

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

**Spectrographic analyses of insoluble-residue samples,
Harrison 1° x 2° quadrangle, Missouri and Arkansas:
Drill holes nos. 16, 17, and 20**

by

B. Chazin* and M. S. Erickson*

Open-File Report 87-654

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.

*U.S. Geological Survey, P.O. Box 25046, DFC, MS 973, Denver, Colorado 80225

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

CONTENTS

	Page
Introduction.....	1
Preparation and analysis of samples.....	1
Description of data tables.....	3
Explanation of data.....	4
RASS.....	4
Acknowledgments.....	4
References.....	4

FIGURE

Figure 1. Locations of drill holes, Harrison 1° x 2° quadrangle, Missouri and Arkansas.....	2
--	---

TABLES

Table 1. Spectrographic analyses of insoluble-residue samples from drill hole no. 16, Harrison 1° x 2° quadrangle, Missouri and Arkansas.....	5
Table 2. Spectrographic analyses of insoluble-residue samples from drill hole no. 17, Harrison 1° x 2° quadrangle, Missouri and Arkansas.....	8
Table 3. Spectrographic analyses of insoluble-residue samples from drill hole no. 20, Harrison 1° x 2° quadrangle, Missouri and Arkansas.....	11

INTRODUCTION

Geochemical studies of the Harrison 1° x 2° quadrangle, Missouri and Arkansas, 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 Arkansas Geological Commission. 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 Arkansas Geological Commission. None of the holes are company confidential and none intersect economically significant mineralized ground.

The analytical results for drill hole no. 16 (Arkansas I.D., Layne Western #1 Lost Bridge Village, Benton Co. 1822), drill hole no. 17 (Arkansas I.D., Layne Western Compton well, Newton Co. 2291) and drill hole no. 20 (Arkansas I.D., Layne Western #2 Valley Spring water well, Boone Co. 2292) are given in this report. Drill hole no. 16 is located in sec. 13, T. 20 N., R. 28 W. in Benton County, Arkansas; drill hole no. 17 is located in sec. 26, T. 17 N., R. 22 W. in Newton County, Arkansas; and drill hole no. 20 is located in sec. 33, T. 18 N., R. 19 W. in Boone Co., Arkansas. Data for the insoluble-residue samples in drill holes 16, 17, and 20 are listed in tables 1, 2, and 3, respectively. State I.D., well name and/or well county number, county, and location allow identification and the ability to locate samples in Arkansas at the Arkansas Geologic Commission, Little Rock, Arkansas.

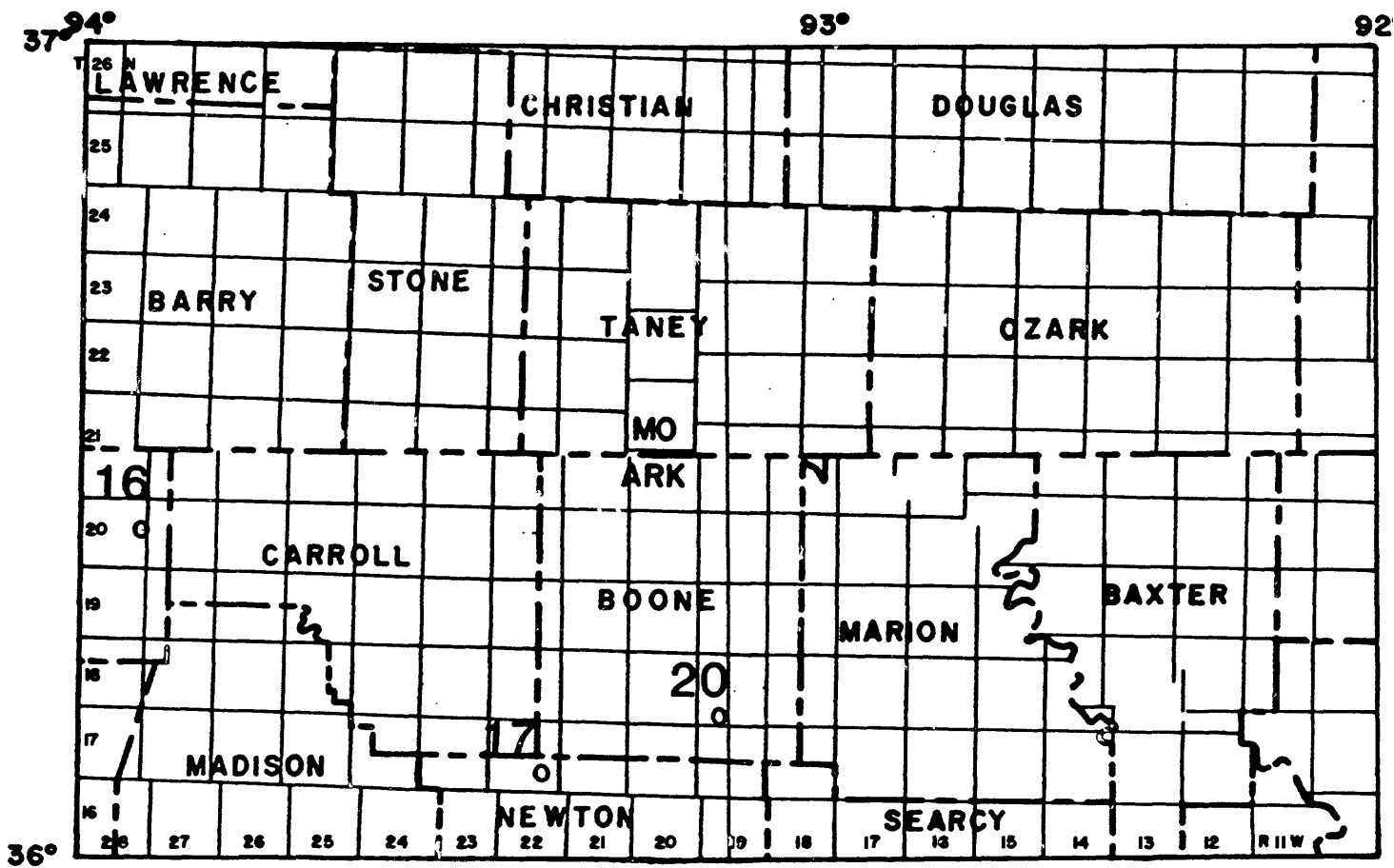
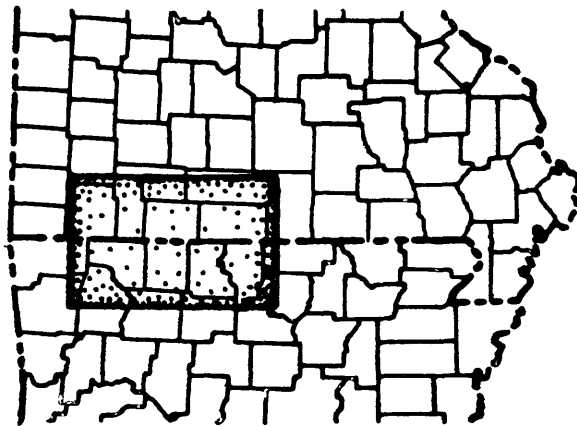
PREPARATION AND ANALYSIS OF SAMPLES

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 then 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 in 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).



HARRISON 1° X 2° QUADRANGLE

Locations of drill holes discussed in this report

The visual lower limits of determination for the 31 elements that were determined spectrographically for this report are as follows:

For those given in percent:

Calcium	0.05
Iron	0.05
Magnesium	0.02
Titanium	0.002

For those given in ppm:

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

DESCRIPTION OF DATA TABLES

Each sample is identified by an eight-character code beginning with the letter H, signifying Harrison. The next number signifies the USGS drill-hole number. The letter R follows this number and signifies insoluble residue. The last four digits identify the depth of the sample from the drill-hole collar. Most samples are composites of 10-foot intervals; some are composites of thicker intervals (15 to as much as 100 feet), 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 (tables 1 through 3) following the thorium column. The code and formation names are as follows:

<u>Code</u>	<u>Formation</u>
16	Eminence Formation
17	Gunter Sandstone member of the Gasconade Formation
18	Gasconade Formation
19	Roubidoux Formation
22	Powell Dolomite
30	Chattanooga Shale
31	Undifferentiated Mississippian units
32	Undifferentiated Pennsylvanian units
39	Jefferson City-Cotter undifferentiated
40	Undifferentiated Ordovician units
42	Everton-St. Peter 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 percent (%); all other elements are in parts per million. Other symbols shown on the tables are: N = Not detected at the limit of determination shown; < = 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 Missouri Division of Geology and Land Survey--Dr. Wallace B. Howe, former Director, and Dr. James H. Williams, Director--and the Arkansas Geological Commission, Dr. Norman F. Williams, State Geologist, for making these drill-hole samples available from their sample libraries.

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.
- Missouri Geological Survey, 1979, Geologic Map of Missouri: Rolla, Missouri, scale 1:500,000.
- 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. H16, HARRISON 1 X 2
 QUADRANGLE, MISSOURI AND ARKANSAS

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

Sample	Fe-ppt. s	Mg-ppt. s	Ca-ppt. s	Ti-pct. s	Mn-ppm s	Ag-ppm s	As-ppm s	Au-ppm s	B-ppm s	Ba-ppm s
H16R0020	.05	.02	<.05	.015	10	N	N	N	150	<20
H16R0100	1.00	.30	.15	.100	20	N	N	N	100	100
H16R0160	7.00	2.00	<.05	1.000	300	N	N	N	200	700
H16R0190	5.00	.30	.20	.150	70	N	N	N	100	100
H16R0300	5.00	1.00	.10	.300	100	N	N	N	150	200
H16R0350	.15	.07	<.05	.050	10	N	N	N	30	100
H16R0450	2.00	1.00	<.05	.700	20	N	N	N	150	500
H16R0550	2.00	1.00	.07	.300	20	N	N	N	150	300
H16R0650	1.50	.50	.20	.200	20	N	N	N	100	200
H16R0740	5.00	.70	.10	.500	30	N	N	N	150	500
H16R0800	2.00	.70	<.05	.500	30	N	N	N	150	200
H16R0850	2.00	.70	.05	.500	10	N	N	N	100	200
H16R0900	1.50	.30	.07	.200	<10	N	N	N	100	150
H16R0950	3.00	.50	<.05	.200	20	N	N	N	150	150
H16R1020	1.00	.30	.05	.200	15	N	N	N	100	200
H16R1100	1.00	.20	.05	.100	15	N	N	N	70	200
H16R1150	.30	.15	.05	.100	10	N	N	N	100	200
H16R1200	.20	.10	<.05	.100	10	N	N	N	50	150
H16R1250	2.00	.10	<.05	.100	10	N	N	N	30	150
H16R1300	.30	.05	.05	.010	<10	N	N	N	100	50
H16R1350	2.00	.10	.07	.070	<10	N	N	N	100	100
H16R1400	.50	.03	.05	.007	<10	N	N	N	70	30
H16R1500	7.00	.03	<.05	.070	<10	N	<200	N	500	50
H16R1550	2.00	.02	<.05	.020	<10	N	N	N	20	20
H16R1625	.70	.15	<.05	.100	10	N	N	N	50	30

TABLE 1.-- SPECTROGRAPHIC ANALYSES OF INSOLUBLE - RESIDUE SAMPLES FROM DRILL HOLE NO. H16, HARRISON 1 X 2 QUADRANGLE, MISSOURI AND ARKANSAS--Continued

Sample	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	Pb-ppm s
H16R0020	<1	N	N	<5	15	<5	N	N	N	7	<10
H16R0100	<1	N	N	5	20	5	N	N	N	50	<10
H16R0160	2	N	N	15	150	100	100	20	<20	50	50
H16R0190	<1	N	N	50	20	50	N	<5	N	300	<10
H16R0300	1	N	N	<5	50	30	N	15	N	10	<10
H16R0350	N	N	N	<5	10	<5	N	<5	N	7	<10
H16R0450	1	N	N	15	100	20	N	<5	<20	50	10
H16R0550	1	N	N	7	50	30	N	7	N	15	<10
H16R0650	<1	N	N	5	30	30	N	5	N	10	<10
H16R0740	<1	N	N	7	70	70	N	20	N	30	50
H16R0800	<1	N	N	10	100	50	N	10	N	20	<10
H16R0850	<1	N	N	5	50	50	N	50	N	15	<10
H16R0900	<1	N	N	7	50	20	N	15	N	10	<10
H16R0950	1	N	N	<5	20	20	N	10	N	15	10
H16R1020	<1	N	N	<5	50	20	N	5	N	10	70
H16R1100	<1	N	N	<5	20	7	N	5	N	10	<10
H16R1150	N	N	N	<5	20	<5	N	<5	N	10	<10
H16R1200	N	N	N	<5	15	<5	N	N	N	7	<10
H16R1250	N	N	N	<5	15	10	N	<5	N	7	<10
H16R1300	N	N	N	<5	10	<5	N	<5	N	7	<10
H16R1350	N	N	N	<5	10	50	N	N	N	7	<10
H16R1400	N	N	N	<5	<10	<5	N	N	N	7	<10
H16R1500	N	N	N	<5	<10	20	N	30	N	10	<10
H16R1550	N	N	N	<5	10	<5	N	5	N	7	<10
H16R1625	1	N	N	<5	10	5	N	5	N	20	<10

TABLE 1.-- SPECTROGRAPHIC ANALYSES OF INSOLUBLE - RESIDUE SAMPLES FROM DRILL HOLE NO. H16, HARRISON 1 X 2
 QUADRANGLE, MISSOURI AND ARKANSAS--Continued

Sample	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
H16R0020	N	N	N	<100	15	N	N	N	N	N	31
H16R0100	N	5	N	<100	100	N	N	N	20	N	31
H16R0160	N	20	N	150	500	N	50	N	100	N	31
H16R0190	N	5	N	<100	100	N	10	<200	100	N	30
H16R0300	N	5	N	<100	100	N	<10	N	100	N	39
H16R0350	N	N	N	100	10	N	N	N	100	N	39
H16R0450	N	7	N	<100	100	N	<10	N	200	N	39
H16R0550	N	5	N	200	70	N	<10	N	200	N	39
H16R0650	N	<5	N	<100	50	N	N	N	100	N	39
H16R0740	N	5	N	<100	100	N	N	<200	200	N	39
H16R0800	N	5	N	<100	100	N	N	N	150	N	39
H16R0850	N	5	N	<100	100	N	N	300	100	N	39
H16R0900	N	<5	N	<100	50	150	N	N	100	N	39
H16R0950	N	5	N	100	50	<50	N	N	100	N	39
H16R1020	N	<5	N	<100	50	<50	N	N	100	N	39
H16R1100	N	<5	N	<100	30	<50	N	N	100	N	19
H16R1150	N	<5	N	<100	30	<50	N	N	50	N	19
H16R1200	N	N	N	<100	20	<50	N	N	100	N	19
H16R1250	N	N	N	<100	20	<50	N	N	200	N	19
H16R1300	N	N	N	<100	15	<50	N	N	N	N	18
H16R1350	N	N	N	<100	30	300	N	N	N	N	18
H16R1400	N	N	N	<100	20	<50	N	N	N	N	18
H16R1500	N	N	N	<100	30	<50	N	N	N	N	18
H16R1550	N	N	N	<100	15	100	N	N	30	N	17
H16R1625	N	<5	N	<100	50	<50	N	N	50	N	17

TABLE 2.-- SPECTROGRAPHIC ANALYSES OF INSOLUBLE - RESIDUE SAMPLES FROM DRILL HOLE NO. H17, HARRISON 1 X 2 QUADRANGLE, MISSOURI AND ARKANSAS

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

Sample	Fe-ppt. s	Mg-pct. s	Ce-pct. s	Ti-pct. s	Mn-ppt. s	Ag-ppt. s	As-ppt. s	Au-ppt. s	B-ppt. s	Be-ppt. s
H17R0015	1.00	.30	N	.500	20	N	N	N	150	100
H17R0045	2.00	.70	N	.700	50	N	N	N	200	300
H17R0075	3.00	.50	<.05	.700	100	N	N	N	150	200
H17R0125	.50	.20	N	.500	15	N	N	N	100	150
H17R0195	1.50	.70	<.05	.700	100	N	N	N	200	300
H17R0245	1.50	.70	.05	.700	150	N	N	N	200	300
H17R0300	1.00	.30	.05	.500	30	N	N	N	150	200
H17R0350	1.00	.70	N	.500	50	N	N	N	200	200
H17R0400	1.50	.50	<.05	.500	70	N	N	N	150	100
H17R0450	1.50	.70	.10	.700	70	N	N	N	200	150
H17R0500	2.00	.70	<.05	.700	30	N	N	N	200	70
H17R0550	1.50	.50	.05	.700	50	N	N	N	150	100
H17R0600	1.00	.50	<.05	.500	30	N	N	N	150	70
H17R0650	1.50	.70	N	.700	50	N	N	N	200	150
H17R0700	1.50	.70	<.05	.500	70	1.0	N	N	200	200
H17R0750	3.00	.70	.10	.300	150	3.0	N	N	200	300
H17R0850	1.00	.20	.05	.200	20	N	N	N	100	100
H17R0950	.70	.02	.20	.020	10	N	N	N	50	<20
H17R1050	.50	.15	.50	.150	20	N	N	N	70	70
H17R1150	.30	.02	.10	.015	15	N	N	N	50	<20
H17R1200	1.50	.10	.15	.070	10	N	N	N	20	20
H17R1250	.05	<.02	N	.010	N	N	N	N	N	N
H17R1300	.05	<.02	N	.007	N	N	N	N	N	N
H17R1350	.20	.03	<.05	.015	<10	N	N	N	20	<20
H17R1400	.30	.05	<.05	.030	<10	N	N	N	15	30
H17R1460	3.00	1.00	<.05	.300	30	<.5	N	N	200	300
H17R1500	1.50	.70	<.05	.200	50	N	N	N	150	300
H17R1650	2.00	.70	<.05	.200	30	N	N	N	150	200
H17R1800	1.00	.30	.05	.100	<10	N	N	N	100	100
H17R1880	.50	.05	<.05	.030	<10	N	N	N	50	100
H17R2000	1.00	.20	<.05	.100	10	N	N	N	100	100
H17R2150	1.00	.30	.07	.200	20	N	N	N	100	200
H17R2250	1.50	.30	<.05	.200	30	N	N	N	100	200
H17R2350	1.00	.15	.05	.100	15	N	N	N	70	70
H17R2450	2.00	.70	<.05	.300	70	N	N	N	100	300
H17R2550	.30	.07	.10	.030	N	N	N	N	70	30
H17R2650	.15	.02	<.05	.015	N	N	N	N	30	30
H17R2750	.15	.05	<.05	.030	<10	N	N	N	30	30
H17R2850	.20	.02	<.05	.007	<10	<.5	N	N	50	30
H17R2900	.50	.07	.05	.020	<10	<.5	N	N	50	20
H17R3000	.15	.02	.05	.015	<10	N	N	N	50	50
H17R3120	2.00	.15	.05	.070	15	<.5	200	N	50	50
H17R3210	<.05	<.02	N	.005	N	N	N	N	N	N

TABLE 2.-- SPECTROGRAPHIC ANALYSES OF INSOLUBLE - RESIDUE SAMPLES FROM DRILL HOLE NO. H17, HARRISON 1 X 2
 QUADRANGLE, MISSOURI AND ARKANSAS--Continued

Sample	Be-ppm g	Bi-ppm g	Cd-ppm g	Co-ppm g	Cr-ppm g	Cu-ppm g	La-ppm g	Mn-ppm g	Nb-ppm g	Ni-ppm g	Pb-ppm g
H17R0015	2	N	N	5	100	5	30	N	<20	20	N
H17R0045	5	N	N	7	150	15	70	N	<20	100	20
H17R0075	3	N	N	30	100	20	150	N	<20	150	30
H17R0125	2	N	N	5	70	7	30	N	N	15	N
H17R0195	3	N	N	7	150	30	50	N	<20	50	15
H17R0245	3	N	N	7	150	20	70	N	<20	50	15
H17R0300	2	N	N	5	100	7	30	N	<20	20	N
H17R0350	5	N	N	7	150	15	30	N	N	30	10
H17R0400	2	N	N	15	100	15	30	N	<20	50	30
H17R0450	3	N	N	10	150	20	50	N	<20	50	30
H17R0500	3	N	N	7	150	10	50	N	<20	70	10
H17R0550	2	N	N	7	150	7	50	N	<20	50	<10
H17R0600	2	N	N	7	100	7	50	N	<20	10	10
H17R0650	5	N	N	10	150	15	50	N	<20	70	20
H17R0700	5	N	N	10	300	30	50	N	N	100	50
H17R0750	5	N	N	7	700	50	50	N	<20	150	30
H17R0850	1	N	N	5	70	30	20	N	N	30	N
H17R0950	N	N	N	5	<10	5	N	N	N	15	N
H17R1050	<1	N	N	5	30	150	N	N	N	20	N
H17R1150	N	N	N	5	N	<5	N	N	N	15	N
H17R1200	<1	N	N	5	<10	7	N	N	N	20	N
H17R1250	N	N	N	N	N	N	N	N	N	<5	N
H17R1300	N	N	N	N	N	N	N	N	N	<5	N
H17R1350	N	N	N	N	N	5	N	N	N	N	N
H17R1400	N	N	N	N	N	5	N	N	N	N	N
H17R1460	1	N	N	10	100	30	N	N	<20	70	20
H17R1500	1	N	N	7	50	20	N	N	<20	20	15
H17R1650	1	N	N	7	70	30	N	N	<20	30	20
H17R1800	<1	N	N	5	10	10	N	N	<20	10	N
H17R1880	N	N	N	N	N	7	N	N	N	5	N
H17R2000	<1	N	N	5	20	20	N	N	N	15	10
H17R2150	<1	N	N	7	30	150	N	N	<20	15	15
H17R2250	<1	N	N	5	50	15	N	N	<20	15	15
H17R2350	<1	N	N	15	15	10	N	N	<20	10	10
H17R2450	1	N	N	30	70	30	N	N	<20	50	20
H17R2550	N	N	N	<5	N	5	N	N	N	5	N
H17R2650	N	N	N	N	N	<5	N	N	N	<5	N
H17R2750	N	N	N	N	N	N	N	N	<20	<5	N
H17R2850	N	N	N	N	N	7	N	N	N	5	N
H17R2900	N	N	N	5	N	5	N	N	N	5	N
H17R3000	N	N	N	N	N	<5	N	N	N	<5	N
H17R3120	N	N	N	5	10	15	N	N	<20	10	10
H17R3210	N	N	N	N	N	N	N	N	N	N	N

TABLE 2.-- SPECTROGRAPHIC ANALYSES OF INSOLUBLE - RESIDUE SAMPLES FROM DRILL HOLE NO. H17, HARRISON 1 X 2
 QUADRANGLE, MISSOURI AND ARKANSAS--Continued

Sample	Sb-ppm	Sc-ppm	Sn-ppm	Sr-ppm	V-ppm	W-ppm	Y-ppm	Zn-ppm	Zr-ppm	Th-ppm	Form
H17R0015	N	10	N	100	100	<50	20	N	>1,500	N	32
H17R0045	N	30	N	N	200	<50	30	N	150	N	32
H17R0075	N	20	N	200	150	<50	30	N	700	N	32
H17R0125	N	7	N	100	70	<50	15	N	200	N	32
H17R0195	N	20	N	100	150	<50	30	N	300	N	32
H17R0245	N	15	N	300	150	<50	30	N	150	N	32
H17R0300	N	10	N	200	150	<50	15	N	150	N	32
H17R0350	N	15	N	100	150	<50	20	N	150	N	32
H17R0400	N	10	N	100	200	<50	20	N	200	N	32
H17R0450	N	15	N	100	150	<50	30	N	150	N	32
H17R0500	N	15	N	100	150	<50	20	N	150	N	32
H17R0550	N	15	N	100	150	<50	30	N	200	N	32
H17R0600	N	15	N	100	150	<50	20	N	150	N	32
H17R0650	N	15	N	100	150	<50	20	N	150	N	32
H17R0700	N	15	N	100	200	<50	20	N	100	N	32
H17R0750	N	15	N	100	300	<50	30	<200	100	N	32
H17R0850	N	<5	N	N	70	<50	N	N	300	N	31
H17R0950	N	N	N	N	20	<50	N	N	15	N	31
H17R1050	N	<5	N	N	50	<50	N	<200	70	N	31
H17R1150	N	N	N	N	10	<50	N	N	N	N	31
H17R1200	N	N	N	N	50	<50	N	N	50	N	31
H17R1250	N	N	N	N	<10	<50	N	N	70	N	40
H17R1300	N	N	N	N	<10	<50	N	N	20	N	40
H17R1350	N	N	N	N	<10	N	N	N	30	N	40
H17R1400	N	N	N	N	10	N	N	N	50	N	40
H17R1460	N	7	N	N	70	N	N	N	150	N	40
H17R1500	N	5	N	N	50	N	N	N	70	N	40
H17R1650	N	5	N	N	70	<50	N	N	100	N	40
H17R1800	N	N	N	100	20	<50	N	N	30	N	40
H17R1880	N	N	N	N	<10	<50	N	N	30	N	40
H17R2000	N	N	N	150	30	<50	N	N	50	N	40
H17R2150	N	N	N	150	50	50	N	<200	200	N	40
H17R2250	N	<5	N	N	50	<50	N	<200	150	N	40
H17R2350	N	N	N	N	20	150	N	<200	70	N	40
H17R2450	N	5	N	N	70	200	N	N	100	N	40
H17R2550	N	N	N	N	10	<50	N	N	15	N	40
H17R2650	N	N	N	N	<10	N	N	N	20	N	40
H17R2750	N	N	N	N	15	N	N	N	50	N	40
H17R2850	N	N	N	N	<10	<50	N	N	N	N	40
H17R2900	N	N	N	N	10	<50	N	N	<10	N	40
H17R3000	N	N	N	N	10	<50	N	N	N	N	40
H17R3120	N	N	N	N	20	<50	N	N	20	N	40
H17R3210	N	N	N	N	N	N	N	N	30	N	17

TABLE 3.--- SPECTROGRAPHIC ANALYSES OF INSOLUBLE - RESIDUE SAMPLES FROM DRILL HOLE NO. H20, HARRISON 1 X 2
 QUADRANGLE, MISSOURI AND ARKANSAS

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

Sample	Fe-pct. %	Mg-pct. %	Ca-pct. %	Ti-pct. %	Mn-ppm	Ag-ppm	As-ppm	Au-ppm	B-ppm	Ba-ppm
H20R0035	.50	.05	.05	.050	1,000	<.5	N	N	70	50
H20R0065	.20	.05	.20	.020	300	N	N	N	70	30
H20R0150	1.50	.70	7.00	.300	500	N	N	N	150	200
H20R0200	.20	.07	.30	.050	10	N	N	N	30	30
H20R0250	1.00	.70	.10	.300	15	N	N	N	100	150
H20R0300	.50	.50	.10	.150	15	N	N	N	70	200
H20R0350	1.50	1.00	.15	.500	50	<.5	N	N	200	300
H20R0400	1.50	1.00	1.00	.300	70	N	N	N	150	200
H20R0450	1.50	1.00	1.00	.300	50	N	N	N	150	200
H20R0500	3.00	1.00	.30	.300	70	N	N	N	150	300
H20R0550	1.00	.50	.20	.100	10	N	N	N	100	100
H20R0600	1.50	.70	.20	.200	30	N	N	N	150	150
H20R0650	.30	.10	.10	.070	<10	N	N	N	100	200
H20R0700	1.50	.70	<.05	.300	10	N	N	N	150	200
H20R0750	.20	.15	.10	.050	<10	N	N	N	100	70
H20R0800	5.00	.70	<.05	.500	50	<.5	N	N	150	300
H20R0850	1.00	.20	<.05	.150	20	<.5	N	N	70	200
H20R0950	1.00	.70	.30	.200	30	<.5	N	N	100	150
H20R1000	1.50	.50	.10	.200	50	N	N	N	100	150
H20R1050	1.50	.30	.05	.200	15	N	N	N	70	150
H20R1150	1.00	.30	.15	.150	10	N	N	N	70	100
H20R1250	2.00	.50	<.05	.300	20	N	N	N	100	150
H20R1350	.20	.05	<.05	.050	<10	N	N	N	30	100
H20R1450	.20	.10	<.05	.030	<10	N	N	N	20	50
H20R1550	1.50	.20	<.05	.150	10	N	N	N	70	70
H20R1650	.10	.03	.05	.010	N	N	N	N	50	50
H20R1750	.15	.03	.05	.010	N	N	N	N	50	20
H20R1850	1.00	.30	<.05	.100	10	N	N	N	70	100
H20R1920	1.50	.02	.05	.007	<10	N	N	N	50	30
H20R1990	.30	<.02	<.05	.007	<10	N	N	N	10	20
H20R2065	1.50	.50	.70	.050	10	<.5	N	N	50	30

TABLE 3.-- SPECTROGRAPHIC ANALYSES OF INSOLUBLE - RESIDUE SAMPLES FROM DRILL HOLE NO. H20, HARRISON 1 X 2
 QUADRANGLE, MISSOURI AND ARKANSAS--Continued

Sample	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	Pb-ppm s
H20R0035	N	N	N	5	10	5	N	N	N	15	N
H20R0065	N	N	N	N	N	<5	N	N	N	10	N
H20R0150	2.0	N	N	7	70	10	30	<5	<20	70	10
H20R0200	<1.0	N	N	N	N	<5	N	N	N	<5	N
H20R0250	1.5	N	N	5	70	30	N	<5	<20	20	N
H20R0300	1.0	N	N	<5	20	10	N	5	N	10	N
H20R0350	1.5	N	N	10	70	50	N	7	<20	30	20
H20R0400	2.0	N	N	5	50	20	N	5	<20	20	30
H20R0450	2.0	N	N	7	50	20	N	15	N	30	20
H20R0500	2.0	N	N	10	50	30	N	20	<20	30	50
H20R0550	1.0	N	N	5	10	15	N	15	N	10	N
H20R0600	1.5	N	N	7	70	20	N	15	<20	20	50
H20R0650	N	N	N	N	N	7	N	10	N	5	N
H20R0700	1.5	N	N	7	70	20	N	150	<20	20	30
H20R0750	N	N	N	N	N	<5	N	<5	N	<5	N
H20R0800	1.0	N	N	7	100	30	N	30	<20	30	30
H20R0850	<1.0	N	N	5	10	30	N	10	N	15	10
H20R0950	1.0	N	N	5	30	20	N	15	N	15	20
H20R1000	1.0	N	N	5	30	30	N	7	N	30	30
H20R1050	<1.0	N	N	5	30	15	N	5	N	15	N
H20R1150	N	N	N	5	N	10	N	20	N	10	N
H20R1250	1.0	N	N	5	70	100	N	7	N	20	20
H20R1350	N	N	N	N	N	<5	N	N	N	<5	N
H20R1450	N	N	N	N	N	<5	N	N	N	<5	N
H20R1550	N	N	N	5	10	10	N	15	N	15	10
H20R1650	N	N	N	N	N	<5	N	N	N	<5	N
H20R1750	N	N	N	N	N	<5	N	5	N	<5	N
H20R1850	<1.0	N	N	5	50	15	N	150	N	20	10
H20R1920	N	N	N	N	N	5	N	15	N	<5	N
H20R1990	N	N	N	N	N	N	N	N	N	<5	N
H20R2065	<1.0	N	N	<5	10	7	N	200	N	5	N

TABLE 3.-- SPECTROGRAPHIC ANALYSES OF INSOLUBLE - RESIDUE SAMPLES FROM DRILL HOLE NO. H20, HARRISON 1 X 2
 QUADRANGLE, MISSOURI AND ARKANSAS--Continued

Sample	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
H20R0035	N	N	N	N	30	<50	N	N	20	N	31
H20R0065	N	N	N	N	10	<50	N	N	10	N	31
H20R0150	N	10	N	N	150	<50	15	<200	150	N	31
H20R0200	N	N	N	N	30	<50	N	N	50	N	42
H20R0250	N	<5	N	N	100	<50	N	N	100	N	42
H20R0300	N	N	N	N	70	<50	N	N	100	N	42
H20R0350	N	5	N	N	100	<50	N	N	150	N	42
H20R0400	N	5	N	N	70	<50	N	N	70	N	42
H20R0450	N	5	N	N	70	<50	N	N	70	N	22
H20R0500	N	7	N	N	70	<50	N	N	100	N	22
H20R0550	N	N	N	N	30	<50	N	N	50	N	22
H20R0600	N	<5	N	N	70	<50	N	N	50	N	22
H20R0650	N	N	N	100	20	<50	N	N	30	N	39
H20R0700	N	5	N	N	150	<50	N	N	70	N	39
H20R0750	N	N	N	N	20	<50	N	N	15	N	39
H20R0800	N	5	N	N	100	<50	N	N	100	N	39
H20R0850	N	N	N	N	20	<50	N	N	70	N	39
H20R0950	N	<5	N	300	50	<50	N	N	30	N	39
H20R1000	N	<5	N	N	30	<50	N	N	30	N	39
H20R1050	N	N	N	N	30	<50	N	N	30	N	39
H20R1150	N	N	N	N	20	<50	N	N	20	N	39
H20R1250	N	5	N	N	70	<50	N	N	30	N	39
H20R1350	N	N	N	N	10	<50	N	N	20	N	39
H20R1450	N	N	N	N	15	<50	N	N	20	N	19
H20R1550	N	N	N	N	30	<50	N	N	30	N	19
H20R1650	N	N	N	N	10	<50	N	N	N	N	18
H20R1750	N	N	N	N	<10	<50	N	N	N	N	18
H20R1850	N	N	N	N	70	<50	N	N	20	N	18
H20R1920	N	N	N	N	<10	<50	N	N	15	N	18
H20R1990	N	N	N	N	<10	<50	N	N	30	N	17
H20R2065	N	N	N	N	20	<50	N	N	20	N	16