ANNUAL WATER-RESOURCES REVIEW, WHITE SANDS MISSILE RANGE, NEW MEXICO, 1982

BY R. R. CRUZ

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CONTENTS

ILLUSTRATIONS

ILLUSTRATIONS

TABLES

CONVERSION FACTORS

In this report, values for measurements are given in inch-pound units only. The following table contains factors for converting to International System (SI) units.

Multiply inch-pound units	By	To obtain SI units
foot	0.3048	meter
mile	1.609	kilometer
gallon	0.003785	cubic meter
acre-foot	1,233	cubic meter

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ABSTRACT

Ground-water data were collected in 1982 at White Sands Missile Range in south-central New Mexico. Depth-to-water measurements in the Post Headquarters supply wells continued to show seasonal declines. Test wells east of the Headquarters well field continued to show long-term declines as well as seasonal fluctuations. The total amount of water pumped from White Sands Missile Range supply wells was 66,226,600 gallons more in 1982 than in 1981. There was a greater difference in specific-conductance between winter and summer water samples from the Post Headquarters supply wells in 1982 than there has been in the past.

INTRODUCTION

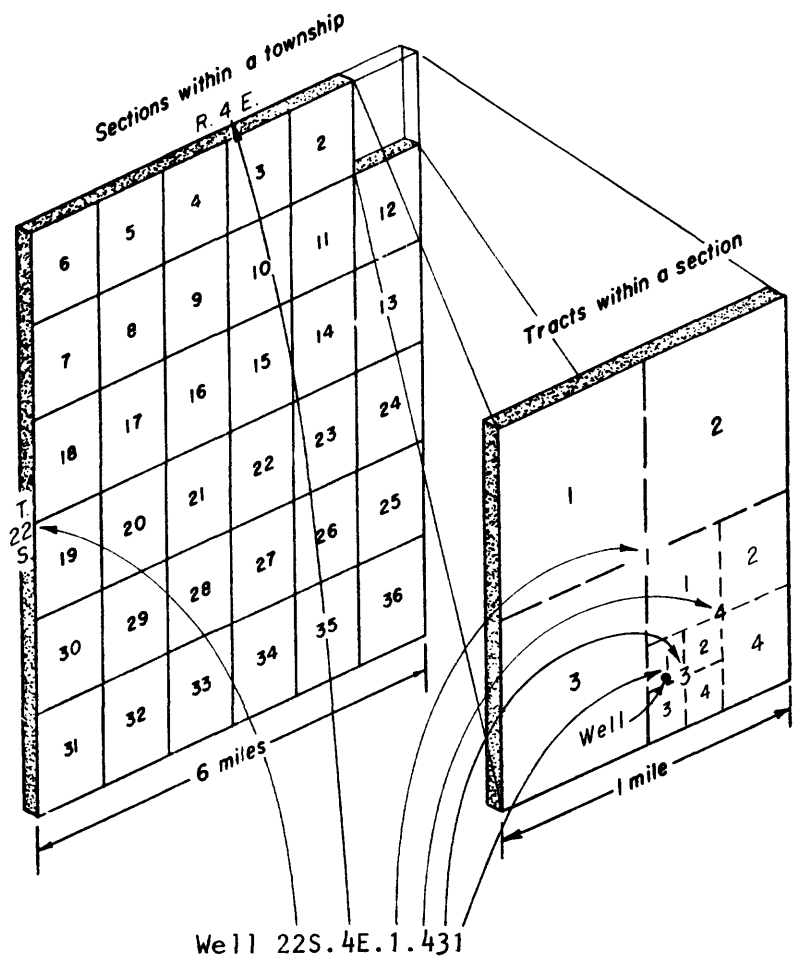
This report presents water-resources information that was collected at White Sands Missile Range during 1982 by personnel of the U.S. Geological Survey. Ground-water pumpage, water-level measurements, and chemical-quality data summarized in this report were obtained as a result of the continuing water-resources hydrologic-data-collection program sponsored by the Facilities Engineering Directorate, White Sands Missile Range.

The 1968 report and subsequent annual reports are open-file reports and are available for inspection at the District Office of the U.S. Geological Survey, Water Resources Division, in Albuquerque, New Mexico.

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. 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 NW¼ of the SW¼ of the SE¼, section 1, Township 22 South, Range 4 East.



DATA-COLLECTION PROGRAM

The program to collect hydrologic data at White Sands Missile Range (fig. 1) has been continuous since 1953. The original program consisted of water-level observations in five test wells in the Post Headquarters area. Over the years, the program has expanded to include water-level observation points and chemical-quality sampling points in seven Range areas (Gregg, Hazardous Test, Small Missile Range, Multifunction Array Radar, NW-30 Tracking Station, Mockingbird Gap, and Stallion Range Center) and more extensive coverage in and around the Post Headquarters (figs. 2, 3, 4).

In 1982, six test wells were drilled in the Post Headquarters area (fig. 2). Drillers' logs or lithologic logs are available for all of the test wells. Borehole-geophysical logs were run in five of the test wells drilled in 1982 (table 1). Four of the test wells will be developed and used for water-level measurements and chemical-quality sampling.

Semiannual water-level measurements were made in 17 supply wells, 27 test and observation wells, and 38 boreholes (tables 2, 3, and 4) in 1982. Water samples were collected for laboratory specific-conductance measurements from 30 wells in 1982 (table 5). In addition, six water samples from five wells were collected in 1982 for analysis of major chemical constituents (table 6).

Ground-water Pumpage

Total ground-water pumpage* at White Sands Missile Range in 1982, according to records provided by the Facilities Engineering Directorate, was 732,171,600 gallons. The Post Headquarters well field produced 706,652,800 gallons; Stallion Range Center wells (SRC-1 and -2) produced 7,894,000 gallons; and Hazardous Test Area (HTA-1), Small Missile Range (SMR-1), and Multifunction Array Radar wells (MAR-1 and -2) produced 17,624,800 gallons in 1982. Total pumpage at White Sands Missile Range was 66,226,600 gallons more in 1982 than in 1981. Pumpage by month and total gallons pumped per year in the Post Headquarters well field for 1968-82 and a hydrograph for Main Gate well for 1968-78 are shown in figure 5. The Main Gate well is dry at a depth of 414 feet.

* The pumpage figures used in this report are to be considered as preliminary figures and may be subject to revision.

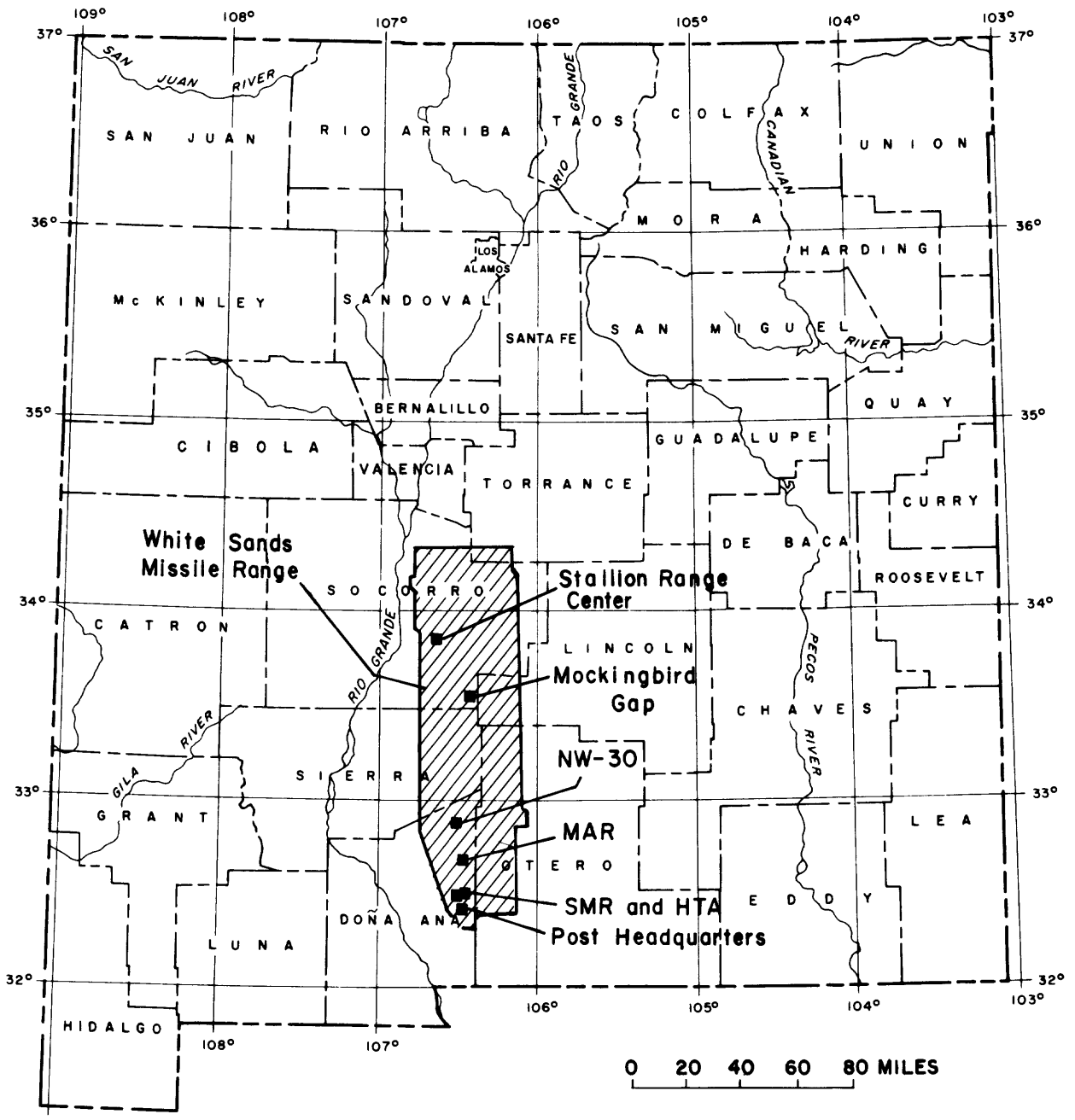


Figure 1. White Sands Missile Range and areas of hydrologic observations.

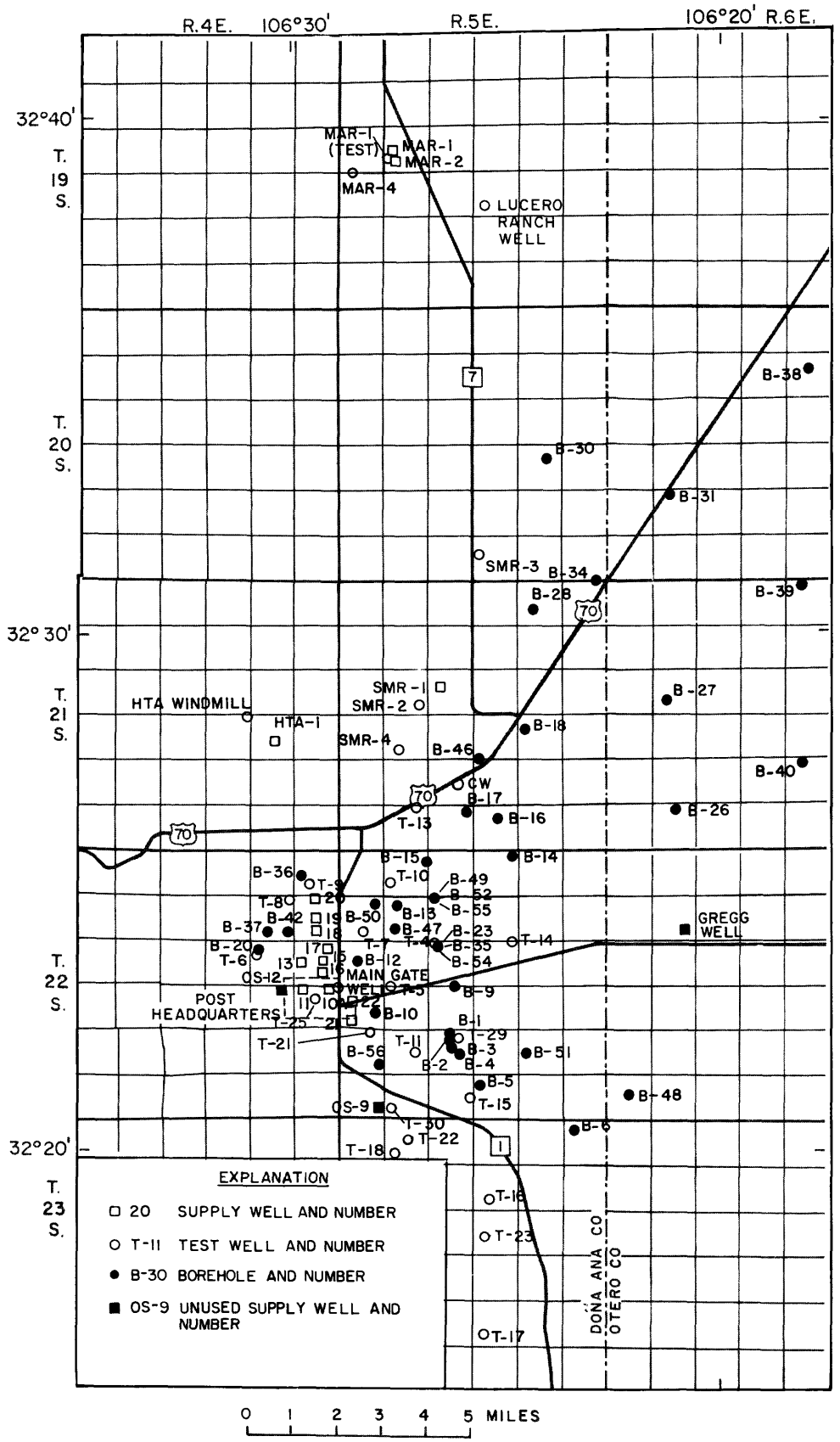


Figure 2 Location of supply wells, test wells, observation wells, and boreholes in the Post Headquarters and adjacent areas.

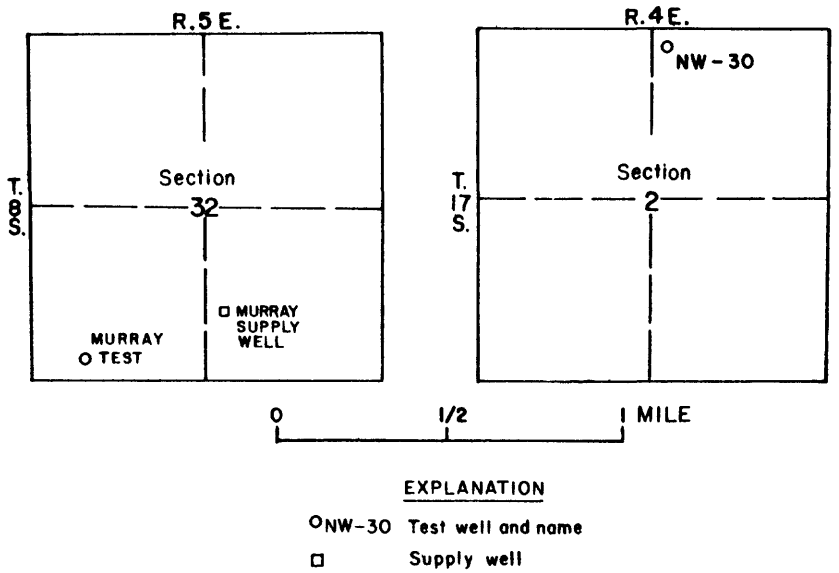


Figure 3. Location of wells in Mockingbird Gap and NW-30 areas.

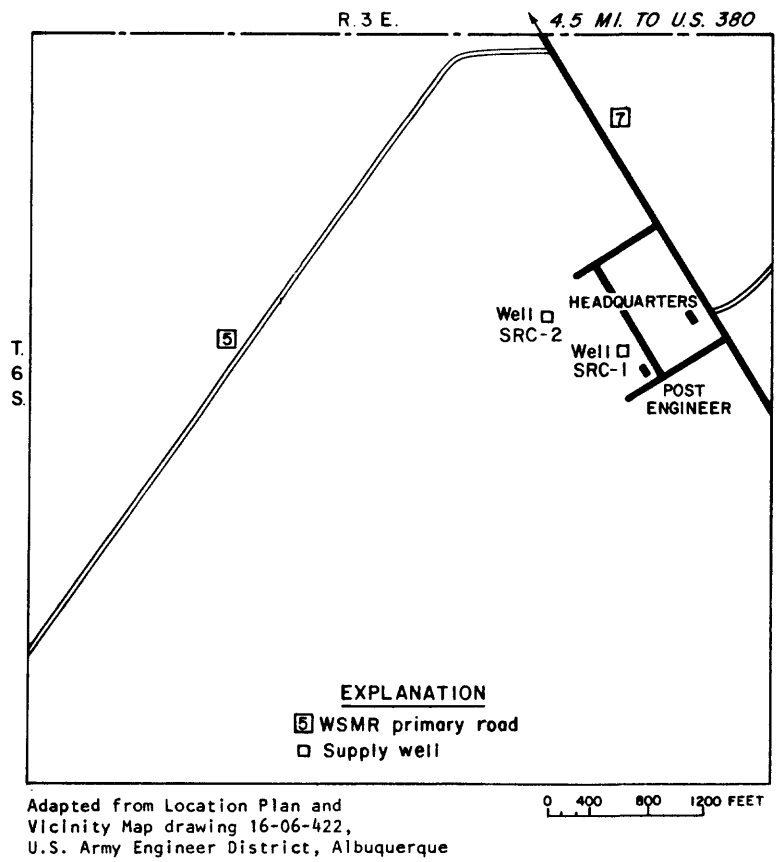


Figure 4. Location of supply wells, Stallion Range Center.

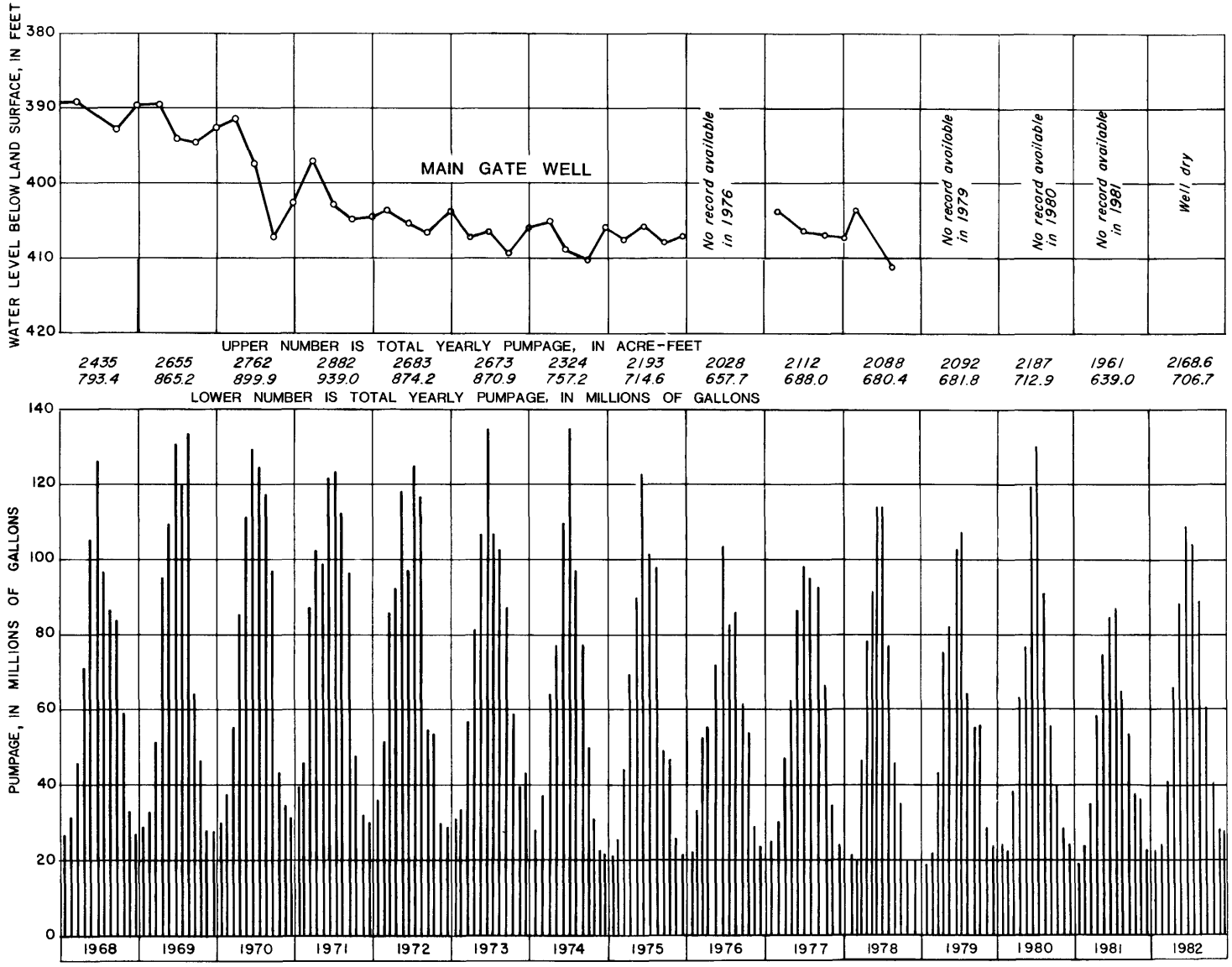


Figure 5. Monthly and yearly pumpage in the Post Headquarters well field, 1968-82, and water-level fluctuations in the Main Gate well.

Water-level Measurements in Supply Wells

Semiannual depth-to-water measurements were made in 11 supply wells in the Post Headquarters area and in 6 supply wells in the Range areas (table 2). Seasonal fluctuations were observed in all of the supply wells in the Post Headquarters well field (figs. 6-8).

The pump was taken out of supply well 15 in April 1982; this well has not been used since June 1980. Supply well 15 was drilled to a depth of 1,010 feet and finished at 820 feet in February 1954. The water level on April 30, 1954, was 337.89 feet. A down-hole camera was lowered into supply well 15 on April 14, 1982. The water level was 430 feet below land surface and the total depth of well was 684. Water was falling through the perforation at a depth of 426 feet. A continuous water-level recorder was installed in supply well 15 in August 1982.

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

Semiannual depth-to-water measurements were made during February 1982 and August 1982 in 27 test and observations wells (table 3) and 38 boreholes (table 4). Four of the test wells (T-7, T-8, T-10, and T-11) in the Post Headquarters area are equipped with continuous water-level recorders; hydrographs of these test wells are shown in figure 9.

Chemical Quality

Thirty-four water samples were collected from supply, test, and observation wells for laboratory analysis of specific conductance (table 5). Specific-conductance values and pH values for selected wells in the Post Headquarters and adjacent areas are shown in figure 10. Six water samples from five wells were collected in 1982 for analysis of major chemical constituents (table 6).

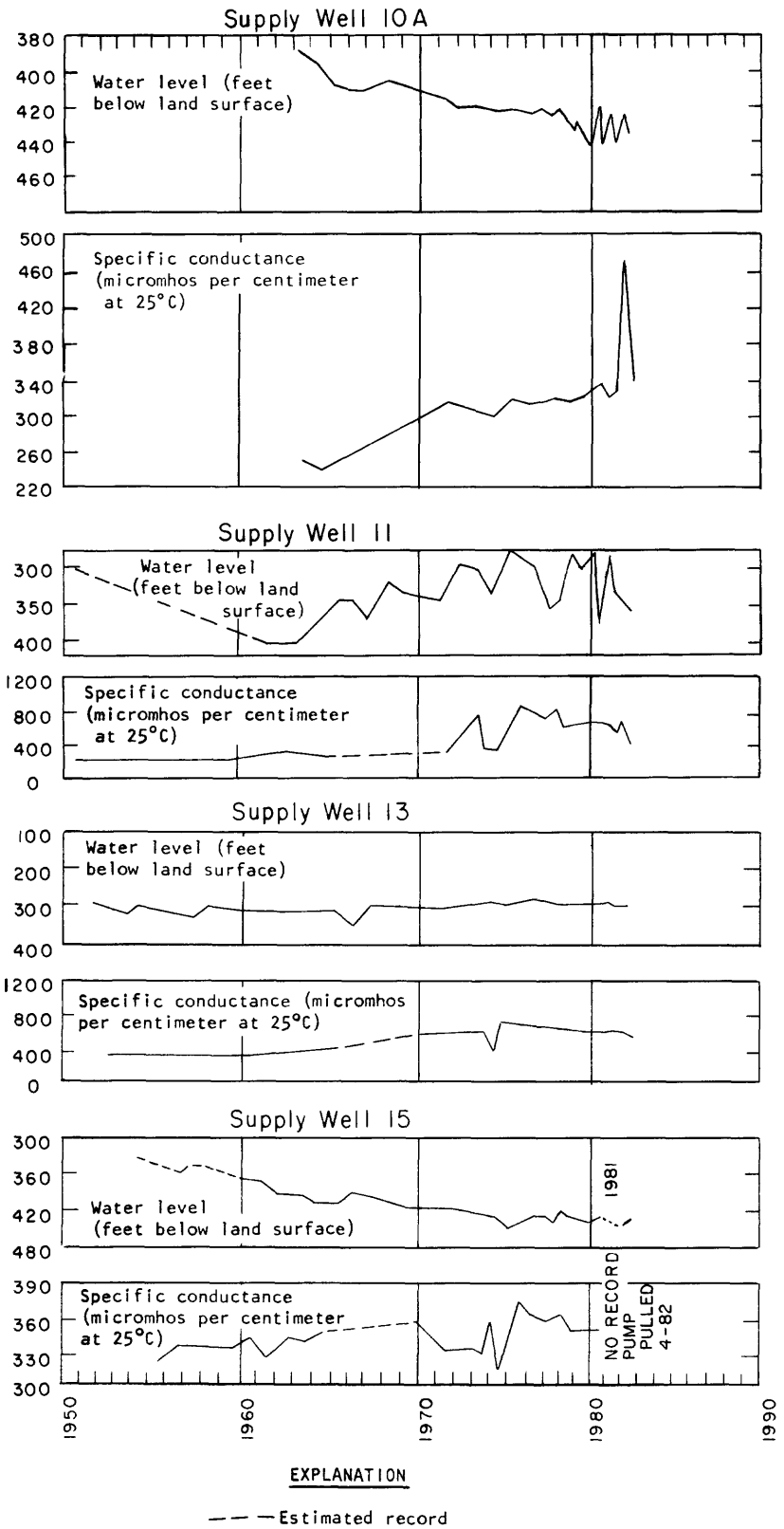


Figure 6. Water levels and specific-conductance values for period of record available in supply wells 10A, 11, 13, and 15.

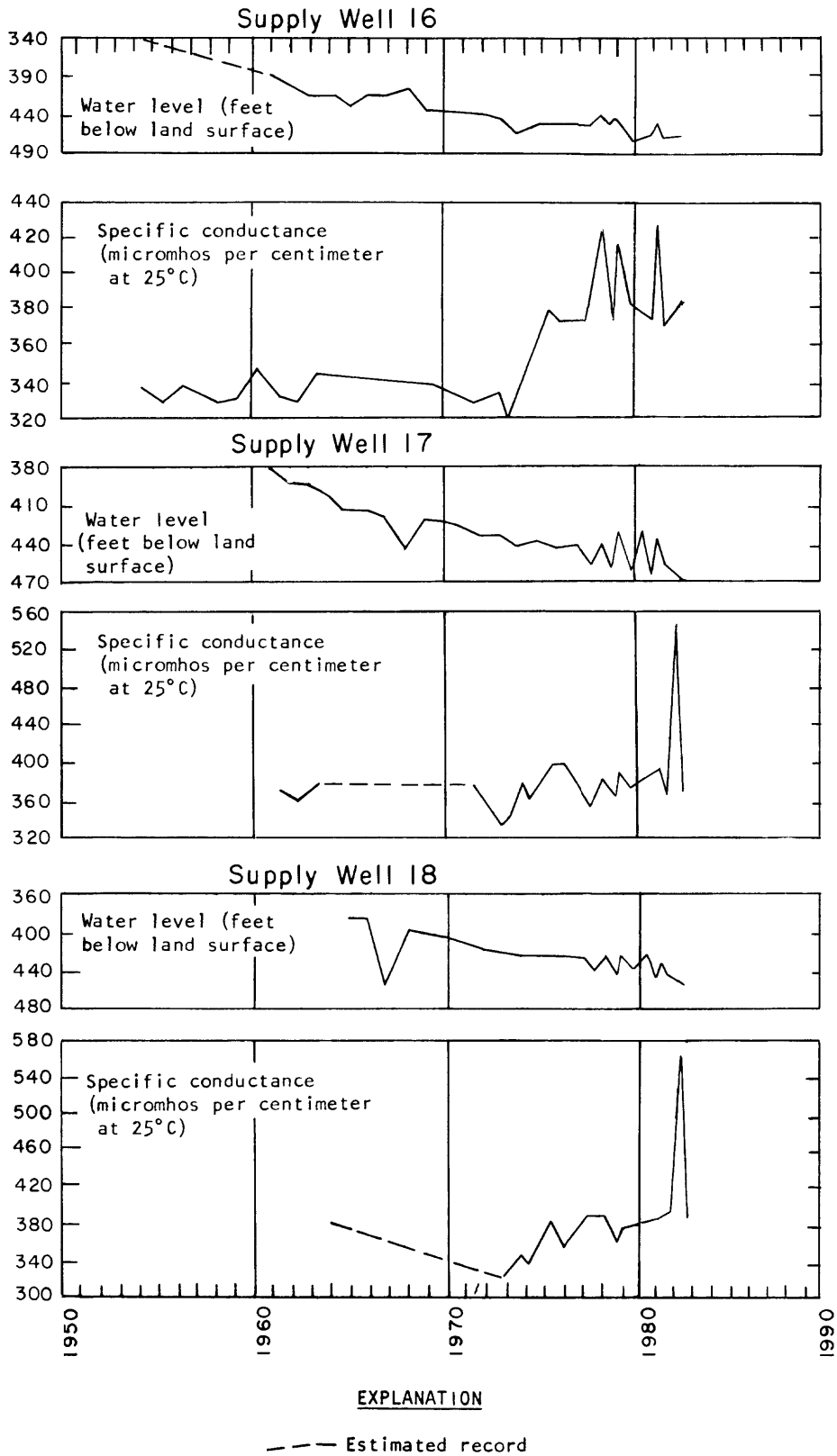


Figure 7. Water levels and specific-conductance values for period of record available in supply wells 16, 17, and 18.

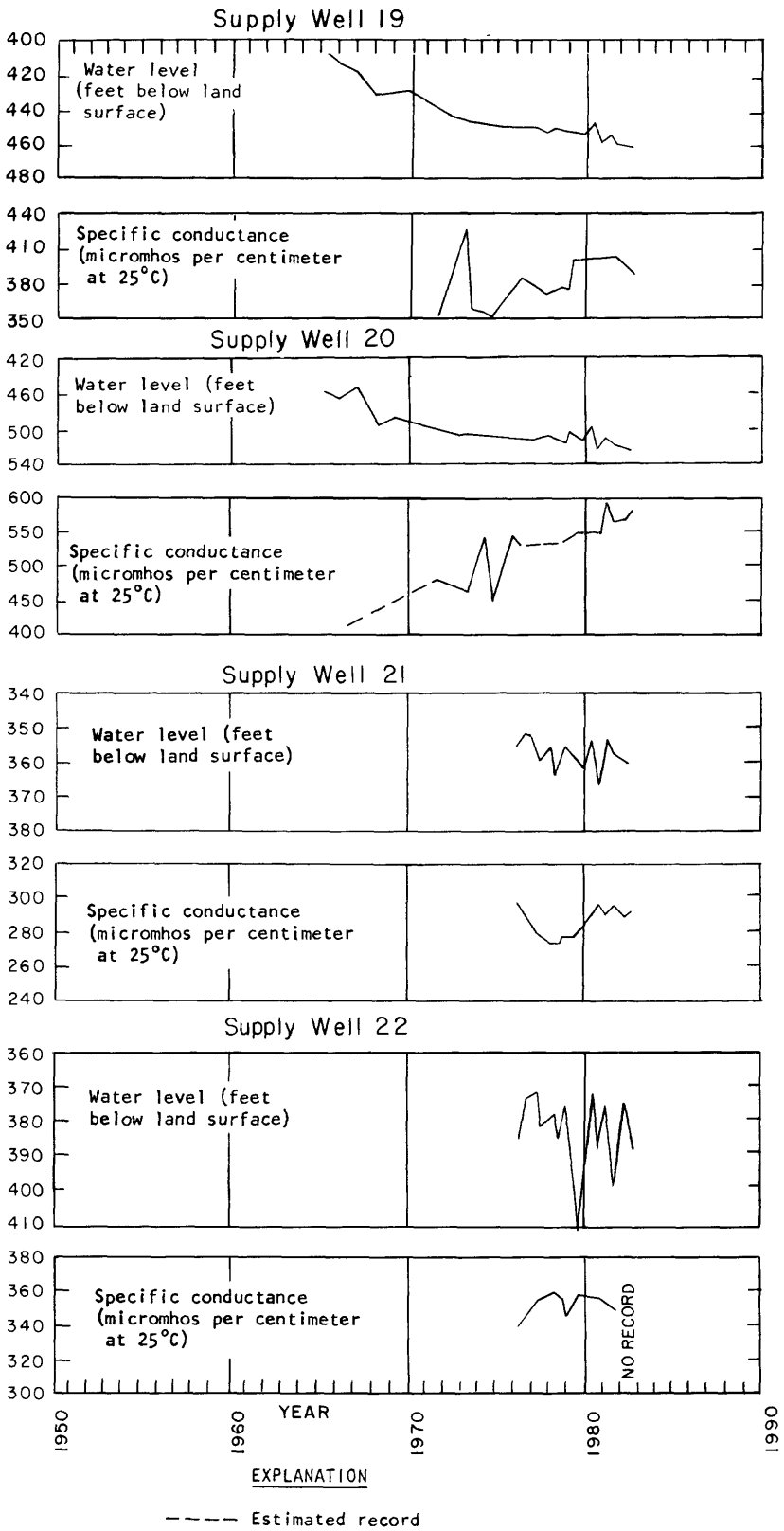


Figure 8. Water levels and specific-conductance values for period of record available in supply wells 19, 20, 21, and 22.

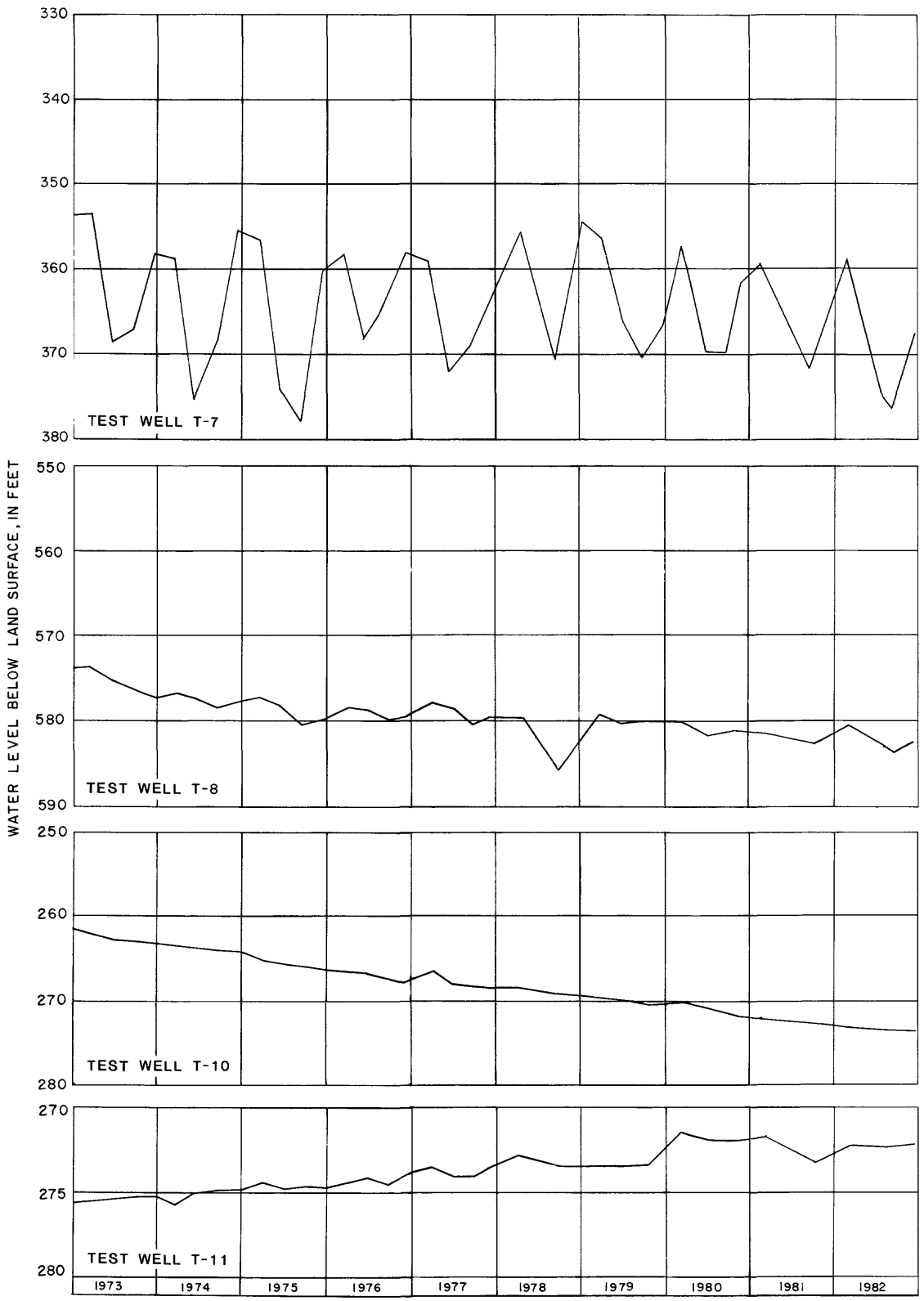


Figure 9. Water-level fluctuations in test wells T-7, T-8, T-10, and T-11 for 1973-82.

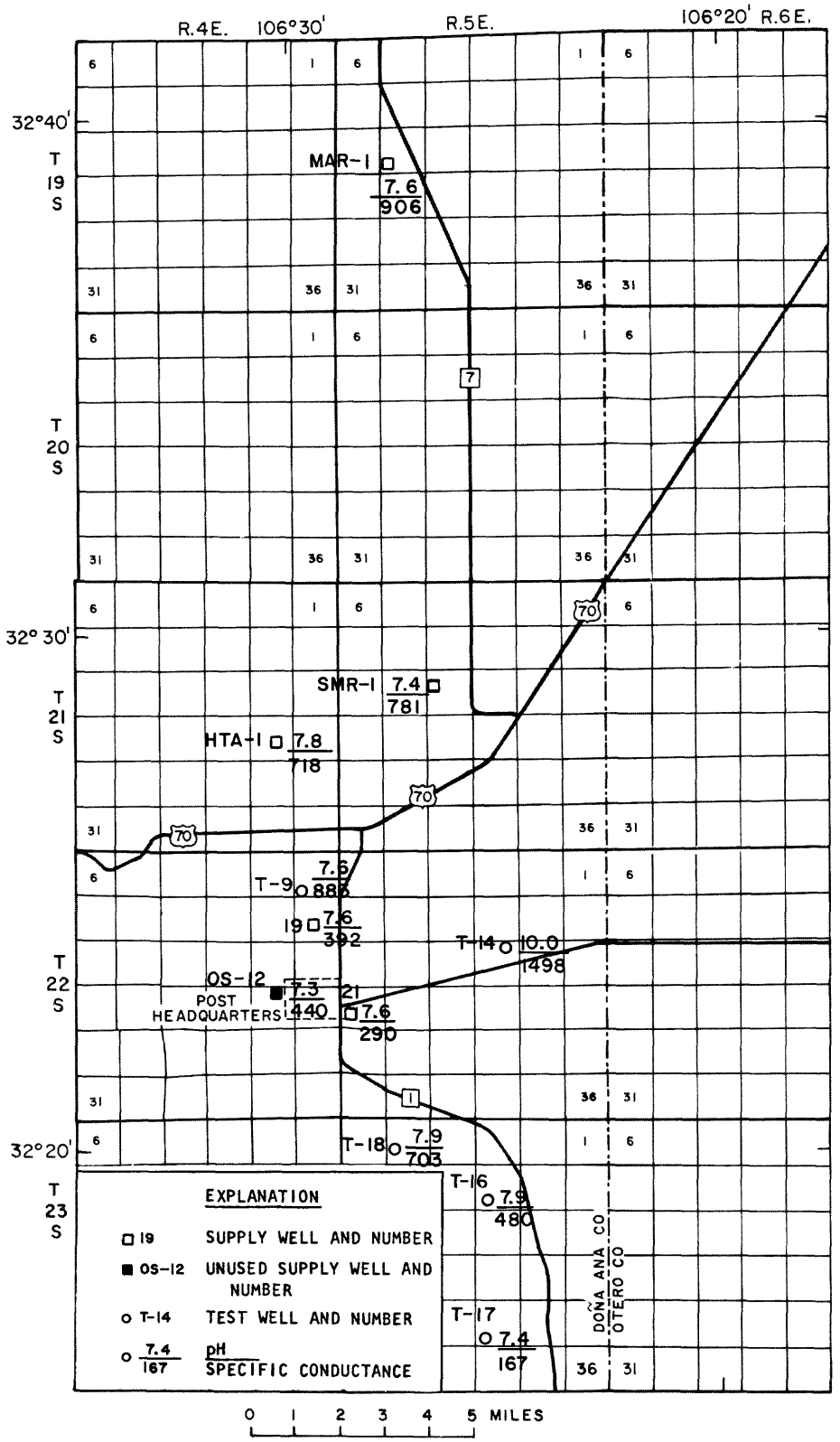


Figure 10. Specific-conductance values and pH values of water from selected wells, Post Headquarters and Range areas, 1982.

MISCELLANEOUS OBSERVATIONS

Water samples were collected in the central and northern part of the Tularosa basin (fig. 11) in July and August 1982 from selected wells and springs. Five of the sampling sites were on or within 1 mile of White Sands Missile Range. Some of the sites had been sampled previously, and these analyses and the 1982 analyses are included in table 7. The 1982 analyses were rather extensive and include age dating of the water by the carbon-14 method. The older water in the area sampled comes from the deeper Permian Yeso Formation, and the younger water is from the Quaternary alluvium.

Vertical electrical soundings (VES) were made at two uprange areas in March 1982. Seven soundings were made in the vicinity of Ash Canyon on the fan slope (fig. 12). Seventeen soundings were made in the Rhodes Canyon area (fig. 13). The data from these soundings are available from the U.S. Geological Survey, Water Resources Division, Las Cruces field office on the New Mexico State University campus.

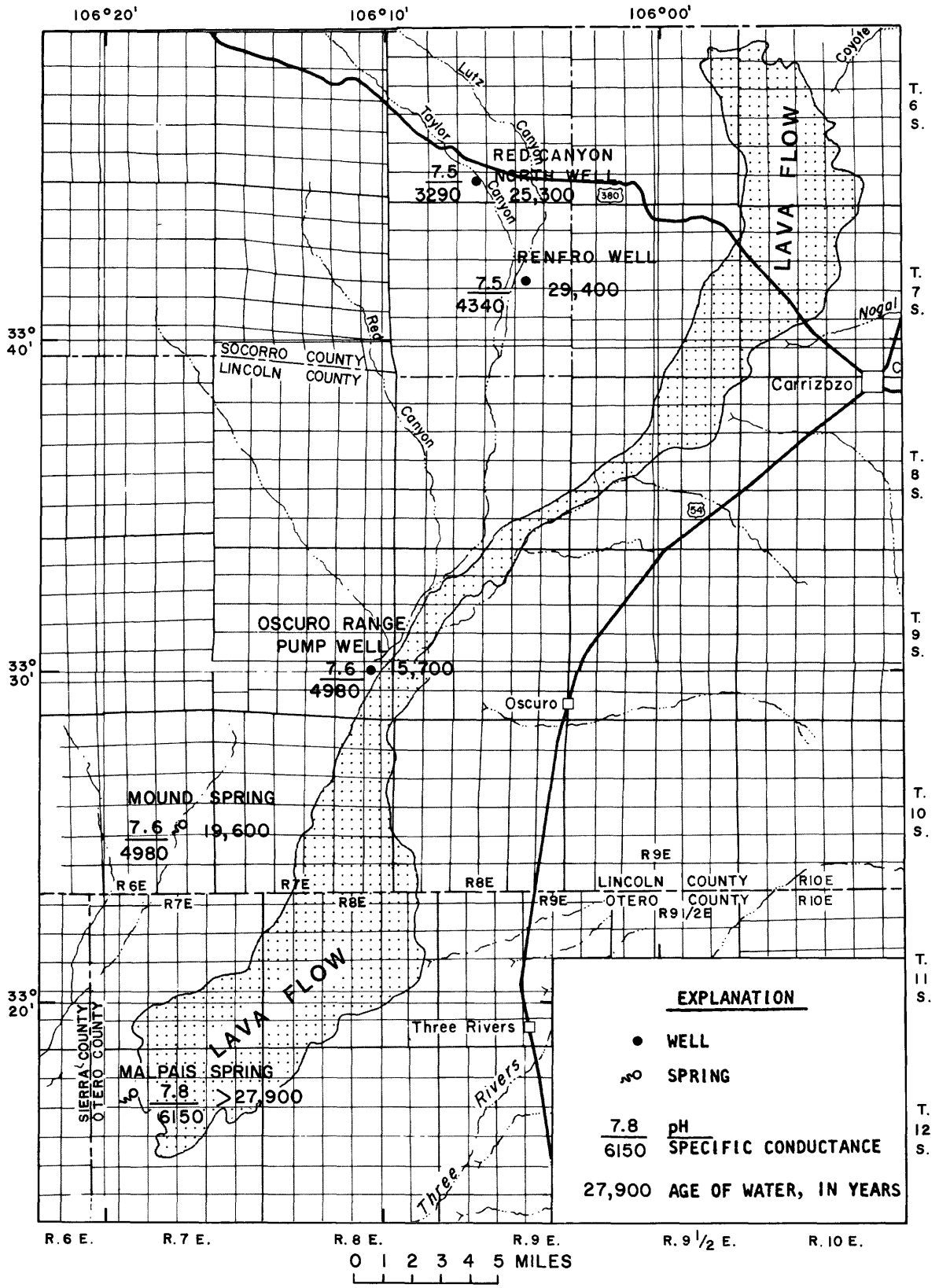


Figure 11. Location of wells and springs sampled in northern White Sands Missile Range.

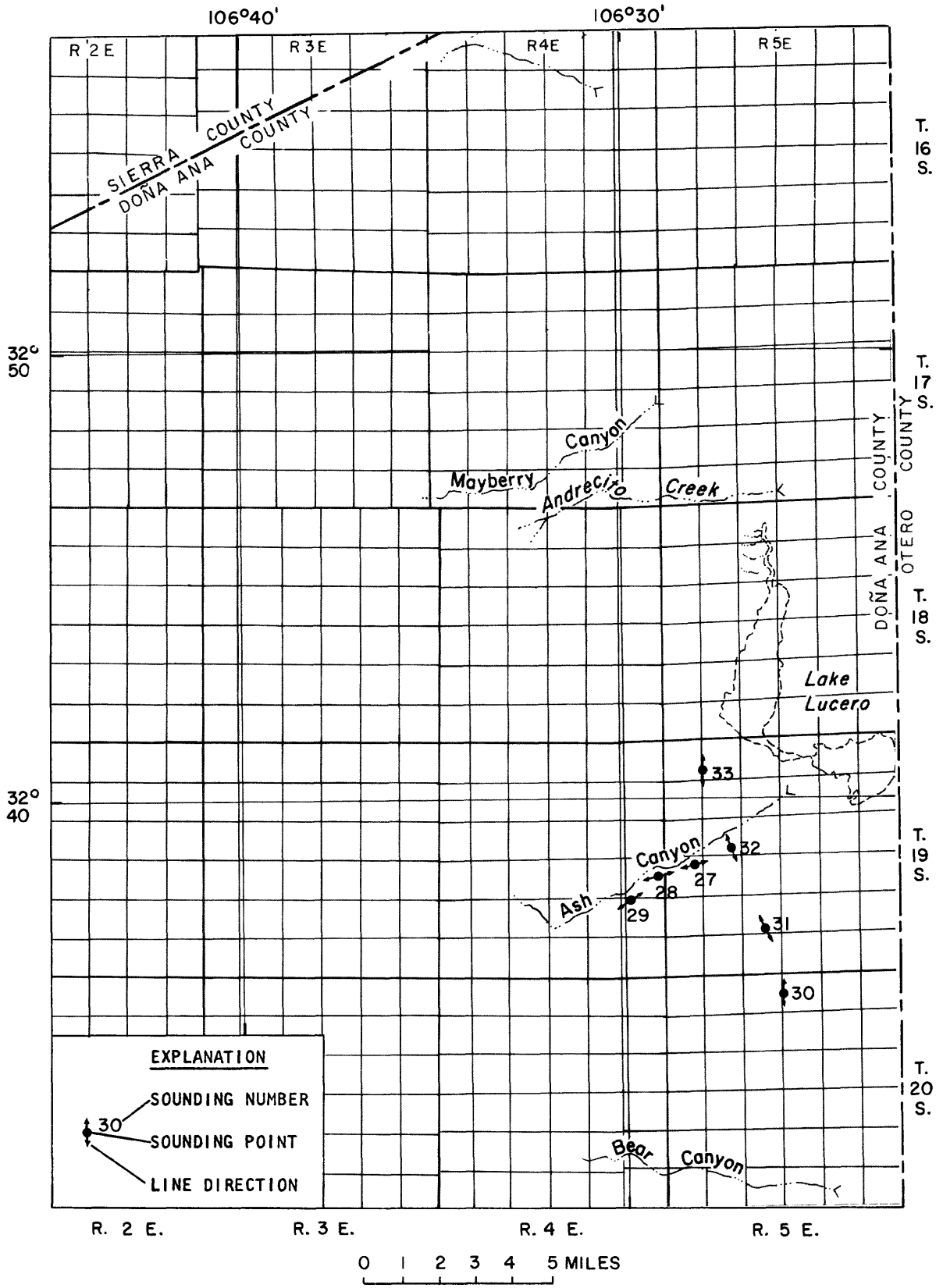


Figure 12. Location of vertical electrical soundings in Ash Canyon area.

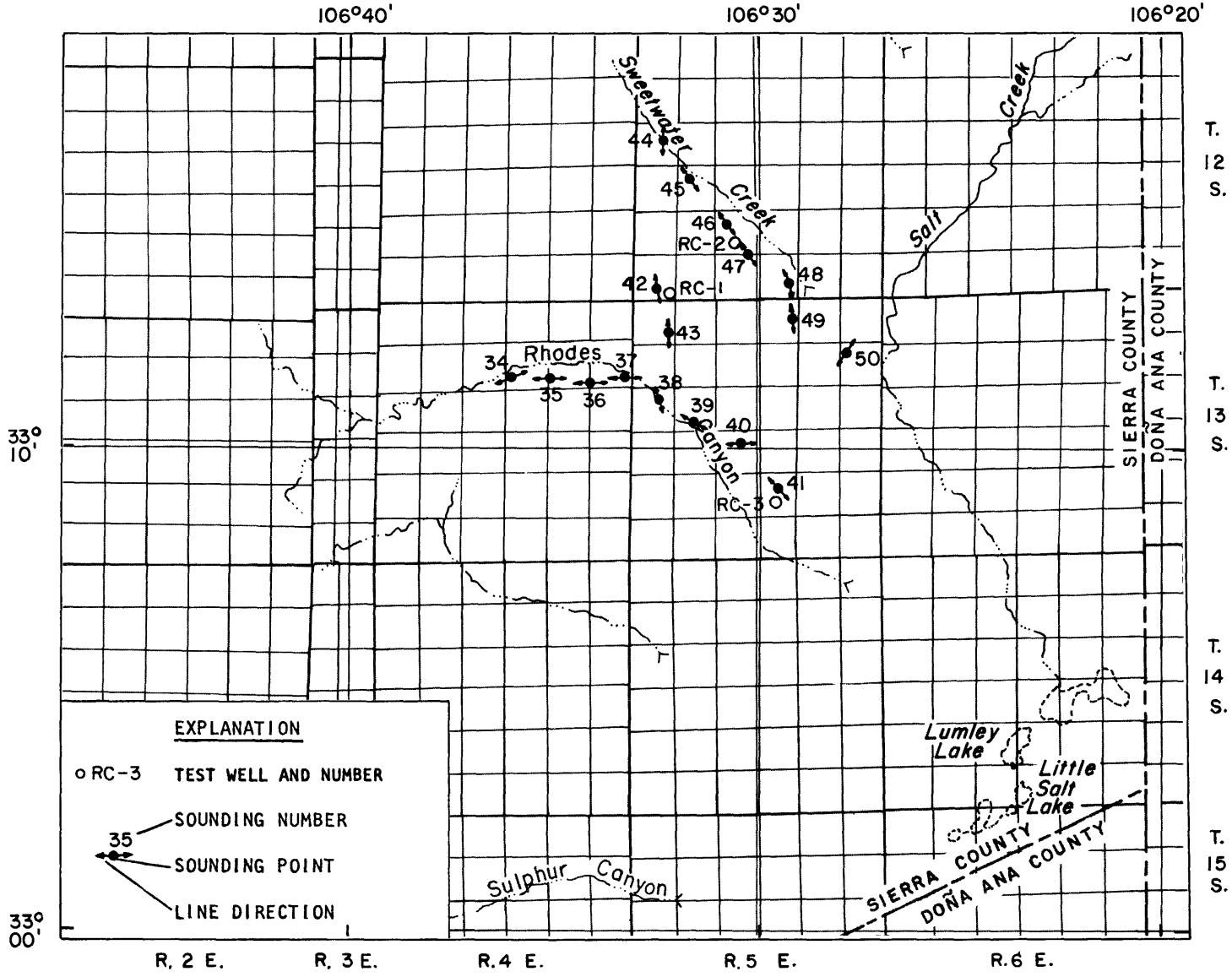


Figure 13. Location of vertical electrical soundings in Rhodes Canyon area.

SELECTED REFERENCES

Cooper, J. B., 1970, Summary records of supply wells and test wells in the Post Headquarters area, White Sands Missile Range, New Mexico: U.S. Geological Survey open-file report, 202 p.

_____1973, Summary records of test and supply wells in Range Areas, White Sands Missile Range, New Mexico: U.S. Geological Survey open-file report, 132 p.

Cruz, R. R., 1982, Annual water-resources review, White Sands Missile Range, New Mexico, 1981: U.S. Geological Survey Open-File Report 82-757, 20 p.

Kelly, T. E., 1973, Summary of ground-water data at Post Headquarters and adjacent areas, White Sands Missile Range: U.S. Geological Survey open-file report, 66 p.

Wier, J. E., Jr., 1965, Geology and availability of ground water in the northern part of White Sands Missile Range and vicinity, New Mexico: U.S. Geological Survey Water-Supply Paper 1801, 78 p.

Table 1.—Test wells drilled by military in the Post Headquarters area, White Sands Missile Range, 1982

Well name	Location	Date drilled (month-year)	Depth drilled (feet)	Casing diameter (inches-type)	Finished depth (feet)	Slot or screen interval (depth below land surface, in feet)	Types of logs available	Remarks
T-21	22S.5E.30.122	9-82	500	4 PVC	420 rept. 379 meas.	380-400 rept.	Gamma ray, neutron, caliper, driller's	Finished depth measured with geophysical logger
T-22	23S.5E.15.332	9-82	1120	8 Steel 0-80 ft 6 Steel 80-260 ft	260	80-240	Gamma ray, neutron, caliper, long-short normal, SP-resistance, driller's	Finished depth measured with geophysical logger
T-23	23S.5E.15.332	11-82	± 860	-	-	-	Lithologic	Abandoned - drill stem twisted off
T-25	22S.4E.24.144	9-82	945	-	-	-	Gamma ray, neutron, caliper, long-short normal, SP-resistance,	Abandoned - only surface casing set
T-29	22S.5E.28.122	11-82	300	4 PVC	255	210-245 slot 245-250 screen 250-255 slot	Gamma ray, neutron, caliper, lithologic	Steel surface casing. Finished depth measured with geophysical logger
T-30	22S.5E.32.334	11-82	340	4 PVC	305	280-290 slot 290-300 screen 300-305 slot	Gamma ray, neutron, caliper, lithologic	Finished depth measured with geophysical logger

Table 2.—Depth to water in supply wells, Post Headquarters and Range areas, 1982

Well number	Location	March 1982 (feet below land surface)	August 1982 (feet below land surface)
10A	22S.4E.24.212a	426.59	436.49
11	22S.4E.24.112	265.20*	365.00*
13	22S.4E.13.311	298.96	299.61
15	22S.4E.13.424	-	433.97
16	22S.4E.13.432	424.85*	467.00*
17	22S.4E.13.241	437.64	469.75
18	22S.4E.12.434	428.94	450.93
19	22S.4E.12.414	452.79	460.96
20	22S.4E.12.214	512.99	519.47
21	22S.5E.19.323	354.62	360.19
22	22S.5E.19.414	374.24	389.07
HTA-1	21S.4E.23.233	62.32	64.07
SMR-1	21S.5E.16.132	294.78	295.79
MAR-1	19S.5E.17.331	-	223.29
MAR-2	19S.5E.17.334	221.20	220.92
SRC-1	6S.3E.05.232	207.70	208.80
SRC-2	6S.3E.05.234	212.65	212.65

* Air line reading

Table 3.—Depth to water in test and observation wells, Post Headquarters and Range areas, 1982

Well number	Location	March 1982 (feet below land surface)	August 1982 (feet below land surface)
T-4	22S.5E.16.111	226.42	226.57
T-5	22S.5E.20.111	276.42	276.52
T-6	22S.4E.14.133	199.59	198.04
T-7	22S.5E.07.342	358.43	375.04
T-8	22S.4E.11.224	580.50	582.91
T-9	22S.4E.01.431	389.32	384.98
T-10	22S.5E.03.313	272.03	272.32
T-11	22S.5E.29.412	272.68	272.78
T-13	22S.5E.32.222	212.79	212.79
T-14	22S.5E.15.221	132.13	132.13
T-15	22S.5E.33.244	179.16	179.63
T-16	23S.5E.10.413	185.07	184.94
T-17	23S.5E.27.142	246.65	242.43
T-18	23S.5E.05.321	239.99	238.63
OS-9	22S.5E.31.424	244.00	243.89
OS-12	22S.4E.23.214	231.92	232.74
Gregg	22S.6E.08.414	214.24	214.52
HTA (wm)	21S.4E.22.222	42.88	41.88
SMR-2	21S.5E.17.424	320.19	320.25
SMR-3	20S.5E.34.133	294.92	295.47
SMR-4	21S.5E.20.344	287.90	288.18
MAR-1 (test)	19S.5E.17.333	221.39	221.29
MAR-4	19S.5E.19.231	302.96	303.10
NW30-1	17S.4E.02.211	212.54	212.65
Murray	8S.5E.32.334	176.94	177.38
Lucero Ranch	19S.5E.22.334	169.60	171.05
CW	21S.5E.28.311	-	153.52

Table 4.—Depth to water in boreholes, Post Headquarters and adjacent areas, 1982

Well number	Location	March 1982 (feet below land surface)	August 1982 (feet below land surface)
B-1	22S.05E.28.122	192.29	-
B-2	22S.05E.28.124	195.81	195.44
B-3	22S.05E.28.142	202.99	203.03
B-4	22S.05E.28.233	197.29	197.54
B-5	22S.05E.33.223	187.79	187.87
B-6	23S.05E.01.113	133.78	133.10
B-9	22S.05E.21.211	225.20	225.34
B-10	22S.05E.19.414	305.55	306.34
B-13	22S.05E.08.141	242.68	243.20
B-14	22S.05E.03.221	112.20	112.30
B-15	22S.05E.05.242	172.98	173.62
B-16	21S.05E.34.213	109.18	109.30
B-17	21S.05E.33.242	111.39	111.46
B-18	21S.05E.23.134	104.21	104.33
B-20	22S.04E.14.134	347.80	349.20
B-23	22S.05E.16.111	224.75	224.82
B-26	21S.06E.32.114	141.07	141.21
B-27	21S.06E.17.314	119.78	119.81
B-28	21S.05E.02.341	140.67	140.26
B-30	20S.05E.23.213	89.64	89.67

Table 4.—Depth to water in boreholes, Post Headquarters and adjacent areas, 1982 - Concluded

Well number	Location	March 1982 (feet below land surface)	August 1982 (feet below land surface)
B-31	20S.06E.29.123	123.30	123.41
B-34	21S.05E.01.221	126.24	126.29
B-36	22S.04E.01.323	211.09	211.40
B-37	22S.04E.11.344	396.32	394.70
B-38	20S.06E.11.234	129.76	129.85
B-39	21S.06E.02.142	156.31	156.37
B-40	21S.06E.26.142	188.60	188.56
B-42	22S.04E.11.444	379.64	378.78
B-46	21S.05E.27.113	135.67	135.70
B-47	22S.05E.08.334	273.29	273.92
B-48	22S.06E.31.322	204.47	204.57
B-49	22S.05E.09.113	199.39	199.70
B-50	22S.05E.07.242	304.87	305.25
B-51	22S.05E.26.312	146.68	146.64
B-52	22S.05E.09.113	210.29	210.62
B-54	22S.05E.16.111	229.98	229.79
B-55	22S.05E.09.113	214.14	214.70
B-56	22S.05E.30.424	279.40	276.86

Table 5.—Specific-conductance values of water samples collected from supply wells, test wells, and observation wells, 1982

Part I. Supply wells

Well number	Specific-conductance value (laboratory) (micromhos per centimeter at 25°C)	
	Winter	Summer
10A	477	331
11	683	403
13	611	600
16	-	385
17	545	372
18	564	389
19	392	392
20	572	584
21	288	290
22	-	-
HTA-1	1020	718
SMR-1	1130	781
MAR-1	-	906
MAR-2	1120	-
SRC-1	3480	3430
SRC-2	3450	-
SRC (product water)	381	456

Table 5.—Specific-conductance values of water samples collected from supply wells, test wells, and observation wells, 1982 - Concluded

Part II. Test and observation wells

Well number	Specific conductance value (lab) (micromhos per centimeter at 25° C) (samples collected during summer)	Sampling point (feet below land surface)
T-4	317	325
T-5	371	330
T-7	344	440
T-7	441	960
T-8	680	610
T-8	626	915
T-9	883	550
T-10	331	530
T-13	490	410
T-14	1498	200
T-14	1479	300
T-15	323	448
T-16	289	480
T-17	167	440
T-18	703	635
OS-12	440	340
Lucero Ranch	840	210

Table 6.–Major chemical-constituent analyses of water from selected wells, White Sands Missile Range

[UMHOS, micromhos per centimeter at 25°C; MG/L, milligrams per liter; UG/L, micrograms per liter; FT, feet; DEG C, degrees Celsius]

WELL	DATE OF SAMPLE	DEPTH OF SAMPLE (FT)	SPECIFIC CONDUCTANCE (UMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	ALKALINITY LAB (MG/L AS $CACO_3$)	HARDNESS (MG/L AS $CACO_3$)	HARDNESS, NONCARBONATE (MG/L $CACO_3$)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)
T-8	82-08-11	915	590	8.1	27.0	92	210	120	53	20	43
T-10	82-08-12	530	280	8.2	27.0	93	110	20	32	8.1	23
T-13	82-08-12	410	480	8.2	27.0	102	170	72	50	12	34
T-14	82-08-12	300	1260	—	25.5	155	—	—	1.4	.0	320
T-14	82-08-12	200	1320	10.0	24.5	160	6	0	2.0	.2	290
LUCERO	82-08-10	210	800	8.3	25.0	178	320	140	40	53	53

WELL	SODIUM ADSORPTION RATIO	PERCENT SODIUM	POTASSIUM, DISSOLVED (MG/L AS K)	CHLORIDE, DISSOLVED (MG/L AS CL)	SULFATE DISSOLVED (MG/L AS SO_4)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO_2)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NO_2+NO_3 DISSOLVED (MG/L AS N)	BORON, DISSOLVED (UG/L AS B)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, DISSOLVED (UG/L AS MN)
T-8	1.3	30	3.2	44	140	.7	26	391	1.4	40	<3	24
T-10	1.0	30	1.9	11	44	.3	39	220	1.1	20	6	<1
T-13	1.2	29	2.6	24	88	.5	36	317	1.9	30	9	<1
T-14	—	14	5.0	350	37	.6	2.7	—	<.10	440	130	1
T-14	56	98	5.2	340	36	.6	2.1	772	<.10	60	8	1
LUCERO	1.3	26	2.9	50	170	.5	17	494	.16	130	6	8

Table 7.-Chemical analyses of water from selected wells and springs, northern White Sands Missile Range

[MG/L, milligrams per liter; UMHOS, micromhos per centimeter at 25°C; PCI/L, picocuries per liter; UG/L, micrograms per liter; FET-FLD, fixed-pH endpoint titration - field; years BP, years before present; GM/ML, grams per milliliter]

WELL OR SPRING NAME	LOCATION	DATE OF SAMPLE	TEMPERATURE (DEG C)	SPECIFIC CONDUCTANCE (UMHOS)	PH FLD (UNITS)	PH LAB (UNITS)
WELL						
RED CANYON NORTH	6S.8E.33.241	53-03-31	—	3150	—	—
RED CANYON NORTH	6S.8E.33.241	53-07-24	—	3160	—	—
RED CANYON NORTH	6S.8E.33.241	82-07-31	22.3	3190	7.0	7.5
RENFRO	7S.8E.14.323	54-02-26	—	3720	—	—
RENFRO	7S.8E.14.323	82-08-04	22.9	4280	7.4	7.5
OSCURO RANGE CENTER	9S.7E.25.134	82-07-29	18.9	5240	7.1	7.5
SPRING						
MOUND	10S.6E.23.242	55-06-02	16.0	4850	7.6	—
MOUND	10S.6E.23.242	82-08-03	22.4	4970	7.3	7.6
MALPAIS	12S.7E.08.422	57-08-06	—	6170	7.2	—
MALPAIS	12S.7E.08.422	62-04-24	—	6190	6.9	—
MALPAIS	12S.7E.08.422	82-08-02	17.1	6050	7.4	7.8

Table 7.-Chemical analyses of water from selected wells and springs, northern White Sands Missile Range - Continued

WELL OR SPRING NAME	DATE OF SAMPLE	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO_2)	ALKA-LINITY FIELD (MG/L AS $CaCO_3$)	BICAR-BONATE FET-FLD (MG/L AS HCO_3)	CAR-BONATE FET-FLD (MG/L AS CO_3)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	PHOS-PHATE, ORTHO, DIS-SOLVED (MG/L AS PO_4)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C)
WELL													
RED C.	53-03-31	—	172	210	0	—	—	.50	—	—	—	—	—
RED C.	53-07-24	—	164	200	—	—	—	.32	—	—	—	—	—
RED C.	82-07-31	28	—	—	—	.140	.070	1.00	1.1	.06	.020	1.0	.3
RENFRO	54-02-26	—	75	92	0	—	—	.05	—	—	—	—	—
RENFRO	82-08-04	7.5	—	—	—	.220	<.020	—	<.10	.06	.020	.7	.1
OSCURO	82-07-29	19	—	—	—	.090	<.020	—	4.2	—	<.010	.7	<.1
SPRING													
MOUND	55-06-02	6.0	124	151	0	—	—	—	—	—	—	—	—
MOUND	82-08-03	11	—	—	—	.320	.030	.35	.38	.06	.020	1.3	.2
MALPAIS	57-08-06	6.0	49	60	0	—	—	—	—	—	—	—	—
MALPAIS	62-04-24	11	44	54	0	—	—	2.50	—	—	—	—	—
MALPAIS	82-08-02	.2	—	—	—	.140	<.020	—	3.2	—	<.010	.6	<.1

Table 7.-Chemical analyses of water from selected wells and springs, northern White Sands Missile Range - Continued

WELL OR SPRING NAME	DATE OF SAMPLE	CARBON, INORGANIC, DISSOLVED (MG/L AS C)	HARDNESS (MG/L AS $CACO_3$)	HARDNESS, NONCARBONATE (MG/L $CACO_3$)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	PERCENT SODIUM	SODIUM+POTASSIUM DISSOLVED (MG/L AS NA)	POTASSIUM, DISSOLVED (MG/L AS K)	CHLORIDE, DISSOLVED (MG/L AS CL)	SULFATE DISSOLVED (MG/L AS SO_4)
WELL													
RED C.	53-03-31	—	2100	2000	—	—	—	—	—	71	—	76	1900
RED C.	53-07-24	—	2100	2000	590	160	—	—	—	68	—	75	2000
RED C.	82-07-31	25	2100	1900	560	160	88	.9	8	—	5.1	93	2000
RENFRO	54-02-26	—	2300	2200	540	220	—	—	—	150	—	67	2300
RENFRO	82-08-04	12	2200	2100	530	210	350	3.4	26	—	5.6	110	2600
OSCURO	82-07-29	18	2400	2300	660	180	420	3.9	28	—	4.5	780	2000
SPRING													
MOUND	55-06-02	—	2450	2330	—	—	—	—	—	—	—	710	1950
MOUND	82-08-03	17	2400	2300	700	150	360	3.3	25	—	4.7	730	2000
MALPAIS	57-08-06	—	2510	2460	—	—	—	—	—	—	—	1200	1900
MALPAIS	62-04-24	—	2400	2300	700	149	—	—	—	621	—	1180	1910
MALPAIS	82-08-02	7.0	2300	2300	680	150	630	5.9	37	—	6.8	1200	2000

Table 7.-Chemical analyses of water from selected wells and springs, northern White Sands Missile Range - Continued

WELL OR SPRING NAME	DATE OF SAMPLE	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SiO_2)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BORON, DISSOLVED (UG/L AS B)	CHROMIUM, DISSOLVED (UG/L AS CR)	COPPER, DISSOLVED (UG/L AS CU)	IRON, SUSPENDED RECOVERABLE (UG/L AS FE)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)	MANGANESE, DISSOLVED (UG/L AS MN)
WELL													
RED C.	53-03-31	—	—	—	—	—	—	—	—	—	—	—	—
RED C.	53-07-24	—	17	—	—	—	—	—	—	—	—	—	—
RED C.	82-07-31	1.6	20	<1	<100	370	<10	20	8900	9300	390	100	130
RENFRO	54-02-26	1.9	10	—	—	—	—	—	—	—	—	—	—
RENFRO	82-08-04	2.0	17	<1	200	2400	10	10	100	470	370	100	50
OSCURO	82-07-29	1.3	24	<1	<100	300	10	20	0	60	60	200	10
SPRING													
MOUND	55-06-02	—	—	—	—	—	—	—	—	—	—	—	—
MOUND	82-08-03	1.2	20	<1	<100	220	10	20	0	60	60	200	20
MALPAIS	57-08-06	—	—	—	—	—	—	—	—	—	—	—	—
MALPAIS	62-04-24	1.3	53	—	—	—	—	—	—	—	—	—	—
MALPAIS	82-08-02	1.2	29	1	<100	220	10	20	0	30	50	200	20

Table 7.-Chemical analyses of water from selected wells and springs, northern White Sands Missile Range - Continued

WELL OR SPRING NAME	DATE OF SAMPLE	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	ZINC, DIS-SOLVED (UG/L AS ZN)	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	TRITIUM TOTAL (PCI/L)	RADIUM 226, DIS-SOLVED, RADON METHOD (PCI/L)	URANIUM NATURAL DIS-SOLVED (UG/L AS U)	CARBON-14, AP-PARENT AGE (YEARS BP)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	DENSITY (GM/ML AT 20°C)
WELL													
RED C.	53-03-31	—	—	—	—	—	—	—	—	3220	—	4.4	—
RED C.	53-07-24	—	—	—	—	—	—	—	—	—	2970	4.0	—
RED C.	82-07-31	7	7600	1100	20	3.0	.44	3.5	25300	—	3030	4.1	1.013
RENFRO	54-02-26	—	—	—	—	—	—	—	—	—	3340	4.5	—
RENFRO	82-08-04	11	8400	400	20	2.0	4.3	1.4	29400	—	3890	5.3	1.015
OSCURO	82-07-29	6	8300	40	20	5.0	.06	6.1	15700	—	4150	5.6	1.016
SPRING													
MOUND	55-06-02	—	—	—	—	—	—	—	—	—	4170	5.7	—
MOUND	82-08-03	3	8400	40	10	<1.0	.08	4.6	19600	—	4040	5.5	1.016
MALPAIS	57-08-06	—	—	—	—	—	—	—	—	—	—	—	—
MALPAIS	62-04-24	—	—	—	—	—	—	—	—	4920	4650	6.7	—
MALPAIS	82-08-02	11	9800	20	20	7.0	.07	3.2	>27900	—	4710	6.4	1.016

Table 7.-Chemical analyses of water from selected wells and springs, northern White Sands Missile Range - Concluded

WELL OR SPRING NAME	DATE OF SAMPLE	NITROGEN, AMMONIA DISSOLVED (MG/L AS NH_4)	NITROGEN, NITRATE DISSOLVED (MG/L AS NO_3)	NITROGEN, NITRITE DISSOLVED (MG/L AS NO_2)	IODIDE, DISSOLVED (MG/L AS I)	BROMIDE DISSOLVED (MG/L AS BR)	C-13/ C-12 STABLE ISOTOPE RATIO PER MIL	H-2/ H-1 STABLE ISOTOPE RATIO PER MIL	O-18/ O-16 STABLE ISOTOPE RATIO PER MIL	CARBON 14 PERCENT MODERN	ALKALINITY LAB (MG/L AS $CACO_3$)
WELL											
RED C.	53-03-31	—	2.2	—	—	—	—	—	—	—	—
RED C.	53-07-24	—	1.4	—	—	—	—	—	—	—	—
RED C.	82-07-31	.18	4.4	.23	.007	.56	-4.4	-66.0	-9.2	4.3	150
RENFRO	54-02-26	—	.22	—	—	—	—	—	—	—	—
RENFRO	82-08-04	.28	—	—	.420	.49	-8.9	-88.0	-11.8	2.6	89
OSCURO	82-07-29	.12	—	—	.006	.66	-3.5	-61.0	-8.6	14.2	121
SPRING											
MOUND	55-06-02	—	—	—	—	—	—	—	—	—	—
MOUND	82-08-03	.41	1.5	.10	.000	.46	-2.6	-61.5	-8.6	8.8	104
MALPAIS	57-08-06	—	—	—	—	—	—	—	—	—	—
MALPAIS	62-04-24	—	11	—	—	—	—	—	—	—	—
MALPAIS	82-08-02	.18	—	—	.010	.34	-8.6	-63.0	-9.1	<3.1	3.0

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