DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
ARIZONA WATER COMMISSION

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WRi
77-44

D AQUIFER

The D aquifer is absent in the Monument Valley area and in places in the northern part of the Black Mesa area. Where present, the aquifer consists of the Dakota Sandstone, the Morrison Formation, the Cow Springs Sandstone, the Summerville Formation, and the Entrada Sandstone. The aquifer is composed of a series of sandstone, mudstone, and siltstone beds and includes carbonaceous material in the upper part. The Morrison and Summerville Formations are absent in the western part of the area. The thickness of the aquifer increases from 700 ft near Cow Springs Trading Post to about 1,200 ft near Yale Point.

Ground water in the D aquifer generally is under confined conditions. Although the formations that make up the aquifer probably are hydraulically connected, most of the water is derived from a few sandstone beds. Well yields range from 10 to 25 gal/min and depend on the saturated thickness of the aquifer.

The water is of marginal to unsuitable chemical quality for domestic use. The sulfate and dissolved-solids concentrations generally exceed the recommended limits of 250 and 500 mg/L, respectively, in drinking water (U.S. Public Health Service, 1962). The fluoride concentration ranges from 0.2 to 3.4 mg/L. The recommended average optimum fluoride concentration for a water supply differs according to the annual average maximum daily air temperatures (U.S. Public Health Service, 1962). In the Monument Valley and the northern part of the Black Mesa areas the annual average maximum daily air temperature is about 67°F, and the optimum concentration of fluoride in drinking water is 0.9 mg/L. The presence of concentrations greater than 1.8 mg/L is grounds for rejection of the water for public supply.

CONVERSION FACTORS

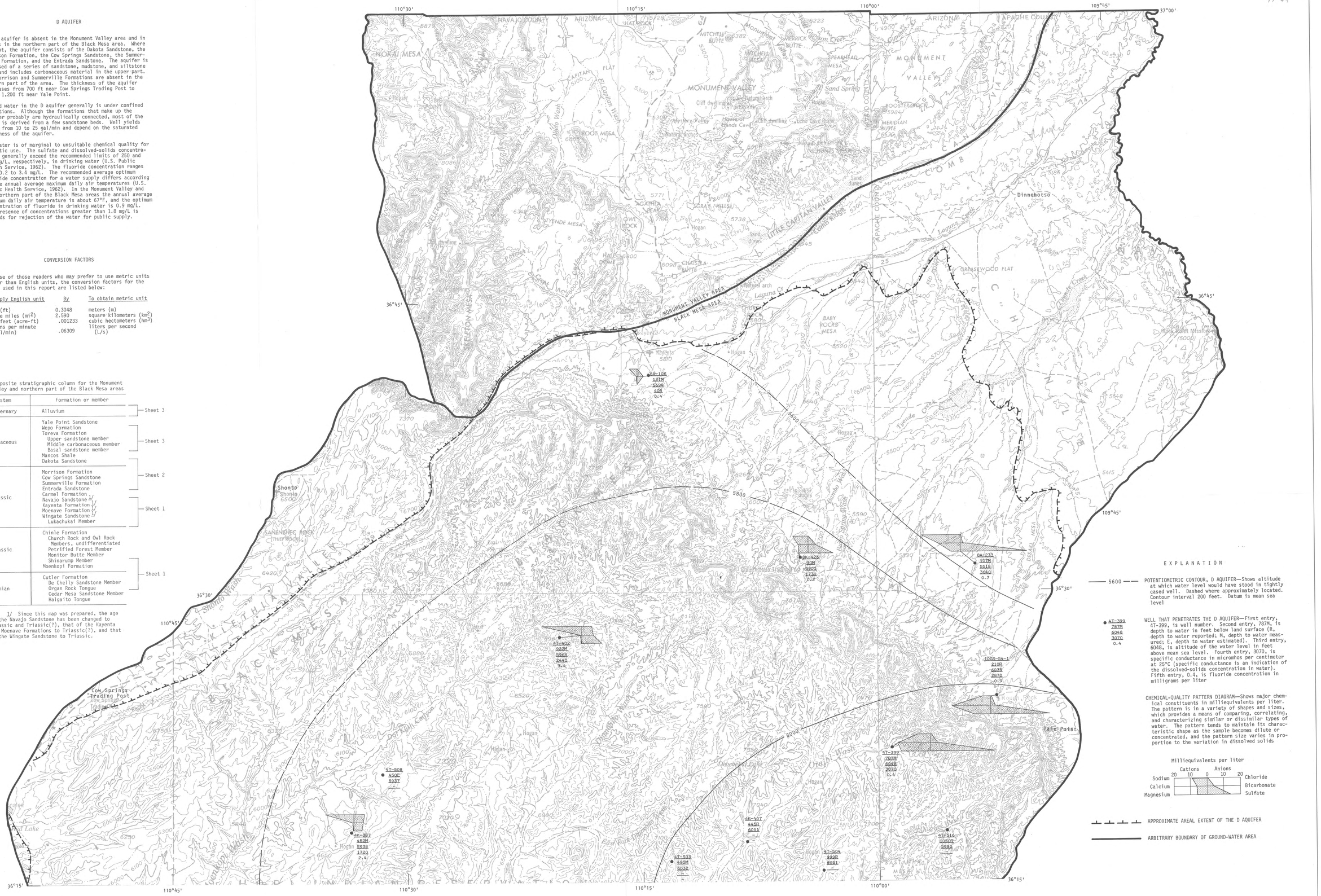
For use of those readers who may prefer to use metric units rather than English units, the conversion factors for the terms used in this report are listed below:

Multiply English unit	By	To obtain metric unit
feet (ft)	0.3048	meters (m)
square miles (mi^2)	2.590	square kilometers (km^2)
acre-feet (acre-ft)	.001233	cubic hectometers (hm^3)
gallons per minute (gal/min)	.06309	liters per second (L/s)

Composite stratigraphic column for the Monument Valley and northern part of the Black Mesa areas

System	Formation or member	
Quaternary	Alluvium	Sheet 3
Cretaceous	Yale Point Sandstone Wepo Formation Toreva Formation Upper sandstone member Middle carbonaceous member Basal sandstone member Mancos Shale Dakota Sandstone	Sheet 3
Jurassic	Morrison Formation Cow Springs Sandstone Summerville Formation Entrada Sandstone Carmel Formation Navajo Sandstone 1/ Kayenta Formation 1/ Moenave Formation 1/ Wingate Sandstone 1/ Lukachukai Member	Sheet 2 Sheet 1
Triassic	Chinle Formation Church Rock and Owl Rock Members, undifferentiated Petrified Forest Member Monitor Butte Member Shinarump Member Moenkopi Formation	Sheet 1
Permian	Cutler Formation De Chelly Sandstone Member Organ Rock Tongue Cedar Mesa Sandstone Member Halgaito Tongue	Sheet 1

1/ Since this map was prepared, the age of the Navajo Sandstone has been changed to Jurassic and Triassic(?), that of the Kayenta and Moenave Formations to Triassic(?), and that of the Wingate Sandstone to Triassic.



EXPLANATION

5600 — POTENTIOMETRIC CONTOUR, D AQUIFER—Shows altitude at which water level would have stood in tightly cased well. Dashed where approximately located. Contour interval 200 feet. Datum is mean sea level

4T-399 / 787M / 6048 / 3070 / 0.4 — WELL THAT PENETRATES THE D AQUIFER—First entry, 4T-399, is well number. Second entry, 787M, is depth to water in feet below land surface (R, depth to water reported; M, depth to water measured; E, depth to water estimated). Third entry, 6048, is altitude of the water level in feet above mean sea level. Fourth entry, 3070, is specific conductance in micromhos per centimeter at 25°C (specific conductance is an indication of the dissolved-solids concentration in water). Fifth entry, 0.4, is fluoride concentration in milligrams per liter

CHEMICAL-QUALITY PATTERN DIAGRAM—Shows major chemical constituents in milliequivalents per liter. The pattern is in a variety of shapes and sizes, which provides a means of comparing, correlating, and characterizing similar or dissimilar types of water. The pattern tends to maintain its characteristic shape as the sample becomes dilute or concentrated, and the pattern size varies in proportion to the variation in dissolved solids

APPROXIMATE AREAL EXTENT OF THE D AQUIFER

ARBITRARY BOUNDARY OF GROUND-WATER AREA

BASE FROM U.S. GEOLOGICAL SURVEY
MARBLE CANYON 1:250,000, 1970 AND
SHIPROCK 1:250,000, 1969

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

GROUND-WATER CONDITIONS IN THE D AQUIFER

MAPS SHOWING GROUND-WATER CONDITIONS IN THE MONUMENT VALLEY AND NORTHERN PART OF THE BLACK MESA AREAS, NAVAJO, APACHE, AND COCONINO COUNTIES, ARIZONA—1976

By

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