	1.00	.20	.05	.150	10	N	N	N
J11R1940	37 45 10	95 33 13	.70	.15	<.05	.200	15	N	N	N
J11R1980	37 45 10	95 33 13	1.00	.15	<.05	.300	50	N	N	N
J11R2020	37 45 10	95 33 13	1.50	.15	.05	.150	15	N	N	N
J11R2060	37 45 10	95 33 13	.10	.05	<.05	.020	<10	N	N	N
J11R2100	37 45 10	95 33 13	.07	.03	<.05	.015	<10	N	N	N
J11R2140	37 45 10	95 33 13	.20	.10	<.05	.070	<10	N	N	N
J11R2180	37 45 10	95 33 13	1.00	.15	<.05	.100	20	N	N	N
J11R2220	37 45 10	95 33 13	5.00	.15	.07	.200	300	200	N	N
J11R2260	37 45 10	95 33 13	3.00	.50	<.05	.300	70	N	N	N
J11R2300	37 45 10	95 33 13	2.00	1.00	.05	.300	50	N	N	N

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 11, 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
J11R0540	150	200	1.5	N	N	10	150	50	30	N	<20	70
J11R0580	100	200	1.5	N	N	15	100	20	20	N	<20	50
J11R0620	100	500	1.5	N	N	20	100	70	50	N	<20	70
J11R0660	150	500	1.5	N	N	20	150	50	30	N	<20	70
J11R0700	150	500	1.5	N	N	20	150	70	30	N	<20	70
J11R0740	100	500	1.5	N	N	15	100	50	30	N	<20	50
J11R0780	150	500	1.5	N	N	10	100	50	50	N	<20	50
J11R0820	200	1,000	1.5	N	N	50	200	150	30	15	<20	100
J11R0860	200	700	1.5	N	N	20	200	100	30	20	<20	100
J11R0900	150	500	2.0	N	N	20	150	20	50	7	<20	50
J11R0940	200	500	1.5	N	N	15	100	30	50	N	<20	50
J11R0980	200	300	1.5	N	N	20	200	50	50	10	<20	70
J11R1020	200	300	1.5	N	N	20	150	50	50	N	<20	50
J11R1060	200	300	1.5	N	N	20	150	50	70	N	<20	70
J11R1100	150	300	1.5	N	N	10	150	15	70	N	<20	30
J11R1140	200	300	2.0	N	N	15	200	20	70	N	<20	70
J11R1180	200	300	1.5	N	N	20	200	30	100	N	<20	70
J11R1220	200	300	1.5	N	N	15	150	20	70	N	<20	70
J11R1260	200	200	1.5	N	N	20	150	20	100	N	<20	70
J11R1300	200	200	1.5	N	N	10	100	50	70	N	<20	50
J11R1340	200	150	1.5	N	N	10	70	150	50	N	<20	50
J11R1380	150	150	1.0	N	N	5	30	150	20	N	<20	50
J11R1420	200	200	2.0	N	N	15	100	50	70	N	<20	70
J11R1460	150	200	1.5	N	N	15	150	1,000	70	N	<20	70
J11R1500	150	300	1.5	N	N	20	200	70	30	N	<20	50
J11R1540	200	300	2.0	N	N	15	200	100	30	N	<20	50
J11R1580	200	300	2.0	N	N	20	150	100	50	20	<20	70
J11R1620	150	200	1.5	N	N	10	100	150	30	N	<20	50
J11R1660	100	500	1.5	N	N	7	50	100	20	N	<20	30
J11R1700	100	200	1.0	N	N	7	70	10	20	N	<20	20
J11R1740	100	500	<1.0	N	N	N	50	100	20	N	<20	7
J11R1780	100	150	1.0	N	N	5	70	30	20	N	<20	20
J11R1820	50	1,500	<1.0	N	N	N	15	<5	N	N	N	N
J11R1860	70	100	1.0	N	N	N	20	5	N	N	N	10
J11R1900	70	100	<1.0	N	N	N	20	5	N	N	N	10
J11R1940	70	100	<1.0	N	N	N	30	<5	20	N	N	15
J11R1980	70	150	1.0	N	N	20	30	<5	20	N	<20	20
J11R2020	70	200	<1.0	N	N	30	10	10	20	5	<20	30
J11R2060	50	30	<1.0	N	N	N	N	N	N	N	N	5
J11R2100	30	200	N	N	N	N	N	N	N	N	N	N
J11R2140	50	50	<1.0	N	N	100	10	<5	N	N	<20	5
J11R2180	50	3,000	<1.0	N	N	100	15	15	N	N	N	10
J11R2220	100	150	1.0	N	N	30	50	20	20	30	<20	20
J11R2260	70	200	1.5	N	N	10	30	150	20	20	<20	20
J11R2300	70	300	2.0	N	N	7	50	50	30	15	<20	20

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 11, JOPLIN 1 x 2 QUADRANGLE,
MISSOURI AND KANSAS.--Continued

Sample	Pb-ppm S	Sb-ppm S	Sc-ppm S	Sn-ppm S	Sr-ppm S	Y-ppm S	W-ppm S	Y-ppm S	Zn-ppm S	Zr-ppm S	Th-ppm S	Form.#
J11R0540	20	N	7	N	100	150	N	10	500	150	N	20
J11R0580	15	N	10	N	<100	150	N	15	N	150	N	20
J11R0620	10	N	20	N	100	200	N	30	N	200	N	20
J11R0660	20	N	15	N	<100	200	N	20	200	150	N	20
J11R0700	<10	N	20	N	100	200	N	20	N	200	N	20
J11R0740	10	N	10	N	100	150	N	20	<200	200	N	20
J11R0780	10	N	15	N	100	200	N	20	200	200	N	20
J11R0820	30	N	15	N	<100	300	1,000	15	500	150	N	20
J11R0860	20	N	10	N	200	200	200	20	500	100	N	20
J11P0900	50	N	15	N	100	200	50	50	<200	300	N	20
J11R0940	10	N	15	N	100	200	N	50	200	200	N	20
J11R0980	20	N	15	N	100	200	N	30	N	150	N	20
J11R1020	15	N	15	N	100	200	N	30	N	150	N	20
J11R1060	10	N	20	N	150	200	N	30	1,000	200	N	20
J11R1100	15	N	20	N	200	200	N	50	N	200	N	20
J11R1140	15	N	20	N	100	200	N	30	N	200	N	20
J11R1180	50	N	20	N	150	200	N	50	300	200	N	20
J11R1220	30	N	20	N	100	200	N	30	<200	150	N	20
J11R1260	15	N	20	N	200	200	50	70	N	200	N	20
J11R1300	10	N	10	N	150	100	N	100	300	100	N	40
J11R1340	<10	N	10	N	150	100	<50	20	N	100	N	40
J11R1380	<10	N	7	N	150	70	N	10	N	70	N	40
J11R1420	20	N	20	N	200	200	N	50	N	150	N	40
J11R1460	20	N	20	N	500	150	N	30	N	150	N	40
J11R1500	20	N	45	N	100	200	N	30	N	150	N	40
J11R1540	20	N	20	N	100	300	N	50	N	200	N	40
J11P1580	30	N	15	N	150	200	N	50	N	150	N	40
J11R1620	20	N	15	N	150	150	N	50	N	150	N	31
J11R1660	10	N	10	N	100	100	100	30	N	150	N	60
J11R1700	15	N	10	N	100	100	N	30	N	150	N	60
J11R1740	N	N	5	N	100	50	N	10	N	70	N	60
J11R1780	<10	N	7	N	100	100	N	20	N	100	N	60
J11R1820	N	N	N	N	N	15	N	N	N	50	N	60
J11R1860	<10	N	5	N	N	30	N	N	N	50	N	60
J11R1900	<10	N	5	N	150	30	N	10	N	70	N	60
J11R1940	N	N	5	N	100	50	N	10	N	70	N	60
J11R1980	N	N	5	N	100	70	100	15	N	100	N	60
J11R2020	<10	N	N	N	100	20	150	10	N	50	N	87
J11R2060	N	N	N	N	N	N	N	N	N	N	N	87
J11R2100	150	N	N	N	N	N	N	N	N	N	N	87
J11R2140	N	N	N	N	1,500	15	500	N	N	30	N	87
J11R2180	N	N	N	N	>5,000	50	70	N	N	50	N	87
J11R2220	20	N	5	N	1,000	70	N	15	N	100	N	87
J11R2260	70	N	N	N	100	70	N	15	N	150	N	87
J11R2300	70	N	N	N	N	70	N	20	N	200	N	87

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 11, JOPLIN 1 x 2 QUADRANGLE,
MISSOURI AND KANSAS,--Continued

Sample	Latitude	Longitude	Fe-pct. S	Hg-pct. S	Ca-pct. N	Ti-pct. S	Mn-ppt S	Ag-ppt S	As-ppt S	Au-ppt S
J11R2340	37 45 10	95 33 13	1.00	.30	<.05	.150	15	N	N	N
J11R2380	37 45 10	95 33 13	1.00	.20	.15	.100	150	N	N	N
J11R2420	37 45 10	95 33 13	1.50	.30	.30	.200	500	N	N	N
J11R2460	37 45 10	95 33 13	1.50	.30	.30	.150	300	N	N	N
J11R2500	37 45 10	95 33 13	2.00	.50	.30	.200	300	N	N	N

Sample	Ph-ppt S	Sb-ppt S	Sc-ppt S	Sn-ppt S	Sr-ppt S	V-ppt S	W-ppt S	Y-ppt S	Zn-ppt S	Zr-ppt S	Th-ppt S	Form.#
J11R2340	N	N	N	N	N	10	N	15	N	300	N	87
J11R2380	10	N	N	N	N	15	N	20	N	300	N	85
J11R2420	20	N	N	N	N	20	N	50	N	100	N	90
J11R2460	15	N	N	N	150	20	N	50	N	150	N	90
J11R2500	20	N	N	N	150	20	N	50	N	100	N	90

Sample	R-ppt S	Ba-ppt S	Be-ppt S	Bi-ppt S	Cd-ppt S	Co-ppt S	Cr-ppt S	Cu-ppt S	La-ppt S	Mo-ppt S	Nb-ppt S	Ni-ppt S
J11R2340	100	200	3.0	N	N	N	10	N	20	N	N	N
J11R2380	50	500	2.0	N	N	N	N	<5	N	5	N	7
J11R2420	30	700	3.0	N	N	N	N	<5	70	N	N	5
J11R2460	30	700	2.0	N	N	N	N	<5	70	N	N	5
J11R2500	30	700	2.0	N	N	N	N	<5	30	N	N	5

TABLE 3--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 12, JOPLIN 1 x 2 QUADRANGLE,

[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	Hg-pct. S	Ca-pct. S	Ti-pct. S	Mn-pdm S	Ag-pdm S	As-pdm S	Au-pdm S
J12R0440	37 9 50	95 56 40	2.0	.70	<.05	.30	70	N	N	N
J12R0480	37 9 50	95 56 40	2.0	1.00	<.05	.50	70	N	N	N
J12R0520	37 9 50	95 56 40	2.0	1.00	<.05	.30	100	N	N	N
J12R0560	37 9 50	95 56 40	3.0	1.00	<.05	.30	100	1.0	N	N
J12R0600	37 9 50	95 56 40	1.5	.30	<.05	.30	50	N	N	N
J12R0640	37 9 50	95 56 40	3.0	1.00	<.05	.50	100	N	N	N
J12R0680	37 9 50	95 56 40	3.0	1.00	<.05	.50	100	N	N	N
J12R0720	37 9 50	95 56 40	2.0	1.00	<.05	.30	100	N	N	N
J12R0760	37 9 50	95 56 40	3.0	.70	<.05	.30	70	2.0	N	N
J12R0800	37 9 50	95 56 40	3.0	1.50	<.05	.50	100	N	N	N
J12R0840	37 9 50	95 56 40	5.0	1.50	<.05	.50	100	1.0	N	N
J12R0880	37 9 50	95 56 40	3.0	1.00	<.05	.30	150	N	N	N
J12R0920	37 9 50	95 56 40	3.0	1.00	<.05	.50	100	.5	N	N
J12R0960	37 9 50	95 56 40	1.5	.50	<.05	.30	70	N	N	N
J12R1000	37 9 50	95 56 40	2.0	.50	<.05	.30	100	N	N	N
J12R1050	37 9 50	95 56 40	2.0	1.00	<.05	.30	100	N	N	N
J12R1100	37 9 50	95 56 40	3.0	1.00	<.05	.50	150	.5	N	N
J12R1140	37 9 50	95 56 40	1.5	.50	<.05	.50	70	N	N	N
J12R1185	37 9 50	95 56 40	2.0	.70	<.05	.50	100	N	N	N
J12R1235	37 9 50	95 56 40	2.0	1.00	<.05	.30	100	3.0	N	N
J12R1260	37 9 50	95 56 40	7.0	.50	<.05	.30	300	1.5	N	N
J12R1300	37 9 50	95 56 40	5.0	.70	<.05	.50	100	1.0	N	N
J12R1340	37 9 50	95 56 40	5.0	1.00	<.05	.50	100	.5	N	N
J12R1380	37 9 50	95 56 40	2.0	.70	<.05	.30	70	N	N	N
J12R1420	37 9 50	95 56 40	2.0	1.00	<.05	.30	100	N	N	N
J12R1460	37 9 50	95 56 40	2.0	.70	<.05	.30	70	N	N	N
J12R1485	37 9 50	95 56 40	3.0	.50	<.05	.30	50	N	N	N
J12R1540	37 9 50	95 56 40	3.0	.70	<.05	.50	70	N	N	N
J12R1580	37 9 50	95 56 40	3.0	.70	<.05	.30	70	N	N	N
J12R1620	37 9 50	95 56 40	3.0	.50	<.05	.30	70	N	N	N
J12R1660	37 9 50	95 56 40	1.5	.20	<.05	.20	30	N	N	N
J12R1700	37 9 50	95 56 40	1.5	.15	<.05	.20	30	N	N	N
J12R1740	37 9 50	95 56 40	2.0	.20	<.05	.30	50	N	N	N
J12R1780	37 9 50	95 56 40	1.0	.10	<.05	.10	20	N	N	N
J12R1820	37 9 50	95 56 40	.7	.07	<.05	.07	20	N	N	N
J12R1860	37 9 50	95 56 40	1.5	.15	<.05	.15	50	N	N	N
J12R1900	37 9 50	95 56 40	3.0	1.00	<.05	.30	100	N	N	N
J12R1940	37 9 50	95 56 40	2.0	.70	<.05	.30	100	N	N	N
J12R1980	37 9 50	95 56 40	5.0	.50	<.05	.20	100	N	N	N
J12R2020	37 9 50	95 56 40	2.0	.20	<.05	.20	50	N	N	N
J12R2060	37 9 50	95 56 40	2.0	.20	<.05	.20	50	N	N	N
J12R2100	37 9 50	95 56 40	2.0	.30	<.05	.30	50	N	N	N
J12R2115	37 9 50	95 56 40	1.5	.20	<.05	.30	50	N	N	N

TABLE 3--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 12, JOPLIN 1 x 2 QUADRANGLE,
MISSOURI AND KANSAS.--Continued

Sample	R-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	Pi-ppm S
J12R0440	150	700	2.0	N	N	7	150	20	50	N	N	30
J12R0480	200	700	2.0	N	N	10	150	30	30	N	N	30
J12R0520	200	700	2.0	N	N	15	100	100	30	N	N	30
J12R0560	200	300	2.0	N	N	15	200	50	50	7	N	70
J12R0600	100	200	1.0	N	N	5	50	10	30	N	N	15
J12R0640	150	500	2.0	N	N	15	100	30	50	N	N	50
J12R0680	150	500	2.0	N	N	15	100	20	50	N	N	50
J12R0720	150	700	2.0	N	N	10	150	20	50	N	N	50
J12R0760	150	500	2.0	N	N	15	200	30	50	15	N	70
J12R0800	150	700	2.0	N	N	15	150	20	50	N	N	50
J12R0840	200	500	2.0	N	N	20	200	50	50	10	N	70
J12R0880	150	300	2.0	N	N	15	100	20	30	N	N	50
J12R0920	200	700	2.0	N	N	20	150	70	30	N	N	50
J12R0960	100	700	1.5	N	N	7	100	15	20	N	N	20
J12R1000	100	500	1.5	N	N	15	70	30	20	N	N	30
J12R1050	150	500	1.5	N	N	10	70	15	20	N	N	30
J12R1100	150	500	2.0	N	N	20	150	50	50	N	N	70
J12R1140	100	700	1.5	N	N	7	70	30	30	N	N	20
J12R1185	150	700	1.5	N	N	10	100	50	30	N	N	30
J12R1235	200	500	2.0	N	N	10	500	200	20	30	N	150
J12R1260	150	500	2.0	N	N	15	200	100	20	20	N	100
J12R1300	200	1,000	2.0	N	N	15	200	70	20	10	N	100
J12R1340	200	1,000	2.0	N	N	20	150	70	50	5	N	70
J12R1380	200	700	2.0	N	N	15	150	20	50	N	N	50
J12R1420	200	500	2.0	N	N	30	200	70	30	N	N	5
J12R1460	200	500	2.0	N	N	20	200	100	50	N	N	50
J12R1485	200	300	2.0	N	N	20	150	20	70	N	N	70
J12R1540	200	300	2.0	N	N	20	200	30	50	N	N	70
J12R1580	200	300	2.0	N	N	15	150	20	50	N	N	70
J12R1620	150	200	1.5	N	N	15	150	20	30	5	N	70
J12R1660	150	200	1.5	N	N	10	70	15	30	N	N	50
J12R1700	150	200	1.0	N	N	15	50	10	20	N	N	30
J12R1740	150	300	1.5	N	N	15	100	20	20	N	N	50
J12R1780	100	100	1.0	N	N	5	30	7	20	N	N	15
J12R1820	150	50	<1.0	N	N	N	20	5	N	N	N	10
J12R1860	100	70	1.0	N	N	5	30	7	20	5	N	20
J12R1900	200	200	2.0	N	N	15	100	50	30	15	N	70
J12R1940	150	200	1.5	N	N	15	50	20	30	30	N	30
J12R1980	200	200	2.0	N	N	20	70	30	30	30	N	50
J12R2020	150	100	1.5	N	N	7	50	15	20	10	N	30
J12R2060	150	150	1.5	N	N	10	50	20	20	20	N	30
J12R2100	150	150	1.5	N	N	10	70	20	20	15	N	50
J12R2115	150	150	2.0	N	N	10	70	15	30	7	N	30

TABLE 3--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 12, JOPLIN 1 x 2 QUADRANGLE,
MISSOURI AND KANSAS.--Continued

Sample	Pb-dpm S	Sb-dpm S	Sc-dpm S	Sn-dpm S	St-dpm S	V-dpm S	W-dpm S	Y-dpm S	Zn-dpm S	Zr-dpm S	Th-dpm S	Form.#
J12R0440	10	N	15	N	150	150	N	30	<200	200	N	20
J12R0480	<10	N	15	N	150	150	N	30	200	200	N	20
J12R0520	<10	N	10	N	150	150	N	30	300	100	N	20
J12R0560	50	N	15	N	150	200	N	30	<200	150	N	20
J12R0600	<10	N	7	N	100	70	N	20	<200	300	N	20
J12R0640	15	N	15	N	150	150	N	30	<200	150	N	20
J12R0680	15	N	15	N	150	150	N	30	<200	150	N	20
J12R0720	20	N	10	N	150	150	N	30	200	100	N	20
J12R0760	50	N	10	N	150	200	N	30	200	100	N	20
J12R0800	20	N	15	N	150	200	N	30	<200	100	N	20
J12R0840	50	N	15	N	150	200	N	30	300	100	N	20
J12R0880	<10	N	10	N	100	100	N	20	<200	150	N	20
J12R0920	10	N	10	N	150	150	50	20	200	150	N	20
J12R0960	N	N	5	N	200	70	N	15	300	200	N	20
J12R1000	N	N	7	N	150	100	N	20	200	200	N	20
J12R1050	<10	N	7	N	100	100	N	20	<200	200	N	20
J12R1100	150	N	15	N	150	150	N	30	<200	150	N	20
J12R1140	10	N	7	N	150	100	N	30	<200	200	N	20
J12R1185	10	N	10	N	150	100	N	30	500	150	N	20
J12R1235	100	N	10	15	150	300	N	10	500	70	N	20
J12R1260	70	N	10	N	200	200	N	15	500	100	N	20
J12R1300	50	N	15	N	300	200	N	20	200	100	N	20
J12R1340	70	N	20	N	200	150	N	50	<200	150	N	20
J12R1380	50	N	20	N	200	150	N	30	300	150	N	20
J12R1420	20	N	20	N	150	150	N	30	N	150	N	20
J12R1460	50	N	20	N	300	150	N	30	N	100	N	20
J12R1485	30	N	15	N	100	200	N	30	<200	100	N	20
J12R1540	500	N	20	N	100	200	N	30	<200	100	N	20
J12R1580	70	N	15	N	150	200	N	30	200	100	N	20
J12R1620	50	N	10	N	100	100	N	30	<200	100	N	20
J12R1660	20	N	7	N	100	50	N	15	200	70	N	40
J12R1700	50	N	5	N	N	30	N	10	200	50	N	40
J12R1740	30	N	7	N	100	70	N	15	<200	100	N	40
J12R1780	10	N	N	N	N	20	N	N	<200	30	N	40
J12R1820	10	N	N	N	N	10	N	N	500	30	N	40
J12R1860	700	N	5	N	N	50	N	10	<200	50	N	40
J12R1900	50	N	10	N	N	200	N	30	<200	200	N	40
J12R1940	50	N	10	N	N	150	N	20	N	150	N	31
J12R1980	30	N	10	N	100	150	N	15	N	150	N	60
J12R2020	15	N	7	N	100	70	N	10	<200	100	N	60
J12R2060	15	N	7	N	100	100	N	10	N	100	N	60
J12R2100	150	N	7	N	100	100	<50	10	N	100	N	60
J12R2115	20	N	10	N	100	100	N	15	500	150	N	60