

UNITED STATES DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

**Spectrographic analyses of insoluble-residue samples,  
Joplin 1° x 2° quadrangle, Kansas and Missouri:  
Drill hole nos. 53, 54, and 55**

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 are company confidential or intersect economically significant mineralized ground.

The analytical results for drill hole no. 53 (#1 Lovell - KGS), drill hole no. 54 (#1 Westevelt - KGS), and drill hole no. 55 (#1 Prewett - KGS) are given in this report. Drill hole no. 53 is located in sec. 14, T. 31 S., R. 23 E. in Crawford County, Kansas; drill hole no. 54 is located in sec. 3, T. 31 S., R. 23 E. in Crawford County, Kansas; drill hole no. 55 is located in sec. 28, T. 31 S., R. 23 E. in Cherokee County, Kansas (fig.1). Data for the insoluble-residue samples from drill holes 53, 54, and 55 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).

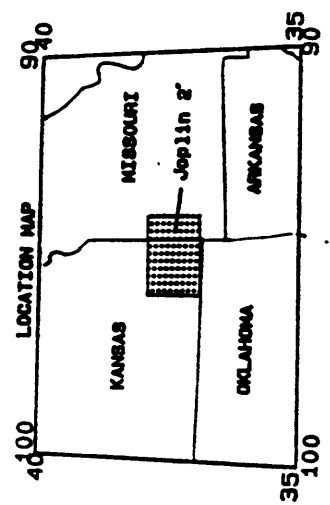
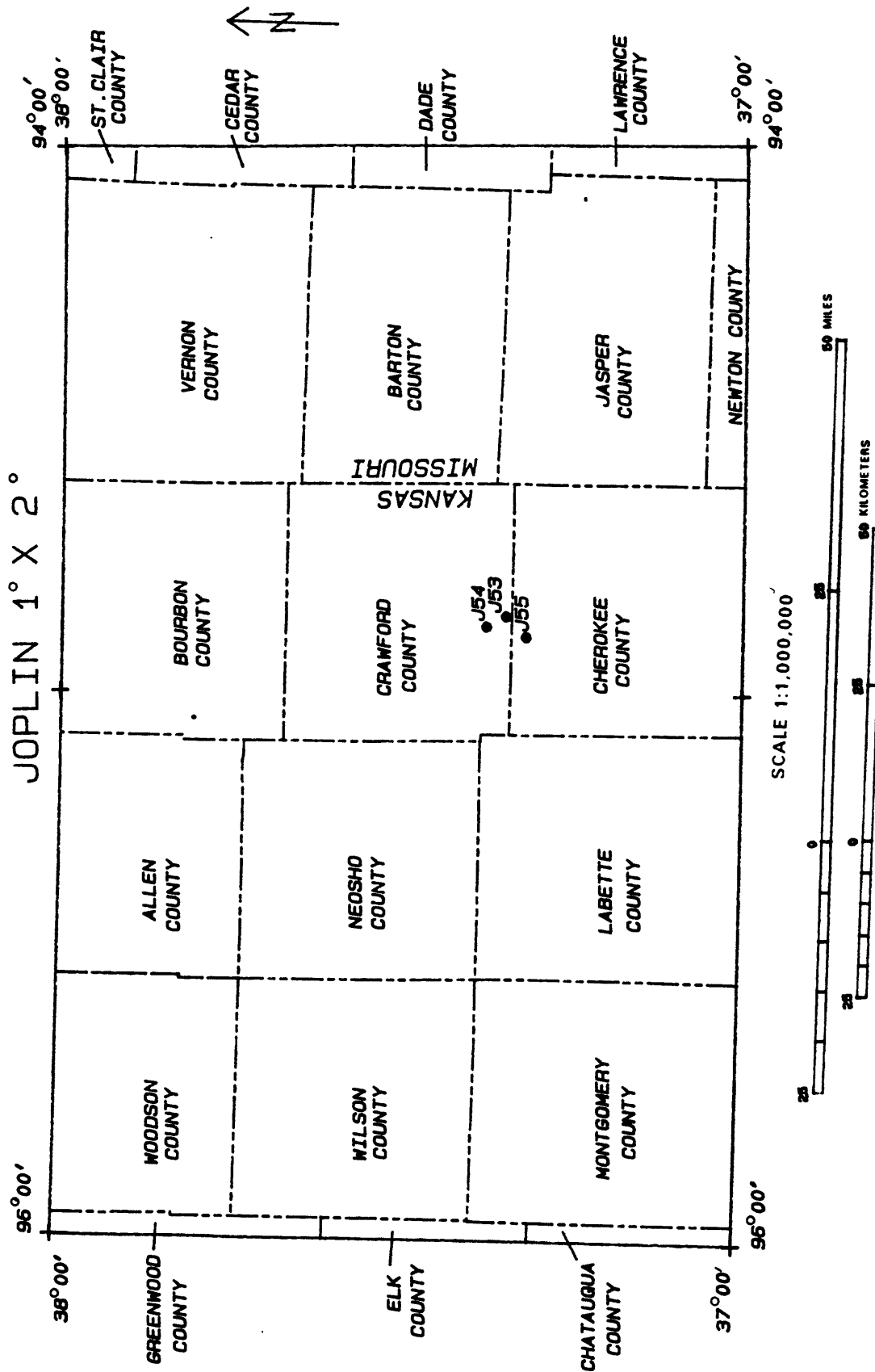


Figure 1. Locations of drill holes 53, 54, and 55, Joplin 1° x 2° quadrangle, Missouri and Kansas.

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

**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
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 (form number). 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 these drill-hole samples available from their sample library.

## REFERENCES

- Grimes, D.J., and Marranzino, A.P., 1968, Direct-current arc and alternating-current spark emission spectrographic field methods for the semiquantitative analysis of geologic materials: U.S. Geological Survey Circular 591, 6 p.
- 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. 53, 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
J53R0010	37 20 36	94 51 33	2.00	.50	.05	.30	70	2.0	N	N
J53R0020	37 20 36	94 51 33	3.00	.70	<.05	.50	150	N	N	N
J53R0030	37 20 36	94 51 33	5.00	.70	.05	.50	200	N	N	N
J53R0040	37 20 36	94 51 33	3.00	.50	.05	.70	200	N	N	N
J53R0050	37 20 36	94 51 33	2.00	.70	.05	.70	200	N	N	N
J53R0060	37 20 36	94 51 33	3.00	.70	<.05	.50	200	N	N	N
J53R0070	37 20 36	94 51 33	3.00	.70	<.05	.50	200	N	N	N
J53R0080	37 20 36	94 51 33	2.00	.70	<.05	.50	200	N	N	N
J53R0090	37 20 36	94 51 33	3.00	.70	<.05	.50	300	N	N	N
J53R0100	37 20 36	94 51 33	2.00	.70	.50	.50	200	.7	N	N
J53R0110	37 20 36	94 51 33	5.00	.70	<.05	.50	300	.5	N	N
J53R0120	37 20 36	94 51 33	5.00	.70	<.05	.50	150	N	N	N
J53R0130	37 20 36	94 51 33	2.00	.50	.15	.70	150	N	N	N
J53R0140	37 20 36	94 51 33	3.00	.70	<.05	.50	100	N	N	N
J53R0150	37 20 36	94 51 33	5.00	.50	<.05	.50	200	N	N	N
J53R0160	37 20 36	94 51 33	3.00	.70	.10	.50	500	N	N	N
J53R0170	37 20 36	94 51 33	3.00	.50	.05	.50	100	.5	N	N
J53R0180	37 20 36	94 51 33	2.00	.50	.05	.70	150	N	N	N
J53R0190	37 20 36	94 51 33	2.00	.50	.05	.70	150	N	N	N
J53R0200	37 20 36	94 51 33	3.00	.70	<.05	.70	150	N	N	N
J53R0210	37 20 36	94 51 33	3.00	.70	.20	.50	300	.7	N	N
J53R0220	37 20 36	94 51 33	3.00	.70	<.05	.70	70	N	N	N
J53R0230	37 20 36	94 51 33	2.00	.50	<.05	.70	70	N	N	N
J53R0240	37 20 36	94 51 33	3.00	.70	<.05	.50	200	N	N	N
J53R0250	37 20 36	94 51 33	3.00	.70	<.05	.70	100	N	N	N
J53R0260	37 20 36	94 51 33	2.00	.50	.05	.50	200	N	N	N
J53R0270	37 20 36	94 51 33	2.00	.50	<.05	.50	100	N	N	N
J53R0280	37 20 36	94 51 33	3.00	.70	.05	.70	200	N	N	N
J53R0290	37 20 36	94 51 33	2.00	.70	<.05	.70	200	N	N	N
J53R0300	37 20 36	94 51 33	2.00	.50	<.05	.70	150	N	N	N
J53R0310	37 20 36	94 51 33	2.00	.50	<.05	.70	100	N	N	N
J53R0320	37 20 36	94 51 33	3.00	.50	.07	.50	1,000	N	N	N
J53R0330	37 20 36	94 51 33	3.00	.70	<.05	.70	150	N	N	N
J53R0340	37 20 36	94 51 33	2.00	.50	<.05	.50	300	N	N	N
J53R0350	37 20 36	94 51 33	3.00	.70	<.05	.50	150	N	N	N
J53R0360	37 20 36	94 51 33	3.00	.50	<.05	.70	200	N	N	N
J53R0370	37 20 36	94 51 33	2.00	.50	<.05	.70	200	N	N	N
J53R0380	37 20 36	94 51 33	3.00	.50	<.05	.70	100	N	N	N
J53R0390	37 20 36	94 51 33	2.00	.50	<.05	.50	200	N	N	N
J53R0400	37 20 36	94 51 33	2.00	.50	.05	.50	200	N	N	N
J53R0410	37 20 36	94 51 33	3.00	.50	<.05	.50	150	N	N	N
J53R0420	37 20 36	94 51 33	2.00	.50	<.05	.50	100	N	N	N
J53R0430	37 20 36	94 51 33	2.00	.50	.05	.50	100	N	N	N
J53R0440	37 20 36	94 51 33	3.00	.70	<.05	.50	100	N	N	N
J53R0450	37 20 36	94 51 33	2.00	.70	<.05	.50	50	N	N	N

TABLE 1--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 53, 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
J53R0010	150	200	2.0	N	N	7	500	30	30	100	N	100
J53R0020	100	300	1.5	N	N	10	70	30	50	N	N	30
J53R0030	150	500	2.0	N	N	10	100	30	20	N	N	50
J53R0040	150	500	1.5	N	N	10	100	30	30	N	<20	30
J53R0050	100	300	2.0	N	N	15	100	30	30	N	<20	30
J53R0060	150	300	2.0	N	N	15	100	30	50	N	<20	50
J53R0070	150	500	2.0	N	N	30	150	50	50	N	<20	100
J53R0080	150	300	2.0	N	N	15	100	20	30	N	<20	50
J53R0090	150	300	2.0	N	N	15	150	100	50	10	<20	100
J53R0100	150	500	2.0	N	N	20	300	150	30	15	<20	200
J53R0110	200	300	2.0	N	N	15	200	50	30	5	<20	100
J53R0120	200	300	3.0	N	N	15	150	30	30	N	<20	70
J53R0130	150	500	1.5	N	N	20	100	20	50	5	<20	50
J53R0140	150	300	2.0	N	N	20	100	20	50	N	<20	50
J53R0150	200	200	2.0	N	N	15	100	70	50	5	<20	70
J53R0160	200	200	3.0	N	N	15	100	70	50	N	<20	70
J53R0170	200	200	3.0	N	N	15	200	70	50	10	<20	150
J53R0180	150	500	1.5	N	N	10	100	15	30	N	<20	30
J53R0190	150	300	1.5	N	N	10	100	15	50	N	<20	30
J53R0200	150	300	2.0	N	N	10	100	15	50	N	<20	50
J53R0210	150	200	3.0	N	N	20	300	100	50	10	<20	150
J53R0220	150	300	2.0	N	N	20	100	20	50	N	<20	70
J53R0230	150	200	3.0	N	N	10	200	50	50	15	<20	70
J53R0240	150	300	2.0	N	N	15	100	70	50	N	<20	70
J53R0250	150	200	2.0	N	N	15	100	70	50	N	<20	70
J53R0260	150	200	3.0	N	N	10	150	30	50	N	<20	70
J53R0270	150	200	2.0	N	N	20	100	50	50	N	<20	70
J53R0280	150	300	2.0	N	N	15	100	30	50	N	<20	70
J53R0290	150	300	2.0	N	N	15	100	20	50	N	<20	50
J53R0300	150	200	2.0	N	N	10	100	20	50	N	<20	30
J53R0310	150	200	2.0	N	N	7	100	15	50	N	<20	50
J53R0320	150	200	3.0	N	N	10	150	30	50	N	<20	70
J53R0330	150	200	3.0	N	N	10	200	30	50	N	<20	100
J53R0340	150	200	2.0	N	N	15	100	20	50	N	<20	50
J53R0350	150	200	3.0	N	N	20	150	20	50	N	<20	100
J53R0360	150	200	3.0	N	N	15	100	50	50	N	<20	70
J53R0370	150	200	2.0	N	N	15	100	20	50	N	<20	70
J53R0380	150	200	3.0	N	N	10	150	30	50	N	<20	70
J53R0390	150	200	2.0	N	N	10	150	30	50	N	<20	70
J53R0400	150	200	2.0	N	N	10	150	30	50	N	<20	70
J53R0410	150	200	2.0	N	N	10	150	30	50	N	<20	100
J53R0420	150	200	2.0	N	N	7	100	20	50	N	<20	50
J53R0430	150	200	3.0	N	N	10	100	20	50	N	<20	50
J53R0440	150	200	2.0	N	N	15	150	20	50	N	<20	70
J53R0450	200	150	2.0	N	N	10	150	30	50	N	<20	50



TABLE 1--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 53, 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#
J53R0010	70	N	10	N	100	1,000	N	20	200	100	N	20
J53R0020	15	N	10	N	100	150	N	30	N	500	N	20
J53R0030	50	N	10	N	100	150	N	20	N	300	N	20
J53R0040	20	N	10	N	100	150	N	20	N	300	N	20
J53R0050	20	N	15	N	100	200	N	20	200	200	N	20
J53R0060	20	N	15	N	100	200	N	20	N	150	N	20
J53R0070	50	N	15	N	150	300	N	20	N	150	N	20
J53R0080	10	N	15	N	100	200	N	20	N	150	N	20
J53R0090	30	N	15	N	100	200	N	20	N	150	N	20
J53R0100	20	N	10	N	100	200	N	15	1,000	100	N	20
J53R0110	50	N	15	N	100	300	N	20	700	150	N	20
J53R0120	20	N	15	N	150	200	N	20	200	100	N	20
J53R0130	15	N	10	N	150	150	N	20	700	500	N	20
J53R0140	10	N	15	N	150	200	N	30	N	200	N	20
J53R0150	70	N	10	N	200	200	N	20	N	100	N	20
J53R0160	20	N	15	N	150	200	N	20	N	100	N	20
J53R0170	20	N	15	N	150	200	N	20	N	100	N	20
J53R0180	<10	N	10	N	150	100	N	20	N	200	N	20
J53R0190	10	N	10	N	150	100	N	30	200	200	N	20
J53R0200	10	N	15	N	150	150	N	20	N	150	N	20
J53R0210	70	N	10	N	100	200	N	20	N	100	N	20
J53R0220	30	N	15	N	100	200	N	30	N	150	N	20
J53R0230	30	N	15	N	200	200	N	20	200	150	N	20
J53R0240	10	N	15	N	100	200	N	30	500	150	N	20
J53R0250	15	N	15	N	150	200	N	30	200	200	N	20
J53R0260	20	N	15	N	200	200	N	20	500	150	N	20
J53R0270	20	N	15	N	100	200	N	20	N	150	N	20
J53R0280	10	N	20	N	200	200	N	30	N	300	N	20
J53R0290	10	N	15	N	100	200	N	30	N	300	N	20
J53R0300	<10	N	15	N	100	150	N	30	N	300	N	20
J53R0310	10	N	15	N	100	150	N	20	N	300	N	20
J53R0320	15	N	20	N	100	200	N	30	N	200	N	20
J53R0330	20	N	20	N	100	200	N	30	<200	200	N	20
J53R0340	10	N	20	N	100	200	N	30	N	200	N	20
J53R0350	20	N	20	N	100	200	N	30	N	150	N	20
J53R0360	20	N	20	N	100	200	N	30	N	200	N	20
J53R0370	15	N	20	N	100	200	N	30	500	200	N	20
J53R0380	30	N	20	N	100	200	N	30	N	200	N	20
J53R0390	20	N	20	N	100	200	N	30	700	200	N	20
J53R0400	20	N	20	N	150	200	N	30	N	200	N	20
J53R0410	20	N	20	N	150	200	N	30	N	200	N	20
J53R0420	15	N	20	N	100	200	N	30	N	200	N	20
J53R0430	10	N	15	N	100	200	N	20	200	200	N	20
J53R0440	20	N	20	N	150	200	N	30	N	200	N	20
J53R0450	15	N	20	N	100	200	N	20	N	100	N	20

TABLE 1--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 53, JOPLIN 1 x 2 QUADRANGLE,  
MISSOURI AND KANSAS.--Continued

Sample	Latitude	Longitude	Fe-pct. S	Mg-pct. S	Ca-pct. S	Ti-pct. S	Mn-ppm S	Ag-ppm S	As-ppm S	Au-ppm S
J53R0460	37 20 36	94 51 33	5.00	.30	<.05	.50	100	N	N	N
J53R0470	37 20 36	94 51 33	1.50	.10	.05	.15	50	N	N	N
J53R0480	37 20 36	94 51 33	1.00	.15	.07	.15	30	N	N	N
J53R0490	37 20 36	94 51 33	1.50	.20	.20	.15	100	N	N	N
J53R0500	37 20 36	94 51 33	1.00	.07	.05	.07	15	N	N	N
J53R0510	37 20 36	94 51 33	1.00	.07	.10	.10	20	N	N	N
J53R0520	37 20 36	94 51 33	1.00	.10	.20	.10	30	N	N	N
J53R0530	37 20 36	94 51 33	.20	.02	.15	.03	<10	N	N	N
J53R0540	37 20 36	94 51 33	.15	.03	.07	.03	<10	N	N	N
J53R0550	37 20 36	94 51 33	.50	.05	.20	.05	10	N	N	N
J53R0560	37 20 36	94 51 33	.70	.05	.05	.07	<10	N	N	N
J53R0570	37 20 36	94 51 33	.30	.05	.15	.07	10	N	N	N
J53R0580	37 20 36	94 51 33	5.00	.10	.05	.20	100	.5	N	N
J53R0590	37 20 36	94 51 33	.50	.10	.05	.10	10	N	N	N
J53R0600	37 20 36	94 51 33	.70	.05	.05	.05	<10	N	N	N
J53R0610	37 20 36	94 51 33	.20	.02	.05	.05	<10	N	N	N
J53R0620	37 20 36	94 51 33	.15	.02	.05	.03	<10	N	N	N
J53R0630	37 20 36	94 51 33	.15	.02	<.05	.02	<10	N	N	N
J53R0640	37 20 36	94 51 33	.10	.02	<.05	.02	<10	N	N	N
J53R0650	37 20 36	94 51 33	.15	.02	<.05	.03	<10	N	N	N
J53R0660	37 20 36	94 51 33	.20	.02	<.05	.03	<10	N	N	N
J53R0670	37 20 36	94 51 33	.07	<.02	<.05	.02	<10	N	N	N
J53R0680	37 20 36	94 51 33	.50	.05	<.05	.15	10	N	N	N
J53R0690	37 20 36	94 51 33	.50	.05	.05	.15	10	N	N	N
J53R0700	37 20 36	94 51 33	.70	.05	.05	.15	10	N	N	N
J53R0710	37 20 36	94 51 33	.30	.03	.05	.07	<10	N	N	N
J53R0720	37 20 36	94 51 33	.20	.03	.05	.07	<10	N	N	N
J53R0730	37 20 36	94 51 33	.70	.05	.07	.15	15	N	N	N
J53R0740	37 20 36	94 51 33	.20	.05	.07	.10	<10	N	N	N
J53R0750	37 20 36	94 51 33	.50	.05	.07	.10	10	N	N	N
J53R0760	37 20 36	94 51 33	.70	.05	.07	.10	10	N	N	N
J53R0770	37 20 36	94 51 33	.70	.07	.05	.15	15	N	N	N
J53R0780	37 20 36	94 51 33	.70	.05	.07	.10	15	N	N	N
J53R0790	37 20 36	94 51 33	.50	.07	.07	.15	10	N	N	N
J53R0800	37 20 36	94 51 33	3.00	.20	.07	.50	70	N	N	N
J53R0810	37 20 36	94 51 33	3.00	.30	<.05	.30	100	N	N	N
J53R0820	37 20 36	94 51 33	1.50	.30	<.05	.50	30	N	N	N
J53R0830	37 20 36	94 51 33	2.00	.50	.07	.30	50	N	N	N
J53R0840	37 20 36	94 51 33	1.50	.30	.05	.20	30	N	N	N

TABLE 1--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 53, JOPLIN 1 x 2 QUADRANGLE,  
MISSOURI AND KANSAS.--Continued

Sample	P-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
J53R0460	150	100	1.5	N	N	5	100	20	50	N	<20	50
J53R0470	100	70	N	N	N	7	30	10	20	N	N	30
J53R0480	100	70	N	N	N	5	30	10	N	N	N	15
J53R0490	70	70	N	N	N	5	20	10	N	N	N	15
J53R0500	70	30	N	N	N	5	20	5	N	N	N	20
J53R0510	70	50	N	N	N	N	30	5	N	N	N	10
J53R0520	70	50	<1.0	N	N	N	30	5	N	N	N	15
J53R0530	70	<20	N	N	N	N	N	<5	N	N	N	5
J53R0540	100	<20	N	N	N	N	N	<5	N	N	N	5
J53R0550	70	20	N	N	N	N	15	<5	N	N	N	5
J53R0560	70	30	N	N	N	N	10	5	N	N	N	5
J53R0570	70	50	N	N	N	N	20	<5	N	N	N	7
J53R0580	150	70	1.0	N	N	20	70	20	20	N	N	100
J53R0590	100	70	<1.0	N	N	5	30	5	N	N	N	15
J53R0600	70	30	N	N	N	N	20	5	N	N	N	5
J53R0610	70	20	N	N	N	N	N	<5	N	N	N	5
J53R0620	70	20	N	N	N	N	N	<5	N	N	N	5
J53R0630	100	20	N	N	N	N	N	<5	N	N	N	5
J53R0640	100	<20	N	N	N	N	N	<5	N	N	N	5
J53R0650	100	20	N	N	N	N	N	<5	N	N	N	5
J53R0660	100	20	N	N	N	N	N	<5	N	N	N	5
J53R0670	150	<20	N	N	N	N	N	<5	N	N	N	5
J53R0680	100	30	N	N	N	N	10	5	N	N	N	7
J53R0690	100	30	N	N	N	N	10	15	N	N	N	10
J53R0700	100	30	N	N	N	N	10	7	N	N	N	15
J53R0710	70	30	N	N	N	N	N	<5	N	N	N	7
J53R0720	70	30	N	N	N	N	N	7	N	N	N	7
J53R0730	70	50	N	N	N	N	10	15	N	N	N	10
J53R0740	70	50	N	N	N	N	10	<5	N	N	N	10
J53R0750	70	50	N	N	N	N	10	<5	N	N	N	30
J53R0760	70	70	N	N	N	5	15	7	N	N	N	100
J53R0770	100	70	N	N	N	N	15	7	20	N	N	15
J53R0780	100	50	N	N	N	<5	15	10	20	N	N	20
J53R0790	100	70	N	N	N	N	20	7	20	N	N	15
J53R0800	150	100	2.0	N	N	15	50	50	30	N	N	200
J53R0810	100	500	2.0	N	N	10	50	30	30	5	N	50
J53R0820	100	100	1.5	N	N	7	70	10	20	N	N	20
J53R0830	150	100	3.0	N	N	15	50	20	30	5	N	50
J53R0840	100	100	2.0	N	N	10	50	20	20	N	N	100

TABLE 1--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 53, 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#
J53R0460	15	N	15	N	100	100	N	20	N	70	N	20
J53R0470	<10	N	5	N	N	30	N	10	N	70	N	40
J53R0480	N	N	5	N	N	30	N	10	N	70	N	40
J53R0490	N	N	5	N	N	30	N	10	N	50	N	40
J53R0500	<10	N	N	N	N	20	N	N	N	20	N	40
J53R0510	<10	N	N	N	N	15	N	N	N	20	N	40
J53R0520	N	N	<5	N	N	30	N	N	N	30	N	40
J53R0530	N	N	N	N	N	N	N	N	N	15	N	40
J53R0540	N	N	N	N	N	N	N	N	N	10	N	40
J53R0550	N	N	N	N	N	10	N	N	N	20	N	40
J53R0560	N	N	N	N	N	10	N	N	N	30	N	40
J53R0570	N	N	N	N	N	20	N	N	500	20	N	40
J53R0580	50	N	7	N	N	30	N	10	N	50	N	40
J53R0590	N	N	5	N	N	30	N	N	N	50	N	40
J53R0600	N	N	N	N	N	15	N	N	N	20	N	40
J53R0610	N	N	N	N	N	N	N	N	N	10	N	40
J53R0620	N	N	N	N	N	N	N	N	<200	10	N	40
J53R0630	N	N	N	N	N	N	N	N	N	N	N	40
J53R0640	N	N	N	N	N	N	N	N	N	N	N	40
J53R0650	N	N	N	N	N	N	N	N	N	10	N	40
J53R0660	N	N	N	N	N	N	N	N	N	15	N	40
J53R0670	N	N	N	N	N	N	N	N	N	10	N	40
J53R0680	N	N	N	N	N	30	N	N	N	30	N	40
J53R0690	N	N	N	N	N	20	N	N	200	30	N	40
J53R0700	N	N	N	N	N	30	N	N.	<200	30	N	40
J53R0710	N	N	N	N	N	10	N	N	N	15	N	40
J53R0720	N	N	N	N	N	15	N	N	N	20	N	40
J53R0730	N	N	N	N	N	20	N	N	<200	30	N	40
J53R0740	N	N	N	N	N	15	N	N	N	20	N	40
J53R0750	N	N	N	N	N	20	N	N	200	20	N	40
J53R0760	10	N	N	N	N	30	N	N	N	30	N	40
J53R0770	N	N	<5	N	N	30	N	<10	N	50	N	40
J53R0780	N	N	<5	N	N	20	N	N	N	30	N	40
J53R0790	N	N	<5	N	N	20	N	<10	N	50	N	40
J53R0800	50	N	10	N	100	100	N	15	300	100	N	40
J53R0810	70	N	10	N	100	150	N	20	500	150	N	40
J53R0820	10	N	5	N	N	150	N	20	N	200	N	40
J53R0830	50	N	10	N	N	200	N	20	N	100	N	40
J53R0840	50	N	7	N	N	100	N	20	N	70	N	40

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 54, 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-ppm S	Ag-ppm S	As-ppm S	Au-ppm S
J54R0030	37 22 19	94 52 38	2.00	.70	.30	.700	300	N	N	N
J54R0040	37 22 19	94 52 38	5.00	.70	.50	.700	300	N	N	N
J54R0050	37 22 19	94 52 38	5.00	1.00	<.05	.500	300	N	N	N
J54R0060	37 22 19	94 52 38	5.00	1.00	<.05	.700	200	N	N	N
J54R0070	37 22 19	94 52 38	5.00	1.50	<.05	1.000	300	N	N	N
J54R0080	37 22 19	94 52 38	5.00	1.50	<.05	.700	300	N	N	N
J54R0090	37 22 19	94 52 38	5.00	1.50	<.05	.700	300	N	N	N
J54R0100	37 22 19	94 52 38	7.00	1.00	.05	.500	300	<.5	N	N
J54R0110	37 22 19	94 52 38	7.00	1.00	.20	.700	500	1.5	N	N
J54R0120	37 22 19	94 52 38	5.00	1.00	<.05	.700	300	<.5	N	N
J54R0130	37 22 19	94 52 38	5.00	.70	<.05	.700	200	N	N	N
J54R0140	37 22 19	94 52 38	5.00	1.00	<.05	.700	300	N	N	N
J54R0150	37 22 19	94 52 38	5.00	.70	<.05	.500	200	N	N	N
J54R0160	37 22 19	94 52 38	5.00	1.00	<.05	1.000	200	N	N	N
J54R0170	37 22 19	94 52 38	3.00	.70	.05	.700	150	N	N	N
J54R0180	37 22 19	94 52 38	3.00	1.00	<.05	.700	150	N	N	N
J54R0190	37 22 19	94 52 38	3.00	1.00	<.05	1.000	200	N	N	N
J54R0200	37 22 19	94 52 38	3.00	1.00	<.05	.700	200	N	N	N
J54R0210	37 22 19	94 52 38	5.00	1.00	<.05	.700	200	N	N	N
J54R0220	37 22 19	94 52 38	5.00	1.00	.30	.500	200	2.0	N	N
J54R0230	37 22 19	94 52 38	3.00	.70	.05	.500	100	.5	N	N
J54R0240	37 22 19	94 52 38	5.00	1.00	<.05	.700	200	N	N	N
J54R0250	37 22 19	94 52 38	1.00	.30	<.05	.300	100	N	N	N
J54R0260	37 22 19	94 52 38	2.00	.50	<.05	.500	150	N	N	N
J54R0270	37 22 19	94 52 38	3.00	.50	<.05	.500	150	N	N	N
J54R0280	37 22 19	94 52 38	2.00	.50	<.05	.500	100	N	N	N
J54R0290	37 22 19	94 52 38	3.00	.70	<.05	.500	200	N	N	N
J54R0300	37 22 19	94 52 38	3.00	.70	<.05	.700	200	N	N	N
J54R0310	37 22 19	94 52 38	3.00	.70	.05	.500	200	N	N	N
J54R0320	37 22 19	94 52 38	3.00	.70	<.05	.700	150	N	N	N
J54R0330	37 22 19	94 52 38	2.00	.50	<.05	.500	200	N	N	N
J54R0340	37 22 19	94 52 38	3.00	.70	<.05	.500	150	N	N	N
J54R0350	37 22 19	94 52 38	3.00	.50	<.05	.500	150	N	N	N
J54R0360	37 22 19	94 52 38	2.00	.70	<.05	.700	150	N	N	N
J54R0370	37 22 19	94 52 38	3.00	.70	<.05	.500	150	N	N	N
J54R0380	37 22 19	94 52 38	2.00	.50	<.05	.500	200	N	N	N
J54R0390	37 22 19	94 52 38	3.00	.70	<.05	.700	150	N	N	N
J54R0400	37 22 19	94 52 38	2.00	.50	<.05	.500	100	N	N	N
J54R0410	37 22 19	94 52 38	3.00	.50	<.05	.500	100	N	N	N
J54R0420	37 22 19	94 52 38	3.00	.70	<.05	.700	150	N	N	N
J54R0430	37 22 19	94 52 38	3.00	.70	<.05	.700	200	N	N	N
J54R0440	37 22 19	94 52 38	2.00	.70	<.05	.700	100	N	N	N
J54R0450	37 22 19	94 52 38	5.00	.15	<.05	.300	70	N	N	N
J54R0460	37 22 19	94 52 38	1.50	.05	<.05	.150	20	N	N	N
J54R0470	37 22 19	94 52 38	1.00	.05	.50	.100	20	N	N	N

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 54, 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
J54R0030	150	200	2.0	N	N	10	70	20	50	N	<20	30
J54R0040	150	300	2.0	N	N	20	100	30	50	N	<20	50
J54R0050	150	300	2.0	N	N	20	100	30	50	N	<20	50
J54R0060	200	500	3.0	N	N	20	100	30	50	N	<20	50
J54R0070	200	500	3.0	N	N	30	100	20	50	N	<20	70
J54R0080	150	500	2.0	N	N	30	100	20	50	N	<20	50
J54R0090	150	500	3.0	N	N	30	100	30	50	N	<20	50
J54R0100	200	2,000	2.0	N	N	20	150	100	20	10	N	70
J54R0110	300	300	3.0	N	N	30	500	150	30	20	N	150
J54R0120	200	300	3.0	N	N	15	100	30	50	N	N	50
J54R0130	200	300	2.0	N	N	10	100	20	50	N	N	50
J54R0140	200	500	2.0	N	N	15	100	15	50	N	N	50
J54R0150	200	300	2.0	N	N	10	150	30	20	5	N	50
J54R0160	200	500	3.0	N	N	20	150	100	70	N	<20	50
J54R0170	200	300	3.0	N	N	15	150	30	70	7	<20	70
J54R0180	200	300	2.0	N	N	15	100	20	50	N	<20	50
J54R0190	200	300	2.0	N	N	15	100	15	50	N	<20	50
J54R0200	200	300	2.0	N	N	15	70	10	50	N	<20	30
J54R0210	200	300	2.0	N	N	20	100	20	50	<5	N	50
J54R0220	200	200	3.0	N	N	20	500	100	50	10	N	200
J54R0230	200	500	2.0	N	N	15	200	50	50	5	N	70
J54R0240	200	300	2.0	N	N	20	150	20	50	N	<20	50
J54R0250	200	150	2.0	N	N	15	150	5	30	N	N	10
J54R0260	150	150	2.0	N	N	15	150	20	30	N	N	50
J54R0270	150	150	1.5	N	N	20	70	15	30	N	N	50
J54R0280	100	100	1.5	N	N	10	70	7	20	N	N	20
J54R0290	150	200	3.0	N	N	20	100	10	70	N	N	50
J54R0300	150	200	3.0	N	N	15	150	20	70	N	N	50
J54R0310	150	200	2.0	N	N	15	100	30	50	N	N	50
J54R0320	150	200	3.0	N	N	15	100	15	50	N	N	50
J54R0330	150	150	1.5	N	N	15	70	15	30	N	N	50
J54R0340	150	200	3.0	N	N	20	100	15	20	N	N	50
J54R0350	150	200	3.0	N	N	30	100	20	50	N	N	70
J54R0360	150	200	2.0	N	N	20	100	20	50	N	N	50
J54R0370	150	200	3.0	N	N	15	100	20	50	N	N	70
J54R0380	150	200	2.0	N	N	10	100	20	50	N	N	50
J54R0390	200	300	2.0	N	N	20	100	20	50	N	N	50
J54R0400	150	300	2.0	N	N	20	100	15	50	N	N	50
J54R0410	200	200	2.0	N	N	15	100	20	50	N	N	50
J54R0420	200	200	2.0	N	N	15	100	20	50	N	N	50
J54R0430	150	300	2.0	N	N	15	100	20	50	N	N	50
J54R0440	200	200	2.0	N	N	15	100	30	50	N	N	50
J54R0450	200	150	1.0	N	N	10	70	20	20	N	N	50
J54R0460	150	100	N	N	N	N	10	10	N	N	N	15
J54R0470	150	70	N	N	N	N	N	5	N	N	N	15

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 54, 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#
J54R0030	10	N	7	N	100	70	N	20	N	300	N	20
J54R0040	20	N	10	N	100	100	N	30	N	300	N	20
J54R0050	15	N	15	N	100	200	N	30	N	200	N	20
J54R0060	10	N	20	N	150	200	N	30	N	200	N	20
J54R0070	20	N	30	N	200	300	N	30	N	200	N	20
J54R0080	<10	N	20	N	150	300	N	30	N	200	N	20
J54R0090	15	N	20	N	100	200	N	30	N	200	N	20
J54R0100	70	N	10	N	150	150	N	15	N	150	N	20
J54R0110	30	N	15	N	150	300	N	20	1,000	200	N	20
J54R0120	20	N	20	N	150	150	N	20	N	150	N	20
J54R0130	10	N	15	N	300	150	N	30	200	200	N	20
J54R0140	N	N	15	N	200	150	N	30	N	200	N	20
J54R0150	10	N	10	N	100	100	N	20	N	200	N	20
J54R0160	10	N	20	N	200	200	N	50	N	150	N	20
J54R0170	20	N	15	N	150	200	N	30	N	150	N	20
J54R0180	N	N	15	N	150	200	N	50	200	300	N	20
J54R0190	<10	N	20	N	200	150	N	50	200	300	N	20
J54R0200	N	N	15	N	150	150	N	20	<200	200	N	20
J54R0210	30	N	20	N	200	200	N	20	N	100	N	20
J54R0220	50	N	20	N	100	200	N	20	300	100	N	20
J54R0230	20	N	15	N	300	200	N	20	N	200	N	20
J54R0240	10	N	20	N	100	200	N	30	N	200	N	20
J54R0250	N	N	5	N	N	30	N	15	N	50	N	20
J54R0260	10	N	10	N	100	200	N	15	200	150	N	20
J54R0270	N	N	15	N	100	200	N	15	N	150	N	20
J54R0280	N	N	7	N	100	150	N	15	N	200	N	20
J54R0290	10	N	15	N	100	200	N	20	<200	150	N	20
J54R0300	<10	N	15	N	100	300	N	30	N	200	N	20
J54R0310	<10	N	15	N	100	200	N	30	N	200	N	20
J54R0320	15	N	15	N	100	200	N	30	N	200	N	20
J54R0330	N	N	10	N	100	150	N	20	N	200	N	20
J54R0340	<10	N	15	N	100	200	N	15	N	100	N	20
J54R0350	30	N	15	N	100	200	N	20	N	200	N	20
J54R0360	30	N	15	N	100	200	N	30	200	200	N	20
J54R0370	20	N	15	N	100	200	N	20	N	150	N	20
J54R0380	15	N	15	N	100	200	N	20	N	150	N	20
J54R0390	10	N	15	N	100	300	N	30	N	150	N	20
J54R0400	15	N	15	N	100	150	N	30	N	150	N	20
J54R0410	10	N	15	N	100	200	N	20	N	300	N	20
J54R0420	10	N	15	N	100	200	N	20	N	200	N	20
J54R0430	10	N	15	N	100	200	N	20	N	150	N	20
J54R0440	15	N	20	N	100	200	N	20	N	200	N	20
J54R0450	<10	N	7	N	N	70	N	10	N	100	N	20
J54R0460	N	N	N	N	N	20	N	N	N	50	N	40
J54R0470	N	N	N	N	N	20	N	N	N	50	N	40

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 54, JOPLIN 1 x 2 QUADRANGLE,  
MISSOURI AND KANSAS.--Continued

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
J54R0480	37 22 19	94 52 38	1.50	.05	.05	.100	20	N	N	N
J54R0490	37 22 19	94 52 38	1.00	.10	.15	.100	20	N	N	N
J54R0500	37 22 19	94 52 38	.70	.02	.20	.020	15	N	N	N
J54R0510	37 22 19	94 52 38	.30	.05	.10	.050	15	N	N	N
J54R0520	37 22 19	94 52 38	.15	.02	.07	.015	10	N	N	N
J54R0530	37 22 19	94 52 38	.20	.02	.05	.015	<10	N	N	N
J54R0540	37 22 19	94 52 38	.70	.03	.05	.020	10	N	N	N
J54R0550	37 22 19	94 52 38	.10	.02	.30	.010	10	N	N	N
J54R0560	37 22 19	94 52 38	.20	.02	.30	.020	20	N	N	N
J54R0570	37 22 19	94 52 38	3.00	.30	.07	.500	100	N	N	N
J54R0580	37 22 19	94 52 38	.50	.10	.10	.150	70	N	N	N
J54R0590	37 22 19	94 52 38	.05	.02	.20	.010	<10	N	N	N
J54R0600	37 22 19	94 52 38	.05	.02	.07	.007	<10	N	N	N
J54R0610	37 22 19	94 52 38	.05	<.02	.20	.005	<10	N	N	N
J54R0620	37 22 19	94 52 38	.05	.02	<.05	.007	<10	N	N	N
J54R0630	37 22 19	94 52 38	.07	.02	<.05	.020	10	N	N	N
J54R0640	37 22 19	94 52 38	.10	.02	<.05	.020	10	N	N	N
J54R0650	37 22 19	94 52 38	.07	.02	<.05	.015	<10	N	N	N
J54R0660	37 22 19	94 52 38	.07	.02	<.05	.020	<10	N	N	N
J54R0670	37 22 19	94 52 38	.20	.05	<.05	.030	10	N	N	N
J54R0680	37 22 19	94 52 38	.15	.03	<.05	.030	10	N	N	N
J54R0690	37 22 19	94 52 38	.20	.05	.05	.070	15	N	N	N
J54R0700	37 22 19	94 52 38	.30	.07	.07	.100	20	N	N	N
J54R0710	37 22 19	94 52 38	.30	.07	.05	.100	20	N	N	N
J54R0720	37 22 19	94 52 38	.30	.10	.10	.100	15	N	N	N
J54R0730	37 22 19	94 52 38	.30	.10	.30	.100	15	N	N	N
J54R0740	37 22 19	94 52 38	1.00	.15	.15	.200	50	N	N	N
J54R0750	37 22 19	94 52 38	.30	.15	.20	.100	15	N	N	N
J54R0760	37 22 19	94 52 38	1.00	.20	.15	.200	30	N	N	N
J54R0770	37 22 19	94 52 38	.70	.10	.15	.100	20	N	N	N
J54R0780	37 22 19	94 52 38	.70	.10	.15	.150	20	N	N	N
J54R0790	37 22 19	94 52 38	3.00	.30	.15	.500	100	N	N	N
J54R0800	37 22 19	94 52 38	2.00	.50	.05	.700	70	N	N	N
J54R0810	37 22 19	94 52 38	2.00	1.00	<.05	.500	100	N	N	N
J54R0820	37 22 19	94 52 38	3.00	1.00	.05	.500	100	N	N	N
J54R0830	37 22 19	94 52 38	5.00	1.00	.05	.500	150	N	N	N
J54R0840	37 22 19	94 52 38	1.50	.20	.05	.150	30	N	N	N
J54R0850	37 22 19	94 52 38	1.00	.15	.07	.150	50	N	N	N
J54R0860	37 22 19	94 52 38	2.00	.30	.07	.300	150	N	N	N
J54R0870	37 22 19	94 52 38	1.50	.20	.05	.300	70	N	N	N
J54R0880	37 22 19	94 52 38	1.00	.10	.07	.150	15	N	N	N
J54R0890	37 22 19	94 52 38	1.00	.05	.07	.100	10	N	N	N
J54R0900	37 22 19	94 52 38	1.00	.10	.15	.150	15	N	N	N
J54R0910	37 22 19	94 52 38	2.00	.50	.05	.500	100	N	N	N
J54R0920	37 22 19	94 52 38	3.00	.10	.07	.150	30	N	N	N



TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 54, 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	Ni-ppm S
J54R0480	150	70	N	N	N	N	N	7	N	N	N	20
J54R0490	50	70	N	N	N	N	N	5	N	N	N	15
J54R0500	50	50	N	N	N	N	N	<5	N	N	N	7
J54R0510	50	30	N	N	N	N	N	<5	N	N	N	5
J54R0520	30	20	N	N	N	N	N	<5	N	N	N	5
J54R0530	50	20	N	N	N	N	N	<5	N	N	N	5
J54R0540	50	20	N	N	N	N	N	7	N	N	N	10
J54R0550	20	20	N	N	N	N	N	<5	N	N	N	5
J54R0560	20	30	N	N	N	N	N	<5	N	N	N	5
J54R0570	100	150	2.0	N	N	10	100	30	30	5	N	50
J54R0580	50	70	N	N	N	N	N	5	N	N	N	10
J54R0590	50	30	N	N	N	N	N	<5	N	N	N	<5
J54R0600	50	30	N	N	N	N	N	<5	N	N	N	<5
J54R0610	50	30	N	N	N	N	N	<5	N	N	N	<5
J54R0620	70	50	N	N	N	N	N	<5	N	N	N	<5
J54R0630	100	50	N	N	N	N	N	<5	N	N	N	<5
J54R0640	70	30	N	N	N	N	N	<5	N	N	N	<5
J54R0650	70	50	N	N	N	N	N	5	N	N	N	<5
J54R0660	100	30	N	N	N	N	N	<5	N	N	N	<5
J54R0670	50	50	N	N	N	N	N	<5	N	N	N	<5
J54R0680	50	50	N	N	N	N	N	<5	N	N	N	5
J54R0690	70	70	N	N	N	N	N	<5	N	N	N	7
J54R0700	70	70	N	N	N	N	N	5	N	N	N	15
J54R0710	70	70	N	N	N	N	N	5	N	N	N	10
J54R0720	50	70	N	N	N	N	N	5	N	N	N	10
J54R0730	70	100	N	N	N	N	N	<5	N	N	N	15
J54R0740	70	100	1.0	N	N	7	20	15	N	N	N	70
J54R0750	50	100	N	N	N	N	10	<5	N	N	N	10
J54R0760	70	150	1.0	N	N	N	10	7	N	N	N	20
J54R0770	50	70	N	N	N	N	N	5	N	N	N	30
J54R0780	50	100	N	N	N	7	20	10	N	N	N	200
J54R0790	100	700	2.0	N	N	7	50	20	20	N	N	50
J54R0800	150	300	1.5	N	N	5	100	10	20	N	N	15
J54R0810	100	200	2.0	N	N	10	100	10	20	N	N	50
J54R0820	100	200	2.0	N	N	15	100	20	20	N	N	30
J54R0830	150	300	5.0	N	N	15	100	30	50	N	N	50
J54R0840	100	200	1.5	N	N	<5	10	15	N	N	N	15
J54R0850	100	200	2.0	N	N	N	N	10	N	N	N	10
J54R0860	100	200	1.5	N	N	10	50	20	N	N	N	20
J54R0870	100	150	1.5	N	N	7	30	20	N	<5	N	50
J54R0880	70	150	N	N	N	N	N	7	N	N	N	10
J54R0890	50	100	N	N	N	N	N	10	N	N	N	10
J54R0900	70	100	N	N	N	N	N	10	N	N	N	10
J54R0910	100	200	3.0	N	N	10	100	30	50	N	N	50
J54R0920	100	150	N	N	N	7	10	50	N	5	N	30

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 54, 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#
J54R0480	N	N	N	N	N	50	N	N	N	30	N	40
J54R0490	N	N	N	N	N	20	N	N	N	20	N	40
J54R0500	N	N	N	N	N	N	N	N	N	<10	N	40
J54R0510	N	N	N	N	N	10	N	N	N	<10	N	40
J54R0520	N	N	N	N	N	N	N	N	N	N	N	40
J54R0530	N	N	N	N	N	N	N	N	N	10	N	40
J54R0540	N	N	N	N	N	N	N	N	N	<10	N	40
J54R0550	N	N	N	N	N	N	N	N	N	N	N	40
J54R0560	N	N	N	N	N	<10	N	N	N	10	N	40
J54R0570	<10	N	10	N	N	150	N	20	N	150	N	40
J54R0580	N	N	N	N	N	50	N	N	N	70	N	40
J54R0590	N	N	N	N	N	N	N	N	N	N	N	40
J54R0600	N	N	N	N	N	N	N	N	N	N	N	40
J54R0610	N	N	N	N	N	N	N	N	N	N	N	40
J54R0620	N	N	N	N	N	N	N	N	N	N	N	40
J54R0630	N	N	N	N	N	N	N	N	N	<10	N	40
J54R0640	N	N	N	N	N	N	N	N	N	10	N	40
J54R0650	N	N	N	N	N	N	N	N	N	10	N	40
J54R0660	N	N	N	N	N	N	N	N	N	<10	N	40
J54R0670	N	N	N	N	N	N	N	N	N	15	N	40
J54R0680	N	N	N	N	N	10	N	N	N	15	N	40
J54R0690	N	N	N	N	N	15	N	N	N	20	N	40
J54R0700	N	N	N	N	N	20	N	N	N	30	N	40
J54R0710	N	N	N	N	N	30	N	N	N	30	N	40
J54R0720	N	N	N	N	N	20	N	N	N	20	N	40
J54R0730	N	N	N	N	N	30	N	N	N	30	N	40
J54R0740	N	N	<5	N	N	50	N	N	N	70	N	40
J54R0750	N	N	N	N	N	30	N	N	N	30	N	40
J54R0760	N	N	<5	N	N	50	N	N	N	70	N	40
J54R0770	N	N	N	N	N	20	N	N	N	20	N	40
J54R0780	N	N	N	N	N	30	N	N	N	50	N	40
J54R0790	N	N	10	N	N	100	N	15	N	150	N	40
J54R0800	<10	N	5	N	N	100	N	30	N	500	N	40
J54R0810	10	N	10	N	N	200	N	20	N	300	N	40
J54R0820	10	N	10	N	N	150	N	20	N	200	N	40
J54R0830	30	N	15	N	N	200	N	20	N	150	N	60
J54R0840	<10	N	N	N	N	50	N	N	N	50	N	60
J54R0850	<10	N	N	N	N	30	N	N	N	70	N	60
J54R0860	<10	N	7	N	N	100	N	10	N	150	N	60
J54R0870	<10	N	10	N	N	100	N	15	N	100	N	60
J54R0880	N	N	N	N	N	30	N	N	N	50	N	60
J54R0890	N	N	N	N	N	15	N	N	N	20	N	60
J54R0900	N	N	N	N	N	20	N	N	N	50	N	60
J54R0910	30	N	20	N	N	100	N	30	N	150	N	60
J54R0920	<10	N	N	N	N	30	N	N	N	50	N	60

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 54, JOPLIN 1 x 2 QUADRANGLE,  
MISSOURI AND KANSAS.--Continued

Sample	Latitude	Longitude	Fe-pct. S	Mg-pct. S	Ca-pct. S	Ti-pct. S	Mn-ppm S	Ag-ppm S	As-ppm S	Au-ppm S
J54R0930	37 22 19	94 52 38	1.50	.15	.10	.200	50	N	N	N
J54R0940	37 22 19	94 52 38	.50	.10	.10	.100	20	N	N	N
J54R0950	37 22 19	94 52 38	1.00	.10	.05	.150	30	N	N	N
J54R0960	37 22 19	94 52 38	.70	.15	.10	.150	15	N	N	N
J54R0970	37 22 19	94 52 38	.70	.20	.05	.200	20	N	N	N
J54R0980	37 22 19	94 52 38	2.00	.15	.10	.200	20	N	N	N
J54R0990	37 22 19	94 52 38	1.50	.20	.05	.200	30	N	N	N
J54R1000	37 22 19	94 52 38	.70	.10	.05	.070	20	N	N	N
J54R1010	37 22 19	94 52 38	2.00	.20	.05	.500	70	N	N	N
J54P1020	37 22 19	94 52 38	.70	.10	.15	.100	20	N	N	N
J54R1030	37 22 19	94 52 38	.50	.10	.07	.100	20	N	N	N
J54R1040	37 22 19	94 52 38	.50	.10	.05	.150	70	N	N	N
J54R1050	37 22 19	94 52 38	1.00	.20	.10	.200	20	N	N	N
J54R1055	37 22 19	94 52 38	.70	.15	.07	.200	30	N	N	N

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 54, 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
J54R0930	70	150	1.0	N	N	5	20	15	N	N	N	20
J54R0940	70	100	N	N	N	N	N	5	N	N	N	10
J54R0950	100	150	N	N	N	N	N	7	N	N	N	10
J54R0960	100	150	N	N	N	N	N	7	N	N	N	5
J54R0970	100	200	N	N	N	N	N	10	N	N	N	5
J54R0980	100	1,500	N	N	N	N	10	15	N	N	N	10
J54R0990	100	100	1.5	N	N	<5	20	15	N	N	N	15
J54R1000	70	70	N	N	N	N	N	5	N	N	N	5
J54R1010	100	200	1.5	N	N	5	50	20	N	N	N	20
J54R1020	70	70	N	N	N	N	10	7	N	N	N	10
J54R1030	70	70	N	N	N	N	N	5	N	N	N	5
J54R1040	70	70	N	N	N	<5	N	5	N	N	N	10
J54R1050	100	100	1.0	N	N	N	N	20	N	N	N	10
J54R1055	100	70	N	N	N	N	N	7	N	N	N	10

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 54, 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#
J54R0930	N	N	<5	N	N	50	N	N	N	70	N	60
J54R0940	N	N	N	N	N	20	N	N	N	30	N	60
J54R0950	N	N	N	N	N	20	N	N	N	50	N	60
J54R0960	N	N	N	N	N	20	N	N	N	70	N	60
J54R0970	N	N	N	N	N	30	N	N	N	200	N	60
J54R0980	N	N	N	N	N	30	N	N	N	70	N	60
J54R0990	N	N	<5	N	N	70	N	N	N	100	N	60
J54R1000	N	N	N	N	N	15	N	N	N	30	N	60
J54R1010	N	N	5	N	N	100	N	N	N	150	N	60
J54R1020	N	N	N	N	N	15	N	N	N	30	N	60
J54R1030	N	N	N	N	N	20	N	N	N	30	N	60
J54R1040	N	N	N	N	N	30	N	N	N	50	N	60
J54R1050	N	N	N	N	N	30	N	N	N	70	N	60
J54R1055	N	N	N	N	N	50	N	N	N	50	N	60

TABLE 3--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 55, JOPLIN 1 x 2 QUADRANGLE,  
MISSOURI AND KANSAS.

Sample	Latitude	Longitude	Fe-pct.		Mg-pct.		Ca-pct.		Ti-pct.		Mn-ppm		Ag-ppm		As-ppm		Au-ppm	
			S		S		S		S		S		S		S		S	
J55R0380	37 19 3	94 53 39	1.50		.20		<.05		.300		20		N		N		N	
J55R0390	37 19 3	94 53 39	2.00		.07		<.05		.200		20		N		N		N	
J55R0400	37 19 3	94 53 39	1.00		.07		.07		.200		20		N		N		N	
J55R0410	37 19 3	94 53 39	1.00		.07		<.05		.150		10		N		N		N	
J55R0420	37 19 3	94 53 39	.70		.07		.05		.150		15		N		N		N	
J55R0430	37 19 3	94 53 39	1.50		.05		.05		.100		10		N		N		N	
J55R0440	37 19 3	94 53 39	1.00		.10		<.05		.150		20		N		N		N	
J55R0450	37 19 3	94 53 39	1.00		.10		.05		.150		15		N		N		N	
J55R0460	37 19 3	94 53 39	1.00		.05		.20		.100		10		N		N		N	
J55R0470	37 19 3	94 53 39	.15		.02		.05		.070		<10		N		N		N	
J55R0480	37 19 3	94 53 39	.10		<.02		<.05		.030		<10		N		N		N	
J55R0490	37 19 3	94 53 39	.15		.02		.05		.030		<10		N		N		N	
J55R0500	37 19 3	94 53 39	.20		.03		.05		.070		<10		N		N		N	
J55R0510	37 19 3	94 53 39	.50		.07		.10		.150		10		N		N		N	
J55R0520	37 19 3	94 53 39	.30		.05		.07		.100		10		N		N		N	
J55R0530	37 19 3	94 53 39	1.50		.20		.07		.500		50		N		N		N	
J55R0540	37 19 3	94 53 39	2.00		.30		.07		.500		50		N		N		N	
J55R0550	37 19 3	94 53 39	.20		.03		.10		.070		<10		N		N		N	
J55R0560	37 19 3	94 53 39	.15		.03		.07		.020		<10		N		N		N	
J55R0570	37 19 3	94 53 39	.20		.02		<.05		.020		<10		N		N		N	
J55R0580	37 19 3	94 53 39	.07		<.02		<.05		.015		<10		N		N		N	
J55R0590	37 19 3	94 53 39	.20		.05		<.05		.070		<10		N		N		N	
J55R0600	37 19 3	94 53 39	.10		.02		<.05		.020		N		N		N		N	
J55R0610	37 19 3	94 53 39	.15		.03		<.05		.050		N		N		N		N	
J55R0620	37 19 3	94 53 39	.50		.05		<.05		.070		N		N		N		N	
J55R0630	37 19 3	94 53 39	.15		.03		.05		.030		N		N		N		N	
J55R0640	37 19 3	94 53 39	.20		.05		.05		.070		N		N		N		N	
J55R0650	37 19 3	94 53 39	.20		.05		.05		.050		N		N		N		N	
J55R0660	37 19 3	94 53 39	1.00		.05		.05		.050		N		N		N		N	
J55R0670	37 19 3	94 53 39	.20		.03		.05		.050		N		N		N		N	
J55R0680	37 19 3	94 53 39	.20		.05		.10		.050		N		N		N		N	
J55R0690	37 19 3	94 53 39	.50		.07		.05		.100		10		N		N		N	
J55R0700	37 19 3	94 53 39	2.00		.15		.05		.200		20		N		N		N	
J55R0710	37 19 3	94 53 39	.70		.07		.05		.070		<10		N		N		N	
J55R0720	37 19 3	94 53 39	5.00		.15		.15		.150		30		N		N		N	
J55R0730	37 19 3	94 53 39	3.00		.10		.07		.200		30		N		N		N	
J55R0740	37 19 3	94 53 39	3.00		.50		.05		.500		30		N		N		N	
J55R0750	37 19 3	94 53 39	2.00		.50		<.05		.500		30		N		N		N	
J55R0760	37 19 3	94 53 39	5.00		.70		.20		.500		50		N		N		N	
J55R0770	37 19 3	94 53 39	1.00		.10		.07		.100		10		N		N		N	
J55R0775	37 19 3	94 53 39	1.50		.15		.05		.150		10		N		N		N	

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

TABLE 3--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 55, JOPLIN 1 x 2 QUADRANGLE,  
MISSOURI AND KANSAS.--Continued

Sample	R-ppm S	Ra-ppm S	Be-ppm S	Ri-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
J55R0380	100	100	1.5	N	N	7	100	10	20	N	N	20
J55R0390	100	50	<1.0	N	N	10	30	10	20	N	N	20
J55R0400	70	70	N	N	N	5	20	10	20	N	N	15
J55R0410	70	30	N	N	N	N	10	7	N	N	N	15
J55R0420	70	50	N	N	N	N	10	7	N	N	N	10
J55R0430	50	30	N	N	N	N	15	7	N	N	N	10
J55R0440	70	50	N	N	N	5	10	7	N	N	N	20
J55R0450	70	70	N	N	N	5	20	10	N	N	N	30
J55R0460	70	50	N	N	N	5	15	7	N	N	N	15
J55R0470	50	20	N	N	N	N	N	<5	N	N	N	N
J55R0480	70	<20	N	N	N	N	N	<5	N	N	N	N
J55R0490	70	50	N	N	N	N	N	5	N	N	N	N
J55R0500	50	20	N	N	N	N	10	<5	N	N	N	5
J55R0510	70	50	N	N	N	N	15	5	N	N	N	7
J55R0520	70	30	N	N	N	N	15	<5	N	N	N	5
J55R0530	100	100	1.5	N	N	10	70	30	30	N	N	50
J55R0540	100	150	1.5	N	N	10	70	20	30	N	N	30
J55R0550	50	30	N	N	N	N	10	<5	N	N	N	N
J55R0560	50	100	N	N	N	N	N	20	N	N	N	N
J55R0570	70	20	N	N	N	N	N	<5	N	N	N	N
J55R0580	100	<20	N	N	N	N	N	<5	N	N	N	N
J55R0590	70	50	N	N	N	N	N	5	N	N	N	5
J55R0600	100	20	N	N	N	N	N	<5	N	N	N	N
J55R0610	70	20	N	N	N	N	N	<5	N	N	N	N
J55R0620	70	30	N	N	N	N	N	5	N	N	N	5
J55R0630	70	20	N	N	N	N	N	<5	N	N	N	N
J55R0640	70	30	N	N	N	N	10	<5	N	N	N	N
J55R0650	70	20	N	N	N	N	N	<5	N	N	N	N
J55R0660	70	30	N	N	N	5	N	<5	N	N	N	20
J55R0670	50	20	N	N	N	N	N	<5	N	N	N	7
J55R0680	50	20	N	N	N	N	N	<5	N	N	N	20
J55R0690	70	70	1.0	N	N	<5	15	50	N	N	N	30
J55R0700	100	100	1.0	N	N	50	50	15	20	N	N	200
J55R0710	30	20	N	N	N	7	10	5	N	N	N	70
J55R0720	100	70	1.0	N	N	10	50	20	N	N	N	150
J55R0730	100	70	N	N	N	10	30	20	N	N	N	500
J55R0740	150	100	1.5	N	N	10	100	15	20	N	<20	70
J55R0750	150	100	2.0	N	N	15	100	20	20	N	<20	50
J55R0760	200	100	5.0	N	N	20	100	50	30	10	<20	50
J55R0770	50	50	N	N	N	N	10	10	N	N	N	10
J55R0775	70	70	N	N	N	N	20	20	N	N	N	15

TABLE 3--SPECTROGRAPHIC ANALISES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 55, 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#
J55R0380	<10	N	7	N	N	150	N	10	N	100	N	20
J55R0390	N	N	5	N	N	50	N	10	N	70	N	40
J55R0400	N	N	5	N	N	50	N	10	N	70	N	40
J55R0410	N	N	N	N	N	30	N	<10	N	50	N	40
J55R0420	N	N	N	N	N	30	N	N	N	50	N	40
J55R0430	N	N	N	N	N	20	N	N	N	50	N	40
J55R0440	N	N	N	N	N	30	N	N	N	50	N	40
J55R0450	N	N	N	N	N	50	N	N	N	70	N	40
J55R0460	N	N	N	N	N	20	N	N	N	50	N	40
J55P0470	N	N	N	N	N	N	N	N	N	20	N	40
J55R0480	N	N	N	N	N	N	N	N	N	15	N	40
J55R0490	N	N	N	N	N	N	N	N	N	15	N	40
J55R0500	N	N	N	N	N	10	N	N	N	30	N	40
J55R0510	N	N	N	N	N	30	N	N	N	50	N	40
J55R0520	N	N	N	N	N	15	N	20	N	50	N	40
J55R0530	15	N	7	N	N	100	N	15	N	100	N	40
J55R0540	10	N	10	N	N	150	N	N	N	150	N	40
J55R0550	N	N	N	N	N	10	N	N	N	20	N	40
J55R0560	N	N	N	N	N	N	N	N	N	N	N	40
J55R0570	N	N	N	N	N	N	N	N	200	10	N	40
J55R0580	N	N	N	N	N	N	N	N	N	N	N	40
J55R0590	N	N	N	N	N	20	N	N	N	20	N	40
J55R0600	N	N	N	N	N	N	N	N	N	N	N	40
J55R0610	N	N	N	N	N	10	N	N	N	30	N	40
J55R0620	N	N	N	N	N	15	N	N	N	50	N	40
J55R0630	N	N	N	N	N	10	N	N	N	10	N	40
J55R0640	N	N	N	N	N	15	N	N	N	20	N	40
J55R0650	N	N	N	N	N	10	N	N	N	10	N	40
J55R0660	N	N	N	N	N	15	N	N	N	15	N	40
J55R0670	N	N	N	N	N	10	N	N	N	10	N	40
J55R0680	N	N	N	N	N	N	N	N	N	10	N	40
J55R0690	N	N	<5	N	N	30	N	N	N	50	N	40
J55R0700	<10	N	7	N	N	100	N	10	N	70	N	40
J55R0710	N	N	N	N	N	20	N	N	N	20	N	40
J55R0720	10	N	5	N	N	70	N	10	N	70	N	40
J55R0730	10	N	5	N	N	50	N	<10	<200	50	N	40
J55R0740	20	N	7	N	N	200	N	20	N	200	N	40
J55R0750	10	N	10	N	N	200	N	20	N	200	N	40
J55R0760	20	N	15	N	N	200	N	20	N	150	N	40
J55R0770	N	N	<5	N	N	20	N	N	N	50	N	80
J55R0775	N	N	N	N	N	50	N	N	N	70	N	80