BEDROCK AQUIFERS OF EASTERN SAN JUAN COUNTY, UTAH

U.S. GEOLOGICAL SURVEY

Open-File Report 85-568

Prepared in cooperation with the
UTAH DEPARTMENT OF NATURAL RESOURCES,
DIVISION OF WATER RIGHTS

Dept.
Seal

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Salt Lake City, Utah

1985

UNITED STATES DEPARTMENT OF THE INTERIOR

DONALD PAUL HODEL, Secretary

GEOLOGICAL SURVEY

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[Plate is in pocket]

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CONVERSION FACTORS AND RELATED INFORMATION

For readers who prefer to use metric units, conversion factors for inch-pound units used in this report are listed below:

Multiply inch-pound units	by	To obtain metric units
acre	4,047	square meter
acre-foot	1,233	cubic meter
cubic foot per second	0.02832	cubic meter per second
	28.32	liters per second
foot	0.3048	meter
foot per day	0.3048	meter per day
foot per mile	0.1894	meter per kilometer
foot squared per day	0.0929	meter squared per day
gallon	3.785	liter
gallon per minute	0.06308	liter per second
	0.00006308	cubic meter per second
inch	25.40	millimeter
	2.54	centimeter
mile	1.609	kilometer
square mile	2.590	square kilometer

Water temperature is given in degrees Celsius (°C), which can be converted to degrees Fahrenheit (°F) by the following equation:

$$^{o}F = 1.8\ (^{o}C) + 32.$$

Air temperature is given in degrees Fahrenheit (°F), which can be converted to degrees Celsius (°C) by the following equation:

$$^{o}C = {^{o}F}/1.8 - 32$$

Chemical concentration is given in milligrams per liter (mg/L) or micrograms per liter (µg/L). Milligrams per liter expresses the concentration of chemical constituents in solution as weight (milligrams) of 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 mg/L, the numerical value is about the same as for concentrations stated in the inch-pound unit of parts per million.

The terms used in this report to classify water according to the concentration of dissolved solids, in milligrams per liter, are as follows:

Fresh	Less than 1,000
Slightly saline	1,000 - 3,000
Moderately saline	3,000 -10,000
Very saline	10,000 -35,000
Briny	Greater than 35,000

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ABSTRACT

This study is one of a series of studies appraising the water-bearing properties of the Navajo Sandstone and associated formations in southern Utah. The study area is about 4,600 square miles, extending from the Utah-Arizona State line northward to the San Juan-Grand County line and westward from the Utah-Colorado State line to the longitude of about 109°50'.

Some of the water-yielding formations are grouped into aquifer systems. The C aquifer is comprised of the DeChelly Sandstone Member of the Cutler Formation. The P aquifer is comprised of the Cedar Mesa Member of the Cutler Formation and the undifferentiated Cutler Formation. The N aquifer is comprised of the sedimentary section that includes the Wingate Sandstone, Kayenta Formation, Navajo Sandstone, Carmel Formation, and Entrada Sandstone. The M aquifer is comprised of the Bluff Sandstone Member and other sandstone units of the Morrison Formation. The D aquifer is comprised of the Burro Canyon Formation and Dakota Sandstone. Discharge from the ground-water reservoir to the San Juan River between gaging stations at Four Corners and Mexican Hat is about 66 cubic feet per second.

The N aquifer is the main aquifer in the study area. Recharge by infiltration of precipitation is estimated to be 25,000 acre-feet per year. A major ground-water divide exists under the broad area east of Monticello. The thickness of the N aquifer, where the sedimentary section is fully preserved and saturated, generally is 750 to 1,250 feet. Hydraulic-conductivity values obtained from aquifer tests range from 0.02 to 0.34 foot per day. The total volume of water in transient storage is about 11 million acre-feet. Well discharge somewhat exceeded 2,340 acre-feet during 1981. Discharge to the San Juan River from the N aquifer is estimated to be 6.9 cubic feet per second. Water quality ranges from a calcium bicarbonate to sodium chloride type water.

INTRODUCTION

Purpose and Scope

The study leading to this report was made in eastern San Juan County, Utah, an area of about 4,600 square miles, which extends from the Utah-Arizona State line north to the San Juan-Grand County line and west from the Utah-Colorado State line to the longitude of about 109°50' (fig. 1). These boundaries generally encompass the area in southeastern Utah that is underlain by the Navajo Sandstone of Triassic (?) and Jurassic age, which is considered to have the potential for yielding relatively large quantities of water to wells.

Figure 1

The study, which was made by the U.S. Geological Survey, in cooperation with the Utah Department of Natural Resources, Division of Water Rights, is one of a series of studies appraising the water-bearing properties of the the Navajo Sandstone and associated formations in southern Utah. The Division of Water Rights needs the appraisals for use as a basis for judging requests for ground-water withdrawals in the area. Other reasons for the study were to consider the effects on the ground-water resources of mining and associated industrial activity and the effects of the withdrawal of water from wells for irrigation. Another consideration was the potential effect of large-scale withdrawals of ground water on the flow in the Colorado River system.

Although the major aquifer in southern Utah is the Navajo Sandstone, it thins eastward and loses its preeminence as the major water-yielding formation in eastern San Juan County. Therefore, the entire sedimentary bedrock section in the eastern part of the county was studied to assess the availability of adequate freshwater at a reasonable depth. The large size of the study area, the availability of only one person for the study, and the relative shortness of time allowed mandated that the study be conducted as a reconnaissance.

Methods of Investigation

Detailed information was collected for recharge, discharge, movement of ground water, water quality, and the relationships of ground water and surface water during fieldwork from November 1981 to November 1983. Field-data collection primarily consisted of an inventory of wells. This involved making either a depth-to-water or pressure measurement, measuring either the pumping or flowing discharge, measuring specific conductance and temperature of the water when possible, and at some wells, taking a water sample for a chemical analysis. About 50 to 60 percent of the existing water wells that penetrate the Navajo Sandstone and associated water-bearing formations were inventoried. Well-completion information for water wells was obtained from the Utah Division of Water Rights. Similar information for oil and gas wells was obtained from Petroleum Information Service, Inc., the U.S. Bureau of Land Management, and the Utah Division of Oil, Gas, and Mining.

Observation wells were measured periodically for about 1.5 years. Streamflow measurements of base flow were made during late October 1982 and early November 1983. An abandoned oil test was perforated, and a test hole was drilled to provide additional hydrologic information in an area lacking such information. Two short-term aquifer tests were conducted during this study, and the results of two other aquifer tests conducted in 1955 and 1963 are included in this report.

In addition to the well inventory, an inventory of easily accessible springs was made. Data are available from previous spring inventories by the U.S. Geological Survey (Davis and others, 1963 and Iorns and others, 1964) and by Richter (1980, Tables I and II). Information also is available in the files of the U.S. Bureau of Land Management for springs that have been developed on land that they administer.

Previous and Concurrent Studies

Gregory (1916) did the earliest hydrologic work in the area on the Navajo Indian Reservation. Waring and Knechtel (1935) did a ground-water study in southeastern Utah and southwestern Colorado, and Feltis (1966) prepared a general summary of available data in Utah on the occurrence and water quality of water in bedrock.

Many stratigraphic and structural studies have been made in the area, but most presented little hydrologic information. Jobin (1962), however, made a regional study of hydraulic properties of the Cretaceous to Permian sedimentary-rock sequence that was intended to aid in locating uranium deposits, and Hanshaw and Hill (1969) made a hydrologic and geochemical study of the regional aquifers in Paleozoic rocks to aid in oil and gas exploration and development. Summaries of much of the geologic information can be found in reports edited by Sanborn (1958) and Wiegand (1981).

Iorns and others (1964 and 1965) did a regional hydrologic study that included San Juan County. A comprehensive study of the geology and water resources of the Navajo Indian Reservation, a part of which extends across southern San Juan County, was reported on by Harshbarger and others (1957), Davis and others (1963), Kister and Hatchett (1963), and Cooley and others (1969).

Sumsion (1971) and Eychaner (1977) reported on the aquifer in the valley-fill deposits in Spanish Valley, about 2 miles south of Moab in north-central San Juan County and southern Grand County. Sumsion (1975) made a reconnaissance of the ground-water resources in the San Juan River valley, about 40 miles south of Monticello, which is an area where the fluvial deposits are considered to be an important aquifer.

The study area lies nearly entirely within the Paradox Evaporite Basin which is a depositional basin in Colorado and Utah delineated by the areal extent of evaporite deposits in the Paradox Member of the Hermosa Formation of Pennsylvanian age. Hydrologic information for the Paradox Basin are contained in reports by Weir and others (1983) and Whitfield and others (1984). The U.S. Geological Survey presently (1985) is studying the ground-water resources of the entire Upper Colorado River Basin as part of its Regional Aquifer Systems Analysis (RASA) program.

Numbering systems for data sites

The system of numbering wells and springs in Utah is based on the cadastral land-survey system of the U.S. Government (fig. 2). The number, in addition to designating the well or spring, describes its position in the land net. By the land-survey system, the State is divided into four quadrants by the Salt Lake base line and meridian, and these quadrants are designated by the letters A, B, C, 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

Figure 2

quarter-quarter section, and the quarter-quarter-quarter section--generally 10 acres;[1] the letters a, b, c, and d[2] indicate, respectively, the northeast, northwest, southwest, and southeast quarters of each subdivision. The number after the letters is the serial number of the well or spring within the 10-acre tract; the letter "S" preceding the serial number denotes a spring.

If a well or spring cannot be located within a 10-acre tract, 1 or 2 location letters are used and the serial number is omitted. Thus, (D-32-24)22adb-1 designates the first well constructed or visited in the NW1/4SE1/4NE1/4 sec. 22 T.32 S., R.24 E., and (D-27-23)31dbc-S1 designates a spring in the SW1/4NW1/4SE1/4 sec. 31, T.27 S., R.23 E. Other sites referenced in the text are numbered in the same manner, but no serial number is used. The numbering system is illustrated in figure 2. In this report, the letter "T" that precedes a well or spring number indicates that the well or spring is in a so-called half-township, a result of errors in the initial land survey.

Surface-water gaging stations, where continuous records are available, are identified by an eight-digit downstream-order number adopted by the U.S. Geological Survey. (See U.S. Geological Survey, 1982b, p. 24.) Thus, the station on the San Juan River near Bluff, Utah, is designated 09379500.

Acknowledgments

The author gratefully acknowledges the cooperation of William Sarson of Energy Fuels Nuclear, Inc., during the aquifer test, John Roring for allowing the drilling of a test hole on his property, and Travest Johnson for allowing access to re-enter a test hole on his property. Thanks are also expressed to all others who cooperated and contributed to the study.

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[1]Although the basic land unit, the section, theoretically is 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.

[2]In computer-generated tables or illustrations, these four letters are capitalized.

GEOGRAPHIC SETTING

Physiography

The study area (fig. 3) is in the Colorado Plateau physiographic province, which is characterized by high altitudes and deeply incised drainage systems. Dissected mesas form several levels, the topmost being at about 7,000 feet at Monticello. They are capped by different resistent sandstone units, which dip off in all directions away from the Abajo Mountains. The topography surrounding the La Sal Mountains is similar, although faulting has interrupted the continuity of some of the mesas. Peaks of 11,360 feet in the Abajo Mountains (fig. 4) and 12,721 feet in the La Sal Mountains (fig. 5) contrast with an approximate altitude of 4,100 feet on the San Juan River at Mexican Hat and 3,900 feet at the confluence of the Green and Colorado Rivers.

The San Juan River flows westward across the southern part of the study area, eventually merging with the Colorado River at Lake Powell. Tributaries to the San Juan River drain about two-thirds of the study area (pl. 1). The Dolores River drainage, predominately in Colorado, includes several eastward-flowing tributaries in San Juan County. The remaining tributaries drain directly to the Colorado River, which crosses the northwest edge of the study area.

Climate

Total annual precipitation in eastern San Juan County ranges from slightly less than 6 inches near Mexican Hat to slightly more than 30 inches in the mountains (fig. 6). The total precipitation in the study area is estimated to average 2.86 million acre-feet per year. In the areas along the Colorado and San Juan River valleys, the meager precipitation is well distributed throughout the year, but the precipitation during October-April proportionately increases as altitude increases. In the mountains, two-thirds of the annual precipitation falls during October-April (U.S. Weather Bureau, no date).

Much of the precipitation during October-April can fall as snow because temperatures commonly are near or below freezing throughout much of the area. Nevertheless, the snowfall generally accumulates for more than a few days only on the mountains and their flanks. Snow does not accumulate on the lower mesas and along the rivers because of the smaller rates of winter precipitation and greater rates of sublimation due to the prevailing low humidity.

In summer, daytime temperatures commonly reach 90 to 100°F along the rivers, whereas 80°F is more common on the higher mesas. Unstable convective cells often result in locally intense thundershowers, which may result in flash floods.

Figure 3

Figure 4

Figure 5

Figure 6

The average annual evaporation from a free-water surface, which is considered approximately equivalent to potential evapotranspiration from a vegetative surface with unlimited water, substantially exceeds the average annual precipitation throughout the area (Farnsworth and others, 1982, Map 3). The annual evaporation exceeds 65 inches along the San Juan River and is slightly less than 45 inches in the mountains.

The precipitation records in figure 6 for the three towns indicate that the number of years of below-normal precipitation exceeds the number of years of above-normal precipitation. The deviation from average is greater during the years of above-normal precipitation, however, and the surplus precipitation generally leaves the area in floods.

Population and Economy

The population of San Juan County in 1980 was 12,253 (U.S. Bureau of the Census, no date). The study area contains about 10,400 persons, with two major centers of population at Monticello and Blanding, which have a combined population of 5,047. The smaller communities of La Sal, Bluff, Mexican Hat, Montezuma Creek, and Aneth, as well as Monticello and Blanding, have some form of municipal water system. Several other small, unincorporated communities are scattered throughout the county, but widely dispersed rural population occurs only on the Navajo Indian Reservation and on the Sage Plain east of Monticello. Hauling water for domestic use from a nearby well or from town is a common occurrence on the Navajo Indian Reservation and in some other parts of the study area where freshwater is not available.

Irrigation with ground water occurs in several areas of San Juan County. Surface-water and ground-water sources are used conjunctively, in most cases. The use of ground water for industry has been increasing, predominately due to the operation of two recently constructed uranium-processing mills. Assorted mineral resources occur in San Juan County. Actively extracted minerals include uranium and vanadium in the La Sal Creek, Lisbon Valley, and Cane Creek districts of the northern part of the county, and oil and gas generally in the southeast part of the county. Copper mining south of LaSal has been an intermittent activity for more than 50 years. Minerals with potential leases include potash in the northeastern part of the area and coal where ever the Dakota Sandstone exists.

GEOLOGIC SETTING

Stratigraphy and Hydrologic Units

The stratigraphy of the study area is presented in table 1. The maximum known thickness of the post Precambrian sedimentary section is about 10,000 feet. The entire sedimentary section can be water bearing to some degree, though the permeability, thickness, and relation to recharge areas govern the water-yielding ability of individual formations. Some of the water-yielding formations are grouped into aquifer systems, following the nomenclature of Cooley and others (1969).

Structure

Laccoliths of Tertiary age which form the La Sal and Abajo Mountains, have modified the local structure and influence the local hydrology. The greatest recharge to any of the aquifers in the study area undoubtedly occurs on the flanks of these mountains.

The Monument upwarp (fig. 7) is a large breached, asymmetric anticline, which generally strikes northward. It bounds the western side of the study area south of the Abajo Mountains. Comb Ridge (fig. 7) is the surficial expression of the eroded steeper limb of Comb monocline, which is the eastern part of the Monument upwarp. The monocline generally is a restriction to the flow of ground-water.

The Blanding structural basin shows closure of at least 500 feet from adjacent basins. There is some expression of a smaller basin, which is called the Mesa Verde structural basin in southwestern Colorado (Haynes and others 1972), in the extreme southeastern corner of the study area between the Blanding structural basin and the San Juan structural basin in northwestern New Mexico. An anticlinorium, or series of anticlines and synclines that form a general arch or upwarp, exists in the study area south of the San Juan River. The area north of a southeast-trending line from the Abajo Mountains is referred to as the Paradox fold and fault belt (Kelley, 1958, p. 31).

Five grabens have been recognized to the north and south of the Abajo Mountains (fig. 7). Displacement of one fault in the Verdure graben (fig. 8) is about 200 feet (fig. 9).

The La Sal Mountains are surrounded by anticlinal structures resulting from intrusions of salt domes which later collapsed due to salt dissolution (Baars and Stevenson, 1981, p. 28 and 30). These processes formed discrete valleys, such as Lisbon and Spanish Valleys, which are bounded on the southwest side above each salt intrusion by a normal fault scarp of major displacement.

Figure 7

Figure 8

Figure 9

Structural deformation causes rock fractures; zones of secondary permeability, due to fracturing, may be delineated by lineament concentrations. Lineament trends and concentrations mapped by Knepper (1982) in the study area south of the 38th parallel appear to be in association with known tectonic structures. An exception is a concentration of lineaments that trend North 0-16° East south of Eastland. North of the 38th parallel, Friedman and Simpson (1980) mapped an extensive lineament concentration which coincides with Spanish and Lisbon Valleys.

HYDROLOGIC SETTING

Surface Water

The location of active (1983) stream-gaging stations operated by the U.S. Geological Survey in and near the study area are shown on plate 1 and streamflow characteristics of selected stations are listed in table 2.

Perennial streams in the area are the Colorado and San Juan Rivers and McElmo Creek. However, the San Juan River was dry for 11 consecutive days during 1934 and for 4 consecutive days during 1939 (U.S. Geological Survey, 1982b, p. 390). Since 1962, the Navajo Reservoir in New Mexico and Colorado has controlled part of the runoff from snowmelt to the San Juan River. Water diverted from the Dolores River for irrigation and municipal use around Cortez, Colo., partly maintains the flow in the McElmo Creek drainage.

A large part of the study area is drained by ephemeral or intermittent streams that generally are perennial in their headwaters. The length of the perennial reaches is dependent on evapotranspiration, diversions, and stream-aquifer relationships.

Below an altitude of about 6,000 feet, phreatophytes such as greasewood (Sarcobatus vermiculatus) are common in wide stream bottoms. Direct evaporation from the shallow water-table and transpiration by phreatophytes increases downstream in all drainages so that little or no perennial flow occurs in most of the tributaries at their confluence with the San Juan or Colorado Rivers.

In some streams, diversions have altered the natural flow. Water from Chinle Creek is diverted in Arizona for irrigation and stock use. Flow in Indian Creek, on the north flank of the Abajo Mountains, is diverted by tunnel and pipeline to Johnson Creek, on the south flank of the mountains. Diversions from Johnson Creek deliver the water for irrigation in the Blanding area. The water rights for this diversion are 50 cubic feet per second through the tunnel and 2 cubic feet per second through the pipeline (Norman Nielson, San Juan County Water Conservancy District, oral commun., 1983). Diversions from other streams for irrigation are on the north and east flank of the Abajo Mountains near Monticello, along the upper and middle reach of Montezuma Creek, on the east and south flanks of the La Sal Mountains, and along the San Juan River. The six water rights for direct diversion for irrigation from the San Juan River total about 34 cubic feet per second (Norman Nielson, San Juan Water Conservancy District, oral commun., 1983). During 1981, the municipalities of Blanding and Monticello and the water district on the Navajo Indian Reservation at Mexican Hat (Halgaito) diverted about 693 acre-feet of surface water for public supply (Hooper and Schwarting, 1982).

The natural flow in streams is affected by the relation of the stream to adjacent and underlying aquifers. Seepage of ground water (base flow) often is the main source of flow in perennial reaches of streams. When evapotranspiration decreases to near zero in the late fall, the streamflow can be considered to be equivalent to the discharge from the aquifers. Miscellaneous measurements of streamflow to measure base flow were made in the drainage basins of Indian Creek, North Cottonwood Creek, and Cottonwood Wash during late October 1982 and in Montezuma and McElmo Creeks during early November 1983 (table 3).

Ground-water discharges along nearly the entire reach of the San Juan River between the gaging stations at Four Corners, Colo., and Mexican Hat. Data for November 1980 were used to calculate ground-water discharge in the following equation:

$$Q_D = Q_u + GI + SI - D - ET \qquad (1)$$

where

Q_D = discharge at downstream gage (San Juan River near Bluff)
Q_u = discharge at upstream gage (San Juan River at Four Corners, Colo.)
GI = ground-water discharge to the river
SI = surface-water tributary inflow (McElmo Creek)
D = diversions
ET = evapotranspiration

It was assumed that D and ET were zero.

Substituting in equation 1 gives the following:

$104{,}000 = 97{,}050 + GI + 3{,}040 - 0 - 0$
GI = 3,910 acre-feet per month (30 days)
or, GI = 66 cubic feet per second.

The San Juan River is sampled periodically for determination of chemical quality at the Four Corners and Bluff gaging stations (U.S. Geological Survey, 1981b and 1982b). During low-flow periods, the dissolved-solids concentration is nearly the same at the two stations. During high-flow periods, the dissolved-solids concentration increases by about 100 milligrams per liter between the stations. This may result from the solution of the saline residues that accumulate due to the process of evapotranspiration.

Ground Water

General occurrence

The major water-yielding formations in the study area have been grouped together into five aquifers designated as P, C, N, M, and D in order of decreasing depth (table 1). Although they are treated individually in the following discussion, little is known of the interaction of the five aquifers or to what degree they are isolated or perched. It is known, however, that the aquifers are not laterally or vertically homogeneous and that they are not entirely isolated by confining beds.

The alluvial deposits in the study area are water bearing and in some places yield small quantities of water to wells, but they are not discussed as aquifers in this report because of their small areal extent. Two areas where the alluvial deposits have been studied are Spanish Valley (Sumsion, 1971) and the San Juan River valley between Aneth and Montezuma Creek (Sumsion, 1975). In these two areas, the alluvial deposits are the primary source of fresh water.

The uranium ore-bearing units of the Chinle Formation are not considered part of any major aquifer, but they yield large quantities of water to uranium mines in the La Sal area. During 1981, about 877 acre-feet of water was pumped from these mines (Utah Division of Environmental Health, written commun., 1981).

P and C Aquifers

Recharge

The P aquifer consists of the Cedar Mesa Sandstone Member of the Cutler Formation or the Cutler Formation undifferentiated. Infiltration from precipitation recharges the P aquifer west of Comb Ridge and its extension north of the Abajo Mountains, where the Cedar Mesa Sandstone Member crops out, and in the Lisbon Valley area where the undifferentiated Cutler Formation crops out (fig. 10). The recharge is estimated to be 5 percent of the total average precipitation falling on those outcrop areas, or about 18,000 acre-feet per year.

Other sources of recharge to the P aquifer possibly are the San Juan River at the downdip side (west side) of the Raplee anticline (fig. 7) east of Mexican Hat and upward movement of water from the Hermosa Formation. Some subsurface flow also may occur in the P aquifer across the State line from Colorado and Arizona. The quantity of all these sources of subsurface recharge is unknown.

The C aquifer consists of the De Chelley Sandstone Member of the Cutler Formation. There are few outcrops of this formation in the study area, and they generally do not occur in the recharge areas. Thus, the source of recharge for the C aquifer is interformational leakage and subsurface flow from Arizona and Colorado. The quantity of recharge is not known.

Figure 10

Movement

Hanshaw and Hill (1969, fig. 8) present a potentiometric map of the Permian aquifer, which is equivalent to the P aquifer in this report. Flow in the study area generally is to the north or south of the Sage Plain. Water movement to the north is diverted by the structural high surrounding the La Sal Mountains towards the Colorado and Dolores Rivers. Water movement to the south combines with flow from the east originating in the San Juan Mountains of western Colorado.

Hanshaw and Hill (1969, p. 290) postulate a deep fault along the Comb monocline that is a barrier to water movement in the P aquifer. The P aquifer west of Comb Ridge and south of the Abajo Mountains, is greatly dissected and upgradient of the flow system in the deeply buried aquifer east of Comb Ridge. Thus, the P aquifer west of Comb Ridge generally is comprised of local flow systems, which are greatly influenced by the topography. The water movement generally is to the west and south.

The flow system is under water-table conditions in the P aquifer in the northwestern part of the study area and is largely a continuation of deep-circulating flow from the Sage Plain which moves towards the Colorado River. A flowing well (D-30-24)12dab-1 in the P aquifer probably results from local flow moving downdip from the La Sal Mountains. Flow in the C aquifer is probably toward the north from the Arizona-Utah State line to the San Juan River.

Hydraulic properties

The thickness of the sandstone units of the P aquifer ranges from 20 feet east of the La Sal Mountains to 1,200 feet, where not eroded, west of the Abajo Mountains (Jobin, 1962, fig. 5). In the La Sal area, the P aquifer is actually more than 20 feet thick because it includes the thin, discontinuous sandstone beds within the undifferentiated Cutler Formation. In the canyonlands area, north of the Abajo Mountains, the Cedar Mesa Sandstone Member is 0 to 700 feet thick (Sumsion and Bolke, 1972, table 1). The C aquifer is about 200 feet thick along the Utah-Arizona State line but thins to zero at the San Juan River (Cooley and others, 1969, fig. 3).

Specific capacities were 0.7 and 0.2 gallon per minute per foot for wells (D-30-20)20aca-1 and (D-30-20)30cba-1 completed in the Cedar Mesa Sandstone Member of the Cutler Formation. Using driller's information for a well penetrating the P aquifer in Hans Flat in Canyonlands National Park, about 25 miles west of Dead Horse Point, Huntoon (1979, p. 8-9) calculated a transmissivity of 30-40 gallons per day-foot, or 4.0 to 5.3 feet squared per day. The initial saturated thickness of 258 feet would give an approximate hydraulic conductivity of 0.02 foot per day.

The distribution of permeability of the Permian sandstones, which correspond to the P and C aquifers, was reported by Jobin (1962, fig. 6). He noted a general increase in permeability from east to west across the study area from slightly less than 20 millidarcys to slightly more than 148 millidarcys (equivalent to hydraulic conductivity of 0.05 to 0.35 foot per day).

Discharge

Discharge from the P and C aquifers is from springs, to streams, by interformational leakage, by evapotranspiration, and from wells. The only quantitative information available is for three wells that provide water for public supply in The Needles area of Canyonlands National Park. These wells discharged 0.90 acre-foot of water from the Cedar Mesa Sandstone Member in 1967 (Sumsion and Bolke, 1972, p. 56). Visitation to the park has increased steadily since 1967 so the well discharge undoubtedly has increased. Interformational leakage to the Hermosa Formation near Mexican Hat by osmotic flow may be indicated by an anomalously deep water level obtained in the P aquifer from a drill-stem test (Hanshaw and Hill, 1969, p. 280). In addition, upward leakage into the C aquifer and the Moenkopi Formation probably occurs where the P aquifer is deep and the water is under confined pressures.

A small quantity of subsurface flow moves eastward into Colorado from the La Sal area in the P aquifer. Subsurface outflow in the local flow systems of the P and C aquifers occurs along the west line of the study area.

Chemical quality

North of Monticello, where the P aquifer is exposed, the analyses in table 4, such as for wells (D-30-20)20aca-1 and (D-30-20)12dab-1, indicate a dissolved-solids concentration of less than 1,000 milligrams per liter. The water is a calcium bicarbonate or calcium magnesium bicarbonate sulfate type. Eastward, in the La Sal area, where the P aquifer is more than 5,000 feet below land surface, the analyses in table 4 for wells (D-28-23)2bcd-1 and (D-29-26)5ddb-1 indicate moderately to very saline water of the calcium or magnesium sodium sulfate type.

In the southern part of the study area, where the C aquifer exceeds 2,500 feet in depth near Aneth, analyses of water from wells (D-41-24)19ac-1 and (D-41-25)17ddc-1 in table 5 indicate moderately saline water to briny water. The water in this area is of the sodium chloride type. South of the Abajo Mountains, the fault barrier along the Comb monocline postulated by Hanshaw and Hill (1969, p. 290) probably prevents the mixing of the briny water on the east side of the study area with the freshwater on the west side. Analysis of water from spring (D-43-19)29-S1 indicates a calcium bicarbonate water.

N Aquifer

Recharge

The N aquifer, which includes the Wingate Sandstone, the Kayenta Formation, the Navajo Sandstone, the Carmel Formation, and the Entrada Sandstone, is the main aquifer in the study area. The primary recharge areas by direct infiltration of precipitation are Dry Valley and contiguous areas north of Monticello, the Chippean Rocks area northwest of Blanding (fig. 11), and Nokaito Bench south of Bluff (fig. 12). Parts of these areas are covered with alluvium, which most likely is a retaining medium for potential recharge water. Minor recharge probably occurs along Comb Ridge.

Figure 11

Figure 12

A vertical potentiometric gradient within the N aquifer, as determined from differing water levels in wells (D-28-23)31abc-1 and (D-28-23)31dcc-1 (table 6) indicates potential recharge from downward leakage around Flat Iron Mesa, northwest of La Sal Junction. Recharge by infiltration of precipitation to the N aquifer is estimated to be 5 percent of the total average precipitation that falls on the area of outcrop, or about 25,000 acre-feet per year.

The hydrograph for well (D-31-23)24dbd-1 (fig. 13) in the Navajo Sandstone shows that most water-level rises occurred during the spring and early summer. This indicates recharge from precipitation that fell during the winter and spring. The hydrograph for well T(D-29-23)33dbb-1 (fig. 13), located approximately 0.25 mile from the midline of Hatch Wash, indicates a slight rise of water level from 1955 to 1977. This suggests that the recharge from seepage from streamflow exceeds the consumption of water by the dense growth of phreatophytes in Hatch Wash.

Recharge to the N aquifer from streams was measured in Cottonwood Wash between Posey and Allen Canyons (0.19 cubic feet per second) and in Montezuma Creek between the confluence with Verdure Creek and Coal Bed Canyon (3.16 cubic feet per second) (table 3). The water lost to the N aquifer from Montezuma Creek moves southeast, following the potentiometric gradient in the area.

In northern San Juan County, the N aquifer is not exposed along the flanks of the La Sal Mountains nor on the Sage Plain. Thus, interformational leakage from overlying formations is assumed to occur in these areas. Water levels measured in the M and N aquifers in well (D-32-24)22adb-1 (table 6) indicate a difference in hydraulic head of 337 feet, with a downward potentiometric gradient. The reported water level of 550 feet in well (D-29-24)17aa-1 in the N aquifer is much deeper than general depths to water in the D and M aquifers.

In southern San Juan County, where the N aquifer is deeply buried, upward leakage probably occurs from the underlying formations. Some movement of water may be along the faults in the grabens that bound the Abajo Mountains.

Subsurface flow may occur in the N aquifer to the study area across the State line from Colorado south of Township 37 South, and across the entire State line from Arizona. These suppositions are based on the potentiometric surface of the aquifer, and the quantity of water is unknown.

<u>Movement</u>

The general direction of water movement in the N aquifer is shown by the potentiometric surface in figure 14. The potentiometric surface has been generalized because of differences of water level in many places due to vertical gradients in the thick aquifer. For example, at sec. 31, T.28 S., R.23 E., which is in a recharge area, the difference in water level between a shallow and deep well exceeds 400 feet. At sec. 5, T.39 S., R.25 E., which is in a discharge area, the difference in water level between deep and shallow wells exceeds 300 feet.

Figure 13

Figure 14

A major ground-water divide is in a broad area under the Sage Plain east of Monticello, and the flow north of the divide generally follows the configuration of the base of the Wingate Sandstone. South of the divide, the water generally moves toward the San Juan River, although east of Monticello there is some movement toward the southeast.

Water also moves north to the San Juan River from the outcrops of the Wingate Sandstone on the east side of the Carrizo Mountains in Arizona and from a large area of outcrop of the N aquifer in the upper drainage of Chinle Creek in northern Arizona (O'Sullivan and Beikman, 1963). The position (relative to the San Juan River) of the 4,750-foot potentiometric contour south of the San Juan River possibly reflects a small quantity of recharge relative to flow from the east from the Carrizo Mountains or a westward thickening of the Navajo Sandstone and resulting increase in transmissivity at the State line.

South of the La Sal Mountains, water moves to the west and southeast from a ground-water divide that extends in a southwest direction. Near La Sal, downgradient of the recharge area, the water exists under confined conditions, probably due to the ground-water barrier formed by the noncollapsed part of the anticlinal structure in Lisbon Valley.

On the east and south flanks of the Abajo Mountains (fig. 14), the water in the N aquifer becomes confined directly downdip from the recharge area. The steep dip of the aquifer results in flowing-well conditions about 15 miles south of the recharge area.

Flowing-well conditions exist in three areas where the N aquifer is not overlain by the Summerville Formation, which elsewhere is a confining bed. The first area is in the area around Bluff. There the Entrada Sandstone is represented only by a silty facies (Harshbarger and others, 1957, fig. 25), which is thought to be the Slick Rock Member. Thus, where the Entrada Sandstone is uneroded around Bluff, it is a confining bed. In the second area, the Gothic Creek Wash south of Bluff, the Carmel Formation or fine-grained alluvium or both confine water in the underlying Navajo Sandstone. In the third area, which is the downstream part of East Canyon Wash, upstream from U.S. Highway 163 between Monticello and La Sal Junction, the Kayenta Formation, which contains considerable interbedded silt, is an upper confining bed for water in the Wingate Sandstone. Wells such as (D-31-24)5cbc-1 open to the Wingate Sandstone in this area flow, whereas wells such as (D-31-24)24bdb-1 open to the Navajo Sandstone do not (table 6).

Hydraulic properties

The thickness of the N aquifer where it is fully preserved and saturated generally is between 750 and 1,250 feet. This full section is present in about 75 percent of the total areal extent of the aquifer. The areal extent and altitude of the top and base of the N aquifer are shown in figures 15 and 10, and the potentiometric surface is shown in figure 14.

Figure 15

Two aquifer tests on the N aquifer were conducted during this study and another was conducted in 1963 at the supply well at Hovenweep National Monument. The calculated values of hydraulic conductivity from these tests ranged from 0.02 to 0.34 foot per day (table 7). Values for specific capacity for wells that penetrate the N aquifer range from 0.1 to 15 gallons per minute per foot (table 6). The largest value was for well (D-29-24)17aa-1 in an area near the Lisbon Valley anticline where the rock may be extremely fractured. The only value available for storage coefficient (table 7) indicates a confined aquifer.

The values for hydraulic conductivity cited above are for the N aquifer, but they are in the same range of magnitude to values obtained outside the study area for the Navajo Sandstone. For details of the other tests, the reader is referred to Cooley and others (1969, table 7), Sumsion (1971, table 9), Hood and Danielson (1981, tables 2 and 12), and Blanchard (1985, table 2).

The distribution of permeability in the study area for individual formations in the N aquifer as reported by Jobin (1962, figs. 14, 17, 20, 23) indicates a range between 60 and 400 millidarcys (0.13 and 0.98 foot per day). Values for the Wingate Sandstone range from slightly greater than 60 to slightly greater than 150 millidarcys (0.13 to 0.36 foot per day), with the largest values south of the San Juan River and north of the escarpment bounding the Sage Plain. The permeability of the Kayenta Formation ranges from slightly less than 60 to slightly greater than 150 millidarcys (0.13 to 0.36 foot per day), with the greatest values in the west-central part of the area. Values for the Navajo Sandstone range from slightly less than 240 to slightly greater than 400 millidarcys (0.60 to 0.98 foot per day), with the greatest values on the west side of the study area. The permeability of the Entrada Sandstone ranges from slightly less than 60 to slightly greater than 150 millidarcys (0.13 to 0.36 foot per day), with the greatest values in the southeast part of the study area.

Thus, the Navajo Sandstone is the most permeable formation in the N aquifer, although the range of permeability is considerable. The values for permeability, however, were determined from tests made on surface samples or shallow cores (Jobin, 1962, p. 8), and the great range may be due to variations of cementation resulting from the varying degrees of weathering. For the N aquifer as a whole, the variation of permeability, and consequently hydraulic conductivity, among the formations is not great enough so that the transmissivity of the entire aquifer would vary significantly in proportion to the regional variation in thickness of the formations that compose the aquifer.

<u>Storage</u>

Hood and Danielson (1981, p. 36) assumed specific yields of 5 and 9 percent for the Wingate and Navajo Sandstones. Since the N aquifer in eastern San Juan County includes the fine-grained Entrada Sandstone as well as the thinner Navajo Sandstone, the smaller value of 5 percent is taken to represent the specific yield of the entire N aquifer.

The areas of discrete thickness of the N aquifer where saturated were determined by planimeter and totaled, resulting in an integrated volume of saturated aquifer of 230 million acre-feet. This, combined with a specific yield of 5 percent gives a total volume of ground water in transient storage of about 11 million acre-feet.

Discharge

The N aquifer discharges to several streams that cross its area of outcrop (including the San Juan River), to wells, to springs and seeps, by evapotranspiration, and by subsurface flow out of the study area. Measurements that indicate discharge from the N aquifer to streams are shown in table 3 for Cottonwood Wash (0.45 cubic foot per second) and Indian Creek (0.22 cubic foot per second). The flow in the North Cottonwood Creek drainage (1.89 cubic feet per second) is assumed to be discharge from the N aquifer from the northwest flank of the Abajo Mountains and Shay Mountain to North Cottonwood Creek and from spring flow along the north side of the Hop Creek canyon. Although not measured, Chinle Creek receives discharge from the N aquifer which has moved westward from a divide south of Bluff (fig. 14). This water generally discharges as spring flow in the short tributaries on the east side of Chinle Creek.

Ground water discharges to the San Juan River in the study area from the sedimentary section below the Brushy Basin Member of the Morrison Formation. The discharge from the N aquifer is estimated by applying Darcy's law: The discharge from the N aquifer is assumed to occur for 17.5 miles along both sides of the San Juan River upstream from Comb Ridge; the decrease in hydraulic head is about 250 feet in the 5 miles upgradient on the north side of the river; from the aquifer test at well (D-37-22)28dbb-1 (table 7), the hydraulic conductivity is estimated to be 0.34 foot per day; and the N aquifer is about 1,000 feet thick at the San Juan River. Thus, expressing Darcy's law in equation 2:

$$Q = 0.061 \; K \; I \; A \qquad (2)$$

where

Q = discharge, in cubic feet per second;
0.061 = the net factor to convert all units to feet and seconds;
K = hydraulic conductivity, in feet per day,
= 0.34 foot per day;
I = hydraulic gradient, in feet per mile,
= 50 feet per mile; and
A = cross-sectional area through which flow occurs, in square miles,
= 6.63 square miles.

About 6.9 cubic feet per second (5,000 acre-feet per year) is calculated as ground-water discharge from the N aquifer to the river.

The N aquifer generally is the objective of most well drillers where the D aquifer is not saturated. This area generally includes Dry Valley and contiguous areas north of Monticello, the canyon bottoms south of Monticello, and most of the area south of the San Juan River.

The first deep wells completed in the confined N aquifer were drilled at Bluff in 1910. Since then, many more flowing wells have been drilled, predominately in the San Juan River valley and lower Montezuma Creek canyon. These wells generally were allowed to flow freely, even when the water was not used. Initially, a flowing well in lower Montezuma Creek canyon was capable of discharging 400 to 500 gallons per minute, but after a month of continuous flow, discharge decreased to about 80 gallons per minute (Lofgren, 1954, p. 115). This practice has resulted in a decline of water levels throughout the area. For example, the hydrograph for well (D-38-24)11dbd-1 (fig. 13) shows a persistent trend of decline in the potentiometric surface near Montezuma Creek canyon. This decline is the result of unabated flow from at least six wells in the area since the mid-1950's. The combined flow of four of these wells has decreased from 538 to 92 gallons per minute since 1961. One well (D-38-24)11dbd-1 (table 6) has already stopped flowing, and eventually enough water will have been discharged from the aquifer to lower the potentiometric surface to a level at which all the wells will stop flowing.

The potentiometric surface near the town of Montezuma Creek shows a closed depression (fig. 14). The most likely cause is intensive pumping by wells, possibly wells on the south side of the San Juan River which have been plugged and abandoned. However, an upward potentiometric gradient exists in the area; thus the depression could be the result of comparing lower water levels in shallow wells in the Montezuma Creek area to higher water levels in deeper wells in the surrounding area.

The residents of Bluff have obtained water from wells completed in the N aquifer since 1910. Previous to the installation of a municipal system during the mid-1960's, many private wells were used, and these wells commonly flowed free. According to Lofgren (1954, p. 117), the water levels in the flowing wells drilled during 1910 at Bluff exceeded 150 feet above land surface. Compared to 1982 water levels, this indicates an approximate decline of 100 feet. In 1981, pumpage from the municipal wells in Bluff was 34.1 acre-feet (Hooper and Schwarting, 1982, p. 55). The hydrographs of wells (D-40-21)25acb-1 and (D-40-22)30bbb-1 (fig. 16) indicate that no significant declines of the potentiometric surface has occurred since the establishment of the municipal system.

Additional withdrawals of water from the N aquifer include about 25 acre-feet per year that is pumped from 2 wells for public-water supply on the Ute Indian Reservation at White Mesa. The withdrawal total is based on per-capita use.

Figure 16

The total discharge during 1981 from the N aquifer by wells is estimated to have slightly exceeded 2,340 acre-feet. About 1,192 acre-feet was pumped from wells during 1981 for industrial use (National Water Use Data System, 1981-82). Although most stock water is obtained from surface-water impoundments, free-flowing wells and pumped wells completed in the N aquifer provide a more reliable source and the only source in some areas. Most, if not all, the flowing wells in Gothic Creek wash, of which only a few are listed in table 6, were drilled as shot holes for geophysical studies by petroleum exploration companies. These and other wells south of the San Juan River are scattered to supply stock water and domestic water to the widely dispersed Indian population. The wells in Dry Valley and contiguous areas all supply water for stock, although some have been unused for many years. An estimated 21 acre-feet per year is discharged from wells for stock in the study area. The estimate is based on distribution of wells, length of time in use, and estimates of discharge.

Water from flowing wells in the N aquifer is used for the irrigation of alfalfa in the San Juan River valley upstream from Bluff. This is supplemental to surface water diverted from the San Juan River (fig. 17). Water also is pumped from the N aquifer for irrigation of about 500 acres of alfalfa, grass, and orchard trees along Montezuma Creek above Dalton's Ranch in sec. 14, T. 36 S., R. 24 E. At an estimated applied rate of 2 feet of water per irrigation season, this would total 1,000 acre-feet per year. The water from the free-flowing wells in sec. 7, T.38S., R.25E., is partly used for irrigation of pasture. The minimum annual discharge from free-flowing wells is 70 acre-feet. This is a minimum value because not all free-flowing wells were measured.

Numerous springs discharge from the N aquifer along the entrenched drainages north of the Abajo Mountains. The quantity of water discharged by springs and seepage is not known, nor is the quantity of water discharged directly from the N aquifer by evapotranspiration. Also, springs discharge along the lower part of Butler Wash, northwest of Bluff, and along Chinle Creek southwest of Bluff.

Subsurface outflow from the study area in the N aquifer occurs in the La Sal and Sage Plain areas eastward into Colorado and northward into Grand County, west of Spanish Valley. The quantities of subsurface flow are unknown.

Chemical quality

The variations of chemical quality of water in the N aquifer shown on plate 1 indicate that the water generally deteriorates in quality from a calcium bicarbonate to sodium chloride type as it moves downdip from areas of recharge by infiltration of precipitation. In such areas of recharge--Dry Valley and contiguous areas north of Monticello, the Chippean Rocks area southwest of Blanding, and Nokaito Bench south of Bluff--the water is of the calcium or calcium magnesium bicarbonate type, and it generally contains less than 250 milligrams per liter of dissolved solids. As the water moves downdip, the water type is modified and the dissolved-solids concentration increases.

Figure 17

Some water in the Montezuma Creek-Aneth area is saline to briny (table 8) with water generally of the sodium chloride sulfate type (table 4). This area is upgradient and southeast of the deepest part of the Blanding structural basin and lowest part of the aquifer, where stagnation and degradation of the ground water aquifer would most likely occur.

The water in the N aquifer in the Bluff area is of the sodium bicarbonate type but it contains fewer dissolved solids than does the water in the Aneth area. This suggests that the major source of recharge to the Bluff area is from the north or south rather than from the Aneth area. If so, the water in the N aquifer in the Aneth area may be discharging upward by interformational leakage in small quantities. The water in the overlying Bluff Sandstone is marginally fresh to slightly saline.

It is possible that the saline water in the Aneth area is related to local oil-development practices. The deeper aquifers in the Aneth area generally contain water with dissolved-solids concentrations that exceed 50,000 milligrams per liter and in some cases 100,000 milligrams per liter (table 5). Water from the N aquifer obtained from well (D-41-25)21bba-1 (table 4) was moderately saline in 1949, before extensive oil drilling started in the area. The water from the N aquifer from well (D-41-25)17cbd-1 originally was used as a "freshwater" source in the oil field to dilute production water in order that mineral buildup did not plug the water-injection wells. By 1983, however, both wells and others in the area had been abandoned because of deterioration of water quality (table 8). The deterioration of water quality in the N aquifer may have resulted from upward movement of saline water from the underlying Cutler and Hermosa Formations in unplugged or poorly plugged oil-test holes or leaking water-injection wells.

Contamination of fresh ground water in the Paradox Evaporite Basin by water from underlying aquifers can be demonstrated by anomalous values for the ratio of bromide and iodide. Bromide and iodide are conservative anions that do not readily react with cations to precipitate into a mineral state. The ratio between dissolved bromide and iodide generally is relatively constant in the water in an aquifer of fairly homogeneous lithology and similar sources of recharge.

The relative abundance of bromine and iodine in rocks of the Earth's crust is 3 and 0.3 parts per million (Berry and Mason, 1959, p. 389-90), and bromide is a more common exchange anion than iodide for the chloride anion in the mineral halite. Many petroleum tests in southern San Juan County have penetrated the Paradox Member of the Hermosa Formation, which underlies the N aquifer at depth. The Paradox Member contains halite and is a source of briny water. If some of this water has flowed upward into the N aquifer, the bromide/iodide ratio in the resulting mixed water generally will be greater than the background value for water in the N aquifer.

Analyses for bromide and iodide were made for water from five wells in the study area (table 9). The analyses for wells (D-32-24)22adb-1 and (D-40-22)30bbb-1, which are outside the area of intensive petroleum exploration near Aneth and Montezuma Creek, showed bromide/iodide ratios of 11:1 and 10:1 (pl. 1). This is virtually the ratio present in the Earth's crust. The analyses for wells (D-41-23)16aaa-1 and (D-41-25)4cad-1 have bromide/iodide ratios within a calculable error of the background ratio. The analysis for well (D-40-23)27baa-1, however, shows a ratio of 29:1. The well, which bottoms in the N aquifer, is near the edge of but downgradient from the intensive area of petroleum exploration. Thus, the large bromide/iodide ratio may be indicative of contamination by upward movement of water from the Paradox Member and subsequent lateral flow in the N aquifer.

Arsenic is the only trace element that exceeds the recommended standard of the U.S. Environmental Protection Agency (1978, p. 14) of 50 micrograms per liter in water supplies for human consumption. The total concentration of arsenic in water that was sampled during 1982-83 from 21 wells showed a range from 1 to 60 micrograms per liter (pl. 1).

The greatest concentration of arsenic occurs at Bluff (inset 3, pl. 1) where there is a fairly good correlation between arsenic concentration and the depth to which wells penetrate the N aquifer. Well (D-40-21)25acb-1 is 450 feet deep, and it yields water with 10 micrograms per liter of total arsenic. Well (D-40-22)30bbb-1 is 825 feet deep, and it yields water with 56 micrograms per liter of total arsenic.

Arsenic may be in a disseminated mineralized form throughout the sedimentary section comprising the N aquifer. This is suggested by the following: (1) Arsenic is found in measurable concentrations throughout the aquifer; (2) arsenic is most concentrated at Bluff, the discharge area for much of the southern one-half of the aquifer in the study area; and (3) in the discharge area at Bluff, arsenic is most concentrated at depth where water has flowed along the longest path and subsequently has had the greatest residence time for dissolution of arsenic.

M Aquifer

Recharge

The M aquifer includes the Bluff Sandstone, Salt Wash, Recapture, and Westwater Canyon Members of the Morrison Formation. The M aquifer crops out where it is not overlain by the D aquifer (fig. 18). The Brushy Basin Member of the Morrison Formation, which exists above the uppermost unit of the M aquifer, is relatively impermeable but not resistant to erosion; thus, most recharge to the M aquifer from direct infiltration of precipitation most likely occurs where the Bluff Sandstone, Salt Wash, Recapture, or Westwater Canyon Members are exposed, such as in Montezuma Creek canyon, the canyons north of Bluff, and a widespread area south of the San Juan River. The alluvium in these areas, especially in the stream channels, is likely to have small permeability because it contains clay and silt derived from erosion of the Brushy Basin Member. Furthermore, the annual precipitation generally is less than 12 inches in the relatively low areas of outcrop of the four lower members of the Morrison Formation. As a result of these two conditions, recharge by direct infiltration of precipitation is considered to be relatively small--5 percent of the total average precipitation falling on the outcrop area, or about 24,000 acre-feet per year.

In the La Sal area the only exposures of the M aquifer are on the west and east flanks of the La Sal Mountains. The formational dip is away from the mountains; thus, the recharge would subsequently flow away from the mountains.

In the area south of the La Sal Mountains to Lisbon Valley (fig. 7) the M aquifer is buried and thus is not recharged directly by precipitation. The M aquifer in that area does contain water, however, as observed in well (D-29-24)7aba-1; thus, it is assumed that the aquifer is being recharged by interformational leakage.

In the central part of the study area, much of the M aquifer is recharged either by interformational leakage or by seepage from streams that have cut deep canyons through the D aquifer to the M aquifer. Gains or losses from stream to aquifer can be calculated from the measurements given in table 3 for Cottonwood Wash (a loss of 0.76 cubic foot per second), Verdure Creek (a loss of 0.04 cubic foot per second), and lower Montezuma Creek (a loss of 3.10 cubic feet per second). The M aquifer undoubtedly is gaining water from or losing water to many other intermittent or ephemeral drainages.

Subsurface flow to the area probably crosses the State line from Colorado south of the Sleeping Ute Mountains, and from Arizona. This supposition is based on the structural dip of the aquifer in both areas. The quantity of water involved is unknown.

Figure 18

Movement

The few water levels available for the M aquifer (fig. 18) are not sufficient to map the potentiometric surface. If there is little or no interformational leakage to the aquifer, the major factor affecting the ground-water movement would be the relation of the aquifer to the stream courses, which generally trend in a north-south direction. In the recharge areas where the streams are losing water, ground-water would move toward the mesas. In the discharge areas where the streams are gaining water, the ground-water would move towards the drainages where it is discharged by evapotranspiration.

Hydraulic properties

The total thickness of the sandstone units of the M aquifer is about 400 feet at the Arizona-Utah State line. There, all four sandstone units--the Bluff Sandstone, Salt Wash, Recapture, and Westwater Canyon Members of the Morrison Formation--are present. The section thins northward to about 150 feet near La Sal where only the Salt Wash Member exists.

Cooley and others (1969, table 7) reported a coefficient of transmissibility transmissivity of 677 gallons per day per foot 90.5 feet squared per day from an aquifer test on the Navajo Indian Reservation in northwestern New Mexico. Analysis of two core samples from the Westwater Canyon Member obtained on the Navajo Indian Reservation in northwestern New Mexico showed specific yields of 10 to 11 percent and coefficients of permeability of 0.1 to 15 gallons per day per square foot (0.01 to 2.0 feet per day) (Cooley and others, 1969, table 7).

The combined average permeability of the sandstone units in the Morrison Formation is slightly greater than 400 millidarcys (0.98 foot per day) in the southern part of the study area, and it generally decreases northward to slightly less than 150 millidarcys (0.36 foot per day) (Jobin, 1962, fig. 32). Permeability of the Salt Wash and Westwater Canyon Members is comparable, but that of the Recapture Member generally is smaller (Jobin, 1962, p. 58). The Bluff Sandstone Member is more permeable than any other members of the Morrison Formation with a maximum permeability of slightly more than 1100 millidarcys (2.7 feet per day) (Jobin, 1962, fig. 27). The zone of highest permeability in the Bluff Sandstone follows a trend northeast from Bluff and the permeability decreases to slightly less than 245 millidarcys (0.60 foot per day) to either side of this trend. Two wells in the Morrison Formation have specific capacities of 0.1 and 0.2 gallon per minute per foot. Two wells in the Bluff Sandstone Member have specific capacities of 0.1 and 0.4 gallon per minute per foot (table 6).

Discharge

Natural discharge from the M aquifer is from springs, seeps, outflow to streams, and by evapotranspiration. None of the springs listed in table 10 had a discharge in excess of 1 gallon per minute. Streams that show gains across the M aquifer (table 3) are upper Montezuma Creek (3.77 cubic feet per second, of which some comes from the D aquifer) and McElmo Creek (2.1 cubic feet per second). It is quite probable that the M aquifer also discharges water to the San Juan River and alluvium upstream from Bluff.

Phreatophytes, predominantly greasewood (<u>Sarcobatus</u> <u>vermiculatus</u>) with some salt cedar (<u>Tamarix</u> sp.), willow (<u>Salix</u> sp.), and cottonwood (<u>Populus</u> sp.) are common in the canyons in the central part of the study area and in the San Juan River valley. This vegetation is undoubtedly subirrigated by water from the M aquifer, but the quantity of use by phreatophytes is not known.

An unknown quantity of water is discharged from wells completed in the M aquifer for domestic and stock use. Most of the wells are in the lower Montezuma Creek canyon area, and they generally are completed in the Bluff Sandstone Member. The estimated discharge, computed on the basis of per capita use, from the two muncipal wells completed in the Bluff Sandstone Member at Montezuma Creek is 75 acre-feet per year.

The withdrawal of water from the M aquifer by industry, including mining, during 1981 was 0.66 acre-foot (National Water Use Data System, 1981-82).

Subsurface flow to Colorado occurs along the State line from the La Sal area south to a point approximately west of Sleeping Ute Mountains, at about Township 40 South. The quantity of water is unknown.

<u>Chemical quality</u>

Water in the M aquifer generally is of the sodium bicarbonate type with dissolved-solids concentrations ranging from 300 to 2,200 milligrams per liter (table 4 and fig. 18). In recharge areas, analyses of water from springs (D-27-23)17a-S1 and (D-28-23)3ad-S1 indicate calcium magnesium bicarbonate type water with dissolved-solids concentrations in the lower part of the range cited above. It is reported by the U.S. Bureau of Land Management that the water in well (D-36-23)25bda-1 is of poor quality and cannot be used for its original purpose of stock watering.

The Salt Wash Member of the Morrison Formation contains economic deposits of uranium and vanadium. Water in that member, therefore, may contain concentrations of radionuclides that are great enough to be harmful for human consumption.

D Aquifer

<u>Recharge</u>

The D aquifer includes the Burro Canyon Formation and the Dakota Sandstone, which cap the highest mesas in the study area (fig. 19). The formations are covered by a thin deposit of alluvium which locally is quite thick on the flanks of the Abajo and La Sal Mountains. The alluvium probably enhances recharge to the D aquifer by retaining moisture and allowing infiltration to occur at a steady rate. The Mancos Shale, in contrast, where it overlies the D aquifer on the east flank of the Abajo Mountains, undoubtedly prevents recharge to the aquifer. Recharge by infiltration of precipitation to the D aquifer is estimated to be 5 percent of the total average precipitation that falls on the area of outcrop, or about 39,000 acre-feet per year. Little or no subsurface inflow to the D aquifer occurs in the study area.

Figure 19

Hydrographs for 1942-56 of two nearby wells of different depths, (D-36-22)27ddb-1 and (D-36-22)27ddb-2, show the effect of recharge from precipitation (fig. 20). Well (D-36-22)27ddb-1, which is 26 feet deep has had annual water-level fluctuations of as much as 8 feet (1948) due to the infiltration of precipitation on a seasonal basis. During the same period, however, well (D-36-22)27ddb-2, which is 121 feet deep, had maximum annual water-level fluctuations of less than 3 feet, reflecting the dampened effect of depth on the infiltrating precipitation. The long-term hydrograph for well (D-36-22)27ddb-2 (fig. 21) shows water-level fluctuations in 1946, 1965, and 1977 that correlate with marked variations in precipitation. The large water-level decline in 1977 also is attributed partly to increased pumping in the area due to the then prevailing drought.

A general water-level rise in the Blanding area has resulted from recharge for irrigation from surface water diverted from Johnson Creek since 1903, Recapture Creek since 1914, and from Indian Creek by transmountain diversion since 1921 (Eugene Johansen, Utah Board of Water Resources, oral commun., 1985). This is illustrated by the long-term hydrographs for three wells in figure 22. The quantity of water diverted is not measured, but water rights total more than 200 cubic feet per second (Norman Nielson, San Juan Water Conservancy District, oral commun., 1983). The seasonal rise in water levels mainly caused by the infiltration of the imported water is shown in figure 23 by the hydrograph of well (D-36-22)22daa-1, which is about 0.5 mile from a large ditch that transports the water.

Water levels also have risen in the Sage Plain area, east of Monticello. The rise in that area is attributed to changes in land use from a pinyon-juniper (Pinus edulis)-(Juniperus osteosperma) forest to dryland farming and to greater-than-normal precipitation since 1977. See hydrograph for well (D-34-26)4dad-1 in figure 24.

Movement

Five areally discrete flow systems are known in the D aquifer in the study area, and selected water levels in each system are shown in figure 19. Near La Sal, the direction of ground-water movement generally coincides with that of surface water. East of La Sal, the flow is toward the southeast; and on the west flanks of the La Sal Mountains, the flow probably is downdip and away from the mountains. McCracken Mesa and Black Mesa south of Blanding have local systems, only 6 to 7 miles long, in which the water generally moves toward the south.

The flow system in the Blanding-White Mesa area is about 13 miles long, and water-level data indicate an approximate gradient of 100 feet per mile in a southerly direction. Most of the water eventually is discharged by seeps along the canyon walls of Recapture Creek and Cottonwood Wash, which border the east and west sides of the mesa.

Figure 20

Figure 21

Figure 22

Figure 23

Figure 24

The flow system on the Sage Plain east of Monticello is the largest system known in the D aquifer. The Mancos Shale completely overlies the D aquifer on the northeast flank of the Abajo Mountains, where recharge to the aquifer would be expected to occur. The ground-water gradient is relatively flat in this area in relation to the slope of the land surface and the base of the aquifer, which is radially away from the mountains. This indicates that more recharge is occurring on the Sage Plain than on the northeast flank of the Abajo Mountains. Ground-water movement generally is toward the north and south away from a ground-water divide that is about 3 miles north of and roughly parallel to U.S. Highway 666.

Hydraulic properties

The total thickness of the D aquifer ranges from 150 to 400 feet; but due to erosion, the thickness of the aquifer decreases with distance from the mountain fronts. In some areas, such as east of Monticello and around Blanding, the Dakota Sandstone is thin and the Burro Canyon Formation virtually constitutes the D aquifer.

Selected results of aquifer tests conducted in the Monticello area during the mid-1950's by the U.S. Atomic Energy Commission are presented in table 7. Hydraulic conductivities of 0.77 and 0.35 feet per day were obtained. Although the storage coefficients of 1.41×10^{-5} and 1.03×10^{-5} indicate confined conditions, such occurrence is of a local nature. There are no known flowing wells penetrating the D aquifer.

Values for specific capacity given in the Remarks column of table 6 indicate a significant variation in the transmissivity, and subsequently the hydraulic conductivity, of the D aquifer. The stated values of specific capacity for the D aquifer are between 0.1 and 11 gallons per minute per foot. The considerable range in values can be due to variations in lithology, cementation, fractures, or the design and development of the well.

W. B. Nelson (U.S. Geological Survey, written commun., 1956) noted differences in values for specific capacity obtained from different depths in well (D-33-24)31bdd-1 near Monticello. It is unknown whether the highest-yielding zone is a basal conglomerate in the Dakota Sandstone, the Burro Canyon Formation, or a transition zone between the two formations.

For the study area, Jobin (1962, fig. 37) reports values of permeabilities for the Dakota Sandstone and Burro Canyon Formation of between 400 and 1,100 millidarcys (0.98 and 2.7 feet per day). The zones of highest permeability extend southeast from Blanding and Monticello.

Analyses of four core samples from the Dakota Sandstone from widely-spaced sites on the Navajo Indian Reservation in Arizona and New Mexico indicate a range in the coefficient of permeability of 0.7 to 25 gallons per day per square foot (0.09 to 3.3 feet per day), and a range in specific yield of 17 to 19 percent (Cooley and others, 1969, table 7). This variability in permeability may be the result of sampling surficial rock which has undergone varying degrees of weathering.

Discharge

Springs and seeps issue from the base of the Dakota Sandstone and Burro Canyon Formation throughout the area, particularly where entrenched drainages have cut entirely through the D aquifer. Discharges generally are small, although spring (D-33-24)29bdd-S1 discharges 14 gallons per minute (table 10). Part of the increase in streamflow of upper Montezuma Creek (table 3) of 3.77 cubic feet per second is discharged from the D aquifer.

Due to its shallow depth, the D aquifer has been tapped by numerous wells to provide water for domestic and stock use, and wells also provide supplemental municipal and irrigation supplies around Blanding and Monticello. The quantity of water pumped for domestic and stock use and public supply is not known. However, in some of the area, the saturated thickness is not sufficient to supply a yield greater than 100 gallons per minute to wells. Maximum well yields in the area generally are less than 100 gallons per minute. The effect of seasonal well pumping on the potentiometric surface around Monticello is shown by the hydrograph of well (D-33-24)30dab-1 (fig. 23).

The withdrawal of water from the D aquifer by industry, including mining, during 1981 was estimated to be 0.74 acre-foot (National Water Use Data System, 1981-82). During the late 1940's and early 1950's, a uranium-processing mill was operated by a private concern in Monticello. Water was obtained from four wells yielding a total of 120 gallons per minute (D. A. Phoenix, U.S. Geological Survey, written commun., 1953). Additional supply for the mill operation apparently was obtained from the Monticello municipal water system. The U.S. Atomic Energy Commission took control of the mill in 1953; and in 1955, when water needs had increased to 150 gallons per minute, eight additional wells were drilled east and northeast of the mill. Mill operations ceased in December 1959, and since then all the 12 wells have never been pumped simultaneously. Several of the wells, however, have been pumped for public-water supply on an intermittent basis by Monticello. The hydrograph of well (D-33-24)30dab-1 (fig. 24) shows the drawdown in 1955 and the subsequent recovery of the potentiometric surface of the D aquifer following shutdown of the mill.

Pumpage for irrigation represents the largest use of water from the D aquifer, and nearly all such withdrawals are in the Blanding area. Although the ground water generally is used as a supplemental supply to surface water, about 4,000 acre-feet per year are withdrawn for irrigation from the D aquifer.

An unknown but small quantity of water is discharged by the phreatophytes cottonwood (*Populus* sp.), willow (*Salix* sp.), and hydrophytes such as cattail (*Typha* sp.) which grow in sparse stands along streams that penetrate the D aquifer. Additional water in the D aquifer moves across the State line into Colorado in the Sage Plain and La Sal flow systems. The quantity of water is unknown.

Chemical quality

In most of the study area the water in the D aquifer can be used for most purposes. (See analyses and measurements in tables 4, 8, and 9). Most of the water is of the calcium bicarbonate type with a concentration of dissolved solids that generally is less than 500 milligrams per liter. This indicates a local source of recharge, most likely by direct infiltration of precipitation to the water table. In some parts of the study area, however, the D aquifer yields more saline water of the sodium bicarbonate type such as near Monticello from well (D-34-23)1dad-1, or of the calcium magnesium sulfate type near Blanding from well (D-37-22)22bbc-1.

An example of local contamination is shown by the diagrams in figure 19 for the analyses of water from three wells in the Blanding area. The much greater quantity of calcium and sulfate in the water from well (D-36-22)27dad-2 indicates the existence of a contaminating source, possibly gypsum.

Some slight deterioration of water quality also is evident near Monticello. W. B. Nelson (U.S. Geological Survey, written commun., 1956) indicated that poor quality water was seeping into the D aquifer at well (D-33-24)30ddb-1, near Monticello, from the overlying alluvium. Water quality deteriorates during the snowmelt period in the spring in wells drilled in the D aquifer around Eastland, east of Monticello, according to local residents. Weathered Mancos Shale concentrated in the alluvium could be the agent contributing to the water degradation.

Analyses of water from springs (D-39-26)33-S1 and (D-39-26)20aac-S1 indicate sulfate-type waters are present in the D aquifer where it caps Cajon Mesa between Cross Canyon and McElmo Canyon.

The N aquifer is the most important regional aquifer in the study area in terms of present and future withdrawals from wells. By 1981, the potentiometric surface for the N aquifer had declined to some extent at five relatively major pumping centers. These are: (1) The grouping of irrigation wells in the middle part of Montezuma Creek valley 5 miles upstream from Dalton's Ranch (T.36 S., R.24 E., sec. 14), (2) the flowing wells in the canyon bottoms of the lower Montezuma Creek drainage upstream from the Hatch Trading Post (T.39 S., R.24 E., sec. 13), (3) the greater Aneth-Montezuma Creek area of past petroleum exploration (T.40S., R.23-24E.; T.41S., R.24-25E.), (4) the San Juan River valley near Bluff (the area of inset 3, pl. 1), and (5) the Energy Fuels well field south of Blanding (T. 37S., R. 22E.).

Water levels at well (D-38-24)11dbd-1 have declined about 14 feet since 1963 (fig. 13) near a group of flowing wells in sec. 7, T. 38S., R. 25E., along lower Montezuma Creek. Water levels in the Bluff area have declined about 100 feet since 1910. Declines in the other areas are assumed from the concentration and number of wells.

The potentiometric surface in the N aquifer has not declined below the water surface of any perennial streams near the five pumping centers. Thus, the N aquifer theoretically is still discharging water to the Colorado River system. Actually, however, the San Juan River is the only perennial stream in the study area with a hydrologic connection to the N aquifer. Discharge from the N aquifer to ephemeral or intermittent tributaries may reach the Colorado River, but the quantity involved would be insignificant. Thus, only declines of the potentiometric surface in the N aquifer where it discharges to the San Juan River would substantially affect the flow in the Colorado River system.

In 1982, the potentiometric surface in the N aquifer was about 45 feet above the San Juan River, resulting in an annual discharge from the aquifer to the river of about 6.9 cubic feet per second. In order to calculate the possible effect on the discharge to the river that would result from a theoretical decline of the potentiometric surface in the Bluff area, an analysis was made of pumping at the two muncipal wells in Bluff, (D-40-21)26ada-1 and 26add-1. The analysis was made with the straight-line solution of Cooper and Jacob (Lohman, 1972, p. 19-21). A pressure head in the aquifer of about 45 feet was assumed to occur at the river, which is about 4,000 feet downgradient of the wells. This is based on measurements at observation well (D-40-21)25acb-1, which is about the same distance from the river as the municipal wells, which showed during the spring of 1981-83 a minimum pressure head of about 45 feet (fig. 16). The values of aquifer coefficients used were those determined during the test at well (D-37-22)28dcb-1 (table 7).

The analyses indicated that at the present (1982) pumping rate, which averages about 21 gallons per minute, or 11 million gallons per year, the cone of depression attributable to the two muncipal wells would never reach the San Juan River. The cone of depression would reach the river in 5 years if the wells were pumped at an average rate of 160 gallons per minute, which would cause a water-level decline at the wells of about 160 feet. Once the cone of depression reached the river, water from the river would be induced into the aquifer; but based on calculations similar to those used by Mower (1978, p. 24), it would be several hundred years before the river water would reach the pumping wells and be discharged into the muncipal system.

In order to capture all the 5,000 acre-feet that is discharging annually to the river from the N aquifer and to start inducing water from the river into the aquifer at least 17 additional pumping wells discharging at the same rate of 160 gallons per minute for at least 5 years would be required. The additional pumping centers would have to be spaced equidistantly upstream as far as the first outcrop of the N aquifer. The loss of river water to the N aquifer would be minimal, however, because of the slight permeability of the aquifer. No matter how deep the potentiometic surface is drawn down beneath the river, the seepage into the aquifer would be at a relatively small rate.

FURTHER STUDIES

The following studies are needed for a more complete understanding of the ground-water resources of eastern San Juan County and to provide a firm basis for planning of future increased ground-water development:

(A) An evaluation of the hydrology of the D aquifer to determine the effects of increased withdrawal from wells and recharge from surface water in the Blanding area and of land-use changes in the Monticello area.

(B) An evaluation of the effect on the flow of the San Juan River caused by pumping from the alluvium in the river valley upstream from Montezuma Creek.

(C) A detailed quantitative determination of how water quality in the San Juan River in the Aneth-Montezuma Creek area is affected by poor-quality water discharging from flowing wells drilled for the petroleum industry. In the same area, determine the possible contamination of the N aquifer by brine originating from deeper aquifers.

SUMMARY AND CONCLUSIONS

The summary of the recharge and discharge for the bedrock aquifers is presented in table 11. Infiltration of precipitation is the main source of recharge to the outcrop areas of the P aquifer west of Comb Ridge and in the Lisbon Valley area; the N aquifer north of Monticello, northwest of Blanding, and south of Bluff; and for nearly the entire areal extent of the D aquifer. Recharge from streamflow to any one of the aquifers appears to be minor except for the M and N aquifers along the middle reach of Montezuma Creek. Recharge by interformational leakage to the aquifers has not been quantified. Subsurface inflow to the study area from Colorado occurs in the P, N, and M aquifers. Subsurface inflow from Arizona occurs in all but the D aquifer.

Water in all the aquifers generally follows the same flow paths. Movement is radially away from the mountains in all directions. Between the La Sal and Abajo Mountains, the water generally moves toward the Colorado River, although some water moves towards the Dolores River. South of the Abajo Mountains water movement is toward the San Juan River. The potentiometric surface of the D aquifer is about 300 to 500 feet above the potentiometric surface of the M aquifer. Under the Sage Plain, the potentiometric surface of the N aquifer is about 300 feet below the potentiometric surface of the M aquifer. Downgradient of the Abajo Mountains, where the N aquifer is deeply buried and pressurized, the potentiometric surface of the N aquifer is nearly coincident with the potentiometric surface of the M aquifer. In the low-lying area of the San Juan River drainage around Montezuma Creek, the potentiometric surface is about 100 feet higher in the N aquifer than in the M aquifer.

The N aquifer is commmonly 750 to 1,250 feet thick when present in full section. The P aquifer ranges from 20 to 1,200 feet in thickness. The D and M aquifers appear to have an equivalent range in thickness, between 150 to 400 feet, although the areas of comparable thickness do not coincide. The D aquifer has the greatest average hydraulic conductivity, and the P and C aquifers have the smallest average hydraulic conductivity.

The San Juan River gains about 66 cubic feet per second of water in the reach between gaging stations at Four Corners and Mexican Hat. The discharge to the San Juan River from the N aquifer was estimated at 6.9 cubic feet per second.

Due to its shallow depth, the D aquifer is tapped by numerous wells to provide water for domestic and stock use. Otherwise, the N aquifer is the objective of most well drillers. The discharge during 1981 from the entire sedimentary section by wells and mines was about 7,300 acre-feet. Surface flow in the Colorado River system would not be affected by increased well pumping unless the cone of depression of the potentiometric surface in the N aquifer reached the San Juan River. It is projected that continuous pumping of 160 gallons per minute by the Bluff municipal wells after 5 years would start to draw the potentiometric surface below that river.

Subsurface flow from the study area to Colorado occurs in all four aquifer systems, though the flow in the P aquifer eastward from the La Sal area probably is insignificant. In addition, some subsurface flow in local flow systems of the P and C aquifers passes across the western boundary of the study area.

Water of a calcium to calcium magnesium bicarbonate type occurs in all aquifers near their recharge areas. The water in the D aquifer is degraded locally, possibly due to the presence of gypsum. The water in the M aquifer is modified to a sodium bicarbonate type. The water in the N aquifer degrades to a sodium chloride sulfate type near Aneth, and the water in the P aquifer near Aneth degrades to a sodium chloride type.

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Geologic unit: The codes shown with unit names are used to identify aquifers, formations, General lithology: Descriptions modified from Haynes and others (1972); Jobin (1962); Sumsion (1971); Baars (1962); Craig (1981); O'Sullivan and Pierce (1983). System: L, lower; M, middle.

Erathem	System	Series	Geologic unit	General lithology
CENOZOIC	Quaternary	Pleistocene and Holocene	Alluvial and eolian deposits (111ALVM)	Silt, sand, and gravel in stream valleys and floodplains. Windblown silt and sand on upland areas, benches, and broad valleys. Sand and gravel deposits on benches along major streams. Poorly sorted angular to well-rounded sand, pebbles, and boulders on dissected pediment surfaces surrounding the Abajo Mountains.
			Colluvium (112CLVM)	Talus, slopewash, and block rubble.
		Pleistocene	Alluvial-fan deposits	Dissected deposits of poorly sorted silt, sand, and gravel.
			Alluvial gravel deposits (112ALVM)	Well-rounded and well-sorted deposits; mostly glacial outwash.
			Glacial till	Unsorted, unstratified, morainal deposits
	Tertiary		Igneous intrusives (stocks, laccoliths, dikes, and sills)	Abajo Mountains—prophyritic rock composed mainly of diorite to quartz-diorite, but including granodiorite and quartz monzonite La Sal Mountains—prophyritic rock composed mainly of diorite, but including soda syenite, syenite, and monzonite.
MESOZOIC (200MSZC)	Cretaceous	Upper Cretaceous	Mancos Shale (200MNCS)	Gray to black soft fissile shale, mudstone, and siltstone with minor thin sandstone beds
			Dakota Sandstone (210DKOT)	Yellowish-brown to gray quartzitic sandstone and conglomeratic sandstone, with interbedded gray to black carbonaceous shale. Some thin beds of low grade coal. A coarse basal conglomerate is present locally.
		Lower Cretaceous	Burro Canyon Formation (217BRCN)	White, gray, and light brown sandstone and conglomerate; interbedded with green and purplish siltstone, shale, and mudstone; thin beds of impure limestone; copper bearing in Lisbon Valley. Shale predominates in upper one-half, with sandstone and conglomerate predominating in lower one-half.
	Jurassic (220JRSC)	Upper Jurassic	Morrison Formation (221MRSN)	Brushy Basin Member (221BRSN)—variegated gray, pale green, and red-brown bentonitic mudstone and siltstone; a few lenses of distinctive green and red chert and pebble conglomeritic sandstone.
				Westwater Canyon Member (221WSRC)—mostly yellowish and greenish-gray to pinkish-gray lenticular fine- to coarse-grained sandstone. Some interbedded greenish-gray or grayish-red sandy shale and mudstone.
				Recapture Member (221RCPR)—reddish-gray, white, and brown fine- to medium grained sandstone, interbedded reddish-gray siltstone and mudstone.
				Salt Wash Member (221SLWS)—white, light gray, grayish-orange or moderate reddish-brown fine- to medium-grained sandston in thick discontinuous beds. Interbedded greenish, gray, and reddish-gray siltstone and mudstone. Locally thin limestone beds near base.

geologic units

or other geologic units in tables 4, 5, 6, 8, 9, and 10.
Williams (1964); Sandborn (1958); Wiegand (1981);

Thickness and areal extent	Water-bearing[1] characteristics	Aquifer system
In Spanish Valley, deposits are as much as 360 feet thick. Otherwise, scattered deposits generally are not more than 100 feet thick.	Low to moderate permeability. Yields small quantities of water to shallow wells in the San Juan River valley. Springs in the Abajo Mountains issue from this unit. For example, spring (D-33-23)30DCC-S1.	
Present high on flanks of the La Sal and Abajo Mountains.		
Present only in the La Sal Mountains		
Exposed only in the middle of the mountains.	Yields water only where fractured.	
Thin remnants underlie hills and ridges on the Sage Plain east of Monticello. Thicker sections flank the Abajo Mountains on the north and east sides.	Very low permeability. In the Monticello area; retards recharge from precipitation.	
Present on downthrown limb between the Lisbon fault and La Sal Mountains; on the flanks of the Abajo Mountains; and capping mesas in the southern part of the area. Maximum thickness is 150 feet.	Very low to low permeability. Generally unconfined, but in places under confined conditions. The Dakota Sandstone is the primary source of water near Monticello and La Sal. The Burro Canyon Formation is the primary source of water around Blanding and on the Sage Plain east of Monticello.	D aquifer
Caps mesas in Blanding area and east of Monticello where the Dakota Sandstone is eroded. Maximum thickness is 160 feet but averages 130 feet. Thins southward to a thin conglomerate at the San Juan River and to zero at the Utah-Arizona State line.		
Forms a conspicuous slope below the Burro Canyon Formation or Dakota Sandstone. Thickness ranges from 250 to 700 feet.	Very low permeability. It is the confining bed between the D and M aquifers.	
Thickness of 180 feet near Bluff; interfingers and eventually grades into the Brushy Basin Member northeast of a northwest-trending line passing between Monticello and Blanding.	Very low to low permeability. The Bluff Sandstone Member is the most permeable unit. This aquifer is confined southeast of the Abajo Mountains, resulting in flowing wells in the vicinity of Montezuma Creek and Aneth.	M aquifer
Maximum thickness is 200 feet. Grades into Salt Wash Member northward from a line extending from Blanding to Cortez.		
Present on the Sage Plain and near La Sal. Maximum thickness is 490 feet in central part of area; thins southward where upper part is defined as the Recapture Member.		

Table 1.—Description of

Erathem	System	Series	Group	Geologic unit	General lithology
MESOZOIC (200MSZC)	Jurassic (220JRSC)	Upper Jurassic		Morrison Formation—Continued (221MRSN)	Bluff Sandstone Member (221BLFF) Light gray to light brown fine- to medium-grained well-sorted quartz sandstone.
		Middle Jurassic	San Rafael Group	Summerville Formation (of former usage, now designated Wanakah Formation)	Red, gray, green, and brown, thin evenly bedded sandy shale, siltstone, shale, and mudstone; and, in south, fine-grained sandstone.
				Entrada Sandstone (221ENRD)	Moab Member– white, medium-grained, well sorted sandstone
					Slick Rock Member– white, reddish, or yellowish-orange fine- to medium-grained quartz sandstone. More silty in southern part of area.
					Dewey Bridge Member– reddish-brown earthy to sandy siltstone, with some white sandstone.
				Carmel Formation	Dark reddish-brown to grayish-red, even thin-bedded silty shale, siltstone, and gray to brown silty sandstone.
		Lower Jurassic	Glen Canyon Group (220GLNC)	Navajo Sandstone (220NVJO)	White, gray, yellowish-gray, or pale orange fine- to medium-grained well-sorted quartz sandstone.
	? Triassic (?)	? Upper Triassic (?)	?		
				Kayenta Formation (231KYNT)	Gray, purplish-gray, or grayish-orange-red, irregularly bedded sandstone and siltstone. Silty facies north of San Juan River; sandy facies south of the San Juan River. Interbedded with the Navajo Sandstone.
	Triassic	Upper Triassic		Wingate Sandstone (231WNGT)	Reddish-brown, buff, to grayish-orange fine-grained, well-cemented quartz sandstone

Thickness and areal extent	Water-bearing[1] characteristics	Aquifer system
Maximum thickness is 300 feet near Bluff. Thins northward to zero at Blanding, and thins southward to about 20 feet at the Utah-Arizona State line.		M aquifer
Present overlying the Entrada Sandstone. Irregular thickness 60 to 200 feet, but thin north of Monticello.	Very low permeability. It is the confining bed between the M and N aquifers.	
Present east of the Comb monocline and its extension to the north, except where eroded on Nokaito Bench and in the Dry Valley area. Thickness 60 to 550 feet; average thickness 150 feet.	Very low to low permeability. The Entrada Sandstone is not considered part of the N aquifer south of the San Juan River (Cooley and others, 1969, table 3). The Kayenta Formation is a partial confining bed between the Navajo and Wingate Sandstones.	N aquifer
Present in western part of area underlying the Entrada Sandstone. Thickens to about 100 feet in the west, thins and grades laterally northward into the Dewey Bridge Member of the Entrada Sandstone.		
Present east of the Comb monocline and its extension to the north. Maximum thickness is 600 feet, generally thins southeastward to zero along a northeast trending line just east of the southeast corner of the county. Average thickness 350 feet. Thickness of 170 feet in U.S. Geological Survey test hole (D-32-24)22ADB-1.		
Average thickness 150 feet. Thins southeastward to near zero at the southeastern corner of the county.		
Present east of the Comb monocline and its extension to the north. .hickness ranges from 150 to 650 feet; average thickness north of San Juan River is 300 feet. Thickness in the central part of the area south of the San Juan River is about 500 feet.		

Table 1.—Description of

Erathem	System	Series	Geologic unit	General lithology
MESOZOIC (200MSZC)	Triassic	Upper Triassic	Chinle Formation (231CHNL)	Varicolored, red, reddish-brown, and orange-red siltstone interbedded with lenses of red sandstone and shale, limestone-pebble and shale-pellet conglomerate; with lenses of grit and quartz-pebble conglomerate near base. Also, bentonitic mudstone, predominately in the lower four members.
				Upper members—limy and tuffaceous mudstone, shale, and some shaly sandstone.
				Lower members—varicolored, gray, brown, pale orange, greenish-yellow, gray-orange-pink, or pale yellowish-green calcareous, sandstone or conglomeritic sandstone with chert and limestone pebbles; some interbedded red, purplish, and gray-green mudstone.
		L and M(?) Triassic	Moenkopi Formation	Upper part--brown and reddish-brown, even-bedded shaly siltstone, thin flaggy sandstone and thick massive beds of sandstone. Lower part (Hoskinnini Member)—interbedded thin commonly contorted beds of reddish-brown, fine-grained silty sandstone and dark-reddish brown shaly siltstone. Some gypsum beds locally.
PALEOZOIC	Permian	Lower Permian	Cutler Formation (undifferentiated) (310CTLR)	Generally, grayish-red to purple, reddish-orange micaceous arkosic sandstone, siltstone, and conglomerate.
				White Rim Sandstone Member—White, gray, and buff medium- to coarse-grained quartzose sandstone.
				De Chelly Sandstone Member (310DCLL)-Light brown to pale reddish-brown fine-grained quartz sandstone.
				Organ Rock Tongue Member—Reddish-brown even-bedded siltstone with some thin-bedded, fine-grained sandstone.
				Cedar Mesa Sandstone Member (310CDRM)—Yellowish-gray, reddish-orange, and reddish-brown fine- to coarse-grained sandstone. Thinner beds of dusky red siltstone. South of Blanding grades into evaporite, banded gray-green and maroon gypsiferous siltstone, silty shale, and friable sandstone.

geologic units—Continued

Thickness and areal extent	Water-bearing[1] characteristics	Aquifer system
Forms a conspicuous slope below the Wingate Sandstone. Maximum thickness is 1,400 feet; thins northward.		
Church Rock Member—Maximum thickness is 400 feet.	Very low permeability. It is the confining bed between the N and P (or C) aquifers.	
Owl Rock Member—Maximum thickness is 450 feet; averages 200 feet.	Ore-bearing units yield large quantities of water to uranium mines in the La Sal area.	
Petrified Forest Member—Thickness south of Moab about 500 feet; thins to zero along a northwest-trending line through the confluence of the Colorado and Green Rivers.		
Mossback Member—Thickness averages 60 feet but can be as much as 150 feet where it fills channels in underlying surface.		
Monitor Butte Member—Present south of northwest-trending line through Monticello. Maximum thickness is 250 feet; average thickness is 100-150 feet.		
Shinarump Member—Present south of a northwest-trending line from north of Bluff to southeast corner of area. Maximum thickness is 225 feet; average thickness is 50 feet.		
This formation and underlying formations down to the Paradox Member of the Hermosa Formation exposed only in the area west of a line extending north along Comb monocline, except for an eroded window resulting from the breached Lisbon anticline. Maximum thickness is 350 feet; thins to zero east of Comb monocline.	Locally may yield small amounts of water.	
This arkosic facies is present in western Colorado and is differentiated into the member units southwestward along a north-northwestward-trending line through Monticello.	Very low permeability. The P aquifer generally exists north of the San Juan River and the C aquifer generally exists south of the San Juan River. Local flow systems under water-table conditions exist in the P aquifer west of Comb monocline.	P aquifer
Present only in northwestern part of area.		
Thins northward from 400 feet to zero on a northwest-trending line through Blanding.		C aquifer
Thins northward from 650 feet to 250 feet near the Abajo Mountains.		
Thins radially outward from 1,200 feet in an area northwest of the Abajo Mountains to about 100 feet before it grades into other facies.		P aquifer
This and all under-lying formations contain saline to briny water.		

Table 1.—Description of

Erathem	System	Series	Geologic unit	General lithology
PALEOZOIC	Permian	Lower Permian	Cutler Formation--Continued	Halgaito Tongue Member (310HLGT)-Reddish-brown thin-bedded shaly siltstone and very fine-grained silty sandstone; some disseminated nodules and beds of gypsum; a few thin lenticular beds of purplish-gray nonfossilerous limestone near base.
			Rico Formation (310RICO)	Gray thin- to thick-bedded fossiliferous, cherty limestone; reddish-brown or greenish-gray fine- to medium-grained sandstone; reddish brown, gray-green, or pale red-purple micaceous or partly gypsiferous siltstone.
	Pennsylvanian (320PSLV)	Middle and Upper Pennsylvanian	Hermosa Formation (324HRMS)	Upper member--Blue to gray thin- to thick-bedded fossiliferous limestone; gray fine-grained, micaceous sandstone and siltstone; gray arkose and conglomerate.
				Paradox Member (324PRDX)--upper unit-buff arkosic granulite, greenish-gray sandy siltstone; interbedded black shale, dark-gray siltstone, gypsum and dolomite. Middle unit--salt, gypsum, anhydrite, black shale, gray sandstone, and limestone. Lower unit--similiar to upper unit.
				Unnamed member--Limestone with interbedded light to dark gray silty shale.
		L and M Pennsylvanian	Molas Formation	Variegated to reddish-brown siltstone, red silty shale, calcareous sandstone; some gray to reddish-brown thin bedded limestone.
	Mississippian (330MSSP)		Redwall (Leadville) Limestone (330LDVL)	Upper part--tan, brown, gray, or pink cherty massive dolomite; thin beds of limestone. Lower part--light-colored, sometimes oolitic, dense limestone.
	? Devonian (340DVNN)		Ouray Limestone (341OURY)	Light gray to tan, dense, often oolitic limestone; some green shale partings.
			Elbert Formation	Sandy, thin-bedded dolomite; with streaks of gray-green and red sandy shale.
			Devonian (undivided)	Upper unit--Sandstone, grading to dolomite to west and northwest.
				Lower unit (341ANTH)--Known as the Aneth Formation in the oil industry. Dark brown to black argillaceous and calcareous shale. Sometimes anhydritric and glauconitic.
	Cambrian		Muav Limestone	Massive limestone with green shale locally.
			Bright Angel Shale	Interbedded fine-grained sandstone and siltstone; green, red, and gray shale; and limestone and dolomite.
			Tapeats Sandstone	Sandstone
Pre-Cambrian			Undifferentiated	Schist, gneiss, and granite.

[1]The ranges of permeability are defined as follows (Hood and Patterson, 1984, p.6):

Range	Permeability, in feet per day
Very low	Less than 0.5
Low	0.5 to 5
Moderate	5 to 50
High	50 to 500
Very high	More than 500

geologic units—Continued

Thickness and areal extent	Water-bearing[1] characteristics	Aquifer system
Thickness 175 to 480 feet, thins northwestward.	Very low permeability. The P aquifer generally exists north of the San Juan River and the C aquifer generally exists south of the San Juan River. Water-table conditions exist in the P aquifer west of Comb monocline.	
Thickness about 300 feet.	This and all underlying formations contain saline to briny water.	
Maximum thickness is 1,800 feet.		
Thickness commonly 500 to 2,500 feet; thickens to the northeast. Thickness as much as 11,000 feet in salt intrusives.		
This member and underlying formations are not exposed in area. Combined thickness of these two units is 100 to 300 feet.		
300 to 500 feet thick		
Thickness about 100 feet.		
100 to 300 feet thick		
50 to 100 feet thick		
0 to 200 feet thick		
Combined thickness 200 to 1,000 feet.		

Table 2.—Streamflow characteristics at active surface-water stations

[From U.S. Geological Survey (1981a, 1981b, 1982a, and 1982b]

Station name and number (plate 1)	Period of record (water years)	Discharge (cubic feet per second)		
		Average	Maximum	Minimum
Montezuma Creek at golf course, at Monticello, Utah (09378200)	1979-81	NA[1]	259	No flow
Recapture Creek near Blanding, Utah (09378630)	1965-81	1.29	142	No flow
Cottonwood Wash near Blanding, Utah (09378700)	1964-81	8.26	20,500	No flow
McElmo Creek near Colorado-Utah State line (09372000) (1.5 miles east of the State line)	1951-81	45.6	3,040	Almost zero
Chinle Creek near Mexican Water, Arizona (09379200) (6 miles south of the State line)	1964-80	21.7	9,880	No flow
San Juan River at Four Corners, Colorado (09371010) (1 mile east of the Four Corners)	1977-80	NA[1]	16,900	110
San Juan River near Bluff, Utah (09379500) (at Mexican Hat)	1914-81	2,532	70,000	No flow

[1]NA, Not available due to short period of record.

Table 3.—Miscellaneous measurements of streamflow and specific conductance during base flow, 1982-83

Drainage basin and location of measurement (plate 1)	Flow (cubic feet per second)	Specific conductance (microsiemens per centimeter at 25°Celsius)
Indian Creek drainage:		
Indian Creek, 3.6 mile upstream from State Highway 211, section 4, T.33 S., R.22 E.	2.56	275
Indian Creek, along State Highway 211, section 7, T.32 S., R.22 E.	2.78	330
North Cottonwood Creek drainage:		
North Cottonwood Creek, 1,000 feet upstream from Hop Creek, section 8, T.33 S., R.21 E.	1.24	470
Hop Creek, just upstream from confluence with North Cottonwood Creek, section 8, T.33 S., R.21 E.	.65	445
Cottonwood Wash drainage:		
Cottonwood Wash, downstream from Posey Canyon, section 13, T.35 S., R.20 E.	.32	740
Cottonwood Wash, upstream from Allen Canyon, section 31, T.35 S., R.21 E.	.13	890
Allen Canyon, just upstream from confluence with Cottonwood Wash, section 31, T.35 S., R.21 E.	.86	500
Cottonwood Wash, upstream of road crossing, section 17, T.36 S., R.21 E.	1.44	650
Cottonwood Wash, 50 ft downstream from gaging station (09378700) at State Highway 95, section 23, T.37 S., R.21 E.	.68	660
Montezuma Creek drainage:		
Vega Creek at U.S. Highway 666, section 27, T.33 S., R.24 E.	.05	1,270
Upper Montezuma Creek at golf course, Monticello (gage reading at gaging station 09378200), section 36, T.33 S., R.23 E.	1.37	405
Montezuma Creek, 1/4 mile above Verdure Creek, section 27, T.34 S., R.24 E.	5.19	880

Table 3.—Miscellaneous measurements of streamflow and specific conductance during base flow, 1982-83—Continued

Drainage basin and location of measurement (plate 1)	Flow (cubic feet per second)	Specific conductance (microsiemens per centimeter at 25°Celsius)
Montezuma Creek drainage--Continued:		
Verdure Creek, upstream from U.S. Highway 163, section 26, T.34 S., R.23 E.	0.85	325
Verdure Creek, 400 feet upstream from powerline crossing, section 31, T.34 S., R. 24 E.	1.01	550
Verdure Creek, at county-road crossing above Montezuma Creek, section 34, T.34 S., R.24 E.	.97	495
Montezuma Creek, 50 feet above Dalton Ranch irrigation diversion at Horsehead Canyon, section 2, T.36 S., R.24 E.	6.03	880
Lower Montezuma Creek, below irrigated fields at Coal Bed Canyon, section 35, T.36 S., R.24 E. (creekbed dried up about 6 miles downstream of last the measurement site)	3.10	1,120
McElmo Creek drainage:		
McElmo Creek, near Colorado-Utah State line (gage reading at gaging station 09372000)	76.2	2,200
Yellowjacket Creek, above confluence with McElmo Creek, just east of the Colorado-Utah State line	12.0	1,290
McElmo Creek, 2,500 feet above Utah Highway 262 near Aneth, section 16, T.41 S., R.25 E.	90.3	2,120

[This page blank so table 4 will start on even-numbered page]

Location: See figure 2 and text for description of data-site numbering system.
Geologic unit: See table 1 for explanation of code which best describes the interval at which the well is open or the formation from which the
Discharge: E, estimated.
Agency analyzing sample: 520, U.S. Soil Conservation Service; 1008, U.S. Bureau of Indian Affairs; 1028, U.S. Geological Survey ; 5052, Wyoming laboratory; 9901, Utah State University Laboratory. For analyses by other than the U.S. Geological Survey, the number of significant the number of significant figures may not conform to later standards of the Geological Survey.
Sample source: 1, unspecified discharge at well head; 8, holding tank; 12, swab; 27, faucet near well; 28, faucet away from well; 31, discharge
Sampling condition: 3, swabbing; 4, natural flow; 8, pumping; 15, bailing.
Units: GPM, gallons per minute; DEG° C, degrees Celsius; µS/CM, microsiemens per centimeter at 25° Celsius; MG/L, milligrams per liter.

LOCATION	GEO-LOGIC UNIT	DATE OF SAMPLE	DIS-CHARGE INSTAN-TANEOUS (GPM)	TEMPER-ATURE (DEG° C)	SPE-CIFIC CON-DUCT-ANCE (µS/CM)	PH (UNITS)	SILICA, DIS-SOLVED (MG/L AS SIO_2)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	SODIUM+ POTAS-SIUM DIS-SOLVED (MG/L AS NA)	ALKA-LINITY LAB (MG/L AS $CACO_3$)
(D-26-21)35CAC-S1	231KYNT	78-06-11	5	18.0	1540	8.2	9.6	71	51	140	9.9	—	—
35DDB-S1	231KYNT	78-06-11	.3	20.0	510	7.9	.8	76	18	21	5.9	—	—
(D-27-19)21BDC-S1	220NVJO	65-05-18	—	7.0	195	7.6	6.9	26	7.5	—	—	1.1	—
	220NVJO	67-10-24	1.0	—	197	7.5	8.1	24	8.5	1.9	1.4	—	—
(D-27-23)17A -S1	221MRSN	33-10-22	—	—	—	—	—	80	20	—	—	15	—
31DBC-S1	221MRSN	82-10-24	1.6	12.0	1140	8.2	9.7	45	77	62	6.4	—	391
(D-27-24)19C -S1	200MNCS	33-10-22	—	—	—	—	—	166	31	—	—	27	—
(D-28-21)16BCB- 1	220GLNC	69-08-14	—	—	—	8.3	5.0	27	20	20	4.0	—	135
	220GLNC	82-08-21	2.9	15.5	245	8.3	8.6	23	17	3.5	1.7	—	124
(D-28-22) 1CAA- 1	221ENRD	69-08-14	—	21.0	—	8.2	14	31	15	80	17	—	—
	221ENRD	79-04-04	—	—	630	—	11	51	29	36	4.0	—	171
1CAB-S1	221ENRD	33-10-28	20	15.0	—	—	—	54	36	—	—	31	—
	221ENRD	77-12-14	—	—	—	7.2	10	46	32	39	4.0	—	172
(D-28-23) 3AD -S1	221SLWS	50-06-28	50	14.5	647	8.3	12	38	59	10	4.6	—	—
31ABC- 1	231WNGT	83-04-18	6.3	14.5	750	8.7	8.8	13	19	110	6.0	—	214
36DBA-S1	217BRCN	33-10-25	—	—	—	—	—	109	30	—	—	23	—
	217BRCN	81-04-15	—	—	—	7.8	13	92	22	35	2.0	—	197
(D-28-26)30DDD-S1	221ENRD	60-10-05	5.0	15.0	315	8.3	10	40	18	3.7	1.9	—	—
	221ENRD	62-05-02	—	11.0	325	7.9	—	—	—	—	—	7.1	—
	221ENRD	62-10-10	2.0	14.5	332	7.9	—	—	—	—	—	8.4	—
T(D-29-19)36BBC-S1	310RICO	70-04-07	<.1	10.0	1020	7.8	8.3	30	18	162	5.4	—	—
(D-29-23) 4CBA- 1	220NVJO	64-01-15	—	—	760	7.5	11	66	39	35	4.4	—	—
20CAA- 1	220NVJO	83-04-17	7.5	13.0	790	7.4	9.0	67	59	8.6	3.7	—	234
(D-29-24)10AAB- 1	111ALVM	61-03-30	—	10.5	581	7.6	21	82	14	27	1.1	—	—
	111ALVM	62-10-10	—	—	572	7.5	—	—	—	—	—	25	—
(D-30-19)12ACB-S1	310CDRM	69-05-20	E.1	13.5	3250	8.1	14	43	156	504	10	—	—
14AAB-S1	310RICO	70-04-07	13	10.5	571	7.6	9.2	59	21	39	3.6	—	—
15ADC-S1	310RICO	70-04-08	5.0	10.5	405	7.7	7.7	46	17	19	2.8	—	—
22ADD-S1	310CDRM	70-03-05	E1.0	9.0	404	7.4	5.6	58	11	12	3.4	—	—
25CDC-S1	310CDRM	68-05-02	E10	15.0	475	7.8	8.0	68	18	12	1.5	—	—
26CBC-S1	310RICO	68-05-02	E2.0	16.0	439	7.7	4.6	63	18	7.8	2.0	—	—
27CDD-S1	310CDRM	68-07-17	.1	21.5	571	7.7	9.5	90	20	6.6	3.5	—	—
31CDD-S1	111ALVM	69-09-04	E10	13.5	611	8.0	14	71	34	15	3.6	—	—
T(D-30-19)34CAC-S1	310CDRM	68-10-09	E.1	13.0	101	7.4	1.6	18	2.9	.7	1.0	—	—
(D-30-20)20ACA- 1	310CDRM	68-10-09	44	15.0	1490	8.0	16	88	73	162	1.6	—	—
20DAC- 1	310CDRM	68-05-02	E60	14.0	1380	7.9	17	36	92	150	3.4	—	—
30CBA- 1	310CDRM	68-05-02	—	15.0	524	7.9	8.4	71	22	19	1.6	—	—
(D-30-23) 3BAC- 1	220NVJO	83-03-11	6.8	13.0	400	8.0	8.4	28	35	3.3	2.3	—	211
(D-30-24)12DAB- 1	310CTLR	83-04-18	—	12.0	730	7.6	16	62	30	42	1.9	—	232
22BDD- 1	231WNGT	80-04-21	—	—	—	8.0	—	23	17	—	—	—	—
22CAA- 1	231WNGT	80-04-21	—	—	—	8.0	—	32	20	—	—	—	—
27CBA- 1	231WNGT	59-05-04	—	—	500	7.8	12	11	11	—	—	93	—
32CCD- 1	220NVJO	82-07-15	3.0	14.0	580	8.8	9.6	2.9	2.6	140	1.9	—	274
(D-31-19) 3BDA-S1	310CDRM	70-12-02	E300	12.0	450	8.1	6.0	73	9.4	4.9	1.9	—	—
4ADC-S1	310CDRM	68-05-20	<.1	13.5	—	—	—	—	—	—	—	—	—
(D-31-20) 6ADA-S1	310CDRM	68-05-02	E2.5	14.5	640	7.8	6.8	48	43	29	3.9	—	—
(D-31-23)32BBD- 1	220GLNC	83-04-16	2.5	11.5	305	8.1	9.3	31	18	4.7	1.9	—	141
(D-32-23)24CCC-S1	217BRCN	33-10-28	2.0	8.5	—	—	—	62	20	—	—	28	—
(D-32-24)22ADB- 1	231WNGT	83-06-12	11.0	16.0	1220	8.6	5.8	7.9	3.5	280	6.7	—	495
(D-33-22)25DBB-S1	112CLVM	79-06-01	—	—	130	8.4	18	21	2.0	4.0	>1	—	66
(D-33-23)30DCC-S1	112CLVM	79-06-01	—	—	260	8.3	18	45	5.0	1.0	>1	—	131
36DAA- 2	220JRSC	80-07-10	—	—	645	8.2	13	75	25	55	6.0	—	287
36DAD- 1	210DKOT	55-05-10	29	10.5	669	7.5	10	50	12	90	2.9	—	—
	210DKOT	55-05-11	27	10.5	612	7.4	10	56	13	64	3.1	—	—
(D-33-24)19DAD- 1	220NVJO	55-11-22	—	20.0	576	8.6	15	47	18	—	—	54	—
	220NVJO	55-11-22	—	—	600	8.5	15	45	17	—	—	63	—
	220NVJO	55-11-22	50	20.0	451	8.4	28	19	19	—	—	54	—
	221ENRD	55-11-30	40	15.5	1260	8.8	21	6.2	5.6	301	5.1	—	—
	210DKOT	55-12-10	—	—	570	7.8	14	50	14	—	—	57	—
	210DKOT	55-12-10	—	—	496	8.4	15	32	13	—	—	58	—
	220JRSC	56-10-01	—	—	550	7.7	—	—	—	—	—	—	—
	220JRSC	56-10-02	—	—	543	7.8	—	—	—	—	—	—	—
	220JRSC	56-10-02	—	—	546	8.2	—	—	—	—	—	—	—
	220JRSC	56-10-02	—	—	554	8.0	—	—	—	—	—	—	—
	220JRSC	56-10-03	—	—	546	8.0	—	—	—	—	—	—	—
	220JRSC	56-10-03	—	—	548	7.6	—	—	—	—	—	—	—
	220JRSC	56-10-04	—	—	547	7.7	—	—	—	—	—	—	—

samples from water wells and springs

spring flows.

Department of Agriculture; 5049, Utah Department of Agriculture; 9749, Utah State Health Laboratory; 9801, private figures may not conform to standards of the Geological Survey. For analyses by the Geological Survey prior to 1971,

pipe; 33, bailer.

BICARBONATE (MG/L AS HCO_3)	CARBONATE (MG/L AS CO_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 NO_3)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	HARDNESS (MG/L AS $CACO_3$)	HARDNESS, NONCARBONATE (MG/L $CACO_3$)	SODIUM ADSORPTION RATIO	AGENCY ANALYZING SAMPLE (CODE NUMBER)	SAMPLE SOURCE	SAMPLING CONDITION
270	—	58	250	.4	5.3	—	868	300	—	—	5052	—	—
180	—	45	20	.3	2.4	—	282	190	—	—	5052	—	—
104	0	6.0	2.9	—	3.4	112	105	96	11	.0	—	—	—
106	0	6.8	4.9	.1	4.9	108	113	95	8	.1	1028	—	—
294	0	66	4.0	—	.09	—	330	282	41	—	1028	—	—
—	—	180	14	—	—	—	629	429	38	1.3	1028	—	—
252	0	361	13	—	<.10	—	722	542	335	—	1028	—	—
—	—	9.0	42	.4	.00	231	—	150	15	.7	5049	—	—
—	—	6.0	4.7	—	—	—	139	127	3	.1	1028	31	8
—	—	151	10	—	.00	452	—	138	—	3.0	5049	28	—
208	0	108	39	.2	.89	376	382	247	76	1.0	9749	—	—
188	16	112	37	.0	.40	442	379	283	102	.8	1028	—	—
209	0	104	40	.2	.58	367	379	247	76	1.1	9801	—	—
351	7	28	24	.4	5.3	362	361	338	39	.2	1028	—	—
—	—	61	66	.3	—	—	413	111	0	4.6	1028	31	8
270	0	191	17	—	1.2	—	504	396	175	.5	1028	—	—
240	0	181	16	.2	1.3	506	481	320	123	.9	9749	—	—
190	4	16	3.0	.1	.09	182	190	174	12	.1	1028	28	—
195	0	23	.5	—	—	174	—	169	9	.2	1028	—	—
203	0	13	4.5	—	—	173	—	168	1	.3	1028	28	—
251	0	57	170	.5	1.3	583	576	149	0	5.9	1028	—	—
221	0	152	35	.4	27	—	479	325	143	.9	9749	28	—
—	—	190	13	.1	—	—	491	410	176	.2	1028	31	8
308	0	51	4.5	.2	8.4	358	361	262	9	.8	1028	—	—
312	153	46	5.5	—	—	339	—	257	1	.7	1028	—	—
662	0	639	474	1.2	2.0	2180	2170	750	207	8.1	1028	—	—
338	0	25	16	.3	.22	337	340	234	0	1.1	1028	—	—
253	0	13	5.8	.1	1.0	236	236	185	0	.6	1028	—	—
208	0	38	10	.3	.00	237	240	190	19	.4	1028	—	—
294	0	18	6.2	.2	.30	279	277	244	3	.3	1028	—	—
276	0	13	4.1	.2	1.2	257	250	231	4	.2	1028	—	—
362	0	18	6.2	—	.10	334	332	307	10	.2	1028	—	—
414	0	8.8	10	.1	.10	365	361	317	0	.4	1028	—	—
60	0	3.8	1.6	.1	1.3	54	61	57	8	.0	1028	—	—
536	0	223	128	.9	.31	926	957	520	80	3.2	1028	—	—
496	0	214	122	1.1	.49	867	880	469	62	3.0	1028	—	—
322	0	17	9.3	.3	.22	305	307	268	4	.5	1028	—	—
—	—	6.3	12	.2	—	—	222	214	3	.1	1028	31	—
—	—	110	18	.6	—	—	420	278	46	1.1	1028	1	4
183	0	.0	350	—	—	—	—	126	0	—	9801	—	—
129	0	.0	400	—	—	—	—	160	54	—	9801	—	—
278	0	18	20	.2	1.0	—	303	73	0	4.7	1028	—	—
—	—	23	16	—	—	—	361	18	0	15	1028	31	4
282	—	12	3.2	.2	.22	250	250	221	0	.1	1028	—	—
—	—	—	—	—	—	—	—	—	—	—	1028	—	—
336	0	52	21	.4	.31	380	369	297	20	.7	1028	—	—
—	—	20	6.6	<.1	—	—	176	152	11	.2	1028	31	8
234	0	86	12	.0	.40	—	324	237	45	.8	1028	—	—
—	—	150	12	1.5	—	—	765	34	0	23	1028	12	3
76	2	7.0	1.0	.01	—	—	98	62	—	—	9801	—	—
160	0	6.0	3.0	.04	—	—	164	132	—	—	9801	—	—
350	0	53	13	.2	1.3	382	414	290	3	1.5	9749	—	—
313	0	101	6.0	.4	—	419	426	174	0	3.1	1028	—	—
263	0	109	5.0	.0	.09	386	390	193	0	2.1	1028	—	—
276	18	49	.5	—	.62	—	367	191	0	—	1028	—	—
279	20	48	6.0	—	.22	—	336	182	0	—	1028	—	—
199	14	46	5.5	—	.31	—	283	126	0	—	1028	—	—
500	80	130	7.5	1.5	.49	816	801	39	0	22	1028	—	—
256	0	80	8.5	—	.09	—	349	183	0	—	1028	—	—
181	9	81	8.0	—	.00	—	308	133	0	—	1028	—	—
248	0	—	7.0	—	—	—	—	180	0	—	1028	—	—
246	0	—	7.0	—	—	—	—	180	0	—	1028	—	—
248	0	—	7.0	—	—	—	—	180	0	—	1028	—	—
248	0	—	7.0	—	—	—	—	178	0	—	1028	—	—
250	0	—	7.0	—	—	—	—	180	0	—	1028	—	—
248	0	—	7.5	—	—	—	—	182	0	—	1028	—	—
250	0	—	7.0	—	—	—	—	182	0	—	1028	—	—

LOCATION	GEOLOGIC UNIT	DATE OF SAMPLE	DISCHARGE INSTANTANEOUS (GPM)	TEMPERATURE (DEG° C)	SPECIFIC CONDUCTANCE (µS/CM)	PH (UNITS)	SILICA, DISSOLVED (MG/L AS SIO_2)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	POTASSIUM, DISSOLVED (MG/L AS K)	SODIUM+POTASSIUM DISSOLVED (MG/L AS NA)	ALKALINITY LAB (MG/L AS $CACO_3$)
	220JRSC	56-10-04	—	—	552	7.6	9.1	50	14	56	2.6	—	—
	210DKOT	56-10-04	—	—	547	7.8	—	—	—	—	—	—	—
	210DKOT	56-10-04	—	—	543	7.7	—	—	—	—	—	—	—
	210DKOT	56-10-05	—	—	543	7.8	—	—	—	—	—	—	—
	200MSZC	56-10-05	—	—	544	7.7	—	—	—	—	—	—	—
	210DKOT	56-10-05	—	—	546	7.8	8.6	51	13	56	2.6	—	—
	220JRSC	56-10-11	—	—	549	7.4	—	—	—	—	—	—	—
	200MSZC	56-10-12	—	—	550	7.4	—	—	—	—	—	—	—
29BDD-S1	210DKOT	55-06-16	14	10.0	990	7.3	23	130	27	62	1.2	—	—
30DDB- 1	210DKOT	55-07-13	60	—	1430	7.5	10	121	32	165	9.7	—	—
30DDC- 1	210DKOT	55-04-07	—	—	672	7.9	15	—	—	—	—	70	—
	210DKOT	55-07-15	220	—	675	7.4	10	61	15	68	3.2	—	—
	210DKOT	55-07-17	200	—	665	7.3	10	61	13	66	3.2	—	—
	210DKOT	57-10-24	125	12.5	677	7.2	8.4	58	16	—	—	75	—
	210DKOT	63-10-16	125	13.5	685	7.1	8.5	55	20	66	2.8	—	—
31ABB- 1	210DKOT	55-06-13	24	—	654	7.6	10	60	16	66	3.5	—	—
	210DKOT	55-06-16	15	—	644	7.1	10	57	17	64	3.3	—	—
31ACB- 1	210DKOT	55-05-15	—	13.5	467	7.7	11	15	5.4	86	2.1	—	—
	210DKOT	55-05-16	50	13.5	462	7.5	11	15	5.0	85	2.5	—	—
31BCC- 1	210DKOT	55-08-05	22	—	474	7.5	12	15	4.1	83	2.1	—	—
31BDB- 1	210DKOT	55-08-05	40	13.5	466	7.5	12	15	3.8	83	2.1	—	—
(D-34-21) 27CCD-S1	111ALVM	82-10-21	13	11.0	470	7.2	12	72	8.5	22	1.1	—	230
(D-34-22) 28CAA- 1	220JRSC	77-12-19	—	—	—	7.6	13	46	9.0	36	2.0	—	198
(D-34-23) 1DAD- 1	210DKOT	54-04-22	—	—	880	—	—	6.0	3.7	156	9.0	—	—
(D-34-26) 30BCC- 1	210DKOT	77-12-14	—	—	—	7.3	10	113	32	37	4.0	—	274
(D-34-26) 30CCB- 1	111ALVM	57-10-24	—	11.0	552	7.2	14	73	24	—	—	60	—
	111ALVM	58-10-09	—	11.0	649	7.5	15	93	24	—	—	18	—
	111ALVM	59-10-21	—	6.0	857	7.3	13	114	38	—	—	22	—
	111ALVM	60-10-06	—	11.5	750	7.8	14	103	33	18	.9	—	—
	111ALVM	61-03-30	—	6.5	793	7.6	14	107	35	18	1.2	—	—
	111ALVM	80-12-08	—	—	—	8.0	12	100	35	47	4.0	—	179
(D-35-23) 9CBD-S1	217BRCN	79-06-01	—	—	180	8.3	12	22	3.0	10	1.0	—	82
(D-35-24) 22DDD- 1	220GLNC	82-07-20	—	15.0	800	7.5	12	49	37	58	7.9	—	344
(D-36-21) 27AAB- 1	221SLWS	50-06-24	10	13.5	1250	7.7	13	77	53	128	6.4	—	—
(D-36-22) 12CCD- 1	220NVJO	82-08-22	15	16.5	510	9.2	11	1.4	.2	130	1.1	—	230
26CBC- 2	217BRCN	83-03-11	38	13.0	510	7.6	15	56	15	31	1.3	—	185
27DAD- 2	217BRCN	83-08-22	8.1	13.0	2890	6.7	16	530	120	110	5.4	—	150
35BBA- 1	217BRCN	83-06-16	10	13.0	910	7.4	15	100	24	56	1.8	—	239
(D-36-24) 14DBA- 1	220JRSC	82-07-20	130	15.0	710	7.6	11	34	17	93	4.3	—	287
(D-36-26) 7BAC- 1	200MSZC	82-10-28	—	22.0	1280	8.1	12	7.0	3.0	290	4.5	—	502
(D-37-21) 10BA - 1	221SLWS	50-06-24	—	8.5	1990	7.4	13	116	114	179	10	—	—
(D-37-22) 10DBD- 1	—	81-07-07	—	—	—	7.9	12	78	23	100	3.0	—	200
	—	82-01-11	—	—	—	8.1	11	80	22	94	3.0	—	241
10DDB- 1	217BRCN	55-06-21	—	—	—	—	6.0	186	32	—	—	787	—
22BBC- 1	217BRCN	82-10-20	—	—	4450	4.6	—	520	480	170	4.5	—	22
22CCB- 1	200MSZC	82-10-28	—	24.0	425	8.1	12	42	18	24	3.4	—	207
28DBB- 1	220GLNC	82-11-25	—	23.0	385	7.9	12	44	18	6.6	3.2	—	193
33DDA- 1	220GLNC	82-09-21	217	24.5	395	8.0	16	30	13	34	2.7	—	181
(D-37-24) 24CBB- 1	221MRSN	54-08-10	—	—	620	—	—	19	7.6	103	21	—	—
	221ENRD	82-06-11	75	17.0	550	7.5	9.3	19	10	86	20	—	235
25BBD- 1	220JRSC	82-06-11	15	16.0	720	7.9	9.1	14	7.2	120	17	—	291
(D-37-25) 19BDD- 1	221ENRD	54-08-10	—	—	780	—	—	15	4.8	161	15	—	—
32CAD- 1	220JRSC	82-10-27	83	18.5	1240	8.5	10	18	8.4	220	22	—	320
(D-38-22) 23ACB- 1	220JRSC	80-05-31	72	—	360	7.6	—	50	8.0	—	—	19	—
(D-38-25) 7CBA- 1	221ENRD	54-06-16	—	—	648	—	—	5.8	3.4	122	3.9	—	—
27CCB- 1	220JRSC	82-06-09	—	19.5	770	8.0	8.9	4.9	1.9	170	8.4	—	353
33BDC- 1	—	69-08-06	28	17.2	—	8.5	9.0	16	2.6	180	19	—	—
35BD - 1	220JRSC	82-06-10	19	15.5	1550	8.4	7.5	11	3.3	350	16	—	617
(D-38-26) 28ACD- 1	—	69-08-07	—	17.8	—	8.2	9.2	21	3.3	110	18	—	—
	—	82-06-09	15	18.0	560	8.2	8.8	6.8	2.6	130	9.7	—	253
	—	82-09-21	47	18.0	850	7.6	8.5	9.7	4.1	170	13	—	344
(D-39-22) 17BAB- 1	220JRSC	82-09-18	28	18.0	370	7.8	18	28	18	24	2.9	—	163
17CBD- 1	220JRSC	82-06-13	15	19.0	400	8.0	15	19	13	55	3.5	—	203
19BBD- 1	220JRSC	82-04-29	10	17.0	460	8.6	13	5.2	1.3	120	1.1	—	220
(D-39-23) 1DDD- 1	221MRSN	82-05-08	1.5	18.0	1200	9.2	8.6	1.2	.2	280	1.9	—	490
(D-39-24) 13DAC- 1	221BLFF	60-08-03	30	—	598	7.9	12	40	15	55	24	—	—
(D-39-25) 5ACA- 1	221ENRD	52-07-19	E230	—	743	8.0	9.0	22	12	138	21	—	—
	221ENRD	52-07-31	—	—	740	—	11	18	9.4	—	—	147	—
	221ENRD	53-08-12	—	14.0	769	8.0	10	15	8.4	152	23	—	—
	221ENRD	54-06-16	—	—	802	—	—	13	8.2	145	11	—	—
	221ENRD	69-08-06	15	16.5	—	7.8	10	20	7.8	150	27	—	385
5ACA- 2	220GLNC	52-07-19	E500	—	1290	8.2	9.3	28	10	264	17	—	—
	220GLNC	52-07-31	—	—	1270	—	13	21	5.2	—	—	294	—
	220GLNC	53-08-12	—	—	1200	8.3	11	12	4.9	271	21	—	—
30BBC- 1	221ENRD	56-05-10	150	21.0	616	7.5	13	30	20	—	—	80	—
(D-39-26) 20AAC-S1	210DKOT	59-05-01	E1.0	—	1650	8.1	8.1	98	134	—	—	122	—
21BDB- 1	221BRSB	63-06-14	E12	—	2040	7.5	7.8	117	48	—	—	311	—
	221WSRC	63-06-25	—	—	1450	8.7	18	13	.0	—	—	353	—

samples from water wells and springs—Continued

BICAR-BONATE (MG/L AS HCO_3)	CAR-BONATE (MG/L AS CO_3)	SULFATE DIS-SOLVED (MG/L AS SO_4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS NO_3)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	HARD-NESS (MG/L AS $CACO_3$)	HARD-NESS, NONCAR-BONATE (MG/L $CACO_3$)	SODIUM AD-SORP-TION RATIO	AGENCY ANA-LYZING SAMPLE (CODE NUMBER)	SAMPLE SOURCE	SAM-PLING CONDI-TION
248	0	91	5.2	.0	.49	340	351	183	0	1.9	1028	—	—
248	0	—	6.0	—	—	—	—	182	0	—	1028	—	—
248	0	—	6.0	—	—	—	—	182	0	—	1028	—	—
246	0	—	6.0	—	—	—	—	180	0	—	1028	—	—
248	0	—	8.0	—	—	—	—	182	0	—	1028	—	—
248	0	90	6.4	.0	—	341	350	181	0	1.9	1028	—	—
251	0	90	7.0	—	.00	—	—	180	0	—	1028	—	—
243	0	92	7.0	—	.22	—	—	175	0	—	—	—	—
398	0	177	24	.2	24	681	664	436	110	1.3	1028	—	—
474	0	358	36	—	1.1	964	963	434	45	3.6	1028	—	—
257	0	131	10	—	.00	—	425	208	0	—	1028	—	—
260	0	136	10	—	.22	434	431	214	1	2.1	1028	31	—
252	—	129	10	—	.22	415	416	206	0	2.1	1028	31	—
240	0	158	8.0	—	.22	—	444	211	14	2.3	1028	—	—
211	0	179	8.0	.2	.62	453	453	220	47	2.0	1028	—	—
244	0	135	16	.1	.09	469	427	216	16	2.0	1028	—	—
243	0	135	7.5	.2	.22	412	414	212	13	2.0	1028	—	—
217	0	62	5.0	.2	2.0	289	294	60	0	5.0	1028	—	—
214	0	62	5.0	.3	.09	286	292	58	0	5.0	1028	—	—
218	0	64	4.0	—	.49	—	292	54	0	5.1	1028	—	—
218	0	63	4.0	—	.22	—	290	53	0	5.1	1028	—	—
—	—	28	5.2	—	—	—	287	215	0	.7	1028	—	—
242	0	22	.0	.8	2.0	215	251	152	0	1.3	9801	—	—
483	0	35	14	—	—	520	486	30	0	13	9749	—	—
334	0	176	34	.3	9.3	563	582	414	140	.8	9801	—	—
412	0	56	9.0	—	3.8	—	443	281	0	1.6	1028	1	8
317	0	86	14	—	1.9	—	408	331	71	.4	1028	1	8
336	0	172	24	—	1.3	—	549	441	165	.5	1028	1	8
276	0	165	20	.2	3.3	498	494	393	167	.4	1028	1	8
308	0	160	20	.3	3.5	525	510	411	158	.4	1028	1	8
218	0	170	96	—	1.8	596	573	394	215	1.1	9749	—	—
100	0	10	4	.05	—	—	116	70	—	—	9801	—	—
—	—	72	6.4	—	—	—	449	275	0	1.6	1028	27	8
378	0	353	27	.2	.22	848	844	411	101	2.8	1028	—	—
—	—	45	2.0	.1	—	—	329	4	0	28	1028	31	8
—	—	58	21	.6	—	—	309	202	17	1.0	1028	31	8
—	—	1700	86	—	—	—	2660	1800	1700	1.1	1028	27	8
—	—	160	53	0.5	—	—	554	350	110	1.4	1028	27	8
—	—	45	11	—	—	—	388	155	0	3.3	1028	31	8
—	—	63	84	1.2	—	—	767	30	0	24	1028	27	8
480	—	631	91	.4	1.9	1550	1400	758	364	—	1028	—	—
244	—	277	22	.5	.89	644	637	289	89	2.6	9749	—	—
294	0	262	23	.5	—	658	640	290	49	2.5	9749	—	—
—	—	2155	49	.8	.49	3915	—	596	—	—	9749	—	—
6	—	3185	213	—	20.4	—	4890	—	—	—	9801	—	—
—	—	35	1.3	.3	—	—	260	179	0	.8	1028	27	—
—	—	26	.8	.2	—	—	227	184	0	.2	1028	27	8
—	—	29	1.7	.2	—	—	235	128	0	1.3	1028	27	8
272	12	51	15	—	—	360	—	79	0	5.2	9901	—	4
—	—	52	13	.7	—	—	351	89	0	4.1	1028	31	4
—	—	51	16	.6	—	—	410	65	0	6.7	1028	31	4
357	10	80	26	—	—	510	488	57	0	9.6	9901	—	4
—	—	68	160	.7	—	—	700	80	0	11	1028	31	8
230	0	29	4.0	.2	—	<254	—	158	0	—	9801	—	—
318	—	58	13	—	—	380	363	28	0	10	520	—	4
—	—	44	8.2	1.4	—	—	460	20	0	17	1028	31	4
—	—	52	16	—	—	543	—	50	—	12	5049	—	—
—	—	67	100	1.0	—	—	927	41	0	25	1028	31	4
—	—	44	12	—	—	408	—	66	—	6.2	5049	—	—
—	—	44	8.2	.7	—	—	363	28	0	11	1028	31	4
—	—	55	30	.6	—	—	498	41	0	12	1028	31	4
—	—	26	.9	.2	—	—	216	144	0	.9	1028	31	4
—	—	27	1.3	.2	—	—	256	101	0	2.4	1028	31	4
—	—	47	5.3	.2	—	—	325	18	0	13	1028	—	—
—	—	130	9.1	1.3	—	—	728	4	0	64	1028	—	—
—	—	39	7.0	.5	66	—	354	162	—	1.9	9749	—	4
398	12	55	16	.5	.09	483	482	104	0	6.0	1028	—	—
423	0	45	5.0	.6	.62	—	445	84	0	7.0	1028	—	—
442	0	54	8.8	.5	.80	470	490	72	0	8.0	1028	—	—
458	0	58	11	—	—	490	—	66	0	8.0	520	—	—
—	—	65	10	—	.00	—	544	82	—	—	5049	—	4
620	12	99	45	1.7	.09	794	791	111	0	11	1028	—	—
660	0	96	48	1.8	.49	—	804	74	0	—	1028	—	—
646	16	103	21	1.9	.60	756	765	50	0	17	1028	—	—
334	0	48	4.0	1.2	.31	—	362	157	0	2.8	1028	—	4
529	0	572	20	.3	2.6	—	1220	796	362	1.9	1028	—	—
438	0	728	33	—	.40	1460	1460	490	131	6.1	1028	33	15
654	26	176	26	—	1.2	952	960	32	0	27	1028	33	15

LOCATION	GEO-LOGIC UNIT	DATE OF SAMPLE	DIS-CHARGE INSTAN-TANEOUS (GPM)	TEMPER-ATURE (DEG° C)	SPE-CIFIC CON-DUCT-ANCE (µS/CM)	PH (UNITS)	SILICA, DIS-SOLVED (MG/L AS SIO_2)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	SODIUM+ POTAS-SIUM DIS-SOLVED (MG/L AS NA)	ALKA-LINITY LAB (MG/L AS $CACO_3$)
	220JRSC	63-07-00	E30	—	1200	8.5	9.9	10	4.6	—	—	287	—
	220JRSC	63-08-20	—	—	1150	—	—	—	—	—	—	—	—
	220JRSC	63-08-26	—	—	1170	—	18	100	89	—	—	—	—
	220JRSC	63-09-07	49	18.5	1740	8.1	9.9	17	5.1	—	—	413	—
	220JRSC	63-09-07	29	21.0	1820	7.9	10	18	7.3	418	22	—	—
	220JRSC	64-03-10	—	21.0	1630	8.4	9.7	13	7.5	—	—	386	—
33 -S1	210DKOT	54-09-08	<.1	23.0	2500	—	15	25	41	—	—	556	—
(D-40-19) 14DDD-S1	310HLGT	58-09-10	<1.0	—	2640	8.0	24	381	128	—	—	164	—
(D-40-20) 36CCB-S1	231WNGT	44-03-01	—	—	491	—	—	18	13	—	—	74	—
(D-40-21) 23AAD- 1	220GLNC	82-11-19	23	18.0	455	8.7	13	13	3.1	88	2.1	—	210
25AAB- 1	220JRSC	33-11-13	12	19.0	—	—	—	—	—	—	—	138	—
25AAC- 1	220NVJO	82-05-04	6.0	17.5	405	8.8	11	3.1	.7	93	1.1	—	170
25ABA- 1	220GLNC	82-05-04	3.7	20.0	780	9.1	—	—	—	—	—	—	—
25ACB- 1	220NVJO	82-07-23	7.5	16.5	420	8.8	11	3.2	.7	96	1.3	—	175
25ADB- 1	220JRSC	82-11-19	—	16.5	560	8.7	10	2.9	.7	140	1.4	—	248
25BAB- 1	220JRSC	82-11-19	—	16.0	460	9.0	11	3.0	.6	110	1.1	—	197
25BDA- 1	220GLNC	82-11-19	—	16.5	690	9.0	10	2.3	.3	160	1.3	—	293
26ADA- 1	220NVJO	82-04-14	—	—	—	—	12	3.0	—	92	2.0	—	179
26DAA- 1	220JRSC	82-11-19	—	16.0	440	9.0	11	2.5	.7	110	1.3	—	191
(D-40-22) 19CDC- 1	220JRSC	82-11-21	—	18.0	370	9.1	12	3.6	.6	84	1.6	—	155
29AAB- 1	220JRSC	58-05-21	—	—	378	8.1	12	4.4	.6	84	1.5	—	—
	220JRSC	82-06-14	—	19.5	360	8.6	12	4.0	.9	83	1.7	—	143
29AAB-S1	221BLFF	47-04-26	—	—	255	—	—	27	9.2	—	—	13	—
	221BLFF	59-05-01	E.5	—	—	8.0	—	—	—	—	—	—	—
29BDB- 1	220JRSC	82-11-21	—	16.5	365	9.0	11	3.4	.7	81	1.7	—	144
30AAC- 1	220GLNC	57-10-24	E100	18.5	376	7.9	11	3.2	1.9	—	—	81	—
	220GLNC	58-10-09	E100	18.5	382	8.2	13	5.2	1.5	—	—	86	—
	220GLNC	59-10-21	E100	18.5	382	8.7	11	4.0	1.5	—	—	87	—
	220GLNC	63-10-16	E100	19.0	376	7.9	12	3.2	2.4	85	1.4	—	—
	220GLNC	82-11-21	—	18.0	415	9.1	11	3.4	.7	96	1.4	—	177
30ABD- 1	111ALVM	59-05-01	—	—	2780	7.5	19	244	46	—	—	4080	—
30BBB- 1	220JRSC	33-11-13	30	19.5	—	—	—	—	—	—	—	137	—
	220JRSC	44-03-01	—	—	558	—	—	<5.0	3.1	—	—	128	—
	220JRSC	49-07-02	—	19.5	570	—	—	3.0	1.9	132	5.0	—	—
	220JRSC	58-09-10	E50	—	418	8.0	10	4.8	1.0	—	—	98	—
	220JRSC	61-03-29	60	20.0	595	8.6	11	4.0	.5	141	1.1	—	—
	220JRSC	62-10-11	50	20.0	609	8.6	—	—	—	—	—	144	—
	220JRSC	64-10-06	22	20.0	591	8.0	11	3.2	1.5	—	—	148	—
	220JRSC	68-03-20	—	25.0	787	8.8	—	2.0	.7	—	—	194	—
	220JRSC	71-07-12	—	22.0	747	8.6	—	1.9	.4	190	1.2	—	—
	220JRSC	74-09-20	—	20.5	750	8.9	11	2.6	1.1	190	2.3	—	—
	220JRSC	75-09-17	—	25.0	800	8.8	11	5.3	.2	190	1.6	—	—
	220JRSC	77-03-09	—	19.0	780	7.7	11	2.2	.8	190	1.5	—	—
	220JRSC	77-09-08	—	22.0	740	8.3	11	4.0	.8	180	1.7	—	—
	220JRSC	78-03-02	—	19.0	790	8.5	12	5.7	.8	190	1.4	—	—
	220JRSC	78-09-05	—	21.0	750	8.4	11	4.3	1.0	190	2.2	—	—
	220JRSC	80-09-04	—	20.0	770	8.6	11	2.7	.8	190	1.8	—	—
	220JRSC	81-03-04	—	15.0	760	8.7	—	1.7	.5	190	1.2	—	—
	220JRSC	82-05-01	—	21.0	650	9.0	11	1.5	.4	180	1.1	—	320
	220JRSC	83-04-14	—	20.0	758	9.0	11	3.3	.4	180	1.1	—	339
30BBD-1	220GLNC	58-09-10	E100	—	637	8.4	10	40	23	—	—	74	—
	220GLNC	82-11-21	—	18.0	405	9.1	11	2.5	.5	93	1.3	—	170
(D-40-23) 4BBC- 1	220JRSC	56-05-00	11	—	—	—	—	71	43	—	—	591	—
12BAD- 1	221MRSN	73-04-05	—	—	—	8.8	—	6.0	—	440	7.0	—	448
21DBC- 1	220JRSC	78-01-19	—	—	—	8.0	11	10	5.0	340	6.0	—	502
	220JRSC	82-01-31	—	—	—	8.1	12	7.0	7.0	330	7.0	—	505
21DB - 1	220JRSC	78-01-19	—	—	—	8.1	11	13	2.0	335	7.0	—	504
	220JRSC	82-01-14	—	—	—	8.1	13	13	5.0	390	9.0	—	512
27BAA- 1	220JRSC	60-07-15	—	—	3115	7.8	9.2	28	6.4	630	20	—	690
	220JRSC	82-06-14	19	17.0	3070	7.8	11	27	12	670	14	—	766
	220JRSC	83-06-16	49	20.0	3000	7.6	11	24	11	680	15	—	823
36ABB- 1	221ENRD	59-04-29	30	—	10400	7.6	11	224	136	—	—	2210	—
(D-40-24) 11ABD- 1	221BLFF	56-03-02	150	17.0	728	7.6	13	33	18	—	—	115	—
14ADB- 1	220JRSC	57-04-00	—	—	—	7.1	—	89	48	—	—	1285	—
17DBD- 1	220JRSC	56-05-00	—	—	—	7.5	—	8.0	32	—	—	1062	—
	220JRSC	82-06-10	2.5	20.0	3990	7.5	11	32	12	950	19	—	800
20 -S1	221RCPR	54-09-08	E3.5	15.5	867	—	11	24	11	—	—	174	—
32DCB- 1	220JRSC	78-01-19	—	—	—	—	9.0	10	5.0	215	8.0	—	440
(D-40-25) 1BCC- 1	220NVJO	52-08-17	2.0	21.5	5390	—	16	54	20	—	—	1350	—
	220NVJO	53-12-09	—	—	14300	—	10	134	77	3400	56	—	—
	220NVJO	55-03-10	1.8	16.0	23400	7.7	11	328	133	5660	65	—	—
5BBB-S1	217BRCN	54-09-08	E.1	20.0	3930	—	13	27	12	—	—	927	—

BICARBONATE (MG/L AS HCO_3)	CARBONATE (MG/L AS CO_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 NO_3)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	HARDNESS (MG/L AS $CaCO_3$)	HARDNESS, NONCARBONATE (MG/L $CaCO_3$)	SODIUM ADSORPTION RATIO	AGENCY ANALYZING SAMPLE (CODE NUMBER)	SAMPLE SOURCE	SAMPLING CONDITION
615	21	108	12	—	1.0	758	756	44	0	19	1028	33	—
—	—	—	44	—	—	—	—	—	—	—	1028	33	15
—	—	175	38	—	1.4	—	—	616	—	—	1028	33	—
704	0	307	46	—	.89	1130	1140	63	0	22	1028	31	8
755	0	297	56	1.2	.71	1200	1200	75	0	22	1028	31	8
644	15	299	28	—	.22	1050	1070	63	0	21	1028	31	8
822	0	673	44	1.1	1.1	—	1760	231	0	16	1028	—	—
206	0	1520	55	.7	1.8	2550	—	1479	1310	1.9	1028	—	—
225	12	42	8.0	—	1.5	—	279	98	0	.3	1028	8	—
—	—	35	3.3	.1	—	—	284	45	0	5.9	1028	1	4
246	20	60	6.0	.0	.09	—	333	—	—	—	1028	—	—
—	—	49	2.1	.1	—	—	262	11	0	13	1028	—	—
—	—	—	—	—	—	—	—	—	—	—	1028	—	—
—	—	49	2.6	—	—	—	269	11	0	13	1028	27	4
—	—	53	6.4	.2	—	—	364	10	0	20	1028	27	4
—	—	44	2.2	.1	—	—	290	0	0	16	1028	27	—
—	—	48	9.1	.3	—	—	408	7	0	27	1028	28	4
198	10	51	—	.1	.00	266	—	9	0	—	9801	—	—
—	—	47	4.1	.1	—	—	292	9	0	17	1028	27	—
—	—	43	1.0	<.1	—	—	239	11	0	11	1028	27	4
172	0	48	1.8	.1	—	239	239	13	0	10	1028	31	4
—	—	46	1.4	.1	—	—	235	14	0	10	1028	28	4
128	0	20	4.0	.1	2.5	—	139	105	0	.6	1028	—	—
719	—	—	12	—	—	—	—	86	0	—	1028	—	—
—	—	52	1.4	<.1	—	—	238	11	0	11	1028	27	4
184	0	36	2.0	—	.71	—	226	16	0	8.8	1028	1	4
186	0	48	2.0	—	.00	—	247	19	0	8.5	1028	1	4
165	11	47	2.0	—	.22	—	245	16	0	9.5	1028	1	4
183	0	44	4.0	.1	.31	242	242	18	0	9.0	1028	1	—
—	—	52	2.5	.1	—	—	274	11	0	13	1028	27	4
357	0	1170	125	1.0	.40	—	2190	799	507	6.3	1028	—	—
238	20	65	6.0	.0	1.0	—	333	—	—	—	1028	—	—
254	13	50	7.0	—	<.10	—	326	558	330	.1	—	—	—
244	13	45	8.1	—	.09	—	466	15	0	15	—	—	—
188	12	44	4.0	.8	.80	270	267	16	0	11	1028	—	—
283	12	49	8.0	.4	.09	369	366	12	0	18	1028	1	4
295	13	48	11	—	—	370	—	17	0	15	1028	—	—
326	0	53	10	—	.31	372	—	14	0	—	1028	31	4
383	23	52	17	—	—	491	—	8	0	—	1028	—	—
379	23	40	16	—	—	—	—	6	0	34	—	—	—
362	27	57	18	—	—	—	488	11	0	26	—	—	—
395	—	54	16	—	—	—	491	14	0	23	—	—	—
417	0	55	18	.4	—	—	485	9	0	29	—	—	—
420	0	55	17	.5	—	—	477	13	0	22	—	—	—
390	24	63	48	.5	—	—	538	18	0	21	—	—	—
350	27	62	24	.6	—	—	495	15	0	22	1028	—	—
—	—	54	17	.5	—	—	480	10	0	27	—	—	—
—	—	51	11	.4	—	—	464	6	0	34	—	—	—
—	—	57	12	.5	—	—	456	5	0	35	1028	—	—
—	—	53	14	.4	—	—	467	0	0	26	1028	31	4
259	7	108	13	.3	—	394	403	195	0	—	1028	—	—
—	—	50	1.9	.1	—	—	263	8	0	15	1028	27	4
380	—	769	374	—	—	—	2035	354	42	—	9801	—	4
547	58	378	35	1.3	—	—	1144	15	0	—	1008	—	—
606	5	92	144	.8	.89	564	915	46	0	23	9801	—	—
616	0	105	154	1.7	—	944	928	46	0	22	—	—	—
600	12	114	162	1.6	.58	940	955	41	0	24	9749	—	—
624	0	123	158	1.7	.18	—	1020	53	0	24	9749	—	—
835	3	214	415	1.2	—	1735	1741	96	0	29	9749	—	—
—	—	190	480	1.4	—	—	1870	117	0	28	1028	31	4
—	—	210	450	1.5	—	—	1900	110	0	29	1028	31	4
624	0	2330	2110	.3	18	—	7350	1119	607	29	1028	1	4
426	0	41	8.5	.8	.22	—	438	157	0	4.0	1028	—	—
1296	0	948	823	—	—	—	4526	420	0	—	9801	1	4
1005	0	624	710	—	—	—	2389	152	0	—	9801	1	4
—	—	290	750	1.4	—	—	2550	129	0	38	1028	31	4
486	0	59	14	1.0	1.2	—	534	105	0	7.4	1028	—	—
530	5	62	18	.8	.93	854	595	46	0	14	9801	—	—
2300	0	286	686	.4	4.1	—	3550	217	0	40	1028	—	4
1140	166	2720	2960	.4	—	—	10100	652	0	60	1028	—	—
435	0	5820	5480	.9	10	—	17800	1367	1010	69	—	—	4
380	0	1670	54	1.7	1.5	—	2890	117	0	37	1028	—	—

LOCATION	GEO-LOGIC UNIT	DATE OF SAMPLE	DIS-CHARGE INSTAN-TANEOUS (GPM)	TEMPER-ATURE (DEG° C)	SPE-CIFIC CON-DUCT-ANCE (µS/CM)	PH (UNITS)	SILICA, DIS-SOLVED (MG/L AS SIO_2)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	SODIUM+ POTAS-SIUM DIS-SOLVED (MG/L AS NA)	ALKA-LINITY LAB (MG/L AS $CACO_3$)
19AAD- 1	221SLWS	53-12-09	E2.0	—	2230	—	10	5.2	1.7	567	6.6	—	—
	221SLWS	82-05-08	1.8	17.5	1850	8.7	8.5	2.1	.5	460	2.9	—	720
19B -S1	221WSRC	54-09-09	E1.0	18.5	4720	—	—	—	—	—	—	—	—
(D-40-26) 19ADC- 1	220JRSC	82-07-22	—	20.5	15200	7.7	10	180	67	3600	30	—	300
(D-41-19) 10 -S1	310HLGT	58-09-10	E1.0	—	2640	8.0	24	381	128	—	—	164	—
29 -S1	310RICO	59-04-30	E5.0	—	3280	7.0	22	585	112	—	—	204	—
(D-41-21) 22CDC- 1	220NVJO	54-01-06	E3.0	16.5	364	—	17	17	4.6	—	—	64	—
25BCA-S1	221BLFF	54-11-03	.5	16.5	354	—	—	—	—	—	—	—	—
36BBC-S1	221BLFF	54-11-03	E.8	16.5	388	—	16	29	3.3	—	—	58	—
(D-41-22) 2DCC-S1	221RCPR	54-10-27	.1	14.5	359	—	18	36	8.3	—	—	27	—
13 -S1	221RCPR	54-10-27	E.2	19.0	506	—	17	46	17	—	—	37	—
33BCC- 1	220JRSC	54-10-27	3.0	17.5	329	—	11	7.1	3.3	—	—	67	—
(D-41-23) 12BDA- 1	220JRSC	56-12-00	32	13.0	—	6.0	—	80	56	—	—	2140	—
16AAA- 1	220JRSC	83-03-10	5.4	16.5	1440	8.8	9.3	3.1	.9	340	4.3	—	539
24ABC-S1	221RCPR	54-10-21	.2	16.5	679	—	15	34	7.6	—	—	113	—
25 -S1	221RCPR	54-10-21	.2	14.5	384	—	16	43	9.7	—	—	24	—
(D-41-24) 18DCC-S1	221RCPR	54-10-21	E.3	17.0	354	—	14	9.5	10	—	—	58	—
20DBA- 1	221BLFF	58-05-07	30	—	—	8.6	—	7.0	5.0	—	—	696	—
	221BLFF	80-08-25	—	—	—	8.7	10	8.0	1.0	576	9.0	—	461
31 -S1	221RCPR	54-10-21	E.3	17.0	1030	—	15	70	22	—	—	134	—
(D-41-25) 4CAD- 1	220GLNC	83-04-15	8.8	20.0	4890	7.6	12	35	13	1100	15	—	868
5ADC- 1	220GLNC	58-04-09	—	—	—	7.8	—	30	5.8	—	—	1163	—
17CAC- 1	220NVJO	64-10-12	60	—	11100	7.9	10	85	41	—	—	2510	—
17CDB- 1	220NVJO	64-03-18	—	—	11200	7.7	5.3	112	46	—	—	2630	—
	220NVJO	64-10-12	72	—	11500	7.8	9.7	112	41	—	—	2550	—
21BBA- 1	220GLNC	49-08-25	E50	18.5	13400	—	—	—	—	—	—	—	—
	220GLNC	55-03-10	E100	18.5	12000	7.9	10	105	74	2940	28	—	—
23 -S1	221WSRC	54-09-09	E.2	19.5	721	—	17	64	13	—	—	77	—
27BDC- 1	111ALVM	69-08-11	E20	18.5	—	7.9	21	105	15	113	10	—	239
(D-42-19) 7DDA- 2	310HLGT	56-04-11	—	—	1190	7.1	19	113	35	—	—	89	—
(D-42-21) 23ABA- 1	220NVJO	82-05-01	.6	14.5	215	8.1	19	23	9.5	14	1.3	—	89
(D-42-22) 14BBC- 1	220NVJO	53-12-03	—	16.0	565	—	14	2.0	.5	129	1.9	—	—
29BAC-S1	220NVJO	54-10-27	E3.0	14.5	384	—	15	33	13	—	—	28	—
(D-42-23) 2BDB- 1	220NVJO	55-03-11	—	16.5	846	9.0	14	1.3	.7	195	.8	—	—
(D-43-19) 29 -S1	310DCLL	54-09-09	E4.0	22.5	941	—	14	33	13	—	—	166	—
(D-43-20) 23BBC-S1	220NVJO	54-11-04	E1.0	16.0	220	—	17	24	4.3	—	—	19	—
(D-43-21) 24ADC-S1	220NVJO	54-10-27	E1.0	12.0	678	—	—	—	—	—	—	—	—
(D-43-22) 6BCA- 1	220NVJO	82-04-30	3.0	15.5	360	8.0	12	37	14	18	1.6	—	88
9CDB-S1	231WNGT	54-10-29	E.5	13.5	206	—	14	21	9.7	—	—	12	—
(D-43-23) 15CAB- 1	220NVJO	54-01-20	—	16.5	—	—	29	5.5	2.2	—	—	178	—
	220NVJO	55-03-11	—	15.0	274	7.5	19	8.7	7.2	—	—	43	—
32 -S1	231WNGT	54-10-20	E.5	20.0	228	—	—	—	—	—	—	—	—
(D-43-24) 19AA - 1	231WNGT	49-08-30	—	19.0	662	—	17	2.0	1.3	—	—	161	—
(D-43-25) 33BBD- 1	220JRSC	82-05-06	2.5	17.0	3070	8.5	7.9	14	4.3	730	3.9	—	520

BICARBONATE (MG/L AS HCO_3)	CARBONATE (MG/L AS CO_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 NO_3)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	HARDNESS (MG/L AS $CACO_3$)	HARDNESS, NONCARBONATE (MG/L $CACO_3$)	SODIUM ADSORPTION RATIO	AGENCY ANALYZING SAMPLE (CODE NUMBER)	SAMPLE SOURCE	SAMPLING CONDITION
962	63	296	35	1.8	.22	—	1460	20	0	57	1028	8	—
—	—	260	26	2.0	—	—	1200	7	0	76	1028	—	—
1200	73	—	34	—	—	—	—	100	0	—	1028	—	—
—	—	5000	2300	—	—	—	11400	725	425	60	1028	27	8
206	0	1520	55	.7	1.8	—	2550	1479	1310	1.9	1028	—	—
330	0	1910	72	.7	.71	—	3070	1922	1651	2.0	1028	—	—
194	0	31	6.0	.2	.09	235	—	61	0	3.5	1028	33	15
218	0	—	4.0	—	—	—	—	—	—	—	1028	—	—
221	0	17	7.0	.8	.80	—	241	86	0	2.7	1028	—	—
127	0	43	10	.7	21	—	226	124	20	1.0	1028	—	—
249	0	21	12	.5	25	—	298	185	0	1.2	1028	—	—
148	0	38	9.0	.5	1.6	—	210	31	0	5.2	1028	—	8
647	—	2550	1378	—	—	—	6850	430	0	—	9801	—	—
—	—	150	52	4.7	—	—	889	11	0	45	1028	27	4
261	0	86	33	1.2	11	—	429	116	0	4.6	1028	—	—
149	0	54	13	.8	2.4	—	236	147	25	.9	1028	—	—
195	0	16	16	.4	6.6	—	216	65	0	3.2	1028	—	—
519	72	559	301	—	—	—	2159	38	0	—	9801	—	—
530	16	520	255	4.0	1.3	1688	1660	24	0	53	9749	—	—
199	0	361	11	.5	.62	—	712	265	102	3.6	1028	—	—
—	—	710	680	.8	—	—	3090	141	0	42	1028	31	4
1349	0	675	581	—	—	—	3815	99	—	—	9801	—	—
546	0	1360	2810	.3	—	—	7080	381	0	56	1028	1	4
635	0	1270	3080	—	.09	7330	7460	469	0	53	—	—	—
594	0	1280	2960	.4	.22	—	7250	449	0	52	1028	1	4
696	0	—	3510	—	—	—	—	—	—	—	1028	—	4
680	0	1640	3490	.1	2.5	—	8640	566	10	—	1028	31	4
190	0	186	19	.6	3.1	—	473	213	57	2.3	1028	—	—
—	—	300	26	.6	.0	754	—	322	—	—	5049	—	—
184	0	413	28	—	.31	—	790	426	275	1.9	1028	—	—
—	—	37	4.6	.2	—	—	163	97	8	.6	1028	—	—
177	29	50	26	.8	.40	341	341	7	0	22	1028	—	—
136	0	48	13	.5	18	—	236	136	24	1.0	1028	—	—
341	45	52	21	.8	.49	500	499	6	0	35	1028	—	—
327	0	181	26	.6	2.8	—	597	136	0	6.2	1028	—	—
107	0	12	10	.6	3.5	—	143	78	0	.9	1028	—	—
244	6	—	51	—	—	—	—	15	0	—	1028	—	—
—	—	82	7.7	.5	—	—	232	150	62	.7	1028	—	—
121	0	9.0	5.0	.2	1.7	—	133	92	0	.5	1028	—	—
366	22	51	10	1.6	1.1	480	—	23	0	16	1028	33	15
151	0	12	5.0	.6	1.4	171	—	51	0	2.6	1028	1	—
130	0	—	5.5	—	3.0	—	—	105	6	—	1028	—	—
242	83	9.5	5.0	1.0	4.9	404	—	10	0	22	1028	1	—
—	—	770	180	3.1	—	—	2030	53	0	45	1028	—	—

Table 5.—Chemical analyses of water samples

[All analyses were done for petroleum companies by private laboratories; the number of

Location: See figure 2 for description of data-site numbering system.
Geologic unit: See table 1 for explanation of code.
Solids, sum of constituents: Sum of listed determined constituents plus trace elements, if any.
Sample source: 2, drillstem test; 12, swab; 49, production water.
Units: FT, feet; MG/L, milligrams per liter.

LOCATION	DEPTH TO TOP OF SAMPLE INTER-VAL (FT)	DEPTH TO BOT-TOM OF SAMPLE INTER-VAL (FT)	GEO-LOGIC UNIT	DATE OF SAMPLE	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)
(D-27-21) 3CDC- 1	4860	4913	330MSSP	63-01-00	4800	486	—	—
(D-27-22) 17DDB- 1	7025	7083	330MSSP	60-12-10	960	1360	—	—
(D-28-19) 18DCA- 1	6338	6467	330MSSP	61-08-19	1840	243	—	—
(D-28-21) 22CAC- 1	7726	7786	330MSSP	61-12-00	1946	622	—	—
(D-28-22) 10DDB- 1	7098	7209	330MSSP	64-01-12	2087	445	31910	640
(D-28-23) 2BCD- 1	6475	6575	310CTLR	61-07-00	479	1556	—	—
	7994	8012	324HRMS	61-08-07	11000	2223	—	—
	10350	10430	330MSSP	61-09-00	1501	389	—	—
(D-28-23) 17CDB- 1	8370	8450	330MSSP	63-01-00	4000	486	—	—
(D-29-20) 4CBA- 1	4193	4240	330MSSP	59-12-16	2480	1069	—	—
	4334	4344	330MSSP	59-12-18	1560	899	—	—
	4905	5076	330MSSP	60-01-00	12000	4850	—	—
(D-29-21) 18CBD- 1	6420	6540	330MSSP	61-10-05	2865	632	—	—
(D-29-26) 5DDB- 1	5126	5194	310CTLR	63-11-00	705	137	652	9.0
	11340	11640	330MSSP	64-02-20	3160	48	42340	2100
(D-30-24) 9ACD- 1	8626	8742	330MSSP	62-12-20	6062	1960	—	—
9BAC- 1	—	—	330MSSP	60-04-00	5600	2916	—	—
14BAD- 1	8862	8930	330MSSP	62-12-18	1342	412	—	—
	8862	8930	330MSSP	62-12-20	866	451	—	—
15CAA- 1	8344	8452	330MSSP	62-12-20	2468	2430	—	—
16AA - 1	8384	8524	330MSSP	62-12-20	7101	1294	—	—
(D-35-22) 33DBD- 1	6074	6114	324PRDX	57-09-00	12980	3938	—	—
(D-35-25) 9ADD- 1	7034	7150	330MSSP	63-04-00	7000	2187	—	—
(D-36-21) 22BDA- 1	5525	5594	324PRDX	59-01-14	15510	2476	—	—
(D-40-21) 31DD - 1	5119	5125	320PSLV	59-08-00	33600	22360	—	—
33DDA- 1	—	—	320PSLV	59-08-00	4200	1582	—	—
(D-40-22) 15BB - 1	5802	5812	324PRDX	59-05-25	25600	2916	—	—
(D-40-23) 4BBA- 1	6940	7057	330MSSP	56-07-16	2079	5580	—	—
12ADA- 1	6134	6151	324PRDX	62-09-04	24000	11700	—	—
20DDB- 1	6856	7050	330MSSP	59-03-00	4425	878	—	—
(D-40-24) 3CDA- 1	5542	5560	324PRDX	57-05-00	19800	4806	—	—
20BAA- 1	7700	7885	341ANTH	61-05-00	1092	137	—	—
	7480	7520	341ANTH	62-05-00	4141	754	—	—
(D-40-25) 5CD - 1	6066	6190	324PRDX	62-07-03	25200	3400	—	—
14CCD- 1	5788	5843	324PRDX	56-11-12	7859	2788	—	—
	5795	5824	324PRDX	56-11-13	8401	5248	—	—
	7280	7449	330MSSP	56-12-10	921	246	—	—
(D-40-26) 7DD - 1	7284	7405	330MSSP	56-07-00	185	285	—	—
34BCA- 1	—	—	324PRDX	61-11-00	3600	7533	—	—
(D-41-21) 4DA - 1	4995	5037	324PRDX	59-08-21	14000	5689	—	—
(D-41-24) 19AC - 1	2598	2799	310DCLL	58-12-16	191	54	—	—
(D-41-25) 17DDC- 1	2333	2502	310DCLL	58-05-00	1946	524	—	—
26AA - 1	—	—	324PRDX	59-03-17	5418	1647	—	—
(D-41-26) 27BBB- 1	5748	5784	324PRDX	64-10-28	7600	1652	—	—
(D-42-20) 34CCB- 1	4832	4865	324PRDX	61-01-18	520	238	—	—
(D-42-21) 33CAC-	5094	5114	324PRDX	59-01-00	5418	1830	—	—
(D-42-22) 1AC - 1	5538	5578	324PRDX	63-05-00	16400	972	—	—
16BD - 1	5550	5648	324PRDX	60-02-03	5000	1340	—	—
33AC - 1	5807	5930	341CURY	55-03-05	6084	1490	—	—
(D-42-23) 2ADC- 1	5855	5990	330LDVL	54-06-00	5030	1040	—	—
30DBD- 1	5993	6004	324HRMS	59-03-13	5508	1720	—	—
(D-43-21) 10CCA- 1	5120	5145	324PRDX	56-01-00	7825	2850	—	—
19BA - 1	6050	6130	324PRDX	62-05-00	4788	709	—	—
	—	—	324PRDX	62-10-00	1961	770	—	—
(D-43-23) 25CAA- 1	4820	4913	324PRDX	56-04-19	1591	1469	—	—
	5041	5214	324PRDX	56-04-22	9485	2604	—	—
	5380	5498	324PRDX	56-04-27	8874	2418	—	—
	5820	5875	330MSSP	56-05-00	2999	744	—	—
(D-43-24) 5AC - 1	6460	6580	324PRDX	62-12-05	8880	2163	—	—
(D-43-24) 6DD - 1	6265	6390	324PRDX	55-06-00	18800	3940	—	—
	6805	6925	340DVNN	55-06-00	7475	1970	—	—
	6118	6153	324PRDX	55-06-20	6500	2758	—	—
(D-43-24) 26AA - 1	5053	5076	324PRDX	63-08-23	3440	753	—	—
(D-43-25) 16CC - 1	5589	5603	324PRDX	63-10-22	3200	534	—	—
(D-43-25) 21BC - 1	5504	5525	324PRDX	63-11-30	2400	1992	—	—

from petroleum test wells
significant figures may not conform to standards of the U.S. Geological Survey.]

SODIUM+ POTASSIUM DISSOLVED (MG/L AS NA)	BICARBONATE (MG/L AS HCO3)	CARBONATE (MG/L AS CO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	SAMPLE SOURCE
16280	342	0	40	34790	—	56740	13989	13708	2
47970	561	0	2600	77390	—	131000	7997	7537	2
1405	878	0	4300	21650	—	42970	5596	4876	—
39970	512	—	3550	64000	—	110000	7421	7001	—
—	390	0	4500	52000	—	91780	7044	6724	2
2386	781	—	11110	410	—	16330	7603	6962	—
44450	122	—	547	94000	—	152000	36625	36525	2
84400	403	—	3707	131000	—	221000	5350	5019	2
40860	781	—	60	71000	—	117000	11991	11350	2
99570	781	0	7853	154800	—	268000	10595	9954	2
25130	756	0	5145	39900	—	73400	7597	6977	—
115800	476	0	6770	208700	—	349000	49979	49589	2
75900	1830	—	3840	120000	—	205000	9757	8257	—
—	232	0	3100	240	—	4957	2325	2135	—
42460	488	0	1800	69580	—	118000	8090	7690	2
734	488	—	288	17100	26100	26630	23209	22809	49
58790	1967	0	6228	103700	—	179000	25991	24381	2
11400	976	—	1488	19500	34930	35120	5048	4247	49
5459	366	240	912	10100	17100	18390	4020	3320	49
595	244	—	192	12100	17860	18030	16168	15968	49
12220	610	—	480	34500	55430	56210	23062	22562	49
43070	135	—	1099	100000	175000	161000	48631	48520	2
76900	85	0	904	463600	204000	—	26487	26417	2
51480	207	0	766	113300	—	184000	48930	48760	—
19500	200	0	824	156200	—	233000	176000	176000	2
99070	293	0	34	164600	—	270000	17003	16763	12
78510	220	—	4185	171800	—	283000	75941	75761	12
26600	1730	—	2588	43400	—	76000	28166	26746	2
38100	317	0	80	134900	—	209000	108000	108000	49
57890	2001	—	3025	96000	166000	163000	14666	13026	2
61320	425	—	533	143000	241000	230000	69237	68888	2
31500	538	0	4511	47300	—	85000	3291	2850	2
26500	187	0	963	48700	—	82200	13446	13293	12
64500	305	—	1170	153000	—	247000	76935	76685	—
43500	120	—	1455	88000	—	144000	31106	31008	—
38820	120	—	1328	89000	156000	143000	42588	42490	2
17900	3050	—	1870	26800	—	49240	3313	813	—
14400	2290	0	3060	19700	—	39900	1635	0	—
115400	488	—	200	205900	—	333000	40005	39605	12
22080	498	—	3252	72420	118000	—	58387	57979	2
6395	106	21	849	9646	—	17300	699	577	2
17540	61	—	446	31700	—	52200	7017	6967	—
3040	195	—	1661	60000	—	99300	20312	20152	—
40900	220	0	280	80900	—	132000	25782	25602	2
2928	1879	0	2475	3195	—	11300	2279	739	2
20500	1147	—	2543	44000	70980	74850	21066	20125	12
53900	219	0	600	114300	—	186000	44961	44781	2
21500	221	0	3800	43300	—	75700	18004	17823	—
19200	1870	—	2240	42000	—	71900	21329	19799	2
26100	2090	—	1324	50000	—	84500	16844	15134	—
24000	1074	—	1576	50000	85370	83340	20838	19957	2
22370	525	—	1840	55000	108000	90150	31277	30846	12
18330	427	0	1300	37600	69370	62930	14877	14527	2
16880	668	0	3025	29120	—	52420	8068	7520	—
26550	1050	—	587	47000	86320	77710	10022	9161	2
27710	134	—	1403	66000	124000	107000	34412	34302	2
27520	450	—	1267	64000	134000	104000	32118	31749	2
11450	570	—	2453	23000	47470	40930	10553	10085	2
29300	1340	0	2060	65000	—	109000	31083	29983	—
34600	560	—	3876	95000	—	157000	63174	62715	2
24400	1230	—	1183	5500	—	90600	26779	25769	2
22890	490	—	3476	52000	97790	87870	27589	27187	2
29170	1100	0	100	52540	—	87100	11692	10790	2
32550	488	120	250	56800	—	93900	10191	9591	2
37000	549	0	1000	66000	—	109000	14195	13745	2

Location: See figure 2 and text for explanation of data-site numbering system.
Owner: Owner at time well was visited by U.S. Geological Survey personnel, listed by driller in Utah well-completion report, or given
Finish: P, perforated casing below depth to first opening; S, screened casing below depth to first opening; X, open hole below depth to
Principal water-yielding formation: See table 1 for explanation of code and description of lithology.
Use of water: C, commercial; D, mine dewatering; H, domestic; I, irrigation; K, mining (uranium extraction) and oil and gas drilling;
Type of lift: C, centrifugal; F, natural flow; P, piston; S, submersible; T, turbine.
Type of power: D, diesel; E, electricity; G, gasoline; H, hand; W, windmill.
Water level: Below or above (+) land surface. R, reported water level; S, measured by U.S. Geological Survey personnel.
Discharge: B, bailer; C, totalizer meter; F, flowing; FS, flowing measured by U.S. Geological Survey personnel; FVA, flowing measured
measured by others using weir; V, measured using volumetric method; VA, measured by others using volumetric method; VS, measured by
Other data available in files of U.S. Geological Survey:
QW (water quality) A, specific conductance and temperature in figure 8; B, chemical analysis for common ions in table 4; I, chemical
WL (water levels) A, annual; C, continuous; I, intermittent; M, monthly; O, single; S, semiannual; W, weekly. Years of record shown in

Units: ft, feet; (gal/min)/ft, gallons per minute per foot drawdown; h, hour, gal/min, gallons per minute; us/cm, microsiemens per

LOCATION	OWNER	DATE COMPLETED	DEPTH OF WELL (FEET)	DEPTH CASED (FEET)	CASING DIAMETER (INCHES)	DEPTH TO FIRST OPENING (FEET)	FINISH	PRINCIPAL WATER-YIELDING FORMATION	DEPTH TO AQUIFER (FEET)	USE OF WATER	TYPE OF LIFT
(D-27-22) 2DBD- 1	U.S. BUREAU OF LAND MANAGEMENT	11/03/1938	315	275	6	275	X	231WNGT	85	U	P
(D-27-23) 9CAC- 1	U.S. BUREAU OF LAND MANAGEMENT	—	96	96	8	—	P	220NVJO	0	U	—
(D-28-21) 5DCD- 1	U.S. BUREAU OF LAND MANAGEMENT	—	—	—	—	—	—	231WNGT	—	S	S
16BCB- 1	U.S. BUREAU OF LAND MANAGEMENT	04/ /1956	700	400	4	400	X	231WNGT	—	S	P
(D-28-22) 1CAA- 1	UTAH DEPARTMENT OF TRANSPORTATION	09/ /1941	114	—	—	—	—	221ENRD	0	P	S
1CDB- 1	DAVIS, STEVE	06/ /1966	180	—	—	—	—	221ENRD	0	H,C,I	S
(D-28-23) 19DCC- 1	U.S. BUREAU OF LAND MANAGEMENT	01/ /1935	450	42	6	42	X	220NVJO	5	U	P
31ABC- 1	NORTHWEST PIPELINE CORP.	07/22/1961	827	827	8	680	P	231WNGT	485	P,N	P
31ACB- 1	NORTHWEST PIPELINE CORP.	11/25/1955	925	850	8.62	850	X	231WNGT	—	P,N	P
31DCC- 1	U.S. BUREAU OF LAND MANAGEMENT	—	280	—	—	—	—	220NVJO	0	U	—
(D-28-24) 33CDC- 1	UNION CARBIDE CORP.	09/07/1980	410	410	6.62	300	P	217BRCN	—	K	—
35DCC- 1	UNION CARBIDE CORP.	07/20/1980	168	168	6	40	P	217BRCN	—	K	—
(D-29-22) 24DDB- 1	U.S. BUREAU OF LAND MANAGEMENT	—	425	—	—	—	—	220NVJO	0	S	P
30ADD- 1	U.S. BUREAU OF LAND MANAGEMENT	05/ /1939	325	10	8.25	10	X	220NVJO	0	S	P
(D-29-23) 4BCA- 1	MCDOUGALD, KEN	10/ /1958	712	—	—	—	—	220NVJO	—	C,H	S
4CBA- 1	GRAVES OIL CO.	11/10/1963	828	682	6.62	682	X	220NVJO	—	C,H	S
20CAA- 1	U.S. BUREAU OF LAND MANAGEMENT	—	425	—	—	—	—	220NVJO	—	S	P
28CBD- 1	U.S. BUREAU OF LAND MANAGEMENT	08/ /1970	350	20	8	20	X	220NVJO	—	S	P
31BAC- 1	—	—	—	—	—	—	—	220NVJO	—	U	—
T(D-29-23) 32CCC- 1	STATE OF UTAH	06/15/1967	275	14	6	14	X	220NVJO	194	S	P
33ACA- 1	U.S. BUREAU OF LAND MANAGEMENT	03/ /1940	178	6	8	6	X	220NVJO	0	S	P
33DBB- 1	U.S. BUREAU OF LAND MANAGEMENT	1938	133	6	8	6	X	220NVJO	0	U	—
(D-29-24) 5DAA- 1	REDD, CHARLES	—	—	—	—	—	—	217BRCN	—	U	—

water wells.

in other State or Federal records.
first opening.

N, industrial; P, public supply; S, stock; U, unused.

by others using volumetric method; FVS, flowing measured by U.S. Geological Survey personnel using volumetric method; FWA, flowing
U.S. Geological Survey personnel using volumetric method.

analysis for common ions in table 4 and trace elements in table 9.
parentheses.
centimeter at 25 °Celsius.

TYPE OF POWER	ALTITUDE OF LAND SURFACE (FEET)	WATER LEVEL (FEET)		DATE WATER LEVEL MEASURED	DISCHARGE (GALLONS PER MINUTE)	DATE DISCHARGE MEASURED	OTHER DATA AVAILABLE QW	OTHER DATA AVAILABLE WL	REMARKS
W	4940	284. 285.7	R S	11/03/1938 04/04/1966	8.5	11/03/1938	—	A(1946-66)	Poverty Flat well no. 2. Obstruction at 117 ft.
—	5280	77.1	S	11/15/1967	—	—	—	O	Obstruction at 70 ft.
E	5600	470. 444.8	R S	— 04/17/1983	12	—	—	O	Uranium test hole converted to water well.
G	5870	300.	R	—	3.9 VS	08/21/1982	I	—	Hatch Point well.
E	5140	23.7	S	11/16/1981	30	10/16/1941	I	A(1946-53)	Supplies water for Kane Springs Highway Rest Area.
E	5120	21.5	S	11/17/1982	6.6 VS	11/17/1982	—	O	Supplies water for Hole-in-the-Rock shop and surrounding buildings. Specific capacity after 1 h was 2.0 (gal/min)/ft, rated on 11/17/1982.
W	5580	295. 274.6	R S	01/ /1935 10/23/1957	12	—	—	A(1946-58)	Nipples well. Obstruction in well.
E	5880	490. 573.2	R S	10/01/1961 04/18/1983	6.5	—	B	O	This well and well (D-28-23)31ACB- 1 supply water to a pipeline pumping station. A former housing area in the 1960's also was supplied by these wells.
E	5880	650.	R	—	11.25	11/12/1959	—	—	
—	5800	135.2	S	07/17/1982	—	—	—	O	Gavin well.
—	6780	238.5	R	09/07/1980	50	—	—	—	Redd Block 4 well. Specific capacity after 4 h was 0.9 (gal/min)/ft, reported by driller.
—	7120	38.	R	07/20/1980	50	07/ /1980	—	—	Beaver Shaft well. Specific capacity after 5 h was 3.8 (gal/min)/ft, reported by driller.
W	5720	177.9	S	07/17/1982	—	—	—	O	Goodman Flat well.
G	6000	240. 229.3	R S	05/ /1939 04/17/1983	12	—	—	O	3 Mile well.
E	5940	—		—	—	—	B	—	Formerly supplied water to La Sal Junction north of highway. Used intermittently in 1982.
E	5920	525.	R	12/14/1963	9.0	—	I	—	Supplies water to La Sal Junction south of highway. No users in 1982.
G	5920	—		—	—	—	B	—	Looking Glass well.
G	5880	280. 230.9	R S	— 07/18/1982	14 VA	08/ /1970	—	O	Pecker Flat well.
—	5600	24.2	S	11/17/1981	—	—	—	O	
—	5810	195. 174.1	R S	06/27/1967 07/18/1982	20	—	—	O	
W	5690	75. 68.7	R S	03/ /1940 08/18/1983	14	—	A	M(1982-83) S(1983-)	Hatch Wash well no. 2. Specific capacity was 0.3 (gal/min)/ft, reported by driller.
—	5670	31.2 30.6	S S	10/17/1946 11/16/1982	14	10/17/1946	— —	A(1946-59) S(1960-82)	Hatch Wash well no. 1. Obstruction at 31 ft. Hydrograph of water-level data in figure 13.
—	6650	76.8	S	10/11/1974	—	—	— — — —	A(1949-51) C(1951-55) A(1956-59) S(1959-74)	Obstruction at 87 ft.

LOCATION	OWNER	DATE COMPLETED	DEPTH OF WELL (FEET)	DEPTH CASED (FEET)	CASING DIAM-ETER (INCHES)	DEPTH TO FIRST OPENING (FEET)	FINISH	PRINCIPAL WATER-YIELDING FORMATION	DEPTH TO AQUIFER (FEET)	USE OF WATER	TYPE OF LIFT
6AAD- 1	UNION CARBIDE CORP.	03/15/1975	215	215	6	180	P	217BRCN	—	P	S
7ABA- 1	MARKLE, FRED	1962	620	—	12	—	—	221MRSN	—	S,I	S
10AAB- 1	WILCOX, EPHRAIM	1948	186	—	—	—	—	217BRCN	—	S,H	S
10CAA- 1	BEEMAN, ROBERT	10/25/1975	535	430	10	250	P	217BRCN	250	I	S
10CDA- 1	BEEMAN, ROBERT	11/01/1975	575	250	10	200	P	217BRCN	200	I	S
17AA - 1	SUPERIOR OIL CO.	10/05/1962	2190	2190	7	612	S	220NVJO	1282	U	—
18BAB- 1	REDD, JOE	—	126	—	—	—	—	221ENRD	—	U	P
(D-29-25)19ACC- 1	RIO ALGOM CORP.	1969	230	—	—	—	—	217BRCN	0	N,P	—
19BCA- 1	RIO ALGOM CORP.	1969	230	—	—	—	—	217BRCN	0	N,P	—
19CBB- 1	RIO ALGOM CORP.	1969	270	—	—	—	—	217BRCN	0	N,P	—
19DAC- 1	RIO ALGOM CORP.	1969	235	—	—	—	—	217BRCN	0	N,P	—
31ABB- 1	U.S. BUREAU OF LAND MANAGEMENT	—	405	—	—	—	—	217BRCN	—	S	P
(D-30-19)25CDC- 1	U.S. NATIONAL PARK SERVICE	05/20/1965	77	77	6	32	X	310CDRM	60	U	—
(D-30-20)20ACA- 1	U.S. NATIONAL PARK SERVICE	07/06/1968	78	78	6	—	P	310CDRM	0	P,H	—
20DAC- 1	U.S. NATIONAL PARK SERVICE	04/10/1965	65	65	8	24	P	310CDRM	24	P,H	S
30CBA- 1	U.S. NATIONAL PARK SERVICE	04/27/1965	52	52	8	32	P	310CDRM	32	P	S
(D-30-21)25AAA- 1	U.S. BUREAU OF LAND MANAGEMENT	08/20/1966	200	10	6	10	X	220NVJO	0	S	P
(D-30-22)13CAA- 1	U.S. BUREAU OF LAND MANAGEMENT	11/27/1965	373	20	6	20	X	220NVJO	160	P,S	—
31CCC- 1	U.S. BUREAU OF LAND MANAGEMENT	—	—	—	—	—	—	220NVJO	—	S	P
(D-30-23) 3BAC- 1	ADAMS, LLOYD	—	300	—	—	—	—	220NVJO	—	S	P
8ADA- 1	U.S. BUREAU OF LAND MANAGEMENT	11/27/1966	355	—	—	—	—	220NVJO	—	S	P
10ADD- 1	UTAH DEPARTMENT OF TRANSPORTATION	07/ /1929	47	4	4	4	X	220NVJO	43	U	—
11DDD- 1	U.S. BUREAU OF LAND MANAGEMENT	—	124	—	—	—	—	220NVJO	—	U	—
17ACB- 1	REDD, DARYLE	07/22/1946	300	22	5.5	22	X	220NVJO	—	S	P
22BCB- 1	U.S. BUREAU OF LAND MANAGEMENT	01/10/1935	300	20	6	20	X	220NVJO	—	S	P
25BBA- 1	U.S. BUREAU OF LAND MANAGEMENT	—	350	20	8	20	X	220NVJO	—	S	P
25DAA- 1	U.S. BUREAU OF LAND MANAGEMENT	—	—	—	—	—	—	—	—	S	P
30CCA- 1	U.S. BUREAU OF LAND MANAGEMENT	—	—	—	—	—	—	—	—	S	P
(D-30-24)12DAB- 1	U.S. BUREAU OF LAND MANAGEMENT	—	670	104	13.37	104	X	310CTLR	—	U	P
22BDD- 1	UNION OIL OF CALIF.	—	500	200	9.62	200	X	231WNGT	95	N,P	S
22CAA- 1	UNION OIL OF CALIF.	07/24/1963	500	211	9.62	221	X	231WNGT	180	N,P	—
27CBA- 1	U.S. BUREAU OF LAND MANAGEMENT	—	—	—	—	—	—	231WNGT	—	S	P
27DAA- 1	U.S. BUREAU OF LAND MANAGEMENT	03/19/1956	—	8	6	—	—	—	—	S	P

TYPE OF POWER	ALTITUDE OF LAND SURFACE (FEET)	WATER LEVEL (FEET)		DATE WATER LEVEL MEASURED	DISCHARGE (GALLONS PER MINUTE)	DATE DISCHARGE MEASURED	OTHER DATA AVAILABLE QW	WL	REMARKS
E	6520	145.	R	05/01/1975	10	05/01/1975	—	—	Supplies water to the Hecla Mine.
E	6570	118.9	S	08/18/1983	—	—	— —	M(1982-83) S(1983-)	
E	6820	44.5	S	08/18/1983	10	—	I -- --	A(1949-61) M(1982-83) S(1983-)	Well deepened from 86 ft to 186 ft in 1976.
E	6750	40. 33.3	R S	10/30/1975 11/08/1982	268	—	—	O	Specific capacity after 12 h was 0.8 (gal/min)/ft, reported by driller.
E	6730	40. 18.9	R S	11/10/1975 11/18/1982	—	—	—	O	
—	6600	550.	R	10/15/1962	180	—	—	—	Well was abandoned and plugged. Specific capacity after 12 h was 15 (gal/min)/ft, reported by driller.
H	6415	16.6	S	04/06/1960	—	—	—	A(1946-60)	Well presumed to be destroyed.
—	6540	2.	R	10/ /1969	90	—	—	—	Maple Leaf well no. 1. This well and three other wells supply water to a uranium-processing mill.
—	6550	14.	R	10/ /1969	76	—	—	—	Maple Leaf well no. 5.
—	6550	31.	R	10/ /1969	55	—	—	—	Maple Leaf well no. 2.
—	6510	22.	R	10/ /1969	79	—	—	—	Maple Leaf well no. 4.
G	6620	210. 75.0	R S	— 08/19/1982	—	—	—	O	
—	5080	24.	R	05/20/1965	13	05/20/1965	—	—	Needles well no. 1.
G	5000	22.1	S	07/17/1968	44 VS	—	I	O	Needles well no. 5. Specific capacity after 5 h was 0.7 (gal/min)/ft, rated on 7/17/1968.
E	4940	21. 6.4	R S	04/10/1965 06/08/1979	60	04/10/1965	I	—	Needles well no. 2.
E	5020	18.0 5.5	S S	05/02/1968 06/08/1979	4.0 VS	05/02/1968	I	O	Needles well no. 3. Specific capacity after 4 h was 0.2 (gal/min)/ft, rated on 5/2/1968.
W	6340	40. 160.9	R S	08/30/1966 07/13/1982	6.8	—	—	O	Summers well.
—	6040	—		—	10.0	06/06/1979	A	—	Windwhistle well. Specific capacity after 1 h was 0.4 (gal/min)/ft, reported by driller. Supplies water to U.S. Bureau of Land Management campground.
W	6520	324.4	S	07/13/1982	5.0	—	—	O	Hart Point well no. 2.
G	5680	—		—	6.8 VS	03/11/1983	B	—	
G	5860	180. 181.1	R S	— 07/18/1982	6.5 VS	04/19/1983	—	O	Mail Station well.
—	5712	30.6	S	10/14/1955	—	—	—	A(1946-55)	Well destroyed in 1956.
—	5760	46.6	S	07/19/1982	—	—	—	O	Sand Rock well.
G	5900	180. 155.9	R S	— 04/19/1983	8.8 VS	04/19/1983	A	O	
G	5870	150. 135.6	R S	02/ /1935 07/18/1982	20	—	—	O	Tank Draw well.
W	5988	280. 194.8	R S	— 08/18/1982	12	—	—	O	5988 well.
W	5810	36.0	S	07/19/1982	5.0	—	—	O	Uranium test hole converted to water well. Well probably open to the N aquifer.
G	6220	191.1	S	07/18/1982	5.0	—	—	O	Mesa well. Well probably open to the N aquifer.
—	6320	+18.	S	04/18/1983	1.8 FVS	04/18/1983	B	O	Potash test hole converted to water well. Well flows freely onto ground.
E	6000	25.	R	12/02/1961	40	12/ /1961	B	—	Plant well. Specific capacity after 7 h was 0.1 (gal/min)/ft, reported by driller.
—	5990	80.	R	08/07/1963	62	08/ /1963	B	—	Shop well. Specific capacity after 1 h was 0.2 (gal/min)/ft, reported by driller.
—	5970	54.9	S	08/21/1982	5.0	—	B	O	Short Draw well.
W	6070	—		—	2.0	04/18/1983	A	—	Bartell's Folly well. Uranium test hole converted to water well. Well probably open to the N aquifer.

LOCATION	OWNER	DATE COMPLETED	DEPTH OF WELL (FEET)	DEPTH CASED (FEET)	CASING DIAMETER (INCHES)	DEPTH TO FIRST OPENING (FEET)	FINISH	PRINCIPAL WATER-YIELDING FORMATION	DEPTH TO AQUIFER (FEET)	USE OF WATER	TYPE OF LIFT
29BDD- 1	U.S. BUREAU OF LAND MANAGEMENT	—	—	—	—	—	—	—	—	S	P
30BDA- 1	U.S. BUREAU OF LAND MANAGEMENT	02/ /1938	185	170	6.25	55	P	220NVJO	—	U	P
30DAC- 1	—	—	—	—	—	—	—	—	—	S	P
32CCD- 1	U.S. BUREAU OF LAND MANAGEMENT	09/30/1966	300	112	6	112	X	231WNGT	—	S	P
35BAC- 1	MOLYBDENUM CORP.	1922	700	—	—	—	—	231WNGT	—	U	—
(D-30-25) 4ABB- 1	U.S. BUREAU OF LAND MANAGEMENT	—	2000	—	—	—	—	—	—	S	P
19DAB- 1	U.S. BUREAU OF LAND MANAGEMENT	—	—	—	—	—	—	—	—	S	P
(D-31-22) 4BDC- 1	U.S. BUREAU OF LAND MANAGEMENT	—	225	20	6	20	X	220NVJO	—	S	P
6ABB- 1	U.S. BUREAU OF LAND MANAGEMENT	01/15/1950	298	—	—	—	—	220NVJO	—	S	P
(D-31-23) 2CCC- 1	STATE OF UTAH	01/20/1965	275	24	7	24	X	220NVJO	105	S	P
5BAA- 1	U.S. BUREAU OF LAND MANAGEMENT	03/24/1959	420	—	—	—	—	220NVJO	—	S	P
9DDD- 1	U.S. BUREAU OF LAND MANAGEMENT	1968	352	60	6	60	X	220NVJO	—	S	P
17BBD- 1	U.S. BUREAU OF LAND MANAGEMENT	—	350	—	—	—	—	220NVJO	—	S	P
23ADD- 1	U.S. BUREAU OF LAND MANAGEMENT	11/ /1934	154	68	6	68	X	220NVJO	96	U	P
24CBA- 1	SUMMERS, K.S.	—	164	—	—	—	—	220NVJO	0	S	P
24DBD- 1	SUMMERS, K.S.	—	164	—	—	—	—	220NVJO	0	U	—
24DCA- 1	SUMMERS, K.S.	—	200	20	5	20	X	220NVJO	0	S	P
26ABD- 1	OGDEN, MARIE	08/19/1946	220	—	—	—	—	220NVJO	80	U	—
28CAB- 1	HALLIDAY, BRUCE	1933	64	—	—	—	—	221ENRD	—	U	—
32BBD- 1	BAR MK RANCH	02/28/1977	1480	—	—	—	—	220NVJO	—	S	P
36DAC- 1	NEILSON, FREEMAN	05/12/1953	402	—	—	—	—	220NVJO	71	S	P
(D-31-24) 5CBC- 1	U.S. BUREAU OF LAND MANAGEMENT	—	300	112	6	112	X	231WNGT	—	S	P
7DAA- 1	U.S. BUREAU OF LAND MANAGEMENT	06/30/1941	220	—	—	—	—	220NVJO	—	S	P
18BCD- 1	SUMMERS, K.S.	1930	65	—	—	—	—	221ENRD	—	U	P
23BBD- 1	U.S. BUREAU OF LAND MANAGEMENT	04/10/1946	—	—	—	—	—	—	—	S	P
24BDB- 1	U.S. BUREAU OF LAND MANAGEMENT	09/01/1981	365	88	7	88	X	220NVJO	—	U	—
30BCA- 1	ALLRED, WILSON	03/ /1940	190	30	8	30	X	221ENRD	—	S	P
(D-31-25) 5DDA- 1	SUMMERS, K.S.	08/28/1967	280	20	6	20	X	220NVJO	0	S	P
6ACA- 1	SUMMERS, K.S.	—	320	—	—	—	—	220NVJO	—	S	P
(D-32-23) 7DBB- 1	U.S. BUREAU OF LAND MANAGEMENT	—	275	—	—	—	—	220NVJO	—	S	P
36DCC- 1	REDD, FRANK	—	107	—	—	—	—	210DKOT	—	U	—
(D-32-24) 22ADB- 1	U.S. GEOLOGICAL SURVEY	06/06/1983	1595	40	8	1091	X	231WNGT	1338	U	—

TYPE OF POWER	ALTITUDE OF LAND SURFACE (FEET)	WATER LEVEL (FEET)		DATE WATER LEVEL MEASURED	DISCHARGE (GALLONS PER MINUTE)	DATE DISCHARGE MEASURED	OTHER DATA AVAILABLE QW	WL	REMARKS
—	5920	220. 143.3	R S	— 07/19/1982	5.0	—	—	O	Rim Rock well. Well probably open to the N aquifer.
—	5830	60. 56.8	R S	02/ /1938 07/19/1982	15	—	—	O	East Canyon well no. 1.
—	5840	F	S	07/19/1982	0.6 FVS	07/19/1982	A	—	Well flows freely into stock trough. Well probably open to the N aquifer.
—	5840	F	S	07/15/1982	3.0 FVS	07/15/1982	B	—	East Canyon well no. 2. Well flows freely into stock trough.
—	6160	193.5	S	10/12/1951	—	—	—	A(1946-51)	
W	6560	155. 156.7	R S	— 08/19/1982	—	—	—	O	Pasture well no. 2. Uranium test hole converted to water well.
W	6170	35.3	S	07/19/1982	5.0 V	—	—	O	Big Indian well. Petroleum test hole Pitts-Federal 73P converted to water well.
W	6320	185. 158.9	R S	— 07/13/1982	5.0	—	—	O	Hart Point well no. 3. Uranium test hole converted to water well.
—	6440	243.7	S	07/13/1982	1.9	—	—	O	Hart Point well.
G	6070	230. 189.9	R S	02/01/1965 02/18/1983	15	02/01/1965	—	O	Specific capacity after 1 h was 0.1 (gal/min)/ft, reported by driller.
G	6210	322.2	S	07/18/1982	5.0	—	—	O	Lloyd Adams 2 well.
W	6195	250. 286.0	R S	— 02/18/1983	3.1 VS	02/18/1983	A	O	Lightening Draw well.
G	6240	250. 330.	R S	— 07/14/1982	6.0	—	—	O	Lone Cedar well.
W	6020	103.3	S	03/17/1965	—	—	— —	A(1946-60) S(1961-65)	Obstruction at 105 ft.
W	6050	—		—	2.3 VS	02/08/1983	A	—	Seismograph hole converted to water well.
—	5980	64.0	S	08/18/1983	—	—	—	S(1966-)	Seismograph hole converted to water well. In 1982, depth of well was 72 ft. Hydrograph of water-level data in figure 13.
G	5970	—		—	11 VS	03/11/1983	A	—	
—	6060	145.	R	08/ /1946	10	08/22/1946	—	O	Specific capacity was 0.2 (gal/min)/ft, reported by driller.
—	6410	53.0	S	08/20/1982	—	—	A	O	Photograph Gap well.
G	6200	406. 172.4	R S	03/01/1977 04/16/1983	3.3 VS	04/16/1983	B	O	Uranium test hole converted to water well. Deeper reported water level possibly due to a lower potentiomentric head in and subsequent water loss to the Moenkopi Formation. Well presumed not to be as deep as shown here.
W	6080	100. 140.4	R S	— 02/18/1983	2.5 V	02/18/1983	A	O	
—	5840	F	S	07/15/1982	0.2 VS	07/15/1982	A	—	East Canyon well no. 3. Flow controlled by valve.
W	5980	60. 70.0	R S	— 08/21/1982	6.5	—	—	O	Miller Flat well. Petroleum test hole converted to water well.
—	5900	24.4	S	07/14/1982	—	—	—	O	
W	5920	60.1	S	07/15/1982	5.0	—	—	O	Obstruction at 63 ft.
—	5960	25.0	S	06/02/1983	—	—	—	O	Originally drilled to 1,200 ft, probably penetrating the Wingate Sandstone and the Chinle Formation; the well was reported to flow.
W	6040	100. 109.6	R S	— 07/15/1982	4.0	—	—	O	
W	6360	180. 190.7	R S	09/13/1967 07/16/1982	15 B	—	—	O	Specific capacity after 1 h was 0.2 (gal/min)/ft, reported by driller.
—	6240	195. 170.7	R S	— 07/16/1982	—	—	—	O	Originally drilled to 1,218 ft, now plugged at about 320 ft.
W	6310	65. 113.8	R S	— 07/13/1982	3.6 VS	02/18/1983	A	O	Harts Draw well.
—	6920	35.5	S	10/31/1953	—	—	—	A(1942-53)	Well presumed to be destroyed.
—	6922	962.	S	06/12/1983	7.0 VS	06/11/1983	I	O	U.S. Geological Survey test well. Packer used to isolate lower water zone (1091-T.D.) in Wingate Sandstone. Water level in annulus above packer stood at 625 ft; water probably from Salt Wash Member of the Morrison Formation. Specific capacity of the lower zone after 6 h was 0.1 (gal/min)/ft, rated on 06/11/1983.

LOCATION	OWNER	DATE COMPLETED	DEPTH OF WELL (FEET)	DEPTH CASED (FEET)	CASING DIAMETER (INCHES)	DEPTH TO FIRST OPENING (FEET)	FINISH	PRINCIPAL WATER-YIELDING FORMATION	DEPTH TO AQUIFER (FEET)	USE OF WATER	TYPE OF LIFT
(D-32-25)14BDA- 1	ATLAS CORP.	—	—	—	—	—	—	—	—	K	—
33CDD- 1	ADAMS, LLOYD	08/22/1964	147	147	7	115	P	210DKOT	0	S	P
(D-32-26)22BDC- 1	UNION CARBIDE CORP.	—	—	—	—	—	—	—	—	P,K	—
34ACB- 1	ATLAS CORP.	06/11/1974	83	83	5	43	P	217BRCN	—	K	S
(D-33-23) 1CAA- 1	SAN JUAN COUNTY AIRPORT	11/01/1966	260	206	5.62	206	X	217BRCN	218	P,H	S
36DAA- 2	CITY OF MONTICELLO	05/04/1980	1655	1216	16	1216	X	220NVJO	1442	U	—
36DAD- 1	U.S. GOVERNMENT	—	168	168	6	102	P	210DKOT	123	U	—
36DAD- 2	U.S. GOVERNMENT	—	235	235	6	87	P	210DKOT	—	U	—
36DAD- 3	U.S. GOVERNMENT	—	500	—	6	—	—	217BRCN	—	U	—
36DBB- 1	CITY OF MONTICELLO	10/ /1977	335	260	8	260	X	210DKOT	235	P	S
36DCA- 1	CITY OF MONTICELLO	05/25/1977	275	155	8.65	155	X	210DKOT	140	P	S
36DCB- 1	CITY OF MONTICELLO	07/07/1977	290	181	8	181	X	210DKOT	175	P	S
36DCD- 1	CITY OF MONTICELLO	05/20/1977	275	175	8	175	X	210DKOT	170	U	—
(D-33-24)19DAD- 1	U.S. GOVERNMENT	1955	1716	1716	7	—	—	220NVJO	1305	U	—
26BDC- 1	COMMUNITY OF GINGERHILL	10/01/1934	145	44	6	44	X	210DKOT	54	U	P
30DAB- 1	U.S. GOVERNMENT	07/ /1953	319	—	—	—	—	210DKOT	—	U	—
30DDB- 1	U.S. GOVERNMENT	1955	330	—	—	—	—	210DKOT	—	U	—
30DDC- 1	CITY OF MONTICELLO	1955	338	—	—	—	—	210DKOT	158	P	S
31ABB- 1	U.S. GOVERNMENT	06/ /1955	353	—	—	—	—	210DKOT	196	U	—
31ABC- 1	U.S. GOVERNMENT	1955	337	—	—	—	—	210DKOT	214	U	—
31ACB- 1	CITY OF MONTICELLO	1955	358	—	—	—	—	210DKOT	226	P	S
31BCC- 1	U.S. GOVERNMENT	1955	342	—	—	—	—	210DKOT	225	U	—
31BDC- 1	CITY OF MONTICELLO	06/19/1977	365	271	8.62	271	X	210DKOT	267	I	S
31BCA- 1	CITY OF MONTICELLO	06/22/1977	360	277	6.37	277	X	210DKOT	275	U	—
31BDB- 1	U.S. GOVERNMENT	06/ /1955	378	—	—	—	—	210DKOT	222	U	—

TYPE OF POWER	ALTITUDE OF LAND SURFACE (FEET)	WATER LEVEL (FEET)		DATE WATER LEVEL MEASURED	DISCHARGE (GALLONS PER MINUTE)		DATE DISCHARGE MEASURED	OTHER DATA AVAILABLE QW	WL	REMARKS
—	6880	—		—	—		—	—	—	Dunn Mine well. Well probably open to the D aquifer.
W	6750	25. 22.2	R S	08/28/1964 09/21/1982	20		—	—	O	
—	7130	—		—	—		—	—	—	Wilson-Silverbell well. Well probably open to the D aquifer.
E	6880	38.	R	06/11/1974	—		—	—	—	
E	6990	90.	R	02/15/1979	20		—	A	—	Specific capacity after 1 h was 0.3 (gal/min)/ft, reported by driller.
—	6990	1153.	S	06/04/1980	—		—	I	—	
—	6890	—		—	—		—	B	—	Mill 4 well. One of four wells used to supply water during the 1940's and 1950's for uranium-processing mill in Monticello. Well presumed to be destroyed.
—	6870	131.5	S	05/04/1955	—		—	—	I	Mill 2 well. Observation well during aquifer test at Mill 3 well. Supplied water for uranium-processing mill. Well presumed to be destroyed.
—	6870	98.0 90.9	S S	05/10/1955 04/19/1983	27	VS	05/11/1955	—	I	Mill 3 well. Supplied water to uranium-processing mill. Aquifer test conducted in May 1955. Specific capacity after 24 h was 0.5 (gal/min)/ft, from aquifer test. (See table 7.)
E	7000	235. 206.	R S	— 03/03/1982	20		—	—	O	City Park well. One of several wells drilled by the city of Monticello in 1977 to supply water during severe drought. Specific capacity after 10 h was 0.9 (gal/min)/ft, reported by driller.
E	6920	175. 134.4	R S	— 03/03/1982	32		—	—	O	Specific capacity after 3 h was 0.4 (gal/min)/ft, reported by driller.
E	6950	158. 156.7	R S	— 03/03/1982	20		—	—	O	Specific capacity after 1 h was 0.7 (gal/min)/ft, reported by driller.
—	6920	137. 130.8	R S	— 03/03/1982	33		—	—	O	Specific capacity after 73 h was 0.6 (gal/min)/ft, reported by driller.
—	6920	970.0	S	11/23/1954	70	VS	10/01/1956	I	I	Hall 1 well. Drilled by U.S. Atomic Energy Commission to test aquifers for production. Specific capacity for Dakota Sandstone (and Burro Canyon Formation?) after 24 h was 0.3 (gal/min)/ft; for Entrada Sandstone-Navajo Sandstone interval after 72 h is 1.3 (gal/min)/ft. Tests conducted in October 1955. Well destroyed after testing.
H	6800	82.4	S	10/06/1949	9		1934	—	A(1946-49)	Obstruction at 60 ft.
—	6916	—		—	47		—	—	C(1955-)	Dalton well no. 2. One of several wells drilled in mid-1950's to supply additional water to U.S. Atomic Energy Commission uranium-processing mill. Used only as an observation well; hydrographs in figures 23 and 24.
—	6925	174.2 177.0	S S	06/20/1956 04/19/1983	60	VS	07/13/1955	B	I	McIntyre well no. 1. Specific capacity after 7 h was 0.4 (gal/min)/ft, rated July 1955.
E	6937	189.9 188.0	S S	05/05/1955 04/19/1983	206	VS	07/16/1955	I	I	Dalton well no. 1. Former U.S. Atomic Energy Commission well, now used by town residents. Specific capacity after 12 h was 2.5 (gal/min)/ft, rated July 1955.
—	6954	197.8 196.2	S S	06/13/1955 04/19/1983	—		—	I	—	Perkins well no. 1. Obstruction at 200 ft.
—	6940	191.8	S	05/05/1955	30	VS	—	—	—	Jensen well no. 2. Specific capacity after 27 h was 0.3 (gal/min)/ft, rated May 1955.
E	6960	211.6 207.3	S S	05/10/1955 04/19/1983	58	VS	05/16/1955	B	I	Jensen well no. 1. Former U.S. Atomic Energy Commission well, now used by town residents. Specific capacity after 20 h was 0.7 (gal/min)/ft, rated May 1955.
—	6901	216.9 199.3	S S	08/05/1955 08/19/1983	30	VS	08/05/1955	B	S(1983-)	Jensen well no. 4.
E	6970	200. 205.1	R S	— 03/03/1982	35		—	—	O	Cemetary well no. 1. Specific capacity after 5 h was 0.2 (gal/min)/ft, reported by driller.
—	6980	195. 203.5	R S	— 03/03/1982	28		—	—	O	Cemetary well no. 2.
—	6981	224.6	S	06/16/1955	40	VS	07/23/1955	B	I	Jensen well no. 3. Specific capacity after 7 h is 0.4 (gal/min)/ft, rated July 1955. Specific capacity at depth of 300 ft was 0.1 (gal/min)/ft. Obstruction at 220 ft.

LOCATION	OWNER	DATE COMPLETED	DEPTH OF WELL (FEET)	DEPTH CASED (FEET)	CASING DIAMETER (INCHES)	DEPTH TO FIRST OPENING (FEET)	FINISH	PRINCIPAL WATER-YIELDING FORMATION	DEPTH TO AQUIFER (FEET)	USE OF WATER	TYPE OF LIFT
31CBB- 1	U.S. GOVERNMENT	—	—	—	—	—	—	210DKOT	—	U	—
32BBD- 1	U.S. GOVERNMENT	1956	293	293	8	229	P	210DKOT	166	U	—
(D-34-22) 28CAA- 1	CITY OF BLANDING	08/10/1960	885	503	10.75	503	X	220NVJO	—	P	T
(D-34-23) 1DAD- 1	PEHRSON, JAY	—	225	—	—	—	—	210DKOT	—	—	—
(D-34-24) 2DAA- 1	RHODES, ELDEN	—	175	—	—	—	—	210DKOT	—	U	P
7CCB- 1	SAUL, EDWARD	07/ /1945	140	—	—	—	—	211DKOT	114	S	P
25AAD- 1	FROST, C.A.	08/ /1945	225	—	—	—	—	210DKOT	66	U	—
34ABB- 1	FROST, WENDELL	04/29/1974	360	85	12	85	X	220NVJO	75	I	T
(D-34-25) 7DDD- 1	ENDTER, G.W.	09/15/1962	150	150	7	70	P	217BRCN	70	S	P
10CDC- 1	JOHNSON, ELDON	07/06/1965	100	43	6.62	0	P	210DKOT	--	U	P
17ABA- 1	—	—	147	—	—	—	—	210DKOT	—	U	—
24DDA- 1	JOHNSON, TRAVEST	1965	1790	1790	8	1500	P	220NVJO	1237	U	—
31CBD- 1	RAMSEY, CLARENCE	06/12/1970	185	185	6	40	P	217BRCN	55	S	P
(D-34-26) 4DAD- 1	STATE OF UTAH	09/ /1934	100	—	6	—	—	217BRCN	85	U	—
6CCB- 1	HUFFMAN, W.C.	07/ /1945	185	45	8	45	X	210DKOT	—	U	—
29CDD- 1	—	—	—	—	—	—	—	210DKOT	—	S	P
30BCC- 1	COMMUNITY OF EASTLAND	05/19/1977	160	160	6	125	P	210DKOT	—	P	S
30CCB- 1	COMMUNITY OF EASTLAND	07/ /1934	14	—	—	—	—	111ALVM	0	P	S
(D-35-24) 22DAD- 1	RANDALL, EARL	07/20/1964	400	—	—	—	—	220NVJO	—	I	T
22DDD- 1	FROST, HAROLD	—	615	100	6	100	X	220NVJO	—	I, H	T
27ADC- 1	FROST, HAROLD	04/17/1961	400	72	13.38	72	X	220NVJO	—	I	T
27BDD- 1	FROST, HAROLD	03/22/1974	310	10	8	10	X	220NVJO	—	I, H, S	T
27DDC- 1	FROST, HAROLD	01/20/1976	400	195	12	195	X	220NVJO	—	I	T
(D-35-25) 15ABD- 1	JOHNSON, FOREST	04/ /1960	30	—	—	—	—	210DKOT	—	H	—
22ABD- 1	—	—	—	—	—	—	—	210DKOT	—	U	—
(D-35-26) 21CCD- 1	TURNER, M.C.	04/19/1965	100	24	8	24	X	210DKOT	—	S	P
27BBB- 1	JONES, CECIL	—	67	—	—	—	—	210DKOT	—	S	P
(D-36-21) 27AAB- 1	U.S. GOVERNMENT	02/23/1950	100	—	—	—	—	221SLWS	—	U	—
(D-36-22) 10CAD- 1	CITY OF BLANDING	07/07/1977	140	27	6.5	27	X	217BRCN	0	I	S
12CCD- 1	BLACK, CALVIN	11/13/1978	1800	—	—	—	—	220NVJO	—	H, S	S
15CDD- 1	CITY OF BLANDING	06/15/1959	1960	—	—	140	P	220NVJO	1300	P	S
22DAA- 1	NIELSON, JOSEPH L	02/ /1945	140	—	—	—	—	217BRCN	—	U	—
26BDA- 1	CITY OF BLANDING	05/23/1977	145	18	5.12	18	X	217BRCN	65	I	S
26BDA- 2	CITY OF BLANDING	05/24/1977	170	25	5.12	25	X	217BRCN	15	I	S
26CBC- 2	CITY OF BLANDING	08/10/1977	150	101	6.62	101	X	217BRCN	13	I	S

TYPE OF POWER	ALTITUDE OF LAND SURFACE (FEET)	WATER LEVEL (FEET)		DATE WATER LEVEL MEASURED	DISCHARGE (GALLONS PER MINUTE)	DATE DISCHARGE MEASURED	OTHER DATA AVAILABLE QW	WL	REMARKS
—	6870	95.0	S	05/10/1955	—	—	—	I	Mill well 1. Observation well during aquifer test of Mill 3 well. Well presumed to be destroyed.
—	6900	158.8	S	07/14/1982	—	—	—	O	Dalton well no. 3.
D	7680	45. 115.2	R S	10/01/1962 10/21/1982	—	—	I	O	Johnson Creek well. Water level greatly effected by surface water in nearby creek.
—	7080	87.	R	07/ /1950	—	—	B	—	
W	6800	108.8	S	06/07/1982	—	—	—	O	
W	7080	85. 82.4	R S	07/28/1945 10/13/1954	20	—	—	A(1949-54)	Well presumed to be destroyed.
—	6800	165.7	S	06/14/1983	—	—	— —	A(1946-59) S(1960-83)	
D	5640	35. 28.8	R S	— 08/23/1982	—	—	—	—	
W	6820	80. 93.9	R S	10/27/1962 06/07/1982	5.0	10/01/1962	—	O	
—	6780	40. 44.0	R S	07/12/1965 06/07/1982	2.0	—	—	O	
—	6835	141.8	S	06/07/1982	—	—	—	O	
—	6824	1151.	S	08/20/1983	—	—	—	O	Petroleum test hole, Travest "A" no. 1. Borehole re-entered by U.S. Geological Survey in 1982. Cement plug placed at 1,790 ft and casing was shot perforated between 1,500 and 1,520 ft.
W	6710	118.	R	06/29/1970	2.0 VS	06/07/1982	A	—	
—	6725	30.6	S	08/19/1983	—	—	— —	A(1946-59) S(1960-)	Obstruction at 45 ft. Hydrograph in figure 24.
—	6840	67.8	S	09/28/1971	—	—	— —	A(1946-59) S(1960-71)	Obstruction at 45 ft.
W	6780	—		—	1.0 VS	06/08/1982	A	—	
E	6790	112.	R	1977	44	—	I	—	Specific capacity after 4 h was 11.0 (gal/min)/ft, reported by driller. Prior to 1983, water was hauled for use in Eastland.
E	6880	2.8	S	03/11/1982	50 V	10/24/1957	I —	A(1946-59) S(1959-83)	Long Draw well. Used by Eastland residents to provide water before well (D-34-26)30BCC-1 was drilled.
D	5480	—		—	210 VA	07/29/1968	—	—	
D	5470	—		—	—	—	B	—	
D	5460	39. 43.2	R S	05/01/1961 11/18/1982	420	—	—	O	Specific capacity after 10 h was 4.2 (gal/min)/ft, reported by driller.
D	5480	70.	R	—	—	—	—	—	
D	5430	42. 39.8	R S	— 11/18/1982	50	—	—	O	
—	6710	10.2	S	06/07/1982	—	—	—	O	
—	6635	17.7	S	06/07/1982	—	—	—	O	
—	6720	30. 20.8	R S	04/23/1965 06/08/1982	30	—	—	O	Specific capacity after 1 h was 0.5 (gal/min)/ft, reported by driller.
W	6680	16.8	S	06/08/1982	—	—	—	O	
—	5590	—		—	10	06/24/1950	I	—	Well presumed to be destroyed.
E	6440	10. 5.5	R S	07/11/1977 03/04/1982	30	—	—	O	Golf Course well. Specific capacity after 2 h was 0.2 (gal/min)/ft, reported by driller.
E	6390	—		—	—	—	I	—	
E	6320	600.	R	—	84	11/21/1959	—	—	Million Gallon Tank well. Water cascades down well from the Burro Canyon Formation at about 150 ft. Water level in well estimated at about 350 ft.
—	6200	42.3	S	09/08/1983	—	—	—	C(1960-)	Hydrograph in figures 22 and 23.
E	6120	66. 61.5	R S	05/26/1977 03/04/1982	9.0	—	—	O	Cemetary well no. 1. Specific capacity after 2 h was 0.1 (gal/min)/ft, reported by driller.
E	6120	62. 59.3	R S	05/26/1977 03/04/1982	22	—	—	O	Cemetary well no. 2. Specific capacity after 2 h was 0.2 (gal/min)/ft, reported by driller.
E	6065	60. 60.0	R S	09/15/1977 03/04/1982	38 VS	03/11/1983	B	O	Center Street well. Specific capacity after 3 h was 0.4 (gal/min)/ft, reported by driller.

LOCATION	OWNER	DATE COMPLETED	DEPTH OF WELL (FEET)	DEPTH CASED (FEET)	CASING DIAMETER (INCHES)	DEPTH TO FIRST OPENING (FEET)	FINISH	PRINCIPAL WATER-YIELDING FORMATION	DEPTH TO AQUIFER (FEET)	USE OF WATER	TYPE OF LIFT
27DAB- 1	CITY OF BLANDING	—	—	—	—	—	—	—	—	P	S
27DAD- 1	SLAVENS, JAMES	04/11/1977	165	47	5.12	47	X	217BRCN	42	I, H	S
27DAD- 2	JONES, CURTIS	04/27/1977	180	66	4.5	66	X	217BRCN	46	U	S
27DCB- 2	CITY OF BLANDING	12/10/1977	890	754	6.62	450	P	221MRSN	146	U	—
27DDB- 1	LYMAN, M.F.	1937	26	20	5	20	X	217BRCN	—	U	—
27DDB- 2	LYMAN, M.F.	1937	121	34	5	34	X	217BRCN	—	I	—
34ABB- 1	REDD, B.FRANK	—	158	158	—	—	—	217BRCN	—	I	—
35BBA- 1	CONWAY, C.M.	—	165	—	—	—	—	217BRCN	—	I	S
35BBD- 2	CITY OF BLANDING	11/01/1977	915	915	6.62	480	P	221MRSN	362	U	—
(D-36-23) 25BDA- 1	U.S. BUREAU OF LAND MANAGEMENT	—	—	—	—	—	—	—	—	S	P
(D-36-24) 14DBA- 1	WAGON-ROD RANCH	05/05/1961	245	55	10.75	55	X	220NVJO	—	I	T
26CDB- 1	WAGON-ROD RANCH	01/15/1964	255	48	18	48	X	220NVJO	—	I	T
(D-36-25) 33CDB- 1	U.S. BUREAU OF LAND MANAGEMENT	—	60	—	—	—	—	221MRSN	—	S, H	P
(D-36-26) 7BAC- 1	WEXPRO CO.	05/11/1980	1880	1984	9.62	1096	P	231WNGT	1685	K	P
33ABA- 1	POSEY, JIM	—	—	—	—	—	—	217BRCN	—	S	S
(D-37-21) 10BA - 1	BLANDING MINES	1950	75	—	—	—	—	221SLWS	—	D	—
(D-37-22) 2DAC- 1	PERKINS, LLOYD	—	—	—	—	—	—	217BRCN	—	S	P
3ADB- 1	UTAH DEPARTMENT OF TRANSPORTATION	—	157	—	—	—	—	217BRCN	—	U	—
10DBD- 1	SCENIC AVIATION CO.	—	—	—	—	—	—	—	—	P, H, I	—
10DDB- 1	U.S. BUREAU OF LAND MANAGEMENT	09/ /1944	164	—	—	—	—	217BRCN	—	U	—
15BCD- 1	PLATEAU RESOURCES LIMITED	12/29/1977	695	520	6.62	520	X	221MRSN	—	N	S
15CBA- 1	PLATEAU RESOURCES LIMITED	04/15/1977	135	60	5.12	60	X	217BRCN	—	P, N	S
22BBC- 1	HOLT, NELDON	11/07/1977	195	33	5.12	33	X	217BRCN	—	S	C
22CCB- 1	ENERGY FUELS NUCLEAR INC.	09/24/1980	1820	1250	8.62	1250	X	220NVJO	1480	N	S
28CAD- 1	ENERGY FUELS NUCLEAR INC.	06/24/1980	1850	1250	8	1250	X	220NVJO	—	U	—
28CBB- 1	ENERGY FUELS NUCLEAR INC.	10/10/1979	1885	1250	10	1250	X	220NVJO	—	N	S
28DCB- 1	ENERGY FUELS NUCLEAR INC.	08/03/1979	1870	1700	6	1080	P	220NVJO	—	P, N	S
28DCD- 1	ENERGY FUELS NUCLEAR INC.	12/06/1976	1800	1250	6	1250	X	220NVJO	—	S	S
33DDA- 1	ENERGY FUELS NUCLEAR INC.	—	2020	2020	—	1270	P	220NVJO	1440	N	S
(D-37-24) 14CCA- 1	U.S. BUREAU OF LAND MANAGEMENT	01/ /1957	—	40	—	—	—	—	—	S	P

TYPE OF POWER	ALTITUDE OF LAND SURFACE (FEET)	WATER LEVEL (FEET)		DATE WATER LEVEL MEASURED	DISCHARGE (GALLONS PER MINUTE)		DATE DISCHARGE MEASURED	OTHER DATA AVAILABLE QW	WL	REMARKS
E	6110	—		—	—		—	—	—	Well 5. Water cascades down well from about 15 ft. Well probably open to the D aquifer.
E	6115	95.	R	04/12/1977	5.7	VS	08/22/1983	A	—	Specific capacity after 2 h was 0.1 (gal/min)/ft, reported by driller.
E	6120	114.	R	04/29/1977	8.1	VS	08/22/1983	B	—	Specific capacity after 2 h was 0.2 (gal/min)/ft, reported by driller.
—	6085	444.2	S	03/04/1982	60		—	—	O	Shop well. Specific capacity was 0.2 (gal/min)/ft, reported by driller.
—	6100	19.4	S	02/28/1958	—		—	—	W(1942-58)	West well; well destroyed February 1958. Hydrograph in figure 20.
—	6100	47.6	S	03/10/1977	—		—	— — —	W(1942-47) C(1947-58) M(1958-77)	East well. In 1977, the well was deepened 60 ft, a pump was installed, and the well and pump were covered with gravel. Hydrographs in figures 20 and 21.
—	6080	121.6	S	08/22/1983	—		—	— — —	M(1952-66) S(1967-82) M(1982-83)	
E	6090	96.3	S	08/22/1983	10		06/16/1983	B — — — — —	M(1952-58) C(1959-60) M(1960-66) S(1967-82) M(1982-83) S(1983-)	Hydrograph in figure 22.
—	6030	400. 390.4	R S	02/15/1978 03/04/1982	82		—	—	O	Southeast well. Specific capacity after 2 h was 0.2 (gal/min)/ft, reported by driller.
W	6170	163.8	S	08/21/1982	—		—	—	O	Alkali Point well. Well probably open to the M aquifer.
G	5380	39. 55.5	R S	05/08/1961 06/11/1982	150		—	B	O	Specific capacity after 4 h was 1.5 (gal/min)/ft, reported by driller.
G	5240	50. 17.4	R S	02/01/1964 06/11/1982	200		—	—	O	
H	5660	45.2	S	03/09/1982	—		—	—	O	Mel Dalton well.
D	6640	1600.	R	—	7.0		—	I	—	Petroleum test hole converted to water well. Supplies water for petroleum drilling. Plugged at 1,880 ft.
E	6470	5.8	S	06/09/1982	—		—	—	O	
—	5360	—		—	—		—	B	—	Dewatering sump for uranium mine. Pumped at 150 (gal/min) for 8 h, once a week.
W	5850	18.0	S	06/12/1982	—		—	—	O	
—	5920	74.7	S	08/22/1983	—		—	— — — —	M(1951-66) S(1967-82) M(1982-83) S(1983-)	Hydrograph in figure 22.
—	5800	—		—	—		—	I	—	Well probably open to the D aquifer.
—	5800	77.4	S	03/15/1971	—		—	B —	A(1946-59) S(1960-71)	Obstruction at 71 ft. Well presumed to be destroyed.
E	5740	362.	R	04/15/1977	10		—	—	—	Specific capacity was 0.1 (gal/min)/ft, reported by driller.
E	5760	55.	R	12/27/1977	18		12/ /1977	—	—	Specific capacity after 2 h was 0.1 (gal/min)/ft, reported by driller.
G	5660	50. 21.7	R S	— 11/26/1982	6.0		—	I	O	Specific capacity after 2 h was less than 0.1 (gal/min)/ft, reported by driller.
E	5660	460. 462.	R S	11/03/1980 05/18/1983	238		—	I	—	Well no. 4. Specific capacity after 48 h was 0.3 (gal/min)/ft, reported by driller.
—	5625	605. 604.0	R S	08/03/1980 11/23/1982	245		08/03/1980	—	—	Well no. 3. Observation well during aquifer test at well no. 2.
E	5650	450.	R	—	158	C	11/24/1982	I	—	Well no. 2. Aquifer test conducted November 1982. See table 7.
E	5640	447. 638.	R S	— 11/23/1982	223	C	—	—	—	Well no. 1. Observation well during aquifer test at well no. 2.
E	5640	387.	R	01/19/1977	120		01/19/1977	—	—	Test well.
E	5570	—		—	217	C	09/21/1982	I	—	Well no. 5(or 4A).
—	5040	F	S	07/20/1982	4.5 2.0	 FVS	— 07/20/1982	A	—	Melvin Dalton well no. 2. Well flows freely into marshy area. Well probably open to the N aquifer.

LOCATION	OWNER	DATE COMPLETED	DEPTH OF WELL (FEET)	DEPTH CASED (FEET)	CASING DIAMETER (INCHES)	DEPTH TO FIRST OPENING (FEET)	FINISH	PRINCIPAL WATER-YIELDING FORMATION	DEPTH TO AQUIFER (FEET)	USE OF WATER	TYPE OF LIFT
23AAB- 1	U.S. BUREAU OF LAND MANAGEMENT	07/25/1957	306	—	—	—	—	221ENRD	190	S	F
24CBB- 1	WAGON-ROD RANCH	05/19/1954	520	—	—	—	—	220NVJO	—	S, I	F
25BBD- 1	WAGON-ROD RANCH	05/01/1955	712	248	4	248	X	220NVJO	—	S	F
(D-37-25)19BDD- 1	U.S. BUREAU OF LAND MANAGEMENT	—	—	—	—	—	—	—	—	S	F
32CAD- 1	WEXPRO CO.	06/24/1980	1650	1749	9.62	687	P	220NVJO	862	K	S
(D-38-21)14CBB- 1	U.S. BUREAU OF LAND MANAGEMENT	03/18/1959	150	80	6	80	X	217BRCN	—	S	P
23CCD- 1	ENERGY RESOURCES CORP.	05/21/1978	1793	1793	4	1542	P	220NVJO	1465	U	S
(D-38-22)23ACB- 1	UTE INDIAN TRIBE	05/ /1980	1385	1385	6.62	1006	S	220NVJO	—	P	S
23CDA- 1	UTE INDIAN TRIBE	04/ /1956	1739	1277	8.62	1277	X	220NVJO	1510	P	—
32AAC- 1	STATE OF UTAH	03/24/1959	—	—	—	—	—	—	—	U	F
(D-38-23)11CAD- 1	U.S. BUREAU OF LAND MANAGEMENT	02/08/1937	360	351	6	—	—	221MRSN	—	U	P
(D-38-24)11DBD- 1	PERKINS, H.C.	—	585	—	3	—	—	221ENRD	—	U	F
12DAA- 1	PERKINS RANCH	—	506	—	—	—	—	221ENRD	—	S, I	F
23ACB- 1	U.S. BUREAU OF LAND MANAGEMENT	—	500	—	—	—	—	221ENRD	—	S	F
(D-38-25) 7CBA- 1	PERKINS RANCH	04/18/1953	520	265	8	265	X	221ENRD	—	S, I	F
7CDD- 1	PERKINS RANCH	—	—	—	—	—	—	221ENRD	—	S	P
7DBB- 1	PERKINS RANCH	—	495	—	—	—	—	221ENRD	—	S, I	F
7DCB- 1	PERKINS RANCH	—	506	—	—	—	—	221ENRD	—	S	F
27CCB- 1	KASPER, ARTHUR	—	750	—	—	—	—	221ENRD	—	H, I, S	F
30CAA- 1	PERKINS, RICHARD	11/10/1977	650	100	5.12	100	X	221ENRD	570	S	F
33BDC- 1	—	—	—	—	—	—	—	—	—	S	F
35BD - 1	U.S. BUREAU OF LAND MANAGEMENT	09/18/1953	1465	1455	9.62	238	X	220NVJO	679	S, K	F
(D-38-26)28ACD- 1	—	—	—	—	—	—	—	—	—	S, K	F
(D-39-21)14DDB- 1	U.S. BUREAU OF LAND MANAGEMENT	09/04/1964	1651	1651	8.62	163	X	220NVJO	1110	S	F
23DCC- 1	U.S. BUREAU OF LAND MANAGEMENT	06/11/1979	830	1600	8.62	312	X	221ENRD	—	S	F
(D-39-22)17BAB- 1	U.S. BUREAU OF LAND MANAGEMENT	03/30/1982	1350	414	8.62	414	X	220NVJO	—	S	F
17CBD- 1	BAR MK RANCH	10/18/1977	820	63	6.62	63	X	220NVJO	—	S, H, I	F
19BBD- 1	U.S. BUREAU OF LAND MANAGEMENT	11/23/1961	1450	1450	5.5	1225	P	231WNGT	1250	S	F
22BCD- 1	U.S. BUREAU OF LAND MANAGEMENT	02/04/1935	475	312	4.5	92	P	221MRSN	—	S	—

TYPE OF POWER	ALTITUDE OF LAND SURFACE (FEET)	WATER LEVEL (FEET)		DATE WATER LEVEL MEASURED	DISCHARGE (GALLONS PER MINUTE)		DATE DISCHARGE MEASURED	OTHER DATA AVAILABLE QW	WL	REMARKS
—	5030	+5.0	R	08/ /1957	6.8 5.0	 FVS	— 06/11/1982	A	--	Max Dalton well. Well flows freely into creekbed.
—	4990	+9. +27.7	R R	05/19/1954 03/ /1955	150 75	 FVS	03/15/1955 06/11/1982	B	—	Max Dalton Artesian well. Originally drilled to 192 ft. In March 1955, deepened to 520 ft.
—	4990	+81.	R	09/ /1955	125 34	 FVS	09/13/1955 08/21/1983	B	—	Well flows at a slow rate into a grove of cottonwood trees.
—	5040	F	S	06/11/1982	11	FVS	06/11/1982	B	—	Melvin Dalton well. Well flows freely into marshy area. Well probably open to the N aquifer.
D	5342	338.	S	10/27/1982	83	VS	10/27/1982	I	O	Patterson 2 well. Petroleum test hole converted to water well. Specific capacity after 2 h was 0.3 (gal/min)/ft, rated October 1982. Plugged at 1,650 ft.
W	5547	97.7	S	06/13/1982	7.0		—	—	O	Vint Jones well.
—	5450	536. 535.7	R S	08/29/1978 09/18/1982	50		—	—	O	Specific capacity after 24 h was 0.2 (gal/min)/ft, reported by driller.
E	5300	443. 428.6	S S	06/04/1980 12/16/1982	72	VS	05/31/1980	I	O	White Mesa well no. 2. Specific capacity after 24 h was 0.6 (gal/min)/ft, reported by driller. Supplies water for Ute Indian Reservation.
—	5300	365.	R	—	32		—	—	—	White Mesa well no. 1. Specific capacity was 0.7 (gal/min)/ft, reported by driller. Supplies water for Ute Indian Reservation.
—	4780	F	S	10/28/1982	47	FVS	10/28/1982	A	—	Abandoned oil well, Bluff Bench no. 1. Water now flows freely to a marshy area and down a creekbed. Well probably open to the N aquifer.
W	5253	213.8	S	03/07/1982	6.3		—	—	O	Alkali Wash well.
—	4980	+9.3 4.7	S S	04/18/1963 08/21/1983	—		—	— — —	S(1963-70) M(1981-83) S(1983-)	Hydrograph in figure 13.
—	4860	F	S	06/10/1982	151 50	FWA FVS	02/ /1961 06/10/1982	A	—	Well flows freely by pipeline into reservoir.
—	4880	F	S	03/07/1982	6.8 0.4	 FVS	— 03/07/1982	A	—	Richard Perkins well. Well flows freely onto ground.
—	4870	+242.	R	07/ /1953	140 15	FWA FVS	02/ /1961 06/10/1982	B	—	Well flows freely by pipeline into reservoir.
—	4920	+25.	S	05/21/1982	8.3	FVS	07/21/1982	A	O	Well flows freely into marshy area.
—	4870	F	S	06/10/1982	131 12	FWA FVS	02/ /1961 06/10/1982	A	—	Well flows freely by ditch into reservoir.
—	4920	F	S	07/21/1982	116 15	FWA VF	02/ /1961 07/21/1982	A	—	Well flows freely into marshy area.
—	4885	F	S	06/09/1982	120	FVA	04/15/1966	B	—	Petroleum test hole converted to water well. Flows constantly; some water diverted for use by owner, the rest discharges into a marsh.
—	4800	+70. +98.	R S	11/14/1977 03/07/1983	86	FVS	03/07/1983	A	O	Well has a valve which shuts in most flow.
—	4780	+6.	S	06/10/1982	7.5	FVS	06/10/1982	B	O	Well flows freely onto ground. Well probably open to the N aquifer.
—	4852	+82.	S	08/21/1983	106	FVS	08/21/1983	B	O	Petroleum test hole 1 Government, converted to water well. Casing cemented in annulus between 0 to 238 ft and about 780 to 1,465 ft.
—	5030	+84.	S	08/21/1983	49	FVS	08/21/1983	I	O	Petroleum test hole converted to water well. Valve on well shuts in most flow. Well probably open to the N aquifer.
—	4680	+55.	S	04/29/1982	6.0	FVS	04/29/1982	A	O	Black Mesa well. Petroleum test hole 3 Black Mesa unit, converted to water well.
—	4620	+94.	S	04/29/1982	0.6	FVS	04/29/1982	A	O	Anderson well. Petroleum test hole Skyline Federal 1-23, converted to water well. Casing cemented in annulus between 0 to 312 ft and between about 830 to 1,700 ft.
—	4705	+75.	S	07/11/1982	27	FVS	09/18/1982	I	O	Petroleum test hole Decker Ranch 2, converted to water well. Aquifer test conducted September 1982. See table 7.
—	4600	+60. +70.8	R S	10/22/1977 09/09/1982	15	FVS	06/13/1982	I	—	Observation well during aquifer test at well (D-39-21)17BAB.
—	4630	+83.	S	04/29/1982	10	FVS	04/29/1982	B	O	Decker well. Petroleum test hole Delhi-Government "A", converted to water well.
—	4860	285.	R	—	20		—	—	—	Cowboy Pasture well.

LOCATION	OWNER	DATE COMPLETED	DEPTH OF WELL (FEET)	DEPTH CASED (FEET)	CASING DIAMETER (INCHES)	DEPTH TO FIRST OPENING (FEET)	FINISH	PRINCIPAL WATER-YIELDING FORMATION	DEPTH TO AQUIFER (FEET)	USE OF WATER	TYPE OF LIFT
(D-39-23) 1DDD- 1	NAVAJO INDIAN TRIBE	07/ /1940	625	—	—	—	—	221MRSN	—	S	P
2BBB- 1	NAVAJO INDIAN TRIBE	04/10/1973	222	—	—	—	—	217BRCN	91	S	P
5AAC- 1	NAVAJO INDIAN TRIBE	02/ /1940	310	—	—	—	—	221MRSN	—	S	P
19CBD- 1	NAVAJO INDIAN TRIBE	—	—	—	—	—	—	—	—	S, H	P
(D-39-24) 13DAC- 1	HATCH, SHERMAN L.	03/10/1958	566	458	7	—	—	221BLFF	495	—	—
(D-39-25) 5ACA- 1	NAVAJO INDIAN TRIBE	07/ /1951	372	309	11.75	309	X	221ENRD	—	H, S, I	F
5ACA- 2	NAVAJO INDIAN TRIBE	08/ /1951	1335	533	11.75	533	X	220NVJO	730	H, S, I	F
30BBC- 1	NAVAJO INDIAN TRIBE	03/04/1956	685	526	8.62	526	X	221BLFF	519	S, I, H	F
36BDB- 1	NAVAJO INDIAN TRIBE	03/15/1966	869	869	6.62	—	—	221BLFF	—	S	P
(D-39-26) 21BDB- 1	U.S. NATIONAL PARK SERVICE	06/ /1963	1425	1425	6	1150	P	220NVJO	—	P	S
(D-40-21) 10ABA- 1	U.S. BUREAU OF LAND MANAGEMENT	05/16/1960	280	4	6	4	X	221BLFF	0	S	P
23AAD- 1	WAYLAND, A.E.	04/ /1910	840	20	6	20	X	220NVJO	320	U	F
25AAB- 1	CITY OF BLUFF	04/ /1910	300	—	—	—	—	220NVJO	—	P	F
25AAC- 1	SAN JUAN SCHOOL DISTRICT	01/05/1964	550	140	6	140	X	220NVJO	—	P	S
25ABA- 1	CITY OF BLUFF	1910	825	97	4	97	X	220NVJO	—	P	S
25ACB- 1	JOHNSON, CLARENCE	05/12/1962	450	—	—	—	—	220NVJO	—	—	F
25ACB- 2	RECAPTURE LODGE	06/24/1962	400	84	4	84	X	220NVJO	—	I, H	—
25ACA- 1	JOHNSON, JOHN	04/30/1951	590	—	—	—	—	220NVJO	—	H	F
25BAB- 1	HOWE, RALPH	01/10/1965	300	45	6	45	X	220NVJO	—	I, H	F
25BAD- 1	FOUCHEE, GENE	—	—	—	—	—	—	—	—	U	F
25BDA- 1	K & C TRADING CO.	05/06/1956	700	63	6	63	X	220NVJO	—	P, C, H	F
25BDA- 2	ARTHUR, ROBERT	11/04/1958	300	42	6	63	X	220NVJO	200	P, C, H	—
26ADA- 1	CITY OF BLUFF	—	—	—	—	—	—	—	—	P	S
26ADD- 1	CITY OF BLUFF	10/09/1957	578	91	7	91	X	220NVJO	—	P	S
26DAA- 1	LESTER, JOHN	—	300	—	—	—	—	220NVJO	—	H, I	F
32DAB- 1	RIVER RANCHES	09/23/1978	400	39	5.62	39	X	220NVJO	35	H	S
(D-40-22) 16BBA- 1	NIELSON, LYMAN	12/18/1975	925	40	6	40	X	220NVJO	—	S	P
19CDC- 1	ROSS, KEN	02/10/1958	350	35	6	35	X	220NVJO	—	H	F
20BDC- 1	STATE OF UTAH	05/ /1960	240	3	—	3	X	221ENRD	155	U	—
29AAB- 1	ST. CHRISTOPHER'S MISSION	11/ /1950	599	599	6	—	—	220NVJO	—	H, I, S	—
29BCB- 1	NIELSON, F.A.	1942	12	—	—	—	—	111ALVM	0	U	—
29BDB- 1	SIMPSON, WOODROW	05/30/1958	325	40	4	40	X	220NVJO	—	S	F

TYPE OF POWER	ALTITUDE OF LAND SURFACE (FEET)	WATER LEVEL (FEET)		DATE WATER LEVEL MEASURED	DISCHARGE (GALLONS PER MINUTE)		DATE DISCHARGE MEASURED	OTHER DATA AVAILABLE QW	WL	REMARKS
W	5195	440. 434.	R S	— 06/03/1983	1.5		05/08/1982	B	O	McCracken Mesa well. Tribal well 12T-533.
W	5240	164. 184.	R S	— 06/03/1983	2.3		05/08/1982	A	O	Tribal well 12T-606.
W	4934	137.6	S	03/07/1983	—		—	—	S(1962-83)	
W	4630	51.4	S	06/13/1982	—		—	A	O	Well probably open to M aquifer.
—	4680	F	R	04/ /1958	30	F	04/24/1958	I	—	
—	4760	+149. +122. +47.	R S S	07/ /1951 01/ /1954 02/19/1983	168	FV	07/ /1951	I	I	Drilled as water source for nearby petroleum test hole. Well leaks constantly.
—	4756	+460. +335.	R S	08/ /1951 01/ /1954	420	FV	08/ /1951	I	—	Petroleum test hole 1-B Hathaway-Glasco-Federal, converted to water well. Well leaks constantly.
—	4670	F	R	04/10/1956	150	F	04/10/1956	B	—	Tribal well 12T-326. Discharge decreased to 75 gal/min when nearby tribal well 12T-332 was drilled and allowed to flow starting May 1956.
W	5300	576. 541.0	R S	— 03/11/1982	15		—	A	O	Tribal well 12T-513. Specific capacity after 9 h was 0.1 (gal/min)/ft, reported by driller.
E	5220	112.3 207.0	S S	09/07/1963 03/10/1982	32	VS	09/07/1963	I	I	Well supplies water to Hovenweep National Monument campground and headquarter's buildings. Specific capacity after 12 h was 0.2 (gal/min)/ft, rated September 1963. Aquifer test conducted September 1963. See table 7.
W	4791	210. 206.3	R S	06/06/1960 03/06/1982	6.8		—	—	O	Tank Point well.
—	4390	F	R	10/20/1946	20 23	FVS FVS	10/20/1946 11/19/1982	B	—	Well flows freely into pond. Another flowing well is reported to exist under a pond about 3/4 mi southeast of this well.
—	4370	+8.	S	10/20/1946	20	FS	10/20/1946	B	—	Wellhead buried and inaccessible, but reportedly still connected to town water system. The water chemistry and water level indicate that this well is shallower than the other wells at Bluff drilled in 1910.
E	4330	+56.	S	05/04/1982	6.0	FVS	05/04/1982	I	O	School well. Incorporated into the Bluff water system in 1983.
E	4370	+48.	S	05/04/1982	3.7	FVS	05/04/1982	I	O	Bitter-Havens-Pouchee well.
—	4303	+38.	S	08/22/1983	7.5	FVS	07/23/1982	I —	S(1962-82) M(1982-83) S(1983-)	Hydrograph in figure 16.
—	4310	+52.	S	05/02/1982	7.5	FVS	05/02/1982	A	O	
—	4300	+62.	S	05/02/1982	7.5	FVS	05/02/1982	B	O	
—	4330	+35. +46.	R S	02/06/1965 05/03/1982	6.0	FVS	11/19/1982	B	O	
—	4350	+28.	S	05/04/1982	2.1	FVS	05/04/1982	A	O	Well probably open to the N aquifer.
—	4310	+45.	S	05/03/1982	7.5	FVS	11/19/1982	I	O	Supplies water to trailer court and possibly a trading post.
—	4310	+35. +42.	R S	 03/04/1982	20	F	11/25/1958	—	O	Supplies resturant, gas station, and trailer court.
E	4325	—		—	9.1	FVA	03/04/1972	I	—	McPherson well no. 2. Well probably open to the N aquifer.
E	4350	+36.	R	—	25	FVA	03/04/1972	—	—	McPherson well no. 1.
—	4310	+8.	S	05/03/1982	1.8	FVS	05/03/1982	B	O	
E	4480	18.	R		25.		—	—	—	Driller encountered water at 144 ft. Specific capacity after 2 h was 0.1 (gal/min)/ft, reported by driller.
G	4760	260. 221.7	R S	02/13/1976 08/22/1982	7.0		—	—	O	
—	4390	+25. +14.	R S	— 11/21/1982	3.5	FVS	11/21/1982	B	O	
—	4600	110. 137.9	R S	05/25/1960 08/22/1983	6.8		—	— —	M(1981-83) S(1983-)	
—	4400	+77. +48.	R S	10/14/1954 03/05/1982	74		06/22/1956	I	—	
—	4325	4.1	S	11/19/1981	—		—	—	A(1942-51)	Well is 8 ft by 8 ft and is concrete lined.
—	4330	+28. +74.	R S	— 11/21/1982	9.4	FVS	11/21/1982	B	O	

LOCATION	OWNER	DATE COMPLETED	DEPTH OF WELL (FEET)	DEPTH CASED (FEET)	CASING DIAMETER (INCHES)	DEPTH TO FIRST OPENING (FEET)	FINISH	PRINCIPAL WATER-YIELDING FORMATION	DEPTH TO AQUIFER (FEET)	USE OF WATER	TYPE OF LIFT
30AAC- 1	NIELSON, F.A.	1951	640	—	—	—	—	220NVJO	—	I	S
30ABD- 1	BUTLER, H.	—	27	—	—	—	—	111ALVM	0	U	—
30BBB- 1	CITY OF BLUFF	1910	825	20	7	20	X	220NVJO	—	P	—
30BBD- 1	JONES, C.	—	600	—	—	—	—	220NVJO	—	H	F
(D-40-23) 3BCC- 1	—	—	—	—	—	—	—	—	—	S	F
4ADA- 1	—	—	—	—	—	—	—	—	—	S	—
4BBC- 1	SHELL OIL CO.	04/30/1956	388	364	7	170	P	221BLFF	220	K	F
12BAD- 1	NAVAJO INDIAN TRIBE	12/16/1972	750	20	6.62	20	X	221MRSN	—	S, H	P
13BAD- 1	TEXACO, INC.	05/16/1957	547	495	7	294	X	221BLFF	294	K	T
21DBC- 1	EL PASO NATURAL GAS CO.	07/15/1960	777	777	12.25	377	P	220NVJO	—	H, N, I	S
21DB - 1	EL PASO NATURAL GAS CO.	04/16/1959	908	908	8.62	547	P	220NVJO	—	P, N, I	S
27BAA- 1	U.S. BUREAU OF LAND MANAGEMENT	—	672	672	12	183	P	220NVJO	—	S	F
36ABB- 1	SMITH, A.B.	04/06/1959	415	35	8	8	X	221ENRD	360	—	—
36ABB- 2	WHEELER, LLOYD	11/01/1962	260	260	7	230	P	221BLFF	230	H	S
36ABB- 3	HOWE, LEONARD	07/06/1982	380	260	6	260	X	221ENRD	360	U	F
(D-40-24) 4DCD- 1	NAVAJO INDIAN TRIBE	06/30/1962	807	807	8.62	300	P	221BLFF	—	I, S	F
11ABD- 1	NAVAJO INDIAN TRIBE	02/22/1956	585	355	8	355	X	221BLFF	400	H, S	F
14ADB- 1	SUPERIOR OIL CO.	03/19/1957	1070	365	9.62	365	X	220NVJO	—	U	—
15BCC- 1	TEXACO, INC.	1956	1100	100	9.62	100	X	220NVJO	—	K	F
17DBD- 1	TEXACO, INC.	04/16/1956	925	253	13.37	253	X	220NVJO	—	K	F
32CDD- 2	NAVAJO INDIAN TRIBE	02/18/1981	350	350	8.62	160	P	221BLFF	125	P	S
32DCB- 1	MONTEZUMA TRAILER PARK	11/14/1967	260	—	—	—	—	221BLFF	—	P, I	S
32DCC- 2	NAVAJO INDIAN TRIBE	03/12/1981	352	352	8.62	140	P	221BLFF	105	P	S
(D-40-25) 1BCC- 1	NAVAJO INDIAN TRIBE	07/01/1952	1404	1222	7	1222	X	220NVJO	1220	U	—
6DAC- 1	NAVAJO INDIAN TRIBE	07/26/1962	1040	1040	6.62	900	P	221ENRD	—	H, S	P
14DAC- 1	NAVAJO INDIAN TRIBE	1962	900	840	8	840	X	221ENRD	—	S, H	P
15BCC- 1	NAVAJO INDIAN TRIBE	09/05/1962	1052	1052	6.62	920	P	221ENRD	—	S, H	P
19AAD- 1	NAVAJO INDIAN TRIBE	12/12/1952	410	410	8	350	P	221SLWS	300	S, H	P
(D-40-26) 19ADC- 1	TEXACO, INC.	—	779	779	9.62	540	P	221BLFF	—	K	S
20ADB- 1	TEXACO, INC.	04/12/1966	1254	1254	7	580	P	220NVJO	975	U	S
21AB - 1	TEXACO, INC.	—	1174	1174	7	510	P	220NVJO	920	K	S
(D-41-20) 2DD - 1	JIM, RICHARD	—	—	—	—	—	—	231WNGT	—	H	S
36DDA- 1	NAVAJO INDIAN TRIBE	06/ /1966	115	12	4	12	X	220NVJO	0	H, S	P
(D-41-21) 22CDC- 1	NAVAJO INDIAN TRIBE	01/06/1954	405	39	12	39	X	220NVJO	130	S	P

TYPE OF POWER	ALTITUDE OF LAND SURFACE (FEET)	WATER LEVEL (FEET)		DATE WATER LEVEL MEASURED	DISCHARGE (GALLONS PER MINUTE)		DATE DISCHARGE MEASURED	OTHER DATA AVAILABLE QW	WL	REMARKS
E	4380	+75. +101.	R S	— 11/21/1982	35	FVS	11/21/1982	I	O	
—	4320	8.8	S	11/21/1982	—		—	B	O	
—	4332	+52.	S	08/22/1983	60 22	FVS FVS	10/20/1946 10/06/1964	I — —	S(1965-82) M(1982-83) S(1983-)	Hydrograph in figure 16.
—	4340	+13.	S	11/21/1982	4.2	FV	11/21/1982	B	O	Wellhead buried, but reportedly still connected to the former Cow Canyon Trading Post building to the north.
—	4570	F	S	06/14/1982	>7.5	FVS	06/14/1982	A	—	Measured discharge is minimum value. Well flows freely onto ground, and some discharge seeps up outside of the casing. Well probably open to the N aquifer.
—	4565	F	S	06/14/1982	2.1	FVS	06/14/1982	A	—	Well flows freely onto ground. Well probably open to the N aquifer.
—	4640	F	R	—	11		05/09/1956	B	—	
W	5280	645. 615.8	R S	04/06/1973 08/22/1983	1.7	FVS	02/19/1983	I	O	Tribal well 12T-605.
E	4760	110.	R	05/ /1957	35		05/25/1957	—	—	
E	4520	+2.	R	08/15/1960	378		08/ /1960	I	—	Well no. 9. Specific capacity after 8 hours was 0.9 (gal/min)/ft, reported by driller.
E	4520	40.	R	08/09/1979	209		08/04/1981	I	—	Well no. 8.
—	4500	+74.	S	05/18/1983	87	FVS	02/19/1983	I	S(1983-)	Well no. 7; former El Paso well.
—	4420	F	R	04/ /1959	25		04/13/1959	B	—	
E	4420	+10.	R	12/15/1962	—		—	—	—	Driller reported high sodium and iron content in the water at 60 ft.
—	4430	2. +35.7	R S	07/10/1982 03/07/1983	25 1.7	 FVS	— 03/07/1983	A	O	Driller reported saline water at 210 ft, possibly in the Bluff sandstone. Well was plugged April 1983.
—	4790	F	R	07/18/1962	100		07/22/1962	A	—	Summer Camp well; tribal well 12T-631.
—	4640	+69.	S	03/02/1956	150	FVS	03/08/1956	B	—	Tribal well 12T-327.
—	4850	—		—	—		—	B	—	
—	4590	+97.	S	02/19/1983	124 85	 FVS	03/29/1963 02/19/1982	O	—	
—	4580	F	R	05/ /1956	131 9.0	 FVS	03/29/1963 03/11/1982	B	—	Petroleum test hole converted to water well. Well flows freely into marsh.
E	4440	—		—	—		—	—	—	Tribal well 9T-599A. One of two wells that supply water for town of Montezuma Creek.
E	4460	17. 67.0	R S	11/26/1967 05/05/1982	10		—	I	O	Clugston well. Supplies water for trailer court.
E	4440	—		—	—		—	—	—	Tribal well 9T-599. One of two wells that supply water for town of Montezuma Creek.
—	5195	271.	R	—	1.8		03/10/1955	I	—	Tribal well 12T-312.
W	5120	332. 342.8	R S	07/27/1962 04/15/1983	17		08/27/1962	A	O	Tribal well 9T-529. Specific capacity after 5 h was 1.3 (gal/min)/ft, reported by driller.
W	5070	155. 227.3	R S	10/30/1962 07/22/1982	18		10/30/1962	—	O	Tribal well 12T-531. Specific capacity after 8 h was 0.2 (gal/min)/ft, reported by driller.
W	5260	465. 463.6	R S	10/04/1964 05/07/1982	18		10/04/1962	A	O	Tribal well 12T-528. Specific capacity after 6 h was 0.3 (gal/min)/ft, reported by driller.
W	4904	231. 226.	S S	01/15/1953 03/10/1982	1.5	VS	03/10/1982	B	O	Tribal well 12K-316.
E	4960	—		—	179		—	B	—	V219 well. Petroleum test hole converted to water well. Specific capacity after 24 h was 0.4 (gal/min)/ft, reported by driller.
E	4970	0. 60.0	R S	04/18/1966 07/22/1982	300		—	—	O	V220 well.
E	4920	F	R	04/25/1966	5.0		04/28/1966	—	—	U121 well.
E	4560	164.8	S	09/29/1982	—		—	—	O	
W	4870	26. 18.7	R S	— 01/20/1983	6.5		—	—	O	Tribal well 9T-565.
W	4600	52. 47.9	R S	01/06/1954 05/01/1982	34		01/06/1954	B	O	Tribal well 9K-220.

LOCATION	OWNER	DATE COMPLETED	DEPTH OF WELL (FEET)	DEPTH CASED (FEET)	CASING DIAMETER (INCHES)	DEPTH TO FIRST OPENING (FEET)	FINISH	PRINCIPAL WATER-YIELDING FORMATION	DEPTH TO AQUIFER (FEET)	USE OF WATER	TYPE OF LIFT
(D-41-22) 6BCA- 1	NAVAJO INDIAN TRIBE	1982	755	696	—	696	X	221ENRD	—	H,S	P
33BCC- 1	NAVAJO INDIAN TRIBE	1941	775	432	6	30	P	220NVJO	418	H,S	P
33CBB- 1	CARTER OIL CO.	08/31/1955	530	523	7	523	X	221ENRD	—	U	—
34ADA- 1	NAVAJO INDIAN TRIBE	—	—	—	—	—	—	220NVJO	—	H,S	—
(D-41-23) 12BDA- 1	SHELL OIL CO.	11/24/1956	612	437	6.62	437	X	220NVJO	574	U	P
16AAA- 1	SOUTHLAND ROYALTY CORP.	06/19/1964	932	932	4.5	532	P	220NVJO	—	K	S
(D-41-24) 18BDB- 1	PHILLIPS PETROLEUM CO.	09/30/1956	1111	1068	7	1068	X	220NVJO	1070	U	P
20DBA- 1	PHILLIPS PETROLEUM CO.	04/13/1958	604	582	7	557	P	220NVJO	—	P,I	—
29CBA- 1	NAVAJO INDIAN TRIBE	—	—	—	—	—	—	—	—	S,H	P
30CDB- 1	NAVAJO INDIAN TRIBE	—	—	—	—	—	—	—	—	S	P
(D-41-25) 4CAD- 1	TEXACO, INC.	02/06/1958	1098	1098	8.62	598	P	220NVJO	510	U	P
5ADC- 1	SUPERIOR OIL CO.	04/07/1958	1122	1106	7	822	P	220NVJO	—	K	S
12DAC- 1	NAVAJO INDIAN TRIBE	12/ /1958	720	474	6	474	X	221ENRD	—	H,S	P
13AA - 1	—	—	—	—	—	—	—	—	—	U	P
17CAC- 1	SUPERIOR OIL CO.	05/09/1964	717	623	13.37	475	P	220NVJO	—	U	T
17CDB- 1	SUPERIOR OIL CO.	03/04/1964	1050	1200	8.62	500	P	220NVJO	453	U	S
21BBA- 1	NAVAJO INDIAN TRIBE	07/ /1942	1163	328	10	328	X	220NVJO	—	U	P
21BBB- 1	NAVAJO INDIAN TRIBE	11/ /1942	300	235	6	235	X	221BLFF	—	U	—
27BCA- 1	NAVAJO INDIAN TRIBE	—	—	—	—	—	—	111ALVM	—	P,I	S
27BDC- 1	NAVAJO INDIAN TRIBE	—	—	—	—	—	—	111ALVM	—	P,I	S
(D-41-26) 20CDB- 1	NAVAJO INDIAN TRIBE	10/ /1962	1245	—	—	—	—	221ENRD	—	S	P
33DBB- 1	NAVAJO INDIAN TRIBE	11/ /1962	753	—	—	—	—	221MRSN	—	S	P
(D-42-19) 7DDA- 2	—	03/ /1946	20	—	—	—	—	310HLGT	—	H	—
8BCA- 1	SAN JUAN ASSOCIATION	—	57	22	8	22	X	310HLGT	19	P	S
8BCC- 1	SAN JUAN ASSOCIATION	—	54	—	—	—	—	310HLGT	—	P	—
(D-42-21) 2DCA- 1	NAVAJO INDIAN TRIBE	—	93	—	—	—	—	220NVJO	—	H,S	P
14BAD- 1	NAVAJO INDIAN TRIBE	—	—	—	—	—	—	220NVJO	—	H,S	P
14CDA- 1	NAVAJO INDIAN TRIBE	—	—	—	—	—	—	220NVJO	—	H,S	P
23ABA- 1	NAVAJO INDIAN TRIBE	—	—	—	—	—	—	220NVJO	—	H,S	P

TYPE OF POWER	ALTITUDE OF LAND SURFACE (FEET)	WATER LEVEL (FEET)	DATE WATER LEVEL MEASURED	DISCHARGE (GALLONS PER MINUTE)	DATE DISCHARGE MEASURED	OTHER DATA AVAILABLE QW	WL	REMARKS
G	4880	315.2 S	04/14/1983	3.7 VS	03/08/1983	A	O	
W	4950	54. S 26.1 S	12/08/1953 01/19/1983	54	12/08/1953	B	O	Tribal well 9Y-209. Well originally drilled to 60 ft, with the water level at 30 ft. Deepened in 1953 to 520 ft, with the water level at 54 ft. Deepened again sometime before 1963 to 775 ft.
—	4950	184. R	10/ /1955	3.0	—	—	—	
—	5042	230.2 S	03/10/1983	—	—	—	O	Tribal well 9T-506.
—	4640	F S	03/11/1982	5.4 FVS	01/18/1983	B	—	Well flows freely into pond.
E	4680	+14. R	07/09/1964	195 5.4 FVS	— 03/10/1983	I	—	Water in sand at 240 to 290 ft, with a water level at 100 ft, produced 0.3 gal/min. Water in sand at 512 to 900 ft, flowed at surface. Specific capacity after 6 h was 1.3 (gal/min)/ft, reported by driller.
—	5120	200. R 376.1 S	10/14/1956 01/18/1983	14	10/14/1956	—	O	
—	4790	105. R	—	30	05/27/1958	I	—	Office well. Supplies water to housing area at an oil camp.
W	4885	—	—	2.0 VS	01/19/1983	A	—	Well probably open to the N aquifer.
W	4810	—	—	2.0 VS	05/05/1982	A	—	Well probably open to the N aquifer.
—	4730	F R	02/17/1958	60 8.8 FVS	02/17/1958 04/15/1983	I	—	Well flows freely onto ground and down dry wash.
E	4720	+172. R	—			B	—	
—	4770	F R	12/03/1958	3 F <0.1 FVS	12/03/1958 05/07/1982	A	—	Tribal well 12T-504. Well flows freely.
—	4790	F S	04/15/1983	18 FS	04/15/1983	A	—	Petroleum test hole converted to water well. Flows freely onto ground. Well probably open to the N aquifer.
E	4460	+180. R +274. S	06/15/1964 08/23/1983	60 F	06/15/1964	B	O	26-N well. Three specific capacity tests by driller ranged between 0.2 to 0.3 (gal/min)/ft. Water from well formerly used to dilute production water before injection for secondary recovery of oil.
E	4460	+130. R	03/09/1964	72 F	03/09/1964	B	—	O-24 well. Petroleum test hole converted to water well. Water level in 1983 was much greater than available pressure-gage maximum of +231 ft. Three specific capacity tests by driller gave values of 0.3 (gal/min)/ft. Well formerly used for dilution of production water before injection of secondary recovery of oil; abandoned due to deterioration of water quality. See tables 4 and 8.
—	4520	F R	09/09/1954	100 F	08/23/1983	I	—	Tribal well 12K-308(?). Located just south of the Navajo Tribal Land Development Office in Aneth. An attempt reportedly was made to plug the flowing well by blasting the borehole with dynamite—the borehole collapsed, but water appeared nearby on a hillside lower than the wellhead.
—	4480	F R	08/26/1949	1 F	08/26/1949	—	—	Tribal well 12K-308A(?).
E	4680	12.4 S	04/15/1983	—	—	—	O	Well no. 2. One of three wells that supply water to Aneth Day School.
E	4680	—	—	—	—	B	—	Well no. 1. One of three wells that supply water to Aneth Day School.
W	5160	240. R 275.3 S	— 05/07/1982	—	—	—	O	Tribal well 12T-540.
W	4880	200. R 246.6 S	— 05/07/1982	—	—	—	O	Tuffy Claw well; tribal well 12T-541.
—	4120	6.7 S	03/08/1982	—	—	B —	A(1947-53) S(1961-83)	
E	4080	19. R	—	—	—	—	—	New well. One of two wells reported to obtain water from fractured rock and to supply water to the town of Mexican Hat.
—	4080	11.0 S	11/20/1982	—	—	—	O	One of two wells reported to obtain water from fractured rock and to supply water to the town of Mexican Hat.
W	4635	—	—	2.7 VS	01/20/1983	A	—	Tribal well 9T-530.
—	4635	F S	03/09/1983	4.2 FVS	03/09/1983	A	—	
—	4670	F S	03/09/1983	31 FVS	03/09/1983	A	—	Part of the freely flowing water is diverted to a stock trough while the rest flows down a draw.
—	4670	F S	05/01/1982	0.6 FVS	05/01/1982	B	—	

LOCATION	OWNER	DATE COMPLETED	DEPTH OF WELL (FEET)	DEPTH CASED (FEET)	CASING DIAMETER (INCHES)	DEPTH TO FIRST OPENING (FEET)	FINISH	PRINCIPAL WATER-YIELDING FORMATION	DEPTH TO AQUIFER (FEET)	USE OF WATER	TYPE OF LIFT
(D-42-22)14BBC-1	NAVAJO INDIAN TRIBE	10/ /1951	590	497	7	497	X	220NVJO	460	U	P
29BBB-1	NAVAJO INDIAN TRIBE	—	—	—	—	—	—	220NVJO	—	H,S	P
33ACB-1	NAVAJO INDIAN TRIBE	—	307	—	—	—	—	220NVJO	—	U	—
(D-42-23) 2BDB-1	SHELL OIL CO.	04/09/1954	460	316	6	316	X	220NVJO	385	H,S	P
30ACB-1	NAVAJO INDIAN TRIBE	09/25/1971	759	759	6.62	—	—	220NVJO	485	H,S	P
(D-42-24)20DA-1	NAVAJO INDIAN TRIBE	02/28/1970	1342	814	7	814	X	221ENRD	—	U	—
(D-42-25)28DCA-1	NAVAJO INDIAN TRIBE	10/ /1958	403	—	—	—	—	221MRSN	—	H,S	P
(D-43-21)10CCC-1	NAVAJO INDIAN TRIBE	1954	—	—	—	—	—	220NVJO	—	S	P
(D-43-22) 6BCA-1	NAVAJO INDIAN TRIBE	—	140	0	—	0	X	220NVJO	—	S	P
36BBD-1	ARCO, INC.	09/01/1949	331	—	—	—	—	220NVJO	—	H	S
(D-43-23)15CAB-1	NAVAJO INDIAN TRIBE	01/20/1954	508	508	6	418	P	220NVJO	210	H,S	P
36ADD-1	NAVAJO INDIAN TRIBE	09/22/1971	240	210	6	210	X	220NVJO	40	S,H	P
(D-43-24) 6DDB-1	NAVAJO INDIAN TRIBE	04/ /1955	950	574	7	574	X	220NVJO	—	S	P
11CCB-1	NAVAJO INDIAN TRIBE	02/23/1972	540	—	—	—	—	221BLFF	—	S	P
12AC-1	NAVAJO INDIAN TRIBE	08/ /1964	660	—	—	—	—	221ENRD	—	S	P
19AA-1	NAVAJO INDIAN TRIBE	02/ /1935	735	560	6	560	X	231WNGT	570	H,S	P
27AAA-1	NAVAJO INDIAN TRIBE	05/ /1961	500	—	—	—	—	221ENRD	—	S,H	P
D-43-25)33BBD-1	NAVAJO INDIAN TRIBE	09/ /1958	560	—	—	—	—	221MRSN	—	S	P

water wells—Continued

TYPE OF POWER	ALTITUDE OF LAND SURFACE (FEET)	WATER LEVEL (FEET)		DATE WATER LEVEL MEASURED	DISCHARGE (GALLONS PER MINUTE)	DATE DISCHARGE MEASURED	OTHER DATA AVAILABLE QW	WL	REMARKS
W	5110	315. 332.6	R S	12/03/1953 03/09/1988	15	10/ /1951	B	O	
—	4740	F	S	03/09/1988	3.6 FVS	03/09/1988	A	—	Water flows freely into trough and out into a pond.
—	5030	99. 96.	R S	— 01/20/1988	—	—	—	O	
—	4760	F +18.6	R S	10/21/1954 05/06/1982	35 7.5 FVS	04/12/1954 05/06/1982	B	O	
W	5150	270.	R	—	40	—	—	—	Tribal well 9T-574.
—	5660	970. 842.4	R S	— 05/06/1982	12	—	—	O	Tribal well 9T-564.
W	4925	171. 207.4	R S	— 05/06/1982	0.10	05/06/1982	A	O	Tribal well 9T-225.
W	5097	77.9	S	03/09/1988	—	—	—	O	Tribal well 9T-517. Petroleum test hole converted to water well.
W	4810	6.7 6.2	R S	— 04/30/1982	8.0	—	B	O	Tribal well 9T-568. Seismograph hole converted to water well.
E	5180	20. 84.7	R S	— 01/20/1988	8.8	05/25/1957	—	O	
W	5194	133. 136.4	S S	01/20/1954 05/06/1982	20 3.3 VS	01/20/1954 01/19/1988	B	O	Tribal well 9K-219.
W	5350	150.	R	—	—	—	A	—	Tribal well 9T-575.
W	5475	585. 540.	R S	— 05/06/1982	20	—	A	O	Tribal well 9T-538.
W	5220	300.	R	—	—	—	A	—	Tribal well 9T-572.
W	5200	430.	R	—	1.8 VS	05/05/1982	A	—	Tribal well 9T-539. Specific conductance previously reported to be 735 us/cm at 25 25 °Celsius.
W	5310	309. 353.7	S S	02/18/1951 05/05/1982	3.0 VS	05/05/1982	B	I	Tribal well 9Y-32.
W	5115	60. 101.	R S	— 01/19/1988	15	—	—	O	Tribal well 9T-547.
W	5216	250.	R	01/ /1965	8.0	—	—	B	Tribal well 9T-227.

Table 7.—Estimates of aquifer coefficients from aquifer tests

Aquifer	Pumped well observation well	Date	Hydraulic conductivity (feet per day)	Storage coefficient
N	(D-39-26)21bdb-1	Sept. 6, 1963	0.02	--
		Sept. 7, 1963	.03	--
N	(D-37-22)28dbb-1	Nov. 24-25, 1982	--	--
	(D-37-22)28dcb-1		.34	2.55×10^{-4}
N	(D-39-22)17bab-1	Sept. 12-18, 1982	.15	--
D	(D-33-23)36dad-3	May 10-11, 1955	--	--
	(D-33-23)36dad-1		.77	[1]1.41×10^{-5}
	36dad-2		.35	1.03×10^{-5}

[1]Curve fits leaky conditions better, with leakance $p'/m' = 9.77 \times 10^{-6}$.

Table 8.—Specific conductance and temperature measurements at wells and springs when water samples were not collected for chemical analysis

Location: See figure 2 for description of data-site numbering system.
Geologic unit: See table 1 for explanation of code.
Statistical analysis of specific conductance and dissolved solids for water analyses in Table 4 provided the correlation: dissolved solids = 0.64 x specific conductance
Units: µS/CM, microsiemens per centimeter at 25° Celsius; DEG° C degrees Celsius.

LOCATION	GEOLOGIC UNIT	DATE OF MEASURE-MENTS	SPECIFIC CONDUCTANCE (µS/CM)	TEMPERATURE (DEGREES° C)
(D-28-24)14CD -S1	112ALVM	11/17/1981	220	--
(D-29-23) 4CBA- 1	220NVJO	03/01/1983	510	15.0
T(D-29-23)33ACA- 1	220NVJO	04/13/1983	265	13.0
(D-30-22)13CAA- 1	220NVJO	06/06/1979	410	24.0
(D-30-23)17ACB- 1	220NVJO	04/19/1983	800	13.0
(D-30-24)27DAA- 1	--	04/18/1983	490	13.0
30DAC- 1	--	07/19/1982	470	--
(D-31-23) 9DDD- 1	220NVJO	02/18/1983	460	13.0
24CBA- 1	220NVJO	02/18/1983	365	12.0
24DCA- 1	220NVJO	03/11/1983	930	12.0
28CAB- 1	221ENRD	09/21/1978	360	15.0
36DAC- 1	220NVJO	02/18/1983	510	12.0
(D-31-24) 5CBC- 1	220NVJO	07/15/1982	500	--
(D-32-22)30DBA-S1	220NVJO	10/20/1982	310	--
(D-32-23) 7DBB- 1	220NVJO	02/18/1983	590	11.5
(D-33-23) 1CAA- 1	217BRCN	09/20/1978	1060	14.0
(D-34-26)29CDD- 1	210DKOT	06/08/1982	1700	12.5
(D-36-22)27DAD- 1	217BRCN	08/22/1983	1410	13.0
(D-37-24)14CCA- 1	--	07/20/1982	840	16.0
23AAB- 1	221ENRD	06/11/1982	720	16.5
(D-37-25)19BDD- 1	--	06/11/1982	720	17.0
(D-38-22)32AAC- 1	--	10/28/1982	410	--
(D-38-24)12DAA- 1	221ENRD	06/10/1982	760	18.0
23ACB- 1	221ENRD	03/07/1982	930	17.0
(D-38-25) 7CBA- 1	221ENRD	06/10/1982	630	18.0
7CDD- 1	221ENRD	07/21/1982	660	17.0
7DBB- 1	221ENRD	06/10/1982	590	18.5
7DCB- 1	221ENRD	07/21/1982	640	17.0
30CAA- 1	221ENRD	07/21/1982	810	18.0
33BDC- 1	--	06/10/1982	850	18.5
(D-39-21)14DDB- 1	220NVJO	04/29/1982	385	16.5
23DCC- 1	221ENRD	04/29/1982	370	16.0

Table 8.—Specific conductance and temperature measurements at wells and springs when water samples were not collected for chemical analysis—Continued

LOCATION	GEOLOGIC UNIT	DATE OF MEASURE- MENTS	SPECIFIC CONDUCTANCE (µS/CM)	TEMPERATURE (DEGREES° C)
(D-39-23) 2BBB- 1	217BRCN	05/08/1982	1140	16.0
19CBD- 1	--	06/14/1982	1290	--
(D-39-25) 5ACA- 1	221ENRD	05/08/1982	820	17.0
36BDB- 1	221BLFF	05/08/1982	1510	--
(D-39-26) 21BDB- 1	220NVJO	03/10/1982	1220	17.0
(D-40-21) 25ACB- 2	220NVJO	05/02/1982	400	17.0
25BAD- 1	--	05/04/1982	375	18.5
(D-40-23) 3BCC- 1	--	06/14/1982	600	19.0
4ADA- 1	--	06/14/1982	3150	17.0
36ABB- 3	221ENRD	03/07/1983	11100	14.5
(D-40-24) 4DCD- 1	221BLFF	07/22/1982	1930	19.0
17DBD- 1	220NVJO	03/11/1982	4110	18.0
(D-40-25) 6DAC- 1	221ENRD	05/08/1982	810	--
15BCC- 1	221ENRD	05/07/1982	840	--
19AAD- 1	221SLWS	03/10/1982	1830	17.0
(D-41-22) 6BCA- 1	221ENRD	03/08/1983	770	12.0
33BCC- 1	220NVJO	03/12/1982	285	17.5
(D-41-23) 12BDA- 1	220NVJO	01/18/1983	9350	18.0
(D-41-24) 20DBA- 1	220NVJO	03/11/1982	2750	--
29CBA- 1	--	01/19/1983	1330	15.5
30CDB- 1	--	05/05/1982	1320	17.0
(D-41-25) 12DAC- 1	221ENRD	05/07/1982	3120	17.0
13AA - 1	--	04/15/1983	13900	19.0
17CDB- 1	220NVJO	08/23/1983	116000	16.0
21BBB- 1	220GLNC	08/22/1983	118000	19.0
(D-42-21) 2DCA- 1	220NVJO	01/20/1983	470	14.0
14BAD- 1	220NVJO	03/09/1983	235	15.0
14CDA- 1	220NVJO	03/09/1983	225	14.5
(D-42-22) 29BBB- 1	220NVJO	03/09/1983	410	10.5
(D-42-23) 2BDB- 1	220NVJO	05/06/1982	810	15.0
(D-42-25) 28DCA- 1	221MRSN	05/05/1982	1920	18.0
(D-43-23) 15CAB- 1	220NVJO	01/19/1983	240	13.0
36ADD- 1	220NVJO	01/19/1983	250	12.5
(D-43-24) 6DDB- 1	220NVJO	05/06/1982	1720	--
11CCB- 1	221BLFF	05/05/1982	1350	--
12AC - 1	221ENRD	05/05/1982	4270	18.0
19AA - 1	231WNGT	05/05/1982	690	16.0

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Table 9.—Analyses of trace elements in water

[For analyses done by the U.S. Geological Survey prior to 1971, the number of significant figures may not conform to the present

Location: See figure 2 and text for description of data-site numbering system.
Geologic unit: See table 1 for explanation of code which best describes the interval at which the well is open or the formation from which the spring
Specific conductance: in microsiemens per centimeter at 25° C.
Units: DEG° C, degrees Celsius; µS/CM, microsiemens per centimeters at 25° Celsius; µG/L, micrograms per liter.

LOCATION	GEO-LOGIC UNIT	DATE OF SAMPLE	TEMPER-ATURE (DEG° C)	SPE-CIFIC CON-DUCT-ANCE (µS/CM)	PH (UNITS)	ARSENIC DIS-SOLVED (µG/L AS AS)	BORON, DIS-SOLVED (µG/L AS B)	BROMIDE DIS-SOLVED (G/L AS BR)	COPPER, DIS-SOLVED (µG/L AS CU)	IODIDE, DIS-SOLVED (µG/L AS I)	IRON, DIS-SOLVED (µG/L AS FE)	SELE-NIUM, DIS-SOLVED (µG/L AS SE)	ZINC, DIS-SOLVED (µG/L AS ZN)	ALUM-INUM, TOTAL RECOV-ERABLE (µG/L AS AL)
(D-27-24)19C -S1	200MNCS	33-10-22	—	—	—	—	—	—	—	—	200	—	—	—
(D-28-21)16BCB- 1	220GLNC	82-08-21	15.5	245	8.3	—	—	—	—	—	—	—	—	20
(D-28-22) 1CAA- 1	221ENRD	79-04-04	—	630	—	—	80	—	—	—	—	—	—	—
1CAB-S1	221ENRD	77-12-14	—	—	7.2	0	110	—	13	—	61	0	188	—
(D-28-23) 3AD -S1	221SLWS	50-06-28	14.5	647	8.3	—	20	—	—	—	30	—	—	—
36DBA-S1	217BRCN	81-04-15	—	—	7.8	—	65	—	—	—	—	—	—	—
(D-28-26)30DDD-S1	221ENRD	60-10-05	15.0	315	8.3	—	30	—	—	—	10	—	—	—
T(D-29-19)36BBC-S1	310RICO	70-04-07	10.0	1020	7.8	50	50	—	70	—	40	20	—	—
(D-29-23) 4CBA- 1	220NVJO	64-01-15	—	760	7.5	—	100	—	—	—	—	—	—	—
(D-29-24)10AAB- 1	111ALVM	61-03-30	10.5	581	7.6	—	130	—	—	—	0	—	—	—
(D-30-19)12ACB-S1	310CDRM	69-05-20	13.5	3250	8.1	0	620	—	10	—	150	0	—	—
14AAB-S1	310RICO	70-04-07	10.5	571	7.6	0	60	—	10	—	20	0	—	—
15ADC-S1	310RICO	70-04-08	10.5	405	7.7	0	20	—	10	—	50	0	—	—
22ADD-S1	310CDRM	70-03-05	9.0	404	7.4	0	20	—	0	—	30	0	—	—
25CDC-S1	310CDRM	68-05-02	15.0	475	7.8	10	60	—	0	—	—	0	—	—
26CBC-S1	310RICO	68-05-02	16.0	439	7.7	10	70	—	10	—	—	0	—	—
27CDD-S1	310CDRM	68-07-17	21.5	571	7.7	—	20	—	—	—	10	—	—	—
31CDD-S1	111ALVM	69-09-04	13.5	611	8.0	0	60	—	0	—	20	10	—	—
T(D-30-19)34CAC-S1	310CDRM	68-10-09	13.0	101	7.4	10	40	—	0	—	40	0	—	—
(D-30-20)20ACA- 1	310CDRM	68-10-09	15.0	1490	8.0	0	400	—	0	—	70	0	—	—
20DAC- 1	310CDRM	68-05-02	14.0	1380	7.9	0	470	—	0	—	—	0	—	—
30CBA- 1	310CDRM	68-05-02	15.0	524	7.9	0	70	—	0	—	—	0	—	—
(D-31-19) 4ADC-S1	310CDRM	68-05-20	13.5	—	—	40	—	—	10	—	70	0	—	—
(D-31-20) 6ADA-S1	310CDRM	68-05-02	14.5	640	7.8	0	60	—	0	—	—	0	—	—
(D-32-24)22ADB- 1	231WNGT	83-06-12	16.0	1220	8.6	—	—	90	—	8	—	—	—	—
(D-33-22)25DBB-S1	112CLVM	79-06-01	—	130	8.4	—	—	—	—	—	—	—	—	—
(D-33-23)30DCC-S1	112CLVM	79-06-01	—	260	8.3	—	—	—	—	—	—	—	—	—
36DAA- 2	220JRSC	80-07-10	—	645	8.2	—	137	—	—	—	—	—	—	—
(D-33-24)19DAD- 1	220JRSC	56-10-04	—	552	7.6	—	60	—	—	—	470	—	—	—
	210DKOT	56-10-05	—	546	7.8	—	30	—	—	—	60	—	—	—
30DDC- 1	210DKOT	63-10-16	13.5	685	7.1	—	10	—	—	—	8100	—	—	—
31ABB- 1	210DKOT	55-06-13	—	654	7.6	—	80	—	—	—	30	—	—	—
	210DKOT	55-06-16	—	644	7.1	—	100	—	—	—	20	—	—	—
(D-34-22)28CAA- 1	220JRSC	77-12-19	—	—	7.6	0	100	—	5	—	304	0	11	—
(D-34-26)30BCC- 1	210DKOT	77-12-14	—	—	7.3	0	100	—	1	—	930	0	845	—
30CCB- 1	111ALVM	60-10-06	11.5	750	7.8	—	50	—	—	—	60	—	—	—
	111ALVM	61-03-30	6.5	793	7.6	—	120	—	—	—	10	—	—	—
	111ALVM	80-12-08	—	—	8.0	—	125	—	—	—	—	—	—	—
(D-35-23) 9CBD-S1	217BRCN	79-06-01	—	180	8.3	—	—	—	—	—	—	—	—	—
(D-36-21)27AAB- 1	221SLWS	50-06-24	13.5	1250	7.7	—	0	—	—	—	—	—	—	—
(D-36-22)12CCD- 1	220NVJO	82-08-22	16.5	510	9.2	—	—	—	—	—	—	—	—	30
(D-36-26) 7BAC- 1	200MSZC	82-10-28	22.0	1280	8.1	—	—	—	—	—	—	—	—	30
(D-37-22)10DBD- 1	—	81-07-07	—	—	7.9	—	80	—	—	—	—	—	175	—
	—	82-01-11	—	—	8.1	—	75	—	—	—	—	—	—	—
22BBC- 1	217BRCN	82-10-20	—	4450	4.6	—	—	—	—	—	—	—	—	—
22CCB- 1	200MSZC	82-10-28	24.0	425	8.1	—	—	—	—	—	—	—	—	30
28DBB- 1	220GLNC	82-11-25	23.0	385	7.9	—	—	—	—	—	—	—	—	50
33DDA- 1	220GLNC	82-09-21	24.5	395	8.0	—	—	—	—	—	—	—	—	90
(D-37-25)32CAD- 1	220JRSC	82-10-27	18.5	1240	8.5	—	—	—	—	—	—	—	—	50
(D-38-22)23ACB- 1	220JRSC	80-05-31	—	360	7.6	<20	—	—	—	—	0	<10	—	—
(D-38-26)28ACD- 1	—	82-09-21	18.0	850	7.6	—	—	—	—	—	—	—	—	100
(D-39-22)17BAB- 1	220JRSC	82-09-18	18.0	370	7.8	—	—	—	—	—	—	—	—	160
17CBD- 1	220JRSC	82-06-13	19.0	400	8.0	—	—	—	—	—	—	—	—	—
(D-39-24)13DAC- 1	221BLFF	60-08-03	—	598	7.9	—	240	—	—	—	—	—	—	—
(D-39-25) 5ACA- 1	221ENRD	52-07-19	—	743	8.0	—	290	—	—	—	50	—	—	—
	221ENRD	53-08-12	14.0	769	8.0	—	39	—	—	—	50	—	—	—
5ACA- 2	220GLNC	52-07-19	—	1290	8.2	—	30	—	—	—	90	—	—	—
	220GLNC	53-08-12	—	1200	8.3	—	28	—	—	—	50	—	—	—
(D-39-26)21BDB- 1	220JRSC	63-09-07	21.0	1820	7.9	—	230	—	—	—	130	—	—	—
(D-40-21)25AAC- 1	220NVJO	82-05-04	17.5	405	8.8	—	—	—	—	—	—	—	—	—
25ABA- 1	220NVJO	82-05-04	20.0	775	9.1	—	—	—	—	—	—	—	—	—
25ACB- 1	220NVJO	82-11-19	17.0	400	8.6	10	—	—	—	—	—	—	—	100
25BDA- 1	220GLNC	82-11-19	16.5	690	9.0	—	—	—	—	—	—	—	—	30
26ADA- 1	—	82-04-14	—	—	—	—	65	—	—	—	—	—	44	—
(D-40-22)29AAB- 1	220JRSC	58-05-21	—	378	8.1	—	60	—	—	—	20	—	—	—
	220JRSC	82-06-14	19.5	360	8.6	—	—	—	—	—	—	—	—	—
30AAC- 1	220GLNC	63-10-16	19.0	376	7.9	—	20	—	—	—	20	—	—	—
30BBB- 1	220JRSC	61-03-29	20.0	595	8.6	—	140	—	—	—	0	—	—	—
	220JRSC	82-05-01	21.0	650	9.0	—	—	—	—	—	—	—	—	—
	220JRSC	83-04-14	20.0	758	9.0	—	—	10	—	1	—	—	—	—

samples from water wells and springs
standards of the U.S. Geological Survey. The laboratory analyzing the sample is listed in table 4.]

flows.

ANTI-MONY, TOTAL (µG/L AS SB)	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)	COPPER, TOTAL RECOV-ERABLE (µG/L AS CU)	IRON, TOTAL RECOV-ERABLE (µG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (µG/L AS PB)	LITHIUM TOTAL RECOV-ERABLE (µG/L AS LI)	MANGA-NESE, TOTAL RECOV-ERABLE (µG/L AS MN)	MOLYB-DENUM, TOTAL RECOV-ERABLE (µG/L AS MO)	NICKEL, TOTAL RECOV-ERABLE (µG/L AS NI)	SELE-NIUM, TOTAL (µG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (µG/L AS AG)	STRON-TIUM, TOTAL RECOV-ERABLE (µG/L AS SR)	ZINC, TOTAL RECOV-ERABLE (µG/L AS ZN)
—	—	—	—	—	—	—	—	400	—	—	—	—	—	—	—	—	—
<1	—	200	<10	1	10	<1	29	2700	10	<10	30	1	2	—	<1	300	570
—	—	70	—	—	—	—	—	—	—	—	5	—	—	—	—	—	640
—	—	—	—	—	—	—	—	150	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	15	—	—	—	—	—	—	—	—	—	50
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	50	—	0	0	—	0	10	—	—	0	—	0	0	0	—	240
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	<1	110	—	<1	<15	—	5	70	<5	—	5	—	<20	<1	<5	—	62
—	<1	<50	—	2	20	—	<5	320	15	—	15	—	<20	<1	<5	—	132
—	9	270	—	—	—	—	40	2700	—	—	120	—	—	—	—	—	60
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	1100	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	350	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	1600	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	15	21000	—	—	180	—	—	—	—	—	215
—	<1	<50	—	2	30	—	<5	150	5	—	15	—	<20	<1	<5	—	3820
—	—	—	—	—	—	—	—	20	—	—	—	—	—	—	—	—	—
<1	1	<100	<10	<1	<10	<1	3	60	<1	70	10	5	4	—	<1	90	20
<1	16	<100	<10	<1	<10	3	2	2300	5	410	50	5	2	—	<1	200	20
—	5	—	—	—	—	—	—	1720	—	—	470	—	15	—	—	—	—
—	7	—	—	—	—	—	415	1810	10	—	445	—	—	—	—	—	290
—	—	—	—	—	—	—	>10	238	—	—	3900	—	—	—	—	—	2000
<1	17	100	<10	<1	<10	<1	1	480	2	30	10	2	<1	—	<1	600	10
<1	16	<100	<10	<1	<10	<1	2	320	4	20	10	<1	2	—	<1	570	10
<1	15	100	<10	<1	<10	1	3	310	3	40	10	3	4	—	<1	700	10
<1	10	200	<10	<1	<10	<1	9	150	5	360	20	4	<1	—	<1	1300	20
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<1	13	100	<10	<1	<10	1	3	150	1	340	10	4	11	—	<1	700	10
<1	16	200	<10	<1	<10	<1	2	230	1	40	40	4	7	—	<1	1300	20
—	12	—	—	—	—	—	—	—	—	—	—	—	—	<1	—	—	—
—	—	—	—	—	—	—	—	180	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	15	—	—	—	—	—	—	—	—	—	—	—	—	<1	—	—	—
—	53	—	—	—	—	—	—	—	—	—	—	—	—	<1	—	—	—
<1	10	<100	<10	<1	<10	<1	2	<10	2	80	10	<1	7	—	<1	120	10
1	60	<100	<10	<1	<10	<1	2	50	3	80	10	<1	2	—	<1	100	10
—	21	—	—	—	—	—	—	60	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	100	—	—	—	—	—	—	—	—	—
—	9	—	—	—	—	—	—	—	—	—	—	—	—	<1	—	—	—
—	—	—	—	—	—	—	—	—	—	—	0	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	56	—	—	—	—	—	—	—	—	—	—	—	—	<1	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LOCATION	GEO-LOGIC UNIT	DATE OF SAMPLE	TEMPER-ATURE (DEG° C)	SPE-CIFIC CON-DUCT-ANCE (µS/CM)	PH (UNITS)	ARSENIC DIS-SOLVED (µG/L AS AS)	BORON, DIS-SOLVED (µG/L AS B)	BROMIDE DIS-SOLVED (µG/L AS BR)	COPPER, DIS-SOLVED (µG/L AS CU)	IODIDE, DIS-SOLVED (µG/L AS I)	IRON, DIS-SOLVED (µG/L AS FE)	SELE-NIUM, DIS-SOLVED (µG/L AS SE)	ZINC, DIS-SOLVED (µG/L AS ZN)	ALUM-INUM, TOTAL RECOV-ERABLE (µG/L AS AL)
(D-40-23) 12BAD- 1	221MRSN	73-04-05	—	—	8.8	—	690	—	—	—	30	—	—	—
21DBC- 1	220JRSC	78-01-19	—	—	8.0	5	600	—	2	—	740	0	9	—
	220JRSC	82-01-31	—	—	8.1	—	1205	—	—	—	—	—	—	—
21DB - 1	220JRSC	78-01-19	—	—	8.1	—	700	—	2	—	67	0	10	—
	220JRSC	82-01-14	—	—	8.1	—	1180	—	—	—	—	—	—	—
27BAA- 1	220JRSC	60-07-15	—	3115	7.8	—	1400	—	0	—	570	—	0	1100
	220JRSC	82-06-14	17.0	3070	7.8	—	—	—	—	—	—	—	—	—
	220JRSC	83-06-16	20.0	3000	7.6	—	—	1100	—	38	—	—	—	40
(D-40-24) 32DCB- 1	220JRSC	78-01-19	—	—	—	3	250	—	16	—	56	0	20	—
(D-40-25) 1BCC- 1	220NVJO	55-03-10	16.0	23400	7.7	—	—	—	0	—	40	—	70	0
(D-41-23) 16AAA- 1	220JRSC	83-03-10	16.5	1440	8.8	—	—	170	—	11	—	—	—	—
(D-41-24) 20DBA- 1	221BLFF	80-08-25	—	—	8.7	—	205	—	—	—	—	—	—	—
(D-41-25) 4CAD- 1	220GLNC	83-04-15	20.0	4890	7.6	—	—	510	—	75	—	—	—	—
21BBA- 1	220GLNC	55-03-10	18.0	12000	7.9	—	—	—	—	—	—	—	—	0

samples from water wells and springs—Continued

ANTI-MONY, TOTAL (μG/L AS SB)	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)	COPPER, TOTAL RECOV-ERABLE (μG/L AS CU)	IRON, TOTAL RECOV-ERABLE (μG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (μG/L AS PB)	LITHIUM TOTAL RECOV-ERABLE (μG/L AS LI)	MANGA-NESE, TOTAL RECOV-ERABLE (μG/L AS MN)	MOLYB-DENUM, TOTAL RECOV-ERABLE (μG/L AS MO)	NICKEL, TOTAL RECOV-ERABLE (μG/L AS NI)	SELE-NIUM, TOTAL (μG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (μG/L AS AG)	STRON-TIUM, TOTAL RECOV-ERABLE (μG/L AS SR)	ZINC, TOTAL RECOV-ERABLE (μG/L AS ZN)
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	900	—	—	—	—	—	—	—	—	—
—	27	—	—	—	—	—	—	—	—	—	15	—	—	—	—	—	30
—	—	—	—	—	—	—	—	350	—	—	—	—	—	—	—	—	—
—	24	—	—	—	—	—	190	310	—	—	20	—	25	—	—	—	80
—	50	—	—	—	—	—	—	780	—	—	0	—	—	—	—	—	—
—	20	—	—	—	—	—	—	—	—	—	—	—	—	<1	—	—	—
<1	18	100	<10	<1	10	<1	<1	960	<1	970	20	4	6	—	<1	2100	10
—	—	—	—	—	—	—	—	180	—	—	39	—	—	—	—	—	—
—	—	—	—	—	—	—	—	3800	—	—	20	—	—	—	—	—	—
—	23	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	4	—	—	—	—	—	—	240	—	—	10	—	—	—	—	—	110
—	40	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	0	130	—	2000	0	—	—	—	—	—	30

Table 10.—Records of springs

Location: See figure 2 and text for explanation of data-site numbering system.
Aquifer: See table 1 for explanation of code and description of lithology.
Use of water: H, domestic; I, irrigation; P, public supply; S, stock; U, unused.
Discharge: E, estimate; V, volumetric measurement; R, reported.
Type of spring: A, artesian; C, contact; D, depression; P, perched; S, seepage.
Other data available: A, specific conductance and temperature in table 8; B, chemical analysis for common ions in table 4; I, chemical analysis for common ions in table 4 and trace elements in table 9.

LOCATION	OWNER OR USER	AQUIFER	USE OF WATER	ALTITUDE OF LAND SURFACE (FEET)	DISCHARGE (GALLONS PER MINUTE)	DATE DISCHARGE MEASURED	TYPE OF SPRING	NAME OF SPRING	OTHER DATA AVAILABLE
(D-26-21)35CAC-S1	U.S. BUREAU OF LAND MANAGEMENT	231KYNT	—	4400	5 E	06/11/1978	C	PRITCHETT CNYN 1	B
35DDB-S1	U.S. BUREAU OF LAND MANAGEMENT	231KYNT	—	4400	.3 V	06/11/1978	C	PRITCHETT CNYN 2	B
(D-27-19)21BDC-S1	U.S. NATIONAL PARK SERVICE	220NVJO	S	5680	1.0 V	10/24/1967	S	CABIN SPRING	B
(D-27-23)17A -S1	STATE OF UTAH	221MRSN	—	—	—	—	—	—	B
31DBC-S1	—	221MRSN	U	5320	1.6 V	10/24/1982	—	—	B
(D-27-24)19C -S1	HAMMOND, BOYD	200MNCS	—	—	—	—	—	—	I
(D-28-22) 1CAB-S1	U.S. BUREAU OF LAND MANAGEMENT	221ENRD	S, P	5130	7.2 V	10/24/1982	—	KANE SPRINGS	I
(D-28-23) 3AD -S1	U.S. BUREAU OF LAND MANAGEMENT	221SLWS	—	—	—	—	—	YELLOW CIRCLE MINE	I
36DBA-S1	STATE OF UTAH	217BRCN	S, P	6300	6.0 V	10/24/1982	—	TROUGH SPRING	I
(D-28-24)14CD -S1	REDD, C. HARDY	112ALVM	H, S, P	8480	112 R	1964		COYOTE SPRINGS	A
(D-28-26)30DDD-S1	TURNER, ROY	221ENRD	H, I	6160	2.0 V	10/10/1962	—	—	I
T(D-29-19)36BBC-S1	U.S. NATIONAL PARK SERVICE	310RICO	U	4390	0.1 V	04/07/1970	C	LOOP TRAIL SPRING	I
(D-30-19)12ACB-S1	U.S. NATIONAL PARK SERVICE	310CDRM	U	4730	0.1 E	05/20/1969	C	DROP OFF SPRING	I
14AAB-S1	U.S. NATIONAL PARK SERVICE	310RICO	U	4780	13 V	04/07/1970	C	LOWER LITTLE SPRING	I
15ADC-S1	U.S. NATIONAL PARK SERVICE	310RICO	U	4780	5.0 V	04/08/1970	C	LOWER BIG SPRING	I
22ADD-S1	U.S. NATIONAL PARK SERVICE	310CDRM	U	4950	1 E	03/05/1970	A	LITTLE SPRING	I
25CDC-S1	U.S. NATIONAL PARK SERVICE	310CDRM	U	5060	10 E	05/02/1968	D	SQUAW SPRING	I
26CBC-S1	U.S. NATIONAL PARK SERVICE	310RICO	U	5080	2 E	05/02/1968	D	BIG SPRING CANYON SP	I
27CDD-S1	U.S. NATIONAL PARK SERVICE	310CDRM	U	5180	0.1 V	07/17/1968	P	SODA SPRING	I
31CDD-S1	U.S. NATIONAL PARK SERVICE	111ALVM	U	5030	10 E	09/04/1969	—	LOST CANYON SPRING	I
T(D-30-19)34CAC-S1	U.S. NATIONAL PARK SERVICE	310CDRM	U	5200	0.1 E	10/09/1968	P	HANGOVER SPRING	I
(D-31-19) 3BDA-S1	U.S. NATIONAL PARK SERVICE	310CDRM	U	5270	3 E	12/02/1970	C	ECHO SPRING	B
4ADC-S1	U.S. NATIONAL PARK SERVICE	310CDRM	U	5400	0.1 E	05/20/1969	C	DORIUS SPRING	I
(D-31-20) 6ADA-S1	U.S. NATIONAL PARK SERVICE	310CDRM	H	5020	2.5 E	05/02/1968	D	PEEK-A-BOO SPRING	I
(D-32-22)30DBA-S1	U.S. BUREAU OF LAND MANAGEMENT	220NVJO	S	7100	4.0 V	10/20/1982	—	SHAY MESA SPRING	A
(D-32-23)24CCC-S1	—	217BRCN	H, S	6850	—	—	—	PETERS SPRING	B
(D-33-22)25DBB-S1	U.S. FOREST SERVICE	112CLVM	P	9200	—	—	C	TAYLOR SPRING	I
(D-33-23)30DCC-S1	U.S. FOREST SERVICE	112CLVM	P	8500	—	—	C	DALTON SPRING	I
(D-33-24)29BDD-S1	DALTON	210DKOT	S	6780	14 R	06/15/1955	—	—	B
(D-34-21)27CCD-S1	U.S. FOREST SERVICE	111ALVM	S	6800	13 V	10/21/1982	C	—	B
(D-35-23) 9CBD-S1	U.S. FOREST SERVICE	217BRCN	P	7040	6.0 R	—	C	DEVILS CANYON SP	I
(D-39-26)20AAC-S1	U.S. NATIONAL PARK SERVICE	210DKOT	H, P	5240	1 E	05/01/1959	C	—	B
33 -S1	NAVAJO INDIAN TRIBE	210DKOT	—	—	0.1 E	09/08/1959	—	12R-163	B
(D-40-19)14DDD-S1	U.S. BUREAU OF LAND MANAGEMENT	310HLGT	—	3630	1 E	09/10/1958	—	—	B
(D-40-20)36CCB-S1	—	231WNGT	H, S	4390	—	—	—	NAVAJO SPRING	B
(D-40-22)29AAB-S1	ST CHRISTOPHER'S MISSION	221BLFF	H	4400	0.25 E	05/01/1959	—	MISSION SPRING	B
(D-40-24)20 -S1	NAVAJO INDIAN TRIBE	221RCPR	—	—	3.5 E	09/08/1954	—	12R-171	B
(D-40-25) 5BBB-S1	NAVAJO INDIAN TRIBE	217BRCN	—	4900	0.1 E	09/08/1954	—	12R-173	B
19B -S1	NAVAJO INDIAN TRIBE	221WSRC	S	4650	1 E	09/09/1954	—	12R-211	B
(D-41-19)10 -S1	U.S. BUREAU OF LAND MANAGEMENT	310HLGT	—	—	1 E	09/10/1958	—	—	B
29 -S1	—	310RICO	—	—	5 E	04/30/1959	—	GOODRICH SULPHUR SP	B

Table 10.—Record of springs—Continued

LOCATION	OWNER OR USER	AQUIFER	USE OF WATER	ALTITUDE OF LAND SURFACE (FEET)	DISCHARGE (GALLONS PER MINUTE)	DATE DISCHARGE MEASURED	TYPE OF SPRING	NAME OF SPRING	OTHER DATA AVAILABLE
(D-41-21)25BCA-S1	NAVAJO INDIAN TRIBE	221BLFF	H,S	4760	0.5 R	11/03/1954		9Y-24	B
36BBC-S1	NAVAJO INDIAN TRIBE	221BLFF	S	4790	0.75 E	11/03/1954	—	9Y-25	B
(D-41-22) 2DCC-S1	NAVAJO INDIAN TRIBE	221RCPR	—	4810	0.1 E	10/27/1954	—	9Y-62	B
13 -S1	NAVAJO INDIAN TRIBE	221RCPR	—	—	0.5 E	10/27/1954	—	9Y-61	B
(D-41-23)24ABC-S1	NAVAJO INDIAN TRIBE	221RCPR	—	4615	0.2 E	10/21/1954	—	9Y-40	B
25 -S1	NAVAJO INDIAN TRIBE	221RCPR	—	—	0.2 E	10/21/1954	—	9Y-43A	B
(D-41-24)18DCC-S1	NAVAJO INDIAN TRIBE	221RCPR	H,S	4765	0.25 E	10/21/1954	—	9Y-42	B
31 -S1	NAVAJO INDIAN TRIBE	221RCPR	—	—	0.25 E	10/21/1954	—	9Y-41	B
(D-41-25)23 -S1	NAVAJO INDIAN TRIBE	221WSRC	—	—	0.2 E	09/09/1954	—	12R-184A	B
(D-42-22)29BAC-S1	NAVAJO INDIAN TRIBE	220NVJO	—	4760	3 E	10/27/1954	—	9Y-29	B
(D-43-19)29 -S1	NAVAJO INDIAN TRIBE	310DCLL	—	—	4 E	09/09/1954	—	8A-260	B
(D-43-20)23BBC-S1	NAVAJO INDIAN TRIBE	220NVJO	H,S	4760	10 E	10/04/1954	—	9Y-21	B
(D-43-21)24ADC-S1	NAVAJO INDIAN TRIBE	220NVJO	H,S	4960	1 E	10/27/1954	—	9Y-31	B
(D-43-22) 9CDB-S1	NAVAJO INDIAN TRIBE	231WNGT	H,S	4900	0.5 E	10/29/1954	—	9Y-65	B
(D-43-23)32 -S1	NAVAJO INDIAN TRIBE	231WNGT	H,S	5350	0.5 E	10/20/1954	—	9Y-57	B

Table 11.—Summary of recharge to and discharge from bedrock aquifers

	Aquifer (acre-feet per year)				Chinle Formation (acre-feet per year)
	D	M	N	P and C	
RECHARGE					
Precipitation	39,000	24,000	25,000	18,000	--
Streamflow	--	2,800	2,400	--	--
Irrigation	--	0	0	0	--
Subsurface inflow	0	--	--	--	--
Interformational leakage	--	--	--	--	--
DISCHARGE					
Springs and seeps	--	--	--	--	--
Streams	--	2,190	6,850	--	--
Wells:					
Domestic and stock	--	--	21	0	--
Irrigation	4,000	0	1,000	0	--
Muncipal or public supply	--	75	59	0.9	--
Industry (includes mine dewatering)	0.74	0.66	1,192	0	887
Flowing wells	0	--	70	--	
Evapotranspiration	--	--	--	--	--
Subsurface outflow	--	--	--	--	--
Interfomational leakage	--	--	--	--	--