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WATER RESOURCES OF THE NORTHERN PART OF THE AGUA FRIA AREA, YAVAPAI COUNTY, ARIZONA

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[Plates are in pocket]

ILLUSTRATIONS

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CONVERSION FACTORS

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

Multiply inch-pound unit	By	To obtain metric unit
inch (in.)	25.4	millimeter (mm)
foot (ft)	0.3048	meter (m)
vara (vr)	1.181	meter (m)
mile (mi)	1.609	kilometer (km)
square mile (mi^2)	2.590	square kilometer (km^2)
acre	0.404	square hectometer (hm^2)
acre-foot (acre-ft)	0.001233	cubic hectometer (hm^3)
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)
acre-foot per acre (acre-ft/acre)	0.3048	cubic hectometer per square hectometer (hm^3/hm^2)
gallon per minute (gal/min)	0.06309	liter per second (L/s)
gallon per minute per foot [(gal/min)/ft]	0.207	liter per second per meter [(L/s)/m]
micromho per centimeter (µmho/cm) at 25°C	1	microsiemen per centimeter (µS/cm) at 25°C

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

WATER RESOURCES OF THE NORTHERN PART OF THE AGUA FRIA AREA, YAVAPAI COUNTY, ARIZONA

By

Richard P. Wilson

ABSTRACT

At least 1,400,000 acre-feet of ground water is in storage in the major aquifers in the 700-square-mile northern part of the Agua Fria area. The study area is divided into three subareas—Lonesome Valley, Mayer, and Black Hills—that are separated by nearly impermeable basement rocks that prevent significant ground-water flow between them. Ground-water development in either Lonesome Valley or Mayer will affect ground-water conditions in the Black Hills only by decreasing potential recharge from base flow in the Agua Fria River by less than 500 acre-feet per year or in Big Bug Creek by a few acre-feet per year. Development in the Black Hills subarea will not affect the other two subareas. The Lonesome Valley subarea contains about 800,000 acre-feet of water in storage and is the most favorable for development of new water supplies. A few thousand acre-feet of water are in storage in the Mayer subarea. An estimate of water in storage in the Black Hills subarea is 600,000 acre-feet. The most favorable area for development of new water supplies in the Black Hills subarea is along the west side where basin fill crops out. An estimated ground-water budget for the 1981 water year included a discharge of about 9,700 acre-feet. Estimated recharge was 14,700 acre-feet, which is the sum of the discharge and the change in storage of about 5,000 acre-feet and is greater than in an average year. The chemical quality of the ground water and base flow of Agua Fria River and its tributaries generally is acceptable for public supply, domestic use, livestock, and irrigation of crops. The general chemical character of ground water in the major aquifers is calcium bicarbonate. Total dissolved solids ranged from about 132 to 748 milligrams per liter. Fluoride concentrations ranged from 0.1 to 1.0 milligrams per liter.

INTRODUCTION

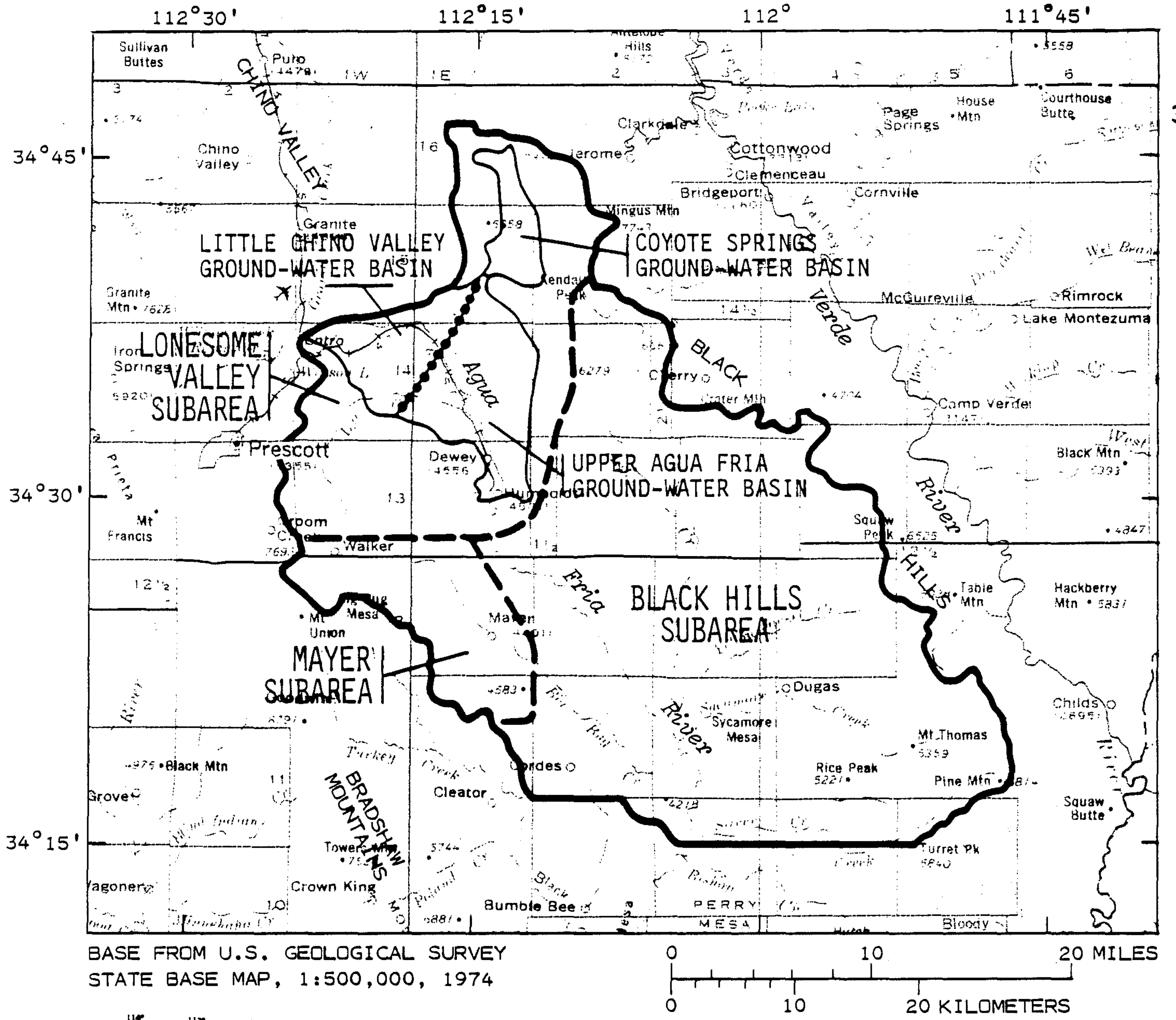
The northern part of the Agua Fria area includes about 700 mi^2 in Yavapai County, north-central Arizona (fig. 1). A rapid population growth and subsequent urbanization and development are increasing the demands on the water supply. Ground water is the source for all public water supplies and most irrigation and private supplies. Increased water-use demands in the near future will be met by increased ground-water withdrawals. Alternate sources are not available at this time. Direct runoff and perennial streamflow in the Agua Fria River and tributaries are reserved for local and downstream users who have existing water rights. This appraisal of the water resources was undertaken because of the increased demand for water and the need for information to evaluate effects of future ground-water development. The investigation was done by the U.S. Geological Survey in cooperation with the Arizona Department of Water Resources.

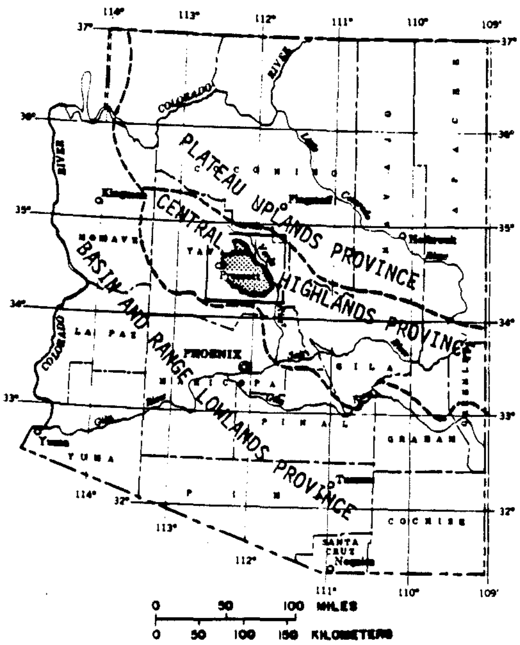
The main source of ground water is the permeable basin-fill, sedimentary, and volcanic rock units that fill the basins and form the major aquifers. The study area contains three ground-water systems or subareas that are separated by nearly impermeable crystalline and foliated basement rocks that prevent significant ground-water flow between the subareas. The subareas are Lonesome Valley, Mayer, and Black Hills (fig. 1).

Purpose and Scope

The purposes of this investigation were to (1) update the hydrologic data bases; (2) define the ground-water flow systems, (3) define changes in depth to water, potential well yields, and chemical quality of water in major aquifers; and (4) delineate seasonal variations in base flow of the perennial reaches of the Agua Fria River and tributaries. The report describes the ground-water systems, the extent of water-resources development as of 1982, and the effect of development on the ground-water system. The report also provides data that may be used by developers, managers, and landowners to minimize the adverse effects of future ground-water development.

Hydrologic data for this investigation were collected from September 1980 to August 1982. Wells and springs are identified and locations are indicated in accordance with the well-numbering system used in Arizona (fig. 2). Water-level measurements are in table 3; records of selected springs and wells are in tables 4 and 5, respectively, in the hydrologic data section. The ground-water flow systems were defined by use of hydrogeologic maps and cross sections that were prepared on the basis of previous studies, well logs, and field mapping. Potentiometric maps were prepared from water-level measurements and base-flow patterns, and base-flow gains and losses were analyzed. Potential well yields were estimated from pump tests and the extent, thickness, and lithology of the major aquifers. A ground-water budget was estimated for the study area. Chemical quality of ground water and suitability for public supply were determined by analyses of water from selected wells, springs, and base-flow sites. Seasonal variations of base flow of the Agua Fria River and tributaries were determined by measuring base flow in November and December 1980 and June 1981 and by computing flow duration and base flow at the Agua Fria River near Mayer gaging station. The extent of water-resources development and the effect on the ground-water systems were defined by evaluating ground-water recharge and discharge, areas of water-level declines, and volume of ground water in storage.





INDEX MAP SHOWING AREA OF REPORT (SHADED)

EXPLANATION

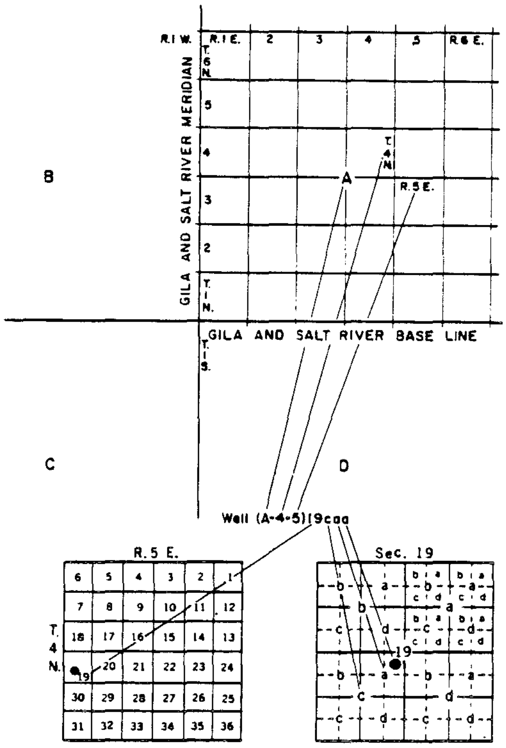
●●●●●●●●●●●●● GROUND-WATER DIVIDE

——— BOUNDARY OF GROUND-WATER BASINS

— — — BOUNDARY OF SUBAREAS

━━━ BOUNDARY OF STUDY AREA

Figure 1.--Area of report and Arizona's water provinces.



The well numbers used by the Geological Survey in Arizona are in accordance with the Bureau of Land Management's system of land subdivision. The land survey in Arizona is based on the Gila and Salt River meridian and base line, which divide the State into four quadrants. These quadrants are designated counterclockwise by the capital letters A, B, C, and D. All land north and east of the point of origin is in A quadrant, that north and west in B quadrant, that south and west in C quadrant, and that south and east in D quadrant. The first digit of a well number indicates the township, the second the range, and the third the section in which the well is situated. The lowercase letters a, b, c, and d after the section number indicate the well location within the section. The first letter denotes a particular 160-acre tract, the second the 40-acre tract, and the third the 10-acre tract. These letters also are assigned in a counterclockwise direction, beginning in the northeast quarter. If the location is known within the 10-acre tract, three lowercase letters are shown in the well number. In the example shown, well number (A-4-5)19caa designates the well as being in the NE¼NE¼SW¼ sec. 19, T. 4 N., R. 5 E. Where more than one well is within a 10-acre tract, consecutive numbers beginning with 1 are added as suffixes.

Figure 2.--Well-numbering system in Arizona.

Previous Investigations

Detailed geologic reports and geologic quadrangle maps have been published by the U.S. Geological Survey for the study area west of longitude 112°00' W. and parts of the east margin of the Black Hills. The emphasis of most of the reports and maps is a detailed examination of the Precambrian and Tertiary or Cretaceous intrusive, igneous, and metamorphic rocks. A report on the Prescott and Paulden quadrangles (Krieger, 1965) contains detailed descriptions of some sediments deposited in Lonesome Valley. Krieger's report includes a section on ground-water resources near Prescott and contains some well-log data for Lonesome Valley and geologic sections near Prescott Valley, Fain Ranch, Dewey, Humboldt, and the Blue Hills. Schwalen (1967) investigated ground-water conditions in the Little Chino Valley ground-water basin from 1937 to 1965. Littin (1981) investigated the ground-water resources of the Agua Fria River drainage north of latitude 33°45' N. Remick (1983) investigated ground-water conditions in the Prescott Active Management Area, which includes Lonesome Valley.

Physical Setting

The northern part of the Agua Fria area is part of the Central highlands water province, which is a transition zone between the Plateau uplands and the Basin and Range lowlands water provinces (fig. 1). The study area includes most of the Agua Fria River drainage north of latitude 34°15' N. and the northern part of the Coyote Springs basin in the Verde River drainage (fig. 1). The area is bounded on the northeast by the Black Hills, which extend from Mingus and Woodchute Mountains southeast to Pine Mountain. The boundary along the Black Hills follows the surface-drainage divide. The study area is bounded on the west by the Bradshaw Mountains.

The Agua Fria River flows out of the study area to the south at an altitude of 3,240 ft above sea level. The land surface gradually rises to the northwest to an altitude of 5,000 ft along Highway 89A. The surrounding mountains reach a maximum altitude of about 7,800 ft.

Climate

Climate in the Agua Fria area is semiarid and is characterized by hot summers and mild winters. Precipitation is predominantly rain but includes some snow in late fall and winter. Most of the rain occurs from mid-July through mid-September (Sellers and Hill, 1974, p. 335). May and June are the driest months. Average annual precipitation is 13.5 in. at Cordes and 12.8 in. at the Prescott airport. Winter storms are characterized by widespread low-intensity precipitation spread over several days. Some of the precipitation is snowfall, which is concentrated in the higher parts of the Bradshaw Mountains and the Black Hills. Summer precipitation generally occurs as short-lived intense thunderstorms from mid-July through mid-September. Evapotranspiration rates are much higher than the annual precipitation rate. The estimated annual lake evaporation is about 60 to 62 in. (Anderson, 1976, p. 24).

Acknowledgments

The author appreciates the cooperation and data provided by William H. Remick, Don V. Wigal, Leonard C. Halpenny, Thomas P. Spence, and Edward S. Davidson. Special appreciation is extended to the well drillers and landowners of the area who provided well records and access to their property.

ROCK UNITS AND THEIR HYDROLOGIC SIGNIFICANCE

In the study area ground water occurs in several individual geologic formations. For purposes of this study, the formations are combined into hydrologic rock units that have similar ground-water storage and transmissive properties. Major factors considered in assigning a formation to a unit are potential well yield, saturated volume, role of the formation in transmitting water from recharge area to discharge area, areal extent, similarity of lithology, and consistency with previous geologic investigations. The extent of the units was delineated by compiling available geologic maps, photointerpretation, field mapping, and interpretation of drillers' and geologists' logs. The units, in order from oldest to youngest, are basement, marine, sedimentary, volcanic, and basin fill.

Basement Unit

The common hydrologic property of the basement rocks is a minimal storage and transmission of water except by means of secondary permeability—fractures and decomposed or weathered zones. The secondary permeability and porosity typically decrease with depth. Yield of water to wells, depth to water, and chemical quality of water are highly variable depending on the degree of local fracturing and chemical alteration of primary rock components. The basement unit is present beneath the other units and separates ground-water flow systems that occur in the permeable rock units. The basement unit forms the floor of the individual ground-water basins. Base flow is maintained in stream reaches that are cut into basement rock because the unit prevents infiltration.

The basement unit is made up of a wide variety of crystalline or foliated igneous and metamorphic rocks that generally are dense, nonporous, and nearly impermeable. The most common rock types are granite, diorite, gabbro, schist, metavolcanics, and metasediments. The rocks generally are Precambrian except for a few Cretaceous and Tertiary granitic bodies.

The basement unit generally is exposed at the surface in the Bradshaw Mountains. The outcrop area includes a large part of the Black Hills south of Mingus Mountain and extends southwestward to Mayer and Poland Junction. Basement outcrops also occur in an area south of Cordes Junction and in the southeast end of the Black Hills (pl. 1). In a zone along the northeast margin of the Black Hills, the unit is exposed in areas where the overlying volcanic, sedimentary, and marine units have been eroded.

Marine Unit

The marine unit is made up of four consolidated sedimentary marine formations of Paleozoic age that store and transmit water primarily in fractures, weathered zones, and solution cavities. The formations from oldest to youngest are Tapeats Sandstone, Martin Formation, Redwall Limestone, and Supai Formation.

The marine unit was deposited on basement rocks in a narrow band that extends from near the north end of Coyote Springs ground-water basin along the margin of the Black Hills to Pine Mountain. The unit is overlain by younger volcanic and sedimentary units and is exposed along side slopes, canyon walls, and canyon bottoms where the overlying units have been extensively eroded. Distribution and thickness of the unit are variable because it was deposited on an irregular basement-rock surface and was eroded before being covered by younger rocks. The unit ranges from 0 to about 1,000 ft thick. Probable extent of the marine unit beneath the volcanic rocks in the Black Hills and the basin fill in the Coyote Springs basin is shown on plate 1. The Tapeats Sandstone and Martin Formation extend from the north end of Coyote Springs basin along the margin of the Black Hills to Pine Mountain. The Redwall Limestone is present near Woodchute and Mingus Mountains but thins to the southeast and occurs only as scattered outcrops near Squaw Peak. The Supai Formation is present only in the northern part of the study area near Woodchute and Mingus Mountains.

Sedimentary Unit

The sedimentary unit forms the major aquifer in the study area and contains large volumes of ground water in storage. The unit is widely distributed in the study area (pl. 1). The sedimentary unit consists of continental sediments of Tertiary age assigned to the Hickey

Formation and similar sediments of late Tertiary age in Lonesome Valley. Generally, all the sediments that underlie or are interbedded with volcanic rocks are included. The unit partly fills the structural trough that forms Lonesome Valley and is interbedded with volcanic rocks at Prescott Valley, Humboldt, Mayer, Cordes, Spring Valley, and Cordes Junction. The unit underlies volcanic rocks near Cienega Creek, along Ash Creek, and near the Agua Fria River in Tps. 10 and 11 N., R. 3 E. The sediments were deposited before, during, and after deposition of the volcanic rocks. Basin fill was deposited on the sedmentary unit after movement along high-angle faults formed the present-day basins. The contact between the two units is poorly defined, and, in some places, small areas of basin fill are included with the sedimentary unit.

The sedimentary unit consists of cobble gravel, sand, silt, clay, marl, and limestone that are weakly to moderately consolidated. The clasts are angular to well rounded and are poorly to moderately sorted; sorting varies from one bed to another and from place to place. Clasts are derived from volcanic, marine, and basement rocks. Most of the sedimentary unit contains all three types but one type generally is predominant in a local area. The unit varies from greenish to yellowish gray to gray to brown depending on the color of the most common particle type. Fine-grained beds in the Fain Ranch-Dewey area are light orange to light brown.

The sedimentary unit includes a poorly sorted basal gravel in much of the study area. Basal gravel includes sand and commonly contains boulders and cobbles. Clasts are angular to well rounded. The material is weakly to firmly consolidated and locally is cemented with caliche (calcium carbonate) near the underlying marine unit. The clasts are derived mainly from basement rocks, lesser amounts from marine rocks, and minor amounts from volcanic rocks. The gravel commonly contains basement-rock clasts that originated south and west of the study area.

Volcanic Unit

The volcanic unit includes the volcanic members of the Hickey Formation of Tertiary age. The unit covers much of the area around Woodchute and Hickey Mountains and substantial areas in the Black Hills and caps mesas and hills in the Bradshaw Mountains (pl. 1). Smaller outcrops occur at Glassford Hill, Humboldt, and in the area between Mayer and Cordes. The unit commonly is interbedded with the sedimentary unit.

The volcanic unit consists of basaltic lava flows, cinder cones, tuff, and water-deposited interbeds of basaltic cinders and gravel. The lava flows typically are 10 to 50 ft thick, generally are vesicular, and have massive interior zones and blocky broken tops. Columnar jointing and fracturing are common. Calcite generally fills fractures or cements brecciated parts of the flows. The basalt is light to dark gray. Water-deposited volcanic sediments are composed of ash, cinders, scoria, and basaltic gravel. Volcanic sediments are light brown to orange red and are weakly to moderately cemented. The material is well bedded to massive and is moderately sorted. The beds contain abundant sand- and gravel-size particles but little silt and clay. The volcanic sediments are most abundant in the Black Hills where they make up more than half the exposed thickness of the volcanic unit.

Basin-Fill Unit

Basin fill is the youngest and most transmissive unit mapped in the study area and stores and transmits large quantities of ground water. The unit serves as a conduit for water from direct runoff that infiltrates readily through the sand and gravel that form the channel bottoms and flood plains of streams and washes. The unit is composed of gravel, sand, silt, and clay eroded from all the older units. Basin fill was deposited after the major Basin and Range tectonic movements uplifted the highland areas and formed basins in the downdropped areas. The unit includes river wash, alluvium, flood-plain and terrace gravels, pediment gravels, and alluvial-fan and talus gravels, all of Quaternary age. Quaternary and Tertiary alluvial-fan gravels, fanglomerate, older gravel, and some sedimentary rocks previously assigned to the Hickey Formation are also included.

Basin fill is composed mainly of unconsolidated to moderately consolidated gravel and sand and includes significant quantities of boulders, cobbles, silt, and clay. The material is moderately sorted to unsorted. The clasts are angular to well rounded; most are subangular and subrounded. Roundness generally varies by lithology; well rounded volcanic cobbles are included with subangular cobbles and gravel of wear-resistant basement rocks. The composition varies according to source area, which is either the Bradshaw Mountains or the Black Hills; in many places, the unit contains rocks derived from one source area. The unit is tan to gray, and weathered exposures commonly are reddish in color. Basin fill is weakly to firmly consolidated and cemented with travertine (calcium carbonate) near Mayer. The large amount of carbonate indicates that the rocks may be part of the sedimentary unit, although the unit is mapped as basin fill. Moderately consolidated basin fill is deposited on basement rocks in the Blue Hills; however, this material may be part of the sedimentary unit.

GEOLOGIC STRUCTURE AND AQUIFER GEOMETRY

Geologic structure and the distribution, lithology, and water-bearing characteristics of the hydrologic rock units determine the location and geometry of the aquifers. Basin-and-range faulting and warping created downdropped structural basins that contain the aquifers. Subsequent deposition within the basins and development of the surface-drainage pattern influenced the location of the present-day ground-water flow systems. The streams and washes form the main recharge and discharge areas of the flow systems. The study area is divided into three ground-water subareas—Lonesome Valley, Mayer, and Black Hills—that are separated by low-permeability basement rocks that prevent significant subsurface flow between them.

Lonesome Valley

The Lonesome Valley subarea includes the part of Lonesome Valley southeast of State Highway 89A and the Coyote Springs ground-water basin, which is along the east side of the valley (fig. 1). Lonesome Valley is the local name for the southeast end of Little Chino Valley.

Little Chino Valley, Lonesome Valley, and Coyote Springs ground-water basin are parts of a structural trough (Krieger, 1965, p. 66), which is filled with basin-fill, sedimentary, and volcanic rock units. These rock units form the major aquifer (pl. 2). Coyote Springs ground-water basin is separated from the main part of Lonesome Valley by the basement rocks of the Indian Hills (pl. 1). Movement along high-angle faults created the trough between the Bradshaw Mountains to the southwest and the uplifted Black Hills to the east. The floor and sides of the structural trough are formed mainly from low-permeability basement rocks. The trough extends about 28 mi from Humboldt to the northwest. The east side of the trough is bounded by the Coyote fault that forms the west edge of the Black Hills. The fault extends from a point 3 mi east of Humboldt to the north boundary of the study area. Vertical movement on the fault was estimated by Krieger (1965) to range from 0 ft at Humboldt and at the north boundary of the study area to about 1,200 ft approximately 1 mi south of State Highway 89A. The southwest margin of the trough appears erosional, although faults may be covered by basin fill.

Basin-fill, volcanic, and sedimentary units form the major aquifer in the Lonesome Valley subarea. Although some basin fill and volcanic rocks are saturated, the sedimentary unit forms most of the aquifer volume. The approximate margin of the major aquifer is shown on plate 1. The margin location is based on well-log data or is estimated from geologic information. Saturated thickness is estimated to be at least 100 ft.

Basin fill forms a thin veneer that covers the sedimentary unit in most of the subarea. Basin fill forms the channel bottoms, flood plains, and terraces of Lynx Creek, Agua Fria River, and other larger canyons and washes and includes the fan gravel at Blue Hills. Low places near the center of the subarea along the Agua Fria River are covered with basin fill that contains substantial amounts of material eroded from the sedimentary unit. Basin fill probably is less than 100 ft thick in most of the main part of Lonesome Valley. Wells close to the Agua Fria River may withdraw some water from basin fill. The unit yields small volumes of water to wells in the Blue Hills where it is deposited on basement rocks; in much of Lonesome Valley, the unit is dry. Basin fill forms the main aquifer in the Coyote Springs ground-water basin. The unit is thin in much of the basin but may be several hundred feet thick near the south and east edges.

Lava flows are interbedded with the sedimentary rock unit at Prescott Valley. The flows extend from Glassford Hill at least 2 mi to the northeast and make up about 20 percent of the aquifer volume penetrated by wells in T. 14 N., R. 1 W. The uppermost flow is 30 to 100 ft thick and is encountered at a depth of about 450 ft; additional flows exist at depth in the unit. The flows are not continuous throughout the area; the uppermost flow was not penetrated by well (B-14-01)10acd but was penetrated by wells to the south and east. The flows cause reduced well yields and retard the vertical movement of ground water.

The sedimentary rock unit forms most of the aquifer volume in the main part of Lonesome Valley (pl. 1). The unit thickens from 0 ft at Humboldt to 1,160 ft in sec. 11, T. 13 N., R. 1 E.; is more than 700 ft thick in the vicinity of Prescott Country Club and Lynx Creek; and probably is more than 850 ft thick at Fain Ranch. The unit, which includes lava flows, probably is more than 1,000 ft thick at Prescott Valley. The thickness of the unit in the central part of Lonesome Valley is unknown but probably exceeds 1,000 ft.

The unit is coarse grained in the vicinity of Prescott Valley and Humboldt and becomes fine grained at Fain Ranch and toward the central part of the valley. Boulders and cobbles are common in the unit at Prescott Valley. At Dewey and Humboldt, the upper 50 to 150 ft of the unit is composed mainly of silt and clay, which thicken to as much as 500 ft at Fain Ranch.

Surface drainage and ground-water movement in the ancestral Lonesome Valley subarea was to the north and northwest into the Verde River. Headward erosion by the Agua Fria River and its tributaries moved the drainage divide to its location along State Highway 89A and in the Coyote Springs ground-water basin (Krieger, 1965, p. 102). Down-cutting by the Agua Fria River stripped away part of the sediments in the southeast end of the subarea and allowed direct runoff and part of the ground water to drain to the southeast. The Agua Fria River has cut down to basement rock at Humboldt; basement rock also outcrops at the land surface a short distance to the east and southeast of the river. A volcanic flow underlain by a thin layer of sedimentary rock forms a barrier to subsurface flow on the west side of the river. The effect of the low-permeability rock units forces ground water to the surface.

Mayer

The Mayer subarea includes most of the Big Bug Creek drainage from Walker to 3 mi southeast of Mayer. The major aquifer extends for 2.5 mi along Big Bug Creek at Mayer (fig. 1). The ancestral valley was cut on low-permeability basement rocks and then was partly filled with older basin-fill gravel. The older gravel extends from at least 2 mi northeast of Poland Junction approximately along the present alignment of Big Bug Creek to southeast of Mayer where it appears to be deposited on the sedimentary unit (pl. 1). The older gravel occurs below stream level at Mayer. Younger basin-fill terrace deposits and gravel are deposited on the older gravel and basement rocks near and along Big Bug Creek and may extend far enough below stream level to yield water to wells. The older gravel is consolidated and cemented with caliche and travertine on the northeast side of Big Bug Creek at Mayer.

Ground water occurs in the basin-fill, sedimentary, and basement rock units in the Mayer subarea. Near Poland Junction, water is obtained from the secondary permeability features in the basement rocks. Big Bug Creek has cut down through and drained the older gravel at Poland Junction and downstream to about 2.5 mi above Mayer. The lowest few feet of the older gravel may be saturated; however, most wells yield water from basement rocks. Water is obtained from older basin-fill gravel and possibly younger gravel along Big Bug Creek at Mayer. Direct runoff along Hackberry Creek recharges basin-fill and sedimentary rocks south of Mayer. Some water may move northward through the units and into Big Bug Creek, but the low hydraulic conductivity of the sedimentary rocks prevents significant flow.

Black Hills

The Black Hills subarea includes most of the southeastern half of the study area including the southwest slopes of the Black Hills from Pinto Mesa to Pine Mountain. The geometry of the Black Hills subarea resulted from the formation of a structural basin and subsequent erosion and development of a surface-drainage network.

Hydrologic rock units that form the major aquifer are basin fill, volcanic, sedimentary, and marine. The basement unit underlies the entire subarea and crops out at the surface in several places (pl. 1). Various combinations of the units are present in different parts of the subarea. Along the west side, three units form the aquifer—basin fill, volcanic, and sedimentary (pl. 1). The marine unit underlies the volcanic rocks along the eastern part of the Black Hills.

Location of the approximate margin of the major aquifer is based on an estimated saturated thickness of at least 100 ft (pl. 2). Thickness data are available from a few well logs; in most of the Black Hills subarea, the position of the aquifer margin was estimated from geologic information.

The thickness and distribution of the four units that form the aquifer vary because each unit was deposited on an erosional surface cut on the underlying units. The marine unit was deposited on an erosional surface of rolling hills cut on basement rocks and probably was as much as 1,000 ft thick. In time, the area tilted to the northeast and streams eroded away all but a band of the marine rocks along the east margin of the Black Hills from Pine Mountain north and northwest toward Mingus and Hickey Mountains.

During Tertiary time, a discontinuous layer of gravel was deposited in the subarea and formed the basal gravel of the sedimentary unit (Wadell, 1972, p. 10). The gravel was eroded from areas mainly to the south and west of the subarea and deposited in stream channels, flood plains, and valleys. Above the basal gravel, sediments that originated outside the subarea are interbedded with lenses and beds of locally derived material.

During late Tertiary time, several hundred feet of basaltic lava flows and volcanic sediments were deposited over most of the subarea except in an area south and southwest of Cordes Junction. Lava flows are dominant in the northern and western parts of the subarea and are interbedded with as much as 250 ft of volcanic sediments in the Black Hills.

After a period of erosion, basin-fill gravel was deposited in a 3- to 5-mile-wide valley cut into the volcanic unit along the west side of the subarea (pl. 1). Drainage may have been from the north because clasts of marine and basement rocks that originated in the Mingus Mountain area have been found northeast of Spring Valley (Anderson and Blacet, 1972a, p. 55; 1972b, c). The gravel was more than 300 ft thick in places. During or after the deposition of the basin-fill gravel, the Black Hills were tilted to the west and southwest in the east side of the subarea and to the south in the northern part. The rock units were tilted to the east along the west side and to the northeast near Cordes and Spring Valley. The dips are small and resulted in a bowl-shaped basin gently tipped toward the south.

Basin-fill, volcanic, and sedimentary rock units form the major aquifer from Spring Valley northward along the west side of the basin to T. 13 N., R. 2 E. (pl. 1). The saturated thickness may be as much as 250 ft. Basin fill overlies volcanic rocks beginning about 0.5 mi northwest of Spring Valley along Big Bug Creek and extends eastward to Cordes Junction, northward across the Agua Fria River, and southward to Cordes. The basin fill thins to the south, and basement rocks crop out along most of the south edge of sec. 16, T. 11 N., R. 2 E.

Saturated thickness of the basin fill is about 100 ft at a point half a mile west of Interstate 17 and thins to nearly zero near the highway. Volcanic rocks crop out west of Spring Valley, continue east and north beneath the basin fill, and reappear at Cordes Junction and near the Agua Fria River. The volcanic rocks are the main water-bearing unit near the intersection of State Route 69 and Interstate 17 and northeast to the Agua Fria River. In much of the area around Cordes Junction, the volcanic rocks are dry or absent and water is obtained from the sedimentary rocks. Sedimentary rocks are present beneath the volcanic rocks from near the west edge of Spring Valley east to Cordes Junction where they are exposed at the surface and north to the Agua Fria River.

The aquifer near Orme Ranch is composed of basin-fill, volcanic, and sedimentary rocks to the west and volcanic and sedimentary rocks to the east and northeast. Most water is pumped from basin fill that forms the flood plain of Ash Creek.

Younger basin-fill gravel is the main water-bearing unit along the flood plain of the Agua Fria River in secs. 22 and 27, T. 12 N., R. 2 E., and is underlain by sedimentary rocks and possibly volcanic rocks. The saturated thickness of the combined basin-fill and sedimentary units is as much as 370 ft.

Volcanic rocks are the main water-bearing unit from Ash Creek and Agua Fria River eastward to the west margin of the Black Hills. The volcanic rocks are thin along a several-mile-wide band that extends from Cienega Creek to Pine Mountain, and underlying basement and marine rocks are exposed in canyon bottoms and walls. West of the band of basement-rock exposures, the volcanic rocks thicken and several hundred feet of the unit may be saturated.

The main water-bearing unit near Pine Mountain is the marine rocks that are exposed in canyon walls and bottoms or are covered by volcanic rocks that cap the intercanyon mesas and ridge tops. The volcanic and marine rocks dip to the west and north. The saturated thickness of the marine unit is highly variable; many areas probably are dry. The aquifer near Cienega Creek is formed by sedimentary rocks that are consolidated and contain significant amounts of fine-grained tuff.

GROUND-WATER HYDROLOGY

The source of ground water and surface water in the northern part of the Agua Fria area is precipitation that falls as rain in the summer wet season and as rain and snow during the winter storm periods. The precipitation is concentrated in the higher altitude areas, and most is lost to evapotranspiration. Some precipitation becomes direct runoff, a part of which infiltrates through the soil and alluvium into the permeable rocks and eventually recharges the ground-water system.

Streams and washes convey direct runoff in their channels, recharge water to the aquifers, and discharge water from the aquifers as base flow. Water leaves the study area mainly as surface flow in the Agua Fria River and as subsurface flow to the northwest in the Little Chino Valley ground-water basin.

Ground water is the source of all public water supplies and much of the water used for irrigation. Several ranches, which divert surface water from the Agua Fria River and its tributaries, have wells to provide irrigation water during periods of low or no flow. Future increases in water demand for industry and the growing population will be met from ground water because no alternate sources are presently available.

Streams and washes of the drainage system form the main recharge and discharge areas in the three subareas of the study area. Each subarea contains a distinct ground-water flow system that consists of source areas for recharge; space for storage and movement toward one or more discharge areas; and discharge by means of pumping from wells, spring flow, base flow in a stream reach, or evapotranspiration.

Lonesome Valley

Ground-Water Flow System

The ground-water flow system in the Lonesome Valley subarea is divided into three parts: Coyote Springs ground-water basin, Little Chino Valley ground-water basin (Schwalen, 1967), and Upper Agua Fria ground-water basin (pl. 2). Coyote Springs ground-water basin lies to the east of Little Chino and Lonesome Valleys and is separated from the main part of Lonesome Valley by low-permeability basement rocks of the Indian Hills. Little Chino Valley ground-water basin extends from a northeast-trending ground-water divide northward beyond the study area (pl. 2). Upper Agua Fria ground-water basin extends from the ground-water divide southeastward to Humboldt. The approximate location of the ground-water divide is from 1 to 4 mi southeast of the surface divide between the Verde River and Agua Fria River drainages.

Recharge.--The main source of recharge in Lonesome Valley is infiltration of direct runoff into the channel bottoms and flood plains of the washes and streams that drain the highlands surrounding the valley. The water moves downward and eventually recharges the aquifers below. Most of the highland areas are underlain by basement rocks that transmit and store only small quantities of water. Most of the infiltration occurs after the direct runoff leaves the mountain front, although underflow may be significant in those canyons that contain sufficient volumes of basin-fill alluvium. Lynx Creek probably is the largest source of recharge for the

Upper Agua Fria and Little Chino Valley ground-water basins because of its large drainage area and the nature of its bed material. The alluvium along Lynx Creek is highly permeable owing to past dredging and hydraulic-mining operations that flushed away fine-grained material. A significant part of the direct runoff infiltrates and recharges the ground-water system beneath Lynx Creek. About one-third of the infiltrated water is estimated to recharge the Little Chino Valley basin, and the rest recharges the Upper Agua Fria basin assuming infiltration is approximately proportional to channel length on each side of the ground-water divide. A significant source of recharge in the main part of the valley is from infiltration of direct runoff along Coyote Wash and Yaeger Canyon, which drain the southern part of the Coyote Springs basin. Direct runoff along the Agua Fria River may make a small contribution to the system near Prescott Valley and a moderate contribution in the area of Fain Ranch, Dewey, and Humboldt. Recharge to the Upper Agua Fria basin also comes from infiltration of direct runoff along Clipper Wash, Green Gulch, and other washes that drain the northeast side of the Bradshaw Mountains.

The source of recharge in Coyote Springs basin is infiltration of direct runoff into the beds of several washes that drain the area of Hickey and Woodchute Mountains. Infiltration of precipitation into basin-fill, volcanic, and marine rocks where the rock units crop out also recharges the basin. Most of the recharge probably occurs after the direct runoff crosses the Coyote fault because basement rocks are close to the surface on the east side of the fault.

Movement.--Ground water in the northern part of the Coyote Springs basin moves southwestward into the Little Chino Valley basin or northward into the Verde River drainage (pl. 2). Water in the southern part of the Coyote Springs basin moves through gaps in the Indian Hills southwestward into the Little Chino Valley and Upper Agua Fria basins. Most of the water probably moves as underflow along Coyote Wash. Ground water recharged along Lynx Creek moves northward out of the study area through the aquifer of the Little Chino Valley basin or eastward through the Upper Agua Fria basin. Ground water recharged along small washes that drain the west side of the Black Hills moves southward and southwestward to the vicinity of the Agua Fria River and then southward toward the outlet of the basin at Humboldt.

Discharge.--Ground water discharges from the Upper Agua Fria basin as base flow in the Agua Fria River at the lowest point of Lonesome Valley at Humboldt. The flow begins about 1.1 mi above Humboldt and increases downstream to near Lazy River Drive (pl. 3, site 1). The river probably is perennial at the Lazy River Drive crossing where flow measurements from 0.84 to 1.61 ft^3/s were made during the 1981 water year. Ground water is pumped from public-supply, irrigation, commercial, and domestic wells in the Upper Agua Fria basin and mainly from public-supply wells near Prescott Valley in the Little Chino Valley basin.

Occurrence of Ground Water

Depth to water.--Depth to water in Upper Agua Fria basin ranges from less than 50 ft along the Agua Fria River from the mouth of Lynx Creek to Humboldt to more than 300 ft along the east edge of the basin. Depth to water in the Little Chino Valley basin is less than 100 ft along much of the flood plain of Lynx Creek to more than 500 ft near the east side of Glassford Hill. Depth to water in the Coyote Springs basin ranges from less than 50 ft along the southwest side to more than 300 ft along the east side.

Potential well yields.--Well yields depend on the hydraulic conductivity of the aquifer; the saturated thickness open to the well bore; and how the well was drilled, constructed, and developed. Well yields near or outside the margin of the major aquifer may be too small for public or irrigation supplies. Well yields may be sufficient for stock or domestic supplies where local aquifers exist or the basement rock is fractured. Potential well yields were estimated from pump tests conducted for water companies and private parties and from the extent, thickness, and lithology of the major aquifers.

Potential well yields in the main part of Lonesome Valley range from 50 to 2,000 gal/min (pl. 2). Larger existing wells yield from 100 to 1,750 gal/min. Specific capacities range from 0.53 to 19.9 (gal/min)/ft. Well yields are greatest near Prescott Valley. Well yields are smaller in the area that extends from Fain Ranch to Humboldt; discharges range from 100 to 1,000 gal/min. Specific capacities range from 0.53 to 5.6 (gal/min)/ft. Potential well yields are more than 100 gal/min near Dewey and Humboldt. Well yields in the Blue Hills are normally less than 10 gal/min and may be as low as a few gallons per hour where water occurs in basement rock. The yields are small because the basin-fill unit is thin, consolidated, poorly sorted, and contains large amounts of cobbles and boulders.

Potential well yields are designated on plate 2 by zones that have overlapping ranges of values because of variations in water-bearing characteristics of the aquifer and availability of data. Local areas within the zones may yield water at rates greater than or less than the indicated values. The zones are a general guide and are intended to be used to illustrate favorable areas for developing water supplies. Obtaining the maximum or optimum well yield at a particular site will require proper exploration and evaluation of the site and optimum design, construction, and development of wells.

Ground water in storage.--About 800,000 acre-ft of water is in storage in the upper 200 ft of the major aquifer in the main part of

Lonesome Valley. About 300,000 acre-ft is stored in that part of the Little Chino Valley ground-water basin in the study area, and about 500,000 acre-ft is stored in the Upper Agua Fria ground-water basin. The volume of water in storage was estimated by delineating the area where the aquifer is at least 200 ft thick and multiplying that volume of aquifer by an assumed specific yield of 0.12. Saturated-thickness data are inadequate to estimate storage at greater depths, but an additional several hundred thousand acre-feet may be in storage. Saturated-thickness data in the Coyote Springs ground-water basin are inadequate to estimate ground water in storage; however, the volume is much smaller than that stored in the main part of Lonesome Valley.

Mayer

Ground-Water Flow System

The main source of recharge in the Mayer subarea is infiltration of direct runoff into the bed and flood plain of Big Bug Creek. The general movement of ground water is parallel to and at about the same gradient as Big Bug Creek (pl. 2), which establishes the altitude for the local potentiometric surface. Ground water occurs at land surface where the stream channel is cut into basement rock downstream from Mayer. Flow of a few gallons per minute of water was observed at that point in December 1980, but the stream was dry in most areas in June 1981. Presence of cottonwoods and other water-loving plants indicate shallow ground-water levels along the creek. Base flow is only a few acre-feet per year; most of the ground water probably is pumped by domestic and public-supply wells or is discharged by evapotranspiration along Big Bug Creek.

Direct runoff along Hackberry Creek recharges sedimentary rocks south of Mayer. Small amounts of water may move northward through the rocks and into Big Bug Creek, but the low hydraulic conductivity of the rocks prevents a significant flow.

Occurrence of Ground Water

Ground water occurs in basin-fill, sedimentary, and basement rocks in the Mayer subarea. Depth to water ranges from less than 15 ft near Big Bug Creek to less than 200 ft near Poland Junction and generally is less than 100 ft near Mayer. The potential well yield is 5 to 100 gal/min where basin fill forms the major aquifer. Potential well yields generally are small owing to low permeability of basement rocks and cemented older basin fill or the small saturated thickness of basin fill.

Black Hills

Ground-Water Flow System

The ground-water flow system of the Black Hills subarea is controlled by geologic structure, aquifer geometry and characteristics, and the location of streams and canyons. Aquifers are recharged by direct runoff that infiltrates through streambeds and flood plains and by infiltration of precipitation on the outcrops of rock units that form the aquifer.

Outcrops of basement rocks downstream from the mouth of Sycamore Creek prevent ground water from entering the Agua Fria River. The nearly impermeable rock forces ground water to the surface where it discharges into the river as base flow. This base-flow reach of the river establishes the lowest altitude of about 3,500 ft for the potentiometric surface for most of the western and northern parts of the subarea. Local position and general slope of the potentiometric surface are defined by base-flow reaches of the streams.

Direct runoff infiltrates and eventually recharges the major aquifer along Big Bug Creek, Agua Fria River, and Yarber Wash on the west and Osborne Spring Wash and Ash Creek on the north. Cienega Creek, Little Ash Creek, Sycamore Creek, Indian Creek, and Silver Creek drain the southwest slopes of the Black Hills. Direct runoff and base flow leave the basin in the Agua Fria River.

Recharge.--The main source of recharge is from direct runoff that infiltrates into the channel bottoms and flood plains of the washes and streams that drain the highland areas surrounding the basin. The two largest sources of recharge are along the channels of Big Bug Creek and Agua Fria River; lesser amounts infiltrate the channels of Ash Creek, Osborne Spring Wash, and other larger streams and washes. The main source of recharge in the area of Spring Valley and Cordes Junction is from infiltration of rainfall and direct runoff into basin-fill and volcanic rocks along Big Bug Creek. Recharge also occurs where volcanic, sedimentary, and marine rocks crop out.

Movement and Discharge.--Water recharged along streams or rock outcrops moves generally downdip through the aquifer and discharges as base flow in streams or is pumped from wells. The main concentration of base-flow discharge is in the Agua Fria River near the mouths of Sycamore and Ash Creeks for about 1 mi above Sycamore Creek.

Ground water moves eastward and northeastward away from Big Bug Creek through the basin-fill, volcanic, and sedimentary rocks and discharges into two reaches of the Agua Fria River from a point in the southern part of sec. 1, T. 11 N., R. 2 E., downstream to the mouth of Sycamore Creek. Part of the ground water is pumped for public supply at Spring Valley and mainly for public-supply and commercial use at Cordes Junction. A small volume of ground water probably moves away from Big Bug Creek to the south and west near Spring Valley through the basin-fill, volcanic, and sedimentary rocks (pl. 2). Springs and seeps in sedimentary rocks discharge ground water beneath the volcanic rocks about 3 mi to the southwest.

Near Orme Ranch, ground water moves toward Ash Creek through the volcanic and sedimentary rocks from the northeast and through the basin-fill, volcanic, and sedimentary rocks from the northwest. Ground water moves southward through the basin fill near and parallel to Ash Creek. In Ash Creek, ground water discharges as base flow or is pumped for irrigation in secs. 17 and 20, T. 12 N., R. 3 E.

In sec. 26, T. 12 N., R. 2 E., ground water moves through the aquifer southward toward the Agua Fria River and then southeastward parallel to the general course of the river. Part of the water eventually appears as base flow in the Agua Fria River above Sycamore Creek.

In the Black Hills, ground water generally moves toward the southwest and discharges into Ash Creek, major canyons, or the Agua Fria River. Near Pine Mountain, ground water moves northward and westward and issues from Nelson Place Springs, Bee House Canyon Springs, and smaller springs located higher in exposures of the marine rock unit (pl. 2). Some water may move into the alluvium and discharge into Sycamore Creek. The water probably moves mainly along fractures enlarged by solution in the Martin Formation. The two larger springs issue from the base of the Martin Formation above the Tapeats Sandstone. Ground water in the Cienega Creek area moves toward or approximately parallel to the stream. The water is pumped locally, discharges to Cienega Creek as base flow, or is lost to evapotranspiration.

Occurrence of Ground Water

Depth to water.--Depth to water in the Black Hills subarea ranges from less than 20 ft near the base-flow reaches of streams to as much as 500 ft in higher locations away from streams or on mesas between major canyons. Depth to water probably is less than 20 ft below stream level in the flood plain of Ash Creek in secs. 8, 17, and 20, T. 12 N., R. 3 E. Along Big Bug Creek, ground water occurs at a depth of less than 20 ft below the channel where permeable sand and gravel allow streamflow to infiltrate into the volcanic and sedimentary rocks or the basin fill.

Potential well yields.--Potential well yields in the Black Hills subarea vary greatly owing to the variation in distribution and saturated thickness of the rock units that form the major aquifer (pl. 1). The basin fill is the most productive unit; the volcanic and sedimentary rocks yield moderate amounts of water, and the marine rocks yield small amounts of water to wells. The probable range in well yields is 50 to 1,000 gal/min for basin fill, 5 to 100 gal/min for volcanic and sedimentary rocks, and less than 10 gal/min for marine rocks.

Well yields near or outside the margin of the major aquifer may be too small for public or commercial water supplies. Well yields may be sufficient for stock or domestic water supplies where local aquifers exist or the basement rock is fractured. In some areas, the basement rocks are dry or potential well yields are a few gallons per hour.

Potential well yields near Cordes Junction range from a few gallons per minute from consolidated and cemented sedimentary rocks to about 100 gal/min from volcanic and sedimentary rocks. In the Spring Valley area, well yields may be more than 100 gal/min if the basin-fill, volcanic, and sedimentary units are all tapped.

Two wells yield 625 and 210 gal/min from basin fill in the flood plain of Ash Creek. Saturated thicknesses are 37 and 12 ft, respectively. Potential yield in that area is at least 100 gal/min if 20 ft or more of the saturated basin fill is penetrated.

Near Cienega Creek, potential yield of wells that tap the sedimentary rocks is a few gallons per minute owing to low hydraulic conductivity of the unit. Low hydraulic conductivity is inferred from the steep ground-water gradient to and the small discharge from several springs issuing from sedimentary rocks in sec. 8, T. 13 N., R. 4 E., adjacent to the study area. Several wells obtain water from an area of basin fill of less than 2 mi^2 in the vicinity of sec. 10, T. 13 N., R. 3 E. One well yields 900 gal/min. The saturated thickness probably is less than 100 ft.

Ground water in storage.--The rock units that form the major aquifer vary in thickness, areal extent, and contribution to total volume of ground water in storage from place to place in the basin. An estimate was made on the basis of 100 ft of saturated thickness for the major aquifer. The specific yield of the basin-fill unit is assumed to be 0.12; the specific yield of the volcanic, sedimentary, and marine rocks considered as a combined unit is assumed to be 0.03. The resulting estimate of the total volume in storage is 600,000 acre-ft. The basin fill may store more than 40 percent of the water; the volcanic, sedimentary and marine rocks contain the remainder.

Operation of the Combined Flow Systems

The three subareas of the northern part of the Agua Fria area are separated by nearly impermeable basement rock that prevents significant subsurface flow between them (pl. 1). The ground-water flow systems have minor interactions by means of surface flow; however, the subareas are nearly independent functioning systems. Ground-water development in either Lonesome Valley or Mayer subareas will affect ground-water conditions in the Black Hills subarea only by decreasing base flow in the Agua Fria River or Big Bug Creek where they flow into the Black Hills subarea. Potential recharge of less than 500 acre-ft/yr from the Agua Fria River to the Black Hills subarea may be diminished, but that quantity is small compared to an estimated 600,000 acre-feet in storage. Development in the Black Hills subarea will not affect the other two subareas.

Ground-Water Budget

A ground-water budget is an accounting for a time period of the recharge, changes in storage, and discharge of a ground-water flow system. A budget was prepared for the 1981 water year for the part of the study area above the Agua Fria River near Mayer gaging station (pl. 3, site 7) excluding the part within the Little Chino Valley ground-water basin. The budget was prepared by estimating discharges and the change in storage in 1981; the total of these two quantities is an estimate of recharge in 1981. Recharge in 1981 was atypical owing to the effect of delayed infiltration from precipitation during 2 preceding extremely wet years. Discharge components are shown in table 1; the number of significant digits does not indicate accuracy.

The ground-water flow systems were not in equilibrium in water year 1981. Distributed recharge away from the main streams and washes occurred in the Lonesome Valley subarea and probably in the Black Hills subarea during 1981 as a result of infiltration of precipitation during the preceding 2 wet years. Water levels were rising or were constant in some wells in the vicinity of Fain Ranch and Prescott Country Club while water levels in several pumped wells probably were declining. Water-level data are inadequate to estimate the distributed recharge in the Black Hills subarea. Substantial infiltration occurred along streams and washes in 1979 and 1980 because of greater-than-average runoff; a much smaller amount of infiltration occurred in 1981. Base-flow discharges along the Agua Fria River and tributaries reflected the high infiltration of the preceding wet years and probably were the greatest since 1942; discharges and lengths of reach in which flow occurs will be less in a period of normal years. The transient hydrologic conditions and lack of water-level data prevented estimation of reasonably accurate values of change in storage and thus recharge. The quantities listed in table 1 are intended to indicate the magnitude of the components of the ground-water budget.

Discharge.--The discharge components of this budget are ground water withdrawn for irrigation, domestic, and commercial use; base flow of the Agua Fria River; and evapotranspiration from riparian areas. Consumptive use by crops includes limited surface-water diversions in the area outside Lonesome Valley. Total discharge from the

Table 1.--Ground-water budget for the study area excluding the Little Chino Valley ground-water basin for the 1981 water year

[Components of this budget are estimated and indicate the magnitude of the transient hydrologic conditions. Values are in acre-feet]

Discharge:	
Irrigation (consumptive use by crops)	4,400
Domestic and commercial use	1,300
Evapotranspiration (riparian vegetation)	1,100
Base flow past Agua Fria River near Mayer gage (site 7, pl. 3)	2,900
Total	9,700
Change in storage:	
Upper Agua Fria ground-water basin	5,000
Black Hills subarea	[1]0
Mayer subarea	[1]0
Total	5,000
Recharge:	
Upper Agua Fria ground-water basin	9,200
Black Hills and Mayer subareas	5,500
Total	[2]14,700

[1]Probably an increase in storage in 1981, but data were not adequate to make estimates.

[2]Minimum value for recharge; data were not adequate to estimate the increase in storage in the Black Hills and Mayer subareas.

study area in 1981 is estimated to be 9,700 acre-ft; this discharge is greater than average because of a higher-than-average base flow in the Agua Fria River.

Irrigation pumpage for the study area was estimated by determining the amount of irrigated acreage from aerial photographs taken September 25, 1980, or October 15, 1977, and applying an annual consumptive-use rate of 4 acre-ft/acre. Domestic pumpage from private wells was estimated to be less than 100 acre-ft. Pumpage for the Prescott Country Club golf course was reported. Pumpage by water companies was reported or estimated on the basis of previous pumpage records. Base flow of the Agua Fria River near Mayer was estimated from adjusted streamflow hydrographs and flow-duration curves. Evaportranspiration was estimated by determining aerial coverage of vegetation and open water along streams and multiplying by an annual consumptive-use rate of 3 acre-ft/acre (Anderson, 1976).

Base flow of the Agua Fria River at Humboldt continued throughout the 1981 water year and probably was greater than that in an average year. Base flow of 1.61 ft^3/s was measured on November 21, 1980, and 0.84 ft^3/s on June 2, 1981 (table 2 and pl. 3, site 1) when evapotranspiration was near annual minimum and maximum values, respectively. The average of these measurements was used as an estimate of base flow for the year. Personnel of the Arizona Department of Water Resources measured 1.21 and 0.95 ft^3/s at the site on August 21 and September 22, 1981, respectively. The discharge at this point during water year 1981 is estimated to be 1,000 acre-ft. About 500 acre-ft of the base flow at Humboldt reached the Black Hills subarea in sec. 22, T. 12 N., R. 2 E., and infiltrated into the bed of the Agua Fria River. The rest evaporated or was transpired. Discharge from the Mayer subarea was a few acre-feet of base flow to Big Bug Creek, which enters the Black Hills subarea above Spring Valley. About 2,900 acre-ft of ground water discharged from the Black Hills subarea in water year 1981 as base flow in the Agua Fria River (table 1 and pl. 3, site 7). Total runoff for water years 1979 and 1980 at the Agua Fria River near Mayer gaging station was the greatest for 2 consecutive years since 1941 (fig. 3). Total runoff in 1981 was below normal—35 percent of average—but the continued high base flow indicated that the infiltration of the previous 2 years had not completely drained from the ground-water system. The gaging-station record does not directly represent conditions in the Upper Agua Fria ground-water basin but is a general indicator of conditions in the Black Hills subarea.

<u>Change in storage</u>.--Change in storage in the Upper Agua Fria ground-water basin was estimated on the basis of changes in water levels and an assumed specific yield of the aquifer material of the major aquifer. The estimate of change in storage is subject to large error owing to the uncertainty of the average water-level change. In Lonesome Valley, data

Table 2.--Base-flow discharge measurements along the Agua Fria River and tributaries for the 1981 water year

[Remarks: QW, chemical analyses; #718, measurement number]

Site (See plate 2)	Stream	Tributary to	Location	Latitude	Longitude	Date	Discharge, in cubic feet per second	Remarks
1	Agua Fria River	Gila River	Lazy River Drive, Humboldt T.13 N., R.1 E., sec. 14, NE¼SE¼SW¼	34°30'08"	112°13'45"	11-21-80 06-02-81	1.61 .84	QW
2	Do.	do.	Below Humboldt T.13 N., R. 21 E., sec. 22, SE¼SE¼SE¼	34°29'11"	112°14'03"	06-02-81	.80	
3	Do.	do.	At (A-12-01)01cba T. 12 N., R.1 E., sec. 1, NE¼NW¼SW¼	34°26'57"	112°12'48"	11-21-80 06-03-81	1.37 .22	
4	Do.	do.	At (A-12-02)17aaa T.12 N., R.2 E., sec. 17, NE¼NE¼NE¼	34°25'43"	112°09'59"	11-22-80 06-03-81	.61 .55	
5	Do.	do.	3,600 ft above Arcosanti T.11 N., R.2 E., sec. 12, SW¼NW¼NE¼	34°21'05"	112°06'08"	11-22-80 06-03-81	1.23 .86	QW
6	Do.	do.	300 ft below Sycamore Creek T.11 N., R.3 E., sec. 20, NW¼NE¼NW¼	34°19'25"	112°04'17"	11-24-80 06-04-81	3.84 1.23	
7	Do.	do.	Near Mayer, (09512500) 700 ft below Big Bug Creek T.11 N., R.3 E., sec. 20, SE¼NW¼SE¼	34°18'55"	112°03'48"	11-20-80 11-25-80 12-11-80 06-06-81 06-01-81	5.77 4.93 6.65 2.20 3.77	#718 #719 QW #720 #725 #724
8	Do.	do.	2,800 ft below Bloody Basin Road, T.10 N., R.3 E., sec. 8, SW¼NW¼SE¼	34°15'28"	112°03'46"	12-12-80	6.56	QW
9	Little Ash Creek	Ash Creek	Near Dugas Road T.12 N., R.3 E, sec. 34, NE¼NE¼NW¼	34°22'57"	112°01'51"	06-04-81	.30	
10	Ash Creek	Agua Fria River	3,600 ft above Agua Fria River, T.11 N., R.3 E., sec. 17, SW¼NW¼NW¼	34°20'10"	112°04'35"	11-23-80	.98	QW
11	Do.	do.	4,600 ft above Agua Fria River, T.11 N., R.3 E., sec. 18, NE¼NE¼NE¼	34°20'33"	112°04'37"	06-04-81	1.18	
12	Sycamore Creek	do.	400 ft below Nelson Place Spring, T.11 N., R.5 E., sec. 21, NE¼SE¼NE¼, unsurveyed	34°19'16"	111°49'47"	12-13-80 06-05-81	.31 .21	QW
13	Do.	do.	Dugas T.11 N., R.4 E., sec. 6, NE¼NE¼SW¼	34°21'38"	111°58'43"	12-16-80 06-05-81	.71 .28	
14	Little Sycamore Creek	Sycamore Creek	Dugas Road T.11 N., R.4 E., sec. 6, NE¼NE¼SW¼	34°21'43"	111°58'44"	12-16-80 06-05-81	.41 .15	
15	Sycamore Creek	Agua Fria River	4,600 ft above Agua Fria River, T.11 N., R.3 E., sec. 17, NE¼NE¼SE¼	34°19'53"	112°03'39"	11-23-80	1.07	
16	Do.	do.	300 ft above Agua Fria River, T.11 N., R.3 E., sec. 20, NE¼NE¼NW¼	34°19'28"	112°04'09"	06-04-81	.17	QW
17	Big Bug Creek	do.	150 ft above Agua Fria River, T.11 N., R.3 E., sec. 20, SW¼NW¼SE¼	34°18'54"	112°03'58"	11-20-80 06-01-81	.56 .28	

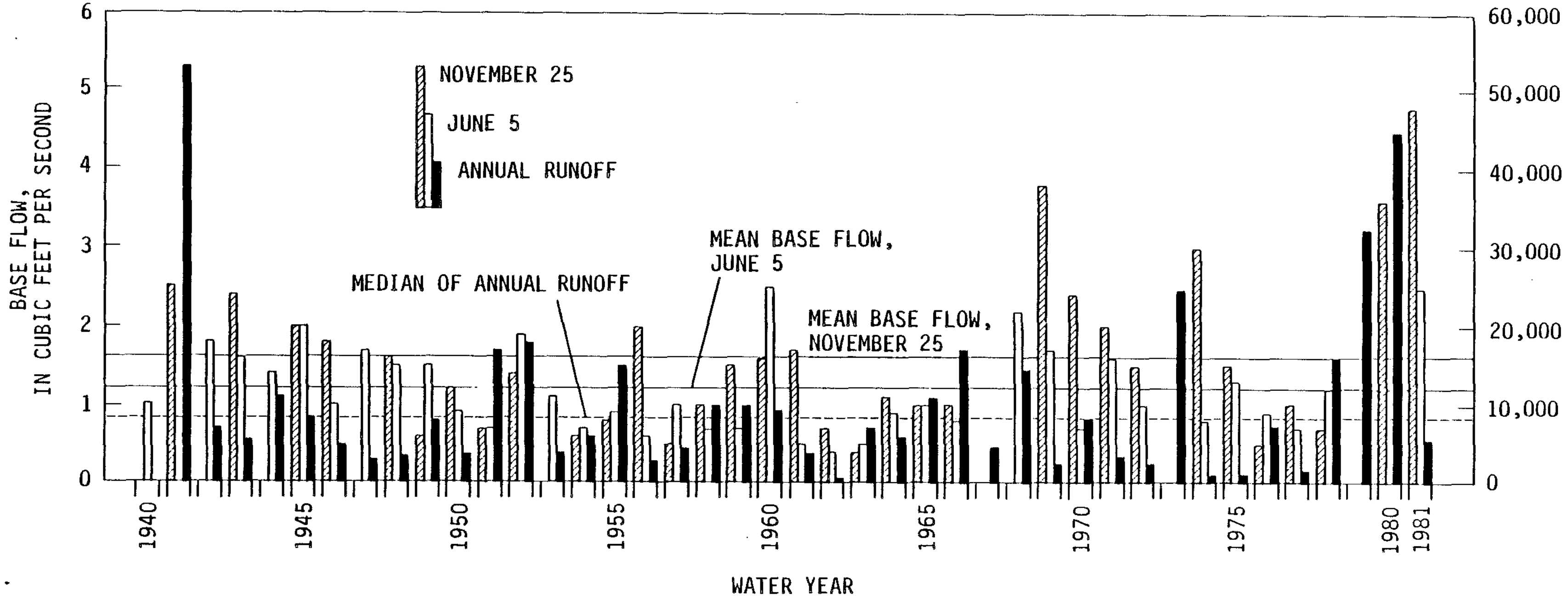


Figure 3.--Base flow for November 25 and June 5 and annual runoff, Agua Fria River near Mayer, 1941-81 water years.

indicate that water levels generally rose or were constant except for local declines in response to withdrawal in the vicinity of Fain Ranch and Prescott Country Club. The water-level rises were from 0 to 10 ft. The water level in well (A-14-01)27dbb rose at least 10.3 ft in water year 1981. The well is 2,000 ft east of the Agua Fria River and 3,000 ft east of Lynx Creek, which are the nearest sources of significant infiltration from streamflow. The nearest pumped wells are 4,000 ft away. An order-of-magnitude estimate of the gain in storage is 5,000 acre-ft assuming an average rise of about 2 ft and a specific yield of 0.12 distributed over the area of the major aquifer. The gain in storage in the Upper Agua Fria basin is not representative of average conditions.

Change in storage in the Mayer subarea was small and is assumed to be zero. Most of the recharge is consumed by pumpage and evapotranspiration; only a few acre-feet of water leaves the subarea as base flow.

Data are inadequate to determine the net change in storage in the Black Hills subarea. A net increase in storage probably occurred in 1981 but the quantity per unit area probably was less than that in Lonesome Valley. The clayey soil covering much of the subarea may cause lower than average infiltration of precipitation. A net outflow of water from storage occurred near the Agua Fria River and larger tributaries. In the large part of the subarea distant from the major streams and washes, however, recharge probably was still occurring in response to larger-than-normal precipitation and runoff in 1979 and 1980. Water pumped from wells near Big Bug Creek at Spring Valley and Cordes Junction probably was balanced by local recharge. Less than 100 acre-ft was pumped from storage near the intersection of Interstate 17 and State Route 69. The change in storage is assumed to be zero for estimation of the budget.

Recharge.--Recharge to the ground-water system occurs as infiltration of runoff in streams and washes and by infiltration of precipitation into permeable rock units. Infiltration along the streams and washes probably was less than average in 1981 because total runoff was about one-third of average. Streamflow or channel-loss data are not available to make an estimate of this infiltration.

Recharge to the ground-water system in the Upper Agua Fria ground-water basin in 1981 was equal to the total of discharge and change in storage and is estimated to be 9,200 acre-ft. Water year 1981, however, is not typical. Discharge was greater than average because of the large base-flow component, and the gain in storage was a delayed result of 2 extremely wet years. Typical recharge to the Upper Agua Fria ground-water basin may be only 2,000 or 3,000 acre-ft/yr. Recharge in the Mayer subarea was about the same as discharge and probably was less than 100 acre-ft. Recharge in the Black Hills subarea was estimated by assuming that recharge was equal to discharge because the change in storage was positive but small. Change in storage in Mayer and Black Hills subareas was assumed to be 0 for estimation of the recharge components of this budget.

Total recharge in the study area, excluding the Little Chino Valley ground-water basin, is estimated to be 14,700 acre-ft in 1981 (table 1). This estimate is based on values of the discharge from the system and the increase in water stored in the system and probably is much greater than that in an average year. The estimate would be greater if the change in storage in Black Hills subarea could be more accurately determined.

BASE FLOW OF STREAMS

Major streams and washes of the study area flow intermittently. Short periods of direct runoff occur in response to summer and winter rainfall and occasionally from snowmelt. After direct runoff has ended, base flow continues in some reaches of the stream channel. Base flow has two components—bank storage that drains from the sand and gravel of the banks and flood plains and long-term base flow, which is ground water that discharges into reaches of channel that are cut down into aquifers. Bank storage is water that infiltrated from the previous period of direct runoff and drains out in a few days to a few weeks. During dry years, only insignificant amounts of bank storage contribute to base flow. Long-term base flow is a result of discharge of ground water from the aquifer after months to years of movement through the aquifer. Under conditions of minimal or no ground-water development, base flow is indicative of the discharge from and therefore the recharge to the aquifer.

Base-flow reaches are discontinuous in the study area and occur principally in the major streams. Long-term base flow will occur in a reach where the channel bottom is cut down into aquifer material that drains the local system. Base flow also occurs downstream from a source area where the channel bottom is cut into nearly impermeable basement rocks. Base flow in the study area commonly is lost to evapotranspiration or infiltrates into the streambed within a few miles of its source.

Long-term base-flow variations can result from changes in ground-water discharge along source areas owing to changes in recharge from direct runoff. Several years of above-average direct runoff, such as occurred in the study area in 1979 and 1980, will recharge aquifers along stream channels and result in 1 or 2 years of above-normal base flow. Base-flow variations also can be caused by changes in consumption—crop variation or changes in area covered by water-loving plants or changes in nearby withdrawal rates. An increase or decrease in base-flow discharge will cause a corresponding lengthening or shortening of base-flow reaches.

Seasonal Variation

Base flows along the Agua Fria River and tributaries were measured during June 1-6 and November 20 to December 11 of the 1981 water year (table 2). During those periods, direct runoff was absent and evapotranspiration was near annual maximum or minimum values. Base-flow discharges in June generally are lower and base-flow reaches are shorter than in November. The average base-flow mean daily discharge for 41 years of record at the Agua Fria River near Mayer gaging station (pl. 3, site 7) for June 5 is 1.2 ft^3/s and for November 25 is 1.6 ft^3/s. Estimated base-flow mean daily discharges on those days at the gaging station for 1941-81 are shown in figure 3. The discharges are the sum of flow past the gage and diversion for irrigation that occurs a few hundred feet upstream. Missing values resulted from direct runoff occurring on those days or no data for diversion discharge.

Base-Flow Availability

Base flow at the gaging station ranges from 0.1 ft^3/s to about 6 ft^3/s. Flow equals or exceeds 0.3 ft^3/s 98 percent of the time, 0.6 ft^3/s 90 percent of the time, and 2.1 ft^3/s 50 percent of the time (fig. 4). Forty-one years of record are available for flow past the gaging station, some of which do not account for the upstream irrigation diversion. Only 26 years of record are available for the total base flow at the site. The longer record was used to adjust the flow-duration curve for the total flow.

Base Flows in the 1981 Water Year

Base flows measured along the Agua Fria River and tributaries during the 1981 water year probably were the greatest since 1942 and should be considered the maximum available for use by man and wildlife. The basin-fill alluvium beneath and near the channels probably was recharged to the maximum extent since 1942 because of the greater-than-average direct runoff during 1979 and 1980. The second greatest annual runoff at the gaging station occurred during 1980 and the third greatest during 1979 (fig. 3). Total runoff for 1979-80 was the highest for 2 consecutive years for the period of record. Base-flow discharge on November 25, 1980, at the Agua Fria River near Mayer gaging station was the greatest discharge in 33 record years and the June 5, 1981, base flow equaled the greatest discharge in 37 record years. Many of the reaches shown as having base flow will be dry during average to dry years. The base-flow distribution shown in Brown and others (1981) is more representative of dry years.

During the measurement period in November 1980, base flow in the Agua Fria River began 1.1 mi above Humbolt (pl. 3, site 1; table 2).

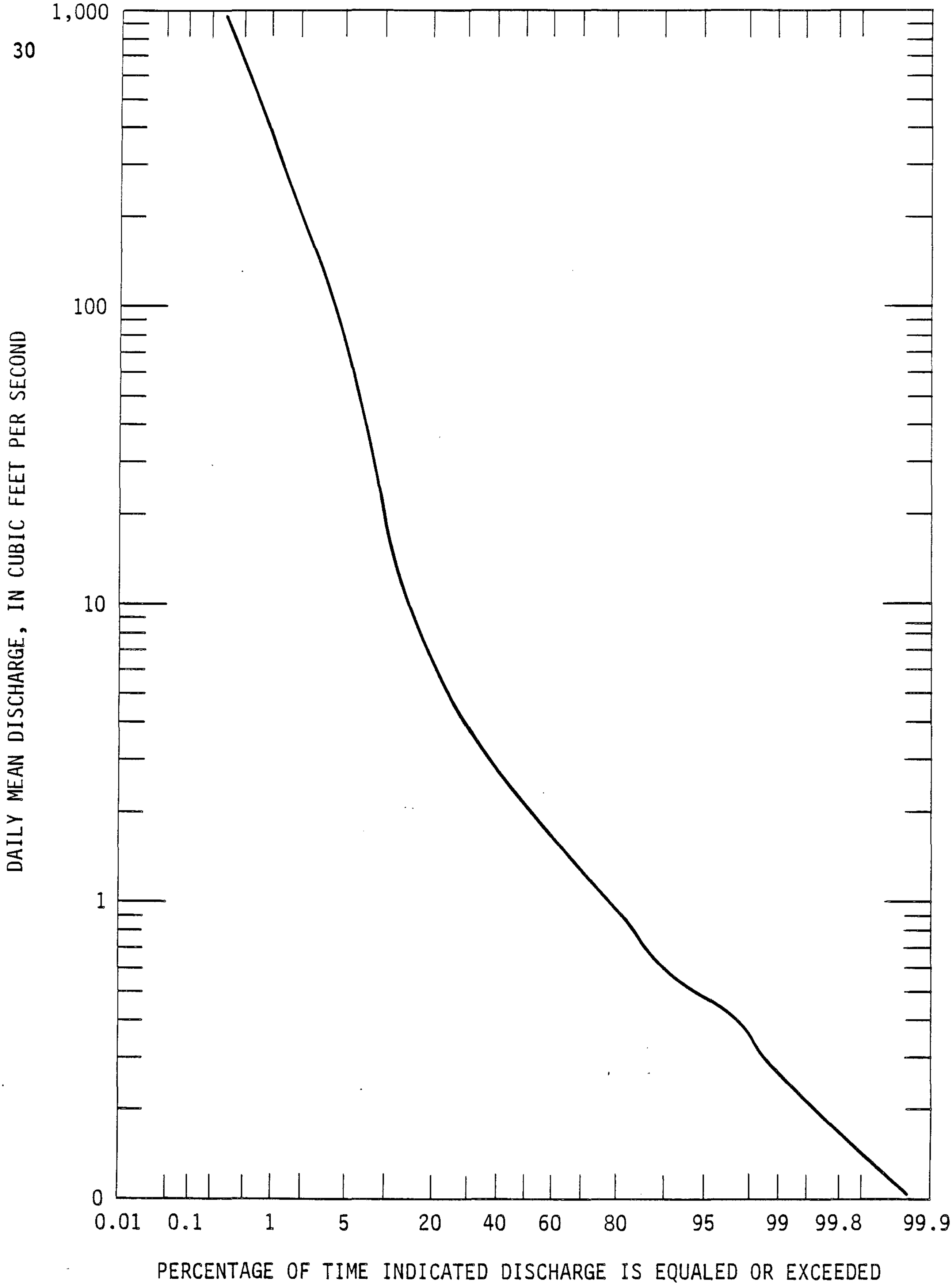


Figure 4.--Flow-duration curve, Agua Fria River near Mayer, 1941-81 water years.

Flow continued into the Black Hills subarea 3.7 mi above Interstate 17. During the June 1981 measurement period, 2.3 mi of the reach was dry. This reach is fed by ground-water discharge from the Upper Agua Fria ground-water basin. Base flow was present along a 1.2-mile reach below Interstate 17 (site 5) during both time periods. Base flow reappeared 2.2 mi above the gage (site 7) where Ash Creek and Sycamore Creek enter the Agua Fria River. This area is the main ground-water discharge point for the Black Hills subarea because the river channel is cut into low-permeability basement rock that prevents ground-water inflow below Sycamore Creek. Big Bug Creek provides the only significant addition of base flow in that reach.

Along Sycamore Creek, the November base flow began at Bee House Canyon Springs. Flow generally increased from Nelson Place Springs (site 12) to the Agua Fria River (site 15). The June base flow was less, and a few reaches in the first mile below Nelson Place Springs were dry.

The November base flow in Ash Creek began in sec. 24, T. 13 N., R. 2 E., and continued throughout its length downstream to its junction with the Agua Fria River (site 10). During the measurement period in June, Ash Creek was dry at Interstate 17 and probably along most of the channel above Interstate 17. Flow began a few hundred feet below the Interstate 17 crossing and continued to a point about 0.8 mi above Agua Fria River (site 11) where it infiltrated into the coarse sand of the channel bottom. Brown and others (1981) show perennial flow for about 4 mi below Kendall Camp where the stream is cut into basement rock. That area was not investigated during this study.

Base flow was measured at the mouth of Big Bug Creek (site 17) during both time periods. Base flow was present from the mouth to about 5 mi upstream near Cordes Junction. In June a short reach above and below Interstate 17 was wet with small pools; flow was not estimated because of disturbances in the channel for construction and diversion of flow into a pipeline that delivered water to a small pond in the southwest corner of sec. 25, T. 11 N., R. 2 E. Brown and others (1981) show perennial flow in the Bradshaw Mountains in the vicinity of sec. 6, T. 12 N., R. 1 E., where the stream is cut into basement rock and saturates a small area of basin fill.

Flow of about 0.2 ft^3/s was observed in Cienega Creek in December 1980, and some flow occurred in June 1981. The stream is reported to have base flow in all but extremely dry periods.

CHEMICAL QUALITY OF GROUND WATER AND BASE FLOW OF STREAMS

The atmosphere and rock and soil particles through which water flows are the sources of elements and compounds dissolved in ground water and base flow of streams. The atmosphere is a source of dissolved gases of which oxygen is the most important. Carbon dioxide is primarily supplied by the soil. The soil and rock particles that form the aquifer and the overlying unsaturated zone contribute most of the dissolved solids that affect the quality of water. The particular ions in solution and their concentrations depend on the composition of the aquifer material, the availability of soluble salts, and the operation of the flow system, which determines the flow path of the water.

Near recharge areas, dissolved-solids concentrations typically are low. As the water moves through the system, it may dissolve ions from the rock material that forms the aquifer. The dissolved solids are also concentrated by evapotranspiration at places where water discharges from the system. Because of this process, water discharging from springs and as base flow commonly is of poorer quality than that stored in the main volume of the aquifer. Ion concentrations also may be changed by the adsorption of the ions on the surfaces of rock and soil particles that form the aquifer. Natural displacement of adsorbed sodium ions by calcium or magnesium ions may cause increased concentrations of sodium and decreased concentrations of the calcium and magnesium ions.

The chemical character of water is defined by the proportions of the major ions in solution. Chemical-quality diagrams can be used to compare one analysis to another and to characterize the general composition of the water sampled (pl. 3). Chemical-quality data are in table 6 in the Hydrologic Data section at the end of this report.

Suitability for Use

The U.S. Environmental Protection Agency (1977a, b) has established national regulations and guidelines for the quality of water provided by public water systems. Primary drinking-water regulations govern contaminants that have been shown to affect human health. Secondary drinking-water regulations apply to those contaminants that affect esthetic quality. The primary regulations are enforceable either by the U.S. Environmental Protection Agency or by the States; in contrast, the secondary regulations are not Federally enforceable but are intended as guidelines for the States.

Chemical quality of ground water and base flow in the study area generally is acceptable for public supply, domestic use, stock watering, and irrigation of crops. Chemical analyses are available for 176 sites; water from 4 sites exceeded primary maximum contaminant levels for public supplies for inorganic chemicals (U.S. Environmental Protection Agency, 1976, 1977a, 1977b; Bureau of Water Quality Control, 1978). Analyses for organic and microbiological contaminants were not done.

Water from 14 sites exceeded the limits for secondary chemical contaminants; the 500 mg/L limit for total dissolved solids was exceeded at 11 sites, the 50 μg/L limit for manganese at 3 sites, and the 300 μg/L limit for iron at 2 sites. These sites are widely scattered and do not indicate extensive areas where ground water is of poor quality.

Analyses of water from 46 sites were available for dissolved-solids concentrations. The values ranged from 132 to 748 mg/L; the median value was 360 mg/L. Dissolved-solids concentrations estimated from specific-conductance values (dissolved solids = specific conductance x 0.6) ranged from 130 to 1,800 mg/L.

Water in the study area generally is suitable for irrigation. The water has a low sodium hazard and a medium to high salinity hazard (U.S. Salinity Laboratory Staff, 1954) (fig. 5). Sodium-adsorption-ratio (SAR) values range from 0.2 to 4.1 except for one value of 8.4 for water from well (A-14-01)35ddc1. Boron concentrations range from less than 1 to 520 μg/L, with a median value of 40 μg/L, which is less than the maximum contaminant level (U.S. Environmental Protection Agency, 1977c).

Ground-Water Subareas

Lonesome Valley

The chemical character of ground water in storage in the major aquifer of Lonesome Valley which discharges as base flow at Humboldt (pl. 3, site 1), typically is calcium bicarbonate with sodium and magnesium concentrations generally less than half of calcium concentrations. Water from three sites in the valley has concentrations of sodium or magnesium or both that are slightly higher than calcium. This ratio may be caused by a natural displacement of sodium ions by calcium ions. This process probably is responsible for the character of water from well (A-14-01)35ddc1 in which 92 percent of the cations are sodium and potassium. The typical bicarbonate concentration is larger than the sum of the chloride and sulfate concentrations.

Total dissolved-solids concentrations range from 196 to 460 mg/L in the major aquifer in Lonesome Valley. Dissolved-solids concentations estimated from specific-conductance values range from 130 to 440 mg/L. The water generally is hard with hardness concentrations ranging from 120 to 280 mg/L as $CaCO_3$. The value of 10 mg/L for well (A-14-01)35ddc1 probably is not representative of a large volume of soft water, but soft water may occur near the center of the valley.

Dissolved-solids concentrations in water from wells and springs outside the major aquifer in the Blue Hills and Bradshaw Mountains west of Humboldt commonly exceed the 500 mg/L secondary limit. Estimated dissolved-solid concentrations in water from 13 sites range from 504 to 1,830 mg/L. The water is withdrawn mainly from the basement rock unit.

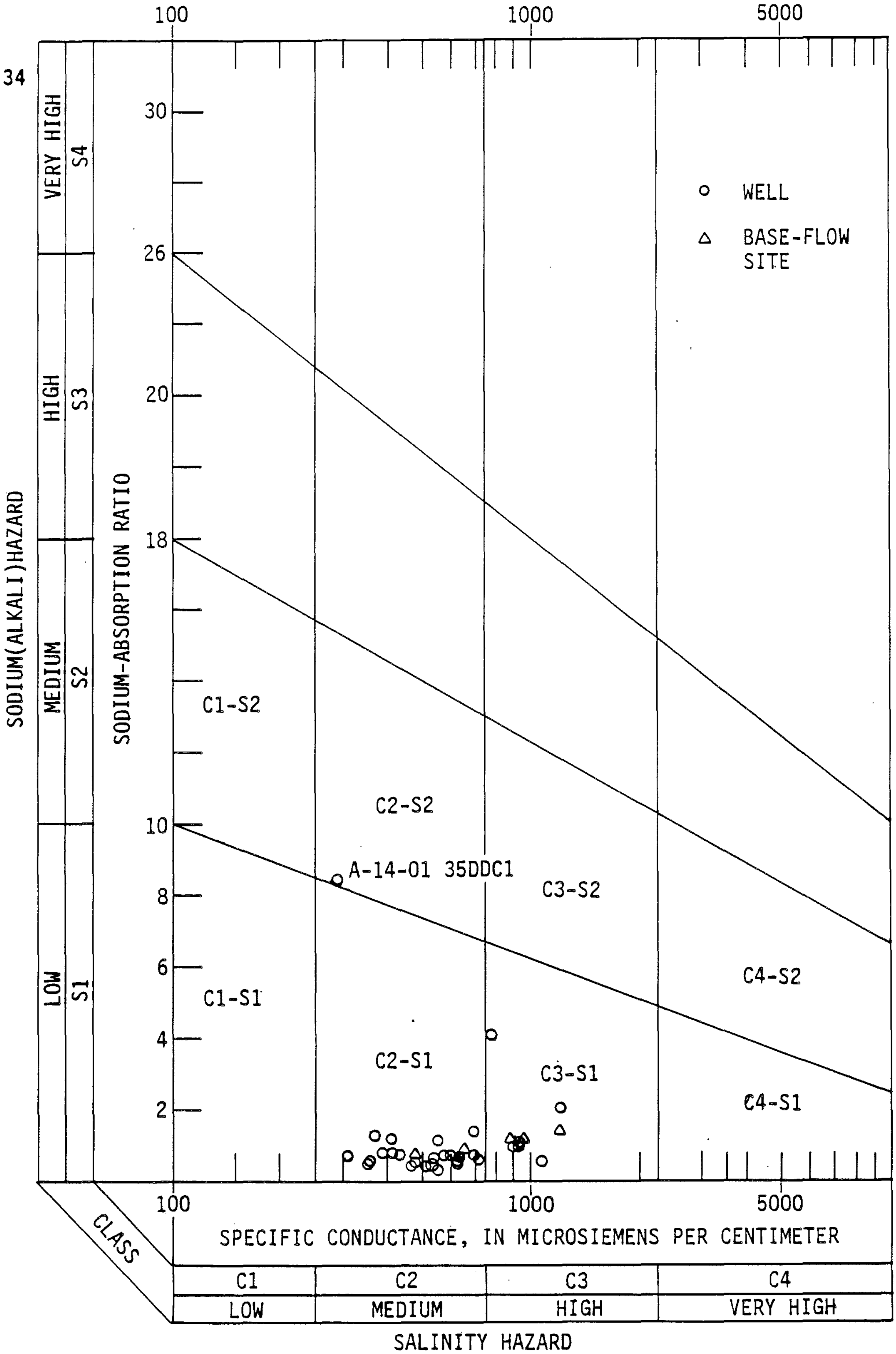


Figure 5.--Sodium and salinity hazard of ground water.

Fluoride concentrations range from 0.2 to 0.9 mg/L, and most values are between 0.3 and 0.8 mg/L. The fluoride concentration in sec. 5, T. 14 N., R. 1 W., may be more than 1 mg/L because water that contains 3.0 and 1.8 mg/L occurs upgradient in wells (B-14-01)06add and (B-14-02)01dcd, respectively.

Concentrations of arsenic and chromium in water from well (A-14-01)35ddc1 exceed the limits of 50 µg/L. The well yields a sodium bicarbonate water that is dissimilar in chemical character to most of the water sampled in Lonesome Valley. The ion-displacement process probably increased sodium concentrations and decreased calcium and magnesium in water from this well. If excessive arsenic and chromium levels are related to the process, then other nearby wells may yield water that contains excessive levels of arsenic and chromium.

Water in the basin fill in Coyote Springs ground-water basin is calcium magnesium bicarbonate in character. Dissolved-solids concentrations range from 266 to 518 mg/L. The water generally is hard, and hardness ranges from 210 to 350 mg/L as $CaCO_3$. Fluoride concentrations range from 0.2 mg/L to 0.9 mg/L. The chemical character of the water is consistent with the presence of significant amounts of limestone and dolomite in the Black Hills to the east of the basin where most of the recharge originates.

Mayer

Ground water in the Mayer subarea is variable in quality; specific-conductance values range from 370 to 2,130 microsiemens per centimeter (µS/cm) at 25 °C. The estimated dissolved-solids concentrations range from 220 to 1,280 mg/L; the single measured value is 698 mg/L. Fluoride concentrations range from 0.2 to 0.7 mg/L. Manganese concentration in water from one well exceeds the maximum limit, however, this well may not be representative of average water quality in the area.

Black Hills

The chemical character of ground water near Spring Valley and Cordes Junction is calcium bicarbonate. Typically, sodium and magnesium concentrations are about half of the calcium concentration, and chloride and sulfate concentrations are about one-quarter of the bicarbonate concentration. Hardness values are 234 to 290 mg/L as $CaCo_3$. Dissolved-solids concentrations range from 336 to 405 mg/L, and estimated dissolved-solids concentrations from specific-conductance values range from 150 to 370 mg/L. Fluoride concentrations range from 0.1 to 1.0 mg/L.

Base Flow of Streams

Water samples for chemical analyses were taken during November and December 1980. Sampling sites are listed on plate 3 and table 2, and data are in table 6. During the sampling period, base flow in the Agua Fria River and its tributaries probably were the greatest since 1942. During a normal to dry year, the concentrations of dissolved solids and specific-conductance values will be larger owing to lower discharges with a larger part of the water being lost to evapotranspiration.

Dissolved-solids concentrations and specific-conductance values generally increase downstream along the Agua Fria River and Sycamore Creek except where tributary inflow of water that contains smaller concentrations dilutes the streamflow. The dissolved-solids concentration at Humboldt (site 1) is 306 mg/L and increases to 582 mg/L at site 3A, which is 5 mi downstream. Dissolved-solids concentration in the base flow at the Agua Fria River near Mayer gaging station is smaller than that at site 5 because of dilution by tributary inflow from Ash Creek (site 10) and Sycamore Creek (site 16). Specific conductance along the Agua Fria River ranged from 486 µS/cm at 25 °C at Humboldt (site 1) to 1,211 µS/cm at site 5. Below site 5, values ranged from 974 to 872 µS/cm.

Base flow in the Agua Fria River is calcium bicarbonate in character. Sodium and magnesium are about equal in concentration and the total is slightly larger than the calcium concentration. The concentration of chloride is slightly lower than sulfate with the sum exceeding the bicarbonate value. The calcium bicarbonate water leaving Lonesome Valley at Humboldt probably dissolves gypsum and halite along the channel in the reach downstream to site 3A. Base flow at site 5 is calcium bicarbonate in character and is a mixture of Agua Fria River water and ground water probably originating from Big Bug Creek. Evapotranspiration along Agua Fria River probably increased the dissolved-solids concentration. Base flow at the gaging station (site 7) is calcium magnesium bicarbonate water that shows an increase of magnesium and bicarbonate and a decrease of sodium and sulfate because of tributary inflow from Ash and Sycamore Creeks. Chemical character of base flow in Ash and Sycamore Creeks is calcium magnesium bicarbonate.

Base flow of the Agua Fria River at and below Humboldt was analyzed for heavy metals and cyanide. No significant concentrations were found. Water from Sycamore Creek below Nelson Place Springs (site 12) contained 63 µg/L of lead, but lead was not detected at site 16. Lead was also below the detection limit at sites 1 and 3A on the Agua Fria River. The concentration seems anomalous, and the source of the lead is unknown.

Chemical character of ground water and base flow generally is similar where exchange between the stream and the aquifer is occurring. The character for water from well (A-12-02)08dbd and site 3A indicates that the alluvium in that area is recharged from flow in the Agua Fria River. The character of water from well (A-12-03)08bdd is similar to base flow at site 10 on Ash Creek.

EFFECTS OF WATER-RESOURCES DEVELOPMENT

The water resources of the northern part of the Agua Fria area are limited owing to the semiarid climate. Ground water is and has been the source for public supplies and most irrigation and domestic supplies. Past withdrawals have caused water-level declines in three areas. Near-future increases in water use will need to be met by increased ground-water withdrawals because alternate sources are not currently available. A large increase in withdrawals will cause additional water-level declines.

Contamination of ground water stored in the aquifers of the study area would threaten the potability of water supplies and could create a health hazard. Knowledge of contamination potential can help local residents and owners prevent ground-water contamination.

Water-Level Declines

Hydraulic head in an area of about 5 mi^2 near Prescott County Club and Fain Ranch has declined as much as 50 ft in response to pumping for irrigation and public supply (pl. 2). The area of decline was estimated from measured and reported water levels in six wells and the shape of potentiometric contours. Most of the decline has occurred since 1967 although pumping at Fain Ranch began in 1936. Fine-grained material occurs in the upper layers of the aquifer in the area, and ground water in deeper layers may occur under confined conditions. Before significant pumping began, there probably was little hydraulic-head variation with depth. Hydraulic heads in 1981 were lower in some deeper wells than in nearby shallow ones. Continued pumping in the vicinity will cause additional lowering of hydraulic heads until the cone of depression is large enough to induce sufficient recharge of water through the fine-grained layers to stabilize heads. If the rate of pumping is greater than the average recharge, the hydraulic heads will continue to decline.

Water levels have declined in the vicinity of Prescott Valley in the two active public-supply wells and in a few nearby wells. The water level in well (B-14-01)15aba has declined 66 ft since 1972. Well (B-14-01)10acd, which is pumped for a public water supply, has declined about 18 ft since 1972. The water level in well (B-14-01)14acc has declined 10 ft since 1978. The altitude of water levels in wells varies in the area because hydraulic heads are different above and below lava flows in the subsurface. The flows can retard or prevent the vertical movement of water in response to recharge or discharge. Water levels in wells

(B-14-01)11daa and (B-14-01)14acc represent hydraulic heads above lava flows, but the water level in well (B-14-01)10acd represents hydraulic heads unaffected by lava flows. During the drilling of well (B-14-01)15aba, water was first encountered above the upper lava flow. Water levels in the well in 1971 and 1972 represented combined hydraulic heads. The hydraulic head is now below the lava flows, and water originating above the upper lava flow cascades down the hole to the potentiometric surface, which is 526 ft below land surface.

No significant water-level changes have occurred in the Mayer subarea. No large cones of depression have developed from past withdrawals in Black Hills subarea. Minor local declines of a few feet may have slightly changed the shape of the potentiometric surface near the intersection of Interstate 17 and State Route 69 at Cordes Junction.

Potential Ground-Water Contamination

Ground-water contamination from man's activities can be minimized by identification of potential contaminant sources; delineation of areas where contaminants may readily enter aquifers; and joint action by managers, developers, and landowners to control use and disposal of potential contaminants. Contaminants can enter the aquifer at any location; however, it will take longer for the contaminants to penetrate to the saturated zone where depth to water is great or where the unsaturated zone is fine grained and the vertical hydraulic conductivity is low. Common activities that may produce contaminants include agriculture, solid-waste disposal, liquid-waste disposal, wastewater treatment and effluent disposal, and transport of substances by people or natural processes. Agricultural activities apply fertilizers, herbicides, and pesticides; generate solid and liquid waste; cultivate crops; and irrigate the land. Precipitation and irrigation water may dissolve contaminants and infiltrate directly to the aquifer or runoff from the source area and infiltrate through the channel bottoms and flood plains of washes and streams. Substances dissolved from solid and liquid waste and effluent from wastewater treatment may infiltrate into the aquifer. Spills from vehicles or pipelines and accidental transport of substances by winds and floods also may contaminate aquifers.

In Lonesome Valley, contaminants could most easily enter the aquifer where infiltration of precipitation and direct runoff are concentrated along the channel bottoms, flood plains, and terraces of Lynx Creek, Agua Fria River, and larger canyons and washes. The next most easily contaminated areas are low areas near the Agua Fria River that are covered with basin-fill alluvium.

In the Mayer subarea, contaminants could most easily enter the aquifer along the channel, flood plain, and nearby low areas of Big Bug Creek that are mainly underlain by basin fill. The water table is shallow in the area, and contaminants could move downward rapidly into the aquifer.

In the Black Hills subarea, contaminants could most easily enter the aquifer along the channel, flood plains, and terraces of Agua Fria River, Big Bug, Sycamore, and Ash Creeks, and the larger washes and canyons. Most of these areas are underlain by basin fill. The next most easily contaminated area is along the west side of the subarea where basin fill crops out at the surface and precipitation can readily infiltrate into the subsurface. An area underlain by volcanic and sedimentary rocks from Cordes Junction to the Agua Fria River is subject to contamination because the volcanic rocks are fractured and may allow precipitation to move rapidly down into the aquifer.

Present and Future Develpment

In the Lonesome Valley subarea, the withdrawal, consumption, and outflow of about 4,700 acre-ft of ground water in 1981 was small compared to more than 800,000 acre-ft in storage. Effects of development through 1981 have been slight. Withdrawals in 1981 were less than recharge although local water-level declines have occurred in two places. Ground-water resources of Lonesome Valley are moderately developed at Prescott Valley and in the area from Fain Ranch south to Humboldt. The northeastern part of Lonesome Valley and Coyote Springs ground-water basin have little or no development. Wells have not been drilled in an area of about 25 mi^2 where Little Chino Valley ground-water basin and Upper Agua Fria ground-water basin join, and subsurface conditions are unknown.

Lonesome Valley contains the largest volume of water in storage in the study area and is the most favorable for exploration and development of new public or commercial water supplies. A major increase in withdrawal would be from water in storage, and water levels would decline. An increase in withdrawal in the Dewey-Humboldt area will reduce the base flow in the Agua Fria River at Humboldt.

The ground-water resources of the Mayer subarea are limited owing to the small volume of the aquifer. A few thousand acre-feet of water are in storage. The major aquifer is unfavorable for development of substantial new public or commercial supplies.

Significant development of ground water in Black Hills subarea has occurred at Spring Valley, Cordes Junction, Orme Ranch, and in secs. 22 and 27, T. 12 N., R. 2 E., however, much of the subarea is undeveloped. The most favorable place to search for new public or commercial water supplies is along the western side of the subarea and is indicated on plate 2 by a potential yield pattern of 50 to 1,000 gal/min. The least favorable area to search is in the Black Hills on mesas between major canyons or ridge tops near basement-rock outcrops.

Future Data Needs

In order to make a quantitative analysis of the ground-water flow system in the Lonesome Valley subarea and evaluate the effects of present and future development, it is essential to determine the nature of the hydraulic connection between the Little Chino Valley and the Upper Agua Fria ground-water basins. The area where the two flow systems join includes about 25 mi^2. Wells were not developed in this area at the time of this study. Part of the current land development is in this area and most of the future population expansion probably will occur here. A major increase in ground-water withdrawal could cause water-level declines in one or both ground-water basins depending on the nature of their hydraulic connection and the volume of ground water in storage. Additional quantitative data required include:

1. Extent, thickness, and hydraulic parameters of the aquifer in the main part of Lonesome Valley.
2. Annual runoff and channel losses in Lynx Creek, Coyote Wash, Yaeger Canyon, Clipper Wash, the Agua Fria River, and other washes that are a major source of recharge to the system.
3. Changes in the shape of the potentiometric surface and in water levels with time.
4. Distribution and volume of ground-water withdrawal.
5. Estimates of return flow from irrigation.

Infiltration from direct runoff in Big Bug Creek provides much of the recharge near Mayer, Spring Valley, and Cordes Junction. A significant volume of ground water is in storage in the vicinity of Spring Valley and Cordes Junction but storage is limited near Mayer. In order to make a quantitative analysis of the ground-water flow system, determine the volume of ground water in storage, and estimate effects of future development, at least the following data will be required:

1. Extent, thickness, and hydraulic parameters of the aquifers from above Mayer to the Agua Fria River.
2. Annual runoff and channel losses in Big Bug Creek from Poland Junction to the mouth and in the Agua Fria River from sec. 21, T. 12 N., R. 2 E., to the Agua Fria River near Mayer gaging station.
3. Changes in the shape of the potentiometric surface and in water levels with time.
4. Distribution and volume of ground-water withdrawal.

SUMMARY

At least 1,400,000 acre-feet of ground water is in storage in the major aquifers in the northern part of the Agua Fria area. Ground water is the source for all public water supplies and most irrigation and private supplies in the 700-square-mile area. Base flow and direct runoff in the Agua Fria River and its tributaries are reserved for local and downstream users who have existing water rights. The increasing demand for water caused by the rapid population growth and development will need to be met by increased ground-water withdrawals. Alternate sources of water are not currently available.

The study area is divided into three subareas—Lonesome Valley, Mayer, and Black Hills—that are separated by nearly impermeable basement rocks that prevent significant ground-water flow between them. The geologic formations of the area are combined into hydrologic rock units that have similar ground-water storage and transmissive properties. They include basement, marine, sedimentary, volcanic, and basin fill. Basement rocks are nearly impermeable and serve to separate the ground-water systems. One or more of the remaining units form the aquifer in the subareas. Basin-fill and sedimentary rocks are the most permeable units and may yield as much as 2,000 gallons per minute of water to wells where saturated.

The subareas are nearly independent ground-water systems but have minor interactions by means of surface flow. Ground-water development in either Lonesome Valley or Mayer will affect ground-water conditions in the Black Hills subarea only by decreasing potential recharge from base flow in the Agua Fria River by less than 500 acre-ft/yr or in Big Bug Creek by a few acre-feet per year. Development in the Black Hills subarea will not affect the other two subareas.

Effects of ground-water development through 1981 in the Lonesome Valley subarea have been slight. Local hydraulic-head declines of as much as 50 feet have occurred near Fain Ranch and Prescott Country Club and declines of a few tens of feet have occurred in the Prescott Valley area. The subarea contains about 800,000 acre-feet of water in storage and is the most favorable for development of new water supplies. A major increase in withdrawal would result in the removal of water from storage, water-level declines, and a decrease in base flow in the Agua Fria River at Humboldt. The ground-water resources of the Mayer subarea are small owing to the limited volume of the aquifer; a few thousand acre-feet of water are in storage. Most of the Black Hills subarea has had little development; moderate ground-water development has occurred at Spring Valley and Cordes Junction. An estimate of water in storage is 600,000 acre-feet; aquifer volume is poorly known. The most favorable area for development of new water supplies in the Black Hills subarea is along the west side where basin fill crops out.

The source of most recharge to the ground-water flow systems is infiltration of direct runoff through the channel bottoms and flood plains of the major streams and washes; some recharge is from infiltration of precipitation on the rock units that form the aquifers. Ground water moves from higher recharge areas toward lower discharge areas and is discharged as pumpage, evapotranspiration, or base flow in the Agua Fria River and its tributaries. In the Little Chino Valley ground-water basin, some ground water moves northwestward and leaves the study area as underflow.

The ground-water flow systems were not in equilibrium in water year 1981. Substantial infiltration occurred along streams and washes in 1979 and 1980 because of greater-than-average runoff; a much smaller amount of infiltration occurred in 1981. Distributed recharge away from the main streams and washes occurred in the Lonesome Valley subarea and probably in the Black Hills subarea during 1981 as a result of infiltration during the preceding 2 wet years.

A ground-water budget for the 1981 water year included a discharge of 9,700 acre-feet. About 4,400 acre-feet was used for irrigation, 1,300 acre-feet was used for domestic and commercial purposes, 1,100 acre-feet was consumed by evapotranspiration from riparian areas, and 2,900 acre-feet was base flow. Recharge of 14,700 acre-ft is the sum of discharge and change in storage. This quantity is a minimum value because data are not available to estimate the gain in storage in the Black Hills subarea. The gain in storage was assumed to be zero in the Mayer and Black Hills subarea. The gain in storage was 5,000 acre-ft in the upper Agua Fria ground-water basin.

Base flows along the Agua Fria River and its tributaries during the 1981 water year probably were the greatest since 1942 and the maximum available for use by man and wildlife. At the Agua Fria River near Mayer gaging station, base flow from ground-water discharge ranges from 0.1 to about 6 cubic feet per second.

The chemical quality of the ground water and base flow of the Agua Fria River and its tributaries in the study area generally is acceptable for public supply, domestic use, livestock, and irrigation of crops. Water from 4 of 176 sites failed to meet Arizona and U.S. Environmental Protection Agency primary water-quality standards for public supply. The general chemical character of ground water in the major aquifers is calcium bicarbonate. Total dissolved solids ranged from about 132 to 748 milligrams per liter; the median value was 360 milligrams per liter. Fluoride concentrations ranged from 0.1 to 1.0 milligrams per liter.

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GLOSSARY

Hydrologic terms used in the report are defined below. The definitions were adapted from Baldwin and McGuinness (1963), Langbein and Iseri (1960), Lohman and others (1972), and U.S. Water Resources Council (1980).

Aquifer — A geologic formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

Artesian aquifer — See confined aquifer.

Base flow — Ground water that has been discharged into a stream channel as spring or seepage water.

Confined aquifer — An aquifer that lies beneath less permeable material and in which ground water is confined under pressure significantly greater than atmospheric. Static water levels in wells that penetrate a confined aquifer are higher than the top of the aquifer. Synonym: artesian aquifer. See also unconfined aquifer.

Consumptive use — The quantity of water absorbed by crops and transpired or used directly in the building of plant tissue together with that evaporated from the cropped area.

Contaminant — Any physical, chemical, biological, or radiological substance or matter in water. U.S. Environmental Protection Agency drinking-water regulations express limits as "maximum contaminant levels."

Direct runoff — Water that enters stream channels promptly after rainfall or snowmelt.

Discharge of ground water — The processes by which water leaves an aquifer.

Evapotranspiration — Water withdrawn from a land area by evaporation from water surfaces and moist soil and by plant transpiration.

Ground-water basin—A depression of the earth's surface that is partly filled with an aquifer. The rock forming the bottom and sides of the depression is less permeable than the rock forming the aquifer.

Ground-water divide — A ridge in the water table or other potentiometric surface from which ground water moves away in both directions.

Hydraulic conductivity — The volume of water that will move in unit time under a unit hydraulic gradient through a unit area measured at right angles to the direction of flow. Hydraulic conductivity describes the ability of the aquifer material to transmit water and may have substantially different values for horizontal and vertical flow through the same material.

Hydraulic gradient — The change in head per unit of distance in a given direction.

Hydraulic head — The height above a standard datum of the surface of a column of water that can be supported by the static pressure at a given point in an aquifer. In this report, datum used is National Geodetic Vertical Datum of 1929. See potentiometric surface.

Intermittent stream — A stream that flows only at certain times of the year when it receives water from springs or from some surface source, such as melting snow in mountainous areas. Synonym: seasonal.

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. Referred to as sea level in this report.

Potentiometric surface — An imaginary surface representing the static head of ground water, of which the water table is one type. The potentiometric surface for a confined aquifer is the level at which water would stand in wells that tap the aquifer.

Perched ground water — Unconfined ground water separated from an underlying body of ground water by an unsaturated zone and held up by material with a low hydraulic conductivity.

Perennial stream — A stream that flows continuously.

Recharge — The processes of addition of water to the zone of saturated permeable material.

Sorting — A measure of the range in size of particles forming a sediment. Well sorted sediments contain particles of near uniform size; poorly sorted sediments contain many sizes of particles, such as various combinations of clay, silt, sand, pebbles, cobbles, and boulders.

Specific capacity — The rate of discharge of water from the well divided by the drawdown of the water level within the well.

Specific yield — The ratio of the volume of water which a unit volume of aquifer will yield by gravity drainage to its own volume.

Storage — Water naturally or artificially impounded in an aquifer.

Transmissivity — The volume of water that will move in unit time through a unit width of an aquifer under a unit hydraulic gradient. Transmissivity describes the ability of the entire thickness of an aquifer to transmit water and is the product of hydraulic conductivity and saturated thickness.

Unconfined aquifer — An aquifer in which the upper surface of the zone of saturation forms a water table under atmospheric pressure. Synonym: water-table aquifer. See also confined aquifer.

Water budget — An accounting of the recharge to, discharge from, and storage changes in an aquifer for a given time period.

Water table — The surface in an unconfined aquifer at which pressure is atmospheric and below which the rocks are saturated with water. The water table is the level at which water stands in wells that penetrate the uppermost part of an unconfined aquifer. See potentiometric surface.

Water-table aquifer — See unconfined aquifer.

HYDROLOGIC DATA

Table 3.--Measurements of water levels in selected wells in the northern part of the Agua Fria area

Local number: See figure 2 for description of well-numbering and location system.

Altitude: In feet above sea level, determined from U.S. Geological Survey topographic maps or engineer's level lines.

Water level: In feet below land surface.

Method of measurement: S, steel tape; V, calibrated electric tape; T, electric tape; R, reported.

Site status: R, recently pumped; S, nearby pumping; P, pumping; X, surface-water effect.

Local number	Altitude	Water level	Method	Date	Status
A-10-02 17DBA	2925.00	45.20	S	08/22/78	---
A-10-02 17DDA	2900.00	6.30	S	08/22/78	---
A-10-03 08ADD	3250.00	14.59	S	05/18/78	---
A-10-03 08DAA	3250.00	15.05	S	05/18/78	---
A-10-04 14CCD	4370.00	7.46	S	08/21/78	---
A-11-02 02ABB1	3711.00	97.00	S	06/09/77	---
A-11-02 02ABB2	3715.00	50.00	S	06/09/77	---
		42.20	S	10/18/78	---
A-11-02 03BCC	4060.00	266.70	S	11/13/81	---
A-11-02 06ABA	4060.00	15.70	S	06/10/77	---
A-11-02 09BCC	3950.00	31.31	S	02/13/82	---
A-11-02 09CCB	3925.00	25.20	---	06/09/77	---
		21.40	S	02/13/82	---
A-11-02 09CCC	3940.00	85.50	S	06/09/77	---
		66.58	S	02/13/82	R
A-11-02 09CCD	3920.00	43.27	S	02/13/82	---
A-11-02 09DBD	3970.00	105.10	S	02/13/82	---
A-11-02 09DDD	3885.00	19.57	S	02/13/82	---
A-11-02 11CCA	3820.00	43.10	---	06/09/77	---
A-11-02 12BDA	3620.00	24.90	---	05/23/77	---
A-11-02 12DDA	3580.00	36.20	S	05/24/77	---
A-11-02 14BDD	3830.00	300.50	V	05/18/77	P

Table 3.--Measurements of water levels in selected wells in the northern part of the Agua Fria area—Continued

Local number	Altitude	Water level	Method	Date	Status
A-11-02 14CAD	3805.00	68.50	S	05/18/77	---
A-11-02 14CBB1	3805.00	79.50	S	06/09/77	S
A-11-02 14CBB2	3800.00	64.20	S	06/10/77	P
A-11-02 14CCA	3810.00	66.65	S	05/25/77	---
A-11-02 14CCD1	3760.00	16.60	S	05/25/77	---
A-11-02 14CCD2	3790.00	18.20	S	05/25/77	---
A-11-02 14DAC	3760.00	54.70	S	05/24/77	---
A-11-02 14DAD	3745.00	56.90	S	05/24/77	---
A-11-02 14DCD2	3765.00	124.00	---	05/18/77	---
A-11-02 16BBA	3930.00	50.24	S	02/13/82	---
A-11-02 23ABA	3770.00	97.00	S	02/10/82	---
A-11-02 23ABB1	3780.00	85.86	S	02/12/82	---
A-11-02 24BBB	3730.00	60.11	S	08/23/78	---
A-11-02 24CAD	3690.00	58.90	---	05/18/77	---
		80.85	S	02/12/82	---
A-11-02 24DDB	3635.00	58.35	S	02/10/82	---
A-11-02 25AAB	3640.00	57.60	S	02/12/82	---
A-11-02 25ACD	3685.00	105.50	---	05/18/77	---
		54.60	S	02/12/82	---
A-11-02 25BCB	3678.00	21.00	S	02/12/82	---
A-11-02 25BDD	3700.00	123.00	---	05/18/77	---
		98.92	S	02/12/82	R
A-11-02 29DAA	3770.00	7.01	S	10/20/78	---
A-11-03 17CCC	3540.00	17.50	---	05/23/77	---
A-11-03 18ADA	3555.00	21.90	S	05/23/77	---
A-11-03 18DBA	3560.00	26.40	---	05/23/77	---
A-11-03 18DDB	3560.00	18.90	S	05/23/77	---
A-11-04 01CBB	4713.00	9.60	S	10/24/80	---
A-12-01 02DAA1	4120.00	24.05	S	10/19/78	---
A-12-01 02DAA2	4120.00	19.34	---	10/19/78	---
A-12-01 04BBC3	4918.00	188.80	---	08/03/77	---

Table 3.--Measurements of water levels in selected wells in the northern part of the Agua Fria area—Continued

Local number	Altitude	Water level	Method	Date	Status
A-12-01 04BBC4	4920.00	186.30	---	08/03/77	---
A-12-01 04BBC5	4920.00	66.20	---	08/03/77	---
A-12-01 04BDA	4890.00	109.90	---	08/03/77	---
A-12-01 04CAA1	4850.00	57.60	---	08/03/77	---
A-12-01 05CAA1	4830.00	8.38	S	10/17/78	---
A-12-01 05CAB	4840.00	20.60	S	10/17/78	---
A-12-01 09CCB1	4640.00	45.70	S	07/23/77	---
A-12-01 09CCB2	4640.00	46.90	S	07/23/77	---
A-12-01 09DCC2	4620.00	47.50	---	08/03/77	---
A-12-01 15CDB	4550.00	43.10	---	08/03/77	---
A-12-01 22BBB1	4470.00	22.40	T	10/04/78	---
A-12-01 22BBC	4470.00	18.25	S	10/04/78	---
A-12-01 22BCA	4445.00	17.02	S	10/04/78	---
A-12-01 22BCD	4440.00	14.02	S	10/04/78	---
A-12-01 22CAB	4410.00	12.63	S	10/04/78	---
A-12-01 22CDA	4410.00	13.80	V	10/03/78	---
A-12-01 22DDD	4370.00	22.44	S	10/04/78	---
A-12-01 24CDC	4408.00	80.50	V	10/19/78	P
		67.60	---	10/14/71	---
A-12-01 26BAA1	4360.00	39.10	---	07/23/77	---
A-12-01 26BAB	4375.00	52.80	---	10/03/78	R
A-12-01 26BBB	4390.00	20.70	V	10/03/78	---
A-12-01 26DAB	4260.00	26.70	---	10/20/78	---
A-12-01 27DBA1	4475.00	20.37	S	10/03/78	---
A-12-01 27DBA2	4475.00	25.00	S	10/03/78	---
A-12-01 29DAC	4900.00	46.50	V	10/05/78	P
A-12-01 31BCC	5300.00	16.40	---	10/05/78	P
A-12-01 33AAD	4645.00	88.40	V	10/05/78	---
A-12-01 33ADA	4640.00	90.00	---	10/05/78	R
A-12-01 33ADD	4635.00	84.40	---	10/05/78	---
A-12-01 34ACC	4535.00	30.89	---	10/05/78	---

Table 3.--Measurements of water levels in selected wells in the northern part of the Agua Fria area--Continued

Local number	Altitude	Water level	Method	Date	Status
A-12-01 34DAC1	4480.00	63.60	---	10/05/78	---
A-12-01 34DBB	4525.00	24.40	---	10/05/78	---
A-12-01 36ABD	4210.00	25.10	---	10/04/78	---
A-12-02 01DAC	4070.00	130.10	---	08/31/78	---
		125.10	---	02/01/81	---
		128.60	S	12/22/81	---
A-12-02 04AAD	4210.00	27.30	S	10/18/78	---
A-12-02 08DBA	3965.00	35.90	V	10/18/78	---
A-12-02 22BCD	3812.00	60.10	V	10/19/78	R
A-12-02 22CDD	3780.00	26.36	S	10/19/78	---
A-12-02 23BAA	3870.00	40.42	S	09/05/78	---
		37.90		02/06/81	---
		40.76	S	12/22/81	---
A-12-02 27ACB	3770.00	5.37	S	03/20/79	---
A-12-02 27BDA1	3766.00	19.80	V	10/18/78	---
A-12-02 27BDA2	3766.00	20.76	S	10/18/78	---
A-12-02 27DDB	3750.00	19.00	V	10/18/78	---
A-12-02 28CBD	4000.00	85.70	V	10/19/78	---
A-12-02 29ACD	4100.00	108.70	V	10/19/78	R
A-12-02 35DCC1	3700.00	71.00	R	01/01/62	---
A-12-03 10BAB	4110.00	79.02	S	09/05/78	---
A-12-03 11BBC	4130.00	41.98	S	08/31/78	---
A-12-03 12CDD	4230.00	136.59	S	12/15/80	---
A-12-03 22BBC	3955.00	72.75	S	08/31/78	P
A-12-04 18AAA	4260.00	153.15	S	12/15/80	---
A-13-01 01AAC	4745.00	217.80	S	09/22/81	---
A-13-01 01ACC	4705.00	174.34	S	08/22/78	---
		173.50	S	09/22/81	---
A-13-01 01BAA	4680.00	149.57	S	09/22/81	---
		150.17	S	02/25/82	---

Table 3.--Measurements of water levels in selected wells in the northern part of the Agua Fria area—Continued

Local number	Altitude	Water level	Method	Date	Status
A-13-01 01CBB	4620.00	106.19	S	09/25/81	---
A-13-01 01CCD	4640.00	123.94	S	08/22/78	---
A-13-01 01DBB	4690.00	169.59	S	09/22/81	---
A-13-01 01DCA	4740.00	212.69	S	09/22/81	---
		208.80	V	02/25/82	---
A-13-01 02CAC	4603.00	85.10	S	04/18/73	---
		89.50	S	01/07/76	---
		88.00	S	01/18/77	---
		89.05	S	03/14/78	---
		89.40	S	09/14/78	---
		86.80	---	03/20/79	P
		82.30	---	04/01/80	---
		93.40	---	02/06/81	---
		88.62	S	09/22/81	---
		87.30	V	02/24/82	---
A-13-01 02CCD	4560.00	40.19	S	09/22/81	---
A-13-01 02DCA	4585.00	79.45	S	10/04/78	---
		75.20	V	02/22/82	---
A-13-01 03ABB	4602.00	38.70	S	09/20/78	---
		38.44	S	09/25/81	---
A-13-01 03ADA	4580.00	33.90	S	09/25/81	---
A-13-01 03BCA	4640.00	64.40	S	09/12/78	---
		66.02	S	09/25/81	---
A-13-01 03DBC2	4610.00	55.00	R	09/12/78	---
		65.40	V	02/23/82	---
A-13-01 04ABA1	4690.00	100.68	S	09/25/81	---
A-13-01 04ACA	4775.00	170.46	S	09/25/81	---
A-13-01 04ADA	4670.00	120.00	R	08/12/72	---
A-13-01 04BBC	4840.00	247.00	S	09/24/81	---
		170.46	S	09/24/81	---

Table 3.--Measurements of water levels in selected wells in the northern part of the Agua Fria area—Continued

Local number	Altitude	Water level	Method	Date	Status
A-13-01 05ADC	4940.00	251.41	S	09/24/81	---
A-13-01 05BAC	4970.00	228.82	S	09/24/81	---
A-13-01 05CBA	5080.00	266.31	S	09/24/81	---
A-13-01 05CCC	5085.00	123.17	S	09/24/81	---
A-13-01 05DCC2	5020.00	385.40	S	09/25/81	---
		355.70	V	03/01/82	---
A-13-01 06CBB	5305.00	246.15	S	09/23/81	---
A-13-01 06CDA	5230.00	252.05	S	04/01/78	---
A-13-01 06DBC	5080.00	51.25	S	09/23/81	---
A-13-01 07ABB	5215.00	208.90	S	04/01/78	---
		211.77	S	03/01/82	---
A-13-01 07ADC	5070.00	19.10	S	04/27/78	---
		18.60	S	04/27/78	---
		52.10	S	08/31/78	---
A-13-01 07BBB	5210.00	12.08	S	08/24/78	---
A-13-01 07BCB2	5220.00	39.32	S	08/31/78	---
A-13-01 07CAD	5160.00	44.85	S	08/31/78	---
A-13-01 07CDD	5210.00	60.10	S	04/01/78	---
		57.02	S	08/25/78	---
		52.14	S	03/01/82	---
A-13-01 07DCA2	5140.00	78.75	S	08/25/78	---
A-13-01 07DCC1	5185.00	94.10	S	04/01/78	---
A-13-01 08ADB	4880.00	17.70	S	08/24/78	---
		10.24	S	03/01/82	---
A-13-01 10AAA	4550.00	44.56	S	02/25/82	P
A-13-01 10CAD	4660.00	88.76	S	11/09/81	---
A-13-01 10CBD	4654.00	35.46	S	09/24/81	---
A-13-01 10DCC	4610.00	72.19	S	11/09/81	---
A-13-01 11BCB	4550.00	41.74	S	11/11/81	R
A-13-01 11BDB	4550.00	46.88	S	11/11/81	---
		43.40	V	02/25/82	---

Table 3.--Measurements of water levels in selected wells in the northern part of the Agua Fria area—Continued

Local number	Altitude	Water level	Method	Date	Status
A-13-01 11CAC	4525.00	48.08	S	11/12/81	---
A-13-01 11CDB	4520.00	37.46	S	12/05/56	P
		43.40	---	05/27/57	P
		38.82	---	12/17/57	---
		37.37	---	03/02/59	---
		76.00	---	03/14/60	P
		41.78	---	04/27/61	---
		49.62	---	02/04/63	S
		44.23	---	01/14/64	---
		43.50	---	09/20/78	P
A-13-01 11CDD1	4525.00	28.31	---	10/08/52	---
		35.50	V	02/22/82	---
A-13-01 12ADC	4871.00	361.23	S	09/21/81	---
A-13-01 12BAA	4655.00	144.55	S	11/12/81	---
A-13-01 12BCB	4630.00	121.49	S	09/21/81	---
A-13-01 12CBD	4650.00	140.50	S	09/21/81	---
A-13-01 12CCC	4570.00	70.61	S	09/21/81	---
A-13-01 13ABA	4665.00	159.80	S	11/11/81	---
A-13-01 13CAA	4650.00	104.50	S	11/12/81	---
A-13-01 13CBB	4540.00	50.69	S	11/12/81	---
A-13-01 14ABA	4540.00	53.89	---	12/06/78	---
A-13-01 14ACB3	4500.00	25.70	S	09/21/78	---
		25.30	S	02/22/82	---
A-13-01 14BBB	4550.00	47.60	S	12/05/78	---
A-13-01 14BCC	4520.00	29.55	S	10/04/78	---
A-13-01 14BDC	4500.00	26.70	V	02/22/82	---
A-13-01 14BDD	4480.00	4.71	S	10/04/78	---
A-13-01 15DBC	4555.00	21.78	S	11/09/81	---
A-13-01 18BAD1	5260.00	98.00	S	08/25/78	---

Table 3.--Measurements of water levels in selected wells in the northern part of the Agua Fria area—Continued

Local number	Altitude	Water level	Method	Date	Status
A-13-01 22AAA	4510.00	26.66	S	11/12/81	---
A-13-01 22BAC	4640.00	62.05	S	03/01/79	---
A-13-01 24BAA	4770.00	234.80	S	10/05/78	---
A-13-01H02AAA	4780.00	142.20	V	02/24/82	---
A-13-02 08CDB	4681.00	16.59	S	02/24/82	---
A-13-02 11AAA	4525.00	15.60	S	04/20/78	---
A-13-02 24ACC	4180.00	25.34	S	09/05/78	---
A-13-02 26CBC	4202.00	11.04	S	09/05/78	---
A-13-02 30DBD	4512.00	8.40	S	10/18/78	---
A-13-02 36DDC	4020.00	16.34	S	08/31/78	---
A-13-03 01BDC	4660.00	175.40	S	04/19/78	---
A-13-03 07DBD	4452.00	29.65	T	04/20/78	---
A-13-03 09CBD	4377.00	9.20	R	04/20/78	---
A-13-03 14BCA	4440.00	27.60	S	04/19/78	---
A-13-03 14BCD	4440.00	24.65	S	04/19/78	---
A-13-03 26CDC	4575.00	51.02	S	12/15/80	---
A-13-03 26CDC	4565.00	57.90	S	09/05/78	---
A-13-04 18ADD	4680.00	67.80	S	04/19/78	---
A-14-01 14BBB	4890.00	223.50	S	08/12/71	---
A-14-01 16ACC	4810.00	138.79	S	01/26/77	---
		148.55	---	04/25/78	---
		144.82	---	02/28/79	---
		129.30	---	02/06/81	---
A-14-01 17AAD	4778.99	112.46	S	01/15/79	---
		114.30	---	02/06/81	---
		114.40	V	07/20/81	---
		114.17	S	09/22/81	---
		113.48	V	02/23/82	---

Table 3.--Measurements of water levels in selected wells in the northern part of the Agua Fria area—Continued

Local number	Altitude	Water level	Method	Date	Status
A-14-01 20CBA1	4885.00	186.07	S	09/23/81	---
A-14-01 20CBA2	4875.00	178.00	---	02/07/81	---
A-14-01 20CDD	4777.62	97.58	S	01/15/79	---
		97.82	S	09/23/81	---
A-14-01 21CAA	4740.00	51.57	S	11/10/81	---
A-14-01 22CAD	4720.00	72.10	S	04/26/78	---
		67.52	S	02/23/82	---
A-14-01 22DCC	4710.00	51.55	S	04/26/78	---
		47.42	S	11/13/81	---
		47.80	S	02/23/82	---
A-14-01 24DCB	4928.00	304.80	V	05/21/81	---
		304.20	S	11/13/81	---
		301.80	V	02/23/82	---
A-14-01 27DBB	4659.91	57.00	R	03/18/67	---
		57.40	---	08/12/71	---
		47.54	S	02/28/79	---
		58.50	V	06/18/81	---
		57.48	S	07/20/81	---
		53.77	S	08/19/81	---
		51.90	S	09/21/81	---
		48.19	S	10/21/81	---
		47.30	S	11/19/81	---
		47.22	S	12/17/81	---
		47.40	S	01/19/82	---
		47.69	S	02/23/82	---
		47.71	S	03/24/82	---
		48.22	S	04/20/82	---
		54.12	S	05/20/82	---
		57.93	S	08/24/82	---

Table 3.--Measurements of water levels in selected wells in the northern part of the Agua Fria area—Continued

Local number	Altitude	Water level	Method	Date	Status
A-14-01 28ADA1	4689.94	30.00	R	01/01/36	---
		83.12	S	01/15/79	---
		72.21	S	11/12/81	---
		67.60	V	02/23/82	---
A-14-01 28ADA2	4682.98	34.00	R	12/30/69	---
		54.90	S	04/19/78	---
		82.60	V	02/23/82	---
A-14-01 28BBB	4714.98	48.48	S	12/05/56	---
		49.20	---	12/17/57	---
		45.64	---	03/02/59	---
		46.36	---	03/14/60	---
		42.54	S	04/17/62	---
		103.00	---	02/04/63	R
		49.66	---	01/14/64	---
		51.38	S	02/19/65	---
		42.32	S	09/23/81	---
A-14-01 28BCB	4758.50	126.30	V	02/28/79	---
		133.67	S	09/23/81	---
A-14-01 28CCA	4746.60	146.60	S	04/09/78	S
		162.85	S	11/10/81	---
A-14-01 28CDC	4724.49	93.00	R	09/18/69	---
		117.90	---	08/12/71	---
		143.43	S	11/12/81	---
A-14-01 28DAC	4666.38	35.86	S	12/05/56	---
		83.23	V	05/21/81	---
		86.08	S	09/22/81	---
		71.75	S	02/23/82	---
A-14-01 29AAA	4726.02	71.20	---	08/12/71	---
		72.60	T	01/07/76	---
		69.10	S	01/18/77	---
		65.10	T	03/14/78	---

Table 3.--Measurements of water levels in selected wells in the northern part of the Agua Fria area—Continued

Local number	Altitude	Water level	Method	Date	Status
A-14-01 29AAA	4726.02	59.90	T	03/20/79	---
		108.40	---	02/11/81	---
		71.78	---	09/22/81	---
		67.80	V	02/25/82	---
A-14-01 34ACB	4623.00	51.02	S	09/20/78	---
A-14-01 34CAC	4622.00	47.25	S	09/20/78	---
A-14-01 34CDA1	4620.00	47.70	S	09/20/78	---
A-14-01 35DDA1	4705.00	152.54	S	11/11/81	---
A-14-01 35DDC1	4695.00	180.15	S	09/13/78	---
A-14-02 07DDA	5344.00	4.00	S	06/20/79	R
		8.98	S	05/21/81	---
		11.32	S	02/23/82	---
A-14-02H25CCA	5150.00	14.00	S	04/20/78	---
A-15-01 01BCD	5620.00	317.30	V	02/24/82	---
A-15-01 10BCD2	5308.00	47.40	V	02/24/81	---
		44.80	V	02/24/82	---
A-15-01 12ACB	5610.00	344.50	V	02/24/82	---
A-15-01 15CBB	5230.00	37.86	S	02/24/82	---
A-15-01 18CBD	4937.00	382.43	V	01/30/77	---
		382.61	T	01/24/79	---
A-15-01 26ABC	5339.00	68.80	V	02/24/81	---
		58.03	S	11/19/81	---
		59.40	V	02/23/82	---
		58.80	S	03/24/82	---
A-15-01 28ACC	5072.00	320.35	S	02/27/79	---
		319.00	---	02/06/81	---
		319.40	V	03/09/81	---
		316.80	V	06/18/81	---
		316.30	V	07/20/81	---
		315.20	V	08/19/81	---
		315.80	V	09/21/81	---

Table 3.--Measurements of water levels in selected wells in the northern part of the Agua Fria area—Continued

Local number	Altitude	Water level	Method	Date	Status
A-15-01 28ACC	5072.00	313.60	V	10/21/81	---
		313.03	S	11/10/81	---
		312.84	S	11/19/81	---
		313.80	V	12/17/81	---
		312.10	V	01/19/82	---
		310.00	V	02/24/82	---
		310.66	S	03/24/82	---
		310.00	V	04/20/82	---
		310.45	S	05/20/82	---
		309.70	V	08/24/82	---
A-15-02 18DBB UNSU	5770.00	21.70	S	07/30/71	---
A-16-01 21ACA2	5349.00	108.90	V	02/03/81	P
		108.80	V	02/24/82	---
A-16-01 27DA UNSUR	5450.00	172.30	V	02/24/81	---
		172.90	V	02/24/82	---
B-12H01 20CBC	6565.00	29.70	V	03/01/82	---
B-13-02 26ACC	6245.00	32.66	---	03/15/75	---
B-13-02 27ADA	6080.00	11.00	S	07/01/71	---
B-14-01 02CBA	4958.00	309.30	---	07/30/71	---
B-14-01 06ADD	5203.00	681.70	V	06/18/81	R
		583.60	V	07/20/81	---
		582.00	V	02/26/82	---
B-14-01 06BCB	5030.00	267.90	V	03/27/63	---
		283.20	V	03/12/81	---
		294.30	V	02/25/82	---
B-14-01 10ACD	5034.83	455.10	V	02/11/82	---
		456.90	V	02/22/82	---
B-14-01 11ACB	5043.72	337.80	T	01/24/79	---
		351.80	S	11/13/81	---
		335.60	V	02/23/82	---

Table 3.--Measurements of water levels in selected wells in the northern part of the Agua Fria area—Continued

Local number	Altitude	Water level	Method	Date	Status
B-14-01 11DAA	5043.52	325.60	V	01/24/79	---
		324.50	S	01/19/81	---
		324.82	S	05/29/81	---
		324.88	S	06/18/81	---
		324.55	S	07/20/81	---
		324.83	S	08/19/81	---
		324.36	S	09/21/81	---
		324.49	S	10/21/81	---
		324.72	S	11/13/81	---
		324.50	S	11/20/81	---
		324.70	S	12/17/81	---
		324.42	S	02/23/82	---
		324.56	S	03/22/82	---
		324.56	S	04/20/82	---
		324.54	S	05/20/82	---
		324.64	S	06/21/82	---
		324.79	S	07/22/82	---
		324.73	S	08/24/82	---
B-14-01 14ACC	5111.16	369.00	R	01/01/64	---
		362.50	T	04/19/78	---
		372.60	V	02/22/82	---
B-14-01 15ABA	5117.42	454.30	S	10/14/71	---
		460.30	---	03/16/72	---
		525.60	V	02/11/82	---
		527.10	V	02/22/82	---
B-14-01 18ACA	5260.00	11.21	S	03/03/82	---
B-14-01 22ADA	5184.10	338.00	R	03/01/71	---
		337.20	V	06/18/81	---
		339.40	V	07/20/81	---
		339.00	V	08/19/81	---
		339.20	V	02/23/82	---

Table 3.--Measurements of water levels in selected wells in the northern part of the Agua Fria area—Continued

Local number	Altitude	Water level	Method	Date	Status
B-14-01 22ADA	5184.10	339.90	S	03/24/82	---
		339.40	V	04/20/82	---
		340.20	V	05/20/82	---
		340.20	V	08/24/82	---
B-14-01 22BDC	5221.44	205.00	S	07/01/71	---
		197.02	S	01/15/79	---
		192.67	S	09/23/81	---
		191.40	V	02/23/82	---
B-14-01 24DCC	5080.00	256.20	S	09/24/81	---
B-14-01 25DAC	4933.00	48.20	S	04/19/78	---
		40.78	---	06/20/79	---
		45.42	S	09/24/81	---
		45.27	S	02/23/82	---
B-14-01 26AAA	5120.00	207.20	V	04/26/78	---
		207.62	S	09/23/81	---
		207.30	V	02/23/82	---
B-14-01 26CCD	5180.00	52.10	S	04/19/78	---
B-14-01 27DCC	5265.00	55.60	S	04/18/78	X
		56.89	S	02/23/82	---
B-14-01 31BBC	5585.00	30.60	S	03/03/82	---

Table 4.--Records of selected springs in the northern part of the Agua Fria area

Local number: See figure for description of well-numbering and location system; UN, unsurveyed.

Use: C, commercial; E, power; H, domestic; I, irrigation; P, public supply; R, recreation; S, stock; T, institution; U, unused; Z, other.

Type: K, artesian and seepage or filtration; C, contact; S, seepage or filtration; F, fracture.

Permanence: P, perennial; I, intermittent.

Altitude of land surface: In feet above sea level; determined from U.S. Geological Survey topographic maps.

Discharge: C, current meter; E, estimated; V, volumetric; W, weir.

Local Number	Use	Type	Permanence	Altitude of land surface (feet)	Discharge (gallons per minute)	Date measured	Temperature (°C)	Specific conductance (microsiemen per centimeter at 25°C)	Spring
A-10-02 02DDD	S	K	---	3,450	------	--------	----	690	BADGER
A-11-04 01CCD	S	C	P	4,710	14 F	10/23/80	12.0	-----	WILLOW
A-11-05 21ADA UN	S	C	P	5,250	96 C	06/05/81	10.0	-----	NELSON PLACE
A-11-05 22BCD UN	S	S	P	5,250	50 E	12/13/80	----	-----	BEE HOUSE CN
A-12-01 02AAD	H,S	F	P	4,240	------	--------	----	860	LESSARD
A-12-01 23BBA	S	---	---	4,470	------	--------	15.5	1,465	DANDREA
A-12-03 01CAC	S	---	---	4,280	.10E	09/05/78	----	615	ASH
A-12-03 28DBA	S	---	---	3,840	.10E	08/31/78	29.0	510	------------
A-12-03 35BAA	S,Z	---	---	3,920	40 E	08/31/78	24.0	460	BROWN
A-13-01 07ADC	S	F	---	5,040	2.0 V	06/18/79	18.0	1,100	------------
A-13-01 20DDD	U	F	---	4,770	5.0 E	10/20/78	15.5	2,050	------------
A-13-01 29AAC	U	F	I	4,840	------	--------	16.0	2,140	------------
A-13-01 29BDB	U	F	P	4,960	1.0 V	10/20/78	16.5	3,050	------------
A-13-03 33CAD	S,Z	---	---	4,250	2.0 E	09/05/78	----	650	GOVERNMENT
A-15-01 01ABA	S	---	---	5,780	1.3 V	02/24/81	----	635	------------
A-15-02 06BC UN	H,S	---	P	5,970	9.4 V	02/24/81	14.0	480	COYOTE
A-15-02 30AAB UN	S	---	---	5,835	.40V	02/24/82	13.0	460	TIN TANK
B-12H01 22DCC	S	C	---	5,910	-----	--------	15.0	1,100	POSTMASTER

Table 5.--Records of selected wells in the northern part of the Agua Fria area

Local number: See figure 2 for description of well-numbering and location system. UN, unsurveyed.

Method constructed: A, air rotary; B, bored or augered; C, cable tool; D, dug; H, hydraulic rotary; P, air percussion.

Finish: C, porous concrete; O, open end; P, perforated or slotted; X, open hole.

Depth to first opening: Depth in feet below land surface, to top of first perforated interval.

Use of water: C, commercial; H, domestic; I, irrigation; N, industrial; P, public supply; R, recreation; S, stock; T, institution; U, unused.

Depth of well: In feet below land surface.

Altitude of land surface: In feet above sea level, determined from U.S. Geological Survey topographic maps or engineer's level lines.

Discharge: B, bailer; C, current meter; E, estimated; O, orifice; R, reported; W, weir.

Local number	Date completed	Method	Finish	Depth to first opening (feet)	Casing diameter (inches)	Use of water	Depth of well (feet)	Altitude of land surface (feet)	Discharge (gallons per minute)	Date discharge measured
A-10-02 17DBA	--	--	--	--	--	S	--	2,925	--	--
A-10-02 17DDA	--	--	--	--	--	--	--	2,900	--	--
A-10-02 23ADD	--	--	--	--	6	S	100	3,200	--	--
A-10-02 24BCC	--	--	--	--	--	S	120	3,200	--	--
A-10-03 08ADD	--	D	--	--	--	--	30	3,250	--	--
A-10-03 08DAA	--	--	P	--	14	H,S,I	55	3,250	--	--
A-10-04 14CCD	--	--	--	--	--	--	--	4,370	--	--
A-11-02 02ABB1	--	--	--	--	--	S	--	3,711	--	--
A-11-02 02ABB2	--	--	--	--	--	--	--	3,715	--	--
A-11-02 03BCC	--	--	--	--	--	H	--	4,060	--	--

Table 5.--Records of selected wells in the northern part of the Agua Fria area—Continued

Local number	Date completed	Method	Finish	Depth to first opening (feet)	Casing diameter (inches)	Use of water	Depth of well (feet)	Altitude of land surface (feet)	Discharge (gallons per minute)	Date discharge measured
A-11-02 05BAA1	06/ /76	H	--	105	8	H	365	4,150	--	--
A-11-02 05BAA2	06/ /76	H	--	20	6	H	450	4,120	--	--
A-11-02 06ABA	1961	--	P	30	6	H	145	4,060	--	--
A-11-02 09BCC	02/05/48	C	X	22	12	U	78	3,950	--	--
A-11-02 09CCB	--	--	--	--	--	--	--	3,925	--	--
A-11-02 09CCC	09/16/72	C	--	100	10.88	H	302	3,940	--	--
A-11-02 09CCD	--	--	--	--	8	P	--	3,920	--	--
A-11-02 09DBD	09/17/76	A	P	145	5.58	T	305	3,970	--	--
A-11-02 09DDD	--	--	--	--	8	P	--	3,885	--	--
A-11-02 11CCA	--	--	--	--	--	S	--	3,820	--	--
A-11-02 12BDA	--	--	X	10	8	H	--	3,620	--	--
A-11-02 12DDA	--	--	--	--	12	H	65	3,580	--	--
A-11-02 14ADB	--	--	--	--	6	H	250	3,800	--	--
A-11-02 14BAC	1969	--	X	10	8	H	160	3,815	--	--
A-11-02 14BDD	--	--	--	--	--	H	--	3,830	--	--
A-11-02 14CAA	08/ /78	--	P	100	8	H	200	3,805	112	09/07/78
A-11-02 14CAD	--	--	--	--	--	H	--	3,805	--	--
A-11-02 14CBB1	--	--	--	--	--	H	--	3,805	--	--
A-11-02 14CBB2	--	--	--	--	--	--	--	3,800	--	--
A-11-02 14CCA	01/ /74	--	X	140	6	H	220	3,810	--	--
A-11-02 14CCD1	01/ /63	--	--	--	6	H	50	3,760	--	--
A-11-02 14CCD2	01/ /66	--	--	--	12	H	50	3,790	--	--
A-11-02 14DAC	--	--	--	--	--	H	310	3,760	--	--
A-11-02 14DAD	07/ /75	--	--	--	--	H	--	3,745	--	--
A-11-02 14DCC2	01/ /78	C	--	--	6	H	235	3,780	--	--

Table 5.--Records of selected wells in the northern part of the Agua Fria area—Continued

Local number	Date completed	Method	Finish	Depth to first opening (feet)	Casing diameter (inches)	Use of water	Depth of well (feet)	Altitude of land surface (feet)	Discharge (gallons per minute)	Date discharge measured
A-11-02 14DCD1	01/16/74	C	--	10	8.60	H	195	3,760	--	--
A-11-02 14DCD2	--	--	--	--	--	H	--	3,765	--	--
A-11-02 14DCD3	--	--	--	--	--	H	--	3,765	--	--
A-11-02 14DDC	--	--	--	--	--	H	--	3,755	--	--
A-11-02 15ACA	08/31/77	H	X	29	8	H	240	3,890	--	--
A-11-02 15ADB	1971	--	X	32	8	H	200	3,900	--	--
A-11-02 16BBA	11/10/75	H	X	25	6	U	385	3,930	--	--
A-11-02 20BAB	--	--	--	--	--	S	--	3,930	--	--
A-11-02 23ABA	--	--	--	--	--	--	--	3,770	--	--
A-11-02 23ABB1	06/ /78	C	--	--	6	--	100	3,780	--	--
A-11-02 23ABB2	08/ /78	C	X	10	8	--	175	3,780	--	--
A-11-02 24BBB	--	C	--	--	6	--	200	3,730	--	--
A-11-02 24CAD	--	--	--	--	--	P	--	3,690	--	--
A-11-02 24DDB	03/17/77	C	P	105	6.62	H	205	3,635	--	--
A-11-02 25AAB	07/30/66	--	--	--	6	U	--	3,640	--	--
A-11-02 25ACD	--	--	--	--	--	R	--	3,685	--	--
A-11-02 25BCB	--	--	--	--	10	S	--	3,678	--	--
A-11-02 25BDD	01/ /68	--	--	--	--	P	--	3,700	--	--
A-11-02 29DAA	--	D	X	0	--	H	14	3,770	--	--
A-11-03 17CCC	--	--	--	--	--	H	--	3,540	--	--
A-11-03 18AAD	1971	--	--	--	6	--	145	3,560	--	--
A-11-03 18ADA	--	--	--	--	8	--	35	3,555	--	--
A-11-03 18DBA	02/ /52	--	P	25	20	I	85	3,560	--	--
A-11-03 18DDB	--	--	--	--	--	--	--	3,560	--	--
A-11-04 01CBB	1980	D	--	--	48	S	--	4,713	--	--

Table 5.--Records of selected wells in the northern part of the Agua Fria area—Continued

Local number	Date completed	Method	Finish	Depth to first opening (feet)	Casing diameter (inches)	Use of water	Depth of well (feet)	Altitude of land surface (feet)	Discharge (gallons per minute)	Date discharge measured
A-12-01 02DAA1	01/ /54	--	--	--	16	--	50	4,120	--	--
A-12-01 02DAA2	01/ /54	--	--	--	16	--	50	4,120	--	--
A-12-01 04BBC1	07/ /73	--	--	--	--	--	305	4,930	--	--
A-12-01 04BBC2	07/ /73	--	--	--	--	H	165	4,930	--	--
A-12-01 04BBC3	03/ /74	--	--	--	--	S	458	4,918	--	--
A-12-01 04BBC4	08/ /75	--	--	--	--	--	425	4,920	--	--
A-12-01 04BBC5	07/ /76	--	--	--	--	H	125	4,920	--	--
A-12-01 04BDA	09/20/76	--	X	10	10.62	H	200	4,890	--	--
A-12-01 04CAA1	05/01/72	--	--	--	--	P	129	4,850	--	--
A-12-01 04CAA2	07/28/77	--	--	--	--	--	149	4,850	--	--
A-12-01 05CAA1	01/ /34	--	X	10	60	H	30	4,830	--	--
A-12-01 05CAA2	--	--	--	--	--	H	--	4,830	--	--
A-12-01 05CAB	--	--	X	10	48	H	24	4,840	--	--
A-12-01 09BCB	--	--	--	--	--	H	--	4,720	--	--
A-12-01 09CCB1	01/ /68	--	P	20	8	H	75	4,640	--	--
A-12-01 09CCB2	01/ /70	C	P	--	6	H	200	4,640	--	--
A-12-01 09DCC1	01/ /65	--	--	--	--	S	280	4,640	--	--
A-12-01 09DCC2	01/ /70	--	--	--	8	H	70	4,620	--	--
A-12-01 15CDB	01/ /68	--	X	10	10	H	47	4,550	--	--
A-12-01 22BBB1	--	--	--	--	6.50	H,S	38	4,470	--	--
A-12-01 22BBB2	09/ /78	--	X	86	6	S	250	4,470	--	--
A-12-01 22BBC	03/ /77	--	--	--	6	--	150	4,470	--	--
A-12-01 22BCA	01/ /77	--	P	0	6	H,I,S	236	4,445	--	--
A-12-01 22BCD	01/ /75	--	X	20	6	H,I,S	226	4,440	--	--
A-12-01 22CAB	--	--	--	--	--	--	17	4,410	--	--

Table 5.--Records of selected wells in the northern part of the Agua Fria area—Continued

Local number	Date completed	Method	Finish	Depth to first opening (feet)	Casing diameter (inches)	Use of water	Depth of well (feet)	Altitude of land surface (feet)	Discharge (gallons per minute)	Date discharge measured
A-12-01 22CDA	08/ /78	--	P	30	6	H	400	4,410	--	--
A-12-01 22DDD	01/ /25	--	X	20	60	I	30	4,370	--	--
A-12-01 24CDC	--	--	--	--	7	S	140	4,408	--	--
A-12-01 26BAA1	01/ /55	--	P	30	8	P	70	4,360	--	--
A-12-01 26BAA2	01/ /55	--	X	100	8	P	200	4,350	--	--
A-12-01 26BAA3	01/ /63	--	P	150	8	H	500	4,350	--	--
A-12-01 26BAA4	01/ /70	--	--	--	6	--	140	4,360	--	--
A-12-01 26BAA5	01/ /72	--	--	--	8	--	200	4,360	--	--
A-12-01 26BAB	06/28/76	C	X	8	10.62	I	210	4,375	--	--
A-12-01 26BBB	--	--	--	--	8	H	127	4,390	--	--
A-12-01 26DAB	1955	--	X	--	--	H	60	4,260	--	--
A-12-01 26DDD	01/ /74	--	P	50	6	H	450	4,310	--	--
A-12-01 27DBA1	--	--	--	--	13	P	94	4,475	--	--
A-12-01 27DBA2	02/16/73	C	X	10	12.75	P	136	4,475	--	--
A-12-01 29DAC	--	--	--	--	6	S	90	4,900	--	--
A-12-01 31BCC	--	--	--	--	6	S	65	5,300	--	--
A-12-01 33AAD	--	--	--	--	6.50	H,S	185	4,645	--	--
A-12-01 33ADA	--	--	--	--	6	H,S	160	4,640	--	--
A-12-01 33ADB	--	--	--	--	6.50	S	140	4,640	--	--
A-12-01 33ADD	--	--	--	--	7	I	180	4,635	--	--
A-12-01 34ACC	--	--	--	--	4	--	34	4,535	--	--
A-12-01 34DAC1	01/ /75	--	--	--	8	H,S	200	4,480	--	--
A-12-01 34DAC2	04/11/78	--	P	100	6.50	--	160	4,480	--	--
A-12-01 34DBB	--	--	--	--	--	H	--	4,525	--	--
A-12-01 36ABD	01/ /76	--	X	7	8	H	435	4,210	--	--

Table 5.--Records of selected wells in the northern part of the Agua Fria area—Continued

Local number	Date completed	Method	Finish	Depth to first opening (feet)	Casing diameter (inches)	Use of water	Depth of well (feet)	Altitude of land surface (feet)	Discharge (gallons per minute)	Date discharge measured
A-12-02 01DAC	--	--	--	--	--	S	250	4,070	--	--
A-12-02 04AAD	03/ /77	--	--	--	6.50	S	109	4,210	--	--
A-12-02 08ACC	--	--	--	--	--	I	50	3,974	--	--
A-12-02 08DBA	--	--	--	--	--	I	60	3,965	--	--
A-12-02 22BCD	--	--	--	--	18	I	--	3,812	1000W	12/00/46
A-12-02 22CDC	--	--	--	--	--	H	--	3,780	--	--
A-12-02 22CDD	--	--	--	--	--	--	--	3,780	--	--
A-12-02 23BAA	--	--	--	--	--	S	140	3,870	--	--
A-12-02 27ACB	--	--	--	--	--	--	34	3,770	--	--
A-12-02 27BAD	--	--	--	--	--	--	--	3,775	--	--
A-12-02 27BDA1	--	--	--	--	16	I	395	3,766	--	--
A-12-02 27BDA2	--	--	--	--	--	--	--	3,766	--	--
A-12-02 27BDA3	08/27/71	--	--	--	6.50	H,S	222	3,766	--	--
A-12-02 27DDB	--	--	--	--	--	H,S	--	3,750	--	--
A-12-02 28CBD	--	--	--	--	--	S	--	4,000	--	--
A-12-02 29AA	--	--	--	--	--	--	--	4,200	--	--
A-12-02 29ACD	--	--	--	--	--	S	--	4,100	--	--
A-12-02 31BDD	01/ /52	--	P	15	6	H	50	4,120	--	--
A-12-02 35DCC1	1962	--	P	--	20	--	246	3,700	--	--
A-12-02 35DCC2	--	--	--	--	--	--	--	3,700	--	--
A-12-03 08BDD	--	--	--	--	--	H	--	3,870	--	--
A-12-03 10BAB	01/ /74	--	--	--	--	S	--	4,110	--	--
A-12-03 11BBC	--	--	--	--	--	S	80	4,130	--	--
A-12-03 12CDD	05/11/63	--	--	20	6	S	--	4,230	--	--
A-12-03 17CCB	03/ /41	--	P	8	16	I	65	3,815	625C	09/01/78

Table 5.--Records of selected wells in the northern part of the Agua Fria area—Continued

Local number	Date completed	Method	Finish	Depth to first opening (feet)	Casing diameter (inches)	Use of water	Depth of well (feet)	Altitude of land surface (feet)	Discharge (gallons per minute)	Date discharge measured
A-12-03 20BCD	05/ /42	--	P	25	12	I	100	3,790	210C	09/01/78
A-12-03 22BBC	--	--	--	--	--	S	180	3,955	1.0E	08/31/78
A-12-03 23BDA	--	--	--	--	--	S	240	4,135	--	--
A-12-04 18AAA	--	--	--	--	8	S	--	4,260	--	--
A-13-01 01AAC	1980	--	--	--	6	I	--	4,745	--	--
A-13-01 01ACC	08/15/78	--	P	200	8	--	300	4,705	--	--
A-13-01 01BAA	1981	--	--	--	8	H	--	4,680	--	--
A-13-01 01BDA	06/02/78	--	P	252	8.60	H,S	350	4,690	--	--
A-13-01 01CBB	11/ /80	C	--	--	6	H,S	290	4,620	--	--
A-13-01 01CCD	08/19/78	--	P	150	6	--	250	4,640	--	--
A-13-01 01DBB	12/ /79	A	P	160	8	H,I	400	4,690	--	--
A-13-01 01DCA	1980	--	--	--	8	H	--	4,740	--	--
A-13-01 02CAC	1968	C	P	90	8	S	200	4,603	75B	--
A-13-01 02CCB	01/ /50	--	--	--	8	H	250	4,560	--	--
A-13-01 02CCD	--	--	--	--	6	H	--	4,560	--	--
A-13-01 02DCA	01/ /37	--	--	--	20	I,H	850	4,585	--	--
A-13-01 02DDD	03/29/77	C	P	100	8.62	H,S,I	251	4,610	120B	03/29/77
A-13-01 03ABB	--	--	--	--	10	H,I	194	4,602	--	--
A-13-01 03ACD	01/03/74	--	P	100	8	H	162	4,590	--	--
A-13-01 03ADA	06/15/51	--	--	--	12.75	I	--	4,580	--	--
A-13-01 03ADC	--	--	--	--	--	H	90	4,580	--	--
A-13-01 03BBC	02/17/73	C	P	118	6	H	139	4,645	--	--
A-13-01 03BCA	--	--	X	100	6	--	150	4,640	--	--
A-13-01 03BCD	--	--	P	90	6	H	128	4,635	--	--
A-13-01 03BDA1	1960	--	--	--	6	H	150	4,600	--	--

Table 5.--Records of selected wells in the northern part of the Agua Fria area—Continued

Local number	Date completed	Method	Finish	Depth to first opening (feet)	Casing diameter (inches)	Use of water	Depth of well (feet)	Altitude of land surface (feet)	Discharge (gallons per minute)	Date discharge measured
A-13-01 03BDA2	1973	C	--	--	6	H	140	4,600	--	--
A-13-01 03BDA3	1973	C	P	160	6	U	179	4,600	--	--
A-13-01 03BDC	1972	C	P	110	6	--	135	4,610	--	--
A-13-01 03CAA	--	--	P	80	8	H	139	4,630	--	--
A-13-01 03CAB	1973	--	--	--	6	H	135	4,620	--	--
A-13-01 03CBA	06/19/78	--	X	45	6	H	150	4,640	--	--
A-13-01 03CCA	06/ /78	A	--	--	--	--	--	4,700	--	--
A-13-01 03DAC	01/ /70	--	--	--	6	H	112	4,555	--	--
A-13-01 03DBB	02/24/73	--	P	135	6	H	153	4,600	--	--
A-13-01 03DBC1	--	--	--	--	6	I	105	4,610	--	--
A-13-01 03DBC2	02/24/73	C	P	135	6	H	153	4,610	--	--
A-13-01 03DCA	01/ /77	--	P	186	4	H	206	4,580	--	--
A-13-01 03DCB	01/ /75	--	P	--	6	H	118	4,600	--	--
A-13-01 04ABA1	01/ /78	--	--	--	8	H	160	4,690	--	--
A-13-01 04ABA2	01/ /78	--	--	--	6	H	187	4,695	--	--
A-13-01 04ACA	--	--	--	--	--	H	--	4,775	--	--
A-13-01 04ADA	1972	C	P	200	6	H	250	4,670	--	--
A-13-01 04BBC	12/14/75	C	--	10	10	H	325	4,840	--	--
A-13-01 04BCB	06/05/76	C	X	10	6.62	H	245	4,790	40B	06/05/76
A-13-01 05ADC	07/05/78	A	P	--	6	H	300	4,940	--	--
A-13-01 05BAC	08/29/79	A	P	230	5.56	H	330	4,970	--	--
A-13-01 05CAB1	01/ /78	--	X	60	6	--	305	5,020	--	--
A-13-01 05CAB2	05/ /78	--	--	--	5	H	300	5,020	--	--
A-13-01 05CBA	01/ /74	--	P	278	6	H	318	5,080	--	--
A-13-01 05CCC	08/ /79	A	P	320	5	H	440	5,085	--	--

Table 5.--Records of selected wells in the northern part of the Agua Fria area—Continued

Local number	Date completed	Method	Finish	Depth to first opening (feet)	Casing diameter (inches)	Use of water	Depth of well (feet)	Altitude of land surface (feet)	Discharge (gallons per minute)	Date discharge measured
A-13-01 05DCC1	10/16/73	--	P	150	6	H	315	5,000	--	--
A-13-01 05DCC2	07/07/78	--	P	410	5.50	H	460	5,020	--	--
A-13-01 05DDA1	--	--	--	--	6	H	125	--	--	--
A-13-01 05DDA2	--	--	X	0	--	S	100	--	--	--
A-13-01 06CBB	01/02/79	A	P	315	5	H	458	5,305	--	--
A-13-01 06CCB	--	--	--	--	6	H	335	5,320	--	--
A-13-01 06CDA	--	--	--	--	6	H	328	5,230	--	--
A-13-01 06DBC	05/ /80	A	P	75	5	H	140	5,080	--	--
A-13-01 07ABA	05/ /78	--	X	240	5	H	380	5,180	--	--
A-13-01 07ABB	11/ /74	--	X	229	6	H	465	5,215	--	--
A-13-01 07ACA	01/ /67	--	X	18	8	H	289	5,115	--	--
A-13-01 07ACD	01/ /76	--	X	20	5.50	H	165	5,090	--	--
A-13-01 07ADC	01/ /71	A	--	--	6	H	350	5,070	--	--
A-13-01 07BBB	01/ /12	D	W	--	36	H	26	5,210	--	--
A-13-01 07BCB1	01/ /71	--	X	60	8	H	89	5,240	--	--
A-13-01 07BCB2	08/ /78	--	X	30	6	H	200	5,220	--	--
A-13-01 07BDB	--	--	P	182	5	H	212	5,170	--	--
A-13-01 07BDD	--	--	--	--	--	--	--	5,155	--	--
A-13-01 07CAD	01/ /68	--	--	--	6	H	53	5,160	--	--
A-13-01 07CBC	10/23/77	--	X	20	8	--	120	5,280	--	--
A-13-01 07CDD	11/ /77	--	X	100	6	Z	160	5,210	--	--
A-13-01 07DAB	--	--	--	--	8	H	36	5,090	--	--
A-13-01 07DBB	01/06/78	--	X	95	5.37	H	125	5,145	--	--
A-13-01 07DCA1	--	--	X	12	6	H	210	5,140	--	--
A-13-01 07DCA2	06/18/77	--	X	12	6	S	305	5,140	--	--

Table 5.--Records of selected wells in the northern part of the Agua Fria area—Continued

Local number	Date completed	Method	Finish	Depth to first opening (feet)	Casing diameter (inches)	Use of water	Depth of well (feet)	Altitude of land surface (feet)	Discharge (gallons per minute)	Date discharge measured
A-13-01 07DCC1	01/ /70	--	X	90	6	H	280	5,185	--	--
A-13-01 07DCC2	--	--	--	--	--	H	150	5,185	--	--
A-13-01 07DDC	01/ /70	--	--	--	8	H	180	5,180	--	--
A-13-01 08ADB	--	--	--	--	6	--	23	4,880	--	--
A-13-01 10AAA	01/ /54	--	P	40	12	I	500	4,550	--	--
A-13-01 10CAD	--	--	--	--	5	H	--	4,660	--	--
A-13-01 10CBD	--	--	--	--	6	H	130	4,654	--	--
A-13-01 10DCC	--	--	--	--	5	H	--	4,610	--	--
A-13-01 11AAC	02/11/77	C	P	60	6	H	180	4,580	--	--
A-13-01 11ABB	08/10/77	--	P	120	6	H	150	4,560	--	--
A-13-01 11ADC	10/22/77	--	P	120	8	H	200	4,590	--	--
A-13-01 11BCA1	01/ /46	--	P	150	10	I,S	482	4,540	--	--
A-13-01 11BCA2	01/ /47	--	X	103	12	I	375	4,540	--	--
A-13-01 11BCB	01/ /00	--	--	--	16	H	80	4,550	--	--
A-13-01 11BDB	01/ /39	--	X	62	16	I	850	4,550	--	--
A-13-01 11CAC	--	--	--	--	6	N	--	4,525	100R	11/12/81
A-13-01 11CDB	--	--	--	--	--	I,H	800	4,520	--	--
A-13-01 11CDD1	--	--	--	--	16	--	80	4,525	--	--
A-13-01 11CDD2	07/ /60	--	P	385	12	--	1395	4,525	--	--
A-13-01 12AAB	09/05/81	C	P	--	6	H	--	4,770	--	--
A-13-01 12ADC	11/10/79	C	P	--	4	H	515	4,871	--	--
A-13-01 12BAA	03/10/77	--	P	10	10	I	455	4,655	480W	03/14/77
A-13-01 12BBA	01/ /74	--	--	--	6	H	225	4,620	--	--
A-13-01 12BBB	12/21/74	--	P	142	6	H,S	225	4,600	--	--
A-13-01 12BCB	--	--	--	--	6	H	--	4,630	--	--

Table 5.--Records of selected wells in the northern part of the Agua Fria area—Continued

Local number	Date completed	Method	Finish	Depth to first opening (feet)	Casing diameter (inches)	Use of water	Depth of well (feet)	Altitude of land surface (feet)	Discharge (gallons per minute)	Date discharge measured
A-13-01 12CBD	10/15/80	A	P	165	5	H	200	4,650	--	--
A-13-01 12CCC	09/24/80	A	P	108	5	H	138	4,570	--	--
A-13-01 13ABA	06/ /81	C	P	--	6	H	309	4,665	--	--
A-13-01 13CAA	05/13/80	A	P	200	5	H	260	4,650	--	--
A-13-01 13CBB	04/21/76	--	--	--	--	H	203	4,540	--	--
A-13-01 13DBC	01/ /73	--	X	58	6	H	258	4,680	--	--
A-13-01 14ABA	--	--	--	--	--	--	--	4,540	--	--
A-13-01 14ACB1	--	--	--	--	--	P	46	4,500	--	--
A-13-01 14ACB2	--	--	--	--	--	P	54	4,500	--	--
A-13-01 14ACB3	--	--	--	--	16	--	72	4,500	--	--
A-13-01 14BBA1	01/ /57	C	P	40	6	--	130	4,540	--	--
A-13-01 14BBA2	--	--	--	--	--	H	--	4,540	--	--
A-13-01 14BBB	10/20/73	--	P	50	10	H	210	4,550	--	--
A-13-01 14BCC	01/ /64	--	--	--	--	--	--	4,520	--	--
A-13-01 14BCD1	--	--	--	--	6	H	90	4,520	--	--
A-13-01 14BCD2	01/ /53	--	--	--	--	I	170	4,515	--	--
A-13-01 14BDC	--	--	--	--	6	P	219	4,500	--	--
A-13-01 14CBA1	--	--	--	--	--	H	--	4,500	--	--
A-13-01 14CBA2	12/07/76	--	P	45	6	P	125	4,500	--	--
A-13-01 14DDB1	06/06/77	--	X	10	10	--	150	4,530	--	--
A-13-01 14DDB2	01/ /77	--	X	20	10	H	185	4,530	--	--
A-13-01 15DBC	--	D	--	--	--	H	36	4,555	--	--
A-13-01 18ABB	--	--	X	53	6	H	112	5,200	--	--
A-13-01 18BAD1	01/ /72	--	--	--	6	--	305	5,260	--	--

Table 5.--Records of selected wells in the northern part of the Agua Fria area--Continued

Local number	Date completed	Method	Finish	Depth to first opening (feet)	Casing diam- eter (inches)	Use of water	Depth of well (feet)	Altitude of land surface (feet)	Discharge (gallons per minute)	Date discharge measured
A-13-01 18BAD2	01/ /75	--	--	--	5	H	165	5,260	--	--
A-13-01 18BAD3	--	--	--	--	--	H	--	5,280	--	--
A-13-01 22AAA	--	--	--	--	--	U	--	4,510	--	--
A-13-01 22BAC	05/27/78	--	P	100	5.56	--	220	4,640	--	--
A-13-01 22CAB	01/ /33	--	--	--	--	H	90	4,560	--	--
A-13-01 23ABA	02/01/74	C	X	18	8.63	H	175	4,520	--	--
A-13-01 24BAA	01/ /74	--	X	60	6	--	375	4,770	--	--
A-13-01 28ADA	06/ /72	--	--	178	5.60	H	220	4,600	--	--
A-13-01H02AAA	--	--	--	--	--	S	--	4,780	--	--
A-13-02 08CDB	--	--	O	--	8	H	25	4,681	--	--
A-13-02 11AAA	--	--	--	--	--	S	--	4,525	--	--
A-13-02 24ACC	--	--	--	--	--	S	--	4,180	--	--
A-13-02 26CBC	--	--	--	--	--	S	--	4,202	--	--
A-13-02 30DBD	--	D	X	--	60	S	10	4,512	--	--
A-13-02 36DDC	--	--	--	--	--	S	20	4,020	--	--
A-13-03 01BDC	--	--	--	--	6.50	S	--	4,660	--	--
A-13-03 07DBD	--	--	--	81	6.62	S	200	4,452	--	--
A-13-03 09CBD	--	--	X	249	6	S	275	4,377	--	--
A-13-03 14BCA	--	--	--	--	15	I,S	--	4,440	--	--
A-13-03 14BCD	--	--	--	--	6	--	--	4,440	--	--
A-13-03 26CDC	--	--	--	--	8	S	73	4,575	--	--
A-13-03 26CDC	--	--	--	--	--	S	--	4,565	--	--
A-13-04 18ADD	--	--	--	--	--	S	--	4,680	--	--
A-14-01 14BBB	--	--	--	--	8	S	24	4,890	--	--
A-14-01 16ACC	--	C	--	--	6	--	237	4,810	--	--

Table 5.--Records of selected wells in the northern part of the Agua Fria area—Continued

Local number	Date completed	Method	Finish	Depth to first opening (feet)	Casing diameter (inches)	Use of water	Depth of well (feet)	Altitude of land surface (feet)	Discharge (gallons per minute)	Date discharge measured
A-14-01 17AAD	11/20/76	C	--	100	11	--	1,100	4,778.99	--	--
A-14-01 20CBA1	11/14/74	--	X	53	8	C	400	4,885	--	--
A-14-01 20CBA2	02/07/81	--	--	--	6	I	315	4,875	350	02/07/81
A-14-01 20CDD	--	--	--	--	--	--	--	4,777.62	408	05/31/78
A-14-01 21CAA	06/ /81	--	--	--	6.62	N	237	4,740	--	--
A-14-01 22CAD	--	--	--	--	--	S	750	4,720	96	--
A-14-01 22DCC	--	D	C	--	--	--	--	4,710	--	--
A-14-01 24DCB	--	--	--	--	8	S	--	4,928	--	--
A-14-01 27DBB	03/28/67	--	P	--	8	--	606	4,659.91	--	--
A-14-01 28ADA1	1936	C	X	80	8	U	850	4,689.94	340W	--
A-14-01 28ADA2	1969	C	P	80	12	I	534	4,682.98	940	04/02/70
A-14-01 28BBB	--	--	--	--	--	I	345	4,714.98	125	--
A-14-01 28BCB	1967	C	X	30	8	H	309	4,758.50	35	--
A-14-01 28CCA	1972	C	--	--	16	I	638	4,746.60	776	05/30/74
A-14-01 28CDC	1969	C	P	80	14	H	582	4,724.49	900	--
A-14-01 28DAC	--	--	--	--	--	H	400	4,666.38	270	--
A-14-01 29AAA	--	--	--	--	--	I	710	4,726.02	800	--
A-14-01 34ACB	--	--	--	--	--	--	--	4,623	--	--
A-14-01 34CAC	06/ /69	--	P	50	12	I	565	4,622	--	--
A-14-01 34CDA1	--	--	--	--	--	I	--	4,620	--	--
A-14-01 34CDA2	--	--	--	--	--	H	--	4,620	--	--
A-14-01 34CDA3	--	--	--	--	--	H	--	4,610	--	--
A-14-01 35DDA1	--	C	P	270	6	H	320	4,705	--	--
A-14-01 35DDA2	08/03/75	--	P	190	6.50	H	348	4,690	--	--
A-14-01 35DDC1	08/20/72	C	P	300	8	P	350	4,695	--	--

Table 5.--Records of selected wells in the northern part of the Agua Fria area—Continued

Local number	Date completed	Method	Finish	Depth to first opening (feet)	Casing diameter (inches)	Use of water	Depth of well (feet)	Altitude of land surface (feet)	Discharge (gallons per minute)	Date discharge measured
A-14-01 35DDC2	--	--	--	--	--	--	--	4,695	--	--
A-14-01 35DDD	01/ /71	--	P	150	8	H	420	4,680	--	--
A-14-02 07DDA	--	--	--	--	--	S	23	5,344	--	--
A-14-02 32DCA	--	--	--	--	--	S	--	4,960	--	--
A-14-02H25CCA	--	D	--	--	54	S	--	5,150	--	--
A-15-01 01BCD	--	--	--	--	--	U	--	5,620	--	--
A-15-01 10BCD1	--	--	--	--	6	--	--	5,308	--	--
A-15-01 10BCD2	--	--	--	--	6	S	--	5,308	--	--
A-15-01 12ACB	--	--	--	--	--	U	--	5,610	--	--
A-15-01 15CBB	--	--	--	--	--	S	120	5,230	--	--
A-15-01 18CBD	--	C	--	--	--	H,S	--	4,937	--	--
A-15-01 26ABC	--	--	--	--	--	S	162	5,339	--	--
A-15-01 28ACC	--	--	X	--	5	U	378	5,072	--	--
A-15-02 18DBB UN	--	D	C	--	36	H	27	5,770	--	--
A-16-01 21ACA1	--	--	--	--	6	U	--	5,350	--	--
A-16-01 21ACA2	--	--	--	--	8	S	--	5,349	--	--
A-16-01 27DA UN	--	--	--	185	6.25	S	--	5,450	--	--
B-12H01 20CBC	--	--	--	--	--	H	--	6,565	--	--
B-12H01 33BAB	01/ /76	--	--	--	--	I	--	6,220	--	--
B-13-02 26ACC	--	--	X	5	7	H	83	6,245	--	--
B-13-02 27ADA	--	--	--	--	--	I	17	6,080	--	--
B-14-01 02CBA	--	--	--	--	--	--	--	4,958	--	--
B-14-01 06ADD	--	--	--	--	6	H	839	5,203	--	--
B-14-01 06BCB	1972	--	--	--	6	H	602	5,030	--	--
B-14-01 10ACD	1972	C	--	805	14	--	750	5,034.83	1,750	11/09/72

Table 5.--Records of selected wells in the northern part of the Agua Fria area—Continued

Local number	Date completed	Method	Finish	Depth to first opening (feet)	Casing diameter (inches)	Use of water	Depth of well (feet)	Altitude of land surface (feet)	Discharge (gallons per minute)	Date discharge measured
B-14-01 11ACB	--	--	--	--	--	--	885	5,043.72	200	02/26/74
B-14-01 11DAA	04/12/73	C	P	496	16	--	500	5,043.52	200	09/17/73
B-14-01 14ACC	1964	C	X	30	16	H	496	5,111.16	260	10/23/64
B-14-01 15ABA	1971	C	P	400	12	H	996	5,117.42	440	--
B-14-01 18ACA	1957	C	P	150	6	H	265	5,260	--	--
B-14-01 21ADA	--	--	--	--	--	--	--	5,255	--	--
B-14-01 22AAC	1971	C	P	360	10	H	655	5,240	370	--
B-14-01 22ADA	1971	C	P	310	14	--	612	5,184.10	--	--
B-14-01 22BDC	1971	C	P	250	12	--	670	5,221.44	--	--
B-14-01 24DCC	10/09/73	C	P	246	6	H,S	346	5,080	--	--
B-14-01 25DAC	06/21/55	C	--	120	8	--	121	4,933	--	--
B-14-01 26AAA	09/01/72	C	X	0	--	--	357	5,120	--	--
B-14-01 26CCD	--	--	--	--	--	--	--	5,180	--	--
B-14-01 27DCC	--	--	--	--	--	--	--	5,265	--	--
B-14-01 28CBA	--	--	--	--	--	P	--	5,265	--	--
B-14-01 31BBC	--	--	--	--	6	S	--	5,585	--	--

Local identifier: See figure 2 for description of well-numbering and location system; UN, unsurveyed.

Site: SP, spring; GW, ground water; SW, surface water.

Local identifier	Date of sample	Site	Stream-flow, instan-taneous (ft^3/s)	Spe-cific con-duct-ance (µS/cm)	Temper-ature (°C)	pH (units)	Solids, residue at 180°C dis-solved (mg/L)	Solids, sum of consti-tuents, dis-solved (mg/L)	Hard-ness (mg/L as $CACO_3$)
Agua Fria River (Site 1)	80-11-21	SW	1.6	486	15.3	8.8	306	311	210
Agua Fria River	78-10-05	SW	----	530	20.0	---	---	---	---
Agua Fria River (Site 3A)	80-11-22	SW	----	955	8.3	8.4	582	581	380
Agua Fria River (Site 3)	81-06-03	SW	.22	975	22.0	7.9	---	---	---
Agua Fria River (Site 4)	81-06-03	SW	.55	1,083	18.0	7.6	---	---	---
Agua Fria River (Site 5)	80-11-23	SW	1.2	1,211	10.3	8.5	748	706	480
Agua Fria River	80-11-24	SW	----	974	13.3	8.2	---	---	---
	81-06-04	SW	----	1,079	23.9	8.1	---	---	---
Agua Fria River (Site 6)	80-11-24	SW	3.8	858	12.5	8.2	---	---	---
	81-06-04	SW	1.2	994	24.5	8.1	---	---	---
Agua Fria River (Site 7)	80-11-25	SW	4.9	885	12.7	8.6	509	519	340
Agua Fria River (Site 8)	80-12-12	SW	6.5	-----	10.0	8.8	540	523	340
Little Ash Creek (Site 9)	81-06-04	SW	.30	489	24.8	8.1	---	---	---
Ash Creek (Site 10)	80-11-23	SW	.98	660	12.2	8.5	394	393	270
Sycamore Creek (Site 12)	80-12-13	SW	.31	-----	10.0	8.0	---	290	230
Sycamore Creek	81-06-05	SW	.28	500	27.4	8.3	---	---	---
Little Sycamore Creek	81-06-05	SW	.15	567	24.8	8.2	---	---	---
Sycamore Creek (Site 16)	80-11-24	SW	1.1	611	10.5	8.3	366	379	280
Big Bug Creek	78-10-17	SW	----	480	13.0	---	---	---	---
	78-10-17	SW	----	480	13.0	---	---	---	---
Big Bug Creek (Site 17)	80-11-25	SW	.60	836	7.9	8.5	---	---	---
	81-06-01	SW	.28	722	23.2	8.1	---	---	---
A-10-02 02DDD	78-05-19	SP	----	690	----	---	---	---	---
A-10-03 08DAA	78-05-18	GW	----	720	----	---	---	---	---
A-11-02 05BAA	77-06-10	GW	----	540	----	---	---	---	---

Abbreviations: ft^3/s, cubic feet per second; µS/cm, microsiemens per centimeter at 25°C Celsius; °C, degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter; ----, no data; 0, concentration of constituent is less than the detection limit of analysis method; <, concentration of constituent is less than the value shown.

Date of sample	Hardness, noncarbonate (mg/L $CACO_3$)	Hardness noncarbonate (mg/L as $CACO_3$)	Sodium adsorption ratio	Alkalinity field (mg/L as $CACO_3$)	Alkalinity lab (mg/L as $CACO_3$)	Bicarbonate it-fld (mg/L as HCO_3)	Bicarbonate fet-fld (mg/L as HCO_3)	Carbonate fet-fld (mg/L as CO_3)	Chloride, dissolved (mg/L as CL)
80-11-21	40	-----	0.7	---	170	---	---	---	19
78-10-05	---	-----	---	---	---	---	---	---	-----
80-11-22	220	-----	1.1	---	160	---	---	---	110
81-06-03	---	-----	---	---	---	---	---	---	-----
81-06-03	---	-----	---	---	---	---	---	---	-----
80-11-23	230	-----	1.4	---	250	---	---	---	100
80-11-24	---	-----	---	---	---	---	---	---	-----
81-06-04	---	-----	---	---	---	---	---	---	-----
80-11-24	---	-----	---	---	---	---	---	---	-----
81-06-04	---	-----	---	---	---	---	---	---	-----
80-11-25	69	-----	1.1	---	270	---	---	---	56
80-12-12	88	-----	1.2	---	250	---	---	---	59
81-06-04	---	-----	---	---	---	---	---	---	-----
80-11-23	3	-----	.9	---	270	---	---	---	30
80-12-13	2	-----	.2	---	230	---	---	---	3.7
81-06-05	---	-----	---	---	---	---	---	---	-----
81-06-05	---	-----	---	---	---	---	---	---	-----
80-11-24	0	-----	.7	---	290	---	---	---	27
78-10-17	---	-----	---	---	---	---	---	---	-----
78-10-17	---	-----	---	---	---	---	---	---	-----
80-11-25	---	-----	---	---	---	---	---	---	-----
81-06-01	---	-----	---	---	---	---	---	---	-----
78-05-19	---	-----	---	---	---	---	---	---	-----
78-05-18	---	-----	---	---	---	---	---	---	-----
77-06-10	---	-----	---	---	---	---	---	---	-----

Table 6.--Chemical analysis of water from the northern part of the

Local identifier	Date of sample	Calcium dis- solved (mg/L as CA)	Magne- sium, dis- solved (mg/L as MG)	Potas- sium, dis- solved (mg/L as K)	Sodium+ potas- sium, dis- solved (mg/L as NA)	Sodium, dis- solved (mg/L as NA)	Sulfate dis- solved (mg/L (as SO_4)	Fluo- ride, dis- solved (mg/L as F)	Silica, dis- solved (mg/L as SIO_2)
Agua Fria River (Site 1)	80-11-21	61	14	1.4	---	23	54	0.3	19
Agua Fria River	78-10-05	-----	----	-----	---	-----	-----	.4	----
Agua Fria River (Site 3A)	80-11-22	110	26	2.7	---	48	170	.4	13
Agua Fria River (Site 3)	81-06-03	-----	----	-----	---	-----	-----	---	----
Agua Fria River (Site 4)	81-06-03	-----	----	-----	---	-----	-----	---	----
Agua Fria River (Site 5)	80-11-23	120	43	1.6	---	69	190	.4	27
Agua Fria River	80-11-24	-----	----	-----	---	-----	-----	---	----
	81-06-04	-----	----	-----	---	-----	-----	---	----
Agua Fria River (Site 6)	80-11-24	-----	----	-----	---	-----	-----	---	----
	81-06-04	-----	----	-----	---	-----	-----	---	----
Agua Fria River (Site 7)	80-11-25	78	35	2.3	---	47	110	.3	28
Agua Fria River (Site 8)	80-12-12	76	36	2.1	---	51	120	.3	27
Little Ash Creek (Site 9)	81-06-04	-----	----	-----	---	-----	-----	---	----
Ash Creek (Site 10)	80-11-23	60	30	2.4	---	36	45	.2	26
Sycamore Creek (Site 12)	80-12-13	50	26	1.4	---	7.5	7.1	.1	55
Sycamore Creek	81-06-05	-----	----	-----	---	-----	-----	---	----
Little Sycamore Creek	81-06-05	-----	----	-----	---	-----	-----	---	----
Sycamore Creek (Site 16)	80-11-24	54	34	1.6	---	28	22	.4	37
Big Bug Creek	78-10-17	-----	----	-----	---	-----	-----	.7	----
	78-10-17	-----	----	-----	---	-----	-----	.7	----
Big Bug Creek (Site 17)	80-11-25	-----	----	-----	---	-----	-----	---	----
	81-06-01	-----	----	-----	---	-----	-----	---	----
A-10-02 02DDD	78-05-19	-----	----	-----	---	-----	-----	.4	----
A-10-03 08DAA	78-05-18	-----	----	-----	---	-----	-----	.4	----
A-11-02 05BAA	77-06-10	-----	----	-----	---	-----	-----	.2	----

Date of sample	Nitrogen, NO2+NO3 dissolved (mg/L as N)	Phosphorus, ortho, dissolved (mg/L as P)	Aluminum, dissolved (µg/L as AL)	Antimony, dissolved (µg/L as SB)	Arsenic dissolved (µg/L as AS)	Barium, dissolved (µg/L as BA)	Beryllium, dissolved (µg/L (as BE)	Boron, dissolved (µg/L as B)	Cadmium, dissolved (µg/L as CD)
80-11-21	3.6	0.020	20	0	4	80	<1	220	<1
78-10-05	-----	-----	--	---	---	----	--	---	---
80-11-22	.91	.010	10	0	4	70	<1	70	<1
81-06-03	-----	-----	--	---	---	----	--	---	---
81-06-03	-----	-----	--	---	---	----	--	---	---
80-11-23	.99	.060	--	---	---	----	--	100	---
80-11-24	-----	-----	--	---	---	----	--	---	---
81-06-04	-----	-----	--	---	---	----	--	---	---
80-11-24	-----	-----	--	---	---	----	--	---	---
81-06-04	-----	-----	--	---	---	----	--	---	---
80-11-25	.00	.060	--	---	---	----	--	90	---
80-12-12	.36	.100	--	---	11	----	--	60	---
81-06-04	-----	-----	--	---	---	----	--	---	---
80-11-23	.27	.010	--	---	5	----	--	40	---
80-12-13	.08	.070	30	---	2	30	<1	0	<1
81-06-05	-----	-----	--	---	---	----	--	---	---
81-06-05	-----	-----	--	---	---	----	--	---	---
80-11-24	.06	.050	10	0	5	30	<1	50	<1
78-10-17	-----	-----	--	---	---	----	--	---	---
78-10-17	-----	-----	--	---	---	----	--	---	---
80-11-25	-----	-----	--	---	---	----	--	---	---
81-06-01	-----	-----	--	---	---	----	--	---	---
78-05-19	-----	-----	--	---	---	----	--	---	---
78-05-18	-----	-----	--	---	---	----	--	---	---
77-06-10	-----	-----	--	---	---	----	--	---	---

Table 6.--Chemical analysis of water from the northern part of the

Local identifier	Date of sample	Chromium, dissolved (µg/L as CR)	Chromium, hexavalent, dissolved (µg/L as CR)	Cobalt, dissolved (µg/L as CO)	Copper, dissolved (µg/L as CU)	Iron, dissolved (µg/L as FE)	Lead, dissolved (µg/L as PB)	Lithium, dissolved (µg/L as LI)	Manganese, dissolved (µg/L as HG)
Agua Fria River (Site 1)	80-11-21	0	--	<3	1	10	0	8	2
Agua Fria River	78-10-05	---	--	--	---	---	---	--	---
Agua Fria River (Site 3A)	80-11-22	0	--	<3	3	<10	0	8	6
Agua Fria River (Site 3)	81-06-03	---	--	--	---	---	---	--	---
Agua Fria River (Site 4)	81-06-03	---	--	--	---	---	---	--	---
Agua Fria River (Site 5)	80-11-23	---	--	--	---	10	---	--	---
Agua Fria River	80-11-24	---	--	--	---	---	---	--	---
	81-06-04	---	--	--	---	---	---	--	---
Agua Fria River (Site 6)	80-11-24	---	--	--	---	---	---	--	---
	81-06-04	---	--	--	---	---	---	--	---
Agua Fria River (Site 7)	80-11-25	---	--	--	---	<10	---	--	---
Agua Fria River (Site 8)	80-12-12	---	0	--	---	<10	---	--	---
Little Ash Creek (Site 9)	81-06-04	---	--	--	---	---	---	--	---
Ash Creek (Site 10)	80-11-23	---	--	--	---	10	---	--	---
Sycamore Creek (Site 12)	80-12-13	---	0	<3	<10	<10	63	<4	2
Sycamore Creek	81-06-05	---	--	--	---	---	---	--	---
Little Sycamore Creek	81-06-05	---	--	--	---	---	---	--	---
Sycamore Creek (Site 16)	80-11-24	10	--	<3	0	<10	0	<4	7
Big Bug Creek	78-10-17	---	--	--	---	---	---	--	---
	78-10-17	---	--	--	---	---	---	--	---
Big Bug Creek (Site 17)	80-11-25	---	--	--	---	---	---	--	---
	81-06-01	---	--	--	---	---	---	--	---
A-10-02 02DDD	78-05-19	---	--	--	---	---	---	--	---
A-10-03 08DAA	78-05-18	---	--	--	---	---	---	--	---
A-11-02 05BAA	77-06-10	---	--	--	---	---	---	--	---

Date of sample	Mercury, dis- solved (µg/L as HG)	Molyb- denum, dis- solved (µg/L as MO)	Nickel, dis- solved (µg/L as NI)	Sele- nium, dis- solved (µg/L as SE)	Silver, dis- solved (µg/L as AG)	Stron- tium, dis- solved (µg/L as SR)	Vana- dium, dis- solved (µg/L as V)	Zinc, dis- solved (µg/L (as ZN)	Cyanide total (mg/L as CN)
80-11-21	0.0	<10	0	2	0	350	<6.0	7	0.00
78-10-05	----	---	---	---	---	---	----	---	----
80-11-22	.0	<10	0	5	0	570	<6.0	6	.00
81-06-03	----	---	---	---	---	---	----	---	----
81-06-03	----	---	---	---	---	---	----	---	----
80-11-23	----	---	---	---	---	---	----	---	.00
80-11-24	----	---	---	---	---	---	----	---	----
81-06-04	----	---	---	---	---	---	----	---	----
80-11-24	----	---	---	---	---	---	----	---	----
81-06-04	----	---	---	---	---	---	----	---	----
80-11-25	----	---	---	---	---	---	----	---	----
80-12-12	----	---	---	---	---	---	----	---	----
81-06-04	----	---	---	---	---	---	----	---	----
80-11-23	----	---	---	---	---	---	----	---	----
80-12-13	.0	<10	---	0	---	270	<6.0	<3	----
81-06-05	----	---	---	---	---	---	----	---	----
81-06-05	----	---	---	---	---	---	----	---	----
80-11-24	.0	<10	0	0	0	490	5.0	<3	.00
78-10-17	----	---	---	---	---	---	----	---	----
78-10-17	----	---	---	---	---	---	----	---	----
80-11-25	----	---	---	---	---	---	----	---	----
81-06-01	----	---	---	---	---	---	----	---	----
78-05-19	----	---	---	---	---	---	----	---	----
78-05-18	----	---	---	---	---	---	----	---	----
77-06-10	----	---	---	---	---	---	----	---	----

Local identifier	Date of sample	Site	Stream-flow, instan-taneous (ft^3/s)	Spe-cific con-duct-ance (µS/cm)	Temper-ature (°C)	pH (units)	Solids, residue at 180°C dis-solved (mg/L)	Solids, sum of consti-tuents, dis-solved (mg/L)	Hard-ness (mg/L as $CACO_3$)
A-11-02 06ABA	77-06-10	GW	----	560	----	---	---	---	---
A-11-02 11CCA	77-06-09	GW	----	410	----	---	---	---	---
A-11-02 09CCC	76-06-02	GW	----	555	----	7.7	380	---	234
A-11-02 09CCD	69-07-25	GW	----	526	----	7.8	---	340	244
A-11-02 12BDA	77-05-24	GW	----	1,300	----	---	---	---	---
A-11-02 12DDA	77-05-24	GW	----	1,300	----	---	---	---	---
A-11-02 14ADB	77-06-09	GW	----	490	----	---	---	---	---
A-11-02 14BAC	77-06-09	GW	----	420	----	---	---	---	---
A-11-02 14CAA	79-06-21	GW	----	545	----	7.2	---	336	240
A-11-02 14CBB1	77-06-10	GW	----	490	23.0	---	---	---	---
A-11-02 14CCA	77-05-25	GW	----	250	----	---	---	---	---
A-11-02 14CCD1	77-05-25	GW	----	620	----	---	---	---	---
A-11-02 14CCD2	77-05-25	GW	----	530	----	---	---	---	---
A-11-02 14DAC	77-05-24	GW	----	510	----	---	---	---	---
A-11-02 14DAD	77-05-24	GW	----	290	----	---	---	---	---
A-11-02 14DCD1	78-08-23	GW	----	520	----	---	---	---	---
A-11-02 15ADB	77-06-09	GW	----	440	26.0	---	---	---	---
A-11-02 25BDD	77-06-09	GW	----	490	----	---	---	---	---
	79-06-21	GW	----	640	----	7.1	---	405	290
A-11-02 29DAA	78-10-20	GW	----	640	19.0	---	---	---	---
A-11-03 18ADA	79-07-05	GW	----	785	21.0	7.4	---	531	160
A-11-04 1CCDC	80-11-00	SP	----	---	12.0	8.1	---	375	310
A-12-01 02AAD	78-10-19	SP	----	860	----	---	---	---	---
A-12-01 04BDA	77-08-03	GW	----	1,000	21.0	---	---	---	---
A-12-01 04CAA1	79-07-05	GW	----	1,080	----	7.2	---	699	520
A-12-01 05CAA2	78-10-17	GW	----	650	----	---	---	---	---
A-12-01 05CAB	78-10-17	GW	----	870	17.0	---	---	---	---
A-12-01 09BCB	78-10-20	GW	----	485	----	---	---	---	---
A-12-01 15CDB	77-07-23	GW	----	1,100	21.0	---	---	---	---
A-12-01 22BBB2	78-10-04	GW	----	740	18.0	---	---	---	---
A-12-01 22BCD	78-10-04	GW	----	800	----	---	---	---	---
A-12-01 22CAB	78-10-04	GW	----	855	17.0	---	---	---	---
A-12-01 22CDA	78-10-03	GW	----	1,420	19.0	---	---	---	---
	79-07-06	GW	----	1,220	----	7.3	---	698	400
A-12-01 22DDD	78-10-04	GW	----	1,150	17.0	---	---	---	---
A-12-01 23BBA	78-10-18	SP	----	1,465	15.5	---	---	---	---
A-12-01 24CDC	78-10-19	GW	----	580	23.0	---	---	---	---
A-12-01 26BAA1	77-07-23	GW	----	1,000	----	---	---	---	---
A-12-01 26BAA2	77-07-23	GW	----	370	----	---	---	---	---
A-12-01 26BAA3	77-07-23	GW	----	860	17.0	---	---	---	---
A-12-01 26BAB	78-10-03	GW	----	790	18.0	---	---	---	---
A-12-01 26BBB	78-10-03	GW	----	2,130	----	---	---	---	---
A-12-01 26DAB	78-10-20	GW	----	700	----	---	---	---	---
A-12-01 26DDD	77-07-23	GW	----	500	20.0	---	---	---	---
A-12-01 27DBA1	78-10-03	GW	----	2,600	18.0	---	---	---	---

Date of sample	Hardness, noncarbonate (mg/L CACO3)	Hardness noncarbonate (mg/L as CACO3)	Sodium adsorption ratio	Alkalinity field (mg/L as CACO3)	Alkalinity lab (mg/L as CACO3)	Bicarbonate it-fld (mg/L as HCO3)	Bicarbonate fet-fld (mg/L as HCO3)	Carbonate fet-fld (mg/L as CO3)	Chloride, dissolved (mg/L as CL)
77-06-10	---	-----	---	---	---	---	---	---	-----
77-06-09	---	-----	---	---	---	---	---	---	-----
76-06-02	---	-----	1.1	216	---	---	---	---	21
69-07-25	---	-----	---	---	---	---	208	0	24
77-05-24	---	-----	---	---	---	---	---	---	-----
77-05-24	---	-----	---	---	---	---	---	---	-----
77-06-09	---	-----	---	---	---	---	---	---	-----
77-06-09	---	-----	---	---	---	---	---	---	-----
79-06-21	54	-----	.4	190	---	---	230	0	39
77-06-10	---	-----	---	---	---	---	---	---	-----
77-05-25	---	-----	---	---	---	---	---	---	-----
77-05-25	---	-----	---	---	---	---	---	---	-----
77-05-25	---	-----	---	---	---	---	---	---	-----
77-05-24	---	-----	---	---	---	---	---	---	-----
77-05-24	---	-----	---	---	---	---	---	---	-----
78-08-23	---	-----	---	---	---	---	---	---	-----
77-06-09	---	-----	---	---	---	---	---	---	-----
77-06-09	---	-----	---	---	---	---	---	---	-----
79-06-21	64	-----	.6	230	---	---	280	0	45
78-10-20	---	-----	---	---	---	---	---	---	-----
79-07-05	0	-----	4.1	340	---	---	420	0	34
80-11-00	49	-----	.5	---	260	---	---	---	14
78-10-19	---	-----	---	---	---	---	---	---	-----
77-08-03	---	-----	---	---	---	---	---	---	-----
79-07-05	210	-----	.6	310	---	---	380	0	85
78-10-17	---	-----	---	---	---	---	---	---	-----
78-10-17	---	-----	---	---	---	---	---	---	-----
78-10-20	---	-----	---	---	---	---	---	---	-----
77-07-23	---	-----	---	---	---	---	---	---	-----
78-10-04	---	-----	---	---	---	---	---	---	-----
78-10-04	---	-----	---	---	---	---	---	---	-----
78-10-04	---	-----	---	---	---	---	---	---	-----
78-10-03	---	-----	---	---	---	---	---	---	-----
79-07-06	210	-----	2.1	190	---	---	230	0	180
78-10-04	---	-----	---	---	---	---	---	---	-----
78-10-18	---	-----	---	---	---	---	---	---	-----
78-10-19	---	-----	---	---	---	---	---	---	-----
77-07-23	---	-----	---	---	---	---	---	---	-----
77-07-23	---	-----	---	---	---	---	---	---	-----
77-07-23	---	-----	---	---	---	---	---	---	-----
78-10-03	---	-----	---	---	---	---	---	---	-----
78-10-03	---	-----	---	---	---	---	---	---	-----
78-10-20	---	-----	---	---	---	---	---	---	-----
77-07-23	---	-----	---	---	---	---	---	---	-----
78-10-03	---	-----	---	---	---	---	---	---	-----

Table 6.--Chemical analysis of water from the northern part of the

Local identifier	Date of sample	Calcium dis- solved (mg/L as CA)	Magne- sium, dis- solved (mg/L as MG)	Potas- sium, dis- solved (mg/L as K)	Sodium+ potas- sium, dis- solved (mg/L as NA)	Sodium, dis- solved (mg/L as NA)	Sulfate dis- solved (mg/L (as SO_4)	Fluo- ride, dis- solved (mg/L as F)	Silica, dis- solved (mg/L as SIO_2)
A-11-02 06ABA	77-06-10	-----	----	-----	---	-----	-----	<0.1	----
A-11-02 11CCA	77-06-09	-----	----	-----	---	-----	-----	.2	----
A-11-02 09CCC	76-06-02	58	25	-----	---	39	60	.2	----
A-11-02 09CCD	69-07-25	63	20	-----	18	-----	68	.4	----
A-11-02 12BDA	77-05-24	-----	----	-----	---	-----	-----	1.3	----
A-11-02 12DDA	77-05-24	-----	----	-----	---	-----	-----	1.4	----
A-11-02 14ADB	77-06-09	-----	----	-----	---	-----	-----	<.1	----
A-11-02 14BAC	77-06-09	-----	----	-----	---	-----	-----	1.0	----
A-11-02 14CAA	79-06-21	74	14	1.8	18	16	27	.4	34
A-11-02 14CBB1	77-06-10	-----	----	-----	---	-----	-----	.9	----
A-11-02 14CCA	77-05-25	-----	----	-----	---	-----	-----	1.0	----
A-11-02 14CCD1	77-05-25	-----	----	-----	---	-----	-----	.6	----
A-11-02 14CCD2	77-05-25	-----	----	-----	---	-----	-----	.1	----
A-11-02 14DAC	77-05-24	-----	----	-----	---	-----	-----	.5	----
A-11-02 14DAD	77-05-24	-----	----	-----	---	-----	-----	.2	----
A-11-02 14DCD1	78-08-23	-----	----	-----	---	-----	-----	.3	----
A-11-02 15ADB	77-06-09	-----	----	-----	---	-----	-----	.8	----
A-11-02 25BDD	77-06-09	-----	----	-----	---	-----	-----	.6	----
	79-06-21	88	18	1.7	26	24	50	.5	35
A-11-02-29DAA	78-10-20	-----	----	-----	---	-----	-----	.5	----
A-11-03 18ADA	79-07-05	34	19	6.9	130	120	40	.4	64
A-11-04 1CCDC	80-11-00	66	35	1.0	---	19	15	.7	66
A-12-01 02AAD	78-10-19	-----	----	-----	---	-----	-----	.5	----
A-12-01 04BDA	77-08-03	-----	----	-----	---	-----	-----	.4	----
A-12-01 04CAA1	79-07-05	160	29	1.0	32	31	160	.3	33
A-12-01 05CAA2	78-10-17	-----	----	-----	---	-----	-----	.6	----
A-12-01 05CAB	78-10-17	-----	----	-----	---	-----	-----	.6	----
A-12-01 09BCB	78-10-20	-----	----	-----	---	-----	-----	.5	----
A-12-01 15CDB	77-07-23	-----	----	-----	---	-----	-----	.2	----
A-12-01 22BBB2	78-10-04	-----	----	-----	---	-----	-----	.3	----
A-12-01 22BCD	78-10-04	-----	----	-----	---	-----	-----	.4	----
A-12-01 22CAB	78-10-04	-----	----	-----	---	-----	-----	.6	----
A-12-01 22CDA	78-10-03	-----	----	-----	---	-----	-----	.3	----
	79-07-06	120	25	4.3	99	95	150	.2	9.9
A-12-01 22DDD	78-10-04	-----	----	-----	---	-----	-----	.5	----
A-12-01 23BBA	78-10-18	-----	----	-----	---	-----	-----	.8	----
A-12-01 24CDC	78-10-19	-----	----	-----	---	-----	-----	.6	----
A-12-01 26BAA1	77-07-23	-----	----	-----	---	-----	-----	.2	----
A-12-01 26BAA2	77-07-23	-----	----	-----	---	-----	-----	.7	----
A-12-01 26BAA3	77-07-23	-----	----	-----	---	-----	-----	.7	----
A-12-01 26BAB	78-10-03	-----	----	-----	---	-----	-----	.4	----
A-12-01 26BBB	78-10-03	-----	----	-----	---	-----	-----	.4	----
A-12-01 26DAB	78-10-20	-----	----	-----	---	-----	-----	.5	----
A-12-01 26DDD	77-07-23	-----	----	-----	---	-----	-----	.6	----
A-12-01 27DBA1	78-10-03	-----	----	-----	---	-----	-----	.8	----

Date of sample	Nitrogen, NO2+NO3 dissolved (mg/L as N)	Phosphorus, ortho, dissolved (mg/L as P)	Aluminum, dissolved (µg/L as AL)	Antimony, dissolved (µg/L as SB)	Arsenic dissolved (µg/L as AS)	Barium, dissolved (µg/L as BA)	Beryllium, dissolved (µg/L (as BE)	Boron, dissolved (µg/L as B)	Cadmium, dissolved (µg/L as CD)
77-06-10	-----	-----	--	---	---	----	--	---	---
77-06-09	-----	-----	--	---	---	----	--	---	---
76-06-02	-----	-----	--	---	<10	----	--	---	<10
69-07-25	-----	-----	--	---	<10	----	--	---	---
77-05-24	-----	-----	--	---	---	----	--	---	---
77-05-24	-----	-----	--	---	---	----	--	---	---
77-05-25	-----	-----	--	---	---	----	--	---	---
77-05-25	-----	-----	--	---	---	----	--	---	---
79-06-21	3.8	-----	--	---	---	----	--	30	---
77-06-10	-----	-----	--	---	---	----	--	---	---
77-05-25	-----	-----	--	---	---	----	--	---	---
77-05-25	-----	-----	--	---	---	----	--	---	---
77-05-25	-----	-----	--	---	---	----	--	---	---
77-05-24	-----	-----	--	---	---	----	--	---	---
77-05-24	-----	-----	--	---	---	----	--	---	---
78-08-23	-----	-----	--	---	---	----	--	---	---
77-06-09	-----	-----	--	---	---	----	--	---	---
77-06-09	-----	-----	--	---	---	----	--	---	---
79-06-21	1.1	-----	--	---	---	----	--	50	---
78-10-20	-----	-----	--	---	---	----	--	---	---
79-07-05	1.2	-----	--	---	---	----	--	520	---
80-11-00	.32	-----	10	---	2	60	<1	40	<1
78-10-19	-----	-----	--	---	---	----	--	---	---
77-08-03	-----	-----	--	---	---	----	--	---	---
79-07-05	2.8	-----	--	---	---	----	--	180	---
78-10-17	-----	-----	--	---	---	----	--	---	---
78-10-17	-----	-----	--	---	---	----	--	---	---
78-10-20	-----	-----	--	---	---	----	--	---	---
77-07-23	-----	-----	--	---	---	----	--	---	---
78-10-04	-----	-----	--	---	---	----	--	---	---
78-10-04	-----	-----	--	---	---	----	--	---	---
78-10-04	-----	-----	--	---	---	----	--	---	---
78-10-03	-----	-----	--	---	---	----	--	---	---
79-07-06	.08	-----	--	---	---	----	--	100	---
78-10-04	-----	-----	--	---	---	----	--	---	---
78-10-18	-----	-----	--	---	---	----	--	---	---
78-10-19	-----	-----	--	---	---	----	--	---	---
77-07-23	-----	-----	--	---	---	----	--	---	---
77-07-23	-----	-----	--	---	---	----	--	---	---
77-07-23	-----	-----	--	---	---	----	--	---	---
78-10-03	-----	-----	--	---	---	----	--	---	---
78-10-03	-----	-----	--	---	---	----	--	---	---
78-10-20	-----	-----	--	---	---	----	--	---	---
77-07-23	-----	-----	--	---	---	----	--	---	---
78-10-03	-----	-----	--	---	---	----	--	---	---

Table 6.--Chemical analysis of water from the northern part of the

Local identifier	Date of sample	Chromium, dissolved (µg/L as CR)	Chromium, hexavalent, dissolved (µg/L as CR)	Cobalt, dissolved (µg/L as CO)	Copper, dissolved (µg/L as CU)	Iron, dissolved (µg/L as FE)	Lead, dissolved (µg/L as PB)	Lithium, dissolved (µg/L as LI)	Manganese, dissolved (µg/L as HG)
A-11-02 06ABA	77-06-10	---	--	--	---	---	---	--	---
A-11-02 11CCA	77-06-09	---	--	--	---	---	---	--	---
A-11-02 09CCC	76-06-02	<10	--	--	<50	60	<50	--	<50
A-11-02 09CCD	69-07-25	<10	--	--	---	<50	---	--	---
A-11-02 12BDA	77-05-24	---	--	--	---	---	---	--	---
A-11-02 12DDA	77-05-24	---	--	--	---	---	---	--	---
A-11-02 14ADB	77-06-09	---	--	--	---	---	---	--	---
A-11-02 14BAC	77-06-09	---	--	--	---	---	---	--	---
A-11-02 14CAA	79-06-21	---	--	--	---	---	<10	--	8
A-11-02 14CBB1	77-06-10	---	--	--	---	---	---	--	---
A-11-02 14CCA	77-05-25	---	--	--	---	---	---	--	---
A-11-02 14CCD1	77-05-25	---	--	--	---	---	---	--	---
A-11-02 14CCD2	77-05-25	---	--	--	---	---	---	--	---
A-11-02 14DAC	77-05-24	---	--	--	---	---	---	--	---
A-11-02 14DAD	77-05-24	---	--	--	---	---	---	--	---
A-11-02 14DCD1	78-08-23	---	--	--	---	---	---	--	---
A-11-02 15ADB	77-06-09	---	--	--	---	---	---	--	---
A-11-02 25BDD	77-06-09	---	--	--	---	---	---	--	---
	79-06-21	---	--	--	---	<10	---	--	2
A-11-02-29DAA	78-10-20	---	--	--	---	---	---	--	---
A-11-03 18ADA	79-07-05	---	--	--	---	<10	---	--	2
A-11-04 1CCDC	80-11-00	---	0	<3	<10	<10	44	<4	3
A-12-01 02AAD	78-10-19	---	--	--	---	---	---	--	---
A-12-01 04BDA	77-08-03	---	--	--	---	---	---	--	---
A-12-01 04CAA1	79-07-05	---	--	--	---	<10	---	--	20
A-12-01 05CAA2	78-10-17	---	--	--	---	---	---	--	---
A-12-01 05CAB	78-10-17	---	--	--	---	---	---	--	---
A-12-01 09BCB	78-10-20	---	--	--	---	---	---	--	---
A-12-01 15CDB	77-07-23	---	--	--	---	---	---	--	---
A-12-01 22BBB2	78-10-04	---	--	--	---	---	---	--	---
A-12-01 22BCD	78-10-04	---	--	--	---	---	---	--	---
A-12-01 22CAB	78-10-04	---	--	--	---	---	---	--	---
A-12-01 22CDA	78-10-03	---	--	--	---	---	---	--	---
	79-07-06	---	--	--	---	<10	---	--	320
A-12-01 22DDD	78-10-04	---	--	--	---	---	---	--	---
A-12-01 23BBA	78-10-18	---	--	--	---	---	---	--	---
A-12-01 24CDC	78-10-19	---	--	--	---	---	---	--	---
A-12-01 26BAA1	77-07-23	---	--	--	---	---	---	--	---
A-12-01 26BAA2	77-07-23	---	--	--	---	---	---	--	---
A-12-01 26BAA3	77-07-23	---	--	--	---	---	---	--	---
A-12-01 26BAB	78-10-03	---	--	--	---	---	---	--	---
A-12-01 26BBB	78-10-03	---	--	--	---	---	---	--	---
A-12-01 26DAB	78-10-20	---	--	--	---	---	---	--	---
A-12-01 26DDD	77-07-23	---	--	--	---	---	---	--	---
A-12-01 27DBA1	78-10-03	---	--	--	---	---	---	--	---

Date of sample	Mercury, dis-solved (µg/L as HG)	Molyb-denum, dis-solved (µg/L as MO)	Nickel, dis-solved (µg/L as NI)	Sele-nium, dis-solved (µg/L as SE)	Silver, dis-solved (µg/L as AG)	Stron-tium, dis-solved (µg/L as SR)	Vana-dium, dis-solved (µg/L as V)	Zinc, dis-solved (µg/L (as ZN)	Cyanide total (mg/L as CN)
77-06-10	----	---	---	---	---	---	----	---	----
77-06-09	----	---	---	---	---	---	----	---	----
76-06-02	<5.0	---	---	<10	<10	---	----	120	----
69-07-25	----	---	---	---	---	---	----	---	----
77-05-24	----	---	---	---	---	---	----	---	----
77-05-24	----	---	---	---	---	---	----	---	----
77-06-09	----	---	---	---	---	---	----	---	----
77-06-09	----	---	---	---	---	---	----	---	----
79-06-21	----	---	---	---	---	---	----	---	----
77-06-10	----	---	---	---	---	---	----	---	----
77-05-25	----	---	---	---	---	---	----	---	----
77-05-25	----	---	---	---	---	---	----	---	----
77-05-25	----	---	---	---	---	---	----	---	----
77-05-24	----	---	---	---	---	---	----	---	----
77-05-24	----	---	---	---	---	---	----	---	----
78-08-23	----	---	---	---	---	---	----	---	----
77-06-09	----	---	---	---	---	---	----	---	----
77-06-09	----	---	---	---	---	---	----	---	----
79-06-21	----	---	---	---	---	---	----	---	----
78-10-20	----	---	---	---	---	---	----	---	----
79-07-05	----	---	---	---	---	---	----	---	----
80-11-00	.0	<10	---	0	---	410	<6.0	<3	----
78-10-19	----	---	---	---	---	---	----	---	----
77-08-03	----	---	---	---	---	---	----	---	----
79-07-05	----	---	---	---	---	---	----	---	----
78-10-17	----	---	---	---	---	---	----	---	----
78-10-17	----	---	---	---	---	---	----	---	----
78-10-20	----	---	---	---	---	---	----	---	----
77-07-23	----	---	---	---	---	---	----	---	----
78-10-04	----	---	---	---	---	---	----	---	----
78-10-04	----	---	---	---	---	---	----	---	----
78-10-04	----	---	---	---	---	---	----	---	----
78-10-03	----	---	---	---	---	---	----	---	----
79-07-06	----	---	---	---	---	---	----	---	----
78-10-04	----	---	---	---	---	---	----	---	----
78-10-18	----	---	---	---	---	---	----	---	----
78-10-19	----	---	---	---	---	---	----	---	----
77-07-23	----	---	---	---	---	---	----	---	----
77-07-23	----	---	---	---	---	---	----	---	----
77-07-23	----	---	---	---	---	---	----	---	----
78-10-03	----	---	---	---	---	---	----	---	----
78-10-03	----	---	---	---	---	---	----	---	----
78-10-20	----	---	---	---	---	---	----	---	----
78-07-23	----	---	---	---	---	---	----	---	----
78-10-03	----	---	---	---	---	---	----	---	----

Local identifier	Date of sample	Site	Stream-flow, instantaneous (ft^3/s)	Specific conductance (µS/cm)	Temperature (°C)	pH (units)	Solids, residue at 180°C dissolved (mg/L)	Solids, sum of constituents, dissolved (mg/L)	Hardness (mg/L as $CACO_3$)
A-12-01 27DBA2	78-10-03	GW	----	1,430	17.0	---	---	---	---
A-12-01 29DAC	78-10-05	GW	----	1,200	17.0	---	---	---	---
A-12-01 31BCC	78-10-05	GW	----	750	22.0	---	---	---	---
A-12-01 33AAD	78-10-05	GW	----	1,180	----	---	---	---	---
A-12-01 33ADA	78-10-05	GW	----	835	----	---	---	---	---
A-12-01 33ADB	78-10-05	GW	----	700	24.0	---	---	---	---
A-12-01 34DAC1	78-10-05	GW	----	675	----	---	---	---	---
A-12-01 34DBB	78-10-05	GW	----	825	----	---	---	---	---
A-12-02 08DBA	78-10-18	GW	----	1,000	15.0	---	---	---	---
	79-07-05	GW	----	950	14.5	7.1	---	620	420
A-12-02 22BCD	78-10-19	GW	----	1,200	----	---	---	---	---
A-12-02 22CDC	78-10-19	GW	----	1,050	----	---	---	---	---
A-12-02 27ACB	79-03-20	GW	----	1,530	15.0	---	---	---	---
A-12-02 27BDA1	78-10-18	GW	----	1,150	16.5	---	---	---	---
A-12-02 27BDA3	78-10-18	GW	----	1,230	17.5	---	---	---	---
A-12-02 27DDB	78-10-18	GW	----	820	----	---	---	---	---
A-12-02 29ACD	78-10-19	GW	----	800	22.0	---	---	---	---
A-12-02 31BDD	77-08-03	GW	----	800	18.0	---	---	---	---
A-12-03 01CAC	78-09-05	SP	----	615	----	---	---	---	---
A-12-03 08BDD	79-06-21	GW	----	645	17.0	7.3	---	378	280
A-12-03 10BAB	78-10-05	GW	----	410	----	---	---	---	---
A-12-03 11BBC	78-08-31	GW	----	440	----	---	---	---	---
A-12-03 17CCB	78-08-31	GW	----	730	16.0	---	---	---	---
A-12-03 20BCD	78-08-31	GW	----	730	17.0	---	---	---	---
A-12-03 22BBC	78-08-31	GW	----	415	21.0	---	---	---	---
A-12-03 28DBA	78-08-31	SP	----	510	29.0	---	---	---	---
A-12-03 35BAA	78-08-31	SP	----	460	24.0	---	---	---	---
A-13-01 02DCA	78-09-14	GW	----	385	19.8	---	---	---	---
A-13-01 03ABB	78-09-20	GW	----	405	----	---	---	---	---
A-13-01 03ACD	78-09-20	GW	----	490	----	---	---	---	---
A-13-01 03BBC	78-09-13	GW	----	470	----	---	---	---	---
A-13-01 03BCD	78-08-23	GW	----	410	----	---	---	---	---
A-13-01 03CAA	78-08-23	GW	----	370	----	---	---	---	---
A-13-01 03CBA	78-08-23	GW	----	280	----	---	---	---	---
A-13-01 03DAC	78-09-20	GW	----	410	----	---	---	---	---
A-13-01 04ABA2	78-09-13	GW	----	390	----	---	---	---	---
A-13-01 04BCB	78-09-11	GW	----	455	----	---	---	---	---
A-13-01 05CAB2	78-08-24	GW	----	430	----	---	---	---	---
A-13-01 05CBA	78-08-31	GW	----	465	----	---	---	---	---
A-13-01 05DCC1	78-08-24	GW	----	390	----	---	---	---	---
A-13-01 05DCC2	78-08-24	GW	----	355	----	---	---	---	---
A-13-01 05DDA1	78-08-24	GW	----	435	----	---	---	---	---
A-13-01 05DDA2	78-08-24	GW	----	495	----	---	---	---	---
A-13-01 06CCB	78-08-24	GW	----	630	----	---	---	---	---
A-13-01 06CDA	78-03-24	GW	----	420	----	---	---	---	---

Date of sample	Hardness, noncarbonate (mg/L $CACO_3$)	Hardness noncarbonate (mg/L as $CACO_3$)	Sodium adsorption ratio	Alkalinity field (mg/L as $CACO_3$)	Alkalinity lab (mg/L as $CACO_3$)	Bicarbonate it-fld (mg/L as HCO_3)	Bicarbonate fet-fld (mg/L as HCO_3)	Carbonate fet-fld (mg/L as CO_3)	Chloride, dissolved (mg/L as CL)
78-10-03	---	-----	---	---	---	---	---	---	-----
78-10-05	---	-----	---	---	---	---	---	---	-----
78-10-05	---	-----	---	---	---	---	---	---	-----
78-10-05	---	-----	---	---	---	---	---	---	-----
78-10-05	---	-----	---	---	---	---	---	---	-----
78-10-05	---	-----	---	---	---	---	---	---	-----
78-10-05	---	-----	---	---	---	---	---	---	-----
78-10-05	---	-----	---	---	---	---	---	---	-----
78-10-18	---	-----	---	---	---	---	---	---	-----
79-07-05	260	-----	1.0	160	---	---	200	0	78
78-10-19	---	-----	---	---	---	---	---	---	-----
78-10-19	---	-----	---	---	---	---	---	---	-----
79-03-20	---	-----	---	---	---	---	---	---	-----
78-10-18	---	-----	---	---	---	---	---	---	-----
78-10-18	---	-----	---	---	---	---	---	---	-----
78-10-18	---	-----	---	---	---	---	---	---	-----
78-10-19	---	-----	---	---	---	---	---	---	-----
77-08-03	---	-----	---	---	---	---	---	---	-----
78-09-05	---	-----	---	---	---	---	---	---	-----
79-06-21	18	-----	.7	260	---	---	320	0	18
78-10-05	---	-----	---	---	---	---	---	---	-----
78-08-31	---	-----	---	---	---	---	---	---	-----
78-08-31	---	-----	---	---	---	---	---	---	-----
78-08-31	---	-----	---	---	---	---	---	---	-----
78-08-31	---	-----	---	---	---	---	---	---	-----
78-08-31	---	-----	---	---	---	---	---	---	-----
78-08-31	---	-----	---	---	---	---	---	---	-----
78-09-14	---	-----	---	---	---	---	---	---	-----
78-09-20	---	-----	---	---	---	---	---	---	-----
78-09-20	---	-----	---	---	---	---	---	---	-----
78-09-13	---	-----	---	---	---	---	---	---	-----
78-08-23	---	-----	---	---	---	---	---	---	-----
78-08-23	---	-----	---	---	---	---	---	---	-----
78-08-23	---	-----	---	---	---	---	---	---	-----
78-09-20	---	-----	---	---	---	---	---	---	-----
78-09-13	---	-----	---	---	---	---	---	---	-----
78-09-11	---	-----	---	---	---	---	---	---	-----
78-08-24	---	-----	---	---	---	---	---	---	-----
78-08-31	---	-----	---	---	---	---	---	---	-----
78-08-24	---	-----	---	---	---	---	---	---	-----
78-08-24	---	-----	---	---	---	---	---	---	-----
78-08-24	---	-----	---	---	---	---	---	---	-----
78-08-24	---	-----	---	---	---	---	---	---	-----
78-08-24	---	-----	---	---	---	---	---	---	-----
78-03-24	---	-----	---	---	---	---	---	---	-----

Local identifier	Date of sample	Calcium dis-solved (mg/L as CA)	Magne-sium, dis-solved (mg/L as MG)	Potas-sium, dis-solved (mg/L as K)	Sodium+ potas-sium, dis-solved (mg/L as NA)	Sodium, dis-solved (mg/L as NA)	Sulfate dis-solved (mg/L (as SO_4)	Fluo-ride, dis-solved (mg/L as F)	Silica, dis-solved (mg/L as SIO_2)
A-12-01 27DBA2	78-10-03	-----	----	-----	---	-----	-----	0.5	----
A-12-01 29DAC	78-10-05	-----	----	-----	---	-----	-----	.5	----
A-12-01 31BCC	78-10-05	-----	----	-----	---	-----	-----	.3	----
A-12-01 33AAD	78-10-05	-----	----	-----	---	-----	-----	.4	----
A-12-01 33ADA	78-10-05	-----	----	-----	---	-----	-----	.3	----
A-12-01 33ADB	78-10-05	-----	----	-----	---	-----	-----	.3	----
A-12-01 34DAC1	78-10-05	-----	----	-----	---	-----	-----	.3	----
A-12-01 34DBB	78-10-05	-----	----	-----	---	-----	-----	.3	----
A-12-02 08DBA	78-10-18	-----	----	-----	---	-----	-----	.8	----
	79-07-05	120	29	1.8	49	47	220	.4	19
A-12-02 22BCD	78-10-19	-----	----	-----	---	-----	-----	.8	----
A-12-02 22CDC	78-10-19	-----	----	-----	---	-----	-----	.7	----
A-12-02 27ACB	79-03-20	-----	----	-----	---	-----	-----	.7	----
A-12-02 27BDA1	78-10-18	-----	----	-----	---	-----	-----	.8	----
A-12-02 27BDA3	78-10-18	-----	----	-----	---	-----	-----	.8	----
A-12-02 27DDB	78-10-18	-----	----	-----	---	-----	-----	.5	----
A-12-02 29ACD	78-10-19	-----	----	-----	---	-----	-----	.6	----
A-12-02 31BDD	77-08-03	-----	----	-----	---	-----	-----	.2	----
A-12-03 01CAC	78-09-05	-----	----	-----	---	-----	-----	.4	----
A-12-03 08BDD	79-06-21	76	22	1.4	32	27	43	.2	32
A-12-03 10BAB	78-10-05	-----	----	-----	---	-----	-----	.2	----
A-12-03 11BBC	78-08-31	-----	----	-----	---	-----	-----	.2	----
A-12-03 17CCB	78-08-31	-----	----	-----	---	-----	-----	.3	----
A-12-03 20BCD	78-08-31	-----	----	-----	---	-----	-----	.4	----
A-12-03 22BBC	78-08-31	-----	----	-----	---	-----	-----	.2	----
A-12-03 28DBA	78-08-31	-----	----	-----	---	-----	-----	.3	----
A-12-03 35BAA	78-08-31	-----	----	-----	---	-----	-----	.2	----
A-13-01 02DCA	78-09-14	-----	----	-----	---	-----	-----	.4	----
A-13-01 03ABB	78-09-20	-----	----	-----	---	-----	-----	.4	----
A-13-01 03ACD	78-09-20	-----	----	-----	---	-----	-----	.3	----
A-13-01 03BBC	78-09-13	-----	----	-----	---	-----	-----	.5	----
A-13-01 03BCD	78-08-23	-----	----	-----	---	-----	-----	.5	----
A-13-01 03CAA	78-08-23	-----	----	-----	---	-----	-----	.9	----
A-13-01 03CBA	78-08-23	-----	----	-----	---	-----	-----	.3	----
A-13-01 03DAC	78-09-20	-----	----	-----	---	-----	-----	.3	----
A-13-01 04ABA2	78-09-13	-----	----	-----	---	-----	-----	.4	----
A-13-01 04BCB	78-09-11	-----	----	-----	---	-----	-----	.6	----
A-13-01 05CAB2	78-08-24	-----	----	-----	---	-----	-----	.5	----
A-13-01 05CBA	78-08-31	-----	----	-----	---	-----	-----	.6	----
A-13-01 05DCC1	78-08-24	-----	----	-----	---	-----	-----	.6	----
A-13-01 05DCC2	78-08-24	-----	----	-----	---	-----	-----	.5	----
A-13-01 05DDA1	78-08-24	-----	----	-----	---	-----	-----	.5	----
A-13-01 05DDA2	78-08-24	-----	----	-----	---	-----	-----	.5	----
A-13-01 06CCB	78-08-24	-----	----	-----	---	-----	-----	.7	----
A-13-01 06CDA	78-03-24	-----	----	-----	---	-----	-----	.5	----

Date of sample	Nitrogen, NO2+NO3 dissolved (mg/L as N)	Phosphorus, ortho, dissolved (mg/L as P)	Aluminum, dissolved (µg/L as AL)	Antimony, dissolved (µg/L as SB)	Arsenic dissolved (µg/L as AS)	Barium, dissolved (µg/L as BA)	Beryllium, dissolved (µg/L (as BE)	Boron, dissolved (µg/L as B)	Cadmium, dissolved (µg/L as CD)
78-10-03	-----	-----	--	---	---	----	--	---	---
78-10-05	-----	-----	--	---	---	----	--	---	---
78-10-05	-----	-----	--	---	---	----	--	---	---
78-10-05	-----	-----	--	---	---	----	--	---	---
78-10-05	-----	-----	--	---	---	----	--	---	---
78-10-05	-----	-----	--	---	---	----	--	---	---
78-10-05	-----	-----	--	---	---	----	--	---	---
78-10-05	-----	-----	--	---	---	----	--	---	---
78-10-18	-----	-----	--	---	---	----	--	---	---
79-07-05	1.3	-----	--	---	---	----	--	70	---
78-10-19	-----	-----	--	---	---	----	--	---	---
78-10-19	-----	-----	--	---	---	----	--	---	---
79-03-20	-----	-----	--	---	---	----	--	---	---
78-10-18	-----	-----	--	---	---	----	--	---	---
78-10-18	-----	-----	--	---	---	----	--	---	---
78-10-18	-----	-----	--	---	---	----	--	---	---
78-10-19	-----	-----	--	---	---	----	--	---	---
77-08-03	-----	-----	--	---	---	----	--	---	---
78-09-05	-----	-----	--	---	---	----	--	---	---
79-06-21	.21	-----	--	---	---	----	--	50	---
78-10-05	-----	-----	--	---	---	----	--	---	---
78-08-31	-----	-----	--	---	---	----	--	---	---
78-08-31	-----	-----	--	---	---	----	--	---	---
78-08-31	-----	-----	--	---	---	----	--	---	---
78-08-31	-----	-----	--	---	---	----	--	---	---
78-08-31	-----	-----	--	---	---	----	--	---	---
78-08-31	-----	-----	--	---	---	----	--	---	---
78-09-14	-----	-----	--	---	---	----	--	---	---
78-09-20	-----	-----	--	---	---	----	--	---	---
78-09-20	-----	-----	--	---	---	----	--	---	---
78-09-13	-----	-----	--	---	---	----	--	---	---
78-08-23	-----	-----	--	---	---	----	--	---	---
78-08-23	-----	-----	--	---	---	----	--	---	---
78-08-23	-----	-----	--	---	---	----	--	---	---
78-09-20	-----	-----	--	---	---	----	--	---	---
78-09-13	-----	-----	--	---	---	----	--	---	---
78-09-11	-----	-----	--	---	---	----	--	---	---
78-08-24	-----	-----	--	---	---	----	--	---	---
78-08-31	-----	-----	--	---	---	----	--	---	---
78-08-24	-----	-----	--	---	---	----	--	---	---
78-08-24	-----	-----	--	---	---	----	--	---	---
78-08-24	-----	-----	--	---	---	----	--	---	---
78-08-24	-----	-----	--	---	---	----	--	---	---
78-08-24	-----	-----	--	---	---	----	--	---	---
78-03-24	-----	-----	--	---	---	----	--	---	---

Local identifier	Date of sample	Chromium, dissolved (µg/L as CR)	Chromium, hexavalent, dissolved (µg/L as CR)	Cobalt, dissolved (µg/L as CO)	Copper, dissolved (µg/L as CU)	Iron, dissolved (µg/L as FE)	Lead, dissolved (µg/L as PB)	Lithium, dissolved (µg/L as LI)	Manganese, dissolved (µg/L as MG)
A-12-01 27DBA2	78-10-03	---	--	--	---	---	---	--	---
A-12-01 29DAC	78-10-05	---	--	--	---	---	---	--	---
A-12-01 31BCC	78-10-05	---	--	--	---	---	---	--	---
A-12-01 33AAD	78-10-05	---	--	--	---	---	---	--	---
A-12-01 33ADA	78-10-05	---	--	--	---	---	---	--	---
A-12-01 33ADB	78-10-05	---	--	--	---	---	---	--	---
A-12-01 34DAC1	78-10-05	---	--	--	---	---	---	--	---
A-12-01 34DBB	78-10-05	---	--	--	---	---	---	--	---
A-12-02 08DBA	78-10-18	---	--	--	---	---	---	--	---
	79-07-05	---	--	--	---	<10	---	--	<1
A-12-02 22BCD	78-10-19	---	--	--	---	---	---	--	---
A-12-02 22CDC	78-10-19	---	--	--	---	---	---	--	---
A-12-02 27ACB	79-03-20	---	--	--	---	---	---	--	---
A-12-02 27BDA1	78-10-18	---	--	--	---	---	---	--	---
A-12-02 27BDA3	78-10-18	---	--	--	---	---	---	--	---
A-12-02 27DDB	78-10-18	---	--	--	---	---	---	--	---
A-12-02 29ACD	78-10-19	---	--	--	---	---	---	--	---
A-12-02 31BDD	77-08-03	---	--	--	---	---	---	--	---
A-12-03 01CAC	78-09-05	---	--	--	---	---	---	--	---
A-12-03 08BDD	79-06-21	---	--	--	---	<10	---	--	30
A-12-03 10BAB	78-10-05	---	--	--	---	---	---	--	---
A-12-03 11BBC	78-08-31	---	--	--	---	---	---	--	---
A-12-03 17CCB	78-08-31	---	--	--	---	---	---	--	---
A-12-03 20BCD	78-08-31	---	--	--	---	---	---	--	---
A-12-03 22BBC	78-08-31	---	--	--	---	---	---	--	---
A-12-03 28DBA	78-08-31	---	--	--	---	---	---	--	---
A-12-03 35BAA	78-08-31	---	--	--	---	---	---	--	---
A-13-01 02DCA	78-09-14	---	--	--	---	---	---	--	---
A-13-01 03ABB	78-09-20	---	--	--	---	---	---	--	---
A-13-01 03ACD	78-09-20	---	--	--	---	---	---	--	---
A-13-01 03BBC	78-09-13	---	--	--	---	---	---	--	---
A-13-01 03BCD	78-08-23	---	--	--	---	---	---	--	---
A-13-01 03CAA	78-08-23	---	--	--	---	---	---	--	---
A-13-01 03CBA	78-08-23	---	--	--	---	---	---	--	---
A-13-01 03DAC	78-09-20	---	--	--	---	---	---	--	---
A-13-01 04ABA2	78-09-13	---	--	--	---	---	---	--	---
A-13-01 04BCB	78-09-11	---	--	--	---	---	---	--	---
A-13-01 05CAB2	78-08-24	---	--	--	---	---	---	--	---
A-13-01 05CBA	78-08-31	---	--	--	---	---	---	--	---
A-13-01 05DCC1	78-08-24	---	--	--	---	---	---	--	---
A-13-01 05DCC2	78-08-24	---	--	--	---	---	---	--	---
A-13-01 05DDA1	78-08-24	---	--	--	---	---	---	--	---
A-13-01 05DDA2	78-08-24	---	--	--	---	---	---	--	---
A-13-01 06CCB	78-08-24	---	--	--	---	---	---	--	---
A-13-01 06CDA	78-03-24	---	--	--	---	---	---	--	---

Date of sample	Mercury, dis- solved (µg/L as HG)	Molyb- denum, dis- solved (µg/L as MO)	Nickel, dis- solved (µg/L as NI)	Sele- nium, dis- solved (µg/L as SE)	Silver, dis- solved (µg/L as AG)	Stron- tium, dis- solved (µg/L as SR)	Vana- dium, dis- solved (µg/L as V)	Zinc, dis- solved (µg/L (as ZN)	Cyanide total (mg/L as CN)
78-10-03	----	---	---	---	---	---	----	---	----
78-10-05	----	---	---	---	---	---	----	---	----
78-10-05	----	---	---	---	---	---	----	---	----
78-10-05	----	---	---	---	---	---	----	---	----
78-10-05	----	---	---	---	---	---	----	---	----
78-10-05	----	---	---	---	---	---	----	---	----
78-10-05	----	---	---	---	---	---	----	---	----
78-10-05	----	---	---	---	---	---	----	---	----
78-10-18	----	---	---	---	---	---	----	---	----
79-07-05	----	---	---	---	---	---	----	---	----
78-10-19	----	---	---	---	---	---	----	---	----
78-10-19	----	---	---	---	---	---	----	---	----
79-03-20	----	---	---	---	---	---	----	---	----
78-10-18	----	---	---	---	---	---	----	---	----
78-10-18	----	---	---	---	---	---	----	---	----
78-10-18	----	---	---	---	---	---	----	---	----
78-10-19	----	---	---	---	---	---	----	---	----
77-08-03	----	---	---	---	---	---	----	---	----
78-09-05	----	---	---	---	---	---	----	---	----
79-06-21	----	---	---	---	---	---	----	---	----
78-10-05	----	---	---	---	---	---	----	---	----
78-08-31	----	---	---	---	---	---	----	---	----
78-08-31	----	---	---	---	---	---	----	---	----
78-08-31	----	---	---	---	---	---	----	---	----
78-08-31	----	---	---	---	---	---	----	---	----
78-08-31	----	---	---	---	---	---	----	---	----
78-08-31	----	---	---	---	---	---	----	---	----
78-09-14	----	---	---	---	---	---	----	---	----
78-09-20	----	---	---	---	---	---	----	---	----
78-09-20	----	---	---	---	---	---	----	---	----
78-09-13	----	---	---	---	---	---	----	---	----
78-08-23	----	---	---	---	---	---	----	---	----
78-08-23	----	---	---	---	---	---	----	---	----
78-08-23	----	---	---	---	---	---	----	---	----
78-09-20	----	---	---	---	---	---	----	---	----
78-09-13	----	---	---	---	---	---	----	---	----
78-09-11	----	---	---	---	---	---	----	---	----
78-08-24	----	---	---	---	---	---	----	---	----
78-08-31	----	---	---	---	---	---	----	---	----
78-08-24	----	---	---	---	---	---	----	---	----
78-08-24	----	---	---	---	---	---	----	---	----
78-08-24	----	---	---	---	---	---	----	---	----
78-08-24	----	---	---	---	---	---	----	---	----
78-08-24	----	---	---	---	---	---	----	---	----
78-03-24	----	---	---	---	---	---	----	---	----

Local identifier	Date of sample	Site	Stream-flow, instan-taneous (ft³/s)	Spe-cific con-duct-ance (µS/cm)	Temper-ature (°C)	pH (units)	Solids, residue at 180°C dis-solved (mg/L)	Solids, sum of consti-tuents, dis-solved (mg/L)	Hard-ness (mg/L as $CACO_3$)
A-13-01 07ABA	78-08-31	GW	----	510	----	---	---	---	---
A-13-01 07ABB	78-08-25	GW	----	495	----	---	---	---	---
A-13-01 07ACA	78-08-25	GW	----	940	----	---	---	---	---
A-13-01 07ACD	78-08-31	GW	----	1,120	----	---	---	---	---
A-13-01 07ADC	78-08-31	GW	----	1,080	----	---	---	---	---
A-13-01 07ADC	79-06-18	SP	----	1,100	18.0	7.4	---	662	450
A-13-01 07BBB	78-08-24	GW	----	575	----	---	---	---	---
A-13-01 07BCB1	78-08-31	GW	----	1,020	----	---	---	---	---
A-13-01 07CAD	78-08-31	GW	----	930	----	---	---	---	---
A-13-01 07CDD	78-08-25	GW	----	720	----	---	---	---	---
A-13-01 07DAB	78-08-31	GW	----	840	----	---	---	---	---
A-13-01 07DBB	79-06-18	GW	----	900	----	6.9	---	472	330
A-13-01 07DCA1	78-08-25	GW	----	805	----	---	---	---	---
A-13-01 07DCA2	78-08-25	GW	----	1,550	----	---	---	---	---
A-13-01 07DCC1	78-08-25	GW	----	720	----	---	---	---	---
A-13-01 07DDC	78-08-31	GW	----	900	----	---	---	---	---
A-13-01 10AAA	78-09-20	GW	----	485	17.0	---	---	---	---
A-13-01 11BCA1	78-09-21	GW	----	490	17.0	---	---	---	---
A-13-01 11BCA2	78-09-21	GW	----	590	15.0	---	---	---	---
A-13-01 11BCB	78-09-21	GW	----	715	----	---	---	---	---
A-13-01 11BDB	78-09-21	GW	----	405	17.5	---	---	---	---
	79-06-19	GW	----	415	17.0	8.2	---	243	120
	81-11-11	GW	1.0	---	18.0	---	---	---	---
A-13-01 11CDB	78-09-20	GW	----	485	----	---	---	---	---
A-13-01 12BAA	81-11-12	GW	1.0	435	20.0	7.9	---	247	170
A-13-01 14BCD1	78-10-04	GW	----	540	----	---	---	---	---
A-13-01 14BDC	78-10-04	GW	----	510	----	---	---	---	---
A-13-01 14CBA2	78-09-20	GW	----	430	----	---	---	---	---
A-13-01 14DDB1	78-10-04	GW	----	560	----	---	---	---	---
A-13-01 18ABB	78-08-25	GW	----	620	----	---	---	---	---
A-13-01 18BAD2	78-08-25	GW	----	725	----	---	---	---	---
A-13-01 20DDD	78-10-20	SP	----	2,050	15.5	---	---	---	---
A-13-01 23ABA	78-10-05	GW	----	590	----	---	---	---	---
A-13-01 29AAC	78-10-20	SP	----	2,140	16.0	---	---	---	---
A-13-01 29BDB	78-10-20	SP	----	3,050	16.5	---	---	---	---
A-13-01 HO2AAA	78-08-23	GW	----	890	20.5	---	---	---	---
A-13-02 11AAA	78-04-20	GW	----	220	16.5	7.5	---	132	---
A-13-02 24ACC	78-09-05	GW	----	650	----	---	---	---	---
A-13-02 26CBC	78-09-05	GW	----	720	----	---	---	---	---
A-13-02 30DBD	78-10-18	GW	----	2,050	19.5	---	---	---	---
A-13-02 36DDC	78-08-31	GW	----	600	23.0	---	---	---	---
A-13-03 01BDC	78-04-19	GW	----	420	21.0	7.8	---	251	150
A-13-03 33CAD	78-09-05	SP	----	650	----	---	---	---	---
A-13-04 18ADD	78-04-19	GW	----	800	15.5	7.4	---	480	---
A-14-01 22CAD	78-04-26	GW	----	300	20.0	---	---	---	---

Date of sample	Hardness, noncarbonate (mg/L $CACO_3$)	Hardness noncarbonate (mg/L as $CACO_3$)	Sodium adsorption ratio	Alkalinity field (mg/L as $CACO_3$)	Alkalinity lab (mg/L as $CACO_3$)	Bicarbonate it-fld (mg/L as HCO_3)	Bicarbonate fet-fld (mg/L as HCO_3)	Carbonate fet-fld (mg/L as CO_3)	Chloride, dissolved (mg/L as CL)
78-08-31	---	-----	---	---	---	---	---	---	-----
78-08-25	---	-----	---	---	---	---	---	---	-----
78-08-25	---	-----	---	---	---	---	---	---	-----
78-08-31	---	-----	---	---	---	---	---	---	-----
78-08-31	---	-----	---	---	---	---	---	---	-----
79-06-18	58	-----	1.4	390	---	---	480	0	64
78-08-24	---	-----	---	---	---	---	---	---	-----
78-08-31	---	-----	---	---	---	---	---	---	-----
78-08-31	---	-----	---	---	---	---	---	---	-----
78-08-25	---	-----	---	---	---	---	---	---	-----
78-08-31	---	-----	---	---	---	---	---	---	-----
79-06-18	17	-----	1.0	310	---	---	380	0	22
78-08-25	---	-----	---	---	---	---	---	---	-----
78-08-25	---	-----	---	---	---	---	---	---	-----
78-08-25	---	-----	---	---	---	---	---	---	-----
78-08-31	---	-----	---	---	---	---	---	---	-----
78-09-20	---	-----	---	---	---	---	---	---	-----
78-09-21	---	-----	---	---	---	---	---	---	-----
78-09-21	---	-----	---	---	---	---	---	---	-----
78-09-21	---	-----	---	---	---	---	---	---	-----
78-09-21	---	-----	---	---	---	---	---	---	-----
79-06-19	0	-----	1.2	130	---	---	160	0	11
81-11-11	---	-----	---	---	---	---	---	---	-----
78-09-20	---	-----	---	---	---	---	---	---	-----
81-11-12	---	21	.7	---	150	210	---	---	21
78-10-04	---	-----	---	---	---	---	---	---	-----
78-10-04	---	-----	---	---	---	---	---	---	-----
78-09-20	---	-----	---	---	---	---	---	---	-----
78-10-04	---	-----	---	---	---	---	---	---	-----
78-08-25	---	-----	---	---	---	---	---	---	-----
78-08-25	---	-----	---	---	---	---	---	---	-----
78-10-20	---	-----	---	---	---	---	---	---	-----
78-10-05	---	-----	---	---	---	---	---	---	-----
78-10-20	---	-----	---	---	---	---	---	---	-----
78-10-20	---	-----	---	---	---	---	---	---	-----
78-08-23	---	-----	---	---	---	---	---	---	-----
78-04-20	---	-----	---	110	---	---	130	0	5.9
78-09-05	---	-----	---	---	---	---	---	---	-----
78-09-05	---	-----	---	---	---	---	---	---	-----
78-10-18	---	-----	---	---	---	---	---	---	-----
78-08-31	---	-----	---	---	---	---	---	---	-----
78-04-19	0	-----	.8	160	---	---	190	0	19
78-09-05	---	-----	---	---	---	---	---	---	-----
78-04-19	---	-----	---	240	---	---	290	0	17
78-04-26	---	-----	---	---	---	---	---	---	-----

Local identifier	Date of sample	Calcium dis- solved (mg/L as CA)	Magne- sium, dis- solved (mg/L as MG)	Potas- sium, dis- solved (mg/L as K)	Sodium+ potas- sium, dis- solved (mg/L as NA)	Sodium, dis- solved (mg/L as NA)	Sulfate dis- solved (mg/L (as SO_4)	Fluo- ride, dis- solved (mg/L as F)	Silica, dis- solved (mg/L as SIO_2)
A-13-01 07ABA	78-08-31	-----	----	-----	---	-----	-----	0.8	----
A-13-01 07ABB	78-08-25	-----	----	-----	---	-----	-----	.9	----
A-13-01 07ACA	78-08-25	-----	----	-----	---	-----	-----	.6	----
A-13-01 07ACD	78-08-31	-----	----	-----	---	-----	-----	.6	----
A-13-01 07ADC	78-08-31	-----	----	-----	---	-----	-----	.9	----
A-13-01 07ADC	79-06-18	120	37	0.6	67	66	110	.5	26
A-13-01 07BBB	78-08-24	-----	----	-----	---	-----	-----	.8	----
A-13-01 07BCB1	78-08-31	-----	----	-----	---	-----	-----	.7	----
A-13-01 07CAD	78-08-31	-----	----	-----	---	-----	-----	.5	----
A-13-01 07CDD	78-08-25	-----	----	-----	---	-----	-----	.6	----
A-13-01 07DAB	78-08-31	-----	----	-----	---	-----	-----	.5	----
A-13-01 07DBB	79-06-18	87	27	1.6	42	40	81	.4	21
A-13-01 07DCA1	78-08-25	-----	----	-----	---	-----	-----	.5	----
A-13-01 07DCA2	78-08-25	-----	----	-----	---	-----	-----	.7	----
A-13-01 07DCC1	78-08-25	-----	----	-----	---	-----	-----	.5	----
A-13-01 07DDC	78-08-31	-----	----	-----	---	-----	-----	.5	----
A-13-01 10AAA	78-09-20	-----	----	-----	---	-----	-----	.9	----
A-13-01 11BCA1	78-09-21	-----	----	-----	---	-----	-----	.8	----
A-13-01 11BCA2	78-09-21	-----	----	-----	---	-----	-----	.5	----
A-13-01 11BCB	78-09-21	-----	----	-----	---	-----	-----	.4	----
A-13-01 11BDB	78-09-21	-----	----	-----	---	-----	-----	.8	----
	79-06-19	22	16	2.5	33	30	39	.7	27
	81-11-11	-----	----	-----	---	-----	-----	---	----
A-13-01 11CDB	78-09-20	-----	----	-----	---	-----	-----	.6	----
A-13-01 12BAA	81-11-12	42	16	1.2	---	19	18	.3	30
A-13-01 14BCD1	78-10-04	-----	----	-----	---	-----	-----	.3	----
A-13-01 14BDC	78-10-04	-----	----	-----	---	-----	-----	.3	----
A-13-01 14CBA2	78-09-20	-----	----	-----	---	-----	-----	.3	----
A-13-01 14DDB1	78-10-04	-----	----	-----	---	-----	-----	.4	----
A-13-01 18ABB	78-08-25	-----	----	-----	---	-----	-----	.5	----
A-13-01 18BAD2	78-08-25	-----	----	-----	---	-----	-----	.4	----
A-13-01 20DDD	78-10-20	-----	----	-----	---	-----	-----	1.0	----
A-13-01 23ABA	78-10-05	-----	----	-----	---	-----	-----	.5	----
A-13-01 29AAC	78-10-20	-----	----	-----	---	-----	-----	1.0	----
A-13-01 29BDB	78-10-20	-----	----	-----	---	-----	-----	1.2	----
A-13-01 HO2AAA	78-08-23	-----	----	-----	---	-----	-----	.4	----
A-13-02 11AAA	78-04-20	26	----	39	---	1.0	8.2	.1	5.6
A-13-02 24ACC	78-09-05	-----	----	-----	---	-----	-----	.4	----
A-13-02 26CBC	78-09-05	-----	----	-----	---	-----	-----	.4	----
A-13-02 30DBD	78-10-18	-----	----	-----	---	-----	-----	1.0	----
A-13-02 36DDC	78-08-31	-----	----	-----	---	-----	-----	.4	----
A-13-03 01BDC	78-04-19	30	17	9.9	---	22	10	.2	38
A-13-03 33CAD	78-09-05	-----	----	-----	---	-----	-----	.4	----
A-13-04 18ADD	78-04-19	96	----	240	---	15	160	.3	25
A-14-01 22CAD	78-04-26	-----	----	-----	---	-----	-----	.3	----

Date of sample	Nitrogen, NO2+NO3 dissolved (mg/L as N)	Phosphorus, ortho, dissolved (mg/L as P)	Aluminum, dissolved (µg/L as AL)	Antimony, dissolved (µg/L as SB)	Arsenic dissolved (µg/L as AS)	Barium, dissolved (µg/L as BA)	Beryllium, dissolved (µg/L (as BE)	Boron, dissolved (µg/L as B)	Cadmium, dissolved (µg/L as CD)
78-08-31	-----	-----	--	---	---	----	--	---	---
78-08-25	-----	-----	--	---	---	----	--	---	---
78-08-25	-----	-----	--	---	---	----	--	---	---
78-08-31	-----	-----	--	---	---	----	--	---	---
78-08-31	-----	-----	--	---	---	----	--	---	---
79-06-18	0.14	-----	--	---	---	----	--	60	---
78-08-24	-----	-----	--	---	---	----	--	---	---
78-08-31	-----	-----	--	---	---	----	--	---	---
78-08-31	-----	-----	--	---	---	----	--	---	---
78-08-25	-----	-----	--	---	---	----	--	---	---
78-08-31	-----	-----	--	---	---	----	--	---	---
79-06-18	.96	-----	--	---	---	----	--	40	---
78-08-25	-----	-----	--	---	---	----	--	---	---
78-08-25	-----	-----	--	---	---	----	--	---	---
78-08-25	-----	-----	--	---	---	----	--	---	---
78-08-31	-----	-----	--	---	---	----	--	---	---
78-09-20	-----	-----	--	---	---	----	--	---	---
78-09-21	-----	-----	--	---	---	----	--	---	---
78-09-21	-----	-----	--	---	---	----	--	---	---
78-09-21	-----	-----	--	---	---	----	--	---	---
78-09-21	-----	-----	--	---	---	----	--	---	---
79-06-19	2.8	-----	--	---	---	----	--	<20	---
81-11-11	-----	-----	10	---	30	<100	--	---	<1
78-09-20	-----	-----	--	---	---	----	--	---	---
81-11-12	1.9	0.020	10	---	17	72	--	20	<1
78-10-04	-----	-----	--	---	---	----	--	---	---
78-10-04	-----	-----	--	---	---	----	--	---	---
78-09-20	-----	-----	--	---	---	----	--	---	---
78-10-04	-----	-----	--	---	---	----	--	---	---
78-08-25	-----	-----	--	---	---	----	--	---	---
78-08-25	-----	-----	--	---	---	----	--	---	---
78-10-20	-----	-----	--	---	---	----	--	---	---
78-10-05	-----	-----	--	---	---	----	--	---	---
78-10-20	-----	-----	--	---	---	----	--	---	---
78-10-20	-----	-----	--	---	---	----	--	---	---
78-08-23	-----	-----	--	---	---	----	--	---	---
78-04-20	.21	<.010	--	---	---	----	--	90	---
78-09-05	-----	-----	--	---	---	----	--	---	---
78-09-05	-----	-----	--	---	---	----	--	---	---
78-10-18	-----	-----	--	---	---	----	--	---	---
78-08-31	-----	-----	--	---	---	----	--	---	---
78-04-19	2.6	.010	--	---	---	----	--	<20	---
78-09-05	-----	-----	--	---	---	----	--	---	---
78-04-19	2.3	<.010	--	---	---	----	--	<20	---
78-04-26	-----	-----	--	---	---	----	--	---	---

Local identifier	Date of sample	Chromium, dissolved (µg/L as CR)	Chromium, hexavalent, dissolved (µg/L as CR)	Cobalt, dissolved (µg/L as CO)	Copper, dissolved (µg/L as CU)	Iron, dissolved (µg/L as FE)	Lead, dissolved (µg/L as PB)	Lithium, dissolved (µg/L as LI)	Manganese, dissolved (µg/L as HG)
A-13-01 07ABA	78-08-31	---	--	--	---	---	---	--	---
A-13-01 07ABB	78-08-25	---	--	--	---	---	---	--	---
A-13-01 07ACA	78-08-25	---	--	--	---	---	---	--	---
A-13-01 07ACD	78-08-31	---	--	--	---	---	---	--	---
A-13-01 07ADC	78-08-31	---	--	--	---	---	---	--	---
A-13-01 07ADC	79-06-18	---	--	--	---	20	---	--	60
A-13-01 07BBB	78-08-24	---	--	--	---	---	---	--	---
A-13-01 07BCB1	78-08-31	---	--	--	---	---	---	--	---
A-13-01 07CAD	78-08-31	---	--	--	---	---	---	--	---
A-13-01 07CDD	78-08-25	---	--	--	---	---	---	--	---
A-13-01 07DAB	78-08-31	---	--	--	---	---	---	--	---
A-13-01 07DBB	79-06-18	---	--	--	---	90	---	--	20
A-13-01 07DCA1	78-08-25	---	--	--	---	---	---	--	---
A-13-01 07DCA2	78-08-25	---	--	--	---	---	---	--	---
A-13-01 07DCC1	78-08-25	---	--	--	---	---	---	--	---
A-13-01 07DDC	78-08-31	---	--	--	---	---	---	--	---
A-13-01 10AAA	78-09-20	---	--	--	---	---	---	--	---
A-13-01 11BCA1	78-09-21	---	--	--	---	---	---	--	---
A-13-01 11BCA2	78-09-21	---	--	--	---	---	---	--	---
A-13-01 11BCB	78-09-21	---	--	--	---	---	---	--	---
A-13-01 11BDB	78-09-21	---	--	--	---	---	---	--	---
	79-06-19	---	--	--	---	20	---	--	1
	81-11-11	<10	1	--	1	---	1	--	---
A-13-01 11CDB	78-09-20	---	--	--	---	---	---	--	---
A-13-01 12BAA	81-11-12	<10	2	--	1	<10	1	--	9
A-13-01 14BCD1	78-10-04	---	--	--	---	---	---	--	---
A-13-01 14BDC	78-10-04	---	--	--	---	---	---	--	---
A-13-01 14CBA2	78-09-20	---	--	--	---	---	---	--	---
A-13-01 14DDB1	78-10-04	---	--	--	---	---	---	--	---
A-13-01 18ABB	78-08-25	---	--	--	---	---	---	--	---
A-13-01 18BAD2	78-08-25	---	--	--	---	---	---	--	---
A-13-01 20DDD	78-10-20	---	--	--	---	---	---	--	---
A-13-01 23ABA	78-10-05	---	--	--	---	---	---	--	---
A-13-01 29AAC	78-10-20	---	--	--	---	---	---	--	---
A-13-01 29BDB	78-10-20	---	--	--	---	---	---	--	---
A-13-01 H02AAA	78-08-23	---	--	--	---	---	---	--	---
A-13-02 11AAA	78-04-20	---	--	--	---	70	---	--	30
A-13-02 24ACC	78-09-05	---	--	--	---	---	---	--	---
A-13-02 26CBC	78-09-05	---	--	--	---	---	---	--	---
A-13-02 30DBD	78-10-18	---	--	--	---	---	---	--	---
A-13-02 36DDC	78-08-31	---	--	--	---	---	---	--	---
A-13-03 01BDC	78-04-19	---	--	--	---	<10	---	--	<10
A-13-03 33CAD	78-09-05	---	--	--	---	---	---	--	---
A-13-04 18ADD	78-04-19	---	--	--	---	80	---	--	40
A-14-01 22CAD	78-04-26	---	--	--	---	---	---	--	---

Date of sample	Mercury, dis- solved (µg/L as HG)	Molyb- denum, dis- solved (µg/L as MO)	Nickel, dis- solved (µg/L as NI)	Sele- nium, dis- solved (µg/L as SE)	Silver, dis- solved (µg/L as AG)	Stron- tium, dis- solved (µg/L as SR)	Vana- dium, dis- solved (µg/L as V)	Zinc, dis- solved (µg/L (as ZN)	Cyanide total (mg/L as CN)
78-08-31	----	---	---	---	---	---	----	---	---
78-08-25	----	---	---	---	---	---	----	---	---
78-08-25	----	---	---	---	---	---	----	---	---
78-08-31	----	---	---	---	---	---	----	---	---
78-08-31	----	---	---	---	---	---	----	---	---
79-06-18	----	---	---	---	---	---	----	---	---
78-08-24	----	---	---	---	---	---	----	---	---
78-08-31	----	---	---	---	---	---	----	---	---
78-08-31	----	---	---	---	---	---	----	---	---
78-08-25	----	---	---	---	---	---	----	---	---
78-08-31	----	---	---	---	---	---	----	---	---
79-06-18	----	---	---	---	---	---	----	---	---
78-08-25	----	---	---	---	---	---	----	---	---
78-08-25	----	---	---	---	---	---	----	---	---
78-08-25	----	---	---	---	---	---	----	---	---
78-08-31	----	---	---	---	---	---	----	---	---
78-09-20	----	---	---	---	---	---	----	---	---
78-09-21	----	---	---	---	---	---	----	---	---
78-09-21	----	---	---	---	---	---	----	---	---
78-09-21	----	---	---	---	---	---	----	---	---
78-09-21	----	---	---	---	---	---	----	---	---
79-06-19	----	---	---	---	---	---	----	---	---
81-11-11	<0.1	---	---	1	---	420	----	10	---
78-09-20	----	---	---	---	---	---	----	---	---
81-11-12	<.1	---	---	1	---	350	----	4	---
78-10-04	----	---	---	---	---	---	----	---	---
78-10-04	----	---	---	---	---	---	----	---	---
78-09-20	----	---	---	---	---	---	----	---	---
78-10-04	----	---	---	---	---	---	----	---	---
78-08-25	----	---	---	---	---	---	----	---	---
78-08-25	----	---	---	---	---	---	----	---	---
78-10-20	----	---	---	---	---	---	----	---	---
78-10-05	----	---	---	---	---	---	----	---	---
78-10-20	----	---	---	---	---	---	----	---	---
78-10-20	----	---	---	---	---	---	----	---	---
78-08-23	----	---	---	---	---	---	----	---	---
78-04-20	----	---	---	---	---	---	----	---	---
78-09-05	----	---	---	---	---	---	----	---	---
78-09-05	----	---	---	---	---	---	----	---	---
78-10-18	----	---	---	---	---	---	----	---	---
78-08-31	----	---	---	---	---	---	----	---	---
78-04-19	----	---	---	---	---	---	----	---	---
78-09-05	----	---	---	---	---	---	----	---	---
78-04-19	----	---	---	---	---	---	----	---	---
78-04-26	----	---	---	---	---	---	----	---	---

Local identifier	Date of sample	Site	Stream-flow, instan-taneous (ft³/s)	Spe-cific con-duct-ance (µS/cm)	Temper-ature (°C)	pH (units)	Solids, residue at 180°C dis-solved (mg/L)	Solids, sum of consti-tuents, dis-solved (mg/L)	Hard-ness (mg/L as $CACO_3$)
A-14-01 22CAD	79-06-20	GW	----	310	23.0	7.7	---	196	130
	81-11-13	GW	0.00	-----	----	---	---	---	---
A-14-01 24DCB	81-11-13	GW	.00	360	21.0	7.9	---	211	160
A-14-01 28BCB	71-08-13	GW	----	356	----	7.7	---	232	160
A-14-01 28CDC	81-05-27	GW	----	390	19.0	7.4	---	230	150
A-14-01 28CDC	81-11-10	GW	2.7	-----	19.0	---	---	---	---
A-14-01 35DDC1	78-09-13	GW	----	290	----	---	---	---	---
	79-06-20	GW	----	290	----	8.3	---	213	9
	81-11-11	GW	.01	288	23.0	8.7	---	---	10
A-14-01 35DDD	78-09-13	GW	----	345	----	---	---	---	---
A-14-02H25CCA	78-04-20	GW	----	700	14.0	7.6	---	552	340
A-14-03 17DDD1	78-03-16	GW	----	700	----	7.4	---	464	340
A-14-03 21BAD	78-03-16	GW	----	580	16.0	6.9	---	390	250
A-15-01 01ABA	81-02-24	SP	----	635	----	---	---	---	---
A-15-01 10BCD2	81-02-24	GW	----	770	----	---	---	---	---
A-15-01 10BCD2	81-05-06	GW	----	910	15.5	7.5	---	518	350
A-15-01 15CBB	81-02-24	GW	----	1,390	----	---	---	---	---
A-15-01 26ABC	81-02-24	GW	----	450	----	---	---	---	---
	81-05-06	GW	----	555	18.5	7.5	---	290	230
A-15-01 28ACC	81-11-10	GW	.00	520	18.0	7.8	---	---	250
A-15-02 02D UN	78-04-20	SP	----	365	16.0	7.6	---	276	230
A-15-02 06BC UN	81-02-24	SP	----	480	14.0	---	---	---	---
	81-05-26	SP	----	560	----	7.6	---	307	250
A-16-01 21ACA2	81-02-03	GW	----	510	----	---	---	---	---
	81-05-26	GW	----	540	17.0	7.3	---	344	260
A-16-01 27DA UN	78-07-19	GW	----	471	18.5	---	---	---	210
	81-02-24	GW	----	470	----	---	---	---	---
	81-05-06	GW	----	510	18.0	7.8	---	266	210
B-12-01 27ABD	78-10-20	GW	----	1,710	----	---	---	---	---
B-12H01 22DDC	78-10-17	SP	----	1,100	15.0	---	---	---	---
B-14-01 06ADD	81-06-18	GW	----	215	----	---	---	---	---
B-14-01 06BCB	78-07-19	GW	----	684	18.0	---	---	---	290
	81-03-12	GW	----	595	----	---	---	---	---
	81-05-04	GW	----	635	18.5	7.1	---	372	280
B-14-01 10ACD	72-02-21	GW	----	412	19.0	7.6	---	255	170
B-14-01 10ACD	81-05-27	GW	----	370	24.5	7.3	---	249	120
	81-11-13	GW	3.8	---	----	---	---	---	---
B-14-01 10DCC	71-10-14	GW	----	542	19.0	7.8	---	354	240
B-14-01 14ACC	71-07-30	GW	----	486	----	7.1	---	322	220
	81-11-13	GW	.60	---	----	---	---	---	---
B-14-01 24DCC	79-06-20	GW	----	730	----	7.2	---	460	310
B-14-02 01DCD	80-12-23	GW	----	570	----	---	---	---	---
	81-05-04	GW	----	630	----	7.0	---	353	250

Date of sample	Hard- ness, noncar- bonate (mg/L $CACO_3$)	Hard- ness noncar- bonate (mg/L as $CACO_3$)	Sodium ad- sorp- tion ratio	Alka- linity field (mg/L as $CACO_3$)	Alka- linity lab (mg/L as $CACO_3$)	Bicar- bonate it-fld (mg/L as HCO_3)	Bicar- bonate fet-fld (mg/L as HCO_3)	Car- bonate fet-fld (mg/L as CO_3)	Chlo- ride, dis- solved (mg/L as CL)
79-06-20	6	-----	0.7	120	---		150	0	9.1
81-11-13	---	-----	---	---	---	---	---	---	-----
81-11-13	---	16	.6	---	140	200	---	---	12
71-08-13	3	-----	.5	157	---	---	191	0	6.9
81-05-27	---	10	.8	---	140	---	---	---	23
81-11-10	---	-----	---	---	---	---	---	---	-----
78-09-13	---	-----	---	---	---	---	---	---	-----
79-06-20	0	-----	8.4	130	---	---	160	0	3.8
81-11-11	---	.00	8.4	---	130	170	---	---	4.0
78-09-13	---	-----	---	---	---	---	---	---	-----
78-04-20	19	-----	1.4	320	---	---	390	0	36
78-03-16	41	-----	.7	300	---	---	370	0	23
78-03-16	84	-----	.7	160	---	---	200	0	17
81-02-24	---	-----	---	---	---	---	---	---	-----
81-02-24	---	-----	---	---	---	---	---	---	-----
81-05-06	---	83	1.1	---	270	---	---	---	80
81-02-24	---	-----	---	---	---	---	---	---	-----
81-02-24	---	-----	---	---	---	---	---	---	-----
81-05-06	---	6.0	.3	---	220	---	---	---	6.9
81-11-10	---	19	.4	---	230	---	---	---	24
78-04-20	26	-----	.2	210	---	---	250	0	3.6
81-02-24	---	-----	---	---	---	---	---	---	-----
81-05-26	---	9.0	.4	---	240	---	---	---	18
81-02-03	---	-----	---	---	---	---	---	---	-----
81-05-26	---	47	.5	---	210	---	---	---	29
78-07-19	---	-----	.4	193	---	---	---	---	22
81-02-24	---	-----	---	---	---	---	---	---	-----
81-05-06	---	11	.4	---	200	---	---	---	6.6
78-10-20	---	-----	---	---	---	---	---	---	-----
78-10-17	---	-----	---	---	---	---	---	---	-----
81-06-18	---	-----	---	---	---	---	---	---	-----
78-07-19	---	-----	.5	255	---	---	---	---	45
81-03-12	---	-----	---	---	---	---	---	---	-----
81-05-04	---	48	.6	---	230	---	---	---	44
72-02-21	36	-----	.6	137	---	---	167	0	17
81-05-27	---	.00	1.3	---	140	---	---	---	15
81-11-13	---	-----	---	---	---	---	---	---	-----
71-10-14	73	-----	.6	167	---	---	203	0	18
71-07-30	64	-----	.5	160	---	---	195	0	11
81-11-13	---	-----	---	---	---	---	---	---	-----
79-06-20	130	-----	.6	180	---	---	220	0	36
80-12-23	---	-----	---	---	---	---	---	---	-----
81-05-04	---	64	.5	---	190	---	---	---	36

Table 6.--Chemical analysis of water from the northern part of the

Local identifier	Date of sample	Calcium dis-solved (mg/L as CA)	Magne-sium, dis-solved (mg/L as MG)	Potas-sium, dis-solved (mg/L as K)	Sodium+ potas-sium, dis-solved (mg/L as NA)	Sodium, dis-solved (mg/L as NA)	Sulfate dis-solved (mg/L (as SO_4)	Fluo-ride, dis-solved (mg/L as F)	Silica, dis-solved (mg/L as SIO_2)
A-14-01 22CAD	79-06-20	22	18	1.4	19	18	20	0.4	27
	81-11-13	-----	----	-----	---	-----	-----	---	----
A-14-01 24DCB	81-11-13	47	9.4	.8	---	15	5.0	.3	28
A-14-01 28BCB	71-08-13	46	11	1.9	---	15	26	.5	26
A-14-01 28CDC	81-05-27	42	11	1.8	---	23	18	.2	22
A-14-01 28CDC	81-11-10	-----	----	-----	---	-----	-----	---	----
A-14-01 35DDC1	78-09-13	-----	----	-----	---	-----	-----	.8	----
	79-06-20	3.1	.4	1.2	60	59	9.1	.8	55
	81-11-11	3.4	.5	.5	---	60	<5.0	.7	56
A-14-01 35DDD	78-09-13	-----	----	-----	---	-----	-----	.4	----
A-14-02H25CCA	78-04-20	91	27	20	---	60	81	.4	27
A-14-03 17DDD1	78-03-16	90	29	2.0	---	30	61	.3	35
A-14-03 21BAD	78-03-16	73	16	.6	---	27	62	.3	24
A-15-01 01ABA	81-02-24	-----	----	-----	---	-----	-----	.4	----
A-15-01 10BCD2	81-02-24	-----	----	-----	---	-----	-----	.8	----
A-15-01 10BCD2	81-05-06	110	19	.9	---	47	55	.7	28
A-15-01 15CBB	81-02-24	-----	----	-----	---	-----	-----	.9	----
A-15-01 26ABC	81-02-24	-----	----	-----	---	-----	-----	.4	----
	81-05-06	59	19	.8	---	11	15	.2	32
A-15-01 28ACC	81-11-10	57	26	1.6	---	13	<5.0	.2	24
A-15-02 02D UN	78-04-20	48	27	1.4	---	6.4	31	.1	31
A-15-02 06BC UN	81-02-24	-----	----	-----	---	-----	-----	.2	----
	81-05-26	52	29	2.3	---	13	4.1	.1	39
A-16-01 21ACA2	81-02-03	-----	----	-----	---	-----	-----	.8	----
	81-05-26	60	26	2.8	---	17	33	.3	36
A-16-01 27DA UN	78-07-19	41	25	2.9	---	12	11	---	----
	81-02-24	-----	----	-----	---	-----	-----	.4	----
	81-05-06	45	24	2.8	---	12	13	.2	35
B-12-01 27ABD	78-10-20	-----	----	-----	---	-----	-----	1.0	----
B-12H01 22DDC	78-10-17	-----	----	-----	---	-----	-----	1.1	----
B-14-01 06ADD	81-06-18	-----	----	-----	---	-----	-----	3.0	----
B-14-01 06BCB	78-07-19	80	21	1.6	---	20	22	---	----
	81-03-12	-----	----	-----	---	-----	-----	1.5	----
	81-05-04	75	22	5.2	---	22	23	1.5	33
B-14-01 10ACD	72-02-21	48	13	2.6	---	17	48	.3	23
B-14-01 10ACD	81-05-27	24	15	3.2	---	32	31	.4	41
	81-11-13	-----	----	-----	---	-----	-----	---	----
B-14-01 10DCC	71-10-14	68	17	1.6	---	23	93	.2	26
B-14-01 14ACC	71-07-30	65	15	.7	---	17	88	.2	24
	81-11-13	-----	----	-----	---	-----	-----	---	----
B-14-01 24DCC	79-06-20	96	18	1.2	25	24	140	.3	28
B-14-02 01DCD	80-12-23	-----	----	-----	---	-----	-----	1.8	----
	81-05-04	67	21	1.4	---	20	39	1.0	27

selected wells, springs, and base flow sites in Agua Fria area--Continued

Date of sample	Nitrogen, NO2+NO3 dissolved (mg/L as N)	Phosphorus, ortho, dissolved (mg/L as P)	Aluminum, dissolved (µg/L as AL)	Antimony, dissolved (µg/L as SB)	Arsenic dissolved (µg/L as AS)	Barium, dissolved (µg/L as BA)	Beryllium, dissolved (µg/L (as BE)	Boron, dissolved (µg/L as B)	Cadmium, dissolved (µg/L as CD)
79-06-20	1.3	-----	--	---	---	----	--	40	---
81-11-13	-----	-----	<0	---	5	100	--	---	<1
81-11-13	1.7	.020	<0	---	3	57	--	10	<1
71-08-13	1.0	.010	--	---	---	----	--	0	---
81-05-27	1.1	.010	--	---	---	----	--	10	---
81-11-10	-----	-----	10	---	3	<100	--	---	<1
78-09-13	-----	-----	--	---	---	----	--	---	---
79-06-20	.31	-----	--	---	---	----	--	200	---
81-11-11	.40	.030	10	---	68	12	--	260	<1
78-09-13	-----	-----	--	---	---	----	--	---	---
78-04-20	3.9	.020	--	---	---	----	--	50	---
78-03-16	2.3	.040	--	---	---	----	--	410	---
78-03-16	16	.020	--	---	<1	----	--	40	---
81-02-24	-----	-----	--	---	---	----	--	---	---
81-02-24	-----	-----	--	---	---	----	--	---	---
81-05-06	3.4	.030	--	---	---	----	--	30	---
81-02-24	-----	-----	--	---	---	----	--	---	---
81-02-24	-----	-----	--	---	---	----	--	---	---
81-05-06	3.1	.030	--	---	5	----	--	20	---
81-11-10	.12	.090	--	---	---	----	--	10	---
78-04-20	.91	.040	--	---	6	----	--	<20	---
81-02-24	-----	-----	--	---	---	----	--	---	---
81-05-26	1.1	.030	--	---	---	----	--	70	---
81-02-03	-----	-----	--	---	---	----	--	---	---
81-05-26	2.9	.020	--	---	---	----	--	30	---
78-07-19	-----	-----	--	---	---	----	--	---	---
81-02-24	-----	-----	--	---	---	----	--	---	---
81-05-06	1.5	.030	--	---	---	----	--	20	---
78-10-20	-----	-----	--	---	---	----	--	---	---
78-10-17	-----	-----	--	---	---	----	--	---	---
81-06-18	-----	-----	--	---	---	----	--	---	---
78-07-19	-----	-----	--	---	---	----	--	---	---
81-03-12	-----	-----	--	---	---	----	--	---	---
81-05-04	1.8	.020	--	---	---	----	--	20	---
72-02-21	.78	.000	--	---	---	----	--	20	---
81-05-27	.79	.140	--	---	---	----	--	60	---
81-11-13	-----	-----	10	---	4	<100	--	---	<1
71-10-14	1.5	.080	--	---	---	----	--	20	---
71-07-30	1.1	.020	--	---	---	----	--	20	---
81-11-13	-----	-----	<0	---	1	<100	--	---	<1
79-06-20	1.7	-----	--	---	---	----	--	40	---
80-12-23	-----	-----	--	---	---	----	--	---	---
81-05-04	5.9	.030	--	---	---	----	--	30	---

Local identifier	Date of sample	Chromium, dissolved (µg/L as CR)	Chromium, hexavalent, dissolved (µg/L as CR)	Cobalt, dissolved (µg/L as CO)	Copper, dissolved (µg/L as CU)	Iron, dissolved (µg/L as FE)	Lead, dissolved (µg/L as PB)	Lithium, dissolved (µg/L as LI)	Manganese, dissolved (µg/L as HG)
A-14-01 22CAD	79-06-20	---	--	--	---	<10	---	--	<1
	81-11-13	20	15	--	27	---	2	--	---
A-14-01 24DCB	81-11-13	<10	<1	--	5	770	1	--	14
A-14-01 28BCB	71-08-13	---	--	--	---	5	---	--	---
A-14-01 28CDC	81-05-27	---	--	--	---	10	---	--	3
A-14-01 28CDC	81-11-10	<10	<1	--	2	---	<1	--	---
A-14-01 35DDC1	78-09-13	---	--	--	---	---	---	--	---
	79-06-20	---	--	--	---	<10	---	--	<1
	81-11-11	40	75	--	3	<10	2	--	2
A-14-01 35DDD	78-09-13	---	--	--	---	---	---	--	---
A-14-02H25CCA	78-04-20	---	--	--	---	<10	---	--	<10
A-14-03 17DDD1	78-03-16	---	--	--	---	20	---	--	40
A-14-03 21BAD	78-03-16	---	--	--	---	30	---	--	50
A-15-01 01ABA	81-02-24	---	--	--	---	---	---	--	---
A-15-01 10BCD2	81-02-24	---	--	--	---	---	---	--	---
A-15-01 10BCD2	81-05-06	---	--	--	---	60	---	--	4
A-15-01 15CBB	81-02-24	---	--	--	---	---	---	--	---
A-15-01 26ABC	81-02-24	---	--	--	---	---	---	--	---
	81-05-06	---	--	--	---	20	---	--	5
A-15-01 28ACC	81-11-10	---	--	--	---	<10	---	--	570
A-15-02 02D UN	78-04-20	---	--	--	---	<10	---	--	<10
A-15-02 06BC UN	81-02-24	---	--	--	---	---	---	--	---
	81-05-26	---	--	--	---	<10	---	--	1
A-16-01 21ACA2	81-02-03	---	--	--	---	---	---	--	---
	81-05-26	---	--	--	---	450	---	--	4
A-16-01 27DA UN	78-07-19	---	--	--	---	---	---	--	---
	81-02-24	---	--	--	---	---	---	--	---
	81-05-06	---	--	--	---	40	---	--	3
B-12-01 27ABD	78-10-20	---	--	--	---	---	---	--	---
B-12H01 22DDC	78-10-17	---	--	--	---	---	---	--	---
B-14-01 06ADD	81-06-18	---	--	--	---	---	---	--	---
B-14-01 06BCB	78-07-19	---	--	--	---	---	---	--	---
	81-03-12	---	--	--	---	---	---	--	---
	81-05-04	---	--	--	---	10	---	--	<1
B-14-01 10ACD	72-02-21	---	--	--	---	10	---	--	---
B-14-01 10ACD	81-05-27	---	--	--	---	10	---	--	2
	81-11-13	<10	<1	--	2	---	1	--	---
B-14-01 10DCC	71-10-14	---	--	--	---	10	---	--	---
B-14-01 14ACC	71-07-30	---	--	--	---	10	---	--	---
	81-11-13	<10	<1	--	3	---	1	--	---
B-14-01 24DCC	79-06-20	---	--	--	---	<10	---	--	6
B-14-02 01DCD	80-12-23	---	--	--	---	---	---	--	---
	81-05-04	---	--	--	---	10	---	--	5

Date of sample	Mercury, dis- solved (µg/L as HG)	Molyb- denum, dis- solved (µg/L as MO)	Nickel, dis- solved (µg/L as NI)	Sele- nium, dis- solved (µg/L as SE)	Silver, dis- solved (µg/L as AG)	Stron- tium, dis- solved (µg/L as SR)	Vana- dium, dis- solved (µg/L as V)	Zinc, dis- solved (µg/L (as ZN)	Cyanide total (mg/L as CN)
79-06-20	----	---	---	---	---	---	----	---	----
81-11-13	<0.1	---	---	1	---	540	----	60	----
81-11-13	<.1	---	---	<1	---	170	----	490	----
71-08-13	----	---	---	---	---	---	----	---	----
81-05-27	----	---	---	---	---	---	----	---	----
81-11-10	<.1	---	---	<1	---	280	----	10	----
78-09-13	----	---	---	---	---	---	----	---	----
79-06-20	----	---	---	---	---	---	----	---	----
81-11-11	<.1	---	---	<1	---	71	----	4	----
78-09-13	----	---	---	---	---	---	----	---	----
78-04-20	----	---	---	---	---	---	----	---	----
78-03-16	----	---	---	---	---	---	----	---	----
78-03-16	----	---	---	---	---	---	----	---	----
81-02-24	----	---	---	---	---	---	----	---	----
81-02-24	----	---	---	---	---	---	----	---	----
81-05-06	----	---	---	---	---	---	----	---	----
81-02-24	----	---	---	---	---	---	----	---	----
81-02-24	----	---	---	---	---	---	----	---	----
81-05-06	----	---	---	---	---	---	----	---	----
81-11-10	----	---	---	---	---	---	----	---	----
78-04-20	----	---	---	---	---	---	----	---	----
81-02-24	----	---	---	---	---	---	----	---	----
81-05-26	----	---	---	---	---	---	----	---	----
81-02-03	----	---	---	---	---	---	----	---	----
81-05-26	----	---	---	---	---	---	----	---	----
78-07-19	----	---	---	---	---	---	----	---	----
81-02-24	----	---	---	---	---	---	----	---	----
81-05-06	----	---	---	---	---	---	----	---	----
78-10-20	----	---	---	---	---	---	----	---	----
78-10-17	----	---	---	---	---	---	----	---	----
81-06-18	----	---	---	---	---	---	----	---	----
78-07-19	----	---	---	---	---	---	----	---	----
81-03-12	----	---	---	---	---	---	----	---	----
81-05-04	----	---	---	---	---	---	----	---	----
72-02-21	----	---	---	---	---	---	----	---	----
81-05-27	----	---	---	---	---	---	----	---	----
81-11-13	<.1	---	---	1	---	310	----	<10	----
71-10-14	----	---	---	---	---	---	----	---	----
71-07-30	----	---	---	---	---	---	----	---	----
81-11-13	<.1	---	---	<1	---	270	----	30	----
79-06-20	----	---	---	---	---	---	----	---	----
80-12-23	----	---	---	---	---	---	----	---	----
81-05-04	----	---	---	---	---	---	----	---	----