1977, plate 3). The abandonment of several high-yielding industrial wells accounts for most of the pumpage decline. Two high-transmissivity sand bodies occur in the Fort Belvoir area as shown on the map, however, their areal extent is problematical because of limited subsurface data.

In 1960 approximately 4 Mgal/d (million gallons per day) was withdrawn from wells in the Potomac sands, however, this rate declined to 1 Mgal/d by 1977. As a result, artesian heads have risen sharply in the lower aquifer. The full potential of the aquifer is uncertain; however, increased pumpage of 3 Mgal/d would simply bring a return to 1960 conditions. Probably at least 6 to 7 Mgal/d is available from the aquifer (with proper well spacing) in Fairfax County and Alexandria based on a consideration of past head declines and pumpages.

Wells finished into the Potomac sands are usually constructed with 6- to 10-inch steel casing and either slotted casing or well screens placed opposite water-bearing sands. Because the sand beds contain varying amounts of clay and silt, geophysical logging is useful for delineating the most permeable sand sections for setting well screens.

Water quality from wells in Potomac sand is generally good. It is soft and low in dissolved solids in the high-transmissivity areas. However, the water is high in iron and contains chlorides up to 200 mg/L (milligrams per liter) in a small area of low-transmissivity sands (Larson, 1978)

BEDROCK AQUIFERS

Triassic Sandstone and Siltstone Aquifers

The Triassic sandstone and siltstone aquifers are the only bedrock units in Fairfax County that are potentially important sources of ground water. Together with a basal conglomerate, these units form a westward-thickening wedge of Triassic sedimentary rocks extending from western Fairfax County to the Blue Ridge. These are fractured-rock aquifers with greatest permeability derived from steeply inclined fractures and joints and from partings parallel to bedding. The occurrence of intensely fractured or jointed rock is indicated by linear features on satellite imagery (as mapped by Iwahashi and Heironimus, 1978). Most high-yielding wells tapping the Triassic aquifers are located along these linear features.

The Triassic sandstone aquifer, although largely composed of sandstone, also contains interbedded shale and siltstone. Based on aquifer tests a transmissivity of about 500 to 1000 ft^2/d is probable for the upper 1000 feet of section. The potential of the aquifer is largely unknown because of the lack of deep wells, however, yields of 100 gal/min or more are likely from deep wells. Slightly hard, good quality water is produced from wells of less than 400 feet depth; however, the quality in deeper zones is unknown.

Calcareous siltstone and shales with interbedded sandstones comprise the Triassic siltstone aquifer. Transmissivity is in the range of 1000 to 2000 ft^2/d based on limited specific capacity data. Deep wells yielding from 300 to 1000 gal/min have been constructed in the siltstone aquifer at Dulles Airport. Deep wells drilled to date in this aquifer produce very hard calcium sulfate water, whereas wells completed in shallower zones are less mineralized (Larson, 1978).

The water-supply potential of the sandstone and siltstone aquifers is uncertain. Essential factors bearing on the potential of the aquifers are (1) moderately high transmissivity (about 1000 ft^2/d), (2) low specific yield (about 1/2 percent), and (3) lack of saprolite or thick residium cover that could act as a leaky confining bed. A rough estimate of the potential of the aquifers was made by simulating increased pumpage with a digital computer model using (1) values of transmissivity and specific yield as given above and (2) aquifer boundaries based on recent geologic mapping by Drake and Froelich (1977). The model indicates that properly spaced wells pumping at rates of 150 to 250 gal/min, can produce 5 Mgal/d of water during a dry summer (100-day period of no recharge)--the time of greatest probable demand. Area water level declines in the aquifer would vary from 10 to 60 feet and drawdowns in the immediate vicinity of pumped wells would vary from 90 to 120 feet at the end of 100 days. In the absence of a previous history of pumping and associated water-level declines, the model cannot be tested for accuracy. Thus these model results are conjectural but provide a conservative appraisal of water-supply potential inasmuch as drawdowns are not large.

Wells tapping the siltstone and sandstone are generally constructed with 6- to 8-inch steel casing to depths of 50 or 100 feet as required by state and county regulations. The remainder of the well is left "open hole" in the rock. Well depths of less than 200 feet are usually sufficient to supply domestic needs. However, for yields exceeding 100 gal/min, well depths of 300 to 1000 feet are required.

Schist Aquifer

The schist aquifer is principally pelitic schist with interbedded gneiss, metagraywacke, and phyllite that has been intensely sheared, refolded, fractured, jointed, and fualted. About one-third of the area of schist outcrop in Fairfax County is characterized by such intensely sheared rock. All high-yielding schist wells are located in the sheared area and only this area is shown on the map. As with the Triassic aquifers, high-yielding schist wells tend to be located along linear features observed on satellite imagery. Transmissivity of the sheared schist ranges from about 25 to 200 ft^2/d whereas the less deformed schist has a transmissivity of less than 25 ft^2/d.

Although yields of 100 gal/min or slightly more have been obtained from the sheared schist, only 10 percent of the deep wells produced 100 gal/min or more. On the other hand about 50 percent of the deep wells yielded 50 gal/min. Good possibilities exist for obtaining moderate quantities of water (50,000 to 75,000 gal/d), useful for supplying housing developments and for many commercial purposes. At present (1978), wells pumping about 100 gal/min each supply the town of Vienna and wells pumping about 75 gal/min each at Pimmit Hills are used for public supply by the Fairfax County Water Authority.

The schist aquifer is widely used for domestic water supplies and probably several million gallons are pumped daily for this purpose. Domestic wells are generally 100 to 200 feet deep. Saprolite is thick in the schist areas and 50 to 100 feet of casing (6- or 8-inch diameter) is usually required through the overburden. High-yielding wells (50-100 gal/min) are generally 400 to 800 feet deep.

The chemical quality of water from the schist is excellent--low in dissolved solids and hardness, (Larson, 1978).

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This report is preliminary and has not been edited for conformity with Geological Survey standards or nomenclature.