RECONNAISSANCE OF GROUND-WATER RESOURCES IN THE LOWER GUNNISON RIVER BASIN, SOUTHWESTERN COLORADO

By Tom Brooks and D. J. Ackerman

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GLOSSARY

Aquifer.--A geologic formation, part of a formation, or group of formations that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs. A confined aquifer is an aquifer in which ground water is confined under pressure greater than atmospheric by overlying, relatively impermeable strata. Water level in a well penetrating a confined aquifer will be above the upper boundary of the aquifer. An unconfined aquifer is an aquifer where the water table is the upper surface of the saturated zone.

Chemical quality.--Concentration of solutes (any substance dissolved in water) and certain properties or characteristics such as hardness, sodium-adsorption ratio, percent sodium, and specific conductance.

Confining bed.--A rock unit above or below an aquifer that is much less permeable than the aquifer and that restrains ground-water flow to and from adjoining units.

National Geodetic Vertical Datum of 1929 (NGVD of 1929).--A geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called "*Mean Sea Level.*" (NGVD of 1929 is referred to as sea level in this report.)

Sodium-adsorption ratio (SAR).--The expression of relative activity of sodium ions in exchange reactions with soil. The formula used for the computation of SAR is:

$$SAR = \frac{(Na+)}{\sqrt{\frac{(Ca^{+2}) + (Mg^{+2})}{2}}}$$

Where solute concentrations are expressed in milliequivalents per liter.

Specific capacity.--A measure of the productive capacity of a well: rate of well discharge per unit of drawdown.

Transmissivity.--The rate at which water is transmitted through a unit width of the aquifer under a unit hydraulic gradient.

METRIC CONVERSION FACTORS

Inch-pound units used in this report may be converted to metric SI (International System) units by using the following conversion factors:

Multiply	*By*	*To obtain SI units*
foot (ft)	0.3048	meter
foot squared per day (ft^2/d)	0.0929	meter squared per day
gallon per minute (gal/min)	0.06309	liter per second
gallon per minute per foot [(gal/min/ft)]	0.01923	liter per second per meter
inch (in.)	25.40	millimeter
mile (mi)	1.609	kilometer
acre	0.4047	hectare
square mile (mi^2)	2.590	square kilometer

To convert degrees Fahrenheit (°F) to degrees Celsius (°C), use the following formula: °C = (°F-32) x 5/9. To convert degrees Celsius (°C) to degrees Fahrenheit (°F), use the following formula: °F = (°C x 9/5) + 32.

The following water quality term has been used in this report: microsiemens per centimeter at 25° Celsius (μS/cm).

RECONNAISSANCE OF GROUND-WATER RESOURCES IN THE LOWER GUNNISON RIVER BASIN, SOUTHWESTERN COLORADO

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ABSTRACT

Information about ground-water quantity and quality in the lower Gunnison River basin assists in developing, appropriating, and managing the basin's water resources. Hydrogeologic data are presented for 51 wells and 61 springs. Chemical analyses are given for 34 wells and 17 springs. Drillers' reports for 71 wells are included.

Springs normally discharge from shorter alluvial flow systems and commonly are less saline than well water. These springs are a calcium sulfate bicarbonate water type. Spring discharges of as much as 200 gallons per minute were measured.

The most productive wells in the study area are completed in alluvium, with reported yields of as much as 750 gallons per minute for an irrigation well. Alluvial gravels are most productive. Specific-conductance values of water samples from alluvial deposits ranged from 80 to 32,200 microsiemens per centimeter at 25 degrees Celsius.

Reported yields of wells completed in the Mesaverde Formation range from 0.7 to 24 gallons per minute. The Dakota Sandstone, Morrison Formation, and Entrada Sandstone include potential aquifers. Wells completed in the Dakota Sandstone reportedly yield 5 to 14 gallons per minute in the study area. Specific-conductance values of water samples from the Mesaverde Formation ranged from 325 to 5,390 microsiemens per centimeter at 25 degrees Celsius. Insufficient data prevented water-quality analysis of other rock units.

INTRODUCTION

Purpose and Scope

The purpose of this ground-water reconnaissance study was to collect data on quantity and quality of ground water available for domestic, livestock, municipal, irrigation, and industrial use in the lower Gunnison River basin. These data will be used for the efficient development, appropriation, and management of Colorado's water resources. The investigation was done by the U.S. Geological Survey in cooperation with the Colorado Department of Natural Resources, Division of Water Resources, Office of the State Engineer.

Location of the study area (the lower Gunnison River basin) and location of previous aquifer studies on the Western Slope of Colorado are shown in the index map (fig. 1). Most data in this report were collected during 1980 and 1981. The system of numbering data sites, local identifier in tables 3, 4, and 5, is explained in figure 2.

Approach

Data for this report were compiled from discussions with well and spring users and from drillers' records of water wells, from completion reports and logs for oil and gas test wells, from geologic maps, and from chemical analyses of water samples from wells and springs. The data reported here consist of: (1) Verified hydrogeologic data from 51 wells and 61 springs, (2) geologic and hydrologic data from 71 additional wells based on drillers' reports, and (3) chemical analyses of water samples from 34 wells and 17 springs.

Data collected include measured water level, depth of well, discharge of well or spring, water-quality information, type of water use, well or spring location, geology, and other hydrogeologic information. All data-collection sites for inventoried and noninventoried wells are shown in plate 1.

Data reported for sites visited as a part of this study are shown in tables 3, 4, and 5 in the "Supplemental Information" section at the end of this report. Data in table 6, also in the "Supplemental Information" section, are from, or are derived from, well reports provided by the State Engineer's Office. Data in tables 3, 4, 5, and 6 may not represent conditions throughout the aquifer because of the discontinuous nature of aquifers and irregularity of water chemistry in some aquifers and irregular distribution of fracturing and zones of saturation. Many of these wells were not completed for optimum yield or penetrate only part of the aquifer. Wells penetrating the full aquifer thickness, and which have well screens in all sand or sandstone zones in the aquifer, might have greater yields than most of those listed in table 6. Some reported yields were from very short tests; therefore, some wells might not support the reported yield for a longer period of time than the test. Well yields given in this report are based on reported well yields given by drillers' records on file with the Colorado State Engineer's Office.

Previous Investigations

General hydrology of the study area was reported by Iorns and others (1965). Hydrogeologic maps in this report were prepared from geologic maps by Cashion (1973), Tweto, Moench, and Reed (1976), Tweto and others (1976) and Williams (1964). Lee (1912) described the geology in western Delta County.

Acknowledgments

Data collected for this report are the result of cooperation from basin residents who provided information on wells and springs, permitted measurements to be made, and allowed water-quality sampling. The Colorado State Engineer's Office assisted with the well and spring inventory and provided well records.

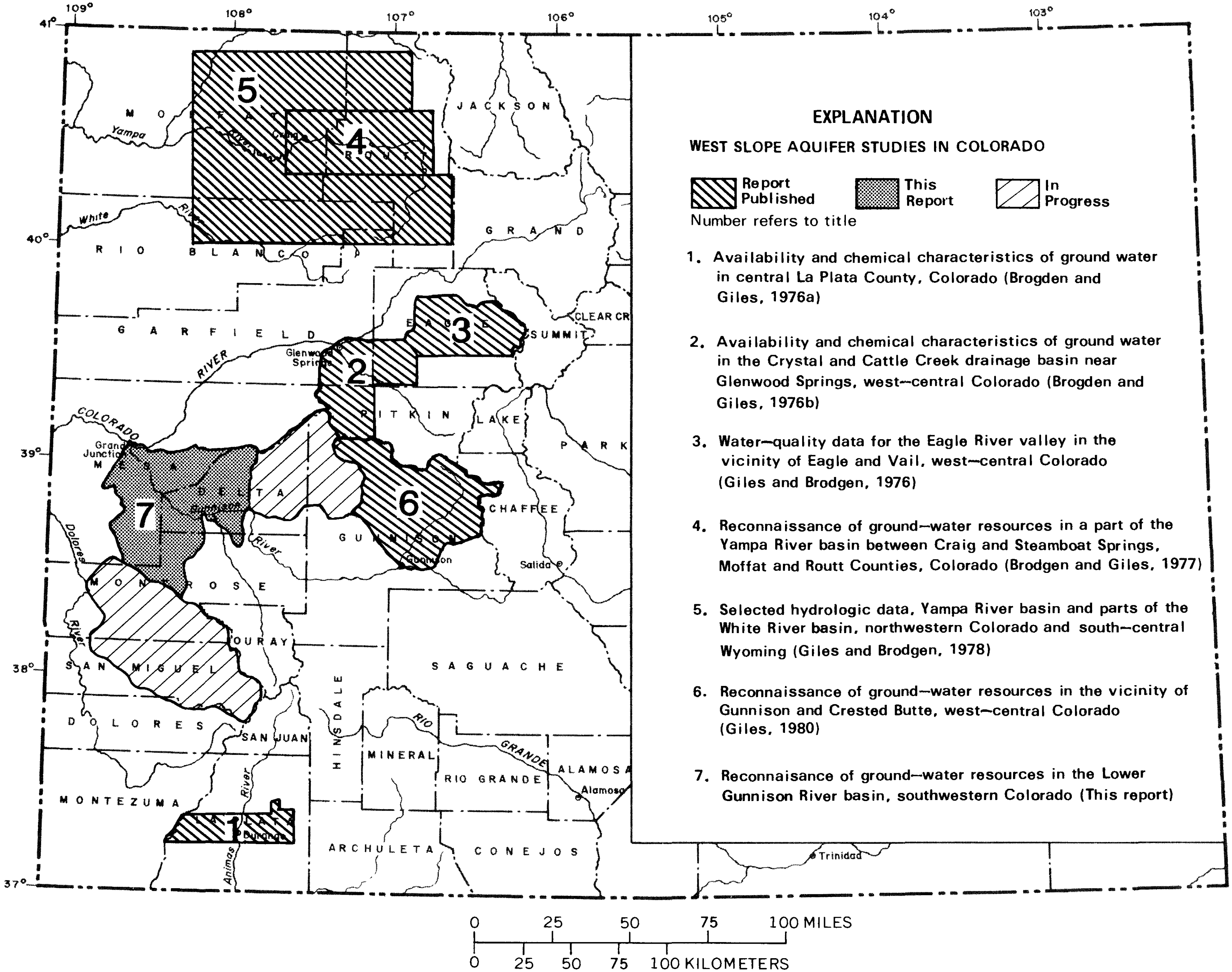

Figure 1.--Location and status of Western Slope aquifer studies in Colorado.

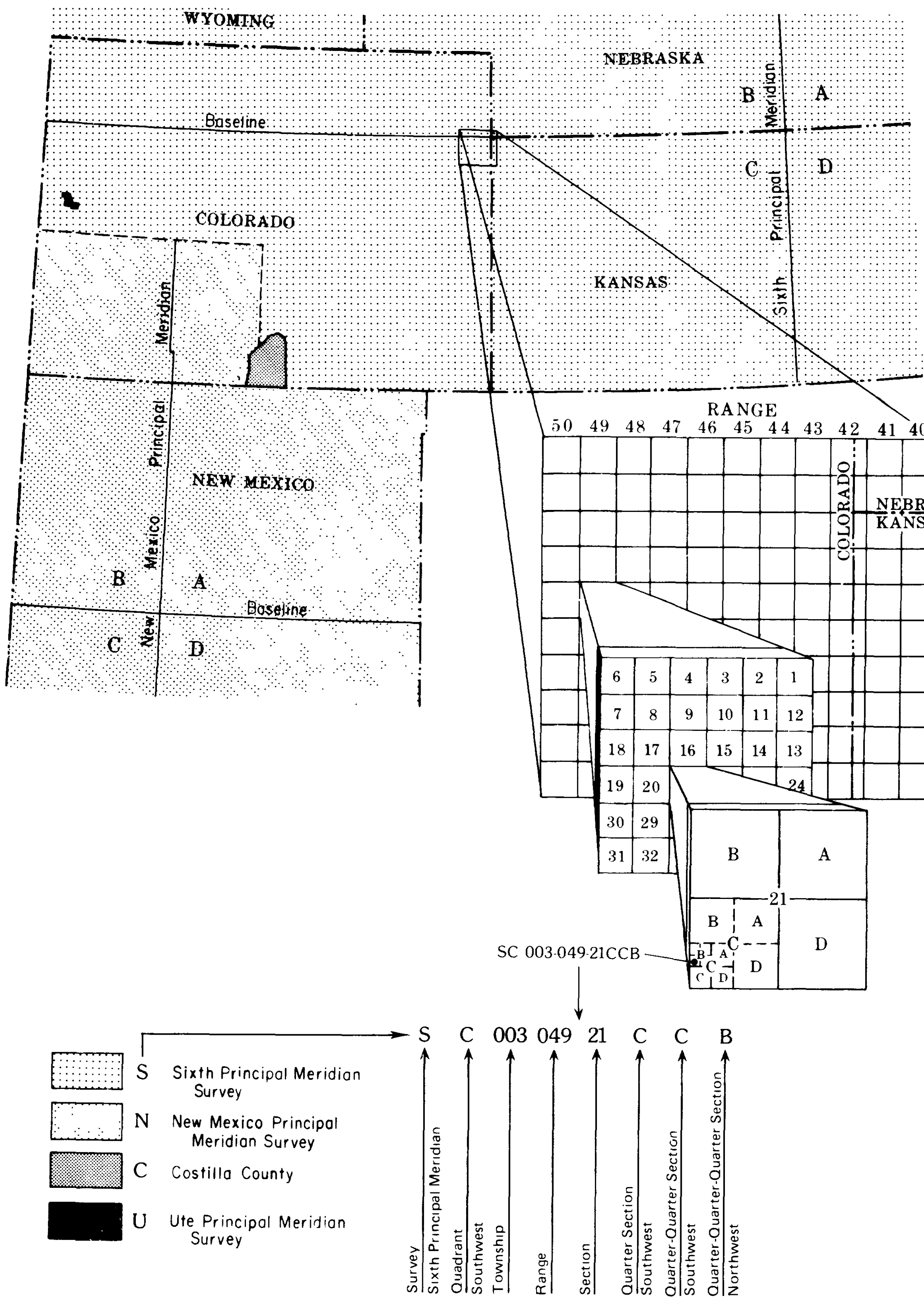

Figure 2.--System of numbering well and spring sites in Colorado.

STUDY-AREA DESCRIPTION

Geography

Physiography and Drainage

The lower Gunnison River basin is the drainage area of the Gunnison River downstream from the junction with the North Fork Gunnison River as shown in figure 1. This basin is mainly within the Canyon Lands section; a small section is in the Uinta Basin section of the Colorado Plateaus physiographic province (Fenneman, 1946).

The highest point in the basin is 11,159 ft, in sec. 24, T. 11 S., R. 94 W. The lowest point in the basin is about 4,550 ft, at the confluence of the Colorado and the Gunnison Rivers at Grand Junction. Tributary streams in the southwestern part of the basin generally flow perpendicular to the axis of the Uncompahgre Plateau uplift (see pl. 1), until reaching more level terrain below. Streams draining southern Grand Mesa have a more dendritic pattern. Total drainage of the lower Gunnison River basin is 1,630 mi^2.

Climate

Climate and vegetation vary within the basin and are very dependent on elevation. Average annual precipitation ranges from less than 8 in. in the lower valley west of Delta to 40 in. along the Grand Mesa divide. The Uncompahgre Plateau (labeled Uncompahgre uplift on plate 2) receives as much as 25 in. annually. Temperature extremes range from more than 95°F near Delta in July to less than -30°F in the mountains in January. Climatological data from four stations in or near the basin are summarized in table 1.

Geology

Two major structural features are within the lower Gunnison River basin--the Uncompahgre uplift west of the Gunnison River and the north-dipping southwestern flank of the Piceance structural basin both shown on plate 2. The Uncompahgre uplift is an asymmetrical anticline plunging northwest and southeast with the axis nearly coinciding with the western boundary of the study area. The average dip for the Uncompahgre anticline slope is 2.5° northeast, ranging from 2° to 4° (see fig. 3, a general geologic section). Nearly parallel drainage from the Uncompahgre Plateau trends northeast and reflects the anticlinal dip and other displacements, such as large-scale joints and minor faults. The southwestern flank of the Piceance structural basin plunges north with an average dip of 2°. The axis of the Montrose syncline, within the Piceance structural basin, plunges north about 8 mi west of Cedaredge (Williams, 1964).

Table 1.--*Climatological data*[1] *from stations in and near the study area*

[ft=foot; in.=inch; °F=degrees Fahrenheit]

Station location	Grand Junction	Delta	Cedaredge	Bonham Reservoir[2]
Altitude (ft) (sea level)	4,670	4,930	6,244	9,835
Mean annual precipitation (in.)	7.95	6.9	11.5	32.0
Mean annual air temperature (°F)	52.5	50.1	49.0	-----
Mean annual daily maximum air temperature (°F)	65.1	67.1	62.9	-----
Mean daily maximum air temperature for July (°F)	93.5	92.6	87.7	-----
Mean daily minimum air temperature for January (°F)	15.5	12.2	15.6	-----
Period of record	1951-80	1950-79	1951-80	1964-78

[1]Based on data from the National Climatic Data Center for indicated period of record.

[2]Bonham Reservoir is about 4 miles north of Eggleston Lake, which is north of the study area.

Rock units in the study area range from Precambrian basement rocks exposed in the Uncompahgre uplift to Quaternary alluvium in the valleys. Most common rock types are sandstone, shale, alluvial sand, and gravel, with igneous rock capping the top of Grand Mesa. Age, thickness, and lithology of the local rock units are summarized in the stratigraphic column (table 2). A hydrogeologic map of the study area with areal extent of exposed rock units is shown on plate 2.

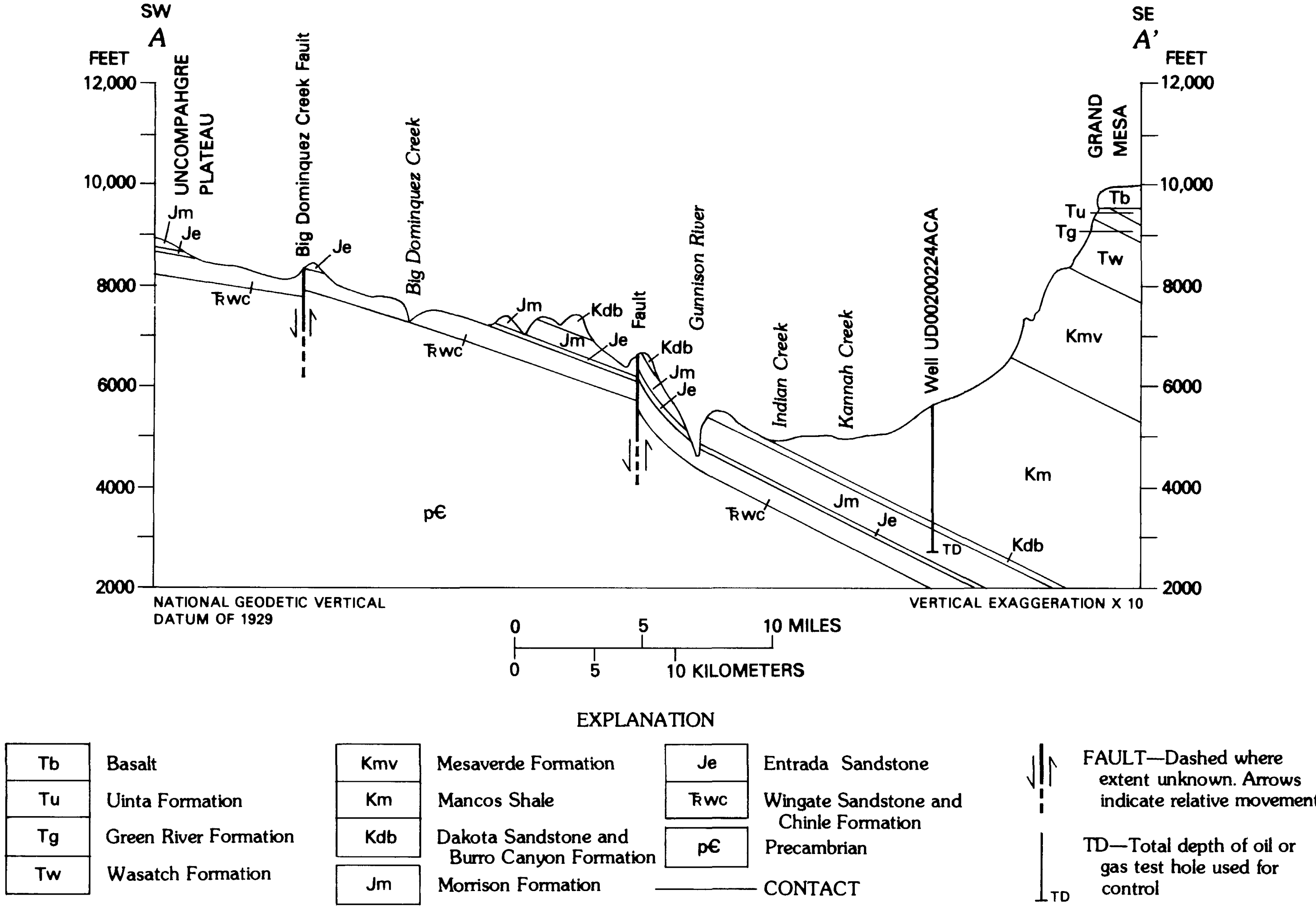

Figure 3.--Generalized geologic section (trace of section shown on plate 2).

Table 2.--*Stratigraphic column, lower Gunnison River basin, southwestern Colorado*
[Wavy lines indicate unconformities]

System and series	Geologic unit	Maximum thickness (feet)	Predominant lithology
Quaternary	Alluvium landslide, talus, colluvium, glacial drift, and terrace gravels.	100(?)	Silt, sand, and gravel.
Tertiary	Extrusive volcanic	200(?)	Dense, black vesicular basalt.
	Uinta Formation Green River Formation	1,000	Siltstone, sandstone, and marlstone.
	Wasatch Formation	1,000	Variegated claystone, siltstone, sandstone, lignite, and conglomerate.
Upper Cretaceous	Mesaverde Formation	3,000	Intertonguing sandstone, shale, and coal.
	Mancos Shale	4,500	Dark gray carbonaceous marine shale.
— — ? — — —			
Lower Cretaceous	Dakota Sandstone Burro Canyon Formation	350	Interbedded hard sandstone, conglomerate, shale, and coal.
Upper Jurassic	Morrison Formation (including Brushy Basin and Salt Wash Members)	600	Bentonitic mudstone, sandstone, siltstone with limestone near base.
Middle Jurassic	Entrada Sandstone (includes overlying Wanaka Formation in places)	150	Very fine-grained yellow to pink eolian sandstone.
Upper Triassic	Kayenta Formation	50	Fine- and medium-grained sandstone, lenses of siltstone, shale and conglomerate.
	Wingate Sandstone	350	Fine-grained, crossbedded eolian sandstone, small quantity of clay.
	Chinle Formation	100	Soft red siltstone, hard lenses of siltstone, limestone, and conglomerates.
Precambrian			Gneiss, schist, and pegmatite.

GROUND WATER

Bedrock Aquifers

Bedrock aquifers in the study area generally are sandstone and fractured bedrock such as sandstone, shale, siltstone, and coal. Fine-grained rocks require significant fractures to transmit and store ground water. The extent of fractures in many of the rocks is unknown and aquifer-characteristic data are limited. The Wingate Sandstone (Upper Triassic) is the oldest rock unit developed for a water supply. Bedrock units that yield the most water to wells are the Mesaverde Formation and the Mancos Shale (Upper Cretaceous), Burro Canyon Formation and the Dakota Sandstone (Lower Cretaceous).

The geologic units shown on plate 2 and summarized in table 2 are grouped into hydrogeologic units and shown by a geologic symbol. Hydrogeologic units represent aquifer systems (such as the Burro Canyon Formation and the Dakota Sandstone), confining beds (such as the Mancos Shale), or groups of rocks of similar water-bearing characteristics (such as igneous and metamorphic rocks).

No wells were reported to have been completed in the Wasatch Formation (Tertiary). Sandstone and conglomerate zones within this formation have reasonable potential for yielding water for domestic well production; however, the formation's occurrence at higher altitudes and inaccessible locations has prevented significant development of these water resources.

Fractured igneous and metamorphic rocks of Precambrian and Tertiary age locally may be aquifers in the eastern part of the study area. Precambrian metamorphic rocks may be found below consolidated sedimentary rocks at most locations in the basin. If a well is to be developed in the igneous and metamorphic rocks, the yield will depend on the number of fractures intersected below the water level in the well. Yields generally decrease with greater depth because most fractures are in the upper part of these rocks. Wells drilled in the broken Tertiary basalt have reported yields of 6 to 25 gal/min.

The Wingate and the Entrada Sandstones have produced 11 to 15 gal/min in this basin, but are areally limited. The Entrada Sandstone, Morrison Formation, and Dakota Sandstone may be potential aquifers, but are more limited in areal extent.

Based on well-production data, the Burro Canyon Formation and the Dakota Sandstone represent the best opportunity for development in the western part of the lower Gunnison River basin with reported well yields ranging from 5 to 14 gal/min.

Ten wells were reported to have been completed in the Mancos Shale. One produced as much as 20 gal/min, but another yielded only 1 gal/min. This formation generally has little potential for yielding sufficient quantities of water for domestic or agricultural uses.

Sandstone beds within the Mesaverde Formation in the study area generally have minimal primary permeability, although secondary permeability, such as fractures, can yield enough water for domestic-well production. Transmissivities for the Mesaverde Formation in the North Fork of the Gunnison River valley are between 0.3 and 16.7 ft^2/d for typically unfractured rock (Brooks, 1983). Wells producing from the Mesaverde Formation, which is exposed in the eastern part of the study area, yield between 0.7 and 24 gal/min.

Specific-conductance values for water samples from 43 springs issuing from consolidated sedimentary-rock formations other than the Mancos Shale ranged from 42 to 18,500 µS/cm with a median of 932 µS/cm. Specific-conductance values for ground water in this formation ranged from 325 to 5,390 µS/cm. Two samples from springs issuing from the Mancos Shale had specific-conductance values of 110 and 7,540 µS/cm. Two wells had specific-conductance values of 629 and 1,900 µS/cm.

Alluvial Aquifers

Sand, silt, and gravel of Quaternary age form aquifers in stream valleys and terraces throughout the basin (see pl. 2); these materials will be referred to collectively as the alluvial aquifers in this report. Springs are common at higher elevations; wells generally are located in the valleys. Most inventoried wells completed in alluvial aquifers are completed in glaciofluvial materials or alluvium. These deposits are rarely more than 200 ft thick, and most often are less than 100 ft thick.

Saturated alluvial deposits are the most productive aquifers yielding water that is suitable for most uses. Well yields reportedly range from 1 to 750 gal/min. Most wells yielded a calcium sulfate bicarbonate type water. Salinity, water chemistry, and relative position of bedrock and alluvial aquifers indicate that some alluvial aquifers receive discharge from bedrock aquifers. Salinity and water chemistry also indicate that flow paths and residence times are longer for most well waters than for spring waters.

Spring waters predominantly originate from precipitation and snowmelt infiltration. Alluvium, glacial drift, and landslide deposits on steep slopes may be saturated only seasonally and are intermittent sources for springs. Some valley springs issue from the base of extensive terrace gravels overlying bedrock and have a large continuous discharge. These springs are less saline than most well waters and probably derive much water from the infiltration of streamflow and irrigation water on the terraces.

Specific-conductance values for samples from 10 wells ranged from 80 to 32,200 µS/cm with a median of 1,750 µS/cm. Specific-conductance values for 16 of 18 sampled springs were less than 500 µS/cm. Most spring waters are a calcium sulfate bicarbonate type, but some are of a calcium magnesium bicarbonate sulfate type.

Water-Quality by Aquifer

Most of the available water-quality data in table 5 in the "Supplemental Information" section at the end of the report are for water samples taken from the Mesaverde Formation and alluvium. Other water quality samples are grouped as other bedrock in the following summary of water quality of aquifers.

Table 5 includes analyses for samples from 19 wells completed in the Mesaverde Formation. The range of specific conductances was from 325 to 5,390 µS/cm with an average of 1,434 µS/cm. The range of dissolved solids was from 206 to 3,360 mg/L with an average of 880 mg/L. The dominant cation was sodium and the dominant anions were bicarbonate and sulfate. Concentrations of dissolved solids, sulfate, iron, and manganese in some samples exceeded the U.S. Environmental Protection Agency's (U.S. EPA) standards for secondary maximum contaminant levels of public drinking waters. Concentrations of fluoride and selenium exceeded the U.S. EPA primary drinking water standards in some samples.

Samples were taken from 10 wells completed in other bedrock and the range of specific conductances was from 173 to 1,900 µS/cm and averaged 886 µS/cm. The range of dissolved solids was from 123 to 1,262 mg/L and averaged 618 mg/L. The dominant cation was sodium and the dominant anion was bicarbonate. Concentrations of sulfate, dissolved solids, iron, and manganese exceeded the secondary maximum contaminant levels established by the U.S. EPA.

Samples were taken from 10 springs that issued from other bedrock. Specific conductances ranged from 275 to 18,500 µS/cm and averaged 3,564 µS/cm. The range of dissolved solids was 166 to 12,400 mg/L and averaged 2,577 mg/L. The dominant cation was calcium and the dominant anion was bicarbonate. Concentrations of sulfate, dissolved solids, chloride, and manganese exceeded the U.S. EPA secondary standards in some samples. Fluoride concentrations exceeded the U.S. EPA primary standards in some samples.

The water quality of samples taken from alluvium and unconsolidated deposits were more suitable for domestic use than bedrock water, although water samples from alluvial wells were more similar to bedrock water quality than springs that issued from alluvium. Water quality samples from 6 wells completed in alluvium and unconsolidated deposits ranged in specific conductance from 80 to 32,200 µS/cm. The range of dissolved solids was 63 to 2,970 mg/L. The dominant cation was calcium and the dominant anion was bicarbonate. Concentrations of sulfate, dissolved solids, manganese, and chloride exceeded the U.S. EPA secondary standards in some samples. The selenium concentration in one sample exceeded the U.S. EPA primary drinking water standard.

Water quality of samples taken from 8 springs that issued from alluvium and unconsolidated deposits were the best in the study area. The range of specific conductance was from 48 to 510 µS/cm and the range of dissolved solids was from 46 to 305 mg/L. The dominant cation was calcium and the dominant anion was bicarbonate. No chemical constituents exceeded the primary or secondard standards established by the U.S. EPA.

SUMMARY

Aquifers occur within bedrock formations and unconsolidated Quaternary sands and gravels in the study area. Water from the Mancos Shale seldom is used because of generally inadequate yields or undesirable quality. Specific-conductance values for water from the Mesaverde Formation ranged between 325 to 5,390 µS/cm and reported well yields from 0.7 to 24 gal/min.

The Dakota Sandstone, Morrison Formation, and Entrada Sandstone may be potential aquifers. Wells in the Dakota Sandstone yield 5 to 14 gal/min in the study area and two wells had specific-conductance values of 629 and 1,900 µS/cm.

Unconsolidated alluvial deposits found in stream valleys contain the best producing aquifers. Water in these deposits had specific-conductance values that ranged from 80 to 32,200 µS/cm. Wells completed in alluvial deposits were reported to yield from 1 to 750 gal/min.

Ground water issuing from springs generally is less saline than well water, especially for those springs with shorter flow systems. Discharges of as much as 200 gal/min were reported. Spring water commonly is a calcium sulfate bicarbonate water.

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SUPPLEMENTAL INFORMATION

Table 3.--*Hydrogeologic data for wells*

Local identifier (see figure 2)	Owner	Principal aquifer	Land surface altitude (feet)	Well depth (feet)	Depth to water (feet)	Date water level measured	Discharge (gallon per minute)
		DELTA COUNTY					
SC01109431CDC1	U.S. Government	Green River Formation	10,180	109	49.4	09/11/1980	0.6
SC01109431DCC1	U.S. Government	Green River Formation	10,200	66	7	09/10/1980	--
SC01209431DCB1	Fender, Lawrence	Alluvium	7,160	162	143	05/ /1981	20
SC01209501BBD1	Frost, Floyde	Glacial deposits	10,229	88	48	09/ /1974	15
SC01209509AAB1	U.S. Government	Alluvium	10,285	170	112.1	09/10/1980	60
SC01209536CAB1	Wall, Frank	Mesaverde Formation	7,305	203	150	79/21/1977	12
SC01209308BAC1	U.S. Bureau of Land Management	Mesaverde Formation	7,000	92	19	11/10/1977	--
SC01309401ACC1	Herbert, Ron	Mesaverde Formation	7,520	957	400	11/07/1977	--
SC01309406BAC1	Surlinger, Leonard	Mesaverde Formation	7,000	120	26	03/22/1962	5
SC01309409ADB1	Nesmith, Homer	Alluvium	7,060	100	64.29	09/10/1981	24
SC01309415AAB1	U.S. Bureau of Land Management	Mesaverde Formation	7,160	356.5	236.45	11/22/1977	--
SC01309418DBA1	Finke, H. W.	Mesaverde Formation	6,440	75	31	09/01/1970	10
SC01309501CDD1	Hodges, Merle	Tertiary rock	6,690	66	--	--	--
SC01309511CBA1	Fisher, Edwin	Mesaverde Formation	6,800	556	59.9	11/18/1977	--
SC01309506BCD1	Lasater, Kitty	Mesaverde Formation	6,560	121	44.66	06/22/1981	15
SC01309508AAC1	Hawkins, Clarence	Mesaverde Formation	6,920	585	31.55	09/22/1977	--
SC01309511ACC1	Grand Mesa Coal Company	Mesaverde Formation	6,480	145	75.67	09/04/1981	5
SC01309511CAD1	Grand Mesa Coal Company	Mesaverde Formation	6,460	118	25.70	06/22/1981	18
SC01309511CBA1	Fenton, Paul	Mesaverde Formation	6,540	140	62	12/24/1964	7
SC01309511CCB1	Hawkins, Clarence	Mesaverde Formation	6,700	459	345.5	06/19/1979	--
SC01309512ACC1	Rogers, Henry	Mesaverde Formation	6,570	100	36.77	07/29/1981	--
SC01309512BDC1	Grand Mesa Coal Company	Mesaverde Formation	6,440	38	20.17	07/16/1981	--
SC01309512BDC2	Grand Mesa Coal Company	Mesaverde Formation	6,440	119	78.21	07/16/1981	--
SC01309512BDC3	Grand Mesa Coal Company	Mesaverde Formation	6,440	253	107.31	07/16/1981	--
SC01309512CAA1	Watt, Arthur	Mesaverde Formation	6,300	55	20	08/18/1972	15
SC01309517AAD1	Hawkins, Clarence	Mesaverde Formation	6,760	378	185.17	09/10/1977	.75
SC01309624ACC1	City of Delta	Mesaverde Formation	7,760	702	565	10/27/1977	--
SC01309625BDC1	U.S. Forest Service	Mesaverde Formation	7,380	136	260.14	12/12/1977	--
SC01309632ACB1	U.S. Bureau of Land Management	Mesaverde Formation	8,720	288	8.5	12/12/1977	--
SC01409306BCD1	Seivers family	Alluvium	6,620	40	--	--	--

Table 3.--*Hydrogeologic data for wells*--Continued

Local identifier (see figure 2)	Owner	Principal aquifer	Land surface altitude (feet)	Well depth (feet)	Depth to water (feet)	Date water level measured	Discharge (gallon per minute)
		DELTA COUNTY--Continued					
SC01409401CAA1	Penland, Charles	Glacial deposits	6,505	--	17.18	03/24/1979	--
SC01409411BAA1	Church, Russel	Glacial deposits	6,320	68	41.06	03/27/1979	6
SC01409412AAA1	Rollins	Glacial deposits	6,600	--	21.30	03/24/1979	--
SC01409412DDD1	Andregg	Glacial deposits	6,380	--	34.38	03/27/1979	--
SC01409415DCB1	Paulson	Glacial deposits	6,030	40	7.55	03/27/1979	--
SC01409416DCA1	Burritt, John	Alluvium	5,965	177	30	08/10/1977	7.5
SC01509632BAD1	Colorado State	Burro Canyon Formation	4,960	230	--	--	14
		MESA COUNTY					
SC01209718ABA1	U.S. Bureau of Land Management	Mesaverde Formation	6,920	114	109.35	01/03/1978	--
SC01209721BCB1	U.S. National Forest Service	Mesaverde Formation	7,240	562	--	12/12/1977	--
UC00100125BCD1	Hogge, Robert	Entrada Sandstone	4,641.2	940	86.20+	08/21/1952	7.3
UC00100126BBD1	City of Grand Junction	Mesozoic rock	4,625	1,213	119.50+	07/16/1946	11
UD00200110DAB1	Hopkins, William	Morrison Formation	4,660	--	30.00	08/20/1981	9
UD00200114AAC1	Lumbardy, Stanley	--	4,670	--	69.58	06/24/1981	--
UD00200115AAA1	Dalton, Earl	Alluvium	4,680	15.5	4	08/21/1981	18
UD00200115BAB1	Riddle, Kent	Mesozoic rock	4,641	1,100	--	06/18/1981	14
UD00200234DBC1	Whiting, Don	Alluvium	5,060	122.9	105.95	06/19/1981	--
UD00300204BCA1	Bradbury, W.	Dakota Sandstone	4,970	506	300	06/30/1964	10
		MONTROSE COUNTY					
NB05001104ADC1	Clubb, Walter	Dakota Sandstone	5,398	230	--	07/15/1981	14
NB05101127DBC1	Newby, Charles	Alluvium	5,300	48.4	30.5	07/15/1981	7.2

Table 4.--*Hydrogeologic data for springs*

Local identifier (see figure 2)	Owner	Principal aquifer	Land surface altitude (feet)	Discharge (gallon per minute)	Date Discharge measured	pH	Specific conductance (microsiemens per centimeter at 25° Celsius)	Date sampled
			DELTA COUNTY					
NB05101320DBC1	U.S. Government	Wingate sandstone	5,880	6*	07/03/1980	--	316	07/11/1980
NB05101321AAA1	U.S. Government	Wingate sandstone	5,600	1*	07/03/1980	--	270	07/11/1980
SC01209414ABD1	U.S. Government	Alluvium	8,885	6.5	06/30/1981	--	127	06/30/1981
SC01209418ACC1	U.S. Government	Alluvium	9,240	6*	07/30/1981	--	52	07/30/1981
SC01209503DBD1	U.S. Government	Glacial deposits	10,080	25*	09/09/1981	7.9	61	09/09/1981
SC01209509ACC1	U.S. Government	Alluvium	10,250	12*	07/29/1981	--	46	07/29/1981
SC01209515ACC1	U.S. Government	Glacial deposits	9,660	200*	09/09/1981	8.2	103	09/09/1981
SC01209516BCD1	U.S. Government	Alluvium	10,120	.2*	07/28/1981	--	72	07/28/1981
SC01209517DCC1	U.S. Government	Alluvium	10,010	4*	07/29/1981	--	62	07/29/1981
SC01209520BAB1	U.S. Government	Alluvium	10,005	6*	07/29/1981	--	60	07/29/1981
SC01309512ACC2	Rogers, Henry	Alluvium	6,480	.5*	07/30/1981	--	--	--
SC01409712CBD1	U.S. Government	Mancos Shale	6,280	1.5	08/19/1981	--	7,540	08/19/1981
SC01509406AAB1	--	Dakota Sandstone	5,100	1*	08/25/1981	6.5	18,500	08/25/1981
			MESA COUNTY					
NB04901415CBA1	U.S. Government	Morrison Formation	8,360	.75*	07/10/1980	--	72	07/10/1980
NB04901415CBD1	U.S. Government	Morrison Formation	8,350	4.0	07/10/1980	--	59	07/10/1980
NB05001501ACC1	U.S. Government	Morrison Formation	8,160	2.5	07/09/1980	--	163	07/09/1980
NB05001610BBD1	U.S. Government	Morrison Formation	8,850	2.5*	07/09/1980	--	250	07/09/1980
NB05001612CAD1	U.S. Government	Morrison Formation	8,940	1.5	07/09/1980	--	428	07/09/1980
NB05101534DCC1	U.S. Government	Dakota Sandstone	8,550	7.0*	08/07/1980	--	181	08/07/1980
NB05101618DBD1	U.S. Government	Morrison Formation	8,770	40*	07/02/1980	--	474	07/10/1980
NB05101629DBD1	U.S. Government	Morrison Formation	8,930	20*	07/01/1980	--	435	07/01/1980
NB05101633DDA1	U.S. Government	Wingate sandstone	8,680	3*	07/17/1980	--	417	07/17/1980
SC01209607CBC1	U.S. Government	Alluvium	10,085	20*	07/30/1981	--	33	07/30/1981
SC01209703CDB1	U.S. Government	Alluvium	9,800	3*	06/24/1980	--	248	06/24/1980
SC01209710DAB1	U.S. Government	Alluvium	9,720	3*	06/24/1980	--	141	06/24/1980
SC01209710DBB1	U.S. Government	Browns Park Formation	9,600	5*	07/14/1980	--	130	07/14/1980
SC01209814DBA1	Somerville, Dick	Alluvium	5,620	15*	07/14/1980	--	480	07/14/1980
SC01310005CAB1	U.S. Government	Wingate sandstone	6,400	0.14	06/05/1981	--	532	06/05/1981

Table 4.--*Hydrogeologic data for springs*--Continued

Local identifier (see figure 2)	Owner	Principal aquifer	Land surface altitude (feet)	Discharge (gallon per minute)	Date Discharge measured	pH	Specific conductance (microsiemens per centimeter at 25° Celsius)	Date sampled
			MESA COUNTY--Continued					
SC01310008BAD1	U.S. Government	Wingate sandstone	6,630	.4*	06/05/1981	--	428	06/05/1981
SC01310019BDD1	--	Dakota Sandstone	8,075	.3*	06/09/1981	--	377	06/09/1981
SC01310029ADD1	U.S. Government	Dakota Sandstone	7,690	0.20	06/10/1981	--	455	06/10/1981
SC01310030AAB1	U.S. Government	Dakota Sandstone	7,678	2*	06/10/1981	--	316	06/10/1981
SC01310119CDD1	Clymer, Dudley	Dakota Sandstone	8,650	4*	06/23/1980	--	172	06/23/1980
SC01310121DBD1	Clymer, Dudley	Dakota Sandstone	8,480	1*	06/23/1980	--	348	06/23/1980
SC01310122CDC1	--	Dakota Sandstone	8,650	.2*	06/10/1981	--	229	06/10/1981
SC01310123ACD1	--	Dakota Sandstone	8,242	3.0	06/09/1981	--	499	06/09/1981
SC01310123CCC1	--	Dakota Sandstone	8,470	.5*	06/10/1981	--	127	06/10/1981
SC01310124BBC1	--	Alluvium	8,180	.5*	06/09/1981	--	558	06/09/1981
SC01310127DAD1	--	Alluvium	8,630	0.25	06/10/1981	--	104	06/10/1981
SC01310129DBB1	Thompson, David	Dakota Sandstone	8,525	3*	06/23/1980	--	475	06/23/1980
SC01509921DCA1	U.S. Government	Morrison Formation	7,160	.2*	08/07/1980	--	1,260	08/07/1980
SC01509933BAA1	U.S. Government	Morrison Formation	7,300	.5*	08/07/1980	--	1,090	08/07/1980
SC01510015CAA1	U.S. Government	Wingate sandstone	7,280	8*	07/01/1980	--	535	07/01/1980
SC01510034CAA1	U.S. Government	Morrison Formation	8,480	.5*	07/01/1980	--	167	07/01/1980
SC01510124ADA1	U.S. Government	Wingate sandstone	7,920	10*	07/17/1980	--	180	07/17/1980
SC01510124ADB1	U.S. Government	Wingate sandstone	7,920	25*	07/17/1980	--	206	07/17/1980
SC01510124ADC1	U.S. Government	Wingate sandstone	7,920	20*	07/17/1980	--	190	07/17/1980
UD00200201DCA1	Somerville, Dick	Alluvium	5,580	25*	08/01/1980	--	2,580	08/01/1980
UD00200201DDD1	Somerville, Richard	Alluvium	5,600	2*	08/20/1981	--	430	08/20/1981
UD00200235DBD1	Whiting, John	Alluvium	5,300	10*	06/19/1981	--	2,920	06/19/1981
			MONTROSE COUNTY					
NB04701218DAD1	U.S. Government	Alluvium	9,885	0.5	10/11/1978	5.5	150	10/11/1978
NB04801231CBA1	U.S. Government	Dakota Sandstone	9,455	--	--	6.7	120	10/11/1978
NB04801336CDB1	U.S. Government	Mancos Shale	9,510	0.4	08/22/1980	6.6	110	08/11/1978
NB04801409CBA1	U.S. Government	Dakota Sandstone	9,200	1.0	06/19/1978	4.9	42	06/19/1978
NB04901306CBC1	U.S. Government	Kayenta Formation	7,720	0.5*	08/08/1980	--	303	08/08/1980

Table 4.--*Hydrogeologic data for springs*--Continued

Local identifier (see figure 2)	Owner	Principal aquifer	Land surface altitude (feet)	Discharge (gallon per minute)	Date Discharge measured	pH	Specific conductance (microsiemens per centimeter at 25° Celsius)	Date sampled
MONTROSE COUNTY--Continued								
NB04901310CDA1	U.S. Government	Morrison Formation	7,460	1.0*	07/16/1980	--	1,220	07/16/1980
NB04901311BAD1	U.S. Government	Dakota Sandstone	7,360	1.0*	07/16/1980	--	937	07/16/1980
NB05001305ADB1	U.S. Government	Burro Canyon Formation	6,915	2.0	08/18/1980	--	1,890	08/18/1981
NB05001331AAD1	Porter, Harold	Morrison Formation	7,580	15*	07/10/1980	--	632	07/10/1980
NB05001425ABA1	U.S. Government	Dakota Sandstone	7,760	0.13	08/18/1981	--	2,640	08/18/1981

* Estimated discharge

Table 5.--*Chemical analyses of water samples*

[Local identifier = location of well or spring (see figure 2); μS/cm = microsiemens per centimeter at 25 degrees Celsius; mg/L = milligram per liter; μg/L = microgram per liter; < = less than; all concentration values are for dissolved constituents.]

Local identifier (see figure 2)	Principal aquifer	Site type	Date of sample	Well depth (feet)	Specific conductance (μS/cm)	pH	Temperature (degree Celsius)	Hardness (mg/L)	Calcium (mg/L)	Magnesium (mg/L)
				DELTA COUNTY						
NB05101320DBC1	Wingate Sandstone	spring	77-07-28	--	275	9.0	25.0	140	35	13
SC01109431CDC1	Green River Formation	well	80-09-11	109	446	9.0	7.0	19	6.1	.90
SC01109431DCC1	Green River Formation	well	80-09-10	66.00	173	9.1	5.0	20	6.4	.90
SC01209501BBD1	Glacial deposits	well	74-09-18	88.00	82	6.8	8.0	38	9.1	3.8
SC01209503DBD1	Glacial deposits	spring	81-09-09	--	61	7.9	10.0	24	6.8	1.7
SC01209509AAB1	Alluvium	well	80-09-10	170	83	7.7	3.5	35	11	1.7
	Alluvium	well	80-09-10	170	80	--	--	--	--	--
SC01209515ACC1	Glacial deposits	spring	81-09-09	--	103	8.2	3.0	40	11	3.1
SC01309308BAC1	Mesaverde Formation	well	81-08-18	92.00	5390	7.8	10.0	150	18	26
SC01309401ACC1	Mesaverde Formation	well	81-09-07	957	1060	7.3	12.5	250	63	23
SC01309406BAC1	Mesaverde Formation	well	74-09-18	126	--	--	--	--	--	--
	Mesaverde Formation	well	81-08-26	126	325	8.3	12.5	64	10	9.4
SC01309409ADB1	Mesaverde Formation	well	81-09-03	100	830	7.5	13.5	390	93	39
SC01309415AAB1	Mesaverde Formation	well	81-08-14	356	780	7.3	16.0	380	68	50
SC01309418DBA1	Mesaverde Formation	well	74-09-19	75.00	355	6.6	11.0	170	42	16
	Mesaverde Formation	well	81-08-26	75.00	325	6.3	12.0	130	24	16
SC01309501CDD1	Tertiary rock	well	74-09-18	66.00	640	6.8	15.0	320	70	35
SC01309511ACC1	Mesaverde Formation	well	81-09-03	150	930	7.5	13.5	21	5.4	1.8
SC01309511CAD1	Mesaverde Formation	well	81-07-07	118	1230	7.4	13.5	390	62	56
SC01309511CBA1	Mesaverde Formation	well	81-07-08	140	1120	8.2	15.5	190	18	34
SC01309511CCB1	Mesaverde Formation	well	81-08-12	459	2090	7.5	16.5	29	6.2	3.2
SC01309512ACC1	Mesaverde Formation	well	81-07-30	100	626	8.2	14.0	120	25	14
SC01309512BDC1	Mesaverde Formation	well	81-07-16	72.00	680	8.7	15.5	8	2.1	.60
SC01309512BDC2	Mesaverde Formation	well	81-07-24	127	1850	8.5	16.0	10	3.1	.50
SC01309512BDC3	Mesaverde Formation	well	81-08-11	267	3820	9.6	14.0	10	3.0	.50
SC01309512CAA1	Mesaverde Formation	well	81-07-07	55.00	1150	7.1	15.5	430	50	75
SC01309517BCB1	Mesaverde Formation	well	81-08-13	378	1330	7.2	14.0	21	4.3	2.5
SC01309624ACC1	Mesaverde Formation	well	81-09-08	702	1360	8.1	15.0	15	3.7	1.3
SC01309625BDC1	Mesaverde Formation	well	81-08-11	136	1110	7.5	15.5	63	15	6.2
SC01409306BCD1	Alluvium	well	74-09-18	40.00	360	7.2	12.0	150	30	19
SC01409712CBD1	Mancos Shale	spring	80-04-18	--	--	7.9	13.0	2500	340	410
	Mancos Shale	spring	80-05-13	--	--	7.8	13.0	2500	340	410
SC01509406AAB1	Dakota Sandstone	spring	76-09-23	--	13800	6.3	16.0	--	--	--
	Dakota Sandstone	spring	81-08-25	--	18500	6.5	17.0	530	140	45
SC01509516CCC1	Alluvium	well	74-09-19	--	2830	--	17.0	1700	560	65

Table 5.--*Chemical analyses of water samples*--Continued

Local identifier (see figure 2)	Date of sample	Sodium (mg/L)	Percent sodium	Sodium absorb-tion ratio	Potas-ium (mg/L)	Bicar-bonate (mg/L)	Field Alka-linity (mg/L)	Lab Alka-linity (mg/L)	Sulfate (mg/L)	Chlo-ride (mg/L)
				DELTA COUNTY--Continued						
NB05101320DBC1	77-07-28	6.4	9	.2	1.7	180	150	--	4.0	1.5
SC01109431CDC1	80-09-11	81	89	8	1.7	--	140	--	55	2.7
SC01109431DCC1	80-09-10	30	75	3	1.6	--	84	--	4.8	.50
SC01209501BBD1	74-09-18	2.2	11	.2	1.9	47	39	--	3.2	1.5
SC01209503DBD1	81-09-09	1.9	13	.2	2.0	--	--	32	1.6	.20
SC01209509AAB1	80-09-10	1.6	9	.1	1.8	--	34	--	1.7	.30
	80-09-10	--	--	--	--	--	--	--	--	--
SC01209515ACC1	81-09-09	2.3	11	.2	1.8	--	--	49	<5.0	<.10
SC01309308BAC1	81-08-18	1300	95	47	6.1	--	--	2640	370	36
SC01309401ACC1	81-09-07	140	54	4	6.2	--	--	400	180	7.6
SC01309406BAC1	74-09-18	--	--	--	--	--	--	--	--	--
	81-08-26	41	53	2	12	--	--	150	18	2.7
SC01309409ADB1	81-09-03	37	17	.8	8.0	--	--	320	140	10
SC01309415AAB1	81-08-14	26	13	.6	10	--	--	360	63	16
SC01309418DBA1	74-09-19	9.2	10	.3	2.5	210	175	--	11	3.1
	81-08-26	11	16	.4	2.8	--	--	140	6.0	4.8
SC01309501CDD1	74-09-18	21	12	.5	5.7	420	345	--	24	4.7
SC01309511ACC1	81-09-03	240	96	24	2.0	--	--	510	<5.0	6.0
SC01309511CAD1	81-07-07	150	46	3	1.3	--	--	460	230	14
SC01309511CBA1	81-07-08	220	72	7	1.9	--	--	450	130	18
SC01309511CCB1	81-08-12	510	96	43	11	--	--	1110	25	21
SC01309512ACC1	81-07-30	110	66	4	4.6	--	--	330	3.0	11
SC01309512BDC1	81-07-16	190	98	31	1.2	--	--	380	2.0	3.0
SC01309512BDC2	81-07-24	530	99	77	2.7	--	--	1090	1.0	15
SC01309512BDC3	81-08-11	860	99	130	7.2	--	--	1760	20	90
SC01309512CAA1	81-07-07	86	30	2	2.4	--	--	410	210	9.8
SC01309517BCB1	81-08-13	350	97	34	2.1	--	--	740	2.0	6.5
SC01309624ACC1	81-09-08	310	95	36	14	--	--	610	96	14
SC01309625BDC1	81-08-11	190	86	11	5.4	--	--	410	150	7.9
SC01409306BCD1	74-09-18	23	24	.8	2.4	220	178	--	15	4.1
SC01409712CBD1	80-04-18	1100	48	10	20	--	410	--	4000	120
	80-05-13	1100	48	10	21	--	420	--	4000	140
SC01509406AAB1	76-09-23	--	--	--	--	--	--	--	--	--
	81-08-25	4400	93	86	110	--	--	3000	1600	4300
SC01509516CCC1	74-09-19	110	13	1	4.3	260	217	--	1600	11

Table 5.--*Chemical analyses of water samples*--Continued

Local identifier (see figure 2)	Date of sample	Fluoride (mg/L)	Dissolved solids (mg/L)	Nitrite and Nitrate as Nitrogen (mg/L)	Ortho phosphorus (mg/L)	Ortho phosphate (mg/L)	Aluminum (µg/L)	Boron (µg/L)	Cadmium (µg/L)	Chromium (µg/L)
DELTA COUNTY--Continued										
NB05101320DBC1	77-07-28	.10	170	--	.010	.03	--	--	--	--
SC01109431CDC1	80-09-11	1.5	240	.000	--	--	10	150	1	.00
SC01109431DCC1	80-09-10	.20	120	.080	--	--	30	20	<1	.00
SC01209501BBD1	74-09-18	.20	68	.030	.070	.21	--	70	--	--
SC01209503DBD1	81-09-09	.10	46	.060	--	--	--	0	1	.00
SC01209509AAB1	80-09-10	.20	62	.250	--	--	10	0	<1	.00
	80-09-10	--	--	--	--	--	--	--	--	--
SC01209515ACC1	81-09-09	.10	79	.100	--	--	--	0	2	.00
SC01309308BAC1	81-08-18	1.7	3400	.690	.010	.03	140	1000	3	10
SC01309401ACC1	81-09-07	.20	680	.020	.170	.52	30	30	2	440
SC01309406BAC1	74-09-18	--	--	--	--	--	--	--	--	--
	81-08-26	.40	200	.210	.000	.00	20	30	<1	.00
SC01309409ADB1	81-09-03	.30	560	1.50	.040	.12	10	40	<1	10
SC01309415AAB1	81-08-14	.40	470	.180	.050	.15	10	100	2	.00
SC01309418DBA1	74-09-19	.20	220	.380	.050	.15	--	90	--	--
	81-08-26	.20	180	.330	.010	.03	20	30	<1	.00
SC01309501CDD1	74-09-18	.50	410	.510	.140	.43	--	90	--	--
SC01309511ACC1	81-09-03	2.8	580	.010	.130	.40	0	190	<1	10
SC01309511CAD1	81-07-07	.80	820	2.00	.000	.00	0	360	<1	10
SC01309511CBA1	81-07-08	2.6	710	.190	.010	.03	0	380	<1	.00
SC01309511CCB1	81-08-12	2.7	1300	.390	.420	1.3	10	1000	1	10
SC01309512ACC1	81-07-30	.40	380	.000	.040	.12	10	90	<1	.00
SC01309512BDC1	81-07-16	4.7	440	.030	.260	.80	20	470	<1	.00
SC01309512BDC2	81-07-24	5.4	1200	.280	.250	.77	20	600	<1	10
SC01309512BDC3	81-08-11	3.0	2100	.200	.080	.25	20	750	1	10
SC01309512CAA1	81-07-07	.70	700	.180	<.010	--	0	260	<1	10
SC01309517BCB1	81-08-13	3.0	830	.210	.230	.71	30	1400	3	10
SC01309624ACC1	81-09-08	2.9	820	.050	.460	1.4	90	450	<1	.00
SC01309625BDC1	81-08-11	.50	630	1.10	.040	.12	20	510	1	10
SC01409306BCD1	74-09-18	1.1	250	1.50	.070	.21	--	140	--	--
SC01409712CBD1	80-04-18	.60	6300	6.30	--	--	--	--	--	--
	80-05-13	.60	6300	6.50	--	--	--	--	--	--
SC01509406AAB1	76-09-23	--	--	--	--	--	--	--	--	--
	81-08-25	2.3	12000	.110	--	--	--	12000	0	10
SC01509516CCC1	74-09-19	1.5	2500	5.10	.100	.31	--	270	--	--

Table 5.--*Chemical analyses of water samples*--Continued

Local identifier (see figure 2)	Date of sample	Copper (µg/L)	Iron (µg/L)	Lead (µg/L)	Manga-nese (µg/L)	Mercury (µg/L)	Nickel (µg/L)	Sele-nium (µg/L)	Zinc (µg/L)	Organic carbon (mg/L)
				DELTA COUNTY--Continued						
NB05101320DBC1	77-07-28	--	<10	--	8	--	--	--	--	--
SC01109431CDC1	80-09-11	0	30	0	10	.0	0	0	<3	4.9
SC01109431DCC1	80-09-10	0	50	3	2	.0	0	0	<3	6.2
SC01209501BBD1	74-09-18	--	70	--	20	--	--	<1	--	--
SC01209503DBD1	81-09-09	1	<10	10	<1	.0	--	0	<3	2.7
SC01209509AAB1	80-09-10	0	30	2	2	.0	0	0	5	3.8
	80-09-10	--	--	--	--	--	--	--	--	--
SC01209515ACC1	81-09-09	1	<10	10	<1	.0	--	0	<3	4.8
SC01309308BAC1	81-08-18	19	840	15	140	.0	2	0	2400	--
SC01309401ACC1	81-09-07	38	47	0	83	.0	2	0	62	3.1
SC01309406BAC1	74-09-18	--	--	--	--	--	--	--	--	--
	81-08-26	8	13	0	20	.0	0	0	<3	3.8
SC01309409ADB1	81-09-03	5	17	5	2	.0	1	5	15	1.4
SC01309415AAB1	81-08-14	3	22	1	48	.0	1	0	28	3.6
SC01309418DBA1	74-09-19	--	110	--	20	--	--	<1	--	--
	81-08-26	8	44	0	2	.0	0	1	20	2.7
SC01309501CDD1	74-09-18	--	30	--	<10	--	--	1	--	--
SC01309511ACC1	81-09-03	1	43	5	6	.0	0	0	13	2.2
SC01309511CAD1	81-07-07	2	150	4	20	.0	1	16	70	3.6
SC01309511CBA1	81-07-08	1	160	2	40	.0	1	3	100	7.3
SC01309511CCB1	81-08-12	3	90	1	50	.1	4	0	20	--
SC01309512ACC1	81-07-30	3	490	0	29	.0	1	0	12	4.5
SC01309512BDC1	81-07-16	5	--	1	4	.0	3	0	10	3.1
SC01309512BDC2	81-07-24	9	10	1	9	.1	2	0	160	--
SC01309512BDC3	81-08-11	5	40	2	10	.0	2	2	20	12
SC01309512CAA1	81-07-07	1	580	3	30	.0	3	9	60	3.6
SC01309517BCB1	81-08-13	7	55	0	8	.0	0	1	15	--
SC01309624ACC1	81-09-08	120	190	0	31	.0	2	0	23	15
SC01309625BDC1	81-08-11	11	150	1	13	.0	3	2	110	--
SC01409306BCD1	74-09-18	--	<10	--	<10	--	--	<1	--	--
SC01409712CBD1	80-04-18	--	30	--	20	--	--	--	--	--
	80-05-13	--	40	--	20	--	--	--	--	--
SC01509406AAB1	76-09-23	--	--	--	--	--	--	--	--	--
	81-08-25	2	40	2	1300	.0	--	0	20	1.3
SC01509516CCC1	74-09-19	--	60	--	20	--	--	21	--	--

Table 5.--*Chemical analyses of water samples*--Continued

Local identifier (see figure 2)	Principal aquifer	Site type	Date of sample	Well depth (feet)	Specific conductance (µS/cm)	pH	Temperature (degree Celsius)	Hardness (mg/L)	Calcium (mg/L)	Magnesium (mg/L)
DELTA COUNTY--Continued										
SC01509632BAD1	Burro Canyon Formation	well	74-09-19	--	1750	6.9	16.0	400	76	50
	Burro Canyon Formation	well	81-08-12	230	1710	6.8	14.5	380	70	50
MESA COUNTY										
NB05101618DBD1	Morrison Formation	spring	81-08-29	--	433	7.3	14.0	240	82	8.5
NB05101629DBD1	Morrison Formation	spring	81-08-29	--	440	7.2	6.0	240	80	8.6
SC01209607CBC1	Alluvium	spring	81-08-22	--	48	6.5	4.0	22	5.6	1.9
SC01209710DAB1	Alluvium	spring	81-08-24	--	118	7.6	5.0	51	15	3.4
SC01209814DBA1	Alluvium	spring	77-07-28	--	440	--	13.0	230	66	16
	Alluvium	spring	77-09-08	--	480	7.0	12.5	230	64	16
SC01310123ACD1	Dakota Sandstone	spring	81-08-24	--	469	7.7	6.0	220	72	9.3
SC01310124BBC1	Alluvium	spring	81-08-24	--	510	6.9	7.5	230	78	9.5
SC01510015CAA1	Wingate Sandstone	spring	79-08-27	--	--	--	11.0	180	64	5.9
UC00100125BCD1	Entrada Sandstone	well	47-07-10	940	684	8.4	18.0	20	3.8	2.5
UC00100126BBD1	Mesozoic rock	well	46-07-25	1210	505	--	20.5	75	16	8.5
	Mesozoic rock	well	55-06-18	1210	579	7.9	20.5	70	15	8.0
	Mesozoic rock	well	77-08-16	1210	440	7.4	21.0	88	22	8.1
	Mesozoic rock	well	81-07-02	1210	526	8.0	21.5	74	16	8.2
UD00200110DAB1	Morrison Formation	well	77-07-28	750	1450	--	18.0	100	15	16
	Morrison Formation	well	77-09-08	750	1480	7.4	18.0	95	15	14
UD00200114AAC1	--	well	77-09-08	--	2500	8.0	17.0	26	4.8	3.5
UD00200115AAA1	Alluvium	well	77-07-28	16.00	3250	--	14.0	1700	380	180
UD00200115BAB1	Mesozoic rock	well	77-07-28	--	800	--	21.5	8	2.8	.30
	Mesozoic rock	well	77-09-08	--	750	8.8	21.0	18	6.9	.20
UD00200201DDD1	Alluvium	spring	77-07-28	--	400	--	13.5	200	55	14
	Alluvium	spring	77-09-08	--	320	7.0	13.0	190	52	15
UD00200234DBC1	Alluvium	well	77-07-28	122	35200	--	15.5	610	140	64
	Alluvium	well	77-09-08	122	32200	6.4	15.5	610	140	63
MONTROSE COUNTY										
NB04801409CBA1	Dakota Sandstone	spring	78-06-19	--	42	4.9	4.5	16	5.0	.80
NB05001104ADC1	Dakota Sandstone	well	81-08-25	230	1900	8.2	14.5	69	15	7.6
NB05001305ADB1	Burro Canyon Formation	spring	80-06-18	--	1270	--	15.0	590	150	52
NB05001425ABA1	Dakota Sandstone	spring	80-06-18	--	2660	7.6	11.0	1800	420	180

Table 5.--*Chemical analyses of water samples*--Continued

Local identifier (see figure 2)	Date of sample	Sodium (mg/L)	Percent sodium	Sodium absorb-tion ratio	Potas-ium (mg/L)	Bicar-bonate (mg/L)	Field Alka-linity (mg/L)	Lab Alka-linity (mg/L)	Sulfate (mg/L)	Chlo-ride (mg/L)
DELTA COUNTY--Continued										
SC01509632BAD1	74-09-19	250	57	6	17	720	594	--	310	48
	81-08-12	260	59	6	14	--	--	600	320	50
MESA COUNTY--Continued										
NB05101618DBD1	81-08-29	2.1	2	.0	1.4	--	--	230	<1.0	2.4
NB05101629DBD1	81-08-29	1.8	2	.0	2.1	--	--	230	1.0	1.9
SC01209607CBC1	81-08-22	1.8	15	.2	.90	--	--	23	2.0	.30
SC01209710DAB1	81-08-24	3.1	11	.2	1.2	--	--	46	<5.0	.30
SC01209814DBA1	77-07-28	14	12	.4	1.6	280	230	--	22	2.3
	77-09-08	14	12	.4	1.7	280	230	--	22	1.6
SC01310123ACD1	81-08-24	13	11	.4	3.3	--	--	160	69	6.4
SC01310124BBC1	81-08-24	17	13	.5	3.9	--	--	200	53	8.2
SC01510015CAA1	79-08-27	8.1	9	.3	1.0	--	170	--	13	6.3
UC00100125BCD1	47-07-10	160	93	16	3.6	260	292	--	57	13
UC00100126BBD1	46-07-25	--	--	--	--	270	219	--	45	5.8
	55-06-18	110	76	6	3.3	290	237	--	55	9.2
	77-08-16	100	70	5	2.3	280	230	--	57	8.5
	81-07-02	97	74	5	1.8	--	--	220	55	7.3
UD00200110DAB1	77-07-28	330	87	14	4.8	610	500	--	240	33
	77-09-08	330	88	15	4.9	620	510	--	220	34
UD00200114AAC1	77-09-08	640	98	55	5.5	1270	1040	--	37	250
UD00200115AAA1	77-07-28	290	27	3	18	490	400	--	1800	35
UD00200115BAB1	77-07-28	180	98	29	.90	400	330	--	55	9.0
	77-09-08	180	95	19	.90	370	350	--	52	9.3
UD00200201DDD1	77-07-28	14	13	.5	1.5	250	210	--	19	1.8
	77-09-08	16	15	.5	1.8	240	200	--	19	1.5
UD00200234DBC1	77-07-28	8400	97	150	19	410	340	--	43	13000
	77-09-08	8000	96	150	19	410	340	--	38	12000
MONTROSE COUNTY--Continued										
NB04801409CBA1	78-06-19	.80	10	.0	.40	12	10	--	6.7	1.1
NB05001104ADC1	81-08-25	400	92	22	9.4	--	--	600	290	63
NB05001305ADB1	80-06-18	35	11	.6	6.2	--	0	--	690	26
NB05001425ABA1	80-06-18	26	3	.3	4.5	--	290	--	1500	34

Table 5.--*Chemical analyses of water samples*--Continued

Local identifier (see figure 2)	Date of sample	Fluoride (mg/L)	Dissolved solids (mg/L)	Nitrite and Nitrate as Nitrogen (mg/L)	Ortho phosphorus (mg/L)	Ortho phosphate (mg/L)	Aluminum (µg/L)	Boron (µg/L)	Cadmium (µg/L)	Chromium (µg/L)
DELTA COUNTY--Continued										
SC01509632BAD1	74-09-19	1.8	1100	.150	.030	.09	--	340	--	--
	81-08-12	1.7	1100	.120	--	--	--	290	<1	.00
MESA COUNTY--Continued										
NB05101618DBD1	81-08-29	.10	240	.740	--	--	--	10	<1	.00
NB05101629DBD1	81-08-29	.10	240	.700	--	--	--	20	<1	.00
SC01209607CBC1	81-08-22	.10	49	.330	--	--	--	0	<1	.00
SC01209710DAB1	81-08-24	.10	85	.490	--	--	--	0	<1	.00
SC01209814DBA1	77-07-28	.10	290	.170	.020	.06	--	--	--	--
	77-09-08	.20	290	.180	.050	.15	--	--	--	--
SC01310123ACD1	81-08-24	.20	280	.300	--	--	--	110	<1	.00
SC01310124BBC1	81-08-24	.20	300	.250	--	--	--	120	<1	.00
SC01510015CAA1	79-08-27	.10	210	.560	--	--	--	--	<2	8
UC00100125BCD1	47-07-10	.30	470	--	--	--	--	--	--	--
UC00100126BBD1	46-07-25	.30	320	--	--	--	--	0	--	--
	55-06-18	.60	360	--	--	--	--	--	--	--
	77-08-16	.50	350	.010	.010	.03	--	--	--	--
	81-07-02	.40	340	.020	--	--	--	220	--	--
UD00200110DAB1	77-07-28	1.4	950	--	.020	.06	--	--	--	--
	77-09-08	--	--	--	--	--	--	--	--	--
UD00200114AAC1	77-09-08	1.7	1600	.100	.090	.28	--	--	--	--
UD00200115AAA1	77-07-28	.60	3000	--	.020	.06	--	--	--	--
UD00200115BAB1	77-07-28	.50	460	.010	.030	.09	--	--	--	--
	77-09-08	.60	500	.020	.020	.06	--	--	--	--
UD00200201DDD1	77-07-28	.10	260	.160	.020	.06	--	--	--	--
	77-09-08	.20	260	.180	.020	.06	--	--	--	--
UD00200234DBC1	77-07-28	.80	22000	--	.060	.18	--	--	--	--
	77-09-08	.60	20000	.030	.010	.03	--	--	--	--
MONTROSE COUNTY--Continued										
NB04801409CBA1	78-06-19	<.10	27	.130	.010	.03	150	<20	<2	--
NB05001104ADC1	81-08-25	1.3	1200	.140	--	--	--	300	<1	.00
NB05001305ADB1	80-06-18	1.9	990	.050	--	--	--	--	--	--
NB05001425ABA1	80-06-18	.50	2400	.260	--	--	--	--	--	--

Table 5.--*Chemical analyses of water samples*--Continued

Local identifier (see figure 2)	Date of sample	Copper (µg/L)	Iron (µg/L)	Lead (µg/L)	Manga-nese (µg/L)	Mercury (µg/L)	Nickel (µg/L)	Sele-nium (µg/L)	Zinc (µg/L)	Organic carbon (mg/L)
DELTA COUNTY--Continued										
SC01509632BAD1	74-09-19	--	40	--	440	--	--	<1	--	--
	81-08-12	1	5000	0	450	.0	--	0	<3	1.1
MESA COUNTY--Continued										
NB05101618DBD1	81-08-29	4	<10	5	3	.0	--	2	290	2.3
NB05101629DBD1	81-08-29	2	<10	2	2	.0	--	1	9	3.1
SC01209607CBC1	81-08-22	2	62	4	2	.0	--	0	41	1.6
SC01209710DAB1	81-08-24	2	12	4	2	.0	--	0	37	2.1
SC01209814DBA1	77-07-28	--	20	--	<10	--	--	--	--	--
	77-09-08	--	<10	--	<10	--	--	--	--	--
SC01310123ACD1	81-08-24	2	<10	4	<1	.0	--	1	24	1.5
SC01310124BBC1	81-08-24	2	<10	7	3	.0	--	1	22	1.9
SC01510015CAA1	79-08-27	--	<10	--	1	<.1	--	1	--	--
UC00100125BCD1	47-07-10	--	50	--	--	--	--	--	--	--
UC00100126BBD1	46-07-25	--	10	--	--	--	--	--	--	--
	55-06-18	--	0	--	--	--	--	--	--	--
	77-08-16	--	30	--	8	--	--	--	--	--
	81-07-02	--	170	--	10	--	--	--	--	--
UD00200110DAB1	77-07-28	--	790	--	40	--	--	--	--	--
	77-09-08	--	10	--	30	--	--	--	--	--
UD00200114AAC1	77-09-08	--	60	--	20	--	--	--	--	--
UD00200115AAA1	77-07-28	--	90	--	1600	--	--	--	--	--
UD00200115BAB1	77-07-28	--	20	--	<10	--	--	--	--	--
	77-09-08	--	150	--	<10	--	--	--	--	--
UD00200201DDD1	77-07-28	--	<10	--	<10	--	--	--	--	--
	77-09-08	--	40	--	<10	--	--	--	--	--
UD00200234DBC1	77-07-28	--	40	--	100	--	--	--	--	--
	77-09-08	--	50	--	110	--	--	--	--	--
MONTROSE COUNTY--Continued										
NB04801409CBA1	78-06-19	2	60	7	<10	<.1	3	<1	<20	5.7
NB05001104ADC1	81-08-25	6	170	1	22	.0	--	0	110	5.3
NB05001305ADB1	80-06-18	--	40	--	910	--	--	--	--	--
NB05001425ABA1	80-06-18	--	30	--	20	--	--	--	--	--

Table 6.--*Hydrogeologic data (noninventoried wells) from drillers' records*

EXPLANATION

TOWNSHIP/RANGE NUMBER
See figure 2.

PERMIT NUMBER
Assigned by State Engineer's Office

UNIT ABBREVIATIONS
gal/min = gallon per minute
gal/min/ft = gallon per minute per foot

PRODUCING FORMATION AND GEOLOGY FROM DRILLERS' LOG

Quaternary
Qa, alluvium
Qg, gravel
Ql, landslide material
Qd, glacial drift

Tertiary
Tb, basalt

Cretaceous
Kmv, Mesaverde
Km, Mancos Shale
Kd, Dakota Sandstone

Jurassic
Je, Entrada Sandstone
Jk, Kayenta Formation

Triassic
ꞦRw, Wingate Sandstone

Table 6.--*Hydrogeologic data (noninventoried wells) from drillers' records*--Continued

Township/range number	Permit number	Total depth (feet)	Type of test	Length of test (hours)	Yield (gal/min)	Perforated interval (feet)	Initial water level (feet)	drawdown (feet)	Specific capacity [(gal/min)/ft]	Producing formation	Geology from drillers' log
NB05001105BA	26456	35	---	--	dry	--	--	--	--	--	Qg
NB05001109BB	18596	260	pump	12	5	170-250	215	35	.1	Kd	Qa/Kd
NB05001116DA	22737	75	pump	--	10	19-49	11	--	--	Qa	--
NB05101115BC	83674	25	bailer	2	28	15-25	7	2.5	11	Qg	Qg
NB05101116ACD	32990	21	bailer	3	30	17-21	12	2	15	Qg	Qg
NB05101116CDD	19167	40	bailer	2	7	20-40	24	10	.7	Km	Qa/Km
NB05101119DAD	18822	124	bailer	2	1	30-124	39	81	< .1	Km	Qg/Km
NB05101121DD	2212F	36	bailer	--	750	16-36	--	30	25	Qg	Qg
NB05101127DBC	17754	55	bailer	1	15	45-55	16	5	3	Qa	Qa/Km
NB05101128AB	16282	78	bailer	10	4	30-78	22	30	.1	Qa/Km	Qa/Km
NB05101130AA	86897	80	bailer	4	20	29-80	30	20	1.0	Km	Qg/Km
NB05101132CC	19228	47	bailer	1	4	25-47	29	13	.3	Qg/Km	Qg/Km
NB05101134AB	40461	60	bailer	3	18	40-60	20	10	1.8	Km	Qg/Km
NB05101135CCD	13399	24	bailer	--	15	18-24	19	4	3.8	Qg	Qg/Km
SC01109536CC	69856	90	bailer	1	11	75-90	55	15	.3	Ql	Ql
SC01209406BC	47261	73	bailer	3	15	68-73	19	49	.1	Ql	Ql
SC01209430CCC	38057	95	bailer	2	18	70-80	55	12	1.5	Ql	Ql
SC01209501AC	39546	75	bailer	2	20	70-75	46	8	2.5	Ql	Ql
SC01209502DB	20619	71	pump	3	6	41-71	61	65	.1	Tb	Tb
SC01209507BA	64714	70	bailer	1	15	60-70	38	6	2.5	Ql	Ql
SC01210126ABC	44015	410	pump	4	11	10-410	392	6	1.8	ħw	Je/ħw
SC01210134CCB	17552	400	bailer	5	15	40-400	370	--	--	ħw	Jk/ħw
SC01309404AC	65287	215	bailer	2	15	210-215	115	55	.3	Qg	Qd/Qg
SC01309405BBD	39617	108	bailer	4	20	90-108	70	15	1.3	Qg	Qg/Kmv
SC01309406BA	10351	126	---	--	5	98-116	26	50	.1	Kmv	Qg/Kmv
SC01309408BB	43002	135	bailer	3	24	120-135	17	68	.4	Qg	Qg
SC01309409BA	83558	160	pump	<1	15	80-150	62	68	.2	Qg	Qd/Qg
SC01309415BBA	8929	79	---	--	2	70-79	70	9	.2	Qg	Qg
SC01309418CA	42734	75	bailer	3	24	55-75	31	22	1.1	Kmv	Qg/Kmv
SC01309419CC	81009	16	pump	2	15	14-16	6	2	7.5	Qg	Qg
SC01309420CCC	24707	170	pump	3	25	147-167	flowing	49	.5	Tb	Tb
SC01309421CD	54988	125	bailer	2	8	89-125	50	50	.2	Km	Qg/Km
SC01309427DAB	24653	202	bailer	3	3	66-86;132-202	130	64	.1	Qg	Qg
SC01309429AC	37986	50	bailer	4	12	40-50	9	19	.6	Qg	Qg
SC01309434AAA	13598	157	--	--	10	97-117;137-157	40	35	.3	Qg	Qg/Km
SC01309436BA	11343F	26	bailer	1	1	15-26	12	14	.1	Qg	Qg/Km

Table 6.--*Hydrogeologic data (noninventoried wells) from driller's records*--Continued

Township/range number	Permit number	Total depth (feet)	Type of test	Length of test (hours)	Yield (gal/min)	Perforated interval (feet)	Initial water level (feet)	drawdown (feet)	Specific capacity [(gal/min)/ft]	Producing formation	Geology from driller's log
SC01309502BC	26157	90	bailer	1	9	55-90	55	25	.4	Kmv	Kmv
SC01309502DDC	31668	55	pump	2	10	41-55	25	5	2.0	Qg	Qg
SC01309511BD	31202	121	pump	1	15	106-121	70	20	.8	Kmv	Kmv
SC01309514DA	31841	107	pump	2	9	92-107	36	20	.5	Qg	Qg/Km
SC01309525DA	40098	60	bailer	2	7	45-60	11	24	.3	Qg	Qg/Km
SC01309526CD	56467	57	bailer	2	15	37-57	32	5	3.0	Qg	Qg/Km
SC01409306CB	74228	105	bailer	2	8	55-105	30	40	.2	Qg	Qg
SC01409401CAA	21055	48	bailer	1	20	23-48	13	4	5.0	Qg	Qg
SC01409406CB	45365	100	bailer	3	9	93-100	15	76	.1	Qg	Qg
SC01409414DB	56468	72	bailer	2	4	52-72	38	24	.2	Qg	Qg
SC01409501DDD	19292	100	bailer	3	3	30-100	28	7	.4	Qg	Qg
SC01409511CD	65820	92	bailer	2	9	60-92	57	9	1.0	Qg	Qg/Km
SC01409513CCC	34487	30	bailer	4	30	25-30	7	14	2.1	Qg	Qg
SC01409521BB	30560	50	bailer	3	14	39-50	8	32	.4	Qg	Qg
SC01409524BBD	10573F	40	bailer	2	5	30-40	7	10	.5	Qg	Qg
SC01409526BB	34666	44	bailer	6	27	24-44	17	10	2.7	Qg	Qg
SC01409535AA	77727	35	bailer	2	20	20-35	17	2	10	Qg	Qg/Km
SC01410001CC	29033	90	bailer	14	5	85-90	81	8	.6	Km	Km
SC01509406DB	28887	42	bailer	2	20	37-42	10	4	5.0	Qg	Qg/Km
SC01509501DB	28186	25	bailer	2	30	20-25	6	3	10	Qg	Qg
SC01509504CD	22769	30	bailer	2	25	25-30	6	1	25	Qa	Qa
SC01509590CDD	13160	42	--	--	20	26-41	21	2	10	Qa	Qa/Km
SC01509510DC	29433	39	bailer	4	20	35-39	19	5	4.0	Qa	Qa
SC01509517CA	86312	40	bailer	2	20	29-40	17	4	5.0	Qa	Qa/Km
SC01509518AAA	27230	30	bailer	4	80	20-30	4	2	40	Qa	Qa
SC01509528AD	14072	25	pump	24	15	20-24	--	--	3.8	Km	Qa/Km
SC01509612AD	29826	30	bailer	2	30	21-30	9	2	15	Qa	Qa
SC01509612DD	32073	28	pump	1	50	23-28	1	10	5.0	Qa	Qa
SC01509613AB	28320	30	pump	2	30	25-30	7	7	4.3	Qa	Qa
SC01509616AD	30139	30	bailer	2	30	27-30	--	--	30	Qg	Qg
SC01509620DD	14336	60	bailer	2	8	40-60	50	5	1.6	Qg	Qa/Qg/Km
SC01509621DCD	14009	37	pump	5	5	29-37	30	5	1.0	Qg	Qg/Km
SC01509623CC	3101F	21	--	--	300	10-21	10	7	43	Qa	Qa
SC01509633ABB	26940	55	bailer	2	20	45-55	20	2	10	Km	Km
SC01509635DDC	38742	23	bailer	4	21	14-23	5	2	10	Qg	Qg/Km