

LOWER WILCOX AQUIFER

Hydrogeologic Setting

The Wilcox Group of Eocene age throughout most of northeastern Arkansas is composed of thin interbedded layers of lignitic sand and clays. East of Crowley's Ridge, the middle to lower part of the Wilcox Group contains a sand bed 200 ft or more in thickness (Peterson and others, 1985). This sand bed has been referred to as the "1,400-foot sand" (Ryling, 1960; Plebuch, 1961) and the "lower Wilcox aquifer" (Hosman and others, 1968). Although this sand bed crops out along the western side of Crowley's Ridge, the lower Wilcox aquifer is an important aquifer only to the east of Crowley's Ridge. Sand beds of the lower Wilcox aquifer generally are not used as a source of water to the west or to the south of the study area because either the sand beds are too thin to be a reliable source of water, the ground water contains high concentration of dissolved solids, or more productive freshwater aquifers are available. The lower Wilcox aquifer is confined by overlying clay beds of the Wilcox Group and underlying clay beds of the Wilcox Group or the Midway Group.

Recharge to the lower Wilcox aquifer in the study area is by infiltration of water in the outcrop areas along the western side of Crowley's Ridge in northeastern Arkansas and southern Missouri. Discharge from the aquifer in the study area mainly is to wells, but some water in this aquifer flows beneath the Mississippi River into Mississippi.

During 1990, water withdrawals from aquifers within the Wilcox Group in Arkansas totaled 30.85 Mgal/d. The lower Wilcox aquifer in northeastern Arkansas accounted for 28.70 Mgal/d, or 93 percent, of the total water withdrawn from the aquifer in the State. The three counties that withdrew the most water from the lower Wilcox aquifer in 1990 were Mississippi (16.85 Mgal/d), Crittenden (5.05 Mgal/d), and Poinsett (3.38 Mgal/d) Counties. The primary use of water from this aquifer is for public supplies but the aquifer also is a source of water for some commercial, domestic, and industrial supplies. Yields of 1,000 gal/min or more of water from wells completed in the lower Wilcox aquifer have been reported within the study area (Peterson and others, 1985).

Potentiometric-Surface Maps

The potentiometric-surface map of the lower Wilcox aquifer shows the altitude to which water levels would rise in tightly cased wells that penetrate the aquifer. The potentiometric surface of the lower Wilcox aquifer generally is highest near Crowley's Ridge. The altitude of the potentiometric surface generally

decreases to the south and southeast. Ground-water flow within the aquifer generally is perpendicular to contours of equal potentiometric surface and in the direction of the hydraulic gradient. Lateral ground-water flow in the aquifer generally is from the outcrop areas near the northwestern boundary of the study area toward the southeast except in the vicinity of Paragould and West Memphis, Arkansas, where ground-water withdrawals have resulted in depressions in the potentiometric surface.

Hydrographs of Selected Wells

Water levels in selected wells completed in the lower Wilcox aquifer are shown for the period of 1971 to 1991. During the period 1971-91, water levels in all four wells for which hydrographs are shown, declined. These declines ranged from 22.01 ft (average decline of 1.1 ft/yr) for the well in Lee County to 13.53 ft (average decline of 0.7 ft/yr) for the well in Mississippi County.

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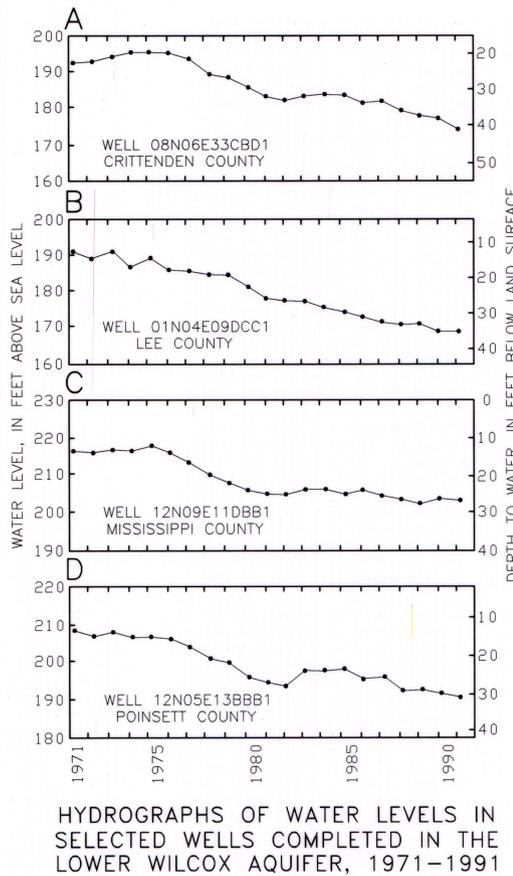
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Water-level measurements for wells completed in the lower Wilcox aquifer, 1991

Well number	County	Altitude of land surface (feet above sea level)	Depth to water below land surface (feet)	Altitude of water level (feet above sea level)	
13N07E14BBA2	Craighead	221	4-17	16.86	204
14N06E27ACB2	Craighead	227	4-17	24.46	203
14N07E17DCB1	Craighead	232	4-17	23.17	209
04N07E36ADB1	Crittenden	201	4-23	30.56	170
05N07E01ABB1	Crittenden	207	4-23	42.15	165
05N07E29ACC1	Crittenden	200	4-23	33.16	167
06N09E07CAC1	Crittenden	210	4-23	67.51	142
07N07E14CCB1	Crittenden	223	4-23	48.21	175
07N08E24CAB1	Crittenden	221	4-23	56.12	165
08N06E33CBD1	Crittenden	215	4-24	40.86	174
17N04E36BCA1	Greene	505	4-24	161.53	343
17N06E31DCB1	Greene	285	4-24	104.68	180
01N04E09DCC1	Lee	204	4-25	35.08	169
10N08E17ADD1	Mississippi	225	4-24	33.73	191
11N08E10AAC1	Mississippi	220	4-24	23.19	197
11N09E33AAB1	Mississippi	237	4-24	42.13	195
11N10E20ADA1	Mississippi	235	4-25	39.01	196
12N09E11DBB1	Mississippi	230	4-24	26.13	204
12N11E17CDD1	Mississippi	245	4-25	44.46	201
13N11E08DDA1	Mississippi	245	4-25	36.71	208
14N11E20CCA1	Mississippi	240	4-26	27.91	212
15N08E08DBC1	Mississippi	236	4-25	8.14	228
15N09E31ACD1	Mississippi	240	4-26	28.44	212
15N10E01ADD1	Mississippi	248	4-26	19.88	228
10N07E16CBB2	Poinsett	218	5-09	37.94	180
11N06E35CDA3	Poinsett	215	5-10	27.11	188
11N07E03BDD1	Poinsett	216	5-10	13.64	202
12N05E13BBB1	Poinsett	222	5-10	30.56	191
04N06E21BAD2	St. Francis	201	5-10	33.38	168



POTENTIOMETRIC-SURFACE MAPS OF THE COCKFIELD AND LOWER WILCOX AQUIFERS, IN ARKANSAS, 1991

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Base from U.S. Geological Survey
State base map, 1967