

**SOUTHEASTERN ARIZONA AND ADJACENT PARTS OF  
NEW MEXICO**

Ground water in most basins in the southeastern part of the study area contains fluoride concentrations of less than 2 mg/L; however, concentrations may exceed 2 mg/L in some basins. Fluoride concentrations generally are less than 1 mg/L in the Tucson basin and Ajo and Altar Valleys. Fluoride concentrations that exceed 1 mg/L occur locally in the Tucson basin near the southern slope of the Santa Catalina Mountains. These fluoride concentrations may be due to leaching of fluoride from pre-Basin and Range sediments of the Pantano Formation of middle Tertiary age. Granite and gneiss are the major rock types that bound the Tucson basin and Ajo and Altar Valleys.

Fluoride concentrations greater than 5 mg/L commonly occur in the artesian aquifers of San Pedro and San Simon Valleys and the Safford area. Water in the artesian aquifer of San Pedro Valley contains concentrations as large as 12 mg/L. The source of the fluoride probably is the rhyolitic and andesitic volcanic rocks of the Galuro Mountains because the basin fill as well as the recharge to the aquifer are derived from these mountains. The artesian aquifer of the Safford area and San Simon Valley is hydrologically similar to the artesian aquifer of San Pedro Valley and also contains large fluoride concentrations. In the southern part of the Safford area, fluoride concentrations range between 5 and 10 mg/L, and a concentration of 32 mg/L was reported from a flowing well near San Simon (Hem, 1970, p. 178). The Prudhoe, Peloncillo, and Willock Mountains that bound the Safford area and San Simon Valley consist chiefly of rhyolitic and andesitic volcanic rocks and may be a source of the fluoride. The large concentrations also may be related to the closed nature of the artesian aquifers. In a chemically closed system, calcium is removed from solution by precipitation of calcium carbonates and formation of smectite clays, which may result in large fluoride concentrations as indicated in equation 2 (plate 1).

The overlying water-table aquifer of San Pedro Valley from Benson northward to Winkelman contains fluoride concentrations that generally are less than 2 mg/L. Locally, concentrations are variable and may range from 1 to 5 mg/L. In the water-table aquifer from Benson south to the international boundary, fluoride concentrations generally are less than 1 mg/L. The water-table aquifer of San Simon Valley and the Safford area also contains fluoride concentrations that are variable and range from 1 to 5 mg/L. Upward leakage of water from the artesian aquifers may account for the variability and larger fluoride concentrations in the overlying water-table aquifer.

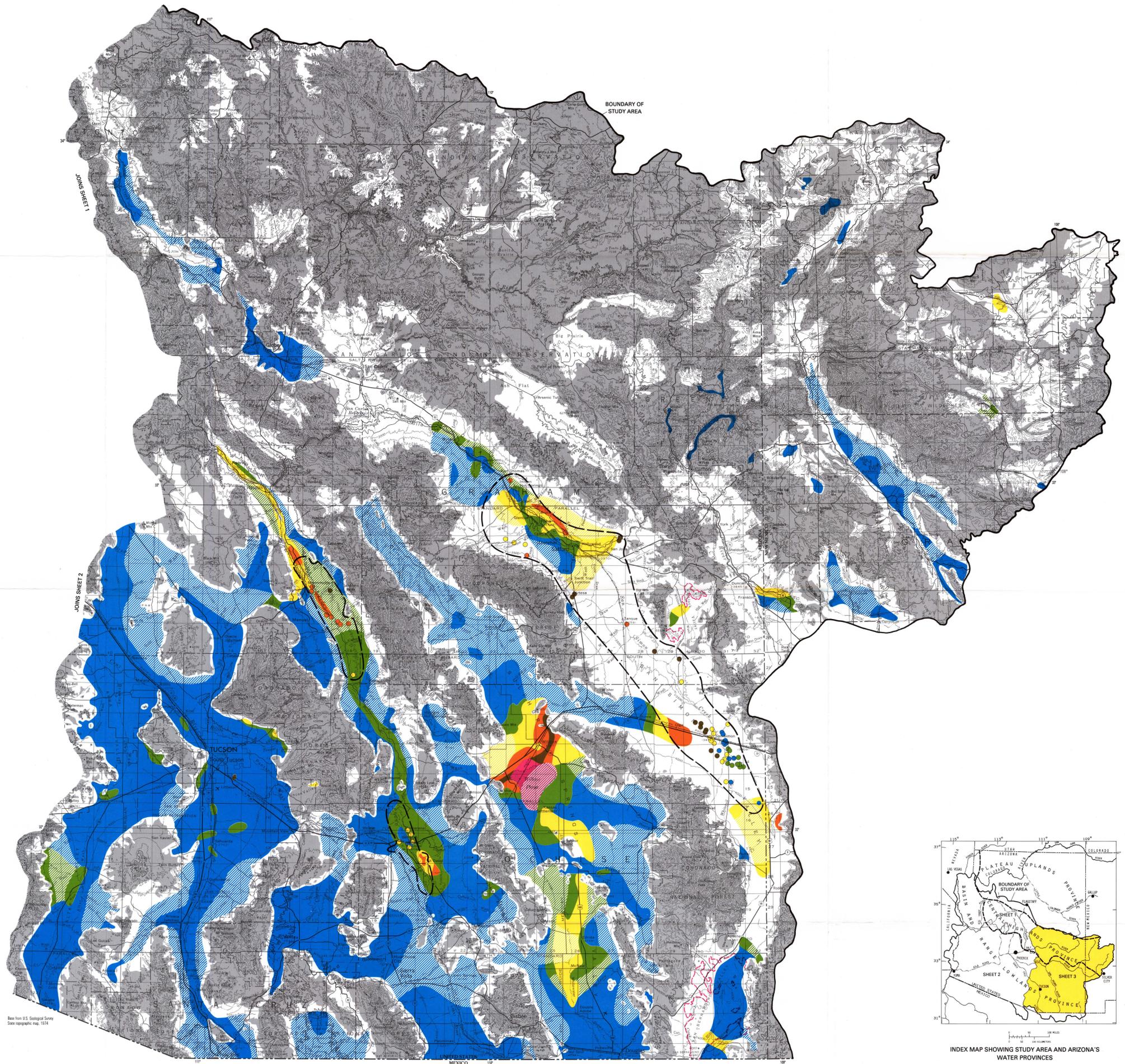
In the Wilcox area in Sulphur Springs Valley, fluoride concentrations exceed 10 mg/L in a northwest-trending area between the Wilcox Playa and the Winchester Mountains. The Winchester Mountains are an extension of the Galuro Mountains and are geologically similar. Fluoride concentrations are 2 to 5 mg/L in a north-to-south-trending area between Sulphur Springs Hills and the playa. These concentrations may be associated with the rhyolitic volcanic rocks of the Sulphur Springs Hills or the nearby Cretaceous and Tertiary volcanic flows. Within the playa, fluoride concentrations exceed 200 mg/L as a result of evaporative concentration. Elsewhere in the north-central parts of Sulphur Springs Valley and in Aravaipa Valley, fluoride concentrations generally are less than 1 mg/L.

In the southern part of Sulphur Springs Valley from the Square Top Hills to the international boundary, fluoride concentrations in the ground water generally are less than 2 mg/L. Concentrations are between 2 and 5 mg/L in an area between Square Top Hills and Double Adobe. Fluoride concentrations commonly are less than 1 mg/L in ground water in the smaller basins in the Central Highlands of eastern Arizona and western New Mexico.

**EXPLANATION**

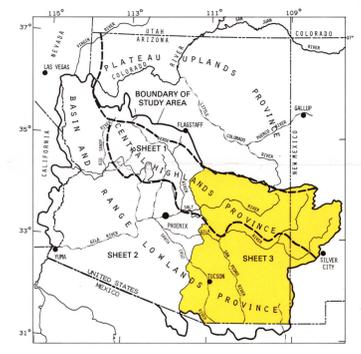
Fluoride concentrations, in milligrams per liter—  
Where fluoride data are available for interpretation, areas of different fluoride concentrations are indicated by solid colors. Control is extended to a maximum of 4 miles in areas where hydrology, geology, and geochemistry are sufficiently known. Where data are not sufficient and concentrations are inferred, areas are indicated by hatched lines.

- 0 to 1
- 1 to 2
- 2 to 5
- 5 to 10
- 10 to 20
- More than 20
- No data
- Extent of the artesian aquifers of San Pedro and San Simon Valleys and the Safford area
- Well that taps the artesian aquifers or well in the water-table aquifer in which fluoride concentration is anomalous—Fluoride concentrations are indicated by color the same as above
- Bedrock of the mountains
- Limit of basalt flows

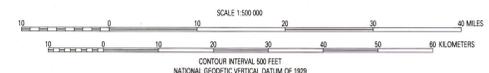


Base from U.S. Geological Survey State topographic map, 1974

Geology modified from Wilson and others (1968)



INDEX MAP SHOWING STUDY AREA AND ARIZONA'S WATER PROVINCES



**DISTRIBUTION OF FLUORIDE IN GROUND WATER IN THE ALLUVIAL BASINS OF ARIZONA AND ADJACENT PARTS OF CALIFORNIA, NEVADA, AND NEW MEXICO**

By  
**Frederick N. Robertson and W. B. Garrett**  
1968