# ANNUAL WATER-RESOURCES REVIEW,
# WHITE SANDS MISSILE RANGE,
# NEW MEXICO, 1983

By R. R. Cruz

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U.S. GEOLOGICAL SURVEY

Open-File Report 84-720

Prepared in cooperation with

WHITE SANDS MISSILE RANGE


Albuquerque, New Mexico

1984

UNITED STATES DEPARTMENT OF THE INTERIOR

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GEOLOGICAL SURVEY

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## CONVERSION FACTORS

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

| Multiply inch-pound units | By | To obtain SI units |
|---|---|---|
| foot | 0.3048 | meter |
| mile | 1.609 | kilometer |
| gallon | 3.785 | liter |
| acre-foot | 1,233 | cubic meter |

# ANNUAL WATER-RESOURCES REVIEW,

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## ABSTRACT

Ground-water data were collected at White Sands Missile Range in 1983. The total amount of water pumped from White Sands Missile Range supply wells in 1983 was 713,557,500 gallons. The Post Headquarters well field accounted for 686,499,200 gallons of the total. Seasonal water-level fluctuations in the supply wells ranged from a rise of 3.00 feet in Stallion Range Center well 2 (SRC-2) to a decline of 51.00 feet in Post Headquarters supply well 11 (SW-11). All of the test wells and observation wells that are located less than 2½ miles east of the Post Headquarters well field and are not affected by artificial recharge showed a decline for the period 1973-83. Only one test well and one borehole west of the Post Headquarters well field showed a decline in water level; the other five showed a rise in water level for the period 1973-83.

Water from the Direct Course well (8S.4E.12.444), drilled west of Mockingbird Gap in May 1983, had a specific conductance of 4,090 micromhos at 25 degrees Celsius. Water from the Rhodes Canyon well (RC-4), drilled in April 1983, had a specific conductance of 1,000 micromhos. The specific conductance of the water from the Post Headquarters supply wells in 1983 was lower during periods of greatest withdrawal.

## INTRODUCTION

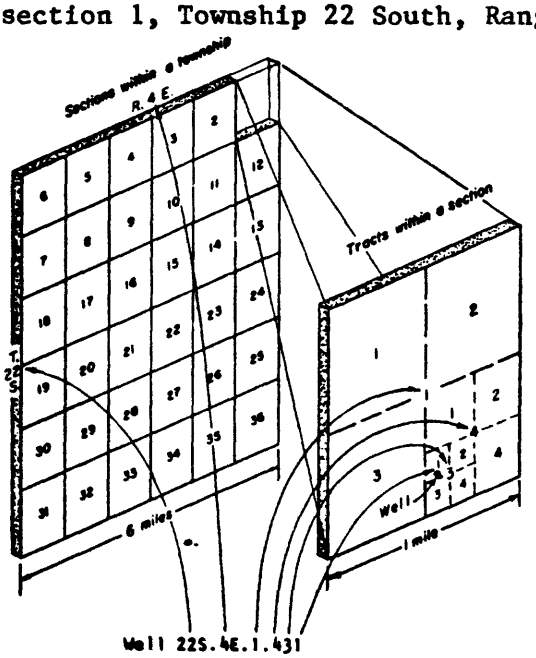
This report presents water-resources data that were collected at White Sands Missile Range (fig. 1) in 1983 by personnel of the U.S. Geological Survey and White Sands Missile Range. Ground-water pumpage, water-level measurements, chemical-quality and well-drilling data summarized in this report were obtained as a result of the continuing water-resources hydrologic-data-collection program sponsored by the Engineering and Housing Directorate, White Sands Missile Range, New Mexico.

This report is the sixteenth Annual Water-Resources Review prepared for White Sands Missile Range. The 1968 report and subsequent annual reports 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.



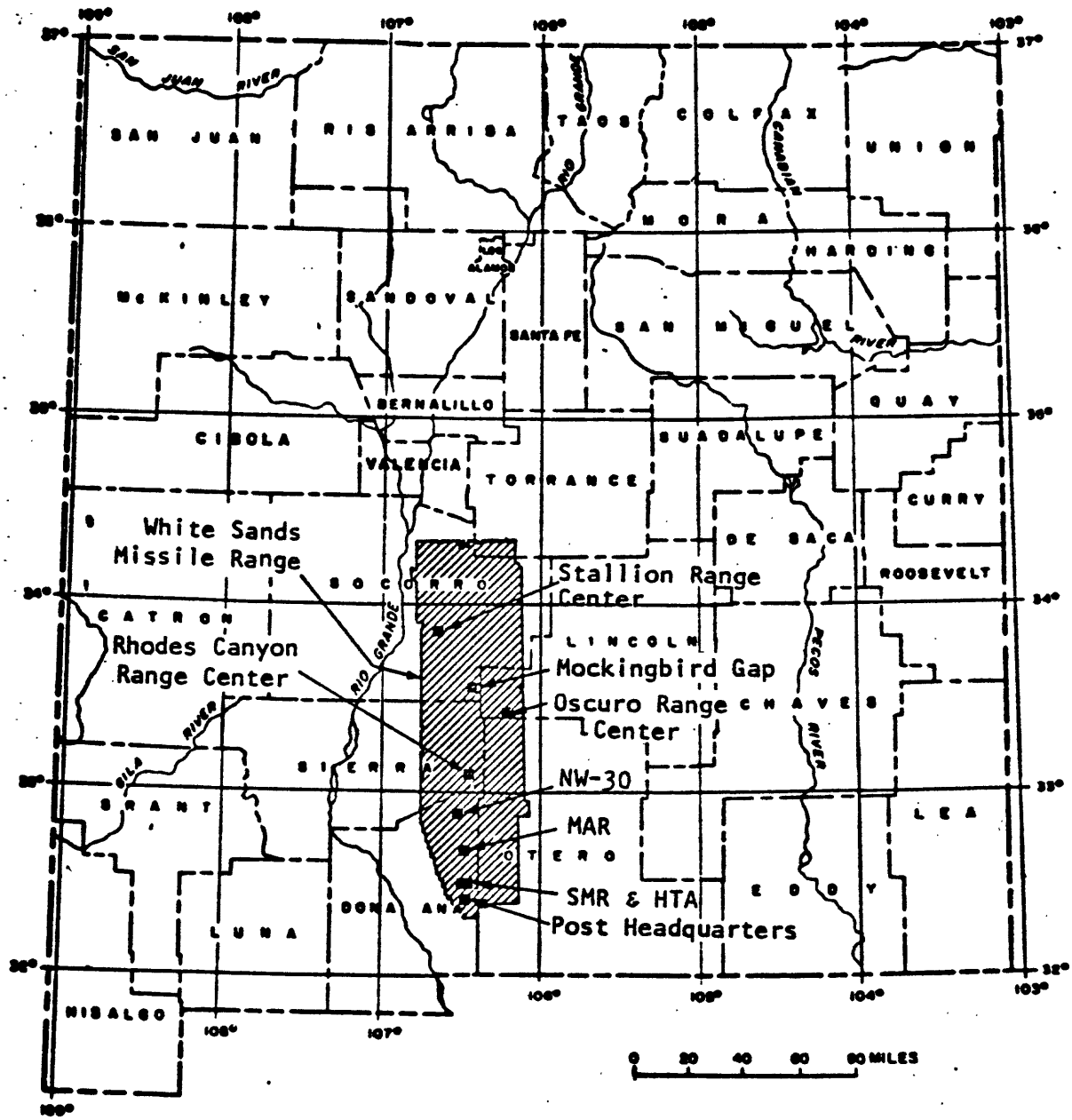



Figure 1.--White Sands Missile Range and areas of hydrologic observations.

## 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 wells in the Post Headquarters area. Over the years, the program has been expanded to include hydrologic data collection in seven range areas, miscellaneous sites, and more extensive coverage in and around the Post Headquarters area (figs. 2, 3, 4, 5). Eleven new wells were drilled on White Sands Missile Range during 1983 (table 1). Water-level measurements in the Main Gate well, a key well in the observation-well program because of its location in relation to the supply wells, were terminated in the latter part of 1978 because the water table dropped below the bottom of the well (fig. 6).

Semiannual water-level measurements were made in 16 supply wells (table 2), 28 test and observation wells (table 3), and 37 boreholes (table 4). The seven wells (T-21, T-22, T-27, T-29, T-30, TW-1, TW-2) at the end of table 3 were drilled during 1982-83, and the summer water level listed is the first measurement reported from these wells. Twenty semiannual water samples were collected from Post Headquarters supply wells. The specific-conductance values and depth to water for these wells for the period of record are shown graphically in figures 7, 8, and 9. Water samples were collected from 10 Post Headquarters supply wells for laboratory specific-conductance measurements and pH values during 1983 (figs. 10, 11, and 12). Water samples from 15 test and observation wells were collected for laboratory specific-conductance analysis in 1983 (table 5). Four test wells (T-7, T-8, T-10, and T-11) are equipped with continuous recording gages, and the hydrographs for 1974-83 are shown in figure 13. In addition, eight water samples from wells in the Post Headquarters and range areas were collected for analysis of major chemical constituents in 1983 (table 6).

### Ground-Water Pumpage

Total ground-water pumpage* at White Sands Missile Range in 1983, according to records provided by the Engineering and Housing Directorate, was 713,557,500 gallons. The Post Headquarters well field produced 686,499,200 gallons, Hazardous Test Area well (HTA-1) produced 480,300 gallons, Small Missile Range well (SMR-1) produced 2,605,400 gallons, Multifunction Array Radar wells (MAR-1 and -2) produced 14,629,600 gallons, and Stallion Range Center wells (SRC-1 and -2) produced 9,343,000 gallons in 1983. Total pumpage was 18,614,100 gallons less in 1983 than in 1982. Monthly pumpage for each supply well in the Post Headquarters well field for 1983 is shown in figures 10, 11, and 12. Pumpage by month and total gallons pumped per year in the Post Headquarters well field for 1969-83 and a hydrograph for Main Gate well for 1969-78 are shown in figure 6. The Main Gate well is dry at a depth of 414 feet; a deeper well at this location would provide valuable data.

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

Table 1.—Wells drilled on White Sands Missile Range, 1983.

| Well number | Location | Date drilled (month-year) | Hole diameter and depth drilled (inches-feet) | Casing diameter (inches-type) | Finished depth (feet) | Slot or screen interval (depth in feet below land surface) |
|---|---|---|---|---|---|---|
| DC-1 | 8S.4E.12.443 | 5-83 | 12 3/4 335 | 8 steel | 335 | 160-300 slot |
| | | | | | | 300-320 screen |
| RC-4 | 13S.4E.11.334 | 4-83 | 9 710 | 6 steel | 710 | 545-710 slot |
| NT-1 | 20S.3E.35.341 | 8-83 | 9 7/8 285 | 4 PVC | 260 | 100-260 |
| PW-2 | 21S.5E.32.334 | 9-83 | 9 7/8 600 | 6 steel | 293 | 96-256 |
| SW-15A | 22S.4E.24.144 | 10-83 | 34 0-160 | 26 steel 0-160 | | 550-630 screen |
| | | | 25 160-1,100 | 16 steel 0-1,100 | 1,100 | 670-710 screen |
| | | | | | | 870-1,080 screen |
| T-27 | 22S.5E.22.141 | 3-83 | 9 7/8 250 | 4 PVC | 250 | 180-250 |
| T-28 | 22S.5E.22.122 | 3-83 | 9 7/8 300* | 4 PVC | 300 | 160-300 |
| T-28A | 22S.5E.22.122A | 10-83 | 12 3/4 205 | 4 PVC | 200 | 145-200 |
| TW-1 | 22S.6E.16.233 | 7-83 | 9 7/8 300 | 4 PVC | 285 | 225-285 |
| TW-2 | 22S.6E.16.234 | 8-83 | 9 7/8 300 | 4 PVC | 285 | 225-285 |
| TW-3 | 22S.6E.16.234A | 10-83 | 9 7/8 300 | 4 PVC | 290 | 230-270 |

* Casing separated at 77 feet below land surface and well filled in below this point.

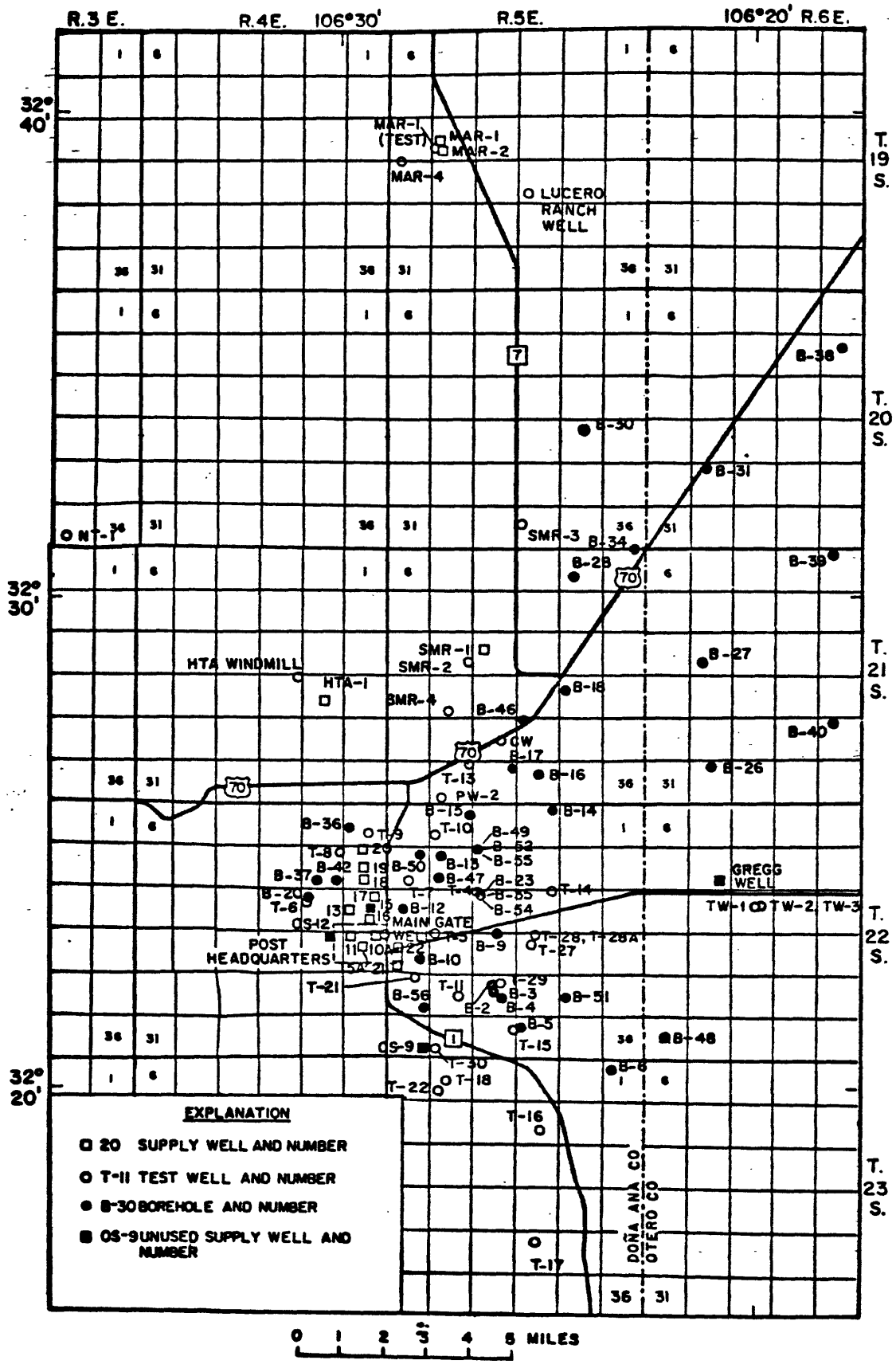



Figure 2.--Location of supply wells, test wells, observation wells, and boreholes in the Post Headquarters and adjacent areas.

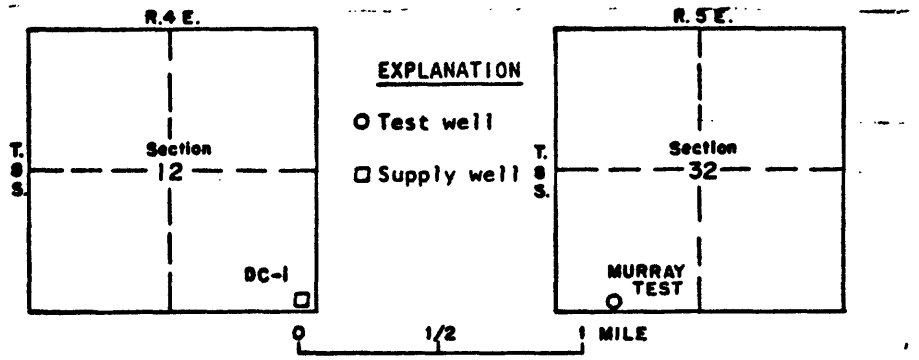



Figure 3.--Location of wells in Mockingbird Gap area.

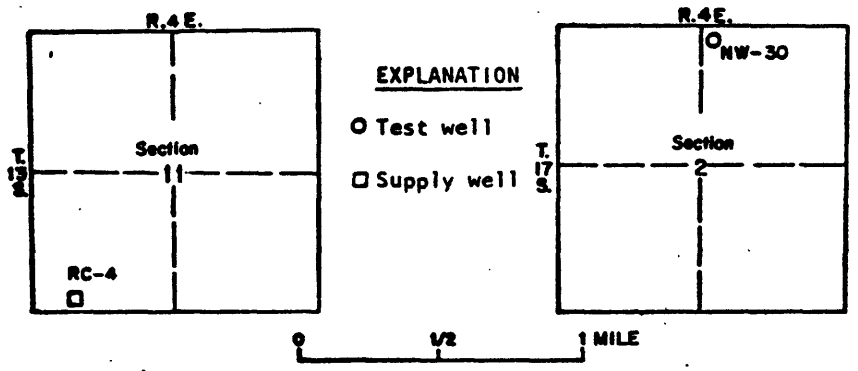



Figure 4.--Location of wells in Rhodes Canyon and NW-30 areas.

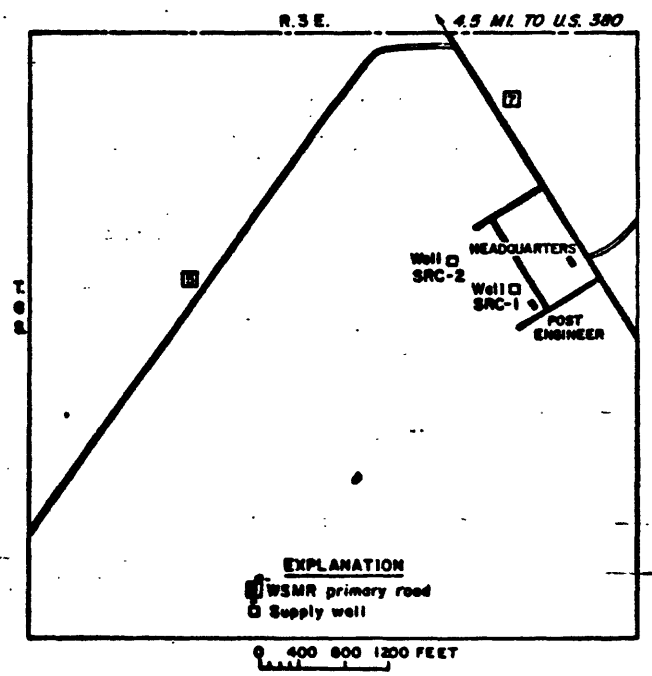



Figure 5.--Location of supply wells, Stallion Range Center.

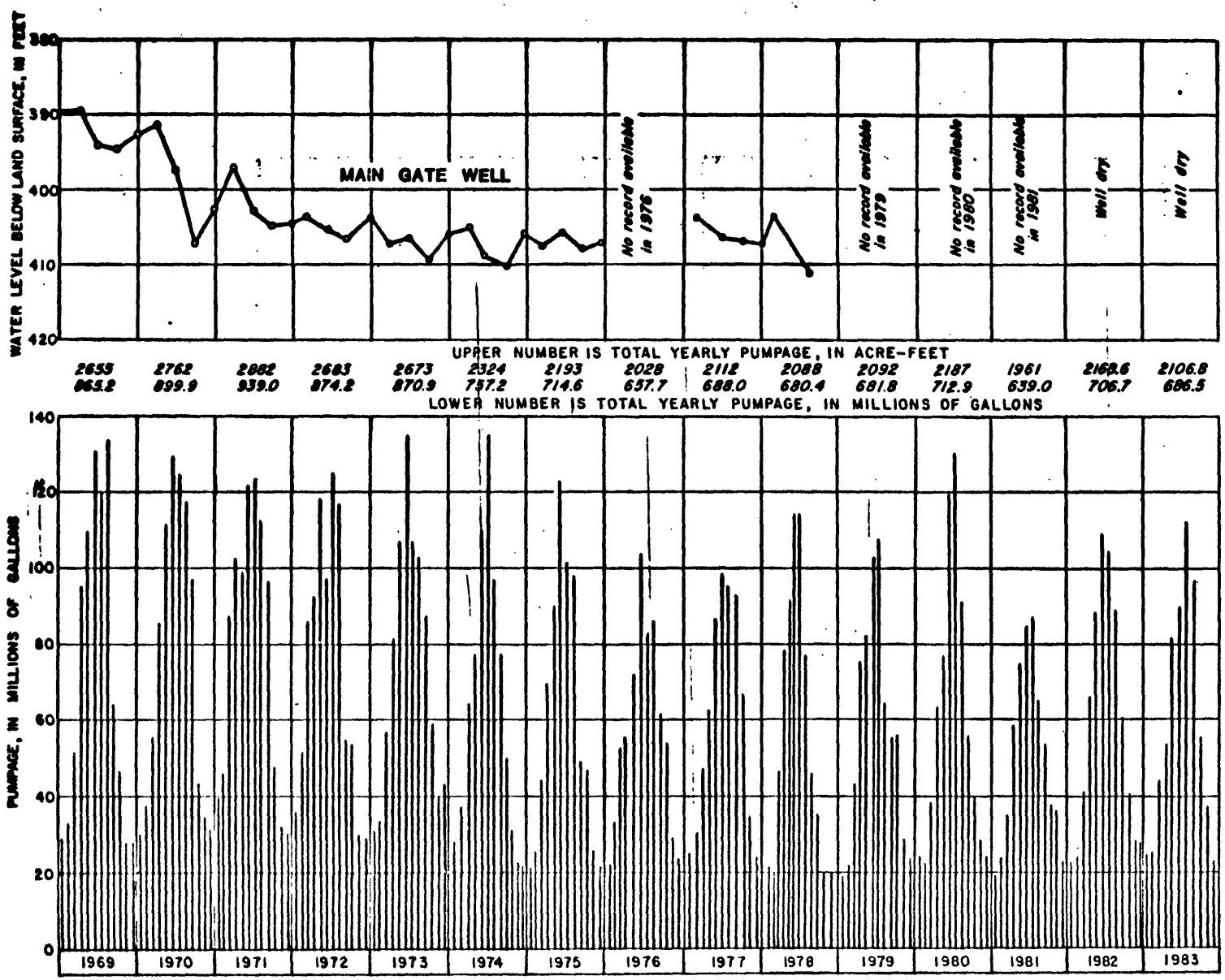



Figure 6.--Monthly and yearly pumpage in the Post Headquarters well field, 1969-83, and water-level fluctuations in the Main Gate well.

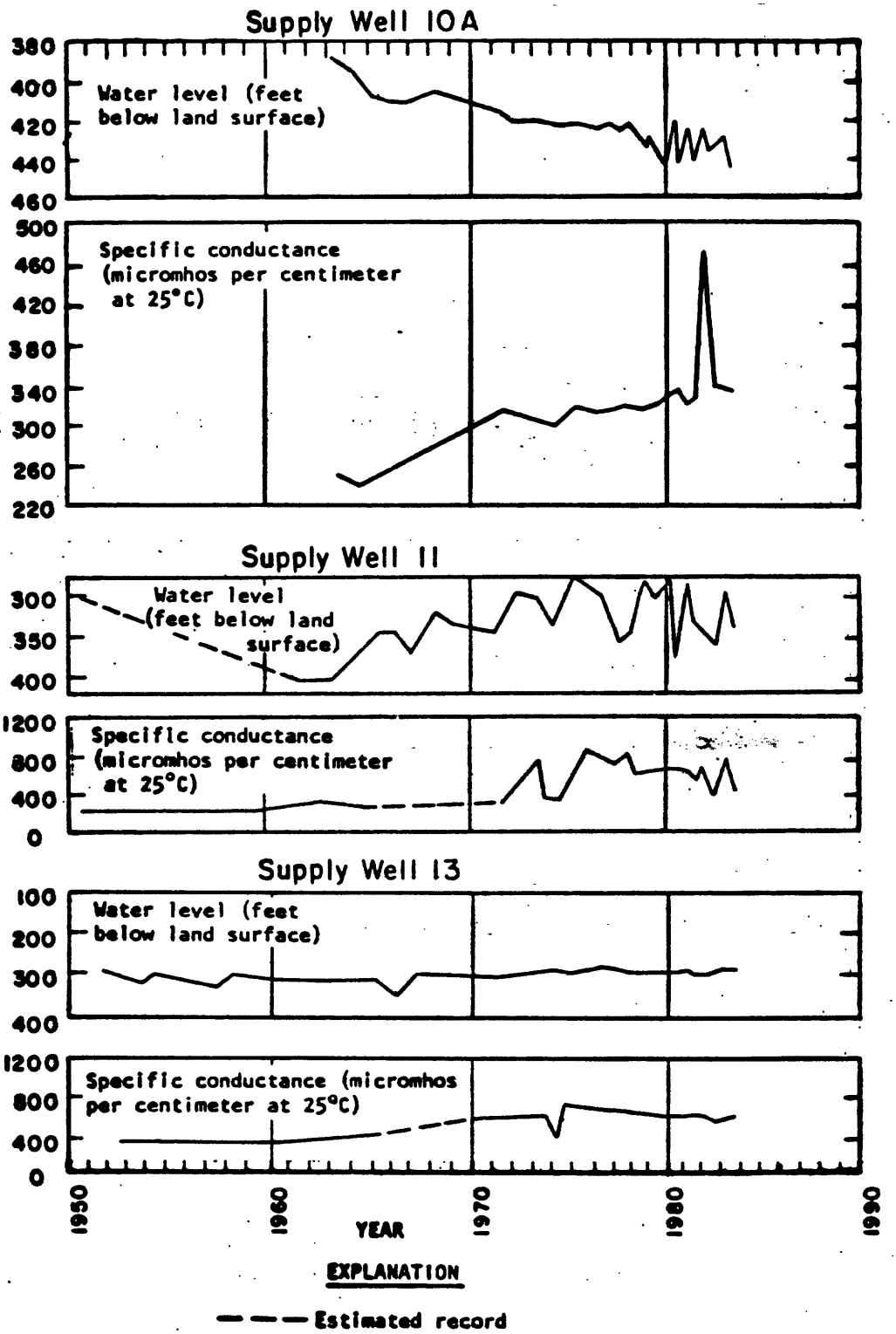



Figure 7.--Water levels and specific-conductance values for period of record available in supply wells 10A, 11, and 13.

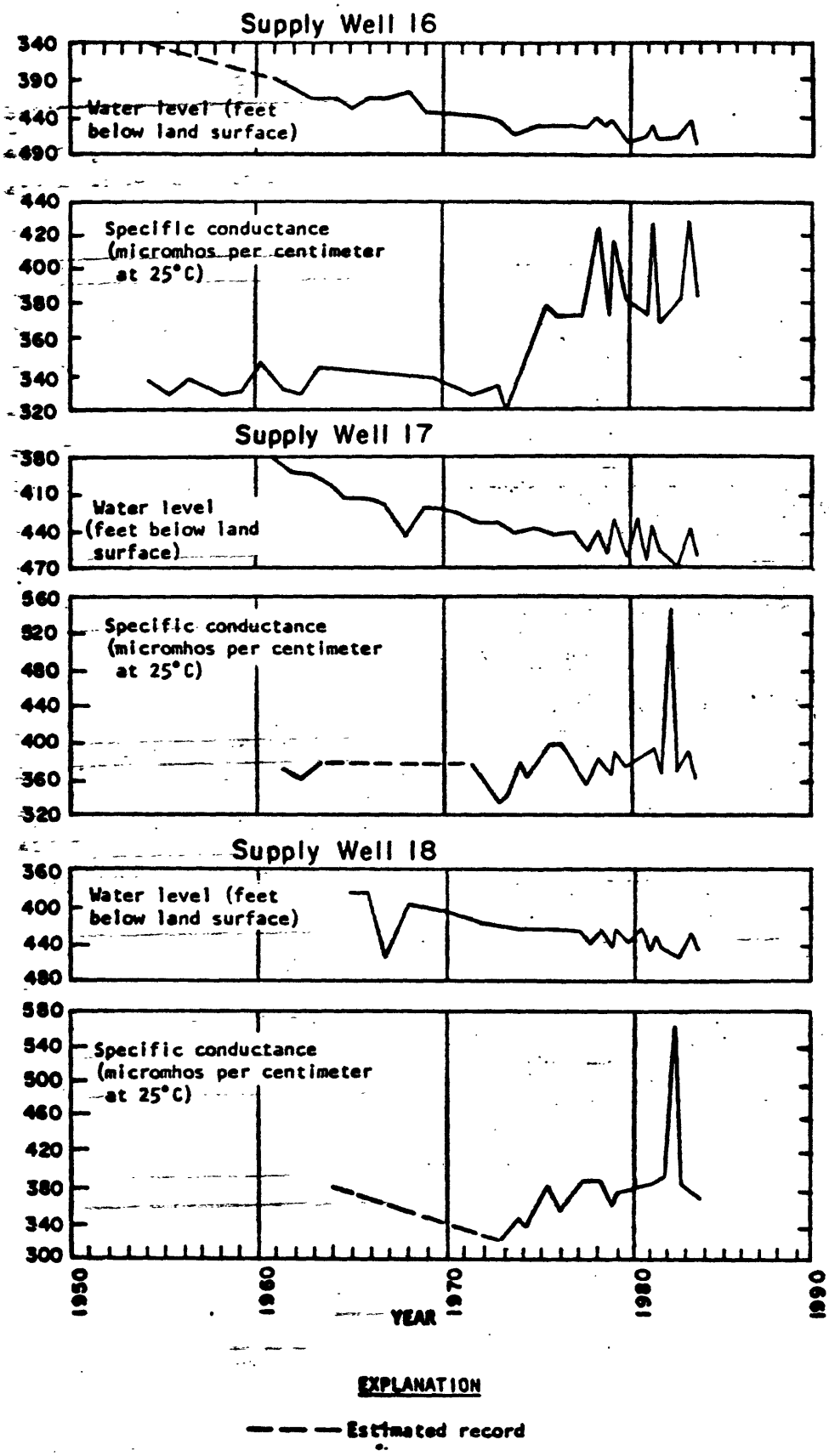



Figure 8.--Water levels and specific-conductance values for period of record available in supply wells 16, 17, and 18.

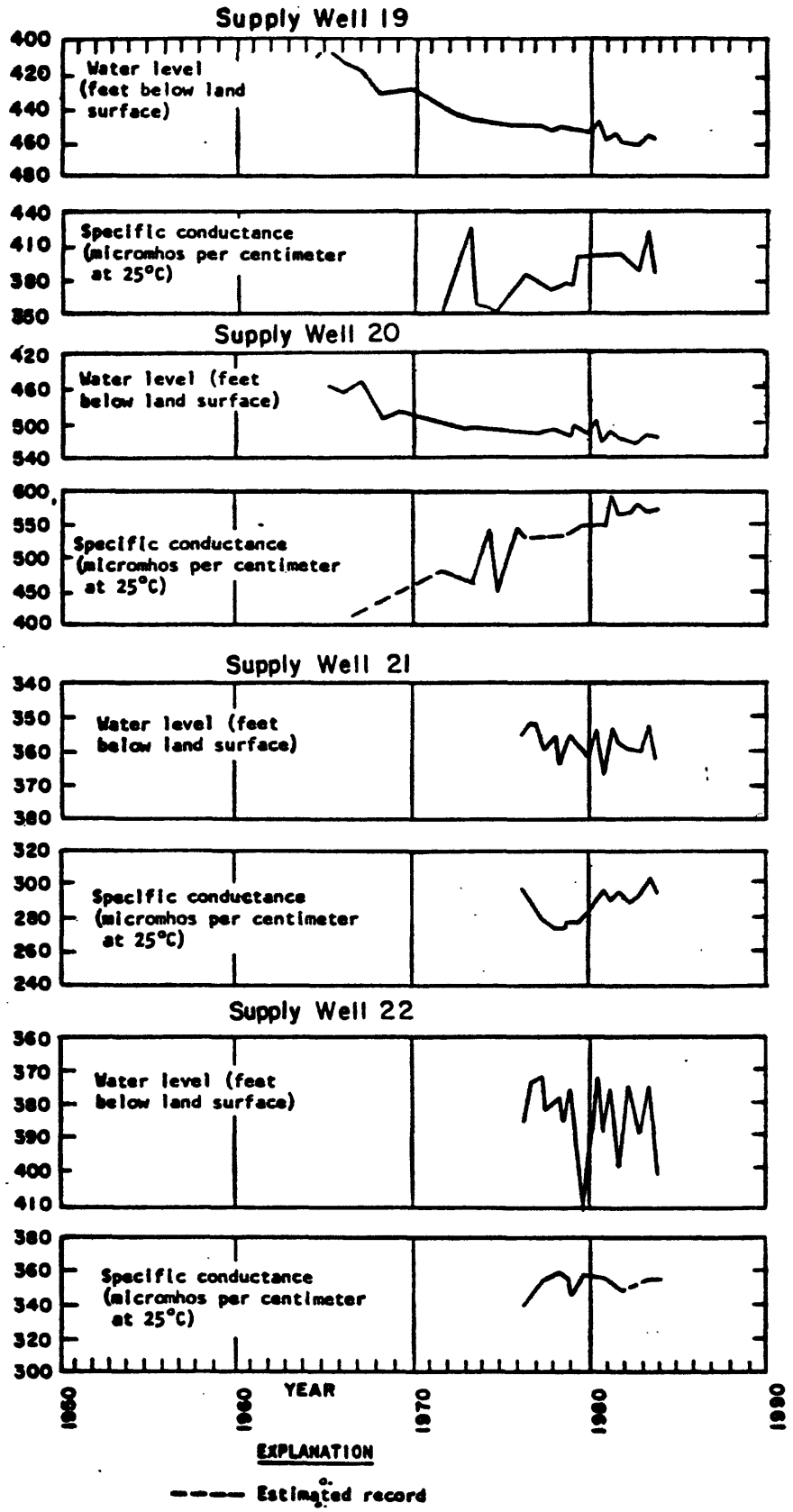



Figure 9.--Water levels and specific-conductance values for period of record available in supply wells 19, 20, 21 and 22.

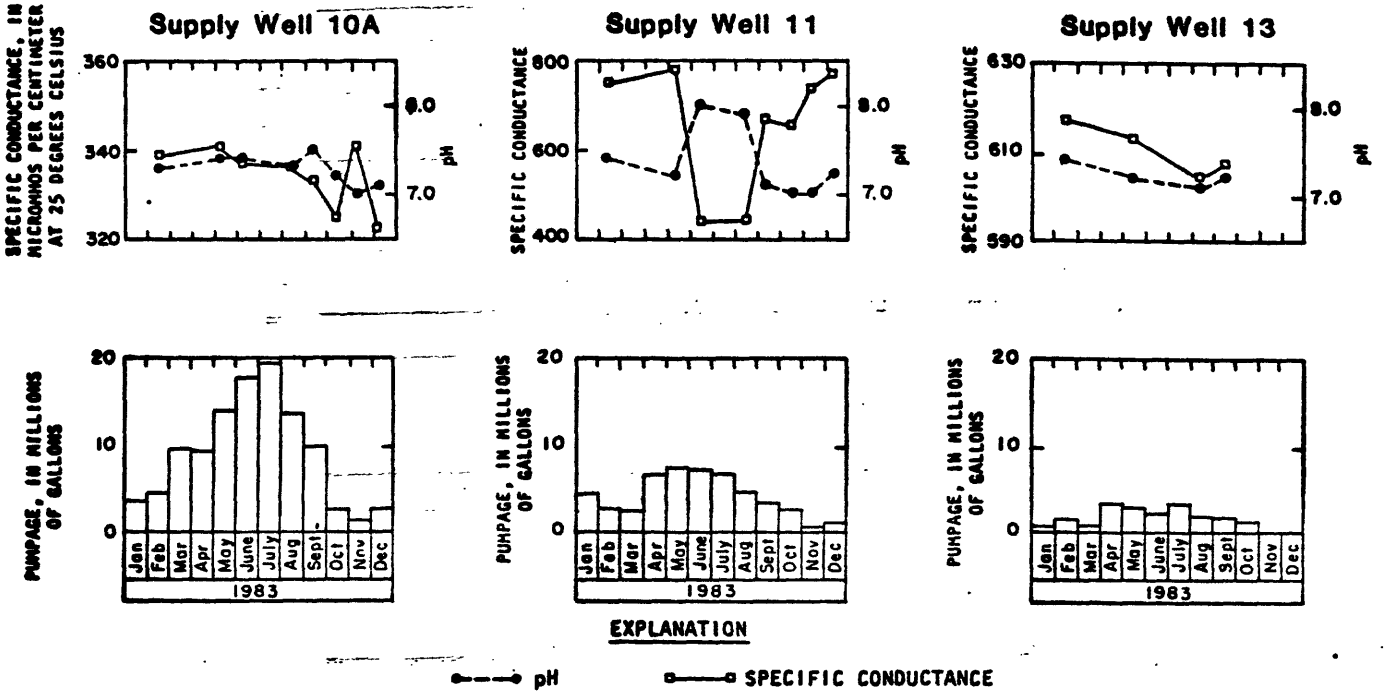



Figure 10.--Monthly specific-conductance, pH, and pumpage values for supply wells 10A, 11, and 13.

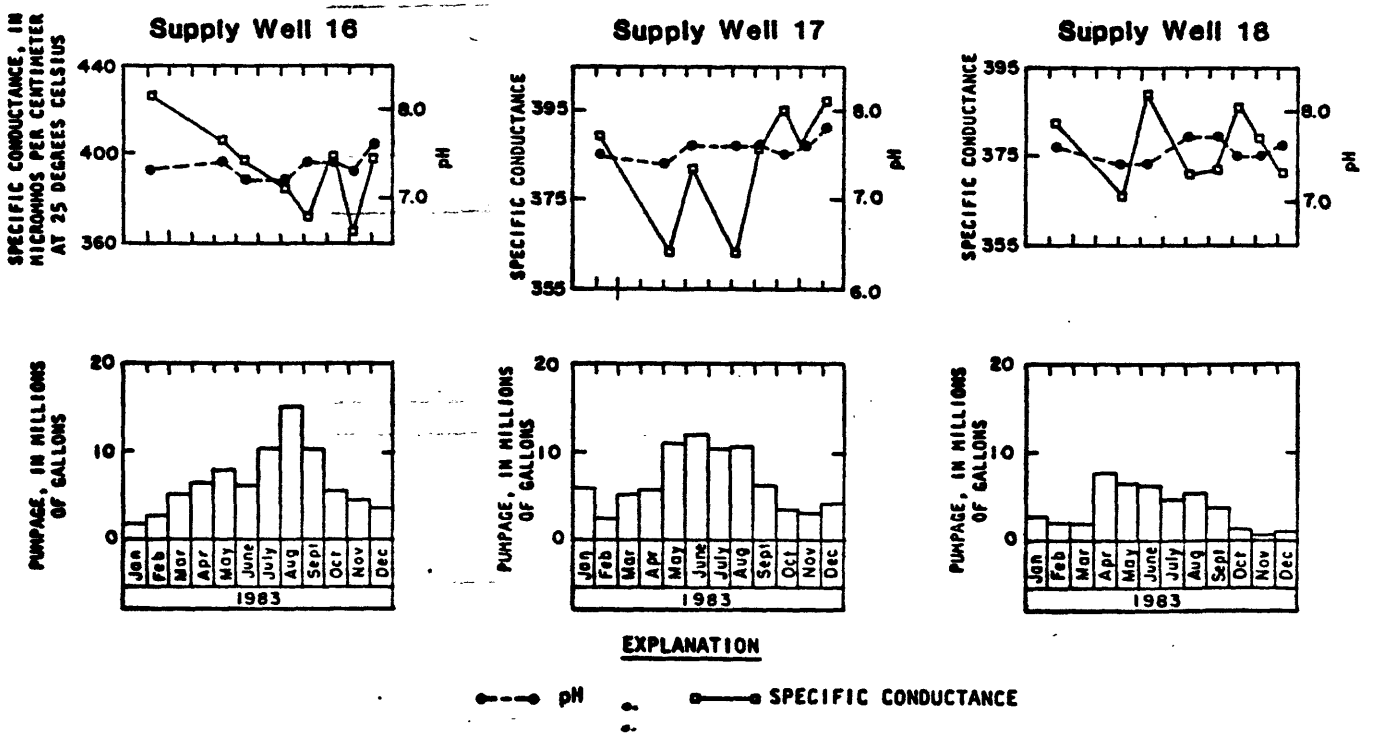



Figure 11.--Monthly specific-conductance, pH, and pumpage values for supply wells 16, 17, and 18.

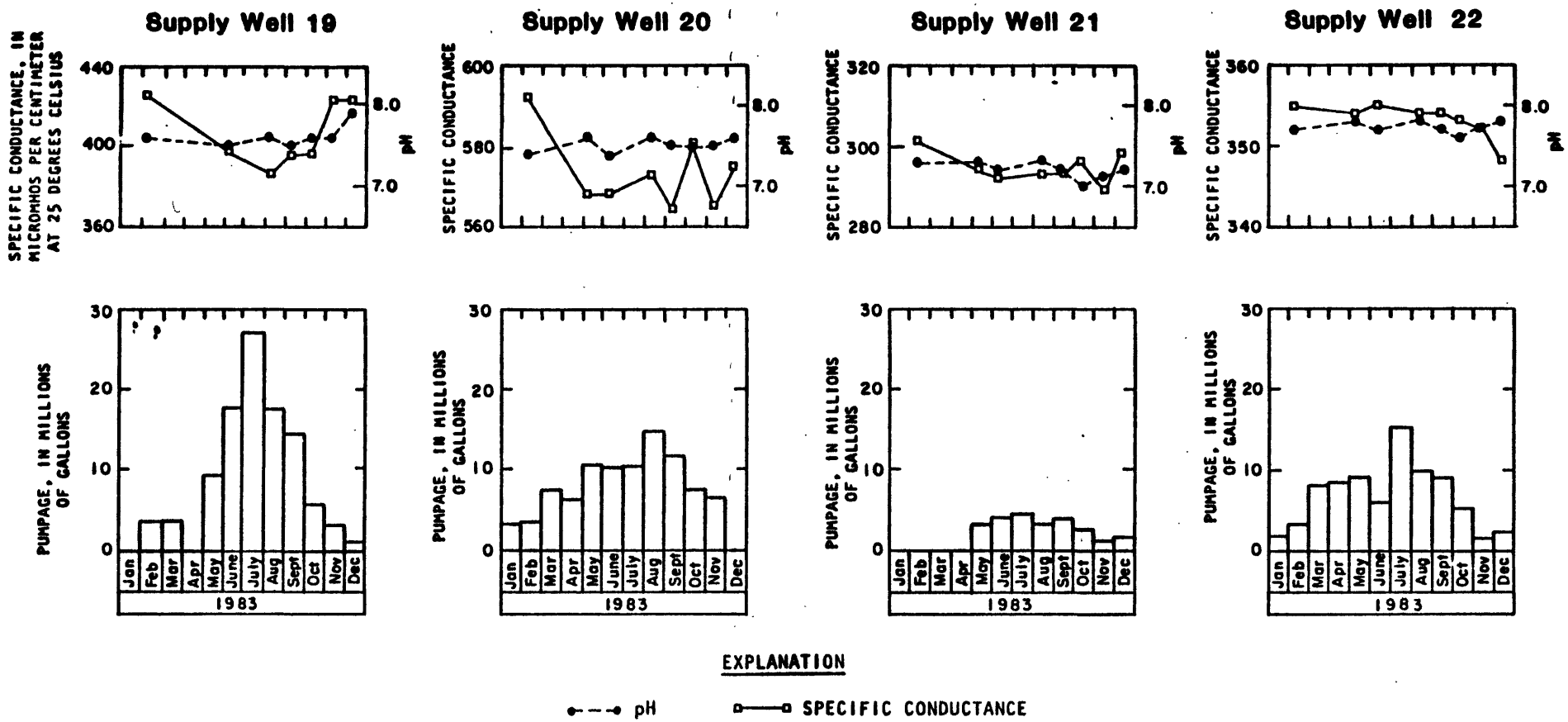



Figure 12.--Monthly specific-conductance, pH, and pumpage values for supply wells 19, 20, 21, and 22.

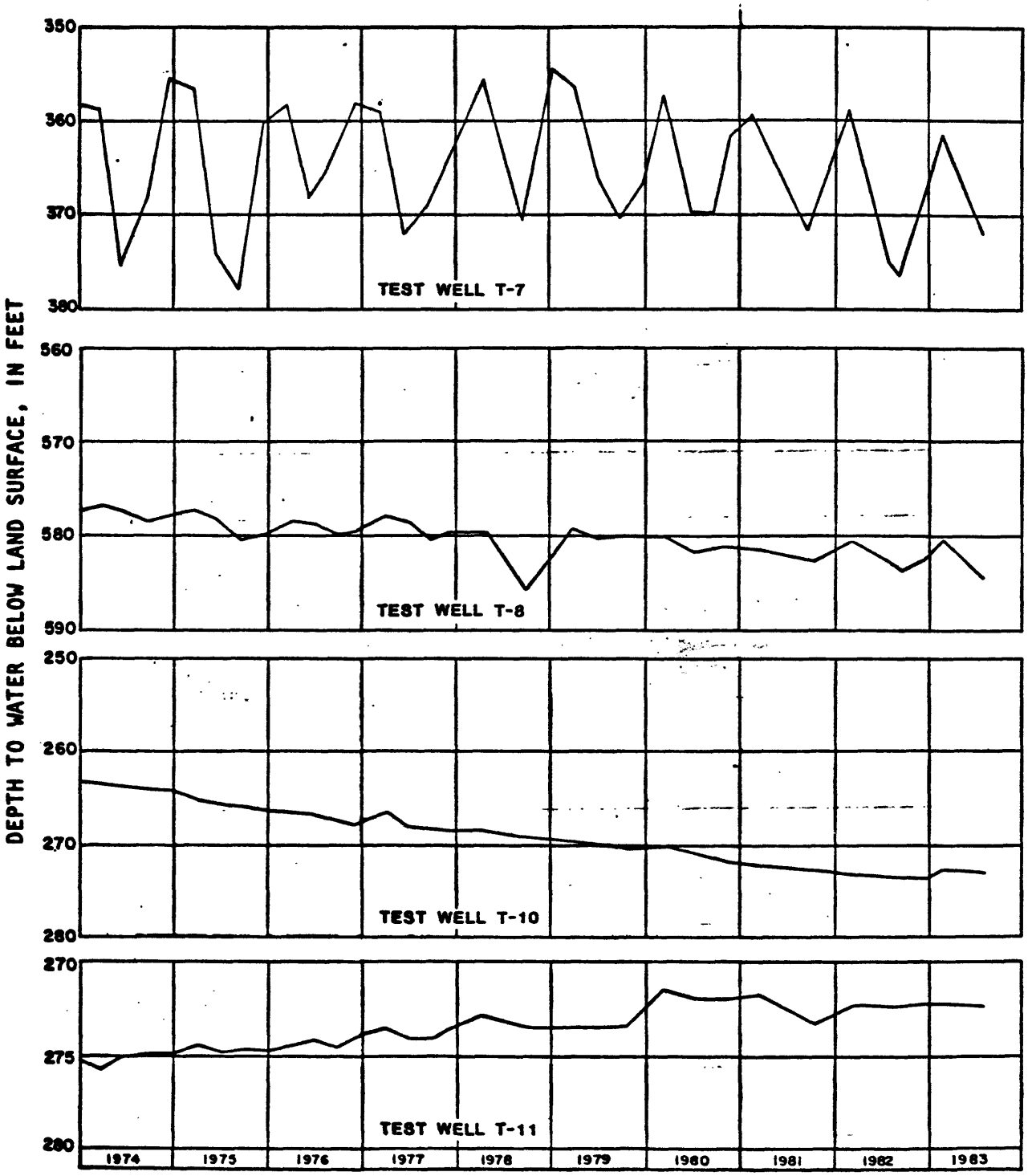



Figure 13.--Water-level fluctuations in test wells T-7, T-8, T-10, and T-11 for 1974-83.

## Water-Level Measurements in Supply Wells

Semiannual depth-to-water measurements were made in 16 supply wells (10 supply wells in the Post Headquarters area and 6 supply wells in the range areas). Observed seasonal changes ranged from a water-level rise of 3.00 feet in Stallion Range Center well 2 (SRC-2) to a water-level decline of 51 feet in Post Headquarters supply well 11 (table 2). Post Headquarters supply well 15A, a replacement for supply well 15, was completed in October 1983. The depth to water measured on December 7, 1983, was 456.00 feet. Semiannual measurements will be made in this well starting in 1984. Water-level fluctuations for the period of record in the Post Headquarters supply wells are shown in figures 7, 8, and 9. The three supply wells, 18, 19, and 20, at the north end of the Post Headquarters well field showed the least amount of seasonal decline, ranging from 2.06 feet to 14.20 feet. The Multifunction Array Radar wells (MAR-1 and -2) were each measured only once during 1983 due to pumping. Seasonal changes are not available in these two wells for 1983, but the static water levels are comparable to 1982 water levels.

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

Semiannual depth-to-water measurements were made in 28 test and observation wells in 1983 (table 3). A summer depth-to-water measurement was not made in NW30-1 because it was temporarily being pumped for uprange construction work. Seven new test and observation wells (T-21, T-22, T-27, T-29, T-30, TW-1, and TW-2) were added to the network in the summer of 1983. The change in water level from 1973 to 1983 for 24 test and observation wells is shown in table 3. West of the Post Headquarters well field, three wells (T-6, T-9, and OS-12) had water-level rises for 1973-83, and well T-8 had a water-level decline. Water-level declines took place in all the test wells (T-4, T-5, T-7, T-10, and T-13) that are less than 2½ miles east of the well field and are not influenced by artificial recharge.

Semiannual depth-to-water measurements were made in 37 boreholes in 1983 (table 4). The change in water level from 1973 to 1983 is shown in table 4 for 32 boreholes. No measurements were made in boreholes B-3, B-14, B-16, B-31, and B-40 during summer of 1973; therefore, no 1973-83 change is shown for these boreholes. Three of the four boreholes west of the Headquarters well field (B-36, B-37, and B-42) had a water-level rise for 1973-83; only B-20 had a decline. Water-level declines took place in all the boreholes (B-10, B-13, B-15, B-47, and B-50) that are less than 2½ miles east of the well field. Twelve boreholes (B-6, B-9, B-18, B-27, B-28, B-30, B-34, B-38, B-39, B-48, B-49, and B-51) had declines of less than 1.00 foot for 1973-83.

Water-level fluctuations in test wells T-7, T-8, T-10, and T-11 for 1974-83 are shown in figure 13. These four test wells are equipped with continuous recording gages.

Table 2.--Depth to water in supply wells, Post Headquarters and range areas, 1983, and seasonal change.

| Well number | Location | Winter 1983 (feet below land surface) | Summer 1983 (feet below land surface) | 1983 seasonal change[a] (feet) |
|---|---|---|---|---|
| 10A | 22S.4E.24.212a | 426.54 | 443.29 | -16.75 |
| 11 | 22S.4E.24.112 | 293.00* | 344.00 | -51.00 |
| 13 | 22S.4E.13.311 | 279.70 | - | - |
| 16 | 22S.4E.13.432 | 444.00* | 473.00* | -29.00 |
| 17 | 22S.4E.13.241 | 437.48 | 459.27 | -21.79 |
| 18 | 22S.4E.12.434 | 427.58 | 441.78 | -14.20 |
| 19 | 22S.4E.12.414 | 454.38 | 459.64 | -2.06 |
| 20 | 22S.4E.12.214 | 514.53 | 518.79 | -4.26 |
| 21 | 22S.5E.19.323 | 353.26 | 367.55 | -14.29 |
| 22 | 22S.5E.19.141 | 375.61 | 402.02 | -26.41 |
| HTA-1 | 21S.4E.23.233 | 64.21 | 65.58 | -1.37 |
| SMR-1 | 21S.5E.16.132 | 294.63 | 297.18 | -2.55 |
| MAR-1 | 19S.5E.17.331 | 214.17 | - | - |
| MAR-2 | 19S.5E.17.334 | - | 221.20 | - |
| SRC-1 | 6S.3E.05.232 | 206.60 | 215.00 | -8.40 |
| SRC-2 | 6S.3E.05.234 | 214.00 | 211.00 | +3.00 |

[a] Water-level rise (+) or decline (-)

* Air line reading

Table 3.--Depth to water in test and observation wells, Post Headquarters and range areas, 1983, and change from 1973 to 1983 (winter measurements).

| Well number | Location | Winter 1983 (feet below land surface) | Summer 1983 (feet below land surface) | Change 1973 to 1983 (feet)† |
|---|---|---|---|---|
| T-4 | 22S.5E.16.111 | 226.52 | 226.63 | -1.20 |
| T-5 | 22S.5E.20.111 | 276.71 | 276.70 | -2.43 |
| T-6 | 22S.4E.14.133 | 195.93 | 194.73 | +12.42 |
| T-7 | 22S.5E.07.342 | 361.95 | 371.73 | -8.50 |
| T-8 | 22S.4E.11.224 | 580.64 | 583.87 | -6.81 |
| T-9 | 22S.4E.01.431 | 380.25 | 377.08 | +11.52 |
| T-10 | 22S.5E.05.313 | 272.64 | 273.10 | -10.73 |
| T-11 | 22S.5E.29.412 | 272.33 | 272.53 | +3.44 |
| T-13 | 21S.5E.32.222 | 212.98 | 213.53 | -3.59 |
| T-14 | 22S.5E.15.221 | 132.19 | 132.19 | -0.27 |
| T-15 | 22S.5E.33.244 | 179.54 | 179.58 | -0.65 |
| T-16 | 23S.5E.10.413 | 185.41 | 183.35 | +0.95 |
| T-17 | 23S.5E.27.142 | 242.26 | 242.22 | -0.24 |
| T-18 | 23S.5E.05.321 | 238.34 | 238.31 | +5.78 |
| OS-9 | 22S.5E.31.424 | 243.86 | 244.00 | - |
| OS-12 | 22S.4E.23.214 | 232.24 | 233.58 | +23.61 |
| OS-15 | 22S.4E.13.424 | 425.41 | 446.70 | - |
| Gregg | 22S.6E.08.414 | 214.21 | 214.48 | -0.03 |
| HTA (wm) | 21S.4E.22.222 | 42.24 | 43.09 | +3.87 |
| SMR-2 | 21S.5E.17.424 | 319.44 | 320.54 | -6.94 |
| SMR-3 | 20S.5E.34.133 | 295.27 | 295.97 | -2.98 |
| SMR-4 | 21S.5E.20.344 | 288.46 | 288.87 | -8.88 |
| MAR-1 (test) | 19S.5E.17.333 | 221.57 | 221.15 | -0.46 |
| MAR-4 | 19S.5E.19.231 | 303.36 | 303.62 | +0.93 |
| NW30-1 | 17S.4E.02.211 | 221.60 | - | -9.98 |
| Murray | 8S.5E.32.334 | 177.06 | 177.31 | -0.57 |

Table 3.—Depth to water in test and observation wells, Post Headquarters and range areas, 1983, and change from 1973 to 1983 (winter measurements) - Concluded.

| Well number | Location | Winter 1983 (feet below land surface) | Summer 1983 (feet below land surface) | Change 1973 to 1983 (feet)† |
|---|---|---|---|---|
| Lucero Ranch | 19S.5E.22.334 | 171.05 | 171.02 | - |
| CW | 21S.5E.28.411 | 154.57 | 154.70 | - |
| T-21 | 22S.5E.30.122 | - | 317.29†† | - |
| T-22 | 23S.5E.15.332 | - | 189.58†† | - |
| T-27 | 22S.5E.22.141 | - | 162.55†† | - |
| T-29 | 22S.5E.28.122 | - | 148.35†† | - |
| T-30 | 22S.5E.32.334 | - | 213.72†† | - |
| TW-1 | 22S.6E.16.233 | - | 229.00†† | - |
| TW-2 | 22S.6E.16.234 | - | 235.46†† | - |

† Water-level rise (+) or decline (-) in winter measurements.
†† First water level included in regularly scheduled measurements.

Table 4.--Depth to water in boreholes, Post Headquarters and adjacent areas, 1983, and change from 1973 to 1983 (summer measurements).

| Borehole number | Location | Winter 1983 (feet below land surface) | Summer 1983 (feet below land surface) | Change 1973 to 1983 (feet)† |
|---|---|---|---|---|
| B-2 | 22S.5E.28.124 | 195.97 | 195.46 | +7.80 |
| B-3 | 22S.5E.28.142 | 202.82 | 202.77 | - |
| B-4 | 22S.5E.28.233 | 196.32 | 196.66 | +3.22 |
| B-5 | 22S.5E.33.223 | 187.82 | 187.43 | +1.79 |
| B-6 | 23S.5E.01.113 | 133.90 | 133.84 | +0.42 |
| B-9 | 22S.5E.21.211 | 225.11 | 225.30 | +0.81 |
| B-10 | 22S.5E.19.414 | 304.79 | 307.87 | -6.31 |
| B-13 | 22S.5E.08.141 | 240.32 | 242.47 | -7.28 |
| B-14 | 22S.5E.03.221 | 112.24 | 112.32 | - |
| B-15 | 22S.5E.05.242 | 173.77 | 174.20 | -6.10 |
| B-16 | 21S.5E.34.213 | 109.21 | 109.42 | - |
| B-17 | 21S.5E.33.242 | 111.42 | 111.65 | -1.96 |
| B-18 | 21S.5E.23.134 | 104.32 | 104.49 | -0.76 |
| B-20 | 22S.4E.14.134 | 349.11 | 349.24 | -15.57 |
| B-23 | 22S.5E.16.111 | 224.66 | 224.94 | -4.90 |
| B-26 | 21S.6E.32.114 | 141.00 | 141.29 | -1.11 |
| B-27 | 21S.6E.17.314 | 119.77 | 119.94 | -0.55 |
| B-28 | 21S.5E.02.341 | 140.33 | 140.44 | -0.72 |
| B-30 | 20S.5E.23.213 | 89.58 | 89.72 | -0.42 |
| B-31 | 20S.6E.29.123 | 123.24 | 123.40 | - |
| B-34 | 21S.5E.01.221 | 126.22 | 126.41 | -0.49 |
| B-36 | 22S.4E.01.323 | 211.60 | 212.03 | +6.20 |
| B-37 | 22S.4E.11.344 | 391.00 | 391.87 | +24.91 |
| B-38 | 20S.6E.11.234 | 129.63 | 129.94 | -0.60 |
| B-39 | 21S.6E.02.142 | 156.18 | 156.33 | +0.05 |
| B-40 | 21S.6E.26.142 | 188.60 | 188.61 | - |
| B-42 | 22S.4E.11.444 | 376.74 | 374.85 | +11.85 |

Table 4.--Depth to water in boreholes, Post Headquarters and adjacent areas, 1983, and change from 1973 to 1983 (summer measurements) - Concluded.

| Borehole number | Location | Winter 1983 (feet below land surface) | Summer 1983 (feet below land surface) | Change 1973 to 1983 (feet)† |
|---|---|---|---|---|
| B-46 | 21S.5E.27.113 | 135.73 | 135.99 | -1.79 |
| B-47 | 22S.5E.08.334 | 273.78 | 274.62 | -5.63 |
| B-48 | 22S.6E.31.322 | 203.54 | 204.44 | -0.04 |
| B-49 | 22S.5E.09.113 | 199.93 | 200.29 | -0.69 |
| B-50 | 22S.5E.07.242 | 304.23 | 304.42 | -12.97 |
| B-51 | 22S.5E.26.312 | 146.52 | 146.64 | +0.89 |
| B-52 | 22S.5E.09.113 | 210.30 | 210.87 | -3.47 |
| B-54 | 22S.5E.16.111 | 229.75 | 229.63 | -1.78 |
| B-55 | 22S.5E.09.113 | 214.50 | 214.43 | -2.33 |
| B-56 | 22S.5E.30.424 | 276.64 | 276.59 | +3.09 |

† Water-level rise (+) or decline (-) in summer measurements.

## Chemical Quality

Sixteen water samples were collected from existing test and observation wells for laboratory analysis of specific conductance in 1983 (table 5). Eight water samples from supply, test, and observation wells were collected for major chemical-constituent analyses in 1983 (table 6). Three of these wells (HTA-4, RC-4, and DC-1) were sampled for the first time in 1983. The specific conductance of the water from well HTA-4 was 838 micromhos; well RC-4, 1,000 micromhos; and well DC-1, 4,090 micromhos. Trace-element analyses, in addition to major chemical-constituent analyses, were completed for these three wells. The water samples from RC-4 and DC-1 were obtained by pumping the well. The water sample from HTA-4 was obtained by using a small bailer.

Graphs of the specific-conductance values of water samples from the Post Headquarters supply wells for the period of record are shown in figures 7, 8, and 9. Specific-conductance and pH values of water from Post Headquarters supply wells for 1983 are shown in figures 10, 11, and 12. The specific conductances of the water from the Post Headquarters supply wells generally were lower in the summer during the period of greatest withdrawal. The location, pH values, and specific-conductance values of selected test wells in the Post Headquarters area are shown in figure 14.

Table 5.--Specific-conductance values of water samples collected from test and observation wells, August 1983, White Sands Missile Range

| Well number | Specific-conductance value (lab) (micromhos per centimeter at 25° Celsius) | Sampling point (feet below land surface) |
|---|---|---|
| T-4 | 309 | 325 |
| T-5 | 354 | 330 |
| T-6 | 337 | 350 |
| T-7 | 347 | 444 |
| T-8 | 596 | 915 |
| T-9 | 844 | 550 |
| T-10 | 323 | 513 |
| T-11 | 286 | 570 |
| T-13 | 519 | 320 |
| T-14 | 1,480 | 200 |
| T-14 | 1,450 | 300 |
| T-15 | 307 | 400 |
| T-16 | 356 | 300 |
| T-17 | 178 | 350 |
| T-18 | 699 | 350 |
| OS-12 | 461 | 350 |

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

[UMHOS, micromhos per centimeter at 25° Celsius; MG/L, milligrams per liter; UG/L, micrograms per liter]

| WELL | LOCATION | DATE OF SAMPLE | SPECIFIC CONDUCTANCE (UMHOS) | PH LAB (STANDARD UNITS) | NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) | CALCIUM DISSOLVED (MG/L AS CA) | MAGNESIUM, DISSOLVED (MG/L AS MG) | SODIUM, DISSOLVED (MG/L AS NA) | POTASSIUM, DISSOLVED (MG/L AS K) | CHLORIDE, DISSOLVED (MG/L AS CL) | SULFATE DISSOLVED (MG/L AS SO4) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T-14 | 22S.05E.15.221 | 83-08-30 | 1450 | 9.2 | .43 | 3.8 | .2 | 320 | 5.0 | 350 | 23 |
| SW-11 | 22S.04E.24.112 | 83-09-07 | 676 | 7.1 | 8.0 | 78 | 19 | 31 | 2.7 | 24 | 140 |
| SW-17 | 22S.04E.13.241 | 83-09-07 | 386 | 7.5 | 1.2 | 31 | 5.0 | 40 | 1.8 | 14 | 62 |
| SW-22 | 22S.05E.19.141 | 83-09-07 | 354 | 7.7 | .83 | 32 | 4.3 | 35 | 1.7 | 9.0 | 59 |
| SRC-2 | 06S.03E.05.234 | 83-08-15 | 3380 | 7.8 | 2.5 | 390 | 180 | 240 | 8.6 | 21 | 2100 |

| WELL | FLUORIDE, DISSOLVED (MG/L AS F) | SILICA, DISSOLVED (MG/L AS SIO2) | BORON, DISSOLVED (UG/L AS B) | SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) | ALKALINITY LAB (MG/L AS CACO3) |
|---|---|---|---|---|---|
| T-14 | .60 | 2.3 | 60 | 716 | 162 |
| SW-11 | .30 | 44 | 10 | 437 | 134 |
| SW-17 | .50 | 31 | 30 | 252 | 104 |
| SW-22 | .40 | 30 | 20 | 229 | 108 |
| SRC-2 | .70 | 32 | 440 | 3390 | 42 |

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

| WELL | LOCATION | DATE OF SAMPLE | SPECIFIC CONDUCTANCE (UMHOS) | PH LAB (STANDARD UNITS) | NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) | PHOSPHORUS, DISSOLVED (MG/L AS P) | HARDNESS (MG/L AS CACO3) | CALCIUM DISSOLVED (MG/L AS CA) | MAGNESIUM, DISSOLVED (MG/L AS MG) | SODIUM, DISSOLVED (MG/L AS NA) | SODIUM ADSORPTION RATIO |
|---|---|---|---|---|---|---|---|---|---|---|---|
| HTA-4 | 21S.04E.14.122 | 83-02-22 | 838 | 7.5 | 6.1 | .070 | 310 | 86 | 22 | 64 | 1.7 |
| RC-4 | 13S.04E.11.344 | 83-06-01 | 1000 | 8.2 | 5.6 | .010 | 450 | 94 | 51 | 38 | .8 |
| DC-1 | 08S.04E.12.444 | 83-08-15 | 4090 | 7.8 | 11 | .010 | 2000 | 490 | 180 | 340 | 3.4 |

| WELL | PERCENT SODIUM | POTASSIUM, DISSOLVED (MG/L AS K) | CHLORIDE, DISSOLVED (MG/L AS CL) | SULFATE DISSOLVED (MG/L AS SO4) | FLUORIDE, DISSOLVED (MG/L AS F) | SILICA, DISSOLVED (MG/L AS SIO2) | ARSENIC DISSOLVED (UG/L AS AS) | BARIUM, DISSOLVED (UG/L AS BA) | BORON, DISSOLVED (UG/L AS B) | CADMIUM DISSOLVED (UG/L AS CD) | CHROMIUM, DISSOLVED (UG/L AS CR) | COPPER, DISSOLVED (UG/L AS CU) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HTA-4 | 31 | 1.7 | 37 | 160 | 5.1 | 25 | 1 | 34 | 40 | 1 | 10 | 18 |
| RC-4 | 16 | 2.7 | 52 | 270 | .80 | 25 | 1 | 22 | 80 | 1 | 10 | 2 |
| DC-1 | 27 | 5.3 | 120 | 2500 | 1.3 | 12 | 1 | 100 | 780 | 2 | 20 | 5 |

| WELL | IRON, DISSOLVED (UG/L AS FE) | LEAD, DISSOLVED (UG/L AS PB) | MANGANESE, DISSOLVED (UG/L AS MN) | SILVER, DISSOLVED (UG/L AS AG) | STRONTIUM, DISSOLVED (UG/L AS SR) | ZINC, DISSOLVED (UG/L AS ZN) | LITHIUM DISSOLVED (UG/L AS LI) | SELENIUM, DISSOLVED (UG/L AS SE) | SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) | SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) | MERCURY DISSOLVED (UG/L AS HG) | HARDNESS NONCARBONATE (MG/L AS CACO3) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HTA-4 | 3 | 1 | 41 | 1 | 280 | 470 | 28 | 2 | 553 | 525 | .2 | 100 |
| RC-4 | 7 | 1 | 12 | 1 | 1600 | 290 | 30 | 3 | 746 | 645 | .2 | 265 |
| DC-1 | 70 | 1 | 90 | 1 | 9500 | 1400 | 120 | 10 | 2930 | 3680 | .1 | 1940 |

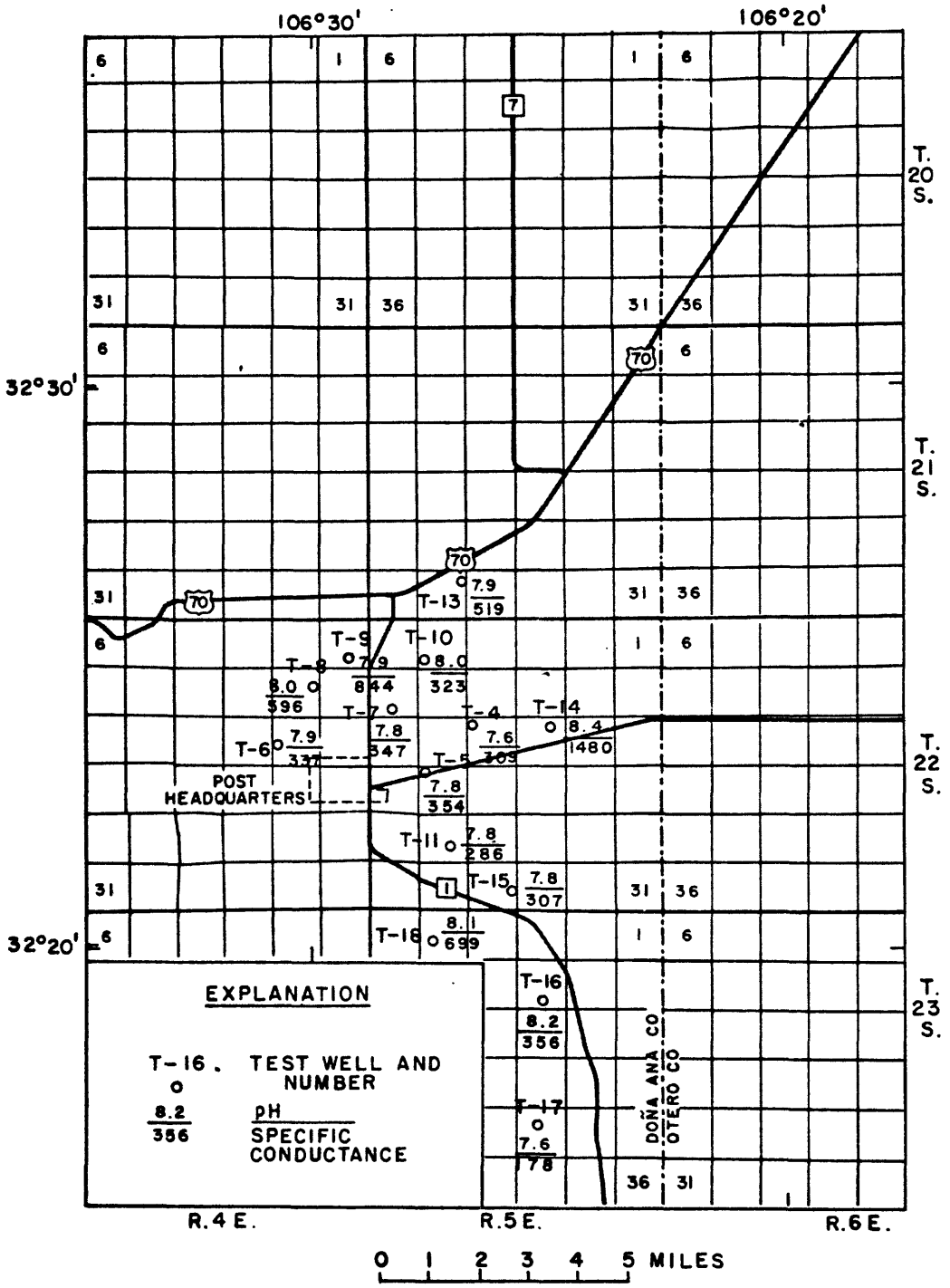



Figure 14.--Specific-conductance values and pH values of water from test wells, Post Headquarters area, 1983.

## MISCELLANEOUS OBSERVATIONS

A total of eleven wells were drilled on White Sands Missile Range during 1983. Two of the wells were drilled by private contractors and nine wells by military personnel.

Of the wells drilled during 1983, supply well 15A is of primary interest to White Sands Missile Range. This well is a replacement for supply well 15, which was taken out of operation in April 1982. Supply well 15A was drilled approximately 1½ miles south of supply well 10A and approximately 1½ miles southwest of supply wells 21 and 22. Pumping at this location probably will cause a more uniform lowering of the water table in the Post Headquarters well field. Supply well 15 was in the center of the well field about 2 miles northwest of supply well 15A.

## 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.

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.