EXHIBIT 1
DATE 02/18/05
HB 2

Montana Bureau of Mines and Geology
Ground-Water Assessment Program
December 2004

Program History

The Legislature established the Ground-Water Assessment Program (85-2-901 et seq.) in 1991 after considering the recommendations of a Ground-Water Task Force organized by the Environmental Quality Council in 1989. Statute specifically requires systematic **Ground-Water Monitoring and Ground-Water Characterization** efforts to improve understanding of Montana's ground-water resources. As part of a mandate to make ground-water information widely available, the Assessment Program includes the **Ground-Water Information Center** (GWIC) database at the Montana Bureau of Mines and Geology (MBMG). The Legislature also created an interagency Steering Committee to select study areas, to address the need for better coordination among state, federal and local government units, and to oversee Assessment Program progress.

The Legislature recognized that ground-water information is the key to dealing with the issues shown below and decided to "systematically assess and monitor the state's ground water and to disseminate the information..." 85-2-902(2) MCA.

- "Montana's citizens depend on ground water..."
- "ground-water supplies are threatened..."
- "there is **insufficient information** characterizing..."
- **"ground-water information deficiencies** are hampering..."
- "...focus on preventing ground-water contamination...but **better ground-water information** is required"
- "there is a need for better coordination among those numerous units of state, federal, and local government..."

(85-2-902(1) MCA)

Ground-Water Information Center

Data collected by the Characterization and Monitoring Programs and other ground-water projects are only useful when they become available to data users. Consequently, all data gathered by the Monitoring or Characterization Programs, many other MBMG projects, and projects managed by other agencies are stored in GWIC. Some of the data available through the GWIC website are described in the table to the right.

Some types of data available from the Ground-Water Information Center website are shown below. GWIC staff add new records and update many existing records daily. New well logs are available 2-3 weeks after receipt.

- Construction information for almost 192,300 wells.
- Results from 27,000 water-quality analyses from about 13,500 sites.
- Water-level measurements from more than 10,040 wells for periods as long as 63 years.
- Descriptions of materials encountered in more than 137,800 wells.
- High-quality data for about 5,900 wells visited by Characterization Program staff.

Who are GWIC customers, what do they do with data, and how can they get data?

More than 8,174 registered GWIC customers include people from all parts of Montana and about 950 individuals from other states. Out-of-state users are either private citizens who are considering purchasing land in Montana or consultants who have jobs in Montana. When entering the GWIC website, users are asked about who they are and what they plan to do with data that they retrieve. The table below shows who database users are and that they consistently return for more information as their data needs and projects change.

GWIC customers contact the website repeatedly for additional or updated information. Between July 1, 2003 and December 31, 2004, customers logged in almost 70,000 times. The average number of logins each month was 3,900. The data below do not include direct access to GWIC through the thematic mapper at the Natural Resources Information System (NRIS).

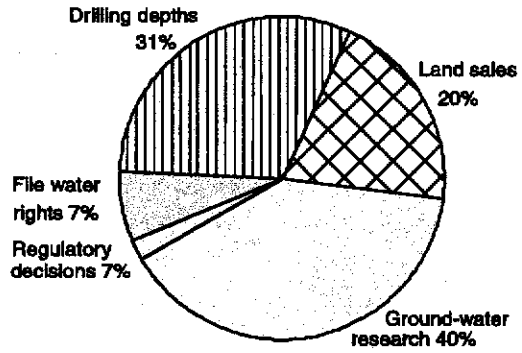
Customer group	Customers in group	Number of logins	Return frequency
General public (homeowners, landowners, students)	2,849	5,919	2.1
Water well drillers	160	5,895	36.8
Industrial/commercial (real estate agents, businesses)	2,506	19,254	7.7
Consultant/scientists (engineering and technical firms)	1,371	11,881	8.7
Government/scientists (regulators and scientists)	1,288	26,986	21.0

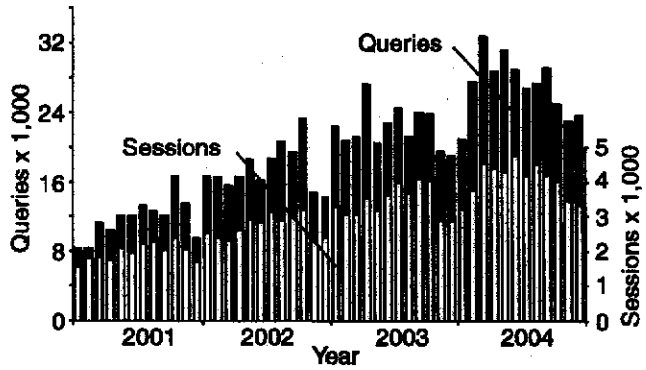
The pie-chart (right) shows how GWIC data are used. About one third of requests are from those who need to determine drilling depths. The need for a new well could be related to drought but is often related to residential development. About one fifth of the data are used to support subdivision of land or are needed for property sales. The ground-water research category covers many other uses including research for environmental assessments.

Usage of the GWIC website continues to increase (graph–bottom right). The ability to serve data electronically has resulted in more efficient data processing at GWIC because staff spends less time answering requests. In the 1997-98 biennium GWIC staff serviced about 200 calls each month involving copying and mailing well logs. Because most users now get data directly from the website, staff serviced only about 20 direct calls each month between July 1, 2003 and December 31, 2004.

On July 1, 2004 drillers began filing well logs directly with MBMG. MBMG was also allowed to accept electronic copies of the log. In March 2004 MBMG launched "DrillerWeb", an Internet tool that licensed water well drillers can use to file water well logs. DrillerWeb allows a driller to enter and edit data, print well log reports for their customers, manage their well log data in their own "private"account, and at the same time complete their obligation to the state. By January 2005 more than 895 logs had been filed through DrillerWeb.

GWIC data are put to a variety of uses by a diverse customer group





Usage of GWIC (http://mbmggwic.mtech.edu) now averages about 3,900 visits and 27,000 queries each month.

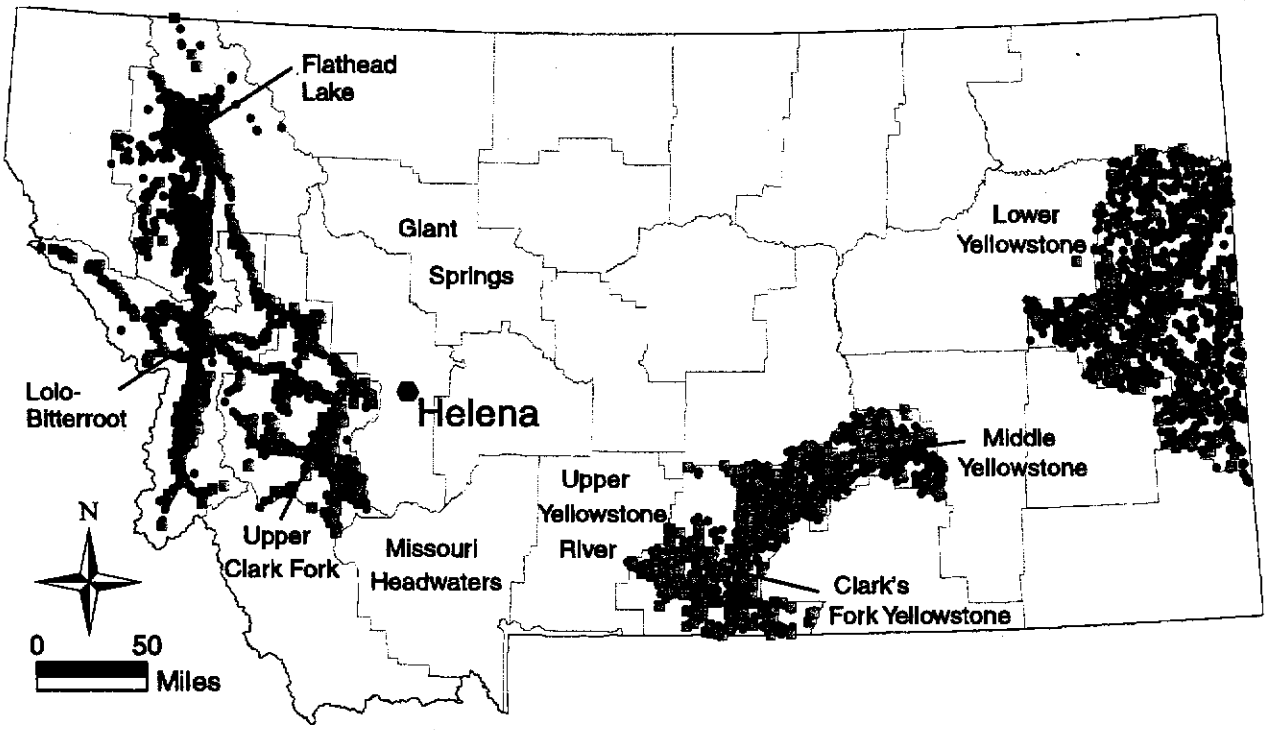
MBMG has released 25 maps describing the hydrogeology of active characterization areas. Characterization Program staff also have visited more than 5,900 wells and high-quality data from those wells are stored in the GWIC database.

- Montana Ground-Water Assessment Atlases 1 and 2. Twenty-one maps detailing the hydrogeology of the Lower Yellowstone River and Flathead Lake areas.
- Montana Ground-Water Assessment Atlas 3 (2 of 7 maps detailing the hydrogeology of the Middle Yellowstone River Area.
- Well-visit data for 884 wells and results from 286 new water-quality analyses for the Lolo-Bitterroot Area. One map released.
- Well-visit data for 915 wells and results from 292 new water-quality analyses for the Upper Clark Fork River Area. One map released.
- Well-visit data for 663 wells and results from 175 new water-quality analyses for the Clark's Fork of the Yellowstone River area.

Ground-Water Characterization

Atlas No. 2 for the Flathead Lake Area was completed. Five of 7 maps for the Middle Yellowstone River Area atlas are in review or released. Four maps for the Lolo-Bitterroot area are ready for review. Data collection is complete in the Lolo-Bitterroot and the Upper Clark Fork River areas, and will be completed in the Clark's Fork of the Yellowstone River area spring 2005. Characterization Program maps are available through MBMG publications and the GWIC website. Since July 2003, 1,140 maps have been delivered by the website.

The Ground-Water Assessment Steering Commitee, at the request of Gallatin County re-prioritized the list of scheduled study areas at its June 2004 meeting. The committee decided to add the Missouri Headwaters area (Gallatin and Madison Counties) to the list of scheduled studies and to change the order of work. The previously scheduled Giant Springs area (Cascade and Teton Counties) study will begin spring 2005. Work in Giant Springs will be followed by work in Missouri Headwaters and the Upper Yellowstone River areas.

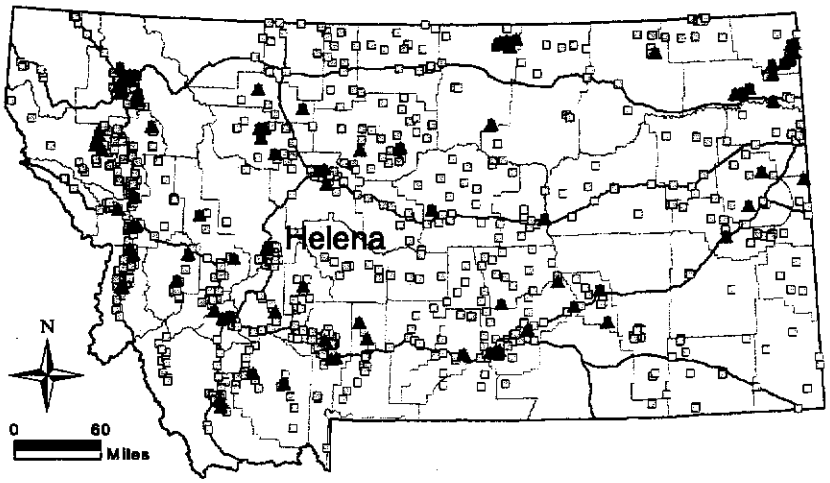


The locations for more than 5,900 visited wells (dots) and 1,281 samples (squares) collected by Characterization Program staff are shown above. The Giant Springs, Missouri Headwaters, and Upper Yellowstone River characterization areas selected by the Ground-Water Assessment Steering Committee for future work are shaded. Field work will begin in Giant Springs in spring 2005. Database preparation is on-going in Missouri Headwaters and complete in Upper Yellowstone River areas.

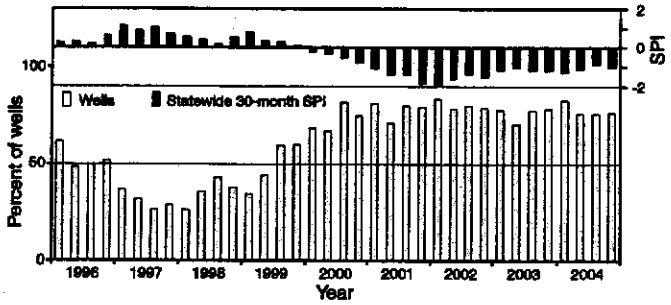
Water-level Monitoring

The Ground-Water Monitoring Program measures water levels in about 880 wells quarterly. Long-term records of water-levels in wells are like long-term records of stream flow and provide information about how ground water responds to seasonal and climatic changes. Water levels in wells also can respond to other factors such as increased withdrawals due to population growth, or from land use change.

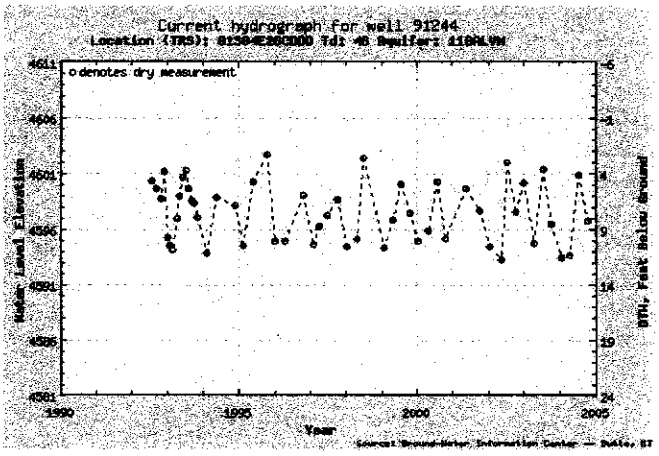
Information from the Ground-Water Monitoring Program helps people understand the impact of drought on water levels in wells. The chart below shows that since 2000, about 75 percent of 300 wells, are below their seasonal average. Detailed analysis of the data often provides clues to why water levels have changed. A report containing evaluations of where and how much water levels have changed is available from the GWIC website. Since July 2003, more than 2,280 copies have been downloaded. Water levels can also show the connection between surface and ground water. The hydrograph below shows that water levels in a shallow well 0.5 mile east of the West Gallatin River are strongly influenced by irrigation practices.



Quarterly water-level data from about 880 wells help people understand how the ground-water resource responds to climatic and other factors. Additionally, 96 water-level recorders (triangles) in the network provide continuous or hourly data. Water-level data collected from the network are available from the Ground-Water Information Center database.



Water-level measurements show that about 75 percent of climate sensitive network wells are below their seasonal averages in response to the recent dry period. The 30-month Standardized Precipitation Index (a drought index) has been negative (dry) since early 2000.



The Monitoring Program also creates long-term records of water quality and collects about 100 samples annually. The water samples provide new water-quality information extending periods of record in wells that have not been sampled for more than 10 years. One parameter of recent interest is tritium. Water with elevated tritium concentrations may be less than 50 years old, possibly identifying aquifers susceptible to contamination.

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