

Results of Post Oak Savannah GCD Stakeholder Meeting September 3, 2008

- DFC Issues

- No objections to proposed drawdown-based DFC
- Suggestion to consider historical drawdowns and current water levels
- Impacts to surface water (spring and streams)
- Water movement between aquifers
- Flows in the water budget
- Shallow portions (outcrop) of the aquifer will go dry before the deeper part (down dip)

- General Issues

- GAM reliability/accuracy (what ifs)
- Safeguards for preventing and correcting problematic drawdowns
- Future changes to Management Plans and Rules

3409 Executive Center Drive
Suite 226
Austin, Texas 78731

512/345-2379
FAX 512/338-9372

R. W. Harden & Associates, Inc.
Hydrologists - Geologists - Engineers

October 29, 2008

Groundwater Management Area 12
C/O Nathan Ausley
Post Oak Savannah Groundwater Conservation District
310 East Avenue C
P.O. Box 92
Milano, TX 76556

Re: GMA-12 Request for Stakeholder Comments

Dear Mr. Ausley:

We offer the following comments per the request of GMA-12 for stakeholder input into the Desired Future Condition (DFC) and Managed Available Groundwater (MAG) process GMA-12 is currently undertaking. Our company represents stakeholders with interests in over 200,000 acres of property and/or groundwater leases within GMA-12. It is difficult to provide insightful comment because the DFC process is in its early stages and GMA-12 has not provided any specifics regarding what the DFC's may be or how they are going to be implemented. Therefore, the following comments are provided based on earlier GMA-12 meetings and listening to the comments made by GMA-12 representatives at those meetings.

- 1) Based on comments made by GMA-12 representatives, GMA-12 appears to be most likely to set DFCs in GMA-12 based on artesian pressure criteria. GMA-12 representatives have indicated (at previous GMA-12 meetings) their reason for setting DFCs based on artesian pressure is to protect existing wells. We offer that solely protecting existing wells is a narrow and limited aquifer management strategy. There are other criteria and issues deserving of consideration also. Overall, we feel using artesian pressure criteria for DFCs is likely to be impractical, and will largely be an ineffective method of groundwater management for the following reasons:
 - Artesian pressure decline represents reductions in groundwater pressure, not desaturation of aquifer pore space (i.e. reduction in aquifer storage). Artesian pressure declines (or recovery) represent a relatively short-term response of the aquifer to stresses because artesian pressure is transmitted rapidly through the formation. Very short pumping durations can produce large, widespread fluctuations in artesian pressures. Artesian pressure fluctuations have little relationship to the total volume of water produced, aquifer water budgets, surface-groundwater interaction issues or water available for production.
 - Artesian pressure fluctuations are typically more dynamic compared to water table fluctuations and are more susceptible to influence by the distribution, timing and rate of pumpage. Monitoring of artesian pressure changes will likely

result in unscientific implementation in addition to inconsistent and arbitrary results.

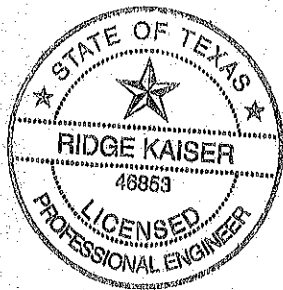
- The physical limitation of monitoring aquifer pressure also adds to the impracticality of using artesian pressure as DFC criteria. Because of a) the lack of appropriate monitor wells in the deeper portion of many of the GMA-12 aquifers, b) the spatial distribution of monitoring points, and c) the spatial variability of present and future pumpage with respect to those monitoring points, from a practical standpoint, artesian pressure measurements can only be recorded at a limited set of points, at discrete times and at varying distances from production. This incomplete and very selective monitoring protocol is arbitrary and thus will result in arbitrary regulatory effects. This sets the stage for conflicts that may arise when regulators are required to treat groundwater producers differently solely because of their proximity to a monitoring point(s) and/or the schedule of the measurement. The results of this may be the unequal distribution of groundwater production rights, and therefore arbitrary government regulatory programs affecting property values.
 - Heterogeneities in the subsurface permeability, structure, and lateral continuity of aquifer sediments can impact regional artesian pressure drawdown. Currently, the actual occurrence of these heterogeneities is only partially understood. GMA-12 is currently struggling with this very issue right now. When this inherent limitation on our ability to reliably forecast artesian pressure conditions is coupled with DFCs attempting to describe dynamic and seasonally inconsistent artesian pressure levels the DFCs/MAGs are not going to be meaningful and likely going to be incorrect or inaccurate.
 - The use of artesian pressure fluctuations as the DFC criteria will likely compel landowners and water producers to locate and configure well fields for regulatory compliance rather than for more tangible concerns such as protection of the health and safety of the public, efficient aquifer management, and technical and economic reasons.
 - The volume of water associated with changes in artesian pressure in GMA-12 aquifers is typically a very small part of the aquifer water budget. A decision to manage and focus regulatory criteria on artesian pressure is in effect a decision to manage considerably less than one percent of the resource and has little to do with groundwater management or availability in the aquifers within GMA-12.
- 2) It is appropriate to remember that the Texas Water Development Board's (TWDB) groundwater availability models (GAM) only simulate potential regional aquifer response to stresses. Limitations on the use of the GAM models are documented in every GAM model report with emphasis given to the regional nature of the models. Given inherent modeling limitations such as cell discretization issues, uncertainty in aquifer hydraulic parameters, over-simplification required in aquifer structure and the many other assumptions made in model development, it is critical that this technology is not overextended or misapplied. It is clear during previous GMA-12 meetings that the limitations of the model are not being acknowledged nor respected. During this DFC process, GMA-12 members have utilized the GAM model to determine the drawdown in the near vicinity of pumping wells and well fields. This in spite of the fact the actual hydraulics controlling artesian pressure change at these locations is mostly uncertain or incorrect in the model.

- 3) DFCs and MAGs should be based on aquifer parameters and conditions that are better known, understood and/or less dynamic than artesian pressure fluctuations so that better data and tools obtained in the future will not result in significant and/or dynamic changes in DFCs and MAGs. We have already seen, if artesian pressure criteria are used, that the DFC/MAG process can get derailed as the result of the drilling and testing of a single production well and GMA-12 now finds itself in the position where modifications to the GAM model are being considered and needed for the DFC process. We do not disagree and strongly support revising and updating the model. However, updating the model is not a solution to the inherent problems of using artesian pressure as DFC criteria. One can easily envision the same type problems occurring in the future. A better and longer-term solution is to select DFCs based on sound more well known and relevant principals and practices that are largely independent of model limitations. The best way for the DFC/MAG process to succeed is to based DFCs and MAGs on sound and meaningful hydrologic principles that will stand the test of time, new data and future better science.
- 4) DFCs based on artesian pressure criteria have little to do with good management practices, solid science and groundwater availability. GMA-12 in previous GMA-12 meetings has agreed stating that the use of artesian pressure as DFC criteria is for the purpose of protecting existing wells. GMA-12's plan to provide some limited protection to existing wells is an arbitrary criterion which will only provide partial protection. The alternative to this management by artesian pressure designed to protect existing wells, and one that makes more sense is to regulate aquifer storage and other important water budget items and to implement a mitigation plan. This alternate regulatory method would better protect stakeholder values in their land and groundwater property rights, and offers even better protection of existing wells.
- 5) Most stakeholders have little understanding as to the significance regarding the defining of DFCs and MAGs. In addition, the impact to stakeholders regarding the setting of the DFCs and MAGs will not be fully realized until GMA-12 member districts decide how they are going to make changes in their rules and management plans in response to them. Only then will stakeholders understand the true and complete ramifications of the DFC/MAG process. Therefore, it is important for GMA-12 to specify in detail by district once the DFCs are proposed, 1) how the districts intend to implement the MAG, 2) what changes will be made in the GMA-12 member district rules and management plans to reflect the MAGs, 3) the type and location of monitoring to evaluate DFC and MAG success, and 4) how these DFCs and MAGs will impact stakeholder's rights to produce groundwater from both existing, currently proposed and future wells. If GMA-12 only provides the DFCs and fails to identify how the districts intend to implement the MAGs, stakeholders cannot provide true and constructive comment on any DFC/MAG proposals. While changes in rules and management plans will likely be implemented at the district level, these need to be discussed at the GMA-12 level to provide stakeholders the full impact of the proposed DFCs. This is also needed to ensure that the DFCs and MAGs can be implemented by the member districts without technical or regulatory conflicts within GMA-12, and to ensure the proposed DFCs can be implemented from a regulatory standpoint and consistent with good groundwater management practices and fair and impartial treatment of groundwater owners.

- 6) It appears GMA-12 is going to "reverse engineer" the DFCs based on selective projections of present and future pumpage in GMA-12, modeling that pumpage, and providing the resulting artesian pressure to the TWDB for MAG determination. As a result, it appears that if a stakeholder's groundwater demands are not included in the model runs they will not be represented in the DFC and resulting MAG. To date, the selection of pumpage to be included to reverse engineer the DFCs has been determined at closed meetings between GMA-12 representatives. If GMA-12 continues with this reverse-engineering the process of determining pumpage which is to be included in the DFC determination should be conducted at open meetings and with stakeholder input. On behalf of my clients in GMA-12 I request specific notice of these meetings and clear instructions on how I can ensure their current and/or future groundwater production is included in the DFC determination.
- 7) GMA-12 representatives have indicated that DFCs can be revised every five years. However, having a "short-term approach" to the DFC/MAG process does not provide the surety required by stakeholders and groundwater districts, to plan for responsible aquifer management. GMA-12 should be encouraging good long-term water planning, not adding to uncertainty. If in fact GMA-12 is going to take this approach it is necessary, for proper DFC/MAG stakeholder evaluations, that each of the GMA-12 districts indicate, in detail, how such DFC and resulting MAG changes are going to be applied with regard to permitting and the allocation of groundwater. Put more simply if more or less water becomes available how it will be re-allocated. This is the only way stakeholders may understand the ramifications of the DFCs proposed and ensure that each district's plans for implementation of the DFCs and MAGs are consistent and not conflicting.
- 8) As opposed to artesian pressure aquifer water budgets are a key to developing sound DFC/MAG criteria. After all, it is the water in the aquifer, not the artesian pressure of the water in the aquifer that needs to be placed to beneficial use under state law. Aquifer water budgets address the important inflows, outflows and changes of water in storage in the aquifer on a regional scale. Once critical water budget items are identified, then the identification of the specific areas or hydrogeologic factors that exert influence on those items can be identified. Although the water budget items reported by the GAM contain inherent error, the relative magnitude and significance of these errors can be appraised to determine if the best and available science is good enough for the task at hand. To date there has been no significant discussion of specific aquifer water budgets at any GMA-12 meetings.
- 9) We recommend an appropriate DFC should be based on managing and monitoring the changes in the water table of the primary aquifers within GMA-12, as this regulates the water resource which we all seek to protect and place to beneficial use. This largely solves the problems inherent in trying to manage the aquifer based on artesian pressure fluctuations including:
 - There are more than sufficient wells already in existence in the primary aquifers within GMA-12 to monitor the water table levels and any rates of decline.
 - Water table fluctuations are much less dynamic than artesian pressure fluctuations and not nearly as impacted by seasonal pumpage fluctuations.

- Water table fluctuations are more reflective of the volume of water produced rather than the rate of production.
- Decisions will be made based on the most important items in the aquifer water budget and that impacts other important items in the water budget such as recharge, evapotranspiration, etc.
- The changes in the water table are comparatively slow and predictable. This provides the member districts the necessary time to slowly, gradually and successfully implement production changes, if required, to meet specified DFCs and MAGs.

The DFC/MAG process is a poorly conceived groundwater management process. However, that does not mean it cannot succeed. In GMA-12 this process stands the best likelihood of success if it can 1) implement good science and hydrologic principles that are known to stand the tests of time, 2) instruct member districts to work through how the proposed DFCs and resulting MAGs will impact landowners and water producers ability to access their water both now and in the future, 3) have open discussions regarding proposed changes in rules and management plans at the GMA-12 level that facilitate proper long-term water planning for all stakeholders, and 4) recognize that the resource must be shared equitably between all stakeholders. If GMA-12 has the foresight to take these steps, we believe GMA-12 can become part of the solution rather than contribute to the legal and regulatory uncertainty and confusion that this process is causing for everyone.



Sincerely,

A handwritten signature in cursive script that reads "Ridge Kaiser".

Ridge Kaiser, P.E.
President
R. W. Harden & Associates, Inc.

CC: Robert Mace/TWDB