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**Spectrographic analyses of insoluble-residue samples,
Joplin 1° x 2° quadrangle, Kansas and Missouri:
Drill hole nos. 19, 20, and 21**

By

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Prepared in cooperation with the Kansas Geological Survey and the Missouri Division of Geology and Land Survey.

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. 19 (#1 Beal - KGS), drill hole no. 20 (#1 Stevenson - KGS), and drill hole no. 21 (#1 D. Kimbell - KGS) are given in this report. Drill hole no. 19 is located in sec. 12, T. 33 S., R. 14 E. in Montgomery County, Kansas; drill hole no. 20 is located in sec. 16, T. 26 S., R. 24 E. in Bourbon County, Kansas; drill hole no. 21 is located in sec. 4, T. 24 S., R. 13 E. in Greenwood County, Kansas (fig.1). Data for the insoluble-residue samples from drill holes 19, 20, and 21 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

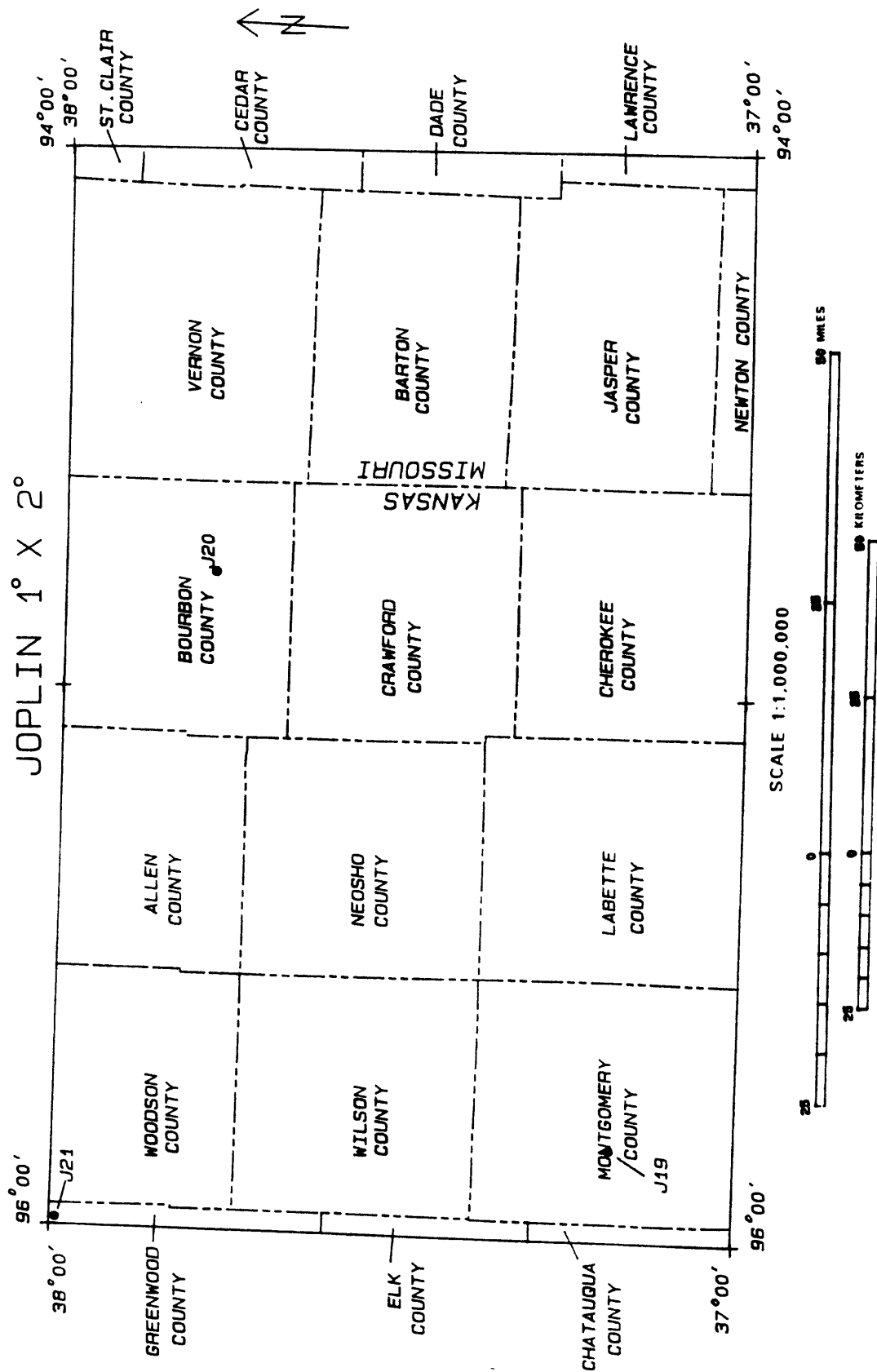


Figure 1. Locations of drill holes 19, 20, and 21, Joplin 1° x 2° quadrangle, Missouri and Kansas.

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

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 their staffs, 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.
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TABLE 1--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 19, 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-PDM S	Ag-PDM S	As-PDM S	Au-PDM S
J19R1437	37 11 7	95 49 43	2.00	.70	<.05	.500	50	N	N	N
J19R1470	37 11 7	95 49 43	2.00	.70	<.05	.500	30	N	N	N
J19R1550	37 11 7	95 49 43	.50	.07	<.05	.070	20	N	N	N
J19R1573	37 11 7	95 49 43	.30	.03	<.05	.030	10	N	N	N
J19R1593	37 11 7	95 49 43	.70	.20	<.05	.100	50	N	N	N
J19R1617	37 11 7	95 49 43	.20	.10	.05	.050	15	N	N	N
J19R1646	37 11 7	95 49 43	2.00	.20	<.05	.150	70	N	N	N
J19R1672	37 11 7	95 49 43	7.00	1.00	<.05	.200	150	N	N	N
J19R1684	37 11 7	95 49 43	5.00	1.00	<.05	.200	100	N	N	N
J19R1910	37 11 7	95 49 43	.70	.10	<.05	.050	10	N	N	N
J19R1960	37 11 7	95 49 43	.50	.07	<.05	.020	10	N	N	N
J19R2006	37 11 7	95 49 43	.70	.05	<.05	.015	10	N	N	N
J19R2043	37 11 7	95 49 43	.50	.15	.10	.015	15	N	N	N
J19R2083	37 11 7	95 49 43	.70	.10	.10	.015	10	N	N	N
J19R2150	37 11 7	95 49 43	.50	.03	<.05	.015	10	N	N	N
J19R2174	37 11 7	95 49 43	.15	.03	<.05	.010	<10	N	N	N
J19R2202	37 11 7	95 49 43	.10	.02	<.05	.005	<10	N	N	N
J19R2240	37 11 7	95 49 43	.10	.05	.05	.005	<10	N	N	N
J19R2341	37 11 7	95 49 43	.70	.15	.10	.015	15	N	N	N
J19R2400	37 11 7	95 49 43	.50	.02	<.05	.003	10	N	N	N
J19R2460	37 11 7	95 49 43	1.00	.03	<.05	.010	15	N	N	N
J19R2492	37 11 7	95 49 43	7.00	.10	<.05	.030	70	N	N	N
J19R2531	37 11 7	95 49 43	5.00	.10	<.05	.070	70	N	N	N
J19R2539	37 11 7	95 49 43	2.00	1.00	.50	.200	200	N	N	N

TABLE 1--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 19, 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
J19R1437	200	100	2.0	N	N	10	150	15	50	N	N	50
J19R1470	200	70	1.5	N	N	10	150	15	50	N	N	50
J19R1550	100	30	N	N	N	20	20	5	N	N	N	10
J19R1573	100	20	N	N	N	N	10	<5	N	N	N	7
J19R1593	100	30	<1.0	N	N	N	15	7	N	N	N	20
J19R1617	70	20	N	N	N	N	10	<5	N	N	N	7
J19R1646	100	50	<1.0	N	N	5	30	10	N	N	N	20
J19R1672	200	200	1.5	N	N	20	100	30	N	5	N	50
J19R1684	150	200	2.0	N	N	30	70	50	N	50	N	50
J19R1910	70	30	<1.0	N	N	N	N	10	N	5	N	5
J19R1960	100	30	<1.0	N	N	N	N	7	N	N	N	5
J19R2006	70	20	N	N	N	N	N	5	N	N	N	5
J19R2043	70	1,000	N	N	N	N	N	5	N	N	N	5
J19R2083	70	300	N	N	N	N	N	5	N	N	N	5
J19R2150	50	200	N	N	N	N	N	7	N	N	N	5
J19R2174	20	50	N	N	N	N	N	<5	N	N	N	N
J19R2202	10	30	N	N	N	N	N	N	N	N	N	N
J19R2240	10	20	N	N	N	N	N	<5	N	N	N	N
J19R2341	70	30	N	N	N	N	N	5	N	N	N	N
J19R2400	70	20	N	N	N	N	N	<5	N	N	N	N
J19R2460	50	20	N	N	N	N	N	5	N	N	N	N
J19R2492	30	1,000	1.5	N	N	N	N	20	N	10	N	7
J19R2531	30	1,000	1.0	N	N	15	N	30	N	30	N	30
J19R2539	30	1,500	2.0	N	N	7	N	7	50	N	N	10

TABLE 1--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 19, 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	V-ppm S	W-ppm S	Y-ppm S	Zn-ppm S	Zr-ppm S	Th-ppm S	Form.#
J19R1437	30	N	15	N	100	150	N	50	N	200	N	40
J19R1470	30	N	15	N	100	150	N	30	N	100	N	40
J19R1550	N	N	N	N	N	N	N	N	N	30	N	40
J19R1573	N	N	N	N	N	N	N	N	N	10	N	40
J19R1593	N	N	N	N	N	20	N	N	N	30	N	40
J19R1617	N	N	N	N	N	N	N	N	N	20	N	40
J19R1646	50	N	10	N	N	30	N	N	N	70	N	40
J19R1672	30	N	10	N	N	150	N	30	N	150	N	31
J19R1684	50	N	10	N	N	150	N	20	<200	100	N	31
J19R1910	<10	N	N	N	N	N	N	N	N	50	N	60
J19R1960	N	N	N	N	N	N	N	N	N	N	N	60
J19R2006	N	N	N	N	N	N	N	N	N	N	N	60
J19R2043	10	N	N	N	N	N	N	N	N	15	N	60
J19R2083	N	N	N	N	N	N	N	N	N	15	N	60
J19R2150	N	N	N	N	N	N	N	N	N	100	N	60
J19R2174	N	N	N	N	N	N	N	N	N	N	N	60
J19R2202	N	N	N	N	N	N	N	N	N	20	N	60
J19R2240	N	N	N	N	N	N	N	N	N	15	N	80
J19R2341	N	N	N	N	N	N	N	N	N	10	N	80
J19R2400	N	N	N	N	N	N	N	N	N	N	N	80
J19R2460	10	N	N	N	N	N	N	N	N	20	N	80
J19R2492	100	N	N	N	N	N	N	N	N	150	N	80
J19R2531	150	N	N	N	N	10	N	10	N	200	N	80
J19R2539	30	N	N	N	500	70	N	30	N	150	N	80

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 20, 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	Hg-pct. S	Ca-pct. S	Ti-pct. S	Mn-pptm S	Ag-pptm S	As-pptm S	Au-pptm S
J20R0065	37 47 2	94 47 0	2.00	.50	.10	.300	200	N	N	N
J20R0095	37 47 2	94 47 0	1.50	.50	<.05	.500	100	N	N	N
J20R0115	37 47 2	94 47 0	5.00	1.00	.20	.300	150	2.0	N	N
J20R0135	37 47 2	94 47 0	5.00	.50	<.05	.300	100	1.5	N	N
J20R0200	37 47 2	94 47 0	5.00	1.00	<.05	.500	200	N	N	N
J20R0225	37 47 2	94 47 0	5.00	1.00	<.05	.500	500	N	N	N
J20R0275	37 47 2	94 47 0	3.00	.70	<.05	.500	100	N	N	N
J20R0400	37 47 2	94 47 0	3.00	1.00	<.05	.500	100	N	N	N
J20R0425	37 47 2	94 47 0	3.00	.70	<.05	.500	100	N	N	N
J20R0435	37 47 2	94 47 0	1.50	.30	<.05	.500	70	N	N	N
J20R0495	37 47 2	94 47 0	1.50	.20	<.05	.300	30	.5	N	N
J20R0658	37 47 2	94 47 0	1.00	.15	<.05	.200	20	N	N	N
J20R0687	37 47 2	94 47 0	.15	.03	<.05	.015	<10	N	N	N
J20R0775	37 47 2	94 47 0	.20	.05	<.05	.050	10	N	N	N
J20R0794	37 47 2	94 47 0	2.00	.10	.07	.150	20	N	N	N
J20R0818	37 47 2	94 47 0	3.00	.10	.05	.200	50	N	N	N
J20R0840	37 47 2	94 47 0	1.50	.70	<.05	.500	30	N	N	N
J20R0868	37 47 2	94 47 0	3.00	1.00	.05	.300	70	N	N	N
J20R0890	37 47 2	94 47 0	2.00	.15	.10	.100	70	N	N	N
J20R0910	37 47 2	94 47 0	10.00	1.00	<.05	.300	100	N	N	N
J20R0930	37 47 2	94 47 0	5.00	.50	<.05	.150	70	N	N	N
J20R0965	37 47 2	94 47 0	1.00	.15	.05	.070	10	N	N	N
J20R0980	37 47 2	94 47 0	.70	.20	.05	.070	<10	N	N	N
J20R1018	37 47 2	94 47 0	.20	.05	.05	.010	10	N	N	N
J20R1075	37 47 2	94 47 0	.70	.07	.05	.010	<10	N	N	N
J20R1150	37 47 2	94 47 0	.10	.05	.05	.015	N	1.0	N	N
J20R1185	37 47 2	94 47 0	.20	.07	.05	.015	N	N	N	N
J20R1217	37 47 2	94 47 0	.15	.05	.05	.010	N	N	N	N
J20R1237	37 47 2	94 47 0	<.05	.03	<.05	.007	N	N	N	N
J20R1268	37 47 2	94 47 0	.15	.05	<.05	.005	N	N	N	N
J20R1290	37 47 2	94 47 0	1.50	.15	.07	.100	30	N	N	N
J20R1320	37 47 2	94 47 0	10.00	.10	.05	.050	20	N	N	N
J20R1337	37 47 2	94 47 0	15.00	.15	.10	.070	150	N	N	N
J20R1365	37 47 2	94 47 0	>20.00	.07	.05	.015	15	N	N	N
J20R1394	37 47 2	94 47 0	>20.00	.05	<.05	.050	10	N	N	N
J20R1440	37 47 2	94 47 0	15.00	.50	.50	.100	70	.5	200	N
J20R1469	37 47 2	94 47 0	15.00	.50	.50	.070	50	N	N	N
J20R1527	37 47 2	94 47 0	7.00	.05	<.05	.020	10	N	N	N
J20R1556	37 47 2	94 47 0	3.00	.03	.05	.050	30	N	N	N
J20R1580	37 47 2	94 47 0	20.00	.10	<.05	.030	100	1.0	500	N
J20R1611	37 47 2	94 47 0	5.00	.05	<.05	.020	50	N	N	N
J20R1640	37 47 2	94 47 0	2.00	.05	<.05	.030	15	N	N	N
J20R1685	37 47 2	94 47 0	10.00	.50	<.05	.200	70	.5	N	N

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 20, 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
J20R0065	100	100	1.0	N	N	5	70	30	20	N	N	50
J20R0095	100	200	1.0	N	N	5	50	7	N	N	N	20
J20R0115	200	200	2.0	N	20	20	700	150	20	50	N	20
J20R0135	150	150	2.0	N	50	15	500	100	20	50	N	150
J20R0200	150	300	1.5	N	N	20	150	70	30	N	N	70
J20R0225	200	500	1.5	N	N	20	150	70	30	7	N	100
J20R0275	150	1,000	1.5	N	N	20	100	30	50	N	N	50
J20R0400	200	300	2.0	N	N	30	200	50	50	N	N	70
J20R0425	150	300	2.0	N	N	30	150	15	50	N	N	70
J20R0435	100	100	1.0	N	N	5	100	5	30	N	N	15
J20R0495	150	100	2.0	N	N	N	200	10	70	N	N	30
J20R0658	100	70	1.5	N	N	N	100	10	30	N	N	20
J20R0687	70	30	N	N	N	N	N	N	N	N	N	N
J20R0775	50	30	N	N	N	N	N	N	N	N	N	N
J20R0794	100	50	1.0	N	N	N	50	15	20	N	N	20
J20R0818	100	200	<1.0	N	N	N	70	20	30	5	N	50
J20R0840	150	200	1.5	N	N	5	100	10	20	N	N	30
J20R0868	150	200	1.5	N	N	7	70	15	20	N	N	50
J20R0890	70	70	<1.0	N	N	N	10	10	N	N	N	30
J20R0910	200	100	2.0	N	N	30	70	30	N	N	N	150
J20R0930	150	300	1.5	N	N	10	30	30	N	50	N	70
J20R0965	100	100	<1.0	N	N	N	N	<5	N	N	N	10
J20R0980	100	100	<1.0	N	N	N	N	<5	N	N	N	7
J20R1018	100	30	N	N	N	N	N	<5	N	N	N	N
J20R1075	70	100	N	N	N	N	N	<5	N	N	N	N
J20R1150	20	50	N	N	<20	N	N	<5	N	N	N	N
J20R1185	15	70	N	N	N	N	N	<5	N	N	N	N
J20R1217	15	50	N	N	N	N	N	N	N	N	N	N
J20R1237	10	20	N	N	N	N	N	N	N	N	N	N
J20R1268	10	30	N	N	N	N	N	5	N	N	N	N
J20R1290	50	50	1.0	N	N	50	30	7	N	N	N	50
J20R1320	20	30	<1.0	N	N	N	10	10	N	N	N	7
J20R1337	30	70	<1.0	N	N	N	30	15	N	N	N	20
J20R1365	N	20	N	N	N	N	N	20	N	N	N	5
J20R1394	N	30	N	N	N	N	N	20	N	N	N	7
J20R1440	50	30	1.0	N	N	20	15	70	N	N	N	50
J20R1469	50	30	<1.0	N	N	N	20	15	N	N	N	15
J20R1527	10	30	N	N	N	N	N	7	N	N	N	10
J20R1556	20	20	N	N	N	7	N	15	N	N	N	30
J20R1580	15	20	<1.0	N	N	50	N	200	N	N	N	100
J20R1611	10	30	--	N	N	N	N	10	N	N	N	5
J20R1640	50	30	--	N	N	N	N	50	N	N	N	10
J20R1685	50	200	1.5	N	N	20	30	150	N	10	N	50

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 20, 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	V-ppm S	W-ppm S	Y-ppm S	Zn-ppm S	Zr-ppm S	Th-ppm S	Form.#
J20R0065	10	N	5	N	N	50	N	15	300	300	N	20
J20R0095	N	N	5	N	100	70	N	20	500	300	N	20
J20R0115	200	N	15	50	100	1,000	N	10	700	100	N	20
J20R0135	70	N	10	10	100	300	N	15	1,000	150	N	20
J20R0200	20	N	15	N	100	200	N	50	<200	200	N	20
J20R0225	30	N	10	N	100	150	N	20	N	200	N	20
J20R0275	<10	N	10	N	300	150	N	30	N	300	N	20
J20R0400	15	N	20	N	150	200	N	50	N	150	N	20
J20R0425	20	N	15	N	100	150	N	50	N	200	N	20
J20R0445	N	N	5	N	N	70	N	50	200	500	N	20
J20R0495	30	N	15	N	300	150	N	70	300	150	N	20
J20R0658	<10	N	7	N	100	70	N	20	N	70	N	40
J20R0687	N	N	N	N	N	N	N	N	N	N	N	40
J20R0775	N	N	N	N	N	N	N	N	N	10	N	40
J20R0794	N	N	5	N	200	50	N	10	N	50	N	40
J20R0818	10	N	5	N	100	30	N	20	N	300	N	40
J20R0840	10	N	5	N	N	150	N	50	N	300	N	40
J20R0868	15	N	7	N	N	100	N	20	N	150	N	40
J20R0890	10	N	N	N	N	20	N	N	N	70	N	40
J20R0910	30	N	15	N	N	200	N	20	200	150	N	31
J20R0930	15	N	5	N	N	150	N	N	N	70	N	60
J20R0965	N	N	N	N	N	50	N	N	N	30	N	60
J20R0980	N	N	N	N	N	50	N	N	N	30	N	60
J20R1018	N	N	N	N	N	N	N	N	N	N	N	60
J20R1075	N	N	N	N	N	N	N	N	N	N	N	60
J20R1150	N	N	N	N	N	N	N	N	2,000	50	N	60
J20R1185	N	N	N	N	N	N	N	N	N	50	N	60
J20R1217	N	N	N	N	N	N	N	N	N	30	N	60
J20R1237	N	N	N	N	N	N	N	N	N	15	N	60
J20R1268	N	N	N	N	N	N	N	N	N	50	N	60
J20R1290	N	N	N	N	N	15	N	N	N	50	N	80
J20R1320	N	N	N	N	N	10	N	N	N	20	N	80
J20R1337	N	N	N	N	N	20	N	N	200	70	N	80
J20R1365	15	N	N	N	N	N	N	N	N	10	N	80
J20R1394	15	N	N	N	N	N	N	N	N	10	N	80
J20R1440	70	N	N	N	N	30	N	N	N	50	N	80
J20R1469	10	N	N	N	N	15	N	N	N	50	N	80
J20R1527	N	N	N	N	N	10	N	N	N	20	N	80
J20R1556	10	N	N	N	N	10	N	N	N	10	N	80
J20R1580	100	N	N	N	N	10	N	N	N	30	N	80
J20R1611	N	N	N	N	N	15	N	N	N	20	N	80
J20R1640	30	N	N	N	N	N	N	N	N	20	N	80
J20R1685	200	N	N	N	N	30	N	15	N	150	N	80

TABLE 3--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 21, 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	Hg-pct. S	Ca-pct. S	Ti-pct. S	Mn-ppt. S	Ag-ppt. S	As-ppt. S	Au-ppt. S
J21R1800	37 59 34	95 57 52	3	.7	<.05	.5	50	N	N	N
J21R2140	37 59 34	95 57 52	3	.7	<.05	.5	50	N	N	N
J21R2180	37 59 34	95 57 52	5	1.0	<.05	.3	50	N	N	N
J21R2210	37 59 34	95 57 52	5	1.0	<.05	.3	50	N	N	N
J21R2240	37 59 34	95 57 52	5	1.0	<.05	.3	50	N	N	N
J21R2270	37 59 34	95 57 52	2	.5	<.05	.3	50	N	N	N
J21R2292	37 59 34	95 57 52	3	.7	<.05	.3	50	N	N	N
J21R2310	37 59 34	95 57 52	3	.7	<.05	.3	50	N	N	N
J21R2325	37 59 34	95 57 52	2	.3	<.05	.2	30	N	N	N

Sample	Pb-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.#
J21R1800	20	N	15	N	N	300	N	30	200	150	N	40
J21R2140	500	N	15	N	N	300	N	15	N	150	N	40
J21R2180	30	N	15	N	N	500	N	15	N	150	N	31
J21R2210	100	N	15	N	N	500	N	20	N	150	N	31
J21R2240	70	N	15	N	N	500	N	15	N	100	N	31
J21R2270	30	N	10	N	N	200	N	10	N	100	N	31
J21R2292	50	N	10	N	N	200	N	15	N	100	N	31
J21R2310	70	N	10	N	N	200	N	15	N	150	N	31
J21R2325	15	N	7	N	N	150	N	<10	200	100	N	60

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
J21R1800	70	150	1.5	N	N	15	100	50	30	N	<20	50
J21R2140	70	150	1.5	N	N	10	100	70	20	N	<20	50
J21R2180	70	150	1.5	N	N	15	100	30	20	5	<20	50
J21R2210	70	500	2.0	N	N	20	70	50	30	30	<20	50
J21R2240	50	200	1.5	N	N	20	50	50	30	30	<20	50
J21R2270	50	100	1.0	N	N	10	50	30	20	5	<20	30
J21R2292	70	200	1.0	N	N	15	50	100	20	7	<20	30
J21R2310	70	150	1.0	N	N	20	50	100	20	10	<20	50
J21R2325	70	100	1.0	N	N	7	30	20	20	N	<20	30