

INTRODUCTION

As part of a program to document and evaluate the potentiometric surface (water level) of the major aquifers in Mississippi, the U.S. Geological Survey, in cooperation with the Mississippi Department of Environmental Quality, Office of Land and Water Resources, measures water levels in wells statewide at about 5-year intervals. This report, the third in a series of reports for the Meridian-upper Wilcox aquifer, includes a potentiometric-surface map (fig. 1) based on water-level data collected in 100 wells in 28 counties during October through December 1988, and hydrographs of water levels in selected observation wells completed in the aquifer (fig. 2). Additional counties are included in the study area to show the down-dip limits of freshwater and the approximate down-dip limit of the outcrop area. Previously published potentiometric-surface maps of the aquifer were based on water-level measurements made in the fall of 1979 (Wasson, 1980) and in the fall of 1983 (Darden, 1986).

HYDROGEOLOGY

The Meridian Sand Member of the Tallahatta Formation and the Bashi Formation of the Wilcox Group of Eocene age comprise the Meridian-upper Wilcox aquifer in Mississippi. The aquifer consists primarily of interconnected, irregular beds of clay and sand. Beds of clay are common at the top and bottom of the Meridian-upper Wilcox aquifer and partially impede vertical movement of water into or out of the aquifer (Wasson, 1980). The beds of sand in the Meridian-upper Wilcox aquifer are present as discontinuous units throughout the aquifer. The Meridian-upper Wilcox aquifer is overlain by the Winona-Tallahatta aquifer and underlain by the middle and lower Wilcox aquifers. The Meridian-upper Wilcox aquifer crops out in a hilly area in northern and east-central Mississippi. The eastern edge of the outcrop area is not well defined and is not shown on the map (fig. 1). The primary source of recharge to the aquifer is precipitation on the outcrop area. The general direction of ground-water flow is from the outcrop area to the west and southwest. A detailed description of the hydrogeology of the Meridian-upper Wilcox aquifer is given by Boswell (1976).

WATER USE

The Meridian-upper Wilcox aquifer is a source of freshwater for many public water supplies and industrial supplies in northwestern and central Mississippi. Water-use data for the Meridian-upper Wilcox aquifer were estimated for 1985 as part of the National Water-Use Information Program of the U.S. Geological Survey. Total withdrawal of freshwater from the aquifer in Mississippi during 1985 was about 40 million gallons per day (P.M. Johnson, U.S. Geological Survey, oral communication, 1993). The largest withdrawal from a single user in 1985 was about 5 million gallons per day at Greenwood in Leflore County.

WATER LEVELS

Water levels in the Meridian-upper Wilcox aquifer (fig. 1) generally decrease from the outcrop in the eastern part of the study area down-gradient toward the west and southwest in the direction of regional ground-water flow. In the confined part of the aquifer, the configuration of the potentiometric surface is defined by differences in the hydraulic conductivity of the aquifer, by natural discharge to overlying aquifers, and by pumping for public and industrial supplies. In the outcrop area, the potentiometric surface is defined by recharge from precipitation, discharge to local streams, and withdrawals for public and industrial supplies.

The potentiometric surface shown on the accompanying map (fig. 1) represents the altitude of water levels during October through December 1988 in 100 wells completed in the Meridian-upper Wilcox aquifer. The largest cone of depression is centered in parts of Bolivar, Leflore, and Sunflower Counties; smaller cones are present in areas of large ground-water withdrawals in parts of Leake and Yazoo Counties.

From 1979 to 1988, large water-level declines of at least 20 feet occurred in the Meridian-upper Wilcox aquifer in Attala, Clarke, Holmes, Humphreys, Newton, Scott, Sharkey, Sunflower, and Yazoo Counties (table 1). Although water levels have declined in the study area, notable recoveries (water-level increases following declines) of 20 feet or more have resulted from the redistribution of pumping in Clarke County near Quitman and Yazoo County near Oakland. Areas where water-level changes were small or unchanged generally are close to the base of the Meridian Sand Member of the Tallahatta Formation and in down-dip areas of the Meridian-upper Wilcox aquifer. Water-level changes measured in 82 observation wells during 1979-88 declined about 1 foot per year on the average.

HYDROGRAPHS

Long-term water-level trends in the Meridian-upper Wilcox aquifer are shown in the hydrographs in figure 2. The trend in water levels in most wells completed in the aquifer was downward; some annual and seasonal variations occurred as a result of well location, variations in precipitation, pumping, and recharge.

- The trend in water levels for well H113 near the outcrop area in Grenada County is slightly upward; overall, the water level rose about 2 feet during 1979-88.
- The trend in water levels for well L1 in Leake County shows a general downward trend; overall the water level declined about 15 feet during 1979-88.
- The trend in water levels for well L39 in Scott County shows a general downward trend; overall the water level declined about 26 feet during 1979-88.

REFERENCES

Boswell, E.H., 1976, The Meridian-upper Wilcox aquifer in Mississippi: U.S. Geological Survey Water-Resources Investigations Report 76-79, 1 sheet.

Darden, Daphne, 1986, Potentiometric map of the Meridian-upper Wilcox aquifer in Mississippi, fall 1983: U.S. Geological Survey Water-Resources Investigations Report 86-4018, 1 sheet.

Wasson, B.E., 1980, Potentiometric map of the Meridian-upper Wilcox aquifer in Mississippi, fall 1979: U.S. Geological Survey Water-Resources Investigations Report 80-590, 1 sheet.

ADDITIONAL INFORMATION

Data describing the individual wells used in this study may be obtained from the following:

Director
Mississippi Department of Environmental Quality
Office of Land and Water Resources
P.O. Box 10631
Jackson, Mississippi 39209

District Chief
U.S. Geological Survey
Water Resources Division
100 West Capitol Street, Suite 710
Jackson, Mississippi 39269

Copies of this report can be purchased from:

U.S. Geological Survey
Earth Science Information Center
Open File Reports Section
Box 25286, MS 517, Federal Center
Denver, Colorado 80225

CONVERSION FACTORS AND VERTICAL DATUM

Multiply	By	To obtain
foot	0.3048	meter
mile	1.609	kilometer
million gallons per day	0.04381	cubic meter per second

Sea Level: In this report "sea level" refers to the National Geodetic Vertical Datum of 1929—a geodetic datum derived from a general adjustment of the first-order level nets of the United States and Canada, formerly called Sea Level Datum of 1929.

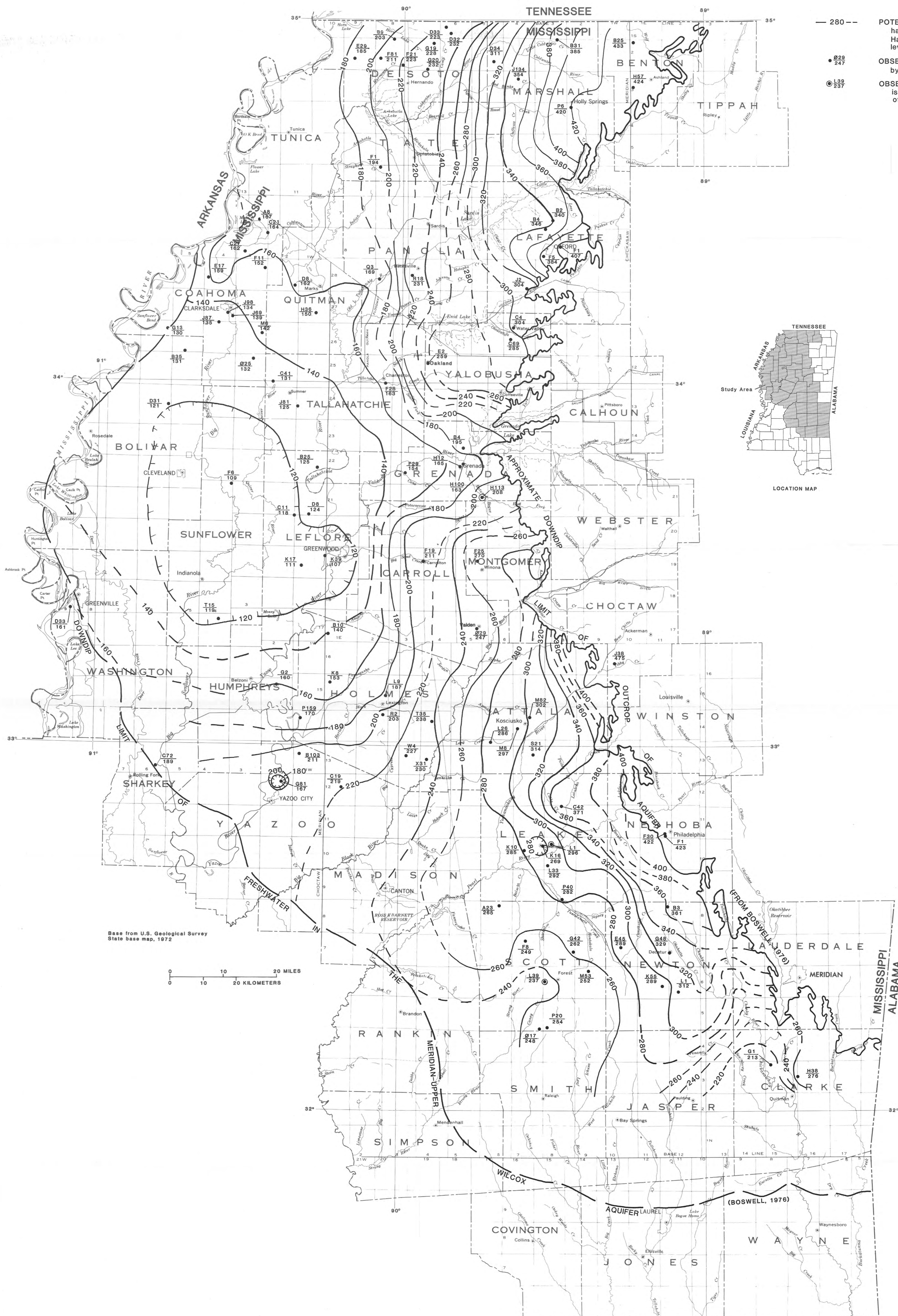


Figure 1.—Potentiometric surface of the Meridian-upper Wilcox aquifer, October through December 1988.

EXPLANATION

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POTENTIOMETRIC CONTOUR—Shows altitude at which water level would have stood in tightly cased wells. Dashed where approximately located. Hachures indicate depression. Contour interval 20 feet. Datum is sea level.

OBSERVATION WELL—Upper number is well number, which is alpha-numerical by county. Lower number is altitude of water surface, in feet.

OBSERVATION WELL FOR WHICH HYDROGRAPH IS SHOWN—Upper number is well number, which is alpha-numerical by county. Lower number is altitude of water surface, in feet.

WATER LEVEL IN FEET BELOW LAND SURFACE

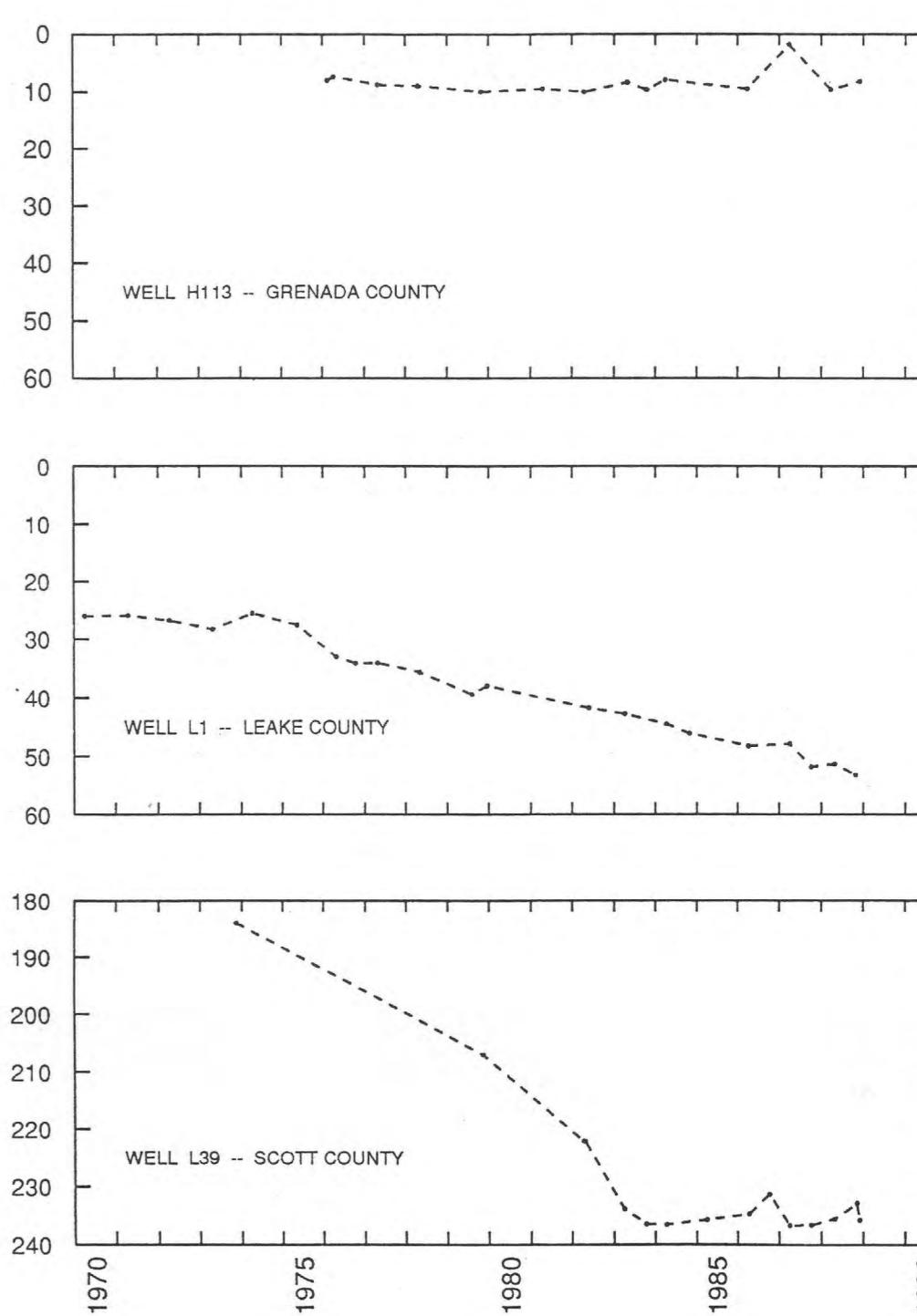


Figure 2.—Water levels in selected observation wells completed in the Meridian-upper Wilcox aquifer, 1970-88.

Table 1.—Water-level changes for wells completed in the Meridian-upper Wilcox aquifer
(—, insufficient data to compute value; negative value indicates a decrease in water level)

County	Local well number	Measured water-level change from 1979 to 1988 (in feet)	County	Local well number	Measured water-level change from 1979 to 1988 (in feet)
Attala	L26	-12	Leake	C42	-3
	M8	-3		K10	-
	M82	-24		K16	-
	S21	5		L1	-15
Benton	B25	-		L33	3
	H57	-15		P90	-
Bolivar	B35	-	Leflore	B25	-14
	D31	-15		C11	-9
Carroll	F19	0		D8	-8
				F28	-8
Choctaw	J38	-		K39	-10
Clarke	G1	-37		L52	-
	H38	25		L52	-
Coahoma	A8	-2	Marshall	B31	5
	C21	-8		D34	-1
	E17	0		H34	0
	F11	-14	Montgomery	F25	-2
	G13	-11		F50	-
	H5	-11	Neshoba	F1	-
	M5	-11		F50	-
	M5	-8	Newton	B3	-8
	M5	-7		B45	-8
				K55	-8
				L1	-8
DeSoto	B9	-5	Panola	G3	0
	D32	-4		K18	-1
	D33	-4	Quitman	D8	1
	F29	-7		H36	-
	F29	-6	Scott	A23	-15
	G19	-13		B4	-15
	G20	-1		L39	-26
Grenada	B4	1		L39	-26
	F29	-11		P17	-20
	H12	-1		P20	-32
	H13	2	Sharkey	C72	-21
Holmes	B10	-18	Sunflower	F6	-18
	K8	-22		T15	-20
	L3	-10	Tallahatchie	C41	-6
	M5	-10		F28	-8
	M5	-10		H31	-
	M5	-10	Tate	F1	-
	M5	-10		F1	-
Humphreys	G2	-20	Washington	D33	-2
Lafayette	B2	-4		C5	-
	B4	-2	Yalobusha	C59	-1
	F29	-4		E2	20
	F29	-4		F29	-
	F29	-4	Yazoo	B103	-
	F29	-4		C19	-16
	F29	-4		C81	-48

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POTENTIOMETRIC-SURFACE MAP OF THE MERIDIAN-UPPER WILCOX AQUIFER IN MISSISSIPPI, OCTOBER THROUGH DECEMBER 1988

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