

Availability of hydrogeologic data needed for high-capacity well assessments in Wisconsin

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Discussion at the August, 2007 meeting of the Wisconsin Groundwater Advisory Committee (GAC) appeared to leave the impression with some committee members that the state of hydrogeologic science in Wisconsin - data, modeling, and understanding - is weak in terms of utility for managing the resource and for making decisions related to well permitting. This could not be further from the truth. Wisconsin is a national and international leader in hydrogeologic science, with extensive databases and numerous highly-qualified hydrogeologists in both the public and private sectors. We acknowledge the limitations and uncertainties in hydrogeologic data sets and in groundwater models, yet such models are now standard tools, and professional hydrogeologists are accustomed to making decisions based on quantitative analyses. In short, quantitative analysis and modeling for decision making is now standard practice, can be conducted in an efficient and timely manner, and ought to be an essential and routine part of high-capacity well assessment in our state.

The purpose of this document is twofold. First, it summarizes the breadth of groundwater and geologic data available in the state. Second, it points out a gap in data availability and responds to the questions raised by several GAC members at the August, 2007 meeting, who asked for specific costs and timeframes for making hydrogeologic data more available.

Data sources and availability

The most useful sources of hydrogeologic data are the reports and maps prepared over the last hundred years by scientists at the Wisconsin Geological and Natural History Survey (WGNHS), U S Geological Survey (USGS), University of Wisconsin system, and other public and private agencies. These resource evaluation studies summarize and interpret the hydrogeologic data for a region or county. Indexes to many of these materials are available online at the following web sites:

WGNHS: <http://www.uwex.edu/wgnhs/maps.htm>

USGS: <http://wi.water.usgs.gov/pubs/index.html>

Many publications from both agencies are in a “county study” format targeted at the hydrogeology of specific counties. Other regional or topical studies span larger areas of the state. Almost all studies contain data on hydrogeologic parameters (transmissivity, hydraulic conductivity, storage); such data are essential for analyzing high-capacity wells. In recent years new reports have been published in digital formats that can be downloaded directly from the web (see <http://www.uwex.edu/wgnhs/gis.htm>); older reports are often available only as paper copies, though the agencies are working to

convert these reports to digital formats. The WGNHS distributes scanned images of thousands of well construction reports; these are organized by county and are available on CD-ROM (see <http://www.uwex.edu/wgnhs/wcrs.htm>). The WGNHS also distributes a database, wisLITH, of geologic and stratigraphic records from nearly 45,000 wells around the state (see <http://www.uwex.edu/wgnhs/wisclith.htm>.)

Other important repositories of information about groundwater in Wisconsin are the Wisconsin Water Resources Institute (WRI) (<http://wri.wisc.edu/>) and the Central Wisconsin Groundwater Center (CWGC, <http://www.uwsp.edu/cnr/gndwater/>). In addition, graduate students in the UW-Madison Hydrogeology Program have produced numerous theses on Wisconsin's groundwater (<http://www.geology.wisc.edu/~hydro/>), as have students at other system campuses.

Research projects are constantly generating new hydrogeologic data for Wisconsin. The Joint Solicitation Research Program sponsored by the Groundwater Coordinating Council supports significant research, and the Wisconsin Water Resources Institute (WRI) makes research findings available on the web: <http://www.wri.wisc.edu/wgrmp/wgrmp.htm>

Groundwater models

Groundwater flow models have recently been developed, and will continue to be developed, for many areas of Wisconsin. These models can serve two purposes in assessing the impacts of proposed wells. First, the models can be used to simulate proposed wells and their potential impacts on nearby water levels and surface water flows. Models allow hydrogeologists to simulate the combined influence of multiple wells over large areas. Second, models serve as databases of hydrogeologic information specific to the region that is simulated. Existing groundwater flow models cover the following areas of the state (model developer in parentheses). These models are in the public domain and are available for use by consultants or DNR personnel.

Dane County (WGNHS)

La Crosse County (USGS)

SEWRPC Counties (Waukesha, Washington, Racine, Kenosha, Walworth, Milwaukee, Ozaukee; USGS, WGNHS)

Sauk County (WGNHS, USGS)

Polk, St Croix, Pierce Counties (USGS)

Rock County (WGNHS)

Central Sand Plains (CWGC)

Eau Claire County (UW-Eau Claire)

Sturgeon Bay area (WGNHS)

West Bend area (WGNHS)

Fox Cities area, Winnebago, Outagamie Counties (USGS)

Fond du Lac County (UW-Milwaukee)

Lake Geneva area (WGNHS)

Brown County (WGNHS)

Eagle area, SW Waukesha County (WGNHS)

Data limitations, and a proposal

While abundant hydrogeologic information is available for Wisconsin, the data needed for high-capacity well approvals are not all currently organized or cataloged in an easily accessible format. The data are distributed among the reports, maps, and models referenced above; these materials are not always immediately available to all personnel within state and federal agencies, and are not always easily accessed by engineering consultants. Organizing and cataloging these data sources, with a focus on high-capacity well permitting, is an activity that could be undertaken by staff at the WGNHS. A rough estimate of the time and resources required for this project is one year and \$60,000. The goal of this project is a web-based catalog of appropriate data and other information, with links to digital datasets and models. The WGNHS will develop a detailed proposal and budget for such an effort on request from the DNR and/or GAC.

Training opportunities

Outreach and training are important parts of the WGNHS Extension mission. Given sufficient interest, the WGNHS could develop a workshop or other training opportunities for Department staff, consultants, well contractors, and others to assist with methodologies, data acquisition, and decision-making for high-capacity well permitting in Wisconsin.