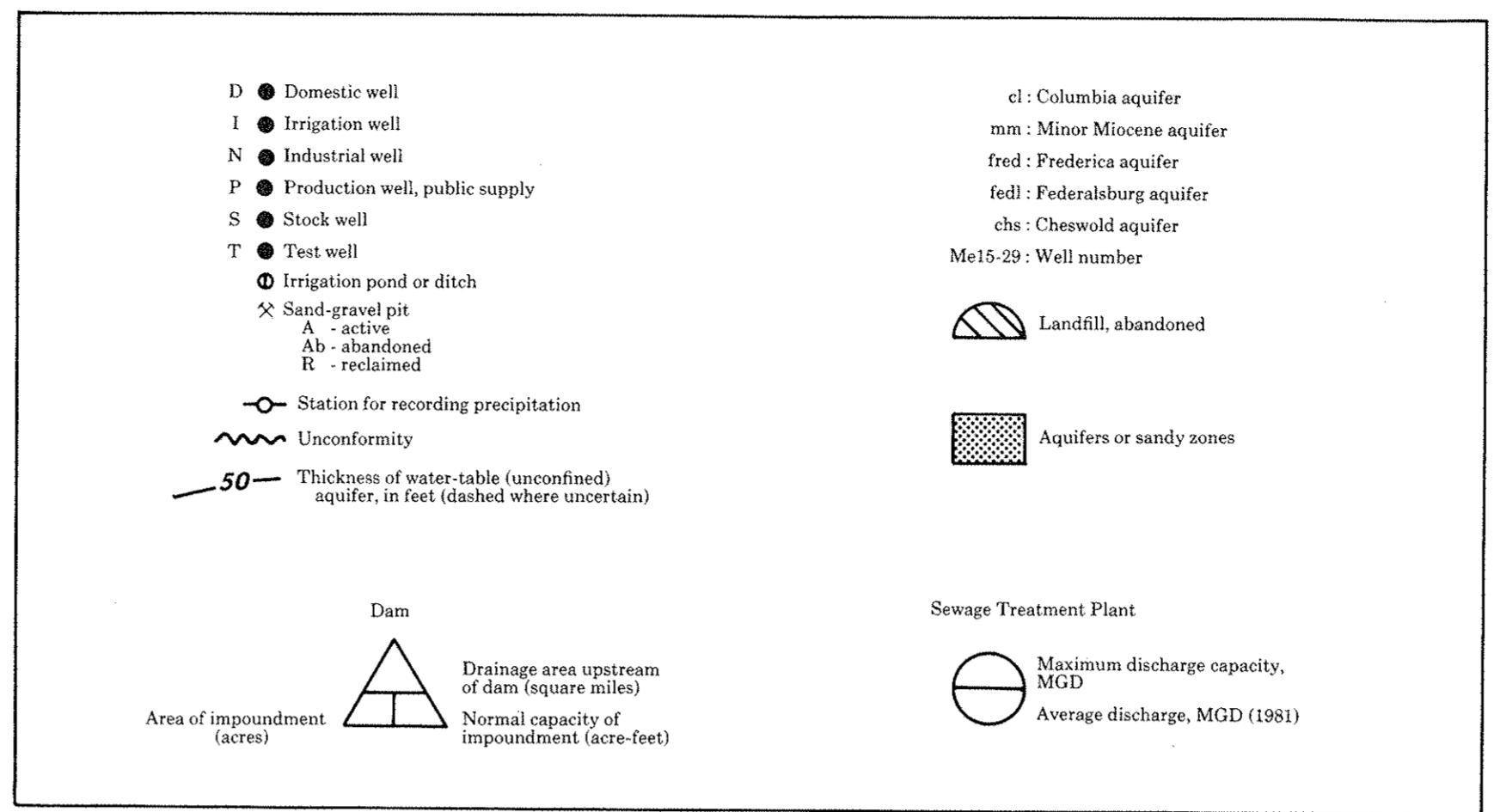
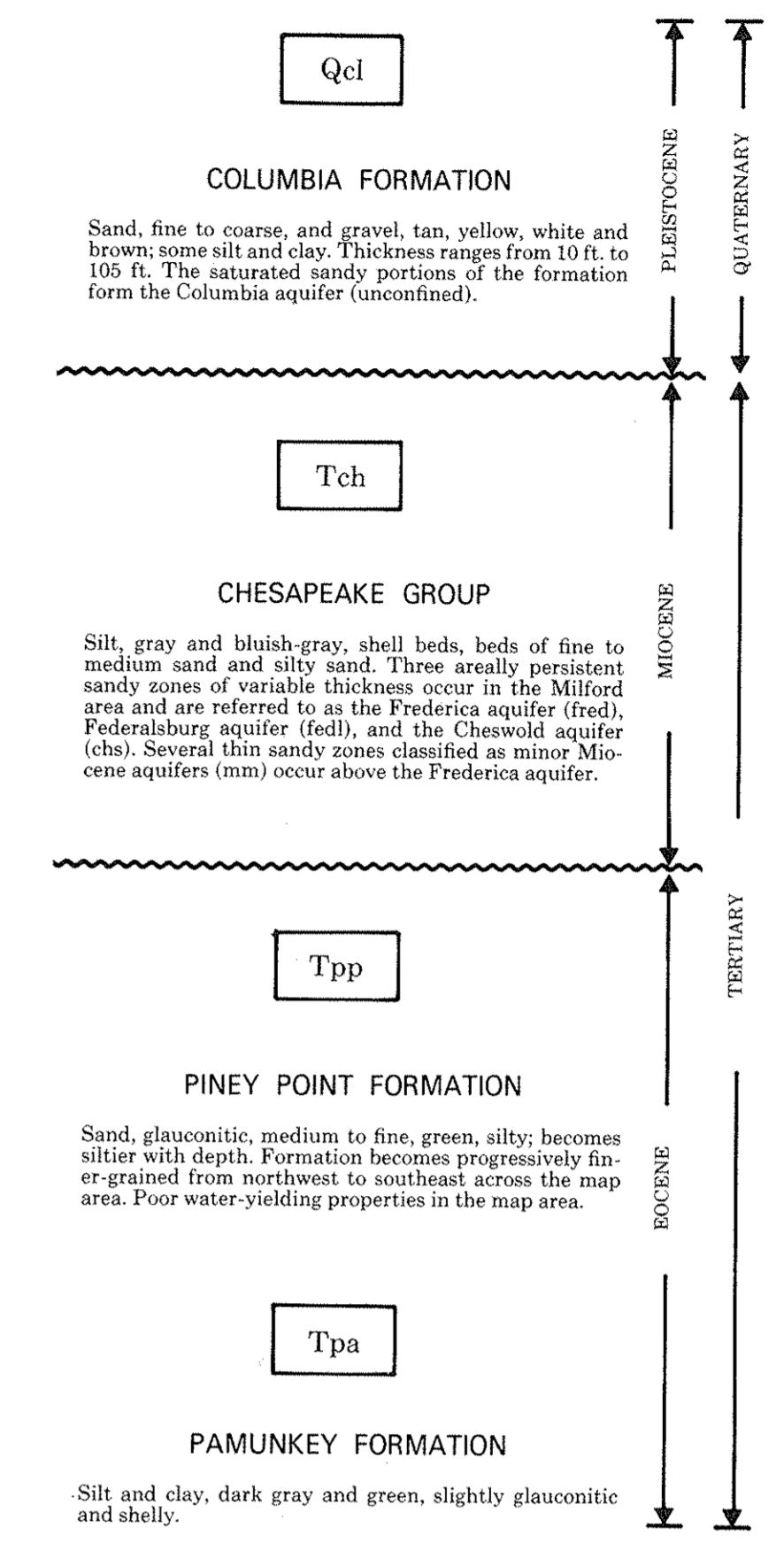


EXPLANATION OF SYMBOLS



KEY TO CROSS-SECTION



DISCUSSION

The Columbia Formation and, in some locations, suberupting sands of the Chesapeake Group, comprise the water-table (unconfined) aquifer. This aquifer receives recharge from precipitation and not only provides large quantities of water to wells, but also provides a source of recharge to underlying aquifers and basins to streams. Water levels in the unconfined aquifer range from 2 to 20 feet below land surface with yearly maximum fluctuations of about 6 to 10 feet. Saturated thickness, maximum thickness of water-bearing sands, ranges from 10 to 30 feet and averages about 50 feet. Specific capacities determined from tests on high yielding wells (irrigation and public supply wells) range from 9 to 80 gpm/ft of drawdown. Yields usually exceed 500 gpm and may exceed 1,000 gpm for short periods of time. Transmissivities vary greatly, reflecting local variations in lithology and saturated thickness. The aquifer is rated good to excellent in water-yielding capabilities.

The quality of water in the water-table aquifer is generally good. However, because the aquifer is either exposed or near the surface, and is usually quite permeable, it is highly susceptible to contamination. Many shallow wells in several areas have been abandoned because of ground-water contamination caused by excessive concentrations of nitrate.

Several discontinuous thin sandy zones within the Miocene age Chesapeake Group have been mapped in the area. A few public wells and many domestic wells are completed in these minor Miocene aquifers. Specific capacities determined from tests in two wells average 4.4 gpm/ft of drawdown and the transmissivity averages 1,440 ft²/day. The highest yields expected, based on available drawdown and calculated hydraulic characteristics, will probably not exceed 200 to 400 gpm. These aquifers are rated fair in water-yielding capabilities.

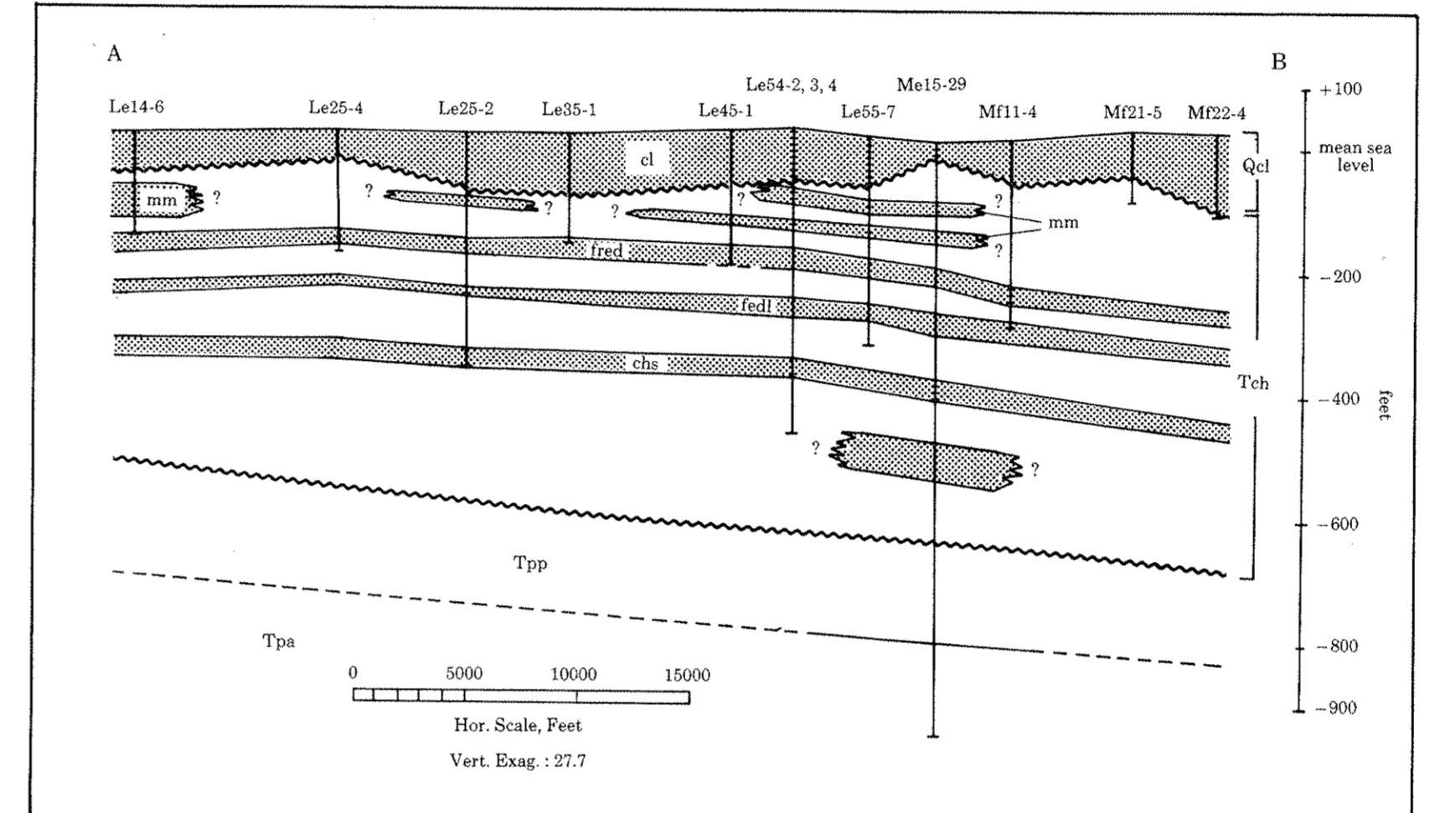
The Frederica aquifer occurs above the Frederaburg aquifer and is separated from it by a silty and clayey interval which in some areas is only 20 to 30 feet thick. The thickness of the Frederica aquifer in the Milford area ranges from 2 to 44 feet. Specific capacities vary from 0.5 to 5.6 gpm/ft of drawdown; yields range from 10 to 400 gpm. This aquifer supplies water for public, domestic, irrigation, and food and poultry processing at a rate exceeding 1 MGD (million gallons per day) in the Milford area. Continuous pumping from this aquifer during the past 20 to 40 years has caused declines in water levels of several tens of feet. Consequently, further development of the Frederica aquifer in this area will probably require readjustment of both well locations and pumping rates. This aquifer is rated fair to good for wells yielding greater than 200 gpm.

The Frederaburg aquifer, a sandy unit of variable thickness (6 to 38 feet) occurs between the overlying Frederica aquifer and the underlying Cheswold aquifer. Water yields from wells constructed in this aquifer range from 10 to 400 gpm. The transmissivity and permeability of the aquifer are generally low in the Milford area. Hypothetical long-term pumping scenarios developed by Sundstrom and Pickett (1969) indicate that yields from properly spaced wells will not exceed 300 gpm and many will, in fact, have yields less than 100 gpm. This aquifer is rated fair for wells yielding greater than 200 gpm.

The Cheswold aquifer occurs at depths ranging from 340 to 380 feet below land surface. In the Milford area, the estimated transmissivity of the aquifer is 800 ft²/day. The water-yielding properties appear to be poor to fair. Yields from properly located wells will probably not exceed 50 to 100 gpm.

Deeper permeable units are brackish and not usable for potable water supplies.

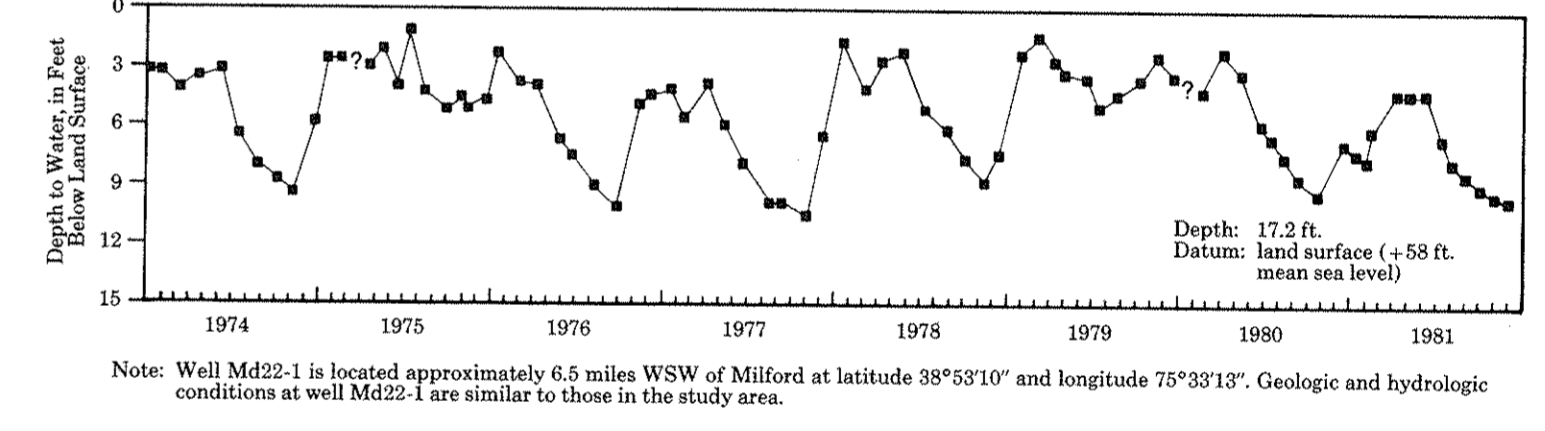
HYDROGEOLOGIC CROSS-SECTION



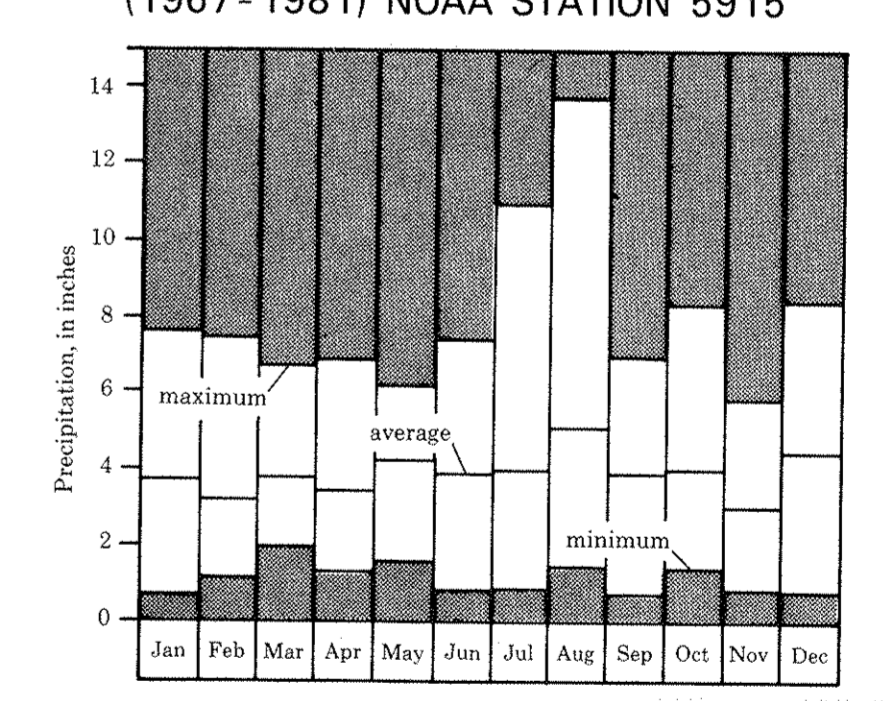
SPECIFIC CAPACITY, TRANSMISSIVITY, AND ESTIMATED TRANSMISSIVITY OF HIGH YIELDING WELLS IN THE MILFORD AREA

Well	Well Use	Aquifer	Specific Capacity (gpm/ft)	Period Pumping (hours)	Yield (gpm)	Transmissivity (ft ² /day)	Estimated Transmissivity (ft ² /day)
Le23-3	I	Columbia	9	—	500	—	1,900
Le23-4	I	Columbia	11	—	400	—	2,300
Le23-5	I	Columbia	26	—	300	—	—
Le23-7	I	Columbia	31	—	1,000	—	—
Le23-8	I	Columbia	18	—	300	—	—
Le23-9	I	Columbia	14	—	400	—	—
Me11-5	I	Columbia	64	—	1,200	—	13,000
Me12-2	I	Columbia	56	—	1,018	—	—
Me24-6	I	Columbia	29	6.5	524	—	5,600
Me24-9	I	Columbia	16	28	700	—	—
Me32-2	I	Columbia	50	6	500	—	—
Me34-4	I	Columbia	45	8	700	—	6,000
M11-6	P	Columbia	25	48	308	—	5,900
M21-1	I	Columbia	15	—	150	—	3,900
M22-4	I	Columbia	80	—	1,041	—	16,000
Le24-2	I	Columbia & Minor Miocene	9.4	8	750	—	—
Le23-4	I	Columbia & Frederica	15	—	900	—	—
Le21-3	I	Minor Miocene	8.7	4	550	—	—
Le24-3	T	Minor Miocene	3.4	6	280	1,400	—
Le25-9	N	Minor Miocene	12.1	6	400	—	—
Le14-5	I	Minor Miocene & Frederica	14	8	740	—	—
Me15-3	P	Frederica	5.6	12	346	—	—
Le25-5	P	Frederaburg	4	8	480	1,250	—
Me15-29	T	Piney Point	0.24	3	—	27	—

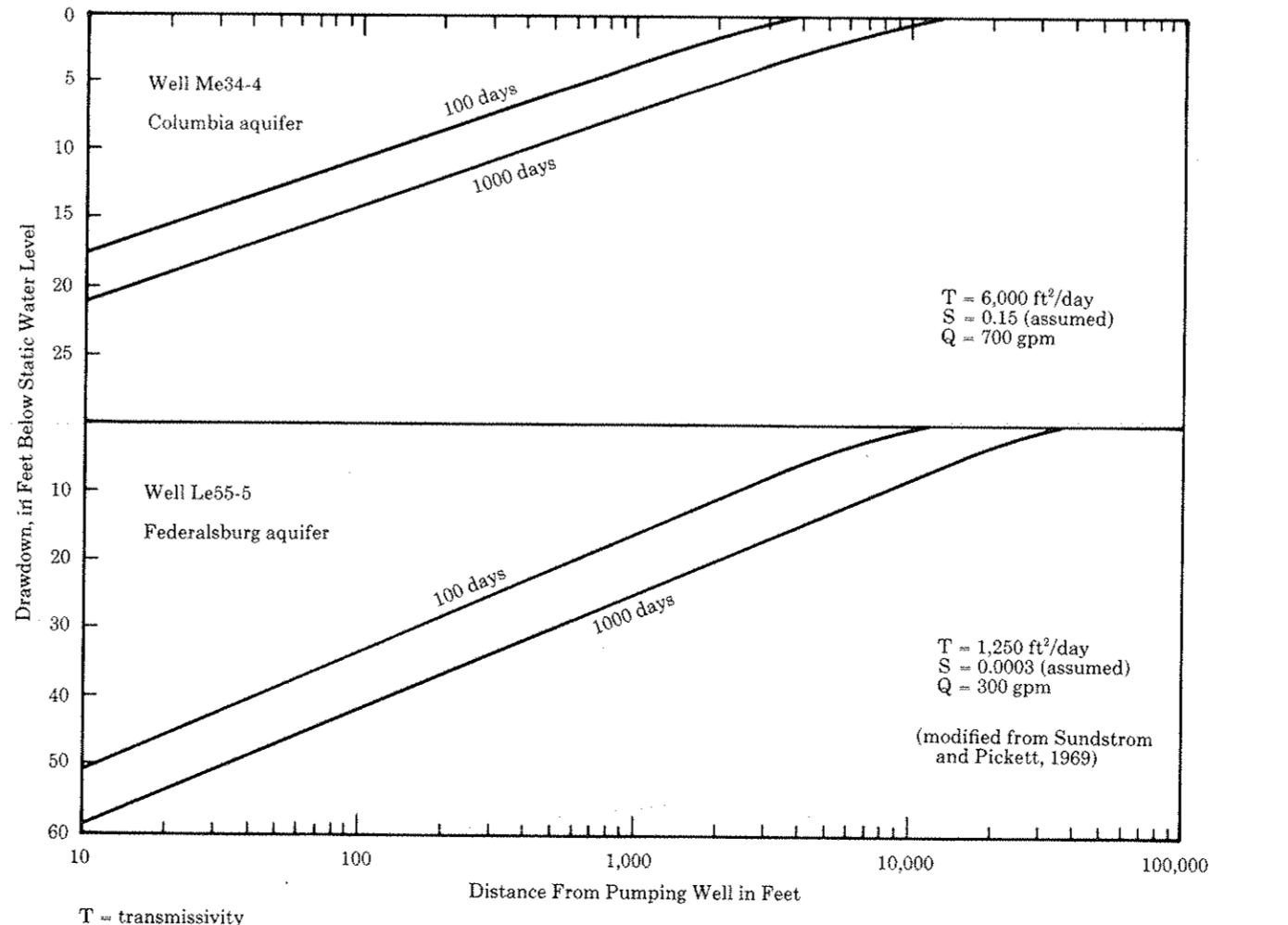
HYDROGRAPH, WELL M22-1, COLUMBIA FORMATION



MONTHLY PRECIPITATION AT MILFORD (1967-1981) NOAA STATION 5915



THEORETICAL DRAWDOWNS AROUND SELECTED PUMPING WELLS



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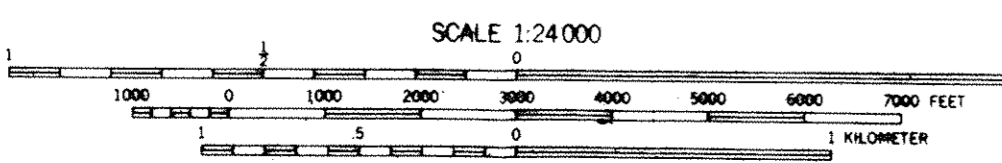
CHEMICAL COMPONENTS IN GROUND WATER

	Columbia aquifer	Frederica aquifer	Frederaburg aquifer	Cheswold aquifer	Piney Point Pm.
Na	10/16	7/5	11/1	198/1	690/1
Total Fe	0.4/19	2/5	—	0.3/1	1.5/1
Cl	11.5/15	9/4	10/1	64/1	535/1
F	<0.1/5	<0.1/4	0.1/1	0.3/1	0.7/1
HCO ₃	—	190/3	—	445/1	650/1
NO ₃	10.4/25	2/5	—	0.3/1	3.4/1
TDS	103/3	170/3	205/1	587/1	1920/1
pH	5.9/26	7.3/4	7.8/1	8.6/1	8.9/1

Milligrams per liter (m/l) of sample. Analyses based on more than one sample represent average concentrations.

GEOHYDROLOGY OF THE MILFORD AREA, DELAWARE

by
John H. Talley
1982



CONTOUR INTERVAL 10 FEET (APPROX. 3 METERS)

QUADRANGLE LOCATION

Base map - USGS Topographic Division
Milford Quadrangle