SELECTED HYDROLOGIC DATA FOR SALT LAKE VALLEY, UTAH, 1990-92, WITH EMPHASIS ON DATA FROM THE SHALLOW UNCONFINED AQUIFER AND CONFINING LAYERS

By Susan A. Thiros

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For additional information write to:

District Chief
U.S. Geological Survey, WRD
Room 1016 Administration Building
1745 West 1700 South
Salt Lake City, Utah 84104

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(Plate is in pocket)

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CONVERSION FACTORS, VERTICAL DATUM, AND ABBREVIATED WATER-QUALITY UNITS

Multiply	By	To obtain
acre	0.4047	hectare
	4,047	square meter
foot (ft)	0.3048	meter
foot per day (ft/d)	0.3048	meter per day
pound per square foot (lb/ft^2)	47.88	pascal or newton per square meter
pound per cubic foot (lb/ft^3)	157.1	newton per cubic meter
inch (in.)	25.4	millimeter
	0.0254	meter
mile (mi)	1.609	kilometer
square mile (mi^2)	2.59	square kilometer

Water temperature is given in degrees Celsius (^oC), which can be converted to degrees Fahrenheit (^oF) by the following equation:

$$^oF = 1.8\ (^oC) + 32.$$

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

Chemical concentration and water temperature are given only in metric units. Chemical concentration in water is given in milligrams per liter (mg/L) or micrograms per liter (µg/L). Milligrams per liter is a unit expressing the solute per unit volume (liter) of water. One thousand micrograms per liter is equivalent to 1 milligram per liter. For concentrations less than 7,000 milligrams per liter, the numerical value is about the same as for concentrations in parts per million. Specific conductance is given in microsiemens per centimeter (µS/cm) at 25 degrees Celsius. Radioactivity is expressed in picocuries per liter (pCi/L), which is the amount of radioactive decay producing 2.2 disintegrations per second in a unit volume (liter) of water. Chemical concentration in material from core samples is given in grams per kilogram (g/kg) or micrograms per gram (µg/g). Micrograms per gram is equivalent to parts per million.

SELECTED HYDROLOGIC DATA FOR SALT LAKE VALLEY, UTAH, 1990-92, WITH EMPHASIS ON DATA FROM THE SHALLOW UNCONFINED AQUIFER AND CONFINING LAYERS

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ABSTRACT

Hydrologic data were collected from wells in the Salt Lake Valley, Utah, from 1990 to 1992, to better understand the hydrologic system in the valley. Most of the data collected are from 36 monitoring wells drilled in June and July 1990 and March and May 1991 using a hollow-stem auger. These wells range from 15.0 to 129.5 feet deep and are completed in the shallow unconfined aquifer, an underlying confining layer, or both. Data from public supply wells and other existing wells completed in aquifers below the confining layers near these monitoring wells are presented in order to compare data from those wells with data from the shallow unconfined aquifer and the underlying confining layers.

Field data collected from selected wells and drill holes include well-completion information, lithologic logs, and water-level and field water-quality measurements. Water samples collected from monitoring wells drilled in 1990 and 1991 and from selected existing wells were analyzed for inorganic constituents, trace metals in unfiltered water, volatile organic compounds, organochlorine pesticides, polychlorinated biphenyls, and radionuclides. Core samples were collected from selected monitoring wells drilled in 1990 and 1991 and analyzed for geochemical and geotechnical properties. Cation exchange capacity, carbon concentration, and the concentration of selected elements in core material are presented. Particle size, dry density, moisture content, porosity, hydraulic conductivity, initial void ratio, specific storage, and other properties determined for material in cores from selected monitoring wells also are listed.

INTRODUCTION

This report contains hydrologic data collected in the Salt Lake Valley mainly from 1990 through 1992. The Salt Lake Valley (pl. 1) is bounded by the Wasatch Range on the east, the Oquirrh Mountains on the west, the Traverse Mountains on the south, and the boundary between Davis and Salt Lake Counties on the north.

The saturated valley-fill material in Salt Lake Valley consists of a deep unconfined aquifer near the mountains, a confined (artesian) aquifer, a shallow unconfined aquifer overlying the confined aquifer, and locally unconfined or perched aquifers (Hely and others, 1971, p. 107-111). Less permeable layers of silt and clay overlie the confined aquifer, but the thickness, continuity, and permeability of these confining layers vary with location. Ground water in the deep unconfined and confined aquifers is used for public supply in many parts of the valley.

The shallow unconfined aquifer is relatively close to activities and processes occurring at land surface. This makes the shallow unconfined aquifer more susceptible to many types of contamination, such as contamination from trace metals, organic compounds, and increased concentrations of dissolved solids as a result of evaporation. The extent of the confining layers separating

the shallow unconfined aquifer from the deep confined aquifer and their effectiveness as a barrier to contaminant movement are not well known.

Hydrologic data were collected by the U.S. Geological Survey in cooperation with the Utah Department of Natural Resources, Division of Water Rights, and the Utah Department of Environmental Quality, Division of Water Quality. The following public water suppliers also provided financial assistance for the collection of hydrologic data presented in this report: Salt Lake City Corporation, Salt Lake County Water Conservancy District, Taylorsville-Bennion Improvement District, Granger-Hunter Improvement District, Murray City, City of South Salt Lake, and Kearns Improvement District.

Purpose and Scope

The purpose of this report is to present hydrologic data for use by the general public and by officials who manage water resources. The U.S. Geological Survey began a study in 1990 to better define the ground-water-flow system in Salt Lake Valley. This report supplements an objective of this study, which is to better define the quality of water and hydraulic properties of the shallow unconfined aquifer and the underlying confining layers.

Most of the data presented in this report are from 36 monitoring wells drilled in June and July 1990 and March and May 1991 using a hollow-stem auger. These monitoring wells range from 15.0 to 129.5 feet deep and penetrate the shallow unconfined aquifer, an underlying confining layer, or both. Data from public supply wells and other existing wells completed in the deep confined and unconfined aquifers near these monitoring wells are presented in order to compare data from those wells with data from the shallow unconfined aquifer and the underlying confining layers. Water levels in selected monitoring wells completed in the shallow unconfined aquifer in 1982 (Seiler and Waddell, 1984) were remeasured in 1990.

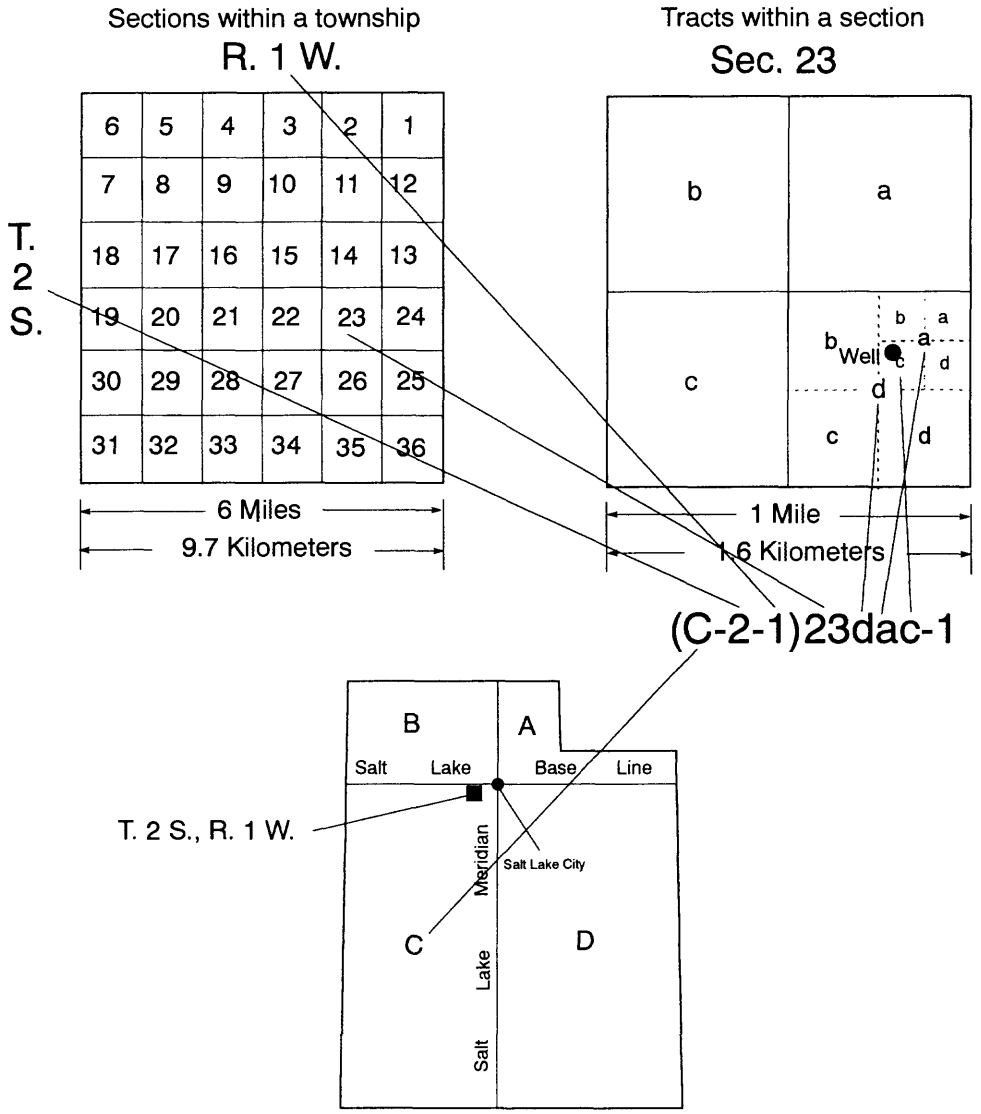
Five existing seismic-data access holes also were converted to monitoring wells. Although depths of the converted access holes range from 168 to 248 feet, two of the wells on the east side of the valley are completed in an unsaturated zone.

Information collected from monitoring wells drilled in 1990 and 1991 by the U.S. Geological Survey and from selected existing wells is presented in tables 1 through 13. Most of the data presented in this report were collected from 1990 through 1992. Selected water-level and water-quality data collected prior to 1990 also are included. Well locations are shown on plate 1. The well-numbering system used in Utah is shown in figure 1. Field data such as well-completion information, lithologic logs, and water-level measurements from wells and drill holes are listed in tables 1, 2, 3, and 4.

Methods and Types of Analysis

Chemical analyses of water from wells sampled in 1990 and 1991 were made mainly by the Utah State Health Laboratory. Methods of analysis used by the Utah State Health Laboratory are listed in its quality assurance plan (Utah State Health Laboratory, 1988). Selected nitrite and nitrate plus nitrite values were determined by the U.S. Geological Survey National Water Quality Laboratory. Chemical analyses of water samples collected prior to 1990 but included in this report and water samples collected from selected public supply wells in 1990 also were made by the National Water Quality Laboratory. Methods of analysis used by the National Water Quality Laboratory are described by Fishman and Friedman (1989). The results of these analyses are listed in tables 5 and 6.

The system of numbering wells in Utah is based on the cadastral land-survey system of the U.S. Government. The number, in addition to designating the well, describes its position in the land net. The land-survey system divides the State into four quadrants separated by the Salt Lake Base Line and the Salt Lake Meridian. These quadrants are designated by the uppercase letters A, B, C, and D, indicating the northeast, northwest, southwest, and southeast quadrants, respectively. Numbers designating the township and range, in that order, follow the quadrant letter, and all three are enclosed in parentheses. The number after the parentheses indicates the section, and is followed by three letters indicating the quarter section, the quarter-quarter section, and the quarter-quarter-quarter section — generally 10[1] acres. The letters, a, b, c, and d indicate, respectively, the northeast, northwest, southwest, and southeast quarters of each subdivision. The number after the letters is the serial number of the well within the 10-acre tract. Thus, (C-2-1)23dac-1 designates the first well constructed or visited in the southwest 1/4, northeast 1/4, southeast 1/4, section 23, T. 2 S., R. 1 W. The numbering system is illustrated below.



[1] Although the basic land unit, the section, is theoretically 1 square mile, many sections are irregular. Such sections are subdivided into 10-acre tracts, generally beginning at the southeast corner, and the surplus or shortage is taken up in the tracts along the north and west sides of the section.

Figure 1. Well-numbering system used in Utah.

The dissolved-solids concentration of water sampled from the shallow unconfined aquifer and an underlying confining layer in 1990 and 1991 varied with location in the valley. Concentrations ranged from 344 mg/L at well (D-2-1)16bba-3 in the southeast part of the valley to 20,300 mg/L at well (B-1-2)19aca-3 in the northwest part of the valley. Dissolved-solids concentrations of water from the deep unconfined and confined aquifers ranged from 130 mg/L at well (D-2-1)29acb-8 to 3,570 mg/L at well (B-1-2)36baa-1.

Water samples from monitoring wells drilled during 1990 and 1991 and from selected existing wells were analyzed using U.S. Environmental Protection Agency method 502.2 for drinking water (Ho, 1989) to determine concentrations of volatile organic compounds. The Utah State Health Laboratory made the analyses. Concentrations of volatile organic compounds detected are listed in the footnotes of table 5. Minimum detection levels for the volatile organic compounds analyzed in this study are listed in table 7.

Water samples from monitoring wells drilled in June and July 1990 were collected to determine concentrations of selected pesticides and polychlorinated biphenyls. The Utah State Health Laboratory used U.S. Environmental Protection Agency waste-water methods 608 (Federal Register, 1984) and 615 (Pressley and Longbottom, 1982) to analyze the water.

Water samples from monitoring wells drilled in March and May 1991 and from selected existing wells were analyzed to determine concentrations of selected pesticides. The Utah State Health Laboratory used U.S. Environmental Protection Agency drinking-water methods 505 (Winfield, 1989) and 515.1 (Graves, 1989) to analyze the water. Wells where water was sampled and analyzed for selected organochlorine pesticides and polychlorinated biphenyls in 1990 and selected organochlorine pesticides in 1991 are listed in table 5. No organochlorine pesticides or polychlorinated biphenyls were detected in the samples. The compounds and their minimum detection levels are listed in table 8.

Concentrations of selected radionuclides measured in water samples collected from selected wells in 1990 and 1991 are listed in table 9. The analyses were made by the Utah State Health Laboratory according to U.S. Environmental Protection Agency methods described by Krieger and Whittaker (1980).

Core samples were collected from the holes drilled in 1990 and 1991. Material from selected sample cores was analyzed for geochemical and geotechnical properties. The carbon concentration and cation exchange capacity of material from selected core samples are listed in table 10. Cation exchange capacities ranged from 2.4 milliequivalents of cations per 100 grams of solid material (meq/100 g) for material 52 feet below land surface at well (D-2-1)29acb-2 to 26 meq/100 g for material 60 feet below land surface at well (C-1-1)23bcd-2. Concentrations of selected elements determined by inductively coupled plasma-atomic emission spectrometry are listed in table 11.

Geotechnical properties of material from selected sample cores were determined by Chen-Northern, Inc.[1] Particle-size distribution, specific gravity, natural dry density, natural moisture content, volumetric moisture content, porosity, hydraulic conductivity, initial void ratio, vertical compressibility, and specific storage values are listed in tables 12 and 13. Porosity values ranged from 0.23 for material 104 feet below land surface at well (C-4-1)4aaa-4 to 0.62 for material 40 feet below land surface at well (C-2-1)23ccb-1. The tests were conducted according to methods presented by the American Society for Testing and Materials (1991) or properties were calculated from other analyzed properties.

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[1]Use of the firm names in this report is for identification purposes only and does not constitute endorsement by the U.S. Geological Survey.

Acknowledgments

The cooperation of property owners who granted permission to drill monitoring wells on their property and who allowed access to these wells and existing wells is greatly appreciated. Personnel of the Utah State Health Laboratory assisted in providing information on methods of analysis.

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Federal Register, 1984, 40 CFR, part 136, chap. VIII, Friday, October 26, 1984, Method 608. Organochlorine pesticides and PCBs: U.S. Environmental Protection Agency, v. 49, no. 209.

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Ho, J.S., 1989, Method 502.2. Volatile organic compounds in water by purge trap capillary column gas chromatography with photoionization and electrolytic conductivity detectors in series, Revision 2.0, in Methods for the determination of organic compounds in drinking water, Environmental Monitoring Systems Laboratory, December 1988: U.S. Environmental Protection Agency series, EPA 600/4-88-039, p. 31-62.

Pressley, T.A., and Longbottom, J.E., 1982, Method 615. Determination of chlorinated herbicides in industrial and municipal wastewater, Environmental Monitoring and Support Laboratory: U.S. Environmental Protection Agency series, EPA 600/4-82-005, 24 p.

Krieger, H.L., and Whittaker, E.L., August 1980, Prescribed procedures for measurement of radioactivity in drinking water, Environmental Monitoring and Support Laboratory: U.S. Environmental Protection Agency series, EPA 600/4-80-032.

Seiler, R.L., and Waddell, K.M., 1984, Reconnaissance of the shallow-unconfined aquifer in Salt Lake Valley, Utah: U.S. Geological Survey Water-Resources Investigations Report 83-4272, 34 p.

Winfield, T.W., 1989, Method 505. Analysis of organohalide pesticides and commercial polychlorinated biphenyl (PCB) products in water by microextraction and gas chromatography, Revision 2.0, in Methods for the determination of organic compounds in drinking water, Environmental Monitoring Systems Laboratory, December 1988: U.S. Environmental Protection Agency series, EPA 600/4-88-039, p. 109-142.

Utah State Health Laboratory, 1988, Quality assurance project plan for the Utah State Health Laboratory, January 1988: Salt Lake City, Bureau of Environmental Chemistry and Toxicology, SHL-4.2-02.

Table 1.—*Records of monitoring*

[—, no data

Location: See page 3 for an explanation of the well-numbering system used in Utah.
Site number: 15-digit U.S. Geological Survey site identification number based on latitude and longitude.
Owner: Refers to the landowner on whose property the monitoring well was drilled.
Depth: In feet below land surface.
Casing: Finish: P, perforated with 0.010-inch-wide slots; X, open hole extending below the bottom of open-ended
Altitude of land surface: In feet above sea level. Surveyed altitudes are in feet and decimal fractions; altitudes
Water level: Measured distance to water is in feet and decimal fractions.
Water quality: Temperature: °C, degrees Celsius. Specific conductance: µS/cm, microsiemens per centimeter at 25
Other data available: Numbers listed refer to tables in this report in which additional data are available. See table

Location	Site number	Owner	Date well completed	Depth of hole (feet)	Depth of well (feet)
(B-1-2)19aca-2	404829112062101	E.J. Jeremy	03-14-91	86.0	86.0
(B-1-2)19aca-3	404829112062102	E.J. Jeremy	05-17-91	24.0	23.1
(B-1-2)22dad-1	404812112024201	Tom Peck	05-22-91	19.4	15.5
(B-1-2)28aab-1	404753112040201	Dale Jolly	05-24-91	19.0	15.0
(B-1-2)32bcb-2	404643112060001	KSL Radio and Television	[1]07-17-90	248	248
(B-1-2)32bcb-3	404643112060002	KSL Radio and Television	05-22-91	24.7	24.7
(B-1-2)36baa-2	404700112005701	Utah State Retirement Systems	03-13-91	83.0	83.0
(B-1-2)36baa-3	404700112005703	Utah State Retirement Systems	05-14-91	20.0	19.0
(C-1-1)15cad-2	404351111562301	U.S. Geological Survey	06-27-90	40.0	40.0
(C-1-1)15cad-3	404351111562302	U.S. Geological Survey	05-08-91	20.0	16.0
(C-1-1)18bda-1	404406111594901	Christensen Environmental Products	06-28-90	45.0	45.0
(C-1-1)23bcd-2	404313111553202	Granger-Hunter Water Improvement District	06-08-90	66.5	66.1
(C-1-1)33ddd-2	404057111565402	Granger-Hunter Water Improvement District	06-08-90	51.5	51.5
(C-1-1)35ddd-5	404057111543901	Leo Knowles	[1]07-17-90	213	213
(C-1-2)14cdd-2	404335112020501	Utah Division of Wildlife Resources	03-16-91	50.0	49.5
(C-1-2)14cdd-3	404335112020502	Utah Division of Wildlife Resources	05-15-91	24.0	17.7
(C-2-1)13abc-1	403859111535601	Murray City	06-13-90	56.5	56.5
(C-2-1)20aad-2	403810111580502	Taylorsville-Bennion Water Improvement Dist.	06-09-90	61.0	61.0
(C-2-1)23ccb-1	403737111554101	Dean Bateman	06-19-90	41.0	41.0
(C-2-1)23dac-1	403742111544301	Murray City	06-18-90	85.0	85.0
(C-2-1)34bbd-2	403624111563602	West Jordan City	06-11-90	41.5	41.5
(C-2-1)36cdd-2	403546111540601	Salt Lake County Parks & Recreation	07-25-90	89.0	62.0
(C-2-1)36cdd-3	403546111540602	Salt Lake County Parks & Recreation	07-27-90	129.5	129.5
(C-2-2)1bcd-2	404029112011202	Lora Spencer	06-29-90	28.5	28.0
(C-3-1)12cdb-1	403409111541501	Alton W. Harrison	06-12-90	41.0	41.0
(C-3-1)15ccb-1	403317111564601	Salt Lake County Parks & Recreation	03-08-91	101.0	51.0
(C-4-1)4aaa-3	403027111565701	Riverton City	06-20-90	49.0	49.0
(C-4-1)4aaa-4	403025111565801	Riverton City	03-09-91	104.0	104.0
(D-1-1)17dab-1	404355111511801	Westminster College	[1]07-19-90	217	215
(D-1-1)17dab-2	404355111511802	Westminster College	07-21-90	68.5	68.5
(D-1-1)19dbc-2	404258111525102	South Salt Lake City	06-25-90	31.0	31.0

wells drilled in 1990 and 1991

available]

casing. Upper and lower limits of open hole or perforations are in feet below land surface.
interpolated from U.S. Geological Survey topographic maps are to the nearest foot.

degrees Celsius.
of contents for a list of table numbers and corresponding tables.

Casing				Altitude of land surface (feet)	Water level		Water quality (measured in the field)			Other data available
					Above (+) or below (-) land surface (feet)	Date	Temperature (°C)	Specific conductance (µS/cm)	Date	
Diameter (inches)	Depth (feet)		Finish (feet)							
2	86.0	P	75.0-85.0	4,210.1	+1.70	07-31-91	22.0	3,550	08-05-91	3,5,6,9,10,12,13
					+1.67	08-22-91				
					+2.51	03-02-92				
2	23.1	P	17.1-22.1	4,210.4	-2.96	07-31-91	14.5	30,000	08-05-91	3,4,5,6,9
2	15.5	P	9.5-14.5	4,215.6	-7.55	07-31-91	14.5	2,270	08-07-91	3,4,5,6,9,10,12,13
2	15.0	P	9.0-14.0	4,220	-3.40	07-31-91	16.5	3,580	08-06-91	3,4,5,6,9,10,12,13
3	240	X	240-248	4,215	+9.0	07-30-91	11.0	14,000	11-08-90	5,6,9
					+8.8	08-22-91				
					+9.2	03-03-92				
2	24.7	P	18.7-23.7	4,215	-3.60	07-30-91	15.0	11,200	08-06-91	3,4,5,6,9,10,12,13
2	83.0	P	72.0-82.0	4,223.6	-4.00	07-30-91	16.0	890	08-29-91	3,4,5,6,9,10,12,13
2	19.0	P	13.0-18.0	4,223.8	-6.21	07-30-91	15.0	6,780	08-29-91	3,4,5,6,9,10,12,13
2	40.0	P	29.0-39.0	4,232.6	-3.12	07-24-91	17.5	1,200	10-15-90	3,4,5,9,10,11,12,13
2	16.0	P	10.0-15.0	4,232.4	-3.97	07-26-91	22.0	2,940	09-03-91	3,4,5,6,9
2	45.0	P	34.0-44.0	4,237	-8.18	07-29-91	14.0	16,000	10-22-90	3,4,5,9,10,11,12,13
2	66.1	P	55.1-65.1	4,230	-1.36	07-29-91	13.0	720	11-08-90	3,4,5,9,10,11,12,13
2	51.5	P	40.5-50.5	4,270	-10.65	07-29-91	14.0	3,580	10-23-90	3,4,5,9
3	200	X	200-213	4,240	+0.47	07-29-91	13.5	370	11-09-90	4,5,9
2	49.5	P	38.5-48.5	4,233	-0.86	07-30-91	20.0	1,690	08-19-91	3,4,5,6,9,10,12,13
2	17.7	P	11.7-16.7	4,233	-4.43	07-30-91	15.0	6,980	08-19-91	3,4,5,6,9
2	56.5	P	45.5-55.5	4,315	-22.06	07-30-91	13.0	2,150	11-06-90	3,4,5,9,10,11
2	61.0	P	50.0-60.0	4,514	-41.22	07-29-91	15.0	3,970	10-29-90	3,4,5,10,11,12,13
2	41.0	P	30.0-40.0	4,350	-9.27	07-30-91	16.0	1,850	10-23-90	3,4,5,9,10,11,12,13
2	85.0	P	74.0-84.0	4,280	-8.59	07-29-91	13.5	1,490	10-29-90	3,4,5,10,11,12,13
2	41.5	P	30.5-40.5	4,384	-21.98	07-29-91	14.5	2,310	10-23-90	3,4,5,9,10,11,12,13
2	62.0	P	51.0-61.0	4,359	-39.28	07-29-91	13.0	2,320	11-14-90	3,4,5,9,10,11,12
2	129.5	P	118.5-128.5	4,359	-70.48	07-29-91	12.5	780	11-06-90	3,4,5,9,10,11,12,13
2	28.0	P	17.0-27.0	4,496	-6.73	07-29-91	14.0	1,060	10-22-90	3,4,5,9,10,11,12
2	41.0	P	30.0-40.0	4,358	-8.10	07-29-91	12.5	2,310	11-13-90	3,4,5,9,10,11,12,13
2	51.0	P	40.0-50.0	4,468	DRY	—	—	—	—	3,10,12,13
2	49.0	P	38.0-48.0	4,478	-42.03	07-29-91	14.5	1,800	11-13-90	3,4,5,9,10,11
2	104.0	P	93.0-103.0	4,480	-50.01	07-29-91	17.5	1,780	09-03-91	3,4,5,6,9,10,12,13
3	203	X	203-215	4,390	-21.63	07-30-91	13.5	360	11-14-90	3,4,5,9
2	68.5	P	57.5-67.5	4,390	-28.09	07-30-91	14.0	810	10-16-90	3,4,5,9,10,11,12,13
2	31.0	P	20.0-30.0	4,262	-8.93	07-30-91	14.0	1,430	10-15-90	3,4,5,9,10,11,12,13

Location	Site number	Owner	Date well completed	Depth of hole (feet)	Depth of well (feet)
(D-1-1)27aca-1	404224111491701	Granite School District	[1]07-18-90	168	168
(D-1-1)30dcb-1	404155111524601	Salt Lake County Parks & Recreation	06-26-90	71.0	71.0
(D-2-1)16bba-3	403910111505502	Salt Lake City Water Department	07-22-90	90.0	90.0
(D-2-1)17cda-2	403829111514401	Murray City	06-14-90	28.5	28.5
(D-2-1)17cda-3	403829111514402	Murray City	06-14-90	23.5	23.5
(D-2-1)29acb-2	403706111514201	Sandy City	06-23-90	52.0	52.0
(D-2-1)30dda-2	403642111521801	Salt Lake County Water Conservancy District	03-12-91	65.0	65.0
(D-2-1)30dda-3	403642111521802	Salt Lake County Water Conservancy District	05-16-91	24.0	21.4
(D-3-1)8aad-1	403439111511401	Intermountain Health Care	[1]07-18-90	223	223
(D-3-1)29ddd-1	403126111511101	Draper City	06-21-90	48.0	48.0

[1]Site was converted from an existing seismic-data access hole to a monitoring well on this date.

wells drilled in 1990 and 1991—Continued

Casing				Altitude of land surface (feet)	Water level		Water quality (measured in the field)			Other data available
Diameter (inches)	Depth (feet)		Finish (feet)		Above (+) or below (-) land surface (feet)	Date	Temperature (°C)	Specific conductance (µS/cm)	Date	
3	160	X	160-168	4,610	DRY	—	—	—	—	—
2	71.0	P	60.0-70.0	4,262	-2.81	07-30-91	12.5	1,030	10-16-90	3,4,5,9,10,11,12,13
2	90.0	P	79.0-89.0	4,351	-25.35	07-30-91	12.5	610	11-06-90	3,4,5,9
2	28.5	P	17.5-27.5	4,360	-2.51	07-29-91	15.0	1,180	10-30-90	3,4,5
2	23.5	P	12.5-22.5	4,360	-2.41	07-29-91	15.5	1,080	10-30-90	3,4,5,9,10,11,12,13
2	52.0	P	41.0-51.0	4,467	-22.43	07-29-91	13.5	680	10-30-90	3,4,5,9,10,11,12
2	65.0	P	54.0-64.0	4,453	-51.94	07-29-91	14.0	740	08-30-91	3,4,5,6,9,10,12,13
2	21.4	P	15.4-20.4	4,453	-11.65	07-29-91	14.5	1,340	08-30-91	3,4,5,6,9
3	203	X	203-223	4,670	DRY	—	—	—	—	—
2	48.0	P	33.0-43.0	4,524	-5.86	07-29-91	15.5	960	11-13-90	3,4,5,9,10,11,12,13

Table 2.—*Records of selected*

[—, no data

Location: See page 3 for an explanation of the well-numbering system used in Utah.
Site number: 15-digit U.S. Geological Survey site identification number based on latitude and longitude.
Depth: In feet below land surface.
Use of water: U, unused; S, stock; P, public supply; I, irrigation; H, domestic or household.
Casing: Diameter: In inches, reported from drillers' logs or measured in the field; Finish: P, perforated; S, screened; screens, or open hole are in feet below land surface, if known, and questioned (?) if extent of perforated
Altitude of land surface is in feet above sea level. Surveyed altitudes are in feet and decimal fractions; altitudes
Water level: Measured distance to water is in feet and decimal fractions. Measured by the U.S. Geological
Water quality: Temperature: °C, degrees Celsius; Specific conductance: µS/cm, microsiemens per centimeter at
Other data available: Numbers listed refer to tables in this report in which additional data are available. See table of

Location	Site number	Owner or user	Date well completed	Depth of hole (feet)	Depth of well (feet)	Use of water
(A-1-1)32bab-1	404659111514501	Salt Lake City Water Dept.	1982	15.0	15.0	U
(B-1-1) 9adc-1	405007111570901	R. Gualazzi	08-25-82	19.5	19.5	U
(B-1-1)22dca-1	404801111560501	Salt Lake City Water Dept.	1982	15.0	15.0	U
(B-1-1)25cdd-1	404703111540401	Salt Lake Pattern Co.	1982	20.0	19.0	U
(B-1-1)26bad-1	404748111551401	Atkinson	08-31-82	20.0	18.5	U
(B-1-1)26cda-1	404710111551301	J. Nelson	08-19-82	20.0	19.5	U
(B-1-1)27ddc-1	404704111555301	Salt Lake City Water Dept.	1982	15.0	15.0	U
(B-1-1)28dca-1	404710111570701	Salt Lake City Water Dept.	1982	14.7	14.7	U
(B-1-1)32dca-1	404619111582801	Salt Lake City Water Dept.	1982	15.0	15.0	U
(B-1-1)35cba-1	404639111554101	Salt Lake City Water Dept.	1982	15.0	15.0	U
(B-1-1)35dcb-1	404621111550501	R. Martinez	08-25-82	20.0	19.5	U
(B-1-2)19aca-1	404826112062201	E. J. Jeremy	1915	450	450	S
(B-1-2)21dcd-1	404754112040501	Bonneville on the Hill	03-31-66	561	561	S
(B-1-2)22daa-1	404815112024201	Tom Peck	08-09-56	148	148	S
(B-1-2)23cbd-1	404810112021901	Tom Peck	08-13-56	270	270	S
(B-1-2)31aaa-1	404700112060301	Salt Lake County	09-28-82	20.0	19.0	U
(B-1-2)32bcb-1	404645112055401	KSL Radio and Television	10-07-43	716	716	U
(B-1-2)34aab-1	404702112025201	Salt Lake County	09-23-82	20.0	18.7	U
(B-1-2)36baa-1	404659112005601	Utah State Retirement System	1915	464	464	S
(C-1-1) 1bdd-1	404545111540601	Salt Lake City Water Dept.	1982	15.0	15.0	U
(C-1-1) 3dab-1	404539111555401	Salt Lake City Water Dept.	1982	15.0	15.0	U
(C-1-1) 4ddb-1	404528111570901	Mineral Services Inc.	08-12-82	19.7	19.7	U
(C-1-1)11bac-1	404505111552501	Maureen Russill	07-26-82	19.7	19.7	U
(C-1-1)11dbc-1	404444111550501	Salt Lake City Water Dept.	1982	15.0	15.0	U
(C-1-1)13abd-1	404416111533401	Salt Lake City Water Dept.	1982	15.0	15.0	U
(C-1-1)14cba-1	404359111553501	Salt Lake City Water Dept.	1982	15.0	15.0	U
(C-1-1)23bcb-1	404314111553601	Granger-Hunter Improvement District	02-25-83	1,036	840	P

wells drilled before 1990

available]

X, open hole extending below the bottom of an open-ended casing. Upper and lower limits of perforations, or screened interval is unknown.
interpolated from U.S. Geological Survey topographic maps are to the nearest foot.
Survey except where noted R, reported. T, recently pumped.
25 degrees Celsius; Alkalinity: mg/L, milligrams per liter as $CaCO_3$.
contents for a list of table numbers and corresponding tables.

Casing				Altitude of land surface (feet)	Water level		Water quality (measured in the field)					Other data available
Diameter (inches)	Depth (feet)		Finish (feet)		Above (+) or below (-) land surface (feet)	Date	Temperature (°C)	Specific conductance (µS/cm)	pH (standard units)	Alkalinity, total (mg/L as $CaCO_3$)	Date	
1.25	15.0	P	(?)	4,860	-13.8 R	04-25-90	—	—	—	—	—	—
2	19.5	P	7.5-19.5	4,210	-6.08	05-09-90	7.0	6,590	8.0	—	02-01-83	—
1.25	15.0	P	(?)	4,215	-8.8 R	05-03-90	—	—	—	—	—	—
2	19.0	P	7.0-19.0	4,228.78	-4.64	05-09-90	—	1,650	—	—	11-19-82	—
2	18.5	P	6.5-18.5	4,216.39	-7.32	05-09-90	9.0	2,530	7.0	—	02-07-83	—
2	19.5	P	7.5-19.5	4,217.69	-8.83	12-30-91	11.5	1,200	7.5	—	01-17-83	4
1.25	15.0	P	(?)	4,215	-7.7 R	05-03-90	—	—	—	—	—	—
1.25	14.7	P	(?)	4,215	-4.6 R	05-03-90	—	—	—	—	—	—
1.25	15.0	P	(?)	4,220	-7.3 R	05-03-90	—	—	—	—	—	—
1.25	15.0	P	(?)	4,220	-6.8 R	02-28-90	—	—	—	—	—	—
2	19.5	P	7.5-19.5	4,221.40	-7.27	05-09-90	11.0	3,680	7.6	—	02-02-83	—
2	—		—	4,211.62	+12.00	07-31-91	17.5	2,350	8.4	380	08-05-91	4,5,6,9
2	561	S	551-561	4,222	+9.70	07-31-91	16.5	—	8.6	240	08-06-91	5,6,9
					+11.53	03-03-92						
2	148	P	145-148	4,215.22	+3.90	08-07-91	15.5	—	8.2	261	08-07-91	5,6,9
					+4.20	03-03-92						
2	—	P	165-(?)	4,219	+2.35	08-07-91	17.0	1,780	8.0	222	08-07-91	5,6,9
2	19.0	P	7.0-19.0	4,215	-4.21	12-30-91	—	36,200	—	—	11-16-82	4
3	—		—	4,214	—	—	18.5	5,500	7.7	156	12-09-91	5,6,9
2	18.7	P	6.7-18.7	4,219	-2.8 R	04-17-91	10.0	14,400	7.8	—	02-01-83	—
2	464	X		4,223.60	+8.63	09-20-91	27.0	6,180	7.7	118	08-29-91	4,5,6,9
1.25	15.0	P	(?)	4,237	-7.8 R	04-26-90	—	—	—	—	—	—
1.25	15.0	P	(?)	4,225	-4.4 R	02-28-90	—	—	—	—	—	—
2	19.7	P	7.7-19.7	4,221.23	-1.13	05-09-90	7.5	4,370	7.7	—	02-02-83	—
2	19.7	P	7.7-19.7	4,232	-9.76	05-09-90	10.5	10,900	7.1	—	01-07-83	—
1.25	15.0	P	(?)	4,210	-4.5 R	04-26-90	—	—	—	—	—	—
1.25	15.0	P	(?)	4,230	-10.70	05-03-90	—	—	—	—	—	—
1.25	15.0	P	(?)	4,230	-4.5 R	05-07-90	—	—	—	—	—	—
30	48	S	145-160	4,227	+17.6	03-06-92	15.0	820	7.9	—	07-13-89	5
18	350		166-181									
16	840		220-240									
			325-340									
			375-390									
			401-406									
			498-508									
			522-562									
			620-630									
			662-672									
			760-804									

Location	Site number	Owner or user	Date well completed	Depth of hole (feet)	Depth of well (feet)	Use of water
(C-1-1)24cdc-1	404247111541001	Utah Dept. of Transportation	10-06-82	20.0	18.7	U
(C-1-1)26dca-1	404154111545901	J. Pagnanelli	08-26-82	20.0	19.7	U
(C-1-1)31abb-1	404142111594301	Jerry McDonald	09-02-82	20.0	14.3	U
(C-1-1)33dbc-1	404110111572901	Joseph R. Stuber	05-29-80	380	103	I
(C-1-1)33ddd-1	404057111565401	Granger-Hunter Improvement District	08-15-60	886	886	P
(C-1-1)36dcb-1	404103111535401	V. Fenning	09-16-82	21.0	7.8	U
(C-1-2)14cdd-1	404335112020601	Utah Division of Wildlife Resources	01-04-80	500	480	H
(C-1-2)22cbb-2	404300112034302	F. Fowler	07-30-82	19.7	19.7	U
(C-2-1) 3dba-1	404025111560301	Lamont C. Higginson	06-01-75	22.0	22.0	I
(C-2-1)12bda-1	403949111540301	Utah Dept. of Transportation	09-28-82	20.0	18.8	U
(C-2-1)13dad-1	403833111532801	Alvin B. Lloyd	1970	35.0	35.0	U
(C-2-1)13dad-2	403833111532802	Alvin B. Lloyd	07-30-75	175	175	I
(C-2-1)13dbb-1	403840111535301	Murray City	03-23-71	445	445	P
(C-2-1)20aad-1	403810111580501	Taylorsville-Bennion Improvement District	05-06-79	660	658	P
(C-2-1)23cab-1	403750111552201	West Jordan City	07-06-72	600	600	U
(C-2-1)23dad-1	403743111544000	Murray City	04-25-72	391	391	P
(C-2-1)24bcd-1	403756111542301	Salt Lake County Water Conservancy Dist.	08-06-65	1,000	370	P
(C-2-1)34bbd-1	403624111563601	Kennecott Corporation	04-04-86	145	140	U
(C-2-1)35bab-1	403632111552301	Joseph Ortega	08-27-82	20.0	19.7	U
(C-2-1)36cdd-1	403546111540101	Salt Lake County Parks & Recreation	09-13-76	240	240	P
(C-2-1)36dda-1	403550111533201	Sandy City	11-30-63	605	605	P
(C-2-2) 1bcd-1	404025112011101	George E. Rushton	1930	30.0	30.0	U
(C-3-1) 1cab-2	403511111541501	Salt Lake County Water Conservancy Dist.	01-25-66	800	800	P
(C-3-1) 1dca-1	403458111534901	Wasatch Shadows Nursery	01-10-71	165	165	I
(C-3-1)15cbc-1	403324111564801	Kennecott Corporation	06-06-86	135	135	U
(C-3-1)25cac-1	403136111541101	Leland Webb	08-04-82	19.0	19.0	U
(C-4-1) 4aaa-2	403026111565701	Riverton City	1973	500	500	P
(D-1-1) 7aaa-1	404514111522001	Wylis Dorman-Leigh	08-20-82	20.0	19.5	U
(D-1-1)18dad-1	404348111522201	P. Blanchard	08-20-82	20.0	19.5	U
(D-1-1)19dbc-1	404258111525101	South Salt Lake City	07-25-56	955	955	P
(D-1-1)30bbb-1	404233111532001	Kelly Bryan	07-29-82	19.7	19.7	U

wells drilled before 1990—Continued

Casing				Altitude of land surface (feet)	Water level		Water quality (measured in the field)					Other data available
Diameter (inches)	Depth (feet)		Finish (feet)		Above (+) or below (-) land surface (feet)	Date	Temperature (°C)	Specific conductance (µS/cm)	pH (standard units)	Alkalinity, total (mg/L as $CaCO_3$)	Date	
2	18.7	P	6.7-18.7	4,235	-3.84	04-27-90	7.0	3,220	7.1	—	02-04-83	—
2	19.7	P	7.7-19.7	4,239.75	-6.77	04-27-90	8.0	4,230	7.4	—	02-02-83	—
2	14.3	P	2.3-14.3	4,275.43	-10.03	04-30-90	10.5	1,990	7.4	—	02-07-83	—
2	103	P	93-103	4,263	-13.82	09-20-91	—	—	—	—	—	4
16	451	P	638-645	4,273	-1.60	03-06-92	21.0	1,490	7.3	—	08-28-81	5
12	886		730-740 746-755 805-812 840-847 875-886									
2	7.8	P	(?)-7.8	4,253.30	-2.84	04-27-90	—	2,060	—	—	11-29-82	—
8	404	S	380-480	4,233	—	—	21.0	3,420	7.8	124	08-19-91	5,6,9
6	480											
2	19.7	P	7.7-19.7	4,233.30	-4.16	04-30-90	—	2,170	—	—	11-16-82	—
6	22.0	P	16.0-22.0	4,270	-9.21	04-30-90	—	2,390	—	—	11-19-82	—
2	18.7	P	6.7-18.7	4,260	-11.27	04-27-90	11.0	2,310	7.3	—	02-03-83	—
4	35.0	X		4,332.38	-17.21	12-30-91	—	—	—	—	—	4
6	175	P	59-65	4,332.39	-25.38	12-30-91	—	—	—	—	—	4
24	97	P	140-165	4,318	—	—	16.0	280	8.2	87	06-20-91	—
20	300		240-255									
12	445		315-355 365-367 395-401									
20	100	P	240-355	4,515	-125.88	03-04-92	15.0	2,260	7.3	—	07-10-89	5
16	658											
20	100	P	240-262	4,285	-4.82	02-11-91	—	—	—	—	—	—
16	600		293-337									
22	123	P	140-220	4,280	-11.68	02-11-91	15.5	1,110	7.6	165	06-20-91	—
16	391		237-280 370-380		-10.75	03-05-92						
20	351	P	179-300	4,307	-30.11	02-11-91	15.5	615	7.7	124	12-23-91	—
16	1,000						15.5	650	7.8	129	02-10-92	
4	140	P	120-140	4,393.60	-19.42 R	04-04-86	—	—	—	—	—	—
2	19.7	P	7.7-19.7	4,304.41	-16.99	05-02-90	12.5	2,500	7.0	—	01-17-83	—
12	100	P	155-230	4,355	-69.94	03-28-91	—	—	—	—	—	—
10	240											
20	40	P	200-280	4,405	-104	02-27-91	—	—	—	—	—	—
16	605		320-412 442-558 575-600									
36	30		—	4,510	-8.22	05-02-90	—	—	—	—	—	—
20	313	P	319-610	4,361.77	-55.34	09-20-91	—	—	—	—	—	4
16	800		645-650 745-750									
12	165	P	125-135	4,388	-61.69	02-15-91	13.0	2,070	7.1	—	09-02-83	4
4	135	P	115-135	4,475	-44.63 R	06-25-86	—	—	—	—	—	—
2	19.0	P	7.0-19.0	4,408.98	-7.05	05-03-90	—	2,750	—	—	11-30-82	—
20	100	P	290-480	4,478	-51.84	03-05-92	—	—	—	—	—	—
10	500											
2	19.5	P	7.5-19.5	4,279.45	-10.41	05-07-90	—	1,380	—	—	11-12-82	—
2	19.5	P	7.5-19.5	4,288.11	-8.90	05-07-90	12.0	1,460	7.0	—	01-07-83	—
16	948	P	574-840	4,262	-81.94 T	02-21-92	19.5	900	7.5	181	03-05-92	—
2	19.7	P	7.7-19.7	4,248.67	-4.98	05-04-90	—	1,810	—	—	11-12-82	—

Location	Site number	Owner or user	Date well completed	Depth of hole (feet)	Depth of well (feet)	Use of water
(D-1-1)30cda-10	404152111525101	Salt Lake County Water Conservancy Dist.	10-01-56	855	855	U
(D-1-1)31dba-1	404119111523501	Frank Godnick	08-10-82	19.7	19.7	U
(D-2-1) 8bba-1	404002111520601	Helen Schmidt	08-05-82	20.0	11.3	U
(D-2-1) 9abd-1	403954111502001	Salt Lake City Water Dept.	08-16-82	540	540	P
(D-2-1)16aaa-1	403907111500201	Salt Lake City Water Dept.	07-26-89	600	590	U
(D-2-1)16bba-1	403906111505701	Salt Lake City Water Dept.	03-20-55	285	285	P
(D-2-1)16bba-2	403910111505501	Salt Lake City Water Dept.	08-13-56	—	604	P
(D-2-1)17cda-1	403829111514301	Murray City	04-09-54	455	440	P
(D-2-1)28ccc-1	403638111511701	Salt Lake County Water Conservancy Dist.	08-28-56	691	691	P
(D-2-1)29acb-8	403706111514101	Sandy City	10-07-58	500	500	P
(D-2-1)30dda-1	403642111521701	Salt Lake County Water Conservancy Dist.	09-22-60	1,002	1,002	P
(D-2-1)34cdc-1	403543111494801	Salt Lake County Water Conservancy Dist.	05-27-80	875	875	P
(D-3-1) 4cad-1	403506111503601	Sandy City	02-11-78	938	938	P
(D-3-1) 6cba-1	403512111531201	Sandy City	10-12-54	1,230	430	P
(D-3-1) 6cdb-1	403500111530601	Sandy City	11-15-68	590	590	U
(D-3-1) 6dad-1	403510111521801	Sandy City	09-08-79	1,000	1,000	P
(D-3-1)12bdd-1	403426111471201	Sandy City	02-17-62	190	171	P
(D-3-1)31cda-1	403038111525501	Vicki McEwen	07-26-82	19.7	19.7	U
(D-3-1)32aaa-1	403117111511601	A. Christensen	08-18-82	20.0	19.7	U
(D-3-1)32cda-1	403041111514801	Dale Ballard	1982	—	13.0	I

wells drilled before 1990—Continued

Casing			Altitude of land surface (feet)	Water level		Water quality (measured in the field)					Other data available
Diameter (inches)	Depth (feet)	Finish (feet)		Above (+) or below (-) land surface (feet)	Date	Temperature (°C)	Specific conductance (µS/cm)	pH (standard units)	Alkalinity, total (mg/L as $CaCO_3$)	Date	
20	610	P 611-850	4,265.57	-0.65	02-13-91	—	—	—	—	—	4
16	855										
2	19.7	P 7.7-19.7	4,277.26	-8.67	05-04-90	12.0	2,040	7.1	—	01-12-83	—
2	11.3	P (?)-11.3	4,285.04	-4.92	05-04-90	11.5	2,120	7.0	—	01-12-83	—
24	67	P 260-295	4,348	-12.74	02-15-91	—	—	—	—	—	—
16	540	315-365									
		425-460									
26	103	P 290-415	4,396	-61.80	02-15-91	—	—	—	—	—	—
20	590	465-505									
		515-532									
12	285	P 150-208	4,351	-28.03	02-15-91	—	—	—	—	—	—
		213-238									
		248-255									
		261-284									
20	604	P 253-305	4,351	-26.66	02-19-91	—	—	—	—	—	—
		329-395		-25.13	03-05-92						
		481-499									
		505-585									
12	202	154-169	4,360	-28.48	03-04-92	12.0	410	8.0	130	06-21-91	—
10	440	180-196									
		207-220									
		240-246									
		283-286									
		388-397									
		400-431									
16	—	P 515-530	4,560	-227.95	02-14-92	12.0	240	8.2	82	09-18-90	5
		535-585				12.0	235	8.2	80	06-20-91	
		592-678									
12	—	P 455-(?)	4,465	—	—	14.0	225	8.3	78	09-17-90	5
20	346	P 560-580	4,453	-140 R	02-13-90	17.0	330	8.0	93	10-22-91	—
16	806	608-617				14.0	295	7.9	91	02-10-92	
12	1,002	620-630									
		648-661									
		687-689									
24	120	P 435-461	4,710	-386 R	02-13-90	12.0	375	7.6	138	09-18-90	5
20	772	595-650				12.0	375	7.6	137	06-20-91	
		740-762									
24	250	P 500-518	4,720	-426 R	07-20-90	11.5	310	8.1	121	09-17-90	5
20	938	660-687									
12	430	P 240-420	4,462	-152.18	02-27-91	—	—	—	—	—	—
20	100	P 485-575	4,483	-171.08	02-27-91	—	—	—	—	—	—
16	590										
24	150	P 473-535	4,515	-244 R	08-12-90	17.0	415	8.1	93	09-17-90	5
20	883	552-620									
16	1,000	650-1,000									
20	40	P 65-168	5,280	—	—	14.0	345	7.0	93	09-17-90	5
16	171										
2	19.7	P 7.7-19.7	4,437.91	-6.79	05-03-90	10.5	2,830	7.3	—	01-12-83	—
2	19.7	P 7.7-19.7	4,510.33	-11.42	05-04-90	11.0	760	6.8	—	01-12-83	—
36	13.0	—	4,487	-10.46	05-03-90	—	1,040	—	—	12-06-82	—

Table 3.—*Lithologic logs of selected monitoring wells drilled in 1990 and 1991*

[in., inches; ft, feet; <, less than]

Location: See page 3 for an explanation of the well-numbering system used in Utah.

Depth: Depth of interval in feet below land surface.

Sample type: Type of sample described in log. R, returns; C, core.

Toughness: Material is moistened then molded and rolled into threads until crumbling occurs. Aids in determining the type and relative amount of clay by testing its consistency near the plastic limit. L, low; M, medium; H, high; ML, medium to low; MH, medium to high.

HCl: Reaction of sample with hydrochloric acid. Y, yes; N, no.

Depth (ft)	Sample type	Lithology	Color	Toughness	HCl	Comments
(B-1-2)19aca-2						
0 - 5	R	Silty clay	Brown			Dry.
5	R	Sandy clay and gravel, sand is very fine to fine grained, gravel (10 percent) is angular up to 1/2 in. diameter				Wet.
12	R	Clay with some fine- to medium fine-grained sand (<10 percent)	Red brown	H	Y	Very moist.
23 - 26	C	Silty clay	Olive gray	H	Y	Slightly moist.
34.3 - 36	C	Fine sand with silt lenses up to 3 in. thick, sand is fine grained at 34.3 ft grading to medium grained; silt is slightly darker	Olive gray		Y	
43 - 45	C	Clay	Olive gray	H		No bedding, moist.
45 - 46	C	Silt grading to very fine sand	Olive gray	L		Slightly moist.
53.4 - 54.5	C	Silt	Light olive-gray	L	Y	No bedding.
65.5 - 66	C	Silty clay	Olive gray	MH	Y	No bedding.
73 - 76	C	Silty clay grading to sandy silt; both silt and clay same color; clay has medium to low toughness; silt reacts with HCl	Olive gray			No bedding.
86	C	Clay	Pale yellow-brown	M	Y	No bedding, very hard, moist.
Total depth drilled is 86.0 ft						
(B-1-2)19aca-3						
0 - 5	R	Silty sandy clay, less than 10 percent sand	Light brown			Water at 3 ft.
5 - 10	R	Clay grading to silty clayey sand	Brown			Wet.
10 - 20	R	Silty sandy clay; grades to green gray, some black present	Brown	H		
Total depth drilled is 24.0 ft						
(B-1-2)22dad-1						
0 - 5	R	Clay with less than 5 percent sand	Light brown	H		
5 - 10	R	Silty clay with some sand				
10	R	Saturated mixed returns				
Total depth drilled is 19.4 ft						
(B-1-2)28aab-1						
0 - 3	R	Sandy soil	Dark brown			
3 - 5	R	Silty clay	Light brown	H		Slightly moist; moist clay at about 4.5 ft.

Table 3.—*Lithologic logs of selected monitoring wells drilled in 1990 and 1991*—Continued

Depth (ft)	Sample type	Lithology	Color	Toughness	HCl	Comments
(B-1-2)28aab-1—Continued						
5 - 10	R	Silty clay with increasing moisture and sand content with depth. Sand in clay is fine to coarse grained, angular, and about 20-30 percent of sediment	Brown			
10 - 14	R	Silty clayey sand, fine- to coarse-grained with some 1/16-in.-diameter gravel	Brown			Saturated.
14	R	Silty clay with less than 5 percent sand				Hard drilling.
Total depth drilled is 19.0 ft						
(B-1-2)32bcb-3						
0 - 5	R	Silty clay grading to clay with fine- to coarse-grained sand	Light brown-brown			Angular grains.
5 - 10	R	Clay with coarse sand (less than 5 percent) grading to clay	Light brown	H		Water at 6-7 ft.
18	R	Flowing sand				
Total depth drilled is 24.7 ft						
(B-1-2)36baa-2						
0 - 3	R	Clay	Brown gray	H		Slightly moist.
3 - 7	R	Sticky clay	Brown	H		
7 - 10	R	Clay with silt and very fine sand		H		Water at 10 ft.
10 - 12	R	Clay, with silt, changes from brown to gray-brown at 12 ft				Saturated.
18 - 19	C	Very fine clean sand	Brown gray			
19 - 21	C	Clay with some silt	Gray	MH		Breaks along bedding.
21 - 28						No returns.
33	C	Very tight clay	Gray green		Y	No layering, slightly moist.
33.5	C	Hard silty clay, with about 2 percent sand	Yellow brown			No bedding, slightly moist.
36	R	Very hard silty sand			Y	No bedding, slightly moist.
43.5 - 45	C	Hard clayey silt	Olive gray	MH	Y	Varve-like bedding, slightly moist.
45 - 46	C	Silty fine sand with clayey silt layers	Olive gray		Y	Bedding present, more moist.
53 - 55	C	Silty clay and 0.5 percent 1/8-1/16-in.-diameter gravel	Olive gray	L	Y	Some yellow-green staining; oxidation or reduction; no bedding.
55 - 55.5	C	Silt with fine sand	Olive gray			Yellow-brown staining, very moist, some bedding.
55.5 - 56	C	Silty clay				Moist.
68 - 71	C	Silty clay	Green gray	M	Y	Plant roots, moist.
80 - 81	C	Tight clay with increasing very fine to fine-grain, bedded sand (olive brown) and silt with depth	Gray green			Very hard.
81.5 - 83	C	Hard silty clay, slightly moist, 1/4-in.-thick contorted siltier zones	Olive gray			Some organic matter.
Total depth drilled is 83.0 ft						
(B-1-2)36baa-3						
0 - 2	R	Silty clay	Dark brown			
2 - 12	R	Silty clay	Light brown			Hard drilling at 8.5 ft; saturated.
12	R	Silty clay, some gray, fine sand	Gray			
Total depth drilled is 20.0 ft						

Table 3.—*Lithologic logs of selected monitoring wells drilled in 1990 and 1991*—Continued

Depth (ft)	Sample type	Lithology	Color	Tough-ness	HCl	Comments
(C-1-1)15cad-2						
0 - 1	R	Topsoil				
1 - 9	R	Gravel, clay balls, minor silt, coarse sand at 4.5 ft; clay, silt at 5.5 ft				Water at 6 ft.
9 - 11	C	Clean medium sand with mica			Y	Saturated, probably disturbed material.
11 - 18	R	Sand and minor gravel				
18 - 18.5	C	Clay	Dark gray		Y	
18.5 - 19	C	Clay	Black	H	Y	
19 - 19.5	C	Clay	Dark gray-black		Y	Disturbed bedding at transition between clay and silt.
19.5 - 20	C	Silt	Dark brown		Y	
20 - 28	R	Silt, clay, minor gravel				
28 - 30	C	6-in. core, fine sand with clay				Probably disturbed material.
30 - 38	R	Fine sand with clay				
38 - 38.5	C	Fine to medium silty sand; 70 percent sand	Dark gray	M		Saturated.
38.5 - 39	C	Alternating 1/4-in.-thick light and dark layers of clay	Dark gray	MH		
39 - 40	C	Clay	Dark gray	MH		
Total depth drilled is 40.0 ft						
(C-1-1)15cad-3						
0 - 1	R	Topsoil				
1 - 2	R	1-in.-diameter gravel				
2 - 3	R	Moist silty, sandy soil				Easy drilling.
4 - 5	R	Silty sand, some clay	Light brown			
5 - 7	R	Sand with clay and silt				Saturated.
7 - 13	R	Sandy clay	Light gray-tan	H		Saturated.
13 -20	R	Clay	Dark gray			
Total depth drilled is 20.0 ft						
(C-1-1)18bda-1						
0 - 8	R	Clay-silt, 1/8-in.-diameter gravel and 10 percent coarse sand	Olive gray	MH		Moist.
9 - 9.3	C	Silty medium sand, some rounded 1/2-in.-diameter gravel (5 percent), clay (10 percent)	Gray brown		Y	Slightly moist.
9.3 - 9.7	C	Clayey silt and fine sand	Dark gray-brown	L		Some iron staining, saturated, no bedding.
9.7 - 10	C	Clayey medium sand and silt	Clay: brown	MH		Iron stained 1/8-in.-thick areas, clay is mottled.
13	R	Clay	Dark gray			
18 - 19.5	C	Interbedded clay and silt, some fine sand in silt layers	Dark gray	M	Y	
19.5 - 19.8	C	Medium to coarse sand, sharp contact with above clay; sand contains mica, clay or shale flakes, some shell fragments				
19.8 - 20	C	1-in.-thick clay and 2-in.-thick fine to medium sand layers	Olive gray		Y	
20 - 28	R	Clay-silt				
28 - 29	C	Clean medium-coarse sand with mica, some shells	Gray		Y	Saturated.
29 - 29.8	C	Tight, hard clay interbedded with thin 1/8-in.-thick silt bands, some plant debris	Gray	H	Y	

Table 3.—*Lithologic logs of selected monitoring wells drilled in 1990 and 1991*—Continued

Depth (ft)	Sample type	Lithology	Color	Toughness	HCl	Comments
(C-1-1)18bda-1—Continued						
29.8 - 30	C	Grading to medium sand and silt with thinner clay layers				
31						Flowing sand.
43 - 45	C	Clay				
Total depth drilled is 45.0 ft						
(C-1-1)23bcd-2						
0 - 1	R	Clay, forms 2.5-in.-diameter balls at surface	Blue gray			Damp-moist.
4	R	Stiff clay	Light gray			
6	R	Clay, some fine sand	Gray			
8 - 11	C	90 percent coarse sand, 10 percent medium to fine sand	Gray		N	No bedding, subrounded to subangular well-sorted grains, water at 8 ft.
12 - 21.5						No returns, not able to sample due to flowing sand.
21.5 - 22	C	80 percent clay, interlayered with 20 percent coarse sand	Black	L	N	
22 - 25.5	C	2 percent sand, 98 percent clay, no bedding	Black	M	N	Smells like rubber.
28.5 - 30	C	Clay with thin silt beds spaced 1/4 in. apart	Dark gray	ML	Y	Silt reacts with HCl.
30 - 31.5	C	60 percent fine sand, 40 percent clay and silt	Dark gray			Bedding.
35						Harder drilling.
38 - 40	C	30 percent very fine sand layered with silt and clay	Dark gray	MH	Y	
40 - 41	C	Very fine sand with some (10 percent) silt and clay	Dark gray	L	Y	Sand is saturated.
47						Hard drilling.
49 - 49.5	C	Medium-fine sand with 60 percent clay and silt	Dark gray	M	Y	Bedding, saturated.
49.5 - 51.5	C	Coarse to medium sand and 1 percent 1/4-in.-diameter gravel	Dark gray		Y	
55 - 59						Easy drilling.
60						Drilling was harder.
60 - 61.5	C	Varve-like clay with thin layers of interbedded silt	Dark gray	H		Silt dries faster and breaks apart.
Total depth drilled is 66.5 ft						
(C-1-1)33ddd-2						
0 - 4	R	Clay	Dark brown			
4 - 8	R	Clay with some silt	Light brown			Moist.
8 - 9	R	Gravel stringer				Water at 8.5-9.0 ft.
9 - 11.5	C	Sandy rounded gravel (up to 1 in. diameter), some silt, more clay at 11.5 ft	Dark gray-brown			Only loose material remained in core liner.
20.5 - 21.5	C	Silty very fine sand, small laminations with stringer of iron staining; some mica flakes	Gray brown	L	Y	Saturated.
26.5						Harder drilling.
30 - 30.5	C	Silty very fine sand	Dark gray	M		Saturated.
30.5 - 31	C	Tighter, finely striated clay		M		
31 - 31.5	C	Becomes sandier				
48						Harder drilling.
49 - 51.5	C	Clay with some silt	Dark gray-black	MH		Only 3-in. sample, rest is washed material.
Total depth drilled is 51.5 ft						

Table 3.—*Lithologic logs of selected monitoring wells drilled in 1990 and 1991*—Continued

Depth (ft)	Sample type	Lithology	Color	Tough-ness	HCl	Comments
(C-1-2)14cdd-2						
0 - 1	R	Topsoil				
1 - 5	R	Silty, sandy clay	Yellow brown	H	Y	Moist.
7						Water at 7 ft.
8 - 9.5	C	3 in. of clay, no bedding, rest is fine to coarse gray-brown sand	Yellow brown	H		Red staining, sand is saturated.
18	R	Same as above				
28 - 29	C	Clayey silt; bottom 3 in. is same lithology as above but gray-olive in color	Gray green	M	Y	Slightly moist, no bedding, hard.
38	C	Clayey silt, some black organic material and pyrite-like crystals	Olive gray	H	Y	No bedding, hard, slightly moist.
41	C	Clayey silt	Light yellow-brown with olive gray		Y	Brown and gray mottled together, not as hard as above, moist.
48 - 49	C	Silt, breaks into angular pieces and eventually powders	Gray orange	M		Very hard, semi-moist.
Total depth drilled is 50.0 ft						
(C-1-2)14cdd-3						
0 - 3	R	1 in. of clayey soil, then sandy clay	Light brown	H		Moist.
3 - 5	R	Sandy clay, saturated sand	Light brown			
5 - 6	R	Clay	Light brown	H		Very hard drilling, water encountered below clay.
6 - 10	R	Alternating layers of sandy clay and sand (fine to coarse grained)	Gray brown			
10 - 20	R	Grades from brown clay and sand to gray green silty clay, then to gray sand				All saturated, flowing sand.
Total depth drilled is 24.0 ft						
(C-2-1)13abc-1						
1	R	Tar, asphalt, and fill				
9 - 11	C	Gravel grading to 1- to 2-in.-thick clay layers; interbedded with thin sand lenses	Brown	M	Y	Sand has iron staining.
14						Water at 14 ft.
19 - 20	C	Coarse, clean sand	Brown			No bedding, well sorted.
20 - 20.5	C	Clay		MH	N	No iron staining, but contorted bedding.
29 - 31	C	Clay and silt	Olive gray	H	N	Mottled color and contorted bedding.
39 - 41	R	Silt and very fine sand on pilot bit	Gray			
45 - 55	R	Clay	Gray			Water and bubbles coming up hole at 50 ft.
56	R	Clay	Light brown			
Total depth drilled is 56.5 ft						
(C-2-1)20aad-2						
0 - 2.5	R	Silty sand with some clay	Brown			
9 - 9.2	C	Silty fine sand	Brown		N	
9.2 - 11	C	Very fine sand with 3 percent silt	Brown	L	Y	Slightly moist, some bedding with iron staining.
19 - 21	C	Very fine sand with 3 percent silt	Light yellow-brown			Fine crossbedding and increased iron staining, moist.
29 - 31	C	Same as above				

Table 3.—*Lithologic logs of selected monitoring wells drilled in 1990 and 1991*—Continued

Depth (ft)	Sample type	Lithology	Color	Tough-ness	HCl	Comments
(C-2-1)20aad-2—Continued						
39 - 41	C	Silt with 1/8-in.-thick clay lenses	Brown	M	Y	Moist, iron staining, thin bedding; clay does not react with HCl.
49 - 50	C	Silt	Light gray			Saturated, thin bedding, less iron staining.
51	C	Silt with 10 percent clay, one 1/4-in.-diameter rounded gravel particle	Light gray		Y	Some iron staining.
59 - 60	C	Clay and silt with some 1/2-in.-diameter well-rounded gravel	Light gray			Saturated.
60 - 61	C	Silt and clay with (1 percent) 1/8-in.-diameter rounded gravel	Yellow brown			Firm, moist, some bedding and iron staining.
Total depth drilled is 61.0 ft						
(C-2-1)23ccb-1						
0	R	Silty topsoil	Brown			Slightly moist.
4	R	Silt and very fine sand	Pale brown	L	Y	
10 - 11	C	Silt and fine sand	Pale brown			Thin bedding with iron staining.
12						Water at 12 ft.
14.5	R	Silty, fine sand				Saturated.
19 - 21	C	Interbedded 1/2-in.-thick silty clay layers and 1/4-in.-thick iron-stained fine sand layers	Light brown-gray	M	Y	Sample breaks vertically along thin red organic deposits.
21 - 28						Harder drilling, water.
28 - 29	C	Iron-stained clay interbedded with a 1-in.-thick layer of brown clay	Gray brown	MH	Y	Thin dark reddish brown vertical organic deposit.
30 - 39	R	Sand lenses in clay				
39 - 41	C	Clay	Dark green-gray	M	Y	Varve-like layering and ostracods.
Total depth drilled is 41.0 ft						
(C-2-1)23dac-1						
0 - 9	R	Gravel and sand				
9 - 9.5	C	Fine sand with some clay	Olive gray	M		Saturated, no bedding.
9.6 - 10.7	C	Clean medium sand with some 1/8-in.-thick layers of fine sand	Light brown-gray		N	Some iron staining; well sorted, rounded silica sand; some mica.
10.7 - 11	C	50 percent clay, 50 percent medium sand	Pale brown		N	Iron streaks, bedding.
12 - 30	R	1- to 2-in.-diameter rounded gravel, some sand				Flattened and well sorted.
30	R	Silty sand and gravel				Poorly sorted.
31.5						Harder drilling.
35 - 38.5	R	1- to 2-in.-diameter gravel				Flattened.
43 - 79	R	Gravel, some sand				
79 - 83	R	Tight hard clay on auger and bit	Brown-light olive gray			Moist, convoluted bedding.
83	R	Clay	Black	H	Y	
84.5 - 85	C	Clay	Light gray	H	Y	
85	C	Coarse sand interbedded with 1/4-in.-thick iron stained sand layer	Pale red		N	Iron stain washes out.
Total depth drilled is 85.0 ft						
(C-2-1)34bbd-2						
0 - 5.5	R	Gravel, fill, and soil	Black			
5.5 - 9	R	Clay with some silt and gravel	Dark brown			Moist.

Table 3.—*Lithologic logs of selected monitoring wells drilled in 1990 and 1991*—Continued

Depth (ft)	Sample type	Lithology	Color	Tough-ness	HCl	Comments
(C-2-1)34bbd-2—Continued						
9 - 11	C	Silty, very fine sand	Brown	M	Y	No visible bedding, moist.
19 - 21	C	Fine sand	Brown		Y	No visible bedding, drier.
29	C	2-in.-diameter rounded quartzite clast plugged core barrel				Water at 28 ft, saturated.
31 - 39	R	Gravel				Hard drilling at 39 ft.
40	R	Hard clay				
41	R	1- to 2-in.-maximum diameter gravel				
Total depth drilled is 41.5 ft						
(C-2-1)36cdd-2						
0 - 1	R	Fine sand	Tan			Moist.
1 - 2	R	Clay	Dark brown			Moist.
2 - 3	R	Silt	Tan			Very moist.
5 - 8	R	Silt, no sand	Brown			Saturated.
8 - 10	C	Hard clay	Brown	H	Y	Water at 9 ft; some roots and iron staining; horizontal laminations but little silt interbedded with clay.
20 - 63	R	Clayey, silty, sandy returns	Gray			Saturated.
63 - 65	C	Silty clay with interbedded fine sand	Dark gray	H	Y	Moist, marshy smell.
65 - 73						No returns.
73 - 89	R	Coarse sand	Gray			Probably washed material.
Total depth drilled is 89.0 ft						
(C-2-1)36cdd-3						
0 - 3	R	Clayey silty topsoil	Dark gray-brown	L	Y	Moist.
3 - 28	R	Clayey silt	Brown	M	Y	Saturated.
28	R	Clay (50 percent) and medium sand (50 percent) on bit	Olive gray	M	Y	Hard, moist.
30 - 55	R	Sandy returns	Tan			Much water.
55 - 60	R	Sandy returns	Gray			More viscous consistency.
61 - 65						No returns.
65 - 83	R	Sandy, clayey returns	Gray			
83 - 84	R	Sandy returns	Gray			
84 - 89						No returns.
89 - 111	R	Sandy returns	Gray			
111 - 128	R	Clayey silt on bit at 128 ft	Light brown	ML	Y	Hard, slightly moist.
129 - 129.5	C	Silty fine sand	Brown			Hard.
Total depth drilled is 129.5 ft						
(C-2-2) 1bcd-2						
0 - 3	R	Sandy topsoil	Brown			
3 - 7	R	Coarse to fine sand	Light tan			Poorly sorted.
7.5 - 8	R	Fine clayey sand	Gray brown			Twigs in returns.
8 - 8.8	C	Clay	Yellow brown	H	Y	Interbedded with light gray lenses.
8.8 - 9.3	C	Fine to very fine sand	Yellow brown		Y	Root debris, no bedding.
9.3 - 10	C	Clay	Yellow brown	M		Root debris.
10 - 18	R	Moist clay	Yellow brown			Water at 18 ft.
18 - 19.5	C	Very fine silty sand	Gray brown		Y	
19.5 - 19.8	C	Silty clay	Light yellow-brown	L	N	
19.8 - 20	C	Medium to coarse sand	Brown		Y	
20 - 26	R	Medium to coarse sand	Brown			

Table 3.—*Lithologic logs of selected monitoring wells drilled in 1990 and 1991*—Continued

Depth (ft)	Sample type	Lithology	Color	Toughness	HCl	Comments
(C-2-2) 1bcd-2—Continued						
26 - 28	R	Very hard silty sand	Gray brown			
28 - 28.5	C	Hard silty sand with pebbles	Pale brown	H	Y	Possible semiconsolidated silt that was broken down into particles during coring.
Total depth drilled is 28.5 ft						
(C-3-1)12cdb-1						
1	R	Topsoil	Dark brown			
6	R	Silt and very fine sand	Light brown			
9 - 11	C	Medium to coarse, rounded quartz sand with mica				Well sorted, no bedding, saturated.
19 - 19.3	C	Clayey silt with thin layers of very fine sand	Gray			Saturated, finely bedded.
19.3 - 19.7	C	Fine to coarse sand	Gray			
19.7 - 21	C	Interbedded 1/4-in.-thick clay layers and fine to coarse sand	Yellow gray	L	N	
29 - 31	C	Medium to coarse sand, rounded quartz grains with mica (gold colored)	Dark gray		N	Well sorted, no bedding, saturated.
39 - 41	C	Very tight, hard clay	Dark gray	H		No bedding.
Total depth drilled is 41.0 ft						
(C-3-1)15ccb-1						
0 - 7	R	Very fine sand (10 percent) and silty clay	Light brown	L	Y	Forms balls in returns.
8 - 8.5	C	Very fine sand (10 percent) and silty clay	Pale yellow-brown		Y	Slightly moist.
8.5 - 9	C	Mostly clay, some sand				Iron staining in sand lenses.
9 - 10	C	Mostly clay	Dark yellow-brown			Graded to Light olive-gray color.
15	R	Silty clay	Gray orange			Saturated.
18 - 18.5	C	Fine sand and silty clay	Yellow gray			Slightly moist.
18.5 - 19	C	More silt and sand	Yellow orange			Oxidation zone, friable.
19	C	1/4-in.-thick layer of gray silt with 1/16- to 1/8-in.-diameter clear quartz clasts; 20 percent fine sand and 1/8-in.-thick layer of medium sand				
20	R		Green gray			Returns saturated.
24 - 28	R	Gravel				
28 - 30	R	Cobbles				Slow drilling.
30	R	Gravel				Slightly faster drilling.
33 - 37	C	Modium to coarse sand with 1/2- to 1 1/2-in.-diameter rounded quartzite clasts; 20 percent clay	Light brown with dark yellow-orange zones	M		Slightly moist; much oxidation on gravel clasts and caliche coating; no bedding.
37.5 - 45	R	Larger gravel				Harder drilling.
45	R	Smaller gravel, 1/2- to 1-in.-diameter rounded clasts				Easier drilling.
48 - 49	C	1/4- to 2-in.-diameter quartzite clasts (rounded) and 20 percent fine material and coarse sand	Dark yellow-orange		N	Core is disturbed, water at 48 ft.
55						Drilling harder but smoother.
58 - 60	C	Clay with some 1/4-in.-diameter rounded gravel	Yellow gray		Y	No bedding, slightly moist, very tight.
68 - 68.5	C	Clayey silt with some fine sand (possibly sloughed material)	Orange			Saturated.
68.5 - 70	C	Clayey silt	Gray brown		N	No bedding, hard, spotty oxidation, slightly moist.

Table 3.—*Lithologic logs of selected monitoring wells drilled in 1990 and 1991*—Continued

Depth (ft)	Sample type	Lithology	Color	Tough-ness	HCl	Comments
(C-3-1)15ccb-1—Continued						
78 - 79	C	Clayey silt with 1/16-in.-thick layers of silt that have oxidized	Gray brown		N	
79 - 80	C	10 percent fine sand and clayey silt			Y	Drier; black dendritic staining and orange iron staining.
87						Next day water level at 57 ft.
88 - 89.5	C	1/16- to 1/2-in.-diameter gravel and sandy clayey silt; some 1/4-in.-diameter decomposed gabbro clasts	Light brown	MH	N	Slightly moist, no bedding or sorting; no oxidation zones.
93	R	Gravel				
96	R	Sandy clay returns				Saturated.
Total depth drilled is 101.0 ft						
(C-4-1) 4aaa-3						
0 - 9	R	Silty topsoil	Yellow brown			Dry.
9 - 11	C	Silty soil with plant roots	Dark brown	M	Y	Bedding present in top 1/2 ft, slightly moist.
14	R	Clayey silt with 1-in.-diameter subrounded gravel	Dark brown			
18	R	1/4- to 1 1/2-in.-diameter gravel in clayey silt matrix				
19.5 - 19.8	C	Medium sand with thin clay lenses	Brown			Some iron staining, moist.
19.8 - 21.5	C	Mostly clay with 1/4-in.-diameter clasts of iron throughout	Yellow brown	MH	Y	Very hard, crumbles into angular blocks; zones of iron staining are composed of friable silty clay; dendritic (black) staining; no bedding; slightly moist.
25	R	Gravel				
28	R	Clay				
29.5	R	Clayey silt with some fine sand		H		Saturated.
30.5	R	Gravel				
33 - 34	R	Clayey silt				Hard drilling.
36	R	Clay, returns contain black crystallized basalt or diorite clasts				
36.5 - 38.5	C	Silt with very fine sand and zones of clay; some 1/4- to 1/2-in.-diameter gravel; some rounded clay-like particles	Yellow brown		Y	No iron staining, moist, some copper colored flakes.
40.5	R	Gravel				Moist.
43 - 46	R	Sandy silty gravel	Dark brown			
49						Water on pilot bit.
Total depth drilled is 49.0 ft						
(C-4-1) 4aaa-4						
0 - 3	R	Topsoil	Dark brown			Moist.
3 - 5	R	Clay and silt	Light brown			Dry, powdery.
5 - 20		Same material as above				
21	R	Clay	Brown			
25	R	Gravel				
25.5	R	Silty clay	Light brown			Saturated.
30	R	Gravel				
35	R	Clean 1/2- to 1-in.-diameter rounded to subrounded gravel				Hard drilling, well sorted.

Table 3.—*Lithologic logs of selected monitoring wells drilled in 1990 and 1991*—Continued

Depth (ft)	Sample type	Lithology	Color	Toughness	HCl	Comments
(C-4-1) 4aaa-4—Continued						
45	R	Clean rounded to subrounded 1/2- to 1 1/2-in.-diameter gravel				Dry.
45 - 46	R	Rounded 1/4- to 1/2-in.-diameter gravel with clay, silt				Dry.
50.5	C	Clayey silt with very fine to fine sand	Dark brown	L		No bedding, moist.
53 - 58	R	Gravel	Dark brown			Moist, water at 56 ft.
60	C	Very coarse sand with less than 10 percent 1/8- to 1/4-in.-diameter gravel	Brown gray		N	Sand contains some black pebbles, saturated.
65	C	Coarse sand and gravel with clay lenses; bottom 1 in. of core is brown silty clay				1-in. rounded gravel.
68 - 96	R	Interbedded gravel and sand				
96	R	Gravel				
103 - 104	C	Clay and 1/2- to 1- in. diameter gravel				Very hard drilling.
Total depth drilled is 104.0 ft						
(D-1-1)17dab-1						
0 - 200						Drilled September 1986 as a seismic-data access hole.
204	R	Shale, clay flakes	Red brown			
205.5	R	Clay flakes	Light brown-reddish brown			
206						Faster drilling.
207	R	Clay flakes				
216	R	5 percent 1/8- to 1/4-in.-diameter gravel, some clay flakes present	Light brown			
Total depth drilled is 217 ft						
(D-1-1)17dab-2						
0 - 4	R	Topsoil and gravel	Dark brown			
4 - 6	R	Coarse sand and clay with some gravel	Light brown			
6 - 8	R	Clay with gravel				
9 - 12	R	Silty clay	Yellow brown			
12 - 12.3	C	Silty clay with some 1/4-in.-diameter rounded shale clasts	Yellow brown	H	Y	Iron staining, roots, moist.
12.3 - 14	C	Clay with pyrite flakes	Yellow brown	H	Y	Hard, roots, ostracods, nodules, iron staining.
14 - 20	R	Silty clay	Light brown	H		Water at 20 ft.
23 - 23.3	C	Clay and silty clay with 5 percent medium-grained red-brown sand	Light olive-gray	M		Iron staining and pyrite flakes; mottled clay.
23.3 - 23.6	C	Coarse sand with fine gravel				Subangular grains, well graded, saturated.
23.6 - 23.8	C	1/8- to 1/4-in.-diameter gravel				Subangular and subrounded.
23.8 - 23.9	C	2-in.-diameter gravel				
23.9 - 24.4	C	1/4- to 1-in.-diameter subrounded gravel; shale and quartzite clasts				Poorly sorted.
24.4 - 24.6	C	2-in.-diameter subrounded gravel with silty clay matrix				
24.6 - 25	C	1-in.-diameter rounded clasts cemented with clay and sand			Y	2 1/2-in.-diameter angular quartzite clasts.
26 - 32.5	R	Clayey silt and fine sand	Red brown	M		
32.5 - 33.3	C	Silty medium sand with 5 percent 1/8- to 1/4-in.-diameter gravel; 1-in.-diameter tufa-like rounded clast	Red brown			Very moist, some iron staining.

Table 3.—*Lithologic logs of selected monitoring wells drilled in 1990 and 1991*—Continued

Depth (ft)	Sample type	Lithology	Color	Toughness	HCl	Comments
(D-1-1)17dab-2—Continued						
33.3 - 34.5	C	Clayey silt and sand, 30 percent tufa-like clasts	Red brown-brown gray		Y	Mottled, some iron staining in sand.
34.5	C	1-in.-diameter quartzite clast with 1/8- to 1/4-in.-diameter gravel in crumbly clay matrix	Light brown-gray			
42.5 - 44.5	C	Hard clay interbedded with thin silt lenses	Gray brown		Y	Iron staining, bedding, slightly moist.
49 - 51	R	Sandy clay				
52.5 - 52.6	C	Clay	Gray brown			
52.6 - 53.8	C	Clay and fine, well-sorted sand	Light brown-gray	H	Y	Interbedded.
53.8 - 54	C	Clay and silt				Very hard, some black dendritic material in silt.
54 - 54.5	C	Silty fine sand	Yellow brown		Y	Slightly moist, bedding, some iron staining.
54.5 - 62.5	R	Fine sand	Tan			
62.5 - 62.8	C	Clay	Gray brown	M	Y	Iron staining, some pyrite, very hard, slightly moist.
64.5	C	Clay and medium sand	Gray brown		Y	Interbedded, very hard, iron staining, white shell fragments.
65 - 67.5	R	Gravel with clay	Clay: gray			
67.5 - 68						Very hard drilling.
Total depth drilled is 68.5 ft						
(D-1-1)19dbc-2						
0	R	Topsoil				
2	R	Clay and gravel	Brown yellow			
9 - 9.8	C	Sticky clay with 1/2-in.-diameter gravel and medium sand, possible shell fragments	Dark red-brown	M	Y	No bedding.
9.8 - 10.4	C	Gravel in clay, less sand	Red brown			Gravel consists of spherical, calcareous material.
10.4 - 11	C	Stiff clay			Y	Bedding present.
19 - 21	C	Clay; top of core is dark gray-brown and bottom is dark gray mottled with red-yellow				Small roots and gravel, hard.
29 - 30.6	C	Clay	Dark gray	H	Y	
30.6 - 31	C	1/8-in.-thick clay layers interlayered with reddish brown very fine sand	Black		Y	Gives off hydrogen sulfide smell.
Total depth drilled is 31.0 ft						
(D-1-1)30dcb-1						
0	R	Topsoil	Brown			
2	R	Cobbles				
3	R	Clayey silt	Lighter brown			Slightly moist.
6	R	Silty clay	Darker brown			Moist.
8	R	Large 2-in.-diameter clay balls, 40 percent silt	Dark gray-brown			
9 - 10.5	C	1/4- to 1/2-in.-thick layers of gray olive clay and reddish brown clayey silt with flattened gravel		MH		Water at 10 ft, iron staining.
10.5 - 11		Clay with silt lenses	Light brown-gray olive		Y	1/8-in.-thick bedding.
11 - 19						Lost returns, wet.
19.5 - 20	C	Silty clay, mottled with gray and reddish brown silt zones	Brown	M	Y	Some rounded 1/2-in.-diameter gravel, slightly moist.

Table 3.—*Lithologic logs of selected monitoring wells drilled in 1990 and 1991*—Continued

Depth (ft)	Sample type	Lithology	Color	Tough-ness	HCl	Comments
(D-1-1)30dcb-1—Continued						
20 - 20.5	C	Siltier clay with 5 percent medium sand, some 1/8-in.-diameter Light gray tubes with no directional preference	Brown	L	Y	Iron staining, slightly moist.
20.5 - 21	C	1-in.-thick clay layers separated by 1/16- to 1/8-in.-thick reddish brown or olive clay lenses with silt	Dark gray	H	Y	"Marsh" odor, slightly moist.
21 - 29						Wet.
29 - 31	C	Clay; varve-like layering with silt	Black-dark gray	MH	Y	Hard; black layers very reactive with HCl.
39 - 41	C	Clay with horizontal 1/16-in.-thick layers of darker clay	Dark gray	H	Y	Slightly moist.
41	C	Rounded 1/8-in.-diameter sand and fine gravel; 1/4-in.-thick clay layer	Light gray			
49 - 49.5	C	Clay grading to mostly silt	Very dark gray	M	Y	
49.5 - 50	C	1-in.-thick clay layer and 1/8-in.-silt layers interbedded with clay layers	Dark gray			Some thin bedded varve-like layering.
50 - 51	C	Clay with a few thin silt intervals	Very dark gray	H		Horizontal bedding.
54	R	1/2- to 1-in.-diameter rounded gravel in clay matrix on bottom auger	Gray			
59 - 61	C	Silty clay	Dark red-gray	H	Y	Moist, soft.
62 - 69	R	Gravel				
Total depth drilled is 71.0 ft						
(D-2-1)16bba-3						
0 - 1	R	Gravel and rounded 4-in.-diameter cobbles				
1 - 2	R	Fine sandy silt with rounded 1/4-in.-diameter gravel	Light brown-gray			
2 - 3	R	Fine sandy silt	Dark gray-brown			
3 - 4	R	Gravel				
4 - 58	R	Gravel with silt and sand				Water at 7 ft.
58 - 85	R	Boulders and cobbles				Saturated.
85 - 88	R	Gravel; more sand, less boulders				
88 - 90	R	Gravel and large boulders				
Total depth drilled is 90.0 ft						
(D-2-1)17cda-2						
0 - 2	R	Topsoil with fine sand and silt	Dark brown			Encountered water.
2 - 8.5	R	Gravel and sand				
8.5 - 9	R	Up to 1-in.-diameter rounded gravel (30 percent), sand (60 percent), fines (10 percent)	Olive brown			Saturated.
13		Possibly clay, lost returns				
15	R	4-in.-diameter cobbles, rounded quartzite and rounded to subangular granite clasts				
17	R	1- to 2-in.-diameter rounded quartzite cobbles				
18.5	R	Coarse, rounded sand with some clay				
26.5	R	Very tight clay	Olive gray	H		
Total depth drilled is 28.5 ft						
(D-2-1)17cda-3						
0 - 1.5	R	Sand	Black			Saturated.
4.5 - 6.5	R	Gravel				
6.5 - 16.5	R	Gravel and cobbles				

Table 3.—*Lithologic logs of selected monitoring wells drilled in 1990 and 1991*—Continued

Depth (ft)	Sample type	Lithology	Color	Tough-ness	HCl	Comments
(D-2-1)17cda-3—Continued						
19.5 - 21.5	R	Clay				
21.5 - 23.5	C	10 percent very fine sand and 90 percent clay	Olive gray-dark brown	M	Y	
Total depth drilled is 23.5 ft						
(D-2-1)29acb-2						
0 - 1		Topsoil	Brown			
1 - 14	R	Gravel, 2-in.-diameter granite clasts				
14 - 15	R	Coarse sand and gravel with 4-in.-diameter cobbles	Brown			Some water.
15 - 17		Probably gravel				No returns, irregular drilling.
17	R	Clean coarse rounded sand with 1/8-in.-diameter gravel				Wet.
23	R	Coarse sand and gravel	Tan		N	Wet.
31 - 36		Probably gravel				Very hard drilling.
36 - 41	R	Clay and sand				Easier drilling.
41 - 46						Hard drilling.
46 - 47.5						Very hard drilling.
51 - 52	C	Very fine sandy silt with 1/4-in.-thick Light olive-gray clay layers	Light yellow-brown	L	Y	Some bedding, iron staining, hard, moist.
Total depth drilled is 52.0 ft						
(D-2-1)30dda-2						
0 - 3	R	Topsoil and gravel				Dry.
4 - 6	R	Sandy topsoil, rounded 2-in.-diameter quartz and granite clasts	Brown			Dry.
6	R	Medium to coarse sand	Tan			Dry; clear rounded quartz grains, 10 percent black biotite and lepidolite mica flakes.
15	R	Moist sand, but not saturated				
23	R	Silty clayey sand				Saturated.
23 - 25	C	Medium sand interbedded with 1- to 2-in.-thick clay layers with 1/8-in.-thick silty sand oxidized zones	Clay: light olive-gray			Sand zones show some oxidation.
25 - 26	C	Sand	Light olive-gray			Moist.
26 - 33	R					Easy drilling, soupy returns.
33 - 38	R					Saturated returns.
42 - 48						Hard drilling.
53 - 55.5	C	Clay, separates horizontally along thin silty clay layers (medium-Dark gray to gray black)	Dark gray	H	N	Hard, slightly moist; some black 1/16-in. flat crystals.
63.5 - 64.5	C	Sand with clay layers and some 1/8-in.-diameter rounded gravel				Wet, may be sloughed material.
64.5	C	Clay				
65	C	Fine to medium sand with 5 percent silt	Tan			Moist, some oxidation and bedding.
Total depth drilled is 65.0 ft						
(D-2-1)30dda-3						
0 - 5	R	Sandy topsoil				Slightly moist.
5 - 6	R	Topsoil with 2-in.-diameter gravel and sand				
6 - 15	R	Medium sand				Slightly moist.
15 - 23	R	Sand grades to silty, sandy clay				Wet at bottom.
Total depth drilled is 24.0 ft						

Table 3.—*Lithologic logs of selected monitoring wells drilled in 1990 and 1991*—Continued

Depth (ft)	Sample type	Lithology	Color	Toughness	HCl	Comments
(D-3-1)29ddd-1						
0	R	Topsoil	Black			
2.5	R	Clay				
9 - 11	R	Very coarse sand with feldspar and mica particles				Water at 9 ft.
14	R	Sand with gravel lenses				
15 - 40	R	Sand				
40	R	Clay				
43 - 44	C	Fine, well-sorted sand and some silt	Gray	M	Y	No bedding, abundant gold and black mica flakes. Black flakes are prevalent in zones about 3 in. long.
44 - 44.5	C	Very coarse sand and 1/4-in.-diameter gravel				Some decomposed yellow-brown particles that may be eroded siltstones with hard quartz and feldspar particles.
44.5 - 45.5	C	Sand with interbedded silty clay layers				1/4-in.-thick layer of mica flakes in fine sand at 45 ft.
45.5 - 47	C	Sand, possibly sloughed material		L		Saturated.
47 - 48	C	Well-sorted, fine sand	Gray	MH	Y	Alternating 1/6-in.-thick dark gray clay layers and 1/16-in.-thick silty sand layers in bottom 1 in. of core.
Total depth drilled is 48.0 ft						

Table 4.—*Water levels in selected wells*

Location: See page 3 for an explanation of the well-numbering system used in Utah.
Altitude of land surface is in feet above sea level. Surveyed altitudes are in feet and decimal fractions; altitudes interpolated from U.S. Geological Survey topographic maps are to the nearest foot. Water levels are in feet above (+) or below land surface.
Letters appearing after measurements: S, nearby well being pumped; T, recently pumped.

LOCATION (B-1-1)26cda-1
ALTITUDE 4,217.69 FEET
WELL DEPTH 19.5 FEET

AUG	19,	1982	10.30
SEP	14		9.87
OCT	01		6.21
NOV	16		9.03
	23		9.20
DEC	22		8.29
JAN	14,	1983	8.50
	17		8.58
FEB	02		7.54
MAR	07		7.41
	28		4.35
APR	12		6.55
MAY	05		8.14
	17		7.41
JUN	08		8.46
JUL	06		9.21
AUG	10		9.88
SEP	07		10.16
OCT	05		10.27
FEB	06,	1984	8.98
	22		8.69
	29		8.69
MAR	07		8.38
	14		4.49
	21		5.14
	28		4.20
APR	03		3.69
	10		6.24
	19		6.50
	26		6.99
MAY	10		6.54
	22		7.82
OCT	23		8.83
DEC	05		9.26
FEB	05,	1985	9.55
MAR	12		5.29
JAN	24,	1986	7.57
FEB	12		7.54
MAR	26		7.20
APR	29		7.09
MAY	09		3.62
	29		7.92
JUN	25		8.62
JUL	31		9.38
AUG	25		9.12
SEP	30		8.82

LOCATION (B-1-1)26cda-1—Continued

OCT	30,	1986	10.06
NOV	25		10.06
JAN	05,	1987	10.07
	27		9.92
FEB	12		9.49
MAR	30		8.68
MAY	03		8.44
JUL	01		7.99
	30		8.61
SEP	24		9.70
OCT	28		9.82
NOV	30		9.80
DEC	30		10.16
JAN	27,	1988	10.10
FEB	16		9.72
MAR	28		9.69
APR	27		9.25
MAY	31		7.96
JUN	28		7.98
JUL	27		7.90
AUG	30		8.36
SEP	29		9.93
NOV	01		9.10
	29		9.76
DEC	29		9.95
JAN	31,	1989	10.02
FEB	14		9.91
MAR	28		8.03
APR	25		8.58
MAY	30		8.44
JUN	27		7.59
JUL	24		6.89
AUG	28		8.85
SEP	26		9.43
OCT	25		10.07
DEC	01		10.05
	27		10.27
JAN	26,	1990	10.28
FEB	16		10.11
MAR	29		8.28
APR	30		8.96
MAY	09		9.11
	29		8.56
JUN	26		8.30
JUL	31		8.03
AUG	27		8.69
SEP	27		9.80

LOCATION (B-1-1)26cda-1—Continued

OCT	30,	1990	9.70
NOV	29		10.41
DEC	26		10.53
JAN	31,	1991	10.25
FEB	14		9.84
MAR	28		9.28
MAY	01		7.44
	29		8.23
JUN	26		8.35
JUL	30		7.33
AUG	28		9.17
SEP	30		9.43
OCT	30		8.37
DEC	02		8.39
	30		8.83
FEB	04,	1992	9.36
	19		7.65
MAR	27		8.79
APR	28		8.16
JUN	01		7.66
JUL	02		8.61
	30		7.48

LOCATION (B-1-2)19aca-1
ALTITUDE 4,211.62 FEET
WELL DEPTH 450 FEET

SEP	01,	1964	+11.35
	03		+11.20
FEB	11,	1965	+11.40
FEB	02,	1966	+12.20
SEP	06		+10.50
FEB	15,	1967	+10.70
SEP	13		+10.40
FEB	13,	1968	+10.80
SEP	17		+9.90
FEB	24,	1969	+11.30
SEP	03		+11.00
FEB	20,	1970	+11.20
FEB	24,	1971	+12.60
FEB	16,	1972	+11.90
FEB	22,	1973	+12.60
FEB	26,	1974	+13.00
FEB	18,	1975	+12.60
FEB	19,	1976	+12.20
FEB	16,	1977	+11.60
FEB	23,	1978	+11.50

Table 4.—*Water levels in selected wells*—Continued

LOCATION (B-1-2)19aca-1—Continued

FEB	23, 1979	+11.50
FEB	15, 1980	+11.10
FEB	14, 1981	+12.20
FEB	24, 1982	+11.50
FEB	14, 1983	+12.20
FEB	06, 1984	+13.50
AUG	30	+16.10
FEB	05, 1985	+14.70
FEB	10, 1986	+13.50
FEB	18, 1987	+14.00
FEB	18, 1988	+12.70
FEB	15, 1989	+12.60
FEB	22, 1990	+12.30
FEB	12, 1991	+11.60
JUL	31	+12.00
FEB	25, 1992	+12.92
MAR	02	+13.19

LOCATION (B-1-2)19aca-3
ALTITUDE 4,210.4 FEET
WELL DEPTH 23.1 FEET

JUL	16, 1991	2.67
	23	2.84
	31	2.96
AUG	05	3.03
	22	3.16
SEP	27	2.80
OCT	30	1.94
NOV	25	1.02
DEC	31	1.23
FEB	03, 1992	1.20
MAR	02	.91

LOCATION (B-1-2)22dad-1
ALTITUDE 4,215.6 FEET
WELL DEPTH 15.0 FEET

JUL	31, 1991	7.55
AUG	07	7.77
	22	8.03
SEP	23	7.01
OCT	30	6.45
NOV	25	5.72
DEC	31	5.72
FEB	03, 1992	5.31
MAR	03	3.49

LOCATION (B-1-2)28aab-1
ALTITUDE 4,220 FEET
WELL DEPTH 15.0 FEET

JUL	31, 1991	3.40
AUG	06	3.33

LOCATION (B-1-2)28aab-1—Continued

AUG	22, 1991	3.55
SEP	23	2.79
OCT	30	2.50
NOV	25	2.41
DEC	31	2.92
MAR	03, 1992	3.24

LOCATION (B-1-2)31aaa-1
ALTITUDE 4,215 FEET
WELL DEPTH 19.0 FEET

OCT	01, 1982	2.40
NOV	16	2.08
DEC	22	.00
JAN	14, 1983	1.24
FEB	02	.16
MAR	07	.00
APR	12	.00
MAY	05	1.03
	17	.38
JUN	09	2.45
	28	3.14
JUL	06	3.38
AUG	10	3.78
SEP	07	3.60
OCT	05	3.85
FEB	06, 1984	.44
	27	.10
MAR	07	+.09
	14	.00
	21	+.03
	28	.14
APR	03	+.03
	12	+.01
	17	.62
	26	.01
MAY	10	.69
	22	2.14
OCT	23	3.99
DEC	05	3.56
FEB	05, 1985	3.53
MAR	12	+.51
JAN	24, 1986	1.85
FEB	12	.53
MAR	26	.58
MAY	09	+.15
	29	1.98
JUN	25	3.17
JUL	31	3.92
AUG	25	4.16
SEP	30	4.01
OCT	30	3.89
NOV	25	3.89
JAN	05, 1987	3.94

LOCATION (B-1-2)31aaa-1—Continued

JAN	27, 1987	3.92
FEB	12	3.18
MAR	30	2.43
MAY	03	3.19
JUL	01	3.61
	31	3.94
AUG	28	4.17
SEP	24	4.45
OCT	28	4.77
NOV	30	4.85
DEC	30	4.94
JAN	27, 1988	4.89
FEB	16	4.65
MAR	28	4.36
APR	27	4.22
MAY	31	4.14
JUN	28	4.34
JUL	27	4.90
AUG	30	5.54
SEP	29	6.37
NOV	01	7.10
	29	7.51
DEC	29	7.85
JAN	31, 1989	7.72
MAR	28	3.82
APR	25	3.71
MAY	30	3.84
JUN	27	4.03
JUL	24	4.39
AUG	28	5.43
SEP	26	6.31
OCT	25	7.02
DEC	01	7.22
	27	7.23
JAN	26, 1990	7.10
FEB	16	7.01
MAR	29	6.17
APR	22	7.25
	30	5.66
MAY	29	5.54
JUN	26	5.59
JUL	31	6.18
AUG	27	7.13
SEP	27	8.55
OCT	30	9.16
NOV	29	9.41
DEC	26	9.55
JAN	31, 1991	9.62
FEB	14	8.58
MAR	28	7.85
MAY	01	5.50
	29	4.49
JUN	26	4.29

Table 4.—*Water levels in selected wells*—Continued

LOCATION (B-1-2)31aaa-1—Continued

JUL	30, 1991	4.59
AUG	28	5.11
SEP	30	5.27
OCT	30	5.00
DEC	02	4.57
	30	4.21
FEB	04, 1992	3.92
	19	2.75
MAR	27	2.56
APR	28	3.31
JUN	01	3.71
JUL	02	3.95
	30	4.23

LOCATION (B-1-2)32bcb-3
ALTITUDE 4,215 FEET
WELL DEPTH 24.7 FEET

JUL	30, 1991	3.60
AUG	06	3.43
	22	3.71
SEP	20	3.49
	27	3.46
OCT	30	3.21
NOV	25	2.34
DEC	31	1.81
FEB	03, 1992	1.66
MAR	03	1.04

LOCATION (B-1-2)36baa-1
ALTITUDE 4,223.60 FEET
WELL DEPTH 464 FEET

OCT	09, 1931	+13.90
NOV	12	+14.56
DEC	15	+13.97
JAN	09, 1932	+14.26
	22	+14.12
FEB	05	+14.84
MAR	07	+14.26
APR	11	+14.41
MAY	03	+13.97
JUN	09	+14.19
JUL	08	+14.12
AUG	12	+13.83
SEP	14	+13.68
OCT	06	+13.97
NOV	03	+13.54
DEC	13	+13.61
JAN	10, 1933	+13.47
MAR	20	+12.67
JUN	02, 1941	+14.35
JUL	16	+13.80
SEP	03	+14.30

LOCATION (B-1-2)36baa-1—Continued

OCT	15, 1941	+14.50
DEC	08	+14.70
APR	02, 1942	+14.70
DEC	24	+14.70
MAR	23, 1943	+14.55
DEC	07	+14.50
APR	08, 1944	+15.10
DEC	16	+15.50
MAR	21, 1945	+15.20
DEC	17	+15.10
DEC	11, 1946	+15.30
APR	01, 1947	+15.10
DEC	03	+15.00
MAR	23, 1948	+14.50
DEC	09	+15.30
MAR	18, 1949	+15.00
DEC	05	+14.10
APR	03, 1950	+14.60
DEC	13	+15.00
APR	02, 1951	+15.20
JAN	04, 1952	+14.20
APR	20, 1953	+13.80
MAR	29, 1955	+10.00
DEC	21, 1956	+11.10
FEB	20, 1957	+9.10
MAR	26	+10.10
APR	30	+9.70
JUN	11	+9.70
JUL	17	+7.80
AUG	20	+9.30
OCT	18	+9.50
DEC	10	+9.30
MAR	12, 1958	+9.80
JUN	05	+9.80
JUL	25	+9.40
OCT	27	+10.80
DEC	17	+11.60
MAR	10, 1959	+11.50
MAY	20	+10.60
JUL	29	+9.10
OCT	01	+9.50
JAN	14, 1960	+12.20
MAY	10	+11.70
SEP	05	+10.90
DEC	05	+11.40
MAR	20	+11.30
MAY	23, 1961	+10.80
DEC	13	+10.60
MAR	14, 1962	+10.40
DEC	11	+11.10
FEB	28, 1963	+10.70
AUG	05	+10.30
OCT	23	+10.55

LOCATION (B-1-2)36baa-1—Continued

FEB	26, 1964	+10.80
APR	13	+10.40
	27	+10.40
MAY	11	+10.40
JUN	11	+9.80
	23	+9.70
JUL	07	+10.50
	21	+10.70
AUG	04	+9.10
	19	+10.40
	31	+8.70
SEP	15	+10.72
OCT	01	+10.60
	27	+10.98
NOV	18	+10.79
DEC	03	+10.95
	23	+11.03
JAN	11, 1965	+11.00
	27	+11.10
FEB	17	+11.03
MAR	11	+10.80
APR	06	+10.70
	26	+10.50
MAY	11	+10.45
JUN	03	+10.25
	14	+10.47
	28	+10.12
JUL	13	+10.09
	27	+10.07
SEP	03	+10.38
	28	+10.78
OCT	14	+10.59
NOV	10	+12.60
DEC	13	+10.91
	28	+11.30
JAN	17, 1966	+10.56
FEB	04	+11.40
	23	+10.61
MAR	16	+10.30
APR	12	+10.44
APR	22	+10.18
MAY	16	+10.04
JUN	09	+9.90
	27	+9.66
JUL	14	+9.53
AUG	01	+9.49
	24	+9.58
SEP	06	+9.60
	29	+9.60
OCT	31	+9.50
NOV	30	+9.90
DEC	29	+10.18
JAN	31, 1967	+10.07

Table 4.—*Water levels in selected wells*—Continued

LOCATION (B-1-2)36baa-1—Continued

FEB	17,	1967	+10.01
APR	28		+9.90
JUN	02		+9.55
	29		+9.30
JUL	29		+8.95
SEP	05		+9.15
	29		+9.21
OCT	30		+9.12
DEC	05		+9.65
	29		+9.91
JAN	30,	1968	+9.98
FEB	12		+10.02
MAR	28		+10.01
APR	30		+10.13
MAY	29		+9.93
JUN	28		+9.91
JUL	31		+8.95
SEP	04		+9.88
	30		+10.03
OCT	30		+10.30
NOV	27		+11.40
DEC	30		+9.90
FEB	19,	1969	+10.30
SEP	02		+10.50
FEB	17,	1970	+10.44
SEP	16		+10.20
FEB	22,	1971	+10.60
SEP	08		+10.10
FEB	16,	1972	+10.70
SEP	19		+10.70
FEB	21,	1973	+11.50
SEP	11		+12.10
FEB	25,	1974	+11.50
SEP	03		+11.40
FEB	18,	1975	+10.70
SEP	08		+10.30
FEB	19,	1976	+9.90
SEP	21		+7.50
FEB	16,	1977	+9.00
SEP	14		+8.80
FEB	21,	1978	+9.10
SEP	19		+7.65
FEB	22,	1979	+8.64
SEP	18		+7.05
FEB	14,	1980	+7.54
SEP	24		+7.00
FEB	14,	1981	+7.55
SEP	04		+7.72
FEB	10,	1982	+7.64
SEP	14		+6.90
FEB	14,	1983	+8.60
SEP	15		+7.50
FEB	06,	1984	+8.95

LOCATION (B-1-2)36baa-1—Continued

MAR	07,	1984	+7.70
	21		+8.90
APR	03		+8.75
SEP	06		+8.30
FEB	05,	1985	+9.70
SEP	27		+9.30
FEB	10,	1986	+9.30
SEP	02		+8.70
FEB	18,	1987	+10.50
AUG	28		+6.85
FEB	16,	1988	+8.34
SEP	19		+6.57
FEB	14,	1989	+7.70
SEP	07		+6.30
FEB	22,	1990	+8.20
AUG	24		+6.30
FEB	12,	1991	+6.95
JUL	30		+6.7
SEP	20		+8.63
FEB	13,	1992	+9.72
MAR	02		+10.08

LOCATION (B-1-2)36baa-2
ALTITUDE 4,223.6 FEET
WELL DEPTH 83.0 FEET

JUL	11,	1991	3.81
	15		3.83
	30		4.00
AUG	22		4.14
	29		4.14
SEP	27		3.86
OCT	30		3.76
NOV	25		3.50
DEC	31		3.39
FEB	03,	1992	3.26
MAR	02		2.67

LOCATION (B-1-2)36baa-3
ALTITUDE 4,223.8 FEET
WELL DEPTH 19.0 FEET

JUL	11,	1991	5.92
	30		6.21
AUG	22		6.20
	29		6.18
SEP	27		5.47
OCT	30		5.05
NOV	25		4.61
DEC	31		4.43
FEB	03,	1992	4.15
MAR	02		2.88

LOCATION (C-1-1)15cad-2
ALTITUDE 4,232.6 FEET
WELL DEPTH 40.0 FEET

OCT	15,	1990	4.47
DEC	04		4.11
	06		4.19
JAN	10,	1991	4.36
FEB	26		3.88
MAR	28		3.92
APR	30		3.21
MAY	29		2.69
JUN	27		2.70
JUL	24		3.12
AUG	21		3.13
SEP	25		2.64
NOV	25		2.66
DEC	31		2.96
FEB	04,	1992	3.45

LOCATION (C-1-1)15cad-3
ALTITUDE 4,232.4 FEET
WELL DEPTH 16.0 FEET

JUN	27,	1991	3.47
JUL	26		3.97
AUG	21		3.74
SEP	03		3.49
	25		3.24
NOV	25		3.06
DEC	31		3.83
FEB	04,	1992	4.26

LOCATION (C-1-1)18bda-1
ALTITUDE 4,237 FEET
WELL DEPTH 45.0 FEET

OCT	22,	1990	9.86
DEC	06		9.20
JAN	09,	1991	8.99
FEB	27		8.39
MAR	28		8.22
APR	30		7.87
MAY	17		7.57
	29		7.53
JUN	28		7.65
JUL	29		8.18
AUG	21		8.42
SEP	25		8.15
OCT	29		8.05
NOV	25		7.63
DEC	30		7.26
FEB	03,	1992	7.19

Table 4.—*Water levels in selected wells*—Continued

LOCATION (C-1-1)23bcd-2
ALTITUDE 4,230 FEET
WELL DEPTH 66.1 FEET

SEP	17,	1990	5.83
	20		5.93
OCT	30		4.53
NOV	08		5.00
	09		5.50
	16		5.14
DEC	06		3.71
JAN	10,	1991	2.81
	18		2.55
FEB	26		1.75
MAR	28		1.32
APR	30		.80
MAY	29		.41
JUL	10		.89
	29		1.36
AUG	21		1.78
SEP	25		1.68
OCT	29		1.25
NOV	25		.81
DEC	30		.45
FEB	03,	1992	.41
MAR	06		.02

LOCATION (C-1-1)33dbc-1
ALTITUDE 4,263 FEET
WELL DEPTH 103 FEET

FEB	10,	1982	9.54
SEP	13		9.90
NOV	10		8.10
FEB	09,	1983	8.48
MAR	07		9.49
MAY	06		8.47
JUN	03		8.56
JUL	07		9.16
AUG	11		9.36
SEP	08		8.42
OCT	07		8.04
FEB	09,	1984	8.38
	22		8.45
	27		8.93
MAR	07		8.81
	14		8.57
	21		8.45
	28		8.77
FEB	11,	1985	9.64
FEB	14,	1986	10.97
FEB	12,	1987	10.37
SEP	26,	1988	15.59
FEB	17,	1989	13.19
SEP	08		19.40
FEB	16,	1990	14.26
APR	30		13.78

LOCATION (C-1-1)33dbc-1—
Continued

SEP	07,	1990	18.96
FEB	14,	1991	13.15
SEP	20		13.82
FEB	13,	1992	10.54

LOCATION (C-1-1)33ddd-2
ALTITUDE 4,270 FEET
WELL DEPTH 51.5 FEET

OCT	22,	1990	11.94
DEC	06		11.90
JAN	10,	1991	11.91
	18		11.80
	25		11.34
FEB	26		11.53
MAR	28		11.54
APR	30		11.23
MAY	29		11.07
JUL	10		10.49
	29		10.65
AUG	21		10.84
SEP	25		11.22
OCT	29		11.27
NOV	25		11.14
DEC	30		11.18
FEB	03,	1992	11.25
MAR	06		11.14

LOCATION (C-1-1)35ddd-5
ALTITUDE 4,240 FEET
WELL DEPTH 213 FEET

SEP	11,	1990	4.59
DEC	13		2.06
JAN	10,	1991	1.29
FEB	26		.09
MAR	28		+.42
APR	30		+.73
MAY	13		+.90
	29		+1.09
JUN	28		+1.34
JUL	29		+.47
AUG	23		+.23
SEP	25		4.02 T
OCT	29		1.32
NOV	25		.09
DEC	30		+1.11
FEB	04,	1992	+1.65

LOCATION (C-1-2)14cdd-2
ALTITUDE 4,233 FEET
WELL DEPTH 49.5 FEET

JUN	28,	1991	.45
JUL	30		.86
AUG	19		.88
	22		.84
SEP	19		.11
	27		.14
OCT	30		+.14
NOV	25		+.51
DEC	31		+.61
FEB	03,	1992	+.59
MAR	03		+.93

LOCATION (C-1-2)14cdd-3
ALTITUDE 4,233 FEET
WELL DEPTH 17.7 FEET

JUN	28,	1991	3.62
JUL	30		4.43
AUG	19		4.62
	22		4.64
SEP	27		4.18
OCT	30		3.79
NOV	25		3.41
DEC	31		3.57
FEB	03,	1992	3.66
MAR	03		3.13

LOCATION (C-2-1)13abc-1
ALTITUDE 4,315 FEET
WELL DEPTH 56.5 FEET

DEC	06,	1990	21.24
JAN	10,	1991	21.27
FEB	26		21.02
MAR	28		21.17
APR	30		20.68
MAY	16		20.21
	29		20.30
JUN	28		21.30
JUL	30		22.06
AUG	23		21.86
SEP	27		21.46
OCT	30		20.98
NOV	27		20.19
DEC	30		20.30
FEB	04,	1992	20.55

LOCATION (C-2-1)13dad-1
ALTITUDE 4,332.38 FEET
WELL DEPTH 35.0 FEET

OCT	27,	1981	15.36
NOV	25		15.40

Table 4.—*Water levels in selected wells*—Continued

LOCATION (C-2-1)13dad-1—Continued

DEC	30,	1981	15.48
JAN	28,	1982	15.43
FEB	19		15.55
MAR	29		15.57
APR	29		15.32
MAY	27		15.23
JUN	30		15.57
JUL	29		15.63
AUG	27		15.61
SEP	29		14.81
OCT	28		13.55
NOV	29		13.90
DEC	29		14.09
JAN	31,	1983	14.44
FEB	09		14.42
MAR	30		14.18
APR	28		13.88
JUN	29		14.29
JUL	29		14.36
AUG	30		13.85
SEP	28		14.10
OCT	28		14.11
NOV	30		13.89
DEC	29		13.58
FEB	14,	1984	14.10
MAY	02		12.76
	30		13.39
JUN	28		13.55
JUL	24		13.76
SEP	28		14.06
OCT	29		13.58
DEC	27		13.76
MAY	31,	1985	13.99
JUL	01		14.00
	26		14.43
SEP	25		14.95
OCT	31		14.82
NOV	25		14.54
DEC	30		14.75
JAN	24,	1986	14.85
FEB	12		14.83
MAR	26		14.30
APR	29		13.32
MAY	29		13.28
JUN	25		14.04
JUL	09		13.99
AUG	25		14.14
SEP	30		14.12
DEC	29		15.12
JAN	27,	1987	15.24
FEB	12		15.29
MAR	30		15.11
MAY	03		15.81
MAY	29,	1987	15.88
JUL	01		16.31
	30		16.56
AUG	31		18.72
SEP	24		16.64
OCT	28		16.36
NOV	30		16.27
DEC	30		16.45
JAN	27,	1988	16.38
FEB	22		16.48
MAR	28		16.50
APR	27		16.65
MAY	31		16.59
JUN	28		17.02
JUL	27		17.42
AUG	30		17.60
SEP	29		17.55
NOV	01		17.72
	29		17.18
DEC	29		17.24
JAN	30,	1989	17.31
FEB	14		17.26
MAR	28		16.78
APR	25		17.07
MAY	30		17.09
JUN	27		16.88
JUL	24		17.42
AUG	28		17.94
SEP	26		18.05
OCT	24		18.05
DEC	01		17.49
	27		17.53
JAN	26,	1990	17.77
FEB	16		17.69
MAR	28		17.61
APR	30		17.51
MAY	29		17.73
JUN	26		17.91
JUL	31		18.49
AUG	27		18.57
SEP	27		18.41
OCT	30		18.21
NOV	29		17.79
DEC	26		17.80
JAN	28,	1991	17.81
FEB	14		17.88
MAR	28		18.06
APR	30		17.83
MAY	29		17.47
JUN	26		17.75
JUL	30		18.33
AUG	28		18.31
SEP	30		17.99
OCT	30,	1991	18.01
DEC	02		17.02
	30		17.21
FEB	04,	1992	17.59
	19		17.56
MAR	27		17.41
APR	28		17.70
JUN	01		17.97
JUL	02		18.49
	30		18.51

LOCATION (C-2-1)13dad-2
ALTITUDE 4,332.39 FEET
WELL DEPTH 175 FEET

OCT	14,	1981	21.22
	27		21.02
NOV	25		20.55
DEC	30		21.10
FEB	19,	1982	21.31
MAR	29		21.35
APR	29		21.58
JUL	29		20.86
AUG	27		21.80
SEP	29		19.81
OCT	28		18.89
NOV	29		20.31
DEC	29		19.36
JAN	31,	1983	19.70
FEB	09		19.76
MAR	30		19.66
APR	28		19.32
JUN	29		19.94
AUG	30		18.76
SEP	28		19.07
OCT	28		18.98
NOV	30		18.86
FEB	15,	1984	19.05
MAY	02		17.93
JUN	28		18.87
JUL	24		18.61
AUG	29		18.70
SEP	29		18.89
OCT	29		18.44
NOV	28		18.60
DEC	27		18.77
FEB	08,	1985	19.06
MAR	22		18.80
MAY	31		19.26
JUL	26		19.74
AUG	26		20.90
SEP	25		19.75
OCT	31		19.62
NOV	25		19.60

Table 4.—*Water levels in selected wells*—Continued

LOCATION (C-2-1)13dad-2—Continued

DEC	30,	1985	19.64
JAN	24,	1986	19.82
FEB	12		19.90
MAR	26		19.70
APR	29		18.70
MAY	29		18.99
JUN	25		19.74
JUL	29		18.80
AUG	25		18.83
SEP	30		18.87
DEC	29		19.70
JAN	27,	1987	19.94
FEB	12		20.00
MAR	30		20.29
MAY	03		21.29
JUL	01		22.51
SEP	24		22.32
OCT	28		21.97
NOV	30		22.16
DEC	30		22.07
JAN	27,	1988	22.19
FEB	22		22.37
MAR	28		22.65
APR	27		23.05
MAY	31		23.51
JUN	28		24.53
JUL	27		25.21
SEP	29		24.68
NOV	01		24.91
	29		24.20
DEC	29		24.23
JAN	30,	1989	24.28
FEB	14		24.19
MAR	28		24.14
APR	25		24.75
JUN	27		24.47
JUL	24		25.82
SEP	26		25.72
OCT	24		25.67
DEC	01		24.79
	27		24.73
JAN	26,	1990	24.88
FEB	16		25.03
MAR	28		25.14
APR	30		25.40
MAY	29		26.27
JUL	31		27.73
AUG	27		27.82
SEP	27		27.29
OCT	30		26.60
NOV	29		25.91
DEC	26		25.84
JAN	28,	1991	25.76

LOCATION (C-2-1)13dad-2—Continued

FEB	14,	1991	25.94
MAR	28		26.27
APR	30		26.26
MAY	29		26.00
JUN	26		27.06.
JUL	30		28.11
AUG	28		27.48
SEP	30		26.90
OCT	30		26.46
DEC	02		25.65
	30		25.38
FEB	04,	1992	25.40
	19		25.32
MAR	27		25.18
APR	28		26.13
JUN	01		26.65

LOCATION (C-2-1)20aad-2
ALTITUDE 4,514 FEET
WELL DEPTH 61.0 FEET

OCT	29,	1990	42.75
DEC	06		42.10
JAN	09,	1991	41.75
FEB	27		42.24
MAR	28		43.30
APR	30		43.96
MAY	29		44.18
JUL	10		43.37
	29		41.22
AUG	21		35.43
SEP	25		27.24
OCT	29		26.96
NOV	26		27.87
DEC	30		29.84
FEB	03,	1992	33.82
MAR	04		36.35

LOCATION (C-2-1)23ccb-1
ALTITUDE 4,350 FEET
WELL DEPTH 41.0 FEET

OCT	23,	1990	10.07
DEC	06		11.22
JAN	09,	1991	12.00
FEB	11		12.68
MAR	28		13.12
APR	30		13.45
MAY	16		13.55
	29		13.63
JUN	28		12.23
JUL	30		9.27
AUG	21		8.96
SEP	25		10.74

LOCATION (C-2-1)23ccb-1—Continued

OCT	29,	1991	11.14
NOV	26		11.42
DEC	30		12.08
FEB	03,	1992	12.85

LOCATION (C-2-1)23dac-1
ALTITUDE 4,280 FEET
WELL DEPTH 85.0 FEET

SEP	19,	1990	9.04
	20		8.31
OCT	29		6.28
DEC	06		5.55
JAN	09,	1991	5.48
	18		5.35
	25		5.42
FEB	01		5.46
MAR	28		5.86
APR	30		5.28
MAY	29		5.11
JUN	28		8.50 S
JUL	29		8.59
AUG	21		9.68
SEP	25		6.24
OCT	29		5.52
NOV	21		5.24
	26		5.18
DEC	30		6.02
FEB	03,	1992	6.32
MAR	05		6.02

LOCATION (C-2-1)34bbd-2
ALTITUDE 4,384 FEET
WELL DEPTH 41.5 FEET

OCT	13,	1990	22.08
DEC	06		23.67
JAN	09,	1991	24.60
FEB	27		25.74
MAR	28		26.42
APR	30		26.95
MAY	17		27.07
	29		26.79
JUN	28		24.67
JUL	29		21.98
AUG	21		21.51
SEP	25		22.13
OCT	29		22.48
NOV	27		23.34
DEC	30		24.18
FEB	03,	1992	25.01

Table 4.—*Water levels in selected wells*—Continued

LOCATION (C-2-1)36cdd-2
ALTITUDE 4,359 FEET
WELL DEPTH 62.0 FEET

SEP	10,	1990	37.60
NOV	06		36.57
	14		37.56
DEC	13		37.12
JAN	09,	1991	37.58
	25		37.68
	30		37.64
FEB	01		37.83
	11		37.52
	26		37.90
MAR	28		38.43
APR	30		37.83
MAY	29		37.64
JUL	10		38.86
	29		39.28
AUG	21		38.93
SEP	25		38.77
OCT	29		38.94
NOV	27		38.55
DEC	30		38.66
FEB	03,	1992	39.21

LOCATION (C-2-1)36cdd-3
ALTITUDE 4,359 FEET
WELL DEPTH 129.5 FEET

NOV	06,	1990	64.49
DEC	13		63.03
JAN	09,	1991	63.03
	25		62.99
	30		63.13
FEB	01		63.13
	11		63.09
	26		63.36
MAR	28		64.09
APR	30		63.49
MAY	29		63.69
JUL	08		70.37
	10		69.24
	29		70.48
SEP	04		69.49
	05		69.99
	25		68.56
OCT	29		64.74
NOV	27		63.24
DEC	30		63.34
FEB	03,	1992	63.44

LOCATION (C-2-2) 1bcd-2
ALTITUDE 4,496 FEET
WELL DEPTH 28.0 FEET

OCT	22,	1990	8.37
DEC	06		8.18
JAN	09,	1991	8.04
FEB	27		7.69
MAR	28		7.16
APR	30		6.91
MAY	17		6.37
	29		5.75
JUN	28		5.69
JUL	29		6.73
AUG	21		7.41
SEP	25		6.36
OCT	29		6.92
NOV	25		6.94
DEC	30		6.94
FEB	03,	1992	7.19

LOCATION (C-3-1) 1cab-2
ALTITUDE 4,361.77 FEET
WELL DEPTH 800 FEET

FEB	18,	1970	41.00
SEP	16		44.70
FEB	18,	1971	40.93
SEP	09		44.07
FEB	14,	1972	40.63
SEP	20		46.41
FEB	20,	1973	41.77
SEP	07		46.76
FEB	14,	1974	41.91
SEP	04		49.00
FEB	18,	1975	42.74
SEP	08		48.70
FEB	18,	1976	42.91
SEP	20		47.59
FEB	17,	1977	44.57
SEP	09		49.26
FEB	23,	1978	44.53
SEP	13		49.69
FEB	23,	1979	43.89
SEP	18		51.87
FEB	13,	1980	46.04
FEB	11,	1982	53.25
FEB	11,	1983	44.54
FEB	09,	1984	42.37
FEB	06,	1985	43.80
FEB	11,	1986	43.80
SEP	04		51.10
FEB	19,	1987	47.30
SEP	07		55.38
FEB	19,	1988	48.77
FEB	17,	1989	49.50
SEP	08		57.00

LOCATION (C-3-1) 1cab-2—Continued

FEB	15,	1990	50.96
AUG	22		56.76
FEB	15,	1991	50.38
SEP	20		55.34
FEB	14,	1992	50.52

LOCATION (C-3-1)1dca-1
ALTITUDE 4,388 FEET
WELL DEPTH 165 FEET

SEP	30,	1981	60.55
FEB	11,	1982	54.63
FEB	11,	1983	52.87
FEB	07,	1984	50.23
FEB	05,	1985	49.33
FEB	11,	1986	49.08
FEB	19,	1987	50.21
FEB	09,	1988	54.99
FEB	17,	1989	58.15
FEB	15,	1990	61.05
FEB	15,	1991	61.69
FEB	14,	1992	62.78

LOCATION (C-3-1)12cdb-1
ALTITUDE 4,358 FEET
WELL DEPTH 41.0 FEET

NOV	13,	1990	10.33
DEC	13		9.55
JAN	09,	1991	9.41
FEB	27		9.57
MAR	28		9.80
APR	30		9.59
MAY	29		8.81
JUN	04		8.59
	28		8.59
JUL	29		8.10
AUG	21		8.82
SEP	25		8.87
OCT	29		9.04
NOV	27		8.32
DEC	30		9.79
FEB	04,	1992	10.04

LOCATION (C-4-1)4aaa-3
ALTITUDE 4,478 FEET
WELL DEPTH 49.0 FEET

NOV	13,	1990	40.59
DEC	13		43.12
JAN	09,	1991	45.44
FEB	27		48.32
MAR	28		48.34
APR	30		47.44

Table 4.—*Water levels in selected wells*—Continued

LOCATION (C-4-1)4aaa-3—Continued

MAY	29, 1991	44.28
JUN	25	44.46
JUL	02	44.52
	29	42.03
AUG	21	40.08
SEP	25	40.44
OCT	29	40.45
NOV	27	42.53
DEC	30	45.10
FEB	04, 1992	47.92

LOCATION (C-4-1) 4aaa-4
ALTITUDE 4,480 FEET
WELL DEPTH 104.0 FEET

JUL	02, 1991	52.49
	29	50.01
AUG	21	45.65
SEP	03	43.12
	25	41.49
OCT	29	39.30
NOV	27	41.18
DEC	30	43.75
FEB	04, 1992	47.95
MAR	05	50.46

LOCATION (D-1-1)17dab-1
ALTITUDE 4,390 FEET
WELL DEPTH 215 FEET

SEP	11, 1990	26.23
OCT	16	27.05
NOV	14	29.90
DEC	13	27.59
JAN	10, 1991	25.62
FEB	27	22.58
MAR	28	21.10
APR	30	20.43
MAY	29	20.66
JUN	11	20.77
JUL	10	21.24
	30	21.63
AUG	23	22.13
SEP	04	22.33
	27	52.90
OCT	30	45.60
NOV	27	41.03

LOCATION (D-1-1)17dab-2
ALTITUDE 4,390 FEET
WELL DEPTH 68.5 FEET

SEP	11, 1990	32.42
OCT	16	28.05

LOCATION (D-1-1)17dab-2—Continued

NOV	14, 1990	24.57
DEC	13	22.30
JAN	10, 1991	20.90
FEB	27	19.04
MAR	28	18.38
APR	30	19.72
MAY	29	20.37
JUN	11	20.63
JUL	10	24.89
	30	28.09
AUG	23	28.77
SEP	05	27.92
	27	26.31
OCT	30	24.88
NOV	27	22.10
DEC	30	20.19
FEB	04, 1992	18.81

LOCATION (D-1-1)19dbc-2
ALTITUDE 4,262 FEET
WELL DEPTH 31.0 FEET

OCT	15, 1990	9.73
DEC	13	9.05
JAN	10, 1991	8.89
	25	8.65
	30	8.67
FEB	27	8.29
MAR	28	8.34
APR	30	7.56
MAY	29	7.98
JUN	28	8.39 S
JUL	30	8.93
AUG	23	9.16
SEP	27	9.20
OCT	30	8.67
NOV	27	8.50
DEC	30	8.63
JAN	29, 1992	8.62
FEB	21	8.27

LOCATION (D-1-1)30cda-10
ALTITUDE 4,265.57 FEET
WELL DEPTH 855 FEET

OCT	26, 1956	6.97
FEB	18, 1957	5.90
FEB	25, 1964	35.72
SEP	03	57.16
FEB	16, 1965	23.98
APR	07	20.50
APR	26	22.70
MAY	12	21.86
JUN	08	28.25

LOCATION (D-1-1)30cda-10—Continued

JUN	25, 1965	33.99
JUL	09	37.67
	27	42.29
AUG	10	45.63
SEP	02	44.73
	17	38.06
OCT	01	33.23
	15	30.37
	29	27.42
NOV	23	24.22
DEC	10	21.63
JAN	14, 1966	17.23
FEB	02	16.23
	17	15.92
MAR	04	16.10
	22	16.47
APR	06	16.15
	19	22.49
MAY	02	21.70
JUN	08	11.11
	28	12.04
JUL	11	12.37
AUG	24	11.08
SEP	08	11.24
	27	10.85
OCT	07	10.60
	28	8.71
NOV	29	6.61
DEC	29	6.23
JAN	30, 1967	4.91
FEB	27	4.59
MAR	31	4.02
APR	17	4.11
	27	3.99
MAY	31	5.56
SEP	29	11.61
OCT	30	8.22
DEC	12	6.92
	29	5.06
JAN	26, 1968	5.04
FEB	26	4.72
MAR	27	4.15
APR	29	4.24
MAY	27	5.15
JUN	29	5.31
JUL	30	5.68
SEP	04	5.69
OCT	01	5.98
	30	6.37
NOV	26	3.81
DEC	27	2.27
FEB	18, 1969	1.89
FEB	17, 1970	1.30

Table 4.—*Water levels in selected wells*—Continued

LOCATION (D-1-1)30cda-10—Continued

SEP	16, 1970	5.66
FEB	16, 1971	.64
SEP	09	5.45
FEB	14, 1972	.63
SEP	18	5.55
FEB	20, 1973	.29
SEP	07	12.70
FEB	19, 1974	7.39
SEP	03	24.73
FEB	18, 1975	5.03
SEP	08	24.31
FEB	19, 1976	3.45
SEP	20	20.19
FEB	16, 1977	10.14
SEP	09	17.31
FEB	22, 1978	2.57
SEP	14	19.07
FEB	22, 1979	3.73
SEP	26	16.65
SEP	19, 1980	13.49
FEB	19, 1981	6.28
SEP	02	15.26
FEB	24, 1982	.12
SEP	13	5.65
SEP	16, 1983	4.43
SEP	10, 1984	5.83
SEP	27, 1985	6.07
FEB	12, 1986	7.03
SEP	03	14.06
FEB	12, 1987	4.27
SEP	08	21.53
FEB	19, 1988	8.43
SEP	30	20.19
FEB	17, 1989	8.91
SEP	08	35.59
FEB	16, 1990	4.84
SEP	07	34.57
FEB	13, 1991	.65
SEP	24	11.33
FEB	12, 1992	+.40

LOCATION (D-1-1)30dcb-1
ALTITUDE 4,262 FEET
WELL DEPTH 71.0 FEET

OCT	16, 1990	5.00
DEC	13	2.26
JAN	10, 1991	1.86
FEB	27	1.05
MAR	28	.64
APR	30	.09
MAY	29	+.10
JUN	04	+.28
	11	.16

LOCATION (D-1-1)30dcb-1—Continued

JUN	28, 1991	1.69
JUL	30	2.81
AUG	23	2.88
SEP	24	1.95
OCT	30	1.49
NOV	27	.85
DEC	30	.48
FEB	04, 1992	.28
MAR	04	.14

LOCATION (D-2-1)16bba-3
ALTITUDE 4,351 FEET
WELL DEPTH 90.0 FEET

SEP	19, 1990	23.09
NOV	06	22.10
DEC	13	21.38
JAN	10, 1991	21.53
	25	21.46
FEB	22	22.58
MAR	28	23.32
APR	30	22.85
MAY	29	22.89
JUL	10	24.82 S
	30	25.35
AUG	23	25.51
SEP	27	24.92
OCT	30	24.24
NOV	27	22.80
DEC	30	21.70
FEB	04, 1992	21.34
MAR	05	21.01

LOCATION (D-2-1)17cda-2
ALTITUDE 4,360 FEET
WELL DEPTH 28.5 FEET

SEP	19, 1990	2.76
	21	2.91
OCT	30	3.06
NOV	16	3.12
DEC	13	3.59
JAN	10, 1991	4.05
FEB	20	4.10
MAR	28	4.58
APR	30	4.16
MAY	29	2.41
JUN	04	2.05
JUL	10	2.54
	29	2.51
AUG	23	2.65
SEP	25	2.65
OCT	30	2.70
NOV	27	2.82

LOCATION (D-2-1)17cda-2—Continued

DEC	30, 1991	3.35
FEB	04, 1992	3.99
MAR	04	3.63

LOCATION (D-2-1)17cda-3
ALTITUDE 4,360 FEET
WELL DEPTH 23.5 FEET

SEP	19, 1990	2.68
	21	2.83
OCT	30	2.97
NOV	16	3.06
DEC	13	3.52
JAN	10, 1991	3.98
FEB	20	4.04
MAR	28	4.53
APR	30	4.10
MAY	29	2.36
JUN	04	2.00
JUL	10	2.44
	29	2.41
AUG	23	2.56
SEP	25	2.55
OCT	30	2.62
NOV	27	2.75
DEC	30	3.20
FEB	04, 1992	3.91
MAR	04	3.57

LOCATION (D-2-1)29acb-2
ALTITUDE 4,467 FEET
WELL DEPTH 52.0 FEET

SEP	14, 1990	21.93
	17	21.80
	21	22.00
OCT	30	22.12
NOV	16	22.52
DEC	13	22.43
JAN	09, 1991	22.96
	18	23.16
FEB	27	23.40
MAR	28	24.23
APR	30	24.10
MAY	29	23.55
JUN	28	22.99
JUL	29	22.43
AUG	23	22.21
SEP	25	22.04
OCT	29	21.94
NOV	26	22.32
DEC	30	22.35
FEB	04, 1992	23.18
	14	23.01
MAR	05	23.10

Table 4.—*Water levels in selected wells*—Continued

LOCATION (D-2-1)30dda-2
ALTITUDE 4,453 FEET
WELL DEPTH 65.0 FEET

JUL	29, 1991	51.94
AUG	23	51.77
SEP	24	52.25
OCT	29	52.12
NOV	26	52.44
DEC	30	52.51
FEB	04, 1992	53.00
	19	52.61

LOCATION (D-2-1)30dda-3
ALTITUDE 4,453 FEET
WELL DEPTH 21.4 FEET

JUL	29, 1991	11.65
AUG	23	11.27
AUG	30	11.19
SEP	24	11.47
OCT	29	12.18
NOV	26	12.85
DEC	30	13.75
FEB	04, 1992	14.47
	19	14.58

LOCATION (D-3-1)29ddd-1
ALTITUDE 4,524 FEET
WELL DEPTH 48.0 FEET

NOV	13, 1990	6.40
DEC	13	6.30
JAN	09, 1991	6.22
FEB	27	5.97
MAR	28	6.38
APR	30	5.96
MAY	29	5.51
JUN	11	5.66
JUL	10	5.28
	29	5.86
AUG	21	5.58
SEP	25	5.17
OCT	29	5.77
NOV	27	5.25
DEC	30	5.48
FEB	04, 1992	5.82

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Table 5.—*Chemical analyses of inorganic*

[Analyses made by the Utah State Health Laboratory unless otherwise noted; mg/L,

Location: See page 3 for an explanation of the well-numbering system used in Utah.

Water temperature: °C, degrees Celsius. Measured onsite by U.S. Geological Survey personnel.

Specific conductance: µS/cm, microsiemens per centimeter at 25 degrees Celsius. Measured onsite by U.S. Geological

Solids, dissolved: Residue on evaporation at 180 degrees Celsius except where noted S, sum of constituents.

Location	Date	Water temperature (°C)	Specific conductance (µS/cm)		pH, field (standard units)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Alkalinity, total, field (mg/L as $CaCO_3$)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)	Nitrogen, Nitrate, dissolved (mg/L as N)	Nitrogen, Nitrite, dissolved (mg/L as N)
(B-1-2)19aca-1	[1]08-05-91	17.5	2,350		8.4	7.0	6.9	480	2.5	380	110	400	2.6	—	—
(B-1-2)19aca-2	[2]08-05-91	22.0	3,550		8.3	3.2	4.5	830	12	874	130	500	4.6	—	—
(B-1-2)19aca-3	[3]08-05-91	14.5	30,000		7.8	45	180	7,600	260	999	440	12,000	0.71	—	—
	[1]12-12-91	13.5	29,100		7.7	—	—	—	—	—	—	—	—	—	—
(B-1-2)21dcd-1	[1]08-06-91	16.5	1,180	L	8.6	19	8.1	230	6.8	240	9.5	230	1.9	—	—
(B-1-2)22daa-1	[1]08-07-91	15.5	1,520	L	8.2	18	16	290	2.9	261	1.3	330	1.2	—	—
(B-1-2)22dad-1	[1]08-07-91	14.5	2,270		8.5	4.0	7.4	450	19	483	21	340	1.8	—	—
(B-1-2)23cbd-1	[1]08-07-91	17.0	1,780		8.0	23	18	310	3.3	222	1.2	400	1.0	—	—
(B-1-2)28aab-1	[1]08-06-91	16.5	3,580		8.6	4.9	5.7	770	46	490	240	650	2.2	—	—
(B-1-2)32bcb-1	[1]12-09-91	18.5	5,500		7.7	110	69	950	16	156	100	1,800	0.91	—	—
(B-1-2)32bcb-2	[1]11-08-90	11.0	14,000		7.8	81	91	3,000	24	240	580	4,300	1.3	0.020	[4]<0.010
	[1]08-06-91	20.0	13,000		7.8	81	92	3,000	23	253	510	4,100	1.2	—	—
(B-1-2)32bcb-3	[1]08-06-91	15.0	11,200		8.0	24	28	2,800	100	354	60	4,100	1.5	—	—
(B-1-2)36baa-1	[4]05-25-89	27.5	6,300		7.3	200	66	990	—	—	36	1,800	1.1	—	—
	[4]08-24-90	26.5	5,700		7.7	180	60	950	18	—	32	1,600	0.90	—	—
	[1]08-29-91	27.0	6,180		7.7	180	60	1,000	19	118	45	1,900	1.2	—	—
(B-1-2)36baa-2	[1]08-29-91	16.0	890		8.1	23	13	150	3.9	163	66	130	0.85	—	—
(B-1-2)36baa-3	[1]08-29-91	15.0	6,780		8.6	44	28	1,500	38	334	83	2,100	3.2	—	—
(C-1-1)15cad-2	[5]10-15-90	17.5	1,200		7.8	33	32	120	34	257	13	210	0.53	0.500	—
(C-1-1)15cad-3	[1]09-03-91	22.0	2,940		7.3	180	170	190	60	499	840	270	0.91	—	[4]0.030
(C-1-1)18bda-1	[1]10-22-90	14.0	16,000		7.7	120	140	3,100	150	256	650	5,000	0.46	0.020	—
(C-1-1)23bcb-1	[4]07-13-89	15.0	820		7.9	72	29	46	—	—	150	55	0.40	—	—
(C-1-1)23bcd-2	[1]11-08-90	13.0	720		8.1	22	27	71	32	343	8.0	21	0.70	0.030	[4]<0.010
(C-1-1)33ddd-1	[4]08-28-81	21.0	1,490		7.3	73	52	150	6.6	—	220	260	0.40	—	—
(C-1-1)33ddd-2	[1]10-23-90	14.0	3,580		7.3	100	86	450	38	381	92	850	0.36	0.140	—
(C-1-1)35ddd-5	[6]11-09-90	13.5	370		8.5	41	15	16	4.0	103	82	10	0.40	0.020	[4]<0.010
	[7]08-28-91	14.5	440		8.3	—	—	—	—	149	—	—	—	—	—
(C-1-2)14cdd-1	[1]08-19-91	21.0	3,420		7.8	95	43	550	17	124	200	900	0.79	—	—
(C-1-2)14cdd-2	[1]08-19-91	20.0	1,690		8.0	31	21	270	26	176	130	310	0.71	—	—
(C-1-2)14cdd-3	[1]08-19-91	15.0	6,980		7.6	48	73	1,400	74	897	1,000	1,200	1.0	—	—
(C-2-1)13abc-1	[1]11-06-90	13.0	2,150		7.9	180	75	160	12	316	380	310	0.35	0.020	—
(C-2-1)20aad-1	[4]07-10-89	15.0	2,260		7.3	180	130	210	—	—	750	380	0.30	—	—
(C-2-1)20aad-2	[1]10-29-90	15.0	3,970		7.1	520	160	120	120	404	1,800	210	0.40	1.23	—
(C-2-1)23ccb-1	[1]10-23-90	16.0	1,850		7.4	110	57	170	18	311	230	240	0.83	3.30	—
(C-2-1)23dac-1	[1]10-29-90	13.5	1,490		7.4	90	47	120	5.0	315	210	160	0.41	2.54	—
(C-2-1)34bbd-2	[1]10-23-90	14.5	2,310		7.2	170	66	230	12	295	450	300	0.34	3.52	—
(C-2-1)36cdd-2	[1]11-14-90	13.0	2,320		7.6	81	78	260	31	316	420	290	1.4	0.020	[4]0.010
(C-2-1)36cdd-3	[6]11-06-90	12.5	780		8.1	77	23	38	4.0	128	93	44	0.17	1.92	—
	[7]09-05-91	16.5	720		8.4	—	—	—	—	121	—	—	—	—	—
(C-2-2)1bcd-2	[1]10-22-90	14.0	1,060		7.9	37	32	160	14	306	70	130	0.76	4.18	—

constituents in water from selected wells

milligrams per liter; µg/L, micrograms per liter; —, no data available; <, less than]

Survey personnel except where noted L, laboratory value.

Nitrogen, NO_2+NO_3, dissolved (mg/L as N)	Silica, dissolved (mg/L as SiO_2)	Solids, residue at 180 °C, dissolved (mg/L)		Arsenic, dissolved (µg/L as As)	Barium, dissolved (µg/L as Ba)	Boron, dissolved (µg/L as B)	Cadmium, dissolved (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)	Copper, dissolved (µg/L as Cu)	Iron, dissolved (µg/L as Fe)	Lead, dissolved (µg/L as Pb)	Manganese, dissolved (µg/L as Mn)	Nickel, dissolved (µg/L as Ni)	Selenium, dissolved (µg/L as Se)	Silver, dissolved (µg/L as Ag)	Zinc, dissolved (µg/L as Zn)
—	23	1,300		<5	68	420	<1.0	<5	<20	73	<5	15	<10	<5	<2.0	<20
—	22	2,030		210	35	1,200	<1.0	<5	<20	78	5	18	<10	<5	<2.0	<20
—	32	20,300		15	170	2,300	<11	<5	57	56	<25	310	<10	<5	<2.0	<20
—	—	—		—	—	—	—	—	—	—	—	—	—	—	—	—
—	52	708		<5	390	420	<1.0	<5	<20	320	<5	—	<10	<5	—	<20
—	22	878		280	190	470	<1.0	<5	<20	68	<5	37	10	<5	<2.0	<20
—	15	1,240		20	56	1,100	<1.0	<5	<20	330	<5	66	<10	<5	<2.0	<20
—	24	978		260	200	460	<1.0	<5	<20	47	<5	57	<10	<5	<2.0	<20
—	27	2,100		190	47	2,000	<1.0	<5	<20	<20	<5	45	<10	<5	—	<20
—	49	3,190	S	20	330	340	2.0	<5	<20	210	<5	210	<10	<5	<2.0	<20
[4]<0.100	23	8,200	S	25	41	530	<3.0	<5	<20	300	<5	130	<30	<1	<2.0	<20
—	25	8,160		30	32	480	<5.0	<5	56	200	<5	120	<10	<5	—	<20
—	25	7,150		<5	190	1,200	<5.0	<5	51	35	<5	95	<10	<5	—	<20
—	49	3,620		<1	660	—	<5.0	<1	<50	560	<50	140	<50	<1	<1.0	<15
—	56	—		—	—	510	—	—	—	410	—	150	—	—	—	—
—	53	3,570		<5	650	490	<1.0	<5	<20	460	<5	140	<10	<5	<2.0	<20
—	25	560		50	48	250	<1.0	<5	<20	21	<5	42	<10	<5	<2.0	<20
—	20	3,700		150	210	2,300	<1.0	<5	<20	26	<5	140	<10	<5	<2.0	<20
—	42	618		9	270	280	<1.0	<10	<20	75	<5	190	<10	<1	<2.0	<20
[4]0.580	47	2,080		10	85	660	<1.0	<5	<20	35	<5	460	<10	<5	<2.0	<20
—	26	9,390		10	100	300	<3.0	<5	<20	180	<5	590	<10	<1	<2.0	<20
—	22	422		8	140	—	<1.0	<1	<10	290	<10	120	<10	<1	<1.0	4
[4]<0.100	40	441	S	24	110	320	<1.0	<5	<20	110	<5	69	<10	<1	<2.0	<20
1.10	54	905	S	—	—	130	—	—	—	<10	—	47	—	—	—	—
—	44	1,940		17	260	350	<1.0	<5	<20	98	<5	370	<10	<1	<2.0	<20
[4]<0.100	9.0	244		10	97	30	<1.0	<5	<20	28	<5	22	<10	<1	<2.0	<20
—	—	—		—	—	—	—	—	—	—	—	—	—	—	—	—
—	48	1,990		5	28	330	<1.0	<5	<20	1300	<5	63	<10	<5	<2.0	<20
—	11	984		20	66	310	<1.0	<5	<20	<20	<5	5	<10	<5	<2.0	<20
—	14	4,410		20	99	3,900	<1.0	<5	33	400	<5	950	<10	<5	<2.0	55
—	31	1,410		8	270	130	<1.0	<5	<20	95	<5	440	<10	<1	<2.0	<20
—	43	2,070		11	21	—	2.0	<5	<10	13	<10	<1	<10	18	<1.0	21
—	52	3,480		<5	16	490	<1.0	<5	22	<20	<5	95	<10	<1	<2.0	<20
—	47	1,120		16	39	390	<1.0	<5	<20	67	<5	8	<10	<1	<2.0	43
—	20	908		<5	58	230	<1.0	<5	<20	30	<5	23	<10	<1	<2.0	<20
—	32	1,550		<5	37	350	<1.0	<5	<20	38	<5	15	<10	<1	<2.0	<20
[4]<0.100	19	1,390		7	96	640	<1.0	<5	<20	<20	<5	670	<10	<1	<2.0	<20
—	16	474		<5	210	40	<1.0	<5	<20	<20	<5	8	<10	<1	<2.0	21
—	—	—		—	—	—	—	—	—	—	—	—	—	—	—	—
—	50	688		45	61	280	<1.0	<5	<20	26	<5	<5	<10	<1	<2.0	<20

Table 5.—*Chemical analyses of inorganic*

Location	Date	Water temperature (°C)	Specific conductance (µS/cm)	pH, field (standard units)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Alkalinity, total, field (mg/L as $CaCO_3$)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)	Nitrogen, Nitrate, dissolved (mg/L as N)	Nitrogen, Nitrite, dissolved (mg/L as N)
(C-3-1)12cdb-1	[1]11-13-90	12.5	2,310	7.3	100	73	260	10	464	330	300	0.36	0.010	[4]<0.010
(C-4-1)4aaa-3	[1]11-13-90	14.5	1,800	7.4	100	70	170	17	220	290	300	0.46	0.770	—
(C-4-1)4aaa-4	[1]09-03-91	17.5	1,780	7.4	78	24	230	6.5	317	190	200	0.21	—	[4]<0.010
(D-1-1)17dab-1	[6]11-14-90	13.5	360	10.9	23	<1.0	19	3.0	70	59	15	0.41	0.150	[4]0.050
	[8]09-06-91	16.0	465	8.5	—	—	—	—	55	—	—	—	—	—
(D-1-1)17dab-2	[9]10-16-90	14.0	810	7.4	70	32	38	4.0	254	120	41	0.29	0.960	—
	[7]09-05-91	17.0	670	7.7	—	—	—	—	228	—	—	—	—	—
(D-1-1)19dbc-2	[1]10-15-90	14.0	1,430	7.2	120	58	79	9.0	451	260	100	0.35	0.520	—
(D-1-1)30dcb-1	[1]10-16-90	12.5	1,030	7.8	96	39	47	5.0	282	160	77	0.21	0.090	—
(D-2-1)16bba-3	[1]11-06-90	12.5	610	7.9	50	25	23	4.0	180	52	48	0.27	2.31	—
(D-2-1)17cda-2	[1]10-30-90	15.0	1,180	7.4	77	36	110	7.0	277	140	130	0.57	0.690	—
(D-2-1)17cda-3	[1]10-30-90	15.5	1,080	7.2	77	34	110	6.0	255	140	130	0.56	0.730	—
(D-2-1)28ccc-1	[4]09-18-90	12.0	240	8.2	25	8.9	8.4	1.5	82	20	11	0.20	—	—
(D-2-1)29acb-2	[1]10-30-90	13.5	680	7.7	77	17	31	5.0	181	38	69	0.36	1.84	—
(D-2-1)29acb-8	[4]09-17-90	14.0	225	8.3	23	8.5	7.7	1.4	78	19	12	0.30	—	—
(D-2-1)30dda-2	[1]08-30-91	14.0	740	7.8	59	20	39	4.9	130	87	67	0.49	—	—
(D-2-1)30dda-3	[1]08-30-91	14.5	1,340	7.6	110	28	110	5.8	189	180	200	0.39	—	—
(D-2-1)34cdc-1	[4]09-18-90	12.0	375	7.6	44	9.9	19	2.4	138	31	14	0.30	—	—
(D-3-1)4cad-1	[4]09-17-90	11.5	310	8.1	37	7.9	12	2.4	121	16	12	0.10	—	—
(D-3-1)6dad-1	[4]09-17-90	17.0	415	8.1	42	10	19	2.8	93	6.8	66	0.30	—	—
(D-3-1)12bdd-1	[4]09-17-90	14.0	345	7.0	37	7.3	15	2.3	93	27	32	0.10	—	—
(D-3-1)29ddd-1	[1]11-13-90	15.5	960	7.6	89	30	44	5.0	269	130	80	0.30	0.010	—

[1] Volatile organic compounds and pesticides analyzed. All compounds listed in tables 7 and 8 were undetected.
[2] Volatile organic compounds and pesticides analyzed. All compounds listed in tables 7 and 8 were undetected except for 11.83 µg/L of
[3] Well purged with additional bailing prior to sampling. Volatile organic compounds analyzed. All compounds listed in table 7 were undetected.
[4] Analyzed by U.S. Geological Survey National Water Quality Laboratory.
[5] Volatile organic compounds and pesticides analyzed. All compounds listed in tables 7 and 8 were undetected except for an estimated value
[6] Well purged with gasoline-powered air compressor prior to sampling. Volatile compounds and pesticides analyzed. All compounds listed in
[7] Well purged with nitrogen gas prior to sampling. Volatile organic compounds analyzed. All compounds listed in table 7 were undetected.
[8] Well purged with nitrogen gas prior to sampling. Volatile organic compounds analyzed. All compounds listed in table 7 were undetected except
[9] Volatile organic compounds and pesticides analyzed. All compounds listed in tables 7 and 8 were undetected except for 0.23 µg/L of

constituents in water from selected wells—Continued

Nitrogen, NO_2+NO_3, dissolved (mg/L as N)	Silica, dissolved (mg/L as SiO_2)	Solids, residue at 180 °C, dissolved (mg/L)		Arsenic, dissolved (µg/L as As)	Barium, dissolved (µg/L as Ba)	Boron, dissolved (µg/L as B)	Cadmium, dissolved (µg/L as Cd)	Chromium, dissolved (µg/L as Cr)	Copper, dissolved (µg/L as Cu)	Iron, dissolved (µg/L as Fe)	Lead, dissolved (µg/L as Pb)	Manganese, dissolved (µg/L as Mn)	Nickel, dissolved (µg/L as Ni)	Selenium, dissolved (µg/L as Se)	Silver, dissolved (µg/L as Ag)	Zinc, dissolved (µg/L as Zn)
[4]<0.100	25	1,460		<5	120	480	<1.0	<5	<20	32	<5	350	<10	<1	<2.0	<20
—	36	1,180		—	82	310	<1.0	—	<20	<20	—	8	—	<1	—	<20
[4]3.90	54	1,080		5	48	440	<1.0	<5	<20	40	<5	56	<10	<5	<2.0	<20
[4]0.200	25	204		<5	27	50	<1.0	<5	<20	<20	<5	<5	<10	<1	<2.0	<20
—	—	—		—	—	—	—	—	—	—	—	—	—	—	—	—
—	20	504		6	31	80	<1.0	<10	<20	<20	<5	11	<10	<1	<2.0	—
—	—	—		—	—	—	—	—	—	—	—	—	—	—	—	—
—	23	972		<5	180	260	<1.0	<10	<20	520	<5	180	<10	<1	<2.0	<20
—	20	628		<5	250	50	<1.0	<10	<20	340	<5	140	<10	<1	<2.0	<20
—	10	344		<5	72	40	<1.0	<5	<20	<20	<5	150	<10	<1	<2.0	<20
—	18	712		<5	150	170	<1.0	<5	<20	160	<5	130	<10	<1	<2.0	<20
—	17	696		<5	120	180	<1.0	<5	<20	45	<5	36	<10	<1	<2.0	<20
—	13	137	S	—	—	—	—	—	—	—	—	—	—	—	—	—
—	16	372		<5	82	20	<1.0	<5	<20	<20	<5	31	<10	<1	<2.0	<20
—	11	130	S	—	—	—	—	—	—	—	—	—	—	—	—	—
—	15	434		<5	82	60	<1.0	<5	<20	45	<5	190	<10	<5	<2.0	<20
—	30	774		<5	220	160	<1.0	<5	<20	76	<5	23	<10	<5	<2.0	<20
—	12	215	S	—	—	—	—	—	—	—	—	—	—	—	—	—
—	15	175	S	—	—	—	—	—	—	—	—	—	—	—	—	—
—	14	217	S	—	—	—	—	—	—	—	—	—	—	—	—	—
—	11	187	S	—	—	—	—	—	—	—	—	—	—	—	—	—
—	39	624		7	460	90	<1.0	<5	<20	90	<5	330	<10	<1	<2.0	<20

bromodichloromethane, 3.23 µg/L of chlorodibromomethane, and 50.19 µg/L of chloroform.

less than the detection limit but greater than zero for 1,1,2,2-tetrachloroethane, chloroform, and hexachlorobutadiene.
tables 7 and 8 were undetected except for some gasoline-derived compounds.

for 1.14 µg/L of chloroform.
tetrachloroethylene.

Table 6.—*Chemical analyses of selected*

[Analyses made by the Utah State Health Laboratory;

Location: See page 3 for an explanation of the well-numbering system used in Utah.

Location	Date	Alumi-num, total recov-erable (µg/L as Al)	Arsenic, total (µg/L as As)	Barium, total recov-erable (µg/L as Ba)	Beryl-lium, total recov-erable (µg/L as Be)	Cadmium, total recov-erable (µg/L as Cd)	Chro-mium, total recov-erable (µg/L as Cr)	Cobalt, total recov-erable (µg/L as Co)
(B-1-2)19aca-1	08-05-91	<100	<5	70	<1.0	<1	<5	<20
(B-1-2)19aca-2	08-05-91	<100	210	[1]30	<1.0	<1	<5	<20
(B-1-2)19aca-3	08-05-91	1,500	20	180	1.1	<11	<5	<20
(B-1-2)21dcd-1	08-06-91	<100	<5	390	<1.0	<1	<5	<20
(B-1-2)22daa-1	08-07-91	<100	280	200	<1.0	<1	<5	<20
(B-1-2)22dad-1	08-07-91	3,200	35	340	<1.0	1	25	<20
(B-1-2)23cbd-1	08-07-91	120	290	210	<1.0	<1	<5	<20
(B-1-2)28aab-1	08-06-91	810	200	70	<1.0	<1	<5	<20
(B-1-2)32bcb-1	12-09-91	<100	20	360	<1.0	[1]<1	<5	<20
(B-1-2)32bcb-2	08-06-91	570	40	50	<1.0	<5	<5	<20
(B-1-2)32bcb-3	08-06-91	590	<5	210	<1.0	<5	<5	<20
(B-1-2)36baa-1	08-29-91	<200	<5	660	<1.0	<1	<5	<20
(B-1-2)36baa-2	08-29-91	730	[1]45	60	<1.0	<1	<5	<20
(B-1-2)36baa-3	08-29-91	740	170	220	<1.0	<1	<5	<20
(C-1-1)15cad-3	09-03-91	3,500	25	120	1.2	<1	10	<20
(C-1-2)14cdd-1	08-19-91	<200	[1]<5	30	<1.0	<1	<5	<20
(C-1-2)14cdd-2	08-19-91	280	20	80	<1.0	<1	<5	<20
(C-1-2)14cdd-3	08-19-91	4,900	25	[1]90	1.5	<1	10	<20
(C-4-1) 4aaa-4	09-03-91	4,000	5	160	<1.0	<1	20	<20
(D-2-1)30dda-2	08-30-91	9,000	<10	270	1.2	<1	10	<20
(D-2-1)30dda-3	08-30-91	18,000	<10	660	2.5	1	40	27

[1]Total concentration is less than dissolved concentration (see table 5).

trace metals in unfiltered water from selected wells

µg/L, micrograms per liter; <, less than; —, no data available]

Copper, total recoverable (µg/L as Cu)	Iron, total recoverable (µg/L as Fe)	Lead, total recoverable (µg/L as Pb)	Manganese, total recoverable (µg/L as Mn)	Mercury, total recoverable (µg/L as Hg)	Molybdenum, total recoverable (µg/L as Mo)	Nickel, total recoverable (µg/L as Ni)	Selenium, total (µg/L as Se)	Silver, total recoverable (µg/L as Ag)	Zinc, total recoverable (µg/L as Zn)
<20	90	<5	[1]7	<0.20	<100	<10	<5	<2	<20
<20	[1]50	10	[1]9	<0.20	<100	<10	<5	<2	<20
[1]51	4,800	<25	380	<0.20	<100	<10	<5	<2	<20
<20	[1]270	<5	33	<0.20	<100	<10	<5	<2	<20
<20	270	<5	[1]36	—	<100	<10	<5	<2	<20
71	32,000	45	1,000	—	<100	30	<5	<2	150
<20	510	<5	63	—	<100	<10	<5	<2	<20
20	2,100	<5	81	<0.20	<100	<10	<5	<2	<20
<20	290	<5	220	<0.20	<200	<10	<5	<2	<20
190	2,000	<5	180	<0.20	<100	<10	<5	<2	300
60	2,000	<5	140	<0.20	<100	<10	<5	<2	<20
<20	550	<5	140	<0.20	<200	<10	<5	<2	<20
<20	2,500	5	83	<0.20	<200	<10	<5	<2	<20
<20	1,600	<5	190	<0.20	<200	<10	<5	<2	<20
51	11,000	15	700	<0.20	<200	<10	<5	<2	70
<20	1,800	<5	[1]61	<0.20	<200	<10	<5	<2	<20
<20	400	<5	38	<0.20	<200	<10	<5	<2	<20
58	11,000	10	1,300	<0.20	<200	<10	<5	<2	60
25	6,400	20	280	<0.20	<200	<10	<5	<2	60
66	23,000	50	1,000	<0.20	<200	<10	<5	<2	150
200	50,000	165	1,500	<0.20	<200	<10	<5	<2	350

Table 7.—*Minimum detection levels for volatile organic compounds in water from selected wells*

[Analyses made by the Utah State Health Laboratory; µg/L, micrograms per liter]

Water was analyzed for volatile organic compounds in 1990 and 1991 using U.S. Environmental Protection Agency method 502.2. The wells from which water samples were collected and analyzed and the compounds detected are listed in table 5.

Minimum detection level: The smallest quantity or concentration that can be detected and quantified by the specified test method.

Compound	Minimum detection level	
1,1-Dichloropropene	0.05	µg/L
1,1-Dichloroethane	0.06	µg/L
1,1,1,2-Tetrachloroethane	0.5	µg/L
1,1,2-Trichloroethane	0.05	µg/L
1,1,2,2-Tetrachloroethane	0.5	µg/L
1,2-Dichloropropane	0.5	µg/L
1,2,3-Trichloropropane	0.09	µg/L
1,3-Dichloropropane	0.5	µg/L
1,3-Dichloropropene	0.5	µg/L
2,2-Dichloropropane	0.5	µg/L
Bromobenzene	0.05	µg/L
Bromodichloromethane	0.09	µg/L
Bromoform	1.0	µg/L
Bromomethane	0.5	µg/L
Chlorobenzene	0.06	µg/L
Chlorodibromomethane	0.22	µg/L
Chloroethane	0.5	µg/L
Chloroform	0.04	µg/L
Chloromethane	0.5	µg/L
cis-1,2-Dichloroethylene	0.09	µg/L
Dibromomethane	0.5	µg/L
Methylene Chloride	0.5	µg/L
Ethylbenzene	0.11	µg/L
1,3-Dichlorobenzene meta	0.06	µg/L
m-Xylene	0.07	µg/L
o-Chlorotoluene	0.1	µg/L
1,2-Dichlorobenzene ortho	0.09	µg/L
o-Xylene	0.07	µg/L
p-Chlorotoluene	0.1	µg/L

Compound	Minimum detection level	
p-Xylene	0.07	µg/L
Styrene	0.5	µg/L
Tetrachloroethene	0.07	µg/L
Toluene	0.06	µg/L
trans-1,2-Dichloroethene	0.5	µg/L
Benzene	0.5	µg/L
Carbon Tetrachloride	0.09	µg/L
1,2-Dichloroethane	0.14	µg/L
Trichloroethene	0.11	µg/L
1,1-Dichloroethene	0.09	µg/L
p-Dichlorobenzene	0.05	µg/L
1,1,1-Trichloroethane	0.09	µg/L
Vinyl Chloride	0.5	µg/L
1,2,3-Trichlorobenzene	0.5	µg/L
1,2,4-Trichlorobenzene	0.12	µg/L
1,2,4-Trimethylbenzene	0.09	µg/L
1,3,5-Trimethylbenzene	0.09	µg/L
Bromochloromethane	0.5	µg/L
n-Butylbenzene	0.13	µg/L
Dichlorodifluoromethane	0.5	µg/L
Fluorotrichloromethane	0.07	µg/L
Hexachlorobutadiene	0.18	µg/L
Isopropylbenzene	0.09	µg/L
p-Isopropyltoluene	0.5	µg/L
Naphthalene	0.5	µg/L
n-Propylbenzene	0.1	µg/L
sec-Butylbenzene	0.12	µg/L
tert-Butylbenzene	0.5	µg/L

Table 8.—*Minimum detection levels for organochlorine pesticides and polychlorinated biphenyls in water from selected wells in 1990 and for organochlorine pesticides in water from selected wells in 1991*

[Analyses made by the Utah State Health Laboratory; µg/L, micrograms per liter]

Water was analyzed for organochlorine pesticides and polychlorinated biphenyls in 1990, and for organochlorine pesticides in 1991 using the specified U.S. Environmental Protection Agency (EPA) methods. Table 5 lists the wells from which water samples were collected and analyzed. None of the compounds listed below were detected.

Minimum detection level: The smallest quantity or concentration that can be detected and quantified by the specified test method.

Compound	Minimum detection level
1990	
EPA METHOD 608	
Aldrin	0.004 µg/L
alpha-BHC	0.008 µg/L
beta-BHC	0.004 µg/L
delta-BHC	0.004 µg/L
gamma-BHC (Lindane)	0.009 µg/L
Chlordane	0.25 µg/L
4,4'-DDD	0.011 µg/L
4,4'-DDE	0.004 µg/L
4,4'-DDT	0.02 µg/L
Dieldrin	0.002 µg/L
Endosulfan I	0.014 µg/L
Endosulfan II	0.004 µg/L
Endosulfan sulfate	0.066 µg/L
Endrin	0.006 µg/L
Endrin aldehyde	0.023 µg/L
Heptachlor	0.003 µg/L
Heptachlor epoxide	0.083 µg/L
Toxaphene	0.24 µg/L
Methoxychlor	0.25 µg/L
PCB-1016	0.5 µg/L
PCB-1221	0.5 µg/L
PCB-1232	0.5 µg/L
PCB-1242	0.5 µg/L
PCB-1248	0.5 µg/L
PCB-1254	0.5 µg/L
PCB-1260	0.5 µg/L
EPA METHOD 615	
2,4-D	1.0 µg/L
Dicamba	0.3 µg/L
Dichlorprop	0.7 µg/L
Dinoseb	0.07 µg/L
2,4,5-T	0.2 µg/L
2,4,5-TP (Silvex)	0.1 µg/L

Compound	Minimum detection level
1991	
EPA METHOD 505	
Aldrin	0.04 µg/L
alpha-BHC	0.04 µg/L
beta-BHC	0.04 µg/L
delta-BHC	0.04 µg/L
gamma-BHC (Lindane)	0.009 µg/L
Chlordane	0.5 µg/L
4,4'-DDD	0.04 µg/L
4,4'-DDE	0.04 µg/L
4,4'-DDT	0.04 µg/L
Dieldrin	0.04 µg/L
Endosulfan I	0.04 µg/L
Endosulfan II	0.04 µg/L
Endosulfan sulfate	0.066 µg/L
Endrin	0.04 µg/L
Endrin aldehyde	0.04 µg/L
Heptachlor	0.04 µg/L
Heptachlor epoxide	0.04 µg/L
Toxaphene	0.5 µg/L
Methoxychlor	0.25 µg/L
EPA METHOD 515	
2,4-D	1.0 µg/L
Dicamba	2.0 µg/L
2,4,5-T	0.5 µg/L
2,4,5-TP (Silvex)	0.5 µg/L

Table 9.—*Chemical analyses of radionuclides in water from selected wells*

[Analyses made by the Utah State Health Laboratory; pCi/L, picocuries per liter; <, less than; —, no data available]

Location: See page 3 for an explanation of the well-numbering system used in Utah.

Gross alpha: Analyzed using U.S. Environmental Protection Agency method 900.0 (Krieger and Whittaker, 1980). Estimated minimum detectable concentration based on a 500-milliliter sample is 1.0 pCi/L.

Gross beta: Analyzed using U.S. Environmental Protection Agency method 900.0 (Krieger and Whittaker, 1980). Estimated minimum detectable concentration based on a 500-milliliter sample is 5.0 pCi/L.

Radium 226: Analyzed using U.S. Environmental Protection Agency method 903.1 (Krieger and Whittaker, 1980). Estimated minimum detectable concentration based on a 500-milliliter sample is 0.5 pCi/L.

Uranium: Analyzed using U.S. Environmental Protection Agency method 908.0 (Krieger and Whittaker, 1980). Estimated minimum detectable concentration based on a 500-milliliter sample is 1.0 pCi/L.

Sample error: The error added to or subtracted from the reported concentration to achieve a 95-percent confidence level.

Location	Date of sample	Gross alpha, dissolved (pCi/L as Am-141)	Sample error (+/-)	Gross beta, dissolved (pCi/L as Cs-137)	Sample error (+/-)	Radium 226, total (pCi/L as Ra-226)	Sample error (+/-)	Uranium, total (pCi/L as U-natural)	Sample error (+/-)
(B-1-2)19aca-1	08-05-91	17	7.0	—	—	2.0	1.0	—	—
(B-1-2)19aca-2	08-05-91	99	21.0	—	—	0.5	0.5	—	—
(B-1-2)19aca-3	08-05-91	24	33.3	—	—	<0.5	0.5	—	—
(B-1-2)21dcd-1	08-06-91	4.0	4.0	26	5.0	—	—	—	—
(B-1-2)22daa-1	08-07-91	6.0	5.0	16	5.0	<0.5	0.5	—	—
(B-1-2)22dad-1	08-07-91	<1.0	1.0	16	6.0	—	—	—	—
(B-1-2)23cbd-1	08-07-91	5.0	5.0	13	5.0	<0.5	0.5	—	—
(B-1-2)28aab-1	08-06-91	5.0	6.0	27	7.0	2.0	1.0	—	—
(B-1-2)32bcb-1	12-09-91	<1.0	—	—	—	—	—	—	—
(B-1-2)32bcb-2	11-08-90	1.1	1.4	—	—	0.6	0.7	0.5	1.0
	08-06-91	6.0	24	24	28	<0.5	0.5	—	—
(B-1-2)32bcb-3	08-06-91	13	21	125	29	1.0	0.5	—	—
(B-1-2)36baa-1	08-29-91	6.0	1.0	—	—	<0.5	0.5	—	—
(B-1-2)36baa-2	08-29-91	2.0	1.0	—	—	—	—	—	—
(B-1-2)36baa-3	08-29-91	3.0	1.0	—	—	—	—	—	—
(C-1-1)15cad-2	10-15-90	6.2	2.4	—	—	1.0	0.9	5.2	2.9
(C-1-1)15cad-3	09-03-91	5.0	1.0	—	—	—	—	—	—
(C-1-1)18bda-1	10-22-90	7.4	2.5	—	—	0.6	2.5	7.8	2.5
(C-1-1)23bcd-2	11-08-90	27	16.2	—	—	6.0	0.4	22	10.8
(C-1-1)33ddd-2	10-23-90	3.7	1.8	—	—	—	—	—	—
(C-1-1)35ddd-5	11-09-90	31	7.8	—	—	1.9	3.0	70	9.5
(C-1-2)14cdd-1	08-19-91	6.0	1.0	—	—	<0.5	0.5	—	—
(C-1-2)14cdd-2	08-19-91	6.0	2.0	—	—	<0.5	0.5	—	—
(C-1-2)14cdd-3	08-19-91	13	2.0	—	—	<0.5	0.5	—	—
(C-2-1)13abc-1	11-06-90	3.2	1.8	—	—	0.6	1.0	3.0	2.0

Table 9.—*Chemical analyses of radionuclides in water from selected wells*—Continued

Location	Date of sample	Gross alpha, dissolved (pCi/L as Am-141)	Sample error (+/-)	Gross beta, dissolved (pCi/L as Cs-137)	Sample error (+/-)	Radium 226, total (pCi/L as Ra-226)	Sample error (+/-)	Uranium, total (pCi/L as U-natural)	Sample error (+/-)
(C-2-1)23ccb-1	10-23-90	13	3.2	—	—	0.6	0.7	16	3.5
(C-2-1)34bbd-2	10-23-90	8.8	2.7	—	—	0.6	1.1	7.2	2.3
(C-2-1)36cdd-2	11-14-90	29	7.6	—	—	<0.6	3.5	17	6.9
(C-2-1)36cdd-3	11-06-90	7.6	3.0	—	—	0.6	1.1	4.0	2.0
(C-2-2) 1bcd-2	10-22-90	8.6	2.6	—	—	0.6	2.6	9.4	2.6
(C-3-1)12cdb-1	11-13-90	5.4	1.5	—	—	0.6	0.7	8.3	1.9
(C-4-1) 4aaa-3	11-13-90	38	8.5	—	—	<0.6	2.4	43	9.6
(C-4-1) 4aaa-4	09-03-91	12	2.0	—	—	<0.5	0.5	—	—
(D-1-1)17dab-1	11-14-90	<1.0	1.0	—	—	<0.6	0.5	<1.0	1.2
(D-1-1)17dab-2	10-16-90	9.3	2.8	—	—	<0.6	0.7	11	2.9
(D-1-1)19dbc-2	10-15-90	8.5	2.7	—	—	<0.6	0.6	3.9	2.6
(D-1-1)30dcb-1	10-16-90	4.3	2.0	—	—	—	—	—	—
(D-2-1)16bba-3	11-06-90	6.2	1.8	—	—	0.6	0.9	3.0	2.0
(D-2-1)17cda-3	10-30-90	20	5.7	—	—	1.1	1.8	19	5.0
(D-2-1)29acb-2	10-30-90	7.5	2.4	—	—	1.2	1.5	6.3	2.0
(D-2-1)30dda-2	08-30-91	<1.0	1.0	—	—	—	—	—	—
(D-2-1)30dda-3	08-30-91	11	2.0	—	—	<0.5	0.5	—	—
(D-3-1)29ddd-1	11-13-90	5.6	1.5	—	—	<0.6	0.5	6.0	1.7

Table 10.—*Carbon concentration and cation exchange capacity of material from selected core samples*

[g/kg, grams per kilogram; <, less than; —, no data available]

Location: See page 3 for an explanation of the well-numbering system used in Utah.

Depth sample collected: Depth is in feet below land surface.

Total carbon: Inorganic plus organic carbon concentration in core sample material, in grams per kilogram as carbon. Analyzed by U.S. Geological Survey National Water Quality Laboratory.

Inorganic carbon: In grams per kilogram as carbon. Analyzed by U.S. Geological Survey National Water Quality Laboratory.

Organic carbon: The difference between the total carbon and inorganic carbon concentration of the sample, in grams per kilogram as carbon. The analytical error for the analysis of total carbon and inorganic carbon is about 10 percent. This results in some values of organic carbon concentration less than zero.

Cation exchange capacity: In milliequivalents (meq) of cations per 100 grams of solid material. Analyzed by Chen-Northern, Inc.

Location	Date sample collected	Depth sample collected (feet)	Total carbon (g/kg as C)	Inorganic carbon (g/kg as C)	Organic carbon (g/kg as C)	Cation exchange capacity (meq/100 g)
(B-1-2)19aca-2	03-14-91	24.5	29	24	5	10
	03-14-91	83.0	31	28	3	8.0
(B-1-2)22dad-1	05-22-91	19.4	14	12	2	3.0
(B-1-2)28aab-1	05-24-91	14.0	25	19	6	2.5
(B-1-2)32bcb-3	05-22-91	24.0	23	19	4	16
(B-1-2)36baa-2	03-13-91	34.0	19	15	4	8.0
	03-13-91	69.0	74	62	12	12
(B-1-2)36baa-3	05-14-91	19.0	33	25	8	15
(C-1-1)15cad-2	06-27-90	38.5	33	27	6	22
(C-1-1)18bda-1	06-28-90	28.5	33	25	8	22
	06-28-90	45.0	28	22	6	17
(C-1-1)23bcd-2	06-06-90	30.0	53	45	8	19
	06-07-90	60.0	34	28	6	26
(C-1-2)14cdd-2	03-16-91	38.5	21	23	-2	18
	03-16-91	49.0	20	22	-2	18
(C-2-1)13abc-1	06-12-90	20.0	11	8.3	2.7	11
	06-12-90	30.0	10	9.2	0.8	13
(C-2-1)20aad-2	06-09-90	49.0	22	19	3	6.3
	06-09-90	59.0	26	24	2	24
(C-2-1)23ccb-1	06-19-90	29.0	28	26	2	22
	06-19-90	41.0	22	12	10	22
(C-2-1)23dac-1	06-18-90	83.5	5.8	3.8	2	21
(C-2-1)34bbd-2	06-11-90	39.0	10	8.1	1.9	17
(C-2-1)36cdd-2	07-24-90	63.5	26	19	7	18
(C-2-1)36cdd-3	07-26-90	129.5	3.1	1.3	1.8	10

Table 10.—*Carbon concentration and cation exchange capacity of material from selected core samples*—Continued

Location	Date sample collected	Depth sample collected (feet)	Total carbon (g/kg as C)	Inorganic carbon (g/kg as C)	Organic carbon (g/kg as C)	Cation exchange capacity (meq/100 g)
(C-2-2) 1bcd-2	06-29-90	28.5	45	44	1	12
(C-3-1)12cdb-1	06-12-90	39.0	16	12	4	19
(C-3-1)15ccb-1	03-08-91	59.0	15	12	3	21
(C-4-1) 4aaa-3	06-20-90	21.5	12	9.7	2.3	25
(C-4-1) 4aaa-4	03-09-91	104.0	1.0	<0.1	<1.0	6.0
(D-1-1)17dab-2	07-20-90	43.0	24	20	4	24
	07-20-90	62.8	20	18	2	25
(D-1-1)19dbc-2	06-25-90	30.0	22	19	3	19
(D-1-1)30dcb-1	06-26-90	40.0	31	15	16	9.5
	06-26-90	60.0	22	16	6	—
(D-2-1)17cda-3	06-14-90	21.5	36	35	1	16
(D-2-1)29acb-2	06-23-90	52.0	5.2	3.9	1.3	2.4
(D-2-1)30dda-2	03-12-91	53.0	5.8	4.7	1.1	5.0
(D-3-1)29ddd-1	06-21-90	46.5	16	12	4	9.0

Table 11.—*Chemical analyses of elements in material from selected core samples*

[Analyses made by U.S. Geological Survey, Branch of Geochemistry; all units are micrograms per grams of sample (μg/g)]

Location: See page 3 for an explanation of the well-numbering system used in Utah. Depth sample collected: Depth in feet below land surface.

Sample preparation: Core sample material was split into two portions to be analyzed by inductively-coupled-plasma atomic-emission spectrometry (ICPE). Acid: Multi-acid digestion: Selected acids were added to core sample material and dried to a residue. More acids were added to residue to make a solution that was analyzed by ICPE. Water: Water extraction: Deionized water was added to core sample material and shaken. The solid phase was removed by centrifuge and filtration. The remaining solution was analyzed by ICPE.

Location:		(C-1-1)15cad-2		(C-1-1)18bda-1		(C-1-1)18bda-1		(C-1-1)23bcd-2		(C-1-1)23bcd-2		(C-2-1)13abc-1		(C-2-1)13abc-1	
Date sample collected:		06-27-90		06-28-90		06-28-90		06-06-90		06-07-90		06-12-90		06-12-90	
Depth sample collected:		38.5 feet		28.5 feet		45.0 feet		30.0 feet		60.0 feet		20.0 feet		30.0 feet	
Sample preparation:		Acid	Water	Acid	Water	Acid	Water	Acid	Water	Acid	Water	Acid	Water	Acid	Water
							Element concentration								
Aluminum	Al	58,000	<1	54,000	<1	49,000	4	46,000	<1	52,000	<1	75,000	<1	80,000	<1
Calcium	Ca	92,000	81	88,000	17	77,000	8	140,000	150	83,000	210	35,000	15	32,000	32
Iron	Fe	25,000	<1	34,000	<1	20,000	2	20,000	<1	24,000	<1	31,000	<1	34,000	<1
Potassium	K	20,000	53	18,000	44	18,000	18	17,000	59	18,000	67	29,000	4	32,000	13
Magnesium	Mg	20,000	49	19,000	9	15,000	3	19,000	110	19,000	83	20,000	6	22,000	11
Sodium	Na	6,100	23	7,300	260	7,300	92	6,100	68	5,000	20	18,000	220	16,000	33
Phosphorus	P	1,000	<1	1,000	<1	800	<1	900	<1	1,000	<1	1,200	<1	1,000	<1
Titanium	Ti	2,100	<1	2,000	<1	2,100	<1	1,700	<1	2,000	<1	3,200	<1	3,400	<1
Manganese	Mn	590	0.2	610	0.09	390	<0.08	520	0.4	540	0.3	720	<0.08	760	0.2
Silver	Ag	<2	<0.04	<2	<0.04	<2	<0.04	<2	<0.04	<2	<0.04	<2	<0.04	<2	<0.04
Arsenic	As	21	<0.2	44	<0.2	<10	<0.2	10	<0.2	21	<0.2	24	<0.2	<10	<0.2
Gold	Au	<8	—	<8	—	<8	—	<8	—	<8	—	<8	—	<8	—
Boron	B	—	0.1	—	0.2	—	<0.1	—	0.2	—	0.1	—	<0.1	—	<0.1
Barium	Ba	460	0.09	140	0.05	460	0.04	630	0.1	370	0.08	950	<0.02	950	0.07
Beryllium	Be	2	<0.02	2	<0.02	1	<0.02	1	<0.02	2	<0.02	2	<0.02	2	<0.02
Bismuth	Bi	<10	<0.2	<10	<0.2	<10	<0.2	<10	<0.2	<10	<0.2	<10	<0.2	<10	<0.2
Cadmium	Cd	<2	<0.04	<2	<0.04	<2	<0.04	<2	<0.04	<2	<0.04	<2	<0.04	<2	<0.04
Cerium	Ce	48	<0.08	45	<0.08	49	<0.08	41	<0.08	45	<0.08	83	<0.08	84	<0.08
Cobalt	Co	11	<0.02	11	<0.02	8	<0.02	11	<0.02	10	<0.02	16	<0.02	17	<0.02
Chromium	Cr	59	<0.02	60	<0.02	44	<0.02	50	<0.02	61	<0.02	40	<0.02	57	<0.02
Copper	Cu	27	0.03	19	0.06	16	0.05	39	0.04	20	0.04	62	<0.02	83	0.04
Europium	Eu	<2	—	<2	—	<2	—	<2	—	<2	—	<2	—	<2	—
Gallium	Ga	14	—	13	—	10	—	12	—	12	—	20	—	24	—
Holmium	Ho	<4	—	<4	—	<4	—	<4	—	<4	—	<4	—	<4	—
Lanthanum	La	32	<0.04	29	<0.04	31	<0.04	26	<0.04	29	<0.04	50	<0.04	49	<0.04
Lithium	Li	77	0.3	80	0.2	54	0.09	49	0.2	64	0.2	44	<0.04	55	<0.04
Molybdenum	Mo	<2	0.05	<2	0.08	<2	<0.04	<2	0.2	<2	0.07	2	0.2	<2	0.05
Niobium	Nb	<4	—	<4	—	<4	—	<4	—	<4	—	<4	—	5	—
Neodymium	Nd	29	—	25	—	25	—	26	—	26	—	39	—	39	—
Nickel	Ni	24	<0.04	26	<0.04	18	<0.04	22	<0.04	24	<0.04	20	<0.04	30	<0.04
Lead	Pb	28	<0.08	23	<0.08	21	<0.08	40	<0.08	22	<0.08	61	<0.08	76	<0.08
Scandium	Sc	9	—	9	—	7	—	7	—	8	—	9	—	10	—
Silica	Si	—	9	—	8	—	15	—	9	—	6	—	5	—	4
Tin	Sn	<5	<0.1	<5	<0.1	<5	<0.1	<5	<0.1	<5	<0.1	<5	<0.1	<5	<0.1
Strontium	Sr	310	0.5	320	0.2	290	0.05	1300	2	280	0.9	340	0.1	310	0.1
Tantalum	Ta	<40	—	<40	—	<40	—	<40	—	<40	—	<40	—	<40	—
Thorium	Th	11	<0.08	9	<0.08	7	<0.08	8	<0.08	10	<0.08	13	<0.08	17	<0.08
Uranium	U	<100	—	<100	—	<100	—	<100	—	<100	—	<100	—	<100	—
Vanadium	V	72	<0.04	69	0.08	57	0.07	55	<0.04	67	<0.04	69	<0.04	77	<0.04
Tungsten	W	—	<0.1	—	<0.1	—	<0.1	—	<0.1	—	<0.1	—	<0.1	—	<0.1
Yttrium	Y	17	<0.04	16	<0.04	16	<0.04	13	<0.04	17	<0.04	12	<0.04	13	<0.04
Ytterbium	Yb	2	—	2	—	2	—	1	—	2	—	1	—	<1	—
Zinc	Zn	86	<0.04	86	<0.04	61	<0.04	83	<0.04	79	<0.04	120	<0.04	150	<0.04
Zirconium	Zr	—	<0.04	—	<0.04	—	<0.04	—	<0.04	—	<0.04	—	<0.04	—	<0.04

Table 11.—*Chemical analyses of elements in material from selected core samples*—Continued

Location:		(C-2-1)20aad-2		(C-2-1)20aad-2		(C-2-1)23ccb-1		(C-2-1)23ccb-1		(C-2-1)23dac-1		(C-2-1)34bbd-2		(C-2-1)36cdd-2	
Date sample collected:		06-09-90		06-09-90		06-19-90		06-19-90		06-18-90		06-11-90		07-24-90	
Depth sample collected:		49.0 feet		59.0 feet		29.0 feet		41.0 feet		83.5 feet		39.0 feet		63.5 feet	
Sample preparation:		Acid	Water	Acid	Water	Acid	Water	Acid	Water	Acid	Water	Acid	Water	Acid	Water
							Element concentration								
Aluminum	Al	44,000	<1	45,000	<1	68,000	<1	59,000	<1	65,000	<1	47,000	<1	34,000	<1
Calcium	Ca	76,000	620	83,000	120	76,000	12	49,000	500	20,000	12	45,000	14	65,000	18
Iron	Fe	20,000	<1	18,000	<1	28,000	<1	26,000	<1	30,000	<1	22,000	<1	15,000	<1
Potassium	K	17,000	55	17,000	42	25,000	7	21,000	56	22,000	3	18,000	6	14,000	18
Magnesium	Mg	13,000	59	14,000	29	21,000	5	16,000	83	13,000	4	11,000	4	13,000	12
Sodium	Na	6,300	18	6,700	16	11,000	22	8,700	53	8,700	10	6,800	26	5,400	33
Phosphorus	P	1,500	<1	1,400	<1	1,100	<1	1,300	<1	1,100	<1	600	<1	800	<1
Titanium	Ti	2,000	<1	2,100	<1	2,400	<1	2,500	<1	2,500	<1	2,100	<1	1,500	<1
Manganese	Mn	270	<0.08	270	<0.08	590	<0.08	370	0.3	660	<0.08	390	<0.08	310	<0.08
Silver	Ag	<2	<0.04	<2	<0.04	<2	<0.04	<2	<0.04	<2	<0.04	<2	<0.04	<2	<0.04
Arsenic	As	10	<0.2	10	<0.2	10	<0.2	10	<0.2	<10	<0.2	<10	<0.2	<10	<0.2
Gold	Au	<8	—	<8	—	<8	—	<8	—	<8	—	<8	—	<8	—
Boron	B	—	<0.1	—	0.1	—	<0.1	—	0.1	—	<0.1	—	<0.1	—	0.1
Barium	Ba	450	0.02	470	0.02	760	0.02	190	0.09	700	<0.02	520	0.03	360	0.08
Beryllium	Be	1	<0.02	1	<0.02	2	<0.02	2	<0.02	2	<0.02	1	<0.02	<1	<0.02
Bismuth	Bi	<10	<0.2	<10	<0.2	<10	<0.2	<10	<0.2	<10	<0.2	<10	<0.2	<10	<0.2
Cadmium	Cd	<2	<0.04	<2	<0.04	<2	<0.04	<2	<0.04	<2	<0.04	<2	<0.04	<2	<0.04
Cerium	Ce	45	<0.08	47	<0.08	70	<0.08	54	<0.08	74	<0.08	49	<0.08	37	<0.08
Cobalt	Co	8	<0.02	8	<0.02	15	<0.02	10	<0.02	12	<0.02	10	<0.02	7	<0.02
Chromium	Cr	51	<0.02	51	<0.02	52	<0.02	62	<0.02	58	<0.02	39	<0.02	33	<0.02
Copper	Cu	21	<0.02	24	0.03	62	<0.02	40	0.03	62	0.02	60	<0.02	11	<0.02
Europium	Eu	<2	—	<2	—	<2	—	<2	—	<2	—	<2	—	<2	—
Gallium	Ga	9	—	11	—	18	—	14	—	16	—	11	—	8	—
Holmium	Ho	<4	—	<4	—	<4	—	<4	—	<4	—	<4	—	<4	—
Lanthanum	La	31	<0.04	31	<0.04	44	<0.04	36	<0.04	44	<0.04	31	<0.04	23	<0.04
Lithium	Li	41	0.07	42	0.06	43	<0.04	58	0.3	41	<0.04	36	<0.04	30	0.04
Molybdenum	Mo	<2	<0.04	<2	<0.04	<2	0.05	2	0.3	<2	<0.04	<2	<0.04	<2	<0.04
Niobium	Nb	<4	—	<4	—	<4	—	<4	—	<4	—	<4	—	<4	—
Neodymium	Nd	24	—	26	—	33	—	26	—	33	—	22	—	22	—
Nickel	Ni	17	<0.04	15	<0.04	23	<0.04	23	—	24	—	18	<0.04	13	<0.04
Lead	Pb	22	<0.08	19	<0.08	47	<0.08	33	<0.08	53	<0.08	50	<0.08	14	<0.08
Scandium	Sc	6	—	6	—	9	—	8	—	9	—	7	—	5	—
Silica	Si	—	16	—	15	—	11	—	18	—	8	—	10	—	4
Tin	Sn	<5	<0.1	<5	<0.1	<5	<0.1	<5	<0.1	<5	<0.1	<5	<0.1	<5	<0.1
Strontium	Sr	260	2	280	0.6	350	0.2	310	2	230	0.06	240	0.07	240	0.1
Tantalum	Ta	<40	—	<40	—	<40	—	<40	—	<40	—	<40	—	<40	—
Thorium	Th	7	<0.08	8	<0.08	11	<0.08	10	<0.08	12	<0.08	8	<0.08	6	<0.08
Uranium	U	<100	—	<100	—	<100	—	<100	—	<100	—	<100	—	<100	—
Vanadium	V	53	<0.04	50	<0.04	76	<0.04	73	<0.04	83	<0.04	55	<0.04	42	<0.04
Tungsten	W	—	<0.1	—	<0.1	—	<0.1	—	<0.1	—	<0.1	—	<0.1	—	<0.1
Yttrium	Y	17	<0.04	17	<0.04	15	<0.04	15	<0.04	16	<0.04	15	<0.04	12	<0.04
Ytterbium	Yb	2	—	2	—	1	—	1	—	1	—	1	—	1	—
Zinc	Zn	60	<0.04	60	<0.04	110	<0.04	90	<0.04	100	<0.04	87	<0.04	44	<0.04
Zirconium	Zr	—	<0.04	—	<0.04	—	<0.04	—	<0.04	—	<0.04	—	<0.04	—	<0.04

Table 11.—*Chemical analyses of elements in material from selected core samples*—Continued

Location:		(C-2-1)36cdd-3		(C-2-2) 1bcd-2		(C-3-1)12cdb-1		(C-4-1) 4aaa-3		(D-1-1)17dab-2		(D-1-1)17dab-2		(D-1-1)19dbc-2	
Date sample collected:		07-26-90		06-29-90		06-12-90		06-20-90		07-20-90		07-20-90		06-25-90	
Depth sample collected:		129.5 feet		28.5 feet		39.0 feet		21.5 feet		43.0 feet		62.8 feet		30.0 feet	
Sample preparation:		Acid	Water	Acid	Water	Acid	Water	Acid	Water	Acid	Water	Acid	Water	Acid	Water
							Element concentration								
Aluminum	Al	37,000	2	35,000	<1	73,000	<1	77,000	<1	62,000	<1	55,000	1	56,000	<1
Calcium	Ca	8,000	9	120,000	7	47,000	120	51,000	16	83,000	16	61,000	13	65,000	59
Iron	Fe	16,000	<1	14,000	<1	27,000	<1	32,000	<1	32,000	<1	24,000	<1	23,000	<1
Potassium	K	14,000	4	12,000	4	27,000	18	26,000	4	21,000	4	19,000	5	22,000	24
Magnesium	Mg	5,500	2	14,000	3	19,000	28	18,000	5	22,000	4	15,000	4	18,000	23
Sodium	Na	6,700	4	7,200	12	14,000	6	9,200	46	5,900	8	5,800	8	8,400	15
Phosphorus	P	800	<1	900	<1	1,300	<1	1,200	<1	1,200	<1	900	<1	1,000	<1
Titanium	Ti	1,500	<1	1,600	<1	3,200	<1.	3,000	<1	2,300	<1	1,900	<1	2,000	<1
Manganese	Mn	140	<0.08	310	<0.08	600	0.3	790	<0.08	460	<0.08	430	<0.08	490	0.1
Silver	Ag	<2	<0.04	<2	<0.04	<2	<0.04	<2	<0.04	<2	<0.04	<2	<0.04	<2	<0.04
Arsenic	As	<10	<0.2	<10	<0.2	10	<0.2	10	<0.2	49	<0.2	20	<0.2	10	<0.2
Gold	Au	<8	—	<8	—	<8	—	<8	—	<8	—	<8	—	<8	—
Boron	B	—	<0.1	—	<0.1	—	<0.1	—	<0.1	—	<0.1	—	<0.1	—	0.1
Barium	Ba	450	0.05	430	<0.02	840	0.07	700	<0.02	450	<0.02	330	<0.02	510	0.1
Beryllium	Be	1	<0.02	1	<0.02	2	<0.02	2	<0.02	2	<0.02	2	<0.02	2	<0.02
Bismuth	Bi	<10	<0.2	<10	<0.2	<10	<0.2	<10	<0.2	<10	<0.2	<10	<0.2	<10	<0.2
Cadmium	Cd	<2	<0.04	<2	<0.04	<2	<0.04	<2	<0.04	<2	<0.04	<2	<0.04	<2	<0.04
Cerium	Ce	45	<0.08	37	<0.08	78	<0.08	68	<0.08	63	<0.08	51	<0.08	47	<0.08
Cobalt	Co	7	<0.02	7	<0.02	14	<0.02	17	<0.02	13	<0.02	11	<0.02	12	<0.02
Chromium	Cr	31	<0.02	29	<0.02	49	<0.02	71	<0.02	66	<0.02	58	<0.02	48	<0.02
Copper	Cu	11	<0.02	15	0.03	50	0.05	54	<0.02	68	0.04	29	0.03	42	<0.02
Europium	Eu	<2	—	<2	—	<2	—	<2	—	<2	—	<2	—	<2	—
Gallium	Ga	9	—	8	—	19	—	19	—	15	—	13	—	13	—
Holmium	Ho	<4	—	<4	—	<4	—	<4	—	<4	—	<4	—	<4	—
Lanthanum	La	26	<0.04	26	<0.04	48	<0.04	43	<0.04	38	<0.04	30	<0.04	31	<0.04
Lithium	Li	20	<0.04	22	<0.04	58	0.1	58	<0.04	41	<0.04	45	<0.04	46	0.09
Molybdenum	Mo	<2	<0.04	<2	<0.04	<2	0.09	<2	<0.04	<2	<0.04	<2	<0.04	<2	0.09
Niobium	Nb	<4	—	<4	—	5	—	<4	—	<4	—	<4	—	<4	—
Neodymium	Nd	20	—	23	—	37	—	33	—	26	—	26	—	25	—
Nickel	Ni	12	<0.04	11	<0.04	21	<0.04	34	<0.04	25	<0.04	23	<0.04	20	<0.04
Lead	Pb	15	<0.08	18	<0.08	51	<0.08	51	<0.08	36	<0.08	29	<0.08	32	<0.08
Scandium	Sc	4	—	5	—	9	—	11	—	9	—	8	—	8	—
Silica	Si	—	7	—	15	—	11	—	12	—	8	—	8	—	5
Tin	Sn	<5	<0.1	<5	<0.1	<5	<0.1	<5	<0.1	<5	<0.1	<5	<0.1	<5	<0.1
Strontium	Sr	170	0.05	260	0.04	370	0.5	290	0.08	230	0.1	190	0.2	210	0.4
Tantalum	Ta	<40	—	<40	—	<40	—	<40	—	<40	—	<40	—	<40	—
Thorium	Th	6	<0.08	6	<0.08	14	<0.08	12	<0.08	8	<0.08	9	<0.08	9	<0.08
Uranium	U	<100	—	<100	—	<100	—	<100	—	<100	—	<100	—	<100	—
Vanadium	V	36	<0.04	37	0.04	74	<0.04	91	<0.04	89	<0.04	70	<0.04	62	<0.04
Tungsten	W	—	<0.1	—	<0.1	—	<0.1	—	<0.1	—	<0.1	—	<0.1	—	<0.1
Yttrium	Y	10	<0.04	32	<0.04	14	<0.04	17	<0.04	17	<0.04	17	<0.04	13	<0.04
Ytterbium	Yb	<1	—	3	—	1	—	2	—	2	—	2	—	1	—
Zinc	Zn	46	<0.04	42	<0.04	110	<0.04	130	<0.04	120	<0.04	80	<0.04	79	<0.04
Zirconium	Zr	—	<0.04	—	<0.04	—	<0.04	—	<0.04	—	<0.04	—	<0.04	—	<0.04

Table 11.—*Chemical analyses of elements in material from selected core samples*—Continued

Location:		(D-1-1)30dcb-1		(D-1-1)30dcb-1		(D-2-1)17cda-3		(D-2-1)29acb-2		(D-3-1)29ddd-1	
Date sample collected:		06-26-90		06-26-90		06-14-90		06-23-90		06-21-90	
Depth sample collected:		40.0 feet		60.0 feet		21.5 feet		52.0 feet		46.5 feet	
Sample preparation:		Acid	Water	Acid	Water	Acid	Water	Acid	Water	Acid	Water
						Element concentration					
Aluminum	Al	71,000	<1	50,000	<1	47,000	<1	75,000	<1	65,000	<1
Calcium	Ca	56,000	160	46,000	54	96,000	13	32,000	29	49,000	31
Iron	Fe	33,000	<1	20,000	<1	18,000	<1	23,000	<1	23,000	<1
Potassium	K	26,000	39	18,000	10	18,000	3	27,000	3	24,000	5
Magnesium	Mg	22,000	71	16,000	15	41,000	3	11,000	5	16,000	5
Sodium	Na	9,400	11	7,700	6	14,000	7	26,000	4	18,000	4
Phosphorus	P	1,100	<1	1,400	<1	1,100	<1	1,400	<1	1,200	<1
Titanium	Ti	3,000	<1	2,000	<1	1,700	<1	3,100	<1	2,500	<1
Manganese	Mn	710	0.4	360	<0.08	390	<0.08	330	<0.08	380	<0.08
Silver	Ag	<2	<0.04	<2	<0.04	<2	<0.04	<2	<0.04	<2	<0.04
Arsenic	As	31	<0.2	<10	<0.2	<10	<0.2	<10	<0.2	<10	<0.2
Gold	Au	<8	—	<8	—	<8	—	<8	—	<8	—
Boron	B	—	0.2	—	<0.1	—	<0.1	—	<0.1	—	<0.1
Barium	Ba	340	0.08	350	0.1	710	<0.02	1100	<0.02	920	0.08
Beryllium	Be	2	<0.02	1	<0.02	1	<0.02	2	<0.02	2	<0.02
Bismuth	Bi	<10	<0.2	<10	<0.2	<10	<0.2	<10	<0.2	<10	<0.2
Cadmium	Cd	<2	<0.04	<2	<0.04	<2	<0.04	<2	<0.04	<2	<0.04
Cerium	Ce	61	<0.08	41	<0.08	61	<0.08	120	<0.08	93	<0.08
Cobalt	Co	15	<0.02	9	<0.02	8	<0.02	8	<0.02	9	<0.02
Chromium	Cr	61	<0.02	60	<0.02	21	<0.02	22	<0.02	29	<0.02
Copper	Cu	47	0.04	20	0.03	72	<0.02	24	0.04	38	0.03
Europium	Eu	<2	—	<2	—	<2	—	<2	—	<2	—
Gallium	Ga	18	—	10	—	9	—	18	—	15	—
Holmium	Ho	<4	—	<4	—	<4	—	<4	—	<4	—
Lanthanum	La	39	<0.04	27	<0.04	39	<0.04	78	<0.04	59	<0.04
Lithium	Li	83	0.3	46	0.05	12	<0.04	16	<0.04	19	<0.04
Molybdenum	Mo	3	0.5	<2	0.05	<2	<0.04	<2	0.08	<2	<0.04
Niobium	Nb	5	—	<4	—	<4	—	<4	—	4	—
Neodymium	Nd	30	—	22	—	30	—	51	—	40	—
Nickel	Ni	27	<0.04	20	<0.04	9	<0.04	8	<0.04	12	<0.04
Lead	Pb	43	<0.08	18	<0.08	25	<0.08	41	<0.08	34	<0.08
Scandium	Sc	10	—	8	—	5	—	5	—	6	—
Silica	Si	—	14	—	5	—	3	—	5	—	8
Tin	Sn	<5	<0.1	<5	<0.1	<5	<0.1	<5	<0.1	<5	<0.1
Strontium	Sr	290	0.8	150	0.5	390	0.05	520	0.08	410	0.08
Tantalum	Ta	<40	—	<40	—	<40	—	<40	—	<40	—
Thorium	Th	13	<0.08	7	<0.08	7	<0.08	17	<0.08	11	<0.08
Uranium	U	<100	—	<100	—	<100	—	<100	—	<100	—
Vanadium	V	89	<0.04	57	<0.04	46	<0.04	50	<0.04	53	<0.04
Tungsten	W	—	<0.1	—	<0.1	—	<0.1	—	<0.1	—	<0.1
Yttrium	Y	15	<0.04	18	<0.04	11	<0.04	15	<0.04	12	<0.04
Ytterbium	Yb	1	—	2	—	<1	—	1	—	1	—
Zinc	Zn	110	<0.04	63	<0.04	47	<0.04	60	<0.04	65	<0.04
Zirconium	Zr	—	<0.04	—	<0.04	—	<0.04	—	<0.04	—	<0.04

Table 12.—*Results of geotechnical tests done*

[Tests on core samples made by Chen-Northern, Inc.;

Location: See page 3 for an explanation of the well-numbering system used in Utah.
Depth sample collected: Depth in feet below land surface.
Particle-size distribution: Determined using American Society for Testing and Materials (ASTM) method D422.
Specific gravity: Determined using ASTM method D854.
Average natural dry density: Determined using ASTM method D2216.
Representative natural moisture content: Determined using ASTM method D2216 on a portion of core sample that
Volumetric moisture content and porosity were calculated using the average natural dry density and representative
moisture content and porosity were calculated using the natural dry density and natural moisture content determined
Permeameter tests: Natural dry density and natural moisture content determined for portion of core sample used in the

Location	Date sample collected	Depth sample collected (feet)	Sample description	Particle-size distribution (in percent retained)						
				Gravel	Sand			Silt	Clay	Colloids
					coarse	medium	fine			
(B-1-2)19aca-2	03-14-91	24.5	Lean clay with sand	0	0	0	24	39	12	25
(B-1-2)19aca-2	03-14-91	83.0	Lean clay	0	0	0	3	43	18	36
(B-1-2)22dad-1	05-22-91	19.4	Silty sand	0	0	0	66	27	1	6
(B-1-2)28aab-1	05-24-91	14.0	Lean clay	0	0	0	2	40	26	32
(B-1-2)32bcb-3	05-22-91	24.0	Silt clay with sand	0	0	0	22	54	7	17
(B-1-2)36baa-2	03-13-91	34.0	Lean clay with sand	0	0	1	19	55	6	19
(B-1-2)36baa-2	03-13-91	69.0	Lean clay	0	0	1	3	62	13	21
(B-1-2)36baa-3	05-14-91	19.0	Silt	0	0	0	13	71	5	11
(C-1-1)15cad-2	06-27-90	38.5	Lean clay, trace of sand	0	0	1	4	43	30	22
(C-1-1)18bda-1	06-28-90	44.5	Sandy silt and clay	0	0	1	34	44	9	12
(C-1-1)23bcd-2	06-07-90	60.0	Silty clay	0	0	2	2	62	14	20
(C-1-2)14cdd-2	03-16-91	38.5	Lean clay	0	0	0	5	57	17	21
(C-1-2)14cdd-2	03-16-91	49.0	—	—	—	—	—	—	—	—
(C-2-1)20aad-2	06-09-90	49.0	Lean clay, some sand, several voids	—	—	—	—	—	—	—
(C-2-1)20aad-2	06-09-90	59.0	Silty clay, several voids	0	0	2	2	65	14	17
(C-2-1)23ccb-1	06-19-90	29.0	Sandy clay, brown	—	—	—	—	—	—	—
(C-2-1)23ccb-1	06-19-90	40.0	Silty clay, some sand	0	0	1	9	59	18	13
(C-2-1)23dac-1	06-18-90	83.5	Silty clay/silty sand	0	0	2	2	66	12	18
(C-2-1)34bbd-2	06-11-90	39.0	Sandy silt and clay	3	4	4	24	39	11	15
(C-2-1)36cdd-2	07-24-90	63.5	Lean clay	—	—	—	—	—	—	—
(C-2-1)36cdd-3	07-26-90	129.0	Silty sand with clay zones	0	0	1	52	38	6	3
(C-2-2) 1bcd-2	06-29-90	28.0	Silty sand	2	6	27	34	23	5	3
(C-3-1)12cdb-1	06-12-90	39.0	Silty clay	0	0	1	1	47	32	19
(C-3-1)15ccb-1	03-08-91	59.0	—	—	—	—	—	—	—	—
(C-4-1) 4aaa-4	03-09-91	104.0	—	—	—	—	—	—	—	—
(D-1-1)17dab-2	07-20-90	43.0	Fat clay	—	—	—	—	—	—	—
(D-1-1)17dab-2	07-20-90	62.8	Silty clay	0	0	0	1	52	23	24
(D-1-1)19dbc-2	06-25-90	29.5	Lean clay, some voids	0	0	1	4	44	24	27
(D-1-1)30dcb-1	06-26-90	39.5	Lean clay, some sand	—	—	—	—	—	—	—
(D-1-1)30dcb-1	06-26-90	59.5	Silty clay, some sand	0	0	3	9	53	14	21
(D-2-1)17cda-3	06-14-90	21.5	Silty sand, gravel and clay zones	0	0	0	50	42	2	6
(D-2-1)29acb-2	06-23-90	51.0	Clayey sand	—	—	—	—	—	—	—
(D-2-1)29acb-2	06-23-90	52.0	Sandy silt	0	0	7	27	56	5	5
(D-2-1)30dda-2	03-12-91	53.0	Lean clay with sand	0	0	1	14	65	8	12
(D-3-1)29ddd-1	06-21-90	46.5	Sand with some silt and clay	0	2	53	35	10	0	0

on material from selected core samples

lb/ft^3, pounds per cubic foot; —, no data available]

appeared to be representative of the whole.
natural moisture content of the core sample if available. If not available, volumetric
for the permeameter tests.
permeameter test. Hydraulic conductivity was determined using ASTM method D2434.

Specific gravity	Length of sample core (inches)	Average natural dry density (lb/ft^3)	Representative natural moisture content (percent by weight)	Volumetric moisture content (percent by volume)	Porosity	Natural dry density (lb/ft^3)	Permeameter tests: Natural moisture content (percent by weight)	Permeameter tests: Hydraulic conductivity (feet per day): Constant-head test	Permeameter tests: Hydraulic conductivity (feet per day): Falling-head test
2.66	—	—	—	43.3	0.44	94	29	—	6.8×10^{-5}
2.68	—	—	—	34.8	0.37	105	21	—	7.4×10^{-5}
2.65	—	—	—	37.3	0.38	102	23	—	1.2×10^{-4}
2.85	—	—	—	58.9	0.61	70	53	—	1.7×10^{-4}
2.86	—	—	—	52.5	0.56	78	42	—	1.1×10^{-4}
2.67	—	—	—	39.5	0.38	103	24	—	8.5×10^{-4}
2.72	—	—	—	48.3	0.49	87	35	—	3.7×10^{-4}
2.64	—	—	—	34.1	0.37	104	20	—	1.8×10^{-2}
—	24	83	38	50.3	0.505	84	38	1.7×10^{-4}	5.1×10^{-5}
2.70	8	117	23	43.2	0.307	107	24	2.0×10^{-4}	9.6×10^{-5}
2.68	12	95	27	41.9	0.430	103	25	2.0×10^{-4}	6.5×10^{-5}
2.71	—	—	—	41.1	0.45	93	28	—	3.1×10^{-4}
—	—	—	—	40.0	0.43	94	26	—	6.5×10^{-4}
—	29	79	34	42.8	0.529	85	35	1.7×10^{-3}	7.9×10^{-4}
—	30	76	37	45.2	0.545	73	34	5.7×10^{-5}	3.4×10^{-4}
2.70	20	78	43	53.3	0.537	86	38	2.0×10^{-4}	8.5×10^{-5}
—	14	64	58	59.4	0.620	61	57	5.7×10^{-4}	2.1×10^{-4}
—	18	104	24	39.5	0.383	110	23	2.0×10^{-4}	1.1×10^{-4}
2.64	24	89	31	44.3	0.457	74	31	2.3×10^{-3}	1.0×10^{-3}
—	9	79	29	36.6	0.528	79	29	—	2.6×10^{-4}
2.65	10	105	25	41.9	0.366	101	25	—	2.0×10^{-4}
2.70	5	110	15	26.5	0.349	113	16	2.8×10^{-3}	2.2×10^{-3}
—	23	72	41	47.4	0.572	84	38	2.6×10^{-4}	1.0×10^{-4}
2.70	—	—	—	51.3	0.53	79	40	—	2.2×10^{-3}
2.66	—	—	—	29.3	0.23	—	—	—	—
—	10	96	30	46.0	0.430	96	30	—	8.2×10^{-5}
—	26	97	27	41.6	0.423	90	27	—	3.1×10^{-4}
—	22	81	48	61.8	0.519	91	33	2.8×10^{-4}	1.6×10^{-4}
—	24	90	59	84.6	0.466	65	58	1.7×10^{-4}	7.7×10^{-5}
2.69	23	99	26	41.1	0.413	122	39	2.8×10^{-4}	1.4×10^{-4}
2.68	28	113	22	39.2	0.324	121	15	4.8×10^{-4}	1.8×10^{-4}
2.66	12	110	23	39.6	0.338	116	16	1.4×10^{-2}	2.8×10^{-3}
2.60	2.5	108	18	30.5	0.336	79	22	2.3×10^{-3}	6.2×10^{-4}
2.71	—	—	—	39.7	0.44	95	26	—	6.5×10^{-4}
2.74	24	106	18	30.2	0.381	96	26	1.7×10^{-3}	1.7×10^{-3}

Table 13.—*Results of consolidation tests done on material from selected core samples*

[Tests on core samples made by Chen-Northern, Inc.]

Location: See page 3 for an explanation of the well-numbering system used in Utah.
Depth sample collected: Depth in feet below land surface.
Natural dry density: In pounds per cubic foot. Determined using American Society for Testing and Materials (ASTM) method D854.
Natural moisture content: Determined using ASTM method D854.
Approximate existing overburden pressure: In pounds per square foot. Estimated to be the effective stress exerted by solid material and water overlying the core sample prior to coring.
Vertical compressibility of core sample: In the inverse of pounds per square foot. Calculated using values determined from a consolidation test (ASTM method D2435) conducted on the core sample: Vertical compressibility = height 1 - height 2 / (stress 1 - stress 2) (height 0).
Specific storage: In the inverse of feet. Calculated using the equation: Specific storage = (vertical compressibility) (specific weight of water).

Location	Depth sample collected (feet)	Initial void ratio	Natural dry density (lb/ft^3)	Natural moisture content (percent by weight)	Approximate existing overburden pressure (lb/ft^2)	Vertical compressibility of core sample ($1/lb/ft^2$)	Specific storage (1/ft)
(B-1-2)19aca-2	24.5	0.773	81	39	1,130	$8.0x10^{-6}$	$5.0x10^{-4}$
(B-1-2)19aca-2	83.0	0.597	106	22	5,418	$6.4x10^{-6}$	$4.0x10^{-4}$
(B-1-2)22dad-1	19.4	0.613	99	26	1,476	$1.4x10^{-5}$	$8.7x10^{-4}$
(B-1-2)28aab-1	14.0	1.548	66	57	657	$1.4x10^{-5}$	$8.7x10^{-4}$
(B-1-2)32bcb-3	24.0	0.561	95	30	1,549	$4.0x10^{-6}$	$2.5x10^{-4}$
(B-1-2)36baa-2	34.0	0.619	104	23	2,360	$1.1x10^{-5}$	$6.9x10^{-4}$
(B-1-2)36baa-2	69.0	0.951	96	31	4,271	$6.5x10^{-5}$	$4.1x10^{-4}$
(B-1-2)36baa-3	19.0	0.589	88	36	1,241	$8.0x10^{-6}$	$5.0x10^{-4}$
(C-1-1)15cad-2	38.5	1.290	73	49	1,833	$9.0x10^{-6}$	$5.6x10^{-4}$
(C-1-1)18bda-1	44.5	0.612	105	22	3,227	$7.0x10^{-6}$	$4.4x10^{-4}$
(C-1-1)23bcd-2	60.0	0.712	98	28	3,700	$9.0x10^{-6}$	$5.6x10^{-4}$
(C-1-2)14cdd-2	38.5	0.812	92	27	2,241	$1.0x10^{-5}$	$6.2x10^{-4}$
(C-1-2)14cdd-2	49.0	0.789	96	27	2,967	$1.0x10^{-5}$	$6.2x10^{-4}$
(C-2-1)20aad-2	59.0	0.599	105	38	5,483	$9.0x10^{-6}$	$5.6x10^{-4}$
(C-2-1)23ccb-1	40.0	1.612	65	53	1,847	$1.1x10^{-5}$	$6.9x10^{-4}$
(C-2-1)23dac-1	83.5	0.631	103	22	5,692	$3.5x10^{-6}$	$2.2x10^{-4}$
(C-2-1)34bbd-2	39.0	0.586	104	29	3,389	$1.4x10^{-5}$	$9.0x10^{-4}$
(C-2-1)36cdd-3	129.0	0.699	97	25	10,374	$2.8x10^{-6}$	$1.7x10^{-4}$
(C-3-1)12cdb-1	39.0	1.075	81	40	2,213	$7.0x10^{-6}$	$4.4x10^{-4}$
(C-3-1)15ccb-1	59.0	1.130	82	41	4,498	$9.5x10^{-6}$	$5.9x10^{-4}$
(C-4-1) 4aaa-4	104.0	0.387	120	15	10,036	$3.5x10^{-6}$	$2.2x10^{-4}$
(D-1-1)17dab-2	62.8	0.734	97	26	4,819	$5.5x10^{-6}$	$3.4x10^{-4}$
(D-1-1)19dbc-2	29.5	0.853	91	33	1,981	$1.5x10^{-5}$	$9.4x10^{-4}$
(D-1-1)30dcb-1	59.5	0.784	94	30	3,590	$1.1x10^{-5}$	$6.9x10^{-4}$
(D-2-1)17cda-3	21.5	0.537	109	22	1,562	$8.0x10^{-6}$	$5.0x10^{-4}$
(D-2-1)30dda-2	53.0	0.776	102	25	5,368	$4.5x10^{-6}$	$2.8x10^{-4}$
(D-3-1)29ddd-1	46.5	0.893	90	32	2,811	$4.0x10^{-6}$	$2.5x10^{-4}$