



**Department of Public Works & Utilities**

David Barfield, P.E.  
Chief Engineer  
Division of Water Resources  
Kansas Department of Agriculture  
109 SW 9<sup>th</sup> St.  
Topeka, KS 66612-1283

May 24, 2013

RE: Requested Modification to Limitations on Water Rights

Dear Mr. Barfield,

Upon completion of the City of Wichita's (City) Recharge Demonstration Project in 2001, the City entered into discussions with the Division of Water Resources (DWR) and Groundwater Management District No. 2 (GMD2) to create appropriate regulations for bank storage wells and the City's Aquifer Storage and Recovery (ASR) project. The Demonstration Project was focused around identifying and refining the most efficient method for capturing, treating and recharging above base flows in the Little Arkansas River into the Equus Beds Wellfield (EBWF). The regulatory development phase focused on all aspects of a recharge program including the establishing the framework and methodology for storing and recovering water. A variety of methods were discussed for setting up the recharge credit accounting methodology for the ASR project. These methods included using water level changes to determine recharge credits, or the use of computer modeling to determine recharge credits.

The City initially contemplated using changes in water levels to manage recharge credits. However, based on their success with computer modeling in two interstate lawsuits, DWR decided that computer modeling would be the appropriate tool to administer the ASR project. Regulations were developed for the project (K.A.R. 5-12-1) requiring the use of computer modeling, and that the horizontal extent and a vertical extent of the basin storage area be defined to provide a reasonable means of calculating the potential storage.

The horizontal extent of the basin storage area was determined to be bounded by the Little Arkansas and Arkansas Rivers, and the expected areas of influence from both artificial recharge injection and recovery. This area was divided into 38 index cells, as shown in Figure 1. An

**Engineering Division**

City Hall • Seventh Floor • 455 North Main • Wichita, Kansas 67202-1606

**T** 316.268.4501 **F** 316.268.4114

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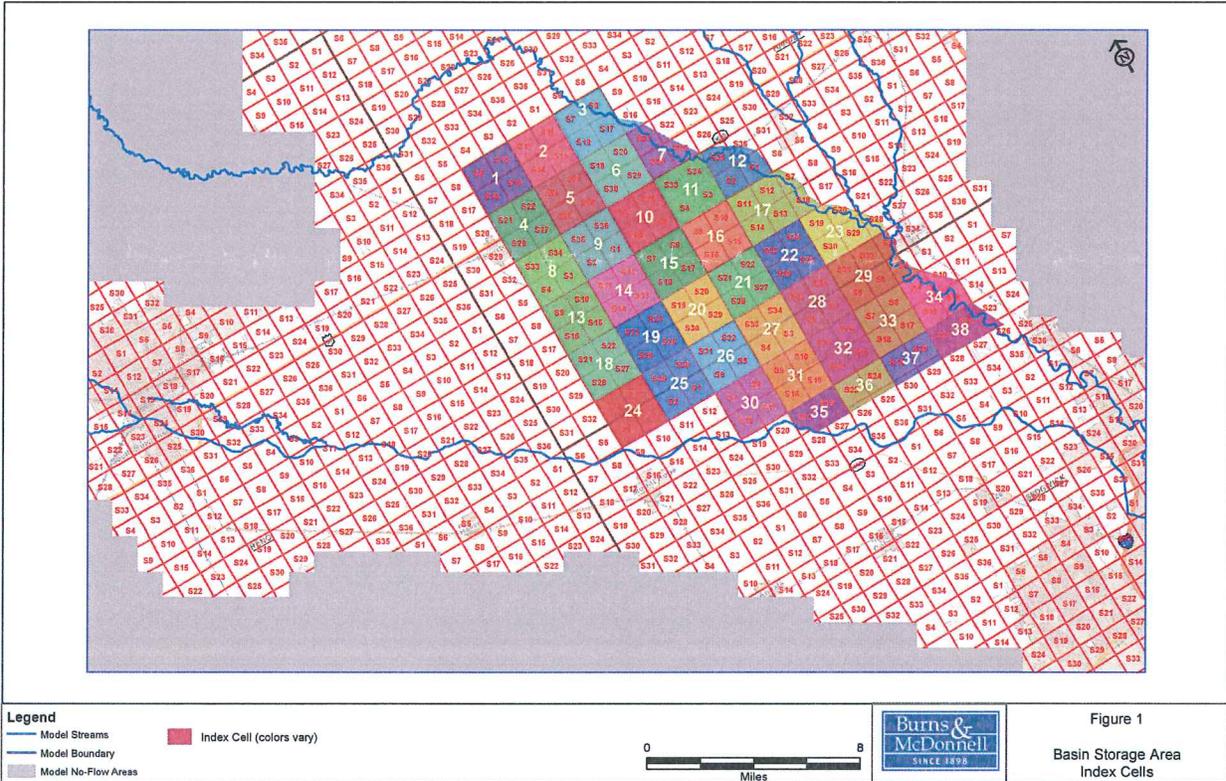
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index well was to be installed in each index cell as a water level monitoring point for regulatory purposes.

The vertical extent of the basin storage area was chosen based on historic high water levels at predevelopment (1940) in each of the 38 index cells, and was further limited in areas where protection for underground structures was a priority. The bottom of the basin storage area was calculated by the United States Geological Survey (USGS) using interpolation of water levels from a year of historic lows (January 1993) for each of the index cells.

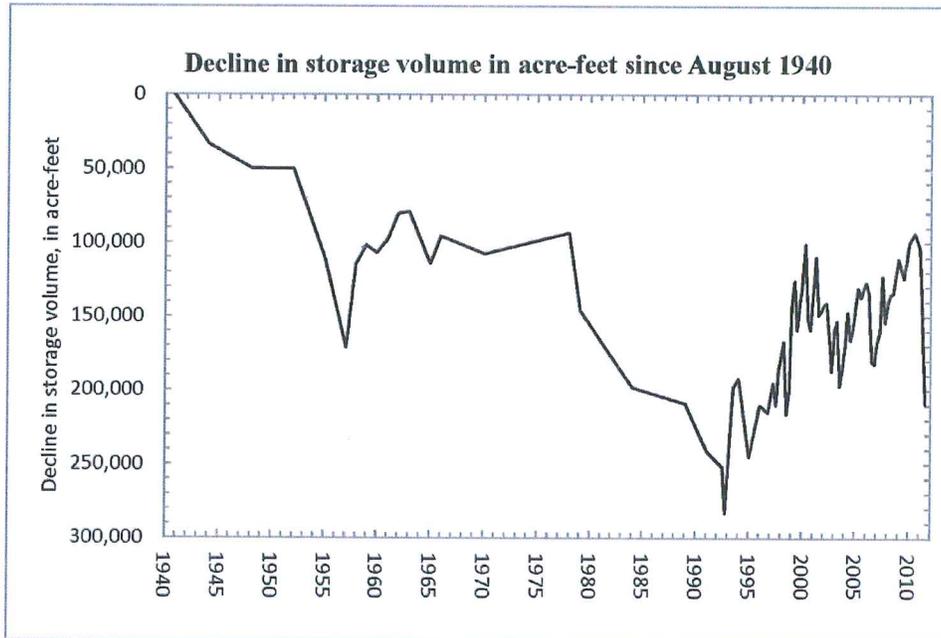


During the discussion and approval process for the Phase I ASR applications, DWR staff and the City agreed that using the 1993 levels as the bottom of the basin storage area was a reasonable and conservative number at the time. This decision was partially based on the fact that water levels could have been much lower in years after 1993 if the City had not made the unilateral decision to temporarily reduce water use from the Equus Beds Aquifer (Equus Beds). Thus the total storage volume was estimated based on historic “high” or predevelopment water levels and the 1993 water levels as estimated by USGS. It should be noted that the established 1993 water levels are under review by USGS, DWR and GMD2.

In 1993, the City began to implement various components of the City’s Integrated Local Water Supply Plan(ILWSP). This included using more water from Cheney Reservoir and reducing withdrawals from the Equus Beds. The USGS estimated that by January of 1993 the aquifer in the area surrounding the basin storage area had lost 255,000 acre-feet from predevelopment storage volume (1940). Thus 225,000 acre-feet represents the approximate storage capacity within the recharge basin as defined by the established upper and lower limits. As part of the

ILWSP strategy the City reduced its withdrawals from the Equus Beds by nearly 50% from typical annual quantities produced prior to 1993.

Due to the significant change in water use strategy by the City in 1993, the USGS estimated that about 60,000 acre-feet of water had been restored to the Equus Beds in the basin storage area by 2003. By January of 2009 the project area had recovered 144,000 acre feet, or about 56 percent of the losses that occurred between 1940 and 1993. The average cumulative water-level change from October 1992 to January 2010 was a rise of approximately 8.7 feet. Shown below is a copy of a water storage graph for the project area as prepared by the USGS.



When the water appropriations were issued by DWR in July of 2005 for Phase I of the ASR project, the Findings and Orders of the Chief Engineer fully described how recharge credits were to be administered. Within the Findings and Orders for Phase I, Conclusion No. 13 specifically addressed the availability of recharge credit withdrawal in relation to the index water levels and the bottom of the basin storage area

ASR Phase I Conclusion No. 13 - *“That if the project is operated so that recharge credits cannot be withdrawn if the static water level in the index well is below the lowest index water level for that index well, the public interest in not diverting Equus Beds groundwater will be protected.”*

Additionally within the Findings and Orders for the Phase I ASR applications, Order No. 8 describes the availability of recharge credit withdrawal in relation to index water levels and the bottom of the basin storage area:

ASR Phase I Order No. 8 – *“That water shall only be injected into the basin storage area by means of the injection wells when the water level at any required monitoring well located within 660 feet of an injection well is 10 feet or more below the land surface elevation at those observation wells; that recharge credits may be withdrawn from a cell only when recharge*

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*credits are available from the cell and the static water level at its index well is above the lowest index level; however, water may be recharged when the static water level is below the lowest index level in that well.”*

The individual approval conditions for each recharge and recovery well also limited the withdrawal of recharge credits to periods when water levels remain above the lowest index water level in the appropriate cell (Permit Approval Condition No. 19):

Permit Approval Condition No. 19 – *“That the proposed recovery of water artificially recharged by the City shall only occur when recharge credits are determined to be available from the corresponding cell, and the static water level is above the elevation established as the lowest index water level in that corresponding cell.”*

A primary purpose of Phase I of the ASR project was to begin the formation of a freshwater barrier to the salt water contamination moving towards the wellfield from the Burrton area. Both Conclusion No. 13 and Order No. 8, stem from the principle that withdrawal of recharge credits during periods when water levels are below those that existed in 1993 would not serve the public interest because it would deteriorate any established hydraulic barrier created from recharge injection. Therefore, the limitations to the recharge credit withdrawal relative to the lowest index water levels for Phase I (January 1993) were largely based on maintaining water quality in the City’s well field with a hydraulic barrier. However, it should be noted that water levels in the barrier area can experience significant declines during dry or drought periods, even without the removal of recharge credited from ASR Phase 1 wells.

In 2009 the appropriations for the wells in Phase II of the ASR project were issued, and virtually duplicated the approval conditions covered in the Phase I appropriations. This included the individual limitation to withdraw recharge credits to periods when water levels are above the lowest index water level (January 1993).

Examination of the USGS storage chart indicates that during the recent drought, a concerning pattern is emerging. While the City has not increased its usage from the Equus Beds and continues to use only about 50% of its available water appropriations in the Equus Beds, water levels have still declined substantially since 2009. The recent declines can be attributed to the combination of drought (less recharge), and increased irrigation use within the basin storage area. This pattern indicates water levels in the basin storage area for both Phase I and Phase II are not solely dependent on the amount of water that the City utilizes, and that it is conceivable that water levels may return to the 1993 levels despite the fact that the City is only using part of its allocation in the area.

The recent water level changes demonstrate that it is appropriate to make modifications to the administration of the City’s ASR project. It is now apparent that increased water use from irrigation users during drought conditions can cause significant declines in water levels not considered when the ASR appropriations were granted, and that the City should be in a position to recover available recharge credits even when water levels are below the 1993 index water levels.

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Phase II of the ASR project was implemented with the goals of supply development, restoration of the Equus Beds as a resource, and to provide a sustainable water supply during periods of drought. While the City has been emphasizing surface waters since 1993, the City will be forced to rely on allocations from the basin storage area if surface water sources become depleted or unavailable. If irrigation use, or the City being forced to utilize more of its allocation, causes the index water levels to drop below the 1993 water levels, the recharge credits created by the City would not be available at a time when they are most needed.

The City is therefore requesting the DWR revise the individual water appropriations granted for Phase II of the ASR project to allow for the withdrawal of recharge credits when they are available, and remove the restrictions limiting recharge credit withdrawal when levels are below the 1993 index water level. This change will allow the City to operate Phase II of the ASR project as intended (storage for when other resources are limited). The storage capacity of the basin storage area will not change under the request, only the ability to recover recharge credits when they are available as determined by the ASR accounting and DWR authorization.

This request would be applied to water rights: #46,714 to #46,733, #47,178 to #47,181 and #47,448 to #47,453 as well as recharge credit recovery rights associated with ASR Phase 2 Municipal wells authorized by Files HV006, #388 and #1006.

The City would be willing to meet with your staff to provide any additional information that may be required to fully consider this request.

Respectfully,



Michael G. Jacobs, P.E.  
Interim Water Resources Engineer

Relief from 1993 Levels Request 2013-05-21.docx

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