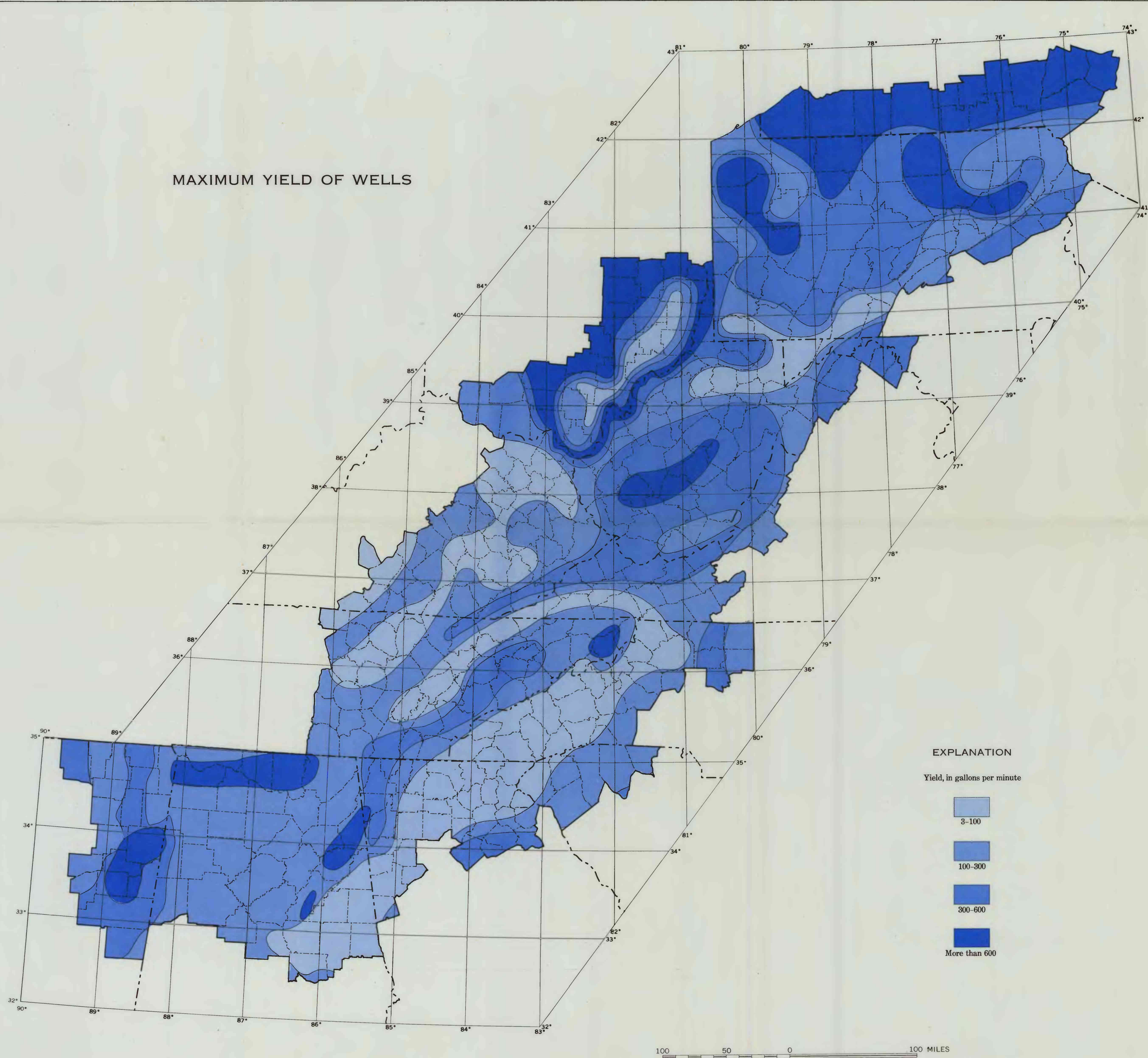


MAXIMUM YIELD OF WELLS



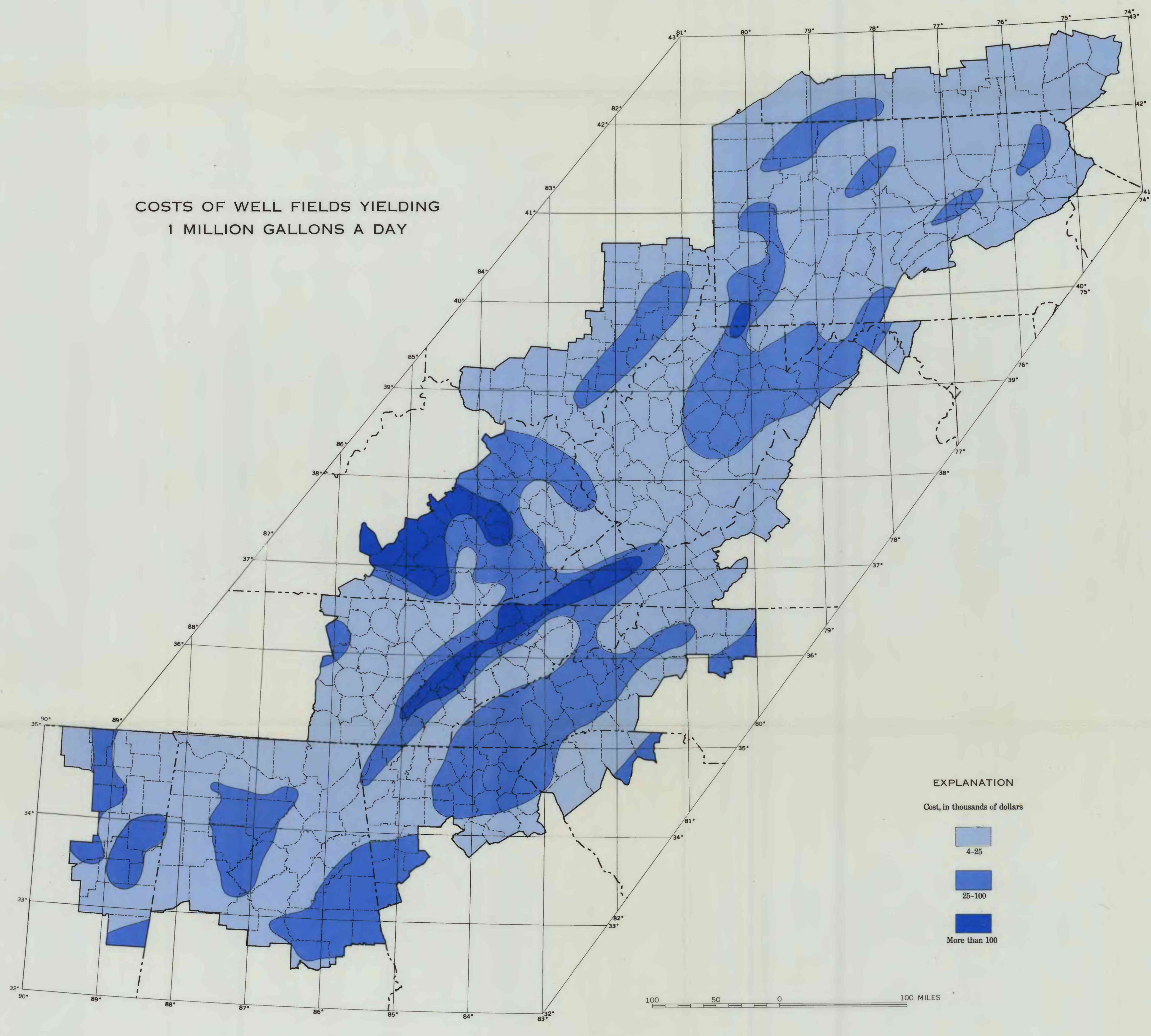
This map indicates the maximum yield that may be expected, from individual wells, within each county of the Appalachian Region. The assumption is made that wells will be located, constructed, and developed with care and that the pump equipment will be of the optimum rating and setting for the wells. Under these conditions a capable driller can construct, within each county, one or more wells capable of the indicated yields. It must be understood that these are maximum yields and that not all carefully constructed wells in the areas indicated will be capable of yielding the quantities indicated.

The data for compiling the map came primarily from tables of well records for county or multi-county reports of ground-water resources prepared largely by the U.S. Geological Survey in cooperation with the States. For many counties the data were published, but some unpublished tables were furnished by the District Offices of the Survey. Thus, data were available from 282 counties of the 373 counties in the Appalachian Region. These data included records of more than 23,000 wells. For counties where tables of well records were not available, interpretative reports, such as Hydrologic Atlases and Basin Reports, were used to complete the map.

The data were selected by first deleting wells that were not designed as water wells. Oil and gas test holes frequently had the highest yields within counties but generally supplied water containing undesirable chemical constituents. These were deleted from the tables. Also deleted were records of supplies developed from abandoned mines and from springs, in order to arrive at a maximum yield of water of acceptable quality based entirely upon water-well construction. The average yields of the highest 3 percent of the wells within a county were used as a maximum yield for that county in preparing the map. This approach was used because the great majority of the wells reported were drilled for purposes such as rural or domestic water supplies that did not require large quantities of water and no attempt was made to develop the maximum capacity of the rocks. High-yield wells for industrial or municipal water supply should, of course, be constructed at the most promising sites.

Several factors affect the occurrence of high-yield sites. In New York, Pennsylvania, Ohio, and the lower Ohio River Basin the high-yield sites generally occur in the valleys underlain by glacial outwash deposits. Yields of wells tapping coarse sand and gravel deposits of glacial origin are reported as high as 3,500 gpm (gallons per minute). Another factor affecting the yield of wells is the fracturing of folded rocks in the Appalachian Region. Almost every report on ground water in the crystalline-rock areas mentions that the ground water occurs in fracture zones of the rocks. The lowest yields of wells occur in the flat-lying, well-indurated rocks where little or no faulting has occurred. The average high yield in some of these areas is less than 10 gpm. However, for special purposes the relatively small temperature change and constant and specific chemical characteristics of ground water may make even small quantities of great economic value.

COSTS OF WELL FIELDS YIELDING  
1 MILLION GALLONS A DAY



This map indicates the approximate cost of constructing a well field capable of yielding 1 mgd (million gallons per day), within each county in the Appalachian Region. The assumption is made that 1 mgd could be obtained from ground-water sources in any county in the region, if a sufficient number of properly drilled and equipped wells were constructed.

The data used in compiling this map included: the yield of wells, the depths of wells, the costs of drilling various rock types, the cost of casing, and the cost of pumps. Specific data were available for 282 of the 373 counties in the region. Data from regional reports were used for the areas not covered by detailed reports.

The calculated costs of individual well fields ranged from about \$6,000 to more than \$390,000. In some counties, particularly along major stream valleys containing glacial outwash sediments, a single well may yield more than 5 mgd (about 3,500 gallons per minute) from depths of less than 100 feet. In other counties the highest yielding wells are 300 to 400 feet deep and they yield less than 15 gpm each. Where individual, shallow wells yield more than 1 mgd, the principal well-field cost is the pumping equipment. Where well yields are low, the principal well-field cost is the drilling cost.

The divisions on the map were selected to indicate where ground-water supplies could be obtained at a reasonable cost (less than \$25,000 per well field). They also indicate where water may be obtained from ground-water sources at a cost competitive with other sources (\$25,000 to \$100,000). The high-cost divisions (greater than \$100,000) indicate where the development of ground-water supplies is not likely to be the most economical source of large supplies of water.

The costs shown by the divisions are not directly proportionate to the amount of water obtained by the well fields. For example, if a 2 mgd well field were required the cost in the zones where individual wells produce 2 to 5 mgd would not be twice as much as a 1 mgd well field; the cost would be approximately twice as much where individual wells yield considerably less than 1 mgd.

The costs are calculated on an average cost for drilling and pumps during 1966. Prices are slightly higher than the average shown on the map in the northern part of the region and slightly lower in the southern part.

GROUND-WATER RESOURCES OF THE APPALACHIAN REGION

By  
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