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August 8, 2017

Alan Day, General Manager
Brazos Valley Groundwater Conservation District
112 West Third Street
Hearne, TX 77859

Reference: Public comments regarding BVGCD Proposed Rule Amendments dated August 10, 2017

Dear Mr. Day:

Thank you for the opportunity to comment on the proposed amendments to BVGCD Rules. I respectfully request a hold on these rule amendments until a thorough review of the consequences of these definitions and rule revisions have been completed regarding their practical application and how they may conflict with other rules.

I understand a well's impact is dependent on the permeability, thickness and storage characteristics of the aquifer and at what rate the well(s) in question will be pumping. Applying general rules of thumb for well-spacing and assigned acreage allows the Board to operate within some degree of standardization but the nature of groundwater movement is hardly uniform. The Board's rule additions to clarify the specific scientific evaluations and studies to be included with new permit applications for wells with significant capacity greater than 400gpm are very welcomed. Hopefully, the inclusion of this important information will mitigate future conflicts and/or establish operational agreements between well operators with overlapping areas of influence that will allow each their fair share.
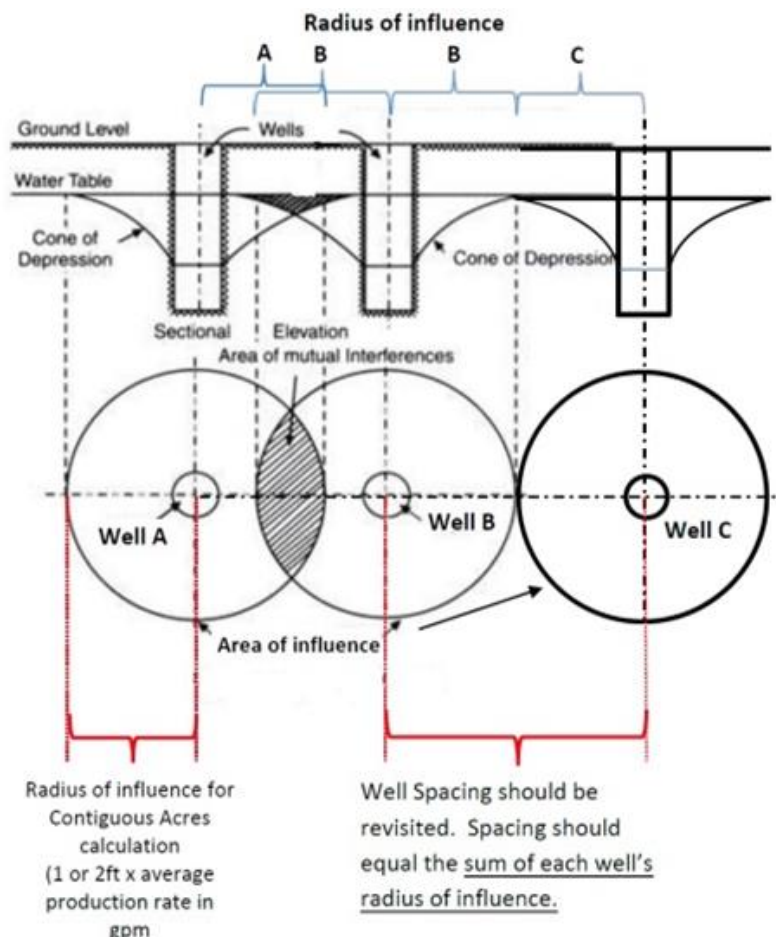
My primary concern is that these "general" rules are indeed based on the best science. Specifically, I am concerned about well-spacing distance. When the original rules were written, the well-spacing requirements (Section 6) and production limits based on acreage (Section 7) were predicated on using the permit's production in "acre-feet per year."   I assume the science at the time suggested a Simsboro multiplier of 1ft/1acft was a reasonable distance between wells in this highly productive aquifer in our specific location. This distance also became the radius to calculate the acreage needed.

Example 1. 3000 acft/yr permit required a distance of 3000 feet between well heads and legal control of approximately one section of land (640 acres)

At some point, these rules were changed or perhaps corrected to calculate the well-spacing and assigned acreage using "average annual production rate." This reduced well-spacing distance by 38+% but reduced the assigned acreage by 60+%. That seems radical; however, I assume scientifically justified.

Example 2. 3000 acft/yr permit is proposed as an average production rate of 1860 gpm to yield 3000 acft/year and therefore requires a distance of 1860 feet between well heads and legal control of approximately 250 acres.

I am assuming the Board's hydrologist has sanctioned the second version as probably closer to calculating the surface *area of influence* created by a pumping well's *cone of depression*. However, this wellhead to wellhead distance only extends to the perimeter of the new well's *area of influence*. This well spacing distance may interfere with **existing wells** and negatively impact production of both.

Radius of influence for Contiguous Acres calculation (1 or 2ft x average production rate in gpm

Well Spacing should be revisited. Spacing should equal the sum of each well's radius of influence.

If the Board's current formula for assigned acreage is representative of a well's impact, then the well-spacing calculation should be revisited. My suggestion is to either create a table for reasonable well-spacing or amend the rule to sum the value of each well's *radius of influence* to determine an appropriate distance between wellheads. Otherwise, just using the new well's radius would favor the new intruder rather than protecting the existing well's permit.

I recently objected to the Board's Rule 6.2(f) to exempt a new non-exempt well from the well-spacing requirement with the caveat "to the extent that the spacing does not allow the new well owner to produce their Production Based Acreage under Rule 7.1(c)." Again, this favors the new application versus an existing permit.

I am concerned that this Board's rule-making is undermining the original historic use permit provisions and the promises to residents that their existing wells would be protected from interference by newer, bigger wells. I am concerned these rule amendments will jeopardize our existing wells, if not by interference from newer wells, then by the ever decreasing water tables due to the inevitable imbalance between "legally allowable discharges" v. recharge of our aquifers.

The Board's bias or perhaps legislative interpretations, seems to favor new applicants regardless of existing historic use or producing wells for current users of our aquifers. Nonetheless, there should always be protections for all new and legacy users to produce their fair share.

I have attached language revisions for some of the definitions and Rule 7.1.(c) for your consideration. Again, thank you.

Sincerely,

Cathy Lazarus

PUBLIC HEARING: Suggestions

(8)   "Contiguous acreage" means land parcels sharing a common border of significant consequence [NOTE: the Board should specify a shared length of 300ft or 500ft or 1000ft or 1250ft…you choose] within the District that is owned or legally controlled for the purpose of groundwater withdrawal by the well owner or operator. Land owned or legally controlled by the well owner or operator that is separated only by a road, highway or river from other land owned or controlled by the well owner or operator is contiguous.

[This should read like a definition, not a rule]

(32)   "Property legally assigned to a well" is property owned or legally controlled for purposes of groundwater withdrawal by a well owner or operator and assigned to a specific well by the owner or operator. For purposes of determining permit production limits as required by District Rule 7.1(c), property legally assigned to a specific well's non-exempt permit shall be contiguous acreage and encompass the maximum *lateral area of influence* created by the assigned well pumping capacity based on the best available science.

Figure 1.
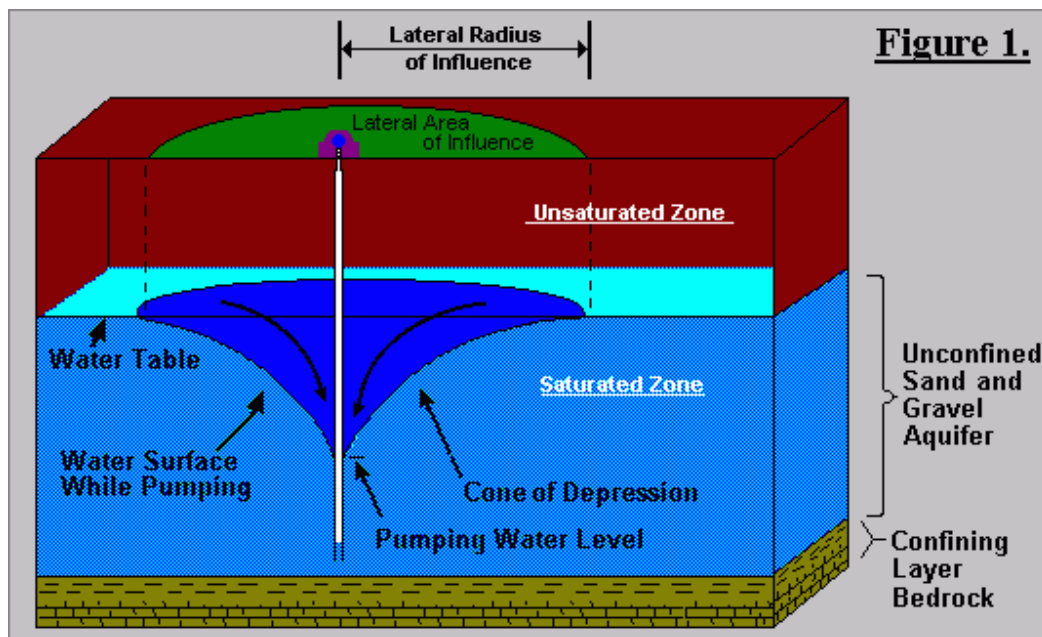
[This is probably more of a rule than definition. However, it is important to differentiate between total property owned or controlled and the minimum acreage assigned to a specific well to determine maximum production limits.]

(c) Production Based Acreage

A permit holder's groundwater production for a new non-exempt well drilled in all aquifers within the District, except the Brazos River Alluvium, is limited by the property legally assigned to a specific well's non-exempt permit shall be <u>contiguous acreage and encompass the maximum lateral area of influence</u> created by the assigned well pumping based on the best available science.

As a general rule, the permitted amount of groundwater produced is limited by the available number of contiguous acres that may be assigned to the specific well permit and still encompass the maximum lateral area of influence and is determined by the following formula:

$$(avg.\ annual\ production\ rate\ \textcolor{red}{gpm}\ \times\ well\ spacing\ multiplier\ \textcolor{red}{ft/gpm})^2\ \times\ \pi) \div 43,560\ \frac{sqft}{acre}$$

$$= total\ number\ of\ \textcolor{red}{contiguous\ acres}\ required\ to\ be\ assigned\ to\ well$$

NOTE: avg. annual production rate in gpm × well spacing multiplier in ft/gpm = approx. *radius of influence*

[It should be noted that new non-exempt well permit application requesting an average annual production rates of greater than 400gpm are required more specific scientific evaluation and/or study to determine the maximum lateral area of influence for the specific well. (see Rule 8.4)]

The average annual production capacity or rate is defined as the permitted annual production amount in acre-feet multiplied by 0.62 to equal gallons per minute of production on an average annual basis.

More than one well may be assigned to the production acreage at the discretion of the Board as long as the ==spacing requirements are met==. [Shouldn't this specify same well owner/operator? If designing a well field, there is usually intended overlap to some degree where spacing requirements are not at issue]

The maximum well pumping capacity denoted in gallons per minute in an operating permit does not mean that the well is authorized by the District to pump that maximum capacity on a year round basis. The authorized amount of water to be produced annually by a permittee is not tied to the pump size. The authorized withdrawal amount of groundwater is stated in each well permit as the rate of production, which authorizes a maximum gpm production, <u>not to exceed a specified number of acre-feet of groundwater production each year.</u>

The permitted groundwater production capacity is also subject to the ==spacing requirements== in Section 6, as well as the availability, production, and beneficial use limits in Section 7. [Shouldn't the exemption caveat be mentioned…?]

This provision applies to new wells in the Simsboro Aquifer that did not meet the definition of an existing well as of December 2, 2004.

This provision applies to permit applications for new wells to be drilled in the Queen City, Sparta, Yegua-Jackson, Calvert Bluff, Carrizo and Hooper aquifers that are deemed to be administratively complete after May 9, 2013.

This requirement also applies to applications to amend a permit by increasing the annual production amount. The additional amount of acres required to be legally assigned to the well only applies to the incremental amount of production asked for in the amendment. [It may be wise to restate the total new assigned contiguous acreage must encompass the newly projected *area of influence*.]

Simsboro permitting requirements								
Production Permit Amount acft/yr	Required Acreage Legally Assigned to Well (acres) *"Area of influence"*	Average Annual Production rate as gpm (62% of acft/yr)	RULE 7.1.c ASSIGNED WELL'S LATERAL RADIUS OF INFLUENCE		RULE 6.1.b(2) Well Spacing distance 1ft/1gpm		RULE 6.1.b.(1) Well distance from property line (min 50' or 1/2ft/1gpm)		Well Spacing using equivalent radius formula
56	EXEMPT	35	35	=	35	?	50	?	62
60	0	37	37	=	37	?	50	?	66
100	0	62	62	=	62	?	50	?	110
250	2	155	155	=	155	?	78	?	275
500	7	310	310	=	310	?	155	?	549
750	16	465	465	=	465	?	233	?	824
1000	28	620	620	=	620	?	310	?	1099
1250	43	775	775	=	775	?	388	?	1374
1500	62	930	930	=	930	?	465	?	1648
2000	111	1240	1240	=	1240	?	620	?	2198
2500	173	1550	1550	=	1550	?	775	?	2747
3000	250	1860	1860	=	1860	?	930	?	3297
3500	340	2170	2170	=	2170	?	1085	?	3846
4000	444	2480	2480	=	2480	?	1240	?	4396
4500	561	2790	2790	=	2790	?	1395	?	4945
5000	693	3100	3100	=	3100	?	1550	?	5495
5325	786	3302	3302	=	3302	?	1651	?	5852

It is my opinion that Rules 6.1.b(1,2 & 3) should be revisited. Currently, the BVGCD well spacing Rules 6.1.b(2 & 3) of 1ft/GPM and 2ft/GPM represent the *lateral radius of influence* of only the new well and NOT the well spacing expected to avoid interference of an adjacent permitted or registered well. A new well should not be operated in such a manner to significantly reduce the production from previously existing wells. It is assumed the 1ft/gpm is a reasonable guide (multiplier) based on the BVGCD's hydrologist's best estimate for the Simsboro aquifer to determine the *radius of influence* in our geographic locale.

[The essential question is which is correct. Is 1ft times well rate in gpm the appropriate distance between wells? Or, is 1ft times well rate in gpm the *radius of influence*? I have trouble accepting this same function as representing these two different distances.]
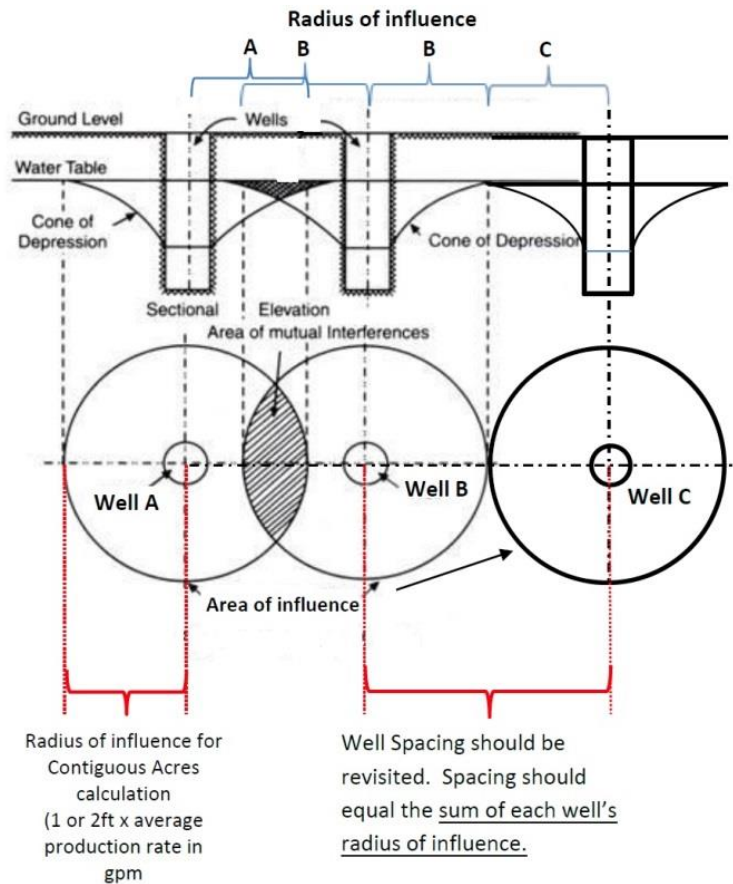
Well spacing should not be the outer boundary (circumference) of the *area of influence.* The existing permitted or registered well may have a significant cone of depression that should be considered.

Equivalent radius formula for determining ideal distance *(d)* between congruent wells is $d = \sqrt{\pi r^2}$ where *r* is the *lateral radius of influence.* Otherwise, the wells of varying size and capacity would be properly space at a distance *(d₂)* equal to the sum of their radii, $d_2 = r_{well\,B} + r_{well\,C}$

Two wells of any area should be spaced in such a way that the cones of depression or areas of influence do not cross each other. Mutual interference reduces the dependable groundwater storage of each well and, in turn, reduces the discharge of both wells. Also, consideration should be given to the inevitable dynamics of time's relationship with the *area of influence* which will increase.