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. 46, 47, and 48

By

John H. Bullock, Jr.* and Helen A. Whitney*

Open-File Report 89-558

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

*U.S. Geological Survey, DFC, Box 25046, MS 973, Denver, CO 80225

1989

CONTENTS

FIGURE

TABLES

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. 46 (#1 Becchner - KGS), drill hole no. 47 (#1 Naylor - KGS),and drill hole no. 48 (#2 Regis - KGS) are given in this report. Drill hole no. 46 is located in sec. 3, T. 30 S., R. 21 E. in Neosho County, Kansas; drill hole no. 47 is located in sec. 17, T. 31 S., R. 24 E. in Cherokee County, Kansas; drill hole no. 48 is located in sec. 8, T. 31 S., R. 24 E. in Crawford County, Kansas (fig.1). Data for the insoluble-residue samples from drill holes 46, 47, and 48 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

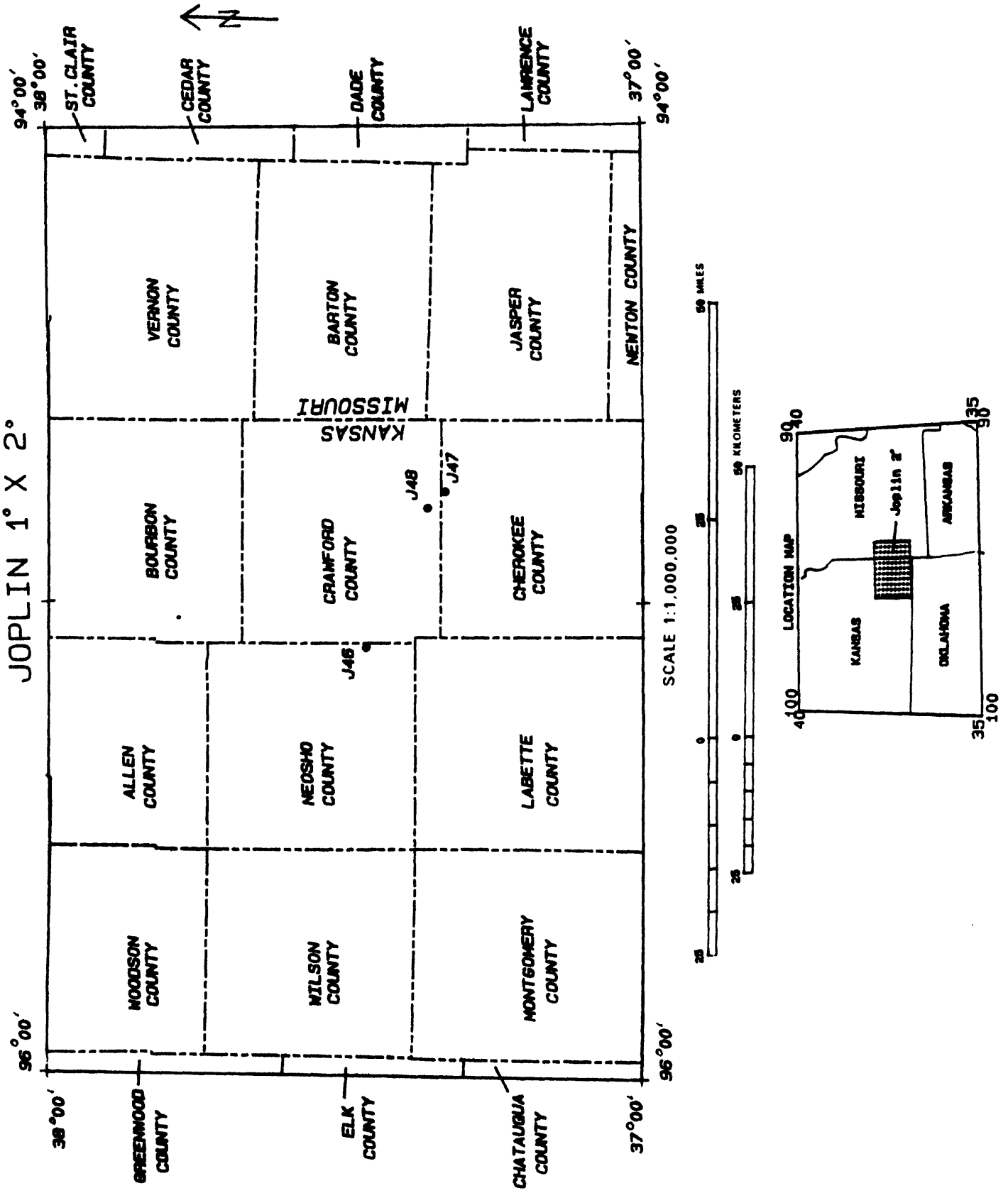

Figure 1. Locations of drill holes 46, 47, and 48, Joplin 1° x 2° quadrangle, Missouri and Kansas.

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:

Code	Formation
20	Pennsylvanian Undifferentiated
40	Mississippian 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

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. 46, 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
J46R0650	37 52 43	95 5 57	.70	.05	<.05	.070	10	N	N	N
J46R0660	37 52 43	95 5 57	.50	.03	<.05	.050	<10	N	N	N
J46R0670	37 52 43	95 5 57	.70	.05	<.05	.100	<10	N	N	N
J46R0680	37 52 43	95 5 57	1.00	.10	.05	.100	10	N	N	N
J46R0690	37 52 43	95 5 57	.70	.05	.05	.070	<10	N	N	N
J46R0700	37 52 43	95 5 57	.30	.02	.05	.050	<10	N	N	N
J46R0710	37 52 43	95 5 57	1.00	.07	.05	.100	<10	N	N	N
J46R0720	37 52 43	95 5 57	1.00	.07	.05	.100	<10	N	N	N
J46R0730	37 52 43	95 5 57	5.00	.50	.15	.500	70	.5	N	N
J46R0740	37 52 43	95 5 57	.70	.05	.07	.100	<10	N	N	N
J46R0750	37 52 43	95 5 57	.70	.05	.05	.100	<10	N	N	N
J46R0760	37 52 43	95 5 57	.15	.02	.05	.030	<10	N	N	N
J46R0770	37 52 43	95 5 57	.15	.03	.05	.050	<10	N	N	N
J46R0780	37 52 43	95 5 57	.10	.02	.05	.015	N	N	N	N
J46R0790	37 52 43	95 5 57	.15	.02	<.05	.020	N	N	N	N
J46R0800	37 52 43	95 5 57	.15	<.02	<.05	.007	N	N	N	N
J46R0810	37 52 43	95 5 57	.20	.02	<.05	.030	N	N	N	N
J46R0820	37 52 43	95 5 57	.30	.02	<.05	.020	N	N	N	N
J46R0830	37 52 43	95 5 57	.50	.02	<.05	.020	N	N	N	N
J46R0840	37 52 43	95 5 57	.50	.10	.05	.070	10	N	N	N
J46R0850	37 52 43	95 5 57	.30	.03	.05	.050	<10	N	N	N
J46R0860	37 52 43	95 5 57	1.00	.10	.05	.200	15	N	N	N
J46R0870	37 52 43	95 5 57	1.00	.07	.07	.100	10	N	N	N
J46R0880	37 52 43	95 5 57	2.00	.20	.15	.300	50	N	N	N
J46R0890	37 52 43	95 5 57	1.00	.10	.20	.150	15	N	N	N
J46R0900	37 52 43	95 5 57	.70	.07	.15	.070	30	N	N	N
J46R0910	37 52 43	95 5 57	2.00	.50	.15	.500	70	N	N	N
J46R0920	37 52 43	95 5 57	1.00	.30	.10	.200	30	N	N	N
J46R0930	37 52 43	95 5 57	1.50	.30	.15	.200	50	N	N	N
J46R0940	37 52 43	95 5 57	3.00	.20	.10	.300	50	N	N	N
J46R0950	37 52 43	95 5 37	2.00	.50	.05	.700	70	N	N	N
J46R0960	37 52 43	95 5 37	3.00	.70	.07	.700	100	N	N	N
J46R0970	37 52 43	95 5 37	3.00	.70	.05	.500	50	N	N	N
J46R0980	37 52 43	95 5 37	3.00	1.00	.05	.700	70	N	N	N
J46R0990	37 52 43	95 5 37	.70	.30	.10	.150	10	N	N	N

TABLE 1--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 46, 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
J46R0650	70	30	N	N	N	N	20	5	20	N	N	7
J46R0660	70	20	N	N	N	N	15	<5	N	N	N	5
J46R0670	70	50	N	N	N	N	20	5	N	N	N	10
J46R0680	70	50	1.0	N	N	N	50	7	N	N	N	15
J46R0690	70	30	N	N	N	N	15	5	N	N	N	10
J46R0700	70	<20	N	N	N	N	10	<5	N	N	N	5
J46R0710	70	50	N	N	N	N	20	7	N	N	N	10
J46R0720	70	50	N	N	N	N	20	5	N	N	N	10
J46R0730	200	200	3.0	N	N	15	200	30	20	20	<20	100
J46R0740	100	30	N	N	N	N	10	5	N	5	N	5
J46R0750	70	30	N	N	N	N	10	5	N	7	N	7
J46R0760	70	<20	N	N	N	N	N	<5	N	N	N	N
J46R0770	70	20	N	N	N	N	N	<5	N	N	N	N
J46R0780	100	<20	N	N	N	N	N	<5	N	N	N	N
J46R0790	70	<20	N	N	N	N	N	<5	N	N	N	N
J46R0800	100	<20	N	N	N	N	N	<5	N	N	N	5
J46R0810	100	20	N	N	N	N	N	<5	N	N	N	5
J46R0820	100	20	N	N	N	N	N	<5	N	N	N	7
J46R0830	100	20	N	N	N	N	N	<5	N	N	N	10
J46R0840	100	70	N	N	N	N	20	5	N	N	N	10
J46R0850	100	30	N	N	N	N	N	<5	N	N	N	10
J46R0860	100	70	N	N	N	5	15	10	N	N	N	20
J46R0870	70	50	N	N	N	5	15	5	N	N	N	30
J46R0880	100	150	1.5	N	N	10	50	10	30	N	N	50
J46R0890	100	50	N	N	N	5	20	<5	N	N	N	20
J46R0900	70	50	N	N	N	5	10	7	N	N	N	30
J46R0910	200	300	2.0	N	N	15	150	15	20	N	N	100
J46R0920	100	100	1.0	N	N	7	50	7	20	N	N	70
J46R0930	100	100	N	N	N	10	50	10	20	N	N	150
J46R0940	150	500	1.0	N	N	15	70	20	20	N	N	300
J46R0950	200	200	2.0	N	N	7	150	20	30	N	<20	20
J46R0960	200	200	3.0	N	N	10	200	30	30	N	<20	70
J46R0970	200	200	5.0	N	N	10	150	20	50	5	<20	70
J46R0980	200	200	5.0	N	N	15	200	30	50	5	<20	50
J46R0990	100	100	N	N	N	N	20	7	N	N	N	7

TABLE 1--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 46, 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.#
J46R0650	N	N	N	N	N	20	N	N	N	20	N	20
J46R0660	N	N	N	N	N	10	N	N	N	15	N	40
J46R0670	N	N	N	N	N	15	N	10	N	30	N	40
J46R0680	N	N	N	N	N	30	N	10	N	150	N	40
J46R0690	N	N	N	N	N	15	N	20	N	50	N	40
J46R0700	N	N	N	N	N	N	N	N	N	20	N	40
J46R0710	N	N	N	N	N	30	N	N	N	30	N	40
J46R0720	N	N	N	N	N	30	N	N	N	20	N	40
J46R0730	30	N	20	N	100	200	N	30	N	150	N	40
J46R0740	N	N	N	N	N	15	N	N	N	30	N	40
J46R0750	N	N	N	N	N	30	N	N	N	15	N	40
J46R0760	N	N	N	N	N	N	N	N	N	10	N	40
J46R0770	N	N	N	N	N	N	N	N	N	10	N	40
J46R0780	N	N	N	N	N	N	N	N	N	N	N	40
J46R0790	N	N	N	N	N	N	N	N	N	10	N	40
J46R0800	N	N	N	N	N	N	N	N	N	N	N	40
J46R0810	N	N	N	N	N	N	N	N	N	15	N	40
J46R0820	N	N	N	N	N	N	N	N	N	10	N	40
J46R0830	N	N	N	N	N	N	N	N	N	10	N	40
J46R0840	N	N	N	N	N	30	N	N	N	20	N	40
J46R0850	N	N	N	N	N	10	N	N	N	15	N	40
J46R0860	N	N	5	N	N	50	N	<10	N	50	N	40
J46R0870	N	N	N	N	N	20	N	N	N	20	N	40
J46R0880	10	N	10	N	100	70	N	15	N	100	N	40
J46R0890	N	N	10	N	N	20	N	N	N	30	N	40
J46R0900	N	N	10	N	N	15	N	N	N	30	N	40
J46R0910	15	N	15	N	100	150	N	15	N	100	N	40
J46R0920	<10	N	7	N	N	50	N	10	N	50	N	40
J46R0930	<10	N	5	N	N	50	N	10	N	70	N	40
J46R0940	10	N	10	N	N	70	N	15	N	70	N	40
J46R0950	10	N	10	N	N	200	N	20	N	500	N	40
J46R0960	15	N	15	N	100	200	N	20	N	200	N	40
J46R0970	30	N	20	N	100	200	N	20	N	150	N	40
J46R0980	30	N	20	N	N	200	N	30	N	200	N	40
J46R0990	<10	N	5	N	N	30	N	10	N	70	N	40

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 47, 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
J47R0040	37 19 50	94 46 11	2.00	.50	.05	.50	100	N	N	N
J47R0060	37 19 50	94 46 11	1.50	.50	<.05	.70	100	.7	N	N
J47R0080	37 19 50	94 46 11	2.00	.50	<.05	.70	100	N	N	N
J47R0090	37 19 50	94 46 11	1.50	.50	<.05	.50	70	N	N	N
J47R0100	37 19 50	94 46 11	2.00	.50	<.05	.50	70	N	N	N
J47R0110	37 19 50	94 46 11	1.50	.30	<.05	.50	50	N	N	N
J47R0120	37 19 50	94 46 11	3.00	.50	<.05	.50	100	N	N	N
J47R0130	37 19 50	94 46 11	2.00	.50	<.05	.50	70	1.5	N	N
J47R0140	37 19 50	94 46 11	2.00	.50	.05	.50	100	N	N	N
J47R0150	37 19 50	94 46 11	2.00	.50	<.05	.50	70	N	N	N
J47R0160	37 19 50	94 46 11	2.00	.50	<.05	.70	150	N	N	N
J47R0170	37 19 50	94 46 11	2.00	.70	<.05	.50	70	N	N	N
J47R0180	37 19 50	94 46 11	2.00	.70	<.05	.50	100	N	N	N
J47R0190	37 19 50	94 46 11	2.00	.50	<.05	.50	100	N	N	N
J47R0200	37 19 50	94 46 11	2.00	.50	<.05	.70	100	N	N	N
J47R0210	37 19 50	94 46 11	2.00	.30	<.05	.50	100	N	N	N
J47R0220	37 19 50	94 46 11	2.00	.50	<.05	.50	100	N	N	N
J47R0230	37 19 50	94 46 11	3.00	.50	<.05	.70	100	N	N	N
J47R0240	37 19 50	94 46 11	2.00	.50	<.05	.70	100	N	N	N
J47R0250	37 19 50	94 46 11	2.00	.50	.05	.50	70	N	N	N
J47R0260	37 19 50	94 46 11	2.00	.50	<.05	.50	150	N	N	N
J47R0270	37 19 50	94 46 11	2.00	.50	<.05	.50	70	N	N	N
J47R0280	37 19 50	94 46 11	5.00	.15	<.05	.20	70	N	N	N
J47R0290	37 19 50	94 46 11	1.00	.05	<.05	.10	10	N	N	N
J47R0300	37 19 50	94 46 11	2.00	.10	.07	.30	50	N	N	N
J47R0310	37 19 50	94 46 11	1.50	.15	.05	.30	70	N	N	N
J47R0320	37 19 50	94 46 11	1.50	.20	.07	.50	50	N	N	N
J47R0330	37 19 50	94 46 11	.50	.05	.05	.10	<10	N	N	N
J47R0340	37 19 50	94 46 11	1.00	.15	.05	.20	30	N	N	N
J47R0350	37 19 50	94 46 11	1.00	.15	.10	.30	50	N	N	N
J47R0360	37 19 50	94 46 11	.50	.05	.20	.15	20	N	N	N
J47R0370	37 19 50	94 46 11	1.50	.15	.15	.30	70	N	N	N
J47R0380	37 19 50	94 46 11	.50	.10	.05	.20	10	N	N	N
J47R0390	37 19 50	94 46 11	1.50	.30	.05	.70	50	N	N	N
J47R0400	37 19 50	94 46 11	1.00	.20	.05	.30	30	N	N	N
J47R0410	37 19 50	94 46 11	.70	.10	.07	.20	10	N	N	N
J47R0420	37 19 50	94 46 11	.70	.10	.07	.20	10	N	N	N
J47R0430	37 19 50	94 46 11	.15	.02	.05	.05	N	N	N	N
J47R0440	37 19 50	94 46 11	.30	.05	.05	.07	<10	N	N	N
J47R0450	37 19 50	94 46 11	.20	.05	.05	.07	<10	N	N	N
H47R0460	37 19 50	94 46 11	.15	.03	.05	.05	<10	N	N	N
J47R0470	37 19 50	94 46 11	.20	.07	.05	.10	<10	N	N	N
J47R0480	37 19 50	94 46 11	.50	.10	.05	.15	10	N	N	N
J47R0490	37 19 50	94 46 11	1.00	.20	.05	.20	20	N	N	N
J47R0500	37 19 50	94 46 11	2.00	.30	.05	.30	20	N	N	N

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 47, 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
J47R0040	150	200	2.0	N	N	15	150	20	50	N	<20	70
J47R0060	200	200	2.0	N	N	10	100	20	70	N	<20	30
J47R0080	150	300	3.0	N	N	15	150	20	50	N	<20	50
J47R0090	150	200	3.0	N	N	10	150	20	50	N	<20	50
J47R0100	150	200	2.0	N	N	10	100	30	50	N	<20	70
J47R0110	150	150	2.0	N	N	7	100	30	50	N	<20	30
J47R0120	150	200	3.0	N	N	15	150	30	70	5	<20	100
J47R0130	150	300	3.0	N	N	10	100	20	50	N	<20	50
J47R0140	150	300	3.0	N	N	10	150	20	50	N	<20	50
J47R0150	150	300	3.0	N	N	10	150	20	50	N	<20	70
J47R0160	150	200	2.0	N	N	10	100	20	50	N	<20	50
J47R0170	150	300	5.0	N	N	10	150	20	50	N	<20	70
J47R0180	150	300	3.0	N	N	15	150	30	50	N	<20	70
J47R0190	150	300	3.0	N	N	15	150	20	50	N	<20	50
J47R0200	150	300	3.0	N	N	10	150	50	50	N	<20	50
J47R0210	150	200	3.0	N	N	7	150	20	30	N	<20	50
J47R0220	150	300	3.0	N	N	20	150	20	50	N	<20	50
J47R0230	150	300	3.0	N	N	10	100	20	50	N	<20	50
J47R0240	150	200	3.0	N	N	15	100	20	50	N	<20	70
J47R0250	150	200	2.0	N	N	7	100	20	50	N	<20	30
J47R0260	150	200	3.0	N	N	10	150	30	50	N	<20	50
J47R0270	200	150	2.0	N	N	20	150	20	50	N	<20	70
J47R0280	150	100	1.0	N	N	7	70	10	20	N	N	50
J47R0290	100	20	N	N	N	N	10	5	N	N	N	10
J47R0300	100	70	<1.0	N	N	5	50	10	30	N	N	30
J47R0310	100	100	1.0	N	N	5	50	10	20	N	N	20
J47R0320	150	150	1.5	N	N	7	100	10	30	N	N	30
J47R0330	100	20	N	N	N	N	10	<5	20	N	N	7
J47R0340	100	100	1.0	N	N	5	50	10	20	N	N	15
J47R0350	100	70	1.0	N	N	5	50	7	20	N	N	20
J47R0360	70	50	N	N	N	N	10	<5	20	N	N	7
J47R0370	100	100	1.0	N	N	5	50	10	20	N	N	15
J47R0380	100	70	N	N	N	N	50	5	N	N	N	10
J47R0390	200	150	2.0	N	N	7	100	20	50	N	<20	30
J47R0400	150	150	1.5	N	N	7	70	10	50	N	N	15
J47R0410	100	70	N	N	N	5	20	5	20	N	N	10
J47R0420	100	100	<1.0	N	N	N	30	5	20	N	N	10
J47R0430	100	20	N	N	N	N	N	<5	N	N	N	5
J47R0440	150	30	N	N	N	N	10	5	N	N	N	5
J47R0450	150	70	N	N	N	N	15	5	N	N	N	5
H47R0460	150	30	N	N	N	N	15	<5	N	N	N	5
J47R0470	150	70	N	N	N	N	10	<5	N	N	N	10
J47R0480	100	100	N	N	N	N	15	10	20	N	N	10
J47R0490	150	150	1.5	N	N	5	70	10	30	N	N	15
J47R0500	150	150	1.5	N	N	7	100	20	30	N	N	20

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 47, 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.#
J47R0040	150	N	15	N	150	150	N	30	N	300	N	20
J47R0060	500	N	15	N	150	150	N	50	N	500	N	20
J47R0080	300	N	15	N	150	200	N	30	N	200	N	20
J47R0090	20	N	15	N	200	150	N	30	N	200	N	20
J47R0100	50	N	15	N	150	150	N	20	N	200	N	20
J47R0110	10	N	10	N	150	150	N	20	N	200	N	20
J47R0120	20	N	20	N	150	200	N	30	3,000	200	N	20
J47R0130	30	N	15	N	150	150	N	30	200	200	N	20
J47R0140	100	N	15	N	150	200	N	30	N	200	N	20
J47R0150	30	N	15	N	150	200	N	20	1,000	100	N	20
J47R0160	15	N	15	N	100	150	N	30	<200	200	N	20
J47R0170	20	N	20	N	100	200	N	20	N	150	N	20
J47R0180	15	N	20	N	100	200	N	20	N	100	N	20
J47R0190	20	N	15	N	100	200	N	20	N	150	N	20
J47R0200	20	N	20	N	100	200	N	50	N	200	N	20
J47R0210	20	N	10	N	100	100	N	30	1,000	150	N	20
J47R0220	50	N	15	N	100	200	N	30	N	200	N	20
J47R0230	30	N	20	N	150	200	N	30	N	150	N	20
J47R0240	100	N	15	N	100	200	N	30	N	200	N	20
J47R0250	200	N	15	N	100	100	N	20	N	200	N	20
J47R0260	30	N	15	N	100	200	N	30	N	200	N	20
J47R0270	100	N	20	N	100	200	N	30	N	100	N	20
J47R0280	20	N	7	N	N	50	N	20	N	150	N	40
J47R0290	N	N	N	N	N	50	N	10	N	100	N	40
J47R0300	30	N	5	N	100	50	N	15	N	50	N	40
J47R0310	10	N	5	N	N	50	N	15	N	100	N	40
J47R0320	20	N	10	N	100	100	N	20	N	200	N	40
J47R0330	N	N	N	N	N	10	N	<10	N	50	N	40
J47R0340	15	N	5	N	100	70	N	10	N	100	N	40
J47R0350	10	N	5	N	N	70	N	10	N	150	N	40
J47R0360	N	N	N	N	N	20	N	<10	N	70	N	40
J47R0370	20	N	5	N	100	50	N	15	N	150	N	40
J47R0380	N	N	N	N	N	30	N	<10	N	100	N	40
J47R0390	15	N	15	N	100	150	N	30	N	300	N	40
J47R0400	10	N	10	N	100	100	N	20	N	150	N	40
J47R0410	N	N	<5	N	N	30	N	10	N	100	N	40
J47R0420	N	N	<5	N	N	50	N	10	N	100	N	40
J47R0430	N	N	N	N	N	N	N	N	N	30	N	40
J47R0440	N	N	N	N	N	15	N	N	N	50	N	40
J47R0450	N	N	N	N	N	10	N	N	N	30	N	40
H47R0460	N	N	N	N	N	N	N	N	N	20	N	40
J47R0470	N	N	N	N	N	15	N	N	N	70	N	40
J47R0480	N	N	5	N	N	30	N	10	N	100	N	40
J47R0490	20	N	5	N	100	50	N	15	N	200	N	40
J47R0500	10	N	7	N	100	100	N	20	N	150	N	40

TABLE 3--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 48, 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
J48R0030	37 41 34	94 48 13	2.00	.70	<.05	.50	100	N	N	N
J48R0040	37 41 34	94 48 13	2.00	.70	<.05	.70	100	N	N	N
J48R0050	37 41 34	94 48 13	5.00	.50	<.05	.50	100	N	N	N
J48R0060	37 41 34	94 48 13	3.00	.70	<.05	.70	100	N	N	N
J48R0070	37 41 34	94 48 13	3.00	.30	.05	.50	70	N	N	N
J48R0080	37 41 34	94 48 13	3.00	.50	.05	.50	100	N	N	N
J48R0090	37 41 34	94 48 13	3.00	.50	<.05	.70	150	N	N	N
J48R0100	37 41 34	94 48 13	1.50	.50	<.05	.70	70	N	N	N
J48R0110	37 41 34	94 48 13	2.00	.50	<.05	.70	100	N	N	N
J48R0120	37 41 34	94 48 13	5.00	1.00	.05	.70	200	N	N	N
J48R0130	37 41 34	94 48 13	3.00	.50	<.05	.70	100	N	N	N
J48R0140	37 41 34	94 48 13	2.00	.50	<.05	.50	100	N	N	N
J48R0150	37 41 34	94 48 13	2.00	.50	<.05	.70	70	N	N	N
J48R0160	37 41 34	94 48 13	3.00	.70	<.05	.70	150	N	N	N
J48R0170	37 41 34	94 48 13	3.00	.50	.05	.70	100	N	N	N
J48R0180	37 41 34	94 48 13	3.00	.50	<.05	.70	100	N	N	N
J48R0190	37 41 34	94 48 13	3.00	.50	.05	.70	100	N	N	N
J48R0200	37 41 34	94 48 13	1.00	.30	.05	.50	100	N	N	N
J48R0210	37 41 34	94 48 13	2.00	.50	.05	.70	100	N	N	N
J48R0220	37 41 34	94 48 13	2.00	.50	<.05	.50	100	N	N	N
J48R0230	37 41 34	94 48 13	3.00	.50	.05	.70	100	N	N	N
J48R0240	37 41 34	94 48 13	3.00	.50	.05	.70	200	N	N	N
J48R0250	37 41 34	94 48 13	2.00	.50	<.05	.50	100	N	N	N
J48R0260	37 41 34	94 48 13	2.00	.50	<.05	.50	100	N	N	N
J48R0270	37 41 34	94 48 13	3.00	.50	<.05	.50	100	N	N	N
J48R0280	37 41 34	94 48 13	2.00	.50	<.05	.50	100	N	N	N
J48R0290	37 41 34	94 48 13	2.00	.50	<.05	.50	70	N	N	N
J48R0300	37 41 34	94 48 13	2.00	.50	<.05	.70	70	N	N	N
J48R0310	37 41 34	94 48 13	2.00	.50	<.05	.70	200	N	N	N
J48R0320	37 41 34	94 48 13	3.00	.50	<.05	.50	100	N	N	N
J48R0330	37 41 34	94 48 13	2.00	.50	<.05	.50	100	N	N	N
J48R0340	37 41 34	94 48 13	3.00	.50	<.05	.50	70	N	N	N
J48R0350	37 41 34	94 48 13	3.00	.50	.05	.50	150	N	N	N
J48R0360	37 41 34	94 48 13	5.00	.50	<.05	.50	100	N	N	N
J48R0370	37 41 34	94 48 13	5.00	.70	<.05	.50	100	N	N	N
J48R0380	37 41 34	94 48 13	5.00	.20	<.05	.20	100	N	N	N
J48R0390	37 41 34	94 48 13	2.00	.30	.07	.30	70	N	N	N
J48R0400	37 41 34	94 48 13	1.50	.10	.10	.15	30	N	N	N
J48R0410	37 41 34	94 48 13	1.50	.15	.07	.20	50	N	N	N
J48R0420	37 41 34	94 48 13	1.00	.07	.15	.07	20	N	N	N
J48R0430	37 41 34	94 48 13	1.00	.05	.05	.05	20	N	N	N
J48P0440	37 41 34	94 48 13	1.50	.05	.15	.10	20	N	N	N
J48R0450	37 41 34	94 48 13	1.00	.07	.10	.10	15	N	N	N
J48R0460	37 41 34	94 48 13	.50	.02	.05	.03	<10	N	N	N
J48R0470	37 41 34	94 48 13	.50	.03	.05	.05	10	N	N	N

TABLE 3--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 48, 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
J48R0030	150	300	3.0	N	N	10	150	20	50	N	<20	30
J48R0040	150	200	3.0	N	N	10	200	30	50	N	<20	50
J48R0050	200	200	3.0	N	N	10	200	30	50	7	<20	50
J48R0060	200	300	2.0	N	N	10	200	30	50	N	<20	50
J48R0070	150	200	2.0	N	N	7	150	30	50	N	<20	100
J48R0080	200	300	3.0	N	N	15	200	30	50	10	<20	70
J48R0090	200	200	2.0	N	N	10	150	20	50	7	<20	50
J48R0100	150	1,000	1.0	N	N	7	100	15	30	N	<20	15
J48R0110	200	300	2.0	N	N	7	100	30	50	N	<20	30
J48R0120	200	300	3.0	N	N	10	300	50	50	N	<20	100
J48R0130	150	300	2.0	N	N	20	150	20	50	N	<20	50
J48R0140	150	200	2.0	N	N	15	100	20	30	N	<20	30
J48R0150	150	200	2.0	N	N	10	100	20	50	N	<20	30
J48R0160	150	500	2.0	N	N	10	150	30	50	N	<20	50
J48R0170	150	200	2.0	N	N	10	150	30	50	N	<20	50
J48R0180	150	200	3.0	N	N	10	200	20	50	5	<20	70
J48R0190	150	200	3.0	N	N	15	150	30	50	7	<20	50
J48R0200	70	100	<1.0	N	N	10	70	7	30	N	<20	30
J48R0210	150	300	3.0	N	N	10	150	20	50	N	<20	30
J48R0220	150	200	3.0	N	N	10	150	15	50	N	<20	50
J48R0230	200	300	3.0	N	N	10	150	20	50	N	<20	70
J48R0240	200	200	3.0	N	N	10	200	20	50	N	<20	70
J48R0250	150	150	2.0	N	N	15	150	15	50	N	<20	50
J48R0260	100	150	3.0	N	N	15	150	30	50	N	<20	50
J48R0270	100	150	2.0	N	N	15	150	15	50	N	<20	70
J48R0280	150	200	3.0	N	N	20	150	20	50	N	<20	70
J48R0290	100	150	2.0	N	N	10	150	20	50	N	<20	50
J48R0300	150	150	2.0	N	N	7	150	20	50	N	<20	50
J48R0310	100	150	2.0	N	N	7	150	30	50	N	<20	50
J48R0320	150	200	2.0	N	N	10	150	20	50	N	<20	100
J48R0330	150	150	2.0	N	N	10	100	15	50	N	<20	50
J48R0340	150	200	2.0	N	N	15	150	20	50	N	<20	70
J48R0350	150	200	2.0	N	N	10	100	30	50	N	<20	50
J48R0360	200	200	3.0	N	N	20	100	20	50	N	<20	70
J48R0370	200	200	2.0	N	N	15	100	30	70	N	<20	70
J48R0380	150	100	1.0	N	N	20	70	20	30	N	N	50
J48R0390	150	150	1.5	N	N	15	100	20	30	N	N	50
J48R0400	150	100	N	N	N	7	30	7	20	N	N	20
J48R0410	150	100	<1.0	N	N	7	30	10	20	N	N	20
J48R0420	100	50	N	N	N	N	10	5	N	N	N	15
J48R0430	100	50	N	N	N	N	10	7	N	5	N	10
J48R0440	100	50	N	N	N	7	15	7	N	N	N	20
J48R0450	100	70	N	N	N	7	20	7	N	N	N	15
J48R0460	100	<20	N	N	N	N	N	<5	N	N	N	5
J48R0470	70	20	N	N	N	N	10	5	N	N	N	N

TABLE 3--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 48, 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#
J48R0030	15	N	15	N	200	150	N	30	1,000	150	N	20
J48R0040	20	N	15	N	200	200	N	30	N	150	N	20
J48R0050	20	N	15	N	300	200	N	30	N	100	N	20
J48R0060	20	N	15	N	300	200	N	20	N	200	N	20
J48R0070	50	N	10	N	150	100	N	30	N	100	N	20
J48R0080	30	N	15	N	200	200	N	20	1,000	100	N	20
J48R0090	10	N	10	N	100	150	N	20	N	200	N	20
J48R0100	<10	N	10	N	100	100	N	30	N	300	N	20
J48R0110	<10	N	15	N	150	150	N	30	<200	200	N	20
J48R0120	20	N	20	N	150	200	N	30	N	150	N	20
J48R0130	10	N	15	N	100	200	N	30	N	300	N	20
J48R0140	<10	N	15	N	100	100	N	20	N	200	N	20
J48R0150	10	N	15	N	150	150	N	30	N	300	N	20
J48R0160	10	N	20	N	150	200	N	30	500	200	N	20
J48R0170	10	N	15	N	150	150	N	30	1,000	200	N	20
J48R0180	15	N	20	N	200	200	N	30	N	200	N	20
J48R0190	30	N	20	N	200	200	N	30	N	200	N	20
J48R0200	N	N	7	N	100	100	N	20	N	200	N	20
J48R0210	20	N	20	N	500	200	N	20	N	150	N	20
J48R0220	15	N	15	N	150	200	N	30	N	200	N	20
J48R0230	30	N	20	N	150	200	N	50	200	200	N	20
J48R0240	20	N	20	N	100	200	N	30	N	200	N	20
J48R0250	10	N	15	N	100	150	N	30	N	200	N	20
J48R0260	10	N	15	N	100	200	N	30	N	200	N	20
J48R0270	15	N	15	N	150	200	N	30	N	150	N	20
J48R0280	15	N	15	N	150	200	N	30	N	100	N	20
J48R0290	10	N	10	N	100	150	N	30	500	200	N	20
J48R0300	20	N	15	N	100	200	N	30	N	200	N	20
J48R0310	15	N	15	N	100	200	N	50	1,000	200	N	20
J48R0320	50	N	20	N	100	200	N	30	N	200	N	20
J48R0330	10	N	20	N	100	200	N	30	N	200	N	20
J48R0340	30	N	20	N	100	200	N	50	300	200	N	20
J48R0350	15	N	15	N	100	200	N	30	700	200	N	20
J48R0360	20	N	20	N	150	200	N	30	N	150	N	20
J48R0370	30	N	20	N	100	200	N	30	N	150	N	20
J48R0380	10	N	7	N	N	50	50	20	N	100	N	20
J48R0390	10	N	10	N	100	100	50	20	500	100	N	40
J48R0400	N	N	<5	N	100	30	<50	10	N	70	N	40
J48R0410	N	N	<5	N	100	50	50	10	N	70	N	40
J48R0420	N	N	N	N	N	10	N	N	N	20	N	40
J48R0430	N	N	N	N	N	10	50	N	N	30	N	40
J48R0440	N	N	N	N	N	15	50	<10	N	30	N	40
J48R0450	<10	N	N	N	N	30	50	<10	N	30	N	40
J48R0460	N	N	N	N	N	N	N	N	N	15	N	40
J48R0470	N	N	N	N	N	N	<50	N	N	15	N	40

TABLE 3--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 48, JOPLIN 1 x 2 QUADRANGLE, MISSOURI AND KANSAS.--Continued

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
J48R0480	37 41 34	94 48 13	1.50	.10	.10	.15	50	N	N	N
J48R0490	37 41 34	94 48 13	.50	.05	.15	.10	15	N	N	N
J48R0500	37 41 34	94 48 13	.30	.05	.15	.05	20	N	N	N
J48R0510	37 41 34	94 48 13	3.00	.30	.10	.50	100	N	N	N
J48R0520	37 41 34	94 48 13	.50	.05	.20	.07	10	N	N	N
J48R0530	37 41 34	94 48 13	.20	.03	.10	.03	<10	N	N	N
J48R0540	37 41 34	94 48 13	.30	.03	.15	.05	20	N	N	N
J48R0550	37 41 34	94 48 13	.15	.02	.07	.02	<10	N	N	N
J48R0560	37 41 34	94 48 13	.20	.02	<.05	.05	<10	N	N	N
J48R0570	37 41 34	94 48 13	.20	.03	<.05	.05	<10	N	N	N
J48R0580	37 41 34	94 48 13	.30	.02	<.05	.05	<10	N	N	N
J48R0588	37 41 34	94 48 13	.70	.07	.05	.10	20	N	N	N

TABLE 3--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 48, 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
J48R0480	100	70	N	N	N	N	20	10	20	N	N	15
J48R0490	70	50	N	N	N	N	10	<5	N	N	N	N
J48R0500	70	20	N	N	N	5	10	<5	N	N	N	N
J48R0510	150	100	2.0	N	N	15	100	20	30	N	N	50
J48R0520	50	30	N	N	N	N	10	<5	N	N	N	N
J48R0530	50	20	N	N	N	N	N	<5	N	N	N	N
J48R0540	70	30	N	N	N	N	N	<5	N	N	N	N
J48R0550	70	20	N	N	N	N	N	<5	N	N	N	N
J48R0560	100	30	N	N	N	N	N	<5	N	N	N	N
J48R0570	100	30	N	N	N	N	N	<5	N	N	N	N
J48R0580	150	20	N	N	N	N	N	<5	N	N	N	N
J48R0588	100	50	N	N	N	5	15	5	N	N	N	10

TABLE 3--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 48, 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#
J48R0480	N	N	5	N	N	50	N	10	N	50	N	40
J48R0490	N	N	N	N	N	10	N	N	N	20	N	40
J48R0500	N	N	N	N	N	10	100	N	N	15	N	40
J48R0510	10	N	10	N	N	100	<50	20	N	200	N	40
J48R0520	N	N	N	N	N	10	N	N	N	20	N	40
J48R0530	N	N	N	N	N	N	N	N	N	10	N	40
J48R0540	N	N	N	N	N	10	N	N	N	10	N	40
J48R0550	N	N	N	N	N	N	N	N	N	10	N	40
J48R0560	N	N	N	N	N	N	N	N	N	50	N	40
J48R0570	N	N	N	N	N	N	N	N	N	15	N	40
J48R0580	N	N	N	N	N	10	<50	N	N	10	N	40
J48R0588	N	N	N	N	N	30	N	N	N	30	N	40