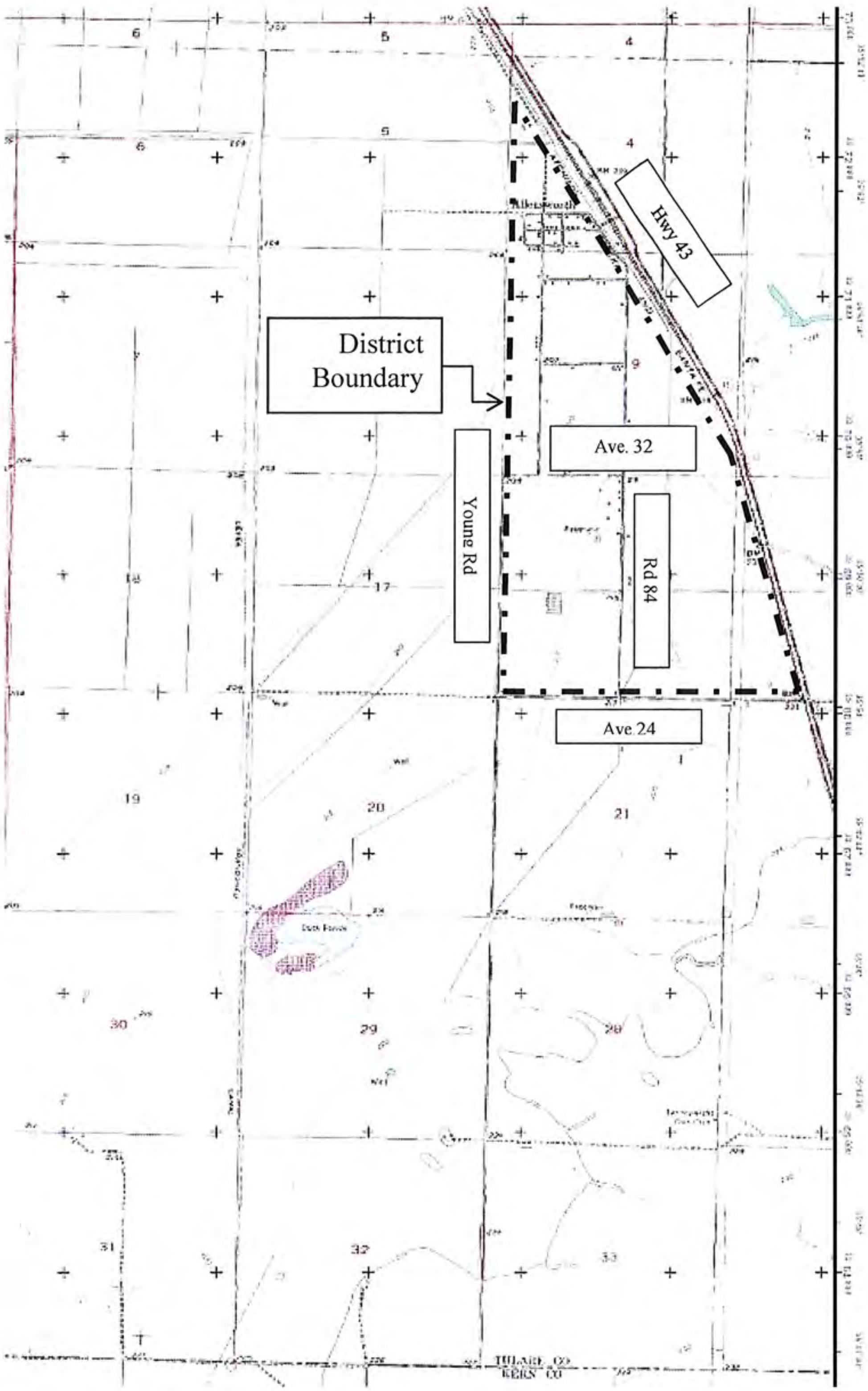

Figure 2

Topographical Map – Allensworth, California

II. Water Supply and Demand

A system map for the ACSD is shown on Figure 3 and 4 below.

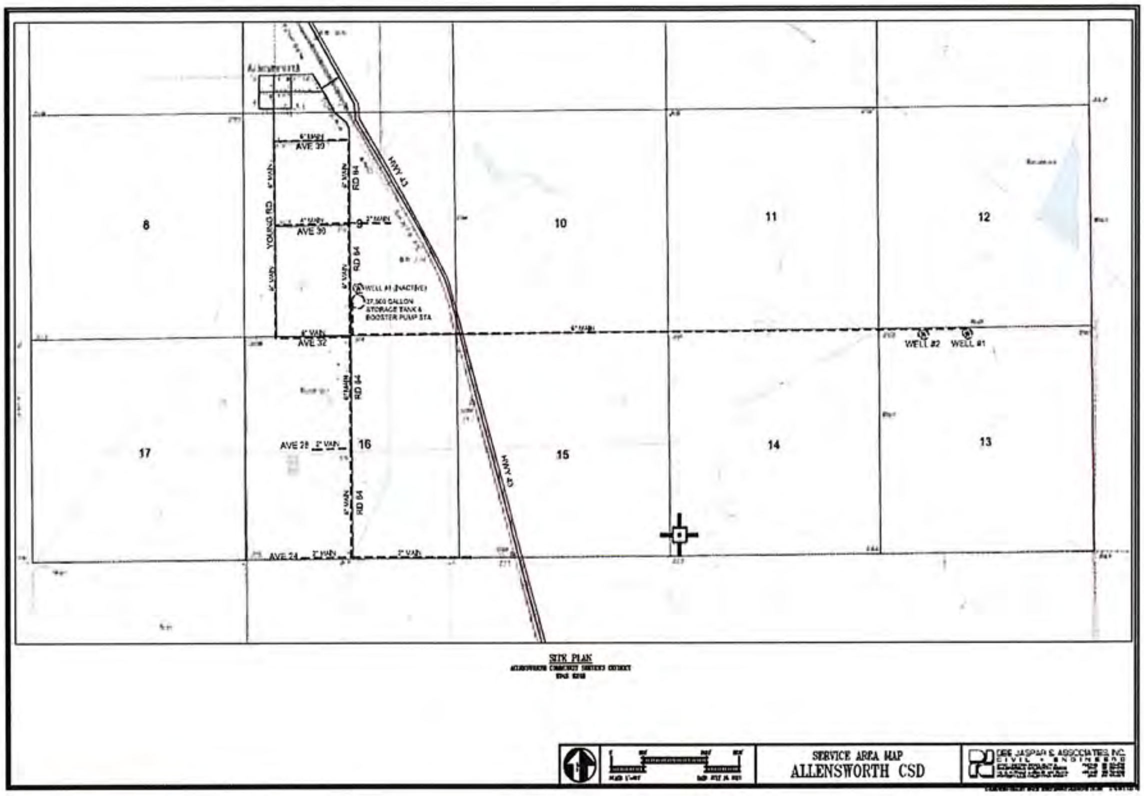

Figure 3

System Map – Allensworth Community Services District & Supply Wells

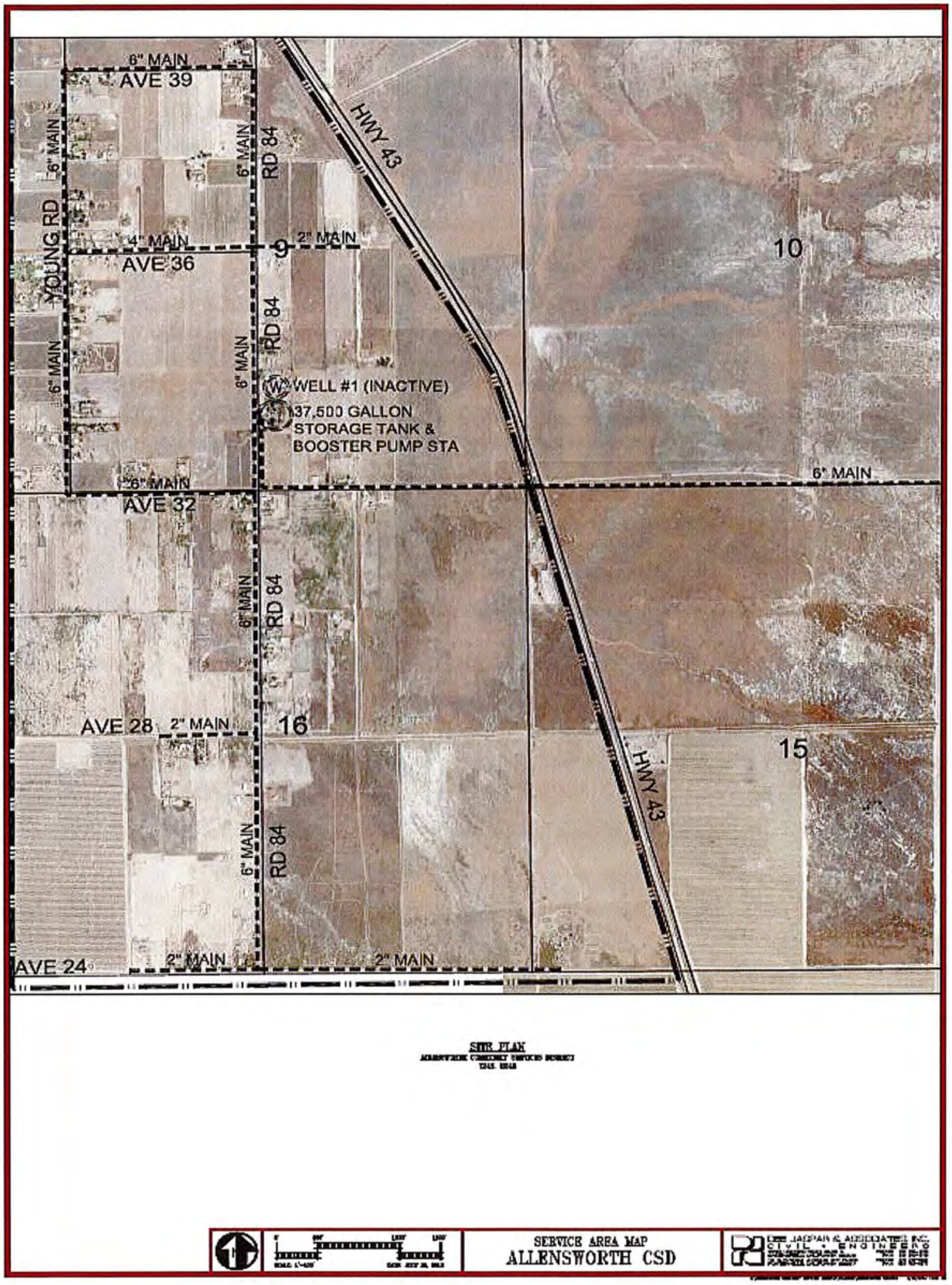

Figure 4

System Map – Allensworth Community Services District

The two groundwater supply wells for the District are located approximately 3 miles east of the Allensworth Community. The water from each of the wells is conveyed through a 6-inch pipeline, 3 miles in length, to fill an approximate 42,000 gallon welded steel storage tank (21-ft diameter by 16-ft tall). Water is pumped from the storage tank into the distribution system through a booster pump station and 5,000 gallon hydropneumatic tank. The booster pump station is equipped with three small end suction booster pumps, two 10 hp pumps and one 15 hp pump.

ACSD receives 100% of its water supply from groundwater. The Allensworth area has been known to have water quality problems since 1966. In 1981, with assistance from Self-Help Enterprises, the community of Allensworth formed a Community Services District. This was necessary to establish eligibility for application to the State Department of Water Resources for funding as well as to make needed water system improvements under the Safe Drinking Water Bond Law of 1976 grant program.

A groundwater study performed between 1982 and 1984 concluded that the water quality was better to the east and southeast of Allensworth and that low arsenic groundwater was available from aquifer zones above 230-ft. As such Well #1 was completed in 1984 by Myers Brothers, Inc. The well was constructed to a total depth of 245-ft with a perforated interval from 185-ft to 240-ft (60 slot). The well has a surface seal to a depth of 170-ft. This well currently produces approximately 140 gpm. At the time of completion the Arsenic concentration was below the maximum contaminant level (MCL) of 50 ppb, however the Arsenic concentration ranges from 11 ppb to 14 ppb and is out of compliance with the current MCL of 10 ppb.

Well #2 was constructed in 1998-1999 to a total depth of 315-ft with perforated intervals from 100-ft to 150-ft, 170-ft to 240-ft, and 270-ft to 305-ft. The well has a surface seal to a depth of 90-ft. This well currently produces approximately 130 gpm. The Arsenic concentration ranges from 7 ppb to 14 ppb, however the lower portion of the well between 260-ft and 305-ft was filled with cement and the Arsenic concentration has been below the MCL of 10 ppb.

The supply for the Allensworth Community Services District is met from two existing water supply wells – Well No. 1 and Well No. 2. The location of these wells is shown on Figure 3 herein.

Table 1

Well Summary

Well Name	1967 Well[1]	Well No. 1	Well No. 2
Flow Rate (gpm)	NA	130	140
Motor Size (hp)	50	10	20
Pump Depth (ft)	NA	NA	260
Well Depth (ft)	NA	245	315
Well Yield (gpm)	NA	130	140
Well Casing Material	NA	Steel	Steel
Well Casing Diameter	NA	8"	12"
Age (yrs)	46	29	14
Regulatory Contaminants	Arsenic	Arsenic	Arsenic

[1]This well is no longer active and is recommended to be abandoned.

The maximum day demand (MDD) for the ACSD system was estimated from water production records for the period from January 2010 through December 2012. This data indicates a MDD of approximately 150 gpm and a peak hour demand of 260 gpm, see Table 2.

Table 2

Historical Water Demand

Allensworth Community Services District							
Historical Water Demand							
Year	Well No. 1	Well No. 2	Total Pumped	Storage Tank/Booster Pump Station	Average Day Demand (GPM)	Maximum Day Demand[1] (GPM)	Peak Hour Demand[2] (GPM)
2010	13,899,400.00	19,169,400.00	33,063,800.00	NA			
2011	21,031,600.00	13,800,700.00	34,832,300.00	34,738,400.00	66.09	132.19	231.32
2012	24,265,500.00	19,466,500.00	43,732,000.00	38,976,600.00	74.16	148.31	259.55

[1]Maximum Day Demand equal to 2x the Average Day Demand per County of Tulare Improvement Standards

[2]Peak Hour Demand equal to 3.5x the Average Day Demand per County of Tulare Improvement Standards

The system capacity between the two wells is approximately 270 gpm. It appears the two wells have enough capacity to meet the actual system demands.

The existing system does not currently have any treatment facilities.

III. PLANNED PROJECTS

A project has been designed to drill and construct a new water supply well in the area southeast of the community that will replace Well No. 1 and construct a pipeline to convey the water to the ACSD system.

The new well will be a 12-inch steel casing drilled to a depth of approximately 230-ft and perforated from 110-ft to 215-ft below ground surface. The well equipping includes site grading, concrete foundations, vertical turbine pump and motor, well discharge piping and appurtenances, chlorination system, electrical and controls, site fencing, site security system, site painting, site ground cover, and 6" PVC conveyance piping.

In addition a 500,000 gallon welded steel storage tank, 60-ft diameter by 24-ft tall, with concrete ringwall foundation and a booster pumping station would be constructed in town to replace the existing storage tank and provide the District adequate storage capacity. Site security system improvements will be made to the two well sites that includes fencing with barbed wire, surveillance cameras with motion activated lights, and all-weather access roads. The electrical and controls of the existing well sites will be upgraded and a SCADA system installed that allows for monitoring of the remote well sites from the District office. It is also recommended that new isolation gate valves be installed or raise to grades performed, flushing valves will be added at the end of 2-inch pipelines, and a chlorine tank and chemical pump be added at the tank inlet line.

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THE HISTORY OF ALLENSWORTH, CALIFORNIA (1908-)

SEPTEMBER 27, 2017 / CONTRIBUTED BY: ROBERT MIKELL

In the article below retired California State University, Fresno historian Robert Mikell explores the history of the only all-black town created in the Golden State. He traces that history including the role of its principal founder, Colonel Allen Allensworth, from 1908.

Allensworth, the first town in California established exclusively by African Americans, was founded in 1908 by a group of men led by Colonel Allen Allensworth. Born a slave in

Louisville, Kentucky in 1842, Allensworth became the highest ranking black officer in the U.S. Army when he retired in 1906.

As a boy, Allensworth was punished for learning to read and write which was unlawful for enslaved people in Kentucky and across the South. During the Civil War, he escaped and sought refuge behind the Union line, where he worked as a civilian nurse in the Army Hospital Corps.

From 1863 to 1865, Allensworth served in the U.S. Navy and afterwards became an ordained Baptist minister. In 1871, Allensworth met Josephine Leavell, a school teacher, organist and pianist. They were married on September 20, 1877. Josephine Allensworth worked diligently with her husband to promote his educational and religious works. The couple had two daughters, Nellie and Eva.

In 1882, Allensworth discovered that of the four black Army regiments (the Buffalo Soldiers), there were no black chaplains. He immediately sought that appointment. On April 1, 1886, President Grover Cleveland appointed Rev. Allensworth as chaplain of the 24th Infantry at the rank of Captain, with the responsibility for the spiritual health and educational well-being of black soldiers in the regiment. At the time of his appointment he was only the second African American, after Henry Plummer, named to serve as a U.S. Army Chaplain. Allensworth retired as a lieutenant-colonel on April 7, 1906, having achieved the highest rank of an African American in the U.S. Armed Forces.

After his retirement, Allensworth traveled widely throughout the United States lecturing on the need for self-help programs which would enable African Americans to become more self-sufficient. In 1904, the Allensworth family decided to settle in Los Angeles. One of Allensworth' s goals was to identify a town-site in the state of California where African Americans might start a new life together outside the restrictions of the Jim Crow South.

In 1906, Allensworth met Professor William Payne who was born in West Virginia in 1885, but was raised in Ohio where his father worked in the coal mines. After completing high school, Payne attended Dennison University In Granville, Ohio, graduating with a bachelor's degree in 1902. Just before his graduation he met and married Zenobia B. Jones, who also attended Dennison University.

Payne served as Assistant Principal at Rentsville School in Rentsville, Ohio for seven years and later as a Professor at the West Virginia Colored Institute for two years. In 1906, Professor Payne and his wife moved to Pasadena, California where he hoped to be a "teacher of teacher." Payne was not eligible to teach in Los Angeles because he lacked prior teaching experience in California. While in southern California, however, Payne met retired colonel Allensworth and the two men decided to pool their talents to create what was then termed a "Race Colony" for the improvement of African Americans across the nation.

Joining Allensworth and Payne to establish their race colony were three other men, Dr. William H. Peck, an AME minister in Los Angeles, J.W. Palmer, a Nevada miner; and Harry Mitchell, a Los Angeles Realtor. Allensworth selected a location in southwest Tulare County which had virgin soil and plentiful water. Together they created the California Colonization and Home Promoting Association and soon thereafter filed a township site legal plan on August 3, 1908 to form the town of Solito, which had a depot connection Los Angeles and San Francisco on the Santa Fe Railroad. The town's name was changed that same year to Allensworth, to honor its most prominent founder.

Town founders established the Allensworth Progressive Association as the official form of government to conduct its affairs. Townspeople elected officers and held town meetings to encourage the civic participation of all of its residents. In 1912 Allensworth became a voting precinct and had its own school district encompassing thirty-three square miles. At its peak in the early 1920s, Allensworth had as many as 300 residents.

Once the school district was established in in 1912, the Allensworth School, costing $5,000, was built with funds donated by local citizens. It was the largest capital investment made by the community, epitomizing the importance of education for the town. The one-room schoolhouse included elementary, intermediate, and high school students. The school was governed by an elected body of three board members. The original trustees were Josephine Allensworth (who also served as the first teacher), Oscar Overr and William H. Hall.

Allensworth School also served as the town center for events and meetings. The Allensworth Progressive Association, the Women's Improvement League, the Debating Society, the Theatre Club, and the Glee Club all met in the building. The most memorable of the year, however, was commencement which took place in June at the end of each school year.

Allensworth was sanctioned a judicial district by the State of California in 1914, and soon afterwards Oscar Overr and William H. Dotson became the first African Americans to hold elected offices as Justice of the Peace and Constable, respectively. A branch of the Tulare County Library and a post office were established with Mary Jane Bickers serving as the first postmistress. On July 4, 1913, an official reading room was established in a separate library building.

Agriculture dominated the economy of Allensworth as several farmers moved in or near the township. The town also had several businesses including a barber shop, bakery, livery stable, drug store, machine shop, and the Allensworth Hotel.

In keeping with Colonel Allensworth' s idea of self-help and self-reliance programs, city leaders in 1914 proposed to establish a vocational education school based on the Tuskegee Institute model and the ideas of its founder, Booker T. Washington. Although it received support for a state funding appropriation from Fresno and Tulare County representatives in the California State Senate and Assembly, the proposal was defeated by the entire state legislature.

The town suffered a far greater loss later in 1914 when Colonel Allensworth died after being struck by a motorcycle while visiting Los Angeles. The town however continued to grow due to the leadership of Oscar Overr, the Justice of the Peace, and Professor William A. Payne, the school principal. New residents continued to arrive and the town continued to prosper until the early 1920s.

Allensworth' s prosperity peaked in 1925 and after that date the lack of irrigation water begin to plague the town. Irrigation water was never delivered in sufficient supply as promised by the Pacific Farming Company, the land development firm that handled the original purchase. As a result, town leaders were engrossed in lengthy and expensive legal battles with Company, expending scarce financial resources on a battle they would not win.

By 1930 the town's population according to the U.S. Census, had dropped below 300 people, as residents and nearby farmers began to leave in search of other employment. The deficient water supply would not sustain the agricultural and ranching enterprises at that time. The residents who remained behind attempted to keep the community alive by designing new methods of farming, creating other businesses, and drilling new water wells.

Yet through the early 1960s, the town continued to exist even if it did not thrive. Then in 1966 the State of California discovered high levels of arsenic in the drinking water. Most residents left but 34 families remained, leaving Allensworth all but a ghost town.

One decade later, however, on May 14, 1976, the California State Parks and Recreation Commission approved plans to develop the Colonel Allensworth Historic Park on the central portion of the town. The process started in 1969 when Cornelius Ed Pope, an African American man draftsman with the Department of Parks and Recreation began a campaign to persuade State Park officials and the general public that the town-site had particular historic and cultural significance for California's African American population. Pope related how as a boy he had lived in the house once owned and occupied by the Allensworth family. As a part of the restoration project, several buildings have been restructured to the likeness of the historic period of 1908-1918.

SUBJECTS:

Perspectives, , African American History

TERMS:

20th Century (1900-1999), , United States - California

CITE THIS ARTICLE IN APA FORMAT:

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SOURCE OF THE AUTHOR'S INFORMATION:

APPENDIX A-7

KEN SCHMIDT MEMO
TCWA GSA GROUNDWATER FLOWS

MEMO

To: Deanna Jackson, TCWA
From: Ken Schmidt
Topic: TCWA GSA Groundwater Flows
Date: January 6, 2020

On January 15, 2018, I prepared a memo to you on groundwater inflows and outflows for the upper and lower aquifers in the TCWA. This evaluation was incomplete, in that groundwater flows into the TCWA Northern Management Area from within the Tule-Sub-basin were not included. Subsequently, I used values for transmissivity and water-level maps for this area to estimate these flows. Following is a summary of the groundwater inflows and outflows for the TCWA GSA, which include all of the lateral flows.

Upper Aquifer

Groundwater inflows were as follows:

Location	Inflow (AF/yr)
From Kern County	5,000
From Tulare Lake GSA	10,500
From Tule Sub-basin into North Management Area	4,400
Total:	19,900

There was no groundwater outflow in the upper aquifer from the TCWA GSA. Thus the net groundwater inflow into the TCWA GSA was 19,900 acre-feet per year.

Lower Aquifer

Groundwater inflows were as follows:

Location	Inflow (AF/yr)
From Kern County	7,000
From DEID & White Areas NE of SE Management Area	7,400
From Tule Sub-basin into North Management Area	20,300
Total:	34,700

There was a groundwater outflow in the lower aquifer into the Tulare Lake GSA of 5,800 acre-feet per year. Thus the net groundwater inflow in the lower aquifer into the TCWA GSA was 28,900 acre-feet per year.

Combined Aquifers

There were 19,900 acre-feet per year of groundwater inflow in the upper aquifer and 34,700 acre-feet per year in the lower aquifer, or a total groundwater inflow of 54,600 acre-feet per year. There was a groundwater outflow of 5,800 acre-feet per year in the lower aquifer to the Tulare Lake GSA. Thus the net groundwater inflow into the TCWA GSA was 48,800 acre-feet per year. Of this amount, 12,000 acre-feet per year were from Kern County, 4,700 acre-feet per year were from the Tulare Lake GSA, and 32,100 acre-feet per year were from the Tule Sub-basin. If one deletes the Tulare Lake GSA groundwater flows, the net remaining groundwater inflow into the TCWA GSA (in the Tule-Sub-basin) would be about 44,000 acre-feet per year. This is in good agreement with the estimate of 41,000 acre-feet per year from Thomas Harder Associates.

Pre-Development Groundwater Flows

The earliest water-level maps for the area are for 1905 from Mendenhall, Dole, and Stabler (1916). Figure 22 in U.S. Geological Survey Professional Paper 437-B by Lofgren and Klausing (1969) shows water-level elevations for the upper aquifer in the Tule Sub-basin in 1905. In the area where the Corcoran Clay is present, a number of flowing wells were present. The direction of groundwater flow in the upper aquifer was largely to the west, toward the Tulare Lakebed. Figure 23 of WSP 437-B shows a water-level map for 1920 in Kern County and for 1921 in Tulare County. This map probably provides the best indication of the directions of groundwater flow in the upper aquifer prior to much development. Near the Kern County line, east of Highway 99, groundwater flow in the upper aquifer was to the northwest, toward the Tulare Lakebed. In the TCWA Southeast Management Area east of Highway 65, groundwater flow was also to the northwest. Near the Kings County-Tulare County line, the direction of groundwater flow was westerly, toward a depression between Corcoran and Alpaugh. This depression indicates that some pumping was going on in this area as of 1920, however the direction of flow was still westerly.

Suitable water-level elevation maps for the lower aquifer in this area aren't available until the late 1950's. By then, pumping in some areas had produced cones of depression. Figure 30 of WSP 437-B shows water-level elevations for the lower aquifer in February 1959. Near the Kern County line and in the part of the TCWA Southeast Management Area east of Highway 65, the direction of groundwater flow was towards a depression cone between Corcoran and Alpaugh. Along the Kings County-Tulare County line, groundwater flow south of Alpaugh was to the west, whereas north of Alpaugh it was to the southwest. These cones of depression are obviously not indicative of pre-development directions of groundwater flow. Thus the best estimates of lower aquifer groundwater flow directions for the pre-development condition are made by eliminating these cones of depression from the late 1950's map. When this is done, the pre-development direction of groundwater flow in the lower aquifer for the area along the Kings-Tulare County line was to the west toward the Tulare Lakebed. For the Kern County line west of Highway 99, a northwesterly direction of groundwater flow was indicated.

Induced Groundwater Flows

Induced groundwater flows are considered flows that did not occur under pre-pumping conditions. Comparison of recent groundwater flow directions with the pre-development flow directions indicates the following:

Kern County Line

Groundwater flows in both aquifers in recent years have a more pronounced northerly direction of flow in the area west of Highway 99 compared to the pre-development condition, which was to the northwest. Also, the water-level slopes are greater than for pre-development conditions. Based on the differences in the direction of flow and the water-level gradients for both aquifers, about half of the total flow of 12,000 acre-feet per year into the TCWA GSA from Kern County, or 6,000 acre-feet per year, is considered to be induced.

DEIR & White Areas

All of the groundwater flow in the lower aquifer (7,400 acre-feet per year) in this area is considered to be induced, because the groundwater flow direction in recent years (southwest) was perpendicular to that under the pre-development conditions (northwest).

Tulare Lake GSA

The net groundwater inflow into the TCWA GSA from the Tulare Lake GSA in the lower aquifer of 4,700 acre-feet per year is considered to all be induced, because the pre-development flow direction was to the west.

North Management Area

The main difference in this area from the pre-development condition is greater water-level gradients, due to larger cones of depression in recent years. Based on a review of these, it is estimated that about one-half of the groundwater inflow into the North Management Area of 24,700 acre-feet per year, or about 12,400 acre-feet per year, is induced.

Summary

Of the 48,800 acre-feet per year of net groundwater inflow into the TCWA, 30,500 acre-feet per year, or about 63 percent, is considered to be induced. Thus in terms of SGMA, the net groundwater inflow into the TCWA would need to be reduced by about 18,300 acre-feet per year.

Please call me if you have any questions.

APPENDIX B

GROUNDWATER CONDITIONS IN THE ANGIOLA WATER DISTRICT WELL FIELDS, KDSA, JANUARY 27, 1992

GROUNDWATER CONDITIONS IN THE ANGIOLA WATER DISTRICT WELL FIELDS

Prepared for:

ANGIOLA WATER DISTRICT
Corcoran, California

Prepared by:

KENNETH D. SCHMIDT AND ASSOCIATES
Groundwater Quality Consultants
Fresno, California

January 27, 1992

KENNETH D. SCHMIDT AND ASSOCIATES
GROUNDWATER QUALITY CONSULTANTS
600 WEST SHAW, SUITE 250
FRESNO, CALIFORNIA 93704
TELEPHONE (209) 224-4412

January 27, 1992

Mr. Jim Provost
Provost & Pritchard, Inc.
3636 N. First Street, Suite 123
Fresno, California 93726

Re: Groundwater Conditions in the
Angiola Water District Well Fields

Dear Jim:

Submitted herewith is our report on the groundwater conditions in the Angiola Water District well fields. We appreciate the cooperation of Mike Steele during this evaluation.

Sincerely yours,

Kenneth D. Schmidt

KDS/d

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

GROUNDWATER CONDITIONS IN THE ANGIOLA WATER DISTRICT WELL FIELDS

INTRODUCTION

The Angiola Water District is located along State Highway 43, southeast of Corcoran, between Avenues 88 and 120. The East Well Field is located in Sections 23, 25, and 26 of T22S/R23E. The West Well Field is located in Sections 21, 22, 27, 28, 33, 34 of T22S/R23E, and Sections 3 and 4 of T23S/R23E (Figure 1). A total of ten new wells, five in each well field, were drilled in 1991 by Grabow Well Drilling, Inc. of Hanford. The purpose of this report is to provide basic information on groundwater conditions in the well fields, and to address the potential to pump in the range of 90 to 100 cfs of water from them over the long term. Hilton, et al (1963) and Lofgren and Klausing (1969) provided information on regional groundwater conditions in the Tulare-Wasco Area, within which the well fields are located.

SUBSURFACE GEOLOGIC CONDITIONS

A widespread well defined, thick clay layer, termed the Corcoran Clay or E-Clay, is present throughout the area. This clay divides the groundwater system into an upper aquifer (above the clay) and a lower aquifer (beneath the clay). The top of the E-Clay slopes to the southwest in the vicinity. The depth to the top of the E-Clay ranges from about 430 to almost 500 feet beneath the land surface at the well fields. The top of the clay is shallowest beneath the northeast part of the East Well Field, and is deepest

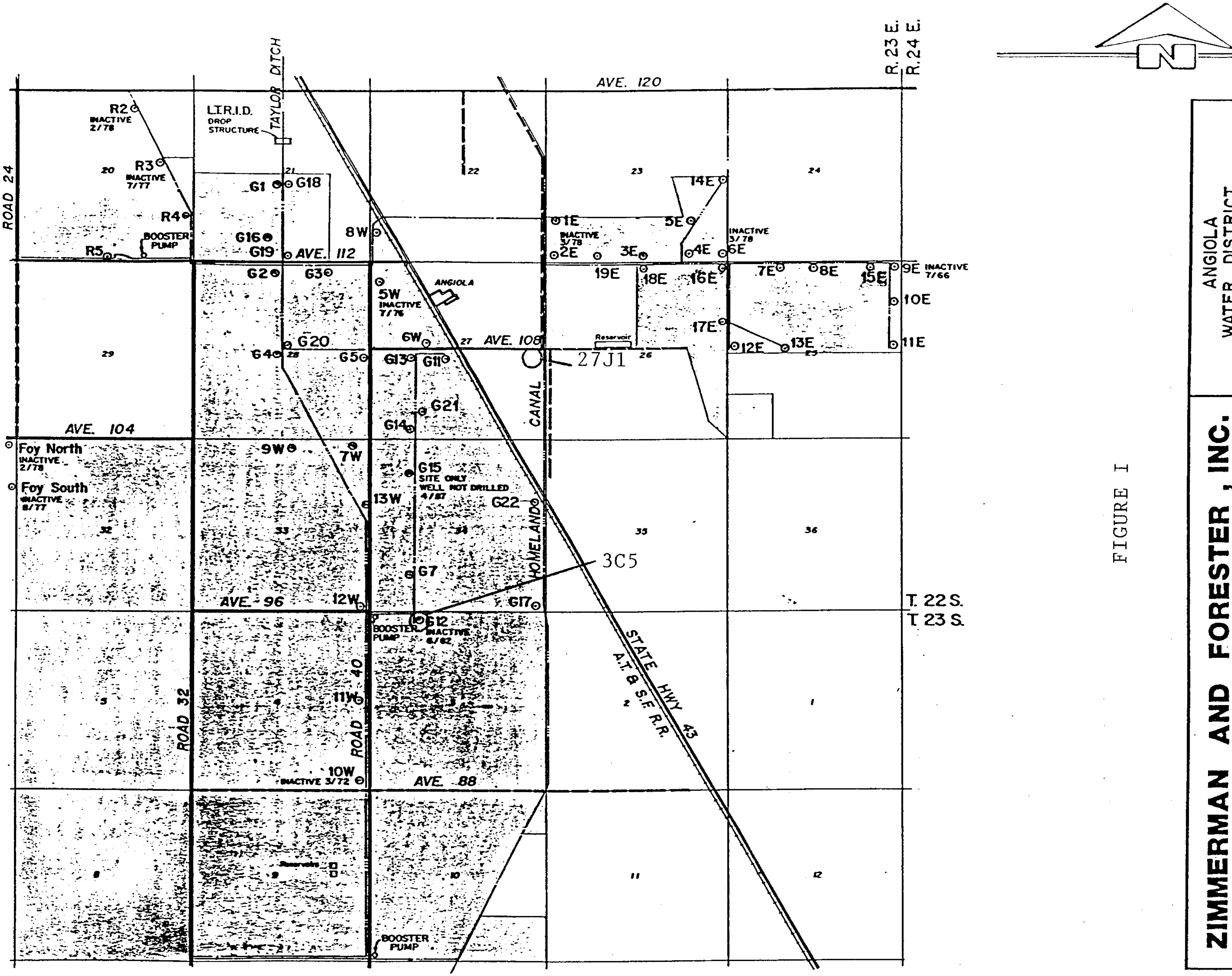


FIGURE I

ANGIOLA
WATER DISTRICT
WELL FIELD

ZIMMERMAN AND FORESTER, INC.

CIVIL SURVEYING STRUCTURAL

P.O. BOX 3470 or 1620 W. MINERAL KING AVE VISALIA, CA. 93277
(209) 732-0102 or 732-1708

beneath the area near the highway and Avenue 108 (Figure 1). The thickness of the E-clay ranges from about 130 to 230 feet beneath the two well fields. The clay thickens to the south-southwest beneath the well fields. The base of the lower aquifer is defined as the base of the fresh groundwater, which is underlain by high salinity groundwater at depth. The base of the fresh water is more than 2,500 feet deep beneath the well fields. Electric logs are available for some deep wells in the vicinity, and indicate that permeable, water-producing strata are present to at least a depth of 2,000 feet.

WELL DATA

Information on well construction is available from drillers logs and electric logs for some District wells, including all of the wells drilled in 1991. Copies of available drillers logs are provided in Appendix A. Hilton, Klausing, and McClelland (1960) presented data on depths and perforated intervals of wells in existence in the 1950's. In addition, the Angiola Water District has information on the depths of all active wells. Table 1 contains information on well locations, depth, perforated interval, date drilled, and availability of logs for the wells in the East Well Field. Records are available for 19 wells, 12 of which were active in November 1991. The shallowest active wells in the East Well Field were drilled in 1991, and range in depth from 960 to 970 feet. The older active wells range in depth from about 1,240 to 2,020 feet. Table 2 contains the same types of information for wells in the West Well Field. Records are available for 32 wells,

TABLE 1 - CONSTRUCTION DATA FOR WELLS IN EAST WELL FIELD

State Location	Local No.	Date Drilled	Depth (Feet)	Perforated Interval (feet)	Drillers Log	Electric Log
T22S/R23E-23J1	14E*	1955	1,788	597-1,788	No	No
23N1	2E	-	-	-	No	No
23N2	1E*	1948	1,559	-	No	No
23N	19E	8/91	960	620-940	Yes	Yes
23P1	3E	1945	215	-	No	No
23Q1	4E*	1946	1,236	-	No	No
23Q2	5E*	1948	1,447	-	No	No
23R	6E	7/46	1,235	-	No	Yes
25A1	9E	-	-	-	No	No
25A	15E*	7/91	969	500-930	Yes	Yes
25C1	8E	-	-	-	No	No
25D1	7E*	1947	1,553	-	No	No
25E1	12E	1951	2,018	1,260-1,854	No	Yes
25F1	13E*	1955	1,798	598-1,798	No	No
25H1	11E*	-	1,719	-	No	No
25H2	10E*	1949	1,728	-	No	No
26A	16E*	7/91	960	500-940	Yes	Yes
26B	18E*	7/91	960	580-930	Yes	Yes
26H	17E*	7/91	960	580-940	Yes	Yes

*Active Well as of November 1991.

TABLE 2 - CONSTRUCTION DATA FOR WELLS IN WEST WELL FIELD

State Location	Local No.	Date Drilled	Depth (Feet)	Perforated Interval (feet)	Drillers Log	Electric Log
T22S/R23E-21K	G-18*	8/91	983	620-940	Yes	Yes
21L1	G-1*	1950	521	321-521	No	No
21P	G-16*	3/78	475	228-468	Yes	No
21Q	G-19*	8/91	950	620-900	Yes	Yes
22N1	8W*	1952	1,850	-	No	No
27D1	5W	11/46	1,256	-	No	Yes
27F1	6W*	-	468	-	No	No
27L	G-11*	-	1,541	-	No	No
27M	G-13*	-	-	782-1,604	No	No
27N	G-14*	2/78	480	228-468	Yes	No
27P	G-21*	9/91	1,000	605-925	Yes	Yes
28A1	G-3*	1950	520	200-500	No	No
28C1	G-2 (old)	1951	864	264-864	No	No
28C	G-2 (new)*	5/77	478	258-468	Yes	No
28G	G-20*	9/91	1,000	620-940	Yes	Yes
28J1	G-5*	1950	504	200-504	No	No
28L1	G-4 (old)	1952	504	192-504	No	No
28L	G-4 (new)	5/77	478	258-468	Yes	No
33A1	4W	-	-	-	No	No
33A2	7W*	2/46	1,200	500-1,200	No	Yes
33A3	2W	-	-	-	No	No

Continued:

TABLE 2 - CONSTRUCTION DATA FOR WELLS IN WEST WELL FIELD
(Continued)

State Location	Local No.	Date Drilled	Depth (Feet)	Perforated Interval (feet)	Drillers Log	Electric Log
T22S/R23E-33A4	1W	1946	1,172	-	No	No
33A5	3W	1954	1,791	684-1,791	No	Yes
33B1	9W*	1954	1,836	674-1,836	No	No
33H	13W*	1/60	1,830	747-1,809	No	Yes
33R	12W*	12/59	1,845	776-1,830	No	Yes
34H	G-22*	9/91	1,000	620-940	Yes	Yes
34N	G-7*	1951	864	264-864	No	No
34R	G-17*	-	1,100	No	-	No
T23S/R23E-3C1	G-12	-	-	-	No	No
4H	11W*	12/59	1,830	808-1,825	No	Yes
4R	10W	12/59	1,854	-	No	Yes

*Active Well as of November 1991.

22 of which were active in November 1991. The older active wells range in depth from about 470 to 1,850 feet. The wells drilled in 1991 range from 950 to 1,000 feet in depth.

MAJOR WATER-PRODUCING ZONES

The shallowest zone tapped by irrigation wells in the vicinity is the upper aquifer. Wells tapping this zone are typically pefor-rated from about 250 to 500 feet in depth. Examples of such wells in the West Well Field are G-1, G-2, G-3, G-5, G-14, G-16, and 6W. The shallowest irrigation wells tapping the lower aquifer are usu-ally about 800 to 900 feet deep. The water-producing strata from the base of the E-Clay to a depth of about 900 feet are termed the intermediate zone in this report. Examples of wells tapping this zone are all of the 10 new wells that were drilled in 1991. These wells are typically perforated from about 550 to 900 feet in depth. The deepest water-producing zone tapped by irrigation wells in the vicinity extends to a depth of about 1,800 feet. Wells tapping the deep zone generally are perforated from about 750 to 1,800 feet in depth. Examples of these are wells 13E, 14E, 9W, 11W, 12W, and 13W.

WATER LEVELS

In 1959, the direction of groundwater flow was to the south-east in the upper aquifer, and the water-level elevation beneath the well field was about 130 to 140 feet. At that time, the direc-tion of groundwater flow was to the southwest in the lower aquifer, and the water-level elevation beneath the well field was about 100 to 110 feet (Lofgren and Klausing, 1969). A California Department of Water Resources map for Spring 1988 indicate a southeasterly direction of groundwater flow in the upper aquifer. Projected water-level elevations in the well fields ranged from about 160 to 120 feet above sea level. A similar map for the lower aquifer indicated that the direction of groundwater flow was to the southwest at that time, and the projected water-level elevation in the well fields ranged from about 95 to 110 feet above sea level. These maps indicate that water levels in both aquifers in 1988 were at almost the same level as in 1959.

Static water levels were measured in six wells in the East Well Field and four wells in the West Well Field on December 23, 1991. Static water levels were measured in seven other wells in the West Well Field on January 14, 1991. Tables 3 and 4 contains the results of these measurements. For shallow wells in the West Well Field, depth to water ranged from about 90 to 110 feet. For intermediate depth wells, depth to water ranged from about 180 to 190 feet in the West Well Field and 195 to 200 feet in the East Well Field. For deep wells, depth to water ranged from about 195 to 220 feet in the West Well Field and from about 190 to 195 feet in the East Well Field.

Approximate water-level elevations were determined by using ground surface elevations from a U.S. Geological Survey 7.5-minute quadrangle map. Water-level elevations for shallow wells ranged from about 90 to 110 feet above sea level in December 1991. For the intermediate depth wells, water-level elevations ranged from near sea level in the northern part of the West Well Field to about

TABLE 3 - WATER-LEVEL MEASUREMENTS
FOR EAST WELL FIELD

Well	Zone	Depth to Water Below Meas. Point (feet)	Depth to Water Below Ground Surface (feet)	Approx. Ground Surface Elevation (feet)	Approx. Water-Level Elevation (feet)
4E	Deep	191.1	190	209	19
10E	Deep	193.6	193	218	25
11E	Deep	195.4	194	218	24
12E	Deep	193.0	192	211	19
16E	Inter.	197.0	196	210	14
18E	Inter.	196.6	196	207	11

All wells were measured on December 23, 1991.

TABLE 4 - WATER-LEVEL MEASUREMENTS FOR WEST WELL FIELD

Well	Zone	Depth to Water Below Meas. Point (feet)	Depth to Water Below Ground Surface (feet)	Approx. Ground Surface Elevation (feet)	Approx. Water-Level Elevation (feet)
G-2	Shal.	111.2	110	200	90
G-4	Shal.	89.5	89	197	108
G-11	Deep	222.4	221	200	-21
G-17	Compos.	152.5	152	202	50
G-19	Inter.	203.8	203	200	-3
G-20	Inter.	189.0	188	198	10
G-21	Inter.	183.1	182	198	16
8W	Deep	206.7	204	200	-4
9W	Deep	207.9	206	198	-8
11W	Deep	201.9	201	201	0
12W	Deep	198.3	197	201	4

Wells 8W, G-2, G-4, and G-9 were measured on December 23, 1991, and remaining wells were measured on January 14, 1992.

15 feet above sea level in the East Well Field in December 1991. The direction of groundwater flow was to the west at this time. For the deep wells, water-level elevations in the East Well Field ranged from about 20 to 25 feet above sea level in December 1991. The direction of groundwater flow was to the southwest. For deep wells in the West Well Field, water-level elevations ranged from near sea level to about 20 feet below sea level in January 1992. The direction of groundwater flow was to the northeast at that time. These lower levels compared to those in 1988 reflect the influence of heavier pumping in the vicinity during the drought.

Long-term water-level hydrographs were prepared for two wells in the vicinity that tap the lower aquifer. Well T22S/R23E-27J1 is located near Avenue 108 and the Homeland Canal (Figure 1), and measurements are available from 1950 to 1981. Depth to water in the spring ranged from about 110 to 200 feet, and the deepest spring levels were during the 1976-77 drought (Figure 2). Although water levels declined at a rate of about fifteen feet per year during periods of heavy pumping, they appear to have recovered during intervening periods, and no long term change is apparent. Seasonal water-level fluctuations in this well averaged from 60 to 70 feet during heavy pumping periods. These variations are typical of those observed in wells tapping the lower aquifer in the Tulare-Wasco Area.

Well T23S/R23E-3C5 (Figure 1) is District Well G-12, which has been inactive since 1982. Measurements for this well are available since 1963. Depth to water in the spring has ranged from about 110 to 120 feet during periods of little pumping, to about 180 feet

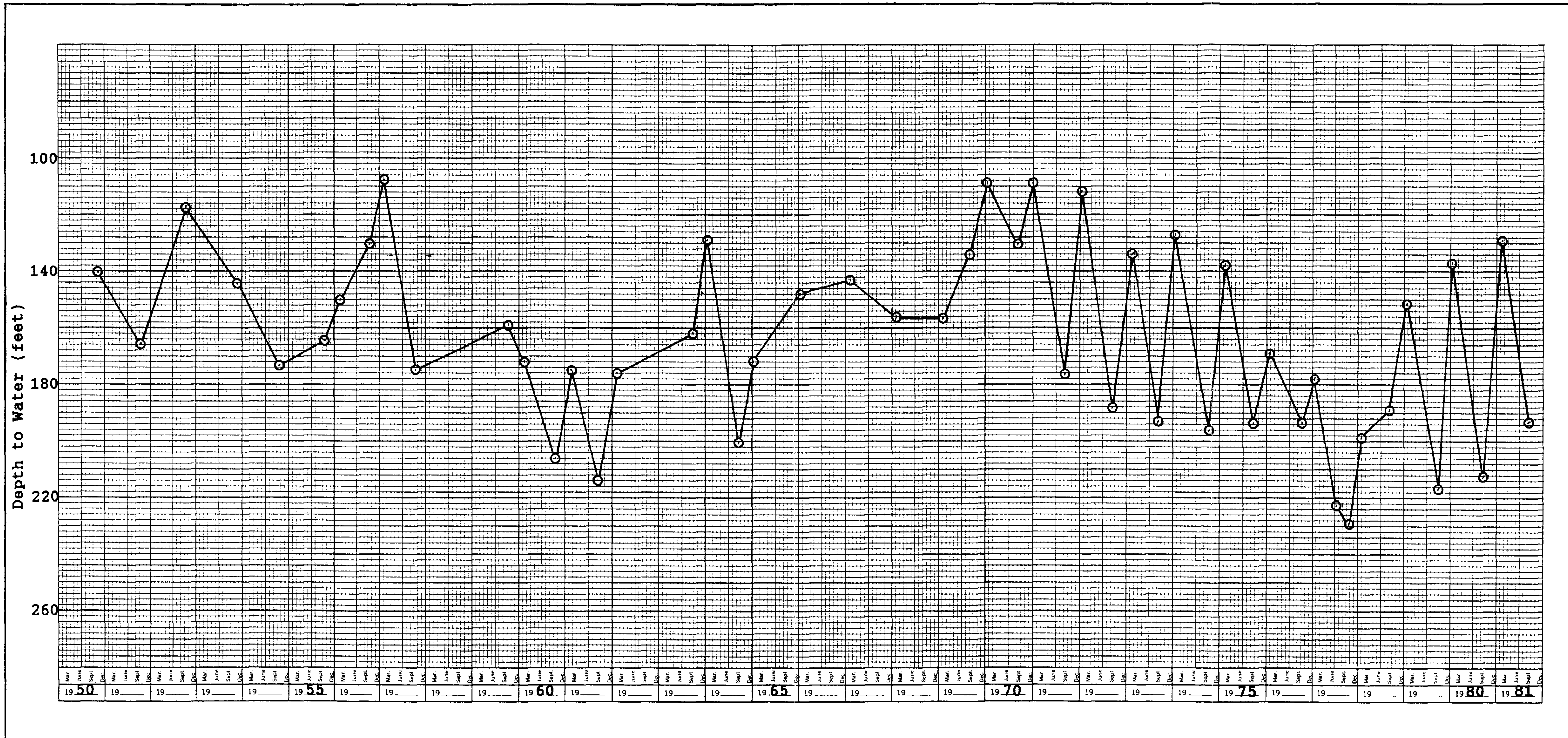


FIGURE 2 - WATER-LEVEL HYDROGRAPH FOR WELL T22S/R23E-27J1

during periods of heavy pumping (Figure 3). Seasonal water-level fluctuations during significant pumping periods have normally ranged from about 30 to 40 feet. This range is typical for a well tapping the intermediate zone. The water level in this well has also declined about 15 feet per year during heavy pumping periods, but has also recovered during intervening periods. No overall long-term change in water level in this well is apparent.

PUMPAGE

Production histories are available for wells in the well field since the 1950's. The combined pumpage from wells in the East Well Field has ranged from about 20 to 40 cubic feet per second (cfs), and has generally declined during drought periods and between well rehabilitation events. The combined pumpage from wells in the West Well Field has ranged from about 30 to 65 cfs, and has also generally declined significantly during drought periods and gradually between well rehabilitation events. Water-level records indicate that these declines are not due to dewatering of the aquifer, because the confined aquifers that are tapped by the wells (except for the upper aquifer) are still full (i.e., the water levels are far above the E-Clay). The declines in pumping rate are primarily due to increased pumping levels and the associated decreased pumping capacity, and secondarily due to well encrustation, which apparently builds up between well rehabilitation events. An additional 21 cfs well capacity was added to the East Well Field in 1991. An additional 19 cfs well capacity was added to the West Well Field in 1991. The estimated total well capacity by the end

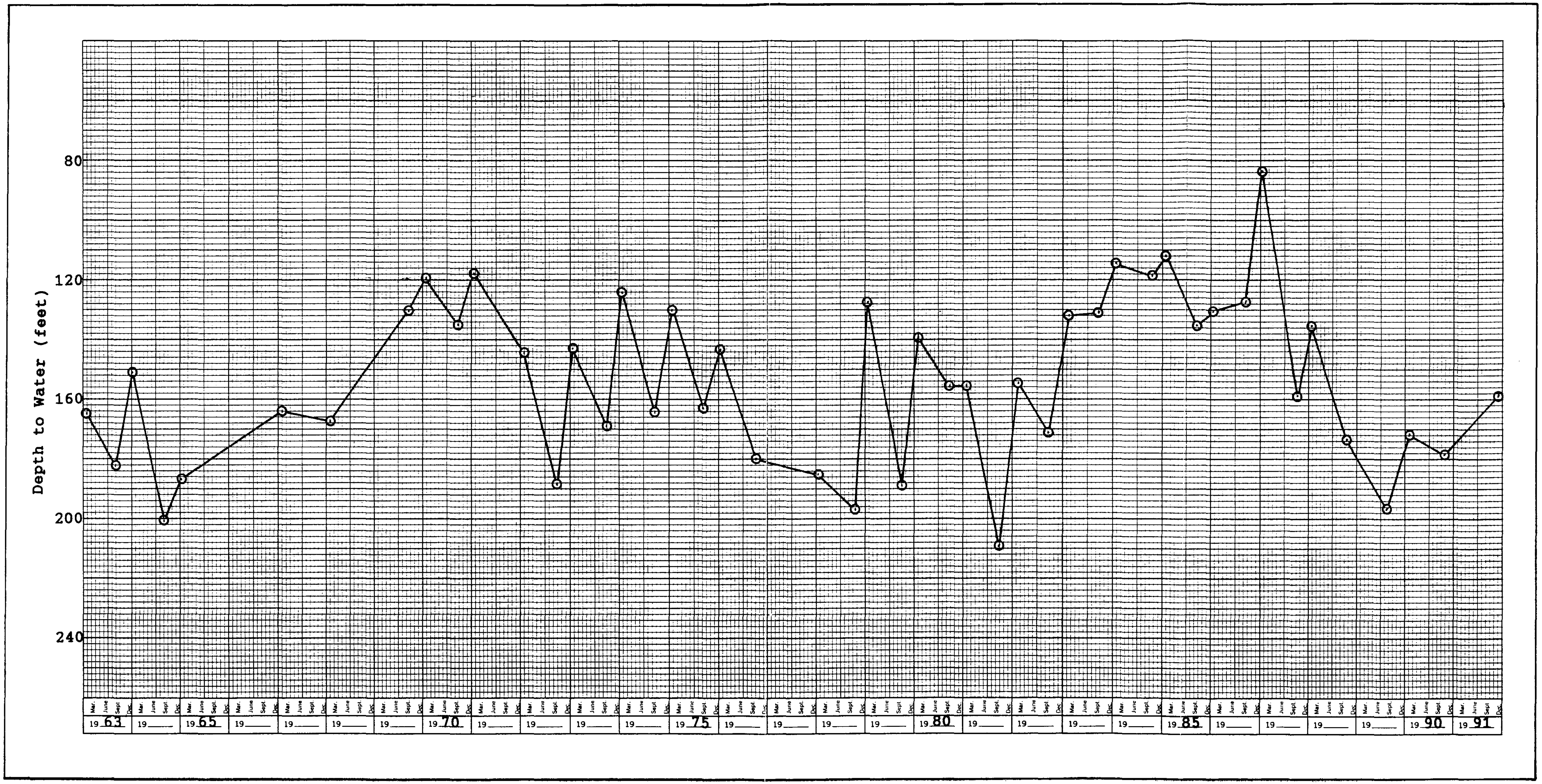


FIGURE 3 - WATER-LEVEL HYDROGRAPH FOR WELL T23S/R23E-3C5

of 1991 for both well fields was 110 cfs. Table 5 shows the capacities of each well as of November 1991.

AQUIFER CHARACTERISTICS

Appendix B contains pump test data for the active wells drilled prior to 1991. Table 6 contains a summary of pump test data for the ten new wells that were drilled in Summer 1991 (Appendix C). All of these wells tap the upper part of the lower aquifer, or the intermediate water-producing zone. Specific capacities for the new wells in the East Well Field ranged from 35 to 52 gpm per foot, except for Well 17E (18 gpm per foot). Specific capacities for the northernmost three wells in the West Well Field ranged from 43 to 48 gpm per foot, comparable to values for most of the new wells in the East Well Field. Specific capacities for the southernmost new wells in the West Well Field (Figure 1) ranged from 9 to 12 gpm per foot.

Recent specific capacities for both existing and new wells were carefully evaluated, and then grouped into the following categories, from highest to lowest:

Average Specific Capacity (gpm/ft)	Zone and Location
98	Deep zone in East Well Field
58	Deep zone in northeast part of West Well Field
42	Intermediate zone in East Well Field and north of Avenue 104 in West Well Field
24	Deep zone at or west of Road 40 in West Well Field

TABLE 5

PRODUCTION DATA FOR ANGIOLA WATER DISTRICT 11-1-91
DMS

WELL NO.	WATER ZONE	DEPTH	PUMP LEVEL	Q GPM
1E	DEEP	1376	302	1302
4E	DEEP	1236	310	987
5E	DEEP	1425	311	1257
7E	DEEP	1584	314	1212
10E	DEEP	1676	309	1257
11E	DEEP	1719	321	1077
13E	DEEP	1795	311	1257
14E	DEEP	1788	315	1212
15E	INTERMEDIATE	920	317	2047
16E	INTERMEDIATE	940	321	1867
17E	INTERMEDIATE	930	377	1620
18E	INTERMEDIATE	930	330	2047
19E	INTERMEDIATE	930	317	2029
			320	19170
6W	SHALLOW	468	NA	1077
7W	DEEP	1200	294	1167
8W	DEEP	1815	266	1122
9W	DEEP	1836	293	943
11W	DEEP	1825	319	1571
12W	DEEP	1839	305	1885
13W	DEEP	1809	340	1436
			303	9201
G1	SHALLOW	415	316	718
G2	SHALLOW	468	310	1212
G3	SHALLOW	520	258	853
G5	SHALLOW	500	NA	1077
G7	INTERMEDIATE	864	NA	987
G11	DEEP	1608	313	1661
G13	DEEP	1604	NA	2244
G14	SHALLOW	468	NA	898
G16	SHALLOW	468	NA	987
G17	INTERMEDIATE	1020	NA	1526
G18	INTERMEDIATE	940	305	1961
G19	INTERMEDIATE	890	301	1979
G20	INTERMEDIATE	930	305	1948
G21	INTERMEDIATE	925	361	1342
G22	INTERMEDIATE	930	397	1490
			318	20884

316 Ft. Avg. Pumping Level
49255 GPM 110 CFS

TABLE 6 - SUMMARY OF PUMP TEST DATA FOR NEW WELLS

Well No.	Date	Pumping Rate (gpm)	Static Water Level (feet)	Pumping Water Level (feet)	Drawdown (feet)	Specific Capacity (gpm/ft)
15E	07/10/91	1,495	270.6	300.6	30.0	49.8
16E	07/20/91	1,800	270	321	51	35.3
17E	07/25/91	1,462	274.4	352.4	82	17.8
18E	08/02/92	1,400	284.4*	321.4	37.0	37.8
19E	08/12/91	1,490	278.7*	307.5	28.8	51.7
G-18	08/23/91	1,685	256.7*	296.0	39.3	42.9
G-19	08/30/91	1,680	261.3*	296.0	34.7	48.4
G-20	09/12/91	1,500	263.7	296.0	32.3	46.4
G-21	09/19/91	1,685	245.8	386.8	141.0	12.0
G-22	10/01/91	1,725	232.0	416.8	184.8	9.3

*These are 10-minute recovery measurements, and are deeper than true static levels prior to pumping. This makes the calculated specific capacity values slightly higher than actual ones.

17	Shallow zone in West Well Field
10	Intermediate zone at or south of Avenue 104 in West Well Field

Thus recent specific capacity values averaging more than about 50 gpm per foot are limited to the deep zone. The deep zone is highly productive, except at or west of Road 40 in the West Well Field.

A comparison of specific capacities for the various depth zones in the same general location in the well field indicated the following. In the East Well Field, wells tapping the deep zone had average specific capacities of 98 gpm per foot, compared to 39 gpm per foot for wells tapping the intermediate zone. Thus wells about 900 feet deep have average specific capacities about 40 percent of those for wells about 1,800 feet deep in the same area. A similar pattern was observed in the south part of the western part of the well field. By theory, the specific capacity of a well is almost directly proportional to the thickness of permeable saturated strata tapped by the well. Thus 900-foot deep wells apparently only tap about 40 percent of the thickness of permeable strata that is tapped by 1,800-foot deep wells.

Aquifer tests were conducted on two of the new wells (17E and 15E) in the East Well Field during July 1991. A transmissivity of 50,000 gallons per day (gpd) per foot was obtained from the test on Well 17E, in excellent agreement with the specific capacity for that well at the time of the test (22 gpm per foot). Based on these results, it appears that reasonable estimates of transmissivity for the intermediate and deep zones can be derived by multiplying the average specific capacities times a conversion factor of

2,000. This factor was developed by the U.S. Geological Survey years ago in the San Joaquin Valley for wells tapping confined aquifers. The average transmissivity of the deep zone is thus estimated to range from about 50,000 to 200,000 gpd per foot. Except for west of Road 40 in the West Well Field, the transmissivity of the deep zone is estimated to range from about 120,000 to 200,000 gpd per foot. The average transmissivity of the intermediate zone is projected to range from about 20,000 gpd per foot south of Avenue 104 to about 85,000 gpd per foot north of Avenue 104. The transmissivity of the shallow zone is estimated, based on a conversion factor of 1,500 for an unconfined aquifer, to average about 25,000 gpd per foot. This conversion factor was also developed by the U.S. Geological Survey, for wells tapping unconfined aquifers in the San Joaquin Valley.

LAND SUBSIDENCE

Land subsidence in the Tulare-Wasco Area was discussed in detail by Lofgren and Klausing (1969). There was an estimated subsidence of about one foot per twenty feet of water-level decline in the area through 1962. There was a total of about four feet of subsidence in the well field by that time. Subsidence should not be significant near the well field in the future unless water levels are lowered significantly below the historic lows, which occurred in the 1976-77 drought.

GROUNDWATER QUALITY

Problems with methane gas in the groundwater have been found in the upper aquifer in the vicinity of the well field, particularly to the west. Water in the lower aquifer (below the E-Clay) is generally of the sodium bicarbonate type, with total dissolved solids (TDS) contents ranging from about 150 to 200 mg/l. Water in the upper aquifer is often of a higher salinity, often in the range of 500 to more than 1,000 mg/l.

RECOMMENDATIONS

Based on available data, the most efficient economic approach to obtaining the 90 to 100 cfs of well capacity needs to be determined. More well capacity can be obtained by drilling more new deep wells. Such wells would be about 1,800 feet deep, and perforated from about 900 to 1,800 feet in depth. The estimated cost is about $250,000 to $300,000 per well (without pump). About six wells could be drilled, with an estimated average capacity of 1,500 gpm each. The best locations for three of these wells are in Sections 23, 25, and 26 of T22S/R23E. The other three would be in Sections 27 and 34 of T22S/R23E.

Existing hydrogeologic data suggest strongly that the desired well capacity could be obtained by modifying pumps in existing wells. The pumps used in the old wells don't appear to be capable of producing adequate rates when water levels decline during heavy pumping periods. Also, the pumping rates used don't correlate well with specific capacities (i.e., wells with larger specific capacities can normally be pumped at higher rates). However, sand production may limit the potential to increase pumping rates in the old wells. In addition, the size and age of the casing may limit the size of a pump that can be placed in the older wells. These factors would have to be evaluated by installing a test pump and performing 24-hour step drawdown tests. An engineering evaluation of costs for testing and equipping such wells and energy costs should be made. In addition, a regular well rehabilitation program is warranted, as the past results have been encouraging.

If new wells tapping the deep zone are constructed, it is recommended that samples of drill cuttings be collected and sieved, in order to determine the optimal perforation size and gradation of the gravel pack. Also, rig development should be done, whereby water-producing strata in specific depth intervals are isolated and thoroughly developed, prior to installing the test pump. This should be followed by pumping and surging with a test pump for at least 24 to 48 hours, and eventually obtaining as high pumping rates as can be feasibly obtained. In addition, when pump tests are conducted in the future, the true static water level should be determined, either by measuring the well after a 24-hour shutdown following development, or by measuring the water-level about one day after pumping for the test ceases.

Lastly, a routine spring and fall static water level measurement program should be undertaken. At least three wells tapping the intermediate zone and three other wells tapping the deep zone should be measured in the East Well Field. In the West Well Field, at least two wells tapping the shallow zone, three wells tapping the intermediate zone, and three wells tapping the deep zone should be measured. This would provide better information on the long-term response of these zones to pumping than is now available.

REFERENCES

Hilton, G.S., Klausing, R.L., and E.J. McClelland, 1960, "Data for Wells, Springs, and Streams in the Terra Bella-Lost Hills Area, Kings, Kern, and Tulare Counties, California", U.S. Geological Survey, 535 p.

Hilton, G.S., McClelland, E.J. Klausing, R.L., and F. Kunkel, 1963, "Geology, Hydrology, and Quality of Water in the Terra Bella-Lost Hills Area, San Joaquin Valley, California", U.S. Geological Survey Open-Field Report, Sacramento, California, 158 p.

Lofgren, R.E., and R.L. Klausing, 1969, "Land Subsidence Due to Ground-Water Withdrawal, Tulare-Wasco Area, California", U.S. Geological Survey Professional Paper 437-B, 101 p.

APPENDIX A

DRILLERS LOGS FOR WELLS

ORIGINAL
File with DWR

Notice of Intent No.
Local Permit No. or Date

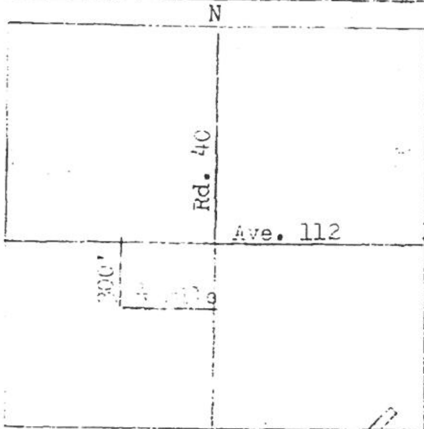
STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do not fill in
No. 25357
G-2
State Well No. 22/23-28
Other Well No.

UNCONFINED

(1) OWNER: [redacted]
Address [redacted]
City [redacted]

(2) LOCATION OF WELL (See instructions):
County Tulare Owner's Well Number
Well address if different from above
Township Range Section
Distance from cities, roads, railroads, fences, etc. 300' South of Ave. 112 ½ mile West of Rd. 40



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☒
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:
Rotary ☐ Reverse ☒
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size 3/16 x 1/4
Diameter of bore
Packed from 63 to 478 ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall
0	468	16"	1/4

(8) PERFORATIONS: Louver
Type of perforation or size of screen

From ft.	To ft.	Slot size
0	240	Blank
240	258	18' CS
258	468	Perf

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 63 ft.
Were strata sealed against pollution? Yes ☒ No ☐ Interval ft.
Method of sealing Cement

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☐ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☐ If yes, by whom?
Was electric log made? Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 478 ft. Depth of completed well 468 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	18	Clay
18	43	Sand
43	75	Brn Clay
75	84	Gray Sand
84	88	Blue Clay
88	104	Gray Sand
104	118	Blue Clay
118	132	Gray Sand
132	151	Blue Clay
151	163	Gray Sand
163	174	Blue Clay
174	179	Gray Sand
179	186	Blue Clay
186	193	Gray Sand
193	211	Blue Clay
211	232	Gray Sand
232	244	Blue Clay
244	250	Gray Sand
250	260	Blue Clay
260	269	Gray Sand
269	289	Blue Clay
289	297	Med Gray Sand
297	303	Blue Clay
303	316	Med Gray Sand
316	318	Blue Clay
318	328	Med Gray Sand
328	339	Blue Clay
339	346	Med Gray Sand
346	350	Blue Clay
350	363	Coarse Gray Sand
363	380	Blue Clay
380	410	Coarse Gray Sand
410	421	Blue Clay
421	428	Gray Sand
428	453	Blue Clay
453	460	Gray Sand
460	478	Blue Clay
		1 landing clamp

Work started 5-25 1977 Completed 5-26 1977

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED (Well Driller)
NAME Myers Brothers, Inc. (Person, firm, or corporation) (Typed or printed)
Address 8650 E. Lacey Blvd.
City Hanford, Calif. Zip 93230
License No. 280310 Date of this report June 1, 1977

CONFIDENTIAL DO NOT FOR PUBLIC USE WATER CODE SEC 13752

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ICINAL
with DWR
of Intent No.
Permit No. or Date

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

6-4

No. 25355

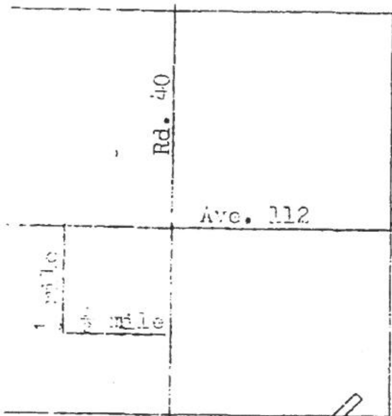
State Well No. 22/23-28F

Other Well No.

OWNER: Name [redacted]

Address [redacted]

LOCATION OF WELL (See instructions):
County Tulare Owner's Well Number
Well address if different from above
Township Range Section
Distance from cities, roads, railroads, fences, etc. ½ mile South of Ave
½ mile West of Rd. 40



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☒
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

EQUIPMENT:
Rotary ☐ Reverse ☒
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK: Yes ☒ No ☐ Size 5/16 x 1/4
Diameter of bore 28"
Packed from 61 to 478 ft.

CASING INSTALLED:
Steel ☐ Plastic ☐ Concrete ☒

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall
0	468	16"	1/4

From ft.	To ft.	Slot size
0	240	Blank
240	258	18' CS
258	468	Perf

WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 61 ft.
Were strata sealed against pollution? Yes ☒ No ☐ Interval ft.
Method of sealing Cement

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☐ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft.
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☐ If yes, by whom?
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth 478 ft. Depth of completed well 468 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	16	Sandy Clay
16	32	Sand
32	46	Clay
46	58	Sand
58	73	Blue Clay
73	82	Gray Sand
82	86	Blue Clay
86	108	Gray Sand
108	122	Blue Clay
122	130	Med Gray Sand
130	150	Blue Clay
150	161	Coarse Gray Sand
161	170	Blue Clay
170	176	Gray Sand
176	183	Blue Clay
183	191	Gray Sand
191	208	Blue Clay
208	230	Med Gray Sand
230	235	Sand & Clay Streaks
235	240	Blue Clay
240	244	Gray Sand
244	247	Blue Clay
247	252	Gray Sand
252	258	Blue Clay
258	271	Med Gray Sand
271	290	Soft Blue Clay
290	296	Gray Sand
296	304	Blue Clay
304	330	Med Gray Sand
330	336	Blue Clay
336	342	Med Gray Sand
342	346	Clay
346	360	Coarse Gray Sand
360	370	Blue Clay
370	376	Gray Sand
376	390	Blue Clay
390	421	Med Gray Sand
421	441	Blue Clay

UNCONFINED

Work started 5-23 1977 Completed 5-24 1977

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED (Well Driller)
NAME Myers Brothers, Inc.
(Person, firm, or corporation) (Typed or printed)
Address 8650 E. Lacey Blvd.
City Hanford, Calif. Zip 93230
License No. 280310 Date of this report May 31, 1977

DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT
Page 2

Do not fill in
No. 25356
State Well No.
Other Well No.

(1) OWNER: Name
Address
City Zip

(2) LOCATION OF WELL (See instructions):
County Owner's Well Number
Well address if different from above
Township Range Section
Distance from cities, roads, railroads, fences, etc.

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☐ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:
Rotary ☐ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☐ No ☐ Size
Diameter of bore
Packed from to ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☐ No ☐ If yes, to depth ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☐ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☐ If yes, by whom?
Was electric log made? Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth ft. Depth of completed well ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
441	446	Med Gray Sand
446	453	Blue Clay
453	460	Gray Sand
460	478	Blue Clay

1 landing clamp

Work started 19 Completed 19

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED (Well Driller)

NAME (Person, firm, or corporation) (Typed or printed)

Address
City Zip
License No. Date of this report

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM 43816-950 7-76 50M QUAD OSP

ORIGINAL

File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

6-14

Do not fill in

No. 144763

State Well No. 22/23-34

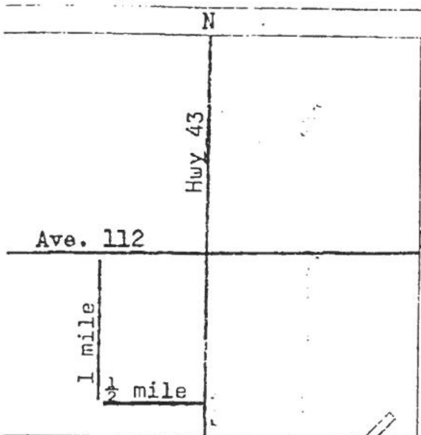
Other Well No. 23N

Notice of Intent No. ____

Local Permit No. or Date ____

(1) OWNER: Name [redacted]
Address ____
City ____

(2) LOCATION OF WELL (See instructions):
County Tulare Owner's Well Number 14
Well address if different from above ____
Township ____ Range ____ Section ____
Distance from cities, roads, railroads, fences, etc. 1/2 mile WEST of Hwy 43 1 mile South of Ave. 112



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☒
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:
Rotary ☐ Reverse ☒
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size 5/16 x 4
Diameter of bore 29"
Packed from 0 to 480 ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall
0	468	16" OD	1/4

(8) PERFORATIONS: Louver
Type of perforation or size of screen

From ft.	To ft.	Slot size
0	210	Blank
210	228	C.S.
228	468	Perf.

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 35 ft.
Were strata sealed against pollution? Yes ☒ No ☐ Interval ____ ft.
Method of sealing Cement

(10) WATER LEVELS:
Depth of first water, if known ____ ft.
Standing level after well completion ____ ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☐ If yes, by whom? ____
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ____ ft. At end of test ____ ft
Discharge ____ gal/min after ____ hours Water temperature ____
Chemical analysis made? Yes ☐ No ☐ If yes, by whom? ____
Was electric log made? Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 480 ft. Depth of completed well 468 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	6	Top Soil
6	18	Clay
18	28	Sand
28	30	Sand & Gravel
30	35	Clay
35	57	Sand & Gravel
57	69	Brn Clay
69	77	Coarse Sand
77	96	Blue Clay
96	110	Coarse Sand
110	121	Blue Clay
121	140	Med Sand
140	180	Blue Clay
180	191	Coarse Sand
191	203	Blue Clay
203	207	Coarse Sand
207	240	Blue Clay
240	259	Coarse Sand
259	275	Blue Clay
275	285	Coarse Sand
285	291	Blue Clay
291	298	Coarse Sand
298	308	Blue Clay
308	320	Coarse Sand
320	336	Blue Clay
336	356	Med Sand
356	360	Blue Clay
360	370	Coarse Sand
370	390	Blue Clay
390	397	Med +. Sand
397	420	Blue Clay
420	430	Coarse Sand
430	440	Blue Clay
440	450	Med + Sand
450	480	Blue Clay
		35' of 30" Conductor
		1 Landing Clamp
		1 18' Compression Section

UNCONFINED

Work started 2-23 1978 Completed 2-24 1978

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED ____ (Well Driller)
NAME Myers Brothers, Inc. (Person, firm, or corporation) (Typed or printed)
Address 8650 E. Lacey Blvd.
City Hanford, Calif. Zip 93230
License No. 280310 Date of this report February 27, 1978

GROUND WATER

-22123- Z1F

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do not fill in

G-16 No. 144769

State Well No. 22/23-34

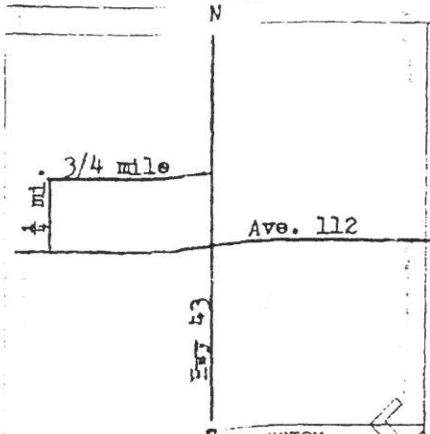
Other Well No.

Notice of Intent No.

Local Permit No. or Date

(1) OWNER: Name [redacted]
Address
City

(2) LOCATION OF WELL (See instructions):
County Tulare Owner's Well Number G 16
Well address if different from above
Township Range Section
Distance from cities, roads, railroads, fences, etc. 3/4 mile West of Hwy 43 1/4 mile North of Ave112



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☒
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:
Rotary ☐ Reverse ☒
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size 5/16 x 4
Diameter of bore 28"
Packed from 0 to 475 ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

(8) PERFORATIONS: Louver
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	468	16 OD	1/4	0	210	Blank
				210	228	C.S.
				228	468	Perf.

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 60 ft.
Were strata sealed against pollution? Yes ☒ No ☐ Interval ft.
Method of sealing Cement

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☐ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☐ If yes, by whom?
Was electric log made? Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 475 ft. Depth of completed well 468 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	6	Top Soil
6	18	Sandy Clay
18	23	Sand
23	25	Clay
25	28	Sand
28	35	Clay
35	36	Sand
36	40	Clay
40	46	Sand
46	56	Clay
56	57	Sand
57	62	Brn Clay
62	68	Gray Sand
68	80	Brn Clay
80	88	Gray Sand
88	102	Blue Clay
102	108	Gray Sand
108	112	Blue Clay
112	126	Sand & Gravel
126	130	Blue Clay
130	138	Gray Sand
138	146	Blue Clay
146	152	Gray Sand
152	160	Blue Clay
160	171	Gray Sand
171	190	Blue Clay
190	196	Gray Sand
196	212	Blue Clay
212	225	Gray Sand
225	232	Blue Clay
232	241	Gray Sand
241	246	Blue Clay
246	260	Gray Sand
260	266	Blue Clay
266	271	Gray Sand
271	278	Blue Clay
278	290	Sand & Clay Streaks
290	294	Gray Sand

UNCONFINED

Work started 3-1 1978 Completed 3-2 1978

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED (Well Driller)
NAME Myers Brothers, Inc.
(Person, firm, or corporation) (Typed or printed)
Address 8650 E. Lacey Blvd.
City Hanford, Calif. Zip 93230
License No. 280310 Date of this report March 3, 1978

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Page 2

Do not fill in

No. 144770

State Well No.
Other Well No.

(1) OWNER: Name [redacted]
Address
City Zip

(2) LOCATION OF WELL (See instructions):
County Owner's Well Number
Well address if different from above
Township Range Section
Distance from cities, roads, railroads, fences, etc.

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☐ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:
Rotary ☐ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☐ No ☑ Size
Diameter of bore
Packed from to ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Slot size

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☐ No ☐ If yes, to depth ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☐ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☐ If yes, by whom?
Was electric log made? Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth ft. Depth of completed well ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
294	310	Blue Clay
310	324	Gray Sand
324	334	Blue Clay
334	358	Gray Sand
358	372	Blue Clay
372	381	Gray Sand
381	396	Blue Clay
396	406	Gray Sand
406	420	Blue Clay
420	428	Gray Sand
428	452	Blue Clay
452	456	Med Gray Sand
456	475	Blue Clay

60' of 30" Conductor
1 Landing Clamp
1 Compression Section

Work started 19 Completed 19

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED
(Well Driller)
NAME
(Person, firm, or corporation) (Typed or printed)
Address
City Zip
License No. Date of this report

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR

Page ___ of ___

Owner's Well No. E-15

Date Work Began 6-26-91 Ended 6-28-91

Local Permit Agency Tulare

Permit No. 369418 Permit Date 6-3-91

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 489850

DWR USE ONLY — DO NOT FILL IN

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION (Describe material, grain size, color, etc.)		
0 : 7	Top Soil	409-412	sand
7 : 20	clay	412-430	clay
20 : 25	sand	430-434	sand
25 : 42	clay	434-570	clay
42 : 48	sand	570-575	sand
48 : 72	clay	575-586	clay
72 : 77	sand	586-605	sand
77 : 108	clay	605-609	clay
108 : 114	sand	609-615	sand
114 : 274	clay	615-628	clay
274 : 280	sand	628-644	sand
280 : 290	clay	644-636	clay
290 : 294	sand	636-642	sand
294 : 302	clay	642-665	clay
302 : 306	sand	665-672	sand
306 : 312	clay	672-675	clay
312 : 316	sand	675-679	sand
316 : 333	clay	679-690	clay
333 : 340	sand	690-700	sand
340 : 357	clay	700-708	clay
357 : 362	sand	708-722	sand
362 : 366	clay	722-746	clay
366 : 370	sand	746-760	sand
370 : 374	clay	760-768	clay
374 : 378	sand	768-780	sand
378 : 381	clay	780-786	clay
381 : 391	sand	786-800	sand
391 : 395	clay	800-826	clay
395 : 401	sand	826-835	sand
401 : 409	clay	835-851	clay

TOTAL DEPTH OF BORING 1000 (Feet)

TOTAL DEPTH OF COMPLETED WELL 930 (Feet)

WELL OWNER

[redacted]

CITY STATE ZIP

WELL LOCATION

Address N.E. Corner of Sec. 25

City Corcoran

County Tulare

APN Book Echoe Page 78 Parcel 293-830-01

or Township 22S Range 23E Section 25

or Latitude ___ DEG. MIN. SEC. NORTH Longitude ___ DEG. MIN. SEC. WEST

LOCATION SKETCH

NORTH

WEST EAST

RECEIVED

AUG 13 1991

[redacted]

SOUTH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc.
PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR

___ Deepen

___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USE(S) (✓)

___ MONITORING

WATER SUPPLY

___ Domestic

___ Public

X Irrigation

___ Industrial

___ "TEST WELL"

___ CATHODIC PROTECTION

___ OTHER (Specify)

DRILLING METHOD Reverse FLUID Natural

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL ___ (Ft.) & DATE MEASURED ___

ESTIMATED YIELD* ___ (GPM) & TEST TYPE ___

TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)

* *May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 : 50	38			X		steel	30	1/4	
0 : 480	30	X				steel	16	5/16	
480 : 500	30	Compression Section					18/16	5/16	
500 : 930	30		X			louver	16	5/16	.070

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 : 50	X			Conductor
0 : 470				5/16x4
470 : 480		X		Tablets
480 : 930				5/16x4

ATTACHMENTS (✓)

___ Geologic Log

___ Well Construction Diagram

___ Geophysical Log(s)

___ Soil/Water Chemical Analyses

___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Grabow Well Drilling, Inc.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

12522 9th Ave. Hanford, Ca 93230
ADDRESS CITY STATE ZIP

Signed [signature] 8-1-91 288489
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 7-90 IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR

Page ___ of ___

Owner's Well No. E-15 Cont.

Date Work Began ________, Ended ________

Local Permit Agency ________

Permit No. ________ Permit Date ________

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 489851

DWR USE ONLY — DO NOT FILL IN

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) ___ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
851 862	sand
862 865	clay
865 895	sand
895 904	clay
904 916	sand
916 929	clay
929 937	sand
937 1000	clay

TOTAL DEPTH OF BORING ________ (Feet)

TOTAL DEPTH OF COMPLETED WELL ________ (Feet)

WELL OWNER

Name [redacted]

Mailing Address ________

CITY ________ STATE ZIP

WELL LOCATION

Address ________

City ________

County ________

APN Book ___ Page ___ Parcel ___
or
Township ___ Range ___ Section ___
or
Latitude ___ DEG. MIN. SEC. NORTH Longitude ___ DEG. MIN. SEC. WEST

LOCATION SKETCH

NORTH

WEST EAST

SOUTH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc.
PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

___ NEW WELL

MODIFICATION/REPAIR

___ Deepen

___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USE(S) (✓)

___ MONITORING

WATER SUPPLY

___ Domestic

___ Public

___ Irrigation

___ Industrial

___ "TEST WELL"

___ CATHODIC PROTECTION

___ OTHER (Specify)

DRILLING METHOD ________ FLUID ________

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL ___ (Ft.) & DATE MEASURED ___

ESTIMATED YIELD* ___ (GPM) & TEST TYPE ___

TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)

* *May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)

ATTACHMENTS (✓)

___ Geologic Log

___ Well Construction Diagram

___ Geophysical Log(s)

___ Soil/Water Chemical Analyses

___ Other ________

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME ________ (PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS ________ CITY ________ STATE ________ ZIP ________

Signed Dean E. Jialow (signature) WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED ________ C-57 LICENSE NUMBER ________

DWR 188 REV. 7-90

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR

Page ___ of ___

Owner's Well No. 16F

Date Work Began 7-2-91 Ended 7-4-91

Local Permit Agency Tulare

Permit No. 369419 Permit Date 6-3-91

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 489852

DWR USE ONLY — DO NOT FILL IN

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION (Describe material, grain size, color, etc.)		
0 : 4	Top Soil	470-462	clay
4 : 18	sand	462-646	sand
18 : 68	clay	646-673	clay
68 : 75	sand	673-686	sand
75 : 120	clay	686-703	clay
120 : 130	sand	703-709	sand
130 : 148	clay	709-740	clay
148 : 152	sand	740-748	sand
152 : 192	clay	748-762	clay
192 : 202	sand	762-776	sand
202 : 228	clay	776-809	clay
228 : 240	sand	809-829	sand
240 : 248	clay	829-840	clay
248 : 264	sand	840-855	sand
264 : 268	clay	855-862	clay
268 : 272	sand	862-891	sand
272 : 288	clay	891-914	clay
288 : 295	sand	914-926	sand
295 : 302	clay	926-941	clay
302 : 312	sand	941-944	sand
312 : 334	clay	944-980	clay
334 : 342	sand		
342 : 388	clay		
388 : 395	sand		
395 : 402	clay		
402 : 412	sand		
412 : 426	clay		
426 : 434	sand		
434 : 462	clay		
462 : 470	sand		

TOTAL DEPTH OF BORING 980 (Feet)

TOTAL DEPTH OF COMPLETED WELL 940 (Feet)

WELL OWNER

Name [redacted]

CITY STATE ZIP

WELL LOCATION

Address N.E. Corner of Sec 26

City Corcoran

County Tulare

APN Book Echoe Page 78 Parcel 298-240-03

Township 22S Range 23E Section 26

Latitude ___ DEG. MIN. SEC. NORTH Longitude ___ DEG. MIN. SEC. WEST

LOCATION SKETCH

NORTH

WEST EAST

SOUTH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR

___ Deepen

___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USE(S) (✓)

___ MONITORING

WATER SUPPLY

___ Domestic

___ Public

X Irrigation

___ Industrial

___ "TEST WELL"

___ CATHODIC PROTECTION

___ OTHER (Specify)

DRILLING METHOD Reverse FLUID Natural

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL ___ (Ft.) & DATE MEASURED ___

ESTIMATED YIELD* ___ (GPM) & TEST TYPE ___

TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)

* *May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 : 50	38			X		steel	30	1/4	
0 : 480	30	X				steel	16	5/16	
480 : 500	30	Compression Section					18/16	5/16	
500 : 940	30		X			louver	16	5/16	.070

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 : 50	X			Conductor
0 : 470				5/16x4
470 : 480		X		Tablets
480 : 940				5/16x4

ATTACHMENTS (✓)

___ Geologic Log

___ Well Construction Diagram

___ Geophysical Log(s)

___ Soil/Water Chemical Analyses

___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Grabow Well Drilling, Inc. (PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

12522 9th Ave. Hanford, CA 93230

ADDRESS CITY STATE ZIP

Signed ___ WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED 8-1-91 C-57 LICENSE NUMBER 288489

DWR 188 REV. 7-90

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR

Page ___ of ___

Owner's Well No. 17E

Date Work Began 7-13-91, Ended 7-13-91

Local Permit Agency Tulare

Permit No. 369745 Permit Date 7-12-91

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 489853

DWR USE ONLY — DO NOT FILL IN

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION (Describe material, grain size, color, etc.)		
0	4	Top Soil	470-477	sand
4	9	Clay	477-630	clay
9	20	sand	630-636	sand
20	66	clay	636-661	clay
66	75	sand	661-673	sand
75	95	clay	673-677	clay
95	101	sand	677-689	sand
101	145	clay	689-693	clay
145	150	sand	693-710	sand
150	170	clay	710-715	clay
170	175	sand	715-728	sand
175	212	clay	728-735	clay
212	214	sand	735-742	sand
214	235	clay	742-748	clay
235	240	sand	748-762	sand
240	275	clay	762-768	clay
275	285	sand	768-788	sand
285	315	clay	788-798	clay
315	328	sand	798-809	sand
328	344	clay	809-813	clay
344	350	sand	813-837	sand
350	355	clay	837-848	clay
355	370	sand	848-860	sand
370	395	clay	860-865	clay
395	410	sand	865-870	sand
410	414	clay	870-873	clay
414	419	sand	873-878	sand
419	430	clay	878-893	clay
430	436	sand	893-898	sand
436	470	clay	898-906	clay

TOTAL DEPTH OF BORING 980'

TOTAL DEPTH OF COMPLETED WELL 940 (Feet)

WELL OWNER

Name [redacted]

Mailing A[redacted]

CITY STATE ZIP

WELL LOCATION

Address ¼mi S. of Ave 112-200ft. W. of Rd 56

City Corcoran

County Tulare

APN Book Echoe Page 78 Parcel 293-240-03

or Township 22S Range 23E Section 26

or Latitude ___ DEG. MIN. SEC. NORTH Longitude ___ DEG. MIN. SEC. WEST

LOCATION SKETCH

NORTH

WEST

EAST

SOUTH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR

___ Deepen

___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USE(S) (✓)

___ MONITORING

WATER SUPPLY

___ Domestic

___ Public

X Irrigation

___ Industrial

___ "TEST WELL"

___ CATHODIC PROTECTION

___ OTHER (Specify)

DRILLING METHOD Reverse FLUID Natural

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL ___ (Ft.) & DATE MEASURED ___

ESTIMATED YIELD* ___ (GPM) & TEST TYPE ___

TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)

* *May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	50	38			X		steel	30	1/4	
0	560	30	X				steel	16	5/16	
560	580	30	Compression section					18/16	5/16	
580	940	30		X			louver	16	5/16	.070

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	50	X			Conductor
0	540				5/16x4
540	550		X		Tablets
550	940				5/16x4

ATTACHMENTS (✓)

___ Geologic Log

___ Well Construction Diagram

___ Geophysical Log(s)

___ Soil/Water Chemical Analyses

___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Grabow Well Drilling, Inc.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS 12522 9th Ave. Hanford, CA 93230
CITY STATE ZIP

Signed [signature] 8-1-91 288489
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 7-90

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR

Page ___ of ___

Owner's Well No. 17E Continued

Date Work Began ________ , Ended ________

Local Permit Agency ________

Permit No. ________ Permit Date ________

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 489855

DWR USE ONLY — DO NOT FILL IN

STATE WELL NO./STATION NO.

LATITUDE | LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) ___ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
906	914	sand
914	925	clay
925	932	sand
932	980	clay

TOTAL DEPTH OF BORING ________ (Feet)

TOTAL DEPTH OF COMPLETED WELL ________ (Feet)

WELL OWNER

Name [redacted]

Mailing Address ________

CITY ________ STATE ________ ZIP ________

WELL LOCATION

Address ________

City ________

County ________

APN Book ____ Page ____ Parcel ____
or
Township ____ Range ____ Section ____
or
Latitude ___ ___ ___ NORTH (DEG. MIN. SEC.) Longitude ___ ___ ___ WEST (DEG. MIN. SEC.)

LOCATION SKETCH

NORTH

WEST

EAST

SOUTH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc.
PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

___ NEW WELL

MODIFICATION/REPAIR

___ Deepen

___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USE(S) (✓)

___ MONITORING

WATER SUPPLY

___ Domestic

___ Public

___ Irrigation

___ Industrial

___ "TEST WELL"

___ CATHODIC PROTECTION

___ OTHER (Specify)

DRILLING METHOD ________ FLUID ________

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL ________ (Ft.) & DATE MEASURED ________

ESTIMATED YIELD* ________ (GPM) & TEST TYPE ________

TEST LENGTH ________ (Hrs.) TOTAL DRAWDOWN ________ (Ft.)

* *May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)

ATTACHMENTS (✓)

___ Geologic Log

___ Well Construction Diagram

___ Geophysical Log(s)

___ Soil/Water Chemical Analyses

___ Other ________

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME ________ (PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS ________ CITY ________ STATE ________ ZIP ________

Signed ________ WELL DRILLER/AUTHORIZED REPRESENTATIVE ________ DATE SIGNED ________ C-57 LICENSE NUMBER

DWR 188 REV. 7-90

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR

Page ___ of ___

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 489856

Owner's Well No. 18E

Date Work Began 7-15-91 Ended 7-17-91

Local Permit Agency Tulare

Permit No. 8 369745 Permit Date 7-12-91

DWR USE ONLY — DO NOT FILL IN

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION (Describe material, grain size, color, etc.)		
0 : 4	Top Soil	294-298	sand
4 : 9	clay	298-301	clay
9 : 15	sand	310-310	sand
15 : 21	clay	310-316	clay
21 : 37	sand	316-336	sand
37 : 39	clay	336-347	clay
39 : 42	sand	347-355	sand
42 : 63	clay	355-400	clay
63 : 74	sand	400-408	sand
74 : 85	clay	408-411	clay
85 : 91	sand	411-426	sand
91 : 97	clay	426-431	clay
97 : 101	sand	431-435	sand
101 : 105	clay	435-440	clay
105 : 125	sand	440-452	sand
125 : 131	clay	452-669	clay
131 : 142	sand	669-716	sand
142 : 176	clay	716-722	clay
176 : 196	sand	722-731	sand
196 : 222	clay	731-747	clay
222 : 228	sand	747-765	sand
228 : 244	clay	765-771	clay
244 : 250	sand	771-775	sand
250 : 256	clay	775-800	clay
256 : 262	sand	800-807	sand
262 : 270	clay	807-820	clay
270 : 274	sand	820-825	sand
274 : 277	clay	825-830	clay
277 : 281	sand	830-852	sand
281 : 294	clay	852-863	clay

TOTAL DEPTH OF BORING 960 (Feet)

TOTAL DEPTH OF COMPLETED WELL 930 (Feet)

WELL OWNER

Name [redacted]

City STATE ZIP

WELL LOCATION

Address Ave 112-½ mi W of Rd 56-200 ft S.

City Corcoran

County Tulare

APN Book Echoe Page 78 Parcel 293-240-03

Township 22S Range 23 E Section 26

Latitude ___ DEG. MIN. SEC. NORTH Longitude ___ DEG. MIN. SEC. WEST

LOCATION SKETCH

NORTH

WEST EAST

SOUTH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR

___ Deepen

___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USE(S) (✓)

___ MONITORING

WATER SUPPLY

___ Domestic

___ Public

X Irrigation

___ Industrial

___ "TEST WELL"

___ CATHODIC PROTECTION

___ OTHER (Specify)

DRILLING METHOD Reverse FLUID Natural

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL ___ (Ft.) & DATE MEASURED ___

ESTIMATED YIELD* ___ (GPM) & TEST TYPE ___

TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)

* May not be representative of a well's long term yield.

CASING(S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	TYPE: BLANK	TYPE: SCREEN	TYPE: CONDUCTOR	TYPE: FILL PIPE	MATERIAL/GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 : 50	38			X		steel	30	1/4	
0 : 560	30	X				steel	16	5/16	
560 : 580	30					Compression section	18/16	5/16	
580 : 930	30		X			louver	16	5/16	.070

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 : 50	X			Conductor
0 : 540				5/16x4
540 : 550		X		Tablets
550 : 930				5/16x4

ATTACHMENTS (✓)

___ Geologic Log

___ Well Construction Diagram

___ Geophysical Log(s)

___ Soil/Water Chemical Analyses

___ Other

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Grabow Well Drilling, Inc. (PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

12522 9th Ave. Hanford, CA 93230

ADDRESS CITY STATE ZIP

Signed ___ WELL DRILLER/AUTHORIZED REPRESENTATIVE 8-1-91 DATE SIGNED 288489 C-57 LICENSE NUMBER

DWR 188 REV. 7-90 IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR

Page ___ of ___

Owner's Well No. 18F Continued

Date Work Began __________ Ended __________

Local Permit Agency __________

Permit No. __________ Permit Date __________

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 489857

DWR USE ONLY — DO NOT FILL IN

STATE WELL NO./STATION NO.

LATITUDE | LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) ___ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION Describe material, grain size, color, etc.
863	868	sand
868	874	clay
874	879	sand
879	890	clay
890	902	sand
902	912	clay
912	920	sand
920	930	clay
930	938	sand
938	960	clay

TOTAL DEPTH OF BORING ______ (Feet)

TOTAL DEPTH OF COMPLETED WELL ______ (Feet)

WELL OWNER

Name [redacted]

Mailing Address __________

CITY __________ STATE ___ ZIP ___

WELL LOCATION

Address __________

City __________

County __________

APN Book ___ Page ___ Parcel ___

or Township ___ Range ___ Section ___

or Latitude ___ DEG. MIN. SEC. NORTH Longitude ___ DEG. MIN. SEC. WEST

LOCATION SKETCH

NORTH

WEST | EAST

SOUTH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

___ NEW WELL

MODIFICATION/REPAIR

___ Deepen

___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USE(S) (✓)

___ MONITORING

WATER SUPPLY

___ Domestic

___ Public

___ Irrigation

___ Industrial

___ "TEST WELL"

___ CATHODIC PROTECTION

___ OTHER (Specify)

DRILLING METHOD __________ FLUID __________

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL ______ (Ft.) & DATE MEASURED ______

ESTIMATED YIELD* ______ (GPM) & TEST TYPE ______

TEST LENGTH ______ (Hrs.) TOTAL DRAWDOWN ______ (Ft.)

* *May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL/GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)

ATTACHMENTS (✓)

___ Geologic Log

___ Well Construction Diagram

___ Geophysical Log(s)

___ Soil/Water Chemical Analyses

___ Other ______

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME __________ (PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS __________ CITY ______ STATE ___ ZIP ___

Signed Dean E. [signature] — WELL DRILLER/AUTHORIZED REPRESENTATIVE | DATE SIGNED | C-57 LICENSE NUMBER

DWR 188 REV. 7-90

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

PLICATE
Driller's Copy
Page ___ of ___
Owner's Well No. 19 E
Date Work Began Aug 1, 1991, Ended Aug 2, 1991
Local Permit Agency Tulare
Permit No. 43244 Permit Date 8-8-91

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 481097

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION (Describe material, grain size, color, etc.)	Ft. to Ft.	Description
0 : 4	Top Soil	353-357	sand
4 : 30	clay	357-394	clay
30 : 34	sand	394-410	sand
34 : 66	clay	410-412	clay
66 : 69	sand	412-425	sand
69 : 95	clay	425-428	clay
95 : 100	sand	428-442	sand
100 : 105	clay	442-494	clay
105 : 117	sand	494-498	sand
117 : 133	clay	498-600	clay
133 : 137	sand	600-679	sand
137 : 165	clay	679-682	clay
165 : 169	sand	682-688	sand
169 : 184	clay	688-695	clay
184 : 187	sand	695-699	sand
187 : 197	clay	699-705	clay
197 : 203	sand	705-712	sand
203 : 223	clay	712-716	clay
223 : 229	sand	716-726	sand
229 : 234	clay	726-730	clay
234 : 238	sand	730-753	sand
238 : 264	clay	753-765	clay
264 : 280	sand	765-772	sand
280 : 308	clay	772-775	clay
308 : 314	sand	775-782	sand
314 : 317	clay	782-788	clay
317 : 328	sand	788-800	sand
328 : 335	clay	800-805	clay
335 : 345	sand	805-815	sand
345 : 353	clay	815-820	clay

TOTAL DEPTH OF BORING 980 (Feet)
TOTAL DEPTH OF COMPLETED WELL 940 (Feet)

WELL OWNER

Name [redacted]
Mailing Address [redacted]
CITY STATE ZIP

WELL LOCATION

Address 90 ft. N & 300 ft. E of rd. 48 & Ave. 112
City Corcoran
County Tulare
APN Book Echoe Page 78 Parcel 293-250-11
or Township 22 S Range 23 E Section 23
or Latitude ___ NORTH Longitude ___ WEST
DEG. MIN. SEC.

LOCATION SKETCH

NORTH / WEST / EAST / SOUTH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc.
PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USE(S) (✓)

___ MONITORING
WATER SUPPLY
___ Domestic
___ Public
X Irrigation
___ Industrial
___ "TEST WELL"
___ CATHODIC PROTECTION
___ OTHER (Specify)

DRILLING METHOD Reverse FLUID Natural

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL ___ (Ft.) & DATE MEASURED ___
ESTIMATED YIELD* ___ (GPM) & TEST TYPE ___
TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)
* *May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 : 50	387			X		steel	30	1/4	
0 : 600	30	X				steel	16	5/16	
600 : 620	30	Compression section							
620 : 940			X			louver	16	5/16	.070

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 : 50	X			
0 : 550				5/16 X 4
550 : 560		X		tablets
560 : 940				5/16 x 4

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Grabow Well Drilling, INc.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

12522 9th Ave. Hanford, CA 93230
ADDRESS CITY STATE ZIP

Signed [signature] 8-19-91 288489
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 7-90

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

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— of —

Owner's Well No. 19 E Continued

Date Work Began ____, Ended ____

Local Permit Agency ____

Permit No. ____ Permit Date ____

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 481098

DWR USE ONLY — DO NOT FILL IN

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) ___ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION *Describe material, grain size, color, etc*
820 : 828	sand
828 : 834	clay
834 : 842	sand
842 : 853	clay
853 : 876	sand
876 : 883	clay
883 : 897	sand
897 : 948	clay
948 : 953	sand
953 : 980	clay

TOTAL DEPTH OF BORING ____ (Feet)

TOTAL DEPTH OF COMPLETED WELL ____ (Feet)

WELL OWNER

Name [redacted]

Mailing Address ____

CITY ____ STATE ____ ZIP ____

WELL LOCATION

Address ____

City ____

County ____

APN Book ____ Page ____ Parcel ____

or

Township ____ Range ____ Section ____

or

Latitude ____ NORTH (DEG. MIN. SEC.) Longitude ____ WEST (DEG. MIN. SEC.)

LOCATION SKETCH

NORTH

WEST

EAST

SOUTH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

___ NEW WELL

MODIFICATION/REPAIR

___ Deepen

___ Other (Specify)

___ DESTROY (*Describe Procedures and Materials Under "GEOLOGIC LOG"*)

PLANNED USE(S) (✓)

___ MONITORING

WATER SUPPLY

___ Domestic

___ Public

___ Irrigation

___ Industrial

___ "TEST WELL"

___ CATHODIC PROTECTION

___ OTHER (Specify)

DRILLING METHOD ____ FLUID ____

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL ____ (Ft.) & DATE MEASURED ____

ESTIMATED YIELD* ____ (GPM) & TEST TYPE ____

TEST LENGTH ____ (Hrs.) TOTAL DRAWDOWN ____ (Ft.)

* *May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)

ATTACHMENTS (✓)

___ Geologic Log

___ Well Construction Diagram

___ Geophysical Log(s)

___ Soil/Water Chemical Analyses

___ Other ____

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Grabow Well Drilling, INc.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

12522 9th Ave. Hanford, CA 93230
ADDRESS CITY STATE ZIP

Signed Dean E Grabow
WELL DRILLER/AUTHORIZED REPRESENTATIVE

8-19-91
DATE SIGNED

288489
C-57 LICENSE NUMBER

DWR 188 REV 7-90

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

DUPLICATE
Driller's Copy

Page ____ of ____

Owner's Well No. G18

Date Work Began Aug. 14,1991 Ended Aug. 15,1991

Local Permit Agency Tulare

Permit No. 43212 Permit Date Aug. 10,1991

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 489895

DWR USE ONLY — DO NOT FILL IN

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) ____ VERTICAL ____ HORIZONTAL ____ ANGLE ____ (SPECIFY)

DEPTH TO FIRST WATER ____ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION (Describe material, grain size, color, etc.)	DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION
0-4	top soil	354-366	sand
4-26	clay	366-372	clay
26-30	sand	372-395	sand
30-57	clay	395--408	clay
57-60	sand	408-415	sand
60-72	clay	415-440	clay
72-76	sand	440-445	sand
76-85	clay	445-612	clay
85-93	sand	612-616	sand
93-96	clay	616-628	clay
96-112	sand	628-634	sand
112-118	clay	634-637	clay
118-125	sand	637-642	sand
125-173	clay	642-650	clay
173-177	sand	650-659	sand
177-192	clay	659-669	clay
192-200	sand	669-674	sand
200-234	clay	674-685	clay
234-240	sand	685-695	sand
240-248	clay	695-704	clay
248-256	sand	704-710	sand
256-261	clay	710-716	clay
261-269	sand	716-725	sand
269-275	clay	725-731	clay
275-280	sand	731-760	sand
280-294	clay	760-770	clay
294-300	sand	770-778	sand
300-308	clay	778-786	clay
308-340	sand	786-800	sand
340-354	clay	800-810	clay

TOTAL DEPTH OF BORING 980 (Feet)

TOTAL DEPTH OF COMPLETED WELL 940 (Feet)

WELL OWNER

[redacted]

CITY STATE ZIP

WELL LOCATION

Address ¼mi N & 50ft E. of Ave.112 & Taylor Canal

City Corcoran

County Tulare

APN Book Echoe Page 78 Parcel 291-070-11

Township 22S Range 23E Section 21

Latitude ____ DEG. MIN. SEC. NORTH Longitude ____ DEG. MIN. SEC. WEST

LOCATION SKETCH

NORTH

WEST EAST

SOUTH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc.
PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR

____ Deepen

____ Other (Specify)

____ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USE(S) (✓)

____ MONITORING

WATER SUPPLY

____ Domestic

____ Public

X Irrigation

____ Industrial

____ "TEST WELL"

____ CATHODIC PROTECTION

____ OTHER (Specify)

DRILLING METHOD Reverse FLUID Natural

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL ____ (Ft.) & DATE MEASURED ____

ESTIMATED YIELD* ____ (GPM) & TEST TYPE ____

TEST LENGTH ____ (Hrs.) TOTAL DRAWDOWN ____ (Ft.)

* *May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	TYPE: BLANK	SCREEN	CONDUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0m - 50	38			X		steel	30	1/4	
0 - 600	30	X				steel	16	5/16	
600 - 620	30	compression section						5/16	
620 - 940	30		X			Louver	16	5/16	.070

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 - 50	X			conductor
0 - 540				5/16x4
540 - 550		C		tablets
550 - 940				5/16x4

ATTACHMENTS (✓)

____ Geologic Log

____ Well Construction Diagram

____ Geophysical Log(s)

____ Soil/Water Chemical Analyses

____ Other

ATTACH ADDITIONAL INFORMATION IF IT EXISTS

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Grabow Well Drilling INc.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS 12522-9th Ave. CITY Hfd. STATE Ca. ZIP 93230

Signed [signature] WELL DRILLER/AUTHORIZED REPRESENTATIVE

DATE SIGNED Aug.20,1991 C-57 LICENSE NUMBER 288489

DWR 188 REV 7-90

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

.CATE
.er's Copy
age ____ of ____

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 489896

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE | LONGITUDE
APN/TRS/OTHER

Owner's Well No. G18 continued
Date Work Began ____ Ended ____
Local Permit Agency ____
Permit No. 43212 Permit Date ____

GEOLOGIC LOG

ORIENTATION (✓) ___ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
810-820	jvxb sand
820-850	clay
850-878	sand
878-890	clay
890-896	sand
896-909	clay
909-916	sand
916-926	clay
926-932	sand
932-945	clay
945-950	sand
950-980	clay

TOTAL DEPTH OF BORING ____ (Feet)
TOTAL DEPTH OF COMPLETED WELL ____ (Feet)

WELL OWNER

[redacted]
CITY ____ STATE ____ ZIP ____

WELL LOCATION

Address ____
City ____
County ____
APN Book ____ Page ____ Parcel ____
or
Township ____ Range ____ Section ____
or
Latitude ____ DEG. MIN. SEC. NORTH Longitude ____ DEG. MIN. SEC. WEST

LOCATION SKETCH

NORTH / WEST / EAST / SOUTH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

___ NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USE(S) (✓)

___ MONITORING
WATER SUPPLY
___ Domestic
___ Public
___ Irrigation
___ Industrial
___ "TEST WELL"
___ CATHODIC PROTECTION
___ OTHER (Specify)

DRILLING METHOD ____ FLUID ____

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL ____ (Ft.) & DATE MEASURED ____
ESTIMATED YIELD* ____ (GPM) & TEST TYPE ____
TEST LENGTH ____ (Hrs.) TOTAL DRAWDOWN ____ (Ft.)
* *May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ____
ATTACH ADDITIONAL INFORMATION IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Grabow Well Drilling Inc.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

12522-9th Ave. Hfd. Ca. 93230
ADDRESS CITY STATE ZIP

Signed ____ WELL DRILLER/AUTHORIZED REPRESENTATIVE ____ DATE SIGNED ____ 288489 C-57 LICENSE NUMBER

DWR 188 REV. 7-90

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

DUPLICATE
Driller's Copy
Page ___ of ___

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 489894

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

Owner's Well No. 196
Date Work Began 8-19-91, Ended 8-20-91
Local Permit Agency Tulare
Permit No. 43213 Permit Date 8-5-91

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION (Describe material, grain size, color, etc.)		
0 - 4	Top Soil	380-412	sand
4 - 36	clay	412-417	clay
36 - 50	sand	417-424	sand
50 - 90	clay	424-630	clay
90 - 112	sand	630-640	sand
112 - 116	clay	640-648	clay
116 - 125	sand	648-672	sand
125 - 150	clay	672-690	clay
150 - 154	sand	690-700	sand
154 - 169	clay	700-704	clay
169 - 173	sand	704-740	sand
173 - 195	clay	740-747	clay
195 - 201	sand	747-780	sand
201 - 223	clay	780-790	clay
223 - 235	sand	790-803	sand
235 - 243	clay	803-808	clay
243 - 250	sand	808-814	sand
250 - 262	clay	814-830	clay
262 - 278	sand	830-839	sand
278 - 289	clay	839-844	clay
289 - 296	sand	844-848	sand
296 - 305	clay	848-887	clay
305 - 310	sand	887-900	sand
310 - 314	clay	900-950	clay
314 - 322	sand		
322 - 334	clay		
334 - 354	sand		
354 - 363	clay		
363 - 372	sand		
372 - 380	clay		

TOTAL DEPTH OF BORING 950 (Feet)
TOTAL DEPTH OF COMPLETED WELL 900 (Feet)

WELL OWNER

[redacted]

WELL LOCATION

Address 80 ft. N of ave112&50' E of Taylor canal
City Corcoran
County Tulare
APN Book Echoe Page 78 Parcel 291-070-11
or Township 22 Range 23 Section 21
or Latitude ___ NORTH DEG. MIN. SEC. Longitude ___ WEST DEG. MIN. SEC.

LOCATION SKETCH

NORTH / WEST / EAST / SOUTH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc.
PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USE(S) (✓)

___ MONITORING
WATER SUPPLY
___ Domestic
___ Public
X Irrigation
___ Industrial
___ "TEST WELL"
___ CATHODIC PROTECTION
___ OTHER (Specify)

DRILLING METHOD Reverse FLUID Natural

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL ___ (Ft.) & DATE MEASURED ___
ESTIMATED YIELD* ___ (GPM) & TEST TYPE ___
TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)
* May not be representative of a well's long-term yield

CASING(S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	TYPE: BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL/GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 - 50	38			X		steel	30	1/4	
0 - 600	30	X				steel	16	5/16	
600 - 620	30					Compression section			
620 - 900	30		X			louver	16	5/16	.070

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 - 50	X			Conductor
0 - 550				5/16x4
550 - 560		X		tablets
560 - 900				5/16x4

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME (PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED) Grabow Well Drilling, Inc.
ADDRESS 12522 9th Ave. CITY Hanford, STATE Ca ZIP 93230
Signed (WELL DRILLER/AUTHORIZED REPRESENTATIVE) [signature] DATE SIGNED 8-22-91 C-57 LICENSE NUMBER 288489

DWR 188 REV. 7-90

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

STATE
Owner's Copy

Page ___ of ___

Owner's Well No. 6-20

Date Work Began 9-11-91, Ended 9-13-91

Local Permit Agency Tulare

Permit No. 43453 Permit Date 9-5-91

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. 489887

DWR USE ONLY — DO NOT FILL IN

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*		
0	36	Xclay	436-655	clay
36	40	sand	655-659	sand
40	60	clay	659-669	clay
60	65	sand	669-694	sand
65	89	clay	694-707	clay
89	108	sand	707-714	sand
108	113	clay	714-720	clay
113	133	sand	720-735	sand
133	172	clay	735-742	clay
172	176	sand	742-753	sand
176	214	clay	753-762	clay
214	225	sand	762-785	sand
225	234	clay	785-794	clay
234	238	sand	794-800	sand
238	242	clay	800-809	clay
242	253	sand	809-818	sand
253	313	clay	818-869	clay
313	335	sand	869-875	sand
335	347	clay	875-908	clay
347	353	sand	908-920	sand
353	356	clay	920-930	clay
356	365	sand	930-935	sand
365	368	clay	935-1000	clay
368	371	sand		
371	374	clay		
374	385	sand		
385	394	clay		
394	415	sand		
415	432	clay		
432	436	sand		

TOTAL DEPTH OF BORING 1000 (Feet)

TOTAL DEPTH OF COMPLETED WELL 940 (Feet)

WELL OWNER

[redacted]

CITY STATE ZIP

WELL LOCATION

Address ¼ mi. S. of Ave. 112 & Taylor canal

City Corcoran

County Tulare

APN Book Echoe Page 78 Parcel 291-100-02

Township 22 S Range 23 E Section 28

Latitude ___ NORTH DEG. MIN. SEC. Longitude ___ WEST DEG. MIN. SEC.

LOCATION SKETCH

NORTH

WEST EAST

SOUTH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR

___ Deepen

___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USE(S) (✓)

___ MONITORING

WATER SUPPLY

___ Domestic

___ Public

X Irrigation

___ Industrial

___ "TEST WELL"

___ CATHODIC PROTECTION

___ OTHER (Specify)

DRILLING METHOD Reverse FLUID Natural

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL ___ (Ft.) & DATE MEASURED ___

ESTIMATED YIELD* ___ (GPM) & TEST TYPE ___

TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)

* *May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	50	38			X		steel	30	1/4	
0	600	30	X				steel	16	5/16	
600	620	30	Compression section						5/16	
620	940	30		X			louver	16	5/16	.070

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	50	X			
0	540				5/16x4
540	550		X		tablets
550	940				5/16x4

ATTACHMENTS (✓)

___ Geologic Log

___ Well Construction Diagram

___ Geophysical Log(s)

___ Soil/Water Chemical Analyses

___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Grabow Well Drilling, Inc. (PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS 12522 9th Ave. CITY Hanford, STATE Ca ZIP 93230

Signed [signature] WELL DRILLER/AUTHORIZED REPRESENTATIVE

DATE SIGNED 9-13-91 C-57 LICENSE NUMBER 288489

DWR 188 REV. 7-90

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

/PLICATE
wner's Copy
'age ___ of ___

STATE OF CALIFORNIA

WELL COMPLETION REPORT

Refer to Instruction Pamphlet

No. **489888**

DWR USE ONLY — DO NOT FILL IN

STATE WELL NO./STATION NO.

LATITUDE | LONGITUDE

APN/TRS/OTHER

Owner's Well No. 6-21
Date Work Began 9-9-91, Ended 9-11-91
Local Permit Agency Tulare
Permit No. 43454 Permit Date 9-5-91

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*		
0 4	Top Soil	695-752	sand
4 39	clay	752-758	clay
39 57	sand	758-770	sand
57 70	clay	770-786	clay
70 78	sand	786-796	sand
78 100	clay	796-806	clays
100 118	sand	806-820	sand
118 128	clay	820-828	clays
128 135	sand	828-852	sand
135 141	clay	852-868	clay
141 155	sand	868-873	sand
155 180	clays	873-884	clay
180 192	sand	884-894	sand
192 235	clay	894-899	clay
235 242	sand	899-905	sand
242 256	clay	905-912	clay
256 266	sand	912-916	sand
266 272	clay	916-925	clay
272 274	sand	925-933	sand
274 277	clay	933-947	clay
277 283	sand	947-954	sand
283 342	clay	954-1000	clay
342 354	sand		
354 367	clay		
367 375	sand		
375 421	clay		
421 440	sand		
440 492	clay		
492 500	sand		
500 695	clay		

TOTAL DEPTH OF BORING 1000 (Feet)
TOTAL DEPTH OF COMPLETED WELL 925 (Feet)

WELL OWNER

[redacted]

WELL LOCATION

Address 5000' s. of Ave 112 & ¾ mi/ e. of Rd 40
City Corcoran
County Tulare
APN Book Echo Page 79 Parcel 291-100-03
or
Township 22S Range 23E Section 27
or
Latitude ___ NORTH (DEG. MIN. SEC.) Longitude ___ WEST (DEG. MIN. SEC.)

LOCATION SKETCH

NORTH / SOUTH / WEST / EAST

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USE(S) (✓)

___ MONITORING

WATER SUPPLY
___ Domestic
___ Public
X Irrigation
___ Industrial
___ "TEST WELL"
___ CATHODIC PROTECTION
___ OTHER (Specify)

DRILLING METHOD Reverse FLUID Natural

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL ___ (Ft.) & DATE MEASURED ___
ESTIMATED YIELD* ___ (GPM) & TEST TYPE ___
TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)
* *May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 50	38			X		steel	30	1/4	
0 585	30	X				steel	16	5/16	
585 605	30	Compression section							
605 925	30		X			louver	16	5/16	.070

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 60	X			conductor
0 540				5/16x4
540 550		X		tablets
550 925				5/16x4

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Grabow Well Drilling Inc.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS 12522 9th Ave Hanford, CA 93230
CITY STATE ZIP

Signed [signature]
WELL DRILLER/AUTHORIZED REPRESENTATIVE

DATE SIGNED 9-20-91 288489 C-57 LICENSE NUMBER

DWR 188 REV. 7-90 IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

DUPLICATE
Driller's Copy
Page ___ of ___

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 489886

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE | LONGITUDE
APN/TRS/OTHER

Owner's Well No. 6-22
Date Work Began 9-11-91, Ended 9-13-91
Local Permit Agency Tulare
Permit No. 43452 Permit Date 9-5-91

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DESCRIPTION — *Describe material, grain size, color, etc.*

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION	DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION
0-4	top soil	420-458	sand
4-42	clay	458-724	clay
42-50	sand	724-737	sand
50-68	clay	737-742	clay
68-79	sand	742-774	sand
79-96	clay	774-777	clay
96-102	sand	777-781	sand
102-115	clay	781-788	clay
115-130	sand	788-820	sand
130-158	clay	820-822	clay
158-164	sand	822-831	sand
164-240	clay	831-835	clay
240-249	sand	835-855	sand
249-255	clay	855-865	clay
255-259	sand	865-879	sand
259-281	clay	879-884	clay
281-289	sand	884-900	sand
289-312	clay	900-910	clay
312-316	sand	910-920	sand
316-332	clay	920-933	clay
332-349	sand	933-940	sand
349-352	clay	940-969	clay
352-357	sand	969-975	sand
357-370	clay	975-1000	clay
370-381	sand		
381-386	clay		
386-394	sand		
394-404	clay		
404-411	sand		
411-420	clay		

TOTAL DEPTH OF BORING 1000 (Feet)
TOTAL DEPTH OF COMPLETED WELL 940 (Feet)

WELL OWNER

[redacted]

WELL LOCATION

Address W. of Hwy 43 & Homeland canal intersecti
City Corcoran
County Tulare
APN Book Echo Page 79 Parcel 291-110-03
or Township 22S Range 23E Section 34
or Latitude ___ NORTH (DEG MIN SEC) Longitude ___ WEST (DEG MIN SEC)

LOCATION SKETCH

NORTH
WEST
EAST
SOUTH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc.
PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USE(S) (✓)

___ MONITORING
WATER SUPPLY
___ Domestic
___ Public
X Irrigation
___ Industrial
___ "TEST WELL"
___ CATHODIC PROTECTION
___ OTHER (Specify)

DRILLING METHOD Reverse FLUID Nutural

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL ___ (Ft.) & DATE MEASURED ___
ESTIMATED YIELD* ___ (GPM) & TEST TYPE ___
TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)
** May not be representative of a well's long-term yield*

CASING(S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	TYPE: BLANK	TYPE: SCREEN	TYPE: CON-DUCTOR	TYPE: FILL PIPE	MATERIAL/GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0-50	38			X		steel	30	1/4	
0-600	30	X				steel	16	5/16	
600-620	30					compression section		5/16	
620-940	30		X			lover	16	5/16	.070

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0-53	X			conductor
0-540				5/16x4
540-550		X		tablets
550-940				5/16x4

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME (PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED) Grabow Well Drilling Inc.
ADDRESS 12522-9th Ave CITY Hfd. STATE Ca. ZIP 93230
Signed (WELL DRILLER/AUTHORIZED REPRESENTATIVE) DATE SIGNED 9-20-91 C-57 LICENSE NUMBER 288489

DWR 188 REV. 7-90

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

APPENDIX B

PUMP TEST DATA FOR ACTIVE WELLS DRILLED PRIOR TO 1991

PREPARED FOR

[redacted]

JANUARY 27, 1991

ATTENTION: MIKE STEELE

NO	TEST NO	WELL CODE	TEST DATE	WELL NO	MTR HP	SWL	DRAW DOWN	LIFT TOTAL	GPM	YIELD G/FT	IHP	KWH/ AC-FT	CALC EFF	YEAR TEST
1	1	BK-101	05-May-61	G1	75	102.0	41.0	145.0	1275	31.1	89.9	285.7	51.9	1961
2	2	BK-101	30-Aug-61	G1	75	176.8	38.2	216.7	1139	29.8	94.2	345.1	66.2	1961
3	3	BK-101	23-May-62	G1	75	97.6	45.2	146.0	1345	29.8	89.1	268.2	55.7	1962
4	4	BK-101	24-Jan-64	G1	75			145.1	1335		85.8		57.0	1964
5	5	BK-101	18-Nov-64	G1	75	109.0	45.5	157.8	1281	28.2	86.1	272.3	59.3	1964
6	6	BK-101	07-Feb-66	G1	75			151.8	1286		84.4	265.9	58.4	1966
7	7	BK-101	23-Apr-76	G1	75	134.5	93.0	230.6	970	10.4	83.5	348.8	67.6	1976
8	8	BK-101	23-Mar-77	G1	75	147.4	106.4	257.0	907	8.5	85.8	383.3	68.6	1977
9	9	BK-101	04-Feb-81	G1	75	112.4	152.4	267.8	711	4.6	78.9	449.9	61.0	1981
10	10	BK-101	21-Sep-81	G1	75	130.5			771		83.1	436.7		1981
11	11	BK-101	23-Mar-88	G1	75	126.5	134.5	264.0	833	6.2	88.5	430.3	63.0	1988
12	13	BK-101	28-Sep-88	G1	75	121.5	142.8	267.3	852	6.0	82.4	392.0	15.7	1988
13	12	BK-101	28-Sep-88	G1	75	121.5	142.8	267.3	852	6.0	82.4	392.0	69.7	1988
14	14	BK-101	03-Aug-89	G1	75	182.5	25.3	210.8	696	27.5	80.8	470.5	45.8	1989
15	15	BK-101	13-Jul-90	G1	75	209.2	106.4	315.6	560	5.3	78.0	564.4	57.7	1990
16	1	BK-102	22-Aug-60	G2	50			203.8	725		56.9	318.0	45.6	1960
17	2	BK-102	05-May-61	G2	50	110.5	26.5	141.0	1030	38.9	62.8	247.0	58.4	1961
18	3	BK-102	30-Aug-61	G2	50	184.5	19.7	206.1	659	33.5	61.3	376.9	56.0	1961
19	4	BK-102	17-Apr-62	G2	50	130.0	30.9	164.1	1045	33.8	62.7	243.3	69.1	1962
20	5	BK-102	10-Feb-64	G2	50	107.1	25.9	134.7	1117	43.1	51.0	185.0	74.5	1964
21	6	BK-102	18-Nov-64	G2	50	112.2	19.8	133.5	800	40.4	47.8	242.1	56.4	1964
22	7	BK-102	25-Oct-77	G2	125	130.8	68.5	201.2	1590	23.2	127.6	325.1	63.3	1977
23	8	BK-102	02-Feb-81	G2	125	151.0	96.9	249.2	1260	13.0	126.1	405.6	63.0	1981
24	9	BK-102	03-Feb-81	G2	125	151.0	97.0	250.3	1300	13.4	126.4	394.0	65.0	1981
25	10	BK-102	13-Aug-85	G2	125	206.7	39.9	247.7	1203	30.1	127.3	428.8	59.1	1985
26	11	BK-102	23-Mar-88	G2	125	160.0	85.0	264.4	1436	16.9	127.6	360.0	70.0	1988
27	12	BK-102	10-May-88	G2	125	171.2	76.8	249.4	1372	17.9	125.5	370.5	68.9	1988
29	14	BK-102	28-Sep-88	G2	125	134.4	80.6	216.4	1425	17.7	124.3	353.3	62.6	1988
28	13	BK-102	28-Sep-88	G2	125	134.4	80.6	216.4	1425	17.7	124.3	353.3	62.6	1988
30	15	BK-102	04-Aug-89	G2	125	211.3	41.3	253.5	1192	28.9	120.6	410.1	63.3	1989
31	16	BK-102	16-Jul-90	G2	125	225.2	84.4	310.6	926	11.0	113.1	495.0	64.2	1990
32	1	BK-103	22-Aug-60	G3	75	172.0	35.0	209.2	1065	30.0	102.4	389.6	54.9	1960
33	2	BK-103	05-May-61	G3	75				1370		106.3	314.4		1961
34	3	BK-103	30-Aug-61	G3	75				648		75.2	470.2		1961
35	4	BK-103	23-May-62	G3	75			149.7	1375		95.7		54.3	1962
36	5	BK-103	24-Jan-64	G3	75				1293		89.1	279.2		1964
37	6	BK-103	18-Nov-64	G3	75			166.7	1152		95.5	335.9	50.8	1964
38	7	BK-103	08-Feb-66	G3	75			187	1389		99.2	289.4	66.1	1966
39	8	BK-103	21-Apr-76	G3	75	138.0	72.0	211.3	1202	16.7	91.7	309.1	69.9	1976
40	9	BK-103	23-Mar-77	G3	75	151.4	90.0	232.6	883	11.0	86.3	396.0	60.1	1977
41	10	BK-103	11-Feb-81	G3	75	109.8	90.4	201.2	915	10.1	88.3	391.1	53.0	1981
42	11	BK-103	13-Aug-85	G3	75	186.7	80.3	267.9			85.2			1985
43	12	BK-103	24-Mar-87	G3	75	71.3	103.7	177.6	1235	11.9	92.1	302.1	60.2	1987
45	14	BK-103	23-Mar-88	G3	75	138.4	82.6	223.4	972	11.8	89.9	374.9	61.0	1988
44	13	BK-103	23-Mar-88	G3	75	196.8	66.7	264.0	793	11.9	81.8	417.8	64.7	1989
46	15	BK-103	30-Sep-88	G3	75	120.4	90.6	213.7	1011	11.2	86.9	348.1	62.8	1988

47	16	BK-103	30-Sep-88	G3	75	120.4	90.6	213.7	1011	11.2	86.9	348.1	62.8	1988
48	17	BK-103	16-Jul-90	G3	75	197.5	60.6	259.6	919	15.2	82.0	361.7	73.4	1990
49	1	BK-104	05-May-61	G4	75	104.0	81.0	187.0						1961
50	2	BK-104	14-Jul-61	G4	75	152.3		232.5	850		87.9	419.0	56.8	1961
51	3	BK-104	30-Aug-61	G4	75				650		75.2	468.7		1961
52	4	BK-104	17-Apr-62	G4	75	129.5	84.5	218.0	957	11.3	87.4	369.7	60.3	1962
53	5	BK-104	24-Jan-64	G4	75	90.7	110.3	203.5	718	6.5	78.2	441.3	47.2	1964
54	6	BK-104	18-Nov-64	G4	75			237.4			74.9			1964
55	7	BK-104	25-Oct-77	G4	125	127.8	64.2	193.2	1571	24.5	126.1	325.2	60.8	1977
56	8	BK-104	04-Feb-81	G4	125				1258		121.0	389.8		1981
57	9	BK-104	15-Aug-85	G4	125				996		118.4	482.0		1985
58	10	BK-104	23-Mar-88	G4	75	144.2	91.8	237.3	947	10.3	98.7	422.1	58.0	1988
60	12	BK-104	28-Sep-88	G4	75	122.3	110.6	233.5	982	8.9	94.8	391.0	61.1	1988
59	11	BK-104	28-Sep-88	G4	75	122.3	110.6	233.5	982	8.9	94.8	391.0	61.1	1988
61	1	BK-105	22-Aug-60	G5	75				734		72.8	401.8		1960
62	2	BK-105	14-Jul-61	G5	75				1077		92.3	347.2		1961
63	3	BK-105	30-Aug-61	G5	75				1132		93.0	332.9		1961
64	4	BK-105	12-Apr-62	G5	75	127.7	32.4	161.1	1209	37.3	86.7	290.5	56.7	1962
65	5	BK-105	23-May-62	G5	75	101.0	46.5	149.7	1375	29.6	95.7	282.3	54.3	1962
66	6	BK-105	10-Feb-64	G5	75	113.2	32.1	146.5	1281	39.9	81.9	259.0	57.9	1964
67	7	BK-105	30-Nov-64	G5	75	112.0	37.8	150.3	1175	31.1	83.4	287.6	53.5	1964
68	8	BK-105	21-Feb-66	G5	75	114	37	151.8	1092	29.4	79.1	293.5	52.9	1966
69	9	BK-105	22-Apr-76	G5	75				860		70.9	334.0		1976
70	10	BK-105	24-Mar-77	G5	75						62.2			1977
71	11	BK-105	25-Oct-77	G5	75				1031		78.0	306.5		1977
72	12	BK-105	03-Feb-81	G5	75				953		78.4	333.4		1981
73	13	BK-105	21-Sep-81	G5	75				975		78.0	324.2		1981
74	14	BK-105	10-May-88	G5	75	148.5	45.8	195.3	1233	26.9	95.8	314.9	63.4	1988
76	16	BK-105	27-Sep-88	G5	75	126.3	45.2	172.3	1184	26.2	94.5	323.4	54.5	1988
75	15	BK-105	27-Sep-88	G5	75	126.3	45.2	172.3	1184	26.2	94.5	323.4	54.4	1988
77	17	BK-105	16-Jul-90	G5	75				976		98.0	406.8		1990
78	1	BK-106	22-Aug-60	G6	75				803		84.5	426.3		1960
79	2	BK-106	14-Jul-61	G6	75				934		90.2	391.3		1961
80	1	BK-107	23-Aug-60	G7	100				1052		113.3	436.3		1960
81	2	BK-107	05-May-61	G7	100			244.5	1130		121.5	435.6	57.4	1961
82	3	BK-107	29-Aug-61	G7	100				1204		119.2	401.1		1961
83	4	BK-107	30-Apr-62	G7	100				1103		118.8	436.4		1962
84	5	BK-107	10-Feb-64	G7	100				1232		117.8	387.4		1964
85	6	BK-107	23-Nov-64	G7	100				1200		119.8	404.5		1964
86	7	BK-107	16-Feb-66	G7	100				1197		120.7	408.5		1966
87	8	BK-107	18-Apr-74	G7	100				1130		107.0	383.6		1974
88	9	BK-107	22-Apr-76	G7	100				1036		102.8	402.0		1976
89	10	BK-107	25-Mar-77	G7	100				938		102.3	441.9		1977
90	11	BK-107	14-Aug-85	G7	100				798		100.8	511.7		1985
91	12	BK-107	22-Mar-88	G7	100	153.5	121.5	276.5	1049	8.6	111.8	431.8	65.5	1988
92	13	BK-107	04-Oct-88	G7	100	149.0	116.0	266.5	1034	8.9	106.7	418.1	65.2	1988
93	14	BK-107	04-Oct-88	G7	100	149.0	116.0	266.5	1034	8.9	106.9	418.1	65.2	1988
94	15	BK-107	30-Jul-90	G7	100				904		110.3	494.4		1990
95	1	BK-108	23-Aug-60	G8	60	217.0	10.7	228.9	220	20.6	46.9	863.7	27.1	1960
96	2	BK-108	05-May-61	G8	60	194.5	45.5	241.5	835	18.4	78.5	380.9	64.9	1961
97	1	BK-109	23-Aug-60	G9	50	162.3	53.7	217.2	556	10.4	67.7	493.3	45.0	1960
98	2	BK-109	05-May-61	G9	50				800		66.5	336.8		1961
99	3	BK-109	29-Aug-61	G9	50	162.4	77.6	242.0	736	95.0	63.9	351.8	70.4	1961
100	4	BK-109	17-Apr-62	G9	50				722		71.9	403.3		1962
101	1	BK-110	23-Aug-60	G10	150				1393		151.1	439.5		1960
102	2	BK-110	10-Feb-64	G10	150				1232		117.8	387.4		1964

103	1	BK-111	14-Jul-61	G11	150	216.1	17.0	238.1	1667	98.1	174.8	424.8	57.3	1961
104	2	BK-111	30-Aug-61	G11	150	227.6	19.1	249.7	1691	98.5	183.7	440.1	58.0	1961
105	3	BK-111	27-Nov-61	G11	150	184.1	27.6	215.5	2184	79.1	181.8	338.1	65.2	1961
106	4	BK-111	12-Apr-62	G11	150	187.1	24.1	214.0	2146	89.0	179.9	339.6	64.5	1962
107	5	BK-111	07-Feb-64	G11	150	160.5	25.7	191.2	2300	89.5	163.6	288.2	67.9	1964
108	6	BK-111	30-Nov-64	G11	150	185.7	28.8	218.8	2227	77.3	175.8	319.8	69.8	1964
109	7	BK-111	08-Feb-66	G11	150			198.8	2088		164.4	319.0	63.8	1966
110	8	BK-111	22-Apr-76	G11	150	186.0	28.0	216.0	1529	54.6	146.7	388.7	56.9	1976
111	9	BK-111	23-Mar-77	G11	150	232.6	28.9	262.9	1690	58.5	170.4	408.5	65.7	1977
112	10	BK-111	17-Mar-88	G11	150	184.0	37.0	223.9	2229	60.2	186.6	339.2	67.5	1988
113	11	BK-111	28-Sep-88	G11	150	222.7	26.4	250.1	1818	68.9	174.8	389.6	65.7	1988
114	12	BK-111	04-Oct-88	G11	150	222.7	26.4	550.1	1818	68.9	174.8	389.6	65.7	1988
115	13	BK-111	04-Aug-89	G11	150	258.6	30.4	290.0	1596	52.5	165.4	419.9	70.6	1989
116	14	BK-111	17-Jul-90	G11	150			313.4	1086		148.4	553.6	58.2	1990
117	1	BK-112	12-Apr-62	G12	200	203.7	67.1	269.3	2623	39.1	271.9	420.0	65.6	1962
118	2	BK-112	07-Feb-64	G12	200	163.5	51.7	216.4	3093	59.8	260.7	341.5	64.8	1964
119	3	BK-112	23-Nov-64	G12	200	191.7	60.5	253.4	2794	46.2	266.9	387.0	67.0	1964
120	4	BK-112	08-Feb-66	G12	200			234.8	2942		262.5	361.5	66.5	1966
121	5	BK-112	08-Jan-81	G12	75	130.8	127.4	260.2	708	5.5	80.1	458.7	58.0	1981
122	1	BK-113	30-Apr-62	G13	200	163.5	40.7	205.9	3445	84.6	259.4	305.1	69.0	1962
123	2	BK-113	07-Feb-64	G13	200	174.5	35.1	213.4	3408	97.1	256.5	304.9	71.6	1964
124	3	BK-113	23-Nov-64	G13	200	216.0	24.7	244.1	3250	131.6	259.9	324.0	77.1	1964
125	4	BK-113	10-Feb-66	G13	200				3090		262.5	346.4		1966
126	5	BK-113	22-Apr-76	G13	200	182.6	40.6	226.2	3170	78.1	254.4	325.1	71.2	1976
127	6	BK-113	23-Mar-77	G13	200	231.8	30.4	265.2	2773	91.2	259.7	379.4	71.5	1977
128	7	BK-113	03-Feb-81	G13	200			187.6	2950		249.1	342.1	56.0	1981
129	8	BK-113	18-Sep-81	G13	200	213.9	38.0	254.9	2551	67.1	257.8	409.4	64.0	1981
130	9	BK-113	14-Aug-85	G13	200			240.6	2760		254.8	374.0	65.8	1985
131	10	BK-113	17-Mar-88	G13	200				2969		259.1	353.6		1988
132	11	BK-113	27-Sep-88	G13	200				2785		258.3	375.8		1988
133	12	BK-113	27-Sep-88	G13	200				2785		258.3	375.8		1988
134	13	BK-113	07-Aug-89	G13	200				2592		259.1	405.0		1989
135	14	BK-113	16-Jul-90	G13	200				2387		258.3	438.4		1990
136	1	BK-114	03-Feb-81	G14	125				1669		133.2	323.4		1981
137	2	BK-114	15-Aug-85	G14	125	174.6	48.1	223.9	1342	27.9	117.2	354.1	64.7	1985
138	3	BK-114	22-Mar-88	G14	125	136.7	87.7	227.4	1431	16.3	120.9	342.3	68.0	1988
139	4	BK-114	04-Oct-88	G14	125	128.8	93.6	223.5	1356	14.5	125.9	376.1	60.8	1988
140	5	BK-114	07-Aug-89	G14	125	169.5	91.8	263.2	1016	11.1	117.4	468.3	57.5	1989
141	6	BK-114	17-Jul-90	G14	125				793		102.7	524.6		1990
142	1	BK-116	11-Feb-81	G16	125	108.7	69.4	181.0	1693	24.3	134.3	321.4	58.0	1891
143	2	BK-116	21-Sep-81	G16	125			210.5	1500		134.0	362.1		1981
144	3	BK-116	13-Aug-85	G16	125						129.7			1985
145	4	BK-116	23-Mar-88	G16	125				1090		125.2	465.4		1988
146	5	BK-116	29-Sep-88	G16	125						128.6			1988
147	6	BK-116	04-Aug-89	G16	125						121.7			1989
148	7	BK-116	13-Jul-90	G16	125				760		113.4	604.6		1990
150	2	BK-117	08-Oct-81	G17	DEV	185.0	32.0	217.0	1800	56.3				1981
152	4	BK-117	08-Oct-81	G17	DEV	185.0	59.0	244.0	3300	55.9				1981
151	3	BK-117	08-Oct-81	G17	DEV	185.0	25.0	210.0	1500	60.0				1981
149	1	BK-117	08-Oct-81	G17	DEV	185.0	39.0	224.0	2100	53.8				1981
153	5	BK-117	23-Mar-88	G17	200				2765		209.2	306.6		1988
154	6	BK-117	10-May-88	G17	200			225.0	2708		209.2	313.1	73.5	1988
155	8	BK-117	04-Oct-88	G17	200			242.2	2475		210.6	344.7	71.9	1988
156	7	BK-117	04-Oct-88	G17	200			242.2	2475		210.6	344.7	71.9	1988
157	9	BK-117	17-Jul-90	G17	200				1422		182	518.7		1990
158	1	BK-201	19-Sep-50	1E	100	156.4	16.2	173.6	1713	105.8	106.3	251.4	70.6	1950

159	2	BK-201	08-Jul-54	1E	100				1832		112.8			1954
160	3	BK-201	13-Aug-54	1E	100				1372		96.2			1954
161	4	BK-201	22-Mar-55	1E	100	148.3	21.4	171.5	1752	81.9	108.2	250.2	70.1	1955
162	5	BK-201	13-Oct-55	1E	100			195.0	1420		125.0		56.0	1955
163	6	BK-201	11-Jul-57	1E	100	162.8	16.8	180.2	1401	83.4	97.1	280.1	65.6	1957
164	7	BK-201	09-Sep-58	1E	100				1756		108.9	251.3		1958
165	8	BK-201	Jun-59	1E	100			163.0	1374		128.7		61.5	1959
166	9	BK-201	20-Aug-59	1E	100				984		90.3	371.8		1959
167	10	BK-201	15-Mar-60	1E	100	181.0	26.2	209.0	1680	64.1	128.7	310.4	68.9	1960
168	11	BK-201	09-Aug-60	1E	100			233.9	1558		128.0		71.9	1960
169	12	BK-201	11-Apr-61	1E	100	182.5	25.3	208.9	1585	62.6	126.3	322.8	66.2	1961
170	13	BK-201	20-Oct-61	1E	100	219.5	21.9	242.5	1486	67.9	128.1	349.3	71.0	1961
171	14	BK-201	10-Sep-62	1E	100	208.8	23.4	233.3	1520	65.0	127.8	340.6	70.0	1962
172	15	BK-201	09-Sep-63	1E	100	181.1	26.4	208.4	1610	61.0	125.8	316.6	67.3	1963
173	16	BK-201	19-Nov-64	1E	100				1600		125.7	318.3		1964
174	17	BK-201	14-Feb-66	1E	100				1594		126.5	321.5		1966
175	18	BK-201	01-Jul-68	1E	100				1595		126.7	321.8		1968
176	19	BK-201	21-Apr-76	1E					1521		122.0	325.0		1976
177	20	BK-201	22-Mar-77	1E	100				1605		131.0	330.7		1977
178	21	BK-201	26-Oct-77	1E	100				1105		125.7	460.9		1977
179	22	BK-201	23-Feb-81	1E	100	125.8	37.2	165.5	1546	41.5	120.5	315.8	54.0	1981
180	23	BK-201	10-Sep-81	1E	100			231.2	1164		127.6	444.2	53.0	1981
181	24	BK-201	25-Mar-88	1E	100				1524		120.8	321.1		1988
182	26	BK-201	12-Oct-88	1E	100				1381		118.4	347.3		1988
183	25	BK-201	12-Oct-88	1E	100				1381		118.4	347.3		1988
184	27	BK-201	26-Jul-90	1E	100				1105		115.4	423.2		1990
185	1	BK-202	18-Sep-50	2E	40				1059	200.1	52.3	200.1		1950
186	2	BK-202	08-Jul-54	2E	40				1309		54.3			1954
187	3	BK-202	13-Aug-54	2E	40				1332		55.2			1954
188	4	BK-202	22-Mar-55	2E	40	102.5	11.5	115.9	1056		55.5	212.9	55.7	1955
189	5	BK-202	13-Oct-55	2E	40				1287		55.0			1955
190	6	BK-202	09-Sep-58	2E	40				1055		54.5	209.3		1958
191	7	BK-202	Jun-59	2E	40				1219		54.2			1959
192	8	BK-202	15-Mar-60	2E	40				800		47.1	238.5		1960
193	9	BK-202	09-Aug-60	2E	40				751		49.4			1960
194	10	BK-202	11-Apr-61	2E	40	125.0	24.7	150.7	764	30.9	49.0	259.8	59.3	1961
195	11	BK-202	20-Oct-61	2E	40	120.5	29.0	150.5	812	28.0	49.6	247.5	62.2	1961
196	12	BK-202	10-Sep-62	2E	40				743		50.0	272.7		1962
197	13	BK-202	09-Sep-63	2E	40				708		48.7	278.7		1963
198	14	BK-202	19-Nov-64	2E	40				825		47.8	234.7		1964
199	15	BK-202	15-Feb-66	2E	40				846		48.9	234.2		1966
200	1	BK-203	20-Sep-50	3E	40	111.4	19.2	131.4	946	49.3	48.9	209.4	64.2	1950
201	2	BK-203	09-Jul-54	3E	40	124.5	22.5	147.0	904	40.2	48.7		68.9	1954
202	3	BK-203	13-Aug-54	3E	40	127.0	22.0	149.0	857	38.9	47.8		62.2	1954
203	4	BK-203	22-Mar-55	3E	40	114.9	19.1	135.0	886	46.4	50.9	232.7	59.3	1955
204	5	BK-203	13-Oct-55	3E	40			141.0	1080		53.5		72.0	1955
205	6	BK-203	11-Jul-57	3E	40	127.7	18.7	147.1	846	45.2	51.1	244.7	61.5	1957
206	7	BK-203	18-Sep-58	3E	40	99.9	23.7	125.0	1026	43.3	50.9	201.0	64.2	1958
207	8	BK-203	Jun-59	3E	40			148.0	835		49.0		63.7	1959
208	9	BK-203	20-Aug-59	3E	40	148.0		182.1	650		49.1	306.0	60.9	1959
209	10	BK-203	14-Mar-60	3E	40	130.0	17.0	148.2	800	47.1	45.9	232.5	65.2	1960
210	11	BK-203	09-Aug-60	3E	40				764		47.5	251.9		1960
211	12	BK-203	11-Apr-61	3E	40	124.5	18.5	143.6	826	44.6	46.3	227.1	64.7	1961
212	13	BK-203	20-Oct-61	3E	40	131.2	20.3	152.5	790	38.9	48.3	247.7	63.0	1961
213	14	BK-203	10-Sep-62	3E	40	136.2	19.8	156.9	777	39.2	48.0	250.3	64.2	1962
214	15	BK-203	09-Sep-63	3E	40	129.7	20.3	150.7	820	40.4	47.3	233.7	66.0	1963

215	16	BK-203	30-Nov-64	3E	40	110.6	22.7	134.0	826	36.4	46.0	225.6	60.8	1964
216	17	BK-203	15-Feb-66	3E	40			144.6	839		47.8	230.8		1966
217	18	BK-203	01-Jul-68	3E	40	125.5	21.1	147.6	820	38.9	48.2	238.1	63.4	1968
218	19	BK-203	21-Apr-76	3E	40	115.2	25.6	141.8	694	27.1	45.6	266.2	54.5	1976
219	20	BK-203	22-Mar-77	3E	40	125.6	26.4	153.4	670	25.4	45.4	274.5	57.2	1977
220	21	BK-203	12-Feb-81	3E	40	113.5	27.5	142.5	755	27.4	44.7	240.3	61.0	1981
221	1	BK-204	20-Sep-50	4E	60	164.0	9.3	173.9	770	82.8	60.8	319.9	55.6	1950
222	2	BK-204	09-Jul-54	4E	75	164.0	17.0	181.0	1419	83.4	94.2		68.8	1954
223	3	BK-204	14-Aug-54	4E	75	153.0	14.0	167.0	1322	95.5	91.7		60.6	1954
224	4	BK-204	22-Mar-55	4E	75	159.0	20.5	180.5	1325	64.6	92.3	282.2	65.4	1955
225	5	BK-204	13-Oct-55	4E	75			219.0	1028		91.1		62.4	1955
226	6	BK-204	11-Jul-57	4E	75	179.6	26.0	206.6	1227	47.2	91.5	302.1	69.9	1957
227	7	BK-204	09-Sep-58	4E	75	151.8	24.0	177.6	1382	57.6	91.4	268.0	67.8	1958
228	8	BK-204	Jun-59	4E	75			185.0	1260		90.1		65.3	1959
229	9	BK-204	24-Aug-59	4E	75			225.1	1117		90.8	329.3	69.9	1959
230	10	BK-204	17-Mar-60	4E	75	195.0	22.9	218.9	1142	49.9	90.2	320.0	70.0	1960
231	11	BK-204	09-Aug-60	4E	75	217.2	21.9	240.2	1113	50.8	95.2	346.5	70.9	1960
232	12	BK-204	12-Apr-61	4E	75				1100		88.8	327.1		1961
233	13	BK-204	25-Oct-61	4E	75				822		81.9	403.7		1961
234	14	BK-204	10-Sep-62	4E	75				1048		89.9	347.6		1962
235	15	BK-204	09-Sep-63	4E	75				1110		89.1	325.2		1963
236	16	BK-204	19-Nov-64	4E	75				1088		89.1	331.8		1964
237	17	BK-204	14-Feb-66	4E	75				1126		87.8	315.9		1966
238	18	BK-204	01-Jul-68	4E	75				1099		88.6	326.6		1968
239	19	BK-204	20-Apr-76	4E	75				1130		87.1	312.3		1976
240	20	BK-204	22-Mar-77	4E	75				1007		88.5	356.1		1977
241	21	BK-204	12-Feb-81	4E	75				1118		84.7	307.0		1981
242	22	BK-204	11-Sep-81	4E	75				989		87.2	357.5		1981
243	23	BK-204	25-Mar-88	4E	75			216.0	1163		90.8	316.1	70.0	1988
244	24	BK-204	11-Oct-88	4E	75				1086		92.6	345.6		1988
245	25	BK-204	26-Jul-90	4E	75				896		92.0	415.8		1990
246	1	BK-205	20-Sep-50	5E	100	162.4	18.3	182.0	1730	94.6	117.4	274.9	67.7	1950
247	2	BK-205	09-Jul-54	5E	75				2009		127.2			1954
249	4	BK-205	13-Aug-54	5E	100	157.0	17.0	174.0	1938	113.8	122.3		68.9	1954
248	3	BK-205	13-Aug-54	5E	75	153.0	14.0	167.0	1322	95.5	91.7		60.6	1954
250	5	BK-205	22-Mar-55	5E	100	154.6	24.0	180.3	1839	76.6	129.9	286.2	64.5	1955
251	6	BK-205	13-Oct-55	5E	100				1303		102.9			1955
252	7	BK-205	11-Jul-57	5E	100	167.7	22.5	191.6	1705	75.8	111.8	265.7	73.8	1957
253	8	BK-205	09-Sep-58	5E	100	146.3	22.5	170.2	1908	84.8	120.1	255.0	68.3	1958
254	9	BK-205	Jun-59	5E	100			177.0	1684		113.6		66.3	1959
255	10	BK-205	Aug-59	5E	100	185.0	14.0	200.5	1032	73.7	97.7	383.6	53.5	1959
256	11	BK-205	16-Mar-60	5E	100	182.5	24.0	208.6	1610	67.0	123.1	309.8	68.9	1960
257	12	BK-205	09-Aug-60	5E	100	215.6	21.2	237.8	1548	73.1	125.5	328.5	74.3	1960
258	13	BK-205	12-Apr-61	5E	100	184.0	25.0	210.3	1670	66.8	123.3	299.1	71.9	1961
259	14	BK-205	20-Oct-61	5E	100			244.3	1415		124.9	357.6	70.0	1961
260	15	BK-205	11-Sep-62	5E	100				1472		124.7	343.2		1962
261	16	BK-205	10-Sep-63	5E	100	185.3	25.2	211.9	1613	64.0	124.3	312.2	69.4	1963
262	17	BK-205	19-Nov-64	5E	100	187.0	24.5	212.8	1580	64.5	124.2	318.5	68.3	1964
263	18	BK-205	14-Feb-66	5E	100			209.1	1592		122.7	312.3	68.5	1966
264	19	BK-205	01-Jul-68	5E	100			214.6	1546		123.1	322.6	68.1	1968
265	20	BK-205	20-Apr-76	5E	100				1485		121.5	331.5		1976
266	21	BK-205	22-Mar-77	5E	100				1130		121.3	434.9		1977
267	22	BK-205	26-Oct-77	5E	100	219.1	17.5	237.5	946	54.1	113.4	485.7	50.0	1977
268	23	BK-205	21-Mar-81	5E	100	126.8	29.2	157.7	1657	56.7	119.7	292.7	55.0	1981
269	24	BK-205	17-Sep-81	5E	100				1481		130.9	358.3		1981
270	25	BK-205	25-Mar-88	5E	100				1591		124.7	317.5		1988

271	26	BK-205	12-Oct-88	5E	100				1388		124.7	363.9		1988
272	27	BK-205	26-Jul-90	5E	100				1158		122.4	428.2		1990
273	1	BK-206	20-Sep-50	6E	40	109.9	22.5	133.2	995	44.2	50.0	203.6	66.9	1950
274	2	BK-206	09-Aug-54	6E	40	118.0	21.0	139.0	979	46.6	48.7		70.5	1954
275	3	BK-206	14-Aug-54	6E	40	112.0	19.0	131.0	980	51.6	48.0		67.5	1954
276	4	BK-206	22-Mar-55	6E	40	114.7	21.8	137.3	849	38.9	49.5	236.2	59.5	1955
277	5	BK-206	13-Oct-55	6E	40			123.0	1003		47.9		65.2	1955
278	6	BK-206	09-Sep-58	6E	40	112.8	24.2	138.2	841	34.8	47.9	230.8	61.4	1958
279	7	BK-206	Jun-59	6E	40			150.0	673		46.9		54.4	1959
280	8	BK-206	20-Aug-59	6E	40	136.9			585		46.9	324.8		1959
281	9	BK-206	16-Mar-60	6E	40	128.0	24.5	153.7	790	32.2	45.6	233.9	67.2	1960
282	10	BK-206	09-Aug-60	6E	40	141.5	21.8	163.9	781	35.8	45.8	237.6	70.6	1960
283	11	BK-206	12-Apr-61	6E	40	122.6	24.2	147.5	780	32.2	44.9	233.2	64.7	1961
284	12	BK-206	23-Oct-61	6E	40	131.3	24.5	157.1	767	31.3	46.6	246.2	65.3	1961
285	13	BK-206	11-Sep-62	6E	40	138.4	23.0	162.4	745	32.4	45.7	248.5	67.0	1962
286	14	BK-206	09-Sep-63	6E	40	132.5	24.7	157.9	787	31.9	46.1	237.3	68.1	1963
287	15	BK-206	19-Nov-64	6E	40	116.7	32.1	151.0	793	24.7	46.0	235.0	65.7	1964
288	16	BK-206	14-Feb-66	6E	40			156.0	772		44.7	234.6	68.0	1966
289	1	BK-207	20-Sep-50	7E	100	168.0	15.0	184.1	1775	118.3	111.9	255.4	73.7	1950
290	2	BK-207	12-Jul-54	7E	100	163.0	19.0	182.0	1866	98.2	117.2		73.0	1954
291	3	BK-207	17-Aug-54	7E	100	165.0	19.0	184.0	1830		96.3		73.2	1954
292	4	BK-207	22-Mar-55	7E	100	152.0	16.2	169.1	1808	111.6	115.8	259.5	66.7	1955
293	5	BK-207	13-Oct-55	7E	100			203.0	1587		100.5			1955
294	6	BK-207	Jul-57	7E	100	165.2			1449		103.7	289.9		1957
295	7	BK-207	11-Sep-58	7E	100	142.5	17.6	161.5	1807	102.7	116.2	260.5	63.4	1958
296	8	BK-207	Jul-59	7E	100				1603		111.2			1959
297	9	BK-207	17-Mar-60	7E	100				1754		126.0	291.0		1960
298	10	BK-207	10-Aug-60	7E	100	211.0	20.1	231.9	1622	80.7	128.5	321.0	73.9	1960
299	11	BK-207	12-Apr-61	7E	100	178.9			1738		126.5	294.9		1961
300	12	BK-207	25-Oct-61	7E	100				1523		129.7	345.0		1961
301	13	BK-207	12-Sep-62	7E	100				1564		128.1	331.8		1962
302	14	BK-207	10-Sep-63	7E	100				1662		129.6	315.9		1963
303	15	BK-207	20-Nov-64	7E	100				1613		126.5	317.7		1964
304	16	BK-207	09-Feb-66	7E	100			191.3	1694		125.2	299.4	65.4	1966
305	17	BK-207	25-Jun-68	7E	100			198.7	1661		126.5	308.6	66.0	1968
306	18	BK-207	20-Apr-76	7E	100	172.0	22.0	195.2	1588	72.2	125.6	320.4	62.3	1976
307	19	BK-207	22-Mar-77	7E	100	212.4	22.6	237.2	1577	69.8	129.1	331.7	73.2	1977
308	20	BK-207	12-Feb-81	7E	100	124.8	25.0	156.4	1585	63.4	115.4	295.0	54.0	1981
309	21	BK-207	11-Sep-81	7E	100	208.5	16.2	225.7			122.2			1981
310	22	BK-207	18-Sep-81	7E	100	208.5	16.2	228.6	1190	73.4	122.5	417.1	56.0	1981
311	23	BK-207	25-Mar-88	7E	100				1508		120.5	323.8		1988
312	24	BK-207	11-Oct-88	7E	100				1279		116.2	368.2		1988
313	25	BK-207	25-Jul-90	7E	100				1053		109.7	421.9		1990
314	1	BK-208	21-Sep-50	8E	40	104.1	20.0	126.2	1132	56.6	53.5	191.5	67.4	1950
315	2	BK-208	14-Jul-54	8E	40	108.0	22.0	130.0	1078	49.0	52.7		67.1	1954
316	3	BK-208	17-Aug-54	8E	40	112.0	18.5	130.5	1050	56.7	53.7		64.6	1954
317	4	BK-208	23-Mar-55	8E	40			133.9	1081		53.3		68.6	1955
318	5	BK-208	14-Oct-55	8E	40	112.0	18.5	130.5	1038	56.2	53.2		64.2	1955
319	6	BK-208	15-Jul-57	8E	40	118.5	15.6	135.1	916	58.7	52.8	232.5		1957
320	7	BK-208	10-Sep-58	8E	40	110.4	18.5	136.1	966	52.2	52.1	218.5	63.7	1958
321	8	BK-208	Jul-59	8E	40			113.0	1034		51.9		56.8	1959
322	9	BK-208	21-Aug-59	8E	40	127.0	8.5	137.5	882	103.8	52.2	239.8	58.7	1959
323	10	BK-208	16-Mar-60	8E	40	123.0			1000		52.6	213.1		1960
324	11	BK-208	10-Aug-60	8E	40				954		52.6	223.4		1960
325	12	BK-208	Mar-61	8E	40	SPRING	1961		1020		51.9			1961
326	13	BK-208	12-Apr-61	8E	40				1020		51.9	206.1		1961

327	15	BK-208	25-Oct-61	8E	40				941		51.7	222.6		1961
328	14	BK-208	25-Oct-61	8E	40				941		51.7			1961
329	16	BK-208	12-Sep-62	8E	40	131.9			885		51.4	235.3		1962
330	17	BK-208	10-Sep-63	8E	40				984		51.1	210.4		1963
331	18	BK-208	20-Nov-64	8E	40				983		51.7			1964
332	19	BK-208	20-Nov-64	8E	40				983		51.7	213.1		1964
333	20	BK-208	15-Feb-66	8E	40				1112		51.5	187.6		1966
334	21	BK-208	12-Apr-76	8E	40				756		53.1	284.6		1976
335	22	BK-208	20-Mar-77	8E	40				783		52.7			1977
336	23	BK-208	11-Feb-81	8E	40				994		52.5	214.2		1981
337	24	BK-208	15-Sep-81	8E	40						49.7			1981
338	25	BK-208	17-Sep-81	8E	40				732		50.0	276.7		1981
339	1	BK-209	21-Sep-50	9E	40	100.0			1034		49.9	195.5		1950
340	2	BK-209	13-Jul-54	9E	40				1077		50.3			1954
341	3	BK-209	14-Aug-54	9E	40				1102		50.8			1954
342	4	BK-209	23-Mar-55	9E	40	112.0	10.0	131.8	925	48.7	50.8	222.5	60.6	1955
343	5	BK-209	18-Oct-55	9E	40	109.0	25.0	134.0	858	34.3	48.8		59.4	1955
344	6	BK-209	10-Sep-58	9E	40	115.3	22.5	138.5	840	37.3	48.5	233.9	60.6	1958
345	7	BK-209	Jul-59	9E	40			130.0	835		49.3		55.6	1959
346	8	BK-209	Aug-59	9E	40	122.9	20.6	144.5	735	35.7	47.4	261.3	56.6	1959
347	9	BK-209	16-Mar-60	9E	40				788	250.9	48.8			1960
348	10	BK-209	10-Aug-60	9E	40				730		47.0	260.9		1960
349	11	BK-209	12-Apr-61	9E	40				743		47.1	256.8		1961
350	12	BK-209	25-Oct-61	9E	40				695		45.2	263.5		1961
351	13	BK-209	10-Sep-63	9E	40				823		48.1	236.8		1963
352	14	BK-209	20-Nov-64	9E	40				823		48.7	239.7		1964
353	15	BK-209	09-Feb-66	9E	40				773		46.9	245.8		1966
354	1	BK-210	21-Sep-50	10E	100	159.3	19.9	181.7	1289	64.8	99.4	312.4	59.5	1950
355	2	BK-210	13-Jul-54	10E	100	152.0	24.0	176.0	1495	62.3	107.0		62.2	1954
356	3	BK-210	14-Aug-54	10E	100				1422		105.0			1954
357	4	BK-210	23-Mar-55	10E	100	150.4	34.2	186.9	1411	41.3	106.8	306.7	62.3	1955
358	5	BK-210	14-Oct-55	10E	100	180.0	31.0	211.0	1322		104.6		67.3	1955
359	6	BK-210	16-Jul-57	10E	100	169.9	30.0	201.2	1295	43.2	104.3	326.5	63.0	1957
360	7	BK-210	10-Sep-58	10E	100	155.7	40.9	197.4	1336	32.7	101.8	308.7	65.4	1958
361	8	BK-210	Jul-59	10E	100			186.0	1304		103.7		59.1	1959
362	9	BK-210	21-Aug-59	10E	100	185.9	28.1	215.1	1179	42.0	101.2	347.8	63.3	1959
363	10	BK-210	17-Mar-60	10E	100	176.7	28.2	206.3	1256	44.5	102.4	330.3	63.8	1960
364	11	BK-210	10-Aug-60	10E	100	206.5	21.9	228.8	1031	47.4	98.2	385.9	60.7	1960
365	12	BK-210	12-Apr-61	10E	100	174.5	30.5	205.6	1175	38.5	101.0	348.3	60.4	1961
366	13	BK-210	23-Oct-61	10E	100	212.5	27.0	240.5	946	35.0	94.7	405.6	60.7	1961
367	14	BK-210	11-Sep-62	10E	100	204.6	26.9	233.5	962	35.8	95.4	401.8	59.4	1962
368	15	BK-210	10-Sep-63	10E	100	184.4	31.4	216.6	1110	35.4	97.9	357.3	62.0	1963
369	16	BK-210	11-Feb-66	10E	100			204.3	1170		99.7	345.2		1966
370	17	BK-210	20-Nov-66	10E	100	185.0	32.0	218.0	1032	32.3	98.6	387.1	57.6	1964
371	18	BK-210	12-Apr-76	10E	100	178.9	34.4	214.8	1194	34.7	99.9	339.0	64.8	1976
372	19	BK-210	20-Mar-77	10E	100	212.9	26.2	240.7	843	32.2	94.1	452.2	54.5	1977
373	20	BK-210	23-Feb-81	10E	100	130.5	44.8	178.2	1271	28.3	99.4	317.1	58.0	1981
374	21	BK-210	15-Sep-81	10E	100	212.9	34.8	249.2	961	27.6	108.7	458.3	56.0	1981
375	22	BK-210	24-Mar-88	10E	100	162.7	67.3	231.3	1385	20.6	120.1	351.3	67.4	1988
376	23	BK-210	11-Oct-88	10E	100	206.3	53.6	261.7	1228	22.9	118.2	390.1	68.7	1988
377	24	BK-210	26-Jul-90	10E	100			306.7	878		121.4	560.4	56.0	1990
378	1	BK-211	21-Sep-50	11E	100	153.1	16.5	170.9	1740	105.5	113.4	264.0	66.2	1950
379	2	BK-211	13-Jul-54	11E	100	149.0	19.0	168.0	1813	95.5	113.0		68.2	1954
380	3	BK-211	18-Aug-54	11E	100				1591		104.3			1954
381	4	BK-211	23-Mar-55	11E	100	145.7	18.1	165.0	1758	97.1	112.4	259.0	65.2	1955
382	5	BK-211	14-Oct-55	11E	100	178.0	16.0	194.0	1298	81.2	101.5		62.6	1955

383	6	BK-211	16-Jul-57	11E	100	163.8	15.0	179.7	1542	102.8	104.6	274.8	66.9	1957
384	7	BK-211	10-Sep-58	11E	100	149.0	20.0	170.0	1716	85.8	109.9	259.5	67.1	1958
385	8	BK-211	Jul-59	11E	100			160.0	1615		104.9		62.2	1959
386	9	BK-211	21-Aug-59	11E	100	180.0	12.0	193.5	1105	92.1	95.6	350.5	56.5	1959
387	10	BK-211	17-Mar-60	11E	100	167.6	23.5	192.1	1738	73.9	124.8	290.9	67.6	1960
388	11	BK-211	10-Aug-60	11E	100	206.0	15.1	222.2	1459	96.6	126.0	349.9	65.0	1960
389	12	BK-211	13-Apr-61	11E	100	180.9	16.1	198.8	1720	106.8	125.0	294.4	69.1	1961
390	14	BK-211	23-Oct-61	11E	100			234.5	1525		127.3		70.9	1961
391	13	BK-211	23-Oct-61	11E	100	213.4	20.0	234.5	1525	76.2	127.3	338.2	70.9	1961
392	15	BK-211	12-Sep-62	11E	100	206.3	20.0	228.7	1496	74.8	126.0	341.2	68.6	1962
393	16	BK-211	12-Sep-62	11E	100			228.7	1496		126.0		68.6	1962
394	17	BK-211	10-Sep-63	11E	100	188.5	19.5	209.9	1660	85.1	124.8	304.6	70.5	1963
396	18	BK-211	20-Nov-64	11E	100			195.6	1630		125.6		64.1	1964
395	19	BK-211	20-Nov-64	11E	100	182.7	10.9	195.6	1630	149.5	125.6	312.2	64.1	1964
397	20	BK-211	09-Feb-66	11E	100			187.6	1743		123.5	287.1	66.9	1966
398	21	BK-211	25-Jun-68	11E	100			197.9	1684		130.8	314.7	64.3	1968
399	22	BK-211	12-Apr-76	11E	100	176.8	22.9	201.2	1629	71.1	128.5	319.6	64.4	1976
400	23	BK-211	20-Mar-77	11E	100	212.5	18.5	232.2	1356	73.3	124.1	370.8	64.1	1977
401	24	BK-211	12-Feb-81	11E	100	137.4	25.4	164.7	1632	64.2	120.1	298.2	57.0	1981
402	25	BK-211	15-Sep-81	11E	100	217.5	21.6	241.0	1339	61.9	128.7	389.4	63.0	1981
403	26	BK-211	24-Mar-88	11E	100	162.0	21.4	184.7	1425	66.6	112.7	320.5	59.0	1988
404	27	BK-211	11-Oct-88	11E	100			224.8	1257		110.3	355.6	64.7	1988
405	28	BK-211	25-Jul-90	11E	100			277.4	915		99.5	440.4	64.4	1990
406	1	BK-212	10-Jul-54	12E	100	154.0	29.0	183.0	1762	60.7	111.2		73.2	1954
407	2	BK-212	18-Aug-54	12E	100				1715		112.0			1954
408	3	BK-212	23-Mar-55	12E	100	144.0	19.2	164.3	1671	87.0	111.4	270.1	62.2	1955
409	4	BK-212	14-Oct-55	12E	100	181.0	16.0	197.0	1641	102.6	112.4		72.7	1955
410	5	BK-212	16-Jul-57	12E	100	165.0	14.2	180.3	1635	115.1	111.3	275.8	66.9	1957
411	6	BK-212	11-Sep-58	12E	100	144.0	19.0	164.9	1715	90.3	110.7	261.6	64.5	1958
412	7	BK-212	Jul-59	12E	100			176.0	1598		111.2		63.8	1959
413	8	BK-212	21-Aug-59	12E	100	166.8	7.0	175.9	1475	210.7	111.0	304.8	59.0	1959
414	9	BK-212	17-Mar-60	12E	100	177.3	16.7	195.5	1512	91.1	111.0	297.4	67.2	1960
415	10	BK-212	Aug-60	12E	100	212.2		239.9	1459	58.6	111.4		55.6	1960
416	11	BK-212	10-Aug-60	12E	100	214.5	23.5	239.9	1377	58.6	111.7	328.7	74.7	1960
417	12	BK-212	13-Apr-61	12E	100	174.8	18.8	195.2	1460	77.7	110.9	307.7	64.9	1961
418	14	BK-212	23-Oct-61	12E	100	211.0	15.5	228.0	1204	77.7	105.4	354.7	65.8	1961
419	13	BK-212	23-Oct-61	12E	100			228.0	1204		105.4		65.8	1961
420	15	BK-212	12-Sep-62	12E	100	201.0	18.5	221.0	1216	65.7	106.5	354.9	63.8	1962
421	16	BK-212	12-Sep-62	12E	100			221.0	1216		106.5		63.8	1962
422	17	BK-212	10-Sep-63	12E	100	177.0	21.5	199.6	1401	65.2	110.6	319.8	63.8	1963
423	19	BK-212	15-Dec-64	12E	100			194.6	1444		111.0		63.9	1964
424	18	BK-212	15-Dec-64	12E	100	175.0	18.0	194.6	1444	80.2	111.0	311.4	63.9	1964
425	20	BK-212	09-Feb-66	12E	100			183.2	1543		110.7	290.7	64.5	1966
426	21	BK-212	01-Jul-68	12E	100			199.8	1373		110.6	326.4	62.6	1968
427	22	BK-212	12-Apr-76	12E	100	174.7	24.3	200.6	1559	64.2	115.4	299.9	68.4	1976
428	23	BK-212	20-Mar-77	12E	100	208.0	20.9	229.9	1274	61.0	108.3	344.4	68.3	1977
429	24	BK-212	11-Feb-81	12E	100	134.0	26.8	162.8	1488	55.5	112.2	305.5	55.0	1981
430	25	BK-212	10-Sep-81	12E	100	209.9	28.0	238.8	919	32.8	101.2	446.2	55.0	1981
431	26	BK-212	15-Sep-81	12E	100	202.4	24.6	228.5	1050	42.6	108.0	416.9	56.0	1981
432	27	BK-212	11-May-88	12E	100	181.6	44.0	226.8	922	21.0	77.5	340.5	68.1	1988
433	28	BK-212	05-Oct-88	12E	100	206.4	54.9	262.1	869	15.8	78.0	363.7	73.7	1988
434	29	BK-212	25-Jul-90	12E	100	261.8	37.5	300.3	639	17.0	83.6	530.3	57.9	1990
435	1	BK-213	23-Mar-55	13E	100	143.8	24.4	161.5	1703	69.8	110.3	262.4	63.0	1955
436	2	BK-213	14-Oct-55	13E	100	178.0	12.0	190.0	1568	130.5	115.4		65.2	1955
437	3	BK-213	16-Jul-57	13E	100	158.3	15.2	175.3	1764	116.0	118.2	271.5	65.9	1957
438	4	BK-213	18-Sep-58	13E	100	132.0	15.0	148.4	1953	160.2	112.7	233.8	64.9	1958

439	5	BK-213	Jul-59	13E	100			169.6	1725		116.6		63.4	1959
440	6	BK-213	21-Aug-59	13E	100	176.0	12.0	189.9	1559	129.9	122.4	318.1	61.1	1959
441	7	BK-213	17-Mar-60	13E	100	167.0	14.3	182.7	1578	110.3	120.9	310.4	60.2	1960
442	8	BK-213	10-Aug-60	13E	100	201.9	11.1	215.0	1202	108.3	117.4	395.7	55.6	1960
443	9	BK-213	13-Apr-61	13E	100	171.0	13.6	186.1	1520	111.8	126.8	338.0	56.3	1961
444	10	BK-213	23-Oct-61	13E	100	211.0	9.0	221.2	1093	121.4	116.8	433.0	52.3	1961
445	11	BK-213	12-Sep-62	13E	100	201.5	12.6	216.3	1412	112.1	120.7	346.3	63.9	1962
446	12	BK-213	10-Sep-63	13E	100	181.0	12.2	195.2	1531	125.5	120.7	319.4	62.5	1963
447	13	BK-213	20-Nov-64	13E	100	185.5	11.5	198.3	1453	126.3	118.2	329.6	61.6	1964
448	14	BK-213	11-Feb-66	13E	100			184	1542		120.1	315.6	59.7	1966
449	15	BK-213	25-Jun-68	13E	100	181.0	14.5	196.3	1531	105.6	119.1	315.2	63.7	1968
450	16	BK-213	12-Apr-76	13E	100	190.0	19.3	211.0	1467	76.0	120.1	331.7	65.1	1976
451	17	BK-213	22-Mar-77	13E	100				1311		117.0	361.6		1977
452	18	BK-213	11-Feb-81	13E	100				1448		116.2	325.2		1981
453	19	BK-213	11-Sep-81	13E	100	215.9	21.0	239.2	1240	59.0	113.5	371.0	66.0	1981
454	20	BK-213	24-Mar-88	13E	100	158.2	29.8	189.0	1553	52.1	120.6	314.7	61.4	1988
455	21	BK-213	05-Oct-88	13E	100	203.3	24.2	228.3	1354	56.0	113.4	339.3	68.9	1988
456	22	BK-213	25-Jul-90	13E	100	257.8	22.5	281.3	1060	47.1	109.5	418.6	68.7	1990
457	1	BK-214	13-Oct-55	14E	100			196.0	1592		119.8		65.9	1955
458	2	BK-214	Jul-57	14E	100	152.7	14.8	169.6	1750	118.2	119.1	275.7	62.9	1957
459	3	BK-214	09-Sep-58	14E	100	130.2	17.1	148.5	1885	110.2	115.4	248.0	61.3	1958
460	4	BK-214	Jul-59	14E	100			163.0	1762		117.7		61.6	1959
461	5	BK-214	20-Aug-59	14E	100	169.0	15.0	184.9	1507	100.5	116.7	313.7	60.3	1959
462	6	BK-214	16-Mar-60	14E	100	159.0	14.8	175.1	1470	99.3	115.8	319.2	56.1	1960
463	7	BK-214	09-Aug-60	14E	100	195.0	10.0	206.5	1171	117.1	114.7	396.8	53.2	1960
464	8	BK-214	13-Apr-61	14E	100	162.5	14.9	179.3	1440	96.6	118.2	332.6	55.2	1961
465	9	BK-214	23-Oct-61	14E	100	202.5	11.7	215.5	1017	86.9	115.1	458.5	48.1	1961
466	10	BK-214	11-Sep-62	14E	100	183.0	19.5	205.5	1541	79.0	121.9	320.5	65.6	1962
467	11	BK-214	09-Sep-63	14E	100	164.7	18.3	183.7	1566	85.6	120.1	310.7	60.5	1963
468	12	BK-214	19-Nov-64	14E	100	174.0	19.4	196.7	1495	75.1	122.7	332.5	60.5	1964
469	13	BK-214	14-Feb-66	14E	100			173.0	1636		124.8	309.1	57.3	1966
470	14	BK-214	20-Apr-76	14E	100	148.9	21.3	171.5	1561	73.3	126.2	327.5	53.6	1976
471	15	BK-214	22-Mar-77	14E	100	188.9	15.5	205.5	1393	89.9	121.5	353.4	59.5	1977
472	16	BK-214	23-Feb-81	14E	100	112.5	19.5	134.0	1615	82.8	118.1	296.3	46.0	1981
473	17	BK-214	11-Sep-81	14E	100	183.6	20.6	205.7	1383	67.1	121.4	355.8	59.0	1981
474	18	BK-214	25-Mar-88	14E	100			165.0	1596		123.5	313.4	54.0	1988
475	20	BK-214	07-Aug-89	14E	100				1285		112.5	354.6		1989
476	21	BK-214	26-Jul-90	14E	100				1163		110.6	385.3		1990
477	1	BK-302	05-Dec-61	2R	75	146.6	96.9	245.8	872	9.0	99.2	461.3	54.6	1961
478	2	BK-302	18-Sep-62	2R	75	184.0	67.1	253.8	856	12.8	87.8	415.6	62.5	1962
479	3	BK-302	15-Jan-64	2R	75	133.3	106.2	241.5	887	8.4	89.1	407.0	60.7	1964
480	1	BK-303	05-Jan-51	3R	60			155.1	1372		79.9		67.2	1951
481	2	BK-303	11-Oct-59	3R	60			206.2	1001		78.0		66.8	1959
482	3	BK-303	05-Dec-61	3R	60	178.5	45.9	225.1	880	19.2	76.9	353.7	65.0	1961
483	4	BK-303	18-Sep-62	3R	60	190.5	39.9	232.5	824	20.7	75.4	370.7	64.2	1962
484	5	BK-303	15-Jan-64	3R	60	134.0	48.6	184.1	1088	22.4	76.7	285.6	65.9	1964
485	6	BK-303	25-Nov-64	3R	60	179.5	40.0	220.7	834	20.9	74.8	363.4	62.1	1964
486	7	BK-303	16-Feb-66	3R	60	161.7	44.1	207.2	856	19.4	75.1	355.5	59.6	1966
487	8	BK-303	16-Feb-66	3R	60				808		87.2	437.2		1966
488	1	BK-304	12-Oct-59	4R	75			147.0	1495		92.6		59.9	1959
489	2	BK-304	05-Dec-61	4R	75				1574		95.0	244.2		1961
490	3	BK-304	17-Sep-62	4R	75				1433		97.7	276.2		1962
491	4	BK-304	25-Nov-64	4R	75				1320		93.9	288.2		1964
492	5	BK-304	23-Apr-76	4R	75				1373		98.3	290.1		1976
493	6	BK-304	23-Mar-77	4R	75				1258		99.8	321.4		1977
494	7	BK-304	24-Mar-88	4R	75				1163		92.9	323.6		1988

495	1	BK-305	05-Dec-61	5R	75	84.0	56.6	145.9	1673	29.6	100.1	242.2	61.6	1961
496	2	BK-305	18-Sep-62	5R	75	137.3	42.5	186.3	1139	26.8	92.5	329.0	57.9	1962
497	3	BK-305	15-Jan-64	5R	75	87.0	53.8	154.4	1692	31.4	97.5	233.5	67.7	1964
498	5	BK-305	25-Nov-64	5R	75			150.0	1631		99.0		62.4	1964
499	4	BK-305	25-Nov-64	5R	75	104.5	43.5	150.0	1631	7.2	99.0	245.9	62.4	1964
500	6	BK-305	16-Feb-66	5R	75	91.9	56.2	159.1	1577	28.1	100.4	257.9	63.1	1966
501	7	BK-305	24-Mar-77	5R	75				985		89.2	366.9		1977
502	8	BK-305	11-Feb-81	5R	75				1229		94.2	310.9		1981
503	9	BK-305	23-Feb-81	5R	75				894		85.2	386.4		1981
504	10	BK-305	24-Mar-88	5R	75						85.5			1988
505	11	BK-305	08-May-88	5R	75				803		81.2	424.7		1988
506	1	BK-306	05-Dec-61	6R	75	72.9	66.7	142.1	1717	25.7	96.5	227.7	63.8	1961
507	2	BK-306	13-Sep-62	6R	75	124.0	51.5	176.7	1369	26.6	96.5	285.6	63.3	1962
508	3	BK-306	24-Jan-64	6R	75	85.9	42.9	130.3	1818	42.4	97.2	216.6	61.5	1964
509	4	BK-306	25-Nov-64	6R	75				1561		101.4	263.2		1964
510	1	BK-401	19-Sep-50	1W	60	168.2	28.5	198.0	932	32.7	64.5	280.4	72.2	1950
511	2	BK-401	14-Jul-54	1W	60				882		68.5			1954
512	3	BK-401	19-Aug-54	1W	60				784		63.3			1954
513	1	BK-403	18-Sep-50	3W	60	173.3	26.7	201.8	1083	40.6	75.6	282.4	73.1	1950
514	2	BK-403	08-Sep-58	3W	100	146.0	16.2	164.1	1785	111.2	111.5	253.1	66.4	1958
515	3	BK-403	Jul-59	3W	100			170.0	1451		106.7		58.4	1959
516	1	BK-405	18-Sep-50	5W	60	166.6	12.1	179.4	755	62.4	60.6	325.2	56.4	1950
517	2	BK-405	14-Jul-54	5W	75	158.0	14.0	172.0	1372	98.1	96.7		61.6	1954
518	3	BK-405	19-Aug-54	5W	75	160.0	14.0	174.0	1273	91.0	88.2		63.3	1954
519	4	BK-405	23-Mar-55	5W	75	154.9	44.1	200.2	1186	26.9	87.7	299.6	68.3	1955
520	5	BK-405	14-Oct-55	5W	75			242.0	930		87.2		65.2	1955
521	6	BK-405	08-Sep-58	5W	75				1121		86.7	313.3		1958
522	7	BK-405	Jul-59	5W	75			222.0	1052		86.5		68.2	1959
523	8	BK-405	24-Aug-59	5W	75	181.5	60.6	242.1	923	15.2	86.5	379.7	65.5	1959
524	9	BK-405	17-Sep-62	5W	75	199.0	58.6	258.6	828	14.1	88.7	434.0	61.0	1962
525	10	BK-405	12-Sep-63	5W	75	173.3	87.5	258.9	860	9.8	88.8	418.3	63.3	1963
526	11	BK-405	18-Nov-64	5W	75	175.5	112.5	288.7	745	6.6	88.7	482.5	61.2	1964
527	12	BK-405	07-Feb-66	5W	75			259.8	799		92.2	467.5	56.9	1966
528	13	BK-405	25-Jun-68	5W	75	160.8	97.8	260.0	752	7.7	88.5	476.8	55.8	1968
529	1	BK-406	18-Sep-50	6W	60	157.9	18.3	176.9	720	39.3	59.6	335.4	54.0	1950
530	2	BK-406	14-Jul-54	6W	75	157.0	29.5	186.5	1220	30.9	87.8		65.3	1954
531	3	BK-406	19-Aug-54	6W	75	156.0	23.0	181.0	1223	48.9	87.6		61.3	1954
532	4	BK-406	23-Mar-55	6W	75	153.9	31.1	186.1	1283	41.2	87.5	276.3	68.9	1955
533	5	BK-406	14-Oct-55	6W	75			210.0	1102		87.9		66.6	1955
534	6	BK-406	10-Jul-57	6W	75	174.3	34.5	209.7	1231	35.7	86.9	286.0	75.0	1957
535	7	BK-406	08-Sep-58	6W	75	145.6	43.0	189.3	1297	30.2	85.2	266.1	72.8	1958
536	8	BK-406	Jul-59	6W	75			217.0	1157		86.2		73.6	1964
537	9	BK-406	24-Aug-59	6W	75	187.0	43.0	230.8	1025	23.8	86.6	342.3	69.0	1959
538	10	BK-406	15-Mar-60	6W	75	187.5	51.5	240.0	936	18.2	85.5	370.1	66.3	1960
539	11	BK-406	11-Apr-61	6W	75	186.4	65.6	253.0	898	13.7	88.8	400.6	64.6	1961
540	12	BK-406	24-Oct-61	6W	75	216.7		278.9	800		87.7	444.1	64.2	1961
541	13	BK-406	17-Sep-62	6W	75				783		87.8	454.3		1962
542	14	BK-406	12-Sep-63	6W	75				860		90.2	424.9		1963
543	15	BK-406	18-Nov-64	6W	75				836		89.4	433.3		1964
544	16	BK-406	15-Feb-66	6W	75				859		91.7	432.5		1966
545	17	BK-406	25-Oct-77	6W	75	132.3	63.7	197.2	1648	25.9	127.2	312.7	65.4	1977
546	18	BK-406	17-Sep-81	6W	125	136.5	68.4	205.9	1491	21.7	126.7	344.9	61.0	1981
547	19	BK-406	14-Aug-85	6W	125	164.0	13.8	178.8	1154	83.6	124.6	437.6	41.8	1985
548	20	BK-406	17-Mar-88	6W	125	143.3	44.7	189.0	1475	33.0	139.0	381.8	51.0	1988
549	21	BK-406	05-Oct-88	6W	125				1464		128.6	355.8		1988
550	22	BK-406	17-Jul-90	6W	125				1036		127.7	499.6		1990

551	1	BK-407	14-Jul-54	7W	100				1860		117.5			1954
552	2	BK-407	19-Aug-54	7W	100				1618		113.2			1954
553	3	BK-407	23-Mar-55	7W	100	153.6	6.7	163.5	1801	268.9	113.4	255.1	65.6	1955
554	4	BK-407	14-Oct-55	7W	100				1349		101.6			1955
555	5	BK-407	10-Jul-57	7W	100	167.0	12.4	180.9	1463	117.9	106.9	296.0	62.5	1957
556	6	BK-407	11-Sep-58	7W	100	142.5		161.5	1807	102.7	116.2	260.5	63.4	1958
557	7	BK-407	Jul-59	7W	100			170.0	1451		106.7		58.4	1959
558	8	BK-407	24-Aug-59	7W	100			204.5	1151		100.8	354.8	59.0	1959
559	9	BK-407	14-Mar-60	7W	100	191.2	18.8	211.7	1622	86.3	127.0	317.2	68.3	1960
560	10	BK-407	11-Aug-60	7W	100	220.4	14.9	237.4	1510	100.7	127.3	341.6	71.1	1960
561	11	BK-407	11-Apr-61	7W	100	200.0	14.0	216.2	1510	107.9	127.2	341.3	64.8	1961
562	12	BK-407	24-Oct-61	7W	100	224.5	17.2	243.8	1335	77.6	128.3	389.3	64.1	1961
563	13	BK-407	17-Sep-62	7W	100	211.1	20.6	234.7	1329	64.5	127.2	387.8	61.9	1962
564	14	BK-407	13-Sep-63	7W	100	183.6	21.1	206.9	1442	68.3	125.0	351.2	60.4	1963
565	15	BK-407	17-Nov-64	7W	100	187.0	25.5	213.3	1305	51.2	126.2	391.8	55.7	1964
566	16	BK-407	07-Feb-66	7W	100			201.1	1567		116.4	301.0	68.4	1966
567	17	BK-407	18-Apr-74	7W	100	126.2		163.2	1045	30.3	119.6	463.7	36.0	1974
568	18	BK-407	22-Apr-76	7W	100	165.5	27.7	194.7	1445	52.2	123.8	347.1	27.4	1976
569	19	BK-407	24-Mar-77	7W	100	217.9	22.5	241.4	1055	46.9	120.5	462.8	53.4	1977
570	20	BK-407	02-Feb-81	7W	100	139.0	31.9	172.9	1486	46.5	120.3	328.2	54.0	1981
571	21	BK-407	21-Sep-81	7W	100	201.4	22.2	225.6	1176	52.9	115.4	397.6	58.0	1981
572	22	BK-407	22-Mar-88	7W	100	165.3	40.4	206.9	1567	38.8	122.7	317.1	67.0	1988
573	23	BK-407	05-Oct-88	7W	100	203.7	45.3	250.0	1413	31.2	119.8	343.6	74.5	1988
574	24	BK-407	07-Aug-89	7W	100	242.0	28.1	271.6	803	28.6	116.5	587.7	47.5	1989
575	1	BK-408	23-Mar-55	8W	100	149.6	16.4	169.1	1918	116.9	121.7	257.1	67.3	1955
576	2	BK-408	14-Oct-55	8W	100			203.0	1789		127.7		71.6	1955
577	3	BK-408	10-Jul-57	8W	100	156.6	16.5	176.1	1826	110.7	125.3	278.0	64.8	1957
578	4	BK-408	08-Sep-58	8W	100	132.1	14.1	150.0	1804	127.9	116.9	262.5	58.4	1958
579	5	BK-408	01-Jul-59	8W	100			169.0	1688		116.7		61.7	1959
580	6	BK-408	15-Mar-60	8W	100	180.0	13.0	194.3	1430	110.0	123.1	348.8	57.0	1960
581	7	BK-408	11-Aug-60	8W	100	207.2	9.2	217.4	1165	126.6	113.1	393.3	56.5	1960
582	8	BK-408	11-Apr-61	8W	100			195.2	1250		111.8		55.1	1961
583	9	BK-408	23-Oct-61	8W	100	214.2	12.4	227.7	1154	93.1	107.2	376.4	61.9	1961
584	10	BK-408	17-Sep-62	8W	100	198.0	14.1	213.1	1308	92.8	111.4	345.0	63.2	1962
585	11	BK-408	12-Sep-63	8W	100	174.2	27.6	192.9	1430	51.8	117.0	331.5	59.5	1963
586	12	BK-408	18-Nov-64	8W	100	187.0	14.4	202.6	1249	86.7	113.5	368.2	56.3	1964
587	13	BK-408	07-Feb-66	8W	100			177.5	1377		120.9	355.7	51.1	1966
588	14	BK-408	01-Jul-68	8W	100			186.7	1499		115.6	312.4	61.7	1968
589	15	BK-408	22-Apr-76	8W	100	174.1	22.8	196.1	1601	70.2	118.8	300.6	66.7	1976
590	16	BK-408	23-Mar-77	8W	100	207.0	19.0	227.0	1185	62.4	113.9	389.4	59.6	1976
591	17	BK-408	11-Feb-81	8W	100	119.0	33.0	153.0	1534	46.4	115.4	304.8	51.0	1981
592	18	BK-408	17-Sep-81	8W	100	188.3	30.6	219.8	1193	38.9	128.7	437.0	52.0	1981
593	19	BK-408	13-Aug-85	8W	100	150.3	45.1	196.4	1392	30.8	127.6	371.4	54.1	1985
594	20	BK-408	24-Mar-87	8W	100	74.6	69.2	144.8	1665	24.1	128.7	313.1	47.3	1987
595	21	BK-408	17-Mar-88	8W	100	148.2	48.8	198.0	1483	30.4	127.7	349.0	58.0	1988
596	22	BK-408	27-Sep-88	8W	100	198.5	38.7	238.2	1185	30.6	123.6	422.6	57.7	1988
597	23	BK-408	04-Aug-89	8W	100	218.5	31.5	251.1	1024	32.5	120.0	474.7	54.2	1989
598	24	BK-408	13-Jul-90	8W	100	240.7	5.3	246.5	253	47.7	81.6	1307.3	19.3	1990
599	1	BK-409	24-Mar-55	9W	100	140.6	15.9	158.4	2024	127.3	145.0	290.3	55.8	1955
600	2	BK-409	14-Oct-55	9W	100			199.0	1862		134.1		69.8	1955
601	3	BK-409	10-Jul-57	9W	100	151.0	19.5	172.7	2001	102.6	136.8	276.9	63.1	1957
602	4	BK-409	08-Sep-58	9W	100	133.0	19.6	154.8	2032	103.7	133.0	265.2	72.8	1958
603	5	BK-409	Jul-59	9W	100			171.0	1867		133.4		60.4	1959
604	6	BK-409	24-Aug-59	9W	100	177.5	20.5	200.0	1785	87.1	145.2	329.6	62.1	1959
605	7	BK-409	14-Mar-60	9W	100	186.4	16.6	204.8	1624	98.8	151.9	379.0	55.3	1960
606	8	BK-409	11-Aug-60	9W	100	213.4	13.4	228.8	1126	84.0	135.6	487.9	48.0	1960

607	9	BK-409	Apr-61	9W	100			214.7	1178		125.6		50.9	1961
608	10	BK-409	06-Oct-61	9W	100	230.0	10.0	240.0	734	73.4	117.7		37.8	1961
609	11	BK-409	24-Oct-61	9W	100	224.1	12.4	237.9	794	64.0	116.7	595.5	40.9	1961
610	12	BK-409	13-Sep-62	9W	100	203.5	25.5	230.1	1283	50.3	122.9	388.1	60.7	1962
611	13	BK-409	13-Sep-63	9W	100	177.5	28.5	207.2	1430	50.2	121.3	343.7	61.7	1963
612	14	BK-409	17-Nov-64	9W	100	195.0	26.7	222.7	1405	52.6	121.5	350.4	65.0	1964
613	15	BK-409	07-Feb-66	9W	100			203.3	1435		119.7	338.0	61.5	1966
614	16	BK-409	21-Apr-76	9W	100	165.0	31.3	197.9	1405	44.9	117.8	339.7	59.6	1976
615	17	BK-409	22-Mar-77	9W	100	222.1	24.8	248.1	1119	45.1	115.2	417.1	60.9	1977
616	18	BK-409	04-Feb-81	9W	100	136.4	41.4	179.7	1365	32.9	115.8	343.8	54.0	1981
617	19	BK-409	18-Mar-88	9W	100	162.0	37.0	200.9	1452	39.2	123.6	344.9	60.0	1988
618	20	BK-409	29-Sep-88	9W	100	208.7	30.4	239.9	1279	42.1	116.6	369.4	66.4	1988
619	21	BK-409	07-Aug-89	9W	100	247.0	24.3	273.8	1135	46.7	112.1	400.0	70.1	1989
620	22	BK-409	16-Jul-90	9W	100	266.6	47.7	316.8	842	17.7	97.6	469.6	69.1	1990
621	1	BK-410	01-Mar-60	10W	150			215.0	2202		206.4		57.9	1960
622	2	BK-410	14-Mar-60	10W	150	189.5	30.5	221.2	2365	77.5	201.1	353.2	64.1	1960
623	3	BK-410	11-Aug-60	10W	150	219.6	22.0	245.6	1922	87.4	203.8	429.6	58.5	1960
624	4	BK-410	13-Apr-61	10W	150			230.0	2240		205.7		63.2	1961
625	5	BK-410	24-Oct-61	10W	150	221.6	24.0	248.3	2163	90.1	206.5	386.8	65.7	1961
626	6	BK-410	Sep-62	10W	150			259.3	2044		207.6		64.6	1962
627	7	BK-410	17-Sep-62	10W	150	221.4	22.6	248.7	2128	94.2	205.2	390.7	65.1	1962
628	8	BK-410	17-Sep-63	10W	150	181.5	25.3	211.6	2348	92.8	199.4	344.1	62.9	1963
629	9	BK-410	17-Nov-64	10W	150	195.5	20.5	221.6	2189	106.8	204.5	378.5	59.9	1964
630	10	BK-410	11-Feb-66	10W	150			214.2	2053		190.0	375.0	58.4	1966
631	11	BK-410	02-Jul-68	10W	150			238.3	1936		192.4	402.6	60.6	1968
632	1	BK-411	14-Mar-60	11W	150	196.0	42.5	236.2	2090	49.2	206.9	401.1	60.3	1960
633	2	BK-411	11-Aug-60	11W	150	220.0	40.9	264.3	2026	49.5	208.2	416.3	64.9	1960
634	3	BK-411	13-Apr-61	11W	150			245.6	2100		207.4		62.8	1961
635	4	BK-411	24-Oct-61	11W	150			257.6	1935		208.5		60.4	1961
636	5	BK-411	28-Sep-62	11W	150	218.7	38.1	259.3	2044	53.6	207.6	411.4	64.6	1962
637	6	BK-411	17-Sep-63	11W	150	181.4	44.1	229.7	2164	49.1	204.1	382.1	61.5	1963
638	7	BK-411	Nov-64	11W	150			221.6	2189		204.5		59.9	1964
639	8	BK-411	17-Nov-64	11W	150	190.2	43.8	237.3	2033	46.4	204.1	406.7	59.3	1964
640	9	BK-411	11-Feb-66	11W	150			227.2	2014		202.3	407.0	57.1	1966
641	10	BK-411	02-Jul-68	11W	150			246.2	1733		205.5	480.4	52.4	1968
642	11	BK-411	21-Apr-76	11W	150	177.7	75.9	255.6	1731	22.8	185.3	433.7	60.3	1976
643	12	BK-411	25-Mar-77	11W	150	231.3	70.0	302.6	1380	19.7	182.8	536.7	57.7	1977
644	13	BK-411	15-Aug-85	11W	150	193.8	105.6	301.8	1272	12.0	157.9	502.9	61.4	1985
645	14	BK-411	25-Mar-87	11W	150	89.0	141.0	231.4	1630	11.6	153.9	382.5	62.0	1987
646	15	BK-411	18-Mar-88	11W	150	180.0	110.0	291.6	1498	13.6	162.6	439.8	68.0	1988
647	16	BK-411	29-Sep-88	11W	150	221.2	126.6	348.9	1161	9.2	151.9	530.0	67.3	1988
648	17	BK-411	07-Aug-89	11W	150	254.0	75.5	330.5	1154	15.3	155.5	545.9	61.9	1989
649	18	BK-411	16-Jul-90	11W	150	281.2	56.3	338.8	1312	23.3	170.9	527.8	65.7	1990
650	1	BK-412	Mar-60	12W	150			225.9	2320		203.4		65.1	1960
651	2	BK-412	14-Mar-60	12W	150	186.5	25.5	215.0	2202	86.4	206.4	379.8	57.9	1960
652	3	BK-412	11-Aug-60	12W	150	220.0	23.8	248.2	2122	89.2	206.5	394.3	64.4	1960
653	4	BK-412	13-Apr-61	12W	150			230.5	1960		203.1		56.6	1961
654	5	BK-412	24-Oct-61	12W	150			245.8	1865		203.0		57.0	1961
655	6	BK-412	13-Sep-62	12W	150				1731		189.5	403.5		1962
656	7	BK-412	17-Sep-63	12W	150	183.5	27.6	215.7	1878	68.0	198.1	427.4	51.6	1963
657	8	BK-412	17-Nov-64	12W	150	191.5	21.8	216.3	1554	71.3	194.3	506.6	43.7	1964
658	9	BK-412	11-Feb-66	12W	150			227.2	2014		202.3	407.0	57.1	1966
659	10	BK-412	02-Jul-68	12W	150			225.1	1983		196.3	401.1	57.4	1968
660	11	BK-412	25-Mar-77	12W	150	227.1	31.9	260.5	1680	52.7	174.6	421.1	63.3	1977
661	12	BK-412	15-Aug-85	12W	150	193.5	47.0	241.8	1478	31.4	166.2	455.6	54.3	1985
662	13	BK-412	25-Mar-87	12W	150	87.0	63.4	152.4	1864	29.4	155.0	336.8	46.3	1987

663	14	BK-412	18-Mar-88	12W	150	186.6	60.4	249.7	2014	33.3	193.7	389.7	66.0	1988
664	15	BK-412	29-Sep-88	12W	150	228.7	49.3	280.3	1774	36.0	195.0	445.4	64.4	1988
665	16	BK-412	07-Aug-89	12W	150	255.0	45.0	301.9	1694	37.6	195.7	468.1	66.0	1989
666	17	BK-412	16-Jul-90	12W	150	253.2	66.0	320.7	1638	24.8	199.6	493.7	66.5	1990
667	1	BK-413	Mar-60	13W	150			221.2	2365		206.4		64.1	1960
668	2	BK-413	14-Mar-60	13W	150	192.5	30.5	225.9	2320	76.1	203.4	355.2	65.1	1960
669	3	BK-413	11-Aug-60	13W	150	220.8	24.4	248.9	2094	85.8	201.4	389.7	65.4	1960
670	4	BK-413	13-Apr-61	13W	150	197.7	25.3	225.8	2220	87.7	197.8	361.0	64.0	1961
671	5	BK-413	25-Oct-61	13W	150	227.8	25.0	255.7	2008	80.3	201.1	405.8	64.5	1961
672	6	BK-413	17-Sep-62	13W	150	214.5	28.6	244.8	2045	71.5	200.7	397.6	63.0	1962
673	7	BK-413	17-Sep-63	13W	150	177.0	38.0	218.8	2212	58.2	199.4	365.2	61.3	1963
674	8	BK-413	17-Nov-64	13W	150	193.0	43.5	239.3	1923	44.2	200.7	422.8	57.9	1964
675	9	BK-413	08-Feb-66	13W	150			227.8	1959		196.8	407.0	57.3	1966
676	10	BK-413	25-Jun-68	13W	150	173.9	85.2	261.8	2043	24.0	208.4	413.3	64.8	1968
677	11	BK-413	22-Apr-76	13W	150	182.5	63.5	248.1	1968	31.0	179.9	370.4	68.5	1976
678	12	BK-413	24-Mar-77	13W	150	231.4	55.0	288.4	1753	31.9	184.1	425.5	69.3	1977
679	13	BK-413	02-Feb-81	13W	150	150.7	70.3	223.9	1952	27.7	182.8	379.5	60.0	1981
680	14	BK-413	21-Sep-81	13W	150	203.0	56.6	261.6	1807	31.9	185.2	415.4	65.0	1981
681	15	BK-413	15-Aug-85	13W	150	214.0	38.9	254.5	1633	41.9	188.4	467.6	55.7	1985
682	16	BK-413	18-Mar-88	13W	150	196.5	75.0	272.8	1912	25.5	189.7	401.9	69.4	1988
683	17	BK-413	30-Sep-88	13W	150	233.9	66.7	301.8	1742	26.1	185.3	430.9	71.6	1988
684	18	BK-413	07-Aug-89	13W	150	255.7	62.2	321.7	1576	25.3	179.1	460.4	71.5	1989
685	19	BK-413	17-Jul-90	13W	150	291.5	43.7	337.4	1177	26.9	156.7	539.4	64.0	1990
686	1	BK-501	28-Apr-54	1FN	60				1151		77.7			1954
687	2	BK-501	13-Sep-62	1FN	60	132.0	29.0	206.9	874	30.1	81.4	377.3	56.1	1962
688	3	BK-501	24-Jan-64	1FN	60	75.8		174.5	986		83.0	341.0	52.3	1964
689	4	BK-501	25-Nov-64	1FN	60	99.0	88.5	195.5	892	10.1	81.3	369.3	54.2	1964
690	5	BK-501	17-Feb-66	1FN	60	69.3	115.7	191.1	896	7.7	81.9	370.3	52.8	1966
691	1	BK-502	13-Sep-62	2FS	60	129.5	67.5	203.2	889	13.2	75.6	344.5	60.3	1962
692	2	BK-502	25-Nov-64	2FS	60	99.5	69.1	176.8	940	13.6	75.3	324.6	55.7	1964
693	3	BK-502	17-Feb-66	2FS	60	70.8	83.0	160.3	978	11.8	75.8	314.0	52.2	1966

APPENDIX C

PUMP TESTS FOR NEW WELLS

DEEP WELL DEVELOPING

Residence Phones
222-9440
Business Phone
237-0869

HOLCOMB & SON, Inc.
1420 NORTH HUGHES
FRESNO, CALIF. 93728

State Contractor
Lic. # 243928
Class. C57 & C61

WELL DATA

Customer [redacted] Date 7-10-91

Address .... Well No. E-15

City Corcoran, CA Section 3 mile E. of Hwy 43/1/2 mile N. of ~~Ave. 108~~

Well Drilled by .... Depth Drilled .... Ft. Cased .... Ft.

Blank Casing Pit 16 In. 480 Ft. From 0 Ft. To 480 Ft.

~~Perforated~~ slip Casing 16 In. 20 Ft. From 480 Ft. To 500 Ft.

Perforated Casing 16 In. 430 Ft. From 500 Ft. To 930 Ft.

Well is Cemented .... Graveled XX Plain .... Cable Tool .... Rotary XX

Developing Pump Set by Kemble Hydra Tech

Pump Setting 460 Ft. 10 In. Plus .... Ft. of .... In. Suction Total ....

With .... Stages of .... In. Developing Bowls XX Permanent .... H. P. Bowls

Discharge Pipe Size 10 In. Orifice Size .... In. Flowmeter XX

During 1st Hours of Running: 2100 G. P. M. From 377 Ft. Pumping Level

PUMPING LEVEL TEST AT END OF RUN

Shaft R. P. M.	G. P. M.	Pumping Level	Yield Per Ft.	Standing Level	
1910	2600	331 Ft.	55.32) G. P. F.	Pre-Run	215 Ft.
1818	2175	321 Ft.	58.78 G. P. F.	5 Min.	284 Ft.
1727	1875	317 Ft.	56.92 G. P. F.	10 Min.	282 Ft.
1636	1450	308 Ft.	60.42 G. P. F.	Static	270.5 Ft.
1545	1000	298 Ft.	71.43 G. P. F.	Use	284 Ft.

Water Sample Taken for Analysis NO Irrigation XX Domestic Use ....

Test Started 7-9-91 1450 Shut Down 7-10-91 1625 Tot. 11.5 Hrs.

Well Surged 8 Times. Water Temp. .... F. Approx. H. P. Used 360

Relative Presence of Sand at Shut Down: Clear XX Moderate .... Heavy .... @ all G.P.M.

Presence of Gas .... Air ....

HOLCOMB & SON, Inc.

Tested by: Ed Rau II

DEEP WELL DEVELOPING

Residence Phones
222-9440
Business Phone
237-0869

HOLCOMB & SON, Inc.
1420 NORTH HUGHES
FRESNO, CALIF. 93728

State Contractor
Lic. # 243928
Class. C57 & C61

WELL DATA

Customer [redacted] Date 7-20-91

Address 10015 Utica Well No. E-16

City Corcoran, CA 93212 Section 1.5 M. E. of Hwy 43
.5 M. N., of 108

Well Drilled by Gravow Drilling Depth Drilled ...... Ft. Cased ...... Ft.

Blank Casing Pit ...... In. ...... Ft. From ...... Ft. To ...... Ft.

Perforated Casing ...... In. ...... Ft. From ...... Ft. To ...... Ft.

Perforated Casing ...... In. ...... Ft. From ...... Ft. To ...... Ft.

Well is Cemented ...... Graveled ...... Plain ...... Cable Tool X Rotary X

Developing Pump Set by Kemble Hydro Tech

Pump Setting 460 Ft. 10 In. Plus ...... Ft. of ...... In. Suction Total ......

With ...... Stages of ...... In. Developing Bowls X Permanent ...... H. P. Bowls

Discharge Pipe Size 10 In. Orifice Size ...... In. Flowmeter X

During 1st Hours of Running: 2100 G. P. M. From 344 Ft. Pumping Level

PUMPING LEVEL TEST AT END OF RUN

Shaft R. P. M.	G. P. M.	Pumping Level	Yield Per Ft.	Standing Level	
19111	2550	333 Ft.	40.4 G. P. F.	Pre-Run	air line plugged Ft.
1820	2100	328 Ft.	36.2 G. P. F.	5 Min.	282.4 Ft.
1774	1800	323 Ft.	33.9 G. P. F.	10 Min.	281.1 Ft.
1683	1400	313 Ft.	32.5 G. P. F.	Static	270 Ft.
		Ft.	G. P. F.	Use	282.4 Ft.

Water Sample Taken for Analysis NO Irrigation X Domestic Use ......

Test Started 7-19-91 1125 Shut Down 7-20-91 1545 Tot. 13225 Hrs.

Well Surged 8 Times. Water Temp. ...... F. Approx. H. P. Used 330

Relative Presence of Sand at Shut Down: Clear X Moderate ...... Heavy ...... @ all G.P.M.

Presence of Gas ...... Air NO

NOTICE
"Under the Mechanics' Lien Law (California Code of Civil Procedure, Section 1181 et seq.), any contractor, sub-contractor, laborer, supplier or other person who helps to improve your property but is not paid for his work or supplies, has a right to enforce a claim against your property. This means that, after a court hearing, your property could be sold by a court officer and the proceeds of the sale used to satisfy the indebtedness. This can happen even if you have paid your own contractor in full, if the sub-contractor, laborer, or supplier remains unpaid."

HOLCOMB & SON, Inc.

Tested by: Ed Rau

Residence Phones
222-9440
Business Phone
237-0869

DEEP WELL DEVELOPING

HOLCOMB & SON, Inc.
1420 NORTH HUGHES
FRESNO, CALIF. 93728

State Contractor
Lic. # 243928
Class. C57 & C61

WELL DATA

Customer [redacted] Date July 26, 1991

Address Well No. E17

City Section 1 1/2 mile E of Hwy 43
1/4 mile N of Avenue 108

Well Drilled by Grabow Well Drilling Depth Drilled ____ Ft. Cased ____ Ft.
Conductor 1/4x30" 0 50

Blank Casing Pit 5/16x16 In. 560 Ft. From 0 Ft. To 560 Ft.

Compression ~~Perforated~~ Casing 5/16x1-8/16 In. 20 Ft. From 560 Ft. To 580 Ft.

Perforated Casing 5/16x16 In. 360 Ft. From 580 Ft. To 580 Ft.

Well is Cemented ____ Graveled X Plain ____ Cable Tool ____ Rotary X

Developing Pump Set by Kemble Hydro Tech

Pump Setting 460 Ft. 10 In. Plus ____ Ft. of ____ In. Suction Total ____

With ____ Stages of ____ In. Developing Bowls X Permanent ____ H. P. Bowls

Discharge Pipe Size 10 In. Orifice Size ____ In. Flowmeter X

During 1st Hours of Running: 1600 G. P. M. From 460 Ft. Pumping Level

PUMPING LEVEL TEST AT END OF RUN

Shaft R. P. M.	G. P. M.	Pumping Level	Yield Per Ft.	Standing Level	
1950	2200	388 Ft.	22.36 G. P. F.	Pre-Run	230 Ft.
1875	2000	380.0 Ft.	22.08 G. P. F.	5 Min.	289.6 Ft.
1750	1600	362 Ft.	22.10 G. P. F.	10 Min.	286.5 Ft.
1700	1380	351 Ft.	22.48 G. P. F.	Static	274.3 Ft.
1600	1240	340 Ft.	24.6 G. P. F.	Use	289.6 Ft.

Water Sample Taken for Analysis no Irrigation X Domestic Use ____

Test Started 7/24/91 11:55 Shut Down 7/26/91 14:22 Tot. 16 Hrs.

Well Surged 23 Times. Water Temp. 75° F. Approx. H. P. Used 360

Relative Presence of Sand at Shut Down: Clear X Moderate ____ Heavy ____ @ all G.P.M.

Presence of Gas no Air no

HOLCOMB & SON, Inc.

Tested by: Ed Rau

Business Phone
(209) 237-0869

Residence Phone
(209) 222-9440

DEEP WELL DEVELOPING

HOLCOMB & SON, Inc.

P.O. BOX 9186
1420 NORTH HUGHES
FRESNO, CALIFORNIA 93791

State Contractor
Lic. #243928
Class. C57 & C61

WELL DATA

Custo[redacted] Date 8-2-91

Addre[redacted] Well No. E-18

City [redacted] Section 1 m. E. of Hwy 43, 1/2 m. N. of Ave 108

Well Drilled by Graybow Drilling Depth Drilled ______ Ft. Cased ______ Ft.

Blank Casing Pit ______ In. ______ Ft. From ______ Ft. To ______ Ft.

Perforated Casing ______ In. ______ Ft. From ______ Ft. To ______ Ft.

Perforated Casing ______ In. ______ Ft. From ______ Ft. To ______ Ft.

Well is Cemented ______ Graveled XX Plain ______ Cable Tool ______ Rotary XX

Developing Pump Set by Kemble Hydro Tech

Pump Setting 460 Ft. 10 In. Plus ______ Ft. of ______ In. Suction Total ______

With ______ Stages of ______ In. Developing Bowls ______ Permanent ______ H. P. Bowls

Discharge Pipe Size 10 In. Orifice Size ______ In. Flowmeter XX

During 1st Hours of Running: 2259 G. P. M. From 353.74 Ft. Pumping Level

PUMPING LEVEL TEST AT END OF RUN

Shaft R. P. M.	G. P. M.	Pumping Level		Yield Per Ft.		Standing Level		
1955	2450	344.5	Ft.	42.42	G. P. F.	Pre-Run	249.79	Ft.
1818	2150	339.88	Ft.	40.47	G. P. F.	5 Min.	286.75	Ft.
1773	1850	332.95	Ft.	40.04	G. P. F.	10 Min.	284.44	Ft.
1682	1400	321.4	Ft.	40040	G. P. F.	Static		Ft.
1636	1100	316.78	Ft.	36.63	G. P. F.	Use	286.75	Ft.

Water Sample Taken for Analysis NO Irrigation XX Domestic Use ______

Test Started 0855 Shut Down 1410 Tot. 5 Hrs.

Well Surged 6 Times. Water Temp. 75° F. Approx. H. P. Used 250

Relative Presence of Sand at Shut Down: Clear XX Moderate ______ Heavy ______ @ ______ G.P.M.

Presence of Gas NO Air NO

HOLCOMB & SON, Inc.

Tested by: ED RAU

Residence Phones
222-9440
Business Phone
237-0869

DEEP WELL DEVELOPING

HOLCOMB & SON, Inc.
1420 NORTH HUGHES
FRESNO, CALIF. 93728

State Contractor
Lic. # 243928
Class. C57 & C61

WELL DATA

Customer [redacted] Date Aug. 12, 1991

Address Well No. E-19

City Section 1/2 mile N of Avenue 108
E of Hwy 43

Well Drilled by Graybow Depth Drilled ______ Ft. Cased ______ Ft.

Blank Casing Pit ______ In. ______ Ft. From ______ Ft. To ______ Ft.

Perforated Casing ______ In. ______ Ft. From ______ Ft. To ______ Ft.

Perforated Casing ______ In. ______ Ft. From ______ Ft. To ______ Ft.

Well is Cemented ______ Graveled X Plain ______ Cable Tool ______ Rotary Rev

Developing Pump Set by Kemble Hydro Teck

Pump Setting 460 Ft. ______ In. Plus ______ Ft. of ______ In. Suction Total ______

With ______ Stages of ______ In. Developing Bowls X Permanent ______ H. P. Bowls

Discharge Pipe Size ______ In. Orifice Size ______ In. Flowmeter X

During 1st Hours of Running: 2600 G. P. M. From 349 Ft. Pumping Level

PUMPING LEVEL TEST AT END OF RUN

Shaft R. P. M.	G. P. M.	Pumping Level	Yield Per Ft.	Standing Level	
1910	2740	330.6 Ft.	53.94 G. P. F.	Pre-Run	261.3 Ft.
1795	2310	323.7 Ft.	52.62 G. P. F.	5 Min.	279.8 Ft.
1727	1865	314.5 Ft.	53.75 G. P. F.	10 Min.	278.7 Ft.
1660	1490	307.5 Ft.	53.79 G. P. F.	Static	Ft.
1523	1125	300.6 Ft.	54.9 G. P. F.	Use	279.8 Ft.

Water Sample Taken for Analysis no Irrigation X Domestic Use ______

Test Started Aug. 12, '91 10:35 Shut Down 8/12/91 17:00 Tot. 6.5 Hrs.

Well Surged 14 Times. Water Temp. ______ F. Approx. H. P. Used 350

Relative Presence of Sand at Shut Down: Clear X Moderate tint Heavy ______ @ all G.P.M.

Presence of Gas none Air none

HOLCOMB & SON, Inc.

Tested by: ED RAU

Residence Phones
222-9440
Business Phone
237-0869

DEEP WELL DEVELOPING

HOLCOMB & SON, Inc.
1420 NORTH HUGHES
FRESNO, CALIF. 93728

State Contractor
Lic. # 243928
Class. C57 & C61

WELL DATA

Customer [redacted] Date Aug. 23, 1991
Address Well No. G18
City Section 1/2 mile W of hwy 43
1/2 mile S of Avenue 120

Well Drilled by Grabow Well Drilling Depth Drilled ...... Ft. Cased ...... Ft.

Blank Casing Pit ...... In. ...... Ft. From ...... Ft. To ...... Ft.

Perforated Casing ...... In. ...... Ft. From ...... Ft. To ...... Ft.

Perforated Casing ...... In. ...... Ft. From ...... Ft. To ...... Ft.

Well is Cemented ...... Graveled X Plain ...... Cable Tool ...... Rotary Rev.

Developing Pump Set by Kemble Hydro Tech

Pump Setting 460 Ft. 10 In. Plus ...... Ft. of ...... In. Suction Total ......

With ...... Stages of ...... In. Developing Bowls ......, Permanent ...... H. P. Bowls

Discharge Pipe Size 10 In. Orifice Size ...... In. Flowmeter X

During 1st Hours of Running: 2500 G. P. M. From 335.3 Ft. Pumping Level

PUMPING LEVEL TEST AT END OF RUN

Shaft R. P. M.	G. P. M.	Pumping Level	Yield Per Ft.	Standing Level
1910	2625	319.1 Ft.	42.07 G. P. F.	Pre-Run 243 Ft.
1818	2375	312.2 Ft.	42.79 G. P. F.	5 Min. 256.7 Ft.
1727	1880	300.6 Ft.	42.82 G. P. F.	10 Min. 256.7 Ft.
1682	1685	296.0 Ft.	42.87 G. P. F.	Static ...... Ft.
1523	1085	279.8 Ft.	46.97 G. P. F.	Use ...... Ft.

Water Sample Taken for Analysis no Irrigation X Domestic Use ......

Test Started 8/23 13:55 Shut Down 8/23 19:55 Tot. 6 Hrs.

Well Surged 15 Times. Water Temp. ...... F. Approx. H. P. Used 350

Relative Presence of Sand at Shut Down: Clear tint Moderate ...... Heavy ...... @ ...... G.P.M.

Presence of Gas H2S Air no

HOLCOMB & SON, Inc.

Tested by: Ed Rau

Residence Phones
222-9440
Business Phone
237-0869

DEEP WELL DEVELOPING

HOLCOMB & SON, Inc.
1420 NORTH HUGHES
FRESNO, CALIF. 93728

State Contractor
Lic. # 243928
Class. C57 & C61

WELL DATA

Customer [redacted] Date Aug. 30, 1991

Address [redacted] Well No. G-19

City [redacted] Section 3/4 mile W of hwy 43 on N side of Avenue 112

Well Drilled by Grabow Depth Drilled ..... Ft. Cased ..... Ft.

Blank Casing Pit 16 In. ..... Ft. From ..... Ft. To ..... Ft.

Perforated Casing ..... In. ..... Ft. From ..... Ft. To ..... Ft.

Perforated Casing ..... In. ..... Ft. From ..... Ft. To ..... Ft.

Well is Cemented ..... Graveled X Plain ..... Cable Tool ..... Rotary Rev.

Developing Pump Set by Kemble Hydro Tech

Pump Setting 460 Ft. 10 In. Plus ..... Ft. of ..... In. Suction Total .....

With ..... Stages of ..... In. Developing Bowls X Permanent ..... H. P. Bowls

Discharge Pipe Size ..... In. Orifice Size ..... In. Flowmeter X

During 1 st Hours of Running: ..... G. P. M. From ..... Ft. Pumping Level

PUMPING LEVEL TEST AT END OF RUN

Shaft R. P. M.	G. P. M.	Pumping Level	Yield Per Ft.	Standing Level	
2145	3210	326.0 Ft.	49.61 G. P. F.	Pre-Run	245.2 Ft.
1925	2665	314.5 Ft.	50.09 G. P. F.	5 Min.	261.3 Ft.
1760	2215	305.2 Ft.	50.45 G. P. F.	10 Min.	Ft.
1650	1680	296.0 Ft.	48.42 G. P. F.	Static	Ft.
1540	1105	284.4 Ft.	47.84 G. P. F.	Use	261.3 Ft.

Water Sample Taken for Analysis ..... Irrigation ..... Domestic Use .....

Test Started 8/30/91 12:25 Shut Down 8/30 18:05 Tot. 5.5 Hrs.

Well Surged 14 Times. Water Temp. 71.9° F. Approx. H. P. Used 440 HP

Relative Presence of Sand at Shut Down: Clear X Moderate ..... Heavy ..... @ all G.P.M.

Presence of Gas no Air no H_2S odor & color

NOTICE

"Under the Mechanics' Lien Law (California Code of Civil Procedure, Section 1181 et seq.), any contractor, sub-contractor, laborer, supplier or other person who helps to improve your property but is not paid for his work or supplies, has a right to enforce a claim against your property. This means that, after a court hearing, your property could be sold by a court officer and the proceeds of the sale used to satisfy the indebtedness. This can happen even if you have paid your own contractor in full, if the sub-contractor, laborer, or supplier remains unpaid."

HOLCOMB & SON, Inc.

Tested by: Ed Rau

Residence Phones
222-9440
Business Phone
237-0869

DEEP WELL DEVELOPING

HOLCOMB & SON, Inc.
1420 NORTH HUGHES
FRESNO, CALIF. 93728

State Contractor Lic. # 248928
Class. C57 & C61

WELL DATA

Customer [redacted] Date Sept. 12, 1991

Address Well No. G20

City Section ½ mi. S. of Ave. 112 ½ mi. W. of Rd. 40.

Well Drilled by Graybow Drilling Depth Drilled 1000 Ft. Cased 940 Ft.

Blank Casing Pit 5/16 x 16 In. 600 Ft. From 0 Ft. To 600 Ft.

~~Perforated~~ Slip Casing 5/16x 16 In. 20 Ft. From 600 Ft. To 620 Ft.

Perforated Casing 5/16 x 16 In. 320 Ft. From 620 Ft. To 940 Ft.

Well is Cemented .... Graveled .... Plain .... Cable Tool .... Rotary R Circ

Developing Pump Set by Kemble Hydro Teck

Pump Setting 460 Ft. 10 In. Plus .... Ft. of .... In. Suction Total ....

With .... Stages of .... In. Developing Bowls X Permanent .... H. P. Bowls

Discharge Pipe Size 10 In. Orifice Size .... In. Flowmeter X

During 1st Hours of Running: 3000 G. P. M. From 330.6 Ft. Pumping Level

PUMPING LEVEL TEST AT END OF RUN

Shaft R. P. M.	G. P. M.	Pumping Level	Yield Per Ft.	Standing Level
1910	3300	330.6 Ft.	49.15 G. P. F.	Pre-Run 247.5 Ft.
1818	2950	321 Ft.	49.17 G. P. F.	5 Min. 266.0 Ft.
1591	2050	307.5 Ft.	49.39 G. P. F.	10 Min. .... Ft.
1455	1500	296. Ft.	50 G. P. F.	Static 263.7 Ft.
1350	1185	289.1 Ft.	51.3 G. P. F.	Use 266.0 Ft.

Water Sample Taken for Analysis Np Irrigation X Domestic Use ....

Test Started 9/12/91 11:25 Shut Down 9/12/91 20:35 Tot. 8 Hrs.

Well Surged 16 Times. Water Temp 73.1 F. Approx. H. P. Used 400

Relative Presence of Sand at Shut Down: Clear tint Moderate .... Heavy .... @ all G.P.M.

Presence of Gas no Air no

NOTICE

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HOLCOMB & SON, Inc.

Tested by: Ed Rau

Residence Phones
222-9440
Business Phone
237-0869

DEEP WELL DEVELOPING

HOLCOMB & SON, Inc.
1420 NORTH HUGHES
FRESNO, CALIF. 93728

State Contractor Lic. # 243928 Class. C57 & C61

RECEIVED OCT 1 1991 ANGIOLA WATER DISTRICT

WELL DATA

Customer [redacted] Date Sept. 18, 1991

Address Well No. G21

City Section 1 mi. S. of Ave. 112 ~~1/4 mi. E. of Rd. 40~~

Well Drilled by Graybow Drilling Depth Drilled 1000 Ft. Cased 925 Ft.

Blank Casing Pit 5/16 x 16 In. 585 Ft. From 0 Ft. To 585 Ft.

Slip ~~Perforated~~ Casing 5/16 x 16 In. 20 Ft. From 595 Ft. To 605 Ft.

Perforated Casing 5/16 x 16 In. 320 Ft. From 605 Ft. To 925 Ft.

Well is Cemented ______ Graveled ______ Plain ______ Cable Tool ______ Rotary R. circ

Developing Pump Set by Kemble Hydro Teck

Pump Setting 560 Ft. 10 In. Plus ______ Ft. of ______ In. Suction Total ______

With ______ Stages of ______ In. Developing Bowls X Permanent ______ H. P. Bowls

Discharge Pipe Size 10 In. Orifice Size ______ In. Flowmeter X

During 1st Hours of Running: 1300 G. P. M. From 460 Ft. Pumping Level

PUMPING LEVEL TEST AT END OF RUN

Shaft R. P. M.	G. P. M.	Pumping Level	Yield Per Ft.	Standing Level
1910	2345	437.6 Ft.	13.53 G. P. F.	Pre-Run 242.9 Ft.
1773	1990	409.9 Ft.	13.67 G. P. F.	5 Min. 264.3 Ft.
1636	1685	386.8 Ft.	13.76 G. P. F.	10 Min. ______ Ft.
1440	1065	338.2 Ft.	14.41 G. P. F.	Static 245.8 Ft.
		Ft.	G. P. F.	Use 264.3 Ft.

Water Sample Taken for Analysis No Irrigation X Domestic Use ______

Test Started 9/18/91 8:40 Shut Down 9/20 16:05 Tot. 13 Hrs.

Well Surged 44 Times. Water Temp. 73.4 F. Approx. H. P. Used 420

Relative Presence of Sand at Shut Down: Clear tint Moderate ______ Heavy ______ @ all G.P.M.

Presence of Gas no Air no

HOLCOMB & SON, Inc.

Tested by: Ed Rau

Residence Phones
222-9440
Business Phone
237-0869

DEEP WELL DEVELOPING

HOLCOMB & SON, Inc.
1420 NORTH HUGHES
FRESNO, CALIF. 93728

State Contractor
Lic. # 243928
Class. C57 & C61

RECEIVED
OCT 7 1991
ANGIOLA WATER DISTRICT

WELL DATA

Customer [redacted] Date Oct. 1, 1991

Address Well No. G22

City Section 1 1/2 mile S of Ave. 112
1/2 mile E of Road 40

Well Drilled by Grabow Well Drilling Depth Drilled ____ Ft. Cased 1000 Ft.

Blank Casing Pit 5/16X16 In. 660 Ft. From 0 Ft. To 660 Ft.

~~Perforated~~ Slip Casing 5/16X16 In. 20 Ft. From 660 Ft. To 680 Ft.

Perforated Casing 5/16X16 In. 320 Ft. From 680 Ft. To 1000 Ft.

Well is Cemented ____ Graveled X Plain ____ Cable Tool ____ Rotary R Cir

Developing Pump Set by Kemble Hydro Tech

Pump Setting 560 Ft. 10 In. Plus ____ Ft. of ____ In. Suction Total ____

With ____ Stages of ____ In. Developing Bowls ____ Permanent ____ H. P. Bowls

Discharge Pipe Size 10 In. Orifice Size ____ In. Flowmeter 10

During 1st Hours of Running: 2500 G. P. M. From 523 Ft. Pumping Level

PUMPING LEVEL TEST AT END OF RUN

Shaft R. P. M.	G. P. M.	Pumping Level	Yield Per Ft.	Standing Level	
1910	2300	469.9 Ft.	11.19 G. P. F.	Pre-Run	225.1 Ft.
1800	2125	453.7 Ft.	11.22 G. P. F.	5 Min.	264.3 Ft.
1682	1725	416.8 Ft.	11.31 G. P. F.	10 Min.	Ft.
1500	1150	361.3 Ft.	11.86 G. P. F.	Static	231.98 Ft.
		Ft.	G. P. F.	Use	264.3 Ft.

Water Sample Taken for Analysis no Irrigation X Domestic Use ____

Test Started 9/30 12:25 Shut Down 10/1 18:25 Tot. 12.5 Hrs.

Well Surged 43 Times. Water Temp. 74.0 F. Approx. H. P. Used 440

Relative Presence of Sand at Shut Down: Clear tint Moderate ____ Heavy ____ @ all G.P.M.

Presence of Gas no Air no

NOTICE
"Under the Mechanics' Lien Law (California Code of Civil Procedure, Section 1181 et seq.), any contractor, sub-contractor, laborer, supplier or other person who helps to improve your property but is not paid for his work or supplies, has a right to enforce a claim against your property. This means that, after a court hearing, your property could be sold by a court officer and the proceeds of the sale used to satisfy the indebtedness. This can happen even if you have paid your own contractor in full, if the sub-contractor, laborer, or supplier remains unpaid."

HOLCOMB & SON, Inc.

Tested by: Ed Rau

APPENDIX C

HYDROGEOLOGIC CONCEPTUAL MODEL AND GROUNDWATER CONDITIONS FOR THE TRI-COUNTY WA GSP, KDSA, MAY 2019

HYDROGEOLOGIC CONCEPTUAL MODEL AND GROUNDWATER CONDITIONS FOR THE TRI-COUNTY WA GSP

<u>Draft</u> <u>Report</u>

prepared for
Tri-County Water Authority
Corcoran, California

by
Kenneth D. Schmidt & Associates
Groundwater Quality Consultants
Bakersfield, California

May 2019

TABLE OF CONTENTS

Continued:

TABLE OF CONTENTS
(Continued)

Continued:

TABLE OF CONTENTS
(Continued)

LIST OF TABLES

LIST OF ILLUSTRATIONS

Continued:

LIST OF ILLUSTRATIONS

HYDROGEOLOGIC CONCEPTUAL MODEL AND GROUNDWATER CONDITIONS FOR THE TRI-COUNTY WA GSP

INTRODUCTION

The Tri-County Water Authority (TCWA) is located in Tulare and Kings Counties, north of the Kern County line (Figure 1). The eastern part of the GSA is in the Tule Sub-basin (5-22.13) and the western part is in the Tulare Lake Sub-basin (5-22.12). North of Avenue 48, all of the GSA is located west of Highway 43, except for lands east of Angiola, comprising the Angiola Water District (AWD) east well field. South of Avenue 48, there are additional lands in the GSA that are east of Highway 43, and extend to the east to about a mile west of Earlimart and Delano. Figure 2 shows districts in the GSA, including the AWD, the Deer Creek Storm Water District (DCSWD), the Wilbur Reclamation District, and the Allensworth CSD.

This report is intended to satisfy the SGMA requirements for preparation of a hydrogeologic conceptual model and a discussion of groundwater conditions in the GSA. Thomas Harder & Co. (2017) prepared a report on the hydrogeologic conceptual model and water budget for the Tule Sub-basin. For this report, the TCWA GSA is divided into three parts. The lands west of 8th Avenue are termed the "west part". It is distinguished from the rest of the GSA by being almost entirely in the Tulare Lakebed and

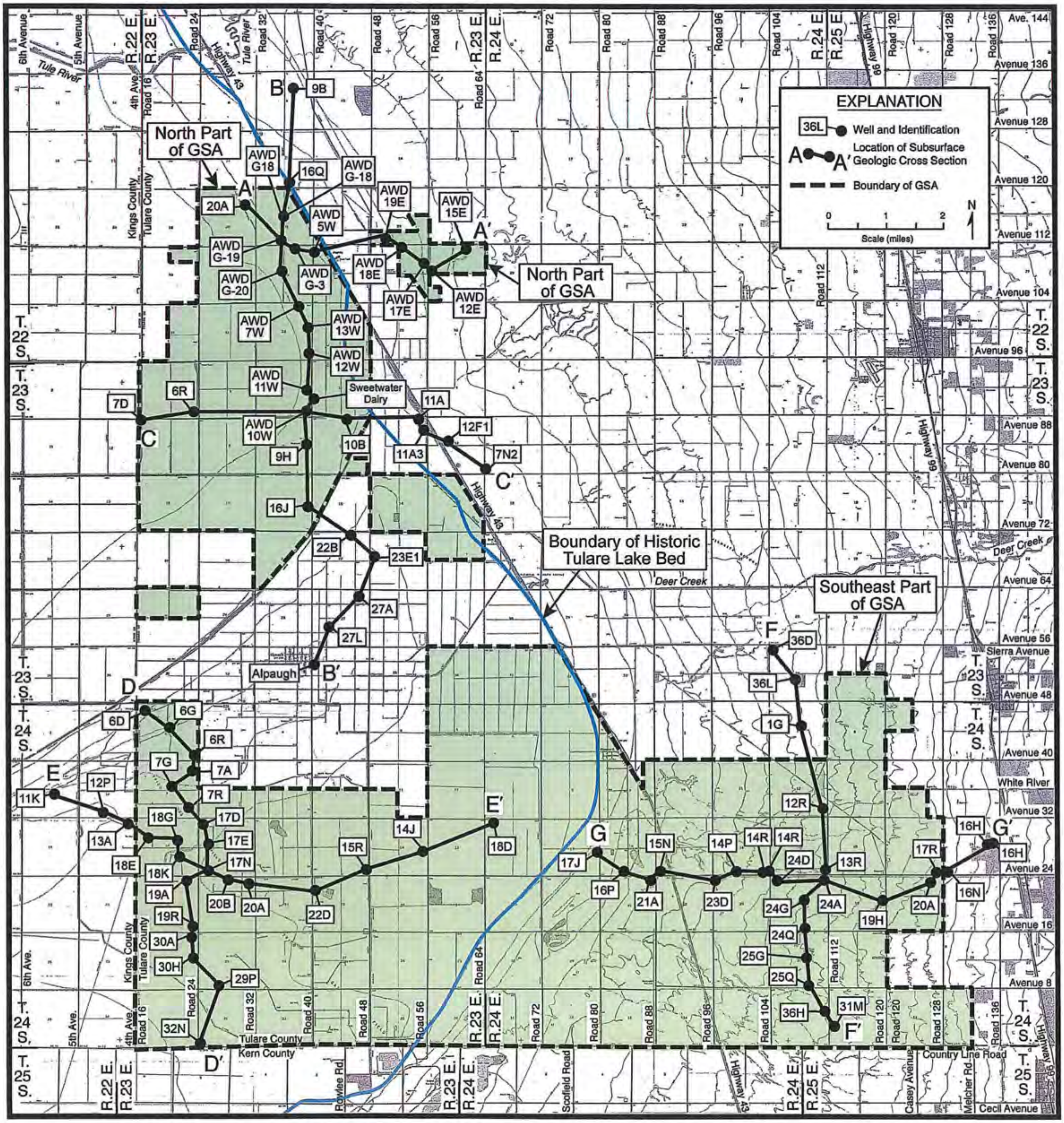
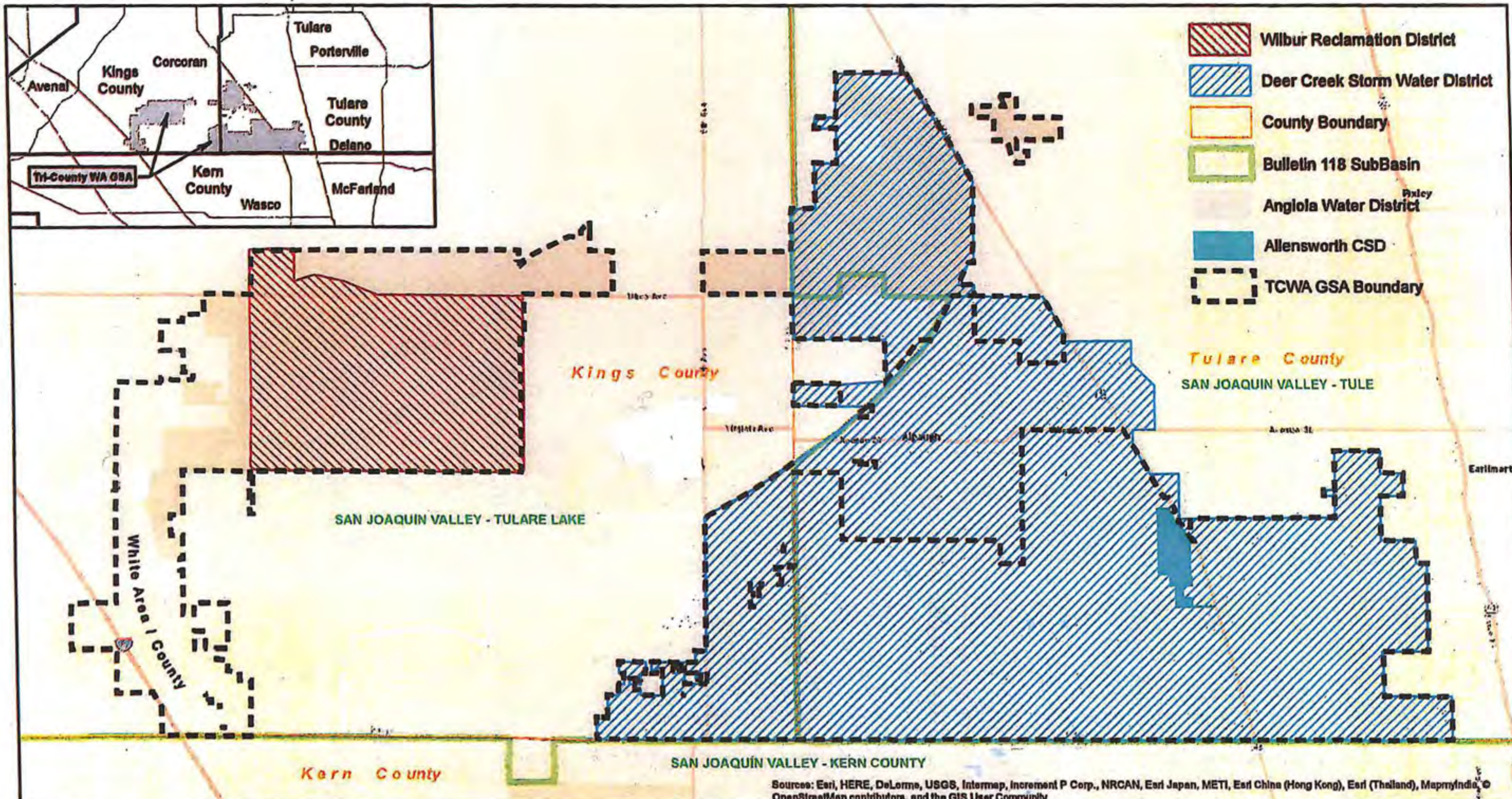


FIGURE 1 - TOPOGRAPHIC MAP OF GSA AND LOCATION OF SUBSURFACE GEOLOGIC CROSS SECTIONS



PROVOST& PRITCHARD CONSULTING GROUP
An Employee Owned Company

0 1 2 Miles

FIGURE- 2 DISTRICTS IN THE GSA

Tri-County Water Authority GSA

12/8/2017 : G:\Tri-County Water Auth.-2737\273717001-Prop.218 Engineers Report\GIS\Map\Districts.mxd by having virtually no large-capacity wells, because of subsurface geologic and groundwater quality issues. The rest of the GSA is divided into the "north part" (north of Avenue 60) and the "southeast part" (south of Avenue 56). The north part includes the AWD well fields and the east part of the AWD. This part of the GSA is located in a transition area between the Tulare Lakebed to the west and the alluvial fan of the Tule River to the east. The southeast part of the GSA is bounded on the south by the Kern County line and extends from 8-1/2 Avenue on the west to Road 132 on the east. Allensworth is in this part of the GSA and Earlimart and Delano are just east of this part. Deer Creek pass through the area north of this part of the GSA and the White River passes through this part of the GSA. Lands in the southeast part of the GSA are east of the historic Tulare Lakebed (Figure 1) and are underlain by the alluvial fans of Deer Creek, the White River, and possibly Poso Creek.

SURFICIAL CHARACTERISTICS OF BASIN

Topography

Figure 1 shows the topography in and near the GSA. In general, the Tulare Lakebed is the lowest area (the lowest part of the lake is about 175 feet above mean sea level). The highest area is west of Delano, where the land surface elevation is about 285 feet above mean sea level. The main streams in the vicinity, the Tule River, Deer Creek, and the White River, drain from the east to the west, following the slope of the topography.

Surficial Geologic Map

Figure 3 is a surficial geologic map of the GSA, modified from Smith (1964). The predominant surficial deposits in the GSA are lake deposits. Basin deposits are present in relatively small areas of the GSA in the southwest part of the west part, in the east part of the AWD east well field, and between 4th and 7th Avenues near the Kern County line. A larger area of basin deposits is in the east part of the east part of the GSA. There is a small area of dune deposits located near the west edge of the west part of the GSA.

Topsoils

Figure 4 shows the major soil types in the GSA. The map is modified for Arroues and Anderson (1956) for the Kings County part and Wasner and Arroues (2003) for the Tulare County part. In most of the north and west parts of the GSA, topsoils are saline-alkali soils that have a perched (shallow) water table. These topsoils are essentially within the historic Tulare Lakebed. The second soil type is predominant in the west part of the west part and in the west part of the southwest part of the GSA. These

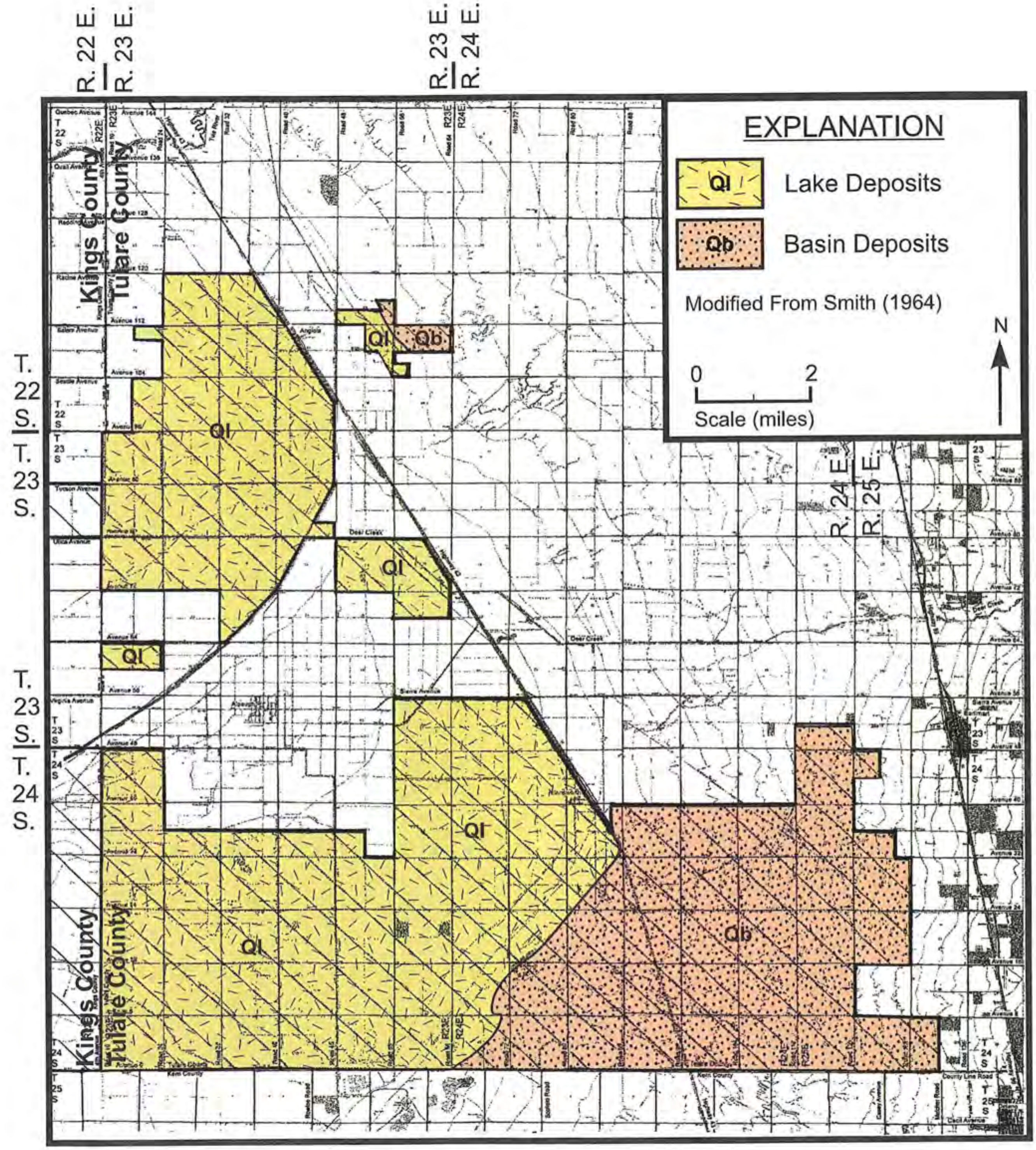


FIGURE 3 - SURFICIAL GEOLOGIC MAP

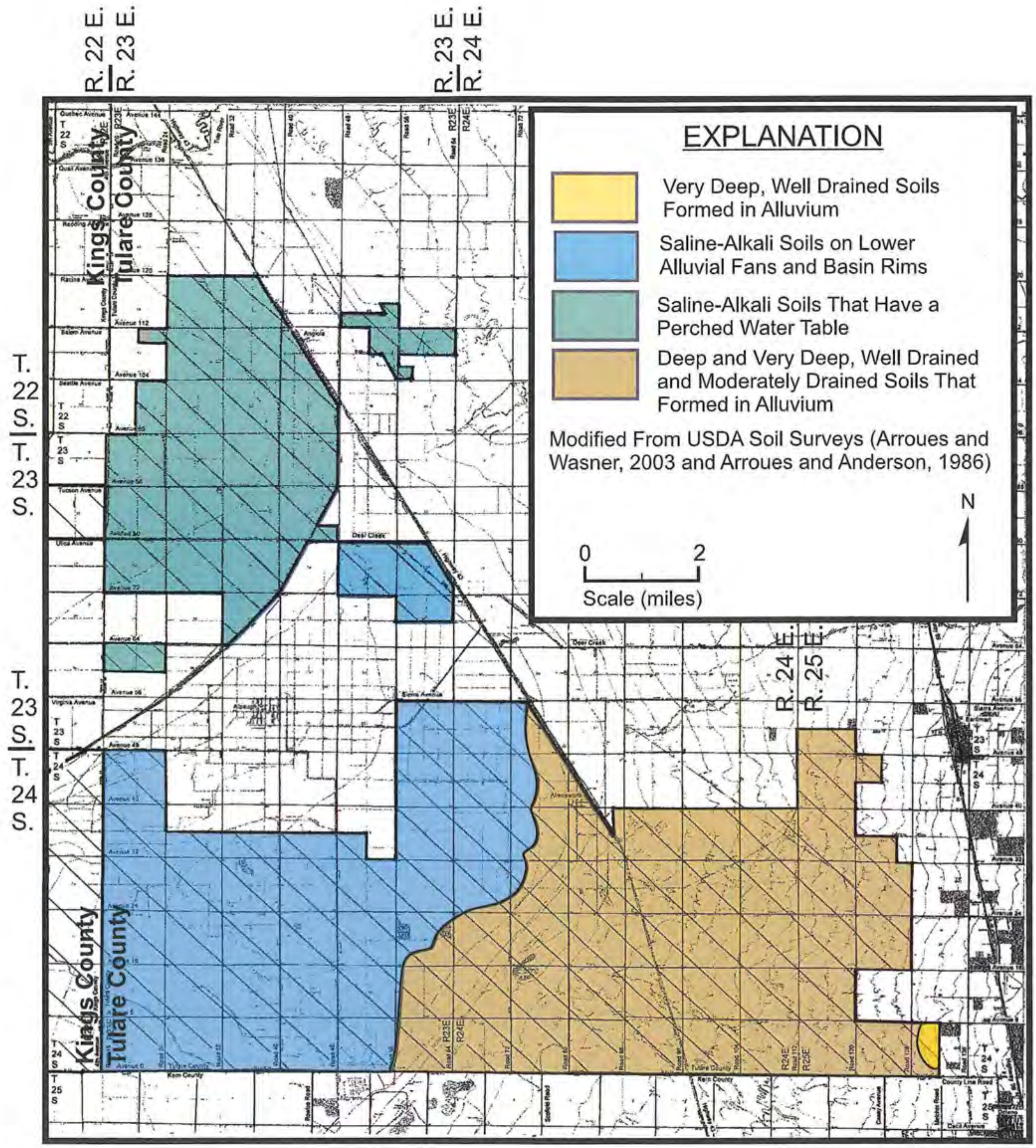


FIGURE 4 - TOPSOILS

are saline-alkali soils on the lower alluvial fans and basin rims. In the east part of the east part of the GSA, topsoils are deep and very deep well drained and moderately drained soils that formed on alluvium. These was a very small area near the southeast corner of the GSA that is covered by very well drained soils formed in alluvium.

Surface Water Bodies

Figure 5 shows surface water bodies in and near the GSA. The Tulare Lakebed is now largely a dry lake bed, except during periods of flooding. The original area of the lake was about 570 square miles. The Tule River passes through the area about two miles west of the north part of the GSA. The Tule River flows from Lake Success into the San Joaquin Valley and eventually to the Tulare Lakebed. The Deer Creek channel extends westerly past Highway 99, where it is about two to three miles north of the east part of the GSA (east of Highway 43). Downstream, the diverted Deer Creek channel then passes through the north part of the GSA and reaches the Tulare Lakebed. The White River crosses Highway 99 south of Earlimart and extends through part of the east part of the GSA. The White River no longer flows into the Tulare Lakebed.

These are also a number of canals in the GSA. The Homeland Canal is the one of the largest, extending from near Angiola to

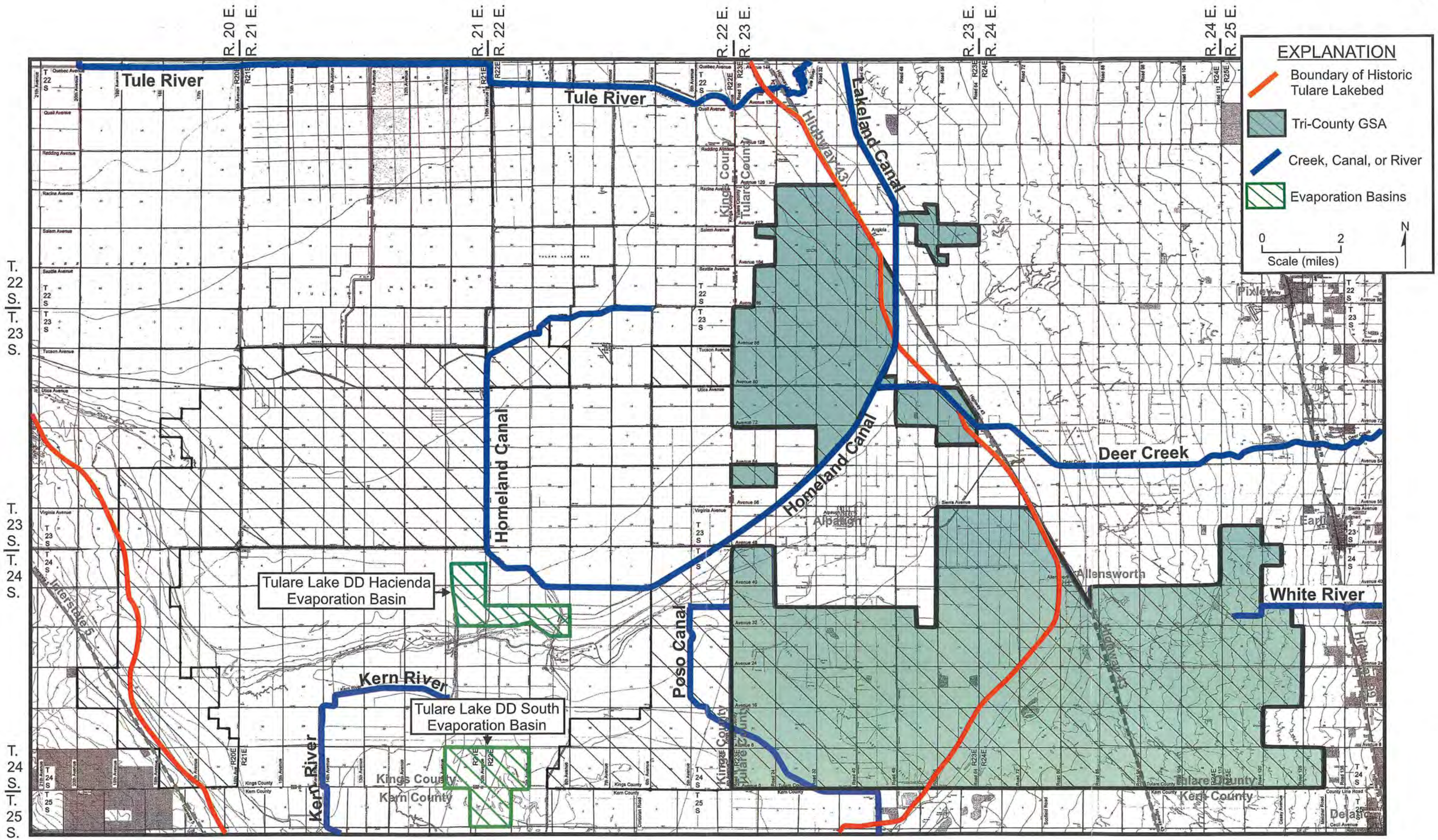


FIGURE 5 - SURFACE WATER BODIES

to the south and southwest. Watersheds for these streams are shown in Figure 2 of Thomas Harder Co. (2017).

SUBSURFACE GEOLOGIC CONDITIONS

Regional Geologic and Structural Setting

Lofgren and Klausing (1969) described groundwater conditions in the Tulare-Wasco area, which includes the Tulare County part of the GSA and the east edge of the Kings County part of the GSA. The San Joaquin Valley is a structural through, whose main axis trends northwest to southeast. The valley is bounded on the east by the crystalline rocks of the Sierra Nevada, and to the west by folded and faulted sedimentary, volcanic, and metamorphic rocks of the Coast Ranges. Thousands of feet of marine deposits accumulated in the valley, and those are overlain by continental deposits. The marine and continental deposits thicken from the east to west beneath the valley. The continental deposits have been titled to the west and downwarped. The uplifting of the Sierra Nevada has resulted in the westerly tilting of the overlying sediments.

Lateral Basin Boundaries

The Tule Groundwater Sub-basin extends from north of the Tule River on the north, south to near the Kern County line, east to the east edge of the alluvial groundwater basin, and west to near the Kings County-Tulare County line. The Tulare Lake Groundwater Sub-basin is bounded on the south by the Kern County line, on the east generally by the Kings-Tulare County line, on the west by the west edge of the alluvial groundwater basin (east of the Kettleman Hills), to the northwest by the boundary with the Westlands W.D., and to the north by branches of the Kings River. The county boundaries are considered jurisdictional boundaries, whereas the others are considered hydrologic boundaries. These boundaries are shown on Figure 1 of Thomas Harder & Co. (2017).

Definable Bottom of the Basin

Figure 6 shows the definable bottom of the basin, which was determined by reviewing and interpreting drillers logs and electric logs for test holes and wells in and near the GSA. Resistivities of less than about 5 ohm-meters are usually indicative of clay and/or salty groundwater. In general, the deepest bottoms of the basin are in the north part of the GSA and near Delano. In contrast, the shallowest bottom of the basin is in the west part of the GSA, where little groundwater production is possible below a depth of several hundred feet due to a predominance of clay and brackish or salty groundwater.

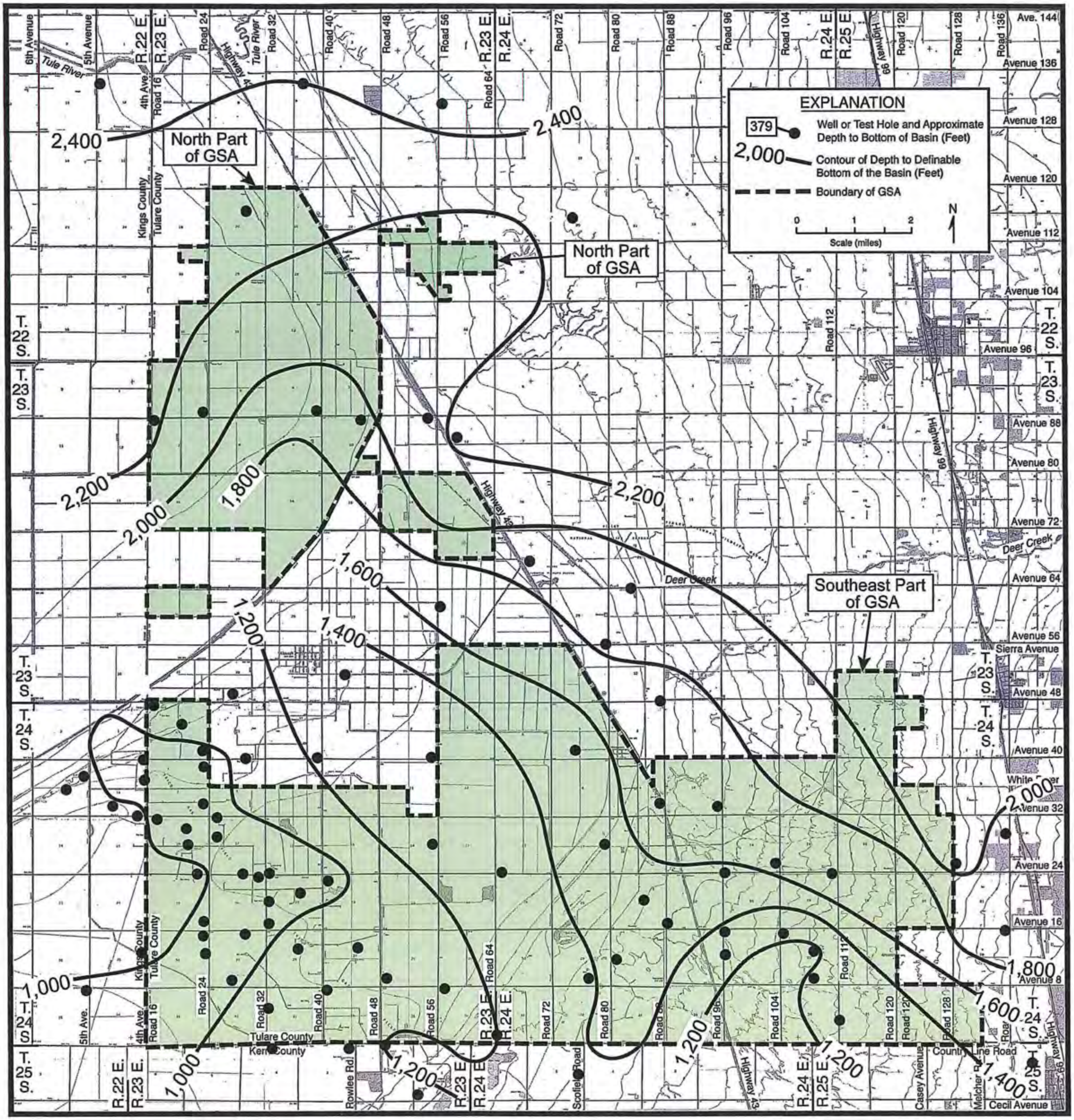


FIGURE 6 - DEFINABLE BOTTOM OF THE BASIN

The bottom of the basin ranges from about 1,600 to 2,300 feet deep beneath the north part of the GSA. This corresponds with the base of the fresh groundwater. The overall trend in this part of the GSA is a deeper bottom as one proceeds to the north. The bottom of the basin in the southeast part of the GSA ranges from about 900 to 2,000 feet deep. The depth to the bottom in this part of the GSA generally increases to the northeast. The shallowest bottom of the basin in this part of the GSA is south-southwest of Alpaugh and the deepest is near Delano. The bottom of the basin in the southeast part of the GSA also coincides with the base of the fresh groundwater. In the west part of the GSA, the bottom of the basin generally is determined by the maximum depths of sand strata, which range from about 250 to 450 feet deep. The groundwater in this part of the GSA has only been tapped by several stock wells.

Formation Names

Lofgren and Klausing (1969) grouped the subsurface deposits in the Tulare-Wasco area into the following main categories:

1. Continental deposits from the Sierra Nevada
2. Upper Pliocene and Pleistocene Marine Strata
3. Santa Margarita Formation
4. Others

Only the first category is relevant in terms of groundwater production in the GSA. In the west part of the GSA, these deposits include the Tulare Formation. Within this formation is the Corcoran Clay member, also termed the E-clay. The bottom of the usable groundwater is the base of the fresh groundwater (less than 3,000 micromhos per centimeter at 25°C). In most of the GSA, thus base is below the Corcoran Clay and above the bottom of the continental deposits.

Confining Beds

Croft (1972) of the USGS prepared several generalized subsurface geologic cross sections extending through the Tulare Lakebed. Croft's sections were based entirely on electric logs or geologic logs for core holes. He identified six "clayey or silty clay tongues", designated by letter symbols A to F, beneath the fringes of part of the lakebed. The most widespread and important of these are the A, C, and E Clays. The E-Clay or Corcoran Clay is the most laterally extensive confining bed in the San Joaquin Valley.

Figure 7 shows the depth to the top of the Corcoran Clay in the GSA. This clay could not be identified in the west part of the GSA, due to a predominance of clay, most of which is blue, in that area. In the north part of the GSA, the depth to the top of the Corcoran Clay ranges from about 400 to 600 feet. The greatest depth to the top of the clay in this part of the GSA is east of Alpaugh, and the shallowest depth is east of the AWD's East Well Field. In the southeast part of the GSA, the depth to the top of the Corcoran Clay ranges from about 250 to 550 feet. The depth in this part of the GSA generally increases

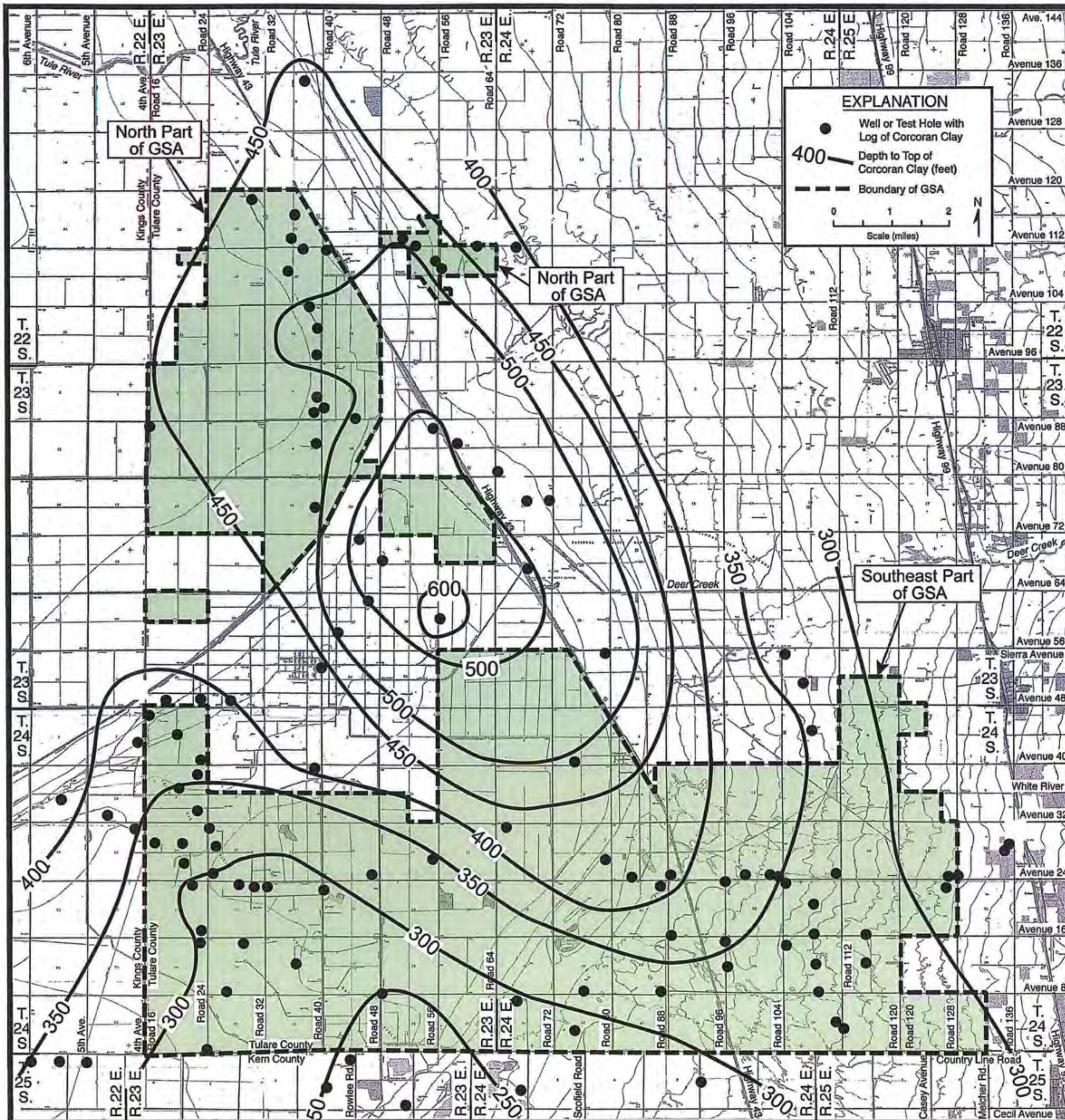


FIGURE 7 - DEPTH TO THE TOP OF THE CORCORAN CLAY

to the north. The shallowest depth to the top of the clay is near the Kern County line, between Roads 40 and 64. The deepest depth is near Avenue 56 and Road 64.

The A-clay is the shallowest of these confining beds, and is normally found within the uppermost 100 feet or so of deposits. It has often been associated with overlying shallow groundwater, which has been termed perched water. The C-clay is found about midway in depth (usually about 250 feet deep) between the A-clay and the Corcoran Clay. It is important in the Corcoran-Angiola area, because many supply wells in that area tap groundwater beneath the C-clay and above the Corcoran Clay. Both the A-clay and C-clay are generally found only beneath and near the historic Tulare Lakebed, whereas the Corcoran Clay is much more laterally extensive.

Principal Aquifers

Groundwater above the A-clay generally is not used for water supply in the GSA due to its high salinity. An exception may be several stock wells. The Corcoran Clay is used to separate the overlying upper aquifer from the underlying lower aquifer. Both of these aquifers are tapped in the north and southeast parts of the GSA.

Subsurface Geologic Cross Sections

As part of this evaluation, eight subsurface geologic cross sections were prepared. Locations of these are shown in Figure 1. Cross Sections A-A′, B-B′, and C-C′ extend through the north part of the GSA. These sections were modified from ones previously prepared for the AWD (Kenneth D. Schmidt and Associates, 2011). Cross Sections D-D′ and E-E′ extend through the west part of the southeast part of the GSA. Cross Sections F-F′ and G-G′ extend through the east part of the southeast part of the GSA. These latter two sections are more distant than the other sections from the Tulare Lakebed. Cross Section H-H′ extends through the west part of the GSA, which is primarily in the Tulare Lakebed. The deepest water supply wells in the GSA have been in the AWD well fields, and the next deepest have been in the east part of the southeast area, in the Delano area. Except for the west part of the GSA, the subsurface geologic cross sections generally extend to near the deepest water supply wells in the different parts of the GSA.

Cross Section A-A′

Cross Section A-A′ (Figure 8) extends from south of Avenue 120 and west of Road 32 on the west to the east, through the north part of the District′s West Well Field, thence through the East Well Field, to near Avenue 112 and Road 64. The top of the Corcoran Clay ranges from about 300 to 500 feet deep along the section, and the clay ranges from about 20 to 180 feet thick along the section. The thickness of this clay increases to the west along the section toward the interior of the Tulare Lakebed. Relatively thick sand strata are present both above and below the Corcoran Clay along

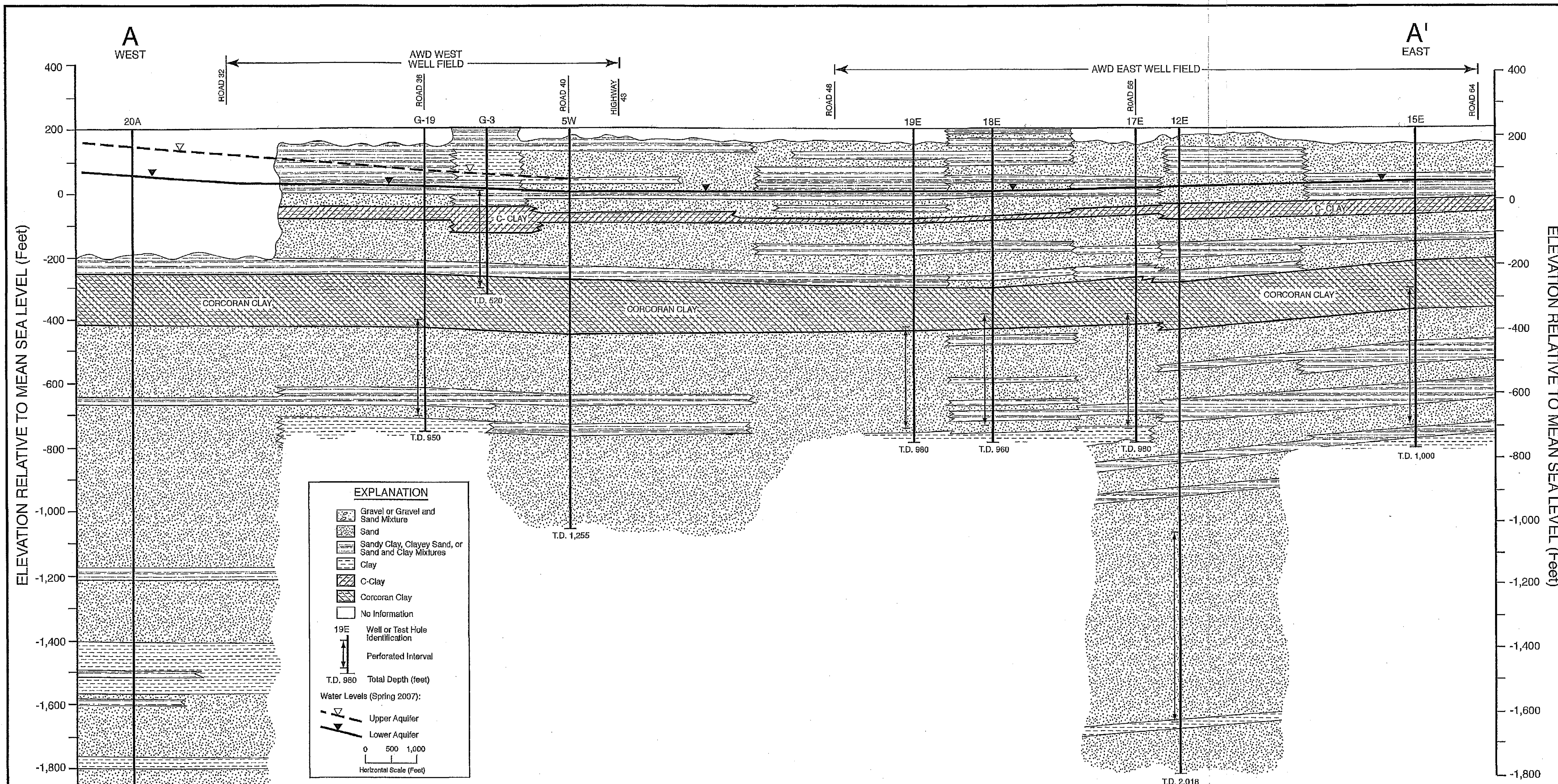


FIGURE 8 - SUBSURFACE GEOLOGIC CROSS SECTION A - A'

most of the western and central parts of this cross section. A sand layer below the Corcoran Clay and above a depth of about 1,000 feet is tapped by a number of intermediate depth (900 to 1,100 feet deep) AWD wells. Sand is predominant below the Corcoran Clay and above a depth of about 2,000 feet along this section, where logs for deep holes or wells are available. The base of the fresh groundwater has been defined as where the total dissolved solids (TDS) concentrations are about 2,000 mg/l. The base of the fresh groundwater is indicated to be below the bottom of this section. The C-clay is also shown along this section. The top of this clay is normally about 250 feet deep in the Angiola vicinity. This clay is indicated to pinch out just east of the District's East Well Field. Where present, this clay usually ranges from about 10 to 40 feet in thickness. Most irrigation wells in the vicinity (including district wells) that tap the upper aquifer are perforated primarily opposite strata below the C-clay and above the Corcoran Clay. Deposits between these two clay layers along this section are predominantly sand. Both the Corcoran and C-clays function as confining beds, which hinder the vertical flow of groundwater. Relatively shallow groundwater is found above the C-clay in the part of the area southwest of Highway 43.

Cross Section B-B'

Cross Section B-B' (Figure 9) extends from near Avenue 120 on

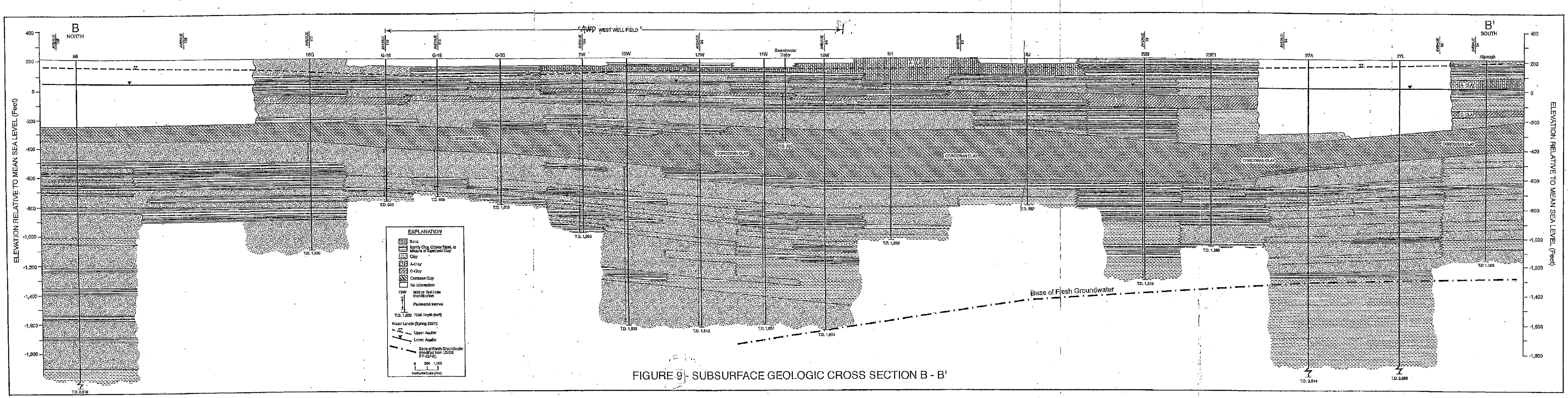


FIGURE 9 - SUBSURFACE GEOLOGIC CROSS SECTION B - B'

the north, through the District's West Well Field, to Alpaugh on the south. The top of the Corcoran Clay ranges from about 420 feet deep near the south end of the section to 500 feet near Avenue 120. The Corcoran Clay ranges from about 200 to 400 feet thick along the section. The C-Clay is present along this section, where information is available. The top of this clay is about 250 feet deep and this clay ranges from about 15 to more than 50 feet thick along this section. A thick, laterally continuous sand is also present above the Corcoran Clay along this section between Avenues 80 and 120, and is the major water-producing layer tapped by shallow (about 500 feet deep) District wells in the West Well Field. Interbedded fine-grained layers generally thicken to the south along this section. Deposits below a depth of about 1,400 feet along the south part of the section are indicated to primarily be clay. A third regional clay layer (A-Clay) that is shallower than the C-Clay is shown along the south part of the section. The base of the fresh groundwater is shown along part of this section. This base ranges from about 1,300 feet deep near Alpaugh to more than 1,800 feet deep along most of the section north of Avenue 88.

<u>Cross Section C-C'</u>

Cross Section C-C' (Figure 10) extends from near Avenue 88 and Road 16 on the west to the east through the south edge of

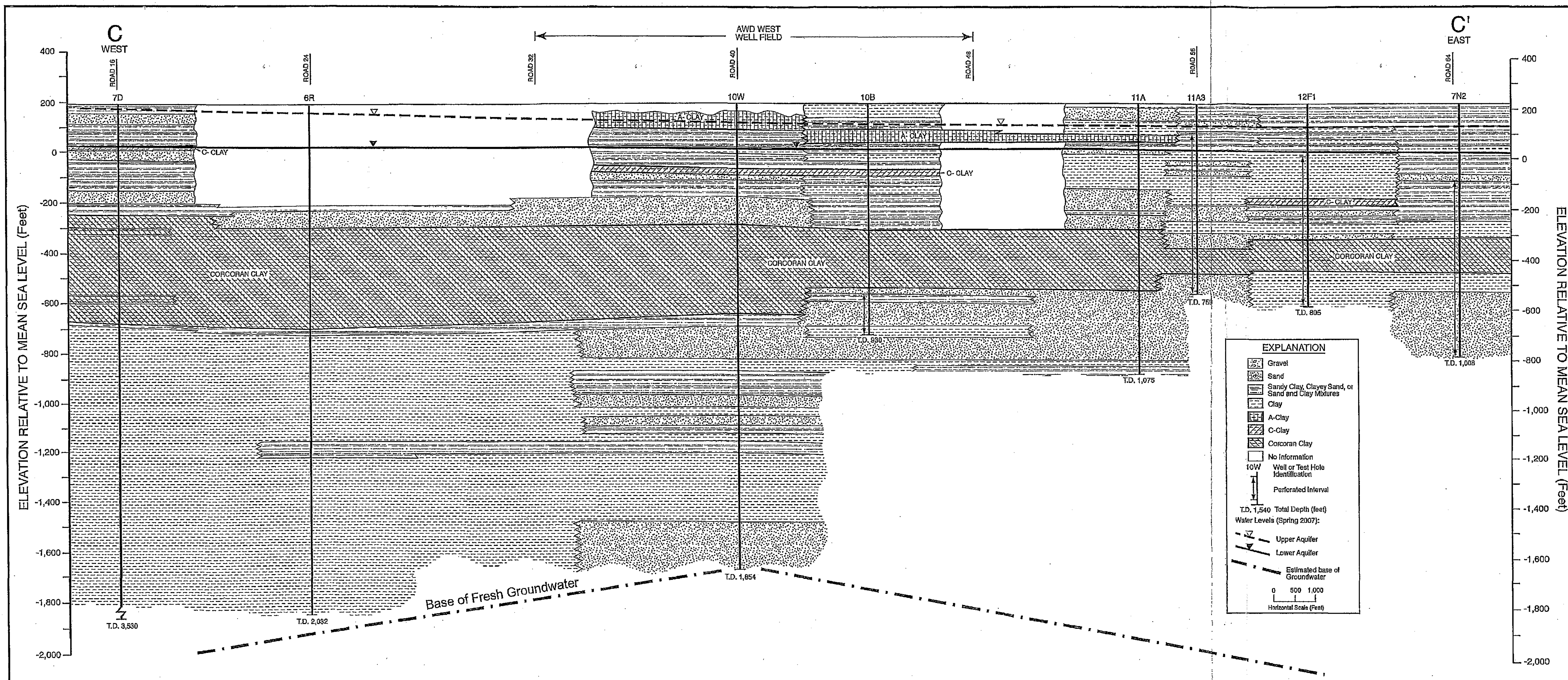


FIGURE 10 - SUBSURFACE GEOLOGIC CROSS SECTION C - C'

the AWD's West Well Field, thence farther to the east and southeast, to near Avenue 80 and Road 64. Clay is increasingly predominant to the west along this section, toward the interior of the Tulare Lakebed. The productive sands of the upper aquifer extend farther west that those of the lower aquifer along this section. This section shows that sands of the lower aquifer become progressively thinner to the west, and are generally not present in the area west of Road 32. Logs for oil or gas exploration holes in the area farther west indicate that clay is predominant and high salinity groundwater is also common. There are few known active-large capacity water supply wells in the area west of Road 24 in the Angiola area.

The base of the fresh groundwater is indicated to be present beneath most of this section, and ranges from about 1,850 to more than 2,000 feet deep. The base of the fresh groundwater is below the bottom of the cross section near the west and east ends.

The top of the Corcoran Clay ranges from about 450 to 550 feet deep along the section. This clay thickens considerably to the west along the section, ranging from about 100 to 150 feet thick to the east to 450 feet thick to the west. The C-clay also pinches out to the east along this section, and isn't indicated to be present east of Road 48 along this section. The top of the C-clay ranges from about 180 to 270 feet deep along this section, and this clay ranges from about 15 to 30 feet in thickness. The A-clay is also shown along the central part of the section, where it is about 30 to 50 feet thick.

Cross Section D-D′

Subsurface Geologic Cross Section D-D′ (Figure 11) extends from the north near Avenue 48 and Road 16 to the south near the Kern County line. Because most of the electric logs used for the northern two-thirds of this section are oil or gas exploration holes, little information on deposits above the Corcoran Clay was available along that part of the section. This is because of the conductors that were normally installed in such wells, that don't allow electric logging of the shallow deposits opposite the conductors. The Corcoran Clay dips to the north along this section. The Corcoran Clay ranges from about 400 feet deep near the north end of the section to 270 feet near the south end. The Corcoran Clay generally thins to the south along the section, from about 100 feet to 50 feet. Neither the A-clay nor the C-clay could be different along this section. A fairly thick sand larger is present above the Corcoran Clay beneath most of the southern third of this section. Sands are predominant below the Corcoran Clay and above a depth of about 1,000 feet south of Avenue 32 along this section. Farther north, clay is predominant between the Corcoran Clay and the bottom of this section, typical of the lakebed area.

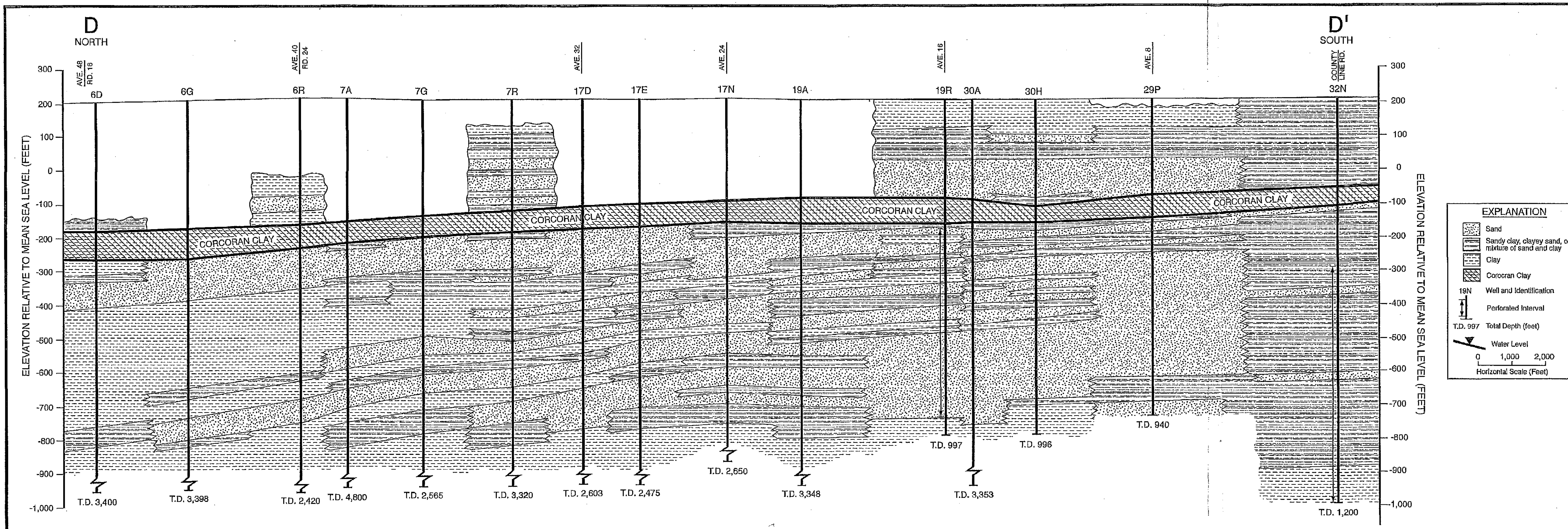


FIGURE 11 - SUBSURFACE GEOLOGIC CROSS SECTION D-D'

Cross Section E-E′

Subsurface Geologic Cross Section E-E- (Figure 12) extends from near Avenue 36 and 5-1/2 Avenue on the west to near Avenue 32 and Road 64 on the east. The top of the Corcoran Clay ranges from about 270 feet deep near Road 30 to 450 feet deep near the west edge of the section. The thickness of the clay ranges from about 70 feet near the east edge to 95 feet near the west edge. The A-clay was identified at one Well (13A) along the west part of the section, within the uppermost 100 feet. The thickest sands below the Corcoran Clay are present beneath the central part of the section, whereas the thickest clay are in the area west of Road 16 near the Tulare lakebed. Most irrigation wells in this area are less than 1,200 feet deep.

Cross Section F-F′

Cross Section F-F′ (Figure 13) extends from near Avenue 56 and Road 104 on the north to near Avenue 4 and road 112 on the south. The north end of the section is about three miles west of Earlimart and the south end is about three miles west of Delano. The top of the Corcoran Clay ranges from about 320 feet deep to about 360 feet along this section. The Corcoran Clay thins to the south along this section, from about 50 feet near the north edge to 25 feet near the south edge. Logs for the deepest wells along the section indicate significant sands below

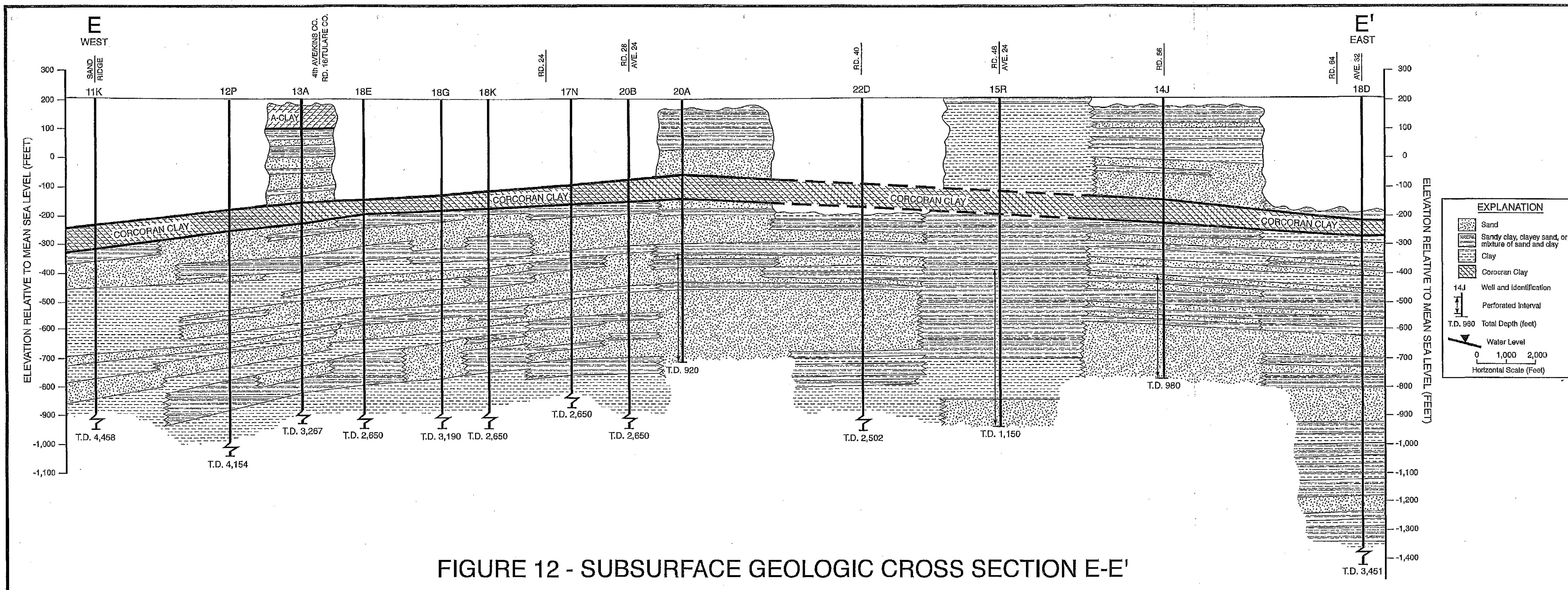


FIGURE 12 - SUBSURFACE GEOLOGIC CROSS SECTION E-E'

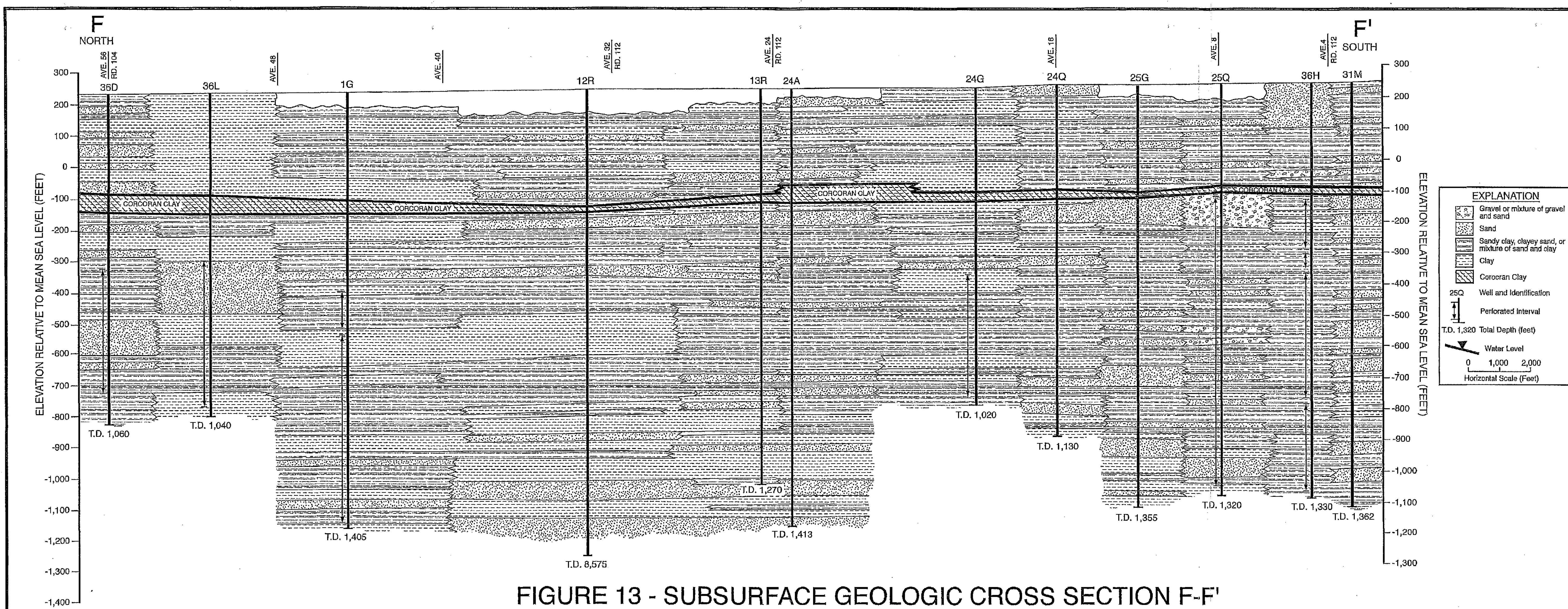


FIGURE 13 - SUBSURFACE GEOLOGIC CROSS SECTION F-F'

a depth of about 1,200 feet, and this is consistent with information from deep wells in Delano. Fine-grained or intermediate textured deposits are predominant below the Corcoran Clay and above a depth about 1,200 feet along much of the section.

Cross Section G-G′

Cross Section G-G′ (Figure 14) extends from near Avenue 28 and Road 80 on the west to west of Highway 99 and Avenue 28 on the east. The Corcoran Clay dips to the west along this section. The top of the clay ranges from about 420 feet deep near the west edge to about 270 feet deep near the east edge. Fine-grained or intermediate textured deposits are predominant in the upper aquifer along most of the section west of Road 120. East of this road, sand strata are predominant below the Corcoran Clay, sand strata are predominant below a depth of about 1,100 feet along most of this section. There are numerous sand strata less than about 50 feet thick in the lower aquifer along most of the section.

CONSTRUCTION DATA FOR WELLS

Angiola Water District

East Well Field

Table 1 contains information on depths and perforated intervals for 14 active wells in the East Well Field. The older ac-

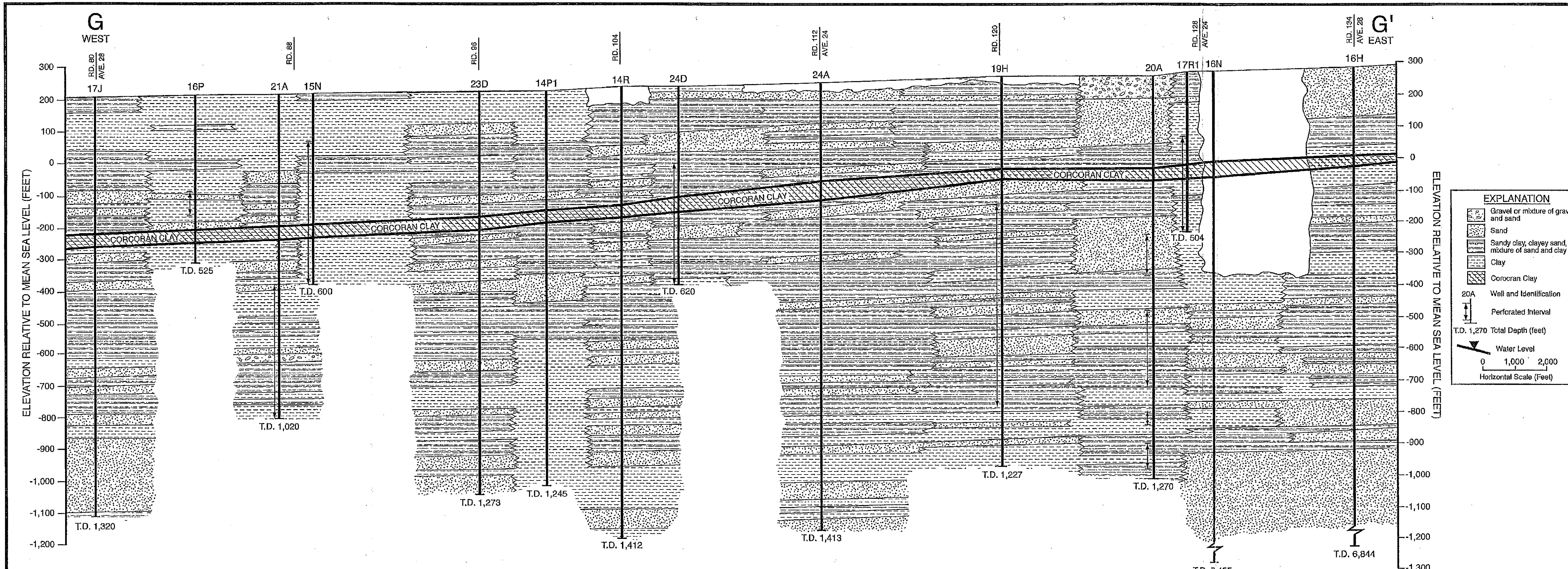


FIGURE 14 - SUBSURFACE GEOLOGIC CROSS SECTION G-G'

TABLE 1-CONSTRUCTION DATA FOR AWD WELLS IN THE EAST WELL FIELD

Local No.	Date Drilled	Total Depth (feet)	Cased Depth (feet)	Casing Diameter (inches)	Perforated Interval (feet)	Annular Seal (feet)
1E	1948	1,559	-	16	-	-
5E	1948	1,447	-	-	-	-
10E	1949	1,728	-	16	-	-
13E	1955	1,798	598	16	-	-
			1,798	12	598-1,798	-
14E	1955	1,788	597	16		
			1,788	12	597-1,788	-
15E	7/91	969	930	16	500-930	0-50
16E	7/91	960	940	16	500-940	0-50
18E	7/91	960	930	16	580-930	0-50
19E	8/91	960	940	16	620-940	0-50
20E	6/07	500	490	18	240-480	0-50
21E	11/07	1,220	1,200	16	640-1200	0-50
22E	5/08	1,150	1,140	16	140-1,120	0-510
23E	5/08	1,220	602	18	-	0-50
			1,202	16	602-1,202	
24E	5/08	1,202	602	18	-	0-50
			1,202	16	602-1,202	

tive wells range in depth from about 1,450 to 1,800 feet. Only one well in the East Well Field (20E) taps the upper aquifer. Four wells in the East Well Field were drilled in 1991, and range in depth from about 960 to 970 feet. Four additional wells (21E-24E) were drilled during 2007-08, and are perforated below the Corcoran Clay and above a depth from about 1,100 to 1,200 feet.

West Well Field

Table 2 contains the same types of information for six active W-Series wells in the West Well Field. Two of the wells (6W and 14W) are shallow, tapping the upper aquifer. Four new deep wells (15W, 16W, and 17W) were drilled in 2008 to tap strata below the Corcoran Clay and above a depth of about 1,030 to 1,300 feet. Table 3 shows construction data for 15 active G-Series wells in the West Well Field. Six of these wells are shallow, and tap strata in the upper aquifer. Three of the wells (G-18, G-19, and G-21) were constructed in 1991 and tap strata between the Corcoran Clay and a depth of 940 feet. Four deeper wells (G-26 through 29) were drilled in 2007-08 and tap strata below depths ranging from 632 to 762 feet and above depths ranging from 860 to 1,122 feet. The deepest well (G-13) is perforated from 782 to 1,604 feet in depth.

Allensworth CSD

Table 4 contains information on construction for the two active wells for the Allensworth CSD. Because of high arsenic

TABLE 2-CONSTRUCTION DATA FOR ACTIVE AWD W-SERIES WELLS IN WEST WELL FIELD

Local No.	Date Drilled	Total Depth (feet)	Cased Depth (feet)	Casing Diameter (inches)	Perforated Interval (feet)	Annular Seal (feet)
6W	1977	468	468	16	240-468	0-77
7W	2/46	1,200	-	-	500-1,200	-
14W	7/07	563	490	18	240-480	0-50
15W	6/08	1,150	1,140	16	830-1,130	0-520
16W	5/08	1,330	1,332	16	870-1,298	0-510
17W	2/08	1,205	1,050	16	670-1,030	0-480

TABLE 3-CONSTRUCTION DATA FOR ACTIVE AWD
G-SERIES WELLS IN WEST WELL FIELD

Local No.	Date Drilled	Total Depth (feet)	Cased Depth (feet)	Casing Diameter (inches)	Perforated Interval (feet)	Annular Seal (feet)
G-1	1950	521	521	16	321-521	-
G-3	1950	520	500	16	200-500	-
G-5	1950	504	504	16	200-504	-
G-11	-	1,541	-	-	-	-
G-13	-	-	-	-	782-1,604	-
G-18	8/91	983	940	16	620-940	0-50
G-19	8/91	950	900	16	620-900	0-50
G-21	9/91	1,000	925	16	605-925	0-50
G-23	6/07	438	430	18	210-420	0-50
G-24	6/07	435	430	18	210-420	0-50
G-25	5/07	480	460	18	210-450	0-50
G-26	7/07	1,205	1,120	16	680-1,100	0-560
G-27	10/07	1,200	870	16	760-860	0-520
G-28	9/07	1,120	762	18	-	0-50
			1,162	16	762-1,122	
G-29	5/08	1,010	992	18	0-632	0-50
				16	632-992	

TABLE 4-CONSTRUCTION DATA FOR ALLENSWORTH CSD SUPPLY WELLS

Well No.	Date Drilled	Total Depth (feet)	Cased Depth (feet)	Casing Diameter (inches)	Perforated Interval (feet)	Annular Seal (feet)
1	8/84	250	245	8	185-240	0-170
2	10/98	320	315	-	100-305	0-90

concentrations in groundwater beneath Allensworth, a well field was constructed about two and a half miles east of Allensworth in 1984. Previous sampling of water supply wells in the Allensworth vicinity had indicated that the lowest arsenic concentrations were in shallow groundwater (above the Corcoran Clay) east of Allensworth. Both wells tap groundwater above a depth of about 301 feet. These wells were constructed when the maximum contaminant level (MCL) for arsenic was 50 ppb. Once the MCL was decreased to 10 ppb, the wells produced water with arsenic concentrations near or exceeding the MCL. In early 2018, a casing hammer test well was completed in this well field and a new shallow well is to be constructed in 2018.

Other Wells

There are hundreds of private irrigation wells in the north and southeast parts of the GSA. The deepest of these are generally in two areas: 1) Angiola, and 2) the Delano area. In the majority of the north and southeast parts of the GSA, the deepest wells are generally about 1,200 to 1,400 feet deep. Some wells tap the upper aquifer, but the majority tap the lower aquifer.

GROUNDWATER USE AND WELL DATA

Primary Uses of Each Aquifer

There are two aquifers in the GSA, the upper and lower aquifers, and both are primarily used for irrigation. Groundwater in the upper aquifer is also used for public supply for Allensworth and also for private domestic use and diaries. Groundwater in the lower aquifer is used primarily for irrigation and for dairies. There has been some limited pumpage for stock use in the west part of the GSA, primarily from the upper aquifer.

Depths of Water Supply Wells

Tables 1,2,3, and 4 show depths of active AWC and ACSD supply wells. Upper aquifer wells in the GSA are usually less than 500 feet deep. Most active lower aquifer wells are less than about 1,200 feet deep. However, there are six active AWD wells that range in depth from about 1,300 to 1,800 feet. During the past decade, with more awareness of the subsidence created by pumping from the lower aquifer, a number of older deeper AWD wells were abandoned and replaced by shallower wells.

In the southwest part of the GSA, maximum depths of most irrigation wells range from about 900 to 1,400 feet. These depths generally are greater to the east and are shallower to the west near the Tulare Lakebed.

WATER LEVELS

Water-Level Elevations and Direction of Groundwater Flow

KDSA (2011) provided a series of water-level elevation and direction of groundwater flow maps for both the upper and lower aquifers for the area bounded by Avenue 192 on the north, Avenue 48 on the south, 7th Avenue on the west, and Road 144 on the east. Upper aquifer maps were prepared for November 1921, February 1959, and Spring 2007. Lower aquifer maps were prepared for February 1959 and Spring 2007. These maps essentially cover the north part of the GSA and lands to the east.

North Part of GSA

Figure 15 shows water-level elevations and the direction of groundwater flow the upper aquifer in and east of the north part of the GSA in Spring 2007. There was a well developed cone of depression in the area east of Road 32 and between Avenue 72 and 144. Groundwater was flowing into a depression beneath the Pixley ID from the north, west, and southwest. Seepage from the Tule River was indicated to be an important source of recharge to groundwater in the area.

Figure 16 shows water-level elevations and the direction of groundwater flow in the lower aquifer in Spring 2007 in and east of the north part of the GSA. Two localized cones of depression were indicated, one coincident with the AWD well fields and a second west of Highway 43 near Deer Creek. Overall, groundwater was flowing from the northeast (in the forebay area) to the southwest toward a pumping depression west and south of the AWD well fields.

Water-level elevation and direction of groundwater flow maps can't be prepared for either aquifer in the west part of the GSA,

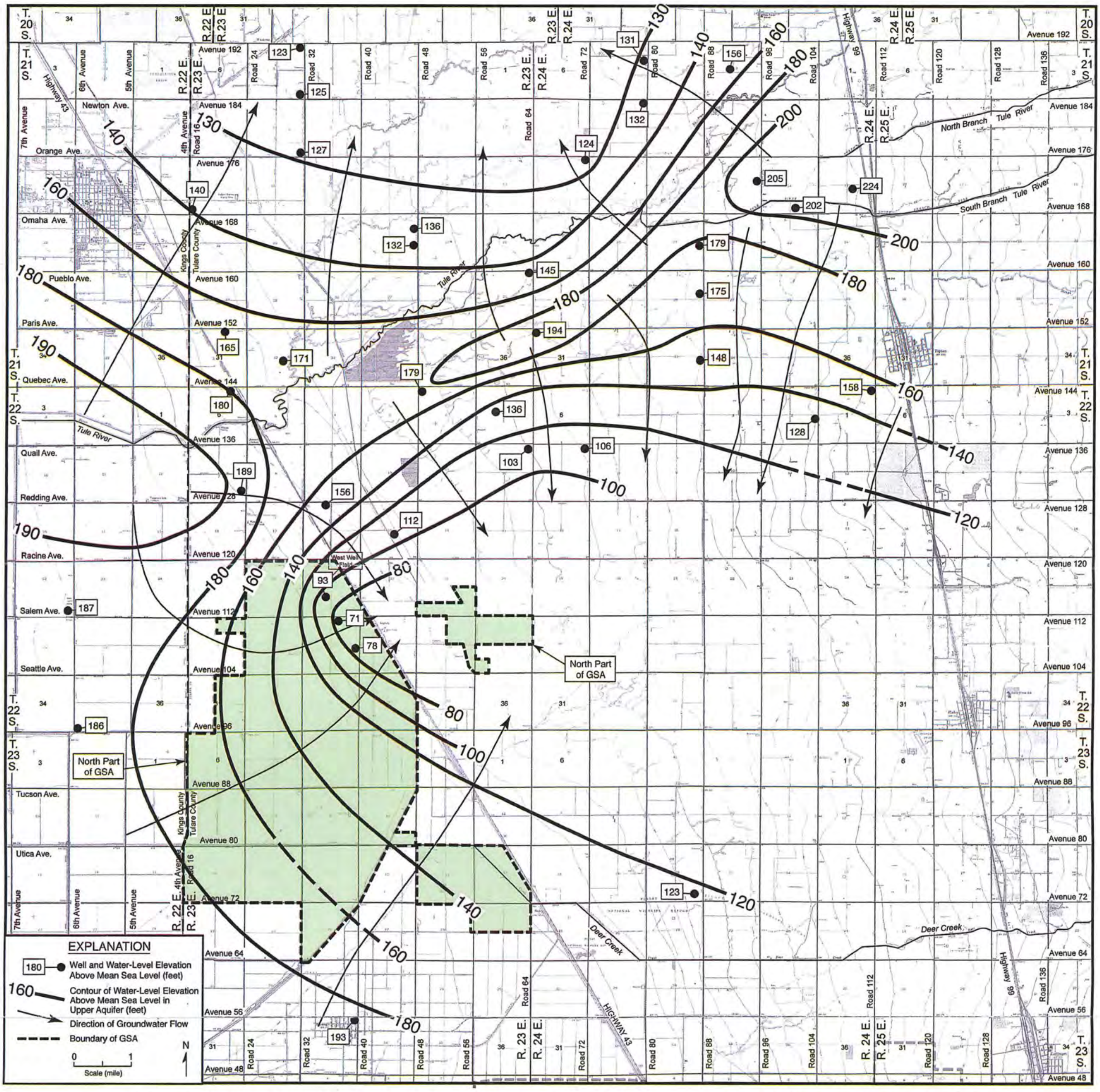


FIGURE 15- WATER-LEVEL ELEVATIONS AND DIRECTION OF GROUNDWATER FLOW IN THE UPPER AQUIFER IN AND EAST OF NORTH PART OF GSA (SPRING 2007)

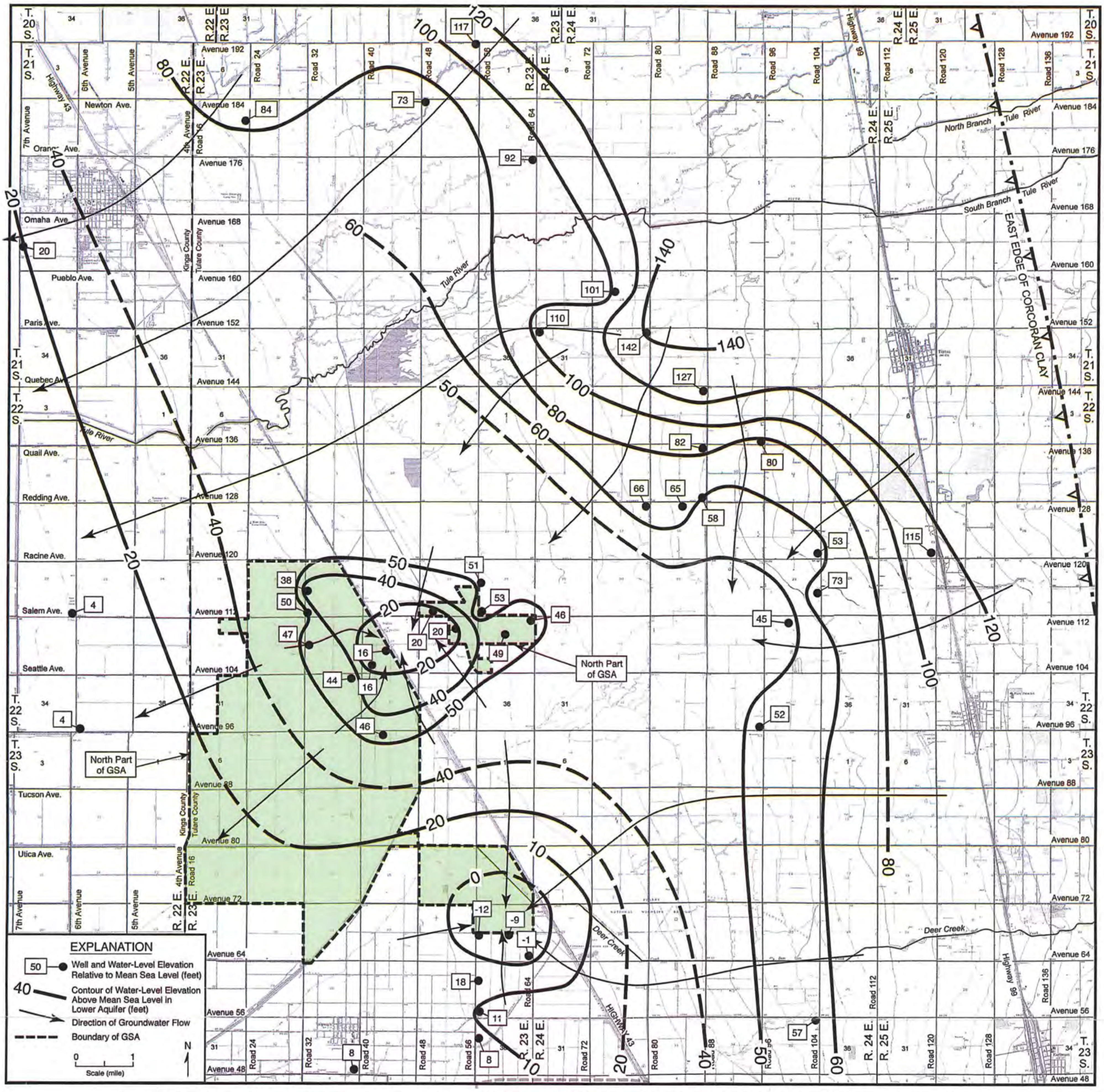


FIGURE 16- WATER-LEVEL ELEVATIONS AND DIRECTION OF GROUNDWATER FLOW IN THE LOWER AQUIFER IN AND EAST OF NORTH PART OF GSA (SPRING 2007)

due to a lack of wells and water-level measurements. Only several water supply wells (primarily stock wells) are known to exist in this area. This is due to the abundance of clay and salty groundwater.

Southeast Part of GSA

Thomas Harder & Co (2017) provided annual water-level elevation maps for the shallower groundwater for Fall 1998 through Fall 2007, and Fall 2010 for the Tule Sub-basin, which includes most of the north and southeast parts of the GSA. They defined shallow as above a depth of about 450 feet (above the Corcoran Clay) in the west part of the Tule Sub-basin and above a depth of about 300 feet in the east part of the basin (i.e. near Porterville). They also provided water-level elevations maps for the deeper groundwater (below the previously referenced depths) for Fall 1998, Fall 1999, and Fall 2010.

The Thomas Harder & Co. (2017) map for the shallower groundwater for Fall 2010 was modified for the southeastern part of the GSA and is presented herein as Figure 17. A water-level elevation map for Fall 2010 from the monitoring program in Kern County associated with the Semitropic WSD water banking project was used to supplement data farther north. The direction of groundwater flow in Fall 2010 beneath the southeast part of the GSA was generally to the north, toward a cone of depression west of Pixley. Higher water-level elevations in the upper aquifer in

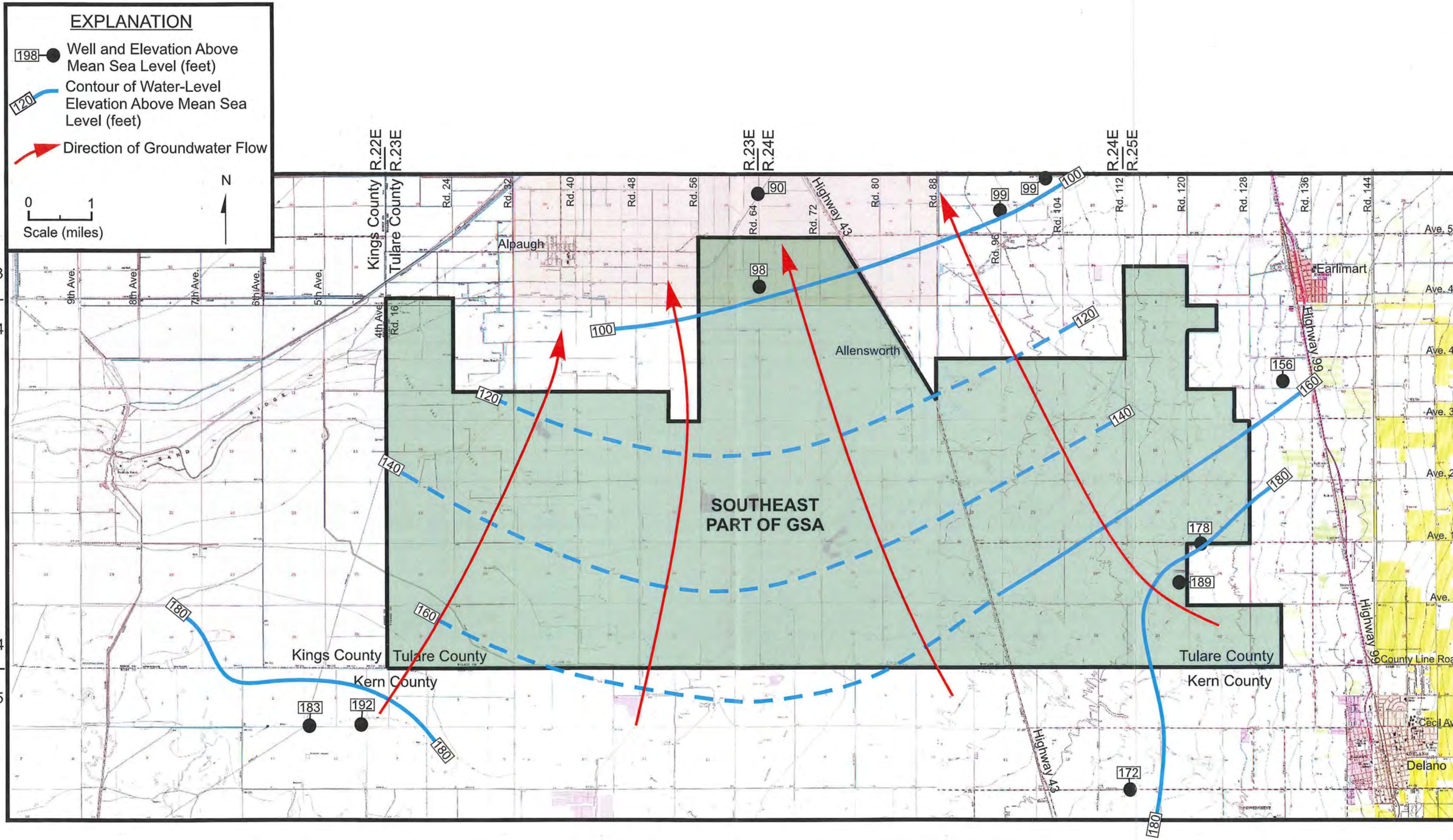


FIGURE 17- WATER-LEVEL ELEVATIONS AND DIRECTION OF GROUNDWATER FLOW FOR UPPER AQUIFER IN SOUTHEAST PART OF GSA (FALL 2010)

the north part of Kern County and west of Highway 43 are indicated to be partly due to recharge from streamflow in Poso Creek. The average water-level slope near the Kern County line was indicated to be about ten feet per mile. Overall, there was a lack of data in large parts of the area.

The Thomas Harder & Co. (2017) map for the deeper groundwater for Fall 2010 was modified for the southeastern part of the GSA and is presented as Figure 18. Overall, little net groundwater flow was indicated across the Kern County line in Fall 2010. However, annual spring water-level elevation maps prepared by KDSA for the lower aquifer in the Semitropic WSD (south of the Kern County line) have generally indicated a northerly flow in much of the area west of Highway 43. Farther north, a westerly direction of flow was indicated toward a groundwater depression in the Alpaugh areas.

Water-Level Trends

North Part of GSA

KDSA (2011) provided water-level hydrographs for upper and lower aquifer wells in the north part of the GSP. Figure 19 shows the locations of wells for which these hydrographs were available. The hydrographs were presented in Appendix C of KDSA (2011).

Upper Aquifer. Water-level measurements and hydrographs were

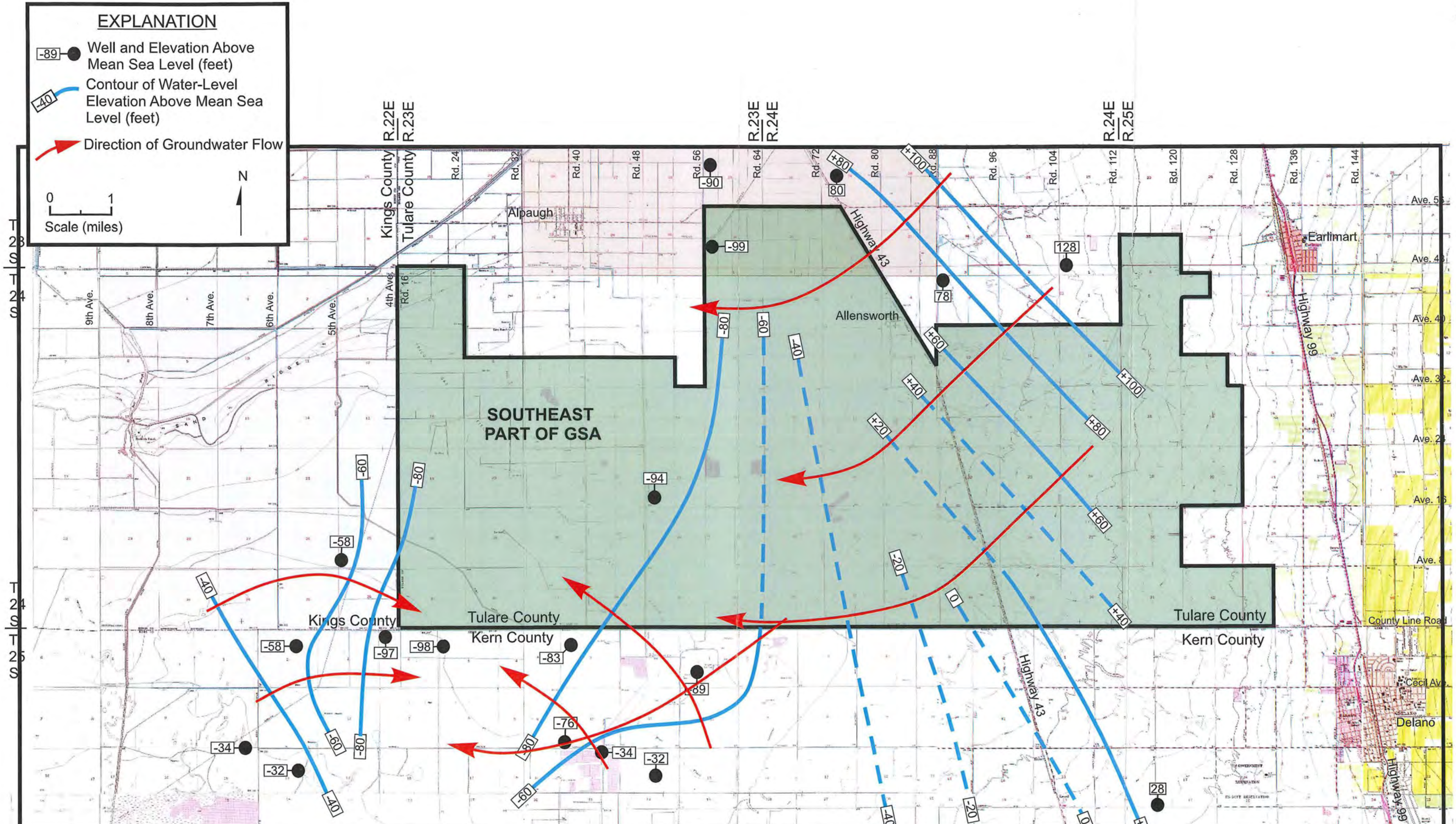


FIGURE 18- WATER-LEVEL ELEVATIONS AND DIRECTION OF GROUNDWATER FLOW FOR LOWER AQUIFER IN SOUTHEAST PART OF GSA (FALL 2010)

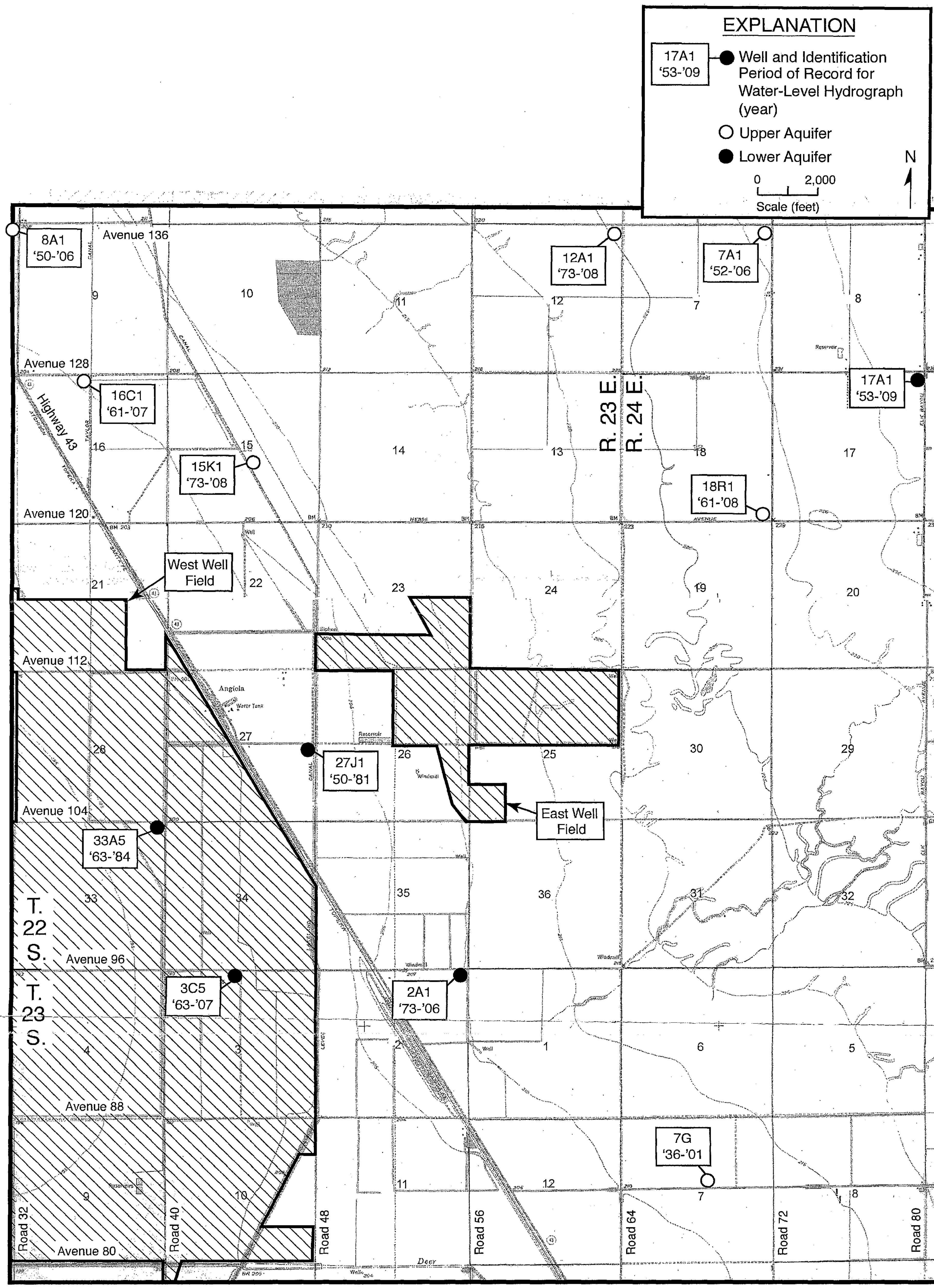


FIGURE 19- LOCATIONS OF WELLS WITH WATER-LEVEL HYDROGRAPHS IN NORTH PART OF GSA

obtained from the California Department of Water Resources (DWR) website for seven wells in the vicinity that tap the upper aquifer (Figure 20). A representative hydrograph for the upper aquifer in the north part of the GSA is provided in Figure 20. Well T22S/ R23E-16C1 is located near Avenue 128 and Taylor Avenue, about a mile and a half north of the north edge of the AWD's West Well Field. Since 1960, depth to water in this well has ranged from about 25 to 110 feet. The water level rose during wet periods and fell during droughts. The deepest water levels for this well are consistent with measurements in two AWD wells in late December, 1991, during a severe drought. No long-term water-level change was apparent for any of the hydrographs for wells tapping the upper aquifer. No groundwater overdraft of the upper aquifer was indicated since 1961.

Lower Aquifer. Water-level hydrographs were available for five wells that tap the lower aquifer in the vicinity of the AWD's well fields. Figure 21 is a representative water-level hydrograph for a well tapping the lower aquifer. Well T23S/R23E-3C5 is AWD Well No. G-12. Pressure levels in wells tapping the lower aquifer have also risen during wet periods and fallen during droughts. For example, water levels in Well G-12 have commonly been in the range of about 110 to 160 feet deep during wet periods, and about 180 to 230 feet deep during droughts. No long-

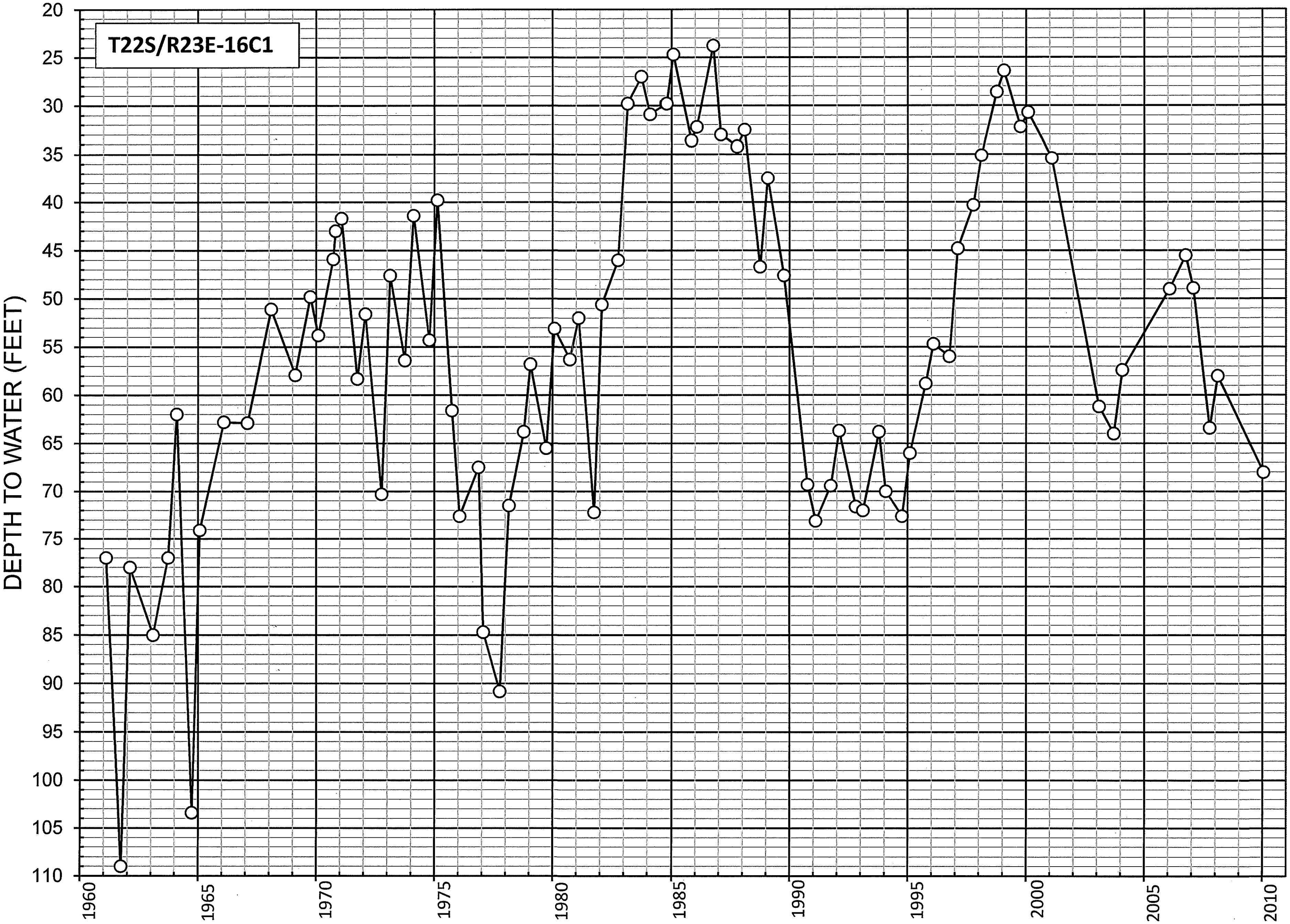


FIGURE 20- LONG-TERM WATER-LEVEL HYDROGRAPH FOR UPPER AQUIFER WELL IN NORTH PART OF GSA

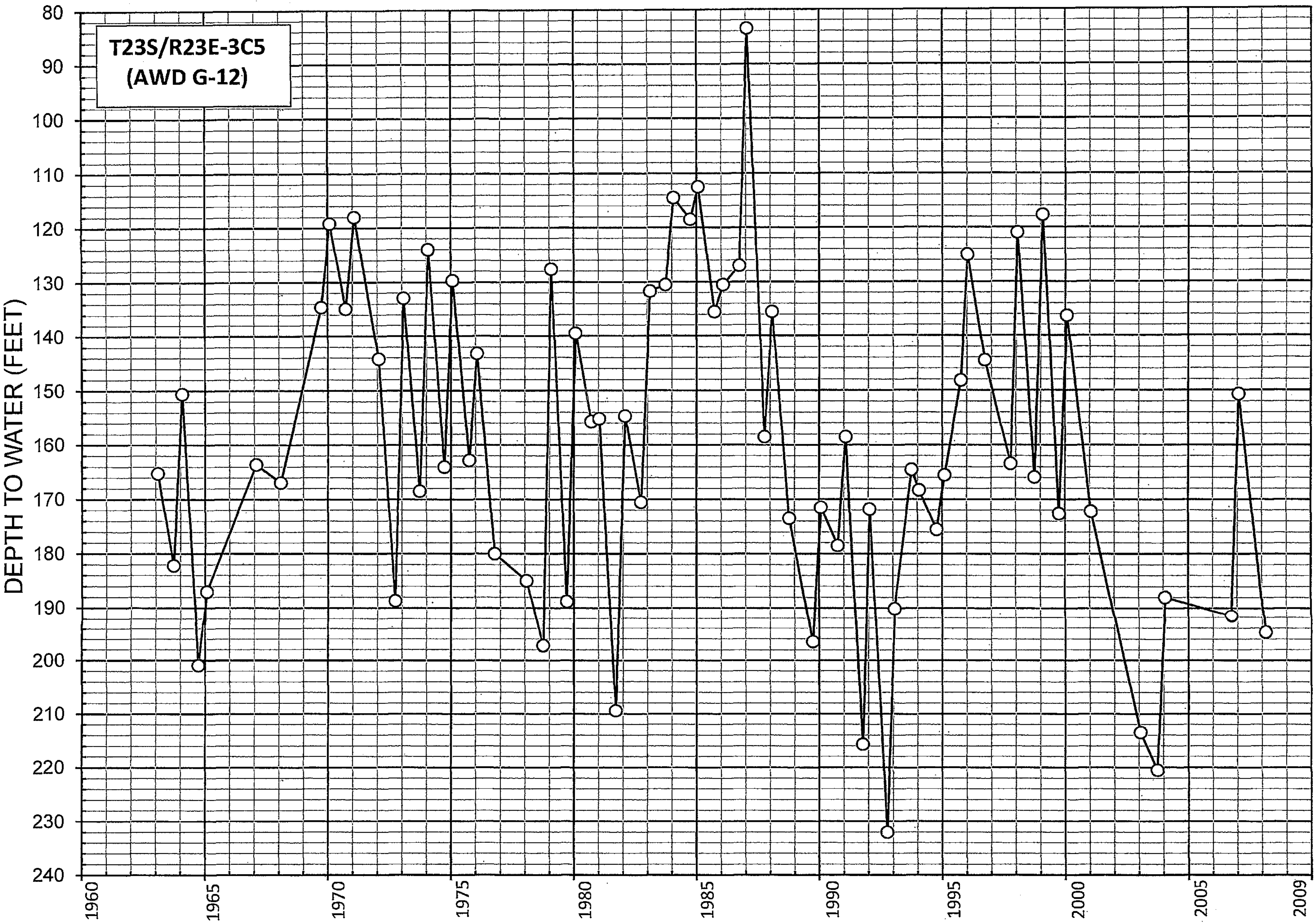


FIGURE 21- LONG-TERM WATER-LEVEL HYDROGRAPH FOR LOWER AQUIFER WELL IN NORTH PART OF GSA

term water-level declines are shown by hydrographs for the deep wells in the Angiola area, and there is no indication of overdraft of the lower aquifer since 1963.

Southeast Part of GSA

Water-level hydrographs were available from the DWR for six upper aquifer wells and for seven lower aquifer wells in the southeast part of the GSA.

Upper Aquifer. Figures 22 and 23 are representative hydrographs for the upper aquifer in the southeast part of the GSA. Well T24S/R23E-22E1 (Figure 23) is located about four and a half miles south of Alpaugh. Records are available since the early 1960's. Water levels fell from 1962 through 1972, then rose from 1973 through the late 1980's. Water-levels were relatively stable through 1993, then rose through 2000. The shallowest levels of record were in 1997-2000. The water level then fell through 2007. Figure 24 is a long-term water-level hydrograph for Well T24S/R24E-34F1, located near the Kern County line and about half mile west of Highway 43. Depth to water in this well fell from 1940 through the early 1970's. Water levels were relatively stable through the end of the 1970's, then rose through the late 1980's. Water levels were then relatively stable through 2007. This well is not far north of the Semitropic WSD, and the water- level trends appear to be related to the

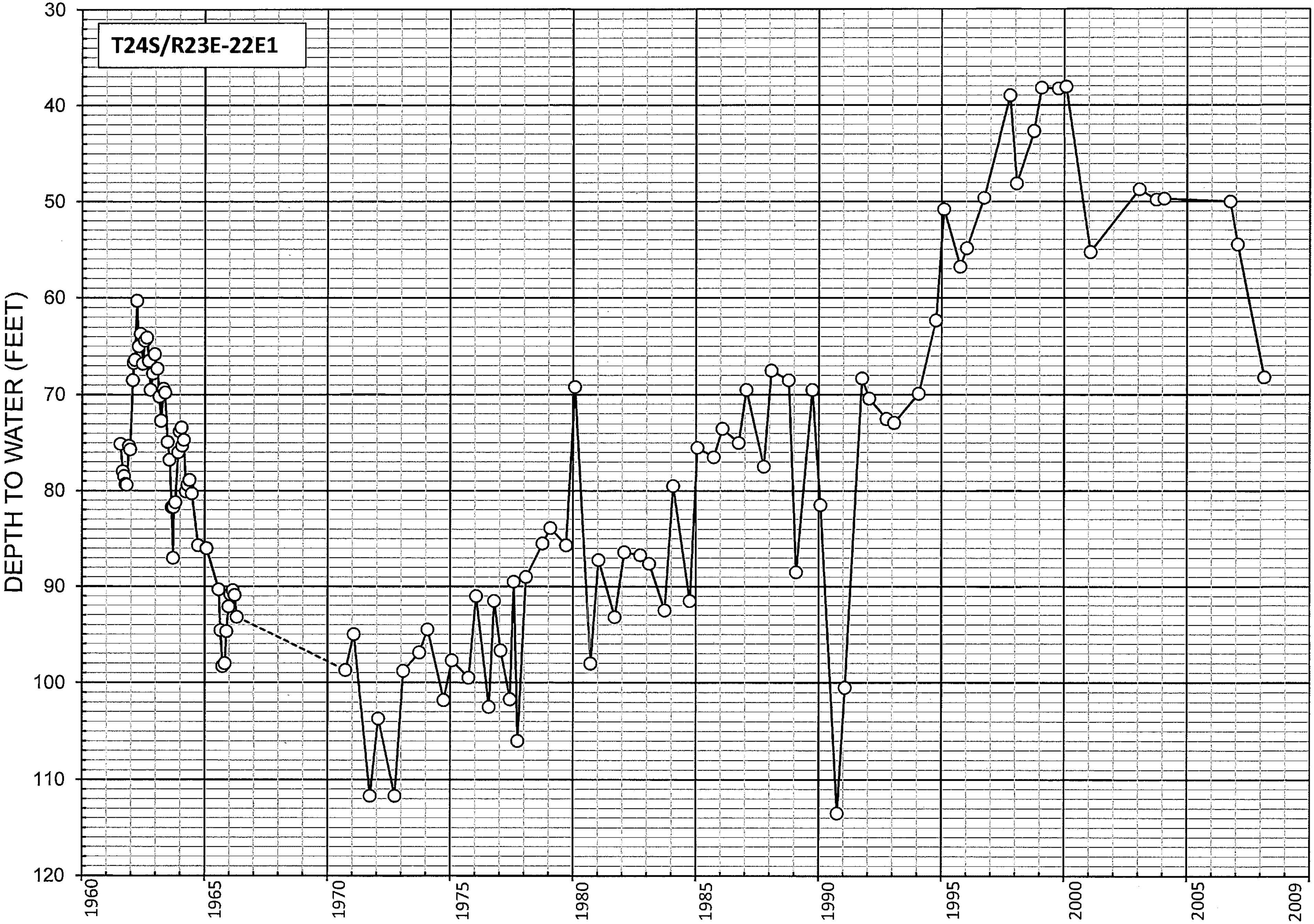


FIGURE 22- LONG-TERM WATER-LEVEL HYDROGRAPH FOR UPPER AQUIFER WELL T24S/R23E-22E1 IN SOUTHEAST PART OF GSA

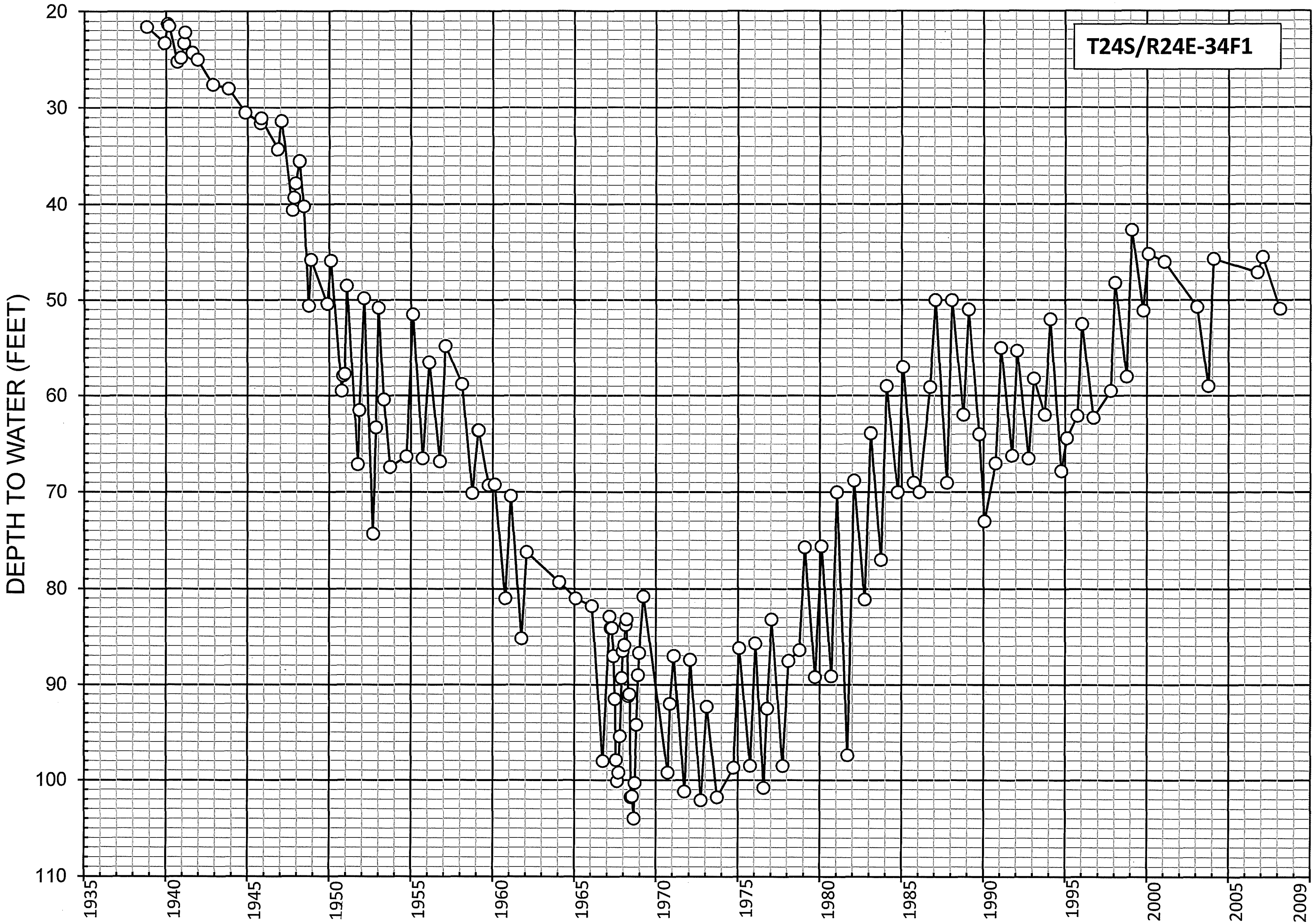


FIGURE 23- LONG-TERM WATER-LEVEL HYDROGRAPH FOR UPPER AQUIFER WELL T24S/R24E-34F1 IN SOUTHEAST PART OF GSA

importation of surface water to that District beginning in the late 1970's.

Lower Aquifer. Figures 24 and 25 are representative water-level hydrographs for two lower aquifer wells in the southeast part of the GSA. The larger seasonal water-level variations for these wells compared to these shown in Figures 21 and 22 are indicative of a confined aquifer. Well T24S/R22E-27B1 (Figure 24) is located two miles north of the Kern County Line and about two and a half miles west of the Tulare County-Kings County Line. The water level in this well fell from the late 1950's through 1978, then rose through 1987, then fell through the early 1990's. The water level then rose and was stable through the end of the late 2000's, then fell during 2007-17. Overall, water levels in this well were relatively stable from about 1978 to 2007, then fell during the recent drought. Figure 25 is a long-term water-level hydrograph for Well T24S/ R23E-22R2. This well is located about five miles south of Alpaugh. The water level in this well fell from 1970 to 1978, then rose from 1978 through 1987, then fell through the early 1990's. Thereafter, the water level was relatively stable prior to 2008. The water level then fell from 2008-10, then rose through 2012. The water level then fell through 2015. Overall, the water levels in this well were relatively stable from about 1980 through 2006, then fell during the recent drought.

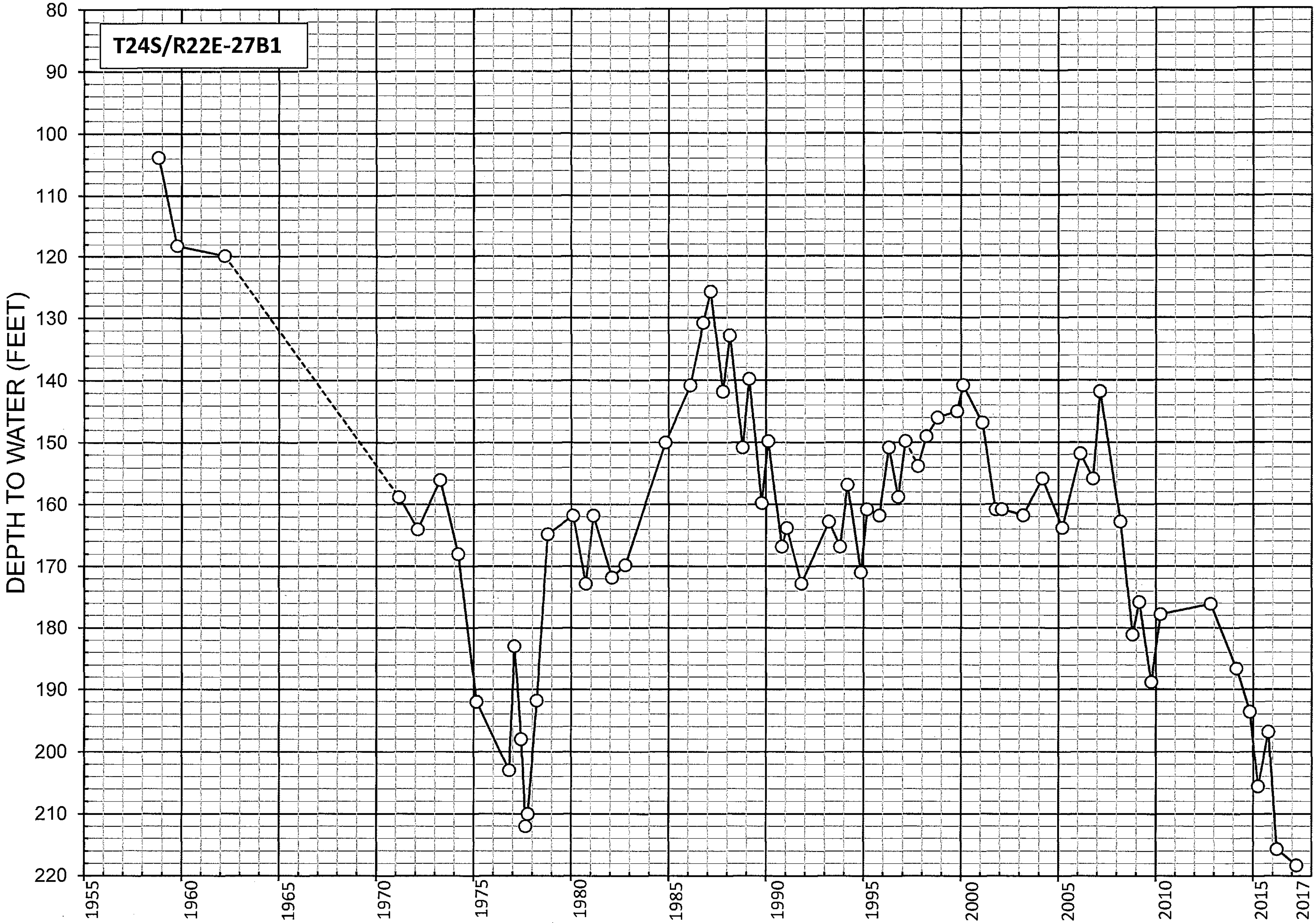


FIGURE 24- LONG-TERM WATER-LEVEL HYDROGRAPH FOR LOWER AQUIFER WELL T24S/R22E-27B1 IN SOUTHEAST PART OF GSA

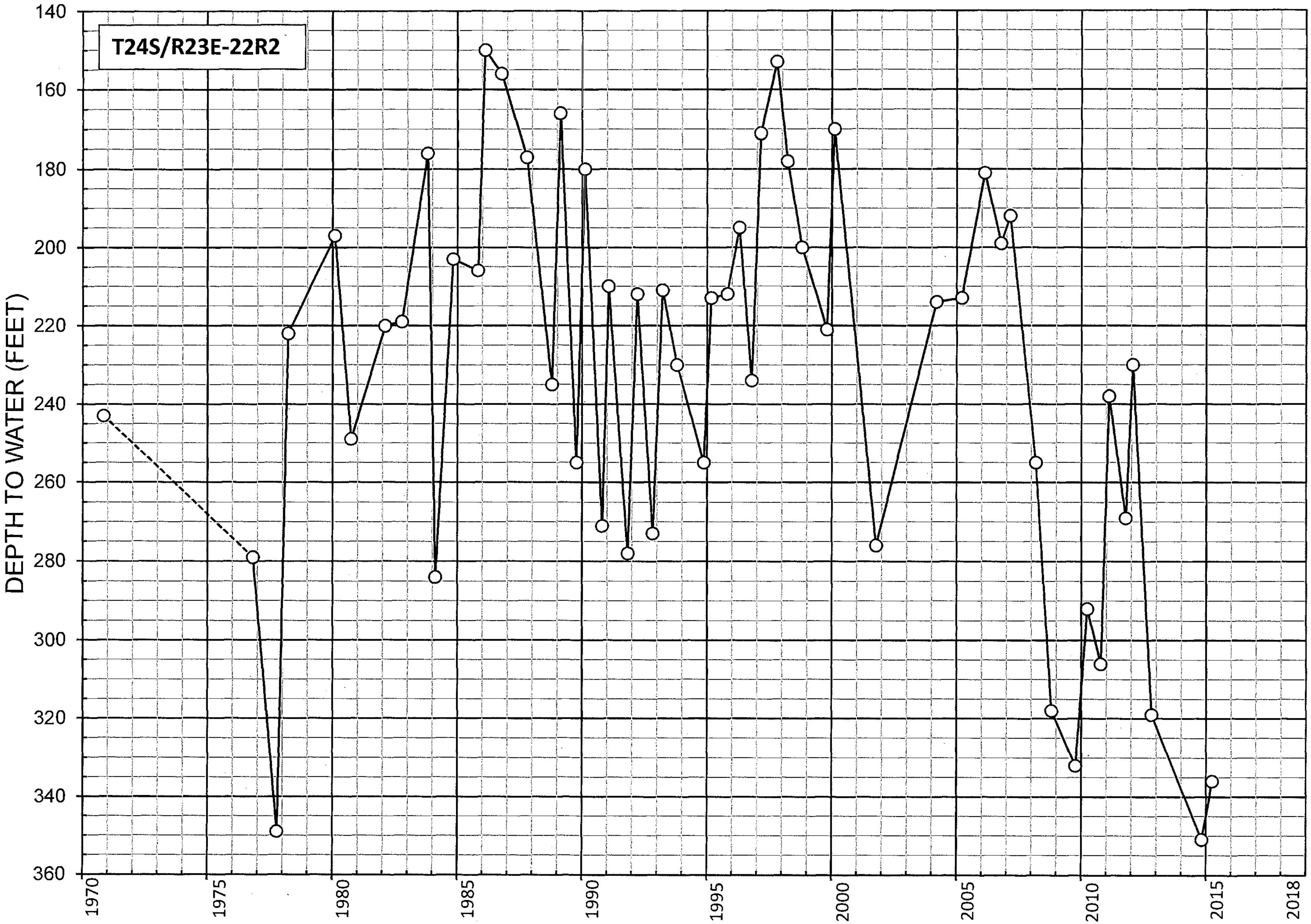


FIGURE 25- LONG-TERM WATER-LEVEL HYDROGRAPH FOR LOWER AQUIFER WELL T24S/R23E-22R2 IN SOUTHEAST PART OF GSA

SOURCES OF RECHARGE

Figure 26 shows the location of potential groundwater recharge areas in the GSA. These include streamflow seepage, groundwater inflow, and deep percolation from irrigation return flow. Streamflow from the Tule River, Deer Creek, and White River were discussed by Thomas Harder & Co. (2017).

Tule River

The Tule River is the largest stream in the Tule Sub-basin. It passes through the area north of the north part of the TCWA GSA. Water-level elevation contours for the upper aquifer indicate that the Tule River is a losing stream and contributes significant recharge to the groundwater.

Deer Creek

Deer Creek passes through the area north of the southeast part of the GSA. Farther west, the realigned creek flows through the south part of the north part of the GSA. Deer Creek is also indicated to be an important source of recharge to the groundwater.

White River

The White River passes beneath Highway 99 south of Earlimart and flows to the west near the north boundary of the southern part of the GSA in the area east of Highway 43. It no longer normally flows in the area west of Highway 43.

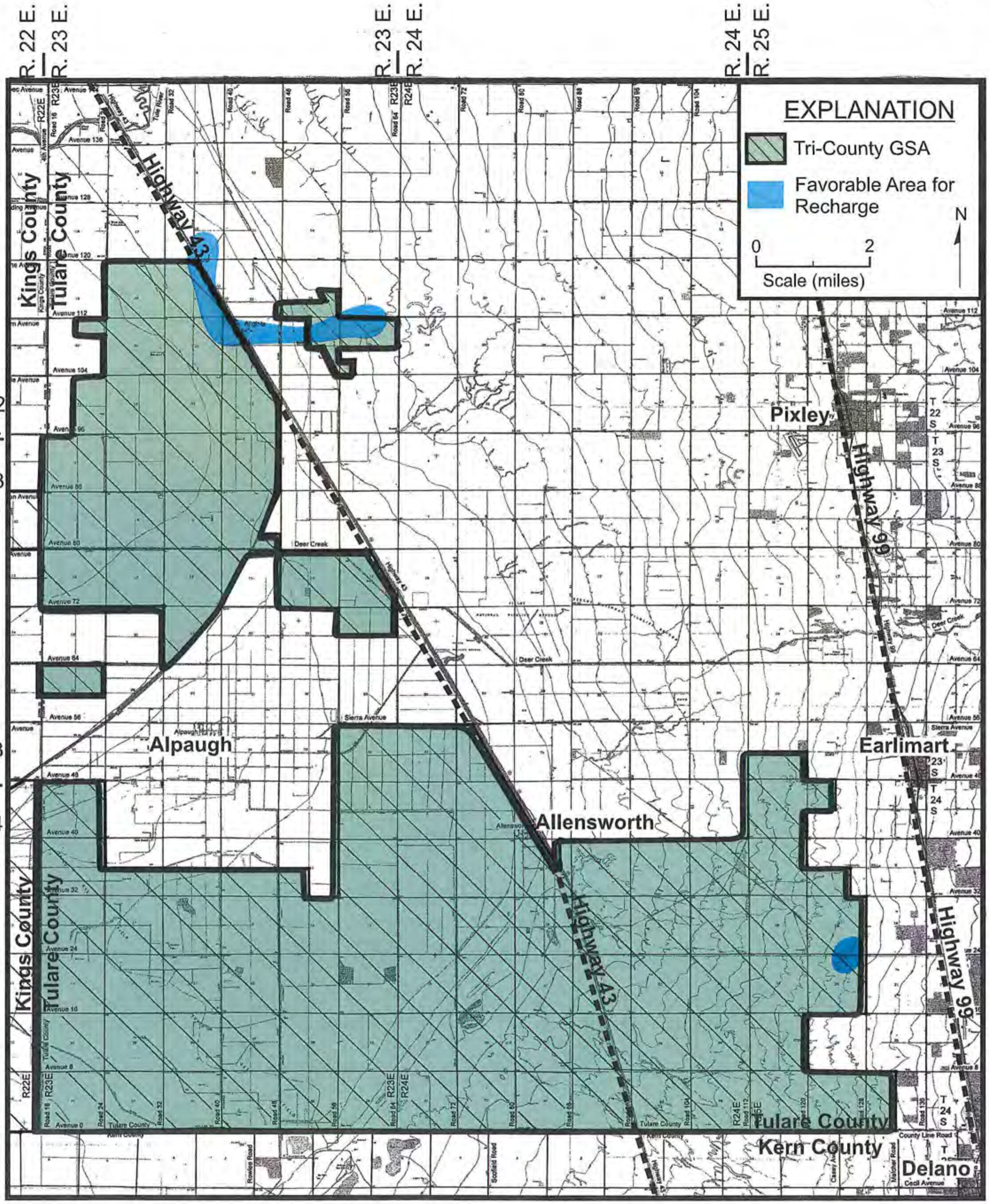


FIGURE 26-POTENTIAL GROUNDWATER RECHARGE AREAS

Poso Creek

Poso Creek crosses Highway 99 at Famoso and eventually flows into Tulare County west of Highway 43. It is an important source of recharge to the groundwater in the north part of the Semitropic WSD, upgradient of the southeast part of the GSA.

Kern River

The diverted Kern River change flows into the Tulare Lakebed and passes through the west part of the GSA. It is an important source of recharge to groundwater in the upper aquifer in the area south of the Tulare Lakebed.

Canal Seepage

The Homeland Canal is a major canal that passes through the north and southwest parts of the GSA. Seepage from the canal is a source of recharge to the upper aquifer, primarily in areas northeast of the Tulare Lakebed.

Deep Percolation

The primary areas where deep percolation is an important source of recharge are lands within AWD and outside of the Tulare Lakebed that are served with canal water. Water applied in excess of crop consumptive use is termed deep percolation and is considered a source of recharge. This is primarily on lands in the east part of the AWD.

Groundwater Inflow

There is groundwater inflow into the upper aquifer in the north part of the GSA from the northwest and southwest. There is groundwater inflow into the upper aquifer in the southeast part of the GSA from the southeast and south. There is groundwater inflow in the lower aquifer in the north and southeast parts of the GSA from the northeast.

SOURCES OF DISCHARGE

Sources of groundwater discharge include pumpage and groundwater outflow. Figure 27 shows locations of groundwater discharge in the GSA, including active large capacity wells.

Pumpage

Pace Engineering (2009) discussed pumpage in the Angiola Water District. Thomas Harder & Co. (2017) discussed pumpage in the Tule Sub-basin. Dee Jaspar & Associates have provided detailed estimates of pumpage in the Tri County WA GSA.

Groundwater Outflow

Groundwater in the upper aquifer flows out of the north part of the GSA to the east to the Pixley I.D. Groundwater in the lower aquifer flows out of the north part of the GSA to the southwest and into groundwater below the Tulare Lakebed.

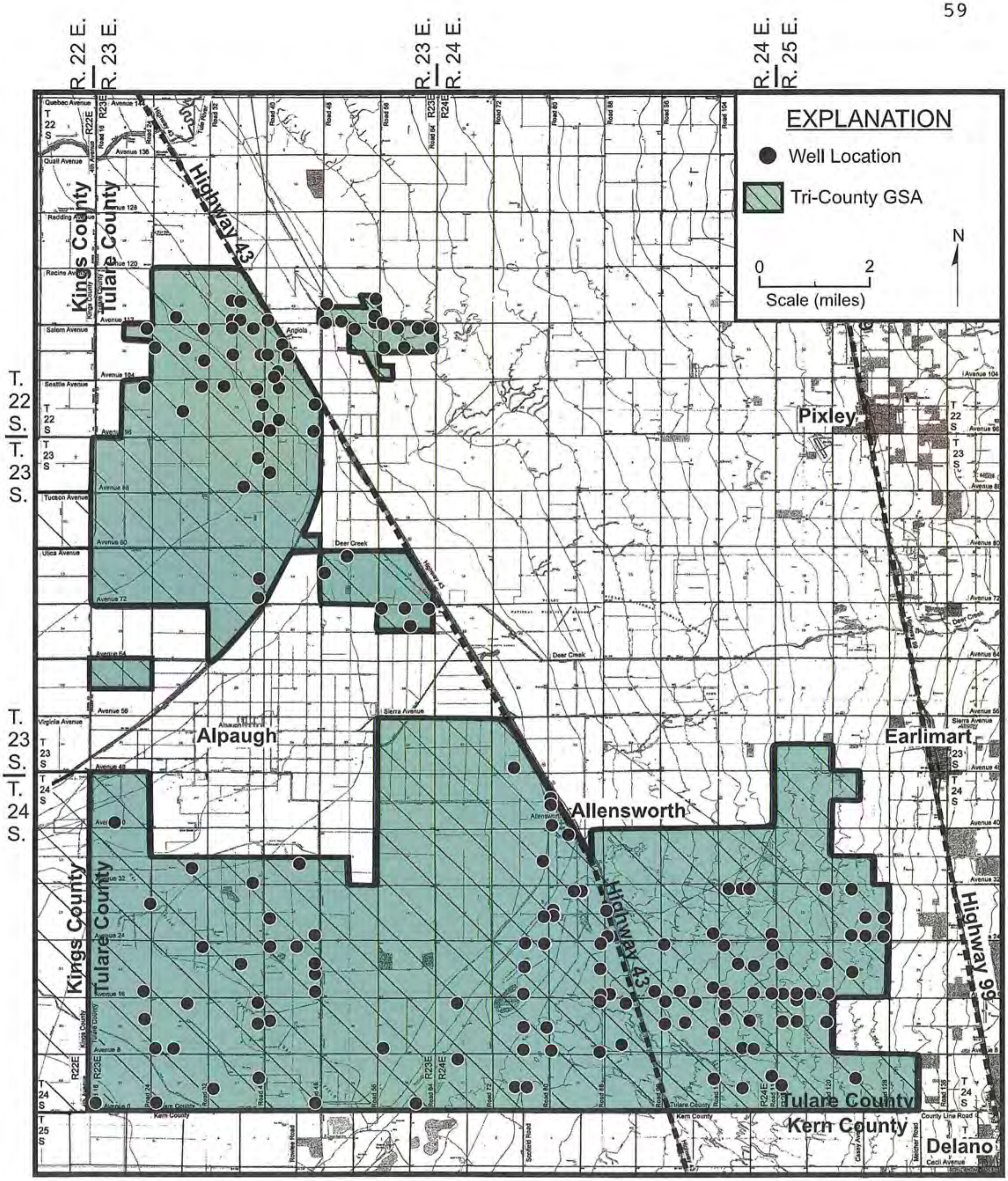


FIGURE 27 - POTENTIAL GROUNDWATER DISCHARGE AREAS

Groundwater in the upper aquifer in the southeast part of the GSA flows to the north toward the Pixley I.D. Groundwater in the lower aquifer flows to the northwest to groundwater underneath the Tulare Lakebed.

CHANGES IN GROUNDWATER STORAGE

Changes in groundwater storage for the upper aquifer are best determined from water level changes in wells tapping strata above the Corcoran Clay and specific yields for the upper aquifer. Although there have been water-level declines in wells tapping the lower aquifer, storage changes are minimal in this aquifer, because this aquifer essentially stays full of water. The lower aquifer water-level changes represent pressure changes only. For the Corcoran Clay and deeper confining bed, there has been a storage change due to the compaction of these deposits. This change in storage can be estimated from land subsidence records. It is considered a one time change in storage.

Upper Aquifer

Water-level records for the following upper aquifer wells were evaluated:

T22S/R23E1-1F1, 2D1, 7R2, 16C1

T23S/R23E-3C5, 15M1

T24S/R22E-26N1, 27B1

T24S/R23E-5B3, 22E1

T24S/R24E-3A1, 4R1, 20A3, 20R1, 25J1, 34F1

T24S/R25E-17P1

Water-level records are not available for the upper aquifer in the west part of the GSP. The wells in T22S and T23S are in the north part of the GSA, whereas those in T24S are in in the southeast part of the GSA.

North Part of GSA

KDSA (2011) in a report prepared for the Angiola W.D. evaluated water-level trends for seven wells in the vicinity of their well fields in or near the north part of the GSA. No long-term water-level changes was indicated. It should be noted that six of the seven wells were located between the Tule River and the north edge of the well fields. Recharge from Tule river seepage has contributed to the relatively stable water levels. As part of this evaluation, these water-level hydrographs were updated through 2011 and the same trends were apparent. DWR hasn't updated water-level measurements for these wells since 2011. Figure 28 shows the annual storage changes for the upper aquifer in the north part of the GSA for 1990-2009.

Southeast Part of the GSA

Water-level hydrographs are available for 10 upper aquifer wells. Data from many of these wells extended through 2017. Activities in surrounding water districts particularly to the

FIGURE 28 - ANNUAL CHANGE IN STORAGE (UNCONFINED) - NORTH AREA

south and east are expected to affect water levels in this part of the GSA to some degree. Records for three of these wells indicate water-level rises since the 1970's. All of these wells were located within a few miles of the Kern County line and west of Highway 43. These rises may have been associated with importation of surface water to the Semitropic WSD, which began in the late 1960's. Records for only one well indicate a water-level decline, and records for this well didn't start until 1998. Records for this well aren't representative of long-term records for wells in the area. Records for the remaining six wells showed relatively stable levels from the 1970's through 2008-2017. Thus there was no significant change in groundwater storage in the upper aquifer in recent decades in the southeast part of the GSA. Figure 29 shows annual changes in groundwater storage for the upper aquifer in the southeast part of the GSA for 1988-2007.

Lower Aquifer

Long-term water-level records are available for 15 lower aquifer wells in or near the southeast part of the GSA. There were water-level declines in seven of these wells. Three wells with the greatest declines (about 5 to 7 feet per year) were northeast of Alpaugh and west of Highway 43. Records for three of the lower aquifer wells indicated water-levels declines of

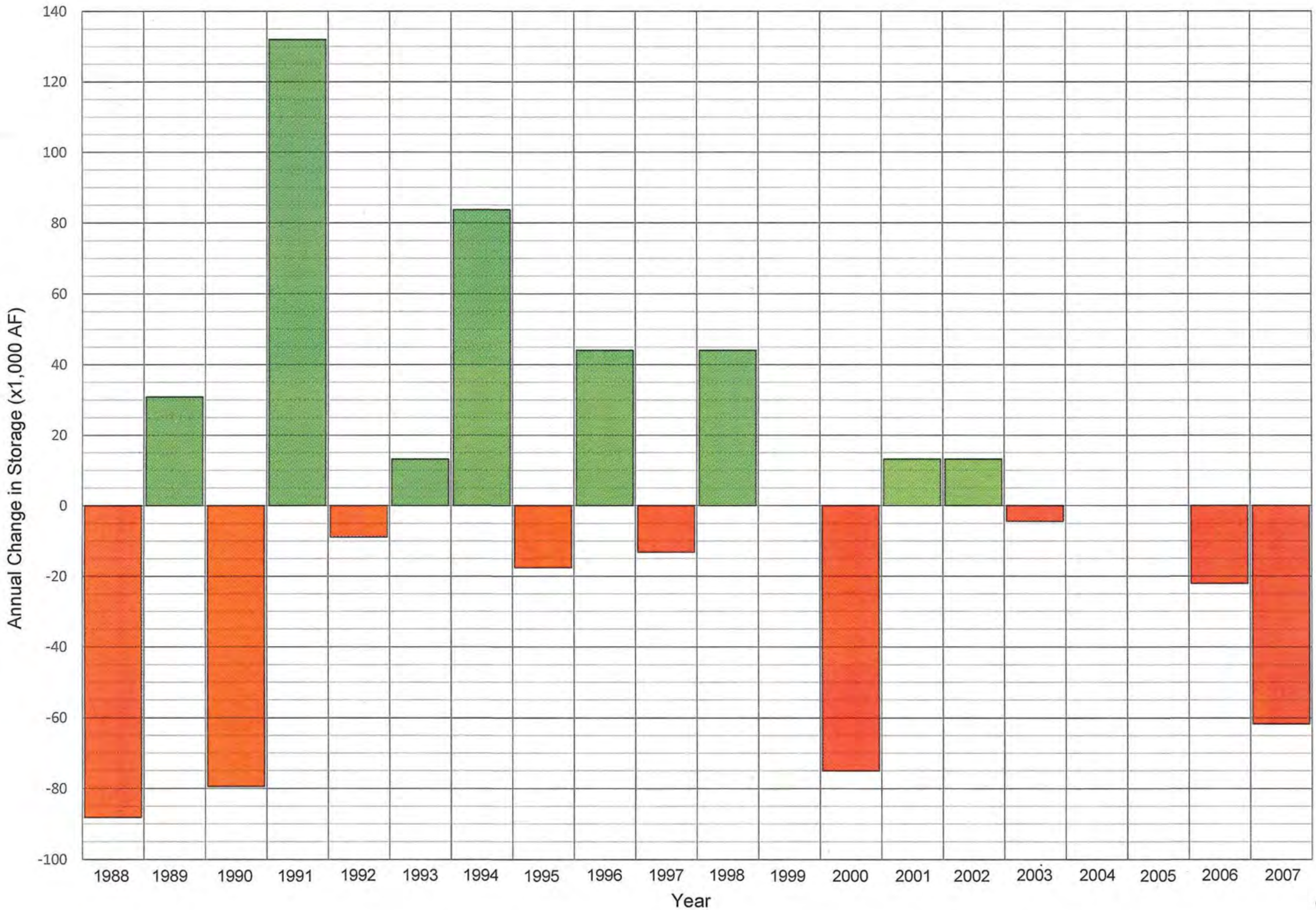


FIGURE 29 - ANNUAL CHANGE IN STORAGE (UNCONFINED) - SOUTHEAST AREA

about 2.5 to 3.0 feet per year. These wells were generally near or to the southeast of Alpaugh. Records for six wells indicated relatively stable water levels. Several of these were in the far southwest part of the southeast part of the GSA.

Water-level declines in wells tapping the lower aquifer aren't indicative of a significant change in groundwater storage in that aquifer, because the water levels remained above the top of the aquifer.

Confining Beds

Water-level declines in wells tapping the lower aquifer are associated with land subsidence and compaction of fine-grained strata or confining beds. These strata include the Corcoran Clay and deeper clays. The amount of this decrease in storage can be estimated by considering historical subsidence (Figure 28). Figure 28 was used to estimate the volume of subsidence between 1949 and 2005. Land subsidence during that period was probably about 70 to 75 percent of the total subsidence through 2017.

Although there was no significant pumpage in the western part of the GSA, there still was land subsidence due to pumping in adjoining areas (primarily to the east and south). An average of 1.0 foot of subsidence was used for the west part of the GSA. In the remaining parts of the GSA, the average of the ranges shown for the three categories (2.5 feet, 7.5 feet, and 12.5 feet) were used. This evaluation indicated that there was about

35,000 acre-feet of groundwater expelled from clay layers in the west part of the GSA between 1949 and 2005. Similarly, there were about 146,000 acre-feet in the north part of the GSA, and 460,000 acre-feet in the southeast part of the GSA for that period. In total, the combined amount was 643,000 acre-feet, or an average of 11,500 acre-feet per year. Assuming that the amount of subsidence during 1949 to 2005 was 75 percent of that for 1949 to 2017, this average would be about 15,000 acre-feet per year for this period. This was the one time loss in groundwater storage from compaction of clay strata with GSA.

For comparison, Thomas Harder & Co. estimated a total land subsidence between 1990 and 2010 in the entire Tule Sub-basin to have averaged about 85,000 acre-feet per year.

AQUIFER CHARACTERISTICS

Pump Tests

AWD Wells

Table 5 summarizes pump test data for AWD upper aquifer wells. Pumping rates ranged from 720 to 3,000 gpm and specific capacities ranged from 7.6 to 18.7 gpm per foot. Most pumping rates ranged from 800 to 2,010 gpm, and most specific capacities range from 8 to 16 gpm per foot. Actual pumping rates for most of these wells are less than 1,500 gpm. Table 6 shows pump test results for AWD lower aquifer wells. For lower aquifer wells,

TABLE 5- PUMP TEST DATA FOR AWD UPPER AQUIFER WELLS

Local No.	Date	Pumping Rate (gpm)	Static Water Level (feet)	Pumping Water Level (feet)	Drawdown (feet)	Specific Capacity (gpm/ft)
E-25	11/15	1,790	191.8	388.9	197.1	9.1
E-26	11/15	1,995	169.2	275.9	106.7	18.7
E-27	10/15	2,005	184.0	328.3	144.3	13.9
G-1	1/07	870	109	246	137	6.4
G-3	1/07	950	127	223	96	9.9
G-5	1/07	800	119	210	91	8.8
G-30	11/15	2,060	177.3	331.0	153.7	13.4
W-6	4/02	720	190	285	95	7.6
W-14	8/07	3,000	180	396	216	13.9
W-18	11/15	2,035	188.3	312.2	123.7	16.4

Pump tests for older wells by Kimball Pump Co., results provided by Angiola Water District. 2015 pump tests for new wells from Layne Christiansen Co.

TABLE 6-PUMP TEST DATA FOR AWD
LOWER AQUIFER WELLS

Local No.	Date	Pumping Rate (gpm)	Static Water Level (feet)	Pumping Water Level (feet)	Drawdown (feet)	Specific Capacity (gpm/ft)
1E	1/07	1,390	-	-	-	-
5E	1/07	750	159	210	51	14.7
10E	1/07	1,150	172	239	67	17.2
13E	1/07	1,300	166	206	40	32.5
14E	1/07	1,300	162	196	34	38.2
15E	6/02	1,915	332	374	42	45.6
16E	1/07	2,300	190	259	69	33.3
18E	1/07	2,250	212	284	72	31.3
19E	1/07	1,800	186	275	89	20.2
7W	1/07	1,150	154	199	45	25.6
13W	4/02	1,390	269	315	46	30.2
G-11	1/07	1,990	184		40	49.8
G-13	1/07	2,250	-	-	-	-
G-18	1/07	1,900	164	303	139	13.7
G-19	1/07	2,050	150	274	124	16.5
G-20	1/07	1,830	151	317	166	11.0
G-21	1/07	1,425	182	354	172	8.3
G-25	7/07	2,200	196	272	76	28.9
G-26	7/07	2,600	312	358	46	56.5

Pump tests by Kimball Pump Co., provided from Angiola Water District.

pumping rates ranged from 750 to 2,600 gpm and specific capacities from 8.3 to 56.5 gpm per foot. Pumping rates for most of the wells ranged from about 1,150 to 2,300 gpm. Most specific capacities ranged from about 15 to 50 gpm per foot.

Aquifer Tests

North Part of GSA

Ten-hour constant discharge tests were conducted on five new AWD upper aquifer wells in late 2015. Drawdown measurements for the tests on three of the wells (E-26, E-27, and W-18) were suitable for determining aquifer transmissivity. Transmissivities ranged from 30,000 gpd per foot to 37,000 gpd per foot, and averaged 34,000 gpd per foot.

A storage coefficient for the upper aquifer of 0.02 is considered applicable to estimate drawdowns beyond about a mile from the centroid of pumping in the AWD's West Well Field. Drawdown calculation indicate that the groundwater in the upper aquifer would no longer be confined at closer distances to the centroid of pumping in the West Well Field. Thus a larger storage coefficient (0.10) could be used to calculate drawdowns in the upper aquifer within one mile of the pumping centroid in the West Well field. A storage coefficient of 0.02 can be used to estimate drawdowns due to pumping in the AWD's East Well Field, because drawdown calculations indicate that the groundwater would still be partially confined.

For the lower aquifer, a transmissivity of 49,000 gpd per foot is applicable for the AWD well fields, based on aquifer tests on two new wells (15E and 17E) in July 1991. A storage coefficient of 0.001 is applicable for drawdown calculations, because this value provided drawdown estimates consistent with historical water-level data.

For the area south of Alpaugh, the results of pump tests for private wells in that vicinity were considered. Based on evaluation of these tests, a transmissivity of 57,000 gpd per foot was developed for the lower aquifer in that area.

Southeast Part of GSA

Aquifer test results are available for about two dozen wells tapping the lower aquifer in or near the southeast part of the GSA (Table 7). Most of these values are from 12 to 24 hour pump tests, and recovery values were used for most of the tests. All of these tests were done on newly constructed wells, following the end of pump and surge development. Specific capacities ranged from 8.6 to 64.8 gpm per foot. Most values ranged from about 14 to 45 gpm per foot. Transmissivities ranged from 15,000 to 135,000 gpd per foot. Most values ranged from about

TABLE 7-SUMMARY OF AQUIFER TRANSMISSIVITIES IN SOUTHEAST PART OF GSA

Well	Date	Perforated Interval (feet)	Specific Capacity (gpm/ft)	Transmissivity (gpd/ft)
T24S/R23E-29B	3/13	560-880	26.0	37,000
-30B	6/17	450-980	51.8	89,000
T24S/R24E-14R	3/17	580-1,395	29.5	36,000
-22M	8/17	650-1,320	27.2	59,000
-23D	3/14	530-1,270	10.3	25,000
-23R	2/18	550-1,390	19.7	28,000
-24Q	8/13	380-1,100	8.6	31,000
-27P	6/17	440-1,250	22.7	37,000
-28R	5/17	440-1,260	38.2	76,000
-36E	7/12	360-1,310	16.9	34,000
T24S/R25E-19R	6/11	720-1,100	14.0	15,000
-20B	7/13	500-1,240	19.3	67,000
-30H	5/10	420-1,170	18.5	29,000
T25S/R21E-3H	11/16	600-1,020	8.9	20,000
-3R	8/16	520-840	15.0	36,000
-10H	12/16	760-930	13.8	29,000
T25S/R22E-1B	1/13	420-890	64.8	104,000
-2A	2/13	410-850	58.4	135,000
T25S/R25E-5B	9/90	955-1,370	22.5	25,000
-7C	5/03	800-1,380	36.5	84,000
-7F	4/03	780-1,370	44.6	85,000
-17G	11/14	350-790	21.3	30,000

25,000 to 85,000 gpd per foot. The transmissivities can be grouped into several geographic areas.

R21E. Aquifer test results are available for three wells in R21E in Kern County within about two miles of the County line. These wells are generally between the west part and the southeast part of the Tri County GSA. These wells tap the lower aquifer below a depth of 540 feet and above a depth of about 1,000 feet. Transmissivities ranged from 20,000 to 36,000 gpd per foot and averaged about 28,000 gpd per foot. These relatively low values appear to be representative of alluvial deposits west of the influence of the ancestral Kern River. Limited data indicate lower transmissivities (13,000 gpd per foot or less) can be expected farther west, near the south boundary of the west part of the GSA.

Near Kern County-Tulare County-Kings County Lines. Aquifer test results are available for four wells between 6th Avenue and Road 32, and within two miles of the Kern County line. These wells tap the lower aquifer below a depth of about 400 feet and above an average depth of about 900 feet. Transmissivities ranged from 37,000 to 135,000 gpd per foot and averaged about 91,000 gpd per foot. These higher values are considered representative of deposits influenced by the ancestral Kern River, which is indicated to have passed through this area.

East of Road 80. Aquifer test results are available for 15 wells in the area between Road 80 and Road 128 and within about three miles of the Kern County line. The top of the Corcoran Clay is generally less than about 350 feet in most of this area. Aquifer transmissivities ranged from 15,000 to 85,000 gpd per foot. The highest values (84,000 to 85,000 gpd per foot) were for two wells in Kern County, several miles west of Delano at Cal State Prison II. These wells tapped strata between about 800 and 1,400 feet in depth. These wells tap highly permeable deposits below a depth of about 1,100 feet, similar to a number of deep wells farther east in the City of Delano. Transmissivities for three other wells ranged from 59,000 to 76,000 gpd per foot. These wells tapped strata between about 500 to 1,300 feet in depth, and they tapped part of the deeper permeable deposits. Excluding these five wells, transmissivities for the remaining ten wells ranged from 15,000 to 37,000 gpd per foot and averaged about 30,000 gpd per foot. These lower values were thus similar to those for wells farther west in R21E. They appear to be representative of strata above about 1,100 feet in depth in this part of the GSA.

LAND SUBSIDENCE

Lofgren and Klausing (1969) reported on land subsidence in the Tulare-Wasco Area. The Tulare-Wasco area was bounded by Tulare and Lindsay on the north, Wasco on the south, near the edge of the alluvial groundwater basin on the east, and a north-south line about three miles west of the Kings County-Tulare County line on the west. The Tulare-Wasco Area included the north part and almost all of southeast part of the GSA. The greatest subsidence in this area by 1962 was south of Pixley and northwest of Delano, where more than ten feet had occurred. By 1967, land subsidence in most of the north and southeast parts of the GSA exceeded two feet. Much of the historical subsidence was due to groundwater pumping in areas that had no surface water for irrigation. Canal water become available in the Delano-Earlimart I.D. by the late 1950's, and in same areas water levels recovered several hundred feet.

Estimates of land subsidence in the San Joaquin Valley for 1949-2005 have been made by the California Department of Water Resources (Figure 30). Subsidence was less than five feet during this period in the west part of the GSA. In most of the north and southeast parts of the GSA, land subsidence ranged from 5 to 15 feet. The greatest subsidence (greater than 15 feet) was north of the AWD East Well Field and west of Pixley. Recent estimates of land subsidence in the San Joaquin Valley have been made by the Jet Propulsion Laboratory. Between May 7, 2015 and September 10, 2016, the land subsidence in the north part of the GSA was indicated to range from about 1.7 to 2.0 feet. The land subsidence in the southeast part of the GSA

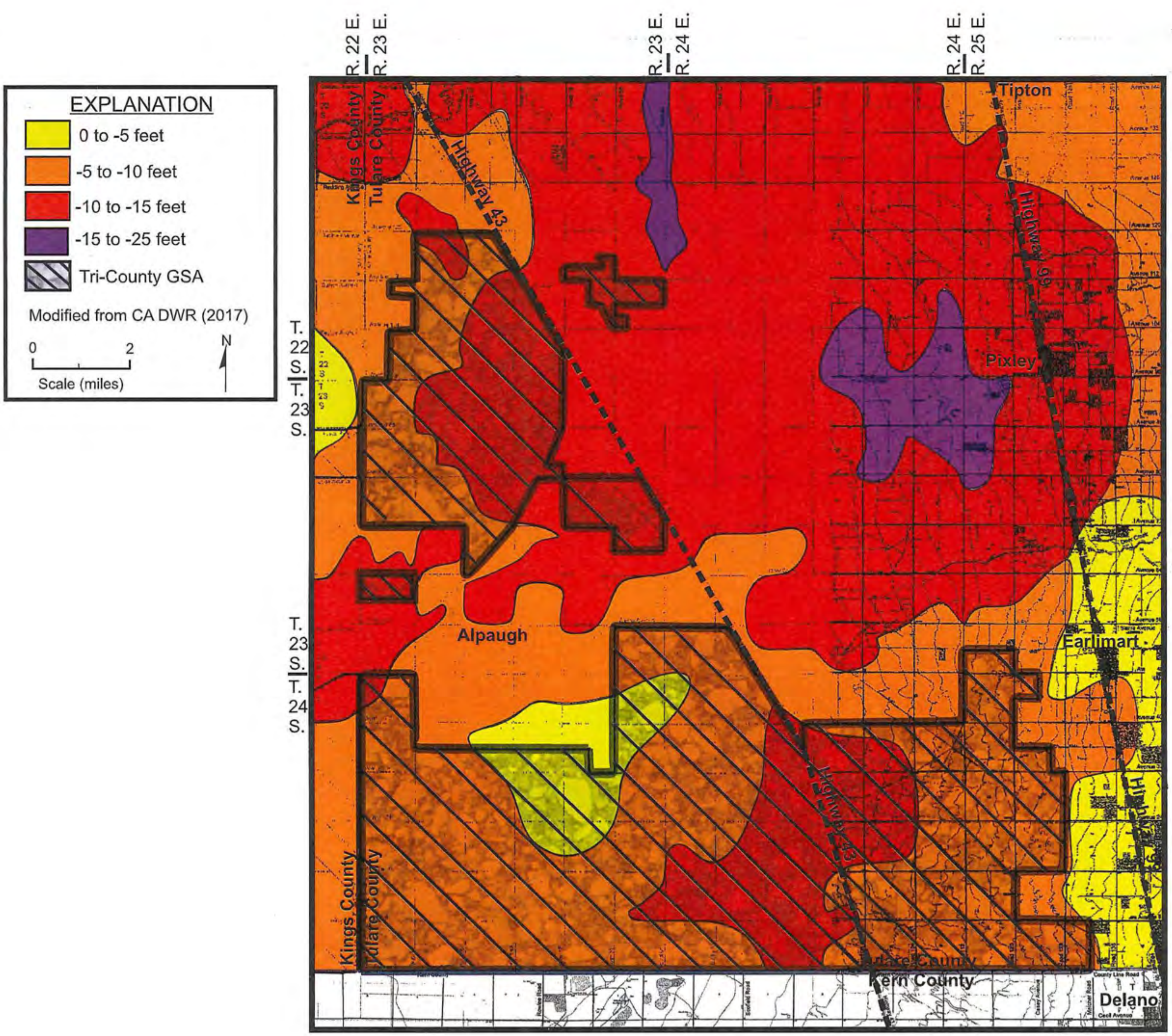


FIGURE 30 - ESTIMATED LAND SUBSIDENCE (1949-2005)

ranged from about 0.7 to 1.7 feet. These values are considered relatively large for such a short time period.

GROUNDWATER QUALITY

Upper Aquifer

Problems with methane gas in the groundwater are common in the Corcoran-Angiola area. Water in the upper aquifer in the vicinity often has higher total dissolved solids (TDS) concentrations than present in the lower aquifer. In October 2006, water samples were collected from two of the AWD upper aquifer wells after at least three days of continuous pumping. In addition, a water sample was collected during the pump test on the new Sweetwater Dairy well. An earlier analysis (August 2004) was available for Well G-5. Table 8 summarizes the results of these analyses. Total dissolved solid (TDS) concentrations ranged from about 190 to 470 mg/l and increased to the south in the West Well Field. The water is indicated to be of the sodium bicarbonate type. Nitrate concentrations in all of the samples were non-detectable, indicative of reduced or anaerobic conditions in the groundwater. Iron and fluoride concentrations in water from these wells were below the respective MCLs. The manganese concentration in the sample from the Sweetwater Dairy was 0.09 mg/l, exceeding the recommended MCL of 0.05 mg/l. Manganese concentrations in water from the other wells were well be-

TABLE 8-CHEMICAL ANALYSES OF WATER FROM AWD UPPER AQUIFER WELLS

Constituents	G-3	G-5		Sweetwater Dairy
Calcium	11	10	9	13
Magnesium	2	2	2	5
Sodium	-	56	-	-
Potassium	-	2	-	-
Carbonate	-	1	-	-
Bicarbonate	-	154	-	-
Sulfate	17	12	19	39
Chloride	24	18	22	64
Nitrate	<0.4	-	<0.4	<0.4
Fluoride	0.4	-	0.5	0.7
pH	8.1	8.2	8.2	8.3
Total Dissolved Solids (@ 180°C)	190	188	210	470
Iron	<0.05	0.02	<0.05	0.14
Manganese	0.02	<0.01	0.01	0.09
Arsenic	0.002		0.003	0.042
Color	4	-	6	-
Alpha Activity (pc/l)	0.3	-	0.7	1.9
Date	10/3/06	8/18/04	10/3/06	10/23/06
Perforated Interval (ft)	200-500	200-504		240-540

Samples for 2006 analyzed by FGL Environmental of Santa Paula (inorganics and alpha activity) and APPL, Inc. of Fresno (color). The 2004 sample was analyzed by Dellavalle Laboratory of Fresno low the MCL. Arsenic concentrations in water from the two District wells ranged from 2 to 3 ppb, well below the MCL of 10 ppb. The arsenic concentration in water from the Sweetwater Dairy well was 42 ppb, exceeding the MCL. Color values ranged from 4 to 6 units in water from the District wells, less than the recommended MCL of 15 units. Alpha activities in the samples were less than 2 picocuries per liter, well below the MCL of 15 picocuries per liter.

Table 9 shows the results of analyses of water from the two Allensworth CSD wells that were sampled during 2011-13. Both wells tap the upper aquifer. Total dissolved solids (TDS) concentrations ranged from 170 to 510 mg/l. Water from Well No. 1 was of the calcium-sodium bicarbonate type, whereas water from Well No. 2 was of the sodium-chloride type. Nitrate concentrations ranged from 9 to 21 mg/l between the MCL of 45 mg/l. Iron, manganese, DBCP, and EDB concentrations were well below the respective MCLs. Arsenic concentrations ranged from 10 to 11 ppb, compared to the MCL of 10 ppb. Hexavalent chromium concentrations ranged from 9.5 to 10 ppb, compared to the proposed MCL of 10 ppb. Alpha activities ranged from 1.3 to 1.7 picocuries per liter well below the MCL of 15 picocuries per liter.

Lower Aquifer

Table 10 shows the results of analyses of water from seven

TABLE 9-CHEMICAL ANALYSES OF WATER FROM ALLENSWORTH CSD SUPPLY WELLS

Constituent (mg/l)	Well No.	
	No. 1	No. 2
Calcium	26	78
Magnesium	-	5
Sodium	29	43
Carbonate	<10	<10
Bicarbonate	122	98
Sulfate	15	44
Chloride	20	138
Nitrate	9	21
Fluoride	<0.1	<0.1
pH	7.9	7.9
Electrical Conductivity (micromhos/cm @ 25°C)	275	701
Total Dissolved Solids (@ 180°C)	170	510
Iron	<0.05	0.09
Manganese	<0.01	<0.01
Arsenic (ppb)	11	10
Hexavalent Chromium (ppb)	10	9.5
Alpha Activity (pc/l)	1.7	1.3
DBCP (ppb)	<0.01	<0.01
EDB (ppb)	<0.02	<0.02
Date	11/16/11	12/16/13

TABLE 10-CHEMICAL ANALYSES OF WATER FROM AWD LOWER AQUIFER WELLS

Constituents	13E	14E	16E	18E
Calcium	3	4	3	3
Magnesium	<1	<1	<1	<1
Sodium	-	-	-	-
Potassium	-	-	-	-
Carbonate	-	-	-	-
Bicarbonate	-	-	-	-
Sulfate	8	7	8	10
Chloride	8	16	7	8
Nitrate	<0.4	<0.4	<0.4	<0.4
Fluoride	0.8	0.7	0.6	0.8
pH	9.1	9.0	9.4	9.1
Total Dissolved Solids (@ 180°C)	180	200	140	140
Iron	<0.05	<0.05	0.06	0.08
Manganese	<0.01	<0.01	<0.01	<0.01
Arsenic	0.012	0.003	0.060	0.067
Color	18	19	14	13
Alpha Activity (pc/l)	4	6	16	13
Date	10/3/06	10/3/06	10/3/06	10/3/06
Perforated Interval (ft)	598-1,798	597-1,798	500-940	580-930

Continued:

TABLE 10- CHEMICAL ANALYSES OF WATER FROM AWD LOWER AQUIFER WELLS
(Continued)

Constituents	G-13	G-20	7W	
Calcium	3	13	6	4
Magnesium	<1	2	1	<1
Sodium	-	54	51	-
Potassium	-	3	1	-
Carbonate	-	<1	18	-
Bicarbonate	-	144	108	-
Sulfate	7	5	15	19
Chloride	7	11	19	12
Nitrate	<0.4	<0.4	-	<0.4
Fluoride	0.8	-	-	1.0
pH	9.2	8.2	8.7	8.9
Total Dissolved Solids (@ 180°C)	150	206	161	180
Iron	0.05	0.04	0.03	<0.05
Manganese	<0.01	0.05	<0.01	<0.01
Arsenic	0.070	-	-	0.089
Color	18	-	-	16
Alpha Activity (pc/l)	3.6	-	-	0.7
Date	10/3/06	8/18/04	8/18/04	10/3/06
Perforated Interval (ft)	782-1,604	620-940	500-1,200	

Water samples analyzed by FGL Environmental of Santa Paula (inorganics and alpha activity) and APPL, Inc. of Fresno (color), except 2004 samples, which were analyzed by Dellavalle Laboratory of Fresno.

AWD lower aquifer wells that were sampled in October 2006. An analyses for 2004 was available for Well 7W. TDS concentrations ranged from 140 to 206 mg/l, and the waters were of the sodium bicarbonate type. Nitrate concentrations were also non-detectable in these samples, indicative of reduced conditions in the groundwater. pH values for the samples from most of the wells ranged from 8.9 to 9.4, typical of deep groundwater in the San Joaquin Valley. Fluoride and iron concentrations in all of the samples were well below the respective MCLs. Manganese concentrations in the samples were non-detectable, except for Well G-20 (0.05 mg/l, equal to the recommended MCL). Arsenic concentrations in water from five of the wells ranged from 12 to 89 ppb, exceeding the MCL of 10 ppb. Water from Well 14E, on the other hand, had an arsenic concentration of only 3 ppb. Alpha activities in water from five of the AWD lower aquifer ranged from about 1 to 13 picocuries per liter, below the MCL of 15 picocuries per liter. Water from Well 16E had an alpha activity of 16 picocuries per liter, exceeding the MCL. Color values in samples from the wells ranged from 13 to 19 units. Color values in water from four wells (13E, 14E, G-13, and 7W) exceeded the recommended MCL of 15 units.

INTERCONNECTED SURFACE WATER AND GROUNDWATER SYSTEMS

Shallow groundwater (less than about 20 feet deep) is common beneath the Tulare Lakebed. In most cases, this shallow groundwater is located above the A-Clay. There is no indication that any of the streams in the GSA are in hydraulic connection with the shallow groundwater. However, when the Tulare Lakebed contains lake water, this water may temporarily be in hydraulic connection with the underlying shallow groundwater at some locations. There are a number of shallow observation wells and monitor wells in parts of the lakebed. Groundwater monitoring at agricultural drainage water evaporation ponds has not indicated a hydraulic connection between water in the ponds and the underlying groundwater. That is, water levels were below the bottom of the ponds. Also, there has been no known pumping of this shallow groundwater in the lakebed area, due to its high salinity.

KNOWN GROUNDWATER CONTAMINATION SITES

Figure 31 shows known contamination sites in the Tri-County WA GSA, obtained from the California Regional Water Quality Central Board Geo Tracker website. Three of the four sites involved gasoline, diesel, or crude oil. Little documentation is available for the fourth site. Two of the four sites have been closed.

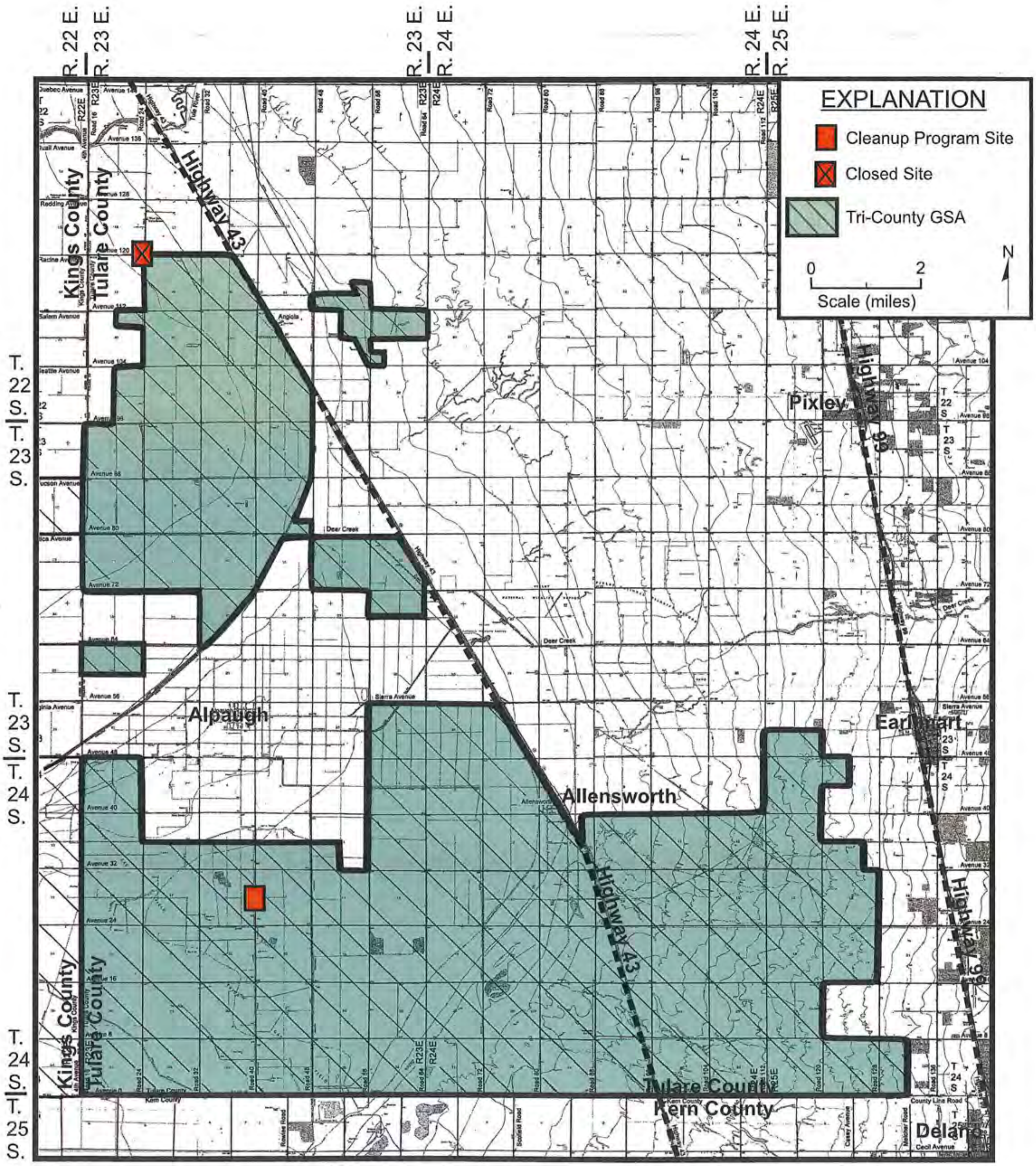


FIGURE 31 - KNOWN CONTAMINATION SITES

APPENDIX D

GROUNDWATER CONDITIONS IN THE ANGIOLA AREA, KDSA, JULY 2011

GROUNDWATER CONDITIONS IN THE ANGIOLA AREA

prepared for
Angiola Water District
Corcoran, California

by
Kenneth D. Schmidt and Associates
Groundwater Quality Consultants
Fresno, California

July 2011

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

GROUNDWATER CONDITIONS IN THE ANGIOLA AREA

INTRODUCTION

The Angiola Water District has two well fields along Highway 43, southeast of Corcoran, in Tulare County. The primary purpose of this report is to describe groundwater conditions in the vicinity of and upgradient of these well fields. Of particular interest are the directions of groundwater flow and water-level changes in the two main aquifers that are present. Subsurface geologic conditions are first described. This is followed by a discussion of historical water levels in the two main aquifers in the vicinity. The historical directions of groundwater flow and changes in depth to water in wells tapping these aquifers are discussed. More recent water levels and the direction of groundwater flow are then discussed.

Important references on groundwater conditions in the vicinity are Lofgren and Klausing (1969) and Kenneth D. Schmidt and Associates (KDSA, 1992). The first of these references was a report on land subsidence in the Tulare-Wasco area, and contains substantial information on historical water levels. The second reference dealt specifically with the District well fields and groundwater conditions in the vicinity of these.

SUBSURFACE GEOLOGIC CONDITIONS

Figure 1 shows the location of the active District wells in the two well fields. The East Well Field is located between Avenues 104 and 116 and Roads 48 and 64. The West Well Field is located between Avenues 88 and 116 and Roads 32 and 48. A widespread well defined thick clay layer, termed the Corcoran Clay, is present throughout the area. This clay divides the groundwater system into an upper aquifer (above the clay) and a lower aquifer (beneath the clay). The depth to the top of the Corcoran Clay ranges from about 430 to almost 500 feet beneath the land surface at the District well fields. The top of the Corcoran Clay thickens and slopes to the southwest in the vicinity of the well fields. The base of the lower aquifer is defined as the base of the fresh groundwater, which is underlain by high salinity groundwater water at depth. Electric logs are available for some deep wells in the vicinity. These indicate that permeable, water-producing strata are present to a depth of at least 2,000 feet and that the base of the fresh water is more than 2,500 feet deep beneath the well fields.

As part of this evaluation, three subsurface geologic cross sections are presented (Figure 1). Electric logs are available for many of the wells along these sections. Water levels shown on the sections are discussed in a subsequent part of this

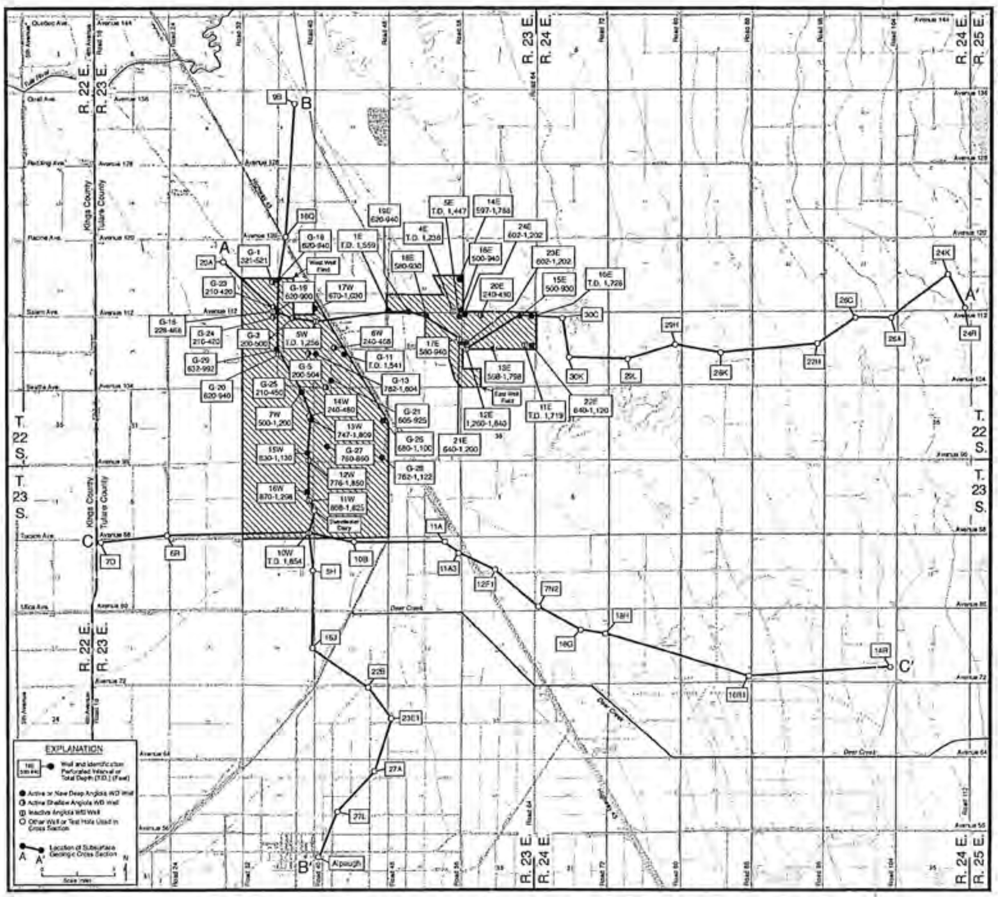


FIGURE 1 - LOCATION OF DISTRICT WELLS AND SUBSURFACE GEOLOGIC CROSS SECTIONS

report. Cross Section A-A' (Figure 2) extends from south of Avenue 120 and west of Road 32 on the west to the east, through the north part of the District West Well Field, thence through the East Well Field, to near Avenue 112 and Road 112. The top of the Corcoran Clay ranges from about 300 to 550 feet deep along the section, and the clay ranges from about 20 to 180 feet thick along the section. The thickness increases to the west along the section toward the interior of the Tulare Lake bed. Relatively thick sand strata are present both above and below the Corcoran Clay along most of the western and central parts of this cross section. A sand below the Corcoran Clay and above a depth of about 1,000 feet is tapped by a number of intermediate depth (900 to 1,100 feet deep) Angiola WD wells. Sand is predominant below the Corcoran Clay and above a depth of about 2,000 feet along the part of this section west of Road 64, where logs for deep holes or wells are available. The base of the fresh groundwater has been defined as where the total dissolved solids (TDS) concentration is about 2,000 mg/l. The base of the fresh groundwater is indicated to be below the bottom of this section. Another important regional clay layer, the C-Clay, is also shown along the west part of this section. The top of this clay is normally about 250 feet deep in the Angiola vicinity. This clay is indicated to pinch out just east of the District East Well Field. Where present, this clay usually ranges from about 10 to 40 feet

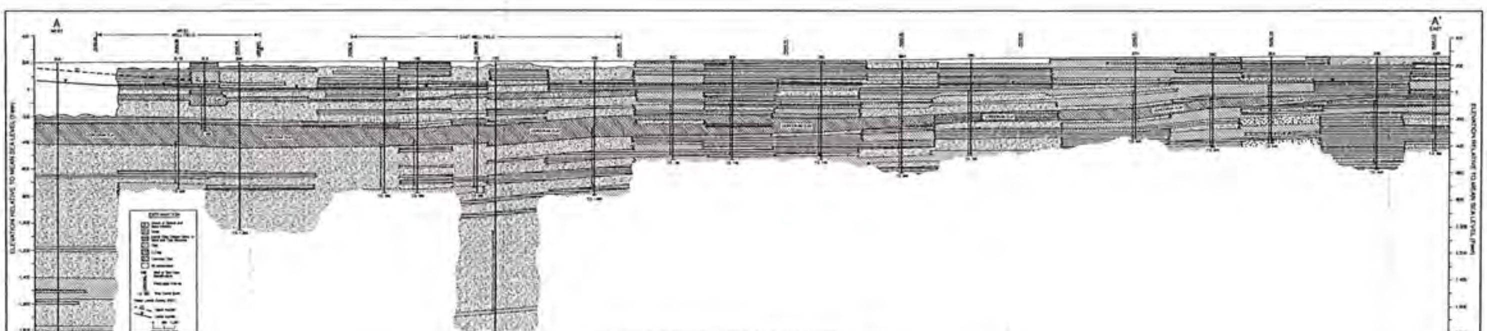


FIGURE 2 - SUBSURFACE GEOLOGIC CROSS SECTION A - A'

in thickness. Most irrigation wells in the vicinity (including District wells) that tap the upper aquifer are perforated primarily opposite strata below the C-Clay and above the Corcoran Clay. Deposits between these two clay layers along this section are predominantly sand. Both the Corcoran and C-Clays function as confining beds, which hinder the vertical flow of groundwater. Relatively shallow groundwater, commonly less than 20 feet deep, is found above the C-Clay in the part of the area southwest of Highway 43.

Cross Section B-B' (Figure 3) extends from south of Avenue 136 on the north, through the District West Well Field, to Alpaugh on the south. The top of the Corcoran Clay ranges from about 420 feet deep near the south end of the section to 660 feet near Avenue 64. The Corcoran Clay ranges from about 200 to 400 feet thick along the section. The C-Clay is present along this section, except near the north end. The top of this clay is about 250 feet deep and this clay ranges from about 15 to more than 50 feet thick along this section. A thick, laterally continuous sand is also present above the Corcoran Clay along this section between Avenues 80 and 120, and is the major water-producing layer tapped by shallow (about 500 feet deep) District wells in the West Well Field. Another sand averaging about 200 feet thick is present just below the Corcoran Clay along the part of the section north of Avenue 80. Interbedded

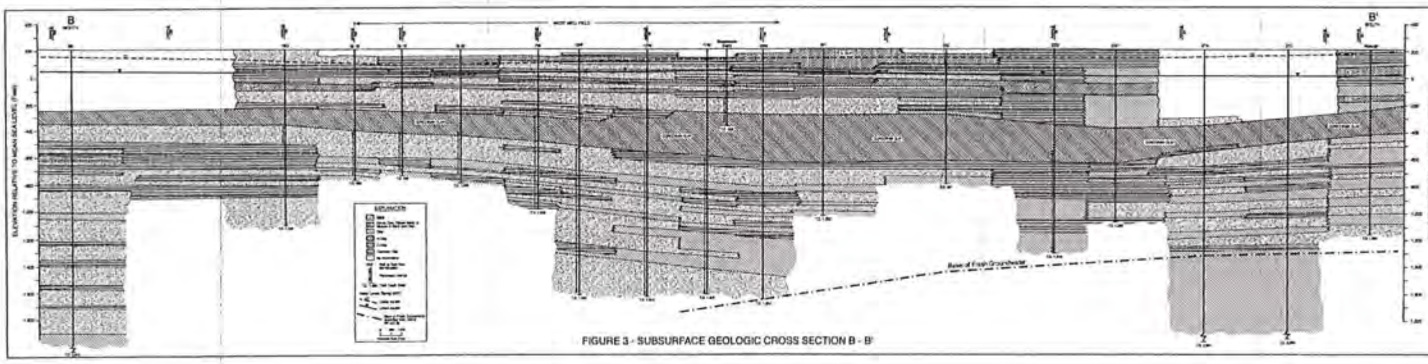


FIGURE 3 - SUBSURFACE GEOLOGIC CROSS SECTION B - B'

fine-grained layers generally thicken to the south along this section. South of Avenue 80, these layers are much more predominant than farther north. Relatively thick water-producing sands are present below the Corcoran Clay in this area. Deposits below a depth of about 1,400 feet along the south part of the section are indicated to primarily be clay. A third regional clay layer (A-Clay) that is shallower than the C-Clay is shown along the south part of the section. The A-Clay is important in terms of shallow groundwater levels in agricultural drainage problem areas. The base of the fresh groundwater is shown along this section. This base ranges from about 1,300 feet deep near Alpaugh to more than 2,000 feet deep along most of the section north of Avenue 104.

Cross Section C-C′ (Figure 4) extends from near Avenue 88 and 4th Avenue on the west to the east through the south edge of the District West Well Field, thence farther to the east and southeast, to north of Avenue 72 and west of Road 104. Clay is increasingly predominant to the west along this section, toward the interior of the Tulare Lake Bed. The productive sands of the upper aquifer extend farther west than those of the lower aquifer along this section. This section shows that sands of the lower aquifer become progressively thinner to the west, and are generally not present in the area west of Road 32. Logs for oil or gas exploration holes in the area farther west indicate that clay

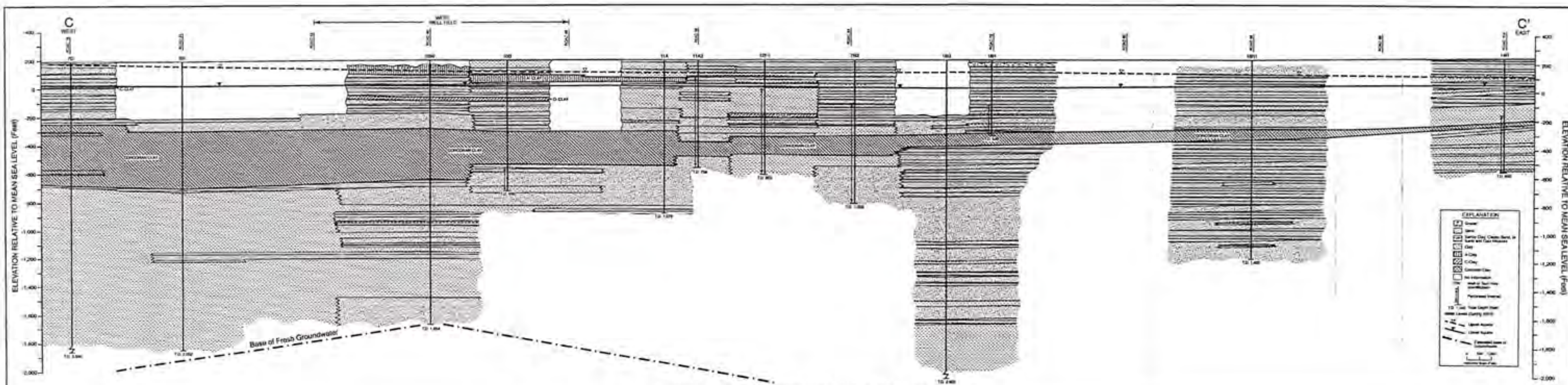


FIGURE 4 - SUBSURFACE GEOLOGIC CROSS SECTION C - C'

is predominant and high salinity groundwater is also common. This westerly area is typical of much of the central part of the Tulare Lake Bed. There are few known active large-capacity water supply wells in the area west of Road 24.

The base of the fresh groundwater is indicated to be present beneath the west part of the section, and ranges from about 1,550 to more than 2,000 feet deep. The base of the fresh groundwater is below the bottom of the cross section near the west end and in the area east of Road 64.

The top of the Corcoran Clay ranges from about 450 to 550 feet deep along the section. This clay thickens considerably to the west along the section, ranging from about 20 to 30 feet thick to the east to 450 feet thick to the west. The C-Clay also pinches out to the east along this section, and isn't indicated to be present east of Road 48 along this section. The top of the C-Clay ranges from about 180 to 270 feet deep along this section, and this clay ranges from about 15 to 30 feet in thickness. The A-Clay is also shown along the central part of the section, where it is about 30 to 50 feet thick.

DISTRICT SUPPLY WELLS

Information on construction is available from drillers logs and electric logs for many District wells. Copies of available drillers logs are provided in Appendix A and copies of electric logs are provided in Appendix B. Some information on older wells was provided in two previous references. Hilton, Klausing, and McClelland (1960) presented data on depths and perforated intervals of wells in that were existence in the vicinity in the 1950's. KDSA (1992) provided information on District wells as of late 1991. In addition, the Angiola WD has information on the depths of all active wells. Locations of active District Wells are shown in Figure 1.

East Well Field

Table 1 contains information on depths and perforated intervals for 14 active wells in the East Well Field. The older active wells range in depth from about 1,450 to 1,800 feet. Only one well in the East Well Field (20E) taps the upper aquifer. Four wells in the East Well Field were drilled in 1991, and range in depth from about 960 to 970 feet. Four additional wells (21E-24E) were drilled during 2007-08, and are perforated below the Corcoran Clay and above a depth from about 1,100 to 1,200 feet.

West Well Field

Table 2 contains the same types of information for six active W-Series wells in the West Well Field. Two of the wells (6W and 14W) are shallow, tapping the upper aquifer. Four new deep wells (15W, 16W, and 17W) were drilled in 2008 to tap strata below the Corcoran Clay and above a depth of about 1,030 to 1,300