WATER RESOURCES ON THE PUEBLO OF LAGUNA, WEST-CENTRAL NEW MEXICO

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Water Resources on the Pueblo of Laguna, West-Central New Mexico

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The wood engravings of Laguna on pages ix, 20, and 85 are from Harper's, February 1891.

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CONVERSION FACTORS

In this report, values for measurements are given in inch-pound units only. The following table contains factors for converting these units to metric units.

Multiply inch-pound units	By	To obtain metric units
acre	0.4047	hectare
acre-foot	1,233	cubic meter
foot	0.3048	meter
gallon	3.785	liter
gallon per day	3.785	liter per day
gallon per minute	0.06309	liter per second
gallon per minute per foot	0.2070	liter per second per meter
mile	1.609	kilometer
square mile	2.590	square kilometer
inch	25.40	millimeter
cubic foot per second	28.32	liters per second
cubic foot per second per mile	17.60	liters per second per kilometer
foot per day	0.3048	meter per day
foot squared per day	0.0929	meter squared per day
pound per square inch	703.1	kilograms per square meter
foot per mile	0.1894	meter per kilometer

Chemical concentrations are given only in metric units -- milligrams per liter (mg/L) and micrograms per liter (μg/L). Degrees Fahrenheit are converted to degrees Celsius as follows: °C = [(5/9)°F] - 32

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

WATER RESOURCES ON THE PUEBLO OF LAGUNA, WEST-CENTRAL NEW MEXICO

by Dennis W. Risser and Forest P. Lyford

ABSTRACT

The Pueblo of Laguna, located on semiarid lands in west-central New Mexico, needs additional quantities of water chemically suitable for public supply and irrigation. This study evaluates the quantity and quality of water available on the Pueblo of Laguna.

Ground water for public supply can be found in the valley fill along the Rio San Jose, in the Paguate and Encinal areas, and possibly in the northern part of the Sedillo Grant. The valley fill along the Rio San Jose at the mouths of Cubero and Encinal Creeks will supply 50 to 450 gallons per minute of water containing 500 to 1,200 milligrams per liter of dissolved solids to properly constructed wells. In the alluvium along Rio Paguate, as much as 250 gallons per minute of ground water containing 300 to 500 milligrams per liter of dissolved solids can be developed. Sandstone units in the Morrison Formation will yield 5 to 50 gallons per minute of water containing 500 to 1,500 milligrams per liter of dissolved solids to properly constructed wells. About 15 to 30 gallons per minute of water from Encinal Springs are presently (1982) used for public supply for the village of Encinal. An additional 70 to 85 gallons per minute of springflow containing less than 200 milligrams per liter of dissolved solids is suitable for public supply. The Dakota Sandstone near Encinal also may supply water suitable for public supply. About 20 to 50 gallons per minute of water containing 800 to 1,200 milligrams per liter of dissolved solids may be obtained in this area. Tertiary sediments that fill a graben structure near Canon de los Apaches on Sedillo Grant may yield 20 to 100 gallons per minute of water containing 300 to 1,500 milligrams per liter of dissolved solids to properly constructed wells.

Ground water for irrigation is restricted by available well yields and quality to the valley fill along the Rio San Jose and possibly the western part of the Major's Ranch area. In the Rio San Jose valley west of New Laguna, well yields of 50 to 450 gallons per minute of water containing 1,200 to 3,000 milligrams per liter of dissolved solids can be obtained. At the mouths of Cubero and Encinal Creeks, dissolved-solids concentrations are less, about 500 to 1,200 milligrams per liter. Digital-model simulations of the valley-fill aquifer west of the village of Laguna show a potential evapotranspiration salvage of as much as 900 acre-feet per year if water levels are lowered. On the western part of the Major's Ranch area, the Morrison Formation may yield several hundred gallons per minute of water containing 1,000 to 2,000 milligrams per liter of dissolved solids to properly constructed wells.

As much as 300 acre-feet of additional surface water could be used for irrigation from the Rio Paguate if water flow into the pueblo during winter months were stored in a reservoir. Digital-model studies indicate that the winter flow of the Rio San Jose could be used to recharge the ground-water reservoir in the valley.

INTRODUCTION

Purpose and Scope

The economic growth of the Pueblo of Laguna and the lifestyle of the Laguna people are dependent, to a great extent, upon the availability of water for irrigation and public supply. Because ground- and surface-water resources on the pueblo are limited, detailed knowledge of these resources is needed to insure their protection and efficient use.

In response to the need for hydrologic information expressed by the Laguna Indians, the U.S. Bureau of Indian Affairs in 1970 requested a comprehensive study of the hydrology on the Pueblo of Laguna. The resulting plan of study consisted of a qualitative investigation followed by an intensive hydrologic investigation. The findings of both phases of the study are presented in this report.

The purpose of this study was to assess the quality and quantity of ground and surface water on the Pueblo of Laguna. The work focused on aspects of the hydrologic system that were recognized in the early phase of the investigation as needing further study. Specific objectives of this study were to: (1) Define areas of potential ground-water development for irrigation and public supply; (2) estimate the availability and suitability of surface water for irrigation; (3) predict possible long-term effects of ground-water withdrawals in the Rio San Jose valley on water levels and streamflow; and (4) report the results of test drilling.

The scope of this study was limited to ground- and surface-water resources on the pueblo that could be used for irrigation and public supply. However, brackish-water resources, which may be important in the future as the demand for water increases, also are discussed briefly in this report.

Location and geographic setting

The Pueblo of Laguna is located in west-central New Mexico (fig. 1). Pueblo lands consist of about 690 square miles, which include the original Spanish grant and lands acquired later by purchase and executive order. The

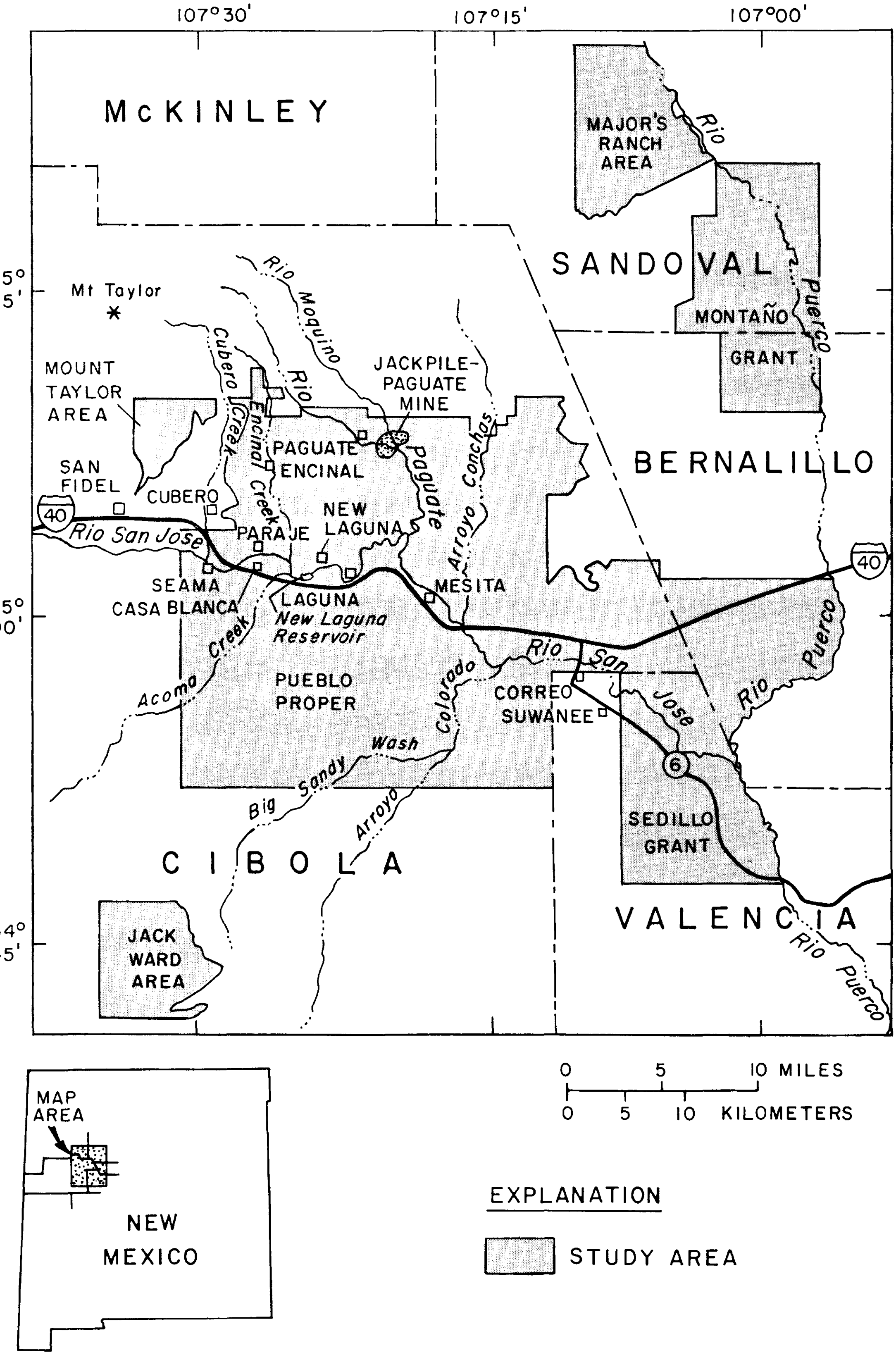


Figure 1.--Location of study area.

major divisions of the pueblo referred to in this report are: Pueblo Proper, Sedillo Grant, Montaño Grant, Mount Taylor Area, Major's Ranch Area, and Jack Ward Area.

Most of the pueblo lands are situated in the Datil section of the Colorado Plateaus physiographic province (Fenneman, 1931). The province is characterized by high mesas, canyons, and abundant evidence of volcanic activity. The Puerco fault zone passes through the Montaño and Sedillo Grants and is the boundary separating the Colorado Plateaus province from the Rio Grande trough to the east. The most prominent feature in the area is Mount Taylor, northwest of the Pueblo of Laguna, which rises to an altitude of 11,301 feet.

The major stream on the pueblo is the Rio San Jose, which flows eastward through the center of the Laguna lands. The stream empties into the Rio Puerco at the southeast corner of the pueblo. Major tributaries of the San Jose include: Cubero Creek, Encinal Creek, Acoma Creek, Rio Paguate, Arroyo Conchas, and Arroyo Colorado.

The climate of the area is semiarid with mean annual precipitation of 7.8 inches and mean annual temperature of 53.3° Fahrenheit at Laguna (New Mexico State Engineer Office, 1956a, and U.S. Department of Commerce, 1955-79).

The resident population on the Pueblo of Laguna in 1980 was 6,233 (Daniel Carr, U.S. Bureau of Indian Affairs, written commun., 1980). The population distribution by village was as follows: Casa Blanca (303), Encinal (347), Laguna (1,585), Mesita (791), Paguate (1,483), Paraje (791), and Seama (933).

Previous investigations

A number of hydrologic studies have been conducted on or near the Pueblo of Laguna. A report on ground water in eastern Valencia County by Titus (1963) contains data for wells on Sedillo Grant and Major's Ranch area. Dinwiddie (1963) briefly described the ground-water resources in the vicinity of Paguate. The availability of ground water on parts of the Pueblos of Acoma and Laguna was studied by Dinwiddie and Motts (1964). Their report includes the results of exploratory drilling and aquifer testing in the alluvium along the Rio San Jose and its tributaries. Cooper and West (1967) wrote a general report describing the major aquifers between the Pueblo of Laguna and city of Gallup, New Mexico.

Acknowledgments

Several individuals and companies provided data and assistance during the course of this project. John Martinez of the Pueblo of Laguna acted as interpreter during onsite investigations, collected historical data pertaining to wells and springs from tribal members, and made monthly water-level measurements. Ray Johnson of the Pueblo of Laguna also made monthly measurements of ground-water levels and surface-water quality on the pueblo. Daniel Carr of the U.S. Bureau of Indian Affairs provided information on many occasions on wells and irrigation systems on the Pueblo of Laguna. Norm Fairbanks, Field Engineer for the Indian Health Service, provided information on public-supply wells and the water-distribution system of the pueblo. Many water samples were analyzed by the U.S. Bureau of Indian Affairs' Soils, Water, and Materials Testing Laboratory in Gallup, New Mexico. The Anaconda Company, El Paso Natural Gas Company, and Transwestern Pipeline Company provided useful information pertaining to their water-related activities. The Continental Oil Company provided data for exploratory test holes on Montaño Grant, and Standard Oil of Ohio (Sohio) provided information for their deep wells north of the pueblo.

Site-identification numbering system

The location of wells, springs, and surface-water sampling sites in this report is identified by a number based on the common subdivision of lands into townships, ranges, and sections. Section lines are extended from sectionized lands across previously unsectionized areas for the purpose of accurately locating wells, springs, and other features.

The location number based on the township-range system is divided by periods into four segments. The first indicates the township north of the New Mexico Base Line, and the second denotes the range west of the New Mexico Principal Meridian. The third segment is the number of the section within the township, and the fourth segment indicates the tract within which the well or spring is situated. To determine the fourth segment of the location number, the section is divided into four quarters numbered 1, 2, 3, and 4 for the NW¼, NE¼, SW¼, and SE¼, respectively. Where map accuracy permits, these quarters are further subdivided down to the nearest 10-acre tract. The numbers are based on a 1-mile-square section that is determined from the southeast corner of the section. The use of zeros in the fourth segment of the location numbers indicates that the well or spring could not be accurately located. For example, well number 9.7.28.400 would indicate that the well could not be located any closer than the southeast quarter of section 28. Letters a, b, c, d, and e are added to the last segment to designate the second through sixth wells in the same 10-acre tract. An example of the numbering system is shown in figure 2.

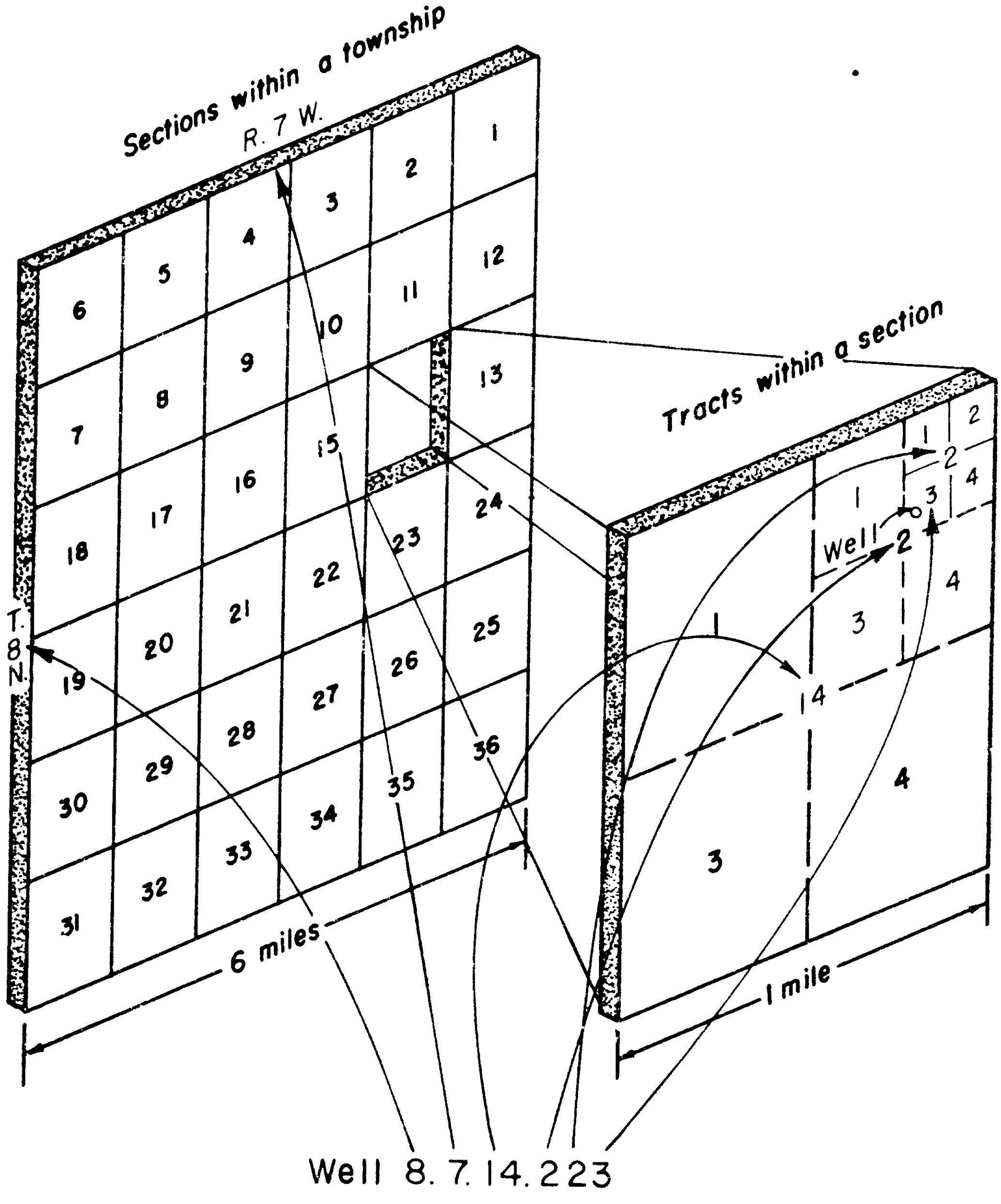


Figure 2.--Method of numbering wells, springs, and surface-water sites.

Methods of investigation

The hydrologic investigation began with an inventory of all wells and springs located on or near the Pueblo of Laguna except for those on the Major's Ranch area, which was purchased by the pueblo after the inventory was complete. The wells and springs are listed in tables 1 and 2 (all tables are at the back of the report); their locations are shown on plate 1.

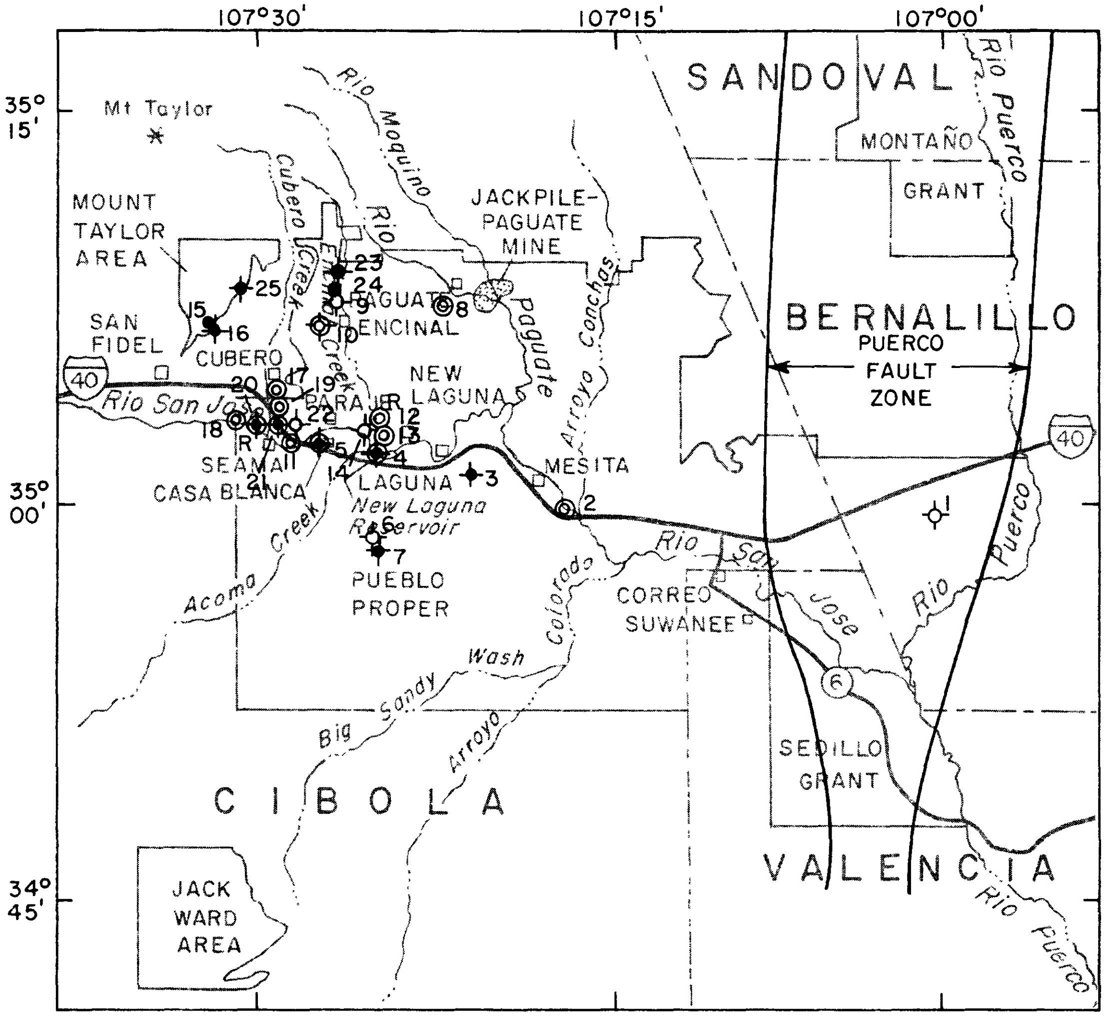
The potential yields of aquifers on the Pueblo of Laguna were evaluated by a program of well drilling and aquifer testing. The locations of new test wells and wells selected for pumping are shown on figure 3. Eight shallow test holes were drilled in the alluvium along the Rio San Jose, Encinal Creek, Seco Canyon, and Castillo Canyon. Three deeper wells were drilled on the Pueblo Proper and Mount Taylor area to test bedrock aquifers. Descriptions of formation cuttings for all new test wells are listed by location number in table 3. Samples of the formation cuttings and geophysical logs of the test wells are on file at the U.S. Geological Survey, Albuquerque, New Mexico.

Nine of the 11 new wells and 6 existing stock, public-supply, or irrigation wells were pumped to evaluate aquifer properties. Results of these tests and other previously reported tests are summarized in table 4.

To evaluate surface- and ground-water relations, water levels in 10 shallow wells completed in the alluvium along the Rio San Jose valley were monitored monthly (fig. 3). Continuous recorders were placed on wells 10.7.36.322 (Laguna 76-2) and 10.6.35.342 (Pueblo Test 2). Water levels were also measured monthly in three deep wells that are completed in bedrock aquifers.

Samples of ground and surface water were collected and analyzed for major ions, nutrients and minor elements, trace elements, and radiochemicals. Results of the water analyses collected from selected wells and springs are listed in tables 5-8. Water-quality samples of surface waters were collected from the Rio Puerco, Rio San Jose, and some tributaries of the Rio San Jose. These analyses are listed in tables 9-13.

A 2-dimensional digital-computer model was used to help evaluate some alternative plans of ground-water development in the alluvium along the Rio San Jose. The model simulates ground-water flow in the valley between the western boundary of the pueblo and the village of Laguna.



NUMBER ON FIGURE	WELL NAME	LOCATION NUMBER
1	BIA Sedillo	9.2.24.230
2	El Rito	9.4.19.124
3	Laguna 78-1	9.5.9.231
4	Laguna 76-7	9.6.2.123
5	Laguna 76-6	9.6.5.222
6	RWP 24	9.6.26.233
7	Timia Well	9.6.26.443
8	MDH 771	10.5.5.142
9	Encinal 1	10.6.3.111
10	Encinal 2	10.6.9.121
11	Seama P.S.	10.6.31.434
12	Pueblo Test 1	10.6.35.322
13	Pueblo Test 2	10.6.35.342
14	Laguna Irrigation 2	10.6.35.342a
15	Seco Canyon 1	10.7.10.122
16	Laguna 79-1	10.7.10.213
17	Abandoned New York	10.7.25.432
18	Irrigation Test 6	10.7.35.232
19	New York 1	10.7.36.221
20	Laguna 76-2	10.7.36.322
21	Laguna 76-1	10.7.36.424
22	Laguna Irrigation 1	10.7.36.424a
23	Encinal Canyon 1	11.6.27.334
24	Encinal Canyon 2	11.6.34.134
25	Castillo Canyon 1	11.7.35.243

0 5 10 MILES

0 5 10 KILOMETERS

EXPLANATION

o WELL

WELL WITH AQUIFER TEST (See table 4)

◎R OBSERVATION WELL--"R" indicates continuous water-level recorder.

NOTE: Solid circle (●) indicates well that was drilled for this study.

Figure 3.--Location of test wells and ground-water monitoring sites.

GROUND WATER

Hydrologic properties of geologic units

Geologic units that crop out on and around the Pueblo of Laguna range in age from Permian to Holocene. The location and distribution of these units are shown on the geologic map of the pueblo (plate 2) and on geologic sections (plate 3). The geologic characteristics, general water quality, and well yields that may be expected from the different geologic units are summarized in table 14.

The areas on the Pueblo of Laguna that have geologic units capable of providing water of suitable quality for public supply, irrigation, and stock are shown on plate 1. The contoured water levels (plate 1) indicate only the elevation of water beneath the pueblo in various geologic formations; the reader should not assume that formations are hydraulically connected or that ground water flows perpendicular to the contours. The geologic units on the Pueblo of Laguna and their hydrologic properties are discussed in detail in the following sections.

Permian System

Permian rocks in the study area include limestone, sandstone, siltstone, and gypsum of the Yeso Formation, Glorieta Sandstone, and San Andres Limestone. These units crop out on Mesa Lucero in the southern part of the Sedillo Grant. Permian units probably are not major aquifers and would supply water with excessive dissolved-solids concentrations to wells in the study area. The water-bearing characteristics of the Glorieta Sandstone and San Andres Limestone warrant special discussion because: (1) Some data exist for the study area; (2) these units are important aquifers in some parts of New Mexico, particularly the Grants-Bluewater area (Gordon, 1961); and (3) many individuals and companies have expressed an interest in the water-bearing properties of these units in the study area.

Glorieta Sandstone and San Andres Limestone--The Mesita test hole (9.5.12.442) was drilled by the U.S. Bureau of Indian Affairs during 1963 and 1964 to test the San Andres Limestone and Glorieta Sandstone for water yield and quality. G. A. Dinwiddie and S. W. West (U.S. Geological Survey, written commun., 1965) believed that the well did not fully penetrate the Chinle Formation at a total depth of 1,729 feet. However, re-examination of cuttings from the well during this study led to the conclusion that the limestone, starting at a depth of about 1,615 feet, is the San Andres and that sandstone beds near the total depth are part of the San Andres Limestone.

The Mesita test hole had a shut-in pressure of 170 pounds per square inch and yielded 15 gallons per minute when allowed to flow. Specific capacity of the well computed from these data is 0.04 gallon per minute per foot of drawdown.

Other deep wells on or near the pueblo that may have penetrated the San Andres include one 8 miles south of Mesita (8.5.17.213) and one about 1 mile south of Suwanee (8.3.15.413) (table 1). Both wells were drilled by the Atchison, Topeka, and Santa Fe Railway early in this century. In 1974, well 8.5.17.213 flowed less than 0.5 gallon per minute, and the specific conductance of the water was 82,800 micromhos (micromhos per centimeter at 25° Celsius) (table 5); well 8.3.15.413 flowed less than 24 gallons per minute and had a specific conductance of 15,800 micromhos. Gas from this well is predominantly carbon dioxide with a little helium, hydrogen, argon, and nitrogen (J. L. Kunkler, U.S. Geological Survey, written commun., 1974).

Shell Oil Company drilled a deep oil test hole (9.1.8.142) at the east edge of the pueblo on Sedillo Grant. Tests of the well showed that water in the Glorieta Sandstone had a dissolved-solids concentration of about 15,500 milligrams per liter and that the San Andres Limestone was not a permeable reservoir rock for oil production (N. J. Isto, Shell Oil Company, written commun., 1973).

A well north of Paguate in the Bibo area (11.5.14.241) drilled in 1974 by Standard Oil of Ohio (Sohio) to a depth of 3,390 feet penetrated the San Andres Limestone and Glorieta Sandstone. Water rose in the well to within 10 feet of the land surface. The well was pumped at 5 gallons per minute, which lowered the water level 390 feet, giving a specific capacity of 0.01 gallon per minute per foot (Dr. Lynn Jacobson, Sohio, oral commun., 1975).

Evidently, the conditions that create significant permeabilities in carbonate rocks in the Grants-Bluewater area do not exist in the study area. A long period of erosion prior to deposition of the overlying Triassic Chinle Formation either did not create solution permeability or the permeability was later destroyed. The likelihood of obtaining large yields of water chemically suitable for public supply and irrigation in rocks of Permian age under the Pueblo of Laguna probably is small.

Triassic System

The Triassic System on the Pueblo of Laguna consists of siltstones and mudstones of the Chinle Formation. Occasional sandstone beds in the formation are minor aquifers of local importance.

Chinle Formation of Late Triassic age lies beneath all Laguna lands with the exception of several small areas on Sedillo Grant, where it was displaced by faults and subsequently eroded (plate 2). The formation crops out or is covered by a veneer of alluvium in the southeast section of the Pueblo Proper and dips gently to the north and west. The Petrified Forest Member of the Chinle Formation is composed of as much as 1,500 feet of grayish-red siltstones and mudstones; the Petrified Forest Member contains the Correo Sandstone Bed, which is composed of as much as 100 feet of grayish-red, arkosic sandstone in the upper part of the Petrified Forest Member (Moench and Schlee, 1967).

Wells completed in only the Petrified Forest Member of the Chinle Formation probably have yields of less than 5 gallons per minute. Wells 8.6.21.224 (RWP 30) and 8.6.24.412 (RWP 22) completed in the Petrified Forest Member were reported as "dry holes" at depths greater than 400 feet.

The Correo Sandstone Bed of the Petrified Forest Member is the most productive water-bearing unit in the Chinle Formation although its areal extent is restricted to a narrow zone between Mesita and Correo. Water from the Correo Sandstone Bed is pumped from wells 9.5.24.413 (EPNG 3) and 9.5.24.414 (EPNG 2) by the El Paso Natural Gas Company. About 1 mile to the northeast, yearly water-level fluctuations of 6 to 14 feet were recorded at well 9.4.19.124 (El Rito) in response to withdrawals from the El Paso wells at rates that averaged from 25 gallons per minute during summer months to less than 1 gallon per minute during winter months (Pat Adkins, El Paso Natural Gas Company, oral commun., 1979) (fig. 4). The large water-level fluctuations in the El Rito well and the small areal extent of the aquifer indicate that the sandstone could not support large withdrawals of ground water. Although the El Paso Natural Gas Company wells were tested at rates as great as 40 gallons per minute (D.C. Kelly, El Paso Natural Gas Company, written commun., 1973), the Correo Sandstone Bed probably is able to sustain yields of only 5 to 20 gallons per minute for long periods.

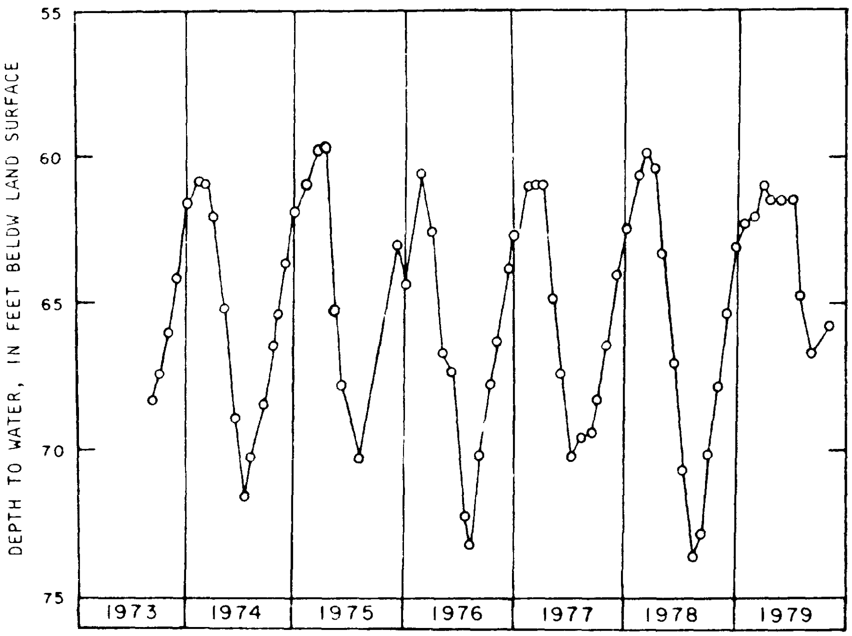


Figure 4.--Water-level fluctuations in well 9.4.19.124 (El Rito), 1973-79.

Jurassic System

Jurassic rocks on the Pueblo of Laguna include the Entrada Sandstone, Todilto Formation, Summerville Formation, Bluff Sandstone, and Morrison Formation. Many stock wells and a few public-supply and industrial wells on the pueblo obtain water from the Jurassic sandstone units.

Entrada Sandstone--The Entrada Sandstone of Middle Jurassic age lies beneath all Laguna lands with the exception of the southeast corner of the Pueblo Proper and small parts of the Jack Ward area and Sedillo Grant (plate 2). The sandstone crops out from the northeast to southwest across the Pueblo Proper and dips about 50 feet per mile to the north and west. Three units are recognized in the Entrada Sandstone: (1) A basal, fine- to coarse-grained, crossbedded sandstone; (2) a medial silty member; and (3) an upper unit composed of a fine to medium-grained, crossbedded sandstone (Moench and Schlee, 1967). The three geologic units are considered together in this report as a single hydrologic unit.

Wells deriving water from the Entrada primarily are used to water stock because yields are small and the quality is marginal for other uses. Well 9.5.13.233 (Mesita P.S.), however, provides part of the public supply for the village of Mesita. This well is completed in both the Correo Sandstone Bed of the Petrified Forest Member of the Chinle Formation and Entrada Sandstone.

The hydrologic properties of the Entrada were tested in two wells (9.6.26.443, Timia Well; and 9.5.9.231, Laguna 78-1), both drilled to the top of the Chinle Formation (fig. 3 and tables 1 and 3). The Timia well produced less than 1 gallon per minute from a 495-foot, open-hole section that included the Bluff Sandstone, Summerville Formation, Todilto Formation, and Entrada Sandstone. Laguna 78-1, drilled in the sand-dune area south of Laguna, produced water mainly from the Todilto Formation. Little additional water was yielded from the Entrada Sandstone. Transmissivity values for the Entrada at both locations probably are minimal.

Reported yields from the Entrada Sandstone on other areas of the pueblo also are small. The Standard well (9.6.4.433) flowed at a rate of 3 gallons per minute with a shut-in pressure of 5 1/2 pounds per square inch, giving a specific capacity of 0.24 gallon per minute per foot of drawdown. The Paraje deep test hole (10.6.33.122) was bailed dry following completion. It is probable that sustained yields from the Entrada Sandstone will be less than 10 gallons per minute on Laguna lands.

Todilto Formation--North of the Rio San Jose valley, the Todilto Formation of Middle Jurassic age, mainly consists of 100 feet or less of gypsum overlying 40 feet or less of limestone. Anhydrite occurs in place of gypsum at depths greater than 1,000 feet (Moench and Schlee, 1967, p. 12). Gypsum occurs in isolated areas on mesas south of the Rio San Jose valley, and the limestone pinches out south of the Pueblo Proper (plate 2).

Well 9.5.9.231 (Laguna 78-1) was drilled in 1978 to a depth of 510 feet to test water quality and yields in Jurassic units. The well penetrated sandstones and siltstones of the Bluff Sandstone and Summerville Formation to a depth of 280 feet. A 70-foot thickness of Todilto Formation, composed primarily of gypsum, was penetrated from 310 to 380 feet, directly beneath about 30 feet of diabase. The diabase probably was part of one of the numerous dikes or sills that crop out in the vicinity of the well (Moench, 1963a). At the bottom of the hole, between depths of 380-503 feet, the Entrada Sandstone was present (table 3). The well was completed only with 30 feet of surface casing. Therefore, water could be contributed to the well from the Bluff Sandstone and Summerville Formation, Todilto Formation, and Entrada Sandstone. Because the dominant ions in the water are calcium and sulfate, possibly a large percent of the water produced by the well is contributed from gypsum in the Todilto Formation.

The well was pumped for 24 hours beginning on December 20, 1978. Discharge averaged 74 gallons per minute for the first 820 minutes of the test but was decreased to 64 gallons per minute for the remainder of the test. The water level could not be measured from 660 to 840 minutes and 1,155 to 1,410 minutes into the test because the water level was below the access tubing in the well. Specific capacity calculated at the end of 660 minutes of pumping at 74 gallons per minute is 0.39 gallon per minute per foot of drawdown. Transmissivity of the aquifer is about 55 feet squared per day based on the first 100 minutes of drawdown data using the modified nonequilibrium formula (Ferris, and others, 1962, p. 98) (fig. 5). Drawdowns after 100 minutes of pumping appear to be affected by a barrier of less permeable material. This barrier could be caused by a change in the number of interconnected fractures in the Todilto Formation away from the well or by intersecting of the aquifer by one of the igneous intrusives near the well.

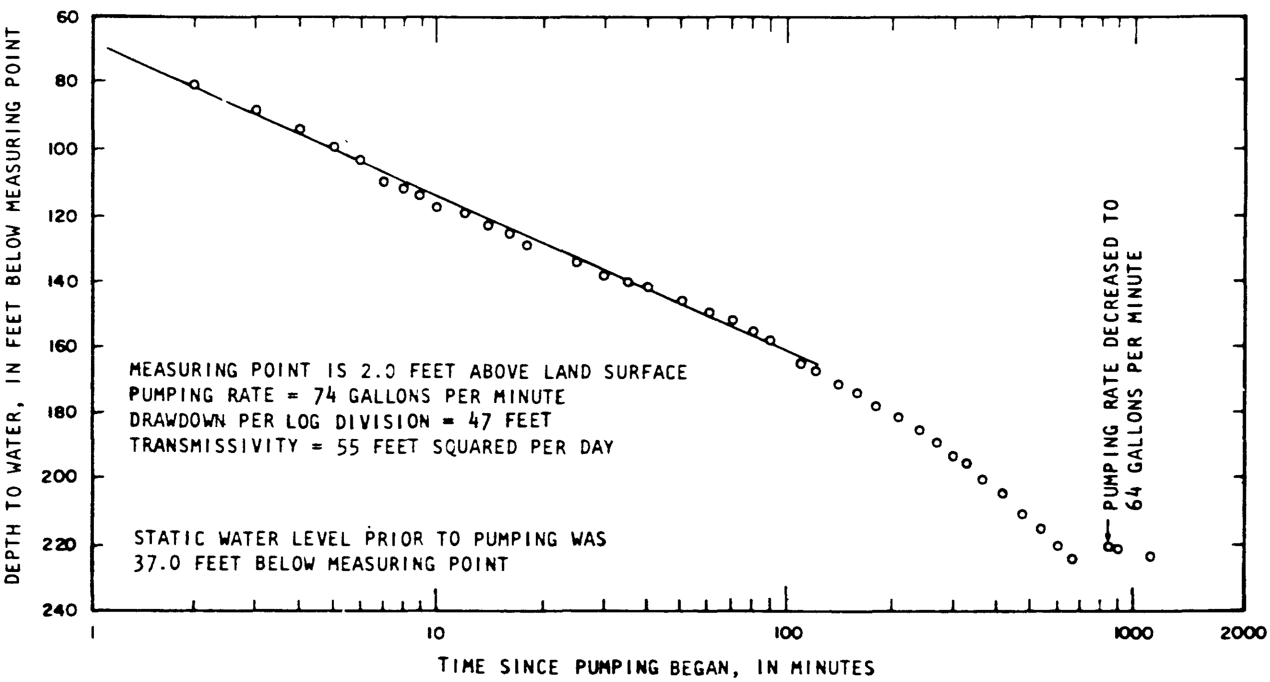


Figure 5.--Water-level drawdown from test of well 9.5.9.231 (Laguna 78-1).

Two sinkholes and other evidence of solution and collapse near the Rio San Jose valley between Laguna and Mesita indicate that solution porosity and permeability may be present in this area. A sinkhole south of the Jackpile-Paguate mine (10.5.14.234) probably is about 500 feet above the soluble Todilto gypsum, indicating the former occurrence of a large solution cavity. This sinkhole contains water at a depth of 50 feet.

Another sinkhole about 300 feet from Dipping Vat Spring (8.3.12.413) probably is the result of the solution of Todilto gypsum and collapse of the overlying Summerville Formation and Bluff Sandstone. The large flow from this spring, averaging more than 500 gallons per minute, may be partly due to solution permeability.

Summerville Formation--The Summerville Formation of Middle Jurassic age consists of alternating beds of mudstone and sandstone, which crop out from the southwest corner to the east-central part of the Pueblo Proper (plate 2). The Summerville Formation does not readily yield water to wells. Test wells 9.5.9.231 (Laguna 78-1) and 9.6.26.443 (Timia well), located south of the Rio San Jose, showed that no water flowed from the Summerville Formation during drilling. The log of well 10.6.33.213 (ECW 12) indicates that a small quantity of water flowed from the Summerville Formation during drilling. No other wells on the pueblo are known to obtain water from this unit.

Bluff Sandstone--The Bluff Sandstone of Middle Jurassic age is present beneath all Laguna lands except the southeast part of the Pueblo Proper, along Acoma Creek, and small sections of the Sedillo Grant (plate 2). The sandstone crops out in a wide band across the center of the pueblo and dips to the north and northwest. The Bluff Sandstone consists of 200 to 400 feet of very fine to medium-grained, moderate to well-sorted sandstone. An upper eolian sandstone and a lower fluviatile sandstone can be recognized in some areas. The upper eolian sandstone is named the Zuni Sandstone and the lower fluviatile sandstone is named the Bluff Sandstone (C. H. Maxwell, U.S. Geological Survey, written commun., 1973). Both units are termed Bluff Sandstone in this report.

Most wells deriving water from the Bluff Sandstone are used to water stock because of the generally small well yields and water quality unacceptable for other uses. However, water suitable for public supply may be obtained from the Bluff Sandstone in outcrop areas south of the Rio San Jose valley. Yields are variable, however, ranging from less than 1/2 gallon per minute in Transwestern Company wells and test holes (9.5.17.141 through 9.5.19.421 on table 1) to perhaps 30 gallons per minute or more in well 9.6.26.233 (RWP 24).

The hydraulic properties of the Bluff Sandstone were tested on outcrop areas south of Laguna in stock well 9.6.26.233 (RWP 24) and test wells 9.6.26.443 (Timia) and 9.5.9.231 (Laguna 78-1) (fig. 3 and tables 1 and 3). Stock well 9.6.26.233 (RWP 24) was pumped for 8 hours at a rate of 5.1 gallons per minute, which resulted in lowering the water level in the well 1.1 feet (table 4). Transmissivity calculated from the test by the modified nonequilibrium method (Ferris and others, 1962, p. 98) is about 450 feet squared per day (fig. 6), a large value for the Bluff Sandstone. Drawdown data collected during the first 8 minutes of the test were not used due to fluctuations in the pumping rate.

A new test well, 9.6.26.443 (Timia), was drilled about 1/2 mile south of stock well 9.6.26.233 (RWP 24) to verify the large yields and chemical quality of the water in this area. However, the well produced less than 1 gallon per minute from an interval that included not only the Bluff Sandstone but also the Summerville Formation, Todilto Formation, and Entrada Sandstone (table 3). This test indicates that the transmissivity of the Bluff calculated for stock well RWP 24 may be the result of local fracture permeability caused by igneous intrusives and faulting in the area (Moench, 1964b).

Test well 9.5.9.231 (Laguna 78-1) seems to confirm the results of the Timia well test. Laguna 78-1 was drilled by cable-tool method in the sand-dune area south of Laguna, where less than 1 gallon per minute of water was produced from the Bluff Sandstone. Apparently, when fractures are not encountered, yields are minimal from this formation. Sustained yields from wells, in general, may be expected to be less than 10 gallons per minute from the Bluff Sandstone.

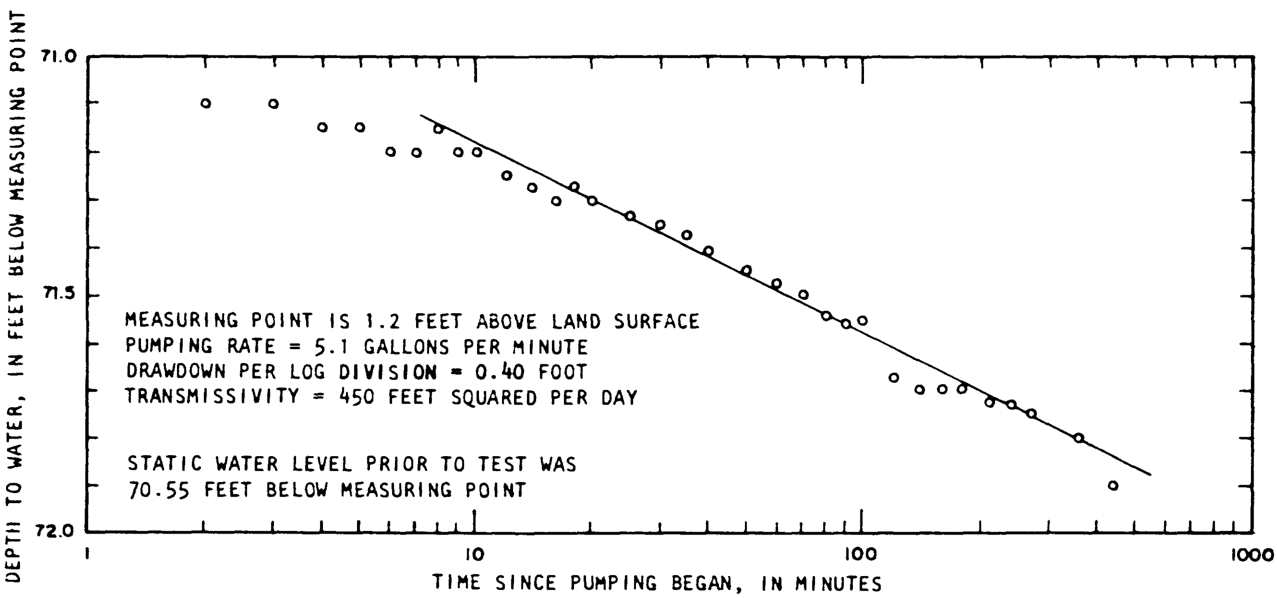


Figure 6.--Water-level drawdown from test of well 9.6.26.233 (RWP-24).

Morrison Formation--The Morrison Formation of Late Jurassic age is present beneath the northern one-half of the Pueblo Proper and all outlying lands except the Jack Ward area. The Morrison crops out in areas shown on plate 2 and dips to the north and northwest into the San Juan Basin. The Morrison Formation is divided into three members and one informal unit. In ascending order the units are: (1) Recapture Member, composed of as much as 50 feet of interbedded mudstone, siltstone, sandstone, and limestone; (2) Westwater Canyon Member, composed of as much as 300 feet of fine- to coarse-grained sandstone; (3) Brushy Basin Member, composed of as much as 300 feet of interbedded mudstone, siltstone, sandstone, and limestone; and the Jackpile sandstone (economic usage), as much as 200 feet of kaolinitic sandstone within the Brushy Basin Member, which is restricted in location to a zone about 13 miles wide extending from Seama to the Major's Ranch area (Moench and Schlee, 1967).

The principal water-bearing units in the Morrison Formation are the Westwater Canyon Member and sandstones in the Brushy Basin Member, which include the Jackpile sandstone. Near Paguate, wells completed in the Westwater Canyon and Brushy Basin Members presently produce water for domestic, industrial, and stock uses. Most wells in this area produce from 5 to 50 gallons per minute although well 11.5.27.322 (Anaconda 4) reportedly was pumped at 100 gallons per minute. In the Major's Ranch and Montaño areas, yields of several hundred gallons per minute may be possible from the Westwater Canyon Member. The rate of ground-water pumpage from Kerr McGee's Rio Puerco and Bokum's Marquez underground uranium mines averaged 1,400 and 1,030 gallons per minute during 1979 (New Mexico Environmental Improvement Division, 1980). Well 12.2.36.442 (Conoco WW-101) completed in the Westwater Canyon was pumped in 1976 at an average rate of 1,212 gallons per minute (D. K. Green and L. C. Halpenny, Water Development Corporation, written commun., 1976).

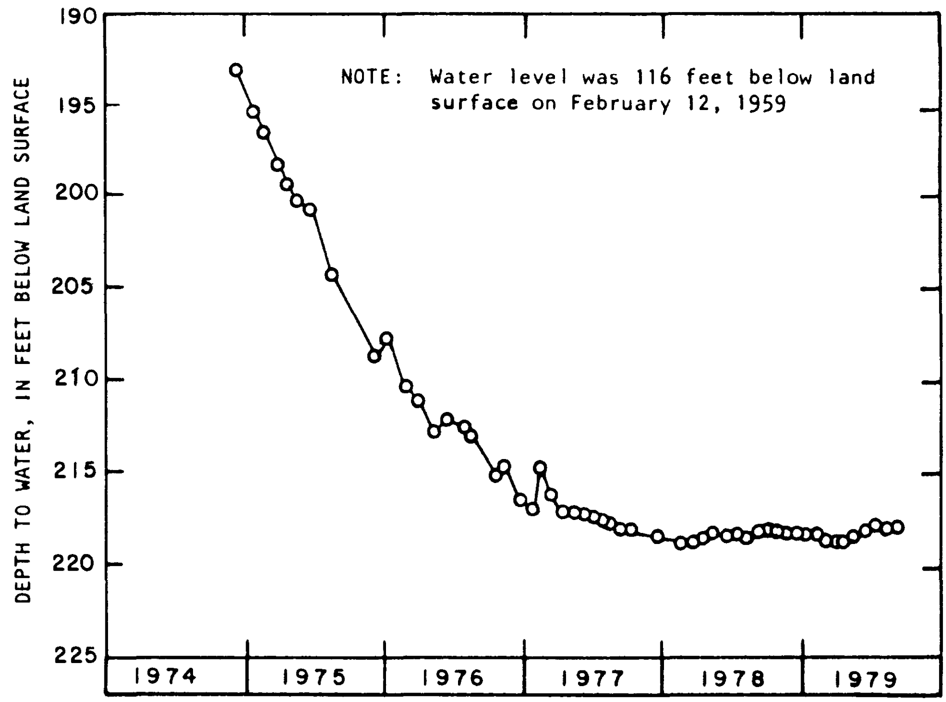


Figure 7.--Water-level declines in well 10.5.5.142 (MDH-771), 1974-79.

The water level in well 10.5.5.142 (MDH-771), which is completed in the Jackpile sandstone, declined 25 feet from December 1974 to December 1977, at least partly in response to mine dewatering from Anaconda's underground workings (fig. 7). Dewatering for Anaconda's P-10 underground mine began in the fall of 1974 at a rate of 86,000 gallons per day and averaged 200,000 gallons per day during 1978 (U.S. Geological Survey, 1978). The water-level decline in well MDH-771 from 1959 to 1979 was about 102 feet. Apparently even before the start of underground mining in 1974, water levels had declined, possibly as a result of ground-water discharging into the pits excavated for the surface mining that began in the early 1950's.

Well 10.7.10.213 (Laguna 79-1) was drilled in 1979 in Seco Canyon on the Mount Taylor area to test yields and water quality of the Morrison Formation (fig. 3, tables 1 and 3). The aquifer of greatest interest was the Westwater Canyon Member of the Morrison Formation because of the large quantity of water yielded in the uranium mining areas west of the Pueblo of Laguna. A second reason for drilling a deep test well at this location was to monitor possible hydraulic-head declines in the Westwater Canyon Member due to extensive pumping from this unit by the uranium mines. The well was drilled to a depth of 1,330 feet and was open to the Dakota Sandstone and Westwater Canyon Member.

To determine hydraulic properties, the well was pumped for 24 hours at an average rate of 10 gallons per minute, which resulted in lowering the water level in the well 128 feet (table 4). Transmissivity of the open-hole section is 19 feet squared per day, calculated from the recovery data shown in figure 8 using the Theis recovery formula (Ferris and others, 1962, p. 100). The nonlinearity of the curve for recovery times of t/t' greater than 10 was probably caused by the effect of well-bore storage. Therefore, late-time data were used to calculate transmissivity. The late-time drawdown data should have projected back to a residual drawdown of zero at t/t' = 1. The apparent incomplete recovery shown in figure 8 indicates that the hydrologic units supplying water may be of small size and therefore have experienced a permanent lowering of the water level, at least until leakage is received from adjacent units.

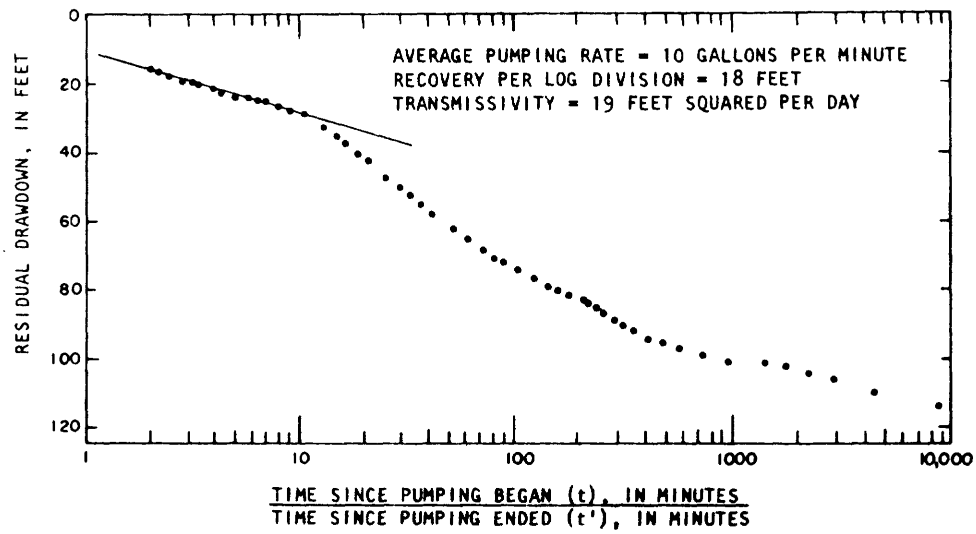


Figure 8.--Water-level recovery from test of well 10.7.10.213 (Laguna 79-1).

The calculated transmissivity of 19 feet squared per day and well yield of 10 gallons per minute were unexpectedly small, especially because the formation samples of the Westwater Canyon Member showed it to be a well-sorted sandstone and neutron logs indicated significant apparent porosity. Possibly drilling mud had plugged the formation and was not properly removed during development of the well.

An aquifer test was conducted on well 12.2.36.442 (Conoco WW-101) by Continental Oil Company on the Montaño Grant. The well penetrated the entire thickness of the Westwater Canyon between depths of 1,381 and 1,685 feet. The well was pumped for 14 days at an average rate of 1,212 gallons per minute, which lowered the water level 470 feet in the well (D. K. Green and L. C. Halpenny, Water Development Corp., written commun., 1976). Transmissivity of the Westwater Canyon determined from the aquifer test was reported to be 240 feet squared per day; however, numerous faults in the area act as hydrologic boundaries that make the test results difficult to interpret.

Cretaceous System

On the Pueblo of Laguna, the Cretaceous System consists of the Dakota Sandstone, the Mancos Shale, and the Mesaverde Group. The geologic units with the greatest water-bearing capabilities are the Dakota Sandstone and sandstone units of the Mesaverde Group.

<u>Dakota Sandstone</u>--The Dakota Sandstone of Late Cretaceous age is present beneath the northern section of the Pueblo Proper and parts of all outlying Laguna lands (plate 2). The Dakota Sandstone is composed of four, fine- to coarse-grained, well-consolidated sandstone beds separated by intertonguing beds of Mancos Shale. Collectively, the sandstone beds range in thickness from 0 to 200 feet (Moench and Schlee, 1967). The sandstones and interbedded shales crop out in areas shown on plate 2 and dip to the north and northwest.

Most wells that penetrate the Dakota Sandstone yield less than 15 gallons per minute of water, which generally is used for stock purposes. However, near Encinal the Dakota yields 10 to 50 gallons per minute of potable water. Well 10.6.3.111 (Encinal 1), for example, is connected to the Encinal public-supply system to augment the better quality spring source when needed. Two aquifer tests were conducted by pumping wells 10.6.3.111 (Encinal 1) and 10.6.9.121 (Encinal 2) to better define the water resource in the Encinal area.

Well 10.6.3.111 (Encinal 1) was drilled in 1964 in the valley of Encinal Creek about 1 mile north of the village of Encinal. Bailing tests conducted by the driller in the open hole indicated a yield of at least 25 gallons per minute from a combined thickness of about 235 feet of Dakota Sandstone and Mancos Shale. After casing off all but the lower 25 feet of Dakota Sandstone, a pumping test was conducted on Encinal 1 by the driller. The well was pumped for an unknown duration at 14 gallons per minute with 63 feet of drawdown. The decrease in yield between the bailer test and pumping test possibly was caused by casing off the upper beds of Dakota Sandstone. The aquifer was tested again by pumping the well on November 17, 1978. The well was pumped for 24 hours at a rate that decreased irregularly from 44 to 8 gallons per minute. The pumping resulted in lowering the water level in the well 190 feet at the end of the test (table 4). Transmissivity of the aquifer could not be determined from the data collected during the test due to the irregular pumping rate.

Well 10.6.9.121 (Encinal 2) was drilled in 1964 about 1 mile west of Encinal. The well yield reportedly was tested in 1964 by pumping "all day" at 30 gallons per minute, which lowered the water level in the pumped well only 1 foot. To estimate transmissivity of the Dakota Sandstone, the well was pumped for 24 hours on November 8, 1978. The pumping rate decreased irregularly during the test from 100 to 47 gallons per minute and averaged 54 gallons per minute (table 4). To analyze the test, pumping was separated into 4 successive steps with average discharge rates of 100, 69, 60, and 50 gallons per minute. Transmissivity estimated from the recovery data using the method of Harrill (1970, p. C212) is 2,000 feet squared per day (fig. 9).

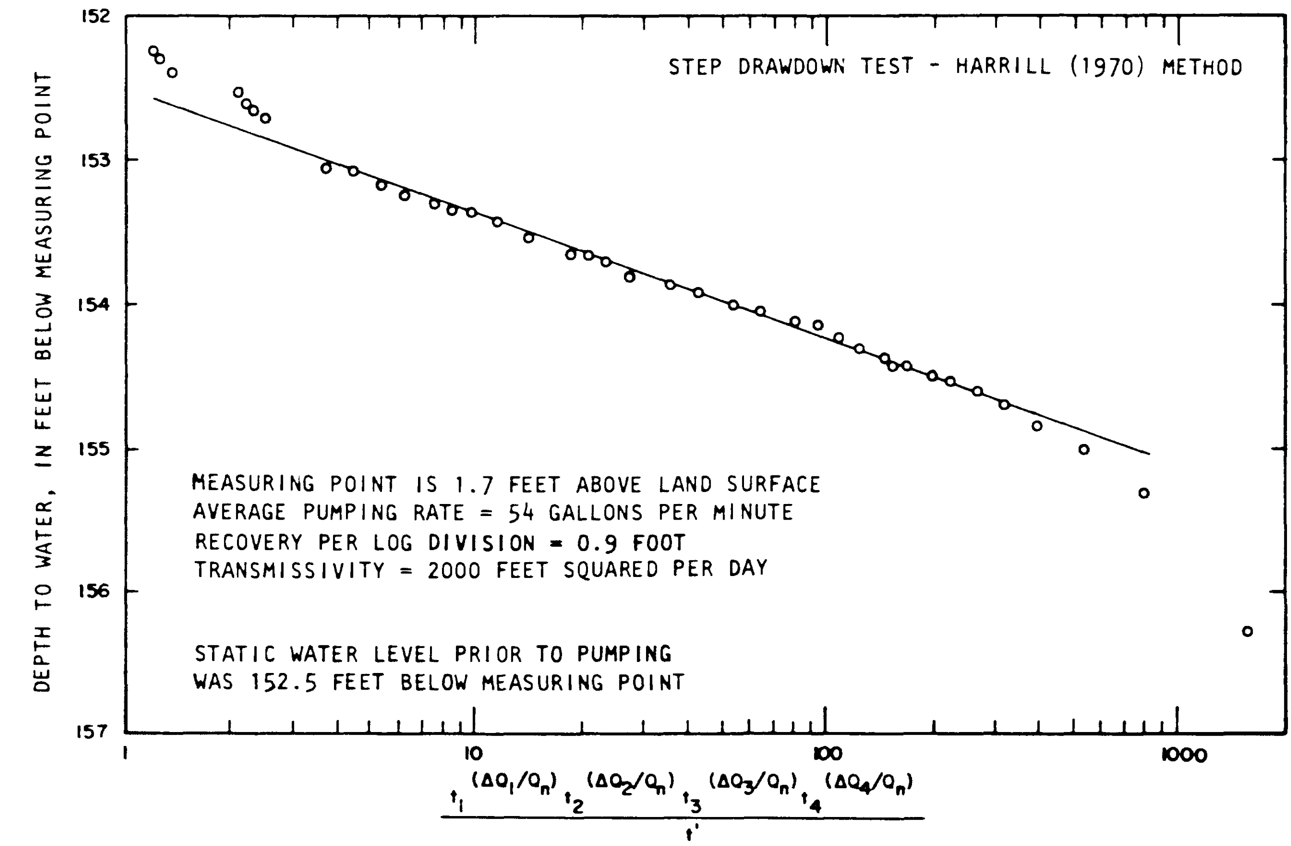
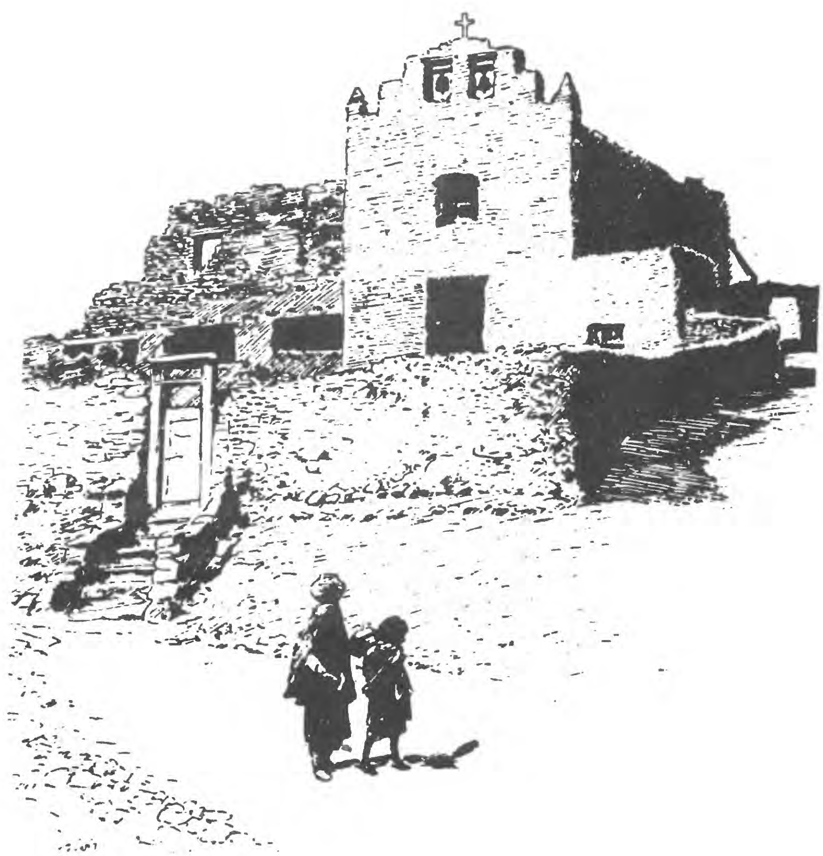


Figure 9.--Water-level recovery from test of well 10.6.9.121 (Encinal 2).

A transmissivity of 2,000 feet squared per day is a large value for 20 feet of Dakota Sandstone; possibly, fracturing in the unit has increased the hydraulic conductivity in the vicinity of the well. The late-time recovery data (t/t' less than 3) were not used to calculate this transmissivity value. The steeper slope of the late-time data indicates the possible effect of a hydrologic boundary of lesser permeability. The igneous intrusives mapped by Moench (1963b) about 1 mile west of the well could represent the hydrologic boundary indicated by the recovery curve. The fact that water levels recovered 0.3 foot above the initial static level may be due to a change in barometric pressure during the recovery period.

Mesaverde Group--Sandstone units of the Mesaverde Group of Late Cretaceous age, including the basal Gallup Sandstone, yield water to stock wells in the southern part of Montaño Grant and the northern part of Sedillo Grant. Reported yields for wells completed in the Mesaverde Group range from 8 to 30 gallons per minute in these areas. Well 11.7.35.243 (Castillo Canyon 1) yielded about 5 gallons per minute of water containing 670 milligrams per liter of dissolved solids from a 20-foot thickness of Gallup Sandstone on the Mount Taylor area. Some of the flow in Paguate Creek also may come from the Mesaverde Group.



Tertiary and Quaternary Systems

The major water-bearing units in the Tertiary and Quaternary Systems are the Mount Taylor basalt flows and unconsolidated valley-fill deposits of the Santa Fe Group.

Basalt--The combined flow from six springs that issue from basalt around Mount Taylor is about 200 gallons per minute. These springs contribute water with a specific conductance generally less than 300 micromhos to streamflow in Encinal Canyon and Paguate Creek. The springs discharge about 100 gallons per minute to Encinal Creek upstream from the village of Encinal.

Santa Fe Group--The Santa Fe Group of Miocene, Pliocene, and Pleistocene age is composed of unconsolidated sand, gravel, and clay. These sediments were deposited in the Puerco fault zone on Sedillo Grant (plate 2). Wells completed in the Santa Fe Group near Interstate Highway 40 just east of the pueblo yield water with specific conductances ranging from 4,000 to 6,000 micromhos, which is suitable for stock use but not for domestic use or irrigation. Wells penetrating a north-trending graben, which probably is present under the Pueblo of Laguna in the vicinity of Cañada de los Apaches, produce water with specific conductances ranging from 460 to 2,180 micromhos (pl. 1). Well 9.2.24.230 (BIA Sedillo), drilled in 1980 by the U.S. Bureau of Indian Affairs in this graben, produced about 12 gallons per minute of water with a specific conductance of 1,600 micromhos. This well is located away from stream valleys, which could provide a source of local recharge. Wells completed in the graben may yield 20 to 100 gallons per minute of water containing dissolved-solids concentrations of between 300 and 1,500 milligrams per liter. This water probably is the best quality water in the Sedillo Grant area.

Quaternary System

The major water-bearing units of the Quaternary System consist of valley-fill deposits of basalt and alluvium.

Basalt--Two basalt flows near the Laguna and Suwanee are present in the study area (plate 2). The Laguna basalt flow originated from volcanic centers west of pueblo lands and flowed eastward down the valley. The basalt is as much as 60 feet thick and overlies 20 to 80 feet of alluvium. The Laguna flow crops out from New Laguna to Mesita but is buried on Laguna lands west of New Laguna by as much as 40 feet of more recent alluvium. The Suwanee basalt flow, which originated about 7 miles south of the pueblo, is present between Correo and Suwanee although locally it may be buried by a thin layer of alluvium.

Two springs (9.5.8.113 and 9.5.8.121) near Laguna discharge from the base of the Laguna flow at a rate of 2 gallons per minute or less. These and other seeps and springs from the Laguna basalt contribute to the perennial flow in the Rio San Jose in this area. Several wells in the Rio San Jose valley west of New Laguna may produce part of their water from the Laguna basalt flow.

Several springs issue from the Suwanee basalt flow near Correo where the Rio San Jose has eroded into and through this unit. One of these, Suwanee Spring, flowed approximately 100 gallons per minute in 1973. The specific conductance of water from springs in this area averages about 4,000 micromhos with only minor differences between springs.

Alluvium and basalt along the Rio San Jose--The valley of the Rio San Jose ranges from 1/2 mile to more than 2 miles wide through the center of the Pueblo Proper and Sedillo Grant (plate 2). The valley was cut mainly in shales and sandstones of the Morrison Formation, San Rafael Group, and Chinle Formation to depths as much as 160 feet below the present valley floor and then filled in Quaternary time with deposits of alluvium and basalt. The altitude of the base of the valley-fill deposits west of the village of Laguna (fig. 10) was mapped based on data from 16 well logs.

The composition of the alluvial deposits is quite variable in both vertical and lateral extent. The alluvium consists of unconsolidated deposits ranging in grain size from very fine sand to gravel. Clay layers, which probably exist as discontinuous lenses, commonly are penetrated in test drilling. Correlation of individual alluvial deposits between wells was not attempted because of the wide spacing between wells and discontinuous nature of the alluvial deposits.

The valley-fill deposits along the Rio San Jose comprise a significant aquifer on the pueblo. The unconsolidated alluvial deposits and the basalt flows that comprise the valley fill probably are the only known source of ground water on the pueblo capable of supplying yields sufficient for irrigation. In general, yields from alluvium increase with increasing saturated thickness and grain size. Relatively large saturated thicknesses combined with large grain size at the mouths of Encinal Canyon and Cubero Creek result in yields from 50 to 450 gallons per minute to public-supply wells and test holes in these areas.

Transmissivity of the valley fill west of New Laguna ranges from 290 to 17,000 feet squared per day based on aquifer tests at wells penetrating 40 to 138 feet of saturated aquifer thickness (table 4 and fig. 10). Hydraulic conductivity of the valley fill based on these tests ranges from 2.4 to 300 feet per day (fig. 10), and specific capacity of the test wells ranges from 0.04 to 33.9 gallons per minute per foot of drawdown. A detailed account of the results from six aquifer tests conducted in the Rio San Jose valley during this study is presented in the following paragraphs.

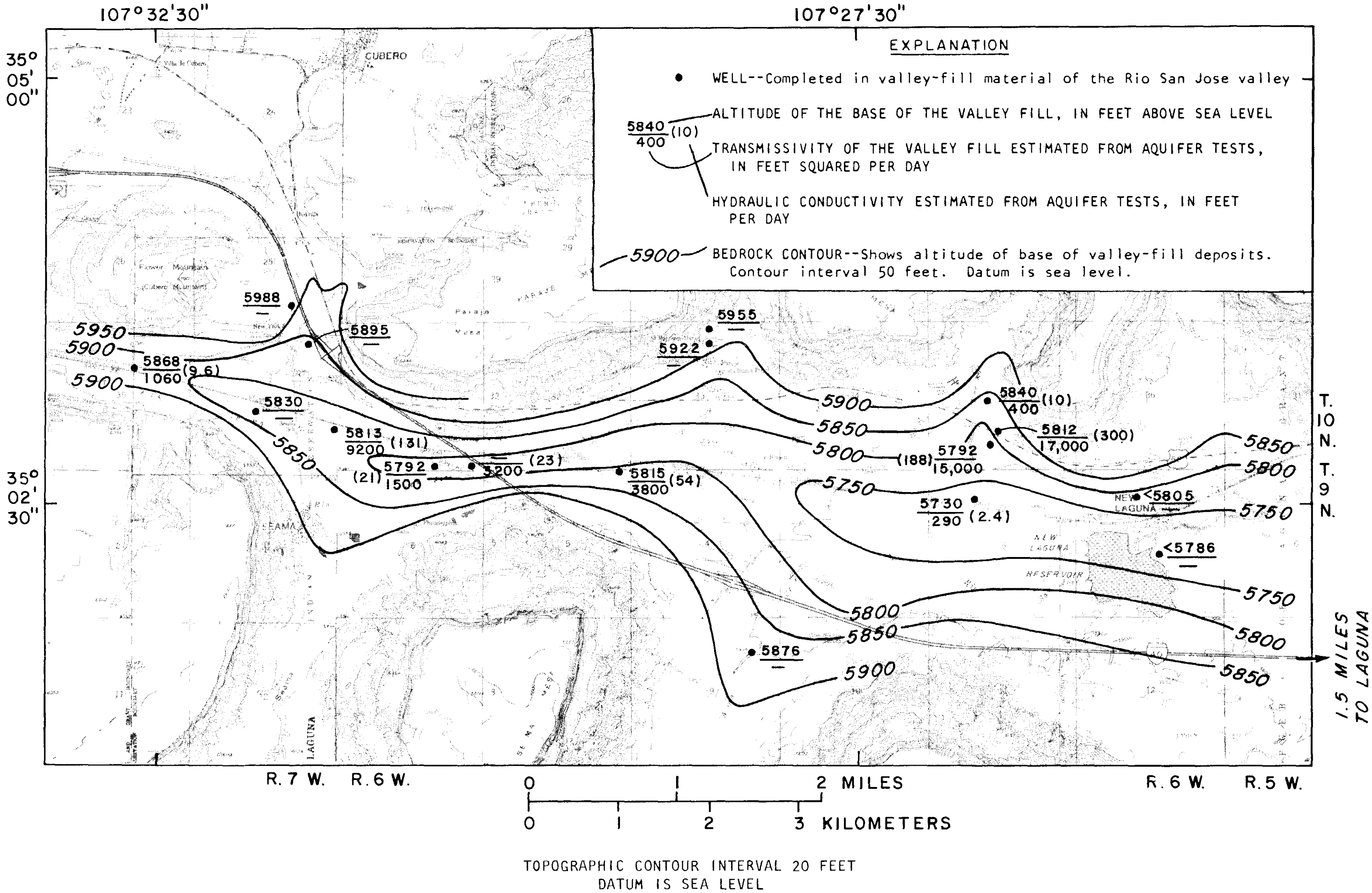


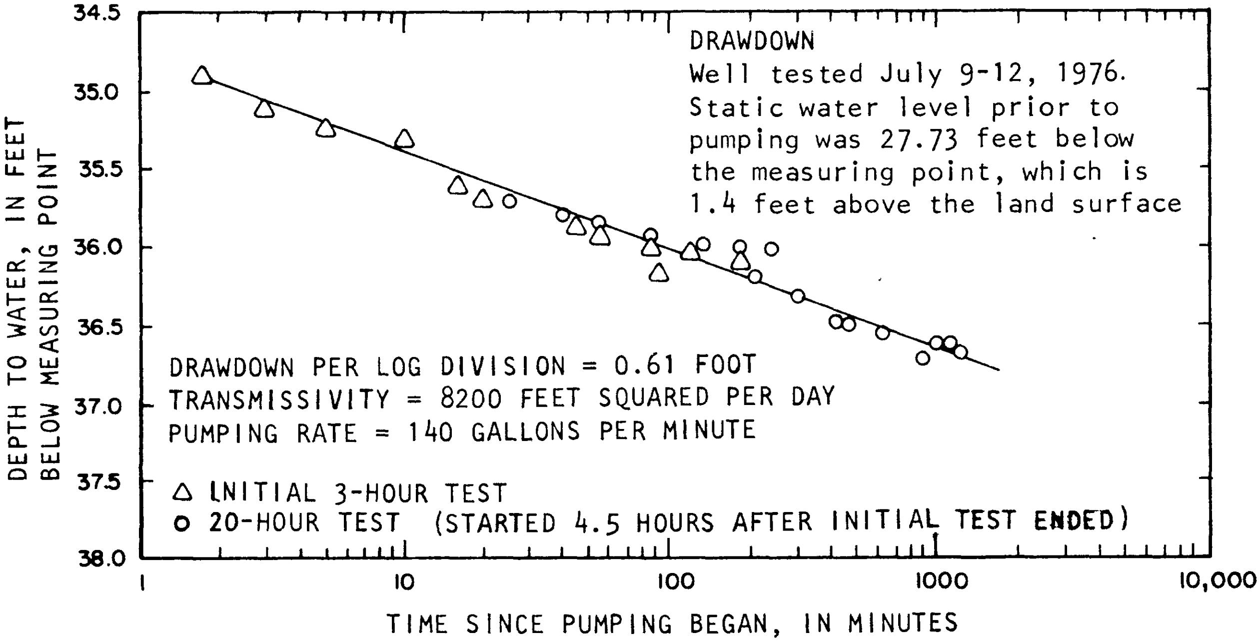
Figure 10.--Altitude of the base of the valley fill and transmissivity values in the Rio San Jose valley west of Laguna.

Well 10.7.36.424 (Laguna 76-1) was drilled about 3/4 mile north of Seama (fig. 3). To test the aquifer properties of the valley fill, the well was pumped at 140 gallons per minute. After pumping for 3 hours, the pump stopped and the water level in the well recovered for 4.5 hours. The test was started again and the well pumped for 20 hours at 140 gallons per minute, resulting in a total drawdown of 8.5 feet from both pumping periods. Transmissivity calculated from the drawdown data using the modified non-equilibrium formula (Ferris and others, 1962, p. 98) is about 8,200 feet squared per day (fig. 11). However, recovery data indicate a slightly greater transmissivity of 9,200 feet squared per day calculated by the Theis recovery method (Ferris and others, 1962). The late-time recovery data may indicate the presence of a boundary of lesser permeability but the change in slope is slight so the data were included in the analysis. The recovery data probably give a more accurate estimate of transmissivity because of the difficulty in measuring drawdown in the pumped well.

Irrigation well 10.7.36.424a (Laguna Ir. 1) was pumped at rates that ranged from 240 to 490 gallons per minute primarily to determine the capacity of the well. The test was conducted for 24 hours, resulting in a final drawdown of 86 feet while pumping at 490 gallons per minute. Specific capacity of the well at the end of the test was 5.7 gallons per minute per foot.

Well 10.7.36.322 (Laguna 76-2) was drilled in the Rio San Jose valley about 1 mile northwest of Seama (fig. 3). The well was pumped for 24 hours at an average rate of 80 gallons per minute to test the hydrologic properties of the valley-fill material at this location. A maximum drawdown of 53 feet was reached after pumping about 200 minutes, then the water level rose about 8 feet for the remainder of the test (fig. 12). The rise in water level may have been caused by a slight decrease in the pumping rate or increase in well efficiency when the well began to produce sand. Because of the possible change in well efficiency during the test and effects of nearby boundaries and water-table conditions, a transmissivity value for the aquifer was not determined for this test.

Well 9.6.5.222 (Laguna 76-6) was drilled in the Rio San Jose valley about 1 mile southwest of Casa Blanca (fig. 3). The well was pumped for 24 hours at an average rate of 125 gallons per minute to test the aquifer properties at this location. Drawdown and recovery of the water level was observed in the pumped well and in stock well 9.6.5.221 (Acoya), located 413 feet away. Transmissivity and storage coefficient were estimated by the Theis non-equilibrium method (Ferris and others, 1962, p. 92) using drawdown data in the stock well. The estimated value of transmissivity is about 3,800 feet squared per day (fig. 13). The calculated value of storage coefficient of 1.9×10^{-4} indicates that confined conditions existed for the duration of the test. For longer periods of pumping, however, the aquifer will become dewatered and a specific yield value of between .05 and .20 should be used in any estimates of long-term pumping effects.



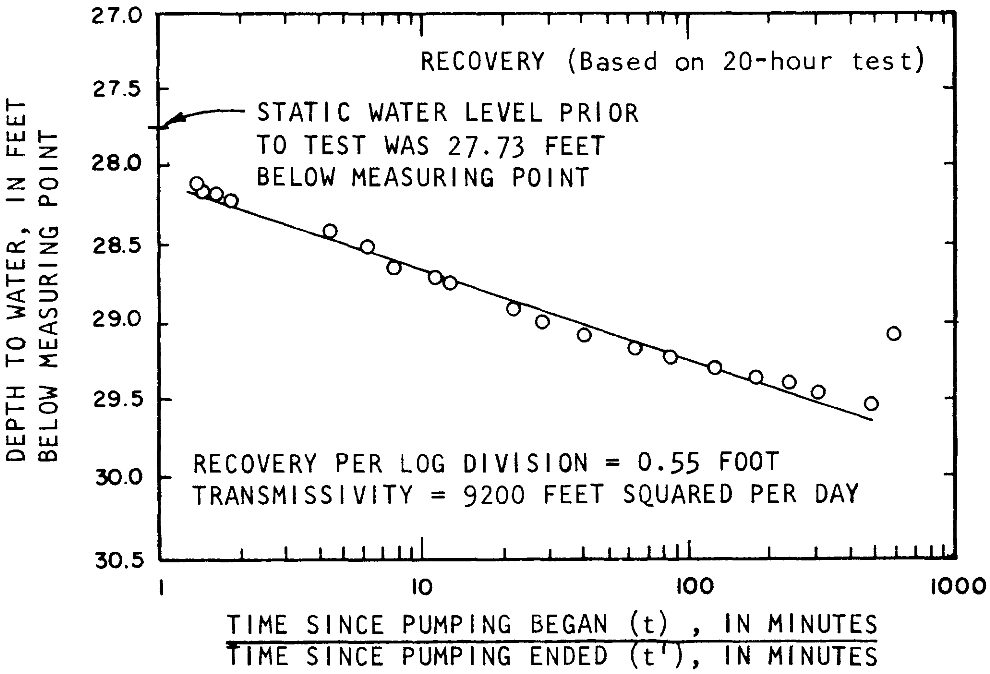


Figure 11.--Drawdown and recovery in well 10.7.36.424 (Laguna 76-1).

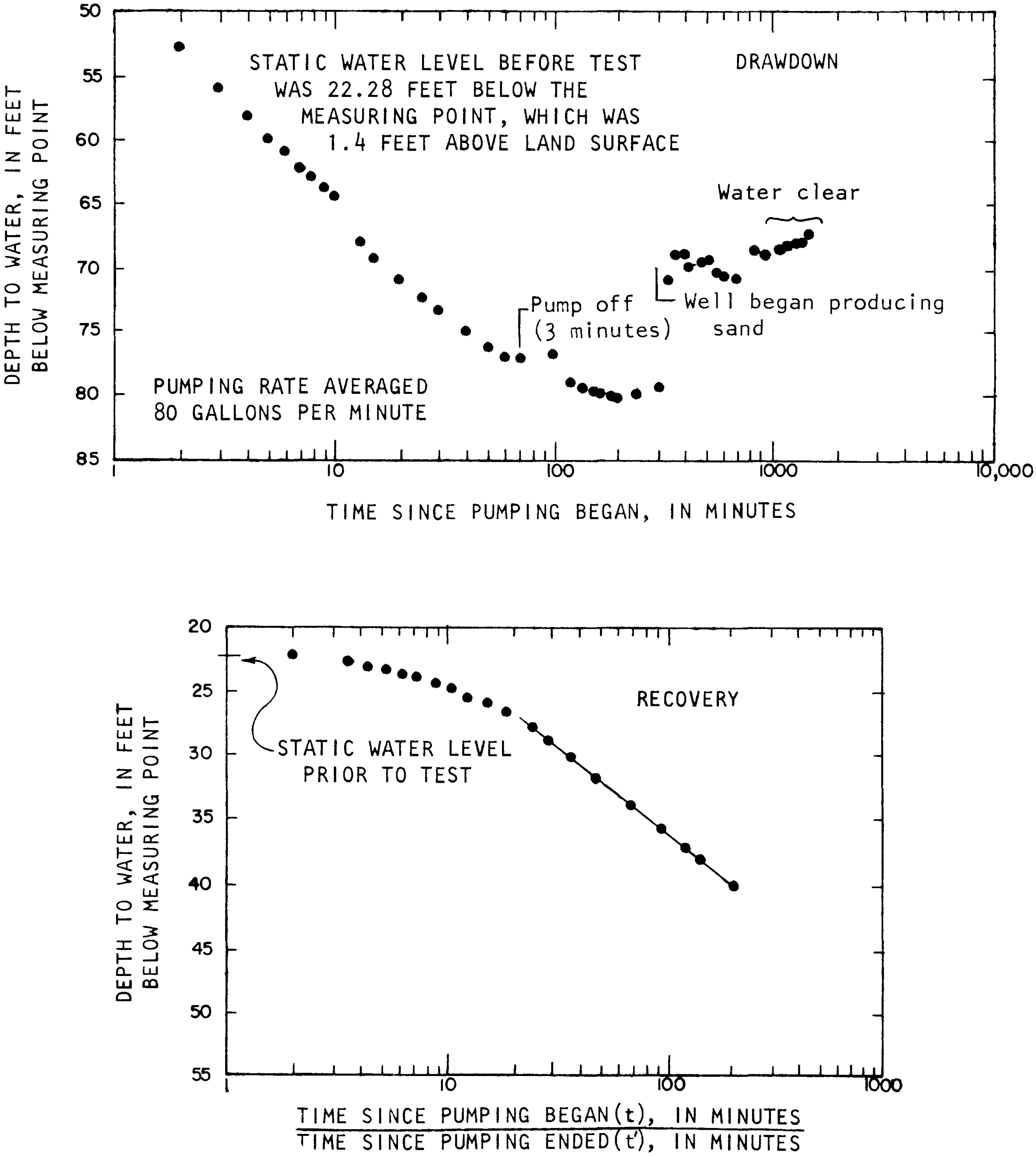


Figure 12.--Drawdown and recovery of water level in well 10.7.36.322 (Laguna 76-2).

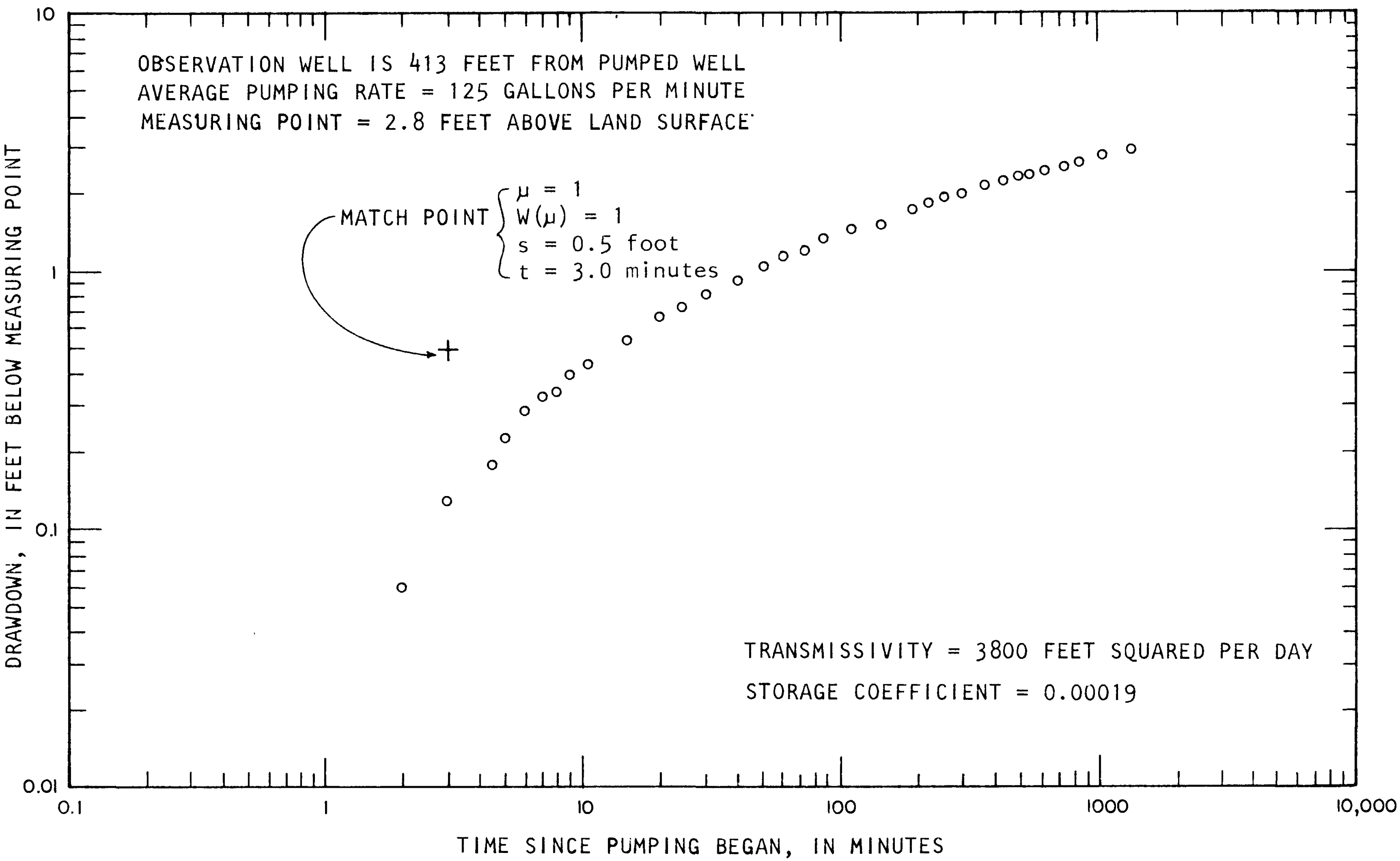


Figure 13.--Drawdown in observation well 9.6.5.221 (Acoya) in response to pumping from well 9.6.5.222 (Laguna 76-6).

Well 9.6.2.123 (Laguna 76-7) was drilled in the Rio San Jose valley where Encinal Creek joins the Rio San Jose (fig. 3). The well was pumped for 24 hours at an average rate of 4.5 gallons per minute, which caused 105 feet of drawdown in the pumped well. Transmissivity estimated from the Theis recovery method (Ferris and others, 1962, p. 100) using data from the pumped well is about 290 feet squared per day (fig. 14). About a year after conducting the aquifer test, the well was cleaned and bailed at a rate of about 20 gallons per minute with less than 5 feet of drawdown. This indicates that the well was not properly developed when the initial aquifer test was conducted. Therefore, the specific capacity value estimated from that initial test probably is less than the actual value.

Well 10.6.35.342a (Laguna Ir. 2) was drilled by the U.S. Bureau of Indian Affairs in 1977 in the Rio San Jose valley at the mouth of Encinal Creek (fig. 3). To test aquifer properties at this location, the well was pumped for 24 hours at a rate that ranged from 80 to 212 gallons per minute, which resulted in lowering the water level in the well 31 feet. Transmissivity of the aquifer was estimated to be about 15,000 feet squared per day from early-time water-level recovery data measured in well 10.6.35.342 (Pueblo Test 2) located about 130 feet from the pumped well (fig. 15). The pumping rates during each of 4 steps (80, 120, 165, and 200 gallons per minute) were used in the calculation of transmissivity by a method described by Harrill (1970, p. C212). The late-time recovery data appear to be affected by a hydrologic boundary of lesser permeability, possibly the valley wall, which is less than 1/2 mile from the pumped well.

Alluvium along the Rio Puerco--The alluvium near the Rio Puerco on Montaño Grant is reported to be as much as 250 feet thick (Gene Saucier, Continental Oil Company, oral commun., 1973). Although yields of as much as 100 gallons per minute may be possible along the Rio Puerco valley, the specific conductance value of the water probably exceeds 6,000 micromhos at most places, which indicates the water quality would be unacceptable for irrigation or public supply.

Alluvium along the Rio Paguate--The alluvium is about 60 feet thick near the two Paguate public-supply wells, 11.5.32.234a (Paguate P.S. 1) and 11.5.32.232 (Paguate P.S. 2). The wells have been pumped at rates of 90 and 75 gallons per minute, respectively. During this study, however, only the Paguate P.S. 2 well was in use. It pumped 53,000 gallons of water per day during August 1-8, 1979, and was estimated to produce about one-half that quantity during winter months when demand was less (Norm Fairbanks, Indian Health Service, written commun., 1979).

Additional development of ground water in the alluvium along the Rio Paguate is possible. Presently, as much as 250 gallons per minute of water is lost to evapotranspiration in the swamp area in the vicinity of the public-supply wells.

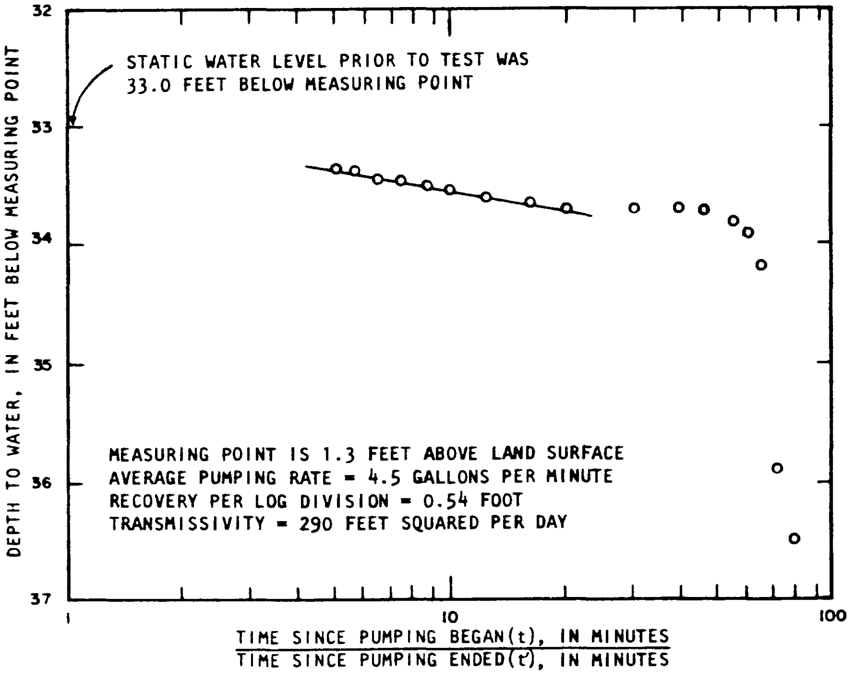


Figure 14.--Water-level recovery from test of well 9.6.2.123 (Laguna 76-7).

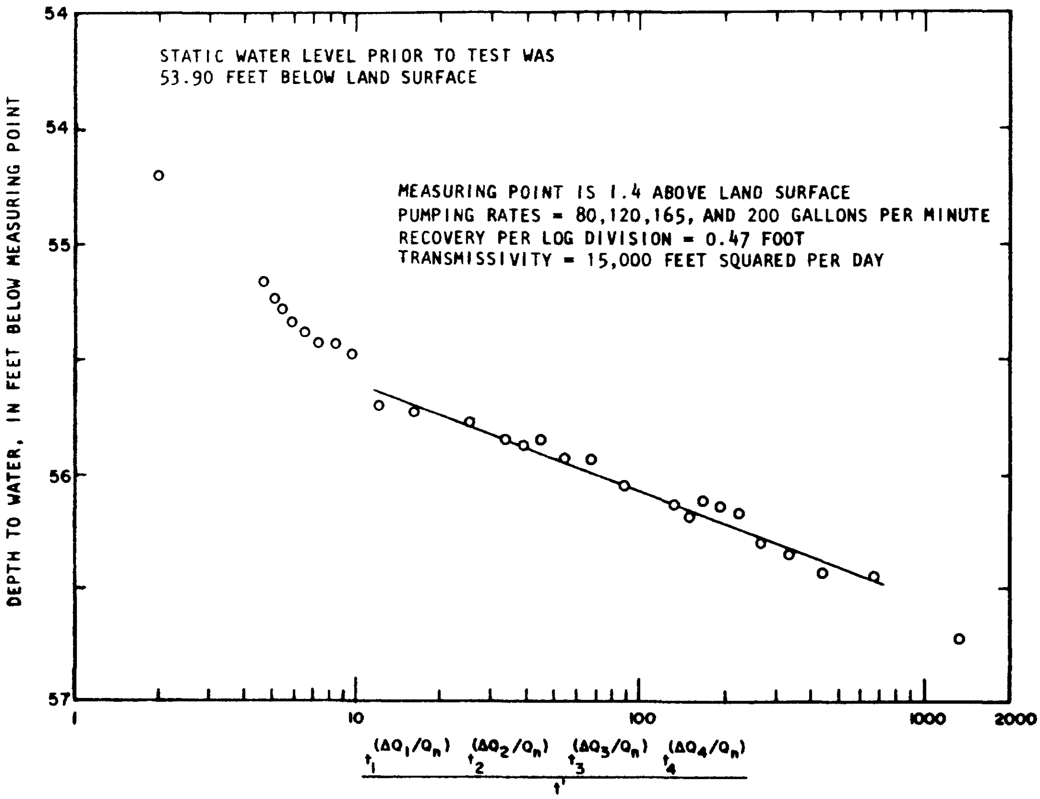


Figure 15.--Water-level recovery in observation well 10.6.35.342 (Pueblo Test 2) from test of well 10.6.35.342a (Laguna Ir. 2).

Alluvium in Encinal Canyon--Two wells were drilled in alluvium in Encinal Canyon about 2 miles up the canyon from the village of Encinal (fig. 3 and table 3). The drilling was performed to determine if the springflow at the head of Encinal Canyon that seeps into the alluvium could be salvaged by pumpage.

Well 11.6.27.334 (Encinal Canyon 1) penetrated 35 feet of alluvium and 75 feet of Mancos Shale. The well produced water containing 1,570 milligrams per liter of dissolved solids from a 3- to 5-foot zone at the base of the alluvium. The well was dry after 100 minutes of bailing at an average rate of 5.3 gallons per minute. Of the 530 gallons of water bailed from the hole, about 300 gallons were provided from water stored in the borehole. The water level in the well rose 4.3 feet from July 1978 to June 1979, probably as a result of recharge from stormflow and snowmelt runoff in Encinal Creek.

Well 11.6.34.134 (Encinal Canyon 2) penetrated 31 feet of alluvium and 4 feet of Mancos Shale. Less than 1 foot of alluvium appeared to be saturated at the contact with the Mancos Shale. The well was bailed dry after removing only 10 to 15 gallons of water, most of which probably came from borehole storage. Specific conductance of the water was 950 micromhos.

Alluvium in Seco and Castillo Canyons--Wells were drilled in Seco and Castillo Canyons on the Mount Taylor area of Laguna lands to test the quality and yields of the unconsolidated valley fill (fig. 3). These valleys were investigated because springflow and storm runoff could provide recharge to the alluvium.

Well 10.7.10.122 (Seco Canyon 1) penetrated 35 feet of alluvium near the mouth of Seco Canyon. The well produced only 10 gallons of water in about 12 hours. The specific conductance of water from the well was 3,000 micromhos.

Well 11.7.35.243 (Castillo Canyon 1) penetrated alluvium to a depth of 40 feet, Gallup Sandstone from 40 to 60 feet, and Mancos Shale from 60 to 75 feet. The alluvium did not produce water at this site.

Movement, recharge and discharge

Aquifers on the Pueblo of Laguna are recharged by precipitation, streamflow and leakage from adjacent geologic units. Water moves through the aquifers to discharge as springflow, evapotranspiration, leakage to adjacent units, and ground-water withdrawals. An understanding of the ground-water flow system is necessary to determine areas on the pueblo where adequate supplies of potable water may be found.

Bedrock aquifers

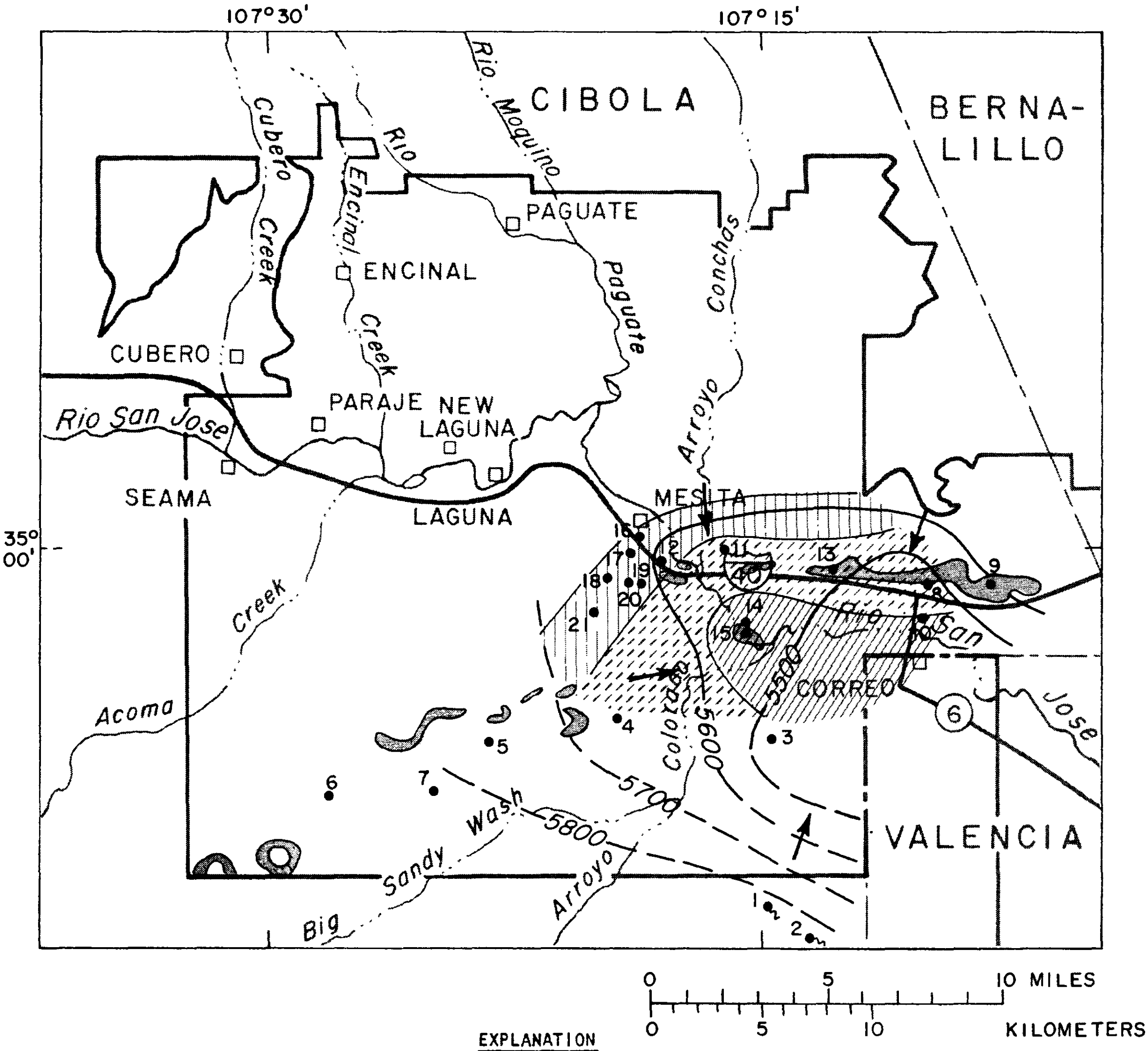
The general horizontal direction of ground-water movement can be determined from potentiometric-surface maps of the Chinle Formation, Entrada Sandstone, Bluff Sandstone, and Morrison Formation shown in figures 16 through 19. It can be assumed that water flows at right angles to the potentiometric contours. Flow directions illustrated by arrows on the potentiometric maps show that the shallow water moves toward the Rio San Jose in most areas. Flow directions in the Puerco fault zone generally are eastward into the Rio Grande trough.

The flow directions shown in figures 16 through 19 illustrate only the horizontal component of ground-water movement. In the study area, the vertical component (upward or downward movement) also is important, especially as it affects water quality. Possible directions of ground-water movement in two geologic sections are shown on plate 3.

Bedrock aquifers of Permian age beneath the pueblo probably are recharged by streamflow and precipitation on outcrop areas in the Grants area, about 20 miles west of the Pueblo of Laguna. Based on water levels in that area and in wells 11.5.14.241 (L-Bar 2) and 9.5.12.442 (Mesita Test), ground water moves southeast across the pueblo with an average gradient of about 20 feet per mile. Discharge to overlying units takes place mainly in the Puerco fault zone where fractures allow upward movement of water from the Permian units. The excessively mineralized springflow in the Montaño and Sedillo Grants is due to this discharge. Ground water also is probably discharged to the Santa Fe Group, which fills the Rio Grande trough.

The Chinle Formation, of Triassic age, is recharged mainly by precipitation on outcrop areas along Arroyo Colorado. Inflow of water to the formation also occurs by upward leakage from Permian rocks. Water movement probably is mostly in the vertical direction in the Petrified Forest Member. The Correo Sandstone Bed in the Petrified Forest Member probably is recharged by precipitation on outcrops and discharges to the alluvium along the Rio San Jose.

Jurassic aquifers south of the Rio San Jose probably are recharged for the most part on and to the southwest of the pueblo where the units crop out. Ground-water flows northeast and discharges into the alluvium along the Rio San Jose. Jurassic aquifers north of the Rio San Jose probably are recharged west of Mount Taylor by precipitation on outcrops and by leakage from the overlying Cretaceous sandstones. Some discharge is to the Rio Paguate and Rio Moquino where they join in the Jackpile-Paguate Mine and to the Rio San Jose valley west of Mesita. Discharge from the Jurassic units also occurs where ground water is withdrawn by the Anaconda Company to operate the Jackpile-Paguate Mine. These withdrawals averaged about 250,000 gallons per day during 1978.



IDENTIFIER	NAME OF WELL OR SPRING	LOCATION NUMBER
1	Salt Spring 195	7.4.3.344
2	Lucero Spring	7.4.11.431
3	ECW-10	8.4.15.123
4	RWP-21	8.5.12.311
5	-	8.5.17.213
6	RWP-30	8.6.21.224
7	RWP-22	8.6.24.412
8	RWP-15	9.3.20.441
9	Coyote Spring	9.3.22.443
10	ECW-3	9.3.29.414
11	RWP-16	9.4.16.341
12	El Rito	9.4.19.124
13	RWP-19	9.4.24.322
14	Pino 1	9.4.33.223
15	Pino 2	9.4.33.223a
16	Mesita P.S.	9.5.13.233
17	Burnell 2	9.5.13.411
18	RWP-20	9.5.23.424
19	EPNG-2	9.5.24.414
20	EPNG-3	9.5.24.413
21	RWP-29	9.5.26.411

EXPLANATION

WELL--Derives water mainly from the Chinle Formation

SPRING--Derives water mainly from the Chinle Formation

OUTCROP AREA OF CHINLE FORMATION, APPROXIMATELY LOCATED

5800 POTENTIOMETRIC CONTOUR--Shows altitude at which water level would have stood in tightly cased wells, 1973-79. Dashed where approximately located. Contour interval 100 feet. Datum is sea level.

APPROXIMATE DIRECTION OF GROUND-WATER FLOW

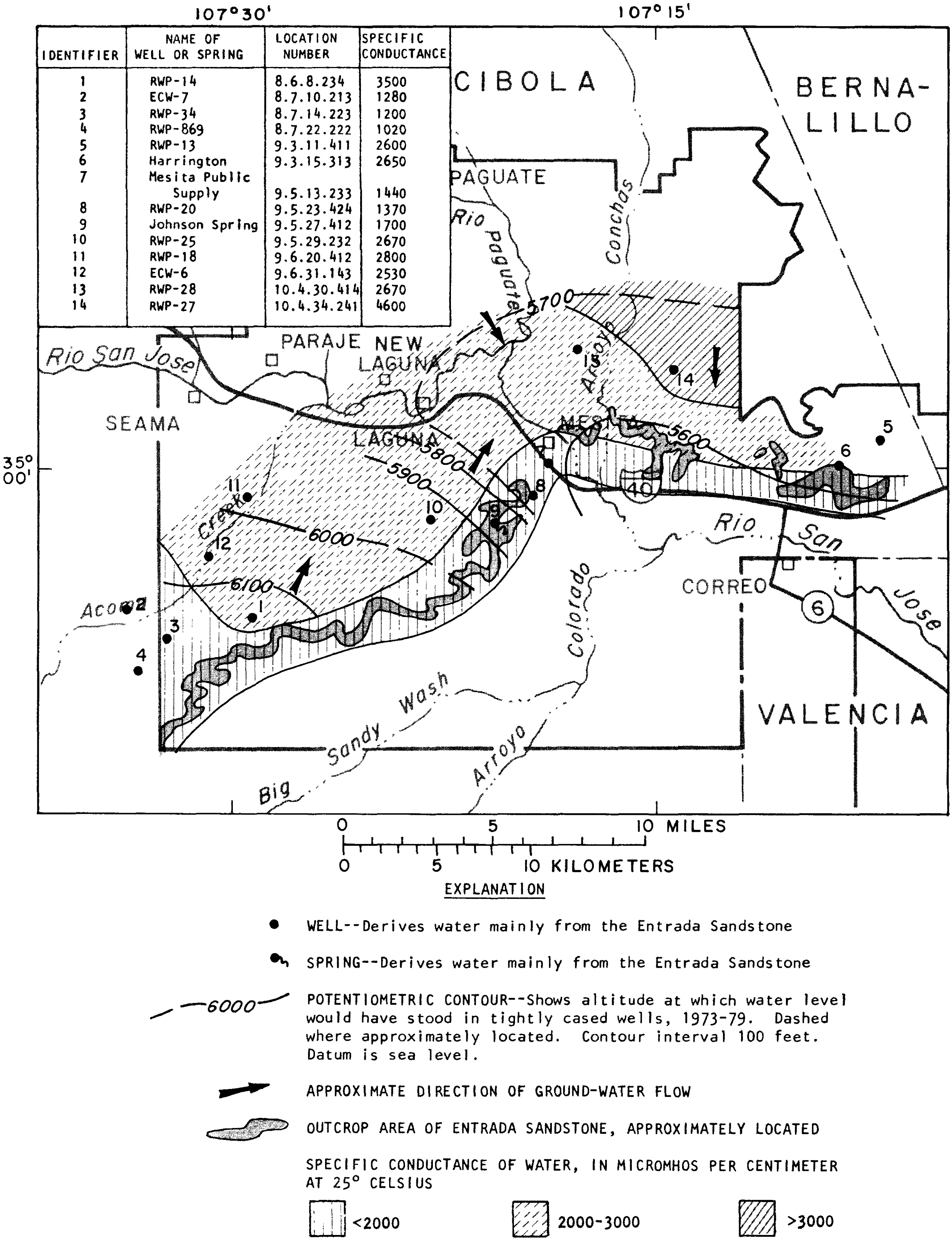
SPECIFIC CONDUCTANCE OF WATER, IN MICROMHOS PER CENTIMETER AT 25° CELSIUS

1000 - 2000

2000 - 4000

Greater than 4000

Figure 16.--Potentiometric surface and specific conductance of water in the Chinle Formation.



IDENTIFIER	NAME OF WELL OR SPRING	LOCATION NUMBER	SPECIFIC CONDUCTANCE
1	RWP-14	8.6.8.234	3500
2	ECW-7	8.7.10.213	1280
3	RWP-34	8.7.14.223	1200
4	RWP-869	8.7.22.222	1020
5	RWP-13	9.3.11.411	2600
6	Harrington	9.3.15.313	2650
7	Mesita Public Supply	9.5.13.233	1440
8	RWP-20	9.5.23.424	1370
9	Johnson Spring	9.5.27.412	1700
10	RWP-25	9.5.29.232	2670
11	RWP-18	9.6.20.412	2800
12	ECW-6	9.6.31.143	2530
13	RWP-28	10.4.30.414	2670
14	RWP-27	10.4.34.241	4600

Figure 17.--Potentiometric surface and specific conductance of water in the Entrada Sandstone.

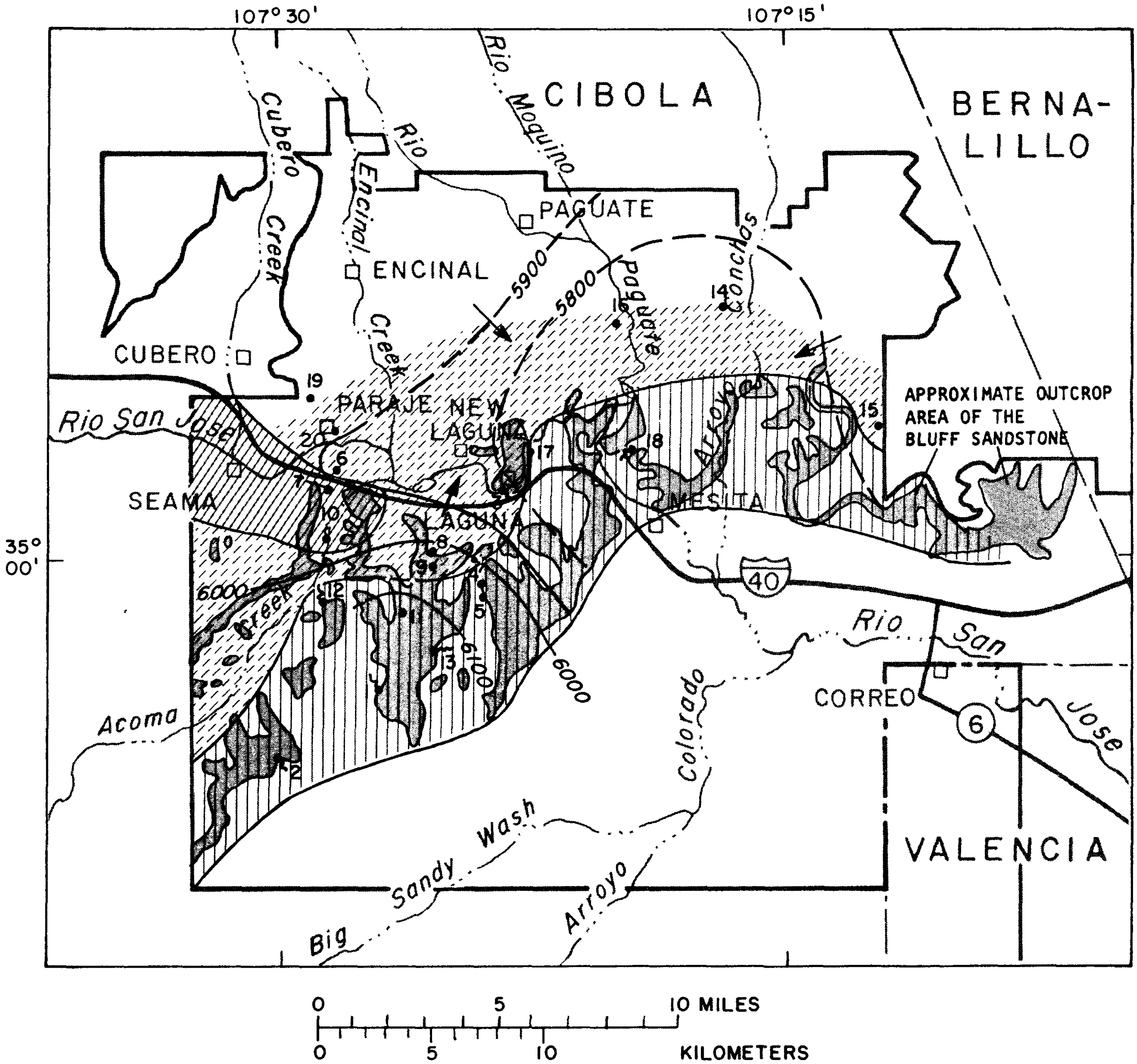


Figure 18.--Potentiometric surface and specific conductance of water in the Bluff Sandstone.

EXPLANATION FOR FIGURE 18

● WELL--Derives water mainly from the Bluff Sandstone

SPRING--Derives water mainly from the Bluff Sandstone

5800 POTENTIOMETRIC CONTOUR--Shows altitude at which water level would have stood in tightly cased wells, 1973-79. Dashed where approximately located. Contour interval 100 feet. Datum is sea level.

APPROXIMATE DIRECTION OF GROUND-WATER FLOW

SPECIFIC CONDUCTANCE OF WATER, IN MICROMHOS PER CENTIMETER AT 25° CELSIUS

<1000 1000-3000 >3000

IDENTIFIER	NAME OF WELL OR SPRING	LOCATION NUMBER	SPECIFIC CONDUCTANCE IN MICROMHOS
1	KEMP SANTIAGO SPRING	8.6.3.243	460
2	DRIPPING SPRING	8.6.18.232	340
3	-	9.5.8.121	2800
4	TEST HOLE 2	9.5.19.234	510
5	TEST HOLE 3	9.5.19.421	370
6	MOONEY	9.6.4.243	2590
7	STANDARD	9.6.4.433	4200
8	TRANSWESTERN 2	9.6.13.322	1110
9	TRANSWESTERN 1	9.6.13.343	1150
10	-	9.6.16.122	4000
11	RWP-24	9.6.26.233	460
12	TURQUOISE SPRING	9.6.28.122	440
13	COYOTE SPRING	9.6.36.144	900
14	ECW-3	9.3.29.414	4000
15	RWP-32	10.4.36.224	2810
16	SINKHOLE	10.5.14.234	2310
17	RWP-1	10.5.33.333	650
18	GOYEA SPRING	10.5.36.331	180
19	RWP-17	10.6.29.244	—
20	ECW-12	10.6.33.213	2810

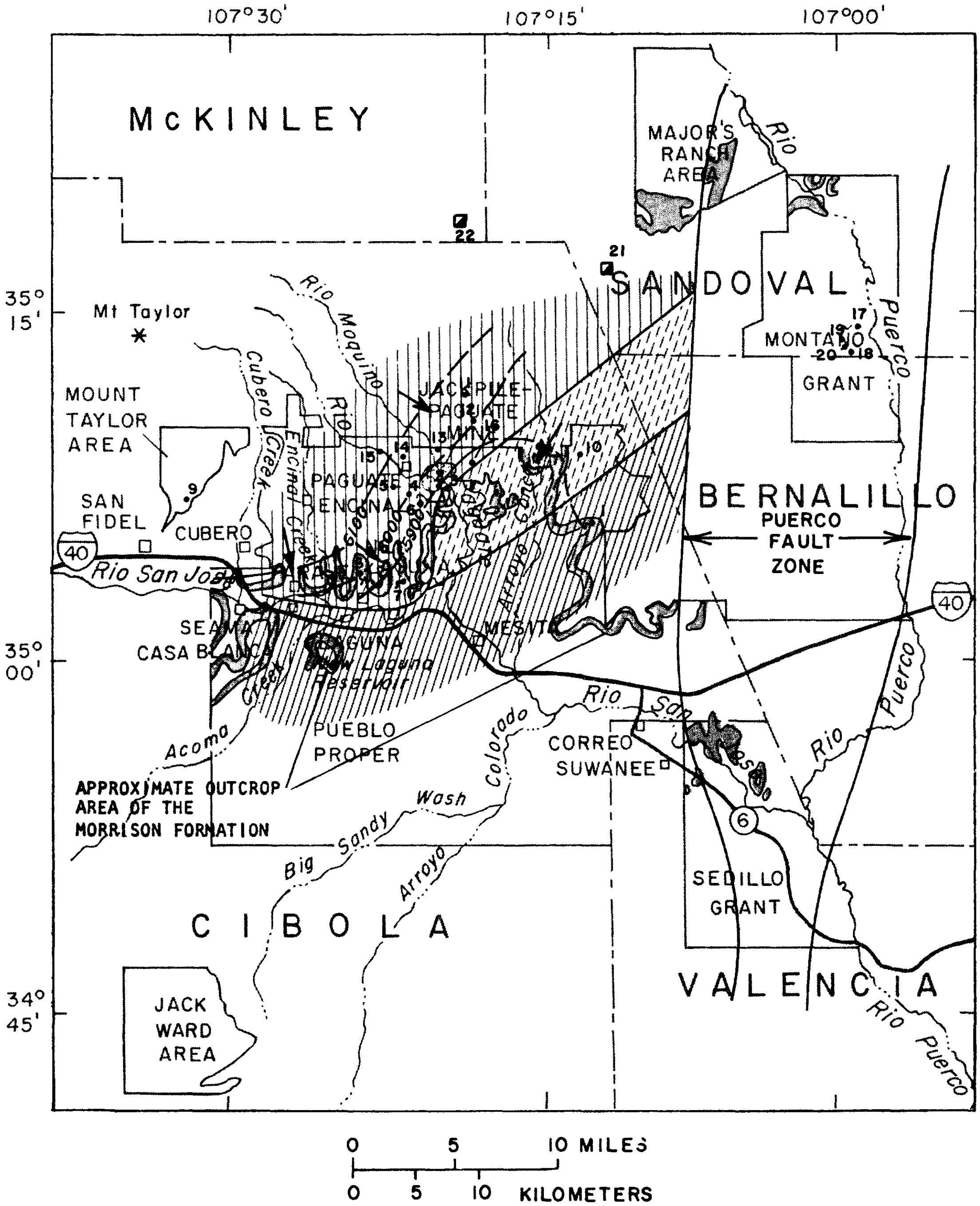


Figure 19.--Potentiometric surface and specific conductance of water in the Morrison Formation.

EXPLANATION FOR FIGURE 19

● WELL--Derives water mainly from the Morrison Formation

●~ SPRING--Derives water mainly from the Morrison Formation

— —6000— POTENTIOMETRIC CONTOUR--Shows altitude at which water level would have stood in tightly cased wells, 1973-79. Dashed where approximately located. Contour interval 100 feet. Datum is sea level.

→ APPROXIMATE DIRECTION OF GROUND-WATER FLOW

SPECIFIC CONDUCTANCE OF WATER, IN MICROMHOS PER CENTIMETER AT 25° CELSIUS

[vertical lines pattern] <2000 [dashed diagonal pattern] 2000-3000 [diagonal lines pattern] >3000

IDENTIFIER	NAME OF WELL, SPRING OR MINE	LOCATION NUMBER	SPECIFIC CONDUCTANCE IN MICROMHOS
1	CHEROMIAH SPRING	10.4.12.342	4,000
2	HOUSING-1	10.5.2.134	2,200
3	HOUSING-2	10.5.2.143	2,250
4	P-10	10.5.4.323	1,650
5	MDH-771	10.5.5.142	1,350
6	PAGUATE SHOP	10.5.9.223	1,900
7	SPRING 15	10.5.28.332	1,500
8	FROG POND SPRING	10.6.25.242	1,670
9	LAGUNA 79-1	10.7.10.213	2,000
10	ECW-4	11.4.26.444	2,500
11	LJ-205	11.5.13.112	590 *
12	ANACONDA-1	11.5.24.213	1,750
13	ANACONDA-4	11.5.27.322	1,200
14	-	11.5.29.444	1,900
15	PUEBLO TEST 3	11.5.30.422	670
16	JACKPILE SHOP	11.5.35.442	1,950
17	CONOCO 65-A	12.1.30.324	12,900
18	CONOCO WQ-7	12.1.31.331	11,800
19	CONOCO OW-192	12.2.36.421	12,800
20	CONOCO WW-101	12.2.36.442	11,000
21	RIO PUERCO MINE	12.3.18.000	1,770
22	MARQUEZ MINE	13.5.36.000	1,650

* Milligrams per liter of dissolved solids

Cretaceous units cap high mesas on the pueblo. Recharge to these units mainly is from precipitation and streamflow on outcrops and from leakage through overlying basalts. These units discharge to the Rio Moquino upstream from the Jackpile-Paguate Mine, to the Rio Paguate upstream from Paguate, as springflow around mesas, and to underlying geologic units.

Valley-fill aquifers

Rio San Jose Valley--Movement of water in the valley-fill deposits of alluvium and basalt is predominantly down the valley. In the Rio San Jose valley, between the western boundary of the pueblo and New Laguna, ground water flows down valley at a gradient of about 18 feet per mile (fig. 20). Cross-valley components also exist where ground water is recharged from or discharged to the Rio San Jose. Flow is toward the Rio San Jose at the western end of the valley where ground water discharges to the stream. East of Casa Blanca, where the stream recharges the aquifer, ground water moves cross-valley away from the stream.

Water in the valley fill is recharged by infiltration through the streambed of the Rio San Jose, seepage from tributary streams, and to a smaller extent from irrigation return flows, upward discharge of water from bedrock units, and downward percolation of precipitation.

Recharge to the valley fill aquifer takes place along several reaches of the Rio San Jose (fig. 21). The major recharge areas are from Casa Blanca diversion to New Laguna (average loss in streamflow of 0.26 cubic foot per second per mile), Mesita diversion to Correo (average loss 0.23 cubic foot per second per mile), and from Dipping Vat Spring to the Rio Puerco (average loss 0.35 cubic foot per second per mile).

Seepage from tributary streams also is an important source of recharge to the valley fill along the Rio San Jose because of the potability of the tributary flow. Cubero Creek, for example, loses an average of 0.30 cubic foot per second of water containing 450 to 520 milligrams per liter of dissolved solids to the valley fill near New York. An unknown volume of stormflow runoff in Cubero Creek also recharges the alluvium. Average yearly runoff in Cubero Creek is estimated to be 1.0 cubic foot per second based on physical characteristics of the drainage basin as described by Borland (1970). Stormflows in Encinal Creek also recharge the valley fill at the mouth of the creek with potable water. Mean annual flow in Encinal Creek estimated from basin characteristics is about 0.89 cubic foot per second. The volume of recharge to the valley fill is not known but is expected to vary considerably from year to year.

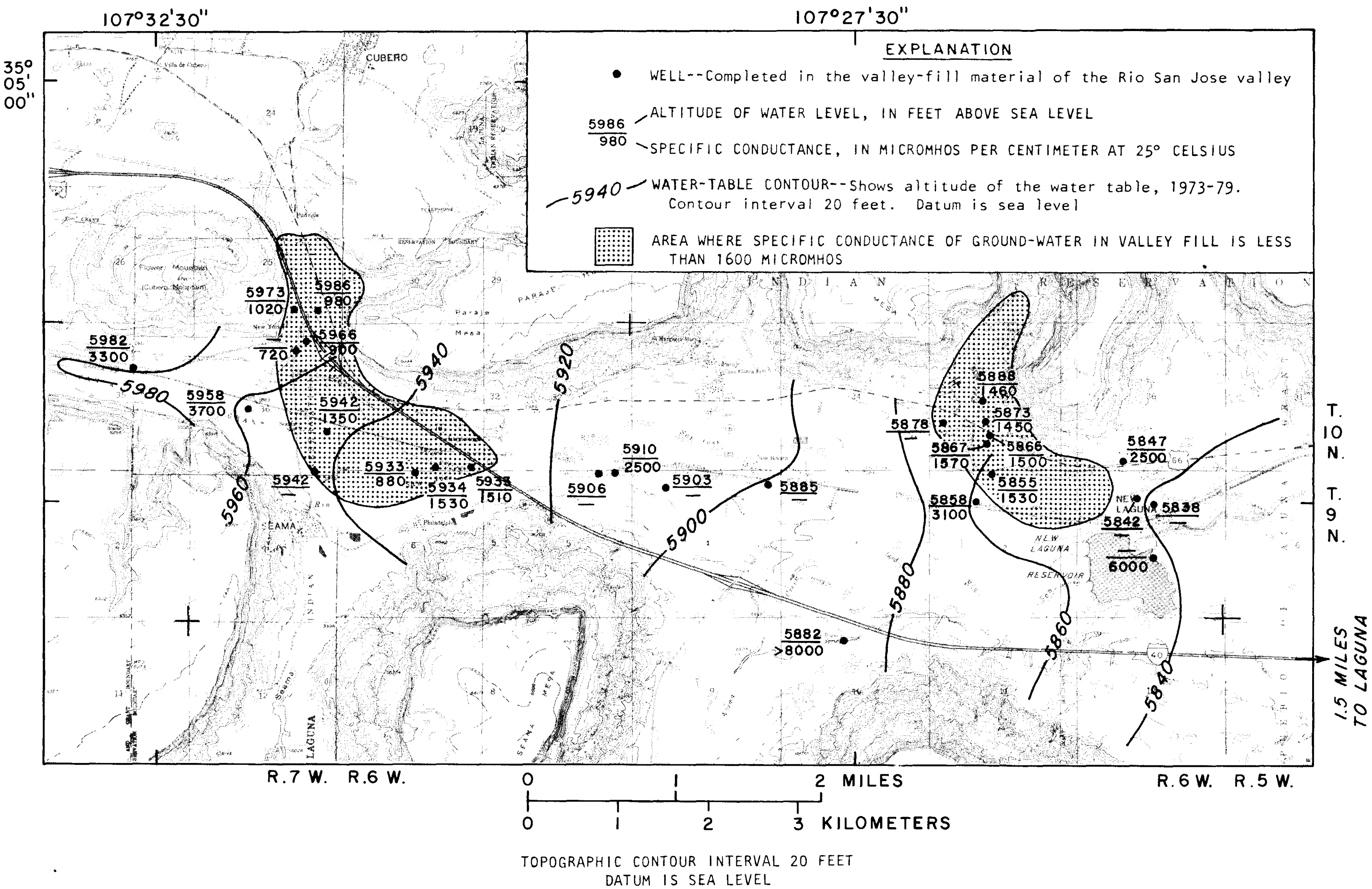


Figure 20.--Water-level altitude and specific conductance of water in the valley fill along the Rio San Jose west of Laguna.

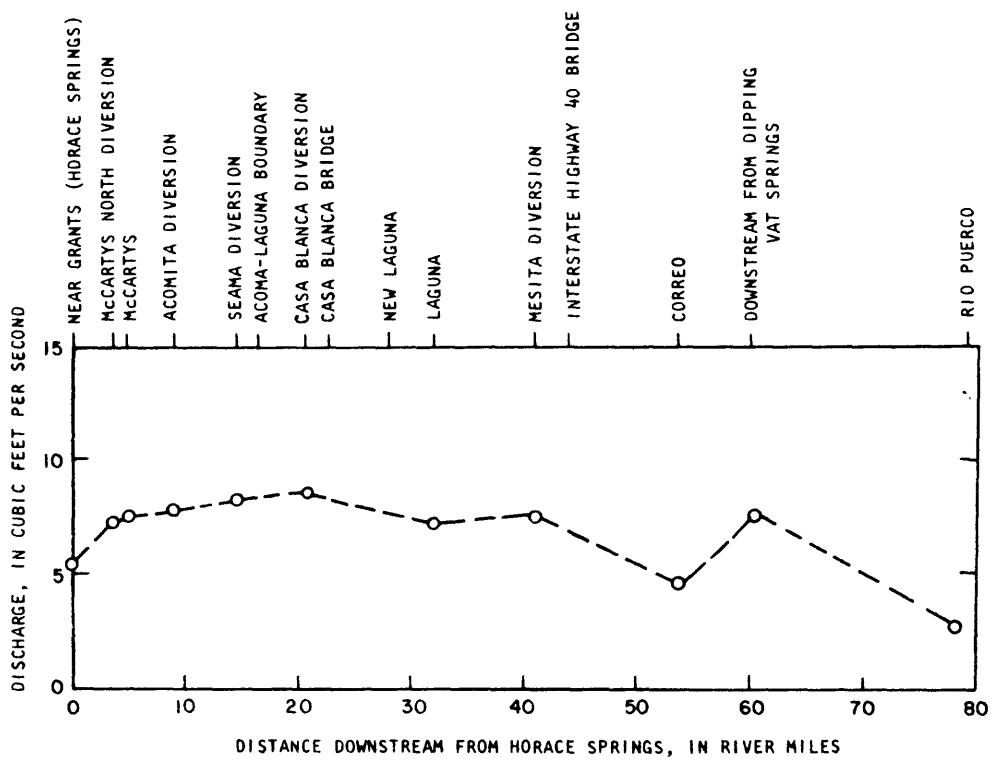


Figure 21.--Average winter discharge in the Rio San Jose calculated from miscellaneous measurements at selected sites between Horace Springs and Rio Puerco (1974-79).

Water in the valley fill discharges to the Rio San Jose and directly to the atmosphere through evapotranspiration. The gaining reaches of the Rio San Jose, between the western pueblo boundary and Casa Blanca diversion (0.02 cubic foot per second per mile) and between Correo and Dipping Vat Spring (0.52 cubic foot per second per mile), are discharge areas for the valley fill (fig. 21). Large volumes of ground water also are lost to evapotranspiraton although exact quantities are difficult to estimate. The volume of water transpired by plants probably is greatest along the channel of the Rio San Jose where phreatophytes are abundant. The annual consumptive use calculated for salt cedar for an area with climatic conditions similar to Laguna is 51.4 inches (Blaney and Hanson, 1965, p. 47). Using this rate and assuming that salt cedars cover an area about 200 feet on each side of the stream, ground-water losses to transpiration in the valley west of the village of Laguna would be about 3.4 cubic feet per second.

Large volumes of surface water also are evapotranspired from New Laguna Reservoir and the surrounding swampy area. Evapotranspiration from this 400-acre area may be as much as 2.4 cubic feet per second.

Ground-water withdrawals also account for a small volume of discharge from the valley fill. During summer months, wells near New York and Seama withdraw about 370 gallons of water per minute for public supply. During the irrigation season, two wells near New Laguna withdraw a combined total of as much as 575 gallons per minute.

Water levels in wells completed in the valley fill fluctuate in response to recharge and discharge. Water levels in wells 10.6.35.322 (Pueblo Test 1) and 10.6.35.342 (Pueblo Test 2) rose from 1966 to 1968, probably in response to recharge from stormflows in Encinal Creek (fig. 22). The larger increase measured in Pueblo Test 1 was probably because the well is nearer the creek. The discontinuation of pumpage from well 10.6.35.324 (New Laguna P. S.) in 1974 may have stopped the water-level declines in Pueblo Test 1. Water levels in well 10.7.35.232 (Ir.Test 6), located near the western pueblo boundary, showed no apparent trend from 1960 to 1979.

Water-level fluctuations for wells in the New York-Seama area are shown in figure 22. Steady declines have been recorded in wells 10.7.36.322 (Laguna 76-2), 10.7.36.424 (Laguna 76-1), 10.7.25.432 (Abandoned New York), and 10.7.36.221 (New York 1) since 1976. The declines are probably in response to ground-water withdrawals for the Laguna public supply from wells 10.7.36.221 (New York 1), 10.7.36.212 (New York 2) and 10.6.31.434 (Seama P.S.). Water levels in well 9.6.6.211 (Seama-Mesita) show no apparent downward trend despite its location less than 1/4 mile southwest of the Seama P.S. well. Possibly, pumpage from Seama P.S. well is derived to a large extent from induced infiltration from the Rio San Jose.

Water levels in well 9.6.5.222 (Laguna 76-6), 9.6.2.123 (Laguna 76-7) and 10.7.36.322 (Laguna 76-2) illustrate the seasonal fluctuations that exist to some extent everywhere in the valley (fig. 22). The fluctuations probably are due to changes in pumping and evapotranspiraton rates, changes in the stream stages in the Rio San Jose, and changes in the amount of recharge from Encinal Creek.

<u>Rio Paguate valley</u>--Ground water in the alluvium along the Rio Paguate is hydraulically connected to streamflow in the Rio Paguate and the bedrock aquifers that bound the valley fill. Upstream from the village of Paguate, the stream recharges the alluvium with potable water containing between 190 and 590 milligrams per liter of dissolved solids. Measurements of winter streamflow, when irrigation withdrawals were not taking place, indicate an average streamflow loss of about 300 gallons per minute from a point about 2½ miles northwest of the village of Paguate to the State Highway 279 bridge. About 30 gallons per minute of the recharge is pumped from the alluvium near Paguate for public supply of the village.

The remainder of the recharge from the stream probably is lost to transpiration in the marshy area near the public-supply wells. Assuming a consumptive use by grasses of about 30 inches per year (Blaney and Hanson, 1965, p. 62) and a marshy area of about 160 acres, water loss to evapotranspiration is about 250 gallons per minute. In addition, ground water is withdrawn for public supply in this area at an average rate of about 30 gallons per minute. More wells withdrawing water at a combined rate of as much as 250 gallons per minute might lower the water table and decrease the water lost to transpiration. This action, however, would dry up the marshy area, which may be an important wetland habitat for wildlife. Downstream from Paguate, water quality in the alluvium becomes more mineralized as water from Jurassic sandstones discharge to the alluvium.

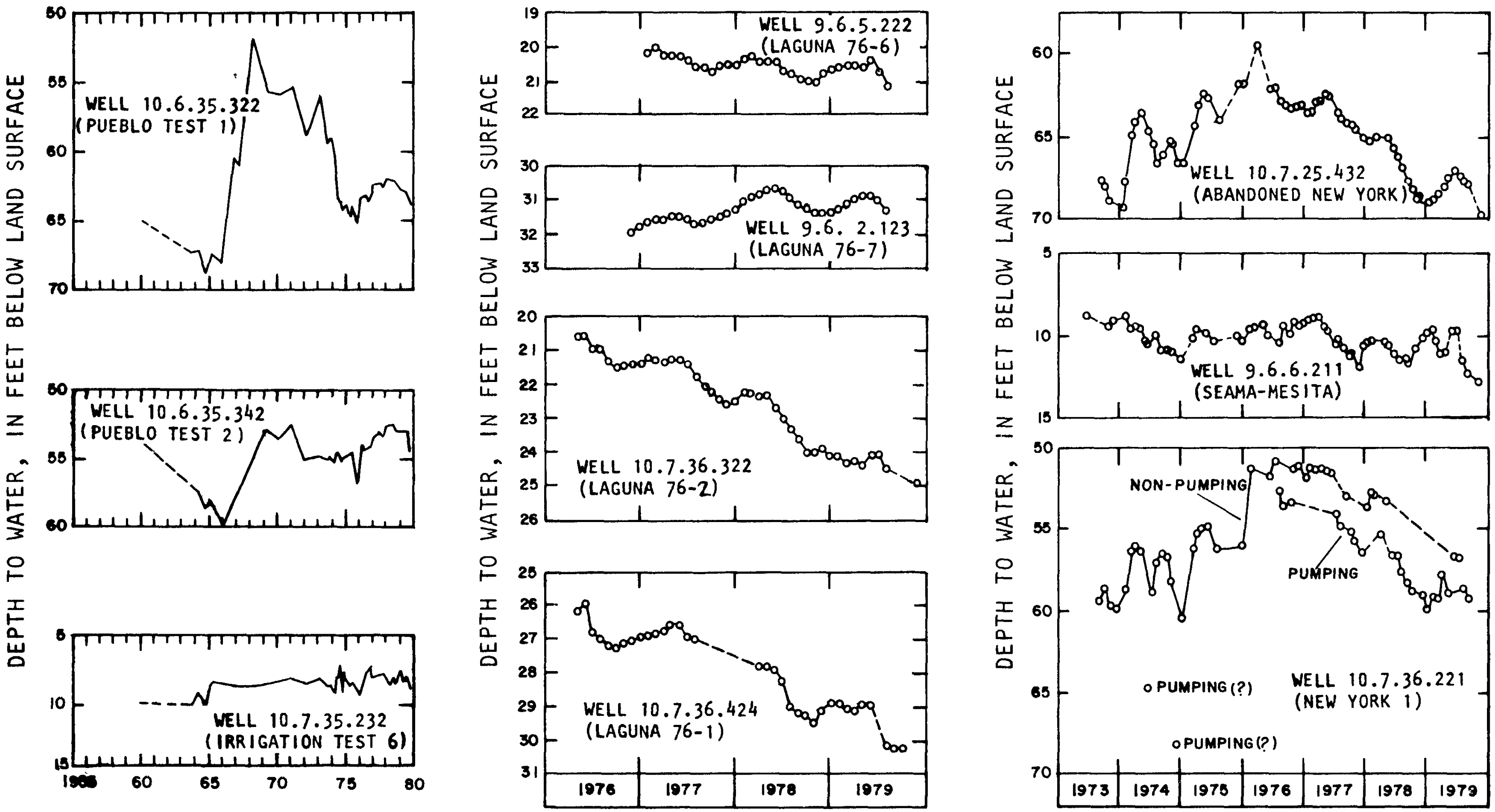


Figure 22.--Hydrographs for wells completed in the valley fill along the Rio San Jose.

Ground-water use

The main water system on the Pueblo of Laguna supplies the residents along the Rio San Jose from wells that derive water from the alluvium in the New York-Seama area. Production from wells 10.7.36.221 (New York 1), 10.7.36.212 (New York 2), and 10.6.31.434 (Seama P.S.) totaled about 370 gallons per minute during August 1-8, 1979 (Norm Fairbanks, Indian Health Service Field Engineer, written commun., 1979). Water consumption by the valley residents was approximately 100 gallons per day per person during this period. The water use by valley residents was estimated to be about one-half this quantity during winter months when gardens and lawns are not being watered.

The village of Encinal obtains about 100 gallons per minute of water for public supply from Encinal Spring, which issues from basalt flows near Mount Taylor. Water use at Encinal has not been measured, but based upon per capita consumption by valley residents, the residents of Encinal probably only use 15 to 30 gallons per minute of the springflow for domestic purposes. The remaining 70 to 85 gallons per minute is either used for other purposes, such as irrigation, or allowed to seep into the alluvium along Encinal Creek.

The village of Paguate obtains water from public-supply wells 11.5.32.234a (Paguate P.S. 1) and 11.5.32.232 (Paguate P.S. 2), which are completed in the alluvium along the Rio Paguate. In August 1979, the Paguate P.S. 2 well was pumped 12 hours per day at an average rate of 73 gallons per minute. Water use during August for the Paguate residents averaged 54 gallons per day per person. The Paguate P.S. 1 well was pumped only occasionally during this study.

The old village of Mesita obtains water from well 9.5.13.233 (Mesita P.S.), which produces from the Entrada Sandstone and Correo Sandstone Bed of the Petrified Forest Member of the Chinle Formation. On the average, the well is pumped for 2 days every 2 weeks at a rate of 10 gallons per minute to fill a 30,000-gallon storage tank. Per capita consumption measured during August 1-8, 1979, averaged 20 gallons per day.

The El Paso Natural Gas Company uses water for domestic and industrial purposes from wells 9.5.24.414 (El Paso Natural Gas 2) and 9.5.24.413 (El Paso Natural Gas 3), which produce from the Correo Sandstone Bed of the Chinle Formation. Pumpage from the two wells ranges from less than 1 gallon per minute during winter to as much as 25 gallons per minute during summer (Pat Adkins, El Paso Natural Gas Co., oral commun., 1979).

Water is pumped from sandstone units of the Brushy Basin Member of the Morrison Formation for industrial and domestic uses by the Anaconda Copper Company near Paquate. Water also is pumped to dewater the P-10 underground uranium mine. Approximate total pumpage for 1978 by Anaconda is summarized below (U.S. Geological Survey, 1978; Meade Stirland, The Anaconda Company, written commun., 1978):

Source of pumpage	Discharge rate (gallons per day)
P-10 Mine	200,000
Well (Paguate Shop)	12,400
Well (P-10 well)	17,800
Well (Jackpile Shop)	400
Well (Anaconda 4)	15,500
Total	246,100

Water for irrigation is pumped during summer months from the alluvium along the Rio San Jose at wells 10.7.36.424a (Laguna Ir. 1) and 10.6.35.342a (Laguna Ir. 2). During the irrigation season, Laguna Ir. 1 pumps about 25 hours per week at 400 gallons per minute, and Laguna Ir. 2 pumps about 25 hours per week at 175 gallons per minute (Denny Fic, Pueblo of Laguna, oral commun., 1981).

SURFACE WATER

Nearly all Laguna lands are drained by the Rio San Jose, which flows eastward through the center of the pueblo and joins the Rio Puerco about 24 miles east of Correo. Major tributaries of the Rio San Jose on the Pueblo of Laguna are Cubero Creek, Seama Creek, Encinal Creek, Acoma Creek, Rio Paguate, Arroyo Conchas, and Arroyo Colorado. Cubero Creek, Encinal Creek, and Rio Paguate, which drain the southeastern flank of Mount Taylor are sustained by spring flow and are perennial in their upper reaches. Other tributary streams flow only in response to storms or snowmelt.

Locations of water-quality and streamflow-gaging sites are shown in figure 23. Streamflow measurements and water-quality data for these sites are listed in tables 9 through 13.

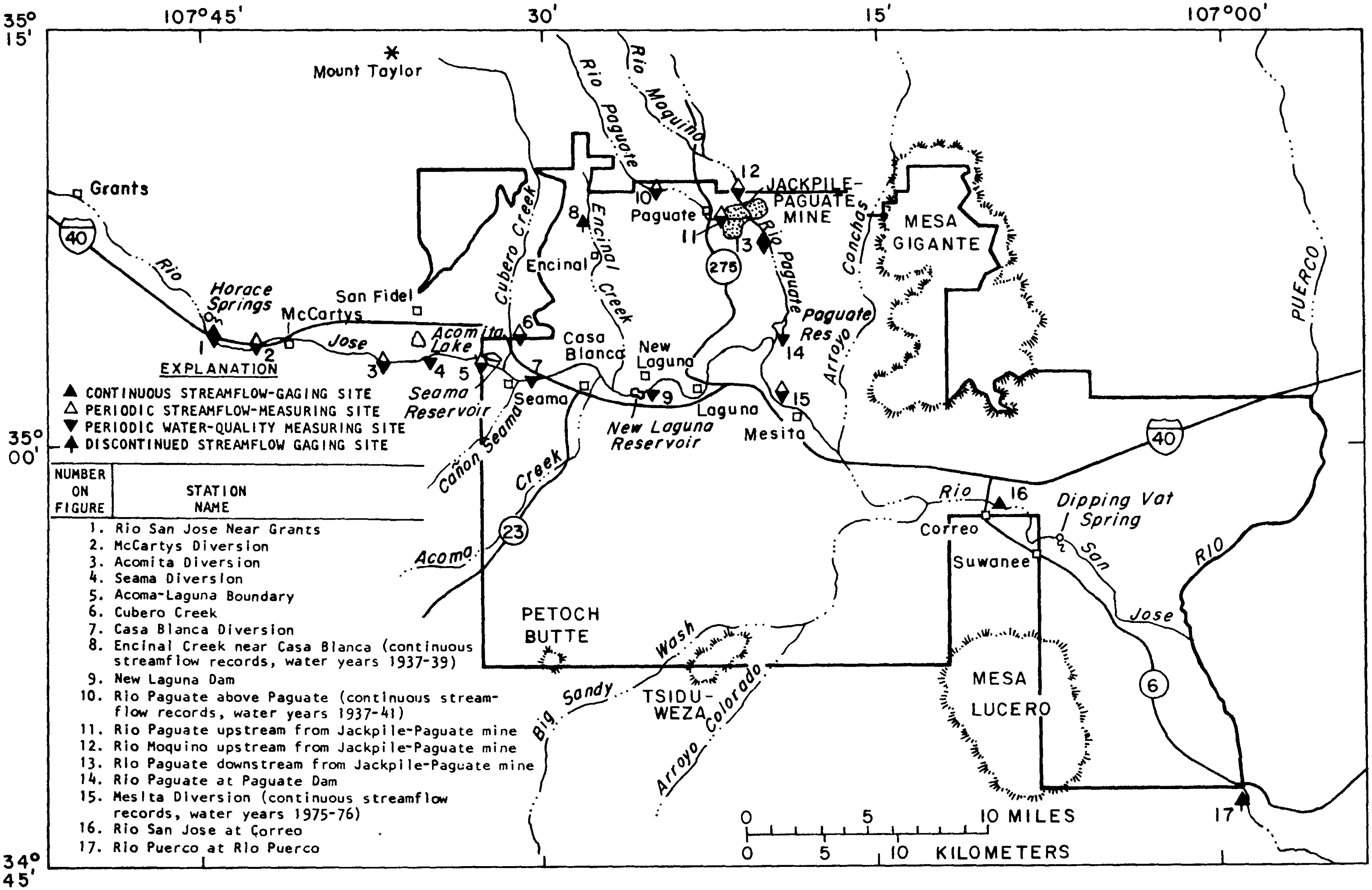


Figure 23.--Location of surface-water monitoring sites.

Flow in the Rio San Jose

The majority of flow in the Rio San Jose is sustained by Horace Springs, which have an average discharge of about 5 cubic feet per second from the valley fill about 16 miles west of Seama. The ephemeral runoff upstream from Horace Springs contributed about 80 acre-feet per year (or less than 2 percent of the total streamflow) from 1969 through 1978 at the gaging station near Grants (08343500). Runoff, however, may have been greater prior to surface- and ground-water use in the Grants-Bluewater area, which began in the 1870's (Risser, 1982).

An additional component of the total flow is the wastewater effluent discharged by the city of Grants into the channel of the Rio San Jose. The effluent travels about 8 miles between Grants and Horace Springs. About 1 to 2 cubic feet per second of wastewater reaches Horace Springs. The streamflow downstream from Horace Springs consists of a mixture that is about 60 to 90 percent springflow and 10 to 40 percent wastewater.

The annual streamflow of the Rio San Jose downstream from Horace Springs averaged 4,710 acre-feet during water years 1937 through 1978 (fig. 24). The constancy of the flow throughout the 52 years is due to the large springflow contribution. Downstream, the flow in the Rio San Jose becomes quite variable due to extensive use of the stream for irrigation during summer months, tributary inflow, and natural gains and losses to and from the alluvium. Gaining and losing reaches of the stream are shown for non-irrigation and non-storm periods on figure 21. Major gains in streamflow from ground-water discharge take place at Horace Springs (5.0 cubic feet per second) between Horace Springs and McCartys (2.7 cubic feet per second), between Acomita and Seama diversions (0.8 cubic foot per second), and between Correo and Dipping Vat Springs (3.4 cubic feet per second). Losing reaches occur from Casa Blanca diversion to New Laguna Dam (1.0 cubic foot per second) and from Mesita diversion to Correo (3.2 cubic feet per second).

Non-storm winter streamflow entering the pueblo in the Rio San Jose averages about 8.5 cubic feet per second. This amounts to about 3,600 acre-feet during the non-irrigation season (October through April). The volume of non-storm runoff entering the pueblo during summer months is difficult to estimate because of extensive use of the water for irrigation on the Pueblo of Acoma. However, miscellaneous streamflow measurements made where the Rio San Jose enters the Pueblo of Laguna average 2.3 cubic feet per second from May through September (table 12). These measurements include water in irrigation ditches entering the pueblo, which probably contains some water released from Acomita Lake in addition to flow diverted from the Rio San Jose. The average non-storm flow in the Rio San Jose available during the growing season from May through September is about 700 acre-feet.

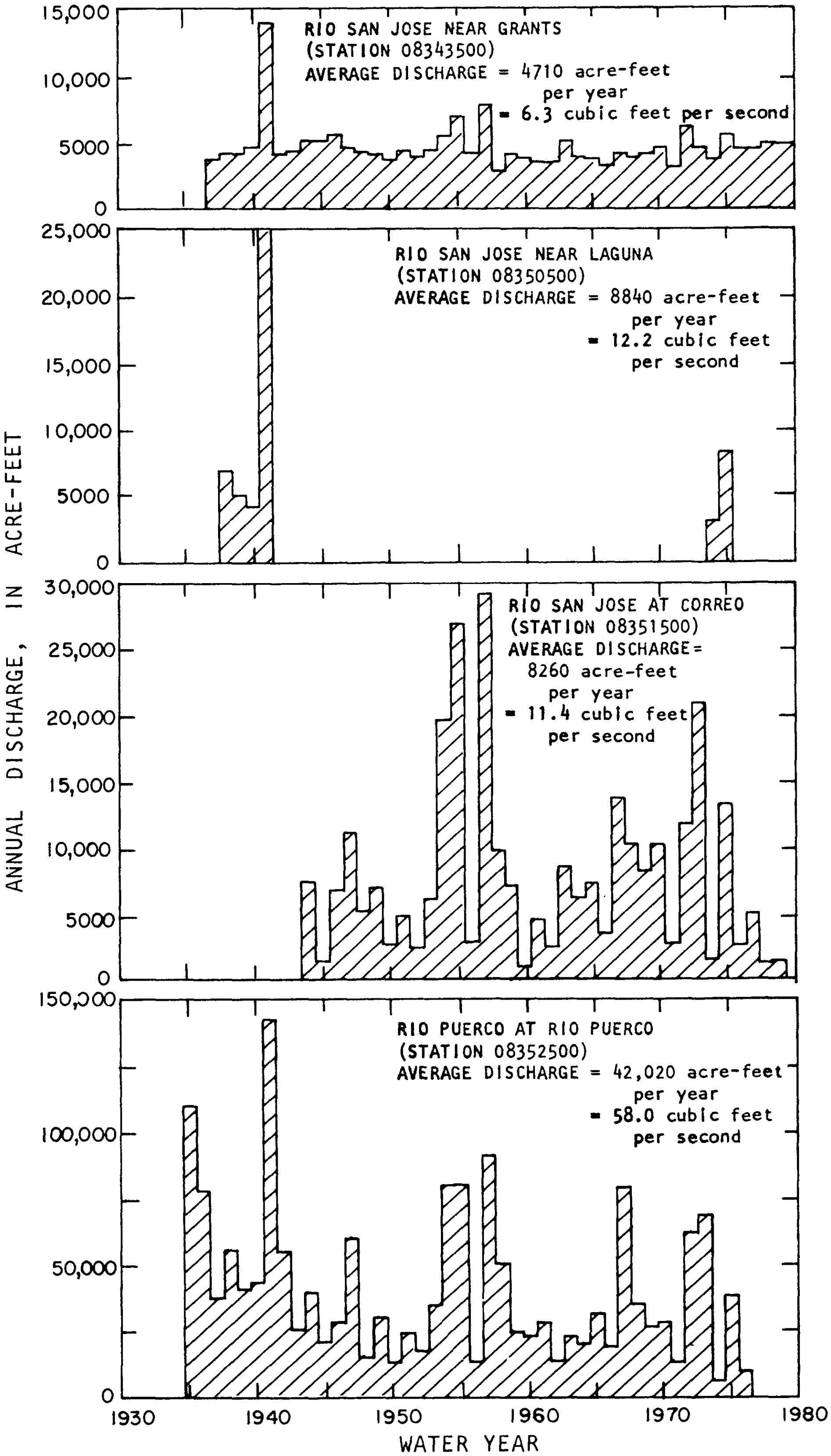


Figure 24.--Average annual discharge of the Rio San Jose and the Rio Puerco.

Storm runoff is a large part of the total flow of the Rio San Jose on Laguna lands. The volume of storm runoff entering the pueblo is unknown but is at least as much as the 80 acre-feet per year measured at the gaging station near Grants (08343500). Records for the Rio San Jose near Casa Blanca upstream from New Laguna Dam for water years 1937 through 1941 show that storms contributed an average of about 2,000 acre-feet per year (U.S. Geological Survey, 1960, p. 472). Farther downstream, stormflows are an even greater part of the total flow. For example, about 48 percent, or 5,400 acre-feet, of the annual streamflow measured at the discountinued gaging station near Laguna (08350500) was contributed by summer stormflows (fig. 25). At Correo, about 6,400 acre-feet per year, or nearly 80 percent of the annual flow of the Rio San Jose, is contributed by storms from July through October.

Duration curves illustrate the distribution of recorded streamflow of the Rio San Jose (fig. 26). There was no flow near Laguna and at Correo as much as 28 and 60 percent of the time. The steepness of the curves for all stations except the one near Grants indicates the extreme variability of streamflow.

Flow in tributaries of the Rio San Jose

All tributaries are ephemeral at their confluence with the Rio San Jose. However, Rio Paguate, Cubero Creek, and Encinal Creek are perennial in their upstream reaches, losing flow by seepage to streambed sands and gravels and by evapotranspiration before reaching the Rio San Jose.

Rio Paguate

Streamflow in the upstream reaches of the Rio Paguate mainly is sustained by spring discharge from basalt and colluvium. Mean-daily streamflow gaged at the Pueblo of Laguna boundary during the 1937-41 water years ranged from 0.2 to 174 cubic feet per second and averaged 1.6 cubic feet per second (fig. 27). An average discharge of 1.0 cubic foot per second calculated by excluding the abnormally wet year of 1941 probably is a more representative value of normal streamflow. The 12 miscellaneous discharge measurements recorded from 1975 through 1979 also average 1.0 cubic foot per second (tables 9 and 12).

The flow of 1.0 cubic foot per second represents about 400 acre-feet of streamflow that could be stored during the winter (October through April). Presently two small reservoirs store about 100 acre-feet of the winter streamflow. Additional reservoir capacity could store about 300 acre-feet of winter streamflows that are not presently used.

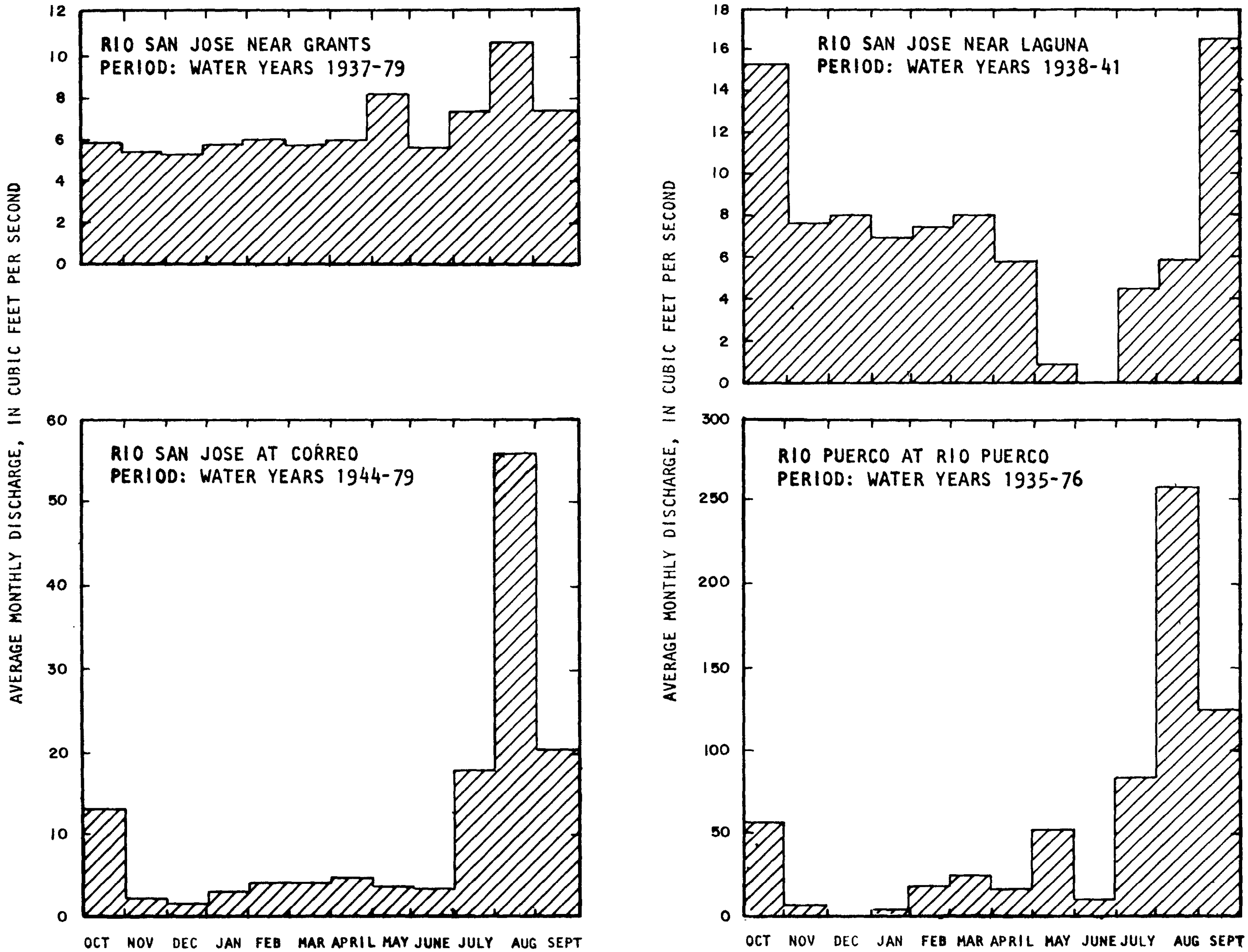


Figure 25.--Average monthly discharge of the Rio San Jose and the Rio Puerco.

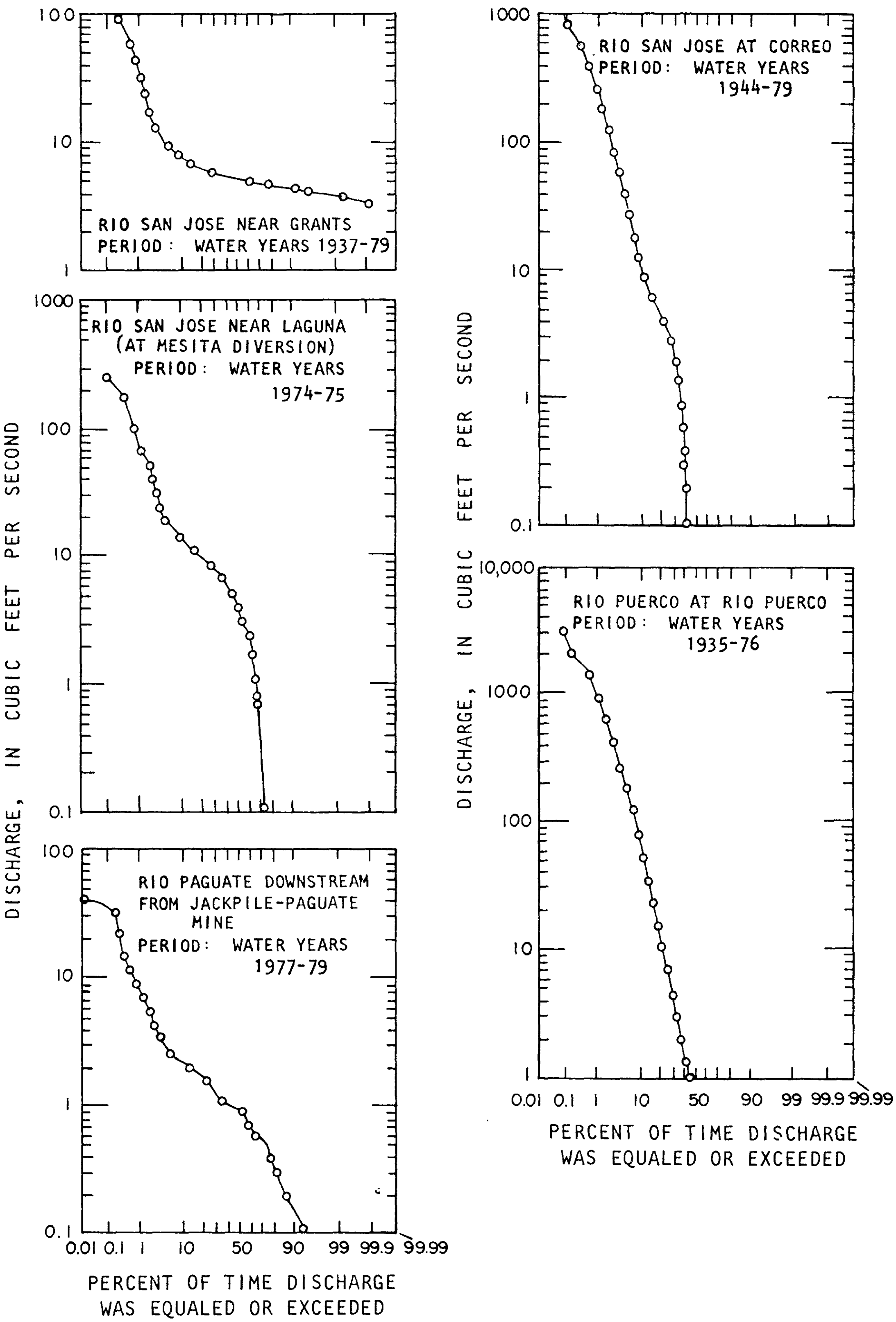


Figure 26.--Streamflow duration curves at gaging stations on Rio San Jose, Rio Puerco, and Rio Paguate.

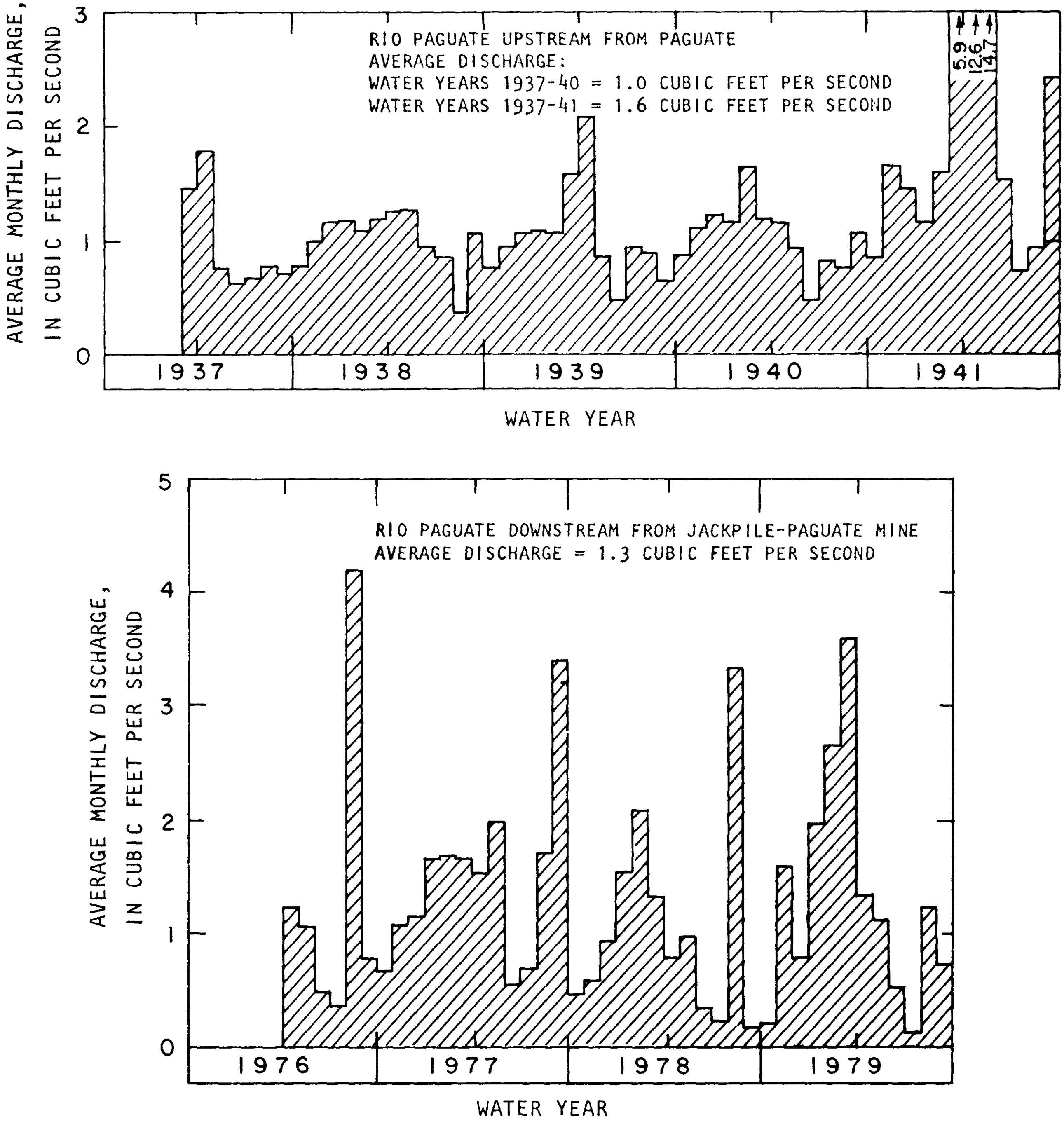


Figure 27.--Average monthly streamflow in the Rio Paguate.

Sixteen miscellaneous streamflow measurements made downstream from the village of Paguate from 1975 through 1979 ranged from 0.1 to 1.4 cubic feet per second. Some of the apparent stream losses occurring between the reservation boundary and Paguate are caused by irrigation diversions during summer months. Comparison of non-irrigation periods at the two sites indicates net seepage losses of about 0.7 cubic foot per second.

Downstream from Paguate, the stream gains water from ground-water discharge and from the Rio Moquino. Streamflow in the Rio Moquino measured at the pueblo boundary about 1/2 mile upstream from the Jackpile-Paguate Mine ranged from 0.09 to 4.6 cubic feet per second and averaged 1.1 cubic feet per second based on 14 miscellaneous measurements made from 1975 through 1977.

Monthly flow of the Rio Paguate downstream from the Jackpile-Paguate Mine from April 1976 through September 1979 is shown in figure 27. Flow averaged 1.3 cubic feet per second and ranged from 0.04 to 2,900 cubic feet per second. In the reach downstream from the Jackpile-Paguate Mine, large quantities of water are lost through seepage and evapotranspiration in the stream channel and in Paguate Reservoir.

Stormflows in the Rio Paguate probably contribute the majority of the annual flow reaching the Rio San Jose. Annual streamflow of 4,550 acre-feet was estimated based on watershed characteristics as described in Borland (1970) and Scott (1971). The magnitude and frequency of floods estimated by the same techniques are shown in table 15.

Cubero Creek

The perennial flow of Cubero Creek at the Pueblo of Laguna boundary is sustained mainly by a spring (10.7.24.411) that issues from the alluvium along the channel. Streamflow entering the reservation ranged from 0.22 to 0.42 cubic foot per second and averaged 0.30 cubic foot per second based on 14 miscellaneous measurements made during 1975-79. Most of this flow seeped into the alluvium in the New York-Seama area.

Stormflows of unknown quantity also added to the total flow of Cubero Creek. Total streamflow was estimated to be about 720 acre-feet per year based on the physical characteristics of the drainage basin as described in Borland (1970). The magnitude and frequency of flood discharges estimated according to techniques in Borland (1970) and Scott (1971) are shown in table 15.

Encinal Creek

Streamflow in Encinal Creek was not measured during this study; however, during the 1937-39 water years, streamflow averaged 0.19 cubic foot per second at a gaging station (08348500) located about 1.5 miles north of Encinal. The streamflow at this point was sustained by numerous springs that issued from basalt at the head of Encinal Creek. Discharge varied seasonally due to winter snowmelt, stormflows, and upstream irrigation withdrawals during summer months. Discharge averaged 0.28 cubic foot per second during winter months when no withdrawals for irrigation were made. Streamflow today may have decreased since 1939 due to development of Encinal Spring as a source of public-supply water.

Stormflows contribute most of the flow in the downstream reaches of Encinal Creek. Total flow at the mouth of the stream was estimated to be 640 acre-feet per year from the physical characteristics of the watershed as described by Borland (1970). The magnitude and frequency of flood flows (table 15) were estimated according to Borland (1970) and Scott (1971).

Ungaged tributaries

Major tributary streams of the Rio San Jose that have never been gaged include Cañon Seama, Acoma Creek, Arroyo Conchas, and Arroyo Colorado. Total annual discharge and the magnitude of certain floods were calculated based upon the physical characteristics of drainage areas (table 15) as described in Scott (1971) and Borland (1970).

Flow in the Rio Puerco

Streamflow of the Rio Puerco at the southeast corner of the Sedillo Grant (station 08352500) averaged 58 cubic feet per second during the 1935-76 water years (fig. 24). The duration curves in figure 26 show that the Rio Puerco is dry about 50 percent of the time at this location. Summer stormflows occurring from July to October contribute 77 percent of the total flow at this station (fig. 25). Most of the flow during non-storm periods is contributed by the Rio San Jose, which flows into the Rio Puerco about 6 miles upstream from the gaging station.

Surface-water use

Most of the non-storm flow in the Rio San Jose upstream from Mesita is used to irrigate crops on the Pueblos of Laguna and Acoma. About 700 acre-feet of water from the Rio San Jose enters Pueblo of Laguna during the growing season, which includes part of the 650 acre-feet stored in Acomita Reservoir during winter months. During 1979, the water was used to irrigate about 70 acres in the Rio San Jose valley (Daniel Carr, U.S. Bureau of Indian Affairs, written commun. 1980). Seama Reservoir, recently constructed in the valley where the Rio San Jose enters the pueblo, will store as much as 480 acre-feet of the water that presently flows through the pueblo during winter months.

Surface water from the Rio Paguate is stored in two small reservoirs that together have a capacity of about 100 acre-feet. This water and the summer flow was used to irrigate about 52 acres near Paguate. Surface water from Encinal Creek was used to irrigate about 19 acres near Encinal.

WATER QUALITY

Development of water resources on the Pueblo of Laguna is largely restricted by water quality. This section discusses water-quality criteria for various uses, ground-water quality, and surface-water quality. Though ground water and surface water are discussed separately, the two are closely related; most surface water, except stormflows and snowmelt runoff, is contributed from ground-water sources.

Water-quality criteria for various uses

The suitability of water for various uses depends on the concentration of dissolved solids and the concentration of particular constituents. The U.S. Environmental Protection Agency (1976a, 1976b) and Federal Water Pollution Control Administration (1968) list water-quality standards and recommended criteria for public supply, freshwater aquatic life, livestock, and irrigation (table 17).

Waters which meet the quality standards and criteria set for public supply are limited on the Pueblo of Laguna. Surface and ground waters in the Encinal and Paguate areas meet all the standards and criteria. Ground water in the alluvium along the Rio San Jose in the New York-Seama and New Laguna areas meet most of the standards and criteria except for specific conductance, hardness, and sulfate.

The water-quality criteria for freshwater aquatic life listed on table 17 were not exceeded in samples analyzed from the Rio San Jose, Rio Paguate, Cubero Creek, Rio Moquino and Rio Puerco except for certain values of iron and cadmium.

Water suitable for consumption by livestock may be obtained almost anywhere on the pueblo except on the Sedillo Grant. Salt springs in that area commonly discharge water with specific-conductance values in excess of 17,000 micromhos.

Water-quality criteria for irrigation are difficult to evaluate because other factors such as soil characteristics, quantity of water available, and types of crops also are important. The three chemical characteristics commonly used to evaluate the suitability of water for irrigation are boron concentration, sodium concentration, and specific conductance. Most surface water and ground water on the pueblo that may be available in sufficient quantities for irrigation have boron concentrations well within the allowable range (500-1,000 micrograms per liter) for sensitive crops. For this reason, boron concentrations should not restrict development of irrigation water. However, waters with large specific-conductance values and sodium concentrations are very common on the pueblo. Large values for these characteristics are good indicators of an excessive dissolved-solids concentration and sodium hazard that may restrict use of the water for irrigation.

Ground-water quality

Bedrock units

The quality of water in bedrock units is affected by many factors including the types of minerals present in the rock, the length of time the water has been in contact with the rock, ion exchange, various chemical reactions, and ground-water movement, which may cause mixing of different water types. Water in bedrock units in the study area is chemically suitable for all uses near areas of recharge but is chemically unsuitable for most uses in salt springs near the Puerco fault zone and in deep wells throughout the study area (tables 5 through 8).

Water in bedrock units can be placed in four general categories determined by the relative abundance of major ionic constituents. These categories are illustrated on the water-analysis diagram of figure 28. The water-analysis diagram may illustrate, in a general way, the chemical evolution of ground water on the pueblo. The major ions in water in or near areas of recharge are calcium, magnesium, and bicarbonate. As the water moves from recharge areas downward through the rock units gypsum is dissolved, which is disseminated in the Mancos Shale, Jurassic sandstones, and found as an identifiable unit in the Todilto Formation. Thus, water becomes enriched in calcium and sulfate. Ion-exchange processes then replace one calcium or magnesium ion in the water with two sodium ions. Ion exchange is most readily accomplished in shale units, such as those in the Mancos Shale, Chinle Formation, and Brushy Basin and Recapture Members of the Morrison Formation. The water resulting from the ion-exchange process contains sodium and sulfate as the major constituents. This is the most common type of water found on the pueblo.

Water discharging from deep units, such as the Permian and Triassic rocks, plots in the right corner of the anion triangle (fig. 28). This water has been deep in the ground-water system a very long time. Because little mixing of water occurs at depth, the water becomes enriched in sodium and chloride ions probably by coming in contact with soluble salt beds in the Permian rocks.

The quality of water is determined by the total ionic concentration as well as the type of ions in solution. Dissolved-solids concentrations for bedrock units are discussed in the following sections.

Permian System--Water in rocks of the Permian System contains excessive concentrations of dissolved solids. Well 8.5.17.213 produced water with a specific conductance of 82,800 micromhos (the specific-conductance value multiplied by 0.7 is approximately equal to the dissolved-solids concentration in milligrams per liter). Water from wells 9.5.12.442 (Mesita Test) and 9.1.8.142 (Shell Oil Test) contained 18,000 and 15,500 milligrams per liter of dissolved solids respectively. The salt springs on the Sedillo

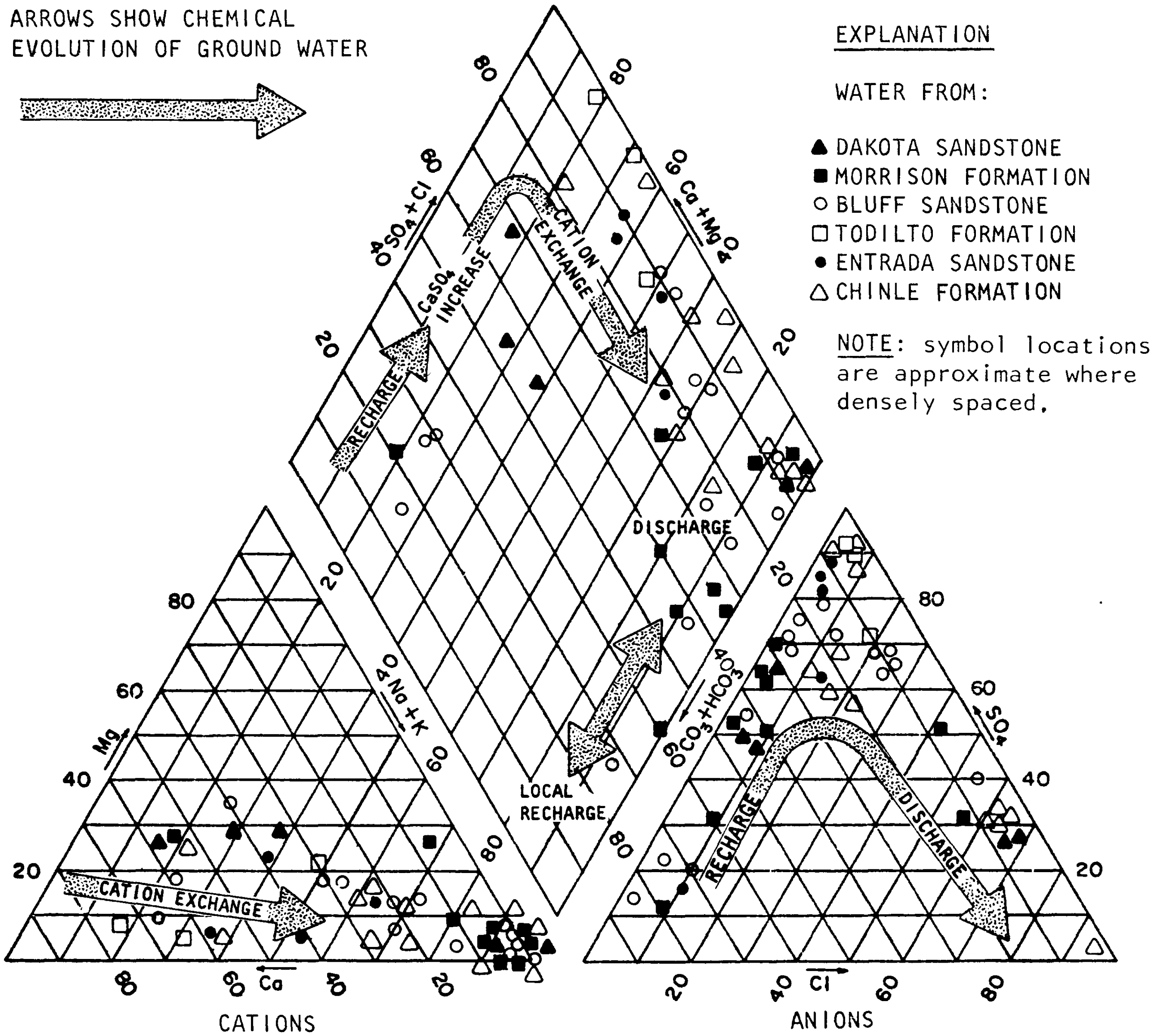


Figure 28.--Water-analysis diagram for selected wells completed in bedrock units.

Grant are caused, in part, by upward seepage of water from Permian rocks. Specific-conductance values of the springflow mainly are in the 30,000 to 40,000 micromhos range. It is unlikely that water with dissolved-solids concentrations acceptable for stock, irrigation, or public-supply use will be found beneath the Pueblo of Laguna in Permian rocks.

Triassic System--Water quality in the Chinle Formation is least mineralized (dissolved-solids concentrations between 700 and 1,500 milligrams per liter) near Mesita along outcrops of the Correo Sandstone Bed of the Petrified Forest Member of the Chinle Formation. Dissolved-solids concentrations increase to the east in the direction of ground-water flow as shown on figure 16. Several springs in the southern part of the Sedillo Grant discharge small quantities of excessively mineralized water. These springs probably represent upward movement of water from deeper units throughout the Puerco fault zone.

Jurassic System--Water quality in the Entrada Sandstone is least mineralized in recharge areas near outcrops. A map delineating water-quality zones based upon specific-conductance measurements is shown in figure 17. Dissolved-solids concentrations are less than 1,500 milligrams per liter on outcrop areas and range from 1,500 to 4,000 milligrams per liter on the remainder of the Pueblo Proper. No water-quality data are available for the Jack Ward, Montaño, Mount Taylor, Sedillo, and Major's Ranch areas; water in the Puerco fault zone is expected to be quite mineralized due to upward movement of water from deeper units.

Specific-conductance values illustrate the distribution of dissolved-solids concentration for water in the Bluff Sandstone (fig. 18). Dissolved-solids concentrations are less than 700 milligrams per liter in outcrop areas and range from 1,000 to 3,000 milligrams per liter in other parts of the Pueblo Proper. Water is quite mineralized in eastern pueblo lands within the Puerco fault zone.

The quality of water in the Morrison Formation based on specific-conductance measurements is shown in figure 19. Dissolved-solids concentrations on the Pueblo Proper range from about 500 to 1,500 milligrams per liter and increase toward the Puerco fault zone (tables 5-8). Near Paguate, the ground water contains between 500 and 1,500 milligrams per liter of dissolved solids. Water in the Morrison Formation on Sedillo and Montaño Grants contains between 7,000 and 24,000 milligrams per liter of dissolved solids due to upward leakage of water throughout the Puerco fault zone. Radium-226 concentrations ranging from 0.95 to 38.7 picocuries per liter were present in water sampled from the Jackpile sandstone unit and Westwater Canyon Member on the Montaño Grant (U.S. Geological Survey, Conservation Division, written commun., 1978). Water quality on the Major's Ranch area is untested; but west of the Puerco fault zone, the Westwater Canyon Member and Jackpile sandstone may yield water with dissolved-solids concentrations ranging from 1,000 to 2,000 milligrams per liter.

Cretaceous System--Dissolved-solids concentrations in the Dakota Sandstone on the Pueblo Proper and Mount Taylor areas range between about 200 and 1,100 milligrams per liter. Most wells in the Encinal area produce water containing 800 to 1,100 milligrams per liter of dissolved solids. The dissolved-solids concentration of 27,600 milligrams per liter at a spring (7.2.6.434, Spring 190) on the Sedillo Grant is due to mixing with ground water from deeper units. Water quality on most of the Jack Ward, Montaño, and Major's Ranch areas is untested but dissolved-solids concentrations probably range from 2,000 to 4,000 milligrams per liter.

The specific conductance of water in the Mesaverde Group on the Sedillo and Montaño Grants ranges from 2,700 to 2,900 micromhos, which is suitable for stock use but not human consumption. Well 11.7.35.243 (Castillo Canyon 1) on the Mount Taylor area contained water with 670 milligrams per liter of dissolved solids. Rainfall and snowmelt on Mount Taylor probably provide recharge water with little dissolved-solids concentration to Mesaverde units near Paguate, Encinal, and on the Mount Taylor area.

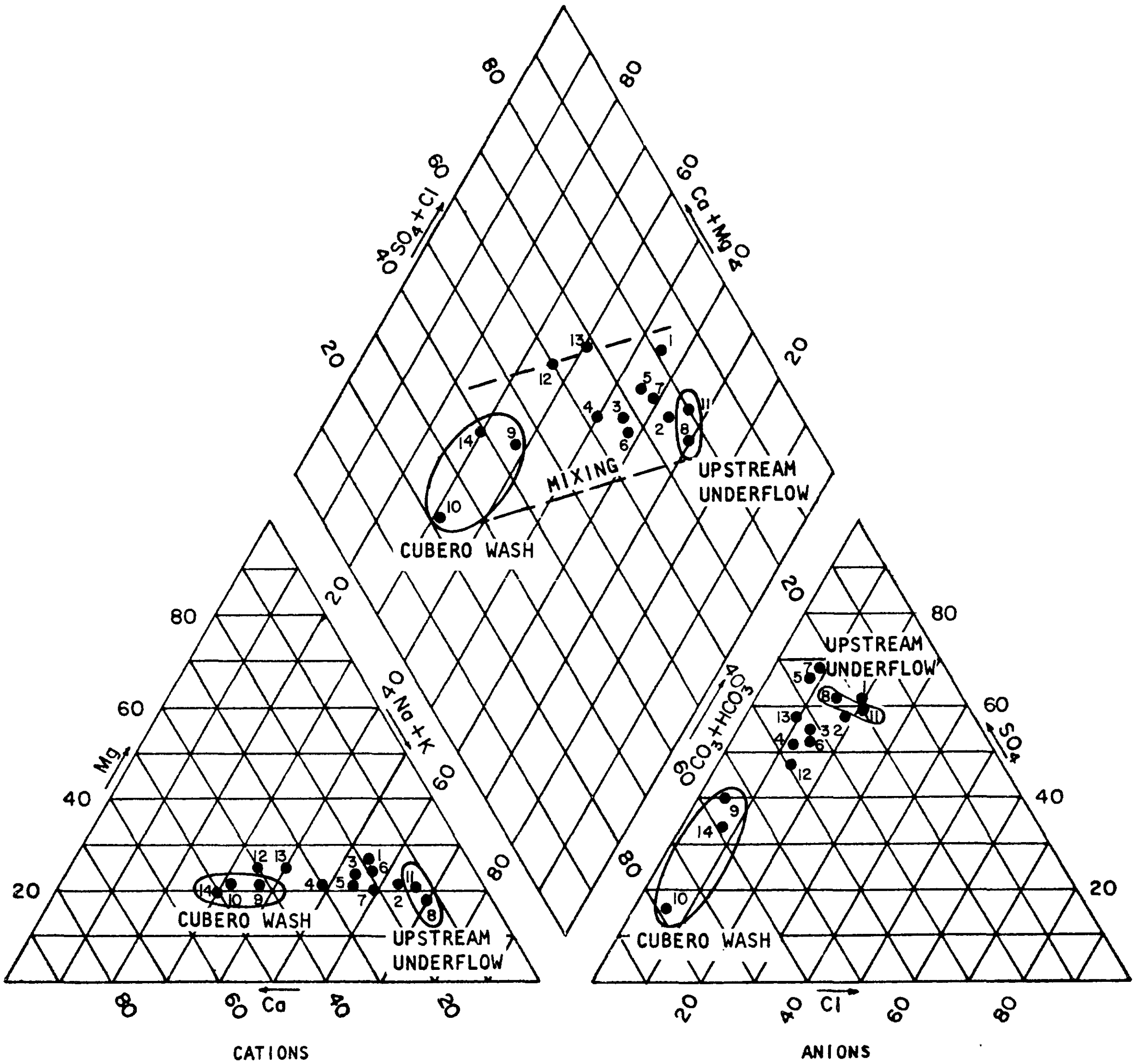
Alluvium

Rio San Jose valley--The quality of water in alluvium along the Rio San Jose valley is quite variable. Specific conductance ranges from 720 to more than 8,000 micromhos. This great variation probably is due to several factors including variations in lithology of the valley fill and recharge of varying quality from different sources.

The general water-quality zones in the valley fill east of the village of Laguna are delineated on the basis of specific conductance in figure 20. Valley fill at the mouth of tributary valleys on the north (Cubero and Encinal Creeks) receives recharge from springs and runoff from Mount Taylor. Specific-conductance values of water in the valley fill range from 720 to 1,570, which represent dissolved-solids concentrations of between about 500 and 1,200 milligrams per liter. Ground water containing about 2,500 milligrams per liter of dissolved solids moving down the Rio San Jose valley from the west mixes with the less mineralized water recharged from Cubero Creek.

The geochemistry of waters in the Rio San Jose valley shows the mixing of different water types (fig. 29). Sodium and sulfate are the predominant ions in the water entering the pueblo in the valley from the west. This water mixes with recharge from Cubero Creek, which is predominantly a calcium bicarbonate water. Therefore, water in the alluvium appears to be a mixture, containing large concentrations of sodium, sulfate, calcium, and bicarbonate.

Water in the alluvium downstream from New Laguna Reservoir and in the Rio Puerco valley has a very high salinity hazard (specific conductances exceed 2,250 micromhos). The sodium hazard also may be high though sufficient chemical-quality data are not available.



IDENTIFIER	LOCATION NUMBER	NAME OF WELL OR SPRING	IDENTIFIER	LOCATION NUMBER	NAME OF WELL OR SPRING
1	9.6.2.123	Laguna 76-7	8	10.7.35.232	Irrigation Test 6
2	9.6.5.222	Laguna 76-6	9	10.7.36.212	New York 2
3	10.6.31.434	Seama Public Supply	10	10.7.36.221	New York 1
4	10.6.31.443	Irrigation Test 7	11	10.7.36.322	Laguna 76-2
5	10.6.35.322	Pueblo Test 1	12	10.7.36.424	Laguna 76-1
6	10.6.35.324	New Laguna Public Supply	13	10.7.36.424a	Laguna Irrigation 1
7	10.6.35.342	Pueblo Test 2			

Figure 29.--Water-analysis diagram for wells completed in valley-fill deposits along the Rio San Jose.

Rio Paguate valley--Water in the alluvium along the Rio Paguate upstream from the village of Paguate is recharged by streamflow generally containing between 190 and 600 milligrams per liter of dissolved solids. The dissolved-solids concentration of ground water in this area is about 300 to 500 milligrams per liter.

Downstream from Paguate, water in the alluvium becomes more mineralized as water from Jurassic sandstones discharge to the alluvium and streamflow from the Rio Moquino containing 1,040 to 3,060 milligrams per liter of dissolved solids joins the Rio Paguate. Water from well 10.5.26.223 (Ir. Test 8), drilled downstream from Paguate Reservoir, has a specific-conductance value of 10,000 micromhos, which corresponds to a dissolved-solids concentration of about 7,000 milligrams per liter.

Surface-water quality

Rio San Jose

The quality of water in the Rio San Jose varies with distance downstream from Horace Springs and from season to season as the volume of irrigation withdrawals, contributions from stormflow and snowmelt, and discharge of wastewater effluent change. Changes in selected water-quality characteristics are shown in figure 30. In general, the average winter concentrations of most constituents increase downstream from McCartys diversion due to ground-water contributions. Average dissolved-solids concentration of water upstream from McCartys is about 890 milligrams per liter. On the Pueblo of Laguna, the average dissolved-solids concentration of water in the Rio San Jose is 1,660 milligrams per liter at the western pueblo boundary, 1,300 milligrams per liter at the mouth of Cubero Creek, due to less mineralized ground-water contributions, and 1,800 milligrams per liter at Mesita diversion. Water with a dissolved-solids concentration between 890 and 1,800 milligrams per liter has a moderate to high salinity hazard for irrigation.

Water quality in the Rio San Jose changes from season to season in part due to changes in streamflow and upstream irrigation withdrawals. Average monthly specific-conductance values from the western pueblo boundary to Mesita were least from January through April, prior to the start of irrigation withdrawals, and peaked in the early summer months (fig. 31). Lesser values in the late summer months were caused by streamflows containing smaller concentrations of dissolved solids.

Specific conductance can be used as a tool to estimate values of other water-quality constituents (Hem, 1970, p. 96). Empirical relations between specific conductance and dissolved-solids concentration, sodium-adsorption ratio, chloride concentration, total hardness, and sulfate concentration in the Rio San Jose from Horace Springs to Mesita diversion are shown in figure 32.

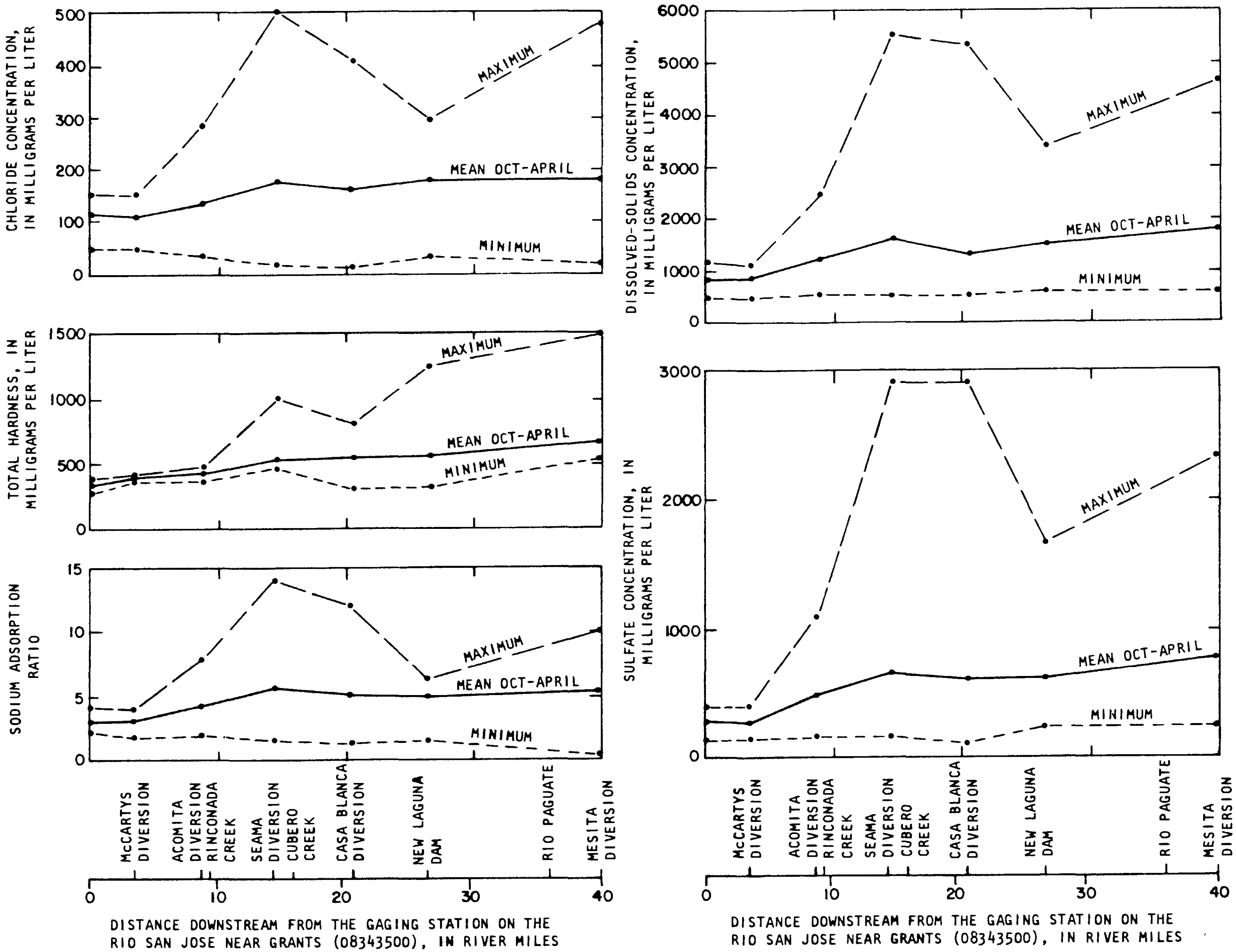


Figure 30.--Variation of selected water-quality characteristics in the Rio San Jose from the streamflow-gaging station near Grants (08343500) to Mesita diversion, 1961-79.

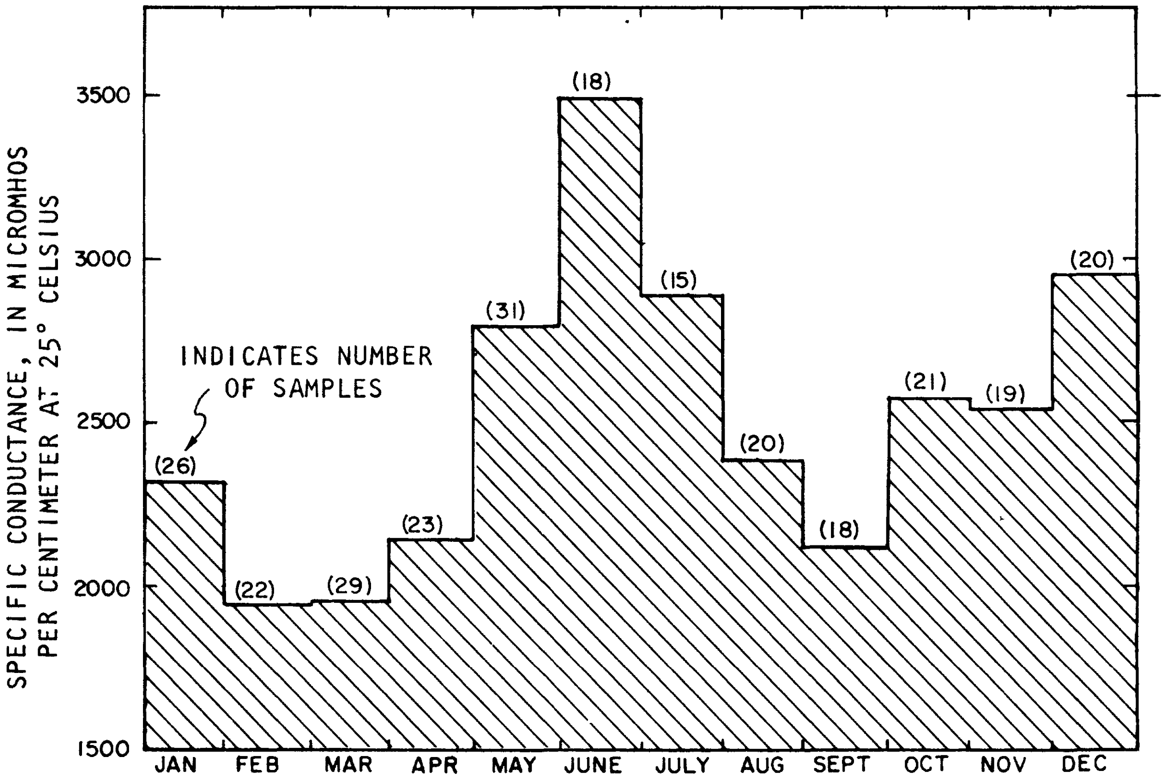


Figure 31.--Average monthly specific conductance of the Rio San Jose on the Pueblo of Laguna upstream from Mesita, 1961-79.

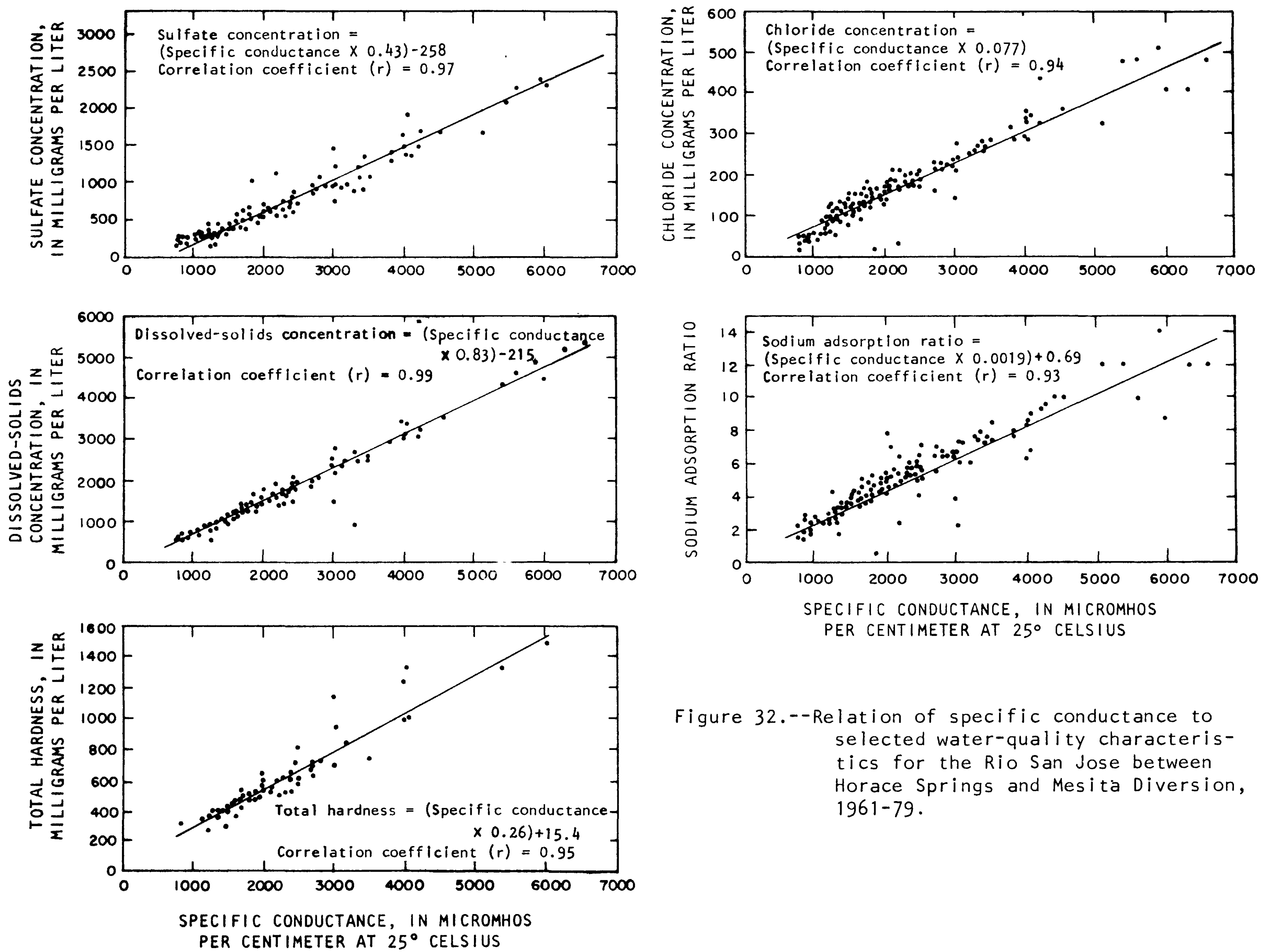


Figure 32.--Relation of specific conductance to selected water-quality characteristics for the Rio San Jose between Horace Springs and Mesita Diversion, 1961-79.

Sodium, calcium, magnesium, sulfate, and bicarbonate are the predominant ions in water in the Rio San Jose. The chemistry changes downstream from Horace Springs by the enrichment of sodium and sulfate and relative decrease of calcium and bicarbonate. The chemical change probably is due to water discharge from Jurassic bedrock units, which typically contains greater concentrations of sodium and sulfate.

Rio Puerco

Water quality of the Rio Puerco was sampled on August 24, 1978, during runoff from a summer storm (table 9). The dissolved-solids concentration was 1,550 milligrams per liter. Suspended-sediment concentrations exceeding 200,000 milligrams per liter have been measured in the Rio Puerco at the gaging station near Bernardo about 25 miles south of the Sedillo Grant (U.S. Geological Survey, 1947-78). The large suspended-sediment concentrations limit the use of this water.

Tributaries of the Rio San Jose

Rio Paguate--Upstream from the Jackpile-Paguate Mine, dissolved-solids concentrations in the Rio Paguate range from 190 to 590 milligrams per liter and the water is suitable for irrigation and public supply (tables 9-13). Downstream from the mine, the dissolved-solids concentration in the river ranges from 990 to 6,420 milligrams per liter and the water is only marginally suited for irrigation. The degradation in quality partly is caused by the addition of water containing 1,040 to 3,060 milligrams per liter of dissolved solids from the Rio Moquino. Changes in quality also may occur where surface runoff comes in contact with the disturbed overburden at the Jackpile-Paguate Mine. Additional quality changes downstream from the mine probably are due to ground-water discharge to the stream and to concentration of dissolved solids by evaporation at Paguate Reservoir. Chemically, the water-quality change is represented by increased concentrations of all dissolved cations and a large increase in sulfate concentration (fig. 33).

Water from storm runoff and snowmelt at the gaging station downstream from the Jackpile-Paguate Mine usually contains lesser dissolved-solids concentrations than does base streamflow (tables 9 and 12). In general, specific conductance decreases with increasing discharge. Suspended-sediment concentrations in six high streamflows ranged from 105,000 to 811,000 milligrams per liter.

Specific conductance can be used to estimate specific water-quality characteristics of the Rio Paguate. Empirical relations between specific conductance and dissolved-solids concentration, calcium magnesium hardness, sulfate concentration, sodium-adsorption ratio, and chloride concentration for the Rio Paguate and Rio Moquino are shown in figure 34.

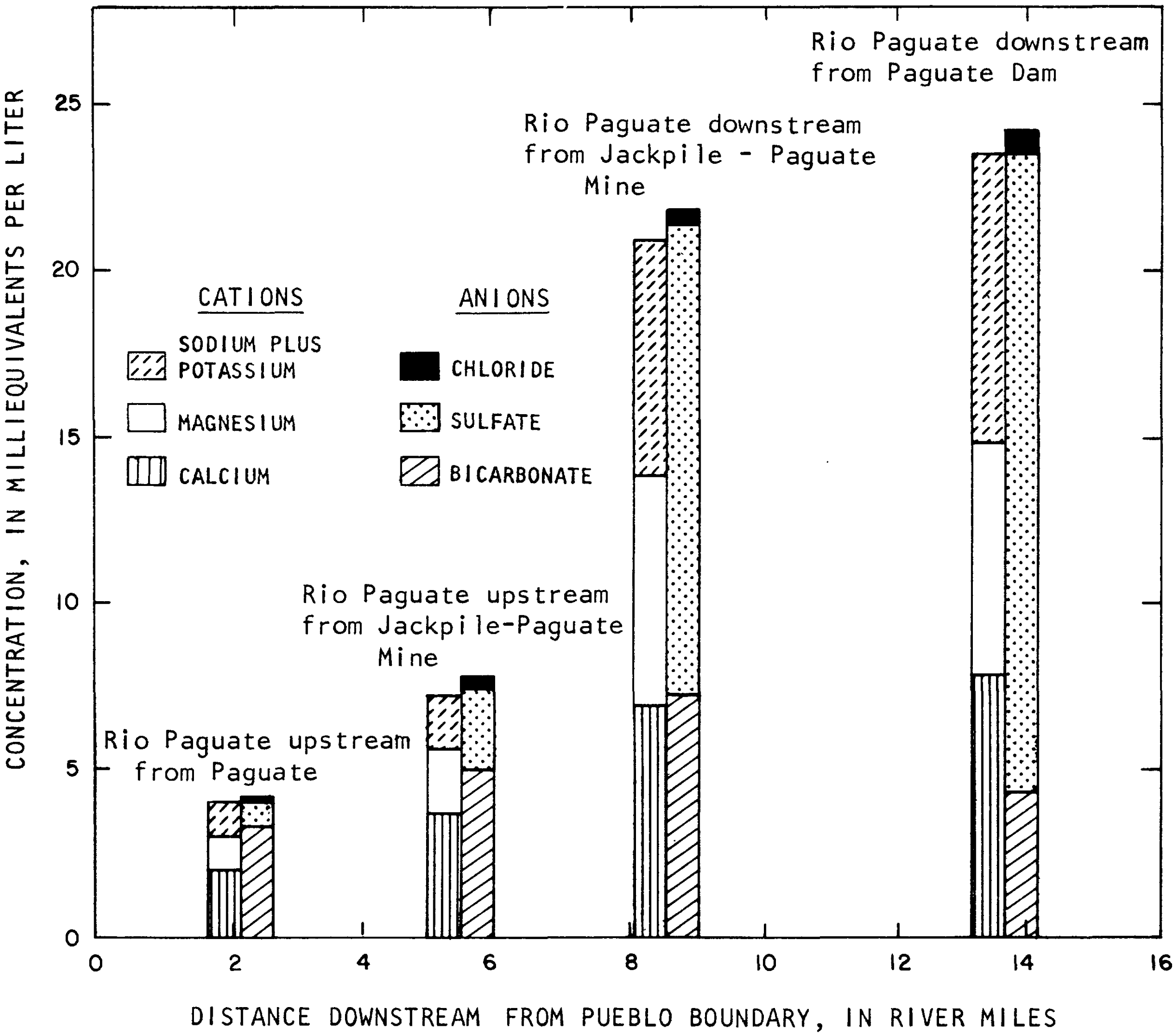
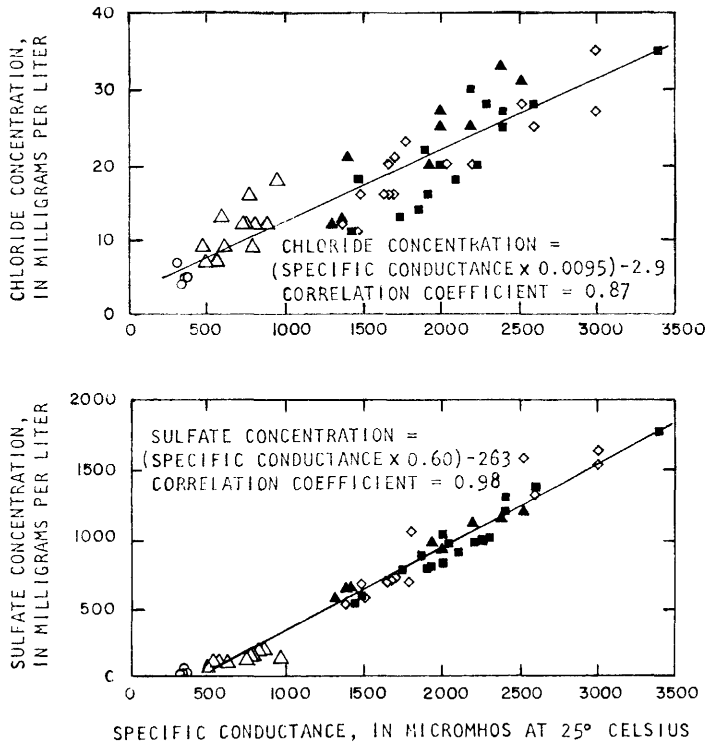
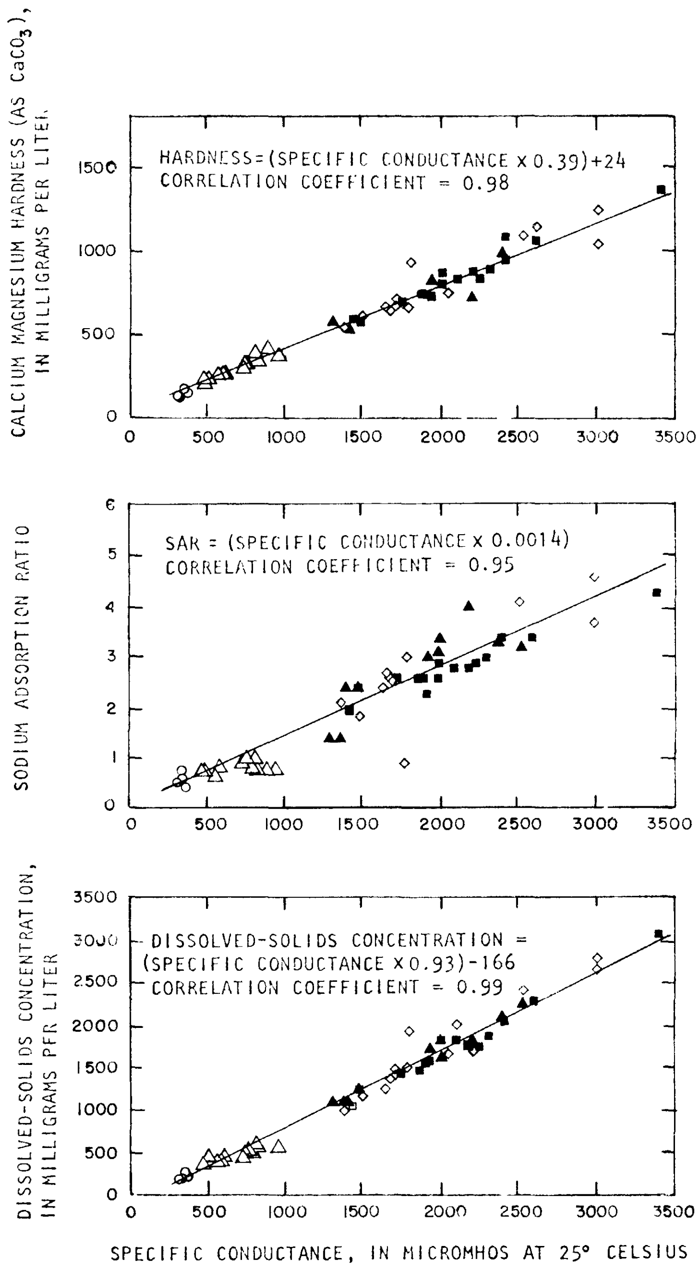


Figure 33.--Average concentrations of major ions of winter streamflow in the Rio Paguate, 1976-79.





EXPLANATION

- ■ Rio Moquino upstream from Jackpile-Paguate Mine
- o Rio Paguate upstream from Paguate
- △ Rio Paguate upstream from Jackpile Paguate Mine
- ◇ Rio Paguate downstream from Jackpile-Paguate Mine
- ▲ Rio Paguate at Reservoir

Figure 34.--Relation of specific conductance to selected water-quality characteristics in Rio Paguate and Rio Moquino, 1976-79.

Water samples had increases in radiochemical concentrations downstream from the Jackpile-Paguate Mine. Concentrations of radium-226 and uranium collected at the streamflow-gaging station downstream from the mine ranged from 1.7 to 8.3 picocuries per liter and 73 to 330 micrograms per liter, respectively (table 13). Concentrations of radium-226 collected upstream from the mine ranged from 0.04 to 0.09 picocurie per liter for Rio Paguate and 0.08 to 0.12 picocurie per liter for Rio Moquino. Concentrations of uranium upstream from the mine ranged from 0.7 to 2.2 micrograms per liter for Rio Paguate and 4.7 to 8.3 micrograms per liter for Rio Moquino. The lesser concentrations of radium-226 and uranium in Rio Moquino and Rio Paguate upstream from the mine indicate that the increase of radiochemicals primarily takes place where the Rio Paguate and Rio Moquino flow through the Jackpile-Paguate Mine.

Sediments from the streambed of the Rio Paguate were sampled for trace elements and radiochemicals at several points upstream and downstream from the Jackpile-Paguate Mine (table 16). Sediments collected at the gaging station downstream from the mine had concentrations of trace elements and radiochemicals comparable to sites sampled on the Rio Moquino and Rio Paguate upstream from the mine. However, much greater concentrations of radiochemicals were found in sediments from 1.5 miles downstream from the mine to Paguate Reservoir. Radium-226 concentrations ranged from 121 to 153 picocuries per liter, and uranium concentrations ranged from 194 to 308 milligrams per liter in these samples. Evidently, at least a part of the sediment load in the Rio Paguate is being deposited in Paguate Reservoir and in the aggrading channel upstream from the reservoir.

Cubero Creek--The quality of water in Cubero Creek was fairly constant when sampled during the study (tables 9-13) because the streamflow was sustained by spring discharge. The dissolved-solids concentration ranged from 450 to 520 milligrams per liter, which is considerably less than the concentration in the Rio San Jose. The quality of this streamflow probably is acceptable for irrigation and for public supply if proper methods are used to filter suspended solids and remove bacterial contamination. Water quality in the alluvium around the New York-Seama area is improved considerably due to seepage from Cubero Creek.

The dissolved-solids concentration of stormflows is at least that of springflow contributions based upon three miscellaneous measurements (table 12). Measured suspended-sediment concentrations of greater than 40,000 milligrams per liter in these stormflows may render the water unsuitable for certain uses.

Encinal Creek--Analyses of water from Encinal Springs, which provide most of the base streamflow in the upstream reaches of Encinal Creek, indicate the water is acceptable for irrigation and public-supply use (table 5). Dissolved-solids concentration in two samples from the springs were 114 and 158 milligrams per liter. The quality of storm runoff is not well documented but specific conductances of 403 and 856 micromhos were measured for two stormflows. The large suspended-sediment concentrations of 45,000 and 151,000 milligrams per liter accompaning these flows may render the water unsuitable for certain uses.

NUMERICAL MODEL OF GROUND-WATER FLOW IN THE VALLEY-FILL AQUIFER ALONG THE RIO SAN JOSE WEST OF LAGUNA VILLAGE

Introduction to modeling study

The availability of water for irrigation, industry, and public supply is a major constraint on the economic growth and prosperity of the Pueblo of Laguna. Because significant new sources of water are unlikely to be discovered, the known water resources on the pueblo must be utilized as carefully as possible. A ground-water flow model of the valley-fill aquifer along the Rio San Jose was constructed to illustrate how ground water can be effectively used for the increased benefit of the tribe.

The valley of the Rio San Jose is 1/2 to 2 miles wide through the center of the Pueblo Proper. The part of the valley selected for modeling is about 11 miles in length, encompasses an area of about 25 square miles, and extends from valley wall to valley wall along the stream from about 2 miles west of the Acoma-Laguna boundary to the village of Laguna (fig. 35). The western part of the valley was chosen for modeling because the area has the greatest potential for additional ground-water development for irrigation and public supply. Because the quality of ground water in the valley fill deteriorates down the valley, it is unlikely that ground-water development in the Quaternary alluvium and basalt of the Rio San Jose valley will take place east of the village of Laguna.

The model allows predictions to be made of aquifer response to various potential stresses placed upon the hydrologic system. Some specific objectives of the study were to predict water-level declines and effects on streamflow of the Rio San Jose caused by different hypothetical amounts of ground-water withdrawals. The study also illustrates the potential use of ground-water storage to salvage unused winter streamflows for use later during the irrigation season.

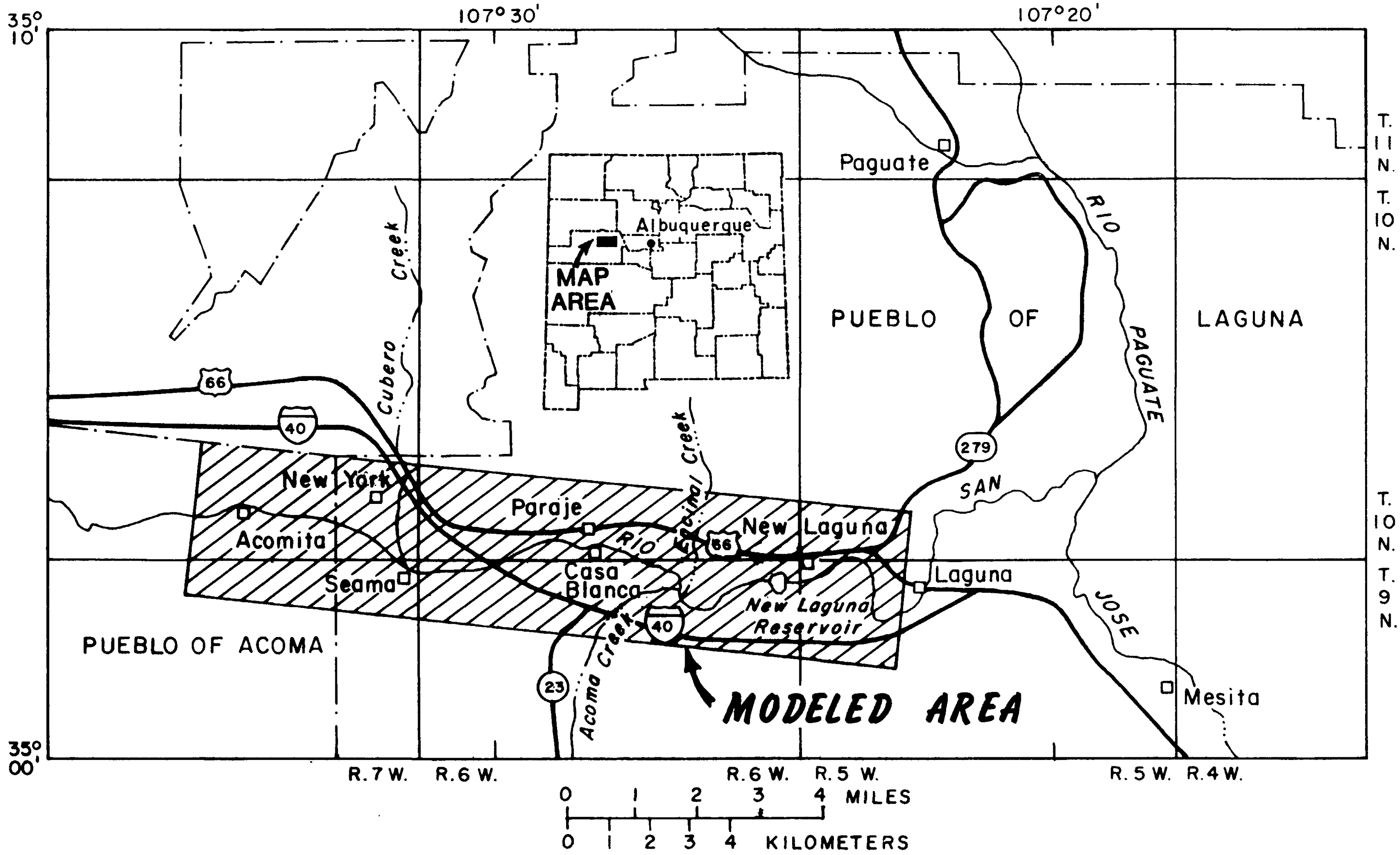


Figure 35.--Location of modeled area.

Description of the Model

Model used

To solve the equation of ground-water flow, a 2-dimensional, finite-difference numerical model written and documented by Trescott, Pinder, and Larson (1976) was used. The differential, ground-water flow equation is approximated in the model by a series of algebraic, finite-difference equations. The study area was divided into a rectangular-grid system that defined a nodal point at the center of each cell. The finite-difference equations were then solved at each node on a digital computer using the strongly implicit procedure.

A 2-dimensional model was used because vertical components of ground-water flow were believed to be insignificant in the valley. Buried basalt flows do confine ground water locally, but the extent of this condition is not well known.

Model construction

The initial setup of the model involved making a finite-difference grid, deciding on boundary conditions, and entering initial estimates of hydrologic characteristics. The initial estimates of hydrologic characteristics such as hydraulic conductivity of the aquifer, hydraulic conductivity of the leaky streambed, recharge from tributary streams, and evapotranspiration rate then were varied in a trial-and-error method until the model satisfactorily met the adjustment criteria. Model construction then was complete.

Finite-difference grid

A rectangular, finite-difference grid consisting of 24 rows and 79 columns was superimposed on the study area (fig. 36). The grid divides the area into 1,896 separate cells for which data is entered and water levels simulated for the node at the center of the cell. The nodal locations are referenced by the row and column numbers of the grid. The data specified at a given node are the average values of these characteristics for the entire cell. The grid is aligned with one axis parallel to the principal down-valley component of ground-water flow. The grid spacing is varied throughout the valley to provide higher resolution for simulated drawdowns in areas near existing pumping centers. The grid spacing near pumping centers is 500 feet in both downstream and cross-valley directions. In other areas the grid spacing is 1,000 feet in the downstream direction and 500 feet in the cross-valley direction.

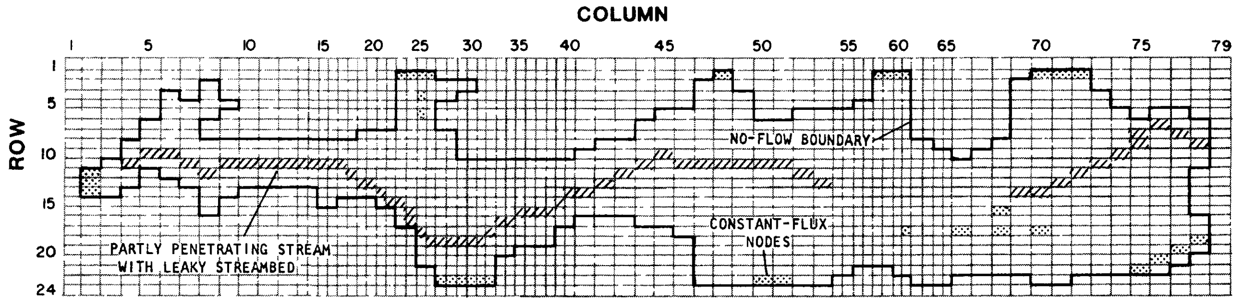


Figure 36.--Finite-difference grid and hydrologic boundaries used in the valley-fill model.

Aquifer properties

The valley-fill aquifer along the Rio San Jose consists of alluvium and a basalt flow that is buried throughout most of the area and crops out near New Laguna. For modeling purposes, all of the valley-fill material is grouped together as a vertically homogeneous unit. Water levels measured during drilling indicate that in most areas a good hydraulic connection exists between alluvium above and below the basalt flow.

The hydraulic conductivity of an aquifer is the volume of water at the existing kinematic viscosity that will move in a unit time under a unit hydraulic gradient through a unit area measured at right angles to the direction of flow (Lohman and others, 1972, p. 4). Initial estimates of hydraulic conductivity used in the model were determined by aquifer tests (table 4). A map of the distribution of hydraulic conductivity values decided on after model adjustment is shown in figure 37.

The hydraulic conductivity values used in the model vary considerably. At the eastern end of the modeled area near New Laguna, hydraulic conductivity was assigned a value of 10 feet per day. This small value reflects the large amount of fine-grained silt and clay deposited by lakes that occupied this part of the valley at various times during the Quaternary. The abrupt change in hydraulic conductivity assigned at the mouth of Encinal

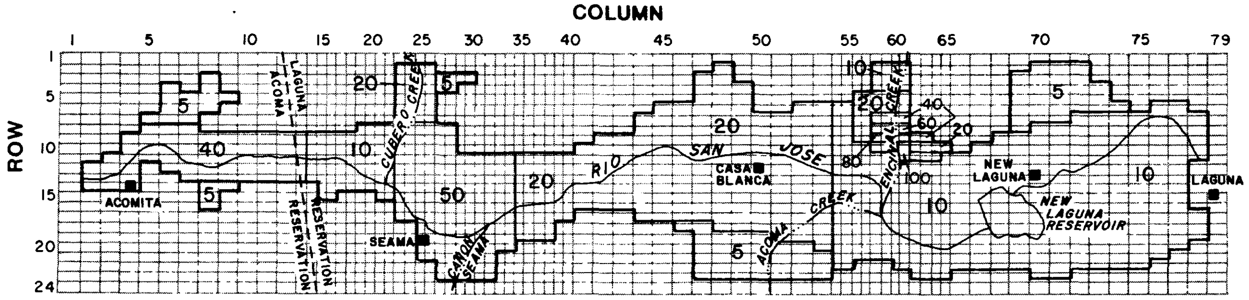


Figure 37.--Hydraulic-conductivity distribution used in the valley-fill model, in feet per day.

Creek may represent the deposition of course-grained valley-fill deposits by Encinal Creek. The variation in hydraulic conductivity from Acomita to Seama in the western part of the modeled area was needed to minimize the error between measured and simulated water levels and streamflow. The physical characteristics of the valley fill observable at this location do not clearly show why this abrupt zonation of hydraulic conductivity should be necessary. However, several single-well aquifer tests conducted in this area (fig. 10) indicate that the zonation used in the model is reasonable.

The specific yield of the valley-fill aquifer was estimated from examination of well cuttings and geophysical logs. Because the fill is composed of clay, sand, gravel, and basalt, an average specific yield of 0.15 was used for the entire valley. Specific yield was estimated using average values for various geologic materials given in Johnson (1967). Locally, the specific yield will vary greatly with clay and basalt layers as low as 0.01 and sand lenses as great as 0.32 (Johnson, 1967 p. 70), but 0.15 is probably reasonable for an average value. Aquifer-test data were not used to estimate specific yield because of the short duration of most tests.

ILLUSTRATIONS - Concluded

The wood engravings of Laguna on pages ix, 20, and 85 are from Harper's, February 1891.

PLATES

[Plates are in pocket]

TABLES

Model boundaries and recharge

The boundary conditions of the model define the physical geometry and hydraulic flux of the ground-water flow system. Boundary conditions used in the model are shown in figure 36 and are described in the following paragraphs.

The Rio San Jose valley in the modeled area is incised into shales and sandstones of Jurassic age, which form a relatively impermeable barrier to ground-water flow. Therefore, the altitude of the base of the valley fill was used as the lower boundary of the model across which no flow is assummed to take place (fig. 10). The lateral model boundaries are located where the alluvium butts against the bedrock valley walls. This boundary, across which no flow is assummed to take place is shown in figure 36. In reality, ground water does flow from Jurassic bedrock units into the alluvium, but most of this recharge probably takes place west of the modeled area and is included in the ground-water flow in the alluvium entering the modeled area from the west.

Constant-flux nodes were used in simulating steady-state conditions at points of major ground-water flow entering or leaving the model. Estimates of flow initially were made by flow-net analyses and were varied within plausible limits during model adjustment. Initial estimates of recharge from tributaries were made using streamflow measurements (tables 9 and 12) and indirect estimates of annual average stormflow calculated from the physical characteristics of each watershed (table 15).

The Rio San Jose gains and loses water throughout the reach being modeled and is simulated as a partially penetrating, leaky stream except in a 2-mile stretch upstream from New Laguna Reservoir. An initial estimate of the vertical hydraulic conductivity of 0.086 foot per day for the confining bed beneath the stream was determined by analyzing seepage losses outside of the modeled area between gaging stations on the Rio San Jose near Laguna and at Correo. If this value of vertical hydraulic conductivity were present on the 13-mile reach of the Rio San Jose west of New Laguna Reservoir, the valley-fill aquifer could be recharged by 3,000 acre-feet during the non-growing season. In the model, the vertical hydraulic conductivity of the confining bed was adjusted to represent the ratio of streambed area in a cell to total area of the cell. Leakage from the stream as simulated in the model will increase until the hydraulic head in the aquifer falls 10 feet below the altitude of the streambed. The leakage is then limited to a maximum value of 0.56 cubic foot per second per mile.

In the 2-mile reach upstream from and including New Laguna Reservoir, the Rio San Jose was simulated by a constant flux from the stream to ground water in the valley fill. In this area, ground-water levels in wells about 1/2 mile from the stream are 20 to 40 feet below the altitude of the streambed. Ground-water levels adjacent to the stream and reservoir probably are also below the streambed throughout much of the year. Certainly this is true during summer months when upstream irrigation withdrawals cause this reach of the stream and the reservoir to be dry.

Water is lost through evaporation and transpiration where the water table is at or near the land surface. Evapotranspiration takes place from the water surface in the stream and through phreatophytes, which are abundant near the channel of the Rio San Jose. A variable-head flux boundary was used to estimate evapotranspiration. The maximum evapotranspiration rate for water at the land surface was set equal to 55 inches per year, which is the mean evaporation rate for shallow reservoirs in the area (Hale and others, 1965). Annual consumptive use of water by salt cedar calculated for Las Vegas, New Mexico, which has climatic conditions similar to Laguna, is 51.6 inches (Blaney and Hanson, 1965, p. 47). The evapotranspiration rate is extrapolated linearly from land surface to a depth of 10 feet below land surface where evapotranspiration was assumed to be negligible.

Model adjustments

For the model to be used with confidence in predicting aquifer response to future stresses, a set of measured aquifer properties must be compared to model simulations of the same conditions. In the part of the valley chosen for modeling, significant water-level declines caused by pumping did not take place prior to 1976 (fig. 22) even though a small amount of pumping was taking place in the valley. Estimated total ground-water withdrawals for public supply in the New York-Seama area was about 75 gallons per minute in 1975. Prior to 1976, water levels in the valley probably represent a nearly steady-state condition. Because the flow system prior to 1976 was assumed to be in a steady-state condition, the simulated aquifer characteristics were adjusted by comparing the measured pre-1976 potentiometric surface in the aquifer with simulated steady-state water levels.

Adjustment of the model involved varying the values specified for certain hydrologic characteristics to achieve a "best fit" between measured and simulated steady-state water levels. The best fit was achieved by minimizing the square of the deviations between observed and simulated water levels. The adjustment process was subjective because values of most aquifer characteristics were known only within large bounds. Steady-state simulations are independent of the specific yield of the aquifer, thus for transient simulations the initial estimate of specific yield was used without any adjustment. Adjustments of both vertical and horizontal hydraulic conductivity and recharge rates were made within estimated plausible limits to match the measured water levels. The degree to which each characteristic was adjusted depended upon the uncertainty in the data base. The steady-state solution determined after numerous adjustments of the hydrologic characteristic is not a unique solution but simply a solution that matches, within acceptable error, the water-level criteria chosen for adjustment of the model.

For the initial simulation, the average error calculated as the square root of the minimum sum of deviations squared divided by the number of nodes with measured water levels was about 8 feet. However, the absolute error at individual nodes exceeded 20 feet. To achieve a better fit, horizontal hydraulic conductivity at the mouths of Cubero and Encinal Creeks was increased by about 30 percent. Estimated recharge from Cubero and Encinal Creeks was increased by about 30 percent, and inflow from upstream throughflow was raised from 0.3 to 0.9 cubic foot per second to account for inflow from bedrock aquifers west of the modeled area.

After adjusting the horizontal hydraulic conductivity of the aquifer and recharge rates, a reasonably good fit between measured and simulated steady-state water levels was achieved (figure 38). Because the land-surface altitudes at wells were determined from topographic maps having contour intervals of 20 feet, differences between measured and simulated water-levels of 10 feet were considered satisfactory. The average least squares error between measured and simulated water levels at 26 wells was 5.6 feet.

The simulated steady-state recharge and discharge for the valley-fill aquifer is shown in the following table.

Ground-water recharge		Ground-water discharge	
Recharge from	Rate, in cubic feet per second	Discharge to	Rate in cubic feet per second
Cubero Creek	0.42	Rio San Jose	0.25
Encinal Creek	0.08	Flow from area	
Cañon Seama	0.04	to east	0.07
Acoma Creek	0.15	Evapotranspiration	3.10
Rio San Jose	1.78		
Misc. small trib.	0.05		
Flow into aquifer	0.90		
Total	3.42	Total	3.42

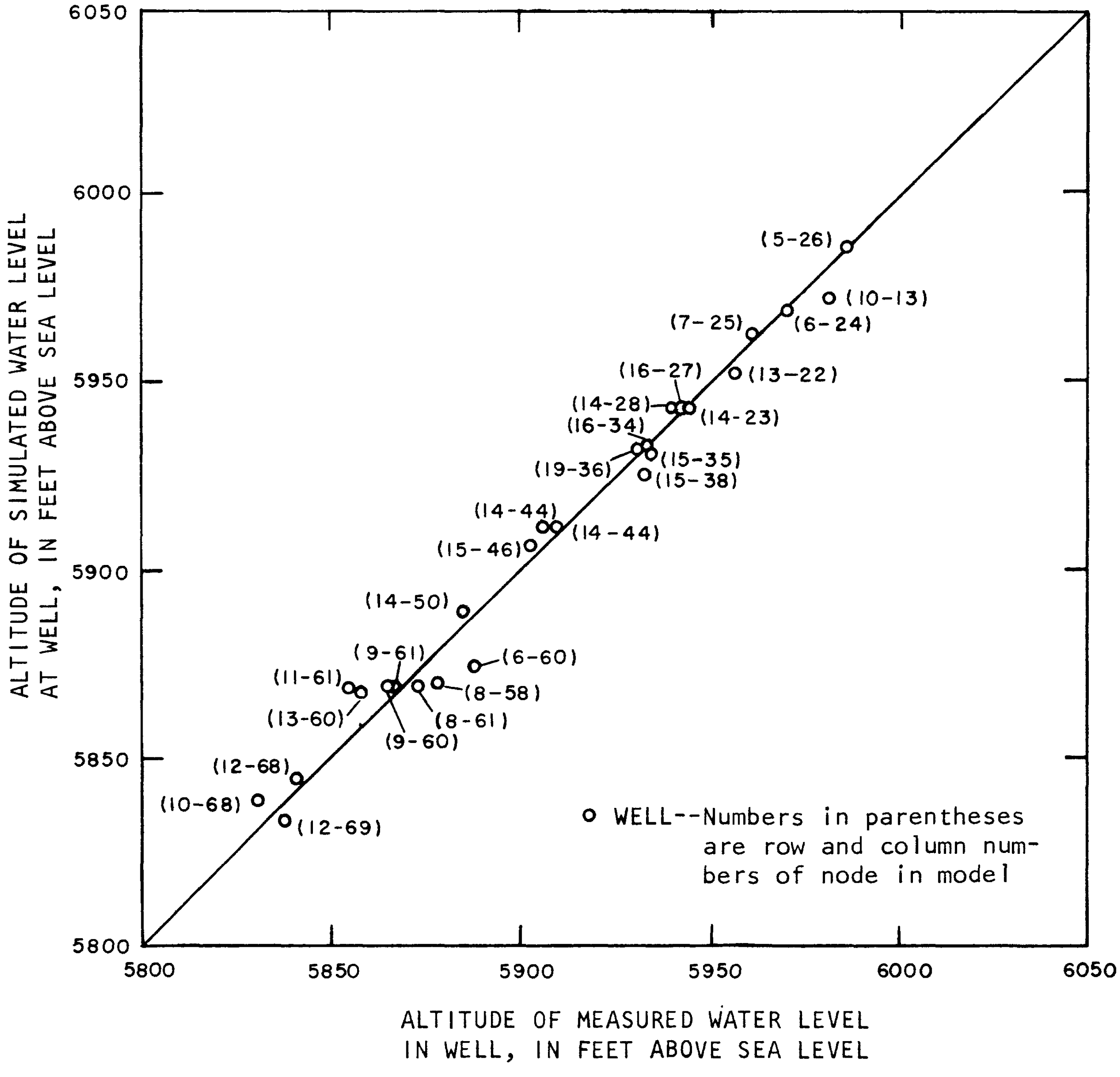


Figure 38.--Comparison of simulated and measured steady-state water levels.

Estimates of aquifer response to future ground-water withdrawals

The objective of the modeling study was to a simulate aquifer response to alternative methods of ground-water development in the valley-fill aquifer. The simulations represent withdrawals that, in many cases, would require pumping from several production wells at a node. Predicted drawdowns represent the average drawdown at a node rather than drawdown in a specific pumping well. The predictions must be viewed as estimates of aquifer response because the predictive capabilities of the model have not been evaluated by comparing modeled and measured aquifer response to stress over time. An idea of the possible error inherent in the predictions may be obtained from the sensitivity analysis; however, a detailed error analysis has not been made for each simulation. If an accurate record of ground-water withdrawals in the valley is kept in the future, the model could be further adjusted to become a better predictive tool.

Ground-water withdrawals for public supply

The existing public-supply well field in the New York-Seama area has three wells: 10.7.36.221 (New York 1), 10.7.36.212 (New York 2), and 10.6.31.434 (Seama P.S.). Pumpage from the three wells varies during the year; however, the 1980 average rate of withdrawal was about 280 gallons per minute. Aquifer response to 10 years of pumping at 280 and 560 gallons per minute at nodes 7-25 (row 7, column 25), 8-24, and 15-35 was simulated. The simulation represents year-round withdrawals of ground- water averaged over the cell area. The drawdowns predicted also are average values for the node, calculated as if the water were pumped at 100-percent efficiency over the entire cell area. Ground-water declines in the pumping nodes after 10 years of pumping at 280 and 560 gallons per minute were as much as 12 and 32 feet, respectively.

After 10 years of withdrawals, the hydrologic system nearly establishes a new equilibrium and little of the pumpage is derived from storage. Most of the withdrawals are derived from a reduction in the streamflow of the Rio San Jose and a decrease in loss of water to evapotranspiration. After 10 years of pumping at 280 and 560 gallons per minute, 50 and 48 percent of the pumpage are derived from a reduction in flow in the Rio San Jose. The remainder of the water withdrawn is derived from a reduction in the amount of water evapotranspired near the Rio San Jose due to the lowered water table.

Ground-water withdrawals for public supply and irrigation

Seasonal ground-water withdrawal for irrigation at nodes 13-28 and 9-61 was simulated in addition to the continuous pumping in the New York-Seama area for public supply at nodes 7-25, 8-24, and 15-35. Nodes 13-28 and 9-61 are located in the area of existing Laguna irrigation wells 10.7.36.424a and 10.6.35.342a. The pumping for irrigation was assummed to take place only from May through September. At nodes 13-28 and 9-61, ground water was withdrawn at a rate of 200 gallons per minute for a 153-day pumping period followed by a 212-day recovery period each year. The simulated public-supply pumpage was set at the approximate present-day rate of 280 gallons per minute from nodes 7-25, 8-24, and 15-35. The predicted water-level declines were about 7 feet at node 13-28 and 14 feet at node 9-61 after the 10th pumping period. To predict aquifer response to more intensive ground-water development in the area, the simulated pumping rate at each node was doubled, resulting in a pumping rate of 400 gallons per minute for irrigation at nodes 13-28 and 9-61 and 560 gallons per minute for public supply at nodes 7-25, 8-24 and 15-35. At these pumping rates, the predicted water-level declines were about 18 feet at node 13-28 and 37 feet at node 9-61 after the 10th pumping period.

The seasonal irrigation pumping increased the simulated drawdown at the nodes representing public-supply wells. Irrigation pumping at 200 gallons per minute at nodes 13-28 and 9-61 caused an additional drawdown of as much as 3 feet at nodes 7-25, 8-24, and 15-35 when their combined pumping rate was 280 gallons per minute. For irrigation withdrawals of 400 gallons per minute at nodes 13-28 and 9-61, drawdowns were increased in the New York-Seama area by as much as 14 feet after 10 years of pumping.

During each nonirrigation period, water levels recovered. For simulations at 200 gallons per minute, water levels nearly recovered to the levels that would have existed had irrigation pumpage not taken place. The recovery of water levels during the winter nonirrigation months was due in part to recharge of the aquifer from surface water in the Rio San Jose. In the simulation, winter flows of the Rio San Jose (which are not presently being used) were stored in the aquifer for use during the following irrigation season. During the 10th nonirrigation season, for example, recharge to ground-water storage was 269 and 370 acre-feet for simulations of irrigation pumping of 270 and 540 acre-feet (withdrawals from two nodes at 200 and 400 gallons per minute for 153 days). Much of this recharge was derived from the Rio San Jose.

Ground-water withdrawals for irrigation

A simulation based solely on intensive ground-water withdrawals for irrigation was examined because: (1) Intensive ground-water withdrawals for irrigation may cause unacceptable water-level declines in public-supply wells completed in the valley-fill aquifer; and (2) surface- and ground-water supplies of suitable quality for public supply exist in several areas of the pueblo away from the modeled area. The response of the valley-fill aquifer to 10 years of seasonal withdrawals of ground water for irrigation was simulated based on total pumping rates of 1,400 and 2,600 gallons per minute. Pumping rates at specific nodes are shown in the following table.

Total simulated pumping rate, in gallons per minute		Pumping rate, in gallons per minute at specific node					
		9-69	14-63	15-49	10-57	13-36	13-53
Pumping rate	1,400	200	200	200	200	300	300
Pumping rate	2,600	200	400	400	400	600	600

Withdrawals of 1,400 gallons per minute resulted in predicted drawdowns of as much as 20 feet near pumping centers at the end of 10 years. However, after the 10th recovery period, water levels rose to within about 5 feet of initial pre-pumping levels. During the recovery period, ground-water storage was recharged by 700 acre-feet, about 73 percent of the amount of water withdrawn in the previous pumping period.

Increasing withdrawals to 2,600 gallons per minute resulted in predicted drawdowns of more than 30 feet near pumping centers after 10 years. Water levels rose to within about 10 feet of prepumping levels after the 10th recovery period. Ground-water storage was replenished by 1,000 acre-feet during the 10th recovery period, which was 58 percent of the amount of water withdrawn during the previous pumping period.

Pumping at high rates lowers the water table and may reduce the amount of water lost to evapotranspiration. The model simulation at 1,400 gallons per minute indicated that about 540 acre-feet of water per year was salvaged in this manner. For the 2,600 gallons-per-minute simulation, an even greater salvage, about 900 acre-feet, was predicted. Estimates of water salvaged by lowering the effective loss to evapotranspiration are, at best, only educated guesses. In practice, most attempts to actually salvage the predicted quantities of water have been unsuccessful.

Sensitivity analysis

Model predictions will be in error if the hydrologic properties that were entered to the model were estimated incorrectly. To test the sensitivity of the steady-state model to variations in horizontal hydraulic conductivity, specific yield, and stream leakage, several simulations were performed, changing only one property in each simulation.

The sensitivity of the model to changes in hydraulic conductivity, specific yield, and stream leakage was evaluated based on 5 years of ground-water withdrawals at nodes 9-61, 8-24, and 12-45 (fig. 39). The three pumping centers were chosen to evaluate model sensitivity in areas of probable ground-water development and at various distances from hydrologic boundaries. Node 9-61 is located at the mouth of Encinal Canyon, where ground water is presently being withdrawn for irrigation; node 8-24 is located in the New York well field; and node 12-45 is located near the Rio San Jose south of Casa Blanca.

The sensitivity analyses were conducted over the range of plausible values for hydraulic conductivity (+100 to -50 percent of the best-fit values), vertical hydraulic conductivity of the streambed (+100 to -50 percent), and specific yield (+33 to -33 percent). The modeled aquifer response is most sensitive to changes in hydraulic conductivity. A 50-percent decrease in the estimate of hydraulic conductivity caused a 96-percent increase in simulated drawdown at node 9-61 after 5 years. A comparable 50-percent decrease in streambed leakage resulted in an increase of 45 percent at node 12-45; a 33-percent decrease in specific yield resulted in an increase of 13 percent at node 9-61.

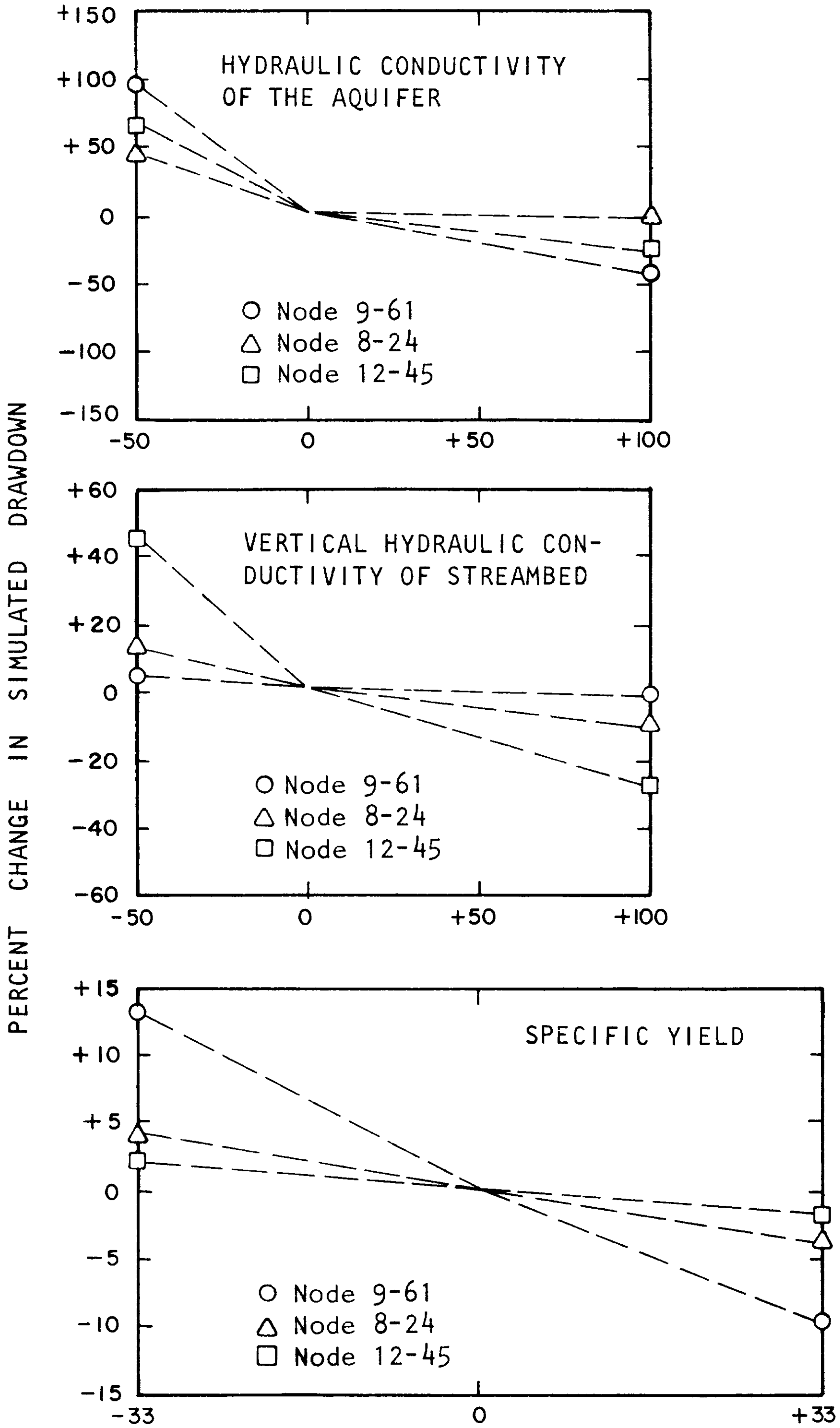


Figure 39.--Sensitivity of simulated drawdowns to changes in hydraulic conductivity, vertical hydraulic conductivity of the streambed, and specific yield after 5 years of groundwater withdrawals at nodes 9-61, 8-24, and 12-45.

For a node, the degree of sensitivity of simulated drawdown to changes in hydrologic properties is dependent on the location of that node in the modeled area. Changes in hydraulic conductivity of the aquifer affected predicted drawdowns at node 9-61 the greatest amount. Of the three nodes, this node is farthest away from the stream. Node 12-45, closest to the Rio San Jose, was most affected by changes in the vertical hydraulic conductivity of the streambed, whereas node 9-61 was relatively insensitive. The opposite effect was observed when the specific yield was varied; the most sensitive node (9-61) was farthest away from the stream, and the least sensitive node (12-45) was closest.

Estimates of the amount of water salvaged when the water table is lowered (and evapotranspiration rates decreased) also are sensitive to changes in hydrologic parameters. The estimated salvage resulting from pumping for 5 years at nodes 9-61, 8-24, and 12-45 was about 200 acre-feet per year using the best fit hydrologic parameters. Lowering the specific-yield value used in the simulation by 33 percent resulted in a 38-percent increase in the estimated quantity of water salvaged. A 50-percent decrease in the value for the hydraulic conductivity of the streambed resulted in a 73-percent increase in the amount of water salvaged, and doubling the value of the hydraulic conductivity of the aquifer caused a 63-percent decrease in the estimated salvage.

SUMMARY AND CONCLUSIONS

The purpose of this study was to better define the hydrology of the Pueblo of Laguna; major emphasis was placed on quantifying potential water resources available for irrigation and public supply. Areas of potential ground- and surface-water development are shown on plate 1 and summarized in the following sections.

Possible ground-water development

Public supply

New York-Seama area.--The alluvium and basalt that fill the valley along the Rio San Jose yield 50 to 450 gallons per minute of water to wells. Aquifer tests indicate that the transmissivity of the valley fill ranges from 290 to 17,000 feet squared per day (table 4). Although the alluvium yields adequate quantities of water throughout the valley, water quality is acceptable for public supply only where Cubero and Encinal Creeks recharge the alluvium.

Ground water in the alluvium in the New York-Seama area presently is the major source of public-supply water for valley residents (plate 1). The alluvium in this area yields ground water containing 500 to 1,200 milligrams per liter of dissolved solids. Perennial, spring-fed streamflow of Cubero

Creek, which averages 0.30 cubic foot per second, recharges the alluvium with water of excellent quality. Modeling indicates that total recharge from Cubero Creek, which includes seepage from ungaged stormflows, is about 0.42 cubic foot per second. Modeling also indicates that present withdrawals in this area could be increased to about 560 gallons per minute if several wells were used. At this rate, drawdowns of more than 32 and 12 feet are predicted in the New York and Seama areas, respectively. However, pumping will draw water from outside of the zone of good-quality water created by recharge from Cubero Creek. The result will be a degradation of the water quality.

New Laguna area--Ground water for public supply can be obtained from the alluvium at the mouth of Encinal Canyon (plate 1). The alluvium at this location is recharged at a rate of about 0.08 cubic foot per second by stormflows of good-quality water in Encinal Creek. The alluvium yields water containing 500 to 1,200 milligrams per liter dissolved solids. However, the water quality may be expected to deteriorate if ground water is pumped from the area.

Encinal area.--Ground water for public supply can be obtained from the Dakota Sandstone near Encinal (plate 1). Wells yield about 20 to 50 gallons per minute of water containing 800 to 1,200 milligrams per liter of dissolved solids. This water could be mixed with better quality water such as that from Encinal Springs. An additional 70 to 85 gallons per minute of water containing less than 200 milligrams per liter of dissolved solids is available from springs.

Paguate area.--Ground water of excellent quality is presently obtained for public supply from the alluvium along Paguate Creek near the village of Paguate (plate 1). Additional development is possible in this area. The alluvium will sustain individual well yields of as much as 50 gallons per minute of water containing 300 to 500 milligrams per liter of dissolved solids. The alluvium is recharged by seepage of about 300 gallons per minute of water from the Rio Paguate on pueblo lands upstream from State Highway 279. Presently, the majority of this water probably is lost to evapotranspiration. Additional ground-water withdrawals of as much as 250 gallons per minute might salvage some of this water loss.

Another possible source of ground water in the Paguate area is from sandstones of the Morrison Formation. Although yields of these individual sandstones are not high, wells completed in several of the units will produce 5 to 50 gallons per minute of water containing 500 to 1,500 milligrams per liter of dissolved solids.

Caprock-Sand dune area.--An 18-square mile area south of the village of Laguna was previously believed to be an area of possible ground-water development for public supply. Two test wells drilled in Jurassic sandstones in this area produce potable water but yield, in general, less than 5 gallons per minute.

Tributary valleys on flanks of Mount Taylor.--Test drilling for ground water in the alluvium in Seco, Castillo, and Encinal Canyons indicated that the saturated thickness of the alluvium was insufficient to yield water for public supply.

Santa Fe Group on Sedillo Grant.--The unconsolidated deposits of the Santa Fe Group probably yield 20 to 100 gallons per minute of water to wells penetrating a graben structure near Cañon de los Apaches (plate 1). The water contains 300 to 1,500 milligrams per liter dissolved solids. This area probably contains the best quality ground water available on the Sedillo Grant.

Major's Ranch area.--Obtaining ground water for public supply may be possible from sandstone units in the Brushy Basin Member and Westwater Canyon Member of the Morrison Formation on the western part of the Major's Ranch area (plate 1). Although no wells were drilled or inventoried in this area, yields and water quality from nearby uranium mines indicate that these sandstones may yield several hundred gallons of water per minute containing 1,000 to 2,000 milligrams per liter of dissolved solids.

Irrigation

Ground-water development for irrigation is severely limited by the low yields or inadequate quality of water in the geologic units beneath the pueblo.

Valley fill along the Rio San Jose--Probably the only shallow aquifer on the pueblo capable of supplying large amounts of water to irrigation wells is the valley-fill aquifer along the Rio San Jose. Water-quality deterioration east of the village of Laguna restricts ground-water development to a section of the valley from the western pueblo boundary to New Laguna Reservoir (plate 1). Most ground water in the valley fill presents salinity and sodium hazards to various degrees. Irrigation water could be used with careful management practices to avoid salt buildup or hardpan conditions caused by sodium dispersal of clays.

Yields from the valley fill are extremely variable due to the heterogeneous composition of the fill. Aquifer tests indicate that transmissivities range from 290 to 17,000 feet squared per day and specific capacities from 0.04 to 33.9 gallons per minute per foot of drawdown. Most wells properly completed throughout the entire thickness of the aquifer probably will produce 50 to 450 gallons per minute.

Ground water withdrawals for irrigation water were simulated by a digital model of the valley-fill aquifer. Water-level declines of more than 30 feet were estimated for ground-water withdrawals of 2,600 gallons per minute in the valley west of Laguna. The model included the influences of recharge from the Rio San Jose and boundary conditions of the valley walls on drawdowns. The model illustrated that ground water in storage may be used during irrigation seasons and replenished during nonirrigation periods. If the water table is lowered, the aquifer becomes a reservoir for storage of previously unused winter flows of the Rio San Jose. After withdrawals during the previous irrigation period, the potential for recharge to storage during the nonirrigation season was estimated by model simulation to be as much as about 1,000 acre-feet. The model also indicated that ground water previously lost through evapotranspiration may be salvaged in amounts as much as 900 acre-feet per year.

Major's Ranch area.--Ground water from the Westwater Canyon Member of the Morrison Formation might be available in sufficient quantity on the Major's Ranch area to supply irrigation wells. Although no wells were drilled or tested in the area for this study, dewatering of nearby uranium mines indicates that the Westwater Canyon Member might yield several hundred gallons per minute of water containing 1,000 to 2,000 milligrams per liter of dissolved solids. This water probably will contain moderate to high sodium and salt hazards, but with careful management practices it may be acceptable for use.

Stock water

Water suitable for livestock may be obtained from various aquifers beneath all parts of the pueblo. Water-quality criteria for livestock are listed in table 17 and may be compared to water-quality analyses for selected wells in this report (tables 5-8).

Possible surface-water development

Rio San Jose.--Possible additional development of surface water for irrigation may be obtained by storing winter flows of the Rio San Jose for later use. Summer flow in the stream presently is fully utilized. After filling Acomita Lake, winter flows in the Rio San Jose totaling about 2,400 acre-feet flow unused through the pueblo. A part of this flow will be stored in Seama Reservoir, which presently is under construction on the Pueblo of Laguna. The maximum storage capacity of Seama Reservoir will be about 480 acre-feet.

Another method of salvaging unused winter streamflow that has been proposed previously (Dinwiddie and Motts, 1964) is to use ground-water storage. Lowering ground-water levels by pumping during the irrigation season will cause the Rio San Jose to recharge the valley-fill aquifer during the nonirrigation season. The maximum leakage rate of the Rio San Jose was estimated based upon gaging-station records near Laguna and at Correo. The maximum stream loss for an average flow of 7 cubic feet per second is 0.56 cubic foot per second per mile. Digital-model simulations of irrigation pumping based on this leakage rate predict possible recharge volumes of as much as 1,000 acre-feet after water levels in the aquifer were lowered by pumping. Irrigation with water from the Rio San Jose needs to be used with careful management practices due to the high dissolved-solids concentrations and moderate sodium hazards.

Encinal Creek.--The perennial flow in the headwaters of Encinal Creek is sustained by springs that have a combined flow of about 100 gallons per minute. About 15 to 30 gallons per minute is used for the public supply of the village of Encinal and the remainder is used for irrigation or lost to seepage in the alluvium along the stream. An additional supply of 70 to 85 gallons per minute of excellent-quality water containing less than 200 milligrams per liter of dissolved solids (suitable for public supply) is available from springs in Encinal Canyon.

Rio Paguate.--The average streamflow entering the Pueblo of Laguna in the Rio Paguate is about 1 cubic foot per second. The streamflow presently is used for irrigation during summer months, although the quality is acceptable for public supply. Winter flows of as much as 100 acre-feet are stored in two small reservoirs northwest of Paguate. Additional reservoir capacity could store as much as 300 acre-feet of winter streamflows that are presently unused.

The streamflow also could be used indirectly by increasing ground-water withdrawals in the alluvium along the stream. Presently, about 250 gallons per minute of streamflow that seeps into the alluvium is lost through evapotranspiration. Increased pumpage would lower ground-water levels and salvage some of this loss while drying up the marshy surface.

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Table 1.--Records of wells.

EXPLANATION:

Location number: See text for explanation.

Latitude-Longitude: Determined from U.S. Geological Survey 7 1/2- and 15-minute topographic quadrangle maps.

Depth: Depths followed by M were measured; all others were reported. An asterisk (*) following the depth indicates a driller's log is available for the well.

Altitude: Altitude of land surface at the well, in feet above sea level, determined from U.S. Geological Survey 7 1/2- and 15-minute topographic quadrangle maps.

Water level: Water levels followed by R were reported; all others were measured.

Principal water-bearing unit: Qal, alluvium; Qb, Quaternary basalt; QTb, Older basalt; QTs, Santa Fe Group; Kmv, Mesaverde Group; Km, Mancos Shale; Kd, Dakota Sandstone, Jm, Morrison Formation; Jb, Bluff Sandstone; Jt, Todilto Formation; Js, Summerville Formation; Je, Entrada Sandstone; ₹c, Chinle Formation; Psa, San Andres Limestone; Glorieta Sandstone

Specific conductance: Specific conductances followed by an asterisk (*) were measured in a laboratory and chemical analyses are available. All other specific conductances were measured onsite; those followed by T were measured in a storage tank or trough. An asterisk alone indicates a chemical analysis is available, but specific conductance was not measured.

Use: D, domestic, Ind, industrial; I, irrigation; N, none; O, observation; P, public supply; S, stock.

Remarks: Yield data is given in gallons per minute (gal/min). The method of determining yield has been specified if known.

Location number and local name or number if known	Latitude and longitude	Owner	Year completed	Depth (feet)	Altitude (feet)	Water level: Depth to water (feet)	Water level: Date	Water level: Altitude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Date	Use	Remarks
6.7.18.113 Wilson	34°45'07" 107°37'23"	Pueblo of Laguna	-	115M	7,248	26.4	8-14-73	7,222	Km	6,100	09-07-73	S	-
										5,070*	07-09-63		-
6.7.32.434 Ward	34°41'52" 107°35'37"	do.	1938	125	7,105	138.2	8-14-75	6,967	Qal, Kd(?)	1,100T	05-04-73	S	-
6.7.34.341 Blue Water	34°41'54" 107°33'58"	do.	1965	155*	7,060	106.6	8-14-73	6,953	Qal, Kd(?)	630*	11-02-73	S	Pumped at 6 gal/min in 1965.
7.1.31.124	34°47'44" 107°59'06"	Huning	-	97	5,048	74.1	2-10-56	4,974	QTs	8,540*	04-26-56	S	Reported yield gal/min. Data from Titus (1963).

Table 1.--Records of wells - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Year completed	Depth (feet)	Altitude (feet)	Water level: Depth to water (feet)	Water level: Date	Water level: Altitude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Date	Use	Remarks
7.2.10.444 RWP 5	34°50'28" 107°01°43"	Pueblo of Laguna	1944	272*	5,211	212.4	1-17-57	4,999	Kmv	9,430T*	6-5-75	S	Bailed at 14 gal/min in 1944. Water level from Titus (1963).
7.2.29.214 RWP 6	34°48'31" 107°04'03"	do	1956	215M	5,220	150.0	8-16-73	5,070	QTs	4,660*	6-11-73	S	-
7.2.34.341	34°47'10" 107°02'19"	New Mexico and Arizona Land Co.	-	137	5,173	122.6	2-10-56	5,050	QTs	-	-	S	Data from Titus (1963).
7.4.6.342 Homestead	34°51'32" 107°17'58"	Harrington	-	60	5,738	37.4	11-2-73	5,701	Qal, QTb	500	11-2-73	S	Cleaned and as received 10-73.
7.5.6.221 Romero	34°52'10" 107°23'56"	-	-	-	5,757	-	-	-	Qal	1,800	8-31-73	S	-
7.5.6.221a	34°52'11" 107°28'55"	-	-	61M	5,757	55.4	8-31-73	5,702	Qal	-	-	N	-
7.6.10.434 Marmon	34°50'34" 107°27'07"	H. Marmon	-	91M	5,852	71.4	10-5-73	5,781	Qal	1,400T	10-5-73	S, D	-
7.6.10.434a Marmon	34°50'33" 107°27'07"	do.	-	78M	5,854	73.4	10-5-73	5,781	Qal	1,600T	10-5-73	S	-
7.6.18.424 Sarracino	34°49'53" 107°30'03"	Sarracino	-	58M	5,940	46.2	10-5-73	5,894	Qal	1,200	10-5-73	S, D	-

Table 1.—Records of wells - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Year completed	Depth (feet)	Altitude (feet)	Water level: Depth to water (feet)	Water level: Date	Water level: Altitude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Date	Use	Remarks
7.6.19.222 Rivera	34°49'38" 107°30'08"	Rivera	-	86	5,946	-	-	-	Qal	1,200T	10-5-73	S, D	-
7.6.20.314 Rivera	34°49'02" 107°29'54"	do.	-	77M	5,959	52.2	10-5-73	5,907	Qal	1,000	10-5-73	S	-
7.6.22.331 Alberts Homestead	34°48'59" 107"27'53"	H. Marmon	-	103M	5,822	86.3	10-5-73	5,736	Qal,QTb(?)	3,000	10-5-73	S	-
7.6.30.222 Daily	34°48'43" 107°30'07"	Daily	-	68M	5,968	58.0	10-5-73	5,910	Qal	1,350	10-5-73	S	-
8.2.1.333 RWP 3	34°56'32" 107°00'33"	Pueblo of Laguna	1967	170*	5,184	134.5	6-29-73	5,049	Kmv	5,430*	6-5-75	S	-
8.3.6.224 RWP 37	34°57'15" 107°11'12"	do.	1974	145*	5,515	109.2	1-17-75	5,406	Qb,Qal	6,000	2-10-75	S	-
8.3.8.222 Marys	34°56'29" 107°10'08"	Harrington	-	108M	5,496	97.7	4-3-74	5,398	Qal,Qb	-	-	N	-
8.3.10.313	34°55'58" 107°08°58	do.	1953	-	5,470	80.0	6-4-57	5,390	Qal,Qb	-	-	S	Data from Titus (1963).
8.3.11.232 CCC 1	34°56'14" 107°07'12"	Pueblo of Laguna	-	79M	5,418	63.7	8-16-73	5,354	Qal,Qb	3,940*	4-21-75	D, S	-
8.3.15.413	34°55'03" 107°08'27"	United Brokers	-	1,250	5,550	Flowing	4-3-74	-	Psa(?)	15,800* 15,800*	11-29-63 5-28-75	N	Well drilled by AT&SF Railroad.

Table 1.--Records of wells - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Year completed	Depth (feet)	Altitude (feet)	Water level: Depth to water (feet)	Water level: Date	Water level: Altitude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Date	Use	Remarks
8.3.19.343 Millet	34°53'58" 107°11'50"	Harrington	1957	-	5,595	43.2	6-4-57	5,552	Qal,Qb	-	-	S	Data from Titus (1963).
8.3.20.211 McGaughys	34°54'46" 107°10'32"	do.	-	-	5,534	-	-	-	Qal,Qb	4,500*	2-8-57	S	do.
8.4.15.123 ECW 10	34°55'30" 107°14'57"	Pueblo of Laguna	1934	231*	5,616	127.7	12-18-74	5,488	Qb, TRc	3,470*	10-29-73	S	Yield 1 gal/min in 1969 when well reconditioned.
8.4.22.344 ECW 9	34°54'05" 107°14'52"	do.	1935	123*	5,656	92.9	6-25-73	5,563	Qal,Qb	3,500	6-25-73	S	Bailed at 10 gal/min in 1935.
8.4.29.444 Kose Sheep Camp	34°53'11" 107°16'22"	-	-	287M	5,693	70.6	6-25-73	5,622	Qal,Qb	-	-	N	Abandoned stock well.
8.5.12.311 RWP 21	34°56'05" 107°19'28"	Pueblo of Laguna	1964	145*	5,685	34.5	8-17-73	5,650	TRc	3,290*	11-16-73	S	Yield 12 gal/min in 1964.
8.5.17.213	34°55'31" 107°23'06"	do.	1923	853*	5,838	Flowing	7-19-75	-	TRc	65,000*	6-12-75	N	Flow less than 1/2 gal/min 7-19-74. Well filled with debris. Drilled by AT&SF RR.

Table 1.--Records of wells - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Year completed	Depth (feet)	Altitude (feet)	Water level: Depth to water (feet)	Water level: Date	Water level: Altitude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Date	Use	Remarks
8.5.22.234 RWP 23	34°54'28" 107°20'51"	Pueblo of Laguna	1964	290*	5,697	-	-	-	₸c	-	-	N	Yield about 3 gal/min in 1964. Well plugged and abandoned because of bad water.
8.5.34.431 ECW 11	34°52'20" 107°21'02"	do.	1935	93*	5,688	61.8	8-17-73	5,626	Qal	2,400T	6-8-73	S	Bailed at 6 gal/min in 1935.
8.5.36.423 ECW 8	34°52'28" 107°18'37	do.	1935	69*	5,685	52.2	5-1-73	5,633	Qal	720*	11-2-73	S	Bailed at 8 gal/min in 1935.
8.6.8.234 RWP 14	34°56'14" 107°29'20"	do.	1958	310*	6,258	130.5	8-28-73	6,127	Je	3,500	4-1-75	S	Pumped at 3.5 gal/min for about 2 hours with 59 feet drawdown in 1975.
8.6.21.224 RWP 30	34°54'41" 107°28'02"	do.	1967	455*	5,950	-	-	-	₸c	-	-	N	Reported "dry hole" Sounded 110 ft 9-21-73.
8.6.24.412 RWP 22	34°54'24" 107°25'07"	do.	-	420*	5,830	-	-	-	₸c	-	-	N	Reported "dry hole."
8.6.36.432 Thompson	34°52'26" 107°25'09"	Thompson	-	-	5,777	-	-	-	Qal(?)	1,630*	11-8-73	S	Unable to measure water level. Casing apparently buried under sand.

Table 1.—Records of wells - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Year completed	Depth (feet)	Altitude (feet)	Water level: Depth to water (feet)	Water level: Date	Water level: Altitude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Date	Use	Remarks
8.7.10.213 ECW 7	34°56'30" 107°33'40"	Pueblo of Acoma	1935	347*	6,184	15.2	5-11-73	6,169	Je	1,280	2-5-74	S	-
8.7.14.223 RWP 34	34°55'39" 107°31'16"	Pueblo of Laguna	1969	268*	6,210	79.3	3-31-75	6,131	Je	1,200	5-3-73	S	Pumped at 3 gal/min for about 2 hours with 60 feet drawdown in 1975.
8.7.22.222 RWP 869	34°54'49" 107°33'13"	Pueblo of Acoma	1952	243	6,228	32.6	8-3-77	6,195	Je	1,020	8-5-77	S	-
9.1.4.414	35°02'03" 106°56'36"	Everready Oil Co.	-	450	5,282	138.2	1-16-75	5,144	Qal,QTs	6,000	1-16-75	Ind	-
9.1.4.432	35°01'55" 106°56'38"	Stuckys	-	450	5,278	90 R	1-16-75	5,188	Qal,QTs	4,360*	6-5-75	O	-
9.1.8.142 Shell Oil test	35°01'29" 106°58'00"	Shell Oil Co.	-	-	5,398	-	-	-	-	-	-	-	Water-quality data available for several depths.
9.1.18.442 CCC 4	35°00'14" 106°58'25"	Pueblo of Laguna	-	160	5,302	129.0	6-29-73	5,173	QTs(?)	3,750T	6-29-73	S	-
9.2.2.314	35°01'04" 107°01'22"	Canoncito Reservation	-	-	5,400	-	-	-	Kmv(?)	5,500T	2-28-75	S	-
9.2.9.433 ECW 8	35°00'56" 107°03'06"	Pueblo of Laguna	1940	445*	5,585	98.6	6-29-73	5,486	Kmv(?)	6,900*	7-3-74	S	Bailed at 20 gal/min in 1940.
9.2.24.230 BIA Sedillo	35°59'37" 107°00'27"	do.	1980	443*	5,560	288	-	5,272	QTs	1,600*	4-29-80	S	Pumped at 12 gal/min for 24 hours with 84 feet drawdown in 1980.

Table 1.--Records of wells - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Year completed	Depth (feet)	Altitude (feet)	Water level: Depth to water (feet)	Water level: Date	Water level: Altitude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Date	Use	Remarks
9.2.27.422 RWP 9	34°58'40" 107°01'43"	Pueblo of Laguna	1958	131*	5,360	69.5	8-17-73	5,290	Kmv,QTs(?)	460*	9-24-73	S	Bailed at 20 gal/min in 1958.
9.2.32.211 RWP 10	34°58'16" 107°04'12"	do.	1962	720*	5,600	250 R	0-0-62	5,350	Km(?)Kd(?)	-	-	N	Bad water: plugged and abandoned.
9.3.11.411 RWP 13	35°01'15" 107°07'25"	do.	1972	370*	5,895	225.6	8-17-73	5,669	Je	2,600	6-11-73	S	-
9.3.13.422 CCC 2	35°00"27" 107°05'52"	do.	-	160	5,663	97.0	6-29-73	5,566	Kmv	2,700	6-29-73	S	-
9.3.15.313 Harrington	35°00'17" 107°08'54"	do.	1969(?)	50*	5,707	16.6	4-26-73	5,690	Qal, Je	2,650	4-26-73	S	-
9.3.20.441 RWP 15	34°59'19" 107°10'18"	do.	1959	250*	5,580	125.3	6-26-73	5,455	℞c	4,000T	6-26-73	S	Yield 11 gal/min in 1959.
9.3.25.233 CCC 7	34°58'54" 107°06'17"	do.	-	50	5,519	22.6	8-17-73	5,496	Qal	3,000T	8-17-73	S	-
9.3.29.414 ECW 3	34°58'35" 107°10'25"	do.	1968	115*	5,523	61.4	6-16-74	5,462	℞c	4,000	4-26-73	O	Abandoned, 1973.
9.3.29.414a Old ECW 3	34°58'36" 107°10'25"	do.	1944	80*	5,523	60.2	9-11-73	5,463	℞c	-	-	N	-
9.4.16.341 RWP 16	35°00'17" 107°16'07"	do.	1959	123*	5,620	54.8	5-3-73	5,565	Qal, ℞c	3,870*	5-1-59	S	Yield 5 gal/min in 1959.

Table 1.—Records of wells - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Year completed	Depth (feet)	Altitude (feet)	Water level: Depth to water (feet)	Water level: Date	Water level: Altitude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Date	Use	Remarks
9.4.19.124 El Rito	34°59'52" 107°18'09"	Pueblo of Laguna	-	160M	5,650	61.4	5-1-73	5,589	Ʀc	-	-	O	Abandoned as domestic supply because of poor quality.
9.4.20.341 Weeker	34°59'20" 107°17'09"	Sandy Weeker	1962	47	5,601	26.9	5-8-73	5,574	Qal	over 8,000T	5-8-73	S	-
9.4.24.322 RWP 19	34°59'32" 107°12'50"	Pueblo of of Laguna	1962	195*	5,630	128.0	4-26-73	5,502	Ʀc	2,900	4-26-73	S	Pumped at 12 gal/min for 12 hours in 1962.
9.4.29.323 Fernando	34°58'39" 107°17'12"	Romero Fernando	-	-	5,596	17.5	5-1-73	5,578	Qal	3,660*	5-1-73	S	-
9.4.33.223 Pino 1	34°58'12" 107°15'32"	Steven Pino	-	90	5,598	30 R	5-3-73	5,568R	Ʀc	6,000	5-3-73	S	Unable to measure water level.
9.4.33.223a Pino 2	34°58'11" 107°15'31"	do.	1972	10C	5,600	26.7	5-3-73	5,573	Ʀc	5,640*	5-3-73	S	-
9.4.34.214 Lente	34°58'12" 107°14'42"	Luis Lente	1950(?)	56M	5,556	15.7	5-3-73	5,540	Qal	3,600	5-3-73	S	-
9.5.4.133 ATSF	35°02'21" 107°22'39"	AT&SF Railroad	-	-	5,750	Flowing	5-21-72	-	Qb	2,390*	9-13-73	N	-
9.5.9.231 Laguna 78-1	35°01'20" 107°22'13"	Pueblo of Laguna	1978	510*	5,880	35	12-20-78	5,845	Jb, Je, Jt, Js	3,500*	12-21-78	N	Pumped at 74 gal/min for 24 hours in 1978. Drawdown after 11 hours was 190 feet.

Table 1.--Records of wells - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Year com-pleted	Depth (feet)	Alti-tude (feet)	Water level: Depth to water (feet)	Water level: Date	Water level: Alti-tude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Date	Use	Remarks
9.5.9.322	35°01'22" 107°22'22"	Pueblo of Laguna	-	8	5,880	-	-	-	Qal	-	-	N	Dug well, formerly supplied water to Laguna.
9.5.12.442 Mesita test	35°01'06" 107°18'36"	do.	1964	1,729*	5,642	Flow-ing	12-3-73	-	Psa(?)	13,000*	12-3-73	N	Flowed 15 gal/min in 1964 with a shut-in pressure of 170 psi.
9.5.12.443 841	35°01'02" 107°18'46"	do.	1923	80	5,670	59.9	12-3-73	5,610	Qal	5,500T	12-3-73	S D	-
9.5.13.144	35°00'32" 107°19'05"	do.	-	120M	5,665	53.9	7-19-74	5,611	Je, TRc	-	-	O	-
9.5.13.233 Mesita P.S.	35°00'36" 107°18'59"	do.	1965	230*	5,658	49.6	5-1-73	5,608	Je, TRc	1,440*	1-19-73	P	Pumped at 15 gal/min in 1965. Drawdown was 77 ft after 3 1/2 hours at 15 gal/min.
9.5.13.411 Burnell 2	35°00'26" 107°18'58"	do.	1963	123*	5,658	42.9	5-8-73	5,615	TRc	1,850*	5-2-63	N	Pumped at 22 gal/min 1963. Drawdown was 51 ft after 24 hours at 22 gal/min.
9.5.14.244 Burnell 1	35°00'35" 107°19'38"	do.	1963	430*	5,700	-	-	-	Je(?)	2,340*	1963	N	Bailed at 13 gal/min.
9.5.17.141 Test hole 1	35°00'42" 107°23'30"	Trans-western Pipeline Co.	1966	655*	5,980	-	-	-	Jb, Je	-	-	N	Yielded two bailers after 2 days.

Table 1.--Records of wells - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Year completed	Depth (feet)	Altitude (feet)	Water level: Depth to water (feet)	Water level: Date	Water level: Altitude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Date	Use	Remarks
9.5.19.234 Test hole 2	34°59'40" 107°24'10"	Trans-western Pipeline Co.	1966	355*	6,050	-	-	-	Jb	510*	8-23-66	N	Bailed hole dry. recovered 10 ft. in 1 hr 10 min.
9.5.19.241 Test hole 3	34°59'50" 107°24'00"	do.	1966	172*	6,080	-	-	-	Jb	-	-	N	-
9.5.19.421 Test hole 5	34°59'32" 107°24'10"	do.	1966	320*	6,100	-	-	-	Jb	370*	8-23-66	N	-
9.5.23.424 RWP 20	34°59'29" 107°19'42"	Pueblo of Laguna	1963	400*	5,750	105.3	5-11-73	5,645	Je, ℞c	1,370T	5-11-73	S	Yield 8 gal/min. Plugged back to 143 ft. Originally Burnell 3.
9.5.24.413 EPNG 3	34°59'27" 107°19'02"	El Paso Nat. Gas	1957	285*	5,686	55 R	2-17-57	5,631	℞c	-*	-	Ind	Pumped at 40 gal/min in 1957. Drawdown was 205 ft at 40 gal/min.
9.5.24.414 EPNG 2	34°59'28" 107°18'54"	do.	1957	125*	5,677	54 R	1-27-57	5,623	℞c	-	-	Ind	-
9.5.26.411 RWP 29	34°58'46" 107°20'00"	Pueblo of Laguna	1967	145	5,740	76.2	5-11-73	5,664	℞c	1,070T	5-11-73	S	Yield 7 gal/min in 1967.
9.5.29.232 RWP 25	34°59'00" 107°23'06"	do.	1965	413*	6,238	271.5	5-21-73	5,966	Je	2,670*	12-11-73	S	Yield 4 1/2 gal/min in 1965. Plugged back to 360 ft.
9.6.1.121 Johnson	35°02'37" 107°25'33"	Johnson	-	-	5,885	54.4	5-24-73	5,831	Qal,Qb	-	-	N	Reported good water.

Table 1.—Records of wells - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Year com-pleted	Depth (feet)	Alti-tude (feet)	Water level: Depth to water (feet)	Water level: Date	Water level: Alti-tude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Date	Use	Remarks
9.6.1.124 Gunn	35°02'32" 107°25'29"	Wally Gunn	1944(?)	70	5,875	33 R	5-24-73	5,842	Qal,Qb	-	-	I	Yield 70 gal/min; well unused when visited.
9.6.1.124a Gunn	35°02'30" 107°25'26"	do.	1923	70	5,875	34.0	5-24-73	5,841	Qal,Qb	-	-	N	Renovated in 1973.
9.6.1.213 Gunn	35°02'29" 107'25°21"	do.	1933	70	5,870	32.3	5-24-73	5,838	Qal,Qb	-	-	N	-
9.6.1.411 Test hole 4	35°02'12" 107°25'20"	Trans-western Pipeline Co.	1966	74*	5,860	-	-	-	Qal	6,000	8-3-66	N	-
9.6.2.122 Mariano	35°02'32" 107°62'32"	L. Mariano	-	60	5,898	43.4 N	11-16-73	5,855	Qal,Qb	1,550		N	Conductance reported by Dinwiddie and Motts (1964)
9.6.2.123 Laguna 76-7	35°02'32" 107°26'37"	Pueblo of Laguna	1976	170*	5,890	31.7	1-25-77	5,858	Qal	3,100*	8-24-78	O	Bailed at 20 gal/min for 1/2 hour in 1978 with less than 5 feet drawdown.
9.6.2.241 Marmon	35°02'27" 107°26'08"	Walter Marmon	-	-	5,884	-	-	-	Qal,Qb	-	-	-	Well blocked at 16 ft.
9.6.4.112 Touchin	35°02'35" 107°28'49"	Touchin	-	57M	5,935	31.9	10-19-73	5,903	Qal,Qb	-	-	N	Windmill on well.
9.6.4.222 Lucero	35°02'36" 107°28'06"	S. Lucero	-	70M	5,910	25.4	11-16-73	5,885	Qal	-	-	N	Reported salty.

Table 1.—Records of wells - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Year completed	Depth (feet)	Altitude (feet)	Water level: Depth to water (feet)	Water level: Date	Water level: Altitude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Date	Use	Remarks
9.6.4.243 Mooney	35°02'17" 107°28'12"	Mooney	1971(?)	183M	5,910	30.1	9-10-73	5,880	Jb	2,590*	10-21-74	O	-
9.6.4.433 Standard	35°01'54" 107°28'32"	Standard Oil	-	357	5,938	Flowing	11-30-73	-	Jb, Je	4,200*	6-12-75	N	Flowed 3 gal/min on 7-19-74. Pressure prior to flowing was 5 1/2 psi.
9.6.5.221 Acoya	35°02'40" 107°29'18"	Acoya	-	71M	5,934	27.8	7-19-74	5,906	Qal	-	-	N	Windmill on well.
9.6.5.222 Laguna 76-6	35°02'40" 107°29'12"	Pueblo of Laguna	1976	120*	5,930	20.4	1-24.77	5,910	Qal,Qb	2,500*	1-25-77	O	Pumped at 124 gal/min for 24 hours in 1977 with 11.4 feet drawdown.
9.6.6.211 Seama-Mesita	35°02'40" 107°30'36"	do.	-	150	5,942	8.8	6-22-73	5,933	Qal	880	12-3-73	P, O	Well reportedly pumped sand; presently unused.
9.6.6.233 Philadelphia	35°02'21" 107°30'35"	do.	-	37M	5,958	26.7	12-3-73	5,931	Qal	-	-	N	-
9.6.9.223 ECW 16	35°01'36" 107°28'14"	do.	1941	45*	5,906	24.9	9-13-73	5,881	Qal, Jb	Over 8,000	11-30-73	N	Yield 2 1/2 gal/min in 1941.
9.6.10.124 Casa Blanca	35°01'42" 107°27'34"	do.	-	21M	5,898	15.9	9-25-73	5,882	Qal	520*	11-16-73	N	Western well of three; other two are dry.

Table 1.--Records of wells - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Year completed	Depth (feet)	Altitude (feet)	Water level: Depth to water (feet)	Water level: Date	Water level: Altitude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Date	Use	Remarks
9.6.13.322 Trans-western 2	35°00'27" 107°25'29"	Trans-western Pipeline Co.	1966	-	6,045	35.2	11-18-73	6,010	Jb(?)	1,110*	5-12-67	N	-
9.6.13.343 Trans-western 1	35°00'07" 107°25'37"	do.	1967	480	6,138	141.9	11-18-73	5,996	Jb, Je	1,150*	5-12-67	N	Yield 1/2 gal/min in 1967. Drawdown was 87 ft. after 1 1/2 hrs at 1/2 gal/min.
9.6.20.412 RWP 18	34°59'36" 107°29'29"	Pueblo of Laguna	1958	172	6,030	53.6	8-28-73	5,976	Je	2,800T	8-28-73	S	Yield 20 gal/min in 1962. Drawdown 12 ft at 20 gal/min.
9.6.26.233 RWP 24	34°58'51" 107°26'23"	do.	1964	115*	6,185	71.5	8-28-73	6,113	Jb	460*	10-11-73	S	Pumped at 5.1 gal/min for 8 hours in 1978 with 1.1 ft of drawdown.
9.6.26.443 Timia	34°58'21" 107°26'07"	do.	1978	530*	6,230	69	10-31-78	6,161	Jb, Je	450*	10-18-78	N	Bailed dry in 1978.
9.6.31.143 ECW 6	34°57'56" 107°30'49"	do.	1934	41*	6,078	30.8	8-28-73	6,047	Je	2,530*	5-13-57	S	Bailed at 10 gal/min 1934.
10.2.25.444 Cañoncito P.S. 2	35°03'36" 106°59'34"	Cañoncito	1974	1,000	5,380	136R	9-25-74	5,244	QTs	2,180*	9-26-74	-	Pumped at 41 gal/min for 24 hours with 114 ft of drawdown.
10.3.17.111 RWP 38	35°05'06" 107°11'08"	do.	1975	-	6,460	-	-	-	-	-	-	-	-

Table 1.--Records of wells - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Year com-pleted	Depth (feet)	Alti-tude (feet)	Water level: Depth to water (feet)	Water level: Date	Water level: Alti-tude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Date	Use	Remarks
10.4.4.114 Analla	35°07'42" 107°16'13"	Analla	-	21M	5,920	18.3	10-5-73	5,902	Qal	1,400	10-5-73	N	-
10.4.8.344 ECW 3	35°06'14" 107°17'06"	Pueblo of Laguna	1935	388*	5,899	127.1	5-21-73	5,772	Jb	2,090*	4-4-74	S	Yield 5 gal/min in 1935.
10.4.30.414 RWP 28	35°03'52" 107°17'48"	do.	1966	355*	5,875	185.8	5-21-73	5,689	Je	2,670*	3-15-74	S	Yield 16 gal/min in 1966.
10.4.34.241 RWP 27	35°03'16" 107°14'27"	do.	1965	505*	5,820	143.2	5-23-73	5,677	Je	4,600	5-23-73	S	Bailed at 6 gal/min in 1965. Plugged back to 412 ft.
10.4.36.224 RWP 32	35°03'25" 107°12'18"	do.	1968	650*	6,440	594.3	9-13-73	5,846	Jb	2,810*	3-27-68	S	Yield 10 gal/min for 7 hours in 1968.
10.5.2.134 Housing 1	35°07'34" 107°20'25"	Anaconda Co.	-	180	5,915	53.4	11-5-74	5,862	Jm	2,200	9-20-65	N	Yield 8 gal/min. Former domestic supply.
10.5.2.143 Housing 2	35°07'31" 107°20'21"	do.	1955	415	5,905	42.2	11-5-74	5,863	Jm	2,250	5-19-71	D	Yield 15 gal/min.
10.5.3.224 Jackpile 5	35°07'44" 107°20'40"	do.	1959	415	5,920	-	-	-	Jm, Jb	-	-	N	Yield 5 gal/min. Former domestic supply.
10.5.4.323 P-10	35°07'20" 107°22'31"	do.	1974	-	6,175	-	-	-	Jm	1,650*	11-25-74		-

Table 1.--Records of wells - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Year com-pleted	Depth (feet)	Alti-tude (feet)	Water level: Depth to water (feet)	Water level: Date	Water level: Alti-tude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Date	Use	Remarks
10.5.5.142 MDH 771	35°07'38" 107°23'20"	Anaconda Co.	1959	329	6,220	193.7	12-3-74	6,027	Jm	1,350	9- -62	O	Yield 8 gal/min in 1963. Drilled to supply water for exploration drilling.
10.5.9.223 Paquate Shop	35°06'53" 107°21'58"	do.	-	605	6,100	-	-	-	Jm	1,900	11-11-74	Ind	Yield 25 gal/min.
10.5.14.234 Sinkhole	35°05'48" 107°19'58"	Pueblo of Laguna	-	about 51	5,820	51	9-27-73	5,769	Jb	2,310*	10-19-74	N	Sinkhole, Unable to measure water level exactly.
10.5.26.223 Ir. test 8	35°03'13" 107°19'50"	do.	1960	35*	5,730	7.0	2-5-60	5,723	Qal,Jb	10,000	2-5-60		Well plugged and aban-doned. Data from Din-widdle and Motts (1964).
10.5.33.333 RWP 1	35°02'45" 107°22'45"	do.	1957	77	5,790	27.8	5-21-73	5,762	Jb	650T	5-21-73	D	-
10.5.34.231 RWP 36	35°03'19" 107°21'07"	do.	1970	131*	5,790	100.5	5-11-73	5,689	Qal	3,000T	5-11-73	S	Bailed at 15 gal/min for 30 minutes in 1970.
10.6.3.111 Encinal 1	35°07'50" 107°27'59"	do.	1964	415*	6,485	30.0	11-16-78	6,455	Kd	1,130*	11-17-78	P	Pumped at 10.6 gal/min for 24 hours with 190 ft drawdown. Driller's bail test indicated yield of at least 25 gal/min.

Table 1.—Records of wells - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Year completed	Depth (feet)	Altitude (feet)	Water level: Depth to water (feet)	Water level: Date	Water level: Altitude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Date	Use	Remarks
10.6.3.132 RWP 5	35°07'37" 107°27'52"	Pueblo of Laguna	1952	360*	6,450	307.5	9-11-73	6,142	Kd	-	-	N	Yield 12 gal/min in 1952. Mill removed in 1968.
10.6.3.313	35°07'18" 107°27'56"	do.	-	13M	6,395	3.8	8-2-74	6,391	Kd	-	-	N	-
10.6.3.331	35°07'15" 107°27'56"	do.	-	15M	6,385	5.1	8-2-74	6,380	Kd	-	-	N	-
10.6.3.334 871	35°07'06" 107°27'06"	do.	1933	45*	6,375	9.0	9-7-73	6,366	Kd	1,350 1,650*	9-7-73 2-20-51	D, S	Well rehabilitated and deepened in 1962.
10.6.9.121 Encinal 2	35°07'02" 107°28'49"	do.	1964	205*	6,350	145.6	9-11-73	6,204	Kd	1,300*	11-7-78	N	Pumped at average rate of 54 gal/min in 1978 for 24 hrs with 14.7 ft drawdown.
10.6.29.244 RWP 17	35°04'05" 107°29'12"	Pueblo of Laguna	1959	650	6,390	424.2	9-27-73	5,966	Jb	-	-	N	-
10.6.31.144 Analla	35°03'08" 107°30'42"	R. Analla	1969	168	6,040	107.6	12-11-73	5,932	Jb(?)	-	-	N	-
10.6.31.434 Seama P.S.	35°02'41" 107°30'28"	Pueblo of Laguna	1963	150*	5,942	8.2	6-22-73	5,934	Qal,Qb	1,530* 1,760*	3-18-65 1-19-73	P	Pumped at 450 gal/min in 1963. Drawdown was 23.5 ft after 45 minutes at 450 gal/min.

Table 1.--Records of wells - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Year completed	Depth (feet)	Altitude (feet)	Water level: Depth to water (feet)	Water level: Date	Water level: Altitude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Date	Use	Remarks
10.6.31.443 Ir. test 7	35°02'42" 107°30'12"	Pueblo of Laguna	1960	145*	5,940	6.8	5-24-60	5,933	Qal	1,510*	5-25-60	N	Pumped at 115 gal/min in 1960. Drawdown was 8.5 ft after 24 hours. Data from Dinwiddie and Motts (1964).
10.6.32.313 Leeds well	35°02'55" 107°30'07"	Leeds	-	115	5,980	53.1	8-2-74	5,927	Qal	-	-	N	Former domestic supply equipped with submersible pump.
10.6.32.313a Hinshaw	35°02'55" 107°30'04"	Hinshaw	-	140M	5,980	55.1	8-2-74	5,925	Qal	-	-	N	Former domestic supply. Water quality reportedly poor.
10.6.33.122 Paraje deep test	35°03'29" 107°28'35"	Pueblo of Laguna	1953	780*	5,990	-	-	-	Jb, Je	3,250*	12-9-52	N	Well bailed dry. Plugged and abandoned.
10.6.33.213 ECW 12	35°03'26" 107°28'35"	do.	1936	581*	5,975	62.2	2-4-74	5,913	Jb, Js	2,810*	10-20-52	O	Pumped at 8 gal/min for 6 hours in 1936.
10.6.35.313 Dailey	35°02'58" 107°26'51"	Tom Dailey	1965	105	5,935	57.0	5-25-73	5,878	Qal	-	-	O	Reported good well.
10.6.35.322 Pueblo Test 1	35°03'06" 107°26'34"	Pueblo of Laguna	1960	120*	5,945	57.2	5-24-73	5,888	Qal	1,460*	2-12-60	O	Pumped at 23 gal/min in 1960. Drawdown was 23 ft after 12 hours at 23 gal/min.

Table 1.--Records of wells - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Year completed	Depth (feet)	Altitude (feet)	Water level: Depth to water (feet)	Water level: Date	Water level: Altitude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Date	Use	Remarks
10.6.35.324 New Laguna P.S.	35°02'57" 107°26'35"	Pueblo of Laguna	1960	98	5,930	56.8	5-24-73	5,873	Qal	1,450*	1-19-73	D	Pumped at 75 gal/min in 1960. Drawdown was 32 ft. after 24 hours at 75 gal/min.
10.6.35.342 Pueblo Test 2	35°02'53" 107°26'32"	do.	1960	122*	5,922	55.2	9-11-73	5,867	Qal	1,570*	3-8-60	O	Pumped at 90 gal/min in 1960. Drawdown was 4 ft after 12 hours at at 90 gal/min.
10.6.35.342a Laguna Ir.2	35°02'52" 107°26'35"	do.	1977	160*	5,920	54	1-16-77	5,866	Qal	1,500	11-14-77	I	Pumped at average rate of 184 gal/min for 24 hours with 31 feet drawdown in 1977.
10.6.36.343 Gillstrep	35°02'45" 107°25'34"	Jim Gillstrep	-	74M	5,905	58.4	5-24-73	5,847	Qal	2,500	5-24-73	D	-
10.7.10.122 Seco Canyon 1	35°07'00" 107°33'50"	Pueblo of Laguna	1978	40*	6,500	-	-	-	Qal	3,000	8-8-78	N	Well produced 10 gallons of water overnight.
10.7.10.213 Laguna 79-1	35°06'54" 107°33'46"	do.	1979	1330*	6,470	297.6	1-10-80	6,172	Jm,Kd	2,000*	1-16-80	O	Pumped at 10 gal/min for 24 hours with 128 feet drawdown in 1980.
10.7.10.233	35°06'37" 107°33'47"	-	1962(?)	123M	6,410	52.7	6-28-73	6,357	Qal,Km(?)	-	-	N	-

Table 1.--Records of wells - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Year com- pleted	Depth (feet)	Alti- tude (feet)	Water level: Depth to water (feet)	Water level: Date	Water level: Alti- tude (feet)	Principal water- bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Date	Use	Remarks
10.7.25.432 Abandoned New York	35°03'37" 107°31'30"	Pueblo of Laguna	1953	117*	6,038	67.5	9-10-73	5,970	Qal	1,020	4-1-53	O	Pumped at 17 gal/min in 1953. Drawdown was 30 ft.
10.7.25.441	35°03'37" 107°31'19"	do.	-	61M	6,025	39.1	11-16-73	5,986	Qal	980*	3-27-53	N	-
10.7.35.232 Ir. Test 6	35°03'19" 107°32'36"	do.	1960	132*	5,990	8.8	10-19-73	5,981	Qal	3,300*	8-14-75	O	Pumped at 100 gal/min in 1960. Drawdown was 17.5 ft after 20 hours pumping at 100 gal/min.
10.7.36.212 New York 2	30°03'24" 107°31'28"	do.	1966	158	6,002	-	-	-	Qal	720*	1-18-73	P	Pumped at 295 gal/min Drawdown was 8.7 ft after 40 hours at 295 gal/min.
10.7.36.221 New York 1	35°03'26" 107°31'22"	do.	1966	150*	6,020	59.4	9-10-73	5,961	Qal	920*	10-29-70	P O	Pumped at 290 gal/min in 1970. Drawdown was 37 ft after 20 hours pumping at 290 gal/min.
10.7.36.242 Joe Day	30°03'12" 107°31'18"	do.	-	100	-	-	-	-	Qal	-	-	N	Unable to measure water level. Former stock and domestic well.

Table 1.—Records of wells - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Year com-pleted	Depth (feet)	Alti-tude (feet)	Water level: Depth to water (feet)	Water level: Date	Water level: Alti-tude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Date	Use	Remarks
10.7.36.322 Laguna 76-2	35°03'02" 107°31'45"	Pueblo of Laguna	1976	154*	5,980	21.9	7-12-76	5,958	Qal,Qb	3,700*	7-14-76	O	Pumped at 80 gal/min for 24 hours with 45 ft drawdown in 1976.
10.7.36.424 Laguna 76-1	35°02'53" 107°31'12"	do.	1976	157*	5,970	26.4	7-6-76	5,944	Qal,Qb	1,350*	7-8-76	O	Pumped at 140 gal/min for 20 hrs. with 8.5 ft drawdown in 1976.
10.7.36.424a Laguna Ir.1	35°02'53" 107°31'12"	do.	1977	155*	5,970	27.1	9-26-77	5,943	Qal,Qb	1,350*	9-27-77	Ind	Step-pumped 250 to 490 gal/min for 24 hrs with 86 ft. drawdown in 1977.
10.7.36.443 858	35°02'40" 107°31'21"	do.	1931	20M	5,961	18.9	12-3-73	5,942	Qal	-	-	N	Dug well. Former windmill.
11.1.4.343 RWP 9	35°12'15" 106°57'00"	do.	1958	158*	5,450	107.2	6-21-73	5,343	Qal	Over 8,000	6-21-73	S	-
11.1.18.234 ECW 1	35°10'56" 106°58'48"	do.	1936	147*	5,511	-	-	-	Kmv	3,250	9-27-73	S	Bailed at 30 gal/min in 1936. No drawdown after 3 hrs at 30 gal/min.
11.2.1.124 ECW 8	35°12'55" 107°00'08"	do.	-	130	5,560	45.0	8-21-73	5,515	Qal,Kmv	2,400	8-21-73	S	Bailed at 15 gal/min in 1964. Drawdown was 45 ft at 15 gal/min. Well cleaned in 1964.
11.2.13.333 RWP 10	35°10'31" 107°00'32"	do.	1961	265*	5,670	222.0	8-21-73	5,448	Kmv	3,500	8-21-73	S	Pumped at 8 gal/min for 8 hours in 1961.

Table 1.--Records of wells - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Year completed	Depth (feet)	Altitude (feet)	Water level: Depth to water (feet)	Water level: Date	Water level: Altitude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Date	Use	Remarks
11.2.27.211 ECW 2	35°09'34" 107°02'09"	Pueblo of Laguna	1938	168 205M	5,771	180.1	8-21-73	5,591	Kmv(?)	3,000	8-21-73	S	-
11.4.18.334	35°10'34" 107°18'18"	L-Bar Ranch	-	65M	6,085	61.6	5-10-74	6,023	Qal	-	-	N	Former stock well.
11.4.26.444 ECW 4	35°08'48" 107°13'20"	Pueblo of Laguna	1935	640*	6,420	488.2	5-18-73	5,932	Jm,Jb(?)	2,500T	5-18-73	S	Bailed at 20 gal/min in 1935.
11.5.13.112 LJ 205	35°11'23" 107°19'28"	Sohio	1971	522	6,159	92.8	10-14-71	6,066	Jm	-*	-	S	Pumped at 34 gal/min in 1971. Drawdown was 154 ft after 15 hrs at 34 gal/min.
11.5.14.241 L-Bar 2	35°11'05" 107°19'48"	do.	1974	3,390	6,233	10R	?-3-75	6,223	Psa,Pg	-	-	I	Data supplied by Standard Oil of Ohio.
11.5.24.213 Anaconda 1	35°10'23" 107°19'06"	do.	1971	390	6,162	161.8	5-10-74	6,000	Jm	1,750*	5-14-71	N	Pumped at 30 gal/min in 1971. Drawdown was 152 ft after 8 hours at 30 gal/min.
11.5.27.322 Anaconda 4	35°09'11" 107°21'12"	Anaconda Co.	-	610	6,002	80R	12-6-60	5,922	Jm	1,200	11-11-74	D	Pumped at 100 gal/min in 1963. Principal domestic supply for Jackpile Mine.

Table 1.--Records of wells - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Year completed	Depth (feet)	Altitude (feet)	Water level: Depth to water (feet)	Water level: Date	Water level: Altitude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Date	Use	Remarks
11.5.29.444	35°08'48" 107°22'50"	Pueblo of Laguna	1955	384*	6,220	166.3	2-4-74	6,054	Jm	1,900*	4-16-55	N	Bailed at 18 gal/min in 1955. Some drawdown after 20 min at 18 gal/min.
11.5.30.422 Pueblo test 3	35°09'11" 107°23'53"	do.	1960	466*	6,260	75.3	10-17-73	6,185	Jm	670*	3-31-60	O	Pumped at 10 gal/min in 1960. Drawdown was 192 ft after 12 hours at 10 gal/min.
11.5.32.232 Paquate P.S. 2	35°08'33" 107°23'07"	do.	1974	63	6,160	+ 1.1	7-19-74	6,161	Qal	-	-	P, O	Pumped at 75 gal/min in 1974. Drawdown was 43 ft after 3 hours at 75 gal/min.
11.5.32.234 Pueblo test 5	35°08'28" 107°23'06"	do.	1960	79*	6,150	Flowing	4-22-60	-	Qal	580*	4-22-60	N	Pumped at 35 gal/min in 1969. Drawdown was 25 ft after 12 hours.
11.5.32.234a Paquate P.S. 1	35°08'28" 107°23'06"	do.	1963	75	6,155	Flowing	6-22-73	-	Qal	630*	1-18-73	P	Pumped at 90 gal/min in 1963. Drawdown was 23 ft after 12 hours at 90 gal/min.
11.5.35.442 Jackpile Shop	35°08'06" 107°19'37"	Anaconda Co.	-	309	5,890	-	-	-	Jm(?)	1,950	5-14-74	Ind, D	Yield 10-20 gal/min.

Table 1.—Records of wells - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Year completed	Depth (feet)	Altitude (feet)	Water level: Depth to water (feet)	Water level: Date	Water level: Altitude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Date	Use	Remarks
11.6.9.441	35°11'36" 107°28'13"	Elkins	-	100M	7,747	88.4	10-18-73	7,659	QTb	-	-	S	-
11.6.27.334 Encinal Canyon 1	35°08'52" 107°27'51"	Pueblo of Laguna	1978	110*	6,765	31.7	7-5-78	6,733	Qal	1,900*	7-5-78	O	Bailed dry in 1978 after 100 min bailing at average rate of 5.3 gal/min.
11.6.34.134 Encinal Canyon 2	35°08'35" 107°27'57"	do.	1978	35*	6,660	-	-	-	Qal	950	7-31-78	N	Small seep of water into well. Bails dry after 10-15 gallons.
11.7.35.243 Castillo Canyon 1	35°08'25" 107°32'29"	do.	1978	75*	6,720	41.3	10-5-78	6,679	Kmv	950*	8-11-78	N	Bailed in 1978 at 5 gal/min for 25 min with about 25 ft drawdown.
12.1.8.132 ECW 6	35°17'08" 106°58'15"	do.	1944	312*	5,534	52.5	6-21-73	5,481	Qal,Kd	-	-	N	Bailed at 20 gal/min in 1944. No drawdown at 20 gal/min.
12.1.20.123 Conoco 5	35°15'30" 106°58'07"	Conoco	-	-	5,495	-	-	-	Jm	-	-	-	Flowed 75 gal/min. Plugged and abandoned
12.1.29.113 Conoco 17-10	35°14'40" 106°58'22"	do.	1971	1,080	5,475	-	-	-	Jm	-*	-	N	Hole filled with cement and abandoned Hole flowed prior to plugging.
12.1.30.233 Conoco 64	35°14'13" 106°58'58"	do.	-	-	5,470	-	-	-	Jm	-	-	-	Flowed 100 gal/min. Plugged and abandoned.

Table 1.--Records of wells - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Year completed	Depth (feet)	Altitude (feet)	Water level: Depth to water (feet)	Water level: Date	Water level: Altitude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Date	Use	Remarks
12.1.30.324 Conoco 65A	34°14'14" 106°58'58"	Conoco	1971	1,100	5,490	Flowing	5-31-74	-	Jm	12,900*	6-5-75	Ind	Flowed at average rate of 80 gal/min for 3 hrs. on 5-31-74. Pressure prior to flowing was 26 psi.
12.1.31.331 Conoco WQ7	35°13'16" 106°59'22"	do.	1976	1,860	5,560	Flowing	5-12-76	-	Jm	11,800	1976	Ind	Flowed 38 gal/min on 5-12-76 shut-in pressure was 30 psi.
12.1.31.431 Conoco 6	35°13'12" 106°58'58"	do.	-	-	5,510	-	-	-	Jm	-	-	N	Flowed 4 gal/min. Plugged and abandoned.
12.1.32.131 Conoco 72	35°13'40" 106°58'25"	do.	-	-	5,475	-	-	-	Jm	-	-	N	Flowed 3-5 gal/min. Abandoned.
12.1.33.132 Conoco 22-10	35°13'40" 106°57'09"	do.	-	-	5,490	-	-	-	Jm	-*	-	N	Flowed 5 gal/min the day after completion but ceased after one week. Plugged and abandoned.
12.2.1.134 ECW 4	35°18'00" 107°00'20"	Pueblo of Laguna	1936	220*	5,559	44.4	8-21-73	5,515	Kd,Km	5,000	8-21-73	S	Pumped at 14 gal/min in 1936. Drawdown was 20 ft after 3 1/2 hours at 14 gal/min.
12.2.10.122 RWP 11	35°17'23" 107°02'17"	do.	1962	320*	5,718	197.9	8-21-73	5,520	Kd,Km	2,000	8-21-73	S	Bailed at 3 gal/min for 2 hours in 1962. Plugged back to 270 ft.

Table 1.—Records of wells - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Year completed	Depth (feet)	Altitude (feet)	Water level: Depth to water (feet)	Water level: Date	Water level: Altitude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Date	Use	Remarks
12.2.15.341 ECW 7	35°15'56" 107°02'20"	Pueblo of Laguna	1944	383*	5,685	146.7	8-21-73	5,538	Kd,Km	3,500	8-21-73	S	Bailed at 4-5 gal/min in 1944.
12.2.24.243 ECW 3	35°15'15" 106°59'36"	do.	1960	120*	5,505	34.3	8-21-73	5,471	Kd,Km	-	-	N	Bailed at 12 gal/min for 5 hours in 1960. Reportedly abandoned because stock would not drink water.
12.2.24.323 Conoco 55	35°15'10" 107°00'10"	Conoco	-	-	5,545	-	-	-	Jm	-	-	N	Flowed 8 gal/min. Plugged and abandoned.
12.2.24.442 Conoco 15-9	35°14'59" 106°59'34"	do.	-	1,200	5,505	-	-	-	Jm	*	-	N	Flowed 20 gal/min. Reported pressure 12-15 psi. Plugged and abandoned.
12.2.28.333 RWP 14	35°14'02" 107°03'44"	Pueblo of Laguna	1972	575*	5,840	314.8	6-25-74	5,525	Kd,Km	-	-	N	Yield 7 gal/min in 1972.
12.2.36.421 Conoco OW-192	35°13'28" 106°59'37"	Conoco	1976	1620	5,620	-	-	-	Jm	12,800	?-?-76	O	-
12.2.36.442 Conoco WW-101	35°13'17" 106°59'32"	do.	1976	1,686	5,560	Flowing	-	-	Jm	11,000*	5-29-76	I	Pumped at 1212 gal/min for about 14 days with 470 feet drawdown.

Table 1.--Records of wells - Concluded

Location number and local name or number if known	Latitude and longitude	Owner	Year completed	Depth (feet)	Altitude (feet)	Water level: Depth to water (feet)	Water level: Date	Water level: Altitude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Date	Use	Remarks
13.1.19.323 RWP 13	35°20'19" 106°59'06"	Pueblo of Laguna	1967	150*	5,660	79.5	6-21-73	5,580	Kd,Km	4,000T	6-21-73	S	Pumped at 10 gal/min for 1 1/2 hours in 1967.
13.1.29.242 Navajo	35°19'48" 106°57'22"	do.	-	190	5,673	99.7	6-21-73	5,573	Km(?)	5,000	6-21-73	S	-
13.2.26.133 RWP 12	35°19'40" 107°01'34"	do.	1967	142*	5,681	123.1	8-21-73	5,558	Qal(?)	4,000	8-21-73	S	Yield 12 gal/min in 1967.
13.2.26.434 Conoco 9-8	35°19'16" 107°00'51"	Conoco	-	710	5,600	-	-	-	Jm(?)	-*	-	N	Flowed 5 gal/min. Plugged and abandoned.

Table 2.—Records of springs.

EXPLANATION:

Location number: See text for explanation.

Latitude and longitude: Determined from U.S. Geological Survey 7 1/2- and 15-minute topographic quadrangle maps.

Altitude: Altitude of land surface at the spring, in feet above sea level, determined from U.S. Geological Survey 7 1/2- and 15-minute topographic quadrangle maps.

Principal water-bearing unit: Qal, alluvium;Qb, Quaternary basalt; QTb, Older basalt; Kmv, Mesaverde Group: Km, Mancos Shale; Kd, Dakota Sandstone; Jm, Morrison Formation; Jb, Bluff Sandstone; Jt, Todilto Formation; Je, Entrada Sandstone, T̵Rc , Chinle Formation; Psa, San Andres Limestone: Py, Yeso Formation; Pa, Abo Formation.

Specific conductance: Specific conductances followed by an asterisk (*) were measured in a laboratory and chemical analyses are available. All other specific conductances were measured onsite. An asterisk alone indicates a chemical analysis is available but specific conductance was not measured.

Yield: E, estimated; all others were measured. The symbol (<) means the yield was less than that given.

Use: D, domestic; I, irrigation; N, none; P, public supply; S, stock.

Remarks: mg/L, milligrams per liter; gal/min, gallons per minute.

Location number and local name or number if known	Latitude and longitude	Owner	Altitude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Yield (gallons per minute)	Date	Use	Remarks
6.2.6.431 Salt Spring 173	34°46'12" 107°05'15"	-	5,420	Py	*	0.1	08-07-41	N	Data from Wright (1946). Dissolved solids 13,700 mg/L.
7.2.6.214 Salt Spring 192	34°52'01" 107°05'07"	Pueblo of Laguna	5,350	Km	* 37,000*	.3	09-03-41 04-21-75	N	Data from Wright (1946). Dissolved solids 33,100 mg/L.
7.2.6.434 Salt Spring 190	34°51'22" 107°05'10"	do.	5,350	Km	* 41,500*	.5	09-03-41 04-22-75	N	Data from Wright (1946). Dissolved solids 27,600 mg/L.
7.2.6.442 Railroad Spring	34°51'40" 107°04'55"	do.	5,300	T̵Rc	36,500*	-	04-22-75	N	-

Table 2.--Records of springs - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Altitude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Yield (gallons per minute)	Date	Use	Remarks
7.2.7.123 Salt Spring 186	34°51'10" 107°05'30"	Pueblo of Laguna	5,600	₮c (?)	*	.5	8-25-41	N	Data from Wright (1946). Dissolved solids 28,400 mg/L.
7.2.7.241 Pipeline Spring	34°51'08" 107°05'15"	do.	5,360	₮c	34,100*	-	4-22-75	-	-
7.2.7.343 Salt Spring 185	34°30'32" 107°05'27"	do.	5,520	₮c	* 36,800*	.05	8-25-41 4-22-75	N	Data from Wright (1946). Dissolved solids 27,100 mg/L.
7.2.18.134 Salt Spring 184b	34°49'58" 107°05'36"	do.	5,560	₮c	*	.05	8-25-41	N	Data from Wright (1946). Dissolved solids 28,300 mg/L.
7.2.18.144 Salt Spring 184c	34°50'02" 107°05'23"	do.	5,440	₮c	*	.2	8-25-41	N	Data from Wright (1946). Dissolved solids 30,600 mg/L.
7.2.18.313 Salt Spring 184a	34°49'52" 107°05'47"	do.	5,620	Psa	* 45,000*	1	4-22-75	N	Data from Wright (1946). Dissolved solids 34,700 mg/l.
7.2.18.431 Mammoth Mound	34°49'36" 107°05'06"	do.	5,440	Psa	34,300*	-	4-22-75	N	-

Table 2.—Records of springs - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Altitude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Yield (gallons per minute)	Date	Use	Remarks
7.2.30.124 Salt Spring 189	34°48'30" 107°05'25"	Pueblo of Laguna	5,600	Psa	* 37,000*	.35	9-2-41 5-16-75	N	Data from Wright (1946). Dissolved solids 21,200 mg/L.
7.2.30.411 Salt Spring 188	34°48'14" 107°05'18"	do.	5,540	Py	*	.05	9-2-41	N	Data from Wright (1946). Dissolved solids 26,100 mg/L.
7.2.31.144 Salt Spring 187	34°47'28" 107°05'22"	do.	5,520	Pa	*	.05	9-2-41	N	Data from Wright (1946). Dissolved solids 17,700 mg/L.
7.3.1.432	34°51'32" 107°06'10"	do.	5,580	Psa	10,000	1E	2-12-75	S	-
7.3.1.432a Indian Ruins Spring	34°51'28" 107°06'14"	do.	5,580	Psa	8,530*	5E	4-21-75	S	-
7.4.2.144 Lower water Spring	34°51'50" 107°13'47"	Harrington	5,720	Qb,Qal	3,500	10E	5-6-74	S	Spring issues from gravel in stream channel. Stream gains for 1/4 mile or more below spring.
7.4.3.344 Salt Spring 195	34°51'22" 107°14'48"	do.	5,820	₨c	* 7,950	.01	9-4-41 5-28-75	S	Data from Wright (1946). Dissolved solids 4,000 mg/L.
7.4.11.431 Lucero Spring	34°50'38" 107°13'38"	do.	5,820	₨c	* 4,370*	20	9-4-41 5-28-75	S	Data from Wright (1946). Dissolved solids 4,000 mg/L.

Table 2.--Records of springs - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Altitude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Yield (gallons per minute)	Date	Use	Remarks
8.2.7.314 Miranda Spring	34°55'56" 107°05'49"	Pueblo of Laguna	5,240	Jb	30,100*	-	4-21-75	N	-
8.2.19.421 El Ojo Escondido	34°54'14" 107°05'01"	Pueblo of Laguna	5,203	Jb	4,230*	10 E	9-24-73	N	-
8.2.20.332 Ojo Escondido	34°54'04" 107°04'37"	do.	5,200	Jb	490*	.5 E	9-24-73	S	-
8.2.20.423 Salt Spring	34°54'12" 107°03'58"	do.	5,180	Jm	32,300* 32,600	0.5 E	9-24-73 4-21-75	N	Salt spring at top of travertine mound. Odorles gas bubbling from spring.
8.2.30.342 Salt Spring 193	34°53'12" 107°05'25"	do.	5,320	Jb	* 41,400*	.3 -	9-3-41 4-21-75	N	Data from Wright (1946). Dissolved solids 21,200 mg/L.
8.3.10.214	34°56'22" 107°08'14"	Talavera Corp.	5,400	Qb	3,800	30 E	10-4-73	N	Many seeps and springs flow from fracture zone in basalt. Combined flow about 30 gal/min.
8.3.10.222 Suwanee Spring	34°56'28" 107°07'56"	do.	5,355	Qb	3,810* 3,930*	- 100	10-12-48 09-24-73	 N	-

Table 2.--Records of springs - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Altitude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Yield (gallons per minute)	Date	Use	Remarks
8.3.12.413 Dipping Vat Spring	34°55'49" 107°06'24"	Pueblo of Laguna	5,320	Jb, Jt(?)	4,150* 4,030*	420	9-14-73 4-21-75	S	Flow at confluence with Rio San Jose about 0.2 mile from spring on 2-12-74 was 507 gal/min measured with a pygmy current meter.
8.3.35.114 Spring 194	34°52'52" 107°07'43"	do.	5,720	Ꞧc, Qal	* 900	1.0 0	9-3-41 2-12-75	S	Data from Wright (1946). Dissolved solids 350 mg/l. Small pools in channel on 2-12-75. No flow observed.
8.6.3.243 Kemp Santiago Spring	34°57'04" 107°27'04"	do.	6,300	Jb	460	< .5 E	10-11-73	S	Spring developed with concrete collection system for stock watering.
8.6.16.142 Alamo Spring	34°55'32" 107°28'35"	U.G. Paisano	6,090	Je	650	< 1 E	9-21-73	S	Specific conductance as measured in pool may be affected by previous storm flows.
8.6.18.232 Dripping Springs	34°55'26" 107°30'20"	Fred Marmon	6,220	Jb	340	< .5 E	10-11-73	N	Collection system of several seeps was once used as a domestic supply.
9.3.22.443 Coyote Spring	34°59'15" 107°08'12"	Pueblo of Laguna	5,600	Ꞧc	4,400*	-	4-26-73	S	-
9.5.2.434	35°02'53" 107°19'57"	do.	5,662	Qal	5,000	-	9-24-73	I	Conductance measured in small reservoir near river. Several seeps apparent in river bed. Conductance of river on 9-24-73 was 5,000.

Table 2.—Records of springs - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Altitude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Yield (gallons per minute)	Date	Use	Remarks
9.5.8.113	35°01'41" 107°23'43"	Pueblo of Laguna	5,800	Qb	2,600	2 E	5-29-74	N	Water drips from the contact between basalt and Bluff Sandstone.
9.5.8.121	35°01'43" 107°23'33"	do.	5,800	Jb,Qb	2,800	< 1 E	5-29-74	N	-
9.5.27.412 Johnson	34°58'42" 107°21'00"	do.	5,860	Je	1,700	< .5 E	6-19-73	S	-
9.6.13.321 Yellow Rock Spring	35°00'27" 107°25'33"	do.	6,035	Jb	-	-	-	S	No flow observed 10-11-73. Reportedly always has water.
9.6.16.122	35°00'53" 107°28'35"	do.	5,918	Jb	4,000	-	10-19-73	N	Small pool nearby had salt crystals floating on top. Conductance was greater than 8,000 on 10-19-73. No flow observed.
9.6.28.122 Turquoise Spring	34°59'07" 107°28'35"	do.	6,060	Jb	440*	< .5 E	2-4-74	N	-
9.6.36.144 Coyote Spring	34°57'57" 107°25'30"	do.	6,195	Jb	900	do.	10-11-73	S	Spring developed for stock use-with concrete collection system.
10.4.12.342 Cheromiah Spring	35°06'17" 107°12'45"	Joe Cheromiah	6,100	Jm	4,000	1	10-15-73	S, D	Water piped from spring for domestic and stock use.

Table 2.--Records of springs - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Altitude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Yield (gallons per minute)	Date	Use	Remarks
10.4.21.223 Arroyo Conchas Spring	35°05'01" 107°15'29"	Pueblo of Laguna	5,773	Qal, Jb	5,000	2-3 E	3-3-75	S	Many seeps from the alluvium. Bluff Sandstone contact contributes to flow.
10.5.10.113 Oak Canyon Spring	35°06'53" 107°21'42"	do.	5.950	Jm	3,500	1 E	12-4-73	N	Flow and conductance affected by effluent discharged into canyon from shop lagoon.
10.5.26.241	35°03'11" 107°19'47"	do.	5,722	Qal	6,000	1 E	2-10-75	N	Below Paguate dam.
10.5.28.332 Spring 15	35°03'47" 107°22'34"	do.	5,820	Jm	1,500	< .5 E	9-27-73	S	Conductance measured in concrete catchment.
10.5.36.331 Goyea Spring	35°02'48" 107°19'32"	do.	5,740	Jb	180	do.	10-15-73	S	Several pools in canyon. This one trickling slightly.
10.6.15.312	35°05'42" 107°27'48"	do.	6,170	Kd	1,500	-	10-17-73	S	Many seeps give a combined flow of 15 gal/min measured. Seeps also evident downstream from measuring point.
10.6.15.322 Kose Spring	35°05'42" 107°27'38"	Kose	6,175	Kd	1,400	< .5 E	10-18-73	S	Was once used for irrigation but reportedly dried up.
10.6.18.331	35°05'24" 107°31'07"	-	6,208	Qal	950	1-2 E	4-3-74	N	Seepage in roadside ditch.

Table 2.—Records of springs - Continued

Location number and local name or number if known	Latitude and longitude	Owner	Altitude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Yield (gallons per minute)	Date	Use	Remarks
10.6.25.242 Frog Pond Spring	35°04'08" 107°24'54"	Pueblo of Laguna	6,100	Jm	1,670*	do.	6-6-73	S	Has collection system with tank; system not maintained
10.7.24.411	35°04'42" 107°31'36"	-	6,110	Qal	700	100+ E	11-4-74	S	Contributes much of flow in Cubero wash.
11.3.30.343 Hanging Grape Spring	35°08'50" 107°11'52"	Pueblo of Laguna	6,260	Kd	560	< .5 E	10-15-73	N	Was once developed for domestic and stock use.
11.6.10.412 Paquate Canyon Spring	35°11'45" 107°27'19"	-	7,665	QTb	280	-	10-18-73	S	Very little flow at point of measurement. Flow downstream at Laguna boundary was 250 to 300 gal/min estimated on 10-17-73.
11.6.16.422 Head Spring	35°10'56" 107°28'03"	Pueblo of Laguna	7,620	QTb	240	-	10-18-73	S	Many seeps give a combined flow of 60 gal/min 0.6 mile downstream.
11.6.21.312	35°10'04" 107°28'52"	do.	7,440	QTb	190	15	7-12-74	S	Stream gains to a maximum of 15 gpm; little to no flow at Laguna boundary downstream.
11.6.21.414	35°09'58" 107°28'20"	do.	7,460	QTb	275	8	10-18-73	S	Flow is from several seeps.
11.6.22.333 Encinal Public Supply Spring	35°09'45" 107°28'00"	do.	7,380	QTb	190*	101	1-18-73	P	Collection system of several springs for Encinal public supply.

Table 2.—Records of springs - Concluded

Location number and local name or number if known	Latitude and longitude	Owner	Altitude (feet)	Principal water-bearing unit	Specific conductance (micromhos per centimeter at 25° Celsius)	Yield (gallons per minute)	Date	Use	Remarks
11.7.15.133 DeArmand Spring	35°10'53" 107°34'12"	U.S. Forest Service	8,190	Qal	170	5	5-16-74	S	Collection system for stock and wildlife.
11.7.16.444 Seco Spring	35°10'28" 107°34'22"	do.	7,990	Qal	190	2	5-16-74	S	Flow is from pipe apparently driven.
11.7.24.143 Leeds Spring	35°10'04" 107°31'55"	Pueblo of Laguna	7,280	Qal	560	< .5 E	10-12-73	N	Former domestic supply.
11.7.26.144 Eagle Nest Springs	35°09'17" 107°32'52"	do.	7,500	QTb	280	-	10-12-73	N	Combined flow of several springs is 30 gal/min estimated.
11.7.27.114 Kose Spring	35°09'30" 107°34'08"	do.	7,600	Kmv	260	2	10-12-73	N	Former domestic supply.
11.7.27.314 Turkey Spring	35°09'04" 107°34'06"	do.	7,360	Qal	280	< 1 E	10-12-73	N	Had larger discharge during spring. 1973.
11.7.33.224 Hiyi Spring	35°08'37" 107°34'25"	do.	7,100	Km	310	2	10-12-73	S	Spring developed for stock use.
11.7.35.421 -	35°08'18" 107°32'26"	do.	6,700	Kmv	650	< 1/2 E	8-8-78	N	-
12.1.18.134 Ojito Spring	35°16'12" 106°59'13"	do.	5,515	Qal	600*	-	6-17-74	D,	Not able to observe flow.

Table 3. Description of formation cuttings for selected wells

Location number: 9.5.9.231 (see text for explanation)
Local well name: Laguna 78-1 test well
Samples described by E. T. Padgett
Formation determinations by D. W. Risser

Interval in feet below land surface	Description
	Quaternary:
	Sand dune:
0-10	Sand, 50 percent, grayish-orange-pink (5YR 7/2 1/), fine- to medium-sized, fair sorting, mostly quartz, subangular; Silt, 50 percent, grayish-orange-pink (5YR 7/2).
10-20	Sand, 90 percent, light-brown (5Yr 6/4), medium- to coarse, fair sorting, mostly quartz, subrounded, frosted grains, minor dark minerals, poorly-consolidated, non-calcareous cement. Rock and mineral fragments, 10 percent, various colors and types, very coarse-grained to pebble size, angular to subangular.
	Jurassic:
	Bluff Sandstone:
20-30	Sandstone, 95 percent, same as interval 10-20 except grains are medium grained and subangular. Calcareous cement. Rock and mineral fragments same as 10-20 except very coarse grained.
30-60	Sandstone, 100 percent, light-brown (5YR 6/4), fine-grained, mostly quartz, minor dark minerals, subangular, some rounded frosted grains, poorly consolidated, non-calcareous cement.
60-75	Sandstone, 100 percent, same as interval 40-50 except very fine to fine-grained.
75-80	Sandstone, 100 percent, light-brown (5YR 5/6) very fine-grained, well-sorted, mostly quartz, subangular. Poorly cemented, noncalcareous cement.
80-85	Sandstone, 100 percent, same as 75-80, except has calcareous cement.
85-90	Sandstone, 100 percent, light-brown (5YR 5/6), fine- to medium-grained, moderately sorted, subrounded to well-rounded, mostly quartz, poorly cemented, calcareous.

1/ Refers to color designation in Goddard (1948)

Table 3. Description of formation cuttings for selected wells - Continued

Interval in feet below land surface	Description
	Jurassic:
	Bluff Sandstone - continued:
90-95	Sandstone, 100 percent, light-brown (5YR 5/6), fine-grained, mostly quartz, well-sorted, subangular to subrounded, very poorly cemented, calcareous cement.
95-100	Sandstone, 100 percent, light-brown (5YR 6/4) fine-grained, well-sorted, angular grains, mostly quartz, poorly cemented, noncalcareous cement.
100-110	Sandstone, 45 percent, moderate-brown (5YR 4/4), fine-grained, some medium grains, fair sorting, mostly quartz, subrounded grains, well-cemented, noncalcareous cement. Sand, 50 percent, light-brown (5YR 6/4), medium- to fine-grained, fair sorting, mostly quartz, angular to subangular, poor consolidation. Black minerals, 5 percent.
110-115	Sandstone, 100 percent, light-brown (5YR 6/4), fine-to medium-grained, some coarse grains, fair sorting, mostly quartz, some dark minerals, subangular to angular, poorly consolidated, slightly effervescent.
115-120	Sandstone, 50 percent, light-brown (5YR 6/4), fine-grained, well-sorted, mostly quartz, very minor black minerals, angular to subangular, poorly consolidated, calcareous. Sandstone, 50 percent, moderate-brown, (5YR 4/4), very fine-grained to fine-grained, fair sorting, thin streaks of white sandstone, good consolidation, noncalcareous cement.
120-125	Sandstone, 100 percent, light-brown (5YR 5/6) fine- to coarse-grained, poorly sorted, mostly quartz; coarse grains are rounded; medium to fine grains are subangular, poorly consolidated.
125-130	Sandstone, 95 percent, same as 120-125. Sandstone, 5 percent, moderate-brown (5YR 4/4), fine to medium-grained, fair sorting, mostly quartz, subrounded, good consolidation, calcareous cement.
130-135	Sandstone, 95 percent, same as 120-125. Sandstone, 5 percent, same as 125-130.
135-140	Sandstone, light-brown (5YR 6/4), fine- to medium-grained, fair sorting, mostly quartz, subangular, some frosted graine, poorly consolidated, calcareous cement.

Table 3. Description of formation cuttings for selected wells - Continued

Interval in feet below land surface	Description
	Jurassic:
	Bluff Sandstone - concluded:
140-145	Sandstone, 90 percent, same as 135-140. Sandstone, 10 percent, moderate-brown, (5YR 4/4), very fine-grained, well-sorted, mostly quartz, sub-angular, fairly well consolidated, calcareous cement.
	Summerville Formation:
145-150	Siltstone, 100 percent, moderate brown (5YR 4/4), sandy. Fairly well consolidated, calcareous cement.
150-155	Siltstone, 100 percent, light-brown (5YR 6/4), very sandy, very fine-grained very well-consolidated, calcareous cement.
155-160	Sandstone, 100 percent, light-brown (5YR 6/4), very fine to silty, well-sorted, friable poorly consolidated, calcareous cement.
160-165	Siltstone, 100 percent, same as 145-150.
165-170	Sandstone, 100 percent, same as 155-160.
170-180	Siltstone, 100 percent, light-brown (5YR 6/4). Very sandy; very fine-grained sand. Very well consolidated, calcareous cement.
180-190	Sandstone, 100 percent, light-brown (5YR 6/4). Very silty; very fine-grained. Well sorted. Fairly well consolidated, friable, calcareous cement.
190-200	Sandstone, 85 percent, light-brown (5YR 6/4), very fine to fine-grained. Fair sorting, mostly quartz, subangular, poorly consolidated, calcareous cement. Sandstone, 10 percent, very pale-orange (10YR 8/2), appears white in sample, fine-grained, well-sorted, mostly quartz, subrounded, only slightly effervescent, Sandstone, 5 percent, same as 140-145 (second constituent).
200-210	Sandstone, 90 percent, light brown (5YR 6/4), very fine-grained, fairly well-sorted, mostly quartz, minor black minerals, subangular, some frosted grains, poorly consolidated. Sand, 5 percent, same as 190-200 (second constituent). Sand, 5 percent, same as 140-145, (second constituent).
210-220	Sandstone, 100 percent, light brown (5YR 6/4), very fine-grained to silt, well-sorted, mostly quartz, minor black minerals, sub-angular, well-consolidated, calcareous cement.

Interval in feet below land surface	Description
	Jurassic:
	Summerville Formation - Concluded:
220-230	Sandstone, 80 percent, moderate-brown (5YR 4/4), very fine-grained and silty, fair sorting, mostly quartz, subangular, subrounded, well-consolidated, calcareous cement. Streaks of white sandstone (20 percent) same as 190-200 (second constituent) except effervescent.
230-240	Sandstone, 80 percent, light-brown (5YR 6/4), same as 210-220. Sandstone streaks, 20 percent, same as 190-200, (second constituent), except effervescent.
240-250	No sample.
250-260	Sandstone, 90 percent, same as 210-220, Sandstone streaks, 5 percent, same as 190-200 (second constituent) except pinkish-gray (5YR 8/1) and effervescent. Sandstone, 5 percent, same as 140-145 (second constituent), minor white streaks.
260-270	Sandstone, 90 percent, grayish-orange-pink (5YR 7/2) very fine-grained, well-sorted, mostly quartz, minor dark minerals, subangular to subrounded, very poorly consolidated. Sandstone, 5 percent, same as 140-145. Sandstone, 5 percent, same as 190-200 except very light-gray (N8).
270-280	Sandstone, 90 percent, very-light-gray (N8), very fine-grained, well-sorted, mostly quartz, minor black minerals, subangular, well-consolidated, calcareous cement. Sandstone, 10 percent, grayish-orange-pink (5YR 7/2) fine-grained, well-sorted, mostly quartz, some minor black minerals, fair consolidation, calcareous cement. Appears to have sharp contact with above sandstone.
	Tertiary:
	Diabase:
280-290	**Porphyritic** plagioclase sandstone, 45 percent, **porphyritic** plagioclase same as 270-280 (first constituent). Diabase, 55 percent, greenish-black (5G 2/1), finely crystalline, **porphyritic** plagioclase.
290-300	Diabase, 90 percent, same as 280-290, Sand, 10 percent, color undefinable due to the basalt, very-fine to fine-grained, sorting undefinable, mostly quartz, subangular to subrounded, poorly consolidated. Very few fragments of sandstone, same as 270-280, (first constituent).

Table 3. Description of formation cuttings for selected wells - Continued

Interval in feet below land surface	Description
	Jurassic:
	Summerville Formation:
300-310	Sandstone, 30 percent, grayish-orange-pink (5YR 7/2), very-fine-grained to silty, fair to good sortine, mostly quartz, minor black minerals, subangular, fair consolidation, calcareous cement. Sandstone, 60 percent, light-gray (N7), very-fine-grained to silty, fair to good sorting, mostly quartz, minor black minerals, subangular, good consolidation, calcareous cement.
	Note: Both of these sandstones have incorporated medium to coarse grained pieces of a black material, possibly diabase. The material may or may not be a true part of the sample. Diabase, 10 percent same as 280-290.
	Todilto Limestone:
310-320	Gypsum, 70 percent, light-gray to white (N7, N8, N9), microcrystalline. Limestone, 10 percent, medium-dark gray (N4), microcrystalline. Silt, 10 percent, white to very light-gray (N9, N8), possible gypsum. Sand, 10 percent, grains of various colors, fine to very-fine, mostly quartz, unconsolidated.
320-330	Sample same in all respect to 320-330, except gypsum, 60 percent; limestone, 20 percent.
330-340	Sample same in all respect to 320-330, except gypsum, 50 percent; limestone, 30 percent.
340-350	Gypsum, 50 percent, white. Limestone, 30 percent, medium gray (5, N4). Sand, 10 percent, various colors, very-fine and fine-grained to silty, cannot determine sorting, mostly quartz, subangular, poor consolidation.
350-355	Same as above in all respects.
355-360	Sandstone, 50 percent, pinkish gray (5YR 8/1), fine and very fine-grained to silty, fair to poor sorting, mostly quartz, fine grains subangular, poor consolidation. Gypsum, 25 percent, white. Limestone, 25 percent, medium-gray to dark-medium-gray (N5, N4).
360-370	Same as above.
370-380	Limestone, 75 percent; medium-gray to medium-dark-gray to dark-gray (N5, N4, N3). Gypsum, white, 10 percent. Sand, 15 percent, very-light-gray (N8), very fine-grained to silty, good sorting, mostly quartz, subangular, poor consolidation.

Table 3. Description of formation cuttings for selected wells - Continued

Interval in feet below land surface	Description
	Jurassic:
	Entrada Formation:
380-390	Sandstone, 90 percent, pinkish-gray (5YR 8/1) very fine-grained, well sorted, mostly quartz, subangular. Limestone, 10 percent, same as above. Included in sample are two pieces of a black unidentified mineral.
390-400	Sandstone, 98 percent, yellowish-gray (5Y 8/1) fine-grained, well-sorted, mostly quartz, angular to subangular, poor consolidation, $CaCo_3$ cement, minor dark minerals. Limestone, 2 percent, same as above.
400-410	Sandstone, 100 percent, grayish-orange-pink (5YR 7/2), very fine-grained, well-sorted, mostly quartz, minor dark minerals, subangular, poorly consolidated, calcareous cement.
410-420	Sandstone, 100 percent, light-brown, (5YR 6/4), fine-grained, some medium grains, well sorted, mostly quartz, minor dark minerals, subangular, poor consolidation, calcareous cement.
420-430	Sandstone, 70 percent, light-brown (5YR 6/4), fine to very fine-grained, fair sorting, mostly quartz, minor dark minerals, subangular, poor consolidation, calcareous cement. Sandy silt, 30 percent, pale-brown, (5YR 5/2), very fine-grained, good sorting, subangular grains, well-consolidated, noncalcareous cement.
430-440	Sandstone, 100 percent, light-brown (5YR 6/4), very fine to medium-grained, poor sorting, mostly quartz, minor dark minerals, smaller grains subangular, larger sub-rounded to rounded, some frosted, poor consolidation, calcareous cement.
440-450	Siltstone, sandy, 100 percent, light-brown (5YR 6/4). Silt, 50 percent. Sand, 50 percent, same as 430-440.
450-460	Sandstone, 100 percent, same as 430-440.
460-470	Sandstone, 100 percent, same as 430-440, except fine-grained, minor medium grains, good sorting.
470-480	Sandstone, 100 percent, same as 430-440.
480-490	Sandstone, silty, 100 percent, light-brown (5YR 6/4), very fine to fine grained, fair sorting, mostly quartz, smaller grains subangular, some medium grains rounded poor consolidation calcareous cement.

Table 3. Description of formation cuttings for selected wells - Continued

Interval in feet below land surface	Description
	Jurassic:
	Entrada Formation - concluded:
490-500	Sandstone, 100 percent, same as 480-490.
500-510	Siltstone, 50 percent, moderate-brown (5YR 4/4), very fine-grained to silt, streaks of white sand. Sand, 40 percent, very light-gray, fine grained, mostly quartz, minor dark minerals, well-consolidated, carbonate cement. Sand, 10 percent, same as 480-490.

Table 3. Description of formation cuttings for selected wells - Continued

Location: 9.6.2.123 (see text for explanation)
Well name: Laguna 76-7
Samples described by F. P. Lyford

Interval in feet below land surface	Description
	Quaternary:
	Alluvium:
0-10	Silt, 100 percent, pale-yellowish-brown (10YR 6/2).
10-15	Silt, 100 percent, pale-yellowish-brown (10YR 6/2) with white calcareous fragments, sandy.
15-20	Sand and gravel, 100 percent, light-brown (5YR 6/4), very fine to pebble sized, silty, mostly quartz and basalt fragments.
20-40	Silt, 100 percent, light-brown (5YR 6/4). Minor gravel. Slightly sandy.
40-60	Silt, 100 percent, pale-red (10R 6/2), very sandy.
60-75	Gravel, 100 percent, granule and pebble, many rock types including quartz, limestone, various igneous rocks, and sandstone. (Samples well washed.)
75-80	Sand, 100 percent, light-brown (5YR 6/4), fine to medium-grained, mostly quartz, subrounded, some frosted. Minor gravel.
80-85	Sand, 70 percent, as above. Gravel, 30 percent, as above. Minor very light-gray (N8) clay.
85-90	As above except more clay.
90-95	Gravel, 80 percent, as above. Sand, 10 percent, as above. Clay, 10 percent, as above.
95-110	Sand, 100 percent, very pale-orange (10YR 8/2), well sorted, mostly quartz, subrounded, frosted. Minor gravel.
110-125	Silt, 100 percent, light-brown (5YR 6/4).
125-130	Gravel, 100 percent, granule and pebble, many rock types as above. Minor silt as above.
130-135	Silt, 100 percent, light-brown (5YR 6/4), very sandy.
135-155	Sand, 80 percent, grayish-orange-pink (5YR 7/2), medium-grained, quartz. Gravel, 20 percent, as above. (Very clean samples).
155-170	As above but less gravel.

Table 3. Description of formation cuttings for selected wells - Continued

Location: 9.6.5.222 (see text for explanation)
Well name: Laguna 76-6
Samples described by F. P. Lyford

Interval in feet below land surface	Description
	Quaternary:
	Alluvium and basalt:
0-5	Sand, 100 percent, very fine to very coarse grained, silty, mostly quartz, angular to subangular, some white calcareous fragments.
5-10	As above, somewhat finer.
10-15	As above. Scattered subangular granules of quartz and igneous rocks.
15-20	As above (mostly medium-grained).
20-25	As above (more basalt particles).
25-30	Basalt, 100 percent, dark-gray (N3), medium crystalline. Scattered rounded sandstone fragments.
30-35	Basalt, 100 percent, as above. Much sand, probably cavings.
35-40	Sand, 70 percent, light-brown (5YR 6/4), mostly fine-grained, very silty. Basalt, 30 percent, as above.
40-45	Sand, 100 percent, as above, scattered granules of basalt and quartzose rocks, minor gastropod shells.
45-55	Silt, 100 percent, brownish-gray (5YR 4/1). Minor sand.
55-60	No sample.
60-70	Basalt, 100 percent, black (N1), coarsely crystalline. Minor quartz sand.
70-75	Basalt, 50 percent, as above. Clay, 50 percent, light-brown (5YR 6/4), silty, slightly sandy.
75-80	Sand and gravel, 70 percent, reddish tinges, medium grained to granule, composed mostly of quartz and quartzite with some sandstone and limestone particles, angular to subangular. Basalt, 30 percent as above.

Table 3. Description of formation cuttings for selected wells - Continued

Interval in feet below land surface	Description
	Quaternary:
	Alluvium and basalt - concluded:
80-105	Sand and gravel, 100 percent as above except grains are rounded.
105-110	Gravel, 60 percent, as above. Clay 40 percent, grayish-orange (10YR 7/4).
110-115	Gravel, 100 percent, granule and pebble, colorful, includes limestone, sandstone, quartzite, various crystalline rocks, quartz, rounded to subrounded.
115-120	Sandstone, 100 percent, pale-red (10R 6/2), fine to medium-grained, poorly cemented, quartz, angular to rounded, some frosted.

Table 3. Description of formation cuttings for selected wells - Continued

Location: 9.6.26.443 (see text for explanation)
Well name: Timia
Described by John J. Rote
Formation picks by D. W. Risser

Interval in feet below land surface	Description
	Quaternary:
	Alluvium:
0-25	Silt, pale-yellowish-brown (10YR 6/2); with some medium-grained sand (25 percent).
25-30	Silt, moderate-yellowish-brown (10 YR 5/4), with very-fine to fine-sand (25 percent) highly cemented and calcareous.
	Jurassic:
	Bluff Sandstone:
30-45	Sandstone, grayish-orange (10YR 7/4), very-fine to fine-grained, highly cemented and calcareous.
45-50	Same as 30-35; at 49 feet sandstone, very pale-orange (10YR 8/2) to pale-yellowish-orange (10YR 8/6), fine to medium-grained, moderately cemented and slightly calcareous; water seep here yields approximately 1/4 gallon per minute with a specific conductance of 450.

Table 3. Description of formation cuttings for selected wells - Continued

Interval in feet below land surface	Description
	Jurassic
	Bluff Sandstone - Continued
50-90	Same as 49-50; at 54 feet sandstone, very pale-orange (10YR 8/2), very-fine to fine-grained hightly cemented and calcareous.
90-105	Same as 54-55; slightly higher percentage of fine sand and not calcareous.
105-110	Same as 54-55; at 106 feet siltstone, light-brown (5YR 6/4), calcareous.
110-115	Siltstone, grayish-orange-pink (5Yr 7/2), calcareous. Sandstone at 112-113 feet, pinkish-gray (5YR 8/1), silt to very fine-grained, moderate to highly cemented and calcareous.
115-120	Sandstone, very light-gray (N8), silt to very fine-grained, calcareous, spotted (1 percent) with brown and black minerals.
120-125	Sandstone, very light-gray (N8), very fine to fine-grained, calcareous, spotted (1 percent) with brown and black minerals.
125-130	Sandstone, light-brown (5YR 6/4), silt to very fine-grained, calcareous, with 10 percent unknown brown mineral.
130-135	Same as 125-130.
135-140	Sandstone, light-brown (5YR 6/4) and white (N9), silt to very fine-grained, very calcareous, with 10 percent unknown brown mineral.

Table 3. Description of formation cuttings for selected wells - Continued

Interval in feet below land surface	Description
	Jurassic
	Bluff Sandstone - Concluded
140-145	Sandstone, pinkish-gray (5YR 8/1), silt to very fine-grained, very calcareous, with 5 percent unknown brown mineral.
145-160	Sandstone, grayish-orange-pink (5YR 7/2), silt to very fine-grained, calcareous, with 5 percent brown and pale blue green (5BG 7/2) minerals.
160-170	Sandstone, light brown (5YR 6/4) and white streaks (N9), silt to very fine-grained, calcareous, unknown minerals above are absent.
	Summerville Formation:
170-175	Siltstone, light-brown (5YR 6/4), with very fine-grained sand, calcareous with 5 percent brown, pale-blue-green minerals and bits of mica.
175-200	Siltstone, light-brown (5YR 6/4) and white streaks (N9), calcareous, with very fine-grained sand.
200-215	Siltstone, light-brown (5YR 6/4), calcareous.
215-250	Same as 200-205; with bits of mica.
250-255	Siltstone, grayish-orange-pink (5YR 7/2), calcareous, with very-fine sand and bits of mica and of unknown brown mineral.
255-290	Sandstone, grayish-orange-pink (5YR 7/2), silt to very fine-grained, calcareous, with bits of mica and of an unknown brown mineral.

Table 3. Description of formation cuttings for selected wells - Continued

Interval in feet below land surface	Description
	Jurassic:
	Summerville Formation - concluded:
290-295	Sandstone, pinkish-gray (5YR 8/1), silt to very fine-grained, calcareous, with bits of unknown brown mineral.
295-300	Same as 290-295.
	Todilto Formation:
300-305	Sandstone, pinkish-gray (5YR 8/1), silt to very fine-grained; and limestone (25 percent), medium gray (N5).
305-310	Same as 300-305; except increase in limestone (40 percent).
310-315	Same as 300-305 except increase in limestone (50 percent).
315-320	Same as 310-315.
	Entrada Sandstone:
320-325	Sandstone, very pale-orange (10YR 8/2), silt to very fine-grained, calcareous, with bits of limestone and (5 percent) fine to medium-grained sand.
325-340	Sandstone, very-pale-orange (10YR 8/2), silt to fine-grained, calcareous, with bits of mica and unknown brown mineral.
340-345	Sandstone, grayish-orange-pink (5YR 7/2), silt to fine-grained, calcareous, with bits of mica and unknown brown mineral.
345-430	Sandstone, light-brown (5YR 6/4), silt to fine-grained; calcareous with bits of mica and unknown brown mineral.
430-440	Sandstone, light-brown (5YR 5/6) with touches of white (N9), silt to very fine-grained, calcareous, with siltstone (10 percent), moderate brown (5YR 4/4) and bits of mica.
440-445	Same as 430-435, except increase in siltstone (40 percent).
445-465	Siltstone, moderate-brown (5YR 4/4), and light-brown (5YR 5/6), calcareous, with very fine-grained, touches of white (N9) sand and bits of mica.
465-475	Siltstone, light-brown (5YR 5/6), calcareous, with bits of mica.

Table 3. Description of formation cuttings for selected wells - Continued

Interval in feet below land surface	Description
	Jurassic:
	Entrada Sandstone - concluded:
475-480	Siltstone, light-brown (5YR 5/6) to moderate-brown (5YR 4/4), calcareous, with touches of white (N9) siltstone.
480-505	Same as 475-480, except white absent.
505-510	Siltstone, light-brown (5YR 5/6), calcareous.
	Triassic:
	Chinle Formation:
510-530	Shale, moderate-reddish-brown (10R 4/6) to dark-reddish-brown (10R 3/4), calcareous.

Table 3. Description of formation cuttings for selected wells - Continued

Location: 10.6.35.342a (see text for explanation)
Well name: Laguna Ir. #2
Samples described by S. Craigg

Interval in feet below land surface	Description
	Quaternary:
	Alluvium and basalt:
0-10	Alluvium, moderate-brown (5YR 4/4) to moderate-reddish-brown (10R 4/6), fine sand to coarse gravel; sand is mostly subrounded quartz grains and gravel is fragments of light-brown sandstone with minor basalt fragments.
10-20	Gravel, subangular to angular; sphere, roller, and disc-shaped; mostly quartz, with minor feldspar, light brown sandstone, and basalt fragments.
20-30	Gravel, fragments of reddish-black rocks, light-brown sandstone, arkosic sandstone, feldspar, calcite, minor hornblende crystals, and basalt.
30-35	Same as above; pebble-sized particles present in this interval (large-screen).
35-40	Same as above (no large screen particles).
40-50	Same as above.
50-60	Same as above, mostly fragments of light-brown sand-stone and basalt.
60-70	Same as above.
70-80	Gravel, granules to medium pebbles, rock types represented include basalt, andesite, gray limestone, and light-gray, tan, and iron-stained sandstone (dry when described).
80-90	Gravel, as above, grain size from coarse sand to medium pebbles. No limestone fragments. Basalt fragments account for about 70 percent of sample. The smaller grain sizes are subangular to round.
90-94	Gravel, as above. Shaley limestone in small amounts. Minor amount of light brown quartzite chips. Basalt fragments account for about 60 percent of sample.

Table 3. Description of formation cuttings for selected wells - Continued

Interval in feet below land surface	Description
	Quaternary:
	Alluvium and basalt - concluded:
94-100	Gravel, as above.
100-110	Gravel, as above. Basalt chips account for about 50 percent of sample. Cream-colored dendritic limestone chips present in small quantities.
110-120	Gravel, as above, 50 percent. Medium-grained, well-rounded, frosted, clean quartz sand accounts for other 50 percent of sample.
120-130	Gravel, as above, 80 percent. Quartz sand, as above, 20 percent.
130-140	Gravel as above, 20 percent. Sandstone, light brown (5YR 6/4), 80 percent, medium to coarse-grained, mostly quartz, subround, polished grains, friable, clay matrix, slightly calcareous.
140-146	Gravel, as above, 15 percent. Sandstone, as above 85 percent, grain size is fine to coarse.
146-150	Gravel, as above, 15 percent. Sandstone, as above, 70 percent. Clay, 15 percent, grayish pink (5R 8/2).
150-156	Gravel, as above, 10 percent. Sandstone, as above, 60 percent. Clay, as above, 5 percent. Highly calcareous "grainy" gypsum, white, 25 percent.
156-160	Same as above.

Table 3. Description of formation cuttings for selected wells - Continued

Location: 10.7.10.122 (see text for explanation)
Well name: Seco Canyon 1
Samples described by John J. Rote

Interval in feet below land surface	Description
	Quaternary:
	Alluvium:
0-5	Basalt boulders, medium-dark-gray (NH); with silt, moderate-yellowish-brown (10YR 5/4); slightly calcareous.
5-10	Same as 0-5.
10-15	Same as 0-5.
15-20	Silt, yellowish-gray (5Y 7/2) and sandstone gravel, dark-yellowish-orange (10YR 6/6).
20-25	Same as 15-20.
25-30	Same as 15-20.
30-35	Silt, light-olive-gray (5Y 6/1).
35-40	Shale, medium-light-gray (N6).

Table 3. Description of formation cuttings for selected wells - Continued

Location: 10.7.10.213 (see text for explanation)
Well name: Laguna 79-1
Samples described by D.W. Risser
Samples described wet unless noted

Interval in feet below land surface	Description
	Quaternary:
	Alluvium:
0-10	Alluvium, unconsolidated silt, sand and rock fragments; grayish-orange (5 YR 7/2-dry), 60 percent silt and sand, 30 percent sandstone rock frags, 10 percent basalt fragments, calcareous.
10-20	Alluvium, as above.
20-30	Alluvium, as above.
30-40	Alluvium, pale-yellow-brown (10YR 6/2-dry), 80 percent gravel composed mainly of sandstone and basalt rock fragments with minor clay, silt and sand 20 percent, mostly quartz grains.
40-50	Alluvium, as above.
50-60	Alluvium, as above.
	Cretaceous:
	Mancos Shale:
60-70	Shale, 90 percent, medium-dark-gray, (N4), silty, poorly-indurated, calcareous, sandstone and basalt 10 percent, probably cavings.
70-80	Shale, 90 percent, medium-dark-gray, (N4), silty, poorly-indurated, calcareous, sandstone and basalt 10 percent, probably cavings.
80-90	Shale, 85 percent, as above, sandstone and basalt 15 percent, probably cavings.
90-100	Shale, 100 percent, as above, minor sandstone and basalt fragments present.
100-110	Shale, 100 percent, as above, very sticky, poorly indurated, minor sandstone and basalt.
110-120	Shale, 100 percent, as above with minor sandstone and basalt.

Table 3. Description of formation cuttings for selected wells - Continued

Interval in feet below land surface	Description
	Cretaceous:
	Mancos Shale - continued:
120-130	Shale, 100 percent, medium-dark-gray, (N4), very silty, calcareous, poorly indurated.
130-140	Shale, 100 percent, as above with minor sandstone.
140-150	Shale, 100 percent, medium-dark-gray, (N4), silty, carbonaceous calcareous, less sticky and better indurated than above, fissility more apparent.
150-160	Shale, 100 percent, as previous interval.
160-170	Shale, 97 percent, as previous interval with 3 percent basalt fragments.
170-180	Shale, 95 percent, as above with basalt and sandstone 5 percent.
180-190	Shale, 100 percent, medium-dark-gray, (N4), silty, carbonaceous sticky, not as well indurated as previous 40 feet, highly calcareous.
190-200	Shale, 100 percent, as above poorly indurated and slightly calcareous.
200-210	Shale, 100 percent, as above.
210-220	Shale, 100 percent, as above.
200-230	Shale, 100 percent, medium-dark-gray, (N4), silty, contains abundant well-rounded, sand-size quartz grains, carbonaceous, calcareous fissile, better indurated than previous 40 feet.
230-240	Shale, 100 percent, as above.
240-250	Shale, 100 percent, as above.
250-260	Shale, 100 percent, as above, with minor sandstone.
260-270	Shale, 100 percent, as above, with minor sandstone.
270-280	Siltstone, 80 percent, medium-dark-gray, (N4), clayey, carbonaceous, sand-size quartz grains present, highly calcareous shale 20 percent, medium-dark-gray, (N4), silty, calcareous.

Table 3. Description of formation cuttings for selected wells - Continued

Interval in feet below land surface	Description
	Cretaceous:
	Mancos Shale - concluded:
280-290	Siltstone, 70 percent, as above, shale 20 percent as above, sandstone 10 percent, light-brown (5 YR 5/6), composed mainly of quartz and feldspar, minor sand-size quartz grains present, minor marcasite.
290-300	Shale, 50 percent, medium-dark-gray, (N4), very sandy, sand predominantly well-rounded quartz grains, silty, calcareous; siltstone 50 percent, medium-dark-gray, (N4), clayey, calcareous.
	Dakota Sandstone:
300-310	Sandstone, 80 percent, medium-dark-gray, (N4), very fine-grained, composed mainly of well-rounded quartz, silty, friable, carbonaceous calcareous; siltstone 20 percent, as above.
310-320	Sandstone, 100 percent, as above.
320-330	Sandstone, 100 percent, as above with minor moderate-reddish-brown (10 R 4/6) sandstone.
330-340	Sandstone, 100 percent, as above, with slightly more clay content.
340-350	Sandstone, 100 percent, as above.
350-360	Sandstone, 100 percent, as above.
360-370	Sandstone, 100 percent, as above.
370-380	Siltstone, 90 percent, medium-dark-gray, (N4), very sandy with well-rounded quartz, carbonaceous, calcareous; shale 10 percent medium-dark-gray, silty, poorly indurated, calcareous.
380-390	Siltstone, 50 percent, as above; sandstone, 50 percent, medium-gray, (N5), composed of well-rounded quartz, silty, friable, carbonaceous, calcareous.
390-400	Siltstone, 60 percent, medium-dark-gray, (N4), sandy, carbonaceous, calcareous; sandstone, 20 percent, as above; shale 20 percent, poorly indurated, calcareous.
400-410	Siltstone, 50 percent; shale, 50 percent, as above.

Table 3. Description of formation cuttings for selected wells - Continued

Interval in feet below land surface	Description
	Cretaceous:
	Mancos Shale:
410-420	Shale, 100 percent, dark-gray, (N3), silty and sandy sticky, poorly indurated, less calcareous than previous intervals.
420-430	Shale, 100 percent, as above.
430-440	Shale, 100 percent, as above but sandier and less sticky.
440-450	Siltstone, 100 percent, medium-dark-gray, (N4), very silty, abundant sand size quartz grains, very clayey, sticky and friable, highly calcareous.
450-460	Siltstone, 100 percent, as above.
460-470	Siltstone, 100 percent, dark-gray, (N3), hard, brittle, silty with sand-size quartz present, slightly calcareous, carbonanceous.
470-480	Siltstone, 100 percent, as above.
480-490	Siltstone, 100 percent, as above.
490-500	Siltstone, 100 percent, grayish-black, (N2), poorly indurated, silty, calcareous.
500-510	Siltstone, 95 percent, as above but much sandier; sandstone, 5 percent, white (N9), composed of very fine-grained quartz, calcareous.
	Dakota Sandstone:
510-520	Sandstone, 90 percent, medium to light-gray, (N5-N7), composed of very-clean, fine-grained, well-rounded quartz, silty, calcareous, friable; shale, 10 percent, grayish-black, (N2), silty, calcareous.
520-530	Sandstone, 50 percent, as above but somewhat coarser; shale, 50 percent, as above.
530-540	Sandstone, 60 percent; shale, 40 percent, as above.
540-550	Shale, 70 percent, medium-dark-gray, (N4), very silty and sandy, poorly indurated, calcareous; sandstone, 30 percent, as above.
550-560	Shale, 50 percent; sandstone, 50 percent, as above.

Table 3. Description of formation cuttings for selected wells - Continued

Interval in feet below land surface	Description
	Cretaceous:
	Dakota Sandstone - concluded:
560-570	Sandstone, 90 percent, light-gray, (N3), composed of very fine-grained, well-rounded quartz, and minor dark minerals, friable, highly calcareous; siltstone, 10 percent, dark-gray, (N3), sandy, calcareous, minor chert present.
570-580	Sandstone, 90 percent, as above; shale, 10 percent, dark-gray, (N3), silty, calcareous, minor chert present.
	Mancos Shale:
580-590	Shale, 100 percent, medium-dark-gray, (N4), silty, carbonaceous, calcareous, poorly indurated.
590-600	Shale, 100 percent, as above but much sandier.
	Dakota Sandstone:
600-610	Sandstone, 90 percent, light to medium-dark-gray, (N4-N7), medium to very fine-grained quartz, well-rounded, minor dark minerals, friable, slightly calcareous, carbonaceous; siltstone, 10 percent, medium-dark gray, (N4), very clayey, carbonaceous, calcareous.
610-620	Sandstone, 90 percent; siltstone, 10 percent, as above.
620-630	Sandstone, 90 percent; siltstone, 10 percent, as above.
630-640	Sandstone, 90 percent; siltstone, 10 percent, as above.
	Jurassic:
	Morrison Formation, Brushy Basin Member:
640-650	Sandstone, 70 percent, very-light to medium-gray, (N8-N5), composed of rounded to subangular quartz, medium to very-fine-grained, darker colored sandstone contains silt and carbonaceous material, minor pyrite also present, friable, non-calcareous; siltstone, 30 percent, dark-gray, (N3), clayey with some sand-size quartz grains, calcareous, carbonaceous.
650-660	Sandstone, 80 percent; siltstone, 20 percent, as above.
660-670	Sandstone, 80 percent; siltstone, 20 percent, as above.

Table 3. Description of formation cuttings for selected wells - Continued

Interval in feet below land surface	Description
	Jurassic:
	Morrison Formation, Brushy Basin Member - continued:
670-680	Shale, 60 percent, greenish-gray, (5 G 6/1), slightly silty, non-calcareous; sandstone, 40 percent, very light-gray to medium-gray (N8-N5), composed mainly of very-fine to fine-grained, rounded to subangular quartz. Sandstone varies from very well-washed orthoquartzite to a very silty, carbonaceous sandstone. Silty sandstone is calcareous, orthoquartzite is non-calcareous.
680-690	Siltstone, 40 percent, medium-dark-gray, (N4), very clayey, calcareous, carbonaceous; claystone, 40 percent, very-light-gray to greenish-gray (N8-5 G 6/1), slightly silty, noncalcareous; sandstone, 20 percent, very light-gray to light-gray (N8-N7), very-fine to fine-grained, rounded to subangular quartz, calcareous.
690-700	Siltstone, 40 percent; claystone, 40 percent; sandstone, 20 percent, as above.
700-710	Siltstone, 40 percent; sandstone, 40 percent; claystone, 20 percent, as above.
710-720	Claystone, 40 percent; siltstone, 30 percent; sandstone, 30 percent, as above.
720-730	Sandstone, 50 percent; claystone, 25 percent; siltstone, 25 percent, as above.
730-740	Sandstone, 40 percent, very light-gray to medium light-gray, (N8-N6), composed mainly of subangular quartz grains, some grains iron-stained, fine-grained, minor carbonaceous material, calcareous. Claystone, 40 percent, yellowish-gray to greenish-gray with minor brownish-gray, (5 Y 8/1 - 5GY 6/1), slightly silty, non-calcareous. Siltstone, 20 percent, light to medium-gray (N7-N5), clayey and sandy, carbonaceous, calcareous.
740-750	Claystone, 70 percent, mainly olive-gray (5 Y 4/1); siltstone, 20 percent; sandstone, 10 percent, as above.
750-760	Claystone, 70 percent; sandstone, 20 percent; siltstone, 10 percent as previous interval.

Table 3. Description of formation cuttings for selected wells - Continued

Interval in feet below land surface	Description
	Jurassic:
	Morrison Formation, Brushy Basin Member - concluded:
760-770	Claystone, 50 percent, light-olive-gray (5 Y 6/1), to greenish-gray (5 G 6/1), much sandier than above. Sandstone, 40 percent, very light-gray (N8), to light-greenish-gray, (5 G 8/1). Siltstone, 10 percent, sandier and more carbonaceous than previous intervals.
770-780	Claystone, 50 percent; siltstone, 30 percent; sandstone, 20 percent, as previous interval.
780-790	Claystone, 50 percent; siltstone, 30 percent; darker colored medium-dark-gray, (N4); sandstone, 20 percent, as above.
790-800	Siltstone, 60 percent, medium-dark-gray, (N4), carbonaceous, as above; claystone, 30 percent; sandstone, 10 percent, as above.
800-810	Siltstone, 70 percent; claystone, 20 percent; sandstone, 10 percent, as above.
810-820	Siltstone, 60 percent; sandstone, 30 percent; claystone, 10 percent, as above.
	Morrison Formation, Westwater Canyon Member:
820-830	Sandstone, 80 percent, light-gray, (N7), composed mainly of fine to medium-grained, well-rounded to subangular quartz grains, contains carbonaceous material, but few accessory minerals, minor pyrite, very friable and poorly cemented, grains appear frosted. Siltstone, 15 percent, medium-dark-gray, (N4), greenish-gray, (5 G 6/1) and moderate-red (5 R 5/4), contains sand-size quartz and abundant clay, carbonaceous, calcareous. Claystone, 5 percent, light-brownish-gray, (5 YR 6/1) to dark-greenish-gray (5 G 4/1), silty, non-calcareous.
830-840	Sandstone, 80 percent; siltstone, 10 percent; claystone, 10 percent, as above.
840-850	Sandstone, 80 percent; siltstone, 15 percent; claystone, 5 percent as above.
850-860	Sandstone, 70 percent; siltstone, 25 percent; claystone, 5 percent, as above.

Table 3. Description of formation cuttings for selected wells - Continued

Interval in feet below land surface	Description
	Jurassic:
	Morrison Formation, Westwater Canyon Member - continued:
860-870	Sandstone, 80 percent; siltstone, 15 percent; claystone, 5 percent, as above.
870-880	Sandstone, 80 percent; siltstone, 15 percent; claystone, 5 percent, as above.
880-890	Sandstone, 90 percent; siltstone, 5 percent; claystone, 5 percent, as above.
890-900	Sandstone, 90 percent; siltstone, 5 percent; claystone, 5 percent, as above.
900-910	Sandstone, 90 percent; siltstone, 5 percent; claystone, 5 percent, as above.
910-920	Sandstone, 80 percent; siltstone, 15 percent; claystone, 5 percent, as above.
920-930	Sandstone, 75 percent; siltstone, 20 percent; claystone, 5 percent, as above.
930-940	Sandstone, 80 percent; siltstone, 15 percent; claystone, 5 percent, as above.
940-950	Sandstone, 80 percent; siltstone, 15 percent; claystone, 5 percent, as above.
950-960	Sandstone, 80 percent; siltstone, 15 percent; claystone, 5 percent, as above.
960-970	Sandstone, 80 percent; siltstone, 15 percent; claystone, 5 percent, as above.
970-980	Sandstone, 80 percent; siltstone, 15 percent; claystone, 5 percent, as above.
980-990	Sandstone, 80 percent; siltstone, 15 percent; claystone, 5 percent, as above.
990-1000	Sandstone, 80 percent, siltstone, 15 percent; claystone, 5 percent, as above.

Table 3. Description of formation cuttings for selected wells - Continued

Interval in feet below land surface	Description
	Jurassic:
	Morrison Formation, Westwater Canyon Member - concluded:
1,000-1,010	Sandstone, 70 percent; siltstone, 25 percent; claystone, 5 percent, as above.
1,010-1,020	Sandstone, 70 percent; siltstone, 25 percent; claystone, 5 percent, as above.
	Morrison Formation, Recapture Member:
1,020-1,030	Siltstone, 40 percent, dark-reddish-brown, (10 R 3/4), very-light to medium-dark-gray, (N8-N4), clayey and sandy, gray grains contain carbonaceous material, calcareous. Sandstone, 40 percent, yellowish-gray, (5 Y 8/1), to dusky-red, (10 R 2/2), composed of fine to medium-grained quartz, well-rounded to subangular, friable. Claystone, 20 percent, grayish-olive, (10 Y 4/2), to dark-greenish-gray, (5 G 4/1), slightly silty, non-calcareous, carbonaceous.
1,030-1,040	Siltstone, 40 percent; sandstone, 40 percent; claystone, 20 percent, as above.
1,040-1,050	Sandstone, 60 percent; siltstone, 30 percent; claystone, 10 percent, as above.
1,050-1,060	Sandstone, 50 percent; claystone, 30 percent; siltstone, 20 percent, as above.
1,060-1,070	Sandstone, 50 percent; siltstone, 30 percent; claystone, 20 percent, as above.
1,070-1,080	Sandstone, 50 percent; siltstone, 40 percent; claystone, 10 percent, as above.
1,080-1,090	Sandstone, 40 percent; siltstone, 40 percent; claystone, 20 percent, as above.
1,090-1,100	Sandstone, 60 percent; siltstone, 20 percent; claystone, 20 percent, as above.
1,100-1,110	Sandstone, 40 percent; siltstone, 30 percent; claystone, 30 percent, as above.
1,110-1,120	Siltstone, 40 percent; claystone, 40 percent; sandstone, 20 percent, as above.

Table 3. Description of formation cuttings for selected wells - Continued

Interval in feet below land surface	Description
	Jurassic:
	Morrison Formation, Recapture Member - continued:
1,120-1,130	Siltstone, 40 percent, harder and better indurated than above; sandstone, 30 percent; claystone, 30 percent, as above.
1,130-1,140	Siltstone, 40 percent; claystone, 40 percent; sandstone, 20 percent, as above.
1,140-1,150	Siltstone, 50 percent; claystone, 30 percent; sandstone, 20 percent, as above.
1,150-1,160	Siltstone, 60 percent; claystone, 20 percent; sandstone, 20 percent, as above.
1,160-1,170	Missing sample.
1,170-1,180	Sandstone, 50 percent; yellowish-gray (5 Y 8/1) to dusky-red (10 R 2/2), composed mainly of very-fine to medium-grained quartz, well-rounded to subangular grains, friable, calcareous. Siltstone, 40 percent, mainly light to medium-dark-gray (N3-N6), some grains dark-reddish-brown (10 R 3/4), clayey and sandy, gray grains contain abundant carbonaceous material, calcareous. Claystone, 10 percent, greenish-gray (5 GY 6/1), to dark-yellowish-brown (10 YR 4/2), non-calcareous.
1,180-1,190	Sandstone, 60 percent; siltstone, 30 percent; claystone, 10 percent, as above.
1,190-1,200	Sandstone, 50 percent; siltstone, 40 percent; claystone, 10 percent, as above.
1,200-1,210	Sandstone, 50 percent; siltstone, 40 percent; claystone, 10 percent, as above except more carbonaceous.
1,210-1,220	Sandstone, 60 percent; siltstone, 30 percent; claystone, 10 percent; sandstone and siltstone very carbonaceous, pyrite common.
1,220-1,230	Sandstone, 60 percent; siltstone, 30 percent; claystone, 10 percent; very carbonaceous with abundant pyrite, minor limestone also present.
1,230-1,240	Sandstone, 60 percent; siltstone, 30 percent; claystone, 10 percent; pyritic sandstone abundant and very carbonaceous.

Table 3. Description of formation cuttings for selected wells - Continued

Interval in feet below land surface	Description
	Jurassic:
	Morrison Formation, Recapture Member - concluded:
1,240-1,250	Sandstone, 65 percent; siltstone, 30 percent; claystone, 5 percent; as above, carbonaceous with pyrite abundant.
1,250-1,260	Sandstone, 60 percent; siltstone, 35 percent; claystone, 5 percent; as above with abundant pyrite.
1,260-1,270	Sandstone, 65 percent; siltstone, 35 percent; claystone, 5 percent; reddish-sandstone becoming more abundant, pyrite abundant.
1,270-1,280	Sandstone, 50 percent, as above; siltstone, 40 percent, with dark-reddish-brown color (10 R 3/4), more abundant than gray siltstone; claystone, 10 percent, as above.
1,280-1,290	Sandstone, 50 percent; siltstone, 40 percent; claystone, 10 percent, as previous interval.
1,290-1,300	Siltstone, 60 percent, dark-reddish-brown (10 R 3/4) and medium-dark-gray (N4); sandstone, 35 percent; claystone, 5 percent; as above, minor limestone presents.
1,300-1,310	Siltstone, 60 percent; sandstone, 35 percent; claystone, 5 percent, as above.
1,310-1,320	Siltstone, 70 percent, mostly medium-dark-gray (N4); sandstone, 25 percent; claystone, 5 percent, as above.
1,320-1,330	Siltstone, 70 percent, dark-reddish-brown and dark-gray; sandstone, 25 percent; claystone, 5 percent, as above, minor pyrite present.

Table 3. Description of formation cuttings for selected wells - Continued

Location: 10.7.36.424a (see text for explanation)
Well name: Laguna Ir. #1
Samples described by S. Craigg

Interval in feet below land surface	Description
	Quaternary:
	Alluvium and basalt:
0-10	Sand, light-brown (5YR 6/4), very-fine to fine-sand, angular to subround, well-sorted, moderate reaction to HCl, quartz-95 percent, dark minerals (Amphibole, biotite) - 5 percent (dry when described).
10-20	Sand and gravel, light-brown (5YR 5/6) to moderate brown (5YR 4/4), fine sand to fine gravel, average grain size is medium to coarse, angular to subround with angular dominating, poorly sorted, slight reaction to HCl, Quartz-60 percent, basalt rock fragments-25 percent, light-gray sandstone rock fragments-25 percent, light-gray sandstone rock fragments-10 percent, dark minerals-5 percent (dry when described).
20-24	Gravel, olive-black (5Y 2/1) to greenish black (5 GY 2/1), coarse sand to medium gravel, angular to subround with angular predominating, poorly sorted, basalt rock fragments-75 percent, Quartz-15 percent, gray sandstone and Quartzite fragments-10 percent (dry when described).
24-27	Gravel, olive-gray (5Y 4/1) to greenish-black (5 GY 2/1), very-coarse sand to coarse gravel, poorly sorted, angular to subangular, basalt rock fragments-85 percent; quartz, sandstone fragments, and Quartzite fragments-15 percent (wet when described).
27-30	Gravel, medium-gray (N5) to greenish black (5 GY 2/1), coarse sand to coarse gravel, poorly sorted, angular to subround, basalt rock fragments-75 percent, gray and pink Quartzite rock fragments and sand-25 percent (dry when described).
30-34	Gravel, brownish-black (5 YR 2/1), medium sand to coarse gravel, poorly sorted, angular to round, larger fragments are angular, smaller grains are more rounded. Basalt rock fragments-75 percent, coarse Quartz sand-5 percent, gray Quartz-25 percent (wet when described).

Table 3. Description of formation cuttings for selected wells - Continued

Interval in feet below land surface	Description
	Quaternary:
	Alluvium and basalt - continued:
34-49	Gravel, medium-gray (N5) to olive-gray (5Y 2/1), medium sand to coarse gravel, poorly sorted, angular to round, basalt rock fragments-80 percent, coarse Quartz sand 10 percent, gray Quartzite fragments-10 percent (dry when described).
49-55	Basalt, medium-dark-gray (N4), finely vesicular,--60 percent; a very light-gray, probably monesilicic rock with aphanitic testure (resembles a dacite/syenite rock)--25 percent; alluvial gravels and sands as described above-15 percent (dry when described).
55-65	Same as above, except basalt-85 percent; "dacite/syenite" rock-10 percent; gravels-5 percent, (dry when described).
65-75	Basalt, 100 percent, amydaloidal, medium dark gray (N4), vesicles are filled with silica, (dry when described).
75-85	Same as above; (wet when described).
85-90	Same as above; except occurs both as amygdaloidal and vesicular fragments (wet when described).
90-95	Basalt fragments-25 percent; alluvial sand-75 percent, light brown (5YR 5/6), fine to very-coarse sand, poorly sorted, angular to round, Quartz-80 percent, light-gray to iron-stained sandstone rock fragments-14 percent, dark minerals-3 percent, opaque minerals (magnetite)-3 percent (dry when described; driller reports to have broken through basalt layer in this interval).
95-100	Gravel, 70 percent, coarse sand to fine pebbles, angular to sub-round, poorly sorted, rock fragments and grains include the following: iron-stained sandstone chips, green (chloritic) schistose rock chips, light and dark-gray Quartzite chips, dark and opague minerals grains, "granitic" rock chips, pinkish white massive quartz chips. Basalt cuttings from above intervals-30 percent (dry when described).
100-105	Same as above, except cuttings are 80 percent gravel, fine sand to fine pebbles; 20 percent basalt fragments (dry when described).
105-115	Same as above, except gravel is 70 percent, basalt is 30 percent (dry when described).
115-125	Gravel, as above, except grain size from fine sand to coarse gravel. Only a minor amount of basalt cuttings (dry when described).

Table 3. **Description of formation cuttings for selected wells - Continued**

Interval in feet below land surface	Description
	Quaternary:
	Alluvium and basalt - concluded:
125-135	Gravel, as above, except grain size is very-fine sand to medium gravel; subround to round, medium-grained quartz sand becoming more common. Minor amount of basalt cuttings (dry when described).
135-145	Gravel, as above, except grain size is very-fine sand to fine pebbles. Very minor amount of basalt cuttings (dry when described).
145-155	Gravel as above; approximately 50 percent is Quartz sand, medium grained, subrounded. (Total depth of pilot hole is 155 feet).

*Note: Samples were washed to remove drilling mud, therefore a small amount of finer grained material in the cuttings was probably also washed out.

Location: 10.7.36.322 (see text for explanation)
Well name: Laguna 76-2
Sample described by Gary Levings

Interval in feet below land surface	Description
	Quaternary:
	Alluvium and basalt:
0-5	Top soil.
5-10	Sand, very silty (may be top soil), light-olive-gray (5Y 6/1) when dry, very fine to very coarse-grained, poorly sorted, subrounded, primarily quartz grains, some basalt and granite, unconsolidated.
10-15	Sand and silt (may be top soil), light-olive-gray (5Y 6/1) when dry, very fine to fine-grained with a few coarse grains, poorly sorted, primarily quartz grains, a few basalt and granite, unconsolidated.
15-20	Sand, light-olive-gray (5Y 6/1) when dry, very-fine to very coarse-grained, poorly sorted, subangular, quartz, granite, and basalt grains, unconsolidated.
20-25	Basalt, 60 percent, grayish-black (N2) when wet. Sand, 40 percent, very fine to coarse-grained, subangular, poorly sorted. (Sand may be cavings).

Table 3. Description of formation cuttings for selected wells - Continued

Interval in feet below land surface	Description
	Quaternary:
	Alluvium and basalt - concluded:
25-30	Same as above except 80 percent basalt and 20 percent sand.
30-35	Same as above except 50 percent basalt and 50 percent sand.
35-55	Same as above except 80 percent basalt and 20 percent sand.
55-75	Same as above except less than 3 percent sand.
75-80	Basalt, 95 percent, grayish-black (N2) when wet. Sand, 5 percent, light-olive-gray (5Y 6/1) when dry, very fine to medium-grained, poorly sorted.
80-85	Clay, 90 percent, sand 5 percent, basalt 5 percent, mixture is light-olive-brown (5Y 5/6) when dry.
90-95	Same as above except mixture is light-gray (N7) - Clay, light-olive-gray (5Y 5/1) when wet. Minor sand, very fine-grained.
95-100	Clay, light-olive-gray (5Y 6/1) when wet, sandy, sand grains composed of basalt and sandstone with a few quartz grains.
100-110	Clay, light-gray (N7) when wet. Minor sand grains composed of basalt and quartz.
110-115	Clay, light-gray (N7) when wet. Minor sand grains composed mainly of sandstone, some chips 1/4 inch in diameter.
115-125	Sand, 80 percent, fine-grained to 1/4 inch in diameter, composed of sandstone, basalt, and siltstone, poorly sorted, very angular chips.
125-130	Same as above except grain size is very fine to coarse, less siltstone chips.
130-135	Sand, very fine to coarse-grained, a few large chips of greenish-gray (5GY 6/1) sandstone, mostly grains from quartz sandstone, mostly angular, poorly sorted. Less than 10 percent clay.
135-150	Sand, very fine to medium-grained, poorly sorted, subangular to subrounded mostly quartz. Less than 3 percent siltstone and sandstone grains.
150-154	Same as above except some large chips of sandstone.

Table 3. Description of formation cuttings for selected wells - Continued

Location: 10.7.36.424 (see text for explanation)
Well Name: Laguna 76-1
Sample described by Gary Roybal

Interval in feet below land surface	Description
	Quaternary:
	Alluvium and basalt:
0-10	Clay, moderate brown (5YR 4/4). Silt, less than 5 percent. Strong reaction to hydrochloric acid.
10-15	Clay and silt, 80 to 90 percent, as above. Gravel, 10 to 20 percent, various colors, mostly dark-gray particles up to 1/2 inch in diameter, subrounded to angular.
15-20	Clay, 50 percent, as above. Gravel, 50 percent, as above.
20-35	Clay, 90 percent, as above. Gravel, 10 percent as above, but smaller-sized particles.
35-40	Clay, 70 percent, as above. Gravel, 30 percent as above but very large range of particles sizes.
40-45	As above, some fine-grained sand as quartz.
45-50	Clay, 80 percent, pale-red (10R 6/2) to grayish-orange (10YR 7/4) slightly silty, only slightly reactive hydrochloric acid. Sand and gravel, 20 percent, angular.
50-55	No sample.
55-65	Clay, 80 percent, pale-yellowish-brown (10YR 6/2), nonreactive to hydrochloric acid. Gravel 20 percent, as above.
65-70	Clay, 50 percent, as above. Basalt, 50 percent, very dark, scattered olivine crystals.
70-85	Basalt, 100 percent, as above.
85-90	Basalt, 40 percent, as above. Sand, 40 percent, very fine-grained, quartz. Silt, 20 percent, nonreactive hydrochloric acid.

Table 3. Description of formation cuttings for selected wells - Continued

Interval in feet below land surface	Description
	Quaternary:
	Alluvium and basalt - concluded:
90-95	Gravel, 80 percent, size range 1/8 to 1/2 inch, angular. Clay 20 percent, pale yellowish-brown (10YR 6/2), nonreactive to hydrochloric acid.
95-100	Gravel, 40 percent, as above except somewhat smaller particle size. Sand, 30 percent, very fine to medium-grained, mostly quartz. Clay, 30 percent, as above.
100-115	Sand, 60 percent, as above. Clay, 30 percent as above. Gravel, 10 percent, as above.
115-120	As above except somewhat less sand and gravel and highly reactive to hydrochloric acid.
120-125	As above except high sand percentage.
125-130	As above except no reaction to hydrochloric acid.
130-140	Sand, 50 percent, as above. Gravel, 30 percent, as above. Clay, 20 percent, as above.
140-145	Sand, 50 percent, very fine to medium-grained, mostly quartz. Gravel, 30 percent, 1/4 inch diameter or less. Clay, 20 percent, pale yellowish-brown (10YR 6/2), no reaction to hydrochloric acid.
145-150	As above except somewhat less sand.
150-157	Silt and clay, 55 percent, light-brown, (5YR 6/4) to pale-brown (5YR 5/2), highly calcareous. Sand, 40 percent, as above. Gravel 5 percent.

Table 3. Description of formation cuttings for selected wells - Continued

Location: 11.6.27.334 (see text for explanation)
Well name: Encinal Canyon #1
well cuttings described by John J. Rote.

Interval in feet below land surface	Description
	Quaternary:
	Alluvium:
0-5	Silt, pale-yellowish-brown (10YR 6/2), with scattered basalt granules. Minor caliche.
5-10	Same as 0-5.
10-15	Same as 0-5 except color is light-brown (5YR 6/4). No caliche.
15-20	Same as 10-15.
20-25	Same as 10-15.
25-30	Same as 10-15.
30-35	Same as 10-15; basalt granules absent.
35-40	Shale, light gray (N7); with limestone fragments (numerous).
40-45	Same as 35-40.
45-50	Shale, calcareous, light gray (N7).
50-55	Same as 45-50.
55-60	Same as 45-50.
60-65	Same as 45-50.
65-70	Same as 45-50.
70-75	Same as 45-50.
75-80	Same as 45-50.
80-85	Same as 45-50.
85-90	Same as 45-50.
90-95	Same as 45-50.

Table 3. Description of formation cuttings for selected wells - Continued

Interval in feet below land surface	Description
	Quaternary:
	Alluvium - concluded:
95-100	Shale, light gray (N7).
100-105	Same as 95-100.
105-110	Same as 95-100.

Table 3. Description of formation cuttings for selected wells - Continued

Location: 11.6.34.134 (see text for explanation)
Well name: Encinal Canyon #2
Well cuttings described by John J. Rote.

Interval in feet below land surface	Description
	Quaternary:
	Alluvium:
0-30	Silt, grayish-orange (10YR 7/4); slightly calcareous scattered basalt and gravel (50 percent).
30-35	Shale, pale yellowish brown (10YR 6/2), calcareous, scattered basalt and gravel.

Note: Percentage of basalt and gravel probably decrease as depth increases, because of drill hole caving near top.

Table 3. Description of formation cuttings for selected wells - Concluded

Location: 11.7.35.243 (see text for explanation)
Well name: Castillo Canyon 1
Well cuttings described by John J. Rote.

Interval in feet below land surface	Description
	Quaternary:
	Alluvium:
0-5	Silt, pale-yellowish-brown (10YR 6/2), slightly calcareous.
5-10	Same as 0-5.
10-15	Same as 0-5.
15-20	Shale, light-gray (N7).
20-25	Same as 15-20.
25-30	Same as 15-20.
30-35	Same as 15-20.
35-40	Silt, light-gray (N7).
40-45	Sandstone, very light-gray (N8) fine grained, poorly cemented.
45-50	Same as 40-45.
50-55	Same as 40-45.
55-60	Sandstone, as above, to silt, very light-gray (N8).
60-65	Shale, very light gray (N8), to light-gray (N7).
65-70	Same as 60-65.
70-75	Same as 60-65.

Table 4. Summary of all aquifer tests conducted on the Pueblo of Laguna

EXPLANATION

Location number : See text for explanation

Water-bearing geologic unit: Qal, alluvium; Qb, Quaternary basalt; QTb, Older basalt; QTs, Santa Fe Group; Kmv, Mesaverde Group Km, Mancos Shale; Kd, Dakota Sandstone, Jm, Morrison Formation; Jb, Bluff Sandstone; Js, Summerville Formation; Jt, Todilto Formation; Je, Entrada Sandstone; ₹c , Chinle Formation; Psa, San Andres Limestone, Pg, Glorieta Sandstone

Specific capacity: Determined at end of aquifer test unless noted

Thickness of producing interval: Determined from well-completion data.

Remarks:
(1) Aquifer test by well driller or consultant
(2) Aquifer test results published by Dinwiddie and Motts (1964)
(3) Well-completion zones not reported by driller; producing interval estimated based on geologic logs
(4) Transmissivity calculated using modified nonequilibrium formula (Ferris and others, 1962, p. 98)
(5) Transmissivity calculated using Theis recovery method (Ferris and others, 1962, p. 100)
(6) Transmissivity calculated using nonequilibrium method (Ferris and others, 1962, p. 92)
(7) Transmissivity calculated using method of Harrill (1970, p C212)

Location number and local name	Water-bearing geologic unit(s)	Year tested	Average discharge (gallons per minute)	Drawdown (feet)	Duration of test (hours)	Specific capacity (gallons per minute per foot)	Transmissivity (feet squared per day)	Thickness of producing interval (feet)	Hydraulic conductivity (feet per day)	Remarks
8.6.8.234 RWP 14	Je	1975	3.5	59	2±	0.05	-	50	-	(3)
8.7.14.223 RWP 34	Je	1975	3	60	2±	0.05	-	35	-	(3)
9.2.24.230 BIA Sedillo	QTs	1980	12	84	24	0.14	-	9	-	Tested by Bureau of Indian Affairs.
9.5.9.231 Laguna 78-1	Jb, Jt, Je	1978	74	190	24	0.39	55 4/	70	0.8	Unable to measure drawdown after 11 hr pumping. Specific capacity calculated after 11 hr pumping.
9.5.12.442 Mesita Test	Psa(?)	1964	15	391	-	0.04	-	-	-	Flowing well.

Table 4. Summary of all aquifer tests conducted on the Pueblo of Laguna - Continued

Location number and local name	Water-bearing geologic unit(s)	Year tested	Average discharge (gallons per minute)	Drawdown (feet)	Duration of test (hours)	Specific capacity (gallons per minute per foot)	Transmissivity (feet squared per day)	Thickness of producing interval (feet)	Hydraulic conductivity (feet per day)	Remarks
9.5.13.233 Mesita P.S.	Je, ₸c	1965	15	77	3.5	0.19	-	-	-	(1)
9.5.13.411 Burnell 2	₸c	1963	22	51	24	0.43	-	24	4.6	(3)
9.5.24.413 EPNG 3	₸c	1957	40	205	-	0.19	-	40	-	(1)
9.6.2.123 Laguna 76-7	Qal	1977	4.5	105	24	0.04	290	122	2.4	(5) Two 1/2 hour bailer tests at 20 gal/min in 1978 caused less than 5 ft drawdown indicating well should produce more than 4.5 gal/min.
9.6.4.433 Standard	Jb, Je	1974	3	12.5	0.5	0.24	-	-	-	(1) Flowing well.
9.6.5.222 Laguna 76-6	Qal,Qb	1977	125	11.4	24	11.0	3,800	70	54	(6)
9.6.13.343 Transwestern 1	Jb, Je	1967	0.5	87	1.5	0.005	-	80	-	(1)
9.6.20.412 RWP 18	Je	1962	20	12	-	1.7	-	40	-	(1)

Table 4. Summary of all aquifer tests conducted on the Pueblo of Laguna - Continued

Location number and local name	Water-bearing geologic unit(s)	Year tested	Average discharge (gallons per minute)	Drawdown (feet)	Duration of test (hours)	Specific capacity (gallons per minute per foot)	Transmissivity (feet squared per day)	Thickness of producing interval (feet)	Hydraulic conductivity (feet per day)	Remarks
9.6.26.233 RWP 24	Jb	1974	4.5	0.6	2±	7.5	-	21	52	(4) 1974 test conducted allowing windmill to pump. A pump jack was installed for 1978 test.
		1978	5.1	1.1	8	4.5	450	21	21	
10.2.25.444 Cañoncito P.S. 2	QTs	1974	41	114	24	.35	60	70	.86	(5) Tested by Bureau of Indian Affairs.
10.6.3.111 Encinal 1	Kd	1964	14	63	-	.22	-	25	-	(3) 1964 test by driller, 1978 test by USGS. Bailer test indicated yield of at least 25 gal/min.
		1978	10.6	190	24	-	-	25	-	
10.6.9.121 Encinal 2	Kd	1964	30	1	"all day"	30	-	20	-	(3,7) 1964 test by driller, 1978 test by USGS. Pumping rate decreased irregularly from 100 to 47 gal/min during 1978 test.
		1978	54	14.7	24	3.7	2,000	20	100	
10.6.31.434 Seama P.S.	Qal,Qb	1963	450	23.5	.75	19.1	1,500	73	21	(1,4) Step pumped 150 to 450 gal/min. Transmissivity calculated after pumping 45 minutes at 150 gal/min.
10.6.31.443 Ir. test 7	Qal	1960	115	8.5	24	13.5	3,200	138	23	(2,3,5)
10.6.35.322 Pueblo test 1	Qal	1960	23	23	12	1.0	400	40	10	(2,3,4)
10.6.35.324 New Laguna P.S.	Qal	1960	75	32	24	2.3	-	-	-	(1)

Table 4. Summary of all aquifer tests conducted on the Pueblo of Laguna - Continued

Location number and local name	Water-bearing geologic unit(s)	Year tested	Average discharge (gallons per minute)	Drawdown (feet)	Duration of test (hours)	Specific capacity (gallons per minute per foot)	Transmissivity (feet squared per day)	Thickness of producing interval (feet)	Hydraulic conductivity (feet per day)	Remarks
10.6.35.342 Pueblo Test 2	Qal	1960	90	4	12	22.5	17,000	56	300	(2,3,5)
10.6.35.342a Laguna Ir. 2	Qal	1977	184	31	24	5.9	15,000	80	188	(7) Pumping rate varied during test from 80 to 212 gal/min.
10.7.10.213 Laguna 79-1	Jm,Kd	1980	10	128	24	.08	19	300	.06	(3,5)
10.7.25.432 Abandoned New York	Qal	1953	17	30	-	.56	-	43	-	(3)
10.7.35.232 Ir. Test 6	Qal	1960	100	17.5	20	5.7	1,060	110	9.6	(2,3,5)
10.7.36.212 New York 2	Qal	1970	295	8.7	40	33.9	-	106	-	(1,3)
10.7.36.221 New York 1	Qal	1970	290	37	20	7.8	-	90	-	(1,3)
10.7.36.322 Laguna 76-2	Qal,Qb	1976	80	45	24	-	-	70	-	-
10.7.36.424 Laguna 76-1	Qal,Qb	1976	140	8.5	20	16.5	9,200	70	131	(5)

Location number and local name	Water-bearing geologic unit(s)	Year tested	Average discharge (gallons per minute)	Drawdown (feet)	Duration of test (hours)	Specific capacity (gallons per minute per foot)	Transmissivity (feet squared per day)	Thickness of producing interval (feet)	Hydraulic conductivity (feet per day)	Remarks
10.7.36.424a Laguna Ir. 1	Qal,Qb	1977	343	86	24	5.7	-	68	-	Step pumped 250 to 490 gal/min. Specific capacity calculated while pumping at 490 gal/min.
11.2.1.124 ECW 8	Qal,Kmv	1964	15	45	-	.33	-	-	-	(1)
11.5.13.112 LJ 205	Jm	1971	34	154	15	.22	-	-	-	(1)
11.5.14.241 L-Bar 2	Psa,Pg	1975	5	390	-	.01	-	-	-	(1)
11.5.24.213 Anaconda 1	Jm	1971	30	152	8	.19	18	-	-	(1)
11.5.30.422 Pueblo test 3	Jm	1960	10	192	12	.05	3.3	-	-	(2,5)
11.5.32.232 Paquate P.S. 2	Qal	1974	75	43	3	1.7	-	50	-	(1,3) Flowing well.
11.5.32.234 Pueblo test 5	Qal	1960	35	25	12	1.4	75	50	1.5	(2,3,4) Flowing well.
11.5.32.234a Paguate P.S. 1	Qal	1963	90	23	12	3.9	-	50	-	(1,3) Flowing well.
11.6.27.334 Encinal Canyon 1	Qal	1978	5.3	-	1.7	-	-	5	-	Bailer test.

Table 4. Summary of all aquifer tests conducted on the Pueblo of Laguna - Concluded

Location number and local name	Water-bearing geologic unit(s)	Year tested	Average discharge (gallons per minute)	Drawdown (feet)	Duration of test (hours)	Specific capacity (gallons per minute per foot)	Transmissivity (feet squared per day)	Thickness of producing interval (feet)	Hydraulic conductivity (feet per day)	Remarks
11.7.35.243 Castillo Canyon I	Kmv	1978	5	25±	.4	.2	-	20	-	Bailer test.
12.1.30.324 Conoco 65A	Jm	1974	80	60	3	1.3	490	-	-	(1,4) Well flowed 80 gal/min for 3 hrs. Shut-in pressure prior to test was 26 psi.
12.2.1.134 ECW 4	Kd,Km	1936	14	20	3.5	.7	-	48	-	(1)
12.2.36.442 Conoco WW-101	Jm	1976	1212	470	336	2.6	240	300	0.8	(1,4)

Table 5. Major constituents of water in selected wells and springs

EXPLANATION

Location number: See text for explanation
Laboratory: BIA, U.S. Bureau of Indian Affairs; USGS, U.S. Geological Survey; P, Private laboratory; PHS, U.S. Public Health Service;

Note: All constituents are dissolved and reported in milligrams per liter. Values for bicarbonate, carbonate, temperature, pH, and specific conductance were measured onsite after August 1, 1975 unless marked with asterisk. "T" indicates trace amount.

Location number	Local well or spring name	Date of collection	Laboratory	Pumping rate (gallon per minute)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)
6.2.6.431	Salt Spg. 173	08-07-41	USGS	-	540	450	3,700	38	1,390
		06-05-75	USGS	-	-	-	3,100	36	960
6.7.18.113	Wilson	07-09-63	USGS	-	550	520	210	15	460
6.7.34.341	Blue Water	11-02-73	BIA	-	66	29	22	2.0	230
7.1.31.124	-	04-26-56	USGS	-	110	55	1,940	-	910
7.2.6.214	Salt Spg. 192	09-03-41	USGS	-	230	190	-	-	2,100
		04-21-75	USGS	-	210	110	10,000	280	-
7.2.6.434	Salt Spg. 190	09-03-41	USGS	-	320	130	-	-	2,140
		04-22-75	USGS	-	110	160	11,000	320	1,910
7.2.6.442	Railroad Spg.	04-22-75	USGS	-	350	350	9,300	260	2,460
7.2.7.123	Salt Spg. 186	08-25-41	USGS	-	110	140	9,900	290	1,750
7.2.7.241	Pipeline Spg.	04-22-75	USGS	-	490	140	9,100	260	2,950

Carbonate (as CO_3)	Sulfate	Chloride	Silica	Calcium-magnesium hardness (as $CaCO_3$)	Hardness, noncarbonate	Dissolved solids residue at 105° Celsius	Temperature (degrees Celsius)	pH (units)	Specific conductance (micromhos per centimeter at 25° Celsius)	Sodium absorption ratio	Irrigation class
-	2,700	5,200	21	3,200	-	13,700	25.5	-	-	-	-
-	-	4,400	-	-	-	-	15.0	8.7	-	-	-
0	3,200	71	8.8	3,500	3,100	4,970	-	6.9	5,070	1.5	C_4S_1
9	94	17	-	290	99	380	14	7.9	630	.6	C_2S_1
0	2,440	1,010	27	500	0	6,170	18	7.7	8,540	89	C_4S_4
-	8,000	12,000	-	-	-	33,100	-	-	-	-	-
-	6,700	11,000	20	980	-	-	-	8.6	37,000	139	C_4S_4
-	6,500	9,800	-	-	-	27,600	-	-	-	-	-
180	7,400	12,000	30	930	0	32,200	-	9.1	41,500	157	C_4S_4
0	6,200	10,000	22	2,300	300	27,700	13.5	6.9	36,500	84	C_4S_4
-	6,800	10,000	38	850	-	28,400	-	-	-	-	-
0	5,600	9,000	23	1,800	0	26,100	14.0	7.7	34,100	93	C_4S_4

Table 5. **Major constituents of water in selected wells and springs - Continued**

Location number	Local well or spring name	Date of collection	Laboratory	Pumping rate (gallon per minute)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)
7.2.7.343	Salt Spg. 185	08-25-41	USGS	-	330	150	-	-	2,250
		04-22-75	USGS	-	140	160	9,400	320	1,920
7.2.10.444	RWP 5	06-05-75	USGS	-	92	30	2,200	33	460
7.2.18.134	Salt Spg. 184b	08-25-41	USGS	-	580	190	-	-	2,070
7.2.18.144	Salt Spg. 184c	08-25-41	USGS	-	430	190	-	-	1,640
7.2.18.313	Salt Spg. 184a	08-25-41	USGS	-	940	230	11,000	290	2,910
		04-22-75	USGS	-	380	230	12,000	310	1,960
7.2.18.431	Mammoth Mound	04-22-75	USGS	-	390	170	8,600	230	2,720
7.2.29.214	RWP 6	05-16-75	USGS	-	410	110	520	34	120
7.2.30.124	Salt Spg. 189	09-02-41	USGS	-	710	220	6,600	170	2,210
		05-16-75	USGS	-	340	230	9,500	280	1,490
7.2.30.411	Salt Spg. 188	09-02-41	USGS	-	300	230	-	-	1,390
7.2.31.144	Salt Spg. 187	09-02-41	USGS	-	610	270	5,300	120	1,630
7.3.1.432a	Indian Ruins Spg.	04-21-75	USGS	-	540	200	1,300	31	640
7.4.3.344	Salt Spg. 195	-	USGS	-	610	150	-	-	410

Carbonate (as CO_3)	Sulfate	Chloride	Silica	Calcium-magnesium hardness (as $CaCO_3$)	Hardness, noncarbonate	Dissolved solids residue at 105° Celsius	Temperature (degrees Celsius)	pH (units)	Specific conductance (micromhos per centimeter at 25° Celsius)	Sodium absorption ratio	Irrigation class
-	6,800	9,200	-	-	-	27,100	-	8.3	-	-	-
0	6,200	10,000	32	1,000	0	27,200	13.5	8.3	36,800	129	C_4S_4
0	2,600	1,500	15	350	0	6,730	-	8.3	9,430	51	C_4S_4
-	7,500	9,400	-	-	-	28,300	-	-	-	-	-
-	8,200	10,300	-	-	-	30,600	-	-	-	-	-
-	9,100	11,400	35	3,300	-	34,700	28	-	-	-	-
54	9,100	12,000	26	1,900	200	35,100	-	8.7	45,000	120	C_4S_4
0	5,900	9,900	27	1,700	0	22,600	11.5	7.8	34,300	49	C_4S_4
0	1,900	480	13	1,500	1,400	3,550	19.0	7.7	4,660	5.9	C_4S_2
-	5,700	6,700	32	2,700	-	21,200	24	-	-	-	-
0	7,400	10,000	23	1,800	570	28,600	21.5	8.3	37,000	98	C_4S_4
-	6,800	9,000	-	-	-	26,100	30	-	-	-	-
-	5,400	5,200	20	2,700	-	17,700	26.5	-	-	-	-
0	2,800	1,100	21	2,200	1,600	6,320	-	7.6	8,530	12	C_4S_4
-	2,000	150	-	-	-	6,400	18.5	-	-	-	-

Table 5. Major constituents of water in selected wells and springs - Continued

Location number	Local well or spring name	Date of collection	Laboratory	Pumping rate (gallon per minute)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)
7.4.11.431	Lucero	09-04-41	USGS	-	640	180	300	26	630
	Spg.	05-28-75	USGS	-	-	-	300	15	-
8.2.1.333	RWP 3	06-05-75	USGS	-	140	53	1,100	28	565
8.2.7.314	Miranda Spg.	04-21-75	USGS	-	260	130	7,400	440	1,780
8.2.19.421	El Ojo Escondido	09-24-73	BIA	-	270	110	580	11	190
8.2.20.332	Ojo Es-	09-08-41	USGS	-	33	20	23	5.6	220
	condido	09-24-73	BIA	-	42	22	25	5.5	230
8.2.20.423	Salt	09-24-73	BIA	-	630	120	8,100	6.3	2,810
	Spg.	04-21-75	USGS	-	570	150	8,300	280	2,900
8.2.30.342	Salt	09-03-41	USGS	-	520	170	6,700	200	1,360
	Spg. 193	04-21-75	USGS	-	560	350	11,000	320	1,530
8.3.10.222	Suwanee	10-12-48	USGS	-	260	120	500	-	230
	Spg.	09-24-73	BIA	-	280	100	510	7.8	180
8.3.11.232	CCC 1	04-21-75	USGS	-	250	100	530	12	219
8.3.12.413	Dipping	12-07-57	USGS	-	270	110	600	11	220
	Vat Spg.	09-14-73	BIA	-	270	110	540	12	190
		04-21-75	USGS	-	270	100	560	12	230
8.3.15.413	United	11-29-63	USGS	-	680	180	3,500	120	2,390
	Brokers	05-28-75	USGS	-	-	-	3,300	110	-
8.3.20.211	McGaughys	02-08-57	USGS	-	450	250	-	380	160

Carbonate (as CO_3)	Sulfate	Chloride	Silica	Calcium-magnesium hardness (as $CaCO_3$)	Hardness, noncarbonate	Dissolved solids residue at 105° Celsius	Temperature (degrees Celsius)	pH (units)	Specific conductance (micromhos per centimeter at 25° Celsius)	Sodium absorption ratio	Irrigation class
-	2,000	330	20	2,300	-	4,000	16.5	-	-	-	-
-	-	320	-	-	-	-	16.0	-	4,370	-	-
0	2,300	210	9.5	570	100	4,120	-	2.4	5,430	20	C_4S_4
0	5,100	7,700	17	1,200	0	22,000	-	8.3	30,100	94	C_4S_4
16	1,600	390	-	1,100	990	3,380	16	8.1	4,230	7.5	C_4S_4
-	32	5.6	12	160	-	240	23	-	-	-	-
17	33	4.6	-	190	10	280	20	8.3	490	0.8	C_2S_1
T	5,500	8,100	-	2,100	-	24,900	25	7.7	32,300	77	C_4S_4
0	6,100	7,800	22	2,000	0	24,700	24	7.1	32,600	80	C_4S_4
-	6,600	6,300	20	2,000	-	21,200	22	-	-	-	-
0	8,900	11,000	19	2,800	1,600	32,900	-	7.3	41,400	90	C_4S_4
0	1,500	300	-	1,100	-	2,850	-	-	3,810	-	-
21	1,400	360	-	1,100	970	3,190	17	8.1	3,930	6.7	C_4S_2
0	1,400	350	31	1,000	860	2,790	-	7.8	3,940	7.2	C_4S_2
0	1,600	380	30	1,100	940	3,270	-	7.7	4,030	7.8	C_4S_3
17	1,600	380	-	1,100	990	3,300	17	8.2	4,150	6.9	C_4S_2
0	1,500	380	30	1,100	900	2,970	16.5	7.9	4,030	7.4	C_4S_2
0	4,300	2,800	11	2,400	460	12,700	20.1	7.3	15,800	31	-
-	-	2,700	-	-	-	-	-	-	15,800	-	-
0	2,220	360	33	2,200	2,000	3,810	15	7.4	4,500	3.5	-

Table 5. Major constituents of water in selected wells and springs - Continued

Location number	Local well or spring name	Date of collection	Laboratory	Pumping rate (gallon per minute)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)
8.3.35.114	Spring 194	09-03-41	USGS	-	65	18	43	3.9	380
8.4.15.123	ECW 10	10-29-73	BIA	-	66	45	730	1.2	460
8.5.12.311	RWP 21	11-16-73	BIA	-	460	24	360	5.5	48
8.5.17.213	-	04-04-74	BIA	-	4,700	370	12,000	T	10
		06-12-75	USGS	-	-	-	12,000	7.8	-
8.5.36.423	ECW 8	11-02-73	BIA	-	36	19	85	1.2	230
8.6.36.432	Thompson	11-08-73	BIA	-	4.0	T	420	T	710
9.1.4.432	Stuckys	06-05-75	USGS	-	45	13	1,000	7.1	900
9.2.9.433	ECW 8	1940	USGS	-	28	10	1,600	-	510
		07-03-74	BIA	-	26	11	1,300	.78	550
9.2.24.230	BIA Sedillo	04-29-80	BIA	12	8.0	T	380	10	440*
9.2.27.422	RWP 9	09-24-73	BIA	-	34	7.3	52	3.9	180
9.3.22.443	Coyote Spg.	04-26-73	BIA	-	220	24	890	T	150
9.4.16.341	RWP 16	05-01-59	USGS	-	-	-	-	-	-
9.4.29.323	Fernando	05-01-73	BIA	-	420	55	470	T	140

Carbonate (as CO_3)	Sulfate	Chloride	Silica	Calcium-magnesium hardness (as $CaCO_3$)	Hardness, noncarbonate	Dissolved solids residue at 105° Celsius	Temperature (degrees Celsius)	pH (units)	Specific conductance (micromhos per centimeter at 25° Celsius)	Sodium absorption ratio	Irrigation class
-	13	31	28	240	-	360	18.5	-	-	-	-
16	1,100	320	-	350	-	2,570	-	8.0	3,470	17	-
T	1,700	99	-	1,300	1,200	2,750	-	7.7	3,290	4.4	-
T	940	28,000	-	13,000	13,000	52,200	-	7.1	82,800	44	-
-	-	27,000	-	-	-	-	18.5	-	65,000	-	-
9	130	19	-	170	-	437	17	8.0	720	2.8	-
40	120	110	-	10	-	1,200	16.5	8.3	1,630	57	-
0	1,300	200	13	170	0	3,030	-	8.1	4,360	34	-
50	2,800	84	-	-	-	4,990	-	-	-	-	-
41	2,300	83	-	110	-	4,170	-	8.4	6,900	53	-
31*	320	60	-	20	0	1,070	-	8.8	1,600*	37	C_3S_4
19	44	4.6	-	110	-	290	20	8.1	460	2.1	-
12	2,100	63	-	660	540	3,570	-	8.3	4,400	15	-
-	-	330	-	-	-	-	-	-	3,870	-	-
12	1,800	140	-	1,300	1,200	3,230	13	8.2	3,660	5.8	-

Table 5. Major constituents of water in selected wells and springs - Continued

Location number	Local well or spring name	Date of collection	Laboratory	Pumping rate (gallon per minute)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)
9.4.33.223a	Pino 2	05-03-73	BIA	-	340	100	910	18	270
9.5.4.133	ATSF	03-19-65	USGS	-	300	76	-	160	210
		09-13-73	BIA	-	310	63	170	5.1	190
9.5.9.231	Laguna 78-1	11-13-78	BIA	50	630	43	170	10	107*
		11-29-78	BIA	40	580	30	230	5.9	120*
		12-21-78	BIA	70	550	24	310	5.9	130*
9.5.12.442	Mesita test	09-19-63	USGS	-	510	300	5,500	32	1,320
		11-10-64	USGS	-	320	330	4,100	59	1,770
		12-03-73	BIA	-	180	150	3,200	28	1,500
		06-12-75	USGS	-	-	-	2,900	31	-
9.5.13.233	Mesita P.S.	03-19-65	USGS	-	95	38	-	230	220
		01-19-73	PHS	-	72	28	220	13	200
9.5.13.411	Burnell 2	05-02-63	USGS	-	74	28	-	320	270
9.5.14.244	Burnell 1	1963	USGS	-	-	-	-	-	
9.5.19.234	Test hole 2	08-23-66	USGS	-	-	-	-	-	264
9.5.19.421	Test hole 5	08-23-66	USGS	-	-	-	-	-	208
9.5.24.413	EPNG 3	02-25-57	P	-	-	-	-	-	-
9.5.29.232	RWP 25	12-11-73	BIA	-	240	27	350	4.3	210

Carbonate (as CO_3)	Sulfate	Chloride	Silica	Calcium-magnesium hardness (as $CaCO_3$)	Hardness, noncarbonate	Dissolved solids residue at 105° Celsius	Temperature (degrees Celsius)	pH (units)	Specific conductance (micromhos per centimeter at 25° Celsius)	Sodium absorption ratio	Irrigation class
19	2,000	630	-	1,300	1,100	4,620	15.5	8.2	5,640	11	-
0	1,000	110	27	1,100	890	1,810	-	7.6	2,280	2.1	-
13	1,000	220	-	1,000	880	1,980	15.5	8.1	2,390	2.4	-
T*	1,880	77	-	1,750	1,660	3,050	15.0	7.6	3,100	1.8	C_4S_1
T*	1,980	35	-	1,580	1,480	3,110	-	8.2	3,200	3.0	C_4S_1
T*	1,950	37	-	1,480	1,370	3,150	17.0	7.4	3,500	3.5	C_4S_2
0	4,800	5,800	14	2,500	1,400	17,700	-	7.3	23,200	48	-
0	4,300	3,700	14	2,200	710	13,700	31.7	6.7	18,000	38	-
62	3,300	2,000	-	1,100	-	9,770	26.5	8.3	13,000	42	-
-	-	2,000	-	-	-	-	26.0	-	-	-	-
0	550	86	25	390	210	1,140	-	7.8	1,660	5.0	-
T	450	79	-	-	-	-	-	-	1,440	5.6	-
0	550	110	20	300	76	1,270	-	7.5	1,850	8.0	C_3S_2
-	470	290	-	-	-	-	-	-	2,340	-	-
0	38	11	10	-	-	-	-	-	510	-	-
0	22	4.3	9.9	-	-	-	-	-	370	-	-
-	360	4	-	60	-	920	-	8.5	-	-	-
T	1,200	34	-	720	550	2,090	-	8.1	2,670	5.7	C_4S_2

Table 5. Major constituents of water in selected wells and springs - Continued

Location number	Local well or spring name	Date of collection	Laboratory	Pumping rate (gallon per minute)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)
9.6.2.123	Laguna 76-7	01-27-77	USGS	4.5	130	90	410	6.6	420
		08-24-78	BIA	20	160	110	450	6.3	400*
9.6.4.243	Mooney	10-21-74	BIA	-	78	95	420	1.6	92
9.6.4.433	Standard	10-19-74	BIA	-	4.0	2.4	940	2.0	190
		06-12-75	USGS	-	-	-	870	6.8	-
9.6.5.222	Laguna 76-6	01-25-77	USGS	125	80	75	400	8.6	430
9.6.10.124	Casa Blanca	11-16-73	BIA	-	76	12	19	3.5	290
9.6.13.322	Trans-western 2	05-12-67	PHS	-	5.0	3.5	230	2.3	450
9.6.13.343	Trans-western 1	05-12-67	PHS	-	11	1.3	210	2.7	250
9.6.26.233	RWP 24	10-11-73	BIA	-	54	9.7	22	2.0	170
		12-11-78	BIA	5	50	11	28	2.4	210
9.6.26.443	Timia	10-18-78	BIA	< 1	60	6	23	2.0	190*
9.6.28.122	Turquoise Spg.	02-04-74	BIA	-	64	.12	13	1.2	210
9.6.31.143	ECW 6	05-13-57	USGS	-	240	89	-	270	270
10.2.25.444	Cañoncito P.S. 2	09-26-74	BIA	-	92	1.2	380	5.9	89

Carbonate (as CO_3)	Sulfate	Chloride	Silica	Calcium-magnesium hardness (as $CaCO_3$)	Hardness, noncarbonate	Dissolved solids residue at 105° Celsius	Temperature (degrees Celsius)	pH (units)	Specific conductance (micromhos per centimeter at 25° Celsius)	Sodium absorption ratio	Irrigation class
0	970	220	25	700	360	2,060	-	7.6	2,900	6.7	C_4S_2
T*	1,110	230	-	850	510	2,460	-	8.0	3,100*	6.8	C_4S_2
12	210	260	12	390	310	1,800	-	7.2	2,590	9.3	C_4S_3
97	1,600	83	16.5	20	-	2,910	-	9.8	4,120	92	C_4S_4
-	-	80	-	-	-	-	15.0	-	4,200	-	-
0	790	170	32	510	160	1,770	-	7.8	2,500	7.7	C_4S_2
T	24	3.6	15	240	3	350	-	8.2	520	.5	C_2S_1
23	110	13	-	27	-	910	-	8.7	1,110	-	-
8	270	15	-	61	-	770	-	8.5	1,150	-	-
11	43	17	-	170	33	270	16	8.3	460	.7	C_2S_1
0	38	18	-	180	15	260	14.5	7.8	480	0.9	C_2S_1
-	39	16	-	180	21	280	-	8.2	450*	0.8	C_2S_1
6	28	20	-	210	35	255	-	8.2	440	.4	C_2S_1
0	1,200	60	21	970	740	2,000	14.4	7.4	2,530	3.7	C_4S_1
T	870	53	-	280	180	1,570	-	-	2,180	9.8	C_3S_3

Table 5. Major constituents of water in selected wells and springs - Continued

Location number	Local well or spring name	Date of collection	Laboratory	Pumping rate (gallon per minute)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)
10.4.8.344	ECW 3	04-04-74	BIA	-	58	6.1	390	2.7	280
10.4.30.414	RWP 28	03-15-74	BIA	-	370	18	260	3.3	180
10.4.36.224	RWP 32	03-27-68	PHS	-	36	12	650	5.9	480
10.5.4.323	P-10	11-25-74	P	-	11	2	450	-	370
10.5.14.234	Sinkhole	08-03-72	BIA	-	98	39	350	6.7	200
		10-19-74	BIA	-	108	39	370	2.3	180
10.6.3.111	Encinal 1	09-11-52	USGS	-	20	9.8	-	300	400
		03-25-65	USGS	-	22	8.5	-	350	400
		11-17-78	BIA	12	160	45	46	4.7	280
10.6.3.334	871	02-20-51	USGS	-	130	67	-	160	300
10.6.9.121	Encinal 2	12-13-66	PHS	-	120	68	110	4.7	380
		11-07-78	USGS	69	140	59	110	4.3	480
10.6.25.242	Frog Pond Spg.	11-26-73	BIA	-	26	51	270	7.4	190
10.6.31.434	Seama P.S.	03-18-65	USGS	-	97	53	-	180	380
		01-19-73	PHS	-	96	55	250	9.4	390
10.6.31.443	Ir. Test 7	05-25-60	USGS	-	100	47	-	180	360
10.6.33.122	Paraje deep test	12-09-52	USGS	-	-	-	-	-	520
10.6.33.213	ECW 12	10-20-52	USGS	-	130	31	-	530	420

Carbonate (as CO_3)	Sulfate	Chloride	Silica	Calcium-magnesium hardness (as $CaCO_3$)	Hardness, noncarbonate	Dissolved solids residue at 105° Celsius	Temperature (degrees Celsius)	pH (units)	Specific conductance (micromhos per centimeter at 25° Celsius)	Sodium absorption ratio	Irrigation class
19	660	37	-	170	-	1,390	-	8.5	2,090	13	C_3S_4
9	1,400	39	-	990	840	2,220	11	8.0	2,670	3.6	C_4S_1
0	1,100	37	-	140	-	-	-	8.2	2,810	-	-
-	580	26	-	-	-	1,240	-	8.2	1,650	-	-
11	830	95	-	410	240	1,610	-	8.3	2,240	7.6	C_3S_2
24	800	100	-	430	280	1,700	14	8.0	2,310	7.8	C_4S_2
0	370	20	12	90	0	940	-	-	1,410	-	-
0	450	23	12	90	0	1,070	-	8.1	1,620	-	-
0	420	9	-	580	360	910	18.0	7.3	1,130	0.8	C_3S_1
0	560	80	50	610	360	1,190	-	-	1,650	2.8	C_3S_1
0	400	25	-	580	-	-	-	7.5	1,370	-	-
0	410	19	18	600	200	1,000	16.0	7.0	1,300	2.0	C_3S_1
38	560	21	-	270	120	1,080	15	8.9	1,670	7.2	C_3S_2
0	430	68	28	460	150	1,050	-	8.0	1,530	3.7	C_3S_1
T	520	92	-	610	-	1,270	-	7.8	1,760	5.0	C_3S_2
0	420	70	36	440	150	1,040	14.4	7.7	1,510	3.8	-
12	-	47	-	370	0	-	-	-	3,250	-	-
0	1,200	37	13	450	110	2,110	-	-	2,810	-	-

Table 5. **Major constituents of water in selected wells and springs - Continued**

Location number	Local well or spring name	Date of collection	Laboratory	Pumping rate (gallon per minute)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)
10.6.35.322	Pueblo test 1	02-12-60	USGS	-	62	50	-	210	260
10.6.35.324	New Laguna P.S.	09-09-60	USGS	-	85	47	-	230	280
		03-25-65	USGS	-	84	56	-	250	280
		01-19-73	PHS	-	78	55	240	3.1	320
10.6.35.342	Pueblo test 2	03-08-60	USGS	-	73	44	-	230	280
10.7.10.213	Laguna 79-1	01-16-80	BIA	10	52	25	400	24	530*
10.7.25.441	-	03-27-53	USGS	-	-	-	-	-	350
10.7.35.232	Ir. test 6	05-01-60	USGS	-	99	81	570	-	490
		08-14-75	BIA	0	110	89	570	9.4	420*
10.7.36.212	New York 2	08-29-70	PHS	-	80	24	60	7.4	310
		01-18-73	PHS	-	78	24	70	8.2	300
10.7.36.221	New York 1	08-29-70	PHS	-	80	24	60	7.4	300
10.7.36.322	Laguna 76-2	07-14-76	BIA	80	100	100	600	11	520*
10.7.36.424	Laguna 76-1	07-08-76	BIA	-	120	47	120	10	320*
		07-10-76	USGS	145	-	-	-	-	-
10.7.36.424a	Laguna Ir. 1	09-27-77	BIA	340	130	56	160	11	320*
11.5.13.112	LJ 205	09- -71	P	-	1	1	310	-	260

Carbonate (as CO_3)	Sulfate	Chloride	Silica	Calcium-magnesium hardness (as $CaCO_3$)	Hardness, noncarbonate	Dissolved solids residue at 105° Celsius	Temperature (degrees Celsius)	pH (units)	Specific conductance (micromhos per centimeter at 25° Celsius)	Sodium absorption ratio	Irrigation class
0	520	38	29	360	150	1,040	15	8.1	1,460	4.8	C_3S_1
0	590	42	27	400	180	1,170	-	7.6	1,650	5.0	C_3S_2
0	650	48	28	440	210	1,240	-	7.8	1,760	5.1	C_3S_2
19	500	61	-	570	-	1,170	-	8.0	1,450	5.2	C_3S_2
0	560	43	24	360	140	1,110	16.1	7.8	1,570	5.3	C_3S_2
12*	560	69	18	240	0	1,400	28.0	7.4	2,000	11	C_3S_3
0	-	22	-	210	-	-	-	7.8	980	-	-
0	1,100	200	27	580	180	2,310	15.6	7.6	3,250	10	C_4S_3
40*	1,060	230	-	640	230	2,500	-	8.1	3,300	9.9	C_4S_3
0	150	13	-	300	-	590	-	7.9	880	-	-
T	160	18	-	-	-	-	-	8.0	720	1.8	C_3S_1
0	150	14	-	300	-	600	-	8.2	920	-	-
T*	1,180	280	-	770	350	2,680	15.5	7.8	3,700	10	C_4S_3
14*	340	66	-	500	220	910	-	8.3	1,350	2.2	C_3S_1
-	-	-	-	-	-	-	-	8.1	1,500	-	-
17*	470	74	-	550	250	1,140	15.0	8.3	1,350	3.0	C_3S_1
37	140	38	-	-	-	590	-	-	-	-	-

Table 5. Major constituents of water in selected wells and springs - Continued

Location number	Local well or spring name	Date of collection	Laboratory	Pumping rate (gallon per minute)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)
11.5.24.213	Anaconda 1	05-14-71	USGS	-	21	12	370	3.0	480
11.5.29.444	-	04-16-55	USGS	-	11	6.5	-	440	400
11.5.30.422	Pueblo test 3	03-31-60	USGS	-	5.5	1.1	-	150	230
11.5.32.234	Pueblo test 5	04-22-60	USGS	-	69	20	-	30	310
11.5.32.234a	Paquate P.S. 1	03-18-65	USGS	-	60	18	-	31	270
		01-18-73	PHS	-	70	21	-	300	250
11.6.22.333	Encinal Public Supply Spring	08-08-69	BIA	-	19	4.3	11.5	3.1	93
		01-18-73	PHS	-	20	3.6	11.5	3.5	97
11.6.27.334	Encinal Canyon 1	07-05-78	BIA	5	180	70	170	8.2	310*
11.7.35.243	Castillo Canyon 1	08-14-78	BIA	4	10	1	250	3.5	620*
12.1.18.134	Ojito Spg.	06-17-74	BIA	-	68	13	40	T	180
12.1.29.113	Conoco 17-10	-	P	-	-	-	-	-	-
12.1.30.324	Conoco 65A	08-05-71	PHS	-	-	-	-	-	420
		05-13-74	BIA	-	94	14	3,100	4.7	430
		06-05-75	USGS	-	-	-	3,200	10	500
		- -76	P	0	74	12	3,300	9.4	380*

Carbonate (as CO_3)	Sulfate	Chloride	Silica	Calcium-magnesium hardness (as $CaCO_3$)	Hardness, noncarbonate	Dissolved solids residue at 105° Celsius	Temperature (degrees Celsius)	pH (units)	Specific conductance (micromhos per centimeter at 25° Celsius)	Sodium absorption ratio	Irrigation class
0	470	16	13	100	0	1,140	18.0	7.5	1,750	16	C_3S_4
7	610	25	15	54	0	1,310	-	8.4	1,900	26	C_3S_4
5	120	7.3	15	18	0	420	18.9	8.4	670	15	C_2S_3
0	53	7.6	42	254	1	380	13.3	7.3	580	.8	C_2S_1
0	45	14	42	220	0	350	-	7.4	510	.9	C_2S_1
T	95	11	-	320	-	410	-	7.6	630	.8	C_2S_1
T	6.2	6.0	-	65	-	110	15	7.7	190	.6	C_1S_1
T	2.9	3.5	-	65	-	160	-	8.0	190	.6	C_1S_1
10*	800	16	-	750	480	1,570	15.0	7.6	1,900	2.8	C_3S_1
14*	17	12	-	30	0	670	17.0	8.4	950	20	C_3S_4
15	108	11	-	230	24	400	-	8.1	600	1.2	C_2S_1
-	-	-	-	350	-	9,690	-	7.6	-	-	-
0	4,000	2,100	-	290	-	9,630	-	7.6	14,000	-	-
32	3,700	2,100	-	290	-	9,650	-	8.2	16,000	79	C_4S_4
-	-	2,100	-	-	-	-	26.0	8.2	12,900	-	-
0*	3,840	2,130	15	230	0	9,520	-	8.0*	-	510	C_4S_4

Table 5. Major constituents of water in selected wells and springs - Concluded

Location number	Local well or spring name	Date of collection	Laboratory	Pumping rate (gallon per minute)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)
12.1.33.132	Conoco 22-10	-	P	-	-	-	-	-	-
12.2.24.442	Conoco 15-9	-	P	-	-	-	-	-	-
12.2.36.442	Conoco WW-101	05-29-76	P	1,212	70	13	3,300	10	250*
13.2.26.434	Conoco 9-8	-	P	-	-	-	-	-	-

Carbonate (as CO_3)	Sulfate	Chloride	Silica	Calcium-magnesium hardness (as $CaCO_3$)	Hardness, noncarbonate	Dissolved solids residue at 105° Celsius	Temperature (degrees Celsius)	pH (units)	Specific conductance (micromhos per centimeter at 25° Celsius)	Sodium absorption ratio	Irrigation class
-	-	-	-	870	-	10,800	-	7.1	-	-	-
-	-	-	-	300	-	9,580	-	7.7	-	-	-
0*	3,380	1,970	17	230	25	8,640	-	8.2*	11,000	510	C_4S_4
-	-	-	-	470	-	2,930	-	8.3	-	-	-

Table 6. Nutrients and minor constituents of water in selected wells

EXPLANATION

Location number: See text for explanation.

Note: All constituents reported in milligrams per liter. Concentrations of dissolved nitrate (as N), boron, and phosphorus (as P) were determined by U.S. Bureau of Indian Affairs unless marked with asterisks. Those marked with asterisks and all other concentrations were determined by U.S. Geological Survey. "T" indicates trace concentration detected.

Location number	Local well name	Date of collection	Nitrate (dissolved as N)	Nitrite plus nitrate (dissolved as N)	Nitrogen (total Kjeldahl as N)	Phosphorus (dissolved as P)
9.5.9.231	Laguna 78-1	11-13-78	0.28	-	-	T
		11-29-78	.01	-	-	T
		12-21-78	.04	0.00	-	T
9.6.2.123	Laguna 76-7	01-27-77	-	.57	0.10	0.04*
		08-24-78	.28	-	-	T
9.6.5.222	Laguna 76-6	01-25-77	.06	.43	.02	.07*
9.6.26.233	RWP 24	12-11-78	.56	1.5	-	T
9.6.26.443	Timia	10-18-78	.28	-	-	T
10.6.3.111	Encinal 1	11-17-78	.07	-	-	.05
10.6.9.121	Encinal 2	11-07-78	.04	.05	-	.01
10.7.10.213	Laguna 79-1	01-16-80	.98	-	-	.03
10.7.35.232	Ir. Test 6	08-14-75	.14	-	-	.11
10.7.36.322	Laguna 76-2	07-13-76	.28	-	-	T
10.7.36.424	Laguna 76-1	07-08-76	2.5	-	-	.05
10.7.36.424a	Laguna Ir. 1	09-27-77	.14	-	-	.90
11.6.27.334	Encinal Canyon 1	07-05-78	.07	-	-	.10
11.7.35.243	Castillo Canyon 1	08-14-78	.14	-	-	.01

Phosphate (total ortho as P)	Phosphate (dissolved ortho as as P)	Carbon (organic, total as C)	Carbon (organic, dissolved as C)	Chemical oxygen demand	Sulfide (dissolved)	Boron (dissolved)
-	-	-	-	-	-	1.2
-	-	-	-	-	-	0.58
-	0.00	0.7	-	6.0	-	T
0.04	.04	1.1	-	-	-	0.47*
-	-	-	-	-	-	.65
.07	.06	0.9	-	-	-	.47*
-	.01	-	-	9.0	0.0	.13
-	-	-	-	-	-	.15
-	.01	-	1.7	1.0	0.1	.20
-	.01	-	2.0	4.0	-	.20*
-	-	-	-	-	-	.30
-	-	-	-	-	-	.40
-	-	-	-	-	-	2.0
-	-	-	-	-	-	0.13
-	-	-	-	-	-	.18
-	-	-	-	-	-	.29
-	-	-	-	-	-	.65

Table 7. Trace elements of water in selected wells

EXPLANATION

Location number: See text for explanation.
Note: All constituents are reported in micrograms per liter unless noted otherwise; concentrations less than the detection limit of the analytical method used are indicated by "<"; "T" indicates trace concentration detected.

Part I

Location number	Local well name	Date of collection	Aluminum (dissolved)	Arsenic (total)	Barium (dissolved)	Barium (total)	Cadmium (total)
9.5.9.231	Laguna 78-1	11-13-78	-	2	-	480	< 1
		11-29-78	-	2	-	80	T
		12-21-78	0	4	0	140	8
9.6.2.123	Laguna 76-7	01-27-77	-	2	-	0	10
		08-24-78	-	1	-	110	T
9.6.5.222	Laguna 76-6	01-25-77	-	3	-	0	10
9.6.26.233	RWP 24	12-11-78	0	2	0	180	T
9.6.26.443	Timla Well	10-18-78	-	< 1	-	340	2
10.6.3.111	Encinal 1	11-17-78	0	2	0	110	T
10.6.9.121	Encinal 2	11-07-78	0	2	0	-	2
10.7.10.213	Laguna 79-1	01-16-78	-	-	90	-	-
10.7.36.322	Laguna 76-2	07-14-76	-	6	-	-	-
10.7.36.424	Laguna 76-1	07-08-76	-	-	-	-	-
		07-10-76	-	3	-	-	-
11.6.27.334	Encinal Canyon 1	07-05-78	-	T	-	220	T
12.1.30.324	Conoco 65A	- -76	< 100	< 10	< 100	-	< 1
12.2.36.442	Conoco WW-101	05-29-76	6	10	< 100	-	< 1

Chromium (total)	Cobalt (dissolved)	Cobalt (total)	Copper (dissolved)	Copper (total)	Flouride (dissolved, in milligrams per liter)	Iron (milligrams per liter) (dissolved)	Iron (milligrams per liter) (total)	Lead (dissolved)	Lead (total)
24	-	-	-	-	1.0	.02	16.8	-	T
T	-	-	-	-	-	T	13.5	-	T
8	-	-	-	-	-	0.01	1.4	-	90
0	-	70	-	< 50	1.1	0.01	6.3	-	< 100
T	-	-	-	-	1.5	0.02	1.7	-	T
0	-	< 50	-	< 50	1.5	0.01	1.9	-	< 100
T	-	-	-	-	0.4	T	0.3	-	T
< 10	-	-	-	-	0.2	T	1.4	-	T
T	-	-	-	-	1.2	T	1.2	-	T
< 10	0	-	0	-	0.9	0.5	0.7	2	T
-	< 3	-	< 10	-	3.4	0.12	-	< 10	-
-	-	-	-	-	1.6	T	-	-	-
-	-	-	-	-	1.0	T	-	-	-
-	-	-	-	-	-	-	-	-	-
T	-	-	-	-	0.5	0.01	11.5	-	62
< 1	< 1	-	< 1	-	0.7	3.4	-	< 1	-
7	2	-	< 1	-	0.9	0.2	-	5	-

Table 7. Trace elements of water in selected wells - Concluded

EXPLANATION

Location number: See text for explanation.

Note: All analyses are reported in micrograms per liter unless noted otherwise; concentrations less than the detection limit of the analytical method used are indicated by "<"; "T" indicates trace concentration detected.

Part II

Location number	Well name	Lithium (dissolved)	Lithium (total)	Manganese (dissolved)	Manganese (total)	Mercury total
9.5.9.231	Laguna 78-1	-	-	-	-	< 2
		-	-	-	-	< 2
		-	-	-	120	< 2
9.6.2.123	Laguna 76-7	250	260	-	350	.1
		-	-	-	-	T
9.6.5.222	Laguna 76-6	370	390	-	110	.1
9.6.26.233	RWP 24	-	-	-	-	< 2
9.6.26.443	Timia	-	-	-	-	-
10.6.3.111	Encinal 1	-	-	-	-	< 2
10.6.9.121	Encinal 2	-	-	90	-	< 2
10.7.10.213	Laguna 79-1	140	-	60	-	-
10.7.36.322	Laguna 76-2	-	-	-	-	.2
10.7.36.424	Laguna 76-1	-	-	-	-	-
		-	-	-	-	.3
11.6.27.334	Encinal Canyon 1	-	-	-	-	T
12.1.30.324	Conoco 65A	-	-	110	-	-
12.2.36.442	Conoco WW-101	-	-	80	-	-

Molybdenum (dissolved)	Molybdenum (total)	Selenium (dissolved)	Selenium (total)	Silver (dissolved)	Silver (total)	Strontium (milligrams per liter) (dissolved)	Strontium (milligrams per liter) (total)	Vanadium (dissolved)	Zinc (dissolved)
-	-	-	T	-	< 10	-	-	-	-
-	-	-	T	-	T	-	-	-	-
6	T	-	T	-	T	10.0	-	0.0	-
-	4	-	3	-	< 10	-	2.8	2.9	-
-	-	-	T	-	T	-	-	-	-
-	7	-	2	-	< 10	-	1.8	3.6	-
2	0	-	T	-	T	.44	-	0.0	-
-	-	-	T	-	< 10	-	-	-	-
3	-	-	T	-	< 10	1.6	-	0.0	-
8	-	0	T	-	< 10	2.7	-	0.0	10
38	-	0	-	-	-	2.7	-	< 6	36
-	7	-	1	-	-	-	-	1.1	-
-	-	-	-	-	-	-	-	-	-
-	3	-	3	-	-	-	-	1.1	-
-	-	-	T	-	T	-	-	-	-
< 1	-	< 10	-	< 1	-	-	-	< 10	10
< 1	-	< 10	-	33	-	-	-	< 10	20

Table 8. Radiochemicals of water in selected wells

EXPLANATION

Location number: See text for explanation.

Note: All constituents are reported in picocuries per liter unless noted otherwise. All analyses by U.S. Geological Survey. Concentrations less than the detection limit of the analytical method used are indicated by "<". U, uranium; Cs, cesium; St, strontium; Yt, yttriun.

Location number	Local well name	Date of collection	Gross alpha (dissolved as U) (micrograms per liter)	Gross alpha (suspended as U) (micrograms per liter)	Gross beta (dissolved as Cs-137)
9.5.9.231	Laguna 78-1	12-21-78	100	-	23
9.6.2.123	Laguna 76-7	01-27-77	< 32	2.4	10
9.6.5.222	Laguna 76-6	01-25-77	< 30	12	8.1
9.6.26.233	RWP 24	12-11-78	9.6	-	4.0
10.6.3.111	Encinal 1	11-17-78	< 17	-	9.5
10.6.9.121	Encinal 2	11-07-78	29	-	7.4
10.7.10.213	Laguna 79-1	01-16-80	< 19	< 28	26

Gross beta (dissolved as Sr/Yt-90)	Gross beta (suspended as Cs-137)	Gross beta (suspended as Sr/Yt-90)	Radium-226 (dissolved, radon method)	Uranium (dissolved as U) (micrograms per liter)	Potassium-40 (dissolved)
21	-	-	3.5	3.5	4.9
8.2	2.6	2.1	.19	7.2	4.8
6.5	12	10	.09	7.9	6.2
3.7	-	-	.13	3.5	1.4
8.5	-	-	.05	4.5	3.9
6.8	-	-	1.0	9.2	3.2
24	-	-	1.0	1.0	-

Table 9.--Selected major chemical constituents of surface water

EXPLANATION

Laboratory: BIA, U.S. Bureau of Indian Affairs; USGS, U.S. Geological Survey

Notes: All constituents are dissolved. All values of water temperature were measured onsite. Specific conductance, pH, bicarbonate, and carbonate values marked by "*" were measured onsite. All other values were determined in the laboratory. Trace concentrations indicated by "T". [g/] Indicates discharge measurement is daily mean value from streamflow-gaging station. All other discharge measurements were of instantaneous flow.

			Constituents in milligrams						
Date of collection	Laboratory	Discharge (cubic feet per second)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)	Carbonate (as CO_3)	Sulfate
Rio San Jose near Grants (below Horace Springs) (10.9.23.444)									
04- -61	BIA	-	81	41	130	4.7	240	6	280
05- -61	BIA	-	80	36	97	2.3	220	13	250
06- -61	BIA	-	80	35	110	5.5	210	13	280
07- -61	BIA	-	79	35	110	3.9	220	4	280
08- -61	BIA	-	84	36	120	.4	240	8	280
09- -61	BIA	-	82	35	110	4.7	210	21	260
10- -61	BIA	-	94	33	140	7.8	230	24	290
02- -62	BIA	-	-	-	-	-	-	-	-
11- -62	BIA	-	-	-	-	-	-	-	-
06-26-67	BIA	2.9[g/]	130	10	100	4.2	230	T	260
07-15-68	BIA	4.6[g/]	81	36	110	4.3	240	T	260
10-14-68	BIA	3.9[g/]	81	38	110	3.9	250	6	250

per liter									
Chloride	Silica	Calcium magnesium hardness (as $CaCo_3$)	Hardness, noncarbonate	Dissolved solids	Temperature (degrees celsius)	pH	Specific conductance (micromhos per centimeter at 25° celsius)	Sodium adsorption ratio	Irrigation class
99	-	370	170	-	-	7.9	1,280	2.9	C_3S_1
84	-	350	170	-	-	8.4	1,170	2.2	C_3S_1
80	-	350	180	-	-	8.4	1,200	2.6	C_3S_1
60	-	350	170	-	-	8.1	1,130	2.5	C_2S_1
91	-	360	160	-	-	8.2	1,250	2.8	C_3S_1
84	-	350	180	-	-	8.5	1,180	2.6	C_3S_1
100	-	370	180	-	-	8.4	1,300	3.1	C_3S_1
-	-	-	-	-	-	-	1,580	3.3	C_3S_1
-	-	-	-	-	-	-	1,180	2.5	C_3S_1
87	-	360	170	784	-	8.3	1,090	2.3	C_3S_1
68	-	350	150	752	-	8.2	1,130	2.5	C_3S_1
94	-	360	140	808	-	8.2	1,190	2.5	C_3S_1

Table 9.--Selected major chemical constituents of surface water-Continued

Date of collection	Laboratory	Discharge (cubic feet per second)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)	Carbonate (as CO_3)	Sulfate
			Constituents in milligrams						
Rio San Jose near Grants (below Horace Springs) (10.9.23.444) - continued									
05-06-69	BIA	6.6[g]	95	51	200	7.0	270	6	390
06-19-69	BIA	4.6[g]	88	39	130	3.9	260	7	250
07- -69	BIA	-	83	40	120	3.9	240	6	280
08-08-69	BIA	5.7[g]	90	41	150	6.3	280	4	310
09- -69	BIA	-	73	26	100	8.2	190	3	230
10- -69	BIA	-	91	46	150	3.9	270	4	290
05-07-70	BIA	4.0[g]	89	44	150	5.9	250	10	360
06-22-70	BIA	4.6[g]	97	50	190	8.6	270	T	410
08-05-70	BIA	6.3[g]	89	44	170	9.8	260	9	370
09- -70	BIA	-	86	39	110	3.1	240	13	350
07-26-71	BIA	5.2[g]	92	40	150	4.8	240	5	350
08- -71	BIA	-	86	38	110	1.6	240	10	260
10-27-71	BIA	7.5[g]	96	47	190	11	220	18	400
07-10-72	BIA	4.3[g]	92	40	150	7.4	270	5	320
08-31-72	BIA	11[g]	58	17	76	4.3	210	T	140
11-01-73	BIA	4.9[g]	86	40	120	5.5	260	6	250

per liter									
Chloride	Silica	Calcium magnesium hardness (as $CaCo_3$)	Hardness, noncarbonate	Dissolved solids	Temperature (degrees celsius)	pH	Specific conductance (micromhos per centimeter at 25° celsius)	Sodium adsorption ratio	Irrigation class
180	-	450	220	1,180	-	8.1	1,740	4.2	C_3S_1
120	-	380	170	854	-	8.3	1,310	2.8	C_3S_1
98	-	370	170	820	-	8.0	1,240	2.8	C_3S_1
130	-	390	160	940	-	8.0	1,440	3.3	C_3S_1
74	-	290	140	664	-	8.1	1,010	2.6	C_3S_1
140	-	420	190	1,010	-	8.8	1,470	3.4	C_3S_1
130	-	410	200	943	-	8.3	1,410	3.3	C_3S_1
150	-	450	230	1,100	-	7.8	1,620	3.8	C_3S_1
150	-	400	190	1,020	-	7.9	1,580	3.7	C_3S_1
99	-	380	180	841	-	8.3	1,220	2.6	C_3S_1
120	-	400	190	935	-	7.9	1,380	3.2	C_3S_1
98	-	370	180	809	-	8.1	1,220	2.6	C_3S_1
150	-	440	250	1,200	-	8.1	1,650	4.0	C_3S_1
120	-	400	180	920	-	8.1	1,350	3.4	C_3S_1
48	-	220	39	493	-	8.0	760	2.2	C_3S_1
110	-	380	170	836	-	7.9	1,260	2.7	C_3S_1

Table 9.--Selected major chemical constituents of surface water-Continued

Date of collection	Laboratory	Discharge (cubic feet per second)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)	Carbonate (as CO_3)	Sulfate
			Constituents in milligrams						
Rio San Jose near Grants (below Horace Springs) (10.9.23.444) - continued									
01-25-74	BIA	5.1[g/]	92	41	140	5.5	250	14	280
04-03-74	BIA	5.9[g/]	88	39	110	5.5	250	12	260
07-08-74	BIA	6.3[g/]	84	38	110	1.6	230	18	250
03-28-75	BIA	5.0	86	36	130	5.9	230	17	300
04-20-76	BIA	5.1	80	41	130	5.9	330	22	230
09-12-76	BIA	4.2	42	41	150	8.2	110	10	340
01-21-77	USGS	6.5	85	38	130	7.4	260	0	290
04-06-77	BIA	5.5	96	38	170	7.8	240	19	310
04-19-78	USGS	6.5	85	40	150	7.6	280*	0*	270
07-24-78	BIA	5.3	84	33	120	6.3	270*	0*	250
10-25-78	BIA	5.7	90	35	140	8.6	300*	0*	300
01-23-79	BIA	5.7	130	17	140	9.4	340*	0*	280
03-08-79	BIA	4.9	-	-	-	-	-	-	-
06-20-79	BIA	5.6	94	38	182	8.6	312*	0*	380
11-13-79	BIA	6.0[g/]	96	40	150	8.6	270	T	310

per liter									
Chloride	Silica	Calcium magnesium hardness (as $CaCo_3$)	Hardness, noncarbonate	Dissolved solids	Temperature (degrees celsius)	pH	Specific conductance (micromhos per centimeter at 25° celsius)	Sodium adsorption ratio	Irrigation gation class
110	-	400	200	897	-	8.2	1,300	3.1	C_3S_1
110	-	380	180	822	-	8.2	1,270	2.5	C_3S_1
99	-	370	190	819	-	8.4	1,190	2.5	C_3S_1
110	-	370	180	850	-	8.4	1,240	2.9	C_2S_1
100	-	370	67	870	-	8.6	1,250	2.9	C_3S_1
130	-	280	170	820	-	9.0	1,230	4.2	C_3S_1
110	28	370	160	830	10.0	7.8*	1,350*	2.9	C_3S_1
120	-	400	170	920	-	8.0	1,370	3.6	C_3S_1
130	29	380	140	870	10.0	8.1*	1,350*	3.4	C_3S_1
100	-	350	130	820	16.0	7.9*	1,180*	2.8	C_3S_1
130	-	370	150	860	12.0	7.6*	1,350*	3.2	C_3S_1
120	-	390	170	900	9.5	7.9*	1,300*	3.2	C_3S_1
160	-	-	-	-	13.5	-	1,480*	-	-
160	-	390	170	970	20.5	8.2	1,500*	4.0	C_3S_1
130	-	410	180	880	-	7.8*	1,400*	3.2	C_3S_1

Table 9.--Selected major chemical constituents of surface water--Continued

Date of collection	Laboratory	Discharge (cubic feet per second)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)	Carbonate (as CO_3)	Sulfate
			Constituents in milligrams						
Rio San Jose at McCartys North Diversion (10.8.29.423)									
04- -61	BIA	-	81	41	140	3.9	240	11	280
05- -61	BIA	-	79	38	120	3.1	210	21	300
06- -61	BIA	-	76	36	110	3.1	220	8	270
07- -61	BIA	-	77	34	120	4.7	220	6	250
08- -61	BIA	-	85	36	140	.8	240	6	310
09- -61	BIA	-	86	38	130	8.6	230	18	310
10- -61	BIA	-	94	35	78	6.3	250	18	160
02- -62	BIA	-	-	-	-	-	-	-	-
11- -62	BIA	-	-	-	-	-	-	-	-
06-26-67	BIA	-	120	12	110	3.7	230	T	280
05-06-69	BIA	-	90	47	180	5.9	270	10	350
06- -69	BIA	-	86	39	140	5.1	240	16	300
07- -69	BIA	-	81	38	110	3.5	240	11	240
08-08-69	BIA	-	83	38	120	4.7	270	6	270
09- -69	BIA	-	68	22	97	10	160	T	240
10- -69	BIA	-	86	43	150	3.1	260	11	290

per liter									
Chloride	Silica	Calcium magnesium hardness (as $CaCo_3$)	Hardness, noncarbonate	Dissolved solids	Temperature (degrees celsius)	pH	Specific conductance (micromhos per centimeter at 25° celsius)	Sodium adsorption ratio	Irrigation gation class
100	-	370	170	-	-	8.1	1,300	3.2	C_3S_1
89	-	350	180	-	-	8.6	1,290	2.6	C_3S_1
80	-	340	160	-	-	8.1	1,180	2.6	C_3S_1
98	-	330	150	-	-	7.9	1,150	2.8	C_2S_1
93	-	360	160	-	-	8.1	1,320	3.2	C_3S_1
93	-	370	180	-	-	8.3	1,320	3.0	C_3S_1
100	-	380	170	-	-	8.2	1,320	1.7	C_3S_1
-	-	-	-	-	-	-	1,420	3.2	C_3S_1
-	-	-	-	-	-	-	1,150	2.4	C_3S_1
89	-	350	160	740	-	8.4	1,110	2.4	C_3S_1
150	-	420	200	1,040	-	8.2	1,560	3.8	C_3S_1
110	-	380	180	870	-	8.5	1,340	3.1	C_3S_1
92	-	360	160	804	-	8.2	1,200	2.6	C_3S_1
99	-	370	150	802	-	8.1	1,260	2.8	C_3S_1
65	-	260	130	654	-	8.0	940	2.6	C_3S_1
120	-	390	180	956	-	8.3	1,390	3.0	C_3S_1

Table 9.--Selected major chemical constituents of surface water--Continued

Date of collection	Laboratory	Discharge (cubic feet per second)	Constituents in milligrams: Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)	Carbonate (as CO_3)	Sulfate
Rio San Jose at McCartys North Diversion (10.8.29.423) - continued									
05-08-70	BIA	-	86	43	140	8.6	260	11	300
06- -70	BIA	-	90	47	170	9.0	260	7	350
08-05-70	BIA	-	80	40	130	5.1	260	10	280
09- -70	BIA	-	86	39	120	3.5	260	10	260
07-26-71	BIA	-	100	45	180	5.7	250	10	400
08- -71	BIA	-	86	43	140	T	250	19	280
10-27-71	BIA	-	86	39	160	9.8	220	17	310
07-10-72	BIA	-	92	43	160	.4	280	17	280
08-31-72	BIA	-	56	18	77	5.5	200	T	160
11-01-73	BIA	-	86	39	130	4.7	370	12	260
01-25-74	BIA	-	86	39	130	4.7	250	12	260
04-03-74	BIA	-	88	39	130	4.3	250	19	270
07-08-74	BIA	-	76	40	110	2.0	220	22	230
10-21-74	BIA	-	86	43	130	3.1	230	24	300
03-28-75	BIA	-	88	39	140	5.9	230	24	270
04-20-76	BIA	-	88	46	160	6.7	270	12	290

per liter									
Chloride	Silica	Calcium magnesium hardness (as $CaCo_3$)	Hardness, noncarbonate	Dissolved solids	Temperature (degrees celsius)	pH	Specific conductance (micromhos per centimeter at 25° celsius)	Sodium adsorption ratio	Irrigation gation class
120	-	390	180	906	-	8.3	1,380	3.2	C_3S_1
130	-	420	210	977	-	8.0	1,470	3.7	C_3S_1
100	-	370	150	892	-	8.0	1,290	3.0	C_3S_1
110	-	380	160	776	-	8.3	1,260	2.7	C_3S_1
150	-	390	160	1,120	-	8.1	1,610	3.7	C_3S_1
100	-	390	180	899	-	8.2	1,290	3.0	C_3S_2
120	-	380	190	951	-	8.2	1,430	3.6	C_3S_1
120	-	410	170	970	-	8.3	1,390	3.5	C_3S_1
48	-	220	47	504	-	8.0	1,280	2.3	C_3S_1
98	-	380	170	786	-	8.1	1,160	2.9	C_3S_1
120	-	380	170	872	-	8.4	1,190	2.8	C_3S_1
110	-	380	180	838	-	8.3	1,270	2.8	C_3S_1
88	-	360	170	839	-	8.3	1,190	2.5	C_3S_1
99	-	390	200	892	-	8.1	1,250	2.9	C_3S_1
110	-	380	190	890	-	8.3	1,340	3.1	C_3S_1
120	-	410	160	1,010	10.0	8.5	1,450*	3.4	C_3S_1

Table 9.--Selected major chemical constituents of surface water-Continued

Date of collection	Laboratory	Discharge (cubic feet per second)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)	Carbonate (as CO_3)	Sulfate
			Constituents in milligrams						
Rio San Jose at McCartys North Diversion (10.8.29.423) - continued									
09-12-76	BIA	-	78	40	130	6.3	160	24	330
04-06-77	BIA	-	88	38	140	7.4	220	22	300
05-31-78	BIA	-	88	38	150	7.0	280*	0*	320
07-20-78	BIA	1.9	84	36	130	6.3	300*	0*	280
11-01-78	BIA	8.0	86	35	140	7.4	270*	0*	250
01-31-79	BIA	7.0	88	36	140	8.2	290*	0*	270
Rio San Jose at Acomita Diversion (10.8.36.223)									
04- -61	BIA	-	140	97	420	9.0	240	13	950
05- -61	BIA	-	100	78	360	3.1	250	19	730
06- -61	BIA	-	90	55	210	4.9	230	17	470
07- -61	BIA	-	88	15	74	9.4	150	-	260
08- -61	BIA	-	97	45	170	.4	250	10	410
09- -61	BIA	-	150	44	190	6.2	230	27	550
10- -61	BIA	-	94	42	170	7.0	220	30	380
02- -62	BIA	-	-	-	-	-	-	-	-
11- -62	BIA	-	-	-	-	-	-	-	-

per liter									
Chloride	Silica	Calcium magnesium hardness (as $CaCo_3$)	Hardness, noncarbonate	Dissolved solids	Temperature (degrees celsius)	pH	Specific conductance (micromhos per centimeter at 25° celsius)	Sodium adsorption ratio	Irrigation gation class
120	-	360	190	890	16.0	9.2	1,350*	3.0	C_3S_1
110	-	380	160	870	15.0	8.0	1,250*	3.1	C_3S_1
120	23	380	150	900	14.5	7.7*	1,300*	3.3	C_3S_1
110	-	360	130	820	18.0	7.7*	1,290*	3.1	C_3S_1
110	-	360	140	810	13.0	8.1*	1,280*	3.1	C_3S_1
120	-	370	150	880	4.0	7.8*	1,330*	3.1	C_3S_1
210	-	750	550	-	-	8.1	3,090	6.7	C_4S_2
170	-	570	360	-	-	8.3	2,470	6.5	C_4S_2
120	-	450	260	-	-	8.4	1,730	4.2	C_3S_1
35	-	280	160	-	-	8.0	900	1.9	C_3S_1
110	-	430	220	-	-	8.3	1,560	3.6	C_3S_1
120	-	560	370	-	-	8.6	1,720	3.6	C_3S_1
110	-	410	230	-	-	8.5	1,430	3.6	C_3S_1
-	-	-	-	-	-	-	1,550	3.6	C_3S_1
-	-	-	-	-	-	-	2,800	6.6	C_4S_2

Table 9.--Selected major chemical constituents of surface water-Continued

Date of collection	Laboratory	Discharge (cubic feet per second)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)	Carbonate (as CO_3)	Sulfate
			Constituents in milligrams						
Rio San Jose at Acomita Diversion (10.8.36.223) - continued									
06-26-67	BIA	-	170	5.5	190	5.4	250	T	480
05-06-69	BIA	-	110	62	250	6.6	280	17	590
06- -69	BIA	-	93	49	180	2.7	250	18	410
07- -69	BIA	-	92	51	160	3.9	250	20	390
08-08-69	BIA	-	110	48	200	7.4	280	T	490
09- -69	BIA	-	82	33	140	9.8	180	4	340
10- -69	BIA	-	100	56	190	3.1	290	14	450
05-07-70	BIA	-	110	71	300	7.8	310	20	670
06- -70	BIA	-	98	52	190	7.0	280	12	410
08-05-70	BIA	-	130	64	240	10	360	8	550
09- -70	BIA	-	100	52	170	3.5	280	18	380
07-26-71	BIA	-	120	57	250	8.6	270	17	560
08- -71	BIA	-	140	94	500	T	330	19	1,100
10-27-71	BIA	-	92	58	240	11	250	18	530
07-10-72	BIA	-	94	47	160	4.3	250	19	360
08-31-72	BIA	-	56	21	85	3.1	200	T	170

per liter									
Chloride	Silica	Calcium magnesium hardness (as $CaCo_3$)	Hardness, noncarbonate	Dissolved solids	Temperature (degrees celsius)	pH	Specific conductance (micromhos per centimeter at 25° celsius)	Sodium adsorption ratio	Irrigation gation class
120	-	460	250	1,200	-	8.3	1,600	3.9	C_3S_1
160	-	520	300	1,420	-	8.3	2,020	4.8	C_3S_2
130	-	440	230	1,090	-	8.5	1,620	3.8	C_3S_1
110	-	440	230	1,060	-	8.3	1,530	3.4	C_3S_1
140	-	480	250	1,250	-	8.1	1,800	4.0	C_3S_1
94	-	340	190	868	-	8.1	1,250	3.2	C_3S_1
130	-	490	250	1,240	-	8.4	1,700	3.8	C_3S_1
170	-	580	320	1,560	-	8.5	2,180	5.4	C_3S_2
130	-	460	230	1,120	-	8.2	1,640	3.9	C_3S_1
160	-	590	300	1,440	-	8.1	1,980	4.2	C_3S_1
120	-	470	240	1,130	-	8.4	1,600	3.4	C_3S_1
210	-	540	290	1,540	-	8.2	2,150	4.8	C_3S_2
280	-	750	480	2,460	-	8.4	3,360	7.9	C_4S_1
150	-	470	270	1,330	-	8.3	1,940	4.8	C_3S_2
120	-	430	220	1,010	-	8.4	1,470	3.4	C_3S_1
48	-	230	65	576	-	8.1	820	2.5	C_3S_1

Table 9.—Selected major chemical constituents of surface water—Continued

Date of collection	Laboratory	Discharge (cubic feet per second)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)	Carbonate (as CO_3)	Sulfate
			Constituents in milligrams						
Rio San Jose at Acomita Diversion (10.8.36.223) - continued									
11-01-73	BIA	-	130	74	330	6.6	350	9	770
01-25-74	BIA	-	94	47	170	5.1	250	20	370
04-03-74	BIA	-	94	50	160	4.7	260	15	370
07-08-74	BIA	-	96	53	180	1.2	230	24	430
10-21-74	BIA	-	130	80	320	7.8	450	44	700
03-06-75	BIA	-	92	44	170	6.3	250	23	390
03-28-75	BIA	-	94	46	170	5.5	270	13	400
04-20-76	BIA	-	98	43	200	6.3	260	5	410
09-12-76	BIA	-	54	55	200	7.0	140	13	490
04-06-77	BIA	-	98	50	200	7.8	260	19	410
05-31-78	BIA	-	100	50	210	7.4	300*	0*	490
07-20-78	BIA	2.3	100	50	200	6.7	320*	0*	470
11-01-78	BIA	6.4	100	49	200	7.4	320*	0*	420
01-31-79	BIA	9.0	96	44	172	7.8	310*	0*	370

per liter									
Chloride	Silica	Calcium magnesium hardness (as $CaCo_3$)	Hardness, noncarbonate	Dissolved solids	Temperature (degrees celsius)	pH	Specific conductance (micromhos per centimeter at 25° celsius)	Sodium adsorption ratio	Irrigation gation class
180	-	630	340	1,750	-	7.7	2,310	5.8	C_4S_2
110	-	430	230	1,080	-	8.5	1,510	3.6	C_3S_1
120	-	440	230	1,080	-	8.4	1,500	3.3	C_3S_1
120	-	460	270	1,170	-	8.5	1,600	3.7	C_3S_1
190	-	660	290	1,800	-	8.3	2,470	5.4	C_4S_2
120	-	410	210	1,040	12.0	8.4	1,470	3.6	C_3S_1
120	-	430	200	1,090	-	8.5	1,520	3.7	C_3S_1
130	-	420	200	1,240	14.0	8.6	1,700*	3.9	C_3S_1
140	-	360	220	1,100	14.0	8.8	1,650*	4.6	C_3S_1
130	-	450	200	1,110	13.0	8.1	1,600*	4.2	C_3S_1
140	19	470	230	1,260	17.5	8.2*	1,700*	4.3	C_3S_1
130	-	470	220	1,160	25.0	8.1*	1,700*	4.0	C_3S_1
130	-	460	210	1,130	13.0	8.2*	1,660*	4.0	C_3S_1
130	-	420	190	1,050	0.0	7.8*	1,530*	3.7	C_3S_1

Table 9.--Selected major chemical constituents of surface water-Continued

Date of collection	Laboratory	Discharge (cubic feet per second)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)	Carbonate (as CO_3)	Sulfate
			Constituents in milligrams						
Rio San Jose at Seama Diversion (10.7.34.242)									
04- -61	BIA	-	160	120	530	5.9	390	15	930
05- -61	BIA	-	150	160	870	7.8	360	30	1,700
06- -61	BIA	-	37	75	290	6.8	320	19	550
07- -61	BIA	-	80	130	55	8.6	140	-	220
08- -61	BIA	-	100	44	200	8.6	260	8	460
09- -61	BIA	-	84	69	240	7.0	220	30	600
10- -61	BIA	-	98	49	210	7.0	250	24	470
02- -62	BIA	-	-	-	-	-	-	-	-
11- -62	BIA	-	-	-	-	-	-	-	-
06-26-67	BIA	-	250	85	610	8.6	320	16	1,500
07- -68	BIA	-	89	75	320	7.8	320	T	700
10-14-68	BIA	-	150	130	540	4.8	260	11	1,400
05-06-69	BIA	-	170	270	1,100	15	280	17	2,900
06- -69	BIA	-	120	97	440	7.8	320	29	970
07- -69	BIA	-	150	140	750	6.3	370	20	1,700
08-08-69	BIA	-	82	34	75	13	160	T	640

per liter									
Chloride	Silica	Calcium magnesium hardness (as $CaCo_3$)	Hardness, noncarbonate	Dissolved solids	Temperature (degrees celsius)	pH	Specific conductance (micromhos per centimeter at 25° celsius)	Sodium adsorption ratio	Irrigation gation class
280	-	890	570	-	-	8.1	3,400	7.9	C_4S_2
330	-	1,030	730	-	-	8.1	5,100	12	C_4S_3
160	-	400	140	-	-	8.4	2,200	6.4	C_3S_2
18	-	730	620	-	-	7.9	770	1.5	C_3S_1
120	-	430	220	-	-	8.2	1,750	4.2	C_3S_1
120	-	490	310	-	-	8.7	1,980	4.8	C_3S_1
120	-	450	240	-	-	8.3	1,690	4.4	C_3S_1
-	-	-	-	-	-	-	1,700	4.0	C_3S_1
-	-	-	-	-	-	-	4,400	10	C_4S_3
360	-	970	710	3,060	-	8.3	4,000	8.6	C_4S_3
180	-	530	270	1,620	-	8.3	2,320	6.0	C_4S_2
290	-	930	700	2,970	-	8.3	3,810	7.7	C_4S_3
480	-	1,540	1,310	5,540	-	8.3	6,590	12	C_4S_4
240	-	690	430	2,190	-	8.5	3,040	7.3	C_4S_2
360	-	960	660	3,540	-	8.3	4,530	10	C_4S_3
170	-	350	220	1,420	-	8.0	2,070	7.1	C_3S_2

Table 9.—Selected major chemical constituents of surface water—Continued

Date of collection	Laboratory	Discharge (cubic feet per second)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)	Carbonate (as CO_3)	Sulfate
			Constituents in milligrams						
Rio San Jose at Seama Diversion (10.7.34.242) - continued									
09- -69	BIA	-	110	36	110	5.5	210	4	440
10- -69	BIA	-	140	97	420	4.3	350	21	940
05-07-70	BIA	-	150	200	930	9.4	460	36	2,100
06- -70	BIA	-	140	130	360	7.4	190	38	1,500
08-05-70	BIA	-	80	22	89	6.6	130	T	300
09- -70	BIA	-	150	110	480	2.4	380	21	1,100
07-26-71	BIA	-	140	64	310	11	270	28	700
08- -71	BIA	-	110	60	240	12	270	25	550
10-27-71	BIA	-	96	56	260	11	250	17	520
07-10-72	BIA	-	140	190	1,100	1.6	360	43	2,400
08-31-72	BIA	-	58	18	91	5.1	190	T	180
09-13-73	BIA	-	112	49	210	13	240	19	530
01-25-74	BIA	-	100	61	240	5.1	270	25	500
04-03-74	BIA	-	100	63	230	5.5	280	20	480
07-01-74	BIA	-	96	81	290	3.1	300	29	650
10-21-74	BIA	-	160	110	510	4.7	280	61	1,100

per liter									
Chloride	Silica	Calcium magnesium hardness (as $CaCo_3$)	Hardness, noncarbonate	Dissolved solids	Temperature (degrees celsius)	pH	Specific conductance (micromhos per centimeter at 25° celsius)	Sodium adsorption ratio	Irrigation gation class
100	-	420	250	1,110	-	8.2	1,520	3.6	C_3S_1
230	-	740	450	2,260	-	8.4	2,970	6.7	C_4S_2
480	-	1,190	820	4,310	-	8.4	5,400	12	C_4S_4
330	-	890	730	3,050	-	8.3	4,210	9.3	C_4S_3
55	-	290	180	608	-	8.3	1,100	2.3	C_3S_1
260	-	830	520	2,580	-	8.4	3,380	7.2	C_4S_2
200	-	620	400	1,660	-	8.2	2,360	5.4	C_4S_2
150	-	530	300	1,370	-	8.5	1,940	4.5	C_3S_2
150	-	470	260	1,340	-	8.3	1,930	5.1	C_3S_2
510	-	1,150	850	4,850	-	8.5	5,900	14	C_4S_4
48	-	220	66	547	-	8.1	840	2.7	C_3S_1
150	-	480	280	1,250	16	8.2	1,900*	4.1	C_3S_1
140	-	510	280	1,320	-	8.5	1,910	4.6	C_3S_2
140	-	520	290	1,370	6	8.4	1,800*	4.4	C_3S_1
180	-	580	330	1,680	20	8.3	2,100*	5.3	C_4S_2
280	-	870	640	2,610	12	8.2	3,000*	2.5	C_4S_2

Table 9.--Selected major chemical constituents of surface water-Continued

Date of collection	Laboratory	Discharge (cubic feet per second)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)	Carbonate (as CO_3)	Sulfate
			Constituents in milligrams						
Rio San Jose at Seama Diversion (10.7.34.242) - continued									
03-28-75	BIA	-	110	57	230	6.3	280	28	520
08-08-75	BIA	-	220	110	660	12	420	34	1,400
03-25-76	BIA	-	100	64	240	6.7	310	10	500
01-11-77	BIA	-	140	88	350	7.4	350	16	890
04-04-77	BIA	-	100	62	270	6.7	280	14	540
07-07-77	BIA	-	90	86	390	11	300	10	780
10-03-77	BIA	-	110	57	260	8.6	280	17	540
01-10-78	BIA	-	110	63	280	7.8	310	T	620
03-01-78	BIA	-	100	62	260	7.8	300	12	540
06-05-78	BIA	-	150	94	530	11	370	10	1,100
09-05-78	BIA	-	150	84	400	11	360	7	1,010
01-08-79	BIA	-	100	56	210	9.0	270	7	450
03-01-79	BIA	-	100	54	230	7.4	300	T	510
06-06-79	BIA	-	130	69	350	11	340	2.4	790

per liter									
Chloride	Silica	Calcium magnesium hardness (as $CaCo_3$)	Hardness, noncarbonate	Dissolved solids	Temperature (degrees celsius)	pH	Specific conductance (micromhos per centimeter at 25° celsius)	Sodium adsorption ratio	Irrigation gation class
150	-	500	270	1,340	5.0	8.5	2,000*	4.5	C_3S_2
350	-	1,020	620	3,370	22.0	8.3	4,060	9.0	C_4S_3
150	-	520	250	1,430	8.0	8.5	1,900*	4.7	C_3S_2
210	-	710	380	2,060	0.0	8.1	2,500*	5.8	C_4S_2
160	-	510	250	1,390	2.0	7.6	1,800*	5.2	C_3S_2
210	-	580	320	1,750	17.0	8.2	2,500*	7.1	C_4S_2
160	-	520	260	1,340	13.0	8.3	2,000*	5.0	C_3S_2
190	-	550	300	1,510	-	8.1	2,100	5.3	C_3S_2
160	-	510	240	1,380	8.0	8.2	2,200*	5.0	C_3S_2
290	-	750	430	2,490	12.0	8.2	3,500*	8.5	C_4S_2
230	-	720	410	2,090	16.0	8.4	2,800*	6.4	C_4S_2
150	-	480	250	1,210	2.0	7.9	1,900*	4.2	C_3S_2
160	-	480	230	1,340	1.0	8.1	1,500*	4.6	C_3S_1
210	-	610	330	1,750	22.0	8.2	2,800*	6.1	C_4S_2

Table 9.--Selected major chemical constituents of surface water--Continued

Date of collection	Laboratory	Discharge (cubic feet per second)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)	Carbonate (as CO_3)	Sulfate
			Constituents in milligrams						
Cubero Creek at Budville (10.7.25.211)									
11-04-74	BIA	.42	92	18	46	6.3	260	20	150
04-20-78	USGS	.30	87	25	52	6.6	290*	11*	150
07-25-78	BIA	.25	64	19	51	7.8	250*	8*	130
10-26-78	BIA	.24	78	23	51	7.0	320*	4*	150
01-29-79	BIA	.40	78	19	51	8.2	280*	10*	130
Rio San Jose at Casa Blanca Diversion (9.6.6.222)									
04- -61	BIA	-	150	110	500	5.9	380	13	920
05- -61	BIA	-	140	100	360	10	380	17	120
06- -61	BIA	-	110	110	390	11	300	11	950
07- -61	BIA	-	77	18	100	8.6	150	-	300
08- -61	BIA	-	88	51	190	7.8	240	4	460
09- -61	BIA	-	96	46	230	7.8	250	21	490
10- -61	BIA	-	92	51	220	7.8	250	18	500
06-26-67	BIA	-	160	15	220	9.9	200	T	580
05-06-69	BIA	-	160	250	1,100	18	290	18	2,900
06- -69	BIA	-	120	98	440	5.1	280	23	960

per liter									
Chloride	Silica	Calcium magnesium hardness (as $CaCo_3$)	Hardness, noncarbonate	Dissolved solids	Temperature (degrees celsius)	pH	Specific conductance (micromhos per centimeter at 25° celsius)	Sodium adsorption ratio	Irrigation class
14	-	310	94	480	12.0	8.3	700*	1.2	C_2S_1
13	42	320	74	520	10.0	8.5*	780*	1.3	C_3S_1
12	-	240	40	450	26.0	8.5*	680*	1.4	C_2S_1
14	-	290	50	480	7.0	8.4*	810*	1.3	C_3S_1
16	-	280	50	500	2.0	8.6*	680*	1.3	C_2S_1
260	-	830	520	-	-	8.2	3,300	7.5	C_4S_2
230	-	760	450	-	-	8.2	2,890	5.6	C_4S_2
220	-	730	480	-	-	8.2	2,960	6.4	C_4S_2
40	-	270	150	-	-	8.0	1,000	2.7	C_3S_1
110	-	430	230	-	-	8.2	1,620	4.0	C_3S_1
140	-	430	220	-	-	8.4	1,930	4.8	C_3S_1
120	-	440	230	-	-	8.3	1,720	4.7	C_3S_1
140	-	450	290	1,350	-	8.3	1,800	4.6	C_3S_2
410	-	1,440	1,200	5,330	-	8.3	6,310	12	C_4S_4
240	-	700	460	2,260	-	8.5	3,090	7.3	C_4S_2

Table 9.--Selected major chemical constituents of surface water-Continued

Date of collection	Laboratory	Discharge (cubic feet per second)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)	Carbonate (as CO_3)	Sulfate
			Constituents in milligrams						
Rio San Jose at Casa Blanca Diversion (9.6.6.222) - continued									
07- -69	BIA	-	30	57	190	4.7	250	20	450
08-08-69	BIA	-	75	29	310	11	120	T	650
09- -69	BIA	-	100	28	120	7.0	130	T	430
10- -69	BIA	-	110	65	220	3.5	290	14	520
05-07-70	BIA	-	130	150	560	11	390	32	1,300
06- -70	BIA	-	110	73	310	9.0	130	31	750
08-05-70	BIA	-	70	21	53	7.0	96	T	270
09- -70	BIA	-	110	77	330	7.4	260	20	740
07-26-71	BIA	-	140	55	270	8.6	290	21	580
08- -71	BIA	-	110	51	220	T	250	24	500
10-27-71	BIA	-	84	46	210	10	240	17	410
07-10-72	BIA	-	110	74	340	11	230	11	780
08-08-72	BIA	-	58	17	84	4.3	180	T	190
09-13-73	BIA	-	100	40	170	12	200	12	460
01-25-74	BIA	-	110	63	250	5.1	290	20	530
04-03-74	BIA	-	100	67	240	4.7	270	21	560

per liter									
Chloride	Silica	Calcium magnesium hardness (as $CaCO_3$)	Hardness, noncarbonate	Dissolved solids	Temperature (degrees celsius)	pH	Specific conductance (micromhos per centimeter at 25° celsius)	Sodium adsorption ratio	Irrigation gation class
130	-	460	250	1,180	-	8.5	1,700	3.9	C_3S_1
160	-	310	200	1,360	-	8.0	2,010	7.8	C_3S_2
60	-	370	260	886	-	7.9	1,220	2.7	C_3S_1
150	-	540	290	1,450	-	8.5	2,000	4.1	C_3S_1
320	-	940	610	2,890	-	8.4	3,800	7.9	C_4S_2
180	-	570	470	1,580	-	8.2	2,340	5.7	C_4S_2
28	-	260	180	541	-	8.3	790	1.4	C_3S_1
190	-	590	380	1,830	-	8.4	2,840	5.9	C_4S_2
210	-	580	300	1,520	-	8.3	2,190	4.8	C_3S_1
150	-	490	280	1,280	-	8.6	1,820	4.4	C_3S_2
150	-	400	200	1,230	-	8.4	1,670	4.6	C_3S_2
200	-	570	380	1,730	-	8.2	2,450	6.1	C_4S_2
48	-	220	66	576	-	8.0	820	2.5	C_3S_1
120	-	430	260	1,090	18	8.1	1,500*	3.5	C_3S_1
150	-	530	290	1,380	-	8.5	1,940	4.8	C_3S_2
150	-	540	310	1,400	7.0	8.4	1,850*	4.4	C_3S_1

Table 9.--Selected major chemical constituents of surface water--Continued

Date of collection	Laboratory	Discharge (cubic feet per second)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)	Carbonate (as CO_3)	Sulfate
			Constituents in milligrams						
Rio San Jose at Casa Blanca Diversion (9.6.6.222) - continued									
07-01-74	BIA	-	68	57	230	2.0	210	13	480
10-21-74	BIA	-	170	110	500	4.7	300	47	1,200
03-28-75	BIA	-	100	64	240	5.9	280	30	540
03-25-76	BIA	-	100	62	240	7.0	310	14	540
01-10-77	BIA	-	120	100	130	7.0	280	12	750
04-04-77	BIA	-	120	75	280	8.6	320	22	620
07-07-77	BIA	-	70	29	170	9.8	200	5	360
10-03-77	BIA	-	110	60	270	9.0	280	19	550
01-10-78	BIA	-	110	63	290	9.4	290	19	670
03-01-78	BIA	-	110	63	280	7.8	270	22	590
06-05-78	BIA	0	240	50	330	11	520	T	750
09-05-78	BIA	-	130	73	310	12	280	10	820
01-08-79	BIA	-	98	60	220	9.0	270	10	500
03-01-79	BIA	-	100	54	230	7.4	300	T	520
06-07-79	BIA	-	150	74	380	6.3	360	7.2	870

per liter									
Chloride	Silica	Calcium magnesium hardness (as $CaCO_3$)	Hardness, noncarbonate	Dissolved solids	Temperature (degrees celsius)	pH	Specific conductance (micromhos per centimeter at 25° celsius)	Sodium adsorption ratio	Irrigation class
130	-	410	230	1,160	21	8.2	1,500*	5.0	C_3S_2
270	-	860	610	2,630	13	8.4	3,000*	7.4	C_4S_2
160	-	530	300	1,380	6.0	8.6	2,000*	4.6	C_3S_2
150	-	510	230	1,410	8.0	8.4	1,850*	4.6	C_3S_2
14	-	710	450	1,460	0.0	8.3	1,800	2.2	C_3S_1
170	-	610	310	1,520	4.0	7.9	2,000*	4.9	C_3S_2
77	-	300	130	860	24.0	8.1	1,500*	4.3	C_3S_1
160	-	530	260	1,370	14.0	8.3	2,000*	5.2	C_3S_2
180	-	550	270	1,500	-	8.2	2,100	5.3	C_3S_2
170	-	540	280	1,480	8.0	8.3	2,400*	5.1	C_3S_2
210	-	810	390	1,980	19.0	8.1	2,500*	5.1	C_4S_2
190	-	640	390	1,780	18.0	8.4	2,400*	5.4	C_4S_2
160	-	490	260	1,240	2.0	7.9	1,850*	4.3	C_3S_2
160	-	480	240	1,370	5.0	8.1	1,800	4.7	C_3S_1
230	-	670	360	1,920	18.0	8.4	3,000*	6.4	C_4S_2

Table 9.--Selected major chemical constituents of surface water--Continued

Date of collection	Laboratory	Discharge (cubic feet per second)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)	Carbonate (as CO_3)	Sulfate
			Constituents in milligrams						
Runoff from Casa Blanca Mesa (9.6.24.311)									
10-10-78	BIA	-	22	0.6	2.3	2.4	52	T	19
Rio San Jose at New Laguna Dam (9.6.1.322)									
08-07-75	BIA	-	92	19	66	11	160	7	250
01-12-77	BIA	-	160	100	400	8.6	420	22	980
04-06-77	BIA	-	110	64	290	7.4	290	14	600
10-04-77	BIA	-	120	50	230	9.4	290	12	460
01-10-78	BIA	-	120	60	280	9.4	290	24	650
03-07-78	BIA	-	110	57	270	9.0	270	12	540
09-06-78	BIA	0	330	100	510	19	360	T	1,670
01-09-79	BIA	-	100	57	230	9.4	250	22	520
03-02-79	BIA	-	110	55	250	9.0	330	T	530
06-08-79	BIA	-	140	62	290	11	310	T	730
Rio Paguate upstream from Paguate, New Mexico (11.5.30.234)									
06-26-67	BIA	-	32	12	13	4.3	150	T	27
04-21-78	USGS	.79	37	14	17	4.7	180*	4*	23
07-19-78	BIA	.20	34	10	16	5.5	190*	0*	25

per liter									
Chlo-ride	Silica	Calcium magnesium hardness (as $CaCo_3$)	Hardness, noncar-bonate	Dissolved solids	Temper-ature (degrees celsius)	pH	Spe-cific conduct-ance (micro-mhos per centimeter at 25° celsius)	Sodium adsorp-tion ratio	Irri-gation gation class
3.6	-	58	15	81	-	8.0	140	0.1	C_1S_1
32	-	310	170	620	21.0	8.0	850*	1.6	C_3S_1
250	-	830	450	2,450	0.0	8.5	3,200*	6.0	C_4S_2
170	-	530	270	1,520	10.0	7.4	2,100*	5.5	C_3S_2
150	-	500	240	1,250	14.0	8.2	1,750*	4.4	C_3S_1
180	-	540	270	1,490	-	8.4	2,000	5.3	C_3S_2
180	-	520	240	1,400	4.0	8.3	2,300*	5.2	C_3S_2
290	-	1,250	950	3,390	20.0	7.9	4,000	6.3	C_4S_2
160	-	490	240	1,270	2.0	8.2	1,800*	4.6	C_3S_2
160	-	500	230	1,360	5.0	8.3	2,000*	4.8	C_3S_1
180	-	610	350	1,690	16.0	8.2	2,400*	5.2	C_4S_1
7	-	130	4	190	-	8.4	310	.51	C_2S_1
5	44	150	0	240	12.0	8.5*	350*	.60	C_2S_1
4	-	130	0	200	20.0	8.0*	330*	.63	C_2S_1

Table 9.--Selected major chemical constituents of surface water--Continued

Date of collection	Laboratory	Discharge (cubic feet per second)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)	Carbonate (as CO_3)	Sulfate
			Constituents in milligrams						
Rio Paguate upstream from Paguate, New Mexico (11.5.30.234) - continued									
10-30-78	BIA	2.4	40	11	18	5.5	190*	0*	25
01-30-79	BIA	.93	48	13	23	7.0	210*	0*	49
Rio Paguate upstream from Jackpile-Paguate Mine (11.5.32.424)									
04-01-76	BIA	-	84	3	41	5.1	300	5	140
01-13-77	BIA	-	68	19	23	5.5	230	14	94
01-18-77	USGS	-	53	18	22	4.2	230	0	64
04-05-77	BIA	-	74	22	34	5.1	280	12	92
01-10-78	BIA	-	68	22	30	7.0	240	10	110
03-07-78	BIA	-	64	18	28	8.6	230	12	99
04-21-78	USGS	.33	98	35	35	5.3	370*	4*	150
06-06-78	BIA	-	84	30	37	6.3	300	12	140
07-19-78	BIA	.12	82	33	41	6.8	330*	0*	190
09-06-78	BIA	-	100	24	34	6.7	270	T	190
10-26-78	BIA	.20	110	35	34	6.2	400*	0*	170
01-08-79	BIA	-	96	33	34	5.5	300	22	140
01-29-79	BIA	1.4	60	19	25	6.7	250*	0*	63

per liter									
Chloride	Silica	Calcium magnesium hardness (as $CaCO_3$)	Hardness, noncarbonate	Dissolved solids	Temperature (degrees celsius)	pH	Specific conductance (micromhos per centimeter at 25° celsius)	Sodium adsorption ratio	Irrigation class
5	-	150	0	210	10.5	8.1*	380*	.42	C_2S_1
5	-	180	1	290	0.0	8.3*	350*	.76	C_2S_1
16	-	340	79	500	-	8.5	770	.98	C_3S_1
7	-	250	38	380	0.0	8.2	560	.63	C_2S_1
7	37	210	15	320	4.0	8.0*	490*	.70	C_2S_1
9	-	280	25	420	6.0	7.7	610	.90	C_2S_1
13	-	260	46	400	-	8.2	590	.81	C_2S_1
7	-	240	27	420	9.0	8.3	510	.78	C_2S_1
10	32	390	100	540	8.0	8.4*	800*	.80	C_3S_1
12	-	340	66	510	17.0	8.3	800*	.87	C_3S_1
12	-	340	130	520	28.0	7.9*	820*	.98	C_3S_1
12	-	350	130	590	15.0	8.3	850*	.80	C_3S_1
12	-	410	100	-	11.0	8.0*	890*	.74	C_3S_1
18	-	380	92	550	0.0	8.2	950*	.77	C_3S_1
9	-	230	16	360	1.0	8.0*	475*	.73	C_2S_1

Table 9.—Selected major chemical constituents of surface water—Continued

Date of collection	Laboratory	Discharge (cubic feet per second)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)	Carbonate (as CO_3)	Sulfate
			Constituents in milligrams						
Rio Paguate upstream from Jackpile-Paguate Mine (11.5.32.424) - continued									
03-01-79	BIA	-	100	30	37	5.9	350	5	160
06-06-79	BIA	-	100	12	35	9.0	330	2.4	130
Rio Moquino upstream from Jackpile-Paguate Mine (11.5.22.344)									
04-01-76	BIA	.37	170	100	180	11	250	10	900
01-13-77	BIA	-	130	100	150	8.6	310	T	800
01-18-77	USGS	3.7	130	63	110	6.1	310	0	540
04-05-77	BIA	-	170	80	170	7.8	300	T	790
07-06-77	BIA	-	190	120	240	14	180	7	1,200
10-03-77	BIA	-	200	92	200	12	220	24	1,030
01-10-78	BIA	-	150	83	160	9.0	300	T	780
03-07-78	BIA	-	180	110	210	10	320	T	1,010
04-20-78	USGS	.31	190	140	250	11	270*	4*	1,300
06-05-78	BIA	-	240	190	370	15	230	2	1,760
09-06-78	BIA	-	240	120	260	12	240	T	1,360
11-02-78	BIA	.75	180	96	190	8.6	300*	0*	990
01-08-79	BIA	-	190	100	190	8.6	320	14	920

per liter									
Chloride	Silica	Calcium magnesium hardness (as $CaCo_3$)	Hardness, noncarbonate	Dissolved solids	Temperature (degrees celsius)	pH	Specific conductance (micromhos per centimeter at 25° celsius)	Sodium adsorption ratio	Irri- gation gation class
11	-	380	87	590	10.0	8.4	850*	.82	C_3S_1
12	-	300	27	440	13.0	8.3	750*	.87	C_2S_1
18	-	840	620	1,830	-	8.4	2,100*	2.8	C_3S_1
16	-	740	480	1,570	0.0	8.2	1,900	2.3	C_3S_1
11	19	580	330	1,040	0.0	7.8*	1,400*	2.0	C_3S_1
2	-	750	500	1,550	6.0	7.3	1,900*	2.6	C_3S_1
25	-	960	790	2,050	32.0	8.1	2,400*	3.4	C_3S_1
20	-	880	660	1,820	25.0	8.1	2,000*	2.9	C_3S_1
13	-	700	460	1,420	-	8.1	1,700	2.6	C_3S_1
28	-	900	620	1,880	13.0	8.1	2,300*	3.0	C_3S_1
27	17	1,100	840	2,060	15.0	8.4*	2,400*	3.4	C_3S_1
35	-	1,380	1,200	3,060	26.0	8.3	3,400*	4.3	C_4S_2
28	-	1,080	880	2,290	17.0	8.2	2,600*	3.4	C_4S_2
20	-	850	630	1,740	10.0	8.3*	2,200*	2.9	C_3S_1
30	-	880	590	1,770	0.0	8.1	2,200*	2.8	C_3S_1

Table 9.--Selected major chemical constituents of surface water-Continued

Date of collection	Laboratory	Discharge (cubic feet per second)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)	Carbonate (as CO_3)	Sulfate
			Constituents in milligrams						
Rio Moquino upstream from Jackpile-Paquate Mine (11.5.22.344) - continued									
01-30-79	BIA	.53	180	90	170	11	440*	0*	830
03-01-79	BIA	-	130	64	130	7.4	280	28	600
06-06-79	BIA	-	180	73	160	11	260	T	880
Rio Paguate downstream from Jackpile-Paguate Mine (10.5.2.434)									
04-01-76	BIA	1.4	120	94	160	8.2	250	12	700
01-13-77	BIA	2.0 g/	120	79	110	7.0	300	17	580
01-18-77	USGS	4.6	110	65	110	5.8	270	0	530
01-24-77	USGS	1.5	130	81	140	9.3	300	0	690
04-04-77	BIA	2.1 g/	120	71	130	8.2	250	19	570
07-08-77	BIA	.25 g/	190	150	310	13	250	7	1,580
01-10-78	BIA	1.3 g/	140	84	160	7.8	310	T	760
03-07-78	BIA	1.7 g/	120	69	140	6.3	220	14	670
04-18-78	USGS	1.1	160	120	200	9.4	320*	8*	1,000
06-05-78	BIA	.46 g/	110	88	160	9.0	250	5	700
07-25-78	BIA	.14	190	140	340	11	340*	0*	1,520
09-06-78	BIA	.10 g/	260	150	300	12	300	T	1,620

per liter									
Chlo- ride	Silica	Calcium magnesium hardness (as $CaCo_3$)	Hardness, noncar- bonate	Dissolved solids	Temper- ature (degrees celsius)	pH	Spe- cific conduct- ance (micro- mhos per centimeter at 25° celsius)	Sodium adsorp- tion ratio	Irri- gation gation class
25	-	810	490	1,650	0.0	8.2*	2,000*	2.6	C_3S_1
18	-	580	300	1,230	11.0	8.3	1,500	2.4	C_3S_1
14	-	750	540	1,470	18.0	8.2*	1,900	2.6	C_3S_1
23	-	670	440	1,490	-	8.5	1,800*	0.9	C_3S_1
5	-	620	340	1,190	-	8.4	1,500	1.9	C_3S_1
12	22	540	320	990	0.0	8.0*	1,370*	2.1	C_3S_1
16	22	660	410	1,240	9.0	8.3*	1,640	2.4	C_3S_1
16	-	600	360	1,160	15.0	8.0	1,200*	2.4	C_3S_1
28	-	1,100	880	2,410	20.0	8.1	3,000*	4.1	C_4S_2
21	-	690	430	1,370	-	8.1	1,700	2.6	C_3S_1
11	-	600	390	1,210	14.0	8.3	1,500*	2.4	C_3S_1
20	20	890	640	1,680	14.0	8.5*	2,200*	2.9	C_3S_1
20	-	640	430	1,350	26.0	8.3	1,700*	2.7	C_3S_1
35	-	1,050	800	2,640	23.0	8.3*	3,000*	4.6	C_4S_2
27	-	1,250	1,010	2,770	22.0	8.2	3,000*	3.7	C_4S_2

Table 9.--Selected major chemical constituents of surface water-Continued

			Constituents in milligrams						
Date of collection	Laboratory	Discharge (cubic feet per second)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)	Carbonate (as CO_3)	Sulfate
Rio Paguate downstream from Jackpile-Paguate Mine (19.5.2.434) - continued									
10-30-78	BIA	.51	200	160	260	10.	340*	0*	1,320
01-08-79	BIA	2.0 9/	180	120	210	8.6	310	24	1,050
01-24-79	BIA	1.5	260	16	160	9.8	420*	T*	720
03-02-79	BIA	2.2 9/	140	75	150	7.8	280	T	730
06-07-79	BIA	.84 9/	170	79	190	14	240	2.4	960
Rio Paguate downstream from Paguate Dam (10.5.25.133)									
09-13-73	BIA	-	160	43	78	9.8	120	6	640
01-15-74	BIA	-	210	120	240	9.8	230	20	1,200
04-04-77	BIA	-	160	100	220	11	230	17	1,000
07-05-77	BIA	-	170	97	200	10	240	12	970
01-10-78	BIA	-	230	100	240	13	320	T	1,150
03-07-78	BIA	-	170	86	200	11	310	10	930
06-06-78	BIA	0	500	320	790	27	120	T	3,950
09-06-78	BIA	-	190	24	76	12	190	T	580
01-08-79	BIA	-	130	54	130	11	130	14	640
03-02-79	BIA	-	140	56	130	9.4	240	T	620
06-07-79	BIA	-	130	97	250	9.8	150	T	1,100

per liter									
Chloride	Silica	Calcium magnesium hardness (as $CaCo_3$)	Hardness, noncarbonate	Dissolved solids	Temperature (degrees celsius)	pH	Specific conductance (micromhos per centimeter at 25° celsius)	Sodium adsorption ratio	Irrigation gation class
25	-	1,150	910	2,300	12.0	8.3*	2,600*	3.4	C_4S_1
37	-	940	640	1,920	0.0	8.1	1,800*	3.0	C_3S_1
16	-	720	440	1,470	-0.5	8.4*	1,700*	2.5	C_3S_1
16	-	650	420	1,400	11.0	8.3	1,500*	2.6	C_3S_1
20	-	750	550	1,650	27.0	8.3	1,900*	3.0	C_3S_1
13	-	590	490	1,080	-	7.9	1,370	1.4	C_3S_1
31	-	1,050	860	2,240	-	8.2	2,520	3.2	C_4S_1
25	-	820	600	1,800	15.0	7.8	2,000*	3.4	C_3S_1
20	-	820	600	1,720	-	8.1	1,900	3.0	C_3S_1
33	-	990	720	2,090	-	8.0	2,400	3.3	C_4S_1
27	-	780	510	1,610	12.0	8.2	2,000*	3.1	C_3S_1
93	-	2,550	2,450	6,420	19.0	7.9	6,100*	6.8	C_4S_3
12	-	580	420	1,080	25.0	8.1	1,300*	1.4	C_3S_1
21	-	540	410	1,080	4.0	8.0	1,400*	2.4	C_3S_1
18	-	580	380	1,220	9.0	8.2	1,500*	2.4	C_3S_1
25	-	730	610	1,810	22.0	8.2	2,200	4.0	C_3S_1

Table 9.--Selected major chemical constituents of surface water-Continued

Date of collection	Laboratory	Discharge (cubic feet per second)	Constituents in milligrams Cal-cium	Mag-nesium	Sodium	Potas-sium	Bicar-bonate (as HCO_3)	Car-bonate (as CO_3)	Sulfate
Rio San Jose at Mesita Diversion (9.5.12.133)									
04- -61	BIA	-	120	77	330	7.0	270	8	710
08- -61	BIA	-	66	9.1	78	7.8	140	3	170
10- -61	BIA	-	94	60	270	9.8	240	18	620
06-26-67	BIA	-	180	22	200	9.4	170	T	650
05-06-69	BIA	-	150	100	500	7.4	220	12	1,300
06- -69	BIA	-	410	81	880	13	250	11	2,300
08-08-69	BIA	-	250	71	160	9.4	130	6	1,100
09- -69	BIA	-	380	24	40	4.3	61	T	1,000
10- -69	BIA	-	120	67	290	5.9	220	10	740
05-08-70	BIA	-	170	130	600	9.8	240	27	1,400
06- -70	BIA	-	160	130	670	14	120	25	1,700
08-05-70	BIA	-	89	26	120	7.8	130	T	390
09- -70	BIA	-	110	38	180	11	140	T	560
07-26-71	BIA	-	90	30	150	9.3	130	8	440
08- -71	BIA	-	110	44	210	3.9	190	15	550
10-27-71	BIA	-	78	50	210	11	240	15	400

per liter									
Chloride	Silica	Calcium magnesium hardness (as $CaCO_3$)	Hardness, noncarbonate	Dissolved solids	Temperature (degrees celsius)	pH	Specific conductance (micromhos per centimeter at 25° celsius)	Sodium adsorption ratio	Irrigation class
190	-	390	170	-	-	8.0	2,500	5.7	C_4S_2
53	-	170	55	-	-	8.0	900	2.4	C_3S_1
140	-	300	100	-	-	8.2	2,000	5.4	C_3S_2
120	-	530	390	1,360	-	8.4	1,780	3.7	C_3S_1
270	-	810	630	2,630	-	8.4	3,430	7.7	C_4S_2
480	-	1,360	1,160	4,640	-	8.2	5,600	10	C_4S_3
32	-	910	810	1,890	-	8.1	2,190	2.4	C_3S_1
15	-	1,060	1,010	1,640	-	7.6	1,860	.5	C_3S_1
170	-	590	410	1,740	-	8.3	2,330	5.3	C_4S_2
340	-	940	740	3,120	-	8.3	4,020	8.6	C_4S_3
330	-	420	310	3,200	-	8.3	4,250	9.5	C_4S_3
59	-	330	220	841	-	8.2	1,220	2.8	C_3S_1
90	-	950	850	1,200	-	8.1	1,630	3.9	C_3S_1
83	-	350	220	907	-	8.1	1,360	3.6	C_3S_1
130	-	450	300	1,250	-	8.5	1,800	4.4	C_3S_2
150	-	400	200	1,130	-	8.4	1,670	4.5	C_3S_1

Table 9.--Selected major chemical constituents of surface water-Continued

Date of collection	Laboratory	Discharge (cubic feet per second)	Calcium	Magnesium	Sodium	Potassium	Bicarbonate (as HCO_3)	Carbonate (as CO_3)	Sulfate
			Constituents in milligrams						
Rio San Jose at Mesita Diversion (9.5.12.133) - continued									
08-31-72	BIA	-	74	44	100	6.4	140	5	260
09-13-73	BIA	-	92	18	64	11	140	6	240
01-25-74	BIA	-	130	73	310	7.4	290	19	770
04-03-74	BIA	-	120	77	300	7.0	270	20	690
10-21-74	BIA	-	170	67	300	9.0	190	42	890
03-28-75	BIA	-	120	73	300	7.4	300	26	700
03-30-76	BIA	-	130	78	300	7.0	310	14	710
01-10-77	BIA	-	190	120	450	11	390	38	1,220
01-24-77	USGS	-	140	84	340	12	340	0	950
04-06-77	BIA	-	130	78	340	8.6	280	22	770
07-06-77	BIA	0	370	100	570	13	150	T	1,910
10-04-77	BIA	-	140	52	290	11	240	10	680
01-10-78	BIA	-	140	74	330	9.4	320	19	770
03-07-78	BIA	-	130	68	330	10	310	19	790
04-19-78	USGS	.50	190	130	610	10	370*	14*	1,500
06-06-78	BIA	0	360	150	780	13	250	5	2,330

per liter									
Chlo-ride	Silica	Calcium magnesium hardness (as $CaCo_3$)	Hardness, noncar-bonate	Dissolved solids	Temper-ature (degrees celsius)	pH	Spe-cific conduct-ance (micro-mhos per centimeter at 25° celsius)	Sodium adsorp-tion ratio	Irri-gation gation class
57	-	270	150	687	-	8.0	980	2.7	C_3S_1
42	-	310	190	620	-	8.3	920	1.6	C_3S_1
200	-	630	390	1,740	-	8.2	2,290	5.4	C_4S_2
180	-	610	390	1,710	-	8.4	2,250*	5.2	C_4S_2
170	-	710	550	1,940	-	8.3	2,200*	5.0	C_4S_2
180	-	610	370	1,730	12.0	8.4	2,400*	5.3	C_4S_2
170	-	640	360	1,780	4.0	8.4	2,000*	5.2	C_4S_2
280	-	950	570	2,780	0.0	8.1	3,050*	6.1	C_4S_2
160	19	700	420	1,880	4.0	8.3*	2,700*	5.6	C_4S_2
170	-	640	370	1,760	17.0	8.0	2,400*	5.8	C_4S_2
280	-	1,340	1,220	3,370	19.0	8.0	4,050*	6.7	C_4S_2
170	-	570	360	1,500	19.0	8.2	2,000*	5.3	C_3S_2
210	-	650	360	1,800	0.0	8.3	2,400	5.7	C_4S_2
200	-	620	330	1,600	11.0	8.4	2,300*	5.7	C_3S_2
330	12	1,000	680	2,980	21.0	8.5*	4,000*	8.4	C_4S_3
410	-	1,500	1,280	4,460	18.0	8.0	6,000*	8.8	C_4S_3

Table 9.--Selected major chemical constituents of surface water-Concluded

Date of collection	Laboratory	Discharge (cubic feet per second)	Constituents in milligrams Cal-cium	Mag-nesium	Sodium	Potas-sium	Bicar-bonate (as HCO_3)	Car-bonate (as CO_3)	Sulfate
Rio San Jose at Mesita Diversion (9.5.12.133) - continued									
09-07-78	BIA	0	350	67	310	12	200	T	1,450
01-09-79	BIA	-	110	60	260	9	280	17	620
01-24-79	BIA	8.1	200	12	280	9.8	310*	0*	630
03-06-79	BIA	-	120	64	290	7.8	270	T	650
06-06-79	BIA	-	150	61	400	11	320	1.2	930
Rio Puerco at Rt. 66 bridge (9.1.4.412)									
08-24-78	BIA	-	210	35	170	9.4	130	T	900

per liter									
Chloride	Silica	Calcium magnesium hardness (as $CaCO_3$)	Hardness, noncarbonate	Dissolved solids	Temperature (degrees celsius)	pH	Specific conductance (micromhos per centimeter at 25° celsius)	Sodium adsorption ratio	Irrigation class
140	-	1,150	990	2,540	19.0	7.9	3,000*	3.9	C_4S_2
170	-	530	280	1,380	0.0	8.2	1,700*	4.8	C_3S_2
160	-	540	290	1,530	0.0	7.8*	2,000*	5.3	C_3S_2
190	-	560	340	1,620	12.0	8.7	2,200*	5.3	C_3S_2
210	-	630	360	1,970	16.0	8.5	2,700	7.0	C_4S_2
20	-	660	550	1,550	-	8.1	1,820	3.0	C_3S_1

Table 10. Nutrients, bacteria, and selected minor elements in surface water

Notes: All constituents are reported in milligrams per liter unless noted. Analyses of total nitrate (as N), total phosphorus (as P), fluoride, and boron were performed by U.S. Bureau of Indian Affairs (BIA) laboratory except where marked with asterisk "*". Those analyses and all others were performed by U.S. Geological Survey (USGS) laboratory. Concentrations less than the detection limit of a particular analytical technique are indicated by "T" by BIA and "<" by USGS lab. Dissolved oxygen was measured on site.

Date of collection	Nitrate (total as N)	Nitrite plus nitrate (total as N)	Nitrite plus nitrate (dissolved as N)	Nitrogen, ammonia (total as N)	Nitrogen (total organic as N)	Nitrogen (total Kjeldahl as N)	Nitrogen (total as N)	Fluoride (dissolved)	Phosphorus (total as P)
Rio San Jose at Seama Diversion (10.7.34.242)									
06-26-67	0.50	-	-	-	-	-	-	1.4	T
07- -68	.50	-	-	-	-	-	-	2.4	0.04
10-14-68	.37	-	-	-	-	-	-	1.8	.06
05-06-69	.62	-	-	-	-	-	-	1.8	.10
06- -69	.12	-	-	-	-	-	-	1.4	.01
07- -69	.25	-	-	-	-	-	-	1.9	.01
08-08-69	1.9	-	-	-	-	-	-	.7	.12
09- -69	.62	-	-	-	-	-	-	.8	.03
10- -69	1.2	-	-	-	-	-	-	1.2	.16
05-07-70	.12	-	-	-	-	-	-	1.4	.12
06- -70	.12	-	-	-	-	-	-	1.1	.22
08-05-70	.62	-	-	-	-	-	-	.6	.03
09- -70	T	-	-	-	-	-	-	.8	.10

Phosphate (total ortho as P)	Phosphate (dissolved ortho as P)	Boron (dissolved) (micrograms per liter)	Carbon (total organic)	Carbon (dissolved organic)	Carbon (suspended organic)	Coliform fecal (membrane filter) (colonies per 100 milliliter)	Streptococci fecal (membrane filter, KF Agar) (colonies per 100 milliliter)	Oxygen (dissolved)
-	-	700	-	-	-	-	-	-
-	-	450	-	-	-	-	-	-
-	-	700	-	-	-	-	-	-
-	-	950	-	-	-	-	-	-
-	-	520	-	-	-	-	-	-
-	-	150	-	-	-	-	-	-
-	-	300	-	-	-	-	-	-
-	-	300	-	-	-	-	-	-
-	-	150	-	-	-	-	-	-
-	-	950	-	-	-	-	-	-
-	-	750	-	-	-	-	-	-
-	-	T	-	-	-	-	-	-
-	-	620	-	-	-	-	-	-

Table 10. Nutrients, bacteria, and selected minor elements in surface water - Continued

Date of collection	Nitrate (total as N)	Nitrite plus nitrate (total as N)	Nitrite plus nitrate (dissolved as N)	Nitrogen, ammonia (total as N)	Nitrogen (total organic as N)	Nitrogen (total Kjeldahl as N)	Nitrogen (total as N)	Fluoride (dissolved)	Phosphorus (total as P)
Rio San Jose at Seama Diversion (10.7.34.242)-Continued									
07-26-71	2.5	-	-	-	-	-	-	.8	.78
08- -71	.12	-	-	-	-	-	-	1.0	.18
10-27-71	5.0	-	-	-	-	-	-	.7	1.4
07-10-72	.25	-	-	-	-	-	-	2.2	.05
08-31-72	1.9	-	-	-	-	-	-	.7	.27
09-13-73	5.0	-	-	-	-	-	-	.6	.32
01-25-74	6.8	-	-	-	-	-	-	1.0	.40
04-03-74	1.9	-	-	-	-	-	-	1.1	.16
07-01-74	3.7	-	-	-	-	-	-	1.4	.05
10-21-74	5.6	-	-	-	-	-	-	1.4	.10
03-28-75	0.98	-	-	-	-	-	-	1.0	0.06
08-08-75	0.11	-	-	-	-	-	-	1.1	0.02
03-25-76	1.5	-	-	-	-	-	-	0.6	0.73
01-11-77	2.4	-	-	-	-	-	-	1.2	0.63
04-04-77	0.98	-	-	-	-	-	-	1.1	0.37
07-07-77	0.28	-	-	-	-	-	-	1.2	0.19

Phosphate (total ortho as P)	Phosphate (dissolved ortho as P)	Boron (dissolved) (micrograms per liter)	Carbon (total organic)	Carbon (dissolved organic)	Carbon (suspended organic)	Coliform fecal (membrane filter) (colonies per 100 milliliter)	Streptococci fecal (membrane filter, KF Agar) (colonies per 100 milliliter)	Oxygen (dissolved)
-	-	710	-	-	-	-	-	-
-	-	400	-	-	-	-	-	-
-	-	820	-	-	-	-	-	-
-	-	1,500	-	-	-	-	-	-
-	-	T	-	-	-	-	-	-
-	-	270	-	-	-	-	-	-
-	-	420	-	-	-	-	-	-
-	-	500	-	-	-	-	-	-
-	-	200	-	-	-	-	-	-
-	-	680	-	-	-	-	-	-
-	-	26	-	-	-	-	-	-
-	-	760	-	-	-	-	-	-
-	-	620	-	-	-	-	-	-
-	-	920	-	-	-	-	-	-
-	-	530	-	-	-	-	-	-
-	-	760	-	-	-	-	-	-

Table 10. Nutrients, bacteria, and selected minor elements in surface water - Continued

Date of collection	Nitrate (total as N)	Nitrite plus nitrate (total as N)	Nitrite plus nitrate (dissolved as N)	Nitrogen, ammonia (total as N)	Nitrogen (total organic as N)	Nitrogen (total Kjeldahl as N)	Nitrogen (total as N)	Fluoride (dissolved)	Phosphorus (total as P)
Rio San Jose at Seama Diversion (10.7.34.242) - concluded									
10-03-77	0.28	-	-	-	-	-	-	0.9	0.43
01-10-78	1.5	-	-	-	-	-	-	1.1	0.69
03-01-78	0.98	-	-	-	-	-	-	1.0	0.88
06-05-78	0.28	-	-	-	-	-	-	1.2	0.38
09-05-78	0.04	-	-	-	-	-	-	1.3	0.20
01-08-79	2.5	-	-	-	-	-	-	2.3	1.3
03-01-79	1.5	-	-	-	-	-	-	0.9	1.8
06-06-79	1.4	-	-	-	-	-	-	0.9	.85
Cubero Creek at Budville (10.7.25.211)									
11-04-74	0.84	-	-	-	-	-	-	0.8	-
04-20-78	-	0.04	0.00	0.01	0.25	0.26	0.30	0.8*	0.01
07-25-78	0.04	-	0.01	-	-	-	-	0.9	T
10-26-78	0.01	0.05	-	0.0	0.04	0.04	0.09	0.7	0.02
01-29-79	0.05*	0.07	-	0.01	0.08	0.09	0.16	1.1	0.04

Phosphate (total ortho as P)	Phosphate (dissolved ortho as P)	Boron (dissolved) (micrograms per liter)	Carbon (total organic)	Carbon (dissolved organic)	Carbon (suspended organic)	Coliform fecal (membrane filter) (colonies per 100 milliliter)	Streptococci fecal (membrane filter, KF Agar) (colonies per 100 milliliter)	Oxygen (dissolved)
-	-	400	-	-	-	-	-	-
-	-	1,000	-	-	-	-	-	-
-	-	680	-	-	-	-	-	-
-	-	490	-	-	-	-	-	-
-	-	570	-	-	-	-	-	-
-	-	380	-	-	-	-	-	-
-	-	480	-	-	-	-	-	-
-	-	540	-	-	-	-	-	-
-	-	120	-	-	-	-	-	-
-	0.01	50*	-	2.1	0.5	-	-	9.6
-	0.0	70	-	1.8	0.4	147	245	8.5
0.01	-	T	-	1.6	0.3	-	-	9.7
0.04	-	T	-	2.3	0.6	9	78	11.8

Table 10. Nutrients, bacteria, and selected minor elements in surface water - Continued

Date of collection	Nitrate (total as N)	Nitrite plus nitrate (total as N)	Nitrite plus nitrate (dissolved as N)	Nitrogen, ammonia (total as N)	Nitrogen (total organic as N)	Nitrogen (total Kjeldahl as N)	Nitrogen (total as N)	Fluoride (dissolved)	Phosphorus (total as P)
Rio San Jose at Casa Blanca Diversion (9.6.6.222) - continued									
06-26-67	0.74	-	-	-	-	-	-	0.9	T
05-06-69	.62	-	-	-	-	-	-	1.8	0.03
06- -69	.25	-	-	-	-	-	-	1.4	.05
07- -69	.12	-	-	-	-	-	-	1.0	.14
08-08-69	2.5	-	-	-	-	-	-	.7	.06
09- -69	.62	-	-	-	-	-	-	.7	.01
10- -69	.62	-	-	-	-	-	-	1.0	.18
05-07-70	.12	-	-	-	-	-	-	1.2	.20
06- -70	1.2	-	-	-	-	-	-	.8	.48
08-05-70	2.5	-	-	-	-	-	-	.6	T
09- -70	.12	-	-	-	-	-	-	.7	.04
07-26-71	2.0	-	-	-	-	-	-	.8	.70
08- -71	T	-	-	-	-	-	-	1.0	.98
10-27-71	3.1	-	-	-	-	-	-	.7	1.2
07-10-72	.25	-	-	-	-	-	-	1.2	T
08-08-72	2.5	-	-	-	-	-	-	.8	.23

Phosphate (total ortho as P)	Phosphate (dissolved ortho as P)	Boron (dissolved) (micrograms per liter)	Carbon (total organic)	Carbon (dissolved organic)	Carbon (suspended organic)	Coliform fecal (membrane filter) (colonies per 100 milliliter)	Streptococci fecal (membrane filter, KF Agar) (colonies per 100 milliliter)	Oxygen (dissolved)
-	-	280	-	-	-	-	-	-
-	-	1,100	-	-	-	-	-	-
-	-	600	-	-	-	-	-	-
-	-	250	-	-	-	-	-	-
-	-	300	-	-	-	-	-	-
-	-	300	-	-	-	-	-	-
-	-	250	-	-	-	-	-	-
-	-	700	-	-	-	-	-	-
-	-	450	-	-	-	-	-	-
-	-	T	-	-	-	-	-	-
-	-	490	-	-	-	-	-	-
-	-	680	-	-	-	-	-	-
-	-	320	-	-	-	-	-	-
-	-	820	-	-	-	-	-	-
-	-	680	-	-	-	-	-	-
-	-	T	-	-	-	-	-	-

Table 10. Nutrients, bacteria, and selected minor elements in surface water - Continued

Date of collection	Nitrate (total as N)	Nitrite plus nitrate (total as N)	Nitrite plus nitrate (dissolved as N)	Nitrogen, ammonia (total as N)	Nitrogen (total organic as N)	Nitrogen (total Kjeldahl as N)	Nitrogen (total as N)	Fluoride (dissolved)	Phosphorus (total as P)
Rio San Jose at Casa Blanca Diversion (9.6.6.222) - continued									
09-13-73	6.8	-	-	-	-	-	-	.6	.13
01-25-74	8.1	-	-	-	-	-	-	1.0	.50
04-03-74	1.9	-	-	-	-	-	-	1.1	.16
07-01-74	3.7	-	-	-	-	-	-	1.1	T
10-21-74	6.8	-	-	-	-	-	-	1.3	.14
03-28-75	1.3	-	-	-	-	-	-	1.1	0.51
03-25-76	0.42	-	-	-	-	-	-	0.9	0.60
01-10-77	0.28	-	-	-	-	-	-	0.6	0.02
04-04-77	0.56	-	-	-	-	-	-	1.1	0.10
07-07-77	0.42	-	-	-	-	-	-	1.1	0.06
10-03-77	0.42	-	-	-	-	-	-	1.0	0.43
01-10-78	1.5	-	-	-	-	-	-	1.0	0.55
03-01-78	0.28	-	-	-	-	-	-	0.9	0.88
06-05-78	0.07	-	-	-	-	-	-	1.4	0.03
09-05-78	T	-	-	-	-	-	-	1.2	0.03
01-08-79	2.5	-	-	-	-	-	-	3.1	1.1

Phosphate (total ortho as P)	Phosphate (dissolved ortho as P)	Boron (dissolved) (micrograms per liter)	Carbon (total organic)	Carbon (dissolved organic)	Carbon (suspended organic)	Coliform fecal (membrane filter) (colonies per 100 milliliter)	Streptococci fecal (membrane filter, KF Agar) (colonies per 100 milliliter)	Oxygen (dissolved)
-	-	T	-	-	-	-	-	-
-	-	500	-	-	-	-	-	-
-	-	350	-	-	-	-	-	-
-	-	T	-	-	-	-	-	-
-	-	550	-	-	-	-	-	-
-	-	40	-	-	-	-	-	-
-	-	540	-	-	-	-	-	-
-	-	50	-	-	-	-	-	-
-	-	290	-	-	-	-	-	-
-	-	460	-	-	-	-	-	-
-	-	400	-	-	-	-	-	-
-	-	550	-	-	-	-	-	-
-	-	610	-	-	-	-	-	-
-	-	360	-	-	-	-	-	-
-	-	620	-	-	-	-	-	-
-	-	250	-	-	-	-	-	-

Table 10. Nutrients, bacteria, and selected minor elements in surface water - Continued

Date of collection	Nitrate (total as N)	Nitrite plus nitrate (total as N)	Nitrite plus nitrate (dissolved as N)	Nitrogen, ammonia (total as N)	Nitrogen (total organic as N)	Nitrogen (total Kjeldahl as N)	Nitrogen (total as N)	Fluoride (dissolved)	Phosphorus (total as P)
Rio San Jose at Casa Blanca Diversion (9.6.6.222) - concluded									
03-01-79	1.1	-	-	-	-	-	-	0.8	1.7
06-07-79	0.84	-	-	-	-	-	-	0.9	0.70
Rio San Jose at New Laguna Dam (9.6.1.322)									
08-07-75	0.11	-	-	-	-	-	-	0.7	0.02
01-12-77	1.8	-	-	-	-	-	-	1.3	0.72
04-06-77	0.70	-	-	-	-	-	-	1.1	0.24
10-04-77	0.06	-	-	-	-	-	-	0.8	0.13
01-10-78	0.70	-	-	-	-	-	-	0.9	0.50
03-07-78	0.03	-	-	-	-	-	-	0.9	0.60
09-06-78	0.14	-	-	-	-	-	-	1.2	0.03
01-09-79	0.70	-	-	-	-	-	-	1.3	0.74
03-02-79	0.42	-	-	-	-	-	-	0.9	1.1
06-08-79	0.04	-	-	-	-	-	-	0.8	0.36
Rio Paguate upstream from Paguate (11.5.30.234)									
04-21-78	-	0.01	0.01	0.0	0.25	0.25	0.26	0.2*	0.05*
07-19-78	0.07	-	0.01	-	-	-	-	0.3	0.01

Phosphate (total ortho as P)	Phosphate (dissolved ortho as P)	Boron (dissolved) (micrograms per liter)	Carbon (total organic)	Carbon (dissolved organic)	Carbon (suspended organic)	Coliform fecal (membrane filter) (colonies per 100 milliliter)	Streptococci fecal (membrane filter, KF Agar) (colonies per 100 milliliter)	Oxygen (dissolved)
-	-	600	-	-	-	-	-	-
-	-	540	-	-	-	-	-	-
-	-	320	-	-	-	-	-	-
-	-	3,730	-	-	-	-	-	-
-	-	430	-	-	-	-	-	-
-	-	400	-	-	-	-	-	-
-	-	780	-	-	-	-	-	-
-	-	540	-	-	-	-	-	-
-	-	690	-	-	-	-	-	-
-	-	250	-	-	-	-	-	-
-	-	500	-	-	-	-	-	-
-	-	400	-	-	-	-	-	-
-	0.03	20*	-	1.2	0.7	-	-	8.6
-	0.04	T	-	2.4	0.7	-	-	9.0

Table 10. Nutrients, bacteria, and selected minor elements in surface water - Continued

Date of collection	Nitrate (total as N)	Nitrite plus nitrate (total as N)	Nitrite plus nitrate (dissolved as N)	Nitrogen, ammonia (total as N)	Nitrogen (total organic as N)	Nitrogen (total Kjeldahl as N)	Nitrogen (total as N)	Fluoride (dis-solved)	Phosphorus (total as P)
Rio Paguate upstream from Paguate, New Mexico (11.5.30.234) - continued									
10-30-78	0.01*	0.01	-	0.01	0.02	0.03	0.04	0.2	0.04*
01-30-79	0.0*	0.02	-	0.01	0.05	0.06	0.08	1.2	0.11*
Rio Paguate upstream from Jackpile-Paguate Mine (11.5.32.424)									
04-01-76	0.28	-	-	-	-	-	-	0.2	T
01-13-77	0.14	-	-	-	-	-	-	0.3	0.02
01-18-77	-	-	0.03	-	-	-	-	0.3*	-
04-05-77	0.01	-	-	-	-	-	-	0.4	0.01
01-10-78	0.14	-	-	-	-	-	-	0.3	0.01
03-07-78	0.03	-	-	-	-	-	-	0.4	0.03
04-21-78	-	0.01	0.01	0.01	0.31	0.32	0.33	0.4*	.03*
06-06-78	T	-	-	-	-	-	-	0.4	T
07-19-78	0.01	-	0.04	-	-	-	-	0.4	0.05
09-06-78	T	-	-	-	-	-	-	0.4	0.01
10-26-78	0.01*	0.01	-	0.0	0.12	0.12	0.13	0.3	.03*
01-08-79	0.04	-	-	-	-	-	-	1.6	0.03
01-29-79	0.00*	0.02	-	0.01	0.05	0.06	0.07	0.9	0.05*

Phosphate (total ortho as P)	Phosphate (dissolved ortho as P)	Boron (dissolved) (micrograms per liter)	Carbon (total organic)	Carbon (dissolved organic)	Carbon (suspended organic)	Coliform fecal (membrane filter) (colonies per 100 milliliter)	Streptococci fecal (membrane filter, KF Agar) (colonies per 100 milliliter)	Oxygen (dissolved)
0.02	-	T	-	2.1	0.2	-	-	8.9
0.03	-	T	-	2.5	0.5	-	-	10.8
-	-	120	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	0.01	20*	-	-	-	-	-	-
-	-	T	-	-	-	-	-	-
-	-	260	-	-	-	-	-	-
-	-	T	-	-	-	-	-	-
-	0.02	30*	-	1.1	0.5	-	-	8.6
-	-	40	-	-	-	-	-	-
-	0.02	T	-	2.1	0.5	-	-	6.6
-	-	40	-	-	-	-	-	-
0.02	-	T	-	1.7	0.4	730	1,150	8.3
-	-	T	-	-	-	-	-	-
0.03	-	T	-	2.4	0.9	-	-	9.8

Table 10. Nutrients, bacteria, and selected minor elements in surface water - Continued

Date of collection	Nitrate (total as N)	Nitrite plus nitrate (total as N)	Nitrite plus nitrate (dissolved as N)	Nitrogen, ammonia (total as N)	Nitrogen (total organic as N)	Nitrogen (total Kjeldahl as N)	Nitrogen (total as N)	Fluoride (dissolved)	Phosphorus (total as P)
Rio Paguate upstream from Jackpile-Paguate Mine (11.5.32.424) - continued									
03-01-79	0.01	-	-	-	-	-	-	0.4	0.01
06-06-79	0.03	-	-	-	-	-	-	0.3	0.01
Rio Moquino upstream from Jackpile-Paguate Mine (11.5.22.344)									
04-01-76	0.01	-	-	-	-	-	-	0.4	0.02
01-13-77	0.56	-	-	-	-	-	-	0.6	T
01-18-77	-	-	0.87	-	-	-	-	0.4*	-
04-05-77	0.14	-	-	-	-	-	-	0.6	T
07-06-77	0.03	-	-	-	-	-	-	0.6	T
10-03-77	T	-	-	-	-	-	-	0.5	T
01-10-78	0.14	-	-	-	-	-	-	0.5	0.01
03-07-78	0.03	-	-	-	-	-	-	0.6	0.03
04-20-78	-	0.01	0.01	0.01	0.39	0.40	0.41	0.6*	0.01*
06-05-78	T	-	-	-	-	-	-	0.8	T
09-06-78	0.03	-	-	-	-	-	-	0.7	0.01
11-02-78	0.03*	0.04	-	0.01	0.99	1.0	1.0	0.5	0.00*
01-08-79	0.14	-	-	-	-	-	-	2.1	0.01

Phosphate (total ortho as P)	Phosphate (dissolved ortho as P)	Boron (dissolved) (micrograms per liter)	Carbon (total organic)	Carbon (dissolved organic)	Carbon (suspended organic)	Coliform fecal (membrane filter) (colonies per 100 milliliter)	Streptococci fecal (membrane filter, KF Agar) (colonies per 100 milliliter)	Oxygen (dissolved)
-	-	20	-	-	-	-	-	-
-	-	T	-	-	-	-	-	-
-	-	50	-	-	-	-	-	-
-	-	180	-	-	-	-	-	-
-	0.02	70*	-	-	-	-	-	-
-	-	T	-	-	-	-	-	-
-	-	340	-	-	-	-	-	-
-	-	T	-	-	-	-	-	-
-	-	320	-	-	-	-	-	-
-	-	260	-	-	-	-	-	-
-	0.0	140*	-	2.6	0.5	-	-	8.4
-	-	40	-	-	-	-	-	-
-	-	260	-	-	-	-	-	-
0.0	-	60	-	2.3	0.2	-	-	9.8
-	-	T	-	-	-	-	-	-

Table 10. Nutrients, bacteria, and selected minor elements in surface water - Continued

Date of collection	Nitrate (total as N)	Nitrite plus nitrate (total as N)	Nitrite plus nitrate (dissolved as N)	Nitrogen, ammonia (total as N)	Nitrogen (total organic as N)	Nitrogen (total Kjeldahl as N)	Nitrogen (total as N)	Fluoride (dis-solved)	Phos-phorus (total as P)
Rio Moquino upstream from Jackpile-Paguate Mine (11.5.22.344) - continued									
01-30-79	0.43*	0.45	-	0.05	0.41	0.46	0.91	2.1	0.14*
03-01-79	0.07	-	-	-	-	-	-	0.6	T
06-06-79	0.04	-	-	-	-	-	-	0.4	0.01
Rio Paguate downstream from Jackpile-Paguate Mine (10.5.2.434)									
04-01-76	0.01	-	-	-	-	-	-	0.6	T
01-13-77	0.28	-	-	-	-	-	-	0.5	0.02
01-18-77	-	-	0.24	-	-	-	-	0.6*	-
01-24-77	-	0.18	0.16	-	-	0.41	-	0.6*	0.26*
04-04-77	0.28	-	-	-	-	-	-	0.6	T
07-08-77	0.03	-	-	-	-	-	-	0.8	0.02
01-10-78	0.28	-	-	-	-	-	-	0.6	0.01
03-07-78	0.03	-	-	-	-	-	-	0.6	0.01
04-18-78	-	0.01	0.0	0.0	0.29	0.29	0.30	0.7*	0.03*
06-05-78	0.04	-	-	-	-	-	-	0.7	T
07-25-78	0.04	-	0.01	-	-	-	-	1.1	0.03
09-06-78	T	-	-	-	-	-	-	0.8	0.01

Phosphate (total ortho as P)	Phosphate (dissolved ortho as P)	Boron (dissolved) (micrograms per liter)	Carbon (total organic)	Carbon (dissolved organic)	Carbon (suspended organic)	Coliform fecal (membrane filter) (colonies per 100 milliliter)	Streptococci fecal (membrane filter, KF Agar) (colonies per 100 milliliter)	Oxygen (dissolved)
0.02	-	T	-	4.3	1.0	-	-	11.0
-	-	100	-	-	-	-	-	-
-	-	T	-	-	-	-	-	-
-	-	50	-	-	-	-	-	-
-	-	180	-	-	-	-	-	-
-	0.03	70*	-	-	-	-	-	-
0.05	0.02	80*	4.3	-	-	-	-	-
-	-	T	-	-	-	-	-	-
-	-	340	-	-	-	-	-	-
-	-	50	-	-	-	-	-	-
-	-	260	-	-	-	-	-	-
-	0.0	120*	2.1	1.6	0.5	120	280	8.2
-	-	150	-	-	-	-	-	-
-	0.0	70	3.1	2.5	0.6	1,138	532	8.3
-	-	210	-	-	-	-	-	-

Table 10. Nutrients, bacteria, and selected minor elements in surface water - Continued

Date of collection	Nitrate (total as N)	Nitrite plus nitrate (total as N)	Nitrite plus nitrate (dissolved as N)	Nitrogen, ammonia (total as N)	Nitrogen (total organic as N)	Nitrogen (total Kjeldahl as N)	Nitrogen (total as N)	Fluoride (dis- solved)	Phosphorus (total as P)
Rio Paguate downstream from Jackpile-Paguate Mine (10.5.2.434) - continued									
10-30-78	0.01*	0.02	-	0.01	2.9	3.0	3.0	0.7	0.07*
01-08-79	0.14	-	-	-	-	-	-	2.4	0.01
01-24-79	0.18*	0.22	-	0.03	0.36	0.39	0.61	0.7	0.15*
03-02-79	0.07	-	-	-	-	-	-	0.6	0.01
06-07-79	0.04	-	-	-	-	-	-	0.7	T
Rio Paguate downstream from Paguate Dam (10.5.25.133)									
09-13-73	3.7	-	-	-	-	-	-	0.5	T
01-15-74	3.1	-	-	-	-	-	-	0.7	T
04-04-77	0.28	-	-	-	-	-	-	0.6	T
07-05-77	0.03	-	-	-	-	-	-	0.6	T
01-10-78	0.14	-	-	-	-	-	-	0.7	0.01
03-07-78	0.28	-	-	-	-	-	-	0.6	T
06-06-78	0.01	-	-	-	-	-	-	1.2	T
09-06-78	0.03	-	-	-	-	-	-	0.7	0.01
01-08-79	0.14	-	-	-	-	-	-	1.9	0.01
03-02-79	0.01	-	-	-	-	-	-	0.5	T
06-07-79	0.04	-	-	-	-	-	-	0.7	T

Phosphate (total ortho as P)	Phosphate (dissolved ortho as P)	Boron (dissolved) (micrograms per liter)	Carbon (total organic)	Carbon (dissolved organic)	Carbon (suspended organic)	Coliform fecal (membrane filter) (colonies per 100 milliliter)	Streptococci fecal (membrane filter, KF Agar) (colonies per 100 milliliter)	Oxygen (dissolved)
0.04	-	60	2.9	2.2	0.7	-	-	9.2
-	-	T	-	-	-	-	-	-
0.03	-	T	5.1	3.9	1.2	10	275	10.9
-	-	100	-	-	-	-	-	-
-	-	T	-	-	-	-	-	-
-	-	T	-	-	-	-	-	-
-	-	200	-	-	-	-	-	-
-	-	220	-	-	-	-	-	-
-	-	250	-	-	-	-	-	-
-	-	320	-	-	-	-	-	-
-	-	180	-	-	-	-	-	-
-	-	290	-	-	-	-	-	-
-	-	40	-	-	-	-	-	-
-	-	T	-	-	-	-	-	-
-	-	120	-	-	-	-	-	-
-	-	T	-	-	-	-	-	-

Table 10. Nutrients, bacteria, and selected minor elements in surface water - Continued

Date of collection	Nitrate (total as N)	Nitrite plus nitrate (total as N)	Nitrite plus nitrate (dissolved as N)	Nitrogen, ammonia (total as N)	Nitrogen (total organic as N)	Nitrogen (total Kjeldahl as N)	Nitrogen (total as N)	Fluoride (dissolved)	Phosphorus (total as P)
Rio San Jose at Mesita Diversion (9.5.12.133)									
06-26-67	0.74	-	-	-	-	-	-	0.9	T
05-06-69	.12	-	-	-	-	-	-	1.2	T
06- -69	.62	-	-	-	-	-	-	1.5	T
08-08-69	.12	-	-	-	-	-	-	1.2	T
09- -69	2.5	-	-	-	-	-	-	.4	T
10- -69	.62	-	-	-	-	-	-	1.1	T
05-08-70	1.2	-	-	-	-	-	-	1.1	T
06- -70	.25	-	-	-	-	-	-	.9	0.03
08-05-70	1.9	-	-	-	-	-	-	.8	.04
09- -70	2.5	-	-	-	-	-	-	.4	T
07-26-71	.50	-	-	-	-	-	-	.8	.06
08- -71	T	-	-	-	-	-	-	1.0	.03
10-27-71	.25	-	-	-	-	-	-	.9	1.2

Phosphate (total ortho as P)	Phosphate (dissolved ortho as P)	Boron (dissolved) (micrograms per liter)	Carbon (total organic)	Carbon (dissolved organic)	Carbon (suspended organic)	Coliform fecal (membrane filter) (colonies per 100 milliliter)	Streptococci fecal (membrane filter, KF Agar) (colonies per 100 milliliter)	Oxygen (dissolved)
-	-	220	-	-	-	-	-	-
-	-	490	-	-	-	-	-	-
-	-	1,100	-	-	-	-	-	-
-	-	200	-	-	-	-	-	-
-	-	150	-	-	-	-	-	-
-	-	200	-	-	-	-	-	-
-	-	640	-	-	-	-	-	-
-	-	740	-	-	-	-	-	-
-	-	80	-	-	-	-	-	-
-	-	270	-	-	-	-	-	-
-	-	380	-	-	-	-	-	-
-	-	320	-	-	-	-	-	-
-	-	600	-	-	-	-	-	-

Table 10. Nutrients, bacteria, and selected minor elements in surface water - Continued

Date of collection	Nitrate (total as N)	Nitrite plus nitrate (total as N)	Nitrite plus nitrate (dissolved as N)	Nitrogen, ammonia (total as N)	Nitrogen (total organic as N)	Nitrogen (total Kjeldahl as N)	Nitrogen (total as N)	Fluoride (dissolved)	Phosphorus (total as P)
Rio San Jose at Mesita Diversion (9.5.12.133) - continued									
08-31-72	1.9	-	-	-	-	-	-	.8	.34
09-13-73	7.4	-	-	-	-	-	-	.6	T
01-25-74	.48	-	-	-	-	-	-	1.0	.42
04-03-74	.19	-	-	-	-	-	-	1.2	.05
10-21-74	3.7	-	-	-	-	-	-	.9	.01
03-28-75	0.70	-	-	-	-	-	-	1.1	0.19
03-30-76	0.28	-	-	-	-	-	-	0.6	0.27
01-10-77	1.82	-	-	-	-	-	-	1.2	0.72
01-24-77	-	0.88	0.88	-	-	1.5	-	0.9*	0.42*
04-06-77	0.42	-	-	-	-	-	-	1.1	0.12
07-06-77	0.14	-	-	-	-	-	-	0.8	0.02
10-04-77	0.03	-	-	-	-	-	-	0.9	T
01-10-78	0.56	-	-	-	-	-	-	1.0	0.34
03-07-78	0.14	-	-	-	-	-	-	0.9	0.51
04-19-78	-	0.02	0.02	0.01	0.48	0.49	0.51	1.2*	0.10*
06-06-78	0.01	-	-	-	-	-	-	0.9	T

Phosphate (total ortho as P)	Phosphate (dissolved ortho as P)	Boron (dissolved) (micrograms per liter)	Carbon (total organic)	Carbon (dissolved organic)	Carbon (suspended organic)	Coliform fecal (membrane filter) (colonies per 100 milliliter)	Streptococci fecal (membrane filter, KF Agar) (colonies per 100 milliliter)	Oxygen (dissolved)
-	-	T	-	-	-	-	-	-
-	-	40	-	-	-	-	-	-
-	-	350	-	-	-	-	-	-
-	-	290	-	-	-	-	-	-
-	-	250	-	-	-	-	-	-
-	-	12	-	-	-	-	-	-
-	-	280	-	-	-	-	-	-
-	-	840	-	-	-	-	-	-
0.31	0.24	380*	4.4	-	-	-	-	-
-	-	550	-	-	-	-	-	-
-	-	760	-	-	-	-	-	-
-	-	400	-	-	-	-	-	-
-	-	320	-	-	-	-	-	-
-	-	540	-	-	-	-	-	-
-	0.10	780*	5.3	4.7	0.6	1	36	8.8
-	-	900	-	-	-	-	-	-

Table 10. Nutrients, bacteria, and selected minor elements in surface water - Concluded

Date of collection	Nitrate (total as N)	Nitrite plus nitrate (total as N)	Nitrite plus nitrate (dissolved as N)	Nitrogen, ammonia (total as N)	Nitrogen (total organic as N)	Nitrogen (total Kjeldahl as N)	Nitrogen (total as N)	Fluoride (dissolved)	Phosphorus (total as P)
Rio San Jose at Mesita Diversion (9.5.12.133) - concluded									
09-07-78	0.03	-	-	-	-	-	-	0.7	0.01
01-09-79	0.84	-	-	-	-	-	-	3.4	0.46
01-24-79	1.0*	1.1	-	0.62	0.68	1.3	2.4	1.0	0.65*
03-06-79	0.28	-	-	-	-	-	-	0.9	0.84
06-06-79	0.04	-	-	-	-	-	-	1.0	0.14

Phosphate (total ortho as P)	Phosphate (dissolved ortho as P)	Boron (dissolved) (micrograms per liter)	Carbon (total organic)	Carbon (dissolved organic)	Carbon (suspended organic)	Coliform fecal (membrane filter) (colonies per 100 milliliter)	Streptococci fecal (membrane filter, KF Agar) (colonies per 100 milliliter)	Oxygen (dissolved)
-	-	500	-	-	-	-	-	-
-	-	120	-	-	-	-	-	-
0.51	-	300	6.6	5.6	1.0	3	152	12.2
-	-	480	-	-	-	-	-	-
-	-	590	-	-	-	-	-	-

Table II.--Selected trace elements in surface water

Notes: All constituents reported in micrograms per liter. All constituents are reported as "total" concentrations unless noted otherwise. Analyses were performed by both U.S. Bureau of Indian Affairs (BIA) laboratory and the U.S. Geological Survey (USGS) laboratory. Concentrations less than the detection limit of a particular analytical technique are indicated by "T" by BIA lab and "<" by USGS lab.

Date of collection	Arsenic	Barium	Cadmium	Chromium	Cobalt	Copper	Iron	Iron (dissolved)	Lead
Cubero Creek at Budville (10.7.25.211)									
04-20-78	4	-	50	-	-	-	-	30	-
07-25-78	3	53	T	T	-	-	150	T	T
10-26-78	1	200	<1	<10	-	-	250	T	T
01-29-79	2	100	3	T	-	-	110	10	T
Rio Paguate upstream from Paguate, New Mexico (11.5.30.234)									
04-21-78	5	-	-	-	-	-	-	20	-
07-19-78	T	42	T	T	-	-	100	10	T
10-26-78	<1	220	<2	<10	-	-	80	T	T
01-30-79	1	T	10	T	-	-	50	10	20
Rio Paguate upstream from Jackpile-Paguate Mine (11.5.32.424)									
04-21-78	-	-	-	-	-	-	-	40	-
07-19-78	1	110	T	T	-	-	290	10	38
10-26-78	<1	220	<1	<10	-	-	370	T	T
01-29-79	1	T	3	T	-	-	500	50	T

Lithium	Manganese	Mercury	Molybdenum	Selenium	Silver	Strontium	Vanadium (dissolved)	Zinc
-	-	-	10	1	-	-	4.0	-
-	-	T	-	5	T	-	3.8	-
-	-	2	-	T	<10	-	5.4	-
-	32	3	-	T	T	-	4.9	-
-	-	-	5	0	-	-	4.0	-
-	-	T	-	T	T	-	4.5	-
-	-	<2	-	T	<10	-	5.8	-
-	T	<2	-	T	T	-	3.3	-
-	-	-	6	3	-	-	0.0	-
-	-	T	-	T	T	-	0.0	-
-	-	<2	-	T	<10	-	0.0	-
-	78	<2	-	T	T	-	1.6	-

Table 11.--Selected trace elements in surface water - Concluded

Date of collection	Arsenic	Barium	Cadmium	Chromium	Cobalt	Copper	Iron	Iron (dissolved)	Lead
Rio Paguate downstream from Jackpile-Paguate Mine (10.5.2.434)									
01-24-77	<5	100	10	1	<50	10	7,500	70	<100
04-18-78	4	-	2	20	3	4	1,600	10	23
07-25-78	T	42	T	T	-	-	T	T	21
10-30-78	<10	240	2	<10	-	-	1,990	T	T
01-24-79	3	61	T	6	-	-	2,660	T	-
Rio San Jose at Mesita Diversion (0.5.12.133)									
01-24-77	4	0	<10	0	<50	10	3,600	40	<100
04-19-78	5	-	2	0	1	8	310	40	90
01-24-79	5	41	T	T	-	-	930	T	-
Rio Puerco at Rt. 66 bridge (9.1.4.412)									
08-24-78	1	700	T	T	-	-	70	40	13

Lithium	Manganese	Mercury	Molybdenum	Selenium	Silver	Strontium	Vanadium (dissolved)	Zinc
50	180	0	2	8	<10	1,500	0.3	-
-	50	0	7	9	-	-	0.0	20
-	-	T	-	T	T	-	0.0	-
-	-	<2	-	T	<10	-	0.0	-
-	110	<2	-	T	T	-	0.5	-
290	110	0	3	4	<10	2,100	3.4	-
-	140	0	8	1	-	-	5.0	20
-	88	<2	-	T	T	-	3.5	-
-	-	T	-	T	-	-	-	-

Table 12. Miscellaneous onsite measurements of streamflow and water quality

Note: All measurements were performed onsite.
An Asterisk indicates discharge measurement was the mean value for the day recorded at a streamflow-gaging station. All other discharge measurements were of instantaneous flow.

Date of collection	Discharge (cubic feet per second)	Specific conductance (micromhos per centimeter at 25° celsius)	pH (units)	Temperature (degrees celsius)	Bicarbonate (milligrams per liter as HCO_3)	Carbonate (milligrams per liter as CO_3)	Dissolved oxygen (milligrams per liter)
Rio San Jose at Seama Diversion (10.7.34.242)							
10-02-73	-	3,100	-	13.0	-	-	-
11-01-73	-	3,500	-	8.0	-	-	-
12-03-73	-	6,000	-	2.0	-	-	-
02-11-74	-	1,400	-	5.0	-	-	-
03-14-74	-	1,700	-	7.0	-	-	-
05-06-74	-	2,000	-	18.0	-	-	-
06-13-74	-	3,250	-	26.0	-	-	-
08-09-74	-	3,000	-	24.0	-	-	-
09-20-74	-	3,500	-	17.5	-	-	-
11-04-74	-	2,900	-	7.0	-	-	-
01-14-75	-	1,540	-	2.0	-	-	-
03-05-75	-	1,900	-	6.0	-	-	-
04-07-75	-	1,800	-	10.0	-	-	-
05-06-75	-	2,060	-	8.0	-	-	-
06-09-75	-	3,200	-	24.0	-	-	-
08-04-75	-	3,000	-	25.0	-	-	-

Table 12. Miscellaneous onsite measurements of streamflow and water quality -- Continued

Date of collection	Discharge (cubic feet per second)	Specific conductance (micromhos per centimeter at 25° celsius)	pH (units)	Temperature (degrees celsius)	Bicarbonate (milligrams per liter as HCO_3)	Carbonate (milligrams per liter as CO_3)	Dissolved oxygen (milligrams per liter)
Rio San Jose at Seama Diversion (10.7.34.242) - Continued							
12-05-75	-	6,050	-	2.0	-	-	-
01-02-76	-	4,000	-	3.0	-	-	-
02-15-76	-	1,950	-	3.0	-	-	-
05-05-76	-	3,000	-	16.0	-	-	-
06-02-76	-	3,000	-	22.0	-	-	-
07-06-76	-	5,000	-	18.0	-	-	-
08-03-76	-	1,550	-	24.0	-	-	-
09-02-76	-	2,200	-	17.0	-	-	-
10-15-76	-	4,000	-	8.0	-	-	-
11-02-76	-	2,300	-	4.0	-	-	-
12-06-76	-	2,100	-	-1.0	-	-	-
02-02-77	-	1,850	-	3.0	-	-	-
03-01-77	-	1,800	-	5.0	-	-	-
05-02-77	-	2,000	-	11.5	-	-	-
06-01-77	-	3,000	-	16.0	-	-	-
08-01-77	-	3,500	-	18.0	-	-	-

Table 12. Miscellaneous onsite measurements of streamflow and water quality -- Continued

Date of collection	Discharge (cubic feet per second)	Specific conductance (micromhos per centimeter at 25° celsius)	pH (units)	Temperature (degrees celsius)	Bicarbonate (milligrams per liter as HCO_3)	Carbonate (milligrams per liter as CO_3)	Dissolved oxygen (milligrams per liter)
Rio San Jose at Seama Diversion (10.7.34.242) - Concluded							
09-07-77	-	1,300	-	19.0	-	-	-
10-31-77	-	1,800	-	11.0	-	-	-
11-02-77	-	1,600	-	5.0	-	-	-
12-05-77	-	2,100	-	4.0	-	-	-
01-02-78	-	2,200	-	4.0	-	-	-
02-07-78	-	2,000	-	5.0	-	-	-
04-03-78	-	2,400	-	10.0	-	-	-
05-01-78	-	5,000	-	11.0	-	-	-
07-05-78	-	3,000	-	14.0	-	-	-
08-01-78	-	2,100	-	17.0	-	-	-
10-02-78	-	3,000	-	14.0	-	-	-
11-01-78	-	2,500	-	11.0	-	-	-
12-01-78	-	2,000	-	4.0	-	-	-
02-05-79	-	1,900	-	1.0	-	-	-
04-05-79	-	1,700	-	15.0	-	-	-
05-01-79	-	2,800	-	10.0	-	-	-
07-02-79	-	1,300	-	16.0	-	-	-
08-06-79	-	6,000	-	20.0	-	-	-

Table 12. Miscellaneous onsite measurements of streamflow and water quality -- Continued

Date of collection	Discharge (cubic feet per second)	Specific conductance (micromhos per centimeter at 25° celsius)	pH (units)	Temperature (degrees celsius)	Bicarbonate (milligrams per liter as HCO_3)	Carbonate (milligrams per liter as CO_3)	Dissolved oxygen (milligrams per liter)
Acomita Ditch at Laguna-Acoma Boundary (10.7.35.411)							
05-27-76	0.89	2,120	-	21.0	-	-	-
06-16-76	0.21	1,720	-	24.0	-	-	-
07-20-76	0.07	1,900	-	26.0	-	-	-
09-02-76	0.93	1,700	-	-	-	-	-
New York Ditch at Laguna-Acoma Boundary (10.7.35.213)							
05-24-78	0.23	1,600	8.6	24.0	252	13	-
Paraje and Acomita Ditches at Acoma-Laguna Boundary (10.7.35.244)							
05-24-78	2.02	1,800	8.5	17.5	287	16	-
06-21-78	0.45	2,030	8.4	21.0	338	8	9.9
07-26-78	4.0	1,700	8.3	18.0	320	0	8.2
08-30-78	0.91	1,900	8.2	15.0	316	0	9.0
09-27-78	1.7	1,870	8.4	13.0	310	6	8.3
Rio San Jose at Laguna-Acoma Boundary (10.7.35.231)							
04-01-76	7.2	1,970	-	-	-	-	-
04-29-76	4.7	2,200	-	8.5	-	-	-
05-27-76	0.10	5,040	-	21.0	-	-	-
06-16-76	0.43	5,890	-	21.5	-	-	-

Table 12. Miscellaneous onsite measurements of streamflow and water quality — Continued

Date of collection	Discharge (cubic feet per second)	Specific conductance (micromhos per centimeter at 25° celsius)	pH (units)	Temperature (degrees celsius)	Bicarbonate (milligrams per liter as HCO_3)	Carbonate (milligrams per liter as CO_3)	Dissolved oxygen (milligrams per liter)
Rio San Jose at Laguna-Acoma Boundary (10.7.35.231) - Concluded							
07-20-76	0.02	3,000	-	26.5	-	-	-
09-02-76	1.04	2,700	-	-	-	-	-
10-04-76	3.9	2,310	8.3	12.5	-	-	-
01-18-77	4.6	2,000	-	0.0	-	-	-
02-18-77	6.5	2,300	-	9.5	-	-	-
03-17-77	10.2	2,000	-	5.5	-	-	-
04-13-77	9.4	2,000	-	10.5	-	-	-
05-12-77	0.67	2,300	-	13.0	-	-	-
05-24-78	0.76	3,500	8.3	22.0	449	0	-
06-21-78	0.02	5,500	8.5	28.0	456	12	9.9
07-26-78	0.55	1,900	8.2	20.0	324	0	7.6
08-30-78	0.68	2,000	8.1	16.0	320	0	7.8
09-27-78	0.63	3,000	8.4	13.5	386	8	8.0
11-02-78	4.7	2,080	8.5	12.0	344	8	9.8
01-03-79	6.0	2,130	-	0.5	-	-	-
01-30-79	7.9	2,200	8.3	0.0	352	0	11.0
02-28-79	7.3	1,830	8.5	5.5	328	6	11.1
03-27-79	7.8	2,000	8.3	11.0	328	0	8.3

Table 12. Miscellaneous onsite measurements of streamflow and water quality — Continued

Date of collection	Discharge (cubic feet per second)	Specific conductance (micromhos per centimeter at 25° celsius)	pH (units)	Temperature (degrees celsius)	Bicarbonate (milligrams per liter as HCO_3)	Carbonate (milligrams per liter as CO_3)	Dissolved oxygen (milligrams per liter)
Paraje Ditch at Laguna-Acoma Boundary (10.7.35.233)							
05-27-76	0.66	3,570	-	21.0	-	-	-
06-16-76	1.54	3,270	-	21.5	-	-	-
07-20-76	1.24	2,300	-	26.0	-	-	-
09-02-76	1.99	2,600	-	-	-	-	-
05-12-77	1.17	2,100	-	13.0	-	-	-
Cubero Creek at Budville (10.7.25.211)							
12-17-74	0.40	750	-	9.0	-	-	-
03-28-75	-	740	-	10.0	-	-	-
05-26-78	0.26	700	7.9	12.0	290	0	-
06-27-78	0.34	650	8.3	20.5	310	0	7.8
08-29-78	0.23	740	8.2	29.5	280	0	6.9
09-26-78	0.23	780	8.4	26.0	300	4	7.3
12-29-78	0.38	650	8.7	9.0	280	10	9.2
02-28-79	0.27	700	8.8	12.0	250	16	10.4
03-28-79	0.22	680	8.75	10.5	270	12	9.7
05-14-79	0.25	700	8.9	23.0	260	8	8.9

Table 12. Miscellaneous onsite measurements of streamflow and water quality -- Continued

Date of collection	Discharge (cubic feet per second)	Specific conductance (micromhos per centimeter at 25° celsius)	pH (units)	Temperature (degrees celsius)	Bicarbonate (milligrams per liter as HCO_3)	Carbonate (milligrams per liter as CO_3)	Dissolved oxygen (milligrams per liter)
Rio San Jose at Casa Blanca Diversion (9.6.6.222)							
10-02-73	-	3,500	-	13.5	-	-	-
11-01-73	-	3,000	-	6.5	-	-	-
12-03-73	-	5,000	-	2.0	-	-	-
01-14-74	-	2,400	-	3.0	-	-	-
02-11-74	-	1,500	-	2.0	-	-	-
03-14-74	-	1,800	-	7.0	-	-	-
05-06-74	-	2,200	-	18.5	-	-	-
06-13-74	-	2,600	-	27.0	-	-	-
08-09-74	-	2,400	-	27.0	-	-	-
09-20-74	-	3,000	-	19.0	-	-	-
11-04-74	-	2,000	-	6.0	-	-	-
11-22-74	-	1,800	-	7.0	-	-	-
01-14-75	-	1,560	-	1.0	-	-	-
03-05-75	-	1,900	-	5.5	-	-	-
04-07-75	-	1,650	-	11.0	-	-	-
05-06-75	-	3,000	-	11.0	-	-	-
06-09-75	-	3,000	-	26.0	-	-	-

Table 12. Miscellaneous onsite measurements of streamflow and water quality — Continued

Date of collection	Discharge (cubic feet per second)	Specific conductance (micromhos per centimeter at 25° celsius)	pH (units)	Temperature (degrees celsius)	Bicarbonate (milligrams per liter as HCO_3)	Carbonate (milligrams per liter as CO_3)	Dissolved oxygen (milligrams per liter)
Rio San Jose at Casa Blanca Diversion (9.6.6.222) - Continued							
08-04-75	-	2,000	-	25.0	-	-	-
12-05-75	-	5,050	-	3.0	-	-	-
01-02-76	-	3,000	-	4.0	-	-	-
02-25-76	-	1,850	-	5.0	-	-	-
05-05-76	-	2,800	-	15.0	-	-	-
06-02-76	-	3,100	-	20.0	-	-	-
07-06-76	-	2,200	-	22.0	-	-	-
08-03-76	-	1,600	-	22.0	-	-	-
09-02-76	-	2,300	-	18.0	-	-	-
10-12-76	-	2,600	-	10.0	-	-	-
11-02-76	-	2,300	-	4.0	-	-	-
12-06-76	-	2,100	-	0.0	-	-	-
02-02-77	-	1,800	-	2.0	-	-	-
03-01-77	-	2,100	-	5.0	-	-	-
05-02-77	-	1,700	-	12.5	-	-	-
06-01-77	-	2,200	-	16.0	-	-	-
08-01-77	-	2,450	-	19.0	-	-	-

Table 12. Miscellaneous onsite measurements of streamflow and water quality -- Continued

Date of collection	Discharge (cubic feet per second)	Specific conductance (micromhos per centimeter at 25° celsius)	pH (units)	Temperature (degrees celsius)	Bicarbonate (milligrams per liter as HCO_3)	Carbonate (milligrams per liter as CO_3)	Dissolved oxygen (milligrams per liter)
Rio San Jose at Casa Blanca Diversion (9.6.6.222) - Concluded							
09-07-77	-	2,000	-	20.0	-	-	-
12-05-77	-	2,100	-	4.0	-	-	-
01-02-78	-	2,400	-	4.0	-	-	-
02-07-78	-	2,200	-	5.0	-	-	-
04-03-78	-	2,800	-	10.0	-	-	-
05-01-78	-	3,500	-	13.0	-	-	-
07-05-78	0	2,800	-	22.0	-	-	-
08-01-78	-	2,000	-	26.0	-	-	-
10-02-78	-	2,200	-	15.0	-	-	-
11-01-78	-	2,200	-	11.0	-	-	-
12-01-78	-	2,000	-	4.0	-	-	-
02-05-79	-	1,900	-	2.0	-	-	-
03-01-79	-	1,500	-	5.0	-	-	-
04-05-79	-	2,000	-	16.0	-	-	-
05-01-79	-	1,600	-	14.0	-	-	-
07-02-79	-	2,200	-	20.0	-	-	-
08-06-79	-	2,000	-	22.0	-	-	-

Table 12. Miscellaneous onsite measurements of streamflow and water quality -- Continued

Date of collection	Discharge (cubic feet per second)	Specific conductance (micromhos per centimeter at 25° celsius)	pH (units)	Temperature (degrees celsius)	Bicarbonate (milligrams per liter as HCO_3)	Carbonate (milligrams per liter as CO_3)	Dissolved oxygen (milligrams per liter)
Rio San Jose at New Laguna Dam (9.6.1.322)							
12-03-73	-	3,000	-	4.0	-	-	-
01-18-74	-	2,100	-	4.0	-	-	-
02-15-74	-	1,800	-	5.0	-	-	-
03-11-74	-	1,800	-	10.0	-	-	-
04-03-74	-	2,100	-	7.0	-	-	-
05-06-74	-	2,200	-	22.0	-	-	-
08-09-74	-	800	-	20.0	-	-	-
10-21-74	-	1,600	-	12.0	-	-	-
11-04-74	-	1,700	-	10.0	-	-	-
01-14-75	-	2,040	-	1.0	-	-	-
02-12-75	-	1,800	-	6.0	-	-	-
03-05-75	-	1,900	-	5.5	-	-	-
03-28-75	-	2,100	-	7.0	-	-	-
04-15-75	-	2,000	-	12.0	-	-	-
05-06-75	-	3,000	-	12.0	-	-	-
12-05-75	-	2,020	-	2.0	-	-	-

Table 12. Miscellaneous onsite measurements of streamflow and water quality -- Continued

Date of collection	Discharge (cubic feet per second)	Specific conductance (micromhos per centimeter at 25° celsius)	pH (units)	Temperature (degrees celsius)	Bicarbonate (milligrams per liter as HCO_3)	Carbonate (milligrams per liter as CO_3)	Dissolved oxygen (milligrams per liter)
Rio San Jose at New Laguna Dam (9.6.1.322) - Continued							
01-04-76	-	2,000	-	3.0	-	-	-
03-25-76	-	2,000	-	9.0	-	-	-
05-05-76	-	3,600	-	14.0	-	-	-
08-03-76	-	1,400	-	22.0	-	-	-
09-02-76	-	1,100	-	26.0	-	-	-
10-04-76	-	2,600	-	17.0	-	-	-
11-01-76	-	2,400	-	8.0	-	-	-
12-07-76	-	2,200	-	0.0	-	-	-
02-02-77	-	1,500	-	7.0	-	-	-
03-01-77	-	1,000	-	3.0	-	-	-
05-03-77	-	2,100	-	15.0	-	-	-
06-02-77	-	5,000	-	23.0	-	-	-
08-01-77	-	1,400	-	30.0	-	-	-
09-08-77	-	1,130	-	22.0	-	-	-
10-31-77	-	2,000	-	9.0	-	-	-
12-07-77	-	2,000	-	3.0	-	-	-
01-03-78	-	2,200	-	2.0	-	-	-
02-08-78	-	1,750	-	7.0	-	-	-

Table 12. Miscellaneous onsite measurements of streamflow and water quality -- Continued

Date of collection	Discharge (cubic feet per second)	Specific conductance (micromhos per centimeter at 25° celsius)	pH (units)	Temperature (degrees celsius)	Bicarbonate (milligrams per liter as HCO_3)	Carbonate (milligrams per liter as CO_3)	Dissolved oxygen (milligrams per liter)
Rio San Jose at New Laguna Dam (9.6.1.322) - Concluded							
04-04-78	-	2,600	-	9.0	-	-	-
05-01-78	-	3,100	-	11.0	-	-	-
10-03-78	-	2,400	-	14.0	-	-	-
11-01-78	-	2,200	-	12.0	-	-	-
12-05-78	-	1,900	-	2.0	-	-	-
02-06-79	-	1,800	-	0.0	-	-	-
04-05-79	-	2,000	-	14.0	-	-	-
05-03-79	-	3,000	-	9.0	-	-	-
07-05-79	-	4,000	-	22.0	-	-	-
Rio Paguate upstream from Paguate, New Mexico (11.5.30.234)							
05-25-78	1.07	330	8.1	17.0	190	0	-
06-27-78	0.44	320	8.1	16.0	190	0	8.4
08-28-78	0.40	330	8.5	19.5	160	8	8.8
09-28-78	0.70	330	8.6	16.0	180	6	8.1
01-02-79	2.0	460	8.3	1.0	250	0	10.8
02-27-79	1.1	300	8.3	4.0	200	0	10.2
03-28-79	0.97	380	8.6	6.5	180	4	9.2
05-10-79	1.1	370	8.6	8.0	190	4	9.2

Table 12. Miscellaneous onsite measurements of streamflow and water quality -- Continued

Date of collection	Discharge (cubic feet per second)	Specific conductance (micromhos per centimeter at 25° celsius)	pH (units)	Temperature (degrees celsius)	Bicarbonate (milligrams per liter as HCO_3)	Carbonate (milligrams per liter as CO_3)	Dissolved oxygen (milligrams per liter)
Rio Paguate upstream from Jackpile-Paguate Mine (11.5.32.424)							
02-04-74	-	900	-	-	-	-	-
04-04-74	-	780	-	8.5	-	-	-
11-22-74	0.57	700	-	8.5	-	-	-
12-05-74	-	850	-	8.0	-	-	-
12-17-74	0.47	-	-	3.0	-	-	-
02-10-75	-	870	-	7.5	-	-	-
03-18-75	-	850	-	10.0	-	-	-
03-28-75	-	900	-	5.0	-	-	-
04-14-75	-	700	-	13.0	-	-	-
05-07-75	-	540	-	13.0	-	-	-
06-12-75	-	550	-	13.0	-	-	-
08-06-75	-	830	-	19.0	-	-	-
12-03-75	-	780	-	4.0	-	-	-
01-06-76	-	700	-	4.0	-	-	-
01-30-76	-	1,000	-	9.0	-	-	-
04-29-76	0.67	890	-	10.5	-	-	-

Table 12. Miscellaneous onsite measurements of streamflow and water quality — Continued

Date of collection	Discharge (cubic feet per second)	Specific conductance (micromhos per centimeter at 25° celsius)	pH (units)	Temperature (degrees celsius)	Bicarbonate (milligrams per liter as HCO_3)	Carbonate (milligrams per liter as CO_3)	Dissolved oxygen (milligrams per liter)
Rio Paguate upstream from Jackpile-Paguate Mine (11.5.32.424) - Continued							
05-05-76	-	830	-	14.0	-	-	-
05-27-76	0.15	1,060	-	23.0	-	-	-
06-04-76	-	700	-	18.0	-	-	-
06-16-76	0.32	830	-	24.5	-	-	-
07-15-76	-	830	-	22.0	-	-	-
08-03-76	-	930	-	20.0	-	-	-
09-02-76	0.10	900	-	-	-	-	-
09-03-76	-	950	-	15.0	-	-	-
10-04-76	-	970	-	13.0	-	-	-
10-06-76	-	950	-	11.0	-	-	-
11-01-76	-	850	-	8.0	-	-	-
12-08-76	-	680	-	2.0	-	-	-
01-12-77	-	580	-	0.0	-	-	-
02-02-77	-	540	-	5.0	-	-	-
03-01-77	-	800	-	3.0	-	-	-
05-03-77	-	750	-	9.0	-	-	-
06-01-77	-	930	-	24.0	-	-	-

Table 12. Miscellaneous onsite measurements of streamflow and water quality -- Continued

Date of collection	Discharge (cubic feet per second)	Specific conductance (micromhos per centimeter at 25° celsius)	pH (units)	Temperature (degrees celsius)	Bicarbonate (milligrams per liter as HCO_3)	Carbonate (milligrams per liter as CO_3)	Dissolved oxygen (milligrams per liter)
Rio Paguate upstream from Jackpile-Paguate Mine (11.5.32.424) - Continued							
07-08-77	-	950	-	19.0	-	-	-
08-02-77	-	930	-	15.0	-	-	-
09-07-77	-	900	-	26.0	-	-	-
10-05-77	-	560	-	15.0	-	-	-
10-31-77	-	900	-	9.0	-	-	-
12-06-77	-	730	-	8.0	-	-	-
01-04-78	-	680	-	2.0	-	-	-
02-09-78	-	800	-	2.0	-	-	-
04-04-78	-	800	-	19.0	-	-	-
05-04-78	-	900	-	14.0	-	-	-
05-25-78	0.21	800	7.8	19.0	340	0	-
06-27-78	0.19	850	8.1	18.5	380	0	8.8
07-07-78	-	850	-	13.0	-	-	-
08-03-78	-	830	-	19.0	-	-	-
08-28-78	0.12	820	8.0	21.5	350	0	6.9
09-29-78	0.13	800	8.2	20.5	350	0	7.2

Table 12. Miscellaneous onsite measurements of streamflow and water quality -- Continued

Date of collection	Discharge (cubic feet per second)	Specific conductance (micromhos per centimeter at 25° celsius)	pH (units)	Temperature (degrees celsius)	Bicarbonate (milligrams per liter as HCO_3)	Carbonate (milligrams per liter as CO_3)	Dissolved oxygen (milligrams per liter)
Rio Paguate upstream from Jackpile-Paguate Mine (11.5.32.424) - Concluded							
10-02-78	-	830	-	19.0	-	-	-
11-01-78	-	850	-	14.0	-	-	-
12-04-78	-	900	-	4.0	-	-	-
01-03-79	0.50	630	8.35	1.0	320	2	11.0
01-08-79	-	950	-	0.0	-	-	-
02-05-79	-	750	-	0.0	-	-	-
02-27-79	0.35	800	8.4	10.0	390	6	8.8
03-26-79	0.28	780	8.3	12.0	370	0	8.3
04-05-79	-	800	-	17.0	-	-	-
05-02-79	-	630	-	10.0	-	-	-
05-11-79	0.40	730	8.4	10.0	350	4	8.3
07-03-79	-	800	-	15.0	-	-	-
08-02-79	-	750	-	14.0	-	-	-
Rio Moquino upstream from Jackpile-Paguate Mine (11.5.22.344)							
02-04-74	-	1,700	-	-	-	-	-
04-04-74	-	1,900	-	4.0	-	-	-
11-22-74	0.57	1,550	-	11.5	-	-	-

Table 12. Miscellaneous onsite measurements of streamflow and water quality — Continued

Date of collection	Discharge (cubic feet per second)	Specific conductance (micromhos per centimeter at 25° celsius)	pH (units)	Temperature (degrees celsius)	Bicarbonate (milligrams per liter as HCO_3)	Carbonate (milligrams per liter as CO_3)	Dissolved oxygen (milligrams per liter)
Rio Moquino upstream from Jackpile-Paguate Mine (11.5.22.344) - Continued							
12-05-74	-	1,850	-	7.0	-	-	-
12-17-74	0.84	-	-	0.0	-	-	-
02-10-75	-	1,300	-	7.5	-	-	-
03-18-75	-	1,600	-	14.0	-	-	-
03-28-75	-	2,300	-	1.0	-	-	-
04-14-75	-	1,400	-	18.0	-	-	-
05-07-75	-	2,000	-	12.0	-	-	-
06-12-75	-	2,030	-	13.0	-	-	-
08-06-75	-	2,020	-	24.0	-	-	-
12-03-75	-	2,000	-	2.0	-	-	-
01-06-76	-	2,050	-	3.0	-	-	-
03-30-76	-	2,000	-	7.0	-	-	-
04-29-76	0.11	2,200	-	16.0	-	-	-
05-05-76	-	2,150	-	20.0	-	-	-
05-27-76	-	2,110	-	26.0	-	-	-
06-04-76	-	2,000	-	22.0	-	-	-
06-16-76	0.04	2,600	-	24.0	-	-	-
07-15-76	-	1,700	-	27.0	-	-	-

Table 12. Miscellaneous onsite measurements of streamflow and water quality — Continued

Date of collection	Discharge (cubic feet per second)	Specific conductance (micromhos per centimeter at 25° celsius)	pH (units)	Temperature (degrees celsius)	Bicarbonate (milligrams per liter as HCO_3)	Carbonate (milligrams per liter as CO_3)	Dissolved oxygen (milligrams per liter)
Rio Moquino upstream from Jackpile-Paguate Mine (11.5.22.344) - Continued							
08-03-76	-	2,200	-	26.0	-	-	-
09-02-76	0.22	2,600	-	-	-	-	-
09-03-76	-	2,100	-	14.0	-	-	-
10-04-76	-	2,190	7.9	15.0	-	-	-
10-06-76	-	2,100	-	18.0	-	-	-
11-01-76	-	1,950	-	14.0	-	-	-
12-08-76	-	2,100	-	0.0	-	-	-
02-02-77	-	1,900	-	10.0	-	-	-
03-01-77	-	2,000	-	2.0	-	-	-
05-02-77	-	2,400	-	25.0	-	-	-
09-06-77	-	1,500	-	32.0	-	-	-
10-31-77	-	2,000	-	6.0	-	-	-
12-07-77	-	2,400	-	10.0	-	-	-
01-04-78	-	1,500	-	0.0	-	-	-
02-09-78	-	1,900	-	0.0	-	-	-
04-04-78	-	1,700	-	17.0	-	-	-
05-04-78	-	1,800	-	13.0	-	-	-
05-26-78	0.52	2,000	8.0	17.0	270	0	-

Table 12. Miscellaneous onsite measurements of streamflow and water quality -- Continued

Date of collection	Discharge (cubic feet per second)	Specific conductance (micromhos per centimeter at 25° celsius)	pH (units)	Temperature (degrees celsius)	Bicarbonate (milligrams per liter as HCO_3)	Carbonate (milligrams per liter as CO_3)	Dissolved oxygen (milligrams per liter)
Rio Moquino upstream from Jackpile-Paguate Mine (11.5.22.344) - Concluded							
08-03-78	-	3,500	-	25.0	-	-	-
08-28-78	0.30	3,150	8.2	28.5	284	0	6.2
09-29-78	0.22	2,550	8.4	25.0	256	2	7.8
10-02-78	-	2,400	-	23.0	-	-	-
11-01-78	-	1,450	-	17.0	-	-	-
12-04-78	-	2,200	-	1.0	-	-	-
01-02-79	0.40	2,480	8.4	0.5	452	4	13.1
02-05-79	-	2,000	-	0.0	-	-	-
02-27-79	1.2	1,500	8.6	8.5	326	6	10.1
03-26-79	1.0	1,580	8.6	19.0	300	10	7.6
04-05-79	-	1,700	-	22.0	-	-	-
05-02-79	-	1,500	-	10.0	-	-	-
07-02-79	-	2,100	-	31.0	-	-	-
08-02-79	-	2,800	-	18.0	-	-	-
Rio Paguate downstream from Jackpile-Paguate Mine (10.5.2.434)							
02-12-74	1.7	1,700	-	9.0	-	-	-
04-04-74	-	2,400	-	11.0	-	-	-
11-22-74	1.4	2,000	-	9.0	-	-	-
12-05-74	-	2,000	-	8.0	-	-	-

Table 12. **Miscellaneous onsite measurements of streamflow and water quality -- Continued**

Date of collection	Discharge (cubic feet per second)	Specific conductance (micromhos per centimeter at 25° celsius)	pH (units)	Temperature (degrees celsius)	Bicarbonate (milligrams per liter as HCO_3)	Carbonate (milligrams per liter as CO_3)	Dissolved oxygen (milligrams per liter)
Rio Paguate downstream from Jackpile-Paguate Mine (10.5.2.434) - Continued							
12-17-74	1.4	-	-	1.0	-	-	-
02-10-75	-	1,600	-	7.5	-	-	-
03-18-75	-	2,000	-	18.0	-	-	-
03-28-75	-	2,700	-	0.5	-	-	-
04-14-75	-	1,400	-	18.0	-	-	-
05-07-75	-	2,000	-	21.0	-	-	-
06-12-75	-	2,030	-	22.0	-	-	-
08-06-75	-	2,020	-	22.0	-	-	-
12-03-75	-	1,580	-	5.0	-	-	-
01-06-76	-	2,000	-	6.0	-	-	-
03-25-76	-	1,950	-	19.0	-	-	-
04-29-76	0.93	1,800	-	13.5	-	-	-
05-27-76	1.1	1,930	-	29.5	-	-	-
06-16-76	0.37	2,170	-	24.0	-	-	-
07-15-76	0.46*	1,700	-	26.0	-	-	-
08-03-76	0.50*	2,500	-	26.0	-	-	-

Table 12. Miscellaneous onsite measurements of streamflow and water quality — Continued

Date of collection	Discharge (cubic feet per second)	Specific conductance (micromhos per centimeter at 25° celsius)	pH (units)	Temperature (degrees celsius)	Bicarbonate (milligrams per liter as HCO_3)	Carbonate (milligrams per liter as CO_3)	Dissolved oxygen (milligrams per liter)
Rio Paguate downstream from Jackpile-Paguate Mine (10.5.2.434) - Continued							
09-03-76	0.87*	3,000	-	28.0	-	-	-
10-04-76	0.37*	2,800	-	24.0	-	-	-
11-01-76	1.1*	2,200	-	13.0	-	-	-
12-08-76	1.2*	1,900	-	0.0	-	-	-
01-10-77	2.0*	1,850	-	0.0	-	-	-
02-02-77	2.0*	1,650	-	5.0	-	-	-
03-01-77	1.8*	1,900	-	0.0	-	-	-
05-03-77	2.3*	1,800	-	12.0	-	-	-
06-02-77	1.0*	2,400	-	16.0	-	-	-
08-02-77	0.05*	3,000	-	25.0	-	-	-
09-07-77	2.0*	3,000	-	30.0	-	-	-
10-05-77	0.54*	1,750	-	15.0	-	-	-
10-31-77	0.48*	2,200	-	9.0	-	-	-
12-06-77	0.52*	2,800	-	10.0	-	-	-
01-04-78	1.8*	1,800	-	0.0	-	-	-
02-09-78	2.3*	2,000	-	0.0	-	-	-
04-04-78	0.61*	2,300	-	19.0	-	-	-
05-05-78	1.1*	1,500	-	10.0	-	-	-

Table 12. Miscellaneous onsite measurements of streamflow and water quality — Continued

Date of collection	Discharge (cubic feet per second)	Specific conductance (micromhos per centimeter at 25° celsius)	pH (units)	Temperature (degrees celsius)	Bicarbonate (milligrams per liter as HCO_3)	Carbonate (milligrams per liter as CO_3)	Dissolved oxygen (milligrams per liter)
Rio Paguate downstream from Jackpile-Paguate Mine (10.5.2.434) - Concluded							
05-25-78	0.76	2,300	8.0	16.0	290	0	-
06-27-78	0.14	3,000	8.2	24.0	330	0	7.4
07-07-78	0.50*	3,000	-	22.0	-	-	-
08-03-78	0.07*	3,000	-	27.0	-	-	-
08-28-78	0.22	3,150	8.0	23.0	350	0	6.9
09-28-78	0.34	3,050	8.4	17.0	350	4	7.9
10-02-78	0.12*	3,000	-	22.0	-	-	-
11-03-78	6.0*	850	-	10.0	-	-	-
12-04-78	0.99*	1,900	-	2.0	-	-	-
01-03-79	1.0*	2,800	8.3	0.0	410	0	10.6
02-05-79	2.4*	1,400	-	0.0	-	-	-
02-27-79	1.4	1,750	8.6	14.0	330	12	8.0
03-26-79	1.7	1,750	8.4	14.5	320	8	7.7
04-05-79	1.3*	2,000	-	22.0	-	-	-
05-02-79	1.7*	1,600	-	14.0	-	-	-
05-11-79	1.0	1,950	8.5	20.0	290	6	6.9
07-03-79	0.23*	3,000	-	20.0	-	-	-
08-02-79	0.07*	2,600	-	25.0	-	-	-

Table 12. Miscellaneous onsite measurements of streamflow and water quality -- Continued

Date of collection	Discharge (cubic feet per second)	Specific conductance (micromhos per centimeter at 25° celsius)	pH (units)	Temperature (degrees celsius)	Bicarbonate (milligrams per liter as HCO_3)	Carbonate (milligrams per liter as CO_3)	Dissolved oxygen (milligrams per liter)
Rio Paguate downstream from Paguate Dam (10.5.25.133)							
09-13-73	-	1,300	-	15.0	-	-	-
01-15-74	-	2,800	-	2.0	-	-	-
02-11-74	-	3,000	-	8.0	-	-	-
03-11-74	-	2,500	-	4.0	-	-	-
04-04-74	-	3,000	-	6.5	-	-	-
08-02-74	-	2,200	-	16.0	-	-	-
10-21-74	-	2,200	-	16.0	-	-	-
01-14-75	-	3,050	-	2.0	-	-	-
02-10-75	-	2,000	-	8.0	-	-	-
03-03-75	-	1,900	-	14.0	-	-	-
03-18-75	-	1,800	-	15.0	-	-	-
04-14-75	-	2,200	-	17.0	-	-	-
05-12-75	-	1,560	-	23.0	-	-	-
12-04-75	-	2,090	-	7.0	-	-	-
01-06-76	-	3,000	-	9.0	-	-	-
03-25-76	-	2,600	-	13.0	-	-	-
05-05-76	-	2,250	-	13.0	-	-	-

Table 12. Miscellaneous onsite measurements of streamflow and water quality -- Continued

Date of collection	Discharge (cubic feet per second)	Specific conductance (micromhos per centimeter at 25° celsius)	pH (units)	Temperature (degrees celsius)	Bicarbonate (milligrams per liter as HCO_3)	Carbonate (milligrams per liter as CO_3)	Dissolved oxygen (milligrams per liter)
Rio Paguate downstream from Paguate Dam (10.5.25.133) - Continued							
09-02-76	-	3,000	-	27.0	-	-	-
10-04-76	-	3,030	-	16.0	-	-	-
12-07-76	-	3,000	-	4.0	-	-	-
02-03-77	-	1,600	-	3.0	-	-	-
03-01-77	-	1,280	-	1.0	-	-	-
05-03-77	-	2,400	-	13.0	-	-	-
08-02-77	-	2,400	-	23.0	-	-	-
09-07-77	-	2,150	-	28.0	-	-	-
10-04-77	-	2,100	-	25.0	-	-	-
01-04-78	-	1,200	-	0.0	-	-	-
02-09-78	-	2,100	-	6.0	-	-	-
04-05-78	-	1,900	-	6.0	-	-	-
05-05-76	-	2,100	-	8.0	-	-	-
08-03-78	0	3,030	-	27.0	-	-	-
10-02-78	-	1,500	-	22.0	-	-	-
11-03-78	-	1,700	-	13.0	-	-	-
12-04-78	-	1,600	-	4.0	-	-	-

Table 12. Miscellaneous onsite measurements of streamflow and water quality -- Continued

Date of collection	Discharge (cubic feet per second)	Specific conductance (micromhos per centimeter at 25° celsius)	pH (units)	Temperature (degrees celsius)	Bicarbonate (milligrams per liter as HCO_3)	Carbonate (milligrams per liter as CO_3)	Dissolved oxygen (milligrams per liter)
Rio Paguate downstream from Paguate Dam (10.5.25.133) - Concluded							
02-05-79	-	2,000	-	0.0	-	-	-
04-05-79	-	1,650	-	11.0	-	-	-
05-02-79	-	1,900	-	16.0	-	-	-
07-02-79	-	2,400	-	27.0	-	-	-
08-02-79	-	3,030	-	26.0	-	-	-
Rio San Jose at Mesita Diversion (9.5.12.133)							
11-01-73	-	5,200	-	13.0	-	-	-
12-03-73	-	4,000	-	2.0	-	-	-
01-14-74	-	3,000	-	1.0	-	-	-
02-14-74	-	1,900	-	7.0	-	-	-
03-08-74	-	2,200	-	5.0	-	-	-
05-06-74	-	3,300	-	28.0	-	-	-
11-05-74	-	2,300	-	5.0	-	-	-
01-14-75	-	2,080	-	2.0	-	-	-
02-14-75	-	2,000	-	10.0	-	-	-
03-05-75	-	2,400	-	12.0	-	-	-
04-15-75	-	2,200	-	10.0	-	-	-

Table 12. Miscellaneous onsite measurements of streamflow and water quality -- Continued

Date of collection	Discharge (cubic feet per second)	Specific conductance (micromhos per centimeter at 25° celsius)	pH (units)	Temperature (degrees celsius)	Bicarbonate (milligrams per liter as HCO_3)	Carbonate (milligrams per liter as CO_3)	Dissolved oxygen (milligrams per liter)
Rio San Jose at Mesita Diversion (9.5.12.133) - Continued							
05-15-75	-	3,500	-	21.0	-	-	-
08-05-75	-	1,560	-	20.0	-	-	-
12-03-75	-	2,050	-	2.0	-	-	-
01-04-76	-	2,050	-	2.0	-	-	-
02-20-76	-	2,300	-	2.5	-	-	-
05-05-76	-	2,000	-	12.0	-	-	-
07-12-76	0	3,000	-	27.0	-	-	-
08-03-76	0	4,050	-	23.0	-	-	-
09-02-76	-	3,200	-	28.0	-	-	-
10-04-76	-	3,050	-	14.0	-	-	-
11-01-76	-	2,800	-	6.0	-	-	-
12-07-76	-	2,500	-	0.0	-	-	-
02-03-77	-	3,000	-	0.0	-	-	-
03-01-77	-	2,000	-	0.0	-	-	-
05-04-77	-	4,000	-	10.0	-	-	-
06-01-77	-	4,500	-	21.0	-	-	-
09-07-77	-	950	-	18.0	-	-	-
11-01-77	-	2,400	-	10.0	-	-	-

Table 12. Miscellaneous onsite measurements of streamflow and water quality -- Concluded

Date of collection	Discharge (cubic feet per second)	Specific conductance (micromhos per centimeter at 25° celsius)	pH (units)	Temperature (degrees celsius)	Bicarbonate (milligrams per liter as HCO_3)	Carbonate (milligrams per liter as CO_3)	Dissolved oxygen (milligrams per liter)
Rio San Jose at Mesita Diversion (9.5.12.133) - Concluded							
12-05-77	-	2,600	-	9.0	-	-	-
01-02-78	-	2,600	-	7.0	-	-	-
02-09-78	-	2,600	-	2.0	-	-	-
04-04-78	-	3,500	-	6.0	-	-	-
05-04-78	-	4,000	-	19.0	-	-	-
05-26-78	.30	4,750	8.0	19.0	282	0	-
07-07-78	0	5,000	-	27.0	-	-	-
08-03-78	-	850	-	19.0	-	-	-
10-03-78	0	3,500	-	20.0	-	-	-
11-03-78	0	3,000	-	11.0	-	-	-
12-04-78	-	2,050	-	0.0	-	-	-
12-28-78	5.0	2,300	8.7	0.0	320	10	15.4
02-07-79	-	2,000	-	1.0	-	-	-
02-28-79	7.1	2,200	8.8	2.0	300	16	15.5
04-05-79	-	2,400	-	13.0	-	-	-
05-03-79	-	4,000	-	13.0	-	-	-
05-14-79	0.41	4,200	-	12.5	390	0	3.5
07-05-79	-	2,400	-	24.0	-	-	-
08-06-79	0	4,000	-	30.0	-	-	-

Table 13. Selected radiochemicals in surface water

Notes: All analyses are in picocuries per liter unless noted otherwise. All analyses were performed by U.S. Geological Survey. Concentrations less than the detection limit of a particular analytical method are marked "<".

Date of collection	Gross alpha, dis-solved (micro-grams per liter)	Gross alpha, sus-pended (micro-grams per liter)	Gross beta, dis-solved as Cs 137	Gross beta, dis-solved as Sr/Yt-90	Gross beta, sus-pended as Cs 137	Gross beta, sus-pended as Sr/Yt-90	Radium 226, dis-solved radon method	Uranium, dis-solved as U (micro-grams per liter)	Potassium 40, dissolved
Cubero Creek at Budville (10.7.25.211)									
04-20-78	-	-	-	-	-	-	.14	6.4	-
07-25-78	7.9	<0.4	7.8	7.3	<0.4	0.4	.06	5.4	6.1
10-26-78	14.0	<0.4	6.6	6.1	0.5	0.5	.07	5.4	5.1
01-29-79	12.0	<0.4	8.5	7.8	0.5	0.5	.10	6.7	5.2
05-14-79	11.0	<0.4	5.4	5.0	0.4	0.4	.08	5.7	5.5
Rio Paguate upstream from Paguate (11.5.30.234)									
04-21-78	-	-	-	-	-	-	.06	.65	-
07-19-78	<2.8	<0.4	3.1	2.8	<0.4	<0.4	.04	.60	3.6
10-30-78	3.5	<0.4	4.0	3.8	<0.4	<0.4	.09	.80	3.6
01-30-79	<4.4	<0.4	2.7	2.5	<0.4	<0.4	.07	1.60	3.4
05-10-79	3.5	0.4	5.2	4.8	<0.4	<0.4	.07	.80	3.6
Rio Paguate upstream from Jackpile-Paguate Mine (11.5.32.424)									
04-21-78	-	-	-	-	-	-	.08	2.1	-
07-19-78	<4.7	<0.4	3.8	3.6	<0.4	<0.4	.08	1.4	5.1
10-26-78	<5.0	<0.4	8.2	7.5	<0.4	<0.4	.07	0.7	4.6
01-29-79	<5.8	1.1	4.0	3.7	0.7	0.7	.08	2.2	3.5
05-14-79	7.3	<0.4	4.6	4.2	0.4	0.4	.07	1.4	4.0
Rio Moquino upstream from Jackpile-Paguate Mine (11.5.22.344)									
04-20-78	-	-	-	-	-	-	.12	8.3	-
11-02-78	21	<0.4	9.5	8.7	<0.4	<0.4	.11	6.1	6.8
01-30-79	<35	12	<9.5	<8.7	9.3	8.7	.12	7.4	7.5
05-11-79	<24	0.4	<8.1	<8.7	0.4	0.4	.08	4.7	6.0

Table 13. Selected radiochemicals in surface water - Concluded

Date of collection	Gross alpha, dis-solved (micro-grams per liter)	Gross alpha, sus-pended (micro-grams per liter)	Gross beta, dis-solved as Cs 137	Gross beta, dis-solved as Sr/Yt-90	Gross beta, sus-pended as Cs 137	Gross beta, sus-pended as Sr/Yt-90	Radium 226, dis-solved radon method	Uranium, dis-solved as U (micro-grams per liter)	Potassium 40, dissolved
Rio Paguate downstream from Jackpile-Paguate Mine (10.5.2.434)									
06-17-76	360	3.2	44	39	2.1	1.7	4.6	210	3.4
01-24-77	120	150	20	17	56	47	1.7	73	5.2
04-18-78	77	28	23	22	16	16	2.2	78	-
07-25-78	590	18	70	63	44	43	3.6	330	9.0
10-30-78	410	120	67	61	50	44	8.3	220	7.5
01-24-79	230	62	58	58	39	37	3.4	110	6.6
05-11-79	180	36	20	18	22	20	2.3	78	6.7
Rio San Jose at Mesita Diversion (9.5.12.133)									
01-24-77	140	6.0	21	16	30	24	.11	91	6.4
04-19-78	< 34	0.5	11	9.7	1.9	1.9	.26	11	-
01-24-79	< 32	3.5	10	9.4	4.0	3.8	.07	10	1.3
05-14-79	< 66	<0.4	<20	<18	1.4	1.5	.07	41	8.2

Table 14.—Summary of selected geologic units and their water-bearing properties

System	Series	Group	Stratigraphic unit	Thickness (feet)	Lithology	Occurrence	Water supply
Quaternary	Holocene and Pleistocene		Alluvium	0-150	Unconsolidated and interbedded silt, clay, sand, and gravel.	Rio San Jose, Rio Puerco, and tributary valleys.	Yields of 450 gallons per minute possible near mouth of Cubero wash. Capable of yielding 50 to 300 gallons per minute between western boundary and New Laguna and near Paguate.
			Basalt	0- 55	Dense to vesicular basalt extruded as lava flows. Highly fractured in some areas.	Two flows: one underlies much of the Rio San Jose valley and crops out between New Laguna and Mesita; the other covers a large area near Correo.	Springs at base of lava flow near Laguna yield less than 5 gallons per minute. Springs from lava flow near Suwanee contribute over 500 gallons per minute to Rio San Jose.
Quaternary or Tertiary			Basalt	0-100+	Dense to vesicular basalt extruded as lava flows, or dense basalt intruded as dikes, sills, or plugs.	Flows cap Mesa Lucero, Tsidu-Weza, and mesas flanking Mt. Taylor. Dikes, sills, and plugs are common and widely distributed.	Springs issue from the base of lava flows at numerous places on the flanks of Mt. Taylor. The largest, Encinal public supply spring, yields 100 gallons per minute.
Quaternary and Tertiary	Pleistocene Pliocene and Miocene	Santa Fe	Undivided	0-500+	Unconsolidated silt, clay, sand, and gravel.	Occurs extensively east of Rio Puerco fault zone. May be greater than 500 feet thick under parts of Sedillo Grant.	Yields adequate for stock use. Water quality generally unsuitable for public supply. Potable water occurs in places north of Sedillo Grant.
Cretaceous	Upper Cretaceous	Mesaverde	Undivided	2,500±	Predominantly shale, siltstone, and sandstone with thin layers of coal and limestone. The lowest unit in this group is the Gallup Sandstone with a thickness of 80 feet or more.	Exposed on the flanks of Mt. Taylor and on Sedillo and Montaño Grants.	Yields from sandstone units adequate for stock use. Water quality generally unsuitable for public supply except in areas near Mt. Taylor.
	Upper and Lower Cretaceous		Mancos Shale and Dakota Sandstone Undivided	1,100	Predominantly gray shale. Lower 350 feet include four Dakota Sandstone beds each up to 100 feet thick separated by shale. Sandstone is fine to medium-grained, strongly cemented by calcite and clay, and composed predominantly of quartz with some feldspar. Basal sandstone mostly fine to medium-grained, very strongly cemented by silica, and composed of angular to rounded quartz. Pebble conglomerates are common near base.	Exposed on the flanks of Mt. Taylor on Sedillo and Montaño Grants. Sandstone units form prominent cliffs in canyons and on slopes of Mt. Taylor and many mesas.	Yields from Dakota Sandstone units generally adequate for stock use, ranging from 3 to 14 gallons per minute. Water quality generally unsuitable for public supply except near Encinal and Paguate.
Jurassic	Upper Jurassic		Morrison Formation	0-600	Predominantly grayish-green mudstone with discontinuous sandstone layers. The uranium ore-bearing Jackpile sandstone bed, with a thickness up to 200 feet, occurs at the top of this formation near Paguate.	Exposed on sides of mesas north and south of the Rio San Jose valley between the west boundary and Laguna. Also on Mesa Gigante and in the Rio Puerco fault zone near Suwanee. Thins southward from the Rio San Jose valley and pinches out near the southwest corner of the Pueblo Proper.	Yields from sandstone units near Paguate generally adequate for stock and domestic use, ranging from 5 to 50 gallons per minute. Yields of several hundred gallons per minute may be possible on Major's Ranch area. Water suitable for public supply near Paguate; water unsuitable for stock use on Montaño Grant; quality unknown on Major's Ranch area.
	Middle Jurassic	San Rafael	Bluff Sandstone (Includes overlying Zuni Sandstone in some areas)	0-400	Fine to medium-grained sandstone, well sorted, well to moderately well cemented by calcite, composed mainly of quartz grains. Crossbedding characteristic of the sandstone, especially in the upper part. Sandstone pipes are common.	Cliff-forming unit at or near the surface from the south side of Mesa Gigante to the southwest corner of the Pueblo Proper. Also exposed in the Puerco fault zone near Suwanee. Underlies valley fill between New Laguna and Seama. Unit thins southward.	Yields generally adequate for stock use ranging from ½ to 20 gallons per minute. Specific capacities generally less than 1 gallon per minute per foot.

Table 14.—Summary of selected geologic units and their water-bearing properties - Concluded

System	Series	Group	Stratigraphic unit	Thickness (feet)	Lithology	Occurrence	Water supply
Jurassic	Middle Jurassic	San Rafael	Summerville Formation	90- 185	Interstratified, sandy mudstone and sandstone. Sandstone is fine to very-fine grained, well sorted, and friable to well cemented with calcite. The unit thins and coarsens southward containing conglomerate beds under Jack Ward area.	Exposed in buttes and mesas west and south of Laguna and Mesita and at south end of Mesa Gigante.	Yielded no water to test wells 9.5.9.231 and 9.6.26.443.
			Todilto Formation	0- 85	Thin layer of laminated limestone overlain by gypsum (or anhydrite at depth).	Exposed near Mesita, at south end of Mesa Gigante, and in buttes and mesas south of Laguna and Mesita. Gypsum unit pinches out southward and is absent at south end of Pueblo Proper. Limestone unit pinches out south of Pueblo. Gypsum and limestone are exposed in the Puerco fault zone near Suwanee.	Yields and quality generally poor. May be productive where fractured. Test well 9.5.9.231 produced 50 gallons per minute near Laguna of poor-quality water.
			Entrada Sandstone	0- 265	Predominantly very fine to coarse-grained, crossbedded, quartzose sandstone with thinner siltstone units. Sandstone generally strongly cemented by calcite. Formation coarsens southward; conglomerate beds are common near the base between Petoch Butte and Jack Ward area.	Exposed near Mesita, at the south end of Mesa Gigante, and in buttes and mesas south of Laguna and Mesita. Pinches out abruptly in Jack Ward area.	Yields generally adequate for stock use, ranging from 4 to 20 gallons per minute. Specific capacities probably less than 1 gallon per minute per foot.
Triassic	Upper Triassic		Chinle Formation	1,500-2,000	Predominantly red, purple, and gray shale. Arkosic sandstone unit up to 100 feet thick at or near top between Mesita and Correo. Sandstone up to 100 feet thick exposed at base of formation on east side of Mesa Lucero.	Underlies all of study area except small area on Sedillo Grant. At or near surface in Big Sandy and Arroyo Colorado drainage areas.	Yields barely adequate to inadequate for stock use except Mesita area where sandstone unit yields adequate quantities for stock and domestic use. Yields in this area range from 8 to 40 gallons per minute with specific capacities less than ½ gallon per minute per foot. Elsewhere yields generally less than 10 gallons per minute; several dry holes reported.
Permian	Lower Permian		San Andres Limestone	250- 300	Limestone, gray, fetid, and sandstone, white, medium-grained, well sorted, and moderately cemented. Massive gypsum comprises more than half of unit in exposures on Mesa Lucero.	Underlies all of study area except where exposed with other Permian units on east side of Mesa Lucero.	Little data available for study area. Mesita test well, which penetrated upper part, flowed 15 gallons per minute with a shut-in pressure of 170 pounds per square inch. Deep test well by Sohio north of Pueblo yielded less than 5 gallons per minute with 390 feet of drawdown. Water quality probably poor throughout Pueblo.
			Glorieta Sandstone	150- 250	Sandstone, white, medium to coarse-grained, well sorted moderately cemented by calcite. Some layers silty and gypsiferous.	do.	Reportedly very dense with low permeability in Sohio test well. Water quality probably poor.
			Yeso Formation	1,000±	Predominantly siltstone interbedded with gypsum, limestone, and sandstone.	do.	No data available.

Table 15. Estimated magnitude and frequency of 1-day flood, peak-flow discharge, and total annual streamflow for tributaries of Rio San Jose.

Note: Magnitude and frequencies calculated at mouth of stream according to techniques in Borland (1970) and Scott (1971).

	2-Year Flood		5-Year Flood		10-Year Flood		25-Year Flood		50-Year Flood		
Stream	1-Day flood volume (acre-feet)	Peak flow (cubic feet per second)	1-Day flood volume (acre-feet)	Peak flow (cubic feet per second)	1-Day flood volume (acre-feet)	Peak flow (cubic feet per second)	1-Day flood volume (acre-feet)	Peak flow (cubic feet per second)	1-Day flood volume (acre-feet)	Peak flow (cubic feet per second)	Total annual streamflow (acre-feet)
Rio Paguate	170	1,400	380	2,800	560	4,000	830	6,000	1,100	7,900	4,600
Cañon Seama	8	430	22	930	34	1,400	58	2,200	79	3,000	72
Encinal Creek	32	640	79	1,400	120	2,000	180	3,100	240	4,200	640
Cañon Largo	69	1,100	180	2,200	260	3,100	420	4,800	580	6,300	940
Arroyo Conchas	130	1,500	340	3,000	500	4,300	810	6,500	1,100	8,600	2,800
Cubero Creek	58	770	130	1,600	190	2,400	300	3,600	380	4,900	720
Acoma Creek	160	1,900	430	3,700	670	5,200	1,100	7,700	1,600	10,000	1,100
Arroyo Lucero	34	990	99	2,000	160	2,900	280	4,500	400	6,000	3,000
Arroyo Colorado	240	2,700	670	5,100	1,100	7,200	2,000	11,000	3,000	14,000	4,000
Standard error, in percent	59	92	55	83	55	82	60	87	66	91	53

Table 16. Chemical analyses of bed material in Rio Paguate and Rio Moquino

Note: Location number - see text for explanation. All analyses were performed by U.S. Geological Survey. Discharge, temperature, pH, specific conductance, were measured onsite.

Date of collection	Water discharge (cubic feet per second)	Water temperature (degrees centigrade)	Water pH	Water specific conductance (micromhos per centimeter at 25° Celsius)	Suspended solids (milligrams per liter)	Arsenic in bed material (micrograms per gram)	Cyanide in bed material (micrograms per gram)	Lead in bed material (micrograms per gram)
Rio Paguate upstream from Jackpile-Paguate Mine (11.5.32.424)								
07-06-79	.25	14.0	8.2	700	-	11	0	15
Rio Moquino upstream from Jackpile-Paguate Mine (11.5.22.344)								
07-06-79	.10	21.0	8.4	2,900	-	11	0	12
Rio Paguate downstream from Jackpile-Paguate Mine (10.5.2.434)								
04-18-78	1.1	14.0	8.5	2,200	98	5	0	5
04-18-78	1.1	14.0	8.5	2,200	98	3	0	7
04-18-78	0	-	-	-	-	4	0	7
07-25-78	.14	23.0	8.3	3,000	65	6	0	0
07-25-78	0	-	-	-	-	4	0	0
07-25-78	0	-	-	-	-	4	0	0
10-30-78	.51	12.0	8.3	2,600	174	0	0	10
10-30-78	0	-	-	-	-	4	0	10
10-30-78	0	-	-	-	-	0	0	8
01-24-79	-	- 0.5	8.3	1,700	-	3	0	20
01-24-79	-	- 0.5	8.3	1,700	-	4	0	20
01-24-79	0	-	-	-	-	5	0	20
Rio Paguate 1.5 miles downstream from Jackpile-Paguate Mine (10.5.12.334)								
05-11-79	-	25.0	-	2,100	-	1	0	6
Rio Paguate 3 miles downstream from Jackpile-Paguate Mine (10.5.24.123)								
05-11-79	-	25.0	-	2,130	-	2	0	4
Rio Paguate 4 miles downstream from Jackpile-Paguate Mine (10.5.24.413)								
05-11-79	-	25.0	-	2,250	-	5	0	-

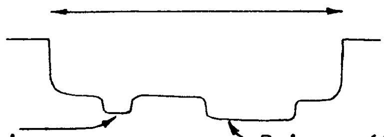
Molybdenum in bed material (micrograms per gram)	Selenium in bed material (micrograms per gram)	Vanadium in bed material (micrograms per gram)	Uranium in bed material (micrograms per gram)	Radium in bed material 226 (pCi per gram)	Remarks on sampling 
0	0.2	-	8.9	1.33	Composite across channel
0	0.2	-	.31	.23	Composite across channel
0	0.0	8.0	16.0	8.4	Primary - flow channel
0	1.0	7.0	2.5	2.7	Secondary - flow channel
0	0.0	5.0	5.4	1.9	Center of active channel
4	1.0	-	17.0	2.0	Primary - flow channel
3	1.0	-	5.0	4.3	6 ft from left bank of active channel
5	2.0	-	17.0	4.3	50 ft from left bank active channel
3	1.0	5.9	4.6	3.9	Primary - flow channel
5	3.0	7.1	10.0	2.4	Center of active channel
4	1.0	5.0	5.1	2.4	15 ft from left bank active channel
0	0.6	6.7	10.0	4.5	Primary - flow channel
0	0.5	3.8	4.9	2.8	Secondary - flow channel
0	0.6	4.8	8.3	3.1	50 ft from left bank active channel
0	1.0	-	293	124	Composite across channel
0	0.0	-	194	121	Composite across channel
0	0.0	-	308	153	Composite across channel

Table 17. Selected water-quality standards and criteria for public water supply, freshwater aquatic life, livestock, and irrigation

PUBLIC-WATER SUPPLY

Selected primary standards from the U.S. Environmental Protection Agency interim drinking water standards (1976a). The maximum allowable limits for these constituents are set according to health criteria.

Constituent	Maximum concentration (milligrams per liter)
Arsenic	0.05
Barium	1.00
Cadmium	0.01
Chromium	0.05
Lead	0.05
Mercury	0.002
Nitrate (as N)	10.0
Selenium	0.01
Silver	0.05

Recommended quality-criteria for secondary constituents in public-supply water (modified from U.S Environmental Protection Agency, 1976b). The recommended limits were set mainly to provide esthetic and taste characteristics.

Constituent	Maximum recommended concentration (milligrams per liter)
Bicarbonate	700
Calcium	75-200
Carbonate	350
Chloride	250
Specific conductance	1,000 micromhos
Copper	3
Hardness	250
Iron	0.3
Manganese	125
pH	0.5
Potassium	6.0-8.5
Sodium	1,000
Sulfate	200
Zinc	5

Table 17. Selected water-quality standards and criteria for public water supply, freshwater aquatic life, livestock, and irrigation - Continued

FRESHWATER AQUATIC LIFE

The following are some selected water-quality criteria for freshwater aquatic life recommended by the U.S. Environmental Protection Agency, 1976a. An asterisk next to the concentration value indicates the value was estimated based on 96-hour bioassay data for rainbow trout survival.

Constituent	Maximum recommended concentration (milligrams per liter)
Alkalinity	Greater than 20
Ammonia	0.02
Beryllium	1.10
Cadmium	0.0012*
Chromium	0.10
Copper	0.09*
Cyanide	0.005
Dissolved Oxygen	5.0
Iron	1.0
Lead	0.05*
Mercury	0.0003
pH	6.5-9.0
Zinc	0.72*

LIVESTOCK

The following are selected water-quality criteria for livestock recommended by the Federal Water Pollution Control Administration, 1968.

Constituent		Maximum recommended concentration (micromhos per centimeter at 25° Celsius))
Specific conductance for:	poultry	4,000
	swine	6,000
	horses	9,000
	dairy cattle	10,000
	beef cattle	14,000
	sheep	17,000

Table 17. Selected water-quality standards and criteria for public water supply, freshwater aquatic life, livestock, and irrigation-Concluded

IRRIGATION

The following are some selected water-quality criteria for irrigation. Values with asterisks were recommended by the U.S. Environmental Protection Agency, 1976a. All other values are from the Federal Water Pollution Control Administration, 1968.

Constituent	Maximum recommended concentration (milligrams per liter)
Arsenic	0.10*
Beryllium:	
(Continuous irrigation on all soils)	0.10*
(Neutral to alkaline soils)	0.50*
Boron:	
(Continuous irrigation of sensitive crops)	0.75*
(Semitolerant crops)	1.0-2.0
(Tolerant crops)	2.0-4.0
Dissolved solids:	
(Usually no detrimental effects to crops)	less than 500
(May have detrimental effects on sensitive crops)	500-1,000
(May have adverse effects on many crops. May require careful management practices)	1,000-2,000
(May be used for tolerant plants on permeable soils if careful management practices are followed)	2,000-5,000