Open File 76-311

Structural features of the Herndon Quadrangle, Va.

This map shows the strike trends (direction of intersection of sloping plane with horizontal) and dips (angle of inclination from horizontal) of planar structures in the rocks of the Herndon quadrangle. Bedding planes, joints, and faults are shown for rocks of Triassic age, and the strike and dip of schistosity for the older crystalline rocks. Joints (fracture or parting that interrupts abruptly the physical continuity of a rock mass) are shown as clusters. These clusters are statistical representations of joints in the map area centered about the joint arrays. They show the average strikes and dips of joints occurring in igneous and sedimentary rocks within the area.

Easiest rock splitting directions are controlled by bedding and joint planes. Therefore, planning that considers bedding and joint orientations on this map prior to construction should aid in cost control. In addition, the safety of steep artifical cuts commonly depends upon the intensity and orientation of splitting planes relative to the trend of the proposed cut. If steeply dipping planar surfaces are undercut, rock falls can develop. Therefore proper planning with this map can indicate those areas where steep artificial cuts would be least or most likely to cause dislodging of large rock masses. In addition, it could be used in planning for certain other types of construction including foundation, pipe lines, sewer and water lines.

Most groundwater recharge in the Triassic rocks is via a complex non-uniform network of bedding plane partings, joints and fractures. These rocks, although locally folded, principally form a west-dipping monocline that directs the transmitted groundwater westerly into the deeper parts of the Triassic basin. These Triassic rocks are a potential source for large supplies of groundwater for municipal and industrial uses. Both Manassas and Leesburg obtain municipal water supplies from deep wells in Triassic rocks. In addition, two wells (860 and 955 feet deep) were drilled in Triassic rocks at Dulles airport (Johnson 1960, p. 3). These wells yield 327 and 600 gallons per minute . Therefore careful geologic evaluation should be given to land use proposals that might possibly lead to either chemical or biologic contamination of groundwater. This is especially critical in the Triassic rocks because of the complex groundwater movement and general paucity of thick residuum, which is commonly less than 10 feet thick (Nelson, 1976). Residuum, if thick enough, commonly provides a high absorption capacity that usually filters out particulate biologic contaminants. Therefore this map used with the overburden thickness map (Nelson, 1976) and soils data (Porter et al, 1963) may be useful as an aid in evaluating sites for sanitary landfill, sewage treatment and disposal plants, and industrial waste disposal.

Used with the geologic map (Eggleton, 1975) this map may aid in predicting locations where water wells might be expected to have high concentrations of mineral matter, such as the deep wells at Dulles Airport in the Balls Bluff Formation. It may aid and possibly serve as a guide to planning and locating future water well sites in potential Manassas Formation reservoirs.

Because of the many generalities and lack of outcrops, this map should be used for general planning purposes, but not for specific site studies.

References cited

Eggleton, R. E., 1975, Preliminary geologic map of the Herndon quadrangle, Virginia: U.S. Geol. Survey open-file map no. 75-386.

Johnson, P. M., 1960, Groundwater supplies in shale and sandstone in Fairfax, Loudon, and Prince William Counties, Virginia: U.S. Geol. Survey Cir. 424, p. 1-7.

Nelson, A. E., 1976, Thickness of overburden, Herndon quadrangle, Virginia: U.S. Geol. Survey open-file map, scale 1:24,000.

Porter, H. C., Derting, J. F., Elder, J. H. and Henry, E. F., and Pendleton, R. F., 1963, Soil survey of Fairfax County, Virginia, U.S. Department of Agriculture, Soil Conservation Service in Cooperation with Virginia Agricultural Experiment Station and Fairfax County, Virginia, Series 1955, no. 11, 103 p.

Explanation

Contact between Triassic rocks in the west and older Precambrian-lower Paleozoic crystalline rocks in the east.

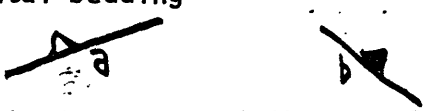
Generalized strike and dip of bedding

a, less than 30 degree dip

b, between 30-60 degree dip

c, greater than 60 degree dip

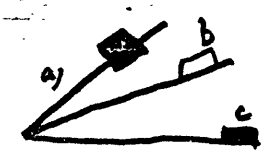
Horizontal bedding



Generalized strike and dip of foliation

a, less than 45 degree dip

b, greater than 45 degree dip



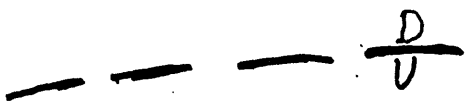
Joints

Representative joint cluster showing generalized strikes and dips of joints occurring in large area centered at joint array.

a, vertical dipping

b, less than 45 degree dip

c, greater than 45 degree dip



Approximately located faults

U indicates upthrown side; D downthrown side