DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
ARIZONA WATER COMMISSION

WATER-RESOURCES INVESTIGATIONS 78-40
OPEN-FILE REPORT (SHEET 1 OF 2)
DEPTH TO WATER AND ALTITUDE OF THE WATER LEVEL

In the western part of the Salt River Valley area, sedimentary deposits form the main water-bearing unit and consist primarily of unconsolidated and weakly consolidated clay, silt, sand, and gravel, which locally contain thick deposits of evaporites. The main water-bearing unit ranges in thickness from a few tens of feet near the mountains to more than 1,200 ft in the central part of the area (Cooley, 1973). The unit may yield from several hundred to a few thousand gallons per minute of water to wells. The evaporite deposits are most widespread in the area immediately southeast of Luke Air Force Base and consist principally of halite capped by anhydrite. According to Eaton and others (1972, p. 1-3, 9), about 10 mi^2 is underlain by the halite body, the top of which ranges from 880 to 1,500 ft below the land surface. The base of the salt body is more than 4,500 ft below the land surface, which is the approximate depth of the deepest well in the area. Estimates based on geophysical data indicate that more than 15 mi^3 of halite is present. In general, the halite will not yield water to wells.

Crystalline rocks, which consist mainly of schist, gneiss, granite, and felsic to mafic volcanic rocks, are present in the mountains that border the main water-bearing unit. Well-cemented conglomerate and sandstone may be present in places. The crystalline rocks, conglomerate, and sandstone may yield no water or may yield as much as a few tens of gallons per minute of water to wells.

In 1976 about 1.68 million acre-ft of ground water was pumped from the eastern and western parts of the Salt River Valley area (Babcock, 1977b). About 90 percent of the water was used for irrigation and 10 percent for municipal and industrial uses. Since 1923, more than 73 million acre-ft of water has been pumped from the Salt River Valley area (see table, sheet 2). The long-term ground-water withdrawal has resulted in a general decline in water levels in the western part of the Salt River Valley area. In the areas north of the Roosevelt Canal and west of the Agua Fria River and in Deer Valley the average water-level decline has been about 250 ft and locally more than 350 ft since 1923. Near the Gila and Salt Rivers, the decline generally has been less than 50 ft. Most of the decline has occurred since the 1940's, when intense ground-water development began.

Detailed information on the chemical quality of the ground water in the western part of the Salt River Valley area is given by Osterkamp (1974) and Kister (1974). The dissolved-solids concentrations in ground water range from less than 500 mg/L (milligrams per liter) in the northernmost part of the area to more than 3,000 mg/L along and near the Gila River. In the Luke area the water from wells that are more than 700 ft deep may be of poor quality owing to the proximity of the wells to the Luke salt body. Water that contains more than 500 mg/L of dissolved solids is not preferred for use as a public supply (U.S. Public Health Service, 1962), but water that contains as much as 3,000 mg/L has been used for irrigation of salt-tolerant crops on well-drained soil (Kister, 1974). The fluoride concentrations in the ground water range from 0.2 mg/L to as much as 10.6 mg/L. The amount of water consumed, and, therefore, the amount of fluoride ingested by humans, depends partly on air temperature. Thus, the optimum fluoride concentration in drinking water is based on the annual average maximum daily air temperature. In the western part of the Salt River Valley the annual average maximum daily air temperature is about 87°F; a fluoride concentration of more than 1.4 mg/L constitutes grounds for rejection of the water supply for public use (U.S. Public Health Service, 1962). In much of the western part of the Salt River Valley area the ground water contains nitrate concentrations that exceed 45 mg/L. Nitrate concentrations in excess of 45 mg/L in drinking water may cause methemoglobinemia or cyanosis in infants (U.S. Public Health Service, 1962).

The hydrologic data on which these maps are based are available, for the most part, in computer-printout form for consultation at the Arizona Water Commission, 222 North Central Avenue, Suite 800, Phoenix, and at U.S. Geological Survey offices in: Federal Building, 301 West Congress Street, Tucson, and Valley Center, Suite 1880, Phoenix. Material from which copies can be made at private expense is available at the Tucson and Phoenix offices of the U.S. Geological Survey.

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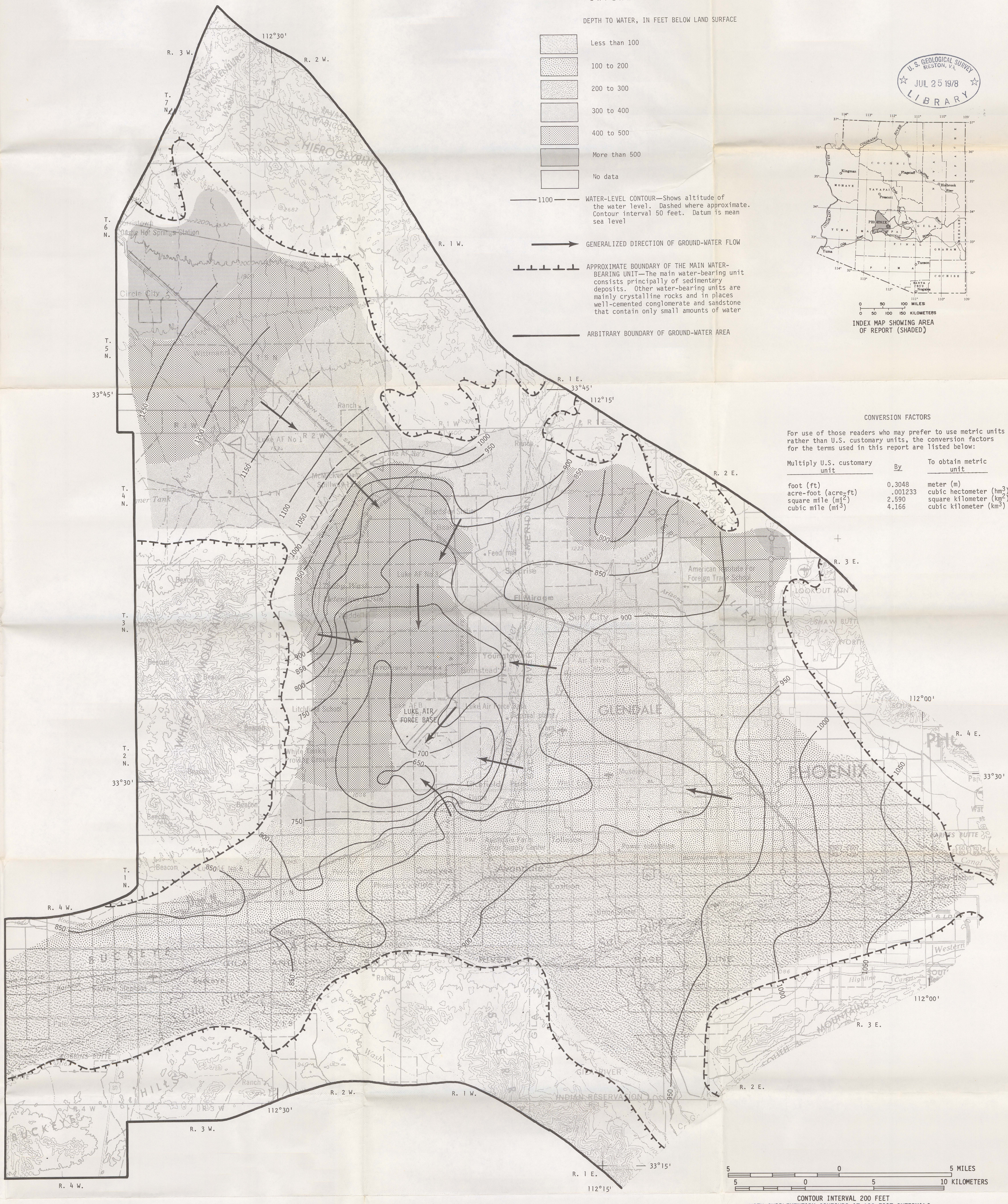

EXPLANATION

DEPTH TO WATER, IN FEET BELOW LAND SURFACE

- Less than 100
- 100 to 200
- 200 to 300
- 300 to 400
- 400 to 500
- More than 500
- No data

——1100—— — — WATER-LEVEL CONTOUR—Shows altitude of the water level. Dashed where approximate. Contour interval 50 feet. Datum is mean sea level

GENERALIZED DIRECTION OF GROUND-WATER FLOW

APPROXIMATE BOUNDARY OF THE MAIN WATER-BEARING UNIT—The main water-bearing unit consists principally of sedimentary deposits. Other water-bearing units are mainly crystalline rocks and in places well-cemented conglomerate and sandstone that contain only small amounts of water

ARBITRARY BOUNDARY OF GROUND-WATER AREA

0 50 100 MILES
0 50 100 150 KILOMETERS

INDEX MAP SHOWING AREA OF REPORT (SHADED)

CONVERSION FACTORS

For use of those readers who may prefer to use metric units rather than U.S. customary units, the conversion factors for the terms used in this report are listed below:

Multiply U.S. customary unit	By	To obtain metric unit
foot (ft)	0.3048	meter (m)
acre-foot (acre-ft)	.001233	cubic hectometer (hm^3)
square mile (mi^2)	2.590	square kilometer (km^2)
cubic mile (mi^3)	4.166	cubic kilometer (km^3)

5 0 5 MILES
5 0 5 10 KILOMETERS

CONTOUR INTERVAL 200 FEET
WITH SUPPLEMENTARY CONTOURS AT 100-FOOT INTERVALS
DATUM IS MEAN SEA LEVEL

BASE FROM U.S. GEOLOGICAL SURVEY
MESA 1:250,000, 1954-69 AND
PHOENIX 1:250,000, 1954-69

DEPTH TO WATER AND ALTITUDE OF THE WATER LEVEL, 1977

MAPS SHOWING GROUND-WATER CONDITIONS IN THE WESTERN PART OF THE SALT RIVER VALLEY AREA, MARICOPA COUNTY, ARIZONA—1977

By

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