BIANNUAL WATER-RESOURCES REVIEW,

WHITE SANDS MISSILE RANGE, NEW MEXICO, 1986 AND 1987

By Robert G. Myers and Steven C. Sharp

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WHITE SANDS MISSILE RANGE

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CONVERSION FACTORS

Measurements in this report are in inch-pound units. Use the following table to convert to metric units.

Multiply inch-pound units	By	To obtain metric units
inch	25.40	millimeter
foot	0.3048	meter
mile	1.609	kilometer
gallon	3.785	liter
million gallons	3,785	cubic meter
acre	4,047	square meter
acre-foot	1,233	cubic meter

Temperature in degrees Celsius (^{o}C) can be converted to degrees Fahrenheit (^{o}F) by the equation:

$$^{o}F = 9/5\ (^{o}C) + 32$$

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

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ABSTRACT

Hydrologic data were collected at White Sands Missile Range in 1986 and 1987. The total ground-water withdrawal in 1986 was 565,462,500 gallons and in 1987 it was 620,492,000 gallons. The 11 water-supply wells in the Post Headquarters well field produced 534,026,000 gallons, or about 94 percent of the total in 1986, and 574,337,000 gallons, or about 93 percent of the total in 1987. In 1986, the six Range area water-supply wells produced 31,436,500 gallons, whereas in 1987 the wells produced 46,155,000 gallons. The total ground-water withdrawal was 110,971,300 gallons less in 1986 than in 1985, but 55,029,500 gallons more in 1987 than in 1986.

Water samples from five Post Headquarters water-supply wells were collected for chemical analysis in 1986. The greatest dissolved-sodium concentration was 39 milligrams per liter in the sample from water-supply well SW-13, and the greatest dissolved-chloride concentration was 27 milligrams per liter in the sample from water-supply well SW-20. The sample from water-supply well SW-11 had the greatest concentrations of dissolved calcium (85 milligrams per liter) and dissolved sulfate (140 milligrams per liter). Samples also were collected from water-supply well Murray-SW and test well Fluor-1.

In 1987, water samples were collected from four test wells in the Post Headquarters area for analysis of selected volatile organic compounds. Water from test well E-1 may have traces of dichlorobromomethane, chloroform, and toluene present. Water from test well E-2 may have traces of toluene present and water from test well E-4 may have traces of chloroform present.

Twenty-eight water samples from wells were collected for analysis of specific conductance in 1986 and 1987. In 1986, the specific conductance ranged from 248 microsiemens per centimeter at 25 degrees Celsius in water from test well T-17 to 1,920 microsiemens per centimeter at 25 degrees Celsius in water from test well T-14. In 1987, the specific conductance ranged from 250 microsiemens per centimeter at 25 degrees Celsius in water from test well T-17 to 1,650 microsiemens per centimeter at 25 degrees Celsius in water from test well T-14.

INTRODUCTION

This report presents water-resources data that were collected at White Sands Missile Range (fig. 1) during 1986 and 1987 by personnel of the U.S. Geological Survey and White Sands Missile Range. Ground-water pumpage, water-level measurements, chemical-quality, precipitation, and sewage-influent data summarized in this report were obtained as a result of the continuing water-resources hydrologic-data-collection program sponsored by the Directorate of Engineering, Housing, and Logistics, White Sands Missile Range.

This report is the 19th water-resources review prepared for the White Sands Missile Range. The 1968 report and subsequent reports are available for inspection at the District Office of the U.S. Geological Survey, Water Resources Division, Albuquerque, New Mexico.

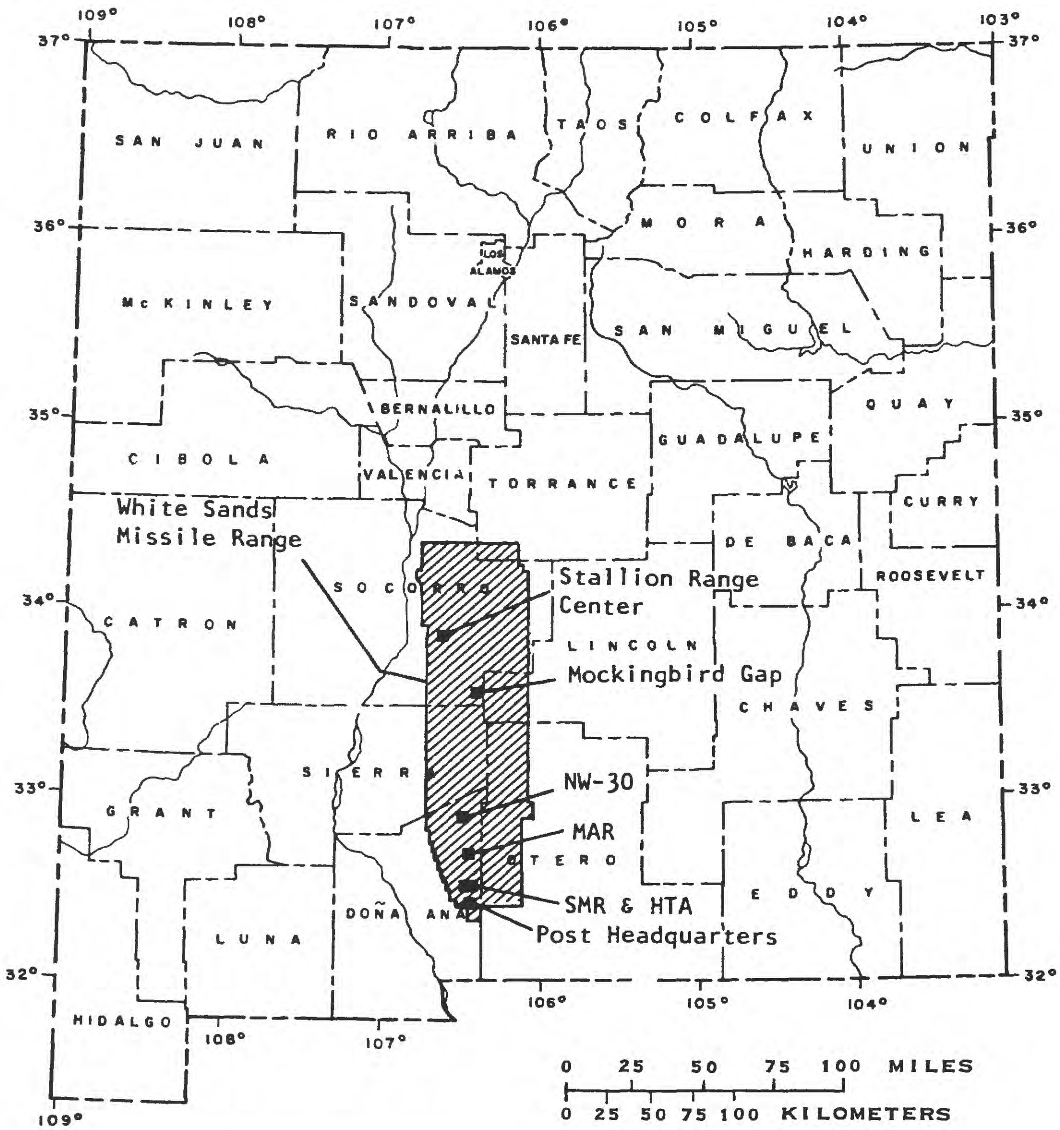

Figure 1.--White Sands Missile Range and areas of hydrologic observations.

WELL-NUMBERING SYSTEM

Wells are located according to the system of common subdivision of sectionized land used throughout the State by the U.S. Geological Survey (fig. 2). The number of each well consists of four segments separated by periods and locates the well's position to the nearest 10-acre tract of land. The segments denote, respectively, the township south of the New Mexico base line, the range east of the New Mexico principal meridian, the section, and the particular 10-acre tract within the section.

The fourth segment of the number consists of three digits denoting, respectively, the quarter section or approximate 160-acre tract, the quadrant (approximately 40 acres in size) of the quarter section, and the quadrant (approximately 10 acres in size) of the 40-acre tract in which the well is located. The system of numbering quarter sections and quadrants, which is done in reading order, as well as the usual numbering of sections within a township is shown below. For example, well 22S.4E.1.431 is located in the NW1/4 of the SW1/4 of the SE1/4, section 1, Township 22 South, Range 4 East. If more than one well has the same location number, the letter "a" is assigned to the second well, the letter "b" to the third well, and so on.

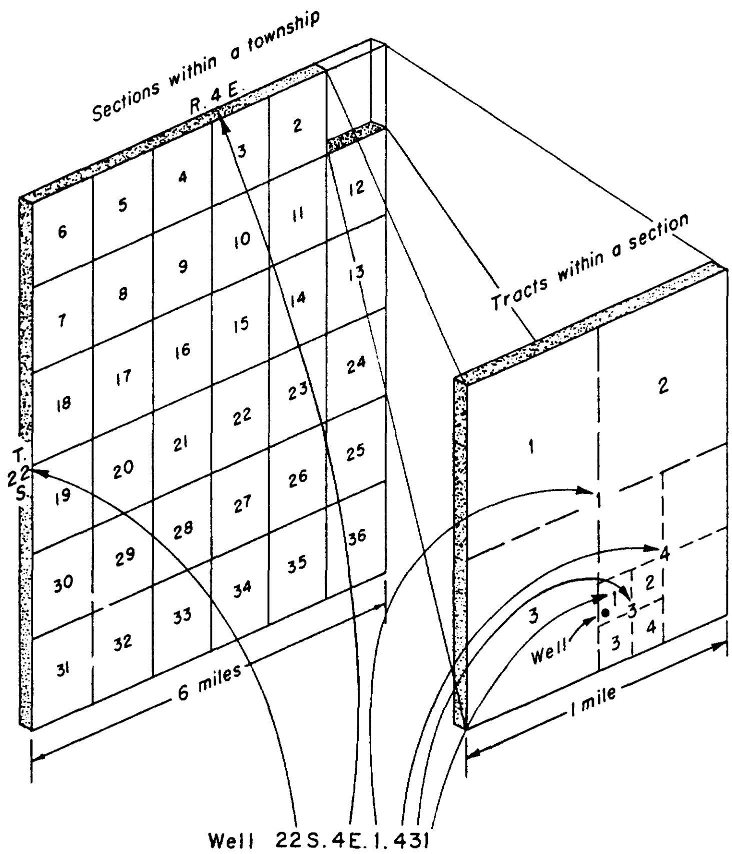

Figure 2.--System of numbering wells in New Mexico.

DATA-COLLECTION PROGRAM

The program to collect hydrologic data at White Sands Missile Range has been continuous since 1953. The original program consisted of water-level measurements in five wells in the Post Headquarters area. The hydrologic-data-collection program has expanded over the years to keep up with expansion of the White Sands Missile Range facilities (fig. 1). Currently, the program consists of depth-to-water measurements in 97 wells, chemical analyses of water samples from 11 wells, and measurement of ground-water withdrawals from 17 wells in the Post Headquarters and Range areas (figs. 3-7). Precipitation data (22S.05E.36.224) and Post Headquarters sewage-influent data for 1986 and 1987 are shown in tables 1 and 2, respectively.

Ground-Water Pumpage

Total ground-water pumpage at White Sands Missile Range in 1986 was 565,462,500 gallons, and in 1987 pumpage was 620,492,000 gallons (table 3). The Multifunction Array Radar wells (MAR-1 and MAR-2), Small Missile Range wells (SMR-1), Hazardous Test Area well (HTA-1), and the Stallion Range Center wells (SRC-1 and SRC-2) produced 6 percent of the total pumpage, or about 31,436,500 gallons, in 1986, and 7 percent, or about 46,155,000 gallons, in 1987. The Post Headquarters well field produced 534,026,000 gallons in 1986 and 574,337,000 gallons in 1987. Water levels in test well T-8 from 1971 to 1987 and yearly pumpage from the Post Headquarters well field are shown in figure 8. Total ground-water pumpage was 110,971,300 gallons less in 1986 than in 1985, but 55,029,500 gallons more in 1987 than in 1986.

Water-Level Measurements in Water-Supply Wells

In 1986 and 1987, depth-to-water measurements were made in 10 wells in the Post Headquarters area and 6 wells in the Range area (table 4). The greatest seasonal water-level fluctuation in 1986 was about 15 feet in water-supply well SRC-2. The greatest seasonal water-level fluctuation in 1987 was about 17 feet in water-supply well SW-17. Water-level measurements were not made in Post Headquarters water-supply well SW-15A because the air line is inoperative and pumping equipment prohibits steel tape measurements. Hydrographs for 10 water-supply wells in the Post Headquarters area and specific conductance for period of record are shown in figure 9. Both seasonal fluctuations and long-term changes in water levels are shown in these hydrographs.

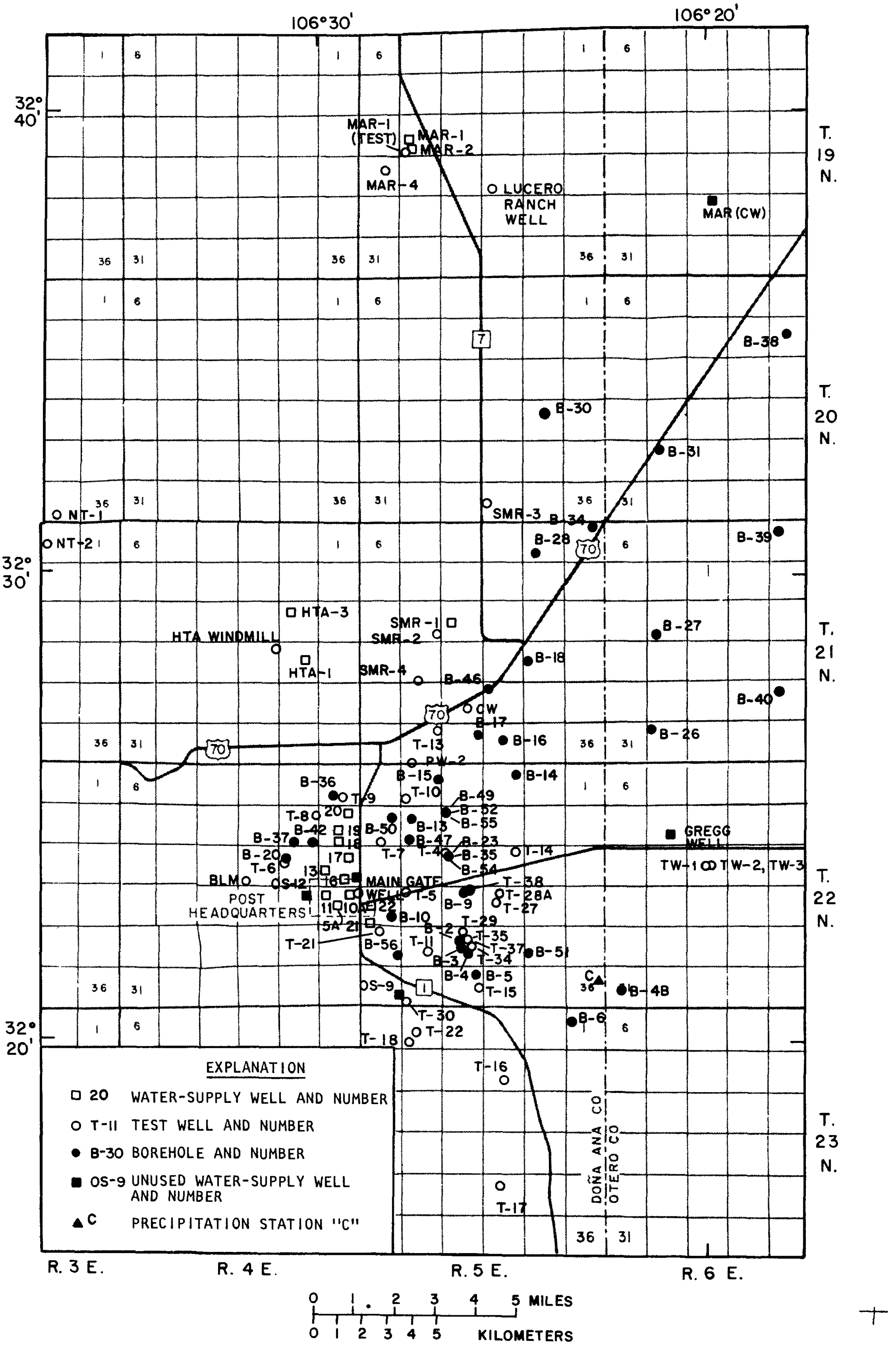

Figure 3.--Location of water-supply wells, test wells, boreholes, unused water-supply sells, and precipitation station in the Post Headquarters and adjacent areas.

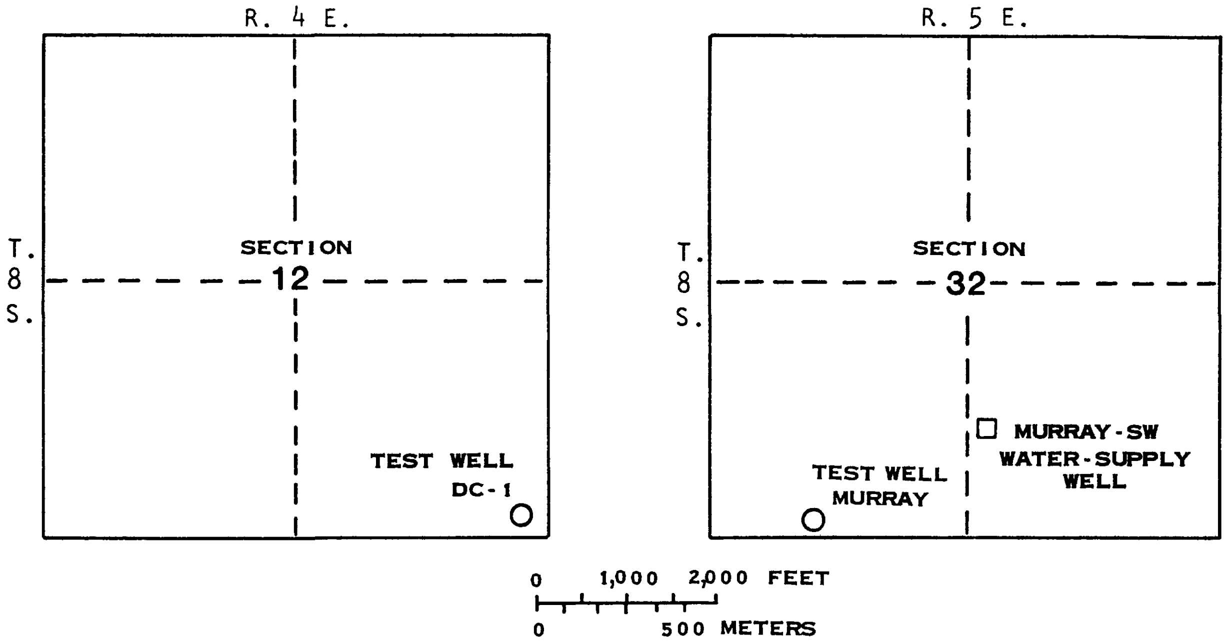

Figure 4.--Location of wells in the Mockingbird Gap area.

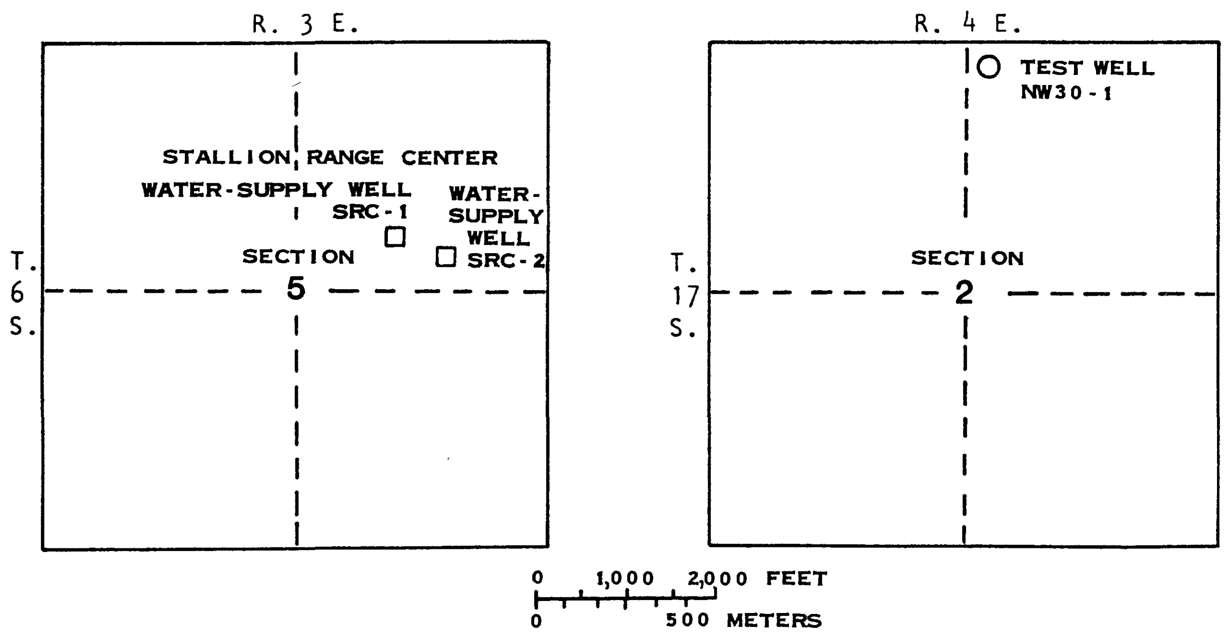

Figure 5.--Location of wells in the Stallion Range Center and NW-30 areas.

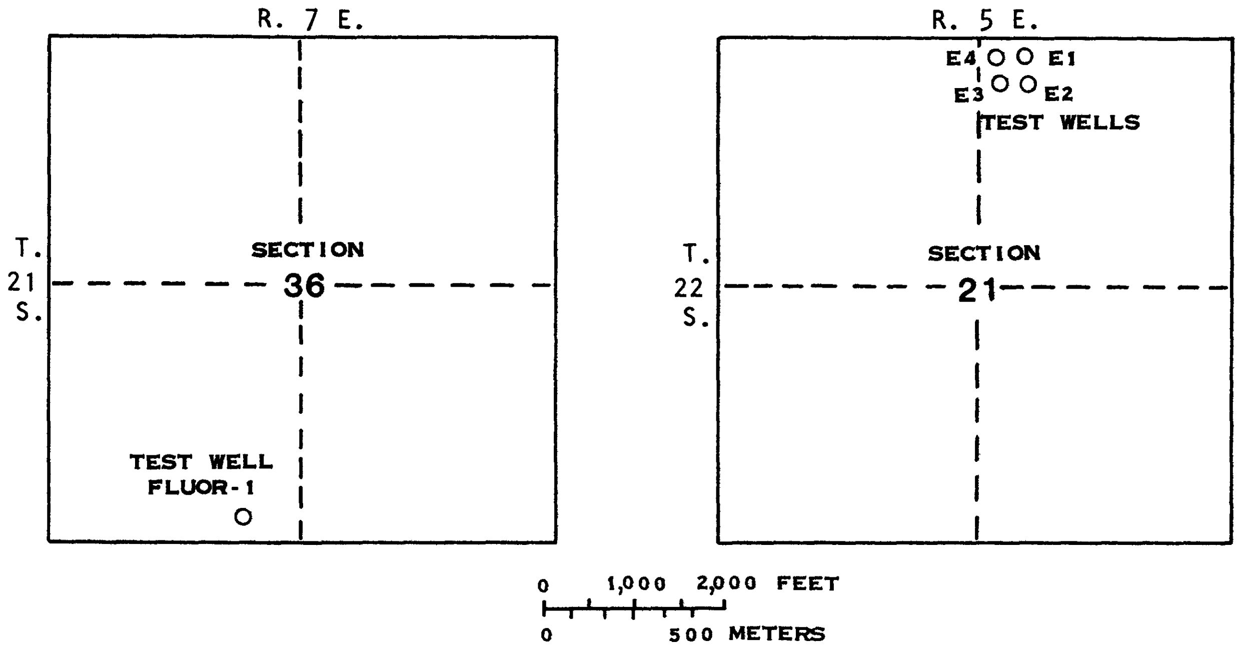

Figure 6.--Location of Fluor-1 and E wells.

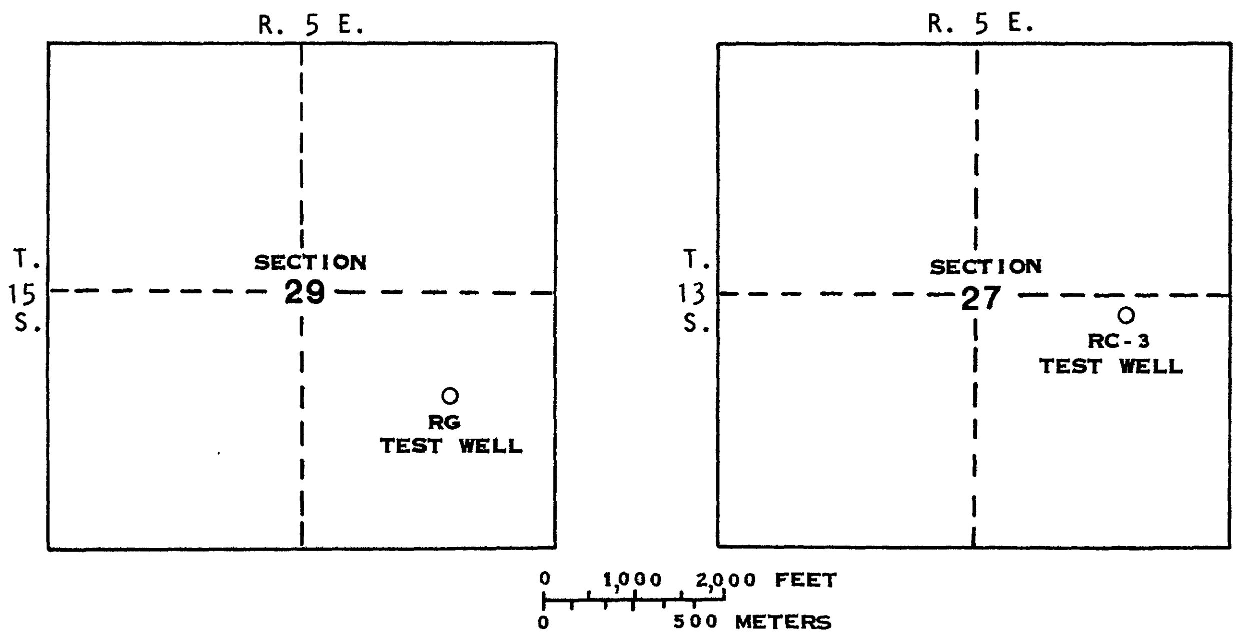

Figure 7.--Location of RG and RC-3 wells.

Table 1.--Monthly precipitation, in inches, at White Sands Missile Range, 1986 and 1987 (22S.05E.36.224)

Month	1986	1987
January	0.08	0.49
February	.41	.77
March	.52	.54
April	Trace	.63
May	.53	.72
June	3.36	1.39
July	1.58	.40
August	3.02	4.82
September	1.26	.75
October	1.30	.13
November	2.74	.58
December	2.10	3.17
Totals	16.90	14.39

Table 2.--Monthly sewage influent, in gallons, for Post Headquarters, 1986 and 1987

Month	1986	1987
January	16,116,600	15,221,500
February	14,159,800	14,400,300
March	16,031,800	17,386,500
April	15,807,500	17,165,500
May	17,359,900	17,726,500
June	16,671,100	17,330,000
July	16,978,000	18,346,200
August	17,963,500	18,712,300
September	17,644,000	18,503,300
October	17,660,000	18,678,900
November	15,630,000	17,515,200
December	15,940,700	17,122,100
Totals	197,962,900	208,108,300

Table 3.--Total ground-water pumpage in water-supply wells, Post Headquarters and Range areas, 1986 and 1987

[Pumpage is in thousands of gallons]

Month	Post Headquarters area ground-water pumpage, 1986											
	10A	11	13	15A	16	17	18	19	20	21	22	Totals
January	2,632	0	512	1,735	5,460	722	1,151	5,130	2,486	1,502	2,447	23,777
February	4,943	0	1,638	2,221	7,078	3,632	106	6,329	0	1,371	2,686	30,004
March	2,832	3,598	294	5,804	6,163	3,726	4,428	11,022	0	2,611	4,015	44,493
April	6,510	6,120	449	6,955	809	4,238	3,898	14,393	2,999	1,474	5,325	53,150
May	8,156	4,535	856	9,101	0	10,447	2,979	17,613	13,607	2,652	868	70,814
June	7,592	4,878	222	5,628	0	10,842	2,058	15,503	7,790	2,351	3,162	60,026
July	7,758	5,407	1,669	4,711	1,824	12,037	4,445	18,803	4,702	2,695	4,113	68,164
August	6,371	3,211	916	3,797	5,859	10,842	1,771	19,216	5,204	2,833	7,192	67,212
September	3,110	2,702	369	12	5,639	9,312	1,506	11,127	3,370	2,307	4,789	44,243
October	824	3,245	111	167	860	7,140	4,045	1,573	5,983	3,011	871	27,830
November	70	856	456	34	1,999	5,062	1,587	6,452	2,929	1,148	2,005	22,598
December	0	1,325	508	68	1,972	4,060	2,485	5,385	2,087	1,764	2,061	21,715
Totals	50,798	35,877	8,000	40,233	37,663	82,060	30,459	132,526	51,157	25,719	39,534	534,026

Table 3.--Total ground-water pumpage in water-supply wells, Post Headquarters and Range areas, 1986 and 1987--Continued

	Range Area ground-water pumpage, 1986						
Month	MAR-1	MAR-2	SMR-1	HTA-1	SRC-1	SRC-2	Totals
January	366.9	420.2	187.2	88.6	489.0	139.0	1,690.9
February	893.0	1,136.9	49.8	11.4	351.0	63.0	2,505.1
March	643.4	851.8	24.5	11.4	370.0	71.0	1,972.1
April	656.6	800.7	32.4	22.6	904.0	21.0	2,437.3
May	556.3	1,105.0	36.1	64.2	687.0	161.0	2,609.6
June	485.4	849.7	56.3	31.7	950.0	33.0	2,406.1
July	581.4	749.1	43.0	46.1	881.0	158.0	2,458.6
August	813.6	1,156.4	324.0	53.8	813.0	10.0	3,170.8
September	583.5	856.2	588.7	45.7	821.0	48.0	2,943.1
October	555.2	1,019.1	1,191.1	53.3	575.0	114.0	3,507.7
November	1.3	1,298.1	866.5	30.8	540.0	37.0	2,773.7
December	146.1	964.6	1,157.9	87.9	577.0	28.0	2,961.5
Totals	6,282.7	11,207.8	4,557.5	547.5	7,958.0	883.0	31,436.5

Table 3.--Total ground-water pumpage in water-supply wells, Post Headquarters and Range areas, 1986 and 1987--Continued

	Post Headquarters area ground-water pumpage, 1987											
Month	10A	11	13	15A	16	17	18	19	20	21	22	Total
January	0	1,635	742	55	5,128	406	2,845	637	4,544	1,862	3,114	20,968
February	33	2,412	1,163	360	1,015	0	2,933	0	11,994	1,456	3,045	24,411
March	3,331	1,917	783	1,674	3,923	2,362	2,135	4,368	7,365	1,015	2,440	31,313
April	7,117	3,280	554	1,282	3,111	5,557	2,184	8,915	7,090	2,248	2,302	43,640
May	4,254	3,529	1,638	0	9,567	10,170	4,129	15,234	17,286	2,966	4,702	73,475
June	6,447	2,565	2,081	0	15,530	11,829	3,978	17,942	16,089	2,488	5,198	84,147
July	10,294	2,426	3,339	0	13,546	13,406	2,307	21,606	22,671	3,861	2,782	96,238
August	6,881	2,227	866	0	11,886	0	4,259	9,772	15,262	3,080	4,048	58,281
September	8,531	4,307	1,212	0	7,573	0	3,721	9,836	8,501	6,551	3,314	53,546
October	2,066	3,072	1,057	0	6,028	0	5,365	6,387	7,567	2,020	2,778	36,340
November	2,250	2,243	917	0	2,121	0	2,444	5,222	5,765	1,742	1,508	24,212
December	3,124	2,906	810	0	2,566	0	3,737	6,485	3,859	2,085	2,194	27,766
Totals	54,328	32,519	15,162	3,371	81,994	43,730	40,037	106,404	127,993	31,374	37,425	574,337

Table 3.--Total ground-water pumpage in water-supply wells, Post Headquarters and Range areas, 1986 and 1987--Concluded

Month	MAR-1	MAR-2	SMR-1	HTA-1	SRC-1	SRC-2	Totals
	Range Area ground-water pumpage, 1987						
January	358.7	399.4	1,405.5	26.5	374.0	37.0	2,601.1
February	860.9	722.9	2,233.7	44.6	518.0	43.0	4,423.1
March	691.8	1,018.5	236.0	62.0	506.0	65.0	2,579.3
April	427.9	1,413.4	2,473.8	25.8	944.0	177.0	5,461.9
May	152.1	1,262.2	1,225.2	54.0	606.0	39.0	3,338.5
June	117.7	1,903.9	86.6	7.1	(1)	1,010.0	3,125.3
July	3.0	3,367.8	98.0	17.0	(1)	966.0	4,451.8
August	1,260.8	1,747.4	65.0	24.1	(1)	946.0	4,043.3
September	1,156.0	1,566.8	58.0	6.9	(1)	837.0	3,624.7
October	1,186.1	1,492.6	783.1	5.6	(1)	706.0	4,173.4
November	1,166.6	1,932.8	712.3	5.0	(1)	473.0	4,289.7
December	1,257.6	1,814.7	555.6	4.0	(1)	411.0	4,042.9
Totals	8,639.2	18,642.4	9,932.8	282.6	2,948.0	5,710.0	46,155.0

(1) Down because of repairs

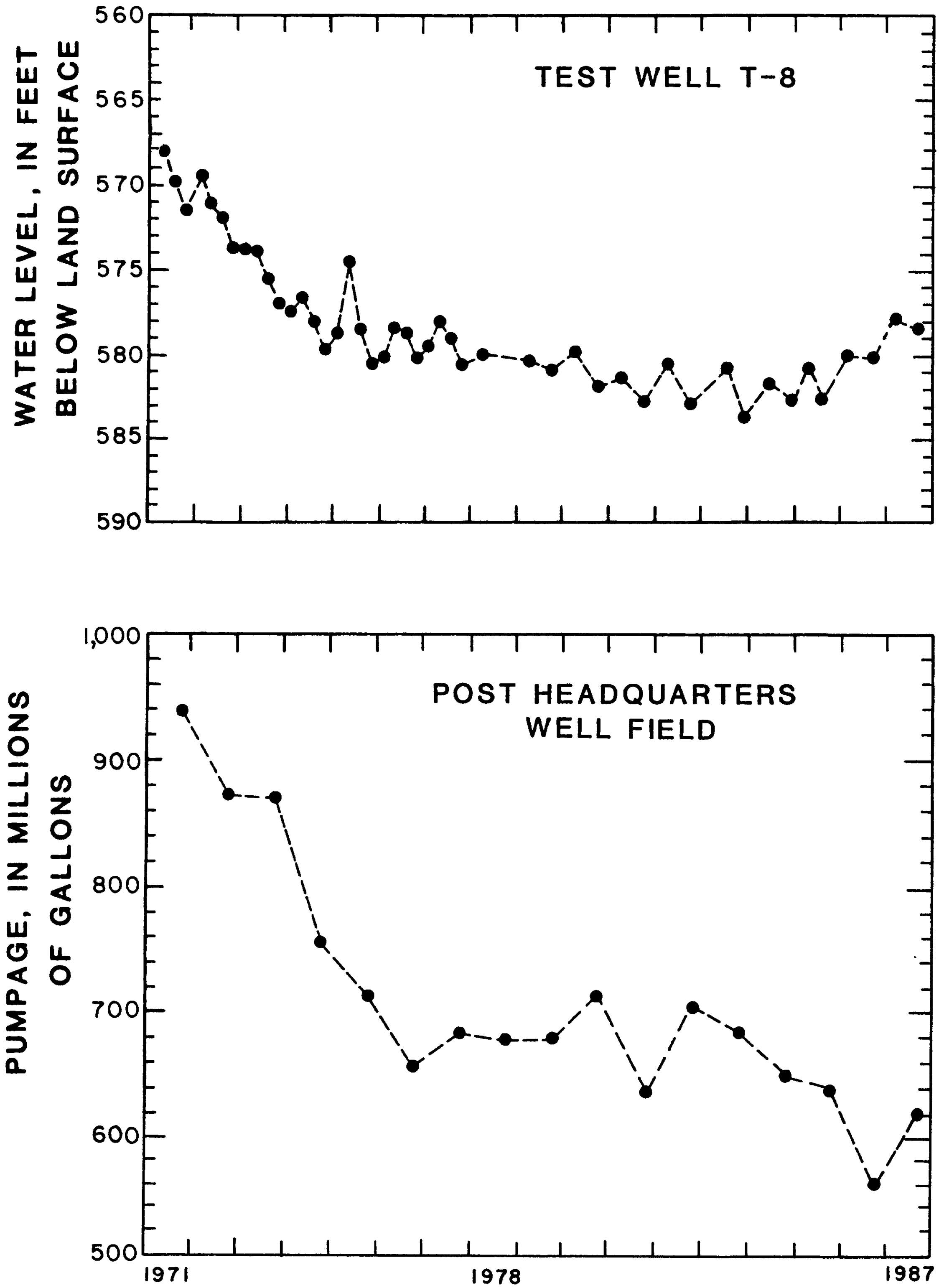

Figure 8.--Water levels in test well T-8 and yearly pumpage from the Post Headquarters well field, 1971-87.

Table 4.--Depth to water in water-supply wells, Post Headquarters and Range areas, 1986 and 1987

Well number	Location	1986 Winter (feet below land surface)	1986 Summer (feet below land surface)	1987 Winter (feet below land surface)	1987 Summer (feet below land surface)
		Post Headquarters area			
SW-10A	22S.4E.24.212a	426.38	435.28	421.70	423.84
SW-11	22S.4E.24.112	(1)	348 (2)	358 (2)	348 (2)
SW-13	22S.4E.13.311	314 (1)	300 (2)	308 (2)	309 (2)
SW-16	22S.4E.13.432	457 (1)	457 (2)	452 (2)	458 (2)
SW-17	22S.4E.13.241	450 (1)	450 (2)	432.81	450 (2)
SW-18	22S.4E.12.434	430.27	433.90	424.75	426.99
SW-19	22S.4E.12.414	454.88	458.16	--	457.65
SW-20	22S.4E.12.214	Repairs	517.35	516.75	516.36
SW-21	22S.5E.19.323	357.06	359.32	351.67	354.47
SW-22	22S.5E.19.141	378.22	381.12	369.05	373.99
		Range area			
HTA-1	21S.4E.23.233	59.70	61.45	62.08	--
HTA-3	21S.4E.14.114	49.85	50.74	49.80	50.15
MAR-1	19S.5E.17.331	(3)	213.96	212.67	(3)
MAR-2	19S.5E.17.334	(3)	(3)	221.77	219.83
SRC-1	6S.3E.05.232	210.40	211.80	205.16	209.70
SRC-2	6S.3E.05.234	213.60	228.79	212.35	213.20

(1) Air line inoperative
(2) Air-line reading
(3) Pumping

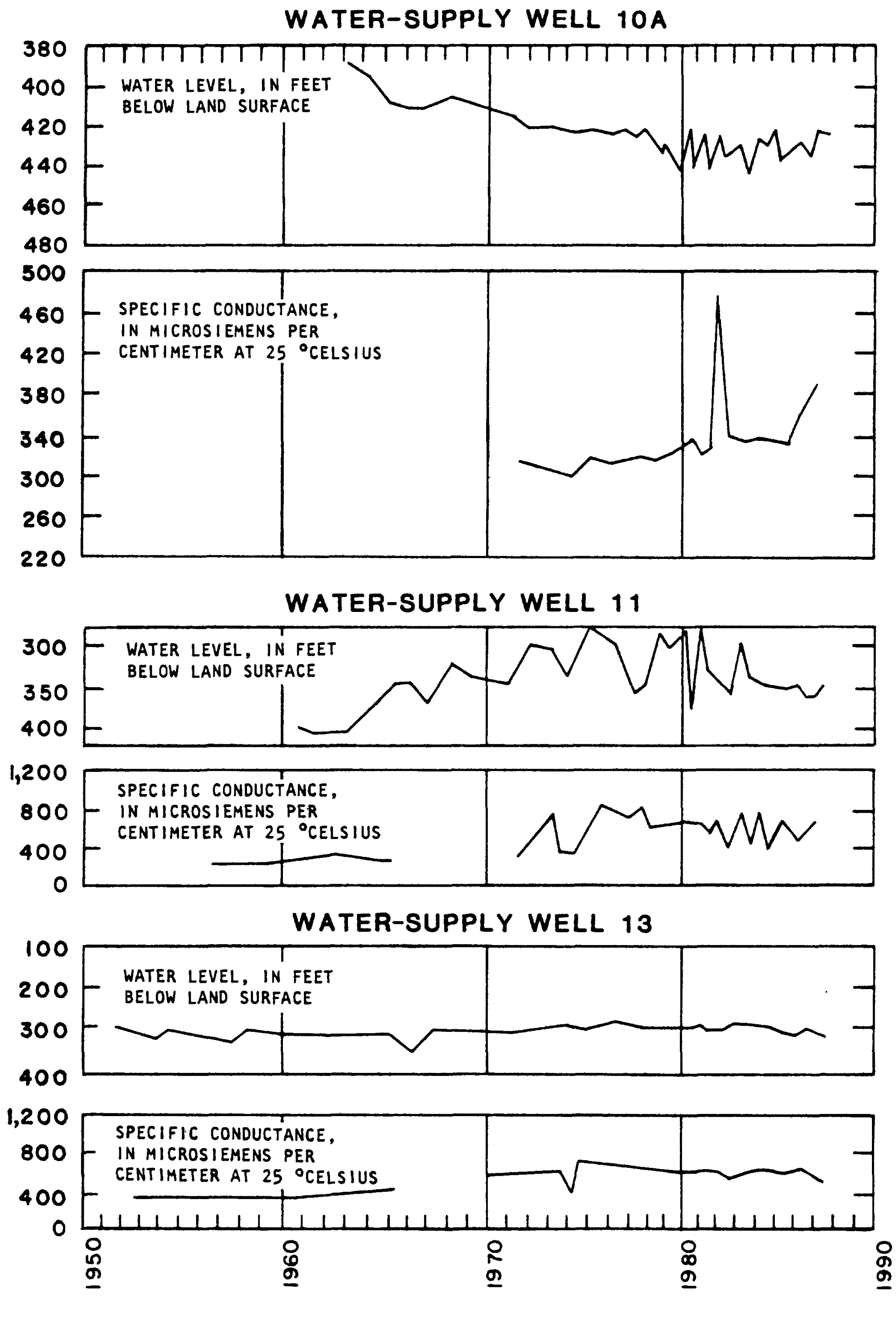

Figure 9.--Water levels and specific conductance for period of record available in selected water-supply wells, Post Headquarters area.

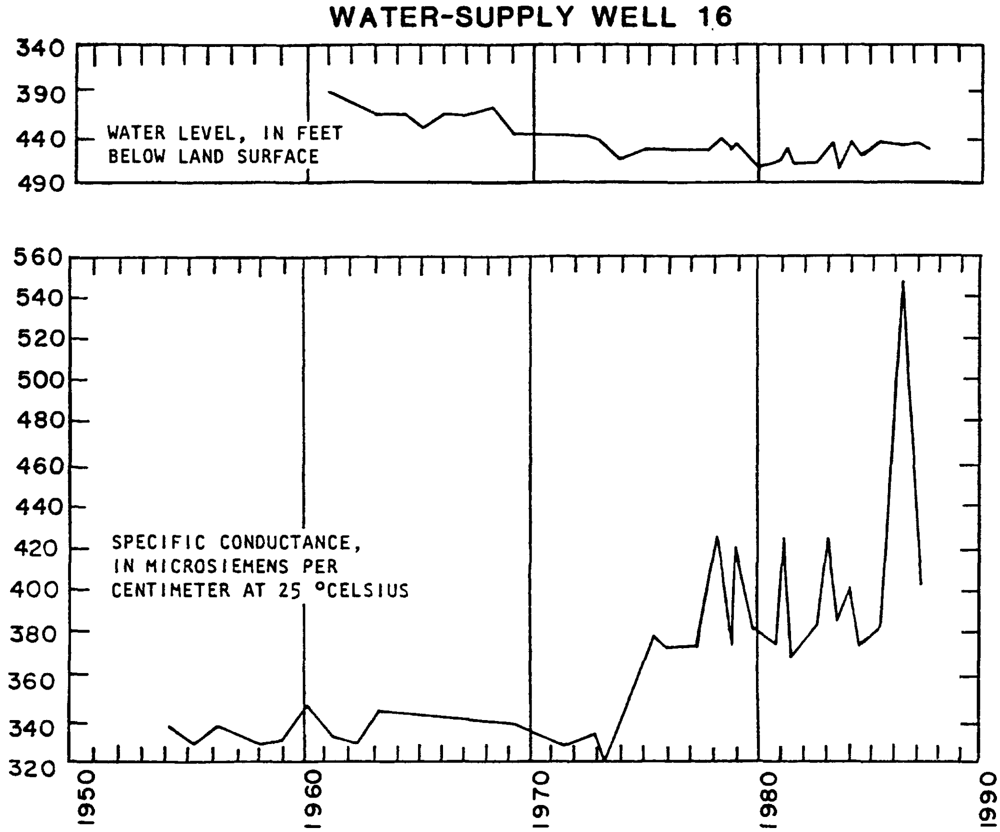

Figure 9.--Water levels and specific conductance for period of record available in selected water-supply wells, Post Headquarters area - Continued.

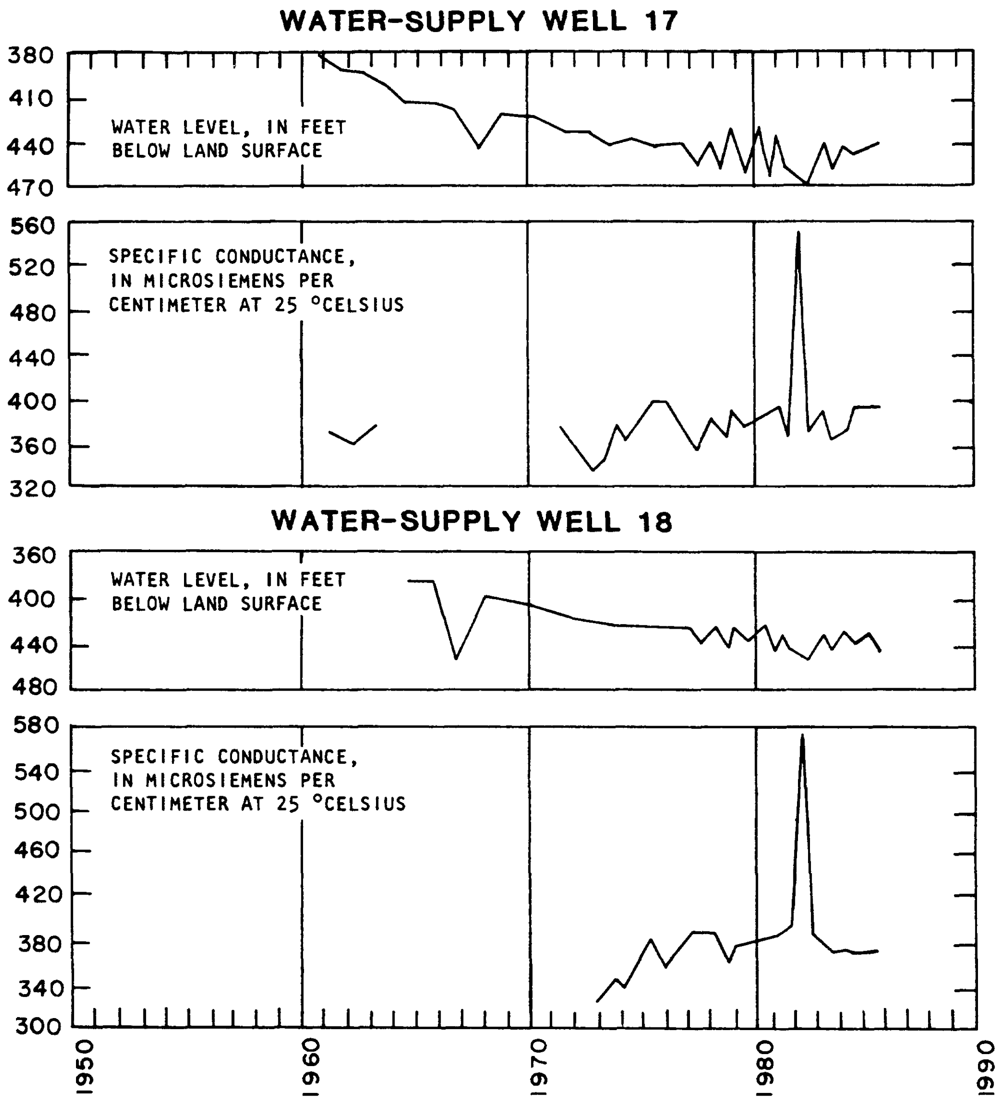

Figure 9.--Water levels and specific conductance for period of record available in selected water-supply wells, Post Headquarters area - Continued.

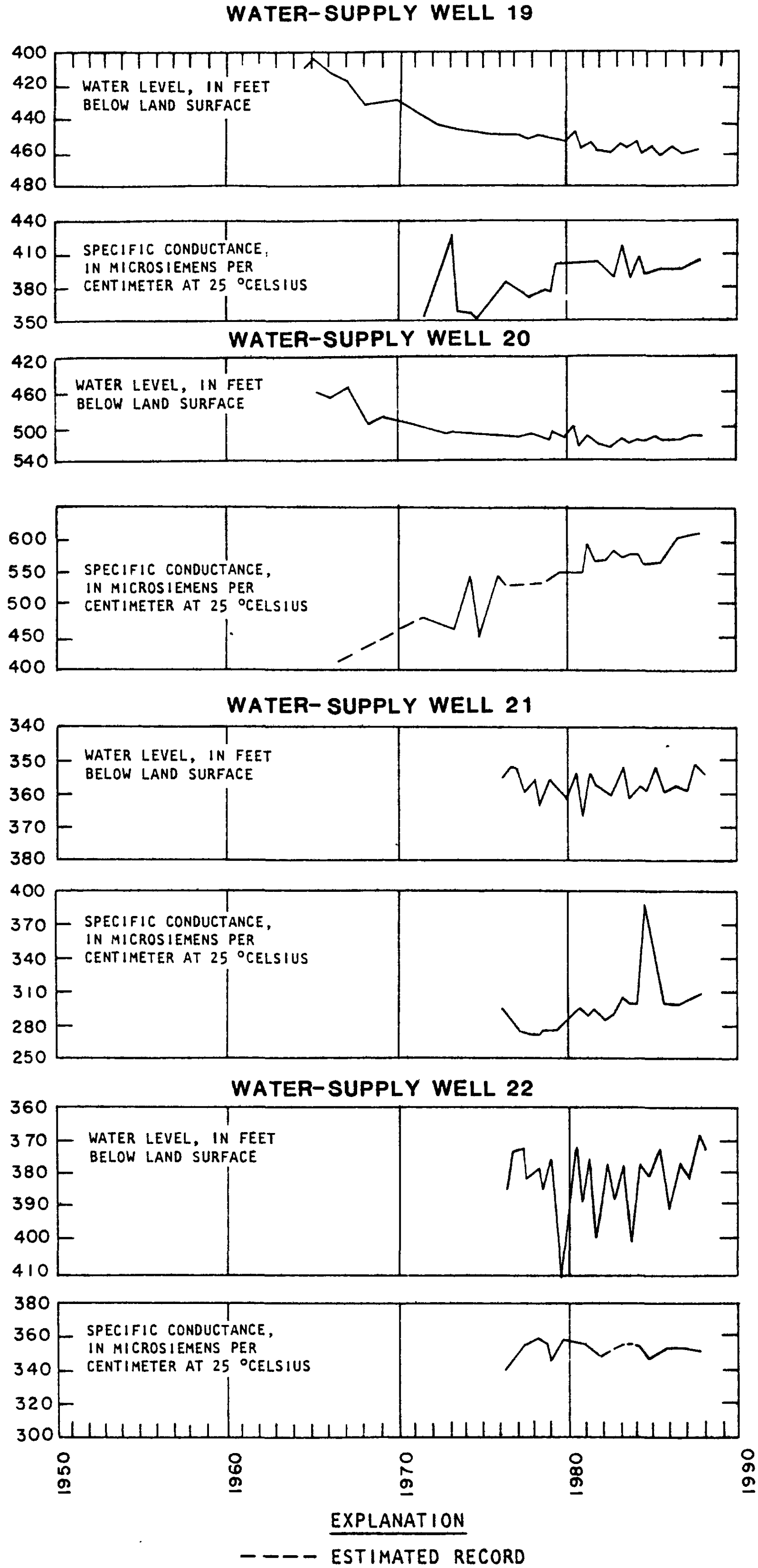

Figure 9.--Water levels and specific conductance for period of record available in selected water-supply wells, Post Headquarters area - Concluded.

Water-Level Measurements in Test Wells, Observation Wells, and Boreholes

Depth-to-water measurements were made in 45 test and observation wells, (table 5) and 36 boreholes (table 6) in 1986 and 1987. In 1986, 11 of the test and observation wells had seasonal water-level declines and 32 wells had seasonal water-level rises. The greatest seasonal water-level decline was 4.30 feet in test well T-7 (excluding data from test well T-29, which may be inaccurate because the well was never developed). The greatest seasonal water-level rise near the Post Headquarters well field was 2.14 feet in test well OS-12. Test well T-10, equipped with a continuous water-level recorder, continued to have a slight, long-term water-level decline in 1986 (fig. 10). The water levels in test wells T-7, T-8 and T-11, also equipped with continuous recorders, continued to show long-term rises in 1986 (fig. 10).

Twenty-three of the test and observation wells had seasonal water-level declines in 1987. Eighteen of the test and observation wells had water-level rises, and one test well (T-11) did not have any seasonal water-level change. The greatest seasonal water-level decline in 1987 was 7.19 feet in test well T-7. The greatest seasonal water-level rise near the Post Headquarters well field was 1.11 feet in test well T-30. Test well T-10 continued to have a long-term water-level decline in 1987, whereas the long-term water levels in test wells T-7, T-8, and T-11 continued to rise (fig. 10).

In 1986, 18 of the 36 boreholes measured had seasonal water-level rises and 18 of the boreholes had seasonal water-level declines (table 6). The greatest seasonal water-level rise was 3.95 feet in borehole B-37, which is about 2 miles west of the Post Headquarters well field (fig. 3). The greatest seasonal water-level decline was 1.19 feet in borehole B-54, which is about 2 miles east of the Post Headquarters well field (fig. 3). In 1987, 11 of the boreholes had seasonal water-level rises and 25 of the boreholes had seasonal declines. The greatest seasonal water-level rise was 3.29 feet in borehole B-37. The greatest seasonal water-level decline was 0.94 foot in borehole B-55, which is about 2 miles east of the Post Headquarters well field (fig. 3).

Table 5.--Depth to water in test and observation wells, Post Headquarters and Range areas, 1986 and 1987

Well number	Location	1986 Winter (feet below land surface)	1986 Summer (feet below land surface)	1987 Winter (feet below land surface)	1987 Summer (feet below land surface)
T-4	22S.5E.16.111	227.00	226.92	226.91	227.18
T-5	22S.5E.20.111	277.62	277.42	277.88	277.68
T-6	22S.4E.14.133	189.23	188.81	188.49	188.11
T-7	22S.5E.07.342	362.60	366.90	356.73	363.92
T-8	22S.4E.11.224	580.40	580.31	577.85	578.15
T-9	22S.4E.01.431	374.02	372.76	371.85	370.98
T-10	22S.5E.05.313	274.78	274.84	274.92	275.00
T-11	22S.5E.29.412	271.69	271.32	271.49	271.49
T-13	21S.5E.32.222	213.84	213.80	213.80	214.00
T-14	22S.5E.15.221	132.44	132.35	132.49	135.99
T-15	22S.5E.33.244	179.44	179.27	179.36	179.23
T-16	23S.5E.10.413	183.75	182.49	182.64	186.10
T-17	23S.5E.27.142	242.41	242.25	242.52	242.32
T-18	23S.5E.05.321	237.44	236.80	236.45	237.65
T-21	22S.5E.30.122	316.04	315.44	314.52	313.63
T-22	23S.5E.05.144	189.23	189.38	188.88	188.52
T-27	22S.5E.22.141	162.45	162.40	162.23	162.15
T-28A	22S.5E.22.122a	155.19	155.04	155.01	154.98
T-29	22S.5E.28.122	173.60	179.98	184.62	185.00
T-30	22S.5E.32.334	213.37	211.32	210.19	209.08
T-34	22S.5E.28.234	188.90	188.70	188.88	189.01
T-35	22S.5E.28.142a	186.25	185.36	185.95	187.39
T-37	22S.5E.28.142b	206.17	206.36	206.54	206.83
T-38	22S.5E.21.211a	214.46	214.68	214.11	214.09
OS-9	22S.5E.31.424	242.81	242.05	239.10	239.40
OS-12	22S.4E.23.214	229.70	227.56	224.90	225.47
TW-1	22S.6E.16.233	229.59	229.37	229.05	229.49
TW-2	22S.6E.16.234	235.90	235.16	235.49	235.87
NT-1	20S.3E.35.341	132.93	125.59	124.51	126.82
NT-2	21S.3E.02.311	177.24	176.93	176.91	170.24

Table 5.--Depth to water in test and observation wells, Post Headquarters and Range areas, 1986 and 1987--Concluded

Well number	Location	1986 Winter (feet below land surface)	1986 Summer (feet below land surface)	1987 Winter (feet below land surface)	1987 Summer (feet below land surface)
Gregg	22S.6E.08.414	214.30	214.18	214.16	214.36
HTA (wm)	21S.4E.22.222	37.92	36.79	38.68	--
SMR-2	21S.5E.17.424	320.72	321.71	321.46	321.08
SMR-3	20S.5E.34.133	Pumping	301.10	298.75	299.63
SMR-4	21S.5E.20.344	290.09	290.32	290.61	290.48
MAR-1 (test)	19S.5E.17.333	222.09	221.11	219.68	219.27
MAR-4	19S.5E.19.231	304.39	302.81	301.56	301.24
NW30-1	17S.4E.02.211	212.84	212.96	212.88	212.59
Murray	8S.5E.32.334	177.68	177.65	177.77	--
Lucero Ranch	19S.5E.22.334	171.09	171.08	171.35	171.10
CW	21S.5E.28.411	153.24	153.22	153.40	153.58
BLM	22S.4E.15.331	56.37	58.66	58.40	59.24
DC-1	8S.4E.12.444	--	254.91	--	--
RC-3	13S.5E.27.421	35.88	36.60	35.43	35.93
RG	15S.5E.29.423	30.35	28.19	28.00	28.56

Table 6.--Depth to water in boreholes, Post Headquarters and adjacent areas, 1986 and 1987

Borehole number	Location	1986 Winter (feet below land surface)	1986 Summer (feet below land surface)	1987 Winter (feet below land surface)	1987 Summer (feet below land surface)
B-2	22S.5E.28.124	196.10	196.08	196.19	196.18
B-3	22S.5E.28.142	202.01	201.98	202.08	202.38
B-4	22S.5E.28.233	195.98	195.88	196.06	196.67
B-5	22S.5E.33.223	187.30	187.07	187.23	187.03
B-6	23S.5E.01.113	133.82	133.74	133.88	133.62
B-9	22S.5E.21.211	225.05	224.98	224.73	224.83
B-10	22S.5E.19.414	305.18	304.99	303.85	302.64
B-13	22S.5E.08.141	245.40	245.64	245.76	245.89
B-14	22S.5E.03.221	112.73	112.65	112.63	112.86
B-15	22S.5E.05.242	175.31	175.40	175.65	175.70
B-16	21S.5E.34.213	109.80	109.79	109.80	110.00
B-17	21S.5E.33.242	112.04	112.11	112.10	112.28
B-18	21S.5E.23.134	104.78	104.88	104.85	104.94
B-20	22S.4E.14.134	349.29	348.80	348.55	348.12
B-23	22S.5E.16.111	225.39	225.41	225.35	225.59
B-26	21S.6E.32.114	141.07	141.31	141.07	141.38
B-27	21S.6E.17.314	120.06	120.00	119.82	120.02
B-28	21S.5E.02.341	140.43	140.50	140.49	140.51
B-30	20S.5E.23.213	89.71	89.79	89.72	89.69
B-31	20S.6E.29.123	123.44	123.45	123.18	123.60
B-34	21S.5E.01.221	126.37	126.46	126.50	126.52
B-36	22S.4E.01.323	211.64	211.46	211.29	211.05
B-37	22S.4E.11.344	385.29	381.34	377.22	373.93
B-38	20S.6E.11.234	129.85	129.88	129.72	129.90
B-39	21S.6E.02.142	156.48	156.39	155.93	156.45
B-40	21S.6E.26.142	188.78	188.66	188.15	188.80
B-42	22S.4E.11.444	366.09	366.76	365.16	363.19
B-46	21S.5E.27.113	136.30	136.38	136.46	136.52
B-47	22S.5E.08.334	274.78	274.93	274.07	274.85
B-48	22S.6E.31.322	204.73	204.62	204.74	204.54
B-50	22S.5E.07.242	307.78	306.10	308.14	308.32
B-51	22S.5E.26.312	146.36	146.39	146.30	146.31
B-52	22S.5E.09.113	211.25	211.29	211.25	211.50
B-54	22S.5E.16.111	229.02	230.21	230.12	230.30
B-55	22S.5E.09.113	215.07	215.14	214.08	215.02
B-56	22S.5E.30.424	275.56	274.50	273.59	272.74

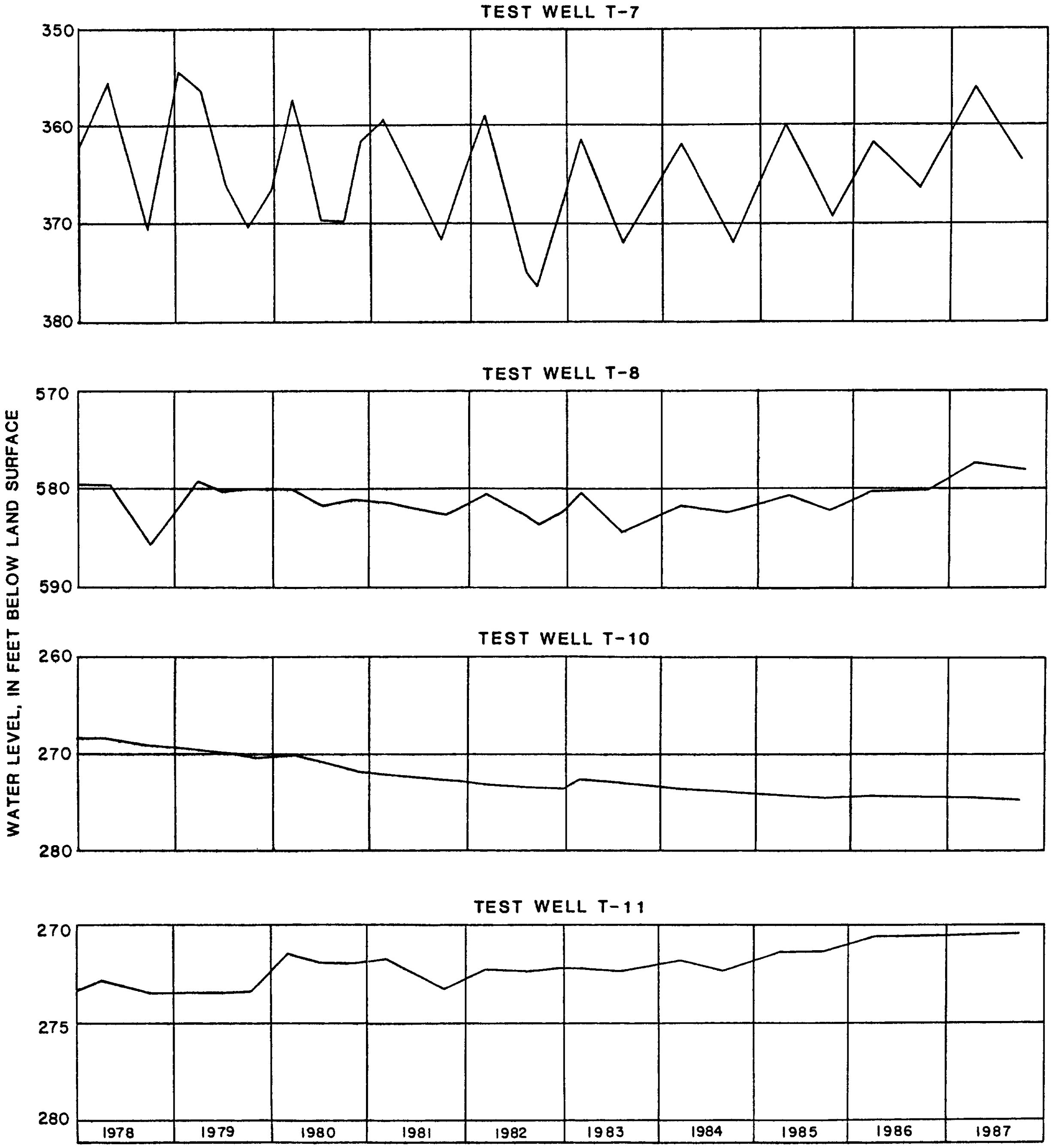

Figure 10.--Water levels in test wells T-7, T-8, T-10, and T-11, 1978-87.

Chemical Quality

Eight water samples were collected in 1986 and 1987 from five water-supply wells in the Post Headquarters area, one water-supply well in the Range area, and one test well in the Range area for chemical analysis (table 7). The long-term specific conductance of water samples collected from 10 water-supply wells in the Post Headquarters area is shown in figure 9. Monthly specific conductance and pumpage from 1986 and 1987 for 11 water-supply wells are shown in figure 11. The dissolved-sodium concentration ranged from 23 milligrams per liter in the sample from water-supply well SW-10A to 3,900 milligrams per liter in water from test well Fluor-1. The dissolved-chloride concentration ranged from 20 milligrams per liter in the sample from water-supply well SW-10A to 4,100 milligrams per liter in water from test well Fluor-1.

Sixteen water samples were collected from four test wells in the Post Headquarters area for analysis of volatile organic compounds in 1987 (table 8). The analyses determined that trace amounts of dichlorobromomethane may be present in test well E-1, traces of chloroform may be present in test wells E-1 and E-4, and traces of toluene may be present in test wells E-1 and E-2. These concentrations however, with one exception, are less than one microgram per liter; thus the detection levels may be questionable.

Twenty-eight water samples, 17 from Post Headquarters area test and observation wells and 11 from Post Headquarters area water-supply wells, were collected for specific-conductance analyses in 1986 and 1987 (table 9). In 1986, the specific conductance ranged from 248 microsiemens per centimeter at 25 degrees Celsius in water from test well T-17 to 1,920 microsiemens per centimeter at 25 degrees Celsius in water from test well T-14. In 1987, the specific conductance ranged from 250 microsiemens per centimeter at 25 degrees Celsius in water from test well T-17 to 1,650 microsiemens per centimeter at 25 degrees Celsius in water from test well T-14.

Table 7.--Chemical analyses of water from selected wells, 1986 and 1987

[QTab, Quaternary and Tertiary alluvium and bolson fill; µS/cm, microsiemens per centimeter at 25 degrees Celsius; deg C, degrees Celsius; mg/L, milligrams per liter; <, less than; µg/L, micrograms per liter]

Well number	Location	Date of sample	Geologic unit	Specific conductance, lab (µS/cm)	pH, lab (standard units)	Temperature water (deg C)	Alkalinity, lab (mg/L as $CaCO_3$)	Dissolved solids, residue at 180 deg C (mg/L)	Calcium, dissolved (mg/L as Ca)
Murray-SW	08S.05E.32.431	08-13-86	--	952	7.8	22.5	134	723	98
Fluor-1	21S.07E.36.344	07-15-87	QTab	18,000	7.4	31.0	87	--	570
Fluor-1	21S.07E.36.344	08-02-87	do.	18,400	7.5	30.0	78	--	580
SW-20	22S.04E.12.214	09-09-86	do.	553	8.1	--	124	405	64
SW-13	22S.04E.13.311	09-09-86	do.	592	7.8	--	166	470	64
SW-16	22S.04E.13.432	09-09-86	do.	426	8.0	--	102	304	44
SW-11	22S.04E.24.112	09-09-86	do.	684	8.0	--	163	533	85
SW-10A	22S.04E.24.212A	09-09-86	do.	355	7.9	--	88	280	36

Well number	Date of sample	Magnesium, dissolved (mg/L as Mg)	Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)	Bromide, dissolved (mg/L as Br)	Silica, dissolved (mg/L as SiO_2)	Nitrogen, NO_2+NO_3 dissolved (mg/L as N)
Murray-SW	08-13-86	36	62	1.6	330	40	1.4	--	27	2.20
Fluor-1	07-15-87	210	3,900	18	4,500	4,100	1.2	--	29	<.10
Fluor-1	08-02-87	220	3,800	17	4,500	--	1.2	<0.01	29	<.10
SW-20	09-09-86	13	35	2.7	120	27	0.5	--	44	2.70
SW-13	09-09-86	16	39	2.9	100	21	0.5	--	39	5.70
SW-16	09-09-86	10	25	2.4	65	24	0.3	--	42	3.90
SW-11	09-09-86	21	35	3.2	140	26	0.4	--	45	9.50
SW-10A	09-09-86	8.2	23	2.1	53	20	0.4	--	45	2.10

Table 7.--Chemical analyses of water from selected wells, 1986 and 1987--Concluded

Well number	Date of sample	Boron, dis-solved (µg/L as B)	Iron, dis-solved (µg/L as Fe)	Lithium, dis-solved (µg/L as Li)	Stron-tium, dis-solved (µg/L as Sr)	Elevation of land-surface datum (feet above sea level)	Depth of well, total (feet)	Depth of hole, total (feet)	Sample interval, (feet below land surface)
Murray-SW	08-13-86	--	--	--	--	5,115	290	--	--
Fluor-1	07-15-87	--	--	--	--	4,095	--	1,175	1,015-1,035
Fluor-1	08-02-87	23,000	24	460	11,000	4,095	1,054	--	--
SW-20	09-09-86	--	--	--	--	4,354	838	--	--
SW-13	09-09-86	--	--	--	--	4,330	534	--	--
SW-16	09-09-86	--	--	--	--	4,270	890	--	--
SW-11	09-09-86	--	--	--	--	4,333	500	--	--
SW-10A	09-09-86	--	--	--	--	4,273	805	--	--

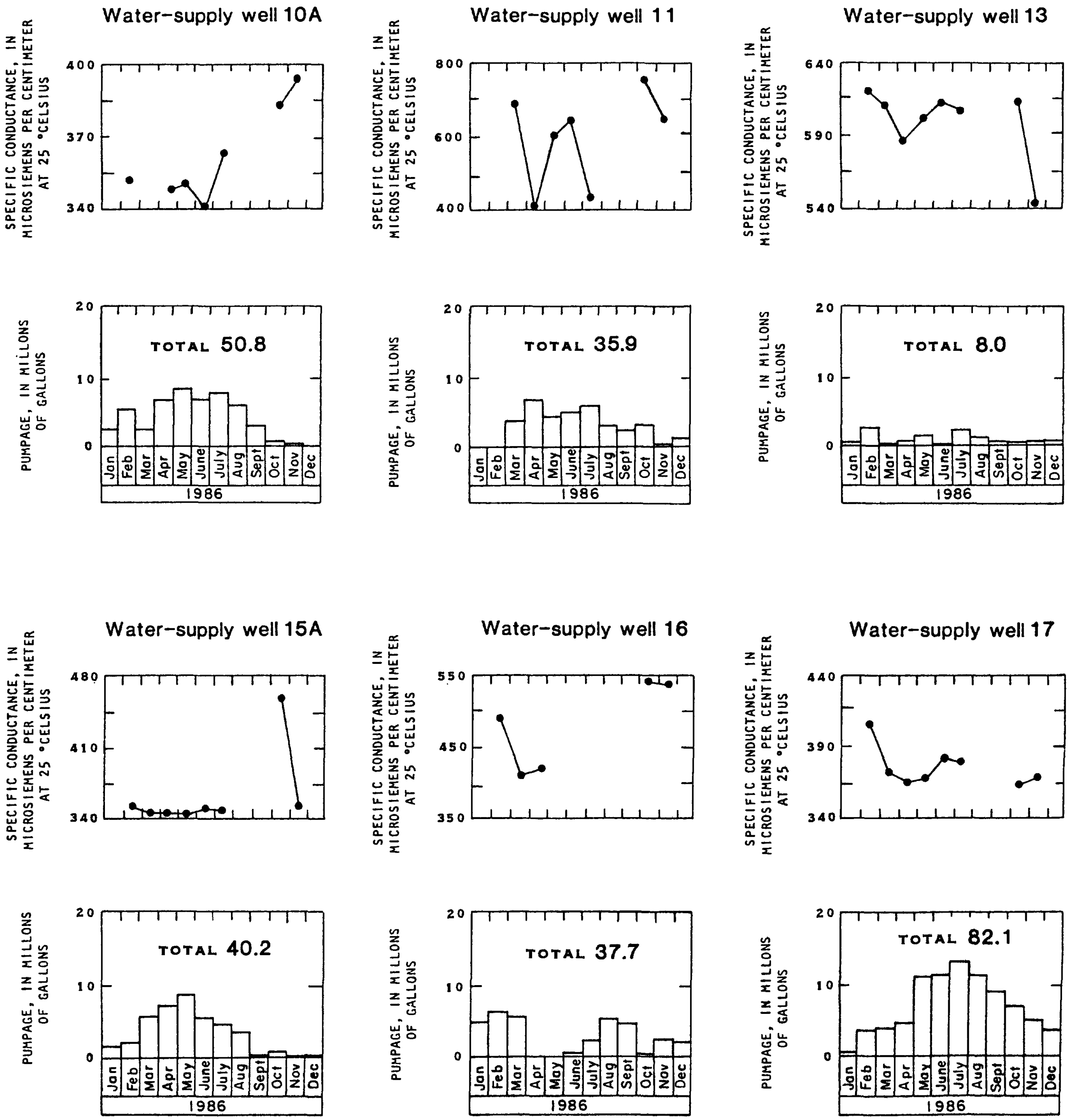

Figure 11.--Monthly specific conductance and pumpage for Post Headquarters water-supply wells, 1986 and 1987.

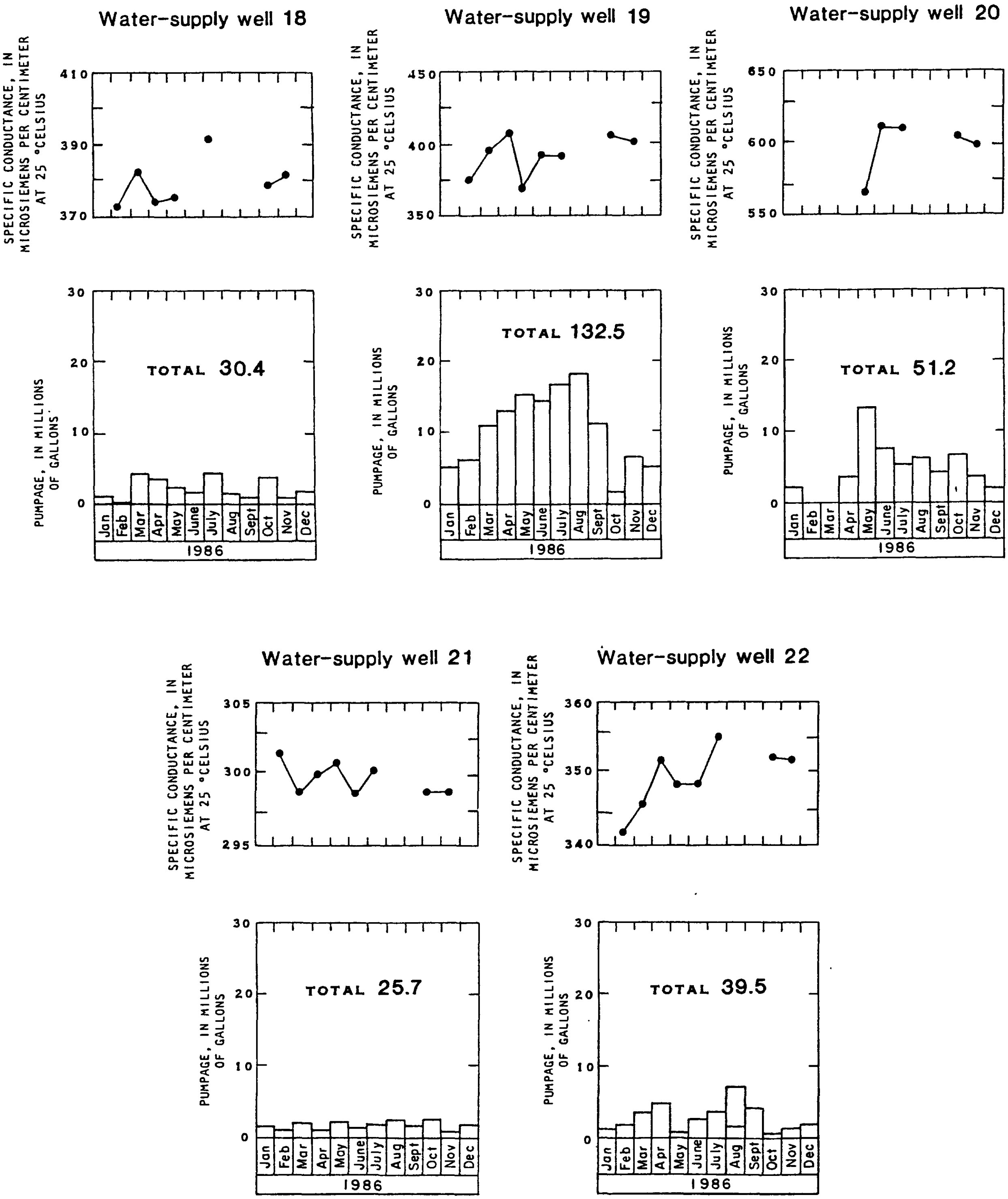

Figure 11.--Monthly specific conductance and pumpage for Post Headquarters water-supply wells, 1986 and 1987 - Continued.

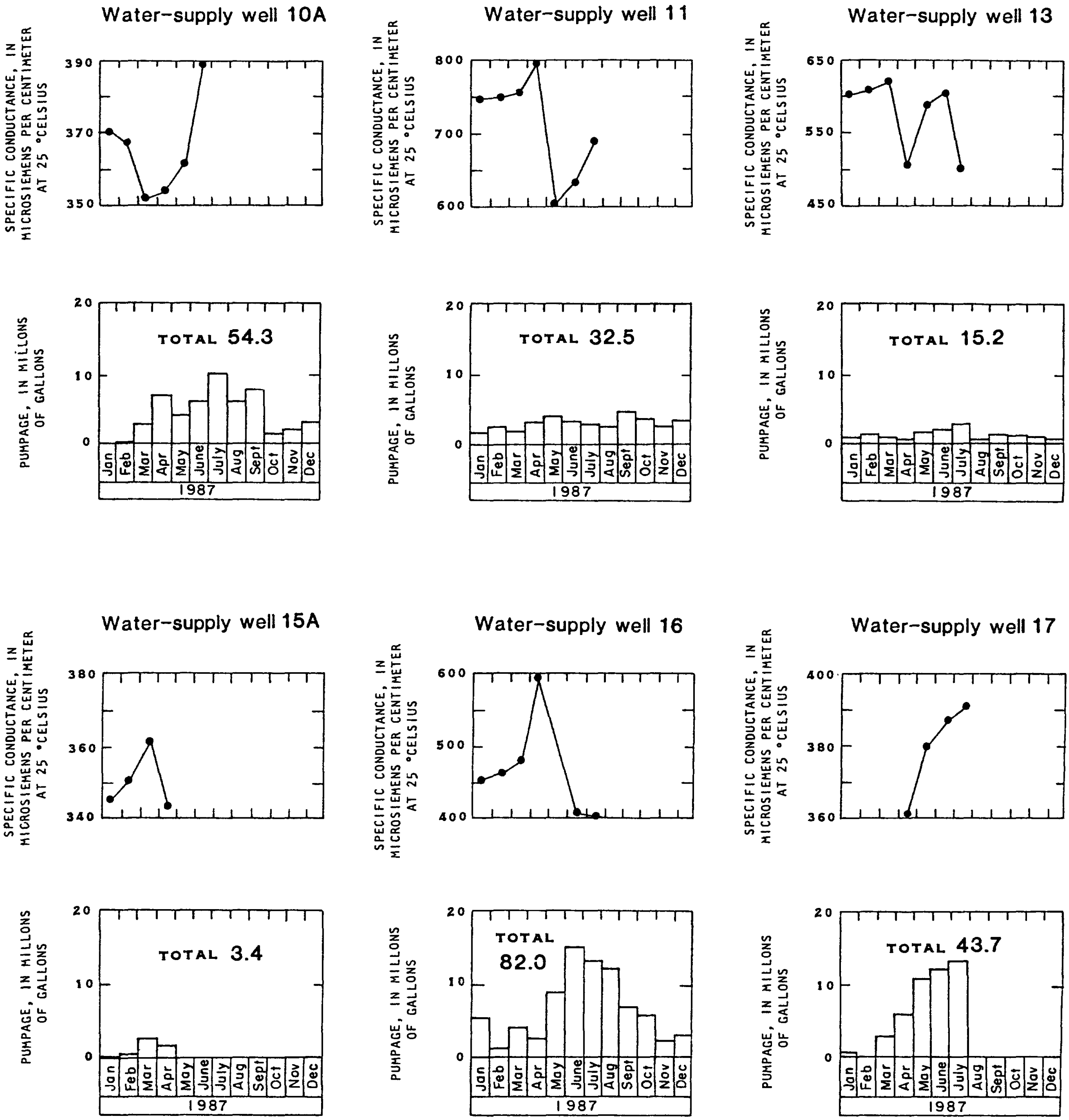

Figure 11.--Monthly specific conductance and pumpage for Post Headquarters water-supply wells, 1986 and 1987 - Continued.

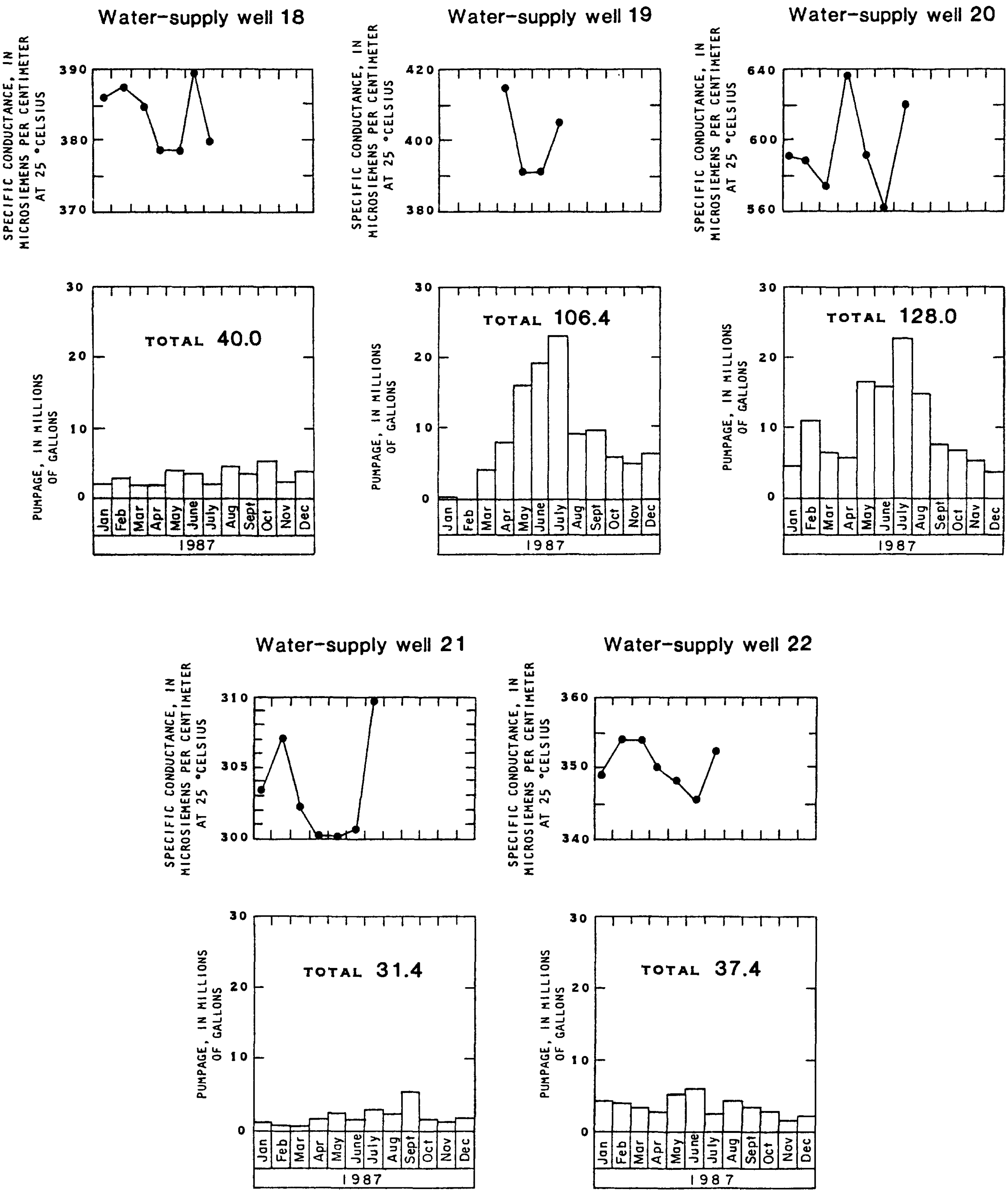

Figure 11.--Monthly specific conductance and pumpage for Post Headquarters water-supply wells, 1986 and 1987 - Concluded.

Table 8.--Volatile organic-compound analyses of water from selected test wells, 1987

[µg/L, micrograms per liter; QTab, Quaternary and Tertiary alluvium and bolson fill; <, less than]

Well number	Location	Date of sample	Geologic unit	Dichlorobromomethane, total (µg/L)	Carbontetrachloride, total (µg/L)	1,2-Dichloroethane, total (µg/L)	Bromoform, total (µg/L)	Chlorodibromomethane, total (µg/L)	Chloroform, total (µg/L)	Toluene, total (µg/L)
E1	22S.05E.21.211B	07-17-87	QTab	0.30	<0.20	<0.20	<0.20	<0.20	0.30	0.40
E1	22S.05E.21.211B	07-17-87	do.	.40	<.20	<.20	<.20	<.20	.30	.40
E1	22S.05E.21.211B	07-17-87	do.	.40	<.20	<.20	<.20	<.20	<.20	.30
E1	22S.05E.21.211B	07-17-87	do.	.40	<.20	<.20	<.20	<.20	.30	.40
E2	22S.05E.21.211C	07-16-87	do.	<.20	<.20	<.20	<.20	<.20	<.20	.90
E2	22S.05E.21.211C	07-16-87	do.	<.20	<.20	.20	<.20	<.20	.40	1.2
E2	22S.05E.21.211C	07-16-87	do.	<.20	<.20	<.20	<.20	<.20	<.20	.70
E2	22S.05E.21.211C	07-16-87	do.	<.20	<.20	<.20	<.20	<.20	<.20	.30
E3	22S.05E.21.211D	07-16-87	do.	<.20	<.20	<.20	<.20	<.20	<.20	<.20
E3	22S.05E.21.211D	07-16-87	do.	<.20	<.20	<.20	<.20	<.20	<.20	<.20
E3	22S.05E.21.211D	07-16-87	do.	<.20	<.20	<.20	<.20	<.20	<.20	<.20
E3	22S.05E.21.211D	07-16-87	do.	<.20	<.20	<.20	<.20	<.20	<.20	<.20
E4	22S.05E.21.211E	07-17-87	do.	<.20	<.20	<.20	<.20	<.20	.50	<.20
E4	22S.05E.21.211E	07-17-87	do.	<.20	<.20	<.20	<.20	<.20	.70	<.20
E4	22S.05E.21.211E	07-17-87	do.	<.20	<.20	<.20	<.20	<.20	.50	<.20
E4	22S.05E.21.211E	07-17-87	do.	<.20	<.20	<.20	<.20	<.20	<.20	<.20

Table 8.--Volatile organic-compound analyses of water from selected test wells, 1987--Continued

Well number	Date of sample	Benzene, total (µg/L)	Chloro-benzene, total (µg/L)	Chloro-ethane, total (µg/L)	Ethyl-benzene, total (µg/L)	Methyl-bromide, total (µg/L)	Methyl-chlo-ride, total (µg/L)	Methyl-ene chlo-ride, total (µg/L)	Tetra-chloro-ethyl-ene, total (µg/L)	Tri-chloro-fluoro-methane, total (µg/L)	1,1-Di-chloro-ethane, total (µg/L)
E1	07-17-87	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20	<0.20
E1	07-17-87	<.20	<.20	<.20	<.20	<.20	<.20	<.40	<.20	<.20	<.20
E1	07-17-87	<.20	<.20	<.20	<.20	<.20	<.20	<.40	<.20	<.20	<.20
E1	07-17-87	<.20	<.20	<.20	<.20	<.20	<.20	<.40	<.20	<.20	<.20
E2	07-16-87	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
E2	07-16-87	<.20	<.20	<.20	<.20	<.20	<.20	.80	<.20	<.20	<.20
E2	07-16-87	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
E2	07-16-87	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
E3	07-16-87	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
E3	07-16-87	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	.40	<.20
E3	07-16-87	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
E3	07-16-87	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
E4	07-17-87	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
E4	07-17-87	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
E4	07-17-87	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
E4	07-17-87	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20

Table 8.--Volatile organic-compound analyses of water from selected test wells, 1987--Continued

Well number	Date of sample	1,1-Dichloroethylene, total (µg/L)	1,1,1-Trichloroethane, total (µg/L)	1,1,2-Trichloroethane, total (µg/L)	1,1,2,2-Tetrachloroethane, total (µg/L)	1,2-Dichlorobenzene, total (µg/L)	1,2-Dichloropropane, total (µg/L)	1,2-Transdichloroethylene, total (µg/L)	1,3-Dichloropropane, total (µg/L)	1,3-Dichlorobenzene, total (µg/L)	1,4-Dichlorobenzene, total (µg/L)	2-chloroethylvinylether, total (µg/L)
E1	07-17-87	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
E1	07-17-87	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
E1	07-17-87	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
E1	07-17-87	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
E2	07-16-87	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
E2	07-16-87	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
E2	07-16-87	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
E2	07-16-87	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
E3	07-16-87	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
E3	07-16-87	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
E3	07-16-87	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
E3	07-16-87	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
E4	07-17-87	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
E4	07-17-87	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
E4	07-17-87	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20
E4	07-17-87	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20	<.20

Table 8.--Volatile organic-compound analyses of water from selected test wells, 1987--Concluded

Well number	Date	Di-chloro-di-fluoro-methane, total (µg/L)	Trans-1,3-Di-chloro-propene, total (µg/L)	Cis-1,3-Di-chloro-propene, total (µg/L)	1,2-Dibromo-ethyl-ene, total (µg/L)	Vinyl chlo-ride, total (µg/L)	Tri-chloro-ethyl-ene, total (µg/L)	Styrene, total (µg/L)	Xylene water whole, tot rec (µg/L)	Elevation of land-surface datum (feet above sea level)	Depth of well, total (feet)
E1	07-17-87	<0.20	<0.20	<0.20	<0.2	<0.20	<0.2	<0.2	<0.2	4,030	--
E1	07-17-87	<.20	<.20	<.20	<.2	<.20	<.2	<.2	<.2	4,030	--
E1	07-17-87	<.20	<.20	<.20	<.2	<.20	<.2	<.2	<.2	4,030	--
E1	07-17-87	<.20	<.20	<.20	<.2	<.20	<.2	<.2	<.2	4,030	--
E2	07-16-87	<.20	<.20	<.20	<.2	<.20	<.2	<.2	<.2	4,031	227
E2	07-16-87	<.20	<.20	<.20	<.2	<.20	<.2	<.2	<.2	4,031	227
E2	07-16-87	<.20	<.20	<.20	<.2	<.20	<.2	<.2	<.2	4,031	227
E2	07-16-87	<.20	<.20	<.20	<.2	<.20	<.2	<.2	<.2	4,031	227
E3	07-16-87	<.20	<.20	<.20	<.2	<.20	<.2	<.2	<.2	4,039	231
E3	07-16-87	<.20	<.20	<.20	<.2	<.20	<.2	<.2	<.2	4,039	231
E3	07-16-87	<.20	<.20	<.20	<.2	<.20	<.2	<.2	<.2	4,039	231
E3	07-16-87	<.20	<.20	<.20	<.2	<.20	<.2	<.2	<.2	4,039	231
E4	07-17-87	<.20	<.20	<.20	<.2	<.20	<.2	<.2	<.2	4,028	229
E4	07-17-87	<.20	<.20	<.20	<.2	<.20	<.2	<.2	<.2	4,028	229
E4	07-17-87	<.20	<.20	<.20	<.2	<.20	<.2	<.2	<.2	4,028	229
E4	07-17-87	<.20	<.20	<.20	<.2	<.20	<.2	<.2	<.2	4,028	229

Table 9.--Specific conductance of water samples collected from test and water-supply wells in the Post Headquarters area, summers of 1986 and 1987

[μS/cm, microsiemens per centimeter at 25 degrees Celsius]

Well number	1986 specific conductance, lab (μS/cm)	1987 specific conductance, lab (μS/cm)	Sampling point (feet below land surface)
Test wells			
T-4	313	305	325
T-5	368	370	330
T-6	438	405	350
T-7	346	345	440
T-7	---	600	960
T-8	640	690	610
T-8	---	640	910
T-9	855	850	550
T-10	334	330	530
T-11	265	270	570
OS-12	449	465	330
T-13	468	475	330
T-14	1,920	1,650	300
T-15	293	285	448
T-16	360	285	480
T-17	248	250	440
T-18	692	710	635
Water-supply wells			
SW-10A	364	390	Pumping
SW-11	430	690	Do.
SW-13	609	500	Do.
SW-15A	344	345	Do.
SW-16	548	400	Do.
SW-17	380	390	Do.
SW-18	391	380	Do.
SW-19	395	405	Do.
SW-20	614	620	Do.
SW-21	300	310	Do.
SW-22	356	352	Do.

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