UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Albuquerque, New Mexico

Annual water-resources review

White Sands Missile Range

1971

- a basic-data report -

By

R. R. Cruz

Open-file report

Prepared by the U.S. Geological Survey, Water Resources Division, in cooperation with White Sands Missile Range

March 1972

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Water Resources Division
P. O. Box 4369
Albuquerque, New Mexico 87106

4 April 1972

CERTIFIED MAIL

Memorandum

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Introduction

This report presents water-resource information that was collected at White Sands Missile Range during 1971 and early 1972 by personnel of the U.S. Geological Survey, Water Resources Division. Data on ground-water pumpage and resulting water-level fluctuation, chemical quality, percipitation, and surface-water runoff are summarized in the report. The data were obtained as a result of the continuing water-resources basic-data collection program sponsored by the Facilities Engineering Directorate, White Sands Missile Range.

Continuing observations

The program to collect basic data on the water resources of White Sands Missile Range has been continuous since 1953. It has expanded from the original program of water-level observations in 5 test wells in the Post Headquarters area to the present program of periodic measurements in 15 supply wells and 27 test and observation wells, semiannual water sampling in 8 test wells, and operation and monitoring of 24 rain gages and 2 runoff stations in widely scattered areas on the missile range (fig. 1). In addition, nonrecurring, or specialized events, other than test-drilling activities, are considered part of the program. Water samples were collected from supply wells 10a, 11, 13, 15, 16, 17, 19, and 20 in the Post Headquarters area at the request of the Post Engineer.

This report is the fifth annual water-resources review prepared for White Sands Missile Range. Reports prior to 1967 were in letter form.

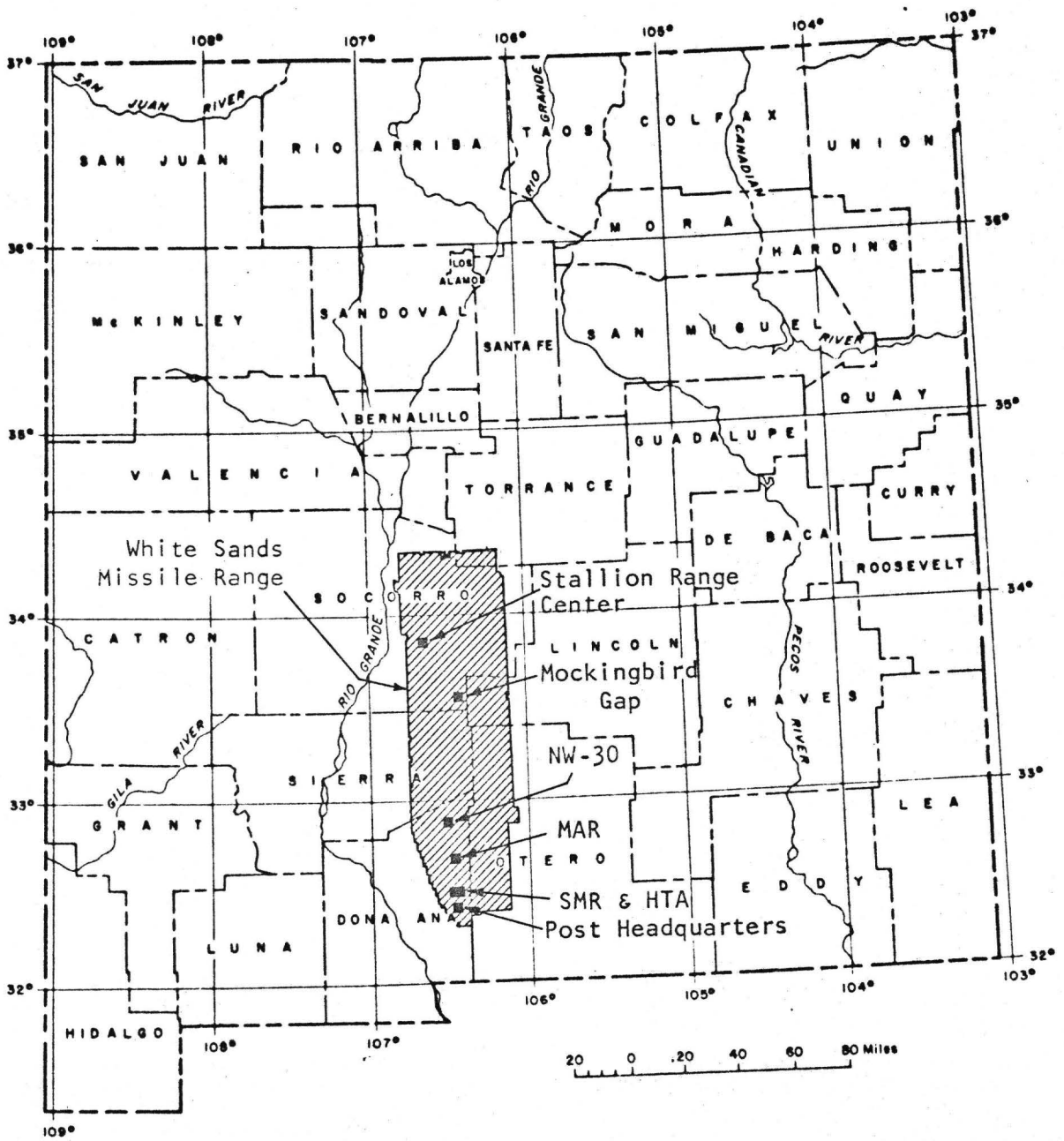

Figure 1.--Areas of hydrologic observations, White Sands Missile Range, New Mexico.

Pumpage and water-level fluctuations

Total ground-water pumpage at White Sands Missile Range in 1971, according to records furnished by the Facilities Engineering Directorate, was 956,090,300 gallons. The Post Headquarters well field produced 939,018,000 gallons; well HTA, 151,100 gallons; wells MAR-1 and 2, 787,200 gallons; well SMR-1, 1,623,000 gallons; and wells SRC-1 and 2, 14,511,000 gallons.

Figure 2 shows pumpage by month and total gallons pumped per year 1961-71 in the Post Headquarters well field. The fluctuation of water level in the Main Gate well (fig. 8) is also illustrated by a hydrograph plotted above the pumpage graph.

Figure 3 shows the combined monthly pumpage of supply wells 17, 18, 19, and 20 in the Post Headquarters well field and water-level fluctuation in test well T-7 (fig. 8). These supply wells are the northernmost wells in the well field (fig. 5), and in 1971 supplied more than half of the total yearly pumpage from the well field. Test well T-7 is located about 0.7 mile east of the supply wells. Water-level fluctuations in test well T-7 (fig. 3) are principally the result of withdrawals from the northern part of the well field. Graphs on figure 4 show water-level fluctuations in test wells T-8, T-10, and T-11. Hourly water-level fluctuations are recorded in the Main Gate well and in wells T-7, T-8, T-10, and T-11.

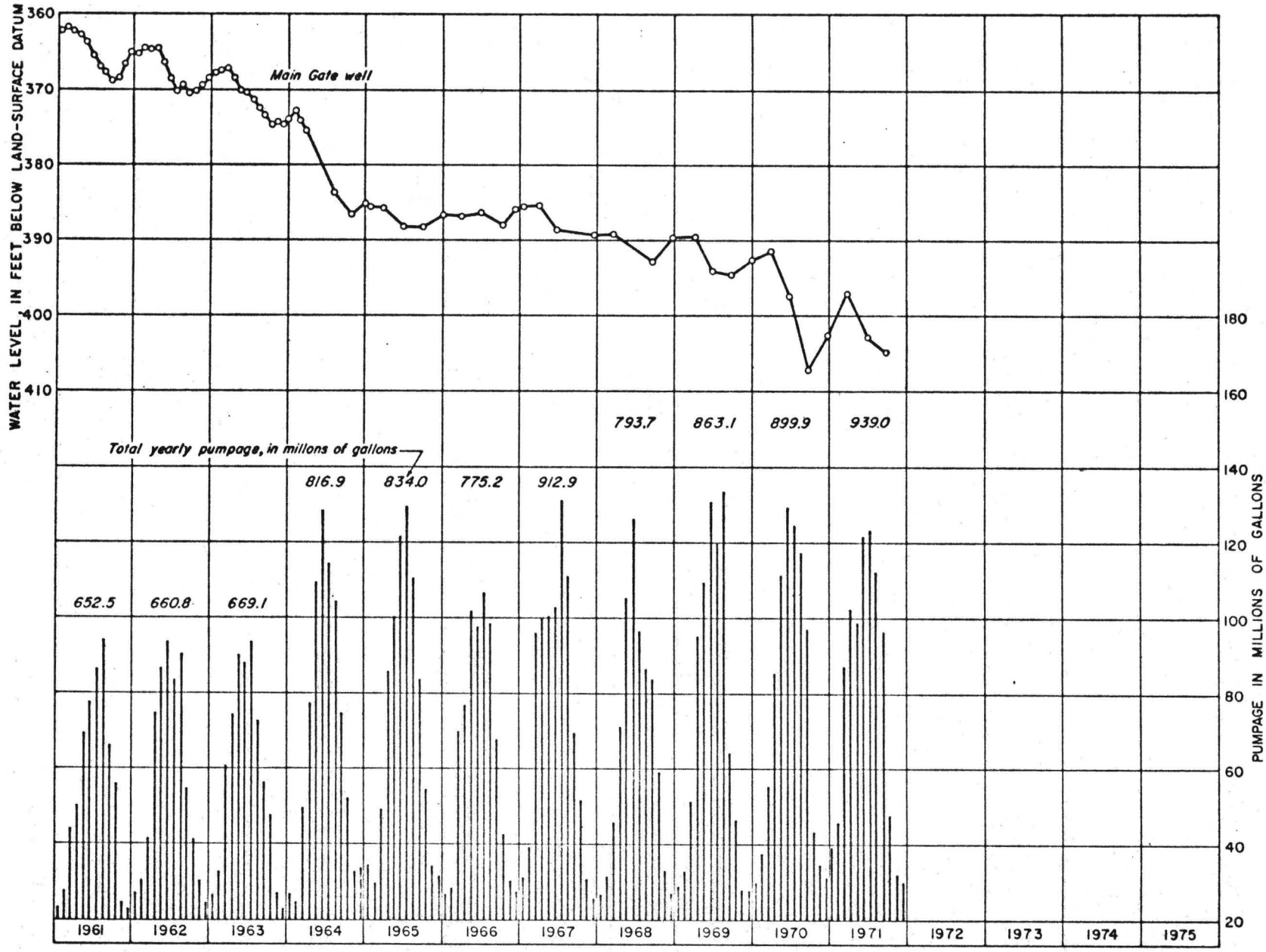

Figure 2.--Monthly and yearly pumpage in the Post Headquarters well field, and water-level fluctuation in the Main Gate well, 1961-71.

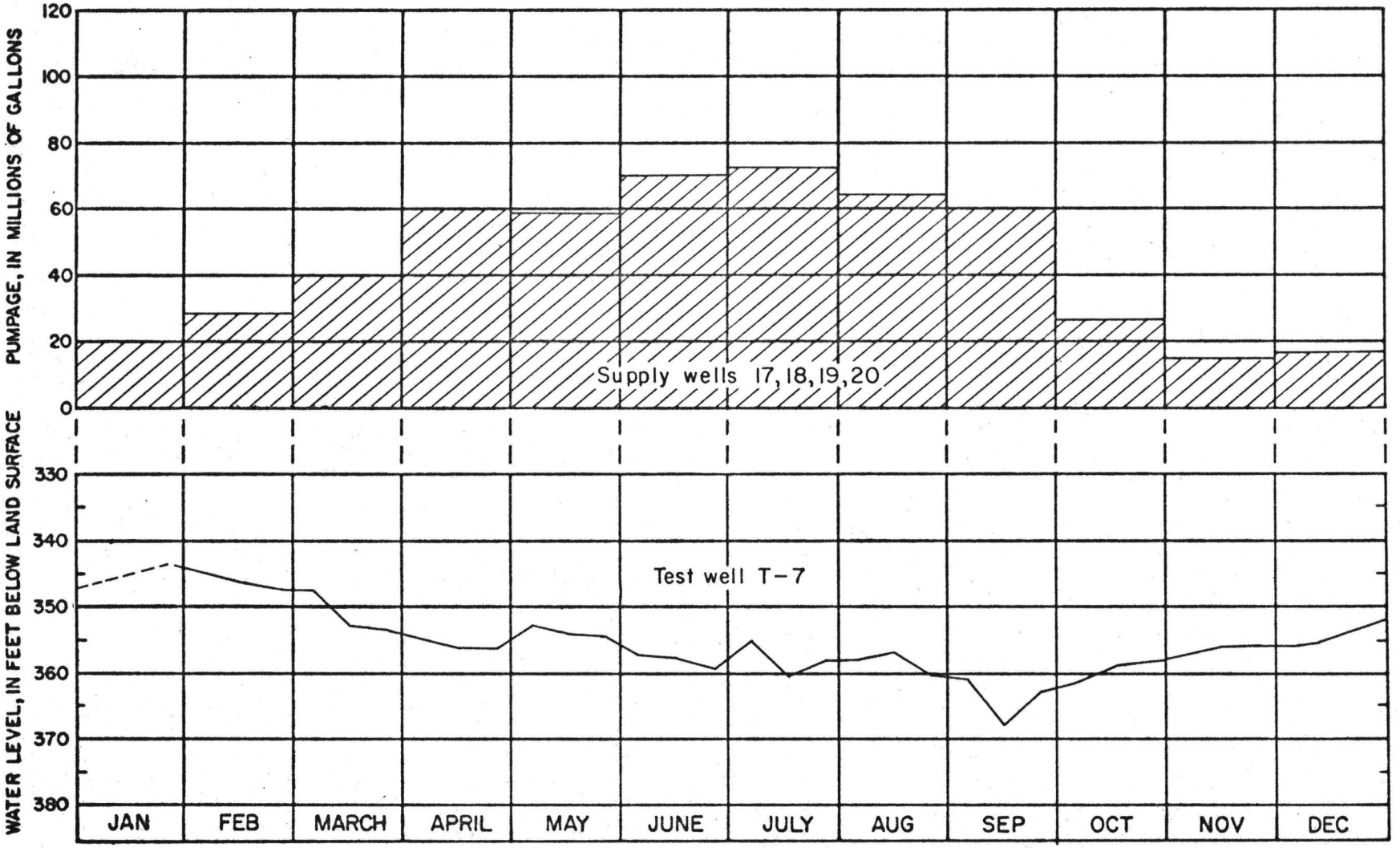

Figure 3.--Combined monthly pumpage of supply wells 17, 18, 19, and 20, and water-level fluctuation in test well T-7, 1971.

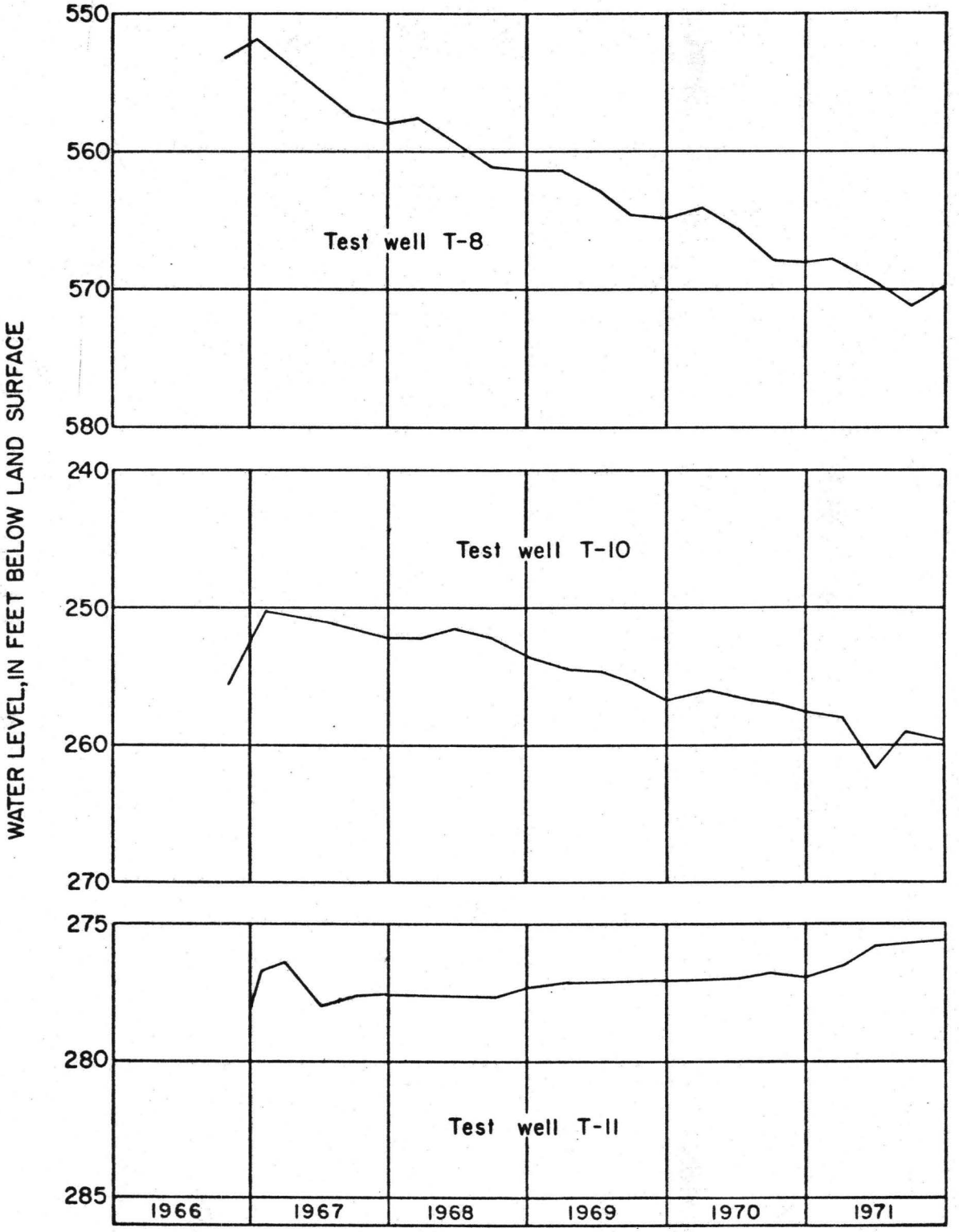

Figure 4.--Water-level fluctuations in test wells T-8, T-10, and T-11 for period of available record.

Water-level measurements in supply wells

Annual depth-to-water measurements are made in nine supply wells in the Post Headquarters well field (fig. 5), two supply wells in the MAR area (fig. 6), one supply well in the SMR area (fig. 6), and two supply wells at Stallion Range Center (fig. 7). The measurements usually are made during January and the change in ground-water storage that has occurred as the result of pumping the supply wells is reflected in table 1 as net change in the depth to water in the wells.

The depths to water and net changes listed in the table are based on measurements made during January 1971 and January 1972 or as otherwise footnoted in the table.

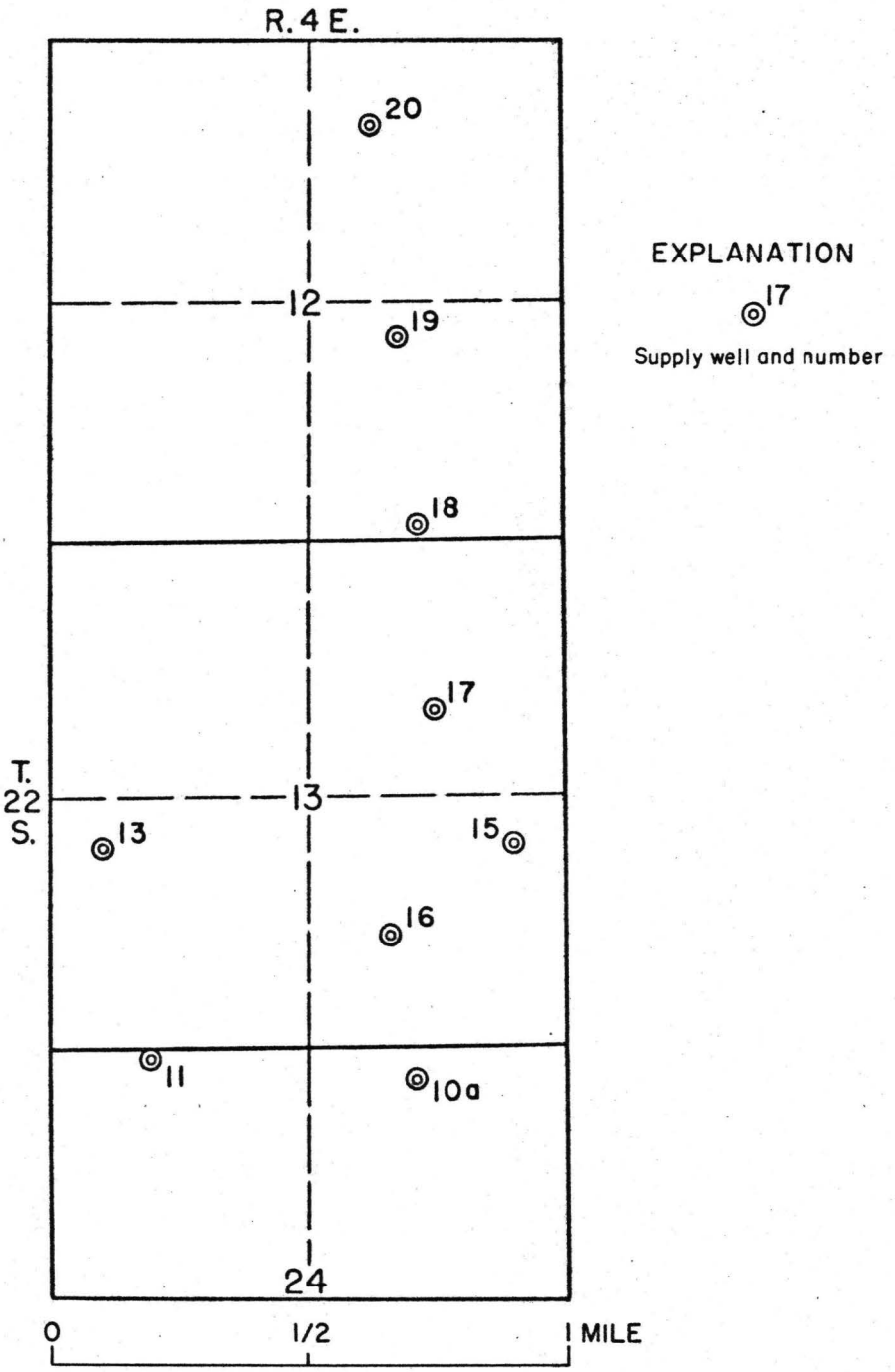

Figure 5.--Location of supply wells,

Post Headquarters well field.

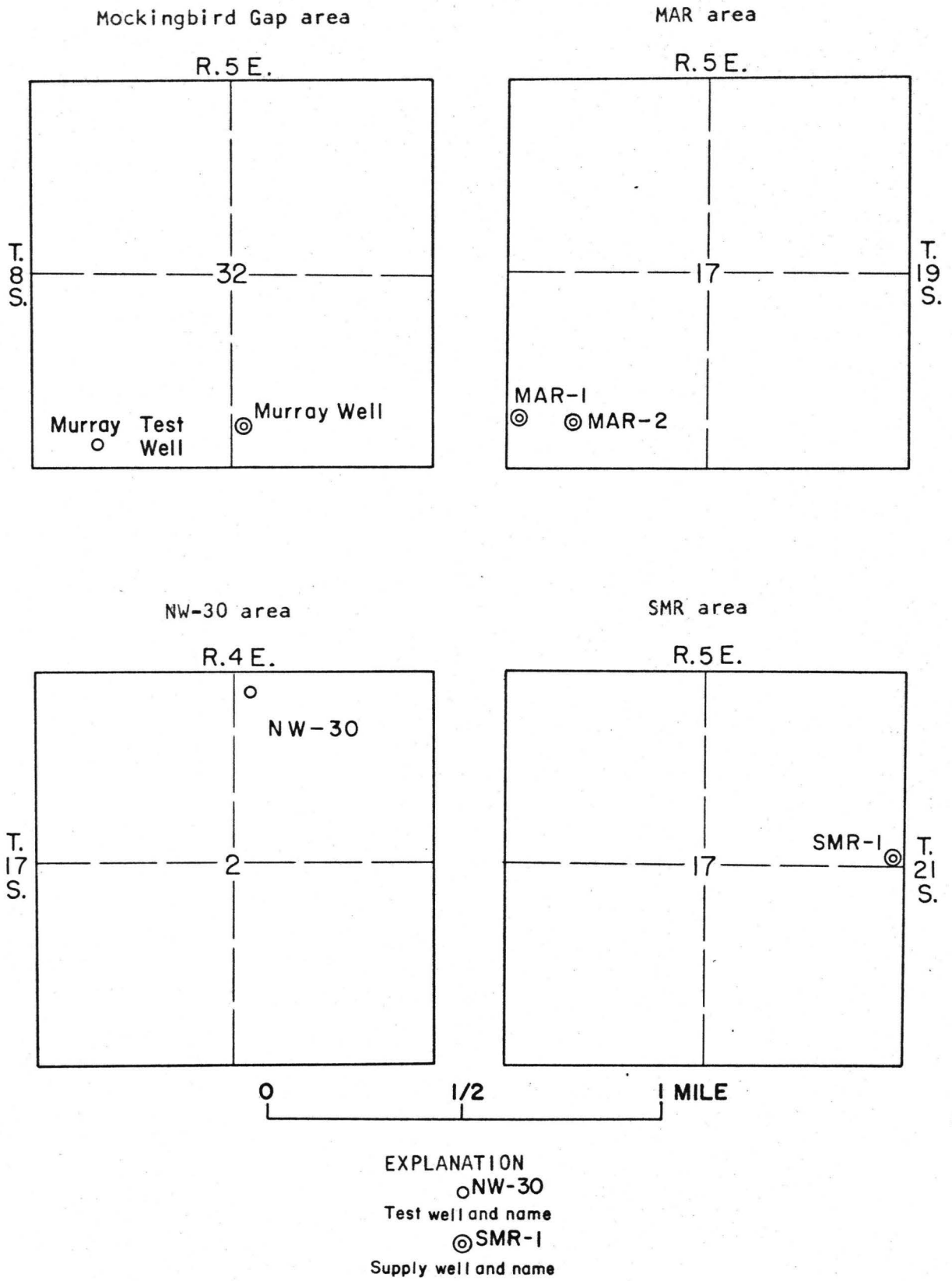

Figure 6.--Location of test wells and supply wells in Mockingbird Gap, MAR, NW-30, and SMR areas.

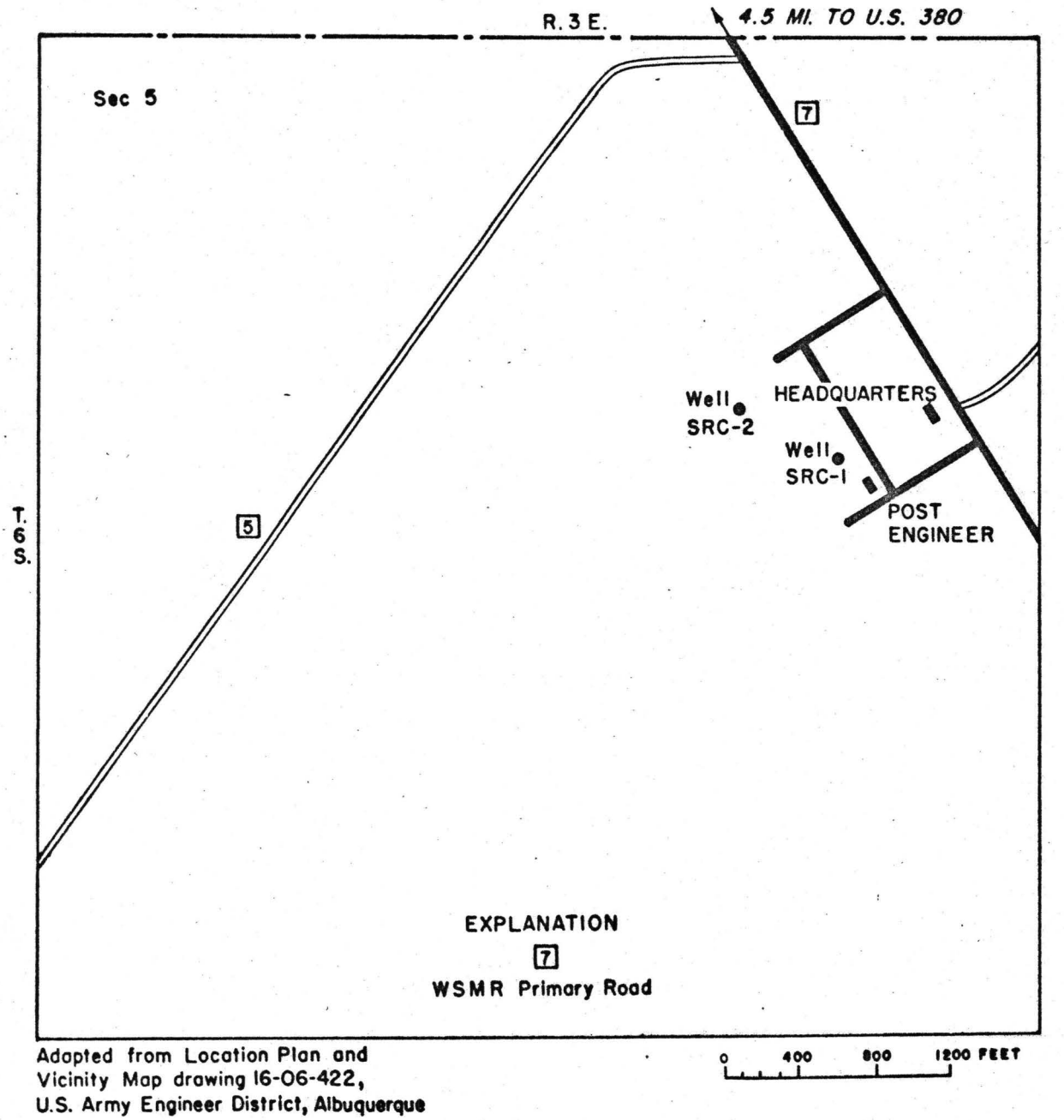

Figure 7.--Location of supply wells, Stallion Range Center.

Table 1.--Depth to water in supply wells, and change of water level from January 1971 to January 1972

Well no.	Depth to water, in feet January 1971	Depth to water, in feet January 1972	Change in water level [a]
10a	416.28	420.70	- 3.42
11	341.54	*291.0	+50.54
13	321.91	*312.0	+ 9.91
15	*420.0	*421.0	- 1.0
16	*430.0	*433.0	- 3.0
17	424.77	431.85	- 7.58
18	411.26	417.52	- 6.26
19	434.60	441.05	- 6.45
20	495.14	501.73	- 4.59
MAR-1	214.16	[c] 217.70	- 2.54
MAR-2	219.96	[c] *220.0	- .04
SMR-1	[b] 291.95	[c] *298.0	- 6.05
SRC-1	[c] 205.51	210.00	- 4.49
SRC-2	[c] 213.07	217.25	- 4.18

a/ Water-level rise (+) or decline (-), in feet.
b/ September
c/ February
* Air-line gage reading

Water-level measurements in test and observation wells

Quarterly measurements were made in 18 wells at Post Headquarters and adjacent areas, 1 well in HTA area, 3 wells in the SMR area, 2 wells in the MAR area (fig. 8), 1 well in the NW-30 area, and 1 well in the Mockingbird Gap area (fig. 6). Depth-to-water measurements made at quarterly intervals during 1971 in the Post Headquarters area are given in table 2. Four of the test wells in the Post Headquarters area were equipped with continuous recording gages. Hydrographs prepared from measurements and recording gages on the Main Gate well and test well T-7 are shown on figures 2 and 3, respectively. The change in water level in test and observation wells in 1971 is shown in table 2.

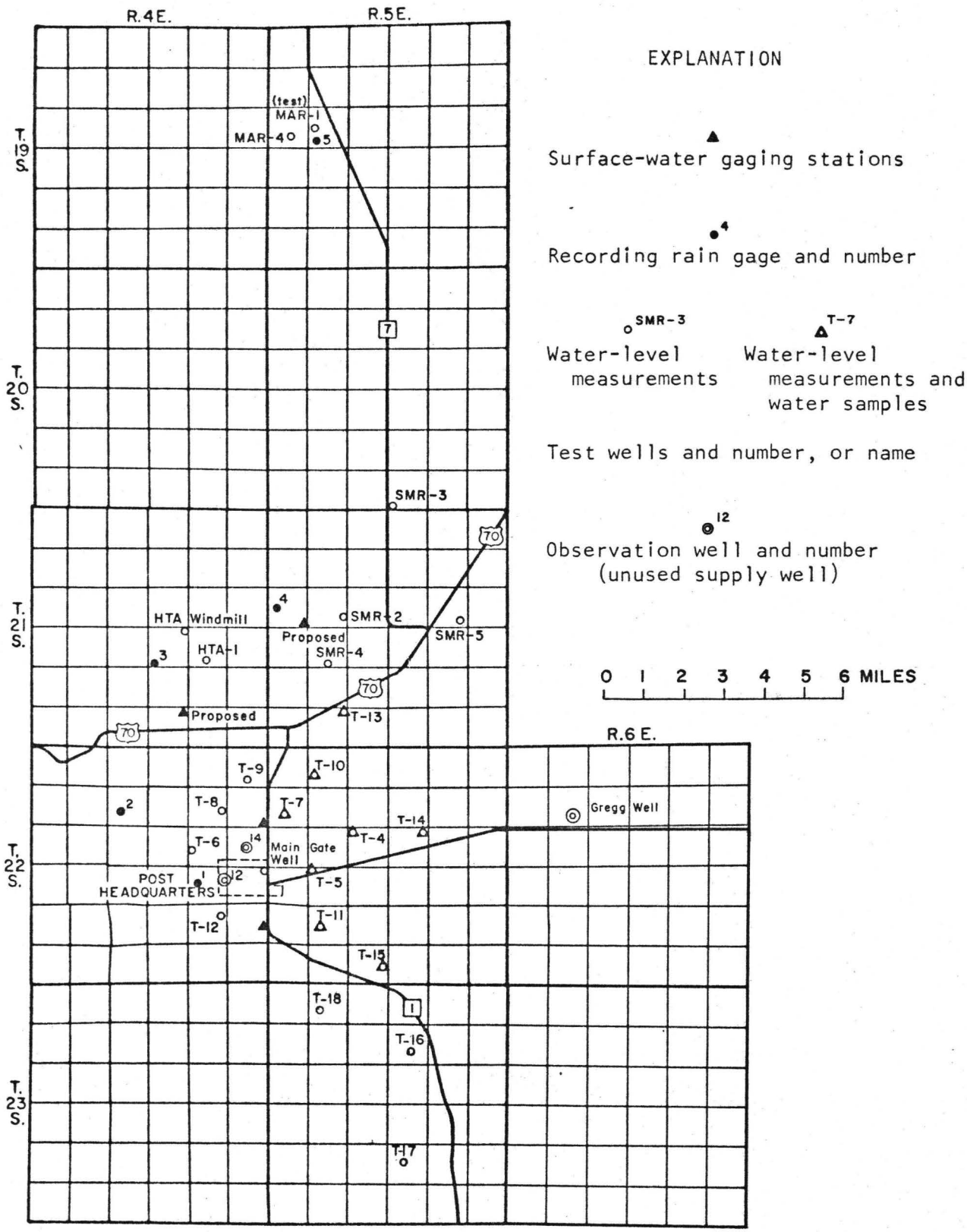

Figure 8.--Location of gaging stations, recording rain gages, test wells, and observation wells at Post Headquarters and adjacent areas.

Table 2.--Depth to water in test and observation wells, and change of water level in 1971

Well no.	Date of measurement	Depth to water, in feet below land surface	Change in water level[a/]	Remarks
T-4	March 4, 1971	225.07	- 0.10	
	June 23, 1971	225.11	- .08	
	Sept. 9, 1971	225.19	- .15	
	Jan. 7, 1972	225.26	- .29	
T-5	March 4, 1971	273.46	- .01	
	June 23, 1971	273.76	- .21	
	Sept. 9, 1971	273.91	- .38	
	Jan. 7, 1972	273.94	- .40	
T-6	March 4, 1971	207.80	- .83	
	June 23, 1971	208.18	- .47	
	Sept.10, 1971	208.33	- .36	
	Jan. 27, 1972	208.55	+ .53	
T-7	March 4, 1971	347.24	- 2.84	
	June 23, 1971	362.12	+ 6.25	Equipped with recorder
	Sept. 9, 1971	366.87	- 1.80	
	Jan. 7, 1972	348.84	- 3.02	
T-8	March 4, 1971	567.89	- 3.68	
	June 22, 1971	569.67	- 3.68	Equipped with recorder
	Sept. 9, 1971	571.38	- 3.22	
	Jan. 7, 1972	569.31	- 1.09	

a/Water-level rise(+) or decline(-), in feet.

Table 2.--Depth to water in test and observation wells, and change of water level in 1971 - Continued

Well no.	Date of measurement	Depth to water, in feet below land surface	Change in water level[a/]	Remarks
T-9	March 4, 1971	386.90	- 1.58	
	June 23, 1971	387.80	- 1.95	
	Sept. 9, 1971	388.26	- 2.01	
	Jan. 27, 1972	388.92	- 2.15	
T-10	March 4, 1971	257.92	- 1.78	Equipped with recorder
	June 23, 1971	261.65	- 4.98	
	Sept. 9, 1971	259.08	- 1.91	
	Jan. 7, 1972	259.64	- 1.89	
T-11	March 4, 1971	276.52	+ .44	Equipped with recorder
	June 23, 1971	276.58	+ .40	
	Sept. 9, 1971	276.37	+ .39	
	Jan. 7, 1972	276.23	+ .67	
T-13	March 4, 1971	208.85	- .12	
	June 23, 1971	209.00	- .12	
	Sept. 9, 1971	209.49	- .61	
	Jan. 7, 1972	209.07	- .29	
T-14	March 4, 1971	131.61	- .05	Windmill installed in spring of 1971
	June 23, 1971	131.69	- .09	
	Sept. 9, 1971	131.66	- .10	
	Jan. 7, 1972	131.74	- .19	

Table 2.--Depth to water in test and observation wells, and change of water level in 1971 - Continued

Well no.	Date of measurement	Depth to water, in feet below land surface	Change in water level[a/]	Remarks
T-15	March 3, 1971	179.01	+ .19	
	June 23, 1971	179.04	+1.16	
	Sept. 9, 1971	179.03	+ .19	
	Jan. 7, 1972	179.05	- .02	
T-16	March 4, 1971	186.63	+ .12	
	June 23, 1971	186.70	- .10	
	Sept. 9, 1971	186.57	+4.48	
	Feb. 3, 1972	186.33	+6.11	
T-17	March 4, 1971	242.12	- .32	
	June 23, 1971	242.23	- .08	
	Sept. 9, 1971	242.11	+2.72	
	Jan. 27, 1972	242.05	+ .18	
T-18	March 4, 1971	245.59	+ .94	
	June 23, 1971	245.58	+ .79	
	Sept. 9, 1971	246.45	- .61	
	Feb. 15, 1972	245.08	+4.94	
Old supply well 12	March 4, 1971	260.58	+3.13	
	June 23, 1971	260.69	+3.05	
	Sept. 9, 1971	260.36	+ .85	
	Jan. 27, 1972	258.45	+2.85	

Table 2.--Depth to water in test and observation wells, and change of water level in 1971 - Continued

Well no.	Date of measurement	Depth to water, in feet below land surface	Change in water level[a/]	Remarks
Old supply well 14	March 4, 1971	388.72	+11.00	
	June 23, 1971	394.20	+13.72	
	Sept. 9, 1971	396.20	- .72	
	Jan. 1972	--	--	Well found destroyed
Main Gate	March 4, 1971	397.77	- 6.32	Equipped with recorder.
	June 23, 1971	403.17	- 5.43	
	Sept. 9, 1971	405.43	+ 1.61	
	Jan. 27, 1972	--	--	Recorder malfunction. No record.
Gregg well	March 4, 1971	214.23	--	
	June 23, 1971	225.96	--	
	Sept. 9, 1971	214.18	--	
	Feb. 9, 1972	214.15	+ .40	
HTA Windmill	March 4, 1971	46.30	--	
	Sept. 9, 1971	41.34	--	
	Feb. 3, 1972	47.18	--	
SMR-2	March 4, 1971	310.22	- 1.00	
	June 22, 1971	310.85	- .80	
	Sept. 9, 1971	310.73	- .54	
	Feb. 15, 1972	311.17	- .60	

Table 2.--Depth to water in test and observation wells, and change of water level in 1971 - Concluded

Well no.	Date of measurement	Depth to water, in feet below land surface	Change in water level [a]	Remarks
SMR-3	March 4, 1971	297.10	+0.58	
	June 22, 1971	296.67	+1.73	
	Sept. 8, 1971	297.18	--	
	Feb. 15, 1972	297.30	--	
SMR-4	March 4, 1971	277.25	-1.03	
	June 22, 1971	277.62	-1.03	
	Sept. 8, 1971	277.79	- .74	
	Feb. 3, 1972	278.42	-1.23	
MAR-1 (Test)	March 22, 1971	221.04	+ .61	
	June 22, 1971	221.00	+ .25	
	Sept. 8, 1971	220.93	+ .16	
	Feb. 15, 1972	221.07	- .05	
MAR-4	March 22, 1971	303.99	+ .14	
	June 22, 1971	303.91	+ .08	
	Sept. 8, 1971	303.97	+ .13	
	Feb. 15, 1972	304.03	- .07	
NW 30	March 22, 1971	211.30	- .25	
	June 22, 1971	211.25	- .12	
	Sept. 8, 1971	211.89	- .59	
	Feb. 15, 1972	211.64	- .43	
Murray Test Well	March 22, 1971	176.47	-	Quarterly water-level measurements began 1971.
	June 22, 1971	176.33	-	
	Sept. 8, 1971	176.41	-	
	Feb. 2, 1972	176.42	- .02	

Chemical quality

Eight test wells (T-4, T-5, T-7, T-10, T-11, T-13, T-14, and T-15) were sampled in June 1971 and in January 1972 to monitor any changes in the chemical quality of ground water that may occur in the area east of the Post Headquarters well field. In addition, eight supply wells (10a, 11, 13, 15, 16, 17, 19, and 20) in the Post Headquarters (fig. 5) well field were sampled in June 1971. The chemical analyses of the test wells and supply wells sampled are given in tables 3 and 4, respectively.

Table 3.--Chemical analyses of water from test wells,

Post Headquarters area, 1971-72

U.S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

Analyses by Geological Survey, United States Department of the Interior

9-268 q (milligrams per liter)

Test well	T-4	T-4	T-5	T-5	T-7	T-7
Laboratory No.	711565	720107	711566	720610	711567	720612
Date of collection	6-17-71	1-7-72	6-17-71	1-7-72	6-17-71	1-7-72
Depth sampled (feet)	300	300	324	330	815	800
Silica (SiO_2)	23	24	38	37	30	32
Iron (Fe)	.10	.01	.01	.02	.02	0
Manganese (Mn)	-	-	-	-	-	-
Calcium (Ca)	21	23	35	35	42	27
Magnesium (Mg)	3.9	4.1	6.7	6.8	4.2	3.5
Sodium (Na)	35	25	30	29	78	36
Potassium (K)	2.5	2.7	1.9	2.5	2.9	2.2
Bicarbonate (HCO_3)	83	86	122	111	129	119
Carbonate (CO_3)	0	0	0	0	0	0
Sulfate (SO_4)	43	44	60	64	130	46
Chloride (Cl)	32	13	20	19	38	12
Fluoride (F)	0.0	0.4	0.0	0.4	0.1	0.6
Nitrate (NO_3)	0.74	1.1	3.0	2.9	2.4	1.3
Nitrite (NO_2)						
Boron (B)	.04	.03	.02	.02	.05	.03
Dissolved solids						
Calculated	205	183	265	261	399	224
Residue on evaporation at 180°C	-	-	-	-	-	-
Hardness as $CaCO_3$	68	74	110	120	120	82
Noncarbonate hardness as $CaCO_3$	0	4	15	24	16	0
Alkalinity as $CaCO_3$	68	71	100	91	106	98
Specific conductance (micromhos at 25°C)	260	276	398	370	602	327
pH	7.7	8.0	7.9	8.0	7.8	8.1
Color	-	-	-	-	-	-
SAR	1.8	1.3	1.2	1.2	3.1	1.7
Temperature (°C)	26	21.5	26.0	24.5	29.0	23.5

Table 3.--Chemical analyses of water from test wells,

Post Headquarters area, 1971-72 - Concluded

U.S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

Analyses by Geological Survey, United States Department of the Interior

9-268 q (milligrams per liter)

Test well	T-14	T-14	T-15	T-15		
Laboratory No.	711571	720660	711572	720608		
Date of collection	6-17-71	2-20-72	6-17-71	1-7-72		
Depth sampled (feet)	295	*	425	400		
Silica (SiO_2)	2.3	53	5.0	5.1		
Iron (Fe)	.03	.04	.01	0		
Manganese (Mn)	-	-	-	-		
Calcium (Ca)	7.9	51	50	46		
Magnesium (Mg)	1.3	6.3	0.5	0.2		
Sodium (Na)	610	56	120	120		
Potassium (K)	6.3	4.8	5.6	6.4		
Hydroxide (OH)	-	-	6	-		
Bicarbonate (HCO_3)	54	137	0	3		
Carbonate (CO_3)	34	0	22	11		
Sulfate (SO_4)	420	110	150	130		
Chloride (Cl)	600	41	180	170		
Fluoride (F)	0.3	0.4	0.5	0.9		
Nitrate (NO_3) / Nitrite (NO_2)	0.01	1.1	0.01	0.02		
Boron (B)	.14	.05	.08	.06		
Dissolved solids						
Calculated	1,710	395	526	491		
Residue on evaporation at 180°C	-	-	-	-		
Hardness as $CaCO_3$	25	150	130	120		
Noncarbonate hardness as $CaCO_3$	0	41	100	95		
Alkalinity as $CaCO_3$	101	112	24	21		
Specific conductance (micromhos at 25°C)	2,880	564	908	909		
pH	9.6	7.6	9.5	9.6		
Color	-	-	-	-		
SAR	53	2.0	4.6	4.9		
Temperature (°C)	25.0	21.5	25.0	23.0		

* Sample collected from pumping windmill on test well T-14.

Table 4.--Chemical analyses of water from supply wells,

Post Headquarters area, 1971

U.S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

Analyses by Geological Survey, United States Department of the Interior

9-268 q (milligrams per liter)

Supply well	10a	11	13	15	16	
Laboratory No.	711555	711556	711557	711558	711559	
Date of collection	6-16-71	6-17-71	6-16-71	6-16-71	6-16-71	
Pump. time before sampling	6 hrs	15 min	15 min	20 min	20 min	
Pumping rate (gpm)	825	525	290	475	725	
Silica (SiO_2)	45	50	43	43	44	
Iron (Fe)	.01	.01	.01	.02	.01	
Manganese (Mn)	-	-	-	-	-	
Calcium (Ca)	32	40	63	40	35	
Magnesium (Mg)	6.9	10	15	7.7	7.7	
Sodium (Na)	24	23	27	26	24	
Potassium (K)	1.7	2.2	2.6	2.0	1.8	
Bicarbonate (HCO_3)	133	125	148	141	137	
Carbonate (CO_3)	0	0	0	0	0	
Sulfate (SO_4)	48	61	100	46	44	
Chloride (Cl)	8.0	14	19	9.9	9.2	
Fluoride (F)	0.5	0.5	0.6	0.5	0.5	
Nitrate (NO_3) / Nitrite (NO_2)	1.1	4.7	12	1.5	1.4	
Boron (B)	.02	.02	.06	.01	.03	
Dissolved solids						
Calculated	236	283	396	251	240	
Residue on evaporation at 180°C	-	-	-	-	-	
Hardness as $CaCO_3$	110	140	220	130	120	
Noncarbonate hardness as $CaCO_3$	0	39	98	16	7	
Alkalinity as $CaCO_3$	109	103	121	116	112	
Specific conductance (micromhos at 25°C)	317	373	540	334	329	
pH	7.8	7.7	7.7	7.8	7.8	
Color	-	-	-	-	-	
SAR	1.0	0.8	0.8	1.0	1.0	
Temperature (°C)	26.5	24.5	23.5	26.5	25.5	

Table 4.--Chemical analyses of water from supply wells,

Post Headquarters area, 1971 - Concluded

U.S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

Analyses by Geological Survey, United States Department of the Interior

9-268 q (milligrams per liter)

Supply well	17	19	20			
Laboratory No.	711560	711561	711562			
Date of collection	6-16-71	6-16-71	6-16-71			
Pump. time before sampling	-	-	-			
Pumping rate (gpm)	750	1,125	1,150			
Silica (SiO_2)	33	42	45			
Iron (Fe)	.01	.01	.01			
Manganese (Mn)	-	-	-			
Calcium (Ca)	33	39	52			
Magnesium (Mg)	5.0	7.9	11			
Sodium (Na)	41	26	29			
Potassium (K)	1.8	1.9	2.0			
Bicarbonate (HCO_3)	133	161	166			
Carbonate (CO_3)	0	0	0			
Sulfate (SO_4)	64	49	86			
Chloride (Cl)	18	11	19			
Fluoride (F)	0.6	0.1	0.1			
Nitrate (NO_3) / Nitrite (NO_2)	1.9	1.2	1.9			
Boron (B)	.04	.02	.02			
Dissolved solids						
Calculated	270	262	334			
Residue on evaporation at 180°C	-	-	-			
Hardness as $CaCO_3$	100	130	180			
Noncarbonate hardness as $CaCO_3$	0	0	39			
Alkalinity as $CaCO_3$	109	132	136			
Specific conductance (micromhos at 25°C)	378	358	478			
pH	7.9	7.8	7.7			
Color	-	-	-			
SAR	1.8	1.0	1.0			
Temperature (°C)	28.0	26.0	25.5			

Precipitation

Measurements of precipitation were made in 19 nonrecording and 5 recording rain gages in the Post Headquarters and MAR areas (fig. 8) during 1971. Locations of nonrecording gages are not shown because these gages are subject to relocation owing to construction activities on the missile range, or for the purpose of obtaining more complete coverage. Monthly measurements and yearly totals of precipitation recorded by these gages are listed in table 5.

Nonrecording rain gages 5, 10, 19, and 21 were relocated in February 1971 and monitoring of these 4 gages resumed in March 1971.

Table 5.--Precipitation record, 1971, White Sands Missile Range

No.	Location	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	Remarks
	Non-recording gages														
17	T. 21 S., R. 4 E. SE¼NE¼SE¼ Sec. 10	0	0.01	0	0.09	0	0	0.89	0.45	0.84	1.45	1.25	0.44	5.42	
19	SW¼NW¼SW¼ Sec. 12	*	*	0	0	0	0	.72	.73	.50	1.15	1.18	.21	4.49 a/	
18	NE¼NW¼SE¼ Sec. 14	0	.03	0	.09	0	0	3.06	.86	1.00	1.43	1.17	.42	8.06	
15	SW¼SW¼NE¼ Sec. 21	0	.03	0	-	0	0	2.47	1.10	.90	2.20	1.45	.28	8.43 a/	
16	NE¼NE¼NE¼ Sec. 22	0	0.	0	.03	0	0	3.12	.94	.64	1.03	.84	1.10	7.70	
14	NE¼NE¼SE¼ Sec. 25	0	.05	0	0	0	0	2.13	1.15	.48	.97	1.05	.34	6.17	
13	NE¼NE¼SW¼ Sec. 27	0	.05	0	-	0	0	3.43	.84	.75	1.45	1.10	.94	8.56 a/	
12	NE¼NW¼SW¼ Sec. 32	0	.03	0	.10	0	0	3.30	.63	.81	1.70	1.00	1.02	8.59	
10	SE¼SE¼SW¼ Sec. 32	*	*	0	.15	0.01	0	3.87	.23	.93	1.30	1.20	1.10	8.79 a/	
9	NE¼NE¼SW¼ Sec. 33	0	0	0	.20	0	0	3.83	.44	.82	1.40	1.19	.70	8.58	
21	T. 21 S., R. 5 E. SE¼SE¼NE¼ Sec. 17	*	*	0	.05	.01	0	.60	.13	.26	.90	1.15	.15	3.25 a/	
8	T. 22 S., R. 4 E. SE¼NW¼NW¼ Sec. 2	0	.02	0	.20	0	0	3.83	.44	.82	1.40	1.19	.70	8.60	
7	NE¼NE¼NW¼ Sec. 10	0	.08	0	.07	0	0	2.73	.27	.40	1.10	1.03	.52	6.20	
6	NW¼NW¼SW¼ Sec. 11	0	.08	0	.05	0	0	2.47	.07	.30	.94	1.31	.36	5.58	
1	SE¼SE¼SE¼ Sec. 11	0	.05	0	.04	0	0	2.35	.17	.28	1.02	1.15	.35	5.41	Paved area
5	SW¼NW¼SW¼ Sec. 17	*	*	0	0	0	0	2.95	0	.10	.75	1.30	.80	5.90 a/	
4	NE¼NE¼NE¼ Sec. 22	0	.05	0	.10	0	0	3.32	0	.36	1.43	1.50	.57	7.33	
3	T. 22 S., R. 5 E. NE¼SW¼SW¼ Sec. 25	0	.20	0	.08	.05	0	2.30	0	.30	1.22	1.15	.48	5.78	
2	T. 23 S., R. 5 E. NW¼NW¼SW¼ Sec. 5	0	.12	0	.05	.03	-	2.73	.03	.08	.90	.03	.12	4.09 a/	
* - a/	Rain gages relocated March 1971. Rain gages inaccessible or destroyed. Partial record.														
	Recording gages														
5	T. 19 S., R. 5 E. SW¼SW¼SW¼ Sec. 17	0.30	0	0	0.14	0.08	0	0.86	1.30	0.85	0.82	0.52	0.28	4.87	MAR area
3	T. 21 S., R. 4 E. NE¼NE¼SE¼ Sec. 22	.27	0.01	0	.34	0	0	3.31	1.89	1.28	1.80	1.16	.42	10.48	
4	T. 21 S., R. 5 E. SE¼SE¼NW¼ Sec. 18	.25	.27	0	.10	0	0	-	.71	.44	.80	.66	.13	3.36 a/	
2	T. 22 S., R. 4 E. NE¼NE¼SW¼ Sec. 9	.48	.01	0	.33	0	0	3.30	.59	1.13	.45	.21	1.83	8.33	
1	SE¼NW¼NW¼ Sec. 23	.43	.07	0	.25	0	0.08	3.73	.55	.51	1.66	1.26	1.92	10.46	

Surface-water runoff

Measurements of runoff made at the two gaging stations in the Post Headquarters area during 1971 are given below:

Location	USGS Station no.	Discharge events (Date)	(cfs-days)
One mile north of Main Gate on WSMR Primary Route No. 1	08486250	6-30	2.5
		7-1	1.4
		7-2	11.6
		7-3	1.0
		7-25	9.7
	Total discharge cfs-days . . .		26.2
	Total acre-feet		52.0
One and a half miles south of Main Gate on WSMR Primary Route No. 1	08486260	7-2	10.8
	Total discharge cfs-days . . .		10.8
	Total acre-feet		21.0

Summary

Ground-water pumpage totaled 939,018,000 gallons at the Post Headquarters well field in 1971. This was 39,149,000 gallons more than was pumped in 1970. Wells MAR-1 and 2 produced 787,200 gallons, 2,774,800 gallons less than in 1970. Well SMR-1 produced 1,623,000 gallons, 287,000 gallons more than in 1970. Wells SRC-1 and 2 produced 14,511,000 gallons in 1971, 3,781,000 less than in 1970. Total pumpage at White Sands Missle Range in 1971, including 151,100 gallons produced by well HTA-1, was 956,090,300 gallons.

Water-level declines occurred in seven of the nine supply wells in the Post Headquarters well field during the period January 1971 to January 1972. The declines ranged from 1.00 foot in well 15 to 7.58 feet in well 17. Supply well 11 was not in use for about 2 months during the latter part of 1971. An air-line gage reading made in January 1972 showed a 50.54-foot rise in water level from January 1971. Supply well 13 showed a 9.91-foot rise from January 1971 to January 1972, from an air-line gage reading made in January 1972.

Declines of water levels were observed in MAR and SMR production wells. The water level in MAR-1 was 2.54 feet lower in February 1972 than in January 1971; the level in MAR-2 was .04 foot lower. The water level in SMR-1 was 6.05 feet lower in February 1972 than in September 1970.

Depth-to-water measurements made in test wells in the Post Headquarters and adjacent areas (fig. 8) indicated that water levels in most wells were lower in January and February 1972 than in December 1970 or January 1971. Declines ranged from .02 foot in test well T-15 to 3.02 feet in test well T-7. Water-level rises occurred in test wells T-6, T-11, T-16, T-18, Old supply well 12, and Gregg well. Rises ranged from .40 foot in Gregg well to 6.11 feet in test well T-16. Wells showing the largest water-level rises are located (fig. 8) several miles southeast of the Post Headquarters well field.

The chemical quality of water samples collected during 1971 was similar to that of samples collected from the same sources in 1970. The specific conductance of water samples collected from test wells in June 1970 and June 1971 is compared in the following table.

Test well	Specific conductance 1970	1971
T-4	247	260
T-5	370	398
T-7	527	602
T-10	343	326
T-11	317	316
T-13	499	490
T-14	2,730 1/	2,880 1/
T-15	921 1/	909 1/

1/ Sample collected in December.

Recorded precipitation in the Post Headquarters area in 1971 varied from a low of 5.41 inches to a high of 8.60 inches, as compared with a low of 4.22 inches, and a high of 7.29 inches in 1970 (totals shown are for gages with a recorded reading for every month of the year).

Surface-water runoff amounts of 52.0 acre-feet and 10.8 acre-feet were recorded in 1971 at the gage 1 mile north of the Main Gate, and 1.5 miles south of the Main Gate, respectively. During 1970 the runoff at the north gate was 14 acre-feet; 61 acre-feet were recorded at the south gage.