



Department of Public Works & Utilities

May 22, 2018

David Barfield
Chief Engineer
Kansas Department of Agriculture
Division of Water Resources
1320 Research Park Drive
Manhattan, Kansas 66502

RE: City of Wichita Aquifer Storage and Recovery (ASR) Permit Modification Proposal

Dear Mr. Barfield:

On March 12, 2018, the City of Wichita (City) submitted "ASR Permit Modification Proposal Revised Minimum Index Levels & Aquifer Maintenance Credits" for your consideration. Prior to and following that submission the City conducted an informal engagement process with interested parties. Information received prior to the submission of the document helped inform the proposed conditions under which certain changes could be made to allow the City's ASR project to better provide drought resilience for the City's utility customers. This letter provides additional clarifications to our proposal based on the remainder of the informal engagement process.

With this submittal, the City considers the informal engagement to be completed and that it is time for the formal process you have recommended to begin. Time is of the essence to the City as we seek to improve the position of the largest water utility in the state to weather a drought.

1. The source water considered eligible for Aquifer Maintenance Credits (AMCs) would be the metered water from the ASR processes required prior to transmission to City's Main Water Treatment Plant.
2. As to the distribution of AMCs, the City offers the following additional information/perspective:

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- Recharge credits are accumulated within Index Cells, not by well/s., All wells (recharge or production) in an Index Cell will be able to recover recharge credits if the permit modifications and pending applications are approved.
 - Distributing AMCs equally across City production wells reasonably represents where groundwater has been left in storage as a result of utilizing LAR diversions as a source of supply.
 - Distributing AMCs by Recharge Recovery Well (RRW) or by all wells does not change the quantity applied. Distribution to all wells will also provide the greatest degree of flexibility during periods of recharge credit recovery ensuring the opportunity to minimize any localized interference.
3. It is important to understand the basis for the selection of the initial and recurring losses:
- A review of field data, previous accounting reports, and the multiple rounds of groundwater modeling completed within Attachment J of the proposal all indicate that an initial loss rate of five percent mirrors the current physical recharge accounting practice over a range of aquifer levels and conditions.
 - Gradational losses of one, three, and five percent moving from west to east across the wellfield reflect the direction of groundwater flow and migration losses of recharge credits from the basin storage area.
 - i. Losses from the BSA on the west side of the EBWF are minimal where water slowly migrates from the west side of the EBWF to Index Cells in the center and eastern portions of the BSA.
 - ii. Losses from the BSA in the center of the wellfield are greater where larger volumes of water are injected resulting in a water level changes that create migration to down-gradient Index Cells and areas outside of the BSA.
 - iii. Losses from the BSA are highest on the east side of the wellfield, where water is lost to the Little Ark River and to the south outside of the BSA.
 - Figure 16 of the proposal illustrates a comparison of the actual physical recharge accounting process (the blue line) and the proposed AMC recharge accounting process using the five percent initial and one, three, and five percent gradational loss (the green line). As can be seen in the figure below, proposed AMC losses track very well with the physical recharge losses.
 - The difference in the total cumulative retention of credits in later years (73% for the physical accounting process compared to 85% utilizing the proposed AMC accounting) is due to full aquifer conditions and the substantial amount of recharge that has occurred at recharge basin RB-36.

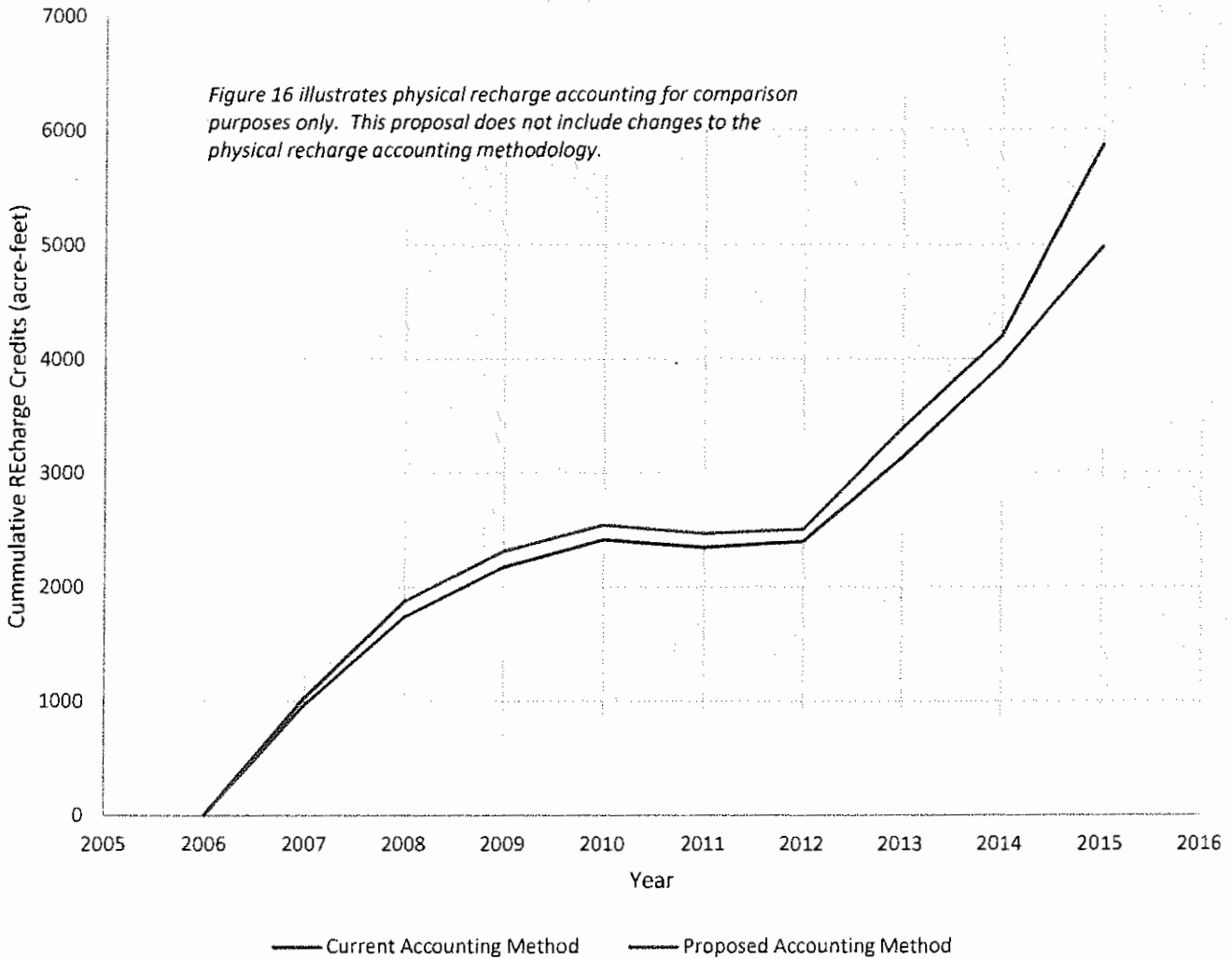
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Figure 16 - Current and Proposed Accounting Method Results Comparison



4. The constructed physical recharge capacity of ASR infrastructure and the capacity of the aquifer to accept recharge are different quantities:
 - At lowered water levels that facilitate physical recharge, the existing ASR system is capable of recharging 34.5 million gallons per day (MGD). Note that constructed physical recharge capacity exceeds the capacity of the Phase II ASR water treatment plant, which can produce up to 30 MGD of water for recharge.
 - Figure 14 located on page 3-12 of the proposal illustrates an example ASR Operations Plan reflective of elevated groundwater levels (2016), current ASR infrastructure, and water level conditions encountered during January of 2016.

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- Based on 2016 elevated groundwater levels, the current sustainable physical recharge capacity is only 1.18 MGD.
5. Regarding the role of ASR recharge basins during consideration of physical recharge capacity and AMCs:
 - The City has excluded all Phase I recharge infrastructure from the permit modification proposal which includes recharge basin RB-2. The City believes that the highest value of water recharged at Phase I facilities will continue to be mitigating the movement of the Burrton chloride plume rather than developing recharge credits for later utilization during prolonged drought.
 - The permit modification proposal is intended to facilitate continued management of the aquifer at near full conditions. During near full aquifer conditions, the recharge water sent to RB-36 experiences significant losses. It is not in the best interest of the City or other aquifer users to focus physical recharge activities on locations where the water recharged is not effectively retained within the BSA for beneficial use, and for this reason RB-36 is not included in the calculation of physical recharge capacity.
 6. The City has proposed utilizing an operations plan which relies upon static groundwater level measurements taken in January of each year:
 - The Kansas Geological Survey (KGS), United States Geological Survey (USGS), Division of Water Resources (DWR) and Groundwater Management District no. 2 (GMD2) standard practice is to use January groundwater levels as the baseline representation of true aquifer storage conditions.
 - ASR physical recharge activities occur during and after significant periods of heavy precipitation which limits the correlation between physical recharge capacity and seasonal irrigation or municipal drawdown.
 - An annual ASR operations plan based on January groundwater levels provides clear, consistent, and manageable tracking of the relationship between physical ASR recharge capacity and groundwater elevations.
 7. The physical recharge capacity of the ASR system is governed by several variables including a minimum feasible operating rate:
 - Please review page 3-7 of the proposal which indicates that the 5 MGD minimum for physical recharge capacity is considerate of the operational limits of the ASR system at lower flows which include pipeline residence times, well redevelopment frequency, pipeline flushing requirements, and water treatment plant startup and shutdown times.
 8. The City offers the following to clarify the purpose of the examples that are provided in the proposal and to augment them as necessary:

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- AMCs would be accumulated during periods when the recharge capacity of the aquifer and ASR system is less than the source water capture and process capacity of the ASR system.
- The examples on page 3-7 of the proposal were provided to illustrate a range of ASR water treatment plant operating rates, water level conditions, and physical recharge capacities.
- Please review section 3.5 of the permit modification proposal which contains the details of the operations plan and provides measurable assurance of the City's continued commitment to conducting physical recharge.
- Example 3 on page 3-7 was provided with the intent of including an instance where the ASR water treatment plant is running at 30 MGD under "Moderate Groundwater Levels" rather than "Lowered Groundwater Levels".
- To illustrate the City's commitment to conducting physical recharge during periods of lowered groundwater levels, the City would like to submit Example 4 below:

Example 4 – Lowered Groundwater Levels with Available Recharge Capacity
ASR Physical Recharge Capacity – 34.5 MGD
ASR WTP Running at 30 MGD – 30 MGD to physical recharge facilities
Max amount of ASR WTP water eligible for AMC – **0 MGD**

9. Regarding the conversion of existing production wells to recharge wells:
 - It is unreasonable to assume that the City should invest in conversion of additional conventional wells to recharge wells given that the City already has adequate infrastructure at existing recharge wells to conduct 34.5 MGD of recharge during lowered groundwater conditions.
 - The purpose of the proposed permit conditions is to facilitate management of the aquifer at near full conditions. During full aquifer conditions the City already has idle recharge well infrastructure due to lack of physical aquifer recharge capacity. Constructing additional idle recharge capacity would not provide a benefit to the City or other aquifer users
 - Future conversion of conventional wells to recharge wells will be based on the anticipated remaining lifespan of all existing wells and the projected benefits to the overall capacity of the ASR system.
10. For 2014 and 2015, a total of 1,132.19 acre-feet was diverted to town and could have been converted to AMCs. Any calculations related to years prior than 2014 would be highly speculative in nature.

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11. Currently the permits that cover the City's ASR program do not contain any limitation on the maximum number of recharge credits that can be accumulated. The City has voluntarily proposed a limitation on the combined total of physical recharge credits and AMCs based on the documented amount of aquifer storage available in 1993 during the original conception of the ASR project.
12. The City remains committed to maintaining the water quality of domestic wells within 660 feet of ASR physical recharge sites.
 - The City believes that a 660 feet distance is consistent with the original protections granted to domestic wells during development of the permit conditions for the ASR project.
 - No information has been presented indicating that ASR operations have caused any significant or detrimental changes in water quality that would warrant an extension of the 660 feet distance to the entire ASR Basin Storage Area.
13. The City remains committed to maintaining the water levels at domestic wells within 660 feet of ASR physical recharge sites.
 - The City believes that a 660 feet distance as is consistent with the protections previously granted to domestic wells during development of the permit conditions for the ASR project.
 - Note that the purpose of the proposed permit conditions is to facilitate improved management of the aquifer resulting in longer durations where the aquifer is at near full conditions.
14. The City agrees with the operating principle that native water rights should be utilized prior to recharge credits.

The City anticipates that you will continue to follow the process and schedule set out in your May 9, 2018 letter. Specifically utilization of an evidentiary hearing process following the schedule previously provided. That is:

- May 2018 – Update proposal and draft proposed approval documents.
- Early June 2018 – Pre-hearing conference, set public hearing date.
- June 2018 – Public informational meeting.
- Late July or early August 2018 – Public hearing including GMD2 bringing its recommendations.
- August 2018 – Close record.
- September/early October 2018 – Review record and decision.
- Potential review of record and decision by the Secretary of Agriculture.
- Potential review of record and decision by district court.

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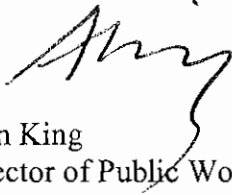
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The City remains committed to dedicating the time and resources necessary to allow this schedule to be maintained and asks that you require the same of all other parties involved.

Sincerely,



Alan King
Director of Public Works & Utilities

CC: Robert Layton, City Manager, City of Wichita
Joseph T. Pajor, City of Wichita Public Works & Utilities
Don Henry, City of Wichita Public Works & Utilities
Brian Meier, Burns & McDonnell
Paul McCormick, Burns & McDonnell
Daniel Clement, Burns & McDonnell
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