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. 65, 66, and 67

By

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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 library of 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. 65 (#1 Hall - KGS), drill hole no. 66 (#4 Baxter Springs - KGS),and drill hole no. 67 (Jordan D - KGS) are given in this report. Drill hole no. 65 is located in sec. 17, T. 34 S., R. 16 E. in Montgomery County, Kansas; drill hole no. 66 is located in sec. 1, T. 35 S., R. 24 E. in Cherokee County, Kansas; drill hole no. 67 is located in sec. 29, T. 26 S., R. 20 E. in Allen County, Kansas (fig. 1). Data for the insoluble-residue samples from drill holes 65, 66, and 67 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:

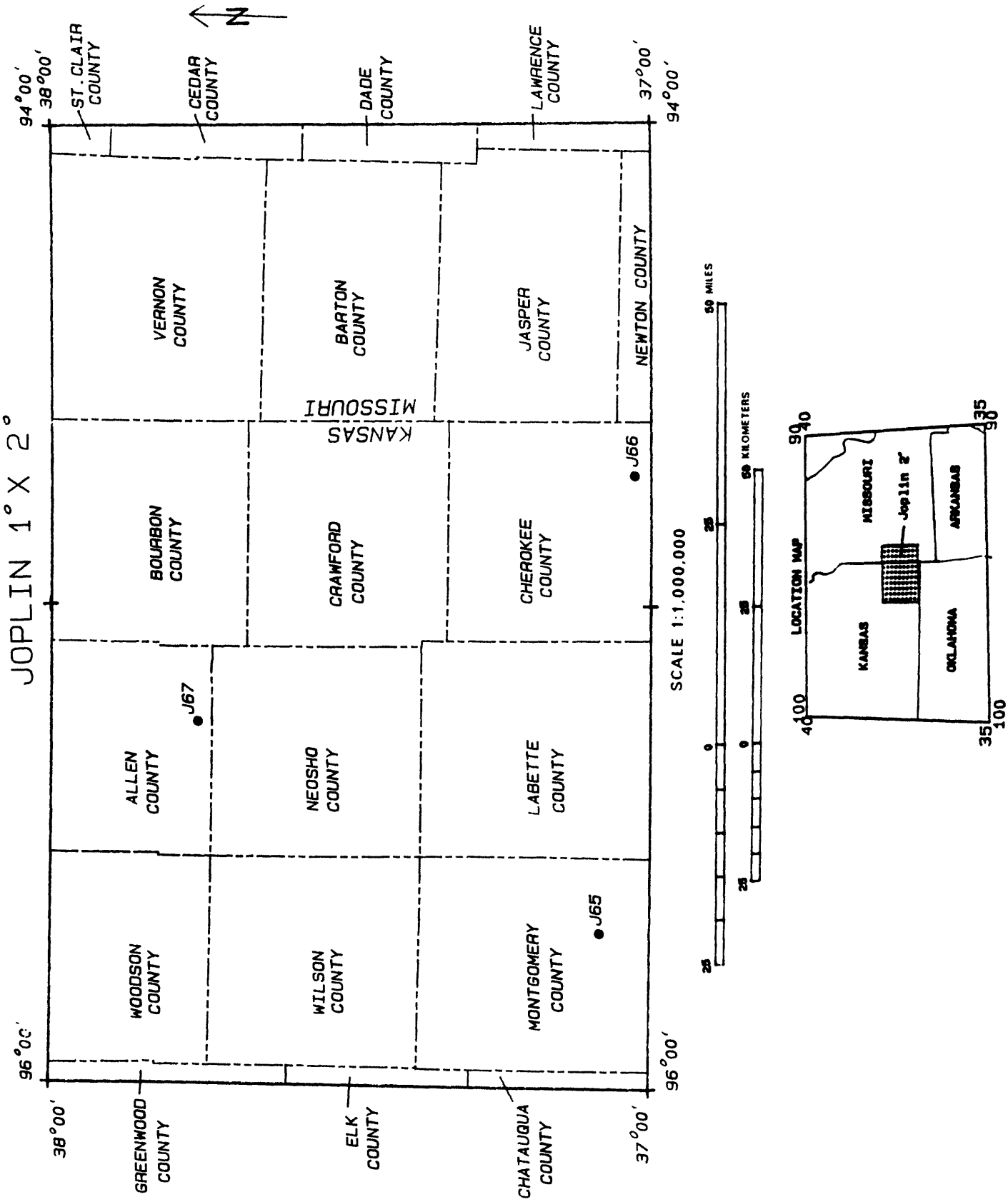

Figure 1. Locations of drill holes 65, 66, and 67, Joplin 1° x 2° quadrangle, Missouri and Kansas.

For those given in percent:

Calcium	0.05
Iron	0.05
Magnesium	0.02
Titanium	0.002

For those given in ppm:

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

DESCRIPTION OF DATA TABLES

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

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

Code	Formation
20	Pennsylvanian Undifferentiated
31	Devonian Chattanoga Shale
40	Mississippian Undifferentiated
78	Cambrian - 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) may 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. 65, 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
J65R0220	37 5 12	95 40 58	3	1	<.05	.5	200	N	N	N
J65R0240	37 5 12	95 40 58	5	1	<.05	.5	200	N	N	N
J65R0260	37 5 12	95 40 58	3	1	<.05	.5	150	N	N	N
J65R0280	37 5 12	95 40 58	3	1	<.05	.5	150	N	N	N
J65R0300	37 5 12	95 40 58	3	1	<.05	.3	150	N	N	N
J65R0320	37 5 12	95 40 58	3	1	.05	.5	200	.5	N	N
J65R0340	37 5 12	95 40 58	3	1	.05	.5	100	N	N	N
J65R0380	37 5 12	95 40 58	3	1	.05	.5	150	N	N	N
J65R0400	37 5 12	95 40 58	5	1	.1	.5	200	N	N	N
J65R0420	37 5 12	95 40 58	3	1	<.05	.5	150	N	N	N
J65R0440	37 5 12	95 40 58	2	.5	.07	.3	100	N	N	N
J65R0460	37 5 12	95 40 58	2	.7	.05	.5	100	N	N	N
J65R0480	37 5 12	95 40 58	3	.7	.05	.5	150	N	N	N
J65R0500	37 5 12	95 40 58	1.5	.3	.05	.5	100	N	N	N
J65R0520	37 5 12	95 40 58	1.5	.5	.05	.5	100	N	N	N
J65R0540	37 5 12	95 40 58	1	.5	.05	.5	100	N	N	N
J65R0560	37 5 12	95 40 58	3	1	.07	.5	150	N	N	N
J65R0600	37 5 12	95 40 58	2	1	.1	.5	150	N	N	N
J65R0620	37 5 12	95 40 58	2	.5	.05	.7	150	N	N	N
J65R0640	37 5 12	95 40 58	1.5	.7	<.05	.5	70	N	N	N
J65R0660	37 5 12	95 40 58	2	.7	<.05	.7	100	N	N	N
J65R0680	37 5 12	95 40 58	3	1	.05	.5	200	N	N	N
J65R0700	37 5 12	95 40 58	3	.7	.1	.3	100	N	N	N
J65R0740	37 5 12	95 40 58	3	1	.1	.5	200	.7	N	N
J65R0780	37 5 12	95 40 58	3	.5	.1	.5	200	2	N	N
J65R0820	37 5 12	95 40 58	3	.5	<.05	.7	150	N	N	N
J65R0840	37 5 12	95 40 58	5	.7	.05	.5	150	<.5	N	N
J65R0860	37 5 12	95 40 58	2	.7	.05	.5	200	N	N	N
J65R0900	37 5 12	95 40 58	3	.5	<.05	.5	150	N	N	N
J65R0940	37 5 12	95 40 58	1.5	.5	<.05	.7	100	N	N	N
J65R0960	37 5 12	95 40 58	1.5	.5	.05	.5	100	N	N	N
J65R0980	37 5 12	95 40 58	1	.5	<.05	.5	100	N	N	N
J65R1000	37 5 12	95 40 58	1.5	.5	.05	.5	200	N	N	N
J65R1040	37 5 12	95 40 58	1.5	.3	<.05	.7	100	N	N	N
J65R1080	37 5 12	95 40 58	1.5	.2	<.05	.3	100	N	N	N
J65R1120	37 5 12	95 40 58	.2	.1	<.05	.1	50	N	N	N
J65R1160	37 5 12	95 40 58	5	.5	<.05	.5	100	.5	N	N
J65R1200	37 5 12	95 40 58	3	.7	<.05	.7	150	N	N	N
J65R1240	37 5 12	95 40 58	2	.5	.05	.5	100	N	N	N
J65R1260	37 5 12	95 40 58	.2	.1	.1	.1	20	N	N	N
J65R1280	37 5 12	95 40 58	.2	.05	.07	.1	20	N	N	N
J65R1300	37 5 12	95 40 58	.5	.2	.3	.2	50	N	N	N
J65R1340	37 5 12	95 40 58	2	.3	.3	.2	100	<.5	N	N
J65R1360	37 5 12	95 40 58	1	.2	.2	.3	70	N	N	N
J65R1380	37 5 12	95 40 58	.7	.15	.05	.3	70	N	N	N
J65R1400	37 5 12	95 40 58	.5	.1	.15	.15	20	N	N	N
J65R1420	37 5 12	95 40 58	.3	.05	.05	.1	20	N	N	N
J65R1440	37 5 12	95 40 58	.7	.2	.3	.2	30	N	N	N
J65R1460	37 5 12	95 40 58	.7	.2	.15	.2	30	N	N	N
J65R1480	37 5 12	95 40 58	1	.2	.15	.2	50	N	N	N
J65R1500	37 5 12	95 40 58	2	.7	.07	.5	70	N	N	N
J65R1520	37 5 12	95 40 58	3	.7	<.05	.5	100	N	N	N
J65R1540	37 5 12	95 40 58	3	1	.05	.5	150	N	N	N
J65R1560	37 5 12	95 40 58	5	1	.05	.5	150	N	N	N
J65R1575	37 5 12	95 40 58	2	.5	.1	.5	70	N	N	N
J65R1580	37 5 12	95 40 58	.5	1	.1	.7	150	N	N	N

TABLE 1--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 65, 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
J65R0220	100	200	3	N	N	20	70	15	30	N	<20	50
J65R0240	100	200	3	N	N	30	70	15	50	N	<20	50
J65R0260	100	200	5	N	N	20	70	30	50	N	<20	50
J65R0280	100	200	3	N	N	20	100	10	50	N	<20	50
J65R0300	100	150	2	N	N	20	100	20	20	N	<20	50
J65R0320	150	150	3	N	N	20	100	30	30	5	<20	50
J65R0340	150	100	2	N	N	30	100	20	30	N	<20	50
J65R0380	100	200	2	N	N	20	70	15	50	N	<20	30
J65R0400	100	200	3	N	N	20	50	15	30	N	<20	50
J65R0420	150	200	3	N	N	15	70	20	30	5	<20	30
J65R0440	150	1,000	1.5	N	N	7	150	30	30	N	<20	50
J65R0460	100	200	2	N	N	7	50	15	20	N	<20	15
J65R0480	100	200	2	N	N	10	70	20	50	N	<20	20
J65R0500	70	100	1	N	N	5	20	7	N	N	<20	10
J65R0520	100	300	2	N	N	5	50	15	20	N	<20	10
J65R0540	100	200	1.5	N	N	5	50	15	20	N	<20	15
J65R0560	100	500	2	N	N	10	70	50	50	N	<20	50
J65R0600	100	200	2	N	N	15	70	20	50	N	<20	30
J65R0620	100	300	2	N	N	10	50	20	50	N	<20	15
J65R0640	100	300	2	N	N	5	70	15	50	N	<20	10
J65R0660	100	300	3	N	N	7	70	20	50	N	<20	15
J65R0680	100	300	3	N	N	15	100	20	70	N	<20	30
J65R0700	100	100	2	N	N	10	100	20	N	10	<20	50
J65R0740	100	150	2	N	N	20	150	70	20	15	<20	100
J65R0780	100	200	2	N	N	15	200	50	30	10	<20	70
J65R0820	150	1,000	2	N	N	15	100	30	50	N	<20	30
J65R0840	150	300	5	N	N	20	150	50	50	N	<20	150
J65R0860	100	300	3	N	N	20	100	10	50	N	<20	50
J65R0900	100	200	2	N	N	20	100	10	50	<5	<20	50
J65R0940	100	200	2	N	N	5	100	7	30	N	<20	20
J65R0960	150	300	2	N	N	7	70	15	30	N	<20	10
J65R0980	100	200	2	N	N	10	50	10	30	N	<20	10
J65R1000	100	300	1.5	N	N	10	50	10	30	N	<20	15
J65R1040	50	200	1.5	N	N	10	30	7	20	N	<20	15
J65R1080	50	150	1	N	N	10	20	10	20	N	N	20
J65R1120	20	100	N	N	N	N	N	5	N	N	N	<5
J65R1160	150	200	5	N	N	30	100	30	50	<5	N	100
J65R1200	150	200	5	N	N	20	150	20	70	N	N	50
J65R1240	100	150	3	N	N	10	150	20	50	N	N	70
J65R1260	70	50	N	N	N	N	N	<5	N	N	N	7
J65R1280	100	50	N	N	N	N	N	<5	N	N	N	7
J65R1300	100	70	N	N	N	N	10	5	N	N	N	10
J65R1340	100	70	N	N	N	30	20	50	20	15	N	70
J65R1360	100	70	1	N	N	7	20	20	20	N	N	20
J65R1380	100	50	N	N	N	5	50	10	N	N	N	20
J65R1400	100	70	N	N	N	N	10	20	N	N	N	10
J65R1420	70	50	N	N	N	N	N	5	N	N	N	10
J65R1440	100	70	1	N	N	5	20	5	30	N	N	20
J65R1460	100	70	1	N	N	N	15	5	N	N	N	20
J65R1480	100	100	1	N	N	10	30	10	20	N	N	30
J65R1500	150	300	2	N	N	10	100	50	20	N	<20	50
J65R1520	150	200	2	N	N	20	100	15	30	N	<20	50
J65R1540	150	300	3	N	N	20	100	20	30	10	<20	30
J65R1560	150	300	5	N	N	30	100	50	20	50	<20	50
J65R1575	100	200	2	N	N	20	100	50	30	7	<20	70
J65R1580	150	200	3	N	N	30	100	30	30	15	<20	50

TABLE 1--SPECTROGRAPHIC ANALYSES OF INSOLUBLE RESIDUE SAMPLES FROM DRILL HOLE NO. 65, 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#
J65R0220	10	N	20	N	100	150	N	30	N	150	N	20
J65R0240	<10	N	20	N	150	150	N	20	N	100	N	20
J65R0260	30	N	20	N	150	150	N	20	N	100	N	20
J65R0280	<10	N	20	N	150	150	N	30	N	200	N	20
J65R0300	10	N	20	N	100	150	N	15	N	100	N	20
J65R0320	10	N	15	N	100	100	N	15	N	100	N	20
J65R0340	N	N	15	N	100	100	N	20	N	150	N	20
J65R0380	N	N	10	N	100	70	N	20	N	300	N	20
J65R0400	N	N	15	N	100	100	N	30	N	200	N	20
J65R0420	10	N	15	N	100	100	N	20	N	100	N	20
J65R0440	20	N	7	N	200	100	N	10	N	200	N	20
J65R0460	10	N	10	N	N	100	N	15	N	200	N	20
J65R0480	15	N	15	N	N	150	N	20	N	200	N	20
J65R0500	N	N	5	N	N	70	N	10	N	150	N	20
J65R0520	N	N	10	N	100	100	N	30	N	300	N	20
J65R0540	N	N	10	N	N	100	N	20	N	200	N	20
J65R0560	10	N	15	N	100	150	N	15	500	100	N	20
J65R0600	10	N	10	N	100	150	N	20	300	150	N	20
J65R0620	<10	N	10	N	150	150	N	30	N	300	N	20
J65R0640	10	N	15	N	100	100	N	30	N	200	N	20
J65R0660	15	N	20	N	100	100	N	30	N	150	N	20
J65R0680	10	N	20	N	150	150	N	30	N	150	N	20
J65R0700	10	N	5	N	N	100	N	N	700	100	N	20
J65R0740	20	N	10	N	N	200	N	10	<200	100	N	20
J65R0780	15	N	10	N	N	200	N	15	200	150	N	20
J65R0820	10	N	15	N	100	150	N	20	200	200	N	20
J65R0840	30	N	20	N	100	150	N	20	500	100	N	20
J65R0860	15	N	15	N	100	150	N	30	N	150	N	20
J65R0900	10	N	15	N	100	150	N	20	N	200	N	20
J65R0940	10	N	15	N	100	100	N	20	N	200	N	20
J65R0960	<10	N	15	N	100	100	N	50	<200	300	N	20
J65R0980	<10	N	10	N	N	100	N	20	N	300	N	20
J65R1000	<10	N	10	N	N	100	N	20	N	300	N	20
J65R1040	N	N	7	N	N	100	N	20	N	500	N	20
J65R1080	<10	N	<5	N	N	70	N	20	N	300	N	20
J65R1120	N	N	N	N	N	10	N	10	N	70	N	20
J65R1160	50	N	10	N	100	100	N	20	N	100	N	20
J65R1200	20	N	20	N	100	200	N	30	N	150	N	20
J65R1240	15	N	15	N	100	150	N	30	N	200	N	20
J65R1260	N	N	N	N	N	15	N	N	N	50	N	40
J65R1280	N	N	N	N	N	15	N	N	N	50	N	40
J65R1300	N	N	N	N	N	30	N	N	N	70	N	40
J65R1340	15	N	N	N	N	70	N	N	300	70	N	40
J65R1360	N	N	5	N	N	70	N	N	N	100	N	40
J65R1380	N	N	<5	N	N	50	N	N	N	70	N	40
J65R1400	N	N	<5	N	N	30	N	N	N	50	N	40
J65R1420	N	N	N	N	N	10	N	N	N	20	N	40
J65R1440	N	N	<5	N	N	70	N	N	N	70	N	40
J65R1460	N	N	<5	N	N	50	N	N	N	70	N	40
J65R1480	10	N	5	N	N	50	N	10	N	100	N	40
J65R1500	10	N	15	N	N	100	N	30	<200	150	N	40
J65R1520	10	N	20	N	N	200	N	30	N	150	N	31
J65R1540	15	N	20	N	N	150	N	20	<200	150	N	31
J65R1560	30	N	15	N	N	150	N	20	200	100	N	31
J65R1575	10	N	10	N	100	200	N	20	N	150	N	31
J65R1580	20	N	20	N	N	200	N	30	N	150	N	78

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 66, 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
J66R1060	37 1 42	94 44 17	.1	.02	.05	.005	10	N	N	N
J66R1070	37 1 42	94 44 17	.1	.02	.05	.005	<10	N	N	N
J66R1080	37 1 42	94 44 17	1.5	.1	.07	.07	20	<.5	N	N
J66R1090	37 1 42	94 44 17	.2	.02	.05	.005	<10	N	N	N
J66R1100	37 1 42	94 44 17	.15	<.02	.07	.05	<10	N	N	N
J66R1110	37 1 42	94 44 17	.5	.02	.05	.01	30	N	N	N
J66R1120	37 1 42	94 44 17	.1	<.02	.05	.002	<10	N	N	N
J66R1130	37 1 42	94 44 17	.15	.02	.05	.003	<10	N	N	N
J66R1140	37 1 42	94 44 17	.15	.02	.05	.005	<10	N	N	N
J66R1150	37 1 42	94 44 17	.2	.02	.07	.005	<10	N	N	N
J66R1160	37 1 42	94 44 17	.15	.02	.05	.002	<10	N	N	N
J66R1170	37 1 42	94 44 17	.15	.02	.05	.002	<10	N	N	N
J66R1180	37 1 42	94 44 17	.15	.02	.07	.002	<10	N	N	N
J66R1190	37 1 42	94 44 17	.3	.02	.05	.007	<10	N	N	N
J66R1200	37 1 42	94 44 17	.5	.02	.1	<.002	<10	N	N	N
J66R1210	37 1 42	94 44 17	.3	.03	.1	.005	10	N	N	N
J66R1220	37 1 42	94 44 17	.7	.02	.07	.007	10	N	N	N
J66R1230	37 1 42	94 44 17	.2	.02	.1	.007	<10	N	N	N
J66R1240	37 1 42	94 44 17	.5	.03	.1	.015	<10	N	N	N
J66R1250	37 1 42	94 44 17	.2	.02	<.05	.007	<10	N	N	N
J66R1260	37 1 42	94 44 17	.2	.02	.05	.005	<10	N	N	N
J66R1270	37 1 42	94 44 17	.2	.02	.05	.005	<10	N	N	N
J66R1280	37 1 42	94 44 17	.15	.02	.05	.007	<10	N	N	N
J66R1287	37 1 42	94 44 17	1	.03	.05	.02	<10	N	N	N

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 66, JOPLIN 1 x 2 QUADRANGLE, MISSOURI AND KANSAS.--Continued

Sample	B-ppm	Ba-ppm	Be-ppm	Bi-ppm	Cd-ppm	Co-ppm	Cr-ppm	Cu-ppm	La-ppm	Mo-ppm	Nb-ppm	Ni-ppm
	s	s	s	s	s	s	s	s	s	s	s	s
J66R1060	20	70	N	N	N	N	N	5	N	N	N	N
J66R1070	30	50	N	N	N	N	N	<5	N	N	N	N
J66R1080	50	150	N	N	N	10	10	20	N	30	N	20
J66R1090	20	100	N	N	N	N	N	5	N	<5	N	<5
J66R1100	20	150	N	N	N	N	N	<5	N	N	N	<5
J66R1110	20	50	N	N	N	N	N	5	N	5	N	5
J66R1120	30	50	N	N	N	N	N	<5	N	N	N	<5
J66R1130	20	50	N	N	N	N	N	5	N	N	N	<5
J66R1140	20	30	N	N	N	N	N	<5	N	<5	N	<5
J66R1150	20	70	N	N	N	N	N	<5	N	<5	N	<5
J66R1160	20	30	N	N	N	N	N	<5	N	N	N	<5
J66R1170	20	20	N	N	N	N	N	5	N	N	N	<5
J66R1180	20	70	N	N	N	N	N	<5	N	N	N	<5
J66R1190	20	50	N	N	N	N	N	7	N	N	N	<5
J66R1200	15	30	N	N	N	N	N	7	N	N	N	5
J66R1210	15	50	N	N	N	N	N	7	N	5	N	5
J66R1220	15	50	N	N	N	N	N	10	N	5	N	7
J66R1230	20	50	N	N	N	N	N	7	N	<5	N	<5
J66R1240	30	70	N	N	N	N	N	7	N	<5	N	<5
J66R1250	20	50	N	N	N	N	N	10	N	5	N	<5
J66R1260	30	30	N	N	N	N	N	10	N	15	N	<5
J66R1270	30	30	N	N	N	N	N	10	N	10	N	<5
J66R1280	30	50	N	N	N	N	N	<5	N	N	N	<5
J66R1287	20	100	N	N	N	<5	N	7	N	5	N	10

TABLE 2--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 66, 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#
J66R1060	N	N	N	N	N	N	N	N	N	N	N	78
J66R1070	N	N	N	N	N	N	N	N	N	N	N	78
J66R1080	N	N	N	N	N	30	N	N	N	15	N	78
J66R1090	N	N	N	N	N	N	N	N	N	N	N	78
J66R1100	N	N	N	N	N	N	N	N	N	N	N	78
J66R1110	N	N	N	N	N	N	N	N	N	N	N	78
J66R1120	N	N	N	N	N	N	N	N	N	N	N	78
J66R1130	N	N	N	N	N	N	N	N	N	N	N	78
J66R1140	N	N	N	N	N	N	N	N	N	N	N	78
J66R1150	N	N	N	N	N	N	N	N	N	N	N	78
J66R1160	N	N	N	N	N	N	N	N	N	N	N	78
J66R1170	N	N	N	N	N	N	N	N	N	N	N	78
J66R1180	N	N	N	N	N	N	N	N	N	N	N	78
J66R1190	N	N	N	N	N	N	N	N	N	N	N	78
J66R1200	N	N	N	N	N	N	N	N	N	N	N	78
J66R1210	N	N	N	N	N	N	N	N	200	N	N	78
J66R1220	N	N	N	N	N	N	N	N	N	N	N	78
J66R1230	N	N	N	N	N	N	N	N	N	N	N	78
J66R1240	N	N	N	N	N	N	N	N	N	20	N	78
J66R1250	N	N	N	N	N	N	N	N	N	N	N	78
J66R1260	N	N	N	N	N	N	N	N	N	N	N	78
J66R1270	N	N	N	N	N	N	N	N	300	N	N	78
J66R1280	N	N	N	N	N	N	N	N	N	10	N	78
J66R1287	N	N	N	N	N	N	N	N	N	30	N	78

TABLE 3--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 67, 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
J67R0520	37 45 22	95 14 33	3	.5	.1	.5	150	2	N	N
J67R0540	37 45 22	95 14 33	3	.5	.05	.5	150	N	N	N
J67R0560	37 45 22	95 14 33	2	.7	.05	.5	100	N	N	N
J67R0580	37 45 22	95 14 33	3	1	.05	.7	150	N	N	N
J67R0600	37 45 22	95 14 33	3	.7	.05	.5	150	N	N	N
J67R0620	37 45 22	95 14 33	3	1	.05	.5	150	.5	N	N
J67R0640	37 45 22	95 14 33	2	.7	<.05	.5	150	N	N	N
J67R0660	37 45 22	95 14 33	3	.7	.05	.7	100	N	N	N
J67R0680	37 45 22	95 14 33	3	.7	<.05	.5	150	N	N	N
J67R0700	37 45 22	95 14 33	3	.7	<.05	.5	100	<.5	N	N
J67R0720	37 45 22	95 14 33	2	.7	.05	.5	100	N	N	N
J67R0740	37 45 22	95 14 33	5	.5	.05	.5	150	.5	N	N
J67R0760	37 45 22	95 14 33	3	.5	.05	.5	200	N	N	N
J67R0780	37 45 22	95 14 33	2	.3	.05	.5	100	N	N	N
J67R0800	37 45 22	95 14 33	2	.5	.05	.7	100	N	N	N
J67R0820	37 45 22	95 14 33	1.5	.2	<.05	.5	70	N	N	N
J67R0840	37 45 22	95 14 33	1.5	.3	.05	.7	70	N	N	N
J67R0860	37 45 22	95 14 33	2	.5	<.05	.5	100	N	N	N
J67R0900	37 45 22	95 14 33	3	.5	.05	.5	100	N	N	N
J67R0940	37 45 22	95 14 33	3	.3	.05	.3	100	N	N	N
J67R0980	37 45 22	95 14 33	1.5	.2	.05	.2	70	N	N	N
J67R1000	37 45 22	95 14 33	.7	.07	.05	.15	30	N	N	N
J67R1020	37 45 22	95 14 33	.3	.07	.05	.1	20	N	N	N
J67R1040	37 45 22	95 14 33	.5	.1	.05	.15	50	N	N	N
J67R1080	37 45 22	95 14 33	.7	.1	.05	.2	50	N	N	N
J67R1100	37 45 22	95 14 33	1	.2	.1	.2	70	N	N	N
J67R1140	37 45 22	95 14 33	1.5	.3	.15	.3	100	N	N	N
J67R1180	37 45 22	95 14 33	2	1	.07	.5	150	N	N	N
J67R1220	37 45 22	95 14 33	2	1	.1	.5	150	N	N	N
J67R1260	37 45 22	95 14 33	2	.5	.05	.3	70	N	N	N
J67R1300	37 45 22	95 14 33	1.5	.5	.07	.3	100	N	N	N
J67R1340	37 45 22	95 14 33	1.5	.5	.07	.3	100	N	N	N
J67R1380	37 45 22	95 14 33	1	.15	.05	.15	50	N	N	N
J67R1420	37 45 22	95 14 33	1.5	.3	.07	.3	100	N	N	N
J67R1460	37 45 22	95 14 33	2	.5	.07	.5	100	N	N	N
J67R1500	37 45 22	95 14 33	1.5	.5	.07	.5	100	N	N	N
J67R1540	37 45 22	95 14 33	2	.3	.1	.3	100	N	N	N
J67R1580	37 45 22	95 14 33	1.5	.2	.1	.3	70	N	N	N
J67R1620	37 45 22	95 14 33	2	.5	.05	.5	100	N	N	N
J67R1660	37 45 22	95 14 33	2	.5	.07	.5	150	N	N	N
J67R1700	37 45 22	95 14 33	1.5	.3	.07	.5	100	N	N	N

TABLE 3--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 67, 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
J67R0520	150	300	3	N	20	10	300	100	20	50	<20	200
J67R0540	100	500	2	N	N	7	100	30	50	5	<20	20
J67R0560	150	500	3	N	N	10	100	20	50	N	<20	20
J67R0580	150	300	3	N	N	10	100	50	70	N	<20	50
J67R0600	100	300	2	N	N	10	100	30	50	N	N	50
J67R0620	150	300	3	N	N	20	200	50	50	10	<20	100
J67R0640	100	300	2	N	N	10	100	30	50	<5	<20	50
J67R0660	150	500	2	N	N	15	100	30	70	5	<20	50
J67R0680	100	300	2	N	N	10	100	15	50	N	<20	30
J67R0700	100	200	2	N	N	20	150	100	50	7	<20	70
J67R0720	150	500	2	N	N	10	150	50	70	N	<20	30
J67R0740	150	300	3	N	N	20	150	50	70	N	<20	70
J67R0760	150	150	3	N	N	7	150	20	50	N	N	50
J67R0780	100	200	2	N	N	20	100	20	50	<5	<20	50
J67R0800	100	200	2	N	N	20	150	20	70	N	<20	50
J67R0820	70	100	1.5	N	N	10	100	10	50	N	<20	30
J67R0840	100	150	2	N	N	10	100	7	50	N	<20	30
J67R0860	100	200	3	N	N	15	150	20	70	N	<20	70
J67R0900	100	200	2	N	N	15	100	20	70	N	<20	50
J67R0940	100	100	1.5	N	N	10	70	20	30	N	N	50
J67R0980	100	100	1	N	N	10	50	20	20	N	N	30
J67R1000	50	50	N	N	N	<5	20	7	N	N	N	10
J67R1020	70	50	N	N	N	N	N	5	N	N	N	7
J67R1040	50	50	N	N	N	<5	10	10	N	N	N	10
J67R1080	70	70	N	N	N	5	10	7	N	N	N	15
J67R1100	100	70	1	N	N	15	30	20	20	5	N	30
J67R1140	100	100	1.5	N	N	20	50	50	30	7	N	50
J67R1180	100	100	2	N	N	20	100	70	N	<5	N	50
J67R1220	150	200	3	N	N	20	100	30	20	N	N	70
J67R1260	100	100	2	N	N	10	50	20	20	20	N	50
J67R1300	100	150	2	N	N	10	50	30	N	5	N	50
J67R1340	100	70	2	N	N	10	70	30	N	N	N	50
J67R1380	70	50	1	N	N	5	20	15	20	N	N	20
J67R1420	100	70	1.5	N	N	15	50	100	20	N	N	30
J67R1460	100	100	2	N	N	15	70	20	20	5	N	50
J67R1500	100	100	2	N	N	10	50	50	20	N	N	50
J67R1540	100	100	1.5	N	N	15	30	30	20	N	N	50
J67R1580	100	70	1.5	N	N	7	30	20	20	<5	N	20
J67R1620	100	100	2	N	N	20	70	100	20	<5	N	50
J67R1660	100	100	2	N	N	20	100	50	30	<5	N	50
J67R1700	100	100	1.5	N	N	10	70	20	20	<5	N	50

TABLE 3--SPECTROGRAPHIC ANALYSES OF INSOLUBLE-RESIDUE SAMPLES FROM DRILL HOLE NO. 67, 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#
J67R0520	50	N	10	N	N	500	N	15	700	150	N	20
J67R0540	<10	N	10	N	200	100	N	30	200	200	N	20
J67R0560	10	N	20	10	150	200	N	20	N	150	N	20
J67R0580	10	N	20	10	200	200	N	30	<200	200	N	20
J67R0600	10	N	15	N	100	200	N	20	N	100	N	20
J67R0620	15	N	15	N	200	300	N	20	<200	150	N	20
J67R0640	10	N	15	N	150	200	N	20	N	150	N	20
J67R0660	10	N	15	N	300	200	N	30	N	200	N	20
J67R0680	10	N	15	N	150	200	N	30	N	200	N	20
J67R0700	20	N	15	N	100	300	N	30	N	100	N	20
J67R0720	<10	N	20	N	200	150	N	30	N	200	N	20
J67R0740	20	N	15	N	200	200	N	30	500	200	N	20
J67R0760	15	N	10	N	200	200	N	20	N	150	N	20
J67R0780	15	N	15	N	200	150	N	30	N	300	N	20
J67R0800	15	N	15	N	200	200	N	30	N	500	N	20
J67R0820	<10	N	10	N	200	150	N	20	200	500	N	20
J67R0840	10	N	10	N	200	150	N	20	N	200	N	20
J67R0860	15	N	20	10	150	150	N	30	N	150	N	20
J67R0900	15	N	15	N	100	200	N	50	N	200	N	20
J67R0940	<10	N	10	N	N	100	N	15	N	100	N	40
J67R0980	10	N	5	N	N	50	N	10	N	100	N	40
J67R1000	N	N	N	N	N	30	N	N	N	50	N	40
J67R1020	N	N	N	N	N	20	N	N	N	30	N	40
J67R1040	N	N	N	N	N	50	N	N	N	50	N	40
J67R1080	N	N	<5	N	N	50	N	N	200	50	N	40
J67R1100	N	N	5	N	N	50	N	10	N	70	N	40
J67R1140	10	N	7	N	100	70	N	15	N	100	N	40
J67R1180	10	N	10	N	N	200	N	20	N	200	N	40
J67R1220	15	N	15	N	N	200	N	20	<200	150	N	40
J67R1260	N	N	7	N	N	150	N	10	N	100	N	40
J67R1300	15	N	7	N	N	100	N	<10	N	100	N	31
J67R1340	15	N	7	N	N	150	N	10	N	100	N	78
J67R1380	10	N	<5	N	N	50	N	N	N	70	N	78
J67R1420	50	N	5	N	N	70	N	10	N	100	N	78
J67R1460	10	N	10	N	N	100	N	15	N	150	N	78
J67R1500	<10	N	10	N	N	100	N	10	N	100	N	78
J67R1540	<10	N	7	N	N	70	N	10	N	100	N	78
J67R1580	N	N	5	N	N	70	N	10	N	100	N	78
J67R1620	30	N	10	N	N	100	N	15	N	150	N	78
J67R1660	20	N	15	N	N	100	N	15	N	150	N	78
J67R1700	<10	N	10	N	N	70	N	15	N	100	N	78