



Department of Public Works & Utilities

March 12, 2018

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

RE: City of Wichita ASR Permit Modification Proposal

Dear Mr. Barfield:

Since the implementation of the Integrated Local Water Supply Plan (ILWSP) in 1993 the City of Wichita (City) has been continuously reviewing ways to improve existing water supplies through infrastructure upgrades and integrated water resources management. In the spring of 2014 a comprehensive water supply planning evaluation was presented to the Wichita City Council. This planning included consideration of future projected demand, drought, current water resources, and enhancements to existing water supply. In April of 2014 the Wichita City Council chose to utilize a 1% exceedance probability drought for water resource planning for future water supplies. As a result of this decision, City staff initiated a series of studies, professional engineering evaluations, and permit reviews, to ensure that existing and planned water resources are adequate to meet the demands of a 1% drought. This included conducting a detailed review of the City's Aquifer Storage and Recovery (ASR) program and the ability of ASR to meet future water resources demands during prolonged drought. The findings of these studies concluded that:

1. During normal hydrologic periods the City has adequate water resources between existing major resources to meet existing and future projected demands (Cheney Reservoir and the Equus Beds Well Field).
2. During drought periods additional water resources beyond the City's existing base water rights of 40,000 acre-feet in Equus Beds Well Field will be needed to maintain the viability of Cheney Reservoir throughout prolonged drought.

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3. A detailed review of multiple regional and area water resources options indicated that ASR is currently the only practical water resource with available firm yield during a 1% drought.

The original implementation of ASR was envisioned and constructed to improve groundwater levels, sustain water quality, and to meet the future projected daily demands of the City. Over the last 20 years, daily demand growth from the City has flattened below the projections made during the early 1990's. The reduced rate of demand growth can be attributed to many factors including a modification to City's water rate structure, a shift to water conserving appliances and fixtures, and focused conservation programs established and financed by the City. These reductions in water demand have shifted the need for ASR recharge credits from a normal daily peak source of supply to a long-term resource only required during extended drought. The focus of the ASR program on drought mitigation allows for the same water quantity and water quality benefits as originally envisioned and results in the withdrawal of ASR recharge credits much less frequently. The focus of the ASR program on drought mitigation also means that recharge credits must be available for withdrawal throughout prolonged drought and maintained at quantities sufficient to meet the projected drought demands.

The City has extensively reviewed the permit conditions that currently regulate the operation of the ASR program. One of these permit conditions establishes the lowest vertical extent of the storage area, and restricts recharge credit recovery to durations when water levels are above a minimum index water level. The minimum index water levels for the City's ASR project basin storage area (BSA) are currently based on the lowest historic water levels recorded in January of 1993. The 1993 groundwater levels represent an average of approximately 92% full aquifer conditions within the BSA and roughly 88% full aquifer conditions within the City's Equus Beds Wellfield. It is now apparent that under the current limitation, the City would not have access to recharge credits during prolonged drought, despite relatively full aquifer conditions. This finding requires the City to seek a reasonable alternative minimum index level for the ASR project so that recharge credits are available throughout periods of long-term drought. Without modification the current minimum index water level elevations incentivize the City to utilize recharge credits earlier in a drought and more frequently throughout drought to ensure that they are utilized prior to becoming stranded below the minimum index level.

The State of Kansas Division of Water Resources (DWR) recently modified K.A.R. 5-12-1 in acknowledgement that additional flexibility was needed statewide for ASR projects with respect to the defined bottom of a basin storage area. To calculate a more appropriate minimum index level elevation for the City's ASR project, the City and the City's consultant Burns & McDonnell (BMcD) began by engaging Groundwater Management District No. 2 (GMD2) and DWR technical staff. Through this collaborative process several methods for evaluating alternative minimum index levels within the ASR BSA were appraised ranging from simple analytical methods to more detailed approaches utilizing groundwater modeling.

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This collective groundwater modeling process produced a set of modeling inputs, results, and figures that have been assembled into the attached proposal report to illustrate how the aquifer would respond during the demands of a 1% drought. From these groundwater modeling results the City is proposing for your consideration a new set of ASR Minimum Index Levels that will allow the City to operate the project with the required flexibility during prolonged drought while still maintaining the aquifer at an average of 80% full within the City's wellfield.

Another critical component of the City's ASR program is the ability to accrue recharge credits at a rate that builds sufficient quantities of recharge credits prior to the occurrence of drought. The City's continued approach to outcome based management of water resources has resulted in unprecedented groundwater level recoveries within the City of Wichita's EBWF. These groundwater level recoveries are a direct result of the City's utilization of alternate surface water resources, such that the aquifer within the EBWF has recovered to nearly 100% full pre-development conditions. The operational shift to the use of more surface water has resulted in a savings of over 400,000 AF of groundwater since 1993. Groundwater level recoveries have improved general groundwater availability, groundwater quality, and provide direct benefits to both the City and other groundwater users in the area.

The City has been reviewing how these groundwater level improvements impact long-term water resource operations and drought resiliency. It is clear that higher groundwater levels directly limit the physical recharge capacity of the City's Aquifer Storage and Recovery program. The ability to establish and recover ASR credits remains a critical component of the City's plan to meet the demand for water during an extended drought. Under existing ASR permit conditions, the City can enhance the physical recharge capacity of the ASR program by making an operational shift to utilization of more groundwater from the EBWF. Rather than lowering groundwater levels in the EBWF to create physical ASR recharge capacity and storage for the ASR program, an alternative recharge credit development strategy during full aquifer conditions is being proposed for your consideration. The City's long-standing history of responsible water resources management evidenced by the historic groundwater level recoveries merits an alternative procedure for establishing ASR recharge credits during periods of high groundwater levels. Without this alternative the City will not be able to continue with outcome based management of available water resources.

To ensure that stakeholders within ASR project area understand benefits to all groundwater users, the City has conducted numerous engagement meetings as documented below. In addition, the City would like to thank the Staff and Board of GMD2 who have provided valuable technical resources during the collaborative development of the proposed ASR permit modifications.

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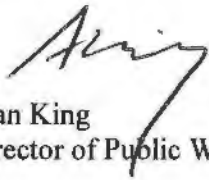
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| <i>Summary of Pre-Proposal Submission Public Engagement Activities</i> | |
|--|--------------------|
| Stakeholder Group | Meeting Date |
| Kansas Farm Bureau (KFB) | August 11, 2017 |
| Equus-Walnut Regional Advisory Committee (RAC) | September 21, 2017 |
| Regional Economic Area Partnership (REAP) | September 28, 2017 |
| Kansas Municipal Utilities (KMU) | October 4, 2017 |
| League of Kansas Municipalities (LKM) | October 6, 2017 |
| Kansas Rural Water Association (KRWA) | October 10, 2017 |
| Kansas Livestock Association (KLA) | October 30, 2017 |
| Sedgwick County Farm Bureau | November 9, 2017 |
| Harvey County Farm Bureau | November 20, 2017 |
| Sedgwick County Commission | January 29, 2018 |
| Harvey County Commission | January 29, 2018 |

The City's long-standing history of a responsible outcome based approach to management of water resources merits the consideration of ASR permit conditions that continue to improve and facilitate the sustainable operation of regional water resources. The proposed ASR permit modifications will serve all groundwater users within the area by enhancing the ability of the ASR program to meet each of the goals originally established for the project including sustainable groundwater levels, improved water quality, and supplemental water supply. Attached to this letter are lists of existing ASR permits and applications that will require modified permit conditions associated with the proposal. Please note that the City is not requesting any modification to permits associated with ASR Phase I infrastructure. The City appreciates your consideration of our proposal, and we look forward to working with you through the proposal review process.

Sincerely,



Alan King
Director of Public Works & Utilities

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ASR Phase II Permits Included for Consideration of Modified ASR Permit Conditions

| File No. | Infrastructure Name | Permit Description |
|----------|---------------------|--------------------------|
| 46714 | MR4 | Recharge & Recovery Well |
| 46715 | MR6 | Recharge & Recovery Well |
| 46176 | MR8 | Recharge & Recovery Well |
| 46717 | MR11 | Recharge & Recovery Well |
| 46718 | MR13 | Recharge & Recovery Well |
| 46719 | MR14 | Recharge & Recovery Well |
| 46720 | MR18 | Recharge & Recovery Well |
| 46721 | MR19 | Recharge & Recovery Well |
| 46722 | MR20 | Recharge & Recovery Well |
| 46723 | MR22 | Recharge & Recovery Well |
| 46724 | MR23 | Recharge & Recovery Well |
| 46725 | MR42 | Recharge & Recovery Well |
| 46726 | MR43 | Recharge & Recovery Well |
| 46727 | MR44 | Recharge & Recovery Well |
| 46728 | MR45 | Recharge & Recovery Well |
| 46729 | MR46 | Recharge & Recovery Well |
| 46730 | MR47 | Recharge & Recovery Well |
| 46731 | MR50 | Recharge & Recovery Well |
| 46732 | MR51 | Recharge & Recovery Well |
| 46733 | MR55 | Recharge & Recovery Well |
| 47178 | MR2 | Recharge & Recovery Well |
| 47179 | MR10 | Recharge & Recovery Well |
| 47180 | MR26 | Recharge & Recovery Well |
| 47181 | MR48 | Recharge & Recovery Well |
| 47448 | RR61 | Recharge & Recovery Well |
| 47449 | RR60 | Recharge & Recovery Well |
| 47450 | RR59 | Recharge & Recovery Well |
| 47451 | RR58 | Recharge & Recovery Well |
| 47452 | RR57 | Recharge & Recovery Well |
| 47453 | RR56 | Recharge & Recovery Well |

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| ASR Phase II Applications Included for Consideration of Modified ASR Permit Conditions | | |
|---|----------------------------|---------------------------|
| File No. | Infrastructure Name | Permit Description |
| 48704 | MW1 | Recharge & Recovery Well |
| 48705 | MW3 | Recharge & Recovery Well |
| 48706 | MW5 | Recharge & Recovery Well |
| 48707 | MW7 | Recharge & Recovery Well |
| 48708 | MW9 | Recharge & Recovery Well |
| 48709 | MW12 | Recharge & Recovery Well |
| 48710 | MW15 | Recharge & Recovery Well |
| 48711 | MW16 | Recharge & Recovery Well |
| 48712 | MW17 | Recharge & Recovery Well |
| 48713 | MW21 | Recharge & Recovery Well |
| 48714 | MW24 | Recharge & Recovery Well |
| 48715 | MW25 | Recharge & Recovery Well |
| 48716 | MW27 | Recharge & Recovery Well |
| 48717 | MW28 | Recharge & Recovery Well |
| 48718 | MW29 | Recharge & Recovery Well |
| 48719 | MW30 | Recharge & Recovery Well |
| 48720 | MW31 | Recharge & Recovery Well |
| 48721 | MW32 | Recharge & Recovery Well |
| 48722 | MW33 | Recharge & Recovery Well |
| 48723 | MW34 | Recharge & Recovery Well |
| 48724 | MW35 | Recharge & Recovery Well |
| 48725 | MW36 | Recharge & Recovery Well |
| 48726 | MW37 | Recharge & Recovery Well |
| 48727 | MW38 | Recharge & Recovery Well |
| 48728 | MW39 | Recharge & Recovery Well |
| 48729 | MW40 | Recharge & Recovery Well |
| 48730 | MW41 | Recharge & Recovery Well |
| 48731 | MW49 | Recharge & Recovery Well |
| 48732 | MW52 | Recharge & Recovery Well |
| 48733 | MW53 | Recharge & Recovery Well |

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| ASR Phase I Existing Permits <i>Excluded</i> from Consideration of Modified ASR Permit Conditions | | |
|---|---------------------|--------------------------|
| File No. | Infrastructure Name | Permit Description |
| 45567 | RRW3 | Recharge & Recovery Well |
| 45568 | RRW2 | Recharge & Recovery Well |
| 45569 | DW-1 | Bank Storage Well |
| 45570 | DW-2 | Bank Storage Well |
| 45571 | DW-3 | Bank Storage Well |
| 45576 | RRW1 | Recharge & Recovery Well |
| 46081 | RRW4 | Recharge & Recovery Well |
| 46578 | Phase 1 Intake | Surface Water Intake |
| 47440 | RR-5 | Recharge & Recovery Well |

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