Microbiological Quality of Public-Water Supplies in the Ozark Plateaus Aquifer System, Missouri

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Missouri is widely dependent on ground water as a source of drinking water for public-water systems. Historically, water from the deep bedrock aquifers in the Ozark Plateaus generally has been free from total and fecal coliform bacterial contamination. Little is known, however, about viral contamination and its relation to the bacterial characteristics of the ground water in the Ozark Plateaus. The Ozark Plateaus aquifer system is characterized as a carbonate system with numerous karst features throughout. The most important source of water for public supplies is the Ozark aquifer, both where it is unconfined and where it is confined by the Ozark confining unit and Springfield Plateau aquifer in southwestern Missouri.

The U.S. Geological Survey, in cooperation with the Missouri Department of Natural Resources, sampled 109 public-water-supply wells in water year 1997 and again in water year 1998 to characterize the microbiological quality of ground water in the Ozark Plateaus aquifer system. Samples from each well were analyzed for the following microbiological organisms—total human enteric viruses, male-specific and somatic coliphage, and fecal indicator bacteria (fecal coliform, *Escherichia coli*, and fecal streptococcus).

The data indicate that microbiological contamination of public-water supplies in the Ozark Plateaus is not widespread. Of the 109 wells sampled in water year 1997, 86 (about 79 percent) showed no presence of microbiological contamination. Human enteric viruses were present in samples collected from 11 of the 109 wells at concentrations ranging from 1.0 to 9.3 most probable number per 100 liters [confirmation of these results currently is (August 1999) underway]. Coliphage were present in samples collected from 11 wells at concentrations ranging from 38 to 2,600 plaque-forming units per 100 liters, and fecal indicator bacteria were detected in three wells at a concentration of 1 colony per 100 milliliters. Coliphage and human enteric viruses were present in two wells. Of the 109 wells sampled in water year 1998, 98 (about 90 percent) showed no presence of microbiological contamination. Coliphage were present in three wells, including one that was fecal-indicator-bacteria positive in water year 1997, at concentrations ranging from 41 to 78 plaque forming units per 100 liters. Fecal indicator bacteria were present in eight wells at concentrations ranging from 15 to 50 colonies per 100 milliliters. Coliphage and fecal indicator bacteria were not detected in the same well.

Results varied considerably between the first and second times of sampling, and no apparent correlation exists between the presence of enteric viruses and coliphage or indicator bacteria. Most of the virus and coliphage detections were outside the area with the most mature karst features. The wells mostly were located where the Ozark aquifer is confined or where the Ozark aquifer is unconfined and karst features are not well developed. The locations generally correlated with the areas that have the most intense agricultural land use, have the largest population, or had a population increase of greater than 10 percent from 1990 to 1997.

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