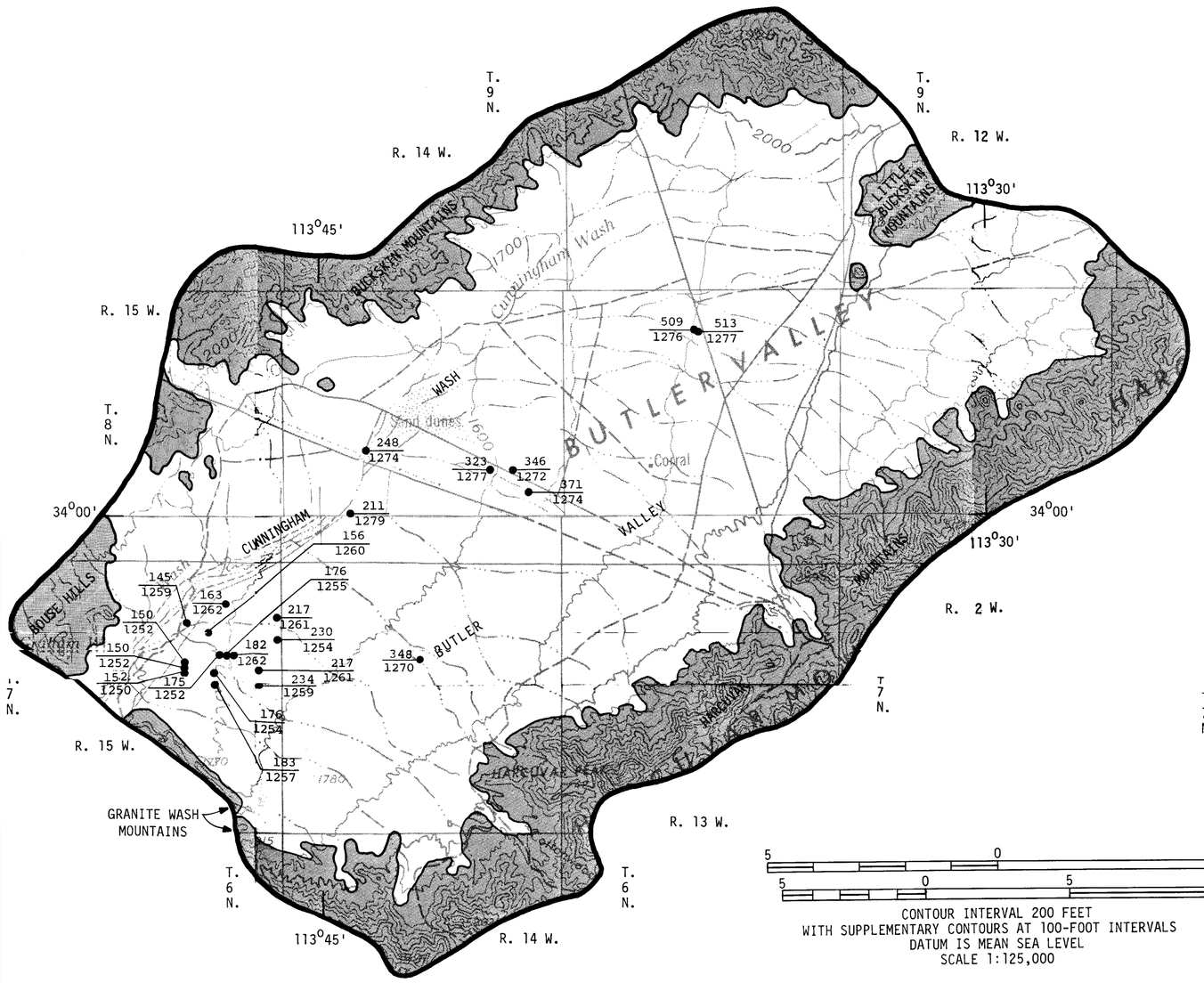
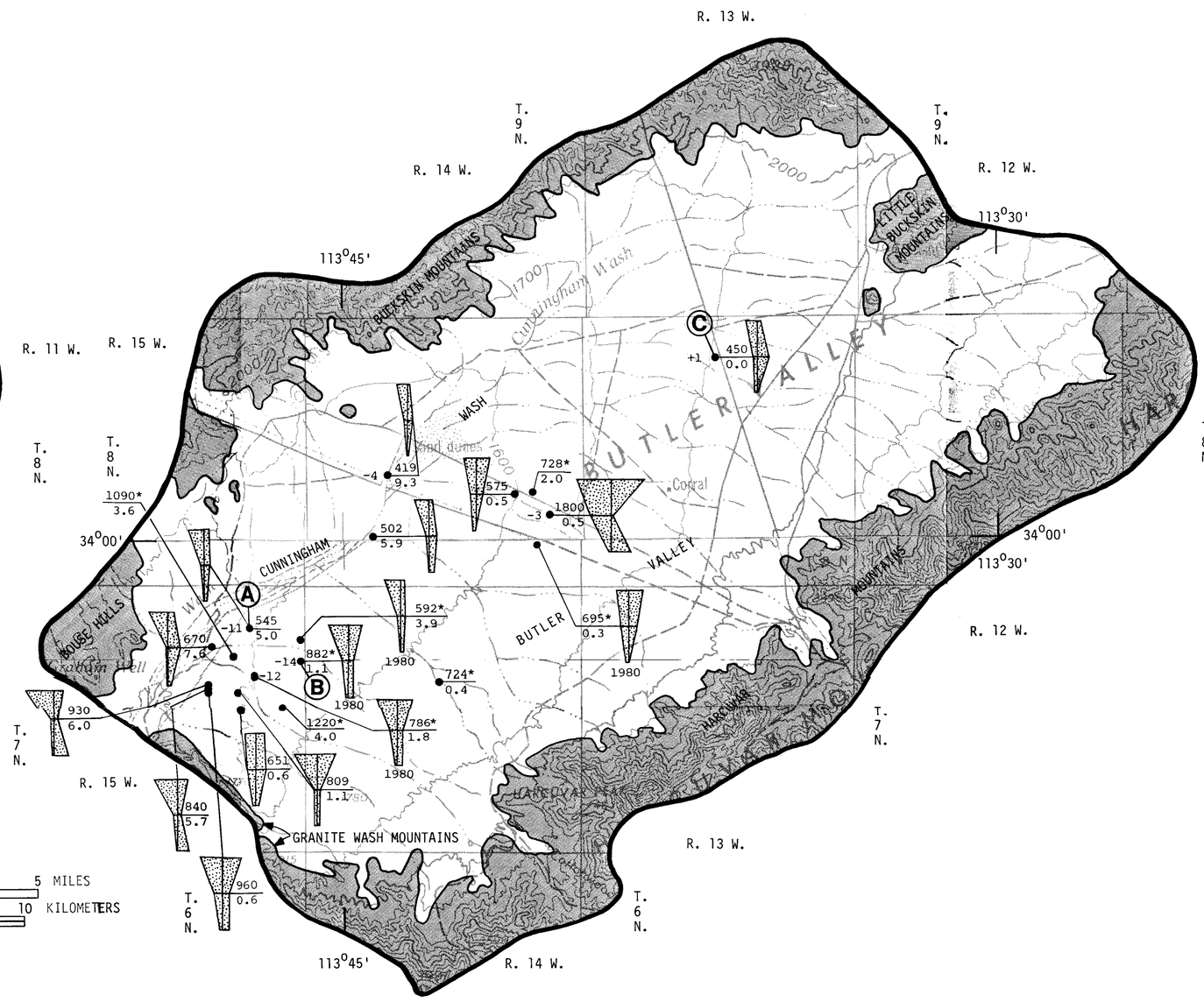
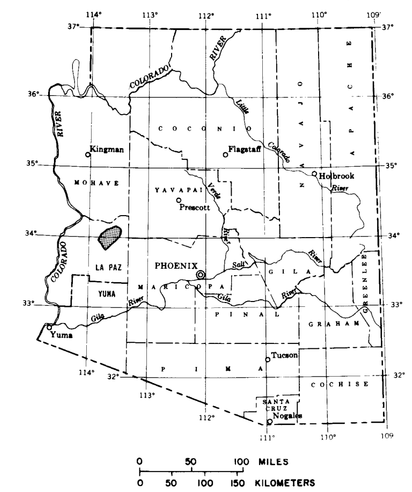



CONTOUR INTERVAL 200 FEET
WITH SUPPLEMENTARY CONTOURS AT 100-FOOT INTERVALS
DATUM IS MEAN SEA LEVEL
SCALE 1:125,000

DEPTH TO WATER AND ALTITUDE OF THE WATER LEVEL, SPRING 1986

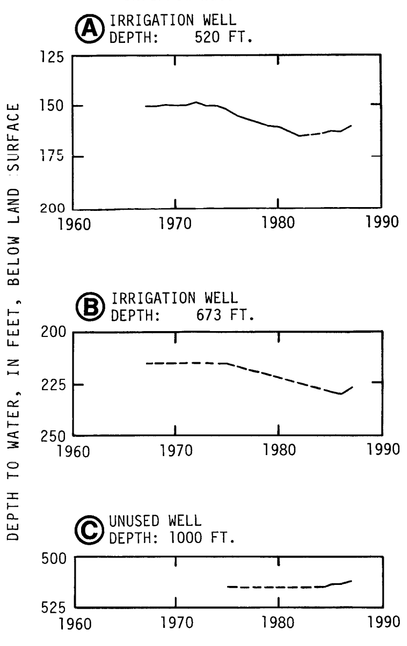



CHANGE IN WATER LEVEL, 1975-1986, HYDROGRAPHS OF THE WATER LEVEL IN SELECTED WELLS, AND CHEMICAL QUALITY OF WATER, 1985




INDEX MAP SHOWING AREA OF REPORT (SHADED)

HYDROGRAPHS OF THE WATER LEVEL IN WELLS SHOWN ON THE MAP
(Dashed Line Indicates Inferred Water Level)




## EXPLANATION

182 / 1262 — WELL IN WHICH DEPTH TO WATER WAS MEASURED IN 1986--Upper number, 182, is depth to water in feet below land surface. Lower number, 1262, is the altitude of the water level in feet above mean sea level

724* / 0.4 — WELL FOR WHICH A WATER SAMPLE WAS COLLECTED IN 1985--Upper number, 724 , is specific conductance in micromhos per centimeter at 25°C (specific conductance is an indication of dissolved-solids concentration in water). Asterisk after number indicates water sample collected in year other than 1985. Lower number, 0.4 , is the fluoride concentration in milligrams per liter

-14 — WELL IN WHICH WATER LEVEL WAS MEASURED IN 1975 AND 1986--Number, -14, is the difference in feet between the 1975 and 1986 measurements

A — WELL FOR WHICH HYDROGRAPH DEPICTING CHANGES IN DEPTH TO WATER IS SHOWN

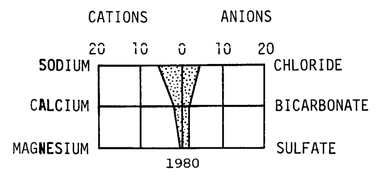
BEDROCK (VOLCANIC, GRANITIC, METAMORPHIC, OR SEDIMENTARY ROCK)--Water may occur in weathered or fractured zones, joint systems, or thin alluvium overlying bedrock

WATER-BEARING UNITS (CLAY, SILT, SAND, AND GRAVEL)

ARBITRARY BOUNDARY OF GROUNDWATER BASIN

CHEMICAL QUALITY DIAGRAM--Shows major constituents in milliequivalents per liter. The diagrams are in a variety of shapes and sizes, providing a means of comparing, correlating, and characterizing similar or dissimilar types of water. Year, 1980, below diagram indicates sample collected in year other than 1985

MILLIEQUIVALENTS PER LITER




For readers who prefer to use metric units rather than inch-pound units, the conversion factors for the terms used in this report are listed below:

| Multiply inch-pound unit | By | To obtain metric unit |
|---|---|---|
| inch | 25.4 | millimeter |
| foot | 0.3048 | meter |
| mile | 1.609 | kilometer |
| square mile | 2.590 | square kilometer |
| acre | 0.4047 | square hectometer |
| acre-foot | 0.001233 | cubic hectometer |
| gallons per minute | 0.06309 | liters per second |

## INTRODUCTION

The Butler Valley basin, located in west-central Arizona, is about 120 miles west of Phoenix and includes approximately 280 square miles. Situated within the Mexican Highlands section of the Basin and Range physiographic province (Fenneman, 1931, p. 381), the basin is bounded on the north and northwest by the Buckskin Mountains, on the northeast by the Little Buckskin Mountains, on the east and southeast by the Harcuvar Mountains, on the south by the Granite Wash Mountains, and on the west by the Bouse Hills. Land surface ranges from 1,345 feet above sea level at the gap in the southwestern end of the basin between the Granite Wash Mountains and the Bouse Hills, to 5,135 feet above sea level in the Harcuvar Mountains. The valley floor slopes in a northeasterly direction from 1,345 feet above sea level in the southwest to 2,000 feet above sea level in the northeast.

No local climatological data are available for the Butler Valley basin. However, data are available for Salome, Arizona, located about 10 miles southeast of the area. The climate of the Salome area is arid, receiving an average annual precipitation of less than seven inches, except in the higher mountain elevations, where the annual precipitation is probably greater. The wettest period of the year is July and August, during which an average of 2.24 inches of precipitation occurs. The average daily maximum air temperature for Salome is 64°F in January and 105°F in July. The average daily minimum air temperature is 33°F in January and 71°F in July. Extremes of 10°F in January and 117°F in July have been recorded (Sellers and others, 1985, pp. 89, 92, 101, 104, 114).

The Butler Valley basin is drained by Cunningham Wash which flows in a southwesterly direction and exits the basin at the gap between the Granite Wash Mountains and the Bouse Hills. Cunningham Wash and its tributaries are ephemeral. Groundwater is the only dependable supply of water. The primary use of groundwater in the Butler Valley basin is for agricultural irrigation. in 1985 approximately 800 acres of land was cultivated and groundwater pumpage was estimated at 4,000 acre-feet. Of this total, less than 500 acre-feet was withdrawn for livestock watering and domestic use.

### Groundwater Occurrence and Movement

Groundwater in the Butler Valley basin occurs predominantly in the basin-fill sediments underlying the valley. These deposits consist of silt, sand, clay and gravel beds (Wilkens and Webb, 1976), and according to drillers' logs range in thickness from 525 feet in Township 7 North, Range 15 West, to 1,450 feet in Township 8 North, Range 14 West. Depths to groundwater in the Butler Valley basin in 1986 ranged from 145 feet below land surface in a well in Township 7 North, Range 15 West, Section 10, to 513 feet below land surface in a well in Township 8 North, Range 13 West, Section 4. Although no wells are known to exist in the mountain areas along the basin margins, small volumes of groundwater may occur locally in thin alluvium and in fractured and weathered volcanic, granitic, metamorphic, and sedimentary rocks that comprise the mountains.

Groundwater in the Butler Valley basin flows generally from the northeast to the southwest. Water-level altitudes throughout the basin indicate that the water-level gradient is low throughout most of the basin, and is less than one foot per mile in the northeast and central parts of the basin. The water-level gradient increases in the south-western end of the basin as a result of the development of a cone of depression caused by pumpage from the concentration of active wells in that area.

The existence of confined (artesian) conditions in the regional aquifer in Township 7 North, Range 15 West, is confirmed upon analysis and interpretation of aquifer tests performed in the spring of 1985 (Arizona Department of Water Resources, 1986, p. 7), and water-level rises observed in several wells either during drilling or after completion of drilling. The uniformity and areal extent of the confining conditions are not known throughout the basin due to the paucity of wells and stratigraphic data. However, the presence of clay layers noted in the few drillers' logs suggests the possibility of groundwater occurring under confined conditions elsewhere.

### Change in Water Level

Due to the limited number of wells drilled in the basin and a correspondingly small amount of pumpage prior to 1975, water levels changed little or not at all up to that time. Water-level changes between 1975 and 1986 range from a decline of 14 feet in the southwest part of the basin to a rise of one foot in the northeast part. The greater rate of decline in the southwest part of the basin has developed since 1975 due to an increase in pumpage in that area.

### Groundwater Quality

The quality of groundwater in the Butler Valley basin is generally suitable for most agricultural and industrial uses, although domestic users should be aware of locally high fluoride levels. Specific-conductance values for water samples collected from wells in the area ranged from 419 to 1,800 micromhos per centimeter at 25°C, and dissolved-solids concentrations estimated from the specific-conductance values ranged from 250 to 1,080 milligrams per liter (mg/L). Seven of the 20 samples analyzed exceeded the maximum contaminant level for dissolved solids 1/. Fluoride concentrations in the water samples collected in the Butler Valley basin ranged from 0.0 to 9.3 mg/L. Eleven of the 20 samples analyzed exceeded the maximum acceptable fluoride concentration of 1.4 mg/L 2/.

### NOTES

1/ The dissolved-solids concentration may be approximated by multiplying the specific-conductance value by 0.6. The maximum contaminant level allowable under National Secondary-Drinking Water regulations is 500 mg/L (U.S. Environmental Protection Agency, 1977b, p. 17146).

2/ The maximum acceptable concentration of fluoride in public water supplies depends on the annual average of maximum daily air temperatures (U.S. Environmental Protection Agency, 1977a, p. 67). The annual average maximum daily air temperature in this area is about 84°F, and the maximum acceptable fluoride concentration is 1.4 mg/L.

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BASE FROM U.S. GEOLOGICAL SURVEY
PHOENIX, AZ., 1954, REV. 1969, 1:250,000
PRESCOTT, AZ., 1954, REV. 1970, 1:250,000

DEPTH TO WATER AND ALTITUDE OF THE WATER LEVEL, SPRING 1986, CHANGE IN WATER LEVEL, 1975-1986, HYDROGRAPHS OF THE WATER LEVEL IN SELECTED WELLS, AND CHEMICAL QUALITY OF WATER, 1985

MAP SHOWING GROUNDWATER CONDITIONS IN THE BUTLER VALLEY BASIN, LA PAZ COUNTY, ARIZONA -- 1986

BY
P. ORAM

These hydrologic maps are available upon request from the Department of Water Resources, Basic Data Unit, 2810 South 24th Street, Suite 122, Phoenix, Arizona, 85034. The hydrologic data on which these maps are based are available, for the most part, in computer-printout form and may be consulted at the Department of Water Resources and at the U.S. Geological Survey offices located at: Federal Building, 301 West Congress Street, Tucson, Arizona, and 3738 North 16th Street, Suite E, Phoenix, Arizona.