



Colored areas are underlain by saturated alluvial deposits, which form the main ground-water reservoir. Gray areas are underlain by rocks that contain only small amounts of recoverable ground water.

Suitable quality
Ground water generally is of good chemical quality for public supply

Fluoride
Ground water generally contains more than 1.4 mg/l (milligrams per liter) of fluoride

Hardness
Ground water generally has more than 150 mg/l of hardness as calcium carbonate

Nitrate
Ground water generally contains more than 45 mg/l of nitrate

Dissolved solids
Ground water generally contains more than 1,000 mg/l of dissolved solids

In public water supplies, large concentrations of fluoride, hardness, nitrate, and dissolved solids are the undesirable water-quality features most common in the ground water in the Phoenix area. Water that has these characteristics, however, may be suitable for irrigation, industrial, or other uses and commonly is used for public supply if better water supply is not available. In some areas trace elements in concentrations undesirable in drinking water also may be present. Fluoride, hardness, nitrate, and dissolved solids in ground water vary also with depth and time. The distribution of the chemical constituents shown on the map represents concentrations in the water in roughly the upper 300 feet (about 100 meters) of saturated alluvial deposits during the 1965-72 irrigation seasons.

The Public Health Service Drinking Water Standards (1962) are applicable to all public water supplies and to the water supplies used by interstate carriers, which are subject to Public Health Service regulations. Fluoride in drinking water is a health problem if ingestion by children is sufficient to cause mottling of teeth; a small amount of fluoride in water, however, strengthens teeth and helps prevent dental caries. Because the amount of water consumed and, therefore, the amount of fluoride ingested by humans partly depends on air temperature, the optimum fluoride concentration in drinking water is based on the annual average of maximum daily air temperature; for the Phoenix area, a fluoride concentration of more than 1.4 mg/l constitutes grounds for rejection of the water for public use.

Hardness—the soap-consuming property of water—is caused mainly by the calcium and magnesium content. Hardness reduces the effectiveness of soap by forming an insoluble residue and causes incrustation on pipes, utensils, and appliances that come in contact with the heated water. Hardness is not known to be a health hazard, and, therefore, no optimum hardness concentration has been set. For domestic water supplies that contain more than about 150 mg/l hardness, however, it is often desirable to reduce the disadvantages of incrustation and soap consumption by use of a water-softening system.

Nitrate concentrations of more than 45 mg/l in drinking water can cause methemoglobinemia or cyanosis in infants. The source of the nitrate in the water in the Phoenix area is unknown, but it may be the nitrate fertilizers applied in the agricultural areas or naturally occurring organic material in the alluvial deposits.

Dissolved-solids represent the total quantity of dissolved salts or minerals in the water; in the Phoenix area dissolved salts and minerals mainly are derived from the alluvial deposits in the basin and from soil and rocks in the recharge area. Water that contains more than 1,000 mg/l dissolved solids generally is not used for public supply without treatment in the Phoenix area. Most water that contains more than 1,000 mg/l, however, does not constitute a health hazard unless specific undesirable constituents are present.

REFERENCES
Kister, L. R., 1974, Dissolved-solids content of ground water in the Phoenix area, Arizona: U.S. Geol. Survey Misc. Geol. Inv. Map, I-845-G
U.S. Public Health Service, 1962, Drinking water standards: U.S. Public Health Service Pub. 956, 61 p.

Base from U.S. Geological Survey
Phoenix and Mesa 1954-69,
Ajo 1953-69 Tucson 1956-62

SCALE 1:250 000
5 0 5 10 15 MILES
5 0 5 10 15 KILOMETERS
CONTOUR INTERVAL 200 FEET
WITH SUPPLEMENTARY CONTOURS AT 100-FOOT INTERVALS
DATUM IS MEAN SEA LEVEL
1974 MAGNETIC DECLINATION VARIES FROM 14° TO 13° EAST

CHEMICAL QUALITY OF GROUND WATER FOR PUBLIC SUPPLY IN THE PHOENIX AREA, ARIZONA

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Interior—Geological Survey, Reston, Va., 1974

For sale by U. S. Geological Survey
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