UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

BASE OF FRESH GROUND WATER, NORTHERN LOUISIANA SALT-DOME BASIN AND VICINITY, NORTHERN LOUISIANA AND SOUTHERN ARKANSAS

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FACTORS FOR CONVERTING INCH-POUND UNITS TO INTERNATIONAL SYSTEM (SI) OF METRIC UNITS

Multiply inch-pound units	By	To obtain SI units
foot (ft)	0.3048	meter (m)
foot per day (ft/d)	0.3048	meter per day (m/d)
mile (mi)	1.609	kilometer (km)
square mile (mi^2)	2.590	square kilometer (km^2)

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ABSTRACT

The National Waste Terminal Storage Program is an effort by the U.S. Department of Energy to locate and develop sites for disposal or storage of commercially produced radioactive wastes. As part of this program, salt domes in the northern Louisiana salt-dome basin are being studied to determine their suitability as repositories. Part of the U.S. Geological Survey's participation in the program has been to describe the regional geohydrology of the northern Louisiana salt-dome basin. A map based on a compilation of published data and the interpretation of electrical logs shows the altitude of the base of freshwater in aquifers in the northern Louisiana salt-dome basin.

INTRODUCTION

In 1976, the U.S. Department of Energy began an expanded waste-management program for both defense and commercially produced radioactive waste. The National Waste Terminal Storage Program is an effort by the U.S. Department of Energy to locate and develop sites for disposal or storage of commercially produced radionuclides. As part of this program, salt domes in the northern Louisiana salt-dome basin are being studied to determine their suitability as repositories. A major role of the U.S. Geological Survey in the program, in cooperation with the U.S. Department of Energy, has been to describe the regional geohydrology of the northern Louisiana salt-dome basin.

This report presents a map showing the altitude of the base of freshwater[1/] in aquifers in the northern Louisiana salt-dome basin. The northern Louisiana salt-dome basin has an area of about 3,000 mi^2 and includes all or parts of 11 parishes in northwestern Louisiana (fig. 1). The mapped area comprises more than 16,000 mi^2 and extends 30 mi into Arkansas.

1/ Freshwater for this study is defined as water containing less than 1,000 milligrams per liter of dissolved solids.

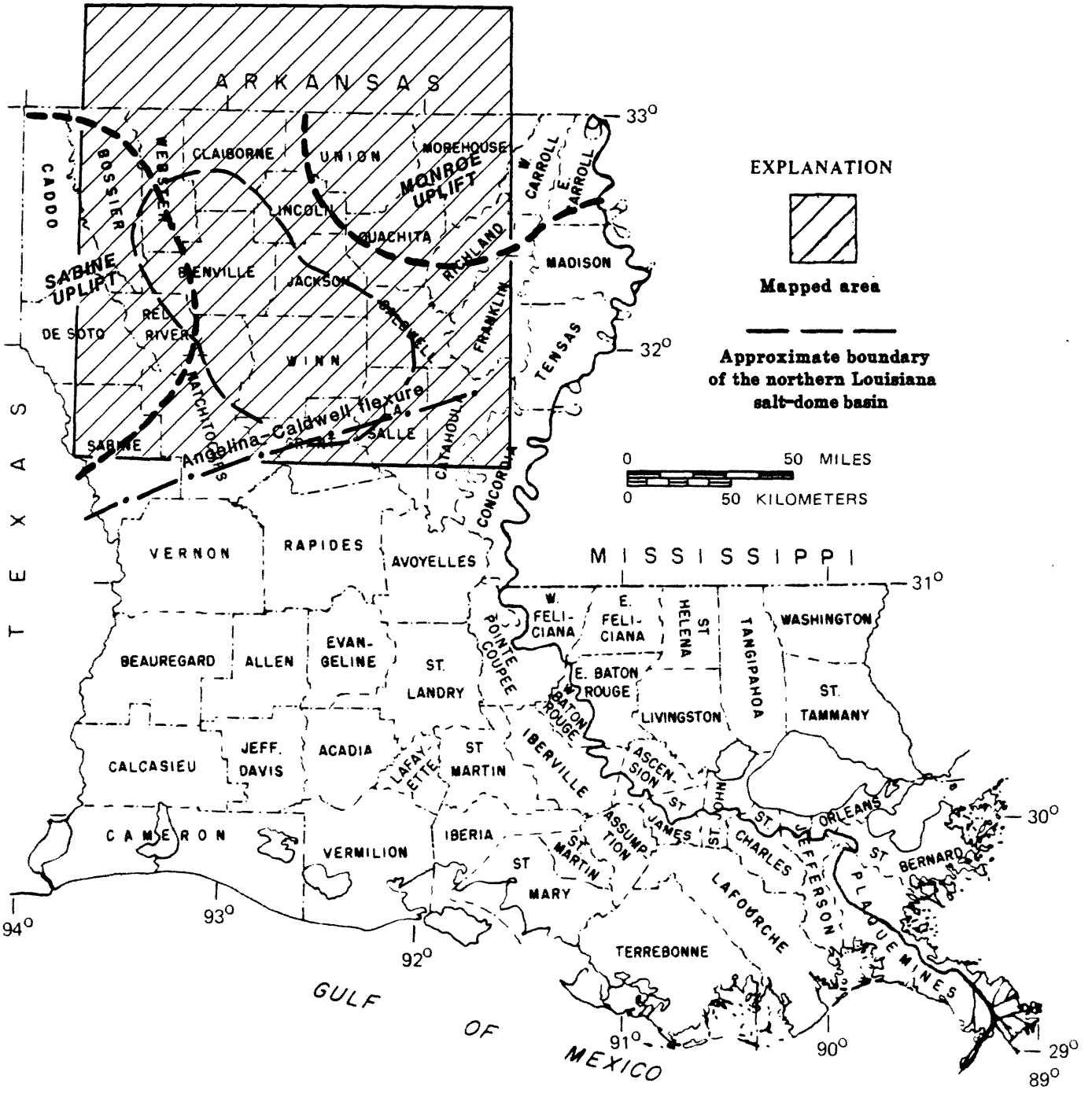

Figure 1.--Location of report area.

BASE OF FRESH GROUND WATER

In the area mapped, freshwater occurs in aquifers of Tertiary age and in minor aquifers of Quaternary age (table 1 and pl. 1). Principal Tertiary aquifers that contain freshwater are, from oldest to youngest, the Wilcox Group (Paleocene to early Eocene), the Carrizo Sand (Eocene), the Sparta Sand (Eocene), the Cockfield Formation (Eocene), and Miocene deposits. The Wilcox is hydraulically interconnected with the overlying Carrizo Sand; therefore, the Carrizo and the Wilcox are mapped as one hydrologic unit. Formations

Table 1.--Generalized stratigraphic column for freshwater section of northern Louisiana salt-dome basin

Era-them	System	Series	Group	Formation	Description	Hydrologic characteristics
Cenozoic	Quaternary	Holocene and Pleistocene			Terrace remnants and alluvial valley fill. Coarse, graveliferous at base grading upward to sand, silt, and clay. Thickness about 50 to 150 ft.	Contains freshwater. Used locally for rural supplies and some public supplies. Withdrawals range from small domestic supplies to large irrigation wells. Hydraulic conductivity ranges from 100 to 300 ft/d.
	Tertiary	Miocene	Undivided	Undivided	Interbedded sand and clay. Thickness 400 to 800 ft.	Contains fresh and saltwater. Hydraulic conductivity ranges from about 25 ft/d to more than 100 ft/d.
		Oligocene	Vicksburg	Undivided	Mostly clay. Thickness 400 to 700 ft.	Generally not water bearing. Local sands yield small quantities of water to walls.
		Eocene	Jackson	Undivided		
			Claiborne	Cockfield Formation	Fine lignitic sand and carbonaceous clay. Thicker sands in lower part. Thickness about 500 to 600 ft.	Contains fresh and saltwater. Used mostly for small rural supplies. Hydraulic conductivity ranges from less than 15 ft/d to more than 40 ft/d.
				Cook Mountain Fm.	Clay, partly sandy and glauconitic. Thickness about 100 ft.	Generally not water bearing. Local sands yield small quantities of water to wells.
				Sparta Sand	Fine to medium sand with clay interbeds; lignitic. Thickness 500 to 700 ft.	Contains fresh and saltwater. Principal aquifer of north-central Louisiana. Large withdrawals by domestic, municipal, and industrial wells. Hydraulic conductivitisa range from 30 ft/d to more than 100 ft/d.
				Cane River Fm.	Mostly clay; some marl. Thicknesa 200 to 300 ft.	Not water bearing.
				Carrizo Sand	Fine to medium sand; discontinuous. Thickness 0 to 150 ft.	Contains fresh and saltwater. Penetrated only by a few shallow wells, mostly in the outcrop. Hydraulic conductivity about 25 ft/d.
			Wilcox	Undivided	Interbedded sand, clay, and silt; lignitic. Thickness 500 to 1,500 ft.	Contains fresh and saltwater. Penetrated mostly by small-yielding rural wells. Larger supplies developed locally where sands are thick. Hydraulic conductivity about 15 ft/d.
		Paleocene	Midway	Porters Creek Clay, Clayton Fm.	Marine clay with thin calcareous basal unit. Thickness about 600 ft.	Not water bearing.

that are predominantly clay (the Midway Group, the Cane River Formation, the Cook Mountain Formation, the Jackson Group, and the Vicksburg Group) separate most of the aquifers (the water-bearing formations) and restrict water movement between them. Because of the clay units, abrupt and large differences in the altitude of the base of freshwater occur as the base of freshwater changes from one aquifer to another.

Most of the area was mapped using published data from Cushing (1966); Gaydos, Rogers, and Smith (1973); Newcome, Page, and Sloss (1963); Page and May (1964); Page, Newcome, and Graeff (1963); Rogers, Calandro, and Gaydos (1972); Sanford (1973a, b); and Snider, Calandro, and Shampine (1972). The western one-third of the area and the area in southern Arkansas (pl. 1) was mapped using electrical logs of oil- and gas-test wells and water wells.

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