

Figure 5. Contonment areas, well locations, and traces for hydrogeologic sections, Fort Polk area Louisiana.

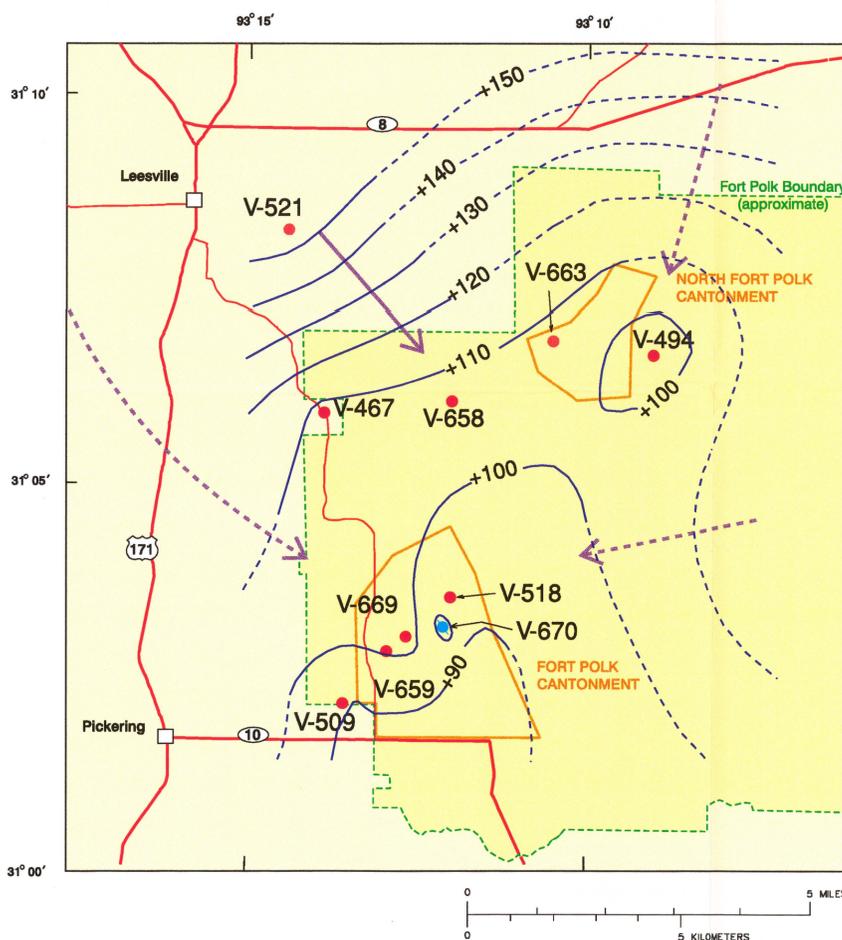


Figure 6. Potentiometric surface of the Williamson Creek aquifer "B" sand, Fort Polk area, Louisiana, March 1997.

POTENTIOMETRIC SURFACE

The potentiometric-surface map of the Williamson Creek aquifer "B" sand (fig. 6) was constructed using the altitude of water levels in 10 wells measured during March 1997 in the Fort Polk area. The water levels in wells, which are equipped with pumps and used frequently for water supply, were measured during non-pumping conditions. Seven of the wells are located at the Reservation. Water-level data from three wells outside the Reservation were used for the potentiometric-surface map. Well V-467 is located just outside the northwestern corner of the Reservation at Northwestern State University at Fort Polk; well V-521 is located southeast of Leesville; and well V-509 is located just outside the southwestern corner of the Reservation. Table 1 lists specific capacity data from selected wells completed in the "B" sand. Water-level measurements are listed in table 2. Water levels ranged from about 90 feet above sea level at well V-670 in the Fort Polk cantonment area, to nearly 157 feet above sea level northwest of the Reservation at well V-521. Dashed potentiometric-surface contours are estimated based on previously published information and measurement of water levels in sand layers of the Williamson Creek aquifer other than the "B" sand.

The natural ground-water-flow pattern in the Fort Polk area is generally north-northwest to south-southeast following the dip of the aquifer. Water withdrawals from the "B" sand have resulted in lower water levels within the North Fort Polk and Fort Polk cantonment areas and have caused ground water to move radially toward these areas (fig. 6). The hydraulic gradient, which is the difference in water level between two points divided by the distance between the points, can be calculated from the potentiometric contours (fig. 6). With a 10-foot change in water level divided by a distance of approximately 0.8 to 0.9 miles, the water level in the North Fort cantonment area decreases at a rate of approximately 11 to 12 feet per mile. Between the North Fort Polk and Fort Polk cantonment areas, the hydraulic gradient flattens out (lessens). The potentiometric-surface map, which shows directions of flow within the "B" sand of the Williamson Creek aquifer, reflects water-level declines in response to long-term water withdrawals at the Reservation.

McWreath and Smoot (1989) report that water levels in the "B" sand at Fort Polk declined an average of 2 feet per year during 1941-1986 due to long-term increases in pumpage from that sand. Pumpage for public supply from the Williamson Creek aquifer was relatively stable from 1991 to 1996 (fig. 7). A composite hydrograph of well V-448 and its replacement well V-670, completed in the "B" sand at Fort Polk, is shown in figure 8. Water-level measurements at this location have been relatively stable (about 250 feet below land surface) at Fort Polk since about 1992.

Table 1. Specific capacity data from selected wells completed in the Williamson Creek aquifer "B" sand, Fort Polk area, Louisiana

[Data are from the U.S. Geological Survey Ground-Water Site Inventory data base.
gal/min, gallon per minute; gal/min/ft, gallon per minute per foot]

U.S. Geological Survey well number	Owner's well name	Pumping test date	Duration of test (hours)	Initial water level (feet below land surface)	Final water level (feet below land surface)	Drawdown (feet)	Pumping rate (gal/min)	Specific capacity (pumping rate/drawdown = gal/mln/ft)
V-467	Unnamed							
V-494	North vehicle-wash	5-27-81	36	231	268.5	37.5	250	6.67
V-509	Well 1	7-11-86	4	219.83	355.58	135.75	580	4.27
V-518	11A	1-22-86	24	244.35	332.90	88.55	736	8.31
V-521	Unnamed							
V-658	16AD	6-1-93	23.3	200	309.74	109.74	654	5.96
V-659	8C	3-2-94	24	229.68	334.80	105.12	752	7.15
V-663	6BPS	9-19-91	23.3	222.35	277.67	55.32	508	9.18
V-669	7B	1-22-92	24	217.3	293.7	76.4	753	9.86
V-670	5B	5-20-92	24	252	342.70	90.7	512	5.64

Table 2. Water-level data used to construct the potentiometric-surface map of the Williamson Creek aquifer "B" sand, Fort Polk area, Louisiana, March 1997

U.S. Geological Survey well number	Owner's well name	Date measured	Well depth (feet)	Altitude of land surface (feet above sea level)	Water level (feet below land surface)	Altitude of water level (feet above sea level)
V-467	Unnamed	3-13	560	320	212.96	107.04
V-494	North vehicle-wash	3-10	675	340.1	246.06	94.04
V-509	Well 1	3-13	925	305	214.04	90.96
V-518	11A	3-14	885	335	239.61	95.39
V-521	Unnamed	3-19	350	270	113.10	156.90
V-658	16AD	3-14	635	309	203.64	105.36
V-659	8C	3-10	912	310	209.32	100.68
V-663	6BPS	3-14	573	330	222.59	107.41
V-669	7B	3-13	904	315	210.00	105.00
V-670	5B	3-14	900	340	250.35	89.65

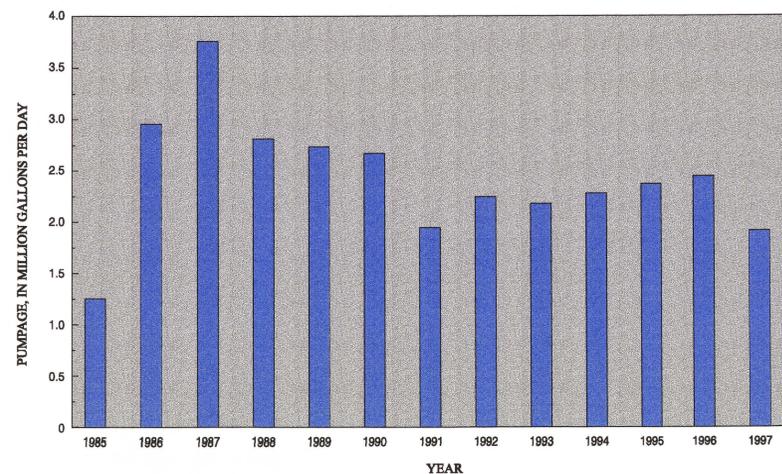


Figure 7. Public-supply pumpage from the Williamson Creek aquifer at Fort Polk, Louisiana, 1985-97.

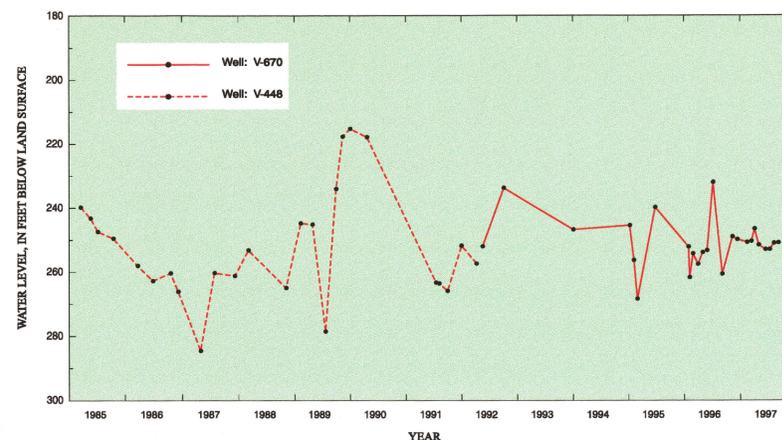


Figure 8. Water level in well V-448 and replacement well V-670 completed in the Williamson Creek aquifer "B" sand at Fort Polk cantonment, 1985-97.

SELECTED REFERENCES

Klug, M.L., 1956, Memorandum on the ground-water resources of the Leesville area, Vernon Parish, Louisiana: U.S. Geological Survey Open-File Report, 25 p.

Maher, J.C., 1945, Ground-water geology of Camp Polk and North Camp Polk, Louisiana: Bulletin of the American Association of Petroleum Geologists, v. 29, no. 8, p. 1169-1188.

Maher, J.C., Guyton, W.F., Drescher, W.J., and Jones, P.H., 1955, Ground-water conditions at Camp Polk and North Camp Polk, Louisiana: U.S. Geological Survey Open-File Report, 67 p.

McWreath, H.C., III, and Smoot, C.W., 1989, Geohydrology and development of ground water at Fort Polk, Louisiana: U.S. Geological Survey Water-Resources Investigations Report 88-4088, 53 p.

National Oceanic and Atmospheric Administration, 1997, Climatological data, annual summary, Louisiana, 1996: U.S. Department of Commerce, National Oceanic and Atmospheric Administration, v. 101, no. 13, 21 p.

Prakken, L.B., and Griffith, J.M., 2000, Analysis of geophysical log data from the Fort Polk Military Reservation, Vernon Parish, Louisiana: U.S. Geological Survey Water-Resources Investigations Report 00-4111, 50 p.

Rogers, J.E., and Calandro, A.J., 1965, Water resources of Vernon Parish, Louisiana: Department of Conservation, Louisiana Geological Survey, and Louisiana Department of Public Works Water Resources Bulletin no. 6, 104 p.

Smoot, C.W., and Seanor, R.C., 1992, Louisiana ground-water map no. 4: Potentiometric surface, 1989, and water-level changes, 1984-89, of the Jasper aquifer system in west-central Louisiana: U.S. Geological Survey Water-Resources Investigations Report 91-4137, 2 sheets.

University of Louisiana at Monroe, Center for Business and Economic Research, Louisiana parishes and municipalities July 1, 1997, population estimates, published in January 1996: accessed January 5, 1999, at URL <http://leap.nlu.edu/POPHS/pop1997.txt>

U.S. Army Joint Readiness Training Center and Fort Polk, "Fort Polk facts" January 1998: accessed January 5, 1999, at URL <http://www.jrtc-polk.army.mil/fact.asp>

U.S. Geological Survey [Jones, P.H.], [1949], Water, in Vernon Parish Resources and Facilities: Louisiana Department of Public Works and Vernon Parish Planning Board, p. 25-30.

Welch, R.N., 1942, Geology of Vernon Parish: Department of Conservation, Louisiana Geological Survey, Geological Bulletin no. 22, 90 p.

Whitfield, M.S., Jr., 1975, Geohydrology of the Evangeline and Jasper aquifers of southwestern Louisiana: Department of Conservation, Louisiana Geological Survey, and Louisiana Department of Public Works Water Resources Bulletin no. 20, 72 p.

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 both the United States and Canada, formerly called Sea Level Datum of 1929.

Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Hydrogeologic Framework and Potentiometric Surface of the Williamson Creek Aquifer "B" Sand in the Fort Polk Area, Vernon Parish, Louisiana, March 1997

By Lawrence B. Prakken