

1320 Research Park Drive  
Manhattan, Kansas 66502  
(785) 564-6700



900 SW Jackson, Room 456  
Topeka, Kansas 66612  
(785) 296-3556

Jackie McClaskey, Secretary

Governor Sam Brownback

September 18, 2017

Joseph Pajor  
City of Wichita  
Deputy Director  
Department of Public Works & Utilities  
455 N Main, 8<sup>th</sup> Floor  
Wichita, KS 67202

**RE: Wichita ASR project  
Process and input on City's technical work**

Per my commitments at our August 15, 2017 meeting, I am writing to provide: 1) an outline of the process we will use to consider the City's request for revised permit conditions related to their Aquifer Storage and Recovery (ASR) project and 2) our comments on the City's technical work to establish reasonable bottoms for the Basin Storage Area.

**Process for consideration changes to ASR conditions** – Below is a summary of what was communicated at our meeting, with additional details in places. Please review and let me know if you have any concerns or see a better path forward than is outlined below.

1. After review, **DWR believes no changes to statute or rules are necessary to consider and implement the City's anticipated request** for changes to ASR conditions. We don't see anything in the rules that prevents two types of recharge credits and separate means of accounting, as long as they can be supported as following *"sound engineering methods based on actual measurements, generally accepted engineering methodology, or a combination of both."* The City's request will need to provide technical support for the requested changes. Attached to this letter are the key provisions from our regulations related to modeling and accounting of ASR projects.
2. **Aquifer Maintenance Credits (AMCs) are not passive recharge credits.** In his order dated August 8, 2005 related to Wichita's ASR project, David Pope specifically concluded it was inappropriate to allow for passive recharge credits. DWR does not believe that AMCs as envisioned are passive recharge credits, the distinction being that the City's proposed AMC recharge credits will pass through the ASR diversion and treatment infrastructure and are subject to the rate and quantity limitations of the permit(s).
3. **Process for considering the pending ASR new applications and revised conditions for existing ASR permits.** After review of statute and regulations, which are not particularly prescriptive on process sequence, we suggest the following steps forward:
  - a. The City will work through its process, including continuing its work with DWR and GMD 2 staff, to finalize its request to include specifics for accounting and modeling, revised terms and conditions for the new applications currently on file as well as other ASR permits, with supporting technical work (for more detail, see #4 below). Concurrently, the City will work on its public outreach.
  - b. When the City's request and support work is complete, DWR will start its formal consideration by sending the package to GMD 2 for review. We will also post the documents on our web site for the general public.

- c. Notwithstanding DWR's public notice for the new applications, we want to make sure everyone is informed of the City's proposal and the public hearing. Per our discussion, this will include publishing notice of the hearing in area newspapers, posting details of the proposal on our web site, and a direct mailing to all those within 1,000 feet of the proposed points of diversion (existing municipal wells).
  - d. We plan to hold a hearing approximately 45 days after providing the package to GMD 2. We anticipate there will be an informational meeting earlier on the same day.
  - e. Due to the nature of the project, we will allow the following GMD 2 board meeting date plus 10 days following the public meeting for GMD 2 to complete its review and recommendations.
  - f. Following receipt of GMD 2 recommendations, DWR plans to process the pending new applications within approximately 45 days.
  - g. Findings and Orders for existing ASR permits will be processed in conjunction with the new application approvals, and will address proposed revisions to the 1993 aquifer levels and other revisions to the permit conditions.
4. **What we expect from the City** – The City's proposal should include details for accounting and modeling of AMCs including how they will be distributed and tracked, how this accounting and modeling will interact with accounting and modeling of the recharge credits currently authorized, and a proposal for notice/reporting on source of pumping (i.e. water rights from Equus Beds aquifer, "normal" ASR credits, AMCs). In addition, the City's proposal should include proposed permit conditions. We are happy to work with you on developing these permit conditions. While not exhaustive, below is a listing of potential items for terms and conditions:
- Require all AMCs to be water diverted and treated at their ASR facility within the approved rates and quantities authorized under File no 46,627.
  - Define under what conditions the City can pump this water directly to the City for credit (i.e. some definition of what cannot reasonably be stored, likely this will include limitations related to rates of intake and available storage capacity within the aquifer.
  - A cap on AMC credits or total recharge credits.
  - Provisions to minimize plume migration (e.g. the City will not pull credits from the Burrton area or they will be the last of the credits taken.
  - Sequencing related to the use of credits.

#### **Comments on your June 26, 2017 draft report on ASR index level permit modification**

We have reviewed your draft report as well as the email comments of GMD 2 of July 18 and have the following comments and suggestions.

First, as an introductory matter, let me thank the City for its detailed work responsive to my request that the City demonstrate and establish reasonable bottoms to the Basin Storage Area which meet both the needs of the City for the ASR project and assure the public that the ASR can be operated without raising significant water supply concerns from others accessing the aquifer. From our review of the draft report, it appears the City's methods are sufficient for this purpose. While there are no perfect models, we believe the existing model is sufficient for this purpose. It also appears the City's assumptions and data are sufficient as used in the analysis.

That said, we believe that the following suggestions will help clarify the analysis and report, which will be helpful in the GMD's and informed public's understanding of the proposal:

- Page 1, last paragraph - you might note via footnote or explanation in the text that the 1993 levels used are those resulting from our recent process to clarify the 1993 levels. You might also add clarification to the report here and/or other references (e.g. on page 12) on the distinctions of the upper and lower aquifer level and how they fit in your analysis as well as how that relates to the model layers (e.g. as referenced on page 12).

- Page 4-5, 1% drought simulation.
  - We assume that the 110% assumption for Cheney is based on the reservoir achieving this level in non-drought years. If so, you might state this basis.
  - While we have not examined the question, we assume that 1933-40 streamflows into Cheney were likely greater than 2011-12 due to changes in land use practices and other developments since. If this is the case, your future Cheney yield would be too high, resulting in less use of the EBWF in your subsequent analysis and a higher estimated bottoms. We assume the City is comfortable with this assumption given your 10 foot “factor of safety” provided to the bottom line of your analysis. We suggest you add a bit more narrative to the report to explain why the 1933-40 streamflows are used here whereas repeated 2011-12 streamflows are used elsewhere.
- Page 8, Table 5.
  - See comment above on 1933-40 streamflows vs. 2011-12 above.
  - GMD 2’s comments questioned whether repeating the 2011-12 pumping by irrigation and others four times might overestimate pumping in a coming 1% drought, given that KDA-DWR allowed more pumping in the period via its drought-term permits and one-time MYFA “forgiveness,” which we do not plan on repeating with the implementation the revised MYFA tool (although who can tell for sure what type of special considerations might be provided in a future 1% drought). How does the pumping for 2011-12 in the analysis compare with two times authorized for the various uses made of water within the modeled area?
- Page 9 – We suggest you reference Figure 3 when referring to the CWSA and BSA and make the terminology between narrative and figure consistent.
- Page 12 – Simulated water level results - While it is helpful to characterize simulated water levels as a percent of full conditions in the CWSA and BSA, we agree with GMD 2 that more refined presentation of the results would be helpful for others to understand the effects to in specific areas and time steps. An examination of the hydrographs in Attachment I showing the modeled results by year and index cell, indicates that minimum levels occurs almost universally in year 8 of the simulation. We suggest a table or graphic similar to Figure 6 show the percent of full in year 8.
- Page 13 – Depiction of proposed levels.
  - Perhaps a figure similar to Figure 9 could be included that has the proposed bottoms of the BSA as a % of pre-development saturated thickness.
  - A map illustrating Figure 10’s remaining aquifer thickness might also be helpful.
  - Why are IW1 and IW2 not included?
- Attachment I – Hydrographs. You might consider adding a note on each hydrograph with the elevation of the bottom of the aquifer. You might also seek to clarify in the narrative describing them the significance of the two hydrographs plotted (upper and lower aquifers) and which corresponds with the current bottoms of the BSA.

We look forward to our continued work on these matters. Please let me know if you have any questions.

*David W. Barfield*

David W. Barfield, P.E.  
 Chief Engineer  
 Kansas Department of Agriculture  
 Division of Water Resources

cc: Tim Boese, Groundwater Management District No. 2  
 Brian Meier, Bruns & McDonnell  
 Lane Letourneau, Kansas Department of Agriculture  
 Chris Beightel, Kansas Department of Agriculture  
 Jeff Lanterman, Kansas Department of Agriculture, Stafford Field Office

## Applicable rules on hearing and ASR accounting/modeling

**K.A.R. 5-12-3. Hearings.** (a) A hearing shall be held by the chief engineer in the general vicinity where an applicant proposes aquifer storage and recovery before approval of any such application for aquifer storage and recovery.

(b) If any part of a proposed basin storage area is within the boundaries of a groundwater management district, the hearing required by subsection (a) of this regulation shall be held within the groundwater management district. (Authorized by K.S.A. 82a-706a; implementing K.S.A. 1999 Supp. 82a-711 and K.S.A. 82a-712; effective Sept. 22, 2000.)

## Applicable rules on modeling and accounting

Supporting definitions from K.A.R. 5-1-1. Recharge credit definition is highlighted.

(e) “Aquifer storage” means the act of storing water in an aquifer by artificial recharge for subsequent diversion and beneficial use.

(f) “Aquifer storage and recovery system” means the physical infrastructure that meets the following conditions:

(1) Is constructed and operated for artificial recharge, storage, and recovery of source water; and

(2) consists of apparatus for diversion, treatment, recharge, storage, extraction, and distribution.

(k) “Basin storage area” means the portion of the aquifer used for aquifer storage that has defined horizontal boundaries and is delimited by a maximum index level and a minimum index level.

(l) “Basin storage loss” means that portion of artificial recharge naturally flowing or discharging from the basin storage area.

(oo) “Index level” means elevations established spatially throughout a basin storage area to be used to represent the maximum volume of a basin storage area, and storage available for recovery based upon accounting methodology, and conditions of the permit.

(ss) “Maximum index level” means the maximum elevation for storage within a basin storage area or, if the basin storage area is subdivided, a smaller subdivided area.

(uu) “Minimum index level” means 20 feet above the bedrock elevation or an alternatively proposed minimum elevation for storage within a basin storage area or, if the basin storage area is subdivided, a smaller subdivided area.

**(mmm) “Recharge credit” means the quantity of water that is stored in the basin storage area and that is available for subsequent appropriation for beneficial use by the operator of the aquifer storage and recovery system.**

(yyy) “Source water” means water used for artificial recharge that meets the following conditions:

(1) Is available for appropriation for beneficial use;

(2) is above base-flow stage in the stream;

(3) is not needed to satisfy minimum desirable streamflow requirements; and

(4) will not degrade the ambient groundwater quality in the basin storage area.

(oooo) “Water balance” means the method of determining the amount of water in storage in a basin storage area by accounting for inflow to, outflow from, and changes in storage in that basin storage area.

Core of the rules requirements on accounting (there is more on information to consider in evaluating impairment; the list is similar).

K.A.R. 5-12-1(d)(1)

(d)(1) Each application for a permit to appropriate water for artificial recharge shall include a methodology for accounting for water stored in a basin storage area both on an annual basis and on a cumulative basis so that recharge credits can be calculated. If more than one application for a permit to appropriate water for artificial recharge relates to the same aquifer storage and recovery system, each application shall use the same methodology for accounting for water stored in the basin storage area. The accounting of the water balance of all

*water entering and leaving the basin storage area shall be determined by using sound engineering methods based on actual measurements, generally accepted engineering methodology, or a combination of both.*

*And 5-12-2 a and b*

*(a) In addition to annual water use reporting requirements pursuant to K.S.A. 82a-732, and amendments thereto, on June 1 of each year the permit holder of an aquifer storage or recovery system shall report an accounting of water in the basin storage area to the chief engineer and to any groundwater management district identified in subsection (c) of this regulation. The annual report for the preceding calendar year shall account for all water entering and leaving the basin storage area and shall specifically compute the amount of recharge credits held in the basin storage area.*

*(b) The report shall be in the form prescribed by the chief engineer and shall address the items in the water balance for the basin storage area, which may include the following amounts:*

- (1) Natural and artificial recharge;*
- (2) groundwater inflow and outflow;*
- (3) evaporation and transpiration;*
- (4) groundwater water diversions from all nondomestic wells;*
- (5) infiltration from streams;*
- (6) groundwater discharge to streams;*
- (7) the calculated recharge credits; and*
- (8) any other information that in the opinion of the chief engineer is pertinent to the basin storage and surrounding areas.*

*The annual accounting shall specifically take into account the amounts of natural recharge, artificial recharge, groundwater inflow, groundwater outflow, evapotranspiration, and groundwater pumpage. Groundwater pumpage shall include recharge credits withdrawn as well as pumpage from all nondomestic wells in the basin storage area. The annual accounting shall include any additional items within a basin storage area that would be necessary to determine the amount of recharge credit available for recovery.*