DIGITAL COMPUTER MAP SHOWING SURFACE MATERIALS, MONTGOMERY COUNTY, MARYLAND

BY

J. NICHOLAS VAN DRIEL

SCALE 1:48,000 (1) JULY 20, 1975 RESTON, VIRGINIA

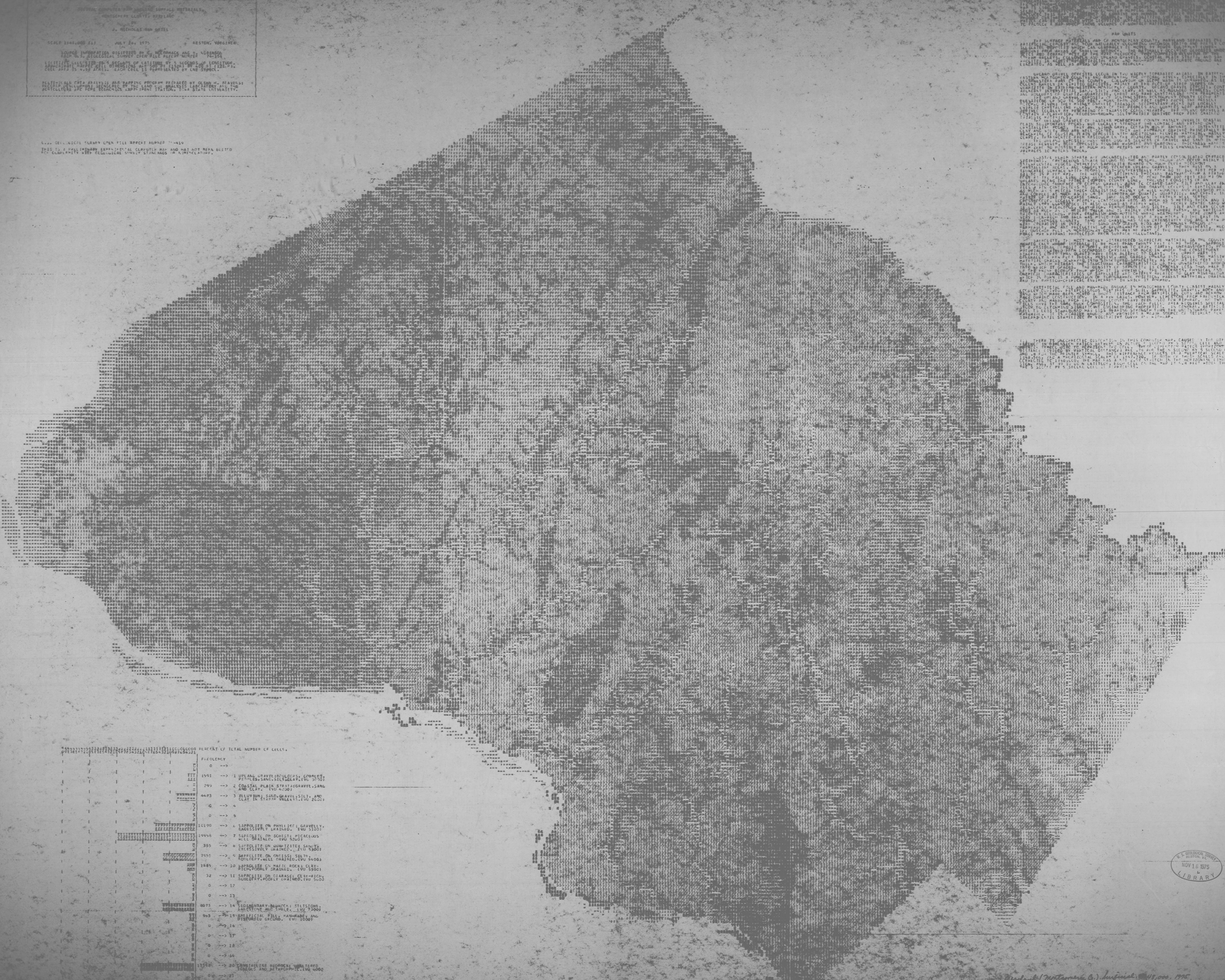
SOURCE INFORMATION DIGITIZED BY C. MCCORMACK AND B. ROBINSON FROM U.S. GEOLOGICAL SURVEY OPEN FILE REPORT NUMBER 74-154

DIGITIZED CELL SIZE IS 5 SECONDS OF LATITUDE BY 5 SECONDS OF LONGITUDE. APPROXIMATE MAPPED CELL DIMENSIONS ARE 500 FT (152M) BY 400 FT (121 M). CELL AREA IS 4.58 ACRES. EACH CELL IS REPRESENTED BY ONE SYMBOL.

MULTI-SCALE DATA ANALYSIS AND MAPPING PROGRAM PREPARED BY GLENN H. BEAVERS; PROGRAM DEVELOPMENT SPONSORED BY THE LAND USE ANALYSIS LABORATORY AND THE AGRICULTURE AND HOME ECONOMICS EXPERIMENT STATION, IOWA STATE UNIVERSITY.

U.S. GEOLOGICAL SURVEY OPEN FILE REPORT NUMBER 75-419

THIS IS A PRELIMINARY EXPERIMENTAL COMPUTER MAP AND HAS NOT BEEN EDITED FOR CONFORMITY WITH GEOLOGICAL SURVEY STANDARDS OR NOMENCLATURE.



EXPLANATION

THIS MAP IS A DIGITIZED VERSION OF THE SURFACE MATERIALS MAP OF MONTGOMERY COUNTY, MARYLAND (USGS OPEN FILE REPORT 74-154). DIGITIZING IS ACCOMPLISHED BY OVERLAYING A GEODETIC GRID ON THE SOURCE MAP, AND RECORDING, FOR EACH CELL, THE LATITUDE-LONGITUDE ADDRESS, AND THE TYPE OF SURFACE MATERIAL. THIS COMPUTER MAP IS USED TO VERIFY THE ACCURACY OF THE ADDRESS AND IDENTIFICATION INFORMATION STORED ON MAGNETIC TAPE. THE COMPUTER MAPPING AND ANALYSIS PROGRAM WHICH PRODUCED THIS MAP IS DESIGNED TO COMBINE ANY NUMBER OF SINGLE FACTOR MAPS TO PRODUCE DERIVATIVE MAPS. FOR EXAMPLE, THE DIGITIZED SURFACE MATERIALS INFORMATION CAN BE COMBINED WITH DIGITIZED SURFACE ELEVATIONS AND BEDROCK ELEVATIONS TO PRODUCE A MAP WHICH SHOWS VOLUMES OF SURFACE MATERIALS.

MAP UNITS

THE SURFACE MATERIALS MAP OF MONTGOMERY COUNTY, MARYLAND SEPARATES ONE ARTIFICIAL DEPOSIT AND FOUR NATURALLY OCCURRING UNCONSOLIDATED AND PARTLY CONSOLIDATED DEPOSITS WHICH CAN GENERALLY BE MOVED BY POWER EQUIPMENT (OVERBURDEN) FROM AREAS OF SHALLOW BEDROCK. THE NATURALLY OCCURRING DEPOSITS UNDERLIE SITES AND BLANKET MOST OF THE HARD BEDROCK. THEY COMPRISE ALLUVIUM OF THE STREAM VALLEYS, COLLUVIUM AND UPLAND GRAVELS, COASTAL PLAIN STRATA, AND SAPROLITE; IN ADDITION, ARTIFICIAL FILL AND MAN-MADE AND DISTURBED GROUND ARE DELINEATED, AS WELL AS AREAS OF SHALLOW BEDROCK.

UPLAND GRAVEL DEPOSITS OCCUR IN TWO WIDELY SEPARATED AREAS: IN EXTREME EASTERN MONTGOMERY COUNTY, AND BORDERING THE POTOMAC RIVER, ESPECIALLY IN THE SOUTHWESTERN PART OF THE COUNTY. COLLUVIUM OR SLOPE WASH IS UNMAPPED, AS IT OCCURS RARELY IN LIMITED DEPOSITS, MAINLY AT THE FOOT OF STEEP SLOPES ON QUARTZITE IN EXTREME WESTERN MONTGOMERY COUNTY. UPLAND GRAVEL DEPOSITS CONTAIN ABUNDANT INTERSTITIAL SAND, SILT, AND CLAY, AS WELL AS ROUNDED PEBBLES, COBBLES AND BOULDERS OF QUARTZ, QUARTZITE, CHERT AND RARE CRYSTALLINE ROCK FRAGMENTS.

THE UPLAND GRAVEL DEPOSITS OF SOUTHWESTERN MONTGOMERY COUNTY OCCUR AT ELEVATIONS OF 300 TO 500 FEET, MORE THAN 200 FEET (60M) ABOVE THE PRESENT POTOMAC RIVER; THEY MAINLY OVERLIE TRIASSIC SEDIMENTARY ROCKS BUT LOCALLY OVERLIE CRYSTALLINE ROCKS. MANY OF THE PEBBLES AND COBBLES WERE APPARENTLY DERIVED LOCALLY BY REWORKING OF TRIASSIC CONGLOMERATE. THE UPLAND GRAVELS ALSO CONTAIN A CLAY-RICH, REDDISH-BROWN, SILTY MATRIX DERIVED FROM FINE GRAINED TRIASSIC MATERIALS.

THE UPLAND GRAVELS OF EASTERN MONTGOMERY COUNTY MAINLY OVERLIE COASTAL PLAIN SEDIMENTARY ROCKS, BUT LOCALLY STRADDLE THE CONTACT AND EXTEND ONTO CRYSTALLINE ROCKS. THEY ARE LIGHT GRAY, CONTAIN MINOR AMOUNTS OF INTERSTITIAL CLAY AND SILT, AND ARE WELL SORTED. THEY ARE PROBABLY DERIVED PRINCIPALLY BY REWORKING OF COASTAL PLAIN DEPOSITS WITH ADDITIONAL FLUVIAL MATERIAL, MAINLY QUARTZ, TRANSPORTED FROM RESIDUUM ON THE ADJACENT PIEDMONT UPLAND TO THE WEST.

THE UPLAND DEPOSITS HAVE BEEN DUG AS SOURCES OF GRAVEL AND SAND IN BOTH AREAS; HOWEVER, BOTH DEPOSITS REQUIRE WASHING AND GRADING. THICKNESS RANGES FROM ZERO TO POSSIBLY AS MUCH AS 30 METERS WHERE IT FILLS CHANNELS, BUT PROBABLY AVERAGES 10 METERS THICK.

COASTAL PLAIN STRATA ARE UNCONSOLIDATED AND PARTLY CONSOLIDATED CRETACEOUS SEDIMENTS. CRETACEOUS STRATA BELONG TO THE POTOMAC GROUP AND OCCUR MAINLY IN INTERFLUVIAL RIDGES OVERLYING SAPROLITE FORMED ON MUCH OLDER PIEDMONT CRYSTALLINE ROCKS, AND UNDERLYING YOUNGER UPLAND GRAVELS. THEY REST ON A TRUNCATED SURFACE WHICH SLOPES EAST-SOUTHEASTERLY FROM 60 TO 100 FEET PER MILE (11 TO 19 M PER KM). THE WEDGE OF SEDIMENTS THICKENS EASTWARD FROM A FEATHER EDGE AT THE FALL LINE ZONE ALONG HIGHWAY 29 TO MORE THAN 100 FEET (30 M) ON THE UPLANDS ALONG THE PRINCE GEORGES COUNTY LINE. THE UNIT CONSISTS OF AN INTERBEDDED SEQUENCE OF COARSE GRAVEL, FINE TO COARSE SAND, SILT AND CLAY IN BEDS A FEW CENTIMETERS TO 10 METERS THICK. THE GRAVEL OCCURS IN LENTICULAR BEDS AS MUCH AS 5 METERS THICK CONSISTING MAINLY OF WELL ROUNDED AND POLISHED PEBBLES AND COBBLES AS MUCH AS 15 CM IN DIAMETER OF QUARTZ, QUARTZITE, AND CHERT, IN A MATRIX OF FINE TO COARSE SAND. SAND ALSO OCCURS IN FAIRLY WELL SORTED CROSSBEDDED, LOCALLY PEBBLY, LENTICULAR BEDS AS MUCH AS 5 METERS THICK AND IS MAINLY VERY QUARTZOSE; IT ALSO OCCURS AS FAIRLY WELL TO POORLY SORTED SAND WHICH IS LOCALLY MICACEOUS, CLAY-RICH, FERRUGINOUS AND SILTY. SILT AND CLAY OCCUR IN BEDS AS MUCH AS 10 METERS THICK AND IS MAINLY GRAY WHERE FRESH, AND VARIEGATED, BRIGHTLY COLORED, PINK, GREENISH AND MOTTLED WHERE WEATHERED. SOME ZONES ARE VERY IRON-RICH AND IRON WAS MINED FOR LOCAL USE A FEW MILES TO THE EAST IN PRINCE GEORGES COUNTY. SAND AND GRAVEL HAS BEEN EXTENSIVELY DUG AND A FEW PITS WERE OPERATIVE IN 1972. THE SAND AND GRAVEL BEDS ARE COMMONLY POROUS AND PERMEABLE, AND ARE PRODUCTIVE OF GROUNDWATER DOWN DIP TO THE SOUTHEAST. MUCH OF THE OUTCROP BELT IN MONTGOMERY COUNTY MAY BE PART OF THE AQUIFER RECHARGE AREA, HENCE MAY WARRANT PROTECTION FROM SURFACE POLLUTANTS.

SAPROLITE, THE MOST WIDELY DISTRIBUTED SURFICIAL MATERIAL IN THE COUNTY, IS MAPPED ONLY WHERE INFERRED TO BE MORE THAN TWENTY FEET (6 M) THICK. SAPROLITE IS A RESIDUAL DEPOSIT OF SOFT, RED-BROWN TO GRAY, EARTHY, UNTRANSPORTED, POROUS MATERIAL DERIVED FROM DECOMPOSED CRYSTALLINE ROCK IN WHICH THE CONSTITUENT MINERALS OTHER THAN QUARTZ HAVE BEEN ALTERED TO CLAYS. THE UPPER PART IS GENERALLY A FEW FEET THICK, MASSIVE, AND GRADES UPWARD INTO SOIL; THE MASSIVE MATERIAL GRADES DOWNWARD INTO STRUCTURED SAPROLITE, AS MUCH AS 160 FEET (50 M) THICK, WHICH RETAINS THE STRUCTURAL CHARACTERISTICS OF THE UNWEATHERED BEDROCK INTO WHICH IT GRADES. THE DENSITY OF SAPROLITE IS COMMONLY LESS THAN HALF THAT OF THE FRESH BEDROCK FROM WHICH IT IS DERIVED. THE THICKNESS, PHYSICAL AND CHEMICAL CHARACTERISTICS OF SAPROLITE ARE CHIEFLY RELATED TO CLAY MINERALOGY, WHICH IN TURN IS A FUNCTION OF TOPOGRAPHIC POSITION, PARENT MATERIAL, DRAINAGE AND THE PHYSICO-CHEMICAL ENVIRONMENT IN WHICH IT FORMED.

ARTIFICIAL FILL AND MAN-MADE GROUND IN MONTGOMERY COUNTY CONSIST MAINLY OF LOCALLY DERIVED, HETEROGENEOUS MIXTURES OF SOIL, SAPROLITE, GRAVEL, ROCK AND SAND WHICH HAVE BEEN MOVED A SHORT DISTANCE FROM ARTIFICIAL CUTS AND BORROW PITS MADE DURING CONSTRUCTION. IN A FEW CASES, HOWEVER, LIMESTONE FROM FREDERICK COUNTY AND MARBLE FROM BALTIMORE COUNTY HAVE BEEN USED FOR RIP-RAP. NO TWO FILLS HAVE THE SAME BULK COMPOSITION, THUS EACH FILLED AREA REQUIRES SPECIAL STUDY TO DETERMINE SIGNIFICANT ENGINEERING PROPERTIES. IN GENERAL, ARTIFICIAL FILL IS LESS STABLE AND HAS LESS BEARING STRENGTH THAN THE UNDISTURBED PARENT MATERIAL. IT IS READILY ERODED AND PROVIDES A MAJOR SOURCE OF SEDIMENT FOR STREAMS UNTIL STABILIZED BY VEGETATIVE COVER AND RIP-RAP.

(1) THERE IS UNCORRECTED DISTORTION IN THIS COMPUTER MAP, CAUSED BY THE DIFFERENCE IN DIMENSION RATIOS BETWEEN AN ACTUAL 5 SECOND BY 5 SECOND CELL AND THE PRINTER SYMBOL USED TO REPRESENT THE CELL. THESE DIMENSION RATIOS (HORIZONTAL DISTANCE DIVIDED BY VERTICAL DISTANCE) ARE .78 FOR THE 5 SECOND BY 5 SECOND CELL AND .8 FOR THE PRINTER SYMBOL. THIS DIFFERENCE RESULTS IN A "VERTICAL SCALE" OF 1:48,566, AND A "HORIZONTAL SCALE" OF 1:47,370. IF BOTH OF THESE SCALES ARE CORRECTED TO 1:48,000, THE MAP HAS A NET 2.5% STRETCH IN THE HORIZONTAL DIMENSION, AND, AT 39 10 00 N LATITUDE, EACH CELL ON THE MAP IS 9.8 FEET WIDER THAN THE 5 SECOND BY 5 SECOND CELL IT REPRESENTS.

PERCENT OF TOTAL NUMBER OF CELLS.

FREQUENCY		
0	-->	
1991	--> 1	UPLAND GRAVEL: BOULDERS, COBBLES, PEBBLES, SAND, SILT, CLAY. (VU 3000)
299	--> 2	COASTAL PLAIN STRATA: GRAVEL, SAND AND CLAY. (VU 4000)
4483	--> 3	ALLUVIUM; SAND, GRAVEL, SILT, AND CLAY IN STREAM VALLEYS. (VU 2000)
0	--> 4	
0	--> 5	
10190	--> 6	SAPROLITE ON PHYLLITE; GRAVELLY, EXCESSIVELY DRAINED. (VU 5100)
19958	--> 7	SAPROLITE ON SCHIST; MICACEOUS WELL DRAINED. (VU 5200)
355	--> 8	SAPROLITE ON QUARTZITE; SANDY, EXCESSIVELY DRAINED. (VU 5300)
7955	--> 9	SAPROLITE ON GNEISS; SILTY, BOULDERY, WELL DRAINED. (VU 5400)
1885	--> 10	SAPROLITE ON MAFIC ROCK; CLAY-RICH, POORLY DRAINED. (VU 5500)
32	--> 11	SAPROLITE ON DIABASE; CLAY-RICH, BOULDERY, POORLY DRAINED. (VU 5600)
0	--> 12	
0	--> 13	
8073	--> 14	SEDIMENTARY BEDROCK; SILTSTONE, SANDSTONE AND SHALE. (VU 7000)
943	--> 15	ARTIFICIAL FILL, MAN-MADE, AND DISTURBED GROUND. (VU 1000)
0	--> 16	
0	--> 17	
0	--> 18	
0	--> 19	
13398	--> 20	CRYSTALLINE BEDROCK; UNALTERED IGNEOUS AND METAMORPHIC. (VU 6000)
0	--> 21	
76418	--> 22	NO DATA

U.S. GEOLOGICAL SURVEY RESTON, VA.
NOV 18 1975
LIBRARY

Maryland (Montgomery Co.) Surficial 1:48,000. 1975
Cp. 1
Open file no. 75-419m