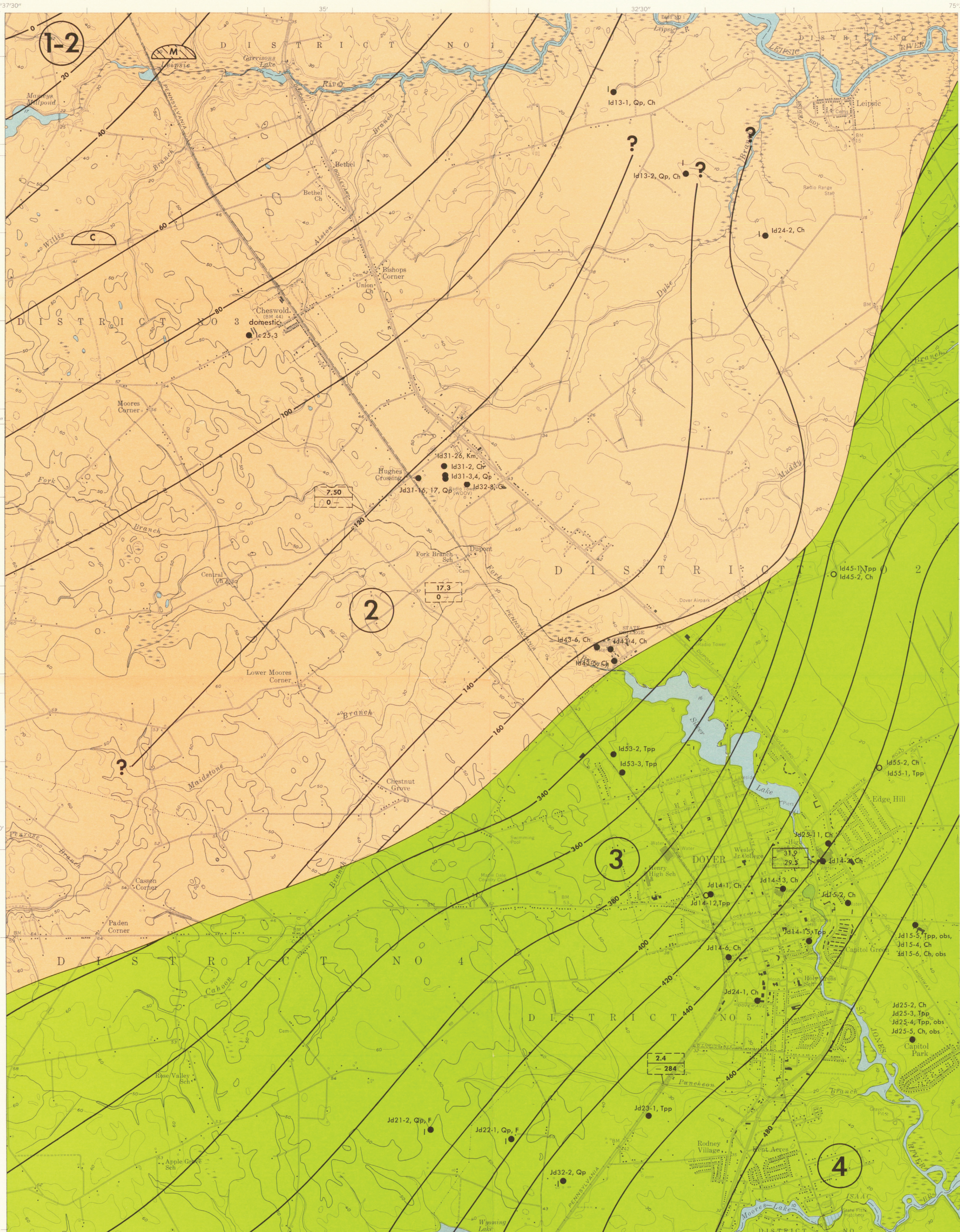
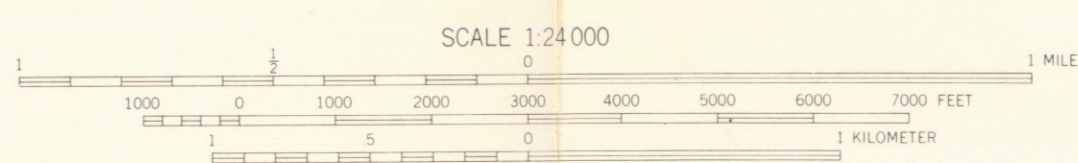




Base Map—U.S.G.S. Topographic Division, Dover, Del. Quadrangle, 1956.

GEOHYDROLOGY OF THE DOVER AREA, DELAWARE

by
Kenneth D. Woodruff
1972



CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL

QUADRANGLE LOCATION

DISCUSSION

Total ground-water use in the immediate Dover area, principally by the City of Dover and the Dover Air Force Base to the southeast, is around 6 to 8 mgd. About 6 to 7 mgd is pumped from the Cheswold aquifer while the remainder comes from the Piney Point Formation. Outside the areas served by public wells, most domestic water comes from the Columbia Formation or the Frederica and Cheswold aquifers. Several large irrigation wells are located where either the Frederica or Cheswold aquifers subcrop directly beneath sands of the Columbia Formation. The Cheswold aquifer is presently being consistently overpumped by about 1-2 mgd and records also indicate that levels in the Piney Point Formation are dropping, particularly during the summer months.

Transmissibilities for the Cheswold aquifer range from about 11,000 gpd/ft. to the south of Dover to about 33,000 gpd/ft. near the middle of Dover. Coefficients of storage range from .0003 to .006 (Sundstrom and Pickett, 1968). Transmissibilities in the Piney Point Formation vary from 6,000 gpd/ft. north of Dover to 36,000 gpd/ft. southeast of Dover.

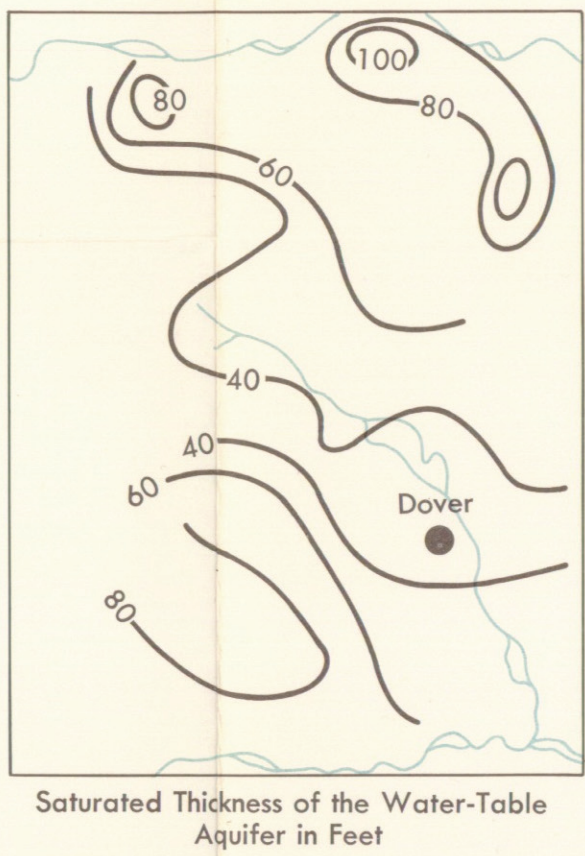
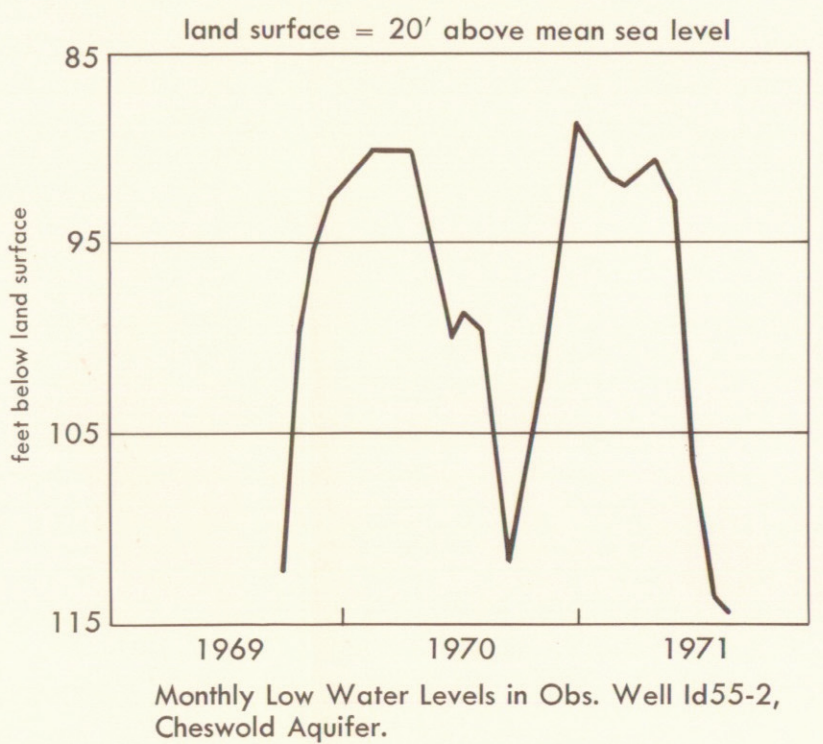
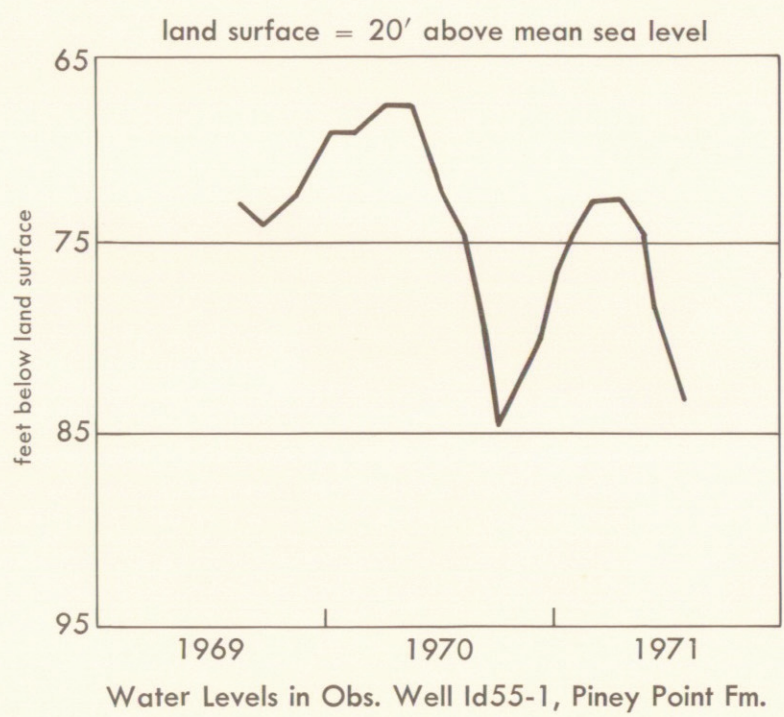
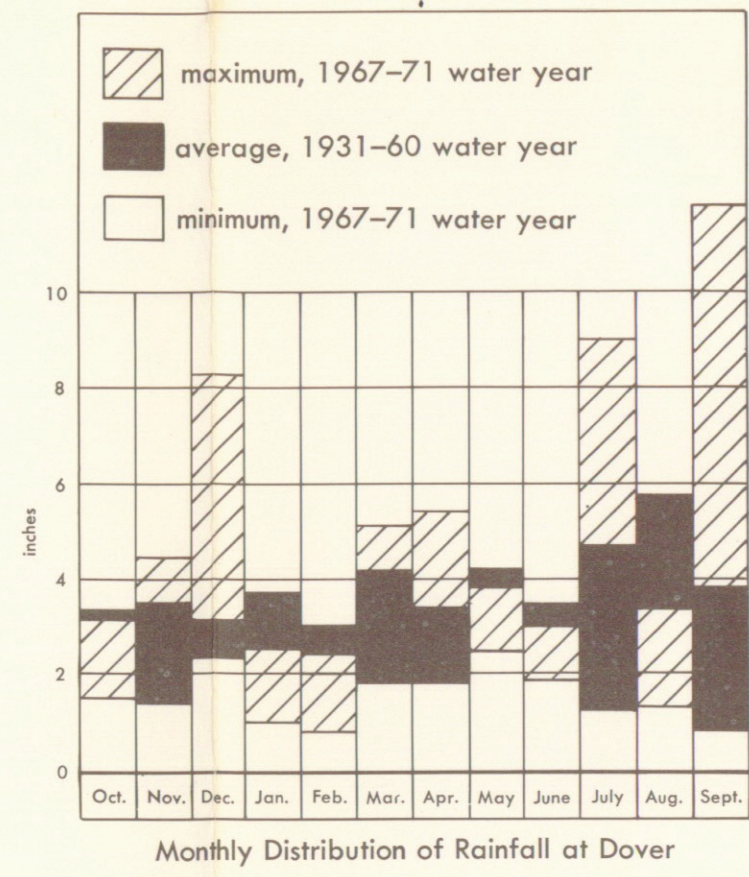
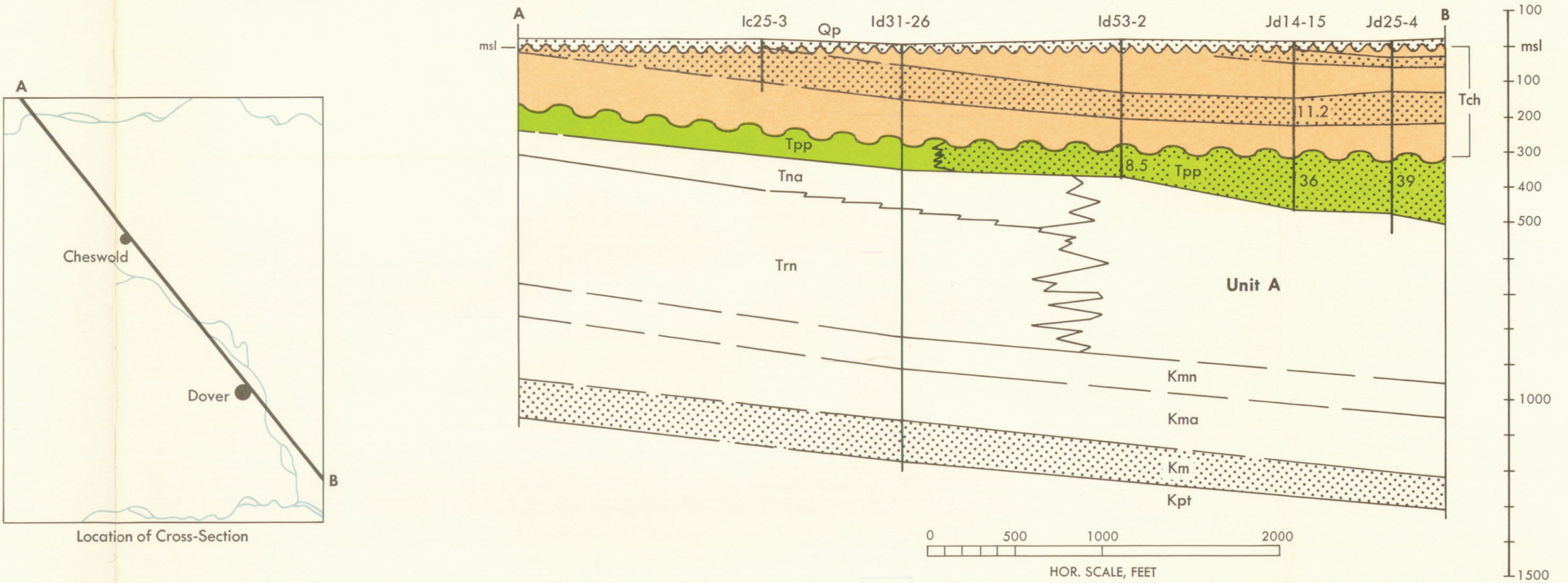
Except in the extreme northern part of the map area aquifers beneath the Piney Point contain water having chloride concentrations greater than 250 mg/l.

The Columbia Formation or water-table aquifer is particularly vulnerable to surface contamination. Preliminary work has shown that many locations within the map area are not suitable for concurrent installation of private, shallow wells and waste disposal systems. Nitrate build-up in the ground water is known to occur when such land development is excessive. Also, high natural concentrations of iron are common in the Columbia Formation.

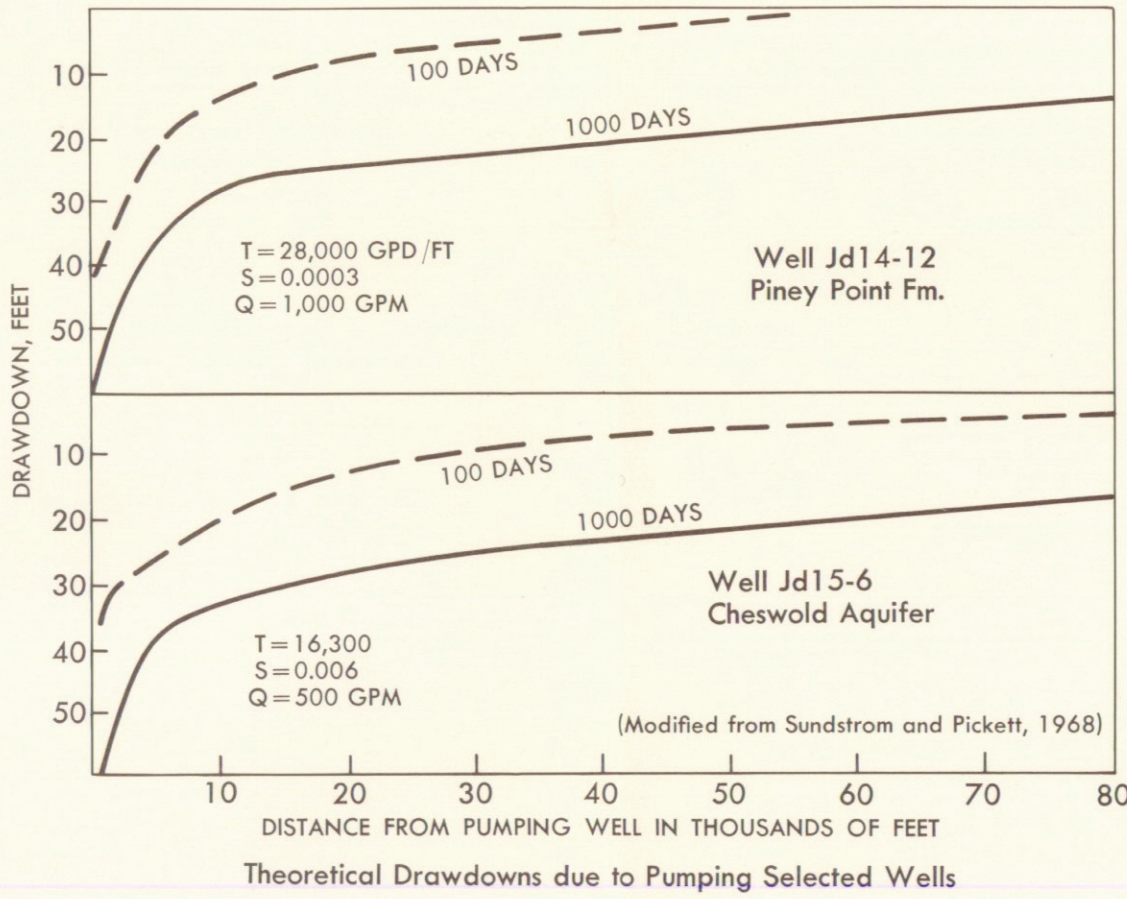
REFERENCES

- Adams, J. K., Boggess, D. H., and Davis, C. F., 1964, Water-table, surface-drainage, and engineering soils map of the Dover quadrangle, Delaware: U. S. Geol. Survey Hydrologic Investigations Atlas HA-139.
- Jordan, R. R., 1962, Stratigraphy of the sedimentary rocks of Delaware: Delaware Geol. Survey Bull. 9, 51 p.
- Kraft, J. C., and Maisano, M. D., 1968, A geologic cross section of Delaware: Water Resources Center, University of Delaware.
- Rasmussen, W. C., Groot, J. J., and Depman, A. J., 1958, High-capacity test well developed at the Air Force Base, Dover, Delaware: Delaware Geol. Survey Rpt. of Investigations 2, 36 p.
- Sundstrom, R. W., and Pickett, T. E., 1968, The availability of ground water in Kent County, Delaware, with special reference to the Dover area: Water Resources Center, University of Delaware, 123 p.
- Woodruff, K. D., Monthly report on water conditions in Delaware: Delaware Geol. Survey Special Publication, issued monthly Nov., 1966 to July, 1971 and bimonthly thereafter.
- Woodruff, K. D., The occurrence of saline ground water in Delaware aquifers: Delaware Geol. Survey Rpt. of Investigations 13, 45 p.

CROSS-SECTION



AVERAGE GROUND-WATER QUALITY			
	Columbia Fm.	Chesapeake Group	Piney Point Fm.
Ca	11/28	35/14	15/2
Na	15/15	41/7	102/2
Mg	6/30	5/14	9/2
SiO ₂	15/27	53/12	24/2
Diss. Fe	.11/8	.02/12	0.1/1
Total Fe	1.7/44	.4/14	0.1/2
HCO ₃	15/55	187/15	345/2
NO ₃	21/49	3.1/15	1.0/2
Cl	23/63	8/16	6/3
SO ₄	15/56	6/16	4/2
TDS	139/15	215/8	367/3
pH	6.1/82	7.9/21	8.1/3



MAP KEY

- DRAINAGE AREA, SQ. MILES
- Stream gage, recording
- AVE DAILY FLOW, CFS
- DRAINAGE AREA, SQ. MILES
- Stream-flow measuring point, partial record
- LOWEST RECORDED FLOW
- HIGHEST RECORDED FLOW

- Jd15-5: Well number
- 1 No. of fresh-water aquifers generally available
- Depth below sea level to base of deepest fresh-water aquifer (chlorides less than 250 MG/L). Aquifer shown by color:
- 160 (FEET)
- CHESWOLD AQUIFER
- PINEY POINT FORMATION
- Landfill, abandoned
- Landfill, active, 1972
- C = Chemical
- M = Mixed Waste
- Observation well (obs)
- RO Observation well with recorder
- Production well, public supply
- Irrigation well
- Ch: Cheswold Aquifer, F: Frederica
- Tpp: Piney Point Formation

CROSS-SECTION KEY

8.5: Transmissibility, thousands of gallons per day per foot

Aquifers or sandy zones

COLUMBIA FORMATION

Sands, fine to coarse, and gravels, yellow, brown, white, some clays. Thickness highly variable but generally about 40 feet in the immediate Dover area with thickening to the northeast. Yields suitable for domestic wells and for high capacity wells in some areas. Iron content of waters often high.

CHESAPEAKE GROUP

Silts, blue to gray, shells, and fine to medium sand. In the Dover area at least two sands are areally persistent and are known informally as the Frederica (upper) and Cheswold (lower) aquifers. Yields and quality in the southern half of the quadrangle suitable for domestic, public, and most industrial supplies (average 200-300 gpm). Yields in the northern third of the quadrangle suitable only for domestic supplies.

PINEY POINT FORMATION

In the southern half of the quadrangle—sand, glauconitic, medium to fine grained, yields up to 500-600 gpm. Grades to silt and very silty sand in the northern half of the quadrangle and is no longer an aquifer although it can be identified as a formation.

NANJEMOY FORMATION

Silt, glauconitic, gray, sandy, clayey. (Formerly designated as Unit C, Jordan, 1962).

RANCOCAS GROUP (Undifferentiated)

Includes Hornerstown and Vincentown Formations. Sand, fine to medium, silty, glauconitic, green to brownish green, and silt, sandy, clayey. Generally is not an aquifer in the map area except possibly in extreme northern edge where small yields for domestic use might be obtained.

UNIT A

Silt and clay, glauconitic, blue, green, and gray, possibly correlative with Pamunkey Group of Maryland.

MONMOUTH FORMATION

Sand, quartzose, glauconitic, silty and clayey in northern part of quadrangle grading to sandy silt and clay in southern half of quadrangle. Generally not an aquifer in the map area.

MATAWAN FORMATION

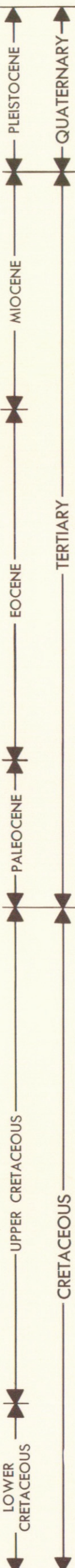
Silt, sandy, and fine-grained quartz sand, micaceous, clayey. Probably yields only small amounts of water to wells. Water may have chloride content in excess of 250 mg/l.

MAGOTHY FORMATION

Sand, white, medium to coarse, with interbeds of gray to black silt, lignitic. Formational water contains chlorides in excess of 1,000 mg/l south of village of Cheswold.

POTOMAC FORMATION

Clay, red, white, and gray, silty, and interbeds of fine to coarse sand, well sorted. Formational water contains chlorides in excess of 1,000 mg/l in map area.



The U.S. Geological Survey and the City of Dover have contributed data used in this publication.