

**CONSTRUCTION, LITHOLOGIC, AND GEOPHYSICAL DATA FROM MONITORING WELLS
IN ALBUQUERQUE, BERNALILLO COUNTY, NEW MEXICO**

By Steven F. Richey

U.S. GEOLOGICAL SURVEY

Open-File Report 90-578

Prepared in cooperation with the

ENVIRONMENTAL HEALTH DEPARTMENT, CITY OF ALBUQUERQUE

Albuquerque, New Mexico

1991



U.S. DEPARTMENT OF THE INTERIOR

MANUEL LUJAN, JR., Secretary

U.S. GEOLOGICAL SURVEY

Dallas L. Peck, Director

For additional information
write to:

District Chief
U.S. Geological Survey
Pinetree Office Park
4501 Indian School Rd. NE, Suite 200
Albuquerque, New Mexico 87110

Copies of this report can
be purchased from:

U.S. Geological Survey
Books and Open-File Reports
Federal Center, Building 810
Box 25425
Denver, Colorado 80225

CONTENTS

	Page
Abstract.....	1
Introduction.....	1
Well-numbering system.....	3
Monitoring-well construction.....	3
Lithologic and borehole-geophysical data.....	5
References.....	14

FIGURES

	Page
Figure 1. Map showing the location of monitoring wells in Albuquerque, New Mexico.....	2
2. Diagram showing the method of locating wells.....	4
3-10. Borehole-geophysical logs for well:	
3. EUBANK-1.....	6
4. JMC-2.....	7
5. LALF-5.....	8
6. LALF-6.....	9
7. LALF-7.....	10
8. MONT-5A.....	11
9. YALE-MW3.....	12
10. YALE-MW5.....	13

TABLES

		Page
Table 1.	Identifiers and locations of the monitoring wells.....	15
	2. Construction data from monitoring wells.....	16
3-19.	Lithologic log for well:	
	3. CC-1.....	17
	4. EUBANK-1.....	18
	5. 4HILLS-1.....	30
	6. JMC-1.....	32
	7. JMC-2.....	36
	8. LALF-2B.....	39
	9. LALF-4.....	41
	10. LALF-5.....	43
	11. LALF-6.....	47
	12. LALF-7.....	51
	13. LALF-8.....	54
	14. MONT-5A.....	57
	15. MONT-5B.....	62
	16. SBM-1.....	66
	17. SBM-2.....	70
	18. YALE-MW3.....	73
	19. YALE-MW5.....	80

CONVERSION FACTORS

Inch-pound units used in this report may be converted to metric units by using the following conversion factors. To convert millimeters to inches, multiply by 0.03937 To convert meters to feet, multiply by 3.281.

<u>Multiply inch-pound unit</u>	<u>By</u>	<u>To obtain metric unit</u>
inch	25.40	millimeter
foot	0.3048	meter
mile	1.609	kilometer
acre	4,047	square meter

Sea level: In this report "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929)--a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called "Sea Level Datum of 1929."

CONSTRUCTION, LITHOLOGIC, AND GEOPHYSICAL DATA FROM MONITORING WELLS

IN ALBUQUERQUE, BERNALILLO COUNTY, NEW MEXICO

By Steven F. Richey

ABSTRACT

The Santa Fe Group is the primary source of ground water used by the city of Albuquerque. This aquifer, and the hydraulically connected Rio Grande alluvium, underlie land uses that could be a potential source of contamination. The Environmental Health Department of the City of Albuquerque installed 21 monitoring wells for the purposes of providing site-specific and regional ground-water quality and flow information, and detecting potential ground-water contamination associated with city-owned facilities such as landfills. Construction data, lithologic descriptions, and borehole-geophysical logs are presented for these wells.

INTRODUCTION

The Santa Fe Group is the primary source of ground water used by the city of Albuquerque. This aquifer, and the hydraulically connected Rio Grande alluvium, underlie land uses that could be a potential source of contamination. The Environmental Health Department of the City of Albuquerque installed 21 monitoring wells in the Albuquerque area (fig. 1) for the following reasons: to provide site-specific information regarding ground-water quality and flow in various parts of the city; to provide initial information regarding regional ground-water quality and flow; and to detect potential ground-water contamination associated with city-owned facilities, such as landfills. Nine wells were installed at the Los Angeles landfill; three at the Yale landfill; two at Santa Barbara-Martineztown Park; two at John Marshall Multi-Service Center; two at Montaña Road east of Edith Boulevard; and one each at the Eubank landfill, Four Hills Road near Tijeras Arroyo, and the Convention Center downtown. Well CC-1 was plugged and abandoned on January 19, 1989, due to a construction project. Well LALF-2B was plugged and abandoned due to problems with the auger sticking. The well identifiers, well names (which are used for identification in this report), and location numbers are listed in table 1.

The U.S. Geological Survey, in cooperation with the City of Albuquerque, collected drill cuttings for later lithologic description and performed geophysical logging of wells EUBANK-1, JMC-2, LALF-5, 6, and 7, MONT-5A and Yale-MW3 and 5. The author wishes to acknowledge the diligent work of James Bearzi, a geologist who worked for the U.S. Geological Survey as a hydrologic aid. His description of drill cuttings is greatly appreciated.

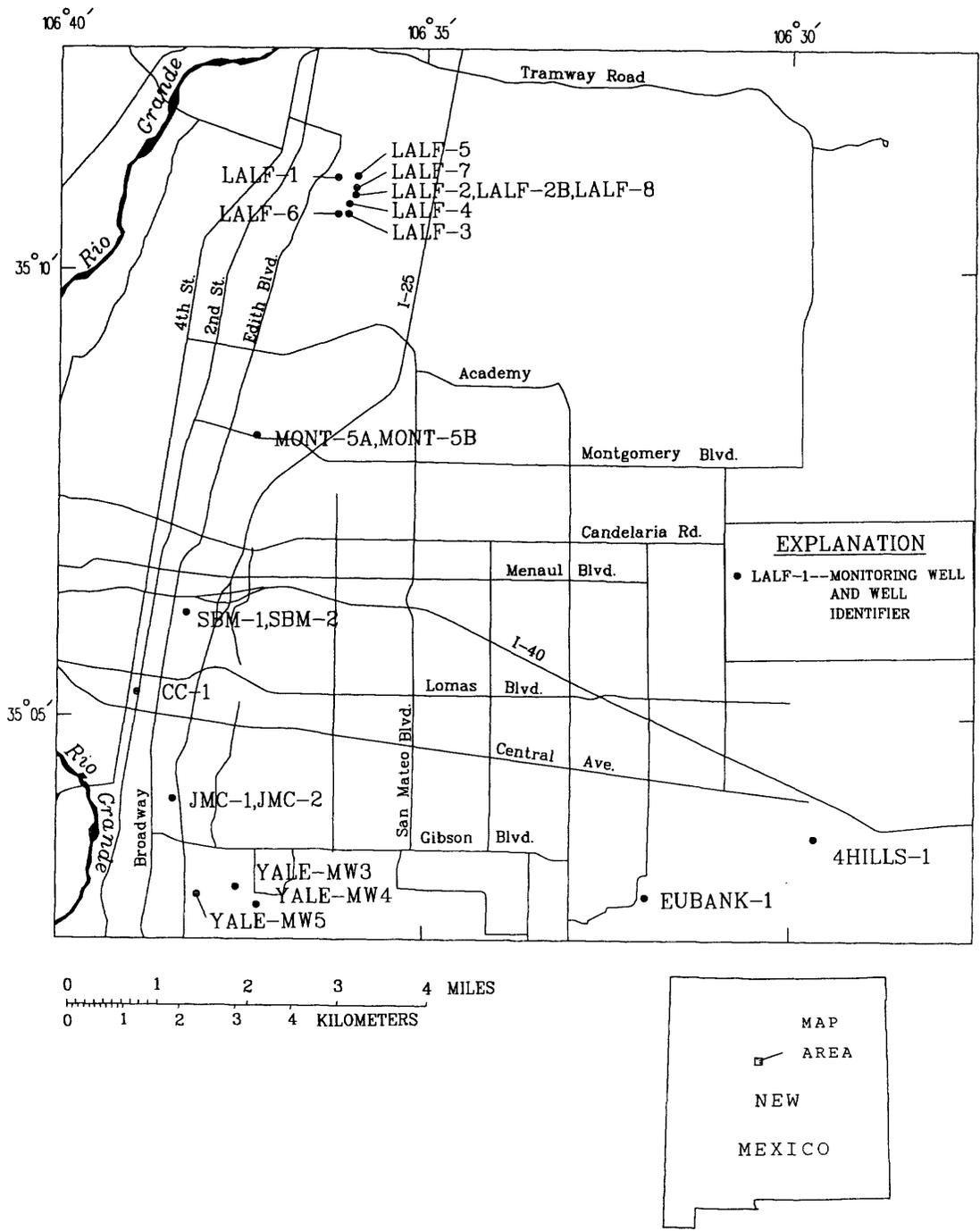


Figure 1.--Location of monitoring wells in Albuquerque, New Mexico.

WELL-NUMBERING SYSTEM

The method of locating wells listed in table 1 is based on the common subdivision of public lands into sections. The well number consists of four segments separated by periods (fig. 2). The first segment is the township number, the second segment is the range number, and the third segment is the section number. Because wells in the Albuquerque area are north of the New Mexico Base Line and east of the New Mexico Principal Meridian, the letters "N" and "E" indicating direction are not used in this report. Hence, the number 10.03.33 is assigned to any well located in T. 10 N., R. 03 E., sec. 33. The fourth segment is composed of digits that denote the particular tract within the section in which the well is located. The section is divided into four quarters, numbered 1, 2, 3, and 4, in the normal reading order, for the northwest, northeast, southwest, and southeast quarters, respectively. The first digit gives the quarter section, which is a tract of 160 acres. Each quarter is subdivided in the same manner, so that the first and second digits together define the 40-acre tract. The 40-acre tract is subdivided into four 10-acre tracts, which are designated by the third digit. For example, well 10.03.33.234 is located in the SE 1/4 of the SW 1/4 of the NE 1/4 of T. 10 N., R. 03 E., sec. 33 (fig. 2). Letters a, b, c, and so on are added to the last part of the location number to designate additional wells in the same tract.

MONITORING-WELL CONSTRUCTION

A monitoring well is a water well constructed for the specific purpose of collecting water-quality and water-level data. The monitoring wells described in this report were constructed using two contract drilling firms, each having equipment and expertise particularly suited to hydrogeologic conditions at individual sites. Three wells were drilled using auger methods (CC-1, LALF-2B, and LALF-4), and the remainder were constructed using fluid-rotary methods. Due to minimal effects to the aquifer, auger drilling is often considered to be the preferred method for monitoring-well construction; however, fluid-rotary methods were required at most sites due to the depth to ground water and the presence of clay and coarse gravel deposits that could not be penetrated using auger equipment. All monitoring wells were completed with PVC casing, stainless steel or PVC well screen, gravel pack, and bentonite seal. Casing diameter and depth, screened material and screen interval, and the elevation of the top of the casing are presented in table 2 for each well.

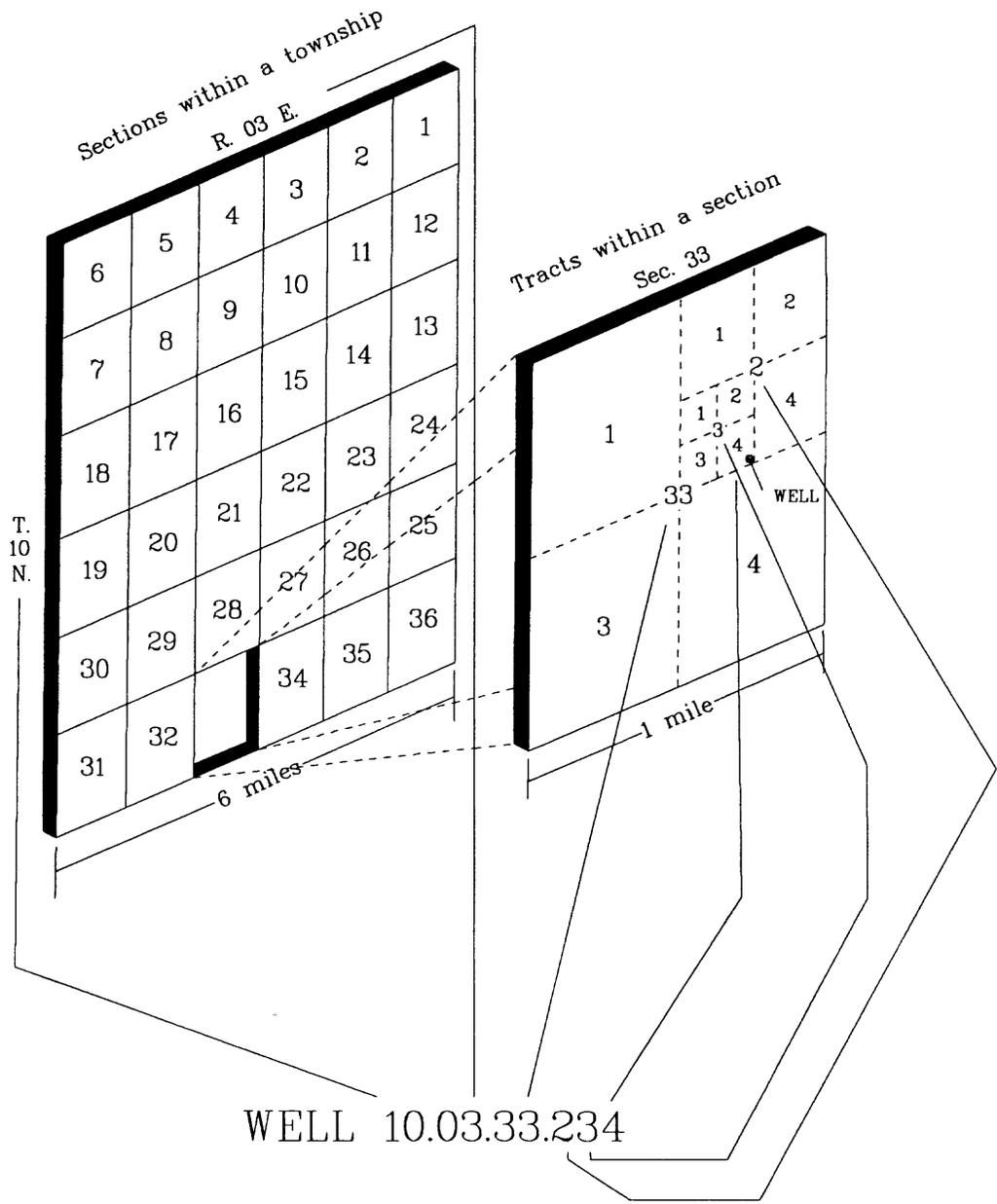


Figure 2.--Method of locating wells.

LITHOLOGIC AND BOREHOLE-GEOPHYSICAL DATA

Lithologic descriptions based on unwashed drill cuttings are presented in tables 3-19. These descriptions of drill cuttings were prepared in the office of the U.S. Geological Survey. Relative percentages of gravel (average diameter of a single grain greater than 2 millimeters), sand (1/16 to 2 millimeters), and silt or clay (less than 1/16 millimeter) were estimated visually. Sorting, which characterizes size variation in the total sample, was evaluated visually using sorting comparators (Folk, 1974). Dry color of silt or clay refers to colors from the Rock-Color Chart prepared by the Rock-Color Chart Committee (National Research Council, 1948). Grain-size estimates of sand refer to the grain-size range of the majority of the sand-size fraction, and were made using grain-size images and scales. Size of gravel refers to intermediate axis length. Grain roundness was evaluated visually using rounding images from Krumbein and Sloss (1956) and Folk (1974). Distinction of rock-fragment types was based on textural characteristics and mineralogical constituents for individual rock fragments as viewed under 15 X magnification. Reaction of the cutting sample to 7 percent hydrochloric acid indicates presence or absence of calcium carbonate. The degree of effervescence is modified from the relative scale of Birkeland (1984).

Borehole-geophysical logs were obtained using equipment from the District Office of the U.S. Geological Survey in Albuquerque (figs. 3-10). Wells were logged before installation of casing and screens while drilling fluid was in the hole. Some holes were only partly filled with fluid, causing a signal shift at the fluid level and subsequent change in scale on the affected neutron logs.

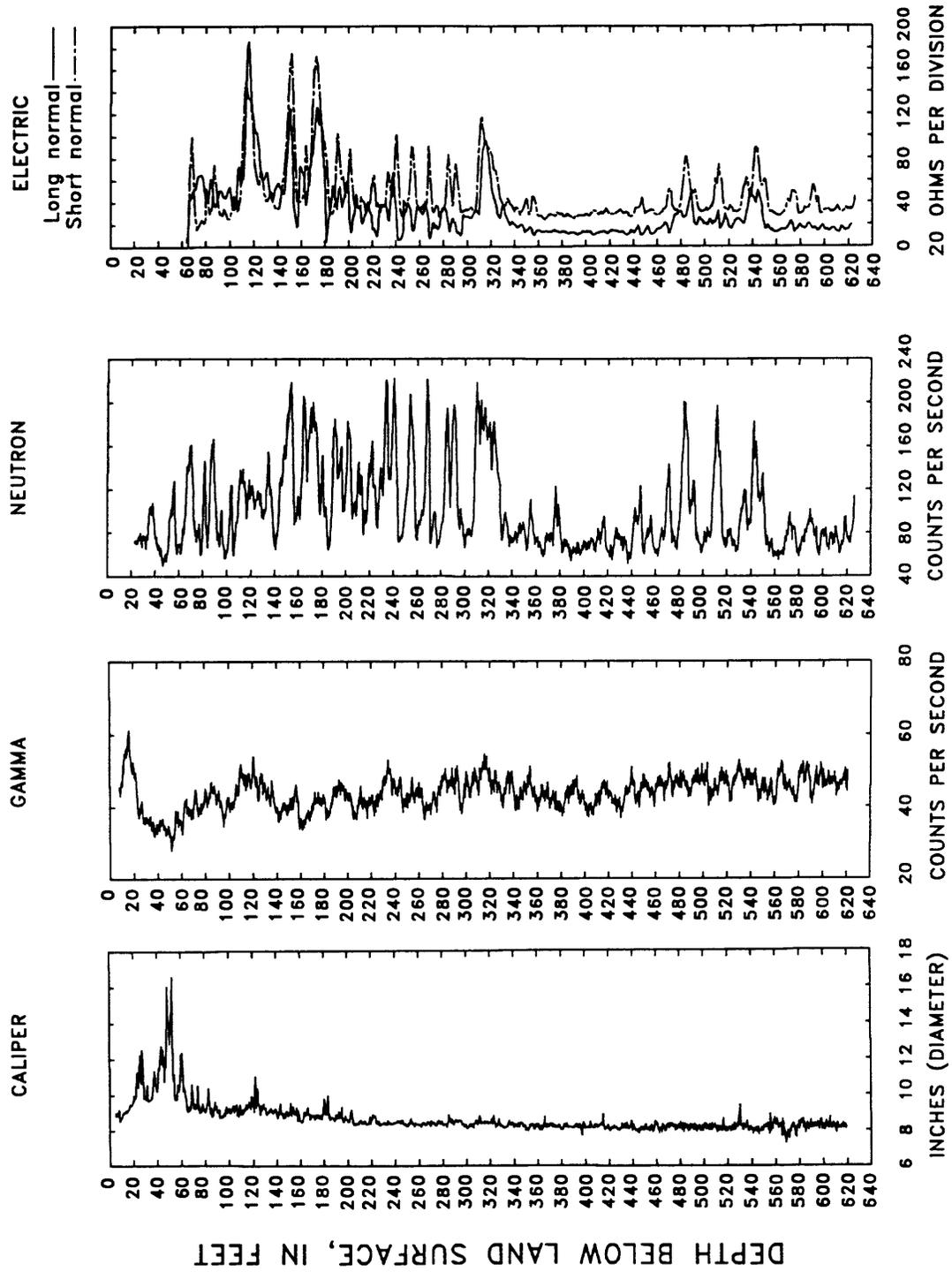


Figure 3.--Borehole-geophysical logs for well EUBANK-1.

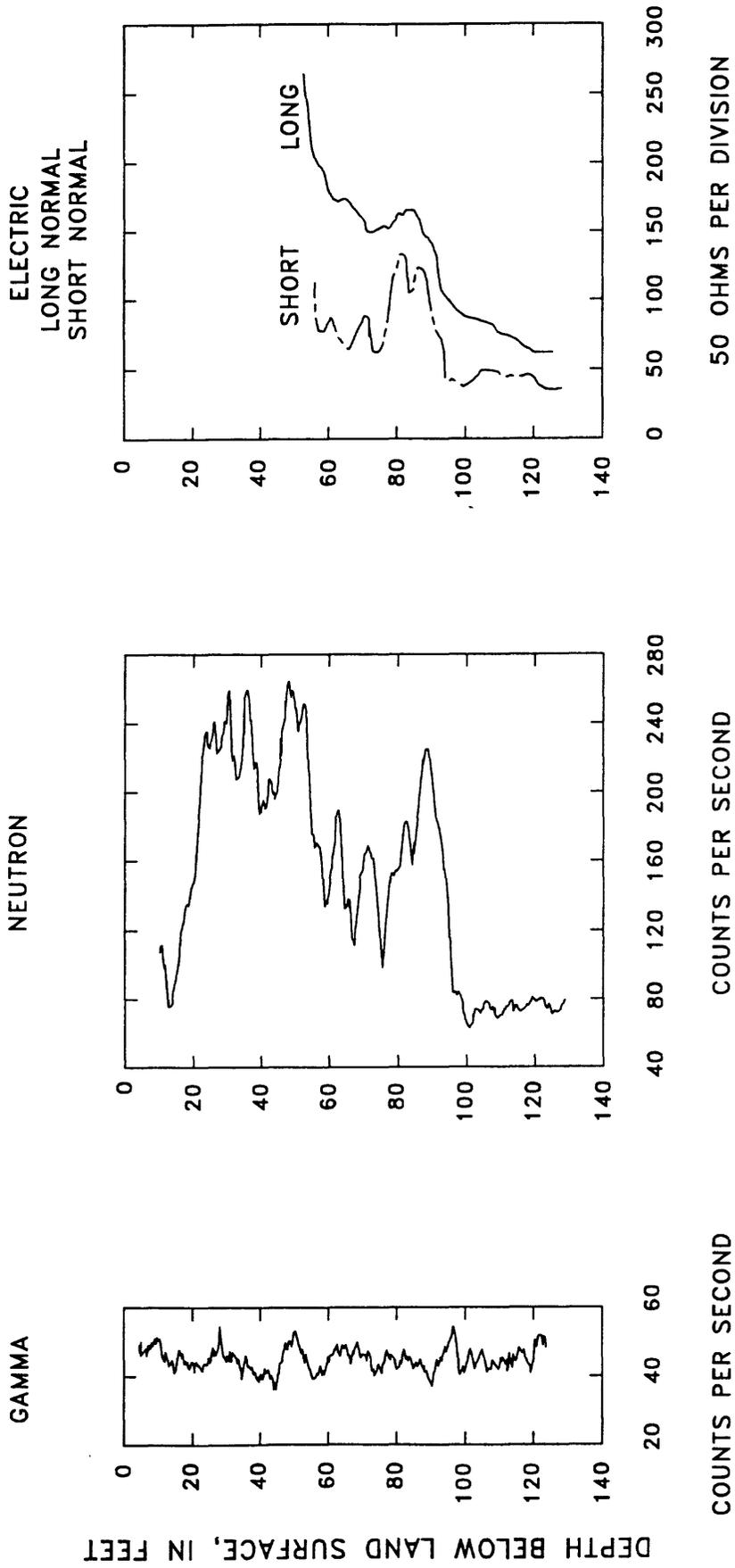


Figure 4.--Borehole-geophysical logs for well JMC-2.

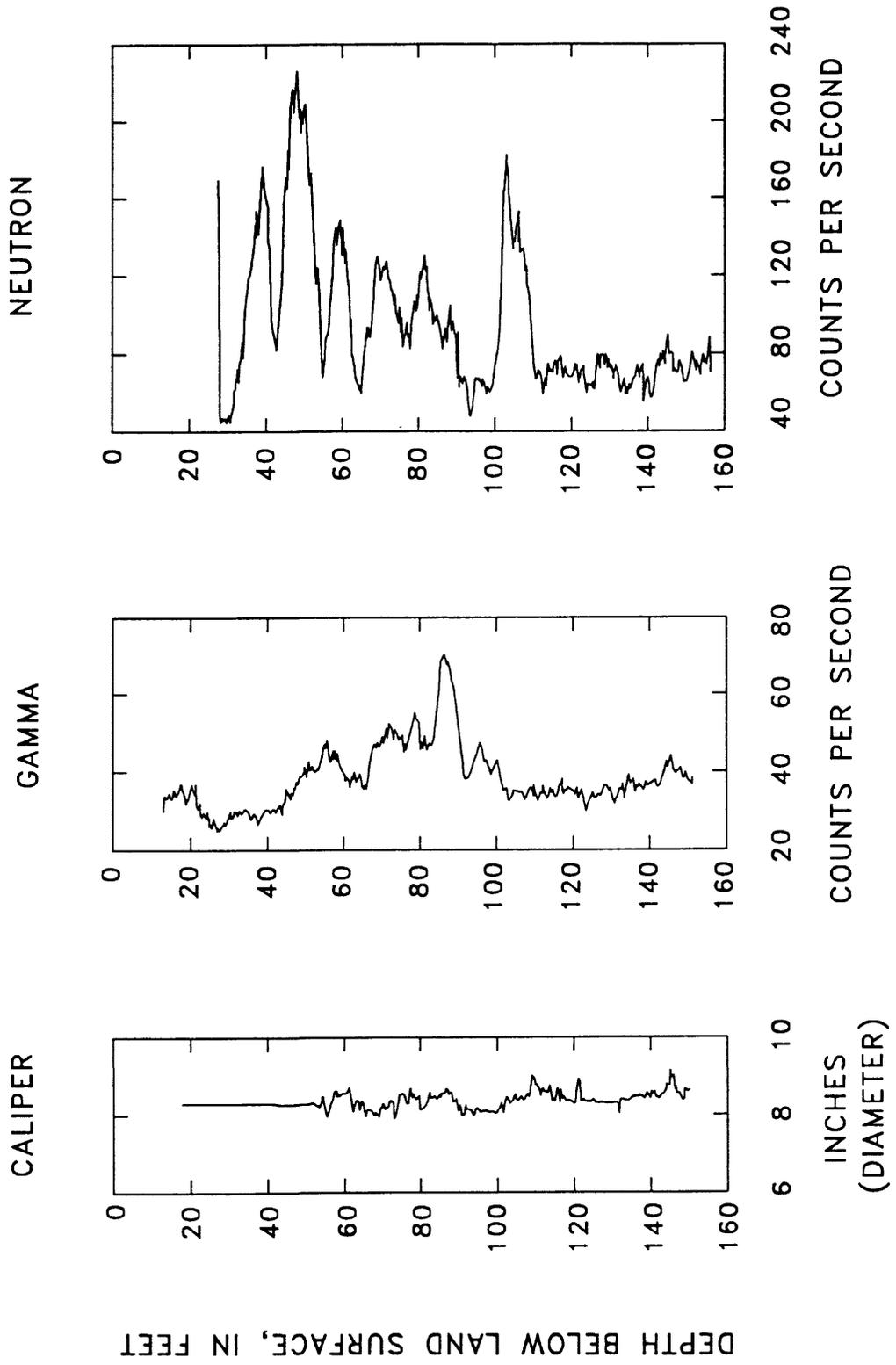


Figure 5.--Borehole-geophysical logs for well LALF-5.

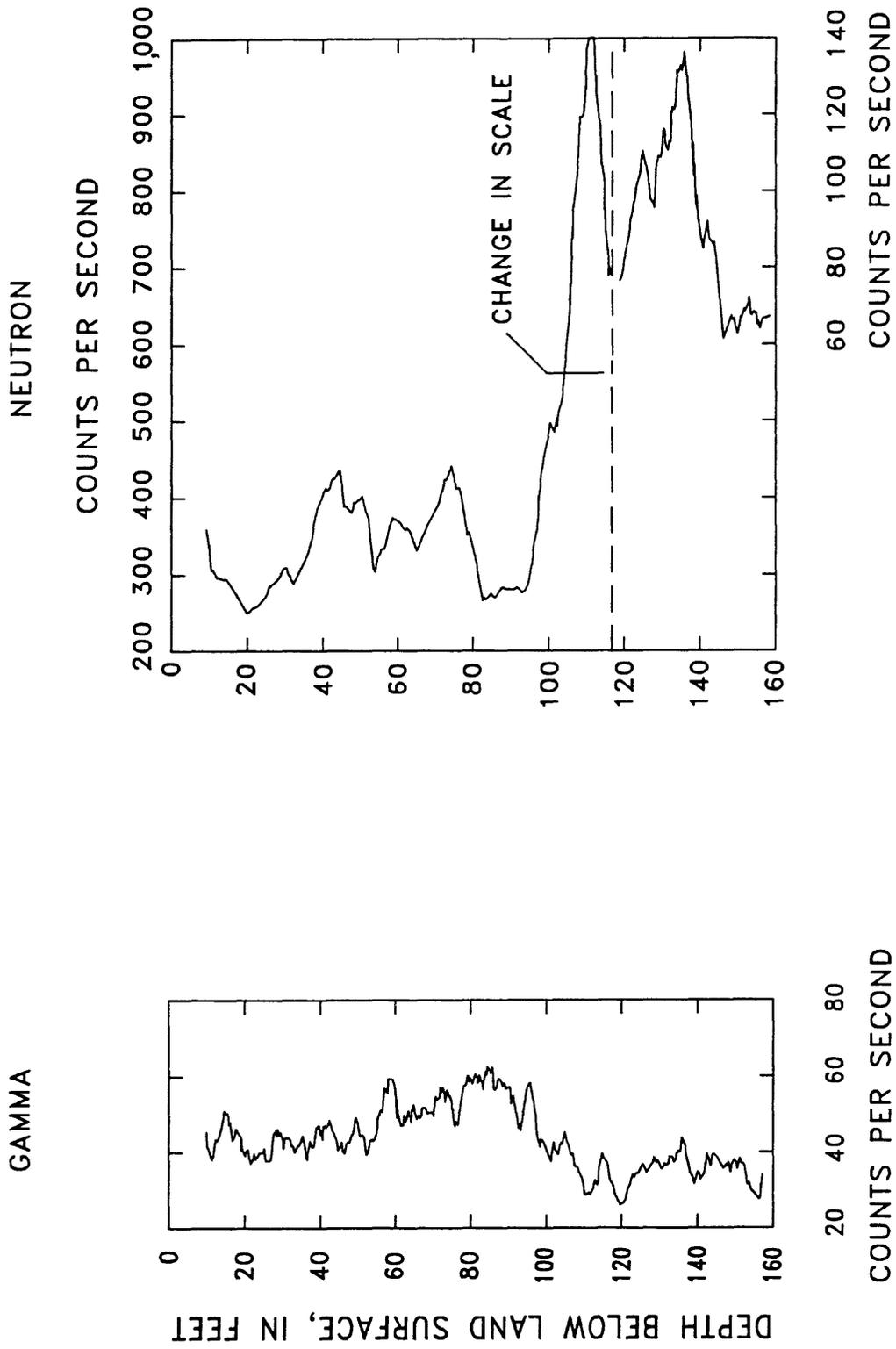


Figure 6.--Borehole-geophysical logs for well LALF-6.

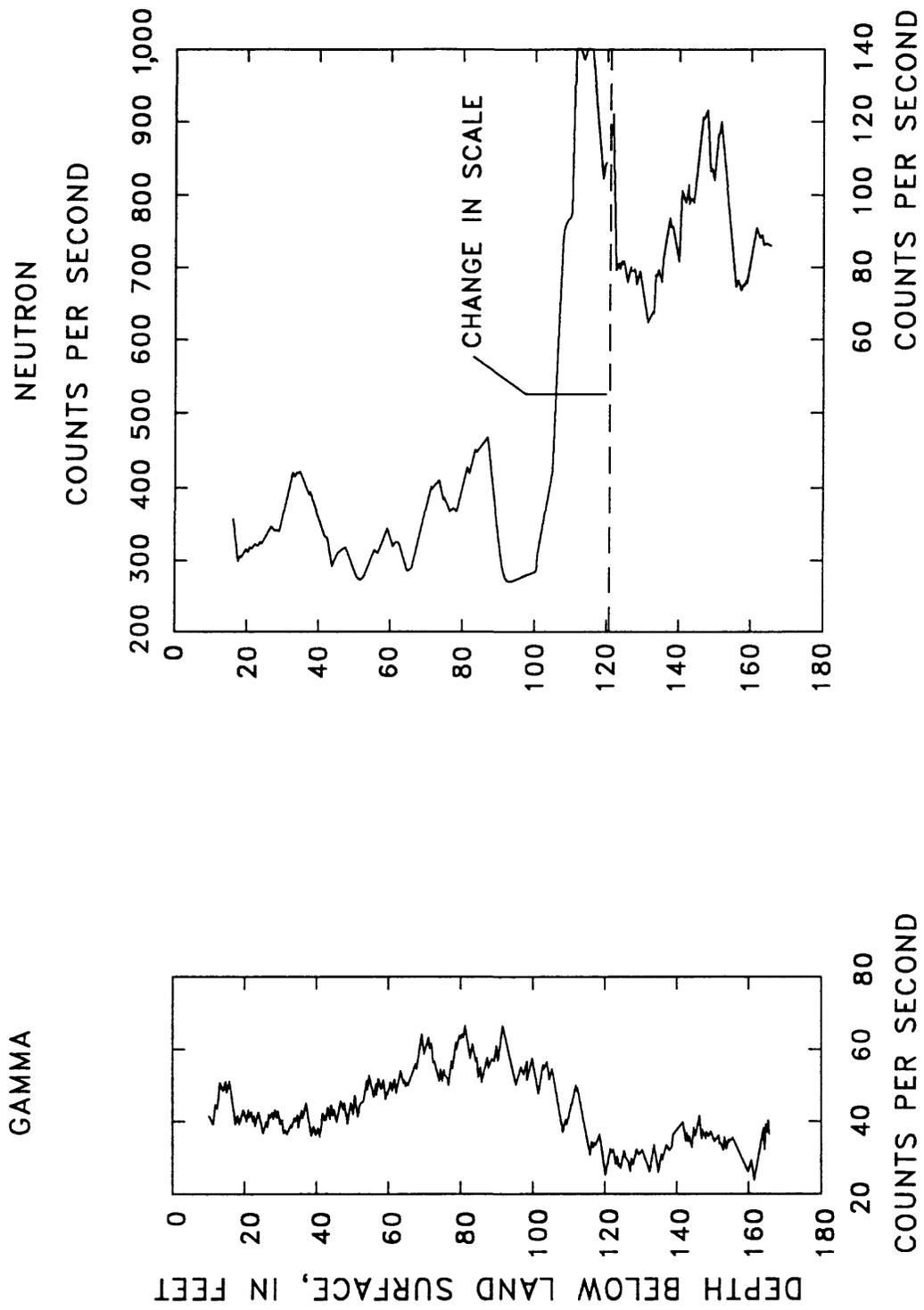


Figure 7.--Borehole-geophysical logs for well LALF-7.

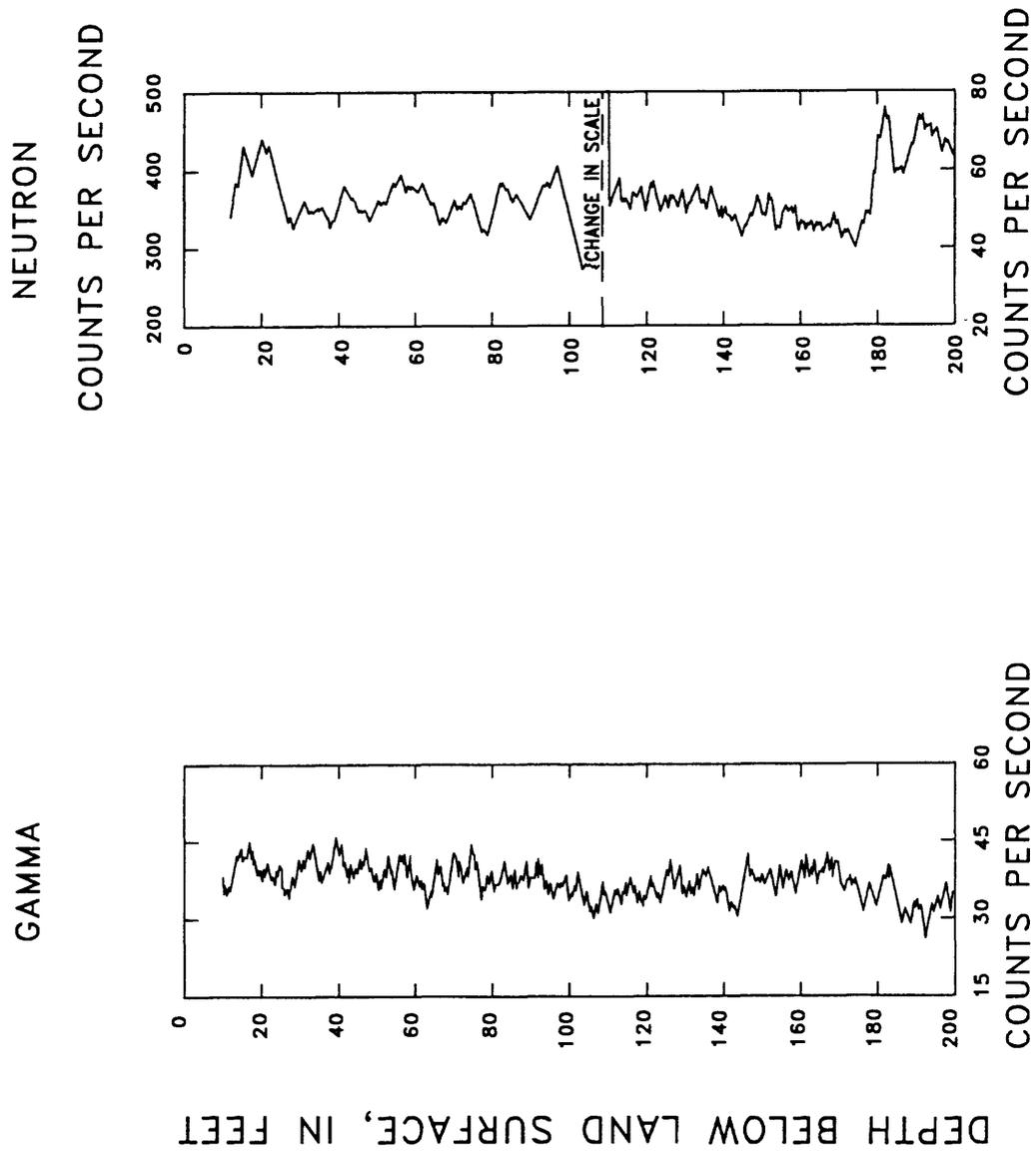


Figure 8.--Borehole-geophysical logs for well MONT-5A.

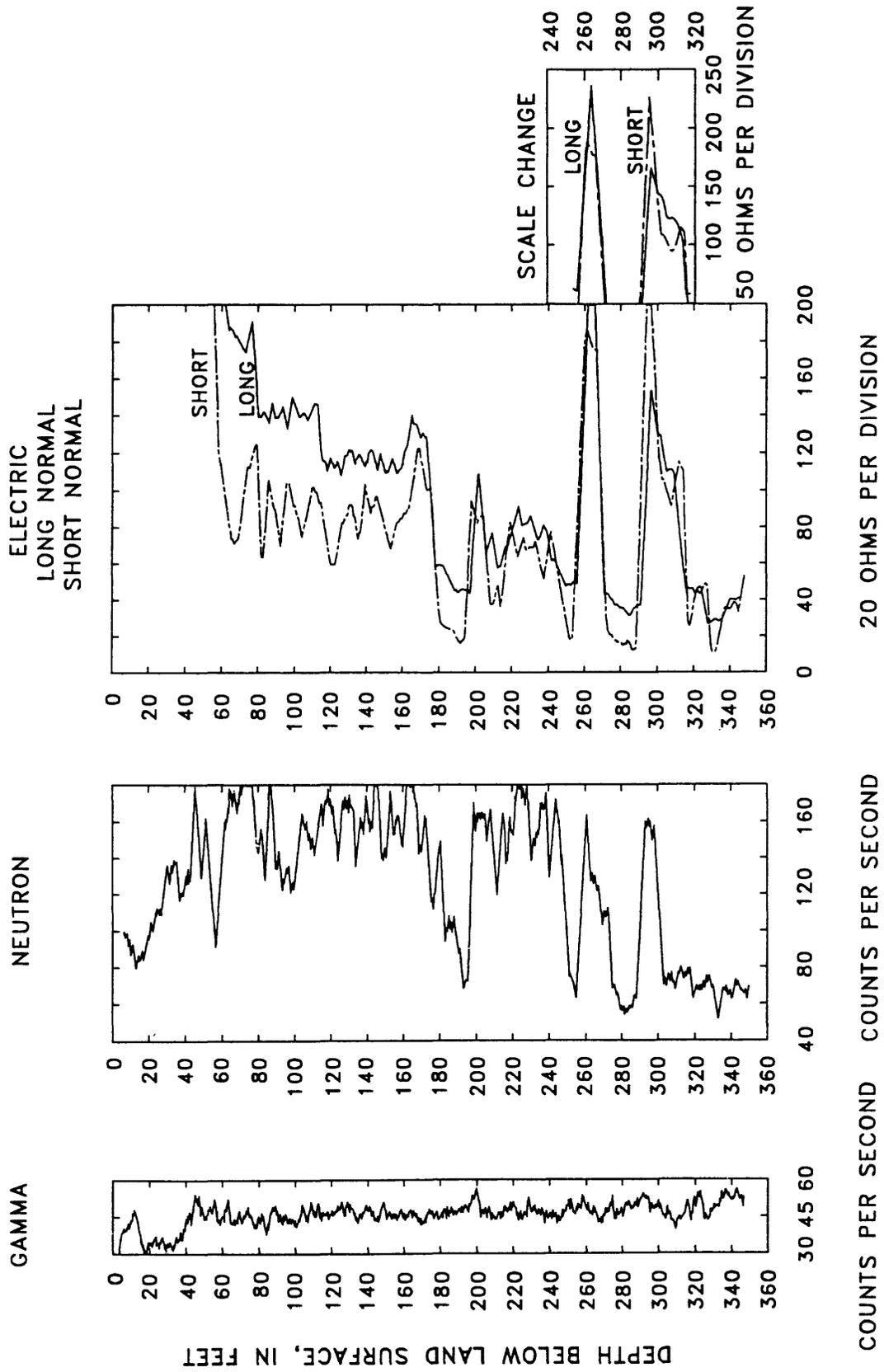


Figure 9.--Borehole-geophysical logs for well YALE-MW3.

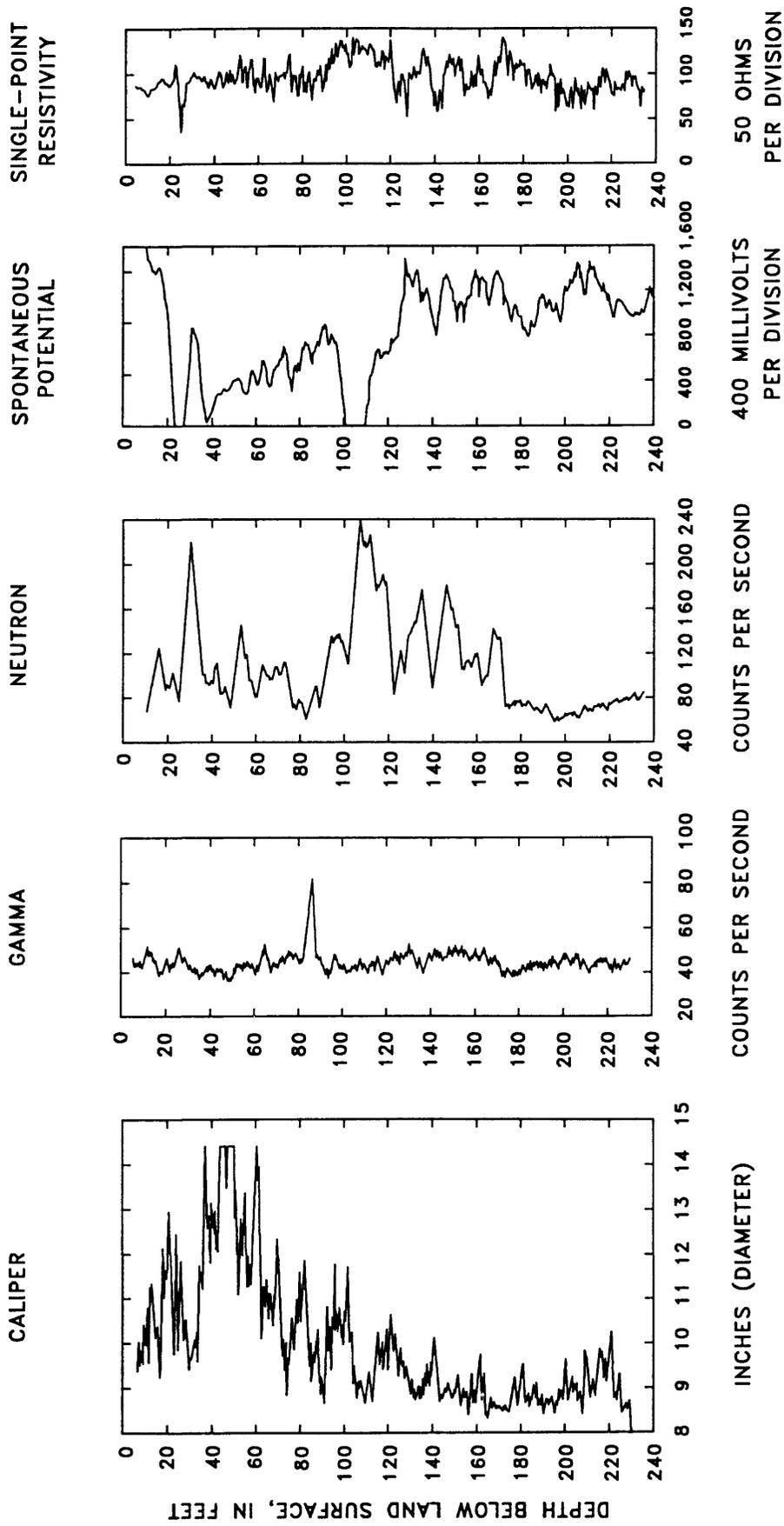


Figure 10.--Borehole-geophysical logs for well YALE-MW5.

REFERENCES

- Birkeland, P.W., 1984, Soils and geomorphology: Oxford University Press.
- Folk, R.L., 1974, Petrology of sedimentary rocks: Austin, Texas, Hemphill Publishing Co., 182 p.
- Krumbein, W.C., and Sloss, L.L., 1956, Stratigraphy and sedimentation: San Francisco, W.H. Freeman and Co., 497 p.
- National Research Council, 1948, Rock-color chart: Prepared by the Rock-Color Chart Committee, E.N. Goddard, chairman, available from the Geological Society of America, Boulder, Colo.

Table 1.--Identifiers and locations of the monitoring wells

Well identifier	Well name	Location number
CC-1	Convention Center 1	10.03.20.122
EUBANK-1	Eubank 1	10.04.32.422
4HILLS-1	Four Hills 1	10.04.26.331
JMC-1	John Marshall Center 1	10.03.29.242A
JMC-2	John Marshall Center 2	10.03.29.242B
LALF-1	Los Angeles landfill 1	11.03.15.242
LALF-2	Los Angeles landfill 2	11.03.14.312A
LALF-2B	Los Angeles landfill 2B	11.03.14.312C
LALF-3	Los Angeles landfill 3	11.03.14.332
LALF-4	Los Angeles landfill 4	11.03.14.314
LALF-5	Los Angeles landfill 5	11.03.14.132
LALF-6	Los Angeles landfill 6	11.03.14.331
LALF-7	Los Angeles landfill 7	11.03.14.143
LALF-8	Los Angeles landfill 8	11.03.14.312B
MONT-5A	Montaño 5A	11.03.33.424A
MONT-5B	Montaño 5B	11.03.33.424B
SBM-1	Santa Barbara-Martineztown 1	10.03.09.333A
SBM-2	Santa Barbara-Martineztown 2	10.03.09.333B
YALE-MW3	Yale monitoring well 3	10.03.33.234
YALE-MW4	Yale monitoring well 4	10.03.34.313
YALE-MW5	Yale monitoring well 5	10.03.33.314

Table 2.--Construction data from monitoring wells

[SS, stainless steel]

Well identifier	Casing diameter (inches)	Bottom of casing (feet below land surface)	Screen material	Bottom of screen (feet below land surface)	Top of screen (feet below land surface)	Elevation of top of casing (feet above sea level)
CC-1 (destroyed)	2	44.7	SS	39.7	29.7	--
EUBANK-1	4	615	SS	610	550	5,457.43
4HILLS-1	4	69.5	PVC	64.5	24.5	5,668.67
JMC-1	4	163	PVC	158	148	5,008.17
JMC-2	4	120	PVC	115	95	5,008.33
LALF-1	2	146	SS	141	101	5,063.81
LALF-2	2	155	SS	150	110	5,080.01
LALF-2B (plugged)	-	--	--	--	--	--
LALF-3	2	180	SS	175	135	5,086.73
LALF-4	2	158	SS	153	113	5,082.18
LALF-5	4	153	SS	148	108	5,079.46
LALF-6	4	160	SS	155	115	5,078.75
LALF-7	4	165	SS	160	120	5,086.31
LALF-8	4	221	SS	216	206	5,084.34
MONT-5A	4	200	PVC	195	185	5,018.37
MONT-5B	4	124	PVC	119	99	5,018.61
SBM-1	4	150	PVC	145	135	4,992.01
SBM-2	4	96	PVC	91	71	4,992.27
YALE-MW3	4	345	SS	340	300	5,196.07
YALE-MW4	2	443	PVC	438	398	5,306.85
YALE-MW5	4	215	PVC	210	170	5,072.11

Table 3.--Lithologic log for well CC-1

[Samples were unwashed. mm, millimeters; HCl, hydrochloric acid; >, greater than]

Depth interval below land surface (feet)	Lithology
0 - 10	No sample available.
10 - 15	Silty, gravelly sand, moderately sorted. Silt (10 percent), light brown (7.5 YR 6/4). Sand (80 percent), fine- to medium-grained, subangular, mainly clear quartz and minor pink feldspar and basalt. Pebbles and granules (10 percent) to 8 mm, subangular, mainly basalt. Strongly effervescent to HCl.
15 - 20	No sample available.
20 - 25	Gravelly sand, poorly sorted. Sand (70 percent), medium- to coarse-grained, subangular to subrounded, mainly clear quartz, lesser amounts of rose quartz, and minor magnetite and basalt. Pebbles and granules (30 percent) to 8 mm with few to 13 mm, subrounded, mainly granite, salt, lesser amounts of white feldspar, and minor white quartz. Slightly effervescent to HCl.
25 - 30	No sample available.
30 - 35	Clayey, gravelly sand, poorly to moderately sorted. Clay and silt (10 percent), pinkish-gray (7.5 YR 6/2). Sand (80 percent), fine- to coarse-grained, angular, mainly clear quartz and lesser amounts of granite, pink feldspar, and dark quartz. Pebbles and granules (10 percent) to 8 mm, angular, mainly granite and dark quartz. Strongly effervescent to HCl.
35 - 45	Sandy clay, moderately sorted. Clay and silt (70 percent), pinkish gray (7.5 YR 6/2). Sand (30 percent), medium- to coarse-grained, subangular, mainly basalt, clear quartz, and rose quartz. Moderately effervescent to HCl.
45 - 55	Sand, well-sorted. Sand (100 percent), very fine to medium-grained, angular to subangular, mainly clear quartz, lesser amounts of rose quartz, and minor magnetite and pink feldspar. Few granules to 4 mm. Moderately effervescent to HCl.

Table 4.--Lithologic log for well EUBANK-1

[Samples were unwashed. mm, millimeters; HCl, hydrochloric acid; >, greater than]

Depth interval below land surface (feet)	Lithology
0 - 5	Silty, sandy gravel, poorly to moderately sorted. Silt (25 percent), light brown (7.5 YR 6/4). Sand (25 percent), medium- to very coarse grained, subangular, mainly clear and white quartz, lesser amounts of black quartzite and white feldspar, and minor biotite. Pebbles and granules (50 percent) to 10 mm, subangular, mainly quartz and dark metamorphic rock fragments with lesser amounts of granite. Violently effervescent to HCl, discontinuous carbonate coatings on most grains.
5 - 10	Sandy, gravelly silt, poorly to moderately sorted. Silt (40 percent), pink (7.5 YR 8/4). Sand (30 percent), medium-grained, subangular, mainly clear and white quartz with lesser amounts of white feldspar. Granules (30 percent) to 4 mm, subangular, mainly white quartz and dark quartzite. Violently effervescent to HCl, hard carbonate masses and continuous carbonate grain coatings.
10 - 20	Silty, sandy gravel, poorly to moderately sorted. Silt (30 percent), pink (7.5 YR 7/4). Sand (25 percent), fine- to medium-grained, subangular, mainly clear and white quartz with minor biotite. Pebbles and granules (45 percent) to 6 mm, subangular, mainly white quartzite and granite with minor dark quartzite. Violently effervescent to HCl, hard carbonate masses and discontinuous carbonate grain coatings.
20 - 30	Gravelly sand, poorly to moderately sorted. Silt (5 percent), light brown (7.5 YR 6/4). Sand (60 percent), medium- to coarse-grained, subangular, mainly clear quartz and dark quartzite, lesser amounts of granite, and minor biotite. Pebbles and granules (35 percent) to 8 mm, subangular, mainly dark metamorphic rock fragments and white quartz with lesser amounts of granite. Strongly effervescent to HCl.

Table 4.--Lithologic log for well EUBANK-1--Continued

Depth interval below land surface (feet)	Lithology
30 - 35	Silty, sandy gravel, poorly sorted. Silt (20 percent), light brown (7.5 YR 6/4). Sand (30 percent), medium- to very coarse grained, subangular, mainly clear and white quartz, lesser amounts of white feldspar, and minor biotite. Pebbles and granules (50 percent) to 8 mm, subangular, mainly dark metamorphic rock fragments and quartz. Violently effervescent to HCl.
35 - 50	Gravelly sand, moderately sorted. Silt (5 percent), light brown (7.5 YR 6/4). Sand (65 percent), medium- to coarse-grained, subangular, mainly clear quartz and white feldspar with minor pink feldspar, biotite, and limestone. Granules (30 percent) to 4 mm, subangular, mainly white quartz and granite, lesser amounts of rose, clear, and dark quartz, and minor dark metamorphic rock fragments. Strongly effervescent to HCl.
50 - 60	Sandy gravel, poorly to moderately sorted. Silt (5 percent), light brown (7.5 YR 6/4). Sand (40 percent), medium- to very coarse grained, subangular, mainly white quartz and quartzite, lesser amounts of pink and white feldspar, and minor dark quartzite and biotite. Pebbles and granules (55 percent) to 8 mm, subangular, mainly dark metamorphic rock fragments with lesser amounts of granite and white quartz. Slightly effervescent to HCl.
60 - 70	Silty, sandy gravel, poorly sorted. Silt (15 percent), brown (7.5 YR 5/4). Sand (30 percent), fine- to coarse-grained, subangular to subrounded, mainly clear and white quartz and quartzite, lesser amounts of dark metamorphic rock fragments, and minor biotite. Pebbles and granules (55 percent) to >10 mm, subrounded, mainly dark metamorphic rock fragments and white quartz with lesser amounts of clear quartz and granite. Strongly effervescent to HCl.
70 - 80	Sandy gravel, poorly sorted. Silt (5 percent), brown (7.5 YR 5/4). Sand (25 percent), coarse- to very coarse grained, subangular, mainly clear and white quartz with minor biotite, pink feldspar, and rose quartz. Pebbles and granules (70 percent) to 10 mm, subangular, mainly white quartz, white feldspar, and dark metamorphic rock fragments with lesser amounts of granite. Strongly effervescent to HCl.

Table 4.--Lithologic log for well EUBANK-1--Continued

Depth interval below land surface (feet)	Lithology
80 - 90	Gravelly sand, moderately sorted. Silt (5 percent), brown (7.5 YR 5/4). Sand (60 percent), medium- to very coarse grained, subangular, mainly white quartzite and feldspar, lesser amounts of clear quartz, and minor dark metamorphic rocks fragments, biotite, and pink feldspar. Granules (35 percent) to 4 mm, subangular, mainly white quartz, white feldspar, and dark metamorphic rock fragments with lesser amounts of granite. Strongly effervescent to HCl.
90 - 100	Silty, sandy gravel, poorly sorted. Silt (20 percent), light brown (7.5 YR 6/4). Sand (30 percent), coarse- to very coarse grained, subangular, mainly clear quartz and white feldspar with minor biotite and dark metamorphic rock fragments. Pebbles and granules (50 percent) to 6 mm, subangular, mainly white feldspar and quartz with lesser amounts of dark metamorphic rock fragments. Violently effervescent to HCl.
100 - 115	Gravelly sand, poorly to moderately sorted. Silt (5 percent), light brown (7.5 YR 6/4). Sand (60 percent), medium- to very coarse grained, subangular, mainly clear quartz with minor biotite, pink feldspar, and white feldspar. Granules (35 percent) to 3 mm with few pebbles to 6 mm, subangular, mainly clear and dark quartz and white feldspar with lesser amounts of dark metamorphic rock fragments and granite. Strongly effervescent to HCl.
115 - 120	Sandy gravel, poorly sorted. Sand (40 percent), coarse- to very coarse grained, angular, mainly clear and white quartz, lesser amounts of white feldspar, and minor biotite, dark metamorphic rock fragments, pink feldspar, and rose quartz. Pebbles and granules (60 percent) to 6 mm, angular, mainly white quartz and feldspar with lesser amounts of granite and dark metamorphic rock fragments. Slightly effervescent to HCl.
120 - 130	Gravelly sand, moderately sorted. Sand (65 percent), very coarse grained, subangular, mainly clear quartz with lesser amounts of biotite, dark metamorphic rock fragments, and pink feldspar. Granules (35 percent) to 4 mm, subangular, mainly clear and dark quartz, white feldspar, and gray limestone with minor dark metamorphic rock fragments and granite. Slightly effervescent to HCl.

Table 4.--Lithologic log for well EUBANK-1--Continued

Depth interval below land surface (feet)	Lithology
130 - 135	Silty, gravelly sand, poorly sorted. Silt (25 percent), light brown (7.5 YR 6/4). Sand (45 percent), fine- to very coarse grained, subangular, mainly clear quartz, lesser amounts of white feldspar and dark metamorphic rock fragments, and minor biotite. Granules (30 percent) to 4 mm, subangular, mainly white feldspar and dark metamorphic rock fragments with lesser amounts of granite and limestone. Strongly effervescent to HCl.
135 - 140	Silty, sandy gravel, poorly sorted. Silt (25 percent), pink (7.5 YR 7/4). Sand (30 percent), fine- to coarse-grained, subangular, mainly clear quartz and white feldspar with minor biotite. Pebbles and granules (45 percent) to 10 mm, subangular, mainly dark metamorphic rock fragments and white feldspar with lesser amounts of dark quartz. Strongly effervescent to HCl.
140 - 150	Silty, gravelly sand, poorly sorted. Silt (15 percent), brown (7.5 YR 5/4). Sand (50 percent), medium- to very coarse grained, subangular, mainly clear quartz and white feldspar with lesser amounts of dark metamorphic rock fragments. Pebbles and granules (35 percent) to 6 mm, subangular, mainly dark metamorphic rock fragments and white feldspar with lesser amounts of granite and dark quartz. Strongly effervescent to HCl.
150 - 155	Gravelly sand, poorly to moderately sorted. Silt (5 percent), brown (7.5 YR 5/4). Sand (65 percent), coarse- to very coarse grained, angular, mainly clear and white quartz, lesser amounts of white feldspar, and minor biotite and magnetite. Granules (30 percent) to 3 mm, angular, mainly dark metamorphic rock fragments with lesser amounts of quartz, white feldspar, and granite. Slightly effervescent to HCl.
155 - 160	Silty, sandy gravel, poorly-sorted. Silt (15 percent), light brown (7.5 YR 6/4). Sand (35 percent), medium- to very coarse grained, subangular, mainly clear and white quartz with lesser amounts of white feldspar. Pebbles and granules (50 percent) to 10 mm, subangular, mainly dark metamorphic rock fragments, white and clear quartz, and white feldspar, with lesser amounts of granite. Strongly effervescent to HCl.

Table 4.--Lithologic log for well EUBANK-1--Continued

Depth interval below land surface (feet)	Lithology
160 - 165	Gravelly sand, moderately sorted. Sand (70 percent), coarse- to very coarse grained, subangular, mainly clear quartz with lesser amounts of white feldspar and dark quartz. Granules (30 percent) to 3 mm, subangular, mainly clear and white quartz and quartzite with lesser amounts of granite and metamorphic rock fragments. Slightly effervescent to HCl.
165 - 180	Sandy gravel, poorly sorted. Silt (5 percent), pink (7.5 YR 7/4). Sand (40 percent), coarse- to very coarse grained, angular, mainly clear quartz, lesser amounts of white feldspar, and minor biotite. Pebbles and granules (55 percent) to 6 mm, angular, mainly white quartz and feldspar, lesser amounts of granite, and minor dark metamorphic rock fragments and rose quartz. Strongly effervescent to HCl.
180 - 195	Sandy gravel, poorly sorted. Sand (30 percent), medium- to very coarse grained, subangular, mainly clear quartz with minor white feldspar and biotite. Pebbles and granules (70 percent) to 10 mm, subangular, mainly dark metamorphic rock fragments and granite. Strongly effervescent to HCl.
195 - 200	Silty, gravelly sand, poorly sorted. Silt (10 percent), pink (7.5 YR 7/4). Sand (55 percent), fine- to very coarse grained, subangular, mainly clear and white quartz with minor biotite, dark metamorphic rock fragments, and white feldspar. Pebbles and granules (35 percent) to 10 mm, subangular, mainly white quartz and granite with minor dark metamorphic rock fragments. Strongly effervescent to HCl.
200 - 205	Gravelly sand, moderately sorted. Silt (5 percent), pink (7.5 YR 7/4). Sand (80 percent), coarse- to very coarse grained, subangular, mainly clear quartz with minor biotite. Granules (15 percent) to 4 mm, subangular, mainly clear, white, and dark quartz, and granite with lesser amounts of dark metamorphic rock fragments. Strongly effervescent to HCl.

Table 4.--Lithologic log for well EUBANK-1--Continued

Depth interval below land surface (feet)	Lithology
205 - 220	Silty, sandy gravel, poorly sorted. Silt (20 percent), light brown (7.5 YR 6/4). Sand (30 percent), medium- to very coarse grained, subangular, mainly clear quartz with minor biotite, dark metamorphic rock fragments, and white feldspar. Pebbles and granules (50 percent) to 8 mm, subangular, mainly dark metamorphic rock fragments and granite with minor limestone. Violently effervescent to HCl, hard masses of carbonate and continuous carbonate grain coatings.
220 - 230	Silty, gravelly sand, poorly to moderately sorted. Silt (25 percent), light brown (7.5 YR 6/4). Sand (40 percent), coarse- to very coarse grained, subangular to subrounded, mainly clear and white quartz with minor biotite and dark metamorphic rock fragments. Pebbles and granules (35 percent) to 6 mm, subrounded, mainly granite and dark metamorphic rock fragments with minor limestone. Strongly effervescent to HCl.
230 - 240	Gravelly sand, poorly to moderately sorted. Sand (60 percent), fine- and coarse- to very coarse grained, subangular, mainly clear and dark quartz, lesser amounts of white feldspar, and minor dark metamorphic rock fragments and pink feldspar. Granules (40 percent) to 4 mm, subangular, mainly clear and white quartz with lesser amounts of dark metamorphic rock fragments and granite. Strongly effervescent to HCl.
240 - 245	Silty, gravelly sand, poorly sorted. Silt (10 percent), light brown (7.5 YR 6/4). Sand (60 percent), medium- to very coarse grained, subangular, mainly clear and white quartz with minor biotite and dark metamorphic rock fragments. Pebbles and granules (30 percent) to 6 mm, subangular, mainly granite with lesser amounts of dark metamorphic rock fragments and clear, white, and dark quartz. Strongly effervescent to HCl.
245 - 255	Gravelly sand, moderately sorted. Sand (70 percent), medium- to coarse-grained, subangular, mainly clear quartz with lesser amounts of white feldspar, biotite, and granite. Granules (30 percent) to 4 mm, subangular, mainly clear and white quartz with lesser amounts of granite and dark metamorphic rock fragments. Slightly effervescent to HCl.

Table 4.--Lithologic log for well EUBANK-1--Continued

Depth interval below land surface (feet)	Lithology
255 - 265	Silty, sandy gravel, poorly sorted. Silt (20 percent), light brown (7.5 YR 6/4). Sand (30 percent), fine- to very coarse grained, angular to subangular, mainly clear quartz with lesser amounts of dark metamorphic rock fragments. Pebbles and granules (50 percent) to 6 mm, subangular, mainly white feldspar, quartz, and granite with minor dark metamorphic rock fragments. Strongly effervescent to HCl.
265 - 280	Silty, sandy gravel, poorly sorted. Silt (10 percent), light brown (7.5 YR 6/4). Sand (30 percent), medium- to very coarse grained, angular, mainly clear quartz with minor biotite. Pebbles and granules (60 percent) to 10 mm, angular, mainly clear quartz and granite with minor dark metamorphic rock fragments and limestone. Strongly effervescent to HCl.
280 - 310	Gravelly sand, moderately sorted. Sand (60 percent), fine- and coarse- to very coarse grained, subangular to subrounded, mainly clear and white quartz with minor white feldspar and biotite. Granules (40 percent) to 3 mm, subrounded, mainly clear and white quartz with lesser amounts of granite, dark quartz, and dark metamorphic rock fragments. Strongly effervescent to HCl.
310 - 315	Sandy gravel, poorly sorted. Silt (5 percent), pinkish gray (7.5 YR 7/3). Sand (35 percent), medium- to very coarse grained, subangular, mainly clear quartz with lesser amounts of dark metamorphic rock fragments, biotite, and muscovite. Pebbles and granules (60 percent) to 6 mm, subangular, mainly white quartz with lesser amounts of granite and dark metamorphic rock fragments. Strongly effervescent to HCl.
315 - 320	Sand and gravel, moderately sorted. Silt (5 percent), pinkish gray (7.5 YR 7/3). Sand (45 percent), medium- to very coarse grained, subangular to subrounded, mainly clear and white quartz with minor white and pink feldspar, rose quartz, and biotite. Granules (50 percent) to 4 mm, subrounded, mainly dark quartz and granite with minor dark metamorphic rock fragments. Strongly effervescent to HCl.

Table 4.--Lithologic log for well EUBANK-1--Continued

Depth interval below land surface (feet)	Lithology
320 - 325	Sandy gravel, poorly to moderately sorted. Sand (30 percent), fine- and coarse- to very coarse grained, angular to subangular, mainly clear quartz, lesser amounts of white feldspar, and minor biotite. Pebbles and granules (70 percent) to 8 mm, subangular, mainly granite with lesser amounts of dark quartz and dark metamorphic rock fragments. Strongly effervescent to HCl.
325 - 330	Silty, sandy gravel, poorly sorted. Silt (15 percent), pale brown (10 YR 6/3). Sand (30 percent), fine- to medium- and very coarse grained, subangular, mainly clear and white quartz with minor biotite. Pebbles and granules (55 percent) to 10 mm, subangular, mainly dark metamorphic rock fragments with lesser amounts of granite and dark quartz. Violently effervescent to HCl.
330 - 355	Gravelly sand, moderately sorted. Silt (5 percent), brown (7.5 YR 5/4). Sand (60 percent), medium- to coarse-grained, subangular to subrounded, mainly clear quartz, lesser amounts of white feldspar, and minor biotite. Pebbles and granules (35 percent) to 6 mm, subrounded, mainly granite with lesser amounts of dark metamorphic rock fragments and white quartz. Slightly effervescent to HCl.
355 - 365	Silty sand and gravel, poorly sorted. Silt (15 percent), light brown (7.5 YR 6/4). Sand (40 percent), medium- to very coarse grained, subangular to subrounded, mainly clear quartz and white feldspar with minor dark quartz and biotite. Granules (45 percent) to 3 mm with few pebbles to 6 mm, subrounded, mainly granite with lesser amounts of clear and white quartz and dark metamorphic rock fragments. Strongly effervescent to HCl.
365 - 405	Clayey, sandy gravel, poorly sorted. Clay and silt (30 percent), light brown (7.5 YR 6/4). Sand (25 percent), coarse- to very coarse grained, subangular, mainly clear and dark quartz, lesser amounts of white feldspar, and minor biotite. Pebbles and granules (45 percent) to 6 mm with few to 12 mm, subangular, mainly granite with lesser amounts of dark metamorphic rock fragments. Violently effervescent to HCl.

Table 4.--Lithologic log for well EUBANK-1--Continued

Depth interval below land surface (feet)	Lithology
405 - 420	Clayey, gravelly sand, poorly to moderately sorted. Clay and silt (20 percent), light brown (7.5 YR 6/4). Sand (50 percent), medium- to very coarse grained, subangular, mainly clear quartz, lesser amounts of white feldspar, and minor pink feldspar and biotite. Granules (30 percent) to 4 mm, subangular, mainly granite with lesser amounts of dark metamorphic rock fragments. Strongly effervescent to HCl.
420 - 440	Silty, sandy gravel, poorly sorted. Silt (30 percent), light brown (7.5 YR 6/4). Sand (20 percent), medium- to coarse-grained, subangular to subrounded, mainly clear quartz, lesser amounts of white quartz and feldspar, and minor biotite. Pebbles and granules (50 percent) to 6 mm, subrounded, mainly granite with lesser amounts of dark quartz. Violently effervescent to HCl.
440 - 465	Silty, sandy gravel, poorly to moderately sorted. Silt (30 percent), light brown (7.5 YR 6/4). Sand (30 percent), fine- to coarse-grained, subangular to subrounded, mainly clear quartz, lesser amounts of white quartz and feldspar, and minor biotite and pink feldspar. Granules (40 percent) to 4 mm, subrounded, mainly granite with lesser amounts of clear quartz. Violently effervescent to HCl.
465 - 470	Silty, gravelly sand, poorly to moderately sorted. Silt (10 percent), light brown (7.5 YR 6/4). Sand (60 percent), fine- to medium-grained, subangular to subrounded, mainly clear and white quartz with minor white and pink feldspar and biotite. Granules (30 percent) to 4 mm with few pebbles to 8 mm, subrounded, mainly granite with lesser amounts of clear quartz and white feldspar. Strongly effervescent to HCl.
470 - 475	Silty, sandy gravel, poorly sorted. Silt (20 percent), light brown (7.5 YR 6/4). Sand (30 percent), medium- to coarse-grained, subangular, mainly clear and white quartz with minor white and pink feldspar and biotite. Pebbles and granules (50 percent) to 5 mm with few to 8 mm, subangular, mainly granite. Strongly effervescent to HCl.

Table 4.--Lithologic log for well EUBANK-1--Continued

Depth interval below land surface (feet)	Lithology
475 - 490	Gravelly sand, moderately sorted. Sand (70 percent), medium- to very coarse grained, subangular to subrounded, mainly clear quartz with minor biotite and white and pink feldspar. Granules (30 percent) to 3 mm, subrounded, mainly granite with minor dark quartz and dark metamorphic rock fragments. Strongly effervescent to HCl.
490 - 500	Silty, gravelly sand, poorly sorted. Silt (10 percent), light brown (7.5 YR 6/4). Sand (55 percent), fine- to medium- and very coarse grained, subangular to subrounded, mainly clear quartz, lesser amounts of white feldspar, and minor biotite and magnetite. Granules (35 percent) to 4 mm with few pebbles to 6 mm, subrounded, mainly granite with lesser amounts of clear and dark quartz. Strongly effervescent to HCl.
500 - 515	Gravelly sand, poorly sorted. Sand (60 percent), fine- and coarse- to very coarse grained, subangular, mainly clear quartz, lesser amounts of white feldspar, and minor biotite. Granules (40 percent) to 4 mm, subangular, mainly granite with lesser amounts of clear quartz and dark metamorphic rock fragments. Strongly effervescent to HCl.
515 - 520	Silty, gravelly sand, poorly sorted. Silt (10 percent), light brown (7.5 YR 6/4). Sand (55 percent), fine- and coarse- to very coarse grained, subangular, mainly clear quartz, lesser amounts of white feldspar and dark quartz, and minor biotite. Pebbles and granules (35 percent) to 6 mm with few to 12 mm, subangular, mainly granite with minor clear quartz and limestone. Strongly effervescent to HCl.
520 - 535	Gravelly sand, poorly to moderately sorted. Silt (5 percent), light brown (7.5 YR 6/4). Sand (60 percent), medium- to very coarse-grained, subangular to subrounded, mainly clear quartz, lesser amounts of white feldspar, and minor biotite. Granules (35 percent) to 4 mm, subrounded, mainly granite with lesser amounts of dark metamorphic rock fragments and dark quartz. Strongly effervescent to HCl.

Table 4.--Lithologic log for well EUBANK-1--Continued

Depth interval below land surface (feet)	Lithology
535 - 545	Silty, gravelly sand, poorly to moderately sorted. Silt (10 percent), pinkish gray (7.5 YR 6/2). Sand (60 percent), fine- to coarse-grained, subangular, mainly clear and white quartz, lesser amounts of white feldspar, and minor magnetite and pink feldspar. Pebbles and granules (30 percent) to 5 mm, subangular, mainly granite with lesser amounts of limestone and dark metamorphic rock fragments. Violently effervescent to HCl.
545 - 565	Gravelly sand, moderately sorted. Silt (5 percent), light brown (7.5 YR 6/4). Sand (65 percent), medium- to very coarse grained, angular, mainly clear quartz with lesser amounts of white feldspar. Granules (30 percent) to 4 mm with few pebbles to 8 mm, angular, mainly granite with minor limestone. Strongly effervescent to HCl.
565 - 570	Silty, gravelly sand, moderately sorted. Silt (10 percent), pinkish gray (7.5 YR 6/2). Sand (65 percent), medium- to coarse-grained, subangular, mainly clear quartz and white feldspar with minor biotite. Granules (25 percent) to 4 mm, subangular, mainly granite with lesser amounts of dark metamorphic rock fragments and quartz. Strongly effervescent to HCl.
570 - 580	Silty sand and gravel; poorly sorted. Silt (10 percent), light brown (7.5 YR 6/4). Sand (40 percent), coarse- to very coarse grained, subangular, mainly white feldspar and clear quartz with minor biotite. Pebbles and granules (50 percent) to 6 mm, subangular, mainly granite with lesser amounts of dark metamorphic rock fragments. Violently effervescent to HCl.
580 - 590	Gravelly sand, moderately sorted. Sand (65 percent), medium- to very coarse grained, angular, mainly white feldspar and clear quartz with minor biotite. Granules (35 percent) to 4 mm, angular, mainly granite with minor dark metamorphic rock fragments. Strongly effervescent to HCl.

Table 4.--Lithologic log for well EUBANK-1--Concluded

Depth interval below land surface (feet)	Lithology
590 - 610	Silty, sandy gravel, poorly sorted. Silt (10 percent), light brown (7.5 YR 6/4). Sand (30 percent), coarse- to very coarse grained, subangular to subrounded, mainly clear quartz, lesser amounts of white feldspar, and minor biotite. Pebbles and granules (60 percent) to 6 mm, subrounded, mainly granite with lesser amounts of dark metamorphic rock fragments and limestone. Strongly effervescent to HCl.
610 - 625	Gravelly sand, moderately sorted. Sand (70 percent), medium- to very coarse grained, subangular to subrounded, mainly clear quartz, lesser amounts of white feldspar, and minor biotite. Granules (30 percent) to 4 mm, subrounded, mainly granite with lesser amounts of clear quartz and limestone. Strongly effervescent to HCl.
625 - 630	Silty, sandy gravel, poorly sorted. Silt (15 percent), light brown (7.5 YR 6/4). Sand (30 percent), fine- to coarse-grained, subangular, mainly clear quartz, lesser amounts of white feldspar, and minor pink feldspar, biotite, and magnetite. Pebbles and granules (55 percent) to 6 mm with few to 12 mm, subangular, mainly granite with lesser amounts of dark metamorphic rock fragments and limestone. Violently effervescent to HCl.

Table 5.--Lithologic log for well 4HILLS-1

[Samples were unwashed. mm, millimeters; HCl, hydrochloric acid; >, greater than]

Depth interval below land surface (feet)	Lithology
0 - 10	Clayey, sandy gravel, poorly sorted. Clay and silt (10 percent), light brown (7.5 YR 6/4). Sand (30 percent), very fine- to fine- and coarse-grained, subangular, mainly clear quartz, granite, lesser amounts of rose quartz and pink feldspar, and minor biotite. Pebbles and granules (60 percent) to 5 mm with chips to >14 mm, subangular, mainly granite and gray limestone. Strongly effervescent to HCl.
10 - 20	Sandy gravel, poorly sorted. Clay and silt (5 percent), light brown (7.5 YR 6/4). Sand (30 percent), fine- to coarse-grained, subangular, mainly clear and white quartz, granite, lesser amounts of pink and white feldspar, and minor biotite. Pebbles and granules (65 percent) to 10 mm, subangular, mainly granite and gray limestone. Moderately effervescent to HCl.
20 - 25	Clayey sand and gravel, poorly sorted. Clay and silt (10 percent), pale brown (10 YR 6/3). Sand (45 percent), medium- to very coarse grained, angular to subangular, mainly clear and white quartz, white and pink feldspar, and minor biotite. Pebbles and granules (45 percent) to 7 mm, subangular, mainly granite and gray limestone. Strongly effervescent to HCl.
25 - 40	Clayey, gravelly sand, poorly to moderately sorted. Clay and silt (25 percent), light gray (2.5 YR 7/2). Sand (55 percent), fine- to coarse-grained, subangular to subrounded, mainly white quartz, lesser amounts of clear quartz and white feldspar, and minor biotite. Pebbles and granules (20 percent) to 7 mm, subrounded, mainly granite and gray limestone. Moderately effervescent to HCl.
40 - 45	Clayey sandy gravel, poorly sorted. Clay and silt (20 percent), light gray (2.5 YR 7/2). Sand (30 percent), very fine- and coarse-grained, subangular to subangular, mainly white feldspar, lesser amounts of clear and white quartz and gray limestone, and minor biotite. Pebbles and granules (50 percent) to 9 mm, subangular, mainly granite and gray limestone. Moderately effervescent to HCl.

Table 5.--Lithologic log for well 4HILLS-1--Concluded

Depth interval below land surface (feet)	Lithology
45 - 60	Clayey, gravelly sand, poorly to moderately sorted. Clay and silt (25 percent), light gray (2.5 YR 7/2). Sand (60 percent), medium- to very coarse grained, subrounded, mainly white quartz and feldspar, lesser amounts of clear quartz and black limestone, and minor biotite. Granules (15 percent) to 4 mm, subrounded, mainly granite and gray limestone. Moderately effervescent to HCl.
60 - 65	Clayey sand and gravel, poorly sorted. Clay and silt (25 percent), light gray (2.5 YR 7/2). Sand (45 percent), fine- to medium-grained, subangular, mainly white feldspar, lesser amounts of white quartz and gray limestone, and minor biotite and clear quartz. Pebbles and granules (30 percent) to 8 mm, subangular, mainly granite and gray limestone. Moderately effervescent to HCl.
65 - 69	Clayey, sandy gravel, poorly sorted. Clay and silt (15 percent), light gray (2.5 YR 7/2). Sand (35 percent), very fine to coarse-grained, subangular to subrounded, mainly dark quartz, lesser amounts of white quartz and feldspar, and minor biotite and clear quartz. Pebbles and granules (50 percent) to 5 mm, subrounded, mainly granite. Moderately effervescent to HCl.
69 - 70	Bedrock chips to 12 mm, mainly granite and gray limestone.

Table 6.--Lithologic log for well JMC-1

[Samples were unwashed. mm, millimeters; HCl, hydrochloric acid; >, greater than]

Depth interval below land surface (feet)	Lithology
0 - 5	Clayey sand and gravel, poorly sorted. Clay and silt (10 percent), light brown (7.5 YR 6/4). Sand (45 percent), very fine to medium-grained, subangular, mainly clear quartz, lesser amounts of rose quartz and white feldspar, and minor pink feldspar, magnetite, and basalt. Pebbles and granules (45 percent) to 6 mm with few to 10 mm, subangular, mainly granite, lesser amounts of basalt, and minor white and clear quartz. Strongly effervescent to HCl.
5 - 30	Sandy gravel, poorly sorted. Silt (5 percent), light brown (7.5 YR 6/4). Sand (35 percent), medium- to very coarse grained, subangular, mainly clear and white quartz, lesser amounts of white feldspar, and minor magnetite, biotite, pink feldspar, and basalt. Pebbles and granules (60 percent) to 7 mm with few to >15 mm, subangular, mainly basalt, granite, and minor dark metamorphic rock fragments and limestone. Slightly effervescent to HCl.
30 - 35	Silty, sandy gravel, poorly sorted. Silt (10 percent), light brown (7.5 YR 6/4). Sand (35 percent), very fine to fine- and very coarse grained, subangular, mainly clear and white quartz, and minor rose quartz, white feldspar, magnetite, and biotite. Pebbles and granules (55 percent) to 7 mm, subangular, mainly granite, lesser amounts of gray limestone, and minor basalt. Moderately effervescent to HCl.
35 - 40	Gravelly sand, poorly to moderately sorted. Silt (5 percent), light brown (7.5 YR 6/4). Sand (70 percent), very fine to medium-grained, subangular, mainly clear quartz, lesser amounts of pink and white feldspar, and minor biotite. Pebbles and granules (25 percent) to 9 mm, subangular, mainly granite, gray limestone, and minor basalt. Strongly effervescent to HCl.
40 - 50	Silty, sandy gravel, poorly sorted. Silt (10 percent), pinkish gray (7.5 YR 7/2). Sand (30 percent), fine- to medium-grained, subangular to subrounded, mainly clear and rose quartz, lesser amounts of pink feldspar, and minor magnetite and biotite. Pebbles and granules (60 percent) to 10 mm, subrounded, mainly granite, basalt, and minor tuff and black chert. Strongly effervescent to HCl.

Table 6.--Lithologic log for well JMC-1--Continued

Depth interval below land surface (feet)	Lithology
50 - 55	Gravelly sand, moderately sorted. Sand (80 percent), very fine to medium-grained, angular to subangular, mainly clear quartz, lesser amounts of granite, and minor rose quartz, white feldspar, and magnetite. Granules (20 percent) to 4 mm with few pebbles to 12 mm, subangular, mainly granite and basalt. Strongly effervescent to HCl.
55 - 60	Silty, sandy gravel, poorly sorted. Silt (10 percent), pinkish gray (7.5 YR 7/2). Sand (35 percent), very fine to medium-grained, angular to subangular, mainly clear and white quartz, white feldspar, lesser amounts of pink feldspar, and minor magnetite and biotite. Pebbles and granules (55 percent) to 6 mm with few to 10 mm, subangular, mainly granite, lesser amounts of basalt, and minor brown chert. Moderately effervescent to HCl.
60 - 65	Silty, gravelly sand, poorly sorted. Silt (20 percent), pinkish gray (7.5 YR 7/2). Sand (50 percent), fine- to medium-grained, subangular, mainly clear quartz, lesser amounts of pink and white feldspar, rose quartz, and minor magnetite and biotite. Pebbles and granules (30 percent) to 5 mm with few to 14 mm, subangular, mainly granite and lesser amounts of gray limestone and dark metamorphic rock fragments. Moderately effervescent to HCl.
65 - 75	Clayey sand and gravel, poorly sorted. Clay and silt (50 percent), very pale brown (10 YR 7/3). Sand (30 percent), fine- to coarse-grained, subangular, mainly clear quartz, lesser amounts of pink feldspar and rose quartz, and minor biotite. Pebbles and granules (20 percent) to 8 mm, subangular, mainly granite and lesser amounts of basalt. Strongly effervescent to HCl.
75 - 80	Silty, gravelly sand, poorly sorted. Silt (30 percent), very pale brown (10 YR 7/3). Sand (45 percent), very fine to fine-grained, subangular, mainly clear quartz, lesser amounts of white and pink feldspar, and minor rose quartz. Pebbles and granules (25 percent) to 10 mm, subangular, mainly granite, lesser amounts of gray limestone, and minor white quartzite and basalt. Strongly effervescent to HCl.

Table 6.--Lithologic log for well JMC-1--Continued

Depth interval below land surface (feet)	Lithology
80 - 100	Gravelly sand, moderately sorted. Silt (5 percent), very pale brown (10 YR 7/3). Sand (70 percent), medium- to very coarse grained, subangular to subrounded, mainly clear quartz, lesser amounts of pink feldspar and rose quartz, and minor basalt and dark metamorphic rock fragments. Granules (25 percent) to 4 mm with few pebbles to 7 mm, subrounded, mainly granite, lesser amounts of basalt and gray limestone, and minor dark metamorphic rock fragments. Moderately effervescent to HCl.
100 - 105	Silty, gravelly sand, moderately sorted. Silt (15 percent), very pale brown (10 YR 7/3). Sand (65 percent), medium- to very coarse grained, subangular, mainly clear and white quartz, white feldspar, and minor pink feldspar and magnetite. Granules (20 percent) to 4 mm with few chips to 6 mm, subangular, mainly white quartzite, granite, and lesser amounts of basalt. Strongly effervescent to HCl.
105 - 110	Silty, gravelly sand, poorly sorted. Silt (30 percent), very pale brown (10 YR 7/3). Sand (55 percent), very fine to medium-grained, angular to subangular, mainly clear and white quartz, lesser amounts of white feldspar, and minor magnetite. Pebbles and granules (15 percent) to 5 mm, subangular, mainly granite and gray limestone. Strongly effervescent to HCl.
110 - 120	Gravelly sand, poorly sorted. Silt (5 percent), very pale brown (10 YR 7/3). Sand (60 percent), fine- to coarse-grained, subangular, mainly clear quartz, lesser amounts of pink feldspar, and minor rose quartz and white feldspar. Pebbles and granules (35 percent) to 8 mm, subangular, mainly basalt, granite, and lesser amounts of gray limestone. Moderately effervescent to HCl.
120 - 125	Gravelly sand, moderately sorted. Sand (80 percent), medium- to very coarse grained, subangular to subrounded, mainly clear quartz, lesser amounts of basalt, pink feldspar, and rose quartz, and minor white feldspar. Granules (20 percent) to 3 mm with few pebbles to 5 mm, subrounded, mainly granite and lesser amounts of basalt. Moderately effervescent to HCl.

Table 6.--Lithologic log for well JMC-1--Concluded

Depth interval below land surface (feet)	Lithology
125 - 130	Gravelly sand, moderately sorted. Silt (5 percent), very pale brown (10 YR 7/3). Sand (65 percent), coarse- to very coarse-grained, subangular, mainly clear and white quartz, lesser amounts of white and pink feldspar, and minor basalt and rose quartz. Granules (30 percent) to 4 mm with few pebbles to 6 mm, subangular, mainly basalt, granite, and minor gray limestone. Strongly effervescent to HCl.
130 - 150	Sand and gravel, moderately sorted. Sand (50 percent), coarse- to very coarse grained, subangular, mainly clear quartz, lesser amounts of basalt, and minor pink and white feldspar. Granules (50 percent) to 4 mm with few pebbles to 8 mm, subangular, mainly granite and lesser amounts of basalt. Slightly effervescent to HCl.
150 - 160	Sandy gravel, moderately to well-sorted. Sand (10 percent), very coarse grained, subangular, mainly clear quartz, basalt, and lesser amounts of pink feldspar and rose quartz. Pebbles and granules (90 percent) to 5 mm with few to 7 mm, subangular, mainly granite, lesser amounts of basalt, and minor brown chert. Very slightly effervescent to HCl.
160 - 169	Gravel, moderately sorted. Sand (5 percent), very coarse grained, subangular, mainly basalt, granite, and lesser amounts of clear quartz and pink feldspar. Pebbles and granules (95 percent) to 10 mm, subangular, mainly granite, lesser amounts of basalt, and minor gray limestone. Slightly effervescent to HCl.

Table 7.--Lithologic log for well JMC-2

[Samples were unwashed. mm, millimeters; HCl, hydrochloric acid]

Depth interval below land surface (feet)	Lithology
0 - 5	Silty, sandy gravel, poorly sorted. Silt (10 percent), light brown (7.5 YR 6/4). Sand (30 percent), fine- to medium-grained, subangular, mainly clear and white quartz, lesser amounts of white feldspar, and minor pink feldspar, magnetite, and biotite. Pebbles and granules (60 percent) to 8 mm, subangular, mainly granite and lesser amounts of gray limestone. Moderately effervescent to HCl.
5 - 40	Sandy gravel, poorly sorted. Silt (5 percent), light brown (7.5 YR 6/4). Sand (35 percent), very fine to fine- and very coarse grained, angular to subangular, mainly clear and white quartz, lesser amounts of white feldspar, and minor pink feldspar, gray limestone, and biotite. Pebbles and granules (60 percent) to 10 mm with few to 25 mm, subangular, mainly gray limestone, granite, and minor black chert and white quartzite. Moderately effervescent to HCl.
40 - 50	Gravelly sand, poorly sorted. Silt (5 percent), light brown (7.5 YR 6/4). Sand (60 percent), medium- to coarse-grained, angular, mainly clear quartz and minor biotite, rose quartz, pink and white feldspar, and magnetite. Pebbles and granules (35 percent) to 15 mm, subrounded to rounded, mainly granite, lesser amounts of basalt and gray quartzite, and minor green metamorphic rock fragments. Moderately effervescent to HCl.
50 - 55	Silty, gravelly sand, poorly sorted. Silt (30 percent), very pale brown (10 YR 7/3). Sand (60 percent), very fine to fine-grained, angular to subangular, mainly clear quartz and minor pink feldspar and biotite. Pebbles and granules (10 percent) to 7 mm, subangular, mainly dark quartzite and lesser amounts of basalt and granite. Strongly effervescent to HCl.
55 - 60	Gravelly sand, moderately sorted. Sand (75 percent), very fine to coarse-grained, subangular, mainly clear quartz and minor pink feldspar, rose quartz, and magnetite. Granules (25 percent) to 4 mm, subangular, mainly granite and lesser amounts of basalt. Slightly effervescent to HCl.

Table 7.--Lithologic log for well JMC-2--Continued

Depth interval below land surface (feet)	Lithology
60 - 65	Silty, gravelly sand, poorly sorted. Silt (15 percent), pinkish gray (7.5 YR 7/2). Sand (60 percent), very fine to medium-grained, subangular, mainly clear quartz and minor white and pink feldspar and magnetite. Pebbles and granules (25 percent) to 10 mm, subangular, mainly granite, lesser amounts of basalt, and minor green metamorphic rock fragments. Moderately effervescent to HCl.
65 - 70	Silty, gravelly sand, poorly sorted. Silt (20 percent), very pale brown (10 YR 7/3). Sand (60 percent), very fine to medium-grained, subangular, mainly clear quartz and minor pink feldspar and magnetite. Pebbles and granules (20 percent) to 5 mm with few to 10 mm, subangular, mainly granite and lesser amounts of basalt. Strongly effervescent to HCl.
70 - 80	Clayey sand, moderately sorted. Clay and silt (40 percent), pinkish gray (7.5 YR 7/2). Sand (60 percent), very fine to medium-grained, subangular, mainly clear quartz and minor pink feldspar and rose quartz. Few pebbles and granules to 10 mm, subangular, mainly basalt and granite. Strongly effervescent to HCl.
80 - 95	Gravelly sand, moderately sorted. Silt (5 percent), pinkish gray (7.5 YR 7/2). Sand (70 percent), medium- to coarse-grained, subangular, mainly clear quartz and minor biotite, basalt, rose quartz, pink feldspar, and magnetite. Pebbles and granules (25 percent) to 7 mm, subangular, mainly granite, lesser amounts of basalt and light limestone, and minor green metamorphic rock fragments and tuff. Moderately effervescent to HCl.
95 - 110	Clayey, gravelly sand, poorly sorted. Clay and silt (15 percent), pink (7.5 YR 7/4). Sand (60 percent), very fine to medium-grained, subangular to subrounded, mainly clear quartz, lesser amounts of rose quartz and pink feldspar, and minor magnetite and basalt. Pebbles and granules (25 percent) to 8 mm, subrounded, mainly granite and lesser amounts of basalt. Moderately effervescent to HCl.

Table 7.--Lithologic log for well JMC-2--Concluded

Depth interval below land surface (feet)	Lithology
110 - 120	Gravelly sand, moderately sorted. Sand (80 percent), medium- to very coarse grained, subrounded, mainly clear quartz, lesser amounts of basalt, rose quartz, and pink feldspar, and minor magnetite. Granules (20 percent) to 4 mm with few pebbles to 6 mm, subrounded, mainly granite and minor basalt. Slightly effervescent to HCl.
120 - 130	Sand, moderately to well-sorted. Sand (95 percent), coarse- to very coarse grained, subrounded, mainly clear quartz, lesser amounts of basalt, rose quartz, and pink feldspar, and minor magnetite. Granules (5 percent) to 3 mm with few pebbles to 6 mm, subrounded, mainly granite and minor basalt. Very slightly effervescent to HCl.

Table 8.--Lithologic log for well LALF-2B

[Samples were unwashed. mm, millimeters; HCl, hydrochloric acid; >, greater than]

Depth interval below land surface (feet)	Lithology
0 - 20	No sample available.
20 - 25	Gravelly sand with bits of trash, moderately sorted. Sand (90 percent), medium- to very coarse grained, subangular to subrounded, mainly clear quartz, lesser amounts of rose quartz, and minor pink and white feldspar. Pebbles and granules (10 percent) to 6 mm with few to >20 mm, subrounded, mainly granite and lesser amounts of basalt. Strongly effervescent to HCl.
25 - 30	No sample available.
30 - 65	Gravelly sand with bits of trash, moderately to well-sorted. Sand (90 percent), very fine to medium-grained, subangular to subrounded, mainly clear and white quartz, lesser amounts of basalt, and minor pink feldspar and rose quartz. Pebbles and granules (10 percent) to 5 mm with few to 45 mm, subrounded, mainly granite, basalt, and lesser amounts of brown quartzite and fine sandstone. Strongly effervescent to HCl.
65 - 75	Clayey, gravelly sand with bits of trash; poorly-sorted. Clay and silt (40 percent), very pale brown (10 YR 7/3). Sand (50 percent), fine- to coarse-grained, subrounded, mainly clear quartz and minor pink feldspar and basalt. Pebbles and granules (10 percent) to 10 mm with few to 25 mm, subrounded, mainly basalt, granite, and minor dark metamorphic rock fragments. Strongly effervescent to HCl.
75 - 80	Silty sand with bits of trash, moderately sorted. Silt (20 percent), light yellowish brown (10 YR 6/4). Sand (75 percent), medium- to very coarse-grained, subrounded, mainly clear quartz and minor rose quartz and basalt. Granules (5 percent) to 4 mm, subrounded, mainly granite and minor basalt. Strongly effervescent to HCl.

Table 8.--Lithologic log for well LALF-2B--Concluded

Depth interval below land surface (feet)	Lithology
80 - 95	Silty, gravelly sand with bits of trash, moderately sorted. Silt (20 percent), light yellowish brown (10 YR 6/4). Sand (70 percent), medium- to very coarse grained, subrounded, mainly clear quartz and minor rose quartz and basalt. Pebbles and granules (10 percent) to 7 mm with few to 15 mm, subrounded, mainly basalt and lesser amounts of granite. Strongly effervescent to HCl.
95 - 105	No sample available.
105 - 122	Silty sand, poorly to moderately sorted. Silt (25 percent), pinkish gray (7.5 YR 6/2). Sand (75 percent), very fine to medium-grained, subangular, mainly clear quartz, lesser amounts of basalt, and minor rose quartz and pink feldspar. Few granules and pebbles to 10 mm. Strongly effervescent to HCl.

Table 9.--Lithologic log for well LALF-4

[Samples were unwashed. mm, millimeters; HCl, hydrochloric acid]

Depth interval below land surface (feet)	Lithology
0 - 5	Sandy silt, well-sorted. Silt (75 percent), brown (7.5 YR 5/4). Sand (25 percent), very fine to fine-grained, subrounded to rounded, mainly clear quartz with minor muscovite and biotite. Few pebbles to 13 mm, rounded, mainly quartzite and granite. Strongly effervescent to HCl.
5 - 10	Sandy silt, well-sorted. Silt (85 percent), light brown (7.5 YR 6/4). Sand (15 percent), very fine grained, subrounded, mainly clear quartz and lesser amounts of muscovite, biotite, and rose quartz. Few pebbles and granules to 5 mm, subrounded, mainly quartzite and granite. Violently effervescent to HCl.
10 - 20	Silty, gravelly sand, moderately to well-sorted. Silt (15 percent), light brown (7.5 YR 6/4). Sand (80 percent), medium- to coarse-grained, subangular to subrounded, mainly clear quartz, lesser amounts of white and pink feldspar, and minor basalt. Pebbles and granules (5 percent) to 5 mm with few to 25 mm, subrounded, mainly subrounded to rounded granite with lesser amounts of basalt. Strongly effervescent to HCl.
20 - 35	Gravelly sand, moderately to well-sorted. Silt (5 percent), light brown (7.5 YR 6/4). Sand (70 percent), medium- to coarse-grained, subangular to subrounded, mainly clear quartz and minor biotite and pink and white feldspar. Pebbles and granules (25 percent) to 20 mm with few to 35 mm, subrounded, mainly subrounded to rounded granite, basalt, and minor tuff. Silt coatings on grains are strongly effervescent to HCl.
35 - 45	Sand and gravel, moderately to well-sorted. Sand (50 percent), medium- to very coarse grained, subrounded, mainly clear quartz and minor white and pink feldspar and basalt. Pebbles and granules (50 percent) to 15 mm with few to 45 mm, subrounded, mainly subrounded basalt and granite. Silt coats on grains are moderately effervescent to HCl.

Table 9.--Lithologic log for well LALF-4--Concluded

Depth interval below land surface (feet)	Lithology
45 - 50	Sandy gravel, moderately sorted. Sand (20 percent), fine- to coarse-grained, subangular to subrounded, mainly clear quartz, lesser amounts of white and pink feldspar, and minor magnetite and biotite. Pebbles and granules (80 percent) to 35 mm, subrounded, mainly rounded basalt, granite, and minor tuff. Silt coatings on grains are strongly effervescent to HCl.
50 - 85	Gravelly sand, moderately sorted. Sand (60 percent), coarse- to very coarse grained, subrounded, mainly clear quartz and pink and white feldspar, lesser amounts of basalt, and minor muscovite and biotite. Pebbles and granules (40 percent) to 25 mm with few to 60 mm, subrounded, mainly basalt, granite, and lesser amounts of limestone and clear quartz. Silt coats on grains are strongly effervescent to HCl.
85 - 90	Gravelly sand, moderately to well-sorted. Silt (5 percent), pinkish gray (7.5 YR 7/2). Sand (85 percent), coarse- to very coarse grained, subrounded, mainly clear quartz and pink and white feldspar, lesser amounts of basalt, and minor magnetite. Pebbles and granules (10 percent) to 10 mm with few to 30 mm, subrounded, mainly rounded basalt and lesser amounts of granite and clear quartz. Moderately effervescent to HCl.
90 - 105	Sand, moderately to well-sorted. Silt (5 percent), pinkish gray (7.5 YR 7/2). Sand (95 percent), coarse- to very coarse grained, subrounded, mainly clear quartz and pink and white feldspar, lesser amounts of basalt, and minor magnetite. Few pebbles to 20 mm, mainly rounded basalt, granite, and clear quartz. Very slightly effervescent to HCl.

Table 10.--Lithologic log for well IALF-5

[Samples were unwashed. mm, millimeters; HCl, hydrochloric acid; >, greater than]

Depth interval below land surface (feet)	Lithology
0 - 5	Gravelly sand, moderately to well-sorted. Sand (90 percent), medium- to very coarse grained, subrounded, mainly clear quartz, lesser amounts of rose quartz, and minor pink and white feldspar and basalt. Granules (10 percent) to 3 mm, subrounded, mainly granite and green, white, and dark metamorphic rock fragments. No reaction to HCl.
5 - 10	Sandy gravel, moderately sorted. Sand (20 percent), medium- to very coarse grained, subrounded, mainly clear quartz and minor pink feldspar, rose quartz, and basalt. Granules (80 percent) to 4 mm with few pebbles to 6 mm, subrounded, mainly basalt and granite. No reaction to HCl.
10 - 15	Sandy gravel, well-sorted. Sand (20 percent), very coarse grained, subangular to subrounded, mainly clear quartz, pink feldspar, and rose quartz. Granules (80 percent) to 4 mm, subrounded, mainly basalt, granite, lesser amounts of clear and rose quartz, and minor tuff. Very slightly effervescent to HCl.
15 - 25	Sand, well-sorted (100 percent). Coarse- to very coarse grained, subrounded, mainly clear quartz, lesser amounts of pink feldspar and rose quartz, and minor basalt, brown quartz, tuff, and dark metamorphic rock fragments. Few granules to 3 mm. No reaction to HCl.
25 - 30	Gravelly sand, poorly to moderately sorted. Sand (70 percent), medium- to very coarse grained, subangular to subrounded, mainly clear quartz, lesser amounts of pink feldspar and rose quartz, and minor basalt. Pebbles and granules (30 percent) to 6 mm, subrounded, mainly basalt, granite, and lesser amounts of clear quartz. No reaction to HCl.
30 - 35	Gravel, poorly sorted. Sand (5 percent), coarse- to very coarse grained, subangular, mainly clear quartz, rose quartz, and pink feldspar. Pebbles and granules (95 percent) to 10 mm, subangular, mainly granite, basalt, lesser amounts of brown chert, and minor tuff. No reaction to HCl.

Table 10.--Lithologic log for well LALF-5--Continued

Depth interval below land surface (feet)	Lithology
35 - 50	Sand, moderately to well-sorted (100 percent). Coarse- to very coarse grained, subangular, mainly clear quartz, lesser amounts of basalt and rose quartz, and minor pink feldspar, tuff, green metamorphic rock fragments. Few granules to 4 mm. No reaction to HCl.
50 - 53	No sample available.
53 - 60	Silty, gravelly sand, poorly-sorted. Silt (15 percent), very pale brown (10 YR 7/3). Sand (50 percent), medium- to very coarse grained, subangular to subrounded, mainly clear quartz, lesser amounts of basalt, and minor rose quartz and pink feldspar. Pebbles and granules (35 percent) to 6 mm, subrounded, mainly basalt, lesser amounts of granite, and minor green metamorphic rock fragments. Very slightly effervescent to HCl.
60 - 65	Clayey, sandy gravel, poorly to moderately sorted. Clay and silt (10 percent), light gray (10 YR 7/2). Sand (35 percent), very fine- and coarse- to very coarse grained, subangular, mainly clear quartz and minor basalt, pink feldspar, and dark metamorphic rock fragments. Pebbles and granules (55 percent) to 5 mm, subangular, mainly basalt, lesser amounts of granite, and minor green and dark metamorphic rock fragments. Strongly effervescent to HCl.
65 - 70	Sandy, gravelly clay, poorly sorted. Clay and silt (60 percent), very pale brown (10 YR 7/3). Sand (20 percent), very fine to medium-grained, subangular, mainly clear quartz and minor rose quartz and basalt. Pebbles and granules (20 percent) to 6 mm with few to 11 mm, subangular, mainly basalt, lesser amounts of granite, and minor white quartzite. Strongly effervescent to HCl.
70 - 85	Gravelly sand, moderately sorted. Sand (90 percent), medium- to very coarse grained, subangular, mainly clear quartz, lesser amounts of pink feldspar, rose quartz, and basalt, and minor dark and light metamorphic rock fragments. Granules (10 percent) to 4 mm with few pebbles to 6 mm, subangular, mainly granite and lesser amounts of basalt. Very slightly effervescent to HCl.

Table 10.--Lithologic log for well LALF-5--Continued

Depth interval below land surface (feet)	Lithology
85 - 90	Clayey, gravelly sand, moderately sorted. Clay and silt (10 percent), pinkish white (7.5 YR 8/2). Sand (70 percent), medium- to very coarse grained, subangular, mainly clear quartz, lesser amounts of pink feldspar, rose quartz, and basalt, and minor dark and light metamorphic rock fragments. Granules (20 percent) to 4 mm with few pebbles to 6 mm, subangular, mainly granite and basalt. Moderately effervescent to HCl.
90 - 105	Sandy, gravelly clay, poorly sorted. Clay and silt (70 percent), pale brown (10 YR 6/3). Sand (20 percent), very fine to medium-grained, subangular, mainly clear quartz and minor basalt and rose quartz. Pebbles and granules (10 percent) to 5 mm, subangular, mainly granite and basalt. Strongly effervescent to HCl.
105 - 120	Gravelly sand, moderately sorted. Clay and silt (5 percent), pink (7.5 YR 7/4). Sand (75 percent), very fine and medium- to very coarse grained, subangular to subrounded, mainly clear quartz and lesser amounts of basalt, pink feldspar, and rose quartz. Granules (20 percent) to 4 mm with few pebbles to 6 mm, subrounded, mainly basalt and lesser amounts of granite. Moderately effervescent to HCl.
120 - 130	Clayey sand and gravel, poorly sorted. Clay and silt (15 percent), pink (7.5 YR 7/4). Sand (40 percent), very fine to medium-grained, subangular, mainly clear quartz and minor basalt, pink feldspar, and biotite. Pebbles and granules (45 percent) to 8 mm, subangular, mainly basalt and lesser amounts of granite. Moderately effervescent to HCl.
130 - 135	Clayey, gravelly sand, poorly to moderately sorted. Clay and silt (10 percent), pink (7.5 YR 7/4). Sand (65 percent), medium- to coarse-grained, subrounded, mainly clear quartz, lesser amounts of rose quartz, and minor basalt. Pebbles and granules (25 percent) to 6 mm, subrounded, mainly basalt, granite, clear and white quartz, and minor tuff. Very slightly effervescent to HCl.

Table 10.--Lithologic log for well LALF-5--Concluded

Depth interval below land surface (feet)	Lithology
135 - 145	Gravelly sand, moderately sorted. Sand (85 percent), medium- to very coarse grained, subangular, mainly clear quartz and lesser amounts of basalt and rose quartz. Pebbles and granules (15 percent) to 5 mm, subangular, mainly basalt, lesser amounts of granite and dark quartz, and minor limestone. Very slightly effervescent to HCl.
145 - 150	Gravelly sand, poorly to moderately sorted. Sand (70 percent), coarse- to very coarse grained, subrounded, mainly clear quartz, lesser amounts of rose quartz and basalt, and minor pink feldspar. Pebbles and granules (30 percent) to 8 mm, subrounded, mainly basalt, granite, lesser amounts of clear and white quartz, and minor brown quartzite. Slightly effervescent to HCl.
150 - 155	Sandy gravel, poorly sorted. Sand (40 percent), medium- to very coarse grained, subangular, mainly clear quartz and minor basalt, rose quartz, and pink feldspar. Pebbles and granules (60 percent) to 8 mm, subangular, mainly basalt and lesser amounts of granite and brown quartzite. No reaction to HCl.
155 - 160	Sandy gravel, poorly sorted. Sand (40 percent), medium- to very coarse grained, subangular to subrounded, mainly clear quartz and lesser amounts of pink feldspar, basalt, and rose quartz. Pebbles and granules (60 percent) to 10 mm with few to >15 mm, subrounded, mainly basalt, brown quartzite, and minor limestone, granite, and dark metamorphic rock fragments. No reaction to HCl.

Table 11.--Lithologic log for well LALF-6

[Samples were unwashed. mm, millimeters; HCl, hydrochloric acid; >, greater than]

Depth interval below land surface (feet)	Lithology
0 - 20	No sample available.
20 - 30	Gravelly sand, poorly to moderately sorted. Sand (60 percent), medium- to very coarse grained, angular to subangular, mainly clear quartz, lesser amounts of rose quartz and basalt, and minor green metamorphic rock fragments. Pebbles and granules (40 percent) to 6 mm with few to >15 mm, subangular, mainly granite, basalt, lesser amounts of clear and white quartz, and minor brown chert, quartz sandstone, and tuff. Very slightly effervescent to HCl.
30 - 35	Sandy gravel, poorly sorted. Sand (40 percent), coarse- to very coarse grained, angular to subangular, mainly clear quartz, lesser amounts of rose quartz, and minor basalt. Pebbles and granules (60 percent) to 10 mm, subangular, mainly granite, basalt, lesser amounts of brown chert, and minor green metamorphic rock fragments. Moderately effervescent to HCl.
35 - 45	Sandy gravel, poorly sorted. Sand (40 percent), medium- to very coarse grained, subangular, mainly clear quartz, lesser amounts of rose quartz, and minor dark metamorphic rock fragments. Pebbles and granules (60 percent) to >20 mm, subangular, mainly subrounded to rounded granite, basalt, and lesser amounts of white quartz and quartzite. Very slightly effervescent to HCl.
45 - 50	Sandy gravel (mostly chips), poorly sorted. Sand (5 percent), fine- to medium-grained, subangular, mainly clear and rose quartz. Pebbles and granules (95 percent) to >10 mm, subangular, mainly basalt and lesser amounts of granite and white quartz and quartzite. Very slightly effervescent to HCl.
50 - 55	Sandy gravel (mainly chips), poorly sorted. Sand (40 percent), medium- to coarse-grained, subangular, mainly clear quartz and lesser amounts of rose quartz and pink feldspar. Pebbles and granules (60 percent) to >10 mm, subangular, mainly granite and lesser amounts of gray quartzite and basalt. Very slightly effervescent to HCl.

Table 11.--Lithologic log for well LALF-6--Continued

Depth interval below land surface (feet)	Lithology
55 - 60	Sandy gravel, poorly sorted. Sand (20 percent), very fine-grained, subangular, mainly clear quartz, lesser amounts of basalt and gray quartz, and minor magnetite and oxidized iron. Pebbles and granules (80 percent) to 12 mm, subangular, mainly basalt and lesser amounts of granite and gray quartzite. Strongly effervescent to HCl.
60 - 65	Clayey, sandy gravel, poorly sorted. Clay and silt (10 percent), pinkish gray (7.5 YR 7/2). Sand (35 percent), very fine to medium grained, subangular, mainly clear quartz, lesser amounts of basalt and rose quartz, and minor pink feldspar. Pebbles and granules (55 percent) to 8 mm with few to 15 mm, subangular, mainly basalt, granite, and lesser amounts of clear and white quartz. Strongly effervescent to HCl.
65 - 80	Gravelly sand, poorly to moderately sorted. Sand (65 percent), medium- to very coarse grained, subangular to subrounded, mainly clear quartz and minor pink feldspar, basalt, and rose quartz. Pebbles and granules (35 percent) to 6 mm with few to 20 mm, subrounded, mainly white quartzite, lesser amounts of basalt and granite, and minor tuff. Very slightly effervescent to HCl.
80 - 85	Clayey sand, moderately sorted. Clay and silt (10 percent), pinkish gray (7.5 YR 7/2). Sand (90 percent), fine- to medium-grained, subangular, mainly clear quartz and minor rose quartz and basalt. Few granules to 4 mm. Slightly effervescent to HCl.
85 - 100	Clayey sand, moderately sorted. Clay and silt (30 percent), light brown (7.5 YR 6/4). Sand (65 percent), fine- to coarse-grained, subangular, mainly clear quartz and minor rose quartz, basalt, and brown chert. Granules (5 percent) to 3 mm, subangular, mainly basalt, granite, and minor green metamorphic rock fragments. Moderately effervescent to HCl.
100 - 115	Gravelly sand, moderately to well-sorted. Sand (90 percent), medium- to very coarse grained, subrounded, mainly clear quartz and lesser amounts of basalt, rose quartz, and pink feldspar. Granules (10 percent) to 4 mm, subrounded, mainly limestone, basalt, granite, and minor tuff. Strongly effervescent to HCl.

Table 11.--Lithologic log for well IALF-6--Continued

Depth interval below land surface (feet)	Lithology
115 - 130	Gravelly sand, moderately to well-sorted. Sand (60 percent), coarse- to very coarse-grained, subangular, mainly clear quartz and minor basalt, rose quartz, and pink feldspar. Granules (40 percent) to 4 mm, subangular, mainly basalt and granite. Very slightly effervescent to HCl.
130 - 135	Sand, well-sorted (100 percent). Medium- to very coarse grained, subangular to subrounded, mainly clear quartz, lesser amounts of basalt, rose quartz, and pink feldspar, and minor granite and green metamorphic rock fragments. Few granules to 4 mm. No reaction to HCl.
135 - 140	Sandy gravel, moderately to well-sorted. Sand (35 percent), coarse- to very coarse-grained, subangular, mainly clear and white quartz and basalt and lesser amounts of rose quartz and pink feldspar. Granules (65 percent) to 3 mm with few pebbles to 5 mm, subangular, mainly basalt and lesser amounts of granite. Slightly effervescent to HCl.
140 - 145	Sandy gravel, poorly sorted. Sand (20 percent), coarse- to very coarse grained, subangular, mainly clear and white quartz and basalt and minor pink feldspar and rose quartz. Pebbles and granules (80 percent) to 5 mm with few to 12 mm, subangular, mainly subrounded to rounded basalt, lesser amounts of granite, and minor dark metamorphic rock fragments. Moderately effervescent to HCl.
145 - 160	Clayey, gravelly sand, poorly sorted. Clay and silt (20 percent), pinkish gray (7.5 YR 7/2). Sand (50 percent), fine- to very coarse grained, subangular, mainly clear quartz and lesser amounts of basalt, rose quartz, and pink feldspar. Pebbles and granules (30 percent) to 10 mm, subangular, mainly basalt and minor granite. Strongly effervescent to HCl.
160 - 165	Gravelly sand, moderately sorted. Clay and silt (5 percent), pinkish gray (7.5 YR 7/2). Sand (75 percent), medium- to very coarse grained, subangular, mainly clear and white quartz and lesser amounts of basalt, rose quartz, and pink feldspar. Pebbles and granules (20 percent) to 5 mm, subangular, mainly basalt and lesser amounts of granite. Strongly effervescent to HCl.

Table 11.--Lithologic log for well LALF-6--Concluded

Depth interval below land surface (feet)	Lithology
165 - 170	Gravelly sand, moderately to well-sorted. Sand (60 percent), medium- to very coarse grained, subangular to subrounded, mainly clear quartz, lesser amounts of basalt, and minor pink feldspar and rose quartz. Pebbles and granules (40 percent) to 5 mm, subrounded, mainly basalt and lesser amounts of granite. Very slightly effervescent to HCl.

Table 12.--Lithologic log for well LALF-7

[Samples were unwashed. mm, millimeters; HCl, hydrochloric acid]

Depth interval below land surface (feet)	Lithology
0 - 10	Gravelly, silty sand, poorly sorted. Silt (25 percent), brown (10 YR 5/3). Sand (60 percent), very fine to medium-grained, subangular, mainly clear quartz, lesser amounts of white feldspar and rose quartz, and minor biotite and magnetite. Pebbles and granules (15 percent) to 10 mm, subangular, mainly basalt, granite, and minor scoria. Strongly effervescent to HCl.
10 - 15	Silty, sandy gravel, poorly sorted. Silt (20 percent), brown (10 YR 5/3). Sand (20 percent), very fine to medium-grained, subangular, mainly clear quartz, lesser amounts of white feldspar, and minor pink feldspar. Pebbles and granules (60 percent) to 10 mm, subangular, mainly basalt, lesser amounts of granite, and minor red quartzite. Strongly effervescent to HCl.
15 - 45	Sandy gravel, poorly sorted. Sand (20 percent), very coarse grained, angular to subangular, mainly clear quartz and pink feldspar. Pebbles and granules (80 percent) to 30 mm, subangular, mainly basalt, lesser amounts of granite and dark quartzite, and minor dark metamorphic rock fragments. Very slightly effervescent to HCl.
45 - 55	No sample available.
55 - 60	Clayey, gravelly sand, poorly sorted. Clay and silt (30 percent), light brown (7.5 YR 6/4). Sand (40 percent), medium- to very coarse grained, subangular, mainly clear quartz, lesser amounts of rose quartz and pink and white feldspar, and minor magnetite and basalt. Pebbles and granules (30 percent) to 6 mm, subangular, mainly basalt, lesser amounts of granite, and minor white quartzite. Moderately effervescent to HCl.
60 - 65	Sand, well-sorted. Sand (95 percent), coarse- to very coarse grained, subangular, mainly clear quartz, lesser amounts of basalt, and minor tuff and pink and white feldspar. Granules (5 percent) to 3 mm with few pebbles to 5 mm, subangular, mainly granite, basalt, and clear quartz. No reaction to HCl.

Table 12.--Lithologic log for well LALF-7--Continued

Depth interval below land surface (feet)	Lithology
65 - 70	Silty, gravelly, sand, moderately to well-sorted. Silt (10 percent), very pale brown (10 YR 7/3). Sand (80 percent), coarse- to very coarse grained, angular to subangular, mainly clear quartz, lesser amounts of basalt, and minor pink feldspar. Granules (10 percent) to 4 mm, subangular, mainly basalt, granite, and clear quartz. Very slightly effervescent to HCl.
70 - 90	Gravelly sand, well-sorted. Sand (90 percent), coarse- to very coarse grained, subangular, mainly clear quartz, lesser amounts of basalt, and minor white and pink feldspar. Granules (10 percent) to 3 mm with few pebbles to 5 mm, subangular, mainly basalt, granite, and clear quartz. No reaction to HCl.
90 - 110	Clayey, gravelly sand, poorly to moderately sorted. Clay and silt (30 percent), very pale brown (10 YR 7/3). Sand (40 percent), fine- and coarse- to very coarse grained, subangular, mainly clear quartz, white feldspar, and minor basalt. Pebbles and granules (30 percent) to 6 mm, subangular, mainly basalt, lesser amounts of granite, and minor clear quartz. Moderately effervescent to HCl.
110 - 120	Gravelly sand, moderately sorted. Silt (5 percent), pink (7.5 YR 7/4). Sand (70 percent), very fine to fine- and coarse-grained, subangular to subrounded, mainly clear quartz and minor basalt and pink feldspar. Granules (25 percent) to 4 mm with few pebbles to 6 mm, subrounded, mainly basalt, granite, and lesser amounts of dark quartzite. Moderately effervescent to HCl.
120 - 130	Gravelly sand and clay, poorly to moderately sorted. Clay and silt (50 percent), pink (7.5 YR 7/4). Sand (40 percent), very fine to medium-grained, subangular, mainly clear quartz and minor pink feldspar and basalt. Granules (10 percent) to 3 mm with few pebbles to 5 mm, subangular, mainly basalt and lesser amounts of granite. Moderately effervescent to HCl.

Table 12.--Lithologic log for well LALF-7--Concluded

Depth interval below land surface (feet)	Lithology
130 - 135	Clayey, gravelly sand, moderately sorted. Clay and silt (10 percent), pink (7.5 YR 7/4). Sand (80 percent), very fine to fine-grained, angular to subangular, mainly clear quartz, lesser amounts of basalt, and minor rose quartz and pink and white feldspar. Granules (10 percent) to 4 mm, subangular, mainly basalt, granite, and minor dark quartzite. Slightly effervescent to HCl.
135 - 155	Gravelly sand, moderately to well-sorted. Sand (85 percent), very fine to medium- and very coarse grained, subangular to subrounded, mainly clear quartz, lesser amounts of basalt, rose quartz, and pink and white feldspar, and minor dark quartzite and muscovite. Granules (15 percent) to 4 mm, subrounded, mainly basalt, lesser amounts of granite and clear quartz, and minor dark quartzite, tuff, and green metamorphic rock fragments. Very slightly effervescent to HCl.
155 - 165	Gravelly sand, poorly to moderately sorted. Sand (65 percent), medium- to very coarse grained, angular to subangular, mainly clear quartz and minor rose quartz. Pebbles and granules (35 percent) to 5 mm with few to 7 mm, subangular, mainly granite, lesser amounts of basalt and clear quartz, and minor tuff and green metamorphic rock fragments. No reaction to HCl.
165 - 169	Sandy gravel, poorly sorted. Sand (40 percent), medium- to very coarse grained, angular, mainly clear quartz, pink feldspar, and lesser amounts of basalt. Pebbles and granules (60 percent) to 9 mm, angular, mainly granite, basalt, clear quartz, and minor green metamorphic rock fragments. No reaction to HCl.

Table 13.--Lithologic log for well LALF-8

[Samples were unwashed. mm, millimeters; HCl, hydrochloric acid; >, greater than]

Depth interval below land surface (feet)	Lithology
0 - 15	Silty, gravelly sand, poorly sorted. Silt (30 percent), light yellowish brown (10 YR 6/4). Sand (50 percent), fine- to very coarse grained, subangular to subrounded, mainly quartz and quartzite and minor basalt and biotite. Pebbles and granules (20 percent) to 8 mm, subrounded, mainly basalt and minor granite. Violently effervescent to HCl.
15 - 25	Silty, gravelly sand, poorly sorted. Silt (20 percent), light yellowish brown (10 YR 6/4). Sand (60 percent), coarse- to very coarse grained, subangular, mainly white quartzite and quartz and minor dark quartzite and basalt. Pebbles and granules (20 percent) to 15 mm, subangular, mainly quartzite and minor basalt and granite. Strongly effervescent to HCl.
25 - 40	Silty, sandy gravel, poorly sorted. Silt (10 percent), light yellowish brown (10 YR 6/4). Sand (20 percent), coarse- to very coarse grained, subangular to subrounded, mainly clear quartz and white quartzite and minor dark quartzite. Pebbles and granules (70 percent) to 20 mm, subrounded, mainly white and black quartzite and minor basalt and granite. Strongly effervescent to HCl.
40 - 45	Sandy gravel, poorly sorted. Sand (20 percent), coarse- to very coarse grained, subangular to subrounded, mainly clear quartz and quartzite with minor basalt and pumice. Pebbles and granules (80 percent) to 15 mm, subrounded, mainly basalt and quartzite. Slightly effervescent to HCl.
45 - 50	Silty, sandy gravel, poorly sorted. Silt (15 percent), light yellowish brown (10 YR 6/4). Sand (35 percent), medium- to very coarse grained, subangular to subrounded, mainly clear quartz and quartzite. Pebbles and granules (50 percent) to 15 mm, subrounded, mainly quartzite, basalt and minor granite. Slightly effervescent to HCl.

Table 13.--Lithologic log for well LALF-8--Continued

Depth interval below land surface (feet)	Lithology
50 - 65	Silty, sandy gravel, poorly to moderately sorted. Silt (20 percent), light yellowish brown (10 YR 6/4). Sand (40 percent), fine- to medium-grained, subangular, mainly quartz and minor basalt and pumice. Pebbles and granules (40 percent) to >25 mm, subangular, mainly basalt and minor tuff and quartzite. Moderately effervescent to HCl.
65 - 70	Silty, gravelly sand, poorly sorted. Silt (10 percent), light yellowish brown (10 YR 6/4). Sand (60 percent), fine- to very coarse grained, subangular, mainly quartz and minor quartzite and basalt. Pebbles and granules (30 percent) to 10 mm, subangular, mainly basalt and minor quartzite. Strongly effervescent to HCl.
70 - 85	Gravelly sand, poorly to moderately sorted. Sand (70 percent), fine- to very coarse grained, subrounded, mainly quartz and minor basalt and granite. Pebbles and granules (30 percent) to 10 mm, subrounded, mainly basalt, quartzite, and minor granite and sandstone. Strongly effervescent to HCl.
85 - 95	Gravelly sand, moderately sorted. Sand (60 percent), coarse- to very coarse grained, subrounded, mainly quartz and minor quartzite and basalt. Granules (40 percent) to 3 mm, subrounded, mainly quartz, basalt, and minor quartzite and granite. Slightly effervescent to HCl.
95 - 105	Silty, gravelly sand, poorly to moderately sorted. Silt (25 percent), light yellowish brown (10 YR 6/4). Sand (50 percent), medium- to coarse-grained, subangular to subrounded mainly quartz, quartzite, and minor basalt. Pebbles and granules (25 percent) to 8 mm, subrounded, mainly quartzite and basalt. Strongly effervescent to HCl.
105 - 130	Gravelly sand, poorly to moderately sorted. Sand (60 percent), fine- to very coarse grained, subangular to subrounded, mainly quartz and minor basalt and quartzite. Pebbles and granules (40 percent) to 5 mm, subrounded, mainly basalt and minor quartzite. Slightly effervescent to HCl.

Table 13.--Lithologic log for well LALF-8--Concluded

Depth interval below land surface (feet)	Lithology
130 - 145	Sandy gravel, poorly to moderately sorted. Sand (40 percent), fine- to very coarse grained, subangular to subrounded, mainly quartz and minor basalt. Pebbles and granules (60 percent) to 8 mm, subrounded, mainly basalt and minor quartzite and granite. Slightly effervescent to HCl.
145 - 175	Silty, sandy gravel, poorly sorted. Silt (10 percent), yellowish pale brown (10 YR 8/4). Sand (30 percent), medium- to coarse-grained, subangular, mainly quartz, quartzite, and minor basalt. Pebbles and granules (60 percent) to 8 mm, subangular, mainly basalt, quartzite, and minor granite. Slightly effervescent to HCl.
175 - 185	Silty, gravelly sand, moderately sorted. Silt (10 percent), yellowish pale brown (10 YR 8/4). Sand (80 percent), medium- to very coarse-grained, subangular to subrounded, mainly quartz and minor basalt. Granules (10 percent) to 4 mm, subrounded, mainly basalt and quartzite. Slightly effervescent to HCl.
185 - 190	Gravelly sand, moderately sorted. Sand (75 percent), medium- to very coarse grained, subangular to subrounded, mainly quartz and minor quartzite and basalt. Pebbles and granules (25 percent) to 6 mm, subrounded, mainly basalt and minor quartzite. Slightly effervescent to HCl.
190 - 200	Silty, sandy gravel, poorly sorted. Silt (20 percent), very pale brown (10 YR 7/3). Sand (30 percent), medium- to very coarse grained, subangular to subrounded, mainly quartz and minor quartzite and basalt. Pebbles and granules (50 percent) to 6 mm, subrounded, mainly basalt and minor quartzite. Violently effervescent to HCl.
200 - 225.5	Gravelly sand, moderately to well-sorted. Sand (70 percent), very coarse grained, subrounded, mainly quartz, basalt, and minor quartzite and granite. Granules (30 percent) to 4 mm, subrounded, mainly basalt and quartzite. Slightly effervescent to HCl.

Table 14.--Lithologic log for well MONT-5A

[Samples were unwashed. mm, millimeters; HCl, hydrochloric acid]

Depth interval below land surface (feet)	Lithology
0 - 5	Silty, sandy gravel, poorly sorted. Silt (15 percent), pinkish gray (7.5 YR 7/2). Sand (30 percent), fine- to coarse-grained, subangular, mainly clear quartz and minor rose quartz and basalt. Pebbles and granules (55 percent) to 8 mm, subangular, mainly basalt, lesser granite, and minor red quartzite. Strongly effervescent to HCl.
5 - 10	Silty sand and gravel, poorly sorted. Silt (15 percent), very pale brown (10 YR 7/3). Sand (40 percent), very fine to medium-grained, angular to subangular, mainly clear quartz and minor rose quartz. Pebbles and granules (45 percent) to 6 mm with few to 12 mm, subangular, mainly basalt, granite, and minor quartzite. Violently effervescent to HCl.
10 - 20	Gravelly sand, poorly sorted. Silt (5 percent), very pale brown (10 YR 7/3). Sand (65 percent), medium- to very coarse grained, angular to subangular, mainly clear quartz and minor pink feldspar, rose quartz, and magnetite. Pebbles and granules (30 percent) to 6 mm with few to 8 mm, subangular, mainly basalt, white quartz, and minor granite, chert, and green metamorphic rock fragments. Strongly effervescent to HCl.
20 - 30	Gravelly sand, poorly to moderately sorted. Sand (60 percent), fine- to coarse-grained, angular to subangular, mainly clear quartz and minor biotite, pink feldspar, and rose and dark quartz. Pebbles and granules (40 percent) to 6 mm with few to 10 mm, subangular, mainly basalt, dark quartzite, and lesser amounts of quartz sandstone and granite. Very slightly effervescent to HCl.
30 - 35	Clayey sand, poorly sorted. Clay and silt (65 percent), very pale brown (10 YR 7/3). Sand (25 percent), very fine to medium-grained, subrounded, mainly clear quartz and minor magnetite. Pebbles and granules (10 percent) to 10 mm, subrounded, mainly basalt, dark quartzite, and lesser amounts of granite. Violently effervescent to HCl.

Table 14.--Lithologic log for well MONT-5A--Continued

Depth interval below land surface (feet)	Lithology
35 - 40	Gravelly clay and sand, poorly sorted. Clay and silt (40 percent), very pale brown (10 YR 7/3). Sand (40 percent), fine- to coarse-grained, subangular to subrounded, mainly clear quartz and minor rose quartz and biotite. Pebbles and granules (20 percent) to 8 mm, subrounded, mainly basalt, dark and clear quartz, and minor tuff. Strongly effervescent to HCl.
40 - 45	Gravelly sand, poorly sorted. Silt (5 percent), pinkish gray (7.5 YR 7/2). Sand (35 percent), very fine to coarse-grained, angular to subangular, mainly clear quartz and minor biotite, muscovite, and rose quartz. Pebbles and granules (60 percent) to 5 mm, subangular, mainly basalt, granite, and dark quartz. Strongly effervescent to HCl.
45 - 60	Gravelly sand, poorly sorted. Sand (50 percent), very fine to coarse-grained, angular to subangular, mainly clear quartz and minor biotite, basalt, and pink and white feldspar. Pebbles and granules (50 percent) to 5 mm with few to 8 mm, subangular, mainly basalt and clear quartz, lesser amounts of granite, and minor scoria, tuff, and sandstone. Very slightly effervescent to HCl.
60 - 65	Clayey sand and gravel, poorly sorted. Clay and silt (25 percent), very pale brown (10 YR 8/3). Sand (35 percent), fine- to coarse-grained, subangular to subrounded, mainly clear quartz and minor muscovite and biotite. Pebbles and granules (40 percent) to 5 mm, subrounded, mainly basalt, red quartz, clear quartz, and lesser amounts of granite. Violently effervescent to HCl.
65 - 70	Gravelly sand, moderately sorted. Silt (5 percent), very pale brown (10 YR 7/3). Sand (85 percent), very fine to medium- and very coarse grained, subangular, mainly clear quartz and minor rose quartz and basalt. Granules (10 percent) to 3 mm with few pebbles to 6 mm, subangular, mainly granite, clear quartz, and lesser amounts of basalt. Strongly effervescent to HCl.
70 - 80	Gravelly sand, poorly to moderately sorted. Sand (60 percent), very fine to medium-grained, subangular to subrounded, mainly clear quartz and minor rose quartz, basalt, and magnetite. Pebbles and granules (40 percent) to 6 mm with few to 12 mm, subangular, mainly basalt, lesser amounts of granite and dark and clear quartz, and minor tuff. Slightly effervescent to HCl.

Table 14.--Lithologic log for well MONT-5A--Continued

Depth interval below land surface (feet)	Lithology
80 - 110	Gravelly sand, moderately sorted. Silt (5 percent), very pale brown (10 YR 7/3). Sand (75 percent), medium- to very coarse grained, subangular, mainly clear quartz and minor rose quartz and magnetite. Granules (20 percent) to 4 mm with few pebbles to 6 mm, subangular, mainly granite, lesser amounts of basalt, and minor tuff and green metamorphic rock fragments. Slightly effervescent to HCl.
110 - 120	Sandy gravel, poorly sorted. Sand (40 percent), fine- to coarse-grained, subangular, mainly clear quartz and minor rose quartz. Pebbles and granules (60 percent) to 7 mm, subangular, mainly granite, clear quartz, lesser amounts of basalt, and minor limestone, tuff, rose quartz, and green metamorphic rock fragments. Very slightly effervescent to HCl.
120 - 135	Gravelly sand, moderately sorted. Silt (5 percent), very pale brown (10 YR 7/3). Sand (75 percent), medium- to very coarse grained, subangular, mainly clear quartz and minor rose quartz and magnetite. Granules (20 percent) to 4 mm with few pebbles to 6 mm, subangular, mainly granite, clear quartz, lesser amounts of basalt, and minor tuff and green metamorphic rocks. Slightly effervescent to HCl.
135 - 140	Sand and gravel, poorly sorted. Sand (50 percent), coarse- to very coarse grained, subangular to subrounded, mainly clear quartz and minor basalt and rose quartz. Pebbles and granules (50 percent) to 6 mm with few to 9 mm, subrounded, mainly granite, lesser basalt and dark quartz, and minor tuff and green metamorphic rocks. Moderately effervescent to HCl.
140 - 145	Gravelly sand, poorly to moderately sorted. Sand (75 percent), very fine to coarse-grained, subangular, mainly clear quartz and minor basalt and magnetite. Granules (25 percent) to 4 mm with few pebbles to 6 mm, subangular, mainly basalt, lesser amounts of granite and dark and clear quartz, and minor tuff. Moderately effervescent to HCl.
145 - 150	Gravelly sand, poorly sorted. Sand (65 percent), fine- to medium-grained, subangular to subrounded, mainly clear quartz and minor basalt and rose quartz. Pebbles and granules (35 percent) to 8 mm, subrounded, mainly basalt, granite, and minor limestone, tuff, and clear quartz. Slightly effervescent to HCl.

Table 14.--Lithologic log for well MONT-5A--Continued

Depth interval below land surface (feet)	Lithology
150 - 155	Sand, moderately sorted. Sand (90 percent), medium- to very coarse grained, subangular, mainly clear quartz and minor basalt and rose quartz. Granules (10 percent) to 4 mm with few pebbles to 8 mm, subangular, mainly granite, lesser amounts of limestone, and minor basalt. Very slightly effervescent to HCl.
155 - 170	Silty, sandy gravel, poorly sorted. Silt (10 percent), very pale brown (10 YR 7/3). Sand (15 percent), very fine to fine- and coarse-grained, subangular to subrounded, mainly clear quartz and minor basalt and magnetite. Pebbles and granules (75 percent) to 8 mm, subrounded, mainly basalt, granite, and minor tuff and brown quartz. Strongly effervescent to HCl.
170 - 180	Gravelly clay and sand, poorly sorted. Clay and silt (50 percent), very pale brown (10 YR 7/3). Sand (40 percent), medium- to coarse-grained, subangular, mainly clear quartz and minor basalt and rose quartz. Pebbles and granules (10 percent) to 6 mm, subangular, mainly basalt, granite, and lesser amounts of dark quartz. Strongly effervescent to HCl.
180 - 185	Sandy, gravelly clay, poorly to moderately sorted. Clay and silt (40 percent), light brown (7.5 YR 6/4). Sand (30 percent), very fine to fine-grained, subangular to subrounded, mainly clear quartz. Granules (30 percent) to 3 mm with few pebbles to 5 mm, subrounded, mainly basalt and minor limestone and clear and dark quartz. Strongly effervescent to HCl.
185 - 195	Silty sand and gravel, poorly sorted. Silt (10 percent), light brown (7.5 YR 6/4). Sand (40 percent), very fine to medium-grained, subangular, mainly clear quartz, lesser amounts of basalt, and minor rose quartz. Pebbles and granules (50 percent) to 6 mm, subangular, mainly basalt, lesser amounts of clear quartz, and minor limestone and granite. Strongly effervescent to HCl.
195 - 200	Gravelly sand, poorly sorted. Silt (5 percent), very pale brown (10 YR 7/3). Sand (70 percent), fine- to coarse-grained, subangular, mainly clear quartz and minor basalt. Pebbles and granules (25 percent) to 7 mm, subangular, mainly basalt, granite, and lesser amounts of clear quartz. Moderately effervescent to HCl.

Table 14.--Lithologic log for well MONT-5A--Concluded

Depth interval below land surface (feet)	Lithology
200 - 205	Clayey, gravelly sand, poorly to moderately sorted. Clay and silt (20 percent), pinkish gray (7.5 YR 7/2). Sand (70 percent), very fine to fine-grained, subangular, mainly clear quartz and minor basalt. Granules (10 percent) to 3 mm with few pebbles to 5 mm, subangular, mainly basalt and clear and dark quartz. Violently effervescent to HCl.

Table 15.--Lithologic log for well MONT-5B

[Samples were unwashed. mm, millimeters; HCl, hydrochloric acid; >, greater than]

Depth interval below land surface (feet)	Lithology
0 - 5	Gravelly sand, poorly sorted. Clay and silt (5 percent), pinkish gray (7.5 YR 7/2). Sand (65 percent), medium- to very coarse grained, subangular, mainly clear and dark quartz and minor pink feldspar. Pebbles and granules (30 percent) to 6 mm with few to 15 mm, subangular, mainly granite, basalt, and minor black chert and tuff. Strongly effervescent to HCl.
5 - 10	Clayey sand and gravel, poorly sorted. Clay and silt (10 percent), light brown (7.5 YR 6/4). Sand (45 percent), very fine to medium-grained, subangular, mainly clear quartz and minor dark quartz, magnetite, and basalt. Pebbles and granules (45 percent) to 11 mm, subangular, mainly basalt, lesser amounts of granite, and minor tuff. Moderately effervescent to HCl.
10 - 20	Clayey sand and gravel, poorly sorted. Clay and silt (10 percent), light brown (7.5 YR 6/4). Sand (45 percent), fine- to coarse-grained, subangular to subrounded, mainly clear quartz and minor magnetite and rose quartz. Pebbles and granules (45 percent) to 6 mm with few to 8 mm, subrounded, mainly basalt, granite, and minor black and brown chert and fine-grained sandstone. Strongly effervescent to HCl.
20 - 25	Gravelly sand, poorly sorted. Sand (75 percent), fine- to medium- and very coarse grained, subangular to subrounded, mainly clear quartz and minor pink feldspar, basalt, and black chert. Pebbles and granules (25 percent) to 6 mm with few to 10 mm, subrounded, mainly basalt, granite, and minor limestone, tuff, and black chert. Moderately effervescent to HCl.

Table 15.--Lithologic log for well MONT-5B--Continued

Depth interval below land surface (feet)	Lithology
25 - 30	Clayey, gravelly sand, poorly sorted. Clay and silt (10 percent), pinkish white (7.5 YR 8/2). Sand (60 percent), very fine to fine- and very coarse grained, subangular, mainly clear quartz and minor pink feldspar, rose quartz, and dark chert. Pebbles and granules (30 percent) to 8 mm with few to 12 mm, subangular, mainly basalt, lesser amounts of brown chert and granite, and minor dark metamorphic rock fragments. Strongly effervescent to HCl.
30 - 40	Clayey sand and gravel, poorly sorted. Clay and silt (60 percent), pinkish white (7.5 YR 8/2). Sand (20 percent), very fine to fine-grained, subangular, mainly clear quartz and minor pink feldspar, rose quartz, and dark chert. Pebbles and granules (20 percent) to 14 mm, subangular, mainly basalt, brown and black chert, and minor granite. Strongly effervescent to HCl.
40 - 50	Clayey gravelly sand, poorly sorted. Clay and silt (25 percent), very pale brown (10 YR 7/3). Sand (60 percent), very fine to medium-grained, subangular to subrounded, mainly clear quartz and minor biotite, magnetite, and pink feldspar. Pebbles and granules (15 percent) to 12 mm, subrounded, mainly black chert, lesser amounts of granite and red and brown chert, and minor tuff. Moderately effervescent to HCl.
50 - 55	Sand and gravel, poorly sorted. Sand (50 percent), medium- to very coarse-grained, subrounded, mainly clear quartz and minor pink feldspar, basalt, and magnetite. Pebbles and granules (50 percent) to 10 mm, subrounded, mainly black chert and lesser amounts of tuff, granite, and brown chert. Very slightly effervescent to HCl.
55 - 60	Gravelly sand, poorly to moderately sorted. Sand (70 percent), fine- to coarse-grained, subangular, mainly clear quartz and minor magnetite, pink feldspar, and green metamorphic rock fragments. Pebbles and granules (30 percent) to 5 mm with few to 10 mm, subangular, mainly basalt and minor black chert, granite, and limestone. Very slightly effervescent to HCl.

Table 15.--Lithologic log for well MONT-5B--Continued

Depth interval below land surface (feet)	Lithology
60 - 65	Silty, gravelly sand, moderately sorted. Silt (10 percent), very pale brown (10 YR 7/3). Sand (70 percent), medium- to coarse-grained, subangular, mainly clear quartz and minor black chert and rose quartz. Granules (20 percent) to 4 mm with few pebbles to 15 mm, subangular, mainly white quartzite, brown chert, basalt, and tuff. Moderately effervescent to HCl.
65 - 70	Gravelly sand, poorly to moderately sorted. Sand (70 percent), coarse- to very coarse grained, subangular to subrounded, mainly clear quartz and minor black chert and rose quartz. Pebbles and granules (30 percent) to 5 mm with few to 12 mm, subrounded, mainly basalt, brown chert, granite, and minor tuff. Moderately effervescent to HCl.
70 - 75	Gravelly sand, poorly sorted. Sand (60 percent), very fine to fine- and coarse-grained, subangular, mainly clear quartz and lesser amounts of rose quartz and pink feldspar. Pebbles and granules (40 percent) to 8 mm with few to 15 mm, subangular, mainly black chert, granite, and lesser amounts of clear quartz, rose quartz, and basalt. Slightly effervescent to HCl.
75 - 80	Gravelly sand, poorly sorted. Sand (70 percent), very fine to fine- and very coarse grained, subangular, mainly clear quartz and minor pink feldspar and basalt. Pebbles and granules (30 percent) to 12 mm, subangular, mainly black chert, gray quartzite, and minor fine sandstone. Slightly effervescent to HCl.
80 - 85	Sand, moderately to well-sorted. Sand (95 percent), fine- to coarse-grained, subangular to subrounded, mainly clear quartz and minor rose quartz, pink feldspar, and magnetite. Granules (5 percent) to 3 mm with few pebbles to 5 mm, subrounded, mainly black chert, basalt, and granite. Very slightly effervescent to HCl.
85 - 90	Gravelly sand, poorly sorted. Sand (65 percent), medium- to very coarse grained, subangular, mainly clear quartz and minor basalt and rose quartz. Pebbles and granules (35 percent) to 8 mm, subangular, mainly basalt, granite, lesser amounts of brown chert, and minor black chert and fine-grained sandstone. Moderately effervescent to HCl.

Table 15.--Lithologic log for well MONT-5B--Concluded

Depth interval below land surface (feet)	Lithology
90 - 130	Sand and gravel, poorly sorted. Sand (50 percent), fine to coarse-grained, subangular to subrounded, mainly clear quartz, lesser amounts of rose quartz and pink feldspar, and minor magnetite and black chert. Pebbles and granules (50 percent) to 8 mm with few to >15 mm, subrounded, mainly brown chert, granite, basalt, and minor limestone, black chert, fine-grained sandstone, clear quartz, and green metamorphic rock fragments. Slightly effervescent to HCl.

Table 16.--Lithologic log for well SBM-1

[Samples were unwashed. mm, millimeters; HCl, hydrochloric acid; >, greater than]

Depth interval below land surface (feet)	Lithology
0 - 5	Clayey sand, moderately to well-sorted. Clay and silt (20 percent), brown (7.5 YR 5/4). Sand (80 percent), very fine to fine-grained, subangular to subrounded, mainly clear quartz and minor pink feldspar, rose quartz, and magnetite. Violently effervescent to HCl.
5 - 15	Clayey, gravelly sand, poorly sorted. Clay and silt (20 percent), light brown (7.5 YR 6/4). Sand (60 percent), very fine to fine- and very coarse grained, subangular to subrounded, mainly clear quartz, lesser amounts of pink and white feldspar and rose quartz, and minor biotite and magnetite. Pebbles and granules (20 percent) to 6 mm with few to 12 mm, subrounded, mainly gray limestone and lesser amounts of granite. Violently effervescent to HCl.
15 - 20	Clayey, sandy gravel, poorly sorted. Clay and silt (15 percent), light brown (7.5 YR 6/4). Sand (35 percent), very fine and coarse- to very coarse grained, subangular, mainly clear quartz, white feldspar, and lesser amounts of pink feldspar. Pebbles and granules (50 percent) to 15 mm, subangular, mainly granite and lesser amounts of gray limestone and basalt. Strongly effervescent to HCl.
20 - 25	Sandy gravel, poorly to moderately sorted. Sand (20 percent), coarse- to very coarse grained, subangular to subrounded, mainly clear quartz, white feldspar, lesser amounts of pink feldspar and rose quartz, and minor biotite. Pebbles and granules (80 percent) to 5 mm with few to 8 mm, subrounded, mainly granite and lesser amounts of basalt and gray limestone. Very slightly effervescent to HCl.
25 - 30	Silty, sandy gravel, poorly sorted. Silt (10 percent), light brown (7.5 YR 6/4). Sand (25 percent), very fine to coarse-grained, subangular, mainly clear quartz, lesser amounts of white feldspar, and minor pink feldspar, rose quartz, and biotite. Pebbles and granules (65 percent) to 10 mm, subangular, mainly granite, lesser amounts of gray limestone, and minor basalt. Slightly effervescent to HCl.

Table 16.--Lithologic log for well SBM-1--Continued

Depth interval below land surface (feet)	Lithology
30 - 40	Silty, gravelly sand, poorly sorted. Silt (20 percent), light brown, (7.5 YR 6/4). Sand (55 percent), very fine to medium-grained, subangular to subrounded, mainly clear quartz and minor pink and white feldspar and rose quartz. Pebbles and granules (25 percent) to 12 mm with few to >15 mm, subrounded, mainly basalt, granite, and minor dark quartzite. Strongly effervescent to HCl.
40 - 45	Silty, gravelly sand, poorly to moderately sorted. Silt (10 percent), light brown (7.5 YR 6/4). Sand (65 percent), coarse- to very coarse grained, subrounded, mainly clear quartz, lesser amounts of white and pink feldspar, and minor biotite. Granules (25 percent) to 3 mm with few pebbles to 5 mm, subrounded, mainly granite and lesser amounts of basalt. Moderately effervescent to HCl.
45 - 55	Silty, gravelly sand, poorly sorted. Silt (25 percent), light brown (7.5 YR 6/4). Sand (45 percent), very fine to fine- and coarse-grained, subangular, mainly clear quartz and minor white feldspar and biotite. Pebbles and granules (30 percent) to 8 mm, subangular, mainly granite and lesser amounts of basalt. Strongly effervescent to HCl.
55 - 60	Silty, sandy gravel, poorly sorted. Silt (10 percent), light brown (7.5 YR 6/4). Sand (30 percent), very fine to medium-grained, subangular to subrounded, mainly clear quartz, lesser amounts of rose quartz and white feldspar, and minor biotite. Pebbles and granules (60 percent) to 10 mm, subrounded, mainly gray mudballs, lesser amounts of granite, and minor basalt. Moderately effervescent to HCl.
60 - 65	Sand and gravel, poorly sorted. Sand (50 percent), very fine and coarse- to very coarse grained, subangular to subrounded, mainly clear quartz, lesser amounts of basalt and white feldspar, and minor biotite. Pebbles and granules (50 percent) to 6 mm with chips to 10 mm, subrounded, mainly granite and basalt. Slightly effervescent to HCl.

Table 16.--Lithologic log for well SBM-1--Continued

Depth interval below land surface (feet)	Lithology
65 - 75	Sandy gravel, poorly sorted. Sand (35 percent), very fine and coarse- to very coarse grained, subangular, mainly clear quartz, lesser amounts of rose quartz, and minor biotite, basalt, and magnetite. Pebbles and granules (65 percent) to 12 mm, subangular, mainly granite, basalt, and minor tuff. Slightly effervescent to HCl.
75 - 80	Gravelly sand, poorly to moderately sorted. Sand (75 percent), coarse- to very coarse grained, subangular to subrounded, mainly clear quartz and lesser amounts of rose quartz, pink and white feldspar, and minor basalt. Pebbles and granules (25 percent) to 7 mm with few to 15 mm, subrounded, mainly gray quartzite, lesser amounts of basalt, and minor granite. Slightly effervescent to HCl.
80 - 90	Gravelly sand, moderately sorted. Sand (85 percent), medium- to very coarse grained, subrounded, mainly clear quartz, lesser amounts of basalt, rose quartz, and pink feldspar, and minor magnetite and biotite. Granules (15 percent) to 4 mm with few pebbles to 7 mm, subrounded, mainly granite, lesser amounts of basalt, and minor gray quartzite. Slightly effervescent to HCl.
90 - 110	Clayey, gravelly sand, moderately sorted. Clay and silt (10 percent), very pale brown (10 YR 7/3). Sand (80 percent), very fine to medium-grained, subangular, mainly clear quartz and minor amounts of magnetite, pink feldspar, and rose quartz. Pebbles and granules (10 percent) to 8 mm, subangular, mainly basalt and lesser amounts of granite. Moderately effervescent to HCl.
110 - 120	Gravelly sand, poorly sorted. Silt (5 percent), very pale brown (10 YR 7/3). Sand (80 percent), fine- to very coarse grained, angular to subangular, mainly clear quartz and minor rose quartz. Granules (15 percent) to 4 mm with few pebbles to 8 mm, subangular, mainly basalt, lesser amounts of granite, and minor gray quartzite. Strongly effervescent to HCl.

Table 16.--Lithologic log for well SBM-1--Concluded

Depth interval below land surface (feet)	Lithology
120 - 130	Clayey, gravelly sand, poorly sorted. Clay and silt (25 percent), very pale brown (10 YR 7/3). Sand (50 percent), very fine to medium-grained, subangular to subrounded, mainly clear quartz, lesser amounts of pink feldspar, and minor rose quartz and magnetite. Pebbles and granules (25 percent) to 10 mm, subrounded, mainly basalt and lesser amounts of granite. Strongly effervescent to HCl.
130 - 145	Gravelly sand, moderately to well-sorted. Sand (65 percent), coarse- to very coarse grained, subrounded, mainly clear quartz, lesser amounts of basalt and rose quartz, and minor magnetite and pink feldspar. Granules (35 percent) to 4 mm with few pebbles to 8 mm, subrounded, mainly basalt and granite. Slightly effervescent to HCl.
145 - 150	Sandy gravel, poorly to moderately sorted. Sand (20 percent), coarse- to very coarse grained, subrounded, mainly clear quartz and lesser amounts of basalt, rose quartz, and pink feldspar. Pebbles and granules (80 percent) to 5 mm with few to 10 mm, subrounded, mainly granite and lesser amounts of basalt. Very slightly effervescent to HCl.
150 - 158	Gravelly sand, poorly sorted. Sand (80 percent), very fine and coarse- to very coarse grained, subrounded, mainly clear quartz, lesser amounts of basalt, rose quartz, and pink feldspar, and minor magnetite. Pebbles and granules (20 percent) to 5 mm, subrounded, mainly granite and lesser amounts of basalt. Very slightly effervescent to HCl.

Table 17.--Lithologic log for well SBM-2

[Samples were unwashed. mm, millimeters; HCl, hydrochloric acid; >, greater than]

Depth interval below land surface (feet)	Lithology
0 - 20	Clayey, sandy gravel, poorly sorted. Clay and silt (10 percent), light brown (7.5 YR 6/4). Sand (30 percent), very fine to medium-grained, angular to subangular, mainly clear quartz, lesser amounts of pink feldspar and rose quartz, and minor biotite and magnetite. Pebbles and granules (60 percent) to 22 mm, subangular, mainly granite, lesser amounts of gray limestone, basalt, and dark quartzite, and minor tuff. Moderately effervescent to HCl.
20 - 30	Sandy gravel, poorly sorted. Sand (40 percent), very fine to fine- and very coarse grained, angular to subangular, mainly clear quartz, lesser amounts of white feldspar, and minor pink feldspar, biotite, and basalt. Pebbles and granules (60 percent) to 6 mm with few to 12 mm, subangular, mainly granite and minor basalt. Slightly effervescent to HCl.
30 - 40	Sandy, silty gravel, poorly sorted. Silt (35 percent), light brown (7.5 YR 6/4). Sand (20 percent), very fine to fine- and very coarse grained, subangular, mainly clear quartz, lesser amounts of white feldspar, and minor rose quartz, pink feldspar, and biotite. Pebbles and granules (45 percent) to 6 mm with few to 10 mm, subangular, mainly granite and lesser amounts of basalt. Strongly effervescent to HCl.
40 - 50	Silty sand and gravel, poorly sorted. Silt (20 percent), light brown (7.5 YR 6/4). Sand (40 percent), very fine and coarse- to very coarse grained, subangular to subrounded, mainly clear quartz, white feldspar, and minor rose quartz, pink feldspar, and biotite. Pebbles and granules (40 percent) to 6 mm, subrounded, mainly granite and lesser amounts of basalt. Strongly effervescent to HCl.
50 - 55	Gravelly sand, poorly sorted. Silt (5 percent), light brown (7.5 YR 6/4). Sand (70 percent), medium- to very coarse grained, subangular, mainly clear quartz and minor magnetite, basalt, rose quartz, and pink and white feldspar. Pebbles and granules (25 percent) to 6 mm with few to 10 mm, subangular, mainly granite and lesser amounts of basalt. Moderately effervescent to HCl.

Table 17.--Lithologic log for well SBM-2--Continued

Depth interval below land surface (feet)	Lithology
55 - 60	Sandy gravel, poorly sorted. Clay and silt (5 percent), light brown (7.5 YR 6/4). Sand (20 percent), medium- to very coarse grained, subangular, mainly clear quartz and minor rose quartz, biotite, and pink and white feldspar. Pebbles and granules (75 percent) to 10 mm with few to 15 mm, subangular, mainly basalt, granite, and minor tuff. Strongly effervescent to HCl.
60 - 65	Gravelly sand, poorly sorted. Sand (60 percent), fine- to very coarse grained, angular, mainly clear quartz, lesser amounts of basalt, pink feldspar, and rose quartz, and minor biotite. Pebbles and granules (40 percent) to 10 mm, subangular, mainly granite and lesser amounts of basalt. Moderately effervescent to HCl.
65 - 75	Sandy gravel, poorly sorted. Sand (10 percent), coarse- to very coarse grained, angular, mainly clear quartz, pink feldspar, and minor biotite. Pebbles and granules (90 percent) to >15 mm, subangular, mainly basalt and lesser amounts of granite. Very slightly effervescent to HCl.
75 - 80	Gravelly sand, poorly sorted. Sand (60 percent), medium- to very coarse grained, subangular, mainly clear quartz and minor rose quartz, magnetite, pink feldspar. Pebbles and granules (40 percent) to 11 mm with few to 15 mm, subangular, mainly dark quartzite, granite, and lesser amounts of basalt. Moderately effervescent to HCl.
80 - 85	Gravelly sand, moderately sorted. Sand (80 percent), fine- to very coarse grained, subangular to subrounded, mainly clear quartz and minor basalt, pink feldspar, and rose quartz. Pebbles and granules (20 percent) to 4 mm and 6 mm to 8 mm, subrounded, mainly basalt and granite. Slightly effervescent to HCl.
85 - 90	Sandy gravel, poorly sorted. Sand (40 percent), fine- to coarse-grained, subangular to subrounded, mainly clear quartz and minor pink feldspar and magnetite. Pebbles and granules (60 percent) to 12 mm, subrounded, mainly basalt, granite, and minor green metamorphic rock fragments. Slightly effervescent to HCl.

Table 17.--Lithologic log for well SBM-2--Concluded

Depth interval below land surface (feet)	Lithology
90 - 100	Sandy, gravelly clay, poorly sorted. Clay and silt (60 percent), pinkish gray (7.5 YR 7/2). Sand (20 percent), very fine to fine-grained, subangular, mainly clear quartz and minor basalt, magnetite, and pink feldspar. Pebbles and granules (20 percent) to >15 mm, subangular, mainly basalt and granite. Strongly effervescent to HCl.

Table 18.--Lithologic log for well YALE-MW3

[Samples were unwashed. mm, millimeters; HCl, hydrochloric acid; >, greater than]

Depth interval below land surface (feet)	Lithology
0 - 10	Silty, sandy gravel, poorly sorted. Silt (10 percent), pink (7.5 YR 7/4). Sand (35 percent), fine- and coarse- to very coarse grained, angular to subangular, mainly clear quartz with minor white feldspar. Pebbles and granules (55 percent) to 6 mm, subangular, mainly basalt and dark quartzite, lesser amounts of clear quartz, and minor dark and green metamorphic rock fragments, pink feldspar, rose quartz, and pumice. Strongly effervescent to HCl.
10 - 20	Sandy gravel, poorly sorted. Silt (5 percent), pink (7.5 YR 7/4). Sand (20 percent), fine- to medium-grained, angular to subangular, mainly clear quartz with minor pink and white feldspar. Pebbles and granules (75 percent) to >15 mm, subangular, mainly basalt and dark quartzite, lesser amounts of granite and white quartzite, and minor limestone. Moderately effervescent to HCl.
20 - 40	No sample available.
40 - 55	Gravelly sand, poorly sorted. Silt (5 percent), pink (7.5 YR 7/4). Sand (60 percent), fine- and coarse- to very coarse grained, angular, mainly clear quartz with minor pink feldspar and basalt. Pebbles and granules (35 percent) to 8 mm, angular, mainly basalt and granite, lesser amounts of clear quartz, and minor red quartzite, dark metamorphic rock fragments, and pumice. Very slightly effervescent to HCl.
55 - 70	Gravelly sand, poorly sorted. Sand (60 percent), very fine to fine-grained, subangular, mainly clear quartz with minor basalt, rose quartz, and magnetite. Pebbles and granules (40 percent) to 7 mm, subangular, mainly basalt, lesser amounts of rose, dark, and white quartzite, and minor granite and tuff. Moderately effervescent to HCl.

Table 18.--Lithologic log for well YALE-MW3--Continued

Depth interval below land surface (feet)	Lithology
70 - 80	Gravelly sand, poorly to moderately sorted. Sand (75 percent), very fine to fine-grained, subangular to subrounded, mainly clear quartz with minor basalt and dark quartzite. Pebbles and granules (25 percent) to 10 mm, subrounded, mainly basalt and dark quartzite, lesser amounts of granite, and minor tuff. Very slightly effervescent to HCl.
80 - 85	Silty sand and gravel, poorly sorted. Silt (10 percent), pink (7.5 YR 7/4). Sand (45 percent), fine- to medium-grained, subangular, mainly clear quartz with minor basalt, dark quartzite, and magnetite. Pebbles and granules (45 percent) to 6 mm, subangular, mainly basalt and dark quartzite with lesser amounts of granite. Strongly effervescent to HCl.
85 - 90	Sand, moderately to well-sorted. Sand (95 percent), coarse- to very coarse grained, subangular, mainly clear quartz with minor pink feldspar, dark quartzite, and basalt. Pebbles and granules (5 percent) to 9 mm, subangular, mainly basalt, granite, dark quartzite, and sandstone. No reaction to HCl.
90 - 100	Gravelly sand, poorly to moderately sorted. Sand (70 percent), fine- to coarse-grained, subangular, mainly clear quartz with minor basalt, red quartzite, and white feldspar. Pebbles and granules (30 percent) to 10 mm, subangular, mainly basalt, lesser amounts of dark quartzite, and minor tuff and clear quartz. Moderately effervescent to HCl.
100 - 105	Gravelly sand, moderately to well-sorted. Sand (70 percent), medium- to very coarse grained, subangular, mainly clear quartz with minor dark quartzite and basalt. Granules (30 percent) to 3 mm, subangular, mainly clear quartz and dark quartzite with minor granite, green metamorphic rock fragments, and tuff. Very slightly effervescent to HCl.

Table 18.--Lithologic log for well YALE-MW3--Continued

Depth interval below land surface (feet)	Lithology
105 - 120	Sand and gravel, poorly sorted. Sand (50 percent), very fine to medium-grained, subangular to subrounded, mainly clear quartz with minor basalt and red and dark quartzite. Pebbles and granules (50 percent) to 8 mm, subrounded, mainly dark quartzite, lesser amounts of basalt, and minor green metamorphic rock fragments, granite, tuff, and pumice. Moderately effervescent to HCl.
120 - 130	Clayey, gravelly sand, poorly sorted. Clay and silt (20 percent), very pale brown (10 YR 7/3). Sand (60 percent), very fine to coarse-grained, subangular to rounded, mainly clear quartz with minor basalt. Pebbles and granules (20 percent) to 8 mm with few to 12 mm, rounded, mainly basalt and dark quartzite with lesser amounts of granite. Moderately effervescent to HCl.
130 - 135	Sandy gravel, moderately sorted. Sand (20 percent), fine- and very coarse grained, subrounded, mainly clear quartz with minor pink feldspar. Granules (80 percent) to 4 mm with few pebbles to 8 mm, subrounded, mainly clear, rose, and white quartz, lesser amounts of dark quartzite and basalt, and minor tuff. Very slightly effervescent to HCl.
135 - 140	Silty, sandy gravel, poorly sorted. Silt (10 percent), very pale brown (10 YR 7/3). Sand (30 percent), fine- to medium-grained, subangular to subrounded, mainly clear quartz with minor basalt and dark quartzite. Pebbles and granules (60 percent) to 7 mm with few to 10 mm, subrounded, mainly basalt and dark quartzite, lesser amounts of granite and clear quartz, and minor red quartzite, dark metamorphic rock fragments, and tuff. Strongly effervescent to HCl.
140 - 155	Sand and gravel, moderately sorted. Silt (5 percent), very pale brown (10 YR 7/3). Sand (50 percent), fine- and coarse- to very coarse grained, subangular to subrounded, mainly clear quartz with minor basalt and red quartzite. Granules (45 percent) to 4 mm with few pebbles to 6 mm, subrounded, mainly clear quartz and dark quartzite, lesser amounts of basalt and granite, and minor tuff and sandstone. Very slightly effervescent to HCl.

Table 18.--Lithologic log for well YALE-MW3--Continued

Depth interval below land surface (feet)	Lithology
155 - 165	Gravelly sand, moderately to well-sorted. Silt (5 percent), very pale brown (10 YR 7/3). Sand (80 percent), very fine and medium- to coarse-grained, subangular, mainly clear quartz, lesser amounts of pink feldspar, and minor basalt and magnetite. Granules (15 percent) to 4 mm, subangular, mainly basalt and clear quartz, lesser amounts of rose quartz and granite, and minor limestone and dark metamorphic rock fragments. Very slightly effervescent to HCl.
165 - 180	Sand and gravel, poorly sorted. Sand (50 percent), medium- to coarse-grained, subangular, mainly clear quartz, lesser amounts of rose quartz and pink feldspar, and minor basalt and magnetite. Pebbles and granules (50 percent) to 6 mm with few to 12 mm, subangular, mainly clear quartz, lesser amounts of basalt and granite, and minor tuff. No reaction to HCl.
180 - 185	Clayey, sandy gravel, poorly sorted. Silt and clay (15 percent), very pale brown (10 YR 7/3). Sand (35 percent), fine- to medium-grained, subangular, mainly clear quartz with lesser amounts of rose quartz. Pebbles and granules (50 percent) to >15 mm, subangular, mainly granite, basalt, and dark quartzite with minor tuff. Violently effervescent to HCl.
185 - 195	Clayey gravel, poorly sorted. Silt and clay (60 percent), very pale brown (10 YR 7/3). Sand (10 percent), very fine to medium-grained, angular to subangular, mainly clear quartz. Pebbles and granules (30 percent) to 10 mm, subangular, mainly basalt, granite, and dark quartzite. Strongly effervescent to HCl.
195 - 200	Clay, poorly to moderately sorted. Clay and silt (90 percent), light gray (10 YR 7/2). Sand (5 percent), very fine- to medium-grained, angular, mainly clear quartz. Pebbles and granules (5 percent) to 6 mm, angular, mainly basalt and dark quartzite. Very slightly effervescent to HCl.

Table 18.--Lithologic log for well YALE-MW3--Continued

Depth interval below land surface (feet)	Lithology
200 - 205	Clayey, gravelly sand, poorly sorted. Silt and clay (10 percent), light gray (10 YR 7/2). Sand (55 percent), fine- to coarse-grained, subangular, mainly clear quartz with lesser amounts of basalt, pink feldspar, and rose quartz. Pebbles and granules (35 percent) to 6 mm, subangular, mainly clear quartz and quartzite and lesser amounts of basalt and granite. Strongly effervescent to HCl.
205 - 220	Clayey sand and clay, poorly sorted. Silt and clay (50 percent), very pale brown (10 YR 7/3). Sand (25 percent), fine- to coarse-grained, subangular, mainly clear quartz with lesser amounts of basalt. Pebbles and granules (25 percent) to 8 mm, subangular, mainly basalt, granite, and dark quartzite. Violently effervescent to HCl.
220 - 240	Silty, sandy gravel, poorly sorted. Silt (10 percent), very pale brown (10 YR 7/3). Sand (35 percent), coarse- to very coarse grained, subangular, mainly clear quartz, lesser amounts of rose quartz and pink feldspar, and minor basalt and magnetite. Pebbles and granules (55 percent) to 7 mm, subangular, mainly basalt, granite, clear quartz, and dark quartzite. Strongly effervescent to HCl.
240 - 250	Silty sand and gravel, poorly sorted. Silt (30 percent), light gray (10 YR 7/2). Sand (40 percent), fine- to medium-grained, angular to subangular, mainly clear quartz with minor basalt, biotite, magnetite, and rose quartz. Pebbles and granules (30 percent) to 6 mm, subangular, mainly granite and basalt, lesser amounts of red quartzite, and minor green metamorphic rock fragments. Strongly effervescent to HCl.
250 - 255	Gravelly silt and sand, poorly sorted. Silt (40 percent), pale brown (10 YR 6/3). Sand (40 percent), fine- to medium-grained, angular to subangular, mainly clear quartz with minor basalt, biotite, magnetite, and rose quartz. Pebbles and granules (20 percent) to 5 mm, subangular, mainly granite and basalt. Strongly effervescent to HCl.

Table 18.--Lithologic log for well YALE-MW3--Continued

Depth interval below land surface (feet)	Lithology
255 - 260	Clayey sand, moderately sorted. Clay and silt (70 percent), pale brown (10 YR 6/3). Sand (30 percent), very fine to medium-grained, subangular, mainly clear quartz with minor basalt and rose quartz. Strongly effervescent to HCl.
260 - 265	Silty, gravelly sand, poorly to moderately sorted. Silt (15 percent), pale brown (10 YR 6/3). Sand (55 percent), fine- to very coarse grained, subangular to subrounded, mainly clear quartz with minor basalt, rose quartz, pink feldspar, and magnetite. Pebbles and granules (30 percent) to 5 mm, subrounded, mainly granite and basalt, lesser amounts of clear quartz, and minor limestone. Moderately effervescent to HCl.
265 - 275	Gravelly sand, moderately to well-sorted. Sand (70 percent), medium- to very coarse grained, subangular, clear quartz with minor magnetite, rose quartz, and basalt. Granules (30 percent) to 4 mm, subangular, mainly basalt, lesser amounts of granite, and minor tuff. Very slightly effervescent to HCl.
275 - 280	Silt, sand, and gravel, poorly sorted. Silt (30 percent), light brownish gray (10 YR 6/2). Sand (30 percent), very fine- to medium-grained, angular to subangular, mainly clear quartz with minor basalt and magnetite. Pebbles and granules (40 percent) to 5 mm with few to 10 mm, subangular, mainly basalt, lesser amounts of clear quartz, and minor granite. Strongly effervescent to HCl.
280 - 295	Sandy silt, moderately to well-sorted. Silt (80 percent), very pale brown (10 YR 7/3). Sand (15 percent), medium- to coarse-grained, subangular, mainly clear quartz with minor basalt. Pebbles and granules (5 percent) to 10 mm, subangular, mainly basalt and granite with minor green metamorphic rock fragments. Violently effervescent to HCl.
295 - 320	Silty, gravelly sand, moderately sorted. Silt (10 percent), very pale brown (10 YR 7/3). Sand (70 percent), fine- to medium- and very coarse grained, subangular to subrounded, mainly clear quartz, lesser amounts of basalt, and minor rose quartz and white feldspar. Pebbles and granules (20 percent) to 6 mm, subrounded, mainly basalt, lesser amounts of granite, and minor tuff and white and clear quartz. Very slightly effervescent to HCl.

Table 18.--Lithologic log for well YALE-MW3--Concluded

Depth interval below land surface (feet)	Lithology
320 - 325	Silty, gravelly sand, poorly sorted. Silt (15 percent), pinkish gray (7.5 YR 7/2). Sand (50 percent), medium- to very coarse grained, subangular to subrounded, mainly clear quartz, lesser amounts of basalt, and minor rose quartz. Pebbles and granules (35 percent) to 6 mm, subrounded, mainly basalt, lesser amounts of granite, and minor clear and white quartz. Moderately effervescent to HCl.
325 - 335	Gravelly sand, moderately sorted. Silt (5 percent), pinkish gray (7.5 YR 7/2). Sand (80 percent), medium- to very coarse grained, subangular, mainly clear quartz, lesser amounts of basalt, and minor pink feldspar, rose quartz, and biotite. Granules (15 percent) to 3 mm with few pebbles to 5 mm, subangular, mainly basalt and granite with minor limestone. Strongly effervescent to HCl.
335 - 345	Gravelly clay and sand, poorly to moderately sorted. Clay and silt (50 percent), very pale brown (10 YR 7/3). Sand (40 percent), very fine to medium-grained, subangular, mainly clear quartz with minor basalt and white and pink feldspar. Granules (10 percent) to 4 mm with few pebbles to 6 mm, subangular, mainly basalt with minor granite. Strongly effervescent to HCl.
345 - 350	Silty sand, moderately sorted. Silt (40 percent), very pale brown (10 YR 7/3). Sand (55 percent), very fine to fine-grained, subangular to subrounded, mainly clear quartz, lesser amounts of basalt, and minor granite, pink feldspar, and biotite. Granules (5 percent) to 4 mm, subrounded, mainly basalt and granite. Violently effervescent to HCl.

Table 19.--Lithologic log for well YALE-MW5

[Samples were unwashed. mm, millimeters; HCl, hydrochloric acid]

Depth interval below land surface (feet)	Lithology
0 - 5	Silty sand, well-sorted. Silt (10 percent), pink (7.5 YR 7/4). Sand (90 percent), very fine to medium-grained, subrounded, mainly clear quartz, lesser amounts of rose quartz and pink feldspar, and minor magnetite. Few granules to 4 mm. Violently effervescent to HCl.
5 - 10	Silty, gravelly sand, moderately to well-sorted. Silt (15 percent), light brown (7.5 YR 6/4). Sand (75 percent), very fine to medium-grained, subangular to subrounded, mainly clear quartz, lesser amounts of rose quartz, and minor pink feldspar. Pebbles and granules (10 percent) to 6 mm, subrounded, mainly granite. Violently effervescent to HCl.
10 - 15	Silty sand, moderately sorted. Silt (10 percent), pink (7.5 YR 7/4). Sand (85 percent), very fine to medium-grained, subangular, mainly clear quartz, lesser amounts of white and pink feldspar, and minor rose quartz. Granules (5 percent) to 4 mm with few pebbles to 8 mm, subangular, mainly basalt and granite. Strongly effervescent to HCl.
15 - 20	Gravelly sand, poorly sorted. Silt (5 percent), pink (7.5 YR 7/4). Sand (75 percent), very fine to coarse-grained, subangular, mainly clear quartz and lesser amounts of rose quartz and pink feldspar. Granules (20 percent) to 4 mm with few pebbles to 6 mm, subangular, mainly granite and white quartz. Moderately effervescent to HCl.
20 - 25	Gravelly sand, poorly sorted. Sand (70 percent), medium- to very coarse-grained, subrounded, mainly clear quartz and minor dark quartz, pink feldspar, and basalt. Granules (30 percent) to 4 mm with few pebbles to 9 mm, subrounded, mainly granite and basalt. Slightly effervescent to HCl.
25 - 30	Sandy, gravelly clay, poorly to moderately sorted. Clay and silt (40 percent), very pale brown (10 YR 7/3). Sand (25 percent), very fine to fine-grained, subangular, mainly clear quartz and lesser amounts of rose quartz and pink feldspar. Pebbles and granules (35 percent) to 10 mm, subangular, mainly basalt and granite. Very slightly effervescent to HCl.

Table 19.--Lithologic log for well YALE-MW5--Continued

Depth interval below land surface (feet)	Lithology
30 - 35	Sand, moderately to well-sorted. Sand (95 percent), medium- to coarse-grained, subangular, mainly clear quartz, lesser amounts of rose quartz and pink feldspar, and minor basalt. Pebbles and granules (5 percent) to 7 mm, subangular, mainly granite and basalt. No reaction to HCl.
35 - 40	No sample available.
40 - 45	Gravelly sand, poorly sorted. Sand (60 percent), medium- to very coarse grained, subangular to subrounded, mainly clear quartz, lesser amounts of rose quartz and pink feldspar, and minor basalt. Pebbles and granules (40 percent) to 6 mm, subrounded, mainly granite and basalt. Slightly effervescent to HCl.
45 - 50	Sandy gravel, poorly sorted. Sand (10 percent), very coarse grained, subangular to subrounded, mainly clear quartz and lesser amounts of basalt and granite. Pebbles and granules (90 percent) to 30 mm, subrounded, mainly gray limestone, granite, and basalt. No reaction to HCl.
50 - 55	Sandy gravel, poorly sorted. Sand (20 percent), coarse- to very coarse grained, angular to subangular, mainly clear quartz, lesser amounts of basalt, and minor biotite. Pebbles and granules (80 percent) to 25 mm, subangular, mainly gray limestone, granite, basalt, and lesser amounts of dark quartzite. Very slightly effervescent to HCl.
55 - 60	Sandy, gravelly silt, poorly sorted. Silt (40 percent), very pale brown (10 YR 7/3). Sand (30 percent), very fine to fine- and very coarse grained, subangular to subrounded, mainly clear quartz, lesser amounts of basalt, and minor pink feldspar and biotite. Pebbles and granules (30 percent) to 15 mm, subrounded, mainly gray limestone and basalt. Strongly effervescent to HCl.
60 - 80	Sandy silt, moderately sorted. Silt (60 percent), very pale brown (10 YR 7/3). Sand (35 percent), very fine to fine-grained, subangular, mainly clear quartz and lesser amounts of pink feldspar and rose quartz. Pebbles and granules (5 percent) to 8 mm, subangular, mainly gray limestone, basalt, and minor granite. Strongly effervescent to HCl.

Table 19.--Lithologic log for well YALE-MW5--Continued

Depth interval below land surface (feet)	Lithology
80 - 90	Sandy clay, moderately to well-sorted. Clay and silt (80 percent), light gray (2.5 YR 7/2). Sand (20 percent), very fine to fine-grained, subangular, mainly clear and rose quartz and pink feldspar. Few pebbles and granules to 6 mm, subrounded, mainly basalt. Moderately effervescent to HCl.
90 - 95	Gravelly, sandy clay, poorly to moderately sorted. Clay and silt (60 percent), light gray (2.5 YR 7/2). Sand (30 percent), very fine to medium-grained, subangular, mainly clear quartz and minor rose quartz and pink feldspar. Pebbles and granules (10 percent) to 8 mm, subangular, mainly basalt, gray limestone, and granite. Strongly effervescent to HCl.
95 - 100	Sandy gravel, poorly sorted. Clay and silt (5 percent), very pale brown (10 YR 7/3). Sand (30 percent), medium- to very coarse grained, angular to subangular, mainly clear quartz and lesser amounts of rose quartz and pink feldspar. Pebbles and granules (65 percent) to 6 mm, subangular, mainly granite, basalt, and lesser amounts of gray limestone. Moderately effervescent to HCl.
100 - 115	Gravelly sand, poorly sorted. Sand (65 percent), medium- to very coarse grained, subangular, mainly clear quartz, lesser amounts of basalt, and minor rose quartz and pink feldspar. Pebbles and granules (35 percent) to 10 mm, subangular, mainly basalt, granite, and minor tuff. Slightly effervescent to HCl.
115 - 120	Sand and gravel, moderately sorted. Silt (5 percent), very pale brown (10 YR 7/3). Sand (45 percent), very fine to fine- and coarse- to very coarse grained, subangular to subrounded, mainly clear quartz, lesser amounts of basalt, and minor rose quartz and pink feldspar. Granules (50 percent) to 4 mm with few pebbles to 6 mm, subrounded, mainly basalt and granite. Slightly effervescent to HCl.

Table 19.--Lithologic log for well YALE-MW5--Concluded

Depth interval below land surface (feet)	Lithology
120 - 175	Sandy silt, moderately sorted. Silt (60 percent), very pale brown (10 YR 7/3). Sand (35 percent), very fine to medium-grained, angular to subangular, mainly clear quartz, lesser amounts of pink feldspar and rose quartz, and minor basalt, biotite, and magnetite. Pebbles and granules (5 percent) to 6 mm, subangular, mainly basalt and lesser amounts of granite. Moderately effervescent to HCl.
175 - 180	Gravelly, silty sand, poorly to moderately sorted. Silt (25 percent), very pale brown (10 YR 7/3). Sand (60 percent), very fine to medium-grained, subangular, mainly clear quartz, lesser amounts of rose quartz and pink feldspar, and minor basalt and magnetite. Pebbles and granules (15 percent) to 6 mm, subangular, mainly granite and lesser amounts of basalt. Moderately effervescent to HCl.
180 - 215	Silty, gravelly sand, poorly to moderately sorted. Silt (20 percent), very pale brown (10 YR 7/3). Sand (60 percent), very fine to medium-grained, subangular, mainly clear quartz, lesser amounts of rose quartz and pink feldspar, and minor basalt and magnetite. Pebbles and granules (20 percent) to 6 mm with few to 10 mm, subangular, mainly basalt and lesser amounts of granite. Moderately effervescent to HCl.
215 - 240	Gravelly sand, moderately sorted. Sand (80 percent), fine- to coarse-grained, subangular, mainly clear quartz, lesser amounts of rose quartz and pink feldspar, and minor basalt and magnetite. Granules (20 percent) to 4 mm, subangular, mainly granite and lesser amounts of basalt. Very slightly effervescent to HCl.