

HB831 Case Study Progress Report work plan

Montana Bureau of Mines and Geology
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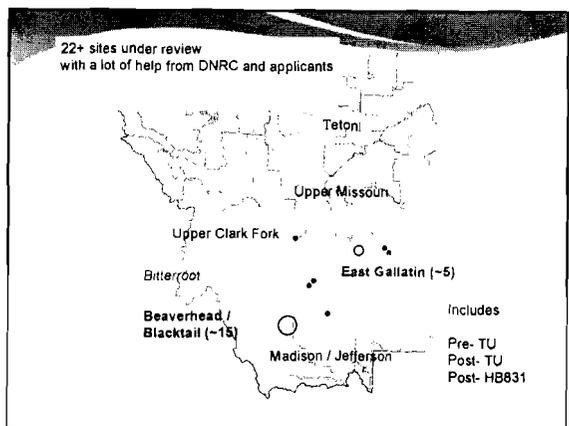


Presented to Water Policy Interim Committee
Dillon
July 11, 2007

Closed basin case study (Section 23):

(1a) the Montana Bureau of Mines and Geology... shall review, assess for scientific accuracy, and compile ground water studies that have been conducted in the last 20 years in closed basins or sub basins in Montana ...

The MBMG has initiated compilation, review, and assessment of studies related to ground water within the closed basins. These reports will be compiled in electronic bibliographic format and provided to the WPIC. The MBMG will use these references and other information to make recommendations as to additional studies related to water balance and potential impacts of ground-water withdrawals on surface water within the closed basins



Section 23 (2): the Bureau of Mines and Geology shall conduct a case study to gather and develop data to determine the adequacy of any additional recommended minimum standards and criteria for hydrogeologic assessments associated with ground water withdrawals and the range of impacts of those withdrawals on surface water and ground-water resources

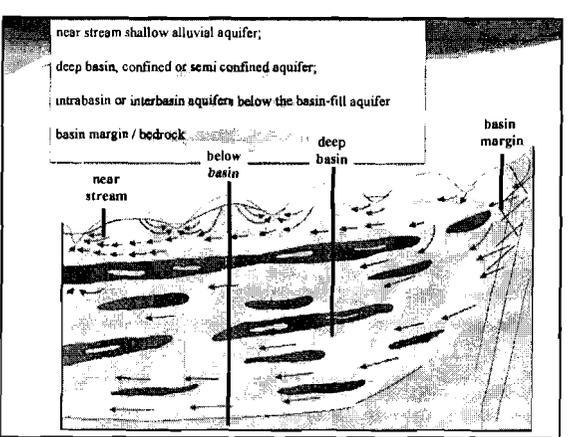
Three phases:

- I Site investigations
- II Site-scale and basin (or sub basin)-scale assessment of impacts
- III Evaluation/development of criteria for hydrologic assessments

I Site Investigations

Past or pending permit applications in closed basins will be evaluated with respect to the that represent various hydrologic conditions that occur in closed basins, including

- a) near stream shallow alluvial aquifer.
- b) deep basin, confined or semi confined aquifer.
- c) intrabasin or interbasin aquifers below the basin-fill aquifer, and
- d) basin margin / bedrock



Objectives of Site Investigations

- 1) describe these hydrologic settings particularly where ground-water is likely to be developed,
- 2) Use modeling to describe the range of potential impacts to ground water and surface water under each setting

II Site-scale and basin-scale (?) assessments

The results of the site investigations, including the models, will be used to construct generalized models of each hydrologic condition

The generalized models constructed from matrices of conditions and stresses based on the site investigations

The overall process is illustrated by example:

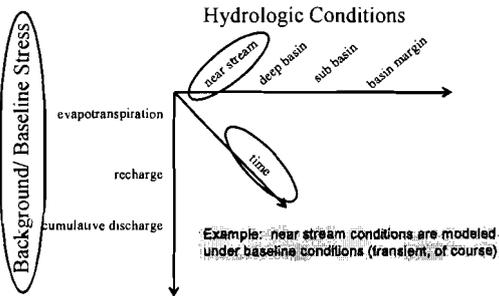
- 1) Evaluate all sites (applications) and categorize each into one or more type of hydrologic condition.
- 2) At least one, but likely several sites will be selected for a detailed examination of the hydrologic condition with particular attention paid to:
 - a) the aquifer test (duration, type of analyses, etc.),
 - b) monitoring well placement (distance from pumped well and stream, depth, etc.), and
 - c) stream characteristics (total flow, gain/loss characteristics, etc.).

The detailed examination will determine if additional data (more monitoring wells, more testing, water quality, etc.) are needed.

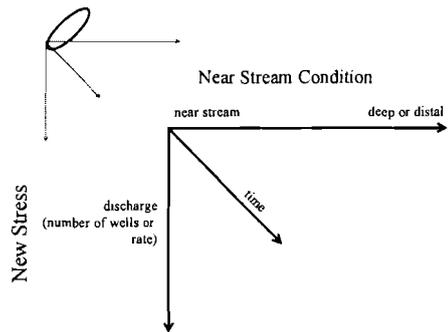
- 3) If more data are desired for that site, the MBMG will seek cooperation and access from the applicant and their agents (if applicable) to conduct the field work

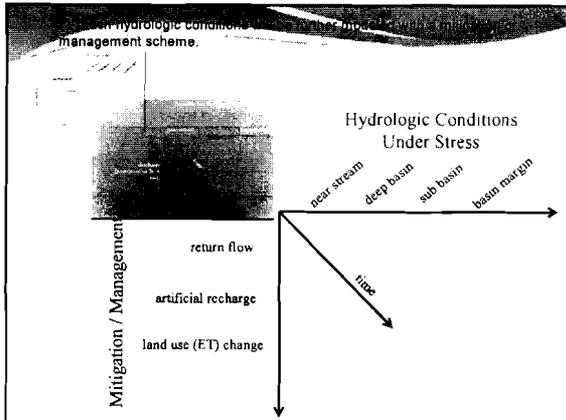
- 4) After completion of the field work, all data for each will be compiled and used to evaluate the potential impact of pumping on surface-water flow. **A ground-water flow model will be constructed** for one or more of the sites; this model will be site specific and will be calibrated using the pumping test data.

- 5) A model of pumping from near-stream shallow aquifer will be constructed under various background/baseline conditions as established in the primary matrix.



The model will then be used to describe the potential impact of pumping on ground water and surface water from pumping from wells at various positions in the aquifer and at various discharge rates as established in the secondary matrix.





In a nutshell...

Review site investigations and collect additional data as necessary

Conduct independent analysis, including modeling, with emphasis on the hydrologic condition and impacts to surface water

Use modeling to generalize and evaluate the range of hydrologic conditions under the range of stresses

Use modeling to generalize and evaluate mitigation/management options

Constraints:

Always based on hydrologic conditions likely to be found in closed basins as determined in the site investigations

aquifer parameters (transmissivity, storage, etc)

aquifer thickness and areal extent

well placement (horizontal and vertical)

Sensitivity Analysis:

Again, based on hydrologic conditions likely to be found in closed basins as determined in the site investigations

aquifer parameters (transmissivity, storage, etc)

stress duration, frequency

calculated versus measured (stream flow, water level, concentration)

III Evaluation/development of Criteria:

The site investigations and the modeling will be used to evaluate the adequacy of the existing hydrologic assessments and minimum standards.

The MBMG will review the current permit process with respect to the data collected, the evaluation methods used, and make recommendations as to additional information and analyses as called for in Section 23(2) of HB831

These recommendations will relate to both individual permit applications and basin-scale evaluations

Section 24. Case study -- requirements for participation (2)

The bureau of mines and geology, in cooperation with the appropriate legislative interim committee, shall notify each of the entities described in subsection (1)(d), in writing, of the opportunity to participate in the case study and the requirements for participation

Upon approval of this Work Plan by the WPIC, the MBMG will finalize its selection of sites for investigations and seek cooperation from individual well owners

Section 23 (6) The Bureau of Mines and Geology shall.

(a) provide updates to the appropriate legislative interim committee throughout the interim related to the progress of the review pursuant to subsection (1) and the case study pursuant to subsections (2) through (5), data trends, if any, and other information necessary to assist the legislative interim committee in developing any necessary recommendations;

(b) upon request, provide updates to the ground water assessment steering committee provided for in 2-15-1523; and

(c) submit a report to the appropriate legislative interim committee and the 61st legislature providing a detailed analysis of the results of the review and case study.

The MBMG will participate in activities related to the Water Policy Interim Committee (WPIC) as requested and include:

- 1) updates of MBMG activities to the committee at each meeting which include:
 - a) progress report on HB831 Case Study
 - b) status and current activities of the MBMG Ground Water Assessment Program
 - c) progress report on 23(4): compiling existing aquifer testing data, as well as data resulting from hydrogeologic assessments for the Ground Water Information Center database.
- 2) presentation of background information related to hydrogeology that may include water balance calculations, the hydrologic cycle, ground-water flow modeling, geochemistry / geochemical modeling, aquifer testing / aquifer characteristics, and recharge as requested by the WPIC

Discussion/decision/guidance points:

Approval of work plan

Use of permit applications outside "TU decision"