

**Missouri Department of Natural Resources  
Water Resources Center**

**GEOLOGIC WELL LOGS**

For more than a century, the most detailed source of subsurface geologic information in Missouri has been the well logs files at the Department of Natural Resources, Division of Geology and Land Survey in Rolla. Beginning in the early 1900s, the Survey struck an informal agreement with the fledgling drilling industry. Drillers would collect and save samples of the rock cuttings from wells each five feet of drilling then send them to the Survey. Geologists there would examine them microscopically, and produce a graphic log of the well that illustrates the geologic data gleaned from the cuttings, along with location, production, and well construction information. The original log was stored at the Survey in Rolla, and a copy of the log was supplied back to the drilling company for their use. Drilling at that time was a slow process, especially for deep, larger diameter wells drilled for municipal water supply or as mineral and oil tests. In many cases, drillers would send cuttings to Rolla frequently while the hole was being constructed so that Survey geologists could tell them what geologic formations they had drilled through and the depths to key zones.

The geologic logs consist of strips of cardstock paper about 3 3/4 inches wide. The lengths vary with well depth. A log of a deep oil test well in the Bootheel may be 10 feet in length. Geologists making the logs mostly used a technique called the insoluble residue method that was pioneered by geologists at the Survey. Much of Missouri is underlain by limestone and dolomite. Both of these are soluble rock that can be dissolved in hydrochloric acid. Two sets of samples were prepared from cuttings collected at each well. One set was left as whole rock; the other was digested in acid to remove the limestone and dolomite, which left behind the insoluble residues. The insoluble residues include siltstone, shale, chert, quartz sand, and secondary minerals such as hematite, pyrite, galena, sphalerite, and barite. The character and composition of the insoluble residues is what was used to determine the geologic formations penetrated by the well. All of the information obtained from the cuttings was plotted on the well log using a standardized set of symbols, patterns and colors (see "[Well Log Symbol Key and Description](#)".)

Over the years, the well log files grew. Today, they contain logs of about 28,000 wells. Geologists at the Survey never intended to log every well that was drilled. There are several hundred thousand wells in Missouri, and another 7,000 or so holes are drilled every year. The

hope was to have an even distribution of logged wells so that subsurface geologic information was available for all areas of the state. Previously, anyone wanting to make use of the logs had to visit the Rolla office or have photocopies of the logs mailed to them. Several years ago, Water Resources Center staff in Rolla began scanning the logs and creating digital versions of them that can be viewed using a computer. The logs were scanned at a resolution adequate to make all of the information contained on them readable. Most recently, the final step was taken to make this information available to anyone needing it. Today, the logs can be viewed over the Internet through the Water Resources Center web page. Users can access the well logs any of three ways. First, they can view a county map to find a well that has been logged, then click on the log number. The scanned log will appear on the screen. A second way is to use a county report option to find the well log. The county report lists the logs by section-township-range location, and starts at the southwest corner of the county. If you know the section, township, and range numbers of a particular location then this option allows you to find and view logs of nearby wells. Finally, if the well log number is known, the six-digit well log number can be entered and the well log viewed. This method works well if the user has a copy of MEGA (the Missouri Environmental Geology Atlas GIS project available from the Division of Geology and Land Survey.) The logged wells are one of the data layers in MEGA, and the well log number is one of the data attributes that can be viewed.