

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. 62, 63, and 64**

By

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Open-File Report 89- 537

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. 62 (#14 Engstom - KGS), drill hole no. 63 (#1 JPKS 7-A1 Conrad - KGS), and drill hole no. 64 (#5 Baxter Springs - KGS) are given in this report. Drill hole no. 62 is located in sec. 10, T. 27 S., R. 13 E. in Greenwood County, Kansas; drill hole no. 63 is located in sec. 24, T. 34 S., R. 21 E. in Cherokee County, Kansas; drill hole no. 64 is located in sec. 36, T. 34 S., R. 24 E. in Cherokee County, Kansas (fig. 1). Data for the insoluble-residue samples from drill holes 62, 63, and 64 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

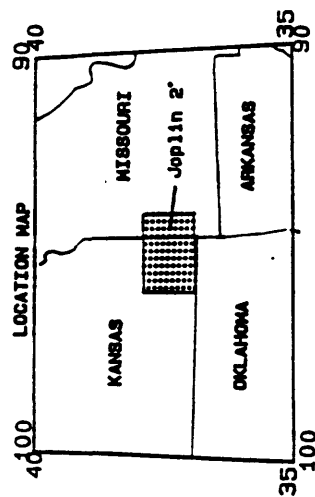
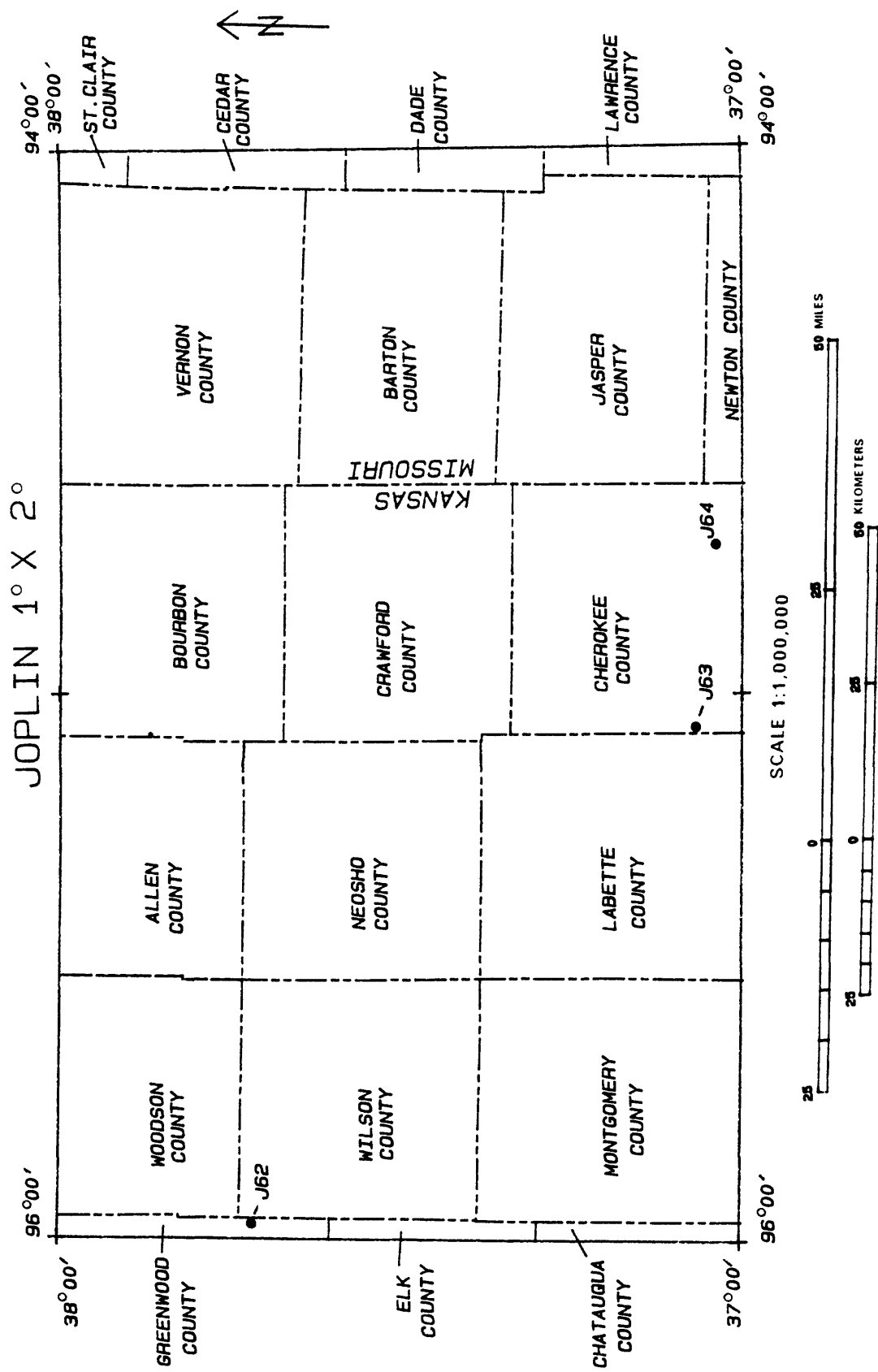


Figure 1. Locations of drill holes 62, 63, and 64, Joplin 1° x 2° quadrangle, Missouri and Kansas.

For those given in ppm:

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

DESCRIPTION OF DATA TABLES

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

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

<u>Code</u>	<u>Formation</u>
20	Pennsylvanian Undifferentiated
31	Chattanooga Shale
40	Mississippian Undifferentiated
60	Ordovician Undifferentiated
78	Cambro - Ordovician Undifferentiated

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 these drill-hole samples available from their sample library.

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. 62, JOPLIN 1 x 2 QUADRANGLE,
MISSOURI AND KANSAS.

Sample	Latitude	Longitude	Fe-pct. S	Hg-pct. S	Ca-pct. S	Ti-pct. S	Mn-ppm S	Ag-ppm S	As-ppm S	Au-ppm S
J62R0370	37 43 0	95 58 33	3.0	.50	.07	.50	100	1.5	N	N
J62R0390	37 43 0	95 58 33	5.0	.50	.07	.50	100	2.0	N	N
J62R0410	37 43 0	95 58 33	5.0	1.00	.05	.50	200	.5	N	N
J62R0430	37 43 0	95 58 33	5.0	1.00	.05	.50	200	<.5	N	N
J62R0450	37 43 0	95 58 33	3.0	1.00	.05	.70	200	<.5	N	N
J62R0480	37 43 0	95 58 33	3.0	.70	.05	1.00	150	<.5	N	N
J62R0510	37 43 0	95 58 33	2.0	.50	<.05	.50	50	N	N	N
J62R0530	37 43 0	95 58 33	2.0	.70	.05	.70	70	N	N	N
J62R0550	37 43 0	95 58 33	2.0	.70	.05	1.00	100	N	N	N
J62R0570	37 43 0	95 58 33	2.0	.50	<.05	.70	70	N	N	N
J62R0590	37 43 0	95 58 33	3.0	.70	.05	1.00	100	N	N	N
J62R0610	37 43 0	95 58 33	5.0	1.00	<.05	.70	150	.5	N	N
J62R0630	37 43 0	95 58 33	3.0	.70	<.05	.70	100	2.0	N	N
J62R0650	37 43 0	95 58 33	2.0	.70	.05	.50	150	.5	N	N
J62R0670	37 43 0	95 58 33	5.0	1.00	<.05	.70	200	N	N	N
J62R0690	37 43 0	95 58 33	5.0	1.50	.05	1.00	300	<.5	N	N
J62R0720	37 43 0	95 58 33	2.0	.50	<.05	1.00	100	N	N	N
J62R0740	37 43 0	95 58 33	5.0	1.00	<.05	.70	150	N	N	N
J62R0770	37 43 0	95 58 33	5.0	1.00	<.05	1.00	200	N	N	N
J62R0800	37 43 0	95 58 33	3.0	.70	<.05	.70	100	N	N	N
J62R0850	37 43 0	95 58 33	1.5	.20	<.05	.70	50	N	N	N
J62R0880	37 43 0	95 58 33	5.0	.70	<.05	.70	150	.7	N	N
J62R0910	37 43 0	95 58 33	5.0	.50	<.05	.70	100	<.5	N	N
J62R0940	37 43 0	95 58 33	2.0	.50	<.05	.50	100	N	N	N
J62R0960	37 43 0	95 58 33	2.0	.50	.05	.70	100	N	N	N
J62R0980	37 43 0	95 58 33	2.0	.70	<.05	.20	50	N	N	N
J62R1000	37 43 0	95 58 33	3.0	.70	<.05	.70	100	N	N	N
J62R1020	37 43 0	95 58 33	3.0	.70	.05	.70	100	N	N	N
J62R1040	37 43 0	95 58 33	3.0	.70	.10	1.00	150	N	N	N
J62R1070	37 43 0	95 58 33	3.0	.70	.07	.70	100	N	N	N
J62R1100	37 43 0	95 58 33	3.0	1.00	.05	.70	100	N	N	N
J62R1130	37 43 0	95 58 33	2.0	.70	<.05	.50	70	N	N	N
J62R1160	37 43 0	95 58 33	3.0	1.00	.10	.30	100	N	N	N
J62R1190	37 43 0	95 58 33	3.0	1.00	.10	.70	100	N	N	N
J62R1220	37 43 0	95 58 33	3.0	1.00	.07	.70	150	N	N	N
J62R1240	37 43 0	95 58 33	3.0	1.00	.05	.70	200	N	N	N
J62R1260	37 43 0	95 58 33	3.0	1.00	.07	.50	150	N	N	N
J62R1310	37 43 0	95 58 33	3.0	1.00	.07	.70	200	N	N	N
J62R1320	37 43 0	95 58 33	3.0	1.00	.07	.50	150	N	N	N
J62R1340	37 43 0	95 58 33	3.0	1.00	.07	.50	150	N	N	N
J62R1360	37 43 0	95 58 33	2.0	.50	<.05	.50	150	N	N	N
J62R1380	37 43 0	95 58 33	3.0	.70	.05	.50	200	N	N	N
J62R1400	37 43 0	95 58 33	5.0	1.00	.07	.50	150	N	N	N
J62R1420	37 43 0	95 58 33	3.0	.50	.05	.50	50	N	N	N
J62R1440	37 43 0	95 58 33	3.0	.50	.10	.30	70	N	N	N

TABLE 1--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 62, 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
J62R0370	150	200	2.0	N	N	10	200	100	30	20	N	100
J62R0390	150	300	3.0	N	20	20	300	500	30	50	N	150
J62R0410	100	200	3.0	N	N	20	150	100	20	5	N	100
J62R0430	200	200	2.0	N	<20	20	100	70	20	5	N	150
J62R0450	150	200	2.0	N	N	20	150	100	20	5	<20	150
J62R0480	150	200	2.0	N	N	10	100	100	30	5	<20	100
J62R0510	100	200	2.0	N	N	10	100	20	30	N	N	70
J62R0530	150	300	2.0	N	N	10	100	30	30	N	<20	30
J62R0550	150	500	2.0	N	N	7	100	150	50	N	<20	20
J62R0570	100	300	2.0	N	N	7	50	70	20	N	<20	15
J62R0590	150	500	2.0	N	N	10	70	50	30	<5	<20	50
J62R0610	150	200	3.0	N	<20	15	200	100	20	10	<20	100
J62R0630	150	300	5.0	N	20	10	700	150	30	30	<20	200
J62R0650	100	200	2.0	N	N	10	200	100	50	10	N	70
J62R0670	100	300	3.0	N	N	15	100	50	50	N	<20	50
J62R0690	150	300	3.0	N	N	20	150	70	50	5	<20	100
J62R0720	100	500	3.0	N	N	10	150	100	30	7	<20	70
J62R0740	100	300	3.0	N	N	20	150	70	50	5	<20	70
J62R0770	150	500	3.0	N	N	30	150	50	50	N	<20	70
J62R0800	100	200	2.0	N	N	20	70	15	50	N	<20	50
J62R0850	100	300	1.5	N	N	15	70	30	30	<5	<20	20
J62R0880	150	300	3.0	N	N	20	200	50	50	7	<20	100
J62R0910	100	300	3.0	N	N	30	200	100	70	<5	<20	70
J62R0940	100	200	2.0	N	N	15	100	30	50	N	<20	30
J62R0960	100	300	2.0	N	N	15	100	30	50	N	<20	30
J62R0980	70	500	2.0	N	N	10	50	30	50	N	N	30
J62R1000	100	300	3.0	N	N	20	100	20	50	N	<20	50
J62R1020	100	300	3.0	N	N	20	100	50	50	N	<20	50
J62R1040	100	500	3.0	N	N	20	100	50	50	N	<20	70
J62R1070	100	300	3.0	N	N	20	100	30	50	N	<20	50
J62R1100	100	500	3.0	N	N	20	100	70	50	N	<20	50
J62R1130	100	300	2.0	N	N	15	70	20	50	N	N	30
J62R1160	100	500	2.0	N	N	10	100	150	20	N	N	50
J62R1190	100	500	3.0	N	N	20	100	70	30	N	<20	70
J62R1220	100	500	3.0	N	N	15	100	50	50	N	<20	50
J62R1240	100	300	3.0	N	N	20	100	50	50	N	<20	50
J62R1260	100	1,000	3.0	N	N	20	100	50	20	N	<20	50
J62R1310	100	500	3.0	N	N	20	100	70	20	N	<20	50
J62R1320	100	700	3.0	N	N	20	100	50	30	N	<20	50
J62R1340	100	500	3.0	N	N	20	100	50	30	N	<20	50
J62R1360	100	300	2.0	N	N	15	70	15	30	N	<20	20
J62R1380	100	200	3.0	N	N	20	100	20	50	N	<20	50
J62R1400	100	700	3.0	N	N	20	100	50	30	N	<20	70
J62R1420	100	200	3.0	N	N	15	100	50	30	N	N	30
J62R1440	100	1,000	2.0	N	N	10	100	30	20	10	<20	50

TABLE 1--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 62, 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#
J62R0370	10	N	10	N	100	500	N	15	300	150	N	20
J62R0390	20	N	15	N	100	1,000	N	15	700	150	N	20
J62R0410	20	N	15	N	100	300	N	10	200	100	N	20
J62R0430	20	N	10	N	100	200	N	10	700	150	N	20
J62R0450	30	N	10	N	100	200	N	15	200	150	N	20
J62R0480	30	N	10	N	100	300	N	20	500	200	N	20
J62R0510	N	N	10	N	100	200	N	15	N	150	N	20
J62R0530	10	N	10	N	100	200	N	20	N	200	N	20
J62R0550	<10	N	10	N	150	200	N	20	N	200	N	20
J62R0570	15	N	7	N	100	150	N	15	N	300	N	20
J62R0590	15	N	15	N	100	200	N	20	N	200	N	20
J62R0610	10	N	15	N	100	200	N	20	700	200	N	20
J62R0630	30	N	10	N	100	1,000	N	15	500	150	N	20
J62R0650	20	N	10	N	150	300	N	20	500	200	N	20
J62R0670	10	N	20	N	100	200	N	30	N	200	N	20
J62R0690	20	N	20	N	150	300	N	20	N	200	N	20
J62R0720	10	N	15	N	150	200	N	20	N	300	N	20
J62R0740	20	N	15	N	100	200	N	20	300	150	N	20
J62R0770	10	N	20	N	500	200	N	30	<200	200	N	20
J62R0800	10	N	15	N	200	200	N	30	N	300	N	20
J62R0850	<10	N	10	N	150	150	N	20	N	300	N	20
J62R0880	50	N	20	N	150	200	N	20	300	200	N	20
J62R0910	30	N	20	N	300	200	N	30	<200	200	N	20
J62R0940	10	N	10	N	150	200	N	50	N	200	N	20
J62R0960	<10	N	15	N	100	200	N	30	N	200	N	20
J62R0980	10	N	10	N	100	150	N	20	N	70	N	20
J62R1000	10	N	15	N	100	200	N	20	500	150	N	20
J62R1020	10	N	15	N	100	200	N	20	N	150	N	20
J62R1040	15	N	15	N	100	300	N	30	<200	200	N	20
J62P1070	10	N	15	N	100	300	N	20	N	200	N	20
J62R1100	10	N	15	N	100	300	N	30	N	150	N	20
J62R1130	10	N	10	N	100	200	N	15	N	100	N	20
J62R1160	<10	N	10	N	100	200	N	10	N	100	N	20
J62R1190	500	N	15	N	300	200	100	20	<200	150	N	20
J62R1220	N	N	15	N	200	200	N	20	N	300	N	20
J62R1240	N	N	15	N	100	200	N	20	N	200	N	20
J62R1260	15	N	10	N	100	200	N	15	N	150	N	20
J62R1310	50	N	10	N	100	200	N	20	N	200	N	20
J62R1320	10	N	15	N	1,000	200	N	20	N	200	N	20
J62R1340	10	N	15	N	300	200	N	20	N	200	N	20
J62R1360	10	N	10	N	100	150	N	30	200	200	N	20
J62R1380	10	N	15	N	100	150	N	20	200	200	N	20
J62R1400	10	N	15	N	200	200	N	20	N	100	N	20
J62R1420	10	N	10	N	100	100	N	15	N	100	N	20
J62R1440	10	N	10	N	150	100	N	10	500	100	N	20

TABLE 1--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 62, JOPLIN 1 x 2 QUADRANGLE,
MISSOURI AND KANSAS.--Continued

Sample	Latitude	Longitude	Fe-pct. S	Hg-pct. S	Ca-pct. S	Tl-pct. S	Mn-ppm S	Ag-ppm S	As-ppm S	Au-ppm S
J62R1460	37 43 0	95 58 33	3.0	.70	.07	.50	100	N	N	N
J62R1480	37 43 0	95 58 33	3.0	.70	<.05	.50	100	N	N	N
J62R1500	37 43 0	95 58 33	3.0	.70	<.05	.50	100	N	N	N
J62R1520	37 43 0	95 58 33	3.0	.70	<.05	.50	150	N	N	N
J62R1540	37 43 0	95 58 33	5.0	.70	<.05	.50	150	N	N	N
J62R1560	37 43 0	95 58 33	2.0	.50	<.05	.50	70	N	N	N
J62R1590	37 43 0	95 58 33	1.5	.10	.10	.20	50	N	N	N
J62R1620	37 43 0	95 58 33	1.0	.07	.05	.10	20	N	N	N
J62R1650	37 43 0	95 58 33	1.0	.05	.05	.10	30	N	N	N
J62R1680	37 43 0	95 58 33	2.0	.15	.07	.30	50	N	N	N
J62R1710	37 43 0	95 58 33	1.5	.15	.10	.20	50	N	N	N
J62R1740	37 43 0	95 58 33	1.5	.15	.07	.20	50	N	N	N
J62R1770	37 43 0	95 58 33	1.5	.20	.07	.20	50	N	N	N
J62R1800	37 43 0	95 58 33	2.0	.30	.07	.30	70	N	N	N
J62R1830	37 43 0	95 58 33	3.0	.70	<.05	.50	100	N	N	N
J62R1850	37 43 0	95 58 33	3.0	1.00	<.05	.30	100	N	N	N
J62R1880	37 43 0	95 58 33	2.0	.20	.05	.30	50	N	N	N
J62R1910	37 43 0	95 58 33	2.0	.20	.05	.20	70	N	N	N
J62R1940	37 43 0	95 58 33	2.0	.30	.05	.30	70	N	N	N
J62R1970	37 43 0	95 58 33	1.5	.15	.05	.15	50	N	N	N
J62R2005	37 43 0	95 58 33	2.0	.20	.05	.20	50	N	N	N

TABLE 1--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 62, 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
J62R1460	100	200	2.0	N	N	10	100	30	50	7	<20	30
J62R1480	100	200	3.0	N	N	20	100	100	50	N	<20	70
J62R1500	100	200	3.0	N	N	20	100	100	30	N	<20	70
J62R1520	100	200	3.0	N	N	20	100	50	50	N	<20	70
J62R1540	100	200	3.0	N	N	20	100	50	50	N	<20	70
J62R1560	100	150	2.0	N	N	10	100	20	20	7	<20	30
J62R1590	50	70	N	N	N	7	20	10	20	N	N	20
J62R1620	70	50	N	N	N	<5	10	7	N	N	N	15
J62R1650	50	30	N	N	N	5	10	10	N	N	N	15
J62R1680	70	100	1.0	N	N	7	20	50	20	N	N	20
J62R1710	70	100	1.0	N	N	7	50	10	N	N	N	30
J62R1740	70	100	1.0	N	N	10	20	50	N	N	N	50
J62R1770	70	100	1.0	N	N	15	50	15	N	N	N	50
J62R1800	50	150	1.5	N	N	10	70	30	20	5	N	70
J62R1830	70	150	2.0	N	N	15	100	30	20	N	N	50
J62R1850	100	150	3.0	N	N	20	70	30	20	15	N	50
J62R1880	70	100	1.5	N	N	10	30	30	20	5	N	20
J62R1910	70	100	1.5	N	N	7	50	30	20	<5	N	20
J62R1940	100	100	1.0	N	N	10	50	20	N	5	N	30
J62R1970	70	70	N	N	N	7	20	10	N	5	N	15
J62R2005	70	100	1.5	N	N	10	50	50	20	5	N	20

TABLE 1--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 62, 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#
J62R1460	50	N	10	N	100	100	N	20	<200	200	N	20
J62R1480	10	N	15	N	150	150	N	20	N	150	N	20
J62R1500	15	N	20	N	150	200	N	20	N	150	N	20
J62R1520	10	N	20	N	200	200	N	20	<200	200	N	20
J62R1540	15	N	20	N	100	200	N	30	N	150	N	20
J62R1560	10	N	10	N	100	200	N	15	N	150	N	20
J62R1590	N	N	N	N	100	50	N	15	N	50	N	40
J62R1620	N	N	N	N	100	20	N	10	N	30	N	40
J62R1650	N	N	N	N	100	20	N	N	N	20	N	40
J62R1680	N	N	<5	N	100	50	N	N	N	70	N	40
J62R1710	N	N	<5	N	100	50	N	<10	N	70	N	40
J62R1740	<10	N	<5	N	100	50	N	<10	N	70	N	40
J62R1770	N	N	5	N	100	70	N	N	N	70	N	40
J62R1800	15	N	10	N	100	150	N	20	N	150	N	40
J62R1830	15	N	10	N	100	150	N	15	N	150	N	31
J62R1850	20	N	15	N	100	200	N	15	N	100	N	31
J62R1880	10	N	7	N	100	100	N	10	<200	100	N	60
J62R1910	<10	N	7	N	100	100	N	10	N	100	N	60
J62R1940	10	N	7	N	100	100	N	10	N	150	N	60
J62R1970	<10	N	N	N	100	70	N	N	500	70	N	60
J62R2005	10	N	5	N	100	100	N	<10	N	100	N	60

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 63, 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-ppm S	Ag-ppm S	As-ppm S	Au-ppm S
J63R0150	37 4 0	95 4 46	3.00	.70	.05	.500	300	N	N	N
J63R0200	37 4 0	95 4 46	3.00	.70	<.05	.500	200	N	N	N
J63R0230	37 4 0	95 4 46	5.00	.70	.05	.700	300	N	N	N
J63R0280	37 4 0	95 4 46	3.00	.70	<.05	.500	150	N	N	N
J63R0310	37 4 0	95 4 46	5.00	.20	.07	.300	50	N	N	N
J63R0350	37 4 0	95 4 46	.70	.03	.05	.050	10	N	N	N
J63R0400	37 4 0	95 4 46	.50	.05	.05	.100	15	N	N	N
J63R0455	37 4 0	95 4 46	.10	.03	.15	.020	<10	N	N	N
J63R0500	37 4 0	95 4 46	.05	<.02	<.05	.005	N	N	N	N
J63R0545	37 4 0	95 4 46	.10	.02	<.05	.015	<10	N	N	N
J63R0580	37 4 0	95 4 46	.15	.03	<.05	.030	15	N	N	N
J63R0650	37 4 0	95 4 46	.20	.10	.05	.070	20	N	N	N
J63R0700	37 4 0	95 4 46	1.50	.30	.07	.200	70	N	N	N
J63R0775	37 4 0	95 4 46	1.00	.20	.10	.150	30	N	N	N
J63R0865	37 4 0	95 4 46	.70	.15	.10	.100	20	N	N	N
J63R0925	37 4 0	95 4 46	.20	.10	.10	.050	10	N	N	N
J63R0981	37 4 0	95 4 46	1.50	.20	.15	.150	50	N	N	N
J63R1021	37 4 0	95 4 46	.70	.10	.10	.100	10	N	N	N
J63R1071	37 4 0	95 4 46	1.50	.15	.05	.150	30	N	N	N
J63R1125	37 4 0	95 4 46	1.00	.10	.07	.050	20	N	N	N
J63R1240	37 4 0	95 4 46	.20	.07	.05	.150	20	N	N	N
J63R1291	37 4 0	95 4 46	.10	.05	.05	.020	<10	N	N	N
J63R1470	37 4 0	95 4 46	.15	.03	.05	.020	<10	N	N	N

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 63, 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
J63R0150	100	200	3	N	N	50	100	50	50	N	N	100
J63R0200	100	200	3	N	N	20	150	20	50	N	N	50
J63R0230	100	200	3	N	N	20	100	20	100	N	N	70
J63R0280	100	200	3	N	N	20	150	20	50	N	N	70
J63R0310	150	100	3	N	N	20	100	30	20	N	N	70
J63R0350	30	20	N	N	N	N	N	<5	N	N	N	7
J63R0400	50	50	N	N	N	N	N	<5	N	N	N	10
J63R0455	50	50	N	N	N	N	N	<5	N	N	N	<5
J63R0500	50	<20	N	N	N	N	N	<5	N	N	N	<5
J63R0545	50	30	N	N	N	N	N	<5	N	N	N	<5
J63R0580	50	50	N	N	N	N	N	<5	N	N	N	5
J63R0650	50	70	N	N	N	N	N	<5	N	N	N	10
J63R0700	70	150	2	N	N	5	20	20	20	N	N	30
J63R0775	50	150	N	N	N	N	10	10	N	N	N	10
J63R0865	50	100	N	N	N	N	N	10	N	N	N	10
J63R0925	50	100	N	N	N	N	N	<5	N	N	N	N
J63R0981	70	70	1	N	N	5	10	10	N	30	N	15
J63R1021	50	70	N	N	N	N	10	7	N	<5	N	7
J63R1071	50	100	1	N	N	5	15	20	N	10	N	15
J63R1125	50	100	N	N	N	N	10	15	N	<5	N	10
J63R1240	20	50	N	N	N	N	N	5	N	<5	N	5
J63R1291	20	20	N	N	N	N	N	<5	N	N	N	<5
J63R1470	30	50	N	N	N	N	N	<5	N	5	N	5

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 63, 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#
J63R0150	10	N	15	N	100	150	N	30	N	150	N	20
J63R0200	10	N	15	N	100	150	N	30	200	150	N	20
J63R0230	20	N	20	N	150	200	N	50	N	200	N	20
J63R0280	10	N	15	N	100	200	N	20	N	100	N	20
J63R0310	30	N	10	N	N	100	N	50	N	70	N	40
J63R0350	N	N	N	N	N	<10	N	N	N	50	N	40
J63R0400	N	N	N	N	N	15	N	N	N	50	N	40
J63R0455	N	N	N	N	N	10	N	N	N	<10	N	40
J63R0500	N	N	N	N	N	N	N	N	N	N	N	40
J63R0545	N	N	N	N	N	N	N	N	N	<10	N	40
J63R0580	N	N	N	N	N	10	N	N	N	10	N	40
J63R0650	N	N	N	N	N	30	N	N	N	20	N	40
J63R0700	<10	N	5	N	N	70	N	10	N	150	N	60
J63R0775	N	N	N	N	N	30	N	N	N	70	N	60
J63R0865	N	N	N	N	N	20	N	N	N	50	N	60
J63R0925	N	N	N	N	N	10	50	N	N	30	N	60
J63R0981	N	N	N	N	N	30	N	N	N	50	N	60
J63R1021	N	N	N	N	N	15	N	N	N	20	N	60
J63R1071	<10	N	N	N	N	30	N	N	N	70	N	60
J63R1125	<10	N	N	N	N	30	N	N	N	50	N	60
J63R1240	N	N	N	N	N	<10	N	N	N	20	N	60
J63R1291	N	N	N	N	N	N	N	N	N	50	N	60
J63P1470	N	N	N	N	N	<10	N	N	N	10	N	60

TABLE 3--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 64, 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	Tl-pct. S	Mn-ppm S	Ag-ppm S	As-ppm S	Au-ppm S
J64R0520	37 2 15	94 44 16	.30	.07	.05	.030	15	N	N	N
J64R0530	37 2 15	94 44 16	.30	.10	.15	.030	10	N	N	N
J64R0550	37 2 15	94 44 16	.20	.10	.15	.030	10	N	N	N
J64R0570	37 2 15	94 44 16	.30	.10	.10	.015	10	N	N	N
J64R0580	37 2 15	94 44 16	.50	.10	.15	.020	20	N	N	N
J64R0590	37 2 15	94 44 16	.30	.10	.15	.020	10	N	N	N
J64R0600	37 2 15	94 44 16	.50	.15	.15	.050	15	N	N	N
J64R0610	37 2 15	94 44 16	.20	.07	.10	.015	<10	N	N	N
J64R0620	37 2 15	94 44 16	.20	.07	.10	.020	10	N	N	N
J64R0630	37 2 15	94 44 16	.30	.07	.07	.050	10	N	N	N
J64R0640	37 2 15	94 44 16	.30	.15	.10	.070	10	N	N	N
J64R0650	37 2 15	94 44 16	.20	.07	.10	.020	<10	N	N	N
J64R0660	37 2 15	94 44 16	1.00	.20	.10	.100	30	N	N	N
J64R0670	37 2 15	94 44 16	.15	.05	.10	.010	<10	N	N	N
J64R0690	37 2 15	94 44 16	.20	.10	.10	.020	10	N	N	N
J64R0710	37 2 15	94 44 16	.20	.05	.07	.007	<10	N	N	N
J64R0730	37 2 15	94 44 16	.50	.10	.07	.020	20	N	N	N
J64R0750	37 2 15	94 44 16	.15	.05	.05	.010	<10	N	N	N
J64R0765	37 2 15	94 44 16	.50	.05	.05	.015	20	N	N	N
J64R0790	37 2 15	94 44 16	.70	.10	.07	.030	10	N	N	N
J64R0810	37 2 15	94 44 16	.50	.05	.05	.015	10	N	N	N
J64R0830	37 2 15	94 44 16	1.00	.05	.07	.010	10	N	N	N
J64R0850	37 2 15	94 44 16	1.50	.10	.10	.050	70	N	N	N
J64R0870	37 2 15	94 44 16	.10	.03	.05	.015	50	N	N	N
J64R0890	37 2 15	94 44 16	.15	.05	.05	.020	20	N	N	N
J64R0910	37 2 15	94 44 16	.50	.07	.10	.015	30	N	N	N
J64R0930	37 2 15	94 44 16	.10	.03	.05	.007	10	N	N	N
J64R0950	37 2 15	94 44 16	.10	.02	<.05	.007	20	N	N	N
J64R0970	37 2 15	94 44 16	.10	.02	<.05	.007	30	N	N	N
J64R0990	37 2 15	94 44 16	.20	.05	.05	.010	20	N	N	N
J64R1010	37 2 15	94 44 16	.30	.03	.05	.015	50	N	N	N
J64R1030	37 2 15	94 44 16	.05	.03	.05	.005	10	N	N	N
J64R1050	37 2 15	94 44 16	.07	.05	.07	.007	15	N	N	N
J64R1070	37 2 15	94 44 16	.20	.05	.07	.010	50	N	N	N
J64R1094	37 2 15	94 44 16	.15	.02	.05	.005	15	N	N	N

TABLE 3--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 64, 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
J64R0520	50	200	N	N	N	N	N	5	N	<5	N	5
J64R0530	50	200	N	N	N	N	N	7	N	5	N	7
J64R0550	50	200	N	N	N	N	N	5	N	<5	N	5
J64R0570	50	70	N	N	N	N	N	7	N	5	N	10
J64R0580	50	70	N	N	N	5	N	15	N	7	N	15
J64R0590	30	70	N	N	N	<5	N	7	N	5	N	7
J64R0600	50	200	N	N	N	<5	N	10	N	10	N	10
J64R0610	50	50	N	N	N	N	N	5	N	7	N	5
J64R0620	50	50	N	N	N	N	N	5	N	5	N	5
J64R0630	50	100	N	N	N	N	N	7	N	5	N	7
J64R0640	50	100	N	N	N	5	N	10	N	7	N	10
J64R0650	50	70	N	N	N	<5	N	5	N	5	N	5
J64R0660	50	100	1.5	N	N	5	N	15	N	7	N	15
J64R0670	50	50	N	N	N	N	N	<5	N	N	N	<5
J64R0690	50	70	N	N	N	N	N	5	N	<5	N	5
J64R0710	50	50	N	N	N	N	N	<5	N	N	N	<5
J64R0730	50	70	N	N	N	N	N	7	N	5	N	7
J64R0750	50	50	N	N	N	N	N	<5	N	<5	N	<5
J64R0765	30	20	N	N	N	N	N	5	N	7	N	7
J64R0790	50	70	N	N	N	N	N	10	N	7	N	5
J64R0810	50	50	N	N	N	N	N	5	N	N	N	5
J64R0830	50	30	N	N	N	N	N	7	N	<5	N	7
J64R0850	50	70	N	N	N	5	50	10	N	5	N	15
J64R0870	30	20	N	N	N	N	N	<5	N	N	N	5
J64R0890	30	20	N	N	N	N	N	<5	N	N	N	5
J64R0910	20	50	N	N	N	N	N	10	N	5	N	10
J64R0930	20	<20	N	N	N	N	N	<5	N	N	N	<5
J64R0950	10	<20	N	N	N	N	N	<5	N	N	N	<5
J64R0970	10	20	N	N	N	N	20	<5	N	N	N	<5
J64R0990	10	20	N	N	N	N	N	<5	N	N	N	5
J64R1010	15	20	N	N	N	N	N	5	N	N	N	5
J64R1030	20	50	N	N	N	N	N	<5	N	N	N	N
J64R1050	20	30	N	N	N	N	N	<5	N	N	N	N
J64R1070	30	30	N	N	N	N	100	<5	N	10	N	<5
J64R1094	20	30	N	N	N	N	N	<5	N	N	N	<5

TABLE 3--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 64, 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#
J64R0520	N	N	N	N	N	10	N	N	N	100	N	78
J64R0530	N	N	N	N	N	10	N	N	N	30	N	78
J64R0550	N	N	N	N	N	10	N	N	N	50	N	78
J64R0570	N	N	N	N	N	<10	N	N	N	15	N	78
J64R0580	N	N	N	N	N	15	N	N	N	20	N	78
J64R0590	N	N	N	N	N	<10	N	N	N	15	N	78
J64R0600	N	N	N	N	N	20	N	N	N	50	N	78
J64R0610	N	N	N	N	N	N	N	N	N	10	N	78
J64R0620	N	N	N	N	N	N	N	N	N	15	N	78
J64R0630	N	N	N	N	N	10	N	N	N	100	N	78
J64R0640	N	N	N	N	N	20	N	N	N	70	N	78
J64R0650	N	N	N	N	N	N	N	N	N	15	N	78
J64R0660	<10	N	N	N	N	30	N	N	N	50	N	78
J64R0670	N	N	N	N	N	N	N	N	N	N	N	78
J64R0690	N	N	N	N	N	N	N	N	N	10	N	78
J64R0710	N	N	N	N	N	N	N	N	N	N	N	78
J64R0730	N	N	N	N	N	10	N	N	N	20	N	78
J64R0750	N	N	N	N	N	N	N	N	<200	N	N	78
J64R0765	N	N	N	N	N	N	N	N	20	20	N	78
J64R0790	N	N	N	N	N	10	N	N	N	15	N	78
J64R0810	N	N	N	N	N	N	N	N	N	10	N	78
J64R0830	N	N	N	N	N	N	N	N	N	N	N	78
J64R0850	N	N	N	N	N	N	N	N	N	50	N	78
J64R0870	N	N	N	N	N	N	N	N	N	10	N	78
J64R0890	<10	N	N	N	N	<10	N	N	1,000	20	N	78
J64R0910	70	N	N	N	N	<10	N	N	2,000	50	N	78
J64R0930	N	N	N	N	N	N	N	N	N	10	N	78
J64R0950	N	N	N	N	N	N	N	N	N	15	N	78
J64R0970	N	N	N	N	N	N	N	N	N	20	N	78
J64R0990	N	N	N	N	N	N	N	N	N	20	N	78
J64R1010	N	N	N	N	N	N	N	N	N	15	N	78
J64R1030	N	N	N	N	N	N	N	N	N	10	N	78
J64R1050	N	N	N	N	N	N	N	N	N	N	N	78
J64R1070	N	N	N	N	N	N	N	N	N	N	N	78
J64R1094	N	N	N	N	N	N	N	N	N	N	N	78