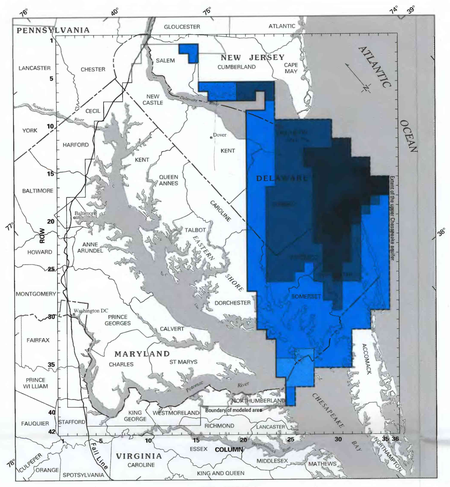


EXPLANATION

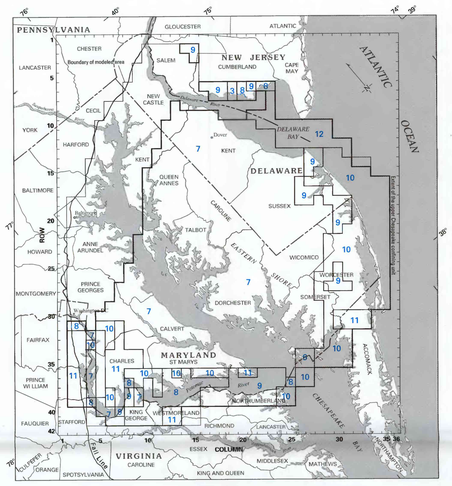
Transmissivity, in feet squared per day

- 10 to 1,000
- 1,000 to 5,000
- 5,000 to 10,000
- 10,000 to 20,000
- More than 20,000

Boundary condition

- Outcrop cell—See text and figure 6 for explanation
- No flow
- Constant flux

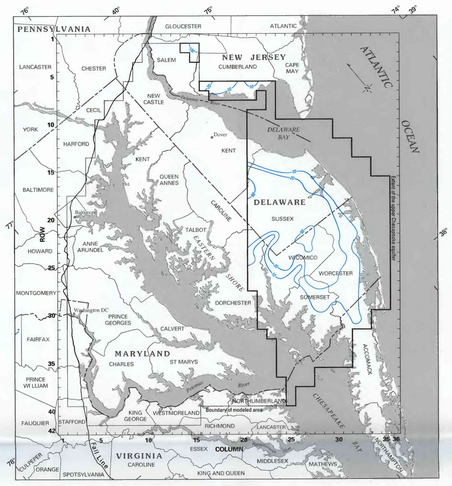
A. **Transmissivity, boundary conditions, and extent of the upper Chesapeake aquifer as used in model**



EXPLANATION

10 **Leakance of confining unit**—Number is negative exponent of base 10. (Example: 10 indicates 10^{-10} cubic feet per second per cubic foot)

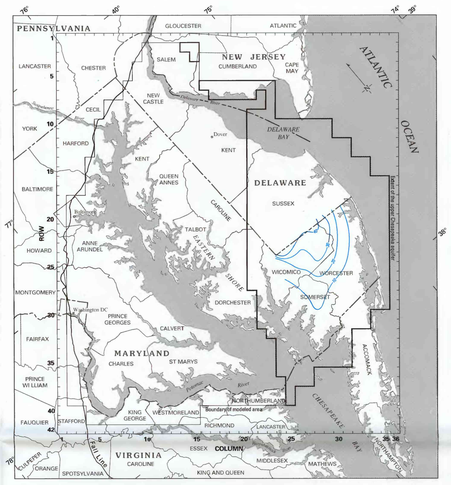
B. **Leakance values of the upper Chesapeake confining unit used in model**



EXPLANATION

Simulated potentiometric contour—Shows altitude at which water level would have stood in tightly cased wells. Contour interval, in feet, is variable. Datum is sea level

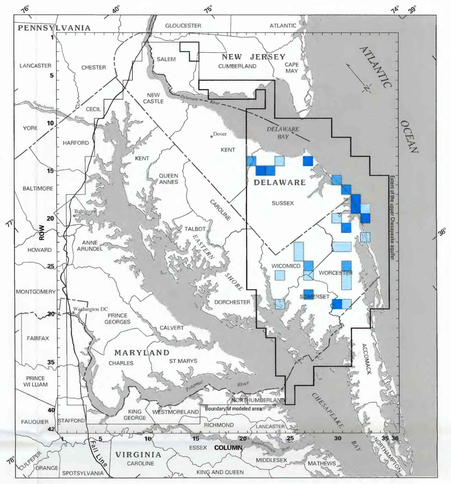
C. **Simulated heads of the upper Chesapeake aquifer for prepumping conditions**



EXPLANATION

Potentiometric contour—Shows altitude at which water level would have stood in tightly cased wells. Contour interval 10 feet. Datum is sea level

D. **Observed heads of the upper Chesapeake aquifer for 1952**

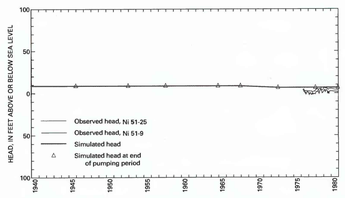


EXPLANATION

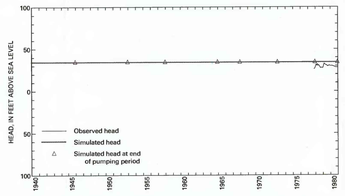
Model cell for which there was pumpage for transient simulation pumping period 10, 1978–80—Magnitude of pumpage, in cubic feet per second

- Less than 0.1
- 0.1 to 0.5
- 0.5 to 1
- 1 to 5

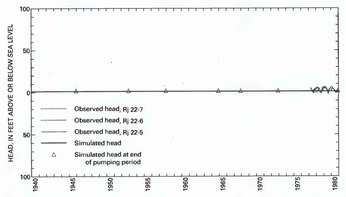
E. **Location and magnitude of pumpage (1978–80) for the upper Chesapeake aquifer as used in model**



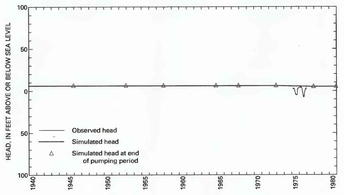
G. **Simulated and observed head for the upper Chesapeake aquifer at wells Ni 51-9 and Ni 51-25**



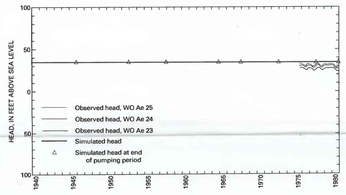
H. **Simulated and observed head for the upper Chesapeake aquifer at well Nf 44-1**



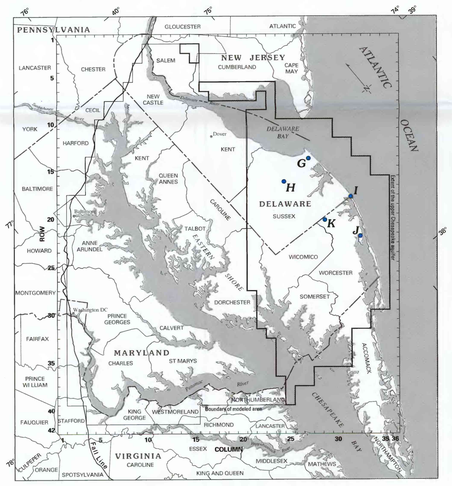
I. **Simulated and observed head for the upper Chesapeake aquifer at wells Rj 22-5, Rj 22-6, and Rj 22-7**



J. **Simulated and observed head for the upper Chesapeake aquifer at well WO Cg 69**



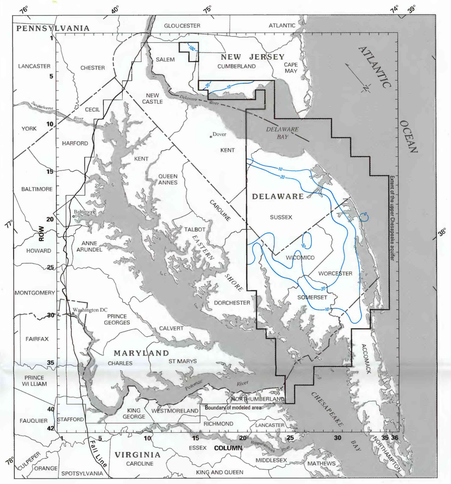
K. **Simulated and observed head for the upper Chesapeake aquifer at wells WO Ae 23, WO Ae 24, and WO Ae 25**



EXPLANATION

G **Well location and letter of accompanying hydrograph**

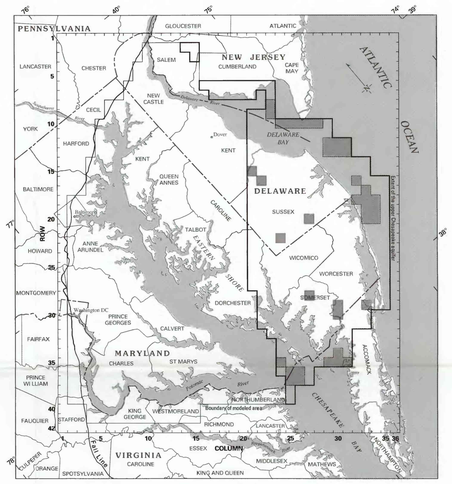
F. **Location of wells for accompanying hydrographs**



EXPLANATION

Simulated potentiometric contour—Shows altitude at which water level would have stood in tightly cased wells. Contour interval, in feet, is variable. Datum is sea level

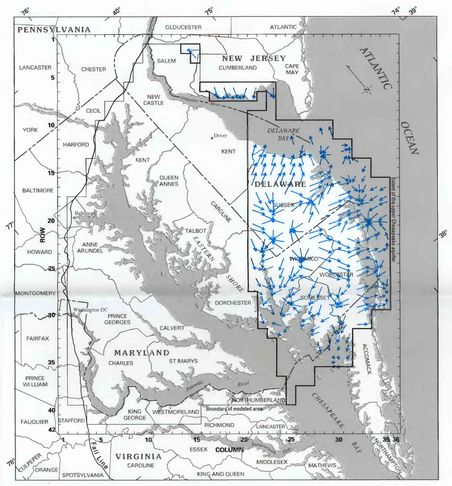
L. **Simulated heads of the upper Chesapeake aquifer for pumping period 4, 1949–52**



EXPLANATION

Area in which direction of vertical leakage through confining unit was upward under simulated prepumping conditions, but reversed to downward under simulated period of 1978–80 conditions

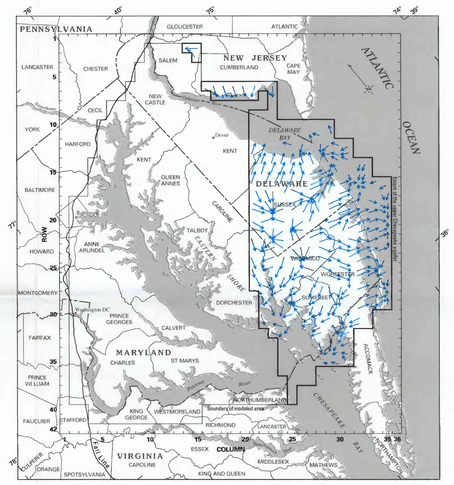
M. **Reversals in the direction of vertical flow through the upper Chesapeake confining unit, from simulations of prepumping conditions to pumping conditions during 1978–80**



EXPLANATION

Vector indicates direction of ground-water flow and length indicates relative magnitude of the logarithm of ground-water velocity

N. **Simulated direction and magnitude of ground-water flow in the upper Chesapeake aquifer during pumping period 10, 1978–80**



EXPLANATION

Vector indicates direction of ground-water flow and length indicates relative magnitude of the logarithm of ground-water velocity

O. **Simulated direction and magnitude of ground-water flow in the upper Chesapeake aquifer during prepumping conditions**

P. **Ground-water budget analysis of the upper Chesapeake aquifer by simulation**

[—, not applicable; <, less than]

Principal sources and sinks	Prepumping				Pumping Period 10, 1978–80					
	Source		Sink		Source			Sink		
	Cubic feet per second	Percentage of sources	Cubic feet per second	Percentage of sinks	Cubic feet per second	Percentage of sources	Percent change from prepumping	Cubic feet per second	Percentage of sinks	Percent change from prepumping
Areal ground-water recharge	208.9	60.6	—	—	208.9	62.1	0	—	—	—
Surface water	0	0	212.2	62.9	0	0	—	208.5	62.1	-1.7
Leakage through confining units	128.7	37.4	124.9	37.0	121.5	36.1	-5.6	108.4	32.3	-13.2
Constant-flux boundary	6.8	2.0	0.1	<0.1	4.6	1.4	-32.4	4.4	1.3	—
Storage	0	0	0	0	<0.1	<0.1	—	0.1	<0.1	—
Pumpage	—	—	0	0	—	—	—	14.0	4.2	—
Total	344.6	100.0	337.3	100.0	336.1	99.7	-2.5	335.5	100.0	-0.5
Percent error	2.1				0.2					

SCALE 1:1,500,000

25 0 25 50 75 100 MILES

25 0 25 50 75 100 KILOMETERS

Base modified from U.S. Geological Survey digital data, 1:2,000,000, 1972

DESCRIPTION OF HYDROGEOLOGY AND SIMULATION OF GROUND-WATER FLOW FOR THE UPPER CHESAPEAKE AQUIFER AND THE UPPER CHESAPEAKE CONFINING UNIT (LAYER 9 OF MODEL)

By
William B. Fleck and Don A. Vroblesky

1996