DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS INVESTIGATIONS SERIES
MAP I–1405

OUTCROPPING TERTIARY UNITS IN SOUTHERN ARKANSAS

By
R. L. Hosman
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The U.S. Geological Survey is conducting a series of hydrologic investigations within the Regional Aquifer-System Analysis program. As part of this program, an investigation of the regional ground-water systems of the West Gulf Coast region was begun in 1980; the Coastal Plain of Arkansas is included in the West Gulf Coast region.

One of the principal objectives of the investigation is to analyze and describe the flow patterns of the major aquifer systems in the region. A principal investigative method will be the construction of a multilayer digital ground-water flow model of the major aquifers in the region. In southern Arkansas, major hydrologic units generally correspond to geologic units. Therefore, outcrop areas as shown on a geologic map provide a sound basis for establishing areal distribution of water-bearing and confining units and areas of natural recharge.

The geologic map of Arkansas (Haley, 1976) depicts the outcrop of Tertiary deposits but does not differentiate the individual units of the Claiborne Group. The Claiborne Group comprises five formations, three of which are important water-bearing units (Cockfield Formation, and Sparta and Carrizo Sands) and two of which are confining units (Cook Mountain and Cane River Formations). Advance planning for the regional-aquifer study revealed the need for delineation of the outcrops of these units for the design of the planned digital model.

In anticipation of this need, a 1-year study to map outcropping Tertiary units in southern Arkansas (index map) was begun in October 1979. Lithologic similarities throughout the Tertiary section make differentiation of units by examination of surface exposures alone a difficult and time-consuming task. Therefore, it was decided to augment standard surface-mapping techniques by use of subsurface data, which are abundant in the area in the form of well logs. Geophysical logs enabled correlation of accepted stratigraphic horizons across south Arkansas to adjacent States.

These correlations were used to project geologic contacts to land surface. Also, most well logs gave an indication of the probable surficial unit at the well site. These geophysical data, plus the projections, were used to supplement onsite examination of surface exposures. A geologic section accompanies the geologic map on this sheet. The table shows a list of wells used in the section. In all, 802 surface exposures were examined during this study, and units were correlated using approximately 800 geophysical logs.

Special recognition and gratitude are extended to William V. Bush and Benjamin F. Clardy of the Arkansas Geological Commission who provided copies of the 7½-minute quadrangle work maps that they prepared for compilation of the geologic map of Arkansas (Haley, 1976). These maps were relied upon to provide delineation of the Upper Cretaceous-Midway, Midway-Wilcox, and Claiborne-Jackson contacts; the boundary of Paleozoic rocks; and the extent of Quaternary alluvium and terrace deposits. The author is deeply indebted to the staff of the U.S. Geological Survey, Arkansas District, who were extremely cooperative when called upon to provide data or information needed for this study. Also, published reports were consulted to assure consistency of interpretation; these reports are shown in the list of references.

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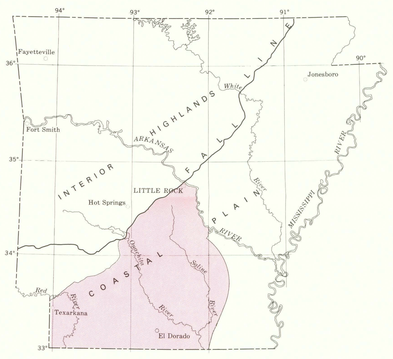
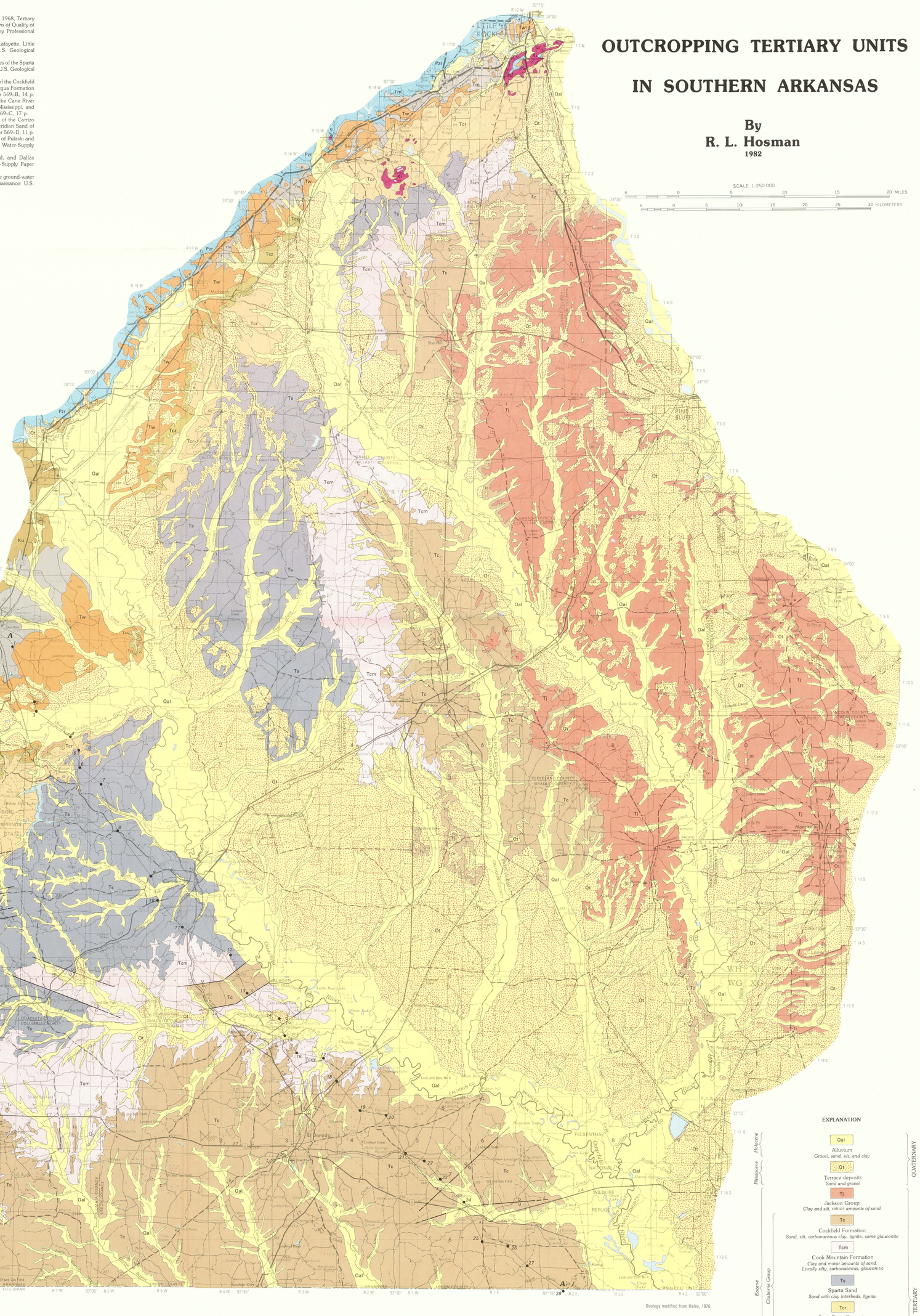
List of oil tests shown on geologic section.

Well	Company	Well name	Location		
			Section	Township	Range
1	H. M. Mills	C. L. Cabe Estate No. 1	3	10 S.	20 W.
2	Dr. Arthur H. Conley et al	P. O. Beals No. 1	31	10 S.	19 W.
3	Coker & Grieves	Williams No. 1	7	11 S.	19 W.
4	Wedgeworth Oil Co	Dooley Womack No. 1	23	11 S.	19 W.
5	H. F. Stinnett	J. T. Tuberville No. 1	26	11 S.	19 W.
6	Jack Carnes	Epperson No. 1	1	12 S.	19 W.
7	Garland Anthony	Hirsch No. 1	8	12 S.	18 W.
8	Garland Anthony	Turner-Anthony No. 1	33	12 S.	18 W.
9	Jack Carnes	Smith No. 1	19	13 S.	17 W.
10	L. J. Peters & S. J. Carnes	H. L. Berg No. 1	6	14 S.	17 W.
11	J. K. Wadley	R. A. Sweatman No. 1	15	14 S.	17 W.
12	F. E. Hargraves & Sons, Inc	Moore Estate No. 1	32	14 S.	16 W.
13	Munoco	Oneta No. 1	15	15 S.	16 W.
14	R. H. V. Oil Co	Laney No. 10	31	15 S.	15 W.
15	J. D. Reynolds	Flanagan No. 2	5	16 S.	15 W.
16	T. R. Goodwin	Abbitt No. 1	16	16 S.	15 W.
17	Creslenn Oil Co	Anthony No. 1	14	16 S.	15 W.
18	Quinn Oil Co	Murphy No. 1	30	16 S.	14 W.
19	John C. Schmidt	L. T. Kelly No. 1	9	17 S.	14 W.
20	Curtis Kinard	A. C. Gaddy No. A–1	14	17 S.	14 W.
21	Arkwells Corp	Jimmie No. 1	31	17 S.	13 W.
22	R. R. Brown	Gwen No. 1	4	18 S.	13 W.
23	W. J. Greer	R. T. Adams No. 1	10	18 S.	13 W.
24	Phillips Petroleum Co	Callie No. 1	30	18 S.	12 W.
25	Creslenn Oil Co	W. M. Clark et al No. 1	8	19 S.	12 W.
26	J. L. Foster	Vera Adams No. 1	14	19 S.	12 W.
27	Creslenn Oil Co	Olin No. 1	19	19 S.	11 W.
28[1]	Olin Oil & Gas Corp	Olin Fee No. W–1	1	23 N.	2 E.

[1]Union Parish, Louisiana

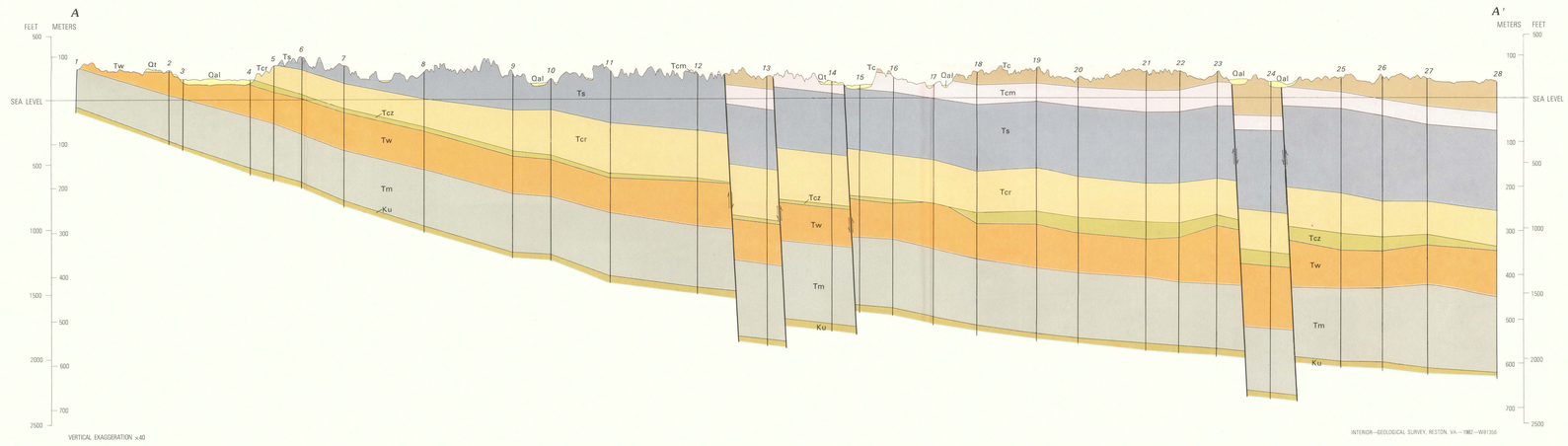


Index map showing location of study area.



Base from U.S. Geological Survey 1:250,000; Texarkana, 1953–72; El Dorado, 1953–77; Greenwood, 1953–79; Little Rock, 1955–77; Helena, 1955–77.

Geology modified from Haley, 1976.



EXPLANATION

QUATERNARY	Holocene	**Qal** — Alluvium. *Gravel, sand, silt, and clay*
	Pleistocene	**Qt** — Terrace deposits. *Sand and gravel*
TERTIARY		**Tj** — Jackson Group. *Clay and silt, minor amounts of sand*
	Eocene, Claiborne Group	**Tc** — Cockfield Formation. *Sand, silt, carbonaceous clay, lignite, some glauconite*
		Tcm — Cook Mountain Formation. *Clay and minor amounts of sand. Locally silty, carbonaceous, glauconitic*
		Ts — Sparta Sand. *Sand with clay interbeds, lignitic*
		Tcr — Cane River Formation. *Clay, locally lignitic, sandy, glauconitic, contains ironstone layers; interbedded sand common in updip areas*
		Tcz — Carrizo Sand. *Sand, slightly lignitic; discontinuous*
		Tw — Wilcox Group. *Interbedded sand, clay, and silt; lignitic*
	Paleocene	**Tm** — Midway Group. *Clay, calcareous in lower part; locally sandy in basal part*
CRETACEOUS		**Ku** — Upper Cretaceous undifferentiated. *Sand, clay, marl, chalk*
		Ki — *Upper Cretaceous, igneous rocks*
PALEOZOIC		**Pzr** — *Paleozoic rocks, undifferentiated. Sandstone, shale*

Contact

Fault zone (U, D). *Dashed where approximately located; dotted where concealed. U, upthrown side; D, downthrown side. Dip of faults unknown but considered high angle*

Trace of geologic section

Oil test and number *see table*

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