

EXPLANATION



Qal
Alluvium
Fadama (valley floor)
The limits of the areas mapped as fadama include all the extensively braided rivers within the report area



Tg
Gwandu Formation
Massive clay beds confine an artesian aquifer of fine to coarse sand reaching a thickness of several hundred feet. Test boreholes have flows from 1,000 to 12,000 gph (gallons per hour) and pressure heads as high as +83 feet in the flowing artesian areas (1,000 square miles). Transmissibility coefficients decrease toward the west from 170,000 (Balle) to less than 1,000 gpd per ft (gallons per day per foot) (Bacaka) as the sand in the aquifer becomes finer grained and interbedded with clay. Water samples show high iron content in places.
Rima Group aquifer underlies Gwandu Formation at depths of 200 (east) to more than 1,000 feet (Niger frontier). The Rima Group sands coarsen and thicken to more than 500 feet toward the southwest. Artesian conditions are found in the fadama at Birnin Kebbi with flows of 7,000 gph and a pressure head of +20 feet. Salinity of water increases with depth, and at Balle water contains 916 mg/l (milligrams per liter) total dissolved solids in the aquifer of the Rima Group



Ts
Sokoto Group
(Kalambaina and Dange Formations)
Limestone of the Kalambaina Formation in Sokoto Group contains a shallow perched water table over impermeable clay of the Dange Formation. Numerous dug wells and also springs (yields to 10 cfs (cubic feet per second)) are fed from the perched zone. These may go dry seasonally. The prevailing calcium bicarbonate water is usually hard.
Beneath Sokoto Group the regional ground-water conditions of Rima Group prevail; however the regional water table under the perched zone may be more than 200 feet below the land surface. Rima Group is the principal aquifer in Sokoto where yields up to 7,000 gph occur and the transmissivities average 40,000 gpd per ft. Water is high in iron (up to 14 mg/l)



Kr
Rima Group
(Wurno, Dakamaje, Taloka Formations)
Unconfined fine sand and mudstone reaching a total thickness of 800 feet. Sediments coarsen southward. Yields of boreholes average a moderate 4,400 gph. Iron in the water may be troublesome.
Gundumi Formation in this area contains artesian water confined beneath basal clay of Rima. The upper Gundumi Formation is permeable and has produced flowing water in the fadama areas at Rabah (1,000 gph, +10 feet head) and at Sokoto (2,500 gph, +23 feet head) from depths below 600 feet



Ki
Ilo Group
Coarse sand and gravel, locally clayey, and varicolored clay; a white nodular clay 30 feet thick separates the upper and lower grit members. Total thickness may exceed 700 feet. North of Niger River the upper grits are water bearing and grade into the aquifer of Rima Group. Contains a water-table aquifer tapped by dug wells. Artesian conditions have not yet been verified

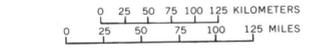
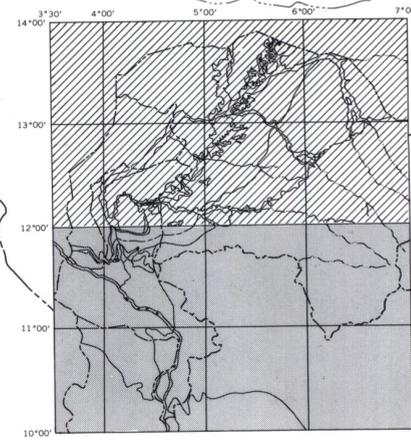


Kg
Gundumi Formation
Mostly varicolored clay with sand and gravel lenses. Water is locally high in iron and also sodium toward north. Borehole yields generally low, average 2,650 gph, but in upper part are 6,000 gph. Upper part (west) contains a good unconfined sand aquifer with a transmissivity of 85,000 gpd per ft at Tureta. Lower section (east) is more clayey and transmissivities decrease to less than 500 gpd per ft near basement rock contact



pK
Pre-Cretaceous basement rocks
Metamorphic and igneous rocks such as granite-gneiss, phyllite, and schist. Water contained in fractures and weathered zones in the rocks which have low permeability and ground-water storage. The weathered zone where saturated can yield up to 2,500 gph to boreholes, but usually yields are much less. Numerous dug wells obtain meager yields from the weathered zone. The best source for relatively high yields in the basement rock areas is the unconsolidated deposits of the stream valleys which yield up to 12,000 gph to individual boreholes

Contact
Dashed where approximately located

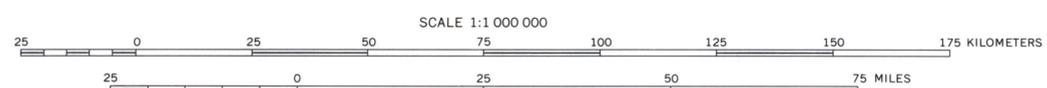


Geology from map by Geological Survey of Nigeria (1965), 1:250 000 series

Geology from map by Geological Survey of Nigeria (1964), scale 1:2 000 000

Note: At time of preparation of report of this area no current geologic maps existed south of 12°00' north. Because of this, irregularities that exist in geologic correlation may be noted. This does not affect the report in any manner. Presentation of this illustration is necessary to relate current geology of the report to areal geology and the availability of ground water in the Sokoto Basin

GEOLOGIC MAP OF THE SOKOTO BASIN, NORTHWESTERN NIGERIA



THE DELINEATION OF INTERNATIONAL BOUNDARIES AND NAMES ON THIS MAP ARE NOT NECESSARILY AUTHORITATIVE

Nupe Sandstones

QUATERNARY

TERTIARY

CRETACEOUS