

Ground water, produced from wells and springs throughout the Commonwealth, is a valuable resource that is vital to our economy and the health and well-being of our citizens. More than 25 percent of the residents of Kentucky depend on ground water for household use, and more than 226 million gallons of ground water are consumed daily by individuals, municipalities, utilities, businesses, and farms. Ground-water quality and its suitability for various uses must be known so that responsible decisions can be made regarding resource management, water-development policy, pollution prevention, and ground-water protection.

In 1998, the Kentucky Interagency Groundwater Monitoring Network was established to collect ground-water data, characterize ground-water quality, and distribute the information to interested organizations and individuals. The steps in the process are:

- Scientists collect water samples from wells and springs and submit them to a qualified laboratory for analysis. Samples may be collected specifically to investigate ground water throughout the state, as is done by the Kentucky Division of Water, or they may be collected by other agencies, organizations, university researchers, or the Kentucky Geological Survey for other purposes.

- All available ground-water information is collected and stored in the Kentucky Ground-Water Data Repository, which is housed at the Kentucky Geological Survey. The Kentucky Interagency Groundwater Monitoring Network uses this database to analyze ground-water quality and prepare reports.

- The Interagency Technical Advisory Committee on Groundwater, composed of representatives from State and Federal organizations, as well as university researchers, helps determine which ground-water constituents are examined and how the results are presented.

- KGS researchers, both independently and in cooperation with the Kentucky Division of Water, prepare maps, statistical summaries, and reports about ground-water quality for the entire state and for specific areas of interest. The maps, summaries, and reports are periodically updated as new information comes to the repository.

Sample products of the Kentucky Interagency Groundwater Monitoring Network

Maps of hardness and pH illustrate some of the products of the network. Water hardness is a measure of the amount of dissolved calcium and magnesium. "Soft" water has little calcium and magnesium and is





The Kentucky Ground-Water Data Repository

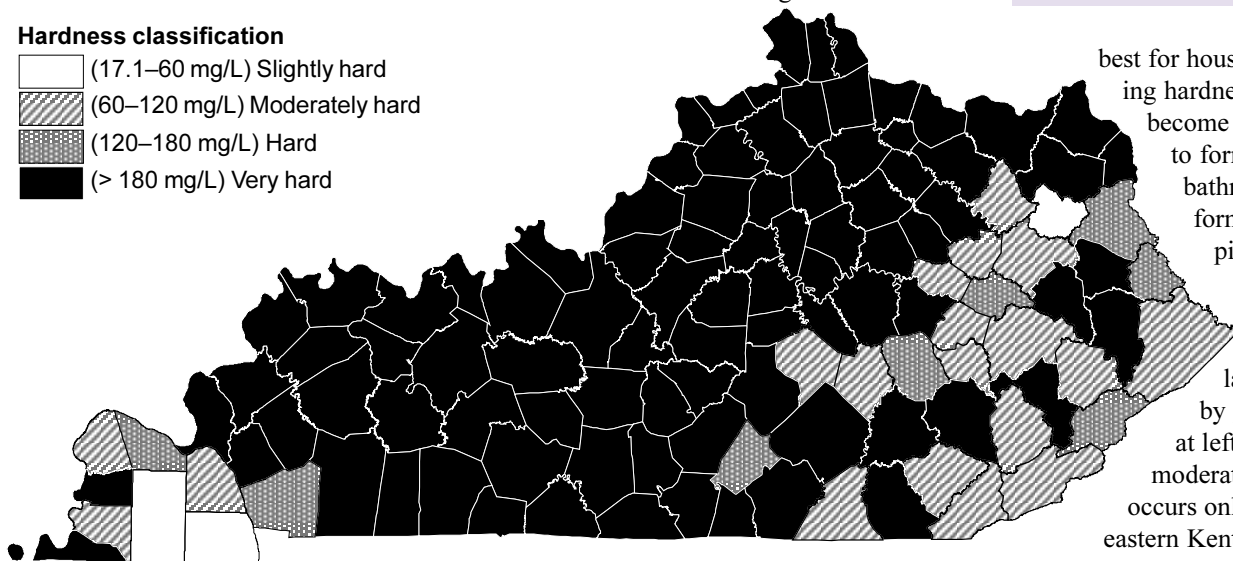
The Kentucky Ground-Water Data Repository was established in 1990 to archive and distribute ground-water data collected by State agencies, other organizations, and independent researchers. Prior to this time there was no central, readily accessible source of ground-water information.

The repository collects and stores water well locations, well construction descriptions, water-quality reports, spring locations and discharge rates, and results of dye traces, as well as ground-water maps and other publications. The repository also provides this information to anyone who is interested in Kentucky ground water, wells, or springs. Currently, the repository contains information for more than 52,000 water wells, 4,000 springs, 350 dye traces, and 45,000 water-quality analyses.

For more information about the Kentucky Ground-Water Data Repository, contact **Bart Davidson** at 859.257.5500 or e-mail bdavidson@kgs.mm.uky.edu.

Hardness classification

	(17.1–60 mg/L) Slightly hard
	(60–120 mg/L) Moderately hard
	(120–180 mg/L) Hard
	(> 180 mg/L) Very hard



best for household use. Increasing hardness causes soaps to become less effective, scum to form in kitchens and bathrooms, and scale to form in water heaters, pipes, and cooking utensils.

Hardness in ground water is largely controlled by geology. The map at left shows that soft to moderately hard water occurs only sporadically in eastern Kentucky and in the

Jackson Purchase Region—where carbonate bedrock is generally absent. In regions underlain by limestone, and in the Western Kentucky Coal Field where slightly acidic ground water dissolves any carbonate present, untreated ground water is hard to very hard. Average hardness values are shown for each county, so general trends are emphasized rather than values at specific sites.

The parameter “pH” is a measure of the acidity of water. A pH of 7 is neutral for pure water at normal temperatures, and values between 6.5 and 8.5 are suitable for household use. Water having lower pH values can corrode pipes and plumbing fixtures, whereas water having higher pH values can cause calcium carbonate scale to form. The map below shows that most wells and springs have pH values between 6.5 and 8.5, but pH varies significantly in the eastern and western Kentucky coal regions, and in the Jackson Purchase. The different rock types in these areas readily explain these patterns. In the Bluegrass and Pennyroyal Regions, carbonate bedrock acts as a buffer, and keeps pH at near-neutral values, whereas the relative absence of limestone in the coal fields and the Jackson Purchase Region permits a wider range of pH values. By showing pH values at

each individual well or spring, this map also indicates the variability that can be expected in different parts of Kentucky.

Similar maps are being prepared for major and minor constituents in water as well as for pesticides, nutrients, and metals. Maps of nitrate and fluoride in ground water can be seen on the KGS Web site at www.uky.edu/KGS/pubs/publications.htm. Other maps will be posted as soon as they are completed.

Summary

Ground water accounts for more than 30 percent of the public and private water supplies in the Commonwealth, and as much as 90 percent of all rural domestic supplies. Furthermore, ground water is the major source of water in Kentucky’s rivers and streams, and is particularly important during periods of drought. To intelligently manage and protect this precious resource, current ground-water quality must be assessed and evaluated. Only when the quality of ground water and its suitability for various uses are known can informed decisions be made about developing community and private water supplies, addressing resource allocation issues, setting boundaries on wellhead protection areas, and recognizing ground-water degradation.

For additional information, visit the network’s Web site at www.uky.edu/KGS/water/gnet/gnet.htm or contact **Steve Fisher** at 859.257.5500 or by e-mail at sfisher@kgs.mm.uky.edu. ❖

Interagency Technical Advisory Committee on Ground Water

Representatives from the following organizations advise and assist the Kentucky Interagency Groundwater Monitoring Network:

- ◆ Kentucky Department for Environmental Protection
- ◆ Kentucky Department for Natural Resources
- ◆ Kentucky Department for Surface Mining Reclamation and Enforcement
- ◆ Kentucky Department of Mines and Minerals
- ◆ Kentucky Division of Conservation
- ◆ Kentucky Division of Environmental Health and Community Safety
- ◆ Kentucky Division of Forestry
- ◆ Kentucky Division of Pesticides
- ◆ Kentucky Division of Waste Management
- ◆ Kentucky Division of Water
- ◆ U.S. Geological Survey
- ◆ University of Kentucky College of Agriculture
- ◆ University of Kentucky Water Resources Research Institute ❖

