

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. 27, 28, and 29**

By

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

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INTRODUCTION

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

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

The analytical results for drill hole no. 27 (#3 C.R. Coombs - KGS), drill hole no. 28 (#1 Forkner - KGS), and drill hole no. 29 (#1 Harley - KGS) are given in this report. Drill hole no. 27 is located in sec. 30, T. 28 S., R. 21 E. in Neosho County, Kansas; drill hole no. 28 is located in sec. 17, T. 33 S., R. 23 E. in Cherokee County, Kansas; drill hole no. 29 is located in sec. 30, T. 31 S., R. 22 E. in Cherokee County, Kansas (fig.1). Data for the insoluble-residue samples from drill holes 27, 28, and 29 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 |

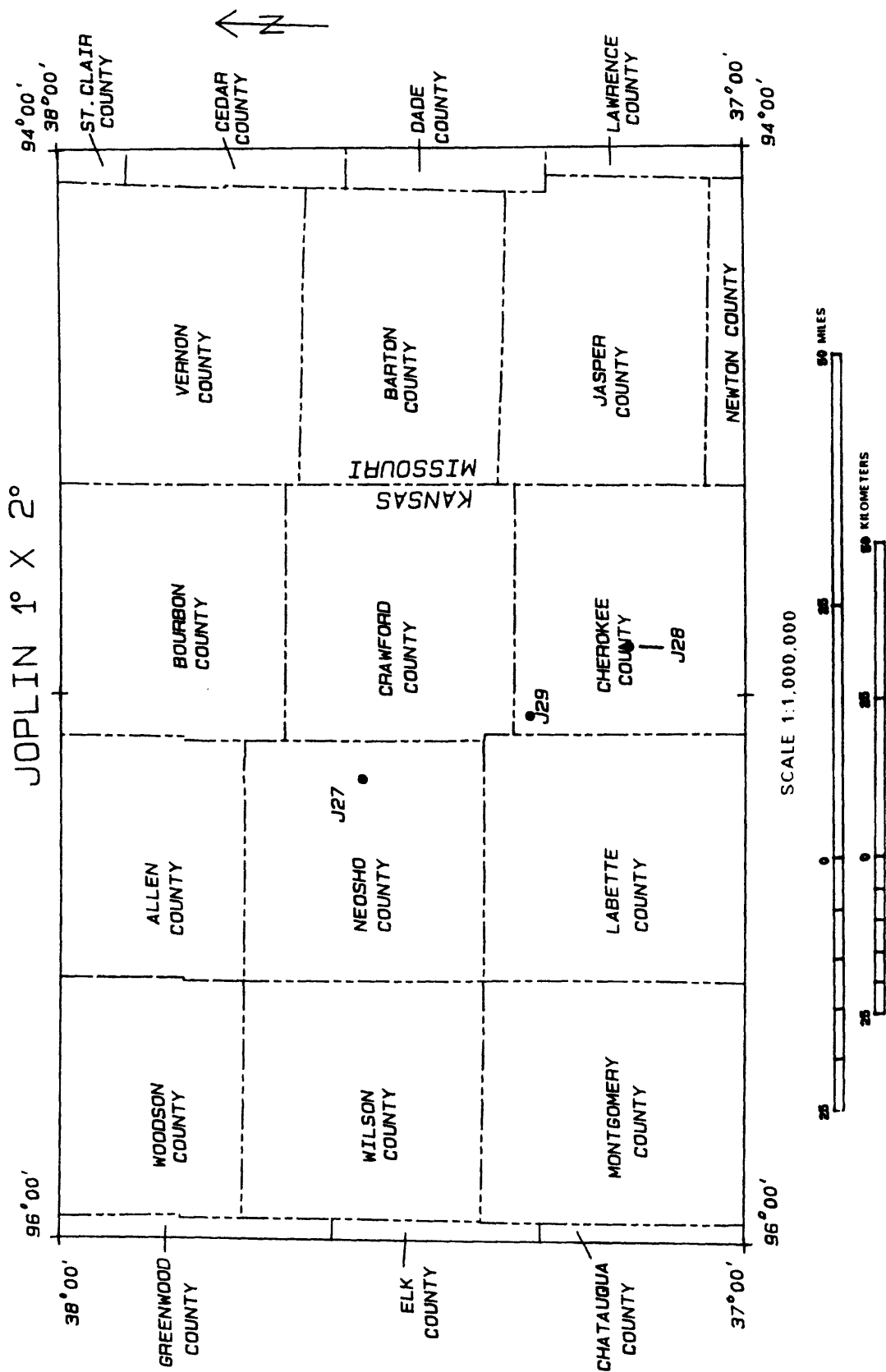


Figure 1. Locations of drill holes 27, 28, and 29, Joplin 1° x 2° quadrangle, Missouri and Kansas.

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 |
| 40 | Mississippian Undifferentiated |
| 60 | Ordovician Undifferentiated |
| 79 | Arbuckle |
| 80 | Cambrian Undifferentiated |
| 84 | Bonneterre Dolomite |
| 86 | Reagan Sandstone |
| 90 | Precambrian Undifferentiated |

EXPLANATION OF DATA

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

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

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

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

RASS

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

ACKNOWLEDGMENTS

The authors wish to thank the 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.
- 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. 27, 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 |
|----------|----------|-----------|--------------|--------------|--------------|--------------|-------------|-------------|-------------|-------------|
| J27R0710 | 37 34 50 | 94 43 0 | 5.00 | .50 | <.05 | .200 | 30 | N | N | N |
| J27R0730 | 37 34 50 | 94 43 0 | 10.00 | .10 | <.05 | .200 | 50 | N | N | N |
| J27R0750 | 37 34 50 | 94 43 0 | 1.50 | .02 | <.05 | .020 | 10 | N | N | N |
| J27R0780 | 37 34 50 | 94 43 0 | 1.50 | .02 | .05 | .020 | 10 | N | N | N |
| J27R0800 | 37 34 50 | 94 43 0 | .50 | .02 | <.05 | .010 | <10 | N | N | N |
| J27R0820 | 37 34 50 | 94 43 0 | .50 | .02 | <.05 | .005 | 20 | N | N | N |
| J27R0840 | 37 34 50 | 94 43 0 | .15 | .02 | <.05 | .003 | 10 | N | N | N |
| J27R0860 | 37 34 50 | 94 43 0 | 1.50 | .10 | <.05 | .150 | 20 | N | N | N |
| J27R0880 | 37 34 50 | 94 43 0 | 2.00 | .15 | .07 | .200 | 30 | N | N | N |
| J27R0900 | 37 34 50 | 94 43 0 | .50 | .02 | .07 | .020 | 10 | N | N | N |
| J27R0920 | 37 34 50 | 94 43 0 | 1.00 | .03 | .05 | .020 | 20 | N | N | N |
| J27R0940 | 37 34 50 | 94 43 0 | 1.50 | .03 | .05 | .030 | 30 | N | N | N |
| J27R0960 | 37 34 50 | 94 43 0 | .50 | .02 | .05 | .020 | 10 | N | N | N |
| J27R0980 | 37 34 50 | 94 43 0 | 5.00 | 1.00 | .07 | .500 | 50 | N | N | N |
| J27R1000 | 37 34 50 | 94 43 0 | 7.00 | 1.00 | <.05 | .500 | 50 | N | N | N |
| J27R1040 | 37 34 50 | 94 43 0 | 10.00 | 1.00 | <.05 | .500 | 100 | N | N | N |
| J27R1060 | 37 34 50 | 94 43 0 | 1.00 | .20 | .05 | .100 | 30 | N | N | N |
| J27R1080 | 37 34 50 | 94 43 0 | .70 | .10 | .05 | .050 | <10 | N | N | N |
| J27R1100 | 37 34 50 | 94 43 0 | 1.00 | .05 | .05 | .020 | N | N | N | N |
| J27R1120 | 37 34 50 | 94 43 0 | .70 | .10 | .10 | .015 | N | N | N | N |
| J27R1160 | 37 34 50 | 94 43 0 | .10 | .02 | .05 | .005 | N | N | N | N |
| J27R1190 | 37 34 50 | 94 43 0 | .30 | .02 | .05 | .007 | N | N | N | N |
| J27R1230 | 37 34 50 | 94 43 0 | .50 | .03 | .05 | .010 | N | N | N | N |
| J27R1270 | 37 34 50 | 94 43 0 | .07 | .02 | <.05 | .005 | 10 | N | N | N |
| J27R1310 | 37 34 50 | 94 43 0 | .50 | .07 | .05 | .015 | 10 | N | N | N |
| J27R1350 | 37 34 50 | 94 43 0 | .10 | .02 | <.05 | .002 | N | N | N | N |
| J27R1390 | 37 34 50 | 94 43 0 | 1.00 | .05 | .05 | .015 | <10 | N | N | N |
| J27R1430 | 37 34 50 | 94 43 0 | .70 | .03 | <.05 | .003 | <10 | N | N | N |
| J27R1470 | 37 34 50 | 94 43 0 | .50 | .05 | .05 | .007 | 20 | N | N | N |
| J27R1530 | 37 34 50 | 94 43 0 | .05 | .03 | .05 | .005 | <10 | N | N | N |
| J27R1590 | 37 34 50 | 94 43 0 | .15 | .07 | .07 | .005 | <10 | N | N | N |
| J27R1640 | 37 34 50 | 94 43 0 | .15 | .02 | .05 | .003 | <10 | N | N | N |
| J27R1665 | 37 34 50 | 94 43 0 | 1.50 | .05 | .07 | .015 | 20 | N | N | N |

TABLE 1--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 27, 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 |
|----------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| J27R0710 | 30 | 70 | N | N | N | 10 | 70 | 10 | N | N | N | 30 |
| J27R0730 | 50 | 30 | N | N | N | 5 | 70 | 30 | 30 | N | N | 50 |
| J27R0750 | 20 | 20 | N | N | N | N | N | 10 | N | N | N | 15 |
| J27R0780 | 30 | 20 | N | N | N | N | N | 5 | N | N | N | 20 |
| J27R0800 | 30 | <20 | N | N | N | N | N | <5 | N | N | N | 10 |
| J27R0820 | 50 | <20 | N | N | N | N | N | <5 | N | N | N | 10 |
| J27R0840 | 30 | <20 | N | N | N | N | N | <5 | N | N | N | 7 |
| J27R0860 | 30 | 50 | N | N | N | 5 | 30 | 70 | 30 | N | N | 30 |
| J27R0880 | 50 | 70 | N | N | N | 7 | 50 | 150 | 50 | N | N | 50 |
| J27R0900 | 20 | 20 | N | N | N | N | N | <5 | N | N | N | 15 |
| J27R0920 | 30 | 20 | N | N | N | 5 | N | 5 | N | N | N | 20 |
| J27R0940 | 30 | 20 | N | N | N | N | N | 30 | N | N | N | 20 |
| J27R0960 | 20 | 20 | N | N | N | N | N | 7 | N | N | N | 10 |
| J27R0980 | 50 | 300 | 1.5 | N | N | 10 | 100 | 50 | 30 | N | <20 | 50 |
| J27R1000 | 70 | 200 | 1.5 | N | N | 15 | 100 | 50 | 20 | N | <20 | 70 |
| J27R1040 | 70 | 700 | 3.0 | N | N | 20 | 100 | 70 | 20 | 30 | <20 | 100 |
| J27R1060 | 30 | 100 | N | N | N | N | 20 | 10 | N | N | N | 20 |
| J27R1080 | 20 | 30 | N | N | N | N | N | 5 | N | N | N | 10 |
| J27R1100 | 30 | 30 | N | N | N | N | N | 7 | N | N | N | 15 |
| J27R1120 | 30 | 50 | N | N | N | N | N | 7 | N | N | N | 10 |
| J27R1160 | 30 | 30 | N | N | N | N | N | <5 | N | N | N | 5 |
| J27R1190 | 30 | 30 | N | N | N | N | N | 5 | N | N | N | 5 |
| J27R1230 | 30 | 30 | N | N | N | N | N | 5 | N | N | N | 5 |
| J27R1270 | 15 | <20 | N | N | N | N | N | <5 | N | N | N | 5 |
| J27R1310 | 20 | 20 | N | N | N | N | N | 7 | N | N | N | 10 |
| J27R1350 | 15 | N | N | N | N | N | N | <5 | N | N | N | 5 |
| J27R1390 | 20 | 30 | N | N | N | N | N | 5 | N | N | N | 10 |
| J27R1430 | 10 | N | N | N | N | N | N | 5 | N | N | N | 10 |
| J27R1470 | 10 | <20 | N | N | N | N | N | <5 | N | N | N | 7 |
| J27R1530 | 15 | <20 | N | N | N | N | N | <5 | N | N | N | 5 |
| J27R1590 | 15 | <20 | N | N | N | N | N | <5 | N | N | N | 5 |
| J27R1640 | 15 | <20 | N | N | N | N | N | <5 | N | N | N | 5 |
| J27R1665 | 15 | 20 | N | N | N | N | N | 10 | N | 5 | N | 10 |

TABLE 1--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 27, 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.# |
|----------|-------------|-------------|-------------|-------------|-------------|------------|------------|------------|-------------|-------------|-------------|--------|
| J27R0710 | 10 | N | 10 | N | N | 150 | N | 15 | N | 100 | N | 40 |
| J27R0730 | 10 | N | 5 | N | N | 70 | N | 20 | N | 50 | N | 40 |
| J27R0750 | N | N | N | N | N | 10 | <50 | N | N | 20 | N | 40 |
| J27R0780 | N | N | N | N | N | 10 | <50 | N | N | 10 | N | 40 |
| J27R0800 | N | N | N | N | N | N | <50 | N | N | 30 | N | 40 |
| J27R0820 | N | N | N | N | N | N | <50 | N | N | N | N | 40 |
| J27R0840 | N | N | N | N | N | N | <50 | N | N | N | N | 40 |
| J27R0860 | <10 | N | 5 | N | 100 | 70 | N | 10 | N | 50 | N | 40 |
| J27R0880 | <10 | N | 5 | N | 200 | 100 | N | <10 | N | 70 | N | 40 |
| J27R0900 | N | N | N | N | N | <10 | N | N | N | 20 | N | 40 |
| J27R0920 | N | N | N | N | N | 10 | N | N | N | 20 | N | 40 |
| J27R0940 | N | N | N | N | N | 10 | N | N | N | 20 | N | 40 |
| J27R0960 | N | N | N | N | N | <10 | <50 | N | N | 10 | N | 40 |
| J27R0980 | 20 | N | 15 | N | N | 200 | N | 20 | N | 300 | N | 40 |
| J27R1000 | 30 | N | 15 | N | N | 500 | 50 | 20 | N | 200 | N | 79 |
| J27R1040 | 50 | N | 15 | N | N | 500 | N | 15 | N | 200 | N | 79 |
| J27R1060 | 10 | N | <5 | N | N | 100 | N | N | N | 50 | N | 79 |
| J27R1080 | N | N | N | N | N | 30 | N | N | N | 30 | N | 79 |
| J27R1100 | N | N | N | N | N | <10 | N | N | N | 20 | N | 79 |
| J27R1120 | N | N | N | N | N | N | <50 | N | N | 15 | N | 79 |
| J27R1160 | N | N | N | N | N | N | N | N | N | N | N | 79 |
| J27R1190 | N | N | N | N | N | N | N | N | N | 10 | N | 79 |
| J27R1230 | N | N | N | N | N | N | N | N | N | 10 | N | 79 |
| J27R1270 | N | N | N | N | N | N | N | N | N | <10 | N | 79 |
| J27R1310 | N | N | N | N | N | <10 | N | N | N | 10 | N | 79 |
| J27R1350 | N | N | N | N | N | N | N | N | N | N | N | 79 |
| J27R1390 | N | N | N | N | N | N | N | N | N | 30 | N | 79 |
| J27R1430 | N | N | N | N | N | N | N | N | N | 20 | N | 79 |
| J27R1470 | N | N | N | N | N | N | N | N | N | 15 | N | 79 |
| J27R1530 | N | N | N | N | N | N | N | N | N | N | N | 79 |
| J27R1590 | N | N | N | N | N | N | 70 | N | N | N | N | 79 |
| J27R1640 | N | N | N | N | N | N | N | N | N | N | N | 79 |
| J27R1665 | N | N | N | N | N | N | N | N | N | 50 | N | 79 |

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 28, 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 |
|----------|----------|-----------|--------------|--------------|--------------|--------------|-------------|-------------|-------------|-------------|
| J28R0055 | 37 10 14 | 94 54 47 | .70 | .10 | <.05 | .200 | 50 | N | N | N |
| J28R0310 | 37 10 14 | 94 54 47 | 3.00 | 1.00 | <.05 | .700 | 100 | N | N | N |
| J28R0326 | 37 10 14 | 94 54 47 | 5.00 | .20 | .05 | .300 | 50 | N | N | N |
| J28R0338 | 37 10 14 | 94 54 47 | 1.00 | .02 | .05 | .020 | <10 | N | N | N |
| J28R0355 | 37 10 14 | 94 54 47 | .30 | .02 | .05 | .015 | <10 | N | N | N |
| J28R0366 | 37 10 14 | 94 54 47 | .10 | <.02 | <.05 | .010 | <10 | N | N | N |
| J28R0372 | 37 10 14 | 94 54 47 | .10 | <.02 | <.05 | .010 | <10 | N | N | N |
| J28R0390 | 37 10 14 | 94 54 47 | .20 | .02 | .05 | .020 | <10 | N | N | N |
| J28R0402 | 37 10 14 | 94 54 47 | .07 | <.02 | <.05 | .003 | <10 | N | N | N |
| J28R0415 | 37 10 14 | 94 54 47 | .05 | <.02 | <.05 | .007 | N | N | N | N |
| J28R0429 | 37 10 14 | 94 54 47 | .07 | <.02 | <.05 | .010 | N | N | N | N |
| J28R0452 | 37 10 14 | 94 54 47 | .10 | <.02 | <.05 | .010 | N | N | N | N |
| J28R0480 | 37 10 14 | 94 54 47 | .15 | .02 | <.05 | .010 | N | N | N | N |
| J28R0497 | 37 10 14 | 94 54 47 | .07 | <.02 | <.05 | .003 | N | N | N | N |
| J28R0522 | 37 10 14 | 94 54 47 | .10 | <.02 | <.05 | .002 | N | N | N | N |
| J28R0540 | 37 10 14 | 94 54 47 | .10 | <.02 | <.05 | .005 | N | N | N | N |
| J28R0557 | 37 10 14 | 94 54 47 | .50 | .02 | .05 | .015 | 30 | N | N | N |
| J28R0580 | 37 10 14 | 94 54 47 | .15 | .02 | <.05 | .030 | <10 | N | N | N |
| J28R0601 | 37 10 14 | 94 54 47 | .30 | .05 | <.05 | .030 | 15 | N | N | N |
| J28R0615 | 37 10 14 | 94 54 47 | .20 | .05 | <.05 | .020 | 10 | N | N | N |
| J28R0651 | 37 10 14 | 94 54 47 | 1.00 | .07 | .10 | .020 | 50 | N | N | N |
| J28R0670 | 37 10 14 | 94 54 47 | 1.50 | .05 | .10 | .050 | 30 | N | N | N |
| J28R0705 | 37 10 14 | 94 54 47 | 3.00 | .10 | .05 | .100 | 50 | N | N | N |
| J28R0715 | 37 10 14 | 94 54 47 | 1.00 | .15 | .05 | .050 | <10 | N | N | N |
| J28R0737 | 37 10 14 | 94 54 47 | 1.00 | .10 | .05 | .050 | <10 | N | N | N |
| J28R0762 | 37 10 14 | 94 54 47 | .50 | .05 | <.05 | .020 | <10 | N | N | N |
| J28R0779 | 37 10 14 | 94 54 47 | 1.50 | .10 | <.05 | .050 | 10 | N | N | N |
| J28R0800 | 37 10 14 | 94 54 47 | 2.00 | .07 | .05 | .030 | <10 | N | N | N |
| J28R0810 | 37 10 14 | 94 54 47 | 1.00 | .03 | .05 | .020 | 10 | N | N | N |
| J28R0817 | 37 10 14 | 94 54 47 | 1.00 | .07 | .10 | .020 | 10 | N | N | N |
| J28R0832 | 37 10 14 | 94 54 47 | 1.00 | .05 | <.05 | .030 | <10 | N | N | N |
| J28R0849 | 37 10 14 | 94 54 47 | 1.50 | .05 | <.05 | .020 | <10 | N | N | N |
| J28R0870 | 37 10 14 | 94 54 47 | .50 | .02 | <.05 | .010 | <10 | N | N | N |
| J28R0888 | 37 10 14 | 94 54 47 | .10 | <.02 | <.05 | .007 | N | N | N | N |
| J28R0910 | 37 10 14 | 94 54 47 | .30 | .07 | .05 | .030 | 10 | N | N | N |
| J28R0928 | 37 10 14 | 94 54 47 | .50 | .07 | <.05 | .030 | 10 | N | N | N |
| J28R0941 | 37 10 14 | 94 54 47 | .20 | .03 | .05 | .007 | <10 | N | N | N |
| J28R0960 | 37 10 14 | 94 54 47 | .30 | .02 | <.05 | .007 | <10 | N | N | N |
| J28R0976 | 37 10 14 | 94 54 47 | .20 | .02 | <.05 | .020 | <10 | N | N | N |
| J28R0987 | 37 10 14 | 94 54 47 | .50 | .03 | .05 | .015 | <10 | N | N | N |
| J28R1004 | 37 10 14 | 94 54 47 | .50 | .02 | <.05 | .010 | <10 | N | N | N |
| J28R1024 | 37 10 14 | 94 54 47 | .50 | .02 | <.05 | .010 | <10 | N | N | N |
| J28R1041 | 37 10 14 | 94 54 47 | | | <.05 | .010 | <10 | N | N | N |
| J28R1052 | 37 10 14 | 94 54 47 | 1.00 | .03 | <.05 | .020 | <10 | N | N | N |
| J28R1062 | 37 10 14 | 94 54 47 | 2.00 | .03 | <.05 | .020 | 10 | N | N | N |

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 28, 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 |
|----------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| J28R0055 | 20 | 50 | N | N | N | N | 10 | <5 | N | N | N | 5 |
| J28R0310 | 70 | 500 | 2.0 | N | N | 10 | 150 | 30 | 50 | N | <20 | 50 |
| J28R0326 | 50 | 70 | 1.0 | N | N | 10 | 70 | 20 | 20 | N | N | 30 |
| J28R0338 | 20 | 20 | N | N | N | N | N | <5 | N | N | N | 10 |
| J2PR0355 | 15 | 20 | N | N | N | N | N | <5 | N | N | N | 7 |
| J28R0366 | 15 | <20 | N | N | N | N | N | <5 | N | N | N | 5 |
| J28R0372 | 15 | <20 | N | N | N | N | N | <5 | N | N | N | 5 |
| J28R0390 | 15 | 20 | N | N | N | N | N | <5 | N | N | N | 7 |
| J28R0402 | 15 | <20 | N | N | N | N | N | <5 | N | N | N | 5 |
| J28R0415 | 30 | <20 | N | N | N | N | N | <5 | N | N | N | <5 |
| J28R0429 | 30 | <20 | N | N | N | N | N | <5 | N | N | N | <5 |
| J28R0452 | 30 | <20 | N | N | N | N | N | <5 | N | N | N | 5 |
| J28R0480 | 30 | <20 | N | N | N | N | N | <5 | N | N | N | <5 |
| J28R0497 | 20 | <20 | N | N | N | N | N | <5 | N | N | N | <5 |
| J28R0522 | 30 | <20 | N | N | N | N | N | <5 | N | N | N | <5 |
| J28R0540 | 30 | <20 | N | N | N | N | N | <5 | N | N | N | <5 |
| J28R0557 | 30 | <20 | N | N | N | N | N | <5 | N | N | N | 5 |
| J28R0580 | 20 | <20 | N | N | N | N | N | <5 | N | N | N | <5 |
| J28R0601 | 30 | 20 | N | N | N | N | N | <5 | N | N | N | 5 |
| J28R0615 | 30 | 20 | N | N | N | N | N | <5 | N | N | N | 5 |
| J28R0651 | 30 | 30 | N | N | N | 20 | N | 5 | N | N | N | 200 |
| J28R0670 | 20 | 50 | N | N | N | 7 | N | 15 | N | N | N | 50 |
| J28R0705 | 30 | 70 | N | N | N | 10 | 10 | 20 | N | 5 | N | 30 |
| J28R0715 | 30 | 70 | N | N | N | N | N | 5 | N | N | N | 7 |
| J28R0737 | 30 | 70 | N | N | N | N | N | 15 | N | N | N | 10 |
| J28R0762 | 30 | 50 | N | N | N | N | N | 5 | N | N | N | <5 |
| J28R0779 | 30 | 70 | N | N | N | N | N | 10 | N | N | N | 15 |
| J28R0800 | 30 | 150 | N | N | N | N | N | 15 | N | N | N | 10 |
| J28R0810 | 30 | 70 | N | N | N | N | N | 7 | N | N | N | 5 |
| J28R0817 | 30 | 30 | N | N | N | N | N | 7 | N | N | N | 5 |
| J28R0832 | 30 | 30 | N | N | N | N | N | 7 | N | N | N | 7 |
| J28R0849 | 30 | 30 | N | N | N | N | N | 10 | N | N | N | 7 |
| J28R0870 | 20 | 20 | N | N | N | N | N | 5 | N | N | N | 7 |
| J28R0888 | 30 | 30 | N | N | N | N | N | <5 | N | N | N | 5 |
| J28R0910 | 30 | 50 | N | N | N | N | N | 5 | N | N | N | 5 |
| J28R0928 | 20 | 50 | N | N | N | N | N | 10 | N | N | N | 10 |
| J28R0941 | 20 | 50 | N | N | N | N | N | <5 | N | N | N | 5 |
| J28R0960 | 30 | 50 | N | N | N | N | N | 7 | N | N | N | 7 |
| J28R0976 | 30 | 30 | N | N | N | N | N | <5 | N | N | N | 5 |
| J28R0987 | 30 | 30 | N | N | N | N | N | 5 | N | N | N | 7 |
| J28R1004 | 20 | 20 | N | N | N | N | N | <5 | N | N | N | 5 |
| J28R1024 | 20 | 30 | N | N | N | N | N | 10 | N | N | N | 5 |
| J28R1041 | 20 | 30 | N | N | N | N | N | 5 | N | N | N | 5 |
| J28R1052 | 20 | 30 | N | N | N | N | N | 10 | N | N | N | 5 |
| J28R1062 | 20 | 30 | N | N | N | N | N | 20 | N | N | N | 10 |

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 28, 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.# |
|----------|-------------|-------------|-------------|-------------|-------------|------------|------------|------------|-------------|-------------|-------------|--------|
| J28R0055 | N | N | N | N | N | 20 | N | N | N | 150 | N | 20 |
| J28R0310 | 20 | N | 20 | N | 100 | 300 | N | 30 | N | 200 | N | 20 |
| J28R0326 | 15 | N | 7 | N | N | 100 | N | 30 | N | 100 | N | 40 |
| J28R0338 | N | N | N | N | N | 15 | N | N | N | 20 | N | 40 |
| J28R0355 | N | N | N | N | N | <10 | N | N | N | <10 | N | 40 |
| J28R0366 | N | N | N | N | N | N | N | N | N | N | N | 40 |
| J28R0372 | N | N | N | N | N | N | N | N | N | 10 | N | 40 |
| J28R0390 | N | N | N | N | N | N | N | N | N | 10 | N | 40 |
| J28R0402 | N | N | N | N | N | N | N | N | N | N | N | 40 |
| J28R0415 | N | N | N | N | N | N | N | N | N | N | N | 40 |
| J28R0429 | N | N | N | N | N | N | N | N | N | N | N | 40 |
| J28R0452 | 10 | N | N | N | N | N | N | N | N | N | N | 40 |
| J28R0480 | 100 | N | N | N | N | N | N | N | N | N | N | 40 |
| J28R0497 | N | N | N | N | N | N | N | N | N | N | N | 40 |
| J28R0522 | N | N | N | N | N | N | N | N | N | N | N | 40 |
| J28R0540 | N | N | N | N | N | N | N | N | N | N | N | 40 |
| J28R0557 | N | N | N | N | N | <10 | N | N | 700 | 200 | N | 40 |
| J28R0580 | N | N | N | N | N | 10 | N | N | N | 15 | N | 40 |
| J28R0601 | N | N | N | N | N | 10 | N | N | N | 10 | N | 40 |
| J28R0615 | N | N | N | N | N | <10 | N | N | N | 10 | N | 40 |
| J28R0651 | N | N | N | N | N | 15 | N | N | N | 10 | N | 40 |
| J28R0670 | 10 | N | N | N | N | 20 | N | N | N | 50 | N | 79 |
| J28R0705 | N | N | N | N | N | 10 | N | N | N | 20 | N | 79 |
| J28R0715 | N | N | N | N | N | 10 | N | N | N | 30 | N | 79 |
| J28R0737 | N | N | N | N | N | N | N | N | N | N | N | 79 |
| J28R0762 | N | N | N | N | N | N | N | N | N | 10 | N | 79 |
| J28R0779 | N | N | N | N | N | 30 | N | N | N | 30 | N | 79 |
| J28R0800 | N | N | N | N | N | 15 | N | N | N | 150 | N | 79 |
| J28R0810 | N | N | N | N | N | N | N | N | N | 20 | N | 79 |
| J28R0817 | N | N | N | N | N | N | N | N | N | N | N | 79 |
| J28R0832 | N | N | N | N | N | N | N | N | N | 10 | N | 79 |
| J28R0849 | N | N | N | N | N | N | N | N | N | 15 | N | 79 |
| J28R0870 | N | N | N | N | N | N | N | N | N | <10 | N | 79 |
| J28R0888 | N | N | N | N | N | N | N | N | N | N | N | 79 |
| J28R0910 | N | N | N | N | N | 10 | N | N | N | 20 | N | 79 |
| J28R0928 | N | N | N | N | N | 10 | N | N | N | 20 | N | 79 |
| J28R0941 | N | N | N | N | N | N | N | N | N | N | N | 79 |
| J28R0960 | N | N | N | N | N | N | N | N | N | N | N | 79 |
| J28R0976 | N | N | N | N | N | N | N | N | N | N | N | 79 |
| J28R0987 | N | N | N | N | N | N | N | N | N | N | N | 79 |
| J28R1004 | N | N | N | N | N | N | N | N | N | 10 | N | 79 |
| J28R1024 | N | N | N | N | N | N | N | N | N | <10 | N | 79 |
| J28R1041 | N | N | N | N | N | N | N | N | N | <10 | N | 79 |
| J28R1052 | N | N | N | N | N | N | N | N | N | <10 | N | 79 |
| J28R1062 | N | N | N | N | N | N | N | N | N | 20 | N | 79 |

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 28, 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 |
|----------|----------|-----------|--------------|--------------|--------------|--------------|-------------|-------------|-------------|-------------|
| J28R1075 | 37 10 14 | 94 54 47 | .70 | .02 | .05 | .010 | <10 | N | N | N |
| J28R1090 | 37 10 14 | 94 54 47 | .30 | .02 | <.05 | .007 | <10 | N | N | N |
| J28R1107 | 37 10 14 | 94 54 47 | .50 | .02 | <.05 | .007 | <10 | N | N | N |
| J28R1125 | 37 10 14 | 94 54 47 | .15 | .02 | <.05 | .007 | <10 | N | N | N |
| J28R1141 | 37 10 14 | 94 54 47 | .20 | .02 | <.05 | .010 | <10 | N | N | N |
| J28R1189 | 37 10 14 | 94 54 47 | .10 | .02 | <.05 | .007 | <10 | N | N | N |
| J28R1208 | 37 10 14 | 94 54 47 | .07 | <.02 | <.05 | .007 | <10 | N | N | N |
| J28R1224 | 37 10 14 | 94 54 47 | .70 | .02 | <.05 | .050 | 30 | N | N | N |
| J28R1250 | 37 10 14 | 94 54 47 | 3.00 | .05 | <.05 | .150 | 1,500 | N | N | N |
| J28R1287 | 37 10 14 | 94 54 47 | 1.00 | .02 | <.05 | .070 | 1,000 | N | N | N |
| J28R1299 | 37 10 14 | 94 54 47 | 1.50 | .02 | <.05 | .150 | 300 | N | N | N |
| J28R1328 | 37 10 14 | 94 54 47 | 1.00 | .02 | <.05 | .200 | 300 | N | N | N |
| J28R1337 | 37 10 14 | 94 54 47 | 1.00 | .02 | <.05 | .050 | 200 | N | N | N |
| J28R1360 | 37 10 14 | 94 54 47 | 1.00 | .02 | <.05 | .050 | 300 | N | N | N |
| J28R1380 | 37 10 14 | 94 54 47 | 1.50 | .03 | <.05 | .100 | 100 | N | N | N |
| J28R1402 | 37 10 14 | 94 54 47 | .05 | .02 | <.05 | .010 | <10 | N | N | N |
| J28R1431 | 37 10 14 | 94 54 47 | .10 | .02 | <.05 | .020 | <10 | N | N | N |
| J28R1455 | 37 10 14 | 94 54 47 | .15 | .02 | <.05 | .020 | <10 | N | N | N |
| J28R1471 | 37 10 14 | 94 54 47 | .10 | .02 | <.05 | .005 | <10 | N | N | N |
| J28R1490 | 37 10 14 | 94 54 47 | .15 | .02 | <.05 | .005 | <10 | N | N | N |
| J28R1508 | 37 10 14 | 94 54 47 | .30 | .03 | .05 | .020 | 10 | N | N | N |
| J28R1542 | 37 10 14 | 94 54 47 | 1.00 | .10 | .20 | .100 | 30 | N | N | N |
| J28R1558 | 37 10 14 | 94 54 47 | 2.00 | .07 | .07 | .150 | 1,500 | N | N | N |
| J28R1573 | 37 10 14 | 94 54 47 | 2.00 | .10 | .10 | .150 | 700 | N | N | N |
| J28R1611 | 37 10 14 | 94 54 47 | 2.00 | .10 | .05 | .100 | 100 | N | N | N |
| J28R1635 | 37 10 14 | 94 54 47 | 5.00 | .20 | .07 | .200 | 70 | N | N | N |
| J28R1650 | 37 10 14 | 94 54 47 | 5.00 | 1.00 | .07 | .500 | 50 | N | N | N |
| J28R1668 | 37 10 14 | 94 54 47 | 7.00 | .70 | .05 | .500 | 50 | N | N | N |
| J28R1691 | 37 10 14 | 94 54 47 | 3.00 | .50 | <.05 | .300 | 30 | N | N | N |
| J28R1714 | 37 10 14 | 94 54 47 | 3.00 | .70 | .05 | .500 | 30 | N | N | N |
| J28R1730 | 37 10 14 | 94 54 47 | 2.00 | .50 | <.05 | .300 | 20 | N | N | N |
| J28R1755 | 37 10 14 | 94 54 47 | 1.50 | .50 | <.05 | .300 | 20 | N | N | N |
| J28R1780 | 37 10 14 | 94 54 47 | 1.00 | .20 | <.05 | .150 | 15 | N | N | N |
| J28R1806 | 37 10 14 | 94 54 47 | 2.00 | .20 | <.05 | .200 | 30 | N | N | N |
| J28R1818 | 37 10 14 | 94 54 47 | .20 | .05 | <.05 | .050 | 15 | N | N | N |
| J28R1829 | 37 10 14 | 94 54 47 | .10 | .02 | <.05 | .020 | 15 | N | N | N |
| J28R1842 | 37 10 14 | 94 54 47 | 1.00 | .02 | <.05 | .020 | 20 | N | N | N |
| J28R1862 | 37 10 14 | 94 54 47 | .20 | .02 | <.05 | .020 | 10 | N | N | N |

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 28, JOPLIN 1 x 2 QUADRANGLE,
MISSOURI AND KANSAS.--Continued

| Sample | B-ppm S | Ba-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 |
|----------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| J28R1075 | 20 | 20 | N | N | N | N | N | 10 | N | N | N | 5 |
| J28R1090 | 15 | <20 | N | N | N | N | N | 5 | N | N | N | 5 |
| J28R1107 | 15 | 30 | N | N | N | N | N | 7 | N | N | N | 7 |
| J28R1125 | 20 | 50 | N | N | N | N | N | <5 | N | N | N | 5 |
| J28R1141 | 20 | 30 | N | N | N | N | N | <5 | N | N | N | 5 |
| J28R1189 | 20 | 50 | N | N | N | N | N | <5 | N | N | N | <5 |
| J28R1208 | 10 | 20 | N | N | N | N | N | <5 | N | N | N | <5 |
| J28R1224 | 15 | 20 | N | N | N | N | N | 5 | N | N | N | 10 |
| J28R1250 | 20 | 150 | N | N | N | 20 | 70 | 10 | N | N | N | 15 |
| J28R1287 | 20 | 70 | N | N | N | 10 | N | 5 | N | N | N | 7 |
| J28R1299 | 30 | 70 | N | N | N | 5 | N | <5 | N | N | N | 5 |
| J28R1328 | 30 | 50 | N | N | N | 7 | N | <5 | N | N | N | <5 |
| J28R1337 | 30 | 100 | N | N | N | N | N | <5 | N | N | N | <5 |
| J28R1360 | 20 | 70 | N | N | N | 5 | N | <5 | N | N | N | 5 |
| J28R1380 | 20 | 300 | N | N | N | <5 | N | 7 | N | N | N | 7 |
| J28R1402 | 10 | 20 | N | N | N | N | N | <5 | N | N | N | <5 |
| J28R1431 | 15 | 20 | N | N | N | N | N | <5 | N | N | N | <5 |
| J28R1455 | 15 | 30 | N | N | N | N | N | 5 | N | N | N | <5 |
| J28R1471 | 15 | 50 | N | N | N | N | N | 7 | N | N | N | <5 |
| J28R1490 | 10 | 20 | N | N | N | N | N | 15 | N | N | N | <5 |
| J28R1508 | 30 | 30 | N | N | N | N | N | 10 | N | N | N | <5 |
| J28R1542 | 20 | 70 | N | N | N | N | N | 20 | N | 5 | N | 10 |
| J28R1558 | 30 | 150 | N | N | N | 10 | N | 20 | 20 | 5 | N | 10 |
| J28R1573 | 30 | 100 | N | N | N | 5 | 15 | 20 | 30 | 5 | N | 10 |
| J28R1611 | 20 | 100 | N | N | N | 5 | 10 | 30 | N | 10 | N | 20 |
| J28R1635 | 20 | 150 | N | N | N | 7 | 20 | 100 | N | 30 | N | 50 |
| J28R1650 | 30 | 700 | 2.0 | N | N | 7 | 50 | 70 | 50 | 15 | <20 | 30 |
| J28R1668 | 30 | 700 | 2.0 | N | N | 7 | 50 | 70 | 50 | 20 | <20 | 30 |
| J28R1691 | 20 | 1,000 | 1.5 | N | N | 7 | 30 | 50 | 30 | 15 | <20 | 20 |
| J28R1714 | 20 | 1,000 | 1.5 | N | N | 7 | 30 | 50 | 50 | 7 | <20 | 20 |
| J28R1730 | 20 | 1,000 | 1.0 | N | N | 7 | 30 | 20 | 50 | 7 | <20 | 15 |
| J28R1755 | 20 | 1,000 | 1.5 | N | N | 5 | 20 | 15 | 50 | 5 | <20 | 10 |
| J28R1780 | 15 | 1,000 | 1.0 | N | N | 5 | 10 | 10 | 30 | N | <20 | 5 |
| J28R1806 | 20 | 1,000 | 3.0 | N | N | 7 | N | 50 | 30 | N | N | 5 |
| J28R1818 | 10 | 100 | N | N | N | N | N | <5 | N | N | N | <5 |
| J28R1829 | 10 | 50 | N | N | N | N | N | <5 | N | N | N | N |
| J28R1842 | 10 | 20 | N | N | N | 7 | N | 5 | N | N | N | 5 |
| J28R1862 | 10 | 50 | N | N | N | N | N | <5 | N | N | N | N |

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 28, 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.# |
|----------|-------------|-------------|-------------|-------------|-------------|------------|------------|------------|-------------|-------------|-------------|--------|
| J28R1075 | N | N | N | N | N | N | N | N | N | 10 | N | 79 |
| J28R1090 | N | N | N | N | N | N | N | N | N | N | N | 79 |
| J28R1107 | N | N | N | N | N | N | N | N | N | <10 | N | 79 |
| J28R1125 | N | N | N | N | N | N | N | N | N | 20 | N | 79 |
| J28R1141 | N | N | N | N | N | N | N | N | N | 50 | N | 79 |
| J28R1189 | N | N | N | N | N | N | N | N | N | <10 | N | 79 |
| J28R1208 | N | N | N | N | N | N | N | N | N | 20 | N | 79 |
| J28R1224 | N | N | N | N | N | N | N | N | N | 50 | N | 79 |
| J28R1250 | N | N | N | N | N | 30 | N | 10 | N | 200 | N | 79 |
| J28R1287 | N | N | N | N | N | 10 | N | N | N | 50 | N | 79 |
| J28R1299 | N | N | N | N | N | 15 | N | N | N | 100 | N | 79 |
| J28R1328 | N | N | N | N | N | 10 | N | N | N | 200 | N | 79 |
| J28R1337 | N | N | N | N | N | 10 | N | N | N | 150 | N | 79 |
| J28R1360 | N | N | N | N | N | <10 | N | N | N | 30 | N | 79 |
| J28R1380 | N | N | N | N | N | 20 | N | N | N | 200 | N | 79 |
| J28R1402 | N | N | N | N | N | N | N | N | N | 100 | N | 79 |
| J28R1431 | N | N | N | N | N | N | N | N | N | 100 | N | 79 |
| J28R1455 | N | N | N | N | N | N | N | N | N | 50 | N | 79 |
| J28R1471 | N | N | N | N | N | N | N | N | N | N | N | 79 |
| J28R1490 | N | N | N | N | N | N | N | N | N | 10 | N | 79 |
| J28R1508 | N | N | N | N | N | N | N | N | N | 70 | N | 79 |
| J28R1542 | N | N | N | N | N | 10 | N | <10 | N | 500 | N | 79 |
| J28R1558 | N | N | N | N | N | 30 | N | <10 | N | 150 | N | 79 |
| J28R1573 | N | N | N | N | N | 20 | N | <10 | N | 200 | N | 79 |
| J28R1611 | 15 | N | N | N | N | 30 | N | <10 | N | 150 | N | 79 |
| J28R1635 | 70 | N | N | N | N | 50 | N | <10 | N | 200 | N | 79 |
| J28R1650 | 70 | N | 10 | N | 100 | 100 | N | 20 | N | 200 | N | 79 |
| J28R1668 | 70 | N | 7 | N | 100 | 100 | N | 20 | N | 200 | N | 79 |
| J28R1691 | 50 | N | 5 | N | 100 | 100 | N | 20 | N | 200 | N | 79 |
| J28P1714 | 50 | N | 5 | N | 150 | 150 | N | 30 | N | 300 | N | 79 |
| J28R1730 | 30 | N | 5 | N | 150 | 100 | N | 30 | N | 300 | N | 79 |
| J28R1755 | 30 | N | 5 | N | 150 | 70 | N | 20 | N | 300 | N | 79 |
| J28R1780 | 30 | N | 5 | N | 100 | 30 | N | 15 | N | 200 | N | 86 |
| J28R1806 | 50 | N | 5 | N | 100 | 50 | N | 30 | N | 300 | N | 86 |
| J28R1818 | N | N | N | N | N | N | N | N | N | 200 | N | 86 |
| J28R1829 | N | N | N | N | N | N | N | N | N | 200 | N | 86 |
| J28R1842 | N | N | N | N | N | N | N | <10 | N | 200 | N | 86 |
| J28R1862 | N | N | N | N | N | N | N | <10 | N | 300 | N | 86 |

TABLE 3--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 29, 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 |
|----------|----------|-----------|--------------|--------------|--------------|--------------|-------------|-------------|-------------|-------------|
| J29R0930 | 37 19 7 | 95 2 26 | 1.50 | .02 | .05 | .015 | <10 | N | N | N |
| J29R0960 | 37 19 7 | 95 2 26 | .15 | .02 | <.05 | .010 | 10 | N | N | N |
| J29R0980 | 37 19 7 | 95 2 26 | .70 | .10 | <.05 | .100 | N | N | N | N |
| J29R1000 | 37 19 7 | 95 2 26 | .10 | .02 | <.05 | .010 | N | N | N | N |
| J29R1045 | 37 19 7 | 95 2 26 | .15 | .02 | <.05 | .005 | N | N | N | N |
| J29R1080 | 37 19 7 | 95 2 26 | .20 | .05 | <.05 | .030 | N | N | N | N |
| J29R1087 | 37 19 7 | 95 2 26 | 1.50 | .05 | .05 | .020 | N | N | N | N |
| J29R1187 | 37 19 7 | 95 2 26 | .20 | .03 | .05 | .005 | N | N | N | N |
| J29R1239 | 37 19 7 | 95 2 26 | .05 | <.02 | <.05 | .003 | N | N | N | N |
| J29R1278 | 37 19 7 | 92 2 26 | .07 | <.02 | <.05 | .002 | N | N | N | N |
| J29R1364 | 37 19 7 | 92 2 26 | .05 | <.02 | <.05 | .002 | N | N | N | N |
| J29R1388 | 37 19 7 | 92 2 26 | .07 | .03 | <.05 | .005 | N | N | N | N |
| J29R1420 | 37 19 7 | 92 2 26 | .20 | .07 | .07 | .020 | 15 | N | N | N |
| J29R1455 | 37 19 7 | 92 2 26 | 1.00 | .07 | .07 | .030 | 20 | N | N | N |
| J29R1518 | 37 19 7 | 92 2 26 | 7.00 | .30 | .15 | .070 | 100 | .5 | N | N |
| J29R1585 | 37 19 7 | 95 2 26 | 10.00 | 1.00 | .70 | .100 | 150 | 1.0 | N | N |
| J29R1637 | 37 19 7 | 95 2 26 | >20.00 | .70 | .10 | .150 | 200 | 1.5 | N | N |
| J29R1722 | 37 19 7 | 95 2 26 | 5.00 | 1.00 | .10 | .300 | 30 | N | N | N |
| J29R1793 | 37 19 7 | 95 2 26 | 1.50 | .30 | <.05 | .200 | 15 | N | N | N |
| J29R1822 | 37 19 7 | 95 2 26 | .50 | .02 | <.05 | .020 | N | N | N | N |
| J29R1846 | 37 19 7 | 95 2 26 | 1.00 | .10 | <.05 | .050 | 20 | N | N | N |
| J29R1852 | 37 19 7 | 95 2 26 | 1.00 | .50 | .20 | .020 | 70 | N | N | N |

TABLE 3--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 29, 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 |
|----------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| J29R0930 | 50 | 20 | N | N | N | N | N | 20 | N | N | N | 10 |
| J29R0960 | 50 | 20 | N | N | N | N | N | 5 | N | N | N | 5 |
| J29R0980 | 50 | 30 | 1 | N | N | N | N | 10 | N | N | N | 10 |
| J29R1000 | 50 | <20 | N | N | N | N | N | <5 | N | N | N | 5 |
| J29R1045 | 30 | 20 | N | N | N | N | N | <5 | N | N | N | N |
| J29R1080 | 20 | 20 | N | N | N | N | N | 7 | N | N | N | 7 |
| J29R1087 | 30 | 20 | N | N | N | N | N | 10 | N | N | N | 10 |
| J29R1187 | 15 | 20 | N | N | N | N | N | <5 | N | N | N | 5 |
| J29R1239 | 10 | 20 | N | N | N | N | N | <5 | N | N | N | N |
| J29R1278 | 10 | <20 | N | N | N | N | N | <5 | N | N | N | 5 |
| J29R1364 | 10 | <20 | N | N | N | N | N | <5 | N | N | N | 5 |
| J29R1388 | 20 | <20 | N | N | N | N | N | <5 | N | N | N | N |
| J29R1420 | 15 | <20 | N | N | N | N | N | <5 | N | N | N | 5 |
| J29R1455 | 15 | 70 | N | N | N | N | N | 10 | N | N | N | 10 |
| J29R1518 | 50 | 200 | N | N | N | 7 | 20 | 70 | N | 15 | N | 30 |
| J29R1585 | 20 | 50 | N | N | N | 10 | 20 | 300 | N | 20 | N | 70 |
| J29R1637 | 10 | 1,000 | N | N | N | 20 | 30 | 300 | N | 20 | N | 70 |
| J29R1722 | 50 | 1,000 | N | N | N | 7 | 10 | 50 | 30 | 10 | N | 20 |
| J29R1793 | 20 | 700 | 1 | N | N | 5 | N | 10 | 30 | N | N | 7 |
| J29R1822 | 10 | <20 | N | N | N | N | N | 5 | N | N | N | 5 |
| J29R1846 | 15 | 70 | N | N | N | N | N | 15 | N | N | <20 | 5 |
| J29R1852 | 10 | 150 | 1 | N | N | N | N | 7 | N | N | N | 5 |

TABLE 3--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 29, 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.# |
|----------|-------------|-------------|-------------|-------------|-------------|------------|------------|------------|-------------|-------------|-------------|--------|
| J29R0930 | N | N | N | N | N | N | N | N | N | N | N | 60 |
| J29R0960 | N | N | N | N | N | N | N | N | N | 10 | N | 60 |
| J29R0980 | N | N | N | N | N | 30 | N | N | N | 20 | N | 60 |
| J29R1000 | N | N | N | N | N | N | N | N | N | N | N | 60 |
| J29R1045 | N | N | N | N | N | N | N | N | N | N | N | 60 |
| J29R1080 | N | N | N | N | N | N | N | N | N | 10 | N | 60 |
| J29R1087 | N | N | N | N | N | N | N | N | N | 10 | N | 60 |
| J29R1187 | N | N | N | N | N | N | N | N | N | N | N | 60 |
| J29R1239 | N | N | N | N | N | N | N | N | N | 10 | N | 60 |
| J29R1278 | N | N | N | N | N | N | N | N | N | 10 | N | 60 |
| J29R1364 | N | N | N | N | N | N | N | N | N | 10 | N | 60 |
| J29R1388 | N | N | N | N | N | N | N | N | N | N | N | 60 |
| J29R1420 | N | N | N | N | N | 10 | N | N | N | 10 | N | 60 |
| J29R1455 | N | N | N | N | N | N | N | N | N | 10 | N | 80 |
| J29R1518 | 70 | N | N | N | N | 50 | N | N | N | 30 | N | 80 |
| J29R1585 | 100 | N | N | N | N | 70 | N | N | 200 | 70 | N | 80 |
| J29R1637 | 150 | N | 5 | N | N | 100 | N | 10 | N | 150 | N | 80 |
| J29R1722 | 150 | N | N | N | N | 100 | N | 20 | N | 200 | N | 84 |
| J29R1793 | 20 | N | N | N | N | 50 | N | 20 | N | 500 | N | 84 |
| J29R1822 | N | N | N | N | N | N | N | N | N | 150 | N | 84 |
| J29R1846 | 10 | N | N | N | N | N | N | <10 | N | 100 | N | 90 |
| J29R1852 | 20 | N | N | N | N | N | N | N | N | 30 | N | 90 |